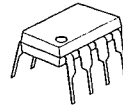


## PRECISION VOLTAGE COMPARATOR

### ■ GENERAL DESCRIPTION

The NJM311 is a voltage comparator that has low input currents. It is also designed to operate covering a wider range of supply voltages from Standard  $\pm 15V$  op amp supplies down to the single 5V supply used for IC logic. Its output is compatible with RTL, DTL and TTL as well as MOS circuits. Further more, it can drive lamps or relays, switching voltages up to 40V at currents as high as 50mA. Offset balancing is provided, and the outputs can be OR wired.

### ■ PACKAGE OUTLINE



NJM311D

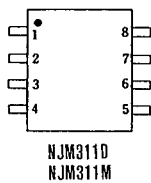


NJM311M

### ■ FEATURES

- Operating Voltage (+5V ~ +36V)
- Single Supply Operation
- Single Circuit
- With  $V_{IO}$  Trim Terminal
- Response Time (200ns typ.)
- Package Outline DIP8, DMP8
- Bipolar Technology

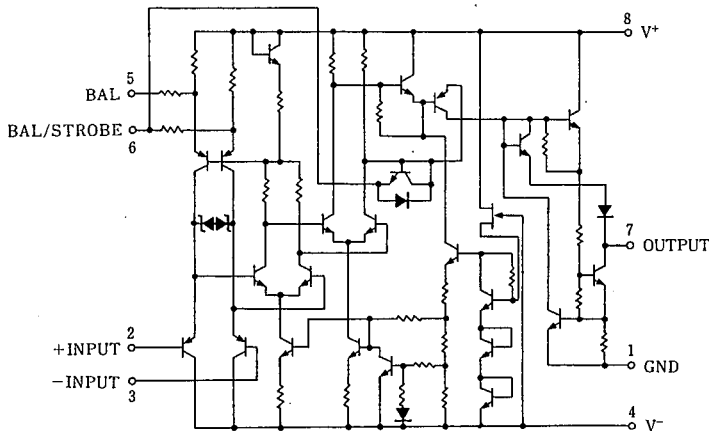
### ■ PIN CONFIGURATION



#### PIN FUNCTION

1. GND
2. +INPUT
3. -INPUT
4.  $V^-$
5. BAL
6. BAL/STROBE
7. OUTPUT
8.  $V^+$

### ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup> /V <sup>-</sup>	36(±18)	V
Output to Negative Supply Voltage	V7-4	40	V
Ground to Negative Supply Voltage	V1-4	30	V
Differential Input Voltage	V <sub>ID</sub>	±30	V
Input Voltage	V <sub>IN</sub>	±15 (note 1)	V
Power Dissipation	P <sub>D</sub>	(DIP8) 500	mW
		(DMP8) 300	mW
Operating Temperature Range	T <sub>opr</sub>	-40~+85	°C
Storage Temperature Range	T <sub>stg</sub>	-40~+125	°C

(note) For supply voltage less than ±15V, the absolute input voltage is equal to the supply voltage.

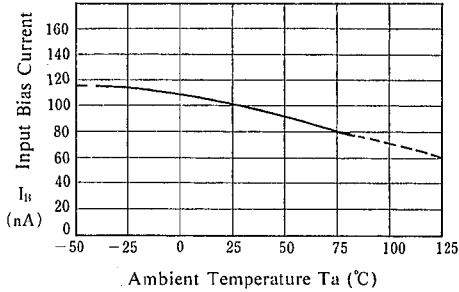
## ■ ELECTRICAL CHARACTERISTICS

(V<sup>+</sup>/V<sup>-</sup>=±15V, Ta=25°C)

