T-73-53

# ECG Semiconductors

# ECG919, ECG919D

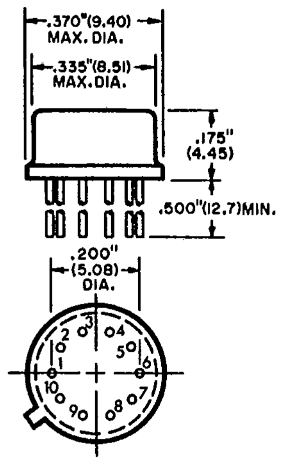
**Dual Hi-Speed Comparator**

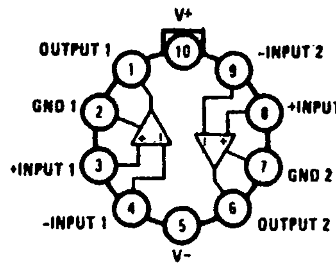
**Features**
- **Two independent comparators**
- **Operates from a single 5V supply**
- **Typically 80ns response time at ±15V**
- **Minimum fan-out of 2 each side**
- **Maximum input current of 1 μA over temperature**
- **Inputs and outputs can be isolated from system ground**
- **High common mode slew rate**

ECG919 and ECG919D are precision high speed dual comparators fabricated on a single monolithic chip. They are designed to operate over a wide range of supply voltages down to a single 5V logic supply and ground. Further, they have higher gain and lower input currents than other devices. The uncommitted collector of the output stage makes them compatible with RTL, DTL and TTL as well as capable of driving lamps and relays at currents up to 25mA.

Although designed primarily for applications requiring operation from digital logic supplies, they are fully specified for power supplies up to ±15V. It features faster response than other comparators at the expense of higher power dissipation. However, the high speed, wide operating voltage range and low package count make them much more versatile than older devices.

