

TECHNICAL DATA

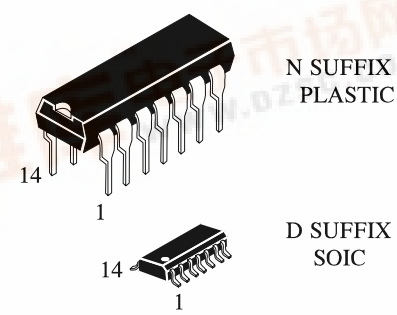
Quad Single Supply Comparator

IL339

The IL339 consists of four independent precision voltage comparators with an offset voltage specification as low as 2.0 mV max for four comparators which were designed specifically to operate from a single power supply over a wide range of voltages.

Application areas include limit comparators, simple analog to digital converters; pulse, squarewave and time delay generators; wide range VCO; MOS clock timers; multivibrators and high voltage digital logic gates.

- Single or Split Supply Operation
- Low Input Bias Current
- Low Input Offset Current
- Input Common Mode Voltage Range to Gnd
- Low Output Saturation Voltage
- TTL and CMOS Compatible

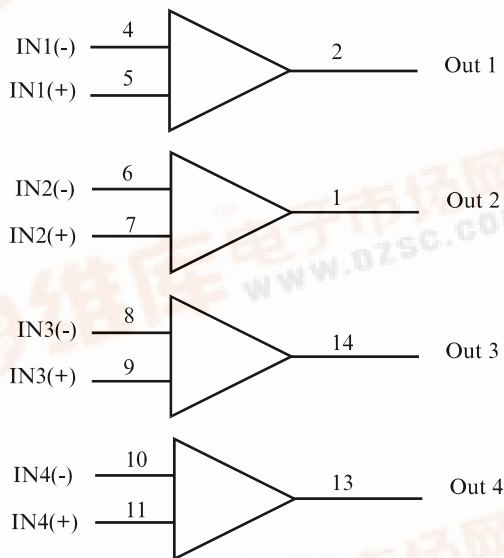


N SUFFIX PLASTIC

D SUFFIX SOIC

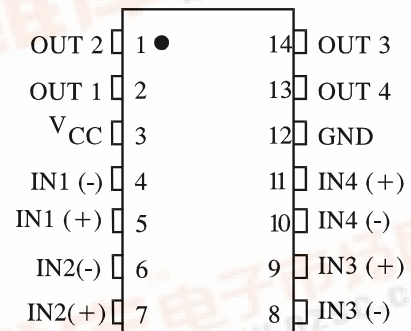
**ORDERING INFORMATION**  
 IL339N Plastic  
 IL339D SOIC  
 T<sub>A</sub> = -40° to 85° C for all packages.

LOGIC DIAGRAM



PIN 3 = V<sub>CC</sub>  
 PIN 12 = GND

PIN ASSIGNMENT



**MAXIMUM RATINGS\***

| Symbol           | Parameter                                      | Value                   | Unit  |
|------------------|--|-------------------------|-------|
| V <sub>CC</sub>  | Power Supply Voltages                          |                         |       |
|                  | Single Supply<br>Split Supplies                | 36<br>±18               | V     |
| V <sub>IDR</sub> | Input Differential Voltage Range               | 36                      | V     |
| V <sub>ICR</sub> | Input Common Mode Voltage Range (1)            | -0.3 to V <sub>CC</sub> | V     |
| I <sub>SC</sub>  | Output Short Circuit to Ground                 | Continuous              |       |
| I <sub>IN</sub>  | Input Current, per pin (2)                     | 50                      | mA    |
| T <sub>J</sub>   | Junction Temperature                           |                         |       |
|                  | Plastic Packages                               | 150                     | °C    |
| T <sub>stg</sub> | Storage Temperature                            | -65 to +150             | °C    |
| T <sub>L</sub>   | Lead Temperature, 1mm from Case for 10 Seconds | 260                     | °C    |
| P <sub>D</sub>   | Power Dissipation @T <sub>A</sub> =25°C        |                         |       |
|                  | Plastic Package                                | 1.0                     | W     |
|                  | Derate above 25°C                              | 8.0                     | mW/°C |

\*Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

Notes:

1. Split Power Supplies.
2. V<sub>IN</sub><-0.3V. This input current will only exist when voltage at any of the input leads is driven negative.

**RECOMMENDED OPERATING CONDITIONS**

| Symbol          | Parameter                                | Min            | Max          | Unit |
|-----------------|--|----------------|--------------|------|
| V <sub>CC</sub> | DC Supply Voltage                        | ±2.5 or<br>5.0 | ±15 or<br>30 | V    |
| T <sub>A</sub>  | Operating Temperature, All Package Types | -40            | +85          | °C   |

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V<sub>IN</sub> and V<sub>OUT</sub> should be constrained to the range GND≤(V<sub>IN</sub> or V<sub>OUT</sub>)≤V<sub>CC</sub>.

