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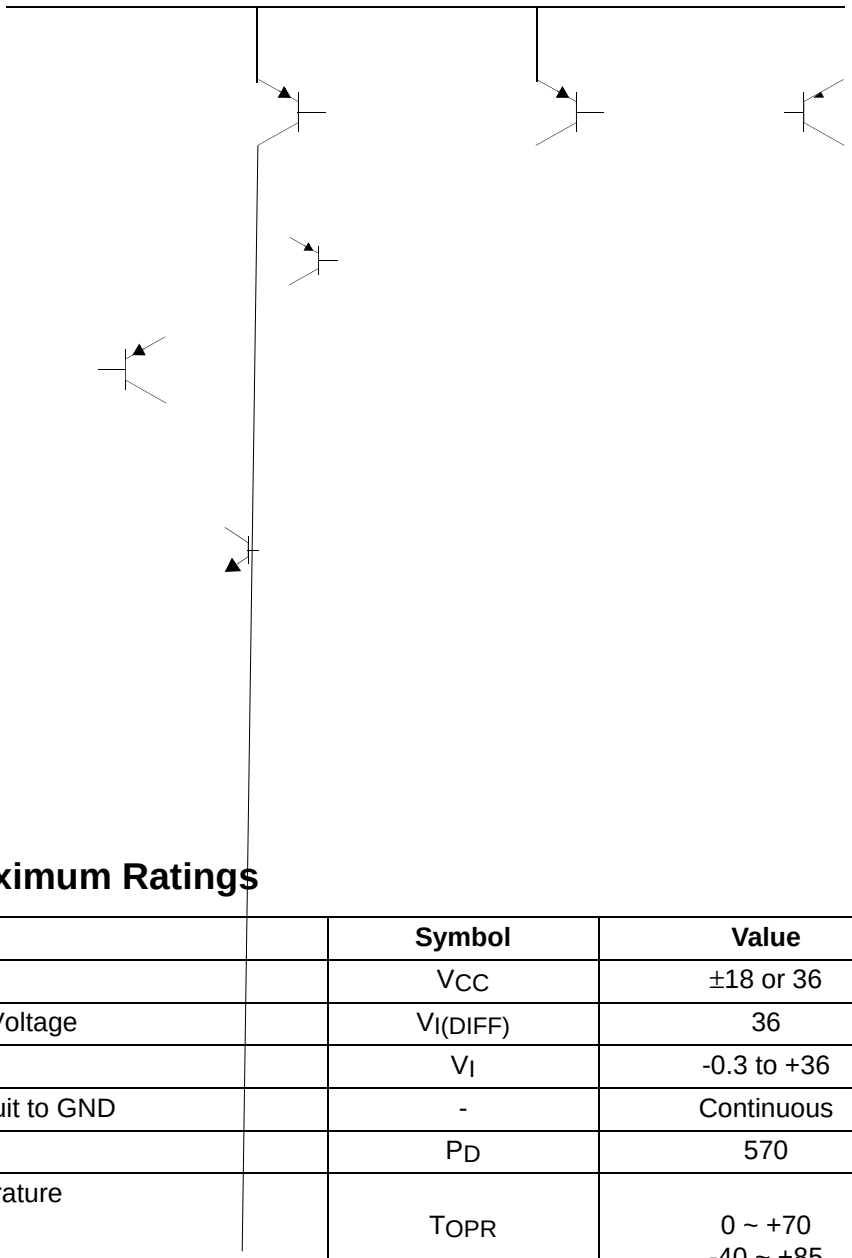
## Schematic Diagram



## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | ±18 or 36 | V |
| Differential Input Voltage | $V_{I(DIFF)}$ | 36 | V |
| Input Voltage | $V_I$ | -0.3 to +36 | V |
| Output Short Circuit to GND | - | Continuous | - |
| Power Dissipation | $P_D$ | 570 | mW |
| Operating Temperature<br>LM339/LM339A<br>LM2901<br>LM239A | $T_{OPR}$ | <br>0 ~ +70<br>-40 ~ +85<br>-25 ~ +85 | °C |
| Storage Temperature | $T_{STG}$ | -65 ~ +150 | °C |