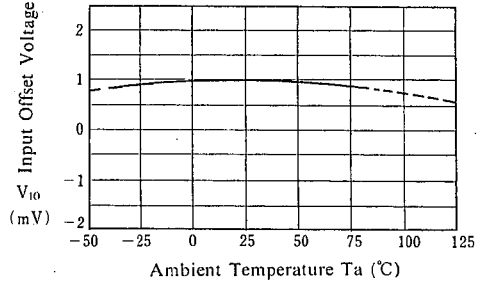
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V <sub>IO</sub>	R <sub>S</sub> ≤ 50kΩ	—	2.0	7.5	mV
Input Offset Current	I <sub>IO</sub>		—	6.0	50	nA
Input Bias Current	I <sub>B</sub>		—	100	250	nA
Voltage Gain	A <sub>V</sub>	V <sub>IN</sub> ≤ -10mV, I <sub>O</sub> = 50mA	—	106	—	dB
Response Time	t <sub>r</sub>		—	200	—	ns
Saturation Voltage	V <sub>SAT</sub>		—	0.75	1.5	V
Stroke ON Current	I <sub>STR</sub>		—	3.0	—	mA
Output Leakage Current	I <sub>LEAK</sub>		V <sub>IN</sub> ≥ 10mV, V <sub>O</sub> = 35V	—	0.2	50
Input Common Mode Voltage Range	V <sub>ICM</sub>	V <sub>IN</sub> ≥ 10mV, V <sub>O</sub> = 35V	—	±14	—	V
Positive Quiescent Current	I <sup>+</sup>		—	5.1	7.5	mA
Negative Quiescent Current	I <sup>-</sup>		—	4.1	5.0	mA

■ TYPICAL CHARACTERISTICS

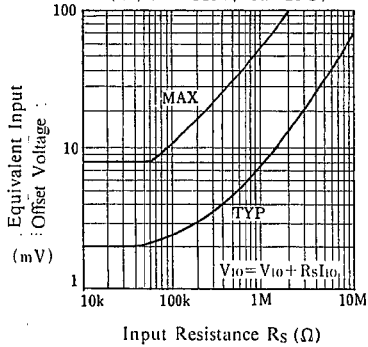
**Input Bias Current vs. Temperature**  
( $V^+/V^- = \pm 15V$ )



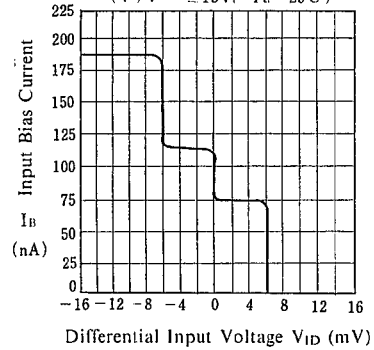
**Input Offset Voltage vs. Temperature**  
( $V^+/V^- = \pm 15V$ )



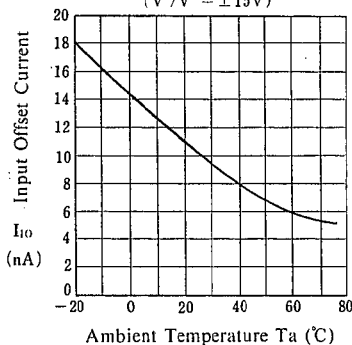
**Offset Voltage vs. Input Resistance**  
( $V^+/V^- = \pm 15V, T_a = 25^\circ C$ )



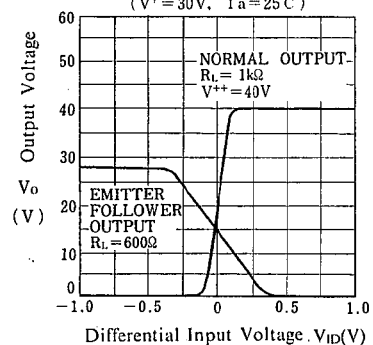
**Input Bias Current vs. Differential Input Voltage**  
( $V^+/V^- = \pm 15V, T_a = 25^\circ C$ )



**Input Offset Current vs. Temperature**  
( $V^+/V^- = \pm 15V$ )



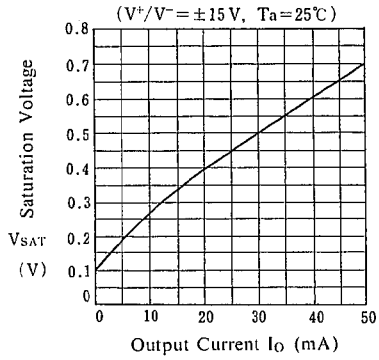
**Output Voltage vs. Differential Input Voltage**  
( $V^+ = 30V, T_a = 25^\circ C$ )



