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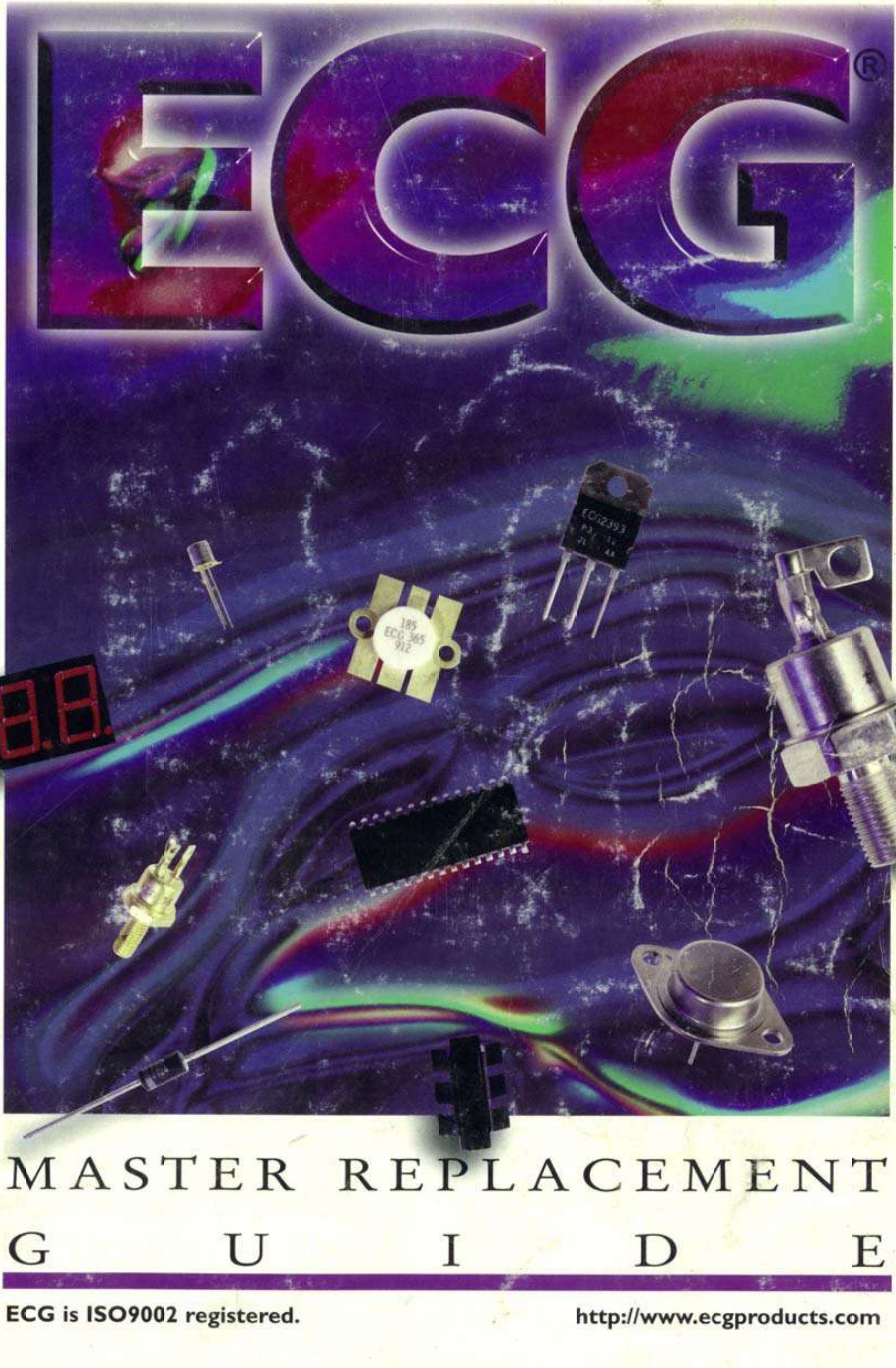
18TH EDITION



MASTER REPLACEMENT GUIDE

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ECG Semicon… e - ECG212T

The 18th Edition Semiconductor M… approximately **300,000 crosses** … product families. Product addition… and are identified by type number… beginning on page 1-5. Compleme… guides and numerous other refine… simplify choosing the best ECG re… application.

The ECG Semiconductor product l… of high quality devices which mee… Industry/Commercial MRO replace… Semiconductors can reduce frequ… replacement parts inventory. ECG… confidence and are available thro… electronic parts distributors.

…pages is intended to show …vel of performance. They …uipment design. We …ovide an exact replacement

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What's New !!

Following is a summary of What's New in Master Guide ECG212T.

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Leadless, (Surface Mount)

- General Purpose
- Ultra Fast

Industrial Rectifiers

- From 1200V, 12A to 1200V, 70A (DO-4 & DO-5)
- Halfwave 30A (TO-247)

Linear ICs

Computer Monitors

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- Horizontal/Vertical Deflection Controllers
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- Video Controllers
- Video Output Amps

TV/VCR

- Vertical Deflection
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- High Power w/Damper
- J-FETs
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How to Use the ECG Master Replacement Guide

Locating A Replacement Device

1. **Consult the Cross Reference section.** This section begins on page 2-1 and is arranged as follows:

   Parts Starting with a Number Are Listed Before Those Starting with a Letter.

   A. Parts starting with a number are listed in order of the numbers occurring before a dash or letter. Examples:

      000000FR2
      .25N6.8
      4-2020-03173
      4202003173

   B. Parts with a dash after a series of numbers are listed ahead of parts with a letter after the same series of numbers. Example:

      48-155001
      48S155001

   C. Parts starting with a letter are listed in alphabetical order of the letters occurring before a dash or number. Example:

      MPS-A20
      MPSA20

   D. Part numbers frequently misread are:

      1. Zero for letter O and vice versa.
      2. One for letter I or L or vice versa.
      3. The Greek letter mu (μ) may be found under either the letter M or U. Check both.

2. **Verify the replacement.** Your application may differ from the norm. It would be to your advantage to verify the replacement part for your particular application. Refer to the Product Index starting on page 1-5. This will direct you to the page number in the Master Guide where the technical data will be found. You may then verify physical dimensions and electrical characteristics.

3. **If a cross reference replacement is not found.** In the event that the cross reference section does not show a replacement, you should first consider the possibility of a no suffix or different suffix replacement. (i.e., 2SC281E is not found in the cross reference section. However, 2SC281 is found and is replaced by ECG123A). The next step is to refer to the Product Index and locate the data page for ECG123A, then compare parameters and physical data, as shown, with your requirements.

   If this procedure does not yield a useable replacement, or no similar types appear in the cross reference section, you may then use one of the following procedures for locating a replacement.

   A. When published information is available, compare the parameters of the device to be replaced with the listed parameters of comparable ECG devices.

   B. When published information is not available, follow the procedure for selecting devices for unlisted types found on pages 1-34 to 1-35.

4. **Dimensions for outline figures.** All dimensions are typical in inches with millimeter equivalent in parentheses.

Alphabetical Index

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74HC154	1-344	D15	IC-Digital Hi Speed CMOS 4-Line-to16-Line Decoder/Demultiplexer
74HC161	1-344	D8	IC-Digital Hi Speed CMOS 4-Bit Binary Counter Asynchronous Reset
74HC163	1-344	D8	IC-Digital Hi Speed CMOS 4-Bit Binary Counter Asynchronous Reset
74HC164	1-345	D6	IC-Digital Hi Speed CMOS 8-Bit Shift Register Serial In-Parallel Out
74HC165	1-345	D8	IC-Digital Hi Speed CMOS 8-Bit Parallel In-Serial Out Shift Register
74HC173	1-345	D8	IC-Digital Hi Speed CMOS Quad 3-State 'D' Register
74HC174	1-345	D8	IC-Digital Hi Speed CMOS Hex 'D Type' Flip-Flop with Clear
74HC175	1-345	D8	IC-Digital Hi Speed CMOS Quad 'D Type' Flip-Flop with Clear
74HC240	1-347	D12	IC-Digital Hi Speed CMOS Octal 3-State Driver
74HC244	1-347	D12	IC-Digital Hi Speed CMOS Octal 3-State Driver
74HC257	1-348	D8	IC-Digital Hi Speed CMOS Quad 2-Input Multiplexer 3-State
74HC259	1-348	D8	IC-Digital Hi Speed CMOS 8-Bit Addressable Latch
74HC273	1-348	D12	IC-Digital Hi Speed CMOS Octal 'D Type' Flip-Flop with Clear
74HC299	1-349	D12	IC-Digital Hi Speed CMOS 8-Bit Bidirectional Universal Shift/Storage Register with 3-State Output
74HC373	1-350	D12	IC-Digital Hi Speed CMOS Octal 3-State 'D' Latch
74HC374	1-350	D12	IC-Digital Hi Speed CMOS Octal 3-State 'D' Flip-Flop
74HC377	1-350	D12	IC-Digital Hi Speed CMOS Octal 'D Type' Flip-Flop with Enable
74HC390	1-350	D8	IC-Digital Hi Speed CMOS Dual Decade Counter
74HC393	1-350	D6	IC-Digital Hi Speed CMOS Dual 4-Bit Binary Counter
74HC573	1-350	D12	IC-Digital Hi Speed CMOS Octal 3-State Output
74HC574	1-350	D12	IC-Digital Hi Speed CMOS Octal 3-State 'D' Flip-Flop
74HC4020	1-352	D8	IC-Digital Hi Speed CMOS 14-Stage Binary/Ripple Counter
74HC4040	1-352	D8	IC-Digital Hi Speed CMOS 12-Stage Binary/Ripple Counter
74HC4053	1-352	D8	IC-Digital Hi Speed CMOS Analog Multiplexer/Demultiplexer
74HC4060	1-353	D8	IC-Digital Hi Speed CMOS 14-Stage Ripple/Carry Binary Counter/Divider and Oscillator
74HC4067	1-353	D15	IC-Digital Hi Speed CMOS 16-Channel Multiplexer/Demultiplexer
74HC40105	1-353	D8	IC-Digital Hi Speed CMOS 4-Bit x 16-Word FIFO Register
74HCT00	1-334	D6	IC-Digital Hi Speed CMOS Quad 2-Input NAND Gate
74HCT04	1-334	D6	IC-Digital Hi Speed CMOS Hex Inverter
74HCT08	1-334	D6	IC-Digital Hi Speed CMOS Quad 2-Input AND Gate
74HCT14	1-335	D6	IC-Digital Hi Speed CMOS Hex Schmitt Trigger
74HCT32	1-336	D6	IC-Digital Hi Speed CMOS Quad 2-Input OR Gate
74HCT138	1-343	D8	IC-Digital Hi Speed CMOS 1-of-8 Decoder/Demultiplexer
74HCT161	1-344	D8	IC-Digital Hi Speed CMOS 4-Bit Binary Counter Asynchronous Reset
74HCT163	1-344	D8	IC-Digital Hi Speed CMOS 4-Bit Binary Counter Synchronous Reset
74HCT174	1-345	D8	IC-Digital Hi Speed CMOS Hex 'D Type' Flip-Flop with Clear
74HCT240	1-347	D12	IC-Digital Hi Speed CMOS Octal 3-State Driver
74HCT244	1-347	D12	IC-Digital Hi Speed CMOS Octal 3-State Driver
74HCT273	1-348	D12	IC-Digital Hi Speed CMOS Octal 'D Type' Flip-Flop with Clear

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74LS283	1-348	D8	IC-TTL Lo Pwr Schottky 4-Bit Binary Adder
74LS290	1-348	D6	IC-TTL Lo Pwr Schottky Decade Counter
74LS293	1-349	D6	IC-TTL Lo Pwr Schottky 4-Bit Binary Counter
74LS295A	1-349	D8	IC-TTL Lo Pwr Schottky 4-Bit Bidirectional Universal Shift Register with 3-State Output
74LS298	1-349	D8	IC-TTL Lo Pwr Schottky Quad 2-Input Multiplexer with Output Latch
74LS299	1-349	D12	IC-TTL Lo Pwr Schottky 4-Bit Bidirectional Universal Shift/Storage Register with 3-State Output
74LS348	1-349	D8	IC-TTL Lo Pwr Schottky 8-Line-to-3-Line Priority Encoder
74LS352	1-349	D8	IC-TTL Lo Pwr Schottky Dual 4-Line-to-1-Line Data Selector/Multiplexer
74LS353	1-349	D8	IC-TTL Lo Pwr Schottky Dual 4-Line-to-1-Line Data Selector/Multiplexer with 3-State Outputs
74LS363	1-349	D12	IC-TTL Lo Pwr Schottky Octal 3-State 'D' Latch
74LS364	1-349	D12	IC-TTL Lo Pwr Schottky 3-State 'D' Flip-Flop
74LS365A	1-349	D8	IC-TTL Lo Pwr Schottky Hex 3-State Buffer Common Enable
74LS366A	1-349	D8	IC-TTL Lo Pwr Schottky Hex Bus Drivers Inverted Data 3-State Output Gated Enable Inputs
74LS367	1-349	D8	IC-TTL Lo Pwr Schottky Hex Buffer, 4-Bit and 2-Bit 3-State
74LS368	1-350	D8	IC-TTL Lo Pwr Schottky Hex Bus Drivers Inverted Data 3-State Output 4-and-2-Line Enable Inputs
74LS373	1-350	D12	IC-TTL Lo Pwr Schottky Octal 3-State 'D' Latch
74LS374	1-350	D12	IC-TTL Lo Pwr Schottky Octal 3-State Flip-Flops
74LS377	1-350	D12	IC-TTL Lo Pwr Schottky Octal 'D Type' Flip-Flop with Enable
74LS378	1-350	D8	IC-TTL Lo Pwr Schottky Hex 'D' Flip-Flop
74LS379	1-350	D8	IC-TTL Lo Pwr Schottky Quad 'D' Flip-Flop
74LS386	1-350	D6	IC-TTL Lo Pwr Schottky Quad Exclusive OR Gate
74LS390	1-350	D8	IC-TTL Lo Pwr Schottky Dual Decade Counter
74LS393	1-350	D6	IC-TTL Lo Pwr Schottky Dual 4-Bit Binary Counter
74LS395A	1-350	D8	IC-TTL Lo Pwr Schottky 4-Bit Universal Shift Register with 3-State Output
74LS398	1-350	D12	IC-TTL Lo Pwr Schottky Quad 2-Input Multiplexer with Storage-Complementary Outputs
74LS399	1-350	D8	IC-TTL Lo Pwr Schottky Quad 2-Input Multiplexer with Storage
74LS490	1-351	D8	IC-TTL Lo Pwr Schottky Dual Decade Counter
74LS540	1-351	D12	IC-TTL Lo Pwr Schottky Octal 3-State Inverting Buffer/Driver
74LS541	1-351	D12	IC-TTL Lo Pwr Schottky Octal 3-State Non-Inverting Buffer/Driver
74LS624	1-351	D6	IC-TTL Lo Pwr Schottky Voltage Controlled Oscillator
74LS625	1-351	D8	IC-TTL Lo Pwr Schottky Dual Voltage Controlled Oscillator with Complementary Outputs
74LS626	1-351	D8	IC-TTL Lo Pwr Schottky Dual Voltage Controlled Oscillator with Complementary Outputs and Enable Control
74LS627	1-351	D6	IC-TTL Lo Pwr Schottky Dual Voltage Controlled Oscillator
74LS629	1-351	D8	IC-TTL Lo Pwr Schottky Dual Voltage Controlled Oscillator with Enable
74LS640	1-351	D12	IC-TTL Lo Pwr Schottky Octal Inverting Bus Transceivers with 3-State Outputs
74LS641	1-351	D12	IC-TTL Lo Pwr Schottky Octal Non-Inverting Bus Transceivers with Open Collector Outputs
74LS642	1-351	D12	IC-TTL Lo Pwr Schottky Octal Inverting Bus Transceivers with Open Collector Outputs
74LS643	1-351	D12	IC-TTL Lo Pwr Schottky Octal Bus Transceivers with Inverting and Non-Inverting 3-State Outputs
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74LS670	1-352	D8	IC-TTL Lo Pwr Schottky 4-By-4 Register File Simultaneous Read/Write 3-State Output
74S00	1-334	D6	IC-TTL Ultra-Hi Speed Quad 2-Input NAND Gate
74S02	1-334	D6	IC-TTL Ultra-Hi Speed Quad 2-Input NOR Gate
74S03	1-334	D6	IC-TTL Ultra-Hi Speed Quad 2-Input NAND Gate with Open Collector Outputs
74S04	1-334	D6	IC-TTL Ultra-Hi Speed Hex Inverter
74S05	1-334	D6	IC-TTL Ultra-Hi Speed Hex Inverter with Open Collector Outputs
74S08	1-334	D6	IC-TTL Ultra-Hi Speed Quad 2-Input AND Gate
74S09	1-334	D6	IC-TTL Ultra-Hi Speed Quad 2-Input AND Gate with Open Collector Output - **Disc.**
74S10	1-334	D6	IC-TTL Ultra-Hi Speed Triple 3-Input NAND Gate
74S11	1-335	D6	IC-TTL Ultra-Hi Speed Triple 3-Input AND Gate
74S15	1-335	D6	IC-TTL Ultra-Hi Speed Triple 3-Input AND Gate with Open Collector Output - **Disc.**
74S20	1-335	D6	IC-TTL Ultra-Hi Speed Dual 4-Input NAND Gate - **Disc.**
74S22	1-335	D6	IC-TTL Ultra-Hi Speed Dual 4-Input NAND Gate with Open Collector Output
74S30	1-346	D6	IC-TTL Ultra-Hi Speed 8-Input NAND Gate - **Disc.**
74S40	1-346	D6	IC-TTL Ultra-Hi Speed Dual 4-Input NAND Buffer

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74S51	1-337	D6	IC-TTL Ultra-Hi Speed Expandable Dual 2-Wide 2-Input AND/OR Invert Gate
74S64	1-338	D6	IC-TTL Ultra-Hi Speed 4-2-3-2 Input AND/OR Input Gate - **Disc.**
74S65	1-338	D6	IC-TTL Ultra-Hi Speed 4-2-3-2 Input AND/OR Input Gate with Open Collector Output - **Disc.**
74S74	1-339	D6	IC-TTL Ultra-Hi Speed Dual 'D Type' Edge Triggered Flip-Flop
74S86	1-340	D6	IC-TTL Ultra-Hi Speed Quad 2-Input Exclusive OR Gate
74S112	1-342	D8	IC-TTL Ultra-Hi Speed Dual J-K Negative Edge Triggered Flip-Flop
74S113	1-342	D6	IC-TTL Ultra-Hi Speed Dual J-K Negative Edge Triggered Flip-Flop with Individual J, K Preset and Clock Inputs
74S114	1-342	D6	IC-TTL Ultra-Hi Speed Dual J-K Negative Edge Triggered Flip-Flop with Common Clock and Common Clear and Individual J, K and Preset Inputs
74S124	1-342	D8	IC-TTL Ultra-Hi Speed Dual Voltage Controlled Oscillator
74S133	1-343	D8	IC-TTL Ultra-Hi Speed 13-Input NAND Gate
74S134	1-343	D8	IC-TTL Ultra-Hi Speed 12-Input NAND Gate - **Disc.**
74S138	1-343	D8	IC-TTL Ultra-Hi Speed 3-Line-to-8-Line Decoder/Demultiplexer
74S140	1-343	D6	IC-TTL Ultra-Hi Speed Dual 4-Input NAND Line Driver
74S151	1-344	D8	IC-TTL Ultra-Hi Speed 8-Input Data Selector/Multiplexer with Compl Outputs - **Disc.**
74S153	1-344	D8	IC-TTL Ultra-Hi Speed Dual 4-Line-to-1-Line Data Selector/Multiplexer - **Disc.**
74S157	1-344	D8	IC-TTL Ultra-Hi Speed Quad 2-Line-to-1-Line Data Selector/Multiplexer with True Data Outputs - **Disc.**
74S158	1-344	D8	IC-TTL Ultra-Hi Speed Quad 2-Line-to-1-Line Data Selector/Multiplexer with Inverted Data Outputs - **Disc.**
74S174	1-345	D8	IC-TTL Ultra-Hi Speed Hex 'D Type' Flip-Flop with Clear
74S175	1-345	D8	IC-TTL Ultra-Hi Speed Quad 'D Type' Flip-Flop with Clear
74S181	1-346	D15	IC-TTL Ultra-Hi Speed Arithmetic Logic Units/Function Generator
74S188	1-362	D8	IC-TTL Schottky 256 Bit PROM, Open Collector Output
74S194	1-346	D8	IC-TTL Ultra-Hi Speed 4-Bit Bidirectional Universal Shift Register
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74S258	1-348	D8	IC-TTL Ultra-Hi Speed Quad 2-Line-to-1-Line Data Selector/Multiplexer
74S287	1-362	D8	IC-TTL Schottky 1K PROM, 3-State Output
74S288	1-362	D8	IC-TTL Schottky 256 Bit PROM, 3-State Output
74S387	1-362	D8	IC-TTL Schottky 1K PROM, Open Collector Output
74S454	1-362	D10	IC-TTL Schottky 8K PROM, 3-State Output
74S472	1-362	D12	IC-TTL Schottky 4K PROM, 3-State Output
74S473	1-362	D12	IC-TTL Schottky 4K PROM, Open Collector Out - **Disc.**
74S474	1-362	D15	IC-TTL Schottky 4K PROM, 3-State Output
74S475	1-362	D15	IC-TTL Schottky 4K PROM, Open Collect Output - **Disc.**
74S478	1-362	D15	IC-TTL Schottky 8K PROM, 3-State Output
74S479	1-362	D15	IC-TTL Schottky 8K PROM, Open Collector Output
74S570	1-362	D8	IC-TTL Schottky 2K PROM, Open Collector Output
74S571	1-363	D8	IC-TTL Schottky 2K PROM, 3-State Output - **Disc.**
74S572	1-363	D10	IC-TTL Schottky 4K PROM, Open Collector Output
74S573	1-363	D10	IC-TTL Schottky 4K PROM, 3-State Output
75	1-41	T30	T-NPN, Si, Hi Pwr Amp, Sw
76	1-41	T50	T-NPN, Si, CATV Broadband Amp
76MP	1-41	T50	T-NPN, Si, Matched Pair of ECG76
77	1-41	T6	T-NPN, Si, CATV Broadband Amp
78	1-41	T39	T-NPN, Si, RF PO, CB, 27 MHz, 3 W
79	1-41	T39	T-NPN, Si, RF PO, 27MHz, 9 W
80C95	1-353	D8	IC-CMOS, Hex 3-State Buffer with Common Enable
80C96	1-353	D8	IC-CMOS, Hex 3-State Inverter with Common Enable
80C97	1-353	D8	IC-CMOS, Hex Non-Inverting Buffer
81	1-41	T12	T-NPN, Si, Dual VHF Amp, Sw - **Disc.**
82	1-41	T12	T-PNP, Si, Dual VHF Amp, Sw
85	1-41	T16	T-NPN, Si, RF, IF, Audio Amp, Sw
86	1-41	T28	T-NPN, Si, Hi Gain Amp, DC Reg
87	1-41	T28	T-NPN, Si, Hi Pwr Audio Amp, Sw
87MP	1-41	T28	T-NPN, Si, Matched Pair of ECG87
88	1-41	T28	T-PNP, Si, Hi Pwr Audio Amp, Sw - **Disc.**
88MP	1-41	T28	T-PNP, Si, Matched Pair of ECG88
88MCP	1-41	T28	T- Matched Compl Pair of ECG87 and ECG88 - **Disc.**
89	1-41	T28	T-NPN, Si, Horiz Output with Damper Diode
90	1-42	T18	T-NPN, Si, HV Hi Gain Amp
91	1-42	T18	T-PNP, Si, HV Hi Gain Amp
92	1-42	T44-1	T-NPN, Si, Hi Pwr AF PO
93	1-42	T44-1	T-PNP, Si, Hi Pwr AF PO
93L08	1-355	T15	IC-TTL Lo Pwr Dual 4-Bit Latch - **Disc.**
93L16	1-355	T8	IC-TTL Lo Pwr Sync 4-Bit Binary Counter - **Disc.**
93MCP	1-42	T44-1	T- Matched Compl Pair of ECG92 and ECG93
94	1-42	T28	T-NPN, Si, HV Gen Purp Amp
95	1-42	T31	T-NPN, Si, HV Amp, Sw, Isolated Stud - **Disc.**
96	1-42	T31	T-NPN, Si, Pwr Amp, Isolated Stud
96L02	1-355	T8	IC-TTL Lo Pwr Dual Retriggerable/Resettable Monostable Multivibrator
96LS02	1-355	T8	IC-TTL Lo Pwr Schottky Dual Retriggerable/Resettable Monostable Multivibrator - **Disc.**

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97	1-42	T28	T-NPN, Si, Pwr Darl HV Amp, Fast Sw
98	1-42	T28	T-NPN, Si, Pwr Darl HV Amp, Fast Sw
99	1-42	T28	T-NPN, Si, Pwr Darl HV Amp, Fast Sw
100	1-42	T5	T-PNP, GE, RF/IF Amp, Osc, Mxr, AM
101	1-42	T5	T-NPN, GE, RF/IF Amp, Osc, Mxr, AM
102	1-42	T5	T-PNP, GE, AF Preamp, Dr, PO
102A	1-42	T1	T-PNP, Ge, AF Preamp, Dr, PO
103	1-42	T5	T-NPN, Ge, AF Preamp, Dr, PO
103A	1-42	T1	T-NPN, Ge, AF Preamp, Dr, PO
104	1-42	T28	T-PNP, Ge, AF PO - **Disc.**
104MP	1-42	T28	T-PNP, Ge, Matched Pair of ECG104
105	1-42	T29	T-PNP, Ge, AF PO
106	1-42	T2	T-PNP, Si, RF/IF Amp, OSC, Mxr, AM/FM
107	1-42	T16	T-NPN, Si, RF/IF Amp, OSC, Mxr, UHF/VHF
108	1-42	T16	T-NPN, Si, RF/IF Vid Amp, Osc, Mxr, UHF/VHF
109	1-109	Z2	D-Ge, Gen Purp, 100 PRV
110A	1-109	Z2	D-Ge, Gen Purp, 40 PRV
110MP	1-109	Z2	D-Ge, Matched Pair - **Disc.**
112	1-109	Z4	D-Si, UHF TV, Mxr
113A	1-109	Z15	D-Si, Dual, Horiz AFC, Common Cathode
114	1-109	Z12	D-Se, Dual, Horiz AFC, Series Connected - **Disc.**
115	1-109	Z12	D-Se, Dual, Horiz AFC, Common Anode
116	1-109	Z3	R-Si, 600 PRV, 1.0 Amp
117A	—	Z10	R-Si, 1000 PRV, 1.0 Amp - **Disc.**
118	1-107	H38	R-Se, TV HV, Foc, 7.5 k PRV - **Disc.**
119	1-107	H39	R-Se, TV Boost, 560 PRV
120	1-109	Z17	R-Se, TV Converge, 18 PRV
121	1-42	T28	T-PNP, Ge, AF PO
121MP	1-42	T28	T-PNP, Ge, Matched pair of ECG121
123	1-42	T6	T-NPN, Si, AF Preamp, Dr, Vid Amp, Sync Sep
123A	1-42	T2	T-NPN, Si, AF/RF Amp
123AP	1-42	T16	T-NPN, Si, AF/RF Amp, CB Dr
124	1-42	T25	T-NPN, Si, HV AF PO
125	1-109	Z3	R-Si, 1000 PRV, 2.5A
126A	1-43	T2	T-PNP, Ge, RF/IF Amp, Osc, Mixer
127	1-43	T28	T-PNP, Ge, Defl Amp, AF PO
128	1-43	T6	T-NPN, Si, AF Preamp, Dr, Vid Amp
128P	1-43	T17	T-NPN, Si, Gen Purp Amp, Sw
129	1-43	T6	T-PNP, Si, AF Preamp, Dr, Vid Amp
129MCP	1-43	T6	T-Matched Compl Pairs of ECG128 and ECG129
129P	1-43	T17	T-PNP, Si, Gen Purp Amp, Sw
130	1-43	T28	T-NPN, Si, AF PO
130MP	1-43	T28	T-NPN, Si, Matched Pair of ECG130
131	1-43	T27	T-PNP, Ge, AF PO
131MP	1-43	T27	T-PNP, Ge, Matched Pair of ECG131
134A	1-114	Z3A	ZD-3.6 V, 1W (2/Pkg)
135A	1-114	Z3A	ZD-5.1 V, 1W (2/Pkg)
136A	1-114	Z3A	ZD-5.6 V, 1W (2/Pkg)
137A	1-114	Z3A	ZD-6.2 V, 1W (2/Pkg)
138A	1-114	Z3A	ZD-7.5 V, 1W (2/Pkg)
139A	1-114	Z3A	ZD-9.1 V, 1W (2/Pkg)
140A	1-114	Z3A	ZD-10.0 V, 1W (2/Pkg)
141A	1-114	Z3A	ZD-11.5 V, 1W (2/Pkg)
142A	1-114	Z3A	ZD-12.0 V, 1W (2/Pkg)
143A	1-114	Z3A	ZD-13.0 V, 1W (2/Pkg)
144A	1-114	Z3A	ZD-14.0 V, 1W (2/Pkg)
145A	1-114	Z3A	ZD-15.0 V, 1W (2/Pkg)
146A	1-114	Z3A	ZD-27.0 V, 1W (2/Pkg)
147A	1-114	Z3A	ZD-33.0 V, 1W (2/Pkg)
148A	1-114	Z3A	ZD-55.0 V, 1W (2/Pkg)
149A	1-114	Z3A	ZD-62.0 V, 1W (2/Pkg)
150A	1-114	Z3A	ZD-82.0 V, 1W (2/Pkg)
151A	1-114	Z3A	ZD-110.0 V, 1W (2/Pkg)
152	1-43	T41	T-NPN, Si, AF PO
152MP	1-43	T41	T-NPN, Si, Matched Pair of ECG152
153	1-43	T41	T-PNP, Si, AF PO
153MCP	1-43	T41	T-Matched Pair of ECG152 and ECG153
154	1-43	T6	T-NPN, Si, Vid Output
155	1-43	T27	T-NPN, Ge, AF PO
156	1-109	Z6	R-Si, 1000 PRV, 3 A
157	1-43	T45	T-NPN, Si, HV AF PO
158	1-43	T-1	T-PNP, Ge, AF PO
159	1-43	T16	T-PNP, Si, AF Preamp, Dr
159MCP	1-43	T16	T-Matched Compl Pair of ECG123AP and ECG159
160	1-43	T4	T-PNP, Ge, RF/IF Amp, Osc, Mxr, AM/FM
161	1-43	T4	T-NPN, Si, Vid IF Amp
162	1-43	T28	T-NPN, Si, Vert Defl
163A	1-43	T28	T-NPN, Si, Horiz Defl
164	1-43	T28	T-NPN, Si, Vert Defl
165	1-43	T28	T-NPN, Si, Horiz Defl
166	1-116	Z23	R-Si, Bridge, 100 PRV, 2A
167	1-116	Z23	R-Si, Bridge, 200 PRV, 2A
168	1-116	Z23	R-Si, Bridge, 400 PRV, 2A
169	1-116	Z23	R-Si, Bridge, 600 PRV, 2A
170	1-116	Z23	R-Si, Bridge, 1000 PRV, 2A
171	—	T36	T-NPN, Si, AF/Vid Amp - **Disc.**

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172A	1-43	T16	T-NPN, Si, Darlington Amp, AF, Sw
175	1-43	T25	T-NPN, Si, AF PO
176	1-43	T6	T-PNP, Ge, AF PO
177	1-109	Z4	D-Si, Gen Purp Det, 200 PRV
178MP	1-109	Z5	D-Si, AFC, AFT, 50 PRV
179	1-44	T28	T-PNP, Ge, AF Amp - **Disc.**
179MP	1-44	T28	T-PNP, Ge, Matched Pair of ECG179
180	1-44	T28	T-PNP, Si, AF Amp
180MCP	1-44	T28	T-Matched Compl Pair of ECG181 and ECG180
181	1-44	T28	T-NPN, Si, AF Amp
181MP	1-44	T28	T-NPN, Si, Matched pair of ECG181
182	—	T46	T-NPN, Si, AF PO - **Disc.**
183	—	T46	T-PNP, Si, AF PO - **Disc.**
184	1-44	T45	T-NPN, Si, AF PO
184MP	1-44	T45	T-NPN, Si, Matched Pair of ECG184
185	1-44	T45	T-PNP, Si, AF PO
185MCP	1-44	T45	T-Matched Compl Pair of ECG184 and ECG185
186	1-44	T38	T-NPN, Si, AF PO
186A	1-44	T39	T-NPN, Si, AF PO/CB Dr
187	1-44	T38	T-PNP, Si, AF PO
187A	1-44	T39	T-PNP, Si, AF PO
188	1-44	T36	T-NPN, Si, AF Dr, PO - **Disc.**
189	1-44	T36	T-PNP, Si, AF Dr, PO - **Disc.**
190	1-44	T36	T-NPN, Si, AF PO, Horiz Dr
191	1-44	T36	T-NPN, Si, HV AF/Vid Amp - **Disc.**
192	—	T21	T-NPN, Si, AF PO - **Disc.**
192A	—	T22	T-NPN, Si, AF PO - **Disc.**
193	1-44	T21	T-PNP, Si, AF PO - **Disc.**
193A	1-44	T22	T-PNP, Si, AF PO
194	1-44	T16	T-NPN, Si, HV, Gen Purp Amp
195A	1-44	T6	T-NPN, Si, CB RF PO/Dr
196	1-44	T41	T-NPN, Si, AF PO
197	1-44	T41	T-PNP, Si, AF PO
198	1-44	T41	T-NPN, Si, HV AF, Sw
199	1-44	T16	T-NPN, Si, Lo Noise, Hi Gain Preamp
201	1-376	AS34	Connector for Cartridge LED/Lamp Indicator (2/Pkg)
202	—	—	Circuit Breaker, 1A - **Disc.**
206	—	—	Pilot Lamp Assembly, 6 V - **Disc.**
207	—	—	Pilot Lamp Assembly, 120 V - **Disc.**
209	1-376	AS9	Standard Socket for TO-3 Package (2/Pkg)
210	—	T38	T-NPN, Si, AF PO, Sw - **Disc.**
211	1-45	T38	T-PNP, Si, AF PO, Sw
213	1-45	T29	T-PNP, Ge, Hi Current, Pwr - **Disc.**
214	1-45	T48-1	T-NPN, Darl 70 V, 10 A, hfe=2000 (min)
215	1-45	T48-1	T-NPN, Darl 110 V, 8 A, hfe=1500 (min)
216	1-45	T17	T-NPN, Si, Hi Speed Sw, Core Driver
217	1-45	T17	T-PNP, Si, Hi Speed Sw, Amp
218	1-45	T25	T-PNP, Si, AF PO
219	1-45	T28	T-PNP, Si, AF PO, Sw
219MCP	1-45	T28	T-Matched Compl Pair of ECG130 and ECG 219
220	1-65	T4	MOSFET-N-Ch, VHF Amp/Mix
221	1-65	T4	MOSFET-N-Ch, VHF Amp/Mix
222	1-65	T4	MOSFET-N-Ch, VHF Amp/Mix
224	1-45	T23	T-NPN, Si, RF PO, 27 MHz
225	1-45	T23	T-NPN, Si, AF, Vid, Sw
226	1-45	T26	T-PNP, Ge, AF PO
226MP	1-45	T26	T-PNP, Ge, Matched Pair of ECG226
227	1-45	T17	T-NPN, Si, HV Amp, Video Out
228A	—	T39	T-NPN, Si, Hi Speed Sw, AF/Vid PO - **Disc.**
229	1-46	T16	T-NPN, Si, VHF Osc/Mxr, IF Amp
230	1-128	Z42	SCR-Horiz Defl, Switching - **Disc.**
231	1-128	Z42	SCR-Horiz Defl, Switching
232	1-45	T16	T-NPN, Si, Darl Amp
233	1-45	T16	T-NPN, Si, Final Vid IF Amp
234	1-45	T16	T-PNP, Si, AF Preamp-Lo Noise Hi Gain
235	1-45	T41	T-NPN, Si, VHF PO (5.0 W at 50 MHz)
236	1-45	T41	T-NPN, Si, VHF PO (13 W at 50 MHz)
237	—	T24	T-NPN, Si, VHF PO (3 W at 27 MHz) - **Disc.**
238	1-45	T28	T-NPN, Si, Horiz Defl
239	1-137	S8	SCR-Switching, TV Vert Osc
240	1-45	T36	T-PNP, Si, HV AF Amp
241	1-45	T41	T-NPN, Si, AF PO, Sw
242	1-45	T41	T-PNP, Si, AF PO, Sw
243	1-45	T28	T-NPN, Si, Darl 80 V, 8 A, hfe = 3000 (typ)
244	1-46	T28	T-PNP, Si, Darl 80 V, 8 A, hfe = 3000 (typ)
245	1-46	T28	T-NPN, Si, Darl 80 V, 10 A, hfe = 4000 (typ)
246	1-46	T28	T-PNP, Si, Darl 80 V, 10 A, hfe = 4000 (typ)
247	1-46	T28	T-NPN, Si, Darl 100 V, 12 A, hfe = 3500 (typ)
248	1-46	T28	T-PNP, Si, Darl 100 V, 12 A, hfe = 3500 (typ)
249	1-46	T28	T-NPN, Si, Darl 100 V, 16 A, hfe = 3500 (typ)
250	1-46	T28	T-PNP, Si, Darl 100 V, 16 A, hfe = 3500 (typ)
251	1-46	T28	T-NPN, Si, Darl 100 V, 20 A, hfe = 2400 (typ)
252	1-46	T28	T-PNP, Si, Darl 100 V, 20 A, hfe = 2400 (typ)
253	1-46	T45	T-NPN, Si, Darl 80 V, 4 A, hfe = 2000 (typ)
254	1-46	T45	T-PNP, Si, Darl 80 V, 4 A, hfe = 2000 (typ)
255	1-46	T17	T-NPN, Si-Horiz Driver, Amp, Sw
256	1-46	T48	T-NPN, Si, Darl 450 V, 20 A, hfe = 50 (min)
257	—	T46	T-NPN, Si, Darl 80 V, 5 A, hfe = 750 (min) - **Disc.**
258	1-46	T46	T-PNP, Si, Darl 80 V, 5 A, hfe = 750 (min) - **Disc.**
259	—	T46	T-NPN, Si, Darl 100 V, 8 A, hfe = 2500 (typ) - **Disc.**
260	—	T46	T-PNP, Si, Darl 100 V, 8 A, hfe = 2500 (typ) - **Disc.**

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ECG No.	Page No.	Fig. No.	Description
261	1-46	T41	T-NPN, Si, Darl 100 V, 8 A, hfe = 1000 (min)
262	1-46	T41	T-PNP, Si, Darl 100 V, 8 A, hfe = 1000 (min)
263	1-46	T41	T-NPN, Si, Darl 100 V, 10 A, hfe = 1000 (min)
264	1-46	T41	T-PNP, Si, Darl 100 V, 10 A, hfe = 1000 (min)
265	1-46	T38	T-NPN, Si, Darl 50 V, 500 mA, hfe = 10,000 (min)
266	1-46	T38	T-NPN, Si, Darl 50 V, 500 mA, hfe = 40,000 (min)
267	—	T38	T-NPN, Si, Darl 30 V, 500 mA, hfe = 90,000 (min)- **Disc.**
268	1-46	T38	T-NPN, Si, Darl 50 V, 2 A, hfe = 1000 (min)
269	1-46	T38	T-PNP, Si, Darl 50 V, 2 A, hfe = 1000 (min)
270	1-46	T48	T-NPN, Darl 100 V, 10 A, hfe = 1000 (min)
271	1-46	T48	T-PNP, Darl 100 V, 10 A, hfe = 1000 (min)
272	1-46	T36	T-NPN, Darl 40 V, 2 A, hfe = 25,000 (min) - **Disc.**
273	1-46	T36	T-PNP, Darl 40 V, 2 A, hfe = 25,000 (min) - **Disc.**
274	1-46	T25	T-NPN, Darl 80 V, 4 A, hfe = 3000 (typ)
275	1-47	T25	T-PNP, Darl 80 V, 4 A, hfe = 3000 (typ)
276	1-128	Z44	SCR-Gate Controlled Switch, TV Horiz Output
278	1-47	T6	T-NPN, Si, Broadband RF Amp, CATV/MATV/COMM
279A	1-128	Z37	SCR-Gate Controlled Switch, Horiz Output
280	1-47	T28	T-NPN, Si, AF PO, Pd 100 W - **Disc.**
280MP	1-47	T28	T-NPN, Si, Matched Pair of ECG280 - **Disc.**
281	1-47	T28	T-PNP, Si, AF PO, Pd 100 W - **Disc.**
281MCP	1-47	T28	T-Matched Compl Pair of ECG280 and ECG281 - **Disc.**
283	1-47	T28	T-NPN, Si, HV-Hi Current Sw and TV Horiz Output
284	1-47	T28	T-NPN, Si, AF PO, Pd 150 W
284MP	1-47	T28	T-NPN, Si, Matched Pair of ECG 284
285	1-47	T28	T-PNP, Si, AF PO, Pd 150 W
285MCP	1-47	T28	T-Matched Compl Pair of ECG284 and ECG285
286	—	T25	T-NPN, Si, PO/Sw, TV Horiz Output - **Disc.**
287	1-47	T16	T-NPN, Si, HV Gen Purp Amp, Ft = 50 MHz
288	1-47	T16	T-PNP, Si, HV Gen Purp Amp, Ft = 50 MHz
289A	1-47	T16	T-NPN, Si, AF PO, Pd 0.6 W
289AMP	1-47	T16	T-NPN, Si, Matched Pair of ECG289A
290A	1-47	T16	T-PNP, Si, AF PO, Pd 0.6 W
290AMCP	1-47	T16	T-Matched Compl Pair of ECG289A and ECG290A
291	1-47	T41	T-NPN, Si, PO and Sw, Pd 40 W
292	1-47	T41	T-PNP, Si, PO and Sw, Pd 40 W
292MCP	1-47	T41	T-Matched Compl Pair of ECG291 and ECG292
293	1-47	T20	T-NPN, Si, AF PO, Pd 0.75 W
293MP	1-47	T20	T-NPN, Si, Matched Pair of ECG293
294	1-47	T20	T-PNP, Si, AF PO, Pd 0.6 W
295	1-47	T45	T-NPN, Si, RF PO, Dr, CB
297	1-47	T20	T-NPN, Si, AF PO, Dr, Pd 0.75 W
297MP	1-47	T20	T-NPN, Si, Matched Pair of ECG297
298	1-47	T20	T-PNP, Si, AF PO, Dr, Pd 0.75 W
300	1-47	T38	T-NPN, Si, AF PO, Pd 7 W
300MP	1-47	T38	T-NPN, Si, Matched Pair of ECG300
302	1-47	T37	T-NPN, Si, RF PO, Dr, Pd 8 W, CB
303	1-371	AC1	Single Application Heat Sink Compound - **Disc.**
304A	—	—	Kit-24 Most Popular ECG Transistors - **Disc.**
306	1-47	T37	T-NPN, Si, RF PO, Dr, Pd 8 W, CB
307	—	T38	T-NPN, Si, AF PO, Pd 7 W - **Disc.**
308	1-129	Z42	Integrated Thyristor and Rectifier (ITR)-TV Horiz Defl Commutating, Sw
308P	1-129	Z41	T-NPN, Integrated Thyristor and Rectifier (ITR)-TV Horiz Defl Commutating, Sw
309K	1-184	L11	IC-Regulator, 5 V, 1 Amp
310	1-129	Z42	T-NPN, Integrated Thyristor and Rectifier (ITR)-TV Horiz Defl Trace, Sw
310P	1-129	Z41	T-NPN, Integrated Thyristor and Rectifier (ITR)-TV Horiz Defl Trace, Sw
311	1-47	T6	T-NPN, VHF/UHF Dr/Amp/PO, Pd 5 W
312	1-65	T16	J-FET-N-Ch, VHF Amp/Mix
313	1-48	T49	T-NPN, Si, VHF Tuner Amp
314	1-125	Z43	SCR-Si, P-Gate, Pwr Regulator/Sw
315	1-48	T19	T-NPN, Si, RF Dr, CB
316	1-48	T4	T-NPN, Si, Lo Noise, UHF Amp
317	1-48	T58	T-NPN, Si, Final RF PO
318	1-48	T58	T-NPN, Si, Final RF PO
319P	1-48	T16	T-NPN, Si, AGC Cont, TV IF Amp
320	1-48	T55	T-NPN, Si, Final RF PO
320F	1-48	T57	T-NPN, Si, RF PO, VHF Marine & Mobile, 175 MHz, 40 W
321	1-48	T25	T-NPN, Si, Horiz Defl
323	1-48	T6	T-PNP, Si, AF Pwr Amp
324	1-48	T6	T-NPN, Si, AF Pwr Amp
325	1-48	T53	T-NPN, Si, RF Pwr Amp
326	1-65	T16	J-FET-P-Ch, Gen Purp AF Amp - **Disc.**
● 326A	1-65	T16	J-FET-P-Ch, Gen Purp Sw Amp
327	1-48	T28	T-NPN, Si, Pwr Amp, Sw
328	1-48	T28	T-NPN, Si, Pwr Amp, Sw
329	1-48	T6	T-NPN, Si, RF Pwr Amp, CB
330	1-48	T29	T-PNP, Ge, Fast Pwr Sw
330W	1-48	T29	ECG330 with Welded-on Wire Leads - **Disc.**
331	1-48	T41	T-NPN, Si, AF PO, Reg, Sw
331MP	1-48	T41	T-NPN, Si, Matched Pair of ECG331
332	1-48	T41	T-PNP, Si, AF PO, Reg, Sw
332MCP	1-48	T41	T-Matched Compl Pair of ECG331 and ECG332
333	1-48	T67	T-NPN, Si, RF PO, 14-30 MHz, 60 W
334	1-48	T53	T-NPN, Si, RF PO, 14-30 MHz, 60 W

ECG No.	Page No.	Fig. No.	Description
335	1-48	T58	T-NPN, Si, RF PO, 14-30 MHz, 80 W
336	1-48	T54	T-NPN, Si, RF PO, 14-30 MHz, 80 W
337	1-48	T53	T-NPN, Si, RF Dr, 27-50 MHz, 8 W
338	1-48	T53	T-NPN, Si, RF Dr & Output, 27-50 MHz, 20 W
338F	1-49	T57	T-NPN, Si, RF Dr & PO, FM, SSB, 50 MHz, 20 W
339	1-49	T54	T-NPN, Si, RF PO, 27-50 MHz, 40 W
340	1-49	T20	T-NPN, Si, RF PO, Dr, 136-174 MHz, 600 mW
341	1-49	T7	T-NPN, Si, RF PO, 136-174 MHz, 4 W
342	1-49	T42	T-NPN, Si, RF PO, 136-174 MHz, 7 W
343	1-49	T42	T-NPN, Si, RF PO, 136-174 MHz, 14 W
344	1-49	T59	T-NPN, Si, RF PO, 136-174 MHz, 30 W
345	1-49	T53	T-NPN, Si, RF PO, 136-174 MHz, 30 W
346	1-49	T6	T-NPN, Si, RF Dr & Predriver, 136-174 MHz, 1 W
347	1-49	T51	T-NPN, Si, RF PO, 136-174 MHz, 3 W - **Disc.**
348	1-49	T53	T-NPN, Si, RF PO, 136-174 MHz, 4 W
349	1-49	T63	T-NPN, Si, RF PO, 136-174 MHz, 10 W
350	1-49	T53	T-NPN, Si, RF PO, 136-174 MHz, 15 W
350F	1-49	T57	T-NPN, Si, RF Pwr Marine & Mobile, 175 MHz, 15 W
351	1-49	T53	T-NPN, Si, RF PO, 136-174 MHz, 25 W
352	1-49	T60	T-NPN, Si, RF PO, 136-174 MHz, 80 W
353	1-49	T57	T-PNP, Si, RF PO, 136-174 MHz, 4 W
354	1-49	T57	T-PNP, Si, RF PO, 136-174 MHz, 15 W - **Disc.**
355	1-49	T57	T-PNP, Si, RF PO, 136-174 MHz, 30 W
356	—	T57	T-PNP, Si, RF PO, 136-174 MHz, 40 W - **Disc.**
357	1-49	T51	T-NPN, Si, RF PO, 30-200 MHz, 7 W
358	1-145	S12	Xtal-Color Osc
358C	1-145	S18	Xtal Color Osc
359	1-49	T53	T-NPN, Si, RF PO, 30-200 MHz, 20 W
360	1-49	T53	T-NPN, Si, RF PO, 30-200 MHz, 40 W
361	1-49	T7	T-NPN, Si, RF PO, 407-512 MHz, 2 W
362	1-49	T52	T-NPN, Si, RF PO, 407-512 MHz, 2 W
363	1-49	T52	T-NPN, Si, RF PO, 407-512 MHz, 4 W
364	1-49	T52	T-NPN, Si, RF PO, 407-512 MHz, 10 W - **Disc.**
365	1-49	T60	T-NPN, Si, RF PO, 407-512 MHz, 15 W
366	1-50	T60	T-NPN, Si, RF PO, 407-512 MHz, 25 W
367	1-50	T60	T-NPN, Si, RF PO, 407-512 MHz, 45 W
368	1-50	T60	T-NPN, Si, RF PO, 407-512 MHz, 60 W
369	1-50	T25	T-NPN, Si, Vert Output, Sw
373	1-50	T45	T-NPN, Si, AF Driver
374	1-50	T45	T-PNP, Si, AF Driver
375	1-50	T41	T-NPN, Si, Vert Defl
376	1-50	T41	T-NPN, Si, Pwr Amp
377	1-50	T41	T-NPN, Si, Pwr Driver, PO, Sw, Reg
378	1-50	T41	T-PNP, Si, Pwr Driver, PO, Sw, Reg
379	1-50	T41	T-NPN, Si, HV Hi Speed Pwr Sw
381	1-50	T43	T-PNP, Si, AF Pwr Amp
382	1-50	T19	T-NPN, Si, AF Driver
383	1-50	T19	T-PNP, Si, AF Driver
384	1-50	T25	T-NPN, Si, Sw, Linear Amp
385	1-50	T28	T-NPN, Si, HV Hi Speed Sw
386	1-50	T28	T-NPN, Si, HV Hi Speed Sw
387	1-50	T28A	T-NPN, Si, Pwr Amp, Sw
387MP	1-50	T28	T-NPN, Si, Matched Pair of ECG387
388	1-50	T28	T-NPN, Si, Hi Pwr Amp (Compl to ECG 68)
389	1-50	T28	T-NPN, Si, Horiz Output
390	1-50	T48	T-NPN, Si, Pwr Amp, Hi Speed Sw
391	1-50	T48	T-PNP, Si, Pwr Amp, Hi Speed Sw
392	1-50	T48	T-NPN, Si, Pwr Amp, Hi Speed Sw
393	1-50	T48	T-PNP, Si, Pwr Amp, Hi Speed Sw
394	1-50	T48	T-NPN, Si, Hv Pwr Amp, Sw
395	1-50	T4	T-PNP, Si, Wide Band VHF/UHF Amp, Osc
396	1-50	T6	T-NPN, Si, Linear Amp & Hi Speed Sw
397	1-51	T6	T-PNP, Si, Linear Amp & Hi Speed Sw
398	1-51	T41	T-PNP, Si, Vert Output
399	1-51	T20	T-NPN,Si, Video Output, Horiz Dr
400	1-372	AH6	Heat Sink for TO-5 Style Package (2/Pkg)
401	1-372	AH7	Heat Sink for TO-5 Style Package (2/Pkg)
402	1-372	AH12	Heat Sink for Plastic Power Packages (2/Pkg)
403	1-372	AH11	Heat Sink for Plastic Power Packages (2/Pkg)
404	1-372	AH9	Heat Sink for TO-66 Style Package - Includes Base, Top Piece, 2 - 6/32 Screws and Nuts
405	1-372	AH10	Heat Sink for TO-3 Style Package - Includes Base, Top Piece, 2 - 6/32 Screws and Nuts
406	1-372	A2	Heat Sink for TO-202 Stlye Package (2/Pkg)
407	1-376	AS6	8-Pin Can, IC Socket (2/Pkg)
408	1-376	AS7	10-Pin Can, IC Socket (2/Pkg)
409	1-376	AS14	14-Pin DIP, IC Socket (2/Pkg)
411	—	AH4	Stud-Mount Heat Sink for TO-5 and TO-39 Style Package (2/Pkg) - **Disc.**
412	1-372	AH5	Heat Sink for TO-18 Style Package (2/Pkg)
413	1-370	—	Insulator Kit for TO-3 Style Package
414	1-370	—	Insulator Kit for TO-36 Style Package with Flat Washer, Shaker Proof Lug, Nut and Plastic Insulating Tube
415	1-370	—	Insulator Kit for TO-66 Style Package
416	1-376	AS15	16-Pin DIP, IC Socket (2/Pkg)
417	1-376	AS2	3-Pin Transistor Socket for TO-18 Package (2/Pkg)
419	1-376	AS3	3-Pin Transistor Socket for TO-5 Package (2/Pkg)
421	1-376	AS10	Standard Socket for TO-66 Package (2/Pkg)
422	1-370	—	Insulator Kit for TO-220 Style Package
423	1-376	AS13	8-Pin DIP, IC Socket (2/Pkg)
424	1-371	AC2	Heat Sink Compound, 1-oz., with Plunger Tube

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425A	1-380	—	Thermal Conductive Insulator for TO-3 Packages
425B	1-380	—	Thermal Conductive Insulator for TO-3 Packages
425C	1-380	—	Thermal Conductive Insulator for TO-3 Packages
425D	1-380	—	Thermal Conductive Insulator for TO-66 Packages
425E	1-380	—	Thermal Conductive Insulator for TO-220 Packages
425F	1-380	—	Thermal Conductive Insulator for TO-126 Packages
425G	1-380	—	Thermal Conductive Insulator for DO-4 Packages
425H	1-380	—	Thermal Conductive Insulator for DO-5 Packages
425J	1-380	—	Thermal Conductive Insulator for TO-36 Packages
425K	1-380	—	Thermal Conductive Insulator for TIP-36 Packages
425L	1-380	—	Thermal Conductive Insulator for TO-3P Packages
426	1-370	—	Metric Hardware Kit of 3mm Nuts, Bolts, etc.
427	—	AH1	Heat Sink Kit for TO-5 and TO-39 Style Packages-Includes Heat Sink, 2 Bushings, 1 Mica - **Disc.**
428	1-376	AS19	24-Pin DIP, IC Socket (2/Pkg)
429	1-377	AS20	28-Pin DIP, IC Socket (2/Pkg)
430	1-377	AS21	40-Pin DIP, IC Socket (2/Pkg)
431	1-376	AS11	Japanese Style Socket for TC-9 Package (2/Pkg)
432	1-371	AW1	Thread Converter, 3/8"-24 to 1/2"-20, for Stud Type Packages
433	1-371	AW2	HV Splice for CRT Anode Leads, 40 kV Insulation, Does Require Soldering
434	1-371	AC3	Non-Corrosive Adhesive/Sealant, 2-oz, Squeeze Tube
435K28	1-377	AS35	28-Pin DIP, IC Socket, .070 Ctrs (2/Pkg)
435K30	1-377	AS36	30-Pin DIP, IC Socket, .070 Ctrs (2/Pkg)
435K42	1-377	AS37	42-Pin DIP, IC Socket, .070 Ctrs (1/Pkg)
435K52	1-377	AS39	52-Pin DIP, IC Socket, .070 Ctrs (1/Pkg)
435K64	1-377	AS38	64-Pin DIP, IC Socket, .070 Ctrs (1/Pkg)
435P6	1-377	AS12	6-Pin DIP, IC Socket (2/Pkg)
435P18	1-377	AS16	18-Pin DIP, IC Socket (2/Pkg)
435P20	1-377	AS17	20-Pin DIP, IC Socket (2/Pkg)
435P22	1-378	AS18	22-Pin DIP, IC Socket (2/Pkg)
435P42	1-378	AS40	42-Pin DIP, IC Socket (1/Pkg)
435Q14	1-378	AS22	14-Pin DIP, IC Socket for PC Board with Staggered Holes (2/Pkg)
435Q16	1-378	AS23	16-Pin DIP, IC Socket for PC Board with Staggered Holes (2/Pkg)
436W8	1-378	AS24	8-Pin DIP, IC Socket, Wire Wrap Leads (2/Pkg)
436W14	1-378	AS25	14-Pin DIP, IC Socket, Wire Wrap Leads (2/Pkg)
436W16	1-378	AS26	16-Pin DIP, IC Socket, Wire Wrap Leads (2/Pkg)
436W18	1-378	AS27	18-Pin DIP, IC Socket, Wire Wrap Leads (2/Pkg)
436W20	1-378	AS28	20-Pin DIP, IC Socket, Wire Wrap Leads (1/Pkg)
436W22	1-378	AS29	22-Pin DIP, IC Socket, Wire Wrap Leads (1/Pkg)
436W24	1-378	AS30	24-Pin DIP, IC Socket, Wire Wrap Leads (1/Pkg)
436W28	1-379	AS31	28-Pin DIP, IC Socket, Wire Wrap Leads (1/Pkg)
436W40	1-379	AS32	40-Pin DIP, IC Socket, Wire Wrap Leads (1/Pkg)
437X18	1-379	AS33	Crystal Socket for HC-18 Case with .017" Diameter Cut Leads
437X33	1-379	AS34	Crystal Socket for HC-33 Case with .030" Diameter Cut Leads
438	1-370	—	Insulator Kit for DO-4 and TO-64 Stud Package with Flat Washer, Solder Lug and Hex Nut
439	1-370	—	Insulator Kit for DO-5 and TO-48 Stud Package with Flat Washer, Lock Washer, Solder Lug and Hex Nut
440A	1-374	AH13	Heat Sink Undrilled Mounting Surface
440B	1-374	AH13	Heat Sink, Drilled for TO-3, TO-48, TO-66, TO-126, TO-127, TO-220, DO-5
440C	1-374	AH13	Heat Sink, Drilled for TO-3, TO-15, TO-6, TO-36, TO-64, DO-4
440D	1-374	AH13-1	Heat Sink, Undrilled Mounting Surface
441A	1-374	AH14	Heat Sink, Drilled for Solid State Relays
441B	1-374	AH14	Heat Sink, Undrilled Mounting Surface
442A	1-374	AH15	Heat Sink, Undrilled Mounting Surface, for PCB Mounting
442B	1-374	AH15-1	Heat Sink, Undrilled Mounting Surface, for PCB Mounting
442C	1-374	AH16	Heat Sink, Undrilled Mounting Surface, for PCB Mounting
443	1-374	AH17	Heat Sink, Undrilled Mounting Surface, for PCB Mounting
444	1-374	AH18	Heat Sink, Undrilled Mounting Surface, for Stud Mounted Devices
445	1-372	AH8	Heat Sink, for TO-92 Style (2/Pkg)
446A	1-375	AH19	Heat Sink, for 1.65" and 2.29" Hockey Puck Packages (2 Required)
446C	1-375	AH20	Heat Sink, for 2.90" Hockey Puck Packages (2 Required)
447A	1-375	AH21	Heat Sink Clamp Assembly for 446A
447B	1-375	AH21	Heat Sink Clamp Assembly for 446A
447C	1-375	AH22	Heat Sink Clamp Assembly for 446C
448B	1-375	AH23	Heat Sink, for 14/16-Pin DIP (2/Pkg)
448E	1-375	AH24	Heat Sink, for 24-Pin DIP (2/Pkg)
448G	1-375	AH25	Heat Sink for 40-Pin DIP (2/Pkg)
449	1-371	AW3	Mounting Clip for To-220 Case Style (2/Pkg)
449A	1-371	AW3-1	Mounting Clip for TO-126, SOT-82 Case Styles (2/Pkg)
450A	1-375	AH26	Heat Sink for ECG740A, ECG804, ECG810A, ECG862, ECG990
451	1-65	T16	JFET-N-Ch, UHF/VHF Amp
452	1-65	T4	JFET-N-Ch, UHF/VHF Amp
453	1-65	T13-1	JFET-N-Ch, VHF/FM Amp
454	—	T4	MOSFET-Dual Gate, N-Ch, UHF/VHF Amp - **Disc.**
455	1-65	T49-1	MOSFET-Dual Gate, N-Ch, TV UHF RF Amp - **Disc.**
456	1-65	T4	JFET-N-Ch, Gen Purp Amp/Sw
457	1-65	T16	JFET-N-Ch, Gen Purp Amp/Sw
458	1-65	T16	JFET-N-Ch, Gen Purp, Lo Noise Audio Amp
459	1-65	T4	JFET-N-Ch, AF Amp/Chopper/Sw
460	1-65	T4	JFET-N-Ch, AF Amp
461	1-65	T3	JFET-Matched Dual, N-Ch, DC Amp/Sampler/Chopper
462	—	T2	MOSFET-N-Ch, AF Amp- **Disc.**
464	—	T4	MOSFET-P-Ch, Enhancement, Sw- **Disc.**
465	1-66	T4	MOSFET-N-Ch, Enhancement, Sw
466	1-66	T2	JFET-N-Ch, Chopper/Sw
467	1-66	T16	JFET-N-Ch, Chopper/Fast Sw
468	1-66	T16	JFET-N-Ch, Chopper/Switch
469	1-66	T16	JFET-N-Ch, Chopper/Switch
470	1-51	T58	T-NPN, Si, RF Pwr, Amateur & Marine, 30 MHz, 100W
471	1-51	T58	T-NPN, Si, RF Pwr, Amateur/Mar, 30MHz, 100W - **Disc.**
472	1-51	T6	T-NPN, Si, RF Dr & PO, Hi Band VHF, FM, 175 MHz, 1.8 W
473	1-51	T6	T-NPN, Si, RF Dr & PO, Hi Band VHF, FM, 175 MHz, 2.2 W
474	1-51	T40	T-NPN, Si, RF PO, Lo-Hi Band, 88 MHz, 6 W, 175 MHz, 3 W
475	—	T56	T-NPN, Si, Hi Band, Marine & Mobile, 175 MHz, 7 W - **Disc.**
476	—	T56	T-NPN, Si, Hi Band, Marine & Mobile, 175 MHz, 12 W - **Disc.**
477	1-51	T60	T-NPN, Si, RF PO, Marine & Mobile VHF, 175 MHz, 45 W
478	—	T60	T-NPN, Si, RF PO, Marine & Mobile VHF, 175 MHz, 100 W - **Disc.**
479	1-51	T6	T-NPN, Si, UHF Dr & PO, 470 MHz, 1.8 W
480	—	T60	T-NPN, Si, UHF PO, FM, 470 MHz, 40 W- **Disc.**
481	1-51	T61	T-NPN, Si, UHF PO, FM, 836 MHz, 6 W
482	1-51	T63	T-NPN, Si, UHF PO, FM, 836 MHz, 15 W
483	1-51	T61	T-NPN, Si, UHF PO, FM, 836 MHz, 18 W
484	1-51	T61	T-NPN, Si, UHF PO, FM, 836 MHz, 25 W
485	1-51	T61	T-NPN, Si, UHF PO, FM, 836 MHz, 25 W
486	1-51	T6	T-NPN, Si, RF PO, UHF Multiplier, 407-512 MHz, .75 W
487	1-51	T8	T-NPN, Si, RF PO, Hi Band VHF Multiplier, 175 MHz, 1 W
488	1-52	T9	T-NPN, Si, RF Dr & PO, Hi Bd VHF, 175MHz, 4 W - **Disc.**
489	1-65	T16	JFET-P-Ch, General Purpose/Chopper
490	1-66	T16	MOSFET, N-Ch Enhancement, Hi Speed Sw
491	1-66	T16	MOSFET, N-Ch Enhancement, Hi Speed Sw
492	1-66	T16	MOSFET, N-Ch Enhancement, Hi Speed Sw
500A	1-100	H3	R-6 Step Silicon Tripler with Focus Tap
● 493	1-372	AH27	Heat Sink, for TO-126 Vert Mount Clip-on
● 494	1-372	AH28	Heat Sink, for TO-220 Vert Mount Clip-on
● 495	1-372	AH29	Heat Sink, Compact Vert Mount
● 496	1-373	AH30	Heat Sink, for TO-220 Vert Mount Clip-on w/Tabs
● 497	1-373	AH31	Heat Sink, Vert Mount Clip-on w/Tabs
● 498	1-373	AH32	Heat Sink, Extruded Vert Mount
501B	1-100	H1	R-5 Step Silicon Tripler with Focus Tap
502	1-107	H40	R-Se, TV HV, 12.4 k PRV
503	1-107	H41	R-Se, TV HV, 14.4 k PRV
504	1-107	H42	R-Se, TV HV, 19.5 k PRV
505	1-107	H43	R-Se, TV HV, 21.4 k PRV
506	1-109	Z6	R-Si, Hi Current/Fast Sw, Damp, Bst, Blank
507	1-109	Z6	R-Si, Hi Current/Fast Sw, Center, Gate - **Disc.**
508/ R-3A3	—	H35	R-Si, Replaces TV HV Rect Tube - **Disc.**
509/ R-3AT2	1-107	H35	R-Si, Replaces TV HV Rect Tube
510/ R-3DB3	1-107	H35	R-Si, Replaces TV HV Rect Tube
511/ R2-AV2	1-107	H36	R-Si, Replaces TV HV Focus Rect Tube
512/ R-6DW4	1-107	H37	R-Si, Replaces TV HV Damper Tube - **Disc.**
513	—	H44	R-Si, Stick, TV HV, 45k PIV - **Disc.**
514/ R-3DS3	1-107	H35	R-Si, Replaces TV HV Rect Tube - **Disc.**
515	1-109	Z10	D-Trace Commutating and Clamp Diode
517	1-106	H49	R-Si, 15 KV, 350mA
518	1-108	H45	R-Si, Fast Switching, 10,000 PRV
519	1-109	Z4	D-Si, Fast Switching, 4 nanosec, 100 PRV
521	1-100	H4	R-6 Step Silicon Tripler with Focus Tap
522	1-100	H3	R-5 Step Silicon Tripler with Focus Tap
523/ 3306	1-100	H10	R-5 Step Silicon Tripler - Internal Focus Divider Network
524V13	1-138	S11	Varistor, Metal Oxide, 130V RMS
524V15	1-138	S11	Varistor, Metal Oxide, 150V RMS
524V17	1-138	S11	Varistor, Metal Oxide, 175V RMS
524V25	1-138	S11	Varistor, Metal Oxide, 250V RMS
524V27	1-138	S11	Varistor, Metal Oxide, 275V RMS
524V30	1-138	S11	Varistor, Metal Oxide, 300V RMS
524V42	1-139	S11	Varistor, Metal Oxide, 420V RMS
524V48	1-139	S11	Varistor, Metal Oxide, 480V RMS

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526A	1-100	H10	R-5 Step Silicon Tripler - Internal Focus Divider Network
527A	1-108	H47	R-Si, Stick, TV HV (35 kV PRV) - **Disc.**
528	1-100	H19	R-5 Step Silicon Tripler - Internal Focus Divider Network
529	1-100	H10	R-5 Step Silicon Tripler with Damper Diode - Internal Focus Divider Network - **Disc.**
530	1-100	H10	R-6 Step Silicon Tripler - Internal Focus Divider Network
531	1-100	H7	R-6 Step Silicon Tripler with Resistor to Focus Tap
532	1-100	H7	R-6 Step Silicon Tripler with Resistor to Focus Tap
533	1-100	H7	R-5 Step Silicon Tripler with Damper Diode and Resistor to Focus Tap
534	1-100	H6	R-5 Step Silicon Tripler with Damper Diode
535	1-100	H11	R-5 Step Silicon Tripler with Damper Diode and Bleeder Resistor
536A	1-100	H8	R-8 Step Silicon Quadrupler with Focus Tap
537	1-100	H7	R-5 Step Silicon Tripler with Damper Diode and Resistor to Focus Tap
538	1-100	H2	R-5 Step Silicon Tripler with Damper Diode and Focus Tap
539	1-100	H1	R-5 Step Silicon Tripler with Damper Diode and Focus Tap
540	—	H26	Microwave Oven Rect-12kV, 600 mA - **Disc.**
542	1-106	H28	Microwave Oven Rect-15kV, 350 mA
544	—	H30	Microwave Oven Rect-12kV, 500 mA - **Disc.**
548	1-106	H34	Microwave Oven Rect-12kV, 750 mA
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550	1-100	H6	R-7 Step Silicon Quadrupler with Damper Diode
551	—	Z9	R-Si, 1500 PRV, 1 A - **Disc.**
552	1-109	Z3	R-Si, 600 PRV, 1 A
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555	—	Z11	D-Pin, VHF Band, Sw - **Disc.**
555A	1-111	Z11A	D-Pin, VHF Band, Sw
556	1-100	H10	R-5 Step Silicon Tripler with Damper Diode and Internal Focus Divider Network
557	1-100	H10	R-5 Step Silicon Tripler with Damper Diode and Internal Focus Divider Network
558	1-109	Z6	R-Si, Fast Recovery, 1500 PRV, 1 A, 250 ns
559	1-100	H15	R-5 Step Silicon Tripotential Tripler
560	1-100	H17	R-5 Step Silicon Tripler with Internal Focus Divider Network
561	1-100	H18	R-5 Step Silicon Tripler with Damper Diode and Internal Focus Divider Network
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563	—	H21	R-3 Step Silicon Doubler with Bleeder Resistor and Indicator Lamp - **Disc.**
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569	1-109	Z6A	R-Si, Soft Recovery, Fast Sw, 600 V, 3 A, 200ns
570	1-110	Z6B	R-Si, Controlled Avalanche, VRM=130 V
571	1-109	Z1A	R-Si, Soft Recovery, Fast Sw, 1000 V, 3 A, 100ns
572	1-109	Z71	R-Si, Fast Recovery, 1000 PRV, 6 A, 500ns
573	1-109	Z6A	D-Schottky Barrier Rectifier
574	1-109	Z3	R-Si, Ultra Fast Recovery, 400V PRV, 1A, 35ns
575	1-109	Z3	R-Si, Ultra Fast Recovery, 1000V PRV, 1A, 70ns
576	1-109	Z6A	R-Si, Ultra Fast Recovery, 400V PRV
577	1-109	Z6A	R-Si, Fast Recovery, Hi Voltage, 1000 V PRV, 5A, 70 ns
578	1-109	Z3	R-Schottky Barrier Rectifier
579	1-109	Z6A	R-Schottky Barrier Rectifier
580	1-109	Z1A	R-Si, 600 PRV, 3 A
581	1-109	Z41A	R-Si, 400 PRV, 8 A
582	1-109	Z17A	D-Si, TV Damper, 6000 PRV - **Disc.**
583	1-109	Z4	D-Schottky Barrier Diode
584	1-110	Z4	D-Schottky Barrier Diode
585	1-110	Z3	D-Schottky Barrier Rectifier
586	1-110	Z6A	D-Schottky Barrier Rectifier
587	1-110	Z3	R-Si, Ultra Fast Recovery, 200 PRV, 1 A, 35 ns
588	1-110	Z6A	R-Si, Ultra Fast Recovery, 200 PRV, 3 A, 35 ns
589	1-110	Z71	R-Si, Fast Recovery, 400V PRV, 6A, 150ns
590	1-110	Z67	D-Dual, Si, Hi Speed Sw, Common Cathode
591	1-110	Z67	D-Dual, Si, Hi Speed Sw, Common Anode
592	1-110	Z69	D-Si, Gen Purp, Sw, 200 PRV
593	1-110	Z69	D-Si, Hi Speed Sw, Detector, 75 PRV, 6 ns
594	1-110	Z69	D-Si, Band Sw, 35 PRV
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596	1-110	Z69	D-Si, Hi Speed Sw, Gen Purp, Common Anode, 70 PRV
597	1-120	Z41A	R-Si, Ultra Fast Recovery, 200 PRV, 8 A, 35 ns
598	1-120	Z41A	R-Si, Ultra Fast Recovery, 600 PRV, 8 A, 60 ns

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600	1-113	Z4	Varistor-Si, 10 mA Forward Current
600L68	1-379	AS41	68-Pin, PLCC Socket
601	1-113	Z4	Varistor-Si, 20 mA Forward Current
605A	1-113	Z2	Varistor-Si, 100 mA Forward Current
606	1-113	Z7	Varistor-Si, 150 mA Forward Current
607	1-113	Z7	Varistor-Si, 100 mA Forward Current
610	1-113	Z13	Varactor-6.8 pF at 4 V
611	1-113	Z13	Varactor-10.0 pF at 4 V
612	1-113	Z13	Varactor-12.0 pF at 4 V
613	1-113	Z13	Varactor-22.0 pF at 4 V
614	1-113	Z13	Varactor-33.0 pF at 4 V
615A	1-112	Z13-2	IC-Voltage Regulator for Electronic Tuner, 33 V
616	1-113	Z4	D-4 Matched Tuning Diodes
617	1-113	Z13-1	D-FM Radio Tuning Diode
618	1-113	Z13-2	D-AM Radio Tunig Diode
● 620	1-110	Z74	D-Si Leadless, Gen Purp 400VPRV, 0.5A
● 621	1-110	Z74	D-Si Leadless, Hi Current 400VPRV, 1A
● 622	1-110	Z74	D-Si Leadless, Ultra Fast 400VPRV, 0.5A
649	—	S19	Ceramic Resonator - 503.5 kHz - **Disc.**
650	1-145	S17	Xtal-Parallel Resonant, 1.0 MHz
651	1-145	S17	Xtal-Parallel Resonant, 2.0 MHz
652	1-145	S18	Xtal-Parallel Resonant, 4.0 MHz
653	1-145	S18	Xtal-Parallel Resonant, 5.0 MHz
654		S18	Xtal-Parallel Resonant, 10.245 MHz - **Disc.**
655	1-145	S18	Xtal-Series Resonant, 4.0 MHz
656	1-145	S18	Xtal-Series Resonant, 4.9152 MHz
657	1-145	S18	Xtal-Series Resonant, 6.144 MHz
658	1-145	S18	Xtal-Series Resonant, 10.0 MHz
659	1-145	S18	Xtal-Series Resonant, 18.0 MHz
660	1-145	S18	Xtal-Series Resonant, 18.432 MHz
661	1-145	S18	Xtal-Series Resonant, 20.0 MHz
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700	1-184	L112	IC-TV Chroma Subcarrier Regeneration
701	1-184	L112	IC-TV Video Signal Processor
702	1-184	L112	IC-TV Chroma Processor
703	1-184	L1A	IC-RF/IF Amp, Osc, Mixer
704	1-184	L5	IC-TV Sound and IF Amp and Det
705A	1-184	L4	IC-Chroma Demod - **Disc.**
706	1-194	L107	IC-TV/FM IF Amp, Lim, Det, Audio Driver for Tube Type Pwr Amp
707	1-184	L7	IC-TV Chroma Demod - **Disc.**
708	1-184	L104	IC-TV/FM Sound IF Amp, Det, Lim
709	1-184	L104	IC-FM and TV Sound IF Amp, Det, Limit
710	1-184	L107	IC-TV/FM IF Amp, Lim, Det, Audio Driver - **Disc.**
711	1-185	L5	IC-Color TV-AFT System
712	1-185	L104	IC-FM/TV Sound IF, Det and electronic Attenuator
713	1-185	L104	IC-TV Chroma Demod
714	1-185	L111	IC-TV Chroma Subcarrier Regeneration
715	1-185	L104	IC-TV Chroma IF Amp
717	1-185	L139	IC-AF PO, 1 W
718	1-185	L104	IC-FM Stereo Multiplex Demod
719	1-185	L104	IC-FM Stereo Multiplex Demod; Emitter Follower Outputs
720	1-185	L104	IC-FM Stereo Multiplex Demod; Adj Ch Separation
721	1-185	L104	IC-Dual Lo Noise Lo Level Preamp - **Disc.**
722	1-185	L104	IC-FM Stereo Multiplex Demod
723	1-185	L104	IC-FM Sound System for Communications and HiFi FM Receivers
724	1-186	L3	IC-Differential Cascade Amp for Communications and Industrial Equipment
725	1-186	L104	IC-Dual Lo Noise Op Amp
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729	1-186	L113	IC-TV Chroma Demod
730	1-186	L117	IC-TV Vid IF System
731	1-186	L111	IC-TV Vid Signal Processor
735	1-186	L96	IC-Class 'A' Audio Driver
736	1-186	L97	IC-FM Gain Block with Voltage Regulator
738	1-186	L104	IC-TV Chroma IF Amp, Auto Chroma Ctr, Color Killer
739	1-186	L104	IC-TV Chroma Demod with RGB Matrix and Chroma Dr Stages
740A	1-187	L106	IC-AF PO, 2 W
742	1-187	L136	IC-TV Sound System, 2 W PO
743	1-187	L111	IC-FM Stereo Demod - PLL
744	1-187	L104	IC-RF IF Amp for AM Radio
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746	1-187	L98	IC-FM/TV Sound IF Amp
747	1-187	L98	IC-TV Lo Level Video Detector - **Disc.**
748A	1-187	L104	IC-TV Sound IF Amp/Lim/Det/AF Preamp
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755	1-187	L94	IC-Class 'A' Audio Driver
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778S	1-188	L35	IC-Dual Op Amp, Internally Compensated
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795	—	L97	IC-TV AGC Control and IF Amp - **Disc.**
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799	1-189	L104	IC-FM 4-Channel 'SQ' Stereo Decoder
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822	1-191	L111	IC-TV Chroma Processor
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842	1-192	L112	IC-TV Video IF, AGC
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847	1-193	L103	IC-Lo Level Audio Amp
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858M	1-193	L98	IC-Dual Lo Noise JFET Input Op Amp
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880	—	L118	IC-TV RGB Processor
887M	1-195	L98	IC-Lo Power JFET Input Op Amp
888M	1-195	L98	IC-Lo Power Programmable Op Amp
889M	1-195	L98	IC-Dual Lo Power JFET Input Op Amp
890	1-195	L98	IC-Voltage to Freq Converter
891M	1-195	L97	IC-Dual Op-Amp, Internally Compensated
891SM	1-195	L159	IC-Dual Op-Amp, Internally Compensated
892	1-195	L111	IC-Precision Waveform Generator
893	1-195	L111	IC-Programmable Timer/Counter
894M	1-195	L97	IC-Op-Amp, Lo Noise
894SM	1-195	L159	IC-Op-Amp, Lo Noise
900	—	L7	IC-Balanced Diff Amp and DC Amp - **Disc.**
901	—	L9	IC Video, Wide-Band Amp - **Disc.**
902	1-196	L3	IC-Operational Transconductance Amp
903	—	L9	IC-Op Amp - **Disc.**
904	1-196	L9	IC-2 Transistors and Darlington Pair
905	—	L7	Diode 'Quad' Plus 2 Isolated Diodes - **Disc.**
906	1-196	L9	IC-Dual HF Diff Amps for Freq Up to 500 MHz
907	1-196	L9	IC-6 Ultra Fast Matched Diodes
908	—	L104	IC-Op Amp - **Disc.**
909	1-196	L3	IC-Hi-Performance Op Amp, 8-Lead Can
909D	1-196	L104	IC-Hi-Performance Op Amp, 14-Lead DIP
910	1-196	LL3	IC-Hi-Speed Diff Comparator, 8-Lead Can
910D	1-196	L104	IC-Hi-Speed Diff Comparator, 14-Lead DIP
911	1-196	L7	IC-Dual Hi-Speed Diff Comparator, 10-Lead Can - **Disc.**
911D	—	L104	IC-Dual Hi-Speed Diff Comparator, 14-Lead DIP - **Disc.**
912	1-196	L104	IC-3 Isolated Transistors, 1 Diff Pair
914	1-196	L104	IC-Zero Voltage Sw
915	1-196	L7	IC-Hi-Speed Op Amp, 10-Lead Can
916	1-197	L111	IC-Transistor Array for Digital Segment Displays
917	1-197	L104	IC-Dual Diff Amp, Lo Pwr App from DC to 120 MHz
918	1-197	L3	IC-Hi-Speed Precision Op Amp, 8-Lead Can
918M	1-197	L97	IC-Hi-Speed Precision Op Amp, 8-Lead DIP
918SM	1-197	L159	IC-Hi-Speed Precision Op Amp, 8-Lead SOIC
919	1-197	L7	IC-Dual Hi-Speed Comparator, 10-Lead Can
919D	1-197	L104	IC-Dual Hi-Speed Comparator, 14-Lead DIP
920	—	L2	IC-Dual Toggle Flip-Flop with Reset - **Disc**
921	1-197	L104	IC-Dual Polarity Tracking VR ± 15 V - **Disc.**
922	1-197	L3	IC-Voltage Comparator, 8-Lead Can
922M	1-197	L97	IC-Voltage Comparator, 8-Lead DIP
922SM	1-197	L159	IC-Voltage Comparator, 8-Lead SOIC
923	1-197	L6	IC-Precision VR, 10-Lead Can
923D	1-197	L104	IC-Precision VR, 14-Lead DIP
924	1-197	L3	IC-Voltage Follower Op Amp, 8-Lead Can
924M	1-198	L97	IC-Voltage Follower Op Amp, 8-Lead DIP
925	1-198	L3	IC-Instrumentation Op Amp, 8-Lead Can - **Disc.**
926	1-198	L111	IC-Quad Timer
927	1-198	L6	IC-Differential Video Amp
927D	1-198	L104	IC-Differential Video Amp
927SM	1-198	L160	IC-Differential Video Amp
928	1-198	L3	IC-Dual Lo Pwr Op Amp, 8-Lead Can
928M	1-198	L97	IC-Dual Lo Pwr Op Amp, 8-Lead DIP
928S	1-198	L39	IC-Dual Lo Pwr Op Amp, 8-Lead SIP - **Disc.**
928SM	1-198	L159	IC-Dual Lo Pwr Op Amp, 8-Lead SOIC
929	1-198	L111	IC-Hi-Current NPN Transistor Array
930	1-198	L3	IC-Bi-MOS Op Amp, 8-Lead Can
931	1-198	L11	IC-Pos VR, 3 Terminal, 5 V, 3 A
932	1-198	L11	IC-Pos VR, 3 Terminal, 5 V, 5 A
933	1-198	L11	IC-Pos VR, 3 Terminal, 12 V, 5 A
934	1-198	L11	IC-Pos VR, 3 Terminal, 13.8 V, 5 A
935	1-198	L11	IC-Pos VR, Adjustable 1.2 to 32 V, 5 A
937	1-199	L3	IC-JFET Input Op Amp, 8-Lead Can
937M	1-199	L98	IC-JFET Input Op Amp, 8-Lead DIP
938	1-199	L3	IC-Precision Op Amp, 8-Lead Can
938M	1-199	L97	IC-Precision Op Amp, 8-Lead DIP
939	—	L111	IC-Burst Control for SCR or TRIAC - **Disc.**
941	1-199	L3	IC-Freq-Compensated Op Amp, 8-Lead Can
941D	1-199	L104	IC-Freq-Compensated Op Amp, 14-Lead DIP
941M	1-199	L97	IC-Freq-Compensated Op Amp, 8-Lead Mini-DIP
941S	1-199	L24	IC-Freq-Compensated Op Amp, 7-Lead SIP
941SM	1-199	L159	IC-Freq-Compensated Op Amp, 8-Lead SOIC
942	1-199	L104	IC-Lo Noise Dual Preamp - **Disc.**
943	1-199	L3	IC-Dual Comparator, 8-Pin Metal Can
943M	1-199	L98	IC-Dual Comparator, 8-Pin DIP
943SM	1-199	L159	IC-Dual Comparator, 8-Pin SOIC
944	1-199	L3	IC-Programmable Op Amp, 8-Pin Metal Can
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945	—	L3	IC-Op Amp/Int Comp/Darl Input - **Disc.**
947	1-200	L7	IC-Dual Freq-Compensated Op Amp, 10-Lead Can
947D	1-200	L104	IC-Dual Freq-Compensated Op Amp, 14-Lead DIP
948	1-200	L104	IC-Quad Op Amp
948SM	1-200	L160	IC-Quad Op Amp
949	1-200	L3	IC-Dual Op Amp, 8-Lead Can
950	1-200	L16	IC-Pos VR, 12 V, 100 mA
951	1-200	L16	IC-Pos VR, 15 V, 100 mA
952	1-200	L16	IC-Precision 2.5 V Voltage Reference
953	1-200	L18	IC-Pos VR, Adjustable 5 to 30 V, 1 A - **Disc.**

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955MC	1-200	L97	IC-Lo Pwr Timer/Oscillator, CMOS
955S	1-200	L35	IC-Timer/Oscillator
955SM	1-200	L159	IC-Timer/Oscillator
956	1-200	L17	IC-Pos VR, 1.2 to 37 V, 1.5 A
957	1-200	L17	IC-Neg VR, 1.2 to 37 V, 1.5 A
958	1-200	L17	IC-Pos VR, 18 V, 1 A
959	1-201	L17	IC-Neg VR, 18 V, 1 A
960	1-200	L17	IC-Pos VR, 5 V, 1 A
961	1-201	L17	IC-Neg VR, 5 V, 1 A
962	1-200	L17	IC-Pos VR, 6 V, 1 A
963	1-201	L17	IC-Neg VR, 6 V, 1 A
964	1-200	L17	IC-Pos VR, 8 V, 1 A
965	1-201	L17	IC-Neg VR, 8 V, 1 A
966	1-200	L17	IC-Pos VR, 12 V, 1 A
967	1-201	L17	IC-Neg VR, 12 V, 1 A
968	1-200	L17	IC-Pos VR, 15 V, 1 A
969	1-201	L17	IC-Neg VR, 15 V, 1 A
970	1-201	L17	IC-Pos VR, 1.2 to 33 V, 3 A
971	1-201	L17	IC-Neg VR, 24 V, 1 A
972	1-201	L17	IC-Pos VR, 24 V, 1 A
973	—	L7	IC-Balanced Modulator/Demodulator - **Disc.**
973D	1-201	L104	IC-Balanced Mod/Demod, 14-Pin DIP
974	—	L104	IC-Phase/Frequency Detector - **Disc.**
975	1-201	L98	IC-Op Amp
975SM	1-201	L159	IC-Op Amp
976	1-201	L97	IC-Op Amp
977	1-201	L16	IC-Pos VR, 5 V, 100 mA
978	1-201	L104	IC-Dual Timing Circuit
978C	1-201	L104	IC-Dual Lo Pwr Timer/Oscillator, CMOS
978SM	1-201	L160	IC-Dual Timing Circuit
980	1-201	L111	IC-Phase Locked Loop (PLL) CMOS
981	1-201	L16	IC-Pos VR, 8 V, 100 mA
982	1-201	L111	IC-TV Subcarrier Regenerator ACC, APC Detector
983	1-201	L104	IC-Dual AF Preamp
984	1-202	L111	IC-TV Video IF, AFT
986	1-202	L122	IC-TV Chroma Processor and Demod
987	1-202	L104	IC-Quad Op Amp
987SM	1-202	L160	IC-Quad Op Amp
988	1-202	L16	IC-Pos VR, 6.2 V, 100 mA
989	1-202	L104	IC-Phase Locked Loop (PLL) Gen Purp
990	1-202	L106	IC-Dual AF PO, 2 W/Channel
991	1-202	L112	IC-CB PLL Freq Synthesizer
992	1-202	L104	IC-4 Independent Amps
993	—	L111	IC-CB Prescalar
994	1-202	L3	IC-Voltage Controlled Oscillator, Function Generator, 8-Lead Can
994M	1-202	L97	IC-Voltage Controlled Oscillator, Function Generator, 8-Pin DIP
995	1-202	L104	IC-Freq to Voltage Converter
995M	1-202	L97	IC-Freq to Voltage Converter
996	1-203	L97	IC-Operational Transconductance Amp
997	1-203	L104	IC-Quad Op Amp
998	1-203	L16A	IC-Precision 1.2 V Voltage Reference
999	1-203	L16	IC-Adjustable Precision Shunt Regulator
999M	1-203	L97	IC-Adjustable Precision Shunt Regulator
999SM	1-203	L159	IC-Adjustable Precision Shunt Regulator
1001	—	L30	Mod-Hybrid, Lo Noise 6-Volt AF Preamp - **Disc.**
1002	1-204	L3	IC-FM/TV IF Amp
1003	1-204	L104	IC-FM/AM IF Amp
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1005	1-204	L104	IC-FM Stereo Demod - **Disc.**
1006	1-204	L104	IC-FM Stereo Demod - **Disc.**
1009	1-204	L127	IC-AF PO, 1 W
1010	1-204	L127	IC-AF PO, 2 W
1011	—	L127	IC-AF PO, 3 W - **Disc.**
1012	1-204	L20	Mod-Hybrid, CB Osc AM IF - **Disc.**
1013	1-204	L37	Mod-Hybrid, AM IF Amp/AF Preamp - **Disc.**
1014	1-204	L38	Mod-Hybrid, RF Amp/Osc of FM Wireless Mic
1015	1-204	L37	Mod-Hybrid, Lo Noise AF Preamp
1016	1-204	L37	Mod-Hybrid, AF Preamp - **Disc.**
1017	1-204	L21	Mod-Hybrid, AF Amp for Wireless Mic
1018	1-204	L44	Mod-Hybrid, TV Hor Osc/AFC - **Disc.**
1019	1-205	L37	Mod-Hybrid, Lo Noise Audio Equalizing Amp
1021	1-205	L37	Mod-Hybrid, Lo Noise Audio Equalizing Amp
1022	—	L112	IC-4-Channel Stereo Matrix Decoder - **Disc.**
1023	1-205	L134	IC-AF PO, 4 W
1024	1-205	L63	Mod-Hybrid, AF PO, 8 W - **Disc.**
1025	1-205	L65	Mod-Hybrid, AF PO, 10 W
1026	1-205	L37	Mod-Hybrid, Master Osc/Buffer for Organs - **Disc.**
1027	—	L63	Mod-Hybrid, AF PO, 13 W - **Disc.**
1028	1-205	L66	Mod-Hybrid, AF PO, 20 W (min)
1029	1-205	L155	IC-AF PO, 3.5 W
1031	1-205	L129	IC-AF PO, 0.5 W - **Disc.**
1032	1-205	L129	IC-AF PO, 1 W - **Disc.**
1033	1-205	L129	IC-AF PO, 1 W - **Disc.**
1034	—	L129	IC-AF PO, 2 W

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1036	1-205	L129	IC-AF PO, 0.7 W - **Disc.**
1037	1-205	L156	IC-AF PO, 5.5 W
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1040	1-205	L34	Mod-FM IF Amp - **Disc.**
1041	1-205	L97	IC-FM IF Amp - **Disc.**
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1043	1-206	L104	IC-AF PO, 1 W
1045	1-206	L104	IC-FM/TV Sound IF Detector/Amp - **Disc.**
1046	1-206	L104	IC-TV AFT - **Disc.**
1047	1-206	L104	IC-TV Sound IF/FM Det, AF Preamp
1048	1-206	L145	IC-Chroma Demod
1049	1-206	L112	IC-AM Radio Tuner with RF Amp
1050	1-206	L145	IC-TV Chroma Demod - **Disc.**
1051	1-206	L104	IC-TV Sound IF/FM Det, AF Preamp - **Disc.**
1052	1-206	L25	Mod-Lo Noise Audio Preamp and Equalizer - **Disc.**
1053	1-206	L8	IC-Lo Noise/Hi Gain Audio Preamp - **Disc.**
1054	1-206	L104	IC-AM/FM IF Amp - **Disc.**
1055	1-206	L104	IC-AM/FM IF Amp - **Disc.**
1056	1-207	L104	IC-FM Stereo Demod
1057	1-207	L104	IC-AM/FM IF Amp/Det/AF Preamp - **Disc.**
1058	1-207	L51	IC-AF PO, 4.4 W and Audio Preamp - **Disc.**
1059	1-207	L15	IC-AF Pwr Driver - **Disc.**
1060	1-207	L111	IC-AM RF Amp/Mxr/Osc and AF/FM IF Amp - **Disc.**
1061	1-207	L104	IC-TV AFT - **Disc.**
1062	1-207	L104	IC-TV Chroma Demod - **Disc.**
1064	1-207	L111	IC-TV Vid Sig Processor - **Disc.**
1065	1-207	L111	IC-TV Vid Sig Processor - **Disc.**
1066	1-207	L111	IC-TV Vid Sig Processor - **Disc.**
1067	1-207	L111	IC-TV Chroma Sig Processor - **Disc.**
1068	1-207	L111	IC-TV Chroma Demod - **Disc.**
1069	1-207	L112	IC-TV Chroma Processor - **Disc.**
1070	1-207	L111	IC-TV Vid Sig Processor - **Disc.**
1071	1-207	L111	IC-Chroma Demod - **Disc.**
1072	1-208	L111	IC-FM/AM IF Amp and AF Preamp - **Disc.**
1073	1-208	L111	IC-AM RF Amp/Mxr/Osc, AF/FM IF Amp - **Disc.**
1074	1-208	L104	IC-FM/AM IF Amp/AM Mxr/Osc & Tune Metr Dr - **Disc.**
1075A	1-208	L145	IC-AF PO, 1 W - **Disc.**
1076	1-208	L104	IC-TV Vid IF, AFT, Output Detector, Take-Off Ckt - **Disc.**
1077	1-208	L104	IC-TV Vert Osc, AFC/Vert Dr - **Disc.**
1079	1-208	L104	IC-Vert Osc/Dr - **Disc.**
1081A	1-208	L90	IC-AF PO, 4.8 W - **Disc.**
1082	1-208	L25	Mod-AF Equalizer and Preamp - **Disc.**
1083	1-208	L110	Mod-Hybrid, Dual Hi Gain AF Preamp - **Disc.**
1084	1-208	L112	IC-TV Vid Output, AFC, Brightness Lim, DC Contrast Cntrl - **Disc.**
1085	1-208	L24	IC-Lo Noise AF Preamp - **Disc.**
1086	1-209	L112	IC-TV Sync Sep/Hor Osc/AFC - **Disc.**
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1090	—	L66	Mod-Hybrid, AF PO, 25 W - **Disc.**
1091	1-209	L112	IC-TV Vid Amp/Inv, AGC Gate/Amp, Color T-Off - **Disc.**
1092	1-209	L25	Mod-RF/IF Amp to 150 MHz - **Disc.**
1093	1-209	L145	IC-AF PO, 1 W - **Disc.**
1094	1-209	L104	IC-TV Chroma Amp - **Disc.**
1095	1-209	L143	IC-AF PO, 1 W - **Disc.**
1096	1-209	L143	IC-TV AFT - **Disc.**
1097	1-209	L143	IC-AF PO, 1 W - **Disc.**
1098	1-209	L14	IC-AF PO, 5 W - **Disc.**
1099	1-209	L104	IC-TV Chroma Demod - **Disc.**
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1103	1-210	L24	Mod-Gen Purp Audio Preamp/Voltage Amp - **Disc.**
1104	1-210	L23	Mod-Hi-Freq Amp to 100 MHz
1106	1-210	L112	IC-FM Stereo Demod - **Disc.**
1107	1-210	L134	IC-AF PO, 4.8 W - **Disc.**
1108	1-210	L104	IC-AM/FM IF Amp/Det/AF Preamp - **Disc.**
1109	1-210	L105	IC-TV Lo Level Vid Det - **Disc.**
1112	1-210	L104	IC-AF PO, 2.2 W - **Disc.**
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1119	1-211	L30	Mod-Hybrid, 2-Stage Audio Amp/Dr - **Disc.**
1120	1-211	L30	Mod-Hybrid, Audio Dr - **Disc.**
1121	1-211	L111	IC-TV Chroma Sync System - **Disc.**
1122	1-211	L104	IC-TV Chroma Demod - **Disc.**
1123	1-211	L111	IC-TV Subcarrier Generator - **Disc.**
1124	1-211	L112	IC-AM/FM IF Amp - **Disc.**
1125	—	—	IC-Replacement for AN216 - **Disc.**
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1128	1-211	L24	IC-TV Video IF
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1131	—	L112	IC-TV Chroma Processor/Sig Amp - **Disc.**
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1179	1-214	L97	IC-AF Preamp
1180	1-214	L144	IC-AF PO, 1.5 W
1181	1-214	L111	IC-MPX Decoder - **Disc.**
1182	1-214	L111	IC-TV Chroma Sig Processor - **Disc.**
1184	1-214	L111	IC-AF Preamp - **Disc.**
1185	1-214	L90	IC-AF PO, 3.5 W - **Disc.**
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1217	1-217	L111	IC-FM Stereo Decoder (PLL)
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1226	1-217	L104	IC-FM Stereo Multiplex Demodulator
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1230	1-217	L111	IC-FM Stereo Multiplex Demodulator - **Disc.**
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1231A	1-218	L111	IC-TV Sound IF and AF PO
1232	1-218	L19	IC-AF PO, 8 W
1233	1-218	L111	IC-CB PLL Freq Synthesizer - **Disc.**
1234	1-218	L24	IC-FM IF and TV Sound IF Amp
1235	1-218	L24	IC-Squelch Amp - **Disc.**
1236	1-218	L104	IC-TV/FM Sound IF
1239	1-218	L83	IC-AF PO, 5.5 W and CB Mod - **Disc.**
1240	1-218	L54	IC-AF PO, 5.5 W and CB Mod
1241	1-219	L26	IC-Head Coil and Meter Driver - **Disc.**
1242	1-219	L111	IC-AM/FM IF AM Converter

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1243	1-219	L105	IC-FM Stereo Multiplex Decoder
1245	1-219	L89	IC-TV Vert Defl
1246	1-219	L145	IC-TV Sound IF, AF PO
1247	1-219	L43	IC-Voltage Controlled Osc
1248	1-219	L112	IC-FM Stereo Demod
1249	1-219	L27	IC-Balanced Demodulator
1250	1-219	L111	IC-TV AFT - **Disc.**
1251	—	L137	IC-Voltage Regulator - **Disc.**
1253	1-219	L121	IC-CB PLL Freq Synthesizer (CMOS)
1254	1-219	L122	IC-CB PLL Freq Synthesizer (CMOS)
1256	—	L84	IC-AF PO, 5.8 W - **Disc.**
1257	1-219	L145	IC-FM IF, Det, AF PO, 2 W
1258	—	L148	IC-TV Vertical Hold, Osc, Output - **Disc.**
1260	—	L83	IC-AF PO, 5.5 W - **Disc.**
1261	—	L82	IC-AF PO, 5.5 W - **Disc.**
1262	1-220	L43	IC-CB Voltage Controlled Osc - **Disc.**
1263	1-220	L112	IC-VCR Record/Playback Ckt
1264	1-220	L111	IC-VCR Luminance Ckt
1265	1-220	L116	IC-VCR Noise Suppression Ckt
1266	1-220	L111	IC-VCR Chroma Processor - **Disc.**
1267	1-220	L111	IC-VCR Dropout Compensator - **Disc.**
1268	1-220	L124	IC-VCR DC Servo Control - **Disc.**
1269	1-220	L124	IC-VCR Color Processor - **Disc.**
1270	1-222	L122	IC-VCR Motor Drive
1271	1-222	L77	IC-VCR Control Voltage Generator
1272	1-221	L111	IC-PLL Freq Synthesizer
1273	1-221	L119	IC-Dual Channel AF PO, 5 W/Channel - **Disc.**
1275	1-221	L90	IC-AF PO, 5.8 W - **Disc.**
1276	—	—	Mod-CB Voltage Controlled Osc - **Disc.**
1277	—	—	IC-Dual Channel AF PO, 3.5 W/Channel
1278	1-221	L85	IC-AF PO, 5.8 W
1279	1-221	L64	Mod-AF PO, 50 W
1280	1-221	L64	Mod-AF PO, 35 W
1281	1-221	L64	Mod-AF PO, 50 W
1282	1-221	L64	Mod-AF PO, 35 W
1283	—	L83	IC-AF PO, 5.3 W - **Disc.**
1284	—	L82	IC-AF PO, 5.3 W - **Disc.**
1285	—	L49	IC-AF PO, 5.8 W - **Disc.**
1286	1-221	L50	IC-AF PO, 5.8 W
1288	1-221	L19	IC-AF PO, 10 W
1289	1-221	L131	IC-TV Vertical Deflection System
1290	1-221	L111	IC-AM Receiver Subsystem - **Disc.**
1291	—	L59	IC-Dual Audio Pwr Amp, 5.5 W/Ch - **Disc.**
1292	—	L104	IC-IF Amp/Detector - **Disc.**
1293	—	L57	IC-Dual AF Pwr Amp, 7 W/Ch - **Disc.**
1294	1-221	L97	IC-AF PO, 2 W, VCC=3 V to 12 V, RL= 8 Ω
1295	1-221	L115	IC-TV Signal Processor
1296	1-222	L114	IC-TV Chroma Processor/Demodulator
1297	1-222	L121	IC-TV Color Signal Processor/Demodulator
1298	—	L111	IC-TV Signal Processor - **Disc.**
1299	1-222	L122	IC-TV Signal Processor
1300	1-223	L35	IC-TV Remote Control
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1302	1-223	L28	IC-Audio Preamp (2-Stage)
1303	1-223	L141	IC-AF PO, 0.5 W - **Disc.**
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1306	1-223	L153	IC-TV Video IF - **Disc.**
1307	1-223	L153	IC-TV Chroma Processor
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1309	1-223	L28	IC-FM IF - **Disc.**
1310	1-223	L142	IC-FM/AM IF, AGC - **Disc.**
1311	1-223	L152	IC-Noise Cancelling Amp - **Disc.**
1312	1-223	L104	IC-TV Vert Osc, Amp - **Disc.**
1314	1-224	L115	IC-VCR Sync Sep/AFC/90° Rotary Circuit - **Disc.**
1315	1-224	L75C	Mod-Dual AF PO, 35 W/Channel, VCC=± 30 V
1316	1-224	L75C	Mod-Dual AF PO, 50 W/Channel, VCC=± 35 V
1317	1-224	L75B	Mod-Dual AF PO, 50 W/Channel, VCC=± 35.5 V
1318	1-224	L53B	Mod-VCR Positive DC VR, 2-Output: 9.5 V @1.6 A, 15 V @ 2.5 A
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1321	—	L64	Mod-AF PO, 55 W - **Disc.**
1322	1-224	L62	Mod-AF PO, 80 W
1323	—	L63	Mod-AF PO, 15 W - **Disc.**
1324	—	L74	Mod-Dual AF PO, 10 W/Channel - **Disc.**
1325	—	L74	Mod-Dual AF PO, 20 W/Channel - **Disc.**
1326	1-224	L66	Mod-AF PO, 22 W
1327	1-224	L66	Mod-AF PO, 35 W
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1329	1-224	L70	Mod-Dual AF PO, 20 W/Channel - **Disc.**
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1339	1-225	L68	Mod-High Power Dual AF Driver Amp
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1346	1-225	L62	Mod-Darlington Pwr Pack, 60 W, VCC= ±40 V, RL = 8Ω
1348	—	L60	Mod-AF PO, 20 W, VCC= ±23 V, RL= 8 Ω - **Disc.**
1349	—	L67	Mod-AF PO, 20 W, VCC= ±20 V, RL= 8 Ω - **Disc.**
1356	1-225	L73	Mod-Dual AF PO, 25 W, VCC= ±25 V, RL= 8 Ω
1357	1-226	L64	Mod-Pwr Darlington, 40 W, VCC= ±33 V, RL = 8 Ω
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1393	1-227	L82	IC-AF PO, 7 W, VCC = 22 V, RL= 8 Ω
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1395	1-227	L92	IC-Dual AF PO, 5.8 W, VCC = 13.2 V, RL= 4 Ω
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1411	1-229	L124	IC-TV Video IF, AGC, AFT
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1413	1-229	L111	IC-VIF Video AGC Amp w/ AFT
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1421	1-230	L41	IC-VCR Freq Divider
1422	1-230	L154	IC-VCR Video Signal Processor - **Disc.**
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1447	1-232	L111	IC-FM Noise Canceller (Auto Ignition) - **Disc.**
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1449	1-232	L32	IC-Lo Noise Equalr Amp, VCC=30 V, VG= 89 dB - **Disc.**
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1451	1-232	L104	IC-Dual Channel Equalizer Amp, VCC= 30 V, VG= 89 dB - **Disc.**
1452	1-232	L27	IC-AF PO, 1 W, VCC= 9 V, RL= 8 Ω
1453	1-232	L104	IC-Dual Channel Equalizer Amp, VCC= 15 V, VG= 86 dB
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1455	1-232	L104	IC-Dual Channel Equalizer Amp, VCC= 20 V, VG= 90 dB - **Disc.**
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1867	1-263	L20B	IC-Hybrid Voltage Regulator (12 V)
1868	1-263	L20B	IC-Hybrid Voltage Regulator (13 V)
1869	1-263	L17C	IC-Adjustable Voltage Regulator; 1.5 V to 25 V
1869SM	1-263	L161	IC-Adjustable Voltage Regulator; 1.5 V to 25 V
1870	1-263	L70A	Mod-Switching Regulator
1871	1-264	L75B	Mod-Dual AF PO 50 W, VCC= ± 35 V, RL= 8 Ω
1872	1-264	L69A	Mod-VCR Pos DC VR: 15 V or 13 V @ 1 A, 5.8 V @ 0.5 A, 12 V @ 1 A, 5.1 V @ 1 A
1873	1-264	L24	IC-2 Input Audio/Video Switch
1874	1-264	L75B	Mod-Dual AF PO 15 W, VCC= ± 20 V, RL= 8 Ω
1875	1-264	L73	Mod-Dual AF PO 30 W, VCC= ± 30 V, RL= 8 Ω **- Disc.**
1876	1-264	L69A	Mod-VCR Pos DC VR: 13 V @ 1.5 A, 9.5 V @ 1.5 A, 12 V @ 1.5 A, 6 V @ .5 A
1877	1-264	L75B	Mod-Dual AF PO 28 W, VCC= ± 35 V, RL= 4 Ω
1878	1-264	L68A	Mod-2-Channel Audio Driver for 40-50 W AF PO
1879	1-264	L69	Mod-Dual AF PO 18 W, VCC= ± 24 V, RL= 8 Ω
1880	1-264	L60A	Mod-VCR Pos DC VR: 13 V @ 1 A, 6.05 V @ 1 A, 5.1 V @ .5 A
1882	1-265	L70B	Mod-Dual AF PO 100 W, VCC= ± 51 V, RL= 8 Ω
1883	1-265	L60B	Mod-VCR Pos DC VR: 12.1 V @ .8 A, 12 V @ 0.8 A, 5.3 V @ 1 A
1884	1-265	L67C	Mod-VCR Pos DC VR: 12.3 V @ 1 A, 12.2 V @ 1 A, 5.3 V @ 1 A
1885	1-265	L75B	Mod-4 Phase Stepping Motor Driver
1886	—	L20B	IC-TV Voltage Regulator (100V) **-Disc.**
1887	1-265	L93A	IC-Horizontal/Vertical Deflection Output **- Disc.**
1888	1-265	L112	IC-Horizontal/Vertical Deflection Output
1889	1-265	L115	IC-AM-FM IF Amp and AM Tuner
1890	1-265	L122	IC-TV Signal Processor, VCC= 12 V
1891	1-265	L91A	IC-DC Motor Drive with Speed Control **- Disc.**
1892	1-265	L91A	IC-Dual Bidirectional Motor Drive
1893	1-266	L47B	IC-Three Phase Motor Driver
1894	1-266	L19B	IC-TV Voltage Regulator (41.8 V)
1895	1-266	L19B	IC-TV Voltage Regulator (41.8 V)
1896	1-266	L19B	IC-TV Voltage Regulator (115 V)
1897	1-266	L19B	IC-TV Voltage Regulator (125 V)
1898	1-266	L92A	IC-Dual 5.8 W/Ch AF PO, VCC=13.2 V, RL = 4 Ω
1899	1-266	L92A	IC-Dual 5.8 W/Ch AF PO, VCC=13.2 V, RL = 4 Ω
1900	1-267	L16	IC-Pos VR, 3 Terminal, adjustable, 1.2 to 37 V, 100 mA
1901	1-267	L16	IC-Neg VR, 3 Terminal, adjustable, -1.2 to -37 V, 100 mA
1902	1-267	L16	IC-Pos VR, 3 Terminal, 9 V, 100 mA
1903	1-267	L16	IC-Neg VR, 3 Terminal, -12 V, 100 mA
● 1904	1-267	L17	IC-Pos VR Lo Dropout, 3.3 V, 1A
1905	1-267	L16	IC-Neg VR, 3 Terminal, -15 V, 100 mA
1906	1-267	L16	IC-Pos VR, 3 Terminal, 18 V, 100 mA
1907	1-267	L16	IC-Neg VR, 3 Terminal, -18 V, 100 mA
1908	1-267	L16	IC-Pos VR, 3 Terminal, 24 V, 100 mA
1909	1-267	L16	IC-Neg VR, 3 Terminal, -24 V, 100 mA
1910	1-267	L17	IC-Pos VR, 3 Terminal, 1.2 to 3.7 V, 100 mA
1911	1-267	L11	IC-Neg VR, 3 Terminal, adjustable, -1.2 to -37 V, 1.5 A
1912	1-267	L11	IC-Pos VR, 3 Terminal, 12 V, 3 A
1913	1-267	L11	IC-Neg VR, 3 Terminal, -5 V, 1.5 A
1914	1-267	L11	IC-Pos VR, 3 Terminal, 12 V, 1.5 A
1915	1-267	L11	IC-Neg VR, 3 Terminal, -12 V, 1.5 A
1916	1-267	L11	IC-Pos VR, 3 Terminal, 15 V, 1.5 A
1917	1-267	L16	IC-Neg VR, 3 Terminal, -5 V, 100 mA
1918	1-267	L11	IC-Pos VR, 3 Terminal, 15 V, 3 A
1919	1-267	L11	IC-Neg VR, 3 Terminal, -15 V, 1.5 A
1920	—	L11	IC-Pos VR, 3 Terminal, 18 V, 1.5 A **- Disc.**
1923	1-267	L11	IC-Neg VR, 3 Terminal, -18 V, 1.5 A
1924	1-267	L11	IC-Pos VR, 3 Terminal, 24 V, 1.5 A
1925	1-267	L11	IC-Neg VR, 3 Terminal, -24 V, 1.5 A
1927	1-267	L11B	IC-Neg VR, 4 Terminal, adjustable, -2.2 to -30 V, 1 A
1928	1-267	L3	IC-Pos VR, Adjustable, 4.5 to 30 V, 12 mA
1930	1-267	L98	IC-Pos VR, Adjustable, 5 to 37 V, 25 mA
1932	1-268	L17	IC-Pos VR, 10 V, 1 A
1934	1-268	L17A	IC-Pos VR, 3 Terminal, 5 V, 2 A
1934X	1-268	L17A	IC-Pos VR, 5 V, 2 A
1936	1-268	L17A	IC-Pos VR, 3 Terminal, 12 V, 2 A
1938	1-268	L17A	IC-Pos VR, 3 Terminal, 15 V, 2 A
1940	1-268	L17A	IC-Pos VR, 3 Terminal, 24 V, 2 A
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1942	1-268	L19	IC-Positive VR, Adjustable 3 to 36 V, 2 A
1951	1-267	L17	IC-Positive VR Lo Drop Out, 5 V, 1 A
1952	1-267	L17	IC-Positive VR Lo Drop Out, 8 V, 1 A
1953	1-267	L17	IC-Positive VR Lo Drop Out, 10 V, 1 A
1954	1-267	L17	IC-Positive VR Lo Drop Out, 12 V, 1 A
1955	1-267	L17	IC-Positive VR Lo Drop Out, 15 V, 1 A
1956	1-267	L17	IC-Positive VR Lo Drop Out, 24 V, 1 A
1960	1-268	L163	IC-Pos VR, 5 V, 1 A
1961	1-268	L163	IC-Neg VR, -5 V, 1 A
1962	1-268	L163	IC-Pos VR, 6 V, 1 A
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1964	1-268	L163	IC-Pos VR, 8 V, 1 A
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1966	1-268	L163	IC-Pos VR, 9 V, 1 A
1967	1-268	L163	IC-Neg VR, -9 V, 1 A
1968	1-268	L163	IC-Pos VR, 10 V, 1 A
1970	1-268	L163	IC-Pos VR, 12 V, 1 A
1971	1-268	L163	IC-Neg VR, -12 V, 1 A
1972	1-268	L163	IC-Pos VR, 15 V, 1 A
1973	1-268	L163	IC-Neg VR, -15 V, 1 A
1974	1-268	L163	IC-Pos VR, 18 V, 1 A
1975	1-268	L163	IC-Neg VR, -18 V, 1 A
1976	1-268	L163	IC-Pos VR, 24 V, 1 A
1977	1-268	L163	IC-Neg VR, -24 V, 1 A
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2001	—	—	IC-Dolby Circuit
2002	—	—	IC-Dolby Circuit **- Disc.**
2003	—	—	IC-Dolby Circuit **- Disc.**
2004	—	—	IC-Dolby Circuit
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2012	1-358	D8	IC-7 Channel PMOS Input Driver **- Disc.**
2013	1-358	D8	IC-7 Channel CMOS/TTL Input Driver **- Disc.**
2014	1-358	D8	IC-7 Channel CMOS/PMOS Input Driver **- Disc.**
2015	1-358	D8	IC-7 Channel CMOS/TTL Input Driver **- Disc.**
2016	1-358	D10	IC-8 Channel MOS/TTL Input Driver
2017	1-358	D10	IC-8 Channel PMOS Input Driver
2018	1-358	D10	IC-8 Channel CMOS/TTL Input Driver
2019	1-358	D10	IC-8 Channel CMOS/PMOS Input Driver
2020	1-358	D10	IC-8 Channel CMOS/TTL Input Driver **- Disc.**
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2022	1-358	D10	IC-8 Digit/Segment Display Driver
2023	1-358	D8	IC-7 Segment Display Driver
2024	1-358	D15	IC-2 Digit BCD-to-Seven-Segment Decoder Driver
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2328	1-52	T48-2	T-NPN, Si, HV, Power Amp (Compl to ECG2329)
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2334	1-53	T41	T-NPN, Darl, 60 V, 5 A, w/Damper Diode, Int Zener Cntrl, Driver, Sw, tf= 1.5 µs
2335	1-53	T48-1	T-NPN, Si, 60 V, 5 A, Int Zener Cntrl, Series Regulator
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2337	1-53	T41-1	T-NPN, Si, HV, Hi Speed Sw, tf= .3 µs Max
2338	1-53	T45	T-NPN, Darl, 60 V, 2 A, w/Damper Diode, Int Zener Cntrl, Amp, Sw, tf= 1 µs
2339	1-53	T41-1	T-NPN, Si, HV, Hi Speed Sw, tf= .3 µs Max
2340	1-53	T45-1	T-NPN, Darl, 60 V, 8 A, w/Damper Diode, Int Zener Cntrl, Driver, Sw, tf= 1 µs
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2373	1-67	T41	MOSFET-P-Ch, Enhancement, Hi Speed Sw
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2388	1-68	T41	MOSFET-N-Ch, Enhancement, Hi Speed Sw
2389	1-67	T41	MOSFET-N-Ch, Enhancement, Hi Speed Sw
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2391	1-68	T41	MOSFET-N-Ch, Enhancement, Hi Speed Sw
2392	1-67	T28	MOSFET-N-Ch, Enhancement, Hi Speed Sw
2393	1-69	T48	MOSFET-N-Ch, Enhancement, Hi Speed Sw
2394	1-69	T48	MOSFET-N-Ch, Enhancement, Hi Speed Sw
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5847	1-118	Z19	R-800 PRV, 3 A, Anode Case
5848	1-118	Z19	R-1000 PRV, 3 A, Cath Case
5849	1-118	Z19	R-1000 PRV, 3 A, Anode Case
5850	1-118	Z19	R-50 PRV, 6 A, Cath Case
5851	1-118	Z19	R-50 PRV, 6 A, Anode Case
5854	1-118	Z19	R-200 PRV, 6 A, Cath Case
5855	1-118	Z19	R-200 PRV, 6 A, Anode Case
5858	1-118	Z19	R-400 PRV, 6 A, Cath Case
5859	1-118	Z19	R-400 PRV, 6 A, Anode Case
5862	1-118	Z19	R-600 PRV, 6 A, Cath Case
5863	1-118	Z19	R-600 PRV, 6 A, Anode Case
● 5864	1-118	Z19	R-200 PRV, 25A, Cath Case
● 5865	1-118	Z19	R-200 PRV, 25A, Anode Case
5866	1-118	Z19	R-800 PRV, 6 A, Cath Case
5867	1-118	Z19	R-800 PRV, 6 A, Anode Case
5868	1-118	Z19	R-1000 PRV, 6 A, Cath Case
5869	1-118	Z19	R-1000 PRV, 6 A, Anode Case
5870	1-118	Z19	R-50 PRV, 12 A, Cath Case
5871	1-118	Z19	R-50 PRV, 12 A, Anode Case
5874	1-118	Z19	R-200 PRV, 12 A, Cath Case
5875	1-118	Z19	R-200 PRV, 12 A, Anode Case
5878	1-118	Z19	R-400 PRV, 12 A, Cath Case
5879	1-118	Z19	R-400 PRV, 12 A, Anode Case
5882	1-118	Z19	R-600 PRV, 12 A, Cath Case
5883	1-118	Z19	R-600 PRV, 12 A, Anode Case
● 5884	1-118	Z19	R-600 PRV, 25A, Cath Case
● 5885	1-118	Z19	R-600 PRV, 25A, Anode Case
5886	1-118	Z19	R-800 PRV, 12 A, Cath Case
5887	1-118	Z19	R-800 PRV, 12 A, Anode Case
● 5888	1-118	Z19	R-1200 PRV, 25A, Cath Case
● 5889	1-118	Z19	R-1200 PRV, 25A, Anode Case
5890	1-118	Z19	R-1000 PRV, 12 A, Cath Case
5891	1-118	Z19	R-1000 PRV, 12 A, Anode Case
5892	1-118	Z19	R-50 PRV, 16 A, Cath Case
5893	1-118	Z19	R-50 PRV, 16 A, Anode Case
5896	1-118	Z19	R-200 PRV, 16 A, Cath Case
5897	1-118	Z19	R-200 PRV, 16 A, Anode Case
5900	1-118	Z19	R-400 PRV, 16 A, Cath Case
5901	1-118	Z19	R-400 PRV, 16 A, Anode Case
5904	1-118	Z19	R-600 PRV, 16 A, Cath Case
5905	1-118	Z19	R-600 PRV, 16 A, Anode Case
● 5906	1-119	Z20	R-1200 PRV, 40A, Cath Case
● 5907	1-119	Z20	R-1200 PRV, 40A, Anode Case
5908	1-118	Z19	R-800 PRV, 16 A, Cath Case
5909	1-118	Z19	R-800 PRV, 16 A, Anode Case
5910	1-118	Z19	R-1000 PRV, 16 A, Cath Case
5911	1-118	Z19	R-1000 PRV, 16 A, Anode Case
5912	1-118	Z19	R-50 PRV, 20 A, Cath Case
5913	1-118	Z19	R-50 PRV, 20 A, Anode Case
5916	1-118	Z19	R-200 PRV, 20 A, Cath Case
5917	1-118	Z19	R-200 PRV, 20 A, Anode Case
5920	1-118	Z19	R-400 PRV, 20 A, Cath Case
5921	1-118	Z19	R-400 PRV, 20 A, Anode Case
5924	1-118	Z19	R-600 PRV, 20 A, Cath Case
5925	1-118	Z19	R-600 PRV, 20 A, Anode Case
● 5926	1-119	Z20	R-1200 PRV, 60A, Cath Case
● 5927	1-119	Z20	R-1200 PRV, 60A, Anode Case

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5928	1-118	Z19	R-800 PRV, 20 A, Cath Case
5929	1-118	Z19	R-800 PRV, 20 A, Anode Case
● 5930	1-119	Z20	R-1200 PRV, 70 A, Cath Case
● 5931	1-119	Z20	R-1200 PRV, 70 A, Anode Case
5932	1-118	Z19	R-1000 PRV, 20 A, Cath Case
5933	1-118	Z19	R-1000 PRV, 20 A, Anode Case
5940	1-118	Z20	R-50 PRV, 15 A, Cath Case
5941	1-118	Z20	R-50 PRV, 15 A, Anode Case
5944	1-118	Z20	R-200 PRV, 15 A, Cath Case
5945	1-118	Z20	R-200 PRV, 15 A, Anode Case
5948	1-118	Z20	R-400 PRV, 15 A, Cath Case
5949	1-118	Z20	R-400 PRV, 15 A, Anode Case
5952	1-118	Z20	R-600 PRV, 15 A, Cath Case
5953	1-118	Z20	R-600 PRV, 15 A, Anode Case
5962	1-118	Z27	R-400 PRV, 25 A, Cath Case, Press Fit
5963	1-118	Z27	R-400 PRV, 25 A, Anode Case, Press Fit
5966	1-118	Z27	R-800 PRV, 25 A, Cath Case, Press Fit
5967	1-118	Z27	R-800 PRV, 25 A, Anode Case, Press Fit
5980	1-119	Z20	R-50 PRV, 40 A, Cath Case
5981	1-119	Z20	R-50 PRV, 40 A, Anode Case
5982	1-119	Z20	R-100 PRV, 40 A, Cath Case
5983	1-119	Z20	R-100 PRV, 40 A, Anode Case
5986	1-119	Z20	R-200 PRV, 40 A, Cath Case
5987	1-119	Z20	R-200 PRV, 40 A, Anode Case
5988	1-119	Z20	R-300 PRV, 40 A, Cath Case
5989	1-119	Z20	R-300 PRV, 40 A, Anode Case
5990	1-119	Z20	R-400 PRV, 40 A, Cath Case
5991	1-119	Z20	R-400 PRV, 40 A, Anode Case
5992	1-119	Z20	R-500 PRV, 40 A, Cath Case
5993	1-119	Z20	R-500 PRV, 40 A, Anode Case
5994	1-119	Z20	R-600 PRV, 40 A, Cath Case
5995	1-119	Z20	R-600 PRV, 40 A, Anode Case
5998	1-119	Z20	R-800 PRV, 40 A, Cath Case
5999	1-119	Z20	R-800 PRV, 40 A, Anode Case
6002	1-119	Z20	R-1000 PRV, 40 A, Cath Case
6003	1-119	Z20	R-1000 PRV, 40 A, Anode Case
6004	1-119	Z20	R-1600 PRV, 40 A, Cath Case
6005	1-119	Z20	R-1600 PRV, 40 A, Anode Case
6006	1-120	Z20	R-200 PRV, 40 A, 200 ns, Cath Case, Fast Recovery
6007	1-120	Z20	R-200 PRV, 40 A, 200 ns, Anode Case, Fast Recovery
6008	1-120	Z20	R-400 PRV, 40 A, 200 ns, Cath Case, Fast Recovery
6009	1-120	Z20	R-400 PRV, 40 A, 200 ns, Anode Case, Fast Recovery
6010	1-120	Z20	R-600 PRV, 40 A, 200 ns, Cath Case, Fast Recovery
6011	1-120	Z20	R-600 PRV, 40 A, 200 ns, Anode Case, Fast Recovery
6013	1-118	Z41B	R-600 PRV, 12 A, Isolated Tab
6020	1-119	Z20	R-50 PRV, 60 A, Cath Case
6021	1-119	Z20	R-50 PRV, 60 A, Anode Case
6022	1-119	Z20	R-100 PRV, 60 A, Cath Case
6023	1-119	Z20	R-100 PRV, 60 A, Anode Case
6026	1-119	Z20	R-200 PRV, 60 A, Cath Case
6027	1-119	Z20	R-200 PRV, 60 A, Anode Case
6032	1-120	Z20	R-1000 PRV, 40 A, 500ns, Cath Case, Fast Recovery
6033	1-120	Z20	R-1000 PRV, 40 A, 500ns, Anode Case, Fast Recovery
6034	1-119	Z20	R-400 PRV, 60 A, Cath Case
6035	1-119	Z20	R-400 PRV, 60 A, Anode Case
6036	1-120	Z20	R-600 PRV, 85 A, 200ns, Cath Case, Fast Recovery
6037	1-120	Z20	R-600 PRV, 85 A, 200ns, Anode Case, Fast Recovery
6040	1-119	Z20	R-600 PRV, 60 A, Cath Case
6041	1-119	Z20	R-600 PRV, 60 A, Anode Case
6042	1-119	Z20	R-800 PRV, 60 A, Cath Case
6043	1-119	Z20	R-800 PRV, 60 A, Anode Case
6044	1-119	Z20	R-1000 PRV, 60 A, Cath Case
6045	1-119	Z20	R-1000 PRV, 60 A, Anode Case
6046	1-120	Z20	R-1000 PRV, 85 A, 500ns, Cath Case, Fast Recovery
6047	1-120	Z20	R-1000 PRV, 85 A, 500ns, Anode Case, Fast Recovery
6048	1-119	Z20	R-50 PRV, 70 A, Cath Case
6049	1-119	Z20	R-50 PRV, 70 A, Anode Case
6050	1-119	Z20	R-100 PRV, 70 A, Cath Case
6051	1-119	Z20	R-100 PRV, 70 A, Anode Case
6054	1-119	Z20	R-200 PRV, 70 A, Cath Case
6055	1-119	Z20	R-200 PRV, 70 A, Anode Case
6060	1-119	Z20	R-400 PRV, 70 A, Cath Case
6061	1-119	Z20	R-400 PRV, 70 A, Anode Case
6064	1-119	Z20	R-600 PRV, 70 A, Cath Case
6065	1-119	Z20	R-600 PRV, 70 A, Anode Case
6068	1-119	Z20	R-800 PRV, 70 A, Cath Case
6069	1-119	Z20	R-800 PRV, 70 A, Anode Case
6070	1-119	Z20	R-1600 PRV, 85 A, Cath Case
6071	1-119	Z20	R-1600 PRV, 85 A, Anode Case
6072	1-119	Z20	R-1000 PRV, 70 A, Cath Case
6073	1-119	Z20	R-1000 PRV, 70 A, Anode Case
6074	1-119	Z20	R-200 PRV, 85 A, Cath Case
6075	1-119	Z20	R-200 PRV, 85 A, Anode Case
6076	1-119	Z20	R-600 PRV, 85 A, Cath Case
6077	1-119	Z20	R-600 PRV, 85 A, Anode Case
6078	1-119	Z20	R-1200 PRV, 85 A, Cath Case
6079	1-119	Z20	R-1200 PRV, 85 A, Anode Case
6080	1-121	Z41A	R-Schottky Barrier, 60 V, 10 A
6081	1-121	Z41A	R-Schottky Barrier, 45 V, 16 A
6082	1-121	Z41A	R-Schottky Barrier, 60 V, 16 A
6083	1-121	Z41A	R-Schottky Barrier, 45 V, 10 A

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6086	1-121	Z41B	R-Dual Schottky Barrier, 100 V PRV, 20 A, Common Cathode
6087	1-121	Z41B	R-Dual Schottky Barrier, 45 V PRV, 30 A, Common Cathode
6088	1-121	Z41B	R-Dual Schottky Barrier, 60 V PRV, 30 A, Common Cathode
6090	1-121	Z41C	R-Dual Schottky Barrier, 45 V PRV, 30 A, Common Cathode
6091	1-121	Z70A	R-Dual Schottky Barrier, 45 V PRV, 40 A, Common Cathode
6092	1-121	Z70A	R-Dual Schottky Barrier, 60 V PRV, 40 A, Common Cathode
6094	1-121	Z20	R-Schottky Barrier Rect, 45 PRV, 60 A, Cath Case
6102	1-119	Z31	R-600 PRV, 550 A, Cath Case
6103	1-119	Z31	R-600 PRV, 550 A, Anode Case
6104	1-119	Z31	R-1200 PRV, 550 A, Cath Case
6105	1-119	Z31	R-1200 PRV, 550 A, Anode Case
6106	1-119	Z31	R-1600 PRV, 450 A, Cath Case
6107	1-119	Z31	R-1600 PRV, 450 A, Anode Case
6108	1-119	Z31	R-1600 PRV, 550 A, Cath Case
6109	1-119	Z31	R-1600 PRV, 550 A, Anode Case - **Disc.**
6110	1-119	Z32	R-600 PRV, 500 A
6111	1-119	Z72	R-600 PRV, 1100 A - **Disc.**
6112	1-119	Z32	R-1200 PRV, 500 A
6113	1-119	Z33	R-600 PRV, 1200 A
6114	1-119	Z72	R-1600 PRV, 1100 A
6115	1-119	Z33	R-1200 PRV, 1200 A
6116	1-119	Z34	R-600 PRV, 2200 A
6118	1-119	Z34	R-1200 PRV, 2200 A - **Disc.**
6120	1-119	Z32	R-1600 PRV, 500 A
6121	1-119	Z33	R-1600 PRV, 1200 A
6122	1-119	Z34	R-1600 PRV, 2200 A
6128	1-120	Z32	R-1400 PRV, 430 A, 1 µs
6129	1-120	Z33	R-1600 PRV, 700 A, 2 µs - **Disc.**
6130	1-120	Z29	R-1000 PRV, 150 A, 1 µs, Cath Case
6131	1-120	Z29	R-1000 PRV, 150 A, 1 µs, Anode Case
6132	1-120	Z29	R-1400 PRV, 150 A, 1.5 µs, Cath Case
6133	1-120	Z29	R-1400 PRV, 150 A, 1.5 µs, Anode Case
6154	1-119	Z29	R-400 PRV, 150 A, Cath Case
6155	1-119	Z29	R-400 PRV, 150 A, Anode Case
6156	1-119	Z29	R-600 PRV, 150 A, Cath Case
6157	1-119	Z29	R-600 PRV, 150 A, Anode Case
6158	1-119	Z29	R-1000 PRV, 150 A, Cath Case
6159	1-119	Z29	R-1000 PRV, 150 A, Anode Case
6162	1-119	Z29	R-1400 PRV, 150 A, Cath Case
6163	1-119	Z29	R-1400 PRV, 150 A, Anode Case
6164	1-119	Z29	R-1600 PRV, 150 A, Cath Case
6165	1-119	Z29	R-1600 PRV, 150 A, Anode Case
6200	1-117	Z43	R-200 PRV, 30 A, Cath Case - **Disc.**
6202	1-117	Z43	R-400 PRV, 30 A, Cath Case - **Disc.**
6204	1-117	Z43	R-600 PRV, 30 A, Cath Case - **Disc.**
6206	1-117	Z43	R-200 PRV, 30 A, 200 ns, Cath Case
6208	1-117	Z43	R-400 PRV, 30 A, 200 ns, Cath Case
6210	1-117	Z43	R-600 PRV, 30 A, 200 ns, Cath Case
6220	1-166	M1	Rectifier Mod, 1200 V, 60 A
6222	1-166	M1	Rectifier Mod, 1600 V, 60 A
6230	1-166	M1	Rectifier Mod, 1200 V, 95 A
6232	1-166	M1	Rectifier Mod, 1600 V, 100 A
6234	1-166	M1-1	Rectifier Mod, 1600 V, 195 A
6236	1-166	M6	Rectifier Mod, 1600 V, 250 A - **Disc.**
6238	1-166	M6	Rectifier Mod, 1600 V, 320 A - **Disc.**
6240	1-117	Z41B	R-Si, Dual 200 V PRV, 16 A, Trr= 35 ns, Common Cathode
6241	1-117	Z41B	R-Si, Dual 600 V PRV, 16 A, Trr= 50 ns, Common Cathode
6244	1-117	Z41B	R-Si, Dual 200 V PRV, 16 A, Trr= 35 ns, Common Anode
6245	1-120	Z41A	R-Si, 1200 V PRV, 8 A, Trr= 100 ns
6246	1-117	Z41C	R-Si, Dual 200 V PRV, 30 A, Trr= 35 ns, Common Cathode
6247	1-117	Z41C	R-Si, Dual 600 V PRV, 30 A, Trr= 60 ns, Common Cathode
6248	1-120	Z41A	R-Si, 600 V PRV, 16 A, Trr= 50 ns
6249	1-120	Z70	R-Si, 600 V PRV, 60 A, Trr= 35 ns
6250	1-120	Z70	R-Si, 1000 V PRV, 60 A, Trr= 35 ns
• 6251	1-117	Z70A	R-Si, Dual 200 V PRV, 30 A, Trr= 50 ns, Common Cathode
• 6252	1-117	Z70A	R-Si, Dual 600 V PRV, 30 A, Trr= 50 ns, Common Cathode
6354	1-119	Z30	R-400 PRV, 300 A, Cath Case
6355	1-119	Z30	R-400 PRV, 300 A, Anode Case
6356	1-119	Z30	R-600 PRV, 300 A, Cath Case
6357	1-119	Z30	R-600 PRV, 300 A, Anode Case
6358	1-119	Z30	R-1000 PRV, 300 A, Cath Case
6359	1-119	Z30	R-1000 PRV, 300 A, Anode Case
6362	1-119	Z30	R-1400 PRV, 300 A, Cath Case
6363	1-119	Z30	R-1400 PRV, 300 A, Anode Case
6364	1-119	Z30	R-1600 PRV, 300 A, Cath Case
6365	1-119	Z30	R-1600 PRV, 300 A, Anode Case
6368	1-120	Z30	R-1400 PRV, 250 A, 1 µs, Cath Case
6369	1-120	Z30	R-1400 PRV, 250 A, 1 µs, Anode Case - **Disc.**
6400B	1-136	S1	T-Unijunction, Si
6401	—	S2	T-Unijunction, Si, - **Disc.**
6402	—	S3	T-Programmable Unijunction, Si - **Disc.**
6403	1-136	S3	Bilateral Switch, Si-1.0 A, 300 mW
6404		S3	Unilateral Switch, Si-1.0 A, 300 mW, - **Disc.**
6405	—	S3	Asymmetrical Switch, Si-500 mA, 350 mW - **Disc.**
6407	1-137	S9	D-Bilateral Trig Diode-2 A, 150 mW, 28 V (BR)F - **Disc.**
6408	1-137	S9	D-Bilateral Trigger Diode-2 A, 150 mW, 32 V (BR)F
6409	—	S2	T-Unijunction, Si - **Disc.**
6410	—	S3	T-Unijunction, Si - **Disc.**
6411	1-137	S9	D-Bilateral Trigger Diode-2 A, 250 mW, 40 V (BR)F
6412	1-137	S9	D-Bilateral Trigger Diode-2 A, 250 mW, 63 V (BR)F
6415	1-137	S16	D-Bidirectional Diode Thyristor-SYDAC, 45-60 VBO, 50 mA
6416	1-137	S16	D-Bidirectional Diode Thyristor-SYDAC, 55-65 VBO, 50 mA
6417	1-137	S16	D-Bidirectional Diode Thyristor-SYDAC, 95-113 VBO, 50 mA
6418	1-137	S16	D-Bidirectional Diode Thyristor-SYDAC, 104-118 VBO, 50 mA
6419	1-137	S16	D-Bidirectional Diode Thyristor-SYDAC, 110-125 VBO, 50 mA
6502	1-365	D19	IC-NMOS 8-Bit Microprocessor, 1 MHz Clock Rate
6507	1-365	D18	IC-NMOS 8-Bit Microprocessor with on Chip Clock Osc/Driver
6508	1-365	D8	IC-CMOS Static 1K RAM, 300 nsecs Max Access Time
6532	1-365	D19	IC-NMOS Combination Memory, I/O, Timer Array
6664	1-365	D8	IC-NMOS Dynamic 64K RAM, 150 nsecs Max Access Time
6800	1-365	D19	IC-MOS 8-Bit Microprocessor, 1 MHz Max Clock Rate
6802	1-365	D19	IC-MOS 8-Bit Microprocessor, 1 MHz Max Clock Rate, Osc/Driver, 128 Bytes RAM
6809	1-365	D19	IC-MOS 8-Bit Microprocessor with Internal Osc and Clock Gen, 1 MHz Clock Rate
6809E	1-365	D19	IC-MOS 8-Bit Microprocessor, Requires External Clock Gen, 1 MHz Clock Rate
6810	1-366	D15	IC-MOS Static 1K RAM for 6800 System, 450 nsecs Max Access Time
6821	1-366	D19	IC-MOS Peripheral Interface Adapter for 6800
6850	1-366	D15	IC-MOS Asynchronous Communications Interface Adapter
6860	1-284	L122	IC-MOS FSK Digital Modem, 600 bps
6875	1-366	D8	IC-Digital, Two Phase Clock Generator/Driver for 6800 System
6880	1-360	D8	IC-Schottky, Quad 3-State Inverting Bus Transceiver
6885	1-360	D8	IC-Schottky Hex Hi Speed 3-State Non-Inverting Bus/Interface Driver with Common Enable
6886	1-360	D8	IC-Schottky Hex Hi Speed 3-State Inverting Bus/Interface Driver with Common Enable
6887	1-360	D8	IC-Schottky Hex Hi Speed 3-State Non-Inverting Bus/Interface Driver with 2-Line and 4-Line Enable
6888	1-360	D8	IC-Schottky Hex Hi Speed 3-State Inverting Bus/Interface Driver with 2-Line and 4-Line Enable
6889	—	D8	IC-Schottky Quad 3-State Non-Inverting Bus Transceiver, - **Disc.**
7000	1-269	L111	IC-AF PO, 5 W, with Muting, VCC=14 V, RL=4 Ω
7001	1-269	L111	IC-Horizontal/Vertical Signal Processor
7002	1-269	L80A	IC-Switch Mode Pwr Sply Controller
7003	1-269	L126C	IC-Single Chip TV Signal Processor
7004	1-269	L111	IC-Electronic Channel Select System Ctrl
7005	1-269	L111	IC-Dual Step Motor Drvr, IO= 300 mA
7006	1-269	L93A	IC-Bidirectional Motor Drive
7007	1-269	L124C	IC-TV/VCR Interface and Function Controller
7008	1-269	L124C	IC-Video/Chroma/Horiz-Vert Drvr/Sync Sep/X-Ray Protect - **Disc.**
7009	1-270	L124C	IC-Video/Chroma Processor/Demod
7010	1-270	L126D	IC-Single Chip TV Processor with OSD Interface
7011	1-270	L55	IC-AF PO, 20 W, VCC= 15 V, RL= 4 Ω
7012	1-270	L111	IC-A/V Sw with Dual Inputs, LED Drvr, Mute Ctrl
7013	1-270	L35B	IC-IR Remote Ctrl Receiver Pre-Amp
7014	1-270	L124D	IC-TV MPX Sound with Separate Audio Prog (SAP)
7015	1-270	L124C	IC-PLL/SIF/VIF/RF AGC
7016	1-270	L111	IC-FM IF System - **Disc.**
7017	1-271	L19A	IC-TV Vertical Deflection with Auto Compensation
7018	1-271	L124	IC-TV Small Signal Sub-System
7019	1-271	L111	IC-TV Digital Tuning System Control
7020	1-271	L121A	IC-VCR Audio Record/Playback Processor
7021	1-271	L169	Mod-Switching Regulator
7022	1-271	L67C	Mod-VCR Positive DC, VR
7023	1-271	L67C	Mod-VCR Positive DC, VR
7024	1-271	L60A	Mod-VCR Positive DC, VR
7025	1-271	L65A	Mod-Switching Regulator
7026	1-271	L60A	Mod-VCR Positive DC, VR
7027	1-271	L167	Mod-VCR Positive DC, VR
7028	1-272	L67C	Mod-VCR Positive DC, VR
7029	1-272	L162	Mod-Dual AF PO, 100 W, RL=8 Ω, VCC= ±51 V
7030	1-272	L69A	Mod-AF PO, 50 W, RL= 8 Ω, VCC= ±35 V
7031	1-272	L70B	Mod-AF PO, 100 W, RL= 8 Ω, VCC= ±51 V

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7032	1-272	L75D	Mod-AF PO, 120 W, RL= 8 Ω, VCC= ±55 V
7033	1-272	L168	Mod-Switching Regulator
7034	1-272	L67C	Mod-VCR Positive DC, VR
7035	1-272	L60A	Mod-VCR Positive DC, VR
7036	—	L60B	Mod-VCR Positive DC, VR - **Disc.**
7037	1-272	L60A	Mod-VCR Positive DC, VR
7038	1-272	L69A	Mod-VCR Positive DC, VR
7039	1-272	L92B	IC-TV Vertical Deflection Output
7040	1-272	L92	IC-AF PO, 20 W, VCC= ±25 V, RL= 8 Ω
7041	1-273	L166	IC-Dual AF PO, 22 W, RL= 4 Ω, VCC= ±13.2 V
7042	1-273	L40	IC-Bidirectional Motor Driver
7043	1-273	L39	IC-Bidirectional Motor Driver
7044	1-273	L41	IC-Switching Regulator Control Circuit
7045	1-273	L43A	IC-Horizontal Processor
7046	1-273	L171	IC-Power Regulator
7047	1-273	L124	IC-TV Small Signal Sub-System
7048	1-273	L118A	IC-TV Chroma Processor/Demodulator
7049	1-273	L122	IC-TV/Video Sync Generator (CMOS)
7050	1-273	L112	IC-PLL Stereo Decoder
7051	1-273	L97	IC-AF PO, 1 W, VCC= ±6 V, RL= 8 Ω
7052	1-273	L79	IC-AF PO, 3 W, VCC= ±11 V, RL= 16 Ω
7053	1-274	L93	IC-Dual AF PO, 6.5 W, 20 W (BTL), VCC= ±14.4 V, RL= 4 Ω
7054	1-274	L126C	IC-Single Chip TV Signal Processor
7055	1-274	L146	IC-Dual AF PO, 1.2 W, VCC= ±9 V, RL= 8 Ω
7056	1-274	L172	IC-Vertical Deflection Output - **Disc.**
7057	1-274	L165	IC-SIF/AFT/RF AGC
7058	1-274	L126B	IC-Single Chip TV Signal Processor
7059	1-274	L175	IC-Dual BTL AF PO, 14 W, VCC= ±13.2 V, RL= 8 Ω
7060	1-274	L126C	IC-Single Chip TV Signal Processor
7061	1-274	L92	IC-Dual AF PO, 5.8 W, VCC= ±12 V, RL= 3 Ω
7062	1-275	L118A	IC-Vert Defl Circuit/Sync/H-V Osc/X-Ray Protect
7063	1-275	L121A	IC-Vert Defl Circuit/Sync/H-V Osc/X-Ray Protect
7064	1-275	L76C	IC-VCR Loading/Bidirectional Motor Driver
7065	1-275	L124D	IC-Vid/Chroma/Horiz-Vert Drvr/Osc/Sync/X-Ray Protect
7066	1-275	L164	IC-Dual Audio/Video Electronic Sw
7067	1-275	L36	IC-VIF/Amp/IF Det/ AGC
7068	1-275	L92A	IC-Dual AF PO, 13 W, VCC= ±28 V, RL= 8 Ω
7069	1-275	L35	IC-PLL Hi Speed Divider with ECL Output (1/128, 1/136)
7070	1-275	L92A	IC-Dual AF PO, 6 W, VCC= ±20 V, RL= 8 Ω
7071	1-275	L93A	IC-Bidirectional Motor Driver, IO= 2 A
7072	1-275	L115	IC-Dual Tandem Electronic Attenuator
7073	—	L171	IC-Power Regulator - **Disc.**
7074	1-276	L65A	Mod-VCR Positive DC, VR
7075	1-276	L70A	Mod-Switching Regulator (115 V)
7076	1-276	L170	Mod-Switching Regulator
7077	1-276	L19B	IC-TV Voltage Regulator (110 V)
7078	1-276	L19B	IC-TV Voltage Regulator
7079	1-276	L19B	IC-TV Voltage Regulator
7080	1-276	L16	IC-Precision Voltage Reference
7081	1-276	L124	IC-RGB Video Amp
7082	1-276	L112	IC-Stepping Motor Driver
7083	1-276	L57B	IC-Vertical Deflection Circuit
7084	1-276	L115	IC-Sync/Deflection Circuit
7085	1-276	L92B	IC-Vertical Deflection Circuit
7086	1-276	L118A	IC-Sync/Deflection Circuit
7087	1-276	L42	IC-Bidirectional Motor Driver
7088	1-277	L166	IC-Dual AF PO, 15 W, VCC= ±13.2 V, RL= 4 Ω
7089	1-277	L163A	IC-Motor Control
7090	1-277	L35	IC-Dual Tracking Voltage Regulator - **Disc.**
7091	1-277	L42	IC-Dual Bidirectional Motor Driver
7092	1-277	L19B	IC-Hybrid Voltage Regulator
7093	1-277	L19B	IC-Hybrid Voltage Regulator
7094	1-277	L19B	IC-Hybrid Voltage Regulator
7095	1-277	L19B	IC-Hybrid Voltage Regulator
7096	1-277	L98	IC-Current Mode PWM Controller
7097	1-277	L98	IC-Current Mode PWM Controller
7098	1-277	L98	IC-Current Mode PWM Controller
7099	1-277	L98	IC-Current Mode PWM Controller
7100	1-278	L35A	IC-Protector IC for AF PO/Speakers
7101	1-278	L78A	IC-AF PO, 7 W, VCC= ±14 V, RL= 4 Ω
7102	1-278	L174	IC-Dual AF PO, 5.5 W, Bridge (BTL) 20 W, VCC= ±18 V, RL= 8 Ω
7103	1-278	L174	IC-High Power Amp Driver (50-80 W)
7104	1-278	L92B	IC-Vertical Deflection Output
7105	1-278	L93	IC-Dual AF PO, 10 W, Bridge (BTL) 18 W, VCC= ±24 V, RL= 4 Ω
7106	1-278	L93	IC-Dual AF PO, 6.5 W, Bridge (BTL) 16 W, VCC= ±14 V, RL= 4 Ω
7107	1-278	L19A	IC-Power Switching Regulator
7108	1-278	L115	IC-Digital Programmable PLL (MOS)
7109	1-278	L111	IC-Switching Regulator Controller
7110	1-278	L111	IC-Audio/Video Analog Switch
7111	1-279	L126C	IC-Single Chip TV Signal Processor - **Disc.**
7112	1-279	L115	IC-Video/Chroma Signal Processor
7113	1-279	L175	IC-Dual BTL AF PO, 14 W, Vcc= 13.2 V, RL= 4 Ω

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7114	1-279	L173	IC-Quad AF PO, 11 W/Ch, 2 x 22 W (BTL), Vcc= 14 V, RL= 2 Ω
7115	1-279	L115	IC-Horizontal/Vertical Signal Processor
7116	1-279	L118A	IC-PLL Stereo Decoder
7117	1-279	L97	IC-SMPS Controller
7118	1-279	L51A	IC- AF PO, 50 W, RL= 4 Ω, Vcc= ± 28 V
7119	1-279	L51A	IC- Dual AF PO, 11 W, RL= 4 Ω, Vcc= 14.4 V
7120	1-280	L124B	IC-RGB Video Amp
7121	1-280	L124B	IC-VIF, SIF, Video Color Signal Processor, Vcc= 9.6 V
7122	1-280	L92	IC-Power Amp Driver, 30-50 W
7123	1-280	L111	IC-Sync/Deflection Circuit, Vcc= 12 V
7124	1-280	L19	IC-VR with Reset, Vo= 5 V
7125	1-280	L176	MOD-Switching Regulator, Io= 6 A
7126	1-280	L176	MOD-Switching Regulator, Io= 8 A
7127	1-280	L123A	IC-VCR Capstan Motor Driver
7128	1-280	L177	IC-POS VR, 12 V, 1 A
● 7129	1-280	L124C	IC-TV/VCR, VIF/SIF PLL,Signal Processor
● 7130	1-281	L124C	IC-TV/VCR, Super Split VIF/SIF PLL,Signal Processor
● 7131	1-281	L51A	IC-TV Vertical Deflection
● 7132	1-281	L118A	IC-Horiz/Vert Deflection Controller for VGA/XGA & Multi Freq Monitors
● 7133	1-281	L118A	IC-Horiz/Vert Deflection Controller for VGA/XGA & Autosync Monitors
● 7134	1-281	L178	IC-Autosync Controller for Monitors
● 7135	1-281	L81A	IC-Vertical Deflection Pwr Amp for Moniters & TVs
● 7136	1-281	L81A	IC-Vertical Deflection Pwr Amp for Moniters & TVs
● 7137	1-281	L118A	IC-Advanced Moniter Video Controller
● 7138	1-281	L118A	IC-Advanced Moniter Video Controller for OSD
● 7139	1-281	L180	IC-Video Output Amp
7400	1-334	D6	IC-TTL Quad 2-Input NAND Gate
7401	1-334	D6	IC-TTL Quad 2-Input NAND Gate with Open Collector Output
7402	1-334	D6	IC-TTL Quad 2-Input NOR Gate
7403	1-334	D6	IC-TTL Quad 2-Input NAND Gate with Open Colllector Output - **Disc.**
7404	1-334	D6	IC-TTL Hex Inverter
7405	1-334	D6	IC-TTL Hex Inverter with Open Collector Output
7406	1-334	D6	IC-TTL Hex Inverter Buffer/Driver with Open Collector High Voltage Output (30 V)
7407	1-334	D6	IC-TTL Hex Buffer/Driver with Open Collector High Voltage Output (30 V)
7408	1-334	D6	IC-TTL Quad 2-Input AND Gate
7409	1-334	D6	IC-TTL Quad 2-Input AND Gate with Open Collector Output
7410	1-334	D6	IC-TTL Triple 3-Input NAND Gate
7411	1-335	D6	IC-TTL Triple 3-Input AND Gate
7412	1-335	D6	IC-TTL Triple 3-Input NAND Gate with Open Collector Output
7413	1-335	D6	IC-TTL Dual NAND Schmitt Trigger
7414	1-335	D6	IC-TTL Hex Schmitt Trigger
7416	1-335	D6	IC-TTL Hex Inverter Buffer/Driver with Open Collector High Voltage Output (15 V)
7417	1-335	D6	IC-TTL Hex Buffer/Driver with Open Collector High Voltage Output (15 V)
7420	1-335	D6	IC-TTL Dual 4-Input NAND Gate
7421	1-335	D6	IC-TTL Dual 4-Input AND Gate
7422	1-335	D6	IC-TTL Dual 4-Input NAND Gate
7423	1-335	D8	IC-TTL Expandable 4-Input NOR Gate with Strobe
7425	1-335	D6	IC-TTL Dual 4-Input NOR Gate with Strobe
7426	1-336	D6	IC-TTL Quad 2-Input High Voltage Interface NAND Gate
7427	1-336	D6	IC-TTL Triple 3-Input NOR Gate
7428	1-336	D6	IC-TTL Quad 2-Input NOR Buffer/Clock Driver
7430	1-336	D6	IC-TTL 8-Input NAND Gate
7432	1-336	D6	IC-TTL Quad 2-Input OR Gate
7433	1-336	D6	IC-TTL Quad 2-Input NOR Buffer with Open Collector Output
7437	1-336	D6	IC-TTL Quad 2-Input NAND Buffer
7438	1-336	D6	IC-TTL Quad 2-Input NAND Buffer with Open Collector Output
7439	1-336	D6	IC-TTL Quad 2-Input NAND Buffer with Open Collector Output -**Disc.**
7440	1-336	D6	IC-TTL Dual 4-Input NAND Buffer
7441	1-336	D6	IC-TTL 1-of10 Decoder Driver for Cold Cathode Indicator Tubes
7442	1-336	D8	IC-TTL 4-Line-to-10-Line Decoder (1-of-10) BCD-to-Decimal
7443	1-336	D8	IC-TTL 4-Line-to-10-Line Decoder (1-of-10) Excess 3-Gray-to-Decimal
7444	1-337	D8	IC-TTL 4-Line-to-10-Line Decoder (1-of-10) Excess 3-Gray-to-Decimal - **Disc.**
7445	1-337	D8	IC-TTL BCD-to-Decimal Decoder/Driver (30 V)
7446	1-337	D8	IC-TTL BCD-to-Seven-Segment Decoder/Driver (30 V)
7447	1-337	D8	IC-TTL BCD-to-Seven-Segment Decoder/Driver (15 V)
7448	1-337	D8	IC-TTL BCD-to-Seven-Segment Decoder/Driver
7450	1-337	D6	IC-TTL Expandable Dual 2-Wide 2-Input AND/OR Invert Gate
7451	1-337	D6	IC-TTL Dual 2-Wide 2-Input AND/OR Invert Gate
7453	1-337	D6	IC-TTL Expandable 4-Wide 2-Input AND/OR Invert Gate - **Disc.**

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7454	1-338	D6	IC-TTL Expandable 4-Wide 2-Input AND/OR Invert Gate
7460	1-338	D6	IC-TTL Dual 4-Input Expander
7470	1-338	D6	IC-TTL J-K Edge Triggered Flip-Flop with Preset and Clear
7472	1-339	D6	IC-TTL J-K M/S Flip-Flop with Preset and Clear
7473	1-339	D6	IC-TTL Dual J-K M/S Flip-Flop with Clear
7474	1-339	D6	IC-TTL Dual 'D Type' Edge Triggered Flip-Flop with Clear
7475	1-339	D8	IC-TTL 4-Bit Bistable Latch
7476	—	D8	IC-TTL Dual J-K M/S Flip-Flop with Preset and Clear - **Disc.**
7480	1-339	D6	IC-TTL Gated Full Adder
7482	1-339	D6	IC-TTL 2-Bit Binary Full Adder
7483	1-340	D8	IC-TTL 4-Bit Binary Full Adder
7485	1-340	D8	IC-TTL 4-Bit Magnitude Comparator
7486	1-340	D6	IC-TTL Quad 2-Input Exclusive OR Gate
7489	1-340	D8	IC-TTL 64-Bit RAM
7490	1-340	D6	IC-TTL Asynchronous Decade Counter (÷2; ÷5)
7491	1-340	D6	IC-TTL 8-Bit Shift Register
7492	1-340	D6	IC-TTL Asynchronous Divide-By-Twelve (÷2;÷5)
7493A	1-340	D6	IC-TTL Asynchronous 4-Bit Binary Counter
7494	1-340	D8	IC-TTL 4-Bit Shift Register
7495	1-341	D6	IC-TTL 4-Bit Right-Shift, Left-Shift Register
7496	1-341	D8	IC-TTL 5-Bit Shift Register
7497	1-341	D8	IC-TTL 6-Bit Binary Multiplier (Synchronous Rate Multiplier)
8063	1-163	C1	Thermal Cutoff, 66 °C
8070	1-163	C1	Thermal Cutoff, 72 °C
8076	1-163	C1	Thermal Cutoff, 77 °C
8080A	1-366	D19	IC-MOS 8-Bit Microprocessor, 2 MHz Max Clock Rate
8081	1-163	C1	Thermal Cutoff, 84 °C
8085	1-163	C1	Thermal Cutoff, 87 °C - **Disc.**
8090	1-163	C1	Thermal Cutoff, 93 °C
8092	1-353	D6	IC-TTL Dual 5-Input NAND Gate
8096	1-163	C1	Thermal Cutoff, 98 °C
8098	1-163	C1	Thermal Cutoff, 100 °C - **Disc.**
8103	1-163	C1	Thermal Cutoff, 104 °C
8108	1-163	C1	Thermal Cutoff, 110 °C
8115	1-163	C1	Thermal Cutoff, 117 °C
8118	1-163	C1	Thermal Cutoff, 121 °C
8123	1-353	D8	IC-TTL Quad 2-Line-to-1-Line Data Selector/Multiplexer with 3-State Outputs
8125	1-163	C1	Thermal Cutoff, 128 °C
8139	1-163	C1	Thermal Cutoff, 291 °C - **Disc.**
⊙ 8139A	1-163	C1	Thermal Cutoff, 141 °C
8149	1-163	C1	Thermal Cutoff, 152 °C
8167	1-163	C1	Thermal Cutoff, 171 °C - **Disc.**
⊙ 8167A	1-163	C1	Thermal Cutoff, 167 °C
8181	1-163	C1	Thermal Cutoff, 184 °C
⊙ 8182	1-163	C1	Thermal Cutoff, 192 °C
8212	1-366	D15	IC-Schottky 8-Bit Input/Output Port with 3-State Output - **Disc.**
8213	1-163	C1	Thermal Cutoff, 216 °C
8216	1-366	D8	IC-Schottky 4-Bit Parallel Bidirectional Non-Inverting Bus Driver
8219	1-353	D15	IC-Digital, 1-of-16 Data Selector/Multiplexer with Inverting 3-State Outputs
8224	1-366	D8	IC-Schottky Clock Generator Driver for 8080A System
8226	1-163	C1	Thermal Cutoff, 228 °C
⊙ 8226A	1-163	C1	Thermal Cutoff, 229 °C
8228	1-366	D17	IC-Schottky System Controller and Bus Driver
8233	1-353	D8	IC-Digital, Quad 2-Line-to-1-Line Data Selector/Multiplexer with Non-Inverting Outputs
8234	1-353	D8	IC-Digital, Quad 2-Line-to-1-Line Data Selector/Multiplexer with Inverting Outputs - **Disc.**
8235	1-353	D8	IC-Digital, Quad 2-Line-to-1-Line Data Selector/Multiplexer with Conditional Complementary Outputs
8242	1-163	C1	Thermal Cutoff, 240 °C
8255	1-366	D19	IC-MOS Programmable Peripheral Interface
8266	1-354	D6	IC-Digital, Quad 2-Line-to-1-Line 4-Bit Multiplexer
8301	1-354	D8	IC-Digital, 4-Line BCD-to-10-Line Decimal Decoder
8308	1-354	D15	IC-Digital, Dual 4-Bit Latch - **Disc.**
8309	1-354	D8	IC-Digital, Dual 4-Line-to-1-Line Data Selector/Multiplexer with Complementary Outputs
8314	1-354	D8	IC-Digital, 4-Bit Latch
8316	1-354	D8	IC-Digital, Synchronous 4-Bit Binary Counter
8318	1-354	D8	IC-Digital, 8-Input Priority Encoder
8321	1-354	D8	IC-Digital, Dual 1-of-4 Decoder
8328	1-354	D8	IC-Digital, Dual 8-Bit Shift Register
8368	1-354	D8	IC-Digital, Seven-Segment Latch/Decoder/Driver for Common Cathode LED - **Disc.**
8370	1-354	D8	IC-Digital, Seven-Segment Decoder/Driver/Latch with Open Collector Outputs
8374	1-354	D8	IC-Digital, Seven-Segment Latch/Decoder/Driver for Common Anode LED
8520	1-354	D8	IC-Digital, Cascadable Modulo-N Divider
8542	1-355	D8	IC-Digital, Quad I/O Registers with 3-State Outputs
8546	1-355	D8	IC-Digital, 8-Bit Universal I/O Shift Register with 3-State Data Lines
8552	—	D8	IC-Digital, Synchronous 3-State Decade Counter/Latch - **Disc.**
8553	1-355	D8	IC-Digital, 8-Bit I/O Latch with 3-State Outputs
8554	1-355	D8	IC-Digital, Synchronous 3-State Binary Counter/Latch
8555	—	D8	IC-Digital, Programmable Decade Counter with 3-State Outputs - **Disc.**
8556	1-355	D8	IC-Digital, Programmable Binary Counter with 3-State Outputs
8813	1-355	D8	IC-Digital, Quad Input Gated 'D' Flip-Flop
8853	1-355	D8	IC-Digital, Dual Retriggerable Resettable Monostable Multivibrator with Delayed Trigger
9093	1-320	D6	IC-DTL Dual M/S J-K Flip-Flop (5 MHz)
9094	1-320	D6	IC-DTL Dual M/S J-K Flip-Flop (8 MHz)
9097	1-320	D6	IC-DTL Dual M/S J-K Flip-Flop (8 MHz)
9099	1-320	D6	IC-DTL Dual M/S J-K Flip-Flop (5 MHz)
9109	—	D6	IC-DTL High Voltage Hex Inverter - **Disc.**
9111	1-320	D6	IC-DTL RS Flip-Flop
9135	1-320	D6	IC-DTL Hex Inverter
9157	1-320	D6	IC-DTL Quad Buffer
9158	1-320	D6	IC-DTL Quad Pwr Gate
9200	1-284	L18A	IC-I^2L Freq Divider for VCR
9301	1-324	D8	IC-HLL Dual Input Expandable NAND Buffer Gate Active Pullup
9302	1-324	D8	IC-HLL Quad 2-Input NAND Buffer Gate Open Collector
9303	1-324	D8	IC-HLL Quad 2-Input NAND Buffer Gate Passive Pullup
9304	1-324	D8	IC-HLL Triple 4,3,4-Input NAND Buffer Gate Passive Pullup - **Disc.**
9306	1-324	D8	IC-HLL Quad 2,2,3,3-Input NOR Gate Active Pullup
9307	1-324	D8	IC-HLL Quad 2,2,3,3-In NOR Gate Open Collect - **Disc.**
9311	1-324	D8	IC-HLL Clocked M/S Flip-Flop Active Pullup
9312	1-324	D8	IC-HLL Dual Edge Triggered J-K Flip-Flop Active Pullup
9321	1-324	D8	IC-HLL Expandable Quad 2-Input NAND Gate Active Pullup - **Disc.**
9322	1-324	D8	IC-HLL Expandable Dual 5-Input NAND Gate Active Pullup
9323	1-324	D8	IC-HLL Expandable Quad 2-Input NAND Gate Open Collector
9324	1-324	D8	IC-HLL Expandable Quad 2-Input NAND Gate Passive Pullup
9325	1-325	D8	IC-HLL Quad 2,2,3,3-Input NAND Gate Active Pullup
9326	1-325	D8	IC-HLL Quad 2,2,3,3-Input NAND Gate Passive Pullup
9331	1-325	D8	IC-HLL Dual 5-Input Gate Expander
9332	1-325	D8	IC-HLL Quad Inverter and Dual 2-Input NAND Gate Open Collector
9333	1-325	D8	IC-HLL Quad Inverter and Dual 2-Input NAND Gate Passive Pullup
9334	—	D8	IC-HLL Strobed Hex NAND Gate Open Collector - **Disc.**
9335	1-325	D8	IC-HLL Strobed Hex NAND Gate Passive Pullup
9342	1-325	D8	IC-HLL Dual Monostable Multivibrator Active Pullup
9343	1-325	D8	IC-HLL 4-Bit Comparator Active Pullup
9347	1-325	D8	IC-HLL Dual Retriggerable Monostable Multivibrator Active Pullup
9361	1-325	D8	IC-HLL Dual Input Level Interface Passive Pullup - **Disc.**
9362	—	D8	IC-HLL Dual Output Level Interface Active Pullup - **Disc.**
9363	1-325	D8	IC-HLL Quad Output Level Interface Passive Pullup
9367	1-325	D8	IC-HLL Quad Schmitt Trigger Active Pullup - **Disc.**
9368	1-326	D8	IC-HLL Quad Schmitt Trigger Open Collector
9370	1-326	D8	IC-HLL Quad 'D' Flip-Flop Passive Pullup
9371	1-326	D8	IC-HLL Decade Counter Passive Pullup
9372	1-326	D8	IC-HLL Hexadecimal Counter Passive Pullup
9375	1-326	D8	IC-HLL 4-Bit Shift Register Active Pullup - **Disc.**
9380	1-326	D8	IC-HLL BCD-to-Decade Decoder/Lamp Driver Open Collector
9381	1-326	D8	IC-HLL BCD-to-Decade Decoder/Logic Driver Open Collector
9382	1-326	D8	IC-HLL BCD-to-Decade Decoder/Gas Discharge Tube Driver Open Collector
9383	1-326	D8	IC-HLL BCD-to-Seven-Segment Decoder/Driver Open Collector
9390	1-326	D6	IC-HLL Dual 4-Input AND (with Expander) Interface Buffer
9391	—	D4	IC-HLL Dual 2-Input AND Interface Buffer - **Disc.**
9392	—	D4	IC-HLL Dual 2-Input NAND Interface Buffer - **Disc.**
9393	—	D4	IC-HLL Dual 2-Input OR Interface Buffer - **Disc.**
9394	1-326	D4	IC-HLL Dual 2-Input NOR Interface Buffer
9401	1-284	L104	IC-Monostable Multivibrator for VCR
9402	1-284	L18A	IC-Hall Switch
9403	1-284	L111	IC-Binary to Octal Decoder for VCR
9600	1-355	D6	IC-Digital, Retriggerable/Resettable Monostable Multivibrator - **Disc.**
9601	1-355	D8	IC-Digital, Dual Retriggerable/Resettable Monostable Multivibrator - **Disc.**
9602	1-355	D8	IC-Digital, Dual Retriggerable/Resettable Monostable Multivibrator - **Disc.**

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ECG® Semiconductors — Replacement Procedures

Universal Replacements

1. ECG Semiconductors can be used with confidence because they are specially selected prime parts whose specifications generally exceed those of the original part or application. A maximum number of replacement requirements can be satisfied with a minimum inventory of ECG Semiconductor devices. For example, ECG125 diode can be used to replace more than 625 JEDEC (1N) types (1N867, 1N4001, 1N4003, 1N4011, etc.) and ECG123A transistor can be used to replace more than 200 (2N) types (2N708, 2N708A, 2N2096A, 2N3115, etc.) plus thousands of other standard industry transistor types.
2. The frequency of equipment repair can be reduced by upgrading with ECG Semiconductors. For example, if a 100 volt, 15 amp rectifier is frequently replaced in an important control unit, replace it with a higher voltage and/or higher current part, as explained in rectifier replacement section. Or, if the device is overheating, additional heat sinking may be required.
3. ECG Replacement Semiconductors are available through an international network of electronic distributors. These distributors provide local availability of ECG replacement semiconductors to help keep equipment downtime at a minimum.

Replacement Techniques

Forming Pins

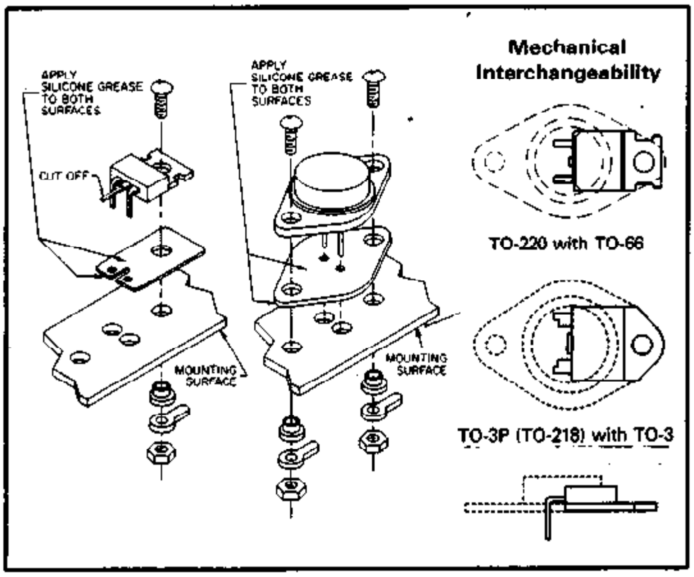
When replacing the original device with an ECG unit, certain mechanical and electrical requirements must be observed. Compare the lead or terminal arrangement of the original part with the ECG replacement. If necessary, bend the leads to the proper basing arrangement and insulate them to prevent possible shorts. For socketed devices, cut the leads on the replacement to proper length. Check the outline dimensions of the replacement if mounting space is a problem. Replacement in untuned stages can generally be made with a minimum of effort.

1. To avoid pulling when bending a plastic device pin, always restrain the pin firmly by holding with a pair of needle-nosed pliers or tweezers located at least 1/8-inch away from the device body. Internal connections of the pins to their junctions may be disrupted if this procedure is not observed.
2. If pins must be spread apart, bend the pin only in the narrow portion of its length, again restraining the pin during bending as per Step 1.
3. Maintain a bend radius of at least 1/16-inch.
4. Do not repeatedly bend pins. Insulate pins if necessary to avoid short circuits.
5. Mount the device before soldering to leads.

Mounting

(See Illustration)

1. Use the proper mounting hardware, such as insulating bushings, insulating washers, etc., called for by the specific application.
2. To promote efficient heat transfer, insulating washers, when required, should be thin (typically three mils for a mica washer). Use a thin, even layer of ECG424 Heat Sink compound on both sides of the washer.
3. Exercise care that the tool used to tighten the transistor retaining nut or bolt does not contact the device body.
4. Unless otherwise specified do not exceed six inch-pounds torque (an average male can exert about 50-inch pounds torque with a screwdriver).



5. Avoid exerting pull of the device pins while connecting them to their circuit connections. Provide a means of strain relief if these connections tend to place pulling forces on the pins.
6. To extend transistor life in high-power dissipation applications where a large thermal interface is not provided by the original equipment, the use of a heat sink is recommended when space permits. The ECG line includes a variety of transistor heat sinks, insulator kits, and heat sink compound for this purpose.

Soldering

1. Solid-state circuitry is generally miniaturized and is most often fabricated on a printed-circuit board. Any repairs to this type of circuitry require a well-tinned, pencil-type soldering iron. Care must be taken in soldering, both to prevent damage to the printed circuit board and to make sure that the solid-state device itself is not overheated. A good quality 60/40 (60% tin, 40% lead) solder helps to make joints quickly with a minimum of heat. When solid-state devices must be removed or installed, some means must be provided to conduct heat away from their junctions. Long-nose pliers or hemostats may be used as a heat sink.
2. Leakage between the heating element and the soldering-iron tip can cause the tip to be above ground potential. This leakage voltage may cause transistor damage if the chassis has a return to ground. To be on the safe side when soldering or unsoldering solid-state devices (especially non-gate protected MOSFET's), it is recommended that a flexible grounding strap be connected from the metal neck of the soldering iron to a good ground.
3. The same considerations about line leakage also apply to the use of oscilloscopes and signal generators. Even though the equipment may have a power transformer, the "line-filter" capacitors which are usually connected between the transformer primary and chassis ground permit an ac flow between chassis ground and earth ground. Therefore, if you connect the ground lead of such test equipment to a sensitive point in transistorized equipment having an earth ground, damage may result.
4. After soldering the connections using good solid-state practice, complete the replacement job with a check of the bias, following the procedures provided by the equipment manufacturer.

Mosfet Handling Precautions

In handling non-gate protected MOSFETS, such as the ECG220 and ECG221, the following precautions should be observed:

Prior to assembly into a circuit, all leads should be kept shorted together with the metal spring.

When devices are handled, the hand being used should be at ground potential.

Tips of soldering irons should be grounded.

Devices should never be inserted into or removed from circuit with power on.

Gate-protected devices, such as the ECG222, incorporate special back-to-back diodes that are diffused directly into the M.O.S. pellet and are electrically connected between each insulated gate and the FET's source. These diodes effectively bypass any voltage transients which exceed approximately ± 10 volts and protect the gates against damage in all normal handling and usage.

CMOS Handling Precautions

The input protection networks incorporated in all CMOS devices are effective in a wide variety of device handling situations. To be totally safe, however, it is desirable to restate the general conditions for eliminating all possibilities of device damage.

CMOS devices may be damaged if exposed to high static charges. The handling procedure shown below should be followed in order to assure against damaging the devices:

1. The leads of the devices should be shorted out with some type of conductive material except when being tested or when actually in the circuit. This will prevent build up of static charges.
2. All tools, jigs and fixtures, soldering-irons and any type of handling device should be grounded.
3. Transient voltages can damage CMOS too. Therefore, units should not be plugged into, or removed from, circuits while power is still on. Signals should not be applied if the power to the device is off.
4. If a lead is not used, it must be either grounded or connected to the device power supply. Which one will depend on the logic circuit involved.

   Table I indicates general handling procedures recommended to prevent damage from static electrical charges.

   Total protection results when personnel and materials are all at the same or ground potential.

Table I

	Should Be Conductive	Should Be Grounded to Common Point
Handling Equipment	X	
Metal Parts of Fixtures and Tools		X
Handling Trays	X	X
Soldering Irons		X
Table Tops	X	X
Transport Carts		(Static Discharge Straps)
Manufacturing Operating Personnel		*(Utilize Grounded Metal Wrist Straps)
General Handling of Devices		*(Utilize Grounded Metal Wrist Straps)

* 470 Kohm series resistor

Dry weather (relative humidity less than 30%) tends to multiply the accumulation of static charges on any surface. Conversely, higher humidity levels tend to reduce the magnitude of the static voltage generated. In a low-humidity environment, the handling precautions listed above take on added importance and should be adhered to without exceptions.

Selecting a Bi-Polar Transistor For An Unlisted Type

If the transistor to be replaced is unmarked or not listed in the ECG Replacement Guide, the following procedure can be used to make an accurate replacement selection.

Step-by-step determine each of the following parameters:

1. Polarity NPN or PNP
2. Type of material - silicon or germanium
3. Operating frequency range
4. Maximum voltage, collector to emitter
5. Maximum voltage, collector to base
6. Maximum collector current
7. Maximum power dissipation
8. Current gain
9. Case packaging
10. Lead configuration

Step 1

Is it an NPN or PNP device? Your first source of information would be the schematic drawings. If the arrow on the emitter of the transistor symbol is pointing toward the base, you know it is a PNP device, or if it is pointing away from the base, it is an NPN.

PNP  NPN 

Now let's say for argument sake that the schematic has been drawn incorrectly or suppose you have no schematic, your next clue would be to determine the polarity of the voltage between the emitter and collector.

If the collector voltage is positive with respect to the emitter voltage, then it is a NPN device. If the collector voltage is negative with respect to the emitter voltage then it is a PNP device. Therefore, if the V_{CE} (collector to emitter voltage) is positive, it's NPN, or if the V_{CE} is negative, it's PNP. An easy way to remember the polarity of the collector voltage for each type is:

NP OSITIVE **N**

PN EGATIVE **P**

Step 2

Next you must decide whether the device is silicon or germanium. This is most effectively done by the use of a schematic drawing. If you find that the D.C. bias voltage level between the base and emitter is 0.2 volts or less, it is probably a germanium device. Now, if you get a bias voltage reading of 0.4 volts or more, it is probably a silicon device. There will, of course, be some cases where there will be either no bias or reverse bias voltage present. This would be the case in oscillator and sync clipper circuits.

Another way of determining the type of material of a transistor is to look at the complexity of the circuit with respect to the number of components in a single stage. Germanium circuits are much more complex due to germanium's unstable nature with respect to temperature changes and its high leakage currents, therefore, several components are required per stage to make it stable. Voltage dividers are used to compensate the bias voltage and an emitter limiting resistor is always used.

A silicon device, however, is very stable with respect to gain when temperature changes and silicon has very low leakage currents. Therefore, a single silicon amplifier stage may only consist of one resistor for base bias and one load resistor. Some circuits using silicon still have more compensating components than they require but as design engineers have become more aware of the stability of silicon, circuits have become simpler.

Step 3

After you have determined the polarity and type of material of a device, you next determine the operating frequency range of the circuit in which it is used. This is done mainly by identifying the type of circuit and whether it is working in the audio range, the kilohertz range or the megahertz range.

Step 4

Next you look at the schematic or the circuit and determine the maximum collector to emitter voltage present in the circuit. In most cases, it is best to use the supply voltage figure as your reference. This figure will then be used to select a replacement device, which has a collector to emitter breakdown voltage at least slightly higher than the supply voltage. Preferably the higher the collector to emitter breakdown voltage, the better.

Step 5

Next the collector to base maximum voltage must be determined. If you have determined the collector to emitter maximum voltage requirements, then you can use this figure for the collector to base maximum voltage requirements.

Step 6

The sixth step is to determine the maximum collector current. To do this you would consider the DC condition with the device fully on, which of course would give you the highest current required of the device.

Step 7

Now that you have determind the maximum voltage and collector current requirements, you can use them in determining the maximum power requirements. However, the type of circuit where the device is used is the major factor with respect to power dissipation. Here we have some general wattage ranges for different circuit types.

1. Input stages, AF or RF, 50-200 milliwatts
2. IF stages and driver stages, 200 MW - 1 watt
3. Higher power output stages 1 watt and up

Step 8

Next you determine the gain expected from the circuit. This is determined primarily by its application in a circuit. Some typical gain categories are:

RF, Mixers, IF and AF	80 - 150
RF and AF Drivers	25 - 80
RF and AF Output	4 - 40
High Gain Preamps and Sync Separators	150 - 500

Step 9

Next you determine the case packaging and over-all dimensions. (Case type and size need only be considered where an exact mechanical fit is required. Otherwise, if you can fit the device into place even though it is not the exact case, it will probably do the job as well as the original. Some high frequency circuits may require exact replacements but even these circuits will require some alignment touch-up, especially in the case of UHF circuits.)

Step 10

Lastly you note the lead configuration. (Lead configuration generally is not a prime consideration for replacement transistors although it may be desirable for ease of insertion and appearance.)

With the above 10 parameters determined, the application selector guides in the transistor section can be used to find an accurate replacement device.

In an emergency situation where a replacement is listed in the ECG Semiconductor Guide but you do not have the recommended type in stock, this procedure could be used to determine alternate ECG replacements with higher ratings or different case or lead configurations.

B

SCR, Triac, Rectifier and Bridge Replacement

A substitute rectifier, SCR, triac or bridge can be used as long as it is:

1. Equal to or greater in current rating
2. Equal to or greater in voltage rating
3. In a similar case
4. Has (for SCR's and triacs) the same or lower I_{GT} rating
5. Has equal or faster switching speed

The important factor in point 3 is that for proper heat transfer, substitutes for stud type devices should have the same stud size - this, so you can simply take out the defective device and install the new device without having to drill a new size hole in the heat sink. In the case of axial lead devices, however, you may substitute if the case is equal to or smaller than the original device.

Not all ECG devices can be substituted in the above manner. The above-mentioned five substitution factors apply to SCR's, triacs, rectifiers, and bridges only. Voltage regulation zener substitutions are somewhat less flexible, since each zener is manufactured for, and used as, a specific voltage regulator you cannot substitute a different zener voltage.

Testing Solid-State Devices

Precautions

Ohmmeters - Ohmmeters must be used with great care in transistor circuits. It must be remembered that the ohmmeter has an internal voltage source. Also, some instruments are capable of delivering high currents.

Meter test probes with sharp points facilitate checks on printed-circuit boards. They minimize the danger of accidentally bridging adjacent conductors. Also, the needle points easily pierce resin, varnish, or surface corrosion on the conductors. False readings are often the result of not making good connections on the printed-circuit board.

In-circuit measurements are often misleading because of the shunt paths provided by transistor junctions that become forward biased by the ohmmeter's supply. An example is shown in Fig. A. With the ohmmeter connected in this fashion, the internal battery places a forward bias on the emitter junction of the transistor. This effectively places R_E in shunt with R2.

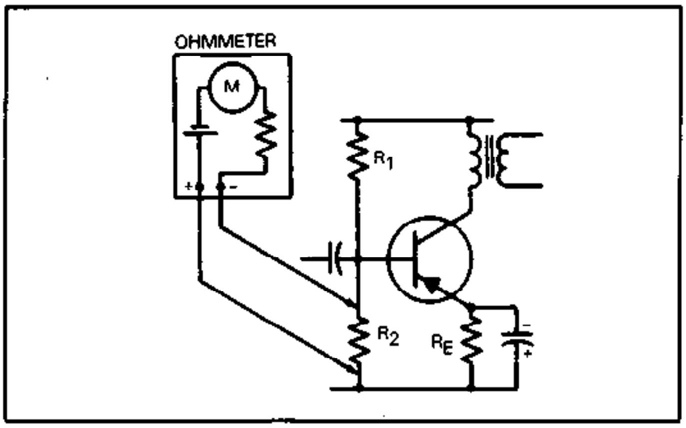


Fig. A. False resistance reading caused by forward-biased emitter junction.

In addition to shunt paths provided by transistor junctions, the physically small electrolytic capacitors employed as coupling and bypass capacitors also provide low-resistance shunt paths if the ohmmeter's internal supply should polarize them incorrectly.

These components can be permanently damaged by even a low voltage of incorrect polarity. Damage can also be caused if the polarity is correct, but the working voltage of the capacitor is exceeded by the ohmmeter's supply. Some capacitors are rated at only 3 volts, while the internal supply of many ohmmeters is 7.5 volts and may run as high as 30 volts. (Most electronic VOM's employ a 1.5-volt supply and are therefore always safe as far as voltage breakdown is concerned.)

As a general rule, ohmmeter measurements in the transistor circuit should be made by disconnecting one lead of the component to be checked. This removes any possibility of a shunt path. However, the reading in Fig. A. could be made if the ohmmeter leads are reversed, in which case the emitter junction becomes reverse biased. This requires a knowledge of the polarity of the ohmmeter voltage at the meter's test leads.

Ohmmeter connections that reverse-bias transistor junctions sometimes run the risk of exceeding the breakdown potential of the junction. This is particularly true in the case of the emitter junction, which breaks down at lower reverse voltages. If the $V_{(BR)EBO}$ of the transistor is not known and if a battery voltage of several volts or more is used in the ohmmeter, it is best to disconnect the transistor.

Ohmmeter readings that intentionally or accidentally forward bias a transistor junction also run the risk of causing excessive current flow through the transistor. The forward-biased junction is practically a short, so that the total current flowing is determined mainly by the ohmmeter's voltage supply and its internal resistance. Many ohmmeters, including electronic VOM's, supply a short-circuit current of 100 mA when used on the Rx1 scale. This current can damage many transistors. To prevent any danger of damage, only use those resistance ranges where the short circuit current is below 1 mA. For most service-type instruments, use of the Rx100 and Rx10k ranges is safe. Do not read forward-bias currents on the Rx1 scale.

Summing up, ohmmeter readings require some judgment before they are made. You need to know three things about the ohmmeter before making measurements: the polarity of the voltage at the leads, the voltage of the internal battery, and the short-circuit current. Also, unless shunt paths can be definitely eliminated by proper polarization, one lead of the component to be checked must be disconnected.

Identifying Leads on Unmarked Transistors — Occasionally, identifying marks may be obliterated on the transistor case. The leads may then be identified with the few ohmmeter checks shown in Fig. B. In Step 1, ohmmeter checks are made between each pair of leads in both the forward and reverse directions. Low readings (below 500 ohms) will be found when the ohmmeter places a forward bias across emitter and collector junctions. The highest forward reading is obtained when the meter is placed across the emitter and collector leads. This check establishes the base lead as the one that is not involved in the high forward-resistance reading.

Step 2 identifies the transistor type. An ohmmeter check is made between the base and one other lead. If a low-resistance reading is obtained when the negative side of the ohmmeter is connected to the base, the transistor is a PNP type. A low resistance reading when the base is positive indicates an NPN unit.

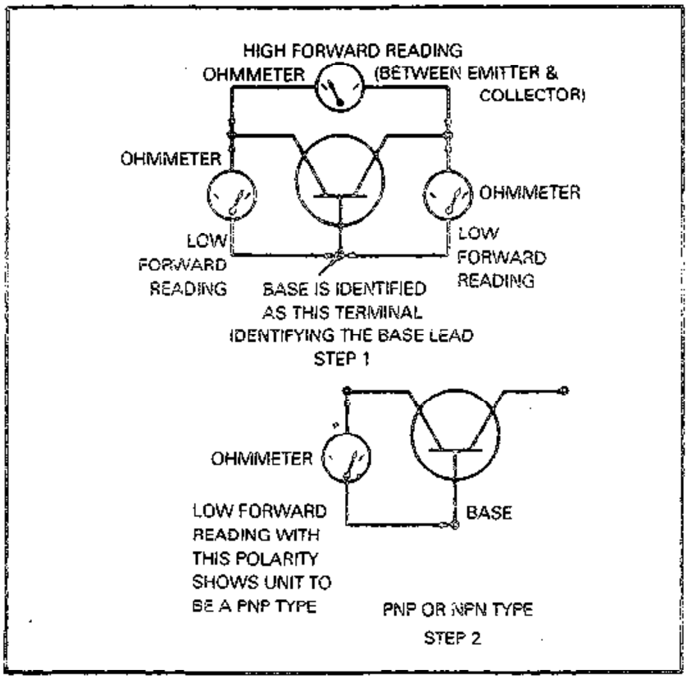


Fig. B. Hookup arrangement for identifying leads.

Testing Bipolar Transistors

A transistor that is operated within its ratings with respect to voltage, power dissipation, and temperature is normally expected to have an almost unlimited life. Failures in transistorized circuits are more often the result of damage or malfunctioning of some other component. This is particularly true when miniature transformers and electrolytic capacitors are employed. Despite the reliability of the transistor itself, failures occur due to shorts or opens in the bias circuitry, temporary overloads, physical damage, or even mishaps while servicing.

A great number of transistor testers and analyzers are available. Some only check leakage and current gain, while others are capable of measuring all of the transistor parameters. From a servicing viewpoint, a few simple tests are enough to reveal a great majority of troubles. These tests, to be described, reveal shorts, opens, excessive leakage, and provide a rough check of current gain. Fortunately, little equipment is required. Some of the tests require only an ohmmeter. The more elaborate checks can be made with just a few additional components.

Testing the Junctions — The transistor contains two p-n junctions or diodes. Most of the characteristics of the transistor are tied in with the behavior of the junctions, while the rest of the device simply serves as connective material. Damage to the transistor, therefore, almost always shows up as a malfunctioning of one of the rectifying junctions. The fault may be an open or shorted junction, or excessive reverse current (leakage).

A rough but useful check of the condition of the junctions may be made with an ohmmeter. First, the forward resistance of each junction is measured, as shown in Fig. C. In this figure, the connections for a PNP transistor are shown. The negative terminal of the ohmmeter is connected to the base. The forward resistance of both junctions is checked by touching the emitter and then the collector terminal in turn with the positive lead. A high reading indicates an open junction. A normal unit should show a reading below 500 ohms. Observe the precautions given earlier for using the ohmmeter. The forward resistance of the junctions of an NPN unit is checked with the same setup shown in Fig. C, but with the leads to the ohmmeter reversed.

Fig. C. Method of checking the forward resistance of both junctions.

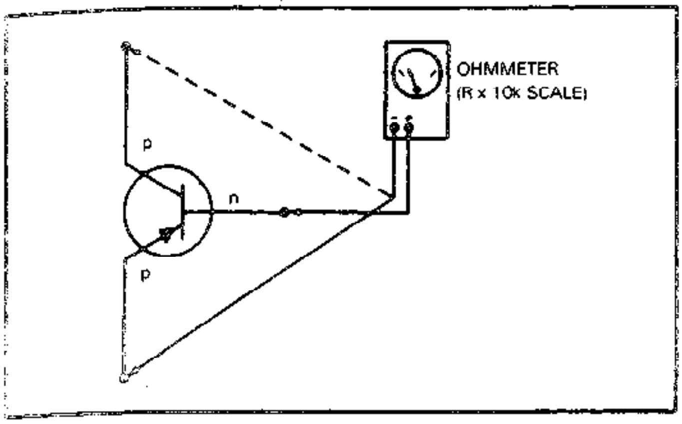


Fig. D. Method of checking the reverse resistance of both junctions.

To check for shorts or excessive leakage, reverse the ohmmeter connections and switch to a higher resistance scale, as shown in Fig. D. Now the ohmmeter places a reverse bias on each junction in turn, and leakage current is registered on the meter. A low resistance reading indicates a shorted or leaky junction. Low- and medium-power germanium transistors should show a resistance reading of at least 500 kilohms.

Typical readings taken with an ohmmeter on the Rx10k scale are 700 kilohms to 1.5 megohms. Silicon transistors give much higher resistance readings. Power transistors have larger junctions and therefore greater leakage currents. Reverse-bias resistance readings should be 50 kilohms or greater for power transistors.

Reverse-resistance checks on NPN transistors are made by reversing the ohmmeter leads so they are opposite to that shown in Fig. D. Note that the actual numerical reading in ohms is meaningless, because the ohmmeter can only measure linear resistances. The specific ohms-reading changes from meter to meter and is not the same for different settings of the range switch. The minimum and maximum values given here apply in the majority of cases. To increase the accuracy of the ohmmeter check, the readings should be compared with those made on a known good transistor of the same type.

Current Gain — Transistor action may be checked with an ohmmeter by means of the setup shown in Fig. E. The meter registers I_{CEO} before the 500-kilohm resistor is touched to the base. Connecting the resistor allows a small base bias to be applied, and the meter shows an increase in current (decrease in resistance reading).

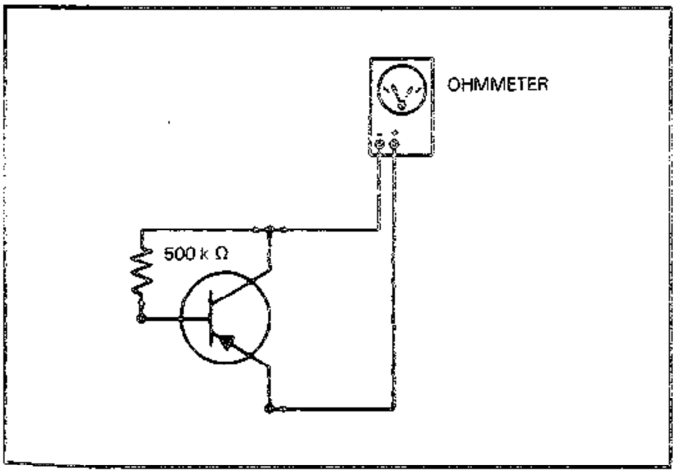


Fig. E. Gain measurement using an ohmmeter.

Testing Field-Effect Transistors

Testing field-effect devices is somewhat more complicated than testing bipolars and must take into account the following:

1. Is the device a JFET or MOSFET?
2. Is the FET an n-channel or p-channel type?
3. If the device is a MOSFET, is it an enhancement or depletion type?

Do not attempt to remove from the circuit or handle a FET unless certain that the device is a JFET or an insulated-gate-protected MOSFET. This verification is essential, because an uninsulated-gate-protected MOSFET may be damaged unless proper handling precautions are taken. When handling or inserting or removing this type of MOSFET, the following should be observed:

1. Prior to assembly into a circuit, all leads should be kept shorted together by either the use of metal shorting springs attached to the device by the vendor, or by the use of a conductive foam. Note - polystyrene "snow" should not be used because it can acquire high static charges.
2. When devices are removed by hand from their carriers, the hand being used should be at ground potential.
3. Tips of soldering irons should be grounded.
4. Devices should never be inserted into or removed from circuits with the power on.

Testing the JFET — The forward resistance of a JFET can be checked with a low-voltage ohmmeter, preferably on the Rx100 scale. Connect the positive lead to gate and the negative lead to the drain or source, if an n-channel JFET. Reverse the leads if a p-channel type.

To test the reverse resistance of an n-channel JFET, connect the negative lead of the ohmmeter to the gate and the positive lead to the drain or source. The device should show almost infinite resistance. Lower readings indicate either leakage or a short. Reverse the leads to test a p-channel device.

Testing the MOSFET — The forward resistance and reverse resistance can be checked with a low-voltage ohmmeter on the highest "R" scale. The insulated-gate MOSFET has an extremely high input resistance. Hence, we should obtain almost infinite resistance readings for both forward and reverse resistance test between gate and drain or source. Lower readings indicate a breakdown in the insulation between gate and drain or source.

Testing Diodes

Diodes and Rectifiers — Because diodes and rectifiers are non-amplifying devices, simple tests for shorts, opens, or excessive leakage are useful methods to determine if they are functioning properly. The following tests are not applicable to the special case of focus diodes and high-voltage triplers, however. The forward resistance of a diode or rectifier is checked by connecting the positive and negative leads of an ohmmeter, preferably set to the Rx100 scale, to their respective positive (anode) and negative (cathode) terminals. A reading of about 500 to 600 ohms is normal for silicon types, about 200 to 300 ohms for germanium types, and for larger-type rectifiers (germanium or silicon) the resistance is somewhat lower than their respective diode types. Because high-voltage types may have several diodes in series, higher resistance readings can be expected.

As a quick go/no-go test, the ohmmeter procedure just described is a good technique.

To check for shorts or excessive leakage, switch to a higher resistance scale and reverse the ohmmeter leads. A low resistance reading indicates a short or leaky device. Germanium diodes should show a resistance reading from about 100 kilohms to 1 megohm. Silicon diodes show higher resistance readings and can go up to 1000 megohms. However, some diodes may show lower resistances but function satisfactorily in some circuits. Rectifiers, because they generally have larger junctions, have higher leakage currents.

Zener Diodes — To quickly determine if Zeners have opens, shorts, or leakage, connect an ohmmeter in the forward direction in the same manner as described for standard diodes. However, these tests, although helpful, do not provide the primary information needed for a Zener diode, namely, is the device regulating at its rated value? A regulation test is accomplished with a metered adjustable power supply that preferably indicates voltage and current.

Connect the output of the power supply through a limiting resistor in series with the Zener diode to be tested and slowly increase the output voltage until the specified current is flowing through the Zener (see Fig. F). Now connect a voltmeter across the Zener to monitor the Zener voltage. Fluctuate the current on either side of the specified Zener current; if the Zener is operating properly, the voltage should remain constant.

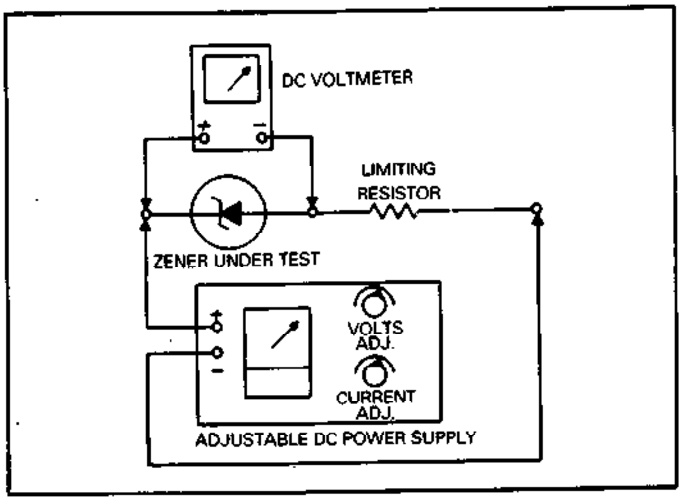


Fig. F. Hookup arrangement for testing Zener diodes.

Testing SCRs and TRIACs (Thyristors)

The functional testing of SCRs and TRIACs usually requires test equipment capable of supplying the specified gate current (I_{GT}) and minimum hold current of the Thyristor. These parameters are given in chart form in the SCR and TRIAC sections of this book.

Testing with an ohmmeter is not recommended for high current Thyristors and should only be used for relative indications in low current Thyristors. The I_{GT} and I_{Hold} parameters of the Thyristor may exceed the source current capability of the ohmmeter causing false readings and therefore, may not always indicate the true function of the device.

However, a simple ohmmeter test on low power Thyristors may provide an approximate evaluation of their gate-firing capabilities by connecting an ohmmeter as shown in Fig. G. The negative lead is connected to cathode and the positive lead is connected to anode.

Using the Rx1 scale, short the gate to the anode. A reading of approximately 15 to 50 ohms is normal. **Note:** When the gate-to-anode short is removed, the same reading should still show on the meter until the leads are removed from cathode or the anode. Now, reconnecting the meter leads to cathode and anode should show no reading until the gate is again shorted to the anode.

Testing of Gate turn off SCRs requires special test equipment. Field testing of these SCRs is difficult and typically provides erroneous results.

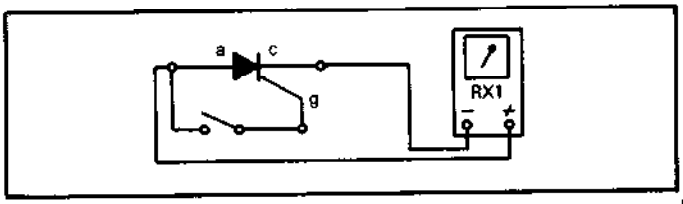


Fig. G. Hookup arrangement for testing thyristors with an ohmmeter.

Transistors

Bi-Polar Types (Maximum Ratings at $T_C = 25°C$ Unless Otherwise Noted)

C

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG10	NPN-Si, Low Noise, UHF/VHF Amp (G_{PE} 10 dB Typ)	25	12	3	70 mA	.600	5 GHz	40 min	TO-92	T16
ECG11	NPN-Si, Hi Gain, Hi Current, Gen Purp (Compl to ECG12)	40	20	7	5	.75	150	200 min	TO-92	T16
ECG12	PNP-Si, Hi Gain, Hi Current, Gen Purp (Compl to ECG11)	27	18	7	5	.75	120	180 min	TO-92	T16
ECG13	NPN-Si, Hi Gain, Gen Purp Amp	25	20	12	.5	.6	200	400 min	M-71	T20-3
ECG14	PNP-Si, Gen Purp, AF Amp, Driver	80	80	5	.7	.75	100	120 min	M-68	T20-2
ECG15	NPN-Si, VHF Amp, Mixer, Osc, UHF Osc	30	18	4	50 mA	.300	600 min	40 min	M-68	T20-2
ECG16	NPN-Si, Gen Purp Small Signal Amp, Low Noise (Compl to ECG17)	50	40	5	.100	.300	180	300	M-71	T20-3
ECG17	PNP-Si, Gen Purp Small Signal Amp, Low Noise (Compl to ECG16)	50	40	5	.100	.300	140	300	M-71	T20-3
ECG18	NPN-Si, AF Driver, Gen Purp Amp (Compl to ECG19)	80	80	5	.700 1 peak	1	120	120 min	M-71	T20-3
ECG19	PNP-Si, AF Driver, Gen Purp Amp (Compl to ECG18)	80	80	5	.700 1 peak	1	100	120 min	M-71	T20-3
ECG20	NPN-Si, AF PO, Dr, Series Pass (Compl to ECG21)	40	32	5	2 2.5 peak	1	100	120 min	M-71	T20-3
ECG21	PNP-Si, AF PO, Dr, Series Pass (Compl to ECG20)	40	32	5	2 3 peak	1	100	120 min	M-71	T20-3
ECG22	NPN-Si, AF PO, Dr, Gen Purp Amp	100	80	5	1 2 peak	1	100	120 min	M-71	T20-3
ECG23	NPN-Si, Low Noise UHF/VHF Amp, Antenna Amp, H.F. IF Amp (G_{PE} 15 dB Typ)	30	14	3	50 mA	.250	2 GHz	80 typ	TO-92	T16
ECG24	NPN-Si, Gen Purp Amp, Sw (Compl to ECG25)	100	80	5	1.25	1	50	80 min	TO-237	T17
ECG25	PNP-Si, Gen Purp Amp, Sw (Compl to ECG24)	100	80	5	1.25	1	50	80 min	TO-237	T17
ECG26	NPN-Si, Audio Amp, Lo Noise	120	120	5	50 mA	.3 ($T_A = 25°C$)	100	300 min	SP-92	T13-1
ECG27	PNP-Ge, Hi Current Gen Purp Amp	60	45	30	60	170	2 (kHz)	120 typ	TO-3	T28A
ECG28	PNP-Ge, Hi Current Gen Purp Amp	60	45	30	60	170	2 (kHz)	120 typ	TO-68	T29A
ECG29	NPN-Si, Hi Pwr Amp, Sw, $t_f = .3$ µsec typ (Compl to ECG30)	80	80	5	50	300	2 min	20 min	TO-3	T28A
ECG30	PNP-Si, Hi Pwr Amp, Sw, $t_f = .3$ µsec typ (Compl to ECG29)	80	80	5	50	300	2 min	20 min	TO-3	T28A
ECG31	NPN-Si, AF Driver Output (Compl to ECG32)	160	160	6	1	.9 ($T_A = 25°C$)	20 min	100 min	TO-92M	T18
ECG32	PNP-Si, AF Driver Output (Compl to ECG31)	160	160	6	1	.9 ($T_A = 25°C$)	15 min	100 min	TO-92M	T18

Notes: * MP - Matched pair
Frequency at which common emitter current gain is 70.0% of low frequency gain
• When alternate packages are shown it indicates a change is in progress. Although only one package is available both packages will be shown as long as the obsolete package may be encountered in the field.

Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package	
									Case	Fig. No.
ECG36 ECG36MP*	NPN-Si, Pwr Amp, Hi Speed Switch (Compl to ECG37)	160	140	6	12	100	15	60 min	TO-3PJ •	T48-1
ECG37 ECG37MCP	PNP-Si, Pwr Amp, Hi Speed Switch (Compl to ECG36) Matched Compl Pair-Contains one each of ECG36 (NPN) and ECG37 (PNP)	160	140	6	12	100	15	60 min	TO-3PJ	T48-1
ECG39	PNP-Si, HV Pwr Amp (Compl to ECG157)	300	300	3	.500	20	10	80 typ	TO-126	T45
ECG41	**Dual** PNP-Si, Hi Gain, Lo Noise, Differential Amp, Common Emitter	100	100	5	50 mA	.200/unit .400 total (T_A=25°C)	150	400 min	SIP-5	T20-1
ECG42	**Dual** NPN-Si, Hi Gain, Lo Noise, Differential Amp, Common Emitter	50	50	5	.100	.200/unit .400 total (T_A=25°C)	150	400 min	SIP-5	T20-1
ECG44	**Dual** NPN-Si, Hi Gain, Lo Noise, Bias Amp (Common Base)	100	100	5	.100	.200/unit .400 total (T_A=25°C)	100	400 min	SIP-5	T20-1
ECG45	**Dual** PNP-Si, Hi Gain, Lo Noise, Bias Amp (Common Base)	100	100	5	.100	.200/unit .400 total (T_A=25°C)	100	400 min	SIP-5	T20-1
ECG46	NPN-Si, Darlington Preamp, Driver, Gen Purp Amp	100	100	12	.500	.625 (T_A = 25°C)	200	10000	TO-92	T16
ECG47	NPN-Si, Hi Gain, Lo Noise Amp	45	45	6	.200	.350	140	500 min	TO-92	T16
ECG48	NPN-Si, Darlington Hi Current Gen Purp Amp, Switch	60	50 (CES)	12	1	1 (T_A = 25°C)	100 min	25000	TO-92M	T18
ECG49	NPN-Si, Gen Purp AF Pwr Out, Driver (Compl to ECG50)	125	100	4	2	10	150	100 typ	TO-202	T38
ECG50	PNP-Si, Gen Purp AF Pwr Amp, Driver (Compl to ECG49)	125	100	4	2	10	150	100 typ	TO-202	T38
ECG51	NPN-Si, HV, Hi Speed Switch t_f = .7 µsec type	700	400	9	4	75	4 min	25 typ	TO-220	T41
ECG52	NPN-Si, HV, Hi Speed Switch t_f = .2 µsec type	750	450	6	5	125	----	10 typ	TO-3	T28
ECG53	NPN-Si, HV, Hi Speed Switch t_f = .7 µsec type	850	400	9	15	175	6 min	12 typ	TO-3	T28
ECG54 ECG54MP*	NPN-Si, AF Power Amp (Compl to ECG55)	150	150	5	8	50	70	100 typ	TO-220	T41
ECG55 ECG55MCP	PNP-Si, AF Power Amp (Compl to ECG54) Matched Compl Pair-Contains one each of ECG54 (NPN) and ECG55 (PNP)	150	150	5	8	50	85	100 typ	TO-220	T41
ECG56	NPN-Si, Hi Gain, Non-Darlington Amp, Switch, Pass Reg.	100	80	6	3	30	15	500 min	TO-220	T41
ECG58	NPN-Si, Hi Power Audio Output (Compl to ECG59)	200	200	6	17	200	20	20 min	TB-35	T44-1
ECG59	PNP-Si, Hi Power Audio Output (Compl to ECG58)	200	200	6	17	200	20	20 min	TB-35	T44-1
ECG60 ECG60MP*	NPN-Si, Power Amp, AF PO, Gen Purp (Compl to ECG61)	140	140	5	20	250	2	30 typ	TO-3	T28
ECG61 ECG61MP* ECG61MCP	PNP-Si, Power Amp, AF PO, Gen Purp (Compl to ECG60) Matched Compl Pair, Contains one each of ECG60 (NPN) and ECG61 (PNP)	140	140	5	20	250	2	30 typ	TO-3	T28

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG63	NPN-Si, UHF/Microwave Amp/Mixer G_{PE} 7.5 dB @ 2 GHz NF 4 dB @ 2 GHz	20	12	3	40 mA	400 mW	5 GHz typ	40	RF-19A	T49-3
ECG64	NPN-Si, UHF/Microwave Amp/Hi Speed Sw G_{PE} 10 dB @ 1 GHz NF 2 dB typ @ 1 GHz	25	15	3	30 mA	350 mW	4.5 GHz typ	60	RF-19A	T49-3
ECG65	NPN-Si, UHF/Microwave Amp, CATV, MATV	20	15	2	25 mA	180 mW	5 GHz typ	30 typ	RF-19	T49-2
ECG66	See FET Selector Guide Page 1-65	----	----	----	----	----	----	----	----	----
ECG67	See FET Selector Guide Page 1-65	----	----	----	----	----	----	----	----	----
ECG68 ECG68MCP	PNP-Si, Gen Purp Hi Pwr Amp (Compl to ECG388) Matched Compl Pair-Contains one each of ECG388 (NPN) and ECG68 (PNP)	400	250	5	16	250	4 min	30 typ	TO-3	T28
ECG69	NPN-Si, UHF/VHF Amp, Osc, Mixer	35	35	4	50 mA	.25 (T_A = 25°C)	800 min	70 typ	TO-92	T16
ECG70	NPN-Si, HV Pwr Amp, Switch	180	150	6	60	250	30 min	30 min	TO-63	T35
ECG71	NPN-Si, Current Amp, Fast Switch	150	90	7	20	200	20	20 min	TO-63	T35
ECG72 DISCONTINUED	NPN-Si, Hi Current Amp, Fast Switch	120	100	6	10	115	30	30 min	TO-61 (Isolated)	T33
ECG74 DISCONTINUED	NPN-Si, Gen Purp Amp, Sw	100	100	6	7	60	30	60 min	TO-59	T32
ECG75	NPN-Si, Hi Pwr Amp, Sw	100	80	8	5	50	50 min	40 min	TO-111	T30
ECG76 ECG76MP*	NPN-Si, CATV Broadband Amp	50	30	5	.4	5	1800	30 min	TO-117	T50
ECG77	NPN-Si, CATV Broadband Amp	50	30	5	.4	3.5	1800	30 min	TO-39	T6
ECG78	NPN-Si, RF PO, CB, 27 MHz, 3W	36	18	4	.6	5	----	5 min	TO-202M	T39
ECG79	NPN-Si, RF PO, CB, 27 MHz	36	18	4	2	10	----	5 min	TO-202M	T39
ECG81	Dual NPN-Si, Switch, DC to VHF Amp DISCONTINUED	75	40	6	.6	2 total (T_C = 25°C) .6 total (T_A = 25°C)	250 min	100 min	TO-78	T12
ECG82	Dual PNP-Si, Switch, DC to VHF	60	60	5	.6	2 total (T_C = 25°C) .6 total (T_A = 25°C)	200 min	100 min	TO-78	T12
ECG85	NPN-Si, Sw, Gen Purp Amp	70	70 (CES)	4	.4	.6 (T_A = 25°C)	200 min	120 min	TO-92	T16
ECG86	NPN-Si, Hi Gain DC Regulator, Amp	200	150	6	5	50	15	400 min	TO-3	T28
ECG87 ECG87MP*	NPN-Si, Hi Pwr Linear Amp (Compl to ECG88)	250	250 (CEX)	5	10	200	3	20 min	TO-3	T28
ECG88 ECG88MP* ECG88MCP DISCONTINUED	PNP-Si, Hi Pwr Linear Amp (Compl to ECG87) Matched Compl Pair Contains one each ECG87 (NPN) and ECG88 (PNP)	250	250 (CEX)	5	10	200	3	20 min	TO-3	T28
ECG89	NPN-Si, Horiz Output with Damper Diode - Page 1-78	1500	600	6	7	50	----	5 min	TO-3	T28

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_c = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG90	NPN-Si, Hi Gain, Gen Purp Amp (Compl to ECG91)	120	120	5	50 mA	.75 (T_A = 25°C)	350	400 min	TO-92M	T18
ECG91	PNP-Si, Hi Gain, Gen Purp Amp (Compl to ECG90)	120	120	5	50 mA	.75 (T_A = 25°C)	150	400 min	TO-92M	T18
ECG92	NPN-Si, Audio Pwr Amp, Hi Speed Sw (Compl to ECG93)	200	200	6	15	150	20	120 typ	TB-35	T44-1
ECG93 ECG93MCP	PNP-Si, Audio Pwr Amp, Hi Speed Sw (Compl to ECG92) Matched Compl Pair-Contains one each ECG92 (NPN) and ECG93 (PNP)	200	200	6	15	150	20	120 typ	TB-35	T44-1
ECG94	NPN-Si, Gen Purp Pwr DC Regulator	300	300	5	5	100	2.5 min	30 min	TO-3	T28
ECG95 DISCONTINUED	NPN-Si, HV Amp, Sw Isolated Stud	250	250	6	3	70	40	90 min	TO-59 (Isolated)	T31
ECG96	NPN-Si, Medium Pwr Amp, Sw, Isolated Stud	100	100	6	7	60	30 min	60 min	TO-59 (Isolated)	T31
ECG97	NPN-Si, HV Darlington Pwr Amp, Fast Sw, t_f = .5 μsec	500	400	8	10	150	----	40 min	TO-3	T28
ECG98	NPN-Si, HV Darlington Pwr Amp, Fast Sw, t_f = .6 μsec	700	500	8	20	175	----	40 min	TO-3	T28
ECG99	NPN-Si, HV Darlington Pwr Amp, Fast Sw, t_f = 1 μsec	600	400	8	50	250	----	25 min	TO-3	T28
ECG100	PNP-Ge, RF/IF Amp, Osc, Mix	25	20 (CER)	20	.3	.150 (T_A = 25°C)	5 #	40 typ at 455 kHz	TO-5	T5
ECG101	NPN-Ge, RF/IF Amp, Osc Mix	25	20 (CER)	20	.3	.150 (T_A = 25°C)	5 #	40 typ at	TO-5	T5
ECG102	PNP-Ge, AF Driver, Preamp Pwr Output (Compl to ECG103)	30	16 (CER)	20	.3	.150 (T_A = 25°C)	2	90 typ	TO-5	T5
ECG120A	PNP-GE, AF Driver, Preamp Pwr Output (Compl to ECG103A)	32	32 (CES)	12	.5	.900 (T_A = 25°C)	2.3	120 typ	TO-1	T1
ECG103	NPN-Ge, AF Driver, Preamp Pwr Output (Compl to ECG102)	30	16 (CER)	20	.250	.150 (T_A = 25°C)	2 #	90 typ at	TO-5	T5
ECG103A	NPN-Ge, AF Driver, Preamp Pwr Output (Compl to ECG102A)	32	32 (CES)	10	.5	.340 (T_A = 25°C)	2.5	105 typ	TO-1	T1
ECG104 ECG104MP*	PNP-Ge, AF Pwr Output	50	35 (CER)	20	7	90	10 kHz #	90 typ	TO-3	T28
ECG105	PNP-Ge, AF Pwr Output	50	35 (CER)	20	15	100	10 kHz #	90 typ	TO-36	T29
ECG106	PNP-Si, RF/IF Amp, Osc, Mix	35	15	1	75 mA	.250 (T_A = 25°C)	500	20 min	TO-18	T2
ECG107	NPN-Si, UHF/VHF Amp, Osc, Mix, IF Amp	30	15	5	50 mA	.250 (T_A = 25°C)	800 min	70 typ	TO-92	T16
ECG108	NPN-Si, RF/IF/Video Amp, Osc Mix, VHF/UHF	30	15	2	50 mA	.600 (T_A = 25°C)	800 min	20 min	TO-92	T16
ECG121 ECG121MP*	PNP-Ge, AF Pwr Output	65	45 (CER)	15	7.0	30	22 kHz #	80 typ	TO-3	T28
ECG123	NPN-Si, AF Preamp, Driver Video Amp, Sync Sep	60	30	5	.8	.800 (T_A = 25°C)	250	150 typ	TO-39	T6
ECG123A	NPN-Si, AF/RF Amp, Sw	75	40	6	.8	.500 (T_A = 25°C)	300	200 typ	TO-18	T2
ECG123AP	NPN-Si, AF/RF Amp, Driver (Compl to ECG159)	75	40	6	.6	.500 (T_A = 25°C)	300	200 typ	TO-92	T16
ECG124	NPN-Si, HV Audio Pwr Output	300	300	5	.150	20	30	100 typ	TO-66	T25

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_c = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG126A	PNP-Ge, RF/IF Amp, Osc, Mix	15	15	3	50 mA	300 mW (T_A = 25°C)	250	40 typ	TO-18	T2
ECG127	PNP-Ge, Horiz & Vert Defl, Pwr Output	320	320 (CES)	2	10	40	1	15 min	TO-3	T28
ECG128	NPN-Si, AF Preamp, Driver Output, Video Amp (Compl to ECG129)	120	80	7	1	1 (T_A = 25°C)	120	90 min	TO-39	T6
ECG128P	NPN-Si, Gen Purp Amp, Sw (Compl to ECG129P)	100	80	7	1	1	100	100 min	TO-237	T17
ECG129 ECG129MCP	PNP-Si, AF Preamp, Driver, Output, Video Amp (Compl to ECG128) Matched Compl Pair-Contains one each ECG128 (NPN) and ECG 129 (PNP)	90	80	7	1	1 (T_A = 25°C)	120	90 min	TO-39	T6
ECG129P	PNP-Si, Gen Purp Amp, Sw (Compl to ECG128P)	80	80	7	1	1	150	100 min	TO-237	T17
ECG130 ECG130MP*	NPN-Si, AF Pwr Amp (Compl to ECG219)	100	60	7	15	115	.800	40 typ	TO-3	T28
ECG131 ECG131MP*	PNP-Ge, AF Pwr Output (Compl to ECG155)	32	20	10	3 peak	6 (T_C = 63°C)	1	110 typ	TC-9	T27
ECG152 ECG152MP*	NPN-Si, AF Pwr Output (Compl to ECG153)	60	60	5	7	50	10	60 typ	TO-220	T41
ECG153 ECG153MCP	PNP-Si, AF Pwr Output Compl to ECG152) Matched Compl Pair-Contains one each ECG152 (NPN) and ECG153 (PNP)	60	60	5	7	50	10	60 typ	TO-220	T41
ECG154	NPN-Si, Video Output Amp	300	300	7	.5	1.0 (T_A = 25°C) 7.0 (T_C = 25°C)	40	60 typ	TO-39	T6
ECG155	M(M-Ge, AF Pwr Amp (Compl to ECG131)	32	20	10	3 peak	7.5	1	110 typ	TC-9	T27
ECG157	NPN-Si, HV AF Pwr Amp (Compl to ECG39)	300	300	3	.5	20.8	10	30 min	TO-126	T45
ECG158	PNP-Ge, AF Pwr Amp	32	32	10	1	1.6	1.5	90 typ	TO-1	T1
ECG159 ECG159MCP	PNP-Si, AF Preamp, Driver Sw (Compl to ECG123AP) Matched Compl Pair-Contains one each ECG123AP (NPN) and ECG159 (PNP)	80	80	5	1	.600 (T_A = 25°C)	200	180 typ	TO-92	T16
ECG160	PNP-Ge, RF/IF Amp, Osc Mix	30	20 (CES)	.5	10 mA	.200 (T_A = 25°C)	400	20 typ	TO-72	T4
ECG161	NPN-Si, Video IF Amp	30	30 (CES)	2.5	25 mA	.200 (T_A = 25°C)	1000	60 typ	TO-72	T4
ECG162	NPN-Si, Vert Defl	500	300	5	3 cont. 10 peak	100	----	20 min	TO-3	T28
ECG163A	NPN-Si, Horiz Defl	700	700 (CEV)	5	10 peak	100	----	10	TO-3	T28
ECG164	NPN-Si, Vert Defl	1500	700 (CER)	5	1	50	.5 min	20	TO-3	T28
ECG165	NPN-Si, Horiz Defl	1500	1400 (CES)	5	5	50	----	5	TO-3	T28
ECG172A	NPN-Si, Darlington AF Preamp, Medium-Speed Sw	40	40	12	.3	.400 (T_A = 25°C)	60	7000 min	TO-92	T16•
ECG175	NPN-Si, AF Pwr Amp	500	300	6	3	40	10	50 typ	TO-66	T25
ECG176	PNP-Ge, AF Pwr Amp	25	25	6	2	6	.700	110 typ	TO-39	T6

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG179 ECG179MP*	DISCONTINUED [illegible] Amp	90	90	2	25	106	.35 min	55 typ	TO-3	T28
ECG180 ECG180MCP	PNP-Si, AF Amp (Compl to ECG181) Matched Compl Pair-Contains one each ECG181 (NPN) and ECG180 (PNP)	100	100 (CER)	4	30	200	2 min	25 min	TO-3	T28
ECG181 ECG181MP*	NPN-Si, AF Amp (Compl to ECG180)	100	100 (CER)	4	30	200	2 min	25 min	TO-3	T28
ECG184 ECG184MP*	NPN-Si, AF Prw Amp, Hi Speed Sw (Compl to ECG185)	80	80	5	4	40	2	30 min	TO-126	T45
ECG185 ECG185MCP	PNP-Si, AF Pwr Amp, Hi Speed Sw (Compl to ECG184) Matched Compl Pair-Contains one each ECG184 (NPN) and ECG185 (PNP)	80	80	5	4	40	2	30 min	TO-126	T45
ECG186	NPN-Si, AF Pwr Amp, Hi Speed Sw (Compl to ECG187)	70	60	5	3	12.5	50	80 typ	TO-202	T38
ECG186A	NPN-Si, AF Pwr Amp, Driver (Compl to ECG187A)	50	50	5	3	10	150	80 min	TO-202M	T39
ECG187	PNP-Si, AF Pwr Amp, Hi Speed Sw (Compl to ECG186)	70	60	5	3	12.5	50	80 typ	TO-202	T38
ECG187A	PNP-Si, AF Pwr Amp (Compl to ECG186A)	50	50	5	3	10	150	80 min	TO-202M	T39
ECG188 DISCONTINUED	NPN-Si, AF Driver, Pwr Amp (Compl to ECG189)	80	80	4	2	10	50	80 typ	TO-202N	T36
ECG189 DISCONTINUED	PNP-Si, AF Driver, Pwr Amp (Compl to ECG188)	80	80	4	2	10	50	80 typ	TO-202N	T36
ECG190	NPN-Si, AF Pwr Amp, Horiz Driver	180	180	5	1	10	100	40 min	TO-202N	T36
ECG191 DISCONTINUED	NPN-Si, HV AF Amp, HV Video Amp (Compl to ECG240)	300	300	6	.5	10	60	40 min	TO-202N	T36
ECG193 DISCONTINUED	PNP-Si, AF Pwr Output (Compl to ECG192)	70	70 (CES)	5	1	.700 (T_A = 25°C) 1 (T_C = 25°C)	120 min	150 typ	TO-92HS	T21
ECG193A	PNP-Si, AF PO (Compl to ECG192A)	70	70 (CES)	5	.5	.6 (T_A = 25°C)	120	120 min	T-16HS	T22•
ECG194	NPN-Si, Gen Purp HV Amp, Hi Speed Sw	180	160	4	.6	.350 (T_A = 25°C)	100	100 typ	TO-92	T16
ECG195A	NPN-Si, RF Pwr Amp/Driver P_O 3.5 W min, 50 MHz, 12V)	70	70 (CER)	4	1.5	8	150	30 min	TO-39	T6
ECG196	NPN-Si, AF Pwr Output (Compl to ECG197)	90	80 (CER)	5	7	50 (TC= 25°C) 1.8 (T_A = 25°C)	.800 min	20 min	TO-220	T41
ECG197	PNP-Si, AF Pwr Output (Compl to ECG196)	90	80 (CER)	5	7	50 (T_C = 25°C) 1.8 (T_A = 25°C)	.800 min	20 min	TO-220	T41
ECG198	NPN-Si, HV AF Sw	500	500 (CES)	5	1	40 (T_C = 25°C) 2 (T_A = 25°C)	20	80 typ	TO-220	T41
ECG199	NPN-Si, Lo Noise Hi Gain Preamp	70	50	5	.1	.360 (T_A = 25°C)	90 min	400	TO-92	T16•

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_c = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package	
									Case	Fig. No.
ECG211	PNP-Si, AF Output, Sw (Compl to ECG210)	90	75	5	1	6.25 (T_C = 25°C) 1.33 (T_A = 25°C)	200	120 min	TO-202	T38
ECG213 DISCONTINUED	PNP-Ge, Hi Current/Power	75	65	40	30	170	.270	80 typ	TO-36	T29
ECG214	NPN-Si, Darlington Dr, Sw, Series Pass, t_f = 1.8 µsec typ	70	60	6	10	60	----	2000 min	TO-3PJ	T48-1
ECG215	NPN-Si, Darlington Dr, Sw Series Pass t_f = 1.6 µsec typ	110	100	6	8	60	---	1500 min	TO-3PJ	T48-1
ECG216	NPN-Si, Hi Speed Sw, Core Driver, t_d = 5 ns, t_r = 15 ns, t_s = 35 ns, t_f = 30 ns typ	80	50	6	1.5	1	300	60 min	TO-237	T17
ECG217	PNP-Si, Hi Speed Sw, Amp, t_d = 10 ns, t_r = 30 ns, t_s = 60 ns, t_f = 30 ns max	40	40	5	1	1	175	40 min	TO-237	T17
ECG218	PNP-Si, AF Pwr Output	90	80	7	3	25	3 min	20 min	TO-66	T25
ECG219 ECG219MCP	PNP-Si, AF Output, Sw (Compl to ECG130) Matched Compl Pair-Contains one each ECG130 (NPN) and ECG219 (PNP)	100	70 (CER)	7	15	150	4 min	20 min	TO-3	T28
ECG220 thru ECG222	See FET Selector Guide Page 1-65									
ECG224	NPN-Si, Final RF Pwr Output (P_O 4 W, 50 MHz)	60	60 (CEV)	2.5	2	10	200	60 typ	TO-39F	T23
ECG225	NPN-Si, AF Video & Sw	450	350	7	1	10	15	40 min	TO-39F	T23
ECG226 ECG226MP*	PNP-Ge, AF Pwr Output	35	35 (CER)	6	2	12	.450	125 typ	TC-9A	T26
ECG227	NPN-Si, HV Amp, Video Output	300	300	7	.1	1	50	40 min	TO-237	T17
ECG229	NPN-Si, VHF Osc, Mix, IF Amp	40	40	4	50 mA	.425 (T_A = 25°C)	600	30 min	TO-92	T16
ECG232	PNP-Si, Darlington Amp	30	30	8	.3	.625 (T_A = 25°C)	175	50,000 typ	TO-92	T16
ECG233	NPN-Si, Final Video IF	30	30	3	.1	.625 (T_A = 25°C)	300	45 typ	TO-92	T16
ECG234	PNP-Si, Lo Noise, Hi Gain AF Preamp	60	50	5	50 mA	.200 (T_A = 25°C)	80 min	TO-92	T16	
ECG235	NPN-Si, Final RF Pwr Output (P_O 5 W, 50 MHz)	65	65 (CER)	4	3 pulse	12	200 min	40 min	TO-220	T41
ECG236	NPN-Si, Final RF Pwr Output (P_O 13 W, 50 MHz, SSB)	70	70 (CER)	4	8 pulse	25	100	20 min	TO-220	T41
ECG238	NPN-Si, Horizontal Output	1500	1500 (CER)	5	7	50	----	5	TO-3	T28
ECG240	PNP-Si, HV AF Amp, Video Output (Compl to ECG191)	300	300	5	.5	10 (T_C = 25°C) 1 (T_A = 25°C)	60 min	40 typ	TO-202N	T36
ECG241	NPN-Si, AF Pwr, Sw (Compl to ECG242)	80	80	5	4	60	2	25 min	TO-220	T41•
ECG242	PNP-Si, AF Pwr, Sw (Compl to ECG241)	80	80	5	4	60	2	25 min	TO-220	T41•
ECG243	NPN-Si, Darlington Pwr Amp (Compl to ECG244)	80	80	5	8	100	----	3000 typ	TO-3	T28

Notes: * MP- Matched Pair
Frequency at which common emitter current is 70.0% of low frequency gain
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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG244	PNP-Si, Darlington Pwr Amp (Compl to ECG243)	80	80	5	8	100	----	3000 typ	TO-3	T28
ECG245	NPN-Si, Darlington Pwr Amp (Compl to ECG246)	80	80	5	10	150	----	4000 typ	TO-3	T28
ECG246	PNP-Si, Darlington Pwr Amp (Compl to ECG245)	80	80	5	10	150	----	4000 typ	TO-3	T28
ECG247	NPN-Si, Darlington Pwr Amp (Compl to ECG248)	100	100	5	12	150	----	3500 typ	TO-3	T28
ECG248	PNP-Si, Darlington Pwr Amp (Compl to ECG247)	100	100	5	12	150	----	3500 typ	TO-3	T28
ECG249	NPN-Si, Darlington Pwr Amp (Compl to ECG250)	100	100	5	16	150	----	3500 typ	TO-3	T28
ECG250	PNP-Si, Darlington Pwr Amp (Compl to ECG249)	100	100	5	16	150	----	3500 typ	TO-3	T28
ECG251	NPN-Si, Darlington Pwr Amp (Compl to ECG252)	100	100	5	20	160	----	2400 typ	TO-3	T28
ECG252	PNP-Si, Darlington Pwr Amp (Compl to ECG251)	100	100	5	20	160	----	2400 typ	TO-3	T28
ECG253	NPN-Si, Darlington Pwr Amp (Compl to ECG254)	80	80	5	4	40	----	2000 typ	TO-126	T45
ECG254	PNP-Si, Darlington Pwr Amp (Compl to ECG253)	80	80	5	4	40	----	2000 typ	TO-126	T45
ECG255	NPN-Si, Horiz Driver, Amp, Sw	325	300	6	1	1	30 min	30 min	TO-237	T17
ECG256	NPN-Si, Darlington w/Damper Diode, Hi Speed Sw, Hi Current, t_f = 150 nsec	450	400	8	20	150	----	30 min	TO-3P (TO-218)	T48
ECG258	PNP-Si, Darlington Pwr Amp	80	80	5	5	70	----	750 min	TO-127	T46
ECG261	NPN-Si, Darlington Pwr Amp (Compl to ECG262)	100	100	5	8	65	----	1000 min	TO-220	T41
ECG262	PNP-Si, Darlington Pwr Amp (Compl to ECG261)	100	100	5	8	65	----	1000 min	TO-220	T41
ECG263	NPN-Si, Darlington Pwr Amp (Compl to ECG264)	100	100	5	10	65	----	1000 min	TO-220	T41
ECG264	PNP-Si, Darlington Pwr Amp (Compl to ECG263)	100	100	5	10	65	----	1000 min	TO-220	T41
ECG265	NPN-Si, Darlington Pwr Amp Switch	50	50	13	.5	6.25	----	10000 min	TO-202	T38
ECG266	NPN-Si, Darlington Pwr Amp, Switch	50	50	13	.5	6.25	----	40000 min	To-202	T38
ECG268	NPN-Si, Darlington Pwr Amp (Compl to ECG269)	50	50	13	2	10	----	1000 min	TO-202	T38
ECG269	PNP-Si, Darlington Pwr Amp (Compl to ECG268)	50	50	13	2	10	----	1000 min	TO-202	T38
ECG270	NPN-Si, Darlington Pwr Amp Switch (Compl to ECG271)	100	100	5	10	125	----	1000 min	TO-3P (TO-218)	T438
ECG271	PNP-Si, Darlington Pwr Amp Switch (Compl to ECG270)	100	100	5	10	125	----	1000 min	TO-3P (TO-218)	T48
ECG272	NPN-Si, Darlington Pwr Amp, Switch (Compl to ECG273)	50	40	12	2	10	----	25000 min	To-202N	T36
ECG273	PNP-Si, Darlington Pwr Amp, Switch (Compl to ECG272)	50	40	12	2	10	----	25000 min	To-202N	T36
ECG274	NPN-Si, Darlington Pwr Amp Switch (Compl to ECG275)	80	80	5	4	50	----	3000 typ	TO-66	T25

Notes: * MP- Matched Pair
Frequency at which common emitter current is 70.0% of low frequency gain
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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_c = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG275	PNP-Si, Darlington Pwr Amp Switch (Compl to ECG274)	80	80	5	4	50	----	3000 typ	TO-66	T25
ECG278	NPN-Si, Broad Band RF Amp	40	30	4	.4	3.5	1200 min	30 min	TO-39	T6
ECG280 ECG280MP*	NPN-Si, AF Pwr Amp (Compl to ECG281)	140	140	5	12	100	6	70 min	TO-3	T28
ECG281 ECG281MCP	PNP-Si, AF pwr Amp (Compl to ECG280) Matched Compl Pair-Contains one each ECG280 (NPN) and ECG281 (PNP)	140	140	5	12	100	6	70 min	TO-3	T28
ECG283	NPN-Si, HV-Hi Current Sw, Horiz Output	800	325	8	10	100	6	15 min	TO-3	T28
ECG284 ECG284MP*	NPN-Si, AF Pwr Amp (Compl to ECG285)	180	180	5	16	150	6	70 min	TO-3	T28
ECG285 ECG285MCP	PNP-Si, AF Pwr amp (Compl to ECG284) Matched Compl Pair-Contains one each ECG284 (NPN) and ECG285 (PNP)	180	180	5	16	150	6	70 min	TO-3	T28
ECG287	NPN-Si, HV Gen Purp Amp (Compl to ECG288)	300	300	6	.5	.625 (T_A = 25°C)	50	40 min	TO-92	T16
ECG288	PNP-Si, HV Gen Purp amp (Compl to ECG287)	300	300	5	.5	.625 (T_A = 25°C)	50	40 min	TO-92	T16
ECG289A ECG289AMP*	NPN-Si, AF Pwr Amp (Compl to ECG290A)	100	80	5	.5	.500 (T_A = 25°C)	120	100 min	TO-92	T16
ECG290A ECG290AMCP	PNP-Si, AF Pwr Amp (Compl to ECG289A) Matched Compl Pair-Contains one each ECG289A (NPN) and ECG290A (PNP)	100	80	5	.5	.500 (T_A = 25°C)	120	100 min	TO-92	T16
ECG291	NPN-Si Pwr Amp, Sw (Compl to ECG292)	130	120	5	4	40	4 min	75 typ	TO-220	T41
ECG292 ECG292MCP	PNP-Si, Pwr Amp, Sw (Compl to ECG291) Matched Compl Pair-Contains one each ECG291 (NPN) and ECG292 (PNP)	130	120	5	4	40	4 min	75 typ	TO-220	T41
ECG293 ECG293MP*	NPN-Si, AF Pwr Amp (Compl to ECG294)	60	50	5	1	1 (Heat Sink) .75 (T_A = 25°C)	200	120 min	T-16	T20
ECG294	PNP-Si, AF Pwr Amp (Compl to ECG293)	60	50	5	1	1 (Heat Sink) .75 (T_A = 25°C)	200	120 min	T-16	T20
ECG295	NPN-Si, RF Output/Driver	75	40	5	1	5	150 min	20 min	TO-126	T45
ECG297 ECG297MP*	NPN-Si, AF Driver/Pwr Amp (Compl to ECG298)	80	80	5	1 peak	.75 (T_A = 25°C)	120	130 min	T-16	T20
ECG298	PNP-Si, AF Driver/Pwr Amp (Compl to ECG297)	80	80	5	1 peak	.75 (T_A = 25°C)	120	130 min	T-16	T20
ECG300 ECG300MP*	NPN-Si, AF Pwr Output	50	40	5	1.5	7	70	90 min	TO-202	T38
ECG302	NPN-Si, RF Driver/Pwr Amp	100	50	6	1.5 peak	8	80	200 min	TO-202J	T37
ECG306	NPN-Si, RF Driver/Pwr Amp	100	50	6	1.5 peak	8	80	200 min	TO-202J	T37
ECG311	NPN-Si, VHF/UHF Osc, Amp Driver	55	30	3.5	.4	5	800 min	25 min	TO-39	T6

Notes: * MP- Matched Pair
Frequency at which common emitter current is 70.0% of low frequency gain
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Package Outlines - See Page 1-91

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG312	See FET Selector Guide Page 1-65	----	----	----	----	----	----	----	----	----
ECG313	NPN-Si, VHF Tuner, RF Amp	30	30	4	20 mA	.15 (T_A = 25°C)	400 min	25 min	RF-15	T49
ECG315	NPN-Si, RF Driver	100	50	6	1	.75 (T_A = 25°C)	80	200 typ	SC-51	T19
ECG316	NPN-Si, Lo Noise UHF Amp (NF 4.5 dB max, 450 MHz)	30	15	3.5	50 mA	.200 (T_A = 25°C)	1400	25 min	TO-72	T4
ECG317	NPN-Si, RF Pwr Output P_o 70 W, 30 MHz)	36	36 (CES)	4	15	220	----	10 min	RF-50F	T58
ECG318	NPN-Si, RF Pwr Output (P_o 50 W, 30 MHz)	36	36 (CES)	4	6	80	----	5 min	RF-50F	T58
ECG319P	NPN-Si, AGC Controlled IF Amp (Includes Metal Shield)	40	30	4	50 mA	.5 (T_A = 25°C)	300 min.	35 typ	TO-92	T16
ECG320	NPN-Si, RF Pwr Output (P_o 40 W, 175 MHz	36	36 (CES)	4	6	80	200 min	5 min	RF-50SS	T55
ECG320F	NPN-Si, RF Pwr Output (P_o 40 W, 175 MHz)	36	18	4	6	80	200 min	5 min	RF-38F	T57
ECG321	NPN-Si, Horiz Defl	1600	700	5	1.5	15 (T_C = 25°C)	----	1.5 min	TO-66	T25
ECG323	PNP-Si, AF Pwr Amp (Compl to ECG324)	120	100	5	2	1 (T_A = 25°C)	30	50 min	TO-39	T6
ECG324	NPN-Si, AF Pwr Amp (Compl to ECG323)	120	100	5	2	1 (T_A = 25°C)	50	50 min	TO-39	T6
ECG325	NPN-Si, RF, PO, 14-30 MHz, 50 W	40	20	4	7.5	115	----	----	RF-38S	T53
ECG326 **ECG326A**	See Fet Selector Guide Page 1-65	----	----	----	----	----	----	----	----	----
ECG327	NPN-Si, Pwr Amp, Sw t_f = 250 nsec	180	150	6	25	200	40	30 min 120 max	TO-3	T28
ECG328	NPN-Si, Pwr Amp Sw	150	130	7	15	140	60	12 min 100 max	TO-3	T28
ECG329	NPN-Si, RF Pwr Amp (P_o 3.5 W min, 27 MHz)	60	30	2.5	1.5 peak	5	----	----	TO-39	T6
ECG330	PNP-Ge, Fast Pwr Sw	----	40	1.4	25	170	----	12 typ	TO-36	T29
ECG331 **ECG331MP***	NPN-Si, AF PO, Reg, Sw (Compl to ECG332)	100	100	5	15	90	3 min	40 typ	TO-220	T41
ECG332 **ECG332MCP**	PNP-Si, AF PO, Reg, Sw (Compl to ECG331 Matched Compl Pair-Contains one each ECG331 (NPN) and ECG332 (PNP)	100	100	5	15	90	3 min	40 typ	TO-220	T41
ECG333	NPN-Si, RF PO, 14-30 MHz, 60 W	36 (CES)	18	4	15	175	----	10 min	RF-38F	T57
ECG334	NPN-Si, RF PO, 14-30 MHz, 60 W	36 (CES)	18	4	15	175	----	10 min	RF-38S	T53
ECG335	NPN-Si, RF PO, 14-30 MHz, 80 W	45	25	4	20	250	----	10 min	RF-50F	T58
ECG336	NPN-Si, RF PO, 14-30 MHz, 80 W	45	25	4	20	250	----	10 min	RF-50S10	T54
ECG337	NPN-Si, RF Driver, 27-50 MHz, 8 W	36	18	4	2	20	----	5 min	RF-38S	T53
ECG338	NPN-Si, RF Driver & Output, 27-50 MHz, 20 W	48	24	4	3.5	50	----	15 typ	RF-38S	T53

Notes: * MP- Matched Pair
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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_c = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG338F	NPN-Si, RF Driver & Output, 27-50 MHz, 20 W	36	18	4	4.5	80	----	10 min	RF-38F	T57
ECG339	NPN-Si, RF PO, 27-50 MHz, 40 W	48	24	4	7	100	----	3 min	RF-50S10	T54
ECG340	NPN-Si, RF PO, Driver 136-174 MHz, 600 mW	36	18	4	.5	.750 (T_A = 25°C)	----	70 typ	T-16	T20
ECG341	NPN-Si, RF PO, 136-174 MHz, 4 W	36	18	4	.640	8	----	5 min	TO-39EC	T7•
ECG342	NPN-Si, RF PO, 136-174 MHz, 7 W	35	17	4	2	12.5	----	50 typ	TO-220EC	T42•
ECG343	NPN-Si, RF PO, 136-174 MHz, 14 W	35	17	4	3.5	25	----	50 typ	TO-220EC	T42•
ECG344	NPN-Si, RF PO, 136-174 MHz, 30 W	35	17	4	7	50	----	50 typ	RF-28F6	T59
ECG345	NPN-Si, RF PO, 136-174 MHz, 30 W	36	18	4	4	65	----	5 min	RF-38S	T53
ECG346	NPN-Si, RF Driver & Predriver, 136-174 MHz, 1 W	40	20	2	.4	1 (T_A = 25°C) 3.5 (T_C = 25°C)	500	10 min	TO-39	T6
ECG347	NPN-Si, RF PO, 136-174 MHz, 3 W	36	18	4	.6	15	----	5 min	RF-38SM	T51
ECG348	NPN-Si, RF PO, 136-174 MHz, 4 W	36	18	4	1	12	----	5 min	RF-38S	T53
ECG349	NPN-Si, RF PO, 136-174 MHz, 10 W	36	18	4	2	30	----	5 min	RF-38S	T53
ECG350	NPN-Si, RF PO, 136-174 MHz, 15 W	36	18	4	2.5	31	----	5 min	RF-38S	T53
ECG350F	NPN-Si, RF PO, 136-174 MHz, 15 W	36	18	4	2.5	31	----	5 min	RF-38F	T57
ECG351	NPN-Si, RF PO, 136-174 MHz, 25 W	36	18	4	4	65	----	5 min	RF-38S	T53
ECG352	NPN-Si, RF PO, 136-174 MHz, 80 W	36	18	4	20	250	----	35 typ	RF-50F6	T60
ECG353	PNP-Si, RF PO, 136-174 MHz, 4 W	36	18	4	1	8	----	5 min	RF-38F	T57
ECG354	PNP-Si, RF PO, 136-174 MHz, 15 W	36	18	4	2.5	20	----	5 min	RF-38F	T57
ECG355	PNP-Si, RF PO, 136-174 MHz, 30 W	36	18	4	4	40	----	5 min	RF-38F	T57
ECG357	NPN-Si, RF PO, 30-200 MHz, 7 W	65	35	4	1	15	----	5 min	RF-38SM	T51
ECG359	NPN-Si, RF PO, 30-200 MHz, 20 W	65	35	4	3	30	----	5 min	RF-38S	T53
RCG360	NPN-Si, RF PO, 30-200 MHz, 40 W	65	35	4	5	60	----	5 min	RF-38S	T53
ECG361	NPN-Si, RF PO, 407-512 MHz, 2 W	36	16	4	.4	5	----	20 min	TO-39EC	T7•
ECG362	NPN-Si, RF PO, 407-512 MHz, 2 W	36	16	4	.4	5	----	20 min	RF-28S	T52
ECG363	NPN-Si, RF PO, 407-512 MHz, 4 W	36	16	4	.8	15	----	20 min	RF-28S	T52
ECG364	NPN-Si, RF PO, 407-512 MHz, 10 W	36	16	4	2	37.5	----	20 min	RF-28S	T52
ECG365	NPN-Si, RF PO, 407-512 MHz, 15 W	36	16	4	3	50	----	30 min	RF-50F6	T60

Notes: * MP- Matched Pair
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Package Outlines - See Page 1-91

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Transistors (cont'd) (Maximum Ratings at T_c = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package	
									Case	Fig. No.
ECG366	NPN-Si, RF PO, 407-512 MHz, 25 W	36	16	4	5	75	----	20 min	RF-50F6	T60
ECG367	NPN-Si, RF PO, 407-512 MHz, 45 W	36	16	4	8	175	----	20 min	RF-50F6	T60
ECG368	NPN-Si, RF PO, 407-512 MHz, 60 W	36	16	4	10	233	----	20 min	RF-50F6	T60
ECG369	NPN-Si, Vert Out, Sw, AF Amp	800	400	6	3.0 peak	40	7	30 min	TO-66	T25
ECG373	NPN-Si, AF Driver (Compl to ECG374)	180	160	5	1.5	1 (T_A = 25°C) 20 (T_C = 25°C)	140	100 typ	TO-126	T45
ECG374	PNP-Si, AF Driver (Compl to ECG373)	180	160	5	1.5	1 (T_A = 25°C) 20 (T_C = 25°C)	140	100 typ	TO-126	T45
ECG375	NPN-Si, Vert Defl, AF Amp (Compl to ECG398)	200	150	6	3	25	8	150 typ	TO-220	T41
ECG376	NPN-Si, Pwr Amp	300	300	5	.15	1.5 (T_A = 25°C) 15 (T_C = 25°C)	80	100 typ	TO-220	T41
ECG377	NPN-Si, Pwr Driver, PO, Sw, Reg (Compl to ECG378)	80	80	5	10	50	50	60 min	TO-220	T41
ECG378	PNP-Si, Pwr Driver, PO, Sw, Reg (Compl to ECG377)	80	80	5	10	50	50	60 min	TO-220	T41
ECG379	NPN-Si, HV Hi Speed Pwr Sw	700	400	9	12	100	4 min	20 typ	TO-220	T41
ECG381	PNP-Si, AF Pwr Amp	150	120	5	5	80	9	60 typ	TB-33	T43
ECG382	NPN-Si, AF Driver (Compl to ECG383)	120	100	5	1	.9 (T_A = 25°C)	140	200 typ	TO-92M	T18
ECG383	PNP-Si, AF Driver	120	100	5	1	.9 (T_A = 25°C)	140	200 typ	TO-92M	T18
ECG384	NPN-Si, Sw, Linear Amp	375	350	9	7	45	1 min	20 typ	TO-66	T25
ECG385	NPN-Si, HV Hi Speed Sw	550	350	6	10	150	----	20 typ	TO-3	T28
ECG386	NPN-Si, HV Hi Speed Sw	800	500	6	20	175	----	30 typ	TO-3	T28
ECG387 ECG387MP*	NPN-Si, Pwr Amp, Sw	180	150	6	50	250	30 min	70 typ	TO-3	T28A
ECG388	NPN-Si, Hi Pwr AF Amp (Compl to ECG68)	400	250	5	16	250	4 min	30 typ	TO-3	T28
ECG389	NPN-Si, Horiz Output	1500	1500 (CES)	5	4	100	4 min	5 min	TO-3	T28
ECG390	NPN-Si, Pwr Amp, Hi Speed Sw (Compl to ECG391)	100	100	5	10	80	3	40 min	TO-3P (TO-218)	T48
ECG391	PNP-Si, Pwr Amp, Hi Speed Sw (Compl to ECG390)	100	100	5	10	80	3	40 min	TO-3P (TO-218)	T48
ECG392	NPN-Si, Pwr Amp, Hi Speed Sw (Compl to ECG393)	100	100	5	25	125	3	25 min	TO-3P (TO-218)	T48
ECG393	PNP-Si, Pwr Amp, Hi Speed Sw (Compl to ECG392)	100	100	5	25	125	3	25 min	TO-3P (TO-218)	T48
ECG394	NPN-Si, HV Pwr Amp, Sw	500	400	5	3	100	2.5	30 min	TO-3P (TO-218)	T48
ECG395	PNP-Si, Wide Band VHF/UHF Amp, Osc	30	25	3	50 mA	.360 (T_A = 25°C)	2.3 GHz	25 min	TO-72	T4
ECG396	NPN-Si, Linear Amp & Hi Speed Sw (Compl to ECG397)	450	350	7	1	10	15 min	60 typ	TO-39	T6

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Package Outlines - See Page 1-91

Transtors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG397	PNP-Si, Linear Amp & Hi Speed Sw (Compl to ECG396)	350	300	6	1	10	15 min	50 typ	TO-39	T6
ECG398	PNP-Si, Vertical Defl, Audio Amp (Compl to ECG375)	200	150	5	2	25	5	100 typ	TO-220	T41
ECG399	NPN-Si, HV Video Output	300	300	6	.1	.9 (T_A = 25°C)	50 min	100 min	T-16	T20
ECG451 thru ECG469	See FET Selector Guide Page 1-65	----	----	----	----	----	----	----	----	----
ECG470	NPN-Si, RF PO, 2-30 MHz, 100 W, 12.5 V	36	18	4	20	250	----	10 min	RF-50F	T58
ECG471	NPN-Si, RF PO, 2-30 MHz, 100 W, 28 V	65	36	4	15	250	----	10 min	RF-50F	T58
ECG472	NPN-Si, RF Driver, PO, 136-174 MHz, 1.8 W	36	16	4	.400	5	40 min	20 min	TO-39	T6
ECG473	NPN-Si, RF Driver, PO, 136-174 MHz, 2.2 W	36	18	4	1	7	----	10 min	TO-39	T6
ECG474	NPN-Si, RF PO, 88 MHz, 6 W, 174 MHz, 3 W	36	18	4	.600	9.5	----	5 min	TO-202C	T40
ECG477	NPN-Si, RF PO, 136-174 MHz, 45 W	36	18	4	6	75	----	20 typ	RF-50F6	T60
ECG479	NPN-Si, RF PO, 407-512 MHz, 1.8W	36	14	3.5	.400	3.5	----	20 min	TO-39	T6
ECG481	NPN-Si, RF PO, 806-870 MHz, 6 W	36	16	4	5	28	----	20 min	RF-38F6B	T61
ECG482	NPN-Si, RF PO, 806-870 MHz, 15 W	36	16	4	7	46	----	20 min	RF-23F6E	T63
ECG483	NPN-Si, RF PO, 806-870 MHz, 18 W	36	16	4	7	46	----	20 min	RF-38F6B	T61
ECG484	NPN-Si, RF PO, 806-870 MHz, 25 W	36	16	4	10	75	----	20 min	RF-38F6B	T61
ECG485	NPN-Si, RF PO, 806-870 MHz, 25 W	36	18	4	7.5	70	----	15 min	RF-23F6	T62
ECG486	NPN-Si, RF Multiplier Amp, 407-512 MHz, .75 W	35	20	4	.15	2.5	1800 min	20 min	TO-39	T6
ECG487	NPN-Si, RF Multiplier Amp 136-174 MHz, 1 W	36	18	4	.400	5	400 min	20 min	TO-39A	T8
ECG488	NPN-Si, RF PO, Driver, 136-174 MHz, 4 W	36	18	4	.800	8	----	5 min	TO-39EG	T9
ECG489 ECG492	See FET Selector Guide Page 1-65	----	----	----	----	----	----	----	----	----
ECG2300	NPN-Si, HV Horiz Output, Sw, t_f = .7 µsec typ	1500	700	6	8	125	7	5	TO-3P (TO-218)	T48
ECG2301	NPN-Si, HV Horiz Output, Sw, t_f = .4 µsec typ	1500	750	5	5	100	4	5	TO-3P (TO-218)	T48
ECG2302	NPN-Si, Horiz Output/Damper Diode, t_f = .7 µsec max	1500	800	7	5	120	3	8 min	TO-3PJ	T48-1
ECG2303	NPN-Si, Horiz Output, Sw, t_f = .65 µsec typ	1500	750	5	2.5	65	4	4	TO-220	T41
ECG2304	NPN-Si, Hi Speed Sw, Amp, t_f = .1 µsec typ (Compl to ECG2314)	60	50	6	15	90	20	100 min	TO-3PJ	T48-1
ECG2305	NPN-Si, Pwr Amp, Sw, t_f = 1.2 µsec typ (Compl to ECG2306)	160	160	7	16	125	1 min	60 min	TO-3P (TO-218)	T48

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package	
									Case	Fig. No.
ECG2306	PNP-Si, Pwr Amp, Sw t_f = 1.2 μsec typ (Compl to ECG2305)	160	160	7	16	125	1 min	60 min	TO-3P (TO-218)	T48
ECG2307	NPN-Si, Hi Gain Amp, Series Pass	200	180	5	5	80	----	500 min	TO-3PJ	T48-1
ECG2308	NPN-Si, Hi Speed Sw, Series Pass t_f = 1 μsec max	500	400	7	12	100	20	15 min	TP-3PJ	T48-1
ECG2309	NPN-Si, HV Hi Speed Sw, t_f = .7μsec max	900	800	7	6	100	15	10 min	TO-3PJ	T48-1
ECG2310	NPN-Si, HV Hi Speed Sw, t_f = .8 μsec max	1000	450	9	8	125	----	10 min	TO-3P (TO-218)	T48
ECG2311	NPN-Si, HV Hi Speed Sw, Hi Current, t_f = .3 μsec typ	1000	450	7	15	150	----	10	TO-3P (TO-218)	T48
ECG2312	NPN-Si, HV Hi Speed Sw, t_f = .7 μsec typ	700	400	9	8	80	4 min	5 min	TO-220	T41
ECG2313	NPN-Si, HV Hi Speed Sw, t_f = .4 μsec typ	1000	450	5	2	40	20 typ	50 typ	TO-220	T41
ECG2314	PNP-Si, Hi Speed Sw, t_f = .1 μsec typ (Compl to ECG2304)	60	50	6	15	90	20	100 min	TO-3PJ	T48-1
ECG2315	NPN-Si, Darlington w/Damper Diode, HV Hi Speed Sw, t_f = .2 μsec Typ	400	200	6	8	60	----	100 min	TO-220	T41
ECG2316	NPN-Si, Darlington Driver w/ Damper Diode, HV Pwr Amp	500	450	5	10	105	----	100 min	TO-3P (TO-218)	T48
ECG2317	NPN-Si, Darlington Driver w/ Damper Diode, HV Hi Current Amp	500	450	5	15	105	----	40 min	TO-3P (TO-218)	T48
ECG2318	NPN-Si, HV, Horiz Output w/Damper Diode, t_f = .7 μsec typ	1500 (CES)	700	6	8	125	7	5 typ	TO-3P (TO-218)	T48
ECG2319	NPN-Si, HV, Hi Speed Sw, Hi Current, t_f = .27 μsec typ	850 (CES)	450	5	15	175	----	6 min	TO-3	T28
ECG2320	NPN/PNP-Si, Quad Discrete Compl Pair, Sw, T_{on} = 30 ns, t_{off} = 255 ns typ	60	30	5	.5	1 unit 3 total	350	100 min	14-Pin DIP	T66
ECG2321	NPN-Si, Quad Gen Purp Amp, Sw t_{on} = 25 ns, t_{off} = 250 ns typ	60	40	5	.5	.65 unit 1.9 total	350	100 min	14-Pin DIP	T66
ECG2322	PNP-Si, Quad Gen Purp Amp, Sw, t_{on} = 30 ns, t_{off} = 225 ns typ	60	40	5	.5	.65 unit 1.9 total	350	100 min	14-Pin DIP	T66
ECG2323	NPN-Si, Quad HV Amp, Driver	200	200	5	.5	.75 unit 1.7 total	80	60	14-Pin DIP	T66
ECG2324	NPN-Si, HV, Sw, Horiz Out t_f = .2μsec max	1500	800	6	8	150	----	8 min	TO-3PJ	T48-1
ECG2325	NPN-Si, HV, Hi Speed Sw, t_f = .7 μsec typ	900	800	7	3	50	15	10 min	TO-220	T41
ECG2326	NPN-Si, Darlington w/Damper Diode, Sw, t_f = 1.2 μsec typ	150	100	7	8	40	----	3K min	TO-220F	T42-1
ECG2327	NPN-Si, HV, Hi Speed Sw, t_f = .4μsec typ	1000	450	5	.5	20	20	50 typ	TO-126	T45
ECG2328	NPN-Si, HV AF Pwr Amp (Compl to ECG2329)	200	200	5	15	150	30	55 min	TO-3PL	T48-2
ECG2329	PNP-Si, HV AF Pwr Amp (Compl to ECG2328)	200	200	5	15	150	30	55 min	TO-3PL	T48-2

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

C

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG2330	NPN-Si, Hi Gain Amp, Regulator w/Int. Zener Cntrl	55^{+15}_{-10}	55^{+15}_{-10}	5	4	80	----	500 min	TO-3PJ	T48-1
ECG2331	NPN-Si, HV, Horiz Sw with Damper Diode, t_f = .3 µsec max	1500	800	6	6	60	----	8 min	TO-3PM	T48-3
ECG2332	NPN-Si, Darlington w/Damper Diode, Int. Zener Cntrl, Drvr, Sw, t_f = .5 µsec	60 ± 10	60 ± 10	6	2	20	180	4K typ	TO-220	T41
ECG2333	NPN-Si, HV, Hi Speed Sw, t_f = .8 µsec max	1000	450	9	8	125	----	10	TO-220	T41
ECG2334	NPN-Si, Darlington w/Damper Diode, Int. Zener Cntrl, Drvr, Sw, t_f = 1.5 µsec	60 ± 10	60 ± 10	6	5	40	20	4K typ	TO-220	T41
ECG2335	NPN-Si, Darlington, Int. Zener Cntrl	60 ± 15	60 ± 10	6	5	80	----	2K min	TO-3PJ	T48-1
ECG2336	NPN-Si, Darlington w/Damper Diode, Int. Zener Cntrl, Drvr, Sw, t_f = 1 µsec	60 ± 10	60 ± 10	7	8	45	----	2K min	TO-220J	T41-1
ECG2337	NPN-Si, HV, Hi Speed Sw, t_f = .3 µsec max	900	500	7	7	40	----	8	TO-220J	T41-1
ECG2338	NPN-Si, Darlington w/Damper Diode, Int. Zener Cntrl, Drvr, Sw, t_f = 1 µsec	60 ± 10	60 ± 10	8	2	10	----	4K min	TO-126	T45
ECG2339	NPN-Si, HV, Hi Speed Sw, t_f = .3 µsec max	1000	800	7	3	40	----	8	TO-220J	T41-1
ECG2340	NPN-Si, Darlington w/Damper Diode, Int. Zener Cntrl, Drvr, Sw, t_f = 1 µsec	60 ± 10	60 ± 10	7	8	45	----	2K min	TO-126N	T45-1
ECG2341	NPN-Si, Darlington, Driver Sw, t_{off} = 1.5 µsec (Compl to ECG2342)	90	80 (CER)	5	1	.800	----	2K min	TO-92	T16
ECG2342	NPN-Si, Darlington, Driver Sw, t_{off} = 1.5 µsec (Compl to ECG2341)	90	80 (CER)	5	1	.800	----	2K min	TO-92	T16
ECG2343	NPN-Si, Darlington Pwr Amp, Sw, t_{off} = 6 µsec typ (Compl to ECG2344)	120	120	5	10	125	----	1K min	TO-220	T41
ECG2344	NPN-Si, Darlington Pwr Amp, Sw, t_{off} = 2.5 µsec typ (Compl to ECG2343)	120	120	5	10	125	----	1K min	TO-220	T41
ECG2345	NPN-Si, Darlington Pwr Amp Sw, t_{off} = 5 µsec typ (Compl to ECG2346)	120	120	5	6	60	----	750 min	SOT-82	T45-2
ECG2346	PNP-Si, Darlington Pwr Amp Sw, t_{off} = 5 µsec typ (Compl to ECG2345)	120	120	5	6	60	----	750 min	SOT-82	T45-2
ECG2347	NPN-Si, Hi Current, Sw t_f = .3 µsec typ	120	80	6	4	1	50	40 min	TO-39	T6
ECG2348	NPN-Si, HV, Hi Current, t_f = .3 µsec typ	900	800	7	10	150	15	8 min	TO-3PJ	T48-1
ECG2349	NPN-Si, Darlington, Hi Current, Gen Purp Amp (Compl to ECG2350)	120	120	5	50	300	----	1000 min	TO-3	T28-1
ECG2350	PNP-Si, Darlington, Hi Current, Gen Purp Amp (Compl to ECG2349)	120	120	5	50	300	----	1000 min	TO-3	T28-1

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG2351	NPN-Si, Darlington, Pwr Amp, Sw, t_f = 0.6 μsec typ (Compl to ECG2352)	100	80	5	4	15	----	1K min	TO-126N	T45-5
ECG2352	PNP-Si, Darlington, Pwr Amp, Sw, t_f = 0.4 μsec typ (Compl to ECG2351)	100	80	5	4	15	----	1K min	TO-126N	T45-5
ECG2353	NPN-Si, Horiz Sw w/Damper Diode, t_f = .3 μsec max	1500	800	6	10	70	----	8 min	TO-3PM	T48-3
ECG2354	NPN-Si, Horiz Out, HV, Sw, t_f = .2 μsec max	1500	800	6	10	150	----	8 min	TO-3PJ	T48-1
ECG2355	NPN-Si, Digital w/Base Resistor (10K), Sw, Driver (Compl to ECG2356)	50	50	10	.100	.300	250	30 min	SP-92	T13-2
ECG2356	PNP-Si, Digital w/Base Resistor (10K), Sw, Driver (Compl to ECG2355)	50	50	10	.100	.300	250	300 min	SP-92	T13-2
ECG2357	NPN-Si, Digital w/Base Resistor (22K), Sw, Driver (Compl to ECG2358)	50	50	10	.100	.300	250	50 min	SP-92	T13-2
ECG2358	PNP-Si, Digital w/Base Resistor (22K), Sw, Driver (Compl to ECG2357)	50	50	10	.100	.300	250	50 min	SP-92	T13-2
ECG2359	NPN-Si, Digital w/Base Resistor (47K), Sw, Driver (Compl to ECG2360)	50	50	10	.100	.300	250	65 min	SP-92	T13-2
ECG2360	PNP-Si, Digital w/Base Resistor (47K), Sw, Driver (Compl to ECG2359)	50	50	10	.100	.300	250	65 min	SP-92	T13-2
ECG2361	NPN-Si, Gen Purp Amp, Sw, t_f = 0.1 μsec typ (Compl to ECG2362)	60	50	5	.5	.3	200	200 typ	SP-92	T13-2
ECG2362	PNP-Si, Gen Purp Amp, Sw, t_f = 0.1 μsec typ (Compl to ECG2361)	60	50	5	.5	.3	200	200 typ	SP-92	T13-2
ECG2363	NPN-Si, Gen Purp Amp (Compl to ECG2364)	60	50	6	2	1	150	200 min	TO-92M	T18
ECG2364	PNP-Si, Gen Purp Amp (Compl to ECG2363)	60	50	6	2	1	150	200 min	TO-92M	T18
ECG2365	NPN-Si, Horiz Out, HV, Sw t_f = .2 μsec max	1500	800	6	12	180	----	8 min	TO-3PL	T48-2
ECG2366	PNP-Si, Video Out, Horiz Dr. (Compl to ECG399)	300	300	5	.1	.9	50	100 min	T-16	T20
ECG2367	NPN-Si, Digital w/Resistor (4.7K), SW, Drvr (Compl to ECG2368)	50	50	6	.1	.3	200	30 min	SP-92	T13-2
ECG2368	PNP-Si, Digital w/Resistor (4.7K), Sw, Drvr (Compl to ECG2367)	50	50	6	.1	.3	200	30 min	SP-92	T13-2
ECG2369	NPN-Si, Digital w/Resistor (4.7K/47K), Sw, Drvr (Compl to ECG2370)	50	50	6	.1	.3	200	30 min	SP-92	T13-2
ECG2370	PNP-Si, Digital w/Resistor (4.7K/47K), Sw, Drvr (Compl to ECG2369)	50	50	6	.1	.3	200	30 min	SP-92	T13-2
ECG2371 thru ECG2399	See FET Selector Guide Page 1-65	----	----	----	----	----	----	----	----	----

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_c = 25°C Unless Otherwise Noted)

C

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG2401	PNP-Si, RF Amp, Osc, Mixer, VHF/FM	30	30	4	25 mA	.300	450 typ	----	SOT-23	T20-4
ECG2402	NPN-Si, Lo Noise, UHF/VHF Amp, G_{PE} 15 dB typ (Compl to ECG2403)	20	15	2	25 mA	.200	5 GHz	40 min	SOT-23	T20-4
ECG2403	PNP-Si, Lo Noise, UHF/VHF Amp, G_{PE} 18 dB typ (Compl to ECG2402)	20	15	2	25 mA	.200	5 GHz	20 min	SOT-23	T20-4
ECG2404	NPN-Si, Darlington, Gen Purp Amp, Preamp, Driver (Compl to ECG2405)	40	30	10	.300	.350	220	4K min	SOT-23	T20-4
ECG2405	PNP-Si, Darlington, Gen Purp Amp, Preamp, Driver (Compl to ECG2404)	40	30	10	.300	.350	220	4K min	SOT-23	TO-20-4
ECG2406	NPN-Si, AF/RF Amp, Driver, Sw, t_f = 60 nsec (Compl to ECG2407)	75	40	5	.800	.425	300	100 min	SOT-23	T20-4
ECG2407	PNP-Si, AF/RF Amp, Driver Sw, t_f = 30 nsec (Compl to ECG2406)	60	60	5	.600	.425	200	100 min	SOT-23	T20-4
ECG2408	NPN-Si, Gen Purp Amp, Lo Noise, AF/RF (Compl to ECG2409)	80	65	5	.100	.200	300	300 typ	SOT-23	T20-4
ECG2409	PNP-Si, Gen Purp Amp, Lo Noise, AF/RF (Compl to ECG2408)	80	65	5	.100	.200	150	350 typ	SOT-23	T20-4
ECG2410	NPN-Si, Gen Purp, HV, Driver, Amp, (Compl to ECG2411)	180	160	6	.600	.350	300	80 min	SOT-23	T20-4
ECG2411	PNP-Si, Gen Purp, HV Driver, Amp (Compl to ECG2410)	160	150	5	.600	.350	300	60 min	SOT-23	T20-4
ECG2412	NPN-Si, Gen Purp, HV Amp (Compl to ECG2413)	300	300 (CER)	5	50 mA	.310	60	50 min	SOT-23	T20-4
ECG2413	PNP-Si, Gen Purp, HV Amp (Compl to ECG2412)	300	300 (CER)	5	50 mA	.310	60	50 min	SOT-23	T20-4
ECG2414	NPN-Si, Digital w/Base Resistor (10K), Sw, Driver, (Compl to ECG2415)	50	50	10	.100	.200	250	30 min	SOT-23	T20-4
ECG2415	PNP-Si, Digital w/Base Resistor (10K), Sw, Driver (Compl to ECG2414)	50	50	10	.100	.200	250	30 min	SOT-23	T20-4
ECG2416	NPN-Si, Digital w/ Base Resistor (22K), Sw, Driver (Compl to ECG2417)	50	50	10	.100	.200	250	50 min	SOT-23	T20-4
ECG2417	PNP-Si, Digital w/Base Resistor (22K), Sw, Driver (Compl to ECG2416)	50	50	10	.100	.200	250	50 min	SOT-23	T20-4
ECG2418	NPN-Si, Digital w/ Base Resistor (47K), Sw, Driver, (Compl to ECG2419)	50	50	10	.100	.200	250	65 min	SOT-23	T20-4
ECG2419	PNP-Si, Digital w/Base Resistor (47K), Sw, Driver, (Compl to ECG2418)	50	50	10	.100	.200	250	65 min	SOT-23	T20-4
ECG2426	NPN-Si, Darlington Driver, Sw, t_{off}=1.5 µs (Compl to ECG2427)	90	80 (CER)	5	.500	1	----	2K min	SOT-89	T20-5
ECG2427	PNP-Si, Darlington Driver, Sw, t_{off}=1.5 µs (Compl to ECG2426)	90	80 (CER)	5	.500	1	----	2K min	SOT-89	T20-5

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Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG2428	NPN-Si, Gen Purp Amp, Sw, t_{off}=1.0 μs (Compl to ECG2429)	90	80	5	1	1	100	100 min	SOT-89	T20-5
ECG2429	PNP-Si, Gen Purp Amp, Sw, t_{off}=.7 μs (Compl to ECG2428)	90	80	5	1	1	100	100 min	SOT-89	T20-5
ECG2430	NPN-Si, HV, Gen Purp Amp (Compl to ECG2431)	400	350	5	1	1	70	40 min	SOT-89	T20-5
ECG2431	PNP-Si, HV, Gen Purp Amp (Compl to ECG2430)	350	300	4	1	1	15	30 min	SOT-89	T20-5
ECG2501	NPN-Si, Hi Freq, Video Out (Compl to ECG2502)	300	300	5	.1	7	150	100 min	TO-126M	T45-4
ECG2502	PNP-Si, Hi Freq, Video Out (Compl to ECG2501)	300	300	5	.1	7	150	100 min	TO-126M	T45-4
ECG2503	NPN-Si, Gen Purp Amp, Hi Gain, Sw, t_f=.06 μs Typ	30	25	15	.7	.6	270	800 min	TO-92	T16
ECG2504	NPN-Si, Gen Purp, Hi Gain Amp, Sw, t_f=.1 μs Typ	30	25	15	2	15	260	1500 typ	TO-126M	T45-3
ECG2505	NPN-Si, Gen Purp, Hi Gain, Sw, t_f=.1 μs Typ	30	25	15	2	1	260	1000 min	M-71	T20-3
ECG2506	NPN-Si, Hi Freq, Video Drvr	115	95	3	.4	5	1GHz	50 min	TO-126	T45
ECG2507	NPN-Si, Hi Freq, Video Out	200	200	5	.3	20	400	40 min	TO-220	T41
ECG2508	NPN-Si, Hi Freq, Video Out (Compl to ECG2509)	120	120	3	.3	8	400	100 min	TO-126M	T45-4
ECG2509	PNP-Si, Hi Freq, Video Out (Compl to ECG2508)	120	120	3	.3	8	400	100 min	TO-126M	T45-4
ECG2510	NPN-Si, Hi Freq, Video Out	30	20	3	.5	5	2GHz	100 Typ	TO-126M	T45-4
ECG2511	NPN-Si, Hi Freq, Video Out (Compl to ECG2512)	80	60	4	.5	10	800	100	TO-126	T45
ECG2512	PNP-Si, Hi Freq, Video Out (Compl to ECG2511)	80	60	4	.5	10	800	100	TO-126	T45
ECG2513	NPN-Si, Hi Freq, Pwr Amp, Sw t_f=20 ns (Compl to ECG2514)	60	50	6	8	20	180	140 min	TO-126M	T45-3
ECG2514	PNP-Si, Hi Freq, Pwr Amp, Sw t_f=20 ns (Compl to ECG2513)	60	50	6	8	20	180	140 min	TO-126M	T45-3
ECG2515	NPN-Si, Hi Freq, Pwr Amp, Sw, t_f=50 ns (Compl to ECG2516)	120	100	6	4	20	180	140 min	TO-126M	T45-3
ECG2516	PNP-Si, Hi Freq, Pwr Amp, Sw, t_f=50 ns (Compl to ECG2515)	120	100	6	4	20	180	140 min	TO-126M	T45-3
ECG2517	NPN-Si, Hi Freq Amp, Sw, t_f=30 ns (Compl to ECG2518)	60	50	6	2.5	10	140	140 min	TO-126M	T45-4
ECG2518	PNP-Si, Hi Freq Amp, Sw, t_f=30 ns (Compl to ECG2517)	60	50	6	2.5	10	140	140 min	TO-126M	T45-4
ECG2519	NPN-Si, Hi Freq Amp, Sw, t_f=.08 μs (Compl to ECG2520)	180	160	6	1.5	10	120	140 min	TO-126M	T45-4
ECG2520	PNP-Si, Hi Freq Amp, Sw, t_f=.08 μs (Compl to ECG2519)	180	160	6	1.5	10	120	140 min	TO-126M	T45-4
ECG2521	NPN-Si, Hi Freq, Video Out	250	250	3	.3	10	400	60 min	TO-126M	T45-4

Notes: * MP- Matched Pair
\# Frequency at which common emitter current is 70.0% of low frequency gain
• When alternate packages are shown it indicates a change in progress. Although only one package is available, both packages will be shown as long as the obsolete package may be encountered in the field.

Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG2522	NPN-Si, Hi Speed Sw, t_f=.2 µs Amp (Compl to ECG2523)	60	45	5	8	15	250	200 typ	TO-126N	T45-5
ECG2523	PNP-Si, Hi Speed Sw, t_f=.2 µs Amp (Compl to ECG2522)	50	40	5	8	15	250	200 typ	TO-126N	T45-5
ECG2524	NPN-Si, Hi Current, Hi Speed Sw, t_f=.02 µs (Compl to ECG2525)	60	50	6	8	20	180	200 typ	TO-126N	T45-5
ECG2525	PNP-Si, Hi Current, Hi Speed Sw, t_f=.02 µs (Compl to ECG2524)	60	50	6	8	20	180	200 typ	TO-126N	T45-5
ECG2526	NPN-Si, Hi Speed Sw, Amp, t_f=.05 µs typ (Compl to ECG2527)	120	100	6	4	20	180	200 typ	TO-126N	T45-5
ECG2527	PNP-Si, Hi Speed Sw, Amp, t_f=.05 µs typ (Compl to ECG2526)	120	100	6	4	20	180	200 typ	TO-126N	T45-5
ECG2528	NPN-Si, Hi Speed Sw, Amp, t_f=.08 µs Typ (Compl to ECG2529)	180	160	6	1.5	15	120	200 typ	TO-126M	T45-4
ECG2529	PNP-Si, Hi Speed Sw, Amp, t_f=.08 µs Typ (Compl to ECG2528)	180	160	6	1.5	15	120	200 typ	TO-126M	T45-4
ECG2530	NPN-Si, HV, Sw, Amp, t_f=.6 µs typ (Compl to ECG2531)	400	400	5	2	15	60	60 min	TO-126M	T45-4
ECG2531	PNP-Si, HV, Sw, Amp, t_f=.6 µs typ (Compl to ECG2530)	400	400	5	2	15	60	60 min	TO-126M	T45-4
ECG2533	NPN-Si, Horiz Out, Sw t_f=.2 µs max	1500	800	6	25	250	----	4 min	TO-3PL	T48-2
ECG2534	NPN-Si, Hi Current Sw, t_f=.2 µs Amp (Compl to ECG2535)	90	80	6	12	80	20	100 min	TO-3PJ	T48-1
ECG2535	PNP-Si, Hi Current Sw, t_f=.2 µs Amp (Compl to ECG2534)	90	80	6	12	80	20	100 min	TO-3PJ	T48-1
ECG2536	NPN-Si, Hi Current Sw, (Compl to ECG2537)	110	100	6	40	150	----	50 min	TO-3PJ	T48-1
ECG2537	PNP-Si, Hi Current Sw, (Compl to ECG2536)	110	100	6	40	150	----	50 min	TO-3PJ	T48-1
ECG2538	NPN-Si, HV, Hi Speed Sw, t_f=.3 µs max	500	400	7	16	60	20	10 min	TO-3PM	T48-3
ECG2539	NPN-Si, HV, Hi Speed Sw, t_f=.3 µs max	500	400	7	25	160	20	10 min	TO-3PJ	T48-1
ECG2540	NPN-Si, Darlington, HV Sw, Power Amp t_f=5 µs	600	400	5	6	25	----	600 min	TO-220J	T41-1
ECG2541	NPN-Si, Darlington, MTR, RLY Driver, Gen Purp, t_f=1 µs (Compl to ECG2542)	120	120	6	25	120	----	2000 min	TO-3PJ	T48-1
ECG2542	PNP-Si, Darlington, MTR, RLY Driver, Gen Purp, t_f=1 µs (Compl to ECG2541)	120	120	6	25	120	----	2000 min	TO-3PJ	T48-1
ECG2543	NPN-Si, Darlington, Pwr Amp, Driver, Sw t_f=3 µs	300	250	20	6	35	----	2000 min	TO-220J	T41-1

Notes: * MP- Matched Pair
Frequency at which common emitter current is 70.0% of low frequency gain
• When alternate packages are shown it indicates a change in progress. Although only one package is available, both packages will be shown as long as the obsolete package may be encountered in the field.

Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG2544	NPN-Si, Darlington, MTR, Printer, RLY, Driver	120	120	6	1.5	10	----	2000 min	TO-126	T45
ECG2545	NPN-Si, Darlington, Hi Speed Driver, Sw, t_f=.2 μs (Compl to ECG2546)	70	60	5	5	30	200	2000 min	TO-220	T41
ECG2546	PNP-Si, Darlington, Hi Speed Driver, Sw, t_f=.2 μs (Compl to ECG2545)	70	60	5	5	30	200	2000 min	TO-220	T41
ECG2547	NPN-Si, Darlington, Driver, Sw, t_f=1.6 μs (Compl to ECG2548)	110	100	6	8	30	----	1500 min	TO-220J	T41-1
ECG2548	PNP-Si, Darlington, Driver, Sw, t_f=1.4 μs (Compl to ECG2547)	110	100	6	8	30	----	1500 min	TO-220J	T41-1
ECG2549	NPN-Si, Darlington, Driver, Pwr Amp, t_f=5 μs	200	200	7	10	50	----	1500 min	TO-220 FM	T42-2
ECG2550	NPN-Si, Darlington, Driver, Power Amp	500	400	12	10	50	----	150 min	TO-220 FM	T42-2
ECG2551	NPN-Si, Darlington, Driver, Pwr Amp, t_f=1.6 μs (Compl to ECG2552)	70	60	6	10	30	----	2000 min	TO-220J	T41-1
ECG2552	PNP-Si, Darlington, Driver, Pwr Amp, t_f=1.5 μs (Compl to ECG2551)	70	60	6	10	30	----	2000 min	TO-220J	T41-1
ECG2553	NPN-Si, Darlington, HV Sw, Driver, t_f=2 μs	300	200	8	10	30	----	2500 Typ	TO-220J	T41-1
ECG2554	NPN-Si, Darlington, MTR, RLY Driver, Pwr Amp, w/Damper Diode t_f=1.7 μs (Compl to ECG2555)	70	60	6	7	35	----	2000 min	TO-220S	T42-3
ECG2555	PNP-Si, Darlington, MTR, RLY Driver, Pwr Amp, w/Damper Diode t_f=1.5 μs (Compl to ECG2554)	70	60	6	70	35	----	2000 min	TO-220S	T42-3
ECG2556	NPN-Si, Darlington, MTR, RLY Driver, Pwr Amp, t_f=1.6 μs	110	100	6	8	40	----	1500 min	TO-220S	T42-3
ECG2557	NPN-Si, Darlington, HV Sw, Driver, Pwr Amp, t_f=5 μs	200	200	7	15	100	----	1500 min	TO-247	T48-4
ECG2558	NPN-Si, Darlington, HV Sw w/ Damper Diode, t_f=2 μs	1500	800	5	15	250	----	25 min	TO-3PL	T48-2
ECG2559	NPN-Si, Darlington, MTR, RLY Driver, Gen Purp Amp, t_f=1 μs (Compl to ECG2560)	120	120	6	16	75	50	2000 min	TO-3PM	T48-3
ECG2560	PNP-Si, Darlington, MTR, RLY Driver, Gen Purp Amp, t_f=1 μs (Compl to ECG2559)	120	120	6	16	75	50	2000 min	TO-3PM	T48-3

Notes: * MP- Matched Pair

Frequency at which common emitter current is 70.0% of low frequency gain

• When alternate packages are shown it indicates a change in progress. Although only one package is available, both packages will be shown as long as the obsolete package may be encountered in the field.

Package Outlines - See Page 1-91

Transistors (cont'd) (Maximum Ratings at T_C = 25°C Unless Otherwise Noted)

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG2561	NPN-Si, Video Amp	100	80	3	.5	15	1.2GHz	30 min	TO-220	T41
ECG2562	NPN-Si, Hi Current, Hi Speed Sw t_f=.03 μs Typ (Compl to ECG2563)	60	30	6	12	25	120	100 min	TO-220J	T41-1
ECG2563	PNP-Si, Hi Current, Hi Speed Sw t_f=.03 μs Typ (Compl to ECG2562)	60	30	6	12	25	120	100 min	TO-220J	T41-1
ECG2564	NPN-Si, Hi Speed Sw, Amp, t_f=.03 μs Typ (Compl to ECG2565)	60	30	6	8	30	120	100 min	TO-220S	T42-3
ECG2565	NPN-Si, Hi Speed Sw, Amp, t_f=.03 μs Typ (Compl to ECG2564)	60	30	6	8	30	120	100 min	TO-220S	T42-3
ECG2566	NPN-Si, Hi Current, Hi Speed Sw, t_f=.05 μs Typ (Compl to ECG2567)	60	50	6	12	30	10	100 min	TO-220J	T41-1
ECG2567	NPN-Si, Hi Current, Hi Speed Sw, t_f=.05 μs Typ (Compl to ECG2566)	60	50	6	12	30	10	100 min	TO-220J	T41-1
ECG2568	NPN-Si, Hi Speed Sw, Amp, t_f=.1 μs Typ (Compl to ECG2569)	80	60	5	10	30	100	100 min	TO-220J	T41-1
ECG2569	PNP-Si, Hi Speed Sw, Amp, t_f=.1 μs Typ (Compl to ECG2568)	80	60	5	10	30	100	100 min	TO-220J	T41-1
ECG2570	NPN-Si, Hi Speed Sw, t_f=.4 μs Typ (Compl to ECG2571)	90	80	6	7	30	20	100 min	TO-220J	T41-1
ECG2571	PNP-Si, Hi Speed Sw, t_f=.4 μs Typ (Compl to ECG2570)	90	80	6	7	30	20	100 min	TO-220J	T41-1
ECG2572	NPN-Si, Hi Speed Sw, Amp, t_f=.4 μs Typ	90	80	6	7	40	20	100 min	TO-220S	T42-3
ECG2574	NPN-Si, Hi Freq Video Amp (Compl to ECG2575)	120	120	3	.4	10	400	100 min	TO-220J	T41-1
ECG2575	PNP-Si, Hi Freq Video Amp (Compl to ECG2574)	120	120	3	.4	10	400	100 min	TO-220J	T41-1
ECG2576	NPN-Si, Audio Out Driver (Compl to ECG2577)	180	180	6	2	20	60	60 min	TO-220J	T41-1
ECG2577	PNP-Si, Audio Out Driver (Compl to ECG2576)	180	180	6	2	20	60	60 min	TO-220J	T41-1
ECG2578	NPN-Si, Hi Speed Sw, Amp, t_f=.5 μs Max	200	60	6	4.5	30	10	30 min	TO-220J	T41-1
ECG2579	NPN-Si, HV, Hi Speed Sw, t_f=.3 μs Max	400	200	6	7	50	10	10 min	TO-220	T41
ECG2580	NPN-Si, Hi Speed Sw, Amp, t_f=.3 μs Max	500	400	7	7	50	20	20 min	TO-220S	T42-3
ECG2581	NPN-Si, HV, Hi Speed Sw, t_f=.3 μs Max	500	400	7	12	70	20	10 min	TO-220	T41
ECG2582	NPN-Si, HV, Hi Speed Sw, t_f=.3 μs Max	500	400	7	12	40	20	10 min	TO-220J	T41-1

Notes: * MP- Matched Pair
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Package Outlines - See Page 1-31

ECG Type	Description and Application	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Base to Emitter Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Device Diss. P_D Watts	Freq. in MHz f_t	Current Gain h_{FE}	Package Case	Package Fig. No.
ECG2583	NPN-Si, HV, Hi Speed Sw, t_f=.2 µs Max	600	400	7	10	35	20	10 min	TO-220J	T41-1
ECG2584	NPN-Si, HV, Hi Speed Sw, Amp, t_f=.3 µs Max	800	500	7	5	50	18	20 min	TO-220S	T42-3
ECG2585	NPN-Si, HV, Amp	800	800	7	20	1.65	40	10 min	TO-220S	T42-3
ECG2586	NPN-Si, HV, Hi Speed Sw, Amp, t_f=.3 µs Max	1100	800	7	3	50	15	20 min	TO-220S	T42-3
ECG2588	NPN-Si, HV, Amp	1500	1200	5	30mA	2	6	10 min	TO-220J	T41-1
ECG2590	NPN-Si, HV, Amp	1700	900	5	50mA	1.2	6	20 min	TO-220S	T42-3
ECG2591	NPN-Si, HV, Amp	2000	900	5	20mA	1.2	6	20 min	TO-220S	T42-3
ECG2592	NPN-Si, HV, Amp	2000	1800	5	15mA	2	6	10 min	TO-220J	T41-1
ECG2593	NPN-Si, HV, Amp	2100	2100	5	10mA	2	6	10 min	TO-220J	T41-1
ECG2594	NPN-Si, HV, Hi Current Sw t_f=.3 µs Max	800	500	7	15	55	18	10 Typ	TO-3PM	T48-3
ECG2596	NPN-Si, HV, Hi Current Sw, t_f=.2 µs typ	800	500	7	50	300	18	20 min	TO-3PL	T48-2
ECG2597	NPN-Si, HV, Hi Speed Sw, t_f=.2 µs typ	1100	800	7	12	65	15	8 min	TO-3PM	T48-3
ECG2598	NPN-Si, HV, Hi Current Sw, t_f=.3 µs max	1100	800	7	25	300	15	15 min	TO-3PL	T48-2
ECG2633	NPN-Si, 1 GHz, Video Dr (Compl to ECG2634	115	95	3	.3	3	1 GHz	2 min	TO-126	T45
ECG2634	PNP-Si, 1 GHz Video Dr (Compl to ECG2633)	115	95	3	.3	3	1 GHz	20 min	TO-126	T45
ECG2635	NPN-Si, Horiz Out w/ Damper, Diode, t_f = .4 µs typ	1500	700	---	8	35	---	23 max	TO-220F	T67
ECG2900 ECG2901	See FET Selector Guide Page 1-65	---	---	---	---	---	---			
ECG2920 thru 2924	See FET Selector Guide Page 1-65	---	---	---	---	---	---			
ECG2940 thru 2947	See FET Selector Guide Page 1-65	---	---	---	---	---	---			
ECG2980 thru 2981	See FET Selector Guide Page 1-65	---	---	---	---	---	---			
ECG2984 thru 2987	See FET Selector Guide Page 1-65	---	---	---	---	---	---			
ECG3300 thru 3304	See IGBT Selector Guide Page 1-72	---	---	---	---	---	---			
ECG3310 thru 3312	See IGBT Selector Guide Page 1-72	---	---	---	---	---	---			
ECG3320 thru 3323	See IGBT Selector Guide Page 1-72	---	---	---	---	---	---			

Notes: * MP- Matched Pair
Frequency at which common emitter current is 70.0% of low frequency gain
• When alternate packages are shown it indicates a change in progress. Although only one package is available, both packages will be shown as long as the obsolete package may be encountered in the field.

Package Outlines - See Page 1-91

Complementary Pairs

NPN Type	PNP Type
ECG11	ECG12
ECG16	ECG17
ECG18	ECG19
ECG20	ECG21
ECG24	ECG25
ECG29	ECG30
ECG31	ECG32
ECG36	ECG37
ECG49	ECG50
ECG54	ECG55
ECG58	ECG59
ECG60	ECG61
ECG87	ECG88
ECG90	ECG91
ECG92	ECG93
ECG103	ECG102
ECG103A	ECG102A
ECG123AP	ECG159
ECG128	ECG129
ECG128P	ECG129P
ECG130	ECG219
ECG152	ECG153
ECG155	ECG131
ECG157	ECG39
ECG181	ECG180
ECG184	ECG185
ECG186	ECG187
ECG186A	ECG187A
ECG188	ECG189
ECG191	ECG240

NPN Type	PNP Type
ECG196	ECG197
ECG241	ECG242
ECG243	ECG244
ECG245	ECG246
ECG247	ECG248
ECG249	ECG250
ECG251	ECG252
ECG253	ECG254
ECG261	ECG262
ECG263	ECG264
ECG268	ECG269
ECG270	ECG271
ECG272	ECG273
ECG274	ECG275
ECG280	ECG281
ECG284	ECG285
ECG287	ECG288
ECG289A	ECG290A
ECG291	ECG292
ECG293	ECG294
ECG297	ECG298
ECG324	ECG323
ECG331	ECG332
ECG373	ECG374
ECG375	ECG398
ECG377	ECG378
ECG382	ECG383
ECG388	ECG68
ECG390	ECG391
ECG392	ECG393

NPN Type	PNP Type
ECG396	ECG397
ECG399	ECG2366
ECG2304	ECG2314
ECG2305	ECG2306
ECG2328	ECG2329
ECG2341	ECG2342
ECG2343	ECG2344
ECG2345	ECG2346
ECG2349	ECG2350
ECG2351	ECG2352
ECG2355	ECG2356
ECG2357	ECG2358
ECG2359	ECG2360
ECG2361	ECG2362
ECG2363	ECG2364
ECG2367	ECG2368
ECG2369	ECG2370
ECG2402	ECG2403
ECG2404	ECG2405
ECG2406	ECG2407
ECG2408	ECG2409
ECG2410	ECG2411
ECG2412	ECG2413
ECG2414	ECG2415
ECG2416	ECG2417
ECG2418	ECG2419
ECG2426	ECG2427
ECG2428	ECG2429
ECG2430	ECG2431
ECG2501	ECG2502

NPN Type	PNP Type
ECG2508	ECG2509
ECG2511	ECG2512
ECG2513	ECG2514
ECG2515	ECG2516
ECG2517	ECG2518
ECG2519	ECG2520
ECG2522	ECG2523
ECG2524	ECG2525
ECG2526	ECG2527
ECG2528	ECG2529
ECG2530	ECG2531
ECG2534	ECG2535
ECG2536	ECG2537
ECG2541	ECG2542
ECG2545	ECG2546
ECG2547	ECG2548
ECG2551	ECG2552
ECG2554	ECG2555
ECG2559	ECG2560
ECG2562	ECG2563
ECG2564	ECG2565
ECG2566	ECG2567
ECG2568	ECG2569
ECG2570	ECG2571
ECG2574	ECG2575
ECG2576	ECG2577
ECG2633	ECG2634

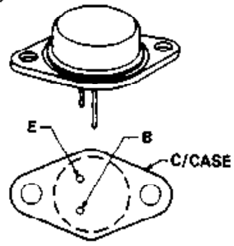
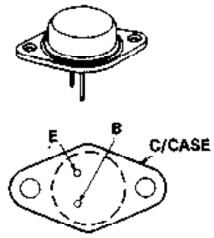
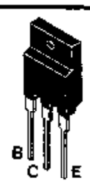
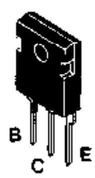
Matched Complementary Pairs –

Contains one each of NPN and PNP Type

ECG Type	Contains One Each	
	NPN Type	PNP Type
ECG37MCP	ECG36	ECG37
ECG55MCP	ECG54	ECG55
ECG61MCP	ECG60	ECG61
ECG68MCP	ECG388	ECG68
ECG93MCP	ECG92	ECG93
ECG129MCP	ECG128	ECG129
ECG153MCP	ECG152	ECG153
ECG159MCP	ECG123AP	ECG159

ECG Type	Contains One Each	
	NPN Type	PNP Type
ECG180MCP	ECG181	ECG180
ECG185MCP	ECG184	ECG185
ECG219MCP	ECG130	ECG219
ECG281MCP	ECG280	ECG281
ECG285MCP	ECG284	ECG285
ECG290AMCP	ECG289A	ECG290A
ECG292MCP	ECG291	ECG292
ECG332MCP	ECG331	ECG332

Darlington Power Transistors Maximum Ratings at $T_C = 25°C$

Description NPN	Description PNP	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Emitter To Base Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Base Current I_B mA	Max. Device Diss. P_D Watts	Typ Current Gain h_{FE}	NPN/PNP Equivalent Circuit	Package Case/Fig./Basing
ECG243	**ECG244**	80	80	5	8	120	100	3,000	A/B	**TO-3** Fig. T28 Fig. T28A 
ECG245	**ECG246**	80	80	5	10	200	150	4,000	A/B	
ECG247	**ECG248**	100	100	5	12	200	150	3.500	A/B	
ECG249	**ECG250**	100	100	5	16	500	150	3.500	A/B	
ECG251	**ECG252**	100	100	5	20	500	160	2,400	A/B	
ECG2349	**ECG2350**	120	120	5	50	2000	300	1,000 min	A/B	
ECG97	---	500	400	8	10	2500	150	40 min	G	
ECG99	---	600	400	8	50	10,000	250	25 min	G	
ECG98	---	700	500	8	20	2500	175	40 min	G	
ECG274	**ECG275**	80	80	5	4	80	50	3,000	A/B	**TO-66** Fig. T25 
ECG270	**ECG271**	100	100	5	10	500	125	1,000 min	E/F	**TO-3P (TO-218)** Fig. T48 TAB CONNECTS TO COLLECTOR 
ECG256	---	450	400	8	20	2500	150	30 min	G	
ECG2316	---	500	450	5	10	5000	105	100 min	A	
ECG2317	---	500	450	5	15	1000	105	40 min	A	
ECG2335	---	60 ± 15	60 ± 15	6	5	---	80	2,000 min	J	**TO-3PJ** Fig. T48-1 TAB CONNECTS TO COLLECTOR 
ECG214	---	70	60	6	10	---	60	2,000 min	A	
ECG215	---	110	100	6	8	---	60	1,500 min	A	
ECG2541	**ECG2542**	120	120	6	25	2000	120	2,000 min	A/B	
ECG2558	---	1500	800	5	15	3000	250	25 min	G	**TO-3PL** Fig. T48-2 
ECG2559	**ECG2560**	120	120	6	16	1000	75	2000 min	A/B	**TO-3PM** Fig. T48-3 
ECG2557	---	200	200	7	15	1000	100	1500 min	E	**TO-247** Fig. T48-4 

Package Outlines - See Page 1-91

Darlington Power Transistors Maximum Ratings at T_C = 25°C (cont'd)

Description NPN	Description PNP	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Emitter To Base Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Base Current I_B mA	Max. Device Diss. P_D Watts	Typ Current Gain h_{FE}	NPN/PNP Equivalent Circuit	Package Case/Fig./Basing
ECG2326	---	150	100	7	8	800	40	3,000 min	A	TO-220F Fig.T42-1 METAL CONTACT CONNECTS TO COLLECTOR 
ECG2549	---	200	200	7	10	500	50	1,500 min	E	TO-220FM FigT42-2 
ECG2550	---	500	400	12	10	500	50	150 min	E	
ECG2554	ECG2555	70	60	6	7	---	35	2,000 min	A/B	TO-220S Fig. T42-3 
ECG2556		110	100	6	8	---	40	1,500 min	A	
ECG2332	---	60 ± 10	60 ± 10	6	2	400	20	4,000 typ	H	TO-220 Fig. T41 TAB CONNECTS TO COLLECTOR 
ECG2334	---	60 ± 10	60 ± 10	6	5	500	40	4,000 typ	H	
ECG2545	ECG2546	70	60	5	5	---	30	2,000 min	A/B	
ECG261	ECG262	100	100	5	8	250	65	1,000 min	A/B	
ECG263	ECG264	100	100	5	10	250	65	1,000 min	A/B	
ECG2343	ECG2344	120	120	5	10	500	125	1,000 min	A/B	
ECG2315	---	400	200	6	8	2000	60	100 min	G	
ECG2336	---	60 ± 10	60 ± 10	7	8	--	45	2,000 min	I	TO-220J Fig. T41-1 
ECG2551	ECG2552	70	60	6	10	---	30	2,000 min	A/B	
ECG2547	ECG2548	110	100	6	8	--	30	1,500 min	A/B	
ECG2553	---	300	200	8	10	1000	30	2,500 typ	A	
ECG2543	---	300	250	20	6	1000	35	2,000 min	K	
ECG2540	---	600	400	5	6	1000	25	600 min	A	
ECG2338	---	60 ± 10	60 ± 10	8	2	200	10	4,000 min	H	TO-126 Fig. T45 METAL CONTACT CONNECTS TO COLLECTOR 
ECG253	ECG254	80	80	5	4	100	40	2,000	A/B	
ECG2544	---	120	120	6	1.5	---	10	2,000 min	A	
ECG2345	ECG2346	120	120	5	6	150	60	750 min	A/B	SOT-82 FigT45-2 METAL CONTACT CONNECTS TO COLLECTOR 

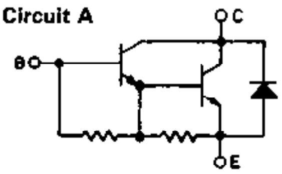
Package Outlines - See Page 1-91

Darlington Power Transistors Maximum Ratings at T_C = 25°C (cont'd)

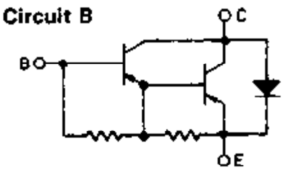
Description NPN	Description PNP	Collector To Base Volts BV_{CBO}	Collector To Emitter Volts BV_{CEO}	Emitter To Base Volts BV_{EBO}	Max. Collector Current I_C Amps	Max. Base Current I_B mA	Max. Device Diss. P_D Watts	Typ Current Gain h_{FE}	NPN/PNP Equivalent Circuit	Package Case/Fig./Basing
ECG2340	---	6 ± 10	60 ± 10	7	8	---	45	2,000 min	I	TO-126N FigT45-1 ECG2351 and ECG2352 use Fig.T45-5 METAL CONTACT CONNECTS TO COLLECTOR 
ECG2351	ECG2352	100	80	5	4	---	15	1,000 min	A/B	
ECG265	---	50	50	13	0.5	---	6.25	10,000 min	C	TO-202 Fig. T38 TAB CONNECTS TO COLLECTOR 
ECG266	---	50	50	13	0.5	---	6.25	40,000 min	C	
ECG268	ECG269	50	50	13	2	---	10	1,000 min	C/D	
ECG272	ECG273	50	40	12	2	---	10	25,000 min	C/D	TO-202N Fig.T36 TAB CONNECTS TO COLLECTOR 
	ECG258	80	80	5	5	100	70	750 min	B	TO-127 Fig.T46 METAL CONTACT CONNECTS TO COLLECTOR 

Darlington Power Transistor Circuits

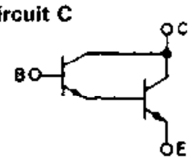
Circuit A



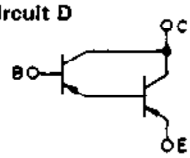
Circuit B



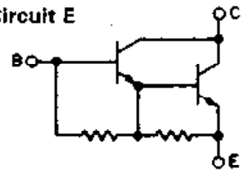
Circuit C



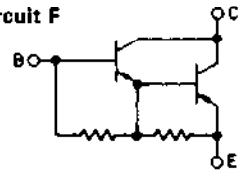
Circuit D



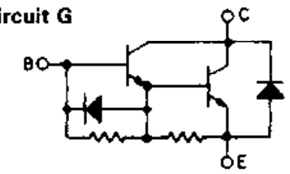
Circuit E



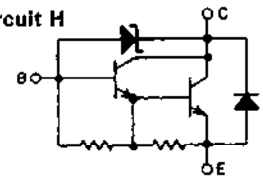
Circuit F



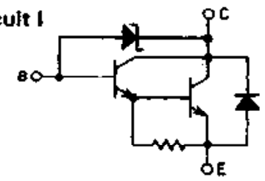
Circuit G



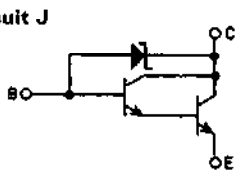
Circuit H



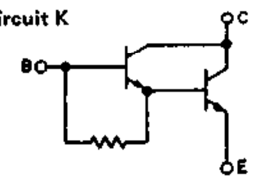
Circuit I



Circuit J



Circuit K

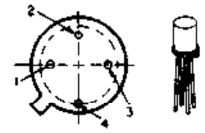


Package Outlines - See Page 1-91

Field Effect Transistors (Maximum Ratings at T_A = 25°C (Observe MOS Handling) ▲

ECG Type	Description and Application	Trans-conductance gfs Typ μmhos	Gate to Source Cutoff Voltage VGS (off) Max V	Zero-Gate Voltage Drain Current IDSS mA Min - Max	Gate To Source Breakdown Voltage BVGSS Min V	Input Cap Ciss Max pf	Transfer Cap Crss Max pf	Device Diss. PD Max mW	Package Case/Fig./Basing
ECG220 ▲	MOSFET, N-Ch, VHF Amp/Mix, NF 5dB Max at 200 MHz	7,500	8	5 - 25	20	7	0.35	330	TO-72 Fig. T4
ECG221 ▲	Dual Gate MOSFET, N-Ch, VHF Amp/Mix, NF 5dB Max at 200 MHz	15,000	6	18 typ	20	5.5	0.03	400	
ECG222 ▲	Dual Gate MOSFET, N-Ch VHF Amp/Mix, NF 6dB Max at 200 MHz Gate Protected	12,000	4	5 - 35	20	6 typ	0.03	330	
ECG452	JFET, N-Ch, UHF/VHF Amp, NF 4dB at 400 MHz	5,500	6	5 - 15	30	4	0.8	300	
ECG456	JFET, N-Ch, Gen Purp Amp/Sw	3,500	6	2 - 6	30	6	2	300	
ECG459	JFET, N-Ch, AF Amp/Chopper/Sw	4,500	6	2 - 10	50	6	3	300	
ECG460	JFET, P-Ch, AF Amp	2,500	6	2 - 6	20	20	---	300	
ECG312	JFET, N-Ch, VHF Amp/Mix NF 4dB at 400 MHz	5,500	6	5 - 15	30	4.5	1.0	360	TO-92 Fig. T16
ECG326	JFET, P-Ch, Gen Purp AF Amp, NF 2.5dB Max at 100 Hz	3,000	7.5	2 - 9	60	7	2	310	
ECG326A	JFET, P-Ch, Gen Purp AF Amp, NF 2.5dB at 100 Hz	2,000	9	4 - 16	40	7	2	310	
ECG451	JFET, N-Ch, UHF/VHF Amp, NF 4dB at 400 MHz	4,000	4	4 - 10	25	5	1.2	310	
ECG457	JFET, N-Ch, Gen Purp Amp/Sw	3,000	5	1 - 5	25	6	3	310	
ECG458	JFET, N-Ch, Gen Purp, Lo Noise Audio Amp	12,000	1.5	1 - 3	50	13 (typ)	2.6 (typ)	250	
ECG489	JFET, P-Ch, Gen Purp, Chopper	11,000	2	2 - 15	30	32	8	360	
ECG455 ▲	Dual Gate MOSFET, N-Ch, TV UHF RF Amp, 900 MHz Gate Protected	22,000	G_1 = 2 G_2 = 0.7	0.5 - 8 (V_{G2S} = 4V)	20 ($B_{V\,DSX}$)	3.5	0.03	200	RF-15A Fig. T49-1
ECG461	Matched Dual JFET, N-Ch, DC Amp/Sampler/Chopper	3,500	4.5	0.5 - 8	50	6	2	400	TO-71 Fig. T3
ECG453	JFET, N-Ch, VHF/FM Amp NF 3.5dB at 100 MHz	7,000	---	12 - 24	18	---	0.65	200	SP-92 Fig. T13-1•

TO-72
Fig. T4



ECG	1	2	3	4
220	D	S	G	CASE
221	D	G2	G1	S,CASE
222	D	G2	G1	S,CASE
452	S	D	G	CASE
456*	D	S	G	CASE
459*	S	D	G	CASE
460*	S	G	D	CASE

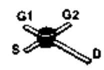
* D & S Interchangeable

TO-92
Fig. T16

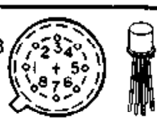
ECG	1	2	3
312*	G	S	D
326*	S	D	G
326A	S	D	G
451	D	S	G
457*	D	S	G
458	D	G	S
489	D	G	S

* D & S Interchangeable

RF-15A
Fig. T49-1



TO-71
Fig. T3



1. S1 4. Blank 7. G2
2. D1 5. S2 8. Blank
3. G1 6. D2

SP-92
Fig. T13-1•

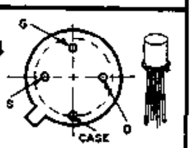
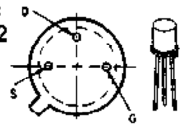
•TO-92 Alt. Fig. T16

▲ Refer to MOSFET Handling Precautions - Page 1-34

Package Outlines - See Page 1-91

C

Field Effect Transistors (cont'd) (Observe MOS Handling) ▲

ECG Type	Description and Application	Transcon-ductance gfs µmhos	Gate to Source Cutoff Voltage V_{GS} (off) Max V	Zero Gate Drain Current I_{DSS}	Drain Current I_D	Input Cap C_{iss} Max pf	Gate to Source Breakdown Voltage BV_{GSS} Min V	Drain to Source Resistance r_{DS} (on) Max ohms	Device Diss. P_D Max mW	Package Case/Fig./Basing
ECG465 ▲	MOSFET, N-Ch, Enhancement Sw	1,000 Min	5	10 nA Max	3 mA Min (on)	5	25	300	300	TO-72 Fig. T4 
						td 60 ns; tr 65 ns; t(off) 60 ns				
ECG466	JFET, N-Ch Chopper/Sw	---	10	50 mA Min	250 pA Max (off)	18	40	25	360	TO-18 Fig. T2 
						td 6 ns; tr 3 ns; t(off) 25 ns				
ECG467	JFET, N-Ch, Chopper/ Fast Sw	---	---	50 mA Min	1.0 nA Max (off)	10	30	30	310	TO-92 Fig. T16 
						td 4 ns; tr 5 ns; t(off) 5 ns				
ECG468	JFET, N-Ch, Chopper/Sw	8,000	10	20 mA Min	1.0 nA Max (off)	16	35	30	360	
						td 7 ns; tr 6 ns; t(off) 20 ns				
ECG469	JFET, N-Ch, Chopper/Sw	7,500	3	2 mA Min	1.0 nA Max (off)	16	35	100	360	
						td 7 ns; tr 6 ns; t(off) 20 ns				

▲ Refer to MOSFET Handling Precautions - Page 1-34

Package Outlines - See Page 1-91

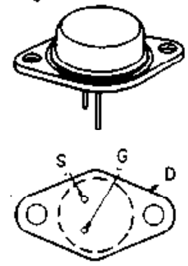
MOSFETS

ECG Type	Description and Application	Transcon-ductance gfs µmhos	Drain to Source Breakdown Voltage BV_{DSS}	Gate to Source Breakdown Voltage BV_{GS}	Continuous Drain Current I_D Amps	Gate to Source Threshold Voltage V_{GS} (th)	Drain to Source Resistance r_{DS} (on) Ohms	Input Cap C_{iss} pf	Device Dissipation @T_C=25° C P_D mW	Package Case/Fig./ Basing
ECG490 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	200,000	60	± 15	.5	3	5	40	830	TO-92 Fig. T16 
						td(off) = 10 ns, td(on) =10 ns				
ECG491 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	100,000	60	± 40	.28	3	5	40	830	
						td(off) = 10 ns, td(on) = 10 ns				
ECG492 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	200,000	200	± 20	.25	3	6.5	45	600	Note: ECG491 Basing is S,G,D
						td(off) = 10 ns, td(on) = 10 ns				

▲ Refer to MOSFET Handling Precautions - Page 1 - 34

Package Outlines - See Page 1 - 91

Power MOSFETS

ECG Type	Description and Application	Transconductance gfs μmhos	Drain to Source Breakdown Voltage BV_{DSS}	Gate to Source Breakdown Voltage BV_{GS}	Continuous Drain Current I_D Amps	Gate to Source Threshold Voltage V_{GS} (th)	Drain to Source Resistance r_{DS} (on) Ohms	Input Cap C_{iss} pf	Device Dissipation @T_C=25° C P_D Watts	Package Case/Fig./Basing
ECG2392 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	6 Min	100 Min	±20 Max*	32	4 Max	.06 Max	1500 Max	125 Max	**TO-3** Fig. T28  ECG2392 use Fig. T28A
						td(off) = 300 ns, td(on) = 50 ns, tf = 200 ns, tr = 200 ns				
ECG2386 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	2 Min	600 Min	±20 Max*	6	4.5 Max	1.2 Max	1800 Max	150 Max	
						td(off) = 200 ns, td(on) = 60 ns, tf = 120 ns, tr = 150 ns				
ECG2384 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	1.8 Min	800 Min	±20 Max*	6	4 Max	1.5 Max	3500 Max	125 Max	
						td(off) = 500 ns, td(on) = 60 ns, tf = 100 ns, tr = 100 ns				
ECG2390 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	3 Min	60 Min	±20 Max*	12	4.5 Max	.2 Max	800 Max	75 Max	**TO-220** Fig. T41 
						td(off) = 80 ns, td(on) = 60 ns, tf = 110 ns, tr = 160 ns				
ECG2389 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	8 Min	60 Min	±30 Max*	35	4 Max	.045 Max	2000 Max	125 Max	
						td(off) = 160 ns, td(on) = 40 ns, tf = 130 ns, tr = 90 ns				
ECG2395 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	17 Min	60 Min	±30 Max*	50	4 Max	.028 Max	2000 Max	150 Max	
						td(off) = 170 ns, td(on) = 20 ns, tf = 120 ns, tr = 70 ns				
ECG2382 ▲ (Compl to ECG2383)	MOSFET, N-Ch, Enhancement Hi Speed Switch	1.5 Min	100 Min	±20 Max*	8	4 Max	.5 Max	750 Max	75 Max	
						td(off) = 50 ns, td(on) = 50 ns, tf = 60 ns, tr = 120 ns				
ECG2383 ▲ (Compl to ECG2382)	MOSFET, P-Ch, Enhancement Hi Speed Switch	2 Min	100 Min	±20 Max*	8	4.5 Max	.4 Max	1200 Max	75 Max	
						td (off) = 200 ns, td(on) = 80 ns, tf = 150 ns, tr = 150 ns				
ECG66 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	3 Min	100 Min	±20 Max*	12	4.5 Max	.18 Max	1200 Max	75 Max	
						td(off) = 200 ns, td(on) = 50 ns, tf = 100 ns, tr = 100 ns				
ECG2371 ▲	MOSFET, P-Ch, Enhancement Hi Speed Switch	6 Min	100 Min	±20 max*	19	4 Max	.2 Max	1400 Typ	150 Max	
						td(off) = 40 ns, td(on) = 20 ns, tf = 60 ns, tr = 80 ns				
ECG2396 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	12 Min	100 Min	±30 Max*	30	4 Max	.057 Max	2000 Max	150 Max	
						td(off) = 150 ns, td(on) = 20 ns, tf = 65 ns, tr = 40 ns				
ECG2372 ▲	MOSFET, P-Ch, Enhancement Hi Speed Switch	1 Min	200 Min	±20 Max*	3.5	4 Max	1.5 Max	350 Typ	40 Max	
						td(off) = 20 ns, td(on) = 20 ns, tf = 20 ns, tr = 30 ns				
ECG2373 ▲	MOSFET P-Ch Enhancement Hi Speed Switch	4 Min	200 Min	±20 max*	11	4 Max	.5 Max	1200 Typ	125 Max	
						td(off) = 50 ns, td(on) = 20 ns, tf = 50 ns, tr = 50 ns				

* Warning - Exceeding BVGS maximum will result in permanent damage to the gate region oxide layer.
▲ Refer to MOSFET Handling Precautions - Page 1-34

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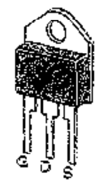
Power MOSFETS (cont'd)

ECG Type	Description and Application	Transcon-ductance gfs µmhos	Drain to Source Breakdown Voltage BV_{DSS}	Gate to Source Breakdown Voltage BV_{GS}	Continuous Drain Current I_D Amps	Gate to Source Threshold Voltage V_{GS} (th)	Drain to Source Resistance $r_{DS(on)}$ Ohms	Input Cap C_{iss} pf	Device Dissipation @T_C=25° C P_D Watts	Package Case/Fig./Basing
ECG2388 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	5 Min	200 Min	±20 Max*	12.5	4 Max	.2 Max	1000 Typ	75 Max	**TO-220** Fig. T41 
						td(off) = 120 ns, td(on) = 20 ns, tf = 60 ns, tr = 60 ns				
ECG2374 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	6 Min	200 Min	±20 Max*	18	4 Max	.18 Max	1300 Typ	125 Max	
						td(off) = 50 ns, td(on) = 20 ns, tf = 40 ns, tr = 60 ns				
ECG2900 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	6 Min	250 Min	±20 Max	14	4 Max	.28 Max	1300 Typ	125 Max	
						td(off) = 60 ns, td(on) = 20 ns, tf = 60 ns, tr = 30 ns				
ECG67 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	2 Min	400 Min	±20 Max*	5	4.5 Max	1.5 Max	1200 Max	75 Max	
						td(off) = 200 ns, td(on) = 50 ns, tf = 100 ns, tr = 100 ns				
ECG2391 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	2.1 Min	400 Min	±30 Max*	4	4 Max	1.8Max	500 Max	75 Max	
						td(off) = 65 ns, td(on) = 20 ns, tf = 40 ns, tr = 60 ns				
ECG2397 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	5 Min	400 Min	±30 Max*	10	4 Max	.5 Max	1800 Max	150 Max	
						td(off) = 200 ns, td(on) = 20 ns, tf = 75 ns, tr =60 ns				
ECG2380 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	1 Min	500 Min	±20 Max*	2	4.5 Max	4 Max	500 Max	75 Max	
						td(off) = 60 ns, td(on) = 40 ns, tf = 30 ns, tr = 60 ns				
ECG2398 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	3.5 Min	500 Min	±30 Max*	5	4 Max	1.5 Max	1000 Max	100 Max	
						td(off) = 100 ns, td(on) = 10 ns, tf = 40 ns, tr = 45 ns				
ECG2385 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	5 Min	500 Min	±30 max*	8	4 Max	.8 Max	1800 Max	125 Max	
						td(off) = 250 ns, td(on) = 40 ns, tf = 90 ns, tr = 90 ns				
ECG2901 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	1 Min	600 Min	±20 Max*	2.5	4 Max	4 Max	500 Max	80 Max	
						td(off) = 20 ns, td(on) = 30 ns, tf = 30 ns, tr = 40 ns				
ECG2379 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	3 Min	600 Min	±20 Max*	6	4 Max	1.25 Max	1400 Typ	100 Max	
						td(off) = 85 ns, td(on) = 40 ns, tf = 20 ns, tr = 25 ns				
ECG2387 ▲	MOSFET, N-Ch Enhancement Hi Speed Switch	3 Min	800 Min	±30 Max*	4	4 Max	3 Max	1250 Max	125 Max	
						td(off) = 150 ns, td(on) = 25 ns, tf = 60 ns, tr = 40 ns				
ECG2399 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	3 Min	1000 Min	±30 Max*	3	4 Max	5 Max	1250 Max	125 Max	
						td(off) = 130 ns, td(on) = 10 ns, tf = 40 ns, tr = 25 ns				

* Warning - Exceeding BVGS maximum will result in permanent damage to the gate region oxide layer.
▲ Refer to MOSFET Handling Precautions - Page 1 - 34

Package Outlines - See Page 1-91

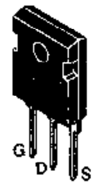
Power MOSFETS (cont'd)

ECG Type	Description and Application	Transconductance gfs μmhos	Drain to Source Breakdown Voltage BV_{DSS}	Gate to Source Breakdown Voltage BV_{GS}	Continuous Drain Current I_D Amps	Gate to Source Threshold Voltage $V_{GS\ (th)}$	Drain to Source Resistance $r_{DS\ (on)}$ Ohms	Input Cap C_{iss} pf	Device Dissipation @T_C=25° C P_D Watts	Package Case/Fig./Basing
ECG2940 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	6 Min	60 Min	±20 Max	13	4 Max	.09 Max	850 Max	30 Max	TO-220J Fig. T41-I 
						td(off) = 70 ns, td(on) = 40 ns, tf = 60 ns, tr = 60 ns				
ECG2941 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	16 Min	60 Min	±20 Max*	32	4 Max	.02 Max	2900 Max	45 Max	
						td(off) = 200 ns, td(on) = 90 ns, tf = 220 ns, tr = 700 ns				
ECG2942 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	5 Min	100 Min	±20 Max*	10	4 Max	.16 Max	1100 Max	35 Max	
						td(off) = 70 ns, td(on) = 60 ns, tf = 30 ns tr = 60 ns				
ECG2943 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	10 Min	100 Min	±20 Max*	18	4 Max	.06 Max	2000 Max	40 Max	
						td(off) = 140 ns, td(on) = 40 ns, tf = 110 ns, tr =70 ns				
ECG2944 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	6 Min	200 Min	±20 Max*	10	4 Max	.18 Max	1600 Max	45 Max	
						td(off) = 140 ns, td(on) = 90 ns, tf = 60 ns, tr = 60 ns				
ECG2945 △	MOSFET, N-Ch Enhancement Hi Speed Switch	5 Min	400 Min	±20 Max*	9	4 Max	.55 Max	1600 Max	45 Max	
						td(off) = 100 ns, td(on) = 50 ns, tf = 50 ns, tr = 150 ns				
ECG2946 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	3.5 Min	500 Min	±20 Max*	5	4 Max	.85 Max	2000 Max	45 Max	
						td(off) = 120 ns, td(on) = 50 ns, tf = 30 ns, tr = 20ns				
ECG2947 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	3 Min	600 Min	±20 max*	4	4 Max	1.25 Max	2000 Max	45 Max	
						td(off) = 170 ns, td(on) = 30 ns, tf = 50 ns, tr = 50 ns				
ECG2393 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	5 Min	500 Min	±20 Max*	9	4 Max	.7 Max	1900 Max	150 Max	TO-3P (TO-218) Fig. T48 
						td(off) = 170 ns, td(on) = 40 ns, tf = 40 ns, tr = 60 ns				
ECG2394 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	9 Min	500 Min	±20 Max*	14	4 Max	.4 Max	3000 Max	180 Max	
						td(off) = 150 ns, td(on) = 35 ns, tf = 70 ns, tr = 50 ns				
ECG2378 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	1 Min	900 Min	±20 Max	5	4 Max	4 Max	950 Typ	150 Max	TO-3PJ ◦ Fig. T48-1 
						td(off) = 80 ns, td(on) = 20 ns, tf = 20 ns, tr = 40 ns				
ECG2377 △	MOSFET, N-Ch, Enhancement Hi Speed Switch	2 Min	900 Min	±30 Max*	8	3.5 Max	1.5 Max	1300 Typ	150 Max	◦ TO-247 Alt. Case Fig T48-4
						td(off) = 200 ns, td(on) = 90 ns, tf = 220 ns, tr = 700 ns				

* Warning - Exceeding BVGS maximum will result in permanent demage to the gate region oxide layer.
△ Refer to MOSFET Handling Precautions - Page 1 - 34

Package Outlines - See Page 1-91

Power MOSFETS (cont'd)

ECG Type	Description and Application	Transconductance gfs µmhos	Drain to Source Breakdown Voltage BV_{DSS}	Gate to Source Breakdown Voltage BV_{GS}	Continuous Drain Current I_D Amps	Gate to Source Threshold Voltage V_{GS} (th)	Drain to Source Resistance r_{DS} (on) Ohms	Input Cap C_{iss} pf	Device Dissipation @T_C=25° C P_D Watts	Package Case/Fig./Basing
ECG2920 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	25 Min	60 Min	±20 Max*	70	4 Max	.014 Max	4000 Typ	200 Max	**TO-247 •** Fig. T48-4
						td(off) = 400 ns, td(on) = 200 ns, tf = 300 ns, tr = 900 ns				
ECG2375 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	13 Min	100 Min	±20 Max*	40	4 Max	.055 Max	2000 Typ	180 Max	
						td(off) = 60 ns, td(on) = 15 ns, tf = 90 ns, tr =140 ns				
ECG2376 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	13 Min	200 Min	±20 Max*	30	4 Max	.085 Max	2000 Typ	180 Max	
						td(off) = 70 ns, td(on) = 20 ns, tf = 80 ns, tr = 125 ns				
ECG2921 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	6 Min	250 Min	±20 Max*	15	4 Max	.28 Max	1400 Typ	150 Max	
						td(off) = 50 ns, td(on) = 20 ns, tf = 30 ns, tr = 60 ns				**• TO-3PJ** Alt. Case Fig T48-1
ECG2922 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	6 Min	400 Min	±20 Max*	16	4 Max	.3 Max	2900 Max	180 Max	
						td(off) = 140 ns, td(on) = 40 ns, tf = 50 ns, tr = 115 ns				
ECG2923 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	5 Min	500 Min	±20 max*	9	4 Max	.85 Max	1000 Typ	180 Max	
						td(off) = 50 ns, td(on) = 20 ns, tf = 30 ns, tr = 30 ns				
ECG2924 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	20 Min	600 Min	±20 max*	7	4 Max	1.3 Max	1000 Typ	180 Max	
						td(off) = 50 ns, td(on) = 20 ns, tf = 30 ns, tr = 25 ns				

Logic Level MOSFETS†

ECG Type	Description and Application	Transconductance gfs µmhos	Drain to Source Breakdown Voltage BV_{DSS}	Gate to Source Breakdown Voltage BV_{GS}	Continuous Drain Current I_D Amps	Gate to Source Threshold Voltage V_{GS} (th)	Drain to Source Resistance r_{DS} (on) Ohms	Input Cap C_{iss} pf	Device Dissipation @T_C=25° C P_D Watts	Package Case/Fig./Basing
ECG2984 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	5 Min	60 Min	±15 Max*	15	2.5 Max	.15 Max	500 Max	70 Max	**TO-220** Fig. T41
						td(off) = 60 ns, td(on) = 90 ns, tf = 90 ns, tr = 190 ns				
ECG2985 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	10 Min	60 Min	±15 Max*	30	2..5 Max	.055 Max	1300 Max	100 Max	
						td(off) = 100 ns, td(on) = 90 ns, tf = 140 ns, tr = 460 ns				
ECG2986 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	17 Min	60 Min	±15 Max	50	2.5 Max	.028 Max	2600 Max	150 Max	
						td(off) = 150 ns, td(on) = 100 ns, tf = 220 ns, tr = 600 ns				
ECG2987 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	10 Min	100 Min	±15 Max*	20	2.5 Max	.12 Max	1500 Max	100 Max	
						td(off) = 80 ns, td(on) = 60 ns, tf = 80 ns, tr = 160 ns				
ECG2980 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	3 Min	60 Min	±10 Max*	7	2 Max	.2 Max	400 Typ	25 Max	**TO-126N** Fig. T45-5
						td(off) = 20 ns, td(on) = 15 ns, tf = 30 ns, tr = 120 ns				
ECG2981 ▲	MOSFET, N-Ch, Enhancement Hi Speed Switch	4 Min	100 Min	±10 Max*	7	2 Max	.27 Max	490 Typ	42 Max	
						td(off) = 25 ns, td(on) = 15 ns, tf = 30 ns, tr = 70 ns				

*Warning - Exceeding BVGS maximum will result in permanent damage to the gate region oxide layer.

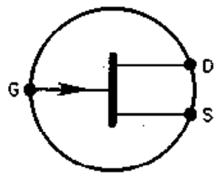
▲ Refer to MOSFET Handling Precautions - Page 1 - 34

† Logic Level MOSFETS are fully enhanced when 5V is applied to the gate.

Package Outlines - See Page 1-91

FET and MOSFET Diagrams (Observe MOS Handling) ▲

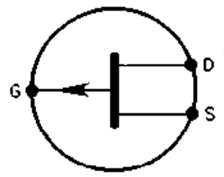
Depletion N-Ch JFET



ECG

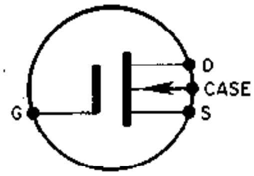
312	456		
451	457	461 (Dual)	468
452	458	466	469
453	459	467	

Depletion P-Ch JFET



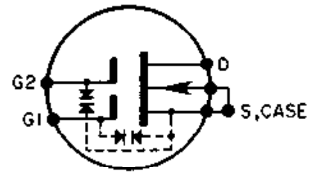
ECG
326
460
489

Depletion N-Ch MOSFET



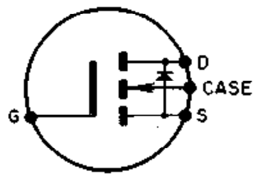
ECG
220
462

Dual Gate Depletion N-Ch MOSFET



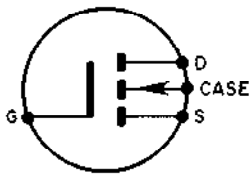
ECG
221
222 (Gate Protected)
454 (Gate protected)
455 (Gate Protected)

Enhancement N-Ch MOSFET



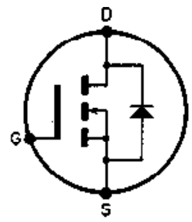
ECG
2384
2386
2392

Enhancement N-Ch MOSFET



ECG
465

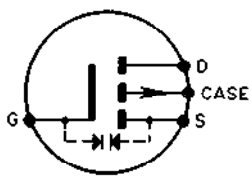
Enhancement N-Ch MOSFET



ECG

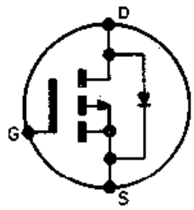
66	2375	2382	2391	2398	2922	2943	2981
67	2376	2385	2393	2399	2923	2944	2984
490	2377	2387	2394	2900	2924	2945	2985
491	2378	2388	2395	2901	2940	2946	2986
492	2379	2389	2396	2920	2941	2947	2987
2374	2380	2390	2397	2921	2942	2980	

Enhancement P-Ch MOSFET



ECG
463 (Dual) (Gate Protected)
464

Enhancement P-Ch MOSFET



ECG
2371 2382
2372
2373
2381

Insulated Gate Bipolar Transistors (IGBT)

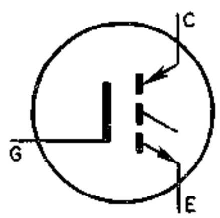
ECG Type	Description	Collector to Emitter Voltage V_{CES}	DC Collector Current I_C Amps	Gate to Emitter Voltage V_{GES}	Gate to Emitter Cutoff Voltage $V_{GE\ (th)}$	Collector to Emitter Saturation Voltage $V_{CE\ (sat)}$	Input Cap C_{IES} pf	Device Dissipation @ T_C=25°C P_D Watts	Package Case/Fig/Basing
ECG3300 ▲	IGBT, N-Ch, Enhancement	400	10	±25	7	8	1350	30	**TO-220J** Fig. T41-1 
					td(off)=7 µs, td(on)=0.5 µs, tf=6 µs, tr=0.5 µs				
ECG3301 ▲	IGBT, N-Ch, Enhancement	400	15	±25	7	8	2000	40	
					td(off)=7 µs, td(on)=0.5 µs, tf=6 µs, tr=0.5 µs				
ECG3302 ▲	IGBT, N-Ch, Enhancement	600	8	±20	6	4	650	30	
					td(off)=1 µs, td(on)=0.8 µs, tf=.35 µs, tr=0.6 µs				
ECG3303 ▲	IGBT, N-Ch, Enhancement	600	15	±20	6	4	1100	35	
					td(off)=1 µs, td(on)=0.8 µs, tf=.35 µs, tr=0.6 µs				
ECG3310 ▲	IGBT, N-Ch, Enhancement	600	15	±20	6	4	1100	100	**TO-3PJ** Fig. T48-1 
					td(off)=1 µs, td(on)=0.8 µs, tf=.35 µs, tr=0.6 µs				
ECG3311 ▲	IGBT, N-Ch, Enhancement	600	25	±20	6	4	1400	150	
					td(off)=1 µs, td(on)=0.8 µs, tf=.35 µs, tr=0.6 µs				
ECG3312 ▲	IGBT, N-Ch, Enhancement	1200	8	±20	6	4	1150	100	Collector to Heat Sink
					td(off)=1.5 µs, td(on)=0.8 µs, tf=0.5 µs, tr=0.6 µs				
ECG3320 ▲	IGBT, N-Ch, Enhancement	600	50	±20	6	4	3500	200	**TO-3PL** Fig. T48-2 
					td(off)=1 µs, td(on)=0.8 µs, tf=0.35 µs, tr=0.6 µs				
ECG3321 ▲	IGBT, N-Ch, Enhancement	600	80	±20	6	3.5	5500	200	
					td(off)=1 µs, td(on)=0.8 µs, tf=0.4 µs, tr=0.6 µs				
ECG3322 ▲	IGBT, N-Ch, Enhancement	900	60	±25	6	4	5500	200	
					td(off)=1.3 µs, td(on)=0.8 µs, tf=0.4 µs, tr=0.6 µs				
ECG3323 ▲	IGBT, N-Ch, Enhancement	1200	25	±20	6	4	3200	200	Collector to Heat Sink
					td(off)=1.5 µs, td(on)=0.8 µs, tf=0.5 µs, tr=0.6 µs				

▲ Refer to MOSFET Handling Precautions Page 1-34

IGBT Diagram

Enhancement N-Ch IGBT

ECG
3300
3301
3302
3303
3310
3311
3312
3320
3321
3322
3323



Surface Mount Transistors

Selector Guide

The following selector chart has been provided to aid in the servicing of equipment using surface mounted transistors.

The very small size of these devices makes it impossible to print the full part number on any surface. To overcome this problem, the various manufacturers use 1 to 3 digits (or alphabet) codes. However, since there are **no standard** codes established between the manufacturers, it is difficult to determine the actual part number when there is no parts list or schematic to refer to.

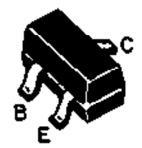
This chart is provided merely as a guide of possible ECG selections by application when the above conditions exist.

D

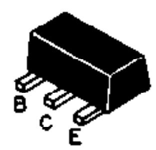
Typical Applications	ECG Type PS Voltage▲		NPN/ PNP	Case
RF	12 V Or Less	24 V Or Less		
UHF Amp/Osc/Mixer	2402		NPN	SOT-23
	2403		PNP	SOT-23
UHF Amp/Osc/Mixer, Modulator	2401	2401	PNP	SOT-23
	2402		NPN	SOT-23
AM/FM Amp/Osc/Mixer, IF	2406	2406	NPN	SOT-23
	2407	2407	PNP	SOT-23
Multipurpose	30 V Or Less	60 V Or Less		
AF Preamps, Bias Amps, Sync Sep, Rec/ Playback Amps, Other Low-Noise High Gain Circuits	2408	2408	NPN	SOT-23
	2409	2409	PNP	SOT-23
	2404*		NPN	SOT-23
	2405*		PNP	SOT-23
	2426*	2426*	NPN	SOT-89
	2427*	2427*	PNP	SOT-89
AF Amp/Driver, Vert/Horiz Osc, AGC Amp, Relay/Solenoid Driver, Lamp Driver, DC Amp, General Purpose Switch, Squelch Amp, Telephone Ckts, Video Amp, Chroma Amp	2406		NPN	SOT-23
	2407	2407	PNP	SOT-23
	2428	2428	NPN	SOT-89
	2429	2429	PNP	SOT-89
	2426*	2426*	NPN	SOT-89
	2427*	2427*	PNP	SOT-89
High Voltage Circuit	150 V Or Less	300 V Or Less		
Video Out, Vert Deflection, HV Switch, Regulator Circuits	2410	2412	NPN	SOT-23
	2411	2413	PNP	SOT-23
		2430	NPN	SOT-89
		2431	PNP	SOT-89

Case Styles

SOT-23 Fig. T20-4



SOT-89 Fig. T20-5



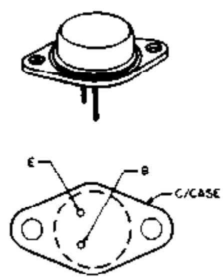
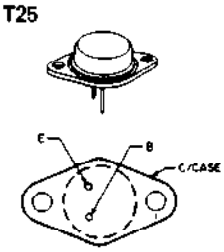
Package Outlines - See Page 1-91

Digital Transistors

Typical Applications	ECG Type Input			NPN/ PNP	Case
	R = 10K	R = 22K	R = 47K		
Inverters, Drivers, Interface, Switches	2414	2416	2418	NPN	SOT-23
	2415	2417	2419	PNP	SOT-23

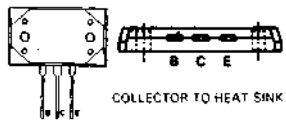
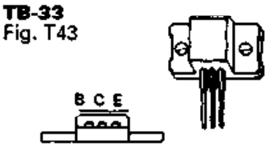
▲ Circuit Power Supply Voltage
* Darlington Transistors

Silicon Power Transistors (By Case Style and Increasing BVCBO) Maximum Ratings at $T_C = 25°C$

Breakdown Voltage BVCBO	Breakdown Voltage BVCEO	Type NPN	Type PNP	Application	Collector Current I_C (A)	Collector Diss. PD (W)	Current Gain hFE	Freq in MHz f_t	Package Case/Basing
80	80	**ECG29**	**ECG30**	Hi Pwr Amp, Sw, tf = .3 μsec (typ)	50	300	20 min	2 min	**TO-3** Fig. T28A
100	60	**ECG130**	**ECG219**	Gen Purp, Pwr Amp	15	115	40 typ	.8	Fig. T28
100	100	**ECG181**	**ECG180**	Gen Purp, Pwr Amp	30	200	25 min	2 min	
140	140	**ECG280**	**ECG281**	Gen Purp, Pwr Amp	12	100	70 min	6	
140	140	**ECG60**	**ECG61**	Gen Purp, Pwr Amp	20	250	30 typ	2	
150	130	**ECG328**	---	Hi Speed Sw, Amp, tf = .5 μs (typ)	15	140	12 min 100 max	60	
180	150	**ECG327**	---	Hi Speed Sw, Amp, tf = .25 μs (max)	25	200	30 min 120 max	40	
180	150	**ECG387**	---	Hi Speed Sw, Amp, tf = .25 μs (max)	50	250	70 typ	30 min	
180	180	**ECG284**	**ECG285**	Gen Purp, Pwr Amp	16	150	70 min	6	
200	150	**ECG86**	---	Hi Gain Amp, DC Regulator	5	50	400 min	15	
250	250	**ECG87**	**ECG88**	Hi Pwr AF Amp	10	200	20 min	3	
300	300	**ECG94**	---	Gen Purp Amp, DC Regulator	5	100	30 min	2.5 min	
400	250	**ECG388**	**ECG68**	Gen Purp, Hi Pwr Amp	16	250	30 typ	4 min	
500	300	**ECG162**	---	Gen Purp Linear, Vert Output	3 cont 10 peak	100	20 min	---	
550	350	**ECG385**	---	Hi Speed Sw, Amp, tf = .1 μs (typ)	10	150	20 typ	---	
700	700	**ECG163A**	---	Horiz Output Sw, tf = .4 μs (typ)	10 peak	100	10	---	
750	450	**ECG52**	---	HV, Hi Speed Sw, tf = .2 μs (typ)	5	125	10 typ.	---	
800	325	**ECG283**	---	Horiz Output Sw, tf = 1 μs (max)	10	100	15 min	6	
800	500	**ECG386**	---	Hi Speed Sw, Amp, tf = .3 μs (typ)	20	175	30 typ	---	
850	400	**ECG53**	---	HV, Hi Speed Sw, tf = .7 μs (typ)	15	175	12 typ	6 min	
850	450	**ECG2319**	---	HV, Hi Speed Sw, Hi Current, tf = .27 μs (typ)	15	175	6 min	---	
1500	600	**ECG89**	---	Horiz Output/Damper Diode tf = .7 μs (typ)	7	50	5 min	---	
1500	700	**ECG164**	---	Gen Purp Linear, Vert	1	50	20	.5 min	
1500	1400	**ECG165**	---	Horiz Output Sw, tf = .7 μs (typ)	5	50	5 min	---	
1500	1500	**ECG389**	---	Horiz Output Sw, tf = .7 μs (typ)	4	100	5 min	4 min	
1500	1500	**ECG238**	---	Horiz Output Sw, tf = .7 μs (typ)	7	50	5	---	
90	80	---	**ECG218**	Gen Purp, Pwr Amp	3	25	20 min	3 min	**TO-66** Fig. T25
300	300	**ECG124**	---	HV Gen Purp, Pwr Amp	.150	20	100 typ	30	
375	350	**ECG384**	---	Hi Speed Sw, Amp, tf = .3 μs (typ)	7	45	20 typ	1 min	
500/400	300/350	**ECG175**		Gen Purp, Pwr Amp	3	40	50 typ	10	
800	400	**ECG369**	---	Gen Purp Linear Amp, Sw, tf = 3.5 μs (typ)	3 peak	40	30 min	7	
1600	700	**ECG321**	---	Horiz Output Sw, tf = 1 μs (typ)	1.5	15 (T_C = 70°C)	1.5 min	---	

Package Outlines - See Page 1-91

Silicon Power Transistors (cont'd)

Breakdown Voltage		Type		Application	Collector Current I_C (A)	Collector Diss. P_D (W)	Current Gain h_{FE}	Freq in MHz f_t	Package
BV_{CBO}	BV_{CEO}	NPN	PNP						Case/Basing
200	200	**ECG2328**	**ECG2329**	HV AF Pwr Amp	15	150	55 min	30	**TO-3PL** Fig. T48-2  Collector to Heat Sink
800	500	**ECG2596**	—	HV, Hi Current Sw tf=.2 μs (typ)	50	300	20 min	18 typ	
1100	800	**ECG2598**	—	HV, Hi Current Sw tf=.3 μs (typ)	25	300	15 min	15 typ	
1500	800	**ECG2365**	—	Horiz Output, HV, Sw tf=.2 μs (max)	12	180	8 min	—	
1500	800	**ECG2533**	—	Horiz Output, Sw tf=.2 μs (max)	25	250	4 min	—	
60	60	**ECG224**	—	RF Pwr Output	2	10	60 typ	200	**TO-39F** Fig. T23 
450	350	**ECG225**	—	Gen Purp, Pwr Amp	1	10	40 min	15	
200	200	**ECG92**	**ECG93**	Hi Pwr AF PO	15	150	120 typ	20	**TB-35** Fig. T44-1  COLLECTOR TO HEAT SINK
200	200	**ECG58**	**ECG59**	Hi Pwr AF PO	17	200	20 min	20	
150	120	—	**ECG381**	Gen Purp, Pwr Amp	7	80	60 typ	9	**TB-33** Fig. T43  COLLECTOR TO HEAT SINK
100	100	**ECG390**	**ECG391**	Hi Speed Sw, Amp toff =1μs (typ)	10	80	40 min	3	**TO-3P (TO-218)** Fig. T48  Collector to Heat Sink
100	100	**ECG392**	**ECG393**	Hi Speed Sw, Amp toff =.7μs (typ)	25	125	25 min	3	
160	160	**ECG2305**	**ECG2306**	Power Amp, Sw tf =1.2μs (typ)	16	125	60 min	1 min	
500	400	**ECG394**	—	HV Pwr Amp, Sw tf =5μs (typ)	3	100	30 min	2.5	
1000	450	**ECG2310**	—	HV Hi Speed Sw toff =.8μs (max)	8	125	10 min	—	
1000	450	**ECG2311**	—	HV Hi Current Hi Speed SW tf =.3μs (typ)	15	150	10	—	
1500	700	**ECG2300**	—	HV Horiz Output, Sw tf =.7μs (typ)	8	125	5	7	
1500	700	**ECG2318**	—	HV, Horiz Output w/Damper Diode tf =.7μs (typ)	8	125	5 typ	7	
1500	750	**ECG2301**	—	HV Horiz Output, Sw tf =.4μs (typ)	5	100	5	4	

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Silicon Power Transistors (cont'd)

Breakdown Voltage BV_{CBO}	Breakdown Voltage BV_{CEO}	Type NPN	Type PNP	Application	Collector Current I_c (A)	Collector Diss. P_D (W)	Current Gain h_{FE}	Freq in MHz f_t	Package Case/Basing
55^{+15}_{-10}	55^{+15}_{-10}	**ECG2330**	—	Hi Gain Amp, Regulator w/ Int. Zener Control	4	80	500 min	—	**TO-3PJ** Fig. T48-1  B C E Collector to Heat Sink
60	50	**ECG2304**	**ECG2314**	Hi Speed Sw, Amp. tf=.1 μs (typ)	15	90	100 min	20	
90	80	**ECG2534**	**ECG2535**	Hi Current Sw, Amp tf=.2 μs	12	80	100 min	20 typ	
110	100	**ECG2536**	**ECG2537**	Hi Current Sw	40	150	50 min	—	
160	140	**ECG36**	**ECG37**	Gen Purp, Pwr Amp, Hi Speed Sw	12	100	60 min	15	
200	180	**ECG2307**	—	Hi Gain Amp, Series Pass	5	80	500 min	—	
500	400	**ECG2308**	—	Hi Speed Sw, Series Pass, tf=1 μs (max)	12	100	15 min	20	
500	400	**ECG2539**	—	HV, Hi Current Sw tf=.3 μs (max)	25	160	10 min	20 typ	
900	800	**ECG2309**	—	HV, Hi Speed Sw, tf=.7 μs (max)	6	100	10 min	15	
900	800	**ECG2348**	—	HV, Hi Current, tf=.3 μs (typ)	10	150	8 min	15	
1500	800	**ECG2302**	—	HV, Horiz Output/Damper Diode, tf=.7 μs (max)	5	120	8 min	3	
1500	800	**ECG2324**	—	HV, Horiz Output, Sw, tf=.2 μs (max)	8	150	8 min	—	
1500	800	**ECG2354**	—	Horiz Out, HV, Sw, tf=.2 μs (max)	10	150	8 min	—	
500	400	**ECG2538**	—	HV, Hi Speed Sw tf=.3 μs (max)	16	60	10 min	20 typ	**TO-3PM** Fig. T48-3  B C E
800	500	**ECG2594**	—	HV, Hi Current Sw tf=.3 μs (max)	15	55	10 min	18 typ	
1100	800	**ECG2597**	—	HV, Hi Speed Sw tf=.3 μs (max)	12	65	8 min	15 typ	
1500	800	**ECG2331**	—	HV, Horiz Output/Damper Diode, Sw, tf=.3 μs (max)	6	60	8 min	—	
1500	800	**ECG2353**	—	HV, Horiz Output/Damper Diode, Sw, tf=.3 μs (max)	10	70	8 min	—	

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Silicon Power Transistors (cont'd)

Breakdown Voltage BV_{CBO}	Breakdown Voltage BV_{CEO}	Type NPN	Type PNP	Application	Collector Current I_c (A)	Collector Diss. P_D (W)	Current h_{FE}	Freq in MHz f_t	Package Case/Basing
60	60	**ECG152**	**ECG153**	Gen Purp, Pwr Amp	7	50	60 typ	10	TO-220 Fig. T41  
65	65	**ECG235**	---	RF Pwr Output	3 peak	12	40 min	200 min	
70	70	**ECG236**	---	RF Pwr Amp	8 peak	25	20 min	100	
80	80	**ECG241**	**ECG242**	Gen Purp, Pwr Amp	4	60	25 min	2	
80	80	**ECG377**	**ECG378**	Hi Speed Sw Amp, tf = .14 μs (typ)	10	50	60 min	50	
90	80	**ECG196**	**ECG197**	Gen Purp, Pwr Amp	7	50	20 min	0.8	
100	80	**ECG2561**	---	Video Amp	.5	15	30 min	1.2 GHz	
100	80	**ECG56**	---	Gen Purp Amp, Sw, Series Pass, tf = 1.3 μs (Typ)	3	30	500 min	15	
100	100	**ECG331**	**ECG332**	Gen Purp	15	90	40 typ	3 min	
130	120	**ECG291**	**ECG292**	Gen Purp, Pwr Amp	4	40	75 typ	4 min	
150	150	**ECG54**	**ECG55**	Gen Purp, Pwr Amp	8	50	100 typ	85	
200	150	**ECG375**	**ECG398**	Gen Purp Linear, Vert	3/2	25	150 typ	8	
200	200	**ECG2507**	---	Hi Freq. Video Output	.3	20	40 min	400	
300	300	**ECG376**	---	Gen Purp	.015	15	100 typ	80	
400	200	**ECG2579**	---	HV, Hi Speed Sw	7	50	10 min	10	
500	400	**ECG2581**	---	HV, Hi Speed Sw tf = .3 μs (max)	12	70	10 min	20	
500	500	**ECG198**	---	HV Amp, Sw toff = 2 μs (typ)	1	40	80 typ	20	
700	400	**ECG51**	---	HV, Hi Speed Sw tf = .7 μs (typ)	4	75	25 typ	4 min	
700	400	**ECG2312**	---	HV, Hi Speed Sw tf = .7 μs (typ)	8	80	5 min	4 min	
700	400	**ECG379**	---	Horiz Sw tf = .7 μs (typ)	12	100	20 typ	4 min	
900	800	**ECG2325**	---	HV, Hi Speed Sw tf = .7 μs (typ)	3	50	10 min	15	
1000	450	**ECG2313**	---	HV, Hi Speed Sw tf = .4 μs (max)	2	40	50 typ	20 typ	
1000	450	**ECG2333**	---	HV, Hi Speed Sw tf = .8 μs (max)	8	125	10	---	
1500	750	**ECG2303**	---	Horiz Sw, tf = .65 μs (typ)	2.5	65	4	4	
1500	700	**ECG2365**	---	Horiz Out w/Damper Diode tf = .4 μs (typ)	8	35	23 max	---	TO-220F Fig. T67 

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Silicon Power Transistors (cont'd)

Breakdown Voltage		Type			Collector Current	Collector Diss.	Current Gain	Freq in MHz	Package
BV_{CBO}	BV_{CEO}	NPN	PNP	Application	I_c (A)	P_D (W)	h_{FE}	f_t	Case/Basing
60	30	**ECG2562**	**ECG2563**	Hi Current, Hi Speed Sw tf=.03 µs (typ)	12	25	100 min	120	**TO-220J** Fig. T41-1 
60	50	**ECG2566**	**ECG2567**	Hi Current, Hi Speed Sw tf=.05 µs (typ)	12	30	100 min	10	
80	60	**ECG2568**	**ECG2569**	Amp, Hi Speed Sw tf=.1 µs (typ)	10	30	100 min	100	
90	80	**ECG2570**	**ECG2571**	Hi Speed Sw tf=.4 µs (typ)	7	30	100 min	20	
120	120	**ECG2574**	**ECG2575**	Hi Freq Video Amp	.4	10	100 min	400	
180	180	**ECG2576**	**ECG2577**	Audio Output Driver	2	20	60 min	60	
200	60	**ECG2578**	—	Amp, Hi Speed Sw tf=.5 µs (max)	4.5	30	30 min	10	
500	400	**ECG2582**	—	HV, Hi Speed Sw tf=.3 µs (max)	12	40	10 min	20	
600	400	**ECG2583**	—	HV, Hi Speed Sw tf=.2 µs (max)	10	35	10 min	20	
900	500	**ECG2337**	—	HV, Hi Speed Sw tf=.3 µs (max)	7	40	8	—	
1000	800	**ECG2339**	—	HV, Hi Speed Sw tf=.3 µs (max)	3	40	8	—	
1500	1200	**ECG2588**	—	HV, Amp	30 mA	2	10 min	6	
2000	1800	**ECG2592**	—	HV, Amp	15 mA	2	10 min	6	
2100	2100	**ECG2593**	—	HV, Amp	10 mA	2	10 min	6	
60	30	**ECG2564**	**ECG2565**	Hi Speed Sw, Amp tf=.03 µs (typ)	8	30	100 min	120	**TO-220S** Fig. T42-3 
90	80	**ECG2572**	—	Hi Speed Sw, Amp tf=.4 µs (typ)	7	40	100 min	20	
500	400	**ECG2580**	—	HV, Hi Speed Sw, Amp tf=.3 µs (max)	7	50	20 min	20	
800	500	**ECG2584**	—	Hi Speed Sw, Amp tf=.3 µs (max)	5	50	20 min	18	
800	800	**ECG2585**	—	HV, Amp	20 mA	1.65	10 min	40	
1100	800	**ECG2586**	—	HV, Hi Speed Sw, Amp tf=.3 µs (max)	3	50	20 min	15	
1700	900	**ECG2590**	—	HV, Amp	50 mA	1.2	20 min	6	
2000	900	**ECG2591**	—	HV, Amp	20 mA	1.2	20 min	6	

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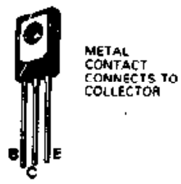
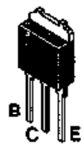
Silicon Power Transistors (cont'd)

Breakdown Voltage		Type		Application	Collector Current I_c (A)	Collector Diss. P_D (W)	Current h_{FE}	Freq in MHz f_t	Package Case/Basing
BV_{CBO}	BV_{CEO}	NPN	PNP						
75	40	**ECG295**	---	RF Output Driver	1	5	20 min	150 min	**TO-126** Fig. T45 
80	60	**ECG2511**	**ECG2512**	Hi Freq Video Output	.5	10	100 min	800 min	
80	80	**ECG184**	**ECG185**	Hi Speed Sw, Amp tf = .34 μs (typ)	4	40	30 min	2	
115	95	**ECG2633**	**ECG2634**	Video Driver	.3	3	20 min	1 GHz	
115	95	**ECG2506**	---	Hi Freq Video Driver	.4	5	50 min	1 GHz	
180	160	**ECG373**	**ECG374**	Gen Purp, Pwr Amp	1.5	1 T_A 25°C 20 T_C 25°C	100 typ	140	
300	300	**ECG157**	**ECG39**	Gen Purp, HV Amp	.5	20.8	30 min	10	
1000	450	**ECG2327**	---	HV, Hi Speed Sw tf = .4 μs (typ)	.5	20	50 typ	20	
30	20	**ECG2510**	---	Hi Freq, Video Output	.5	5	100 typ	2 GHz	**TO-126M** Fig. T45-4 
60	50	**ECG2517**	**ECG2518**	Hi Freq Amp, Sw tf = .03 μs (max)	2.5	10	140 min	140	
120	120	**ECG2508**	**ECG2509**	Hi Freq, Video Output	.3	8	100 min	400	
180	160	**ECG2519**	**ECG2520**	Hi Freq, Amp, Sw tf = .08 μs	1.5	10	140 min	120	
250	250	**ECG2521**	---	Hi Freq, Video Output	.3	10	60 min	400	
300	300	**ECG2501**	**ECG2502**	Hi Freq, Video Output	.1	7	100 min	150	
30	25	**ECG2504**	---	Gen Purp, Hi Gain Amp sw, tf = .1 μs (typ)	2	1.2	1500 typ	260	**TO-126M** Fig. T45-3 
60	50	**ECG2513**	**ECG2514**	Hi Freq Pwr Amp, Sw tf = .02 μs (max)	8	20	140 min	180	
120	100	**ECG2515**	**ECG2516**	Hi Freq Pwr Amp, Sw tf = .05 μs (max)	4	20	140 min	180	
60/50	45/40	**ECG2522**	**ECG2523**	Hi Speed Sw, Amp tf = .2 μs	8	15	200 typ	250	**TO-126N** Fig. T45-5 
60	50	**ECG2524**	**ECG2525**	Hi Current, Hi Speed Sw tf = .02 μs (max)	8	20	200 typ	180	
120	100	**ECG2526**	**ECG2527**	Hi Speed Sw, Amp tf = .05 μs (typ)	4	20	200 typ	180	
180	160	**ECG2528**	**ECG2529**	Hi Speed Sw, Amp tf = .08 μs (typ)	1.5	15	200 typ	120	
400	400	**ECG2530**	**ECG2531**	HV, Sw, Amp tf = .6 μs (typ)	2	15	60 min	60	
50	40	**ECG300**	---	Gen Purp	1.5	7	90 min	70	**TO-202** Fig. T38 ECG: 1 2 3 49: E B C 50: E B C 186/187: B C E 300: C B E 171/210/211: E B C 
70	60	**ECG186**	**ECG187**	Hi Speed Sw tf = .075 μs (typ)	3	12.5	80 typ	50	
125	100	**ECG49**	**ECG50**	Gen Purp, Pwr Amp	2	10	100 typ	150	

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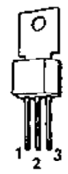
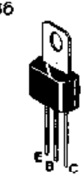
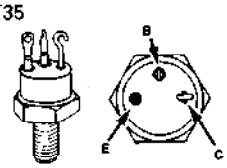
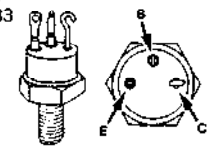
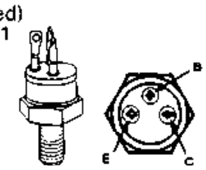
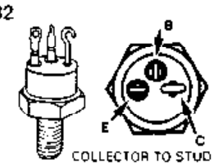
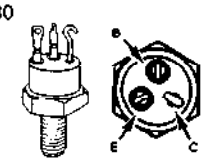
Silicon Power Transistors (cont'd)

Breakdown Voltage		Type		Application	Collector Current I_c (A)	Collector Diss. P_D (W)	Current h_{FE}	Freq in MHz f_t	Package Case/Basing
BV_{CBO}	BV_{CEO}	NPN	PNP						
36	18	**ECG78**	---	RF Amp, CB	.6	5	5 min	---	**TO-202M** Fig. T39 ECG: 1 2 3 TAB 78: B C E C 79: B C E C 186A: B C E C 187A: B C E C 228A: E B C C 
36	18	**ECG79**	---	RF Amp, CB	2	10	5 min	---	
50	50	**ECG186A**	**ECG187A**	Gen Purp, Linear Amp	1	10	40 typ	15	
100	50	**ECG302**	—	RF Driver, Pwr Amp	1.5 peak	8	200 min	80	**TO-202J** Fig. T37 ECG: 1 2 3 302: E B C 306: B C E 
100	50	**ECG306**	—	RF Driver, Pwr Amp	1.5 peak	8	200 min	80	
80	80	**ECG188**	**ECG189**	Gen Purp, Pwr Amp	2	10	80 typ	50	**TO-202N** Fig. T36  TAB CONNECTED TO COLLECTOR
180	180	**ECG190**	—	Gen Purp, Pwr Amp, Horiz Driver	1	10	40 min	100	
300	300	**ECG191**	**ECG240**	Gen Purp, HV Amp, Video	.5	10	40 typ	60	
150	90	**ECG71**	—	Hi Current Amp, Fast Sw	20	200	20 min	20	**TO-63** Fig. T35 
180	150	**ECG70**	—	HV Pwr Amp, Sw	50	250	30 min	30 min	
120	100	**ECG72**	—	Hi Current Amp, Fast Sw Isolated Stud	10	115	30 min	30	**TO-61** Fig. T33 
100	100	**ECG96**	—	HV Amp, Sw	7	60	60 min	30 min	**TO-59** (Isolated) Fig. T31 
250	250	**ECG95**	—	HV Amp, Sw	3	70	90 min	40	
100	100	**ECG74**	—	Gen Purp Amp, Sw	7	60	60 min	30	**TO-59** Fig. T32  COLLECTOR TO STUD
100	80	**ECG75**	—	Hi Pwr Amp, Sw	5	50	40 min	50 min	**TO-111** Fig. T30 

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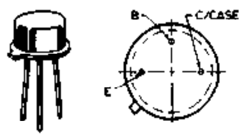
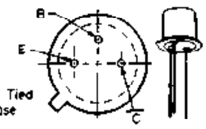
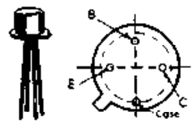
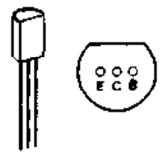
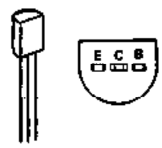
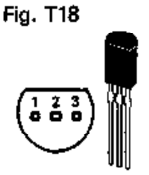
Silicon Small Signal Transistors (By Case Style and Increasing BVCBO) Maximum Ratings at $T_C = 25°C$

Breakdown Voltage		Type		Application	Collector Current I_C (A)	Collector Diss. PD (W)	Current Gain hFE	Freq in MHz f_t	Package
BVCBO	BVCEO	NPN	PNP						Case/Basing
40	20	**ECG346**	---	Gen Purp-Hi Freq, Driver	.4	1	10 min	500	**TO-39** Fig. T6 
40	30	**ECG278**	---	Gen Purp-Hi Freq, Amp	.4	3.5	30 min	1200 min	
50	30	**ECG77**	---	CATV Broadband Amp	.4	3.5	30 min	1800	
55	30	**ECG311**	---	Gen Purp-Hi Freq	.4	5	25 min	800 min	
60	30	**ECG123**	---	Gen Purp, Amp, Driver	.8	.8	150 typ	250	
60	30	**ECG329**	---	RF Pwr Amp	1.5 peak	5	---	---	
70	70	**ECG195A**	---	RF Pwr Amp, Driver	1.5	8	30 min	150	
120/90	80	**ECG128**	**ECG129**	Gen Purp	1	1	90 min	120	
120	80	**ECG2347**	---	Hi Current, Sw tf = .3 μs (typ)	4	1	40 min	50	
120	100	**ECG324**	**ECG323**	Gen Purp	2	1	50 min	30	
300	300	**ECG154**	---	HV Gen Purp, Amp	.5	1 TA 25°C	60 typ	40	
450/350	350/300	**ECG396**	**ECG397**	HV Pwr Amp, Sw	1	10	60 typ	15 min	
35	15	---	**ECG106**	Gen Purp-Hi Freq, Amp	75 mA	.25	20 min	500	**TO-18** Fig. T2  Collector Tied To Case
75	40	**ECG123A**	---	Gen Purp, Amp, Sw	.8	.5	200 typ	300	
30	15	**ECG316**	---	UHF Amp, Lo Noise	50 mA	.2	25 min	1400	**TO-72** Fig. T4 
30	25	---	**ECG395**	UHF/VHF Amp	50 mA	.36	25 min	2.3 GHz	
30	30	**ECG161**	---	Gen Purp-Hi Freq, Amp	25 mA	.2	60 typ	1 GHz	
36	18	**ECG340**	---	Gen Purp, RF Pwr	.5	.75	70 typ	---	**T-16** Fig. T20 
60	50	**ECG293**	**ECG294**	Gen Purp, Pwr Amp	1	1 H Sink .75 TA 25°C	120 min	200	
80	80	**ECG297**	**ECG298**	Gen Purp, Pwr Amp	1 peak	.75	130 min	120	
300	300	**ECG399**	**ECG2366**	Video Output, Horiz Dr	.1	.9	100 min	50 min	
100	50	**ECG315**	---	RF Driver	1	.75	200 typ	80	**SC-51** Fig. T19 
60	50	**ECG48**	---	Gen Purp Amp-Darlington	1	1	25,000	100 min	**TO-92M** Fig. T18 
60	50	**ECG2363**	**ECG2364**	Gen Purp Amp	2	1	200 min	150	
120	100	**ECG382**	**ECG383**	Gen Purp	1	.9 TA = 25°C	200 typ	140	
120	120	**ECG90**	**ECG91**	HV Hi Gain Amp	50 mA	.75	400 min	150	
160	160	**ECG31**	**ECG32**	AF Driver Output	1	.9 TA = 15°C	100 min	15 min	

TO-92M pin assignment:

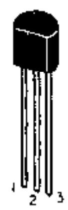
ECG	1	2	3
31	E	C	B
32	E	C	B
48	E	B	C
90	E	C	B
91	E	C	B
382	E	C	B
383	E	C	B
2363	E	C	B
2364	E	C	B

Package Outlines - See Page 1-91

Silicon Small Signal Transistors (cont'd)

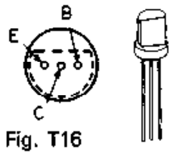
Breakdown Voltage BVCBO	Breakdown Voltage BVCEO	Type NPN	Type PNP	Application	Collector Current I_C (A)	Collector Diss. PD (W)	Current Gain hFE	Freq in MHz ft	Package Case/Basing
25	12	ECG10	---	Lo Noise UHF/VHF Amp (GPE=10 dB typ)	70 mA	.600	40 min	5 GHz	TO-92• T16
27	18	---	ECG12	Hi Gain, Hi Current Gen Purp	5	.75	180 min	120	
30	14	ECG23	---	Lo Noise, UHF, VHF Amp, RF Amp, HF IF Amp (GPE=15 dB typ)	50 mA	.25	80	2 GHz	
30	15	ECG108	---	RF/IF Video Amp, Osc	50 mA	.6	20 min	800 min	
30	25	ECG2503	---	Gen Purp Amp, Hi Gain, Sw, tf=.06 μs (typ)	.7	.6	800 min	270	
30	30	ECG233	---	Gen Purp	.1	.625	45 typ	300	
30	30	---	ECG232	Gen Purp-Darlington	.3	.625	50,000 typ	175	
35	35	ECG69	---	TV UHF/VHF Amp	50 mA	.25	70 typ	800 min	
30	15	ECG107	---	TV UHF/VHF Amp	50 mA	.25	70 typ	800 min	
40	20	ECG11	---	Hi Gain, Hi Current Gen Purp	5	.75	200 min	150	
40	30	ECG319P	---	TV IF Amp, AGC Controlled (Includes Metal Shield)	50 mA	.5	35 typ	300 min	
40	40	ECG172A	---	Gen Purp-Darlington	.3	.4	7,000 min	60	
40	40	ECG229	---	VHF Osc, IF Amp	50 mA	.425	30 min	600	
45	45	ECG47	---	Gen Purp, Hi Gain Amp	.2	.35	500 min	140	
60	50	---	ECG234	Gen Purp, Hi Gain Amp	50 mA	.2	400 typ	80 min	
70	50	ECG199	---	Gen Purp, Hi Gain Amp	.1	.36	400 typ	90 min	
70	70	ECG85	---	Gen Purp Amp, Sw	.4	.6	120 min	200 min	
75/80	40/80	ECG123AP	ECG159	Gen Purp	.6/1.0	.6	200 typ	300/200	
90	80	ECG2341	ECG2342	Darlington Driver, Sw, toff=1.5 μs (typ)	1	.80	2,000 min	---	
100	80	ECG289A	ECG290A	Gen Purp, Pwr Amp	.5	.5	100 min	120	
100	100	ECG46	---	Gen Purp-Darlington	.5	.625	10,000 min	200	
180	160	ECG194	---	Hi Speed Sw, Amp, tf=.4 μs (typ)	.6	.35	100 typ	100	
300	300	ECG287	ECG288	HV Gen Purp	.5	.625	40 min	50	• TO-98 Alt. Case - Fig. T15
40	40	ECG172A	---	Gen Purp-Darlington	.3	.4	7,000 min	60	TO-98• Fig. T15
70	50	ECG199	---	Gen Purp, Hi Gain Amp	.1	.36	400	90	• TO-92 Alt. Case - Fig. T16
40	40	---	ECG217	Very Hi Speed Sw, Amp, tf=30 ns (max)	1	1	40 min	175	TO-237 Fig. T17
80	50	ECG216	---	Very Hi Speed Sw, Core Driver, tf=20 ns (typ)	1.5	1	60 min	300	
100	80	ECG24	ECG25	Gen Purp Amp, Sw	1.25	1	80 min	50	
100/80	80	ECG128P	ECG129P	Gen Purp Amp, Sw	1	1	100 min	100/150	
300	300	ECG227	---	HV Amp, Video Output	.1	1	40 min	50	
325	300	ECG255	---	Horiz Driver, Amp, Sw	1	1	30 min	30 min	

TO-92• T16



ECG	1	2	3
10	B	E	C
11	E	C	B
12	E	C	B
23	B	E	C
46	E	B	C
47	E	B	C
69	B	E	C
85	E	C	B
107	E	C	B
108	E	B	C
123AP	E	B	C
159	E	B	C
172A	E	C	B
194	E	B	C
199	E	C	B
229	B	E	C
232	E	B	C
233	E	B	C
234	E	C	B
287	E	B	C
288	E	B	C
289A	E	C	B
290A	E	C	B
319P	B	E	C
2341	E	C	B
2342	E	C	B
2503	E	C	B

TO-98• Fig. T15

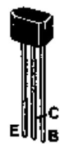
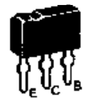


TO-237 Fig. T17

ECG	1	2	3
24	E	C	B
25	E	C	B
128P	E	B	C
129P	E	B	C
216	E	B	C
217	E	B	C
227	E	B	C
255	E	B	C

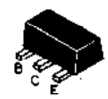
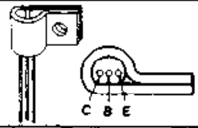
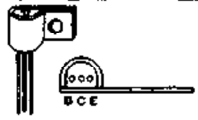
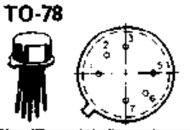
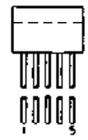
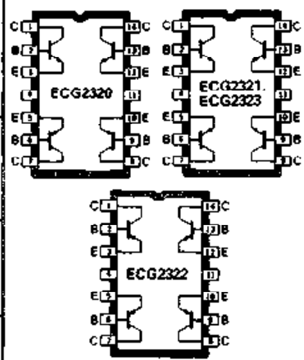
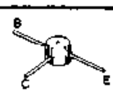
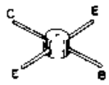
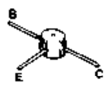
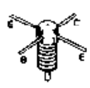
Package Outlines - See Page 1-91

Silicon Small Signal Transistors (cont'd)

Breakdown Voltage		Type			Collector Current I_C (A)	Collector Diss. PD (W)	Current Gain hFE	Freq In MHz ft	Package
BVCBO	BVCEO	NPN	PNP	Application					Case/Basing
50	50	ECG2355	ECG2356	Digital w/Base Resistor (10K) Sw, Driver	.1	.3	30 min	250	**SP-92** Fig. T13-1* Fig. T13-2 
50	50	ECG2367	ECG2368	Digital w/Base Resistor (4.7K) Sw, Driver	.1	.3	30 min	250	
50	50	ECG2369	ECG2370	Digital w/Base Resistor (4.7/47K) Sw, Driver	.1	.3	30 min	250	
50	50	ECG2357	ECG2358	Digital w/Base Resistor (22K) Sw, Driver	.1	.3	50 min	250	
50	50	ECG2359	ECG2360	Digital w/Base Resistor (47K) Sw, Driver	.1	.3	65 min	250	
60	50	ECG2361*	ECG2362*	Gen Purp Amp, Sw, $t_f = .1\ \mu s$ (typ)	.5	.300	200 typ	200	
120	120	ECG26*	---	Audio Amp, Lo Noise	50 mA	.3 $T_A = 25°C$	300 min	100	
25	20	ECG13	---	Hi Gain, Gen Purp Amp	.5	.6	400 min	200	**M-71** Fig. T20-3 
30	25	ECG2505	---	Gen Purp Amp, Hi Gain, Sw, $t_f = .1\ \mu s$ (typ)	2	1	1000 min	260	
40	32	ECG20	ECG21	AF PO, Driver, Series Pass	2 2.5 peak	1	120 min	100	
50	40	ECG16	ECG17	Gen Purp, Small Sig, Lo Noise	.1	.3	300	180/140	
80	80	ECG18	ECG19	AF Driver, Gen Purp Amp	.7 1 peak	1	120 min	120/100	
100	80	ECG22	---	AF Pwr Output, Driver, Gen Purp Amp	1 2 peak	1	120 min	100	
30	18	ECG15	---	VHF Amp, Mixer, Osc, UHF Osc	50 mA	.3	40 min	600 min	**M-68** Fig. T20-2 
80	80	---	ECG14	Gen Purp AF Amp, Driver	.7	.75	120 min	100	
20	15	ECG2402	ECG2403	Lo Noise, UHF/VHF Amp ECG2402 (G_{PE} = 15 dB Typ) ECG2403 (G_{PE} = 18 dB Typ)	25 mA	.200	40/20 min	5 GHz	**SOT-23** Fig. T20-4 
30	30	---	ECG2401	RF Amp, Osc, Mixer, VHF/FM	25 mA	.300	---	450 typ	
40	30	ECG2404	ECG2405	Darlington, Preamp Dr, Gen Purp Amp	.300	.350	4,000 min	220	
50	50	ECG2414	ECG2415	Digital w/Base Resistor (10K) Sw, Driver	.100	.200	30 min	250	
50	50	ECG2416	ECG2417	Digital w/Base Resistor (22K) Sw, Driver	.100	.200	50 min	250	
50	50	ECG2418	ECG2419	Digital w/Base Resistor (47K) Sw, Driver	.100	.200	65 min	250	
75/60	40/60	ECG2406	ECG2407	AF/RF Amp, Driver, Sw	.800/ .600	.425	100 min	300/200	
80	65	ECG2408	ECG2409	Lo Noise, AF/RF, Gen Purp Amp	.100	.200	300/350 typ	300/150	
180/160	160/150	ECG2410	ECG2411	Gen Purp, HV, Dr, Amp	.600	.350	80/60 min	300	
300	300 (CER)	ECG2412	ECG2413	Gen Purp, HV Amp	50 mA	.310	50 min	60	

Package Outlines - See Page 1-91

Silicon Small Signal Transistors (cont'd)

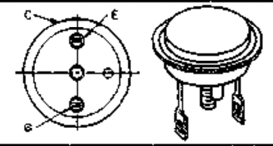
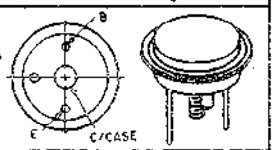
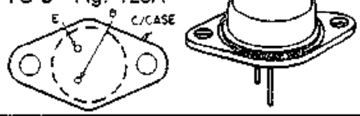
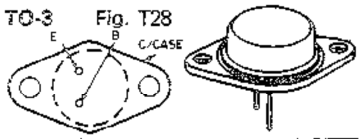
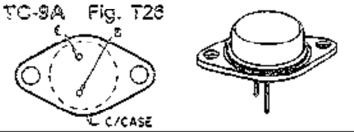
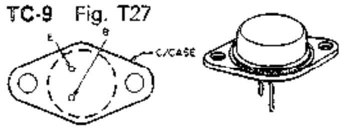
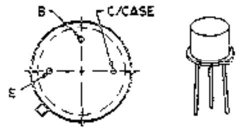
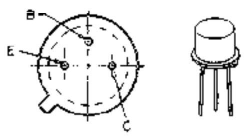
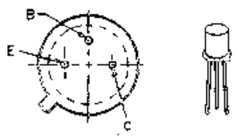
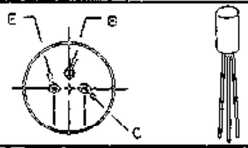
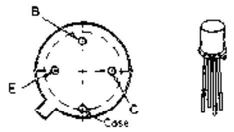
Breakdown Voltage		Type		Application	Collector Current I_C (A)	Collector Diss. P_D (W)	Current Gain hFE	Freq in MHz f_t	Package Case/Basing
BVCBO	BVCEO	NPN	PNP						
90	80 (CER)	ECG2426	ECG2427	Darlington Driver, Sw	.500	1	2,000 min	---	SOT-89 Fig. T20-5 
90	80	ECG2428	ECG2429	Gen Purp Amp, Sw	1	1	100 min	100	
400/350	350/300	ECG2430	ECG2431	HV, Gen Purp Amp	1	1	40/30 min	70/15	
70	70		ECG193	Gen Purp, Pwr Amp	1	1 T_C 25°C	150 typ	120 min	TO-92HS Fig. T21 
70	70	---	ECG193A	Gen Purp, Pwr Amp	.5	.6	120 min	120	T16HS Fig. T22 
75/60	40	ECG81	ECG82	Dual VHF Amp, Sw	.6	.6 total $T_A = 25°C$ 2 total $T_C = 25°C$	100 min	250	TO-78 Fig. T12  1. Collector 1 2. Base 1 3. Emitter 1 5. Emitter 2 6. Base 2 7. Collector 2
50	50	ECG42		Dual Diff. Amp, Common Emitter	.1	.2 unit .4 total	400 min	100	SIP-5 Fig. T20-1 
100	100		ECG41	Dual Diff. Amp, Common Emitter	50 mA	.2 unit .4 total	400 min	150	
100	100	ECG44	ECG45	Dual Bias Amp, Common Base	.1	.2 unit .4 total	400 min	100	
60	30	ECG2320		Quad Discrete, Compl Pair, Sw, $t_{on} = 30$ ns, $t_{off} = 225$ ns (typ)	.5	1 unit 3 total	100 min	350	14-Pin DIP Fig. T66 
60	40	ECG2321	---	Quad Gen Purp Amp, Sw, $t_{on} = 25$ ns, $t_{off} = 250$ ns (typ)	.5	.65 unit 1.9 total	100 min	350	
60	40	---	ECG2322	Quad Gen Purp Amp, Sw, $t_{on} = 30$ ns, $t_{off} = 225$ ns (typ)	.5	.65 unit 1.9 total	100 min	350	
200	200	ECG2323	---	Quad HV Amp, Driver	.5	.75 unit 1.7 total	60	80	
30	30	ECG313	---	RF Amp	20 mA	.15	25 min	400 min	RF-15 Fig. T49 
20	12	ECG63	---	UHF/Microwave Amp/ Mixer	40 mA	.400	40	5 GHz typ	RF-19A Fig. T49-3 
25	15	ECG64	---	UHF/Microwave Amp/Hi Speed Sw	30 mA	.350	60	4.5 GHz typ	
20	15	ECG65	---	UHF/Microwave Amp, CATV, MATV	25 mA	.180	30 typ	5 GHz typ	RF-19 Fig. T49-2 
50	30	ECG76	---	CATV Broadband Amp	.4	5	30 min	1800	TO-117 Fig. T50 

SIP-5 pin table:

ECG	1	2	3	4	5
40	B	C	E	C	B
41	B	C	E	C	B
42	B	C	E	C	B
43	B	C	E	C	B
44	E	C	B	C	E
45	E	C	B	C	E

Package Outlines - See Page 1-91

Germanium Transistors (Maximum Ratings at $T_C = 25°C$ Unless Otherwise Noted)

Breakdown Voltage		Type			Collector Current	Collector Diss.	Current Gain	Freq in MHz	Package
BV_{CBO}	BV_{CEO}	NPN	PNP	Application	I_C (A)	P_D (W)	h_{FE}	f_t	Case/Fig./Basing
40	40	---	**ECG330**	Gen Purp, Pwr Amp	25	170	12 typ	---	**TO-36** Fig. T29 
50	35	---	**ECG105**	Gen Purp, Pwr Amp	15	100	90 typ	10 kHz	
75	65	---	**ECG213**	Gen Purp, Pwr Amp	30	170	80 typ	0.27	
60	45	---	**ECG28**	High Current Gen Purp Amp	60	170	120 typ	2 kHz	**TO-66** Fig. T29A 
60	45	---	**ECG27**	High Current Gen Purp Amp	60	170	120 typ	2 kHz	**TO-3** Fig. T28A 
50	35	---	**ECG104**	Gen Purp, Pwr Amp	7	90	90 typ	10 kHz	**TO-3** Fig. T28 
65	45	---	**ECG121**	Gen Purp, Pwr Amp	7	30	80 typ	22 kHz	
90	90	---	**ECG179**	Gen Purp, Pwr Amp	25	106	55 typ	0.35 min	
350	350	---	**ECG127**	Horiz Switch, PO	10	40	15 min	1	
35	35	---	**ECG226**	Gen Purp, Pwr Amp	2	12	125 typ	0.45	**TC-9A** Fig. T26 
32	20	**ECG155**	**ECG131**	Gen Purp, Pwr Amp	3 peak	6 TC 63°C	110 typ	1	**TC-9** Fig. T27 
25	25	---	**ECG176**	Gen Purp, Pwr Amp	2	6	110 typ	0.7	**TO-39** Fig. T6 
25	20	**ECG101**	**ECG100**	Gen Purp	0.3	0.15 ($T_A = 25°C$)	40 typ	5	**TO-5** Fig. T5 
30	16	**ECG103**	**ECG102**	Gen Purp	0.3	0.15 ($T_A = 25°C$)	90 typ	2	
25	25	---	**ECG126A**	Gen Purp	10 mA	0.2 ($T_A = 25°C$)	60 typ	250	**TO-18** Fig. T2 
32	32	**ECG103A**	**ECG102A**	Gen Purp	0.5	0.9	120 typ	2.3	**TO-1** Fig. T1 
32	32	---	**ECG158**	Gen Purp, Pwr Amp	1	1.6	90 typ	1.5	
30	20	---	**ECG160**	Gen Purp	0.01	0.2 ($T_A = 25°C$)	20 typ	400	**TO-72** Fig. T4 

Package Outlines - See Page 1-91

RF Transistor Selector Guide

Amateur 13-30 MHz

ECG Type	Description and Application	Output Power Watts Pout	Input Power Watts Pin	Supply Voltage Vcc	Test Freq MHz	Package Fig. No.	Package Case	
ECG318	NPN-Si, PO	50	1.6	12.5	30	T58	RF-50F	
ECG325	NPN-Si, PO	50	4	13.6	30	T53	RF-38S	
ECG333	NPN-Si, PO	60	3	12.5	30	T57	RF-38F	
ECG334	NPN-Si, PO	60	3	12.5	30	T53	RF-38S	
ECG317	NPN-Si, PO	70	3	12.5	30	T58	RF-50F	
ECG335	NPN-Si, PO	80	5	12.5	30	T58		
ECG336	NPN-Si, PO	80	5	12.5	30	T54	RF-50S10	
ECG470	NPN-Si, PO	100	6.3	12.5	30	T58	RF-50F	
ECG471	NPN-Si, PO	100	3.2	28	30	T58		

Low Band FM 27-50 MHz

ECG337	NPN-Si, Driver	8	.8	12.5	50	T53	RF-38S	
ECG338	NPN-Si, Driver/PO	20	3.2	12.5	50	T53		
ECG338F	NPN-Si, Driver/PO	20	3.2	12.5	50	T57	RF-38F	
ECG339	NPN-Si, PO	40	7	12.5	50	T54	RF-50S10	

VHF Marine FM 156-162 MHz

ECG340	NPN-Si, Driver/PO	0.6	.05	13.5	175	T20	T-16	
ECG341	NPN-Si, Driver/PO	4	.25	12.5	175	T7	TO-39EC*	
ECG488	NPN-Si, Driver/PO	4	.25	13.5	175	T9	TO-39EG*	
ECG342	NPN-Si, PO	7	.6	13.5	175	T42	TO-220EC*	
ECG343	NPN-Si, PO	14	2.5	13.5	175	T42		
ECG344	NPN-Si, PO	30	6	13.5	175	T59	RF-28F6	
ECG345	NPN-Si, PO	30	3.8	13.6	160	T53	RF-38S	

VHF AM 108-175 MHz

ECG311	NPN-Si, Predriver, Driver, PO	1	0.1	28	175	T6	TO-39	
ECG357	NPN-Si, Driver/PO	7	1.0	28	175	T51	RF-38SM	
ECG359	NPN-Si, Driver/PO	20	3	28	175	T53	RF-38S	
ECG360	NPN-Si, Driver/PO	40	7	28	175	T53		

* - Emitter to Case

Package Outlines - See Page 1-91

High Band VHF FM 136-174 MHz

ECG Type	Description and Application	Output Power Watts Pout	Input Power Watts Pin	Supply Voltage Vcc	Test Freq MHz	Package	
						Fig. No.	Case
ECG346	NPN-Si, Predriver, Driver	1	0.1	12.0	175	T6	TO-39 
ECG487	NPN-Si, Driver/PO	1	0.1	12.5	175	T8	TO-39A 
ECG472	NPN-Si, Driver/PO	1.8	0.12	12.5	175	T6	TO-39 
ECG473	NPN-Si, Driver/PO	2.2	0.5	15	175	T6	
ECG347	NPN-Si, Driver/PO	3	0.5	13.6	175	T51	RF-38SM 
ECG474	NPN-Si, Driver/PO	3	0.3	12.5	175	T40	TO-202EC* 
ECG341	NPN-Si, Driver/PO	4	0.25	12.5	175	T7	TO-39EC* 
ECG488	NPN-Si, Driver/PO	4	0.25	13.5	175	T9	TO-39EG* 
ECG348	NPN-Si, Driver/PO	4	0.25	12.5	175	T53	RF-38S 
ECG349	NPN-Si, Driver/PO	10	3	13.6	175	T53	RF-38S 
ECG350	NPN-Si, Driver/PO	15	3.8	12.5	175	T53	RF-38S 
ECG350F	NPN-Si, Driver/PO	15	3.8	12.5	175	T57	RF-38F 
ECG351	NPN-Si, Driver/PO	25	6	12.5	175	T53	RF-38S 
ECG345	NPN-Si, Driver/PO	30	3.8	13.6	160	T53	
ECG320	NPN-Si, PO	40	14	12.5	175	T55	RF-50SS 
ECG320F	NPN-Si, PO	40	14	12.5	175	T57	RF-38F 
ECG477	NPN-Si, PO	45	10	12.5	175	T60	RF-50F6 
ECG352	NPN-Si, PO	80	18	12.5	175	T60	
ECG353	PNP-Si, PO	4	0.25	12.5	175	T57	RF-38F 
ECG354	PNP-Si, PO	15	3.8	12.5	175	T57	
ECG355	PNP-Si, PO	30	8	12.5	175	T57	

* - Emitter to Case

Package Outlines - See Page 1-91

UHF FM 407-512 MHz

ECG Type	Description and Application	Output Power Watts Pout	Input Power Watts Pin	Supply Voltage Vcc	Test Freq MHz	Package Fig. No.	Package Case
ECG486	NPN-Si, Multi, Driver	.75	.12	12.5	470	T6	TO-39 
ECG479	NPN-Si, Driver/PO	1.8	.1	12.5	470	T6	
ECG361	NPN-Si, Driver/PO	2	.32	12.5	470	T7	TO-39EC* 
ECG362	NPN-Si, Driver/PO	2	0.25	12.5	470	T52	RF-28S 
ECG363	NPN-Si, Driver/PO	4	0.63	12.5	470	T52	
ECG364	NPN-Si, Driver/PO	10	2.5	12.5	470	T52	
ECG365	NPN-Si, Driver/PO	15	3.0	12.5	470	T60	RF-50F6 
ECG366	NPN-Si, Driver/PO	25	6	12.5	470	T60	
ECG367	NPN-Si, PO	45	15	12.5	470	T60	
ECG368	NPN-Si, PO	60	22	12.5	470	T60	

UHF FM 806-870 MHz

ECG481	NPN-Si, PO	6	.95	12.5	836	T61	RF-38F6B 
ECG482	NPN-Si, PO	15	4.5	12.5	836	T63	RF-23F6E 
ECG483	NPN-Si, PO	18	4.5	12.5	836	T61	RF-38F6B 
ECG484	NPN-Si, PO	25	8	12.5	836	T61	
ECG485	NPN-Si, PO	25	7	12.5	836	T62	RF-23F6 

* - Emitter to Case

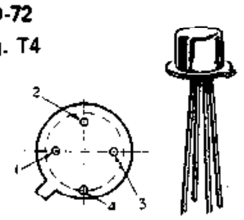
Package Outlines - See Page 1-91

TV Tuner Transistor Selector Guide

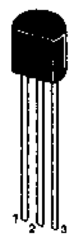
The following Selector Guide has been prepared to aid in the servicing of UHF and VHF TV tuners. These tuners have been classified into two types: the Varactor (electronically tuned tuners) and the Mechanical tuners (individually tuned coils for each TV channel). A wide variety of tuner circuit designs are used, many of which require special transistor characteristics. To simplify the selection of a replacement transistor, follow these steps:

1. Determine tuner type and stage to the Selector Guide that matches the one being repaired.
2. Determine the polarity (NPN, PNP, N-Ch) - **ALL** replacements are NPN unless otherwise listed in this guide.
3. Select the proper basing required for the device.
4. Select the case style of the transistor.

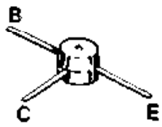
TO-72
Fig. T4



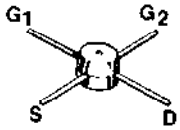
TO-92
Fig. T16



RF-15
Fig. T49



RF-15A
Fig. T49-1



Varactor Tuners (Electronic Color TV Tuners) UHF/VHF Tuners

R.F. Stage

UHF

ECG454 - DG_2G_1S, Case (FET, N-Ch, TO-72)
ECG107 - ECB (TO-92)
ECG69 - BEC (TO-92)
ECG395 - EBC Case (PNP, TO-92)
ECG455 - G_2G_1SD (FET, N-Ch, RF-15A)

VHF

ECG222 - DG_2G_1S, Case (FET, N-Ch, TO-72)
ECG107 - ECB (TO-92)
ECG69 - BEC (TO-92)
ECG395 - EBC Case (PNP, TO-72)
ECG454 - DG_2G_1S, Case (FET, N-Ch, TO-72)

Single Mixer Stage

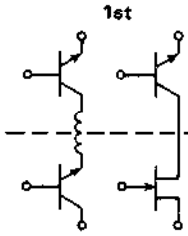
ECG222 - DG_2G_1S, Case (FET, N-Ch, TO-72)
ECG107 - ECB (TO-92)
ECG69 - BEC (TO-92)

UHF Diode Mixer

ECG112

Dual Mixers

1st



2nd

1st **ECG229** - BEC (TO-92)
2nd **ECG107** - ECB (TO-92)
2nd **ECG229** - BEC (TO-92)
2nd **ECG312** - GSD (TO-92) (FET, N-Ch, D & S Interchangeable)

OSC Stage

ECG107 - ECB (TO-92)
ECG69 - BEC (TO-92)
ECG395 - EBC Case (PNP, TO-72)

Tuning Diodes

(4 Matched)

ECG616

IF Amp Stage

(Located In Tuner)

ECG107 - ECB (TO-92)
ECG108 - EBC (TO-92)
ECG161 - EBC Case (TO-72)
ECG229 - BEC (TO-92)

Switching Diodes

ECG553
ECG555

Package Outlines - See Page 1-91

Mechanical Tuners (Black and White/Color TV)
UHF Tuners (No RF Stage)

Oscillator Stage	Mixer Diode	AFC Diode
ECG313 - ECB (RF-15) **ECG107** - ECB (TO-92) **ECG108** - EBC (TO-92) **ECG69** - BEC (TO-92) **ECG395** - EBC Case (PNP, TO-72)	ECG112	ECG612 (Typ)

UHF Tuners (With RF Stage)

RF Stage	Mixer Stage	OSC Stage
ECG455 - G_2G_1SD (FET, N-Ch, RF-15A) **ECG395** - EBC Case (PNP, TO-72)	**ECG222** - DG_2G_1S, Case (FET, N-Ch, TO-72) **ECG107** - ECB (TO-92) **ECG69** - BEC (TO-92)	**ECG107** - ECB (TO-92) **ECG69** - BEC (TO-92)

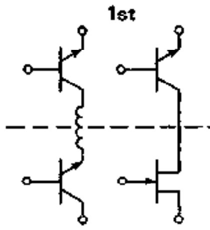
VHF Tuners

R.F. Stage	Single Mixer Stage	OSC Stage
ECG107 - ECB (TO-92) **ECG108** - EBC (TO-92) **ECG69** - BEC (TO-92) **ECG161** - EBC Case (TO-72) **ECG395** - EBC Case (PNP, TO-72) **ECG313** - ECB (RF-15) **ECG222** - DG_2G_1S, Case (FET, N-Ch, TO-72)	**ECG107** - ECB (TO-92) **ECG161** - EBC Case (TO-92) **ECG229** - BEC (TO-92) **ECG313** - ECB (RF-15) **ECG222** - DG_2G_1S, Case (FET, N-Ch, TO-72)	**ECG107** - ECB (TO-92) **ECG108** - EBC (TO-92) **ECG161** - EBC Case (TO-72) **ECG229** - BEC (TO-92) **ECG69** - BEC (TO-92) **ECG313** - ECB (RF-15)

IF Amp Stage	Dual Mixers	AFC Diode
(Located in Tuner) **ECG107** - ECB (TO-92) **ECG108** - EBC (TO-92) **ECG161** - EBC Case (TO-72) **ECG229** - BEC (TO-92)	see diagram and list below	ECG613 (Typ)

Dual Mixers

1st



2nd

1st	**ECG229**	BEC (TO-92)
2nd	**ECG229**	BEC (TO-92)
2nd	**ECG107**	ECB (TO 92)
2nd	**ECG312**	GSD (TO-92) (FET, N-Ch, D & S Interchangeable)

Package Outlines - See Page 1-91

Notes:

ECG108 - **NOT** for use in oscillator stage of Varactor tuners as varactor diodes load down the oscillator output.

ECG319P - Use for AGC controlled IF's, **NOT** good for 3rd VIF.

ECG229 - Use in last VIF stage.

ECG233 - Black and White only, use in 3rd or last VIF stage.

Transistor Outlines

Fig. T1
TO-1

ECG
102A
103A
158

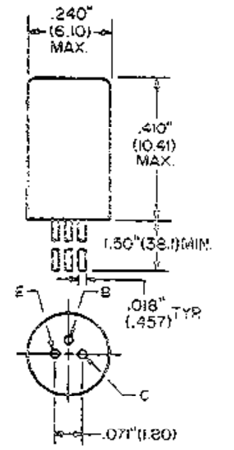


Fig. T2
TO-18

ECG	1	2	3
106	E	B	C
123A*	E	B	C
126A	E	B	C
462	S	G	D
466	S	D	G

*Collector to Case

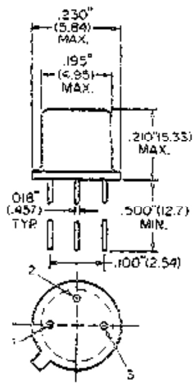
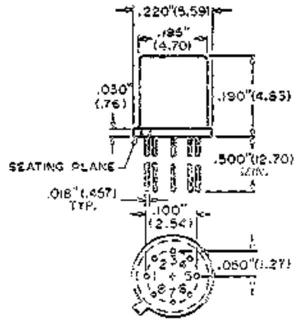


Fig. T3
TO-71

ECG
461



1. S1
2. D1
3. G1
4. Blank
5. S2
6. D2
7. G2
8. Blank

Fig. T4
TO-72

ECG	1	2	3	4
160	E	B	C	CASE
161	E	B	C	CASE
220	D	S	G	CASE
221	D	G2	G1	S, CASE
222	D	G2	G1	S, CASE
316	E	B	C	CASE
395	E	B	C	CASE
452	S	D	G	CASE
454	D	G2	G1	S, CASE
456	D	S	G	CASE
459*	S	D	G	CASE
460	S	G	D	CASE
464	S	G	D	S, CASE
465	S	G	D	CASE

* D & S interchangeable

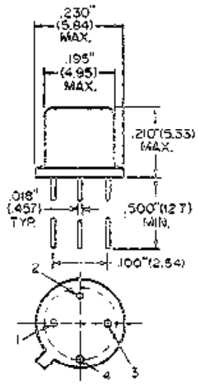


Fig. T5
TO-5

ECG
100
101
102
103

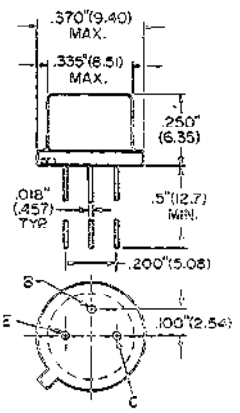


Fig. T6
TO-39

ECG

77	324
123	329
128	346
129	396
154	397
176	472
185A	473
278	479
311	486
323	2347

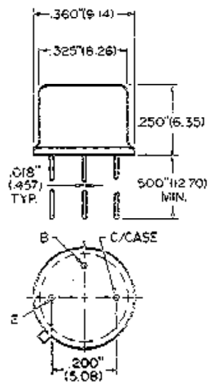


Fig. T7
TO-39EC

ECG
341
361

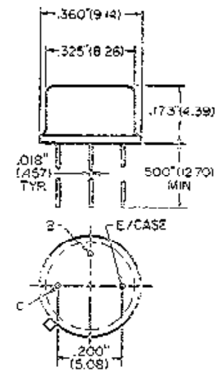
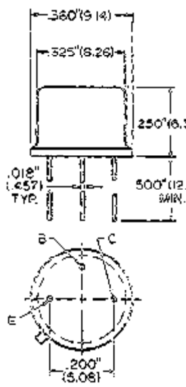


Fig. T8
TO-39A

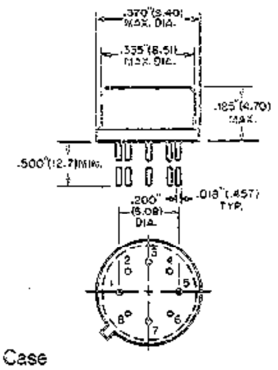
ECG
487



Note: All leads electrically isolated from case.

Fig. T10
TO-99

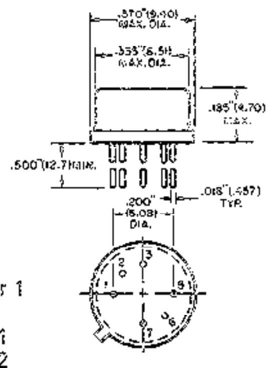
ECG
463



1. D1
2. S1
3. G1
4. Base, Case
5. G2
6. S2
7. D2
8. NC

Fig. T12
TO-78

ECG
82



1. Collector 1
2. Base 1
3. Emitter 1
5. Emitter 2
6. Base 2
7. Collector 2

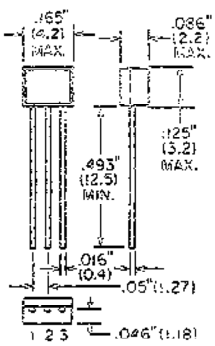
Note: All leads electrically isolated from case

Fig. T13-1
SP-92

ECG
20
459*°
2331
2332

°Alternate Fig. T16

1. Emitter
2. Collector
3. Base



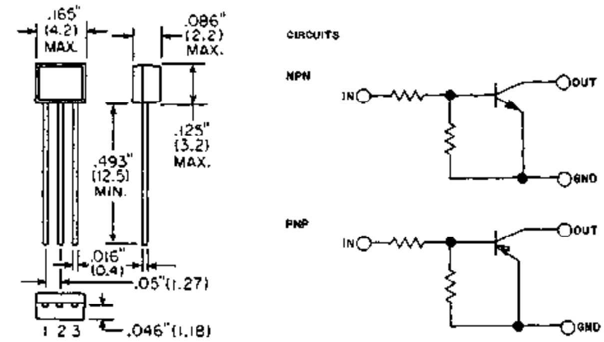
*1. D
2. S
3. G

Transistor Outlines (cont'd)

Fig. T13-2

SP-92

ECG
2355
2356
2357
2358
2359
2360
2367
2368
2369
2370



1. GND
2. OUT
3. IN

Fig. T15 • Alternate Fig. T16

TO-98

ECG
172A•
199•

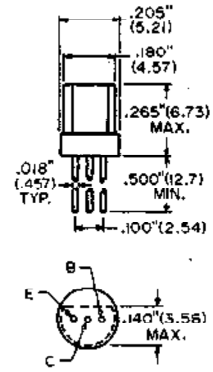


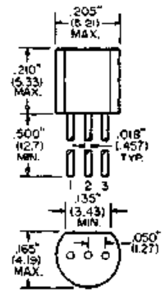
Fig. T16

TO-92

ECG	1	2	3
10	B	E	C
11	E	C	B
12	E	C	B
23	B	E	C
46	E	B	C
47	E	B	C
69	B	E	C
85	E	C	B
107	E	C	B
108	E	B	C
123AP	E	B	C
159	E	B	C
172A■	E	C	B

ECG	1	2	3
194	E	B	C
199■	E	C	B
229	B	E	C
232	E	B	C
233	E	B	C
234	E	C	B
287	E	B	C
288	E	B	C
289A	E	C	B
290A	E	C	B
312*	G	S	D
319P	B	E	C
451	D	S	G

ECG	1	2	3
453•	D	S	G
457*	D	S	G
458	D	G	S
467	D	S	G
468	D	S	G
469	D	S	G
489	D	G	S
490	D	G	S
491	S	G	D
492	D	G	S
2341	E	C	B
2342	E	C	B
2503	E	C	B

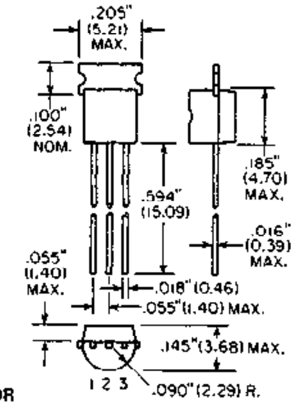


• Alternate Fig. T13-1
■ Alternate Fig. T15
* D & S Interchangeable

Fig. T17

TO-237

ECG
24*
25*
128P
129P
216
217
227
255



1. EMITTER
2. BASE
3. COLLECTOR

*1. EMITTER
2. COLLECTOR
3. BASE

Fig. T18

TO-92M

ECG	1	2	3
31	E	C	B
32	E	C	B
48	E	B	C
90	E	C	B
91	E	C	B
382	E	C	B
383	E	C	B
2363	E	C	B
2364	E	C	B

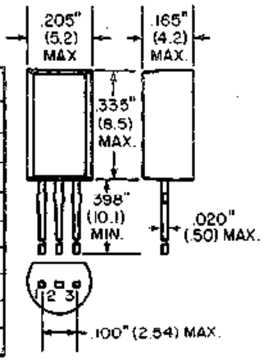


Fig. T19

SC-51

ECG
315

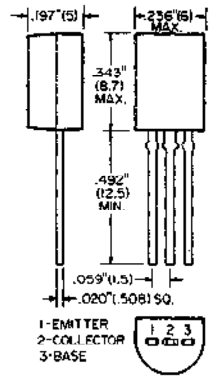


Fig. T20

T-16

ECG
293
294
297
298
340
399
2366

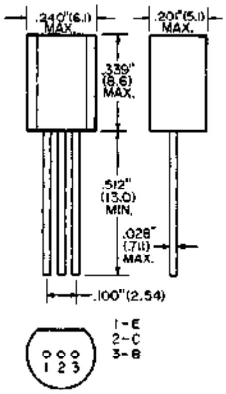


Fig. T20-1

SIP-5

ECG	1	2	3	4	5
40	B	C	E	C	B
41	B	C	E	C	B
42	B	C	E	C	B
43	B	C	E	C	B
44	E	C	B	C	E
45	E	C	B	C	E

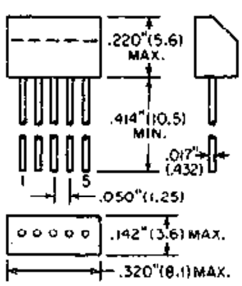
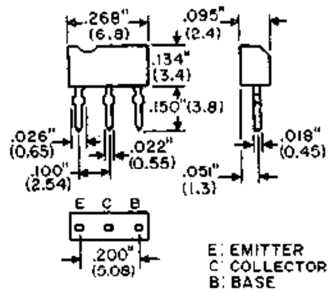


Fig. T20-2

M-68

ECG
14
15

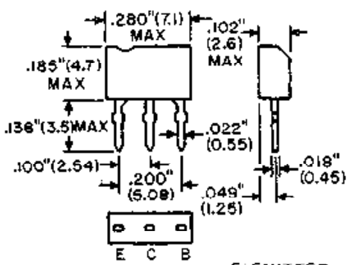


E: EMITTER
C: COLLECTOR
B: BASE

Fig. T20-3

M-71

ECG
13
16
17
18
19
20
21
22
2606



E: EMITTER
C: COLLECTOR
B: BASE

Fig. T20-4
SOT-23
ECG
2401 2411
2402 2412
2403 2413
2404 2414*
2405 2415*
2406 2416*
2407 2417*
2408 2418*
2409 2419*
2410

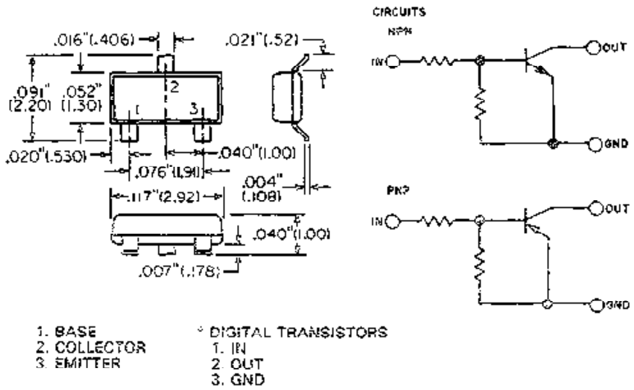


Fig. T20-5
SOT-89
ECG
2426
2427
2428
2429
2430
2431

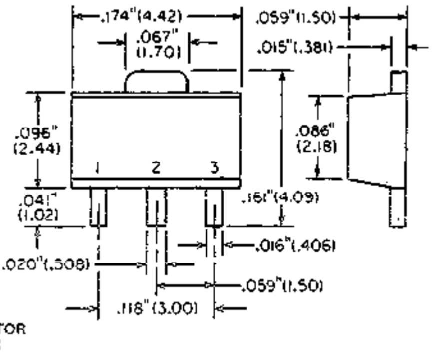


Fig. T22
T-18HS
ECG
123A

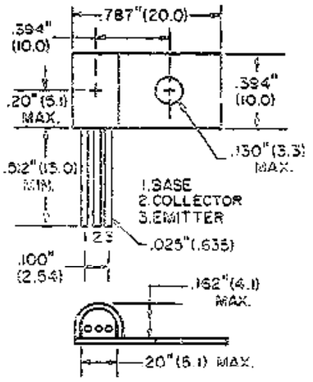


Fig. T23
TO-39F
ECG
224
225

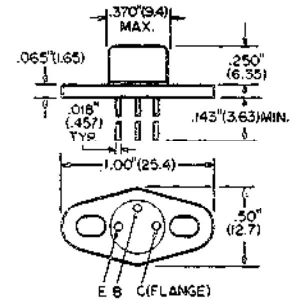


Fig. T24
TO-39HS
ECG
287

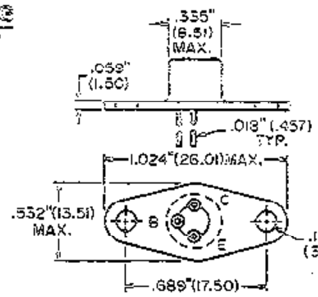


Fig. T25
TO-66
ECG
38
124
175
218
274
275
286
321
369
384

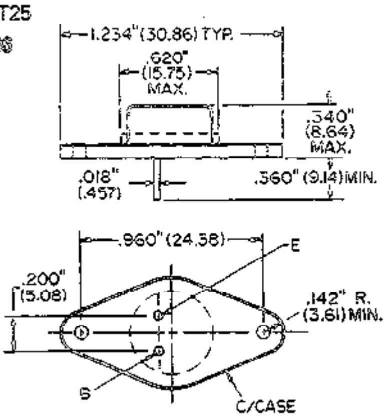


Fig. T26
TC-9A
ECG
226

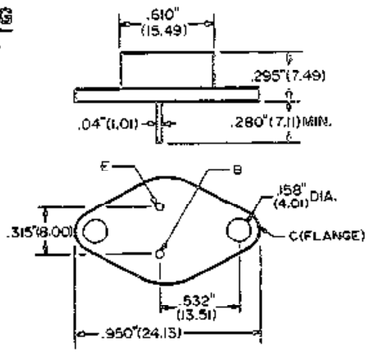


Fig. T27
TO-8
ECG
131
155

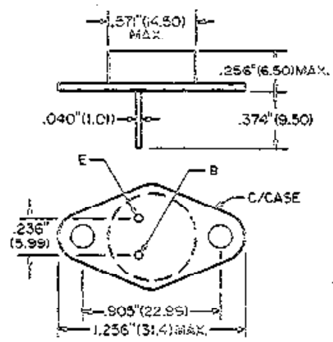
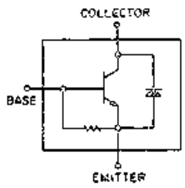
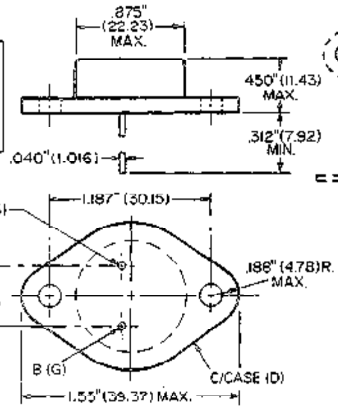


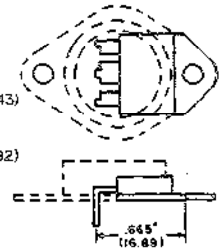
Fig. T28
TO-3
ECG
52 162 250
53 163A 251
60 164 252
61 165 283
68 180 284
86 181 285
87 219 327
89* 238 328
94 243 385
97 244 386
98 245 388
99 246 389
121 247 2319
127 248 2386◦
130 249

* Internal Circuit for ECG89
$R_{BE} \cong 27\ \Omega$





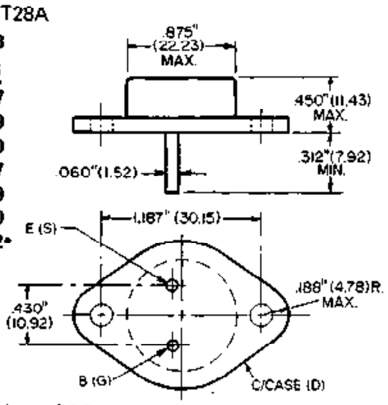
Mechanical Interchangeability of Plastic Package with TO-3 Case.



◦ Basing - SGD

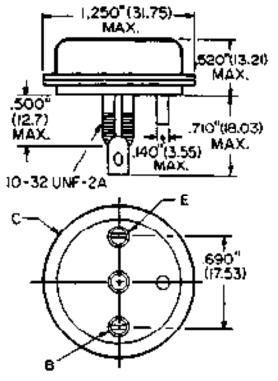
Transistor Outlines (cont'd)

Fig. T28A
TO-3
ECG
27
29
30
387
2349
2350
2392•



•Basing - SGD

Fig. T29
T0-36
ECG
105
330



* Supplied with Welded-On Wire Leads

Fig. T29A
TO-68
ECG
28

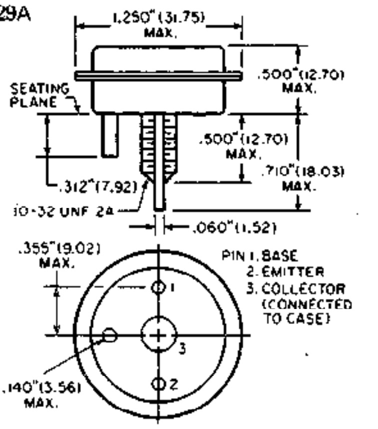
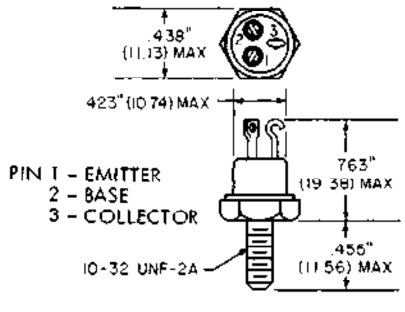


Fig. T30
TO-111
ECG
75



COLLECTOR TO STUD

Fig. T31
T0-59
Isolated Stud
ECG
96

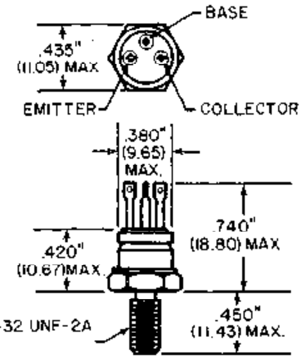
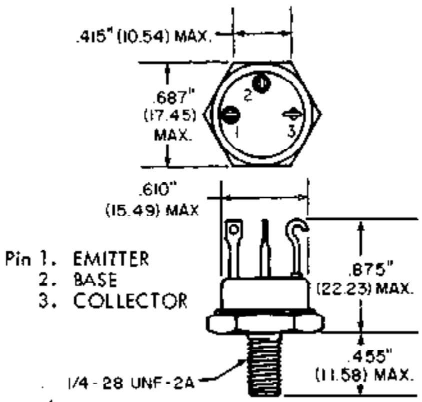


Fig. T34
TO-61
ECG
73



COLLECTOR TO STUD

Fig. T35
TO-63
ECG
70
71

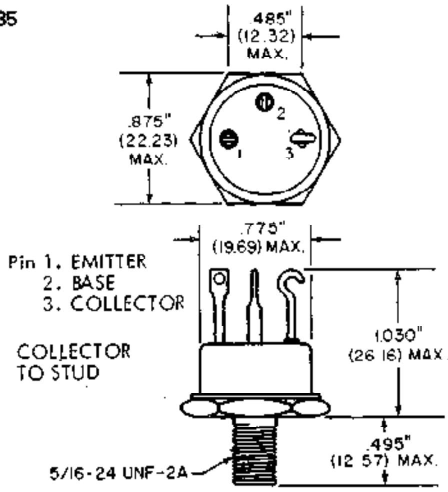


Fig. T36
T0-202N
ECG
240

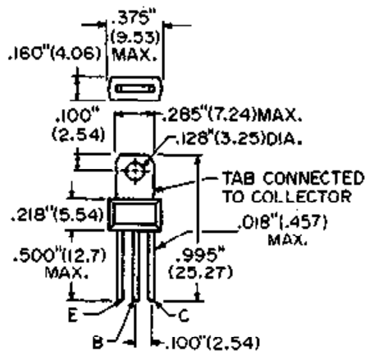


Fig. T37
TO-202J

ECG	1	2	3
80	B	C	E
302	E	B	C
306	B	C	E

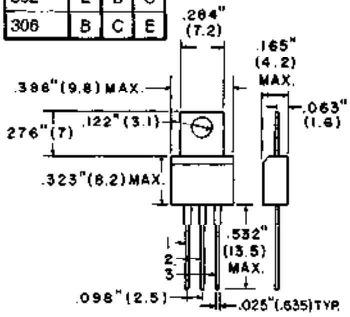


Fig. T38
TO-202

ECG	1	2	3
186, 187	B	C	E
300, 307	C	B	E

ECG	1	2	3
49, 50, 171, 210, 211, 265, 266, 267, 268, 269	E	B	C

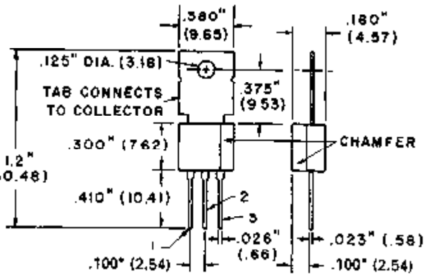
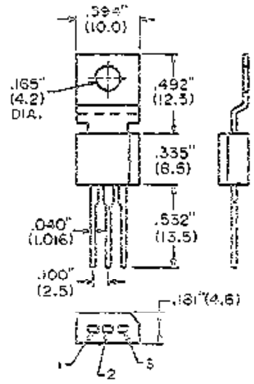


Fig. T39
TO-202M

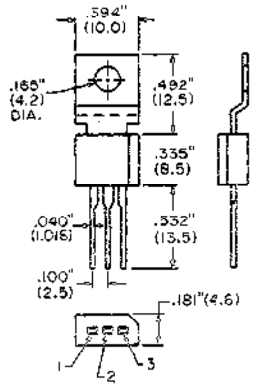
ECG
78
79
186A
187A



PIN 1 - BASE
2 - COLLECTOR
3 - EMITTER
TAB - COLLECTOR

Fig. T40
TO-202EC

ECG
474

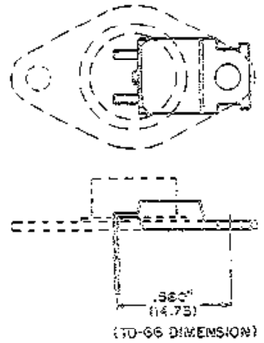


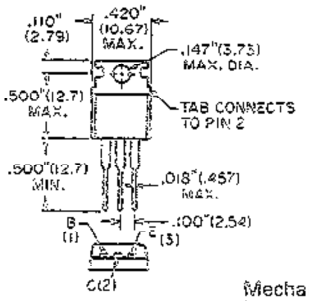
PIN 1 - BASE
2 - EMITTER, TAB
3 - COLLECTOR

Fig. T41
TO-220

ECG	263	2333	2391*
51	264	2334	2395*
54	291	2343	2396*
55	292	2344	2397*
56	331	2371*	2398*
66*	332	2372*	2399*
67*	375	2373*	2507
152	376	2374*	2545
153	377	2375*	2546
186	378	2380*	2561
187	379	2381*	2572
188	393	2382*	2581
235	2303	2383*	2900*
236	2312	2385*	2901*
241	2313	2387*	2984*
242	2315	2388*	2985*
261	2325	2389*	2986*
262	2332	2390*	2987*

* Basing - GDS





Mechanical Interchangeability of TO-220 Plastic Package with TO-66 Case - See Detailed Illustration Page 1-33.