## Electrical Characteristics

($V_{CC}$ = 5V, $T_A$ = 25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | LM239A/LM339A | | | LM339 | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| Input Offset Voltage | $V_{IO}$ | $V_{O(P)}$ =1.4V, $R_S$ = 0Ω | - | 1 | 2 | - | 1.4 | 5 | mV |
| | | Note1 | - | - | 4.0 | - | - | 9.0 | |
| Input Offset Current | $I_{IO}$ | $I_{IN(+)}$ - $I_{IN(-)}$, $V_{CM}$ = 0V | - | 2.3 | 50 | - | 2.3 | 50 | nA |
| | | Note1 | - | - | 150 | - | - | 150 | |
| Input Bias Current | $I_{BIAS}$ | $V_{CM}$ = 0V | - | 57 | 250 | - | 57 | 250 | nA |
| | | Note1 | - | - | 400 | - | - | 400 | |
| Input Common Mode Voltage Range | $V_{I(R)}$ | $V_{CC}$ = 30V | 0 | - | $V_{CC}$-1.5 | 0 | - | $V_{CC}$-1.5 | V |
| | | Note1 | 0 | - | $V_{CC}$-2 | 0 | - | $V_{CC}$-2 | |
| Supply Current | $I_{CC}$ | $V_{CC}$ = 5V, $R_L$ = ∞ | - | 1.1 | 2.0 | - | 1.1 | 2.0 | mA |
| Voltage Gain | $G_V$ | $V_{CC}$ =15V, $R_L$ ≥ 15kΩ (for large swing) | 50 | 200 | - | 50 | 200 | - | V/mV |
| Large Signal Response Time | $T_{LRES}$ | $V_I$ = TTL Logic Swing $V_{REF}$ = 1.4V, $V_{RL}$ = 5V, $R_L$ = 5.1kΩ (Note2) | - | 300 | - | - | 300 | - | ns |
| Response Time | $T_{RES}$ | $V_{RL}$ = 5V, $R_L$ = 5.1kΩ (Note2) | - | 1.3 | - | - | 1.3 | - | µs |
| Output Sink Current | $I_{SINK}$ | $V_{I(-)}$ ≥ 1V, $V_{I(+)}$ = 0V, $V_{O(P)}$ ≤ 1.5V | 6 | 18 | - | 6 | 18 | - | mA |
| Output Saturation Voltage | $V_{SAT}$ | $V_{I(-)}$ ≥ 1V, $V_{I(+)}$ = 0V | - | 140 | 400 | - | 140 | 400 | mV |
| | | $I_{SINK}$ = 4mA Note1 | - | - | 700 | - | - | 700 | |
| Output Leakage Current | $I_{O(LKG)}$ | $V_{I(-)}$ = 0V, $V_{I(+)}$ = 1V, $V_{O(P)}$ = 5V, $V_{O(P)}$ | - | 0.1 | - | - | 0.1 | - | nA |

**Note:**

1. LM339/LM339A : 0 ≤ $T_A$ ≤ +70°C
   LM2901 : -40 ≤ $T_A$ ≤ +85°C
   LM239A : -25 ≤ $T_A$ ≤ +85°C
2. These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (Continued)