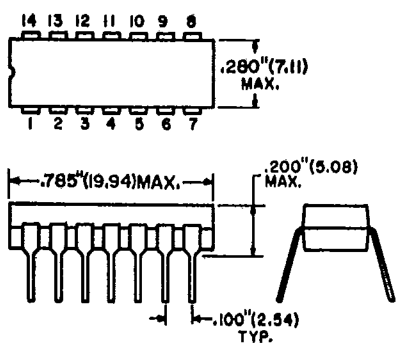
**ECG919**

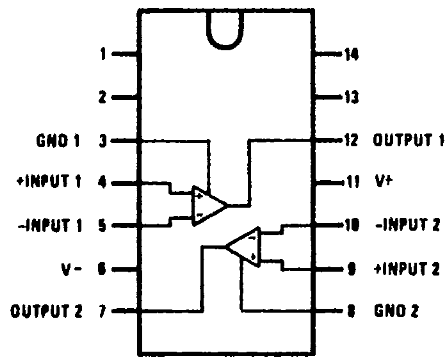



TOP VIEW

**ECG919D**




TOP VIEW

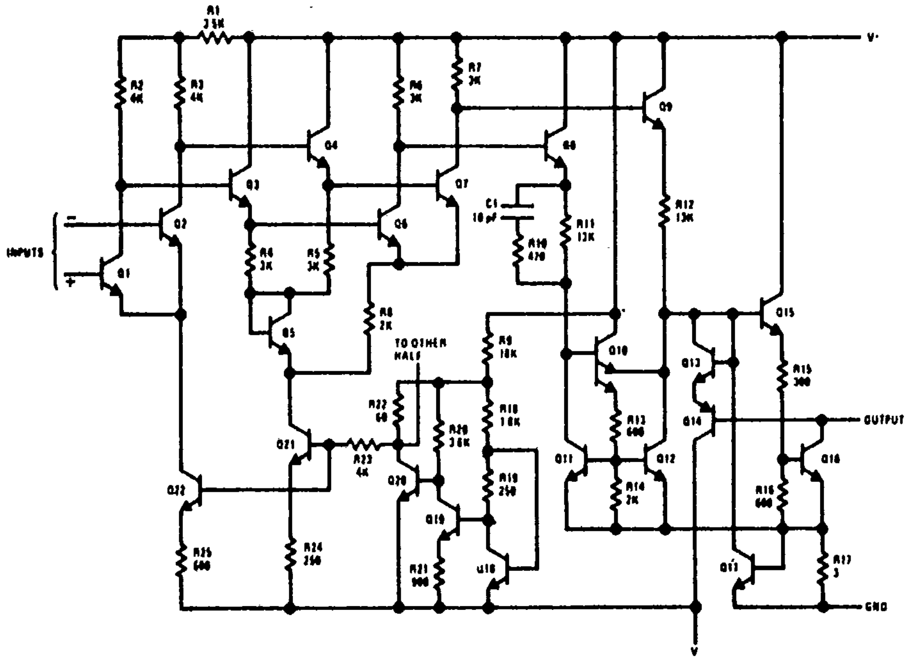
**Absolute Maximum Ratings**

Total Supply Voltage .......... 36V
Output to Negative Supply Voltage .......... 36V
Ground to Negative Supply Voltage .......... 25V
Ground to Positive Supply Voltage .......... 18V
Differential Input Voltage .......... ±5V
Input Voltage (Note 1) .......... ±15V
Power Dissipation (Note 2) .......... 500mW
Output Short Circuit Duration .......... 10 sec
Operating Temperature Range .......... 0°C to 70°C
Storage Temperature Range .......... −65°C to 150°C
Lead Temperature (Soldering, 10 seconds) .......... 300°C

**Note 1:** For supply voltages less than ±15V the absolute maximum input voltage is equal to the supply voltage.

**Note 2:** The maximum junction temperature is 85°C. For operating at elevated temperatures, devices in the TO-5 package must be derated based on a thermal resistance of 150°C/W, junction to ambient, or 45°C/W, junction to case. The thermal resistance of the dual-in-line package is 100°C/W, junction to ambient.

**Circuit Schematic**



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**Electrical Characteristics** (Note 3)

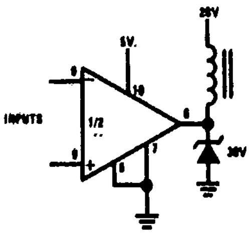
| Characteristic | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Input Offset Voltage (Note 4) | $V_{IO}$ | $T_A=25°C$, $R_S \leq 5k\Omega$ | | 2.0 | 8.0 | mV |
| Input Offset Current (Note 4) | $I_{IO}$ | $T_A=25°C$ | | 80 | 200 | nA |
| Input Bias Current | $I_B$ | $T_A=25°C$ | | 250 | 1000 | nA |
| Voltage Gain | $V_G$ | $T_A=25°C$ | 8 | 40 | | V/mV |
| Response Time (Note 5) | $t_{res}$ | $T_A=25°C$, $V_S=\pm15V$ | | 80 | | ns |
| Saturation Voltage | $V_{sat}$ | $V_{IN} \leq -10mV$, $I_{OUT}=25mA$, $T_A=25°C$ | | 0.75 | 1.5 | V |
| Output Leakage Current | | $V_{IN} \geq 10mV$, $V_{OUT}=35V$, $V^-=V_{GND}=0V$, $T_A=25°C$ | | 0.2 | 10 | μA |
| Input Offset Voltage (Note 4) | $V_{IO}$ | $R_S \leq 5k\Omega$ | | | 10 | mV |
| Input Offset Current (Note 4) | $I_{IO}$ | | | | 300 | nA |
| Input Bias Current | $I_B$ | | | | 1200 | nA |
| Input Voltage Range | $V_{Ir}$ | $V_S=\pm15V$,<br>$V^+=5V$, $V^-=0$ | <br>1 | ±13 | <br>3 | V<br>V |
| Saturation Voltage | $V_{sat}$ | $V^+ \geq 4.5V$, $V^-=0$, $V_{IN} \leq -10mV$, $I_{SINK} \leq 3.2mA$ | | 0.3 | 0.4 | V |
| Differential Input Voltage | $V_{ID}$ | | | | ±5 | V |
| Positive Supply Current | $+I_S$ | $T_A=25°C$, $V^+=5V$, $V^-=0$ | | 4.3 | | mA |
| Positive Supply Current | $+I_S$ | $T_A=25°C$, $V_S=\pm15V$ | | 8 | 12.5 | mA |
| Negative Supply Current | $-I_S$ | $T_A=25°C$, $V_S=\pm15V$ | | 3 | 5 | mA |

**Note 3:** These specifications apply for $V_S=\pm15V$ and $0°C \leq T_A \leq 70°C$, unless otherwise stated. The offset voltage, offset current and bias current specifications apply for any supply voltage from a single 5V supply up to ±15V supplies.