Fig. T41-1
TO-220J

ECG	2569	2943*
2336	2570	2944*
2337	2571	2945*
2338	2574	2946*
2340	2575	2947*
2343	2576	3300†
2347	2577	3301†
2548	2578	3302†
2551	2582	3303†
2552	2583	
2553	2588	
2562	2592	
2563	2593	
2566	2940*	
2567	2941*	
2568	2942*	

*Basing - GDS
† 1. Gate
2. Collector
3. Emitter

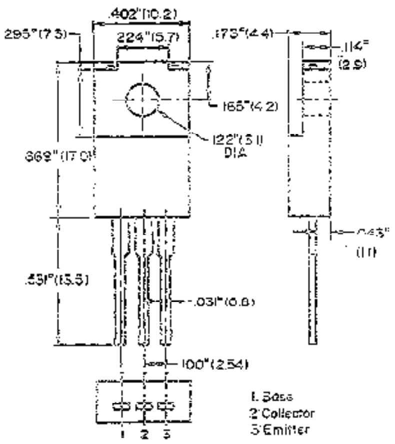


Fig. T42
TO-220EC

ECG
342
343

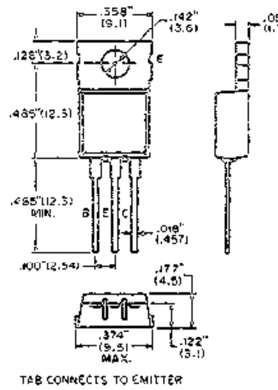
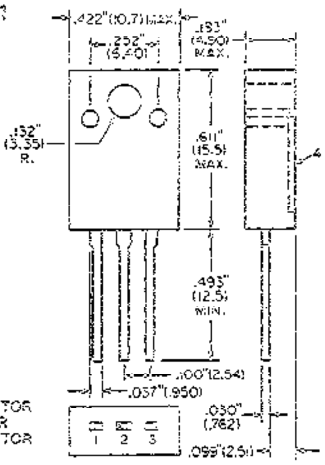


Fig. T42-1
TO-220F

ECG
2326



1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

Fig. T42-2
TO-220FM

ECG
2546
2550

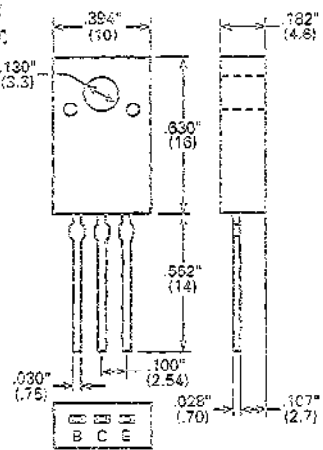
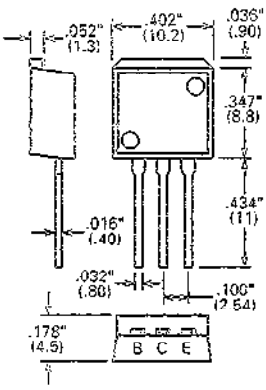


Fig. T42-3
TO-220S

ECG
2554
2555
2556
2564
2565
2572
2580
2584
2585
2586
2590
2591



Transistor Outlines (cont'd)

Fig. T43
TB-33
ECG
381

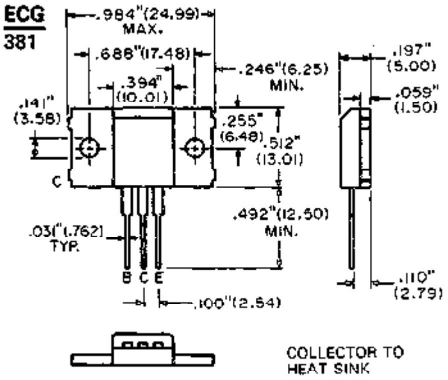


Fig. T44-1
TB-35
ECG
58
59
92
93

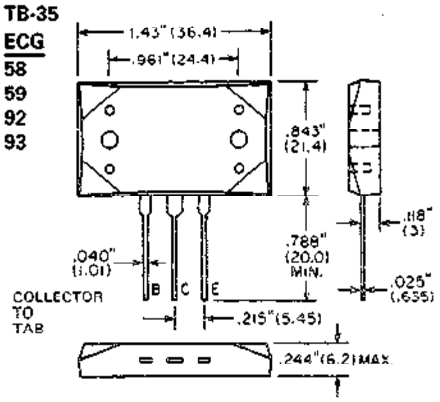


Fig. T45
TO-126
ECG
39
157
184
185
253
254
295
373
374
2327
2338
2506
2511
2512
2544

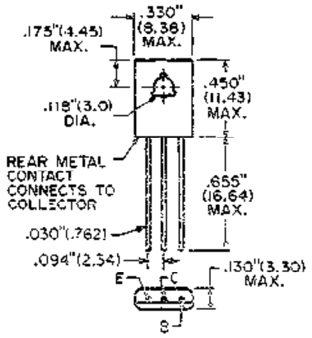


Fig. T45-1
TO-126N
ECG
2340

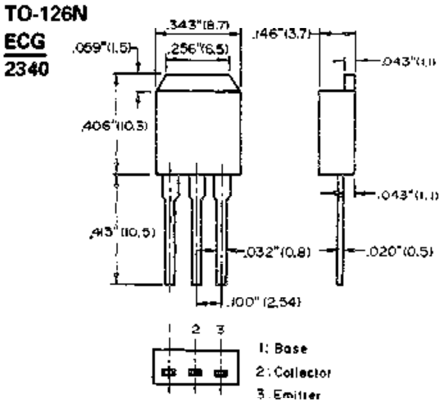


Fig. T45-2
SOT-82
ECG
2345
2346

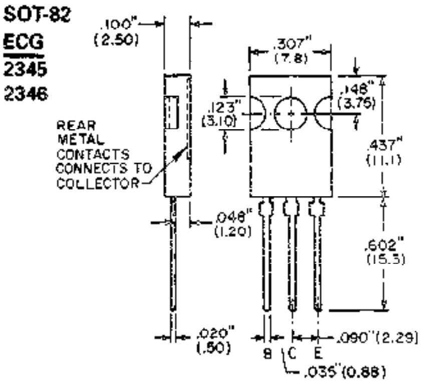


Fig. T45-3
TO-126M
ECG
2504
2513
2514
2515
2516

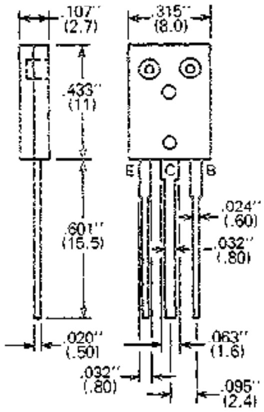


Fig. T45-4
TO-126M
ECG
2501
2502
2508
2509
2510
2517
2518
2519
2520
2521

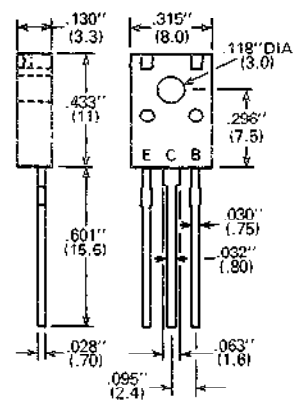
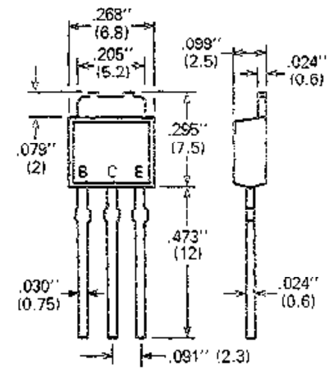


Fig. T45-5
TO-126N
ECG
2351
2352
2522
2523
2524
2525
2526
2527
2528
2529
2530
2531
2980*
2981*



*Basing - GDS

Fig. T46
TO-127
ECG
257
258
259

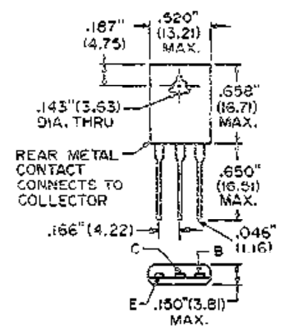
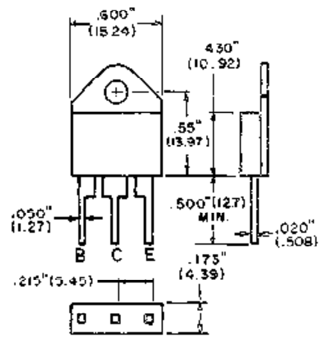
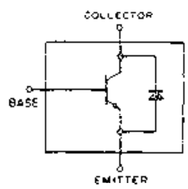


Fig. T48
TO-3P (TO-218)

ECG	**2317**
256	**2318***
270	**2393†**
271	**2394†**
390	
391	
392	
393	
394	
2300	
2301	
2305	
2306	
2310	
2311	
2316	



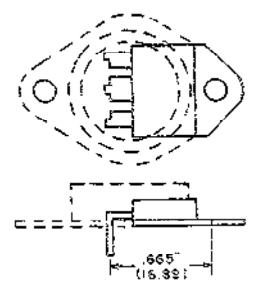


* Internal Circuit for ECG2318

Collector to Tab

†Basing — GDS

Mechanical Interchangeability of TO-218 Plastic Package with TO-3.



Transistor Outlines (cont'd)

Fig. T48-1

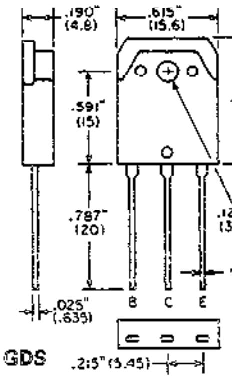
TO-3PJ

ECG	
36	2377•
37	2378
214	2534
215	2535
2302†	2536
2304	2537
2307	2539
2308	2541
2309	2542
2314	3310⊠
2324	3311⊠
2330*	3312⊠
2335	
2348	
2354	

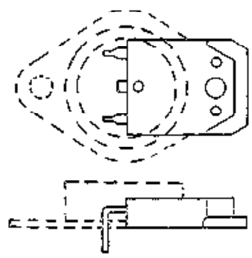
• Basing - GDS

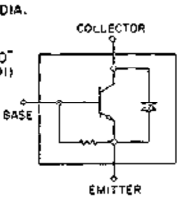
⊠ 1. Gate
2. Collector (Heat Sink)
3. Emitter

COLLECTOR TO TAB

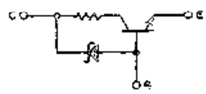


Mechanical Interchangeability of TO-3PJ Plastic Package with TO-3.





† Internal Circuit for ECG2302
RBE≅50 Ω

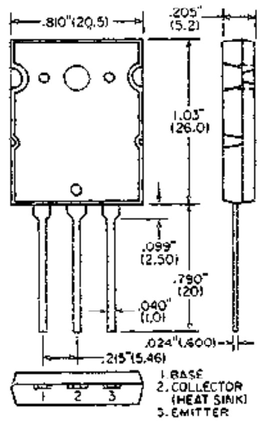


* Internal Circuit for ECG2330

Fig. T48-2

TO-3PL

ECG
2328
2329
2365
2533
2558
2596
2598
3320*
3321*
3322*
3323*

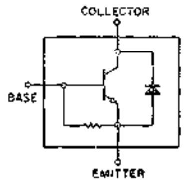


* 1. Gate
2. Collector (Heat Sink)
3. Emitter

Fig. T48-3

TO-3PM

ECG	
2331	2560
2353	2594
2538	2597
2559	



RBE≅50 Ω

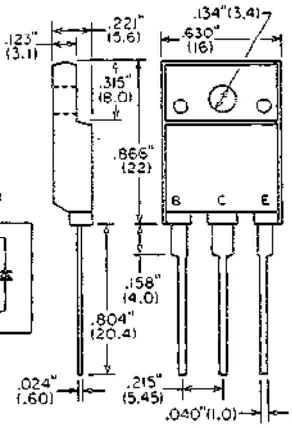
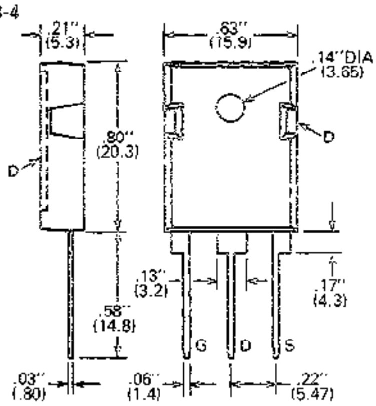


Fig. T48-4

TO-247

ECG
2375
2376
2557
2920*
2921*
2922*
2923*
2924*



*Basing - GDS

Fig. T49

RF-15

ECG
313

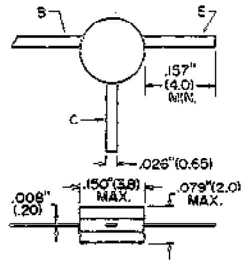


Fig. T49-2

RF-19

ECG
66

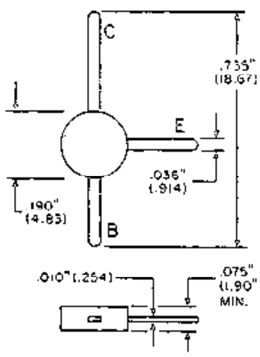


Fig. T49-3

RF-19A

ECG
63
64

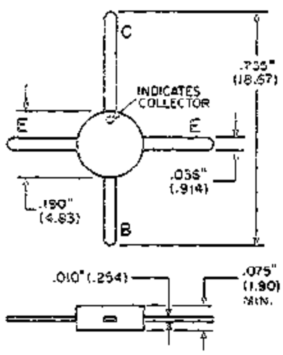


Fig. T50

TO-117

ECG
76

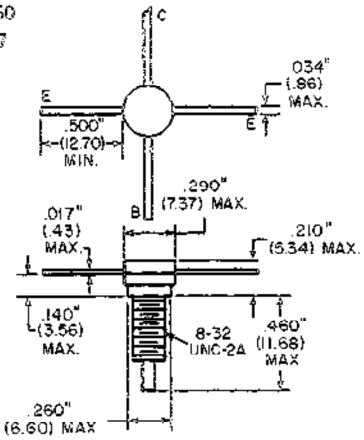


Fig. T51

RF-36SM

ECG
357

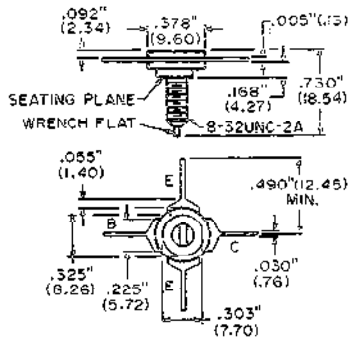


Fig. T52

RF-28S

ECG
362
363

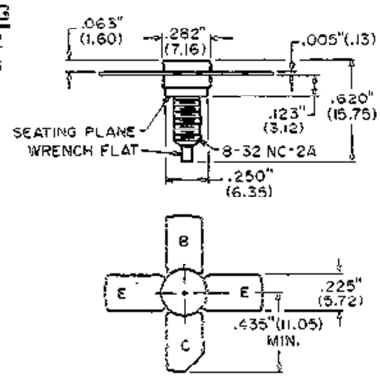


Fig. T53
RF-38S
ECG
325
334
337
338
345
348
349
350
351
359
360

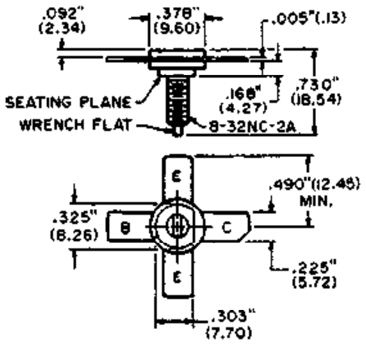


Fig. T54
RF-50S10
ECG
336
339

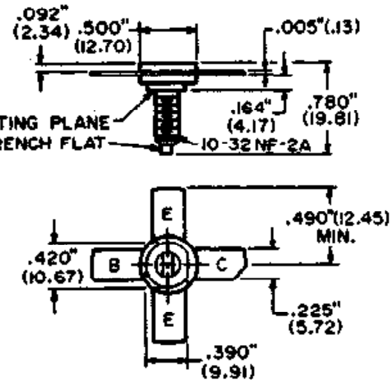


Fig. T55
RF-50SS
ECG
320

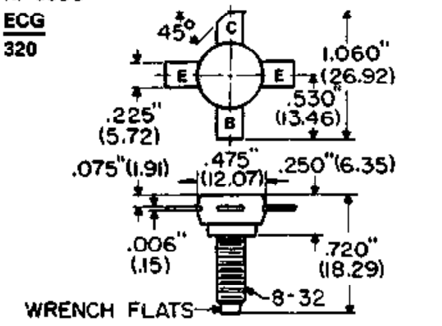


Fig. T56
TO-60
ECG
475
476

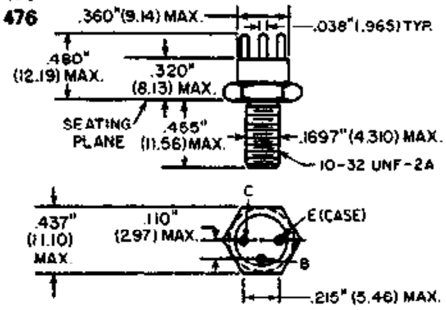


Fig. T57
RF-38F
ECG
320F
333
338F
350F
353
354
355
356

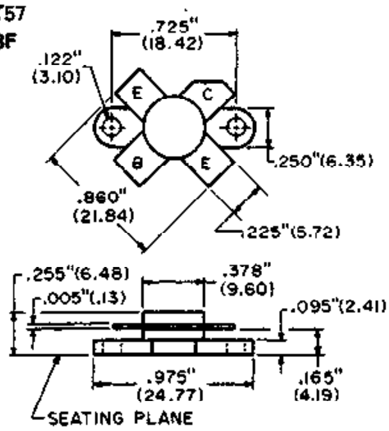


Fig. T58
RF-50F
ECG
317
318
335
470

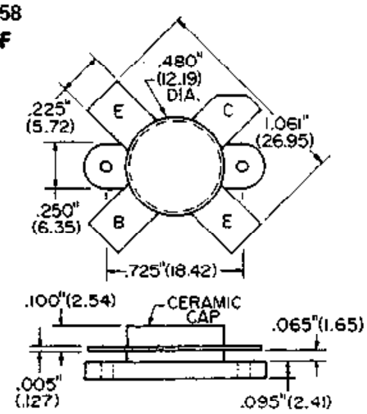


Fig. T59
RF-28F6
ECG
344

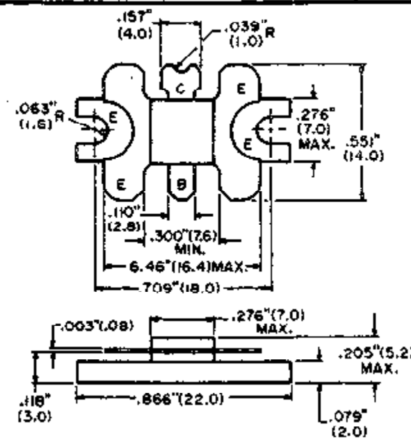


Fig. T60
RF-50F6
ECG
352
365
366
367
368
477
478
480

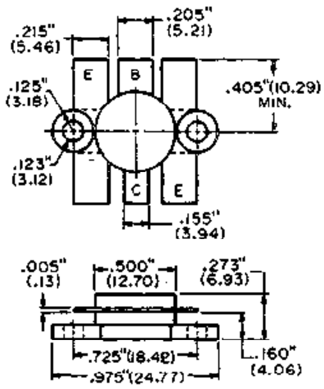


Fig. T61
RF-38F6B
ECG
481
483
484

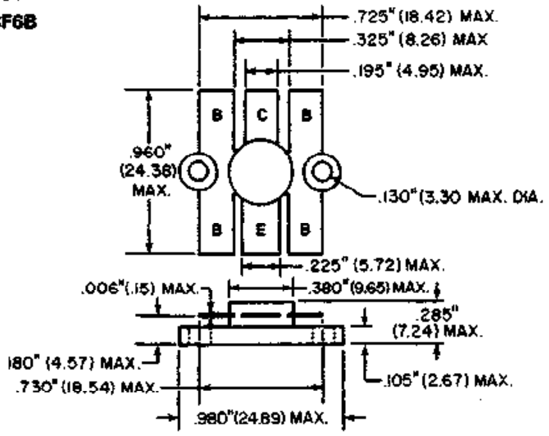


Fig. T62
RF-23F6
ECG
485

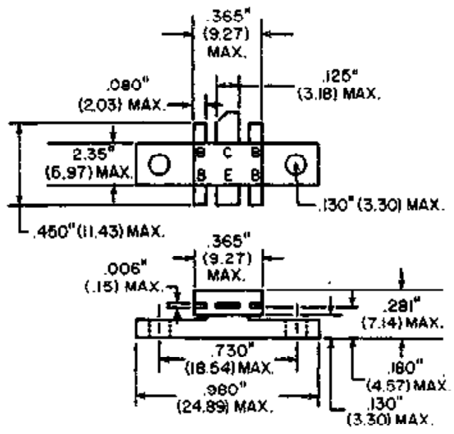


Fig. T63
RF-23FGE
ECG
482

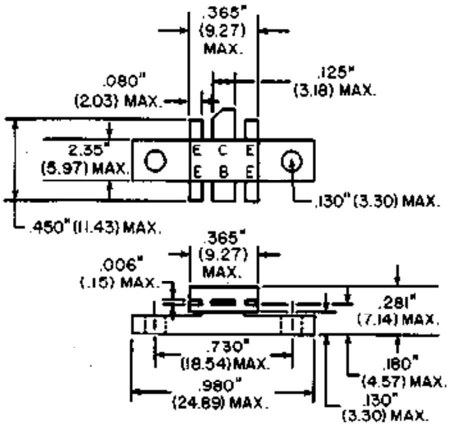


Fig. T66
14 Pin Dip
ECG
2320
2321
2322
2323

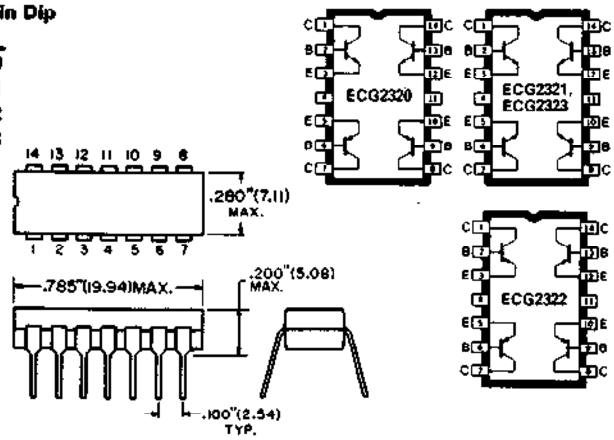
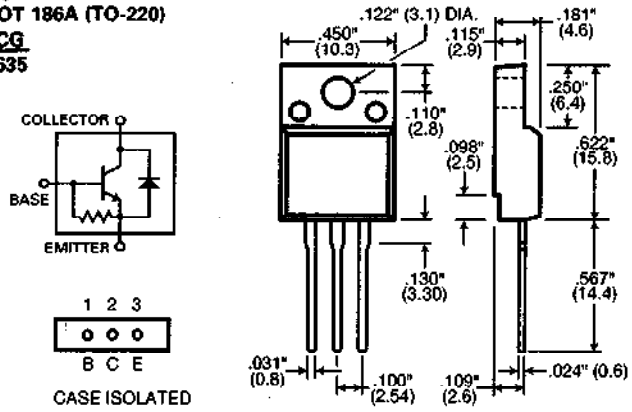


Fig. T67
SOT 186A (TO-220)
ECG
2635



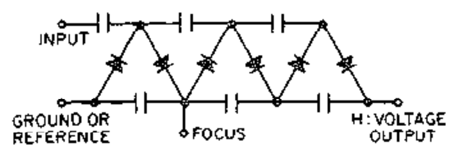
$R_{BE} \cong 33\ \Omega$

High Voltage Devices
High Voltage Multipliers

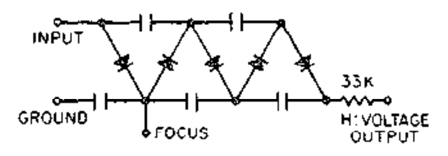
ECG Type	Max KV Output	Input KV Peak to Peak	Output Lead Length	Description	Ckt. Diag.	Fig. No.
ECG500A	30 at 2 mA	12	27 In.	6 Step Silicon Tripler with Focus Tap	A	H3
ECG501B	27 at 1.5 mA	10	27.5 In.	5 Step Silicon Tripler with Focus Tap	B	H1
ECG521	30 at 2 mA	12	19 In.	6 Step Silicon Tripler with Focus Tap	C	H4
ECG522	30 at 2 mA	12	29 In.	5 Step Silicon Tripler with Focus Tap	D	H3
ECG523/ 3306	30 at 2 mA	12	26 In.	5 Step Silicon Tripler - Internal Focus Divider Network	E	H10
ECG526A	30 at 2 mA	12	26 In.	5 Step Silicon Tripler - Internal Focus Divider Network	F	H10
ECG528	30 at 2 mA	12	16.5 In.	6 Step Silicon Tripler - Internal Focus Divider Network	G	H19
ECG529	30 at 2 mA	12	30 In.	5 Step Silicon Tripler with Damper Diode - Internal Focus Divider Network	H	H10
ECG530	30 at 2 mA	12	30 In.	6 Step Silicon Tripler - Internal Focus Divider Network	I	H10
ECG531	30 at 2 mA	12	24 In.	6 Step Silicon Tripler with Resistor to Focus Tap	J	H7
ECG532	30 at 2 mA	12	24 In.	6 Step Silicon Tripler with Resistor to Focus Tap	K	H7
ECG533	30 at 2 mA	12	25 In.	5 Step Silicon Tripler with Damper Diode and Resistor to Focus Tap	L	H7
ECG534	30 at 2 mA	12	26 In.	5 Step Silicon Tripler with Damper Diode	M	H5
ECG535	30 at 2 mA	12	30 In.	5 Step Silicon Tripler with Damper Diode and Bleeder Resistor	N	H11
ECG536A	30 at 2 mA	8	12 In.	8 Step Silicon Quadrupler with Focus Tap	O	H8
ECG537	30 at 2 mA	12	24 In.	5 Step Silicon Tripler with Damper Diode and Resistor to Focus Tap	P	H7
ECG538	30 at 2 mA	12	21 In.	5 Step Silicon Tripler with Damper Diode and Focus Tap	Q	H2
ECG539	30 at 2 mA	12	21 In.	5 Step Silicon Tripler with Damper Diode and Focus Tap	R	H1
ECG549	30 at 2 mA	12	18.5 In.	5 Step Silicon Tripotential Tripler with Damper Diode	S	H14
ECG550	30 at 2 mA	8	25 In.	7 Step Silicon Quadrupler with Damper Diode	T	H6
ECG556	30 at 2 mA	12	27 In.	5 Step Silicon Tripler with Damper Diode and Internal Focus Divider Network	V	H10
ECG557	30 at 2 mA	12	27 In.	5 Step Silicon Tripler with Damper Diode and Internal Focus Divider Network	W	H10
ECG559	28 at 2 mA	12	22 In.	5 Step Silicon Tripotential Tripler	X	H15
ECG560	30 at 2 mA	12	22 In.	5 Step Silicon Tripler with Internal Focus Divider Network	Y	H17
ECG561	28 at 2 mA	12	22 In.	5 Step Silicon Tripler with Damper Diode and Internal Focus Divider Network	Z	H18
ECG562	28 at 2 mA	12	22 In.	5 Step Silicon Tripotential Tripler with Damper Diode	AA	H16
ECG564	21 at 1.5 mA	8	12.5 In.	5 Step Silicon Tripler with Internal Focus Divider Network	AC	H12
ECG565	30 at 2 mA	12	Plug-in	5 Step Silicon Tripler with Damper Diode and Bleeder Resistor	AD	H13

HV Multiplier Circuits

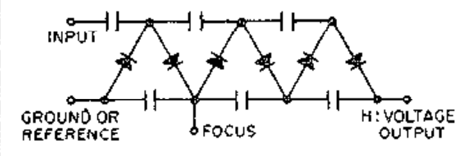
Ckt. A **ECG500A**



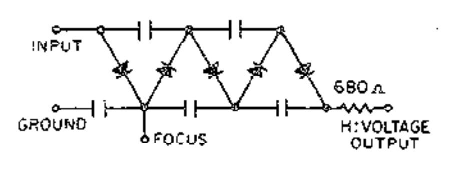
Ckt. B **ECG501B**



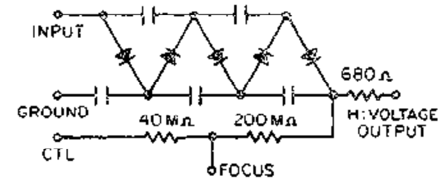
Ckt. C **ECG521**



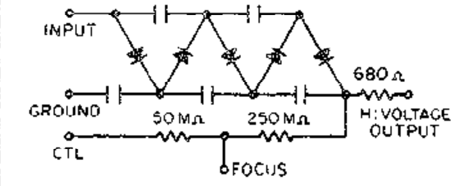
Ckt. D **ECG522**



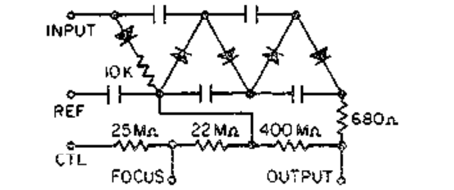
Ckt. E **ECG523/3306**



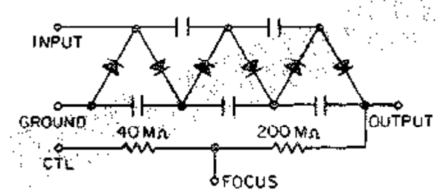
Ckt. F **ECG526A**



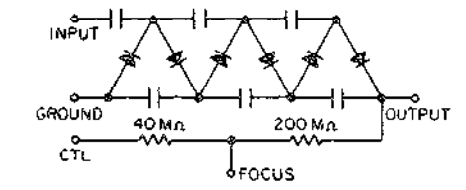
Ckt. G **ECG528**



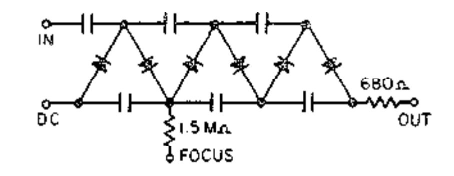
Ckt. H **ECG529**



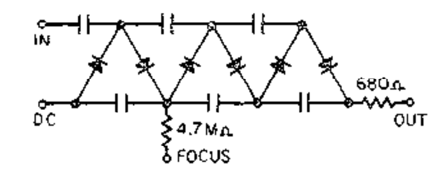
Ckt. I **ECG530**



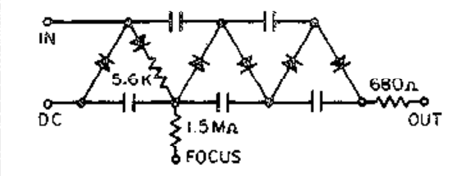
Ckt. J **ECG531**



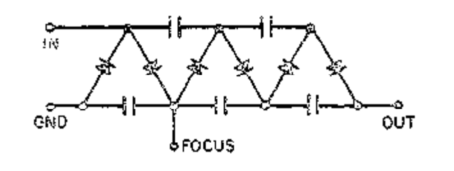
Ckt. K **ECG532**



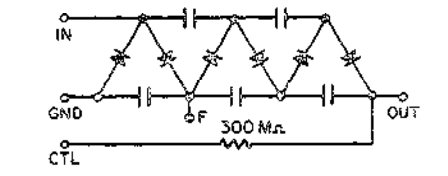
Ckt. L **ECG533**



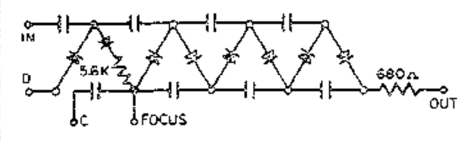
Ckt. M **ECG534**



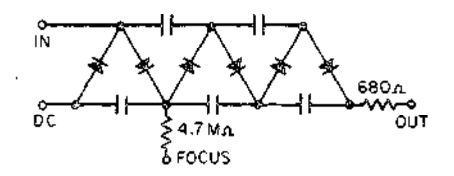
Ckt. N **ECG535**



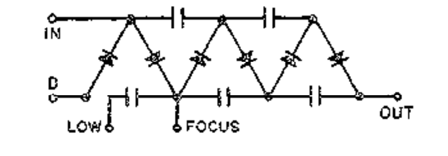
Ckt. O **ECG536A**



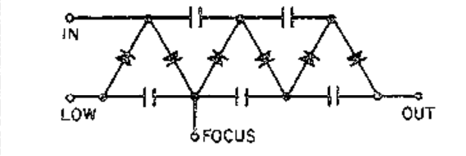
Ckt. P **ECG537**



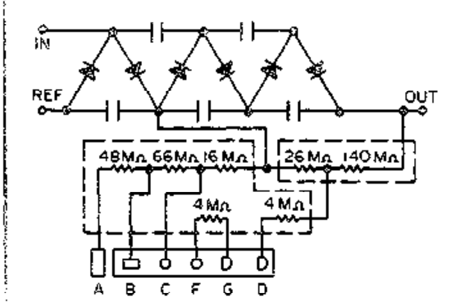
Ckt. Q **ECG538**



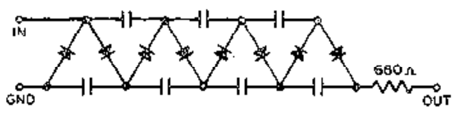
Ckt. R **ECG539**



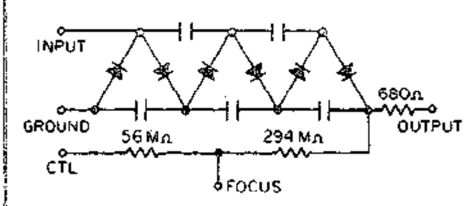
Ckt. S **ECG549**



Ckt. T **ECG550**



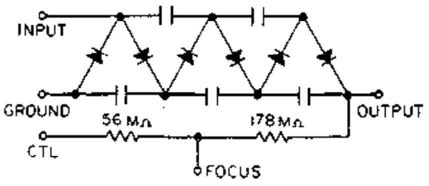
Ckt. V **ECG556**



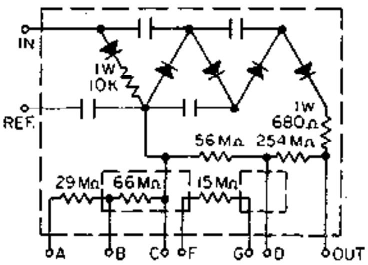
E

HV Multiplier Circuits (cont'd)

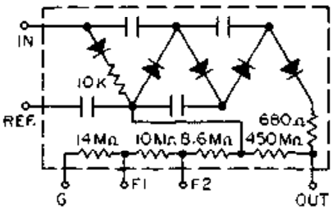
Ckt. W — ECG557



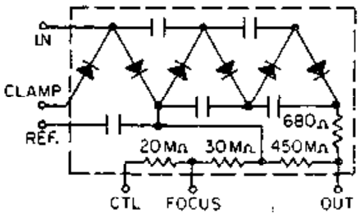
Ckt. X — ECG559



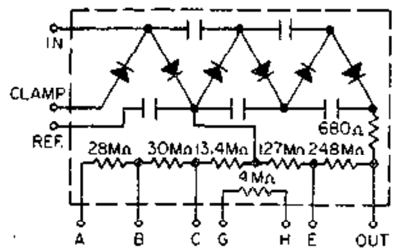
Ckt. Y — ECG560



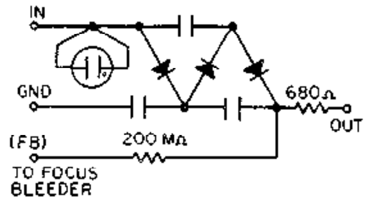
Ckt. Z — ECG561



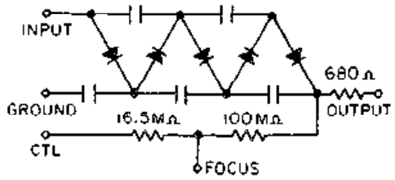
Ckt. AA — ECG562



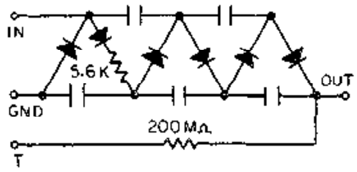
Ckt. AB — ECG563



Ckt. AC — ECG564



Ckt. AD — ECG565



HV Multiplier Outlines

Fig. H1

ECG
501B
539

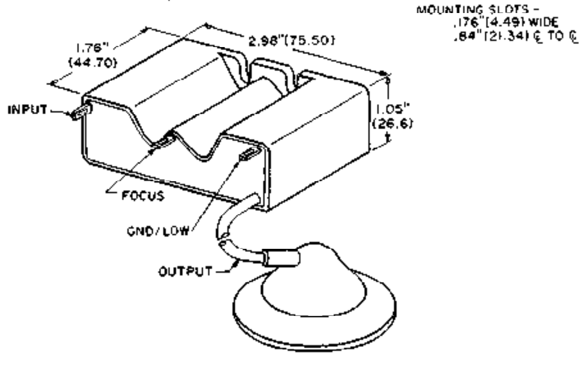
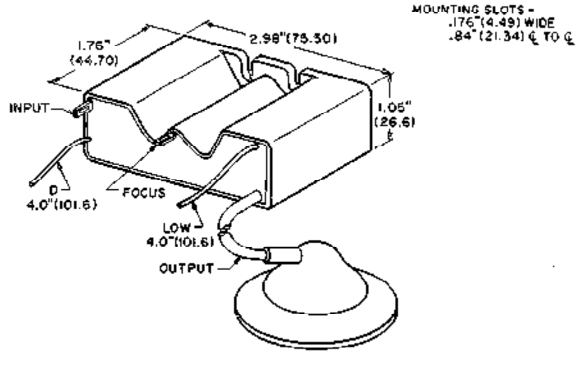


Fig. H2

ECG538



HV Multiplier Outlines (cont'd)

Fig. H3
ECG
500A
522

MOUNTING SLOTS – .187" WIDE .406" LONG 3.375" ℄ to ℄

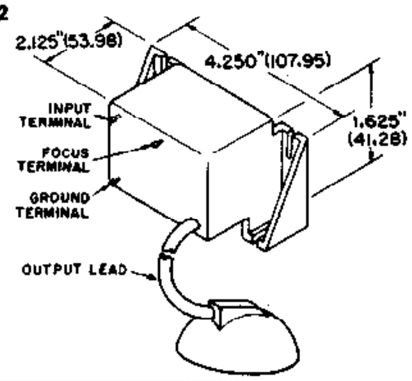


Fig. H4
ECG621

MOUNTING SLOTS – 4.8 WIDE 10.3 LONG 78.7 ℄ to ℄

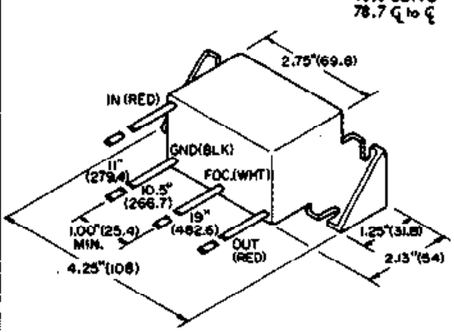


Fig. H5
ECG534

MOUNTING SLOTS – .19"(4.83) WIDE 3.38"(85.85) ℄ TO ℄

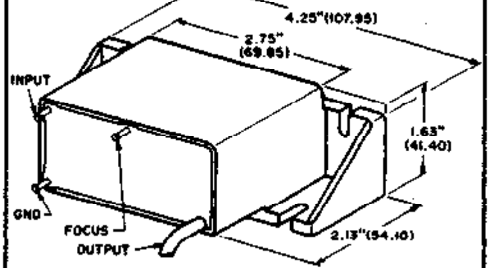


Fig. H6
ECG550

MOUNTING SLOTS .19" (4.83) Wide .40" (10.2) Long 3.38" (85.8) ℄ to ℄

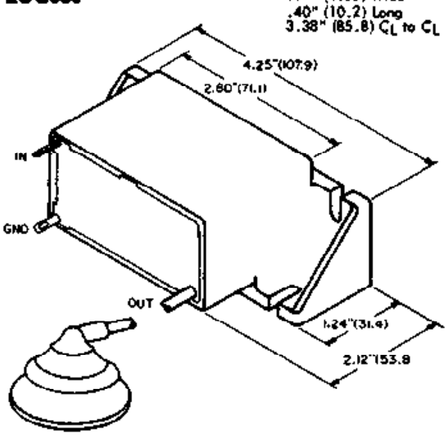


Fig. H7
ECG
531
532
533
537

MOUNTING HOLES – .19"(4.83) DIA. .19"(4.83) X .25"(6.35) 3.375"(85.7) ℄ TO ℄

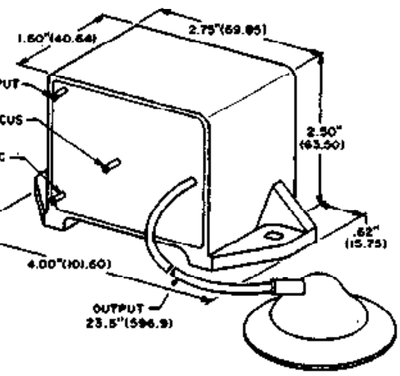


Fig. H8
ECG536A

MOUNTING HOLES – .19"(4.83) DIA. .19"(4.83) X .25"(6.35) 3.375"(85.7) ℄ TO ℄

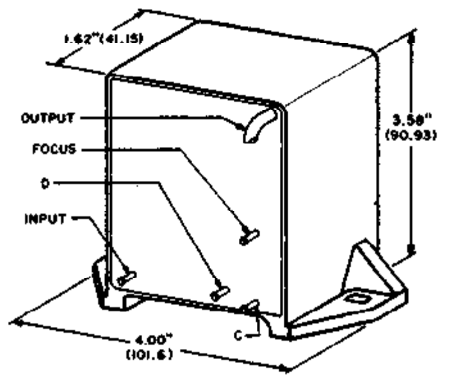
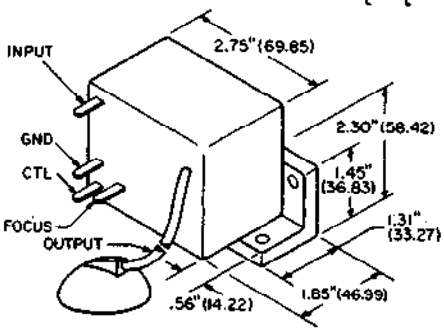


Fig. H9
ECG523/3306•

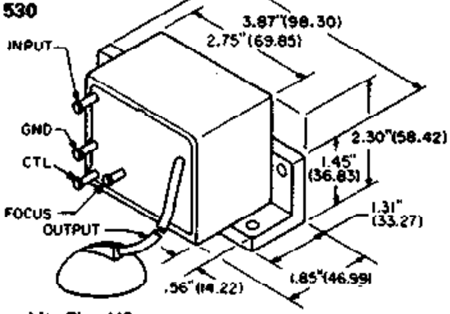
MOUNTING HOLES – .19" (4.83) x .25" (6.35) 3.39" (86.11) ℄ to ℄



• Alt. Fig. H10

Fig. H10
ECG
523/3306• 556
526A 557
530

MOUNTING HOLES – .19"(4.83) DIA. 3.38"(85.85) ℄ TO ℄



• Alt. Fig. H9

Fig. H11
ECG535

MOUNTING HOLES – .19"(4.83) DIA. 3.38"(85.85) ℄ TO ℄

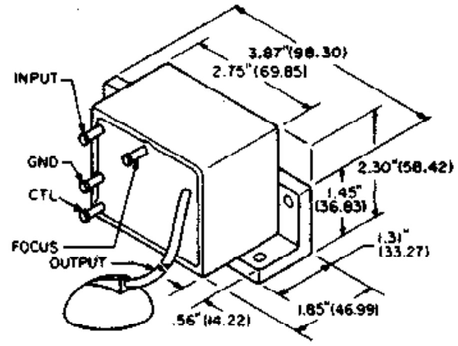


Fig. H12
ECG564

MOUNTING HOLES – .19"(4.83) DIA. 3.38"(85.85) ℄ TO ℄

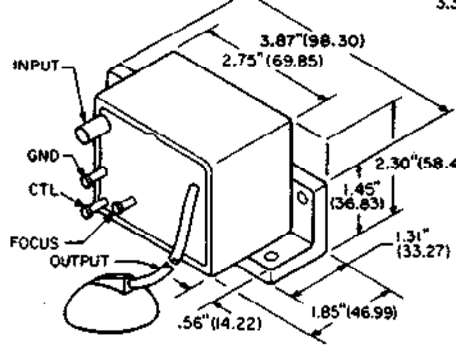
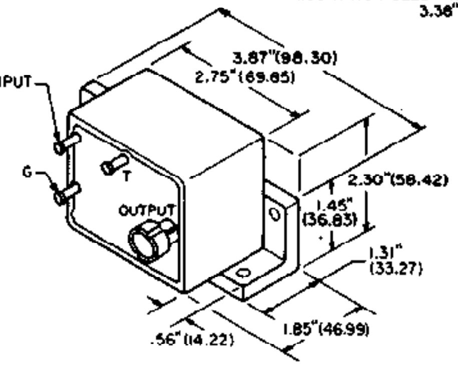


Fig. H13
ECG
565

MOUNTING HOLES – .19"(4.83) DIA. 3.38"(85.85) ℄ TO ℄



E

Fig. H14
ECG 549

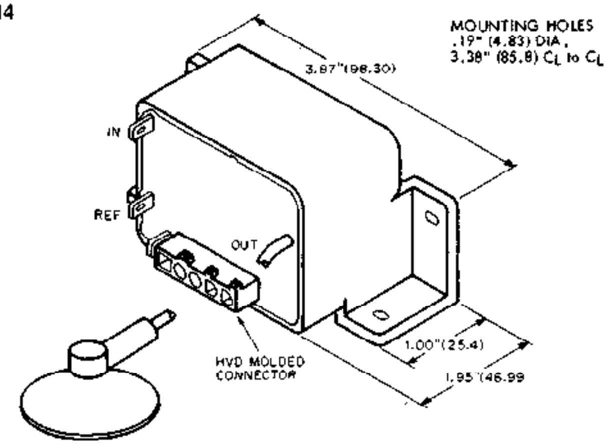


Fig. H15
ECG559

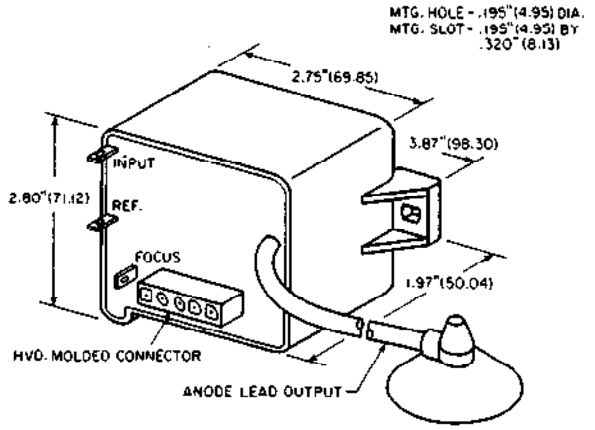


Fig. H16
ECG562

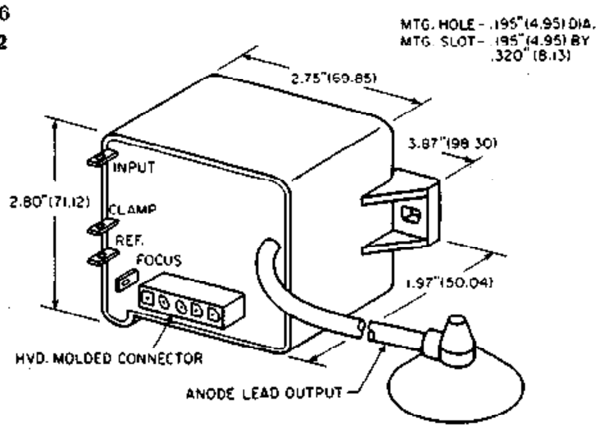


Fig. H17
ECG560

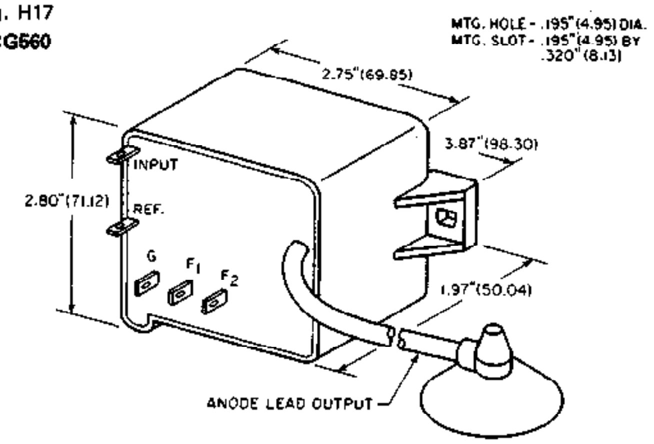


Fig. H18
ECG561

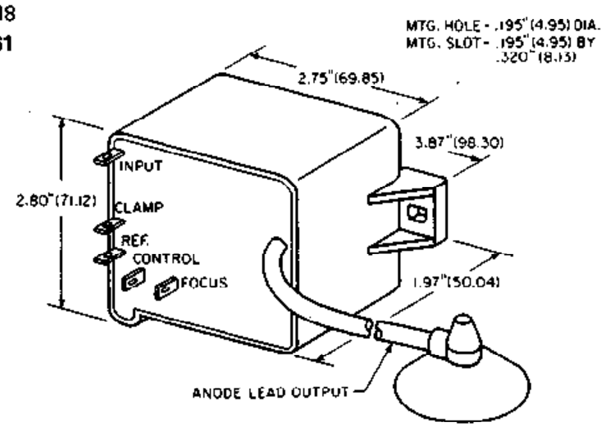
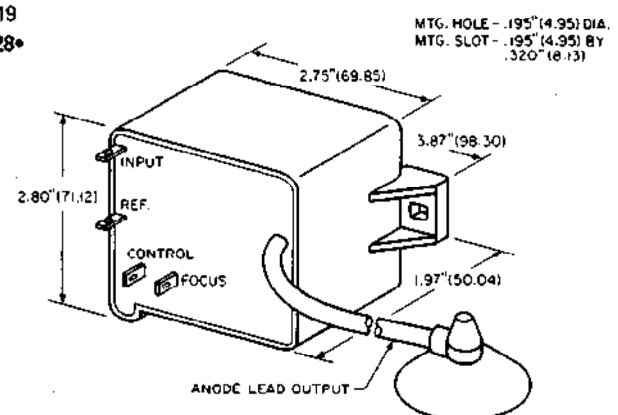
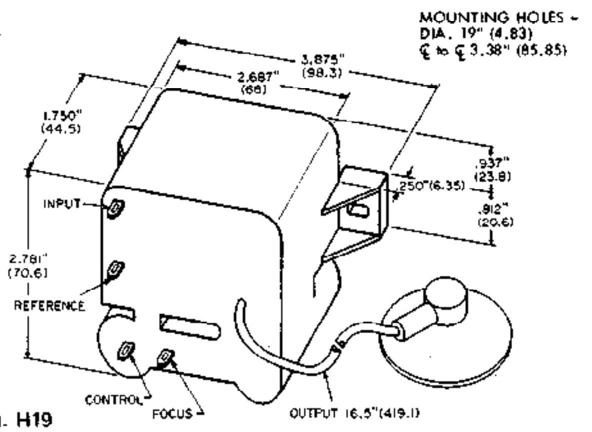


Fig. H19
ECG528•



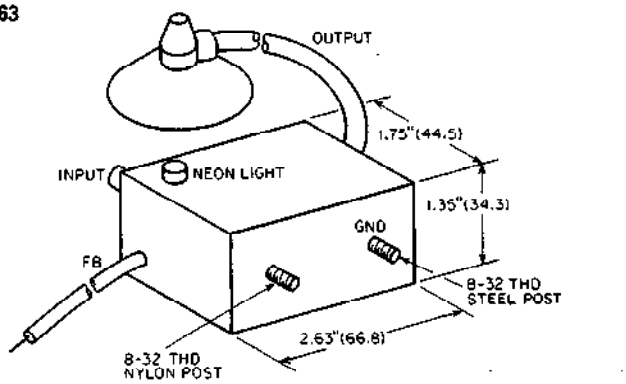
• Alt. Fig. H20

Fig. H20
ECG528•



• Alt. Fig. H19

Fig. H21
ECG563



HV Dividers/Focus Assemblies

ECG Type	Application and Description	Outline No.
HiDiv*-1 DISCONTINUED	Resistive High Voltage Divider Assembly: 240 Megohms, tapped at 40 Megohms; Total Dissipation - 4 Watts; 35 KV max.	H22
HiDiv-2	Resistive High Voltage Divider Assembly: 300 Megohms, tapped at 50 Megohms; Total Dissipation - 4 Watts; 35 KV max.	H22
HiDiv-3 DISCONTINUED	Resistive High Voltage Divider Assembly: 240 Megohms, tapped at 40 Megohms; Total Dissipation - 4 Watts; 35 KV max.	H23
HiDiv-4 DISCONTINUED	Resistive High Voltage Divider Assembly: 300 Megohms, tapped at 50 Megohms; Total Dissipation - 4 Watts; 35 KV Max.	H24
HiDiv-12	Resistive High Voltage Divider Assembly: 300 Megohms, tapped at 50 Megohms; Total Dissipation - 4 Watts; 35 KV max.	H25

* Trademark of Philips ECG

Fig. H22
HiDiv-2

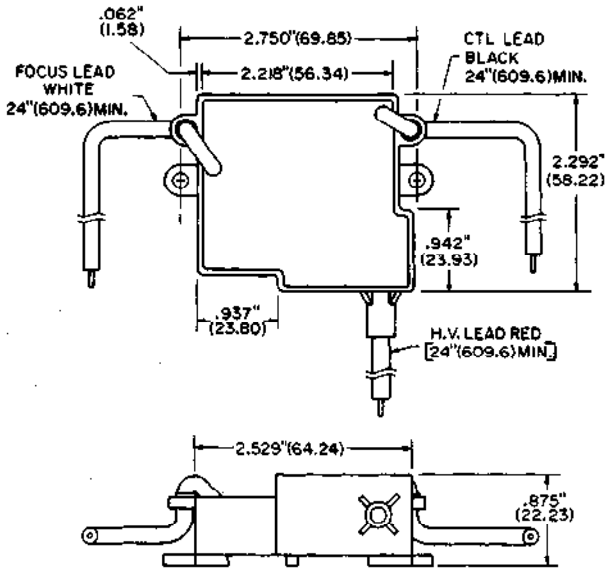
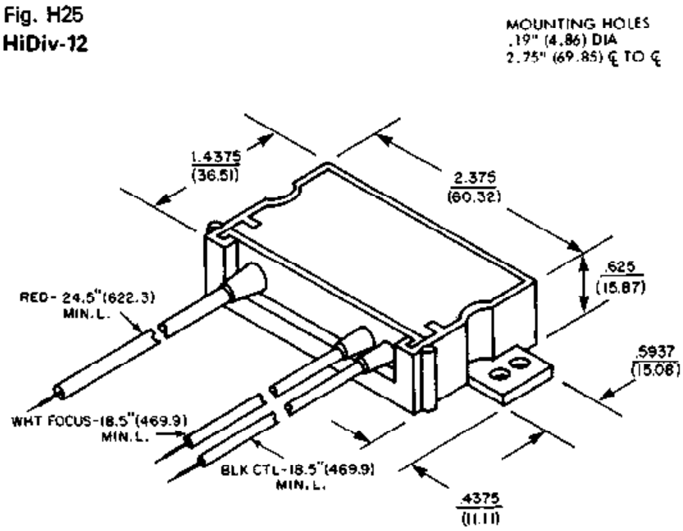


Fig. H25
HiDiv-12



HV Rectifiers (Silicon Industrial/Microwave Oven)

ECG Type	Minimum Breakdown Voltage V_B	Maximum Surge Current (Nonrep.) I_{FSM} A	Average Output Current I_O mA	Maximum Forward Voltage Drop V_{FM} V	Maximum Reverse Leakage Current I_{RM} µA	Fig. No.
ECG517	15kV at 1 µA	30	350 at TA 55°C	14 at 350 mA	5.0 at 10.5 kV	H49A
ECG542	15 kV at 10 µA	50	350 at TA 50°C	13.5 at 350 mA	1.0 at 12 kV	H28
ECG548	12 kV at 100 µA	250	750 at TC 50°C	14 at 750 mA	1.0 at 10 kV	H34

Fig. H28
ECG542

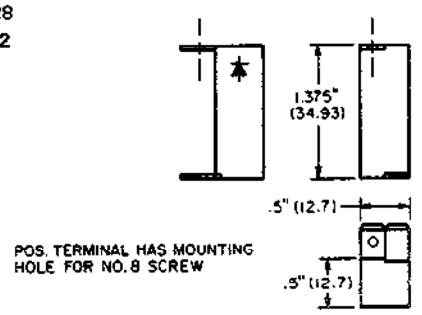


Fig. H34
ECG548

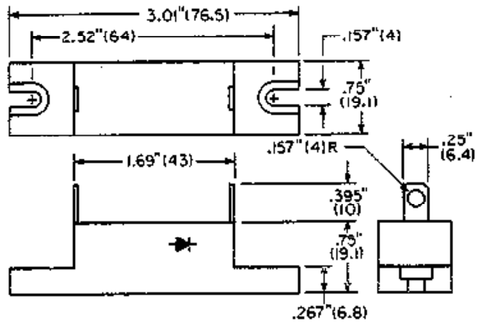
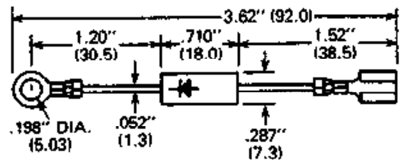


Fig. H49A
ECG517



HV Rectifiers (Solid State Replacement for TV)

ECG Type	Application Replaces Following Tube Types:	Peak Reverse Volts	Peak Repetitive Forward Current (mA)	Average Forward Current I_F (mA)	Forward Voltage Drop V_F (V)	Fig. No.
ECG509/R-3AT2	3AT2, 3AW2, 3BL2, 3BM2, 3BN2	45,000	110	5	50 at 5 mA	H35
ECG510/R-3DB3	3CY3, 3DB3, 3DJ3	45,000	110	5	50 at 5 mA	H35
ECG511/R-2AV2	1AU2, 1V2, 2AV2	9,000	100	5	20 at 5 mA	H36
ECG512/R-6DW4	6BA3, 6BH3, 6BS3, 6CH3, 6CJ3, 6CK3, 6CL3, 6CM3, 6DW4	3,000	1300	250	10 at 350 mA	H37
ECG514/R-3DS3	3DR3, 3DS3	45,000	110	5	50 at 5 mA	H35

Fig. H35 ECG509, ECG510

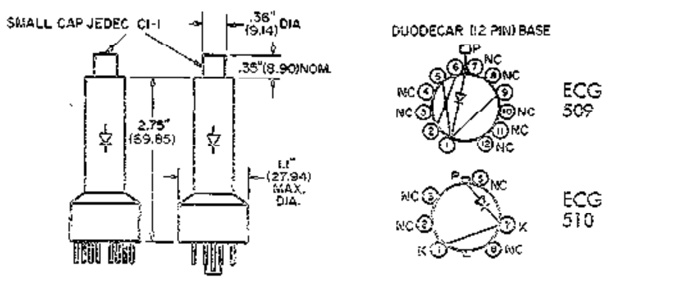
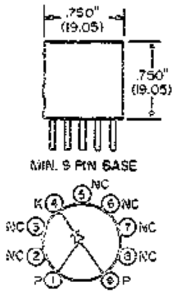
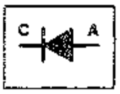


Fig. H36 ECG511





HV Rectifiers (Selenium)

ECG Type	Description and Application	Limit Conditions: PRV No-Load	Limit Conditions: Peak Input Pulse Volts	Operating Conditions: DC Output Volts	Operating Conditions: Peak Input Pulse Volts	Operating Conditions: Forward Current 60°C Max I_F (mA)	Operating Conditions: Forward Voltage Drop V_F (VDC)	Fig. No.
ECG118	TV HV Focus Rect	7,600	9,000	6,500	7,800	0.5	130 at 0.5 mA	H38
ECG119	TV HV Boost Rect	560	827	--	550	2.2	12 at 2.5 mA	H39
ECG502	TV HV Rect	12,400	14,500	11,000	13,200	0.5	220 at 2.5 mA	H40
ECG503	TV HV Rect	14,400	17,300	13,000	15,600	0.5	260 at 2.5 mA	H41
ECG504	TV HV Rect	19,500	23,400	18,000	21,600	0.5	360 at 3 mA	H42
ECG505	TV HV Rect	21,400	25,400	20,000	24,000	0.5	400 at 3 mA	H43

Fig. H39 ECG119

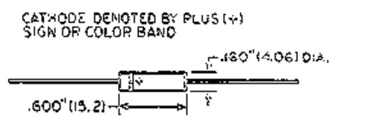


Fig. H40 ECG502

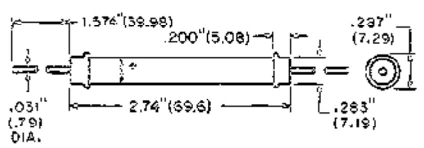


Fig. H41 ECG503

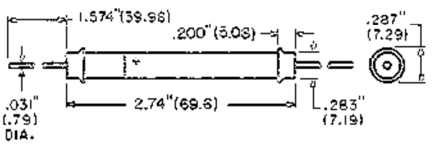


Fig. H42 ECG504

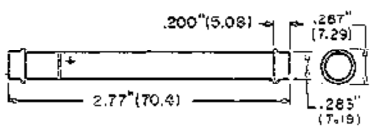
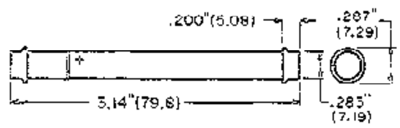


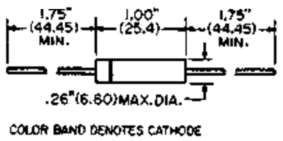
Fig. H43 ECG505



HV Rectifiers (Silicon)

ECG Type	Application	Peak Reverse Volts	Peak Repetitive Forward Current (mA)	Average Forward Current I_F (mA)	Forward Voltage Drop V_F	Fig. No.
ECG518	TV HV Rect	10,000	---	5	20 V at 5 mA	H45
ECG527A	TV HV Rect	35,000	100	2.2	60 V at 10 mA	H47

Fig. H45 **ECG518**



Diodes and Rectifiers (General Purpose)

ECG Type	Description		Peak Reverse Voltage PRV Max V	Average Rectified Forward Current I_o Max	Forward Current Repetitive Peak I_{FRM} Max	Reverse Recovery Time t_{rr}	Forward Voltage Drop Max V_F	AFC	Fast Sw	Gen Purp	Fast Recovery	Fig. No.
ECG109	Gen Purp	Ge	100	200 mA	—	—	—			●		Z2
ECG110A	Gen Purp	Ge	40	50 mA	150 mA	—	—			●		Z2
ECG110MP	Matched Diode Pair	Ge	30	15 mA at 60°C	—	—	—	●		●		Z2
ECG112	UHF Mixer (Schottky)	Si	5	25 mA	—	—	.5 at 60 mA					Z4
ECG113A	Common Cathode Dual Diode, CenterTap TV Horiz	Si	100	1.5 A	—	—	0.95 V at 1 A	●		●		Z15
ECG114	Series Dual Diodes, TV Horiz	Se	20	min 1.1 mA	—	—	—	●		●		Z12
ECG115	Common Anode, Dual Diode, TV Horiz AFC	Se	20	min 1.1 mA	—	—	—	●		●		Z12
ECG116	Gen Purp Rect	Si	600	1 A	—	—	0.8 V at 1 A			●		Z3
ECG120	Color TV Convg Rect	Se	18	65 mA	—	—	—			●		Z17
ECG125	Gen Purp Rect	Si	1000	2.5 A at 25°C Lead Temp	—	—	1.1 V at 1 A			●		Z3
ECG156	Gen Purp Rect	Si	1000	3 A	—	—	1.1 V at 1.5 A			●		Z6
ECG177	Fast Sw, Det, etc.	Si	200	160 mA	250 mA	50 ns	1.0 V at 100 mA		●			Z4
ECG178MP	Matched Diode Pair, AFC, AFT, etc	Si	50	75 mA	100 mA	—	1.0 V at 5 mA	●				Z5
ECG506	Sw, Fast Recovery, Bst Damp, Blanking	Si	1400	2 A	3.5 A	500 ns	1.0 V at 1 A		●		●	Z6
ECG507	Gen Purp Rect, Gating, Centering	Si	50	250 mA	—	3 µs	1.0 V at 1 A			●		Z6
ECG515	Sw, Fast Recovery, SCR Defl Cla	Si	800	3 A	9 A	1.3 µs	1.3 V at 4 A		●		●	Z8
ECG519	Fast Sw Diode	Si	100 (BRV)	200 mA	450 mA	4 ns	1.0 V at 10 mA		●			Z4
ECG525	Sw, Fast Recovery, Damp	Si	2000	1 A	—	500 ns (Fwd Rec)	2 V at 2 A		●		●	Z6A
ECG552	Gen Purp Rect, Fast Recovery	Si	600	1 A	—	200 ns	1.5 V at 250 mA		●	●	●	Z3
ECG558	Gen Purp Rect, Fast Recovery, HV	Si	1500	1 A	—	250 ns	1.2 V at 1 A		●	●	●	Z3
ECG569	Fast Sw, Soft Recovery	Si	600	3 A	100 A	200 ns	1.1 V at 3 A		●	●	●	Z6A
ECG571	Fast Sw, Soft Recovery	Si	1000	3 A	—	100 ns	1.5 V at 3 A		●	●	●	Z1B
ECG572	Gen Purp, Fast Recovery	Si	1000	6 A	300 A	500 ns	1.3 V at 6 A		●	●	●	Z71
ECG573	Schottky, Barrier Rectifier	Si	60	5 A	150 A	—	0.7 V at 5 A		●		●	Z6A
ECG574	Sw, Ultra Fast Rec.	Si	400	1 A	30 A	35 ns	1.3 V at 1 A		●	●	●	Z3
ECG575	Sw, Ultra Fast Rec.	Si	1000	1 A	30 A	70 ns	1.7 V at 1 A		●	●	●	Z3
ECG576	Sw, Ultra Fast Rec.	Si	400	5 A	150 A	35 ns	1.25 V at 5 A		●	●	●	Z6A
ECG577	Sw, Fast Recovery, HV	Si	1000	5 A	200 A	70 ns	1.7 V at 5 A		●	●	●	Z6A
ECG578	Schottky, Barrier Rect	Si	90	1 A	50 A	—	.8 V at 1 A		●			Z3
ECG579	Schottky, Barrier Rect	Si	90	3 A	150 A	—	.8 V at 3 A		●			Z6A
ECG580	Gen Purp Rect, Fast Recovery	Si	600	3 A	Single Surge 100 A	250 ns	1.3 V at 3 A		●	●	●	Z1A
ECG581	Gen Purp Rect, Fast Recovery	Si	400	8 A	Single Surge 150 A	200 ns	1.2 V at 3 A		●	●	●	Z41A
ECG582	TV Damper	Si	6000	300 mA	Single Surge 100 A	300 ns	8.0 V at 100 mA				●	Z17A
ECG583	Detector, Mixer, (Schottky) Hot Carrier Modulator	Si	70	15 mA	—	1 ps	.41 V at 1 mA	●	●	●	●	Z4

F

Diodes and Rectifiers (General Purpose) (cont'd)

ECG Type	Description		Peak Reverse Voltage PRV Max V	Average Rectified Forward Current I_O Max	Forward Current Repetitive Peak IFRM Max	Reverse Recovery Time trr	Forward Voltage Drop Max V_F	AFC	Fast Sw	Gen Purp	Fast Recovery	Fig. No.
ECG584	Detector, Mixer, (Schottky) Hot Carrier Modulator	Si	20	35 mA	—	1 ps	.41 V at 1 mA	●	●	●	●	Z4
ECG585	Schottky Barrier Rect	Si	40	1 A	25 A	—	.6 V at 1 A		●		●	Z3
ECG586	Schottky Barrier Rect	Si	40	3 A	80 A	—	.525 V at 3 A		●		●	Z6A
ECG587	Sw, Ultra Fast Recovery	Si	200	1 A	30 A	35 ns	.95 V at 3 A		●	●	●	Z3
ECG588	Sw, Ultra Fast Recovery	Si	200	3 A	125 A	35 ns	.95 V at 3 A		●	●	●	Z6A
ECG589	Gen Purp, Fast Recovery	Si	400	6 A	300 A	150 ns	1.3 V at 6 A		●	●	●	Z71
ECG590	Common Cathode Dual Diode, Hi Speed Sw	Si	75	200 mA, 100 mA /Leg	300 mA	4 ns	1.2 V at 100 mA		●			Z67
ECG591	Common Cathode Dual Diode, Hi Speed Sw	Si	75	200 mA, 100 mA /Leg	300 mA	4 ns	1.2 V at 100 mA		●			Z67

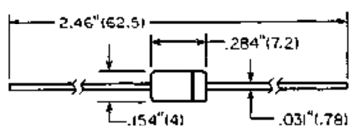
Diodes (Surface Mount)

ECG Type	Description		Peak Reverse Voltage PRV Max V	Average Rectified Forward Current I_O Max	Forward Current Repetitive Peak I_{FRM} Max	Reverse Recovery Time trr	Forward Voltage Drop Max V_F	AFC	Fast Sw	Gen Purp	Fast Recovery	Fig. No.
ECG592	Gen Purp, Sw	Si	200	200 mA	625 mA	50 ns	1V at 200 mA		●	●		Z69
ECG593	Hi Speed Sw, Det	Si	75	250 mA	250 mA	6 ns	1 V at 250 mA		●		●	Z69
ECG594	Band Sw, r_D = .7 Ω at 200 MHz	Si	35	100 mA	—	---	1.2V at 100 mA					Z69
ECG595	Common Cathode Dual Diode, Hi Speed Sw, Gen Purp	Si	70	500 mA 250 mA /Leg	250 mA	6 ns	1 V at 250 mA	●	●	●	●	Z69
ECG596	Common Anode Dual Diode, Hi Speed Sw, Gen Purp	Si	70	500 mA	250 mA	6 ns	1 V at	●	●	●	●	Z69
ECG620	Gen Purp	Si	400	500 mA	---	---	1.2 V max			●		Z74
ECG621	Gen Purp Hi-Current	Si	400	1 A	---	---	1.1 V			●		Z74
ECG622	Gen Purp Ultra Fast	Si	400	500 mA	---	50 ns	1.35 V			●	●	Z74

Controlled Avalanche Diode

ECG Type	V_{RM} V Max	I_{ZSM} A Max	V_Z I_Z = 1 mA V Max	I_R μA Max
ECG570	130	1 (Pulse)	135 - 150	10

Fig. Z6B



Color Band Denotes Cathode

Microwave Mixer Diodes

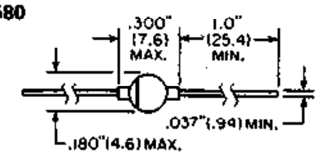
Type No.	Test Freq. (MHz)	Noise Figure (dB)	I.F. IMPED. @ 30 MHz (Ohms)	VSWR Max. Ratio	Burn Out (ERGS)	Fig. No.
1N415C	9375	9.5	325-475	1.5	2.0	Z64
1N415E	9375	7.5	335-465	1.3	2.0	Z64
DISCONTINUED		8.3	300-700	---	2.0	Z64
1N416E	3060	7.0	350-450	1.3	5.0	Z64

PIN Diodes

ECG Type	Description and Application	Max. Power (mW)	V (BR) R Min. (Volts)	IR Max. (nA)	CT Max. (pf)	LS Typ. (nH)	RA Max. (Ohms)	Fig. No.
ECG553	Si PIN Diode, UHF, VHF Switch	200	30	150	2	2.5	1.2	Z4
ECG555A	Si PIN Diode, Gen Purp & VHF Switch	250	35	100	1.2	---	0.7	Z11A

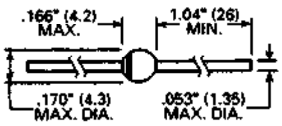
Diode and Rectifier Outlines

Fig. Z1A
ECG580



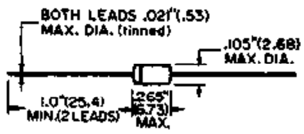
COLOR BAND INDICATES CATHODE END

Fig. Z1B
ECG571



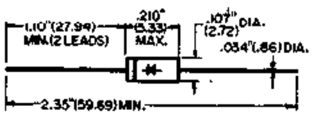
COLOR BAND DENOTES CATHODE

Fig. Z2 **DO7**
ECG
109



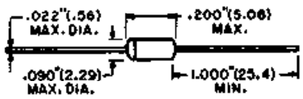
(COLOR BAND DENOTES CATHODE)

Fig. Z3 **DO-41**
ECG
116 585
125 587
552
558
574
575
578



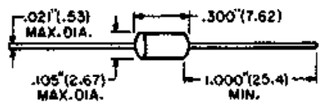
COLOR BAND DENOTES CATHODE

Fig. Z4 **DO-35**
ECG
112
177
519
553
583
584
600



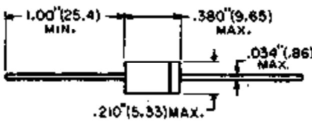
COLOR BAND DENOTES CATHODE

Fig. Z5
ECG178MP



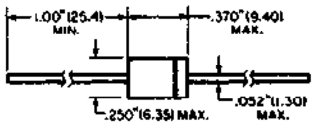
(COLOR BAND DENOTES CATHODE)

Fig. Z6
ECG
156
506
507



COLOR BAND DENOTES CATHODE

Fig. Z6A **DO-27**
ECG
525
569
573
576
577
579
586
588



COLOR BAND DENOTES CATHODE

Fig. Z7
ECG
606
607

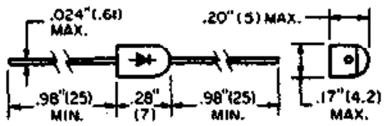


Fig. Z8
ECG515

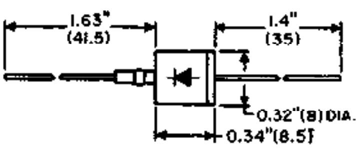
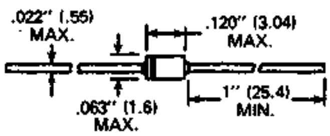
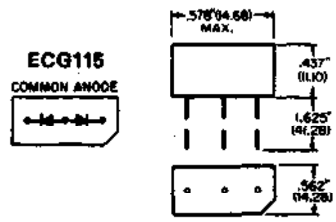


Fig. Z11A
ECG555A



COLOR BAND DENOTES CATHODE

Fig. Z12



Diode and Rectifier Outlines (cont'd)

Fig. Z13
ECG
610
611
612
613
614

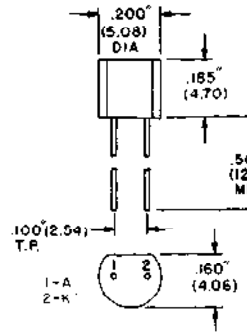


Fig. Z15
ECG113A

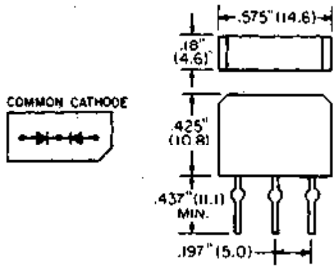


Fig. Z17
ECG120

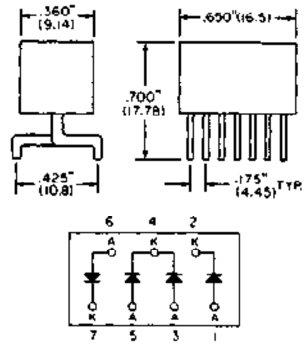


Fig. Z41A
ECG581

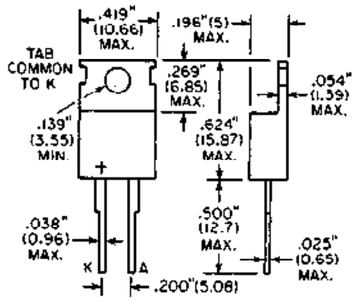
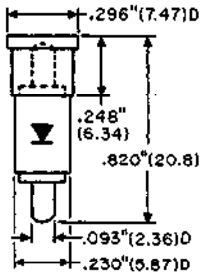


Fig. Z64
1N415C
1N415E
1N416E



(DIODE POLARITY IS REVERSED WHEN BRASS CAP IS REMOVED AND PLACED ON OPPOSITE END)

Fig. Z67
ECG
590
591

SP-92

ECG	1	2	3
590	A	K	A
591	K	A	K

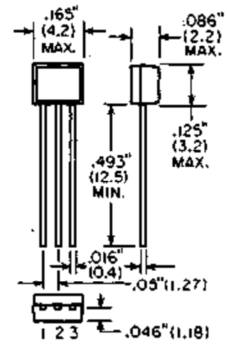
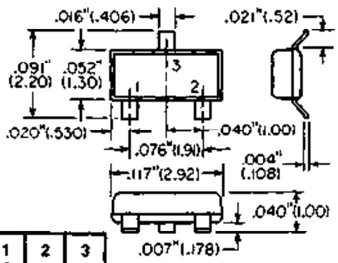


Fig. Z69
ECG
592
593
594
595
596

SOT-23



ECG	1	2	3
592	A	NC	K
593	A	NC	K
594	A	NC	K
595	A	A	K
596	K	K	A

Fig. Z71
ECG
572
589

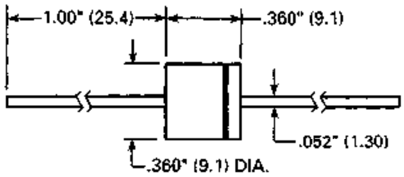


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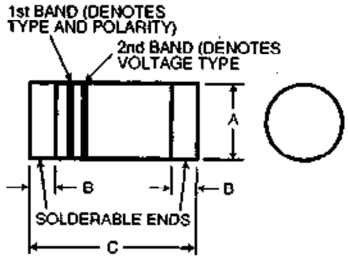
Fig. Z74
ECG
620
621
622



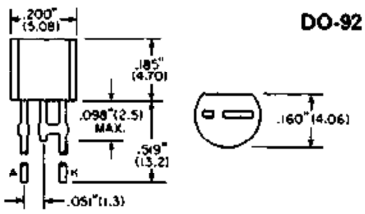
ECG	A	B	C
620	.066" (1.68)	.022" (.559)	.145" (3.68)
621	.105" (2.67)	.022" (.559)	.205" (.185)
622	.066" (1.68)	.022" (.559)	.145" (3.68)

Voltage Regulator for Electronic Tuner

ECG615A	Min.	Typ.	Max.	$T_A = 25°C$
Vz	31	33	35	V
ΔVz/ΔT	−1	0	+1	mV/°C
P_D	200 mW ($T_A = 75°C$)			

Fig. Z13-2
ECG615A

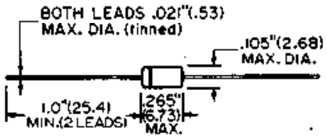
DO-92



Varistors (Temperature Compensating Diodes)

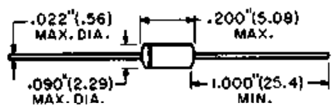
ECG Type	Description	Forward Current I_F mA	Forward Voltage V_F Min. Volts	Max. Volts	Change Per °C in mV	Fig. No.
ECG600	Silicon	10	0.63 at 3 mA	0.69 at 3 mA	2	Z4
ECG601	Silicon	20	0.56 at 1.5 mA	0.61 at 1.5 mA	1.5	Z4
ECG605A	Silicon	100	1.26 at 3 mA	1.36 at 3 mA	4.6	Z2

Fig. Z2 ECG605A



(COLOR BAND DENOTES CATHODE)

Fig. Z4 DO-35 ECG600 ECG601



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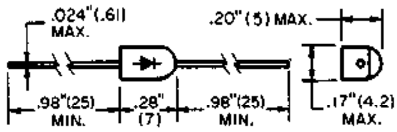
Varistors (Voltage Compensating Diodes)

ECG Type	Forward Characteristics	Maximum Forward DC Current	Maximum Surge Current for 10 msec	Reverse Characteristics
ECG606	1.8 V ± 0.2 V at 1 mA 2.3 V ± 0.25 V at 70 mA	150 mA	27 A	10 μA Max at 100 V
ECG607	2.35 V ± 0.25 V at 1 mA 3.0 V ± 0.3 V at 70 mA	100 mA	25 A	10 μA Max at 100 V

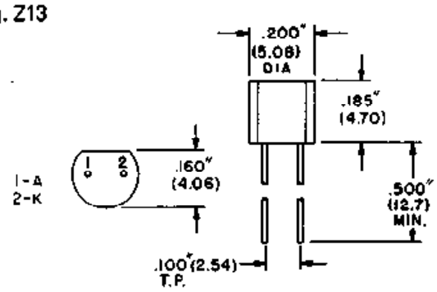
Fig. Z7 ECG 606 607



Varactors (Variable Capacitance Diodes)

ECG Type	Cap. at 4 Volts pF	Cap. Ratio C2/C30	Reverse Voltage V_R Volts Max.	Forward Current I_F mA Max.	Device Diss. P_D mW Max.
ECG610	6.8	2.7	30	200	280
ECG611	10.0	2.9	30	200	280
ECG612	12.0	2.9	30	200	280
ECG613	22.0	2.9	30	200	280
ECG614	33.0	3.2	30	200	280

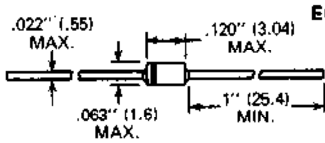
Fig. Z13 ECG 610 611 612 613 614



Matched Varactors (Variable Capacitance Diodes) (Matched Set of Four)

ECG Type	Matched Cap. at 3 Volts pF	Cap. Ratio C3/C25	Reverse Voltage V_R Volts Max.	Max. Osc. Freq. at 3 V GHz	Series Inductance L_s (nH)	Series Resistance R_s Max. Ohms
ECG616	11	5.5	30	24	2.5	0.8

Fig. Z11A ECG616



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Varactors (Radio Tuning Diodes)

ECG Type	Application Band	Cap. In pF	Cap. In pF	Cap. Ratio	Reverse Voltage V_R Max Volts	Q Min. @ 100 MHz	Fig. No.
ECG617	FM Tuning	39 at 3 V	15 at 30 V	2.6	32	100 at 3 V	Z13-1
ECG618	AM Tuning	440 at 1.2 V	22 at 8 V	15.5	12	200 at 1 V	Z13-2

Fig. Z13-1 ECG617

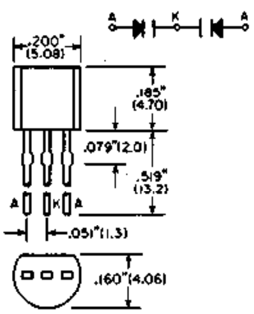
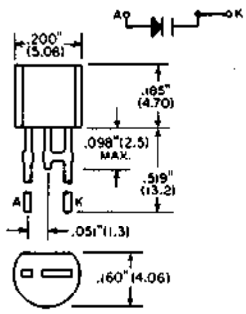


Fig. Z13-2 ECG618



Zener Diodes

Note: 10 Watt and 50 Watt Zeners listed have anode connected to stud. Add Suffix letter "K" to the ECG number for cathode connected to stud. The ECG type" numbers shown have a standard tolerance for the Zener voltage of +/- 5%.

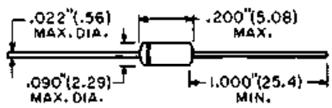
Voltage	Surface Mount	Axial Lead			Stud Mount	
	SOT-23				DO-4	DO-5
See Notes for Tolerance	Fig. No. Z69	Z3A		Z18	Z19	Z20
	0.3 W #	1/2 Watt †	1 Watt †	5 Watt	10 Watt	50 Watt
2.4	—	ECG5000A	—	—	—	—
2.5	—	ECG5001A	—	—	—	—
2.7	—	ECG5002A	ECG5063A	—	—	—
2.8	—	ECG5003A	—	—	—	—
3.0	—	ECG5004A	ECG5065A	—	—	—
3.3	ECG5005SM	ECG5005A	ECG5066A	ECG5111A	—	—
3.6	ECG5006SM	ECG5006A	ECG134A	ECG5112A	ECG5173A	—
3.9	ECG5007SM	ECG5007A	ECG5067A	ECG5113A	ECG5174A	ECG5240A
4.3	ECG5008SM	ECG5008A	ECG5068A	ECG5114A	ECG5175A	ECG5241A
4.7	ECG5009SM	ECG5009A	ECG5069A	ECG5115A	ECG5176A	ECG5242A
5.1	ECG5010SM	ECG5010A	ECG135A	ECG5116A	ECG5177A	ECG5243A
5.6	ECG5011SM	ECG5011A	ECG136A	ECG5117A	ECG5178A	ECG5244A
6.0	—	ECG5012A	ECG5070A	ECG5118A	ECG5179A	ECG5245A
6.2	ECG5013SM	ECG5013A	ECG137A	ECG5119A	ECG5180A	ECG5246A
6.8	ECG5014SM	ECG5014A	ECG5071A	ECG5120A	ECG5181A	ECG5247A
7.5	ECG5015SM	ECG5015A	ECG138A	ECG5121A	ECG5182A	ECG5248A
8.2	—	ECG5016A	ECG5072A	ECG5122A	ECG5183A	ECG5249A
8.7		ECG5017A	ECG5073A	ECG5123A	ECG5184A	ECG5250A
9.1	ECG5018SM	ECG5018A	ECG139A	ECG5124A	ECG5185A	ECG5251A
10.0	—	ECG5019A	ECG140A	ECG5125A	ECG5186A	ECG5252A
11.0	—	ECG5020A	ECG5074A	ECG5126A	ECG5187A	ECG5253A
11.5	—	—	ECG141A	—	—	—
12.0	ECG5021SM	ECG5021A	ECG142A	ECG5127A	ECG5188A	ECG5254A
13.0	—	ECG5022A	ECG143A	ECG5128A	ECG5189A	ECG5255A
14.0	—	ECG5023A	ECG144A	ECG5129A	ECG5190A	ECG5256A
15.0	ECG5024SM	ECG5024A	ECG145A	ECG5130A	ECG5191A	ECG5257A
16.0	—	ECG5025A	ECG5075A	ECG5131A	ECG5192A	ECG5258A
17.0	—	ECG5026A	ECG5076A	ECG5132A	ECG5193A	ECG5259A
18.0	ECG5027SM	ECG5027A	ECG5077A	ECG5133A	ECG5194A	ECG5260A
19.0	—	ECG5028A	ECG5078A	ECG5134A	ECG5195A	ECG5261A
20.0	—	ECG5029A	ECG5079A	ECG5135A	ECG5196A	ECG5262A
22.0	—	ECG5030A	ECG5080A	ECG5136A	ECG5197A	ECG5263A
24.0	ECG5031SM	ECG5031A	ECG5081A	ECG5137A	ECG5198A	ECG5264A
25.0	—	ECG5032A	ECG5082A	ECG5138A	ECG5199A	ECG5265A
27.0	—	ECG5033A	ECG146A	ECG5139A	ECG5200A	ECG5266A
28.0	—	ECG5034A	ECG5083A	ECG5140A	ECG5201A	ECG5267A
30.0	—	ECG5035A	ECG5084A	ECG5141A	ECG5202A	ECG5268A
33.0	—	ECG5036A	ECG147A	ECG5142A	ECG5203A	ECG5269A
36.0	—	ECG5037A	ECG5085A	ECG5143A	ECG5204A	ECG5270A
39.0	—	ECG5038A	ECG5086A	ECG5144A	ECG5205A	ECG5271A
43.0	—	ECG5039A	ECG5087A	ECG5145A	ECG5206A	ECG5272A
45.0	—	—	—	—	ECG5207A	ECG5273A
47.0	—	ECG5040A	ECG5088A	ECG5146A	ECG5208A	ECG5274A
50.0	—	—	—	—	ECG5209A	ECG5275A
51.0	—	ECG5041A	ECG5089A	ECG5147A	ECG5210A	ECG5276A
52.0	—	—	—	—	ECG5211A	ECG5277A
55.0	—	—	ECG148A	—	—	—
56.0	—	ECG5042A	ECG5090A	ECG5148A	ECG5212A	ECG5278A
60.0	—	ECG5043A	ECG5091A	ECG5149A	ECG5213A	ECG5279A
62.0	—	ECG5044A	ECG149A	ECG5150A	ECG5214A	ECG5280A
68.0	—	ECG5045A	ECG5092A	ECG5151A	ECG5215A	ECG5281A
75.0	—	ECG5046A	ECG5093A	ECG5152A	ECG5216A	ECG5282A
82.0	—	ECG5047A	ECG150A	ECG5153A	ECG5217A	ECG5283A
87.0	—	ECG5048A	ECG5094A	ECG5154A	ECG5218A	—
91.0	—	ECG5049A	ECG5095A	ECG5155A	ECG5219A	ECG5284A
100.0	—	ECG5050A	ECG5096A	ECG5156A	ECG5220A	ECG5285A
105.0	—	—	—	—	ECG5221A	ECG5286A
110.0	—	ECG5051A	ECG151A	ECG5157A	ECG5222A	ECG5287A
120.0	—	ECG5052A	ECG5097A	ECG5158A	ECG5223A	ECG5288A
123.0*	—	ECG5107T2	—	—	—	—
130.0	—	ECG5053A	ECG5098A	ECG5159A	ECG5224A	ECG5289A
140.0	—	ECG5054A	ECG5099A	ECG5160A	ECG5225A	ECG5290A
150.0	—	ECG5055A	ECG5100A	ECG5161A	ECG5226A	ECG5291A
160.0	—	ECG5056A	ECG5101A	ECG5162A	ECG5227A	ECG5292A
170.0	—	ECG5057A	ECG5102A	ECG5163A	ECG5228A	—
175.0	—	—	—	—	ECG5229A	ECG5293A
180.0	—	ECG5058A	ECG5103A	ECG5164A	ECG5230A	ECG5294A
190.0	—	ECG5059A	ECG5104A	ECG5165A	ECG5231A	ECG5295A
200.0	—	ECG5060A	ECG5105A	ECG5166A	ECG5232A	ECG5296A

* 2% Tolerance † 1/2 W and 1 W, 5% Tolerance Zeners are supplied 2 Per Pkg.
\# 0.3 W, 5% Tolerance Zeners are supplied 3 Per Pkg.

1% Tolerance - ½ Watt

ECG Type	Nominal Zener Voltage @ $T_A = 25°C$ V_Z @ $I_{ZT} = 20$ mA*
ECG5010T1	5.1
ECG5011T1	5.6
ECG5013T1	6.2
ECG5019T1	10
ECG5021T1	12

Fig. Z4



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* I_{ZT} = Test Current

Zener Diode Outlines

Fig. Z3A

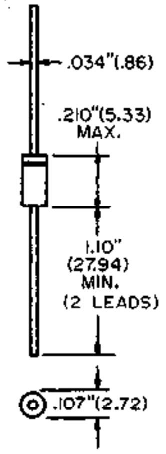

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Fig. Z18

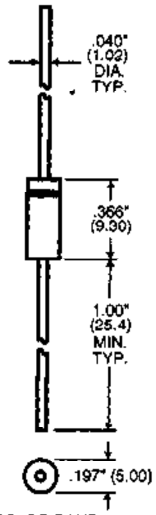

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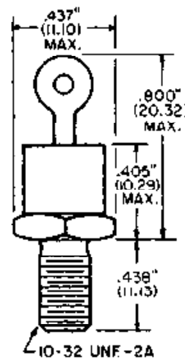
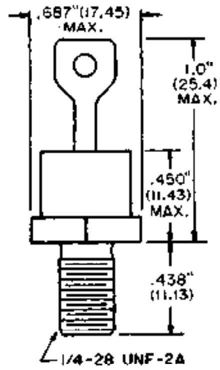
Fig. Z19



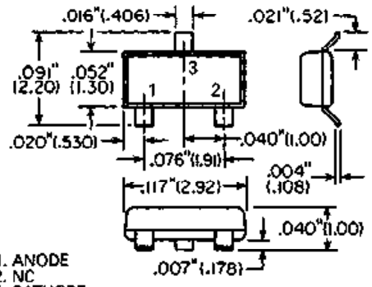
DO-4-Torque To 15 in-lbs. min;
20 in-lbs. max

Fig. Z20



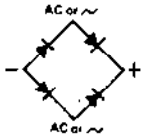
DO-5-Torque To 25 in-lbs. min;
30 in-lbs. max.

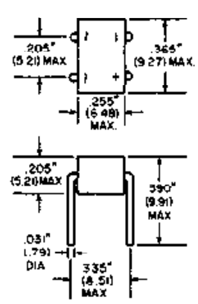
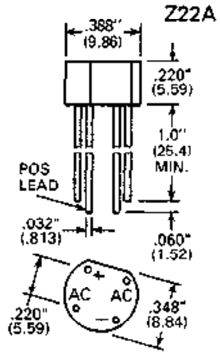
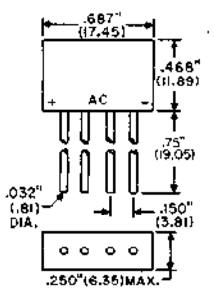
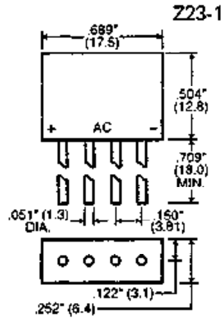
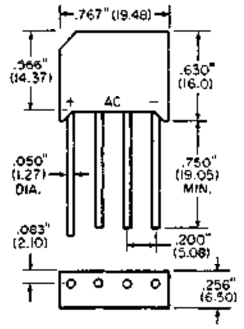
Fig. Z69

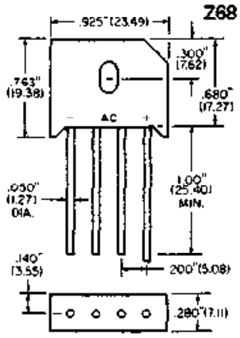
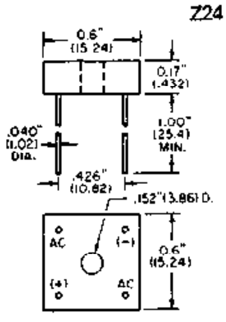
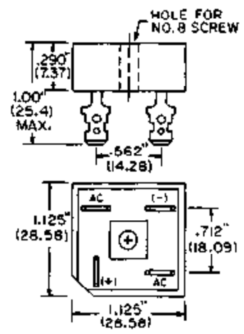
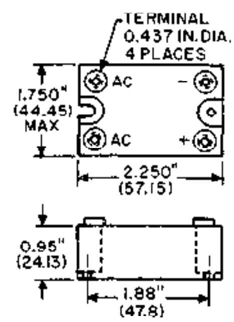


1. ANODE
2. NC
3. CATHODE

Bridge Rectifiers (Silicon)
Single-Phase

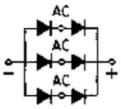


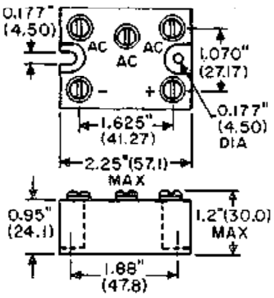
Peak Reverse Voltage (PRV Volts)	I_O, Average Rectified Forward Current (Amps)				
	1 A	1.5 A	2 A	4 A	
100			ECG166		
200			ECG167	ECG5309*	ECG5318
400		ECG5304	ECG168		
600	ECG5332	ECG5305	ECG169	ECG5310	ECG5319
800		ECG5306			
1000	ECG5334	ECG5307	ECG170	ECG5311	ECG5320
Peak Forward Surge Current (Amps)	50	50	60	250	200
Max. Forward Voltage Per. Element V_F (Volts)	1.0	1.0	1.0	1.0	1.0
T_A at Rated I_O (°C) Max	+40	+25	+25	+40	+50
Fig. No.	Z21 	Z22A 	Z23 	Z23-1  * Alt. Pkg. Z68A	Z68A 

Peak Reverse Voltage (PRV Volts)	I_O, Average Rectified Forward Current (Amps)				
	6 A	8 A	25 A	40 A	80 A	100 A
100		ECG5312				
200	ECG5329	ECG5313	ECG5322	ECG5340		
400		ECG5314	ECG5324			
600	ECG5330	ECG5315	ECG5326	ECG5342	ECG5346	ECG5348
800		ECG5316	ECG5327			
1000	ECG5331	ECG5317	ECG5328	ECG5344		
Peak Forward Surge Current (Amps)	200	125	300	400	800	1000
Max. Forward Voltage Per. Element V_F (Volts)	1.0	1.2	1.2	1.1	1.6	1.4
T_A at Rated I_O (°C) Max	+40	+50	+60	+60	+85	+80
Fig. No.	Z68 	Z24 	Z25 		Z65 	

Bridge Rectifiers (cont'd)

Three-Phase*

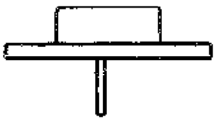


Peak Reverse Voltage (PRV Volts)	I_o Average Rectified Forward Current (Amps) 60 A	100 A
600	ECG5335	ECG5338
Peak Forward Surge Current (Amps)	500	800
Max. Forward Voltage Per Element V_F (Volts)	1.26	12.5
T_C @ Rated I_o (°C) Max.	+70	+100
Fig. No.	Z66	
		

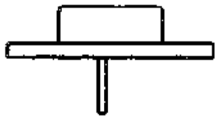
* See page 1-168 for additional Three-Phase Bridge Rectifiers

Half Wave Rectifiers (or Dual Diode)

Standard Recovery

Peak Reverse Voltage (PRV Volts)	I_o, Average Rectified Forward Current (Amps) 30 A (15 A/Leg)
200	ECG6200
400	ECG6202
600	ECG6204
I_{FM} Surge (Per Diode)	250 A
T_C @ Rated I_o Max (°C)	+100
Forward Voltage Drop @ Rated I_o, V_F (Volts) (Per Diode)	1 Typ 1.2 Max
Fig. No.	Z43
Package	TO-3 Case/Cathode 

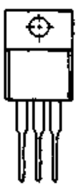
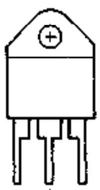
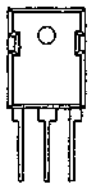
Fast Recovery

Reverse Recovery Time, Trr = 200 ns Max	
Peak Reverse Voltage (PRV Volts)	I_o, Average Rectified Forward Current (Amps) 30 A (15 A/Leg)
200	ECG6206
400	ECG6208
600	ECG6210
I_{FM} Surge (Per Diode)	150 A
T_C @ Rated I_o Max (°C)	+100
Forward Voltage Drop @ Rated I_o, V_F (Volts) (Per Diode)	1 Typ 1.4 Max
Fig. No.	Z43
Package	TO-3 Case/Cathode 

F

Half Wave Rectifiers (or Dual Diode) (cont'd)

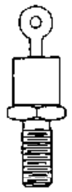
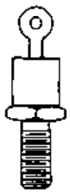
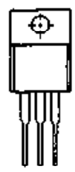
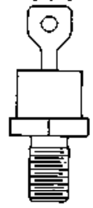
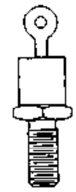
Ultra Fast Recovery

Peak Reverse Voltage (PRV Volts)	I_o Average Rectified Forward Current (Amps) 16 A (8 A/Leg)			30 A (15 A/Leg)		
200	ECG6240	ECG6244		ECG6246		ECG6251
600			ECG6241		ECG6247	ECG6252
I_{FM} Surge (Per Diode)	100 A	200 A	100 A	200 A	150 A	250 A
T_C @ Rated I_o Max (°C)	+150	+100	+150	+150	+145	+150
Forward Voltage Drop @ Rated I_o, V_F (Volts) (Per Diode)	.90	.95	1.5	.85	1.5	1.50
Reverse Recovery Time (ns)	35	35	50	35	60	50
Fig. No.	Z41B			Z41C		Z70A
Package	TO-220 			TO-3P (TO-218) 		TO-247 

Industrial Rectifiers

Note: Standard polarity is cathode to case.
* Indicates polarity is anode to case.

K A

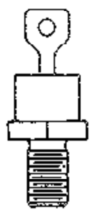
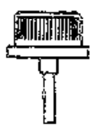
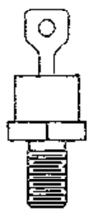
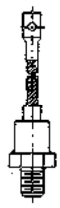
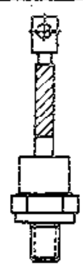
Peak Reverse Voltage (PRV Volts)	I_O, Average Rectified Forward Current (Amps)									
	3 A		6 A	6 A/22 A	12 A		15 A	16 A	20A	25A
50	ECG5800	ECG5830	ECG5850		ECG5870		ECG5940	ECG5892	ECG5912	
50		ECG5831*	ECG5851*		ECG5871*		ECG5941*	ECG5893*	ECG5913*	
100	ECG5801			ECG5812						
200	ECG5802	ECG5834	ECG5854		ECG5874		ECG5844	ECG5896	ECG5916	ECG5864
200		ECG5835*	ECG5855*		ECG5875*		ECG5945*	ECG5897*	ECG5917*	ECG5865*
400	ECG5804	ECG5838	ECG5858	ECG5814	ECG5878		ECG5948	ECG5900	ECG5920	
400		ECG5839*	ECG5859*		ECG5879*		ECG5949*	ECG5901*	ECG5921*	
600	ECG5806	ECG5842	ECG5862	ECG5815	ECG5882	ECG6013	ECG5952	ECG5904	ECG5924	ECG5884
600		ECG5843*	ECG5863*		ECG5883*		ECG5953*	ECG5905*	ECG5925*	ECG5885*
800	ECG5808	ECG5846	ECG5866		ECG5886			ECG5908	ECG5928	
800		ECG5847*	ECG5867*		ECG5887*			ECG5909*	ECG5929*	
1000	ECG5809	ECG5848	ECG5868	ECG5817	ECG5890			ECG5910	ECG5932	
1000		ECG5849*	ECG5869*		ECG5891*			ECG5911*	ECG5933*	
1200					ECG5810				ECG5844	ECG5888
1200					ECG5811*				ECG5845*	ECG5889*
I_{FM} Surge	150 A	40 A	150 A	400 A	250 A	300 A	250 A	300 A	400A	400 A
Tc at Rated I_O (°C) Max	+ 105 (T_L)	+ 150	+ 150	See # Note	+ 150	+ 80	+ 150	+ 150	+ 150	+150
V_F at Rated I_O	.9 V Typ 1.0 V Max	.9 V Typ 1.1 V Max	.9 V Typ 1.1 V Max	.8 V Typ .9 V Max	.9 V Typ 1.1 V Max	1.0 V Typ 1.6 V Max	.9 V Typ 1.1 V Max	.9 V Typ 1.1 V Max	.9 V Typ 1.1 Max	.9 V Typ 1.1 Max
Fig. No.	Z18A	Z19		Z26	Z19	Z41B	Z20	Z19		
Package	Axial 	DO-4 		Axial  Alt. Package Fig. Z71	DO-4 	TO-220 	DO-5 	DO-4 		

I_O = 6 A with PC Board Mtg., TA = 60°C, I_O = 22 A, 1/8" Leads, T_L = 60°C

Peak Reverse Voltage (PRV Volts)	I_O, Average Rectified Forward Current (Amps)
	25 A
400	ECG5962
400	ECG5963*
800	ECG5966*
800	ECG5967*
I_{FM} Surge	300A
Tc at Rated I_O (°C) Max	+ 100
V_F at Rated I_O	.9 V Typ 1.1 V Max
Fig. No.	Z27
Package	Press Fit 

Industrial Recifiers (cont'd)

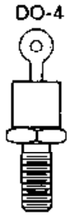
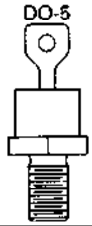
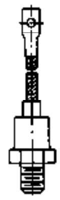
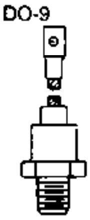
Note: Standard polarity is cathode to case.
* Indicates polarity is anode to case

Peak Reverse Voltage (PRV Volts)	I_O, Average Rectified Forward Current (Amps)								
	40 A	50 A	60 A	70 A	85 A	150 A	300 A	450 A	550 A
50	ECG5980		ECG6020	ECG6048					
50	ECG5981*		ECG6021*	ECG6049*					
100	ECG5982		ECG6022	ECG6050					
100	ECG5983*		ECG6023*	ECG6051*					
200	ECG5986		ECG6026	ECG6054	ECG6074				
200	ECG5987*		ECG6027*	ECG6055	ECG6075*				
300	ECG5988								
300	ECG5989*								
400	ECG5990	ECG5826	ECG6034	ECG6060		ECG6154	ECG6354		
400	ECG5991*	ECG5827*	ECG6035*	ECG6061*		ECG6155*	ECG6355*		
500	ECG5992								
500	ECG5993*								
600	ECG5994		ECG6040	ECG6064	ECG6076	ECG6156	ECG6356		ECG6102
600	ECG5995*		ECG6041*	ECG6065*	ECG6077*	ECG6157*	ECG6357*		ECG6103*
800	ECG5998	ECG5828	ECG6042	ECG6068					
800	ECG5999*		ECG6043*	ECG6069*					
1000	ECG6002		ECG6044	ECG6072		ECG6158	ECG6358		
1000	ECG6003*		ECG6045*	ECG6073*		ECG6159*	ECG6359*		
1200	ECG5906		ECG5926*	ECG5930	ECG6078				ECG6104
1200	ECG5907*		ECG5927*	ECG5931*	ECG6079*				ECG6105*
1400						ECG6162	ECG6362		
1400						ECG6163*	ECG6363*		
1600	ECG6004				ECG6070	ECG6164	ECG6364	ECG6106	ECG6108
1600	ECG6005*				ECG6071*	ECG6165*	ECG6365*	ECG6107*	ECG6109*
I_{FM} Surge	500 A	600 A	700 A	1200 A	1500 A	2100 A	5000 A	8500 A	10,000 A
T_C at Rated I_O (°C) Max	+ 140	+ 150	+ 125	+ 125	+ 120	+ 125	+ 120	+ 120	+ 125
V_F at Rated I_O	1.0 V Typ 1.3 V Max	.9 V Typ 1.0 V Max	1.0 V Typ 1.3 V Max	1.0 V Typ 1.2 V Max	1.0 V Typ 1.6 V Max	1.0 V Typ 1.6 V Max	1.0 V Typ 1.45 V Max	1.1 V Typ 1.45 V Max	1.0 V Typ 1.4 V Max
Fig. No.	Z20	Z28	Z20			Z29	Z30	Z31	
Package	DO-5 	Press Fit 	DO-5 			DO-8 	DO-9 	SR-75 	

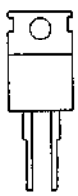
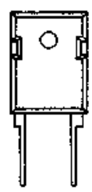
Peak Reverse Voltage (PRV Volts)	I_O, Average Rectified Forward Current (Amps)			
	500 A	1100 A	1200 A	2200 A
600	ECG6110	ECG6111	ECG6113	ECG6116
1200	ECG6112		ECG6115	ECG6118
1600	ECG6120	ECG6114	ECG6121	ECG6122
I_{FM} Surge	6500 A	12,000 A	12,500 A	30,000 A
T_C at Rated I_O (°C) Max	+ 55	+ 80	+ 55	+ 105
V_F at Rated I_O	1.4 V Typ 1.85 V Max	1.4 V Max	1.2 V Typ 1.6 V Max	1.1 V Typ 1.45 V Max
Fig. No.	Z32	Z72	Z33	Z34
Package	HR-16 		HR-23 	HR-29 

F

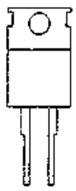
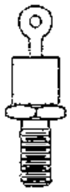
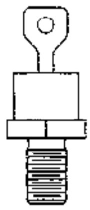
Fast Recovery

Peak Reverse Voltage (PRV Volts)	IO, Average Rectified Forward Current (Amps)										
	12 A		40 A		85 A		150 A		250A	430A	700A
200	ECG5818		ECG6006								
200	ECG5819*		ECG6007*								
400	ECG5820		ECG6008								
400	ECG5821*		ECG6009*								
600	ECG5822		ECG6010		ECG6036						
600	ECG5823*		ECG6011*		ECG6037*						
1000		ECG5824		ECG6032		ECG6046	ECG6130				
1000		ECG5825*		ECG6033*		ECG6047*	ECG6131*				
1400								ECG6132	ECG6368	ECG6128	
1400								ECG6133*	ECG6369*		
1600											ECG6129
IFM Surge	200 A		350 A		1100 A		3700 A		4500 A	4500 A	8000 A
Tc at Rated Io (°C) Max	+ 100		+ 75		+ 75		+ 85		+ 85	+ 55	+ 55
VF at Rated Io	0.9 V Typ 1.4 V Max		1.0 V Typ 1.9 V Max		1.7 V Max		1.6 V Max		2 V Max	2 V Max	2.2 V Max
Reverse Recovery Time (ns)	200	500	200	500	200	500	1 μs	1.5 μs	1 μs	1 μs	2 μs
Fig. No.	Z19		Z20				Z29		Z30	Z32	Z33
Package	DO-4 		DO-5 				DO-8 		DO-9 	HR-16 	HR-23 

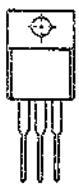
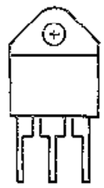
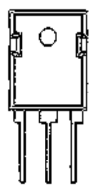
Ultra Fast Recovery

Peak Reverse Voltage (PRV Volts)	IO Average Rectified Forward Current (Amps)						
	8 A			15A	16 A	60A	
200	ECG597			ECG599			
400							
600		ECG598			ECG6248	ECG6249	
1000							ECG6250
1200			ECG6245				
IFM Surge (Per Diode)	100 A	100 A	120 A	200 A	250 A	500 A	
Tc @ Rated Io Max (°C)	+ 125	+ 125	+ 100	+ 150	+ 100	+ 70	+ 60
Forward Voltage Drop @ Rated Io, VF (Volts) (Per Diode)	1.3	1.5	2.0	1.0	1.5	1.5	1.8
Reverse Recovery Time (ns)	35	60	100	35	50	35	35
Fig. No.	Z41A					Z70	
Package	TO-220 (2-Pin) 					TO-247 (2-Pin) 	

Schottky Barrier Rectifiers

Peak Reverse Voltage (PRV Volts)	I_O, Average Rectified Forward Current (Amps)					
	10 A		16 A		35 A	60 A
40	—	—	—	—	—	—
45	ECG6083	—	ECG6081	—	ECG6084	ECG6094
60	—	ECG6080	—	ECG6082	—	—
100	—	—	—	—	—	—
I_{FM} Surge (A)	150		150		600	800
T_C @ Rated I_O (°C) Max	+ 120	+ 133	+ 125		+ 95	+ 95
Forward Voltage Drop @ Rated I_O, V_F (V)	0.6	0.8	0.65	0.75	0.6	0.65
Fig. No.	Z41A				Z19	Z20
Package	TO-220				DO-4	DO-5
Available in Cathode to Case Only						

Schottky Barrier Rectifiers – Dual

Peak Reverse Voltage (PRV Volts)	I_O, Average Rectified Forward Current (Amps)						
	12 A* (6 A/Leg)	20 A* (10 A/Leg)	30 A* (15 A/Leg)			40 A (20 A/Leg)	
40	ECG6085	—	—	—	—	—	—
45	—	—	ECG6087	—	ECG6090	ECG6091	—
60	—	—	—	ECG6088	—	—	ECG6092
100	—	ECG6086	—	—	—	—	—
I_{FM} Surge (A)	140/Leg	150/Leg	150/Leg	150/Leg	200/Leg	400/Leg	
T_C @ Rated I_O (°C) Max	+ 120	+ 130	+ 130	+ 125	+ 105	+ 120	
Forward Voltage Drop @ Rated I_O V_F (V)	.65/Leg	.85/Leg	.73/Leg	.75/Leg	.72/Leg	.70/Leg	.80/Leg
Fig. No.	Z41B				Z41C	Z70A	
Package	TO-220				TO-3P(TO-218)	TO-247	
Available in Cathode to Case Only							

* Dual Rectifiers

Industrial Rectifier Outlines

Fig. Z18A **Axial**

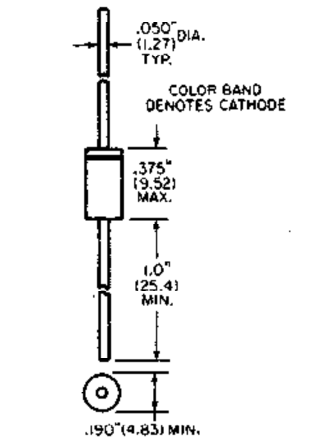
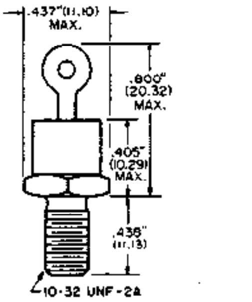
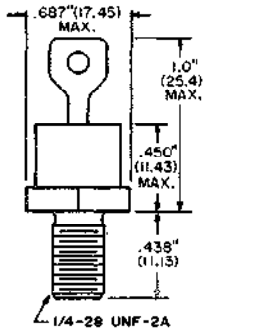


Fig. Z19 **DO-4**



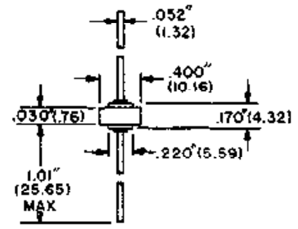
DO-4-Torque To 15 in-lbs. min; 20 in-lbs max

Fig. Z20 **DO-5**



DO-5-Torque To 25 in-lbs. min; 30 in-lbs. max.

Fig. Z26 **Axial**



Note: I_O = 6A with PC Board Mtg., T_A = 60°C; I_O = 22A, 1/8" Leads, T_L = 60°C

Fig. Z27 **Press Fit**

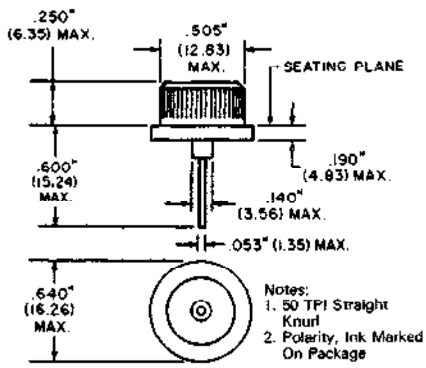


Fig. Z28 **Press Fit**

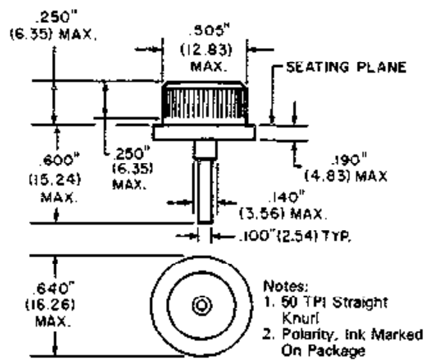
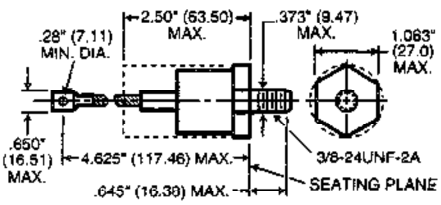
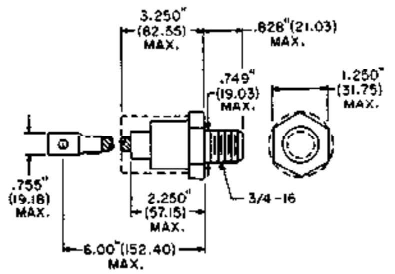


Fig. Z29 **DO-8**



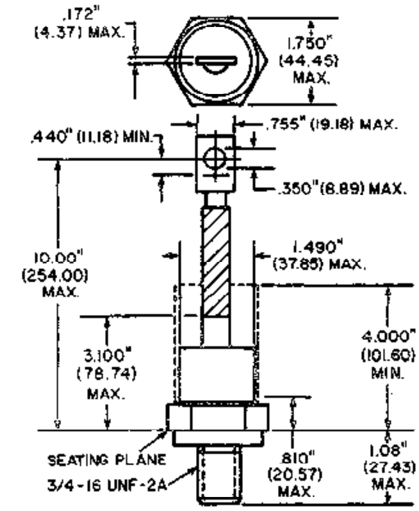
Torque to 90 in-lbs min.
100 in-lbs max

Fig. Z30 **DO-9**



Torque to 275 in-lbs. Min;
320 in-lbs. Max

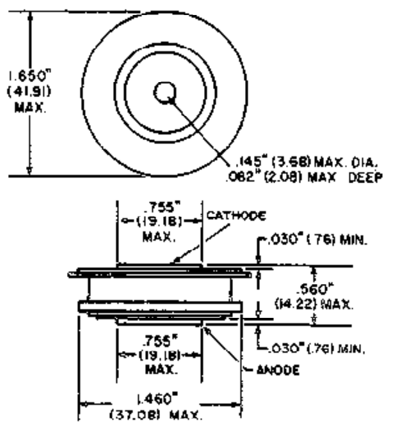
Fig. Z31 **SR-75**



Torque to 360 in-lbs. Max

Fig. Z32 **HR-16**

Min. Test Pressure 200 Lbs (.9 KN)
Operating Pressure 1400 Lbs (6.2 KN)



Industrial Rectifier Outlines (cont'd)

Fig. Z33 **HR-23**

Min. Test Pressure 200 Lbs (.9 KN)
Operating Pressure 2400 Lbs (10.7 KN)

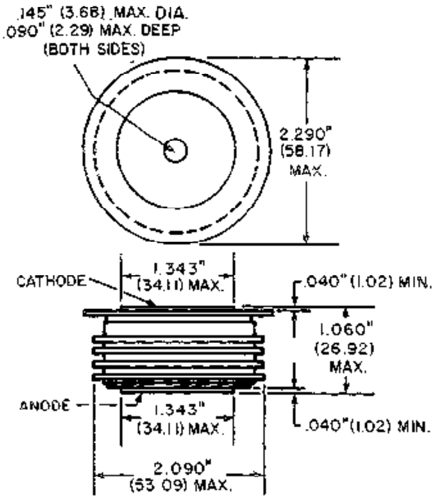


Fig. Z34 **HR-29**

Min. Test Pressure 200 Lbs (.9 KN)
Operating Pressure 6000 Lbs (26.7 KN)

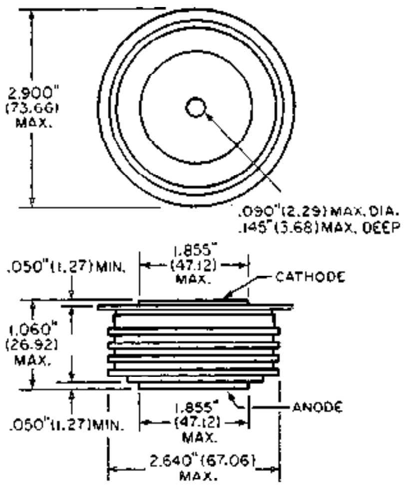


Fig. Z41A **TO-220 (2 Pin)**

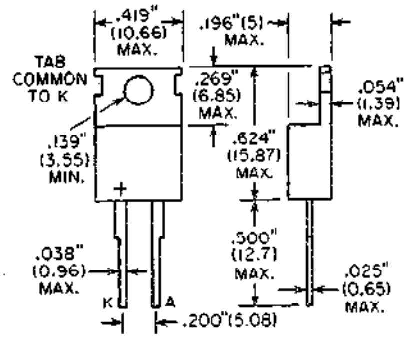
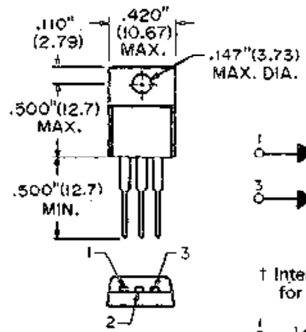
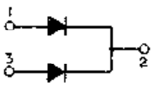
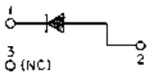


Fig. Z41B **TO-220**





† Internal Circuit
for ECG6013



ECG	1	2	3	TAB
6013†	K	A	NC	NC
6085	A	K	A	K
6086	A	K	A	K
6087	A	K	A	K
6088	A	K	A	K
6240	A	K	A	K
6241	A	K	A	K
6244°	K	A	K	A

° Internal Circuit
for ECG6244

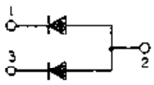
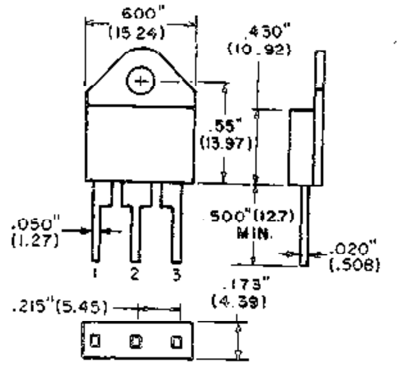


Fig. Z41C **TO-3P (TO-218)**



ECG	1	2	3	TAB
6090	A	K	A	K
6246	A	K	A	K
6247	A	K	A	K

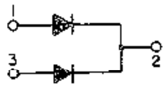
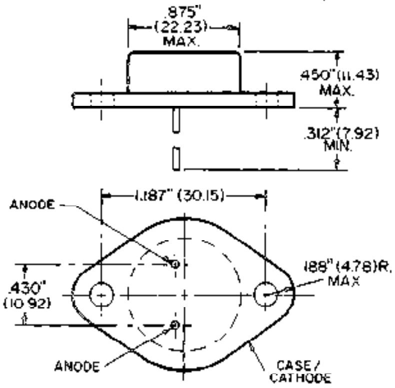
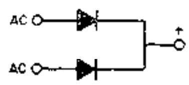


Fig. Z43 **TO-3**
Case/Cathode





COMMON CATHODE

Fig. Z70 **TO-247 (2 Pin)**

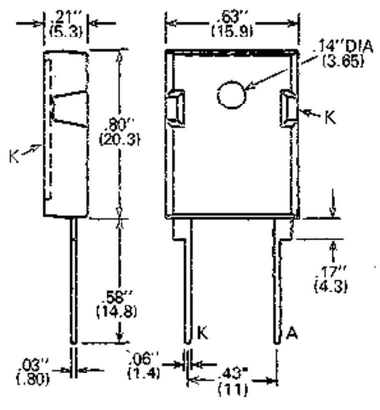


Fig. Z70A **TO-247**

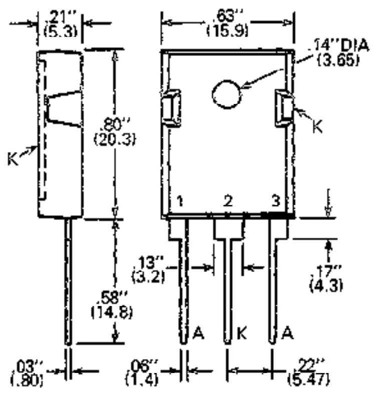
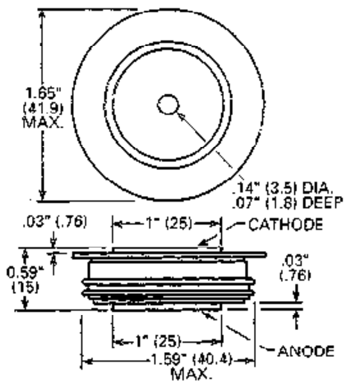
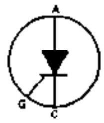


Fig. Z72

Min. Test Pressure 200 Lbs (.9 KN)
Operating Pressure 1400 Lbs (6.2 KN)

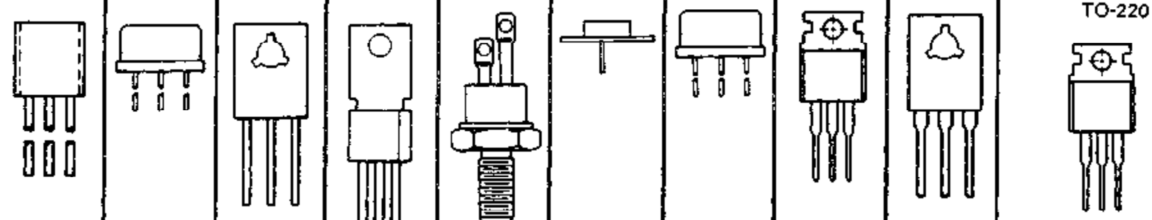


Silicon Controlled Rectifiers (SCR)



Phase Control - SCR

V_{DRM}	I_T Max Forward Current (Amps) — I_T RMS · All Conduction Angles / I_T Ave · Conduction Angle = 180°										
RMS	.8A	3A	4A		5A		* 7 A	8 A		10 A	
Av.	.5 A	1.9 A	2.5 A		3.2 A		4.3 A	5.1 A		6.2 A	
30	ECG5400		ECG5411	ECG5452							
50				ECG5453	ECG5470				ECG5442		
60	ECG5401		ECG5412								
100	ECG5402		ECG5413	ECG5454							
200	ECG5404	ECG5408	ECG5414	ECG5455		ECG5511	ECG5427		ECG5444	ECG5417	
400	ECG5405	ECG5409	ECG5415	ECG5457		ECG5512	ECG5428	ECG5437	ECG5446	ECG5418	ECG5426
600	ECG5406	ECG5410	ECG5416	ECG5458	ECG5476		ECG5429	ECG5438	ECG5448	ECG5419	
I_{GT} Min	200 µA #	10 mA	200 µA #	200 µA #	10 mA	15 mA	15 mA	200 µA #	30 mA	15 mA	200 µA #
V_{GT} Max (V)	0.8	1.5	1.0	0.8	1.5	2.0	1.5	1.5	1.5	1.5	0.8
I_{Surge} (A)	6.0	30	25	20	100	60	100	100	80	100	100
I_{Hold} Min (mA)	5.0	20	5.0	3.0	25	20	20	6.0	4.0	30	3.0
V_{GFM} (V)	8.0	10	6.0	6.0	6.0	10	6.0	5.0	6.0	5.0	5.0
V_{GRM} (V)	8.0	10	6.0	6.0	6.0	5.0	6.0	5.0	6.0	5.0	5.0
$V_{F\ on}$ (V) Max	1.7	1.6	2.0	2.2	2.0	2.8	2.6	2.0	1.5	1.6	1.6
P_G Av (W)	.01	0.3	0.1	0.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Operating Temp. Tj°C	-65 to +125	-40 to +125	-40 to +110		-40 to +110		-65 to +100	-40 to +110		-40 to +110	
d_v/d_t (Typ) V/µsec	30	30	10		50	200	100	10	50	20	
Fig. No.	Z36	Z35	Z38	Z40	Z48	Z42	Z35	Z41	Z39	Z41	
Package	TO-92	TO-5M	TO-126	TO-202	TO-64	TO-66	TO-5M	TO-220	TO-127	Isolated Tab TO-220	



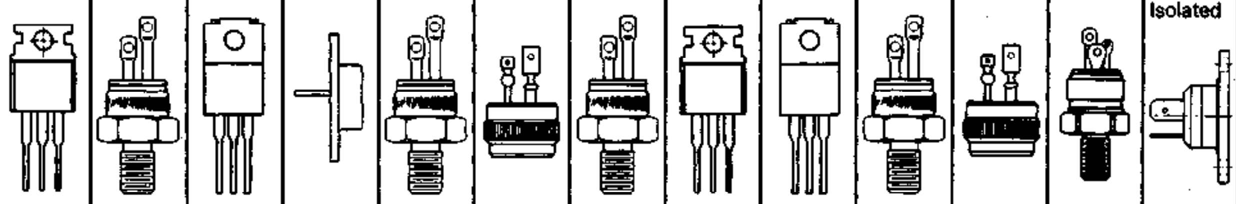
Return Gate to Cathode through 1000 ohms minimum.

* If I_{TRMS} exceeds 4 A, anode connection must be made to case.

Package Outlines - See Page 1-129

Phase Control - SCR (cont'd)

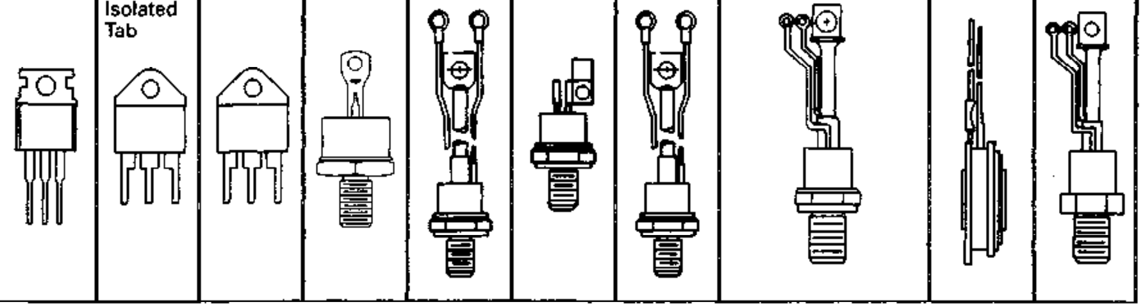
VDRM		IT Max Forward Current (Amps) IT RMS - All Conduction Angles											IT Ave - Conduction Angle = 180°
	RMS	10 A			12.5 A	16 A	20 A	25 A			35 A		40 A
	Av.	6.2 A			8 A	10 A	13 A	16 A			22 A		25 A
50		ECG5461				ECG5501		ECG5521	ECG5550		ECG5541		
100		ECG5462	ECG5491			ECG5502		ECG5522			ECG5542		
200		ECG5463	ECG5492			ECG5504	ECG5514	ECG5524	ECG5552		ECG5543	ECG5517	ECG5562
400		ECG5465	ECG5494		ECG314	ECG5507	ECG5515	ECG5527	ECG5554		ECG5545	ECG5518	ECG5564
600		ECG5466	ECG5496			ECG5509	ECG5516	ECG5529	ECG5556		ECG5547	ECG5519	ECG5566
800		ECG5468		ECG5440				ECG5531	ECG5558	ECG5460	ECG5548		
IGT Min (mA)	15	15	15	40	25	15	40	40	40	40	40	40	50
VGT Max (V)	1.5	2.0	1.5	2.0	2.5	2.0	2.0	1.5	1.5	1.5	2.0	1.6	2.0
ISurge (A)	100	200	100	200	125	200	150	300	300	325	350	350	440
IHold Min (mA)	20	20	20	50	25	20	50	40	40	50	50	50	75
VGFM (V)	10	10	5	10	10	10	10	10	10	10	10	10	10
VGRM (V)	5.0	10	5	5.0	5.0	5.0	5.0	10	10	10	10	10	10
VF on Max (V)	1.8	2.5	1.8	1.8	2.5	2.4	2.0	1.8	1.8	1.5	1.8	1.4	1.8
PG Av (W)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Operating Temp. Tj°C	−40 to +100		−40 to +110	−40 to +100	−65 to +125	−40 to +100	−65 to +125	−40 to +125		−40 to +100			−40 to +125
dv/dt (Typ) V/µsec	100	30	50	100	30	50	30	50	100	50			500
Fig. No.	Z41	Z49	Z41D	Z43	Z49	Z46	Z49	Z41	Z41D	Z49	Z46	Z50	Z45A
Package	TO-220	TO-48	TO-220J	TO-3	TO-48	1/2" Press Fit	TO-48	TO-220	TO-220J	TO-48	1/2" Press Fit	Isolated Stud	TO-3 Flange Isolated



Package Outlines - See Page 1-129

Phase Control - SCR (cont'd)

V_{DRM}	IT RMS - All Conduction Angles			IT Max Forward Current (Amps)						IT Ave - Conduction Angle = 180°
RMS	40 A	50 A	55 A	80 A	125 A		175 A	275 A	360 A	470 A	550 A
Av.	25 A	32 A	35 A	50 A	80 A		110 A	175 A	230 A	300 A	350 A
200				ECG5567	ECG5570	ECG5575		ECG5580		ECG5590	
400			ECG5539								
600				ECG5568	ECG5572	ECG5577	ECG5576	ECG5582	ECG5586	ECG5591	ECG5587
800	ECG5536	ECG5538	ECG5540								
1200				ECG5569	ECG5574	ECG5579		ECG5584		ECG5592	ECG5589
1600				ECG5571			ECG5578	ECG5585	ECG5588	ECG5597	ECG5593
I_{GT} Min (mA)	40	80	40	100	100	100	150	150	150	150	200
V_{GT} Max (V)	1.5	1.5	1.5	3	3	3	3	3	3	3	3
I_{SURGE} (A)	400	500	600	1000	1800	1800	1800	4500	5500	4500	8000
I_{Hold} Min (mA)	60	150	60	200	200	200	300	300	300	300	300
V_{GFM} (V)	10	10	10	20	5	5	5	5	5	5	5
V_{GRM} (V)	10	5	5	10	5	5	5	5	5	5	5
V_F on (V) Max	1.8	1.9	1.8	2.5	2.2	2.2	1.5	1.5	1.5	2	2
P_G Av (W)	0.5	1	0.8	2	3	3	3	3	3	3	3
Operating Temp. Tj°C	-40 to + 125	-40 to + 125	-40 to +125	-40 to + 125	-40 to +125	-40 to +125		-40 to +125	-40 to +125	-40 to +125	-40 to +125
dv/dt (Max) V/µsec	50	500	375	200	300	300	400	300	300	300	300
Non-Repetitive di/dt Max Amps/µsec	—	—	—	200	800	800	600	800	800	800	800
Fig. No.	Z41	Z40A	Z40A	Z47	Z52	Z51	Z52	Z53		Z55	Z54
Package	TO-220	TO-218 Isolated Tab	TO-218	TO-65	TO-94	TO-83	TO-94	TO-93		HT-16	ST-75



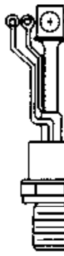
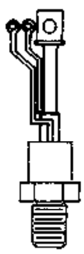
Package Outlines - See Page 1-129

Phase Control - SCR (cont'd)

IT RMS		IT Max Forward Current (Amps) All Conduction Angles / IT Ave - Conduction Angle = 180°			
VDRM	RMS	750 A	820 A	850 A	1880 A
	Av.	400 A	720 A	550 A	1200 A
200				ECG5594	
400					
600		ECG5551	ECG5555	ECG5595	ECG5598
800					
1200				ECG5596	ECG5599
1600		ECG5553	ECG5557	ECG5561	ECG5563
IGT Min (mA)		150	200	200	200
VGT Max (V)		3	3	3	3
ISURGE (A)		5000	8000	8000	27,000
IHold Min (mA)		300	300	300	500
VGFM (V)		5	5	5	5
VGRM (V)		5	5	5	5
VF on (V) Max		2	2	2	1.7
PG Av (W)		3	3	3	3
Operating Temp. Tj°C		-40 to +125	-40 to +125	-40 to +125	-40 to +125
dv/dt (Max) V/µsec		300	300	300	300
Non-Repetitive di/dt Max Amps/µsec		800	800	800	800
Fig. No.		Z55	Z73	Z56	Z57
Package		HT-16 	HT-16A 	HT-23 	HT-29 

Package Outlines - See Page 1-129

High Speed - SCR (Switching)

V_{DRM}	I_T Max Forward Current (Amps) I_T RMS - All Conduction Angles; I_T Ave - Conduction Angle = 180°					
RMS	125 A		275 A	400 A	475 A	700 A
Av.	80 A		175 A	250 A	300 A	450 A
600	ECG5368	ECG5371	ECG5374	ECG5380	ECG5377	ECG5386
1200	ECG5369	ECG5372	ECG5375	ECG5381	ECG5378	ECG5387
I_{GT} Min (mA)	150	150	150	150	150	150
V_{GT} Max (V)	3.0	3.0	3.0	3.0	3.0	3.0
I_{Surge} (A)	1400	1400	4500	4500	8000	8000
V_{GRM} (V)	5.0	5.0	5.0	5.0	5.0	5.0
V_F on (V) Max	2.0	2.0	1.85	1.85	2.6	2.6
P_G Av (W)	3.0	3.0	3.0	3.0	3.0	3.0
Operating Temp. T_j°C	−40 to +125		−40 to +125	−40 to +125	−40 to +125	−40 to +125
Repetitive d_i/d_t Amps/μsec Max	150	150	300	300	400	400
Non-Repetitive d_i/d_t Amps/μsec Max	800	800	800	800	800	800
d_v/d_t (Max) V/μsec	200	200	300	300	300	300
Turn-Off Time t_q μsec Max	10	15	10	20	25	25
Fig. No.	Z51	Z52	Z53	Z55	Z54	Z56
Package	TO-83 	TO-94 	TO-93 	HT-16 	ST-75 	HT-23 

Gate Turn-Off - SCR (For TV Applications)

ECG Type	Description/ Application	V_{DRM} Volts	I_{TRMS} Amps	I_{Surge} (Amps)	I_{GT} (mA)	V_{GT} (Volts)	I_{GO} (mA)	V_{GO} (Volts)	Package Case	Package Fig. No.
ECG276	Gate Turn Off SCR	1250	5	80	75	1.5	−450	7	TC-9	Z44
ECG279A	Gate Turn Off SCR	350	.25	3	.38	1.5	−115	3	SC-51	Z37

TV Horizontal Deflection - SCR

ECG Type	Description/ Application	V_{DRM} (Volts)	I_{TRMS} (Amps)	I_{Surge} (Amps)	I_{GT} (mA)	V_{GT} (Volts)	I_{Hold} (mA)	Turn-Off Time T_Q (μsec)	Package Case	Package Fig. No.
ECG230	TV Horizontal Deflection Trace Switch	700	5	80	50	2.0	100	2.5	TO-66	Z42
ECG231	TV Horizontal Deflection Commutating Switch	600	5	80	50	2.0	100	4.3	TO-66	Z42

Package Outlines - See Page 1-129

TV Power Supply Switching - SCR

ECG Type	Description/ Application	V_{DRM} (Volts)	I_{TRMS} (Amps)	I_{Surge} (Amps)	I_{GT} (mA)	V_{GT} (Volts)	I_{Hold} (mA)	Turn-Off Time T_Q (μsec)	Package Case	Package Fig. No.
ECG5424	SCR, Hi Speed Sw, Power Supply Control Regulator	400	4.7	55	20	3	135	4.0	TO-220	Z41
ECG5425	SCR, Hi Speed Power Supply Control	525	5	80	40	2.7	20	2.5	TO-66	Z42

Integrated Thyristor/Rectifiers (ITR)

ECG Type	Description/ Application	V_{DRM} (Volts)	I_{TRMS} (Amps)	I_{Surge} (Amps)	I_{GT} (mA)	V_{GT} (Volts)	I_{Hold} (mA)	Turn-Off Time T_Q (μsec)	Package Case	Package Fig. No.
ECG308	TV Horizontal Deflection Commutating Switch	800	5	70	50	3.5	100	5.5	TO-66	Z42
ECG308P	TV Horizontal Deflection Commutating Switch	750	8	80	45	4.0	---	4.2	TO-220	Z41
ECG310	TV Horizontal Deflection Trace Switch	800	5	70	50	3.5	100	3.0	TO-66	Z42
ECG310P	TV Horizontal Deflection Trace Switch	750	8	80	45	4.0	---	2.4	TO-220	Z41

G

SCR Outlines

Fig. Z35 TO-5M

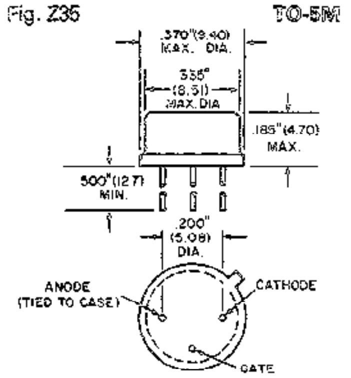
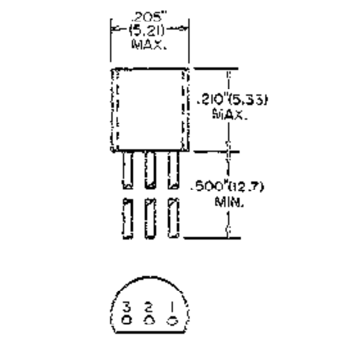
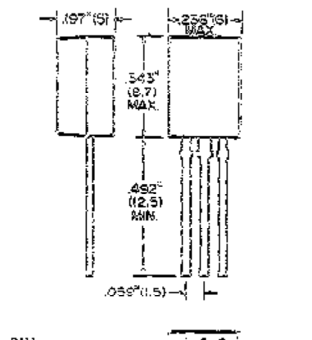


Fig. Z36 TO-92



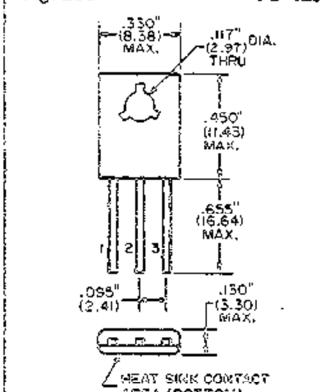
PIN
1. CATHODE (K)
2. GATE (G)
3. ANODE (A)

Fig. Z37 SC-61



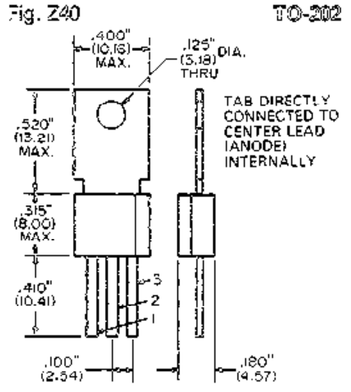
PIN
1. GATE (G)
2. ANODE (A)
3. CATHODE (K)

Fig. Z38 TO-126



PIN 1. CATHODE (K)
2. ANODE (A) - HEAT SINK AREA
3. GATE (G)

Fig. Z40 TO-202



PIN 1. CATHODE
2. ANODE
3. GATE LEAD ADJACENT TO CHAMBER

Fig. Z40A TO-218

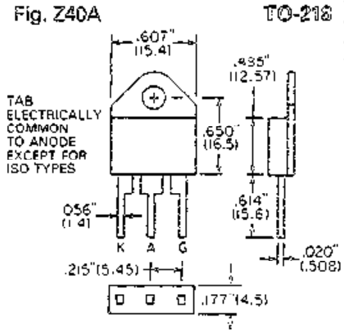
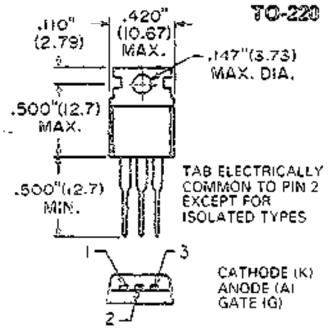


Fig. Z41 TO-220

ECG	1	2	3	TAB
308P	G	A	K	A
310P	G	A	K	A
5417	K	A	G	Iso
5418	K	A	G	Iso
5419	K	A	G	Iso
5424	K	A	G	A
5426	K	A	G	Iso
5437	K	A	G	A
5438	K	A	G	A
5461	K	A	G	A

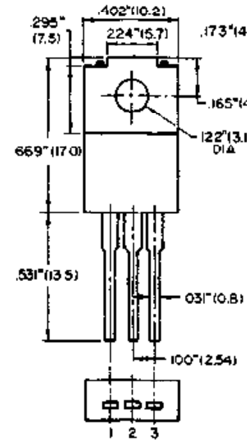
ECG	1	2	3	TAB
5462	K	A	G	A
5463	K	A	G	A
5465	K	A	G	A
5466	K	A	G	A
5468	K	A	G	A
5550	K	A	G	A
5552	K	A	G	A
5554	K	A	G	A
5556	K	A	G	A
5558	K	A	G	A



CATHODE (K)
ANODE (A)
GATE (G)

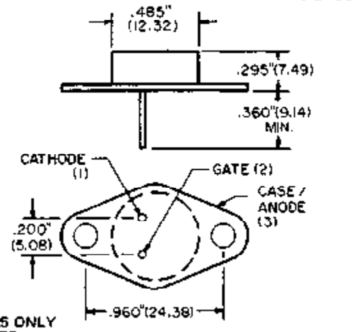
SCR Outlines (cont'd)

Fig. Z41D **TO-220J**



PIN 1. CATHODE
2. ANODE
3. GATE

Fig. Z42 **TO-66**



FOR ECG5425 ONLY
PIN 1. GATE
2. CATHODE

Fig. Z43 **TO-3**

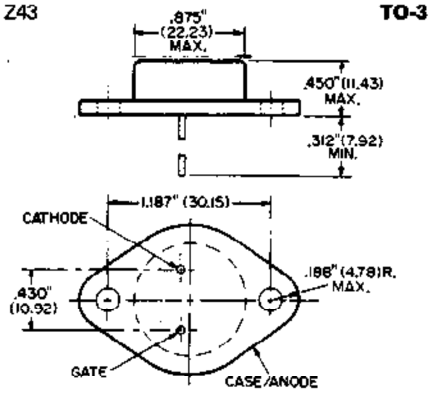


Fig. Z44 **TC-9**

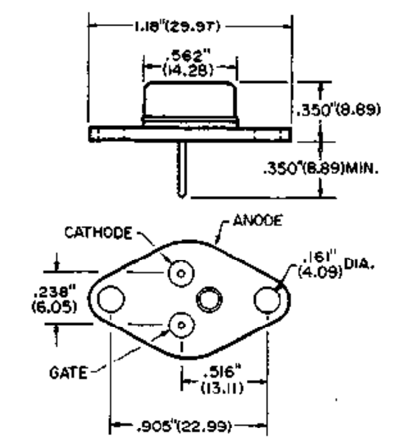
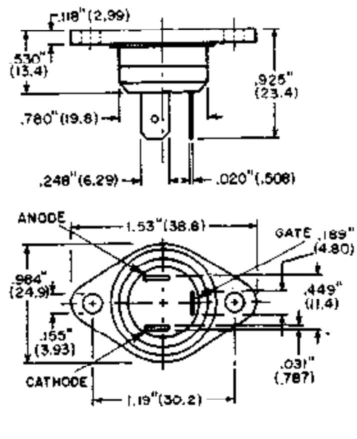


Fig. Z45A **TO-3 Flange Isolated**



ALL TERMINALS ELECTRICALLY ISOLATED FROM CASE

Fig. Z46 **1/2" Press Fit**

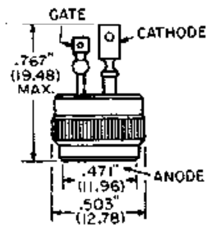
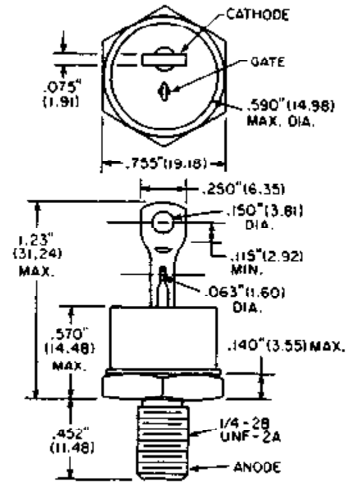
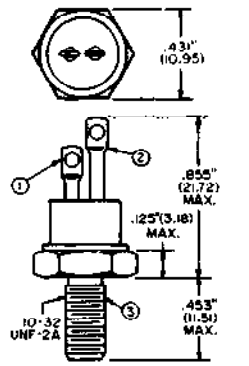


Fig. Z47 **TO-65**



TORQUE TO 27 in-lbs MAX.

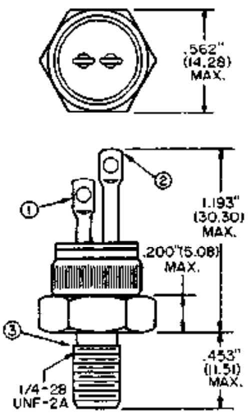
Fig. Z48 **TO-64**



PIN
1. GATE (G)
2. CATHODE (K)
3. ANODE (A)

Torque to 12 in-lbs min; 15 in-lbs max

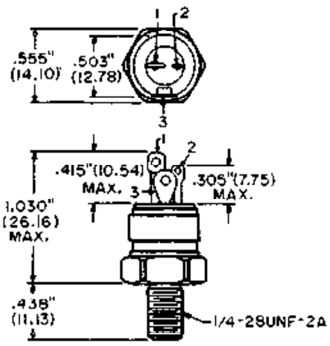
Fig. Z49 **TO-48**



PIN 1. GATE (G)
2. CATHODE (K)
3. ANODE (A)

Torque to 25 in-lbs min; 30 in-lbs max

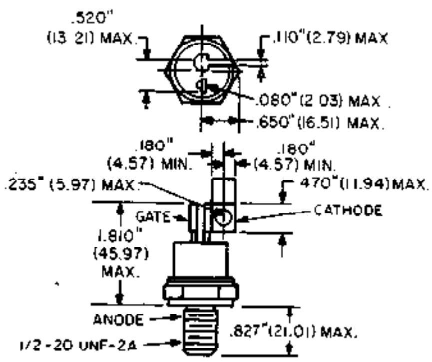
Fig. Z50 **TO-48 Isolated Stud**



PIN 1 CATHODE
2 GATE
3 ANODE

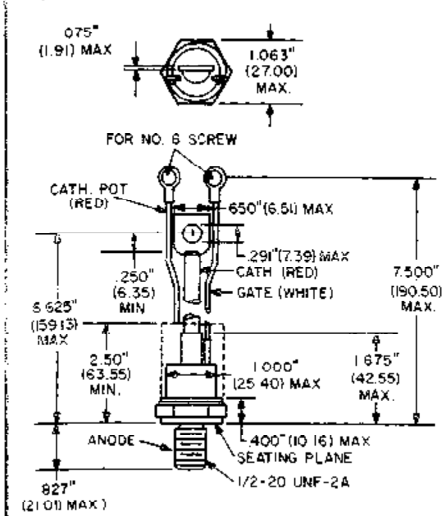
Torque to 25 in-lbs min; 30 in-lbs max

Fig. Z51 **TO-83**



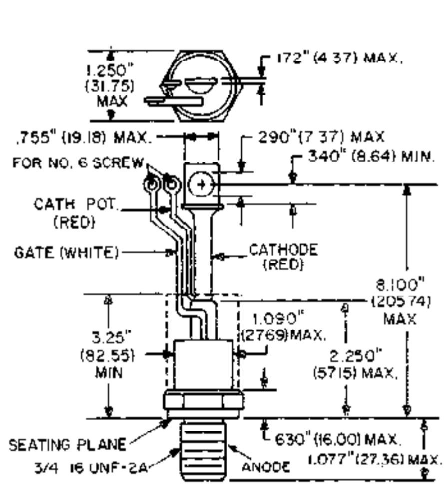
TORQUE TO 130 IN-LBS. MAX.

Fig. Z52 **TO-94**



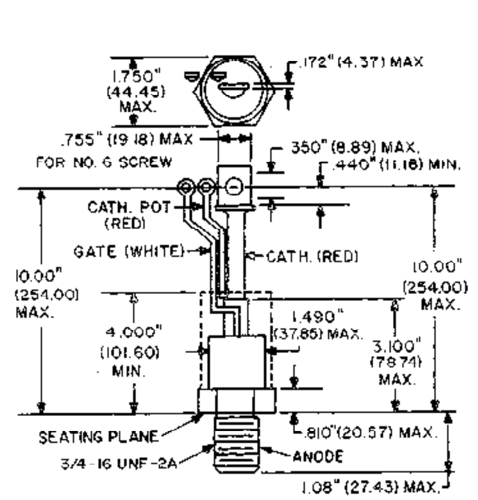
Torque to 130 in-lbs. Max.

Fig. Z53 **TO-93**



Torque to 300 in-lbs. Max.

Fig. Z54 **ST-75**



Torque to 360 in-lbs. Max.

Fig. Z55 **HT-16**

Min. Test Pressure 200 Lbs (.9 KN)
Operating Pressure 1400 Lbs (6.2 KN)

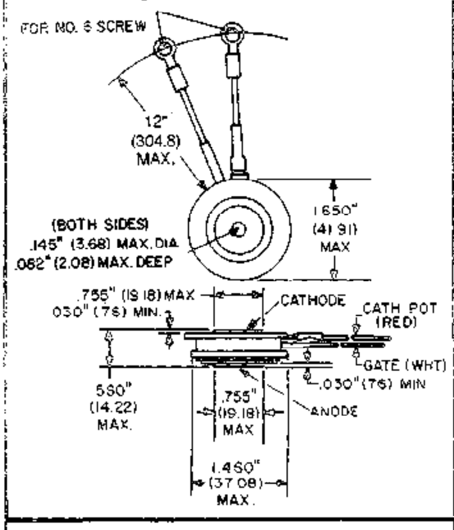


Fig. Z56 **HT-23**

Min. Test Pressure 200 Lbs (.9 KN)
Operating Pressure 2400 Lbs (10.7 KN)

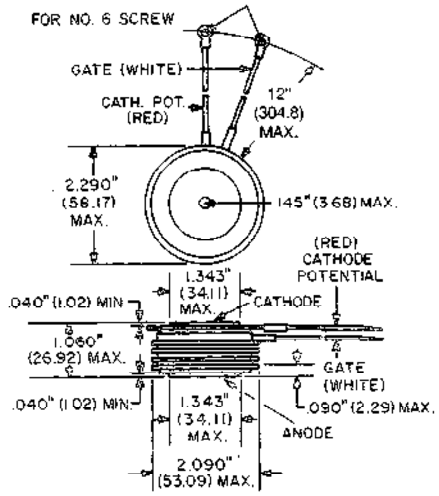


Fig. Z57 **HT-29**

Min. Test Pressure 200 Lbs (.9 KN)
Operating Pressure 5500 Lbs (24.5 KN)

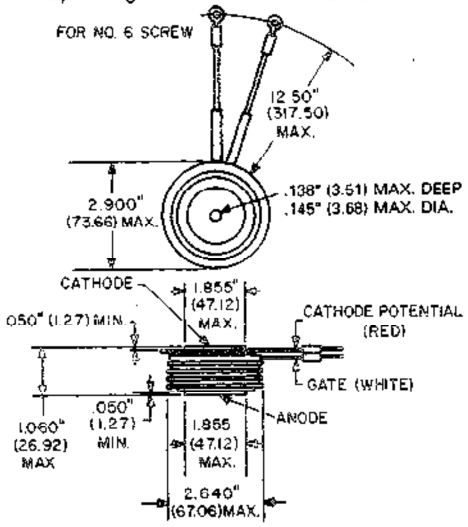
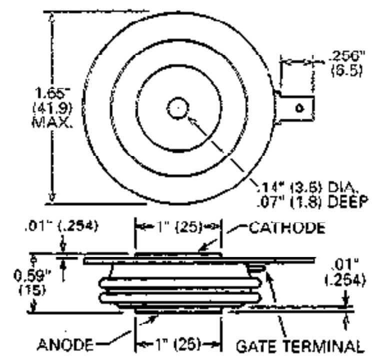


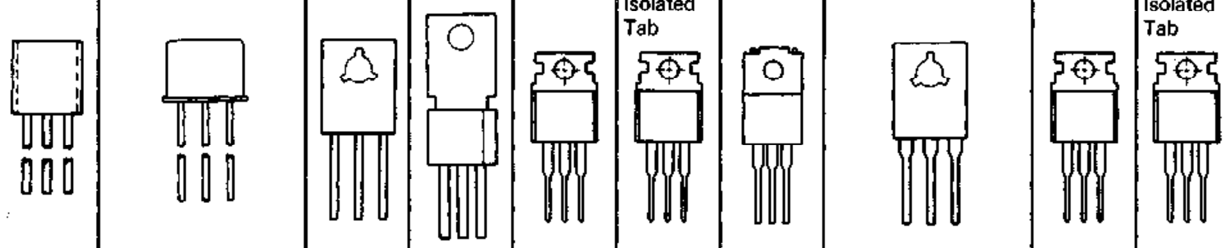
Fig. Z73 **HT-16A**

Min. Test Pressure 200 Lbs. (.9 KN)
Operating Pressure 1400 Lbs. (6.2 KN)



TRIACS

VRRM DC or Peak Volts	IT RMS Max Forward Current (Amps) 0.8 A	2.5 A		4 A		8 A			10 A			
50				ECG5601					ECG5612		ECG5631	
100		ECG5640	ECG5650	ECG5602					ECG5613	ECG5623	ECG5632	
200	ECG5655	ECG5641	ECG5651	ECG5603					ECG5614		ECG5633	
400	ECG5656	ECG5642	ECG5652	ECG5605	ECG5629	ECG5608	ECG5638		ECG5616		ECG5635	
600	ECG5657	ECG5643	ECG5653	ECG5607		ECG5609			ECG5618		ECG5637	ECG5645
800						ECG5610		ECG5620				
I_{GT} Min (mA) Quadrants I & III	5.0	25	3.0	30	3.0	10	10	35 Quads I, II, III	50	50	50	50
I_{GT} Min (mA) Quadrants II & IV	5.0	40	3.0	—	3.0	10	10	70 Quad IV	75	—	50*	75
V_{GT} Max (V)	2.0	2.2	2.2	2.5	2.0	2.5	2.0	1.5	2.5	2.0	2.5	2.5
I_{Surge} Max (A)	8.0	25	25	30	40	80	80	60	100	100	100	120
I_{Hold} Min (mA)	20	35	5.0	30	5.0	15	10	20	50	50	50	50
V_{on} Max (V)	1.5	1.8	2.2	2.0	1.6	1.5	1.6	1.7	1.8	1.8	1.65	1.6
V_{GM} (V)	±5.0	±5.0	±5.0	±5.0	±5.0	±10	±5.0	±10	±5.0	±5.0	±10	±5.0
P_G Av (W)	.01	.05	.05	.5	.3	.5	.4	.5	.5	.5	.5	.5
Operating Temperature T_J °C	−40 to +110	−65 to +100	−40 to +90	−40 to +110	−40 to +110	−40 to +110	−40 to +110	−40 to +120	−65 to +100	−40 to +100	−40 to +100	−40 to +110
Off State dv/dt (Typ) V/μsec	20	100	5	5	10	25	25	100	5	5	50	60
Operating Quadrants	I,II,III,IV	I,II,III,IV	I,II,III,IV	I,III	I,II,III,IV	I,II,III,IV	I,II,III,IV	I,II,III,IV	I,II,III,IV	I,III	I,II,III	I,II,III,IV
Fig. No.	Z36	Z61		Z38	Z40	Z41	Z41	Z41D	Z39		Z41	Z41
Package	TO-92	TO-5		TO-126	TO-202	TO-220	TO-220 Isolated Tab	TO-220J	TO-127		TO-220	TO-220 Isolated Tab

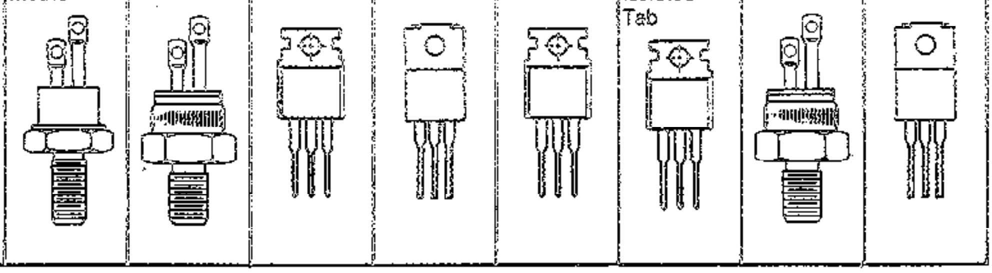


* 3 Mode device not specified in Quadrant IV

Package Outlines - See page 1-134

TRIACS (cont'd)

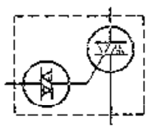
VRRM DC or Peak Volts	IT RMS Max Forward Current (Amps) 12 A	15 A	15 A	16 A	25 A	25 A	25 A	25 A
50							ECG5681	
100							ECG5682	
200		ECG5673	ECG56004		ECG56015	ECG56019	ECG5683	
400		ECG5675	ECG56006		ECG56016	ECG56020	ECG5685	
600	ECG5667A	ECG5677	ECG56008		ECG56017		ECG5687	
800	ECG5668A		ECG56010	ECG5671	ECG56018			ECG5699
1000	ECG5669A							
IGT Min (mA) Quadrants I & III	100	50	40	35 Quads I,II,III	50 Quads I,II,III	50	75	50 Quads I,II,III
IGT Min (mA) Quadrants II & IV	100	80	75	70 Quad IV	75 Quad IV	50	100	80 Quad IV
VGT Max (V)	2.5	2.5	2.5	1.5	2.5	2.5	3.0	2.0
ISurge Max (A)	120	100	150	150	250	200	225	250
IHold Min (mA)	100	75	40	30	50	70	75	50
Von Max (V)	2.2	1.8	1.6	1.5	1.85	1.8	1.9	2.0
VGM (V)	---	±5.0	±10	±10	±10	±10	±5.0	±5.0
PG Av (W)	1	.5	.5	.5	.5	.5	.75	.5
Operating Temperature TJ °C	−40 to +125	−65 to +100	−40 to +125	−40 to +125	−40 to +125	−40 to +110	−40 to +100	−40 to +125
Off State dv/dt (Typ) V/µsec	100	100	50	100	40	60	100	40
Operating Quadrants	I,II,III,IV	I,II,III,IV	I,II,III,IV	I,II,III,IV	I,II,III,IV	I,II,III	I,II,III,IV	I,II,III,IV
Fig. No.	Z48A	Z49	Z41	Z41D	Z41	Z41	Z49	Z41D
Package	TO-64 Metric	TO-48	TO-220	TO-220J	TO-220	TO-220 Isolated Tab	TO-48	TO-220J

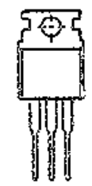


3 Mode device not specified in Quadrant IV

Package Outlines - See page 1-134

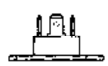
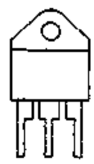
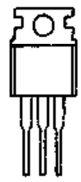
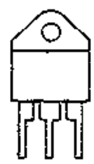
TRIAC with Internal Trigger DIAC



ECG Type	IT RMS Amps	VRRM DC or Pk Volts	Operating Quadrants	VBO (V)	IBO (µA)	Max Ratings VF (on) Volts	ISurge Amps	IHold mA	Oper Temp TJ °C	Off State dv/dt V/µsec	Fig. No.	Package TO-220 Isolated Tab
CG5646	10 A	600	I, II, III, IV	35 Min	200	1.6	110	50	−40 to +100	60	Z41	

G

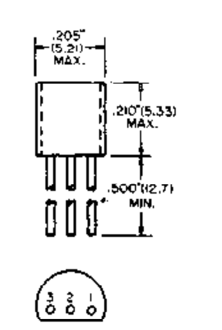
TRIACS (cont'd)

VRRM DC or Peak Volts	IT RMS Max Forward Current (Amps)						
	40 A						45 A
200	ECG5693	ECG56022		ECG5688			
400	ECG5695	ECG56024		ECG5689	ECG56030		
600	ECG5697	ECG56026	ECG5679	ECG5690	ECG56031		ECG56033
800						ECG56028	
1000							
IGT Min (mA) Quadrants I & III	50	50	50	50	100 Quads I,II,III	50	50 Quads I,II,III
IGT Min (mA) Quadrants II & IV	80	80	50*	80	150 Quad IV	75	100 Quad IV
VGT Max (V)	2.5	2.5	2.5	2.5	1.5	2.0	1.5
ISurge Max (A)	300	300	300	300	300	350	300
IHold Min (mA)	60	60	75	60	100	75	80
Von Max (V)	2.0	2.0	1.8	2.0	1.8	1.8	1.8
VGM (V)	±10	±10	±10	±10	±10	±10	±10
PG Av (W)	.75	.75	.8	.75	1	.5	1
Operating Temperature TJ °C	−65 to +110	−65 to +110	−40 to +110	−40 to +110	−40 to +125	−40 to +125	−40 to +125
Off State dv/dt (Typ) V/μsec	100	100	60	100	250	50	250
Operating Quadrants	I,II,III,IV	I,II,III,IV	I,II,III	I,II,III,IV	I,II,III,IV	I,II,III,IV	I,II,III,IV
Fig. No.	Z49	Z50	Z63	Z62	Z40A	Z41	Z40A
Package	TO-48 	TO-48 Isolated Stud 	Square Pak TO-3 (Isolated Flange) 	1/2" Press Fit 	TO-218 Isolated Tab 	TO-220 	TO-218 

* 3 Mode device not specified in Quadrant IV

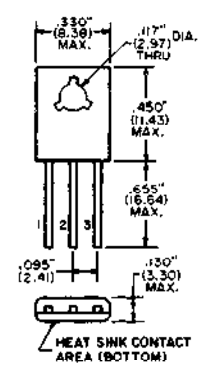
TRIAC Outlines

Fig. Z36 **TO-92**



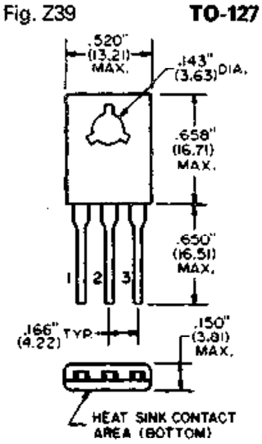
1 MAIN TERMINAL 1(MT1)
2 GATE (G)
3 MAIN TERMINAL 2(MT2)

Fig. Z38 **TO-126**



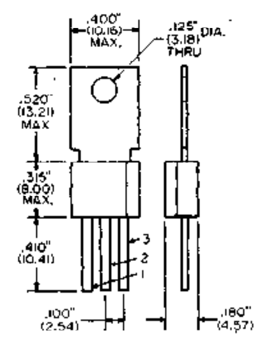
PIN
1. MAIN TERMINAL 1 (MT1)
2. MAIN TERMINAL 2 (MT2) HEAT SINK AREA
3. GATE (G)

Fig. Z39 **TO-127**



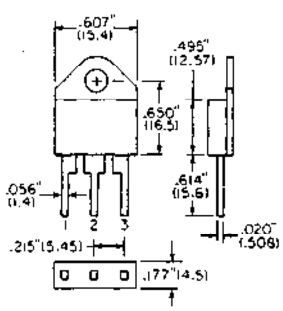
PIN
1. MAIN TERMINAL 1 (MT1)
2. MAIN TERMINAL 2 (MT2) HEAT SINK AREA
3. GATE (G)

Fig. Z40 **TO-202**



1. MT1
2. MT2
3. GATE
TAB COMMON TO PIN 2

Fig. Z40A **TO-218**

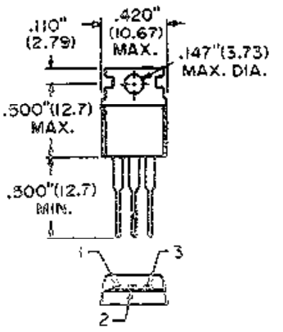


1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE

Tab Electrically Common to Pin 2
Except for Isolated Types

TRIAC Outlines (cont'd)

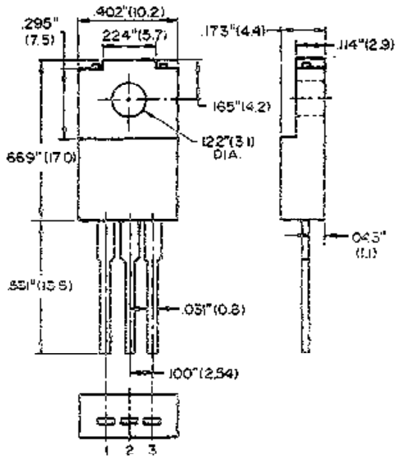
Fig. Z41 — **TO-220**



PIN
1. MAIN TERMINAL 1 (MT_1)
2. MAIN TERMINAL 2 (MT_2)
3. GATE (G)

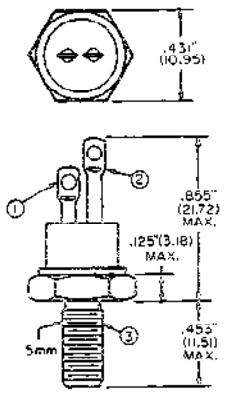
Tab Electrically Common to Pin 2 except for Isolated Types

Fig. Z41D — **TO-220J**



1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE

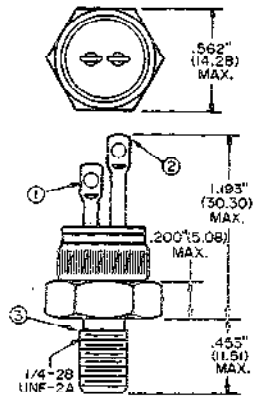
Fig. Z48A — **TO-64M**



PIN
1. GATE (G)
2. MAIN TERMINAL 1 (MT_1)
3. MAIN TERMINAL 2 (MT_2)

Torque to 12 in-lbs min.
15 in-lbs max

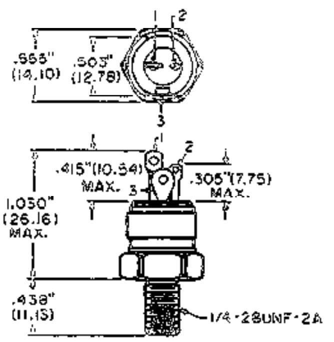
Fig. Z49 — **TO-48**



PIN
1. GATE (G)
2. MAIN TERMINAL 1 (MT_1)
3. MAIN TERMINAL 2 (MT_2)

Torque to 25 in-lbs min;
30 in-lbs max

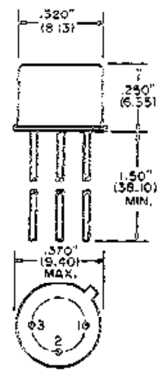
Fig. Z50 — **TO-48 Isolated Stud**



PIN
1. MAIN TERMINAL 1
2. GATE
3. MAIN TERMINAL 2

Torque to 25 in-lbs min;
30 in-lbs max

Fig. Z61 — **TO-5**



PIN 1. MAIN TERMINAL 1 (MT_1)
PIN 2. GATE (G)
PIN 3. MAIN TERMINAL 2 (MT_2)
COMMON TO CASE

Fig. Z62 — **1/2" Press Fit**

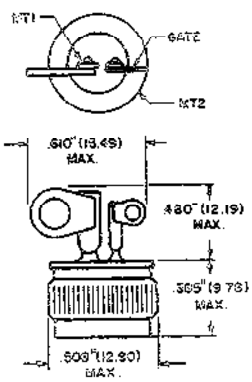
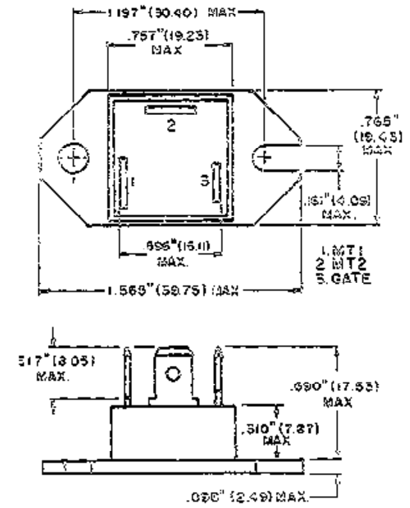


Fig. Z63 — **Square Pak TO-3 Isolated Flange**

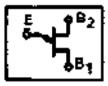


All Terminals Electrically Isolated from Case.

G

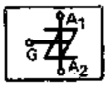
Special Purpose Devices

Silicon Unijunction Transistors (UJT)



ECG Type	I_E mA	η Min Max	R_{BBO} (Kohms) Min	R_{BBO} (Kohms) Max	Inter-Base Volts	P_D mW	I_{EO} μ Amps	I_V (Min) mA	Package/ Outline No.
ECG6400B	50	0.54 - 0.67	4	12	55	450	1 Max	8	TO-39 Fig. S1

Silicon Bilateral Switch (SBS)



ECG Type	I_{FM} Rep Amps	I_F Max mA	V_S Volts	I_S Max μA	I_H mA	P_D mW	Package/ Outline No.
ECG6403	1.0	175	6 Min 10 Max	500	1.5	300	Fig. S3

Fig. S1 TO-39

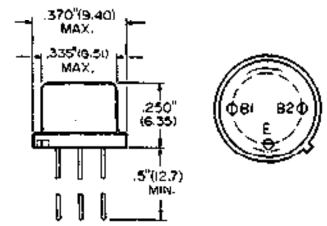


Fig. S2 TO-18

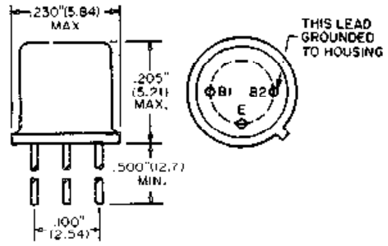
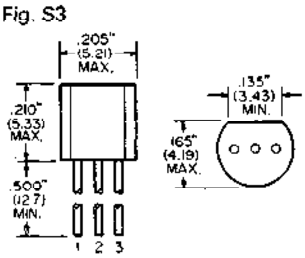
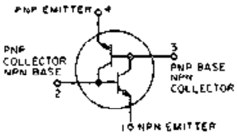


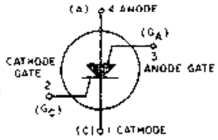
Fig. S3 TO-92



ECG	1	2	3
6403	A_1	G	A_2
6404	A	G	C



Transistor Equivalent Circuit



Thyristor Circuit

Silicon Controlled Switch (SCS)

ECG Type		BV_{CBO} Volts	BV_{EBO} Volts	BV_{CER} Volts	H_{FE} Min	I_{GT} Max mA	V_{GT} Max Volts	I_T Max mA	I_T Pk Max mA	I_{TSM} Max mA	I_H Max mA	P_D Max mW	Package/ Outline No.
ECG239	PNP	−70	−70	−70	0.1	1.0	0.8	50	100	500	1.0	200	TO-72 Fig. S8
	NPN	70	5	70	15	1.0	1.2						

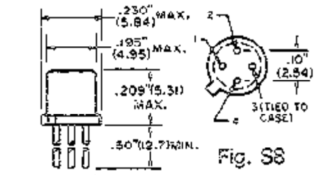
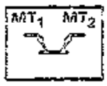


Fig. S8

Bilateral Trigger Diodes (DIAC's)



ECG Type	I_{Pulse} Amps	V_{BO} (+) Volts	V_{BO} (−) Volts	I_{BO} (+) Max mA	I_{BO} (−) Max mA	ΔV_F Volts	ΔV_R Volts	P_D mW DO-7	P_D mW TO-92	Package/ Outline No.
ECG6407*	2	28±4	28±4	1	1	6	6	250	300	DO-7 Fig. S9
ECG6408*	2	32±4	32±4	1	1	6	6	250	300	TO-92 Fig. S10
ECG6411	2	40±5	40±5	1	1	6	6	250	--	DO-7 Fig. S9
ECG6412	2	63±7	63±7	1	1	6	6	250	--	

* May be shipped in either case style.

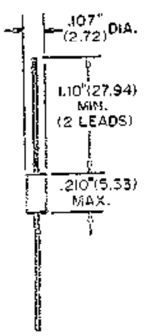


Fig. S9

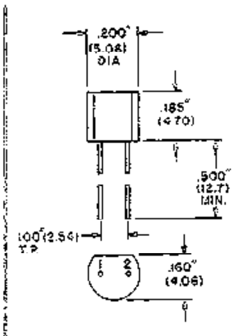
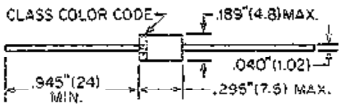


Fig. S10

Bidirectional Diode Thyristors (SYDAC)

ECG Type	Breakover Voltage V_{BO} (Volts)	Holding Current I_H (mAmps)	Effective Current I_{TRMS} (Amps)	Surge Current I_{Surge} (Amps)	On Voltage V_T (Volts)	Power Diss. P_D (mWatts)	Band Color *	Package Case	Package Fig. No.
ECG6415	45 to 60	50	1	13	1.5 Max	850	Red	DO-201	S16
ECG6416	55 to 65	50	1	13	1.5 Max	850	Gold		
ECG6417	95 to 113	50	1	13	1.5 Max	850	Orange		
ECG6418	104 to 118	50	1	13	1.5 Max	850	Blue		
ECG6419	110 to 125	50	1	13	1.5 Max	850	Green		



* Band Color denotes rated V_{BO} and is not cathode band.

Overvoltage Transient Suppressors
Metal Oxide Varistors (MOV)

ECG Type	Maximum Voltage RMS V_{ACM} (Volts)	Maximum Voltage DC V_{DCM} (Volts)	Maximum Voltage Clamping V_{CL} (Volts)	Nominal Varistor Voltage V_{NOM} Volts	Energy W_{TM} (Joules)	Peak Current I_{TM} (Amps)	Transient Power Dissipation P_D (Watts)	Figure No.
ECG1V010	10	14	42	18	.8	250	.25	S11-1
ECG2V010	10	14	39	18	3.5	1000	.6	S11-2
ECG1V014	14	18	47	22	.9	250	.25	S11-1
ECG2V014	14	18	43	22	4.0	1000	6	S11-2
ECG1V015	15	20	52	24	1.0	250	.25	S11-1
ECG2V015	15	20	48	24	4.5	1000	.6	S11-2
ECG1V017	17	22	57	27	1.0	250	.25	S11-1
ECG2V017	17	22	53	27	5.0	1000	.6	S11-2
ECG1V020	20	26	68	33	1.2	250	.25	S11-1
ECG2V020	20	26	64	33	6.0	1000	.6	S11-2
ECG1V025	25	30	77	39	1.5	250	.25	S11-1
ECG2V025	25	30	77	39	10.0	1000	.6	S11-2
ECG1V030	30	37	93	47	1.8	250	.25	S11-1
ECG2V030	30	37	93	47	10.0	1000	.6	S11-2
ECG1V035	35	45	107	56	2.2	250	.25	S11-1
ECG2V035	35	45	103	56	10.0	1000	.6	S11-2
ECG1V040	40	55	135	68	2.5	250	.25	S11-1
ECG2V040	40	55	135	68	12.0	1000	.6	S11-2
ECG1V050	50	66	152	82	3.0	250	.25	S11-1
ECG2V050	50	66	147	82	14.0	1000	.6	S11-2
ECG1V060	60	85	165	100	4.0	1200	.25	S11-1
ECG2V060	60	85	165	100	20.0	4500	.6	S11-2
ECG1V075	75	100	195	120	5.0	1200	.25	S11-1
ECG2V075	75	100	195	120	20.0	4500	.6	S11-2
ECG1V095	95	125	245	150	6.0	1200	.25	S11-1
ECG2V095	95	125	245	150	25.0	4500	.6	S11-2
ECG1V115	115	153	295	171	9.0	1200	.25	S11-1
ECG2V115	115	153	300	171	30.0	4500	.6	S11-2
ECG1V130	130	175	340	208	10.0	1200	.25	S11-1
ECG2V130	130	175	340	208	35	4500	.6	S11-2
ECG524V13	130	175	340	208	70	6500	1.0	S11
ECG8V140	140	180	360	220	80	8000	.8	S20
ECG25V140	140	180	360	220	200	25000	1.2	S20-1
ECG1V150	150	200	395	240	11	1200	.25	S11-1
ECG2V150	150	200	395	240	40	4500	.6	S11-2
ECG8V150	150	200	395	240	95	8000	.8	S20
ECG25V150	150	200	395	240	240	25000	1.2	S20-1
ECG524V15	150	200	395	240	80	6500	1.0	S11
ECG1V175	175	225	440	270	12	1200	.2	S11-1
ECG8V175	175	225	445	270	100	8000	.8	S20
ECG25V175	175	225	445	270	260	25000	1.2	S20-1
ECG524V17	175	225	440	270	90	6500	1.0	S11
ECG1V250	250	330	650	390	17	1200	.25	S11-1
ECG2V250	250	330	650	390	70	4500	.6	S11-2
ECG8V250	250	320	650	390	130	8000	.8	S20
ECG25V250	250	320	650	390	350	25000	1.2	S20-1
ECG524V25	250	320	650	390	130	6500	1.0	S11
ECG1V275	275	350	700	430	20.0	1200	.25	S11-1
ECG2V275	275	350	700	430	75.0	4500	.6	S11-2
ECG8V275	275	350	710	430	140	8000	.8	S20
ECG25V275	275	350	710	430	400	25000	1.2	S20-1
ECG524V27	275	350	700	430	140	6500	1.0	S11
ECG1V300	300	385	765	470	20.0	1200	.25	S11-1
ECG2V300	300	385	765	470	80.0	4500	.6	S11-2
ECG524V30	300	385	765	470	150	6500	1.0	S11
ECG8V315	315	420	840	510	160	8000	.8	S20
ECG25V315	315	420	840	510	420	25000	1.2	S20-1

Metal Oxide Varistors (MOV) (cont'd)

ECG Type	Maximum Voltage RMS VACM (Volts)	DC VDCM (Volts)	Clamping VCL (Volts)	Nominal Varistor Voltage VNOM Volts	Energy WTM (Joules)	Peak Current ITM (Amps)	Transient Power Dissipation PD (Watts)	Figure No.
ECG2V420	420	560	1110	680	90.0	4500	.6	S11-2
ECG8V420	420	560	1120	680	175	8000	.8	S20
ECG25V420	420	560	1120	680	450	25000	1.2	S20-1
ECG524V42	420	560	1110	680	160	6500	1.0	S11
ECG8V460	460	615	1240	750	190	8000	.8	S20
ECG25V460	460	615	1240	750	500	25000	1.2	S20-1
ECG2V480	480	640	1240	750	105	4500	.6	S11-2
ECG524V48	480	640	1240	750	180	6500	1.0	S11
ECG8V510	510	670	1355	820	215	8000	.8	S20
ECG25V510	510	670	1355	820	545	25000	1.2	S20-1

Overvoltage Transient Suppressors (Surge Clamping Diodes) Unidirectional (DC)
1500 Watts

ECG Type	Application	Reverse Standoff Voltage VR (Volts)	Breakdown Voltage VBR (Volts)	@ IT (mA)	Maximum Ratings: Clamping Voltage V_c (Volts) @ Ipp = 120 A	@ Ipp = 60 A	@ Ipp = 30 A	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG4900	Designed to Protect 5.0V, TTL, DTL and MOS Circuitry	5.0	6.0	1.0	8.5	8.0	7.6	1500	S14

ECG Type	Reverse Standoff Voltage VR (Volts)	Breakdown Voltage VBR (Volts) Min.	Nom.	Max.	@ IT (mA)	Peak Pulse Current Ipp (Amps)	Maximum Ratings: Clamping Voltage @ Ipp Vc (Volts)	Temperature Coefficient of VBR (%/°C)	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG4902	5.80	6.45	6.8	7.14	10	143	10.5	.057	1500	S14
ECG4904	6.40	7.13	7.5	7.88	10	132	11.3	.061	1500	
ECG4908	7.02	7.79	8.2	8.61	10	124	12.1	.065	1500	
ECG4910	8.55	9.5	10.0	10.5	1.0	103	14.5	.073	1500	
ECG4914	10.20	11.4	12.0	12.6	1.0	90.0	16.7	.078	1500	
ECG4918	11.10	12.4	13.0	13.7	1.0	82.0	18.2	.081	1500	
ECG4920	12.80	14.3	15.0	15.8	1.0	71.0	21.2	.084	1500	
ECG4922	13.60	15.2	16.0	16.8	1.0	67.0	22.5	.086	1500	
ECG4926	15.30	17.1	18.0	18.9	1.0	59.5	25.2	.088	1500	
ECG4928	17.10	19.0	20.0	21.0	1.0	54.0	27.7	.090	1500	
ECG4932	20.50	22.8	24.0	25.2	1.0	45.0	33.2	.094	1500	
ECG4934	23.10	25.7	27.0	28.4	1.0	40.0	37.5	.096	1500	
ECG4936	25.60	28.5	30.0	31.5	1.0	36.0	41.5	.097	1500	
ECG4938	28.20	31.4	33.0	34.7	1.0	33.0	45.7	.098	1500	
ECG4940	30.80	34.2	36.0	37.8	1.0	30.0	49.9	.099	1500	
ECG4942	33.30	37.1	39.0	41.0	1.0	28	53.9	.100	1500	
ECG4944	36.80	40.9	43.0	45.2	1.0	25.3	59.3	.101	1500	
ECG4946	40.20	42.3	47.0	51.7	1.0	23.2	64.8	.101	1500	
ECG4950	43.60	48.5	51.0	53.6	1.0	21.4	70.1	.102	1500	
ECG4952	47.80	53.2	56.0	58.8	1.0	19.5	77.0	.103	1500	
ECG4954	53.0	58.9	62.0	65.1	1.0	17.7	85.0	.104	1500	
ECG4958	58.10	64.6	68	71.4	1.0	16.3	92.0	.104	1500	
ECG4960	64.10	71.3	75.0	78.8	1.0	14.6	103.0	.105	1500	
ECG4962	70.10	77.9	82.0	86.1	1.0	13.3	113.0	.105	1500	
ECG4964	77.80	86.5	91.0	95.5	1.0	12.0	125.0	.106	1500	
ECG4966	85.50	95.0	100.0	105.0	1.0	11.0	137.0	.106	1500	
ECG4968	94.0	105.0	110.0	116.0	1.0	9.9	152.0	.106	1500	
ECG4970	102.0	114.0	120.0	126.0	1.0	9.1	165.0	.107	1500	
ECG4972	111.0	124.0	130.0	137.0	1.0	8.4	179.0	.107	1500	

1500 Watts (cont'd)

ECG Type	Reverse Standoff Voltage VR (Volts)	Breakdown Voltage VBR (Volts) Min.	Nom.	Max.	@ IT (mA)	Peak Pulse Current Ipp (Amps)	Maximum Ratings: Clamping Voltage @ Ipp Vc (Volts)	Temperature Coefficient of VBR (%/°C)	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG4974	128.0	143.0	150.0	158.0	1.0	7.2	207.0	.108	1500	S14
ECG4976	136.0	152.0	160.0	168.0	1.0	6.8	219.0	.108	1500	
ECG4978	145.0	162.0	170.0	179.0	1.0	6.4	234.0	.108	1500	
ECG4980	154.0	171.0	180.0	189.0	1.0	6.1	246.0	.108	1500	
ECG4982	185.0	209.0	220.0	231.0	1.0	4.6	328.0	.108	1500	
ECG4984	214.0	237.0	250.0	263.0	1.0	5.0	344.0	.110	1500	
ECG4988	171.0	190.0	200.0	210.0	1.0	5.5	274.0	.108	1500	
ECG4990	256.0	285.0	300.0	315.0	1.0	5.0	414.0	.110	1500	
ECG4992	273.0	304.0	320.0	336.0	1.0	4.5	438.0	.110	1500	
ECG4994	300.0	332.0	350.0	368.0	1.0	4.0	482.0	.110	1500	
ECG4996	342.0	380.0	400.0	420.0	1.0	4.0	548.0	.110	1500	
ECG4998	376.0	418.0	440.0	462.0	1.0	3.5	603.0	.110	1500	

5000 Watts

ECG Type	Reverse Standoff Voltage VR (Volts)	Breakdown Voltage VBR (Volts) Min.	Nom.	Max.	@ IT (mA)	Peak Pulse Current Ipp (Amps)	Maximum Ratings: Clamping Voltage @ Ipp Vc (Volts)	Temperature Coefficient of VBR (%/°C)	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG4828	15.0	15.0	16.7	18.5	5.0	206.0	24.4	.094	5000	S14-2
ECG4840	24.0	24.0	26.7	29.5	5.0	128.0	38.9	.101	5000	
ECG4846	30.0	30.0	33.3	36.8	5.0	103.0	48.4	.103	5000	
ECG4848	33.0	33.0	36.7	40.6	5.0	94.0	53.3	.104	5000	
ECG4850	36.0	36.0	40.0	44.2	5.0	85.0	58.1	.104	5000	
ECG4858	48.0	48.0	53.3	58.9	5.0	65.0	77.4	.106	5000	
ECG4868	64.0	64.0	71.1	78.6	5.0	49.0	103.0	.108	5000	

15000 Watts

ECG Type	Reverse Standoff Voltage VR (Volts)	Breakdown Voltage VBR (Volts) Min.	Max.	@ IT (mA)	Peak Pulse Current Ipp (Amps)	Maximum Ratings: Clamping Voltage @ Ipp Vc (Volts)	Temperature Coefficient of VBR (mV/°C)	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG4702	18.0	20.0	22.1	50.0	485.0	30.9	18.0	15000	S14-1
ECG4714	30.0	33.3	36.8	5.0	296.0	50.7	34.0	15000	
ECG4744	85.0	94.4	104.0	5.0	109.0	137.0	102.0	15000	

Note: A Surge Clamping Diode is normally selected according to the reverse "Stand Off Voltage" (VR) which should be equal to or greater than the DC or continuous peak operating level. Typical response time equals 1 pico second.

Bidirectional (AC)
1500 Watts

ECG Type	Description	Abs. Max. RMS VAC (Volts)	Breakdown Voltage: VBR Peak Volts	Breakdown Voltage: @ IT (mA)	Peak Pulse Current Ipp (Amps)	Maximum Ratings: Clamping Voltage @ Ipp Vc	Maximum Ratings: Temp. Coefficient of VBR (%/°C)	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG4901	Designed for Bidirectional Protection of Data Trans-mission, Digital Controls, Computer Systems, Etc.	3.50	6.0	10	166	9.4	.051	1500	S14
ECG4903		4.00	6.8	10	143	10.5	.057	1500	S14

ECG Type	Abs. Max. RMS VAC (Volts)	Breakdown Voltage: VBR Peak Volts Min.	Nom.	Max.	@ IT (mA)	Peak Pulse Current Ipp (Amps)	Maximum Ratings: Clamping Voltage @ Ipp Vc (Volts)	Maximum Ratings: Temperature Coefficient of VBR (%/°C)	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG4905	4.50	7.13	7.5	7.88	10	132.0	11.3	.061	1500	S14
ECG4907	4.90	7.79	8.2	8.61	10	124.0	12.1	.065	1500	
ECG4911	6.00	9.5	10.0	10.5	1.0	103.0	14.5	.073	1500	
ECG4915	7.20	11.4	12.0	12.6	1.0	90.0	16.7	.078	1500	
ECG4919	7.80	12.4	13.0	13.7	1.0	82.0	18.2	.081	1500	
ECG4921	9.00	14.3	15.0	15.8	1.0	71.0	21.2	.084	1500	
ECG4923	9.60	15.2	16.0	16.8	1.0	67.0	22.5	.086	1500	
ECG4927	10.80	17.1	18.0	18.9	1.0	59.5	25.2	.088	1500	
ECG4929	12.00	19.0	20.0	21.0	1.0	54.0	27.7	.090	1500	
ECG4933	14.50	22.8	24.0	25.2	1.0	45.0	33.2	.094	1500	
ECG4935	16.00	25.7	27.0	28.4	1.0	40.0	37.5	.096	1500	
ECG4937	18.00	28.5	30.0	31.5	1.0	36.0	41.5	.097	1500	
ECG4939	19.90	31.4	33.0	34.7	1.0	33.0	45.7	.098	1500	
ECG4941	21.80	34.2	36.0	37.8	1.0	30.0	49.9	.099	1500	
ECG4943	23.50	37.1	39.0	41.0	1.0	28.0	53.9	.100	1500	
ECG4945	25.80	40.9	43.0	45.2	1.0	25.3	59.3	.101	1500	
ECG4947	28.40	42.3	47.0	51.7	1.0	23.2	64.8	.101	1500	
ECG4951	30.00	48.5	51.0	53.6	1.0	21.4	70.1	.102	1500	
ECG4953	33.80	53.2	56.0	58.8	1.0	19.5	77.0	.103	1500	
ECG4955	37.50	58.9	62.0	65.1	1.0	17.7	85.0	.104	1500	
ECG4959	41.00	64.6	68	71.4	1.0	16.3	92.0	.104	1500	
ECG4961	45.30	71.3	75.0	78.8	1.0	14.6	103.0	.105	1500	
ECG4963	49.50	77.9	82.0	86.1	1.0	13.3	113.0	.105	1500	
ECG4965	55.00	86.5	91.0	95.5	1.0	12.0	125.0	.106	1500	
ECG4967	60.40	95.0	100.0	105.0	1.0	11.0	137.0	.106	1500	
ECG4969	66.40	105.0	110.0	116.0	1.0	9.9	152.0	.106	1500	
ECG4971	72.10	114.0	120.0	126.0	1.0	9.1	165.0	.107	1500	
ECG4973	78.50	124.0	130.0	137.0	1.0	8.4	179.0	.107	1500	
ECG4975	90.50	143.0	150.0	158.0	1.0	7.2	207.0	.108	1500	
ECG4977	96.10	152.0	160.0	168.0	1.0	6.8	219.0	.108	1500	
ECG4979	102.5	162.0	170.0	179.0	1.0	6.4	234.0	.108	1500	
ECG4981	108.9	171.0	180.0	189.0	1.0	6.1	246.0	.108	1500	
ECG4983	130.8	209.0	220.0	231.0	1.0	4.6	328.0	.108	1500	
ECG4985	151.3	237.0	250.0	263.0	1.0	5.0	344.0	.110	1500	
ECG4989	121.0	190.0	200	210.0	1.0	5.5	274.0	.108	1500	
ECG4991	181.0	285.0	300.0	315.0	1.0	5.0	414.0	.110	1500	
ECG4993	193.0	304.0	320.0	336.0	1.0	4.5	438.0	.110	1500	
ECG4995	212.1	332.0	350.0	368.0	1.0	4.0	482.0	.110	1500	
ECG4997	241.8	380.0	400.0	420.0	1.0	4.0	548.0	.110	1500	
ECG4999	265.8	418.0	440.0	462.0	1.0	3.5	603.0	.110	1500	

Bidirectional (AC) (cont'd)

7500 Watts

ECG Type	Ave. RMS VAC (Volts)	VR DC (Volts)	Breakdown Voltage VBR Peak Volts Min.	Breakdown Voltage @ IT (mA)	Peak Pulse Current Ipp (Amps)	Maximum Ratings Clamping Voltage @ Ipp Vc (Volts)	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG7V24	24.0	34.0	40.0	10.0	112.0	67.0	7500	S21

15000 Watts

ECG Type	Ave. RMS VAC (Volts)	VR DC (Volts)	Breakdown Voltage VBR Peak Volts Min.	Breakdown Voltage @ IT (mA)	Peak Pulse Current Ipp (Amps)	Maximum Ratings Clamping Voltage @ Ipp Vc (Volts)	Peak Pulse Power (1 msec) PP (Watts)	Fig. No.
ECG15V60	60.0	85.0	100.0	1.0	90.0	167.0	15000	S21
ECG15V250	250.0	354.0	418.0	1.0	23.0	652.0	15000	
ECG15V440	440.0	623.0	735.0	1.0	13.2	1138.0	15000	

Note: A Surge Clamping Diode is normally selected according to the reverse "Stand Off Voltage" (VR) which should be equal to or greater than the DC or continuous peak operating level. Typical response time equals 1 pico second.

Symbols

V_R, **Reverse Stand Off Voltage**: Applied reverse voltage to assure a non-conductive condition. (See note)

V_{BR}, **Breakdown Voltage**: This is the minimum breakdown voltage the device will exhibit and is used to assure that conduction does not occur prior to this voltage level at 25°C.

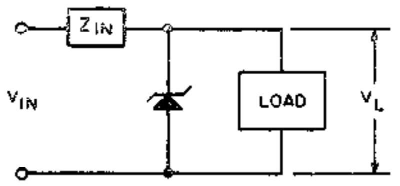
V_C, **Maximum Clamping Voltage**: The maximum peak voltage which will appear across the device when it is subjected to the peak pulse current in a one millisecond time interval.

PP, Peak Pulse Power at 1 msec duration.

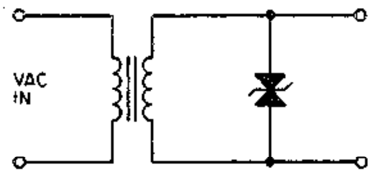
I_{pp}, **Peak Pulse Current.**

Typical Protection Circuits

Unidirectional (DC)



Bidirectional (AC)



Overvoltage Transient Suppressor Outlines

Fig. S11

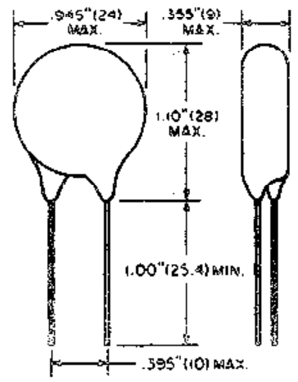


Fig. S11-1

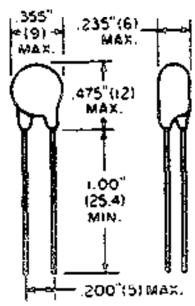


Fig. S11-2

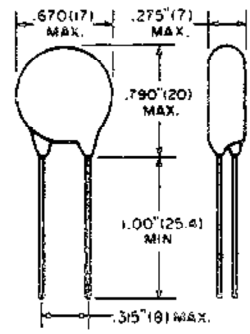
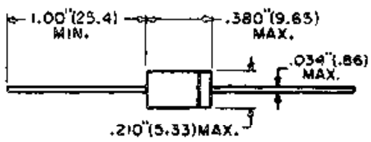


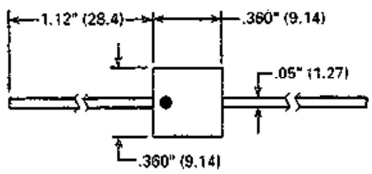
Fig. S14



COLOR BAND DENOTES CATHODE

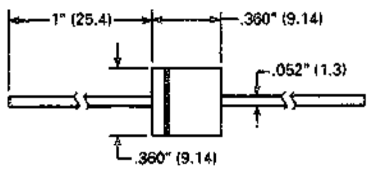
Note: Bidirectional Suppressors do not have polarity bands.

Fig. S14-1



DOT OR COLOR BAND DENOTES CATHODE

Fig. S14-2



DOT OR COLOR BAND DENOTES CATHODE

Fig. S20

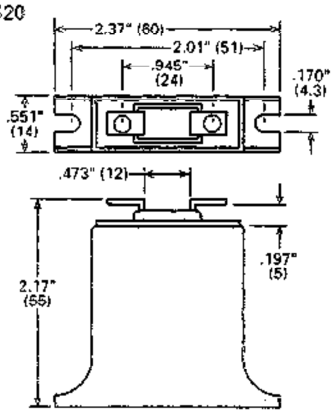


Fig. S20-1

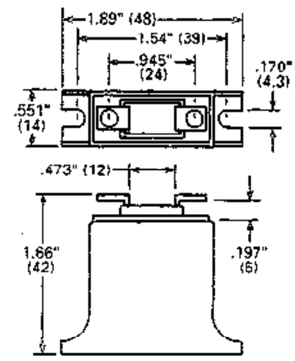
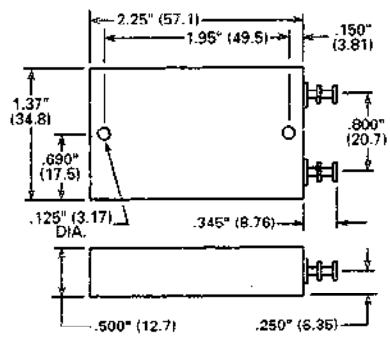


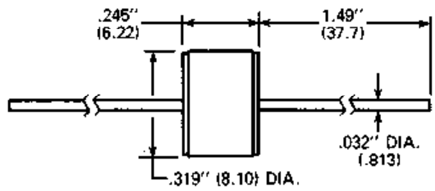
Fig. S21



Surge Arresters (Gas Filled)

ECG Type	DC Breakdown Voltage Nominal Voltage (VDC)	Min. Volts	Max. Volts	Impulse Breakdown @ (100 V/μs) Maximum Voltage	Maximum Capacitance Between Electrodes @ 1 MHz (pF)
ECG15040	75	60	90	400	1.0
ECG15041	90	72	108	400	1.0
ECG15042	110	88	132	450	1.0
ECG15043	145	116	174	500	1.0
ECG15044	230	195	265	600	1.0
ECG15045	300	255	345	700	1.0
ECG15046	350	297	403	750	1.0
ECG15047	470	400	540	850	1.0
ECG15048	600	510	690	1000	1.0
ECG15049AC	120VAC	225	---	700	1.0
ECG15050AC	240VAC	425	---	800	1.0

Fig. SA-1



Specifications

Surge Life
- 10A 10/1000 μs Pulse .... 2500 Operations
- 500A 10/1000 μs Pulse .... 1000 Operations
- AC Suffix .... 300 Operations

Surge Current
- 8/20 .... 20 kA

AC Current
- 10 Operations 60 Hz for 1 sec, with 3 min. intervals 20
- AC Suffix 5

AC Current
- 11 Cycles 60 Hz .... 20 A
- AC Suffix .... 10 A

Insulation Resistance
- 100 VDC .... 10,000 Megohms

Operating Temperature .... −65°C to +125°C

Response Time (Typical) .... <100 nsec.

Typical Circuit Applications

Application	Protected Equipment	ECG Type
CATV	Trunk Amplifier	15043
	Cable Extender, Splitter, Grounding Block, Converter Box, 30 & 60 VAC Power Supply	15044
AC Line Protection	117 VAC Line	15049AC
	220 VAC Line, All AC Loads	15050AC
Communication	Modem	15046
	Antenna Connected Equipment	15041, 15043 & 15044
Power Supplies	Voltage Doubler, Capacitors, Voltage Regulator, Rectifier Diodes	15044 & 15047
Computer	Data Lines	15041 & 15044

Application	Protected Equipment	ECG Type
Test Equipment	Meter Inputs	15040 & 15045
Capacitive Discharge	Ignition Circuit Components, Pulse Generator Components	15044 & 15046
Signal Lines (Single Ended)	Alarm Circuits	15040
Communications (Lightning)	Telephone Line (Normal Mode)	15046
Power Line (Lightning)	AC Wall Outlet (Long Branch Ckt) 120 VAC	15049AC
	Breaker Box (Short Branch Ckt) 240 VAC	15050AC
Process Control (24 MA Signal Loop)	Instrumentation Circuits	15040 & 15041

Quartz Crystals

Color Subcarrier Crystals

ECG Type	Frequency MHz	Frequency Tolerance % at 25°C	Load Capacitance pF	Capacitance (Pin to Pin) pF Max	Effective Resistance Ohms Max.	Operating Temperature Range °C	Temperature Drift %	Figure No.
ECG358	3.579545	±.003	Parallel Reson. 18 ± .5	7	100	+20 to +65	±.003	S12
ECG358C	3.579545	±.005	18	---	100	0 to +70	±.005	S18

Parallel Resonant Crystals

ECG Type	Frequency MHz	Frequency Tolerance % at 25°C	Load Capacitance pF	Effective Resistance Ohms Max.	Operating Temperature Range °C	Temperature Drift %	Figure No.
ECG650	1.000	±.005	13	500	0 to +70	±.02	S17
ECG651	2.000	±.005	20	200	0 to +70	±.02	S17
ECG652	4.000	±.005	20	100	0 to +70	±.02	S18
ECG653	5.000	±.005	20	50	0 to +70	±.02	S18

Series Resonant Crystals

ECG Type	Frequency MHz	Frequency Tolerance % at 25°C	Effective Resistance Ohms Max.	Operating Temperature Range °C	Temperature Drift %	Figure No.
ECG655	4.0000	±.005	100	0 to +70	±.02	S18
ECG656	4.9152	±.005	50	0 to +70	±.02	S18
ECG657	6.1440	±.005	50	0 to +70	±.02	S18
ECG658	10.0000	±.005	20	0 to +70	±.02	S18
ECG659	18.0000	±.005	20	0 to +70	±.02	S18
ECG660	18.4320	±.005	20	0 to +70	±.02	S18
ECG661	20.0000	±.005	20	0 to +70	±.02	S18
ECG662	22.1184	±.005	20	0 to +70	±.02	S18

Ceramic Resonator

ECG Type	Frequency kHz	Frequency Tolerance % at 25°C	Effective Resistance Ohms Max.	Capacitance pF	Volts Max.	Figure No.
ECG649	503.5	±1.0	30	500	60	S19

Fig. S12 Color Osc.