($V_{CC}$ = 5V, $T_A$ = 25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | LM2901 | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Input Offset Voltage | $V_{IO}$ | $V_{O(P)}$ =1.4V, $R_S$ = 0Ω | - | 2 | 7 | mV |
| | | Note1 | - | 9 | 15 | |
| Input Offset Current | $I_{IO}$ | | - | 2.3 | 50 | nA |
| | | Note1 | - | 50 | 200 | |
| Input Bias Current | $I_{BIAS}$ | | - | 57 | 250 | nA |
| | | Note1 | - | 200 | 500 | |
| Input Common Mode Voltage Range | $V_{I(R)}$ | LM2901, $V_{CC}$ =30V | 0 | - | $V_{CC}$-1.5 | V |
| | | Note1 | 0 | - | $V_{CC}$-2 | |
| Supply Current | $I_{CC}$ | $R_L$ =∞, $V_{CC}$=5V | - | 1.1 | 2.0 | mA |
| | | $R_L$ =∞,$V_{CC}$=30V | - | 1.6 | 2.5 | |
| Voltage Gain | $G_V$ | $V_{CC}$ =15V, $R_L$ ≥ 15kΩ (for large swing) | 25 | 100 | - | V/mV |
| Large Signal Response Time | $T_{LRES}$ | $V_I$ =TTL Logic Swing $V_{REF}$ =1.4V, $V_{RL}$ =5V, $R_L$ =5.1kΩ (Note2) | - | 300 | - | ns |
| Response Time | $T_{RES}$ | $V_{RL}$ = 5V, $R_L$ = 5.1kΩ (Note2) | - | 1.3 | - | µs |
| Output Sink Current | $I_{SINK}$ | $V_{I(-)}$ ≥ 1V, $V_{I(+)}$ =0V, $V_{O(P)}$ ≤ 1.5V | 6 | 18 | - | mA |
| Output Saturation Voltage | $V_V$Voltag3f23.4217 3 Tm9.200 Tm9.200 Tm9.200 Tm9.j/T.266694 Tc -2158.28 404.2403 Tm-0.00nV | | | | | |

**Note:**

1. LM339/LM339A : 0 ≤ $T_A$ ≤ +70°C
   LM2901 : -40 ≤ $T_A$ ≤ +85°C
   LM239A : -25 ≤ $T_A$ ≤ +85°C
2. These parameters, although guaranteed, are not 100% tested in production.

