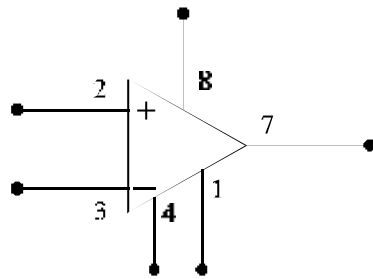
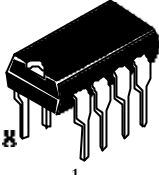


High Performance Voltage Comparators


LOGIC DIAGRAM



Input polarity is reversed when GND pin is used as an output.



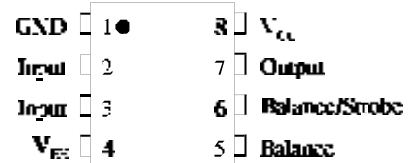
**N SUFFIX
PLASTIC**



**D SUFFIX
SOIC**

ORDERING INFORMATION
 LM311N Plastic
 LM311D SOIC
 $T_A = -45^{\circ}\text{C}$ to 85°C
 for all packages

PIN ASSIGNMENT



MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|--------------------------|--|--------------------------|------------------------------|
| $V_{CC} + V_{EE} $ | Total Supply Voltage | 36 | V |
| $V_O - V_{EE}$ | Output to Negative Supply Voltage | 40 | V |
| V_{EE} | Ground to Negative Supply Voltage | 30 | V |
| V_{ID} | Input Differential Voltage | ± 30 | V |
| V_{IN} | Input Voltage (Note) | ± 15 | V |
| - | Voltage at Strobe Pin | V_{CC} to $V_{CC} - 5$ | V |
| P_D $1/\theta_{JA}$ | Power Dissipation and Thermal Characteristics Plastic Dual In-Line Packages Derate above $T_A = +25^{\circ}\text{C}$ | 625 5.0 | mW mW/ $^{\circ}\text{C}$ |
| $T_{J(max)}$ | Operating Junction Temperature | +150 | $^{\circ}\text{C}$ |
| T_{stg} | Storage Temperature Range | -60 to +150 | $^{\circ}\text{C}$ |

Note: This rating applies for ± 15 volt supplies. The positive input voltage limit is 30 volts above the negative supply. The negative input voltage limit is equal to the negative supply voltage or 30 volts below the positive supply, whichever is less.



LM311

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|----------------------|--|-----|-----|------|
| $V_{CC+} V_{EE} $ | Total Supply Voltage | | 30 | V |
| T_A | Operating Temperature, All Package Types | -45 | +85 | °C |

ELECTRICAL CHARACTERISTICS ($V_{CC}=+15\text{ V}$, $V_{EE}=-15\text{ V}$, $T_A = +25^\circ\text{C}$ unless otherwise noted [Note 1])

| Symbol | Parameter | Test Conditions | Guaranteed Limits | | Unit |
|-----------|----------------------------------|---|-------------------|-------------------|------|
| | | | Min | Max | |
| V_{IO} | Input Offset Voltage (Note 2) | $R_S \leq 50\text{ k}\Omega$, $T_A = +25^\circ\text{C}$ $R_S \leq 50\text{ k}\Omega$, $-45^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$ | | 7.5 10 | mV |
| I_{IO} | Input Offset Current (Note 2) | $T_A = +25^\circ\text{C}$ $-45^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$ | | 50 100 | nA |
| I_{IB} | Input Bias Current | $T_A = +25^\circ\text{C}$ $T_A = -45^\circ\text{C}$ $T_A = +85^\circ\text{C}$ | | 250 375 500 | nA |
| A_V | Voltage Gain | | 150000 | | |
| t_{DLH} | Propagation Delay Time | | | 300 | ns |
| V_{DS} | Saturation Voltage | $T_A = +25^\circ\text{C}$ $V_{ID} \leq -10\text{ mV}$, $I_O = 50\text{ mA}$ | | 1.5 | V |
| V_{IR} | Input Voltage Range | | -14.5 | 13.0 | V |
| I_{CC} | Positive Supply Current | | | +7.5 | mA |
| I_{EE} | Negative Supply Current | | | -5.0 | mA |

NOTES:

- Offset voltage, offset current and bias current specifications apply for a supply voltage range from a single 5.0 volt supply up to ± 15 volt supplies.
- The offset voltages and offset currents given are the maximum values required to drive the output within a volt of either supply with a 1.0 mA load. Thus, these parameters define an error band and take into account the “worst case” effects of voltage gain and input impedance.