



ECG910, ECG910D

HIGH-SPEED DIFFERENTIAL COMPARATOR

T-73-53

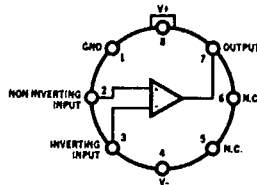
- 5 mV Maximum Offset Voltage
- 5 μ A Maximum Offset Current
- 1000 Minimum Voltage Gain
- 20 μ V/ $^{\circ}$ C Maximum Offset Voltage Drift

General Description - The ECG910 and ECG910D are differential voltage comparators intended for applications requiring high accuracy and fast response times. They are constructed on a single silicon chip. The devices are useful as variable threshold Schmidt triggers, pulse height discriminators, voltage comparators in high-speed A-D converters, memory sense amplifiers or high-noise immunity line receivers. The output of the comparators are compatible with all integrated logic forms.

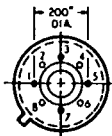
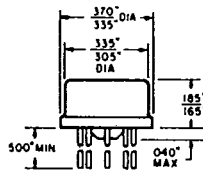
ABSOLUTE MAXIMUM RATINGS

| | |
|---------------------------------------|---------------------------------------|
| Positive Supply Voltage | +14.0 V |
| Negative Supply Voltage | -7.0 V |
| Peak Output Current | 10 mA |
| Differential Input Voltage | \pm 5.0 V |
| Input Voltage | \pm 7.0 V |
| Internal Power Dissipation (Note 1) | 300 mW |
| Operating Temperature Range | 0 $^{\circ}$ C to +70 $^{\circ}$ C |
| Storage Temperature Range | -65 $^{\circ}$ C to +150 $^{\circ}$ C |
| Lead Temperature (Soldering, 60 sec.) | 300 $^{\circ}$ C |

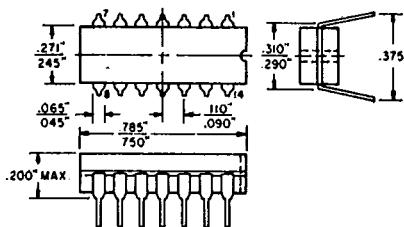
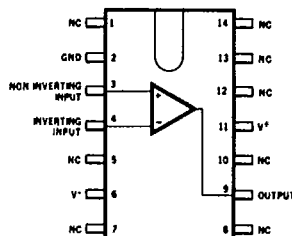
ECG910



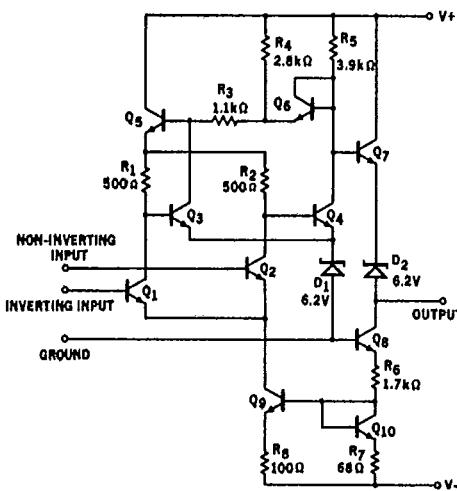
Note: Pin 4 connected to case



ECG910D



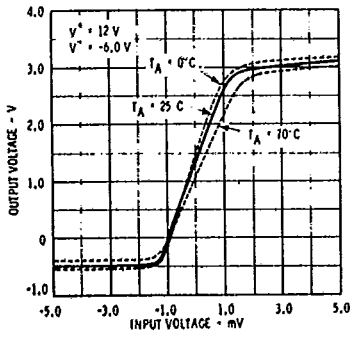
SCHEMATIC DIAGRAM



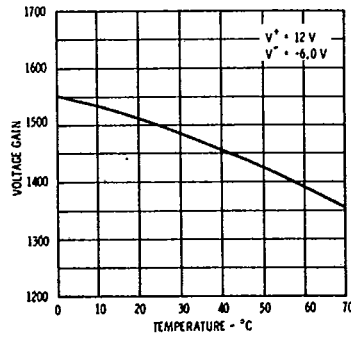
TYPICAL PERFORMANCE CURVES

T-73-53

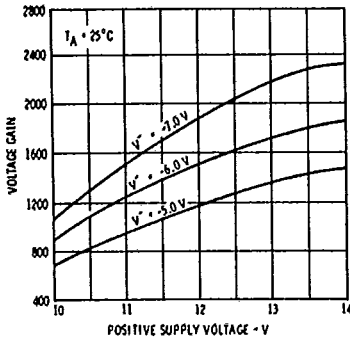
VOLTAGE TRANSFER CHARACTERISTIC



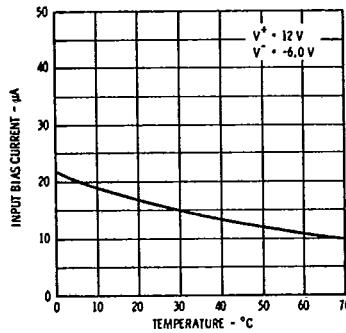
VOLTAGE GAIN AS A FUNCTION OF AMBIENT TEMPERATURE



