

## SINGLE-SUPPLY QUAD COMPARATOR

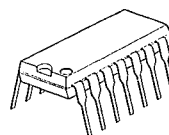
## ■ GENERAL DESCRIPTION

These devices offer higher frequency operation and faster switching than can be had from internally compensated quad op amps. Indeed for single-supply applications, the Darlington PNP input stage allows them to compare voltages that include ground. The two-stage common-emitter output circuit provides gain and output sink capacity of 6mA at an output level of 400mV. The output collector is left open, permitting the designer to drive devices in the range of 2V to 36V.

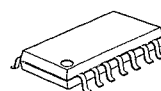
## ■ FEATURES

- Operating Voltage (+2V ~ +36V)
- Single Supply Operation
- Open Collector Output
- Package Outline DIP14, DMP14, SSOP14
- Bipolar Technology

## ■ PACKAGE OUTLINE



NJM2901N

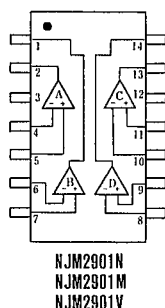


NJM2901M



NJM2901V

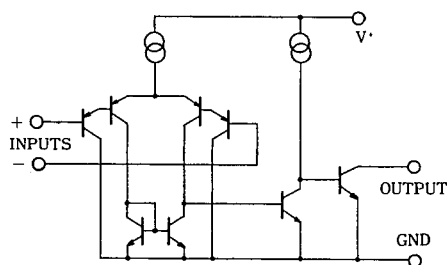
## ■ PIN CONFIGURATION



## PIN FUNCTION

1. B OUTPUT
2. A OUTPUT
3. V<sup>+</sup>
4. A-INPUT
5. A+INPUT
6. B-INPUT
7. B+INPUT
8. C-INPUT
9. C+INPUT
10. D-INPUT
11. D+INPUT
12. GND
13. D OUTPUT
14. C OUTPUT

## ■ EQUIVALENT CIRCUIT (1/4 Shown)



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER                   | SYMBOL           | RATINGS      | UNIT |
|-----------------------------|------------------|--------------|------|
| Supply Voltage              | V*               | 36(±18)      | V    |
| Differential Input Voltage  | V <sub>ID</sub>  | 36           | V    |
| Input Voltage               | V <sub>IN</sub>  | -0.3~+36     | V    |
| Power Dissipation           | P <sub>D</sub>   | (DIP14) 570  | mW   |
|                             |                  | (DMP14) 300  | mW   |
|                             |                  | (SSOP14) 300 | mW   |
| Operating Temperature Range | T <sub>opr</sub> | -40~+85      | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | -50~+125     | °C   |

■ ELECTRICAL CHARACTERISTICS

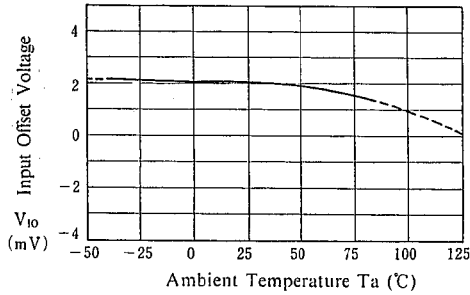
(Ta=25°C, V\*=5V)

| PARAMETER                       | SYMBOL            | TEST CONDITION                                                                             | MIN.  | TYP. | MAX. | UNIT |
|---------------------------------|-------------------|--------------------------------------------------------------------------------------------|-------|------|------|------|
| Input Offset Voltage            | V <sub>IO</sub>   | R <sub>S</sub> =0Ω, V <sub>O</sub> ≅1.4V                                                   | —     | 2    | 7    | mV   |
| Input Offset Current            | I <sub>IO</sub>   | I <sub>IN</sub> =I <sub>IN</sub> <sup>+</sup> -I <sub>IN</sub> <sup>-</sup>                | —     | 5    | 50   | nA   |
| Input Bias Current              | I <sub>B</sub>    |                                                                                            | —     | 25   | 250  | nA   |
| Input Common Mode Voltage Range | V <sub>ICM</sub>  |                                                                                            | 0~3.5 | —    | —    | V    |
| Large Signal Voltage Gain       | A <sub>v</sub>    | R <sub>L</sub> =15kΩ                                                                       | —     | 106  | —    | dB   |
| Response Time                   | t <sub>R</sub>    | R <sub>L</sub> =5.1kΩ                                                                      | —     | 1.3  | —    | μs   |
| Output Sink Current             | I <sub>SINK</sub> | V <sub>IN</sub> <sup>-</sup> =1V, V <sub>IN</sub> <sup>+</sup> =0V, V <sub>O</sub> =1.5V   | 6     | 16   | —    | mA   |
| Output Saturation Voltage       | V <sub>SAT</sub>  | V <sub>IN</sub> <sup>-</sup> =1V, V <sub>IN</sub> <sup>+</sup> =0V, I <sub>SINK</sub> =3mA | —     | 200  | 400  | mV   |
| Output Leakage Current          | I <sub>LEAK</sub> | V <sub>IN</sub> <sup>-</sup> =0V, V <sub>IN</sub> <sup>+</sup> =1V, V <sub>O</sub> =5V     | —     | 0.1  | 1.0  | μA   |
| Operating Current               | I <sub>CC</sub>   | R <sub>L</sub> =∞                                                                          | —     | 0.8  | 2    | mA   |