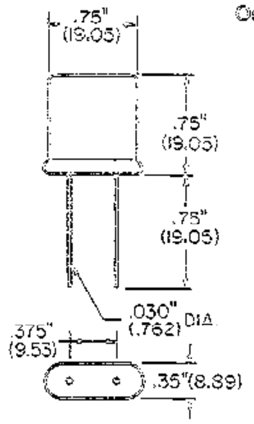


Fig. S17 HC-33 Case

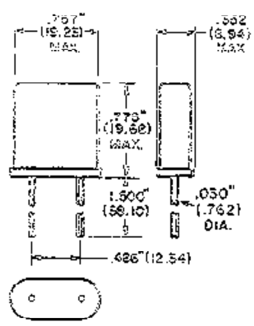
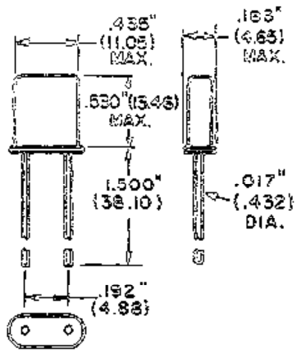
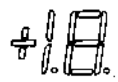


Fig. S18 HC-18 Case



Opto-Electronic Devices

Numeric LED Displays

ECG Type	Description	Color	Digit Des.	Current Per Segment (mA)	Reverse Voltage Per Segment (V)	Power Diss. P_t (mW)	Fig. No.
ECG3050	.270"; Com Anode; LHDP	Red		30	10	750	P30
ECG3051	.270"; Com Anode; Polarity/Overflow	Red		30	10	480	P31
ECG3052	.3"; Com Anode; RHDP	Red		30	5	700	P32
ECG3053		Orange		20	3	400	
ECG3054		Green		20	3	400	
ECG3055		Yellow		20	3	400	
ECG3056	.3"; Com Cathode; RHDP	Red		30	5	700	P32
ECG3057		Red		25	3	700	
ECG3058		Orange		20	3	400	
ECG3059		Green		20	3	400	
ECG3060		Yellow		20	3	400	
ECG3061	.3"; Com Anode; LHDP	Red		30	5	700	P33
ECG3062		Orange		20	3	400	
ECG3063		Green		20	3	400	
ECG3064		Yellow		20	3	400	
ECG3065	.3"; Com Anode; Polarity/Overflow	Red		30	5	350	P34
ECG3068	.4"; Com Anode; RHDP	Red		30	5	700	P35
ECG3069	.4"; Com Cathode; RHDP	Red		30	5	700	P36
ECG3070	.4"; Com Anode; RHDP	Orange		20	5	400	P35
ECG3071	.4"; Com Cathode; RHDP	Orange		20	5	400	P36
ECG3074	.560"; Com Anode; RHDP; 2-Digit	Red		20	5	800	P37
ECG3075	.560"; Com Cathode; RHDP; 2-Digit	Red		20	5	800	
ECG3076	.560"; Com Anode; RHDP; 1-1/2 Digit	Red		20	5	650	P38
ECG3077	.560"; Com Cathode; RHDP; 1-1/2 Digit	Red		20	5	650	
ECG3078	.560"; Com Anode; RHDP	Red		20	5	400	P39
ECG3079	.560"; Com Cathode; RHDP	Red		20	5	400	
ECG3080	.8"; Com Anode; RHDP	Red		20	6	600	P40A

LHDP - Left Hand Decimal Point
RHDP - Right Hand Decimal Point

Numeric LED Display Outlines

Fig. P30

ECG3050 - Red

1. A – Cathode
2. F – Cathode
3. Common Anode
4. No Pin
5. No Pin
6. Dec Pt Cathode
7. E – Cathode
8. D – Cathode
9. Common Anode
10. C – Cathode
11. G – Cathode
12. No Pin
13. B – Cathode
14. Common Anode

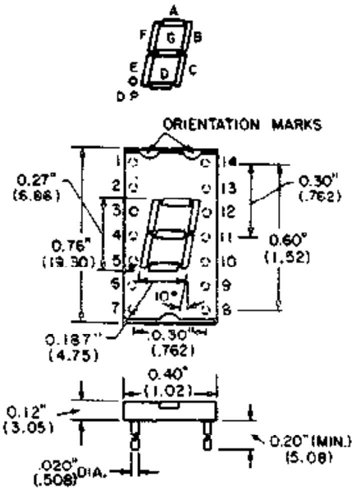


Fig. P31

ECG3051 - Red

1. Anode Common C/D
2. No Connection
3. No Connection
4. No Connection
5. No Connection
6. No Connection
7. D – Cathode
8. C – Cathode
9. No Connection
10. B – Cathode
11. A – Cathode
12. No Connection
13. No Connection
14. Anode Common A/B

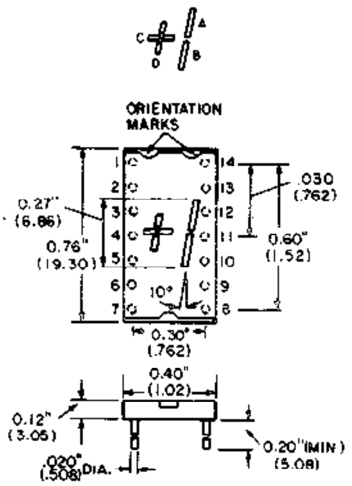


Fig. P32

ECG3052 - Red
ECG3053 - Orn
ECG3054 - Grn
ECG3055 - Yel

1. A – Cathode
2. F – Cathode
3. Common Anode
4. No Pin
5. No Pin
6. No Connection
7. E – Cathode
8. D – Cathode
9. Dec Pt Cathode
10. C – Cathode
11. G – Cathode
12. No Pin
13. B – Cathode
14. Common Anode

ECG3056 - Red
ECG3058 - Orn
ECG3059 - Grn
ECG3060 - Yel

1. F – Anode
2. G – Anode
3. No Pin
4. Common Cathode
5. No Pin
6. E – Anode
7. D – Anode
8. C – Anode
9. Dec Pt Anode
10. No Pin
11. No Pin
12. Common Cathode
13. B – Anode
14. A – Anode

ECG3057 - Red

1. No Pin
2. Common Cathode
3. F – Anode
4. G – Anode
5. E – Anode
6. D – Anode
7. No Pin
8. No Pin
9. Common Cathode
10. Dec Pt Anode
11. C – Anode
12. B – Anode
13. A – Anode
14. No Pin

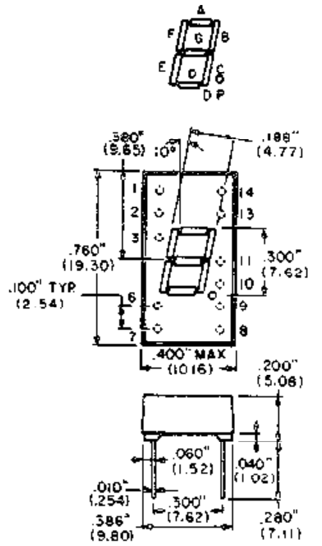


Fig. P33

ECG3061 - Red
ECG3062 - Orn
ECG3063 - Grn
ECG3064 - Yel

1. A – Cathode
2. F – Cathode
3. Common Anode
4. No Pin
5. No Pin
6. Dec Pt Cathode
7. E – Cathode
8. D - Cathode
9. No Connection
10. C – Cathode
11. G – Cathode
12. No Pin
13. B – Cathode
14. Common Anode

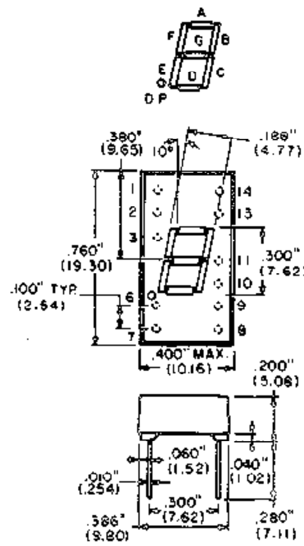


Fig. P34

ECG3065 - Red

1. Common Anode C/D
2. No Pin
3. Common Anode C/D
4. No Pin
5. No Pin
6. No Pin
7. D – Cathode
8. C – Cathode
9. No Connection
10. B – Cathode
11. A – Cathode
12. No Pin
13. No Pin
14. Common Anode A/B

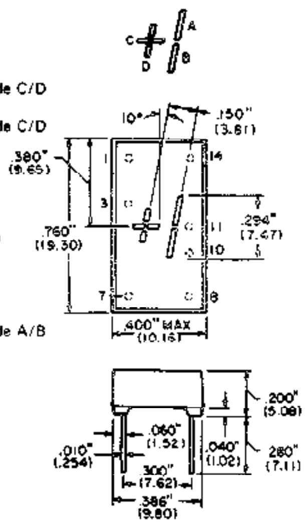


Fig. P35

ECG3068 - Red
ECG3070 - Orn

1. A – Cathode
2. F – Cathode
3. Common Anode
4. No Pin
5. No Pin
6. No Connection
7. E – Cathode
8. D – Cathode
9. Dec Pt Cathode
10. C – Cathode
11. G – Cathode
12. No Pin
13. B – Cathode
14. Common Anode

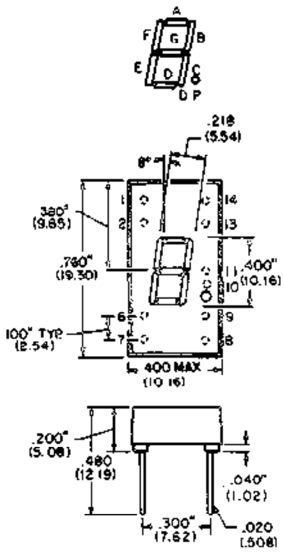
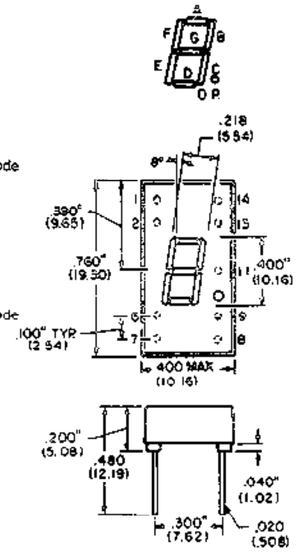


Fig. P36

ECG3069 - Red
ECG3071 - Orn

1. F – Anode
2. G – Anode
3. No Pin
4. Common Cathode
5. No Pin
6. E – Anode
7. D – Anode
8. C – Anode
9. Dec Pt Anode
10. No Pin
11. No Pin
12. Common Cathode
13. B – Anode
14. A Anode



Numeric LED Display Outlines (cont'd)

Fig. P37

ECG3074 - Red	ECG3075 - Red
1. E – Cathode - 1	1. E – Anode - 1
2. D – Cathode - 1	2. D – Anode - 1
3. C – Cathode - 1	3. C – Anode - 1
4. Dec P_t Cathode - 1	4. Dec P_t Anode - 1
5. E – Cathode - 2	5. E – Anode - 2
6. D – Cathode - 2	6. D – Anode - 2
7. G – Cathode - 2	7. G – Anode - 2
8. C – Cathode - 2	8. C – Anode - 2
9. Dec P_t Cathode - 2	9. Dec P_t Anode - 2
10. B – Cathode - 2	10. B – Anode - 2
11. A – Cathode - 2	11. A – Anode - 2
12. F – Cathode - 2	12. F – Anode - 2
13. Common Anode - 2	13. Common Cathode - 2
14. Common Anode - 1	14. Common Cathode - 1
15. B – Cathode - 1	15. B – Anode - 1
16. A – Cathode - 1	16. A – Anode - 1
17. G – Cathode - 1	17. G – Anode - 1
18. F – Cathode - 1	18. F – Anode - 1

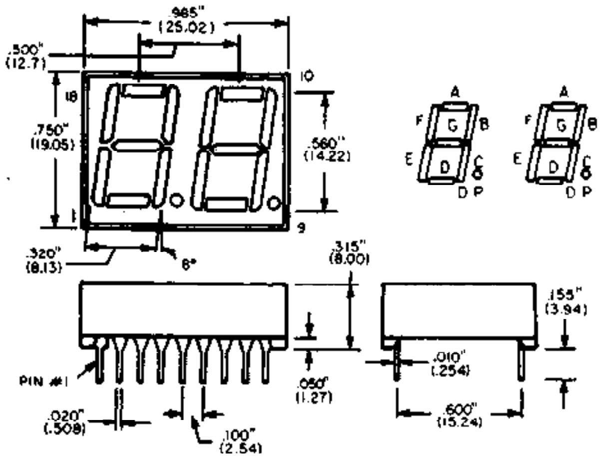


Fig. P38

ECG3076 - Red	ECG3077 - Red
1. C – Cathode - 1	1. C – Anode - 1
2. D – Cathode - 1	2. D – Anode - 1
3. B – Cathode - 1	3. B – Anode - 1
4. Dec P_t Cathode - 1	4. Dec P_t Anode - 1
5. E – Cathode - 2	5. E – Anode - 2
6. D – Cathode - 2	6. D – Anode - 2
7. G – Cathode - 2	7. G – Anode - 2
8. C – Cathode - 2	8. C – Anode - 2
9. Dec P_t Cathode - 2	9. Dec P_t Anode - 2
10. B – Cathode - 2	10. B – Anode - 2
11. A – Cathode - 2	11. A – Anode - 2
12. F – Cathode - 2	12. F – Anode - 2
13. Common Anode - 2	13. Common Cathode - 2
14. Common Anode - 1	14. Common Cathode - 1
15. A – Cathode - 1	15. A – Anode - 1
16. No Connection	16. No Connection
17. No Connection	17. No Connection
18. No Connection	18. No Connection

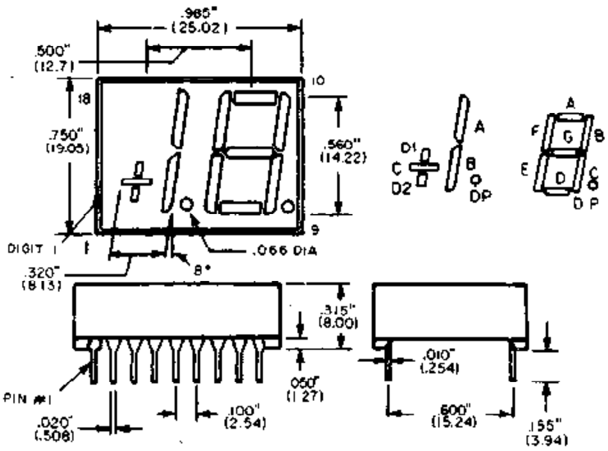


Fig. P39

ECG3078 - Red	ECG3079 - Red
1. E – Cathode	1. E – Anode
2. D – Cathode	2. D – Anode
3. Common Anode	3. Common Cathode
4. C – Cathode	4. C – Anode
5. Dec P_t Cathode	5. Dec P_t Anode
6. B – Cathode	6. B – Anode
7. A – Cathode	7. A – Anode
8. Common Anode	8. Common Cathode
9. F – Cathode	9. F – Anode
10. G – Cathode	10. G – Anode

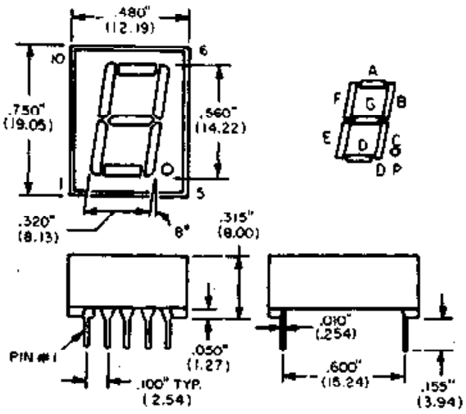
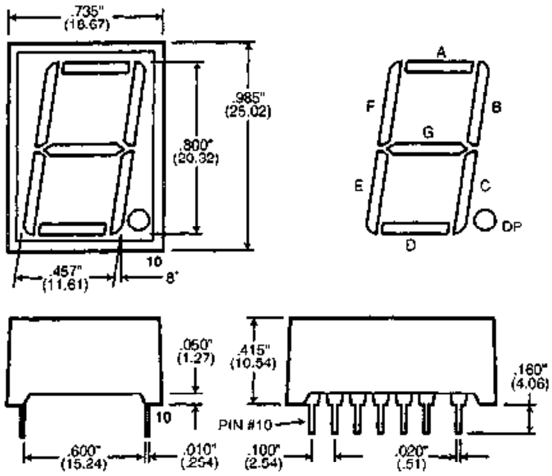


Fig. P40A

ECG3080 - Red

1. No Connection	10. DP Cathode
2. A Cathode	11. D Cathode
3. F Cathode	12. Common Anode
4. Common Anode	13. C Cathode
5. E Cathode	14. G Cathode
6. -	15. B Cathode
7. E Cathode	16. -
8. -	17. Common Anode
9. D Cathode	18. -



Bar Graph LED Displays

ECG Type	Description	Viewed Color	Total Power Dissipation P_t (mW)	Ratings Per Element: Max Forward Voltage V_F (V)	Max Reverse Voltage V_R (V)	Max Forward Current I_F (mA)	Typical Luminous Intensity MCD	Fig. No.
ECG3111	5-Element, Com Anode	Red	100	1.9	3	15	.15	P43
ECG3112	5-Element, Com Anode	Green	200	2.05	3	20	.20	P43
ECG3113	9-Element, Com Anode	Red	300	1.9	3	15	.30	P44
ECG3114	9-Element, Com Anode	Green	300	2.05	3	20	.20	P44
ECG3115	10-Element, Separate Anodes and Cathodes	Hi-Efficiency Red	750	2.5	3	20	2.0	P45
ECG3116	10-Element, Separate Anodes and Cathodes	Green	750	3.0	3	20	2.0	P45
ECG3117	10-Element, Separate Anodes and Cathodes	Yellow	750	3.0	3	20	2.0	P45

Outlines

Fig. P43

ECG3111 - Red
ECG3112 - Grn

1. Common Anode
2. D1 Cathode
3. D2 Cathode
4. D3 Cathode
5. D4 Cathode
6. D5 Cathode
7. Common Anode

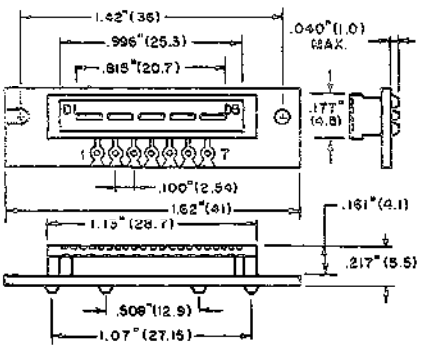


Fig. P44

ECG3113 - Red
ECG3114 - Grn

1. Common Anode
2. D1 Cathode
3. D2 Cathode
4. D3 Cathode
5. D4 Cathode
6. D5 Cathode
7. D6 Cathode
8. D7 Cathode
9. D8 Cathode
10. D9 Cathode
11. Common Anode

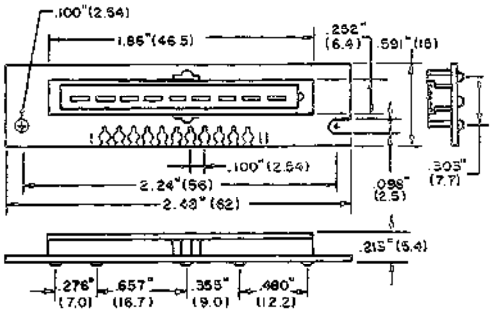
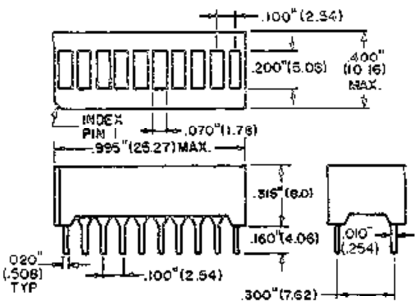


Fig. P45

ECG3115 - Red
ECG3116 - Grn
ECG3117 - Yel

1. D1 Anode
2. D2 Anode
3. D3 Anode
4. D4 Anode
5. D5 Anode
6. D6 Anode
7. D7 Anode
8. D8 Anode
9. D9 Anode
10. D10 Anode
11. D10 Cathode
12. D9 Cathode
13. D8 Cathode
14. D7 Cathode
15. D6 Cathode
16. D5 Cathode
17. D4 Cathode
18. D3 Cathode
19. D2 Cathode
20. D1 Cathode



K

Multi-Lamp LED Arrays

ECG Type	Description	Viewed Color	Ratings Per Lamp: Max Power Dissipation P_t (mW)	Max Forward Voltage V_F (V)	Max DC Reverse Voltage V_R (V)	Max Forward Current I_F (mA)	Typical Viewing Angle Degrees	Typical Luminous Intensity MCD	Fig. No.
ECG3150	5 Lamp Rectangular LED Array for Bar Graph, Level and VU Meters	Red	70	1.9	3.0	30	50	.4	P41
ECG3151		Green	70	2.1	3.0	30	50	.7	P41
ECG3152		Yellow	70	2.1	3.0	30	50	1.5	P41
ECG3153		Red	70	1.9	3.0	30	50	.5	P42
ECG3154		Green	70	2.1	3.0	30	50	1.2	P42
ECG3155		Yellow	70	2.1	3.0	30	50	1.5	P42
ECG3156	7 Lamp Rectangular LED Array for Bar Graph, Level and VU Meters	Red	70	2.8	4.0	15	50	.6	P48
ECG3157		Green	90	2.8	4.0	20	50	1.5	P48
ECG3158		Yellow	90	2.8	4.0	20	50	1.5	P48

Outlines

Fig. P41

ECG3150 - Red
ECG3151 - Grn
ECG3152 - Yel

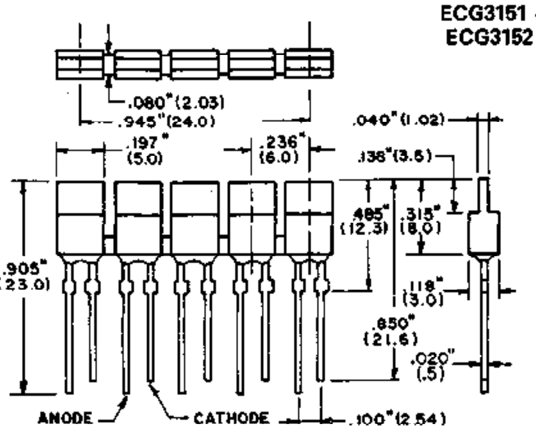


Fig. P42

ECG3153 - Red
ECG3154 - Grn
ECG3155 - Yel

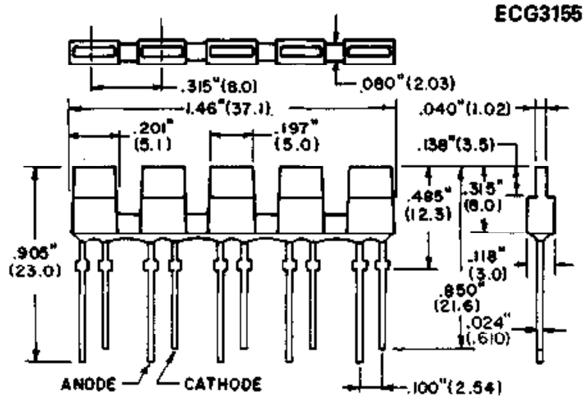
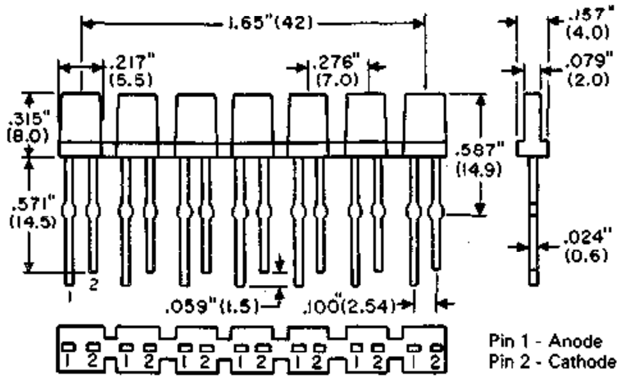


Fig. P48

ECG3156 - Red
ECG3157 - Grn
ECG3158 - Yel



Discrete LED Indicators

ECG Type	Description/Application	Viewed Color	Forward Voltage V_F (V)	Reverse Voltage V_R (V)	Max DC Forward Current I_F (mA)	Maximum Power Diss. P_D (mW)	Typical Viewing Angle Degrees	Typical Luminous Intensity MCD	Qty Per Pkg	Fig. No.
ECG3000	Indicator Lights, Diagnostic and Panel Displays, Printed Circuit Board Indicators, Miniature Low Profile Package	Clear Red	1.65	5.0	40	80	80	1.4	4	P1
ECG3001		Flooded Red	1.65	5.0	40	80	80	1.0	4	P1
ECG3002		Clear Yellow	2.10	5.0	35	105	80	1.0	2	P1
ECG3003		Clear Green	2.20	5.0	35	105	80	1.0	2	P1
ECG3004	Diagnostic or Indicator Lights in Low-Power/Low Current Environments, MOS Compatible	Red	1.60	5.0	35	105	25	2.0	2	P2
ECG3007	General Purpose Indicators, Developmental Projects, Breadboards	Red	1.68	5.0	50	100	70	2.5	4	P3
ECG3008		Bright Red	2.00	5.0	35	105	90	5.0	2	P3
ECG3009		Orange	2.00	5.0	35	105	90	5.0	2	P3
ECG3010		Green	2.20	5.0	35	105	90	1.0	2	P3
ECG3011		Yellow	2.10	5.0	35	105	90	3.0	2	P3
ECG3012A	Panel Circuit Indicators, Low Drive Power, High Intensity Visible Emission	Diffused Red	2.20	4.0	25	70	30	3.5	4	P4A
ECG3013A		Clear Red Jewel	2.80	4.0	25	70	30	3.5	4	P5A
ECG3014A		Green	2.8	4.0	25	70	30	10	2	P4A
ECG3015A		Clear Green Jewel	2.10	4.0	25	70	30	12	2	P5A
ECG3016A	**Two Color** Panel Circuit Indicator	Red or Green	2.15	4.0	25	68	60	.8	2	P6A
ECG3018	Instruments, Printed Circuit Board Indicators, Boardmounted Panel Display	Soft Red	1.65	5.0	100	180	90	1.6	2•	P7
ECG3019		Soft Red	1.65	5.0	100	180	60	3.0	2•	P7
ECG3020	Computers, General Purpose Indicators, Instruments, Test Systems, Mini- and Micro-Processors, Process Controlled Industrial Systems, Sorting Machines, Assembly Equiment, Vending Machines, Telephone Equipment, Backlight Panels. High Intensity Indicators in Four Colors	Flooded Red	1.70	5.0	100	180	80	1.6	2•	P8
ECG3021		Yellow	2.10	5.0	35	105	65	6.0	2•	P8
ECG3022		Bright Red	2.00	5.0	35	105	65	6.0	2•	P8
ECG3023		Orange	2.00	5.0	35	105	65	6.0	2•	P8
ECG3024		Diffused Green	2.20	5.0	35	105	65	1.5	2•	P8
ECG3025	Instruments, Printed Circuit Board Indicators, Boardmounted Panel Display	Red	1.80	5.0	100	180	40	3.0	2•	P9
ECG3026	**Polarity** Indication Tri-State Indicator, Flow Direction Display, Instruments, Tester Displays, Educational Aids	Red or Green	1.65 - R 2.20 - G	--	70 - R 35 - G	200	50	.5 - G 1.5 - R	1•	P10A
ECG3030	**Flashing Red** LED with Integral IC. Applications Include Status Indicators and Warning Lights, Pulse Rate = 3 Hz Typ at 5 VDC	Flashing Red	Max V Applied 5.25	.4	20	--	40	1.2	1	P9A
ECG3130	**Flashing Yellow** LED with Integral IC. For Status Indicators and Warning Lights, Pulse Rate = 2.5 Hz Typ at 5 V	Flashing Yellow	Max V Applied 5.25	.4	20	--	40	3	1	P9A
ECG3131	**Flashing Green** LED with Integral IC. For Status Indicators and Warning Lights, Pulse Rate = 2.5 Hz Typ at 5 V	Flashing Green	Max V Applied 5.25	.4	20	--	40	2	1	P9A

• Package includes 2 piece panel mounting grommets consisting of 1 lamp holder and 1 collar for each device.

Discrete LED Indicators (cont'd)

ECG Type	Description/Application	Viewed Color	Forward Voltage VF (V)	Reverse Voltage VR (V)	Max DC Forward Current IF (mA)	Maximum Power Diss. PD (mW)	Typical Viewing Angle Degrees	Typical Luminous Intensity MCD	Qty Per Pkg	Fig. No.
ECG3160	**Rectangular** LEDS. Applications Include Bar Graph Displays, Level Meters, Panel Displays, Instrumentation and General Purpose Indicators	Red	1.90	3.0	30	70	50	.4	5	P12
ECG3161		Green	2.10	3.0	30	70	50	.7	5	P12
ECG3162		Yellow	2.10	3.0	30	70	50	2.0	5	P12
ECG3163		Red	1.90	3.0	30	70	50	.4	5	P13
ECG3164		Green	2.10	3.0	30	70	50	.7	5	P13
ECG3165		Yellow	2.10	3.0	30	70	50	1.5	5	P13
ECG3166		Red	1.90	3.0	30	70	50	.5	5	P14
ECG3167		Green	2.10	3.0	30	70	50	.7	5	P14
ECG3168		Yellow	2.10	3.0	30	70	50	2.0	5	P14
ECG3169	Square LED, Used as Level Indicator, Panel Display and General Purpose	Diffused Red	2.8	5.0	20	--	--	1.5	5	P49
ECG3170		Diffused Green	2.8	5.0	20	--	--	2.0	5	P49
ECG3171		Diffused Yellow	2.8	5.0	20	--	--	2.0	5	P49
ECG3172	Triangular LED, Used as Location Indicator and Line Finder	Diffused Red	2.8	4.0	25	70	50	.4	5	P50
ECG3173		Diffused Green	2.8	4.0	30	90	50	1.0	5	P50
ECG3174		Diffused Yellow	2.8	4.0	30	90	50	1.0	5	P50
ECG3180	P. C. Mount. LED, Used as Panel Indicators, Backlight Legends, Light Arrays. Mounting Grommet Supplied With Each LED	Red	2.5	5.0	35	200	120	4.5	2	P51
ECG3181		Green	3	5.0	30	200	120	4.5	2	P51
ECG3182		Yellow	2.5	5.0	25	200	120	4.5	2	P51

Discrete LED Indicator Outlines

Fig. P1

ECG3000 - Red
ECG3001 - Red
ECG3002 - Yel
ECG3003 - Grn

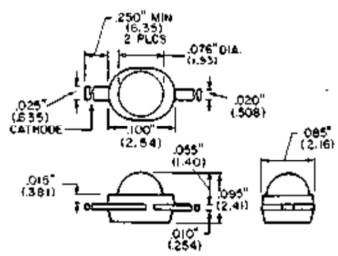


Fig. P2

ECG3004 - Red

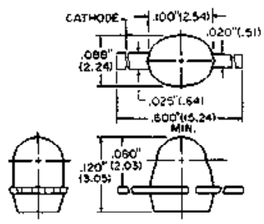


Fig. P3

ECG3007 - Red
ECG3008 - Red
ECG3009 - Orn
ECG3010 - Grn
ECG3011 - Yel

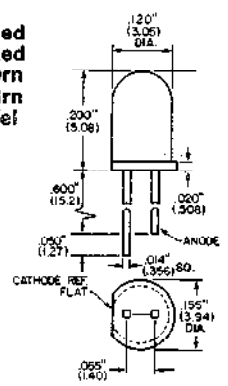


Fig. P4A

ECG3012A - Red
ECG3014A - Grn

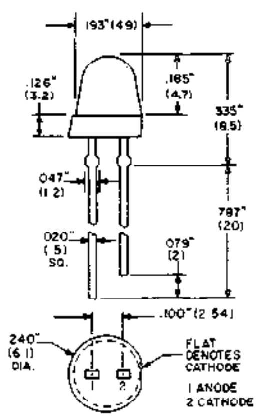


Fig. P5A

ECG3013A - Red
ECG3015A - Grn

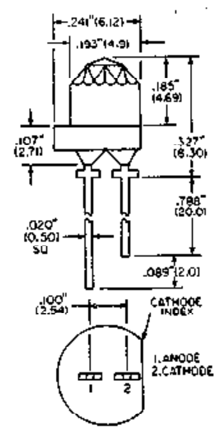
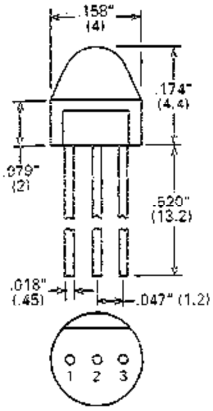


Fig. P6A

ECG3016A
Red or Grn



1. ANODE (RED)
2. CATHODE (COMMON)
3. ANODE (GREEN)

Fig. P7

ECG3018 - Red
ECG3019 - Red

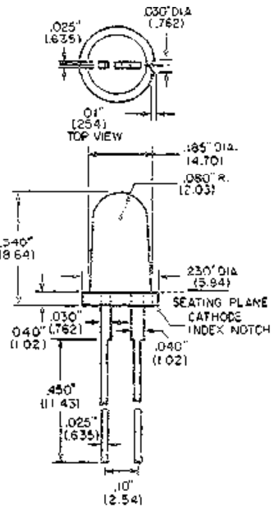


Fig. P8

ECG3020 - Red
ECG3021 - Yel
ECG3022 - Red
ECG3023 - Orn
ECG3024 - Grn

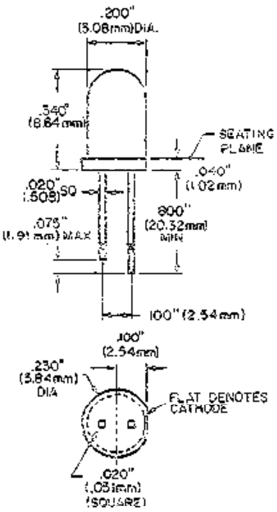


Fig. P9

ECG3025 - Red

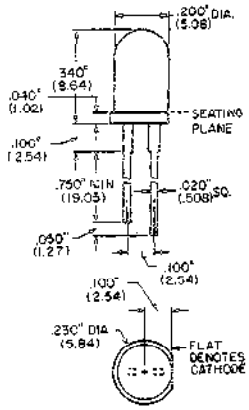
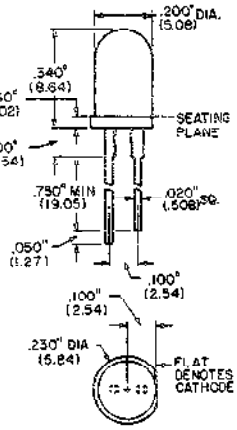


Fig. P9A

ECG3030 - ○
Flashing Red
ECG3130 -
Flashing Yel
ECG3131 -
Flashing Grn



○ Alt. Fig. P11

Fig. P10A

ECG3026 -
Red or Grn

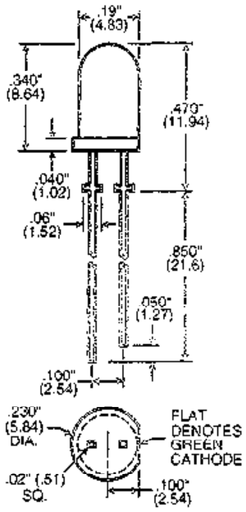
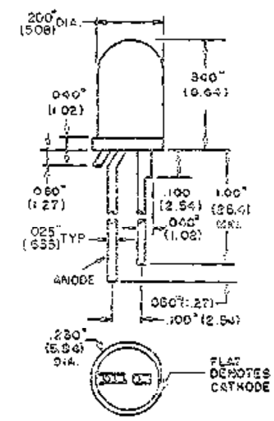


Fig. P11

ECG3030 - ○
Flashing Red



○ Alt. Fig. P9A

Fig. P12

ECG3160 - Red
ECG3161 - Grn
ECG3162 - Yel

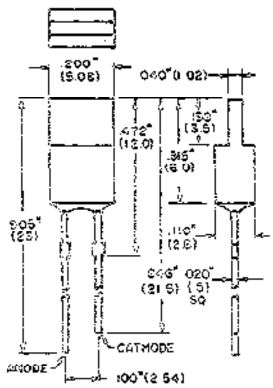


Fig. P13

ECG3163 - Red
ECG3164 - Grn
ECG3165 - Yel

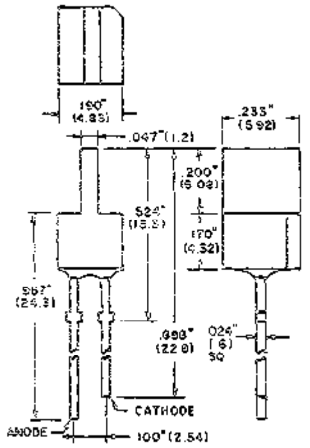


Fig. P14

ECG3166 - Red
ECG3167 - Grn
ECG3168 - Yel

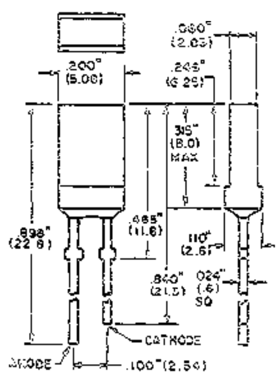


Fig. P49

ECG3169 - Red
ECG3170 - Grn
ECG3171 - Yel

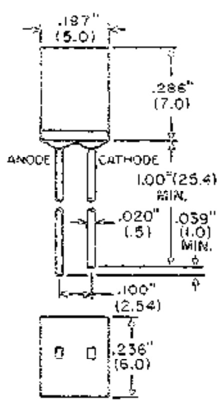


Fig. P50

ECG3172 - Red
ECG3173 - Grn
ECG3174 - Yel

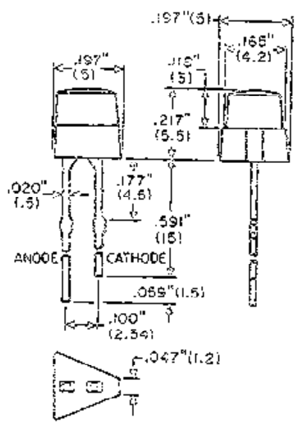
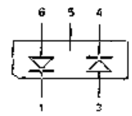
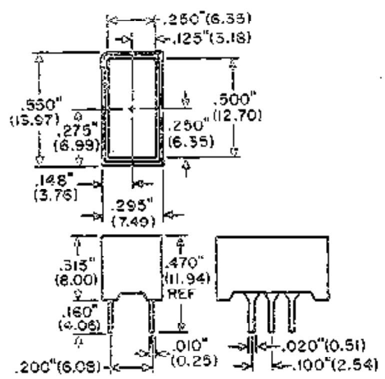


Fig. P51

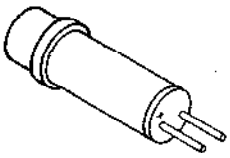
ECG3180 - Red
ECG3181 - Grn
ECG3182 - Yel





K

LED Cartridge Indicator



- **Integrated circuit compatibility**
- **Solid state reliability**
- **Immune to shock and vibration**
- **Polarized; terminal base is keyed**

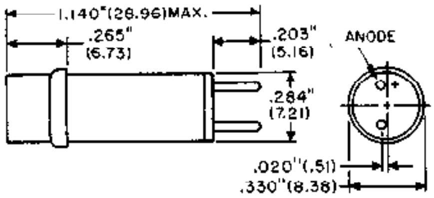
The ECG32XX series can be used as direct replacements for existing incandescent lamp cartridges operating from a DC power source.

The ECG32XX series are compatible with integrated circuits and may be driven directly by RTL, DTL and TTL logic.

(Operating Temperature Range, T_{opg} = −55°C to +70°C)

ECG Type	Viewed Color	Rated Voltage (V)	Forward Current (Typ)
ECG3200	Red	5 - 6 VDC	18 mA
ECG3201	Green		
ECG3202	Amber		

Fig. P53
ECG3200 - Red
ECG3201 - Grn



Note: Panel mounting clip included

See Page 1-380 for optional cartridge connector (ECG201)

Infrared Emitting Diodes

ECG Type	Description	Min Power Output P_o	Max Forward Voltage V_F (V)	Reverse Voltage V_R (V)	DC Forward Current I_F (mA)	Power Diss. P/Case (m/W)	Peak Emission Wavelength λp (nM)	Response Time (nS)	Beam Angle Θ HI (Deg)	Fig. No.
ECG3017	Infrared Emitting Diode for TV Remote Control, 15 mW @ I_F = 100 mA	15 mW	1.7	5	150	210	950	400	60	P9
ECG3027	PN Gallium Arsenide	1 mW	1.5	5	100	150	900	100	15	P16
ECG3028	PN Gallium Arsenide	200 µW	1.5	3	150	200	900	50	15	P17
ECG3029A*	PN Gallium Arsenide	2 mW	1.8	6	50	150	900	1000	30	P18A
ECG3029B	PN Gallium Arsenide	.28 mW/Sr	1.7	6	60	100	940	---	30	P18B
ECG3099	Bi-Directional IR LED	1.8 mW	1.5	3	50	75	940	---	15	P56

* 2 Per Pkg.

Outlines

Fig. P9
ECG3017

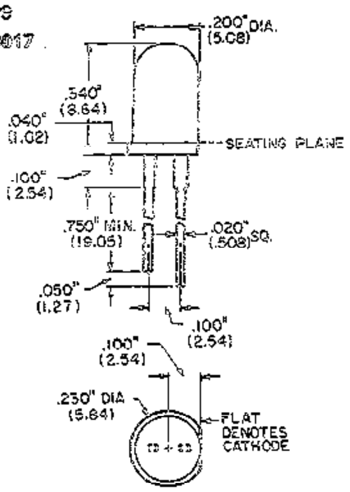


Fig. P16
ECG3027

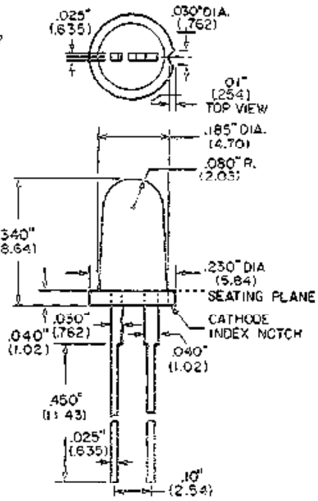


Fig. P17
ECG3028

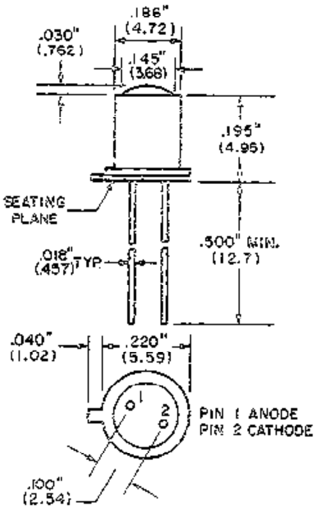


Fig. P18A
ECG3029A

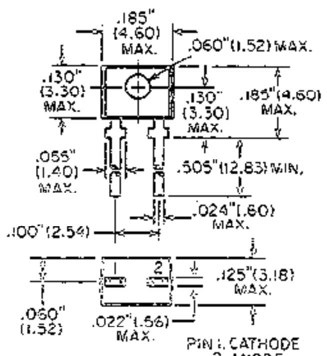


Fig. P56
ECG3099

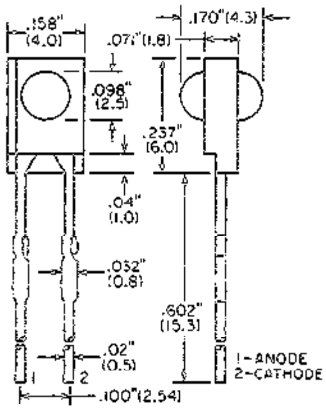
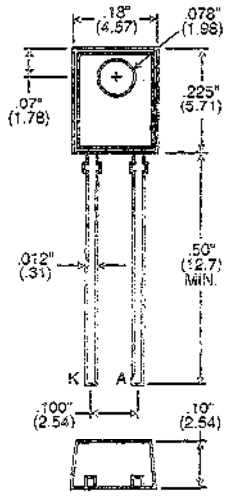


Fig. P18B
ECG3029B



Phototransistor Detectors

ECG Type	Description	Collector to Base Voltage BVCBO (V)	Max Collector Current I_c (mA)	Max Dark Current I_D at 25°C (nA)	Min Light Current I_L (mA)	Max Power Dissipation at 25°C P_t (mW)	Rise Time t_r (μS)	Fig. No.
ECG3031	NPN, Si, Visible and IR	50	40	20 at VCE 5V	6	200	2 Typ	P19
ECG3032	NPN, Si, Visible and IR	45	40	20 at VCE 5V	12	200	2 Typ	P20
ECG3034A	NPN, Si, Visible and IR	30 (VCEO)	100	100 at VCE 10V	.7	150	—	P18B
ECG3035A	NPN, Si-Darlington Amp $h_{fe} \approx 2.0$ K, Visible and IR	60	100	100 at VCE 10V	5	150	75	P18A
ECG3036	NPN, Si-Darlington, Visible and IR	25	250	100 at VCE 10V	3	300	300	P22
ECG3037	NPN, Si, Visible and IR	50	50	500 at VCE 30V	10	150	2 Typ	P23
ECG3038	NPN, Si-Darlington, Visible and IR	25	20	20 at VCE 10V	5	50	1.5 Typ	P24
ECG3120	NPN, Si, Visible and IR	20 (VCEO)	20	500 at VCE 10V	1	100	10 Max	P52
ECG3121	NPN, Si, Darlington Visible and IR	20 (VCEO)	30	500 at VCE 10V	.5	100	100 Typ	P52
ECG3122	NPN, Si, Darlington, IR, Visible Cut-off, Narrow Acceptance	35 (VCEO)	50	1 μA at VCE 10V	1.5	75	80	P59
ECG3123	NPN, Si, Darlington, IR, Visible Cut-off	35 (VCEO)	50	1 μA at VCE 10V	.2	75	80	P60

Phototransistor Detector Outlines

Fig. P18A
ECG3035A

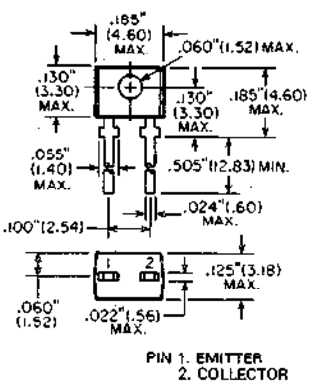


Fig. P18B
ECG3034A

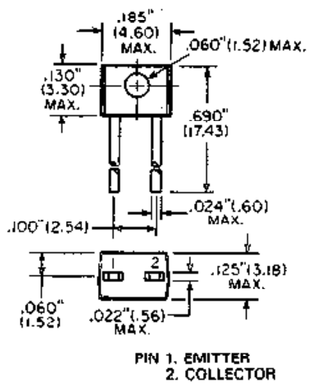


Fig. P19
ECG3031

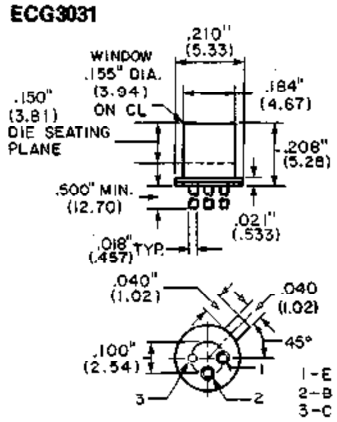


Fig. P20
ECG3032

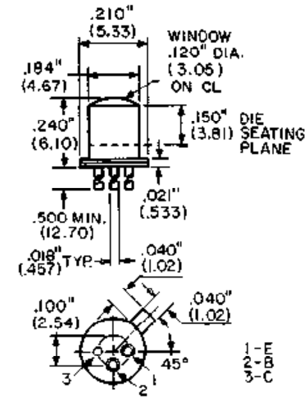


Fig. P21
ECG3034

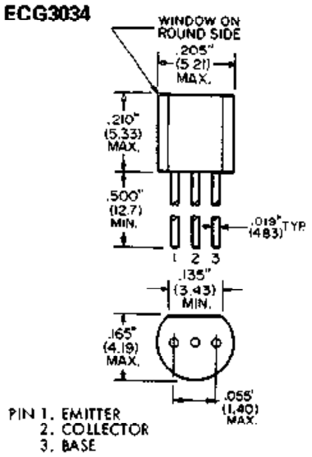


Fig. P22
ECG3036

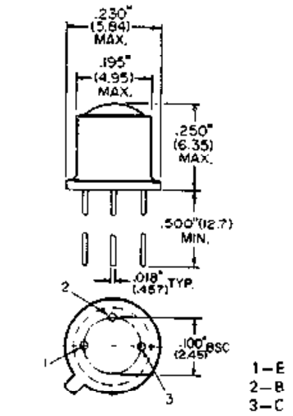


Fig. P23
ECG3037

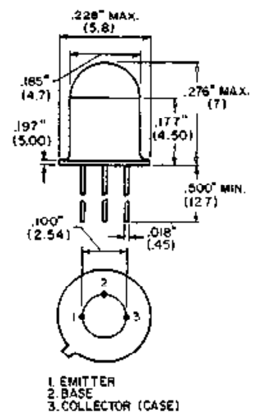
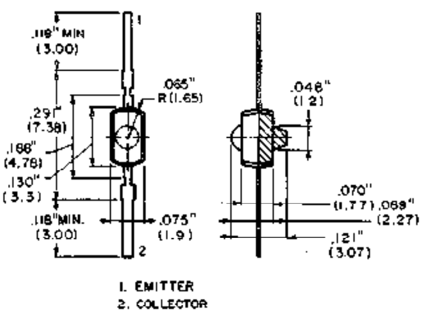


Fig. P24
ECG3038



Phototransistor Detector Outlines (cont'd)

Fig. P52
ECG3120
ECG3121

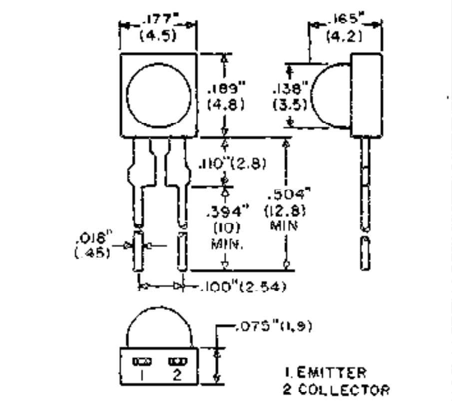


Fig. P59
ECG3122

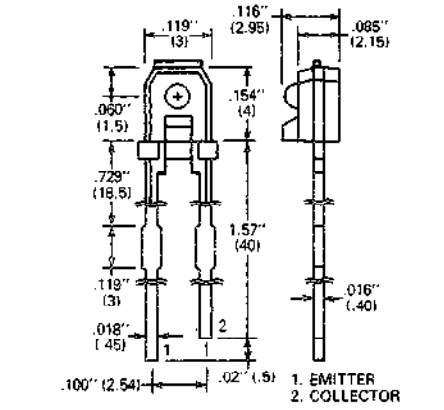
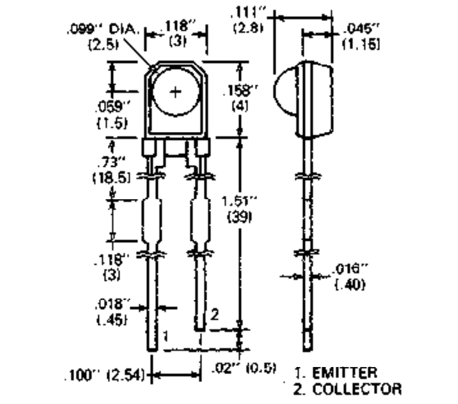


Fig. P60
ECG3123



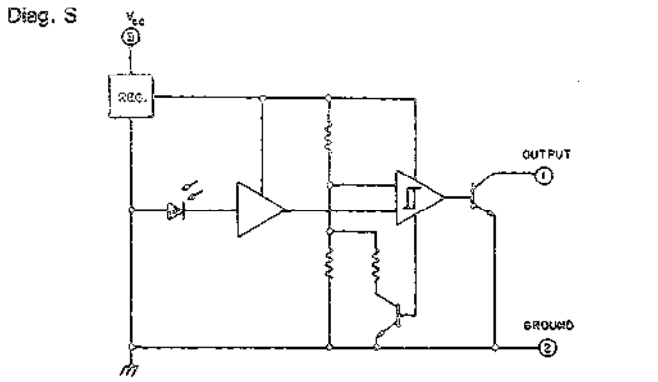
Opto-Electronic Switch — Day/Night Sensing

ECG Type	Description	Max Ratings: Supply Voltage Vcc (V)	Output Voltage VOUT (V)	Output Current IOUT (mA)	Power Diss. PD (mW)	Typical Ratings: Light Threshold ON EON (Lumens/Ft²)	Light Threshold OFF EOFF (Lumens/Ft²)	Ckt Diagram	Fig.* No.
ECG3039	Light/Dark Electronic Switch	15	15	50	750	5.0	5.9	S	P46 P46A

* May be shipped in either case style.

Circuit

Diag. S



Outlines

Fig. P46 **ECG3039**

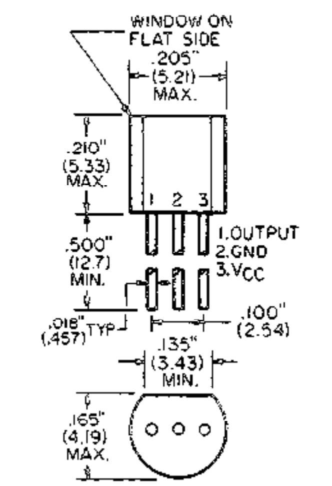
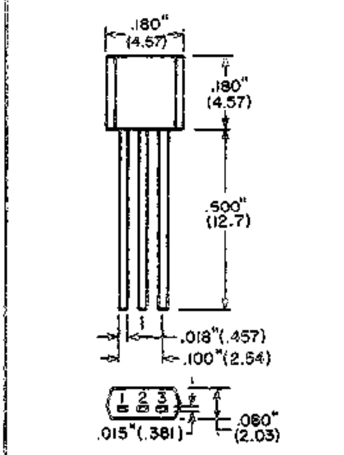
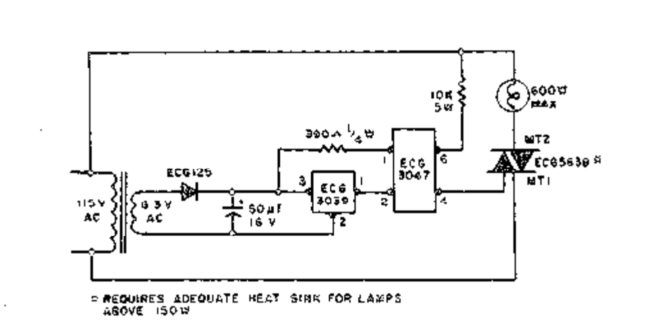


Fig. P46A **ECG3039**



Typical Application



* REQUIRES ADEQUATE HEAT SINK FOR LAMPS ABOVE 150W

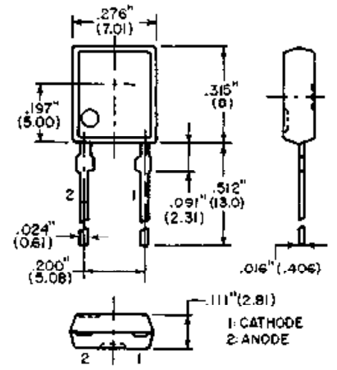
Infrared Detector Diodes

ECG Type	Description	Reverse Voltage V_R (V)	Max. Dark Current I_D (nA)	Min Light Current I_L (μA)	Power Dissipation P_D (mW)	Rise Time t_r (nS)	Typ Detection Angle	Typ Detection Wavelength (nm)	Fig. No.
ECG3033	Infrared PIN Detector Diode	30	50	35	100	50	65°	900	P54

Outline

Fig. P54

ECG3033



Note: Index mark denotes window side.

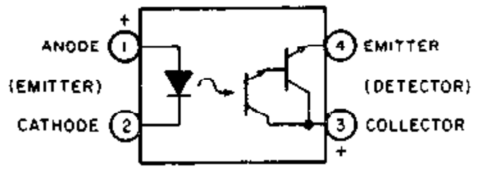
Opto-Coupled Interrupter Modules

ECG Type	Output Configuration	Total Power Dissipation P_t (mW)	LED Max Ratings: Forward Current I_F (mA)	LED Max Ratings: Reverse Voltage V_R (V)	Collector To Emitter Voltage BV_{CEO} (V)	Collector Current I_C (mA)	Ckt. Diagram	Fig. No.
ECG3100	NPN Transistor	250	60	6	55	100	D	P25
ECG3101	NPN Darlington	250	60	6	55	100	C	P25
ECG3102	NPN Transistor	250	60	6	55	100	D	P26
ECG3103	NPN Darlington	250	60	6	55	100	C	P26
ECG3104	NPN Transistor	100	50	6	35	20	T	P57
ECG3105	NPN Transistor	75	50	3	30	20	U	P58

Circuits

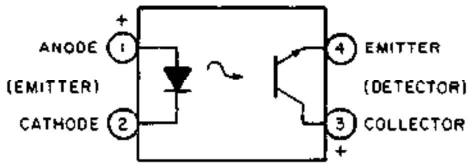
Diag. C

ECG 3101 3103



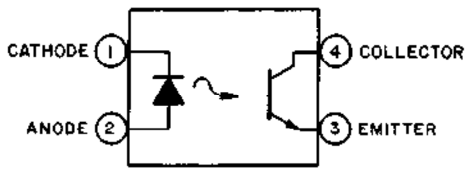
Diag. D

ECG 3100 3102



Diag. T

ECG 3104



Diag. U

ECG 3105

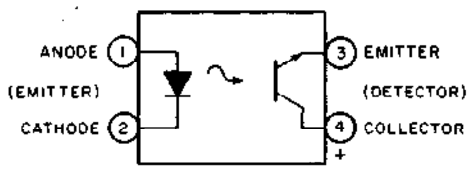


Fig. P25

ECG 3100 3101

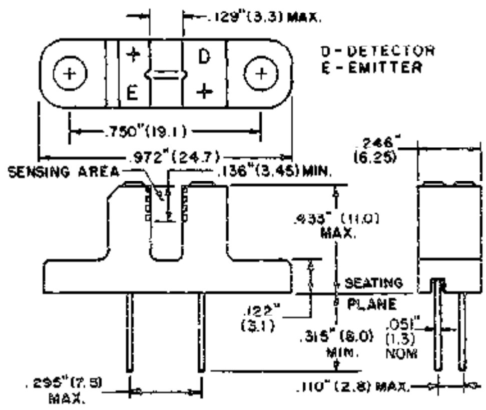


Fig. P26

ECG 3102 3103

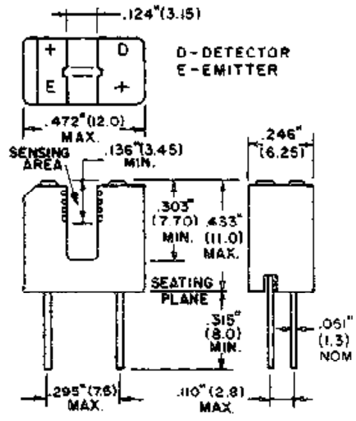


Fig. P57

ECG 3104

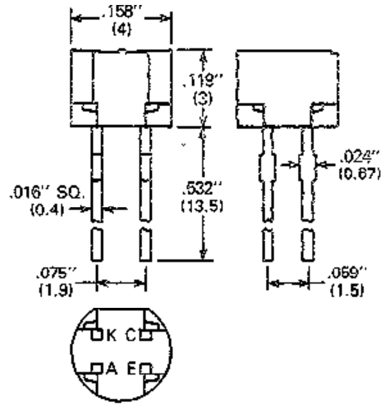
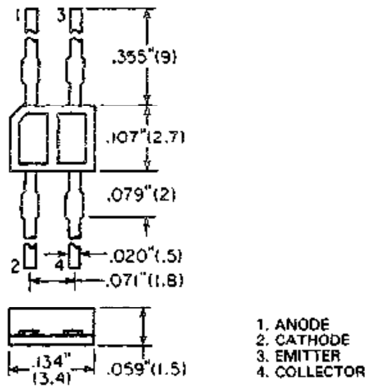


Fig. P58

ECG 3105



K

Optoisolators

Phototransistors		Total Device Ratings			LED Max Ratings		Phototransistor Ratings					
ECG Type	Output Configuration	Isolation Voltage V_{iso} Surge (V)	Total Power P_t (mW)	DC Current Transfer Ratio % *	Forward Current I_F (mA)	Reverse Voltage V_R (V)	Collector to Base Voltage BV_{CBO} (V)	Collector to Emitter Voltage BV_{CEO} (V)	Collector Current I_c (mA)	Typ Freq KHz	Ckt. Diag.	Fig. No.
ECG3040	NPN Transistor	7500	250	20	80	3	70	30	3.5 Typ	300	A	
ECG3041	NPN Transistor	7500	250	100	60	6	70	30	100 Max	150	A	
ECG3042	NPN Transistor	7500	250	20	60	3	70	30	50 Max	150	A	P28
ECG3043	NPN Transistor	3550	260	70	60	3	70	80	50 Max	100	A	
ECG3044	NPN Darlington	7500	260	300	60	6	80	80	–	75	B	
ECG3045	NPN Darlington	7500	260	500	60	6	80	80	--	75	B	
ECG3081	NPN Transistor	6000	250	20	60	3	--	30	100	100	D	P27
ECG3082	NPN Darlington	6000	250	400	60	3	--	30	100	75	C	
ECG3083	NPN Darlington	7500	250	100	60	3	55	55	100	75	E	P28
ECG3084	NPN Darlington	7500	250	200	60	3	30	30	100	75	E	
ECG3086	NPN Dual Transistor	7500	400	50	60	3	---	30	30	200	F	P29
ECG3220	NPN Dual Transistor	5000	150	100	50	5	---	55	50	---	V	
ECG3088	NPN Transistor	7500	300	20	60	6	300	300 (BV_{CER})	100	200	A	
ECG3089	NPN Transistor	7500	300	20	60	--	70	30	100	200	M	P28
ECG3096	Low Input Drive NPN Transistor	7500	300	50 @ I_F 1 mA	60	6.0	70	30	100	200	A	
ECG3098	NPN Transistor	5000	250	100	60	5	---	55	50	---	S	P55
ECG3221	NPN Quad Transistor	5000	150	100	50	5	---	55	50	---	W	P61

* DC Current Transfer Ratio is the output transistor collector current divided by the LED forward current - $h_{FE} = I_c/I_F$

Photothyristors		Total Device Ratings		LED Max Ratings		Photothyristor Ratings						
ECG Type	Output Configuration	Isolation Voltage V_{iso} Surge (V)	Power P_t (mW)	Forward Current I_F (mA)	Reverse Voltage V_R (V)	V_{DRM} (V)	I_T RMS (mA)	I_{FT} (mA)	V_F (on) (V) 100 mA	I_{HOLD} (mA)	Ckt. Diag.	Fig. No.
ECG3046	SCR	3550	260	60	3	400	100	14	1.3	.5	G	
ECG3047	TRIAC	7500	330	50	3	250	100	10	3.0	.1	H	
ECG3048	TRIAC	7500	330	50	3	400	100	10	3.0	.1	H	
ECG3049	TRIAC with Zero Crossing Circuit	7500	330	50	3	250	100	15	3.0	.1	J	P28
ECG3091	SCR	4000	400	60	6	400	300	11	1.3 at 300 mA	.5	G	
ECG3097	TRIAC with Zero Crossing Circuit	7500	300	50	6	400	100	15	3.0	.2	J	

Photo FET		Total Device Ratings		LED Max Ratings		Photo FET Ratings						
ECG Type	Output Configuration	Isolation Voltage V_{iso} Surge (V)	Power P_t (mW)	Forward Current I_F (mA)	Reverse Voltage V_R (V)	Drain to Source Breakdown Voltage BV_{DSS} (V)	Drain Current I_D (mA)	RDSon (Ohms)	Ton (μsec)	Toff (μsec)	Ckt. Diag.	Fig. No.
ECG3085	FET	2500	300	60	6	±30	±100	200	15	15	K	P28

TTL Compatible Photo Coupled Logic Gates		Total Device Ratings		LED Ratings		Output Ratings					
ECG Type	Output Configuration	Isolation Voltage V_{iso} (V)	Power P_t (mW)	Forward Current I_F (mA)	Reverse Voltage V_R (V)	Max Supply Voltage V_{cc} (V)	Output Current I_o (mA)	Propagation Delay Time (nsecs)	Enable Voltage V_E (V)	Ckt. Diag.	Fig. No.
ECG3087	Hi Speed Open Collector, NAND Gate	3000	100	10	5.0	5.0	50	75	5.0	L	P29
ECG3094	Dual Hi Speed Open Collector, NAND Gates	3000	60	15	5.0	5.0	16 Per Channel	75	--	Q	

Optoisolators (cont'd)

TTL Compatible Phototransistors		Device Ratings		LED Max Ratings		Output Ratings						
ECG Type	Output Configuration	Isolation Voltage Viso (V)	Power P_t (mW)	Forward Current I_F (mA)	Reverse Voltage V_R (V)	Max V_{CC} (V)	Current Transfer Ratio % *	Output Current I_o (mA)	Propagation Delay Time (nsec)	Data Transfer Rate Mbit/sec	Ckt. Diag.	Fig. No.
ECG3092	Open Collector NPN Transistor	3000	100	25	5	15	15	8	800	1	O	
ECG3093	NPN Split Darlington	3000	100	20	5	18	400	60	t_{PHL} 1 μsec t_{PLH} 7 μsec	100K	P	P29
ECG3095	Dual Open Collector, NPN Transistors	3000	100	25	5	15	15	8	800	1	R	

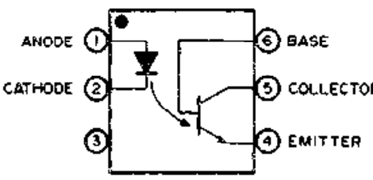
* DC Current Transfer Ratio is the output transistor collector current divided by the LED forward current - $h_{FE} = I_C / I_F$

		Total Device Ratings		Led Max Ratings		Output Ratings						
ECG Type	Output Configuration	Isolation Voltage Viso Surge (V)	Power P_t (mW)	Forward Current I_F (mA)	Reverse Voltage V_R (V)	V_{CC} Voltage Range (V)	Output Voltage V_o (V)	Output Current I_o (mA)	Turn-On Time Ton (μsec)	Turn-Off Time Toff (μsec)	Ckt. Diag.	Fig. No.
ECG3090	Schmitt Trigger	7500	150	60	6	3V to 15V	15 max	50 max	1.2 typ	1.2 typ	N	P28

Optoisolator Circuits

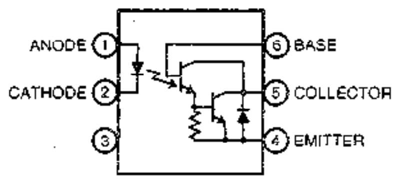
Diag. A Fig. P28

ECG
3040
3041
3042
3043
3088
3096



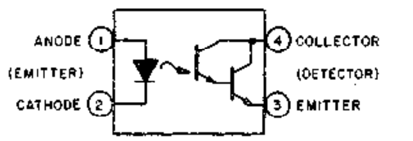
Diag. B Fig. P28

ECG
3044
3045



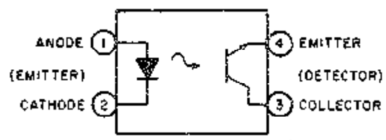
Diag. C Fig. P27

ECG3082



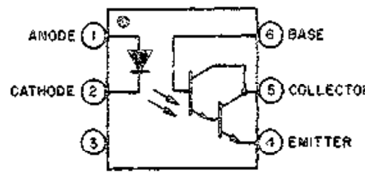
Diag. D Fig. P27

ECG3081



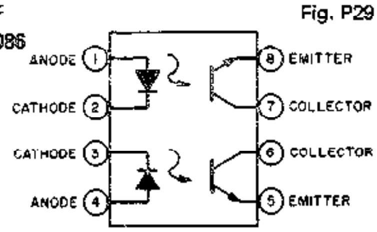
Diag. E Fig. P28

ECG
3083
3084



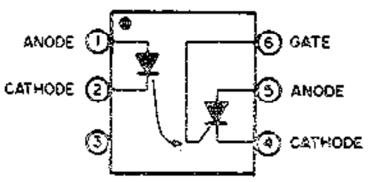
Diag. F Fig. P29

ECG3086



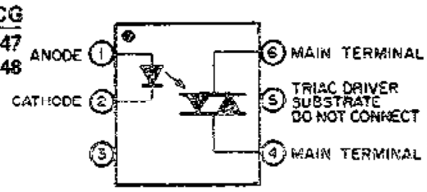
Diag. G Fig. P28

ECG
3046
3091



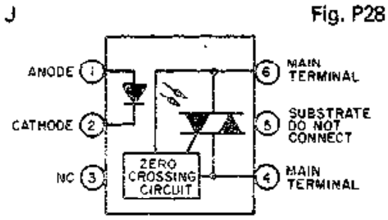
Diag. H Fig. P28

ECG
3047
3048



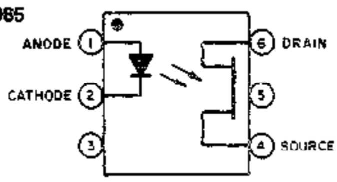
Diag. J Fig. P28

ECG
3049
3097



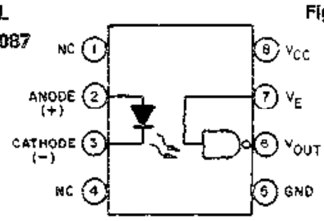
Diag. K Fig. P28

ECG3085



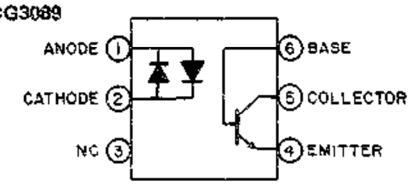
Diag. L Fig. P29

ECG3087



Diag. M Fig. P28

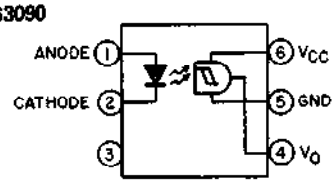
ECG3089



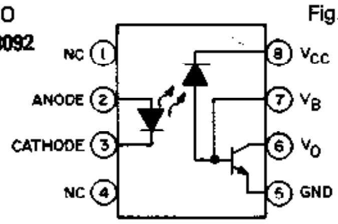
K

Optoisolator Circuits (cont'd)

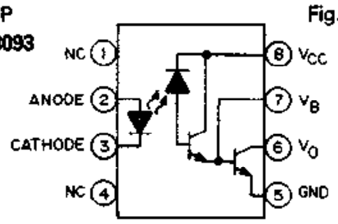
Diag. N — Fig. P28
ECG3090



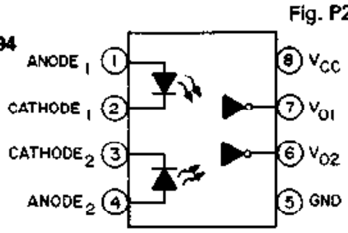
Diag. O — Fig. P29
ECG3092



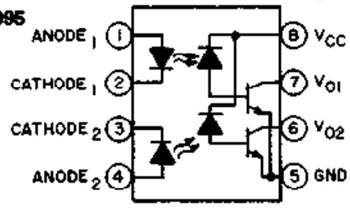
Diag. P — Fig. P29
ECG3093



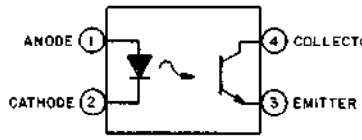
Diag. Q — Fig. P29
ECG3094



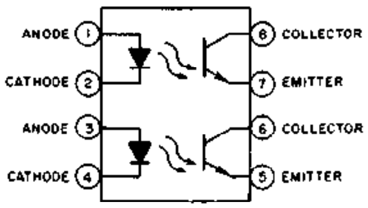
Diag. R — Fig. P29
ECG3095



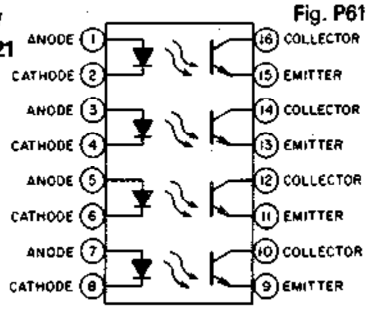
Diag. S — Fig. P55
ECG3098



Diag. V — Fig. P29
ECG3220



Diag. W — Fig. P61
ECG3221



Optoisolator Outlines

Fig. P27
ECG
3081
3082

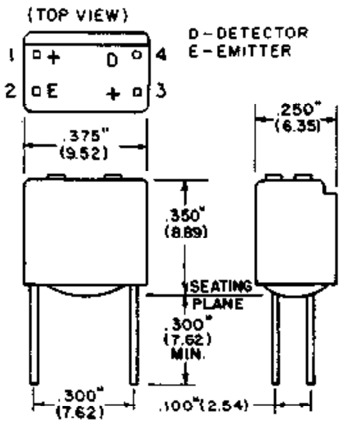


Fig. P28
ECG
3040 3096
3041 3097
3042
3043
3044
3045
3046
3047
3048
3049
3083
3084
3085
3088
3089
3090
3091

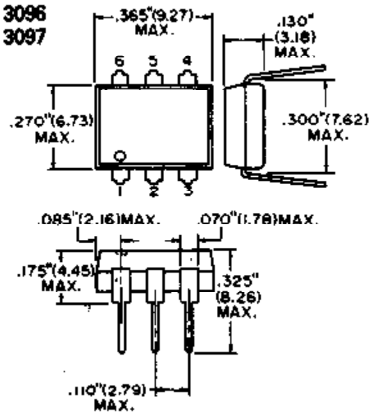


Fig. P29
ECG
3086 3092 3094 3220
3087 3093 3095

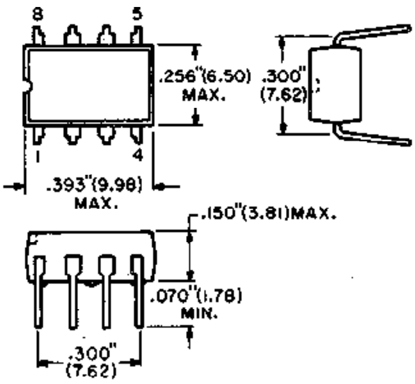


Fig. P55
ECG
3098

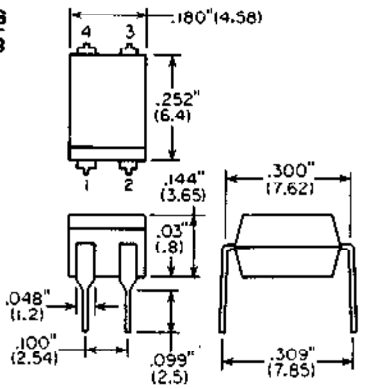
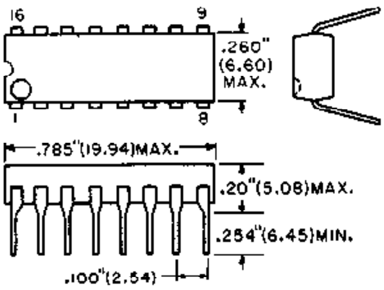


Fig. P61
ECG
3221

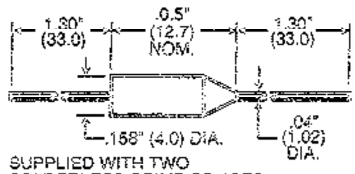


Thermal Cutoffs

Maximum Current Rating: 120 VAC/15 A, 250 VAC/10 A
Typical Operating Temperature Tolerance: +0°C, -5°C

ECG Type	Maximum Opening Temperature °C	Maximum Opening Temperature °F	ECG Type	Maximum Opening Temperature °C	Maximum Opening Temperature °F
ECG8063	66	151	ECG8125	128	263
ECG8070	72	162	ECG8139	141	286
ECG8076	77	171	ECG8139A	144	291
ECG8081	84	184	ECG8149	152	306
ECG8085	87	189	ECG8167	171	340
ECG8090	93	200	ECG8167A	167	333
ECG8096	98	209	ECG8181	184	364
ECG8098	100	212	ECG8182	192	378
ECG8103	104	220	ECG8213	216	421
ECG8108	110	230	ECG8226	228	443
ECG8115	117	243	ECG8226A	229	444
ECG8118	121	250	ECG8242	240	464

Fig. 1C



SUPPLIED WITH TWO SOLDERLESS CRIMP SPLICES

Replacement Procedures and Precautions

Proper Identification Of Part To Be Replaced.

It is important to determine the correct cut-off temperature from any available information. The original part may be marked with a part number, a cut-off temperature (in °C or °F), three resistor-type color bands (starting at seal end, bands represent opening temperature in degrees C) or any combination of these three markings.

The color of the plastic on the end of a TCO is not a reliable indication of the cut-off temperature. **There is no industry standard.**

Frequently the last three digits of the part number are the same as the cut-off temperature in either degrees Farenheit or degrees Celsius. The table below lists Celsius to Farenheit temperature conversions for your reference. When replacing a thermal cut-off with a trip temperature less than 120°C, the replacement part should have a trip temperature within 4°C of the original part. If the original part has a trip temperature greater than 120°C, the replacement should be within 8°C of the original part.

°C to °F Temperature Equivalents

°C	°F	°C	°F	°C	°F	°C	°F
60	140	95	203	140	284	210	410
65	149	100	212	150	302	220	428
70	158	105	221	160	320	230	446
75	167	110	230	170	338	240	464
80	176	115	239	180	356	250	482
85	185	120	248	190	374		
90	194	130	266	200	392		

Replacement Techniques

THE THERMAL CUT-OFF CAN FAIL TO OPEN IF ONE OR MORE OF THE FOLLOWING CONDITIONS ARE PRESENT:

A. - Cracked or broken end seal due to improper lead bending, over-temperature soldering or excessive temperatures in use.

B. - Compression on the end seal lead during use that could re-establish continuity with the case after tripping.

C. - Distorted case caused by damage or clamping during the replacement operation.

The replacement thermal cut-off should have the same lead orientation as the original part to maintain proper heat flow characteristics and to avoid possible shock hazard from failed device case.

If it is necessary to bend the leads of the replacement device, care must be exercised to support the leads near the seal or body with a hand tool or bending fixture as illustrated in Fig. A.

Because these devices are temperature sensitive, we recommend solderless crimp splices or crimp terminations be used as shown in Fig. B. If the leads of the original device are long enough, cut the defective part out at the seal and body. The replacement part can then be installed to the original part leads using the seamless crimp splices supplied with the ECG replacement.

Thermal cut-off leads can be soldered using a heat sink between the thermal cut-off body and the point of connection as shown in Fig. C. Excessive heat could shorten the thermal cut-off life, causing a nuisance trip.

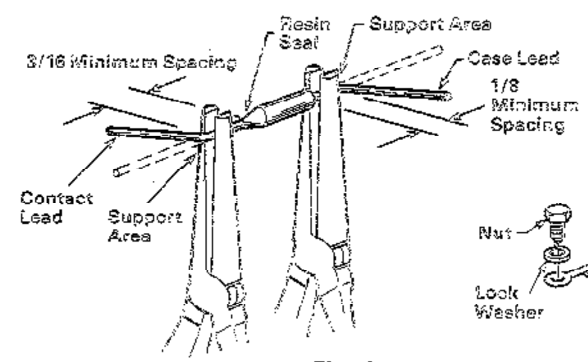


Fig. A

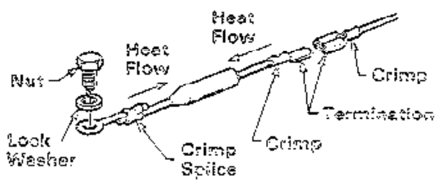


Fig. B

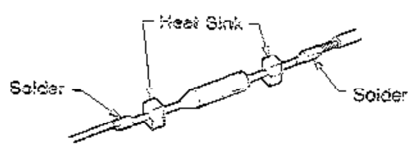


Fig. C

L

IC Protectors

ECG IC Protectors are components designed to protect ICs and all types of electronic equipment against overloads.

These fast cut-off devices are intended solely for exact replacement in existing equipment. The chart shown below is for quick reference and not for design criteria. No further data is available.

ECG Number	Rated Voltage V Max	Rated Current A Max	Internal Resistance Ω Typ	Case Style	Fig. No.
ECG15005	50	0.4	.220	M-68	L16B
ECG15006	50	0.6	.135	M-68	L16B
ECG15007	50	0.8	.100	M-68	L16B
ECG15008	50	1.0	.070	M-68	L16B
ECG15009	50	1.5	.042	M-68	L16B
ECG15019	50	0.25	.350	TO-92	L16A
ECG15020	50	0.4	.220	TO-92	L16A
ECG15021	50	0.6	.135	TO-92	L16A
ECG15022	50	0.8	.100	TO-92	L16A
ECG15023	50	1.0	.070	TO-92	L16A

Operating Temperature: −55°C to +125°C

Fig. L16A **TO-92**

ECG
15019
15020
15021
15022
15023

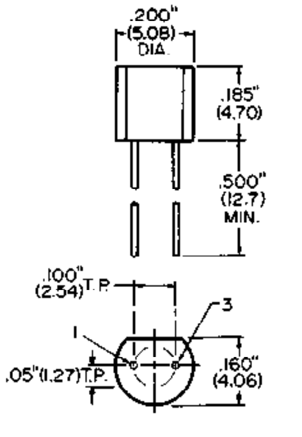
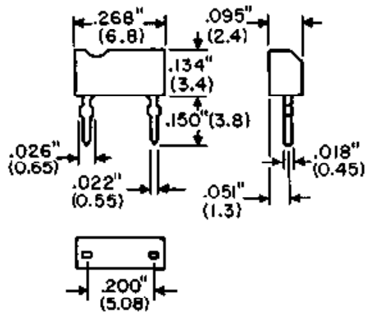


Fig. L16B **M-68 2-Pin**

ECG
15005
15006
15007
15008
15009



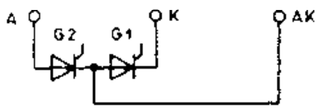
Industrial Power Modules

Thyristor Modules

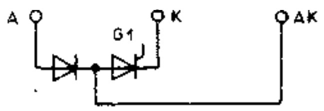
Circuit No.	ECG No.	ECG No.	ECG No.	ECG No.	ECG No.	ECG No.	ECG No.
1		5710		5720			
2		5711		5721			
3		5712		5722			
6	5708		5714		5724	5726	5728
$I_{T\ (AV)}$*	**25 A**	**65 A**	**65 A**	**95 A**	**95 A**	**160 A**	**250 A**
$I_{T\ (RMS)}$*	**60 A**	**120 A**	**120 A**	**150 A**	**160 A**	**350 A**	**550 A**
V_{DRM}	1600 Volts	1200 Volts	1600 Volts	1200 Volts	1600 Volts	1600 Volts	1600 Volts
V_F	1.95 Volts	1.45 Volts	1.6 Volts	1.34 Volts	1.6 Volts	1.5 Volts	1.45 Volts
I_H	200 mA	250 mA	200 mA	250 mA	200 mA	500 mA	500 mA
I_{TSM} (1 Cycle)	420 A	1500 A	740 A	1900 A	1870 A	5300 A	8900 A
I^2T	730 A^2sec	9300 A^2sec	12.5 KA^2sec	15 KA^2sec	14.5 KA^2sec	119 KA^2sec	330 KA^2sec
R_{THCS}	.35° C/W	.08° C/W	.1° C/W	.08° C/W	.1° C/W	.17° C/W	.03° C/W
T_J (Max)	+ 125° C	+ 125° C	+ 125° C	+ 140° C	+ 125° C	+ 125° C	+ 125° C
dv/dt	500 V/µsec	200 V/µsec	500 V/µsec	200 V/µsec	500 V/µsec	500 V/µsec	500 V/µsec
T_q	150 µsec	150 µsec	150 µsec	150 µsec	150 µsec	150 µsec	150 µsec
V_{GT} (Max)	2.5 Volts	1.5 Volts	2.5 Volts	1.5 Volts	2.5 Volts	3 Volts	3 Volts
I_{GT} (Max)	150 mA	200 mA	150 mA	200 mA	150 mA	200 mA	200 mA
P_{GT} (Max)	2.5W	20 W	3 W	20 W	3 W	2 W	2 W

* Per SCR or Rectifier

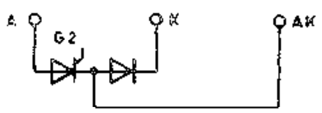
Circuit 1



Circuit 2



Circuit 3



Circuit 6

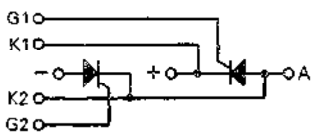


Fig. M1

ECG
5708
5710
5711
5712
5714
5720
5721
5722
5724

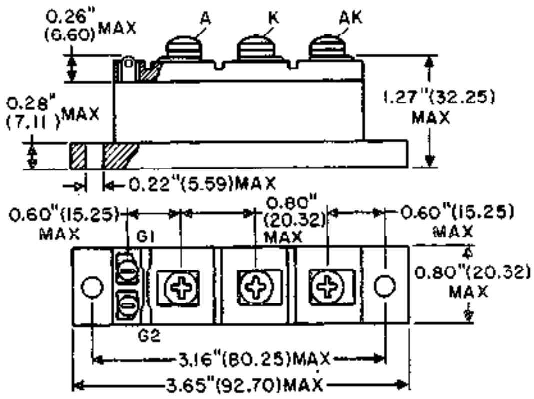
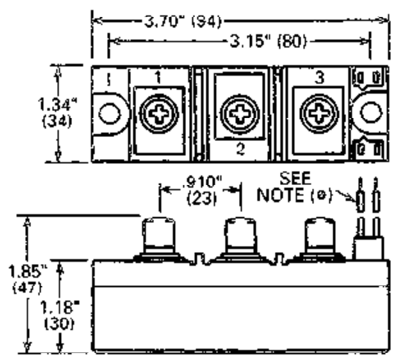


Fig. M1-1

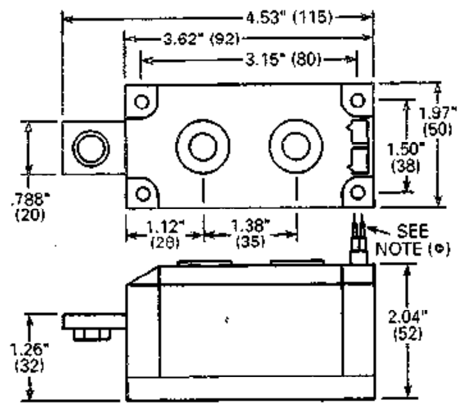
ECG
5726°



° 5726 has wire leads

Fig. M-6

ECG
5728°



° 5728 has wire leads

M

Rectifier Modules

Circuit No.	ECG No.	ECG No.	ECG No.	ECG No.	ECG No.	ECG No.	ECG No.
4	6220	6222	6230	6232	6234	6236	6238
I_F (AV)*	**60 A**	**60 A**	**95 A**	**100 A**	**195 A**	**250 A**	**320 A**
I_F (RMS)*	**100 A**	**90 A**	**150 A**	**150 A**	**305 A**	**390 A**	**500 A**
V_{DRM}	1200 Volts	1600 Volts	1200 Volts	1600 Volts	1600 Volts	1600 Volts	1600 Volts
I_{FSM} (1 Cycle)	1000 A	1600 A	3600 A	2020 A	4750 A	7000 A	10,000 A
I^2T	5 KA^2sec	12.9 KA^2sec	6.5 KA^2sec	18.6 KA^2sec	105 KA^2sec	225 KA^2sec	465 KA^2sec
V_F	1.25 V	1.5 V	1.15 V	1.5 V	1.3 V	1.3 V	1.3 V
T_J (Max)	+ 150° C	+ 150° C	+ 150° C	+ 150° C	+ 150° C	+ 150° C	+ 150° C
R_{THCS}	.08° C/W	.1° C/W	.08° C/W	.05° C/W	.02° C/W	.01° C/W	.01° C/W

* Per Rectifier

Circuit 4

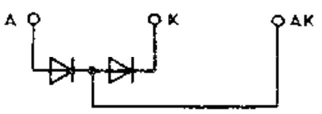


Fig.M1
ECG
6220
6222
6230
6232

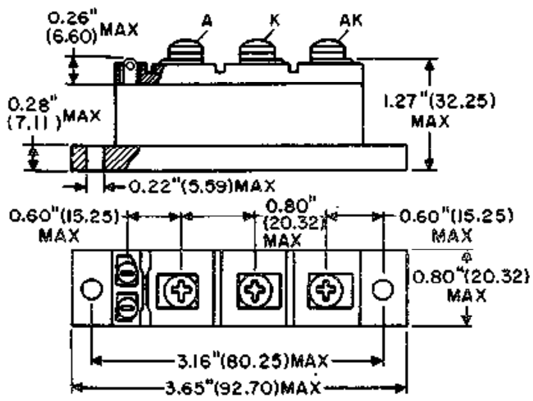


Fig.M1-1
ECG
6234

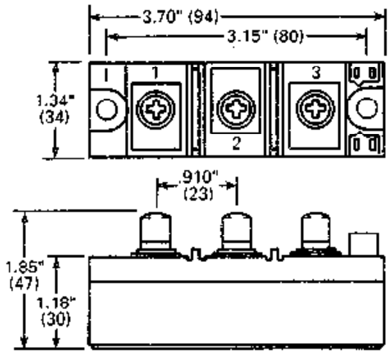
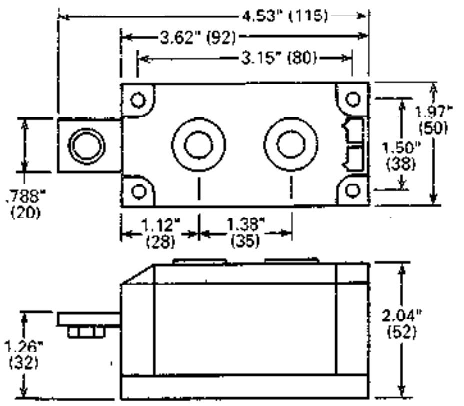
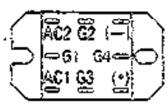
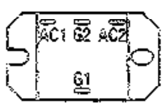
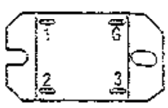
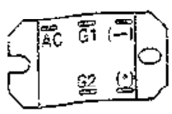
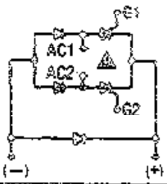
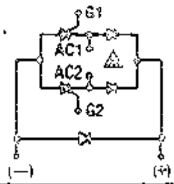
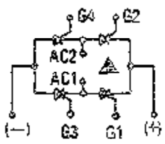
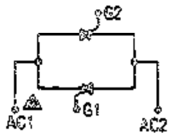
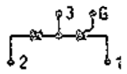
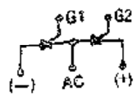


Fig.M-6
ECG
6236
6238



Hybrid Modules

ECG No.	5700	5701	5702	5703	5704	5705
Description	Single Phase, Hybrid Bridge, Common Cathode, Freewheeling Diode	Single Phase, Hybrid Bridge, Common Anode, Freewheeling Diode	Single Phase All SCR Bridge	SCR AC Switch	Hybrid Doubler	SCR Doubler
Terminal Positions						
Schematic Diagrams						

△ For transient protection a metal oxide varistor (MOV) may be connected across Terminals AC1 and AC2 externally.

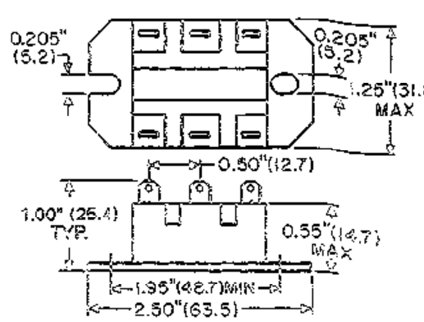
Electrical Characteristics

Symbol	Rating	Unit
V_{DRM}	1200	V
I_T (AV)°	12.5	A
I_T (RMS)°	28	A
I_O†	25	A
I_{TSM} (1 Cycle)	375	A
I^2T	580	A^2sec
V_F (Max)	1.35	V
I_H	100	mA
P_{GT} (Max)	11	W
I_{GT} (Max)	60	mA
V_{GT} (Max)	2	V
d_v/d_t	200	V/µsec
V_{ISO}	2500	V
Terminal Torque	35-50	In. Lb.

° Per SCR or Rectifier
† Rating for ECG5700, ECG5701 and ECG5702 only

Module Outline

Fig. M2



Industrial Power Modules (cont'd)

3 Phase Bridge Modules

Circuit No.	ECG No.	ECG No.	ECG No.	ECG No.	ECG No.	ECG No.
5	5740	5741	5742	5743	5744	5745
VDRM	800 V	1600 V	800 V	1600 V	800 V	1600 V
I_o*	30 A	30 A	75 A	75 A	100 A	100 A
VF*	1.1 V	1.3 V	1.2 V	1.4 V	1.2 V	1.25 V
ITSM (1 Cycle)	365 A	270 A	910 A	910 A	1000 A	1000 A
TJ (Max)	+ 150 °C	+ 150 °C	+ 150 °C	+ 150 °C	+ 150 °C	+ 150 °C
RTHCS	1.0° C/W	.42° C/W	.24° C/W	.24° C/W	.2° C/W	.22° C/W

* Per Diode

Circuit 5

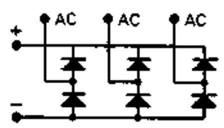


Fig. M3
ECG
5740

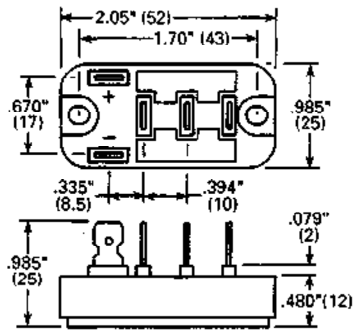


Fig. M4
ECG
5741

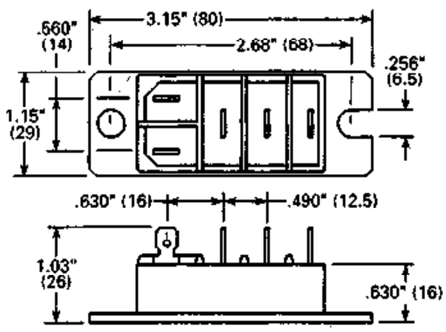
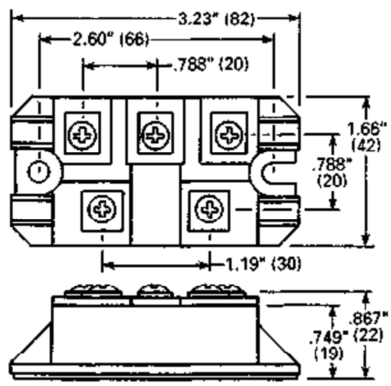


Fig. M5
ECG
5742
5743
5744
5745



Symbols, Terms and Definitions

NPN Bipolar Transistor	P-Channel Enhancement Mode MOS FET Dual Gate	Silicon Unilateral Switch (SUS)	Optoisolator with Photo-Darlington Output, No Base
PNP Bipolar Transistor	Silicon N-Type Unijunction Transistor (UJT)	Silicon Asymmetrical Switch (SAS)	Optoisolator with Photo-Darlington Output, and Base
NPN Darlington Transistor	Silicon P-Type Unijunction Transistor (UJT)	PIN Diode	Optoisolator Triac Driver
PNP Darlington Transistor	Programmable Unijunction Transistor (PUT)	Varactor	Optoisolator SCR Driver
N-Channel J FET	Rectifier or Diode	Varistor	AND Gate
P-Channel J FET	Full-Wave Bridge Rectifier	Metal Oxide Varistor (MOV)	OR Gate
N-Channel Depletion Mode MOS FET Single Gate	Zener Diode	Light Emitting Diode (LED)	NAND Gate
P-Channel Depletion Mode MOS FET Single Gate	SCR (Thyristor)	Photodiode	NOR Gate
N-Channel Enhancement Mode MOS FET Single Gate	Triac (Thyristor)	NPN Phototransistor, No Base Connection	Inverting AMP
P-Channel Enhancement Mode MOS FET Single Gate	Diac (Bilateral Trigger Diode)	NPN Phototransistor, with Base Connection	Non-Inverting AMP
N-Channel Depletion Mode MOS FET Dual Gate	Silicon Controlled Switch (SCS) (Thyristor)	Optoisolator with Photodiode Output	Exclusive OR Gate
P-Channel Depletion Mode MOS FET Dual Gate	Silicon Controlled Switch (Transistor) (SCS)	Optoisolator with Phototransistor Output, No Base Connection	
N-Channel Enhancement Mode MOS FET Dual Gate	Silicon Bilateral Switch (SBS)	Optoisolator with Phototransistor Output, and Base Connection	

Diodes, Rectifiers, Thyristors

C_t — Total Capacitance - The Total Small-Signal Capacitance Between The Diode Terminals.

d_i/d_t — Rate Of Change Of Current Versus Time.

d_v/d_t — Rate Of Change Of Voltage Versus Time.

I_F — Forward Junction Current - The Value Of DC Current That Flows Through A Semiconductor Diode Or Rectifier Diode In The Forward Direction.

I_{FRM} — Peak Forward Current Repetitive Peak - The Peak Value Of The Forward Current Including All Repetitive Transient Currents.

I_{FSM} — Forward Surge Peak DC Current - Maximum (Peak) Surge Forward Current Having A Specified Waveform And A Short Specified Time Interval.

$I_{GT\,Min}$ — Gate Trigger Current - Minimum Gate DC Current Required To Trigger The Device Under The Conditions Specified.

$I_{GO\,Max}$ — Peak Gate Turn-Off Current - Maximum Negative Gate Current Required To Switch Off.

I_H — Holding Current - Anode Current Necessary To Maintain On-State.

I_O — Average Rectifier DC Forward Current - The Value Of The Forward Current Averaged Over A 180° Conduction Angle At 60 Hz.

I_R — DC Reverse Current - Value Of DC Current That Flows Through The Diode In The Reverse Direction. (Leakage Current.)

I_{RM} — Maximum Reverse DC Current - The Respective Value Of Current That Flows Through The Junction In The Reverse Direction.

I_{trms} — Continuous On-State Current.

I_{tsm} — Surge (Non-Repetitive) Peak On-State Current - A Surge Current Of Short-Time Duration.

L_S — Series Inductance - The Inductance Between The Terminals On The Diode.

PRV — Peak Reverse Voltage - Maximum Repetitive Peak Reverse Blocking Voltage That May Be Applied To The Anode-Cathode Of The Device.

R_S — Series Resistance - The Total Small Signal Resistance Between The Diode Terminals.

T_A — Ambient Temperature - The Air Temperature Measured Below A Device, In An Environment Of Substantially Uniform Temperature, Cooled Only By Natural Air Convection And Not Materially Affected By Reflective And Radiant Surfaces.

T_C — Case Temperature - The Temperature Measured At A Specified Location On The Case Of A Device.

T_j — Semiconductor Junction Temperature.

T_Q — Turn Off Time.

t_{rr} — Reverse Recovery Time - The Time Required For The Current Or Voltage To Recover To A Specified Value After Instantaneous Switching From A Stated Forward Current Condition To A Stated Reverse Voltage Or Current Condition.

V_B — DC Breakdown Voltage - Value Of Voltage Measured At The Point Which Breakdown Occurs With The Diode Reverse Biased.

$V_{(BR)R}$ — Static Reverse Breakdown Voltage - The Value Of Negative Anode-To-Cathode Voltage At Which The Differential Resistance Breakdown Between The Anode And Cathode Terminals Changes From A High Value To A Substantially Lower Value.

V_{DRM} — Repetitive Peak Off-State Voltage - Maximum Instantaneous Value Of The Off-State Voltage That Occurs Across The Devices, Including All Repetitive Transient Voltages, But Excluding All Non-Repetitive Transient Voltages.

V_F — Forward Voltage - The Voltage Drop In A Semiconductor Diode Resulting From The Respective Forward Current.

V_{FM} — Maximum Forward Voltage - The Voltage Drop In A Semiconductor Diode Resulting From The Respective Forward Current.

V_{GFM} — Maximum Forward Gate Voltage - Maximum DC Forward Gate Voltage Permitted To Produce A Specified Forward Gate Current.

$V_{GO\,Max}$ — Peak Gate Turn-Off Voltage - Maximum Reverse Gate Voltage Required To Switch Off.

V_{GRM} — Maximum Reverse Gate Voltage - Maximum Peak Reverse Voltage Allowable Between The Gate Terminal And The Cathode Terminal When The Junction Between The Gate Region And The Adjacent Cathode Region Is Reverse Biased.

V_Z — Zener Regulator Reference Voltage - Value Of DC Voltage Across The Diode When It Is Biased To Operate In Its Breakdown Region.

$\Delta V_Z/\Delta T$ — Change In Zener Voltage To Change In Temperature.

Transistors

BV_{CBO} — Collector To Base Breakdown Voltage - Voltage Measured Between Collector And Base With Emitter Open.

BV_{CEO} — Collector To Emitter Breakdown Voltage - Voltage Measured Between Collector And Emitter With Base Open.

BV_{CER} — Collector To Emitter Breakdown Voltage - Voltage Measured Between Collector And Emitter When The Base Terminal Is Returned To The Emitter Terminal Through A Specified Resistance.

BV_{CES} — Collector To Emitter Breakdown Voltage - Voltage Measured Between Collector And Emitter With The Base Terminated Through A Short Circuit To The Emitter.

BV_{CEV} — Collector To Emitter Breakdown Voltage - Voltage Measured Between Collector And Emitter When A Specified Voltage (V) Is Applied Between The Base And Emitter.

Transistors (cont'd)

BV_{CEX} — Collector To Emitter Breakdown Voltage - Voltage Measured Between Collector And Emitter When The Base Is Terminated Through A Specified Load (X) To The Emitter.

BV_{DSS} — Drain To Source Breakdown Voltage - Voltage Measured Between The Drain And Source Terminals With The Gate Short-Circuited To The Source Terminal.

BV_{EBO} — Emitter To Base Breakdown Voltage - Reverse Voltage Measured Between Emitter And Base With The Collector Terminal Open.

BV_{GSS} — Gate To Source Breakdown Voltage - The Breakdown Voltage Between The Gate And Source Terminals With The Drain Terminal Short-Circuited To The Source Terminal.

C_{iss} — Input Capacitance - The Capacitance Between The Terminals (Gate And Source) With The Drain Short-Circuited To The Source.

C_{RSS} — Reverse Transfer Capacitance - The Capacitance Between The Drain And Gate Terminals.

f_T — Gain Bandwidth Product - Frequency At Which Small-Signal Gain Becomes Unity.

g_{fs} — Forward Transfer Conductance - Common Source Forward Transconductance.

G_{PE} — Power Gain Emitter Output.

h_{FE} — DC Current Gain - The Ratio Of Collector Current To Base Current At A Specified Collector-Emitter Voltage.

I_B — DC Base Current - Value OF DC Current Into The Base Terminal.

I_C — DC Collector Current - Value OF DC Current Into The Collector Terminal.

I_{DSS} — Zero Bias Drain Current - Amount Of Current Which Flows In The Drain When The Gate Is Connected To The Source.

N.F. — Noise Figure.

P_D — Average Power Dissipation.

P_{IN} — Signal Input Power To Device.

P_{OUT} — Signal Output Power.

r_{DSS} — Drain-Source On-State Resistance.

V_{CC} — DC Supply Voltage Applied To The Collector Terminal.

Special Purpose Devices

BV_{CER} — Breakdown Voltage Between Collector And Emitter With A Specified Resistor Between Base And Emitter.

BV_{GKF} — Gate To Cathode Forward Breakdown Voltage.

BV_{GKR} — Gate To Cathode Reverse Breakdown Voltage.

h_{FE} — DC Current Gain - Ratio Of DC Output Current To The DC Input Current.

$I_{BO+(Max)}$ — Maximum Forward Breakover Current.

$I_{BO-(Max)}$ — Maximum Reverse Breakover Current.

I_E — Value Of The DC Current Into The Emitter.

I_{EO} — Emitter Current With One Base Open.

I_G — DC Gate Current - The DC Current Flowing Through The Gate As A Result Of Applied Gate Voltage.

$I_{T\,PK}$ — Total Peak Current.

I_V — Valley Current - The Valley Current Is The Emitter Current At The Second Lowest Current Point.

η — Intrinsic Stand Off Ratio.

R_{BBO} — Base 1 To Base 2 Resistance With Open Emitter.

V_{AK} — Anode To Cathode Voltage - The Maximum Value Of Voltage Applied Between Anode And Cathode Without Failure.

$V_{(BO)+}$ — Forward Breakover Voltage.

$V_{(BO)-}$ — Reverse Breakover Voltage.

ΔV_F — Forward Breakback Voltage.

ΔV_R — Reverse Breakback Voltage.

V_{GT} — Gate Trigger Voltage - The Gate Voltage Required To Produce The Gate Trigger Current.

Opto Electronic Devices

I_D — Dark Current - The Current Which Flows In A Photodetector When There Is No Incident Radiation On The Detector.

I_{FT} — Input Trigger Current - Emitter Current Necessary To Trigger The Coupled Device.

I_L — Light Current - The Current That Flows Through A Photo Sensitive Device When It Is Exposed To Illumination.

P_t — Total Device Power Dissipation.

Response Time — The Time It Takes The Device To React To An Incoming Signal.

Rise Time (t_r) — The Time Duration During Which The Leading Edge Of A Pulse Is Increasing From 10% To 90% Of Its Maximum Amplitude.

V_{ISO} — DC Isolation Surge Voltage - The Dielectric Withstanding Voltage Between The Input And Output.

λ_P — Wavelength At Peak Emission - The Wavelength At Which The Power Output From A Light-Emitting Diode Is Maximum.

θ_{HI} — Half-Intensity Beam Angle - The Angle Within Which The Radiant Intensity Is Not Less Than Half Of The Maximum Intensity.

Linear IC Selector Guide

- **Amplifiers**

Audio Power

Output Watts	ECG No.	Package
0.45	1530	14 Pin DIP-ET
0.5	1465	9 Pin SIP
	1467	8 Pin SIP
0.7	1612	9 Pin SIP
1.0	717	14 Pin DIP
	784	12 Pin TO-5
	812	14 Pin DIP
	823	8 Pin DIP
	825	14 Pin DIP
	1009	8 Pin DIP-W
	1452	7 Pin SIP
	7051	8 Pin DIP
1.2	1704	9 Pin SIP
1.3	1137	10 Pin TO-5
1.4	1476	10 Pin SIP-HS
1.5	1141	8 Pin DIP-ET
	1180	14Pin DIP-ET
1.8	1516	8 Pin DIP-ET
2.0	740A	14 Pin DIP-W
	810A	14 Pin DIP-W
	862	14 Pin DIP-W
	1010	8 Pin DIP-W
	1117	14 Pin DIP-Q
	1140	8 Pin DIP-ET
	1294	8 Pin DIP
2.1	1113	14 Pin DIP-Q
	1228	14 Pin DIP-ET
2.5	1150	8 Pin DIP-W
	1470	14 Pin DIP-ET
3.0	7052	9 Pin SIP-HS
3.3	1118	14 Pin DIP-Q, HS
3.5	1029	10 Pin DIP-ET
	1038	10 Pin DIP-ET
3.8	1385	14 Pin DIP-W
4.0	1023	14 Pin DIP-W
	1732	12 Pin SIP
	1852	9 Pin SIP-HS
4.4	1407	9 Pin SIP
4.5	1165	10 Pin SIP-HS
	1193	12 Pin SIP-HS
5.0	862	14 Pin DIP-W
	1116	12 Pin DIP-W
	1450	10 Pin DIP
	7000	16 Pin DIP
5.2	1160	10 Pin SIP-HS
	1365	9 Pin SIP-HS
5.5	1037	10 Pin DIP-ET
	1240	11Pin SIP
5.7	1424	8 Pin SIP-HS
5.8	1155	10 Pin SIP-HS
	1166	10 Pin SIP-HS
	1278	10 Pin SIP-HS
	1286	7 Pin SIP
6.5	1638	12 Pin SIP
7.0	1115	12 Pin DIP-W
	1392	10 Pin SIP-HS
	1393	10 Pin SIP-HS
	7101	8 Pin SIP-HS
8.0	1024	10 Pin SIP-M
	1232	5 Pin TO-220
10.0	1025	10 Pin SIP-M
	1288	5 Pin TO-220
	1343	15 Pin SIP-M
	1378	5 Pin TO-220
12.0	1361	9 Pin SIP-HS
	1374	5 Pin TO-220
	1390	10 Pin SIP
	1391	10 Pin SIP
	1832	7 Pin SIP-HS
14.0	1380	5 Pin TO-220
	7059	16 Pin SIP-HS
15.0	1319	10 Pin SIP
18.0	1399	12 Pin SIP-HS
19.0	1602	12 Pin SIP-HS
20.0	1028	10 Pin SIP-M
	1389	12 Pin SIP
	1724	10 Pin SIP
	1815	15 Pin SIP-M
	7011	12 Pin SIP-HS
	7040	12 Pin SIP-HS
22.0	1376	5 Pin TO-220
24.0	1326	10 Pin SIP-M
25.0	1320	10 Pin SIP-M
30.0	7122	12 Pin SIP-HS
35.0	1280	10 Pin SIP-M
	1282	10 Pin SIP-M
	1327	10 Pin SIP-40.0
	1333	10 Pin SIP-M
	1357	10 Pin SIP-M
50.0	1279	10 Pin SIP-M
	1281	10 Pin SIP-M
	1328	10 Pin SIP-M
	1350	10 Pin SIP-M
	1358	10 Pin SIP-M
	7030	15 Pin SIP-M
60.0	1346	10 Pin SIP-M
	1360	10 Pin SIP-M
70.0	1337	10 Pin SIP-M
80.0	1322	10 Pin SIP-M
	1335	10 Pin SIP-M
100.0	1882	15 Pin SIP-M
	7031	15 Pin SIP-M
120.0	7032	18 Pin SIP-M

Audio Dual Power

Output Watts	ECG No.	Package
1.2	7055	14 Pin DIP-ET
2.0	804	14 Pin DIP-W
	990	14 Pin DIP-W
	1154	14 Pin DIP-W
2.3	1667	16 Pin DIP-W
2.4	1387	10 Pin SIP-HS
2.5	1687	11 Pin SIP-HS
3.5	1685	10 Pin SIP-HS
3.9	1372	20 Pin DIP
4.2	1382	20 Pin DIP
	1626	12 Pin SIP
	1637	14 Pin SIP
4.3	1606	12 Pin SIP-HS
5.0	1367	18 Pin DIP
5.1	1383	18 Pin DIP
5.5	1364	14 Pin SIP
	1371	12 Pin SIP
	1373	12 Pin SIP
	1379	20 Pin DIP
	1394	12 Pin SIP
	1707	12 Pin SIP
	7102	14 Pin SIP-HS
5.8	1368	12 Pin SIP
	1395	12 Pin SIP-HS
	1398	12 Pin SIP-HS
	1830	12 Pin SIP-HS
	1831	12 Pin SIP-HS
	1898	12 Pin SIP-HS
	1899	12 Pin SIP-HS
	7061	12 Pin SIP-HS
6.0	1220	15 Pin SIP-M
	1377	14 Pin SIP
	1798	10 Pin SIP
	1802	13 Pin SIP
	1816	18 Pin SIP-M
	7070	12 Pin SIP-HS
6.5	1396	11 Pin SIP-HS
	7053	11 Pin SIP-HS
	7106	11 Pin SIP-HS
7.0	1218	15 Pin SIP-M
8.5	1675	20 Pin DIP
10.0	7105	11 Pin SIP-HS
11.0	7119	9 Pin SIP
12.0	1850	9 Pin SIP
	1851	13 Pin SIP
13.0	7068	12 Pin SIP-HS
14.0	7113	16 Pin SIP-HS
15.0	1219	15 Pin SIP-M
	1252	16 Pin SIP-M
	1330	16 Pin SIP-M
	1874	18 Pin SIP-M
	7088	17 Pin SIP
20.0	1817	18 Pin SIP-M
22.0	7041	17 Pin SIP
25.0	1331	16 Pin SIP-M
	1356	16 Pin SIP-M
	1818	18 Pin SIP-M
28.0	1877	18 Pin SIP-M
30.0	1345	16 Pin SIP-M
	1819	18 Pin SIP-M
	1820	16 Pin SIP-M
35.0	1315	16 Pin SIP
50.0	1316	18 Pin SIP
	1317	18 Pin SIP-M
	1871	18 Pin SIP-M
100.0	7029	22 Pin SIP

Linear IC Selector Guide (cont'd)

Audio Quad Power

Output Watts	ECG No.	Package
11	7114	17 Pin SIP-HS

Audio Power with Preamps

Output Watts	ECG No.	Package
1.0	1043	14 Pin DIP

Audio Preamps

ECG735	4 Pin DIP
ECG755	4 Pin DIP-Q
ECG772A	8 Pin DIP-Q
ECG839	8 Pin DIP
ECG1015	8 Pin ZIL
ECG1019	9 Pin ZIL
ECG1021	9 Pin ZIL
ECG1087	7 Pin SIP
ECG1179	8 Pin DIP
ECG1210	9 Pin SIP
ECG1223	7 Pin SIP
ECG1302	7 Pin SIP
ECG1433	7 Pin SIP
ECG1466	9 Pin SIP
ECG1468	7 Pin SIP
ECG1497	7 Pin SIP
ECG1660	8 Pin SIP

Audio Dual Preamps

ECG725	14 Pin DIP
ECG824	8 Pin DIP
ECG942	14 Pin DIP
ECG947D	14 Pin DIP
ECG983	14 Pin DIP
ECG1170	8 Pin SIP
ECG1339	15 Pin SIP-M
ECG1435	9 Pin SIP
ECG1453	14 Pin DIP
ECG1477	14 Pin DIP-ET
ECG1517	10 Pin SIP
ECG1571	14 Pin DIP
ECG1634	14 Pin DIP
ECG1651	16 Pin DIP
ECG1659	8 Pin SIP
ECG1730	9 Pin SIP
ECG1865	18 Pin DIP
ECG1878	15 Pin SIP-M
ECG7103	14 Pin SIP-HS

Audio Quad Preamps

ECG727	16 Pin DIP
ECG834	14 Pin DIP
ECG948	14 Pin DIP
ECG987	14 Pin DIP
ECG992	14 Pin DIP

Audio/Spkr/Protect/Voltage/Temp/Overload

ECG1635	8 Pin SIP
ECG7100	8 Pin SIP

General Purpose

Differential

ECG724	8 Pin Can
ECG773	8 Pin DIP-Q
ECG906	12 Pin Can
ECG917	14 Pin DIP

General Purpose

ECG1101	7 Pin SIP

Hi-Frequency

ECG1104	5 Pin SIP

Noise Reduction

ECG1744	22 Pin DIP
ECG1794	8 Pin SIP
ECG1795	8 Pin SIP
ECG1833	18 Pin DIP
ECG1859	16 Pin SIP

Wide Band

ECG838	8 Pin DIP

Operational (Op Amp)

Single DC Power Supply

Differential, Cascade

ECG773	8 Pin DIP-Q

Dual/Hi Speed/Programmable/Current Mode

ECG869	14 Pin DIP

Quad Current Mirror/Int. Comp.

ECG992	14 Pin DIP

Single or Split DC Power Supply

Bi-MOS

ECG930	8 Pin Can

Dual Hi Gain/Internally Comp.

ECG928	8 Pin Can
ECG928M	8 Pin DIP
ECG928SM	8 Pin SOIC

Hi Frequency

ECG724	8 Pin Can

Low Power Drain

ECG877	8 Pin Can

Quad General Purpose/Freq Comp.

ECG987	14 Pin DIP
ECG987SM	14 Pin SOIC

Wide Band/Large Signal/Hi Speed

ECG871	8 Pin Can

Split DC Power Supply

Dual/Internal Compensation

ECG778A	8 Pin DIP
ECG778S	8 Pin SIP
ECG778SM	8 Pin SOIC
ECG891M	8 Pin DIP
ECG891SM	8 Pin SOIC
ECG947	10 Pin Can
ECG947D	14 Pin DIP

FET Input

ECG857M	8 Pin DIP
ECG857SM	8 Pin SOIC
ECG887M	8 Pin DIP
ECG937	8 Pin Can
ECG937M	8 Pin DIP

FET Dual Input

ECG858M	8 Pin DIP
ECG858SM	8 Pin SOIC
ECG889M	8 Pin DIP

FET Quad Input

ECG859	14 Pin DIP
ECG859SM	14 Pin SOIC

General Purpose

ECG847	14 Pin DIP
ECG941	8 Pin Can
ECG941D	14 Pin DIP
ECG941M	8 Pin DIP
ECG941S	7 Pin SIP
ECG941SM	8 Pin SOIC
ECG975	8 Pin DIP
ECG975SM	8 Pin SOIC

General Purpose (cont'd)

ECG976	8 Pin DIP
ECG1171	8 Pin Can

Hi Gain/Lo Noise

ECG894M	8 Pin DIP
ECG894SM	8 Pin DIP-SM
ECG909	8 Pin Can
ECG909D	14 Pin DIP

Hi Gain/Lo Noise (Dual)

ECG1529	9 Pin SIP

Hi Gain/Lo Noise (Quad)

ECG948	14 Pin DIP
ECG948SM	14 Pin SOIC
ECG997	14 Pin DIP

Hi Speed/Hi Gain

ECG915	10 Pin Can
ECG918	8 Pin Can
ECG918M	8 Pin DIP
ECG918SM	8 Pin SOIC

Hi Speed/Internal Comp.

ECG927	10 Pin Can
ECG927D	14 Pin DIP
ECG927SM	14 Pin SOIC

Hi Speed/Voltage Follower

ECG924	8 Pin Can
ECG924M	8 Pin DIP

Internal Comp./Low Input Current

ECG945	8 Pin Can

Precision/Instrumentation

ECG938	8 Pin Can
ECG938M	8 Pin DIP

Programmable

ECG888M	8 Pin DIP
ECG944	8 Pin Can
ECG944M	8 Pin DIP

Transconductance

ECG870	14 Pin DIP
ECG902	8 Pin Can
ECG996	8 Pin DIP

• Arrays

Diode Arrays

ECG907	12 Pin Can
ECG1680	7 Pin SIP

Transistor Arrays

ECG904	12 Pin Can
ECG912	14 Pin DIP
ECG916	16 Pin DIP
ECG929	16 Pin DIP
ECG1828	9 Pin SIP
ECG1829	9 Pin SIP

• Attenuators

Attenuator (Single)

ECG829	8 Pin DIP
ECG1783	7 Pin SIP

Attenuator (Dual)

ECG1439	14 Pin DIP
ECG1792	9 Pin SIP
ECG1803	18 Pin DIP

Attenuator (Quad)

ECG802	16 Pin DIP

Dual Attenuator/Tone Control

ECG1576	16 Pin DIP
ECG1780	12 Pin SIP
ECG7072	18 Pin DIP

Linear IC Selector Guide (cont'd)

● Attenuators (cont'd)

Quadrophonic Decoder Systems

ECG799 14 Pin DIP
ECG803 16 Pin DIP
ECG813 28 Pin DIP

● Bar Display Drivers

8-Circuit Fluorescent

ECG1715 18 Pin DIP

Linear 5-Step Indicator Driver

ECG1502 9 Pin SIP

Log. 5-Step Indicator Driver

ECG1503 9 Pin SIP

Linear 5-Step Indicator Driver Open Collector

ECG1505 8 Pin DIP

Log. 5-Step Indicator Driver-Open Collector

ECG1504 8 Pin DIP

Log. 5-Step VU Meter Indicator Driver

ECG1561 9 Pin SIP
ECG1866 9 Pin SIP

Linear 7-Step Indicator Driver

ECG1501 16 Pin DIP-ET

Log. 7-Step Indicator Driver

ECG1500 16 Pin DIP-ET

Linear 10-Step Indicator Driver

ECG1519 16 Pin DIP

Linear 10-Step Indicator Driver Open Collector

ECG1508 18 Pin DIP

Log. 10-Step Indicator Driver Open Collector

ECG1509 18 Pin DIP

Log. 10-Step VU Meter Indicator Driver

ECG1549 18 Pin DIP

● Bucket Brigades

Audio Signal Delay

ECG1641 8 Pin DIP
ECG1642 14 Pin DIP

Clock Generator/Driver for BBDs

ECG1639 8 Pin DIP

● CD Player

D to A Converter

ECG2057 ★ 28 Pin DIP

Digital Filter

ECG1853 24 Pin DIP

Op Amp

ECG1854D 16 Pin DIP
ECG1854M 8 Pin DIP
ECG2057 ★ 28 Pin DIP

● Computer Monitor

Horiz/Vert Deflection Controller

ECG7132 20 Pin DIP
ECG7133 20 Pin DIP
ECG7134 32 Pin DIP

Vert Deflection

ECG7135 9 Pin SIP-HS
ECG7136 9 Pin SIP-HS

Video Controllers

ECG7137 20 Pin DIP
ECG7138 20 Pin DIP

● Frequency Dividers

ECG1197 9 Pin SIP
ECG1198 24 Pin DIP
ECG9200 ★ 4 Pin SIP

● Frequency to Voltage Converter

ECG890 8 Pin DIP
ECG995 14 Pin DIP
ECG995M 8 Pin DIP

● Modem

ECG2400 ★ 40 Pin DIP
ECG2047 ★ 16 Pin DIP
ECG6860 ★ 24 Pin DIP

● Modulator-Demodulator

Balanced Modulator

ECG973D 14 Pin DIP
ECG1249 7 Pin SIP

Color/Video/Modulator

ECG846 18 Pin DIP
ECG855 14 Pin DIP

RF Oscillator/Video Modulator

ECG856 8 Pin DIP

● Motor Drivers/Controls

Bidirectional

ECG1892 12 Pin SIP-HS
ECG7006 15 Pin SIP-HS
ECG7042 9 Pin SIP
ECG7043 9 Pin SIP
ECG7087 10 Pin SIP

Bipolar Step Driver

ECG1749 16 Pin DIP

DC Motor Driver

ECG1748 7 Pin SIP
ECG1824 7 Pin SIP

Dual

ECG7005 16 Pin DIP

Dual Bidirectional

ECG1774 16 Pin DIP-W
ECG1834 10 Pin SIP
ECG7091 10 Pin SIP

Dual Motor Driver

ECG1825 16 Pin SIP

Dual Solenoid/Motor Driver

ECG1750 15 Pin SIP-HS

4-Phase Step Driver

ECG1736 18 Pin SIP-M
ECG1885 18 Pin SIP-M

Motor Speed Regulator

ECG1844 4 Pin SIP
ECG7089 TO-126

Stepping Motor Driver/Control

ECG1848 18 Pin SIP-M
ECG1857 16 Pin DIP
ECG7082 16 Pin DIP

● Operational (Op Amp)

See Amplifiers Operational (Op Amp)

● Phase Frequency Detectors

ECG974 14 Pin DIP
ECG1172 14 Pin DIP
ECG1208 9 Pin SIP

● Phase Locked Loops

ECG980 16 Pin DIP
ECG989 14 Pin DIP
ECG991 16 Pin DIP
ECG1167 16 Pin DIP
ECG1253 22 Pin DIP
ECG1254 24 Pin DIP
ECG1272 16 Pin DIP
ECG1475 20 Pin DIP
ECG1484 16 Pin DIP
ECG1534 16 Pin DIP

● Pulse Width Modulators

ECG1720 16 Pin DIP
ECG1721 16 Pin DIP
ECG1722 18 Pin DIP
ECG1723 16 Pin DIP
ECG1729 16 Pin DIP
ECG1753 14 Pin DIP
ECG1765 16 Pin DIP
ECG7002 9 Pin SIP-HS
ECG7096 8 Pin DIP
ECG7097 8 Pin DIP
ECG7098 8 Pin DIP
ECG7099 8 Pin DIP
ECG7109 16 Pin DIP

● Power Supply

ECG1737 18 Pin SIP-M

● Radio/AM

IF Amps

ECG1301 7 Pin SIP

IF Amp/AF Preamp

ECG710 14 Pin DIP-Q
ECG787 16 Pin DIP
ECG1013 9 Pin SIP

RF/IF Amp

ECG744 14 Pin DIP

RF/Amp/Mixer/Oscillator, IF Amp

ECG703 6 Pin Plastic
ECG806 14 Pin DIP
ECG1049 16 Pin DIP
ECG1214 16 Pin DIP
ECG1237 14 Pin DIP
ECG1491 14 Pin DIP

RF Amp/Osc/Mixer/IF/Det for ET

ECG1608 20 Pin DIP

● Radio/FM

IF Amp

ECG726 10 Pin Can
ECG736 8 Pin DIP
ECG746 8 Pin DIP
ECG760 6 Pin DIP-Q
ECG805 8 Pin DIP
ECG1002 8 Pin Can
ECG1039 8 Pin DIP
ECG1100 7 Pin SIP
ECG1448 9 Pin SIP

IF Amp/Limiter

ECG750 14 Pin DIP

★ Listed in Misc. Section, Pg. 1-282

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Linear IC Selector Guide (cont'd)

● Radio/FM (cont'd)

IF Amp/Detector

ECG708	14 Pin DIP
ECG709	14 Pin DIP
ECG712	14 Pin DIP
ECG800	14 Pin DIP
ECG860	18 Pin DIP
ECG1234	7 Pin SIP
ECG1541	7 Pin SIP

IF Amp/Detector/AF PO

ECG742	16 Pin DIP-W
ECG807	16 Pin DIP-W
ECG826	18 Pin DIP
ECG1257	14 Pin DIP-ET

IF Amp/Detector/Preamp

ECG706	14 Pin DIP
ECG710	14 Pin DIP
ECG723	14 Pin DIP
ECG788	16 Pin DIP
ECG1047	14 Pin DIP
ECG1441	16 Pin DIP

IF Amp/Det/Preamp/Meter Driver/Mute

ECG1604	16 Pin ZIL

Noise Cancel Circuit

ECG1543	16 Pin DIP

Oscillator/Mixer/IF/Scan Control

ECG853	16 Pin DIP

RF/IF Amp/Osc/Mixer

ECG703	6 Pin Plastic
ECG1843	9 Pin SIP

Stereo Demod

ECG718	14 Pin DIP
ECG719	14 Pin DIP
ECG720	14 Pin DIP
ECG722	14 Pin DIP
ECG743	16 Pin DIP
ECG789	16 Pin DIP-Q
ECG1056	14 Pin DIP
ECG1217	16 Pin DIP
ECG1226	14 Pin DIP
ECG1243	14 Pin DIP
ECG1248	16 Pin DIP
ECG1484	16 Pin DIP
ECG1489	16 Pin DIP
ECG1560	16 Pin DIP
ECG1565	16 Pin DIP
ECG1631	16 Pin ZIL
ECG1657	9 Pin SIP
ECG1864	20 Pin DIP

Tuning Indicator Systems

ECG1488	16 Pin DIP

1/20 Divider Prescalar

ECG1499	9 Pin SIP

● Radio/CB

PLL Frequency Synthesizer

ECG991	16 Pin DIP
ECG1167	16 Pin DIP
ECG1233	16 Pin DIP
ECG1253	22 Pin DIP
ECG1254	24 Pin DIP
ECG1272	16 Pin DIP
ECG1475	20 Pin DIP

Prescalar

ECG993	16 Pin DIP

Voltage Controlled Operator

ECG1192	9 Pin SIP
ECG1201	10 Pin SIP

● Radio/AM/FM

AM/FM IF/Det/AM Osc/Mix/AGC/AF Out

ECG1624	16 Pin DIP

Frequency Synthesizer

ECG1534	16 Pin DIP

IF Amps

ECG1003	14 Pin DIP
ECG1242	16 Pin DIP
ECG1301	7 Pin SIP
ECG1563	16 Pin DIP
ECG1889	18 Pin DIP

IF Amp/Mixer/Osc/Det/Signal Meter Driver

ECG1654	16 Pin DIP
ECG1842	16 Pin DIP

IF/Detector/Preamp/Meter Driver

ECG1486	16+2 Pin DIP-ET
ECG1490	16 Pin DIP
ECG1557	16 Pin DIP

Oscillator/Mixer/IF Amp

ECG1242	16 Pin DIP

● RF Hybrid Amplifiers

RF/IF/VHF Amp

ECG1768	3 Pin Can
ECG1769	3 Pin Can
ECG1770	3 Pin Can

● Tachometer and Air Core Meter Driver

ECG1670	14 Pin DIP

● Tape Decks

Signal Sense/Solenoid Driver

ECG1478	10 Pin SIP-HS

10-Step Indicator Driver

ECG1519	16 Pin DIP

● Television

AFT

ECG711	10 Pin Can
ECG780	10 Pin Can
ECG1174	14 Pin DIP-Q

Audio Limiter/Amp/Demod/Bass/Treble

ECG1652	16 Pin DIP

Audio/Video Switch

ECG7012	16 Pin DIP

Chroma Amplifiers

ECG738	14 Pin DIP

Chroma Demodulators

ECG713	14 Pin DIP
ECG790	14 Pin DIP
ECG798	14 Pin DIP
ECG821	14 Pin DIP
ECG1159	16 Pin DIP

Chroma Demodulator/Driver

ECG729	16 Pin DIP-Q

Chroma Demodulator/Matrix-RGB

ECG739	14 Pin DIP
ECG1163	16 Pin DIP
ECG1305	24 Pin DIP-ET
ECG1890	24 Pin DIP
ECG7112	18 Pin DIP

Chroma Processor

ECG715	14 Pin DIP
ECG728	16 Pin DIP

Chroma Processor (cont'd)

ECG797	16 Pin DIP
ECG809	16 Pin DIP
ECG1200	16 Pin DIP
ECG1304	24 Pin DIP-ET

Chroma Processor/Demodulator

ECG702	16 Pin DIP
ECG791	16 Pin DIP
ECG844	28 Pin DIP
ECG986	24 Pin DIP
ECG1189	28 Pin DIP
ECG1196	24 Pin DIP
ECG1216	16 Pin DIP
ECG1297	22 Pin DIP
ECG1305	24 Pin DIP-ET
ECG1307	24 Pin DIP-ET
ECG1747	28 Pin DIP
ECG7048	20 Pin DIP

Chroma Subcarrier Gen

ECG700	16 Pin DIP
ECG714	16 Pin DIP
ECG982	16 Pin DIP

Chroma/Vid Amp

ECG822	16 Pin DIP
ECG845	24 Pin DIP

Chroma/Vid Amp/Demodulator

ECG1473	28 Pin DIP
ECG1589	28 Pin DIP
ECG1673	28 Pin DIP
ECG7009	30 Pin DIP

Chroma/Vid Amp/Demodulator-RGB

ECG1410	28 Pin DIP
ECG1416	28 Pin DIP

Color Compensation

ECG1415	14 Pin DIP

Computer I/F Digital

ECG7108	18 Pin DIP

Horiz Oscillator

ECG820	16 Pin DIP

Horiz Osc/Driver/Sync/X-Ray Protect

ECG1629	9 Pin SIP

Horiz Processor

ECG815	8 Pin DIP
ECG836	8 Pin DIP
ECG1784	16 Pin DIP
ECG7001	16 Pin DIP
ECG7045	12 Pin SIP
ECG7115	18 Pin DIP

Horiz/Vert Countdown

ECG849	14 Pin DIP

Horiz/Vert Countdown Driver

ECG874	28 Pin DIP

Horiz/Vert Deflector

ECG1888	16 Pin DIP

Horiz/Vert Proc/Vert Out

ECG1661	16 Pin DIP-ET

Horiz/Vert/Osc/Driver/Countdown

ECG1683	18 Pin DIP
ECG1739	16 Pin DIP

Horiz/Vert/Osc/Sync/AFC

ECG1540	16 Pin DIP
ECG1647	16 Pin DIP

Horiz/Vert/Osc/Sync/Driver

ECG1632	18 Pin DIP

Horiz/Vert/Osc/Sync/X-Ray Prot.

ECG1295	18 Pin DIP
ECG1417	24 Pin DIP
ECG1471	16+2 Pin DIP-ET

● Television (cont'd)

Horiz/Vert/Osc/Sync/X-Ray Prot. (cont'd)

ECG1496	16 Pin DIP
ECG1535	24 Pin DIP
ECG1538	16 Pin DIP
ECG1539	18 Pin DIP
ECG1544	16 Pin DIP
ECG1550	16+2 Pin DIP-ET
ECG1664	22 Pin DIP
ECG1727	18 Pin DIP
ECG7062	20 Pin DIP
ECG7063	22 Pin DIP

IF/FMDet/Limiter/Tone/Vol/Preamp

ECG1633	20 Pin DIP

Interface for Character/Pattern

ECG1835	22 Pin DIP

Luminance/Chroma Proc/Demod

ECG873	28 Pin DIP

Luminance Processor

ECG818	16 Pin DIP
ECG1177	14 Pin DIP

PIF/SIF/Vid/Chroma/Def/Aud/HV Protect

ECG1790	64 Pin DIP
ECG1846	52 Pin DIP
ECG1863	42 Pin DIP
ECG7003	52 Pin DIP
ECG7010	54 Pin DIP
ECG7054	52 Pin DIP
ECG7058	64 Pin DIP
ECG7060	52 Pin DIP

RGB Encoder

ECG879	20 Pin DIP

RGB Vid Amp

ECG7081	28 Pin DIP
ECG7120	30 Pin DIP

Sound IF

ECG746	8 Pin DIP
ECG1002	8 Pin Can

Sound IF/AF PO

ECG742	16 Pin DIP-W
ECG826	18 Pin DIP
ECG1231	12 Pin DIP-QW
ECG1231A	16 Pin DIP
ECG1246	14 Pin DIP-ET
ECG1257	14 Pin DIP-ET
ECG1404	16 Pin DIP-ET

Sound IF/AF Preamp

ECG704	10 Pin Can
ECG706	14 Pin DIP
ECG712	14 Pin DIP
ECG723	14 Pin DIP
ECG748A	14 Pin DIP
ECG1047	14 Pin DIP
ECG1133	16 Pin DIP
ECG1162	14 Pin DIP
ECG1236	14 Pin DIP
ECG1308	14 Pin DIP

Sound IF/Detector

ECG708	14 Pin DIP
ECG1234	7 Pin SIP
ECG1521	9 Pin SIP
ECG1616	14 Pin DIP
ECG1668	8 Pin SIP

Sound IF/Det/Limiter/AF Out

ECG1752	18 Pin DIP

Sound Out/Vol Ctrl/Mute

ECG1789	9 Pin SIP-HS

Stero Decoder

ECG1655	16 Pin DIP
ECG1800	30 Pin DIP
ECG1801	28 Pin DIP
ECG7014	36 Pin DIP
ECG7050	16 Pin DIP
ECG7116	20 Pin DIP

Sync Deflection

ECG7084	18 Pin DIP
ECG7086	20 Pin DIP
ECG7123	16 Pin DIP

Vert Countdown

ECG793	14 Pin DIP

Vert Deflection

ECG1567	9 Lead Formed SIP
ECG1674	9 Pin SIP-HS

Vert Deflection (cont'd)

ECG1676	7 Pin SIP
ECG1684	7 Pin SIP-HS
ECG1767	8 Pin SIP-HS
ECG1773	7 Pin SIP-HS
ECG1782	7 Pin SIP-HS
ECG1788	7 Pin SIP-HS
ECG1797	10 Pin SIP
ECG1804	13 Pin SIP
ECG1855	13 Pin SIP-HS
ECG1858	11 Pin SIP-HS
ECG1862	11 Pin SIP-HS
ECG7017	7 Pin SIP
ECG7039	13 Pin SIP-HS
ECG7083	13 Pin SIP
ECG7085	13 Pin SIP-HS
ECG7104	13 Pin SIP-HS
ECG7131	9 Pin SIP

Vert Driver/Output

ECG1485	11 Pin SIP

Vert Oscillator/Output

ECG1245	10 Pin SIP-HS
ECG1289	12 Pin DIP-QW

Vert Output

ECG1420	10 Pin SIP-HS
ECG1429	5 Pin TO-220

Video Amp/Blanker

ECG808	16 Pin DIP

Video Amp/Blanker/Black Control

ECG1569	7 Pin SIP

Video Amp/Brightness Limiter

ECG1164	16 Pin DIP

Video/ChromaAmp/Demod/Color/Osc/Auto Tint

ECG1650	28 Pin DIP

Video/Chroma/Demod/Horiz/Vert/Osc Driver/HV Protect

ECG1547	42 Pin DIP
ECG1671	42 Pin DIP
ECG1771	30 Pin DIP
ECG1845	30 Pin DIP
ECG1856	30 Pin DIP
ECG7008	30 Pin DIP
ECG7065	36 Pin DIP

Video/Chroma/Horiz-Vert Drvr/Sync Sep/HV Protect

ECG1793	42 Pin DIP

Video Output Amp

ECG7139	9 Lead Formed SIP

Video/Sound IF Processor

Super

ECG7130	24 Pin DIP

Low

ECG7129	24 Pin DIP

Video Switch

ECG1826	9 Pin SIP

Video/Sync/AGC

ECG731	16 Pin DIP
ECG779A	14 Pin DIP
ECG1168	16 Pin DIP

Video Sync Amp/AGC/Horiz/Osc/Phase Det

ECG701	16 Pin DIP

VIF Amp

ECG1542	16 Pin DIP

VIF Amp/AGC

ECG749	14 Pin DIP
ECG1186	14 Pin DIP
ECG1618	9 Pin SIP
ECG1620	9 Pin SIP
ECG7067	9 Pin SIP

VIF Amp/AGC/AFC

ECG1785	16 Pin DIP

VIF/Detector/AFT/SIF

ECG730	16+2 Pin DIP-Q
ECG841	16 Pin DIP

VIF/Detector/AGC/AFT

ECG1469	24 Pin DIP

VIF/Det/AGC/AFT/Video Amp

ECG1725	16 Pin DIP
ECG1775	16 Pin DIP
ECG1779	22 Pin DIP
ECG7057	12 Pin SIP

VIF/Detector/Video Amp

ECG1551	16 Pin DIP-ET

VIF/Detector/Video Amp/AGC

ECG875	28 Pin DIP
ECG878	28 Pin DIP
ECG984	16 Pin DIP
ECG1413	16 Pin DIP
ECG1522	14 Pin DIP-ET
ECG1545	16 Pin DIP
ECG1607	9 Pin SIP
ECG1610	9 Pin SIP
ECG1669	22 Pin DIP

VIF/Mute/AGC/AFT

ECG1827	20 Pin DIP

VIF/SIF

ECG1161	28 Pin DIP

VIF/SIF/AGC/AFT

ECG1411	28 Pin DIP
ECG1847	30 Pin DIP
ECG1861	28 Pin DIP
ECG7015	30 Pin DIP
ECG7121	42 Pin DIP

VIF/SIF Amp/Det/AGC/AFT/Elec Att/AF Driver

ECG1570	24 Pin DIP
ECG1653	30 Pin DIP
ECG1656	30 Pin DIP
ECG1728	30 Pin DIP
ECG7018	28 Pin DIP
ECG7047	28 Pin DIP

VIF/SIF/Detector/Video Amp/AFT

ECG843	16 Pin DIP

VIF/Sync/AGC

ECG842	16 Pin DIP

VIR Signal Processor

ECG1437	24 Pin DIP
ECG1556	16 Pin DIP
ECG1593	16 Pin DIP

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Linear IC Selector Guide (cont'd)

• TV Tuners

Band Select
- ECG867 18 Pin DIP
- ECG1658 9 Pin SIP
- ECG1708 9 Pin SIP

Bandswitch
- ECG1615 9 Pin SIP
- ECG1688 9 Pin SIP

Channel Decoder
- ECG840 16 Pin DIP

Computer I/F Digital
- ECG1786 24 Pin DIP
- ECG7007 30 Pin DIP
- ECG7019 16 Pin DIP

Electronic Channel Selector
- ECG1402 24 Pin DIP
- ECG1409 24 Pin DIP
- ECG1409C 24 Pin DIP
- ECG1564 16 Pin DIP
- ECG1662 16 Pin DIP
- ECG7004 20 Pin DIP

Frequency Synthesizer
- ECG1677 16 Pin DIP
- ECG1836 20 Pin DIP
- ECG1837 16 Pin DIP

PLL Divider
- ECG7069 8 Pin SIP

TV Remote Control Preamp
- ECG1682 9 Pin SIP
- ECG1763 14 Pin DIP
- ECG1764 14 Pin DIP
- ECG7013 8 Pin DIP

TV Remote Control Receiver
- ECG840 16 Pin DIP
- ECG1738 28 Pin DIP
- ECG1757 18 Pin DIP
- ECG1759 16 Pin DIP
- ECG1761 16 Pin DIP
- ECG1762 16 Pin DIP

TV Remote Control Receiver Amp
- ECG1714M 8 Pin DIP
- ECG1714S 8 Pin SIP
- ECG1791 8 Pin SIP

TV Remote Control Transmitter
- ECG1574 16 Pin DIP
- ECG1758 16 Pin DIP
- ECG1760 16 Pin DIP

UHF/VHF Prescalar ÷256/ ÷64
- ECG851 14 Pin DIP

Voltage Regulator for Electronic Tuner
- ECG615A DO-92
- ECG1531 14 Pin DIP-ET

Television Voltage Regulators
- ECG1546 TO-3 3 Pin
- ECG1548 TO-3 3 Pin
- ECG1553 TO-3 3 Pin
- ECG1644 TO-3 3 Pin
- ECG1645 TO-3 3 Pin
- ECG1646 TO-3 3 Pin
- ECG1678 14 Pin DIP
- ECG1719 TO-3 3 Pin
- ECG1740 4 Pin SIP
- ECG1741 4 Pin SIP
- ECG1742 4 Pin SIP
- ECG1743 4 Pin SIP
- ECG1776 5 Pin SIP
- ECG1777 5 Pin SIP
- ECG1778 5 Pin SIP

Television Voltage Regulators (cont'd)
- ECG1839 5 Pin SIP
- ECG1867 5 Pin SIP
- ECG1868 5 Pin SIP
- ECG1896 5 Pin SIP
- ECG1897 5 Pin SIP
- ECG7077 5 Pin SIP

• Telephone

Pulse Dialer
- ECG1693 16 Pin DIP
- ECG1731 16 Pin DIP

Ringers
- ECG1648 8 Pin DIP

Tone Dialer
- ECG1690 16 Pin DIP

• Timing Circuits

Single
- ECG833 8 Pin DIP
- ECG893 16 Pin DIP
- ECG955M 8 Pin DIP
- ECG955MC 8 Pin DIP
- ECG955S 8 Pin SIP
- ECG955SM 8 Pin SOIC

Dual
- ECG978 14 Pin DIP
- ECG978C 14 Pin DIP
- ECG978SM 8 Pin SOIC

Quad
- ECG926 16 Pin DIP

• VCRs

Capstan Drive
- ECG1809 24 Pin DIP

Capstan Speed Control
- ECG1686 16+2 Pin DIP-ET

Carrier Osc/FM Demod
- ECG1623 16 Pin DIP

Color Signal Processor
- ECG1408 16 Pin DIP
- ECG1702 18 Pin DIP
- ECG1703 16 Pin DIP
- ECG1813 22 Pin DIP
- ECG1814 18 Pin DIP

Cylinder Motor Drive Control
- ECG1613 24 Pin DIP

D/A Converter
- ECG1679 14 Pin DIP

Digital Clock/Timer
- ECG1414 40 Pin DIP

Drum Servo Control for Speed/Phase
- ECG1701 28 Pin DIP

Dual Switching Power Supply
- ECG1717 16 Pin ZIL

Electronic Switch
- ECG1603 6 Pin DIP
- ECG1781 8 Pin SIP
- ECG1787 7 Pin SIP
- ECG1873 7 Pin SIP
- ECG7066 12 Pin SIP
- ECG7110 16 Pin DIP

End of Tape Sensor/Hall Sw
- ECG1705 3 Pin SIP

Freq Divider/Speed Select
- ECG1700 18 Pin DIP

Head Amp/Filter/Mixer
- ECG1263 16 Pin DIP
- ECG1419 14 Pin DIP
- ECG1558 18 Pin DIP

HeadAmp/Limiter/D.O.C. /Switching
- ECG1689 18 Pin DIP

Head Amp/Switch
- ECG1806 22 Pin DIP

Line Noise Canceling Circuit
- ECG1713 18 Pin DIP

Loading Motor Drive/Bidirectional Motor Driver
- ECG1628 9 Pin SIP-HS
- ECG7064 7 Pin SIP-HS
- ECG7071 15 Pin SIP-HS

Modulator
- ECG1555 16 Pin DIP
- ECG1709 9 Pin SIP

Motor Drive/Braking
- ECG1716 10 Pin SIP-HS
- ECG1766 10 Pin SIP-HS

Programmable Timer
- ECG2207 ★ 18 Pin DIP

Recording Amp
- ECG1711 9 Pin SIP

Record/Playback Circuits
- ECG1710 22 Pin DIP
- ECG7020 22 Pin DIP

Recording Video Proc/FM Mod/AGC/Sync/Clamp
- ECG1621 24 Pin DIP

Reference Frequency Divider
- ECG1421 9 Pin SIP
- ECG9200 ★ 4 Pin SIP
- ECG9401 ★ 14 Pin DIP

Servo Amp/Drive
- ECG1636 22 Pin DIP

Servo Controls
- ECG1270 24 Pin DIP
- ECG1300 8 Pin SIP
- ECG1554 12 Pin DIP-W

Servo Interface
- ECG1811 18 Pin DIP
- ECG1812 20 Pin DIP

Three Output Voltage Regulator
- ECG1271 8 Pin SIP-HS

Three Phase Capstan Motor Drive/PG/FG/Motor Lock
- ECG1630 24 Pin DIP

Three Phase Motor Driver
- ECG1893 23 Pin SIP-HS

Three Phase Motor Speed Control Forward/Reverse
- ECG1600 16+2 Pin DIP-ET

Timing Circuits/Tuner Band Switches
- ECG1609 7 Pin SIP
- ECG1625 9 Pin SIP

Video Amp/Color Mixer
- ECG1265 18 Pin DIP

Video and FM Sound Mod/Carrier Osc
- ECG1611 16 Pin DIP

Video/Color Amp/FM Demod
- ECG1622 28 Pin DIP-HS

★ Listed in Misc. Section, Pg. 1-282

Linear IC Selector Guide (cont'd)

● VCRs (cont'd)

Video Processor for Recording

ECG1712	22 Pin DIP
ECG1805	28 Pin DIP

Video Signal Processor

ECG1264	16 Pin DIP
ECG1808	28 Pin DIP
ECG1810	28 Pin DIP

Video Switch

ECG1826	9 Pin SIP

Video Sw/Sync Sep/AGC/FM Mod

ECG1601	24 Pin DIP-ET

VIF/Det/AGC/AFT/Mute

ECG1827	20 Pin DIP

Voltage Regulators

ECG1318	10 Pin SIP-M
ECG1733	15 Pin SIP-M
ECG1734	15 Pin SIP-M
ECG1735	15 Pin SIP-M
ECG1821	15 Pin SIP-M
ECG1823	12 Pin SIP-M
ECG1872	15 Pin SIP-M
ECG1876	15 Pin SIP-M
ECG1880	8 Pin SIP-M
ECG1883	8 Pin SIP-M
ECG1884	12 Pin SIP-M
ECG7022	12 Pin SIP-M
ECG7023	12 Pin SIP-M
ECG7024	8 Pin SIP-M
ECG7026	8 Pin SIP-M
ECG7027	15 Pin SIP
ECG7028	12 Pin SIP-M
ECG7034	12 Pin SIP-M
ECG7035	8 Pin SIP-M
ECG7037	8 Pin SIP-M
ECG7038	15 Pin SIP-M
ECG7074	10 Pin SIP-M

● Voltage Comparators

Split DC Power Supply

Hi Speed

ECG910	8 Pin Can
ECG910D	14 Pin DIP

Hi Performance

ECG922	8 Pin Can
ECG922M	8 Pin DIP
ECG922SM	8 Pin SOIC

Dual Hi Speed

ECG919	10 Pin Can
ECG919D	14 Pin DIP
ECG1718	9 Pin SIP

Dual Lo Offset

ECG943	8 Pin Can
ECG943M	8 Pin DIP
ECG943SM	8 Pin SOIC

Quad Lo Offset

ECG834	14 Pin DIP
ECG834SM	14 Pin SOIC

● Voltage Controlled Oscillators

ECG994	8 Pin Can
ECG994M	8 Pin DIP
ECG1201	10 Pin SIP
ECG1247	10 Pin SIP

● Voltage Reference

ECG952	TO-92
ECG998	TO-92
ECG1869	TO-92M

* Regulator Ratings on Pg 1-179

● Voltage Reference (cont'd)

ECG1869SM	SOT-92
ECG7080	TO-92

● Voltage Regulators*

Adj Shunt Regulators

ECG999	TO-92
ECG999M	8 Pin DIP
ECG999SM	8 Pin SOIC

Hybrid

ECG1796	5 Pin SIP
ECG1840	5 Pin SIP
ECG1841	5 Pin SIP
ECG1894	5 Pin SIP
ECG1895	5 Pin SIP
ECG7046	9 Pin SIP-HS
ECG7078	5 Pin SIP
ECG7079	5 Pin SIP
ECG7092	5 Pin SIP
ECG7093	5 Pin SIP
ECG7094	5 Pin SIP
ECG7095	5 Pin SIP

Positive Fixed VR

ECG977	TO-92
ECG981	TO-92
ECG988	TO-92
ECG1902	TO-92
ECG950	TO-92
ECG951	TO-92
ECG1906	TO-92
ECG1908	TO-92
ECG309K	TO-3
ECG960	TO-220
ECG962	TO-220
ECG964	TO-220
ECG966	TO-220
ECG968	TO-220
ECG958	TO-220
ECG972	TO-220
ECG1910	TO-220
ECG1932	TO-220
ECG1914	TO-3
ECG1916	TO-3
ECG1924	TO-3
ECG1934	TO-3PJ
ECG1934X	TO-3PJ
ECG1936	TO-3PJ
ECG1938	TO-3PJ
ECG1940	TO-3PJ
ECG931	TO-3
ECG1912	TO-3
ECG1918	TO-3
ECG932	TO-3
ECG933	TO-3
ECG934	TO-3
ECG1960	TO-220M
ECG1962	TO-220M
ECG1964	TO-220M
ECG1966	TO-220M
ECG1968	TO-220M
ECG1970	TO-220M
ECG1972	TO-220M
ECG1974	TO-220M
ECG1976	TO-220M

Positive Fixed VR/Low Drop Out

ECG1904	TO-220
ECG1951	TO-220
ECG1952	TO-220
ECG1953	TO-220
ECG1954	TO-220

Positive Fixed VR/Low Drop Out (cont'd)

ECG1955	TO-220
ECG1956	TO-220

Positive Fixed VR with Reset

ECG7124	TO-220 (5 Pin)

Negative Fixed VR

ECG1917	TO-92
ECG1903	TO-92
ECG1905	TO-92
ECG1907	TO-92
ECG1909	TO-92
ECG961	TO-220
ECG963	TO-220
ECG965	TO-220
ECG967	TO-220
ECG969	TO-220
ECG959	TO-220
ECG971	TO-220
ECG1913	TO-3
ECG1915	TO-3
ECG1919	TO-3
ECG1923	TO-3
ECG1925	TO-3
ECG1961	TO-220M
ECG1963	TO-220M
ECG1965	TO-220M
ECG1967	TO-220M
ECG1971	TO-220M
ECG1973	TO-220M
ECG1975	TO-220M
ECG1977	TO-220M

Adjustable Negative VR

ECG1901	TO-92
ECG1927	TO-3 (4 Pin)
ECG957	TO-220
ECG1911	TO-3

Adjustable Positive VR

ECG758	4 Pin DIP-Q
ECG759	4 Pin DIP-Q
ECG757	4 Pin DIP-Q
ECG1928	8 Pin Can
ECG1930	8 Pin DIP
ECG1900	TO-92
ECG1942	TO-220
ECG956	TO-220
ECG970	TO-3
ECG935	TO-3

Positive or Negative Adjustable VR

ECG923	10 Pin Can
ECG923D	14 Pin DIP

Switching Regulator

ECG1681	15 Pin SIP-HS
ECG1870	15 Pin SIP-M
ECG7021	16 Pin SIP
ECG7025	10 Pin SIP-M
ECG7033	15 Pin SIP
ECG7044	9 Pin SIP
ECG7075	15 Pin SIP-M
ECG7076	16 Pin SIP
ECG7107	7 Pin SIP
ECG7125	12 Pin SIP
ECG7126	12 Pin SIP

Switching SCR Driver

ECG1751	7 Pin SIP

Three Regulated Voltage Outputs

ECG1271	8 Pin SIP-HS

● Wireless Microphones

ECG1014	9 Pin ZIL
ECG1017	5 Pin ZIL

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● Zero Voltage Switches

ECG776	8 Pin DIP
ECG914	14 Pin DIP
ECG939	16 Pin DIP

● Misc Circuits

A/D Converters

ECG2049 ★	40 Pin DIP
ECG2050 ★	40 Pin DIP
ECG2051 ★	40 Pin DIP
ECG2052 ★	28 Pin DIP
ECG2053 ★	20 Pin DIP
ECG2054 ★	16 Pin DIP
ECG2055 ★	24 Pin DIP
ECG2063 ★	40 Pin DIP
ECG2065 ★	40 Pin DIP

Battery Protection Circuit

ECG1136	14 Pin DIP

Digital Clocks

ECG2060 ★	40 Pin DIP
ECG2207 ★	18 Pin DIP

Hall Switches

ECG1705	3 Pin SIP
ECG9402 ★	4 Pin SIP

LED Flasher/Osc.

ECG876	8 Pin DIP

Precision Wave Form Generator

ECG864	14 Pin DIP
ECG892	16 Pin DIP

Quad Single Pole Analog Open Switch

ECG861	16 Pin DIP

SMPS

ECG7117	8 Pin DIP

Tone Decoder

ECG832	8 Pin DIP
ECG832SM	8 Pin SOIC

Triple 2-Position Analog Switch

ECG1799	16 Pin DIP

Video Sync Generator

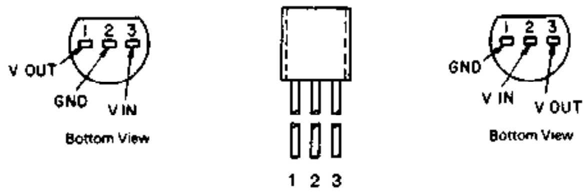
ECG7049	24 Pin DIP

★ Listed in Misc. Section, Pg. 1-282

Voltage Regulator Selector Guide
Fixed Regulators

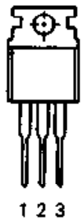
Output Voltage V_{OUT} (DC) ± 5%	ECG Type Pos	ECG Type Neg	I_o A (DC)	Input Voltage V_{IN} (DC) Max	Input Voltage V_{IN} (DC) Min	PD Watts	Case Style
5	977	1917	0.1	30	7	0.7	TO-92
6.2	988	—	0.1	35	8.2	0.7	TO-92
8	981	—	0.1	30	10	1	TO-92
9	1902	—	0.1	30	11	0.7	TO-92
12	950	1903	0.1	35	14	0.7	TO-92
15	951	1905	0.1	35	17	0.7	TO-92
18	1906	1907	0.1	35	20	0.7	TO-92
24	1908	1909	0.1	40	26	0.7	TO-92
5	960	961	1	35	7	15	TO-220
6	962	963	1	35	8	15	TO-220
8	964	965	1	35	10	15	TO-220
9	1910	—	1	35	11	15	TO-220
10	1932	—	1	35	12	20	TO-220
12	966	967	1	35	14	15	TO-220
15	968	969	1	35	17	15	TO-220
18	958	959	1	35	20	15	TO-220
24	972	971	1	40	26	15	TO-220
3.3	1904	—	1	16	6	15	TO-220 (Low Dropout)
5	1951	—	1	16	6	15	TO-220 (Low Dropout)
8	1952	—	1	19	9	15	TO-220 (Low Dropout)
10	1953	—	1	21	11	15	TO-220 (Low Dropout)
12	1954	—	1	23	13	15	TO-220 (Low Dropout)
15	1955	—	1	26	16	15	TO-220 (Low Dropout)
24	1956	—	1	30	25	15	TO-220 (Low Dropout)
5	1960	1961	1	35	7	15	TO-220M
6	1962	1963	1	35	8	15	TO-220M
8	1964	1965	1	35	10	15	TO-220M
9	1966	1967	1	35	11	15	TO-220M
10	1968	—	1	35	12	15	TO-220M
12	1970	1971	1	35	14	15	TO-220M
15	1972	1973	1	35	17	15	TO-220M
18	1974	1975	1	35	20	15	TO-220M
24	1976	1977	1	40	26	15	TO-220M

TO-92



TO-220

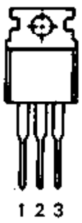
Positive
Tab Common to Pin 2
1. Input
2. Ground
3. Output



Negative
1. Ground
2. Input
3. Output
Tab Common to Pin 2

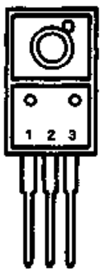
TO-220 (Low Dropout)

Positive
Tab Common to Pin 2
1. Input
2. Ground
3. Output



TO-220M

Positive
1. Input
2. Ground
3. Output



Negative
1. Ground
2. Input
3. Output

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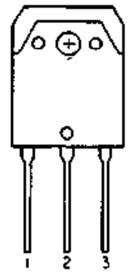
Fixed Regulators (cont'd)

Output Voltage V_{OUT} (DC) ± 5%	ECG Type Pos	ECG Type Neg	I_O A (DC)	Input Voltage V_{IN} (DC) Max	Input Voltage V_{IN} (DC) Min	PD Watts	Case Style
5	1934	--	2	30	8	50	TO-3PJ
5	1934X*	--	2	30	8	50	TO-3PJ
12	1936	--	2	35	15	50	TO-3PJ
15	1938	--	2	40	18	50	TO-3PJ
24	1940	--	2	40	27	50	TO-3PJ
5	309K	1913	1.5	35	7.5	20	TO-3
5	931	--	3	20	7.5	30	TO-3
5	932	--	5	25	8.5	50	TO-3
12	1914	1915	1.5	35	14.1	15	TO-3
12	1912	--	3	35	14.5	30	TO-3
12	933	--	5	30	14.6	50	TO-3
13.8	934	--	5	35	16.4	50	TO-3
15	1916	1919	1.5	40	17.4	20	TO-3
15	1918	--	3	35	17.5	30	TO-3
18	1920	1923	1.5	35	20.5	20/15	TO-3
24	1924	1925	1.5	40	26.4	20/15	TO-3

TO-3PJ

1. Output
2. (Case) Input
3. Ground



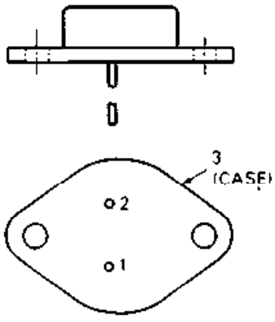
* ECG1934X (Only)

1. Ground
2. (Case) Output
3. Input

TO-3

Positive

1. Input
2. Output
3. Ground

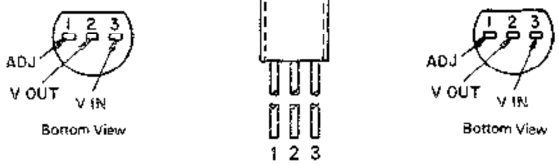
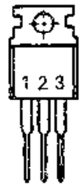
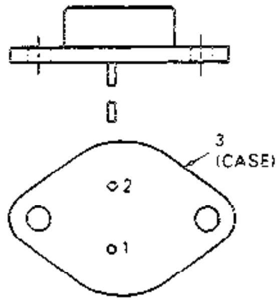
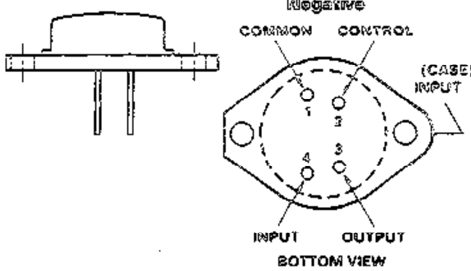
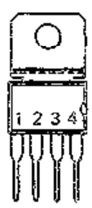
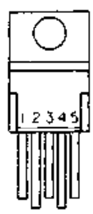


Bottom View

Negative

1. Ground
2. Output
3. Input

Adjustable Regulators

Output Voltage V_{OUT} (DC) ±5%	ECG Type Pos	ECG Type Neg	I_o A (DC)	Input Voltage V_{IN} (DC) Max	Input Voltage V_{IN} (DC) Min	P_D Watts	Case Style
1.2–37	1900	1901	0.1	40	2.45	0.625	TO-92 Positive / Negative 
1.2–37	956	957	1.5	40	3.7	15.0	TO-220 Positive: Tab Common to Vout; 1. Adj 2. Vout 3. Vin  Negative: Tab Common to Vin; 1. Adj 2. Vin 3. Vout
1.2–37	--	1911	1.5	40	2.45	20	TO-3 Positive: 1. Adj 2. Input 3. Output  Bottom View Negative: 1. Adj 2. Output 3. Input
1.2–33	970	--	3.0	35	3.7	30	
1.2–32	935	--	5.0	35	2.45	50	
2.2–30	--	1927	1.0	40	4.7	15	TO-3 4-Pin Negative 
5–30	953	--	1.0	40	7.5	15	TO-202 4-Pin Positive: Tab Common to Pin 1; 1. Common 2. Input 3. Output 4. Control 
3–36	1942	--	2	40	8.0	Int. Limit	TO-220 5-Pin Positive: 1. Input 2. Limiting 3. Ground 4. Ref 5. Output 

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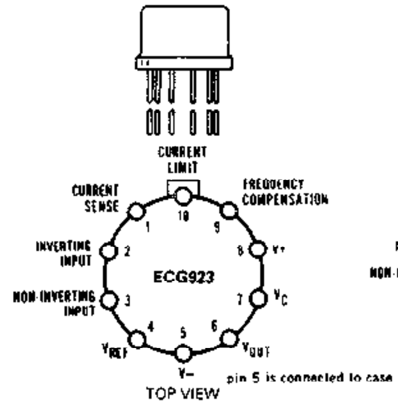
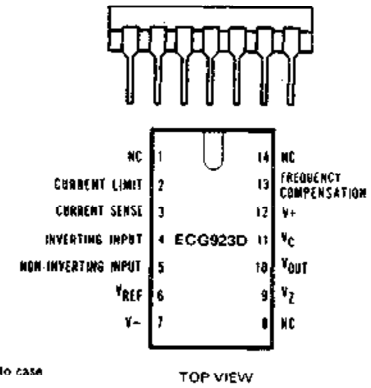
Adjustable Regulators — Precision Types

Output Voltage V_{OUT} (DC) ±5%	ECG Type Pos	ECG Type Neg	I_o A (DC)	Input Voltage V_{IN} (DC) Max	Input Voltage V_{IN} (DC) Min	P_D Watts	Case Style
2–37	923	--	0.15	40	9.5	0.8	10-Pin Can
2–37	923D	--	0.15	40	9.5	0.9	14-Pin DIP
4.5–30	1928	--	0.012	40	8.5	0.8	8-Pin Can
5–37	1930	--	0.025	40	9.0	0.4	8-Pin DIP
Dual Tracking Voltage Regulator							
±15	ECG921		0.1	±30	±18	1	14-Pin DIP

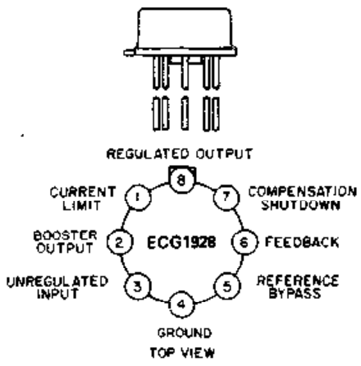
10-Pin Can



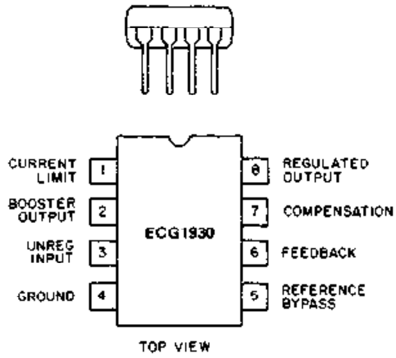
14-Pin DIP



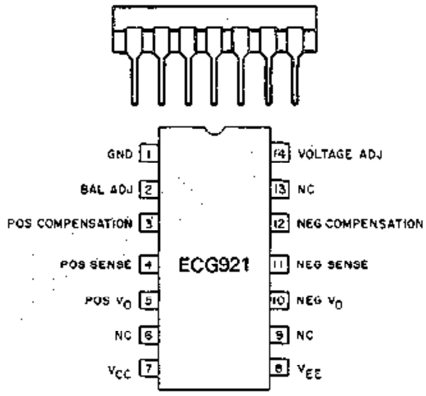
8-Pin Can



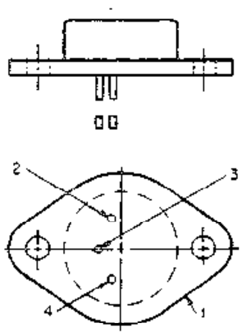
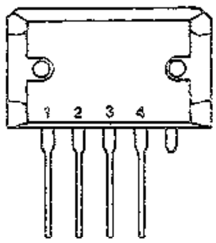
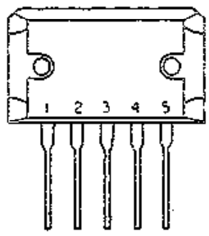
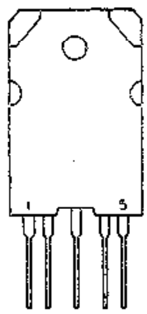
8-Pin DIP



14-Pin DIP



TV Fixed Voltage Regulators

Output Voltage VOUT (DC) ±1 V	ECG Type Pos	ECG Type Neg	Max I_o A (DC)	Input Voltage V_{IN} (DC) Max	Input Voltage V_{IN} (DC) Min	P_D Watts $T_c = 100°C$	Case Style
120	1719	--	1	200	122	25	TO-3  1. Input/Case 2. Output 3. Common 4. Base
123	1548	--	1	200	125	25	
127	1553	--	1	200	129	25	
129	1646	--	1	200	131	25	
130	1546	--	1	200	132	25	
115	1740	--	1	200	117	40	5-Pin SIP  1. Input 2. Base 3. Common 4. Output
125	1741	--	1	200	127	40	
130	1742	--	1	200	132	40	
135	1743	--	1	200	137	40	
12	1867	--	2	45	18	75	5-Pin SIP  1. Output 2. Adjust 3. Common 4. Sense 5. Input
13	1868	--	2	45	19	75	
110	7077	--	1	200	125	27	5-Pin SIP  ECG7077: 1. Common 2. Base 3. DC Input 4. Output 5. Output Control; 1. Common 2. Base 3. DC Input 4. Output 5. N/C
115	1896	--	1	200	125	27	
120	1839	--	1	200	122	27	
123	1776	--	1	200	125	27	
125	1897	--	1	200	145	27	
130	1777	--	1	200	132	27	
135	1778	--	1	200	137	27	

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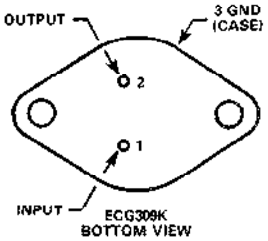
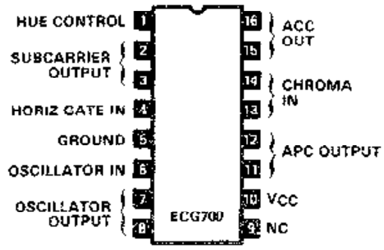
Linear IC and Module Circuits

ECG309K TO-3 See Fig. L11
Regulator, 5 V, 1 Amp

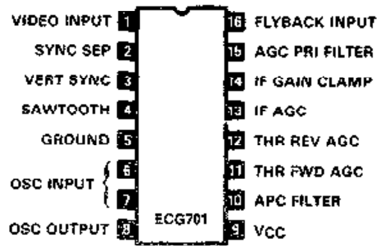


See Voltage Regulator Selector Guide Page 1-179

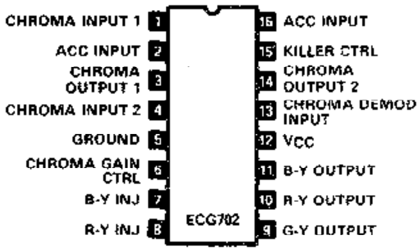
ECG700 16-Pin DIP See Fig. L112
TV Chroma Subcarrier Regeneration



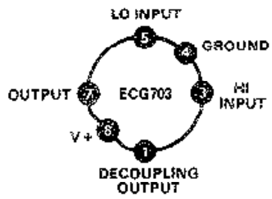
ECG701 16-Pin DIP See Fig. L112
TV Video Signal Processor



ECG702 16-Pin DIP See Fig. L112
TV Chroma Processor

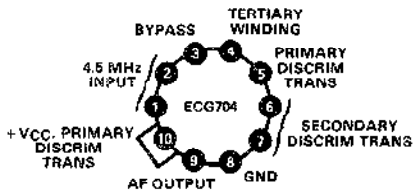


ECG703 6-Pin Plastic See Fig. L1A
RF/IF Amp, Osc, Mixer

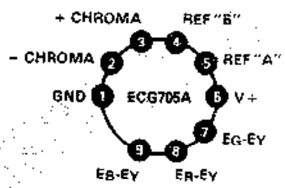


Top View

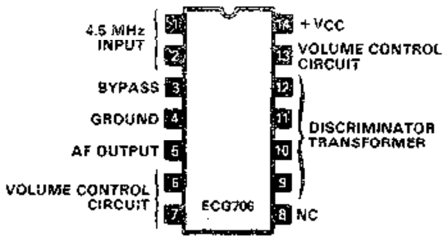
ECG704 10-Pin Can See Fig. L5
TV Sound and IF Amplifier and Detector



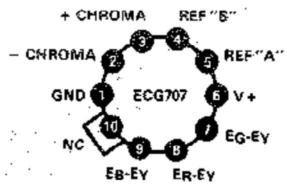
ECG705A 9-Pin Can See Fig. L4
Chroma Demodulator



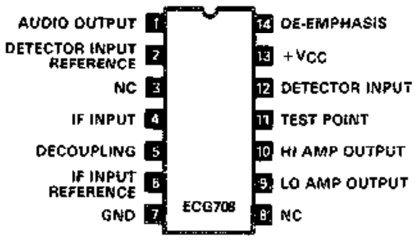
ECG706 14-Pin DIP See Fig. L104
TV/FM IF Amp/Limiter/Detector/Audio Driver for Tube-Type Audio Power Amplifiers



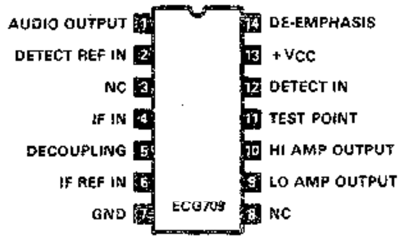
ECG707 10-Pin Can See Fig. L7
Chroma Demodulator



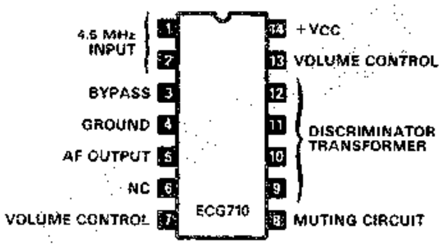
ECG708 14-Pin DIP See Fig. L104
FM & TV Sound IF Amp/Detector/Limiter



ECG709 14-Pin DIP See Fig. L104
FM & TV Sound IF Amp/Detector/Limiter for Portable & Vehicular Equipment



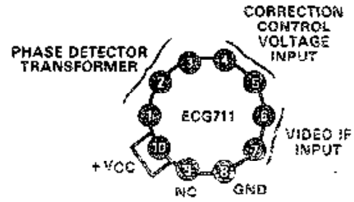
ECG710 14-Pin DIP-Q See Fig. L107
(14-Pin DIP See Alternate Fig. L104)
TV/FM IF Amp/Limiter/Detector/Audio Driver for Transistor-Type Power Amplifiers



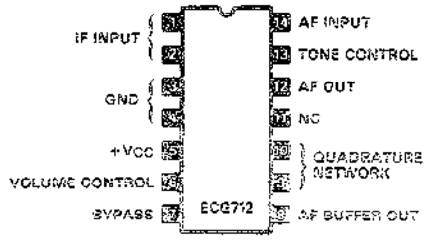
Package Outlines - See Page 1-285

Note: Can Diagrams are Bottom View unless otherwise noted.

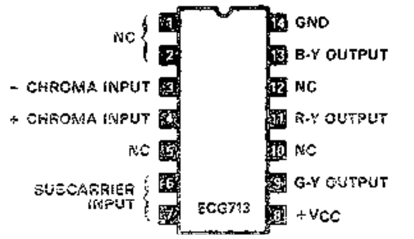
ECG711 10-Pin Can See Fig. L5
Color TV-AFT System



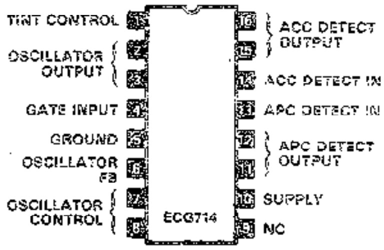
ECG712 14-Pin DIP See Fig. L104
(14-Pin DIP-Q See Alternate Fig. L107)
FM & TV Sound IF Detector & Electronic Attenuator



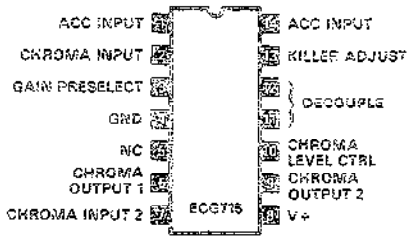
ECG713 14-Pin DIP See Fig. L104
Chroma Demodulator



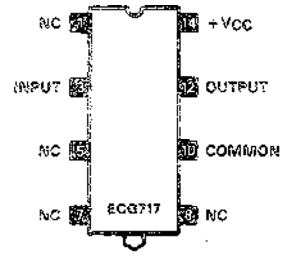
ECG714 16-Pin DIP See Fig. L111
Color Subcarrier Regenerator



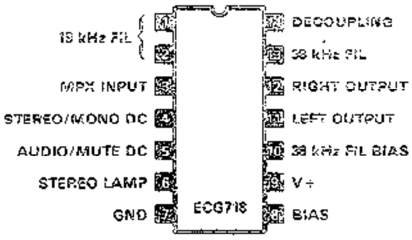
ECG715 14-Pin DIP See Fig. L104
Chroma IF Amplifier



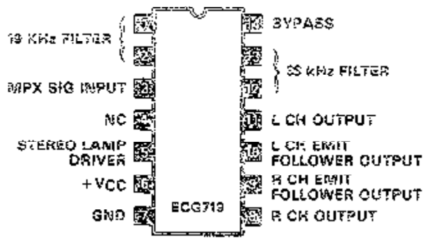
ECG717 14-Pin DIP-EP See Fig. L139
Audio Power Amplifier. Replacement for PA234



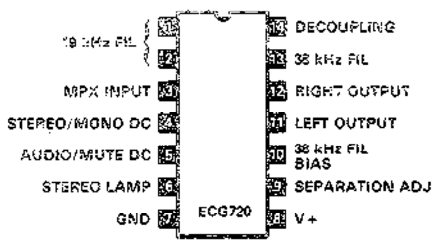
ECG718 14-Pin DIP See Fig. L104
FM-Stereo Multiplex Demodulator



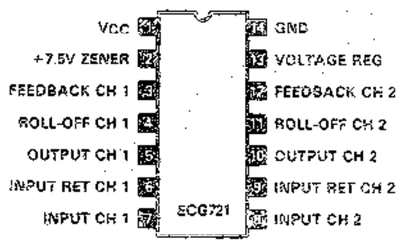
ECG719 14-Pin DIP See Fig. L104
FM-Stereo Multiplex Demodulator. Emitter Follower Outputs



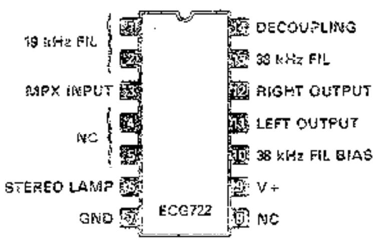
ECG720 14-Pin DIP See Fig. L104
FM-Stereo Multiplex Demodulator with Adjustable Stereo Channel Seperation



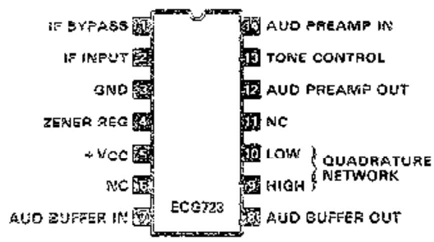
ECG721 14-Pin DIP See Fig. L104
Dual Low-Noise, Low-Level Preamplifier



ECG722 14-Pin DIP See Fig. L104
FM-Stereo Multiplex Demodulator



ECG723 14-Pin DIP See Fig. L104
FM Sound System for Communications & High-Fidelity FM Receivers

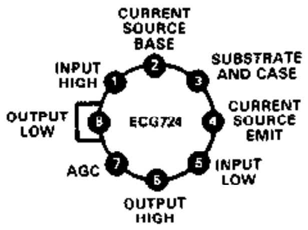


Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

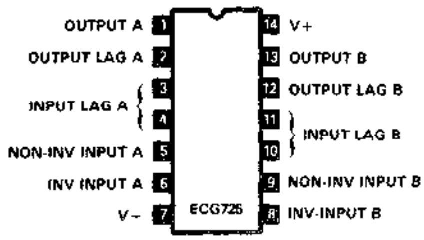
ECG724 8-Pin Can See Fig. L3

Differential/Cascade Amplifier for Communications & Industrial Equipment. From DC to 120 MHz



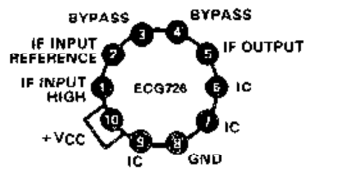
ECG725 14-Pin DIP See Fig. L104

Dual Low-Noise Operational Amplifier



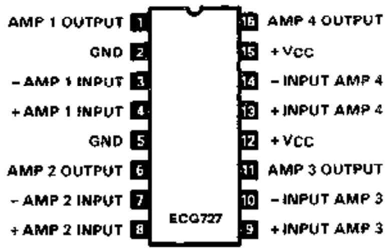
ECG726 10-Pin Can See Fig. L7

Wide-Band Amplifier Replacement for CA3011 and CA3012



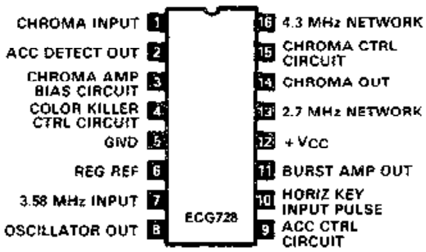
ECG727 16-Pin DIP See Fig. L111

Four Independent AC Amplifiers for Low-Noise AC Applications in Consumer and Industrial Service



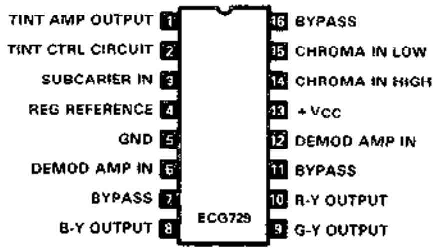
ECG728 16-Pin DIP-Q See Fig. L113

Chroma Signal Processor



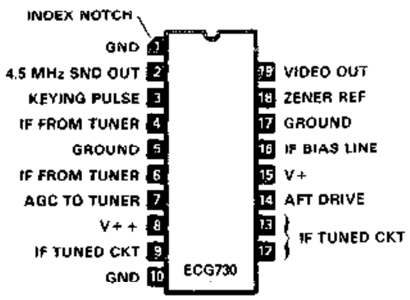
ECG729 16-Pin DIP-Q See Fig. L113

Chroma Demodulator



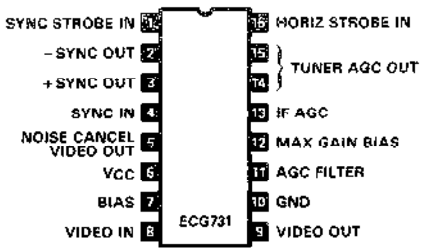
ECG730 16 + 2 Pin DIP-Q See Fig. L117

TV Video IF System



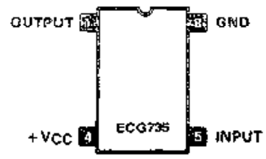
ECG731 16-Pin DIP See Fig. L111

Video Signal Processor. Replacement for Zenith 221-45



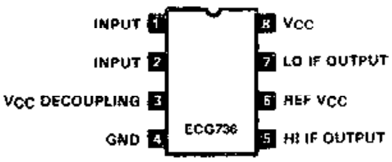
ECG735 4-Pin DIP See Fig. L96

Class "A" Audio Driver



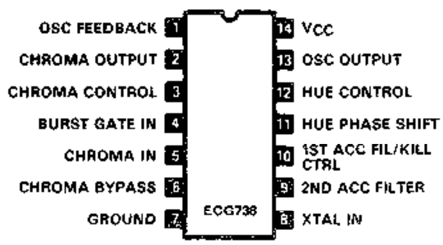
ECG736 8-Pin DIP See Fig. L97

FM Gain Block with Voltage Regulator



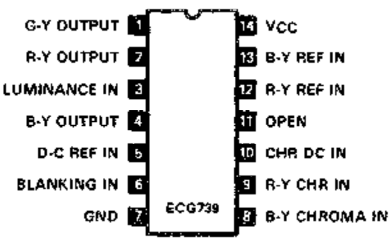
ECG738 14-Pin DIP See Fig. L104

Chroma IF Amp, Automatic Chroma Control, Color Killer, Injection Lock Reference System, and DC Hue Control



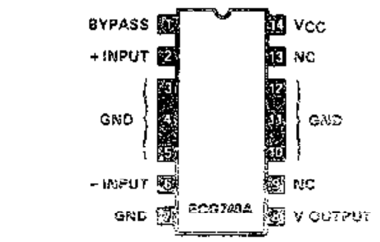
ECG739 14-Pin DIP See Fig. L104

Chroma Demodulator with RGB Matrix and Chroma Driver Stages

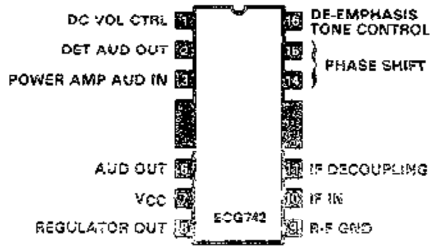


Package Outlines - See Page 1-285

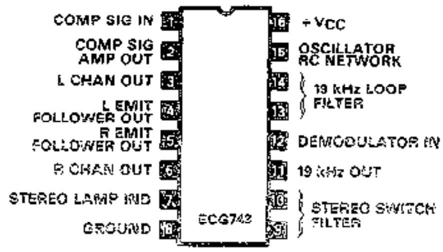
ECG740A 14-Pin DIP-W See Fig. L106
(14-Pin DIP-W See Alternate Fig. L132)
AF PO, 2 W



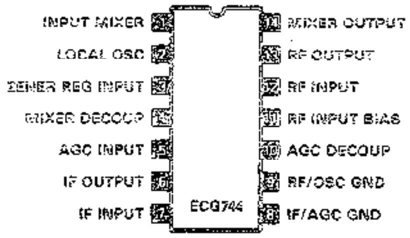
ECG742 16-Pin DIP-W See Fig. L136
TV Sound System, 2 W PO



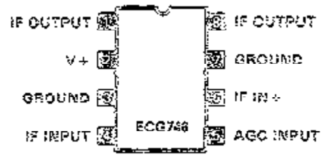
ECG743 16-Pin DIP See Fig. L111
FM Stereo Decoder - Phase-Locked Loop



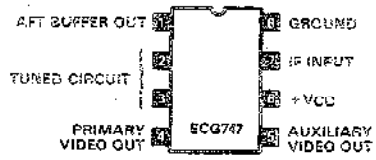
ECG744 14-Pin DIP See Fig. L104
RF IF Amplifier for AM Radio



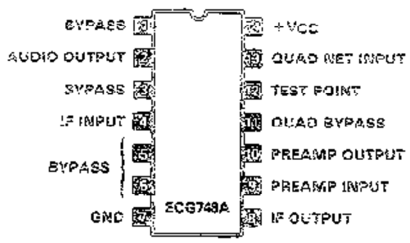
ECG746 8-Pin DIP See Fig. L98
FM TV Sound IF Amplifier



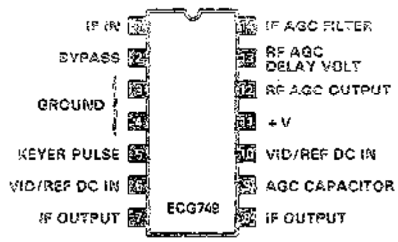
ECG747 8-Pin DIP See Fig. L98
Low-Level Video Detector



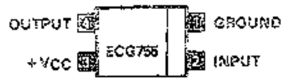
ECG748A 14-Pin DIP See Fig. L104
TV Sound IF Amp/Limiter/Detector, Audio Preamp



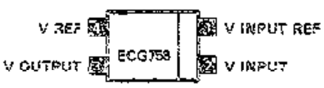
ECG749 14-Pin DIP See Fig. L104
TV Video IF Amplifier with Keyed AGC



ECG755 4-Pin DIP-Q See Fig. L94
Class "A" Audio Driver, Replacement for MFC4050



ECG758* 4-Pin DIP-Q See Fig. L94
Voltage Regulator 9-20 Volts,
200 mA - I LOAD (max.)
Load Regulation 1 mA - 50 mA - 0.2%
Line Regulation - 0.03%
Replacement for MFC4063, MFC4063A



ECG759* 4-Pin DIP-Q See Fig. L94
Voltage Regulator 9-20 Volts,
200 mA - I LOAD (max.)
Load Regulation 1 mA - 50 mA - 0.4%
Line Regulation - 0.06%
Replacement for MFC4064, MFC4064A

ECG768 6-Pin DIP-Q See Fig. L95
3-Input AND Gate, Compatible with TTL and DTL, Replacement for MFC6060

*3-Volt Differential Between V_{IN} and V_{OUT}

Package Outlines - See Page 1-285

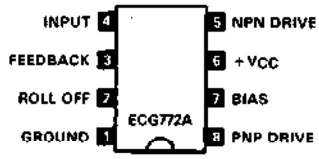
N

ECG770 6-Pin DIP-Q See Fig. L95

RS Flip-Flop. Compatible with TTL and DTL. High-Current Buffered Outputs Allow Direct Drive of Medium Current Lamps and Relays. Replacement for MFC6080

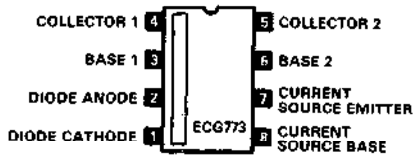
ECG772A 8-Pin DIP-Q See Fig. L101
(8-Pin DIP See Alternate Fig. L97)

Audio Pre-Amp and Class "B" Driver. For Complementary Output Transistors. Drives Up to 15-Watt Output Into 4-Ohm Lead Stages. Replacement for MFC8020



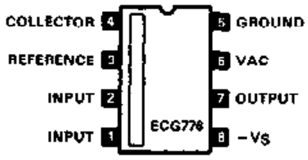
ECG773 8-Pin DIP-Q See Fig. L99

Differential/Cascade Amplifier. Diode Available for Biasing. Replacement for MFC8030



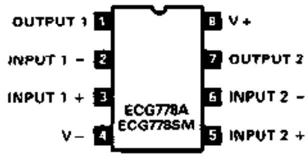
ECG776 8-Pin DIP-Q See Fig. L99

Zero Voltage Switch for Use in AC Power Switching Applications with Output Drive Capable of Triggering TRIAC. Replacement for MFC8070



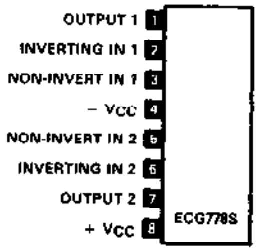
ECG778A 8-Pin DIP See Fig. L98
ECG778SM 8-Pin SOIC See Fig. L159

Dual, Internally Compensated, High-Performance Operational Amplifier



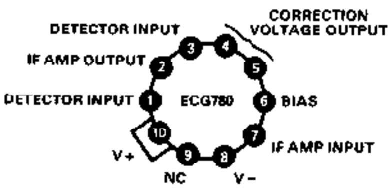
ECG778S 8-Pin SIP See Fig. L35

Dual Internally Compensated High Performance Operational Amplifier, V_{CC} = ±15 V Typ



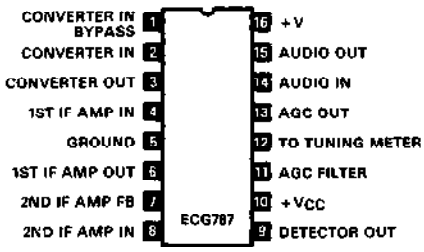
ECG780 10-Pin Can See Fig. L5

Wide-Band Amplifier, Differential Detector, DC Amplifier, and Zener Diode Regulator for Automatic Frequency Control Applications. High-Gain IF Amplifier Allows Use with TV Receivers with Low-Level IF Amps



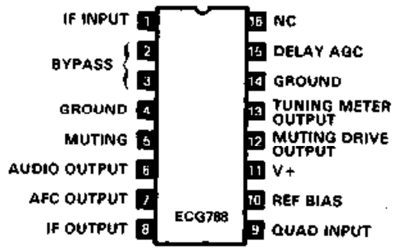
ECG787 16-Pin DIP See Fig. L111

AM Receiver Subsystem and General-Purpose Amplifier Array



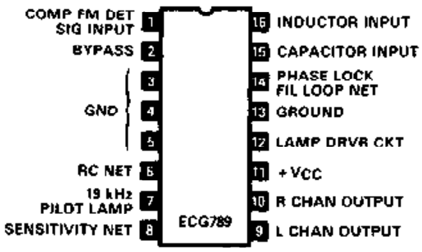
ECG788 16-Pin DIP See Fig. L111

FM IF System. IF Amplifier, Quadrature Detector, AF Preamplifier, Circuits for AGC, AFC, Muting, and Tuning Meter



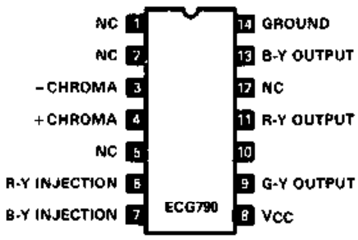
ECG789 16-Pin DIP-Q See Fig. L113

FM-Stereo Decoder



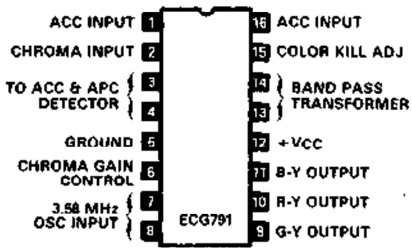
ECG790 14-Pin DIP See Fig. L104

Dual Chroma Demod



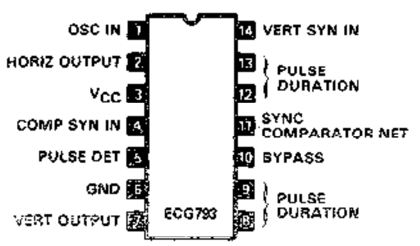
ECG791 14-Pin DIP See Fig. L111

Chroma Amp, Demod

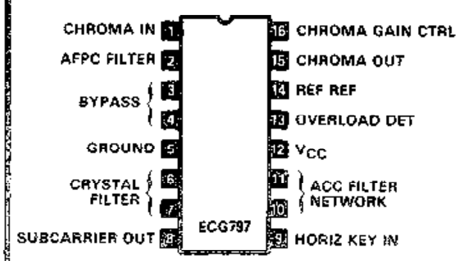


Package Outlines - See Page 1-285

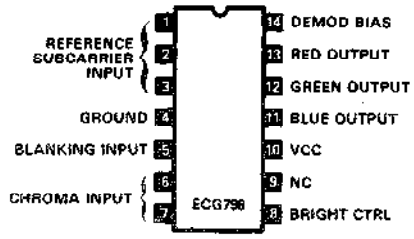
ECG793 14-Pin DIP See Fig. L104
Vert Countdown



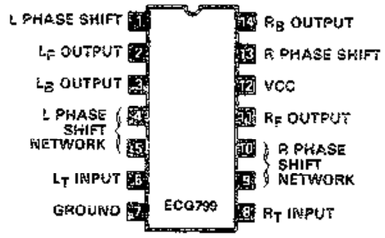
ECG797 16-Pin DIP See Fig. L111
Chroma Processor



ECG798 14-Pin DIP See Fig. L104
Chroma Demod

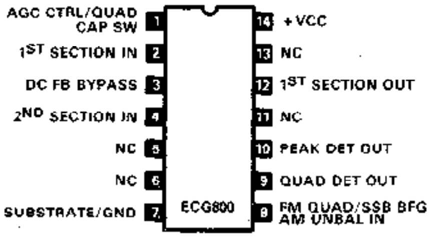


ECG799 14-Pin DIP See Fig. L104
4-Channel "SQ" Stereo Decoder

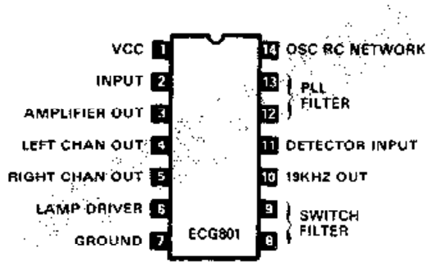


Package Outlines - See Page 1-285

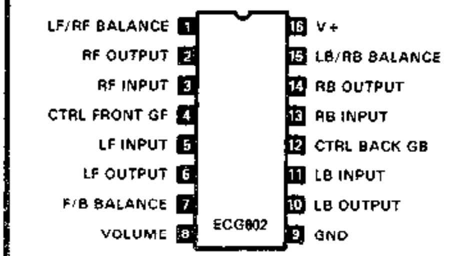
ECG800 14-Pin DIP See Fig. L104
FM/AM/SSB IF Amp, Det



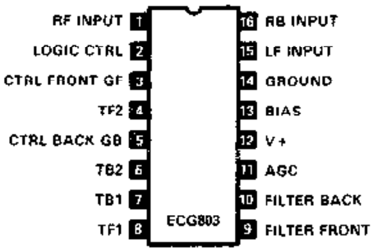
ECG801 14-Pin DIP See Fig. L104
FM Stereo Demod, Phase Locked Loop



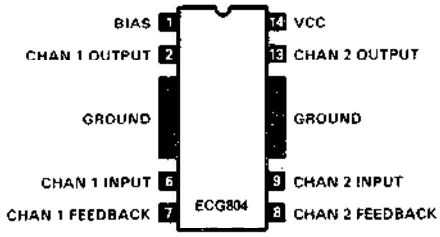
ECG802 16-Pin DIP See Fig. L112
4-Channel Voltage Controlled Attenuator



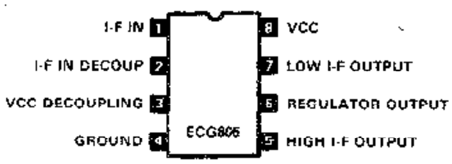
ECG803 16-Pin DIP See Fig. L112
4-Channel "SQ" Stereo DC Logic - F/B Enhancement



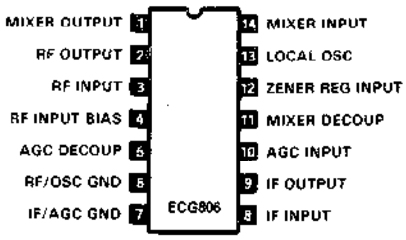
ECG804 14-Pin DIP-W See Fig. L106
(14-Pin DIP-W See Alternate Fig. L132)
(14-Pin DIP See Alternate Fig. L104)
Dual 2-Watt Audio Amp



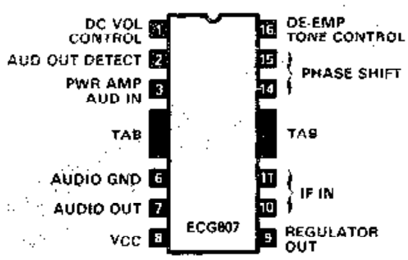
ECG805 8-Pin DIP See Fig. L97
FM IF Gain Block



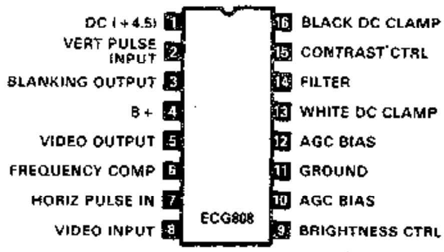
ECG806 14-Pin DIP See Fig. L104
AM Radio RF/IF Amp



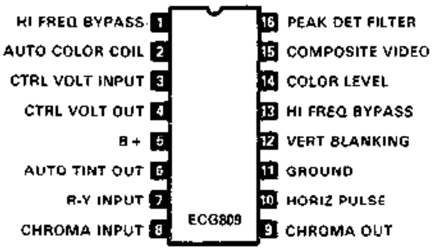
ECG807 16-Pin DIP-W See Fig. L136
TV/FM Sound System, 1 W, PO



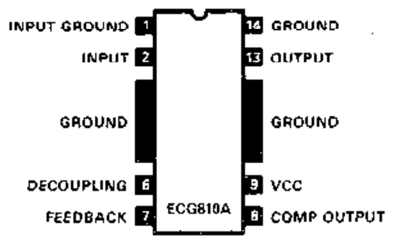
ECG808 16-Pin DIP See Fig. L111
TV Video Signal Processor



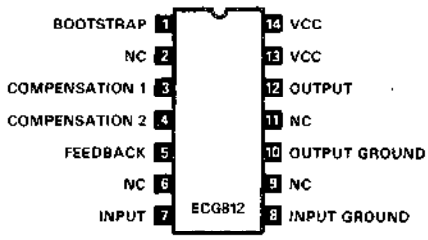
ECG809 16-Pin DIP See Fig. L111
TV Chroma Processor



ECG810A 14-Pin DIP-W See Fig. L106
2 W Audio PO



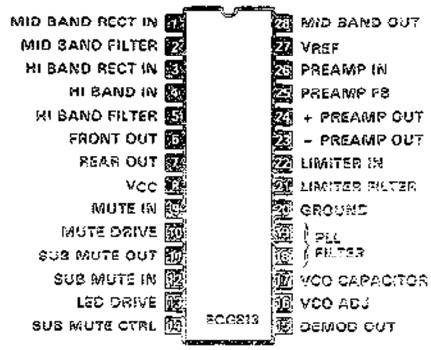
ECG812 14-Pin DIP See Fig. L104
AF PO



Package Outlines - See Page 1-285

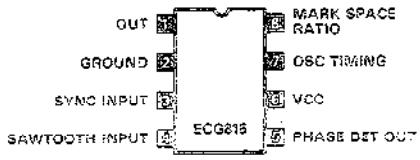
ECG813 28-Pin DIP See Fig. L124

CD4 Disc Demodulation System with Preamp, V_{CC} = 13 V Typ



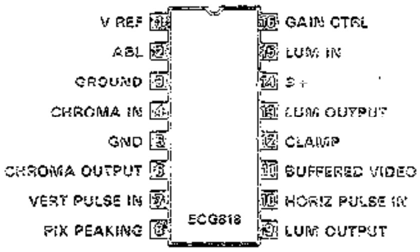
ECG815 8-Pin DIP See Fig. L98

TV Horiz Processor for Positive Sawtooth Input



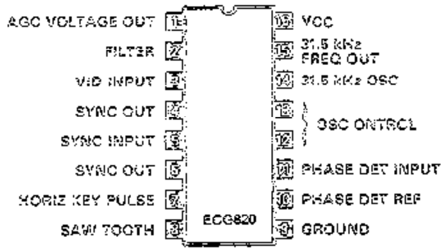
ECG818 16-Pin DIP See Fig. L111

TV Luminance Processor



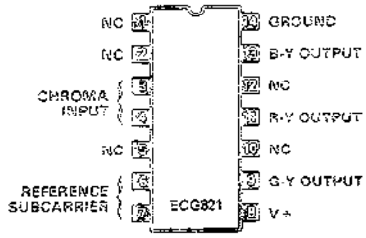
ECG820 16-Pin DIP See Fig. L111

Horiz Osc and AGC



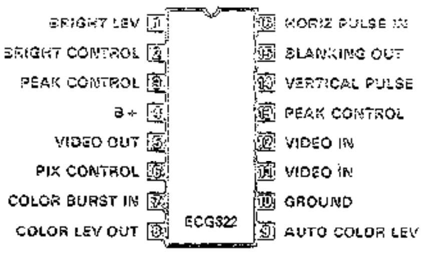
ECG821 14-Pin DIP See Fig. L104

Chroma Demod



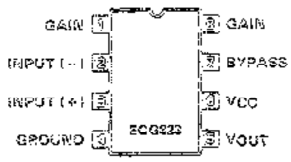
ECG822 16-Pin DIP See Fig. L111

TV Chroma Processor



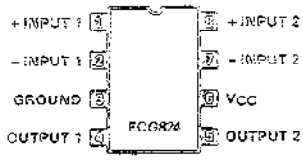
ECG823 8-Pin DIP See Fig. L98

AF PO, V_{CC} = 15 V Max



ECG824 8-Pin DIP See Fig. L98

Dual AF Preamp

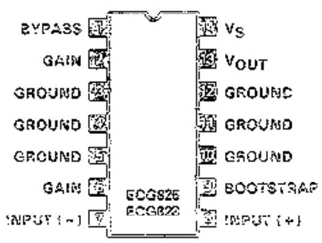


ECG825 14-Pin DIP See Fig. L104

AF PO, 1 W

ECG826*

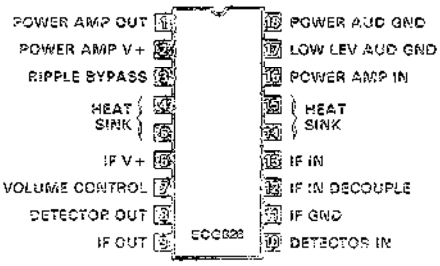
AF PO, 1.5 W



*DISCONTINUED

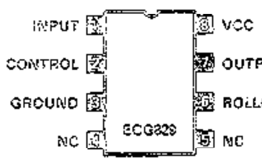
ECG828 18-Pin DIP See Fig. L116

FM IF, AF PO, 2 W



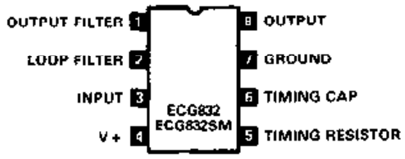
ECG829 8-Pin DIP See Fig. L98

Electronic Attenuator

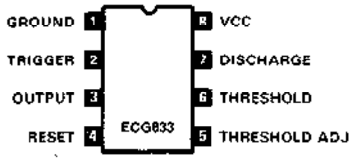


Package Outlines - See Page 1-285

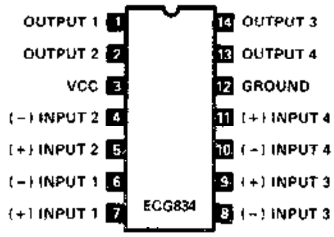
ECG832 8-Pin DIP See Fig. L98
ECG832SM 8-Pin SOIC See Fig. L159
Tone Decoder, V+ = 5 V Typ



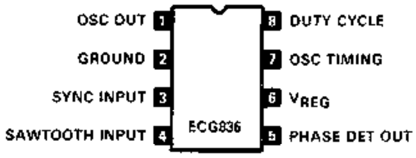
ECG833 8-Pin DIP See Fig. L98
Timing Circuit



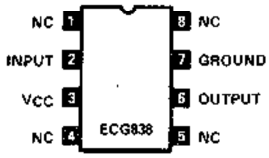
ECG834 14-Pin DIP See Fig. L104
ECG834SM 14-Pin SOIC See Fig. L160
Quad Comparator



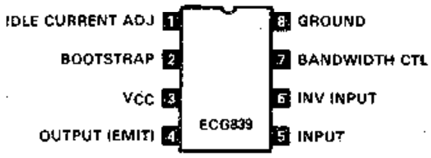
ECG836 8-Pin DIP See Fig. L97
TV Horiz Processor for Negative Sawtooth Input