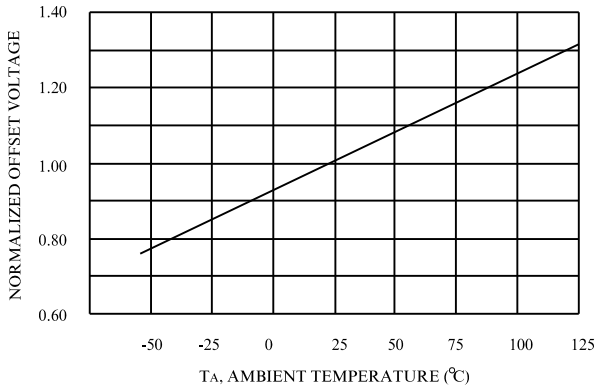
Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V<sub>CC</sub>). Unused outputs must be left open.

**DC ELECTRICAL CHARACTERISTICS** ( $T_A=-40$  to  $+85^\circ\text{C}$ )

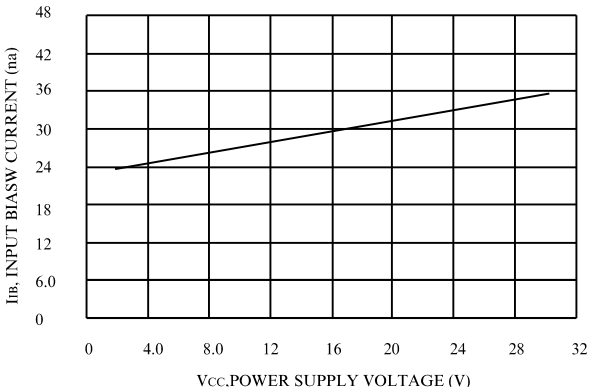
| Symbol     | Parameter                        | Test Conditions   | Guaranteed Limit |      |                      | Unit          |
|------------|----------------------------------|---|------------------|------|----------------------|---------------|
|            |                                  |   | Min              | Typ  | Max                  |               |
| $V_{IO}$   | Input Offset Voltage             | $V_0=1.4\text{V}$<br>$V_{CC}=5.0\text{-}30\text{V}; R_S \leq 100\Omega$<br>$V_{ICR}=0\text{V} - (V_{CC}-1.5)\text{V}$           | -                |      | 9.0<br>5.0*          | mV            |
| $I_{IB}$   | Input Bias Current               | $V_0=1.4\text{V}$<br>$V_{CC}=5.0\text{-}30\text{V}$<br>$V_{ICR}=0\text{V} - (V_{CC}-1.5)\text{V}$                               | -                |      | 400                  | nA            |
| $I_{IO}$   | Input Offset Current             | $V_0=1.4\text{V}$<br>$V_{CC}=5.0\text{-}30\text{V}$<br>$V_{ICR}=0\text{V} - (V_{CC}-1.5)\text{V}$                               | -                |      | $\pm 150$            | nA            |
| $V_{ICR}$  | Input Common Mode Voltage Range  | $V_{CC}=5.0\text{-}30\text{V}$  | 0                |      | $V_{CC}-2.0\text{V}$ | V             |
| $I_{CC}$   | Supply Current                   | $R_L=\infty, V_{CC}=5.0$<br>$R_L=\infty, V_{CC}=30\text{V}$   | -<br>-           |      | 2.0*<br>2.5*         | mA            |
| $A_{VOL}$  | Voltage Gain                     | $V_{CC}=15\text{V}, R_L=15\text{K}\Omega$   | -                | 200* | -                    | V/mV          |
| $t_1$      | Large Signal Response Time       | $V_{IN}=\text{TTL Logic Swing}$ ,<br>$V_{ref}=1.4\text{V}, V_{CC}=5.0\text{V}$ ,<br>$R_L=5.1\text{K}\Omega, V_{RL}=5.0\text{V}$ | -                | 300* | -                    | ns            |
| $t_2$      | Response Time                    | $V_{CC}=5.0\text{V}, R_L=5.1\text{K}\Omega$ ,<br>$V_{RL}=5.0\text{V}$   | -                | 1.3* | -                    | $\mu\text{s}$ |
| $I_{sink}$ | Output Sink Current              | $V_1(-)=1.0\text{V}, V_1(+)=0\text{V}$ ,<br>$V_0 \leq 1.5\text{V}, V_{CC}=5.0\text{V}$  | 6.0*             | -    | -                    | mA            |
| $V_{sat}$  | Saturation Voltage               | $V_1(-)=1.0\text{V}, V_1(+)=0\text{V}$ ,<br>$I_{sink} \leq 4.0\text{mA}, V_{CC}=5.0\text{V}$                                    | -                | -    | 700                  | mV            |
| $I_{OL}$   | Output Leakage Current           | $V_1(+)=1.0\text{V}, V_1(-)=0\text{V}$ ,<br>$V_0=5.0\text{V}$<br>$V_0=30\text{V}$   |                  | 0.1* | 1000                 | nA            |
| $V_{IDR}$  | Differential Input Voltage Range | All $V_{IN} \geq \text{GND}$ or V-Supply<br>(if used)   |                  |      | $V_{CC}^*$           | V             |