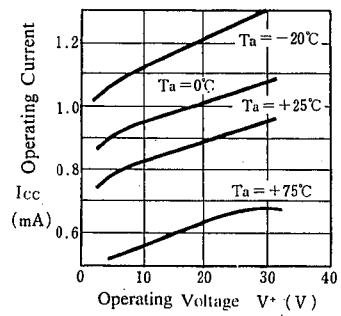
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## TYPICAL CHARACTERISTICS

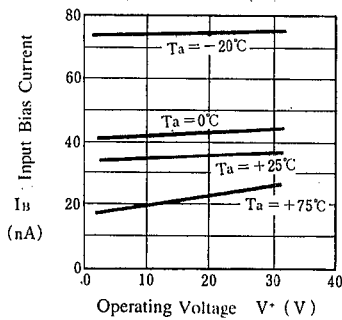
**Input Offset Voltage vs. Temperature**  
( $V^+ = 5\text{ V}$ )



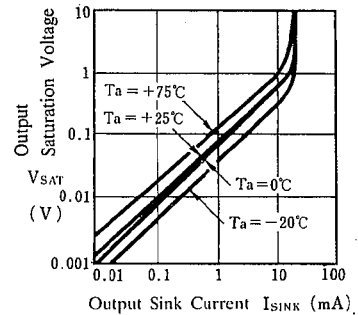
**Operating Current**  
( $R_L = \infty$ )



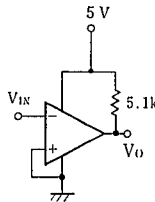
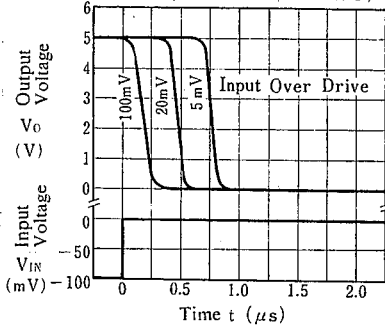
**Input Bias Current**



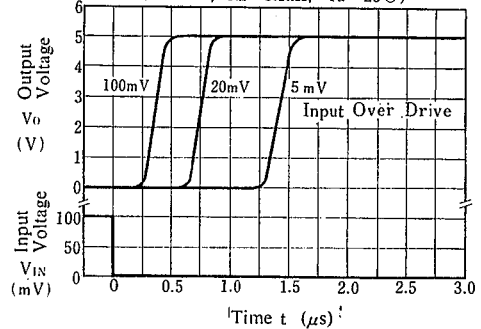
**Output Saturation Voltage**  
( $V^+ = 5\text{ V}$ )



**Response Time for Various Input Over Drives**  
( $V^+ = 5\text{ V}$ ,  $R_L = 5.1\text{ k}\Omega$ ,  $T_a = 25^\circ\text{C}$ )

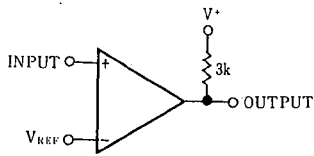


**Response Time for Various Input Over Drives**  
( $V^+ = 5\text{ V}$ ,  $R_L = 5.1\text{ k}\Omega$ ,  $T_a = 25^\circ\text{C}$ )

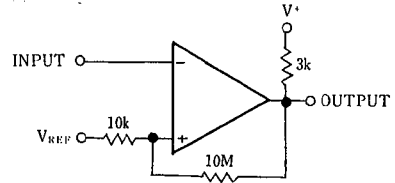


■ TYPICAL APPLICATIONS

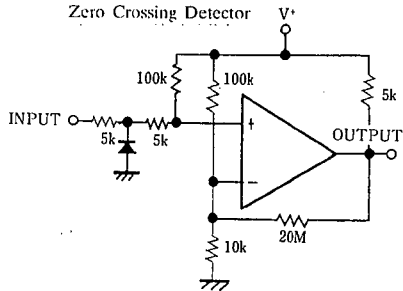
Basic Comparator



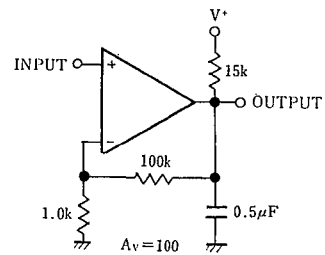
Comparator With Hysteresis:



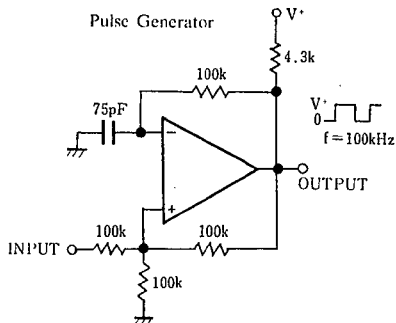
Zero Crossing Detector



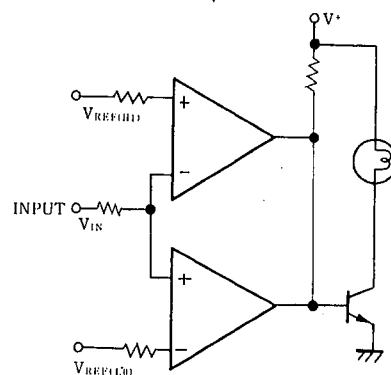
Low Frequency Op. Amp.



Pulse Generator



Limit Comparator



## MEMO

**[CAUTION]**

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