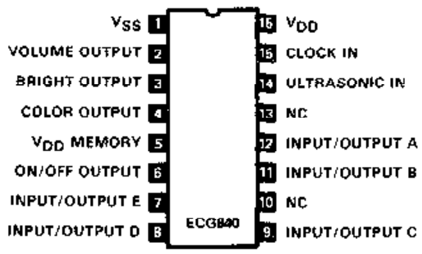
ECG838 8-Pin DIP See Fig. L98
Wide Band Amplifier, V_{CC} = 12 V Typ



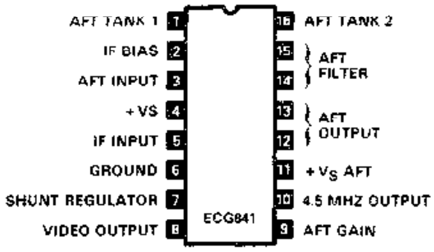
ECG839 8-Pin DIP See Fig. L98
AF Preamp, Class "B", V_{CC} = 30 V Typ



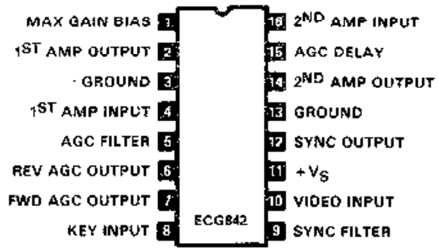
ECG840 16-Pin DIP See Fig. L112
TV 30-Channel Decoder



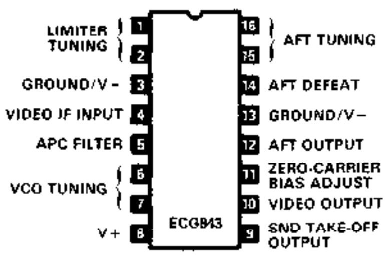
ECG841 16-Pin DIP See Fig. L112
TV Video IF, AFT



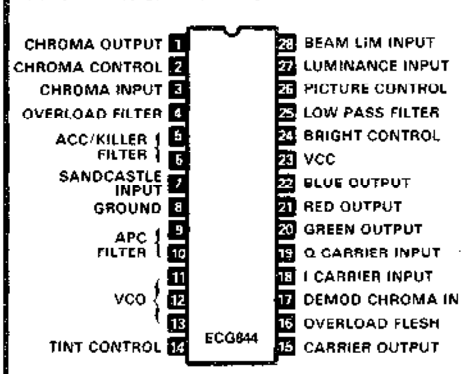
ECG842 16-Pin DIP See Fig. L112
TV Video IF, AGC



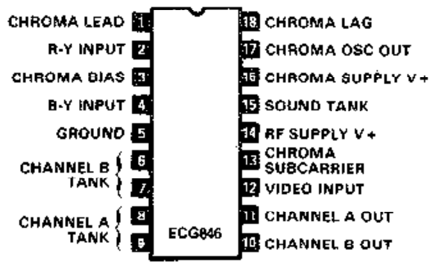
ECG843 16-Pin DIP See Fig. L112
TV Video IF, AFT



ECG844 28-Pin DIP See Fig. L124
TV Chroma/Luminance Circuit

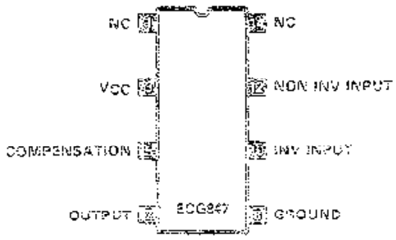


ECG846 18-Pin DIP See Fig. L115
TV Video Modulator

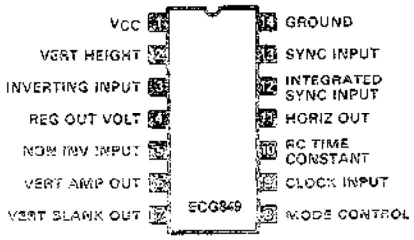


Package Outlines - See Page 1-285

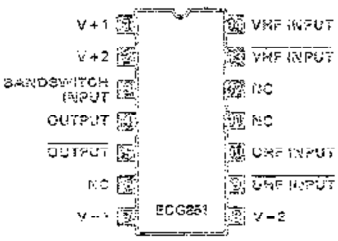
ECG847 14-Pin DIP See Fig. L103
Low Level Audio Amp. Replaces PA230 and PA238, V_{CC} = 12 V Typ



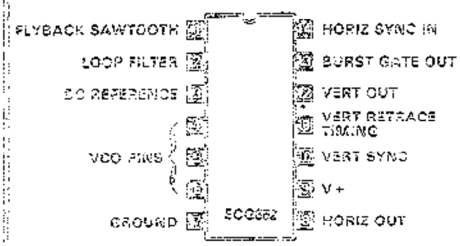
ECG849 14-Pin DIP See Fig. L104
TV Horiz/Vert Countdown



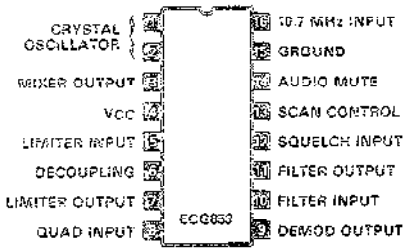
ECG851 14-Pin DIP See Fig. L104
TV VHF-UHF Pre-scaler



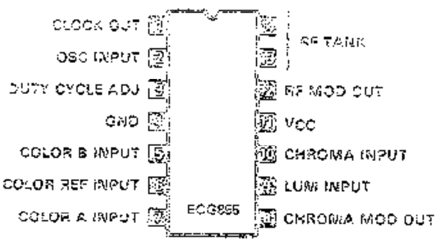
ECG852 14-Pin DIP See Fig. L104
No Hold Control, Vert/Horiz Circuit



ECG853 16-Pin DIP See Fig. L111
Narrow Band FM, IF, Squelch, Scan Control

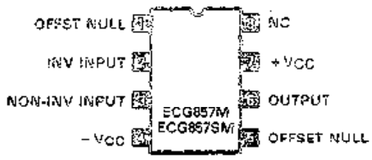


ECG855 14-Pin DIP See Fig. L104
Color TV Video Modulator

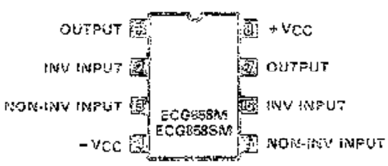


ECG856 8-Pin DIP See Fig. L97
TV Video Modulator

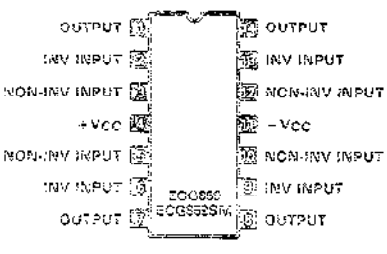
ECG857M 8-Pin DIP See Fig. L98
ECG857SM 8-Pin SOIC See Fig. L159
Lo Noise JFET Input Op Amp



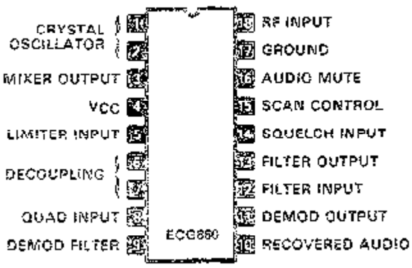
ECG858M 8-Pin DIP See Fig. L98
ECG858SM 8-Pin SOIC See Fig. L159
Dual Lo Noise JFET Input Op Amp



ECG859 14-Pin DIP See Fig. L104
ECG859SM 14-Pin SOIC See Fig. L160
Quad Lo Noise JFET Input Op Amp



ECG860 18-Pin DIP See Fig. L115
Narrow Band FM, IF Amp Scan Control
Squelch Osc. Mixer, DET and AFC

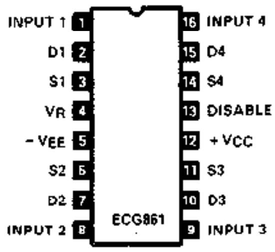


Package Outlines - See Page 1-285

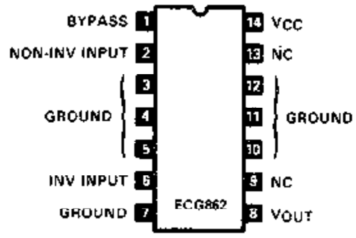
N

Linear IC and Module Circuits (cont'd)

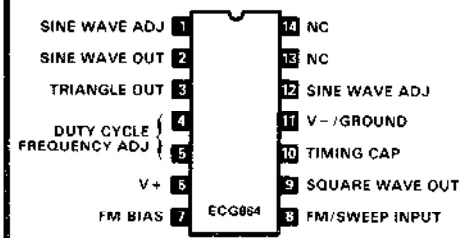
ECG861 16-Pin DIP See Fig. L112
Quad Single Pole Analog Switches-Normally Open



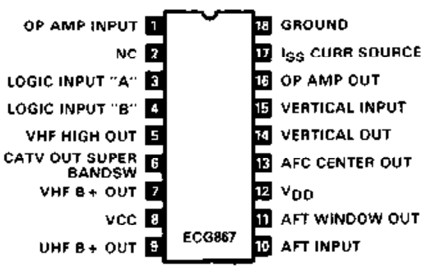
ECG862 14-Pin DIP-W See Fig. L106
AF PO, V_{CC} = 22 V, R_L = 8 Ω
2 W (No Heat Sink)
5 W (with ECG 450A Heat Sink)



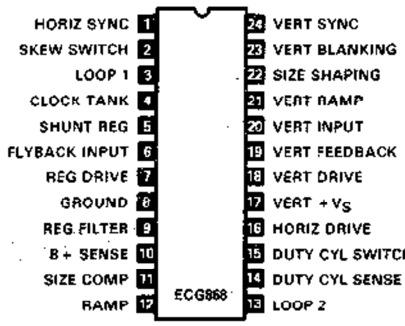
ECG864 14-Pin DIP See Fig. L104
Precision Waveform Generator



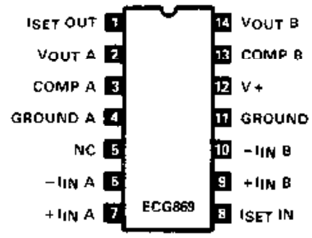
ECG867 18-Pin DIP See Fig. L115
TV Tuner Band Select and Quad Comparator (PMOS), V_{CC} = 12 V, V_{DD} = 5 V, V_{GG} = 0 V Typ



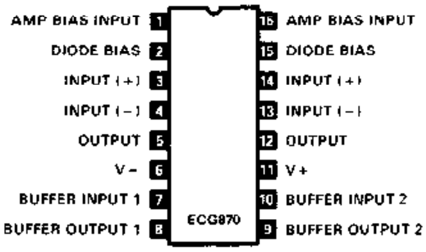
ECG868 24 Pin DIP See Fig. L122
TV Horizontal/Vertical/Osc/Driver/Countdown



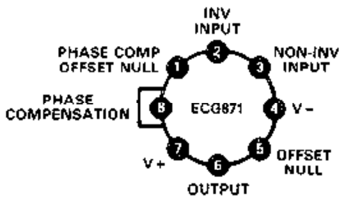
ECG869 14-Pin DIP See Fig. L104
Dual Hi Speed/Programmable/Current Mode Op Amp/Single Supply



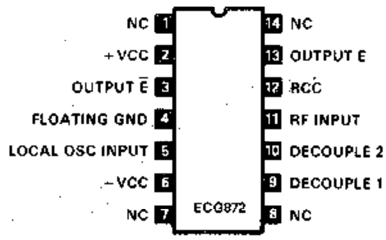
ECG870 16-Pin DIP See Fig. L111
Dual Transconductance Op Amp



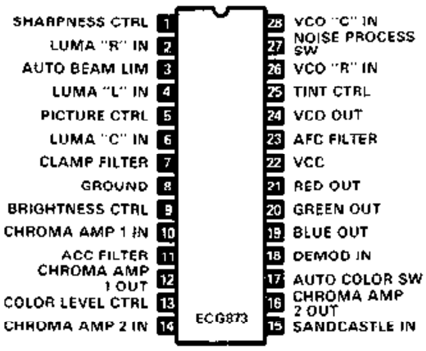
ECG871 8-Pin Can See Fig. L3
Wide Band Op Amp



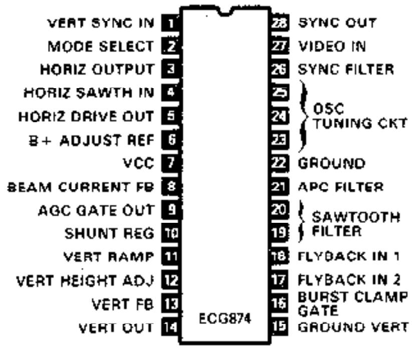
ECG872 14-Pin DIP See Fig. L104
VCR Double Balanced Modulator/Mixer



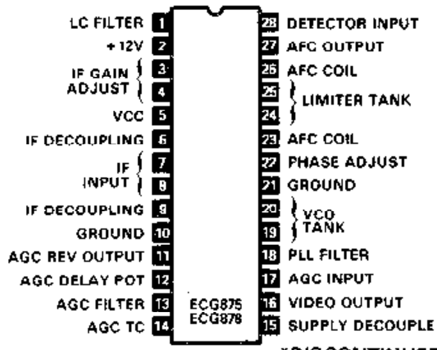
ECG873 28-Pin DIP See Fig. L124
Luminance/Chroma Prod/Demod



ECG874 28-Pin DIP See Fig. L124
TV Horizontal/Vertical Countdown/Driver



ECG875 28-Pin DIP See Fig. L124
ECG878* (Pin 16 and 17 Video Output)
VIF Amp/AGC/Det/Vid Amp

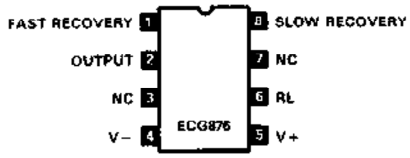


*DISCONTINUED

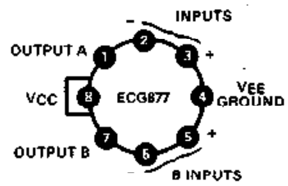
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

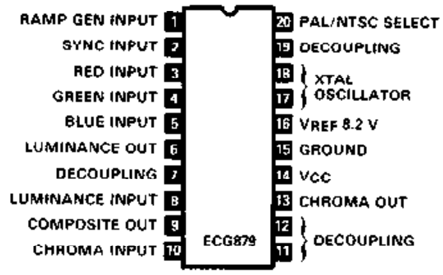
ECG876 8-Pin DIP See Fig. L97
Flasher/Oscillator for LEDs



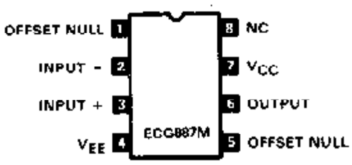
ECG877 8-Pin Can See Fig. L3
Dual Op Amp



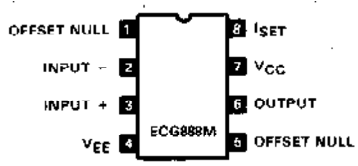
ECG879 20-Pin DIP See Fig. L118A
TV RGB to PAL/NTSC Encoder,
V_{CC} = 12 V Typ



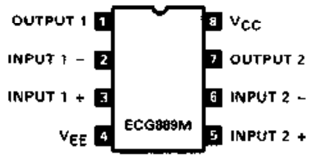
ECG887M 8-Pin DIP See Fig. L98
Lo Power JFET Input Op Amp



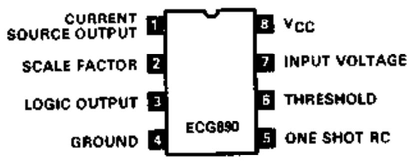
ECG888M 8-Pin DIP See Fig. L98
Lo Power Programmable Op Amp



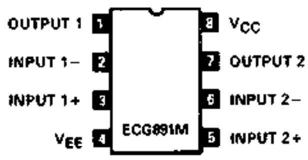
ECG889M 8-Pin DIP See Fig. L98
Dual Lo Power JFET Input Op Amp



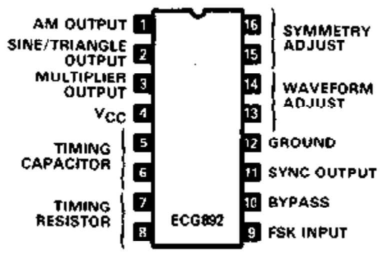
ECG890 8-Pin DIP See Fig. L98
Voltage to Frequency Converter



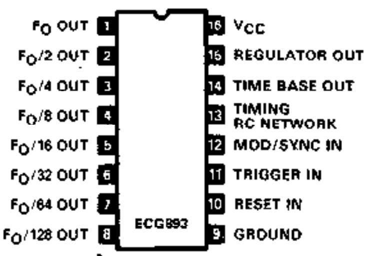
ECG891M 8-Pin DIP See Fig. L97
ECG891SM 8-Pin SOIC See Fig. L159
Dual Op Amp, Internally Compensated,
V_{CC} = + 15 V, V_{EE} = - 15 V



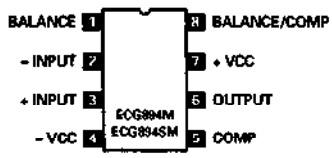
ECG892 16-Pin DIP See Fig. 111
Precision Waveform Generator,
V_{CC} = 12 V Typ, Freq Range .01 Hz to 1 MHz



ECG893 16-Pin DIP See Fig. L111
Programmable Timer/Counter,
V_{CC} = 5 V Typ



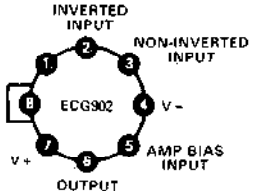
ECG894M 8-Pin DIP See Fig. L97
ECG894SM 8-Pin SOIC See Fig. L159
Lo Noise Op Amp, V_{CC} = ± 15 V



Package Outlines - See Page 1-285

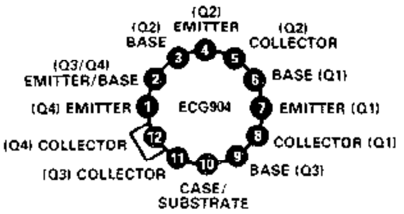
N

ECG902 8-Pin Can See Fig. L3
Operational Transconductance Amplifier

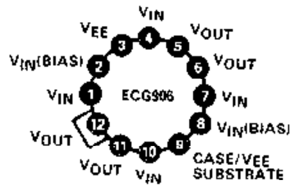


Pin 4 Connected to Case

ECG904 12-Pin Can See Fig. L9
2 Transistors and Darlington Pair

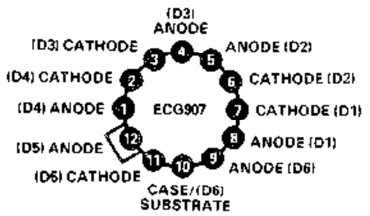


ECG906 12-Pin Can See Fig. L9
Dual HF Diff Amps for Frequency Up to 500 MHz

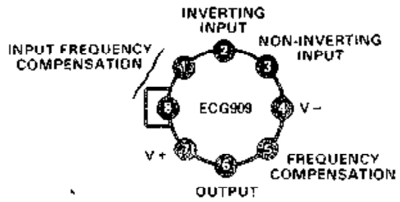


PINS 4-9 = DIFF AMP 1
PINS 1-3, 10-12 = DIFF AMP 2

ECG907 12-Pin Can See Fig. L9
Ultra Fast Matched Diodes

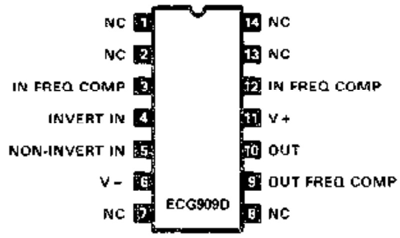


ECG909 8-Pin Can See Fig. L3
Hi-Performance Op Amp

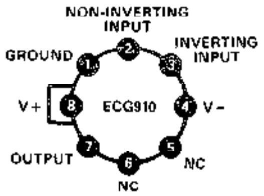


Pin 4 Connected to Case

ECG909D 14-Pin DIP See Fig. L104
Hi-Performance Op Amp

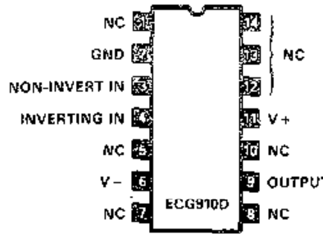


ECG910 8-Pin Can See Fig. L3
Hi-Speed Diff Comparator

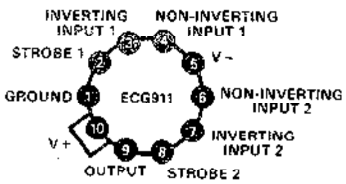


Pin 4 Connected to Case

ECG910D 14-Pin DIP See Fig. L104
Hi-Speed Diff Comparator

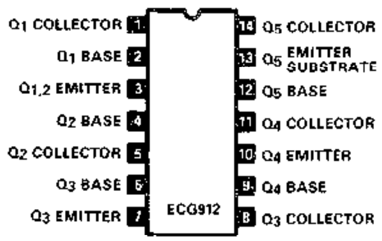


ECG911 10-Pin Can See Fig. L7
Dual Hi-Speed Diff Comparator

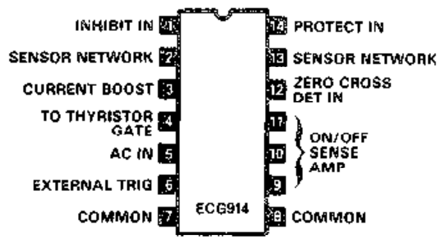


Pin 5 Connected to Case

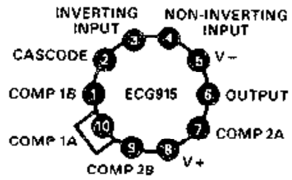
ECG912 14-Pin DIP See Fig. L104
3 Isolated Transistors, 1 Diff Pair



ECG914 14-Pin DIP See Fig. L104
Zero Voltage Switch



ECG915 10-Pin Can See Fig. L7
Hi-Speed Op Amp

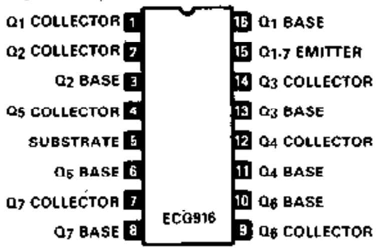


*3-Volt Differential Between V_{IN} and V_{OUT}

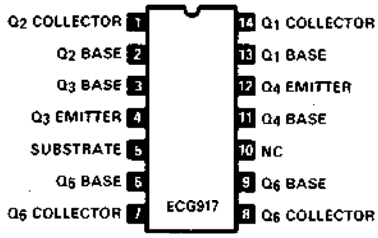
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

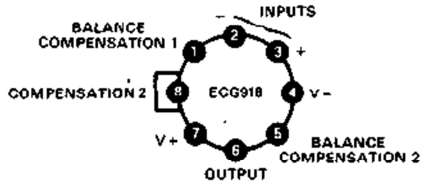
ECG916 16-Pin DIP See Fig. L111
NPN Transistor Array for Digital Segment Displays



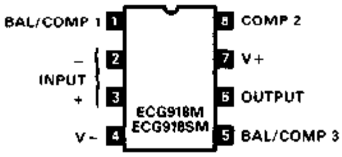
ECG917 14-Pin DIP See Fig. L104
Dual Diff Amp. Lo-Power Application from DC to 120 MHz



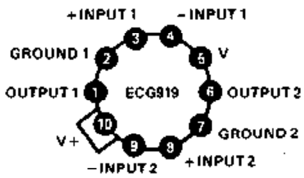
ECG918 8-Pin Can See Fig. L3
Hi-Speed Precision Op Amp



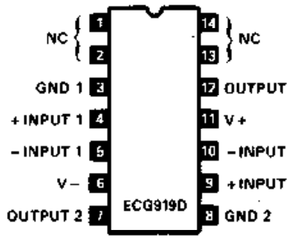
ECG918M 8-Pin DIP See Fig. L97
ECG918SM 8-Pin SOIC See Fig. L159
Hi-Speed Precision Op Amp



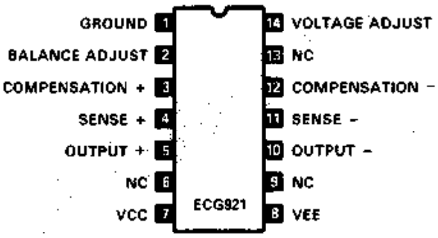
ECG919 10-Pin Can See Fig. L7
Dual Hi-Speed Comparator



ECG919D 14-Pin DIP See Fig. L104
Dual Hi-Speed Comparator



ECG921 14-Pin DIP See Fig. L104
Dual Polarity Tracking VR ±15 V



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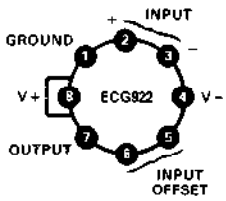
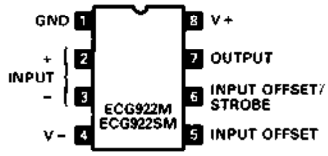
ECG922 8-Pin Can See Fig. L3
Voltage Comparator

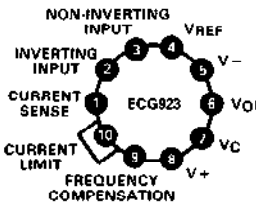


Pin 4 Connected to Case

ECG922M 8-Pin DIP See Fig. L97
ECG922SM 8-Pin SOIC See Fig. L159
Voltage Comparator

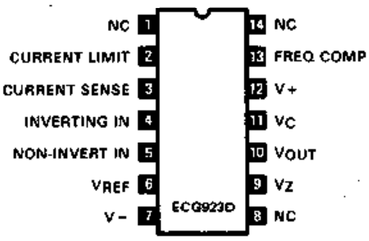


ECG923 10-Pin Can See Fig. L6
Precision VR

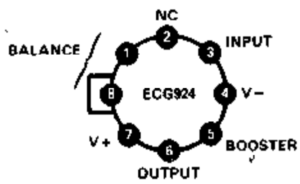


Pin 5 Connected to Case
See Voltage Regulator Selector Guide Page 1-179

ECG923D 14-Pin DIP See Fig. L104
Precision VR

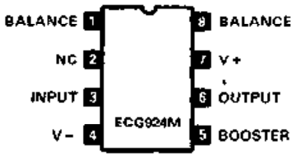


ECG924 8-Pin CAN See Fig. L3
Voltage Follower Op Amp

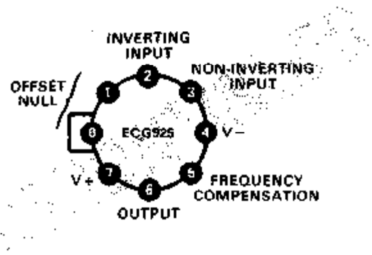


Package Outlines - See Page 1-285

ECG924M 8-Pin DIP See Fig. L97
Voltage Follower Op Amp

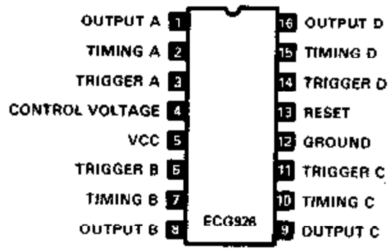


ECG925 8-Pin Can See Fig. L3
Instrumentation Op Amp

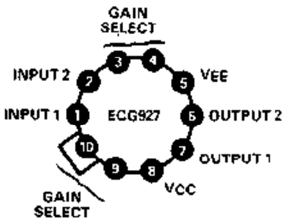


Pin 4 Connected to Case

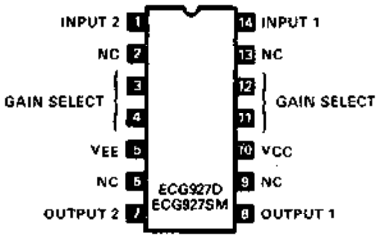
ECG926 16-Pin DIP See Fig. L111
Quad Timer



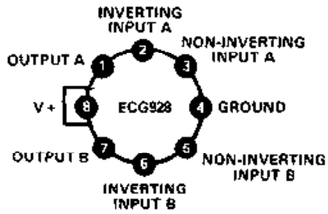
ECG927 10-Pin Can See Fig. L6
Differential Video Amp



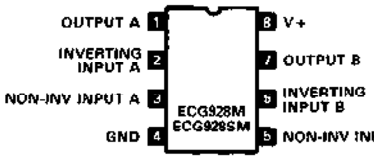
ECG927D 14-Pin DIP See Fig. L104
ECG927SM 14-Pin SOIC See Fig. L160
Differential Video Amp



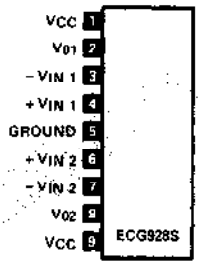
ECG928 8-Pin Can See Fig. L3
Dual Low Power Op Amp



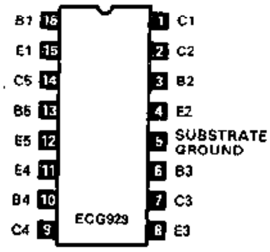
ECG928M 8-Pin DIP See Fig. L97
ECG928SM 8-Pin SOIC See Fig. L159
Dual Low Power Op Amp



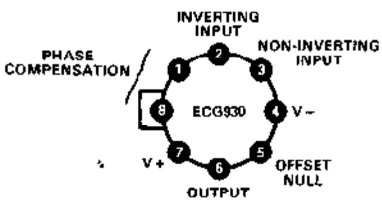
ECG928S 9-Pin SIP See Fig. L39
Dual Low Power Op Amp



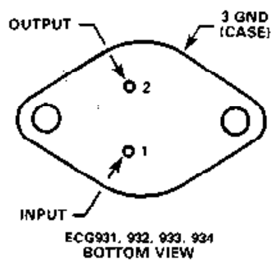
ECG929 16-Pin DIP See Fig. L111
Hi Current NPN Transistor Array w/Matched Pair (Q1 and Q2), V_{CBO} = 60 V Typ. V_{CEO} = 24 V Typ



ECG930 8-Pin Can See Fig. L3
Bi-MOS Op Amp

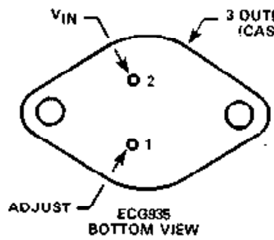


ECG931, ECG932, ECG933, ECG934 TO-3 Fig. L11
3 Terminal Positive Voltage Regulators



See Voltage Regulator Selector Guide Page 1-179

ECG935 TO-3 Fig. L11
3 Terminal Positive Adjustable Voltage Regulator; 1.2 to 32 V_{OUT}, I_O = 5 A, PD = 50 W, V_{IN} Max = 30 + V_{OUT}, V_{IN} Min = 1.25 + V_{OUT}

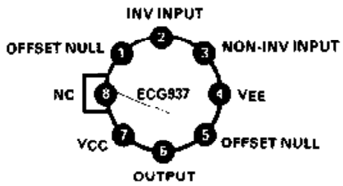


See Voltage Regulator Selector Guide Page 1-179

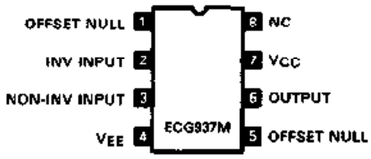
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

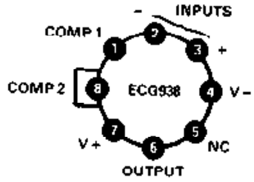
ECG937 8-Pin Can See Fig. L3
JFET Input Op Amp



ECG937M 8-Pin DIP See Fig. L98
JFET Input Op Amp

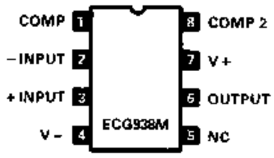


ECG938 8-Pin Can See Fig. L3
Precision Op Amp

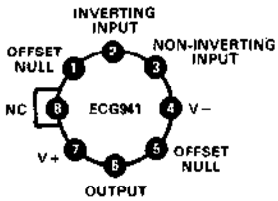


Pin 4 Connected to Case

ECG938M 8-Pin DIP See Fig. L97
Precision Op Amp

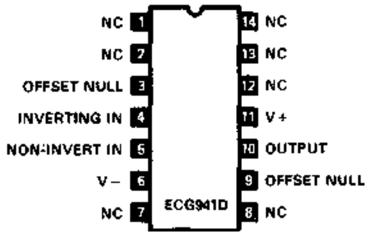


ECG941 8-Pin Can See Fig. L3
Freq-Compensated Op Amp

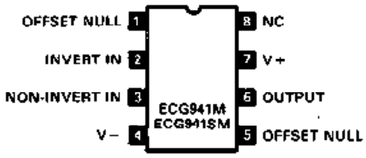


Pin 4 Connected to Case

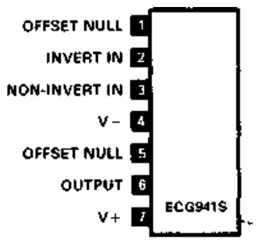
ECG941D 14-Pin DIP See Fig. L04
Freq-Compensated Op Amp



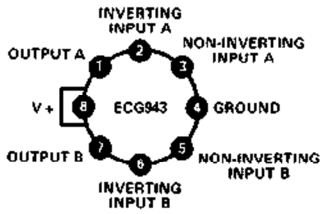
ECG941M 8-Pin DIP See Fig. L97
ECG941SM 8-Pin SOIC See Fig. L159
Freq-Compensated Op Amp



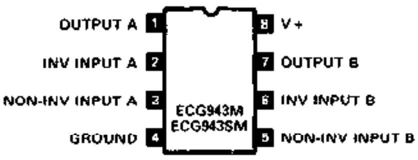
ECG941S 7-Pin SIP See Fig. L24
Freq-Compensated Op Amp



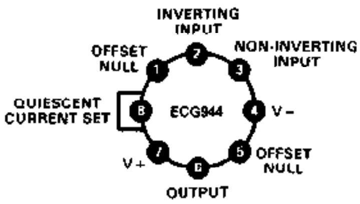
ECG943 8-Pin Can See Fig. L3
Dual Comparator



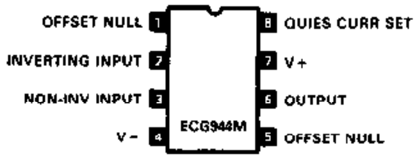
ECG943M 8-Pin DIP See Fig. L98
ECG943SM 8-Pin SOIC See Fig. L159
Dual Comparator



ECG944 8-Pin Can See Fig. L3
Programmable Op Amp

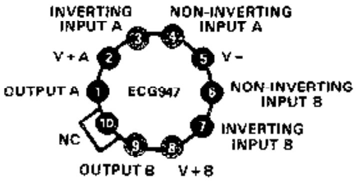


ECG944M 8-Pin DIP See Fig. L98
Programmable Op Amp

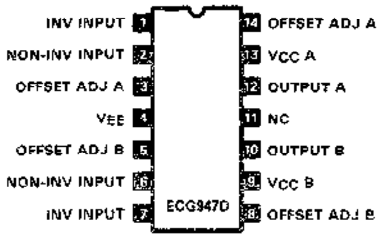


Package Outlines - See Page 1-285

ECG947 10-Pin Can See Fig. L7
Dual, Freq-Compensated Op Amp

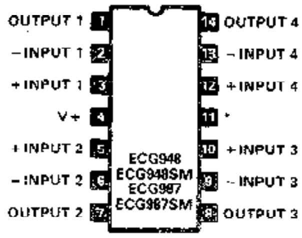


ECG947D 14-Pin DIP See Fig. L104
Dual, Freq-Compensated Op Amp



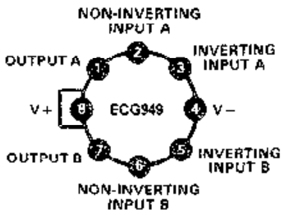
Pins 9 and 13 Tied Externally

ECG948 14-Pin DIP See Fig. L104
ECG948SM 14-Pin SOIC See Fig L160
Quad Op Amp



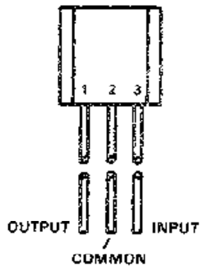
*ECG948, 948SM - Dual Supply, Pin 11 = V-

ECG949 8-Pin Can See Fig. L3
Dual Op Amp



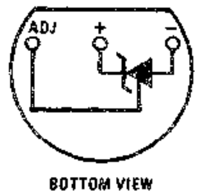
Pin 4 Connected to Case

ECG950 TO-92 See Fig. L16
Pos VR, 12 V, 100 mA
ECG951
Pos VR, 15 V, 100 mA

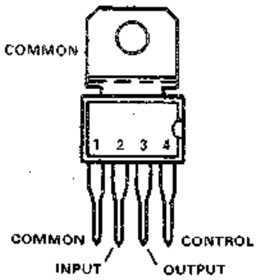


See Voltage Regulator Selector Guide Page 1-179

ECG952 TO-92 See Fig. L16
Precision 2.5 V Voltage Reference

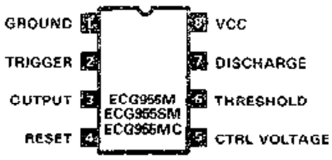


ECG953 TO-202 4-Pin See Fig. L18
Pos VR, Adjustable 5 to 30 V, 1 A

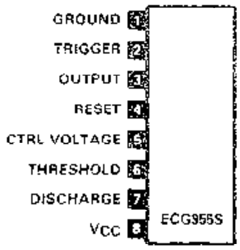


Heat sink tabs connected to common through device substrate. Not recommended for direct electrical connection.

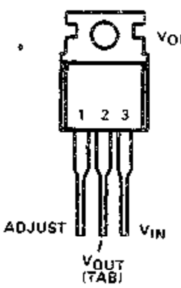
ECG955M 8-Pin DIP See Fig. L98
ECG955SM 8-Pin SOIC See Fig. L159
Timer/Oscillator
ECG955MC 8-Pin DIP See Fig. L97
Low Power Timer/Oscillator, CMOS Output



ECG955S 8-Pin SIP See Fig. L35
Timer/Oscillator

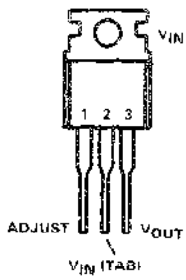


ECG956 TO-220 See Fig. L17
Pos VR, 1.2 to 37 V, 1.5 A



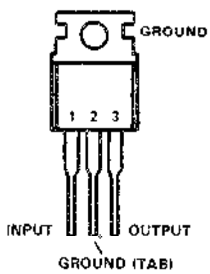
See Voltage Regulator Selector Guide Page 1-179

ECG957 TO-220 See Fig. L17
Neg VR, 1.2 to 37 V, 1.5 A



See Voltage Regulator Selector Guide Page 1-179

ECG958 TO-220 See Fig. L17
Pos VR, 18 V, 1 A
ECG960
Pos VR, 5 V, 1 A
ECG962
Pos VR, 6 V, 1 A
ECG964
Pos VR, 8 V, 1 A
ECG966
Pos VR, 12 V, 1 A
ECG968
Pos VR, 15 V, 1 A

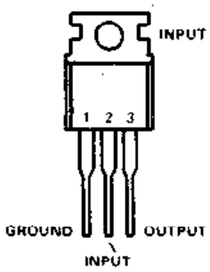


See Voltage Regulator Selector Guide Page 1-179

Package Outlines - See Page 1-285

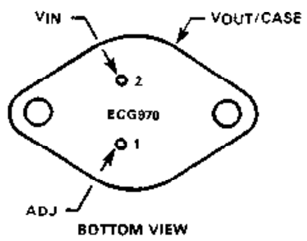
Linear IC and Module Circuits (cont'd)

ECG959 TO-220 See Fig. L17
Neg VR, 18 V, 1 A
ECG961
Neg VR, 5 V, 1 A
ECG963
Neg VR, 6 V, 1 A
ECG965
Neg VR, 8 V, 1 A
ECG967
Neg VR, 12 V, 1 A
ECG969
Neg VR, 15 V, 1 A



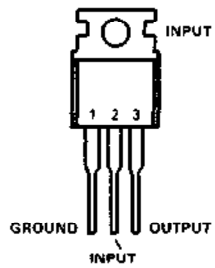
See Voltage Regulator Selector Guide Page 1-179

ECG970 TO-3 See Fig. L11
Pos VR, 1.2 to 33 V, 3 A



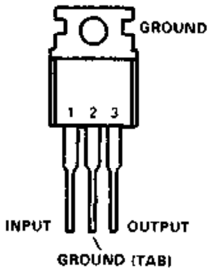
See Voltage Regulator Selector Guide Page 1-179

ECG971 TO-220 See Fig. L17
Neg VR, 24 V, 1 A



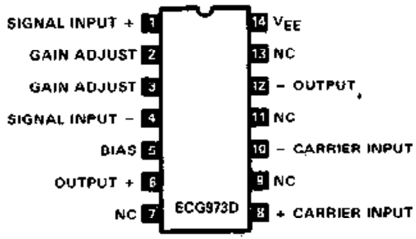
See Voltage Regulator Selector Guide Page 1-179

ECG972 TO-220 See Fig. L17
Pos VR, 24 V, 1 A

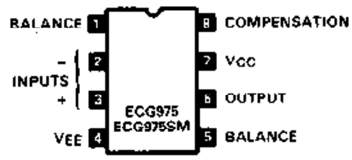


See Voltage Regulator Selector Guide Page 1-179

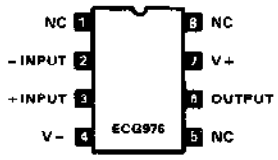
ECG973D 14-Pin DIP See Fig. L104
Balanced Mod/Demod



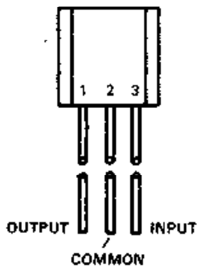
ECG975 8-Pin DIP See Fig. L98
ECG975SM 8-Pin SOIC See Fig. L159
Op Amp, Externally Compensated, Supply Voltage ±18 V Max



ECG976 8-Pin DIP See Fig. L97
Op Amp, Internally Compensated, Supply Voltage ±18 V Max

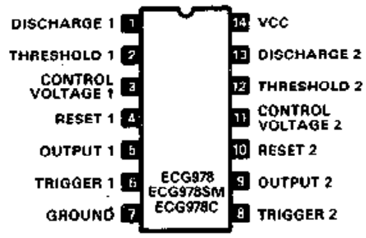


ECG977 TO-92 See Fig. L16
Pos VR, 5 V, 100 mA
ECG981
Pos VR, 8 V, 100 mA

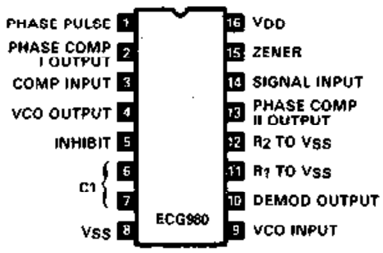


See Voltage Regulator Selector Guide Page 1-179

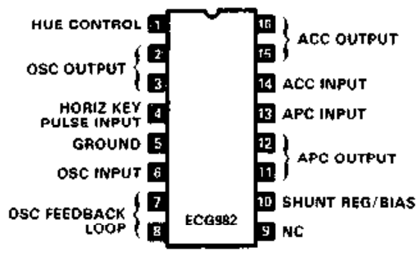
ECG978 14-Pin DIP See Fig. L104
ECG978SM 14-Pin SOIC See Fig. L160
Dual Timing Circuit
ECG978C 14-Pin DIP See Fig. L104
Dual Low Power Timer/Oscillator, CMOS Output



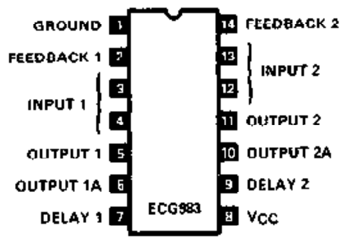
ECG980 16-Pin DIP See Fig. L111
CMOS Phase Locked Loop



ECG982 16-Pin DIP See Fig. L111
Subcarrier Regenerator ACC, APC Detector

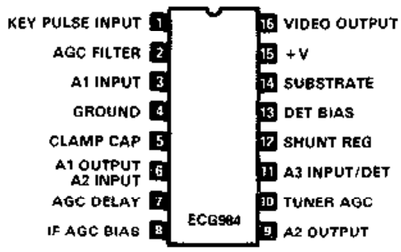


ECG983 14-Pin DIP See Fig. L104
Dual Audio Preamp

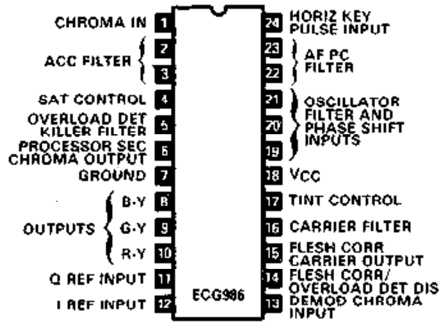


Package Outlines - See Page 1-285

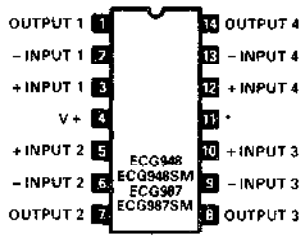
ECG984 16-Pin DIP See Fig. L111
TV Video IF, AFT (16-Pin DIP-Q See Alternate Fig. L113)



ECG986 24-Pin DIP See Fig. L122
Chroma Processor and Demod

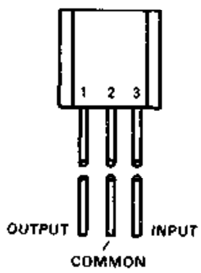


ECG987 14-Pin DIP See Fig. L104
ECG987SM 14-Pin SOIC See Fig. L160
Quad Op Amp



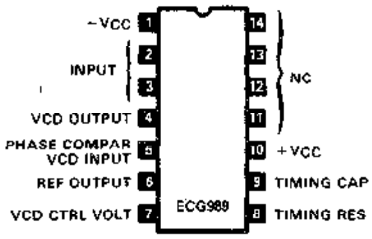
*ECG987, 987SM - Single Supply, Pin 11 = GND

ECG988 TO-92 See Fig. L16
Pos VR, 6.2 V, 100 mA

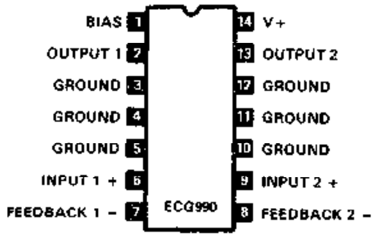


See Voltage Regulator Selector Guide Page 1-179

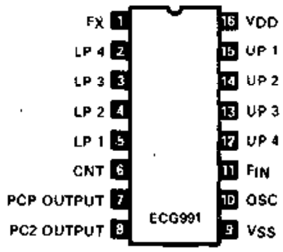
ECG989 14-Pin DIP See Fig. L104
PLL, Gen Purpose



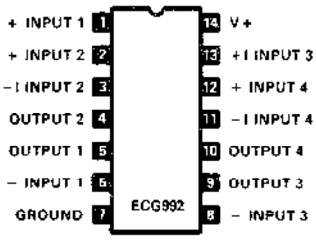
ECG990 14-Pin DIP-W See Fig. L106
Dual AF PO, 2 W



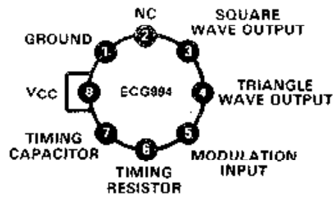
ECG991 16-Pin DIP See Fig. L112
CB PLL, Freq Synthesizer



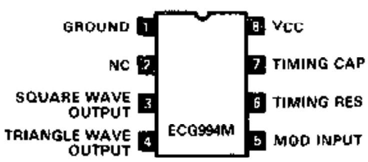
ECG992 14-Pin DIP See Fig. L104
4 Independent Amps, V+ = +32 V Max



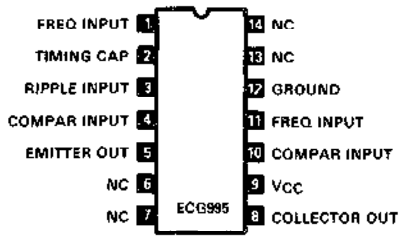
ECG994 8-Pin Can See Fig. L3
General Purpose Voltage Controlled Oscillator, Function Generator



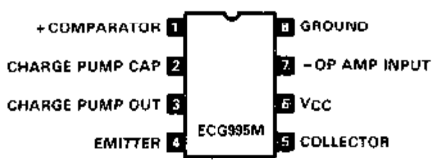
ECG994M 8-Pin DIP See Fig. L97
General Purpose Voltage Controlled Oscillator, Function Generator



ECG995 14-Pin DIP See Fig. L104
Frequency to Voltage Converter

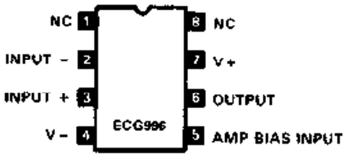


ECG995M 8-Pin DIP See Fig. L97
Frequency to Voltage Converter, V_{CC} = 12 V Typ

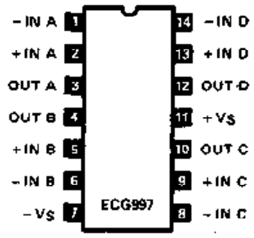


Package Outlines - See Page 1-285

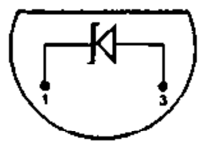
ECG996 8-Pin DIP See Fig. L97
Op Amp, V = ±15 V Typ



ECG997 14-Pin DIP See Fig. L104
Quad Op Amp, V_S = ±15 V Typ

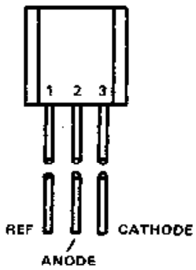


ECG998 TO-92 See Fig. L16A
Precision 1.2 V Voltage Reference

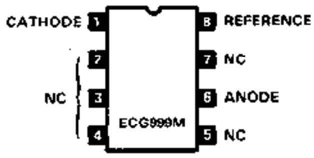


(BOTTOM VIEW)

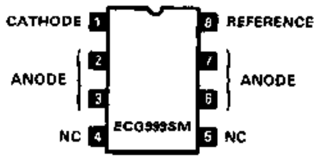
ECG999 TO-92 See Fig. L16
Adjustable Precision Shunt Regulator, VREF = 2.5 V, ADJ = VREF to 36 V



ECG999M 8-Pin DIP See Fig. L97
Adjustable Precision Shunt Regulator, VREF = 2.5 V, ADJ = VREF to 36 V

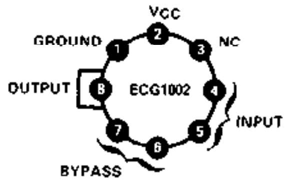


ECG999SM 8-Pin SOIC See Fig. L159
Adjustable Precision Shunt Regulator, VREF = 2.5 V, ADJ = VREF to 36 V

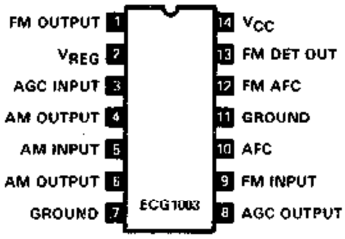


Package Outlines - See Page 1-285

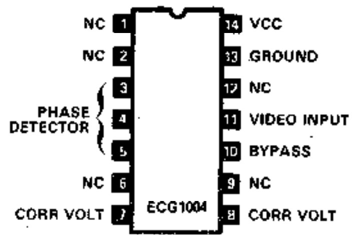
1002 8-Pin Can See Fig. L3
M/TV IF Amp



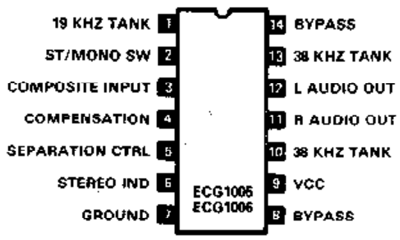
ECG1003 14-Pin DIP See Fig. L104
FM/AM IF Amp



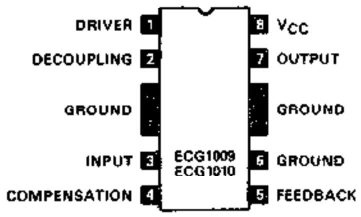
ECG1004 14-Pin DIP See Fig. L105
AFT System for TV



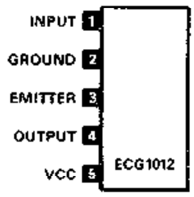
ECG1005, ECG1006 14-Pin DIP See Fig. L104
FM Stereo Demod, V_{CC} = 6 V Typ



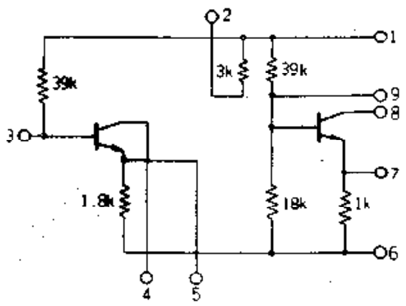
ECG1009 8-Pin DIP-W See Fig. L127
1 W AF Amp
ECG1010
2 W AF Amp



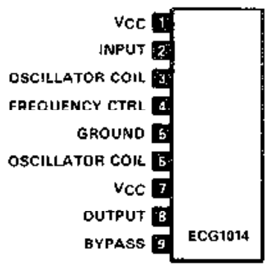
ECG1012 5-Pin SIP See Fig. L20
Mod-Hybrid, CB Osc/AM IF, V_{CC} = 3.2 V Typ



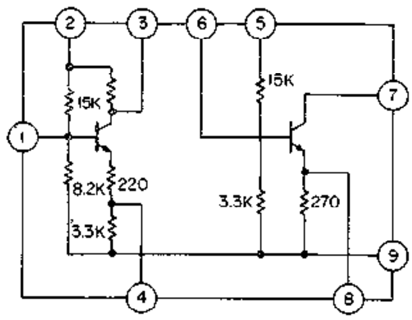
ECG1013 9-Pin ZIL See Fig. L37
Mod-Hybrid, AM IF Amp/AF Preamp



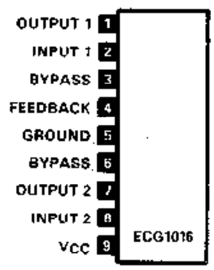
ECG1014 9-Pin ZIL See Fig. L38
Mod-Hybrid, RF Amp/Osc of FM Wireless Mic



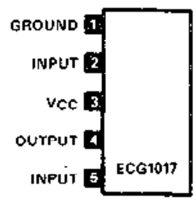
ECG1015 9-Pin ZIL See Fig. L37
Mod-Hybrid, Lo-Noise AF Preamp



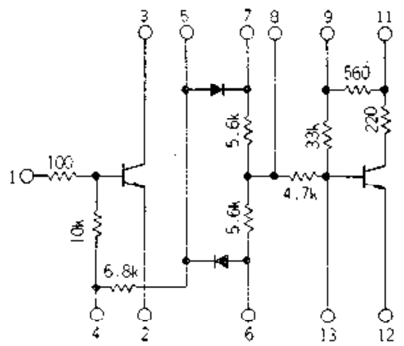
ECG1016 9-Pin ZIL See Fig. L37
Mod-Hybrid, AF Preamp



ECG1017 5-Pin ZIL See Fig. L21
Mod-Hybrid, AF Amp for Wireless Mic

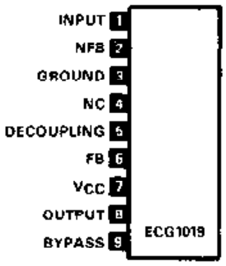


ECG1018 13-Pin ZIL See Fig. L44
Mod-Hybrid, Hor Osc/AFC

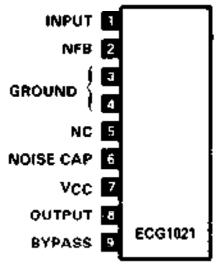


Package Outlines - See Page 1-285

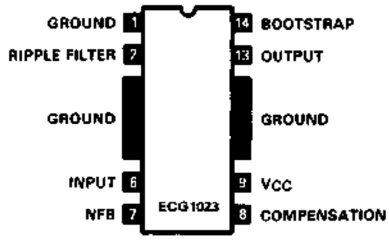
ECG1019 9-Pin ZIL See Fig. L37
Mod-Hybrid, Lo-Noise Audio Equalizing Amp



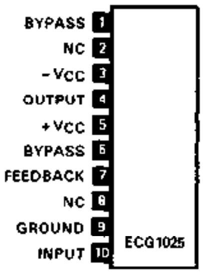
ECG1021 9-Pin ZIL See Fig. L37
Mod-Hybrid, Lo-Noise Audio Equalizing Amp, V_{CC} = 9 V



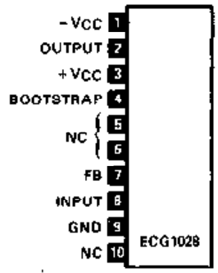
ECG1023 14-Pin DIP-W See Fig. L134
4 W Audio Amp



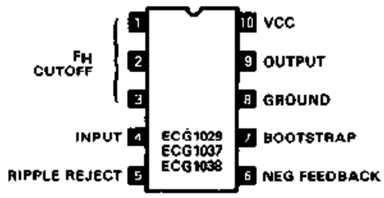
ECG1025 10-Pin SIP-M See Fig. L65
Mod-Audio 10 W Min Pwr Amp



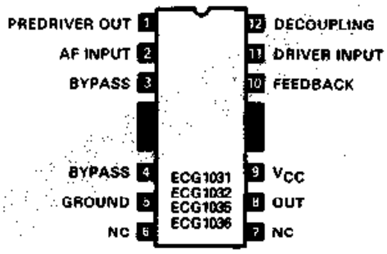
ECG1028 10-Pin SIP-M See Fig. L66
Mod-Hybrid 20 W Min Audio Amp



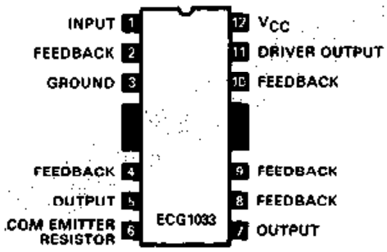
ECG1029 10-Pin DIP-HS See Fig. L155
3.5 W Audio Amp, V_{CC} = 13.2 V Typ



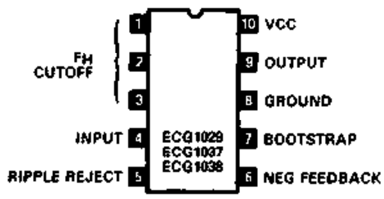
ECG1031 12-Pin DIP-W See Fig. L129
0.5 W Audio Amp
ECG1032, ECG1035
1 W Audio Amp
ECG1036
0.7 W Audio Amp



ECG1033 12-Pin DIP-W See Fig. L129
1 W Audio Amp

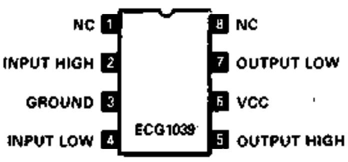


ECG1037 10-Pin DIP-HS See Fig. L155
5.5 W Audio Amp, V_{CC} = 13.2 V Typ
ECG1038*
3.5 W Audio Amp, V_{CC} = 13.2 V Typ

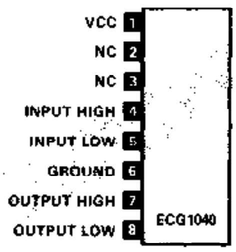


*DISCONTINUED

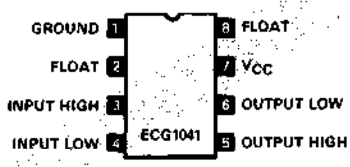
ECG1039 8-Pin DIP See Fig. L97
FM IF Amp



ECG1040 8-Pin SIP See Fig. L34
Mod-FM IF Amp



ECG1041 8-Pin DIP See Fig. L97
IF Amp



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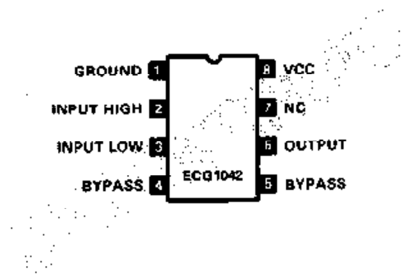
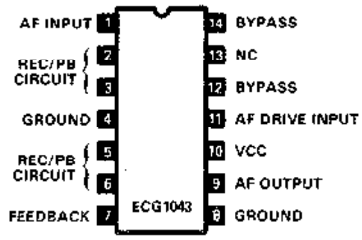
Linear IC and Module Circuits (cont'd)

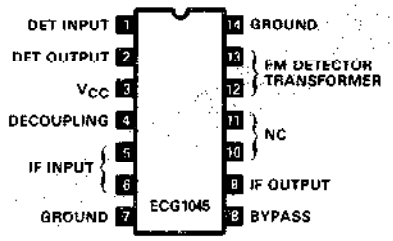
ECG1042 8-Pin DIP See Fig. L97
3 Stage FM IF Amp



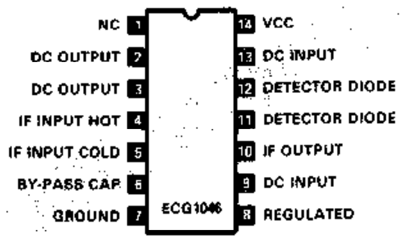
ECG1043 14-Pin DIP See Fig. L104
Audio Preamp and 1 W Audio Output



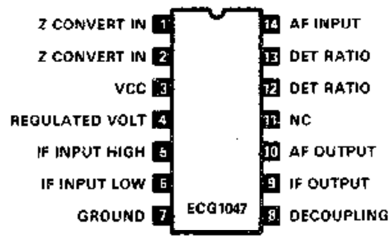
ECG1045 14-Pin DIP See Fig. L104
FM/TV Sound IF Detector/Amp



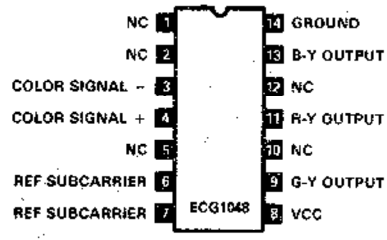
ECG1046 14-Pin DIP See Fig. L104
TV AFT



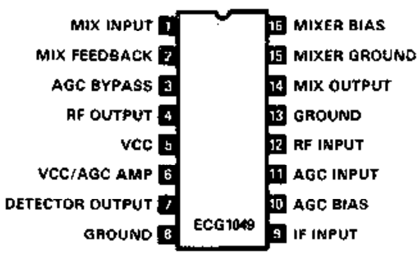
ECG1047 14-Pin DIP See Fig. L104
TV Sound IF/FM Det/AF Preamp



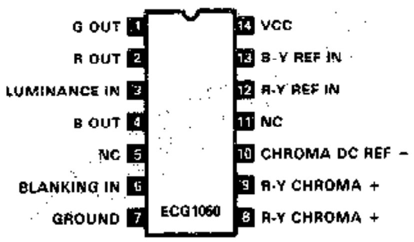
ECG1048 14-Pin DIP-ET See Fig. L145
Chroma Demod



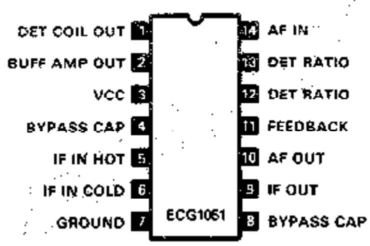
ECG1049 16-Pin DIP See Fig. L112
AM Radio Tuner with RF Amp,
V_{CC} = 10 V Typ



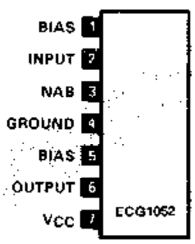
ECG1050 14-Pin DIP-ET See Fig. L145
Chroma Demod



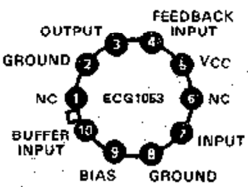
ECG1051 14-Pin DIP See Fig. L104
TV Sound IF/FM Det/AF Preamp



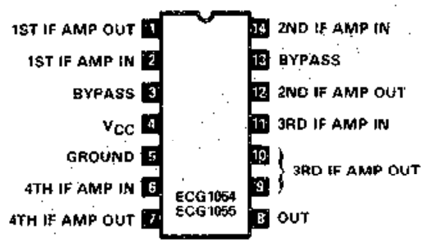
ECG1052 7-Pin SIP See Fig. L25
Mod-Lo-Noise Audio Preamp and Equalizer



ECG1053 10-Pin Can See Fig. L8
Lo-Noise/Hi-Gain Audio Preamp



ECG1054, ECG1055 14-Pin DIP See Fig. L104
AM/FM IF Amp



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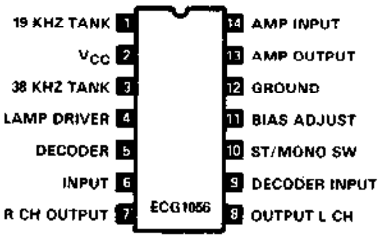
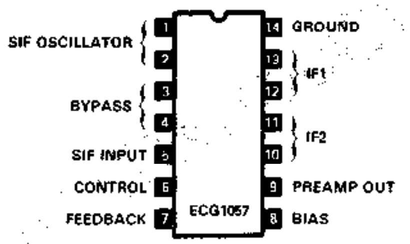
Linear IC and Module Circuits (cont'd)

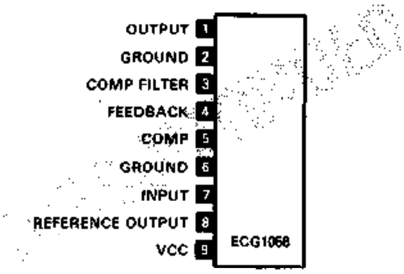
ECG1056 14-Pin DIP See Fig. L104
FM Stereo Demod



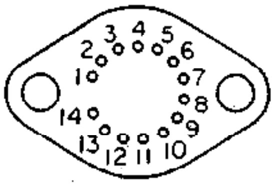
ECG1057 14-Pin DIP See Fig. L104
FM IF Amp/Det/AF Preamp



ECG1058 9-Pin SIP See Fig. L51
Audio Preamp and 4.4 W Pwr Amp, V_{CC} = 13 V Typ

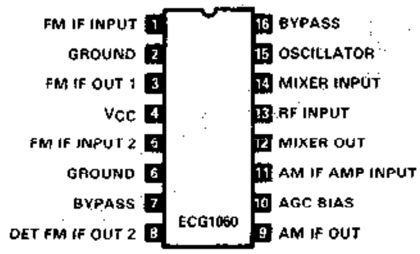


ECG1059 TO-3, 14-Pin See Fig. L15
AF Pwr Driver, V_{CC} = ±16 V Typ

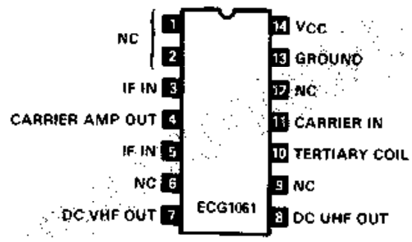


1. NEG DRIVE OUT
2. OUT
3. POS DRIVE OUT
4. +VCC
5. BIAS CONTROL
6. BIAS CONTROL
7. DECOUPLING
8. RIPPLE FILTER
9. SIGNAL INPUT
10. NEG FEEDBACK
11. RIPPLE FILTER
12. POS FEEDBACK
13. PHASE COMP
14. −VCC, CASE

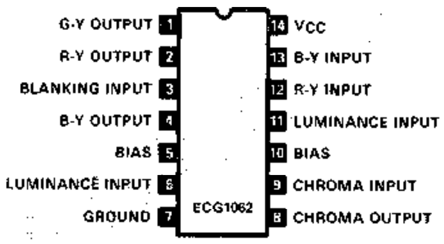
ECG1060 16-Pin DIP See Fig. L111
AM RF Amp/Mxr/Osc and AF/FM IF Amp



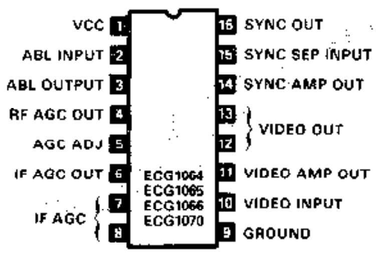
ECG1061 14-Pin DIP See Fig. L104
TV AFT



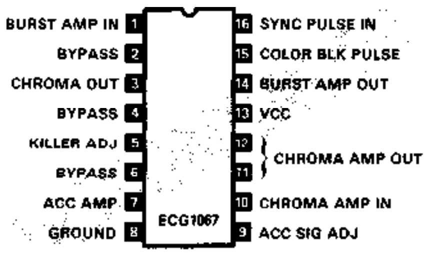
ECG1062 14-Pin DIP See Fig. L104
Chroma Demod



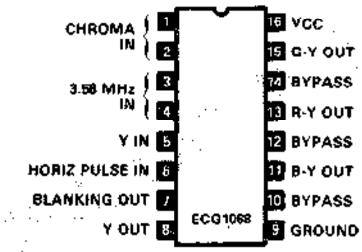
ECG1064, ECG1065, ECG1066, ECG1070 16-Pin DIP See Fig. L111
TV Vid Sig Processor



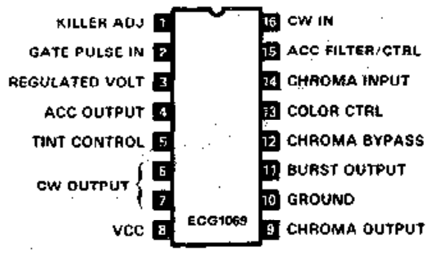
ECG1067 16-Pin DIP See Fig. L111
Chroma Sig Processor, V_{CC} = 12 V Typ



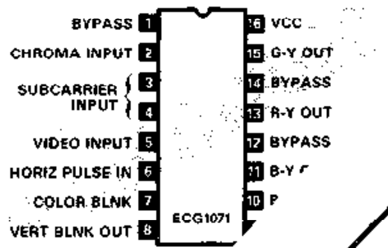
ECG1068 16-Pin DIP See Fig. L111
Chroma Demod, V_{CC} = 12 V Typ



ECG1069 16-Pin DIP See Fig. L112
Chroma Processor, V_{CC} = 12 V Typ



ECG1071 16-Pin DIP See Fig. L111
Chroma Demod, V_{CC} = 12 V Typ



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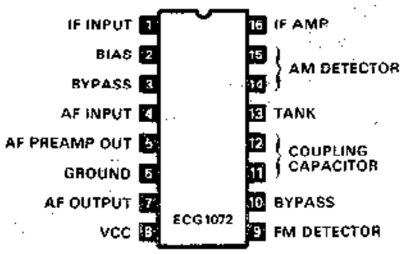
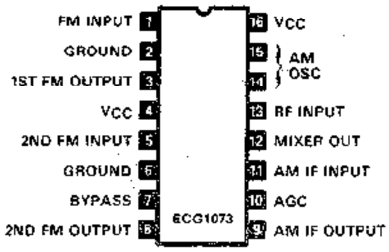
Linear IC and Module Circuits (cont'd)

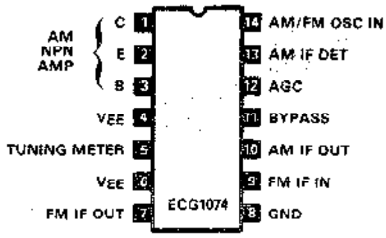
ECG1072 16-Pin DIP See Fig. L111
FM/AM IF Amp and AF Preamp,
V_{CC} = 5 V Typ



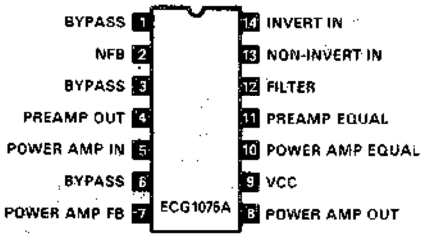
ECG1073 16-Pin DIP See Fig. L111
AM/RF Amp/Mxr/Osc and FM/AM IF Amp,
V_{CC} = 8 V Typ



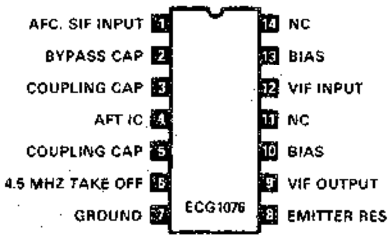
ECG1074 14-Pin DIP See Fig. L104
FM/AM IF Amp/AM Mxr Osc and Tuning
Meter Dr, VEE = 6 V Typ



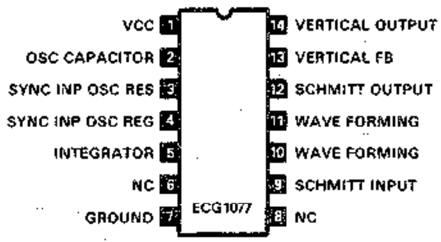
ECG1075A 14-Pin DIP-ET See Fig. L145
1.0 W Audio Amp, V_{CC} = 20 V Max



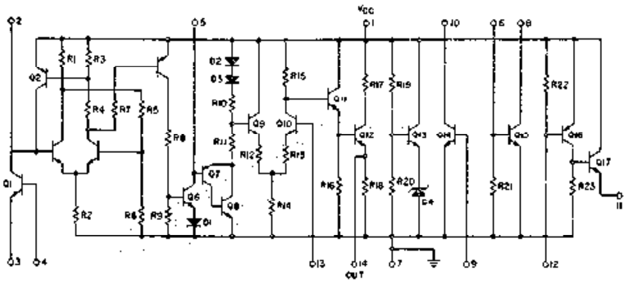
ECG1076 14-Pin DIP See Fig. L104
TV Vid IF, Output Detector, AFT, Take-Off Ckt



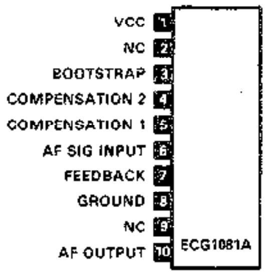
ECG1077 14-Pin DIP See Fig. L104
Vert Osc, AFC/Vert Dr



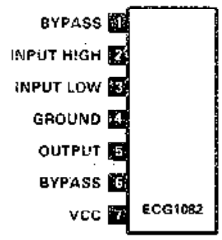
ECG1079 14-Pin DIP See Fig. L104
Vert Osc/Dr, V_{CC} = 7.7 V Typ



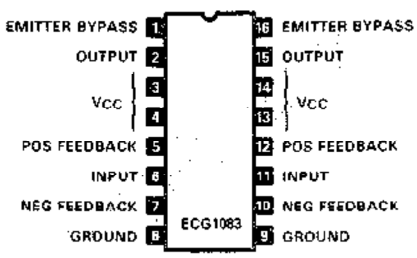
ECG1081A 10-Pin SIP-HS See Fig. L90
4.8 W Audio Amp



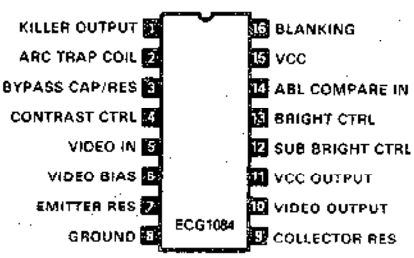
ECG1082 7-Pin SIP See Fig. L25
Mod-AF Equalizer and Preamp



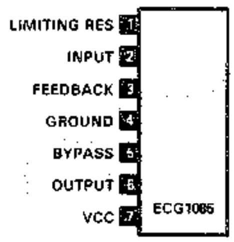
ECG1083 16-Pin (Dual 8) See Fig. L110
Mod-Hybrid, Dual Hi-Gain Audio Preamp,
V_{CC} = 12 VDC Typ



ECG1084 16-Pin DIP See Fig. L112
Vid Output, ARC, Brightness Lim, DC
Contrast Control



ECG1085 7-Pin SIP See Fig. L24
Lo-Noise Audio Preamp, V_{CC} = 35 V Typ



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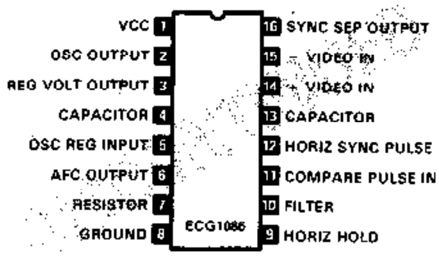
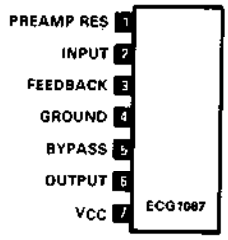
Linear IC and Module Circuits (cont'd)

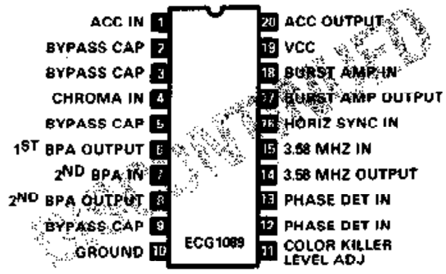
ECG1086 16-Pin DIP See Fig. L112
TV Sync Sep/Hor Osc/AFC



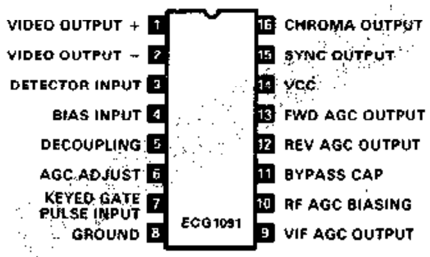
ECG1087 7-Pin SIP See Fig. L24
Mod-Gen Purp Lo-Noise/Hi-Gain Audio Preamp



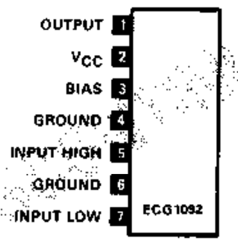
ECG1089 20-Pin DIP See Fig. L118
Chroma Sig Processor



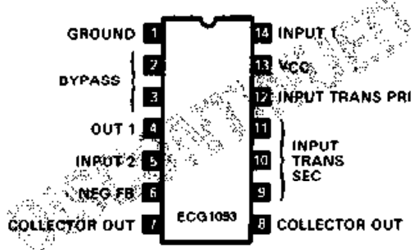
ECG1091 16-Pin DIP See Fig. L112
1st Vid Amp/Inv, AGC Gate/Amp, Color Take-Off



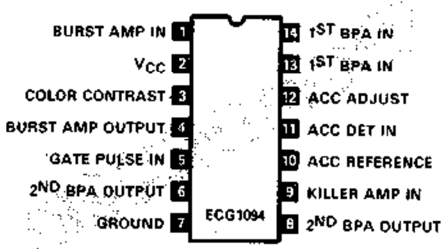
ECG1092 7-Pin SIP See Fig. L25
Mod-RF/IF Amp to 150 MHz *



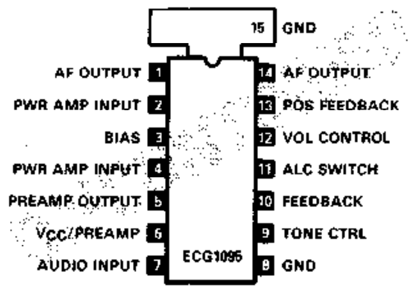
ECG1093 14-Pin DIP-ET See Fig. L145
Audio Preamp/1 W Pwr Output, V_{CC} = 6 V Typ



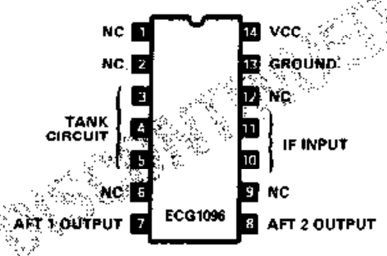
ECG1094 14-Pin DIP See Fig. L104
TV Chroma Amp



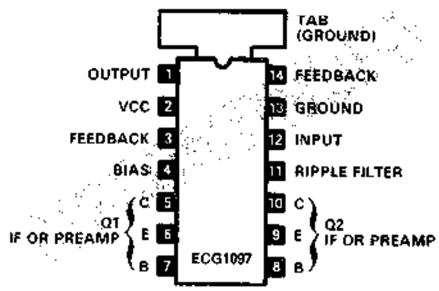
ECG1095 14-Pin DIP-ET See Fig. L143
Audio Preamp/Dr/1 W Pwr Output, V_{CC} = 7.5 V Typ



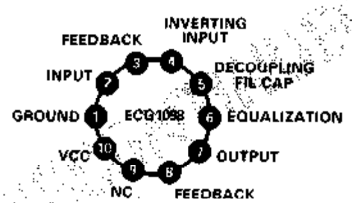
ECG1096 14-Pin DIP-ET See Fig. L143
TV AFT, V_{CC} = 18 V Typ



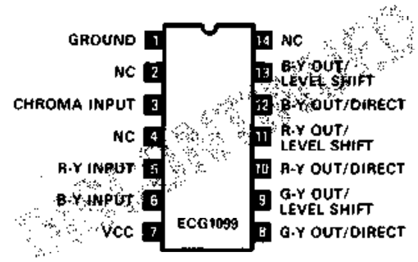
ECG1097 14-Pin DIP-ET See Fig. L143
1 W Audio Amp Plus 2 Transistors, V_{CC} = 9 V Typ



ECG1098 TO-3, 10-Pin See Fig. L14
5 W Audio Amp



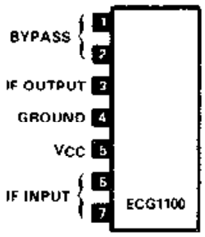
ECG1099 14-Pin DIP See Fig. L104
Chroma Demod, V_{CC} = 24 V Typ



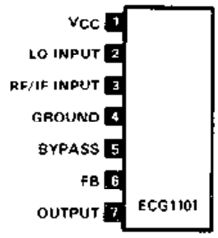
Package Outlines - See Page 1-285

N

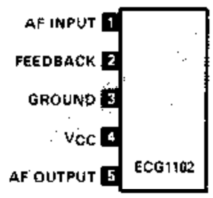
ECG1100 7-Pin SIP See Fig. L24
Mod-FM IF Amp



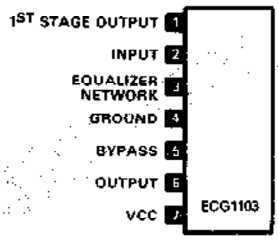
ECG1101 7-Pin SIP See Fig. L24
Mod-Gen Purp Amp, DC to 100 MHz



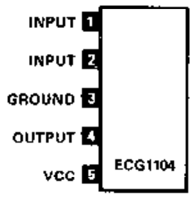
ECG1102 5-Pin SIP See Fig. L23
Mod-3 Stage Audio Amp/Dr, $V_{CC} = 12$ V Typ



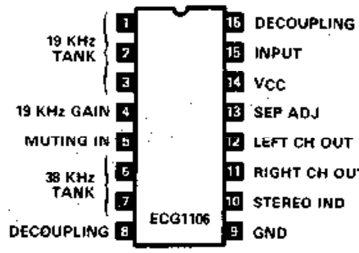
ECG1103 7-Pin SIP See Fig. L24
Mod-Gen Purp Audio Preamp/Voltage Amp, $V_{CC} = 8$ V Typ



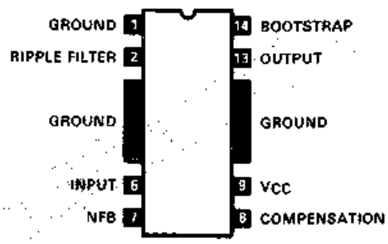
ECG1104 5-Pin SIP See Fig. L23
Mod-Hi-Freq Amp to 100 MHz, $V_{CC} = 15$ V Max



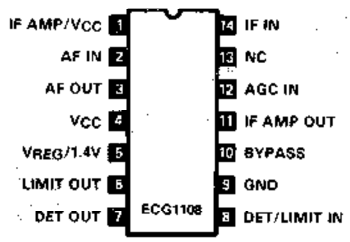
ECG1106 16-Pin DIP See Fig. L112
FM Stereo Demod, $V_{CC} = 5$ V Typ



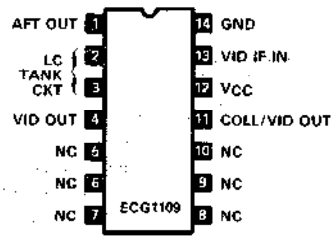
ECG1107 14-Pin DIP-W See Fig. L134
4.8 W Audio Amp



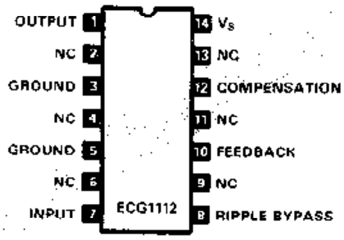
ECG1108 14-Pin DIP See Fig. L104
AM/FM IF Amp/Det/AF Amp, $V_{CC} = 5$ V



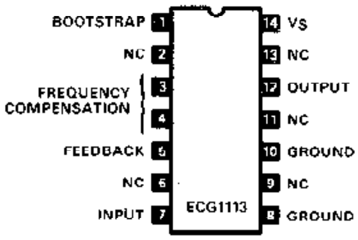
ECG1109 14-Pin DIP See Fig. L105
Lo-Level Vid Det, $V_{CC} = 20$ V



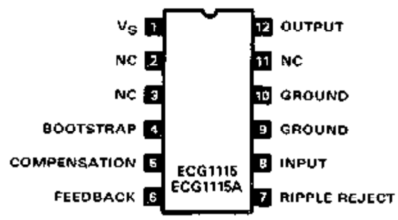
ECG1112 14-Pin DIP See Fig. L104
2.2 W Audio Amp, $V_S = 18$ V, $R_L = 16\ \Omega$



ECG1113 14-Pin DIP-Q See Fig. L107
2.1 W Audio Amp, $V_S = 15$ V Max, $R_L = 8\ \Omega$



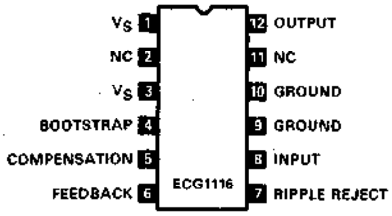
ECG1115 12-Pin DIP-W See Fig. L130
7 W Audio Amp



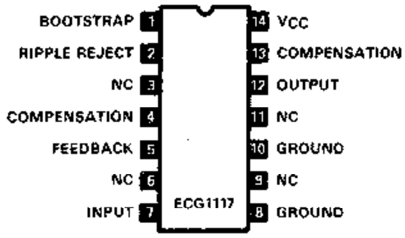
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

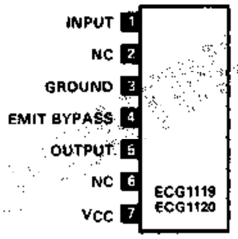
ECG1116 12-Pin DIP-QW See Fig. L131
5 W Audio Amp



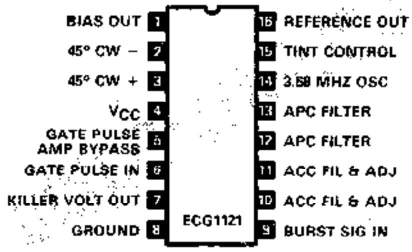
ECG1117 14-Pin DIP-Q See Fig. L107
2 W Audio Amp V_{CC} = 16 V Max



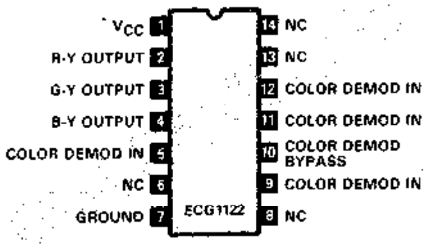
ECG1119, ECG1120 7-Pin SIP See Fig. L30
Mod-Hybrid, Audio Amp/Dr, V_{CC} = 12 V Typ



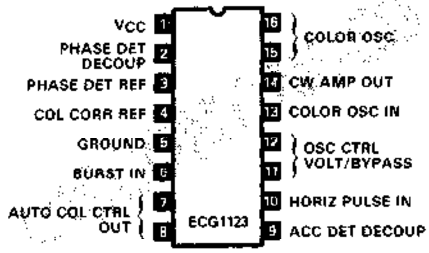
ECG1121 16-Pin DIP See Fig. L111
Chroma Sync System



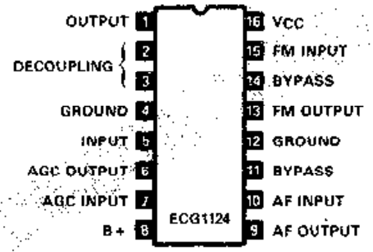
ECG1122 14-Pin DIP See Fig. L104
Chroma Demod



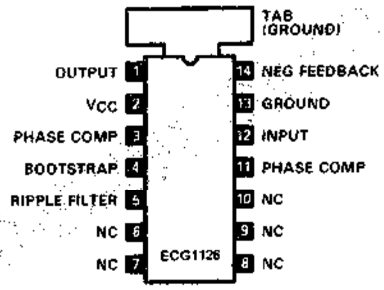
ECG1123 16-Pin DIP See Fig. L111
TV Subcarrier Generator, V_{CC} = 12 V Typ



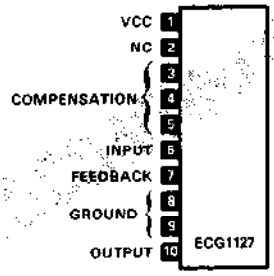
ECG1124 16-Pin DIP See Fig. L112
AM/FM IF Amp, V_{CC} = 5 V Typ



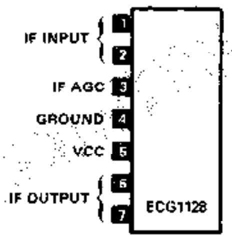
ECG1126 14-Pin DIP-ET See Fig. L143
1 W Audio Amp, V_{CC} = 9 V Typ



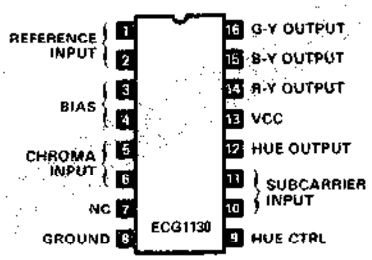
ECG1127 10-Pin SIP-HS See Fig. L90
4.5 W Audio Amp



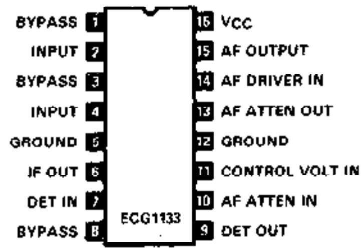
ECG1128 7-Pin SIP See Fig. L24
TV Vid IF



ECG1130 16-Pin DIP See Fig. L112
Chroma Demod/Matrix Hue Cntrl,
V_{CC} = 15 V Typ



ECG1133 16-Pin DIP See Fig. L112
TV Sound IF/Det, V_{CC} = 12 V Typ



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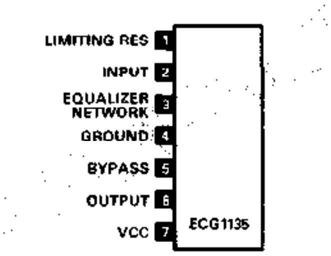
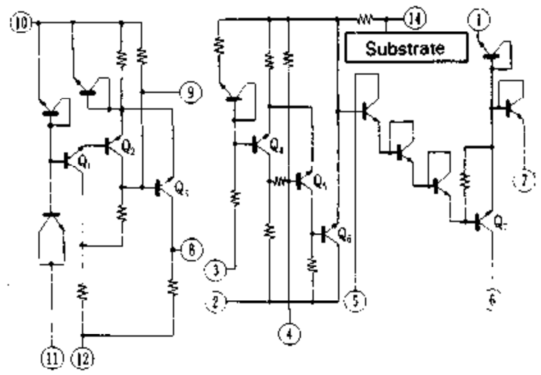
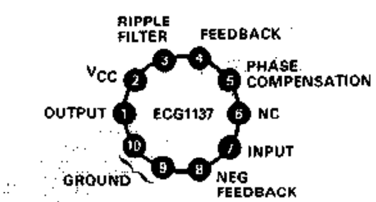
ECG1135 7-Pin SIP See Fig. L26
Hi-Gain Audio Preamp,
V_{CC} = 12 V Typ



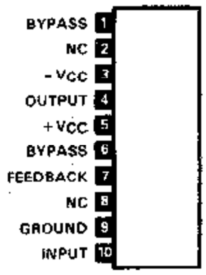
ECG1136 14-Pin DIP See Fig. L104
Battery Protect Ckt



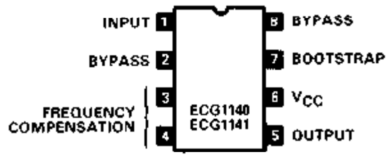
ECG1137 10-Pin Can See Fig. L8
1.3 W Audio Amp



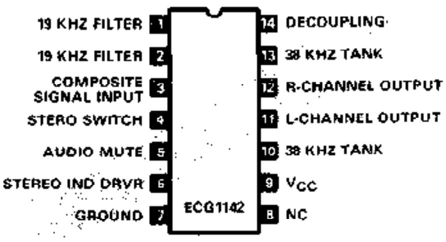
ECG1139 10-Pin SIP-M See Fig. L65
Mod-Audio 13 W Min Pwr Amp



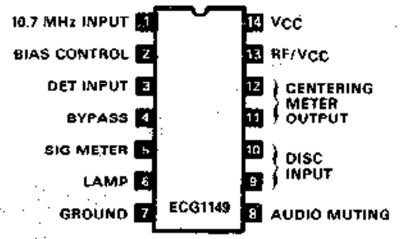
ECG1140 8-Pin DIP-ET See Fig. L137
2.0 W Audio Amp, V_{CC} = 13.2 V Typ
ECG1141
1.5 W Audio Amp, V_{CC} = 13.2 V Typ



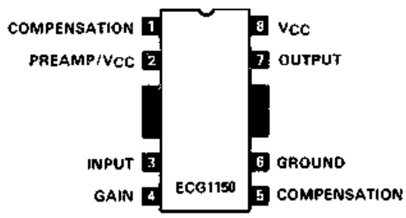
ECG1142 14-Pin DIP See Fig. L104
FM Multiplex Stereo Demodulator



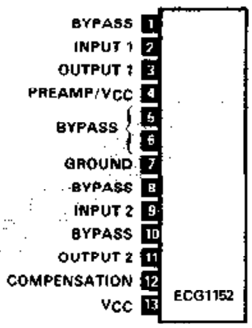
ECG1149 14-Pin DIP See Fig. L105
FM Tuning System and Indicator, V_{CC} = 12 V



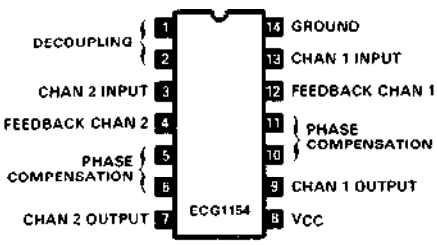
ECG1150 8-Pin DIP-W See Fig. L127
AF PO, 2.5 W, V_{CC} = 17 V Typ



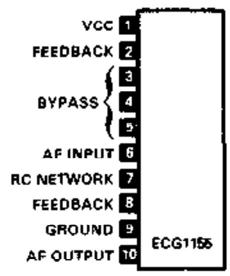
ECG1152 13-Pin ZIL See Fig. L44
Mod-AF Preamp, High Gain, V_{CC} = 15.5 V



ECG1154 14-Pin DIP-W See Fig. L133
AF PO, 2-Channel, 2 W/Channel,
V_{CC} = 14 V Typ



ECG1155 10-Pin SIP-HS See Fig. L85
AF PO, 5.8 W, V_{CC} = 18 V Max



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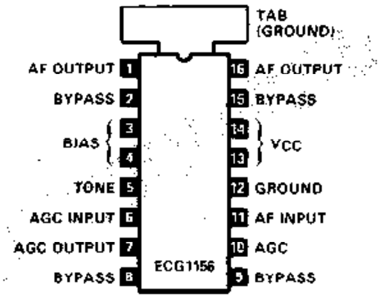
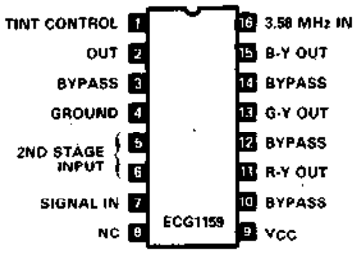
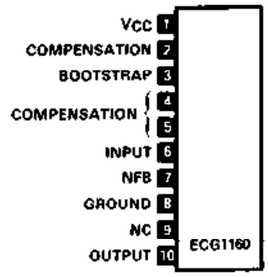
ECG1156 16-Pin DIP-ET See Fig. L150
AF PO, 2 W, V_{CC} = 9 V Typ



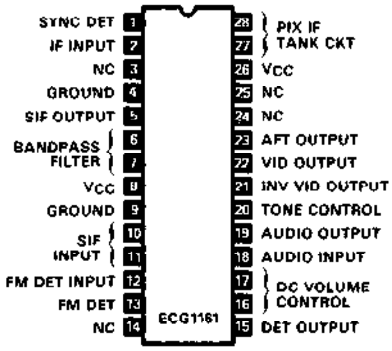
ECG1159 16-Pin DIP See Fig. L111
Color Demodulator



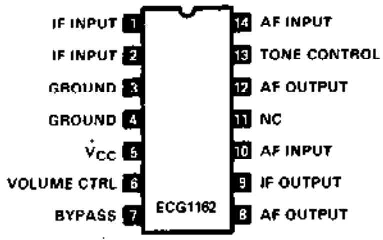
ECG1160 10-Pin SIP-HS See Fig. L90
AF PO, 5.2 W, V_{CC} = 13.2 V



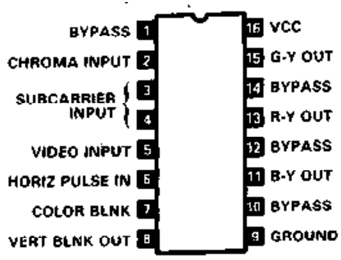
ECG1161 28-Pin DIP See Fig. L124
Video and Sound IF Combination
V_{CC} = 12 V Typ



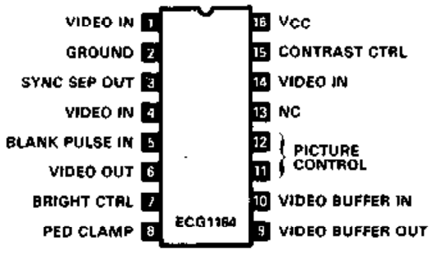
ECG1162 14-Pin DIP See Fig. L104
IF, Detector and Audio Preamp



ECG1163 16-Pin DIP See Fig. L111
TV Color Demodulator

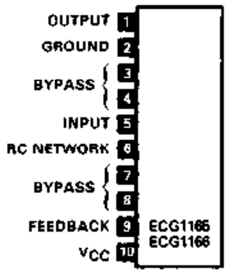


ECG1164 16-Pin DIP See Fig. L111
TV Video Sig Processing Circuit,
V_{CC} = 12 V Typ

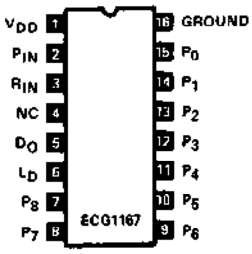


ECG1165 10-Pin SIP-HS See Fig. L87
Modulator/Audio Output, Stereo and CB,
4.5 W, V_{CC} = 13.2 V Typ

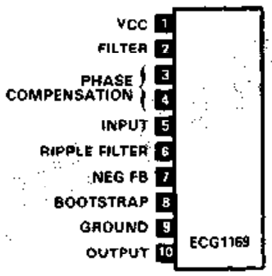
ECG1166
Modulator/Audio Output, Stereo and CB,
5.8 W, V_{CC} = 13.2 V Typ



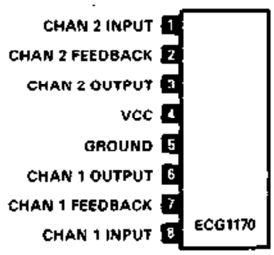
ECG1167 16-Pin DIP See Fig. L111
CMOS PLL Frequency Synthesizer



ECG1169 10-Pin SIP-HS See Fig. L83
Audio Output/Modulator, V_{CC} = 13.2 V



ECG1170 8-Pin SIP See Fig. L33
Audio Preamp (Dual)



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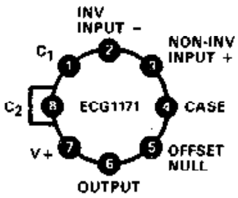
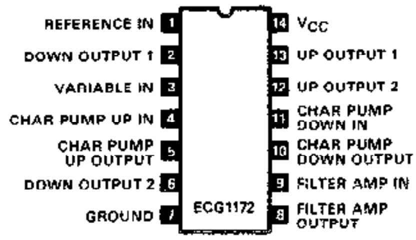
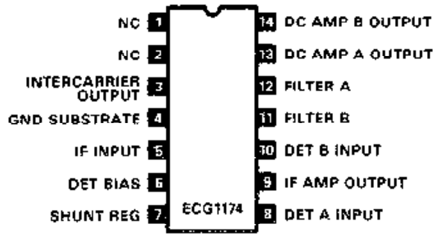
ECG1171 8-Pin Can See Fig. L3
Op Amp



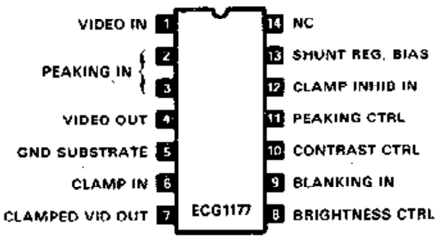
ECG1172 14-Pin DIP See Fig. L104
Phase Frequency Detector for PLL



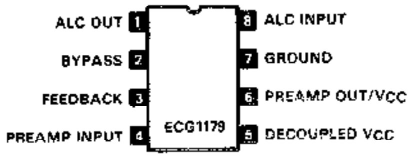
ECG1174 14-Pin DIP-Q See Fig. L107
TV Automatic Fine Tuning



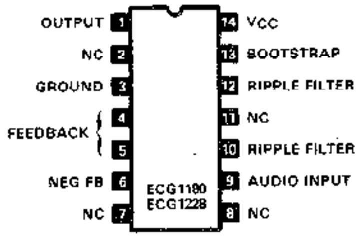
ECG1177 14-Pin DIP See Fig. L104
TV Luminance Processor



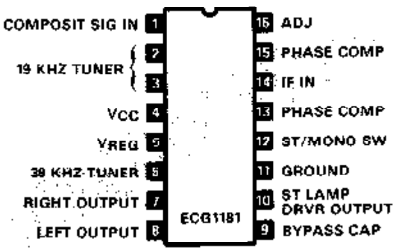
ECG1179 8-Pin DIP See Fig. L97
Audio Preamp, V_{CC} = 5.5 V Typ



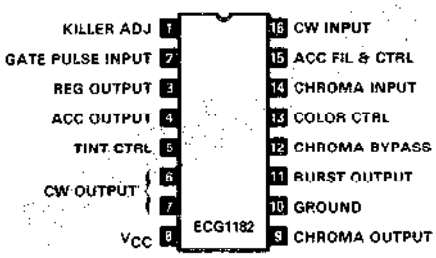
ECG1180 14-Pin DIP-ET See Fig. L144
Audio Pwr Output, 1.5 W, V_{CC} = 7.5 V Typ



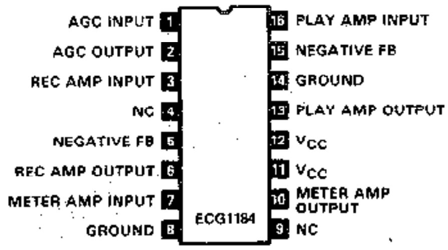
ECG1181 16-Pin DIP See Fig. L111
MPX Decoder, V_{CC} = 6 V Typ



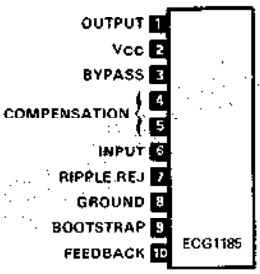
ECG1182 16-Pin DIP See Fig. L111
Chroma Sig Processor



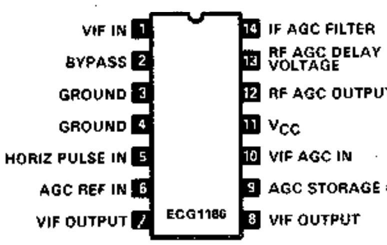
ECG1184 16-Pin DIP See Fig. L111
Audio Preamp



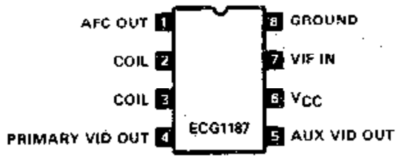
ECG1185 10-Pin SIP-HS See Fig. L90
3.5 W Audio Output, V_{CC} = 18 V, R_L = 8 Ω



ECG1186 14-Pin DIP See Fig. L104
Vid IF and Keyed AGC



ECG1187 8-Pin DIP See Fig. L97
Vid Det/Amp



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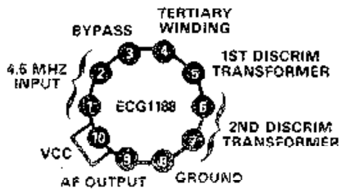
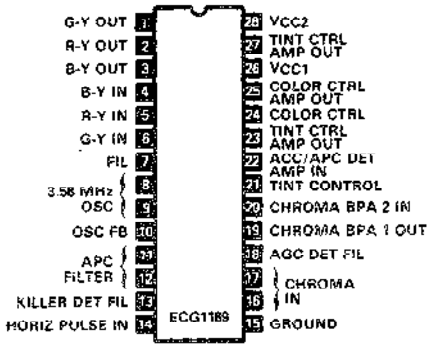
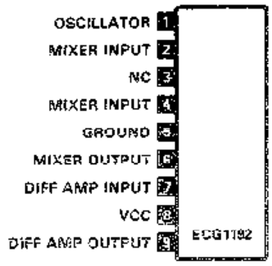
ECG1188 10-Pin Can See Fig. L7
TV Sound IF Amp and Disc



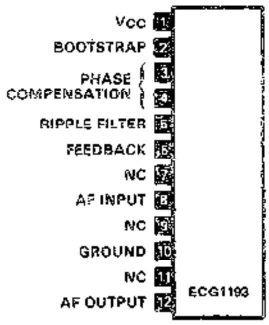
ECG1189 28-Pin DIP See Fig. L124
TV Chroma Processor, $V_{CC}1$ = 12 V Typ, $V_{CC}2$ = 18 V Typ



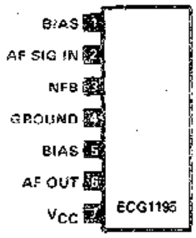
ECG1192 9-Pin SIP See Fig. L39
CB Voltage Controlled Oscillator and Mixer



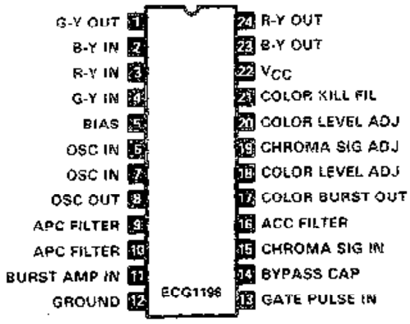
ECG1193 12-Pin SIP-HS See Fig. L91
4.5 W Audio Output, V_{CC} = 13.2 V, R_L = 4 Ω



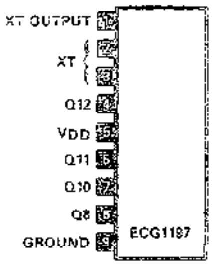
ECG1195 7-Pin SIP See Fig. L25
Lo-Noise Audio Preamp



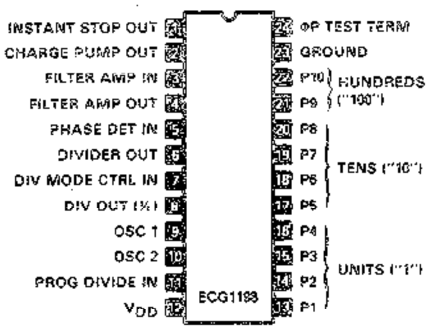
ECG1196 24-Pin DIP See Fig. L122
Chroma Processor and Demodulator



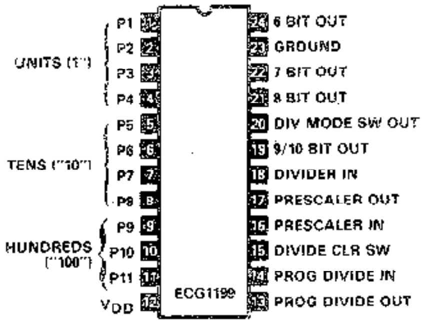
ECG1197 9-Pin SIP See Fig. L39
CMOS Freq Divider and Amp



ECG1198 24-Pin DIP See Fig. L122
CMOS Frequency Divider

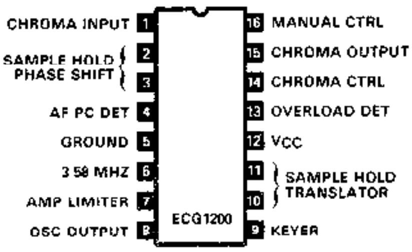


ECG1199 24-Pin DIP See Fig. L122
CMOS Frequency Divider



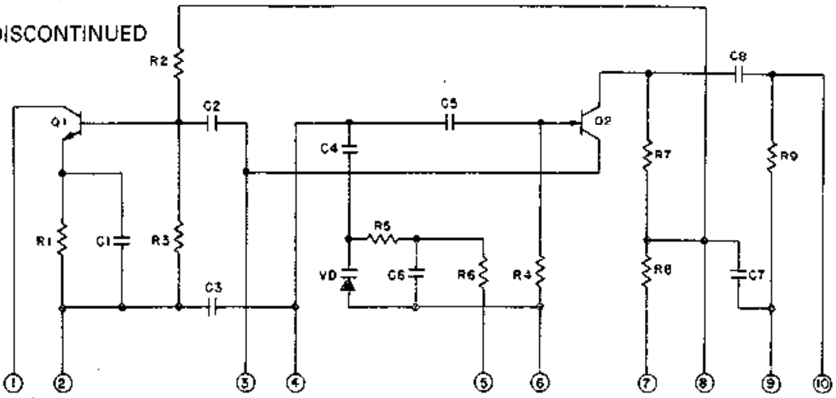
Package Outlines - See Page 1-285

ECG1200 16-Pin DIP See Fig. L112
TV Chroma Processor, V_{CC} = 11.2 V Typ

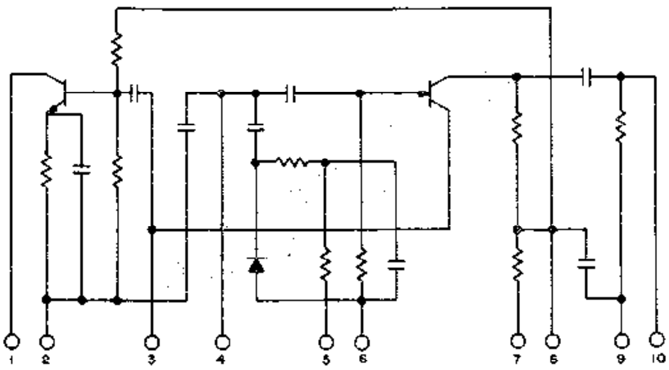


ECG1201, ECG1204* 10-Pin SIP See Fig. L43
CB Voltage Controlled Oscillator

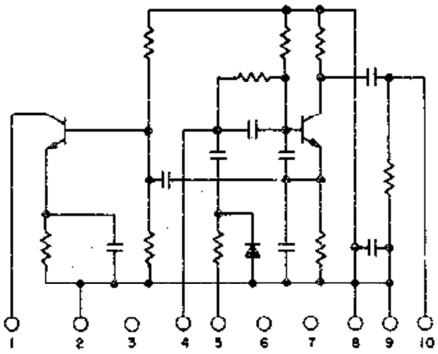
* DISCONTINUED



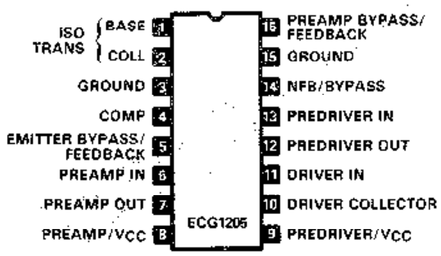
ECG1202 10-Pin SIP See Fig. L43
CB Voltage Controlled Oscillator



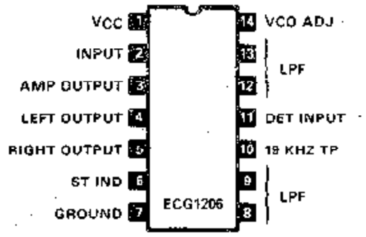
ECG1203 10-Pin SIP See Fig. L43
CB Voltage Controlled Oscillator



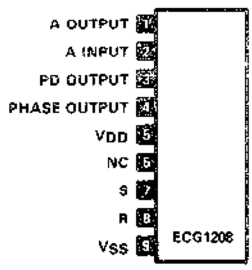
ECG1205 16-Pin DIP See Fig. L112
Tape Recorder Preamp, V_{CC} = 5 V



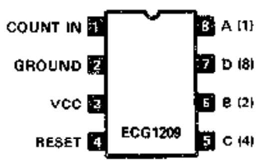
ECG1206 14-Pin DIP See Fig. L105
PLL Stereo Decoder



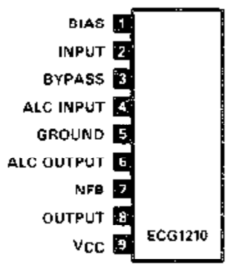
ECG1208 9-Pin SIP See Fig. L39
CMOS Phase Comparator



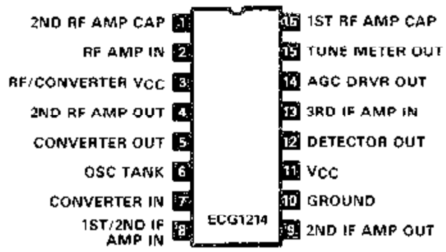
ECG1209 8-Pin DIP See Fig. L97
4-Bit Binary Counter



ECG1210 9-Pin SIP See Fig. L40
Audio Preamp

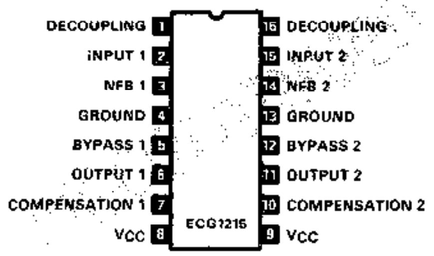


ECG1214 16-Pin DIP See Fig. L111
AM Tuner, RF Conv, IF, Det, AGC,
V_{CC} = 12 V Typ

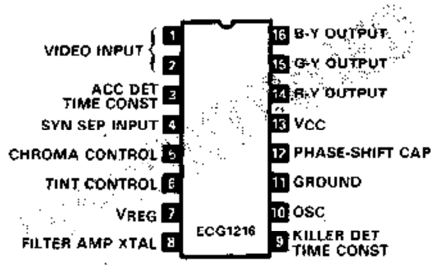


Package Outlines - See Page 1-285

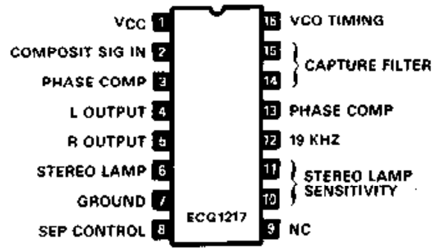
ECG1215 16-Pin DIP See Fig. L111
Stereo Equalizer Amp, V_{CC} = 9 V



ECG1216 16-Pin DIP See Fig. L111
Chroma Demodulator, V_{CC} = 18 V Typ

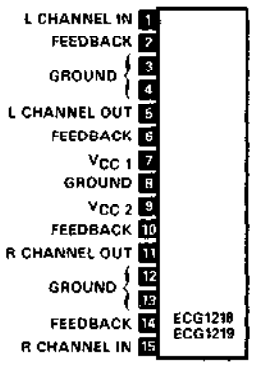


ECG1217 16-Pin DIP See Fig. L111
PLL FM Stereo Decoder, V_{CC} = 12 V Typ

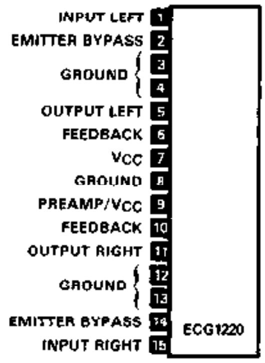


ECG1218 15-Pin SIP-M See Fig. L69
Dual Channel AF Pwr Amp, 7 W/Channel, V_{CC} = 27 V Typ

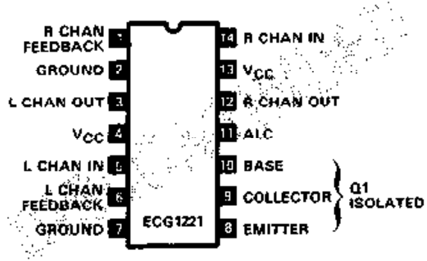
ECG1219 15-Pin SIP-M See Fig. L70
Dual Channel AF Pwr Amp, 15 W/Channel, V_{CC} = 39 V Typ



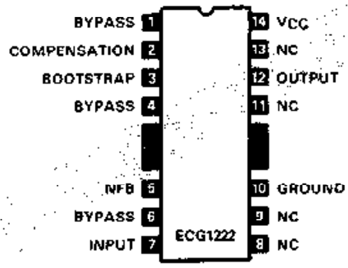
ECG1220 15-Pin SIP-M See Fig. L69
Mod Dual AF PO 6 W/Channel, V_{CC} = 24 V, R_L = 8 Ω



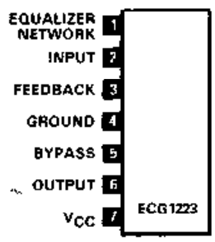
ECG1221 14-Pin DIP See Fig. L104
Stereo Preamp



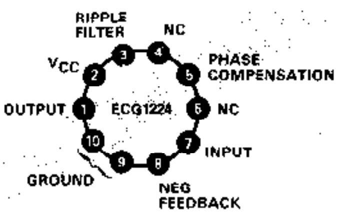
ECG1222 14-Pin DIP-W See Fig. L133
AF Pwr Amp, 4.2 W, V_{CC} = 13.2 V, R_L = 4 Ω



ECG1223 7-Pin SIP See Fig. L27
Lo-Noise Preamp

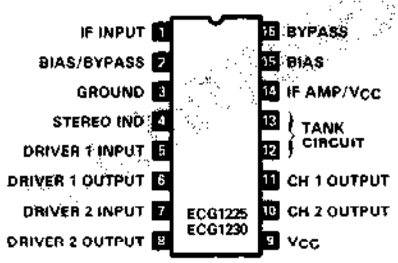


ECG1224 10-Pin Can See Fig. L8
AF Pwr Amp, 1.55 W

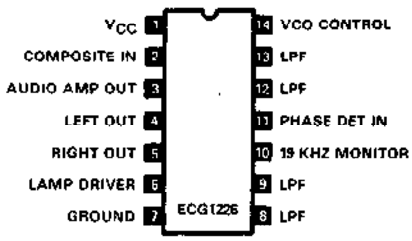


ECG1225 16-Pin DIP See Fig. L111
FM Stereo Multiplex Demodulator, V_{CC} = 16 V

ECG1230
FM Stereo Multiplex Demodulator, V_{CC} = 9 V



ECG1226 14-Pin DIP See Fig. L104
FM Stereo Multiplex Demodulator

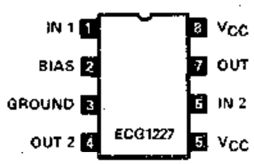


Package Outlines - See Page 1-285

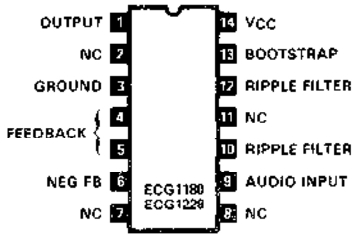
N

Linear IC and Module Circuits (cont'd)

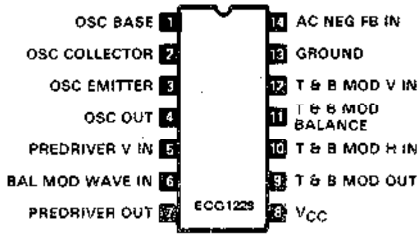
ECG1227 8-Pin DIP See Fig. L97
FM IF Amp



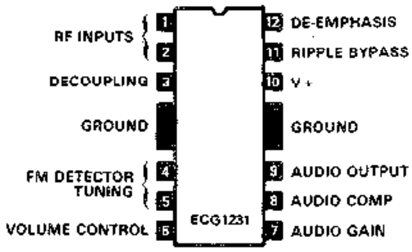
ECG1228 14-Pin DIP-ET See Fig. L144
AF Pwr Amp, 2.1 W, V_{CC} = 9 V Typ



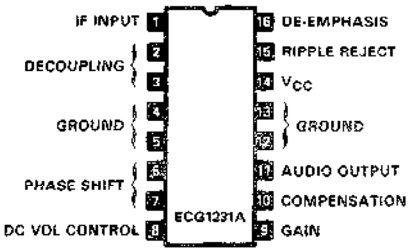
ECG1229 14-Pin DIP See Fig. L104
TV Vert Defl and Pincushion Correction



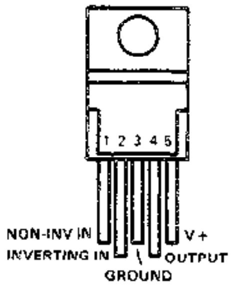
ECG1231 12-Pin DIP-QW See Fig. L131
TV Sound IF and Audio Output



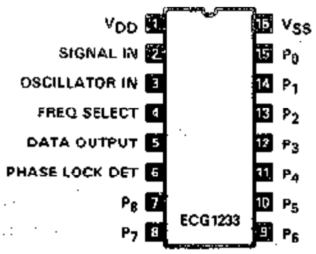
ECG1231A 16-Pin DIP See Fig. L111
TV Sound IF and Audio Output



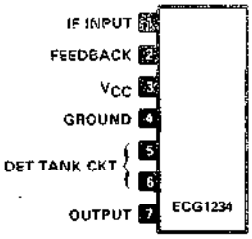
ECG1232 TO-220, 5-Pin See Fig. L19
AF Pwr Amp, 8 W



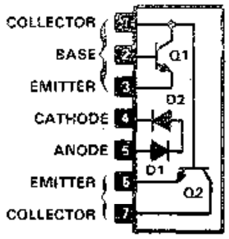
ECG1233 16-Pin DIP See Fig. L111
CB PLL Freq Synthesizer



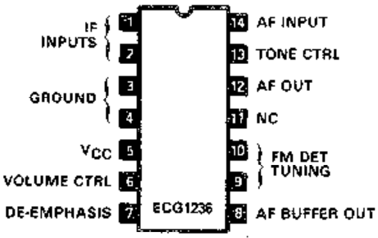
ECG1234 7-Pin SIP See Fig. L24
FM IF and TV Sound IF Amp



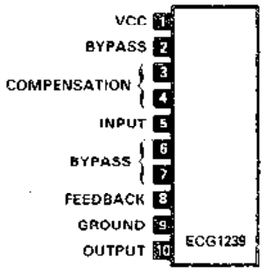
ECG1235 7-Pin SIP See Fig. L24
Squelch Amplifier



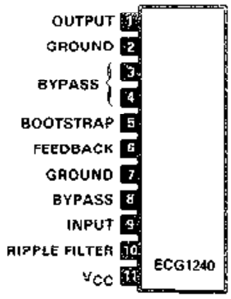
ECG1236 14-Pin DIP See Fig. L104
TV/FM Sound IF



ECG1239 10-Pin SIP-HS See Fig. L83
Audio Output and CB Mod



ECG1240 11-Pin SIP See Fig. L54
5.5 W Audio Output and CB Mod



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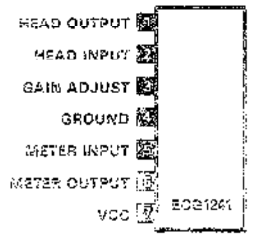
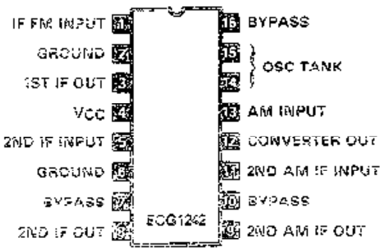
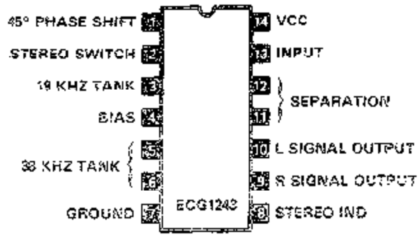
ECG1241 7-Pin SIP See Fig. L26
Head Coil and Meter Driver, V_{CC} = 5 V Typ



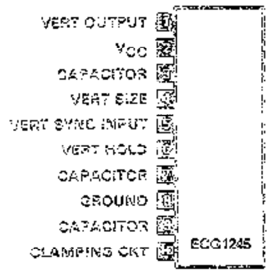
ECG1242 16-Pin DIP See Fig. L111
AM/FM IF and AM Converter, V_{CC} = 8 V Typ



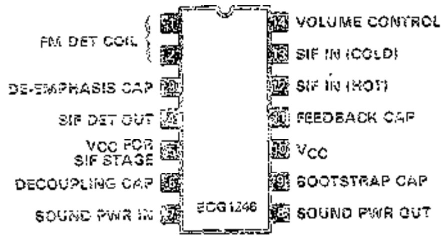
ECG1243 14-Pin DIP See Fig. L105
FM Stereo Multiplex Decoder, V_{CC} = 12 V Typ



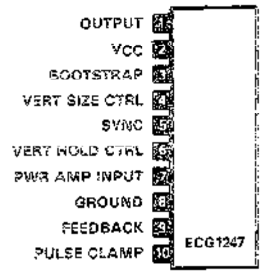
ECG1245 10-Pin SIP-HS See Fig. L89
Vertical Deflection (Alternate Fig. L90)



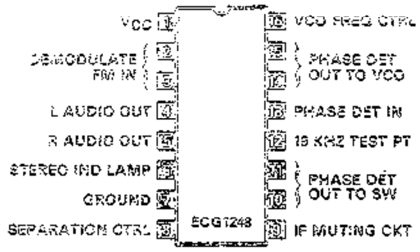
ECG1246 14-Pin DIP-ET See Fig. L145
TV Sound IF, Det AF PO



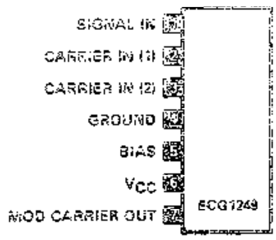
ECG1247 10-Pin SIP See Fig. L43
Voltage Controlled Osc, V_{CC} = 12 V



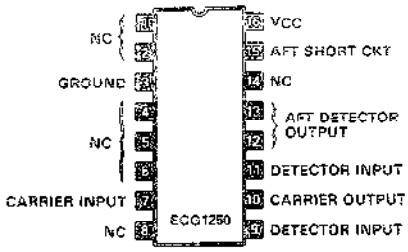
ECG1248 16-Pin DIP See Fig. L112
FM Stereo Demod



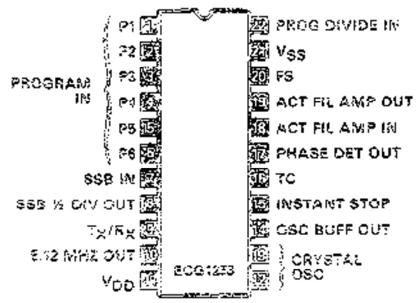
ECG1249 7-Pin SIP See Fig. L27
Balanced Modulator, V_{CC} = 12 V Typ



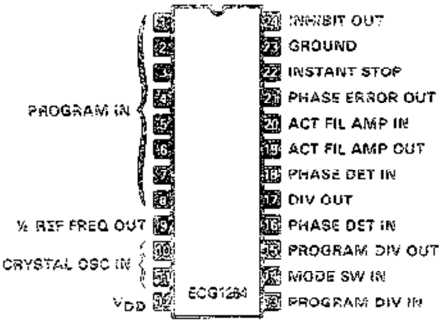
ECG1250 16-Pin DIP See Fig. L111
TV AFT, V_{CC} = 12 V Typ



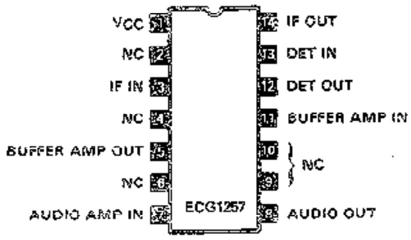
ECG1253 22-Pin DIP See Fig. L121
CMOS-PLL Freq Synthesizer, CB



ECG1254 24-Pin DIP See Fig. L122
CMOS-PLL Freq Synthesizer, CB



ECG1257 14-Pin DIP-ET See Fig. L145
FM IF, Det, AF PO, V_{CC} = 12 V Typ



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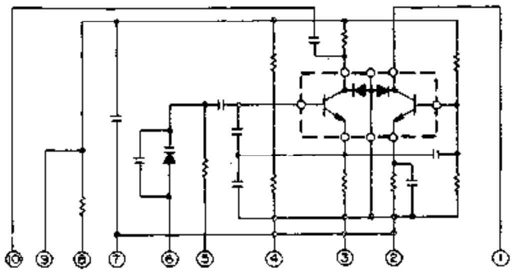
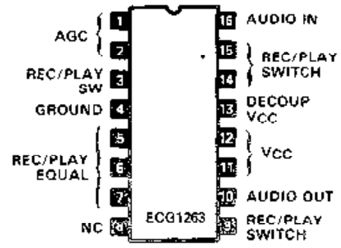
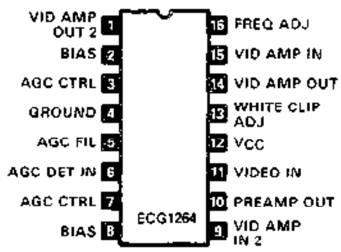
ECG1262 10-Pin SIP See Fig. L43
Voltage Controlled Osc, CB



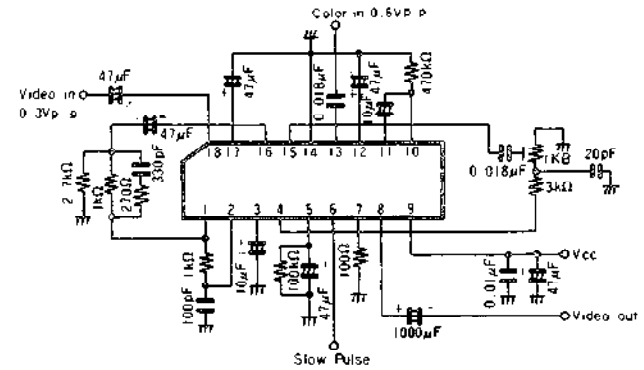
ECG1263 16-Pin DIP See Fig. L112
Record/Playback Ckt, VCR, V_{CC} = 12 V Typ



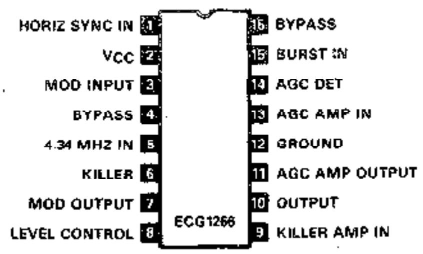
ECG1264 16-Pin DIP See Fig. L111
Luminance Ckt, VCR, V_{CC} = 12 V



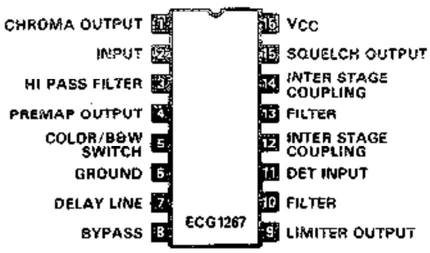
ECG1265 18-Pin DIP See Fig. L116
Noise Suppression Ckt, VCR, V_{CC} = 12 V Typ



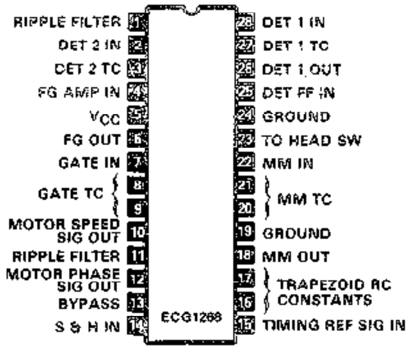
ECG1266 16-Pin DIP See Fig. L111
Chroma Processor, VCR, V_{CC} = 12 V Typ



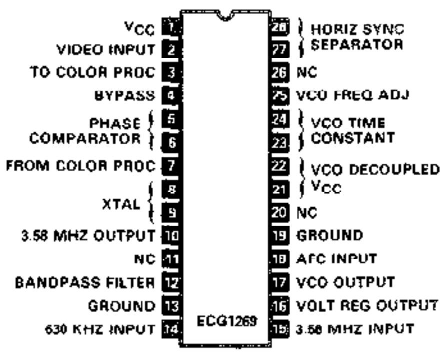
ECG1267 16-Pin DIP See Fig. L111
Dropout Compensator, VCR, V_{CC} = 12 V Typ



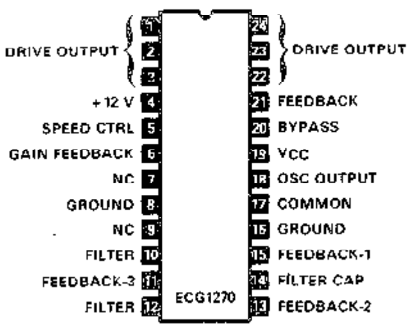
ECG1268 28-Pin DIP See Fig. L124
DC Servo Control, VCR, V_{CC} = 12 V Typ



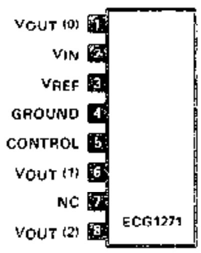
ECG1269 28-Pin DIP See Fig. L124
Color Processor, VCR



ECG1270 24-Pin DIP See Fig. L122A
VCR Motor Drive

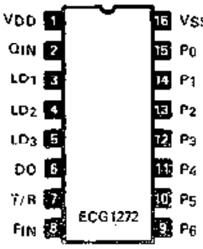


ECG1271 8-Pin SIP-HS See Fig. L77
Control Voltage Generator

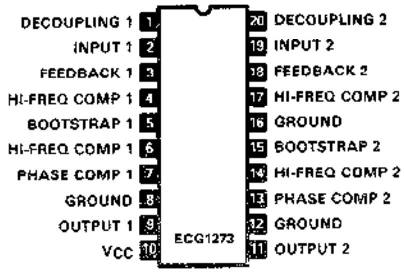


Package Outlines - See Page 1-285

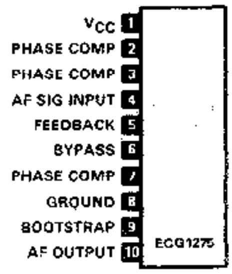
ECG1272 16-Pin DIP See Fig. L111
PLL Freq Synthesizer



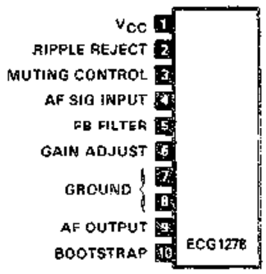
ECG1273 20-Pin DIP See Fig. L119
Dual Channel Audio Pwr Amp, 5 W/Channel, 15 W (BTL), V_{CC} = 13.2 V Typ



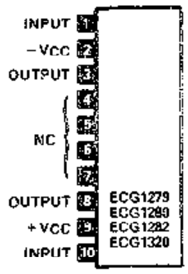
ECG1275 10-Pin SIP-HS See Fig. L90
AF Pwr Amp, 5.8 W



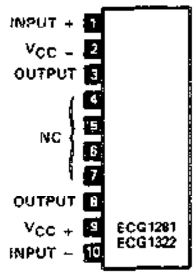
ECG1278 10-Pin SIP-HS See Fig. L85
AF PO, 5.8 W



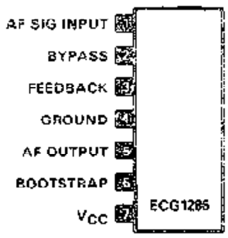
ECG1279 10-Pin SIP-M See Fig. L64
AF PO, 50 W, V_{CC} = ±36 V Typ
ECG1280, ECG1282
AF PO, 35 W, V_{CC} = ±31 V Typ



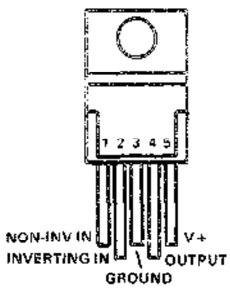
ECG1281 10-Pin SIP-M See Fig. L64
AF PO, 50 W, V_{CC} = ±36 V Typ



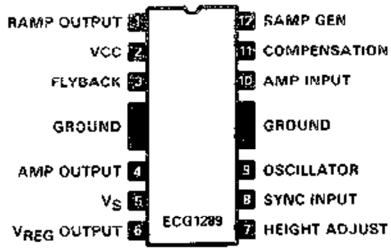
ECG1286 7-Pin SIP See Fig. L50
AF PO, 5.8 W



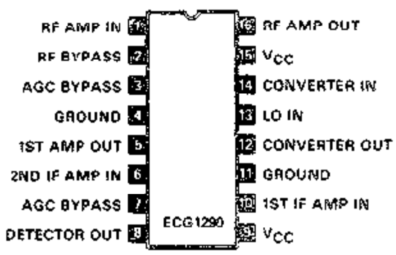
ECG1288 TO-220, 5-Pin See Fig. L19
AF Pwr Amp, 10 W



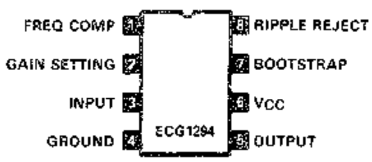
ECG1289 12-Pin DIP-QW See Fig. L131
TV Vertical Deflection System



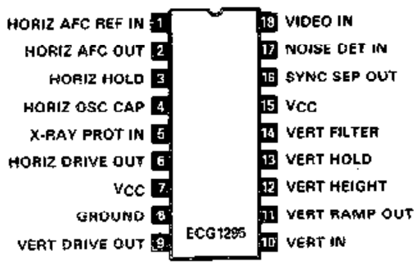
ECG1290 16-Pin DIP See Fig. L111
AM Receiver Subsystem



ECG1294 8-Pin DIP See Fig. L97
AF PO, 2 W, V_{CC} = 3 V to 12 V, R_L = 8 Ω



ECG1295 18-Pin DIP See Fig. L115
TV Signal Processor w/Vert Defl, AFC, X-Ray Protection, V_{CC} = 12 V Typ

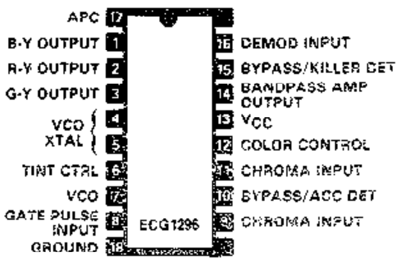


Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

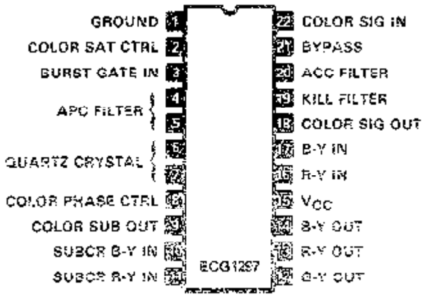
ECG1296 16 + 2-Pin DIP-ET See Fig. L114

TV Chroma Processor/Demodulator, V_{CC} = 12 V Typ



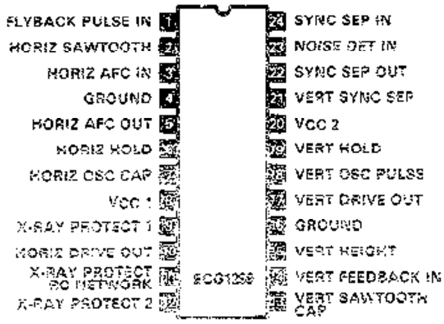
ECG1297 22-Pin DIP See Fig. L121

TV Color Signal Processor/Demodulator



ECG1298 24-Pin DIP See Fig. L122

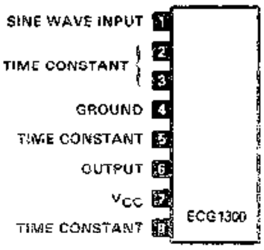
TV Signal Processor w/V-H Osc, Sync Sep, X-Ray Protect, V_{CC} = 12 V Typ



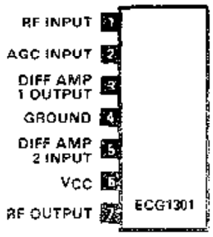
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

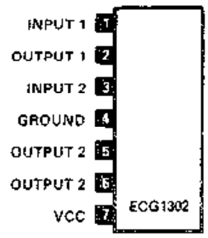
ECG1300 8-Pin SIP See Fig. L35
TV Remote Control



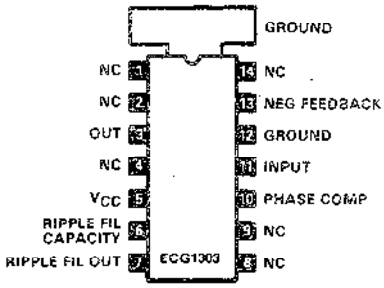
ECG1301 7-Pin SIP See Fig. L29
AM/FM IF, V_{CC} = 4 V Typ



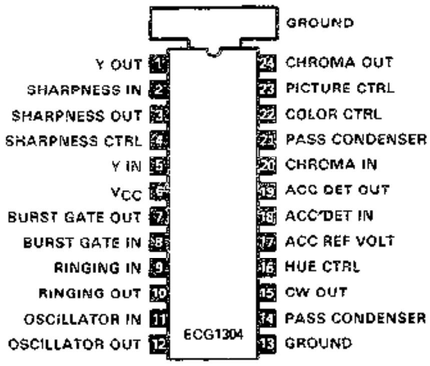
ECG1302 7-Pin SIP See Fig. L28
Audio Preamp



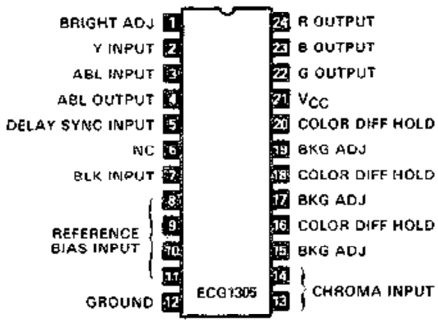
ECG1303 14-Pin DIP-ET See Fig. L141
AF Pwr Output, V_{CC} = 6 V Typ



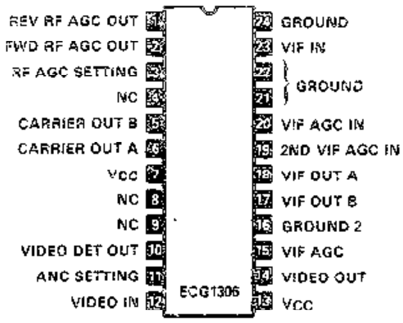
ECG1304 24-PIN DIP-ET See Fig. L153
Chroma Processor, V_{CC} = 12 V Typ



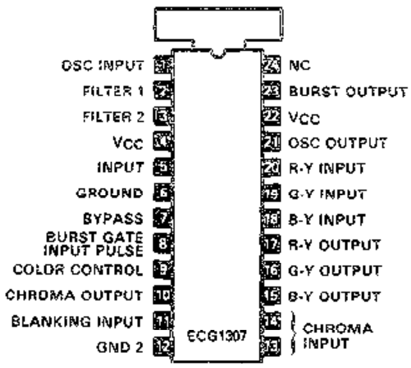
ECG1305 24-Pin DIP-ET See Fig. L153
Color Demodulator



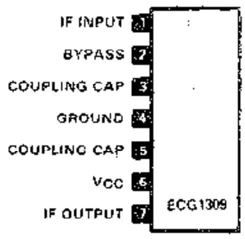
ECG1306 24-PIN DIP-ET See Fig. L153
Video IF, V_{CC} = 12 V Typ



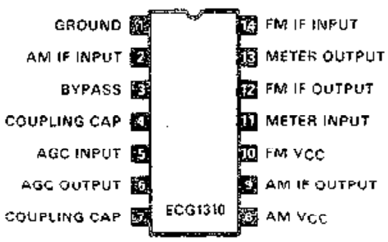
ECG1307 24-PIN DIP-ET See Fig. L153
Chroma Processor, V_{CC} = 12 V Typ



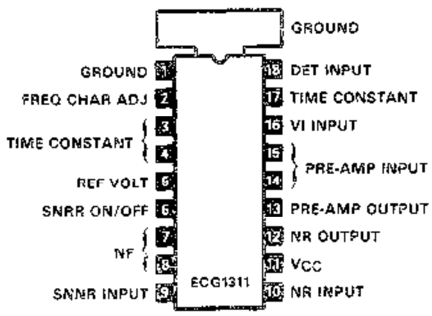
ECG1309 7-PIN SIP See Fig. L28
FM IF



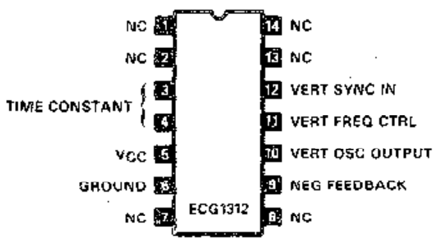
ECG1310 14-PIN DIP-ET See Fig. L142
FM/AM IF, AGC



ECG1311 18-PIN DIP-ET See Fig. L152
Noise Cancelling Amp, V_{CC} = 13 V Typ

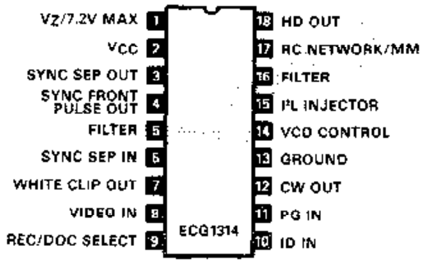


ECG1312 14-PIN DIP See Fig. L104
Vert Osc, Amp, V_{CC} = 12 V Typ

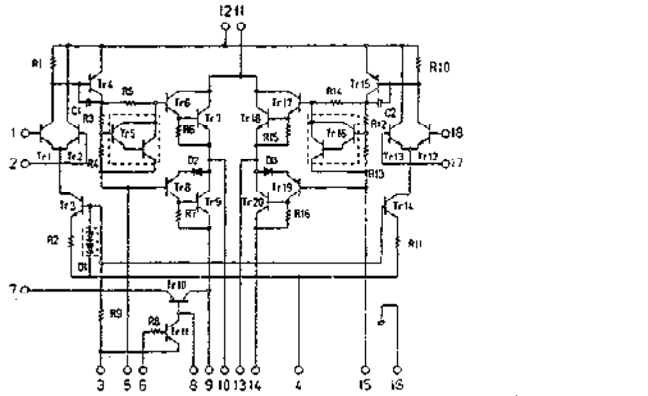


Package Outlines - See Page 1-285

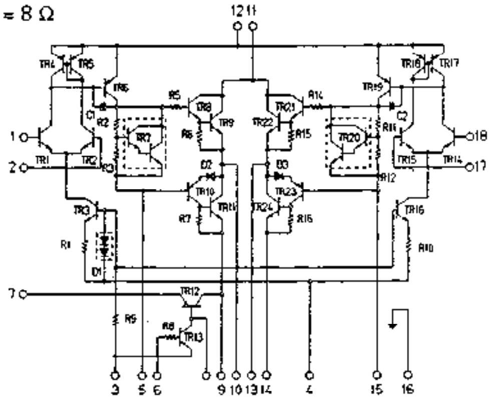
ECG1314 18-Pin DIP See Fig. L115
VCR Sync Sep/AFC/90° Rotary Circuit, V_{CC} = 12 V DC Typ



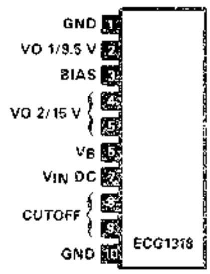
ECG1315 18-Pin SIP-M See Fig. L75D
Dual AF PO, 35 W, V_{CC} = ± 30 V, R_L = 8 Ω
ECG1316
Dual AF PO, 50 W, V_{CC} = ± 35 V, R_L = 8 Ω



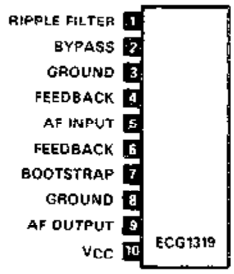
ECG1317 18-Pin SIP-M See Fig. L75B
Dual AF PO, 50 W, V_{CC} = ± 35.5 V Typ, R_L = 8 Ω



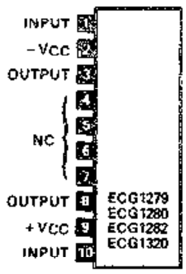
ECG1318 10-Pin SIP See Fig. L53B
VCR Pos DC VR, Dual Output, 9.5 V @ 1.6 A, 15 V @ 2.5 A



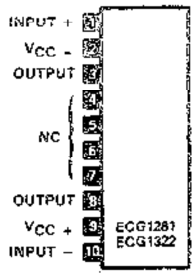
ECG1319 10-Pin SIP See Fig. L53A
Mod-AF PO, 15 W, V_{CC}= 38 V DC Typ, R_L = 8 Ω



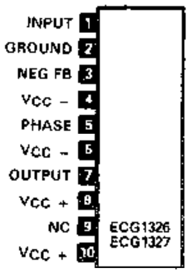
ECG1320 10-Pin SIP-M See Fig. L63
AF PO, 25 W, V_{CC} = ±25 V Typ



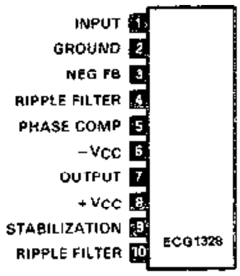
ECG1322 10-Pin SIP-M See Fig. L62
AF PO, 80 W, V_{CC} = ±46 V Typ



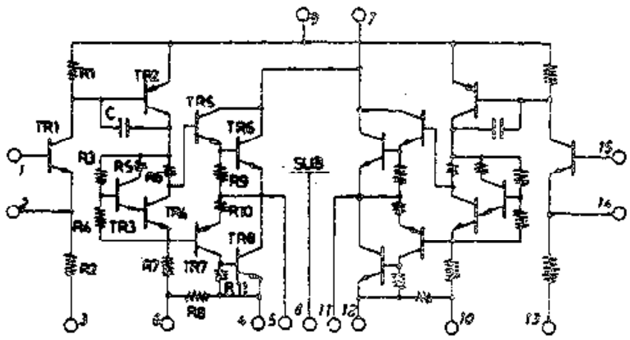
ECG1326 10-Pin SIP-M See Fig. L66
Mod-AF PO, 24 W, V_{CC} = ± 25 V Typ
ECG1327
Mod-AF PO, 35 W, V_{CC} = ± 30 V Typ



ECG1328 10-Pin SIP-M See Fig. L66
Mod-AF PO, 50 W, V_{CC} = ± 35 V Typ



ECG1329 10-Pin SIP-M See Fig. L70
Mod-Dual AF PO, 20 W/Channel, V_{CC} = 44 V Typ, R_L = 8 Ω



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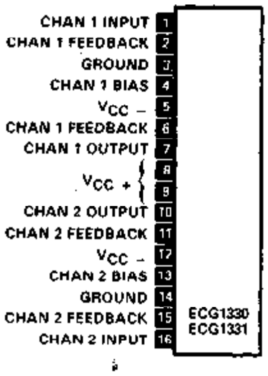
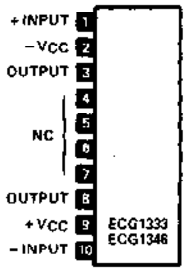
ECG1330 16-Pin SIP-M See Fig. L73
Mod-Dual AF PO, 15 W/Channel, $V_{CC} = \pm21$ V Typ

ECG1331
Mod-Dual AF PO, 25 W/Channel, $V_{CC} = \pm23$ V Typ

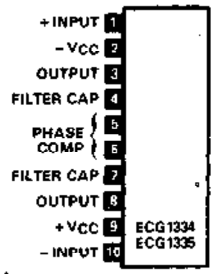


ECG1333 10-Pin SIP-M See Fig. L63
Mod-AF PO, 40 W, $V_{CC} = \pm33$ V, $R_L = 8\ \Omega$



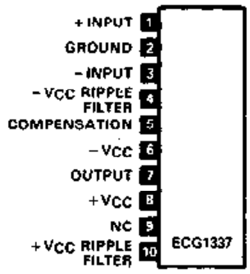
ECG1334* 10-Pin SIP-M See Fig. L62
Mod-AF PO, 60 W, $V_{CC} = \pm41$ V, $R_L = 8\ \Omega$

ECG1335
Mod-AF PO, 80 W, $V_{CC} = \pm47$ V, $R_L = 8\ \Omega$

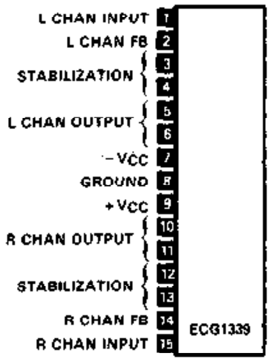


*Discontinued

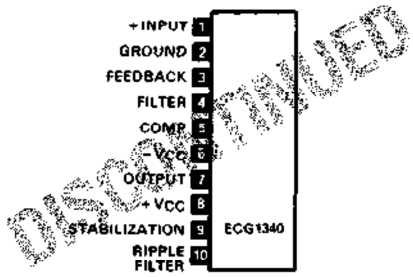
ECG1337 10-Pin SIP-M See Fig. L66
Mod-AF PO, 70 W, $V_{CC} = \pm42$ V, $R_L = 8\ \Omega$



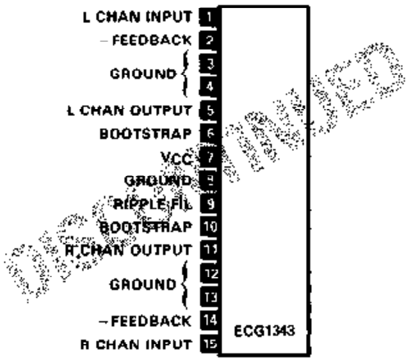
ECG1339 15-Pin SIP-M See Fig. L68
High Power Dual AF Driver Amp



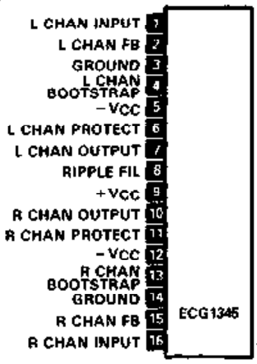
ECG1340 10-Pin SIP-M See Fig. L66
Mod-AF PO, 24 W, $V_{CC} = \pm25$ V, $R_L = 8\ \Omega$



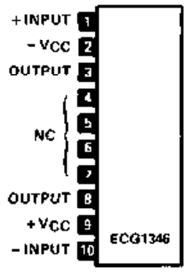
ECG1343 15-Pin SIP-M See Fig. L69
Mod-Bridge (BTL), AF PO, 10 W, $V_{CC} = 13.8$ V, $R_L = 4\ \Omega$



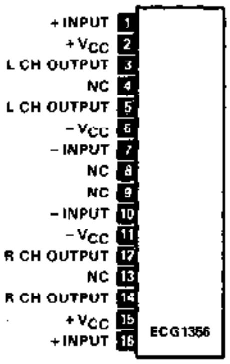
ECG1345 16-Pin SIP-M See Fig. L73
Mod-Dual AF PO, 30 W, $V_{CC} = \pm28$ V, $R_L = 8\ \Omega$



ECG1346 10-Pin SIP-M See Fig. L62
Mod-Darlington Pwr Pack, 60 W, $V_{CC} = \pm40$ V, $R_L = 8\ \Omega$



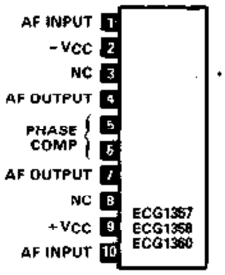
ECG1356 16-Pin SIP-M See Fig. L73
Mod-Dual AF PO, 25 W, $V_{CC} = \pm25$ V, $R_L = 8\ \Omega$



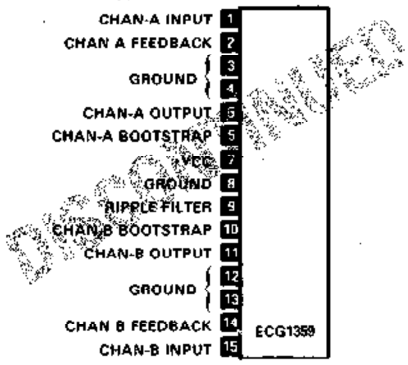
ECG1357 10-Pin SIP-M See Fig. L64
Mod-Pwr Darl, 40 W, $V_{CC} = \pm33$ V, $R_L = 8\ \Omega$

ECG1358
Mod-Pwr Darl, 50 W, $V_{CC} = \pm36$ V, $R_L = 8\ \Omega$

ECG1360
Mod-Pwr Darl, 60 W, $V_{CC} = \pm40$ V, $R_L = 8\ \Omega$



ECG1359 15-Pin SIP-M See Fig. L69
Mod-Dual AF PO, 22 W/Channel, $V_{CC} = \pm31$ V Typ, $R_L = 4\ \Omega$



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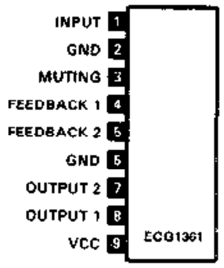
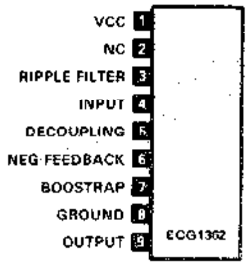
Linear IC and Module Circuits (cont'd)

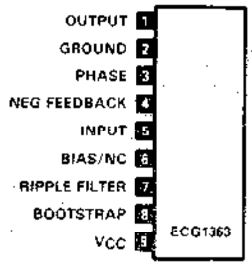
ECG1361 9-Pin SIP-HS See Fig. L80
IC-AF Pwr Amp, 12 W Bridge (BTL), V_{CC} = 13.2 V, R_L = 4 Ω



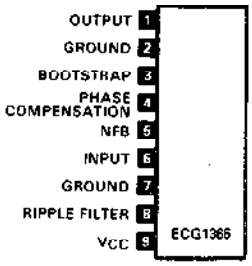
ECG1362 9-Pin SIP-HS See Fig. L80
IC-AF PO, 5.5 W, V_{CC} = 13.2 V, R_L = 4 Ω



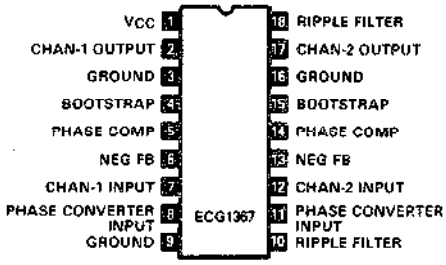
ECG1363 9-Pin SIP-HS See Fig. L79
IC-AF PO, 4.2 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



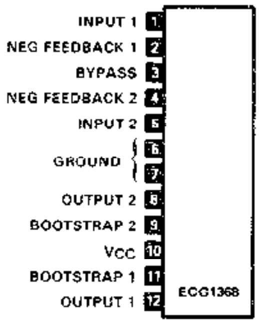
ECG1365 9-Pin SIP-HS See Fig. L79
IC-AF PO, 5 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



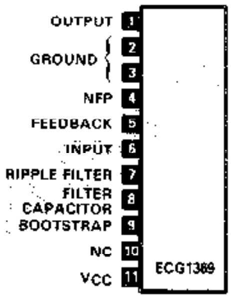
ECG1367 18-Pin DIP See Fig. L116
IC-AF PO, Dual 5 W, R_L = 4 Ω, Bridge (BTL), 10 W, R_L = 8 Ω, V_{CC} = 13.2 V Typ



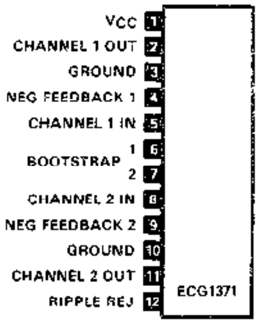
ECG1368 12-Pin SIP See Fig. L57
IC-Dual AF PO, 5.8 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



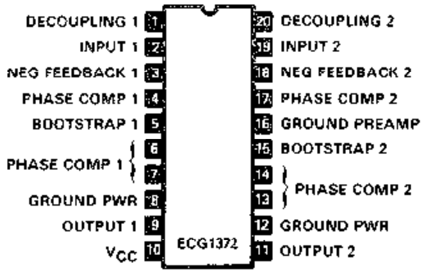
ECG1369 11-Pin SIP See Fig. L54
IC-AF PO, 5.5 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



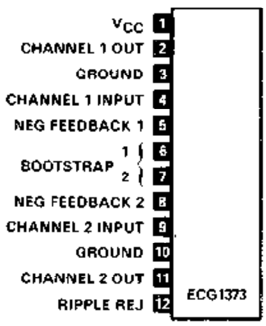
ECG1371 12-Pin SIP See Fig. L55
IC-Dual AF PO, 5.5 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



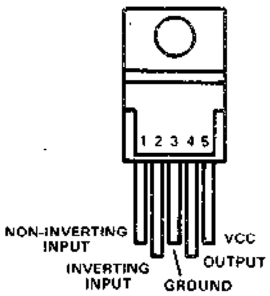
ECG1372 20-Pin DIP See Fig. L119
IC-Dual AF PO, 3.9 W, Bridge (BTL), 12 W, V_{CC} = 12 V, R_L = 4 Ω



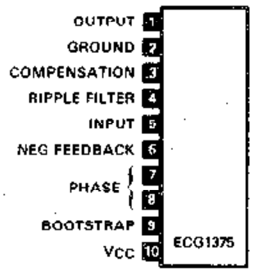
ECG1373 12-Pin SIP See Fig. L55
IC-Dual AF PO, 5.5 W, V_{CC} = 13.2 V, R_L = 4 Ω



ECG1374 TO-220, 5-Pin See Fig. L19
IC-AF PO, 12 W, V_{CC} = 22 V, R_L = 4 Ω



ECG1375 10-Pin SIP-HS See Fig. L87
IC-AF PO, 5.8 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



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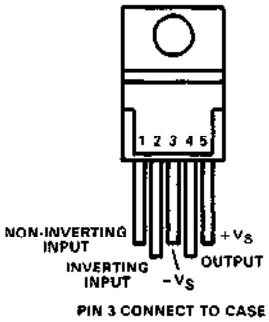
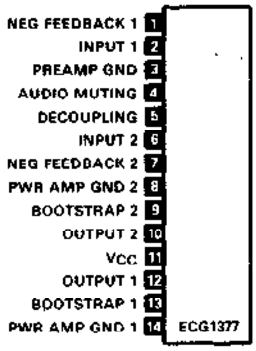
ECG1376 TO-220, 5-Pin See Fig. L19
IC-AF PO, 22 W, V_{CC} = 32 V, RL = 4 Ω

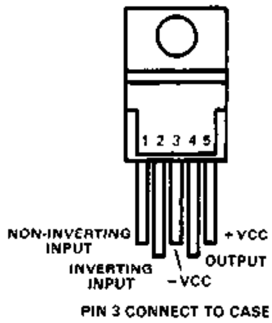


ECG1377 14-Pin SIP See Fig. L58
IC-Dual AF PO, 6 W, Bridge (BTL), 19 W, V_{CC} = 13.2 V, R_L = 4 Ω

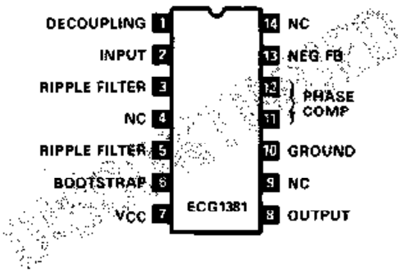


ECG1378 TO-220, 5-Pin See Fig. L19
IC-AF PO, 10 W, V_{CC} = ±12 V, RL = 4 Ω

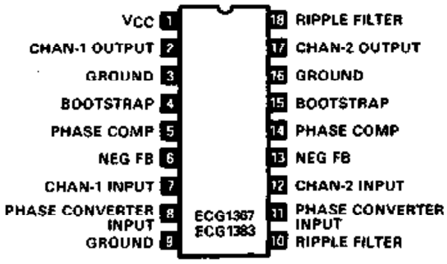
ECG1380
IC-AF PO, 14 W, V_{CC} = ±14 V, RL = 4 Ω



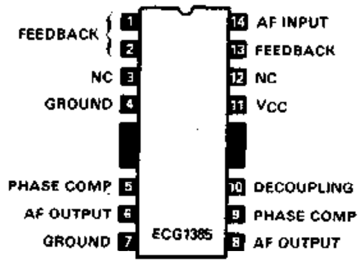
ECG1381 14-Pin DIP-ET See Fig. L147
IC-AF PO, 2.1 W, V_{CC} = 9 V Typ, RL = 4 Ω



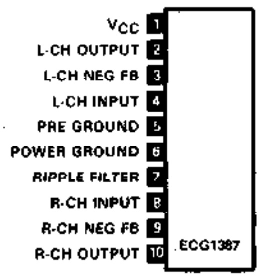
ECG1383 18-Pin DIP See Fig. L116
IC-Dual AF PO, 5.1 W, RL = 4 Ω, Bridge (BTL), 10.5 W, RL = 8 Ω, V_{CC} = 13.2 V



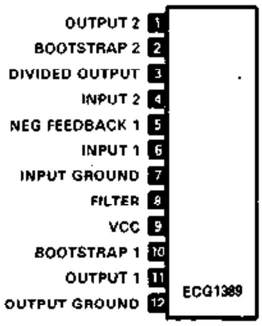
ECG1385 14-Pin DIP-W See Fig. L133
IC-AF PO, 3.8 W, V_{CC} = 9 V Typ , RL = 8 Ω



ECG1387 10-Pin SIP-HS See Fig. L85
IC-Dual AF PO, 2.4 W, V_{CC} = 14 V_{DC}, R_L = 8 Ω

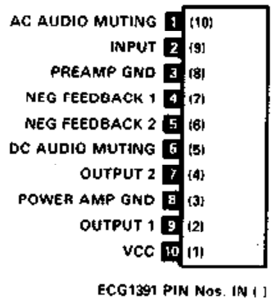


ECG1389 12-Pin SIP See Fig. L57
IC-AF PO, 20 W, V_{CC} = 13.2 V, RL = 4 Ω



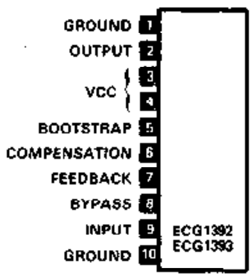
ECG1390 10-Pin SIP See Fig. L52
IC-AF PO, 12 W, V_{CC} = 13.2 V, RL = 4 Ω

ECG1391
IC-AF PO, 12 W, V_{CC} = 13.2 V, RL = 4 Ω

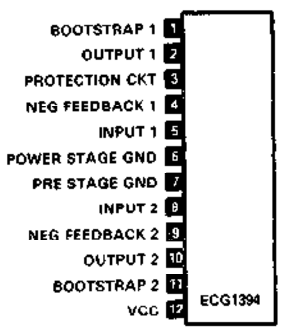


ECG1392 10-Pin SIP-HS See Fig. L83
IC-AF PO, 7 W, V_{CC} = 22 V, RL = 8 Ω

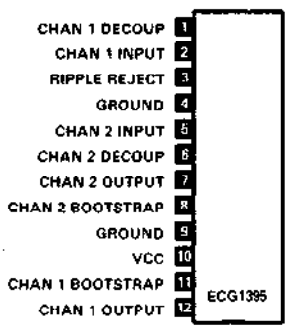
ECG1393 10-Pin SIP-HS See Fig. L82
IC-AF PO, 7 W, V_{CC} = 22 V, RL = 8 Ω



ECG1394 12-Pin SIP See Fig. L56
IC-Dual AF PO, 5.5 W, Bridge (BTL), 17 W, V_{CC} = 13.2 V, R_L = 4 Ω



ECG1395 12-Pin SIP-HS See Fig. L92
IC-Dual AF PO, 5.8 W, V_{CC} = 13.2 V, R_L = 4 Ω



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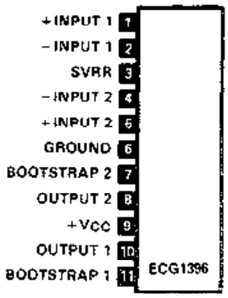
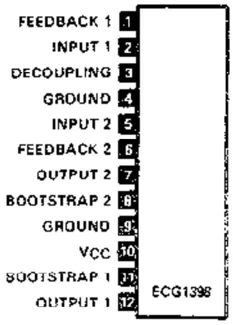
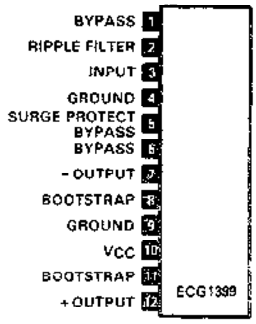
ECG1396 11-Pin SIP-HS See Fig. L93
IC-Dual AF PO, 6.5 W, Bridge (BTL), 20 W, V_{CC} = 14.4 V, R_L = 4 Ω



ECG1398 12-Pin SIP-HS See Fig. L92
Dual AF PO, 5.8 W, Bridge (BTL), 17 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



ECG1399 12-Pin SIP-HS See Fig. L92
AF PO, 18 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



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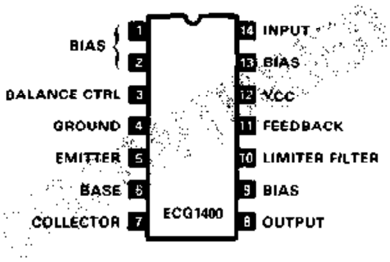
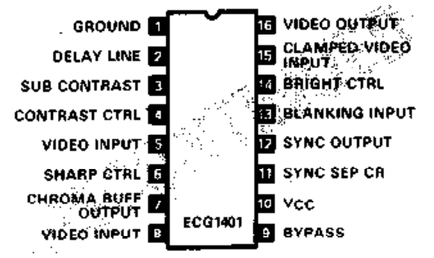
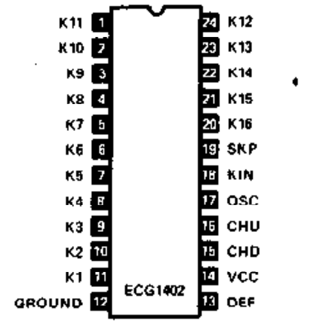
ECG1400 14-Pin DIP See Fig. L104
IC-FM Limiter, V_{CC} = 12 V Typ



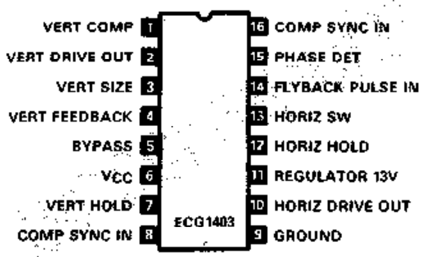
ECG1401 16-Pin DIP See Fig. L111
IC-TV Video Amp, V_{CC} = 12 V Typ



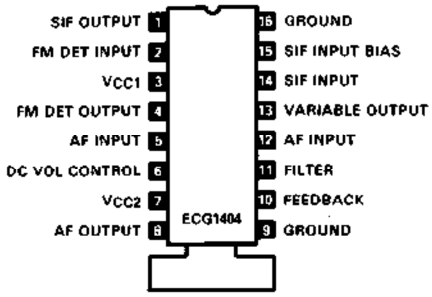
ECG1402 24-Pin DIP See Fig. L122
IC-Electronic Channel Selector Circuit, V_{CC} = 7.2 V Max



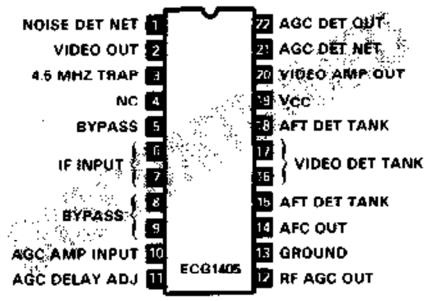
ECG1403 16-Pin DIP See Fig. L111
IC-TV Vertical, Horizontal Driver, V_{CC} = 15 V Max



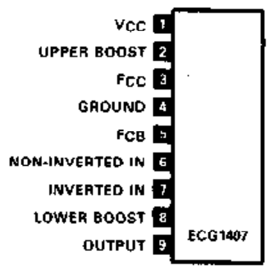
ECG1404 16-Pin DIP-ET See Fig. L151
IC-TV Sound IF Amp, Det, AF PO, $V_{CC}1$ = 12 V Typ, $V_{CC}2$ = 17 V Typ



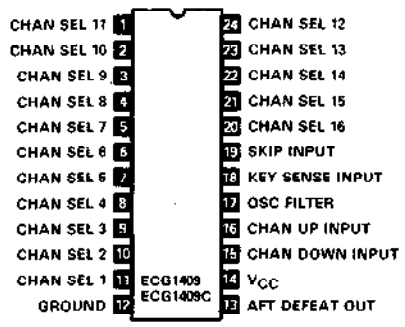
ECG1405 22-Pin DIP See Fig. L121
IC-TV Video IF Amp (Rev AGC), V_{CC} = 12 V Typ



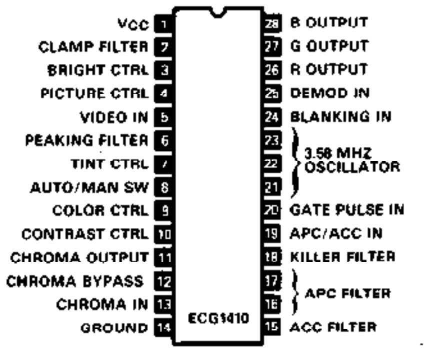
ECG1407 9-Pin SIP-HS See Fig. L81
IC-Audio Pwr Amp, 4.4 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



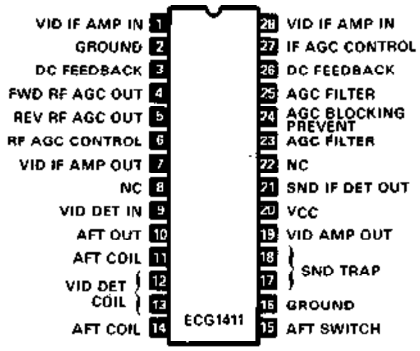
ECG1409 24-Pin DIP See Fig. L122
ECG1409C 24-Pin DIP See Fig. L122C
Electronic Channel Selector, V_{CC} = 12 V Typ



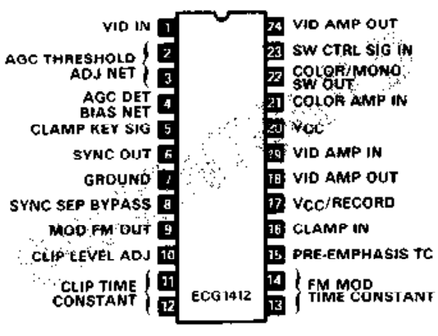
ECG1410 28-Pin DIP See Fig. L124
IC-TV Video and Chroma Processor, V_{CC} = 12 V Typ



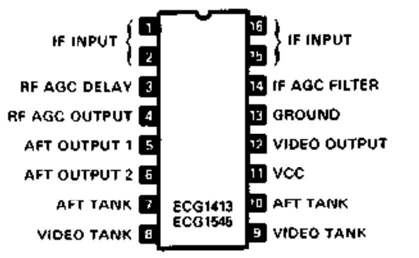
ECG1411 28-Pin DIP See Fig. L124
IC-TV Video IF, AGC, AFT, V_{CC} = 12 V Typ



ECG1412 24-Pin DIP See Fig. L122
IC-VCR Video Signal Processor, V_{CC} = 12 V Typ



ECG1413 16-Pin DIP See Fig. L111
IC-VIF Video AGC Amp w/AFT, V_{CC} = 12 V Typ



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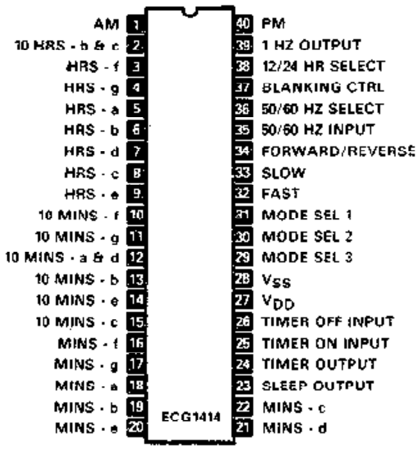
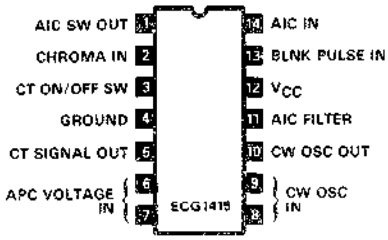
ECG1414 40-Pin DIP See Fig. L125

IC-VCR Digital Clock, Timer (CMOS), V_{DD} = 12 V Typ



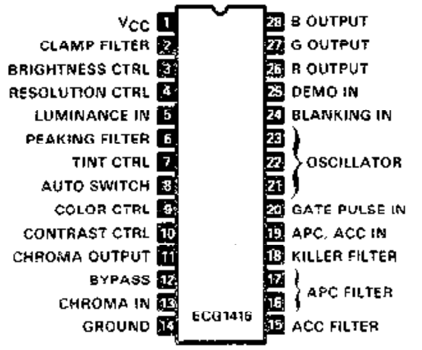
ECG1415 14-Pin DIP See Fig. L104

IC-TV Color Compensation Ckt, V_{CC} = 12 V Typ



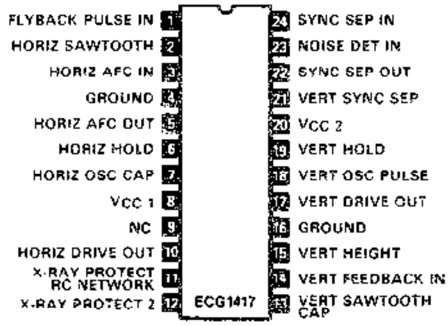
ECG1416 28-Pin DIP See Fig. L124

IC-Luminance Amp, Chroma Demod, V_{CC} = 12 V Typ



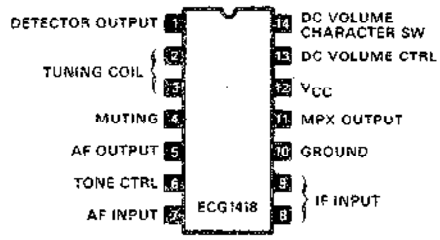
ECG1417 24-Pin DIP See Fig. L122

IC-TV Deflection Signal Processor, V_{CC} = 12 V Typ



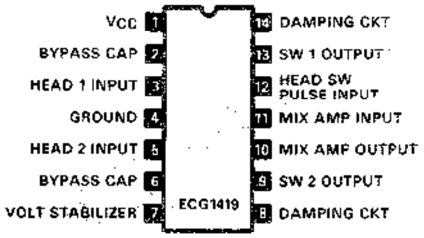
ECG1418 14-Pin DIP See Fig. L105

IC-TV Sound IF Amp, V_{CC} = 12 V Typ



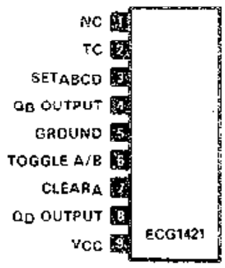
ECG1419 14-Pin DIP See Fig. L104

IC-VCR Head Amp, V_{CC} = 12 V Typ



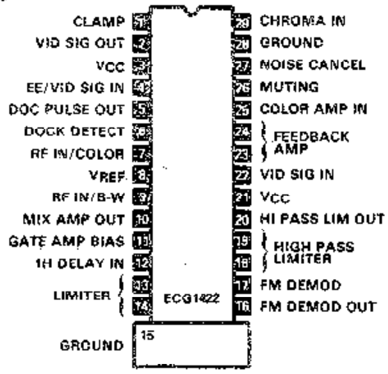
ECG1421 9-Pin SIP See Fig. L41

IC-VCR Freq Divider, V_{CC} = 15 V Max



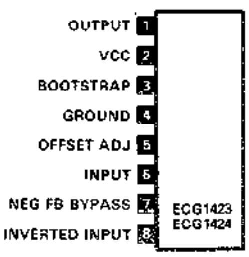
ECG1422 28-Pin DIP-HS See Fig. L154

IC-VCR Video Signal Processor, V_{CC} = 12 V Typ



ECG1423* 8-Pin SIP-HS See Fig. L77
ECG1424 8-Pin SIP-HS See Fig. L78

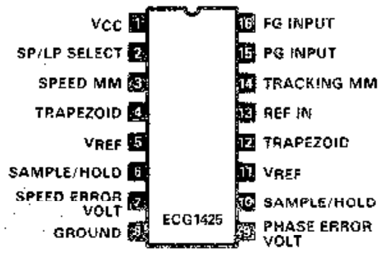
IC-AF PO, 5.7 W, V_{CC} = 13.2 V, R_L = 4 Ω



*DISCONTINUED

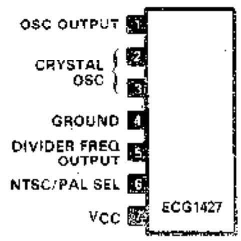
ECG1425 16-Pin DIP See Fig. L111

IC-VCR Capstan Servo Control, V_{CC} = 12 V Typ



ECG1427 7-Pin SIP See Fig. L27

IC-VCR Reference Freq Divider, V_{CC} = 9 V Typ



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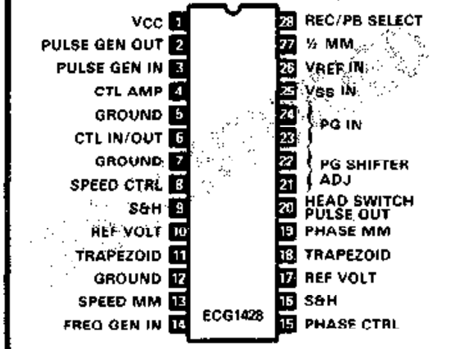
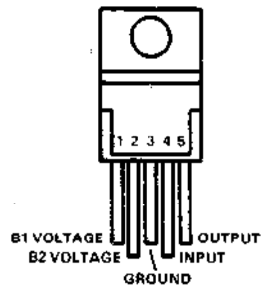
Linear IC and Module Circuits (cont'd)

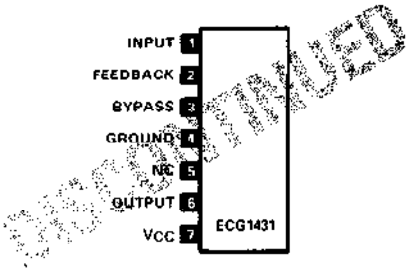
ECG1428 28-Pin DIP See Fig. L124
IC-VCR Cylinder Servo Control, V_{CC} = 12 V Typ



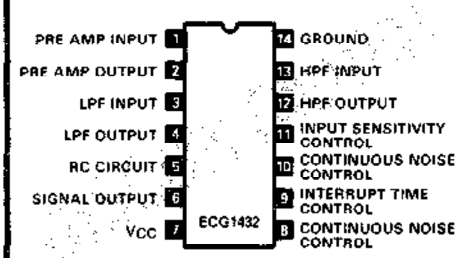
ECG1429 TO-220, 5-Pin See Fig. L19
IC-Vert Output, B_1 = 110 V Typ, B_2 = 40 to 60 V



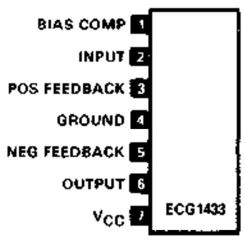
ECG1431 7-Pin SIP See Fig. L26
IC-Audio Driver, V_{CC} = 6 V Typ



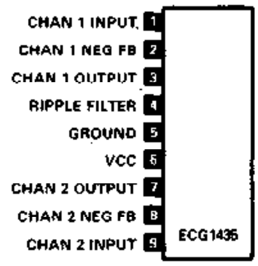
ECG1432 14-Pin DIP See Fig. L104
IC-FM Noise Canceller (Auto Ignition), V_{CC} = 12 V Typ



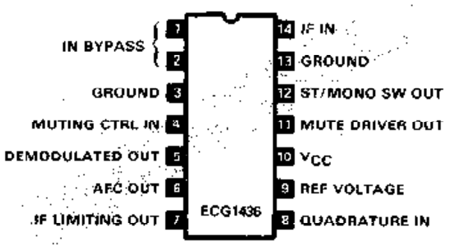
ECG1433 7-Pin SIP See Fig. L26
IC-Audio Preamp, V_{CC} = 35 V Typ



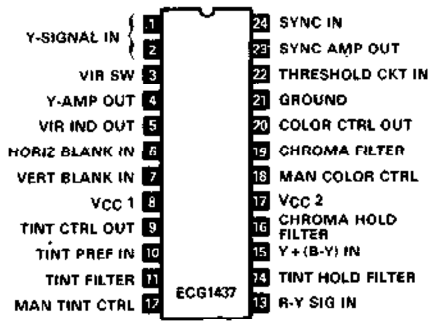
ECG1435 9-Pin SIP See Fig. L41
IC-Dual Audio Preamp, V_{CC} = 8 V Typ



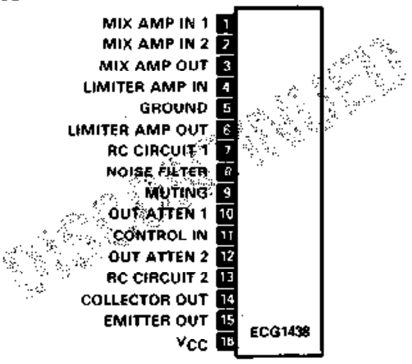
ECG1436 14-Pin DIP See Fig. L104
IC-FM IF Amp, Limiter,Det, AFC, Stereo-Mono Switch, V_{CC} = 12 V Typ



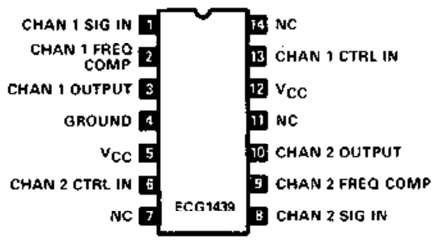
ECG1437 24-Pin DIP See Fig. L122
IC-VIR Signal Processor, $V_{CC}1$ = 12 V Typ, $V_{CC}2$ = 5.1 V Typ



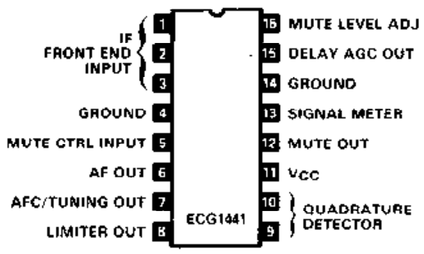
ECG1438 16-Pin ZIL See Fig. L47
IC-Audio Tape Program Selector, V_{CC} = 6 V Typ



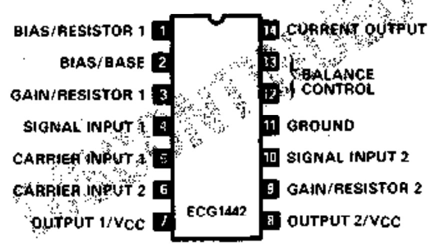
ECG1439 14-Pin DIP-ET See Fig. L140
IC-Dual Attenuator, V_{CC} = 12 V Typ



ECG1441 16-Pin DIP See Fig. L111
IC-FM IF Amp, Limiter, Det, AF Amp, V_{CC} = 12 V Typ



ECG1442 14-Pin DIP See Fig. L104
IC-Balanced Modulator, 10 MHz BW, V_{CC} = 12 V Typ



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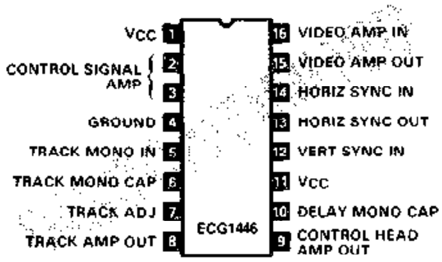
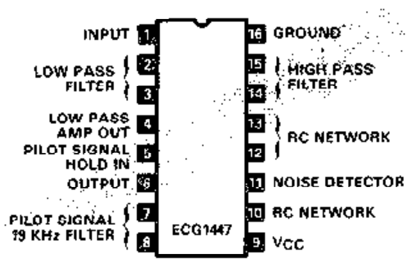
ECG1446 16-Pin DIP See Fig. L112

IC-VCR Servo Control, V_{CC} = 12 V Typ



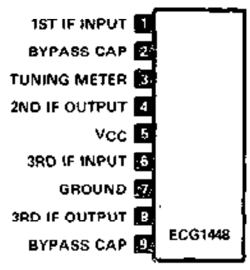
ECG1447 16-Pin DIP See Fig. L111

IC-FM Noise Canceller (Auto Ignition), V_{CC} = 12 V Typ



ECG1448 9-Pin SIP See Fig. L41

IC-FM IF Amp, V_{CC} = 9 V Typ

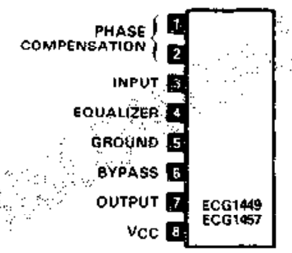


ECG1449 8-Pin SIP See Fig. L32

IC-Lo Noise Equalizer Amp, V_{CC} = 30 V Typ, V_G = 89 dB, R_L = 47 KΩ

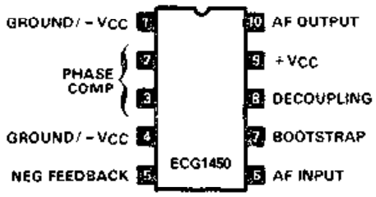
ECG1457 8-Pin SIP See Fig. L32

IC-Lo Noise Audio Preamp, V_{CC} = 20 V Typ, V_G = 89 dB, R_L = 47 KΩ



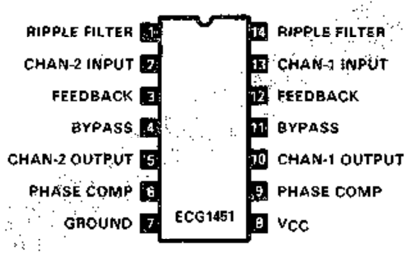
ECG1450 10-Pin DIP See Fig. L102

IC-AF PO, 5 W, V_{CC} = +20 V/ ± 10 V Typ, R_L = 8 Ω



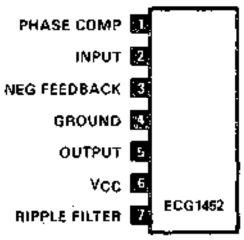
ECG1451 14-Pin DIP See Fig. L104

IC-Dual Channel Equalizer Amp, V_{CC} = 30 V Typ, V_G = 89 dB



ECG1452 7-Pin SIP See Fig. L27

IC-AF PO, 1 W, V_{CC} = 9 V Typ, R_L = 8 Ω

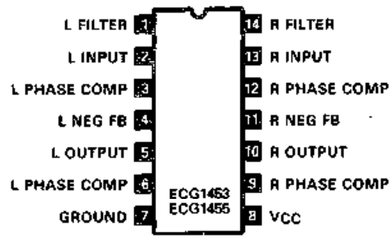


ECG1453 14-Pin DIP See Fig. L104

IC-Dual Channel Equalizer Amp, V_{CC} = 15 V Typ, V_G = 88 dB

ECG1455* 14-Pin DIP See Fig. L104

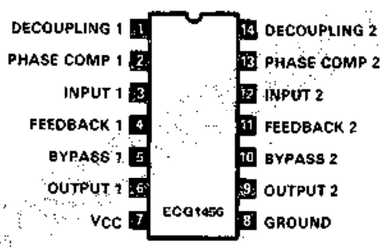
IC-Dual Channel Equalizer Amp, V_{CC} = 20 V Typ, V_G = 90 dB



*DISCONTINUED

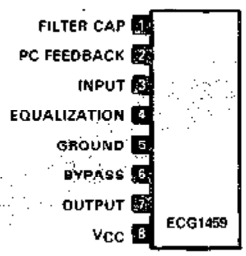
ECG1456 14-Pin DIP See Fig. L104

IC-Dual Audio Preamp, V_{CC} = 8 V, V_G = 46 dB Min



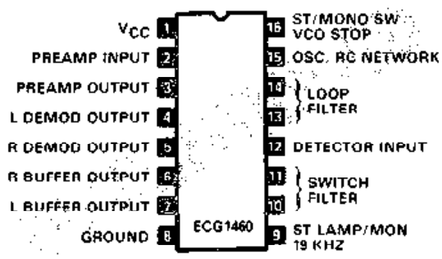
ECG1459 8-Pin SIP See Fig. L32

IC-Lo Noise Equalizer Amp, V_{CC} = 9 V, V_G = 79 dB



ECG1460 16-Pin DIP See Fig. L111

IC-Stereo Demod w/PLL, Stereo/Mono Sw, Stereo Indicator, Lamp Driver, V_{CC} = 12 V Typ



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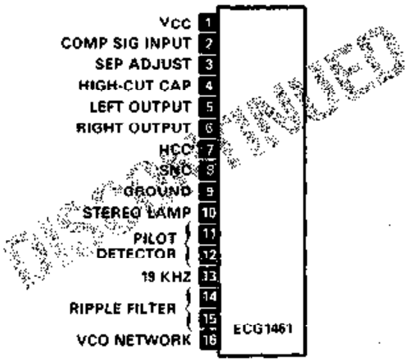
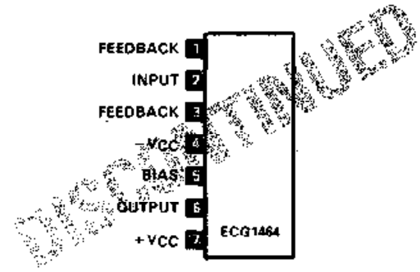
ECG1461 16-Pin ZIL See Fig. L46

IC-PLL FM, Stereo Demod, V_{CC} = 10 V Typ



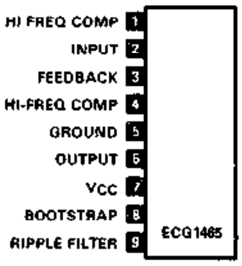
ECG1464 7-Pin SIP See Fig. L24

IC-Audio Preamp, V_{CC} = ± 15 V Typ, V_G = 92 dB



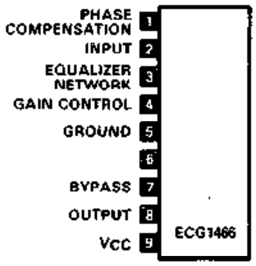
ECG1465 9-Pin SIP See Fig. L36

IC AF PO, 500 mW, V_{CC} = 6 V Typ, R_L = 8 Ω



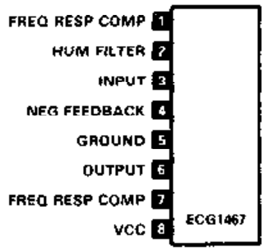
ECG1466 9-Pin SIP See Fig. L39

IC-Audio Preamp, V_{CC} = 5 V Typ, V_G = 35 dB



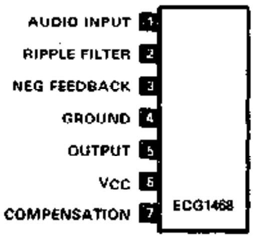
ECG1467 8-Pin SIP See Fig. L35

IC-AF PO, 500 mW, V_{CC} = 6 V, R_L = 8 Ω



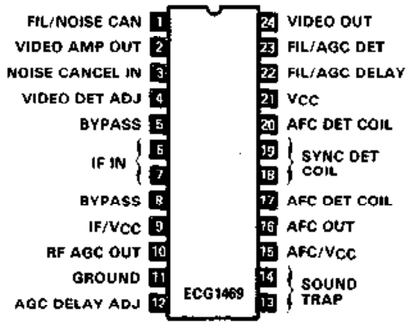
ECG1468 7-Pin SIP See Fig. L24

IC-Audio Preamp, V_{CC} = 20 V Typ, V_G = 40 dB



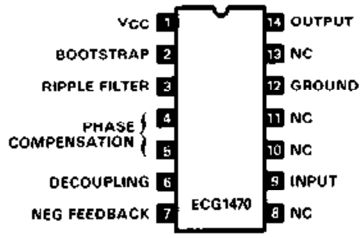
ECG1469 24-Pin DIP See Fig. L122

IC-TV Video IF Amp, Det, AGC, AFC and Noise Filter, V_{CC} = 12 V Typ



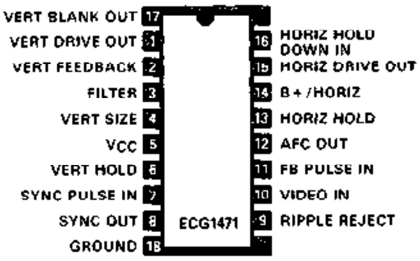
ECG1470 14-Pin DIP-ET See Fig. L144

IC-AF PO, 2.5 W, V_{CC} = 14 V Typ, R_L = 8 Ω



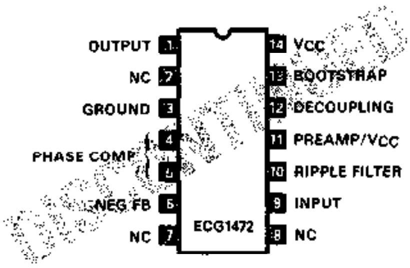
ECG1471 16 + 2-Pin DIP-ET See Fig. L114

IC-TV Horiz Osc, AFC, Sync Sep, Vert Osc and Blanking Pulse Gen, V_{CC} = 12 V Typ



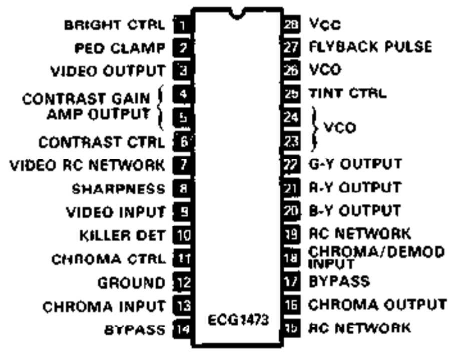
ECG1472 14-Pin DIP-ET See Fig. L144

IC-AF PO, 1 W, V_{CC} = 6 V Typ, R_L = 4 Ω



ECG1473 28-Pin DIP See Fig. L124

IC-TV Chroma and Video Processor, V_{CC} = 12 V Typ



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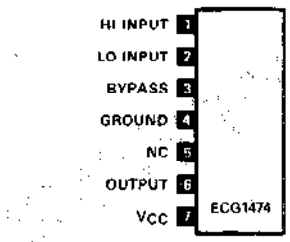
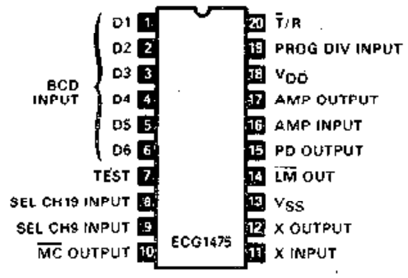
ECG1474 7-Pin SIP See Fig. L24

IC-FM IF Amp, V_{CC} = 12 V Typ, V_G = 34 dB



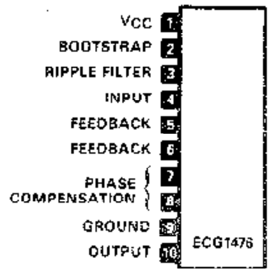
ECG1475 20-Pin DIP See Fig. L118

IC-CB PLL Freq Synthesizer (CMOS), V_{DD} = 6 V Typ



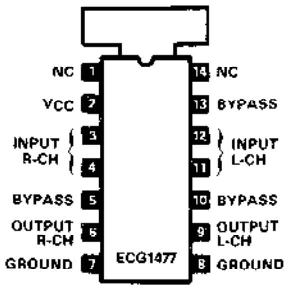
ECG1476 10-Pin SIP-HS See Fig. L85

IC-AF PO, 1.4 W, V_{CC} = 7.5 V Typ, R_L = 4 Ω



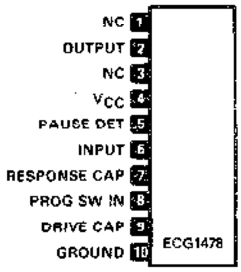
ECG1477 14-Pin DIP-ET See Fig. L144

IC-Dual Lo Pwr AF PO or Driver, V_{CC} = 14 V Typ, V_G = 9 dB, R_L = 8 Ω



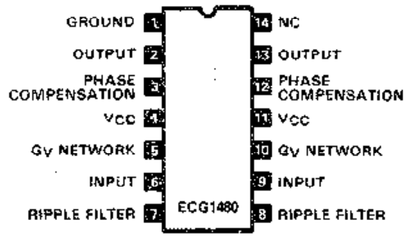
ECG1478 10-Pin SIP-HS See Fig. L86

IC-Solenoid Driver and Signal Sensing Ckt, V_{CC} = 13.2 V, 4 A



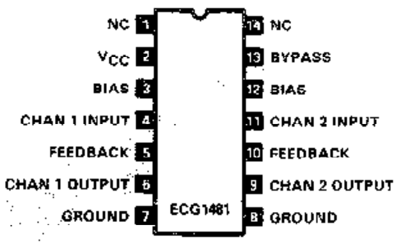
ECG1480 14-Pin DIP See Fig. L104

IC-Dual Channel Audio Preamp, V_{CC} = 25 V Typ, VG = 95 dB, R_L = 75 KΩ



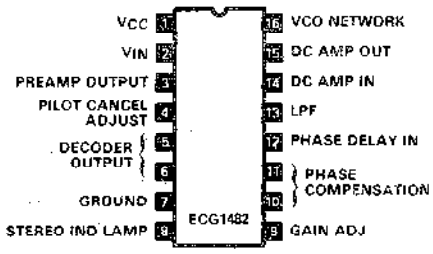
ECG1481 14-Pin DIP-ET See Fig. L144

IC-Dual Channel Audio Amp, Headphone Amp, Line Amp, V_{CC} = 12 V Typ, V_G = 38 dB, R_L = 39 Ω



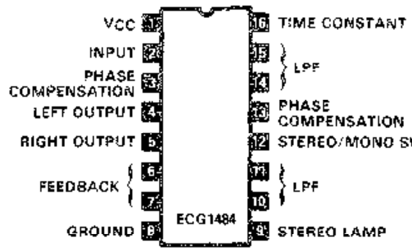
ECG1482 16-Pin DIP See Fig. L112

IC-FM PLL Stereo Demod w/Pilot Cancel, V_{CC} = 13 V Typ



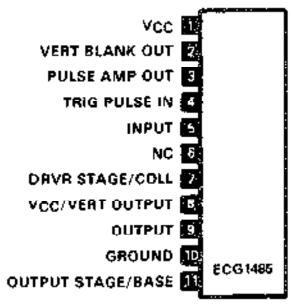
ECG1484 16-Pin DIP See Fig. L111

IC-FM PLL Stereo Demod, Indicator Lamp Dr, V_{CC} = 12 V Typ



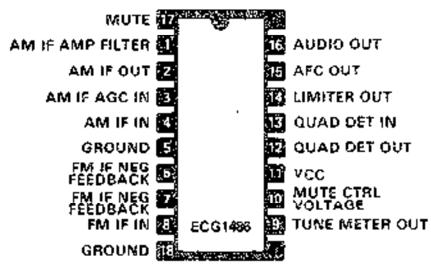
ECG1485 11-Pin SIP See Fig. L54

IC-TV Vert Driver and Output, V_{CC} = 24 V Typ



ECG1486 16 + 2-Pin DIP-HS See Fig. L114

IC-AM/FM IF Amp, Limiter, Det, AFC, Mute and Meter Level Drivers, V_{CC} = 12 V Typ



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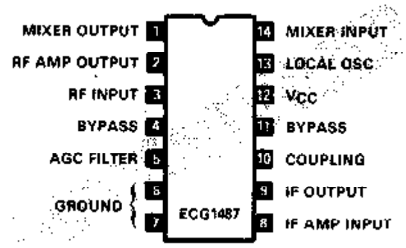
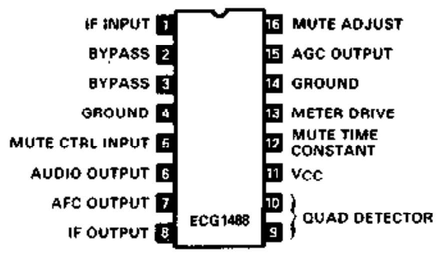
Linear IC and Module Circuits (cont'd)