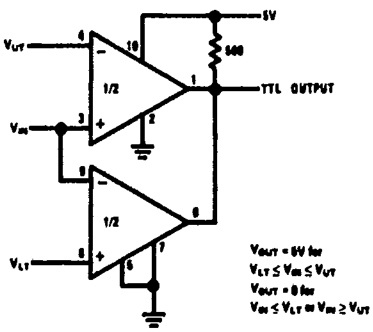
**Note 4:** The offset voltages and offset currents given are the maximum values required to drive the output within a volt of either supply with a 1mA load. Thus, these parameters define an error band and take into account the worst case effects of voltage gain and input impedance.

**Note 5:** The response time specified is for a 100mV input step with 5mV overdrive.

**Typical Applications**




**Relay Driver**




**Window Detector**

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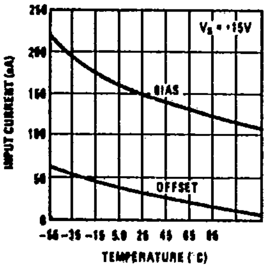
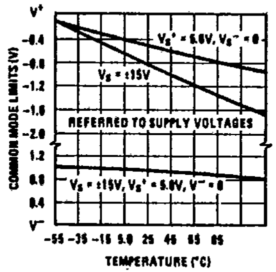
## Typical Performance Characteristics

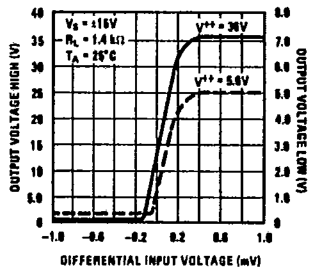
Input Currents



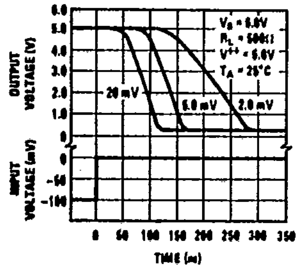

Common Mode Limits



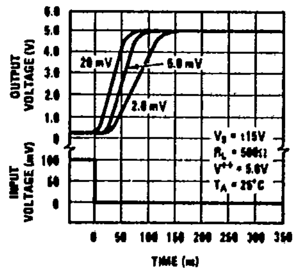

Transfer Function



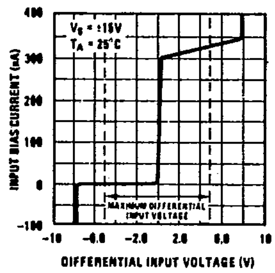

Response Time for Various Input Overdrives




Response Time for Various Input Overdrives




Input Characteristics

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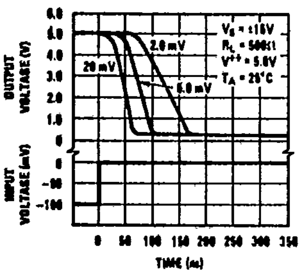
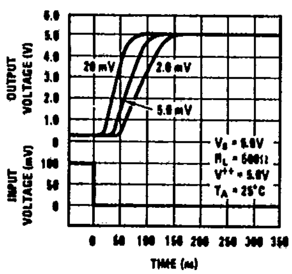
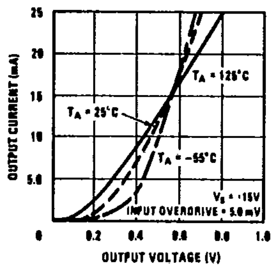


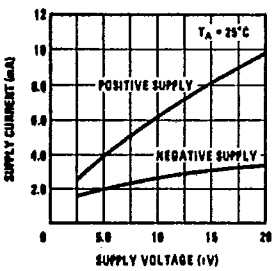

Response Time for Various Input Overdrives



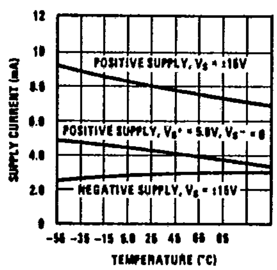

Output Saturation Voltage




Supply Current




Supply Current




Output Limiting Characteristics