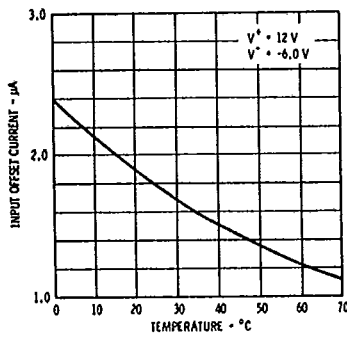
VOLTAGE GAIN AS A FUNCTION OF SUPPLY VOLTAGES



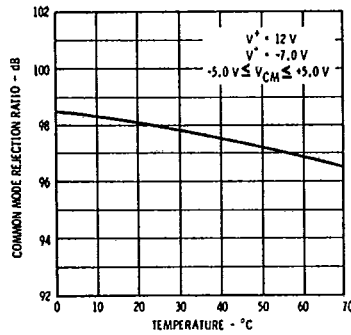
INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



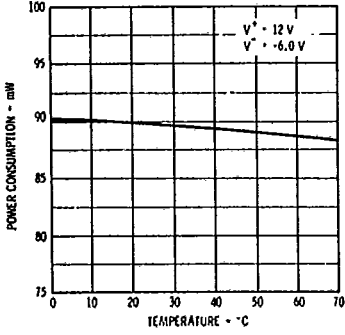
INPUT OFFSET CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



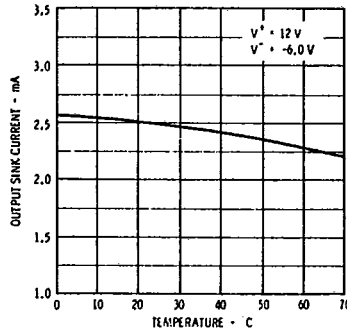
COMMON MODE REJECTION RATIO AS A FUNCTION OF AMBIENT TEMPERATURE



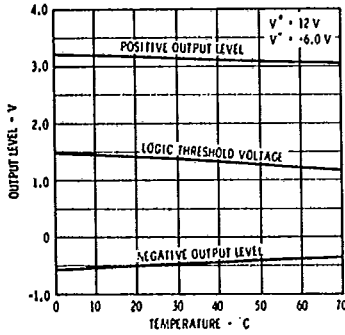
POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



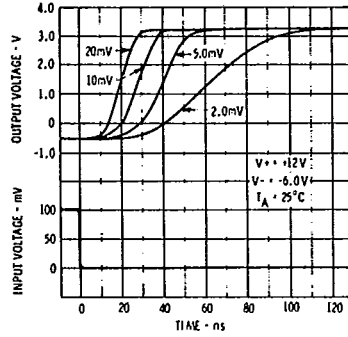
OUTPUT SINK CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



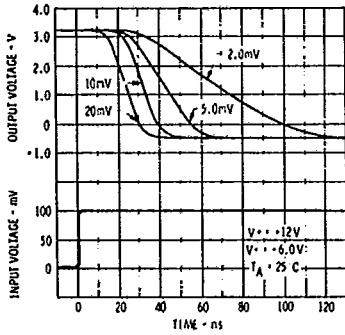
OUTPUT VOLTAGE LEVELS AS A FUNCTION OF AMBIENT TEMPERATURE



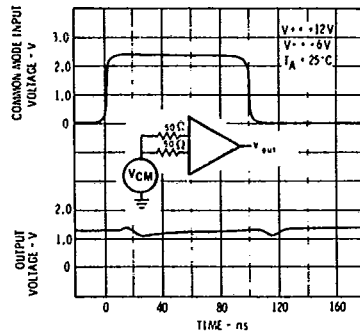
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



COMMON MODE PULSE RESPONSE



ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V^- = 12.0\text{V}$, $V^+ = -6.0\text{V}$ unless otherwise specified)

| PARAMETER (see definitions) | CONDITIONS (Note 3) | MIN. | TYP. | MAX. | UNITS |
|--------------------------------|--|------|------|------|---------------|
| Input Offset Voltage | $R_i \leq 200\Omega$ | | 1.6 | 5.0 | mV |
| Input Offset Current | | | 1.8 | 5.0 | μA |
| Input Bias Current | | | 16 | 25 | μA |
| Voltage Gain | | 1000 | 1500 | | |
| Output Resistance | | | 200 | | Ω |
| Output Sink Current | $\Delta V_o \geq 5\text{ mV}, V_{out} = 0$ | 1.6 | 2.5 | | mA |
| Response Time (Note 2) | | | 40 | | ns |