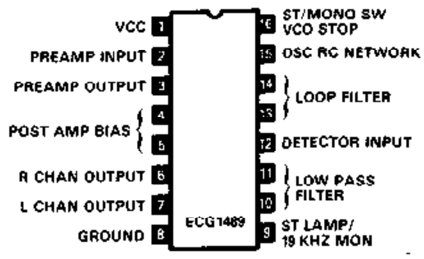
ECG1487 14-Pin DIP See Fig. L104
IC-AM RF Amp, Mixer, Osc, IF Amp, Det and AGC, V_{CC} = 12 V Typ



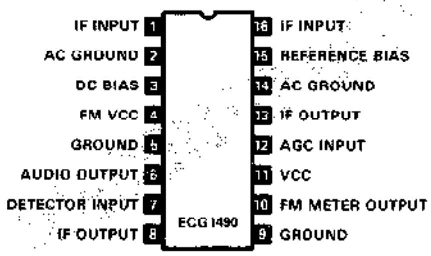
ECG1488 16-Pin DIP See Fig. L111
IC-FM IF Amp, Det, Audio Preamp w/Mute, AGC, AFC and Meter Driver, V_{CC} = 13 V Typ



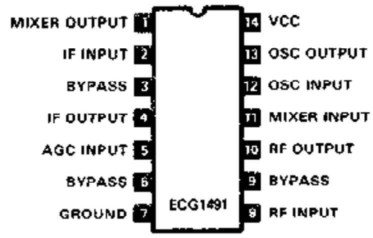
ECG1489 16-Pin DIP See Fig. L111
IC-Stereo Demodulator, V_{CC} = 12 V Typ



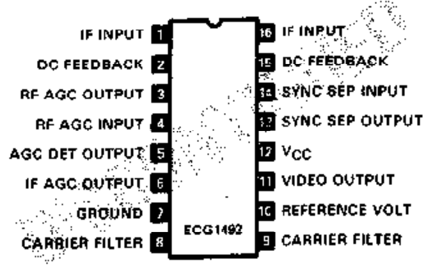
ECG1490 16-Pin DIP See Fig. L111
IC-AM/FM IF Amp, Det, AF Preamp, Meter Driver, V_{CC} = 8 V Max



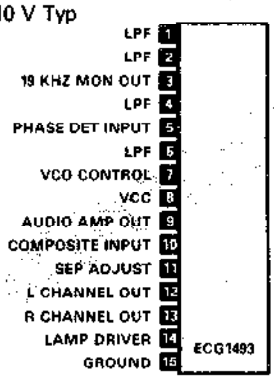
ECG1491 14-Pin DIP See Fig. L104
IC-AM RF/IF Amp, V_{CC} = 13 V Typ



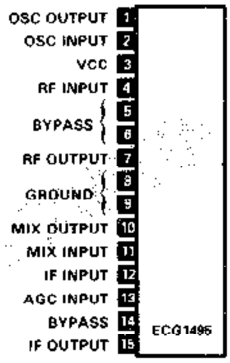
ECG1492 16-Pin DIP See Fig. L111
IC-TV Video IF Amp, Sync Sep and AGC, V_{CC} = 11 V Typ



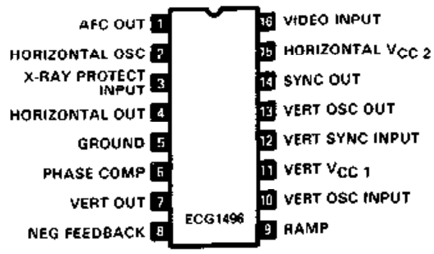
ECG1493 15-Lead Formed SIP See Fig. L45
IC-FM Mux Stereo Demodulator, V_{CC} = 10 V Typ



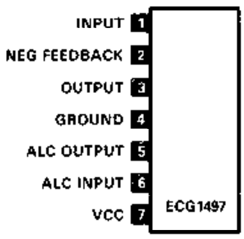
ECG1495 15-Lead Formed SIP See Fig. L45
IC-AM RF Amp, Mixer and IF Amp, V_{CC} = 13 V Typ



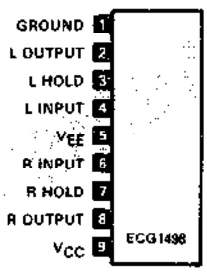
ECG1496 16-Pin DIP See Fig. L111
IC-Sync Sep, Vert/Horiz Osc, X-Ray Prot Ckt, $V_{CC}1$ = 12 V Typ, $V_{CC}2$ = 15 V Typ



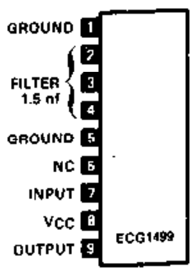
ECG1497 7-Pin SIP See Fig. L25
IC-AF Preamp w/Automatic Level Control, V_{CC} = 5 V Typ



ECG1498 9-Pin SIP See Fig. L39
IC-Dual Channel Peak Pwr Meter Driver, V_{CC} = + 14V/ ±7 V Typ



ECG1499 9-Pin SIP See Fig. L39
IC-1/20 Divider Prescaler, Input Freq (40-120) MHz, V_{CC} = 5.2 V Typ



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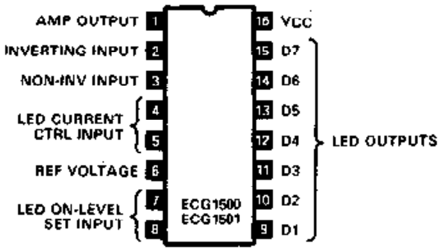
Linear IC and Module Circuits (cont'd)

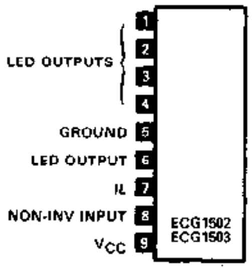
ECG1500 16-Pin DIP-ET See Fig. L151
IC-Voltage Level Ind. Dr, 7 Step Output for LED, Log Scale, V_{CC} = 9 V Typ

ECG1501
IC-Voltage Level Ind. Dr, 7 Step Output for LED, Linear Scale, V_{CC} = 9 V Typ



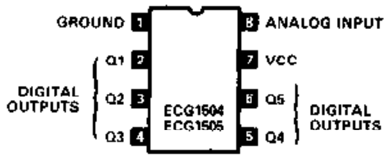
ECG1502 9-Pin SIP See Fig. L41
IC-Voltage Level Ind. Dr, 5 Step Output for LED, Linear Scale, V_{CC} = 16 V Typ

ECG1503
IC-Voltage Level Ind. Dr, 5 Step Output for LED, Log Scale, V_{CC} = 16 V Typ



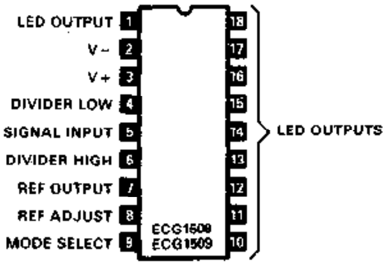
ECG1504 8-Pin DIP See Fig. L97
IC-Voltage Level Ind. Dr, 5 Step Log, Open Collector Outputs, V_{CC} = 12 V Typ

ECG1505
IC-Voltage Level Ind. Dr, 5 Step Linear, Open Collector Outputs, V_{CC} = 12 V Typ

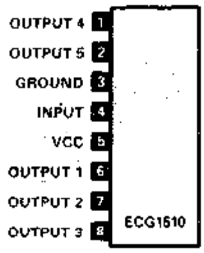


ECG1508 18-Pin DIP See Fig. L115
IC-Voltage Level Ind. Dr, 10 Step Linear, Open Collector Outputs, V+ = 25 V Max

ECG1509
IC-Voltage Level Ind. Dr, 10 Step Log, Open Collector Outputs, V+ = 25 V Max

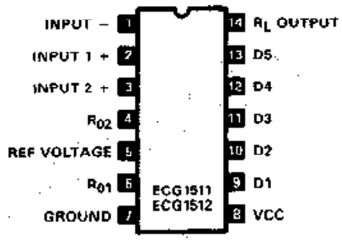


ECG1510 8-Pin SIP See Fig. L35
IC-Voltage Level Ind. Dr, 5 Step Output for LED, Linear Scale, V_{CC} = 10 V Typ

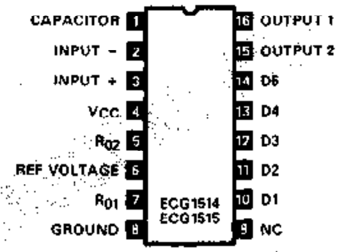


ECG1511 14-Pin DIP-ET See Fig. L144
IC-Voltage Level Ind. Dr, 5 Step Output for LED, Linear Scale, V_{CC} = 18 V Max

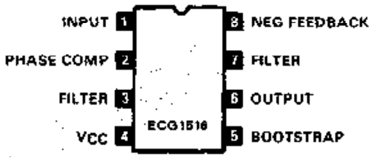
ECG1512
IC-Voltage Level Ind. Dr, 5 Step Output for LED, Log Scale, V_{CC} = 18 V Max



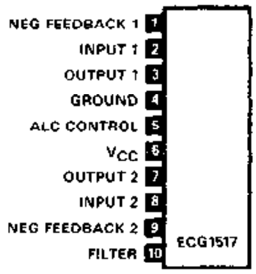
ECG1514, ECG1515 16-Pin DIP See Fig. L111
IC-Voltage Level Ind. Dr, 5 Step Output for LED, Log Scale, V_{CC} = 6 V Typ



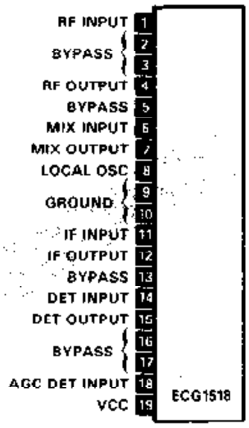
ECG1516 8-Pin DIP-ET See Fig. L138
IC-AF PO, 1.8 W, V_{CC} = 9 V, R_L = 4 Ω



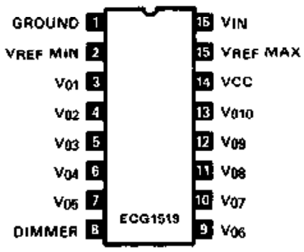
ECG1517 10-Pin SIP See Fig. L42
IC-Dual Audio Preamp w/ALC, V_G = 46 dB



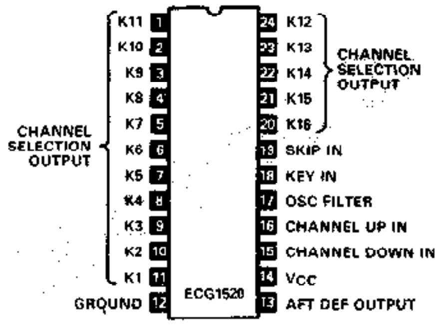
ECG1518 19-Lead Formed SIP See Fig. L48
IC-AM RF/IF/Detector/AGC, V_{CC} = 13 V Typ



ECG1519 16-Pin DIP See Fig. L111
IC-Voltage Level Ind. Dr, 10 Step Output for LED, Linear Scale, V_{CC} = 12 V Typ



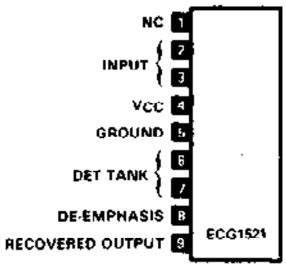
ECG1520 24-Pin DIP See Fig. L122
IC-Electronic Channel Selector, V_{CC} = 6 V Typ



Package Outlines - See Page 1-285

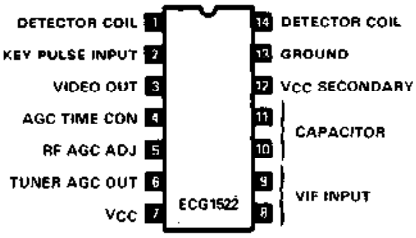
ECG1521 9-Pin SIP See Fig. L39

IC-TV Sound IF Amp and Detector, V_{CC} = 12 V Typ



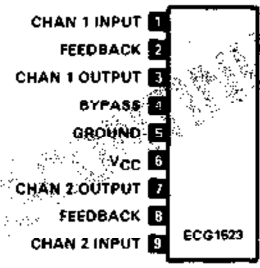
ECG1522 14-Pin DIP-ET See Fig. L145

IC-Video IF Amp, Det and Video Amp, V_{CC} = 12 V Typ



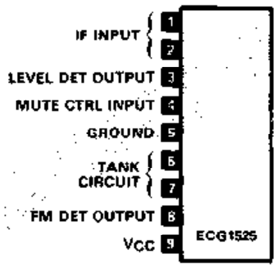
ECG1523 9-Pin SIP See Fig. L39

IC-Dual Lo Noise Audio Preamp, V_{CC} = 8 V Typ, V_G = 70 dB, R_L = 10 KΩ



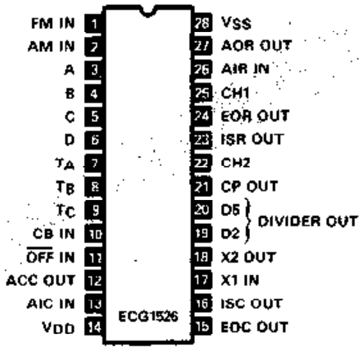
ECG1525 9-Pin SIP See Fig. L39

IC-FM Differential IF Amp Det w/Meter Driver and Muting Ckt, V_{CC} = 12 V Typ



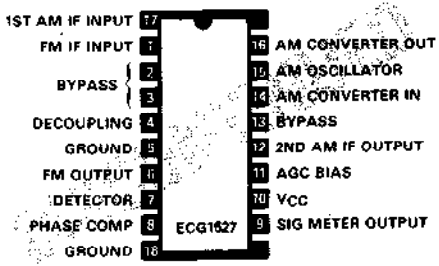
ECG1526 28-Pin DIP See Fig. L124

IF-PLL Freq Synthesizer for FM Stereo (CMOS), V_{DD} = 5 V Typ



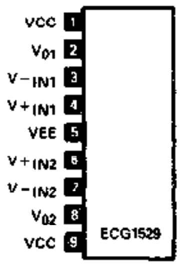
ECG1527 16 + 2-Pin DIP-ET See Fig. L114

IC-FM, IF Amp, AFC and Meter Driver, AM Conv, IF Amp and AGC, V_{CC} = 5.5 V Typ



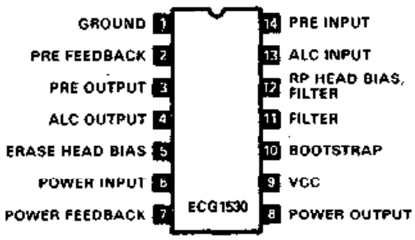
ECG1529 9-Pin SIP See Fig. L39

IC-Dual OP Amp, V_{CC} = 15 V Typ



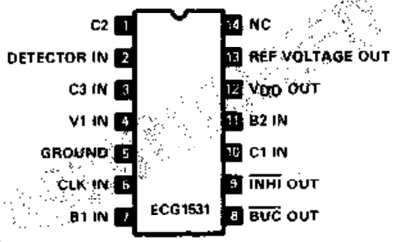
ECG1530 14-Pin DIP-ET See Fig. L146

IC-AF PO, 450 mW, V_{CC} = 6 V Typ



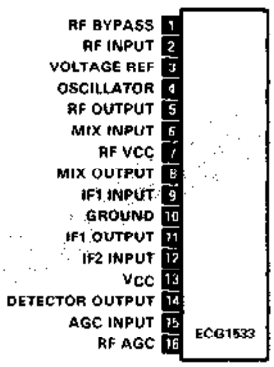
ECG1531 14-Pin DIP-ET See Fig. L144

IC-Voltage Regulator for Electronic Tuner



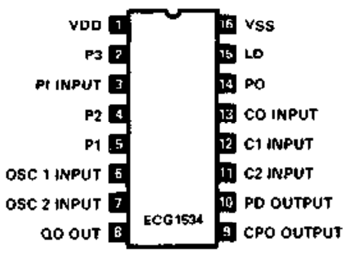
ECG1533 16-Pin ZIL See Fig. L46

IC-AM RF Amp, Mixer, Osc, IF Amp, Det and AGC, V_{CC} = 8 V Typ



ECG1534 16-Pin DIP See Fig. L111

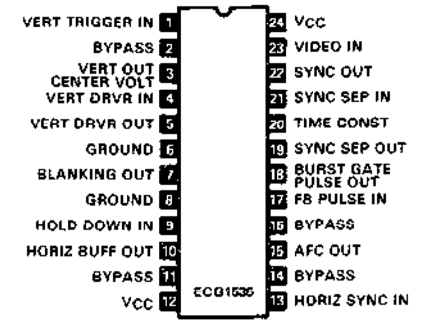
IC-AM/FM PLL Freq Synthesizer (CMOS), V_{DD} = 6 V Typ



Package Outlines - See Page 1-285

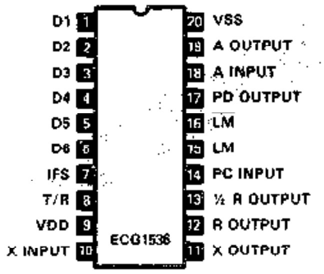
ECG1535 24-Pin DIP See Fig. L122

IC-TV Sync, Horiz/Vert Osc, Driver, AFC and HV Holddown, V_{CC} = 12 V Typ



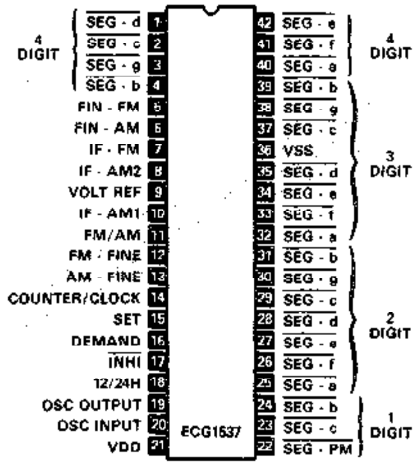
ECG1536 20-Pin DIP See Fig. L118

IC-CB PLL Freq Synthesizer (CMOS), V_{DD} = 7 V Typ



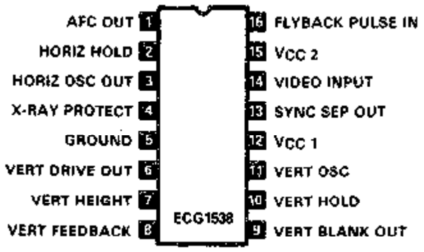
ECG1537 42-Pin DIP See Fig. L126

IC-Time-Freq Display for AM/FM w/ Stopwatch Day/Date (CMOS)
V_{DD} = 8 V Typ, V_{SS} = 0 V Typ, V_{REF} = < V_{DD}



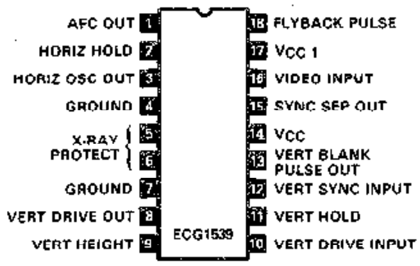
ECG1538 16-Pin DIP See Fig. L111

IC-TV Horiz/Vert Osc, Driver, Vert Blank, AFC and Sync Sep, V_{CC} = 12 V Typ



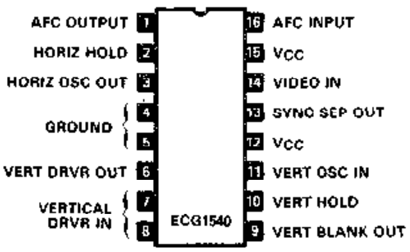
ECG1539 18-Pin DIP See Fig. L115

IC-TV Horiz/Vert Osc, Driver, Vert Blank, AFC and Sync Sep, V_{CC} = 12 V Typ



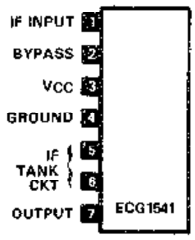
ECG1540 16-Pin DIP See Fig. L111

IC-TV Horiz/Vert Osc, Driver, Vert Blank, AFC and Sync Sep, V_{CC} = 12 V Typ



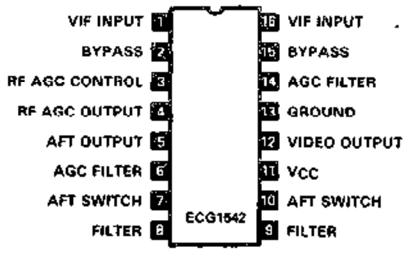
ECG1541 7-Pin SIP See Fig. L31

IC-FM IF Amp Detector, V_{CC} = 12 V Typ



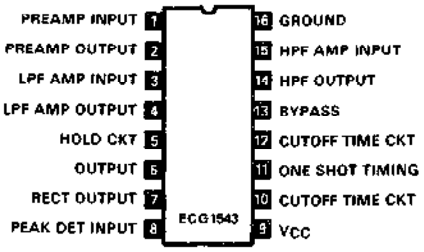
ECG1542 16-Pin DIP See Fig. L111

Video IF Amp/Detector/AGC, AFT, V_{CC} = 12 V Typ



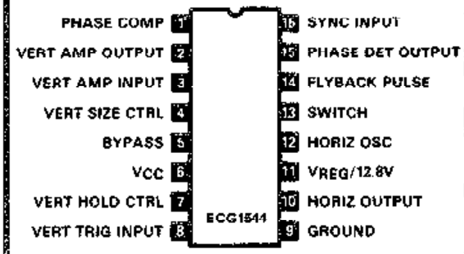
ECG1543 16-Pin DIP See Fig. L111

IC-FM Noise Suppressor (40 dB Typ), V_{CC} = 12.4 V Typ



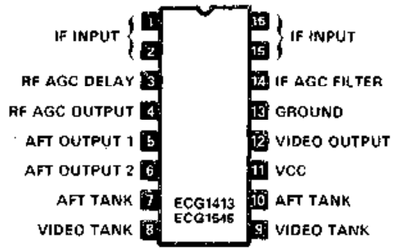
ECG1544 16-Pin DIP See Fig. L111

IC-TV Horiz/Vert Osc, Driver, AFC and X-Ray Prot, V_{CC} = 12 V Typ



ECG1545 16-Pin DIP See Fig. L111

IC-VIF, AGC Amp with AFT, V_{CC} = 12 V Typ



Package Outlines - See Page 1-285

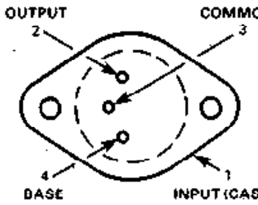
Linear IC and Module Circuits (cont'd)

ECG1546 TO-3, 3 Pin See Fig. L11A
Output = + 130 V DC, 1 A

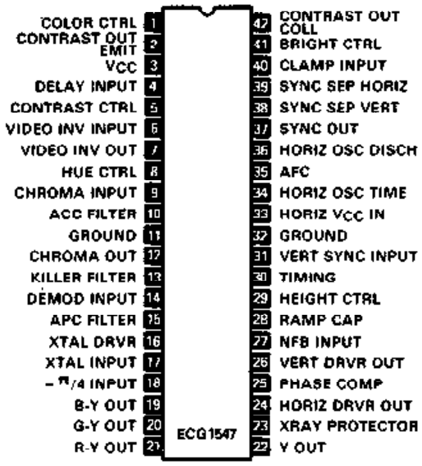
ECG1548
Output = + 123 V DC, 1 A

ECG1553
Output = + 127 V DC, 1 A

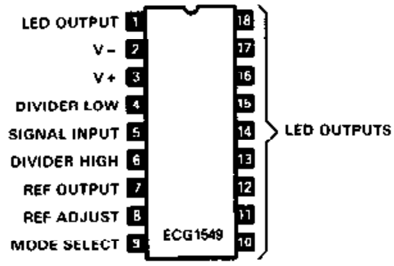
Hybrid TV Voltage Regulator



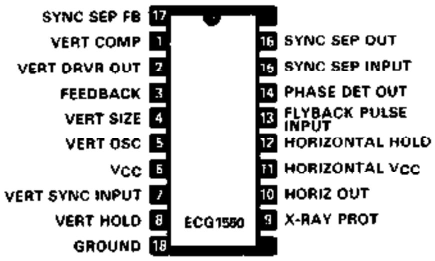
ECG1547 42-Pin DIP See Fig. L126
Video-Chroma Demod/Horiz/Vert/Osc Dr, V_{CC} = 12 V Typ



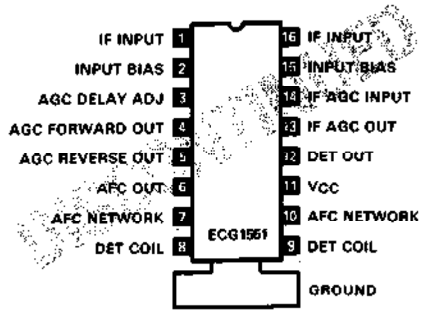
ECG1549 18-Pin DIP See Fig. L115
Voltage Level Ind Dr., 10 Step VU Meter



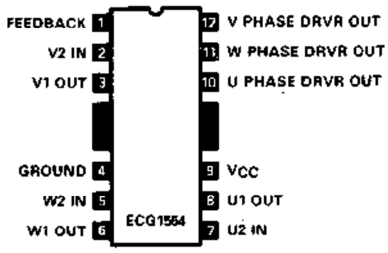
ECG1550 16 + 2-Pin DIP-ET See Fig. L114
TV Sync Signal Processor, V_{CC} = 12 V Typ



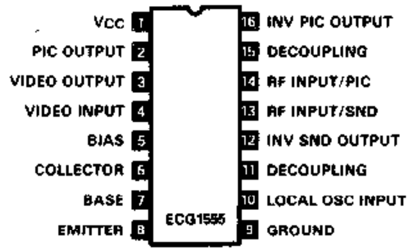
ECG1551 16-Pin DIP-ET See Fig. L151
TV Video IF Amp w/Detector, AGC, AFC, V_{CC} = 12 V Typ



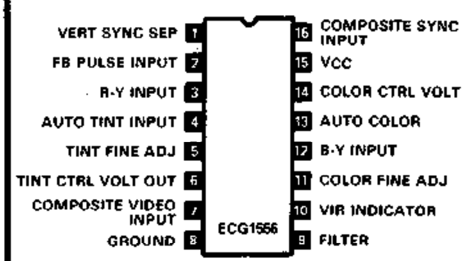
ECG1554 12-Pin DIP-W See Fig. L130
VCR Cylinder and Capstan Motor Drive, V_{CC} = 18 V Typ



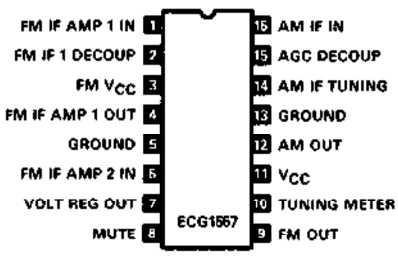
ECG1555 16-Pin DIP See Fig. L111
VCR Dual Balanced Mixer



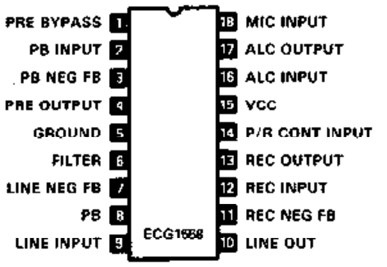
ECG1556 16-Pin DIP See Fig. L111
VIR Signal Processor, V_{CC} = 12 V Typ



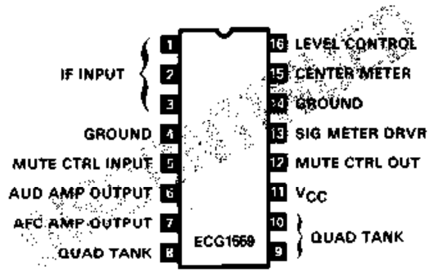
ECG1557 16-Pin DIP See Fig. L111
FM/AM/IF Amp, w/Det, AM, AGC and Meter Driver, V_{CC} = 5.5 V Typ



ECG1558 18-Pin DIP See Fig. L115
VCR Audio Record/Playback Amp, V_{CC} = 9 V Typ



ECG1559 16-Pin DIP See Fig. L111
FM IF Amp, AFC, Det, Mute and Meter Driver, V_{CC} = 13 V Typ

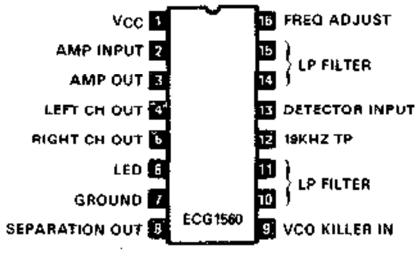


Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

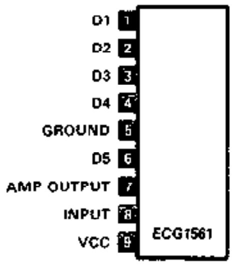
ECG1560 16-Pin DIP See Fig. L111

FM Stereo Demodulator V_{CC} = 6 V Typ



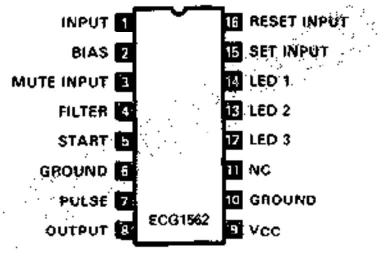
ECG1561 9-Pin SIP See Fig. L40

Voltage Level Ind. Dr, 5 Step VU Meter, Direct AC or DC Signal Inputs Io = 15 mA Typ/Seg, V_{CC} = 8 V Typ



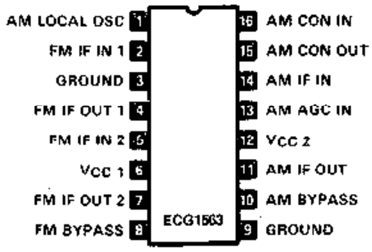
ECG1562 16-Pin DIP See Fig. L111

Programmable Search System for Audio Cassettes, V_{CC} = 9 V Typ



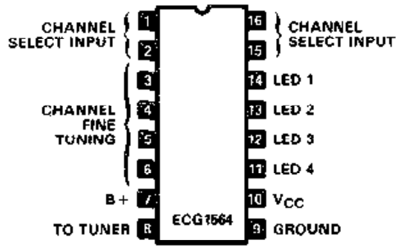
ECG1563 16-Pin DIP See Fig. L111

AM/FM IF Amp w/AM Tuner, V_{CC} = 4 V Typ



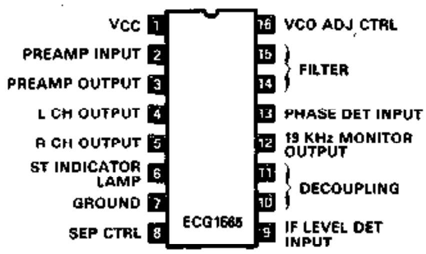
ECG1564 16-Pin DIP See Fig. L111

TV/FM Channel Selector System, B+ = 33 V, V_{CC} = 17 V Typ



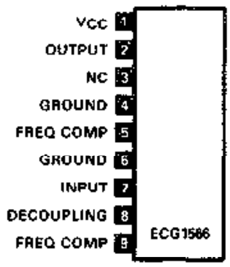
ECG1565 16-Pin DIP See Fig. L111

PLL FM Demod for Portable/Car Radio, V_{CC} = 9 V Typ



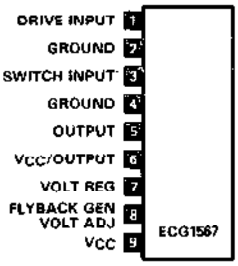
ECG1566 9-Pin SIP-HS See Fig. L81A

AF PO, 4.5 W, V_{CC} = 18 V Typ, R_L = 8 Ω



ECG1567 9-Lead Formed SIP See Fig. L81B

TV Vertical Deflection, V_{CC} = 26 V Typ



ECG1568 16-Pin DIP See Fig. L112

Capstan Freq Gen for 2, 4, 6 Hr Speed Control, V_{CC} = 12 V Typ

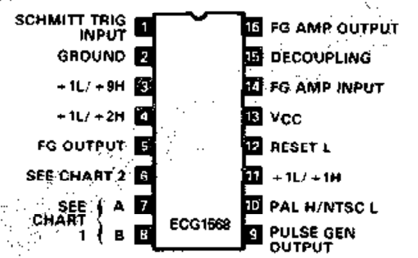


Chart 1

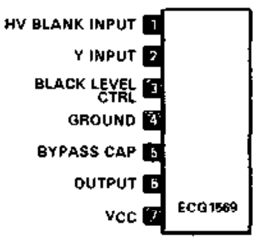
	2H	4H	6H
A	L	H	H
B	L	L	H

Chart 2

Pin 6	2H	4H	6H
H	1/2	1	1
L	1/6	1/3	1/2

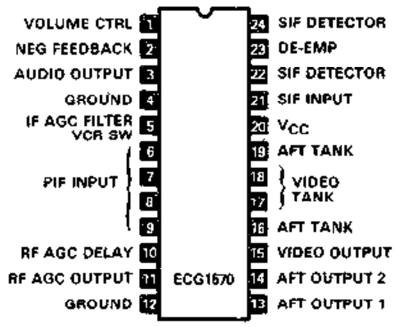
ECG1569 7-Pin SIP See Fig. L29

Video Amp/Blanker/Black Control, V_{CC} = 12 V Typ



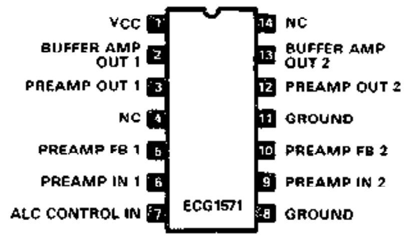
ECG1570 24-Pin DIP See Fig. L122

TV Video/IF/SIF/Det/AGC/Audio Driver for NPN Tuner, V_{CC} = 12 V Typ



ECG1571 14-Pin DIP See Fig. L104

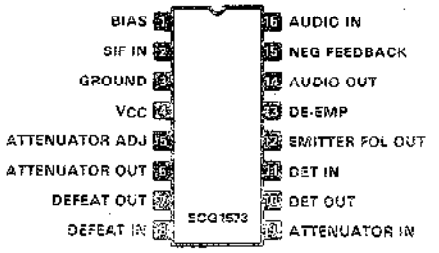
Dual Audio Preamp with ALC, V_{CC} = 6 V Typ



Package Outlines - See Page 1-285

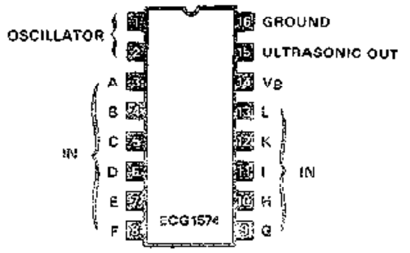
ECG1573 16-Pin DIP See Fig. L112

Sound IF, FM Limiter, Detector, Attenuator, AF Driver, V_{CC} = 11 V Typ



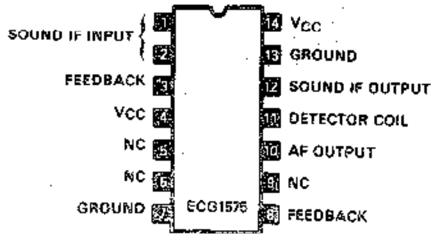
ECG1574 16-Pin DIP See Fig. L111

TV 30 Channel Remote Control Transmitter, V_B = 9 V



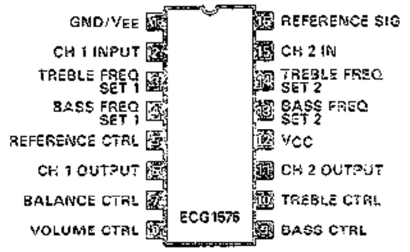
ECG1575 14-Pin DIP See Fig. L104

TV Sound IF Amp, V_{CC} = 5.5 V Typ



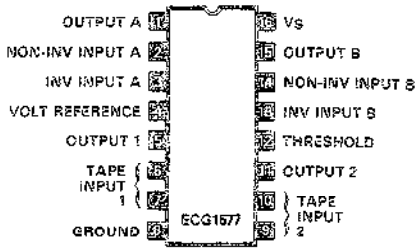
ECG1576 16-Pin DIP See Fig. L111

Dual Volume/Balance/Tone (Bass, Treble), DC Control. V_{CC} = 12 V Typ



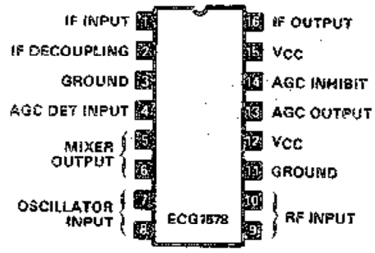
ECG1577 16-Pin DIP See Fig. L111

Dual Audio Tape Preamp (Lo Noise) w/Auto Reverse, V_S = 14.4 V



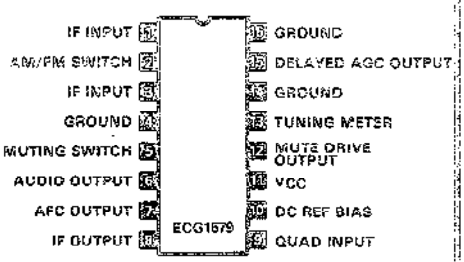
ECG1578 16-Pin DIP See Fig. L111

FM Mixer/IF Amp w/AGC Detector, V_{CC} = 8 V Typ



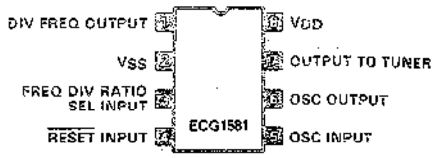
ECG1579 16-Pin DIP See Fig. L111

FM IF Amp w/AFC, Muting and Meter Driver, V_{CC} = 8 V Typ



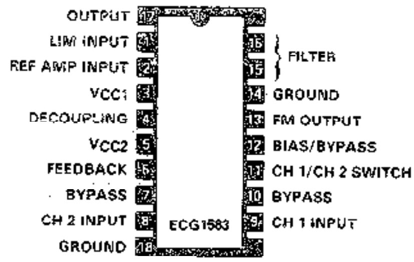
ECG1581 8-Pin DIP See Fig. L97

VCR Freq Divider/Counter (CMOS), V_{DD} = 6.5 V Typ



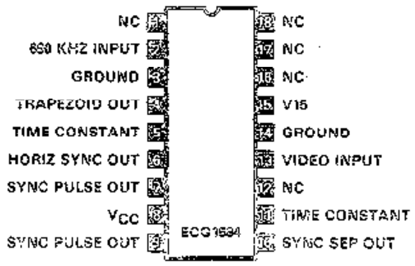
ECG1583 16 + 2-Pin DIP-ET See Fig. L114

VCR FM Demod/AGC/Clipper/Pre-Emph, $V_{CC}1$ = 12 V Typ, $V_{CC}2$ = 7 V Typ



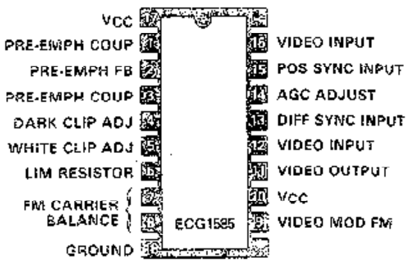
ECG1584 18-Pin DIP-ET See Fig. L152

VCR Sync Separator/Divider/Trapezoid Generator, V_{CC} = 12 V Typ



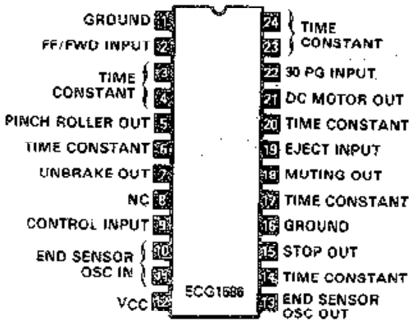
ECG1585 16 + 2-Pin DIP-ET See Fig. L114

VCR Video/Sync Amp/AGC/FM Mod/Limiter, V_{CC} = 12 V Typ



ECG1586 24-Pin DIP-ET See Fig. L153

VCR Tape Sensing/Mute/End of Tape Pause/Load/Rotation, V_{CC} = 12 V Typ

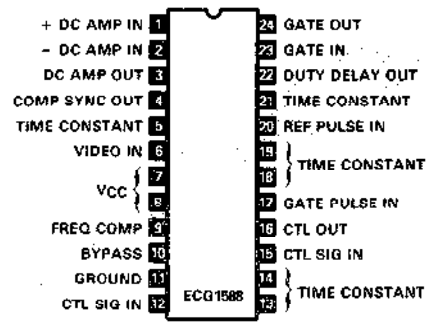


Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

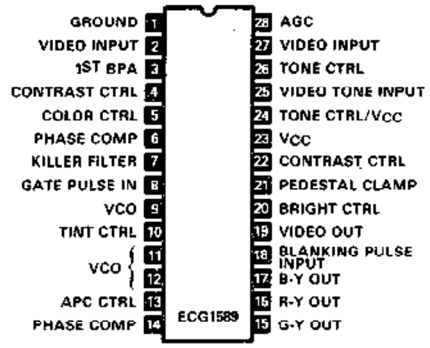
ECG1588 24-Pin DIP-ET See Fig. L153

VCR Drum Servo Control/Sync/Delay/Tracking, V_{CC} = 12 V Typ



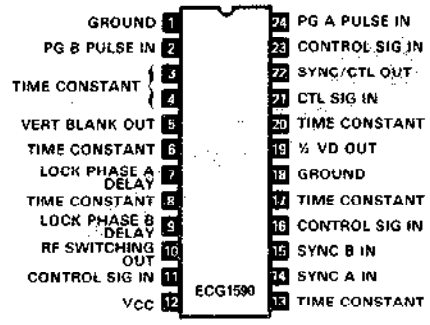
ECG1589 28-Pin DIP See Fig. L124

Chroma/Video Amp/Demod, V_{CC} = 12 V Typ



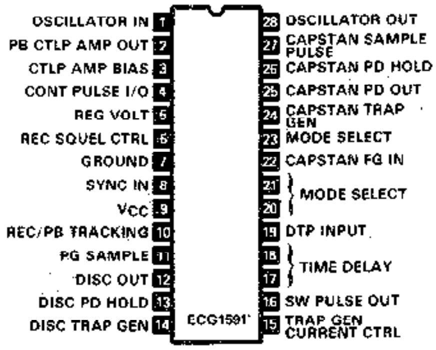
ECG1590 24-Pin DIP-ET See Fig. L153

VCR Drum/Capstan Servo Control/Phase/Blank Delay/Counter, V_{CC} = 12 V Typ



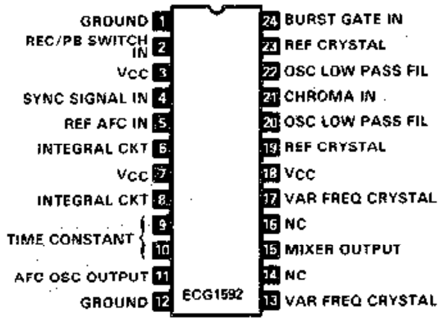
ECG1591 28-Pin DIP See Fig. L124

VCR Capstan Phase Control System, V_{CC} = 12 V Typ



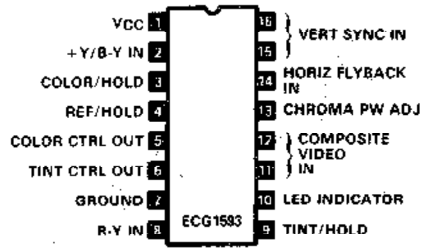
ECG1592 24-Pin DIP-ET See Fig. L153

VCR Auto Phase/Freq Det/ Color Osc and Mixer, V_{CC} = 12 V Typ



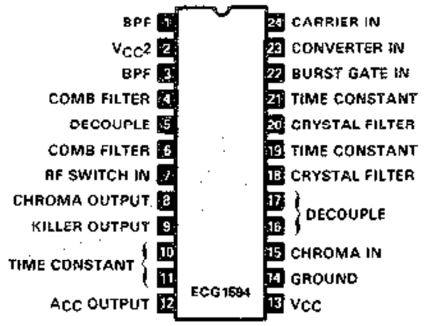
ECG1593 16-Pin DIP See Fig. L111

VIR Signal Processor, V_{CC} = 12 V Typ



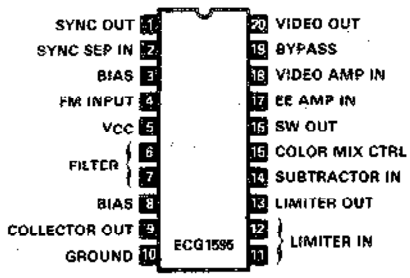
ECG1594 24-Pin DIP-ET See Fig. L153

VCR Playback/Chroma/Burst Amp/Det/Killer, V_{CC} = 12 V Typ



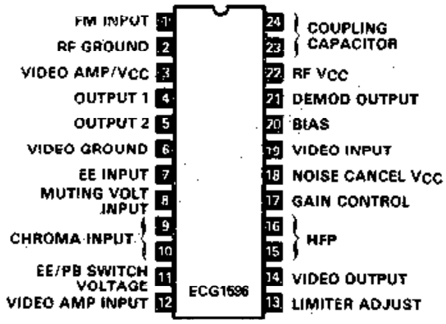
ECG1595 20-Pin DIP See Fig. L118

VCR FM Limiter Demod/Sync Sep/Video Amp, V_{CC} = 12 V Typ



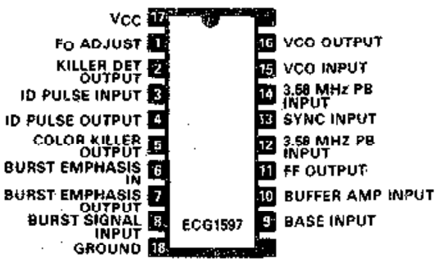
ECG1596 24-Pin DIP-ET See Fig. L153

VCR Freq Demod/Noise Cancel/Video Chroma Amp, V_{CC} = 12 V Typ



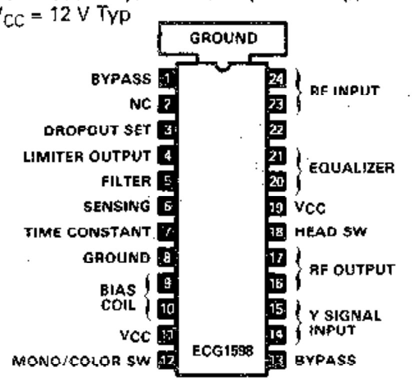
ECG1597 16 + 2-Pin DIP-ET See Fig. L114

Chroma Amp/VCR/Burst/Buffer Amp, V_{CC} = 14 V Max



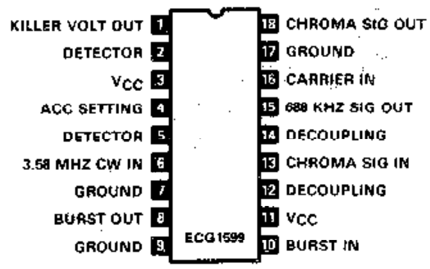
ECG1598 24-Pin DIP-ET See Fig. L153

VCR Head Amp/Limiter/Dropout Comp, V_{CC} = 12 V Typ



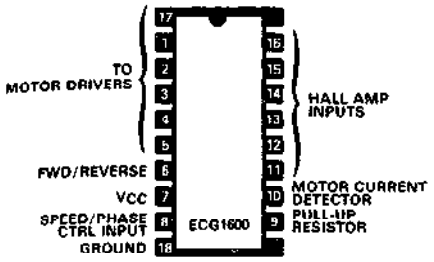
ECG1599 18-Pin DIP-ET See Fig. L152

VCR Chroma Processor and 688 kHz Modulator, V_{CC} = 12 V Typ

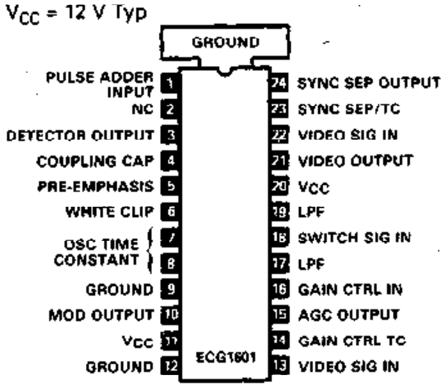


Package Outlines - See Page 1-285

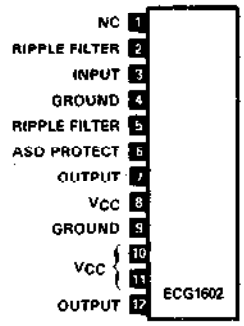
ECG1600 16 + 2-Pin DIP-ET See Fig. L114
VCR 3-Phase Motor Speed Control/Forward/Reverse, V_{CC} = 14 V Max



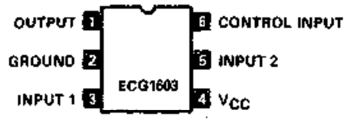
ECG1601 24-Pin DIP-ET See Fig. L153
VCR Video Sw/Sync Sep/AGC/FM Mod, V_{CC} = 12 V Typ



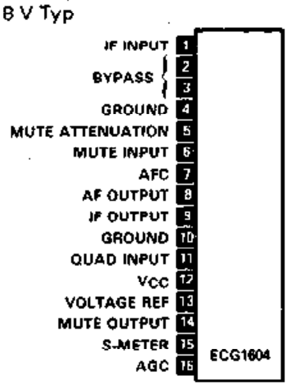
ECG1602 12-Pin SIP-HS See Fig. L92
19 W AF PO, V_{CC} = 13.2 V, R_L = 4 Ω



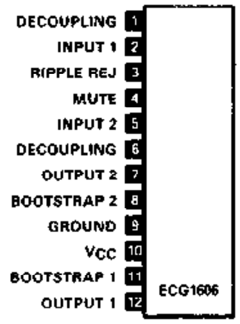
ECG1603 6-Pin DIP See Fig. L96A
VCR Electronic Switch, V_{CC} = 12 V Typ



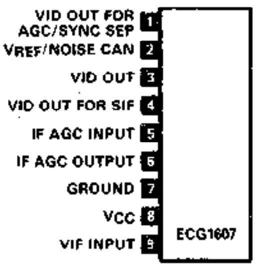
ECG1604 16-Pin ZIL See Fig. L46
IF/Det/Preamp/Meter Drive/Mute, V_{CC} = 8 V Typ



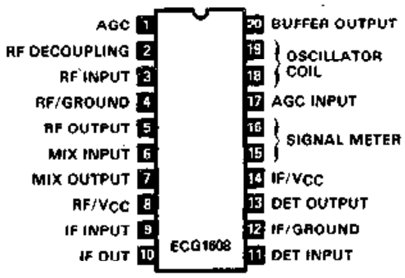
ECG1606 12-Pin SIP-HS See Fig. L92
Dual 4.3 W/Ch AF PO, V_{CC} = 12 V Typ, R_L = 4 Ω



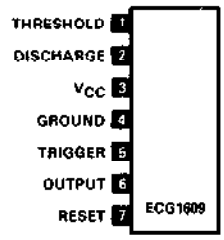
ECG1607 9-Pin SIP See Fig. L41
VIF/Det/Video Amp/AGC, V_{CC} = 5.5 V Typ



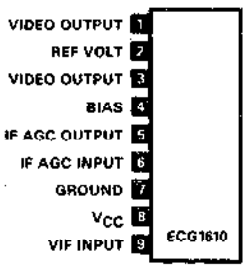
ECG1608 20-Pin DIP See Fig. L118
AM RF Amp/Osc/Mix/IF/Det for Electronic Tuning, V_{CC} = 12 V Typ



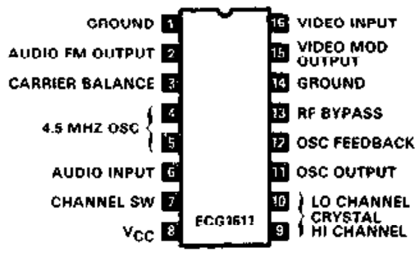
ECG1609 7-Pin SIP See Fig. L31A
VCR Instrumentation Timer, V_{CC} = 12 V Typ



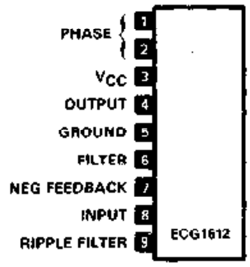
ECG1610 9-Pin SIP See Fig. L41
VIF Amp/Det/Video Amp/AGC, V_{CC} = 11 V Typ



ECG1611 16-Pin DIP See Fig. L111
VCR Video and FM Sound Mod/Carrier Osc, V_{CC} = 6.2 V Typ



ECG1612 9-Pin SIP See Fig. L40
700 mW AF PO for Battery Use, V_{CC} = 6 V Typ, R_L = 8 Ω



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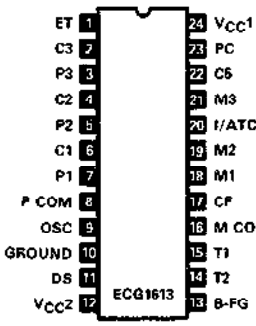
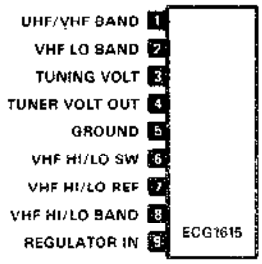
Linear IC and Module Circuits (cont'd)

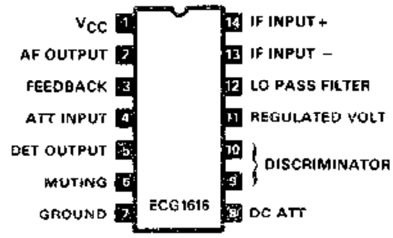
ECG1613 24-Pin DIP See Fig. L122A
VCR Cylinder Motor Drive/Control, V_{CC}1 & 2 = 12 V Typ



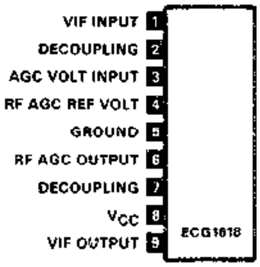
ECG1615 9-Pin SIP See Fig. L41
B/W TV Tuner Band Switch



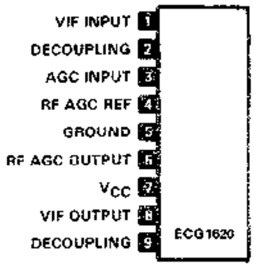
ECG1616 14-Pin DIP See Fig. L104
TV Sound IF Amp/Det/Driver, V_{CC} = 12 V Typ



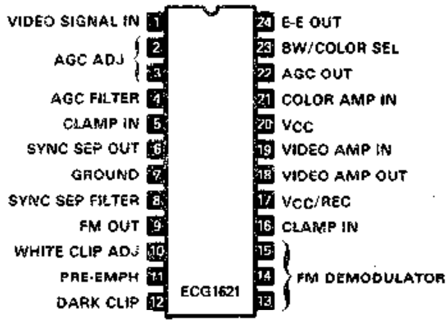
ECG1618 9-Pin SIP See Fig. L41
TV Video IF Amp and AGC, V_{CC} = 11 V Typ



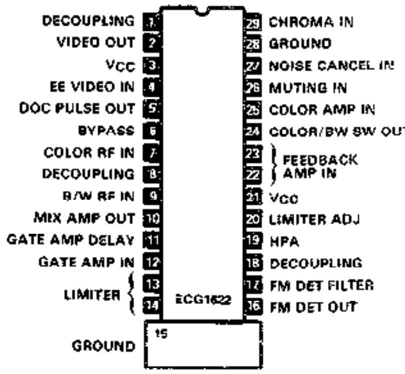
ECG1620 9-Pin SIP See Fig. L41
IC-TV Video IF/AGC/B & W, V_{CC} = 5.5 V Typ



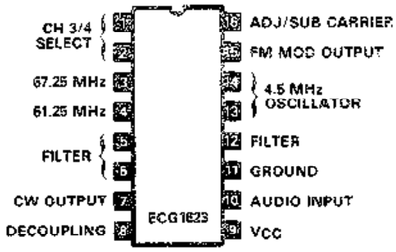
ECG1621 24-Pin DIP See Fig. L122
VCR Recording Video Proc/FM Mod/AGC/Sync/Clamp, V_{CC} = 12 V DC Typ



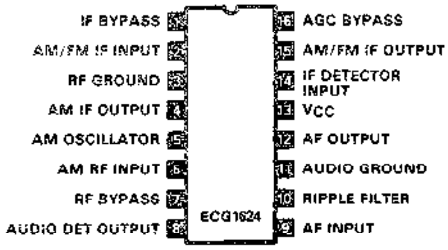
ECG1622 28-Pin DP-HS See Fig. L154
VCR Video/Color Amp/FM Demod, V_{CC} = 12 V Typ



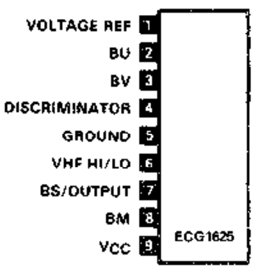
ECG1623 16-Pin DIP See Fig. L111
VCR Carrier Osc/FM Demod, V_{CC} = 9 V Typ



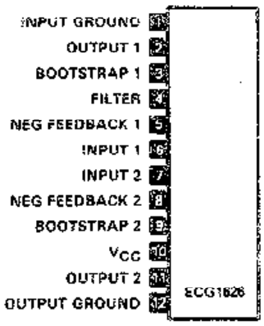
ECG1624 16-Pin DIP See Fig. L111
AM/FM IF/Det/AM Osc/Mix/AGC/AF Out, V_{CC} = 9 V Typ



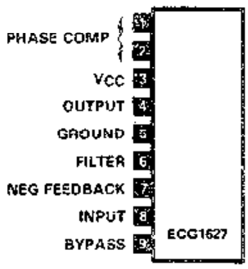
ECG1625 9-Pin SIP See Fig. L41
Tuner Band Switch/Tuning, V_{CC} = 24 V Typ, V_{REF} = 33 V Typ



ECG1626 12-Pin SIP See Fig. L57
Dual 4.2 W/Ch AF PO, V_{CC} = 12 V Typ, R_L = 4 Ω



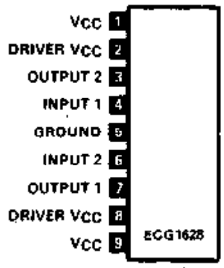
ECG1627 9-Pin SIP See Fig. L40
0.55 W (Typ) AF PO, V_{CC} = 6 V Typ, R_L = 8 Ω



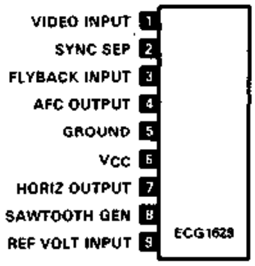
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

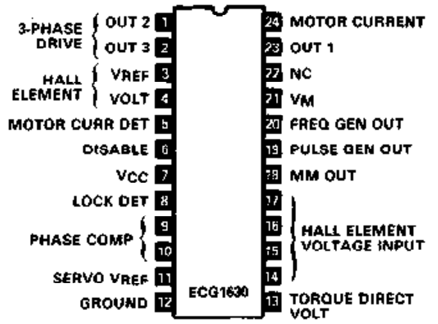
ECG1628 9-Pin SIP-HS See Fig. L80
VCR Loading/Bi-directional Motor Drive, V_{CC} = 15 V Typ



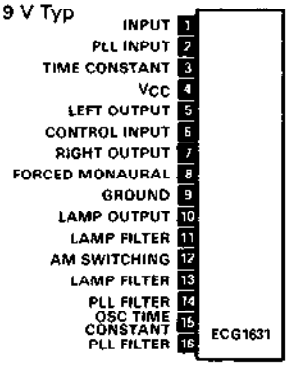
ECG1629 9-Pin SIP See Fig. L41
IC-TV Sync Sep/Phase Det/Horiz Osc, Driver, X-Ray Protect, V_{CC} = 11 V Typ



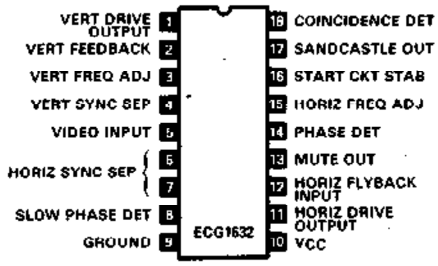
ECG1630 24-Pin DIP See Fig. L122A
IC-VCR 3 Phase Capstan Motor Driver, PG, FG, Motor Lock Det, V_{CC} = 13 V Max



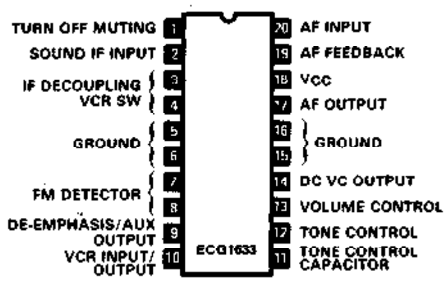
ECG1631 16-Pin ZIL See Fig. L47A
IC-FM Stereo Demod, Soft Muting, Pop Noise Reduction, V_{CC} = 9 V Typ



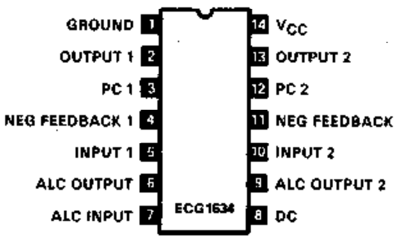
ECG1632 18-Pin DIP See Fig. L115
IC-Horiz, Vert, Osc, Sync, Driver, $V_{CC}1$ = 12 V Typ



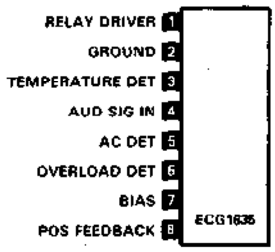
ECG1633 20-Pin DIP See Fig. L118A
IC-TV Sound IF, Tone, Vol, FM Det, Limiter, Preamp, P_O = 4 W, R_L = 16 Ω, V_S = 24 V Typ



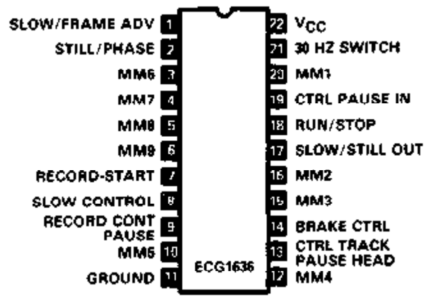
ECG1634 14-Pin DIP See Fig. L104
Dual Channel AF Preamp, V_{CC} = 5 V Typ



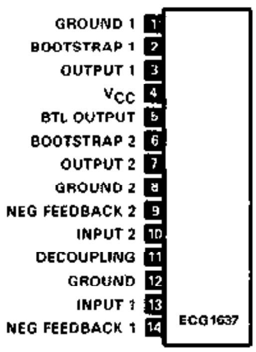
ECG1635 8-Pin SIP See Fig. L35A
Spkr Protector/Voltage/Temp/Overload, V_{CC} = 45 V



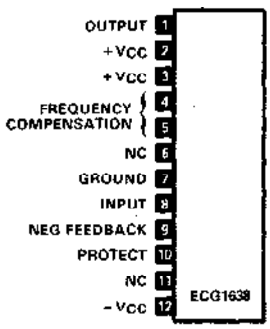
ECG1636 22-Pin DIP See Fig. L121
VCR Phase/Still Control



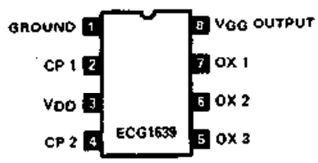
ECG1637 14-Pin SIP See Fig. L58
Dual 4.2 W (Typ)/Ch AF PO, V_{CC} = 12 V Typ, R_L = 4 Ω



ECG1638 12-Pin SIP See Fig. L57
6.5 W (Typ) AF PO, V_{CC} = ± 12 V Typ, R_L = 8 Ω



ECG1639 8-Pin DIP See Fig. L97
Clock Generator/Driver for BBD's, V_{DD} = 15 V Typ



Package Outlines • See Page 1-285

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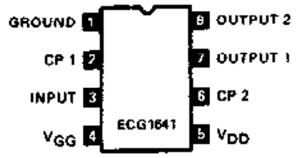
Linear IC and Module Circuits (cont'd)

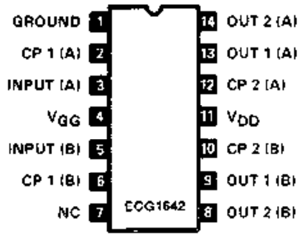
ECG1641 8-Pin DIP See Fig. L97

Audio Signal Delay, 1024 Stage Low Noise BBD, 5.12 to 51.2 msec Delay, V_{DD} = - 15 V Typ, V_{GG} = - 14 V Typ



ECG1642 14-Pin DIP See Fig. L104

Audio Signal Delay, Dual 512 Stage BBD (PMOS) Delay to 25.6 msec/Stage, V_{DD} = - 15 V Typ, V_{GG} = - 14 V Typ

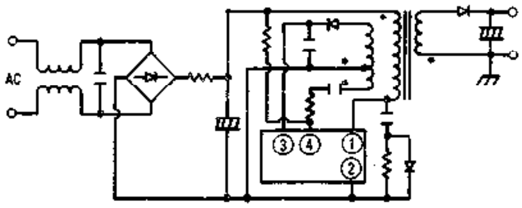


ECG1644 TO-3, 3-Pin See Fig. L11A

Hybrid Self Exciting Converter, V_{IN} = 120 V AC

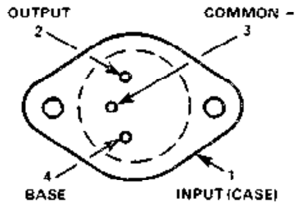
ECG1645

Hybrid Self Exciting Converter, V_{IN} = 240 V AC



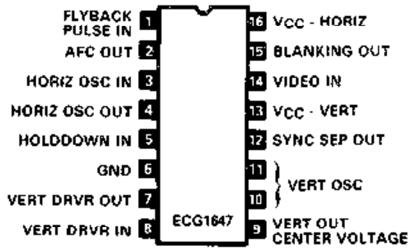
ECG1646 TO-3, 3-Pin See Fig. L11A

TV Voltage Regulator, Output = + 129 V DC, 1 A



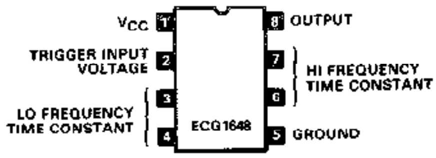
ECG1647 16-Pin DIP See Fig. L111

TV Horiz/Vert Osc/Driver/Sync Sep, AFC, V_{CC} = 12 V Typ



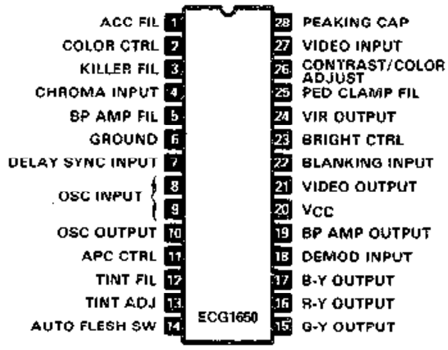
ECG1648 8-Pin DIP See Fig. L97

Telephone Tone Ringer, Programmable Threshold, with Logic Inhibit, V_{CC} = 15 V Typ



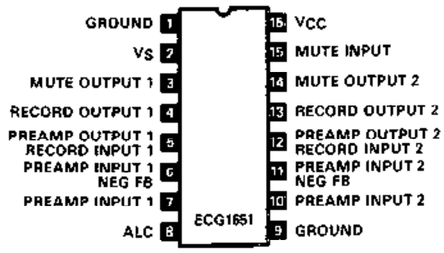
ECG1650 28-Pin DIP See Fig. L124

TV Video, Chroma, Amp, Demod, Color Osc, Auto Tint, V_{CC} = 12 V Typ



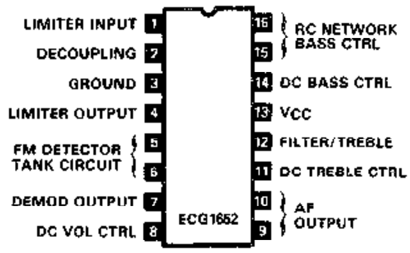
ECG1651 16-Pin DIP See Fig. L111

Recorder Dual Preamp w/ALC Det, Muting, V_{CC} = 9 V Typ



ECG1652 16-Pin DIP See Fig. L111

TV Audio Limiter/Amp, Demod and Bass/Treble Control



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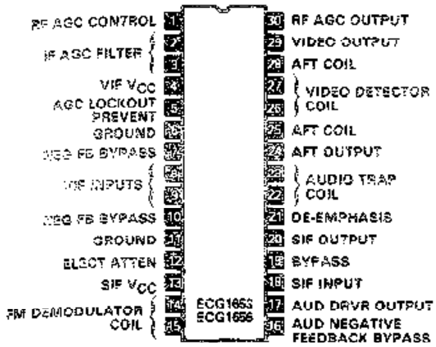
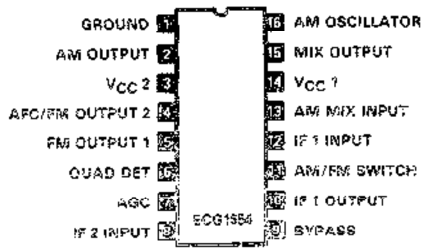
Linear IC and Module Circuits (cont'd)

ECG1653 30-Pin DIP See Fig. L124B
TV VIF/SIF Amp Det, Fwd AGC, AFT, Elect Att, and Audio Driver, V_{CC} = 12 V Typ

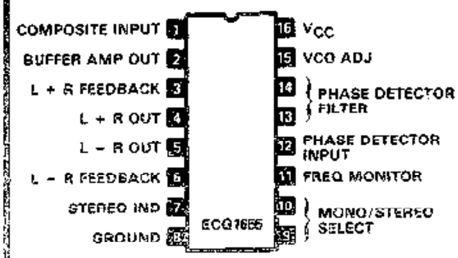
ECG1656
TV VIF/SIF Amp Det, Rev AGC, AFT, Elect Att, and Audio Driver, V_{CC} = 12 V Typ



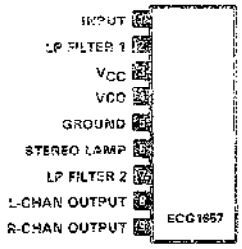
ECG1654 16-Pin DIP See Fig. L111
AM/FM IF Amp, AM-Mixer, Osc, Det, and FM-Quad Det. V_{CC} = 5 V Typ



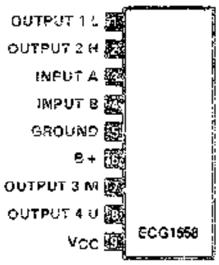
ECG1655 16-Pin DIP See Fig. L111
TV Stereo Decoder, V_{CC} = 12 V Typ



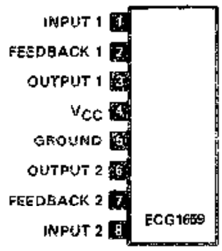
ECG1657 9-Pin SIP See Fig. L39
FM Stereo PLL Multiplex, V_{CC} = 8 V Typ



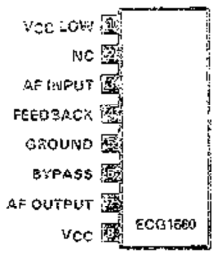
ECG1658 9-Pin SIP See Fig. L36
TV Tuner Band Selector, V_{CC} = 12 V Typ



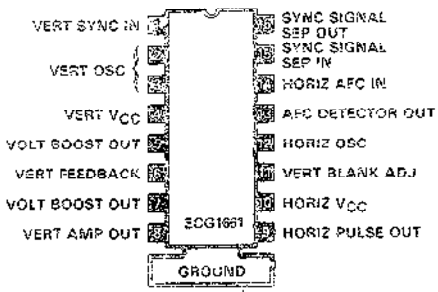
ECG1659 8-Pin SIP See Fig. L35
Dual AF Preamp, V_{CC} = 7 V Typ



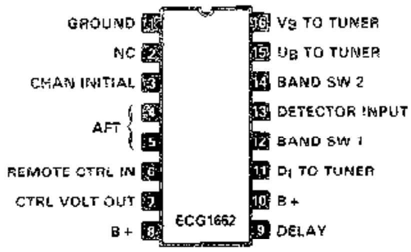
ECG1660 8-Pin SIP See Fig. L34
IC-Audio Preamp, V_{CC} = 9 V Typ, V_G = 63 dB Typ



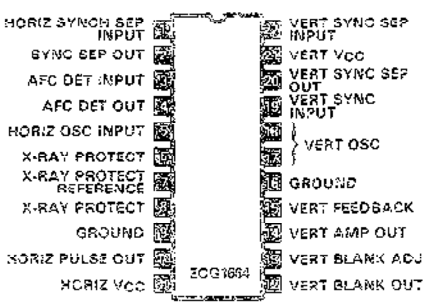
ECG1661 16-Pin DIP-ET See Fig. L150A
IC-TV Horiz, Vert Processor, Vert Out, V_{CC} = 12 V Typ



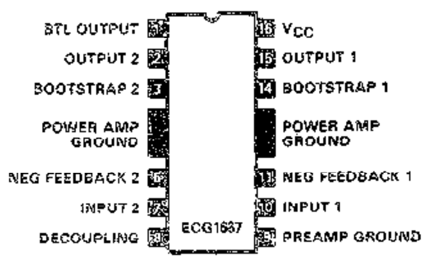
ECG1662 16-Pin DIP See Fig. L111
IC-TV/FM Channel Selector Controller, B+ = 18 V Typ



ECG1664 22-Pin DIP See Fig. L121
IC-TV Sync Horiz, Vert Osc, Driver, AFC, X-Ray Protect, V_{CC} = 12 V Typ



ECG1667 16-Pin DIP-W See Fig. L136
IC-Dual AF PO, 2.3 W, Bridge (BTL), 4.7 W, V_{CC} = 9 V, R_L = 8 Ω



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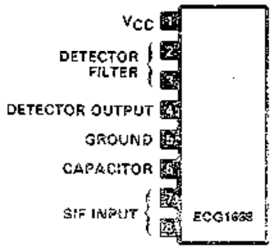
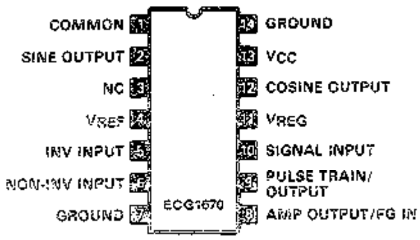
Linear IC and Module Circuits (cont'd)

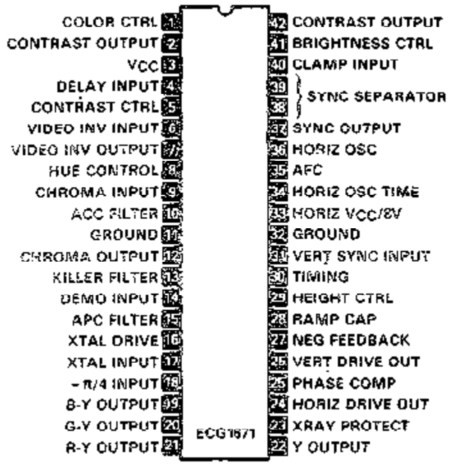
ECG1668 8-Pin SIP See Fig. L35
IC-TV Sound IF, Detector, V_{CC} = 12 V Typ



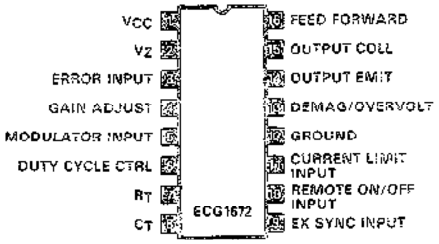
ECG1670 14-Pin DIP See Fig. L104
IC-Tachometer and Air Core Meter Driver, V_{CC} = 20 V Max



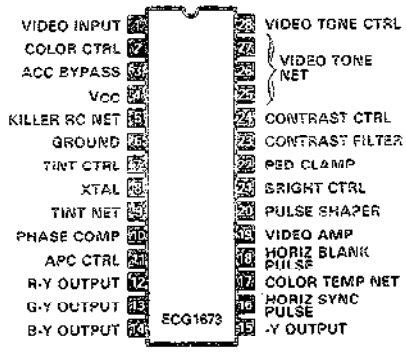
ECG1671 42-Pin DIP See Fig. L126
IC-Video-Chroma Demod, Horiz, Vert, Osc, Dr, HV Protect, V_{CC} = 12 V Typ



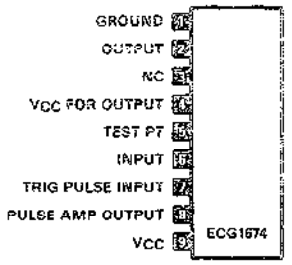
ECG1672 16-Pin DIP See Fig. L111
IC-Pulse Width Modulator Control Ckt, V_{CC} = 12 V Typ



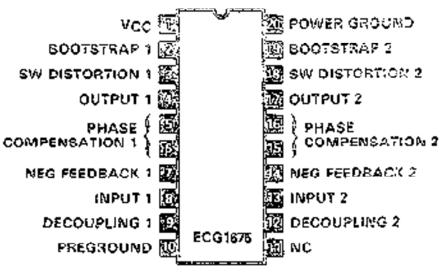
ECG1673 28-Pin DIP See Fig. L124
IC-TV Chroma, Vid Amp, Demod, V_{CC} = 12 V Typ



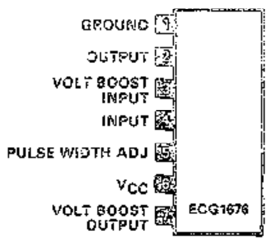
ECG1674 9-Pin SIP-HS See Fig. L79
IC-TV Vertical Deflection, V_{CC} = 24 V Typ



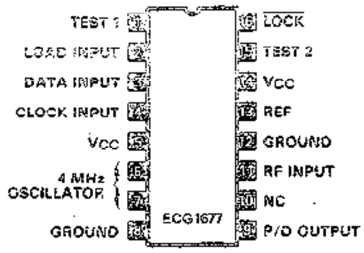
ECG1675 20-Pin DIP See Fig. L119A
IC-Dual AF PO, 8.5 W, V_{CC} = 15 V Typ, R_L = 3 Ω



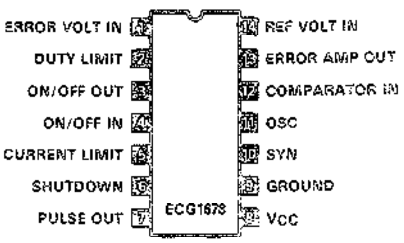
ECG1676 7-Pin SIP See Fig. L49
IC-TV Vertical Deflection, V_{CC} = 24 V Typ



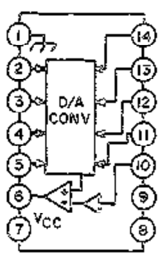
ECG1677 16-Pin DIP See Fig. L111
Frequency Synthesizer for TV/CATV Tuner, V_{CC} = 5 V Typ



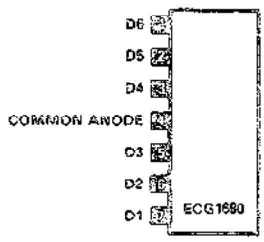
ECG1678 14-Pin DIP See Fig. L105
Switching Regulator for TV with Shutdown, V_{CC} = 6.6 V Typ



ECG1679 14-Pin DIP See Fig. L104
VCR D/A Converter and Comparator, V_{CC} = 9 V Typ



ECG1680 7-Pin SIP See Fig. L25
Diode Array, Common Anode



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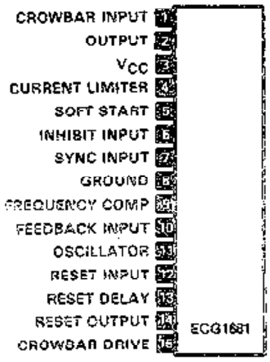
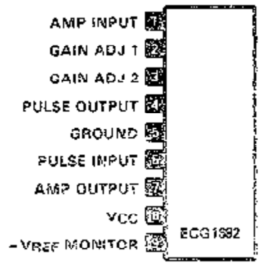
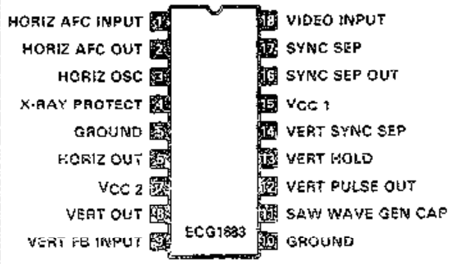
ECG1681 15-Pin SIP See Fig. L93A
High Current Switching Regulator, 5.1-40 V at 4 A



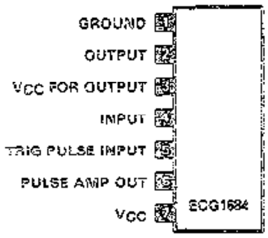
ECG1682 9-Pin SIP See Fig. L41
Preamp for IR Remote Control, V_{CC} = 12 V Typ



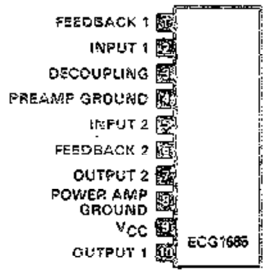
ECG1683 18-Pin DIP See Fig. L115
TV Horizontal/Vertical Processor, V_{CC} = 12 V Typ



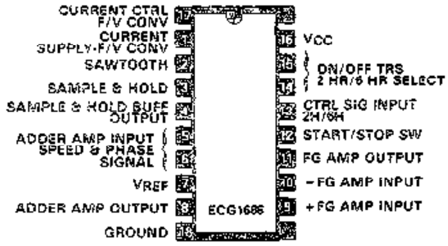
ECG1684 7-Pin SIP-HS See Fig. L76A
TV Vertical Deflection, V_{CC} = 24 V Typ



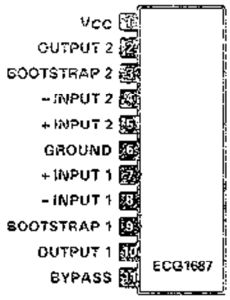
ECG1685 10-Pin SIP-HS See Fig. L88
Dual AF PO, 3.5 W, V_{CC} = 16 V Typ, R_L = 8 Ω



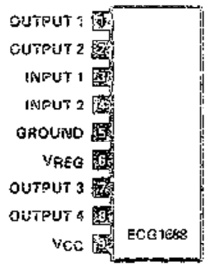
ECG1686 16 + 2-Pin DIP-ET See Fig. L114
VCR Capstan Speed Controller, V_{CC} = 9 V Typ



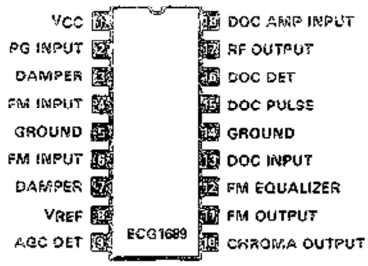
ECG1687 11-Pin SIP-HS See Fig. L93B
Dual AF PO, 2.5 W, Bridge (BTL), 7.8 W, V_{CC} = 9 V Typ, R_L = 4 Ω



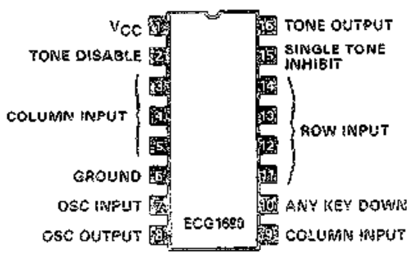
ECG1688 9-Pin SIP See Fig. L41
TV Tuner Band Switch - 4 Circuit, V_{CC} = 12 V Typ



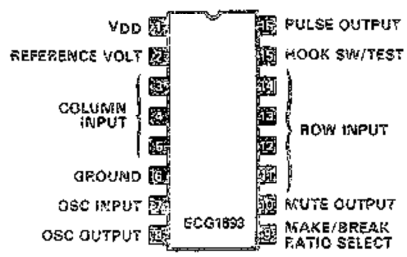
ECG1689 18-Pin DIP See Fig. L115
VCR Head Amp/Limiter/D.O.C./Switching, V_{DD} = 5 V Typ



ECG1690 16-Pin DIP See Fig. L111
Dual Tone Multifrequency (DTMF) Dialer (CMOS), V_{CC} = 6 V Typ



ECG1693 16-Pin DIP See Fig. L111
Push Button Pulse Dialer with Redial (CMOS), V_{DD} = 6 V Max



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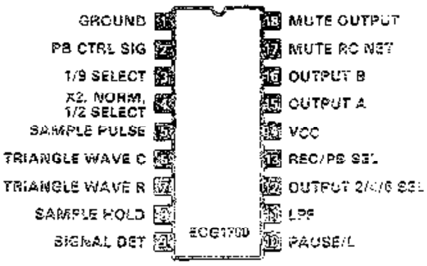
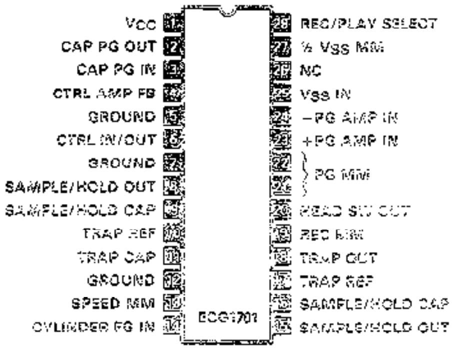
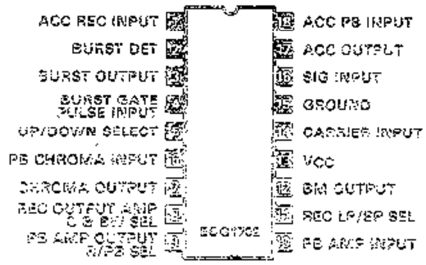
ECG1700 18-Pin DIP See Fig. L115
VCR Frequency Divider and Speed Select, 2/4/6 Hr., V_{CC} = 12 V Typ



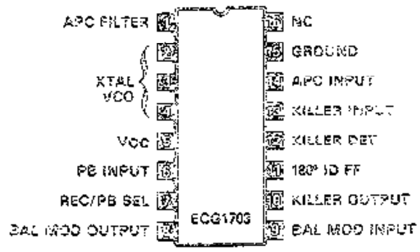
ECG1701 28-Pin DIP See Fig. L124
VCR Drum Servo Control for Speed/Phase V_{CC} = 12 V Typ



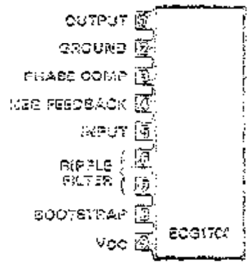
ECG1702 18-Pin DIP See Fig. L115
VCR Color Signal Processor, V_{CC} = 12 V Typ



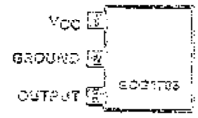
ECG1703 16-Pin DIP See Fig. L112
VCR Color Signal Processor, V_{CC} = 12 V Typ



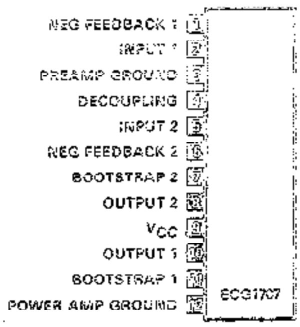
ECG1704 9-Pin SIP See Fig. L41
AF Power Amp, 1.2 W, V_{CC} = 9 V Typ, R_L = 8 Ω



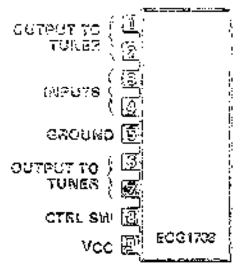
ECG1706 3-Pin SIP See Fig. L178
Hall Switch - VCR End of Tape Sensor, V_{CC} = 18 V Max



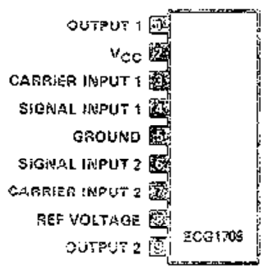
ECG1707 12-Pin SIP See Fig. L57A
Dual AF PO, 5.5 W, V_{CC} = 13.2 V Typ, R_L = 4 Ω



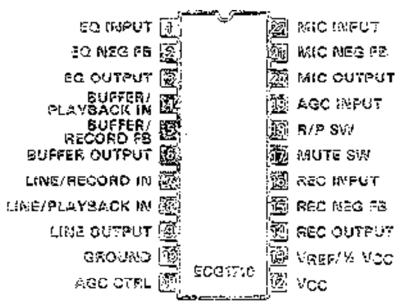
ECG1708 9-Pin SIP See Fig. L36
TV Tuner Band Selector, V_{CC} = 12 V Typ



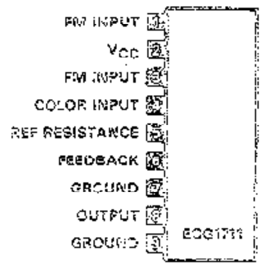
ECG1709 9-Pin SIP See Fig. L41
VCR Dual Balanced Modulator, V_{CC} = 9 V Typ



ECG1710 22-Pin DIP See Fig. L121
VCR Record/Playback Circuit, V_{CC} = 9 V Typ

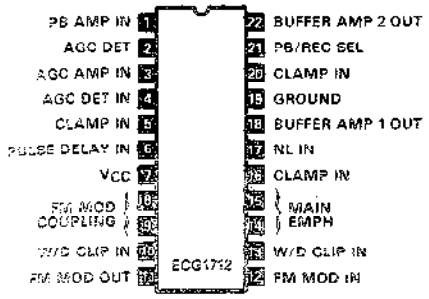


ECG1711 9-Pin SIP See Fig. L41
VCR Recording Amp Circuit, V_{CC} = 9 V Typ

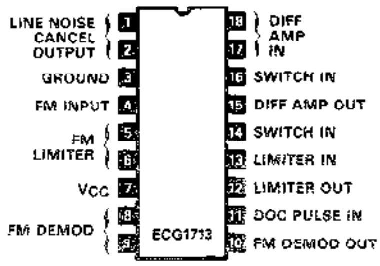


Package Outlines - See Page 1-285

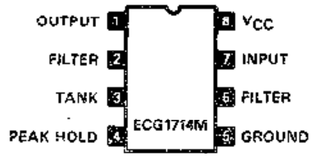
ECG1712 22-Pin DIP See Fig. L121
VCR Video Processor for Recording,
$V_{CC} = 5$ V



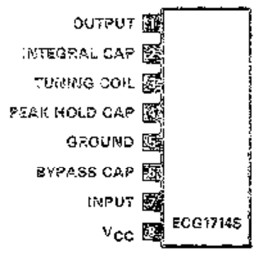
ECG1713 18-Pin DIP See Fig. L115
VCR Line Noise Cancelling Circuit,
$V_{CC} = 5$ V Typ



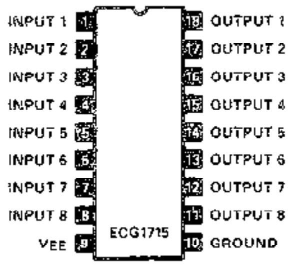
ECG1714M 8-Pin DIP See Fig. L98
TV Remote Control Signal Amp,
$V_{CC} = 5$ V Typ



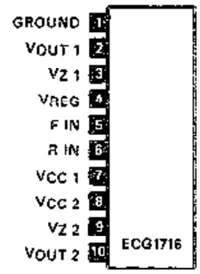
ECG1714S 8-Pin SIP See Fig. L35B
TV Remote Control Signal Amp,
$V_{CC} = 8.5$ V Typ



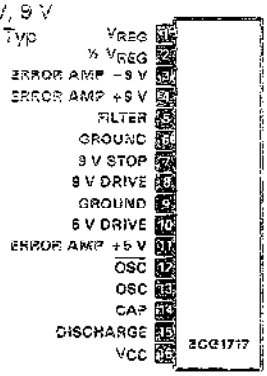
ECG1715 18-Pin DIP See Fig. L115
Fluorescent Display Driver - 8 Circuits,
$V_{EE} = -50$ V Typ



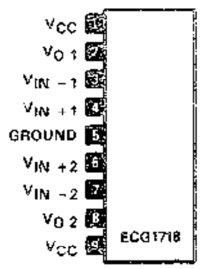
ECG1716 10-Pin SIP-HS See Fig. L87
VCR Motor Driver with Braking,
$V_{CC} = 18$ V Max, $I_O = 1.6$ A Max



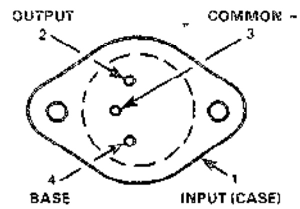
ECG1717 16-Pin ZIL See Fig. L47A
VCR Dual Switching Power
Supply, 5 V, 9 V
$V_{CC} = 12$ V Typ



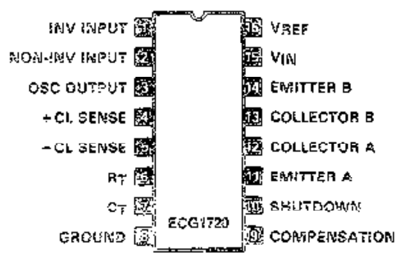
ECG1718 9-Pin SIP See Fig. L39
Dual Comparator/VCR, Single/Dual Supply,
$V_{CC} = +36$ V or ± 18 V Max



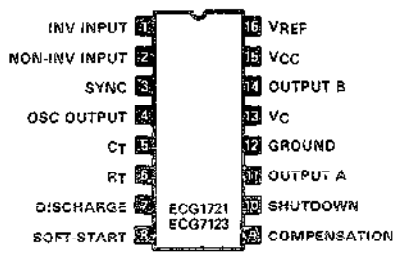
ECG1719 TO-3, 3-Pin See Fig. L11A
Hybrid TV Voltage Regulator,
Output = +120 V DC, 1 A



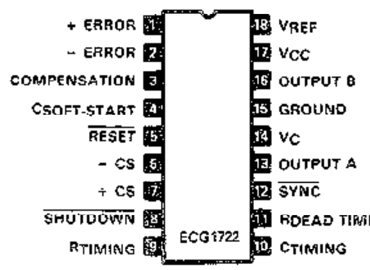
ECG1720 16-Pin DIP See Fig. L112
Pulse Width Modulator/Dual Switching Reg.
Outputs



ECG1721 16-Pin DIP See Fig. L112
Pulse Width Modulator/Dual NOR Sw.
Reg. Outputs/ + Output Pulse
ECG1723
Pulse Width Modulator/Dual OR Sw. Reg.
Outputs/ − Output Pulse



ECG1722 18-Pin DIP See Fig. L115
Pulse Width Modulator/Dual Totem Pole
Outputs, $V_{CC} = 15$ V Typ, $V_C = 4.5$ V to 35 V

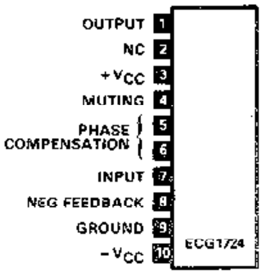


Package Outlines - See Page 1-285

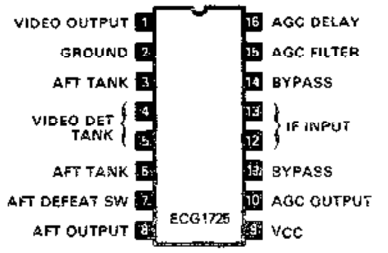
N

Linear IC and Module Circuits (cont'd)

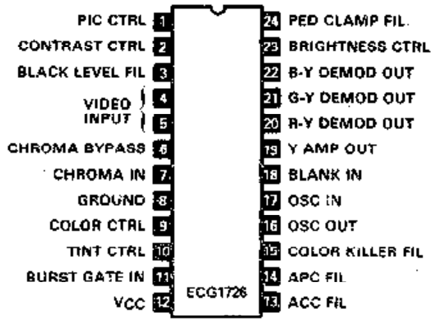
ECG1724 10-Pin SIP See Fig. L52A
AF PO, 20 W, $V_{CC} = \pm 22$ V, $R_L = 8\ \Omega$



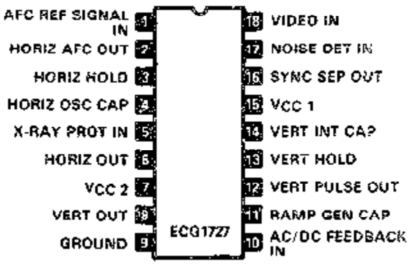
ECG1725 16-Pin DIP See Fig. L111
TV Video/IF Amp, Det, AFT, AGC, $V_{CC} = 12$ V Typ



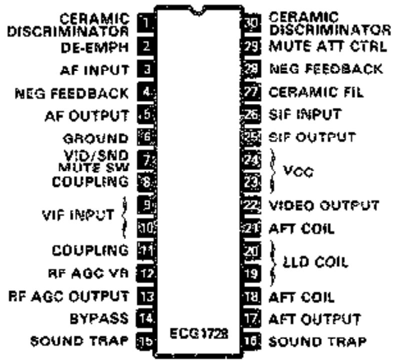
ECG1726 24-Pin DIP See Fig. L122
TV Chrome and Vid Processor/Demod, $V_{CC} = 12$ V Typ



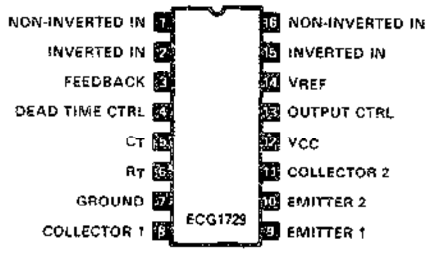
ECG1727 18-Pin DIP See Fig. L116
TV Signal Processor with V/H Osc/AFC Sync Sep/X-Ray Protect, $V_{CC}1 = 12$ V Typ, $V_{CC}2 = 10.5$ V Max



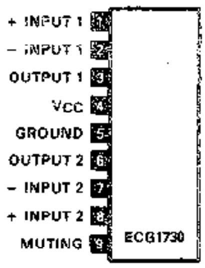
ECG1728 30-Pin DIP See Fig. L124C
TV VIF/SIF Amp/Det/AGC/AFT/Elect Att Audio Driver, $V_{CC} = 12$ V Typ



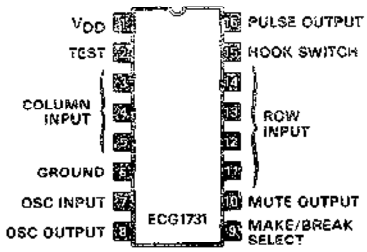
ECG1729 16-Pin DIP See Fig. L111
Pulse Width Modulator Control Ckt, $V_{CC} = 15$ V Typ



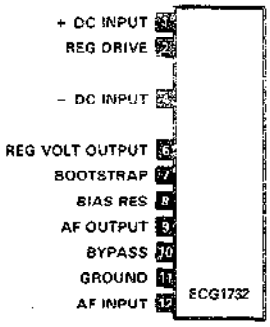
ECG1730 9-Pin SIP See Fig. L39
Dual Hi Gain Preamp, $V_{CC} = 10$ V Typ



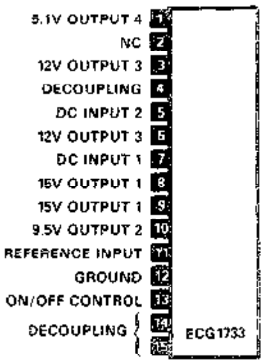
ECG1731 16-Pin DIP See Fig. L111
Ten Number Repertory Dialer (CMOS), $V_{DD} = 5$ V Typ



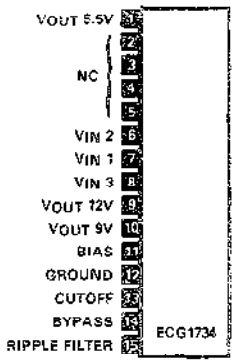
ECG1732 12-Pin SIP See Fig. L67A
135 V Regulator Plus AF PO 4 W for TV



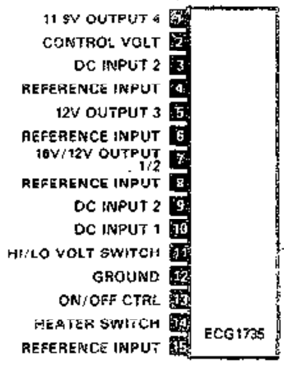
ECG1733 15-Pin SIP See Fig. L69A
VCR Fixed VR, 15 V @ 1 A, 9.5 V @ 1 A, 12 V @ 1 A, 5.1 V @ 0.5 A



ECG1734 15-Pin SIP See Fig. L69A
VCR Fixed VR, 12 V @ 2 A, 9 V @ 1 A, 5.1 V @ 0.5 A



ECG1735 15-Pin SIP See Fig. L69A
VCR Fixed VR, 16 V @ 1 A, 12 V @ 1 A, 12 V @ 1.5 A, 11.9 V @ 1.5 A



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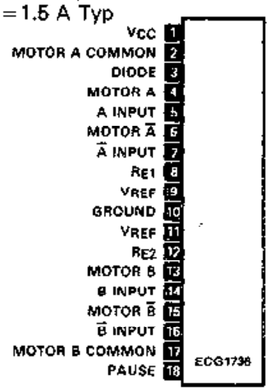
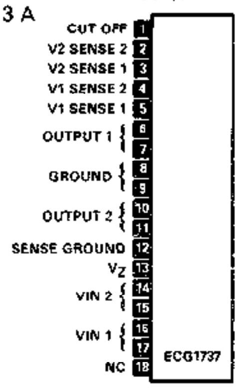
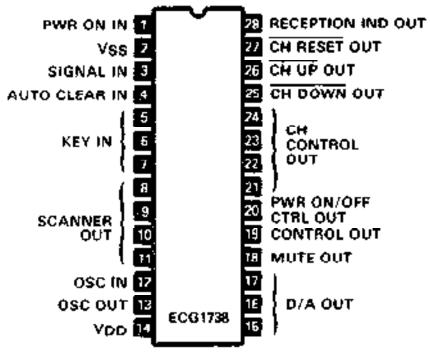
ECG1736 18-Pin SIP See Fig. L75A
4-Phase Constant Current Step Motor Driver, $V_{CC}=24$ V, $I_L=1.5$ A Typ



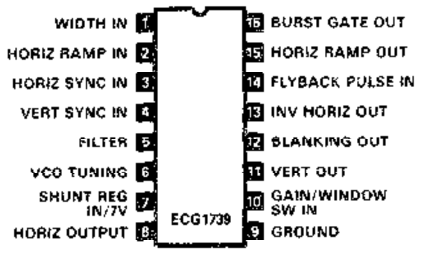
ECG1737 18-Pin SIP-M See Fig. L75B
Chopper Dual Power Supply, 5 V @ 3 A, 24 V @ 3 A



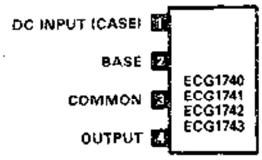
ECG1738 28-Pin DIP See Fig. L124
TV/Stereo Remote Control Receiver, $V_{DD}=12$ V Typ



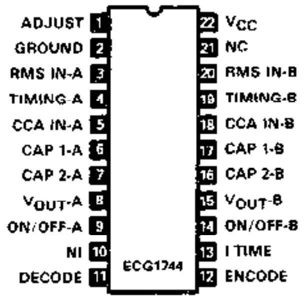
ECG1739 16-Pin DIP See Fig. L111
TV Horiz/Vert Deflection Oscillator Countdown, $V_{CC}=12$ V Typ



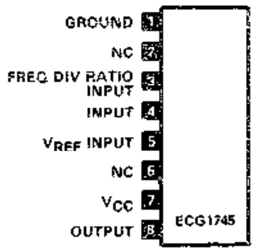
ECG1740 4-Pin SIP See Fig. L18B
TV Voltage Regulator, Output = 115 V, 1 A
ECG1741
Output = 125 V @ 1 A
ECG1742
Output = 130 V @ 1 A
ECG1743
Output = 135 V @ 1 A



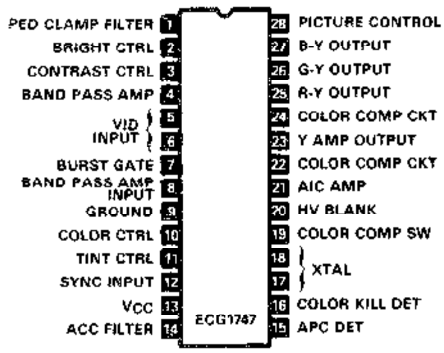
ECG1744 22-Pin DIP See Fig. L121
Dual dbx Noise Reduction, $V_{CC}=3$ V Typ



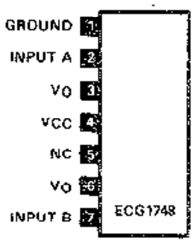
ECG1745 8-Pin SIP See Fig. L35
VCR Hi Speed Frequency Divider, (1/20 to 1/100), $V_{CC}=5$ V Typ



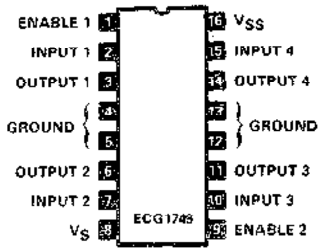
ECG1747 28-Pin DIP See Fig. L124
TV Chroma/Vid Processor/Demodulator, $V_{CC}=12$ V Typ



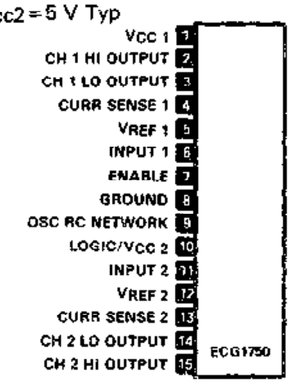
ECG1748 7-Pin SIP See Fig. L30A
DC Motor Driver, $V_{CC}=12$ V Typ



ECG1749 16-Pin DIP See Fig. L111
Dual Bidirectional Motor Driver, $V_{SS}=5$ V, $V_S=24$ V



ECG1750 15-Pin SIP-HS See Fig. L93A
Dual Solenoid/Motor Driver, $V_{CC}1=36$ V Typ, $V_{CC}2=5$ V Typ



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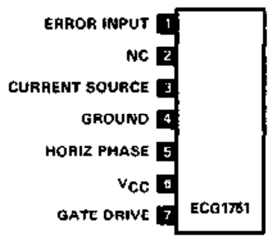
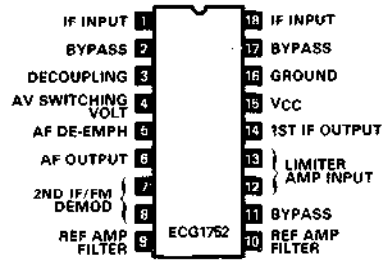
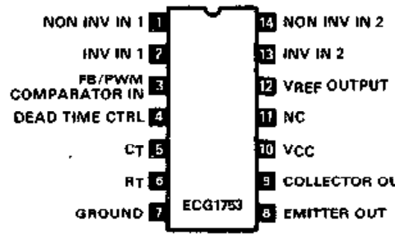
ECG1751 7-Pin SIP See Fig. L29
TV/Switching SCR Driver for Voltage Reg., V_{CC} = 30 V Max



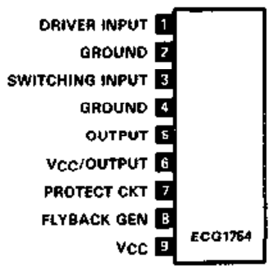
ECG1752 18-Pin DIP See Fig. L115
TV Sound IF/Lim/Det/Demod/AF Out, V_S = 12 V Typ



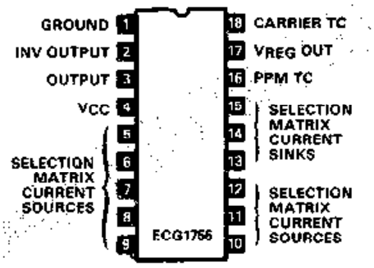
ECG1753 14-Pin DIP See Fig. L104
Pulse Width Modulation Control Ckt, V_{CC} = 15 V Typ



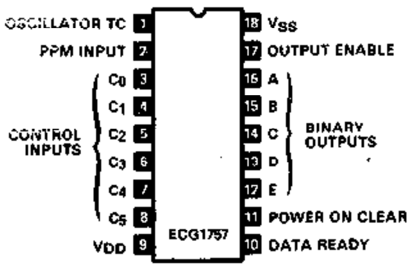
ECG1754 9-Pin SIP See Fig. L51A
TV Vertical Deflection, V_{CC} = 26 V Typ



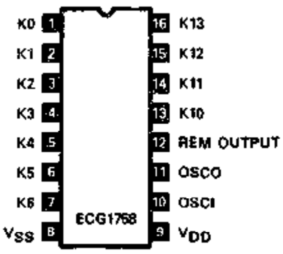
ECG1755 18-Pin DIP See Fig. L115
32-Command Remote Control Transmitter, V_{CC} = 9 V Typ



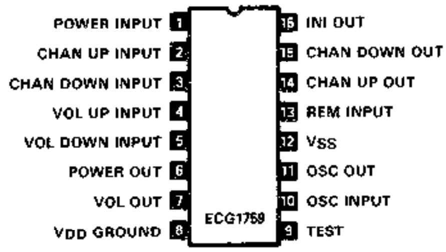
ECG1757 18-Pin DIP See Fig. L115
Programmable Remote Control Receiver, V_{DD} = −16 V Typ (PMOS)



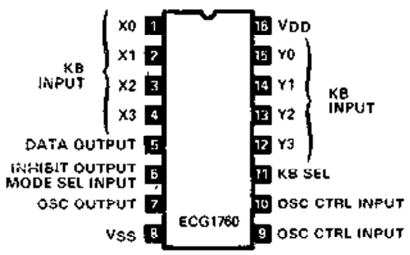
ECG1758 16-Pin DIP See Fig. L111
27-Command Remote Control Transmitter, V_{DD} = 6 V Typ (CMOS)



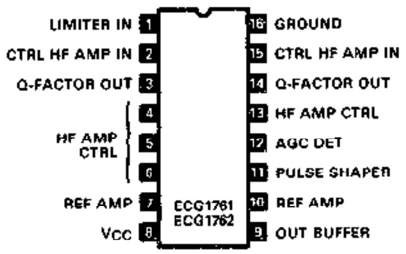
ECG1759 16-Pin DIP See Fig. L111
26-Command Remote Control Receiver, V_{SS} = −12 V Typ (PMOS)



ECG1760 16-Pin DIP See Fig. L111
32-Command Remote Control Transmitter, V_{DD} = −9 V Typ (PMOS)

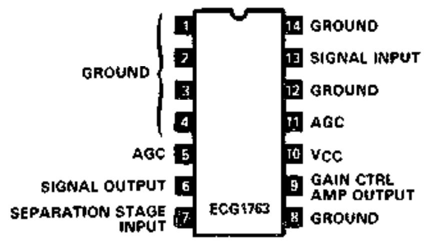


ECG1761 16-Pin DIP See Fig. L111
ECG1762
Infrared Remote Control Receiver, V_{CC} = 5 V Typ



ECG1761 - Active Hi Output
ECG1762 - Active Lo Output

ECG1763 14-Pin DIP See Fig. L104
Remote Control Infrared Preamp, V_{CC} = 20 V Max



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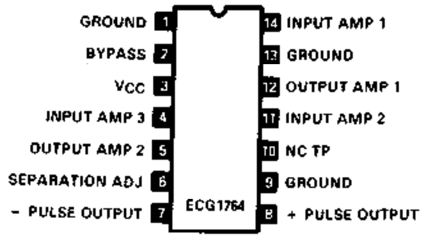
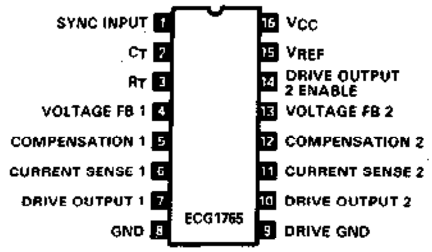
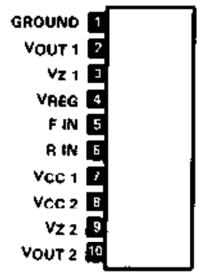
ECG1764 14-Pin DIP See Fig. L104
Remote Control Infrared Preamp, V_{CC} = 6 V Max and 5 V Typ



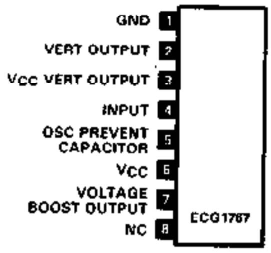
ECG1765 16-Pin DIP See Fig. L111
Dual Channel Current Mode Controller/Totem Pole Outputs, V_{CC} = 15 V Typ



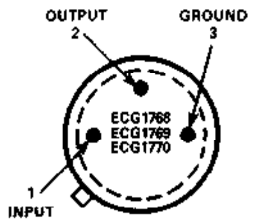
ECG1766 10-Pin SIP-HS See Fig. L87
Motor Driver with Braking, V_{CC} = 12 V, I_O = 2.2 A Max



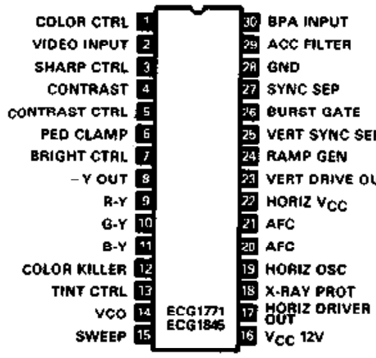
ECG1767 8-Pin SIP See Fig. L78A
Vertical Deflection Output, V_{CC} = 24 V Typ



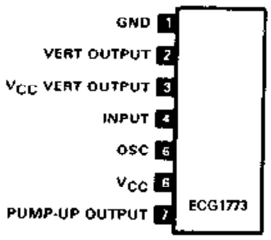
ECG1768 3-Pin Can See Fig. L1B
RF/IF/VHF Hybrid Amp, I_D = 10 mA, V_D = 2.9 Vdc, P_G = 14 dB Typ, B_W = 400 MHz
ECG1769
RF/IF/VHF Hybrid Amp, I_D = 25 mA, V_D = 5 Vdc, P_G = 14 dB Typ, B_W = 400 MHz
ECG1770
RF/IF/VHF Hybrid Amp, I_D = 25 mA, V_D = 3.2 Vdc, P_G = 10 dB Typ, B_W = 600 MHz



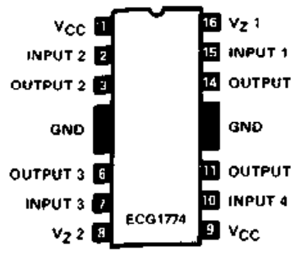
ECG1771 30-Pin DIP See Fig. L124C
Vid/Chroma/Demod/Horiz-Vert Osc/Driver/Sync Sep/HV Protect, V_{CC} = 12 V Typ



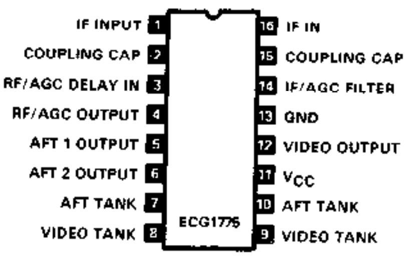
ECG1773 7-Pin SIP-HS See Fig. L76B
TV Vertical Deflection, V_{CC} = 24 V Typ



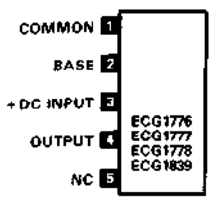
ECG1774 16-Pin DIP-W See Fig. L136
Dual Bidirectional Motor Driver, V_{CC} = 12 V Typ



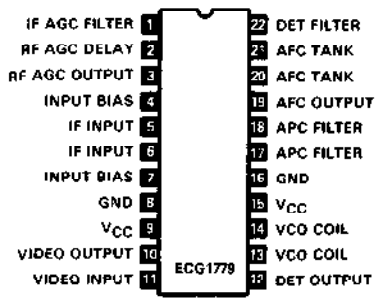
ECG1775 16-Pin DIP See Fig. L111
VIF/AFT/Reverse AGC/Video Amp, V_{CC} = 12 V Typ



ECG1776 5-Lead Formed SIP See Fig. L19B
TV Voltage Regulator, Output = 123 V @ 1 A
ECG1777
Output = 130 V @ 1 A
ECG1778
Output = 135 V @ 1 A



ECG1779 22-Pin DIP See Fig. L121
TV Vid/IF Amp/Det/AGC/AFC, V_{CC} = 12 V Typ



Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

ECG1780 — 12-Pin SIP See Fig. L43A
Dual Volume/Tone/Balance Control, $V_{CC} = 12$ V Typ

Pin	Function
1	BALANCE CONTROL
2	V_{CC}
3	R-CH OUTPUT
4	R-CH LO-FREQ INPUT
5	BASS CONTROL
6	R-CH INPUT
7	GND
8	TREBLE CONTROL
9	L-CH INPUT
10	L-CH OUTPUT
11	L-CH LO-FREQ INPUT
12	VOLUME CONTROL

ECG1781 — 8-Pin SIP See Fig. L32
VCR/TV Electronic Video Sw, $V_{CC} = 12$ V Typ

Pin	Function
1	V_{CC}
2	INPUT 2
3	CONTROL INPUT
4	OUTPUT
5	GND
6	NC
7	INPUT 1
8	NC

ECG1782 — 7-Pin SIP-HS See Fig. L76A
TV Vertical Deflection, $V_{CC} = 24$ V Typ

Pin	Function
1	GND
2	OUTPUT
3	V_{CC} FOR OUTPUT
4	INPUT
5	TRIG INPUT
6	PULSE AMP OUTPUT
7	V_{CC}

ECG1783 — 7-Pin SIP See Fig. L27
TV Volume Control and Mute, $V_{CC} = 10$ V Typ

Pin	Function
1	SND INPUT
2	MUTE INPUT
3	VOLUME CONTROL
4	GND
5	FEEDBACK
6	V_{CC}
7	SND OUTPUT

ECG1784 — 16-Pin DIP See Fig. L111
TV Horizontal Processor, $V_S = 12$ V Typ

Pin	Function	Pin	Function
1	V_S	16	GND
2	– OUT	15	OSC CNTRL CURR
3	+ OUT	14	OSCILLATOR
4	PROTECT INPUT	13	CONST CURR OUT
5	PHASE SHIFT FILTER	12	TIME CONST SW
6	FLYBACK INPUT	11	COINCIDENCE DET
7	KEY/BLNK PULSE OUT	10	VERT SYNC SEP OUT
8	SYNC SEP INPUT	9	VERT SYNC SEP INPUT

ECG1785 — 16-Pin DIP See Fig. L112
TV VIF/AGC/AFC Amp, $V_{CC} = 12$ V Typ

Pin	Function	Pin	Function
1	IF INPUT	16	IF INPUT
2	COUPLING CAP	15	COUPLING CAP
3	AGC DELAY INPUT	14	AGC FILTER
4	AGC OUTPUT	13	GND
5	AFC OUTPUT	12	VIDEO OUTPUT
6	AFC SW INPUT	11	V_{CC}
7	AFC TANK SYNC	10	AFC TANK SYNC
8	AFC TANK AMP	9	AFC TANK AMP

ECG1786 — 24-Pin DIP See Fig. L122
TV Computer Interface for Digital Tuning/Control (CMOS)

Pin	Function	Pin	Function
1	DAC 3 OUTPUT	24	DAC 2 OUTPUT
2	SERIAL DATA LINE	23	DAC 1 OUTPUT
3	SERIAL CLOCK LINE	22	DAC 0 OUTPUT
4	P20 (I/O PORT)	21	OSC INPUT
5	P21 (I/O PORT)	20	PRE-SENSE INPUT
6	P22 (I/O PORT)	19	Vp2 +13V
7	P23 (I/O PORT)	18	P13 (TUNER BAND SEL PORT OUTPUT)
8	AFC + INPUT	17	P12 (TUNER BAND SEL PORT OUTPUT)
9	AFC – INPUT	16	P11 (TUNER BAND SEL PORT OUTPUT)
10	TUNER VOLT INPUT	15	P10 (TUNER BAND SEL PORT OUTPUT)
11	GND	14	Vp3 +32V
12	TUNER VOLT AMP OUTPUT	13	Vp1 +12V

ECG1787 — 7-Pin SIP See Fig. L31B
VCR Audio Record/Playback Sw, $V_{CC} = 9$ V Typ

Pin	Function
1	PLAYBACK SW
2	NC
3	RECORD SW
4	GND
5	RECORD INPUT
6	V_{CC} 9V
7	PLAYBACK INPUT

ECG1788 — 7-Lead Formed SIP See Fig. L19A
TV Vertical Deflection Output, $V_S = 35$ V

Pin	Function
1	INV INPUT
2	V_S 35V
3	FB GEN
4	GND
5	OUTPUT
6	OUTPUT V_S
7	NON-INV INPUT

ECG1789 — 9-Pin SIP-HS See Fig. L79
TV Sound Output/Volume Control/Mute, PO 2.3 W Typ, $V_{CC}1 = 12$ V Typ, $V_{CC}2 = 18$ V Typ

Pin	Function
1	V_{CC}1 12V
2	SND INPUT
3	MUTE CONTROL
4	VOL CONTROL
5	FILTER
6	FEEDBACK
7	GND
8	SND OUTPUT
9	V_{CC}2 18V

ECG1790 — 64-Pin DIP See Fig. L126B
TV PIF/SIF/Video/Chroma/Deflection/Audio/HV Protect, $V_{CC} = 9$ V Typ

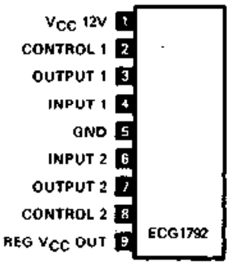
Pin	Function	Pin	Function
1	X-RAY PROTECTOR	64	HOR DR OUTPUT
2	TINT CONTROL	63	32 FH OSC
3	COLOR CONTROL	62	32 FH OSC
4	FSC VCO	61	32 FH OSC
5	KILLER FILTER	60	AFC
6	FSC VCO	59	FLYBACK PULSE INPUT
7	APC FILTER	58	H V_{CC}
8	CONTRAST	57	SYNC SEP INPUT
9	R-Y OUTPUT	56	SYNC SEP
10	R-Y OUTPUT	55	VERTICAL NFB
11	B-Y OUTPUT	54	VERTICAL OUTPUT
12	GND	53	VIDEO INPUT
13	Y OUTPUT	52	DIFF INPUT
14	PEDESTAL CLAMP	51	PICTURE SHARP
15	BRIGHTNESS	50	GND
16	V_{CC} 9V	49	CHROMA INPUT
17	BYPASS	48	ACC FILTER
18	RF AGC DELAY	47	VIDEO OUTPUT
19	V_{CC} 9V	46	RF AGC OUTPUT
20	PIF INPUT	45	VIDEO DET TANK
21	PIF INPUT	44	VIDEO DET TANK
22	PIF AGC	43	AFT TANK/DEFEAT
23	PIF AGC	42	AFT OUTPUT
24	GND	41	4.5 MHZ OUTPUT
25	QIF INPUT	40	GND
26	QIF INPUT	39	I/C DET
27	QIF AGC	38	I/C DET
28	PRE-AMP OUTPUT	37	V_{CC} 9V
29	NFB	36	SIF INPUT
30	VOLUME CONTROL	35	SIF BIAS
31	AUDIO INPUT	34	DET OUTPUT
32	FM DET TANK	33	FM DET TANK

ECG1791 — 9-Pin SIP See Fig. L41A
TV Remote Control Signal Amp, $V_{CC} = 5$ V Typ

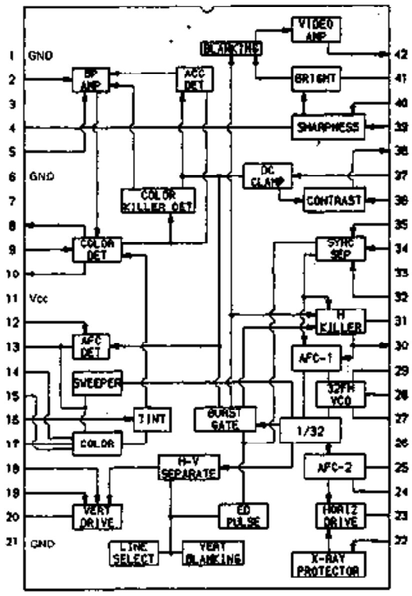
Pin	Function
1	OUTPUT
2	2ND STAGE TANK
3	CARRIER FILTER
4	1ST STAGE TANK
5	GND
6	BIAS FILTER
7	PEAK HOLD DET
8	INPUT
9	V_{CC} 5V

Package Outlines - See Page 1-285

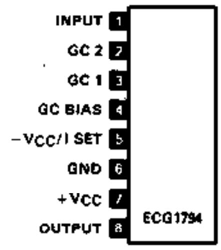
ECG1792 9-Pin SIP See Fig. L39A
Dual Attenuator, $V_{CC} = 12$ V Typ



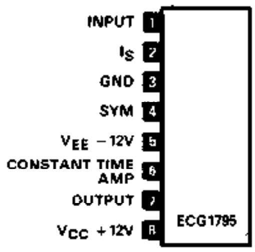
ECG1793 42-Pin DIP See Fig. L126A
TV Video/Chroma/Horiz, Vert Drvr/Sync Sep/HV Protect, $V_{CC} = 12$ V Typ



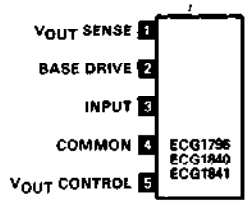
ECG1794 8-Pin SIP See Fig. L35
dbx Noise Reduction Voltage Controlled Amp, $V_{CC} = \pm 12$ V Typ



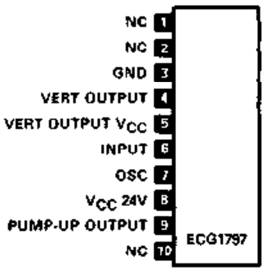
ECG1795 8-Pin SIP See Fig. L35
dbx Noise Reduction RMS Level Sensor, $V_{CC} = \pm 12$ V Typ



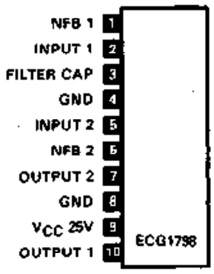
ECG1796 5-Lead Formed SIP See Fig. L19B
Hybrid Voltage Regulator, Output = 114.5 V



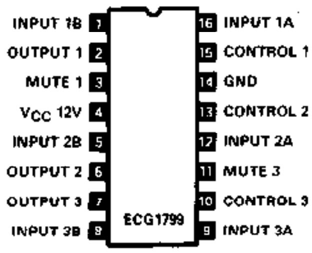
ECG1797 10-Pin SIP See Fig. L52
TV Vertical Deflection, $V_{CC} = 24$ V Typ



ECG1798 10-Pin SIP See Fig. L52
Dual 6 w/Ch AF PO, $V_{CC} = 25$ V, $R_L = 8\ \Omega$



ECG1799 16-Pin DIP See Fig. L111
Triple 2-Position Analog Switch w/2 Ch Muting Function, $V_{CC} = 12$ V Typ



Package Outlines - See Page 1-285

ECG1800 — 30-Pin DIP See Fig. L124C
TV Sound MPX Decoder, $V_{CC} = 12$ V Typ

Pin	Function	Pin	Function
1	GND	30	SAP LAMP
2	LIM AMP INPUT	29	STEREO LAMP
3	FILTER CAP	28	PHASE COMP CAP
4	FILTER CAP	27	PHASE COMP CAP
5	5 FH VCO CAP	26	PHASE COMP INPUT
6	5 FH ADJ	25	PHASE COMP
7	PHASE DET CAP	24	PHASE COMP
8	L-R SAP OUTPUT	23	4 FH ADJ
9	MODE SW	22	PILOT REGEN CAP
10	MONO SW	21	PILOT INPUT
11	L-R SAP INPUT	20	STEREO INPUT
12	L-R INPUT	19	PRE-AMP OUTPUT
13	R OUTPUT	18	PRE-AMP INPUT
14	L OUTPUT	17	MUTE
15	V_{CC} 12V	16	L-R OUTPUT

ECG1800

ECG1801 — 28-Pin DIP See Fig. L123A
TV dbx Decoder/Voltage Controlled Amp/ RMS Level Detector, $V_{CC} = 12$ V Typ

Pin	Function	Pin	Function
1	GND	28	REF VOLTAGE
2	NON-INV INPUT	27	CAPACITOR
3	INV INPUT	26	BUFFER INPUT
4	PRE-AMP OUTPUT	25	BUFFER OUTPUT
5	BUFFER INPUT	24	VCA1 INPUT
6	BUFFER OUTPUT	23	VCA1 ADJ
7	RMS DET 1 INPUT	22	NC
8	CAPACITOR	21	NC
9	RMS DET 2 INPUT	20	AMP 3 INPUT
10	CAPACITOR	19	AMP 3 OUTPUT
11	RESISTOR ADJ	18	VCA-2 INPUT
12	NON-INV INPUT	17	AMP 4 INPUT
13	INV INPUT	16	L-R/SAP OUTPUT
14	V_{CC} 12V	15	L+R OUTPUT

ECG1801

ECG1802 — 13-Lead Formed SIP See Fig. L57B
Dual 6 W/Ch, 22 W (BTL) AF PO, $V_{CC} = 14$ V, $R_L = 4\ \Omega$

Pin	Function
1	NON-INV INPUT 1
2	INV INPUT
3	GND SIGNAL
4	V REF
5	OUTPUT 1
6	BOOTSTRAP 1
7	GND SUBSTRATE
8	BOOTSTRAP 2
9	OUTPUT 2
10	V_{CC} 14V
11	MUTE/SB SW
12	FILTER CAP
13	NON-INV INPUT 2

ECG1802

ECG1803 — 18-Pin DIP See Fig. L115
Dual Tone/Volume Control, $V_{CC} = 12$ V Typ

Pin	Function	Pin	Function
1	VOL CTRL INPUT	18	GND
2	FILTER CAP	17	CONTOUR SW
3	V_{CC} 12V	16	BALANCE CTRL INPUT
4	R INPUT	15	L INPUT
5	COUPLING CAP	14	COUPLING CAP
6	COUPLING CAP	13	COUPLING CAP
7	CAPACITOR	12	CAPACITOR
8	R OUTPUT	11	L OUTPUT
9	BASS CTRL INPUT	10	TREBLE CTRL INPUT

ECG1803

ECG1804 — 13-Lead Formed SIP See Fig. L57B
Vertical Deflection Output, $V_{CC} = 26$ V Typ

Pin	Function
1	OSC ADJ
2	SYNC IN/BLANK OUT
3	SAWTOOTH GEN OUT
4	PRE-AMP INPUT
5	VERT OUT V_{CC}
6	VERT OUT
7	FB GEN OUTPUT
8	GND
9	V_{CC} 26V
10	VREF
11	SAWTOOTH GEN CAP
12	50/60 HZ DET OUT
13	OSC CAP

ECG1804

ECG1805 — 28-Pin DIP See Fig. L123A
VCR Video Processor, $V_{CC} = 5$ V Typ

Pin	Function	Pin	Function
1	SYNC SEP	28	FM OUT
2	SYNC OUT	27	WHITE CLIP ADJ
3	EE LEVEL ADJ	26	MOD
4	REC VID IN	25	MOD
5	AGC DET	24	DARK CLIP ADJ
6	PB VID IN	23	MOD IN
7	SUB CLAMP DET	22	FB AMP IN
8	SUB CLAMP OUT	21	EMPHASIS OUT
9	GND	20	V_{CC}
10	EE/VV OUT	19	CLAMP IN
11	SYNC PULSE IN	18	PG IN & HEAD SELECT
12	PB CHROMA IN	17	NL EMPHASIS IN
13	LPF NOISE CAN	16	12 DB AMP OUT
14	HPF NOISE CAN IN	15	12 DB AMP IN

ECG1805

ECG1806 — 22-Pin DIP See Fig. L121A
VCR 4 Head Amp, $V_{CC} = 5$ V Typ

Pin	Function	Pin	Function
1	HEAD SW	22	AGC DET
2	INITIAL BIAS CH 1	21	AGC REVERSE OUTPUT
3	INITIAL INPUT CH 1	20	AGC OUTPUT
4	INITIAL INPUT CH 2	19	OUTPUT GND
5	INITIAL BIAS CH 2	18	PEAKING CONSTANT
6	INPUT GND	17	EMB STOP SW
7	INITIAL BIAS CH 3	16	V_{CC}
8	INITIAL INPUT CH 3	15	CHROMA OUTPUT
9	INITIAL INPUT CH 4	14	EMB OUTPUT
10	INITIAL BIAS CH 4	13	CH 3 & 4 EMB DET
11	HEAD AMP SW	12	CH 1 & 2 EMB DET

ECG1806

ECG1807 — 14-Pin DIP See Fig. L104
VCR 2 Head Amp, $V_{CC} = 5$ V Typ

Pin	Function	Pin	Function
1	V_{CC}	14	PEAKING AMP
2	AMP	13	GND
3	AMP 1 IN	12	AGC AMP OUT
4	N/C	11	AGC AMP OUT
5	AMP 2 IN	10	AGC DET
6	AMP	9	CHROMA AMP OUT
7	PB L	8	PG AMP IN

ECG1807

ECG1808 — 28-Pin DIP See Fig. L123A
VCR Video Signal Processor, $V_{CC} = 5$ V Typ

Pin	Function	Pin	Function
1	VID OUTPUT	28	DOC OUTPUT
2	PIC CTRL	27	ENVELOPE DET
3	DE-EMPHASIS	26	RF INPUT
4	PEAKING	25	RF OUTPUT
5	EXTENSION	24	DELAY RF INPUT
6	REL DET OUTPUT	23	V_{CC}
7	LIM OUTPUT	22	HPF INPUT
8	REC V_{CC}	21	LPF INPUT
9	LIM INPUT	20	GND
10	DIF SIG INPUT	19	LIM
11	DIF SIG OUTPUT	18	LIM
12	LIMIT SIG INPUT	17	DEM GAIN CTRL
13	VID INPUT	16	DEM OUTPUT
14	VID 1H INPUT	15	DEM 1H OUTPUT

ECG1808

ECG1809 — 24-Pin DIP See Fig. L122B
VCR Capstan Drive, $V_{CC} = 5$ V Typ

Pin	Function	Pin	Function
1	DR OUT 3	24	MOTOR POWER
2	TOTAL OUT CURR	23	DRIVE OUT 1
3	DR OUT 4	22	CURR PHASE COMP
4	BRAKE	21	GND
5	HALL IN 3	20	CURR DET
6	HALL IN 3	19	TORQUE LIMIT
7	HALL IN 2	18	VOLT PHASE COMP
8	HALL IN 2	17	RIPPLE CANCEL IN
9	HALL IN 1	16	TORQUE IN
10	HALL IN 1	15	REF VOLTAGE
11	DIR IN	14	HALL SUPPLY IN
12	DIR IN	13	V_{CC}

ECG1809

ECG1810 — 28-Pin DIP See Fig. L123A
VCR Video Signal Processor, $V_{CC} = 12$ V Typ

Pin	Function	Pin	Function
1	GND	28	SIF COIL
2	IF INPUT	27	SIF COIL
3	IF INPUT	26	SOUND OUTPUT
4	V_{CC}	25	SOUND LEVEL ADJ
5	IF AGC FILTER	24	SIF BIAS
6	RF AGC DELAY	23	SIF INPUT
7	RF AGC OUTPUT	22	SIF BIAS
8	LOCK DET FILTER	21	GND
9	AFC COIL	20	VID F CHAR COMP
10	AFC OUTPUT	19	VID OUTPUT
11	APC FILTER SW	18	VID INPUT
12	V_{CC} VCO	17	DET OUTPUT
13	APC FILTER	16	VCO COIL
14	GND VCO	15	VCO COIL

ECG1810

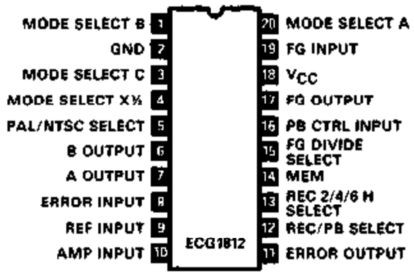
ECG1811 — 18-Pin DIP See Fig. L115
VCR Servo Interface, $V_{CC} = 5$ V Typ

Pin	Function	Pin	Function
1	PB CTRL OUTPUT	18	GND
2	PB CTRL INPUT	17	FG INPUT
3	PB CTRL AMP OUTPUT	16	PG INPUT
4	FWD/REW SEL	15	PG CONT
5	½ V_{CC}	14	HEAD SW
6	CTRL SIGNAL	13	TRACKING CONT
7	GND	12	TRACKING OUTPUT
8	CTRL AMP FEEDBACK	11	V_{CC}
9	REC/PB SELECT	10	½ V_{SS} INPUT

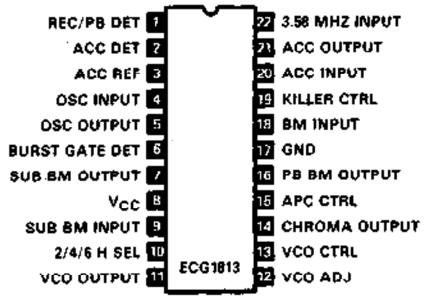
ECG1811

Package Outlines - See Page 1-285

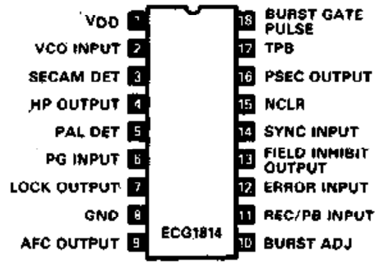
ECG1812 20-Pin DIP See Fig. L118
VCR Servo Interface, V_{CC} = 5 V Typ



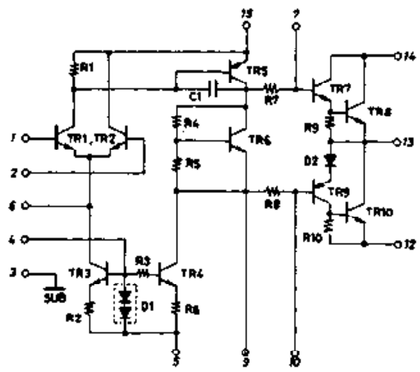
ECG1813 22-Pin DIP See Fig. L121A
VCR Color Signal Processor, V_{CC} = 5 V Typ



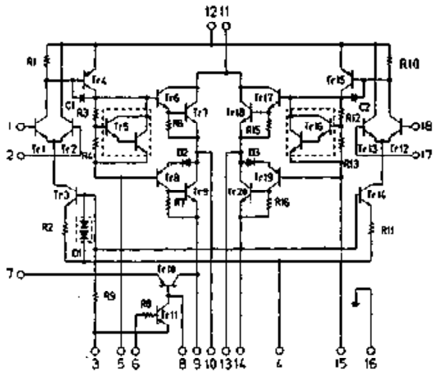
ECG1814 18-Pin DIP See Fig. L115A
VCR Color Signal Processor (CMOS), V_{DD} = 5 V Typ



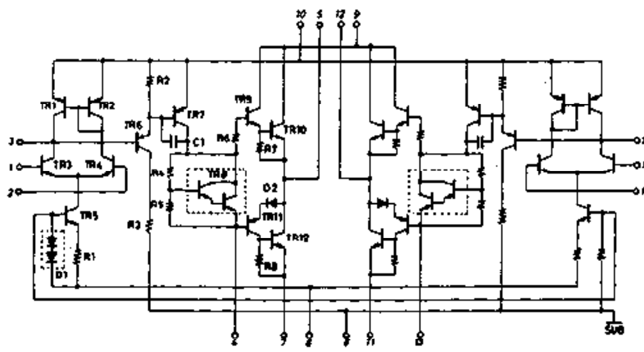
ECG1815 15-Pin SIP-M See Fig. L69A
AF PO, 20 W, $V_{CC} = \pm 23$ V, $R_L = 8\Omega$



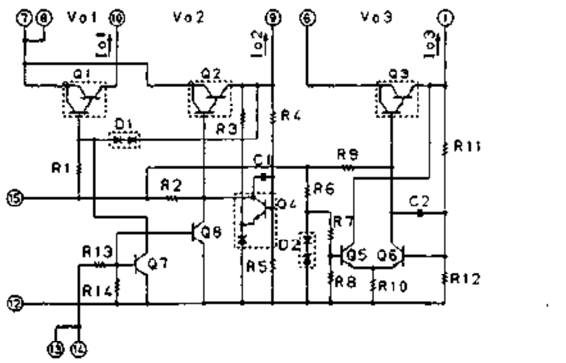
ECG1816 18-Pin SIP-M See Fig. L75B
Dual AF PO, 6 W, $V_{CC} = \pm 13.2$ V, $R_L = 8\ \Omega$
ECG1817
20 W, $V_{CC} = \pm 23$ V, $R_L = 8\ \Omega$
ECG1818
25 W, $V_{CC} = \pm 26$ V, $R_L = 8\ \Omega$
ECG1819
30 W, $V_{CC} = \pm 27.5$ V, $R_L = 8\ \Omega$



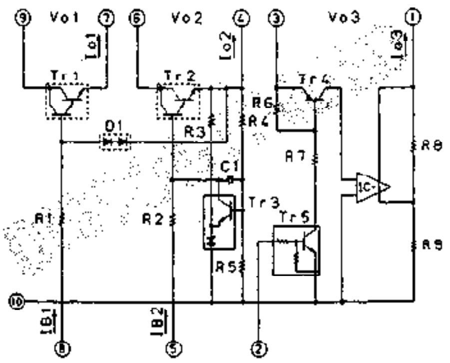
ECG1820 16-Pin SIP-M See Fig. L73
Dual AF PO, 30 W, $V_{CC} = \pm 27.5$ V, $R_L = 8\Omega$



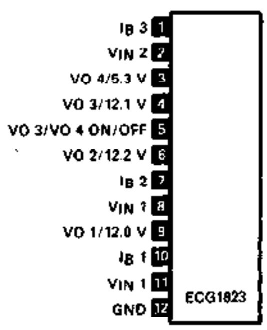
ECG1821 15-Pin SIP See Fig. L69C
VCR 3-Output Positive DC VR: 12 V @ 1 A, 12 V @ 1 A, 5.3 V @ 1 A



ECG1822 10-Pin SIP-M See Fig. L65A
VCR 3-Output Positive DC VR: 12 V @ 1.5 A, 12 V @ 1.5 A, 5.3 V @ .5 A

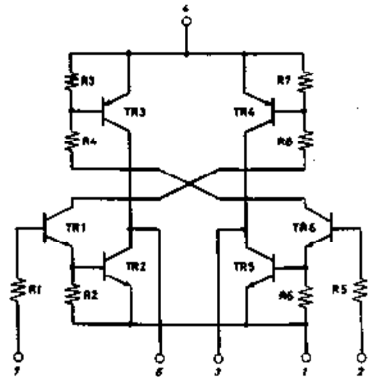


ECG1823 12-Pin SIP-M See Fig. L67B
VCR 4-Output Positive DC VR: 12 V @ 1.5 A, 12.2 V @ 1 A, 12.1 V @ 1 A, 5.3 V @ 1 A

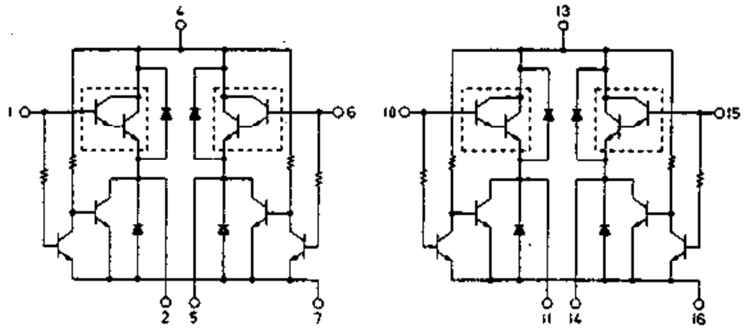


Package Outlines - See Page 1-285

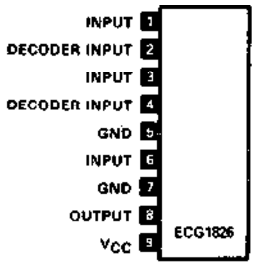
ECG1824 7-Pin SIP See Fig. L30B
DC Motor Driver, V_{CC} = 12 V Typ



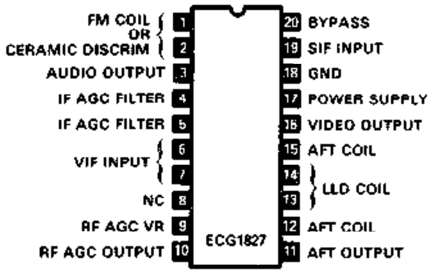
ECG1825 16-Pin SIP See Fig. L72A
Dual DC Motor Driver, V_{CC} = 12 V Typ



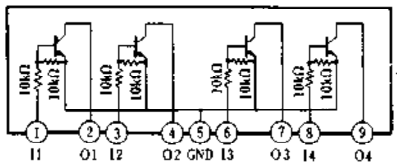
ECG1826 9-Pin SIP See Fig. L39
TV/VCR Decoder/Video Sw, V_{CC} = 9 V Typ



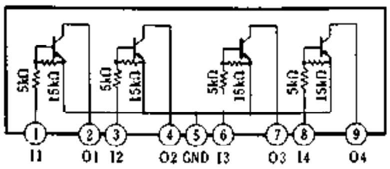
ECG1827 20-Pin DIP See Fig. L118A
TV VIF/Det/Vid-Snd Mute/RF AGC/AFT, V_{CC} = 12 V



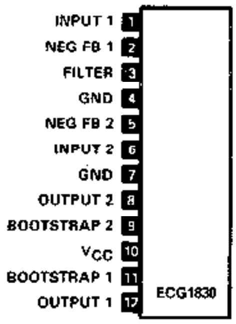
ECG1828 9-Pin SIP See Fig. L41
Quad Transistor Array



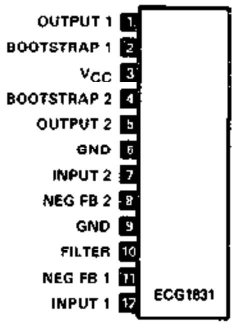
ECG1829 9-Pin SIP See Fig. L41
Quad Transistor Array



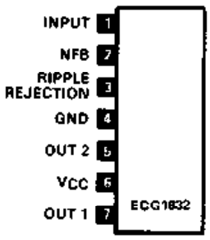
ECG1830 12-Pin SIP-HS See Fig. L92A
Dual 5.8 W/Ch (19 W BTL) AF PO, V_{CC} = 13.2 V, R_L = 4 Ω



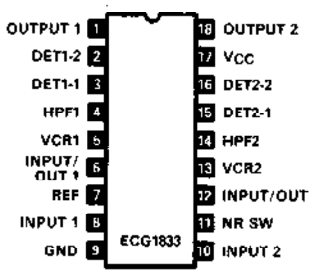
ECG1831 12-Pin SIP-HS See Fig. L92A
Dual 5.8 W/Ch (19 W BTL) AF PO, V_{CC} = 13.2 V, R_L = 4 Ω



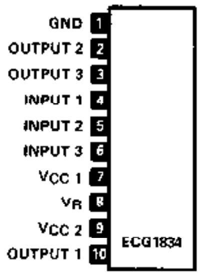
ECG1832 7-Pin SIP-HS See Fig. L76C
AF PO, 12 W, V_{CC} = 13.2 V, R_L = 4 Ω



ECG1833 18-Pin DIP See Fig. L115
Dolby B-Type Noise Reduction System, V_{CC} = 12 V Typ



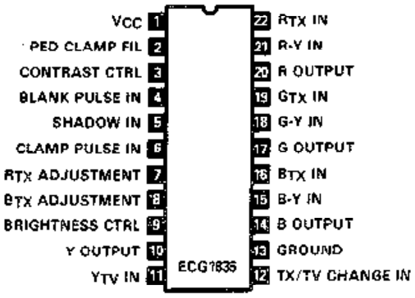
ECG1834 10-Pin SIP-HS See Fig. L87
Dual Bi-Directional Motor Driver, V_{CC} = 12 V Typ



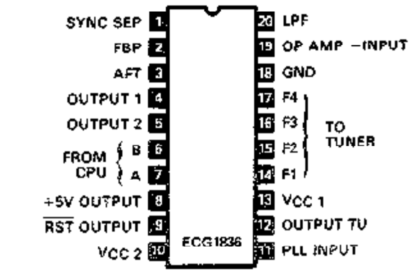
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

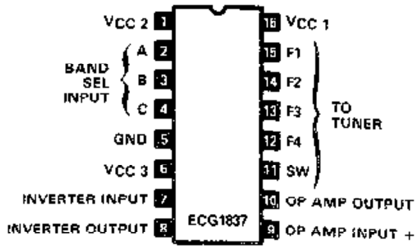
ECG1835 22-Pin DIP See Fig. L121
TV Interface for Character and Pattern, V_{CC} = 12 V Typ



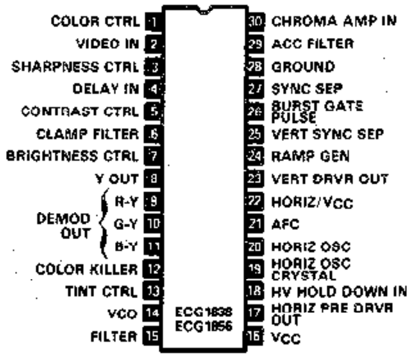
ECG1836 20-Pin DIP See Fig. L118A
TV/VCR Peripheral Circuit for Frequency Synthesizer Channel Select, V_{CC} = 12 V Typ



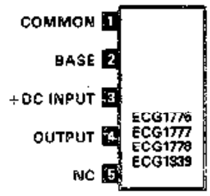
ECG1837 16-Pin DIP See Fig. L111
TV Tuner Controller, $V_{CC}1$ = 12 V Typ, $V_{CC}3$ = 35 V Max



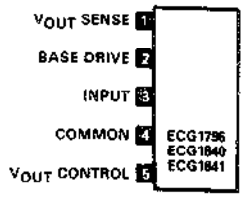
ECG1838 30-Pin DIP See Fig. L124C
Video/Chroma-Demod/Horiz-Vert Driver/Osc, V_{CC} = 12 V Typ



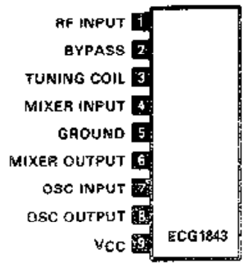
ECG1839 5-Lead Formed SIP See Fig. L19B
TV Voltage Regulator, Output = 120 V @ 1 A



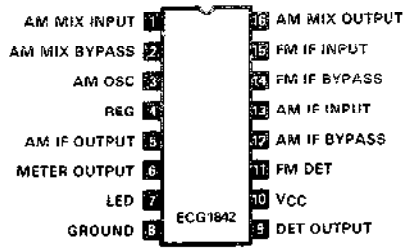
ECG1840 5-Lead Formed SIP See Fig. L19B
Hybrid Voltage Regulator, Output = 41.8 V
ECG1841
Hybrid Voltage Regulator, Output = 43 V



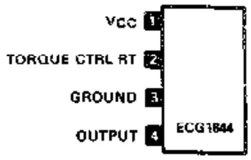
ECG1843 9-Pin SIP See Fig. L39
RF Amp/Mixer/Local Osc, V_{CC} = 5 V Typ



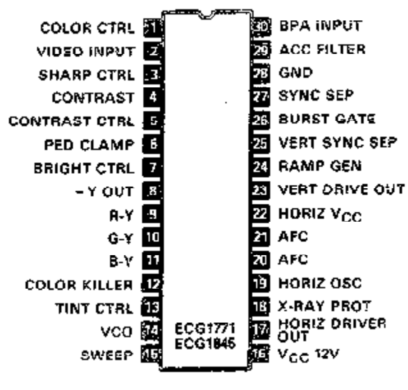
ECG1842 16-Pin DIP See Fig. L111
AM/FM IF System/Osc/Det/LED Driver, V_{CC} = 5 V Typ



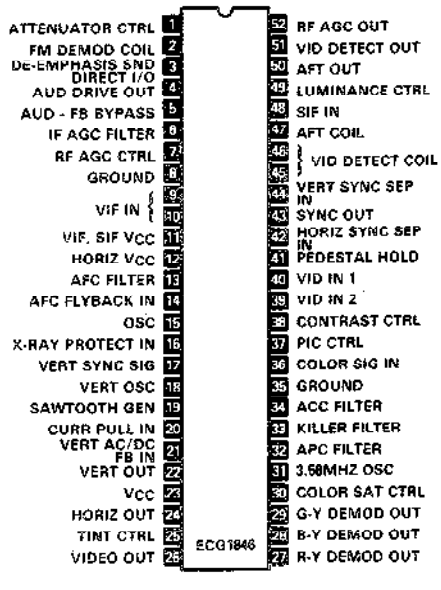
ECG1844 4-Pin SIP See Fig. L18C
Motor Speed Regulator, V_{CC} = 12 V Typ



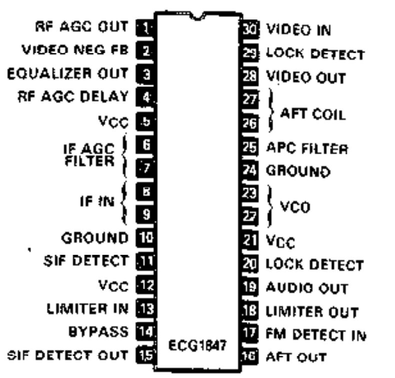
ECG1845 30-Pin DIP See Fig. L124C
Vid/Chroma/Demod/Horiz-Vert Osc/Driver/Sync Sep/HV Protect/Vid Peak Clipping, V_{CC} = 12 V Typ



ECG1846 52-Pin DIP See Fig. L126C
Single Chip TV Signal Processor, V_{CC} = 9 V Typ



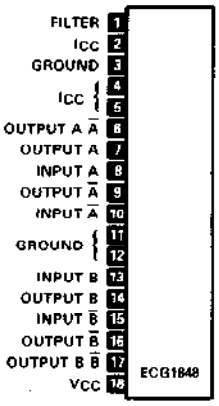
ECG1847 30-Pin DIP See Fig. L124C
PLL-SIF/VIF/RF AGC, V_{CC} = 9 V Typ



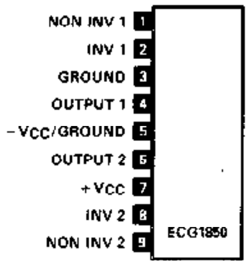
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

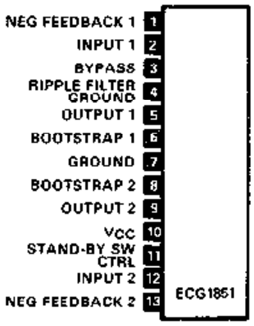
ECG1848 18-Pin SIP-M See Fig. L75C
Hybrid Stepping Motor Driver/Controller, V_{CC} = 24 V Typ, I_O = 1.5 A Max



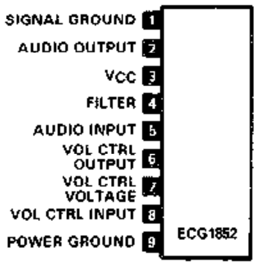
ECG1850 9-Pin SIP See Fig. L51A
Dual AF PO, 12 W/Ch, V_{CC} = ±16 V, R_L = 8 Ω



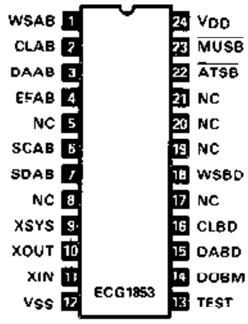
ECG1851 13-Lead Formed SIP See Fig. L57B
Dual AF PO, 12 W/Ch, 24 W (BTL), V_{CC} = 14.4 V, R_L = 2 Ω



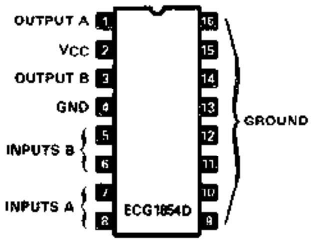
ECG1852 9-Pin SIP-HS See Fig. L81A
AF PO, 4 W with Volume Control, V_{CC} = 18 V, R_L = 8 Ω



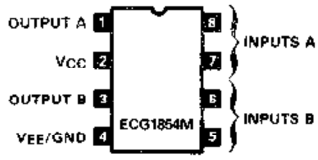
ECG1853 24-Pin DIP See Fig. L122
Digital Filter for CD Digital Audio Systems (CMOS), V_{DD} = 5 V Typ



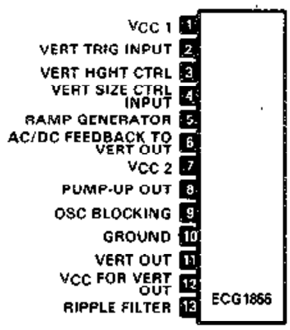
ECG1854D 16-Pin DIP See Fig. L111
Dual Power Op Amp, V_{CC} = 24 V, I_O = 1 A Max



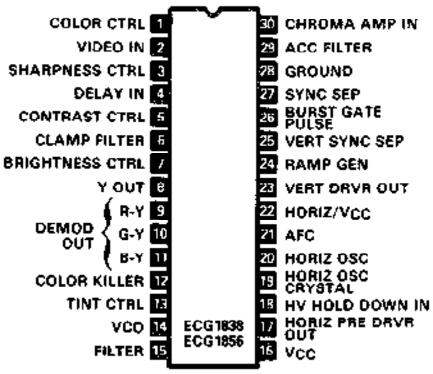
ECG1854M 8-Pin DIP See Fig. L98
Dual Power Op Amp, V_{CC} = ±15 V Typ, I_O = 1 A Max



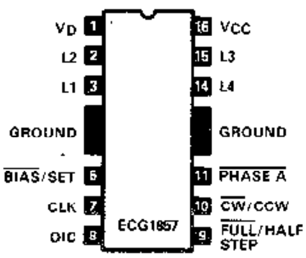
ECG1855 13-Pin SIP-HS See Fig. L92B
Vertical Deflection Output, V_{CC1} = 12 V Typ, V_{CC2} = 24 V Typ



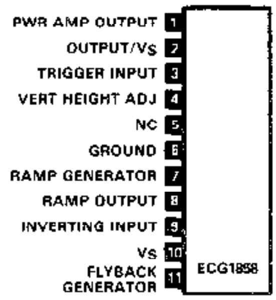
ECG1856 30-Pin DIP See Fig. L124C
Video/Chroma-Demod/Horiz-Vert Driver/Osc w/Video Peak Clipping



ECG1857 16-Pin DIP See Fig. L111
DC Stepper Motor Driver, V_{CC} = 12 V Typ, I_O = 500 mA Max



ECG1858 11-Pin SIP-HS See Fig. L93
TV Vertical Deflection Output, V_S = 35 V Max



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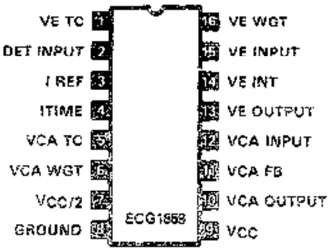
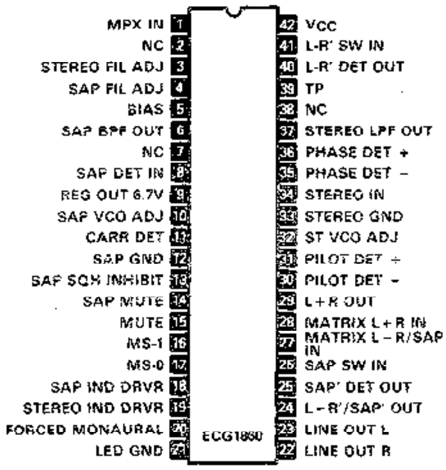
ECG1859 16-Pin DIP See Fig. L111

TV dbx Noise Reduction, $V_{CC} = 9$ V Typ



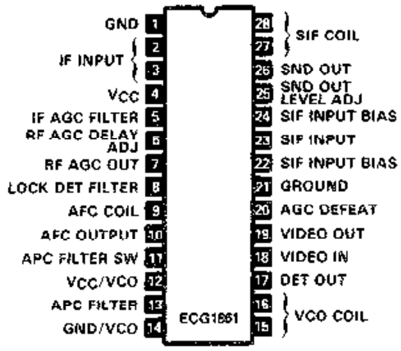
ECG1860 42-Pin DIP See Fig. L126A

TV Separate Audio Program (SAP), $V_{CC} = 9$ V Typ



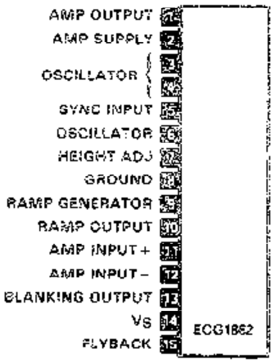
ECG1861 28-Pin DIP See Fig. L123A

TV Video IF Signal Processor, $V_{CC} = 12$ V Typ



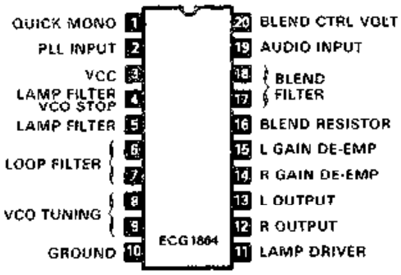
ECG1862 15-Pin SIP-HS See Fig. L93A

TV Vertical Deflection Output, $V_S = 35$ V Max



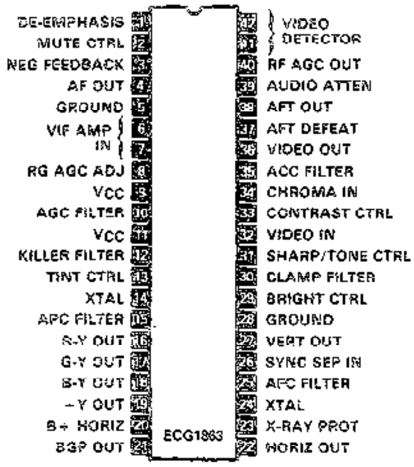
ECG1864 20-Pin DIP See Fig. L118A

FM Stereo Demodulator w/Blend (PLL) $V_{CC} = 8$ V Typ



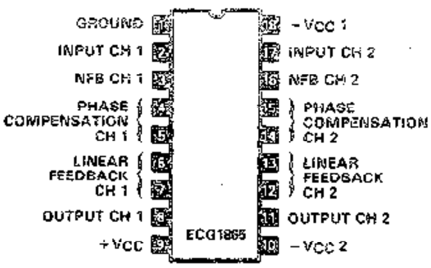
ECG1863 42-Pin DIP See Fig. L126A

Single Chip TV Signal Processor, $V_{CC} = 12$ V Max, 9 V Typ



ECG1865 18-Pin DIP See Fig. L115

Dual Audio Driver for 60 W AF PO, $V_{CC} = \pm 70$ V

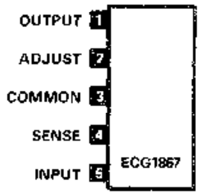


ECG1867 5-Pin SIP See Fig. L20B

Hybrid Voltage Regulator, Output = 12 V, 2 A

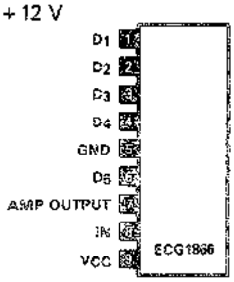
ECG1868

Output = 13 V, 2 A



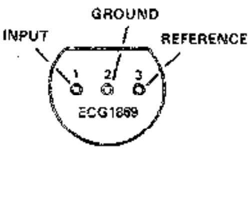
ECG1866 9-Pin SIP See Fig. L40

Driver for 5-Point + LED VU Meter, $V_{CC} = +12$ V



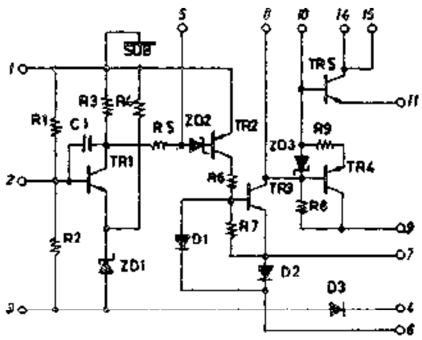
ECG1869 TO-92L See Fig. L17C

Adjustable Voltage Reference, 1.5 V to 25 V



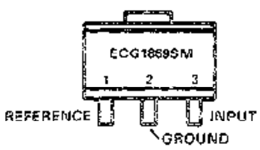
ECG1870 15-Pin SIP-M See Fig. L70A

Switching Regulator Power Module, 115 V



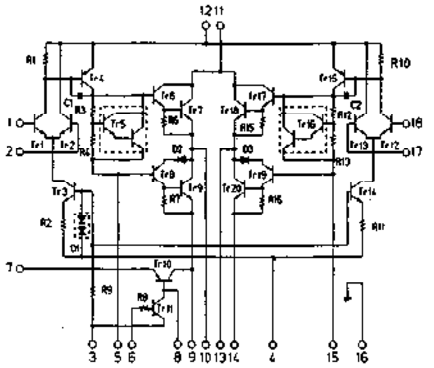
ECG1869SM SOT-89 See Fig. L161

Adjustable Voltage Reference, 1.5 V to 25 V

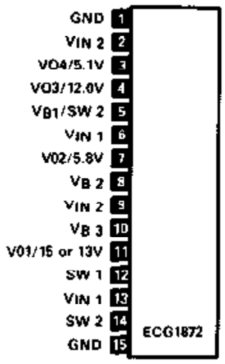


Package Outlines - See Page 1-285

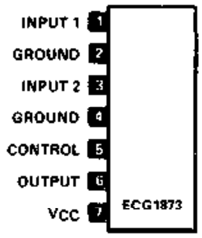
ECG1871 18-Pin SIP-M See Fig. L75B
Dual AF PO,
50 W, $V_{CC} = \pm 35$ V, $R_L = 8\ \Omega$
ECG1874
15 W, $V_{CC} = \pm 20$ V, $R_L = 8\ \Omega$



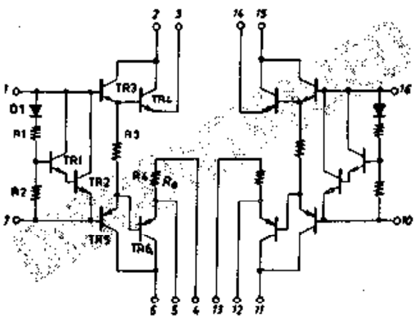
ECG1872 15-Pin SIP-M See Fig. L69A
VCR Positive DC VR: 15 V/13 V @ 1 A; 5.8 V @ .5 A; 12 V @ 1 A; 5.1 V @ 1 A



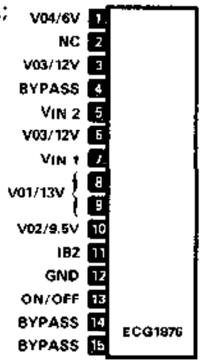
ECG1873 7-Pin SIP See Fig. L24
2 Input Audio/Video Switch, $V_{CC} = 9$ V Typ



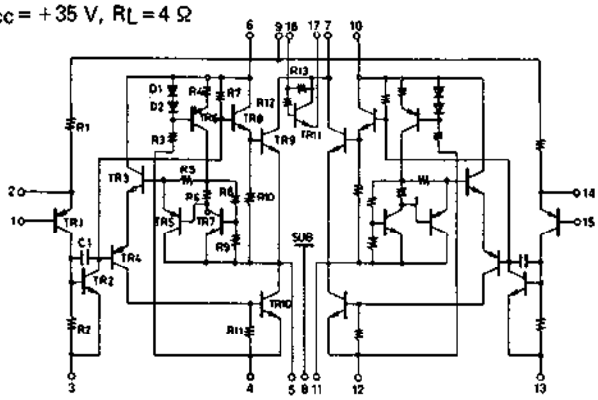
ECG1875 16-Pin SIP-M See Fig. L73
Dual AF PO, 30 W, $V_{CC} = \pm 30$ V, $R_L = 8\ \Omega$



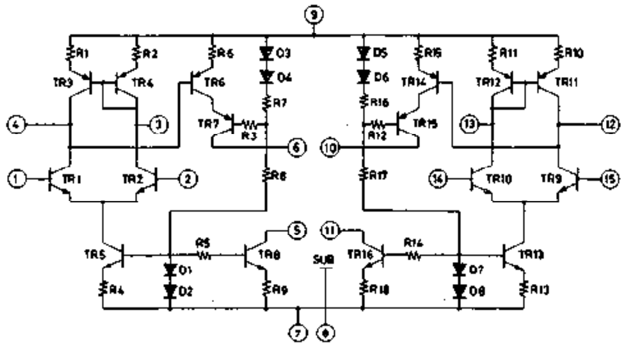
ECG1876 15-Pin SIP-M See Fig. L69A
VCR Positive DC VR: 13 V @ 1.5 A; 9.5 V @ 1.5 A; 12 V @ 1.5 A; 6 V @ .5 A



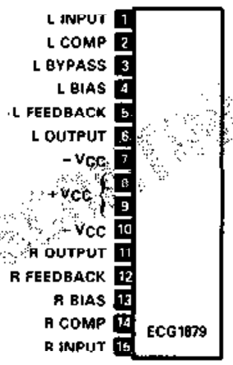
ECG1877 18-Pin SIP-M See Fig. L75B
Dual AF PO, 28 W,
$V_{CC} = +35$ V, $R_L = 4\ \Omega$



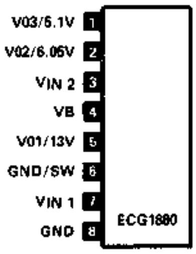
ECG1878 15-Pin SIP-M See Fig. L68A
2 Channel Audio Driver for 40 to 50 W AF PO



ECG1879 15-Pin SIP-M See Fig. L69
Dual AF PO, 18 W, $V_{CC} = \pm 24$ V, $R_L = 8\ \Omega$



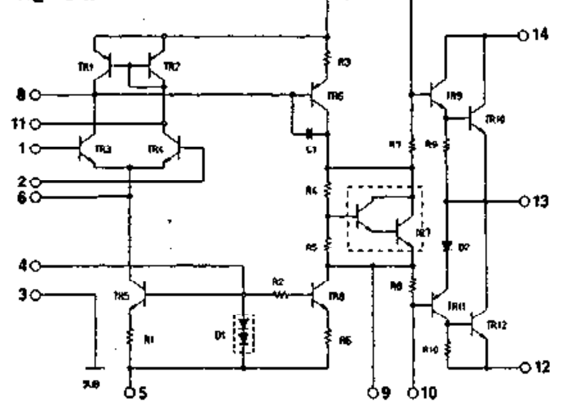
ECG1880 8-Pin SIP-M See Fig. L60A
VCR Positive DC VR: 13 V @ 1 A; 6.05 V @ 1 A; 5.1 V @ .5 A



Package Outlines - See Page 1-285

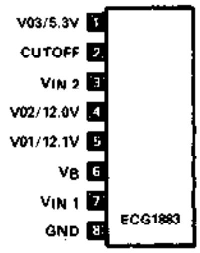
ECG1882 15-Pin SIP-M See Fig. L70B

AF PO, 100 W, V_{CC} = ±51 V, R_L = 8 Ω



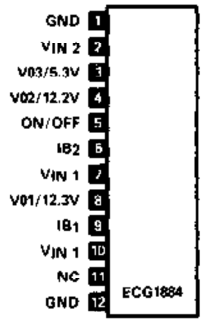
ECG1883 8-Pin SIP-M See Fig. L60B

VCR Positive DC VR: 12.1 V @ .8 A; 12 V @ .8 A; 5.3 V @ 1 A



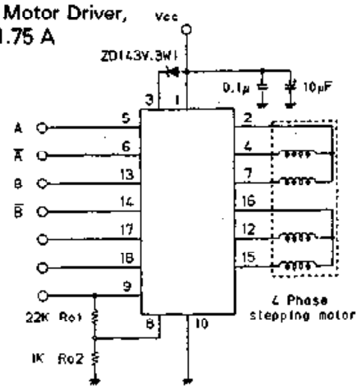
ECG1884 12-Pin SIP-M See Fig. L67C

VCR Positive DC VR: 12.3 V @ 1 A; 12.2 V @ 1 A; 5.3 V @ 1 A



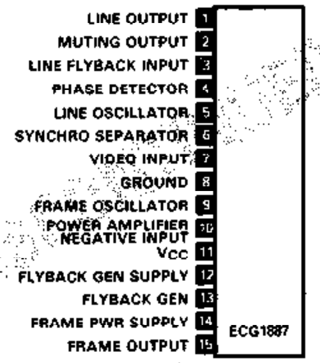
ECG1885 18-Pin SIP-M See Fig. L75B

4-Phase Stepping Motor Driver, V_{CC} = 36 V, I_O = 1.75 A



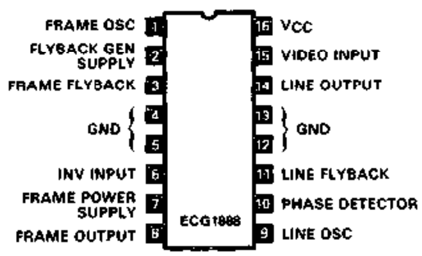
ECG1887 15-Pin SIP See Fig. L93A

Horiz/Vert Deflection Output, V_{CC} = 10 V



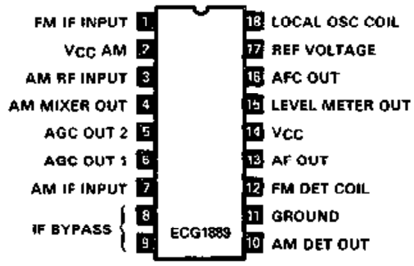
ECG1888 16-Pin DIP See Fig. L112

Horiz/Vert Deflection Output, V_{CC} = 14 V



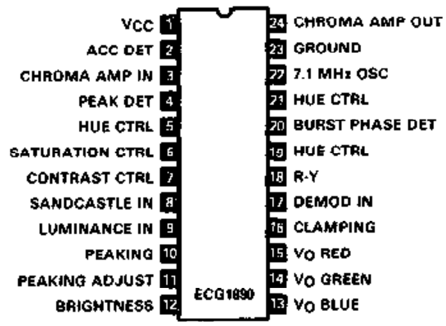
ECG1889 18-Pin DIP See Fig. L115

AM/FM IF Amp and AM Tuner, V_{CC} = 5 V



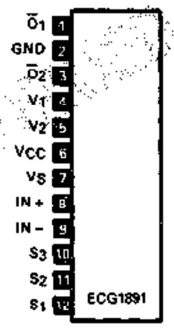
ECG1890 24-Pin DIP See Fig. L122

TV Signal Processor, V_{CC} = 12 V



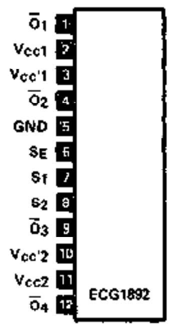
ECG1891 12-Pin SIP See Fig. L91A

DC Motor Driver with Speed Control, V_{CC} = 12 V, I_O = 200 mA



ECG1892 12 Pin SIP See Fig. L91A

DC Dual Bi-Directional Motor Driver, V_{CC} = 12 V, I_O = 300 mA



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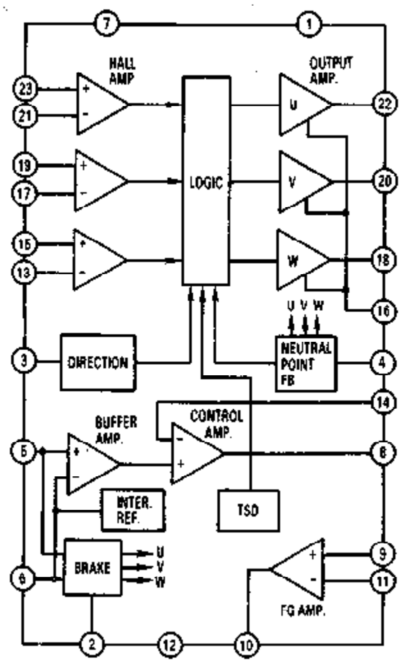
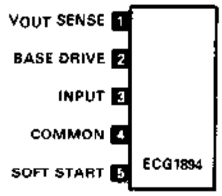
ECG1893 23-Pin ZIL See Fig. L47B
3-Phase Motor Driver, $V_{CC}1 = 5$ V, $V_{CC}2 = 15$ V, $I_O = 1.5$ A

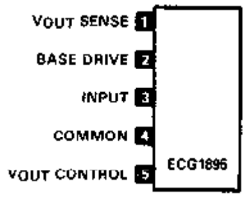


Pin 1 = $V_{CC}2$, Pin 7 = $V_{CC}1$, Pin 12 = GND

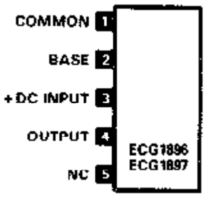
ECG1894 5-Lead Formed SIP See Fig. L19B
TV Voltage Regulator, Output = 41.8 V @ 1.2 A



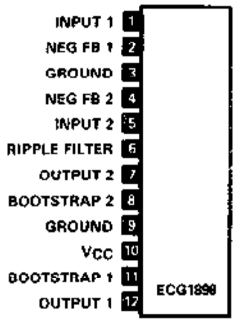
ECG1895 5-Lead Formed SIP See Fig. L19B
TV Voltage Regulator, Output = 41.8 V @ 1.1 A



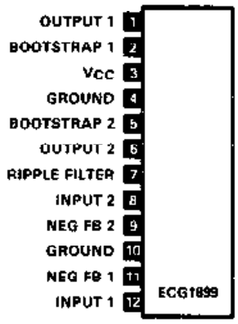
ECG1896 5-Lead Formed SIP See Fig. L19B
TV Voltage Regulator,
Output = 115 V, 1 A
ECG1897
TV Voltage Regulator,
Output = 125 V, 1 A



ECG1898 12-Pin SIP See Fig. L92A
Dual AF PO, 5.8 W/Ch, 19 W BTL,
$V_{CC} = 13.2$ V, $R_L = 4\ \Omega$



ECG1899 12-Pin SIP See Fig. L92A
Dual AF PO, 5.8 W/Ch, 19 W BTL,
$V_{CC} = 13.2$ V, $R_L = 4\ \Omega$



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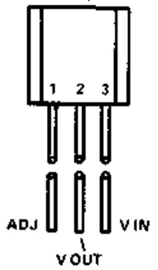
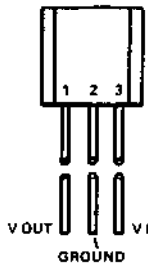
Linear IC and Module Circuits (cont'd)

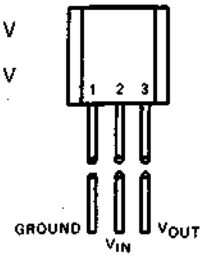
ECG1900 TO-92 See Fig. L16
3-Terminal Pos Adj Voltage Regulator,
V_O = 1.2 V to 37 V, I_O = 100 mA,
V_{in} = 40 V_{max}, 2.45 V_{min}, P_D = 625 mW
ECG1901
3-Terminal Neg Adj Voltage Regulator,
V_O = -1.2 V to -37 V, I_O = 100 mA,
V_{in} = -40 V_{max},
-2.45 V_{min},
P_D = 625 mW



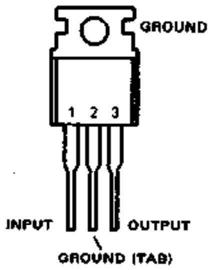
ECG1902 TO-92 See Fig. L16
3-Terminal Pos Fixed Voltage Regulators,
Output = 9 V, 100 mA
ECG1906
Output = 18 V
ECG1908
Output = 24 V



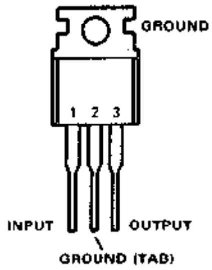
ECG1903 TO-92 See Fig. L16
3-Terminal Neg Fixed Voltage Regulators,
Output = -12 V, 100 mA
ECG1905
Output = -15V
ECG1907
Output = -18 V
ECG1909
Output = -24 V
ECG1917
Output = -5V



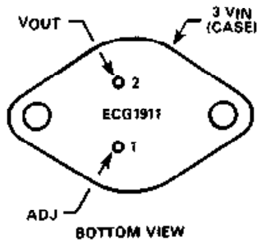
ECG1904 TO-220 See Fig. L17
3-Terminal Pos Fixed Voltage Regulators with Low Drop Out, Output = 3.3 V, 1 A
ECG1951
Output = 5V
ECG1952
Output = 8 V
ECG1953
Output = 10 V
ECG1954
Output = 12 V
ECG1955
Output = 15 V
ECG1956
Output = 24 V



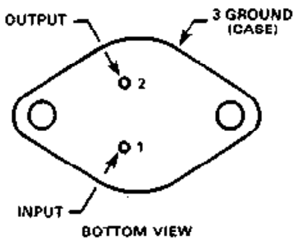
ECG1910 TO-220 See Fig. L17
Positive Voltage Regulator, 9 V @ 1 A



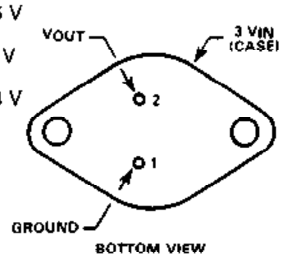
ECG1911 TO-3 See Fig. L11
3-Terminal Neg Adj Voltage Regulator,
V_o = -12 V to -37 V, I_o = 1.5A,
V_{in} = -40 V_{max}, -2.45 V_{min}, P_D = 20 W



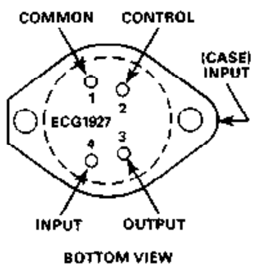
ECG1912 TO-3 See Fig. L11
3-Terminal Pos Fixed Voltage Regulators,
Output = 12 V, 3A
ECG1914
Output = 12 V, 1.5 A
ECG1916
Output = 15 V, 1.5 A
ECG1918
Output = 15 V, 3 A
ECG1924
Output = 24 V, 1.5 A



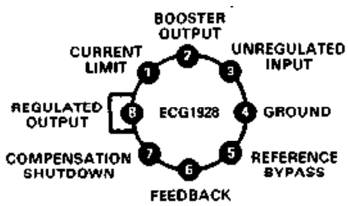
ECG1913 TO-3 See Fig. L11
3-Terminal Neg Fixed Voltage Regulators,
Output = -5 V, 1.5 A
ECG1915
Output = -12 V
ECG1919
Output = -15 V
ECG1923
Output = 18 V
ECG1925
Output = -24 V



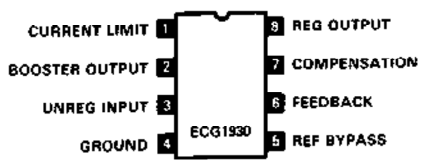
ECG1927 TO-3, 4-Pin See Fig. L11B
4-Terminal Neg Adj Voltage Regulator,
V_o = -2.2 V to -30 V, I_o = 1A,
V_{in} = -40 V_{max}, -4.7 V_{min}, P_D = 15 W



ECG1928 TO-5, 8-Pin See Fig. L3
Positive Adj Voltage Regulator,
Output = 4.5 to 30 V



ECG1930 8-Pin DIP See Fig. L98
Positive Adj Voltage Regulator,
Output = 5 to 37 V



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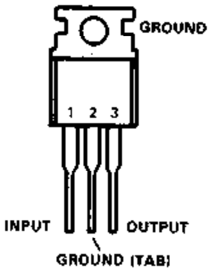
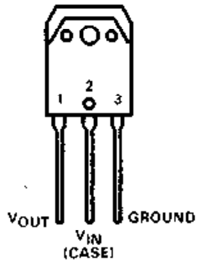
Linear IC and Module Circuits (cont'd)

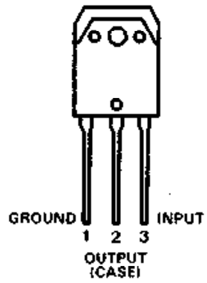
ECG1932 TO-220 See Fig. L17
Positive Voltage Regulator, 10 V @ 1 A



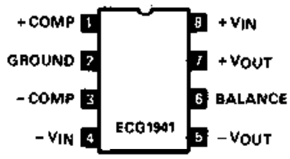
ECG1934 TO-3PJ See Fig. L17A
3-Terminal Positive Voltage Regulators,
Output = 5 V, 2 A
ECG1936
Output = 12 V
ECG1938
Output = 15 V
ECG1940
Output = 24 V



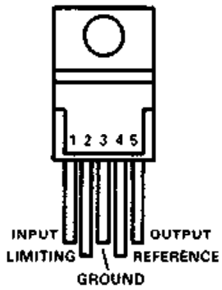
ECG1934X TO-3PJ See Fig. L17A
3-Terminal Positive Voltage Regulator,
5 V, 2 A



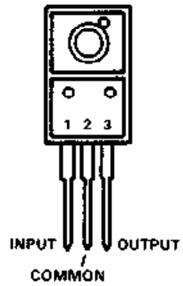
ECG1941 8-Pin DIP See Fig. L97
Dual Tracking Voltage Regulator, ± 15 V,
V_{in} = ± 30 Vmax, I_{out} = 100 mA Max



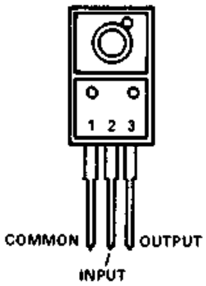
ECG1942 TO-220, 5-Pin See Fig. L19
Positive Adj Voltage Regulator,
Output = 3 to 36 V, 2 A



ECG1960 TO-220M See Fig. L163
3-Terminal Pos Fixed Voltage Regulators,
Output = 5 V, 1 A
ECG1962
Output = 6 V
ECG1964
Output = 8 V
ECG1966
Output = 9 V
ECG1968
Output = 10 V
ECG1970
Output = 12 V
ECG1972
Output = 15 V
ECG1974
Output = 18 V
ECG1976
Output = 24 V



ECG1961 TO-220 See Fig. L163
3-Terminal Neg Fixed Voltage Regulators,
Output = −5 V, 1 A
ECG1963
Output = −6 V
ECG1965
Output = −8 V
ECG1967
Output = −9 V
ECG1971
Output = −12 V
ECG1973
Output = −15 V
ECG1975
Output = −18 V
ECG1977
Output = −24 V



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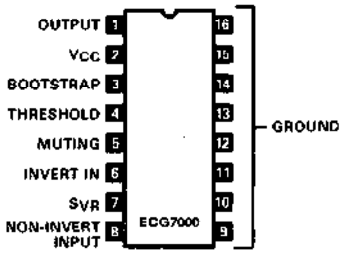
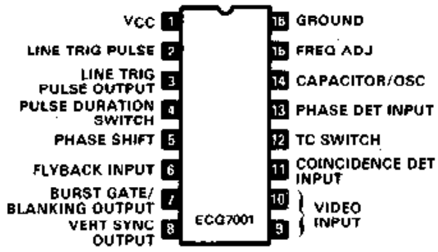
Linear IC and Module Circuits (cont'd)

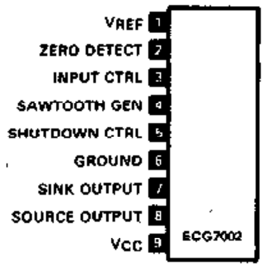
ECG7000 16-Pin DIP See Fig. L111
AF PO, 5 W, $V_{CC}=14$ V, $R_L=4\ \Omega$



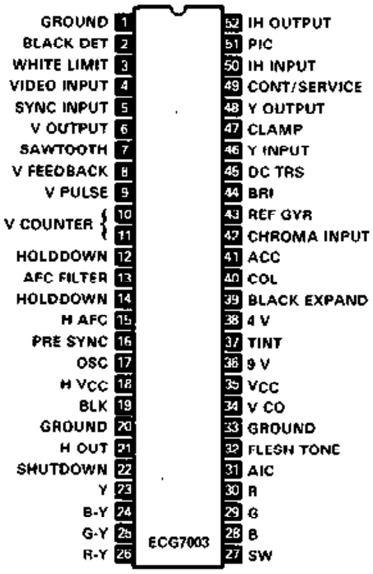
ECG7001 16-Pin DIP See Fig. L111
Horiz/Vert Signal Processor, $V_{CC}=12$ V Typ



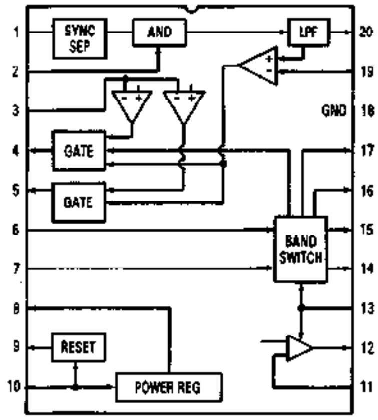
ECG7002 9-Pin SIP-HS See Fig. L80A
Switch Mode Power Supply Controller,
$V_{CC}=10$ V Typ



ECG7003 52-Pin DIP See Fig. L126C
Single Chip TV Signal Processor,
$V_{CC}=12$ V Typ

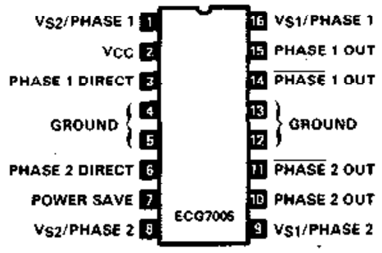


ECG7004 20-Pin DIP See Fig. L118A
Channel Select System Controller,
$V_{CC}=12$ V Typ

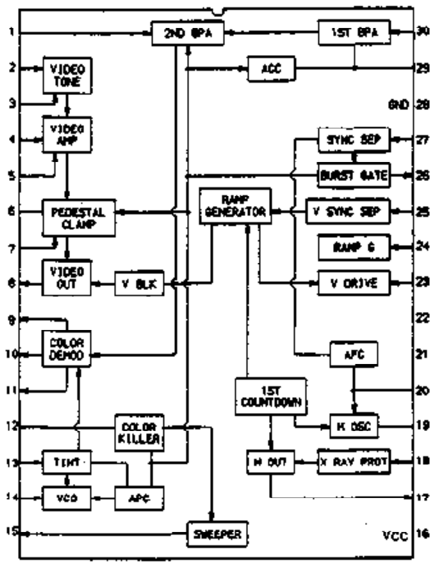


Pin 10 = V_{CC}

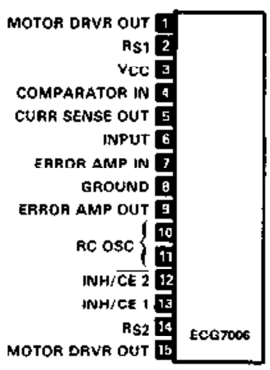
ECG7005 16-Pin DIP See Fig. L111
Dual Stepping Motor Driver, $V_{CC}=5$ V,
$I_O=300$ mA



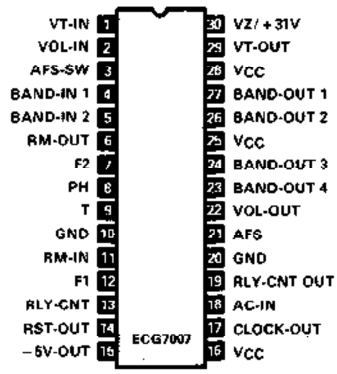
ECG7008 30-Pin DIP See Fig. L124C
Video/Chroma/Horiz-Vert Driver/Sync Sep/
X-Ray Protect, $V_{CC}=12$ V Typ



ECG7006 15-Pin SIP-HS See Fig. L93A
Bi-Directional Motor Driver, $V_{CC}=24$ V Typ,
$I_O=2.5$ A



ECG7007 30-Pin DIP See Fig. L124C
TV/VCR Interface and Function Control,
$V_{CC}=12$ V Typ



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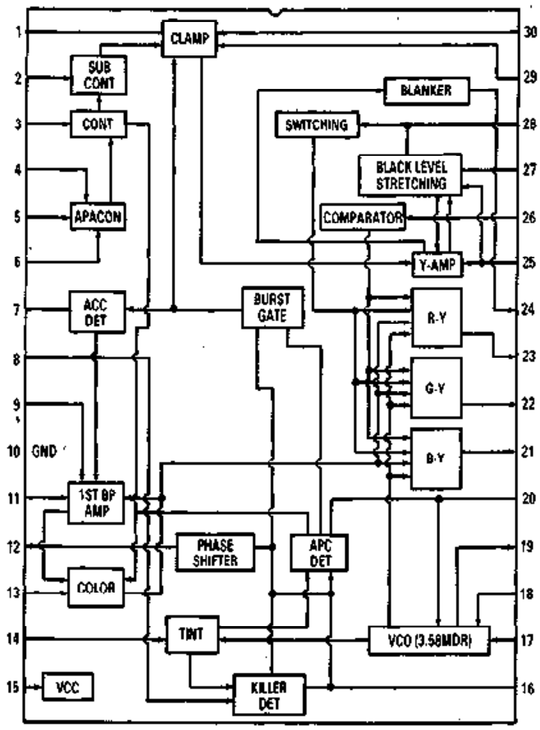
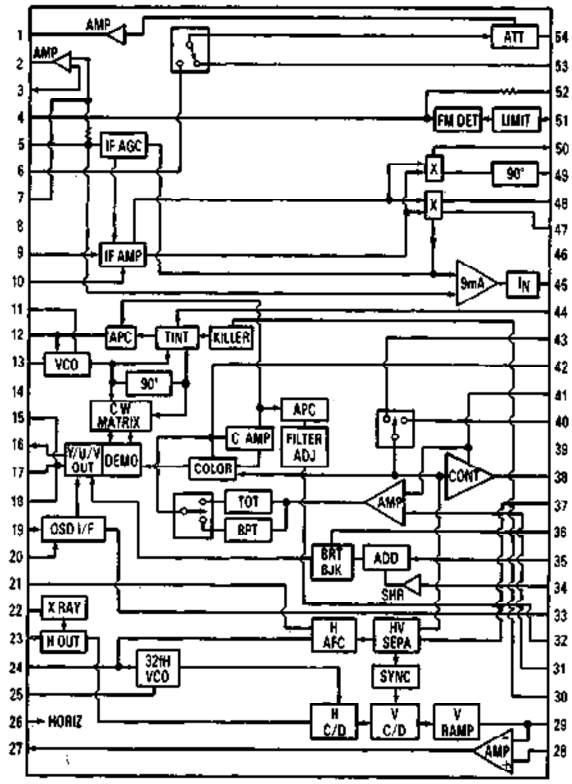
Linear IC and Module Circuits (cont'd)

ECG7009 30-Pin DIP See Fig. L124C
Video/Chroma Processor/Demod, $V_{CC} = 12$ V Typ

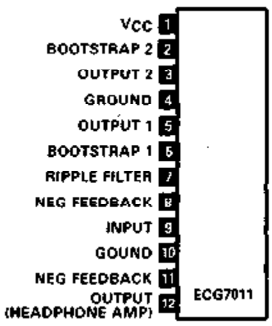


ECG7010 54-Pin DIP See Fig. L126D
Single Chip Processor with OSD Interface, $V_{CC} = 9$ V Typ

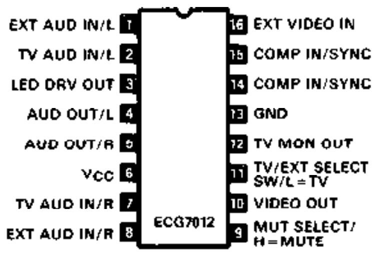


Pin 8,39 = GND, Pin 46 = V_{CC}

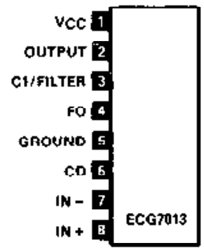
ECG7011 12-Pin SIP See Fig. L55
AF PO, 20 W, $V_{CC} = 15$ V, $R_L = 4\ \Omega$



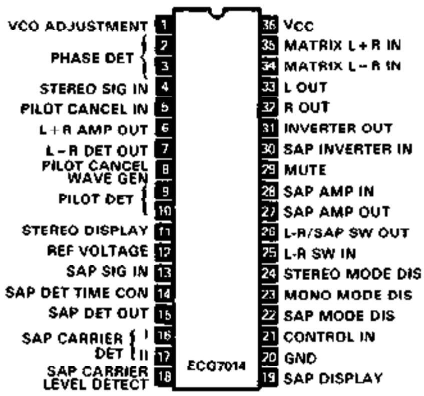
ECG7012 16-Pin DIP See Fig. L111
A/V Switch with Dual Inputs/LED Driver/ Mute Control, $V_{CC} = 12$ V Typ



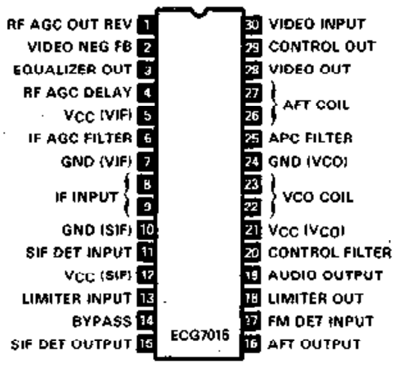
ECG7013 8-Pin SIP See Fig. L35B
IR Remote Control Receiver Preamp, $V_{CC} = 5$ V Typ



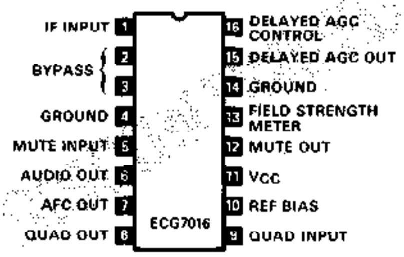
ECG7014 36-Pin DIP See Fig. L124D
TV MPX Sound with Separate Audio Program, $V_{CC} = 12$ V Typ



ECG7015 30-Pin DIP See Fig. L124C
PLL/SIF/VIF/RF AGC, $V_{CC} = 9$ V Typ



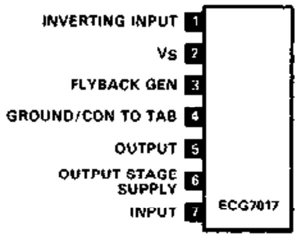
ECG7016 16-Pin DIP See Fig. L111
FM IF System, $V_{CC} = 12$ V Typ



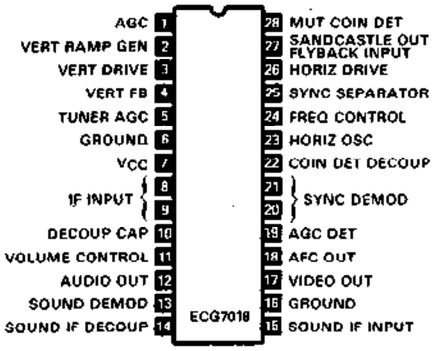
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

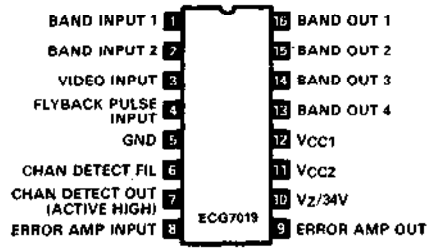
ECG7017 7-Lead Formed SIP See Fig. L19A
TV Vert Deflection with Auto Compensation/ Thermal Protect, V_S = 35 V Typ



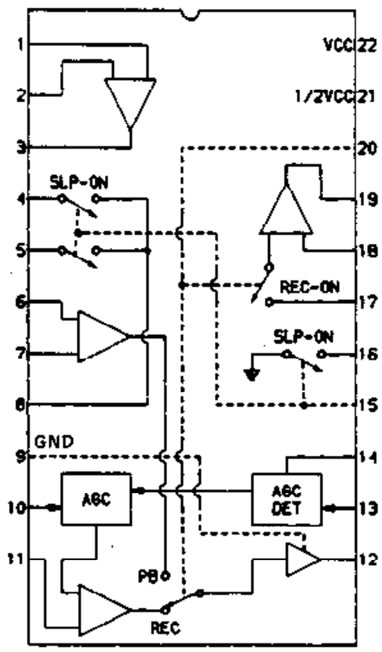
ECG7018 28-Pin DIP See Fig. L124
TV Small Signal Sub-system, V_{CC} = 12 V Typ



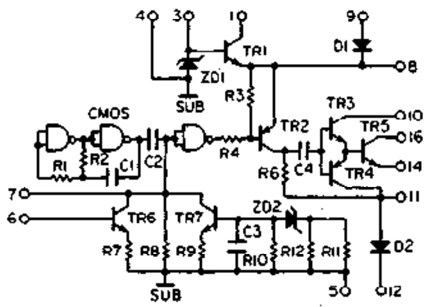
ECG7019 16-Pin DIP See Fig. L111
TV Digital Tuning System Control, $V_{CC}1$ = 12 V Typ, $V_{CC}2$ = 13.2 V Typ



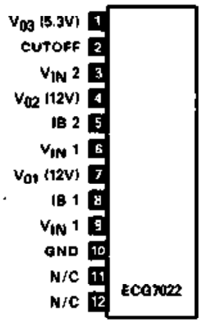
ECG7020 22-Pin DIP See Fig. L121A
VCR Audio Record/Playback Processor, V_{CC} = 9 V Typ



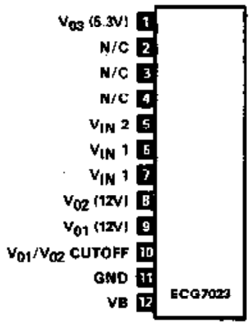
ECG7021 16-Pin SIP See Fig. L169
Switching Regulator



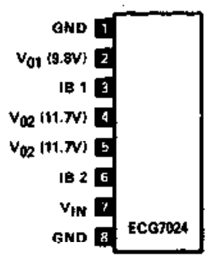
ECG7022 12-Pin SIP-M See Fig. L67C
VCR Positive DC VR: 12 V @ 1.5 A, 12 V @ 1.5 A, 5.3 V @ 1 A



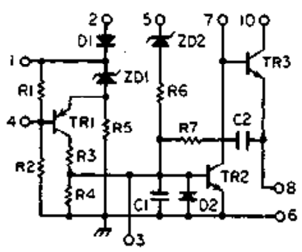
ECG7023 12-Pin SIP-M See Fig. L67C
VCR Positive DC VR: 12 V @ 1 A, 12 V @ 1 A, 5.3 V @ 1 A



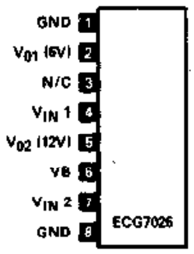
ECG7024 8-Pin SIP-M See Fig. L60A
VCR Positive DC VR: 9.8 V @ 1 A, 11.7 V @ 2 A



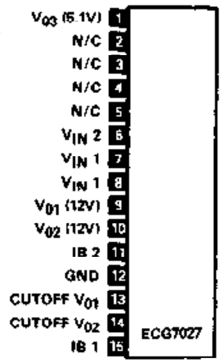
ECG7025 10-Pin SIP-M See Fig. L65A
Switching Regulator



ECG7026 8-Pin SIP-M See Fig. L60A
VCR Positive DC VR: 6 V @ .5 A, 12 V @ 1 A

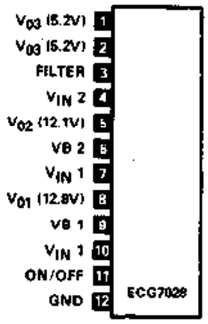


ECG7027 15-Pin SIP See Fig. L167
VCR Positive DC VR: 12 V @ 1 A, 12 V @ 1 A, 5.1 V @ .5 A

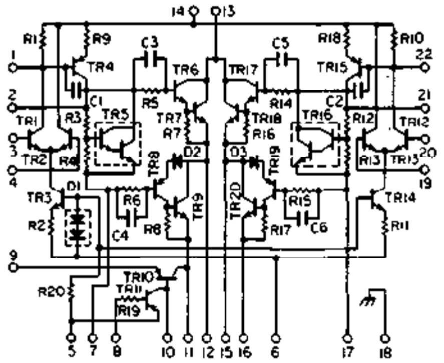


Package Outlines - See Page 1-285

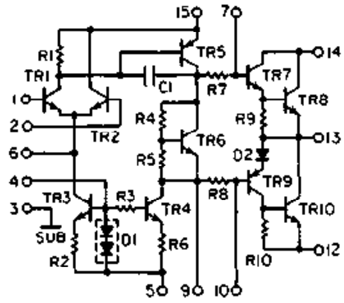
ECG7028 12-Pin SIP-M See Fig. L67C
VCR Positive DC VR: 12.8 V @ 1 A, 12.1 V @ 1 A, 5.2 V @ 1 A