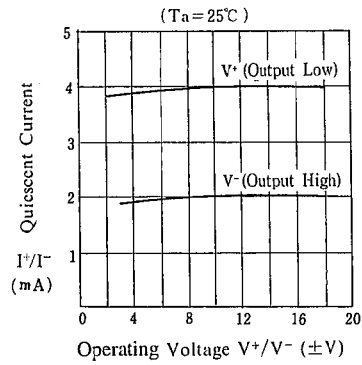
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## ■ TYPICAL CHARACTERISTICS

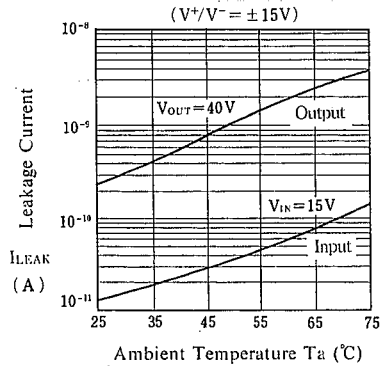
**Saturation Voltage vs. Output Current**



**Quiescent Current vs. Operating Voltage**



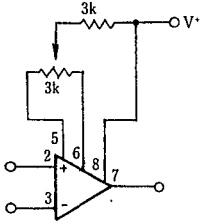
**leakage Current vs. Temperature**



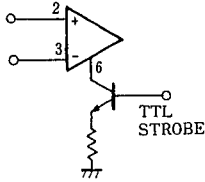
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## TYPICAL APPLICATIONS

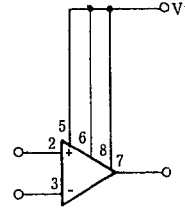
### Offset Null Circuit



### Strobing

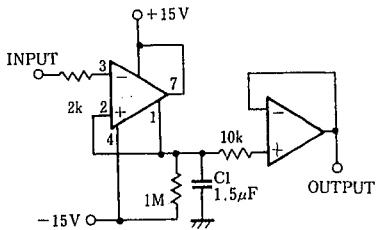


### Increasing Input Stage Current



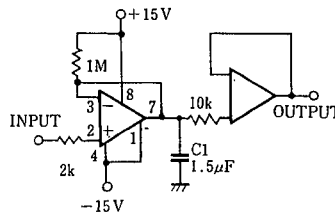
Increases typical common mode slew from  $7.0V/\mu s$  to  $18V/\mu s$

### Positive Peak Detector



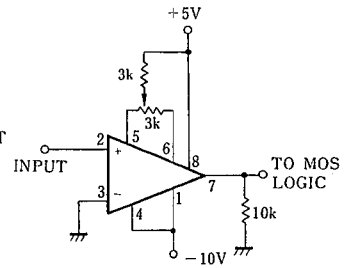
\*Solid tantalum

### Negative Peak Detector

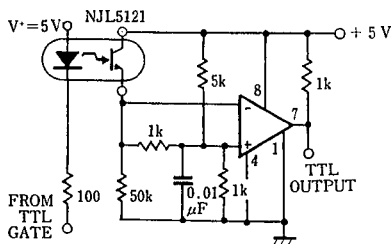


\*Solid tantalum

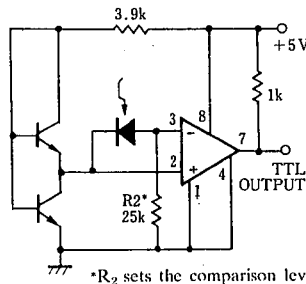
### Zero Crossing Detector driving MOS Logic



### Digital Transmission Isolator

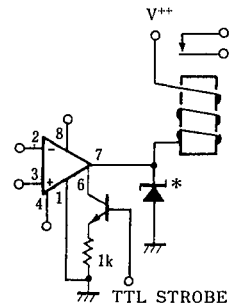


### Precision Photodiode Comparator



\*R<sub>2</sub> sets the comparison level.

### Relay Driver with Strobe



\*Absorbs inductive kickback of relay and protects IC from severe voltage.

## MEMO

[CAUTION]

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