

## HIGH SPEED DIFFERENTIAL COMPARATOR

### ■ GENERAL DESCRIPTION

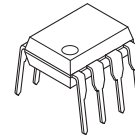
The NJM360 is a very high speed differential input, complementary TTL output voltage comparator. The device has been optimized for greater speed, input impedance and fan-out and lower input offset voltage.

Applications involve high speed analog to digital converters and zero-crossing detectors in disc file systems.

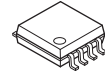
### ■ FEATURES

- Operating Voltage (  $\pm 4.5V \sim \pm 6.5V$  )
- High Speed Guarantee ( 20ns max. )
- Both output delay time has been precisely adjusted
- Complementary TTL Output
- High Input Impedance
- Stabilized Speed for Over Driving Change
- Bipolar Technology
- Fan-out is 4
- Low Input Offset Voltage
- Package Outline DIP8, DMP8, SOP8 JEDEC 150mil

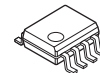
### ■ PACKAGE OUTLINE



**NJM360D**  
( DIP8 )

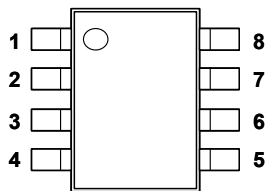


**NJM360M**  
( DMP8 )



**NJM360E**  
( SOP8 )

### ■ PIN CONFIGURATION

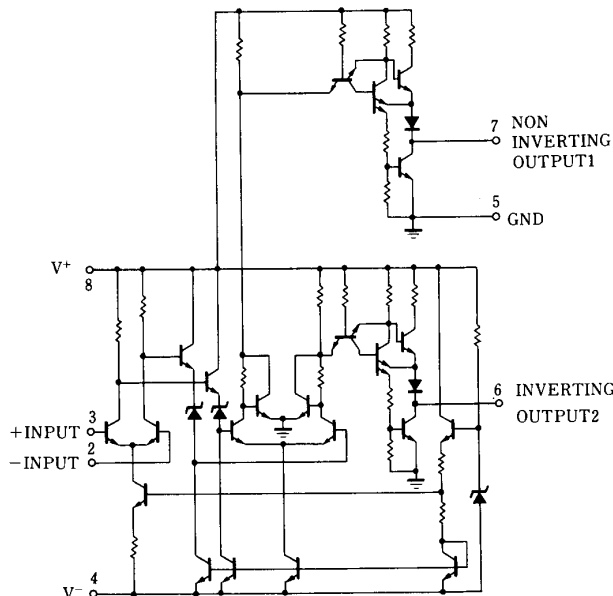


**NJM360D**  
**NJM360M**  
**NJM360E**

#### PIN FUNCTION

1. NC
2. -INPUT
3. +INPUT
4.  $V^-$
5. GND
6. OUT2
7. OUT1
8.  $V^+$

### ■ EQUIVALENT CIRCUIT



# NJM360

## ■ ABSOLUTE MAXIMUM RATINGS

( Ta=25°C )

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+V^-$	$\pm 8$	V
Differential Input Voltage	$V_{ID}$	$\pm 5$	V
Input Voltage	$V_I$	$\pm 8$ ( note1 )	V
Power Dissipation	$P_D$	( DIP8 ) 500 ( DMP8 ) 300 ( SOP8 ) 300	mW
Maximum Output Current	$I_O$	$\pm 20$	mA
Operating Temperature Range	$T_{opr}$	-40~+85	°C
Storage Temperature Range	$T_{stg}$	-40~+125	°C

( note1 ) For supply voltage less than  $\pm 8V$ , the absolute input voltage is equal to the supply voltage.

## ■ ELECTRICAL CHARACTERISTICS

( Ta=25°C )