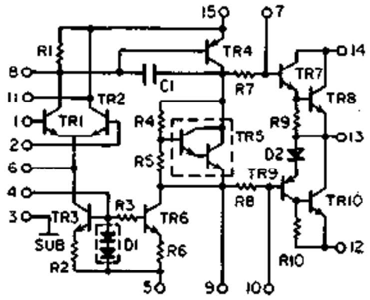
ECG7029 22-Pin SIP See Fig. L162
Dual AF PO, 100 W, $R_L = 8\ \Omega$, $V_{CC} = \pm 51$ V



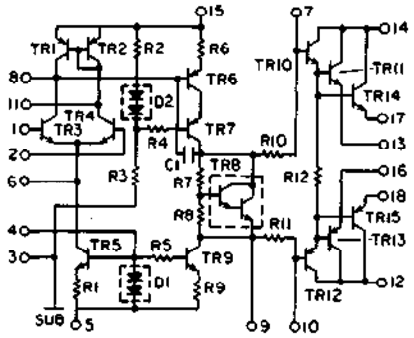
ECG7030 15-Pin SIP-M See Fig. L69A
AF PO, 50 W, $R_L = 8\ \Omega$, $V_{CC} = \pm 35$ V



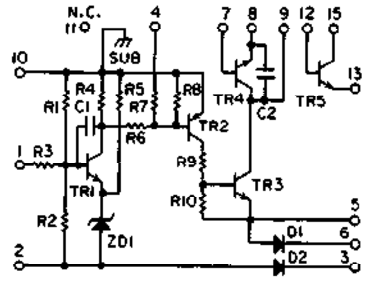
ECG7031 15-Pin SIP-M See Fig. L70B
AF PO, 100 W, $R_L = 8\ \Omega$, $V_{CC} = \pm 51$ V



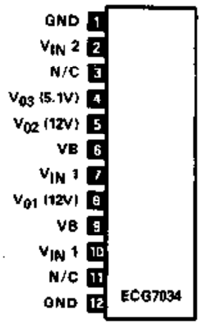
ECG7032 18-Pin SIP See Fig. L75D
AF PO, 120 W, $R_L = 8\ \Omega$, $V_{CC} = \pm 55$ V



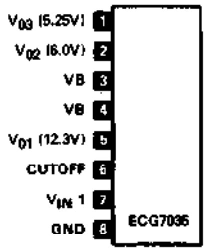
ECG7033 15-Pin SIP See Fig. L168
Switching Regulator



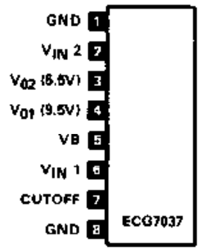
ECG7034 12-Pin SIP-M See Fig. L67C
VCR Positive DC VR: 12 V @ 1 A, 12 V @ 1 A, 5.1 V @ 1 A



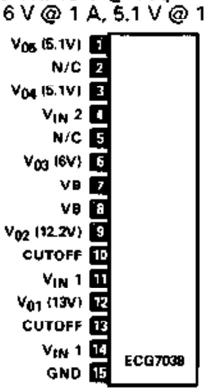
ECG7035 8-Pin SIP-M See Fig. L60A
VCR Positive DC VR: 12.3 V @ 1 A, 6 V @ 1 A, 5.25 V @ .6 A



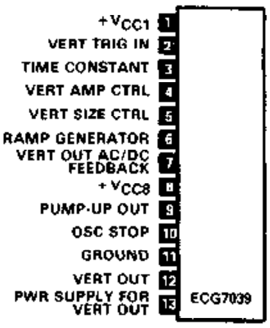
ECG7037 8-Pin SIP-M See Fig. L60A
VCR Positive DC VR: 9.5 V @ 1 A, 5.5 V @ 1 A



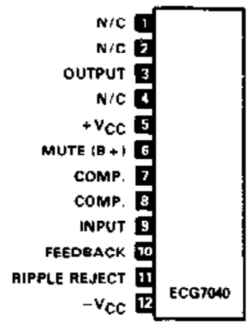
ECG7038 15-Pin SIP-M See Fig. L69A
VCR Positive DC VR: 13 V @ 1 A, 12.2 V @ 1 A, 6 V @ 1 A, 5.1 V @ 1 A, 5.1 V @ 1 A



ECG7039 13-Pin SIP-HS See Fig. L92B
TV Vertical Deflection Output, $V_{CC}1 = 12$ V, $V_{CC}8 = 24$ V

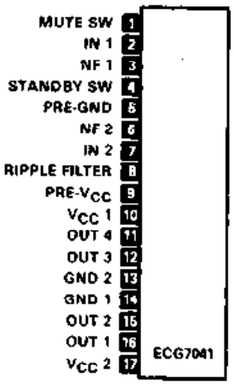


ECG7040 12-Pin SIP-HS See Fig. L92
AF PO, 20 W, $R_L = 8\ \Omega$, $V_{CC} = \pm 25$ V

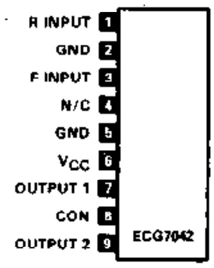


Linear IC and Module Circuits (cont'd)

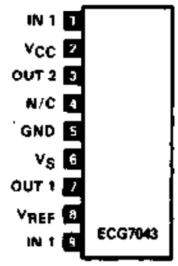
ECG7041 17-Pin SIP See Fig. L166
Dual AF PO, 22 W, $R_L = 4\ \Omega$, $V_{CC} = 13.2$ V



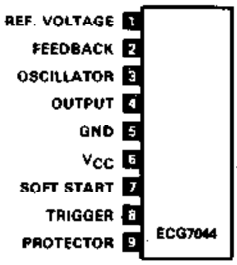
ECG7042 9-Pin SIP See Fig. L40
Bi-directional Motor Driver, $I_O = .7$ A, $V_{CC} = 9$ V



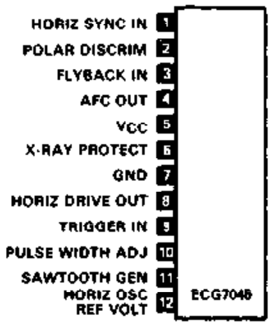
ECG7043 9-Pin SIP See Fig. L39
Bi-directional Motor Driver, $I_O = 1$ A, $V_{CC} = 12$ V



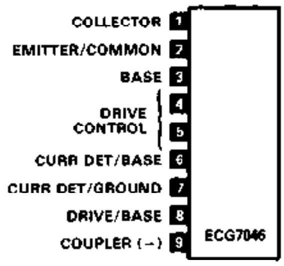
ECG7044 9-Pin SIP See Fig. L41
Switching Regulator Control Circuit, $V_{CC} = 12$ V



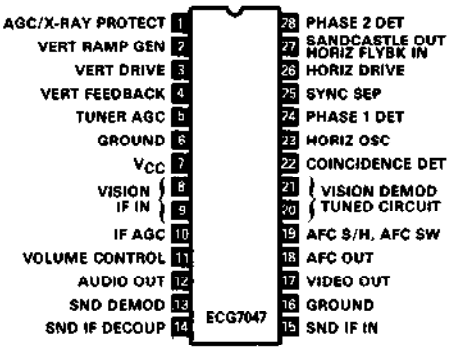
ECG7045 12-Pin SIP See Fig. L43A
Horizontal Processor, $V_{CC} = 11$ V



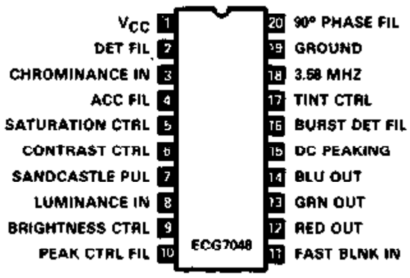
ECG7046 9-Pin SIP-HS See Fig. L171
Power Regulator



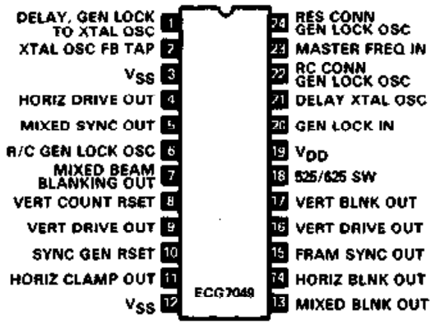
ECG7047 28-Pin DIP See Fig. L124
TV Small Signal Sub-System, $V_{CC} = 12$ V Typ



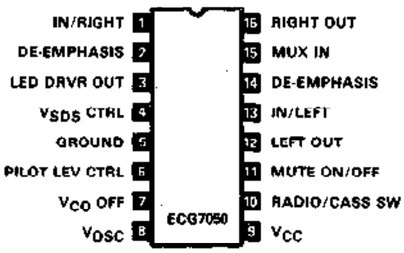
ECG7048 20-Pin DIP See Fig. L118A
TV Chroma Processor/Demodulator, $V_{CC} = 12$ V Typ



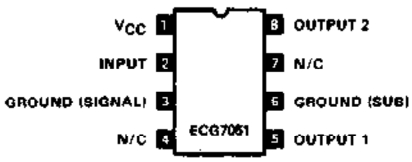
ECG7049 24-Pin DIP See Fig. L122
TV Video Sync Generator (CMOS), VDD = +4 to +15 V



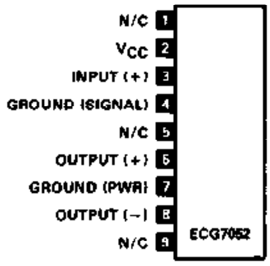
ECG7050 16-Pin DIP See Fig. L112
PLL Stereo Decoder, $V_{CC} = 8.5$ V Typ



ECG7051 8-Pin DIP See Fig. L97
AF PO, 1 W, $R_L = 8\ \Omega$, $V_{CC} = 6$ V Typ, 15 V Max



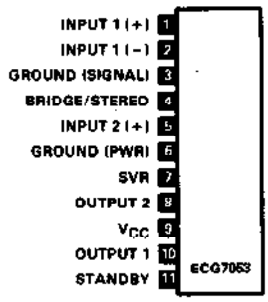
ECG7052 9-Pin SIP-HS See Fig. L79
AF PO, 3 W, $R_L = 16\ \Omega$, $V_{CC} = 11$ V Typ



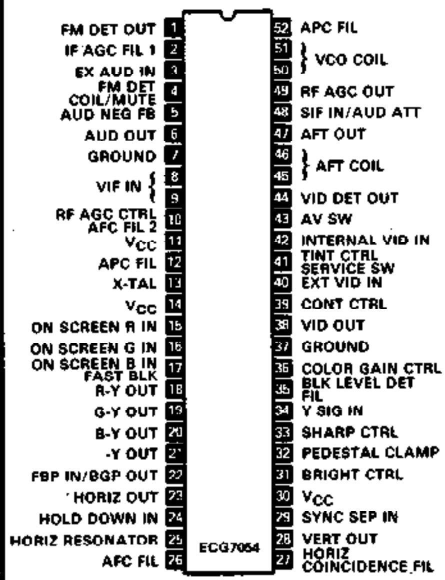
Package Outlines - See Page 1-285

Linear IC and Module Circuits (cont'd)

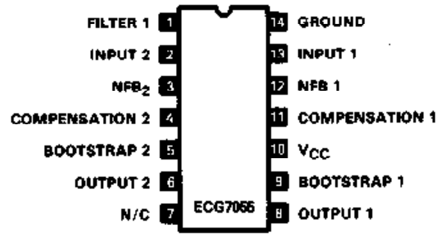
ECG7053 11-Pin Formed SIP See Fig. L93
Dual AF PO, 6.5 W, 20 W (BTL), RL = 4 Ω, V_{CC} = 14.4 V



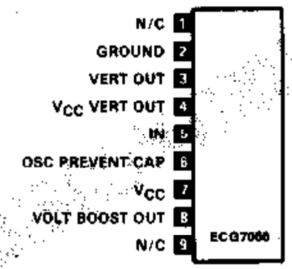
ECG7054 52-Pin DIP See Fig. L126C
Single Chip TV Signal Processor, V_{CC} = 9 V Typ



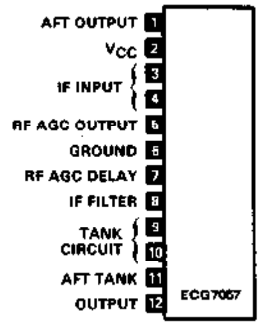
ECG7055 14-Pin DIP-ET See Fig. L146
Dual AF PO, 1.2 W, RL = 8 Ω, V_{CC} = 9 V



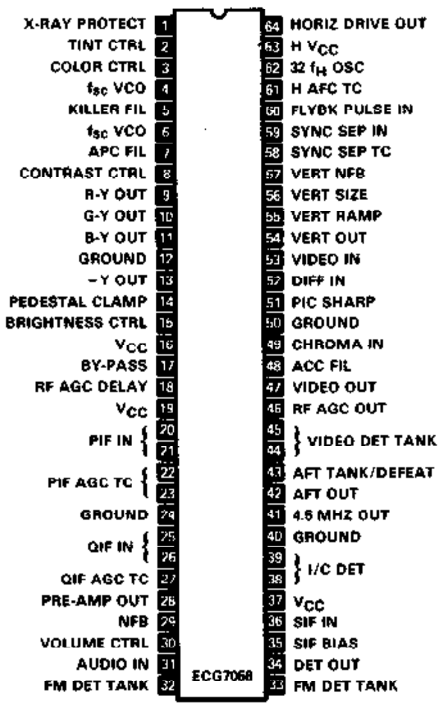
ECG7056 9-Pin SIP-HS See Fig. L172
Vertical Deflection Output, V_{CC} = 24 V Typ



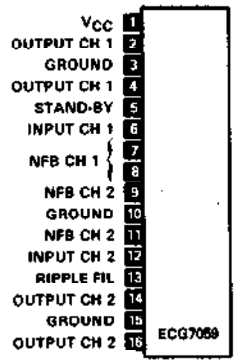
ECG7057 12-Pin SIP See Fig. L165
TV SIF/AFT/RF AGC, V_{CC} = 9 V Typ



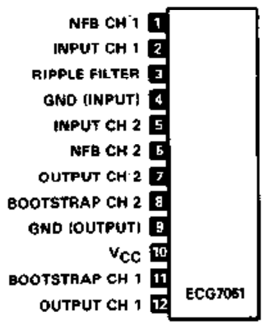
ECG7058 64-Pin DIP See Fig. L126B
Single Chip TV Signal Processor, V_{CC} = 9 V Typ



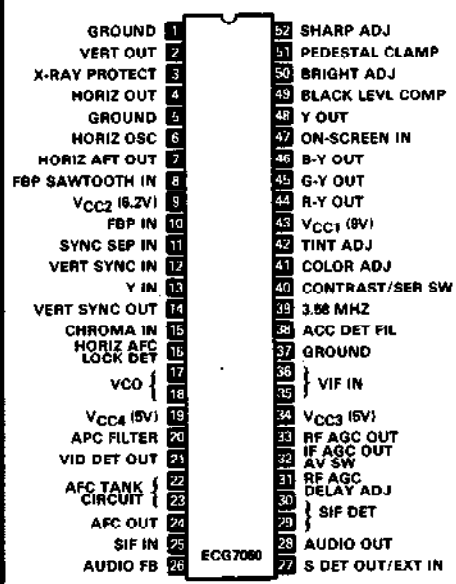
ECG7059 16-Pin SIP-HS See Fig. L175
Dual BTL AF PO, 14 W, RL = 8 Ω, V_{CC} = 13.2 V



ECG7061 12-Pin SIP-HS See Fig. L92
Dual AF PO, 5.8 W, RL = 3 Ω, V_{CC} = 12 V

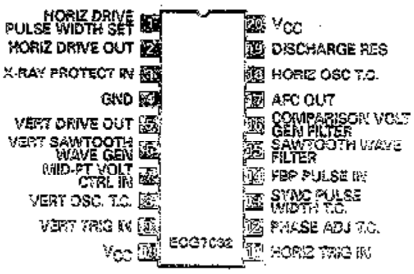


ECG7060 52-Pin DIP See Fig. L126C
Single Chip TV Signal Processor, V_{CC1} = 9 V Typ

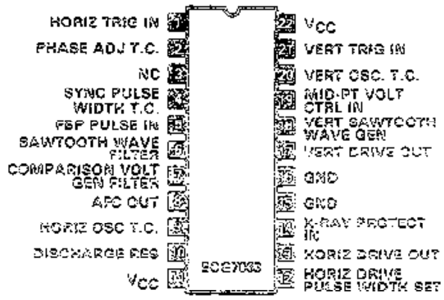


Package Outlines - See Page 1-285

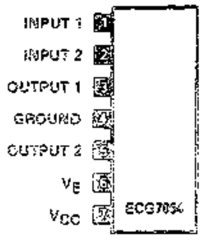
ECG7062 20-Pin DIP See Fig. L118A
Vertical Deflection Circuit/Sync/H-V Osc/ X-Ray Protect, V_{CC} = 12 V Typ



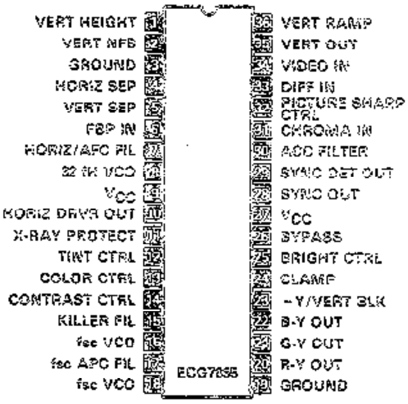
ECG7063 22-Pin DIP See Fig. L121A
Vertical Deflection Circuit/Sync/H-V Osc/ X-Ray Protect, V_{CC} = 12 V Typ



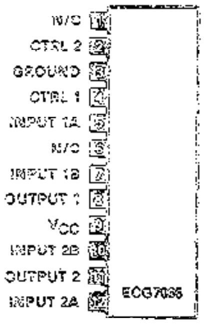
ECG7064 7-Pin SIP-HS See Fig. L76C
VCR Loading/Bi-directional Motor Driver, I_O = 1 A, V_{CC} = 18 V Typ



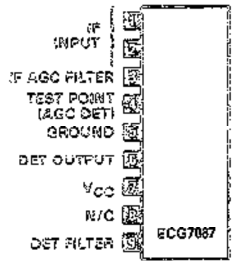
ECG7065 36-Pin DIP See Fig. L124D
Video/Chroma/Horiz-Vert Drvr/Osc/Sync/ X-Ray Protect, V_{CC} = 9 V Typ



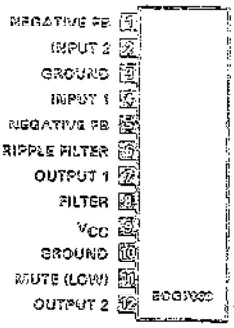
ECG7066 12-Pin SIP See Fig. L164
Dual Audio/Video Electronic Switch, V_{CC} = 12 V Typ



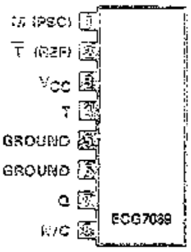
ECG7067 9-Pin SIP See Fig. L36
VIF/Amp/IF Det/AGC, V_{CC} = 9 V Typ



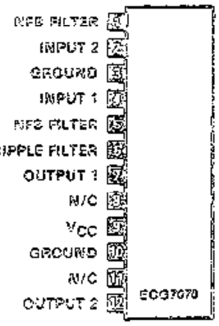
ECG7068 12-Pin SIP-HS See Fig. L92A
Dual AF PO with Mute, 13 W, R_L = 8 Ω, V_{CC} = 28 V



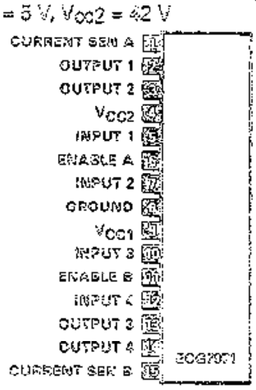
ECG7069 8-Pin SIP See Fig. L35
PLL Hi-Speed Divider w/ECL Output (1/128, 1/136), V_{CC} = 5 V Typ



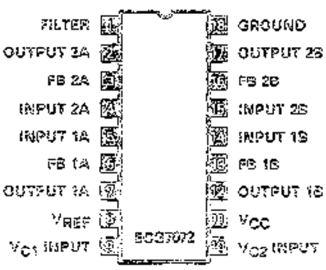
ECG7070 15-Pin SIP-HS See Fig. L92A
Dual AF PO, 8 W, R_L = 8 Ω, V_{CC} = 20 V



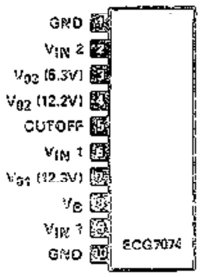
ECG7071 15-Pin SIP-HS See Fig. L93A
Bi-directional Motor Driver, I_O = 2 A, V_{CC1} = 5 V, V_{CC2} = 42 V



ECG7072 18-Pin DIP See Fig. L115
Dual Tandem Electronic Attenuator, V_{CC} = 13.2 V Typ



ECG7074 10-Pin SIP-M See Fig. L65A
VCR Positive DC VR: 12.3 V @ 1 A, 12.2 V @ 1 A, 5.3 V @ 1 A



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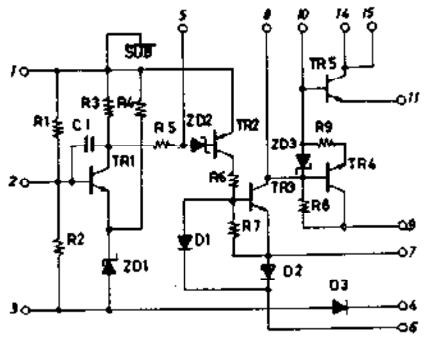
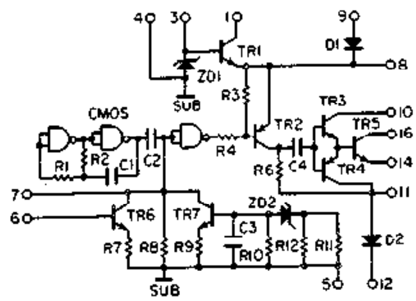
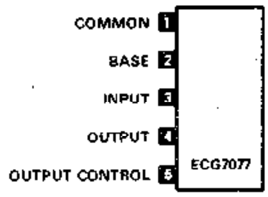
ECG7075 15-Pin SIP-M See Fig. L70A
Switching Regulator Power Module, 115 V



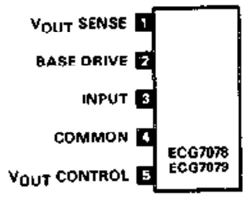
ECG7076 16-Pin SIP See Fig. L170
Switching Regulator Power Module, 85-264 VAC



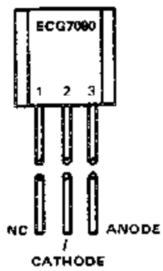
ECG7077 5-Lead Formed SIP See Fig. L19B
TV Voltage Regulator, 110 V @ 1 A



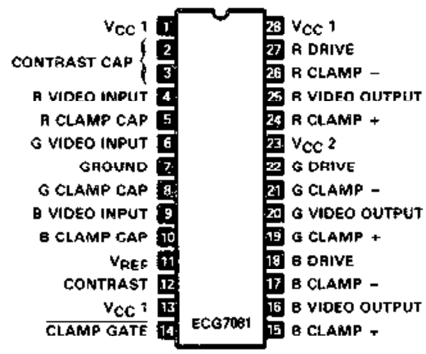
ECG7078 5-Lead Formed SIP See Fig. L19B
Hybrid Voltage Regulator, Output = 115 V
ECG7079
Output = 110 V



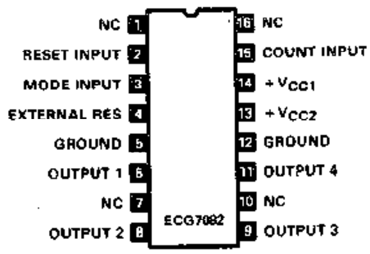
ECG7080 TO-92 See Fig. L16
Precision 1.235 V Voltage Reference



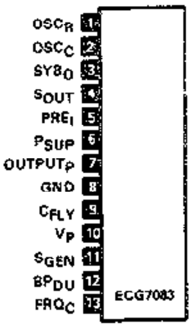
ECG7081 28-Pin DIP See Fig. L124
RGB Video Amp, $V_{CC}1 = 12$ V, $V_{CC}2 = 12$ V



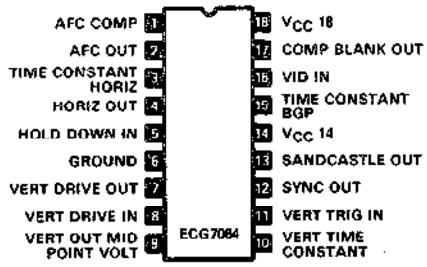
ECG7082 16-Pin DIP See Fig. L112
Stepping Motor Driver, $V_{CC} = 12$ V



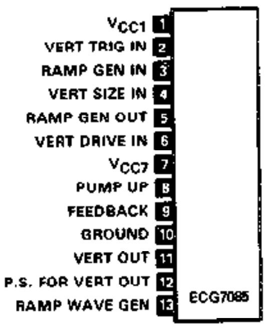
ECG7083 13-Pin Lead Formed SIP See Fig. L57B
Vertical Deflection Circuit, $V_P = 23$ V



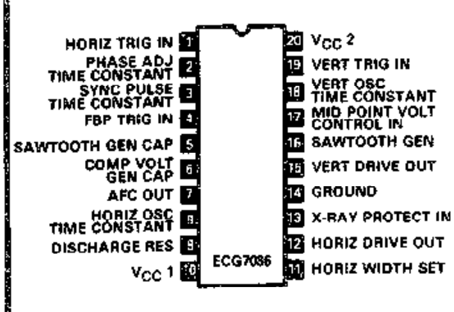
ECG7084 18-Pin DIP See Fig. L115
Sync/Deflection Circuit, $V_{CC}14 = 12$ V



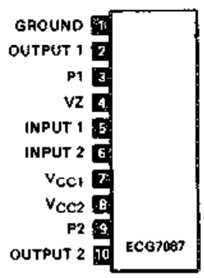
ECG7085 13-Pin SIP-HS See Fig. L92B
Vertical Deflection Circuit, $V_{CC}1 = 12$ V, $V_{CC}7 = 24$ V



ECG7086 20-Pin DIP See Fig. L118A
Sync/Deflection Circuit, $V_{CC}1 = 12$ V, $V_{CC}2 = 12$ V

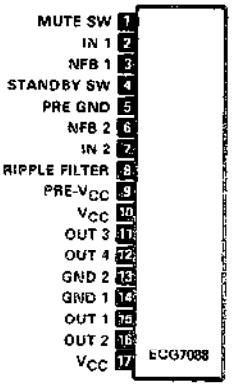


ECG7087 10-Pin SIP See Fig. L42
Bi-directional Motor Driver, $V_{CC}1 = 12$ V, $V_{CC}2 = 12$ V, $I_O = 1.6$ A

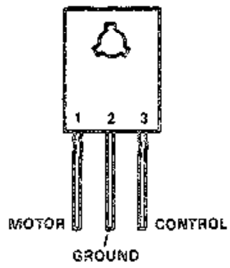


Package Outlines - See Page 1-285

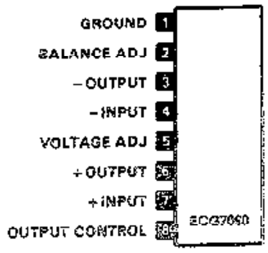
ECG7088 17-Pin SIP See Fig. L166
Dual AF PO, 15 W, RL = 4 Ω, V_{CC} = 13.2 V



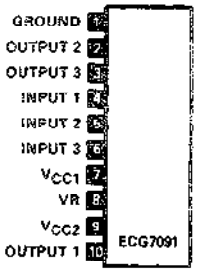
ECG7089 TO-126 See Fig. L163A
Motor Control, Control Voltage = 4.5 V to 16 V



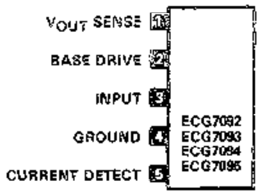
ECG7090 8-Pin SIP See Fig. L35
Dual Tracking Voltage Regulator,
Vout = ±3 V to ±30 V



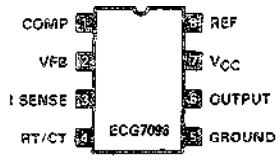
ECG7091 10-Pin SIP See Fig. L42
Dual Bi-directional Motor Driver, I_O = 1.6 A,
V_{CC1} = 12 V, V_{CC2} = 16 V



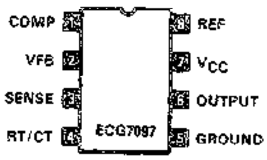
ECG7092 5-Lead Formed SIP See Fig. L19B
100 V 1 A Max
ECG7093
130 V 1 A Max
ECG7094
140 V 1 A Max
ECG7095
160 V 1 A Max
Hybrid Voltage Regulators



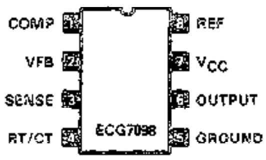
ECG7096 8-Pin DIP See Fig. L98
Current Mode PWM Controller,
UNLO = 16 V (ON), 10 V (OFF),
Duty Cycle 100%, V_{CC} = 15 V



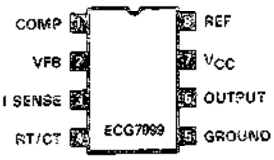
ECG7097 8-Pin DIP See Fig. L98
Current Mode PWM Controller,
UNLO = 8.5 V (ON), 7.5 V (OFF),
Duty Cycle 100%, V_{CC} = 15 V



ECG7098 8-Pin DIP See Fig. L98
Current Mode PWM Controller,
UNLO = 16 V (ON), 10 V (OFF),
Duty Cycle 50%, V_{CC} = 15 V



ECG7099 8-Pin DIP See Fig. L98
Current Mode PWM Controller,
UNLO = 8.5 V (ON), 7.5 V (OFF),
Duty Cycle 50%, V_{CC} = 15 V



Package Outlines - See Page 1-285

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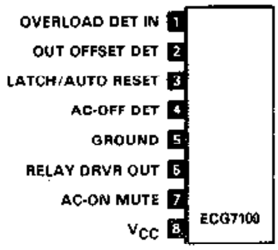
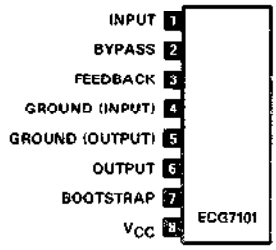
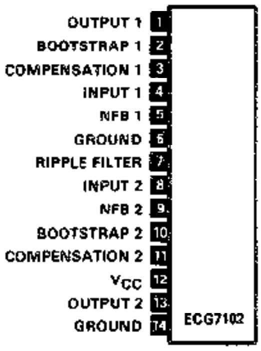
ECG7100 8-Pin SIP See Fig. L35A
Protector IC for AF PO/Speakers, $V_{CC}=45$ V



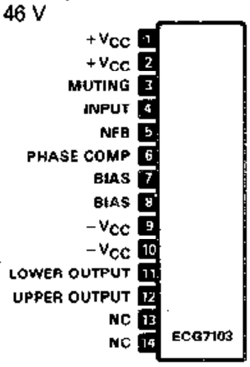
ECG7101 8-Pin SIP-HS See Fig. L78A
AF PO 7 W, $V_{CC}=14$ V, $R_L=4\ \Omega$



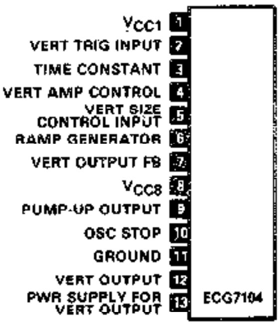
ECG7102 14-Pin SIP-HS See Fig. L174
Dual AF PO 5.5 W, Bridge (BTL) 20 W, $V_{CC}=18$ V, $R_L=8\ \Omega$



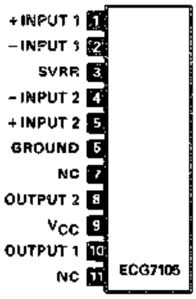
ECG7103 14-Pin SIP-HS See Fig. L174
High Power Amp Driver (50 to 80 W), $V_{CC}=\pm46$ V



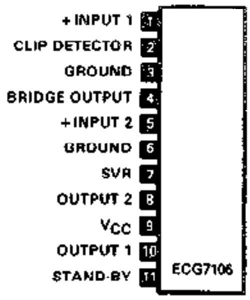
ECG7104 13-Pin SIP-HS See Fig. L92B
TV Vertical Deflection Output, $V_{CC}1=12$ V, $V_{CC}8=24$ V



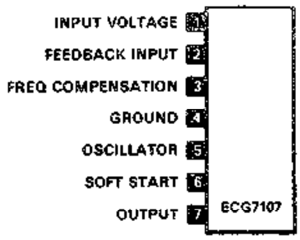
ECG7105 11-Pin SIP-HS See Fig. L93
Dual AF PO 10 W, Bridge (BTL) 18 W, $V_{CC}=24$ V, $R_L=4\ \Omega$



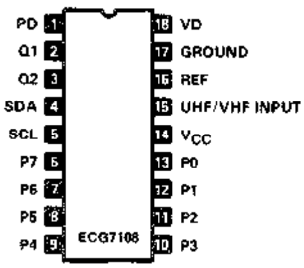
ECG7106 11-Pin SIP-HS See Fig. L93
Dual AF PO, 6.5 W, Bridge (BTL) 16 W, $V_{CC}=14$ V, $R_L=4\ \Omega$



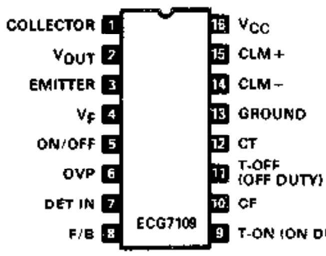
ECG7107 7-Lead Formed SIP See Fig. L19A
Power Switching Regulator, 5.1 V to 40 V @ 2.5 A



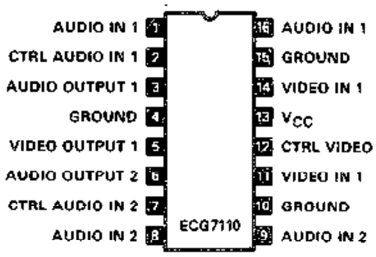
ECG7108 18-Pin DIP See Fig. L115
Digital Programmable PLL (MOS), $V_{CC}=5$ V Typ



ECG7109 16-Pin DIP See Fig. L111
Switching Regulator Control, $V_{CC}=18$ V Typ



ECG7110 16-Pin DIP See Fig. L111
Audio/Video Analog Switch, $V_{CC}=9$ V Typ



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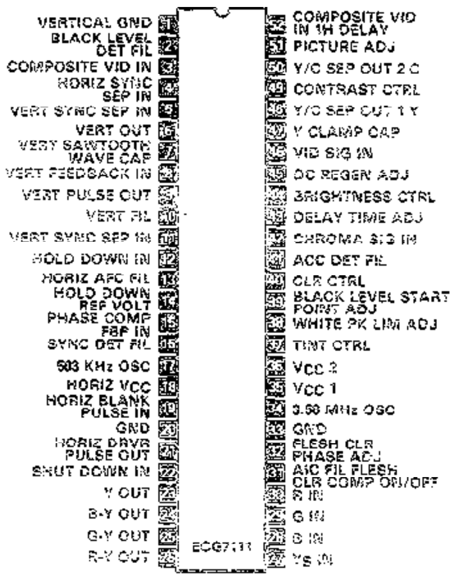
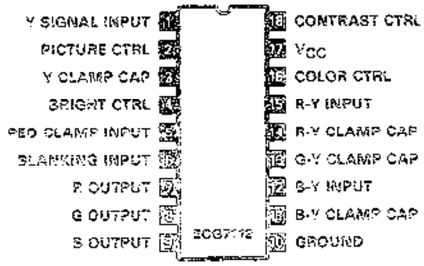
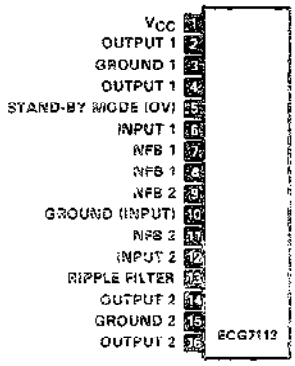
ECG7111 52-Pin DIP See Fig. L126C
Single Chip TV Signal Processor, $V_{CC}1 = 12$ V, $V_{CC}2 = 9$ V



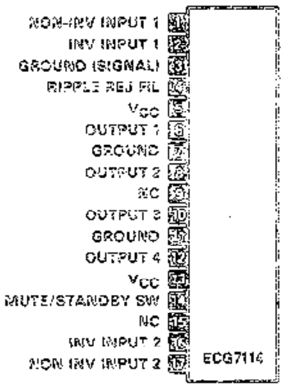
ECG7112 18-Pin DIP See Fig. L115
Video/Chroma Signal Processor, $V_{CC} = 12$ V Typ



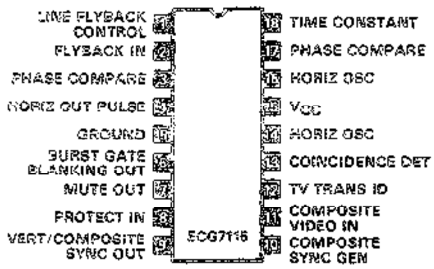
ECG7113 16-Pin SIP-HS See Fig. L175
Dual BTL AF PO, 14 W, $V_{CC} = 13.2$ V, $R_L = 4\ \Omega$



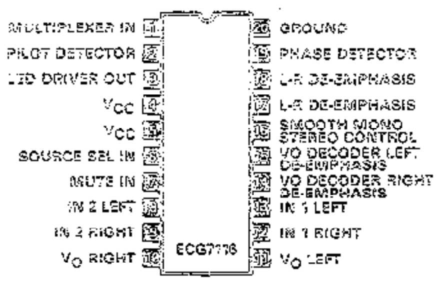
ECG7114 17-Pin SIP See Fig. L173
Quad AF PO 11 W/Ch, 2 x 22 W (BTL), $V_{CC} = 14$ V, $R_L = 2\ \Omega$



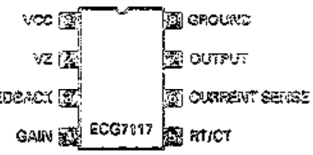
ECG7115 18-Pin DIP See Fig. L115
Horizontal/Vertical Signal Processor, $V_{CC} = 12$ V Typ



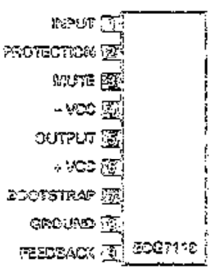
ECG7116 20-Pin DIP See Fig. L118A
PLL Stereo Decoder, $V_{CC} = 8.5$ V Typ



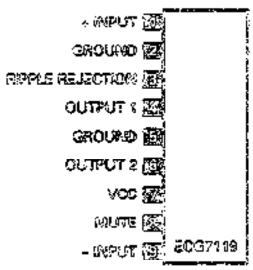
ECG7117 8-Pin DIP See Fig. L97
SMPS Controller, $V_{CC} = 12$ V



ECG7118 9-Pin SIP See Fig. L51A
AF PO, 50 W, $R_L = 4\ \Omega$, $V_{CC} = \pm 28$ V



ECG7119 9-Pin SIP See Fig. L51A
AF PO, 11 W, $R_L = 4\ \Omega$, $V_{CC} = 14.4$ V



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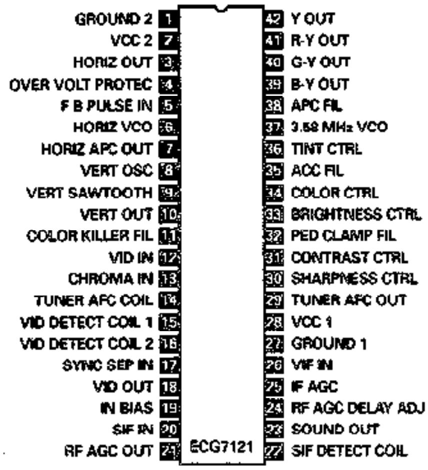
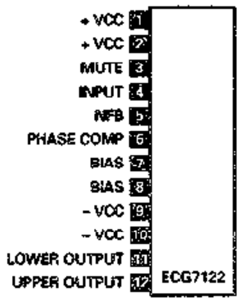
Linear IC and Module Circuits (cont'd)

ECG7120 30-Pin DIP See Fig. L124B
RGB Video Amp, V_{CC} = 12 V

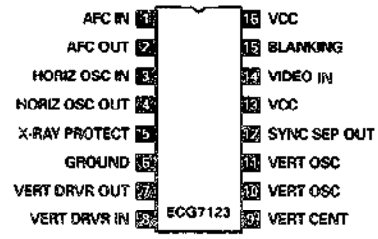
ECG7121 42-Pin DIP See Fig. L126A
VIF, SIF, Video, Color Signal Processor,



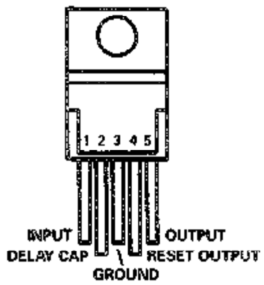
ECG7122 12-Pin SIP-HS See Fig. L92
Power Amp Driver, 30-50 W, V_{CC} = ± 36V



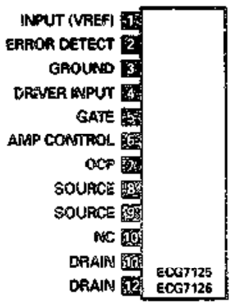
ECG7123 16-Pin DIP See Fig. L111
Sync/Deflection Circuit, V_{CC} = 12 V



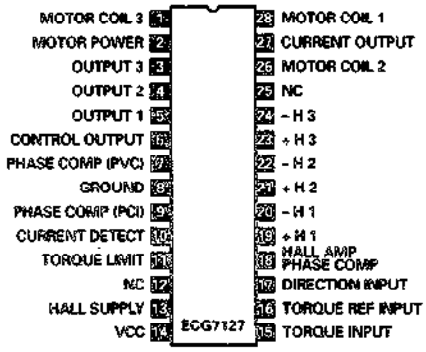
ECG7124 TO-220, 5-Pin See Fig. L19
Voltage Regulator with Reset, Vo = 5 V



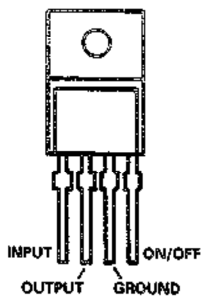
ECG7125 12-Pin SIP See Fig. L176
Switching Regulator
I_D = 6A
ECG7126
I_D = 8A



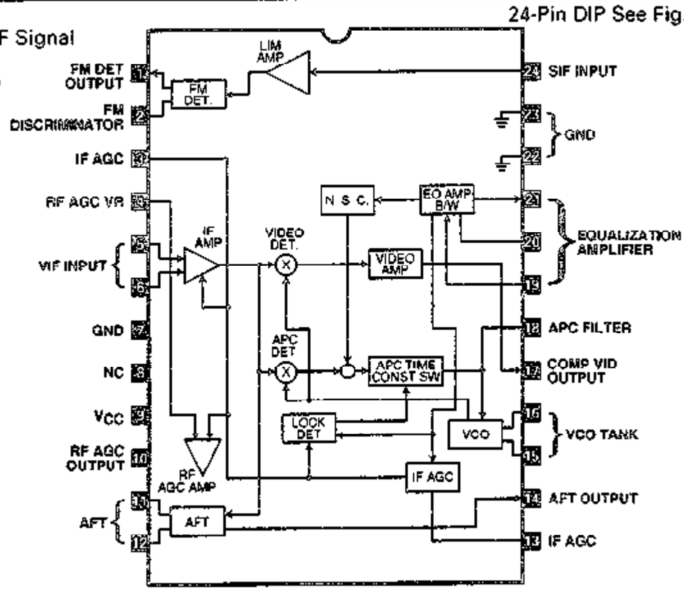
ECG7127 28-Pin DIP See Fig. L123A
VCR Capstan Motor Driver, V_{CC} = 5 V



ECG7128 TO-220, 5-Pin See Fig. L177
Positive Voltage Regulator with On/Off Control, 12 V, 1 A

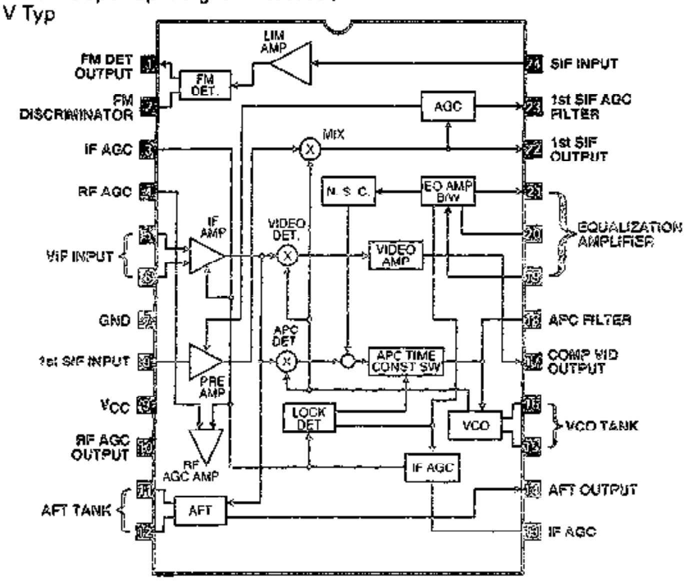


ECG7129 24-Pin DIP See Fig. L124C
TV/VCR, VIF/SIF Signal Processor,
V_{CC} = 12 V Typ

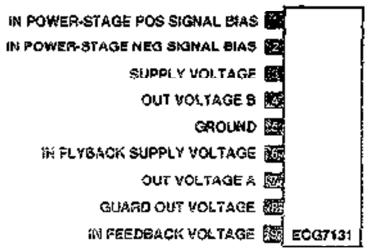


Package Outlines - See Page 1-285

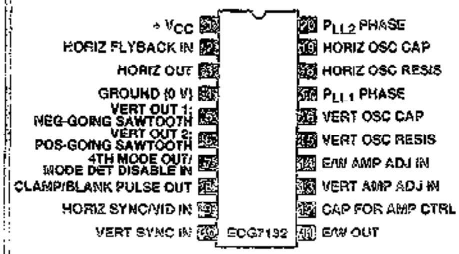
ECG7130 24-Pin DIP See Fig. L124C
TV/VCR, VIF/SIF Super-Split Signal Processor, V_{CC} = 12 V Typ



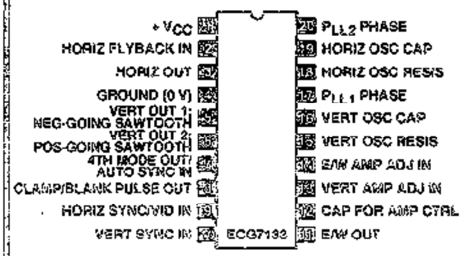
ECG7131 9-Pin SIP See Fig. L51A
TV Vertical Deflection, V_{CC} = 13.5 V Typ



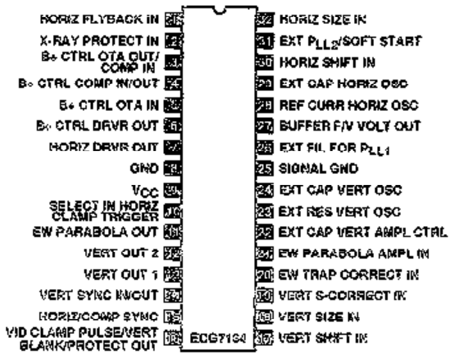
ECG7132 20-Pin DIP See Fig. L118A
Horizontal/Vertical Deflection Controller for VGA/XGA & Multifrequency Monitors, V_{CC} = 12 V Typ



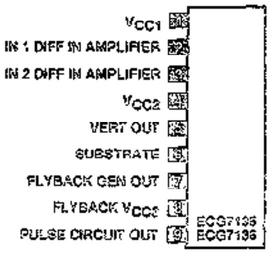
ECG7133 20-Pin DIP See Fig. 118A
Horizontal/Vertical Deflection Controller for VGA/XGA & Autosync Monitors, V_{CC} = 12 V Typ



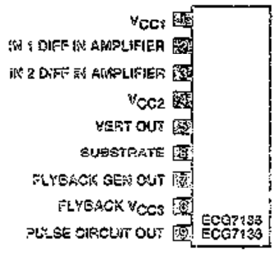
ECG7134 32-Pin DIP See Fig. L178
Horizontal/Vertical Deflection Controller for Monitors, V_{CC} = 12 V Typ



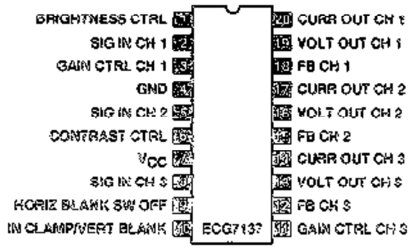
ECG7135 9-Pin SIP-HS See Fig. L81A
Vertical Deflection Power Amp for Monitors, V_{CC} = 25 V Typ



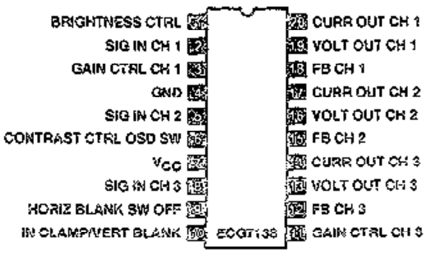
ECG7136 9-Pin SIP-HS See Fig. L179
Vertical Deflection Power Amp for Monitors & TVs, V_{CC} = 25 V Typ



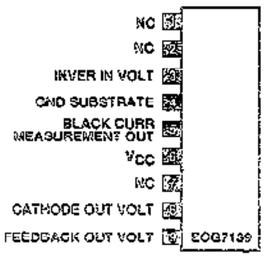
ECG7137 20-Pin DIP See Fig. L118A
Advanced Monitor Video Controller, V_{CC} = 8 V Typ



ECG7138 20-Pin DIP See Fig. L118 A
Advanced Monitor Video Controller for OSD V_{CC} = 8 V Typ



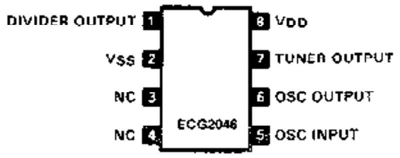
ECG7139 9-Lead Formed SIP See Fig. L180
Video Output Amplifier, V_{CC} = 200 V Typ



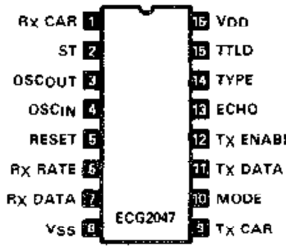
Package Outlines - See Page 1-285

Miscellaneous Integrated Circuits

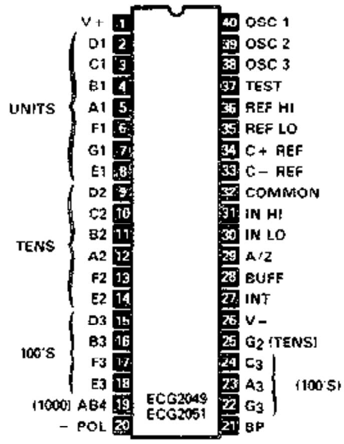
ECG2046 8-Pin DIP See Fig. L97
60 Hz Time Base Generator, Input Freq = 3.58 MHz (CMOS), VDD = 15 V Max



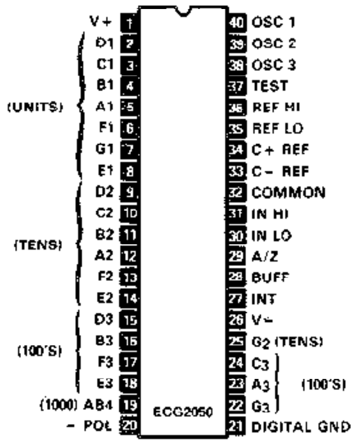
ECG2047 16-Pin DIP See Fig. L112
FSK Modem, 0-600 Baud (CMOS), VDD = 15 V Max



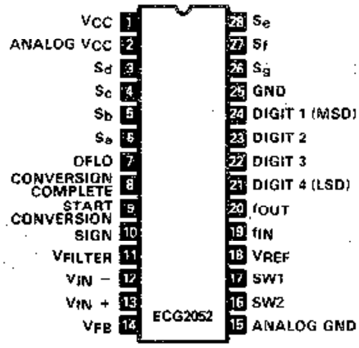
ECG2049 40-Pin DIP See Fig. L125
LCD 3½ Digit A/D Converter, Low Power (CMOS), V± = 15 V Max
ECG2051
LCD 3½ Digit A/D Converter (CMOS)



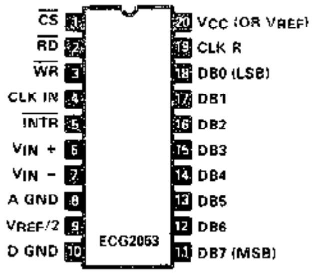
ECG2050 40-Pin DIP See Fig. L125
LED 3½ Digit A/D Converter (CMOS), V = ±5 V Typ



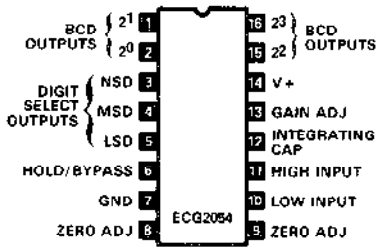
ECG2052 28-Pin DIP See Fig. L124A
3½ Digit A/D Converter with Multiplexed 7-Segment Output (CMOS), Vcc = 5 V Typ



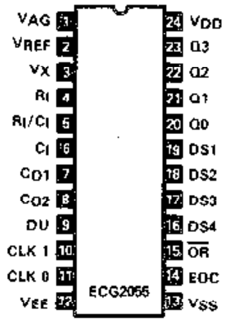
ECG2053 20-Pin DIP See Fig. L118A
8-Bit MPU Compatible A/D Converter (CMOS), Vcc = 5 V Typ



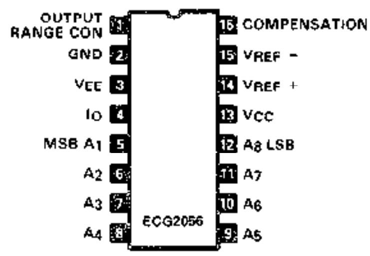
ECG2054 16-Pin DIP See Fig. L112
3 Digit A/D Converter, V+ = 5 V Typ



ECG2055 24-Pin DIP See Fig. L122
3½ Digit A/D Converter (CMOS), VDD, VEE = ±5 V Typ, Vss = GND



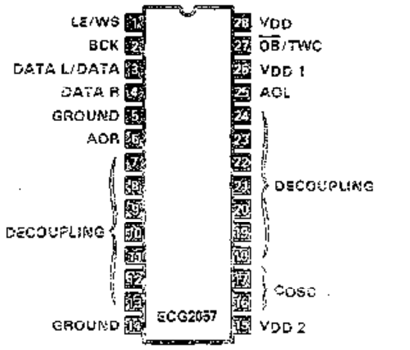
ECG2056 16-Pin DIP See Fig. L112
D/A Converter, Vcc = +5 V Typ, VEE = −15 V Typ



Package Outlines - See Page 1-285

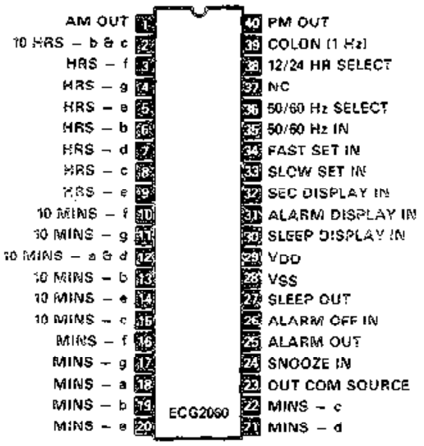
ECG2057 28-Pin DIP See Fig. L124A

Dual 16-Bit D/A Converter, VDD = +5 V, VDD1 = −5 V, VDD2 = −15 V



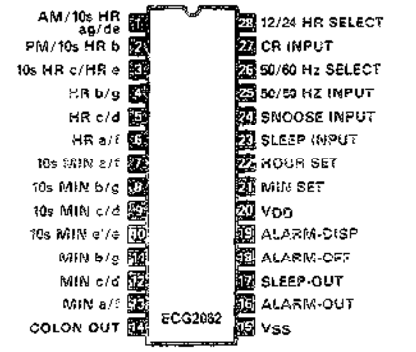
ECG2060 40-Pin DIP See Fig. L125

Digital Alarm Clock Ckt for LED Display (PMOS), V_{SS} = 26 V Max



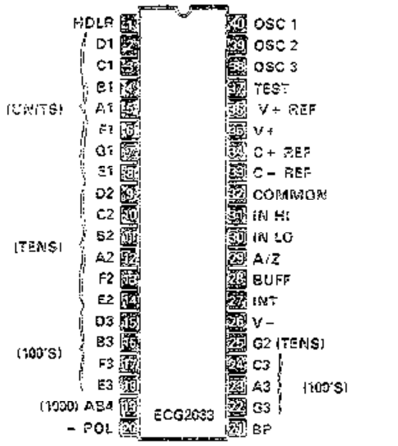
ECG2062 28-Pin DIP See Fig. L123A

IC-4 Mode Digital Alarm Clock for LED Display (PMOS), VDD = −12 V Typ



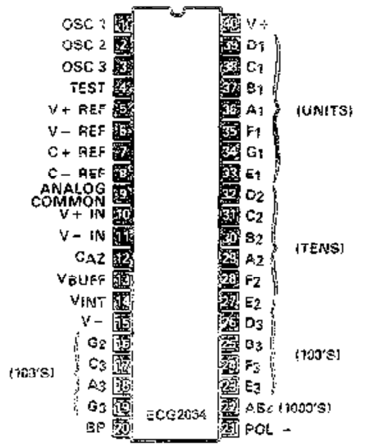
ECG2063 40 Pin DIP See Fig. L126

LCD 3½ Digit A/D Converter with Display Hold (CMOS), V± = 9 V



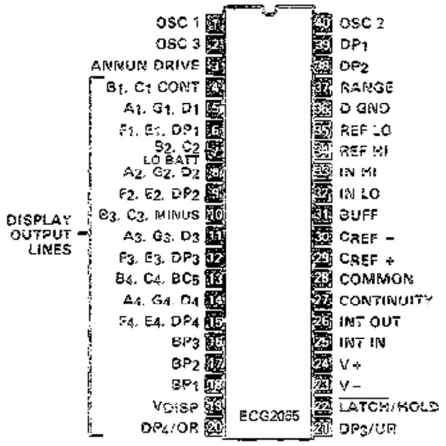
ECG2064 40-Pin DIP See Fig. L125

LCD 3½ Digit A/D Converter, Lo Power (CMOS), V± = 9 V



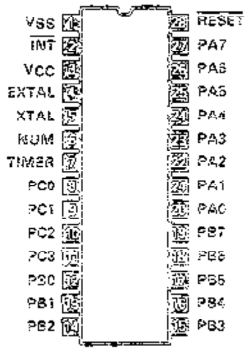
ECG2065 40-Pin DIP See Fig. L125

LCD 4½ Digit A/D Converter, Lo Power (CMOS), V± = 9 V



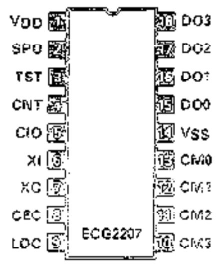
ECG2200, ECG2202*, ECG2203*, ECG2206 28-Pin DIP See Fig. L124

TV Tuner Microprocessor, Vcc = 5.25 V, Vss = 0 V Typ (HMOS)



ECG2207 18-Pin DIP See Fig. L115

Digital Clock for 4-Bit Microcomputers (CMOS), VDD = 5 V Typ

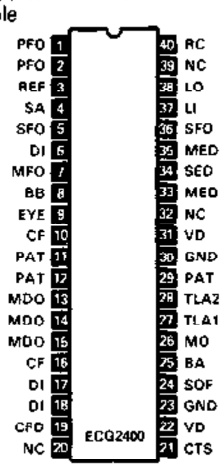


* Discontinued

Package Outlines - See Page 1-285

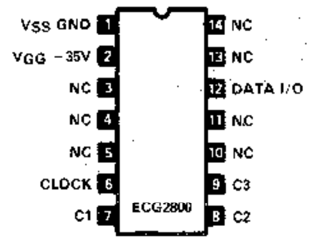
ECG2400 40-Pin DIP See Fig. L125

Modem, 100/300/600/1200 Baud FSK, Single +5 V Supply, Bell 103, 113A and 202 Compatible



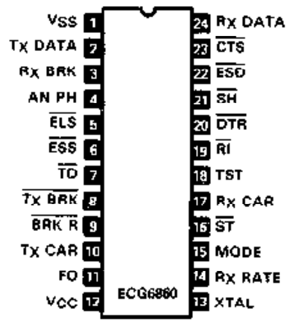
ECG2800 14-Pin DIP See Fig. L104

1400-Bit Serial EAROM for Channel Memory Storage in Digital Tuners (PMOS), VGG = −35 V Typ



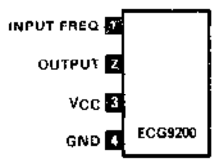
ECG6860 24-Pin DIP See Fig. L122

FSK Digital Modem, 600 bps (MOS), V_{CC} = 5 V Typ



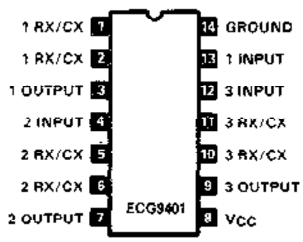
ECG9200 4-Pin SIP See Fig. L18A

I^2L Freq Divider for VCR and Electronic Organs, V_{CC} = 16 V Max



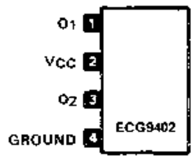
ECG9401 40-Pin DIP See Fig. L125

Monostable Multivibrator for VCR, V_{CC} = 15 V Max



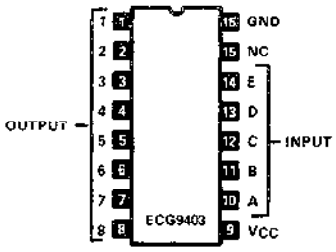
ECG9402 4-Pin SIP See Fig. L18A

Hall Switch, V_{max} = 18 V, I_{max} = 8 mA



ECG9403 16-Pin DIP See Fig. L111

Binary to Octal Decoder for VCR, V_{CC} = 8 V Max



Package Outlines - See Page 1-285

Linear IC and Module Outlines

Fig. L1A — 6-Pin Plastic

ECG
703

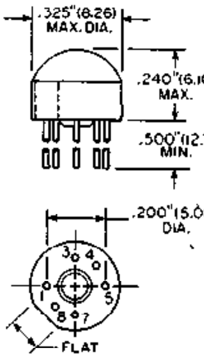


Fig. L1B — 3-Pin Can

ECG
1768
1769
1770

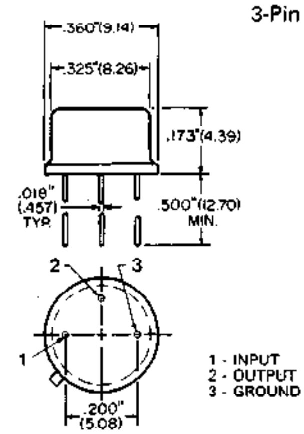


Fig. L2 — 8-Pin Can

ECG
920

1. Q2
2. R
3. GND
4. No Pin
5. Vcc
6. T
7. Q1
8. No Pin

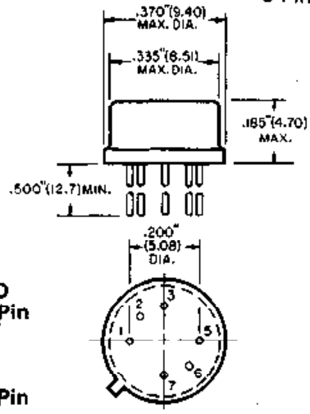


Fig. L3 — 8-Pin Can

ECG

716	**937**
724	**938**
871	**940**
877	**941**
902	**943**
909	**944**
910	**945**
918	**949**
922	**994**
924	**1002**
928	**1171**
939	**1928**

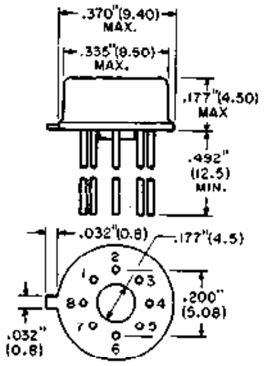


Fig. L5 — 10-Pin Can

ECG
704
711
780

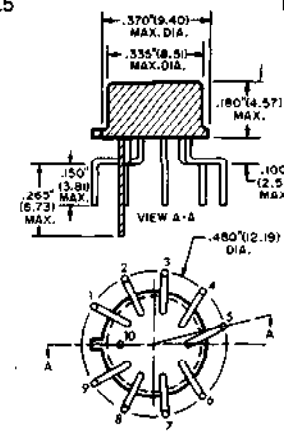


Fig. L6 — 10-Pin Can

ECG
923
927

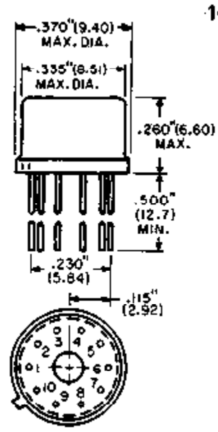


Fig. L7 — 10-Pin Can

ECG
370A
726
905
915
919
947

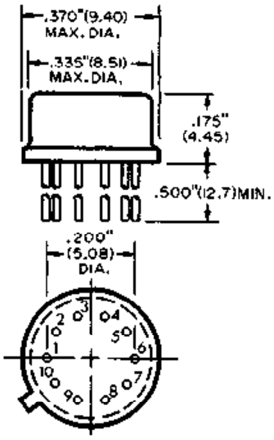


Fig. L9 — TO-5, 12-Pin Can

ECG
784
903
904
906
907

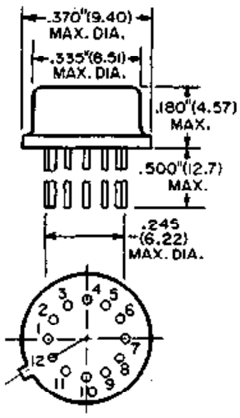


Fig. L11 — TO-3

ECG

309K	**1913**
931	**1914**
932	**1915**
933	**1916**
934	**1918**
935	**1919**
970	**1923**
1911	**1924**
1912	**1925**

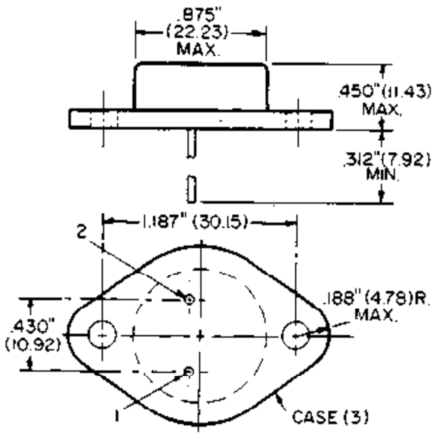
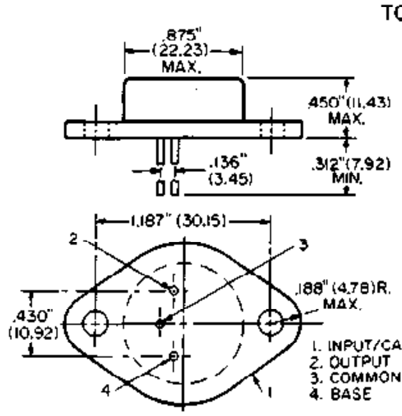


Fig. L11A — TO-3, 3-Pin

ECG
1546
1548
1553
1644*
1645*
1646
1719

*1. Output/Case
2. Common
3. Input
4. Base



N

Linear IC and Module Outlines (cont'd)

Fig. L11B TO-3, 4-Pin

ECG
1927

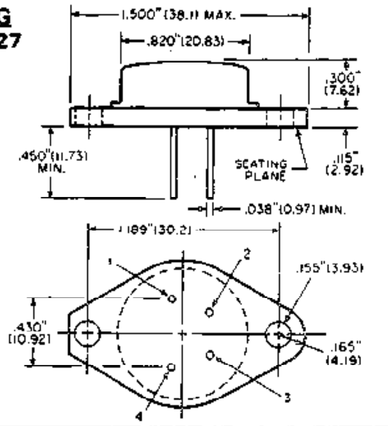


Fig. L12 TO-66, 9-Pin

ECG
946

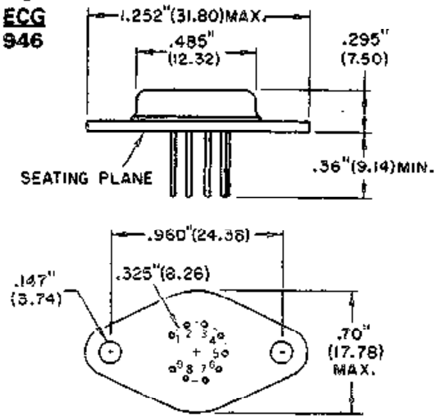


Fig. L15 TO-3, 14 Pin

ECG
1059

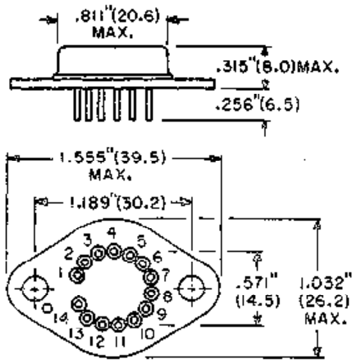


Fig. L16 TO-92

ECG
950
951
952
977
981
988
999
1900
1901
1902
1903
1905
1906
1907
1908
1909
1917
7080

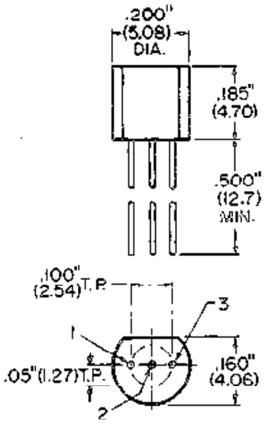


Fig. L16A TO-92

ECG
998

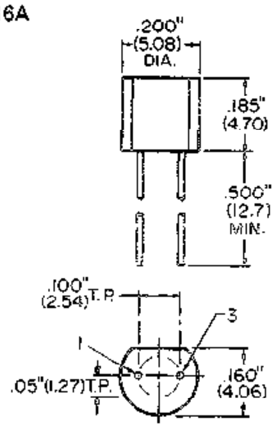


Fig. L17 TO-220

ECG
956
957
958
959
960
961
962
963
964
965
966
967
968
969
971
972
1904
1910
1932
1951
1952
1953
1954
1955
1956

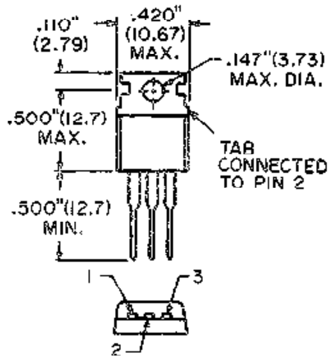


Fig. L17A TO-3PJ

ECG
1934
1934X
1936
1938
1940

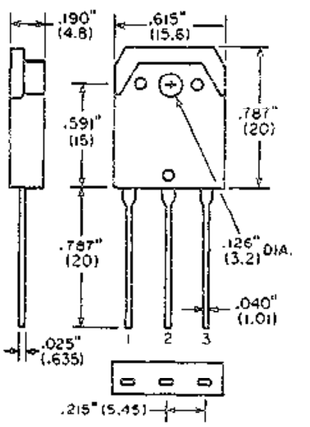


Fig. L17B 3-Pin SIP

ECG
1705

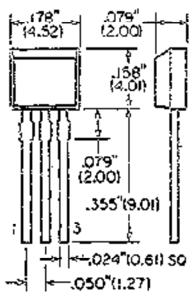


Fig. L17C TO-92L

ECG
1869

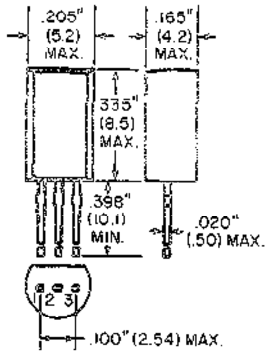


Fig. L18A 4-Pin SIP

ECG
9200
9402

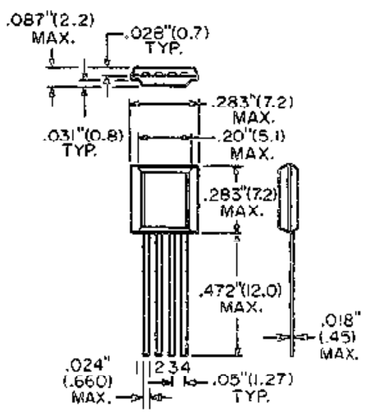


Fig. L18B 4-Pin SIP

ECG
1740
1741
1742
1743

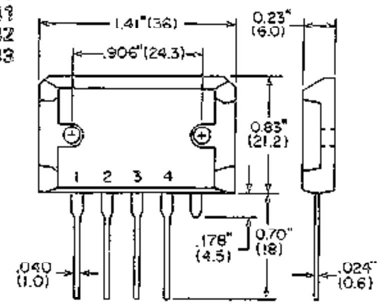
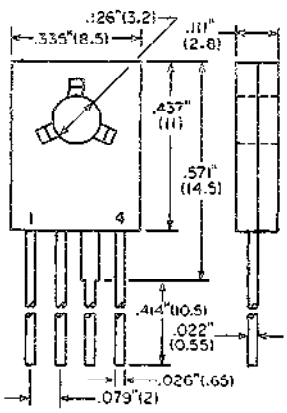


Fig. L18C 4-Pin SIP

ECG
1844



Linear IC and Module Outlines (cont'd)

Fig. L19 — TO-220, 5-Pin

ECG
1232
1288
1374
1376
1378
1380
1429•
1942
7124

• Dotted lines for Alt. Package

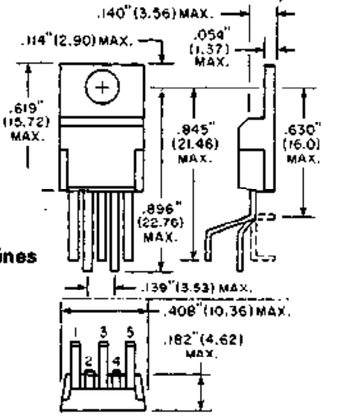


Fig. L19A — 7-Lead Formed SIP

ECG
1788
7017
7107

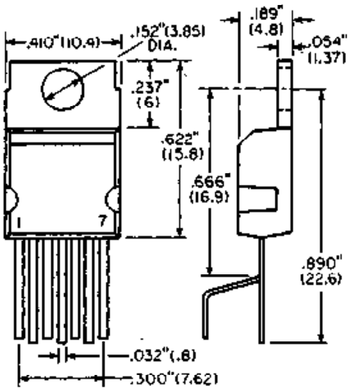


Fig. L19B — 5-Lead Formed SIP

ECG
1776
1777
1778
1796
1839
1840
1841
1894
1895
1896
1897
7077
7078
7079
7092
7093
7094
7095

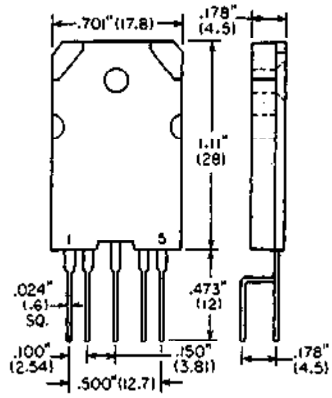


Fig. L20B — 5-Pin SIP

ECG
1867
1868
1886

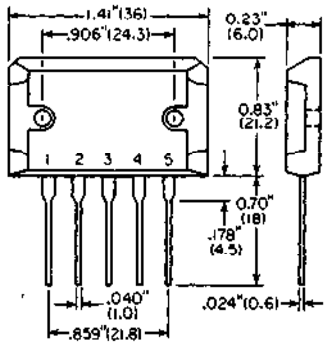


Fig. L21 — 5-Pin ZIL

ECG
1017

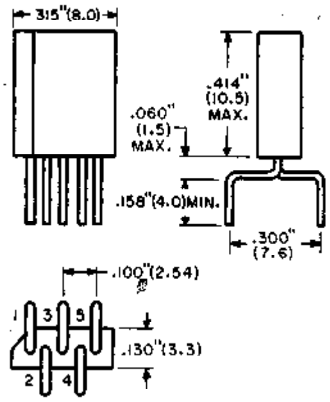


Fig. L23 — 5-Pin SIP

ECG
1104

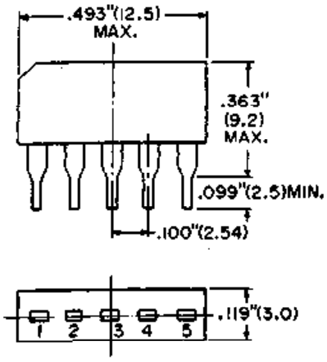


Fig. L24 — 7-Pin SIP

ECG
941S
1087
1100
1101
1234
1468
1873

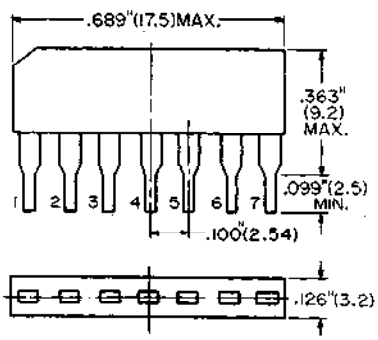


Fig. L25 — 7-Pin SIP

ECG
1497
1680

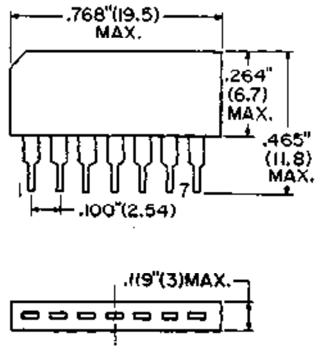


Fig. L26 — 7-Pin SIP

ECG
1433

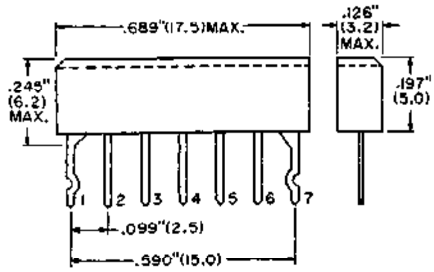


Fig. L27 — 7-Pin SIP

ECG
1223
1249
1452
1783

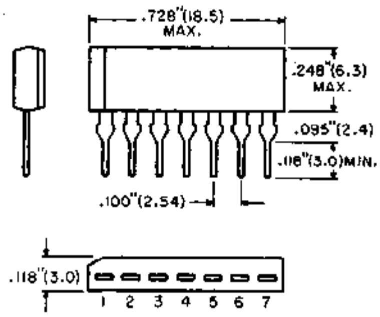


Fig. L28 — 7-Pin SIP

ECG
1302

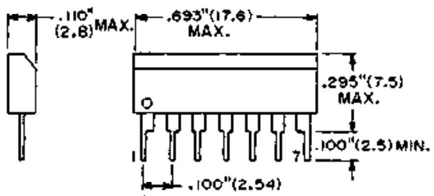
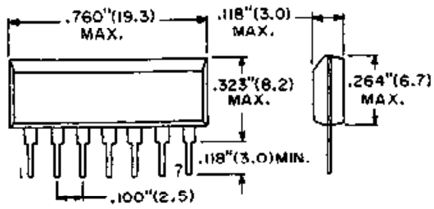


Fig. L29 — 7-Pin SIP

ECG
1301
1569
1751



Linear IC and Module Outlines (cont'd)

Fig. L30A 7-Pin SIP
ECG
1748

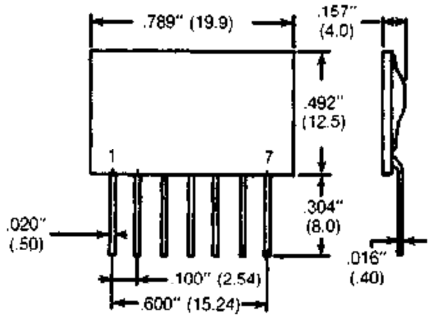


Fig. L30B 7-Pin SIP
ECG
1824

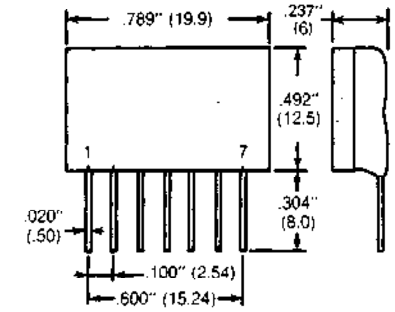


Fig. L31 7-Pin SIP
ECG
1541

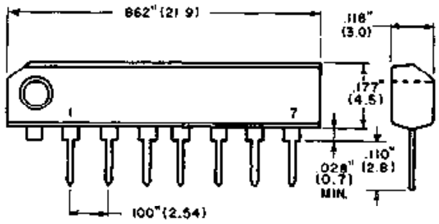


Fig. L31A 7-Pin SIP
ECG
1609

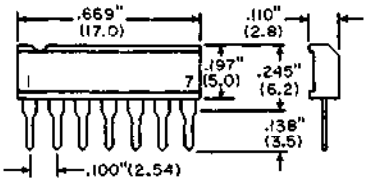


Fig. L31B 7-Pin SIP
ECG
1787

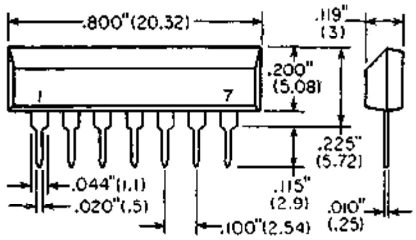


Fig. L32 8-Pin SIP
ECG
1781

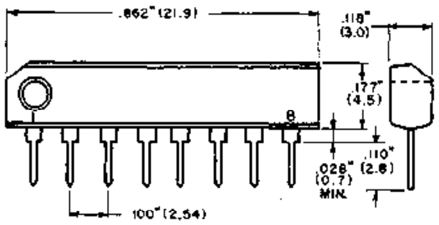


Fig. L33 8-Pin SIP
ECG
1170

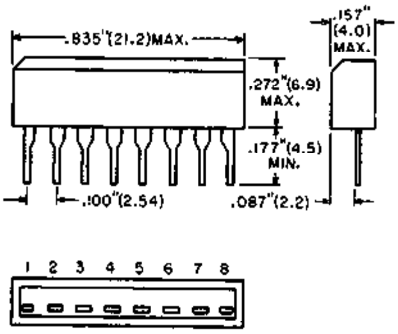


Fig. L34 8-Pin SIP
ECG
1660
1666

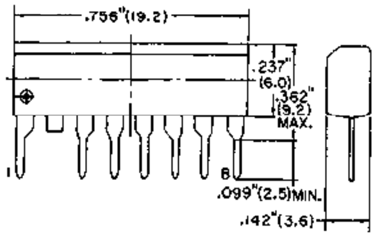


Fig. L35 8-Pin SIP
ECG

778S	**1668**
955S	**1745**
1300	**1794**
1467	**1795**
1510	**7069**
1659	**7090**

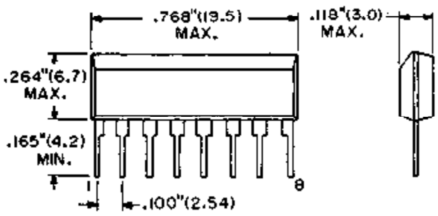


Fig. L35A 8-Pin SIP
ECG
1635
7100

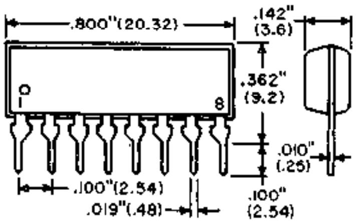


Fig. L35B 8-Pin SIP
ECG
1714S
7013

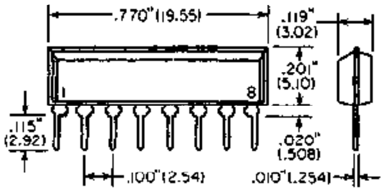
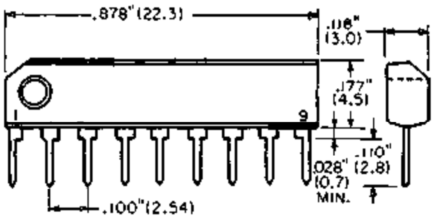


Fig. L36 9-Pin SIP
ECG
1465
1658
1708
7067



Linear IC and Module Outlines (cont'd)

Fig. L37 — 9-Pin ZIL

ECG
1015
1019
1021
1026

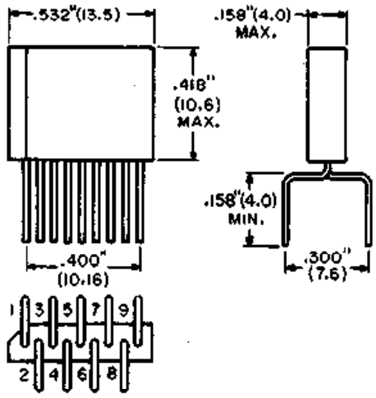


Fig. L38 — 9-Pin ZIL

ECG
1014

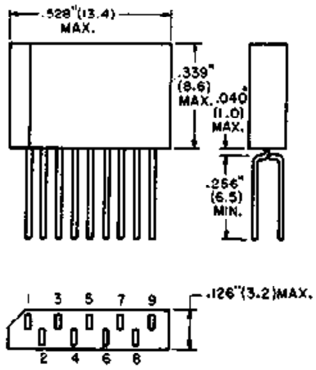


Fig. L39 — 9-Pin SIP

ECG

1192	1499	1718	7043
1197	1521	1730	
1208	1529	1826	
1466	1657	1843	

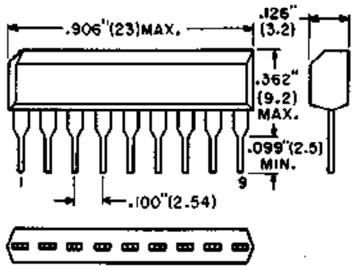


Fig. L39A — 9-Pin SIP

ECG
1792

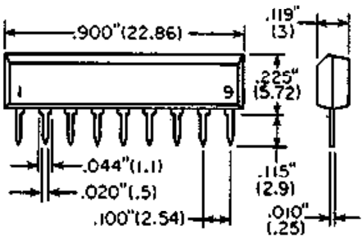


Fig. L40 — 9-Pin SIP

ECG

1210	1866
1561	7042
1612	

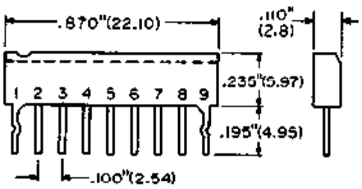


Fig. L41 — 9-Pin SIP

ECG

1421	1503	1620	1688	1828
1435	1607	1625	1704	1829
1448	1610	1629	1709	7044
1502	1615	1682	1711	

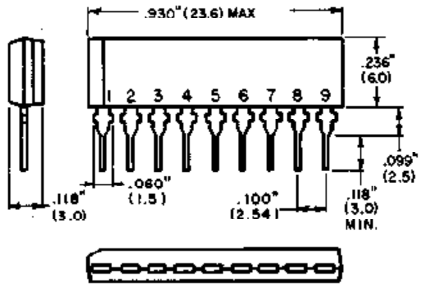


Fig. L41A — 9-Pin SIP

ECG
1791

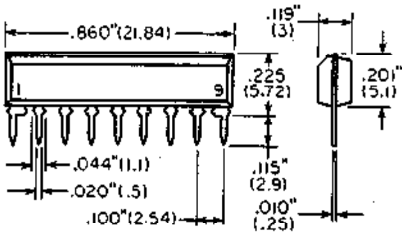


Fig. L42 — 10-Pin SIP

ECG
1517 7087 7091

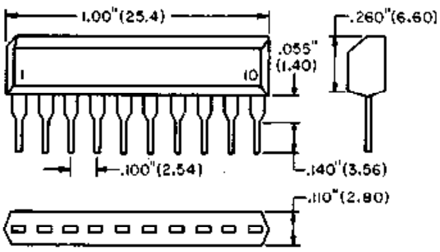


Fig. L43 — 10-Pin SIP

ECG
1201
1247

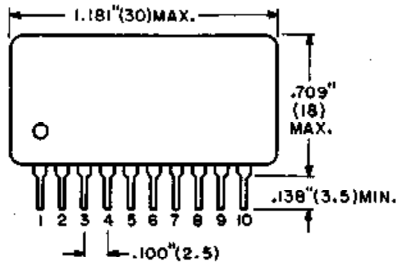


Fig. L43A — 12-Pin SIP

ECG
1780
7045

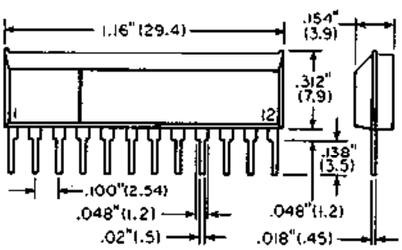


Fig. L46 — 16-Pin ZIL

ECG
1604

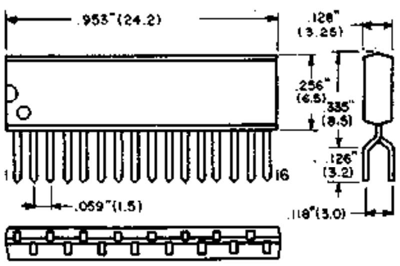
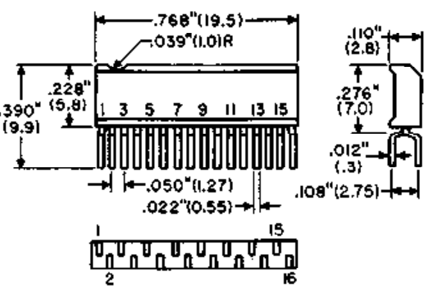


Fig. L47A — 16-Pin ZIL

ECG
1631
1717



N

Fig. L47B 23-Pin ZIL-HS

ECG
1893

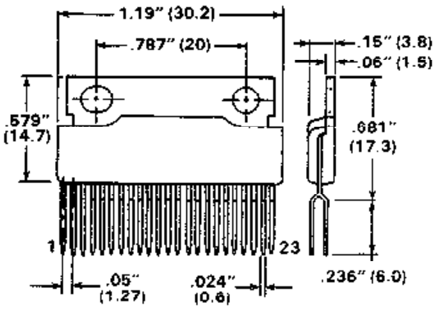


Fig. L49 7-Pin SIP

ECG
1676

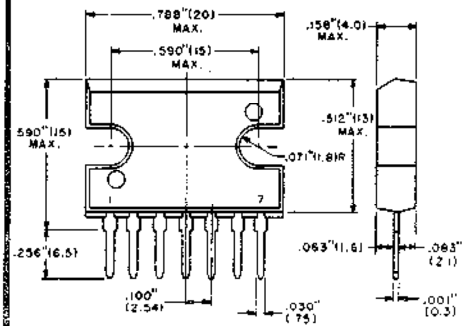


Fig. L50 7-Pin SIP

ECG
1286

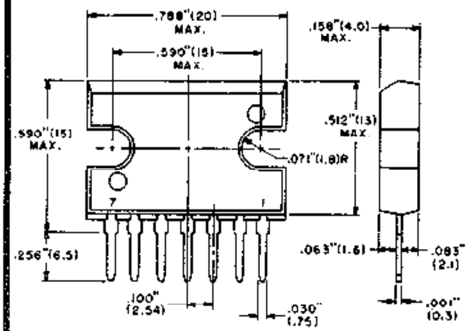


Fig. L51A 9-Pin SIP

ECG
1754 7118 7131
1850 7119

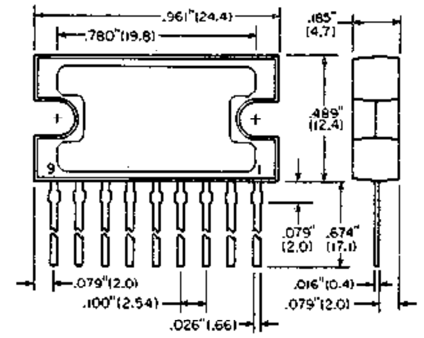


Fig. L52 10-Pin SIP

ECG
1390
1797
1798

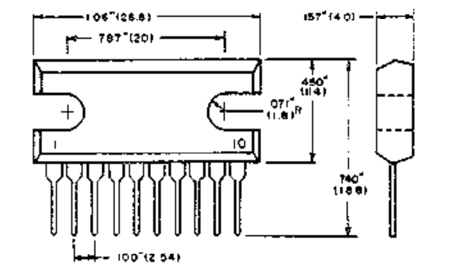


Fig. L52A 10-Pin SIP

ECG
1724

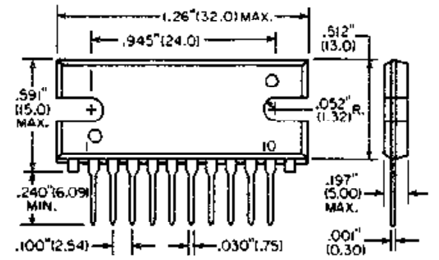


Fig. L53 10-Pin SIP

ECG
1391

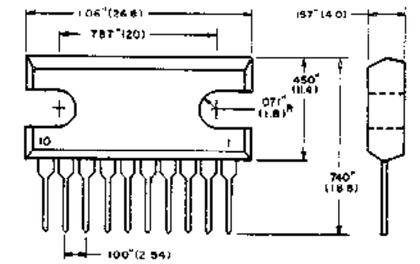


Fig. L53A 10-Pin SIP

ECG
1319

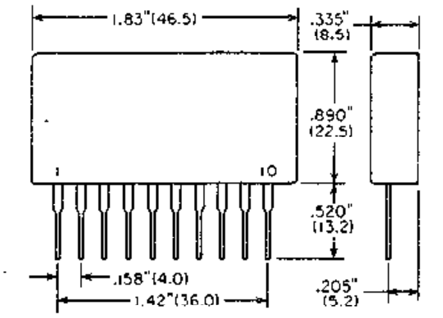


Fig. L53B 10-Pin SIP

ECG
1318

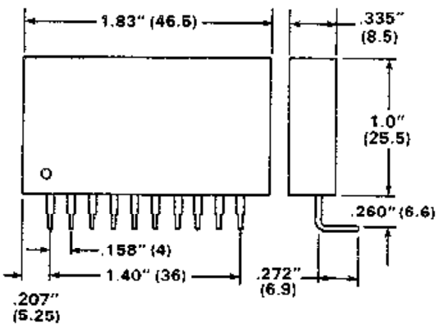


Fig. L54 11-Pin SIP

ECG
1240
1369
1485

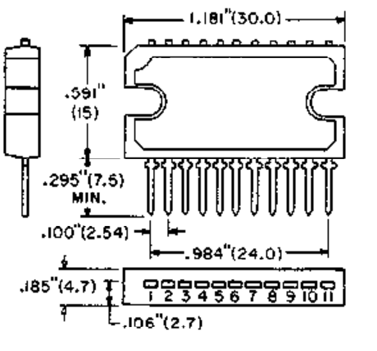


Fig. L55 12-Pin SIP

ECG
1371 7011
1373

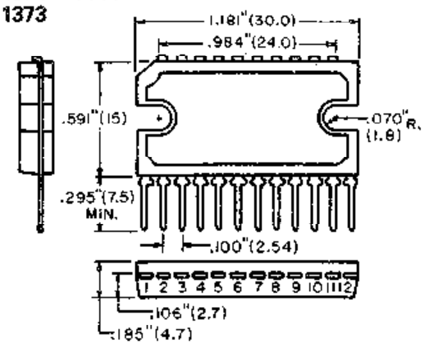
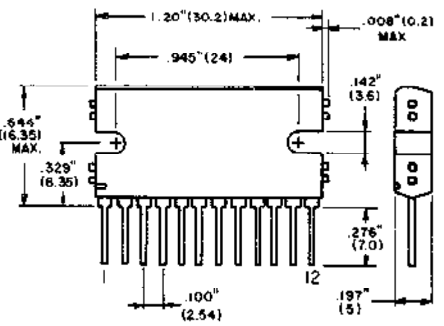


Fig. L56 12-Pin SIP

ECG
1394



Linear IC and Module Outlines (cont'd)

Fig. L57 — 12-Pin SIP

ECG
1368 1626
1389 1638

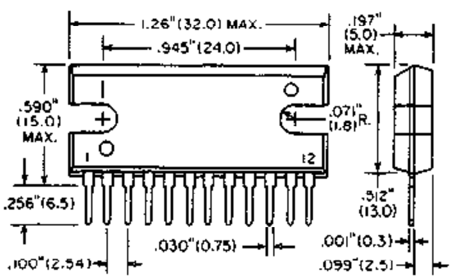


Fig. L57A — 12-Pin SIP

ECG
1707

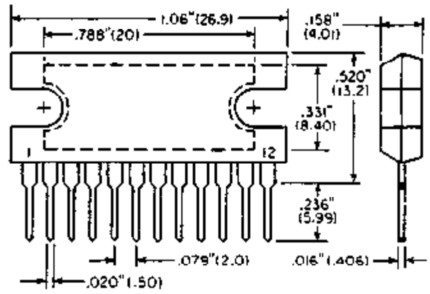


Fig. L57B — 13-Lead Formed SIP

ECG
1802 1804 1851 7083

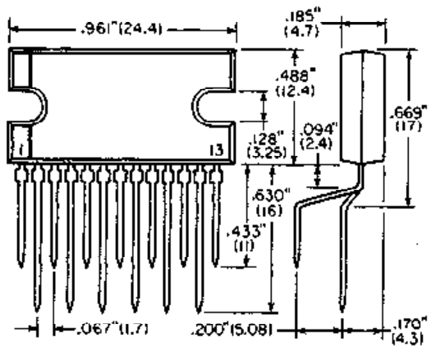


Fig. L58 — 14-Pin SIP

ECG
1377
1637

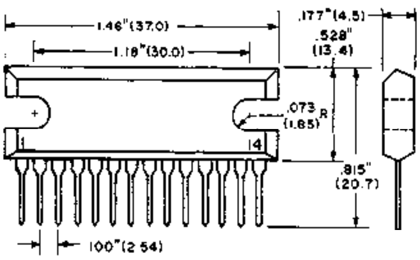


Fig. L59 — 14-Pin SIP

ECG
1364

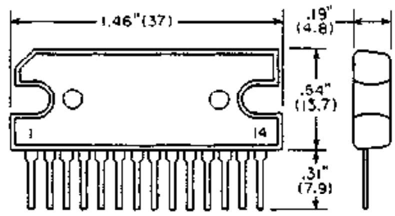


Fig. L60A — 8-Pin SIP-M

ECG
1880 7024 7026 7035 7037

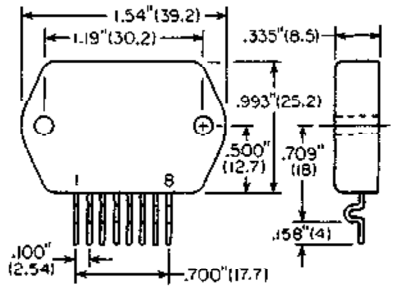


Fig. L60B — 8-Pin SIP-M

ECG
1883

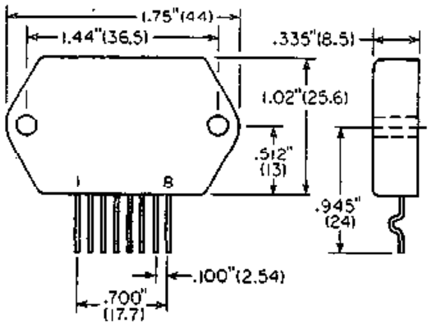


Fig. L61 — 10-Pin SIP

ECG
1350

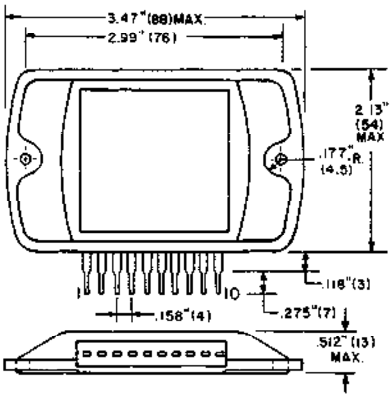


Fig. L62 — 10-Pin SIP-M

ECG
1322
1335
1346

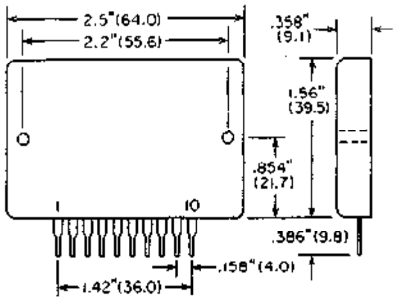


Fig. L63 — 10-Pin SIP-M

ECG
1024
1027
1320
1333

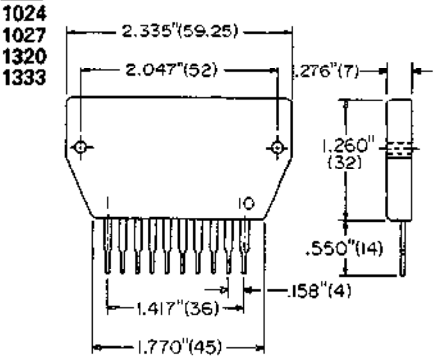


Fig. L64 — 10-Pin SIP-M

ECG
1279
1280
1281
1282
1321
1357
1358
1360

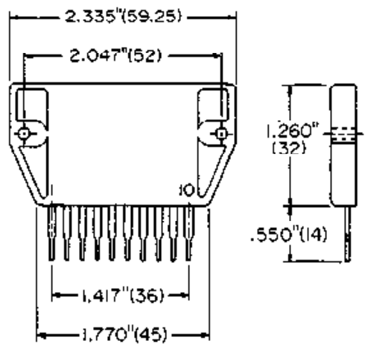
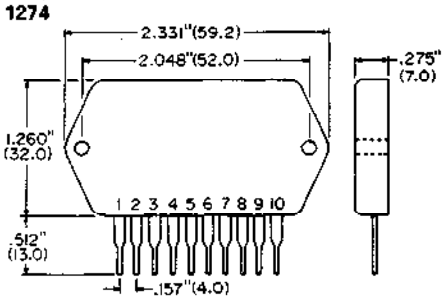


Fig. L65 — 10-Pin SIP-M

ECG
1025
1274



N

Fig. L65A — 10-Pin SIP-M

ECG

7025 7074

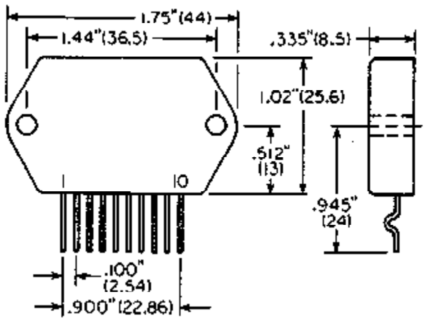


Fig. L66 — 10-Pin SIP-M

ECG

1028 1327 1337
1326 1328

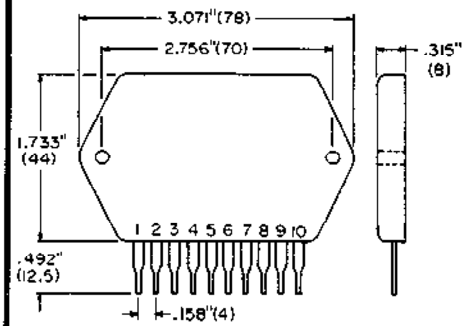


Fig. L67A — 12-Pin SIP

ECG

1732

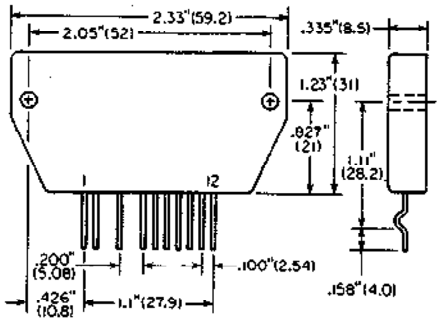


Fig. L67B — 12-Pin SIP-M

ECG

1823

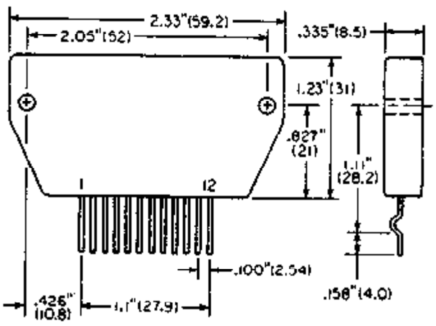


Fig. L67C — 12-Pin SIP-M

ECG

1881 7022 7028
1884 7023 7034

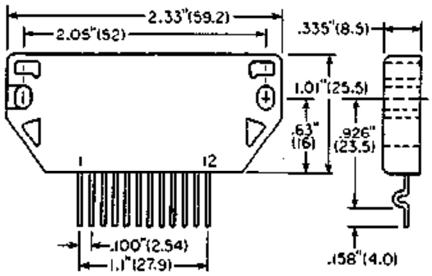


Fig. L68 — 15-Pin SIP-M

ECG

1338
1339

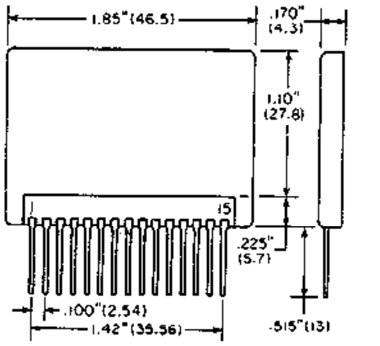


Fig. L68A — 15-Pin SIP-M

ECG

1878

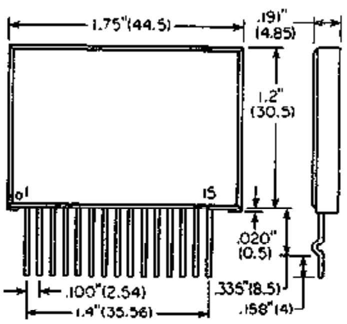


Fig. L69 — 15-Pin SIP-M

ECG

1218
1220

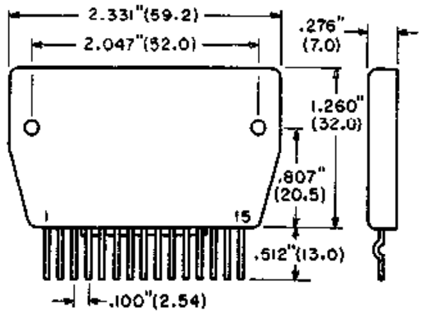


Fig. L69A — 15-Pin SIP-M

ECG

1733* 1815 7030
1734 1872 7038
1735 1876

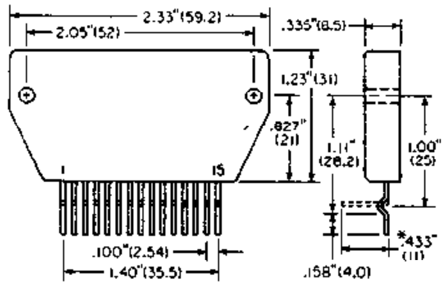


Fig. L69C — 15-Pin SIP

ECG

1821

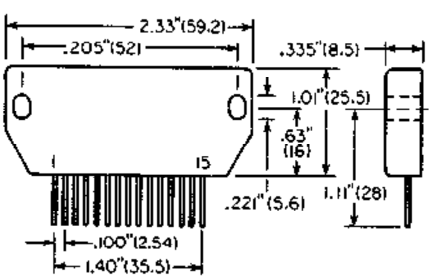


Fig. L70 — 15-Pin SIP-M

ECG

1219
1344

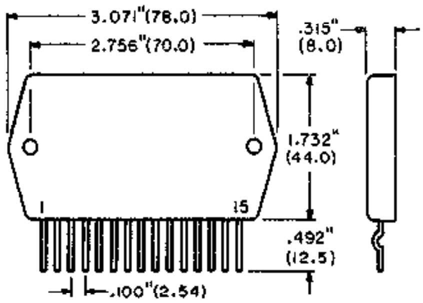
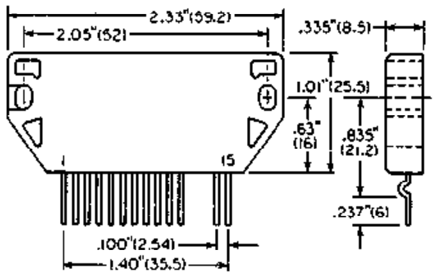


Fig. L70A — 15-Pin SIP-M

ECG

1870 7075



Linear IC and Module Outlines (cont'd)

Fig. L70B — 16-Pin SIP-M

ECG

1882 7031

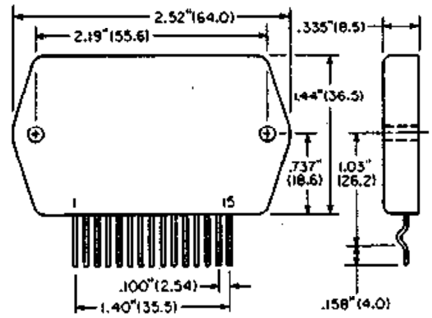


Fig. L71 — 16-Pin SIP-M

ECG

1252

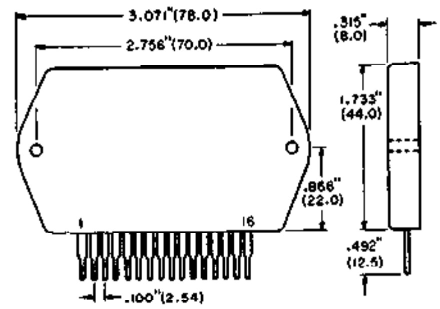


Fig. L72 — 16-Pin SIP-M

ECG

1336

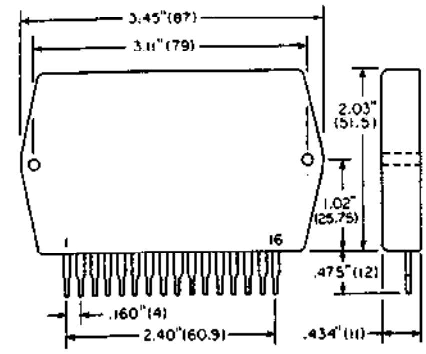


Fig. L72A — 16-Pin SIP

ECG

1825

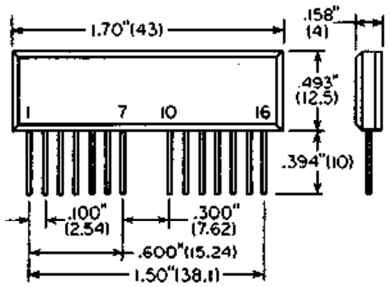


Fig. L73 — 16-Pin SIP-M

ECG

1330 1345 1356

1331 1347 1820

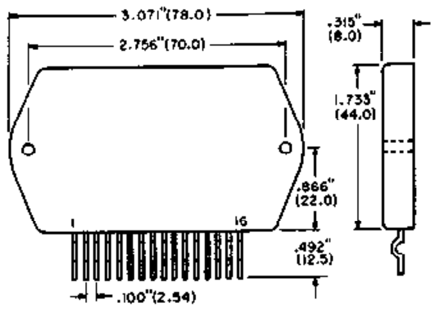


Fig. L75 — 16-Pin SIP

ECG

1351

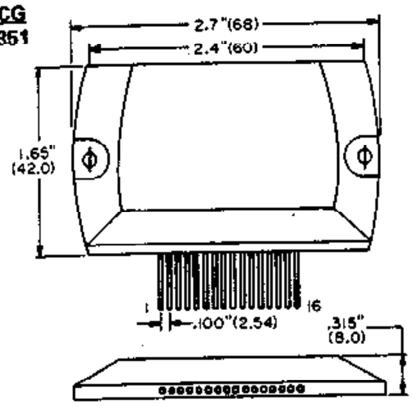


Fig. L75A — 18-Pin SIP-M

ECG

1736

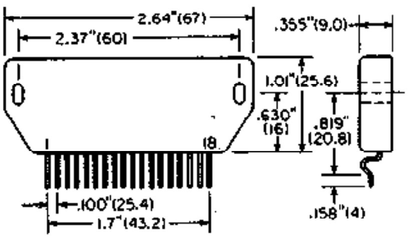


Fig. L75B — 18-Pin SIP-M

ECG

1317 1816 1818 1871 1877

1737 1817 1819 1874 1885

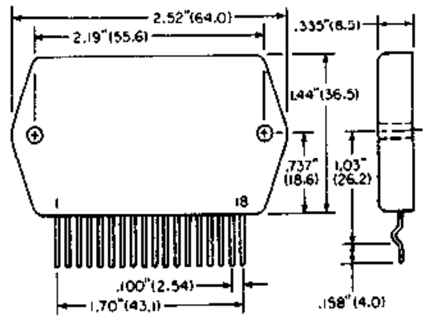


Fig. L75C — 18-Pin SIP-M

ECG

1848

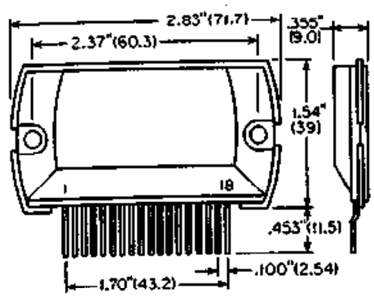


Fig. L75D — 18-Pin SIP

ECG

1315 7032

1316

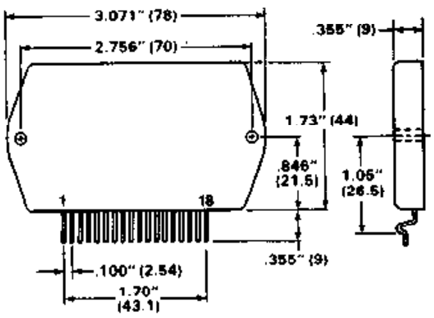


Fig. L76 — 8-Pin SIP-HS

ECG

1244

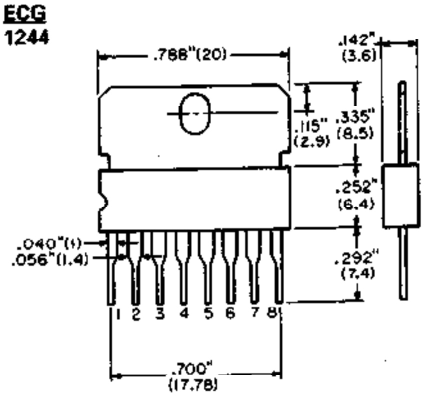
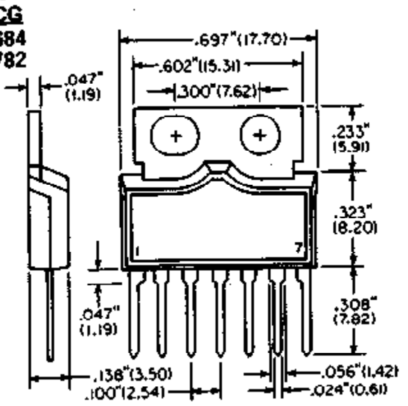


Fig. L76A — 7-Pin SIP-HS

ECG

1684

1782



N

Linear IC and Module Outlines (cont'd)

Fig. L76B — 7-Pin SIP-HS

ECG
1773

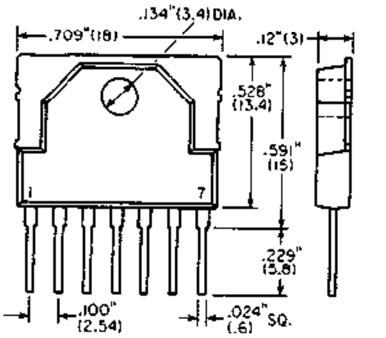


Fig. L76C — 7-Pin SIP-HS

ECG
1832
7064

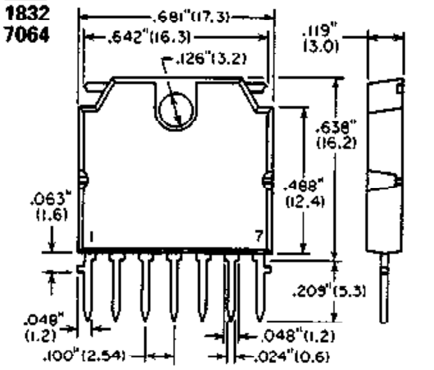


Fig. L77 — 8-Pin SIP-HS

ECG
1271

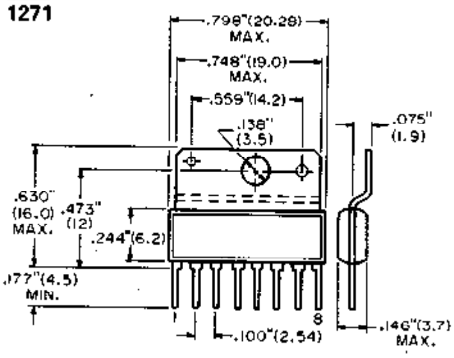


Fig. L78 — 8-Pin SIP-HS

ECG
1424

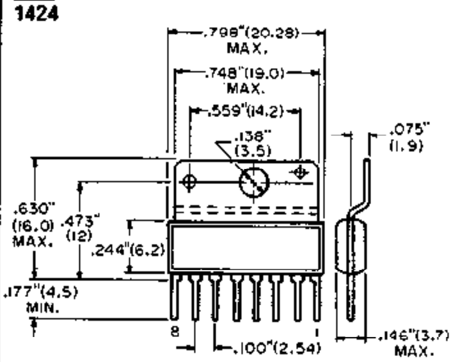


Fig. L78A — 8-Pin SIP-HS

ECG
1767
7101

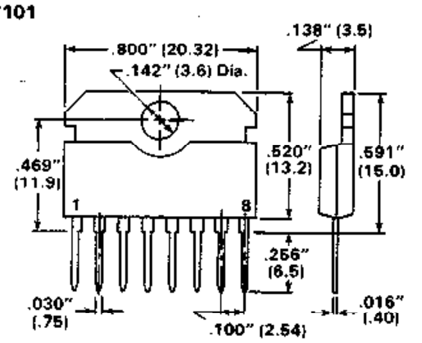


Fig. L79 — 9-Pin SIP-HS

ECG
1365
1674
1789
7052

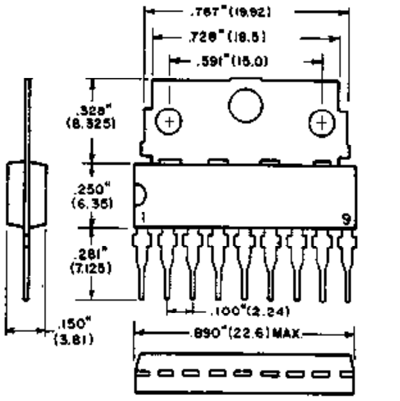


Fig. L80 — 9-Pin SIP-HS

ECG
1361
1628

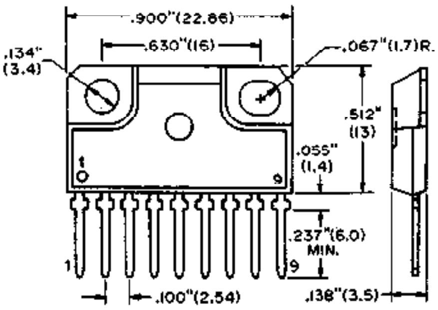


Fig. L80A — 9-Pin SIP-HS

ECG
7002

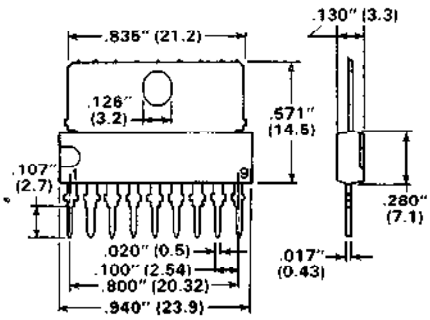


Fig. L81 — 9-Pin SIP-HS

ECG
1407

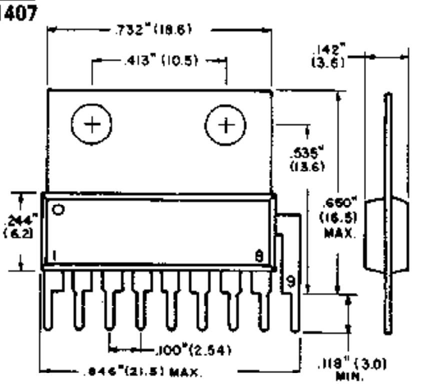


Fig. L81A — 9-Pin SIP-HS

ECG
1566 **7135**
1852

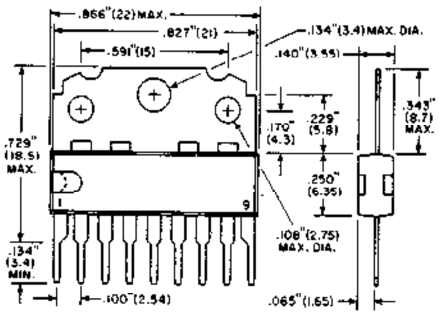


Fig. L81B — 9-Lead Formed SIP

ECG
1567

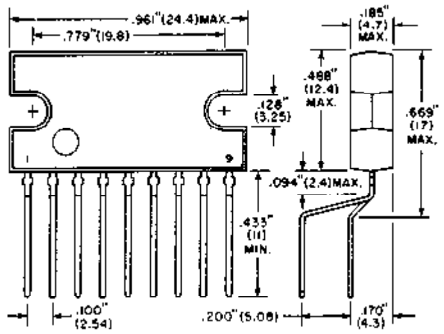
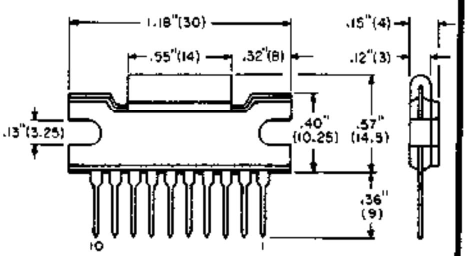


Fig. L82 — 10-Pin SIP-HS

ECG
1393



Linear IC and Module Outlines (cont'd)

Fig. L83 — 10-Pin SIP-HS

ECG
1392

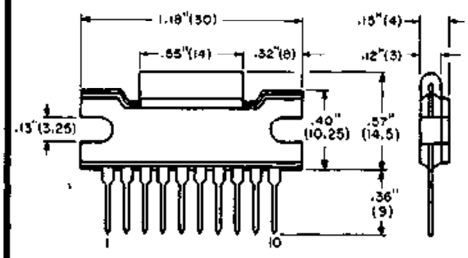


Fig. L85 — 10-Pin SIP-HS

ECG
1155
1278
1370
1387

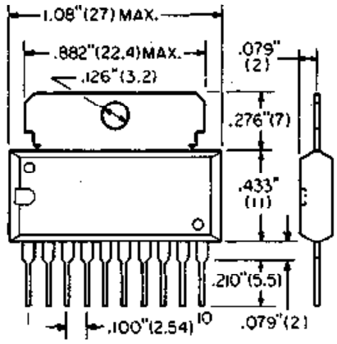


Fig. L86 — 10-Pin SIP-HS

ECG
1478

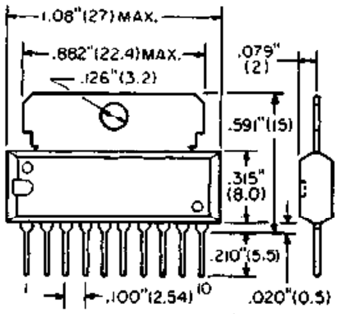


Fig. L87 — 10-Pin SIP-HS

ECG
1165
1166
1716
1766
1834

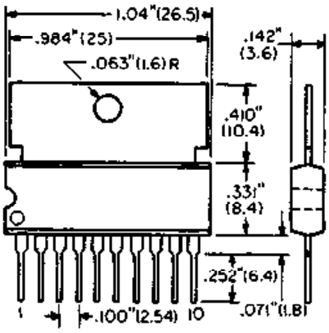


Fig. L88 — 10-Pin SIP-HS

ECG
1685

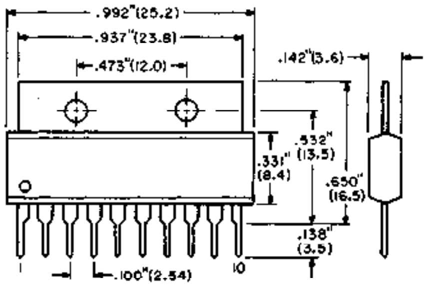
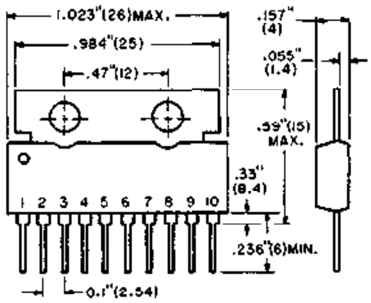


Fig. L89 — 10-Pin SIP-HS

ECG
1245•



•Alt. Fig. L90

Fig. L90 — 10-Pin SIP-HS

ECG
1160
1420

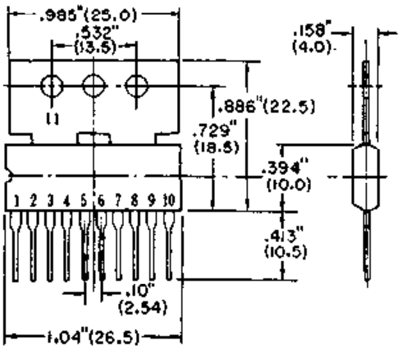


Fig. L91 — 12-Pin SIP-HS

ECG
1193

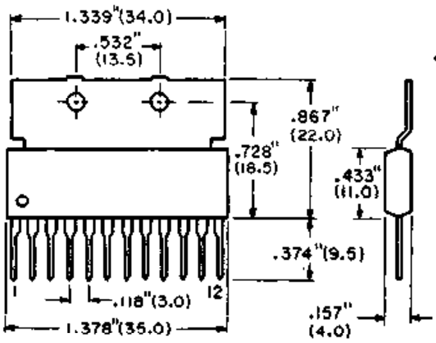


Fig. L91A — 12-Pin SIP-HS

ECG
1892

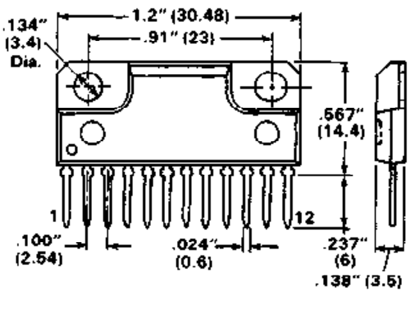


Fig. L92 — 12-Pin SIP-HS

ECG
1395
1398
1399
1602
1606
7040
7061
7122

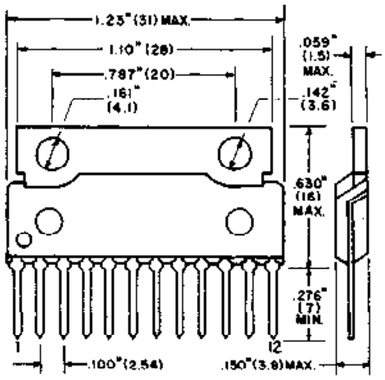


Fig. L92A — 12-Pin SIP-HS

ECG
1830 1898 7068
1831 1899 7070

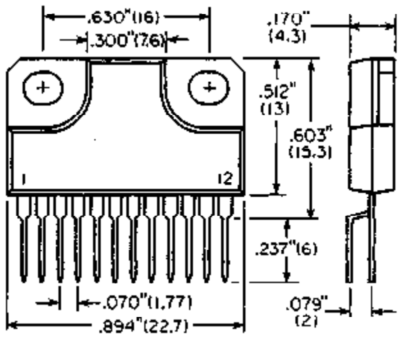
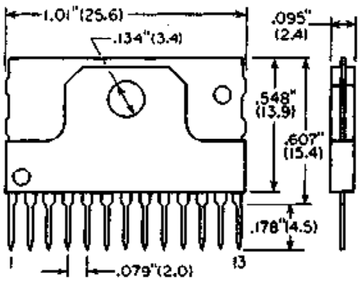


Fig. L92B — 13-Pin SIP-HS

ECG
1865 7085
7039 7104



Linear IC and Module Outlines (cont'd)

Fig. L93 — 11-Pin SIP-HS

ECG

1396	7195
1858	7106
7053	

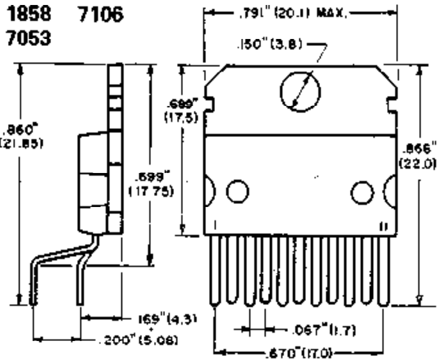


Fig. L93A — 15-Pin SIP-HS

ECG

1681	7006
1750	7071
1862	

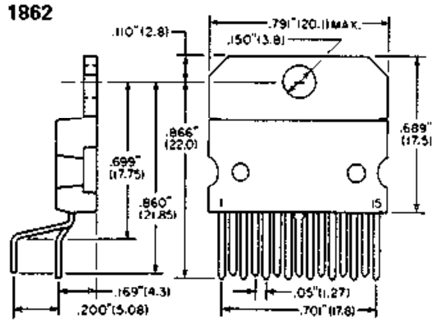


Fig. L93B — 11-Pin SIP-HS

ECG

1687

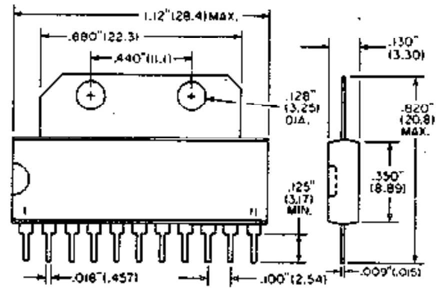


Fig. L94 — 4-Pin DIP-Q

ECG

752
755
757
758
759

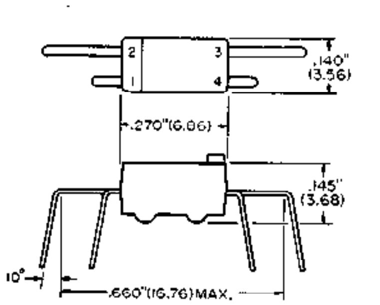


Fig. L95 — 6-Pin DIP-Q

ECG

760
768
770

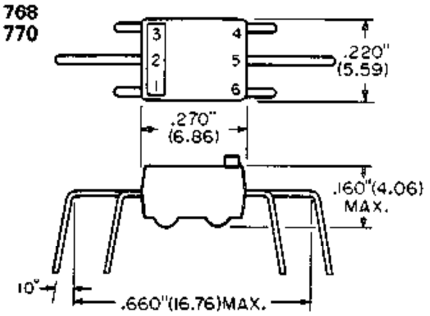


Fig. L96 — 4-Pin DIP

ECG

735

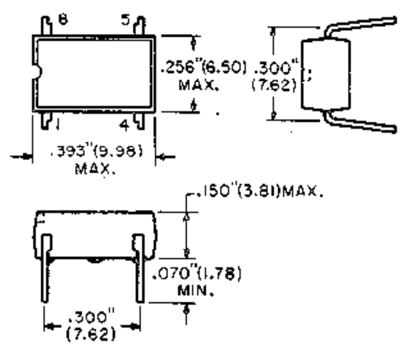


Fig. L96A — 6-Pin DIP

ECG

1603

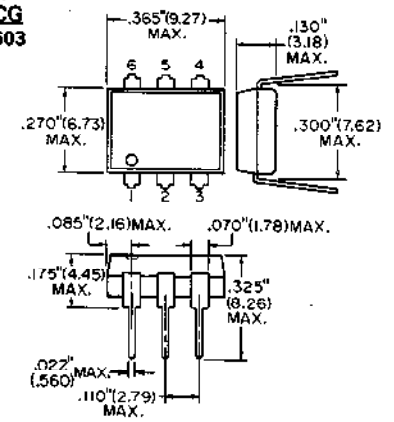
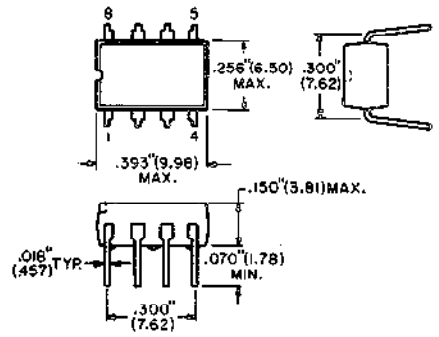


Fig. L97 — 8-Pin DIP

ECG

736	994M
766A	995M
772A•	996
805	999M
836	1039
856	1179
876	1209
891M	1294
894M	1504
918M	1505
922M	1639
924M	1641
928M	1648
938M	1941
941M	2046
955MC	7051
976	7117



•Alt. Fig. L101

Fig. L98 — 8-Pin DIP

ECG

746	889M
778A	890
815	937M
823	943M
824	944M
829	955M
832	975
833	1714M
838	1845M
839	1930
857M	7096
858M	7097
887M	7098
888M	7099

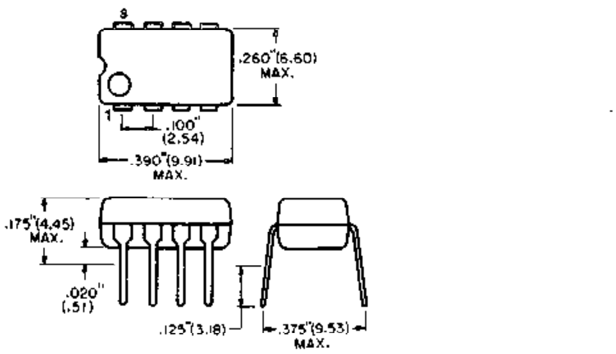
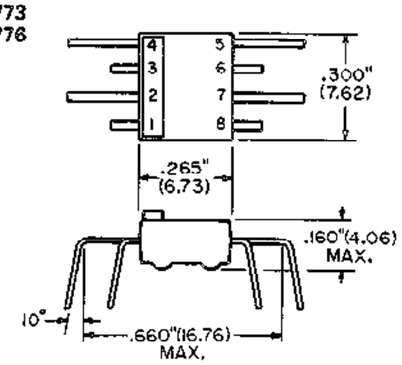


Fig. L99 — 8-Pin DIP-Q

ECG

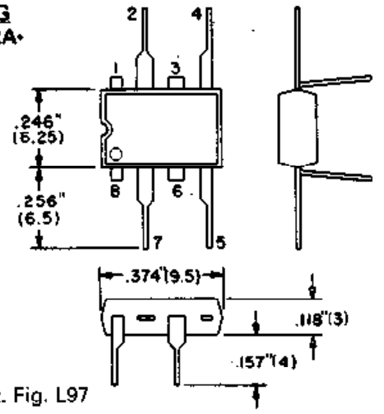
773
776



Linear IC and Module Outlines (cont'd)

Fig. L101 — 8-Pin DIP-Q

ECG
772A•



•Alt. Fig. L97

Fig. L102 — 10-Pin DIP

ECG
1450

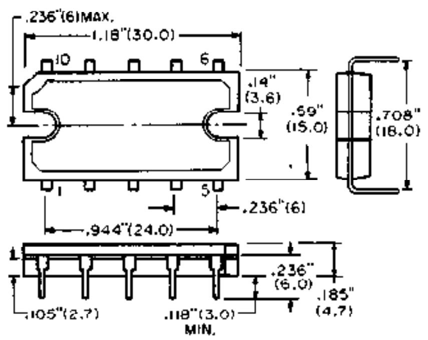


Fig. L103 — 14-Pin DIP

ECG
847

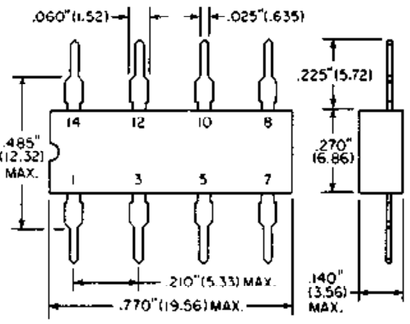


Fig. L104 — 14-Pin DIP

ECG

706	**779A**	**908**	**983**	**1453**
708	**782**	**909D**	**987**	**1454**
709	**790**	**910D**	**989**	**1491**
712	**793**	**912**	**992**	**1571**
713	**798**	**914**	**995**	**1616**
715	**799**	**917**	**997**	**1634**
718	**800**	**919D**	**1003**	**1642**
719	**804**	**923D**	**1043**	**1670**
720	**806**	**927D**	**1047**	**1679**
722	**812**	**941D**	**1056**	**1753**
723	**821**	**942**	**1136**	**1763**
725	**825**	**947D**	**1162**	**1764**
738	**834**	**948**	**1172**	**1807**
739	**849**	**973D**	**1177**	**9401**
744	**855**	**974**	**1186**	
748A	**859**	**978**	**1226**	
749	**864**	**978C**	**1236**	
750	**869**	**979**	**1415**	

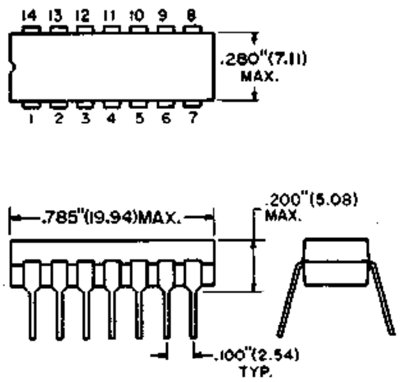
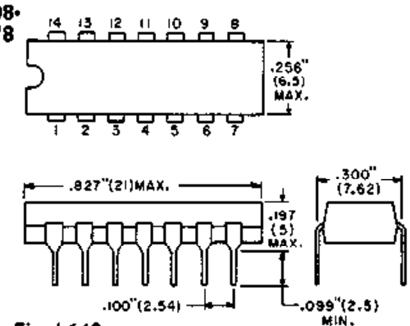


Fig. L105 — 14-Pin DIP

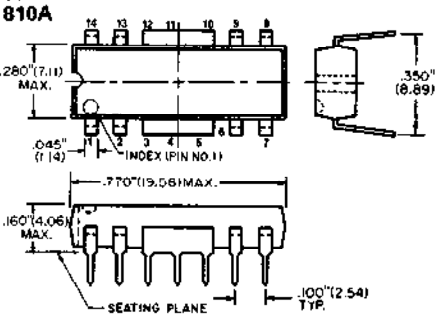
ECG
1237
1243
1308•
1678



•Alt. Fig. L143

Fig. L106 — 14-Pin DIP-W

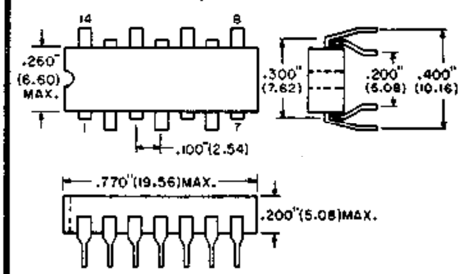
ECG
740A **862**
804• **990**
810A



•Alt. Fig. L104, L132

Fig. L107 — 14-Pin DIP-Q

ECG
1113
1117
1174



•Alt. Fig. L104

Fig. L108 — 14-Pin DIP

ECG
1078

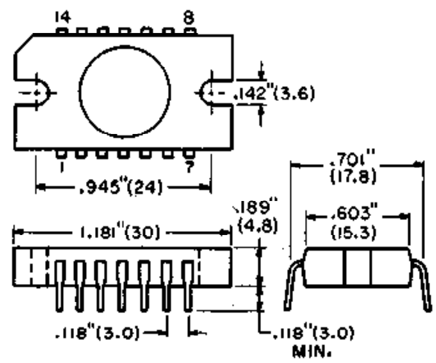
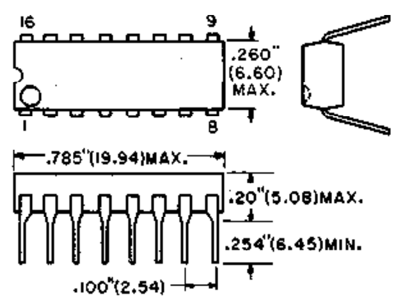


Fig. L111 — 16-Pin DIP

ECG

714	**853**	**1159**	**1484**	**1557**	**1655**	**1761**	**7005**
727	**865**	**1163**	**1488**	**1560**	**1662**	**1762**	**7012**
731	**870**	**1164**	**1489**	**1563**	**1672**	**1765**	**7019**
743	**892**	**1167**	**1496**	**1564**	**1677**	**1775**	**7109**
787	**893**	**1168**	**1519**	**1565**	**1690**	**1784**	**7110**
788	**916**	**1214**	**1534**	**1574**	**1693**	**1799**	**7123**
791	**926**	**1217**	**1538**	**1576**	**1725**	**1837**	**9403**
797	**929**	**1231A•**	**1540**	**1611**	**1729**	**1842**	
808	**939**	**1242**	**1542**	**1623**	**1731**	**1849**	
809	**980**	**1264**	**1543**	**1624**	**1739**	**1854D**	
818	**982**	**1272**	**1544**	**1647**	**1749**	**1857**	
820	**984**	**1298**	**1545**	**1651**	**1758**	**1859**	
822	**993**	**1413**	**1555**	**1652**	**1759**	**7000**	
831	**1158**	**1441**	**1556**	**1654**	**1760**	**7001**	



•Pins 4 & 5, 12 & 13 webbed together

N

Linear IC and Module Outlines (cont'd)

Fig. L112 — 16-Pin DIP

ECG

700 1200
701 1248
702 1263
802 1408
803 1703
835 1720
840 1721
841 1723
842 1785
843 1888
861 2047
991 2054
1049 7050
1133 7082

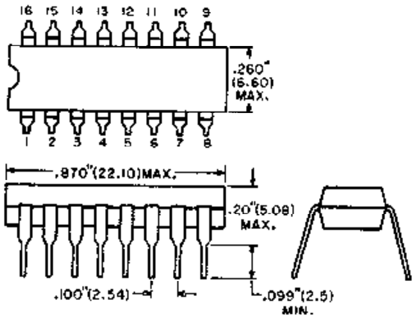


Fig. L113 — 16-Pin DIP-Q

ECG

728
729
789

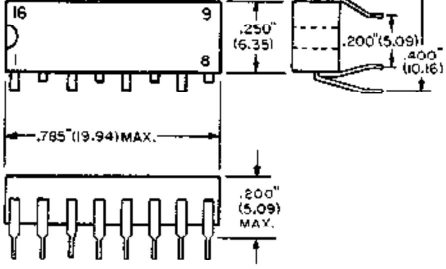


Fig. L114 — 16 + 2-Pin DIP-ET

ECG

1296
1471
1486
1550
1600
1686

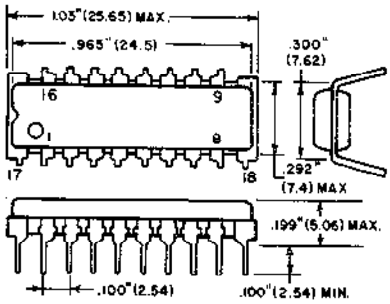


Fig. L115 — 18 Pin DIP

ECG

826 1715
846 1722
860 1727
867 1752
1295 1757
1508 1803
1509 1811
1539 1833
1549 1865
1558 1889
1632 2207
1683 7072
1689 7084
1691 7108
1700 7112
1702 7115
1713

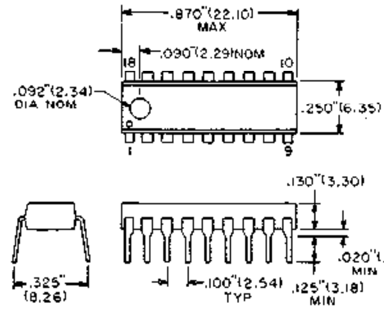


Fig. L115A — 18-Pin DIP

ECG

1814

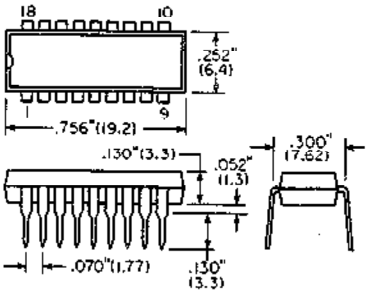


Fig. L116 — 18-Pin DIP

ECG

1265
1367
1383

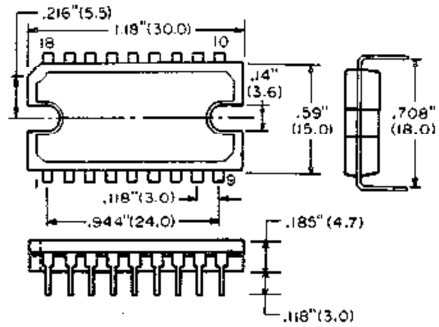


Fig. L117 — 16 + 2-Pin DIP-Q

ECG

730

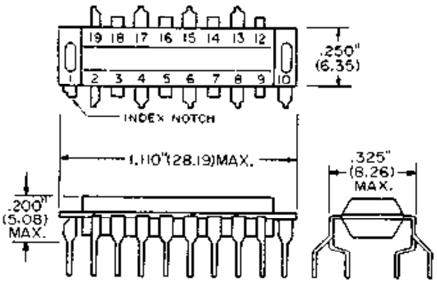


Fig. L118 — 20-Pin DIP

ECG

880 1608
1475 1812

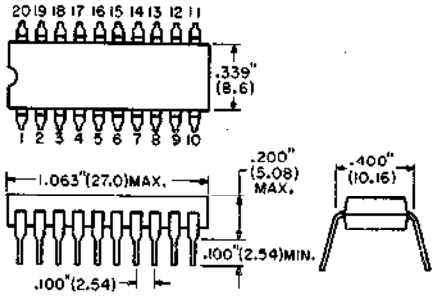


Fig. L118A — 20-Pin DIP

ECG

879 1836 7004 7086 7133
1633 1864 7049 7116 7137
1827 2053 7062 7132 7138

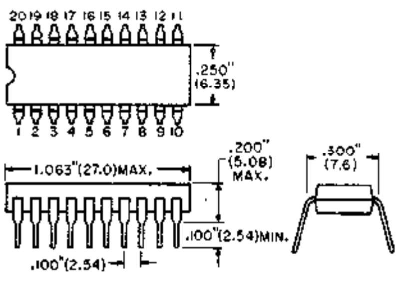
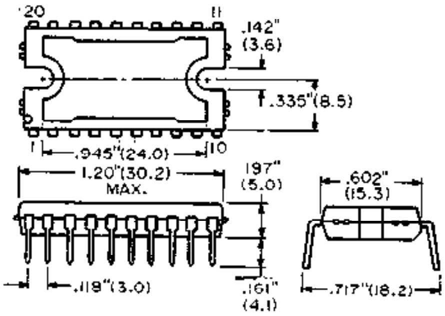


Fig. L119 — 20-Pin DIP

ECG

1372
1379



Linear IC and Module Outlines (cont'd)

Fig. L119A — 20-Pin DIP

ECG
1675

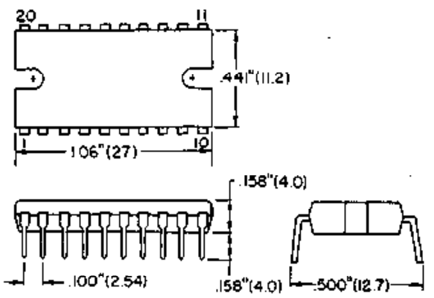


Fig. L120 — 20-Pin DIP (18 Pins)

ECG
1382

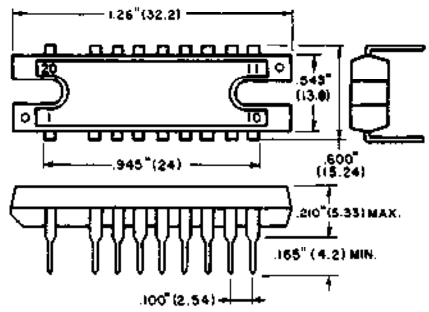


Fig. L121 — 22-Pin DIP

ECG
1253
1297
1636
1664
1669
1710
1712
1744
1772
1779
1835

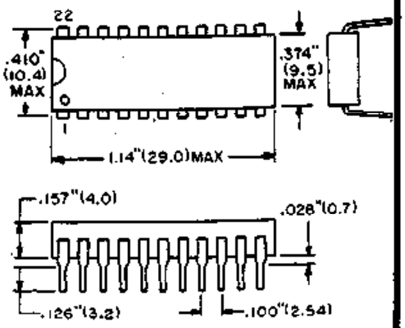


Fig. L121A — 22-Pin DIP

ECG
1806
1813
7020
7063

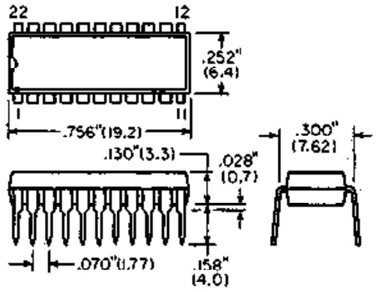


Fig. L122 — 24-Pin DIP

ECG

845	1535
986	1570
1196	1621
1198	1726
1254	1786
1299	1853
1402	1890
1409	2055
1417	6860
1437	7049
1469	

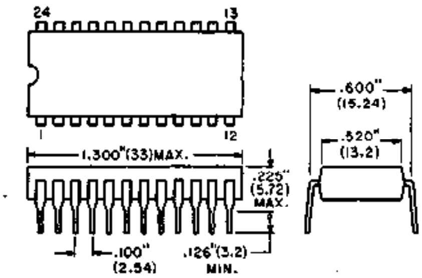


Fig. L122A — 24-Pin DIP

ECG
1270
1587
1613
1630

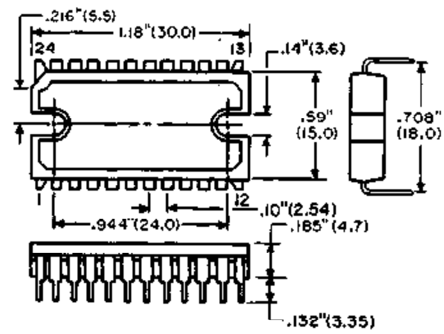


Fig. L122B — 24-Pin DIP

ECG
1809

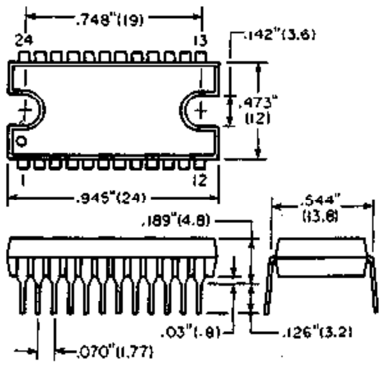


Fig. L122C — 24-Pin DIP

ECG
1409C

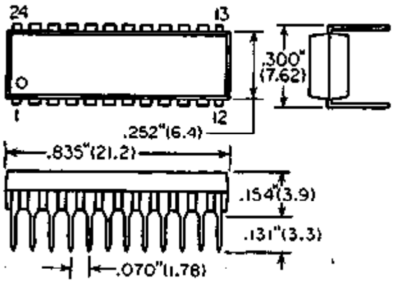
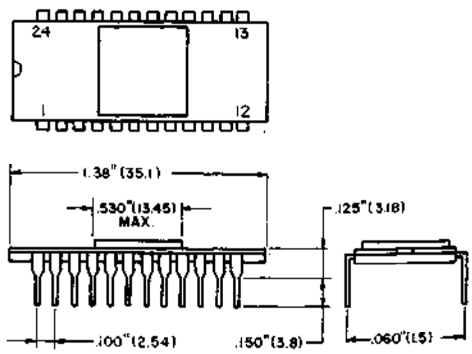


Fig. L123 — 24-Pin DIP

ECG
854



N

Linear IC and Module Outlines (cont'd)

Fig. L123A — 28-Pin DIP

ECG
1801
1805
1808
1810
1861
2062
7127

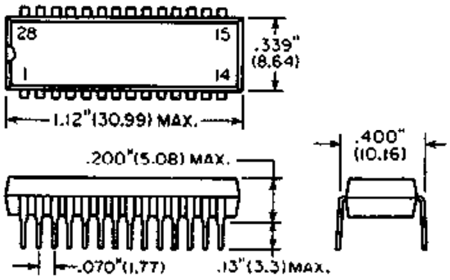


Fig. L124 — 28-Pin DIP

ECG

813	1650
844	1673
873	1701
874	1738
875	1747
1161	2200
1189	2202
1410	2205
1411	2206
1416	7018
1473	7047
1532	7081
1589	

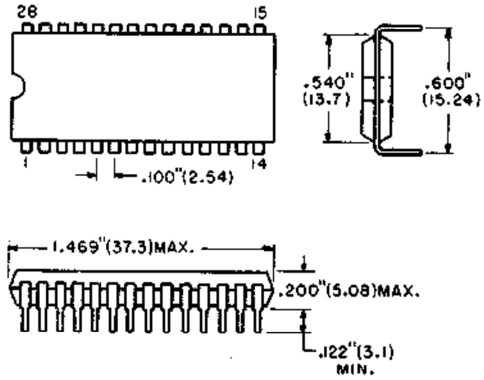


Fig. L124A — 28-Pin DIP

ECG
2057

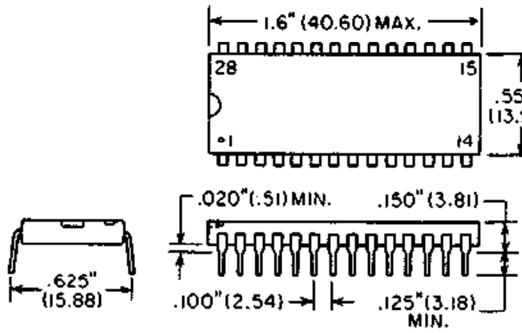


Fig. L124B — 30-Pin DIP

ECG
1653
1656
7120

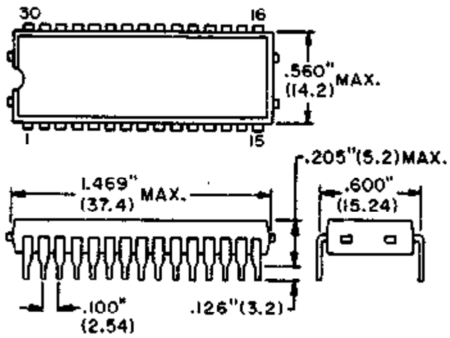


Fig. L124C — 30-Pin DIP

ECG
1728
1771
1800
1845
1847
1856
7007
7008
7009
7015
7129
7130

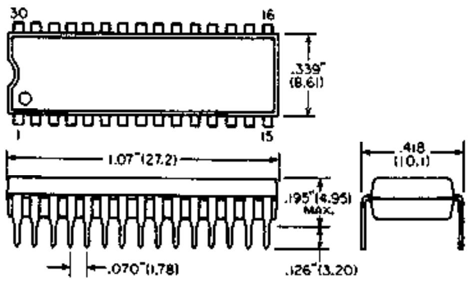


Fig. L124D — 36-Pin DIP

ECG
7014
7066

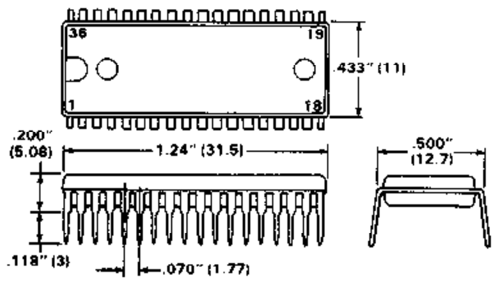


Fig. L125 — 40-Pin DIP

ECG

1414	2051	2065
2049	2060	2400
2050	2063	

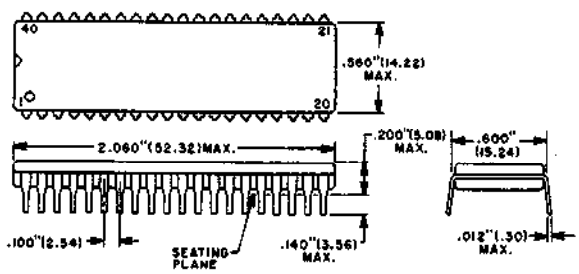


Fig. L126 — 42-Pin DIP

ECG
1547
1671

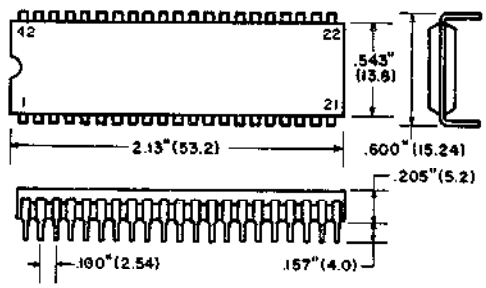


Fig. L126A — 42-Pin DIP

ECG
1793
1863
7121

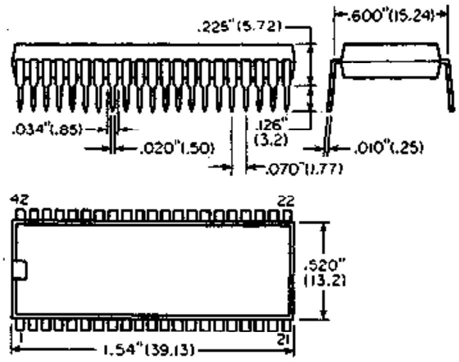


Fig. L126B — 64-Pin DIP

ECG
1790
7058

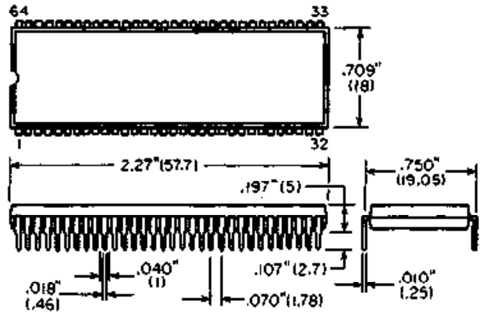


Fig. L126C — 52-Pin DIP

ECG
1846
7003
7054
7060

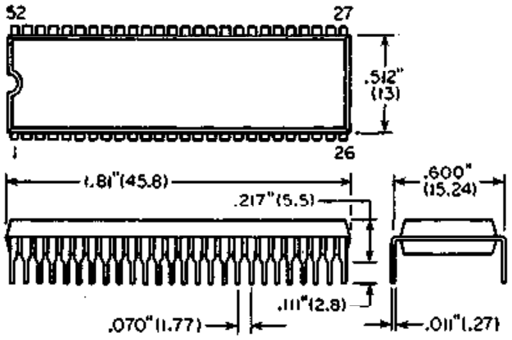


Fig. L126D — 54-Pin DIP

ECG
7010

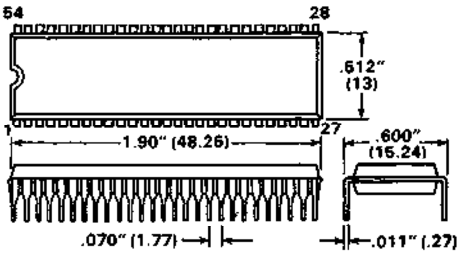


Fig. L127 — 8-Pin DIP-W

ECG
1009
1010
1150

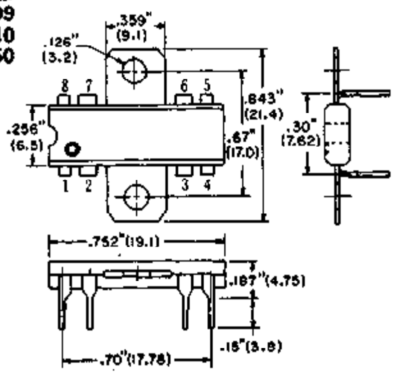


Fig. L128 — 10-Pin DIP-W

ECG
1259

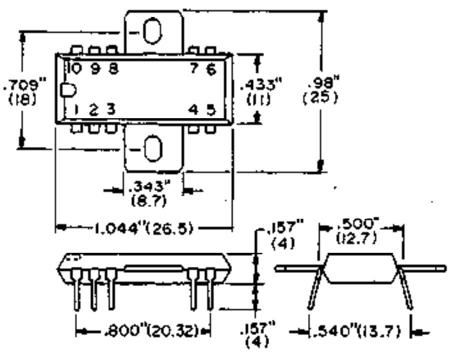


Fig. L129 — 12-Pin DIP-W

ECG
1238

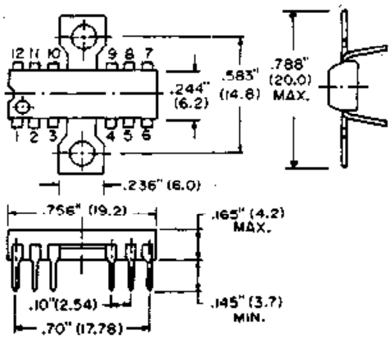


Fig. L130 — 12-Pin DIP-W

ECG
1115
1554

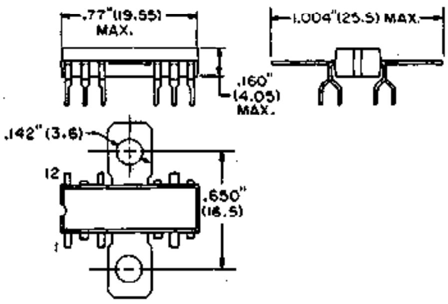


Fig. L131 — 12-Pin DIP-QW

ECG
1115A 1231
1116 1289

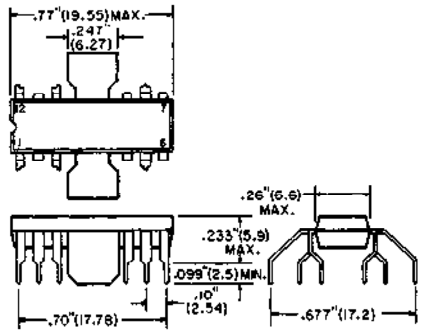
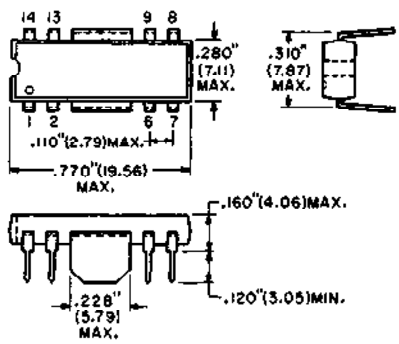


Fig. L132 — 14-Pin DIP-W

ECG
804



N

Fig. L133 — 14-Pin DIP-W

ECG
1154
1385

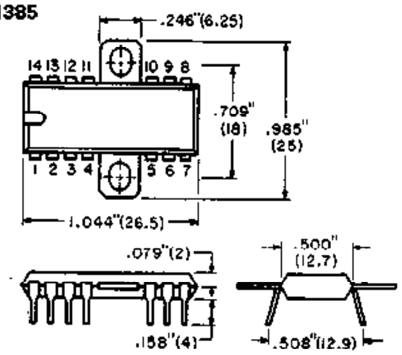


Fig. L134 — 14-Pin DIP-W

ECG
1023

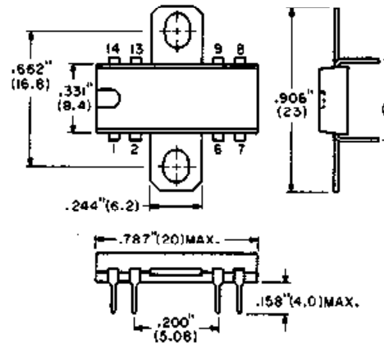


Fig. L135 — 14-Pin DIP-W

ECG
814A

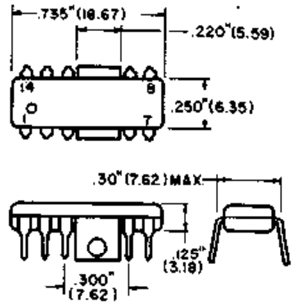


Fig. L136 — 16-Pin DIP-W

ECG
742
1667
1774

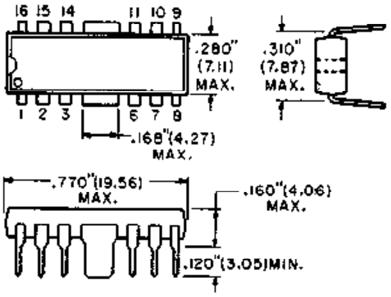


Fig. L137 — 8-Pin DIP-ET

ECG
1140
1141

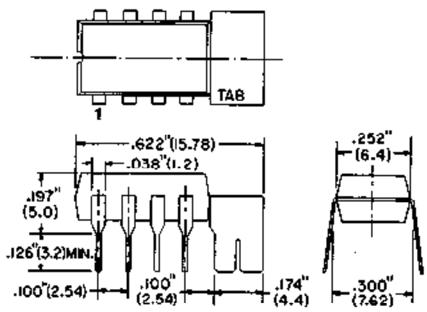


Fig. L139 — 14-Pin DIP-ET

ECG
717

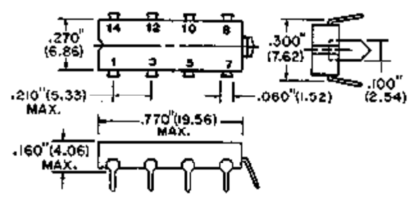


Fig. L140 — 14-Pin DIP-ET

ECG
1439

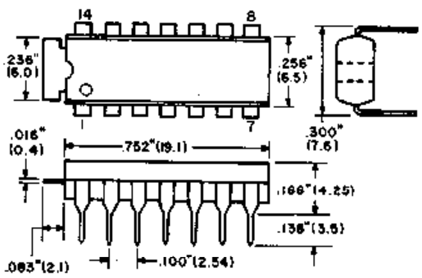


Fig. L141 — 14-Pin DIP-ET

ECG
1313

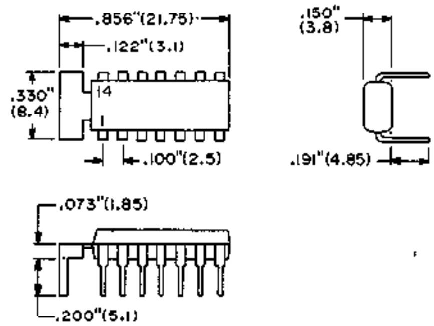
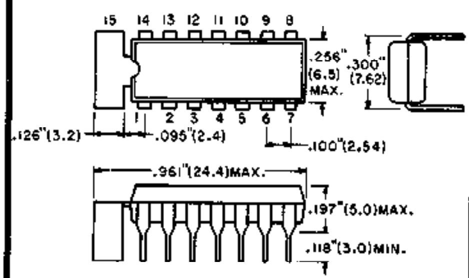


Fig. L143 — 14-Pin DIP-ET

ECG
1308•



•Alt. Fig. L105

Fig. L144 — 14-Pin DIP-ET

ECG
1180 **1463**
1228

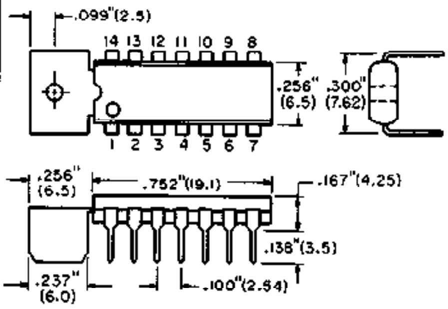


Fig. L145 — 14-Pin DIP-ET

ECG
1246
1257
1522

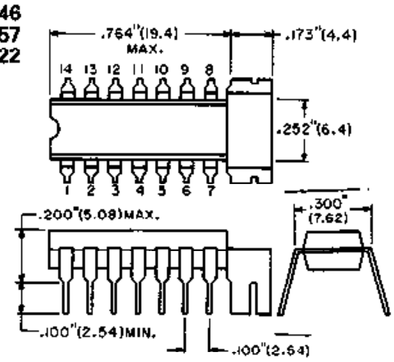
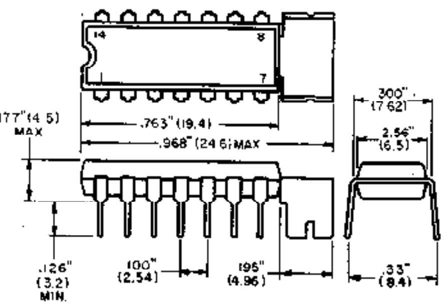


Fig. L146 — 14-Pin DIP-ET

ECG
1530
7065



Linear IC and Module Outlines (cont'd)

Fig. L149 — 16-Pin DIP-ET

ECG
1110

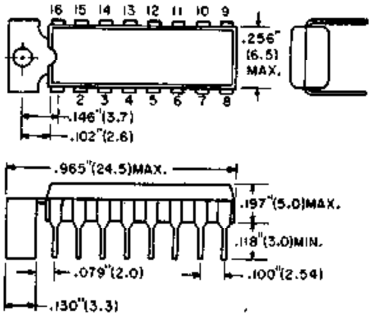


Fig. L150A — 16-Pin DIP-ET

ECG
1661

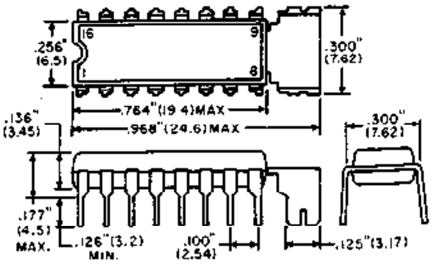


Fig. L151 — 16-Pin DIP-ET

ECG
1404
1500
1501
1551

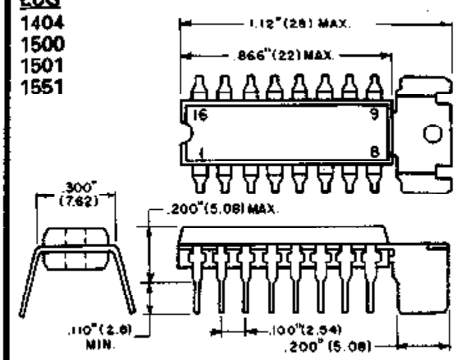


Fig. L153 — 24-Pin DIP-ET

ECG
1304
1305
1307
1601

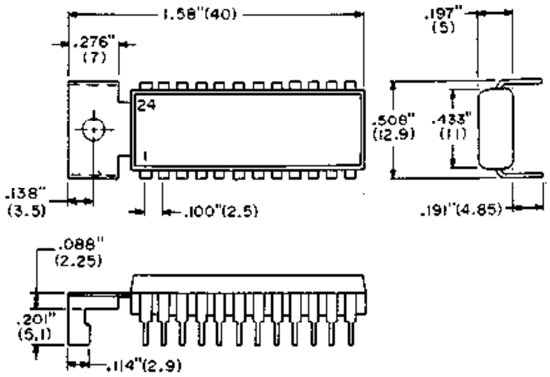


Fig. L154 — 28-Pin DIP-HS

ECG
1422
1622

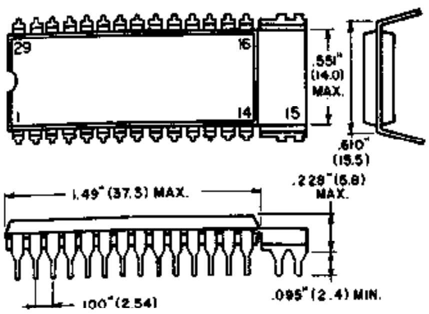


Fig. L155 — 10-Pin DIP-HS

ECG
1029
1037

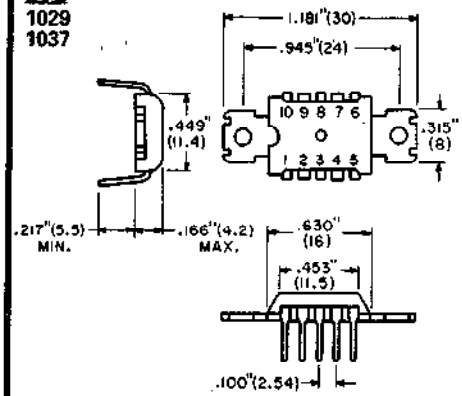


Fig. L157 — 14-Pin DIP-Q-HS

ECG
1111
1118

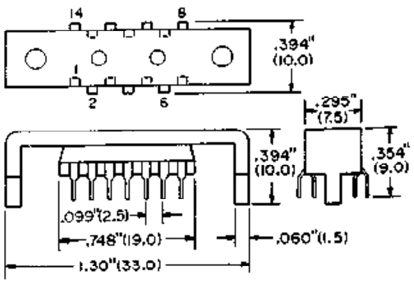


Fig. L158 — 16-Pin DIP-HS

ECG
1175

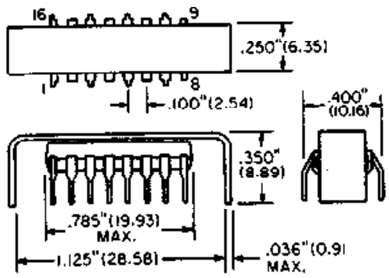
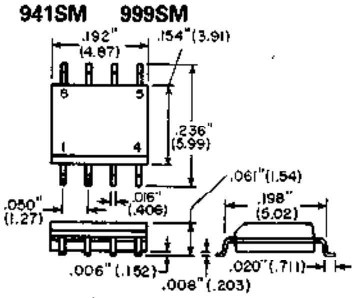


Fig. L159 — 8-Pin SOIC

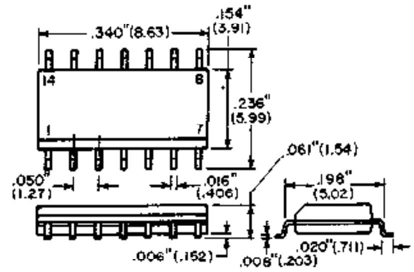
ECG
778SM 918SM 943SM
832SM 922SM 955SM
857SM 928SM 975SM
858SM 941SM 999SM
891SM
894SM



Note: Pin 1 on beveled edge

Fig. L160 — 14-Pin SOIC

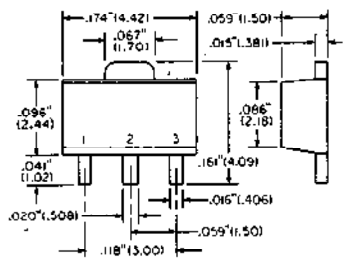
ECG
834SM 948SM
859SM 978SM
927SM 987SM



Note: Pin 1 on beveled edge

Fig. L161 — SOT-89

ECG
1869M



N

Linear IC and Module Outlines (cont'd)

Fig. L162 — 22-Pin SIP

ECG
7029

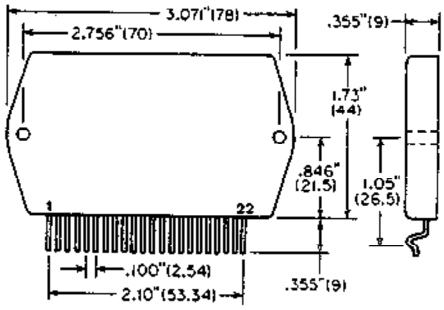


Fig. L163 — TO-220M

ECG
1960
1961
1962
1963
1964
1965
1966
1967
1968
1970
1971
1972
1973
1974
1975
1976
1977

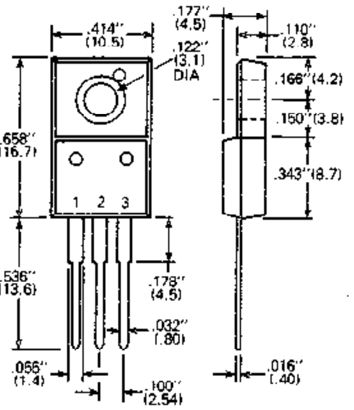


Fig. L163A — TO-126

ECG
7089

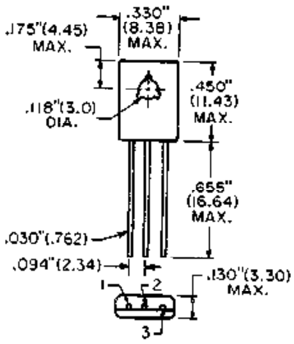


Fig. L164 — 12-Pin SIP

ECG
7066

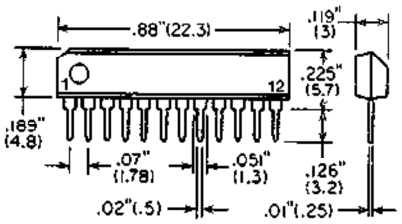


Fig. L165 — 12-Pin SIP

ECG
7057

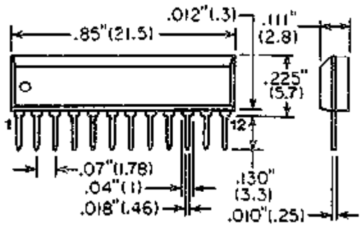


Fig. L166 — 17-Pin SIP

ECG
7041
7088

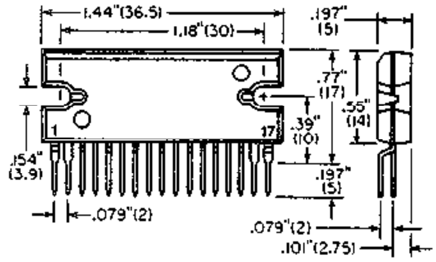


Fig. L167 — 15-Pin SIP

ECG
7027

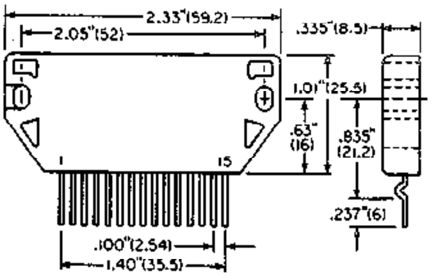


Fig. L168 — 15-Pin SIP

ECG
7033

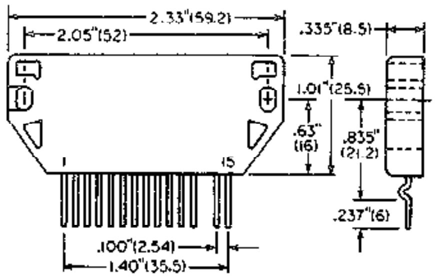


Fig. L169 — 16-Pin SIP

ECG
7021

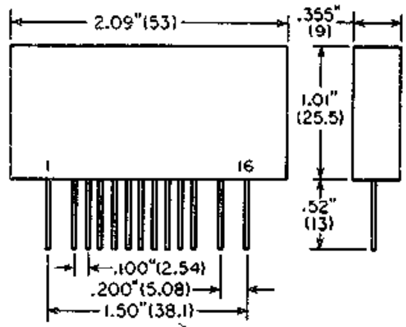


Fig. L170 — 16-Pin SIP

ECG
7076

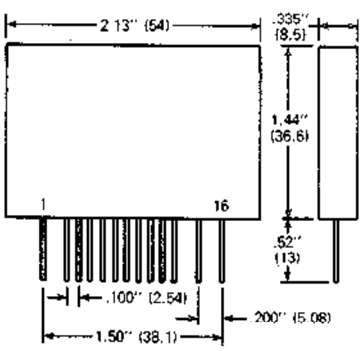


Fig. L171 — 9-Pin SIP-HS

ECG
7046

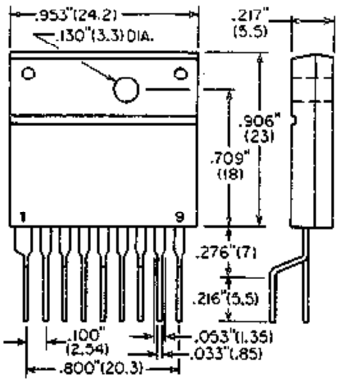
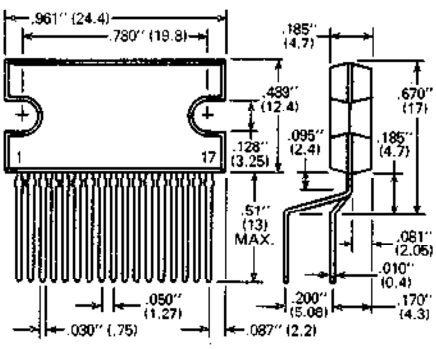


Fig. L173 — 17-Pin SIP

ECG
7114



Linear IC and Module Outlines (cont'd)

Fig. L174 — 14-Pin SIP-HS

ECG
7102
7103

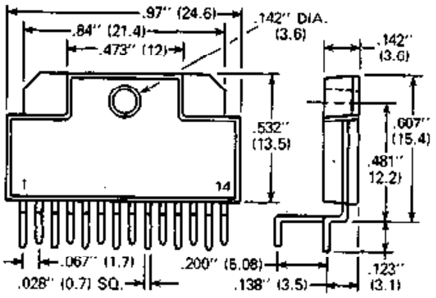


Fig. L175 — 16-Pin SIP-HS

ECG
7059
7113

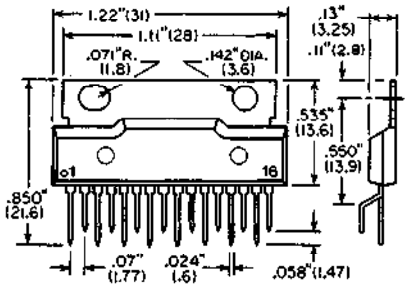


Fig. L176 — 12-Pin SIP

ECG
7125
7126

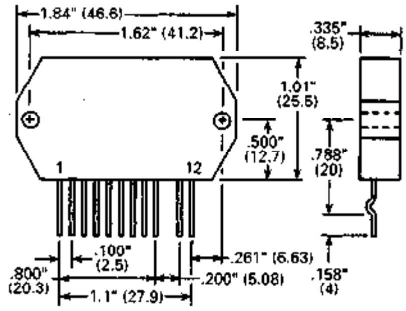


Fig. L177 — TO-220, 4-Pin

ECG
7128

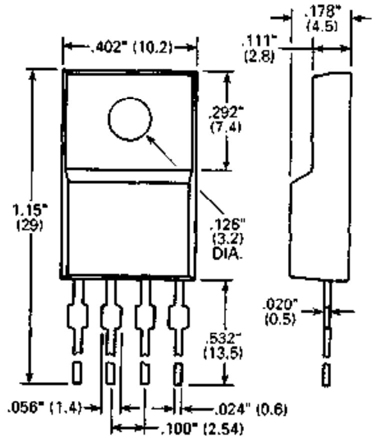


Fig. L178 — 32-Pin DIP

ECG
7134

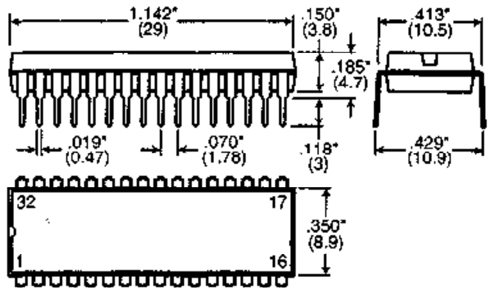


Fig. L179 — 9-Pin SIP

ECG
7136

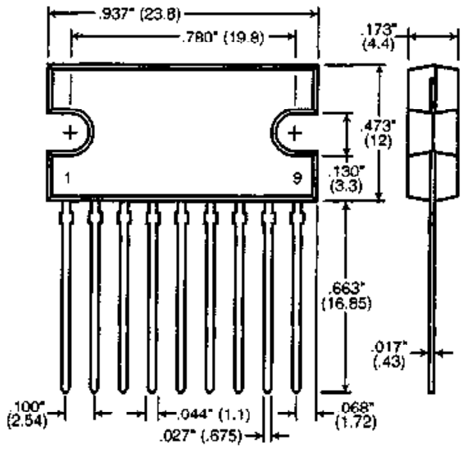
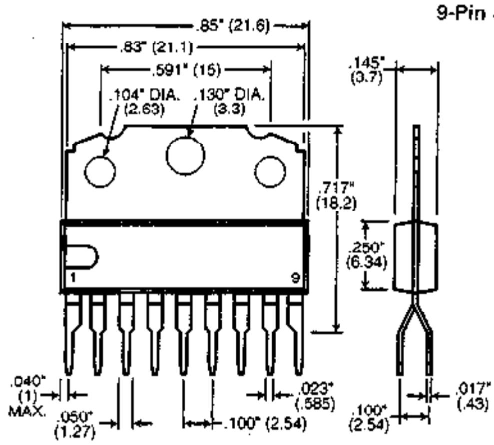


Fig. L180 — 9-Pin SIP-HS

ECG
7139



N

Digital Integrated Circuits
CMOS Selector Guide

ECG No.	Description

• Analog Switches and Analog Multiplexers/Demultiplexers

ECG4016B	Quad Bilateral Switch
ECG4051B	Single 8-Channel Multiplexer
ECG4052B	Differential Dual 4-Channel Multiplexer
ECG4053B	Triple 2-Channel Analog Multiplexer/Demultiplexer
ECG4066B	Quad Bilateral Switch
ECG4067B	16-Channel Multiplexer/Demultiplexer
ECG4097B	Differential 8-Channel Multiplexer/Demultiplexer
ECG4529B	Single 8-Channel or Dual 4-Channel Analog Data Selector
ECG4539B	Dual 4-Channel Data Selector/Multiplexer
ECG4551B	Quad 2-Input Analog Multiplexer/Demultiplexer

• Arithmetic Functions/Digital Comparators

ECG74C85	4-Bit Magnitude Comparator
ECG4008B	4-Bit Full Adder
ECG4032B	Triple Serial Adder (Positive Logic)
ECG4038B	Triple Serial Adder (Negative Logic)
ECG4063B	4-Bit Magnitude Comparator
ECG4585B	4-Bit Magnitude Comparator
ECG40085B	4-Bit Magnitude Comparator

• Buffers

Inverters and Inverting Buffers

ECG74C04	Hex Inverter
ECG74C901	Hex Inverting CMOS to TTL Interface Buffer
ECG74C903	Hex Inverting PMOS to CMOS/TTL Interface Buffer
ECG4049	Hex Buffer/Converter (Inverting)
ECG4069	Hex Inverter
ECG4502B	Strobed Hex Inverter/Buffer (3-State Output)
ECG40098B	Hex 3-State Inverting Buffer

Non-Inverting Buffers

ECG74C902	Hex Non-Inverting CMOS to TTL Interface Buffer
ECG4050B	Hex Buffer/Converter
ECG40097B	Hex 3-State Non-Inverting Buffer

• Counters

Binary

ECG74C93	4-Bit Binary Counter
ECG74C161	Binary Counter with Asynchronous Clear
ECG74C193	Synchronous 4-Bit Up/Down Binary Counter
ECG4020B	14-Stage Binary/Ripple Counter
ECG4024B	7-Stage Binary Counter
ECG4029B	Presettable Up/Down Counter
ECG4040B	12-Stage Binary/Ripple Counter
ECG4045B	21-Stage Counter
ECG4060B	14-Stage Ripple/Carry Binary Counter/Divider and Oscillator
ECG4516B	Presettable Binary Up/Down Counter
ECG4520B	Dual Binary Up Counter
ECG4526B	Programmable Divide-By-"N", 4-Bit Binary Counter
ECG40161B	4-Bit Binary Asynchronous Reset Counter
ECG40163B	4-Bit Binary Synchronous Reset Counter
ECG40193B	4-Bit Up/Down Synchronous Binary Counter

Decade

ECG74C90	4-Bit Decade Counter
ECG74C192	Synchronous 4-Bit Up/Down Decade Counter
ECG4017B	Decade Counter/Divider
ECG40160B	4-Bit Decade Asynchronous Reset Counter
ECG40162B	4-Bit Decade Synchronous Reset Counter
ECG40192B	Synchronous 4-Bit Up/Down Decade Counter

ECG No.	Description

Other

ECG4018B	Presettable Divide-By-"N" Counter
ECG4022B	Counter/Divider
ECG4089B	Binary Rate Multiplier
ECG4510B	Presettable BCD Up/Down Counter
ECG4518B	Dual BCD Up Counter
ECG4522B	BCD-Programmable Divide-By-"N", 4-Bit Counter
ECG4527B	BCD Multiplier
ECG4553B	3-Digit BCD Counter
ECG4568B	Phase Comparator and Programmable Counter
ECG4569B	Programmable Divide-By-"N" Dual 4-Bit BCD/Binary Counter

• Decoders

Decoders/Display Drivers

ECG4026B	Decade Counter/Divider/Decoder for 7-Segment Display
ECG4033B	HV Counter/Divider, Decoded 7-Segment Display Output
ECG4055B	BCD-to-7-Segment Decoder/Driver
ECG4056B	BCD-to-7-Segment Decoder/Driver with Strobed Latch
ECG4511B	BCD-to-7-Segment Latch Decoder/Driver
ECG4513B	BCD-to-7-Segment Latch/Decoder/Driver with Ripple Blanking
ECG4543B	BCD-7-Segment Latch/Decoder/Driver for LCD
ECG4547B	BCD-7-Segment Latch/Decoder/Driver, Hi Current

Decoders/Multiplexers/Demultiplexers

ECG74C42	BCD-to-Decimal Decoder
ECG74C48	BCD-to-7-Segment Decoder
ECG74C151	8-Channel Digital Multiplexer
ECG74C154	4-Line-to-16-Line Decoder/Demultiplexer
ECG74C157	Quad 2-Input Multiplexer
ECG4028B	BCD-to-Decimal Decoder
ECG4512B	8-Input Multiplexer (3-State Output)
ECG4514B	4-Bit Latch/4-to-16-Line Decoder
ECG4515B	4-Bit Latch/4-to-16-Line Decoder
ECG4555B	Dual Binary to 1-of-4 Decoder/Demultiplexer (High-On-Select)
ECG4556B	Dual Binary to 1-of-4 Decoder/Demultiplexer (Low-On-Select)
ECG4558B	BCD-to-7-Segment Decoder

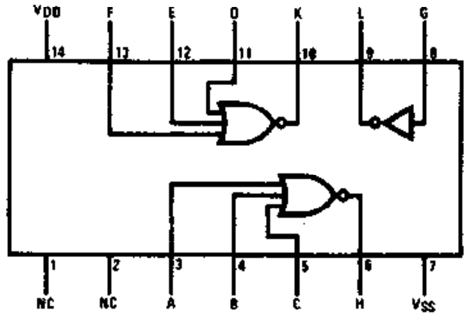
• Flip-Flops

ECG74C73	Dual J-K Flip-Flop with Clear
ECG74C74	Dual "D" Flip-Flop
ECG74C76	Dual J-K Flip-Flop with Clear and Preset
ECG74C107	Dual J-K Flip-Flop with Clear
ECG74C173	Quad "D" Flip-Flop
ECG74C174	Hex "D" Flip-Flop
ECG74C175	Quad "D" Flip-Flop
ECG74C374	Octal "D" Flip-Flop with Common Enable, 3-State Output
ECG4013B	Dual "D" Flip-Flop with Set/Reset
ECG4027B	Dual J-K M/S Flip-Flop
ECG4095B	Gated J-K Flip-Flop with Non-Inverting J and K Inputs
ECG4096B	Gated J-K Flip-Flop with Inverting and Non-Inverting J and K Inputs
ECG40174B	Hex "D" Flip-Flop
ECG40175B	Quad "D" Flip-Flop

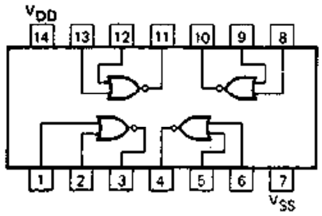
ECG No.	Description
• Gates	
AND	
ECG74C08	Quad 2-Input AND Gate
ECG4073B	Triple 3-Input AND Gate
ECG4081B	Quad 2-Input AND Gate
ECG4082B	Dual 4-Input AND Gate
NAND	
ECG74C00	Quad 2-Input NAND Gate
ECG74C10	Triple 3-Input NAND Gate
ECG74C20	Dual 4-Input NAND Gate
ECG74C30	8-Input NAND Gate
ECG4011B	Quad 2-Input NAND Gate
ECG4012B	Dual 4-Input NAND Gate
ECG4023B	Triple 3-Input NAND Gate
ECG4068B	8-Input NAND Gate
NOR	
ECG74C02	Quad 2-Input NOR Gate
ECG4000	Dual 3-Input NOR Gate
ECG4001B	Quad 2-Input NOR Gate
ECG4002B	Dual 4-Input NOR Gate
ECG4025B	Triple 3-Input NOR Gate
ECG4078B	8-Input NOR Gate
Exclusive OR	
ECG4030B	Quad 2-Input Exclusive OR Gate
ECG4070B	Quad 2-Input Exclusive OR Gate
OR	
ECG74C32	Quad 2-Input OR Gate
ECG4071B	Quad 2-Input OR Gate
ECG4072B	Dual 4-Input OR Gate
ECG4075B	Triple 3-Input OR Gate
• Keyboard Encoders	
ECG74C922	16-Key Keyboard Encoder with 3-State Output
ECG74C923	20-Key Keyboard Encoder with 3-State Output
• Line Drivers and Line Receivers	
ECG74C240	Octal Buffer/Line Driver with Inverting 3-State Outputs
ECG74C244	Octal Buffer/Line Driver with Non-Inverting 3-State Outputs
• Multivibrators/One Shots/PLLs	
ECG74C221	Dual Monostable Multivibrator
ECG4046B	Phase Locked Loop
ECG4047B	Monostable/Astable Multivibrator
ECG4098B	Dual Monostable Multivibrator
ECG4521B	24-Stage Frequency Divider
ECG4528B	Dual Monostable Multivibrator
ECG4536B	Programmable Timer
ECG4538B	Dual Precision Monostable Multivibrator
ECG4541B	Programmable Oscillator/Timer
ECG4566B	Industrial Time Base Generator

ECG No.	Description
• Registers	
Latches and Registers	
ECG74C373	Octal "D" Transparent Latch, 3-State Output
ECG4042B	Quad-Clocked "D" Latch
ECG4043B	Quad 3-State R/S Latch (NOR)
ECG4044B	Quad 3-State R/S Latch (NAND)
ECG4076B	4-Bit "D" Type Register (3-State Output)
ECG4099B	8-Bit Addressable Latch
ECG4508B	Dual 4-Bit Latch
ECG4597B	8-Bit Bus Compatible 3-State Latch with Internal Counter
ECG4598B	8-Bit Bus Compatible 3-State Latch with Binary Address Decoder
Shift	
ECG74C95	4-Bit Right-Shift Left-Shift Register
ECG74C164	8-Bit Parallel-Out Serial Shift Register
ECG4006B	18-Stage Static Shift Register
ECG4014B	8-Stage Static Shift Register
ECG4015B	Dual 4-Stage Static-Shift Register
ECG4021B	8-Stage Serial to Parallel Shift Register
ECG4031B	64-Stage Static Shift Register
ECG4034B	8-Stage Static Bidirectional Parallel/Serial Input/Output Bus Register
ECG4035B	4-Stage Parallel In/Parallel Out Shift Register
ECG4094B	8-Stage Shift and Store Register (3-State Output)
ECG4517B	Dual 64-Bit Static Shift Register
ECG4562B	128-Bit Static Shift Register
ECG40100B	32-Stage Static Left/Right Shift Register
ECG40194B	4-Bit Right/Left Shift Register
ECG40195B	4-Bit Shift Register
• Schmitt Triggers	
ECG74C14	Hex Schmitt Trigger
ECG4093B	Quad 2-Input NAND Schmitt Trigger
ECG4583B	Dual Schmitt Trigger
ECG40106B	Hex Schmitt Trigger
• Special Functions	
ECG4007	Dual Complementary Pair with Inverter
ECG4019B	Quad AND/OR Select Gate
ECG4048B	HV Multifunction Expandable 8-Input Gate (3-State Output)
ECG4077B	Quad Exclusive NOR Gate
ECG4086B	Expandable 4-Wide 2-Input AND/OR Invert Gate
ECG4501	Dual 4-Input NAND, 2-Input OR/NOR, 8-Input AND/NAND Multifunction Gate
ECG4506B	Dual Expandable AND/OR/Invert Gate
ECG4531B	12-Bit Parity Tree
ECG4532B	8-Bit Priority Encoder
ECG4582B	Look-Ahead Carry Block (Use ECG40182B for Replacement)
ECG40182B	Look-Ahead Carry Generator

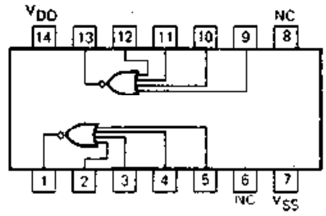
ECG4000 14-Pin DIP See Fig. D6
ECG4000T 14-Pin SOIC See Fig. D22
Dual 3-Input NOR Gate Plus Inverter,
V_{DD} = 3 V to 15 V



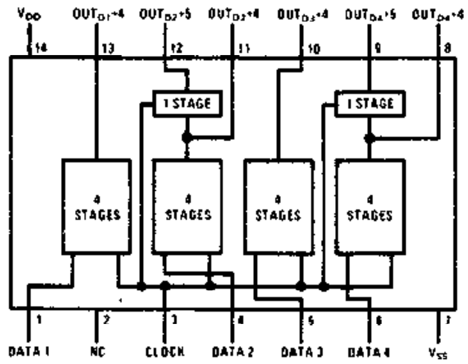
ECG4001B 14-Pin DIP See Fig. D6
ECG4001BT 14-Pin SOIC See Fig. D22
Quad 2-Input NOR Gate,
V_{DD} = 3 V to 15 V



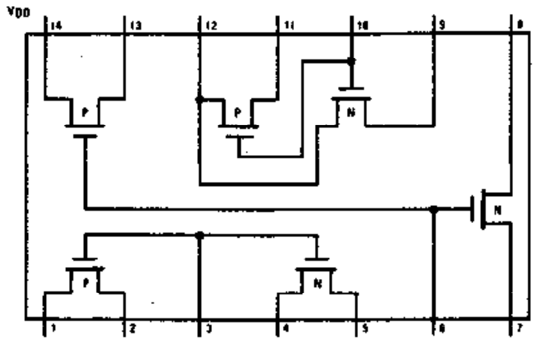
ECG4002B 14-Pin DIP See Fig. D6
ECG4002BT 14-Pin SOIC See Fig. D22
Dual 4-Input NOR Gate,
V_{DD} = 3 V to 15 V



ECG4006B 14-Pin DIP See Fig. D6
18-Stage Static Shift Register,
V_{DD} = 3 V to 15 V

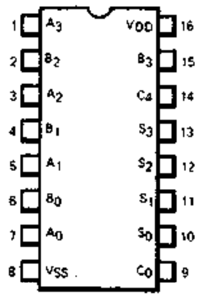


ECG4007 14-Pin DIP See Fig. D6
ECG4007T 14-Pin SOIC See Fig. D22
Dual Complementary Pair with Inverter, V_{DD} = 3 V to 15 V

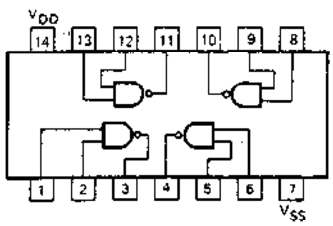


Note: All P-channel substrates are connected to V_{DD} and all N-channel substrates are connected to V_{SS}.