The following specifications apply for $0^\circ\text{C} \leq T_A \leq +70^\circ\text{C}$:

| | | | | | |
|---|--|-----------|----------|-----------|--|
| Input Offset Voltage | $R_i \leq 200\Omega$ | | | 6.5 | mV |
| Average Temperature Coefficient of Input Offset Voltage | $R_i \leq 50\Omega, T_A = 0^\circ\text{C}$ to $T_A = +70^\circ\text{C}$ | | 5.0 | 20 | $\mu\text{V}/^\circ\text{C}$ |
| Input Offset Current | | | | 7.5 | μA |
| Average Temperature Coefficient of Input Offset Current | $T_A = 25^\circ\text{C}$ to $T_A = +70^\circ\text{C}$ $T_A = 25^\circ\text{C}$ to $T_A = 0^\circ\text{C}$ | | 15 24 | 50 100 | nA/ $^\circ\text{C}$ nA/ $^\circ\text{C}$ |
| Input Bias Current | $T_A = 0^\circ\text{C}$ | | 25 | 40 | μA |
| Input Voltage Range | $V^- = -7.0\text{V}$ | ± 5.0 | | | V |
| Common Mode Rejection Ratio | $R_i \leq 200\Omega$ | 70 | 98 | | dB |
| Differential Input Voltage Range | | ± 5.0 | | | V |
| Voltage Gain | | 800 | | | |
| Positive Output Level | $\Delta V_o \geq 5\text{ mV}, 0 \leq I_{out} \leq 5.0\text{ mA}$ | 2.5 | 3.2 | 4.0 | V |
| Negative Output Level | $\Delta V_o \geq 5\text{ mV}$ | -1.0 | -0.5 | 0 | V |
| Output Sink Current | $\Delta V_o \geq 5\text{ mV}, V_{out} = 0$ | 0.5 | | | mA |
| Positive Supply Current | $V_{out} \leq 0$ | | 5.2 | 9.0 | mA |
| Negative Supply Current | | | 4.6 | 7.0 | mA |
| Power Consumption | | | 90 | 150 | mW |

NOTES:

- (1) Ratings apply for ambient temperatures to $+70^\circ\text{C}$.
- (2) The response time specified (see definitions) is for a 100-mV input step with 5-mV overdrive.
- (3) The input offset voltage and input offset current (see definitions) are specified for a logic threshold voltage of 1.5V at 0°C , 1.4V at $+25^\circ\text{C}$ and 1.2V at $+70^\circ\text{C}$.

DEFINITIONS

LOGIC THRESHOLD VOLTAGE — The approximate voltage at the output of the comparator at which the loading logic circuitry changes its digital state.

INPUT OFFSET VOLTAGE — The voltage between the input terminals when the output is at the logic threshold voltage. The input offset voltage may also be defined for the case where two equal resistances are inserted in series with the input leads.

INPUT OFFSET CURRENT — The difference in the currents into the two input terminals with the output at the logic threshold voltage.

INPUT BIAS CURRENT — The average of the two input currents.

INPUT VOLTAGE RANGE — The range of voltage on the input terminals for which the comparator will operate within specifications.

INPUT COMMON MODE REJECTION RATIO — The ratio of the input voltage range to the maximum change in input offset voltage over this range.

DIFFERENTIAL INPUT VOLTAGE RANGE — The range of voltage between the input terminals for which operation within specifications is assured.

VOLTAGE GAIN — The ratio of the change in output voltage to the change in voltage between the input terminals producing it with the DC output level in the vicinity of the logic threshold voltage.

RESPONSE TIME — The interval between the application of an input step function and the time when the output crosses the logic threshold voltage. The input step drives the comparator from some initial, saturated input voltage to an input level just barely in excess of that required to bring the output from saturation to the logic threshold voltage. This excess is referred to as the voltage overdrive.

POSITIVE OUTPUT LEVEL — The DC output voltage in the positive direction with the input voltage equal to or greater than a minimum specified amount.

NEGATIVE OUTPUT LEVEL — The DC output voltage in the negative direction with the input voltage equal to or greater than a minimum specified amount.

OUTPUT SINK CURRENT — The maximum negative current that can be delivered by the comparator.

PEAK OUTPUT CURRENT — The maximum current that may flow into the output load without causing damage to the comparator.

OUTPUT RESISTANCE — The resistance seen looking into the output terminal with the DC output level at the logic threshold voltage.

POWER CONSUMPTION — The DC power into the amplifier with no output load. The DC power will vary with signal level, but is specified as a maximum for the entire range of input-signal conditions.