\*= $@25^\circ\text{C}$

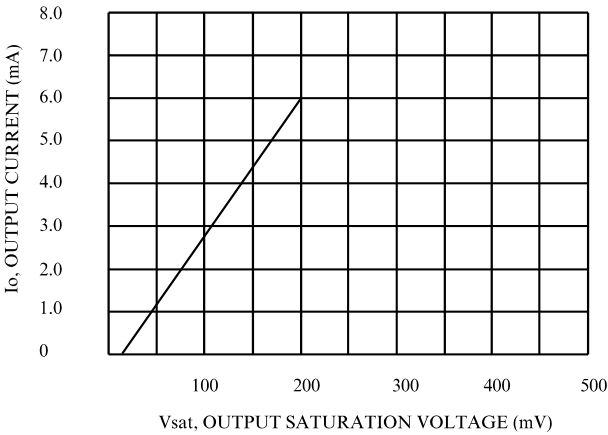
**TYPICAL PERFORMANCE CHARACTERISTICS**  
( $V_{CC}=1.5V$ ,  $T_A=+25^\circ C$ , (each comparator))



**Figure 1. Normalized Input Offset Voltage**

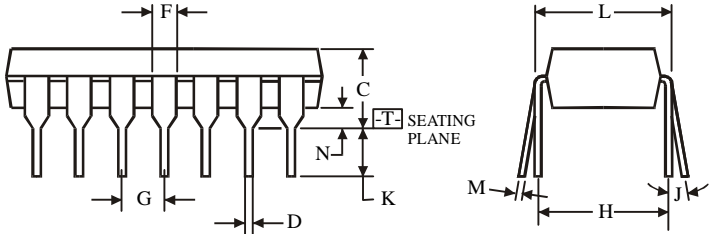
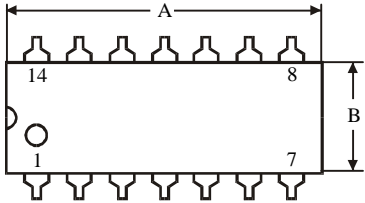
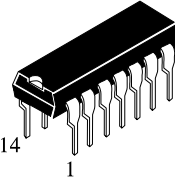


**Figure 2. Input Bias Current**



**Figure 3. Output Sink Current versus Output Saturation Voltage**

**N SUFFIX PLASTIC DIP  
(MS - 001AA)**



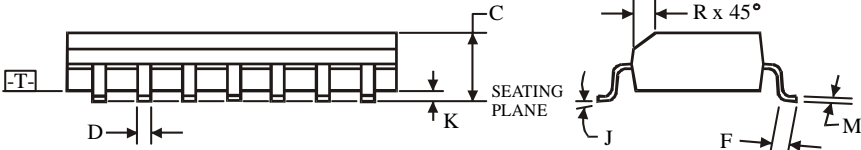
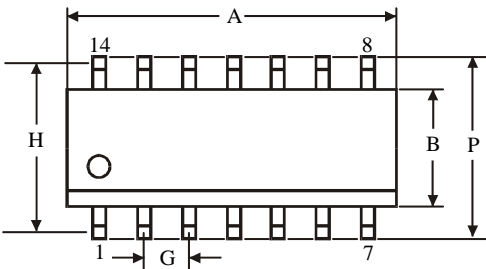
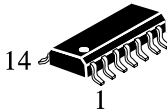
$\oplus 0.25 (0.010) \text{ (M) T}$

**NOTES:**

- 1. Dimensions "A", "B" do not include mold flash or protrusions.  
Maximum mold flash or protrusions 0.25 mm (0.010) per side.

|        | Dimension, mm |       |
|--------|---------------|-------|
| Symbol | MIN           | MAX   |
| A      | 18.67         | 19.69 |
| B      | 6.1           | 7.11  |
| C      |               | 5.33  |
| D      | 0.36          | 0.56  |
| F      | 1.14          | 1.78  |
| G      | 2.54          |       |
| H      | 7.62          |       |
| J      | 0°            | 10°   |
| K      | 2.92          | 3.81  |
| L      | 7.62          | 8.26  |
| M      | 0.2           | 0.36  |
| N      | 0.38          |       |

**D SUFFIX SOIC  
(MS - 012AB)**



$\oplus 0.25 (0.010) \text{ (M) T C (M)}$

**NOTES:**

- 1. Dimensions A and B do not include mold flash or protrusion.
- 2. Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B - 0.25 mm (0.010) per side.

|        | Dimension, mm |      |
|--------|---------------|------|
| Symbol | MIN           | MAX  |
| A      | 8.55          | 8.75 |
| B      | 3.8           | 4    |
| C      | 1.35          | 1.75 |
| D      | 0.33          | 0.51 |
| F      | 0.4           | 1.27 |
| G      | 1.27          |      |
| H      | 5.27          |      |
| J      | 0°            | 8°   |
| K      | 0.1           | 0.25 |
| M      | 0.19          | 0.25 |
| P      | 5.8           | 6.2  |
| R      | 0.25          | 0.5  |