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Supply Voltage	$V^+$		4.5	5	6.5	V
Operating Supply Voltage	$V^-$		-4.5	-5	-6.5	V
Input Offset Voltage	$V_{IO}$	$R_S \leq 200\Omega$	-	2	5	mV
Input Offset Current	$I_{IO}$		-	0.5	3	$\mu A$
Input Bias Current	$I_B$		-	5	20	$\mu A$
Output Resistance	$R_O$	$V_{OUT}=V_{OM}$	-	100	-	$\Omega$
Response Time 1	$t_{R1}$	$V^+V^-=\pm 5V$ ( note1 )	-	13	25	ns
Response Time 2	$t_{R2}$	$V^+V^-=\pm 5V$ ( note2 )	-	12	20	ns
Response Time 3	$t_{R3}$	$V^+V^-=\pm 5V$ ( note3 )	-	14	-	ns
Response Time Difference Between Outputs ( $t_{pd} \text{ of } +V_{IN1}$ )-( $t_{pd} \text{ of } -V_{IN2}$ )		( note1 )	-	2	-	ns
( $t_{pd} \text{ of } +V_{IN2}$ )-( $t_{pd} \text{ of } -V_{IN1}$ )		( note1 )	-	2	-	ns
( $t_{pd} \text{ of } +V_{IN1}$ )-( $t_{pd} \text{ of } +V_{IN2}$ )		( note1 )	-	2	-	ns
( $t_{pd} \text{ of } -V_{IN1}$ )-( $t_{pd} \text{ of } -V_{IN2}$ )		( note1 )	-	2	-	ns
Input Resistance	$R_{IN}$	$f=1MHz$	-	17	-	k $\Omega$
Input Capacitance	$C_{IN}$	$f=1MHz$	-	3	-	pF
Average Temperature Coefficient of Input Offset Voltage	$\Delta V_{IO}/\Delta T$	$R_S=50\Omega$	-	8	-	$\mu V/^\circ C$
Average Temperature Coefficient of Input Offset Current	$\Delta I_{IO}/\Delta T$		-	7	-	nA/°C
Common Mode Input Voltage Range	$V_{ICM}$	$V^+V^-=\pm 6.5V$	$\pm 4$	$\pm 4.5$	-	V
Differential Input Voltage Range	$V_{ID}$		$\pm 5$	-	-	V
Output High Voltage ( High )	$V_{OH}$	$V^+V^-=\pm 4.5V, I_{OUT}=-320\mu A$	2.4	3	-	V
Output Low Voltage ( Low )	$V_{OL}$	$V^+V^-=\pm 4.5V, I_{SINK}=6.4mA$	-	0.25	0.4	V
Positive Supply Current	$I^+$	$V^+V^-=\pm 6.5V$	-	18	32	mA
Negative Supply Current	$I^-$	$V^+V^-=\pm 6.5V$	-	-9	-16	mA

( note1 ) Response time measured from the 50% point of a 30mV<sub>P-P</sub> 10MHz sinusoidal input to the 50% point of the output.

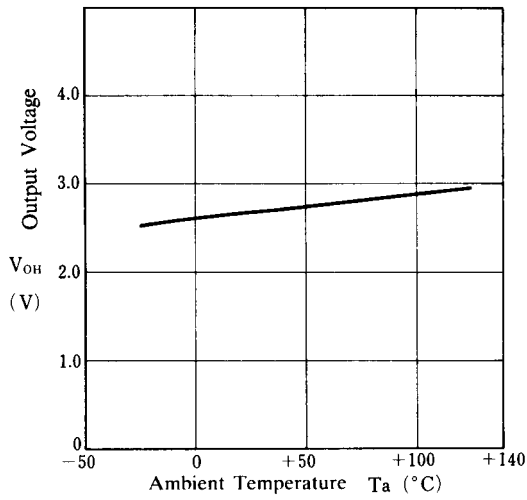
( note2 ) Response time measured from the 50% point of a 2V<sub>P-P</sub> 10MHz sinusoidal input to the 50% point of the output.

( note3 ) Response time measured from the start of a 100mV input step with 5mV overdrive to the time when the output crosses the logic threshold.

## ■ TYPICAL CHARACTERISTICS

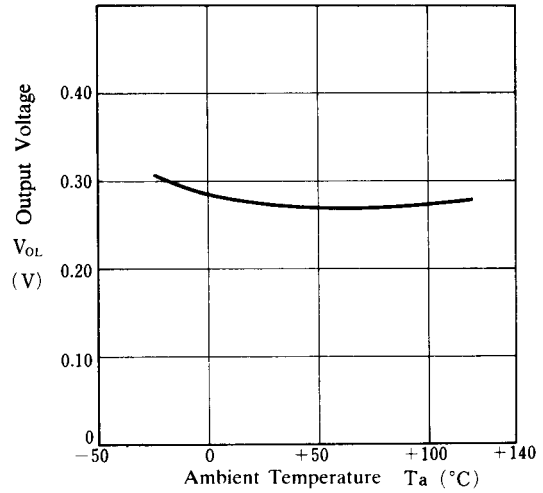
**Output Voltage (High) vs. Temperature**

( $V^+/V^- = \pm 4.5V$ ,  $I_{OUT} = -320\mu A$ )