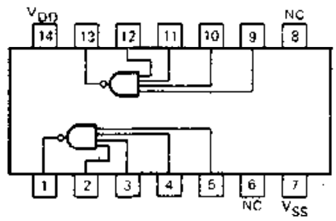
ECG4008B 16-Pin DIP See Fig. D8
4-Bit Full Adder, V_{DD} = 3 V to 15 V



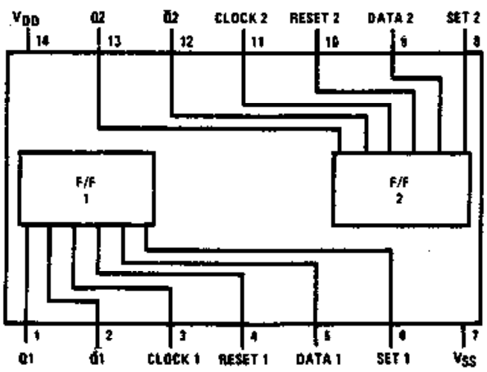
ECG4011B 14-Pin DIP See Fig. D6
ECG4011BT 14-Pin SOIC See Fig. D22
Quad 2-Input NAND Gate, V_{DD} = 3 V to 15 V



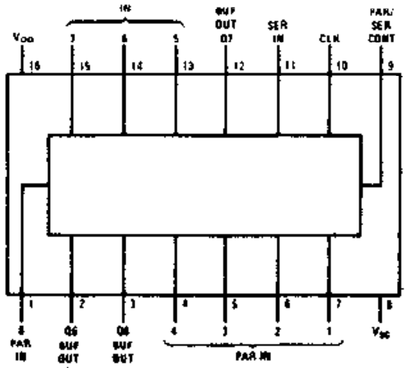
ECG4012B 14-Pin DIP See Fig. D6
ECG4012BT 14-Pin SOIC See Fig. D22
Dual 4-Input NAND Gate, V_{DD} = 3 V to 15 V



ECG4013B 14-Pin DIP See Fig. D6
ECG4013BT 14-Pin SOIC See Fig. D22
Dual "D" Flip-Flop with Set/Reset, V_{DD} = 3 V to 15 V



ECG4014B 16-Pin DIP See Fig. D8
8-Stage Static Shift Register, V_{DD} = 3 V to 15 V



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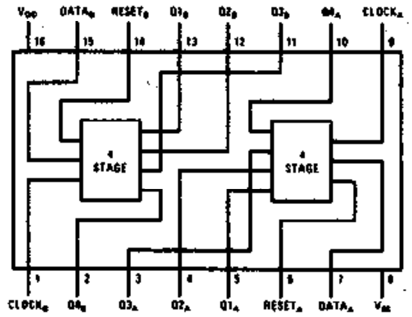
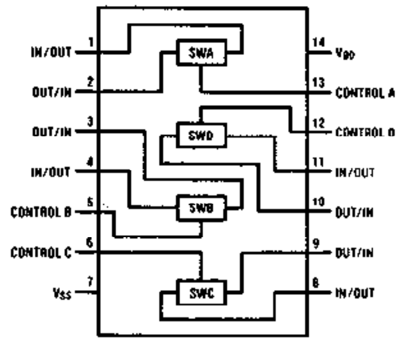
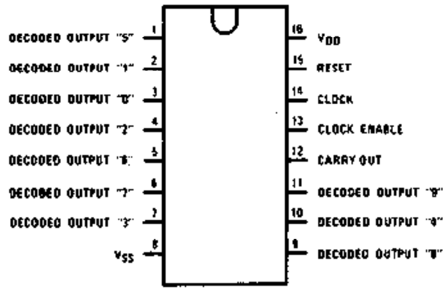
ECG4015B 16-Pin DIP See Fig. D8
ECG4015BT 16-Pin SOIC See Fig. D21
Dual 4-Stage Static Shift Register,
V_{DD} = 3 V to 15 V



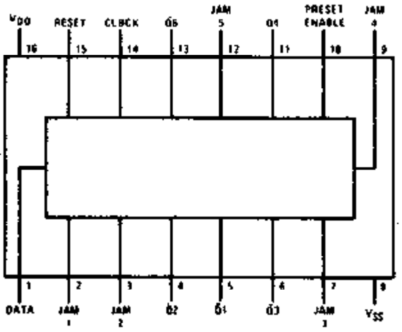
ECG4016B 14-Pin DIP See Fig. D8
ECG4016BT 14-Pin SOIC See Fig. D22
Quad Bilateral Switch,
V_{DD} = 3 V to 15 V



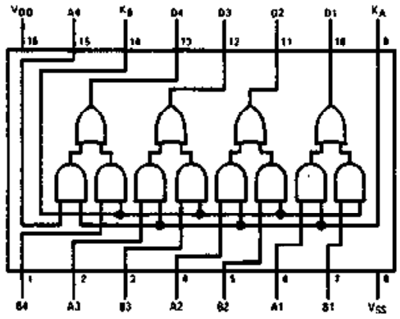
ECG4017B 16-Pin DIP See Fig. D8
Decade Counter/Divider,
V_{DD} = 3 V to 15 V



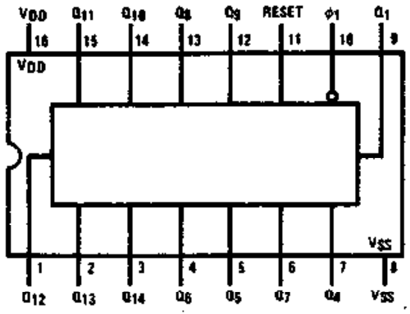
ECG4018B 16-Pin DIP See Fig. D8
Presettable Divide-by-"N" Counter,
V_{DD} = 3 V to 15 V



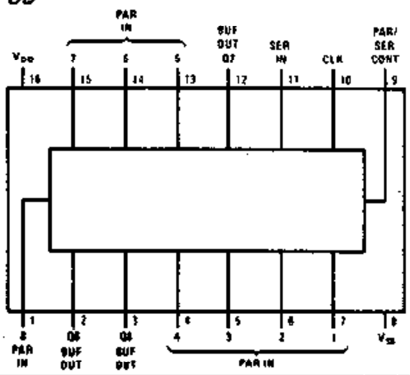
ECG4019B 16-Pin DIP See Fig. D8
Quad AND/OR Select Gate,
V_{DD} = 3 V to 15 V



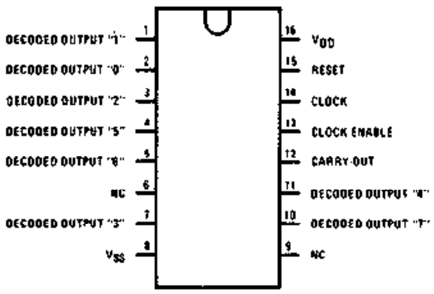
ECG4020B 16-Pin DIP See Fig. D8
ECG4020BT 16-Pin SOIC See Fig. D21
14-Stage Binary/Ripple Counter,
V_{DD} = 3 V to 15 V



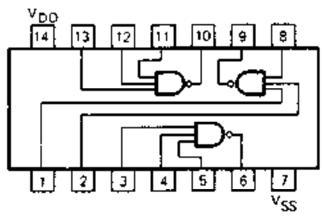
ECG4021B 16-Pin DIP See Fig. D8
ECG4021BT 16-Pin SOIC See Fig. D21
8-Stage Serial to Parallel Shift Register,
V_{DD} = 3 V to 15 V



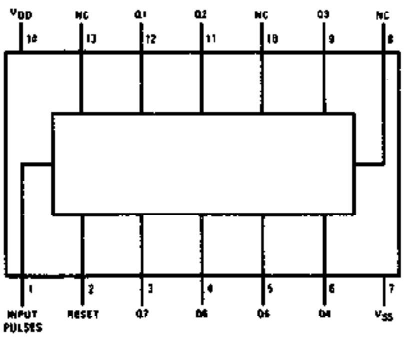
ECG4022B 16-Pin DIP See Fig. D8
Counter/Divider, V_{DD} = 3 V to 15 V



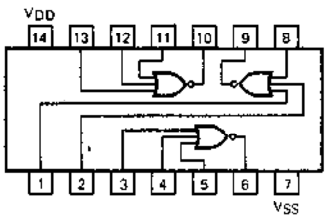
ECG4023B 14-Pin DIP See Fig. D6
ECG4023BT 14-Pin SOIC See Fig. D22
Triple 3-Input NAND Gate,
V_{DD} = 3 V to 15 V



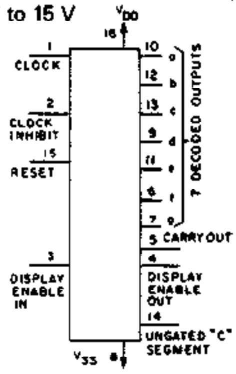
ECG4024B 14-Pin DIP See Fig. D6
7-Stage Binary Counter, V_{DD} = 3 V to 15 V



ECG4025B 14-Pin DIP See Fig. D6
ECG4025BT 14-Pin SOIC See Fig. D22
Triple 3-Input NOR Gate, V_{DD} = 3 V to 15 V



ECG4026B 16-Pin DIP See Fig. D8
Decade Counter/Divider with Display Enable,
V_{DD} = 3 V to 15 V



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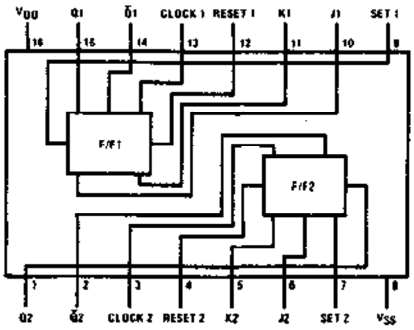
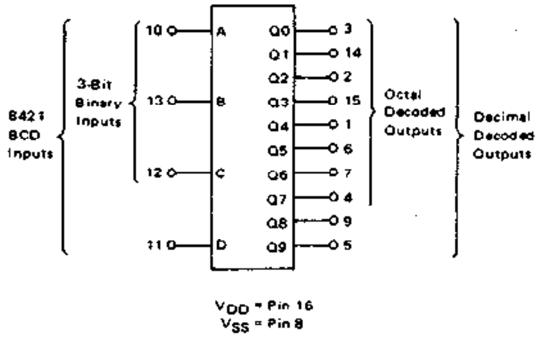
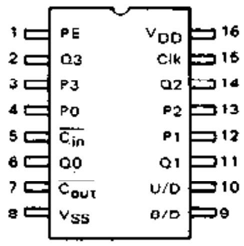
ECG4027B 16-Pin DIP See Fig. D8
ECG4027BT 16-Pin SOIC See Fig. D21
Dual J-K Master-Slave Flip-Flop, V_{DD} = 3 V to 15 V



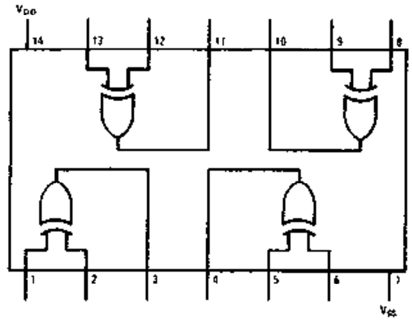
ECG4028B 16-Pin DIP See Fig. D8
ECG4028BT 16-Pin SOIC See Fig. D21
BCD-to-Decimal Decoder, V_{DD} = 3 V to 15 V



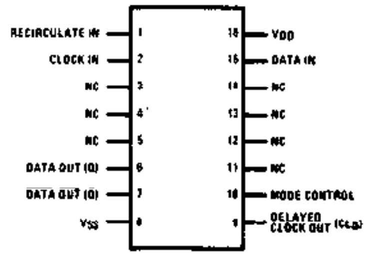
ECG4029B 16-Pin DIP See Fig. D8
ECG4029BT 16-Pin SOIC See Fig. D21
Presettable Up/Down Counter,
V_{DD} = 3 V to 15 V



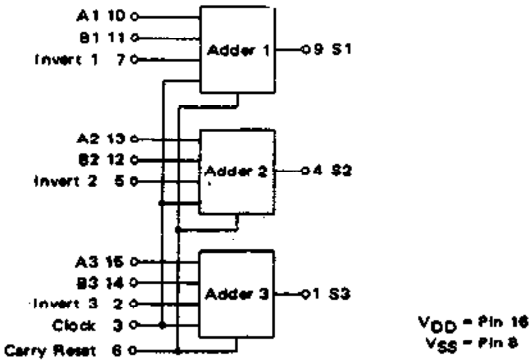
ECG4030B 14-Pin DIP See Fig. D6
Quad Exclusive OR Gate,
V_{DD} = 3 V to 15 V



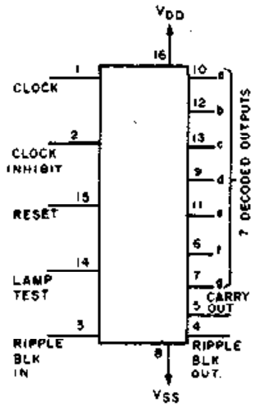
ECG4031B 16-Pin DIP See Fig. D8
64-Stage Static Shift Register,
V_{DD} = 3 V to 15 V



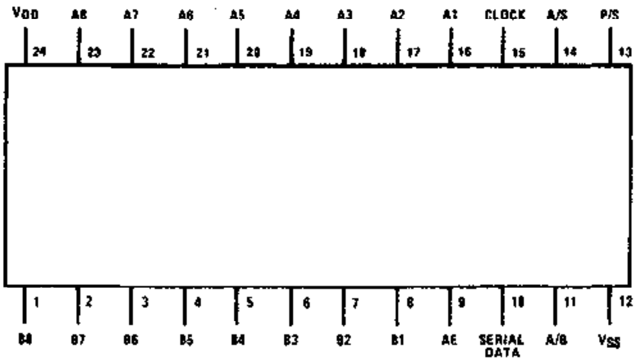
ECG4032B—Positive Logic 16-Pin DIP See Fig. D8
ECG4038B—Negative Logic
Triple Serial Adders, V_{DD} = 3 V to 15 V



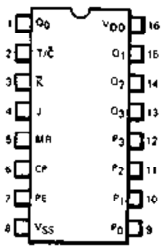
ECG4033B 16-Pin DIP See Fig. D8
Decade Counter/Divider, V_{DD} = 3 V to 15 V



ECG4034B 24-Pin DIP See Fig. D15
8-Stage Static Bi-Directional Parallel/Serial Input/Output Bus Register, V_{DD} = 3 V to 15 V



ECG4035B 16-Pin DIP See Fig. D8
4-Stage Parallel In/Parallel Out Shift Register,
V_{DD} = 3 V to 15 V



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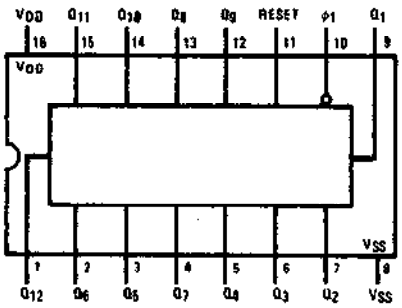
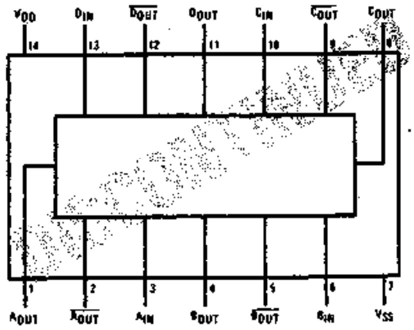
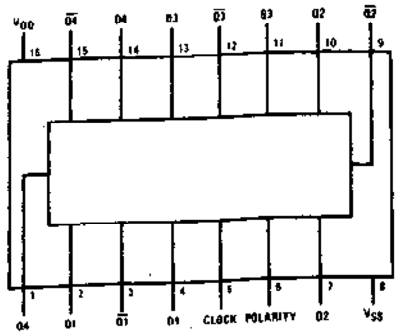
ECG4040B 16-Pin DIP See Fig. D8
ECG4040BT 16-Pin SOIC See Fig. D21
12-Stage Binary/Ripple Counter,
V_{DD} = 3 V to 15 V



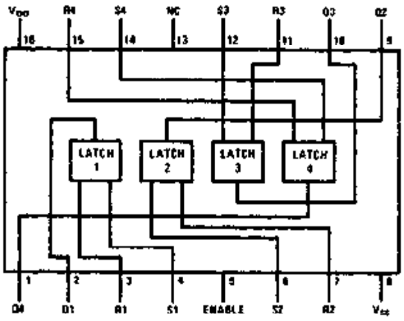
ECG4041 14-Pin DIP See Fig. D6
Quad True/Complement Buffer,
V_{DD} = 3 V to 15 V



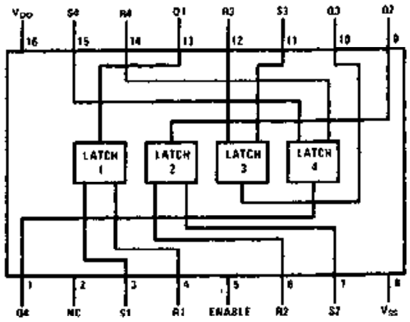
ECG4042B 16-Pin DIP See Fig. D8
ECG4042BT 16-Pin SOIC See Fig. D21
Quad-Clocked "D" Latch,
V_{DD} = 3 V to 15 V



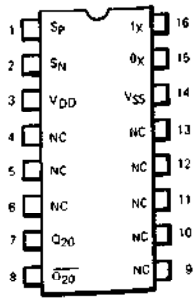
ECG4043B 16-Pin DIP See Fig. D8
ECG4043BT 16-Pin SOIC See Fig. D21
Quad 3-State NOR R/S Latch,
V_{DD} = 3 V to 15 V



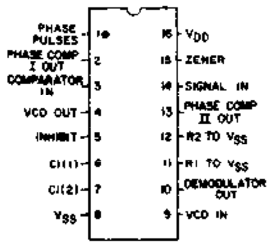
ECG4044B 16-Pin DIP See Fig. D8
ECG4044BT 16-Pin SOIC See Fig. D21
Quad 3-State NAND R/S Latch,
V_{DD} = 3 V to 15 V



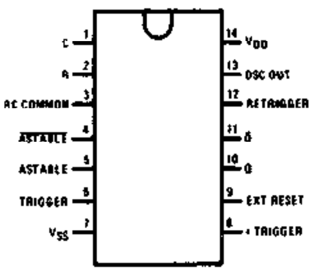
ECG4045B 16-Pin DIP See Fig. D8
21-Stage Counter, V_{DD} = 3 V to 15 V



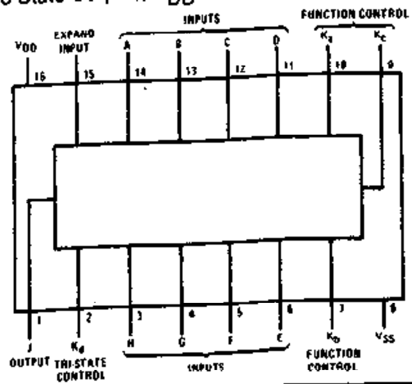
ECG4046B 16-Pin DIP See Fig. D8
ECG4046BT 16-Pin SOIC See Fig. D21
CMOS-Phase Locked Loop,
V_{DD} = 3 V to 15 V



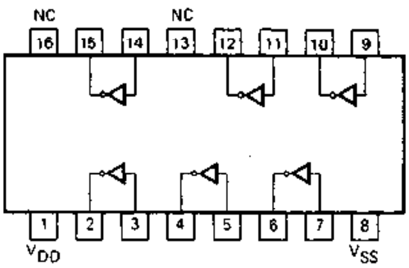
ECG4047B 14-Pin DIP See Fig. D6
ECG4047BT 14-Pin SOIC See Fig. D22
Monostable/Astable Multivibrator,
V_{DD} = 3 V to 15 V



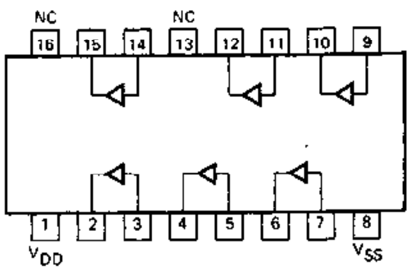
ECG4048B 16-Pin DIP See Fig. D8
Multifunction Expandable 8-Input Gate,
(3-State Output), V_{DD} = 3 V to 15 V



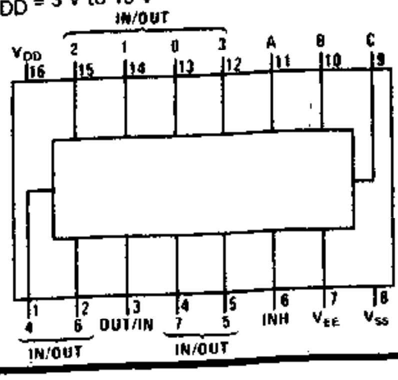
ECG4049 16-Pin DIP See Fig. D8
ECG4049T 16-Pin SOIC See Fig. D21
Hex Buffer/Converter (Inverting),
V_{DD} = 3 V to 15 V



ECG4050B 16-Pin DIP See Fig. D8
ECG4050BT 16-Pin SOIC See Fig. D21
Hex Buffer/Converter (Non-Inverting),
V_{DD} = 3 V to 15 V



ECG4051B 16-Pin DIP See Fig. D8
ECG4051BT 16-Pin SOIC See Fig. D21
Single 8-Channel Multiplexer,
V_{DD} = 3 V to 15 V



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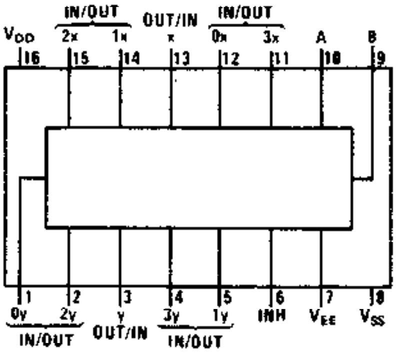
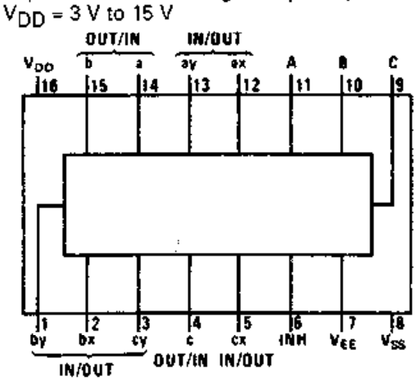
CMOS (cont'd)

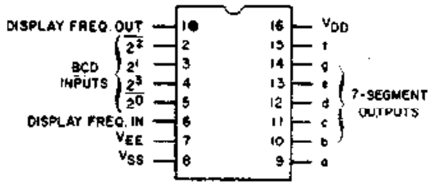
ECG4052B 16-Pin DIP See Fig. D8
ECG4052BT 16-Pin SOIC See Fig. D21
Differential Dual 4-Channel Multiplexer, V_{DD} = 3 V to 15 V



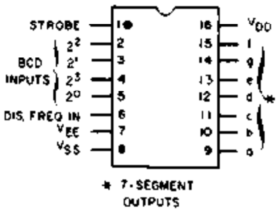
ECG4053B 16-Pin DIP See Fig. D8
ECG4053BT 16-Pin SOIC See Fig. D21
Triple 2-Channel Analog Multiplexer, V_{DD} = 3 V to 15 V



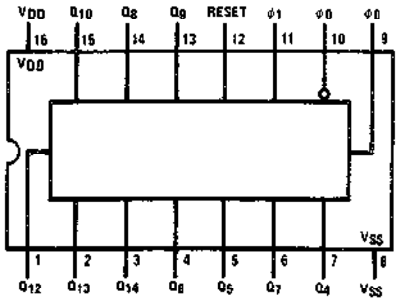
ECG4055B 16-Pin DIP See Fig. D8
BCD-to-7-Segment Decoder/Driver, V_{DD} = 3 V to 15 V



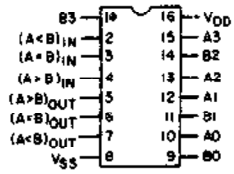
ECG4056B 16-Pin DIP See Fig. D8
BCD-to-7-Segment LCD Decoder/Driver with Strobe Latch, V_{DD} = 3 V to 15 V



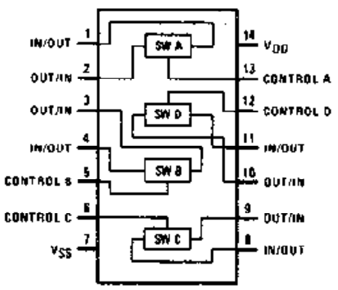
ECG4060B 16-Pin DIP See Fig. D8
ECG4060BT 16-Pin SOIC See Fig. D21
14-Stage Ripple-Carry Binary Counter/Divider and Oscillator, V_{DD} = 3 V to 15 V



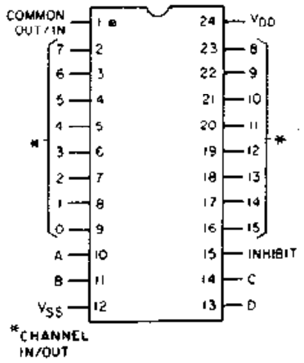
ECG4063B 16-Pin DIP See Fig. D8
4-Bit Magnitude Comparator, V_{DD} = 3 V to 15 V



ECG4066B 14-Pin DIP See Fig. D6
ECG4066BT 14-Pin SOIC See Fig. D22
Quad Bilateral Switch, V_{DD} = 3 V to 15 V

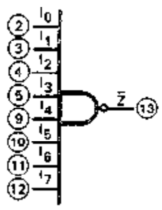


ECG4067B 24-Pin DIP See Fig. D15
16-Channel Multiplexer/Demultiplexer, V_{DD} = 3 V to 15 V



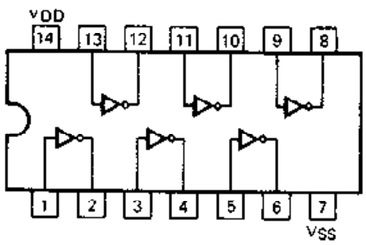
ECG4068B 14-Pin DIP See Fig. D6
ECG4068BT 14-Pin SOIC See Fig. D22
8-Input NAND Gate, V_{DD} = 3 V to 15 V

V_{DD} = Pin 14
V_{SS} = Pin 7
NC = Pins 1, 6, 8

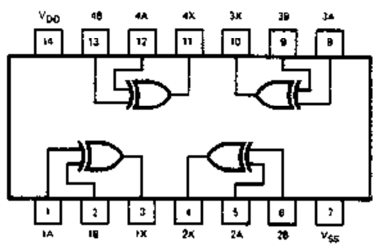


I_0-I_7 NAND Gate Inputs
$\overline{Z}$ Output (Active LOW)

ECG4069 14-Pin DIP See Fig. D6
ECG4069T 14-Pin SOIC See Fig. D22
Hex Inverter, V_{DD} = 3 V to 15 V

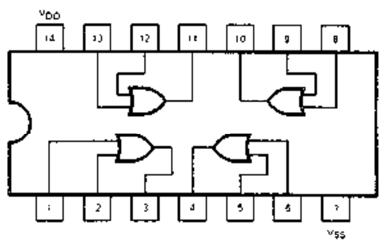


ECG4070B 14-Pin DIP See Fig. D6
ECG4070BT 14-Pin SOIC See Fig. D22
Quad Exclusive OR Gate, V_{DD} = 3 V to 15 V



$X = \overline{A}B + A\overline{B}$

ECG4071B 14-Pin DIP See Fig. D6
ECG4071BT 14-Pin SOIC See Fig. D22
Quad 2-Input OR Gate, V_{DD} = 3 V to 15 V



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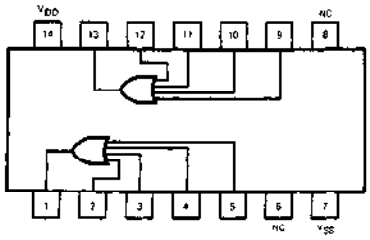
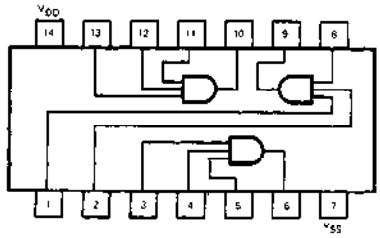
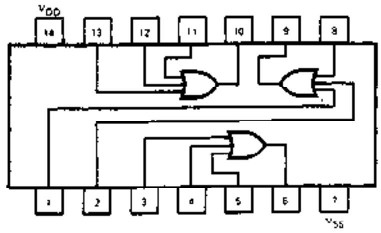
ECG4072B 14-Pin DIP See Fig. D6
Dual 4-Input OR Gate, V_{DD} = 3 V to 15 V



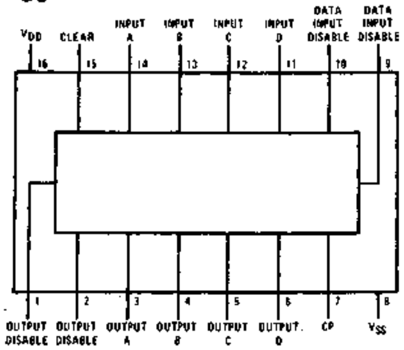
ECG4073B 14-Pin DIP See Fig. D6
ECG4073BT 14-Pin SOIC See Fig. D22
Triple 3-Input AND Gate, V_{DD} = 3 V to 15 V



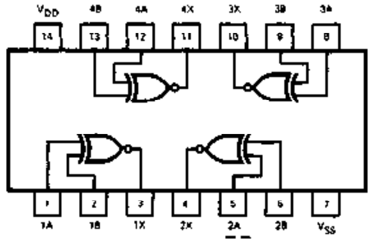
ECG4075B 14-Pin DIP See Fig. D6
ECG4075BT 14-Pin SOIC See Fig. D22
Triple 3-Input OR Gate, V_{DD} = 3 V to 15 V



ECG4076B 16-Pin DIP See Fig. D8
4-Bit "D" Type Register (Tri-State Output), V_{DD} = 3 V to 15 V

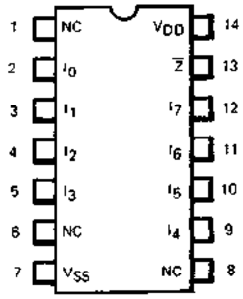


ECG4077B 14-Pin DIP See Fig. D6
ECG4077BT 14-Pin SOIC See Fig. D22
Quad Exclusive NOR Gate, V_{DD} = 3 V to 15 V

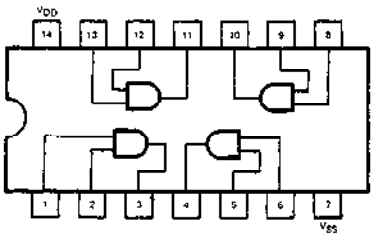


$X = AB + \bar{A}\bar{B}$

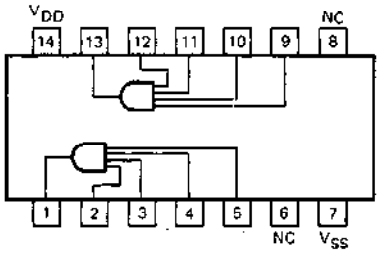
ECG4078B 14-Pin DIP See Fig. D6
8-Input NOR Gate, V_{DD} = 3 V to 15 V



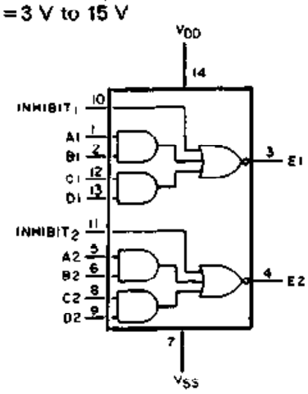
ECG4081B 14-Pin DIP See Fig. D6
Quad 2-Input AND Gate, V_{DD} = 3 V to 15 V



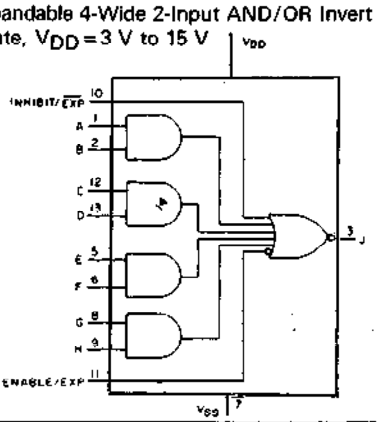
ECG4082B 14-Pin DIP See Fig. D6
Dual 4-Input AND Gate, V_{DD} = 3 V to 15 V



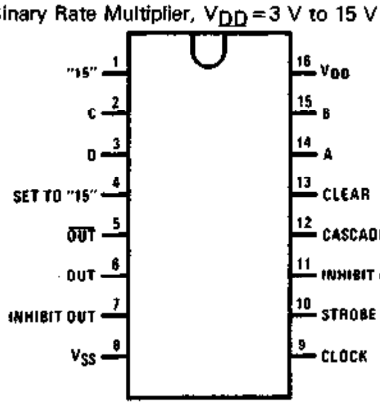
ECG4085B 14-Pin DIP See Fig. D6
Dual 2-Wide 2-Input AND/OR Invert Gate, V_{DD} = 3 V to 15 V



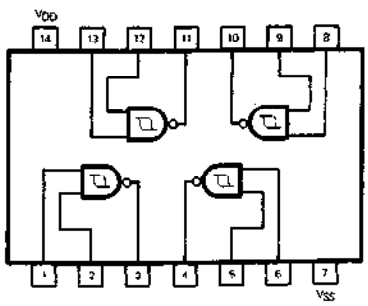
ECG4086B 14-Pin DIP See Fig. D6
Expandable 4-Wide 2-Input AND/OR Invert Gate, V_{DD} = 3 V to 15 V



ECG4089B 16-Pin DIP See Fig. D8
Binary Rate Multiplier, V_{DD} = 3 V to 15 V



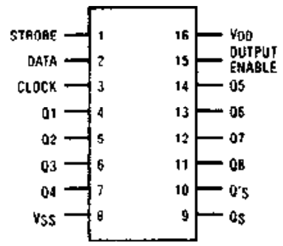
ECG4093B 14-Pin DIP See Fig. D6
ECG4093BT 14-Pin SOIC See Fig. D22
Quad 2-Input NAND Schmitt Trigger, V_{DD} = 3 V to 15 V



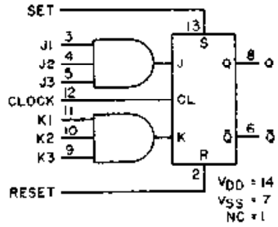
Package Outlines - See Page 1-367

CMOS (cont'd)

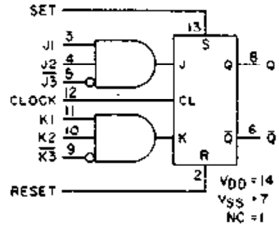
ECG4094B 16-Pin DIP See Fig. D8
ECG4094BT 16-Pin SOIC See Fig. D21
8-Stage Shift and Store Bus Register (3-State Output), V_{DD} = 3 V to 15 V



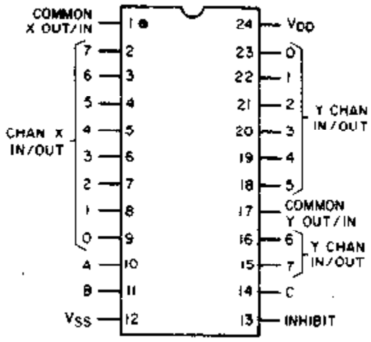
ECG4095B 14-Pin DIP See Fig. D6
J-K Flip-Flop with Non-Inverting J and K Inputs, V_{DD} = 3 V to 15 V



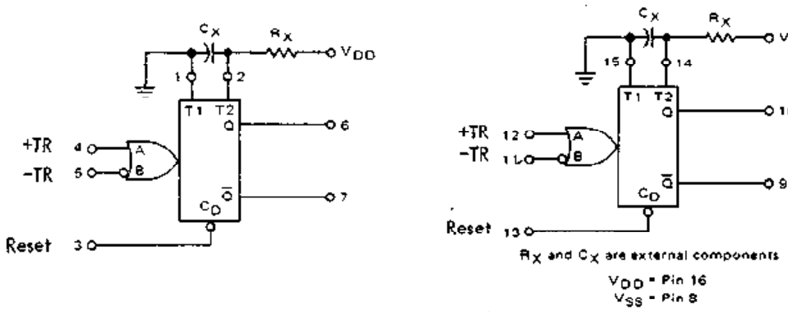
ECG4096B 14-Pin DIP See Fig. D6
J-K Flip-Flop with Inverting and Non-Inverting Inputs, V_{DD} = 3 V to 15 V



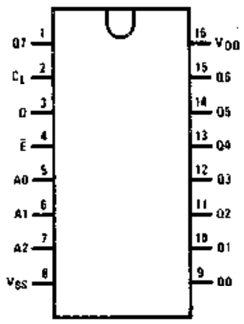
ECG4097B 24-Pin DIP See Fig. D15
Differential 8-Channel Multiplexer/Demultiplexer, V_{DD} = 3 V to 15 V



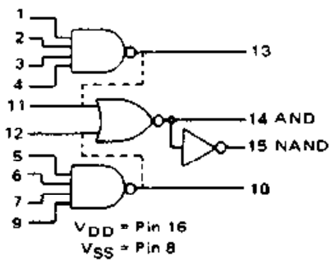
ECG4098B 16-Pin DIP See Fig. D8
Dual Monostable Multivibrator, V_{DD} = 3 V to 15 V



ECG4099B 16-Pin DIP See Fig. D8
8-Bit Addressable Latch, V_{DD} = 3 V to 15 V



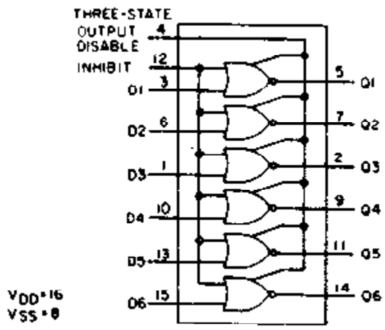
ECG4501 16-Pin DIP See Fig. D8
Multifunction Gate, V_{DD} = 3 V to 18 V



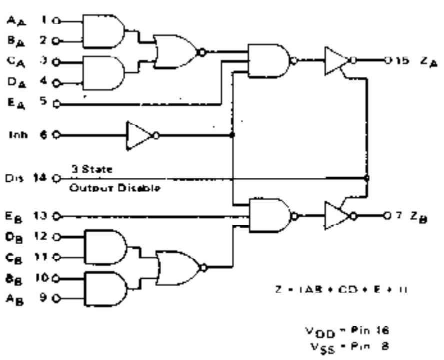
Use Dotted Connection Externally to Obtain 8-Input AND/NAND

Note. Pin 14 must not be used as an input to the inverter.

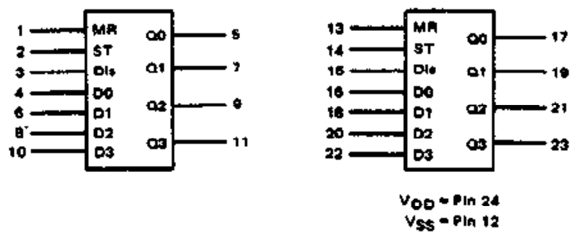
ECG4502B 16-Pin DIP See Fig. D8
Strobed Hex Inverter/Buffer, (3-State Output), V_{DD} = 3 V to 18 V



ECG4506B 16-Pin DIP See Fig. D8
Dual Expandable AND/OR/Invert (AOI) Gate, V_{DD} = 3 V to 18 V



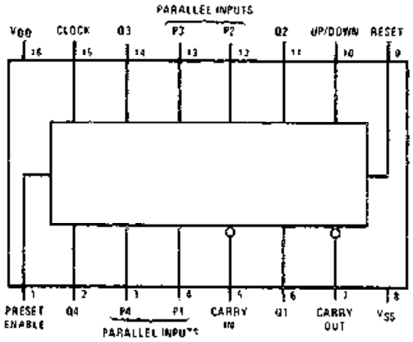
ECG4508B 24-Pin DIP See Fig. D14
Dual 4-Bit Latch, V_{DD} = 3 V to 18 V



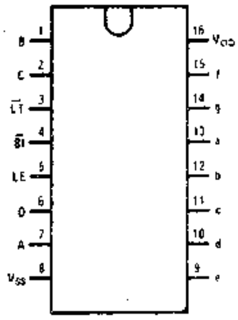
Package Outlines - See Page 1-367

CMOS (cont'd)

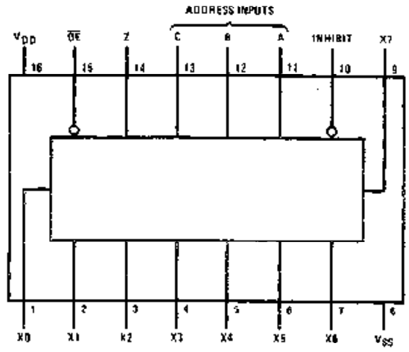
ECG4510B 16-Pin DIP See Fig. D8
ECG4510BT 16-Pin SOIC See Fig. D21
Presettable BCD Up/Down Counter, V_{DD} = 3 V to 15 V



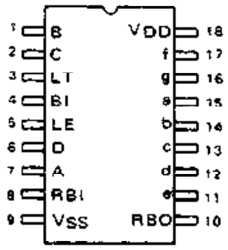
ECG4511B 16-Pin DIP See Fig. D8
ECG4511BT 16-Pin SOIC See Fig. D21
BCD-to-7 Segment Latch Decoder/Driver, V_{DD} = 3 V to 15 V



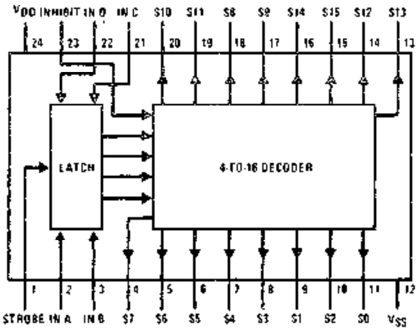
ECG4512B 16-Pin DIP See Fig. D8
8-Input Multiplexer with 3-State Outputs, V_{DD} = 3 V to 15 V



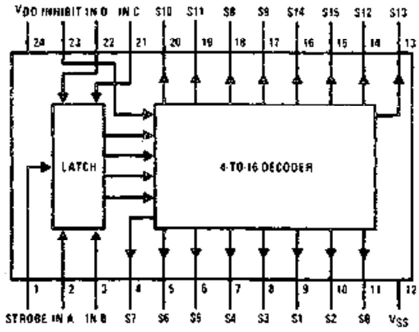
ECG4513B 18-Pin DIP See Fig. D11
BCD-to-7 Segment Latch/Decoder/Driver, V_{DD} = 3 V to 18 V



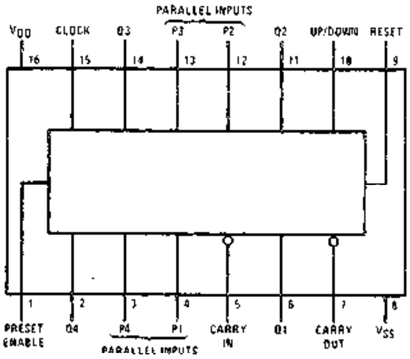
ECG4514B 24-Pin DIP See Fig. D15
4-Bit Latch/4-to-16 Line Decoder (Active High), V_{DD} = 3 V to 15 V



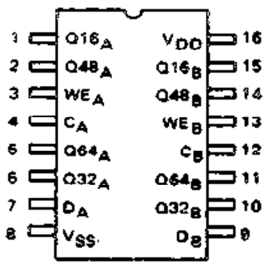
ECG4515B 24-Pin DIP See Fig. D15
4-Bit Latch/4-to-16 Line Decoder (Active Low), V_{DD} = 3 V to 15 V



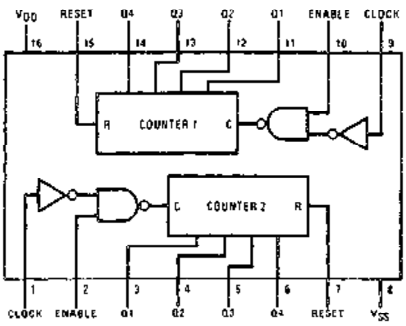
ECG4516B 16-Pin DIP See Fig. D8
Presettable Binary Up/Down Counter, V_{DD} = 3 V to 15 V



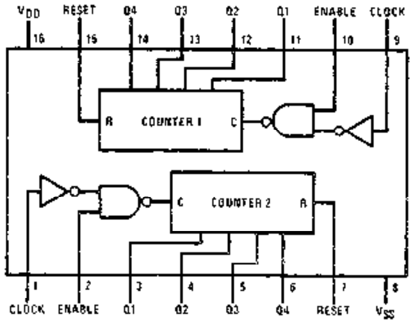
ECG4517B 16-Pin DIP See Fig. D8
Dual 64-Bit Static Shift Register, V_{DD} = 3 V to 18 V



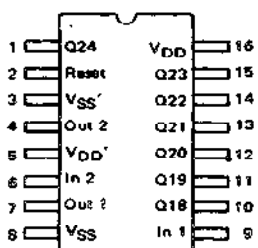
ECG4518B 16-Pin DIP See Fig. D8
ECG4518BT 16-Pin SOIC See Fig. D21
Dual BCD Up Counter, V_{DD} = 3 V to 15 V



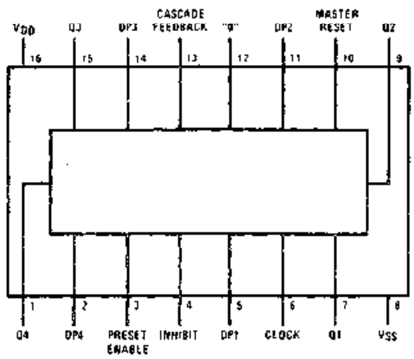
ECG4520B 16-Pin DIP See Fig. D8
ECG4520BT 16-Pin SOIC See Fig. D21
Dual Binary Up Counter, V_{DD} = 3 V to 15 V



ECG4521B 16-Pin DIP See Fig. D8
24-Stage Frequency Divider, V_{DD} = 3 V to 18 V



ECG4522B 16-Pin DIP See Fig. D8
BCD-Programmable Divide-by-"N", 4-Bit Counter, V_{DD} = 3 V to 18 V



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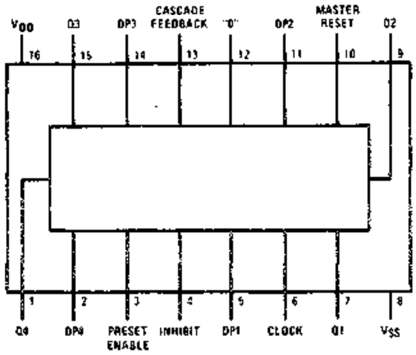
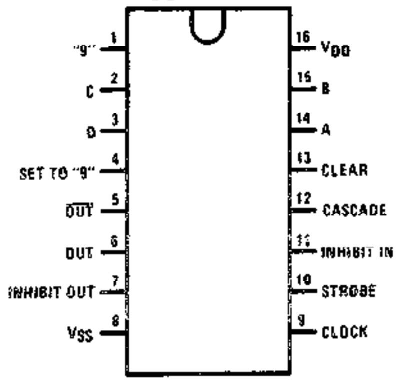
ECG4526B 16-Pin DIP See Fig. D8

Programmable Divide-by-"N", 4-Bit Counter (Binary), V_{DD} = 3 V to 18 V



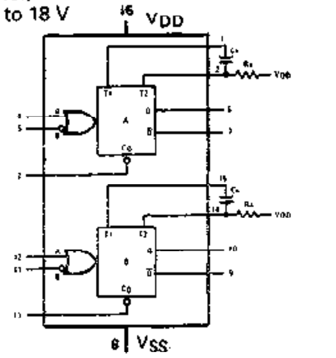
ECG4527B 16-Pin DIP See Fig. D8

BCD Multiplier, V_{DD} = 3 V to 15 V



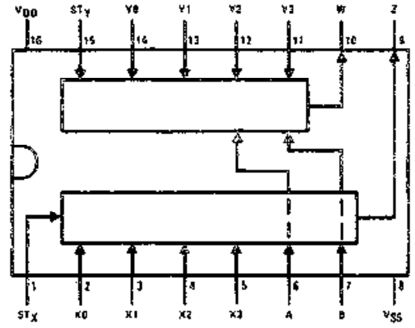
ECG4528B 16-Pin DIP See Fig. D8
ECG4528BT 16-Pin SOIC See Fig. D21

Dual Retriggerable/Resettable Monostable Multivibrator, V_{DD} = 3 V to 18 V



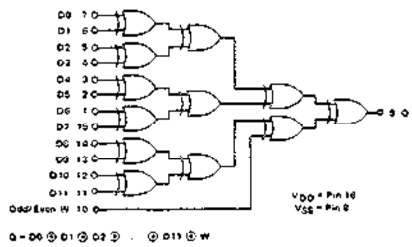
ECG4529B 16-Pin DIP See Fig. D8

Dual 4-Channel Analog Data Selector, V_{DD} = 3 V to 15 V



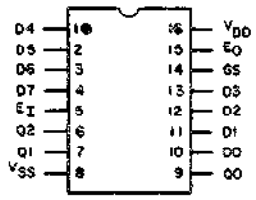
ECG4531B 16-Pin DIP See Fig. D8

12-Bit Parity Tree, V_{DD} = 3 V to 18 V



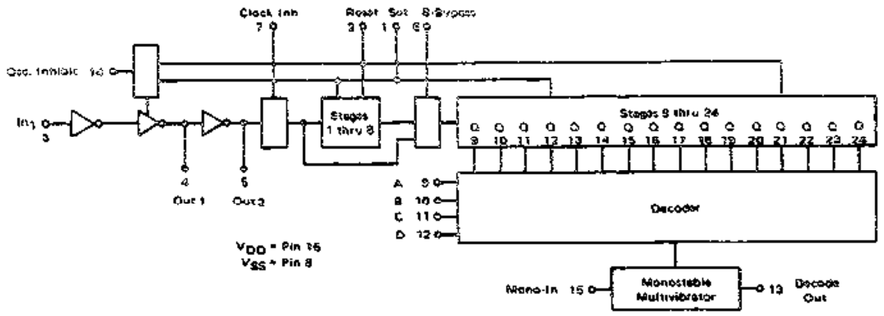
ECG4532B 16-Pin DIP See Fig. D8

8-Bit Priority Encoder, V_{DD} = 3 V to 18 V



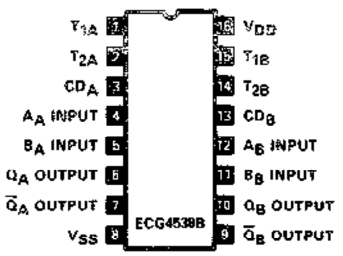
ECG4536B 16-Pin DIP See Fig. D8

Programmable Timer, V_{DD} = 3 V to 18 V



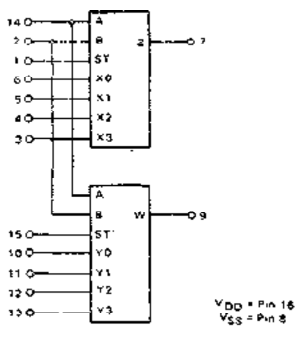
ECG4538B 16-Pin DIP See Fig. D8

Dual Precision Monostable, Multi, V_{DD} = 3 V to 15 V



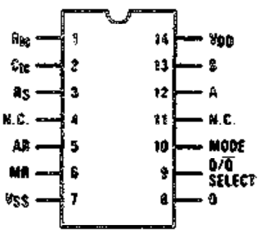
ECG4539B 16-Pin DIP See Fig. D8

Dual 4-Channel Digital Mixer, V_{DD} = 3 V to 18 V



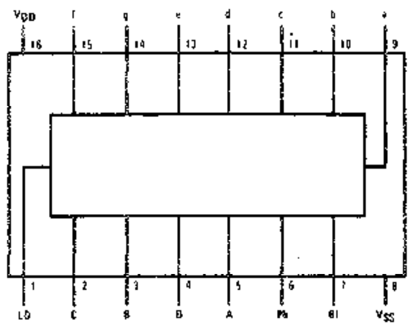
ECG4541B 14-Pin DIP See Fig. D6
ECG4541BT 14-Pin SOIC See Fig. D22

Oscillator/Timer, V_{DD} = 3 V to 15 V



ECG4543B 16-Pin DIP See Fig. D8

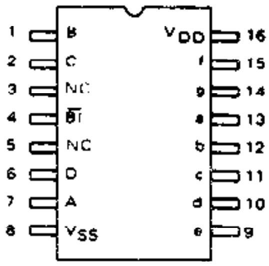
BCD-to-7 Segment Latch Decoder/Driver for LCD, V_{DD} = 3 V to 18 V



Package Outlines - See Page 1-367

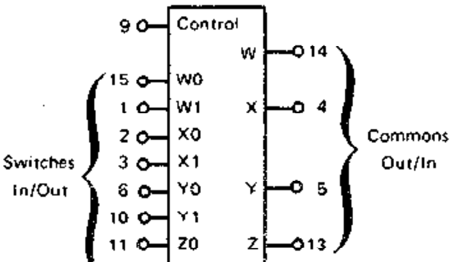
ECG4547B 16-Pin DIP See Fig. D8

BCD-to-7 Segment Decoder/Latch/Driver, V_{DD} = 3 V to 18 V



ECG4551B 16-Pin DIP See Fig. D8

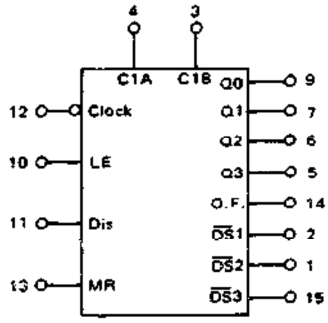
Quad Analog Multiplexer/Demultiplexer, V_{DD} = 3 V to 18 V



V_{DD} = Pin 16
V_{SS} = Pin 8

ECG4553B 16-Pin DIP See Fig. D8

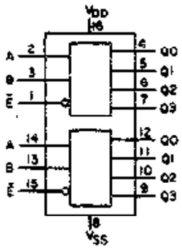
3-Digit BCD Counter, V_{DD} = 3 V to 18 V



V_{DD} = Pin 16
V_{SS} = Pin 8

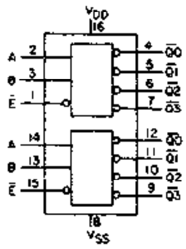
ECG4555B 16-Pin DIP See Fig. D8

Dual Binary to 1-of-4 Decoder/Demultiplexer (High-on-Select), V_{DD} = 3 V to 18 V



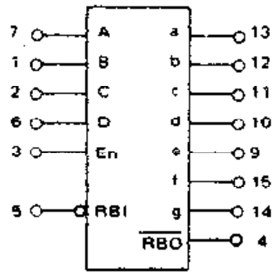
ECG4556B 16-Pin DIP See Fig. D8

Dual Binary to 1-of-4 Decoder/Demultiplexer (Low-on-Select), V_{DD} = 3 V to 18 V



ECG4558B 16-Pin DIP See Fig. D8

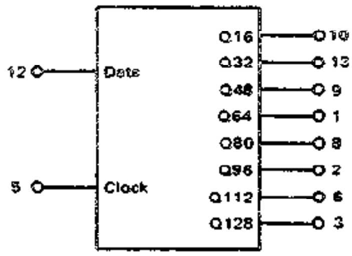
BCD-to-7 Segment Decoder, V_{DD} = 3 V to 18 V



V_{DD} = Pin 16
V_{SS} = Pin 8

ECG4562B 14-Pin DIP See Fig. D6

128-Bit Static Shift Register, V_{DD} = 3 V to 18 V

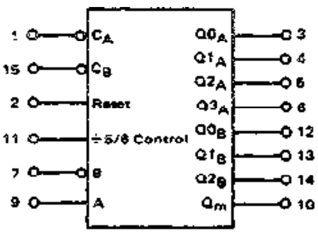


Pins 4 and 11 not used.

V_{DD} = Pin 14
V_{SS} = Pin 7

ECG4566B 16-Pin DIP See Fig. D8

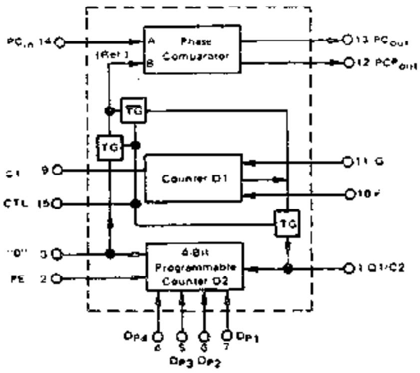
Industrial Time Base Generator, V_{DD} = 3 V to 18 V



V_{DD} = Pin 16
V_{SS} = Pin 8

ECG4568B 16-Pin DIP See Fig. D8

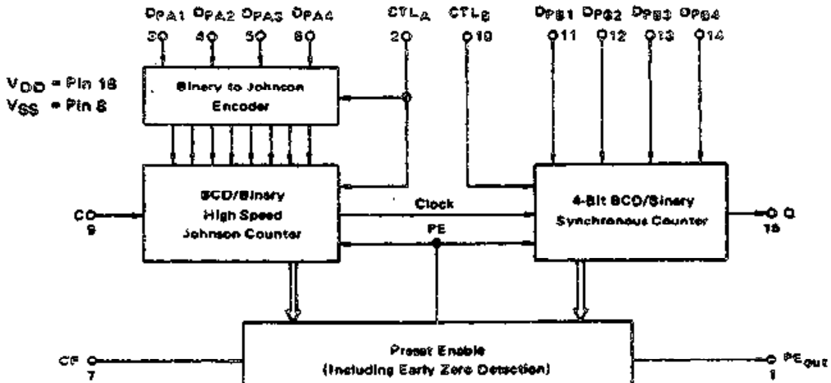
Phase Comparator and Programmable Counter, V_{DD} = 3 V to 18 V



V_{DD} = Pin 16
V_{SS} = Pin 8

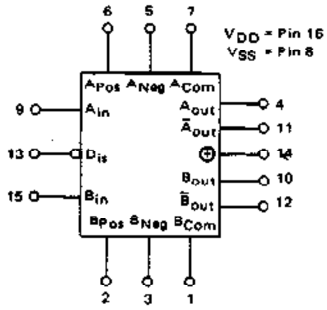
ECG4569B 16-Pin DIP See Fig. D8

Programmable Divide-by-"N" Dual 4-Bit BCD/Binary Counter, V_{DD} = 3 V to 18 V

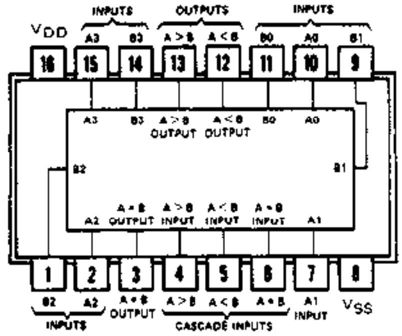


Package Outlines - See Page 1-367

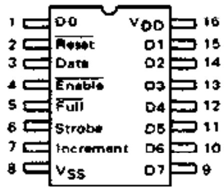
ECG4583B 16-Pin DIP See Fig. D8
Dual Schmitt Trigger, V_{DD}=3 V to 18 V



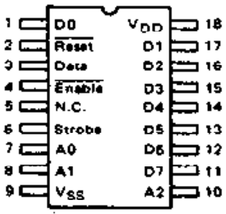
ECG4585B 16-Pin DIP See Fig. D8
4-Bit Magnitude Comparator,
V_{DD}=3 V to 18 V



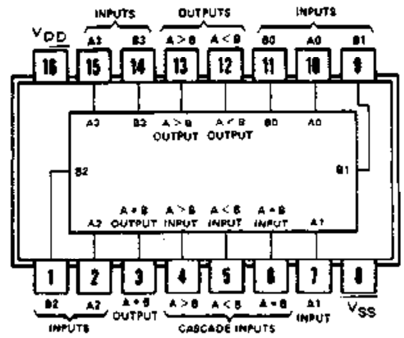
ECG4597B 16-Pin DIP See Fig. D8
8-Bit 3-State Bus Compatible Latches with Internal Counter, V_{DD}=3 V to 18 V



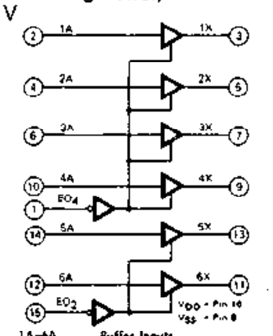
ECG4598B 18-Pin DIP See Fig. D11
8-Bit 3-State Bus Compatible Latches with Binary Address, V_{DD}=3 V to 18 V



ECG40085B 16-Pin DIP See Fig. D8
4-Bit Magnitude Comparator,
V_{DD}=3 V to 15 V

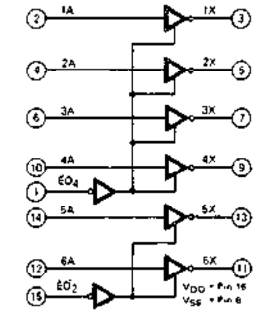


ECG40097B 16-Pin DIP See Fig. D8
ECG40097BT* 16-Pin SOIC See Fig. D21
Hex 3-State Non-Inverting Buffer,
V_{DD} = 3 V to 15 V

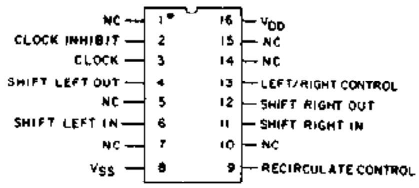


*DISCONTINUED

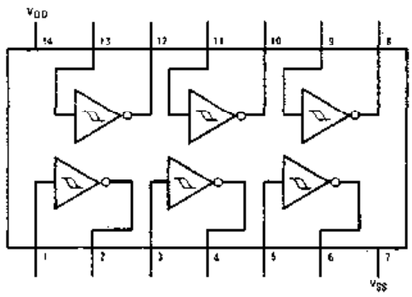
ECG40098B 16-Pin DIP See Fig. D8
Hex 3-State Inverting Buffer,
V_{DD}=3 V to 15 V



ECG40100B 16-Pin DIP See Fig. D8
32-Stage Static Left/Right Shift Register,
V_{DD}=3 V to 18 V

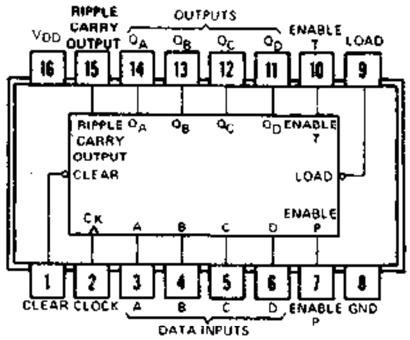


ECG40106B 14-Pin DIP See Fig. D6
ECG40106BT* 14-Pin SOIC See Fig. D22
Hex Schmitt Trigger, V_{DD} = 3 V to 15 V

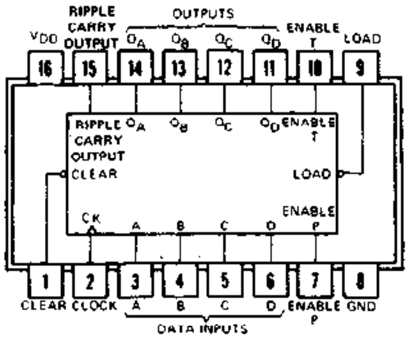


*DISCONTINUED

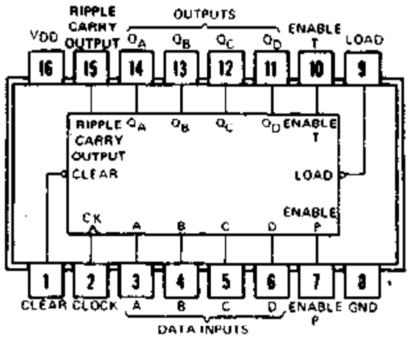
ECG40160B 16-Pin DIP See Fig. D8
4-Bit Decade Asynchronous Reset Counter,
V_{DD}=3 V to 15 V



ECG40161B 16-Pin DIP See Fig. D8
4-Bit Binary Asynchronous Reset Counter,
V_{DD}=3 V to 15 V



ECG40162B 16-Pin DIP See Fig. D8
4-Bit Decade Synchronous Reset Counter,
V_{DD}=3 V to 15 V



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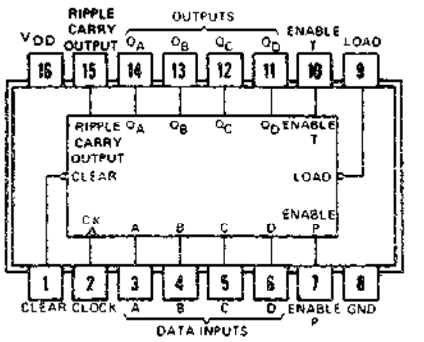
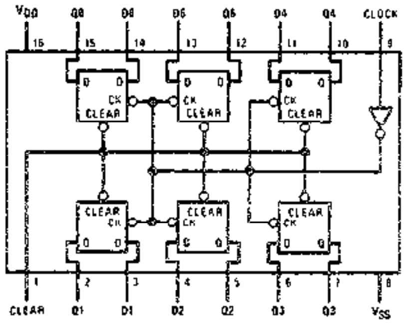
ECG40163B 16-Pin DIP See Fig. D8

4-Bit Binary Synchronous Reset Counter, V_{DD} = 3 V to 15 V



ECG40174B 16-Pin DIP See Fig. D8
ECG40174BT* 16-Pin SOIC See Fig. D21

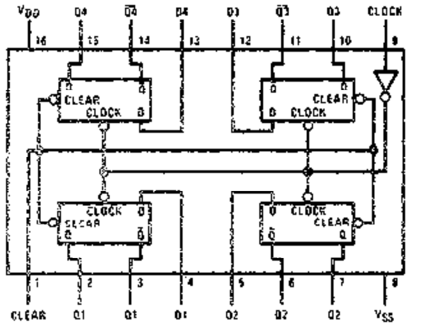
Hex "D" Flip-Flop, V_{DD} = 3 V to 15 V



*DISCONTINUED

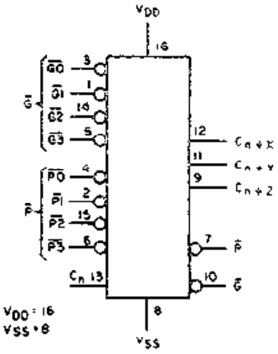
ECG40175B 16-Pin DIP See Fig. D8

Quad "D" Flip-Flop, V_{DD} = 3 V to 15 V



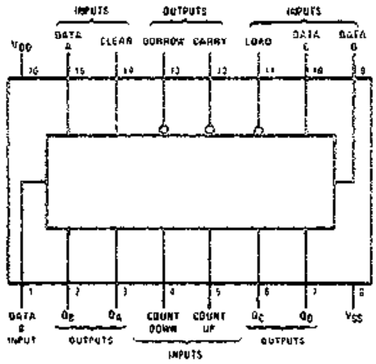
ECG40182B 16-Pin DIP See Fig. D8

Look-Ahead Carry Generator, V_{DD} = 3 V to 18 V



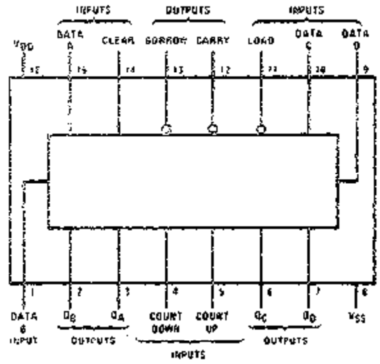
ECG40192B 16-Pin DIP See Fig. D8

4-Bit Up/Down Synchronous Decade Counter, V_{DD} = 3 V to 15 V



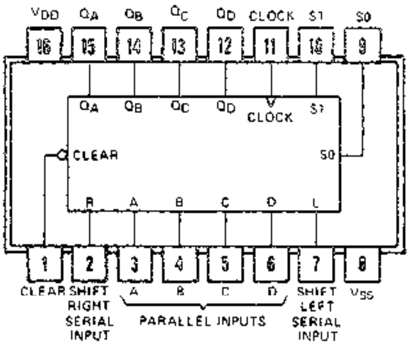
ECG40193B 16-Pin DIP See Fig. D8

4-Bit Up/Down Synchronous Binary Counter, V_{DD} = 3 V to 15 V



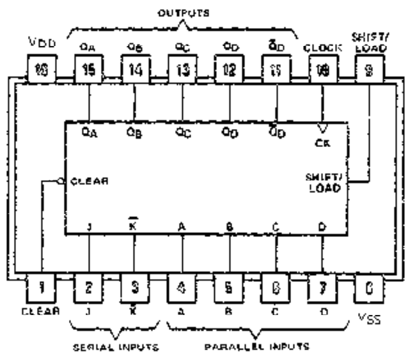
ECG40194B 16-Pin DIP See Fig. D8

4-Bit Right/Left Shift Register, V_{DD} = 3 V to 15 V



ECG40195B 16-Pin DIP See Fig. D8

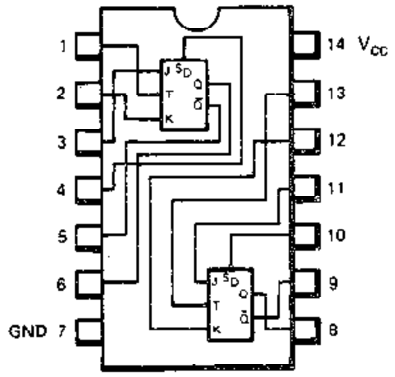
4-Bit Shift Register, V_{DD} = 3 V to 15 V



Package Outlines - See Page 1-367

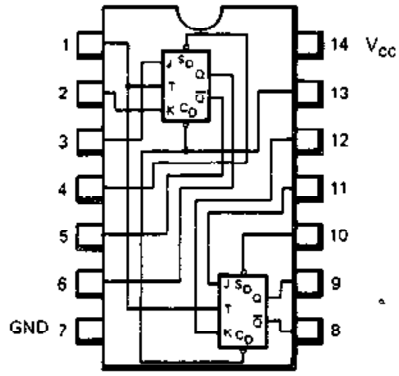
DTL Diode-Transistor Logic

ECG9093 14-Pin DIP See Fig. D6
Dual M/S J-K Flip-Flop (5 MHz)
ECG9094
Dual M/S J-K Flip-Flop (8 MHz)



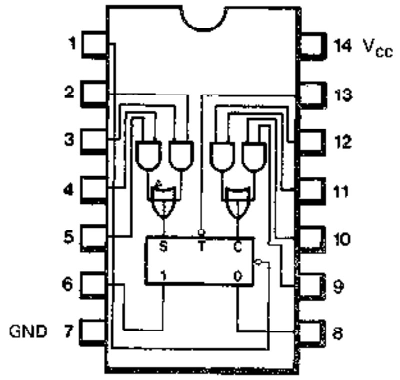
V_{CC} = +5 V (Nom.)

ECG9097 14-Pin DIP See Fig. D6
Dual M/S J-K Flip-Flop (8 MHz)
ECG9099
Dual M/S J-K Flip-Flop (5 MHz)



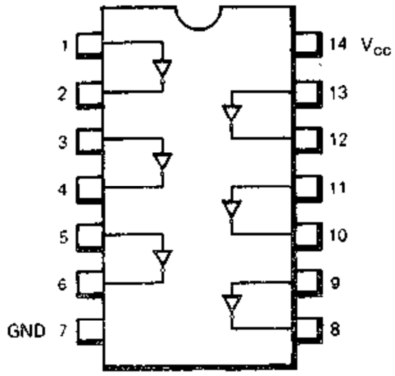
V_{CC} = +5 V (Nom.)

ECG9111 14-Pin DIP See Fig. D6
RS Flip-Flop



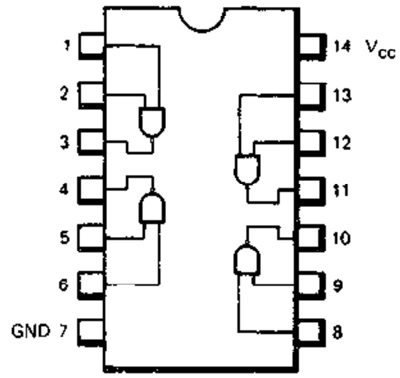
V_{CC} = +5 V (Nom.)

ECG9135 14-Pin DIP See Fig. D6
Hex Inverter (Open Collector)



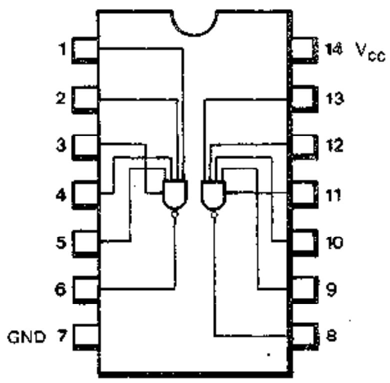
V_{CC} = +5 V (Nom.)

ECG9157 14-Pin DIP See Fig. D6
Quad 2-Input Buffered NAND Gate
ECG9158
Quad 2-Input Power NAND Gate



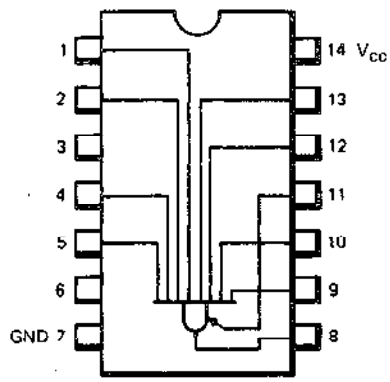
V_{CC} = +5 V (Nom.)

ECG9800 14-Pin DIP See Fig. D6
Dual 5-Input NAND Gate (6 Kohm-Pullup)
ECG9801
Dual 5-Input NAND Gate (2 Kohm-Pullup)



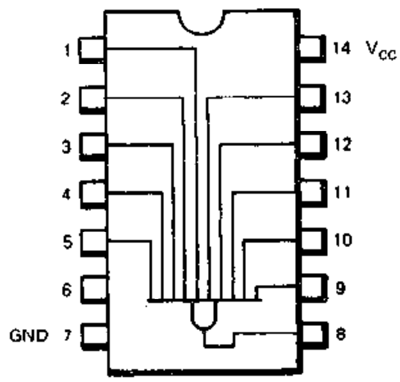
V_{CC} = +5 V (Nom.)

ECG9802 14-Pin DIP See Fig. D6
8-Input NAND Gate (6 Kohm-Pullup)
ECG9803
8-Input NAND Gate (2 Kohm-Pullup)



V_{CC} = +5 V (Nom.)

ECG9804 14-Pin DIP See Fig. D6
10-Input NAND Gate (6 Kohm-Pullup)
ECG9805
10-Input NAND Gate (2 Kohm-Pullup)



V_{CC} = +5 V (Nom.)

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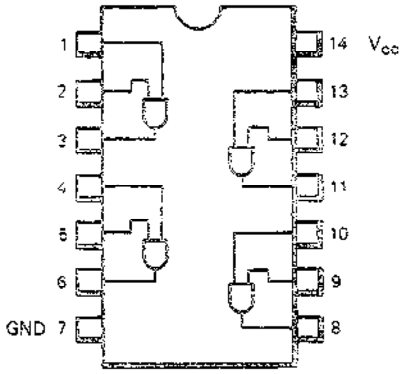
DTL (cont'd)

ECG9806* 14-Pin DIP See Fig. D6
Quad 2-Input AND Gate (6 Kohm-Pullup)

ECG9807
Quad 2-Input AND Gate (2 Kohm-Pullup)

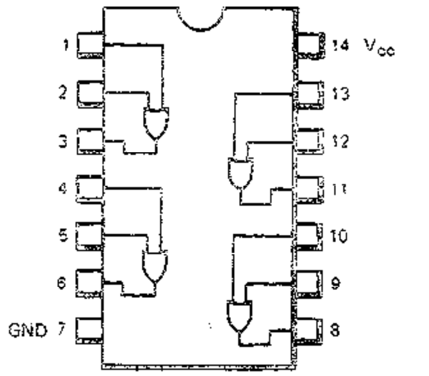


V_{CC} = +5 V (Nom.)

*DISCONTINUED

ECG9808 14-Pin DIP See Fig. D6
Quad 2-Input OR Gate (6 Kohm-Pullup)

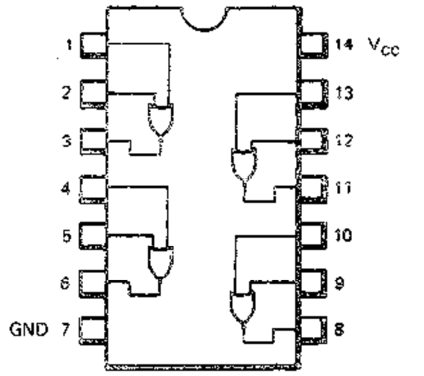
ECG9809
Quad 2-Input OR Gate (2 Kohm-Pullup)



V_{CC} = +5 V (Nom.)

ECG9810* 14-Pin DIP See Fig. D6
Quad 2-Input NOR Gate (6 Kohm-Pullup)

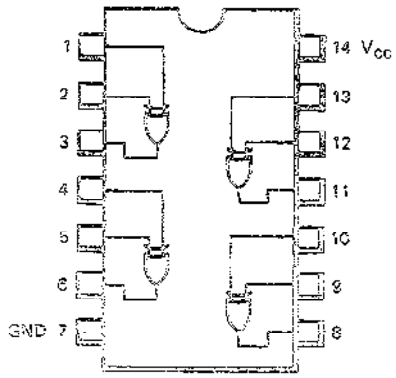
ECG9811
Quad 2-Input NOR Gate (2 Kohm-Pullup)



V_{CC} = +5 V (Nom.)

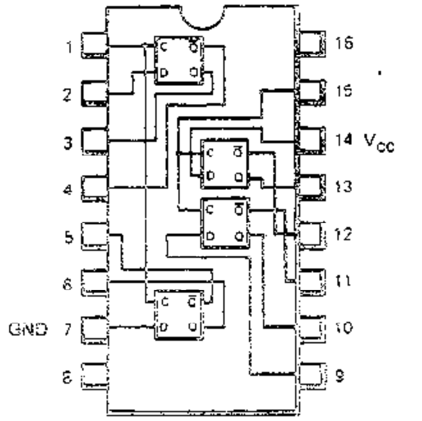
*DISCONTINUED

ECG9812 14-Pin DIP See Fig. D6
Quad 2-Input Exclusive OR Gate



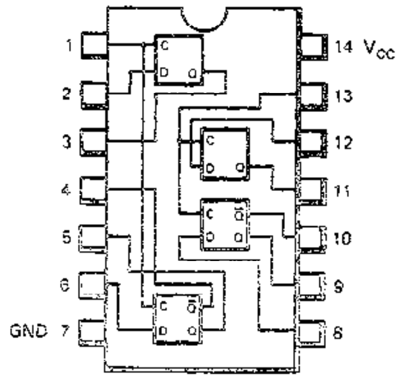
V_{CC} = +5 V (Nom.)

ECG9813 16-Pin DIP See Fig. D8
Quad Latch with Complementary Outputs



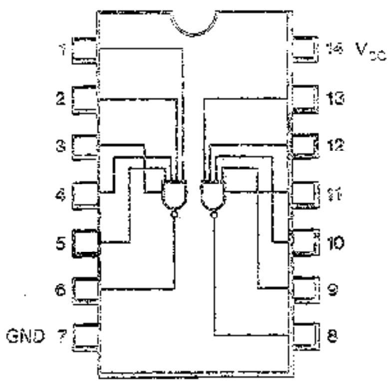
V_{CC} = +5 V (Nom.)

ECG9814 14-Pin DIP See Fig. D6
Quad Latch



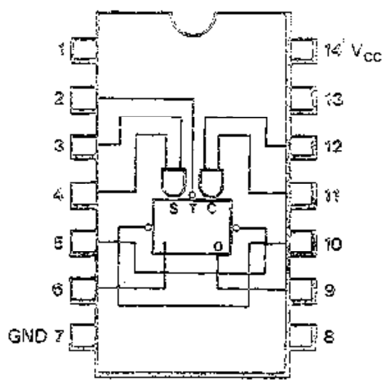
V_{CC} = +5 V (Nom.)

ECG9930 14-Pin DIP See Fig. D6
Dual 4-Input Extendable NAND Gate



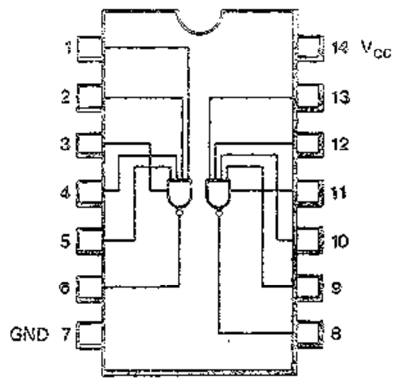
V_{CC} = +5 V (Nom.)

ECG9931 14-Pin DIP See Fig. D6
RS Clocked Flip-Flop



V_{CC} = +5 V (Nom.)

ECG9932 14-Pin DIP See Fig. D6
Dual 4-Input Extendable NAND Buffer Gate



V_{CC} = +5 V (Nom.)

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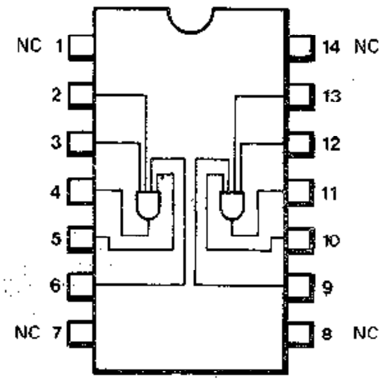
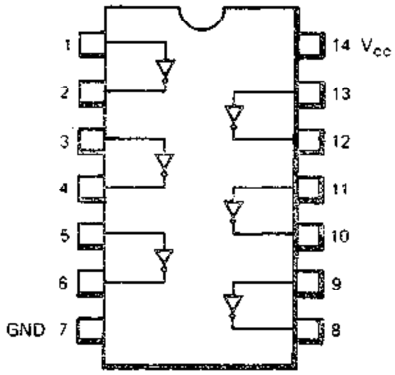
ECG9933 14-Pin DIP See Fig. D6
Dual 4-Input Extender

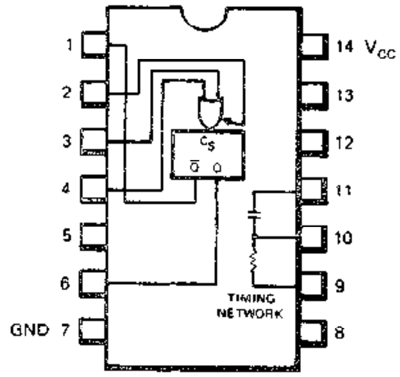


ECG9935 14-Pin DIP See Fig. D6
Extendable Hex Inverter
ECG9936, ECG9937
Hex Inverters



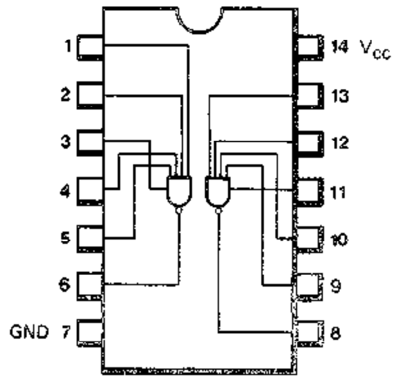
V_{CC} = +5 V (Nom.)

ECG9941 14-Pin DIP See Fig. D6
Monostable Multivibrator (Input Clamp Diodes)



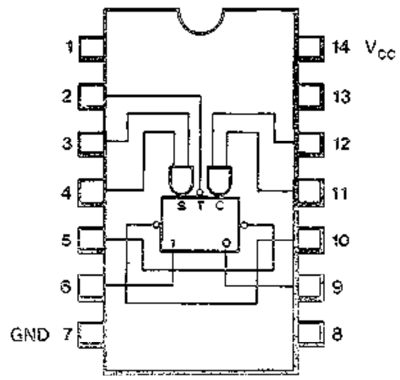
V_{CC} = +5 V (Nom.)

ECG9944 14-Pin DIP See Fig. D6
Dual 4-Input Extendable NAND Buffer Gate (Open Collector)



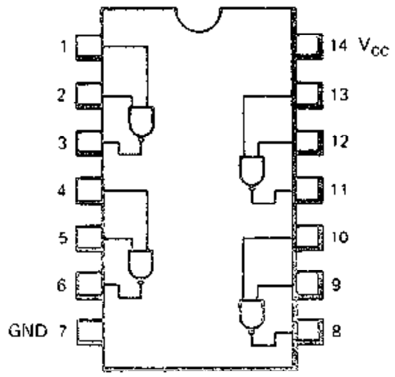
V_{CC} = +5 V (Nom.)

ECG9945 14-Pin DIP See Fig. D6
RS Clocked Flip-Flop



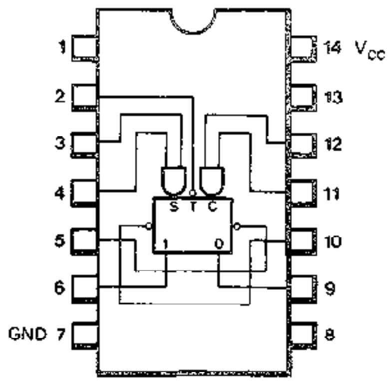
V_{CC} = +5 V (Nom.)

ECG9946 14-Pin DIP See Fig. D6
Quad 2-Input NAND Gate



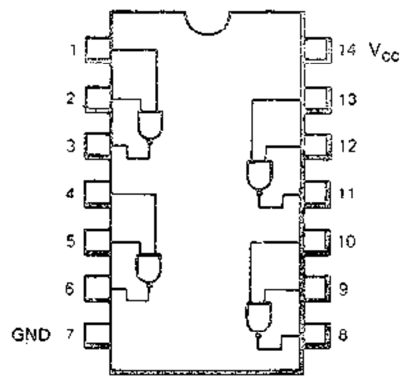
V_{CC} = +5 V (Nom.)

ECG9948 14-Pin DIP See Fig. D6
RS Clocked Flip-Flop (Fast)



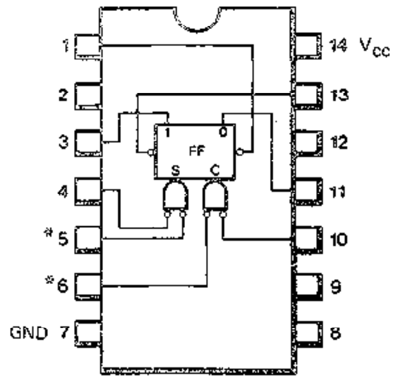
V_{CC} = +5 V (Nom.)

ECG9949 14-Pin DIP See Fig. D6
Quad 2-Input NAND Gate (Fast)



V_{CC} = +5 V (Nom.)

ECG9950 14-Pin DIP See Fig. D6
A-C Coupled RS Flip-Flop



V_{CC} = +5 V (Nom.)
* These inputs are capacitively coupled.

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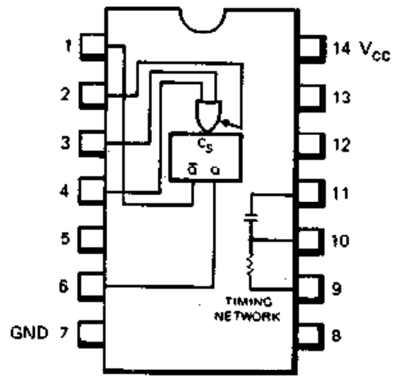
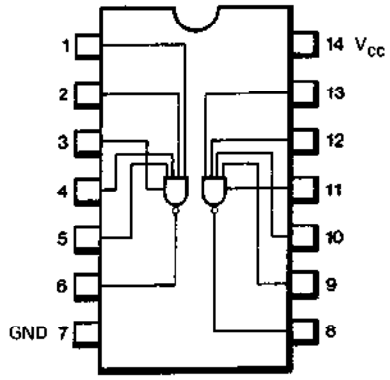
ECG9951 14-Pin DIP See Fig. D6
Monostable Multivibrator



V_{CC} = +5 V (Nom.)

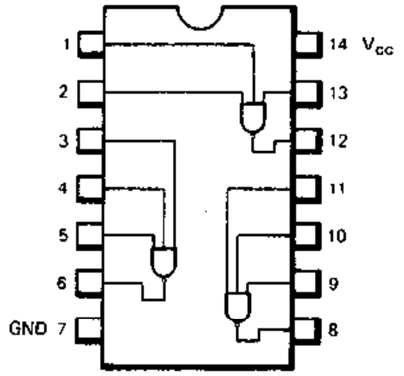
ECG9961 14-Pin DIP See Fig. D6
Dual 4-Input Extendable NAND Gate (Fast)



V_{CC} = +5 V (Nom.)

ECG9962 14-Pin DIP See Fig. D6
Triple 3-Input NAND Gate

ECG9963
Triple 3-Input NAND Gate (Fast)



V_{CC} = +5 V (Nom.)

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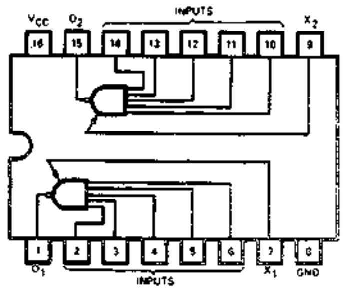
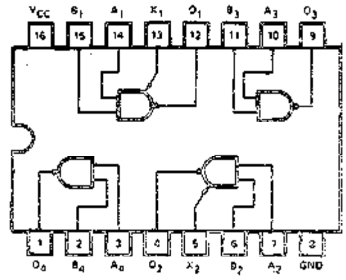
ECG9301 16-Pin DIP See Fig. D8

Dual 5-Input Power NAND Gate (Active Pull-Up), $V_{CC} = +15$ V (Nom.)



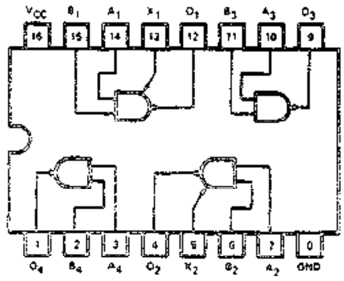
ECG9302 16-Pin DIP See Fig. D8

Quad 2-Input NAND Buffer Gate (Open Collector), $V_{CC} = +15$ V (Nom.)



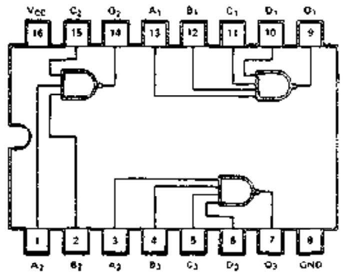
ECG9303 16-Pin DIP See Fig. D8

Quad 2-Input NAND Buffer Gate (Passive Pull-Up), $V_{CC} = +15$ V (Nom.)



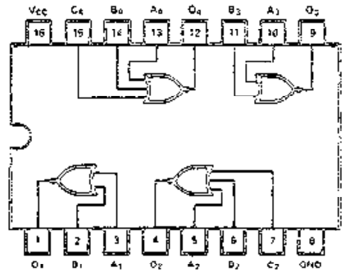
ECG9304 16-Pin DIP See Fig. D8

Triple 4,3,4 Input NAND Gate (Passive Pull-Up), $V_{CC} = +15$ V (Nom.)



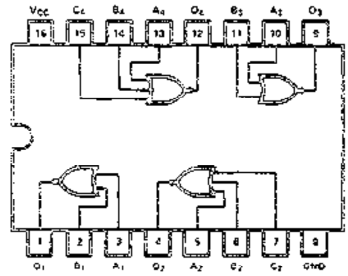
ECG9306 16-Pin DIP See Fig. D8

2,2,3,3 Input NOR Gate (Active Pull-Up), $V_{CC} = +15$ V (Nom.)



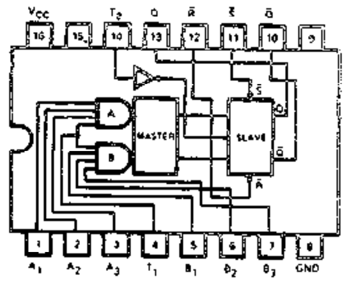
ECG9307 16-Pin DIP See Fig. D8

2,2,3,3 Input NOR Gate (Open Collector), $V_{CC} = +15$ V (Nom.)



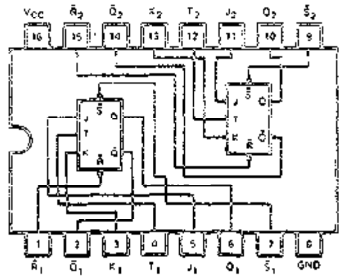
ECG9311 16-Pin DIP See Fig. D8

Master/Slave Flip-Flop (Active Pull-Up), $V_{CC} = +15$ V (Nom.)



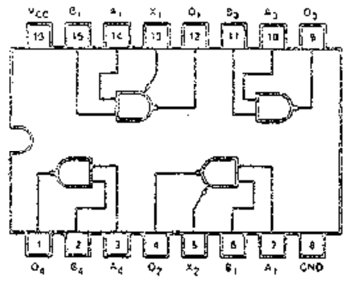
ECG9312 16-Pin DIP See Fig. D8

Dual J-K Flip-Flop (Active Pull-Up), $V_{CC} = +15$ V (Nom.)



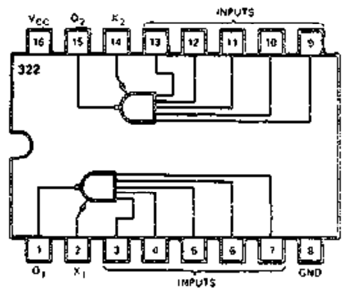
ECG9321 16-Pin DIP See Fig. D8

Qual 2-Input NAND Gate (Active Pull-Up), $V_{CC} = +15$ V (Nom.)



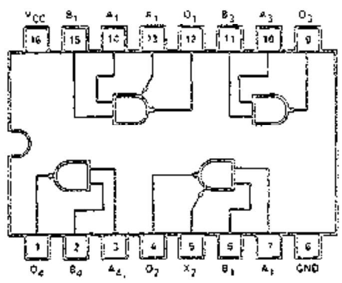
ECG9322 16-Pin DIP See Fig. D8

Dual 5-Input NAND Gate (Active Pull-Up), $V_{CC} = +15$ V (Nom.)



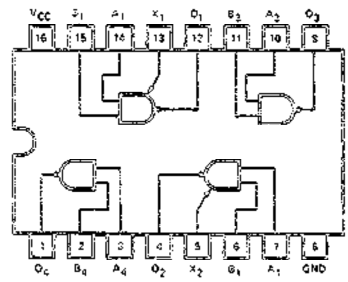
ECG9323 16-Pin DIP See Fig. D8

Quad 2-Input NAND Gate (Open Collector), $V_{CC} = +15$ V (Nom.)



ECG9324 16-Pin DIP See Fig. D8

Quad 2-Input NAND Gate (Passive Pull-Up), $V_{CC} = +15$ V (Nom.)



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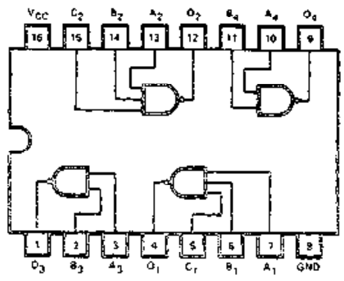
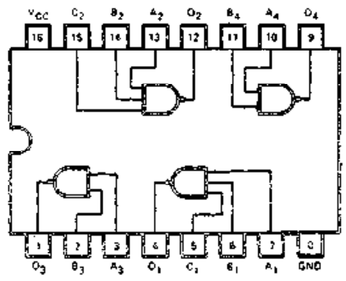
HLL Circuits (cont'd)

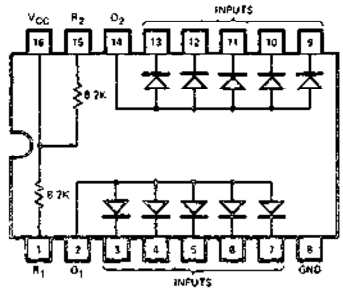
ECG9325 16-Pin DIP See Fig. D8
2,2,3,3, Input NAND Gate (Active Pull-Up), V_{CC} = + 15 V (Nom.)



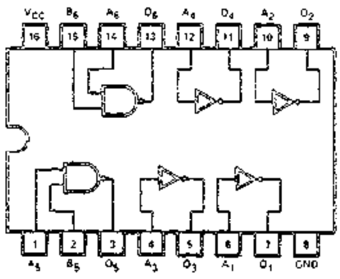
ECG9326 16-Pin DIP See Fig. D8
2,2,3,3, Input NAND Gate (Passive Pull-Up), V_{CC} = + 15 V (Nom.)



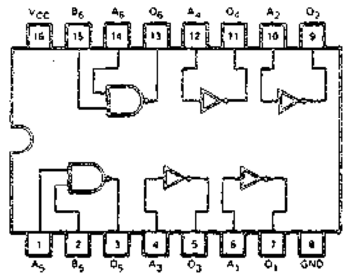
ECG9331 16-Pin DIP See Fig. D8
Dual 5-Input Gate Expander, V_{CC} = + 15 V (Nom.)



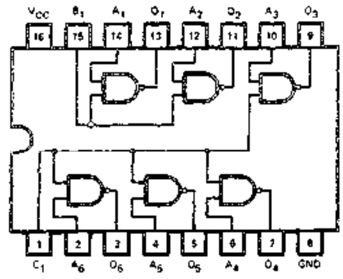
ECG9332 16-Pin DIP See Fig. D8
Hex Inverter Gate (Open Collector), V_{CC} = + 15 V (Nom.)



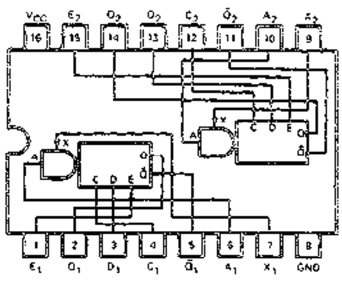
ECG9333 16-Pin DIP See Fig. D8
Hex Inverter Gate (Passive Pull-Up), V_{CC} = + 15 V (Nom.)



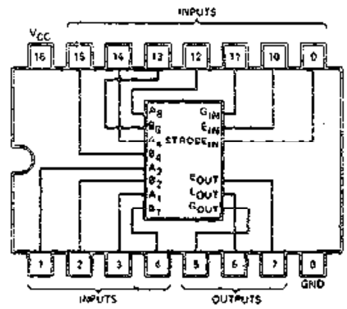
ECG9335 16-Pin DIP See Fig. D8
Strobed Hex Inverter Gate (Passive Pull-Up), V_{CC} = + 15 V (Nom.)



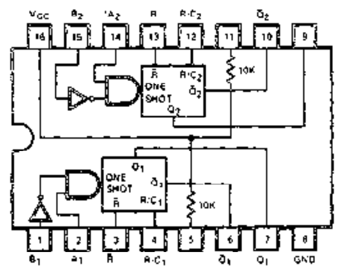
ECG9342 16-Pin DIP See Fig. D8
Dual Monostable Multivibrator (Active Pull-Up), V_{CC} = + 15 V (Nom.)



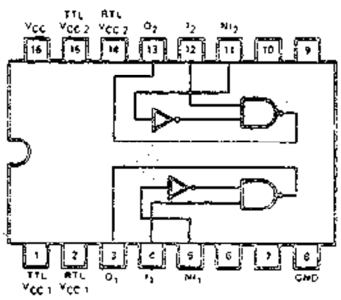
ECG9343 16-Pin DIP See Fig. D8
Four Bit Comparator (Active Pull-Up), V_{CC} = + 15 V (Nom.)



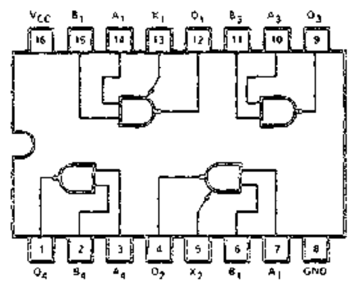
ECG9347 16-Pin DIP See Fig. D8
Dual Retriggerable Monostable Multivibrator (Active Pull-Up), V_{CC} = + 15 V (Nom.)



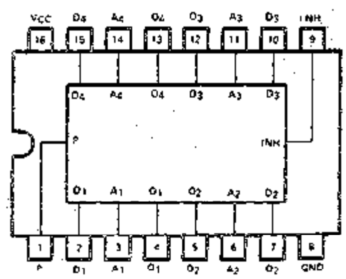
ECG9361 16-Pin DIP See Fig. D8
Dual Input Interface (Passive Pull-Up), V_{CC} = + 15 V (Nom.)



ECG9363 16-Pin DIP See Fig. D8
Quad Output Interface (Passive Pull-Up), V_{CC} = + 15 V (Nom.)



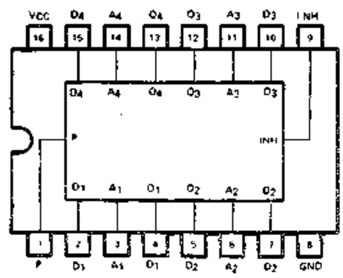
ECG9367 16-Pin DIP See Fig. D8
Quad Schmitt Trigger (Active Pull-Up), V_{CC} = + 15 V (Nom.)



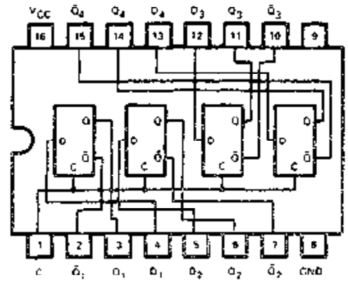
Package Outlines - See Page 1-367

HLL Circuits (cont'd)

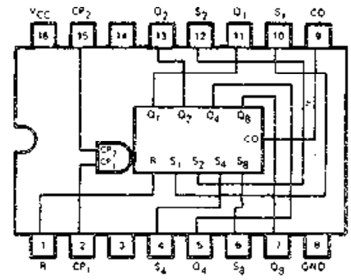
ECG9368 16-Pin DIP See Fig. D8
Quad Schmitt Trigger (Open Collector),
V_{CC} = + 15 V (Nom.)



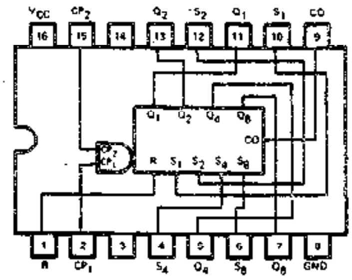
ECG9370 16-Pin DIP See Fig. D8
Quad D Flip-Flop (Passive Pull-Up),
V_{CC} = + 15 V (Nom.)



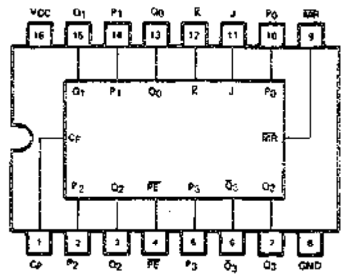
ECG9371 16-Pin DIP See Fig. D8
Decade Counter (Passive Pull-Up),
V_{CC} = + 15 V (Nom.)



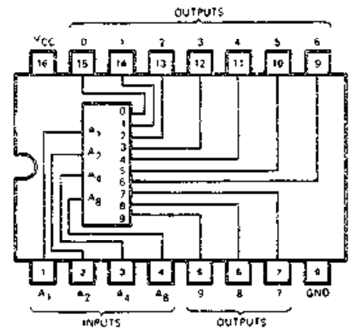
ECG9372 16-Pin DIP See Fig. D8
Hexadecimal Counter (Passive Pull-Up),
V_{CC} = + 15 V (Nom.)



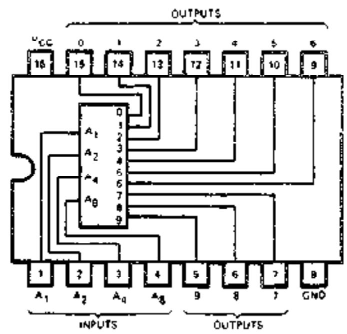
ECG9375 16-Pin DIP See Fig. D8
Four Bit Shift Register (Active Pull-Up),
V_{CC} = + 15 V (Nom.)



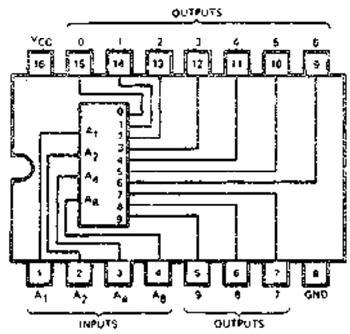
ECG9380 16-Pin DIP See Fig. D8
BCD-to-Decade Decoder/Lamp Driver (Open Collector), V_{CC} = + 15 V (Nom.)



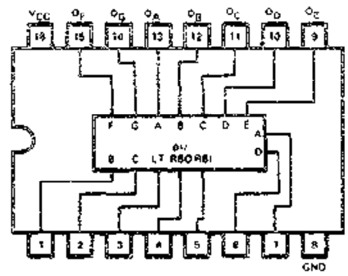
ECG9381 16-Pin DIP See Fig. D8
BCD-to-Decade Decoder/Logic Driver (Open Collector), V_{CC} = + 15 V (Nom.)



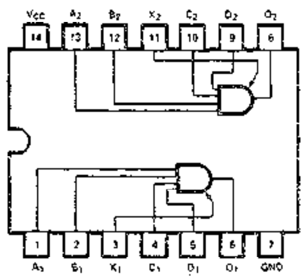
ECG9382 16-Pin DIP See Fig. D8
BCD-to-Decade Decoder/Gas Discharge (Open Collector) Tube Driver,
V_{CC} = + 15 V (Nom.)



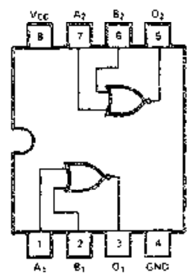
ECG9383 16-Pin DIP See Fig. D8
BCD-to-Seven Segment Decoder/Driver, (Open Collector), V_{CC} = + 15 V (Nom.)



ECG9390 14-Pin DIP See Fig. D6
Dual 4-Input AND Interface Buffer,
V_{CC} = + 15 V (Nom.)

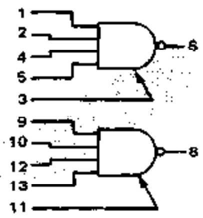


ECG9394 8-Pin DIP See Fig. D4
Dual 2-Input NOR Interface Buffer,
V_{CC} = + 15 V (Nom.)



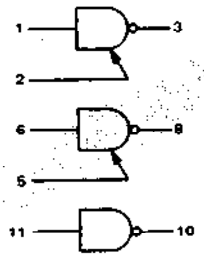
Package Outlines - See Page 1-367

ECG9661 14-Pin DIP See Fig. D6
Expandable 4-Input NAND Gate (Passive Pull-Up), V_{CC} = +15 V (Nom.)



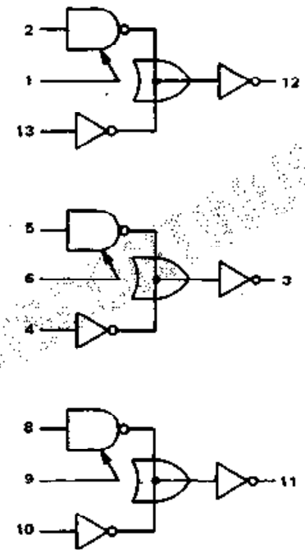
V_{CC} = Pin 14, GND = Pin 7

ECG9665 14-Pin DIP See Fig. D6
Triple Level Translator tp = 40 ns Typ, V_{CC} = +15 V (Nom.)



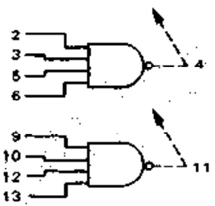
V_{CC} = Pin 14, GND = Pin 7

ECG9666 14-Pin DIP See Fig. D6
Triple Level Translator tp = 75 ns Typ, V_{CC} = +15 V (Nom.)



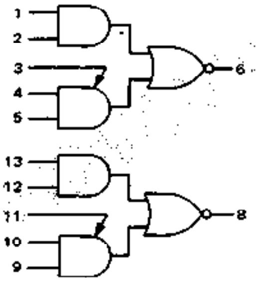
V_{CC} = Pin 14, GND = Pin 7

ECG9669 14-Pin DIP See Fig. D6
Dual 4-Input Expander, V_{CC} = +15 V (Nom.)



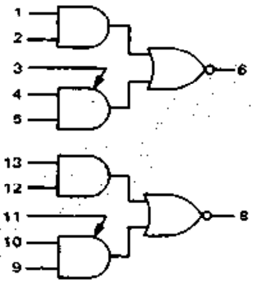
V_{CC} = Pin 14, GND = Pin 7

ECG9673 14-Pin DIP See Fig. D6
Dual-Input AND/OR/Invert Gate (Active Pull-Up), V_{CC} = +15 V (Nom.)



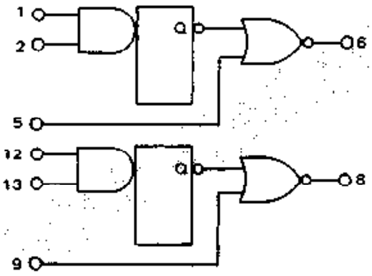
V_{CC} = Pin 14, GND = Pin 7

ECG9674 14-Pin DIP See Fig. D6
Dual 2-Input AND/OR/Invert Gate (Passive Pull-Up), V_{CC} = +15 V (Nom.)



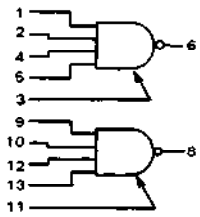
V_{CC} = Pin 14, GND = Pin 7

ECG9675 14-Pin DIP See Fig. D6
Dual Pulse Stretcher, V_{CC} = +15 V (Nom.)

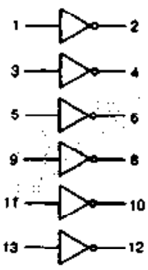


V_{CC} = Pin 14, GND = Pin 7

ECG9679 14-Pin DIP See Fig. D6
Dual Lamp/Line Driver, V_{CC} = +15 V (Nom.)

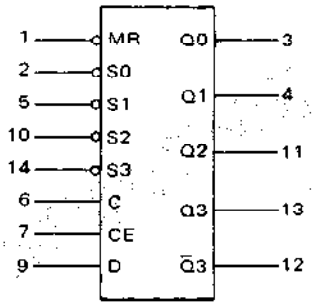


ECG9681 14-Pin DIP See Fig. D6
Hex Inverter (Open Collector), V_{CC} = +15 V (Nom.)



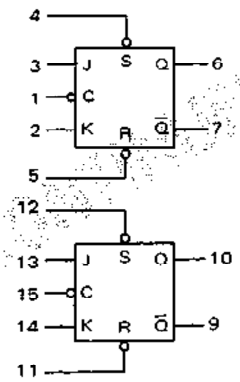
V_{CC} = Pin 14, GND = Pin 7

ECG9686 16-Pin DIP See Fig. D8
4-Bit Shift Register, V_{CC} = +15 V (Nom.)



V_{CC} = Pin 16, GND = Pin 8

ECG9688 16-Pin DIP See Fig. D8
Dual J-K Flip-Flop, V_{CC} = +15 V (Nom.)



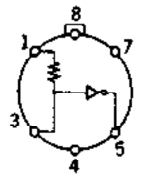
V_{CC} = Pin 16,
GND = Pin 8

Package Outlines - See Page 1-367

RTL Resistor-Transistor Logic

ECG9900 8-Pin Can See Fig. D2

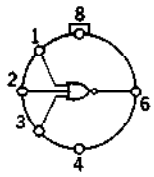
Buffer-Medium Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9903 8-Pin Can See Fig. D2

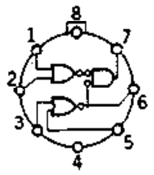
3-Input NOR Gate-Medium Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9904 8-Pin Can See Fig. D2

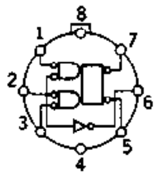
Half Adder-Medium Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9905 8-Pin Can See Fig. D2

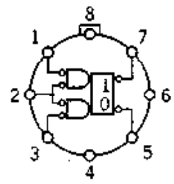
Half-Shift Register-Medium Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9906 8-Pin Can See Fig. D2

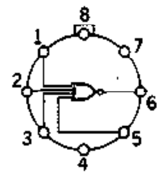
Half-Shift Register W I/O-Inverter-Medium Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9907 8-Pin Can See Fig. D2

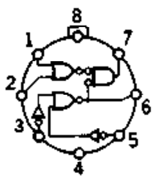
4-Input NOR Gate-Medium Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9908 8-Pin Can See Fig. D2

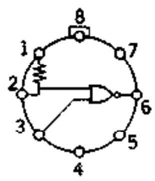
Adder and Exclusive OR-Low Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9909 8-Pin Can See Fig. D2

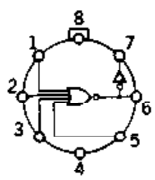
Buffer-Low Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9911 8-Pin Can See Fig. D2

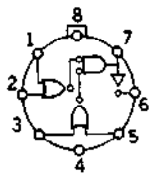
4-Input NOR Gate and Inverter-Low Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9912 8-Pin Can See Fig. D2

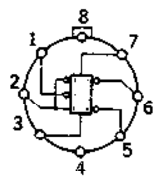
Half Adder-Low Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9913 8-Pin Can See Fig. D2

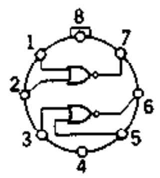
Type "D" Flip-Flop-Low Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9914 8-Pin Can See Fig. D2

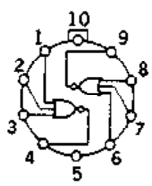
Dual 2-Input NOR Gate-Medium Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

ECG9915 10-Pin Can See Fig. D3

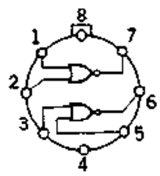
Dual 3-Input NOR Gate-Medium Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 10, GND = Pin 5

ECG9921 8-Pin Can See Fig. D2

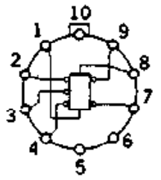
Gate Expander-Low Power, $V_{CC} = +3.6$ V (Nom.)



V_{cc} = Pin 8, GND = Pin 4

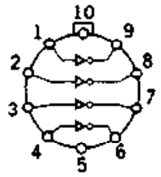
Package Outlines - See Page 1-367

ECG9926 10-Pin Can See Fig. D3
J-K Flip-Flop-Medium Power,
V_{CC} = +3.6 V (Nom.)



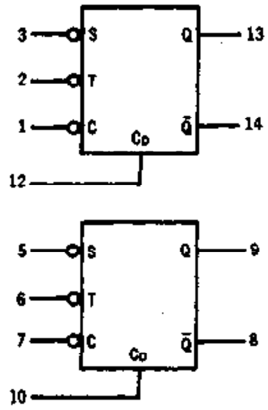
V_{CC} = Pin 10, GND = Pin 5

ECG9927 10-Pin Can See Fig. D3
Quad Inverter-Medium Power,
V_{CC} = +3.6 V (Nom.)

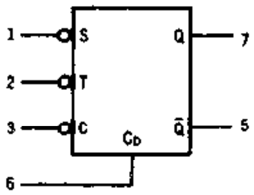


V_{CC} = Pin 10, GND = Pin 5

ECG9976 14-Pin DIP See Fig. D6
Dual J-K Flip-Flop-Low Power,
V_{CC} = +3.6 V (Nom.)

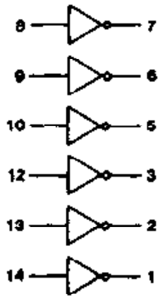


ECG9982 8-Pin Can See Fig. D2
J-K Flip-Flop, V_{CC} = +3.6 V (Nom.)



V_{CC} = Pin 8, GND = Pin 4

ECG9989 14-Pin DIP See Fig. D6
Hex Inverter-Medium Power,
V_{CC} = +3.6 V (Nom.)



V_{CC} = Pin 11, GND = Pin 4

Package Outlines - See Page 1-367

TTL Selector Guide

- **AND Gates**
  - **Dual 4-Input**
    - ECG7421
    - ECG74H21
    - ECG74LS21
  - **Triple 3-Input**
    - ECG7411
    - ECG74H11
    - ECG74HC11
    - ECG74LS11
    - ECG74S11
  - **Quad 2-Input**
    - ECG7408
    - ECG74C08
    - ECG74H08
    - ECG74HC08
    - ECG74HCT08
    - ECG74LS08
    - ECG74S08
- **AND Gates with Open Collector Output**
  - **Triple 3-Input**
    - ECG74LS15
    - ECG74S15
  - **Quad 2-Input**
    - ECG7409
    - ECG74LS09
- **AND/OR/Invert Gates**
  - **2-Wide 4-Input**
    - ECG74LS55
  - **Dual 2-Wide 2-Input**
    - ECG7451
    - ECG74S51
  - **Dual 2-Wide 2-2-3-2-Input**
    - ECG74LS51
  - **4-Wide 2-Input**
    - ECG7454
  - **4-Wide 2-2-3-2-Input**
    - ECG74H54
  - **4-Wide 3-2-2-3-Input**
    - ECG74LS54
- **Arithmetic & Logic Function Devices**
  - **Adders**
    - **1-Bit**
      - ECG7480
    - **2-Bit**
      - ECG7482
    - **4-Bit**
      - ECG7483
      - ECG74LS83A
      - ECG74LS283
    - **Dual Carry/Save**
      - ECG74H183
    - **Look-Ahead Carry-Generator**
      - ECG74182
    - **True/Complement Zero/One Element**
      - ECG74H87
  - **4-Bit Arithmetic Logic Unit/ Function Generator**
    - ECG74181
    - ECG74LS181
    - ECG74S181
  - **4-Bit Magnitude Comparator**
    - ECG7485
    - ECG74C85
    - ECG74LS85
  - **4 x 4 Register Files**
    - ECG74170
    - ECG74LS170
    - ECG74LS670
  - **6-Bit Binary Rate Multiplier**
    - ECG7497
  - **9-Bit Parity Generator/Checker**
    - ECG74180
    - ECG74LS280
- **Buffer Gates**
  - **Quad 2-Input NAND**
    - ECG7437
    - ECG74LS37
  - **Quad 2-Input NOR**
    - ECG7428
    - ECG74LS28
  - **Dual 4-Input NAND**
    - ECG7440
    - ECG74H40
    - ECG74LS40
    - ECG74S40
- **Buffer Gates with Open Collector Output**
  - **Hex**
    - ECG7406
    - ECG7407
    - ECG7416
    - ECG7417
  - **Quad**
    - ECG74125
    - ECG74HC125
    - ECG74LS125A
    - ECG74126
    - ECG74HC126
    - ECG74LS126
  - **Quad 2-Input NAND**
    - ECG7438
    - ECG74LS38
    - ECG7439
  - **Quad 2-Input NOR**
    - ECG7433
    - ECG74LS33
- **Buffers/Drivers**
  - **Hex Inverting**
    - ECG7406
    - ECG7416
    - ECG80C96
  - **Hex Non-Inverting**
    - ECG7407
    - ECG7417
    - ECG80C95
    - ECG80C97
  - **Octal Inverting**
    - ECG74C240
    - ECG74HC240
    - ECG74HCT240
    - ECG74LS240
    - ECG74LS540
  - **Octal Non-Inverting**
    - ECG74LS241
    - ECG74C244
    - ECG74HC244
    - ECG74HCT244
    - ECG74LS244
    - ECG74LS541
- **Bus Drivers**
  - **Hex Inverting**
    - ECG74366
    - ECG74LS366A
    - ECG74368
    - ECG74LS368
    - ECG80C96
  - **Hex Non-Inverting**
    - ECG74365
    - ECG74LS365A
    - ECG74367
    - ECG74LS367
    - ECG80C95
    - ECG80C97
- **Bus Transceivers**
  - **Octal Inverting**
    - ECG74LS640
    - ECG74LS642
  - **Octal Inverting/Non-Inverting**
    - ECG74LS643
  - **Octal Non-Inverting**
    - ECG74LS245
    - ECG74LS641
    - ECG74LS645
  - **Quad Inverting**
    - ECG74LS242
  - **Quad Non-Inverting**
    - ECG74LS243
- **Counters, Asynchronous**
  - **Binary/Ripple**
    - ECG74HC4020
    - ECG74HC4040
    - ECG74HC4060
  - **Decade**
    - ECG7490
    - ECG74C90
    - ECG74LS90
    - ECG74290
    - ECG74LS290
  - **Dual Decade**
    - ECG74390
    - ECG74HC390
    - ECG74LS390
    - ECG74490
    - ECG74LS490
  - **4-Bit Binary**
    - ECG7493A
    - ECG74C93
    - ECG74L93
    - ECG74LS93
    - ECG74LS293
  - **Dual 4-Bit Binary**
    - ECG74393
    - ECG74HC393
    - ECG74LS393
  - **Divide-By-N**
    - ECG8520
  - **Divide-By-12**
    - ECG7492
    - ECG74LS92
- **Counters, Synchronous**
  - **Decade**
    - ECG74160
    - ECG74LS160A
    - ECG74162
    - ECG74LS162A

4-Bit Binary
- ECG74161
- ECG74C161
- ECG74HC161
- ECG74HCT161
- ECG74LS161A
- ECG74163
- ECG74HC163
- ECG74HCT163
- ECG74LS163A
- ECG8316
- ECG8556
- ECG93L16

○ Counters, Up/Down

Decade
- ECG74LS168A
- ECG74LS190
- ECG74192
- ECG74C192
- ECG74LS192

4-Bit Binary
- ECG74LS169A
- ECG74191
- ECG74LS191
- ECG74193
- ECG74C193
- ECG74LS193

○ Counter/Latch

Decade
- ECG74176
- ECG74196
- ECG74LS196

4-Bit Binary
- ECG74177
- ECG74197
- ECG74LS197
- ECG8554

○ Counters with Decoder/Drivers

4-Digit with Multiplexed 7-Segment Output
- ECG74C925

○ Data Selectors/Multiplexers

Dual 4-Line-to-1-Line
- ECG74153
- ECG74HC153
- ECG74LS153
- ECG74LS253
- ECG74LS352
- ECG74LS353
- ECG8309

Quad 2-Line-to-1-Line
- ECG74157
- ECG74C157
- ECG74LS157
- ECG74158
- ECG74LS158
- ECG74HC257
- ECG74LS257
- ECG74LS258
- ECG74S258
- ECG8123
- ECG8233

Quad 2-Line-to-1-Line with Storage
- ECG74LS298
- ECG74LS398
- ECG74LS399

Quad 2-Line-to-1-Line (Open Collector)
- ECG8234
- ECG8235
- ECG8266

8-Line-to-1-Line
- ECG74C151
- ECG74HC151
- ECG74LS151
- ECG74152
- ECG74251
- ECG74LS251
- ECG74S251

16-Line-to-1-Line
- ECG74150
- ECG8219

○ Decoder, 4-Line-to-10-Line

BCD-to-Decimal
- ECG7442
- ECG74C42
- ECG74LS42
- ECG8301

Excess-3-to-Decimal
- ECG7443

Excess-3-Gray-to-Decimal
- ECG7444

○ Decoder/Demultiplexers

Dual-2-Line-to-4-Line
- ECG74HC139
- ECG74LS139
- ECG74155
- ECG74LS155
- ECG8321

Dual 2-Line-to-4-Line (Open Collector)
- ECG74156
- ECG74LS156

4-Line-to-16-Line
- ECG74154
- ECG74C154

3-Line-to-8-Line
- ECG74HC138
- ECG74HCT138
- ECG74LS138
- ECG74S138

○ Display Decoder/Drivers

BCD-to-Decimal - Drives Cold Cathode Tubes
- ECG74141

BCD-to-Decimal - Drives Gas Filled Tubes
- ECG7441

BCD-to-Decimal (Open Collector)
- ECG7445
- ECG74145
- ECG74LS145

BCD-to-7-Segment (Open Collector)
- ECG7446
- ECG7447
- ECG74LS47
- ECG74LS49
- ECG74LS247
- ECG74249
- ECG74LS249

BCD-to-7-Segment
- ECG7448
- ECG74C48
- ECG74LS48
- ECG74LS248

○ Display Decoder/Drivers with Input Latches

Hexadecimal-to-7-Segment - Drivers Common Anode LED
- ECG8374

Hexadecimal-to-7-Segment - Drives Common Cathode LED
- ECG8368

Hexadecimal-to-7-Segment - Open Collector Output
- ECG8370

○ Display Decoder/Driver with Counter

BCD-to-Decimal - Drives Gas Filled Tubes
- ECG74142

4-Digit Counter with Multiplexed 7-Segment Output
- ECG74C925

○ Encoders

Keyboard Encoders
- ECG74C922
- ECG74C923

8-Line-to-3-Line - Octal Priority Encoder
- ECG74LS148
- ECG74LS348
- ECG8318

10-Line-to-4-Line - Decimal-to-BCD Priority Encoder
- ECG74147
- ECG74LS147

○ Exclusive OR Gates

Quad 2-Input
- ECG7486
- ECG74H86
- ECG74HC86
- ECG74LS86
- ECG74S86
- ECG74LS386

○ Exclusive OR Gates with Open Collector Output

Quad 2-Input
- ECG74136
- ECG74LS136

○ Exclusive NOR Gates with Open Collector Output

Quad 2-Input
- ECG74LS266

○ Expandable Gates

Dual 2-Wide 2-Input AND/OR/Invert
- ECG7450
- ECG74H50

Dual 4-Input NOR
ECG7423

2-Wide 4-Input AND/OR/Invert
ECG74H55

4-Wide 2-Input AND/OR/Invert
ECG7453

4-Wide 2-2-3-2-Input AND/OR/Invert
ECG74H52
ECG74H53

- **Expandable AND/OR/Invert Gates**

Dual 2-Wide 2-Input
ECG7450
ECG74H50

2-Wide 4-Input
ECG74H55

4-Wide 2-Input
ECG7453

4-Wide 2-2-3-2-Input
ECG74H52
ECG74H53

- **Expander Gates**

Dual 4-Input
ECG7460
ECG74H60

Triple 3-Input
ECG74H61

4-Wide 2-3-3-2-Input
ECG74H62

- **Flip-Flops, Master-Slave (M-S) Types**

Dual J-K
ECG7473
ECG74H73
ECG74H76
ECG74H78
ECG74107

Gated J-K
ECG74H71
ECG7472
ECG74H72
ECG74110

- **Flip-Flops, J-K Edge Triggered Types**

Dual J-K Negative Edge Triggered
ECG74C73
ECG74LS73
ECG74C76
ECG74LS76A
ECG74LS78
ECG74H103
ECG74H106
ECG74C107
ECG74LS107
ECG74H108
ECG74LS112A
ECG74S112
ECG74LS113
ECG74S113
ECG74LS114
ECG74S114

Dual J-K Positive Edge Triggered
ECG74109
ECG74HC109
ECG74LS109A

Gated J-K Positive Edge Triggered
ECG7470

Gated J-K Negative Edge Triggered
ECG74H102

- **Flip-Flops, "D" Types**

Dual
ECG7474
ECG74C74
ECG74H74
ECG74LS74A
ECG74S74

Hex
ECG74174
ECG74C174
ECG74HC174
ECG74HCT174
ECG74LS174
ECG74S174
ECG74LS378

Octal
ECG74HC273
ECG74HCT273
ECG74LS273
ECG74LS364
ECG74C374
ECG74HC374
ECG74HC574
ECG74HCT374
ECG74HCT574
ECG74LS374
ECG74HC377
ECG74LS377

Quad
ECG74175
ECG74C175
ECG74HC175
ECG74LS175
ECG74S175
ECG74LS379
ECG8613

- **Interface Gates, Hi-Voltage with Open Collector Output**

Hex Inverting
ECG7406
ECG7416

Hex Non-Inverting
ECG7407
ECG7417

Quad 2-Input NAND
ECG7426
ECG74LS26

- **Interface Buffers, Level Shifting**

Hex Inverting
ECG74C901
ECG74C903

Hex Non-Inverting
ECG74C902
ECG74C904

- **Inverters**

Hex
ECG7404
ECG74C04
ECG74H04
ECG74HC04
ECG74HCT04
ECG74LS04
ECG74S04

- **Inverters with Open Collector Output**

Hex
ECG7405
ECG74H05
ECG74LS05
ECG74S05
ECG7406
ECG7416

- **Latches**

Dual 4-Bit
ECG8308
ECG93L08

Octal "D"
ECG74LS363
ECG74C373
ECG74HC373
ECG74HC573
ECG74HCT373
ECG74HCT573
ECG74LS373

Quad $\overline{S}$ - $\overline{R}$
ECG74LS279

Quad Latch
ECG8314

4-Bit Bistable
ECG7475
ECG74LS75
ECG74LS77

8-Bit Addressable
ECG74HC259
ECG74LS259

- **Level Shifters (See Interface Buffers)**

- **Line Drivers and Receivers**

Dual 4-Input NAND 50 Ohm Line Driver
ECG74S140

Dual Differential Line Receiver
ECG9615

Octal Inverting Line Driver/Receiver
ECG74C240
ECG74HC240
ECG74HCT240
ECG74LS240
ECG74LS540

Octal Non-Inverting Line Driver/Receiver
ECG74LS241
ECG74C244
ECG74HC244
ECG74HCT244
ECG74LS244
ECG74LS541

Quad 2-Input NOR 50 Ohm Line Driver
ECG74128

TTL Selector Guide (cont'd)

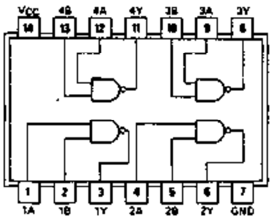
- **Multiplexers/Demultiplexers**
  - ECG74HC4053
  - ECG74HC4067
- **Multivibrators, Monostable (One Shots)**
  - **Monostable**
    - ECG74121
  - **Retriggerable/Resettable Monostable**
    - ECG9600
  - **Dual Retriggerable/Resettable Monostable**
    - ECG8853
    - ECG9602
    - ECG96L02
    - ECG96LS02
    - ECG96S02
  - **Retriggerable Monostable**
    - ECG74122
    - ECG74LS122
    - ECG74221
    - ECG74C221
    - ECG74LS221
    - ECG9601
  - **Dual Retriggerable Monostable**
    - ECG74123
    - ECG74HC123
    - ECG74LS123
- **NAND Gates**
  - **Quad 2-Input**
    - ECG7400
    - ECG74C00
    - ECG74H00
    - ECG74HC00
    - ECG74HCT00
    - ECG74LS00
    - ECG74S00
    - ECG7437
    - ECG74LS37
  - **Triple 3-Input**
    - ECG7410
    - ECG74C10
    - ECG74H10
    - ECG74HC10
    - ECG74LS10
    - ECG74S10
  - **Dual 4-Input**
    - ECG7420
    - ECG74C20
    - ECG74H20
    - ECG74LS20
    - ECG7440
    - ECG74H40
    - ECG74LS40
    - ECG74S40
  - **Dual 5-Input**
    - ECG8092
  - **8-Input**
    - ECG74C30
    - ECG74H30
    - ECG74LS30
  - **13-Input**
    - ECG74LS133
    - ECG74S133
- **NAND Gates with Open Collector Output**
  - **Quad 2-Input**
    - ECG7401
    - ECG74H01
    - ECG74LS01
    - ECG74LS03
    - ECG74S03
    - ECG7426
    - ECG74LS26
    - ECG7438
    - ECG74LS38
  - **Triple 3-Input**
    - ECG7412
    - ECG74LS12
  - **Dual 4-Input**
    - ECG7422
    - ECG74H22
    - ECG74LS22
    - ECG74S22
- **NOR Gates**
  - **Quad 2-Input**
    - ECG7402
    - ECG74C02
    - ECG74HC02
    - ECG74LS02
    - ECG74S02
    - ECG7428
    - ECG74LS28
  - **Triple 3-Input**
    - ECG7427
    - ECG74LS27
  - **Dual 4-Input**
    - ECG7425
  - **Dual 5-Input**
    - ECG74LS260
  - **Expandable Dual 4-Input**
    - ECG7423
- **NOR Gates with Open Collector Output**
  - **Quad 2-Input**
    - ECG7433
    - ECG74LS33
- **OR Gates**
  - **Quad 2-Input**
    - ECG7432
    - ECG74C32
    - ECG74HC32
    - ECG74HCT32
    - ECG74LS32
- **Registers**
  - **Quad I/O**
    - ECG8542
  - **4-Bit "D"**
    - ECG74173
    - ECG74C173
    - ECG74HC173
    - ECG74LS173
  - **4-Bit x 16 Word FIFO**
    - ECG74HC40105
- **Schmitt Triggers**
  - **Dual 4-Input NAND**
    - ECG7413
    - ECG74LS13
  - **Hex Inverter**
    - ECG7414
    - ECG74C14
    - ECG74HC14
    - ECG74HCT14
    - ECG74LS14
  - **Quad 2-Input NAND**
    - ECG74132
    - ECG74HC132
    - ECG74LS132
- **Shift Registers**
  - **4-Bit Parallel-In/Serial Out**
    - ECG7494
  - **4-Bit Parallel**
    - ECG74179
    - ECG74195
    - ECG74LS195A
  - **4-Bit Universal**
    - ECG74LS395A
  - **4-Bit Bidirectional Universal**
    - ECG74LS194A
    - ECG74S194
    - ECG74LS295A
  - **4-Bit Bidirectional Parallel**
    - ECG7495
    - ECG74C95
    - ECG74LS95B
  - **5-Bit Serial-In/Parallel-Out or Parallel-In/Serial-Out**
    - ECG7496
  - **8-Bit Serial**
    - ECG7491
    - ECG74LS91
  - **8-Bit Serial-In/Parallel-Out**
    - ECG74164
    - ECG74C164
    - ECG74HC164
    - ECG74LS164
  - **8-Bit Parallel-In/Serial-Out**
    - ECG74165
    - ECG74HC165
    - ECG74LS165
  - **8-Bit Universal**
    - ECG74199
  - **8-Bit Bidirectional Universal**
    - ECG74198
    - ECG74HC299
    - ECG74LS299
  - **8-Bit Serial or Parallel-In/Parallel-Out**
    - ECG74166
    - ECG74LS166
  - **Dual 8-Bit Serial**
    - ECG8328
- **Voltage Controlled Oscillators (VCO)**
  - **Single**
    - ECG74LS624
  - **Dual**
    - ECG74S124
    - ECG74LS625
    - ECG74LS626
    - ECG74LS627
    - ECG74LS629

O

TTL Logic Diagrams (V_{CC} = +5 V Nom.)

Diag. 1 — 14-Pin DIP See Fig. D6

ECG7400, ECG74C00, ECG74H00, ECG74HC00, ECG74HCT00, ECG74LS00, ECG74S00

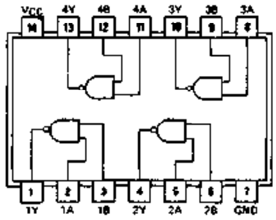


Quad 2-Input NAND Gate

Diag. 2 — 14-Pin DIP See Fig. D6

(See Also Diag. 3)

ECG7401, ECG74LS01

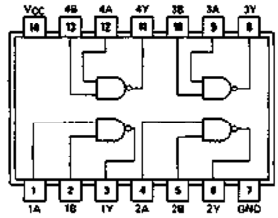


Quad 2-Input NAND Gate with Open Collector Output

Diag. 3 — 14-Pin DIP See Fig. D6

(See Also Diag. 2)

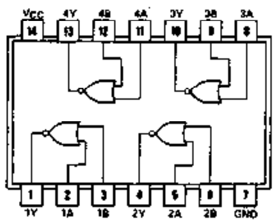
ECG74H01



Quad 2-Input NAND Gate with Open Collector Output

Diag. 4 — 14-Pin DIP See Fig. D6

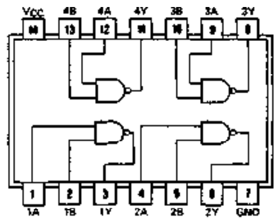
ECG7402, ECG74C02, ECG74HC02, ECG74LS02, ECG74S02



Quad 2-Input NOR Gate

Diag. 5 — 14-Pin DIP See Fig. D6

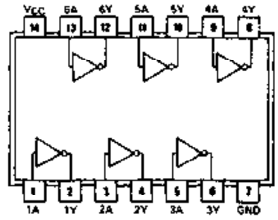
ECG7403*, ECG74LS03, ECG74S03



Quad 2-Input NAND Gate with Open Collector Output *DISCONTINUED

Diag. 6 — 14-Pin DIP See Fig. D6

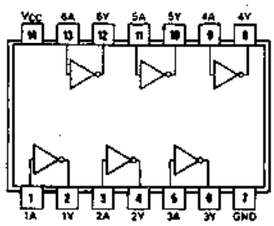
ECG7404, ECG74C04, ECG74H04, ECG74HC04, ECG74HCT04, ECG74LS04, ECG74S04



Hex Inverter

Diag. 7 — 14-Pin DIP See Fig. D6

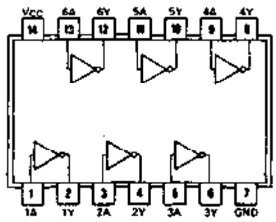
ECG7405, ECG74H05, ECG74LS05, ECG74S05



Hex Inverter with Open Collector Output

Diag. 8 — 14-Pin DIP See Fig. D6

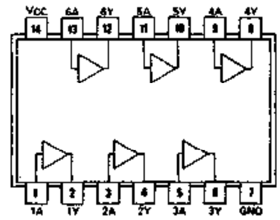
ECG7406



Hex Inverter/Buffer with Hi-Volt (30 V) Open Collector Output

Diag. 9 — 14-Pin DIP See Fig. D6

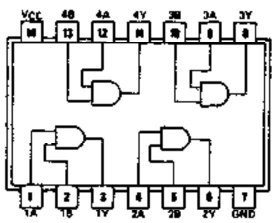
ECG7407



Hex Buffer with Hi-Volt (30 V) Open Collector Output

Diag. 10 — 14-Pin DIP See Fig. D6

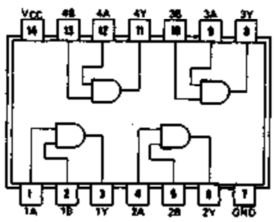
ECG7408, ECG74C08, ECG74H08, ECG74HC08, ECG74HCT08, ECG74LS08, ECG74S08



Quad 2-Input AND Gate

Diag. 11 — 14-Pin DIP See Fig. D6

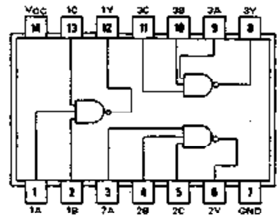
ECG7409, ECG74LS09, ECG74S09



Quad 2-Input AND Gate with Open Collector Output

Diag. 12 — 14-Pin DIP See Fig. D6

ECG7410, ECG74C10, ECG74H10, ECG74HC10, ECG74LS10, ECG74S10

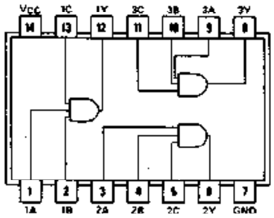


Triple 3-Input NAND Gate

Package Outlines - See Page 1-367

Diag. 13 — 14-Pin DIP See Fig. D6

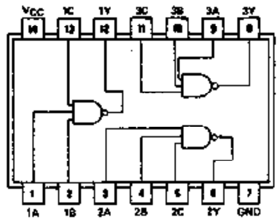
ECG7411, ECG74H11, ECG74HC11, ECG74LS11, ECG74S11



Triple 3-Input AND Gate

Diag. 14 — 14-Pin DIP See Fig. D6

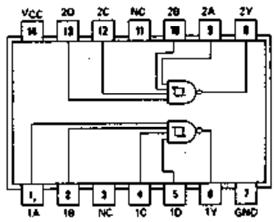
ECG7412, ECG74LS12



Triple 3-Input NAND Gate with Open Collector Output

Diag. 15 — 14-Pin DIP See Fig. D6

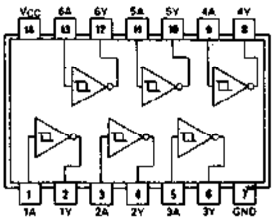
ECG7413, ECG74LS13



Dual 4-Input NAND Schmitt Trigger

Diag. 16 — 14-Pin DIP See Fig. D6

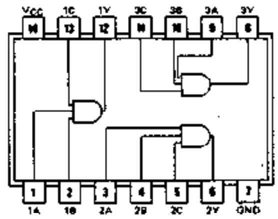
ECG7414, ECG74C14, ECG74HC14, ECG74HCT14, ECG74LS14



Hex Schmitt Trigger Inverter

Diag. 17 — 14-Pin DIP See Fig. D6

ECG74LS15, ECG74S15*

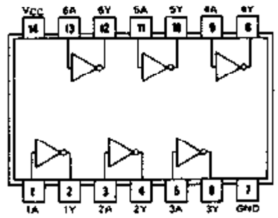


Triple 3-Input AND Gate with Open Collector Output

*Discontinued

Diag. 18 — 14-Pin DIP See Fig. D6

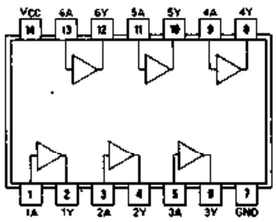
ECG7416



Hex Inverter/Buffer with Hi-Volt (15 V) Open Collector Output

Diag. 19 — 14-Pin DIP See Fig. D6

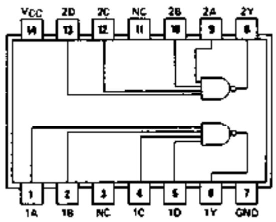
ECG7417



Hex Buffer with Hi-Volt (15 V) Open Collector Output

Diag. 20 — 14-Pin DIP See Fig. D6

ECG7420, ECG74C20, ECG74H20, ECG74LS20, ECG74S20*

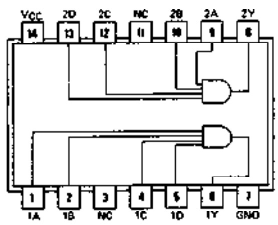


Dual 4-Input NAND Gate

*Discontinued

Diag. 21 — 14-Pin DIP See Fig. D6

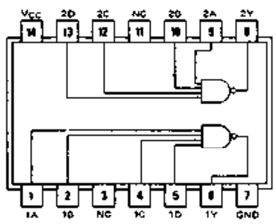
ECG7421, ECG74H21, ECG74LS21



Dual 4-Input AND Gate

Diag. 22 — 14-Pin DIP See Fig. D6

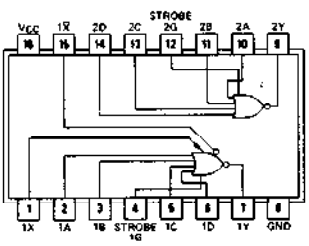
ECG7422, ECG74H22, ECG74LS22, ECG74S22



Dual 4-Input NAND Gate with Open Collector Output

Diag. 23 — 16-Pin DIP See Fig. D8

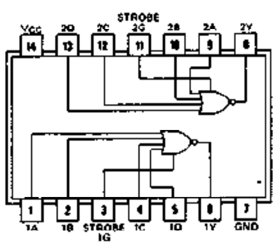
ECG7423



Expandable Dual 4-Input NOR Gate with Strobe

Diag. 24 — 14-Pin DIP See Fig. D6

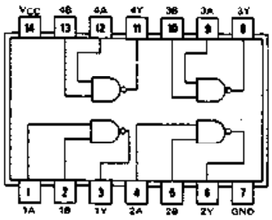
ECG7425



Dual 4-Input NOR Gate with Strobe

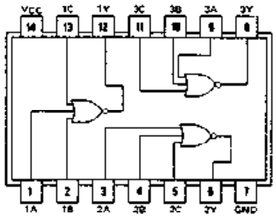
Package Outlines - See Page 1-367

Diag. 25 14-Pin DIP See Fig. D6
ECG7426, ECG74LS26



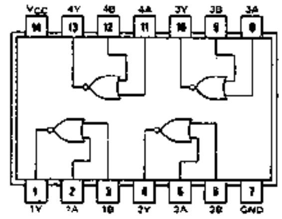
Quad 2-Input Hi-Volt Interface NAND Gate with Open Collector Output

Diag. 26 14-Pin DIP See Fig. D6
ECG7427, ECG74LS27



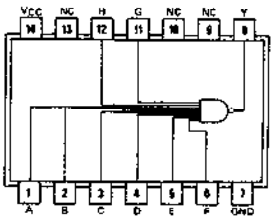
Triple 3-Input NOR Gate

Diag. 27 14-Pin DIP See Fig. D6
ECG7428, ECG74LS28



Quad 2-Input NOR Buffer

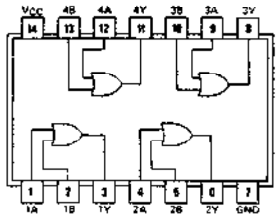
Diag. 28 14-Pin DIP See Fig. D6
ECG7430*, ECG74C30, ECG74H30, ECG74LS30, ECG74S30*



8-Input NAND Gate

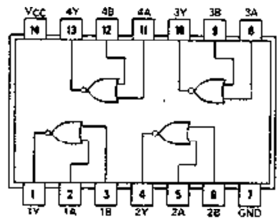
*Discontinued

Diag. 29 14-Pin DIP See Fig. D6
ECG7432, ECG74C32, ECG74HC32, ECG74HCT32, ECG74LS32



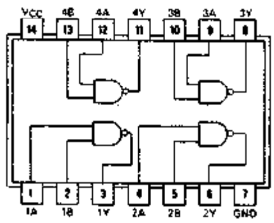
Quad 2-Input OR Gate

Diag. 30 14-Pin DIP See Fig. D6
ECG7433, ECG74LS33



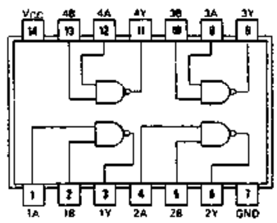
Quad 2-Input NOR Buffer with Open Collector Output

Diag. 31 14-Pin DIP See Fig. D6
ECG7437, ECG74LS37



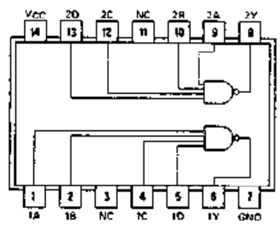
Quad 2-Input NAND Buffer

Diag. 32 14-Pin DIP See Fig. D6
ECG7438, ECG74LS38



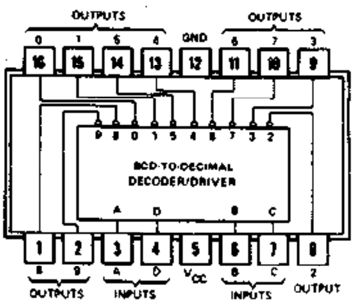
Quad 2-Input NAND Buffer with Open Collector Output

Diag. 34 14-Pin DIP See Fig. D6
ECG7440, ECG74H40, ECG74LS40, ECG74S40



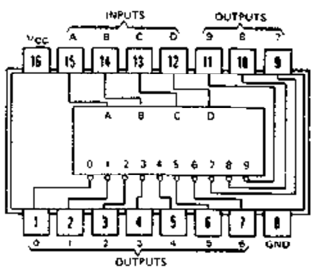
Dual 4-Input NAND Buffer

Diag. 35 16-Pin DIP See Fig. D8
ECG7441



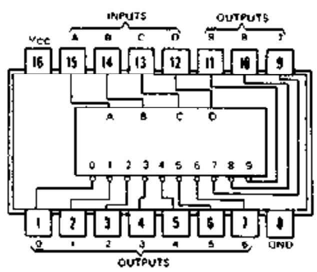
BCD-to-Decimal Decoder/Driver for Gas Filled Tubes

Diag. 36 16-Pin DIP See Fig. D8
ECG7442, ECG74C42, ECG74LS42



BCD-to-Decimal Decoder

Diag. 37 16-Pin DIP See Fig. D8
ECG7443



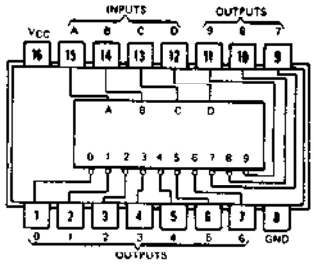
Excess-3-to-Decimal Decoder

Package Outlines - See Page 1-367

TTL Logic Diagrams (cont'd)

Diag. 38 — 16-Pin DIP See Fig. D8

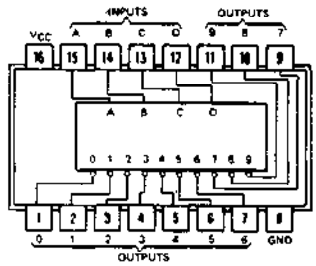
ECG7444



Excess-3-Gray-to-Decimal Decoder

Diag. 39 — 16-Pin DIP See Fig. D8

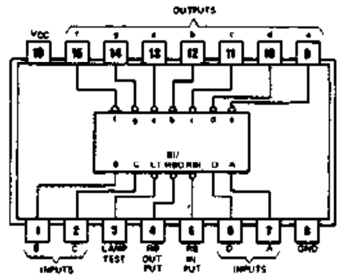
ECG7445



BCD-to-Decimal Decoder/Driver with Open Collector Output

Diag. 40 — 16-Pin DIP See Fig. D8

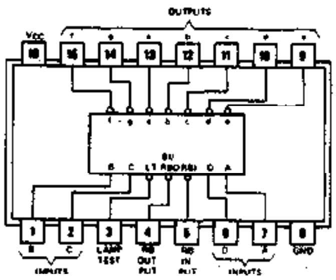
ECG7446



BCD-to-7-Segment Decoder/Driver with Hi-Volt (30 V) Open Collector Output

Diag. 41 — 16-Pin DIP See Fig. D8

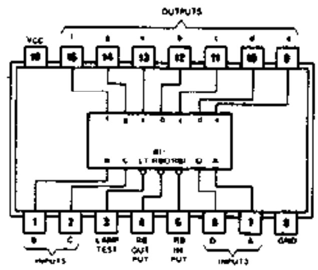
ECG7447, ECG74LS47



BCD-to-7-Segment Decoder/Driver with Hi-Volt (15 V) Open Collector Output

Diag. 42 — 16-Pin DIP See Fig. D8

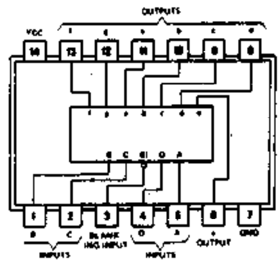
ECG7448, ECG74C48, ECG74LS48



BCD-to-7-Segment Decoder/Driver

Diag. 43 — 14-Pin DIP See Fig. D6

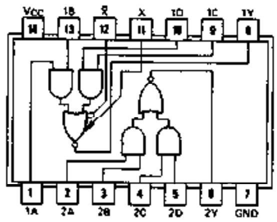
ECG74LS49



BCD-to-7-Segment Decoder/Driver with Open Collector Output

Diag. 44 — 14-Pin DIP See Fig. D6

ECG7450, ECG74H50

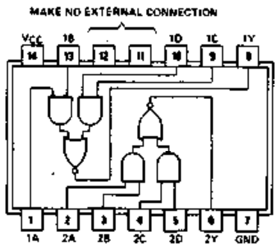


Dual 2-Wide 2-Input AND/OR/Invert Gate (One Gate Expandable)

Diag. 45 — 14-Pin DIP See Fig. D6

(See also Diag. 46)

ECG7451, ECG74H51*, ECG74S51



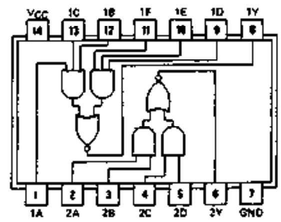
Dual 2-Wide 2-Input AND/OR/Invert Gate

*Discontinued

Diag. 46 — 14-Pin DIP See Fig. D6

(See also Diag. 45)

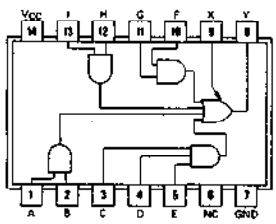
ECG74LS51



Dual 2-Wide 2-Input, 2-Wide 3-Input AND/OR/Invert Gate

Diag. 47 — 14-Pin DIP See Fig. D6

ECG74H52

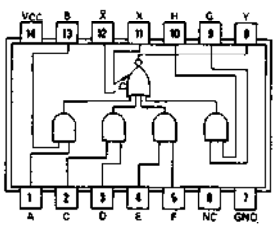


Expandable 4-Wide 2-Input 2-3-2-2 Input AND/OR Gate

Diag. 48 — 14-Pin DIP See Fig. D6

(See also Diag. 49)

ECG7453

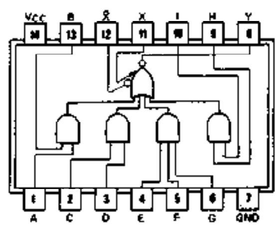


Expandable 4-Wide 2-Input AND/OR/Invert Gate

Diag. 49 — 14-Pin DIP See Fig. D6

(See also Diag. 48)

ECG74H53

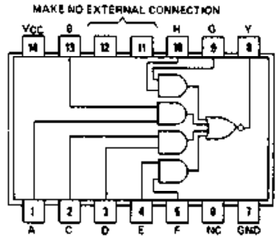


Expandable 4-Wide 2-Input 2-2-3-2 Input AND/OR/Invert Gate

Package Outlines - See Page 1-367

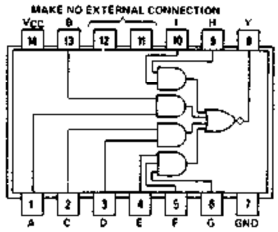
TTL Logic Diagrams (cont'd)

Diag. 50 — 14-Pin DIP See Fig. D6
(See also Diag. 51 and 52)
ECG7454



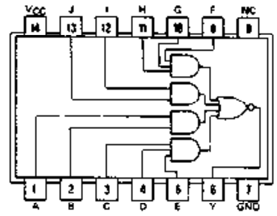
4-Wide 2-Input AND/OR/Invert Gate

Diag. 51 — 14-Pin DIP See Fig. D6
(See also Diag. 50 and 52)
ECG74H54



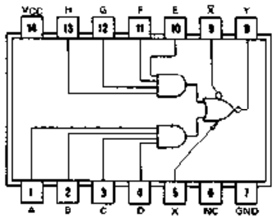
4-Wide 2-2-2-3 Input AND/OR/Invert Gate

Diag. 52 — 14-Pin DIP See Fig. D6
(See also Diag. 50 and 51)
ECG74LS54



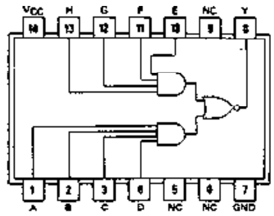
4-Wide 3-2-2-3 Input AND/OR/Invert Gate

Diag. 53 — 14-Pin DIP See Fig. D6
(See also Diag. 54)
ECG74H55



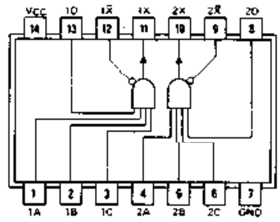
Expandable 2-Wide 4-Input AND/OR/
Invert Gate

Diag. 54 — 14-Pin DIP See Fig. D6
(See also Diag. 53)
ECG74LS55



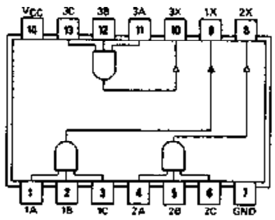
2-Wide 4-Input AND/OR/Invert Gate

Diag. 55 — 14-Pin DIP See Fig. D6
ECG7460



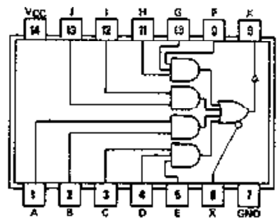
Dual 4-Input Expander

Diag. 56 — 14-Pin DIP See Fig. D6
ECG74H61



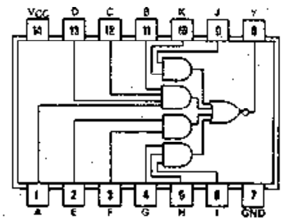
Triple 3-Input Expander

Diag. 57 — 14-Pin DIP See Fig. D6
ECG74H62



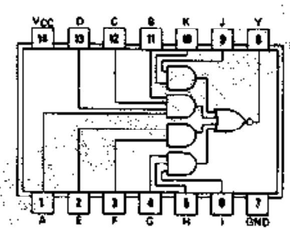
4-Wide 3-2-2-3 Input AND/OR Expander

Diag. 58 — 14-Pin DIP See Fig. D6
ECG74S64



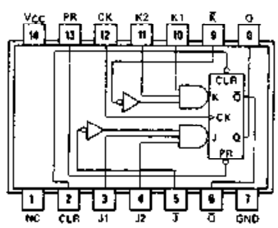
4-Wide 4-2-3-2 Input AND/OR/Invert Gate

Diag. 59 — 14-Pin DIP See Fig. D6
ECG74S65



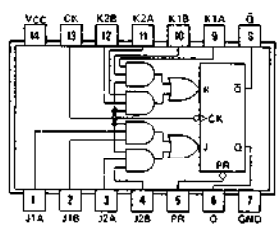
4-Wide 4-2-3-2 Input AND/OR/Invert Gate
with Open Collector Output

Diag. 60 — 14-Pin DIP See Fig. D6
ECG7470



Gated J-K Positive Edge Triggered Flip-Flop
with Preset and Clear

Diag. 61 — 14-Pin DIP See Fig. D6
ECG74H71



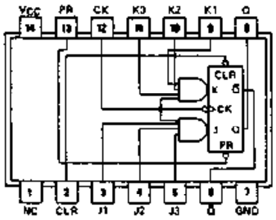
Gated J-K M/S Flip-Flop with Preset

Package Outlines - See Page 1-367

TTL Logic Diagrams (cont'd)

Diag. 62 — 14-Pin DIP See Fig. D6

ECG7472, ECG74H72

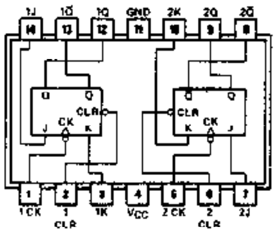


Gated J-K M/S Flip-Flop with Preset and Clear

Diag. 63 — 14-Pin DIP See Fig. D6

(See also Diag. 64)

ECG7473, ECG74H73

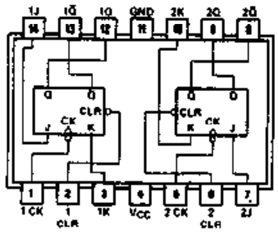


Dual J-K M/S Flip-Flop with Clear

Diag. 64 — 14-Pin DIP See Fig. D6

(See also Diag. 63)

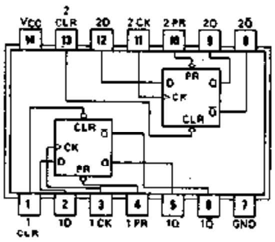
ECG74C73, ECG74LS73



Dual J-K Negative Edge Triggered Flip-Flop with Clear

Diag. 65 — 14-Pin DIP See Fig. D6

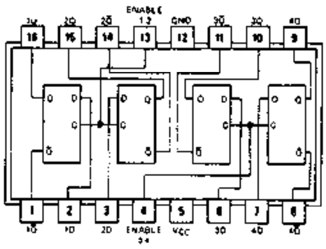
ECG7474, ECG74C74, ECG74H74, ECG74LS74A, ECG74S74



Dual "D" Flip-Flop with Preset and Clear

Diag. 66 — 16-Pin DIP See Fig. D8

ECG7475, ECG74LS75

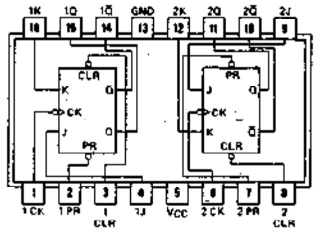


4-Bit Bistable Latch with Complementary Outputs

Diag. 67 — 16-Pin DIP See Fig. D8

(See also Diag. 68)

ECG74H76

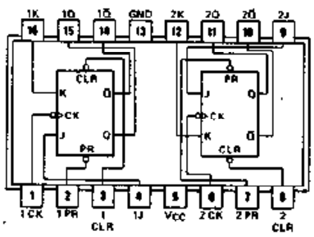


Dual J-K M/S Flip-Flop with Preset and Clear

Diag. 68 — 16-Pin DIP See Fig. D8

(See also Diag. 67)

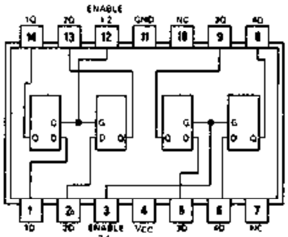
ECG74C76, ECG74LS76A



Dual J-K Negative Edge Triggered Flip-Flop with Preset and Clear

Diag. 69 — 14-Pin DIP See Fig. D6

ECG74LS77

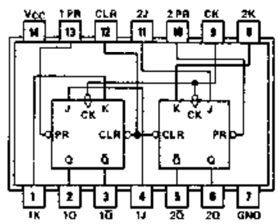


4-Bit Bistable Latch

Diag. 70 — 14-Pin DIP See Fig. D6

(See also Diag. 71)

ECG74H78

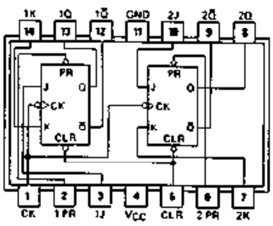


Dual J-K M/S Flip-Flop with Presets and a Common Clock and Clear

Diag. 71 — 14-Pin DIP See Fig. D6

(See also Diag. 70)

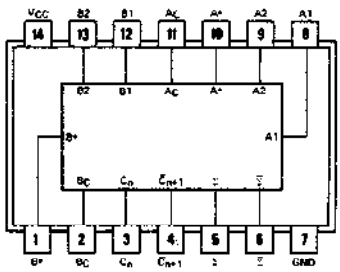
ECG74LS78



Dual J-K Negative Edge Triggered Flip-Flop with Preset and a Common Clock and Clear

Diag. 72 — 14-Pin DIP See Fig. D6

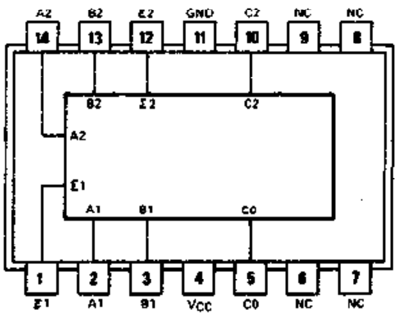
ECG7480



Gated Full Adder with Complementary Sum Outputs

Diag. 74 — 14-Pin DIP See Fig. D6

ECG7482

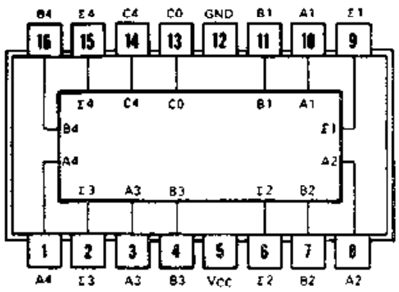


2-Bit Binary Full Adder

Package Outlines - See Page 1-367

Diag. 75 — 16-Pin DIP See Fig. D8

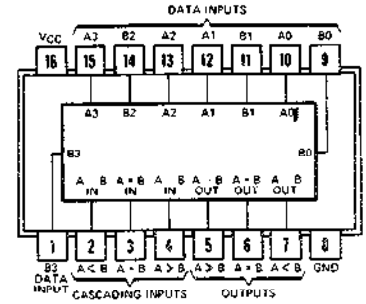
ECG7483, ECG74LS83A



4-Bit Full Adder

Diag. 76 — 16-Pin DIP See Fig. D8

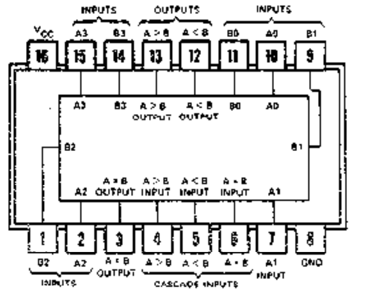
ECG7485, ECG74LS85



4-Bit Magnitude Comparator

Diag. 77 — 16-Pin DIP See Fig. D8

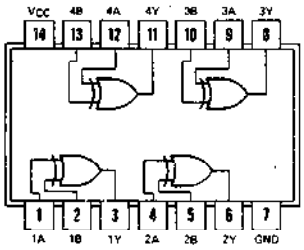
ECG74C85



4-Bit Magnitude Comparator

Diag. 78 — 14-Pin DIP See Fig. D6

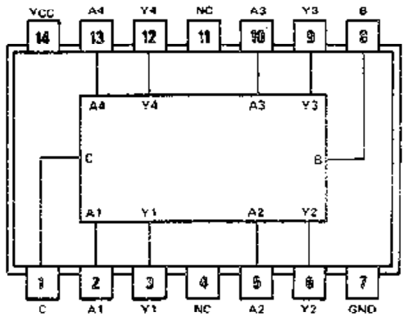
ECG7486, ECG74H86, ECG74HC86, ECG74LS86, ECG74S86



Quad Exclusive OR Gate

Diag. 79 — 14-Pin DIP See Fig. D6

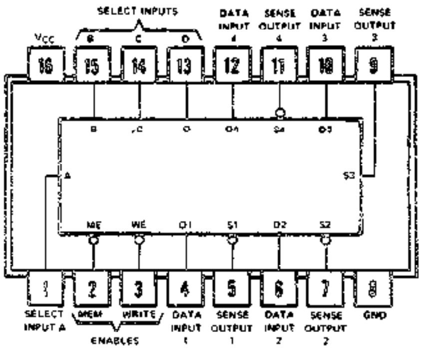
ECG74H87



4-Bit True/Complement Zero/One Element

Diag. 80 — 16-Pin DIP See Fig. D8

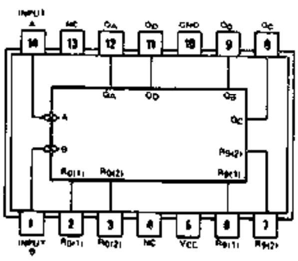
ECG7489



64-Bit RAM (16 x 4)

Diag. 81 — 14-Pin DIP See Fig. D6

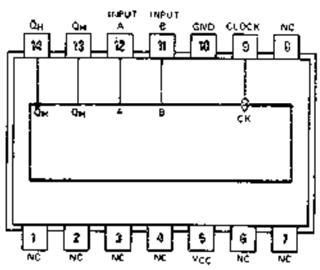
ECG7490, ECG74C90, ECG74LS90



Decade Counter

Diag. 82 — 14-Pin DIP See Fig. D6

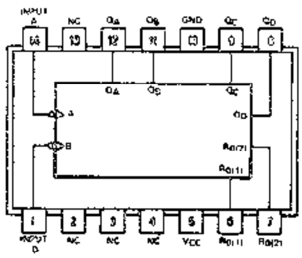
ECG7491, ECG74LS91



8-Bit Serial Shift Register

Diag. 83 — 14-Pin DIP See Fig. D6

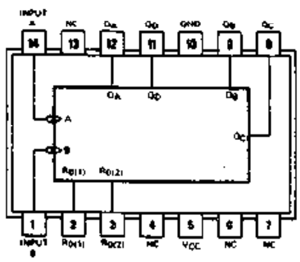
ECG7492, ECG74LS92



Divide-by-12 Counter

Diag. 84 — 14-Pin DIP See Fig. D6

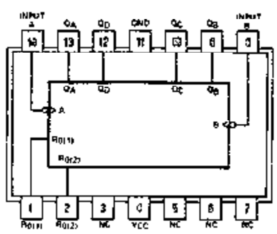
ECG7493A, ECG74LS93



4-Bit Binary Counter

Diag. 85 — 14-Pin DIP See Fig. D6

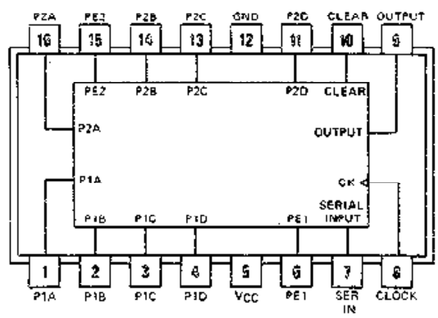
ECG74C93, ECG74L93



4-Bit Binary Counter

Diag. 86 — 16-Pin DIP See Fig. D8

ECG7494

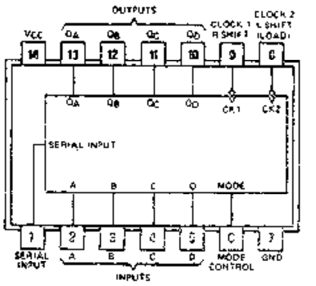


4-Bit Serial or Parallel Shift Register

Package Outlines - See Page 1-367

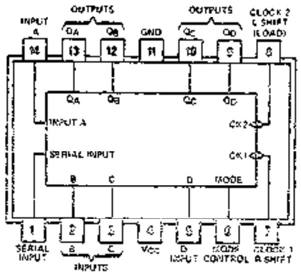
TTL Logic Diagrams (cont'd)

Diag. 87 — 14-Pin DIP See Fig. D6
(See also Diag. 88)
ECG7495, ECG74LS95B



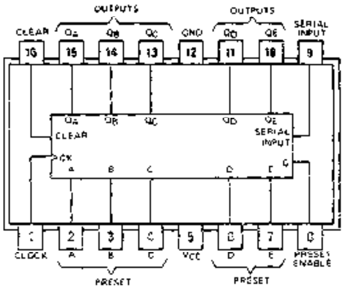
4-Bit Bidirectional or Parallel Shift Register

Diag. 88 — 14-Pin DIP See Fig. D6
(See also Diag. 87)
ECG74C95



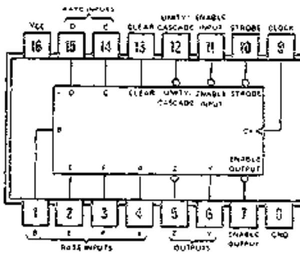
4-Bit Bidirectional Parallel Shift Register

Diag. 89 — 16-Pin DIP See Fig. D8
ECG7496



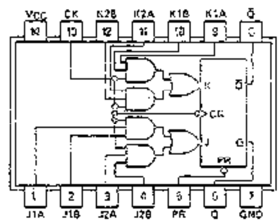
5-Bit Serial-In/Parallel-Out or Parallel-In/Serial-Out Shift Register

Diag. 90 — 16-Pin DIP See Fig. D8
ECG7497



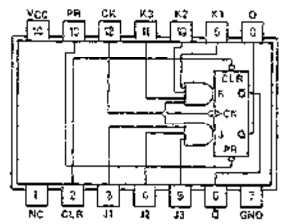
Synchronous 6-Bit Binary Rate Multiplier

Diag. 91 — 14-Pin DIP See Fig. D6
ECG74H101



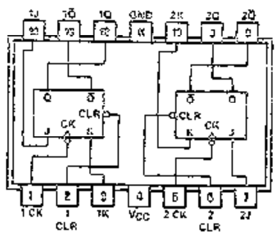
Gated J-K Negative Edge Triggered Flip-Flop with Preset

Diag. 92 — 14- Pin DIP See Fig. D6
ECG74H102



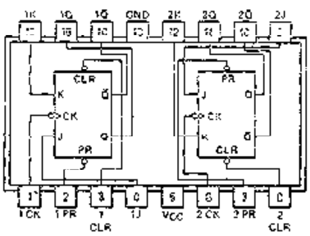
Gated J-K Negative Edge Triggered Flip-Flop with Preset and Clear

Diag. 93 — 14-Pin DIP See Fig. D6
ECG74H103



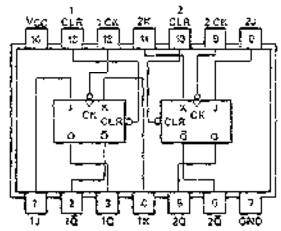
Dual J-K Negative Edge Triggered Flip-Flop with Clear

Diag. 94 — 16-Pin DIP See Fig. D8
ECG74H106



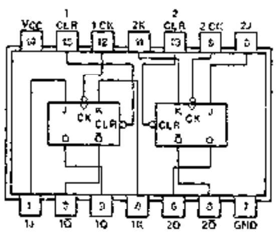
Dual J-K Negative Edge Triggered Flip-Flop with Clear

Diag. 95 — 14-Pin DIP See Fig. D6
(See also Diag. 96)
ECG74107



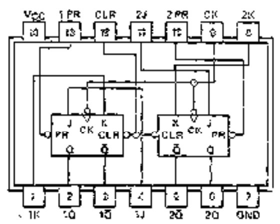
Dual J-K M/S Flip-Flop with Clear

Diag. 96 — 14-Pin DIP See Fig. D6
(See also Diag. 95)
ECG74C107, ECG74LS107



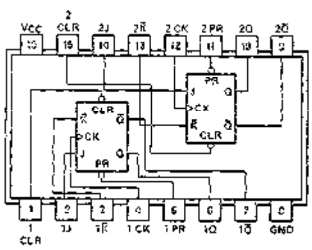
Dual J-K Negative Edge Triggered Flip-Flop with Clear

Diag. 97 — 14-Pin DIP See Fig. D6
ECG74H108



Dual J-K Negative Edge Triggered Flip-Flop with Clear

Diag. 98 — 16-Pin DIP See Fig. D8
ECG74109, ECG74HC109, ECG74LS109A

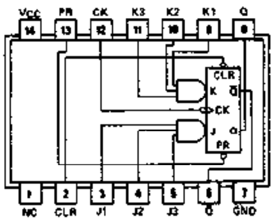


Dual J-$\bar{K}$ Positive Edge Triggered Flip-Flop with Preset and Clear

Package Outlines - See Page 1-367

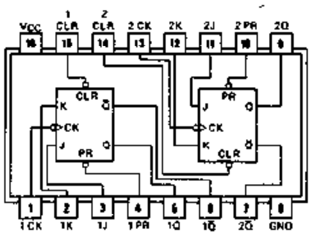
TTL Logic Diagrams (cont'd)

Diag. 99 — 14-Pin DIP See Fig. D6
ECG74110



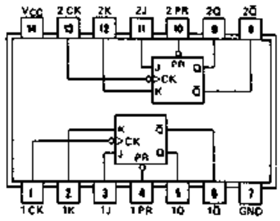
Gated J-K M/S Flip-Flop with Preset and Clear

Diag. 101 — 16-Pin DIP See Fig. D8
ECG74LS112A, ECG74S112



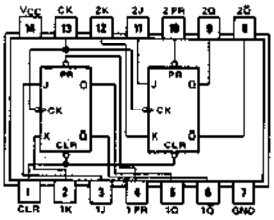
Dual J-K Negative Edge Triggered Flip-Flop with Preset and Clear

Diag. 102 — 14-Pin DIP See Fig. D6
ECG74LS113, ECG74S113



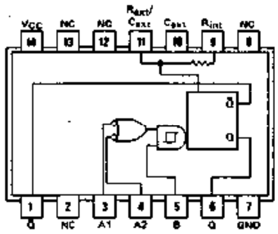
Dual J-K Negative Edge Triggered Flip-Flop with Preset

Diag. 103 — 14-Pin DIP See Fig. D6
ECG74LS114, ECG74S114



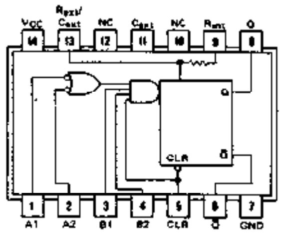
Dual J-K Negative Edge Triggered Flip-Flop with Presets and a Common Clock and Clear

Diag. 104 — 14-Pin DIP See Fig. D6
ECG74121



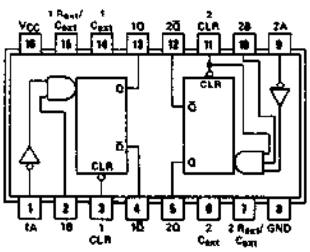
Monostable Multivibrator

Diag. 105 — 14-Pin DIP See Fig. D6
ECG74122, ECG74LS122



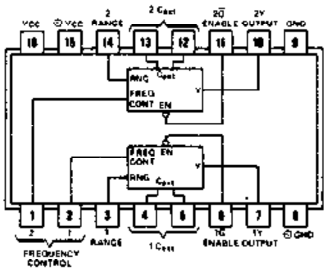
Retriggerable Monostable Multivibrator with Clear

Diag. 106 — 16-Pin DIP See Fig. D8
ECG74123, ECG74HC123, ECG74LS123



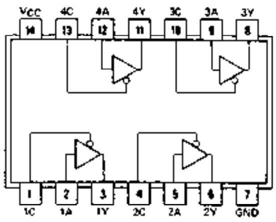
Dual Retriggerable Monostable Multivibrator with Clear

Diag. 107 — 16-Pin DIP See Fig. D8
ECG74S124



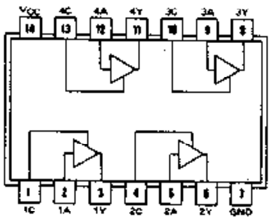
Dual Voltage Controlled Oscillator

Diag. 108 — 14-Pin DIP See Fig. D6
ECG74125, ECG74HC125, ECG74LS125A



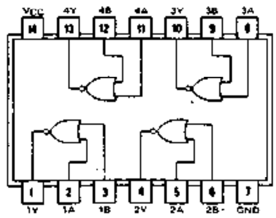
Quad Bus Buffer with 3-State Output (Active Low)

Diag. 109 — 14-Pin DIP See Fig. D6
ECG74126, ECG74HC126, ECG74LS126



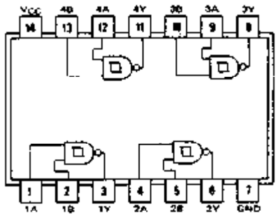
Quad Bus Buffer with 3-State Output (Active High)

Diag. 110 — 14-Pin DIP See Fig. D6
ECG74128



Quad 2-Input NOR 50 Ohm Line Driver

Diag. 111 — 14-Pin DIP See Fig. D6
ECG74132, ECG74HC132, ECG74LS132

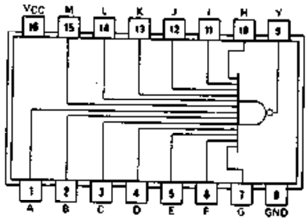


Quad 2-Input NAND Schmitt Trigger

Package Outlines - See Page 1-367

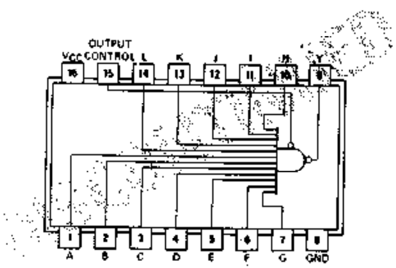
TTL Logic Diagrams (cont'd)

Diag. 112 16-Pin DIP See Fig. D8
ECG74LS133, ECG74S133



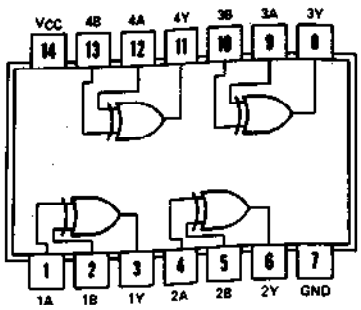
13-Input NAND Gate

Diag. 113 16-Pin DIP See Fig. D8
ECG74S134



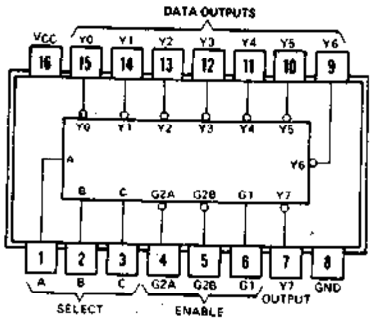
12-Input NAND Gate with 3-State Output

Diag. 114 14-Pin DIP See Fig. D6
ECG74136, ECG74LS136



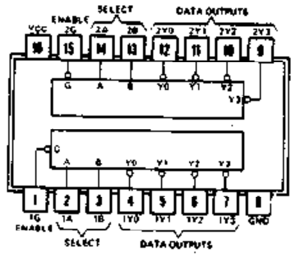
Quad Exclusive OR Gate with Open Collector Output

Diag. 115 16-Pin DIP See Fig. D8
ECG74HC138, ECG74HCT138, ECG74LS138, ECG74S138



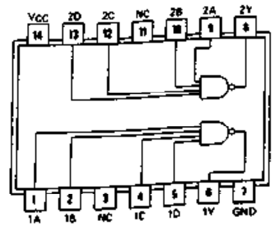
3-Line-to-8-Line Decoder/Demultiplexer

Diag. 116 16-Pin DIP See Fig. D8
ECG74HC139, ECG74LS139



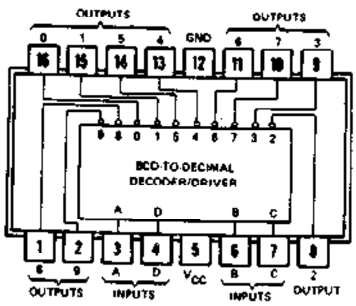
Dual 2-Line-to-4-Line Decoder/Demultiplexer

Diag. 117 14-Pin DIP See Fig. D6
ECG74S140



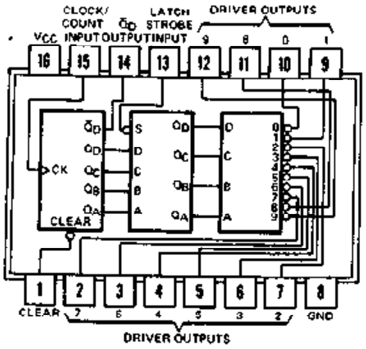
Dual 4-Input NAND 50 Ohm Line Driver

Diag. 118 16-Pin DIP See Fig. D8
ECG74141



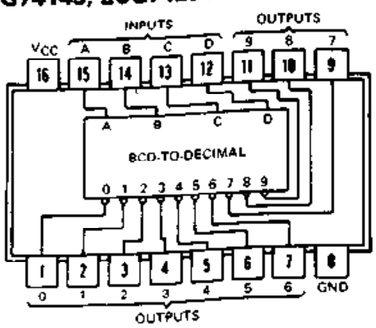
BCD-to-Decimal Decoder/Driver for Cold Cathode Tubes

Diag. 119 16-Pin DIP See Fig. D8
ECG74142



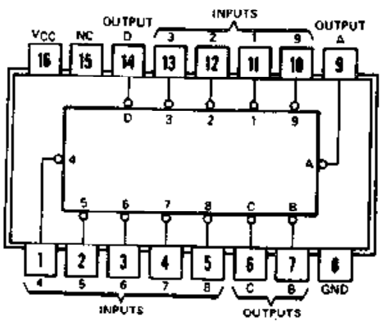
BCD Counter/4-Bit Latch/BCD Decoder/Driver

Diag. 122 16-Pin DIP See Fig. D8
ECG74145, ECG74LS145



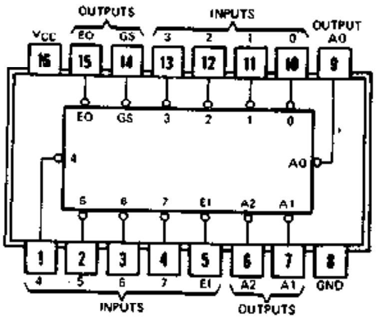
BCD-to-Decimal Decoder Driver with Open Collector Output

Diag. 123 16-Pin DIP See Fig. D8
ECG74147*, ECG74LS147



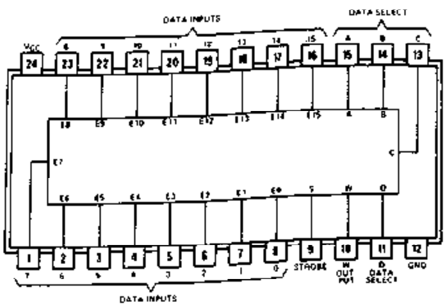
Decimal-to-BCD-Priority Encoder
*Discontinued

Diag. 124 16-Pin DIP See Fig. D8
ECG74LS148



8-Line-to-3-Line Octal Priority Encoder

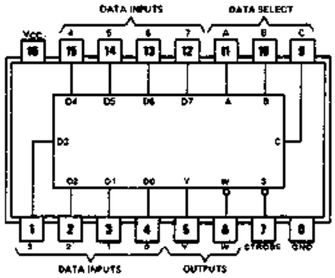
Diag. 125 24-Pin DIP See Fig. D15
ECG74150



16-Line-to-1-Line Data Selector/Multiplexer

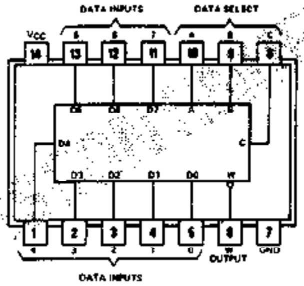
Package Outlines - See Page 1-367

Diag. 126 16-Pin DIP See Fig. D8
ECG74151, ECG74C151, ECG74HC151, ECG74LS151, ECG74S151*



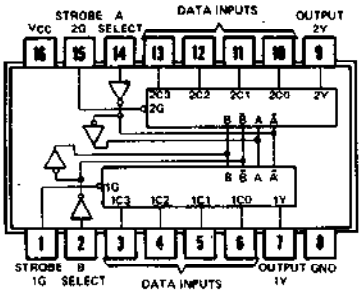
8-Line-to-1-Line Data Selector/Multiplexer with Strobe *Discontinued

Diag. 127 14-Pin DIP See Fig. D6
ECG74152



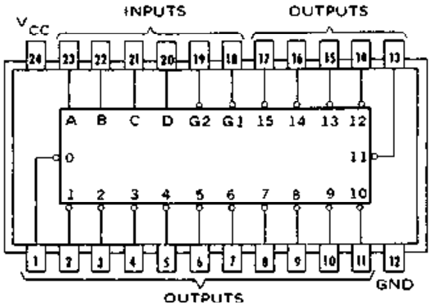
8-Line-to-1-Line Data Selector/Multiplexer

Diag. 128 16-Pin DIP See Fig. D8
ECG74153, ECG74HC153, ECG74LS153, ECG74S153*



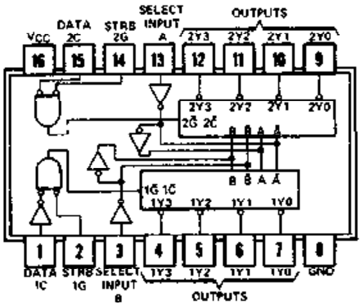
Dual 4-Line-to-1-Line Data Selector/Multiplexer *Discontinued

Diag. 129 24-Pin DIP See Fig. D15
ECG74154, ECG74C154, ECG74HC154



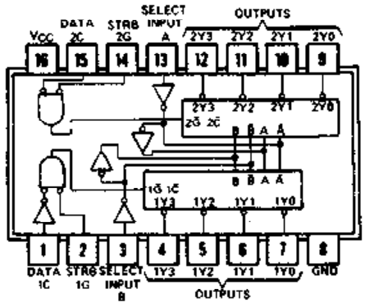
4-Line-to-16-Line Decoder/Demultiplexer

Diag. 130 16-Pin DIP See Fig. D8
ECG74155, ECG74LS155



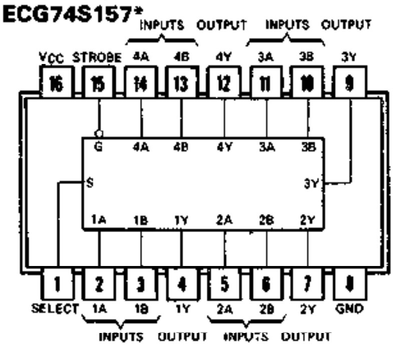
Dual 1-Line-to-4-Line Decoder/Demultiplexer

Diag. 131 16-Pin DIP See Fig. D8
ECG74156, ECG74LS156



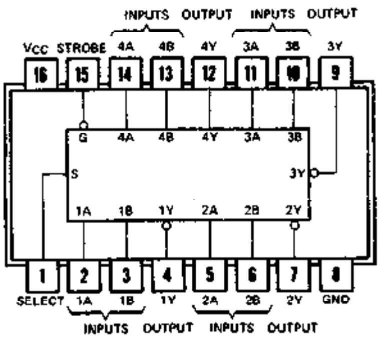
Dual 1-Line-to-4-Line Decoder/Demultiplexer with Open Collector Output

Diag. 132 16-Pin DIP See Fig. D8
ECG74157, ECG74C157, ECG72LS157, ECG74S157*



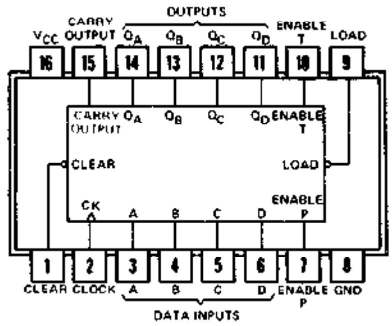
Quad 2-Line-to-1-Line Data Selector/Multiplexer with Non-Inverting Output *Discontinued

Diag. 133 16-Pin DIP See Fig. D8
ECG74158, ECG72LS158, ECG74S158*



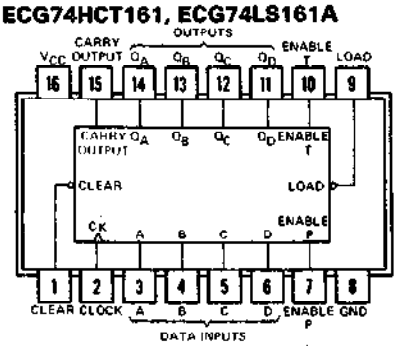
Quad 2-Line-to-1-Line Data Selector/Multiplexer with Inverting Output *Discontinued

Diag. 134 16-Pin DIP See Fig. D8
ECG74160, ECG74LS160A



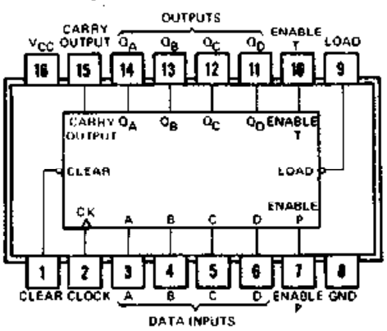
Presettable Synchronous Decade Counter with Direct Clear

Diag. 135 16-Pin DIP See Fig. D8
ECG74161, ECG74C161, ECG74HC161, ECG74HCT161, ECG74LS161A



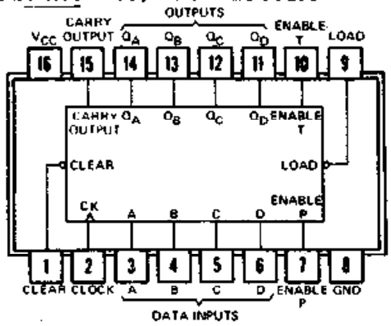
Presettable Synchronous 4-Bit Binary Counter with Direct Clear

Diag. 136 16-Pin DIP See Fig. D8
ECG74162, ECG74LS162A



Presettable Synchronous Decade Counter with Synchronous Clear

Diag. 137 16-Pin DIP See Fig. D8
ECG74163, ECG74HC163, ECG74HCT163, ECG74LS163A



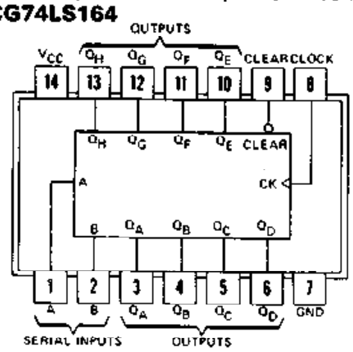
Presettable Synchronous 4-Bit Binary Counter with Synchronous Clear

Package Outlines - See Page 1-367

TTL Logic Diagrams (cont'd)

Diag. 138 — 14-Pin DIP See Fig. D6

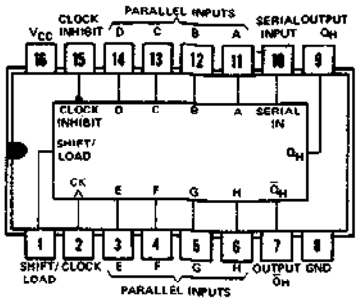
ECG74164, ECG74C164, ECG74HC164, ECG74LS164



8-Bit Serial-In/Parallel-Out Shift Register

Diag. 139 — 16-Pin DIP See Fig. D8

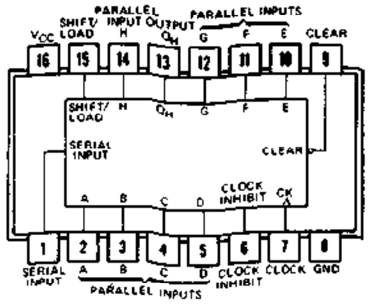
ECG74165, ECG74HC165, ECG74LS165



8-Bit Parallel-In/Serial-Out Shift Register

Diag. 140 — 16-Pin DIP See Fig. D8

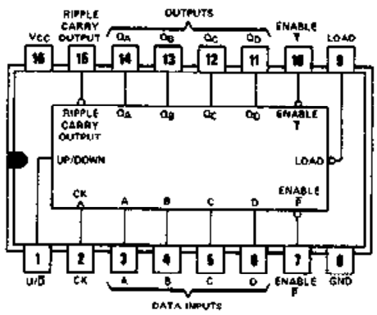
ECG74166, ECG74LS166



8-Bit Serial or Parallel-In/Serial-Out Shift Register

Diag. 141 — 16-Pin DIP See Fig. D8

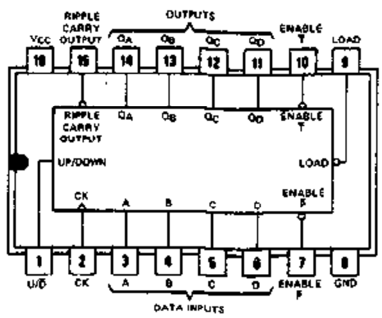
ECG74LS168A



Presettable Synchronous Decade Up/Down Counter

Diag. 142 — 16-Pin DIP See Fig. D8

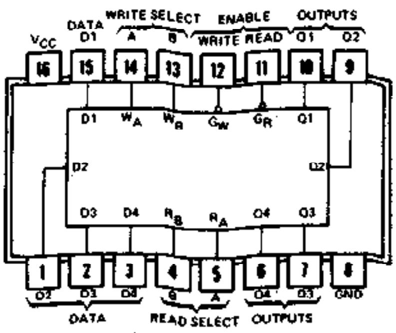
ECG74LS169A



Presettable Synchronous 4-Bit Binary Up/Down Counter

Diag. 143 — 16-Pin DIP See Fig. D8

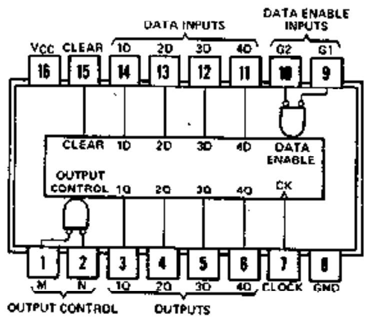
ECG74170, ECG74LS170



4 x 4 Register File with Open Collector Output

Diag. 144 — 16-Pin DIP See Fig. D8

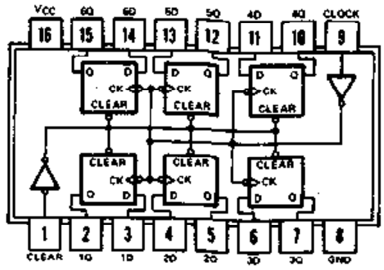
ECG74173, ECG74C173, ECG74HC173, ECG74LS173



4-Bit "D" Register with 3-State Output

Diag. 145 — 16-Pin DIP See Fig. D8

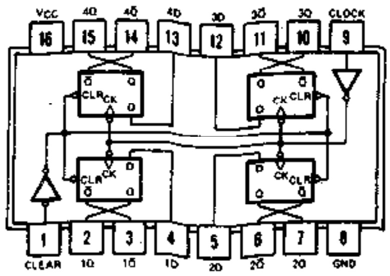
ECG74174, ECG74C174, ECG74HC174, ECG74HCT174, ECG74LS174, ECG74S174



Hex "D" Flip-Flop with Clear

Diag. 146 — 16-Pin DIP See Fig. D8

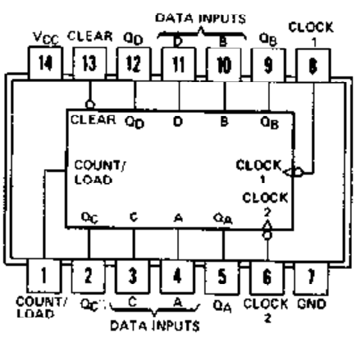
ECG74175, ECG74C175, ECG74HC175, ECG74LS175, ECG74S175



Quad "D" Flip-Flop with Complementary Outputs

Diag. 147 — 14-Pin DIP See Fig. D6

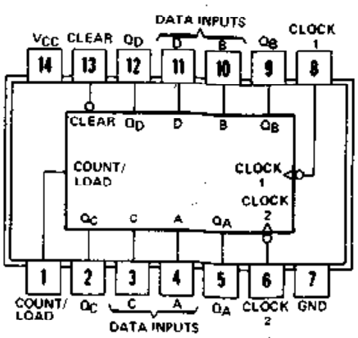
ECG74176



Presettable Decade Counter/Latch

Diag. 148 — 14-Pin DIP See Fig. D6

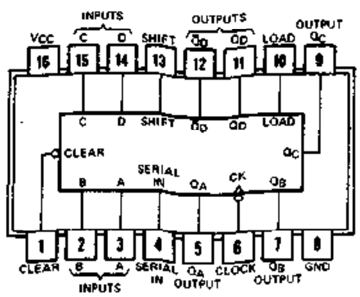
ECG74177



Presettable 4-Bit Binary Counter/Latch

Diag. 150 — 16-Pin DIP See Fig. D8

ECG74179

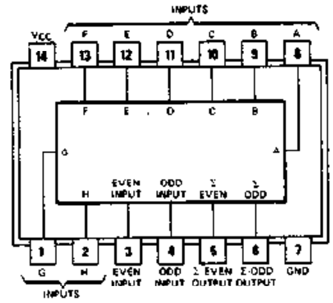


4-Bit Parallel Shift Register with Complementary Final Stage

Package Outlines - See Page 1-367

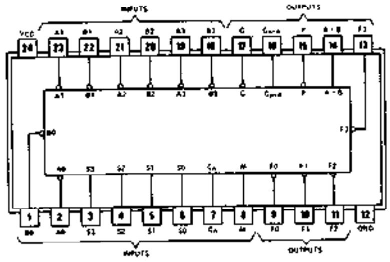
TTL Logic Diagrams (cont'd)

Diag. 151 14-Pin DIP See Fig. D6
ECG74180



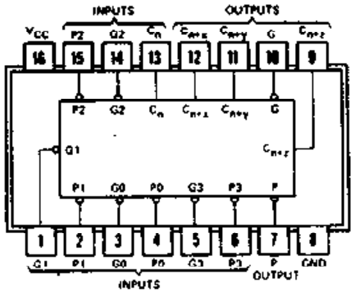
9-Bit Odd/Even Parity Generator/Checker

Diag. 152 24-Pin DIP See Fig. D15
ECG74181, ECG74LS181, ECG74S181



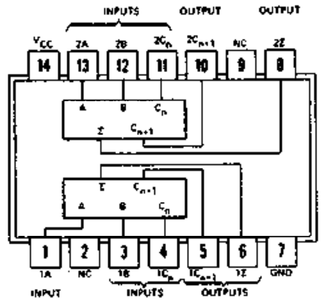
Arithmetic Logic Unit (ALU)/Function Generator

Diag. 153 16-Pin DIP See Fig. D8
ECG74182



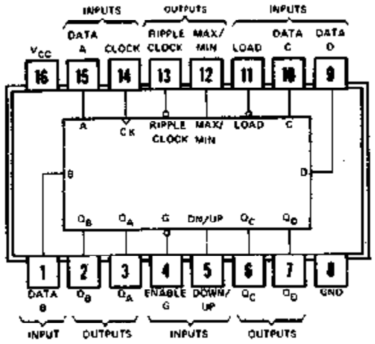
Look-Ahead Carry Generator

Diag. 154 14-Pin DIP See Fig. D6
ECG74H183



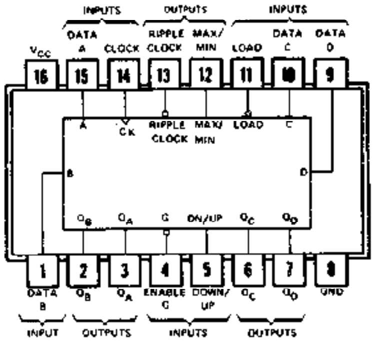
Dual Carry/Save Adder

Diag. 155 16-Pin DIP See Fig. D8
ECG74190*, ECG74LS190



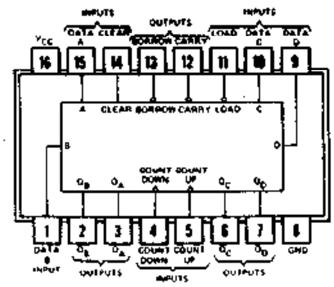
Presettable Synchronous Decade Up/Down Counter *Discontinued

Diag. 156 16-Pin DIP See Fig. D8
ECG74191, ECG74LS191



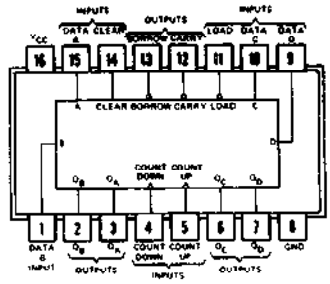
Presettable Synchronous 4-Bit Binary Up/Down Counter

Diag. 157 16-Pin DIP See Fig. D8
ECG74192, ECG74C192, ECG74LS192



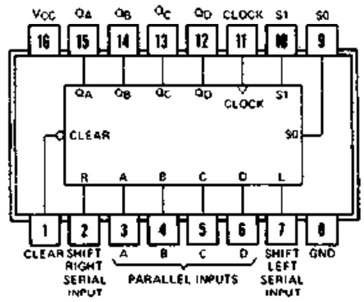
Presettable Synchronous Decade Up/Down Counter with Dual Clocks

Diag. 158 16-Pin DIP See Fig. D8
ECG74193, ECG74C193, ECG74LS193



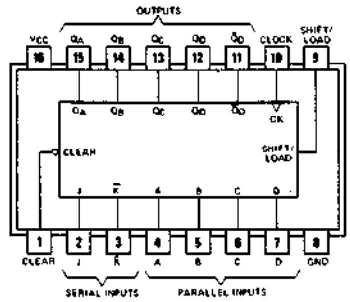
Presettable Synchronous 4-Bit Binary Up/Down Counter with Dual Clocks

Diag. 159 16-Pin DIP See Fig. D8
ECG74LS194A, ECG74S194



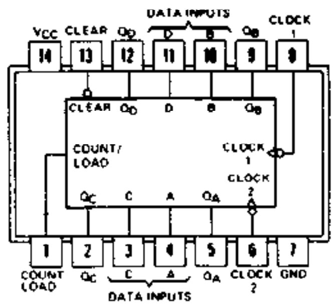
4-Bit Bidirectional Parallel Shift Register

Diag. 160 16-Pin DIP See Fig. D8
ECG74195, ECG74LS195A



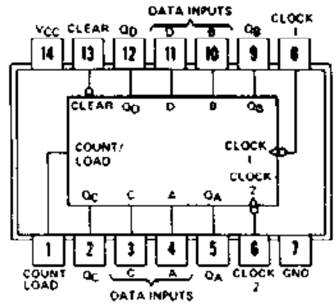
4-Bit Parallel Shift Register with Complementary Final Stage

Diag. 161 14-Pin DIP See Fig. D6
ECG74196, ECG74LS196



Presettable Decade Counter/Latch

Diag. 162 14-Pin DIP See Fig. D6
ECG74197, ECG74LS197



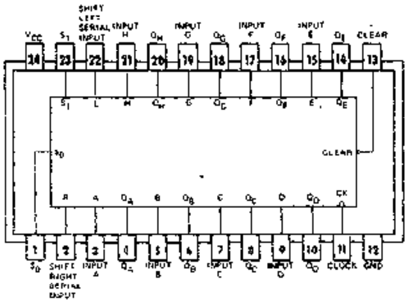
Presettable 4-Bit Binary Counter/Latch

Package Outlines - See Page 1-367

TTL Logic Diagrams (cont'd)

Diag. 163 24-Pin DIP See Fig. D15

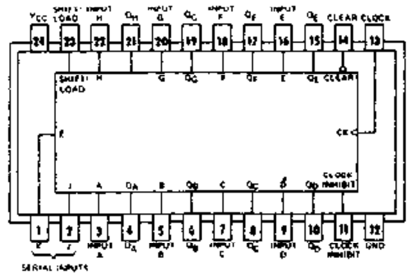
ECG74198



8-Bit Bidirectional Parallel Shift Register

Diag. 164 24-Pin DIP See Fig. D15

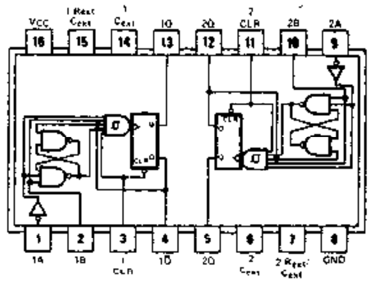
ECG74199



8-Bit Serial or Parallel-In/Parallel-Out Shift Register

Diag. 165 16-Pin DIP See Fig. D8

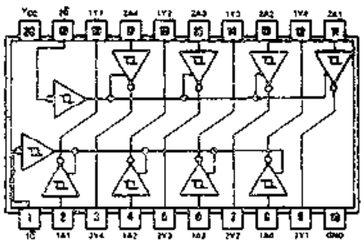
ECG74221, ECG74C221, ECG74LS221



Dual Monostable Multivibrator

Diag. 166 20-Pin DIP See Fig. D12

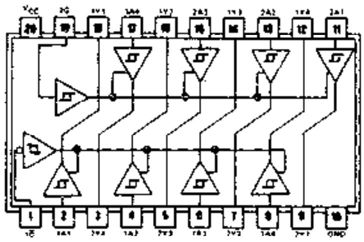
ECG74C240, ECG74HC240, ECG74HCT240, ECG74LS240



Octal Buffer/Line Driver/Line Receiver with Inverting 3-State Output

Diag. 167 20-Pin DIP See Fig. D12

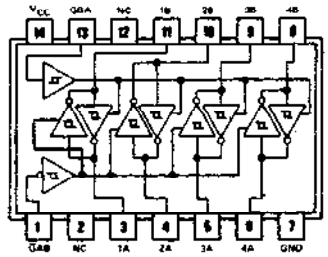
ECG74LS241



Octal Buffer/Line Driver/Line Receiver with Non-Inverting 3-State Output

Diag. 168 14-Pin DIP See Fig. D6

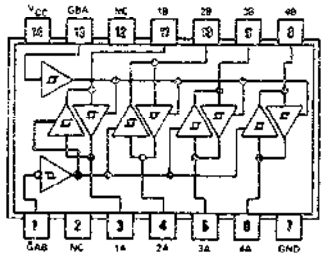
ECG74LS242



Quad Bus Transceiver with Inverting 3-State Output

Diag. 169 14-Pin DIP See Fig. D6

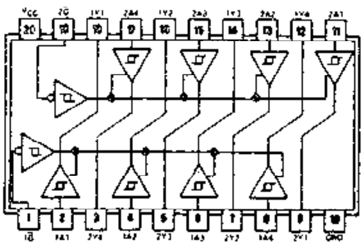
ECG74LS243



Quad Bus Transceiver with Non-Inverting 3-State Output

Diag. 170 20-Pin DIP See Fig. D12

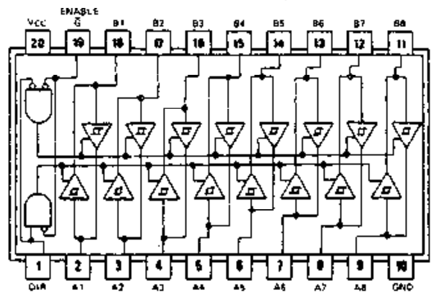
ECG74C244, ECG74HC244, ECG74HCT244, ECG74LS244



Octal Buffer/Line Driver/Line Receiver with Non-Inverting 3-State Output

Diag. 171 20-Pin DIP See Fig. D12

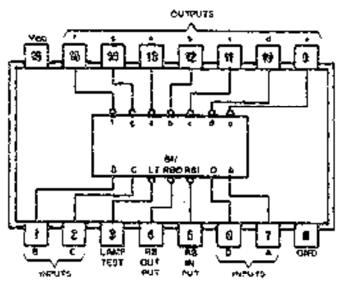
ECG74LS245



Octal Bus Transceiver with Non-Inverting 3-State Output

Diag. 172 16-Pin DIP See Fig. D8

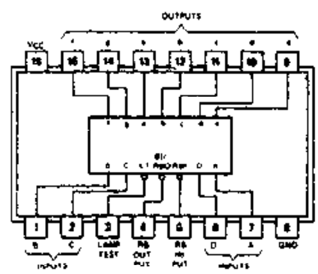
ECG74LS247



BCD-to7-Segment Decoder/Driver with Hi-Volt (15 V) Open Collector Output

Diag. 173 16-Pin DIP See Fig. D8

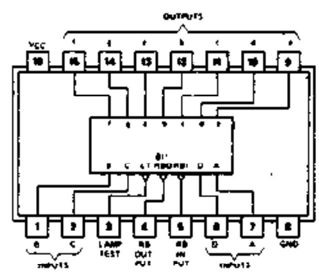
ECG74LS248



BCD-to7-Segment Decoder/Driver

Diag. 174 16-Pin DIP See Fig. D8

ECG74249, ECG74LS249



BCD-to-7-Segment Decoder/Driver with Open Collector Output

Package Outlines - See Page 1-367