# Typical Performance Characteristics

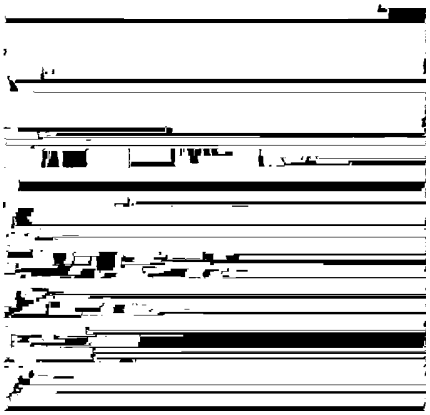


**Figure 1. Supply Current vs Supply Voltage**

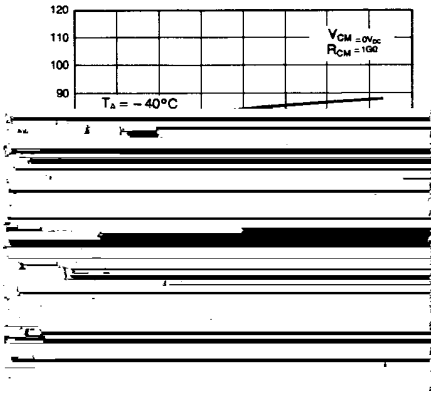



**Figure 2. Input Current vs Supply Voltage**

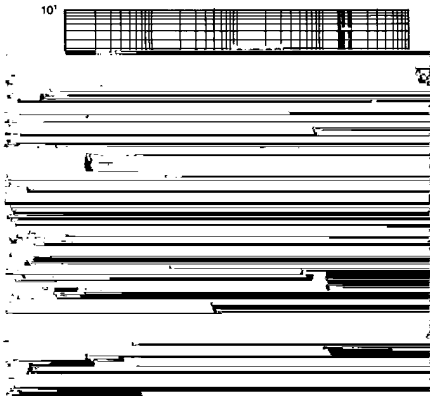



**Figure 3. Output Saturation Voltage vs Sink Current**

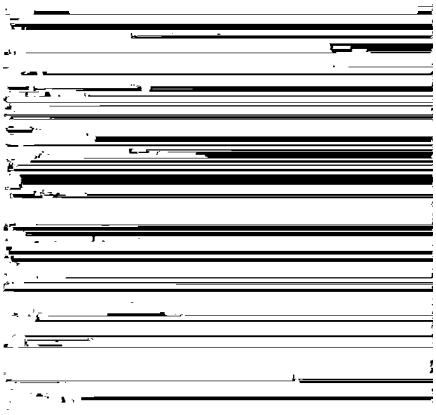


**Figure 4. Response Time for Various Input Overdrive-Negative Transition**

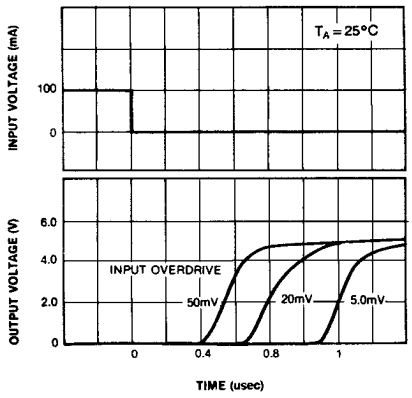
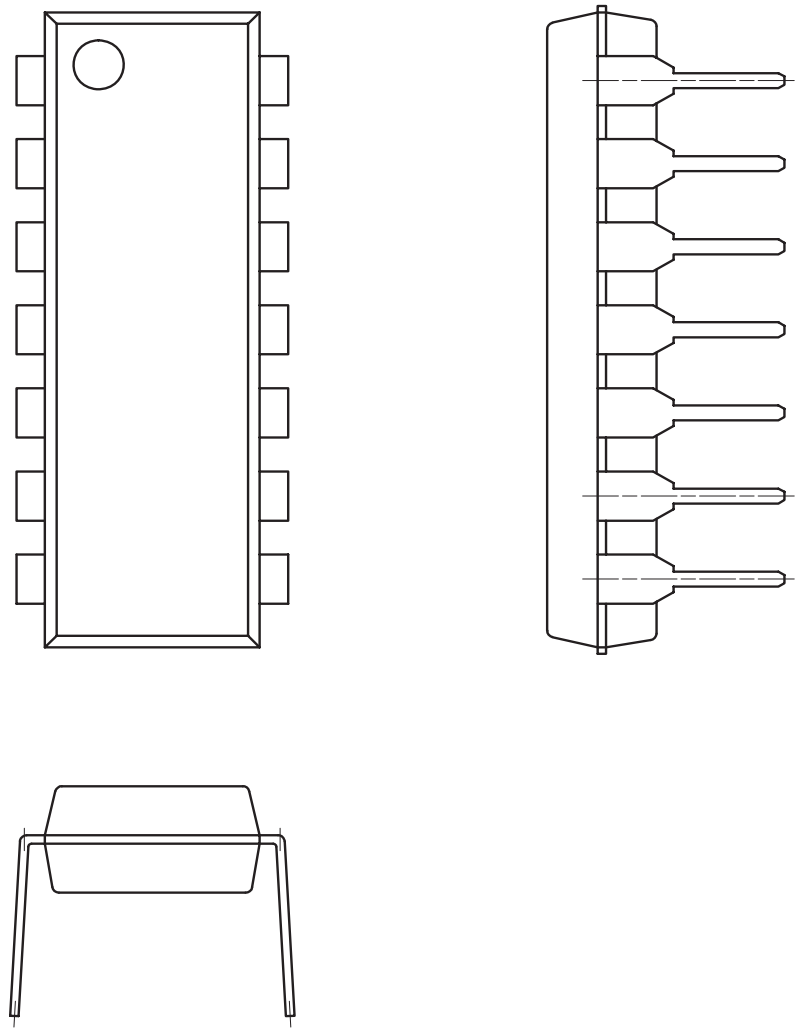



**Figure 5. Response Time for Various Input Overdrive-Positive Transition**

# Mechanical Dimensions

## Package

**Dimensions in millimeters**



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