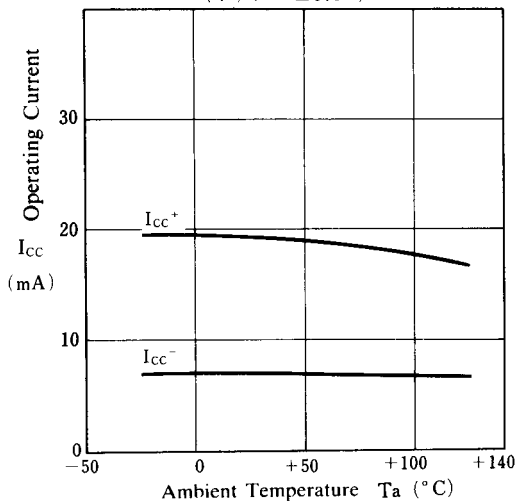
**Output Voltage (Low) vs. Temperature**

( $V^+/V^- = \pm 4.5V$ ,  $I_{SINK} = 6.4mA$ )



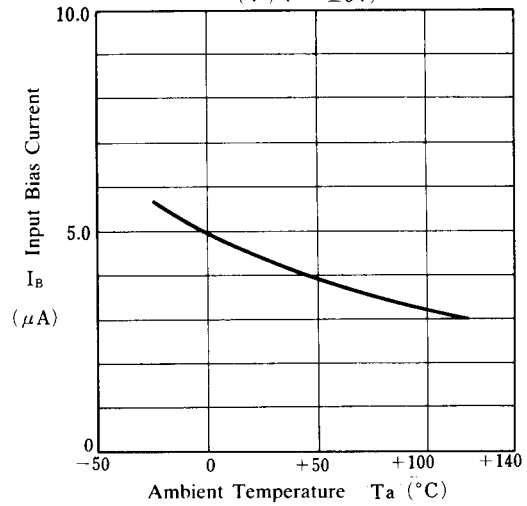
**Operating Current vs. Temperature**

( $V^+/V^- = \pm 6.5V$ )



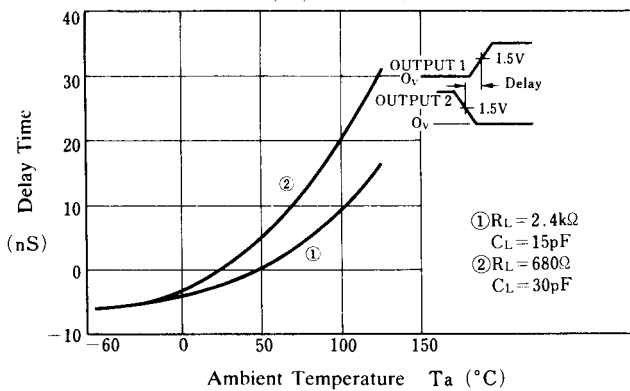
**Input Bias Current vs. Temperature**

( $V^+/V^- = \pm 5V$ )



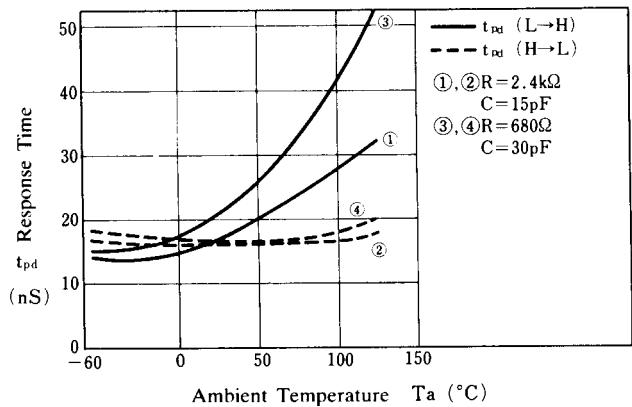
**OUTPUT1 and OUTPUT2 Delay Time vs. Temperature**

( $V^+/V^- = \pm 5V$ )



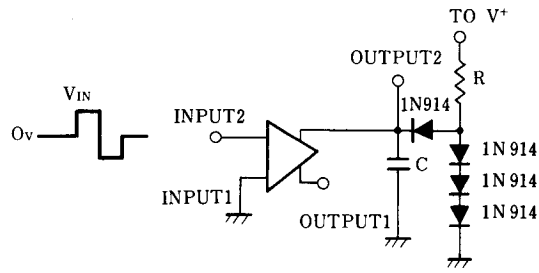
**Response Time vs. Temperature**

( $V^+/V^- = \pm 5V$ ,  $V_{IN} = \pm 50mV$ )



# NJM360

## ■ AC TEST CIRCUIT



**[CAUTION]**

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