LM160,LM360

LM160/LM360 High Speed Differential Comparator



Literature Number: SNOSBJ4B



LM160/LM360 High Speed Differential Comparator

General Description

The LM160/LM360 is a very high speed differential input, complementary TTL output voltage comparator with improved characteristics over the μ A760/ μ A760C, for which it is a pin-for-pin replacement. The device has been optimized for greater speed, input impedance and fan-out, and lower input offset voltage. Typically delay varies only 3 ns for overdrive variations of 5 mV to 400 mV.

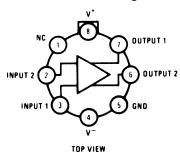
Complementary outputs having minimum skew are provided. Applications involve high speed analog to digital convertors and zero-crossing detectors in disk file systems.

Features

- Guaranteed high speed: 20 ns max
- Tight delay matching on both outputs
- Complementary TTL outputs
- High input impedance
- Low speed variation with overdrive variation
- Fan-out of 4
- Low input offset voltage
- Series 74 TTL compatible

Connection Diagrams

Metal Can Package

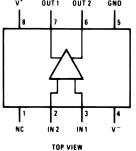


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Order Number LM160H/883 (Note 1) See NS Package Number H08C

Note 1: Also available in SMD# 5962-8767401

Dual-In-Line Package v⁺ 00T1 0UT2 GND



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Order Number LM360M, LM360MX or LM360N See NS Package Number M08A or N08E

Absolute Maximum Ratings (Notes 6, 8)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Positive Supply Voltage +8VNegative Supply Voltage -8VPeak Output Current 20 mADifferential Input Voltage $\pm 5V$ Input Voltage $V^+ \ge V_{\text{IN}} \ge V^-$ ESD Tolerance (Note 9) 1600V

Operating Temperature Range

 Storage Temperature Range -65°C to +150°C

Lead Temperature

(Soldering, 10 sec.) 260°C

Soldering Information

Dual-In-Line Package

Soldering (10 seconds) 260°C

Small Outline Package

Vapor Phase (60 seconds) 215°C

220°C

Infrared (15 seconds)

See AN-450 "Surface Mounting Methods and Their Effect on Product Reliability" for other methods of soldering

surface mount devices.

Electrical Characteristics

 $(T_{MIN} \le T_A \le T_{MAX})$

Parameter	Conditions	Min	Тур	Max	Units
Operating Conditions					
Supply Voltage V _{CC} ⁺		4.5	5	6.5	V
Supply Voltage V _{CC} ⁻		-4.5	-5	-6.5	V
Input Offset Voltage	$R_S \le 200\Omega$		2	5	mV
Input Offset Current			0.5	3	μA
Input Bias Current			5	20	μA
Output Resistance (Either Output)	$V_{OUT} = V_{OH}$		100		Ω
Response Time	$T_A = 25^{\circ}C, V_S = \pm 5V \text{ (Notes 2, 7)}$		13	25	ns
	$T_A = 25^{\circ}C, V_S = \pm 5V \text{ (Notes 3, 7)}$		12	20	ns
	$T_A = 25^{\circ}C, V_S = \pm 5V \text{ (Notes 4, 7)}$		14		ns
Response Time Difference between Outputs					
$(t_{pd} \text{ of } +V_{IN1}) - (t_{pd} \text{ of } -V_{IN2})$	T _A = 25°C (Notes 2, 7)		2		ns
$(t_{pd} \text{ of } +V_{IN2}) - (t_{pd} \text{ of } -V_{IN1})$	T _A = 25°C (Notes 2, 7)		2		ns
$(t_{pd} \text{ of } +V_{IN1}) - (t_{pd} \text{ of } +V_{IN2})$	T _A = 25°C (Notes 2, 7)		2		ns
$(t_{pd} \text{ of } -V_{IN1}) - (t_{pd} \text{ of } -V_{IN2})$	T _A = 25°C (Notes 2, 7)		2		ns
Input Resistance	f = 1 MHz		17		kΩ
Input Capacitance	f = 1 MHz		3		pF
Average Temperature Coefficient of	$R_S = 50\Omega$		8		μV/°C
Input Offset Voltage					
Average Temperature Coefficient of			7		nA/°C
Input Offset Current					
Common Mode Input Voltage Range	$V_{S} = \pm 6.5 V$	±4	±4.5		V
Differential Input Voltage Range		±5			V
Output High Voltage (Either Output)	$I_{OUT} = -320 \mu A, V_{S} = \pm 4.5 V$	2.4	3		V
Output Low Voltage (Either Output)	I _{SINK} = 6.4 mA		0.25	0.4	V
Positive Supply Current	V _S = ±6.5V		18	32	mA
Negative Supply Current	V _S = ±6.5V		-9	-16	mA

Note 2: Response time measured from the 50% point of a 30 mVp-p 10 MHz sinusoidal input to the 50% point of the output.

Note 3: Response time measured from the 50% point of a 2 Vp-p 10 MHz sinusoidal input to the 50% point of the output.

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Electrical Characteristics (Continued)

Note 4: Response time measured from the start of a 100 mV input step with 5 mV overdrive to the time when the output crosses the logic threshold.

Note 5: Typical thermal impedances are as follows:

Flow)

 θ_{jC} 25°C/W

Note 6: The device may be damaged if used beyond the maximum ratings.

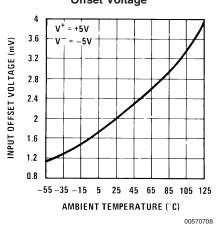
Note 7: Measurements are made in AC Test Circuit, Fanout = 1

Note 8: Refer to RETS 160X for LM160H, LM160J-14 and LM160J military specifications.

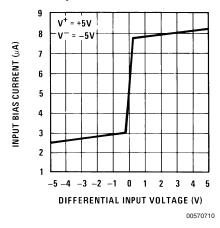
Note 9: Human body model, 1.5 k Ω in series with 100 pF.

Typical Performance Characteristics

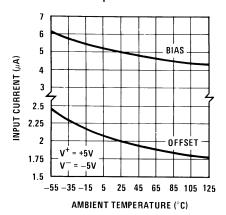




Input Characteristics

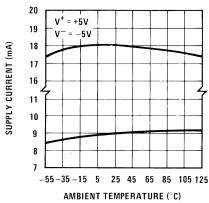


Input Current vs Ambient Temperature



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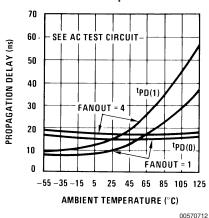
Supply Current vs Ambient Temperature



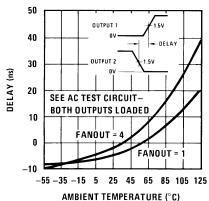
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Typical Performance Characteristics (Continued)



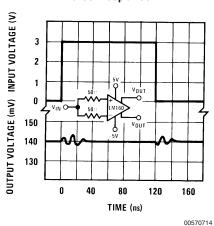


Delay of Output 1 With Respect to Output 2 vs Ambient Temperature

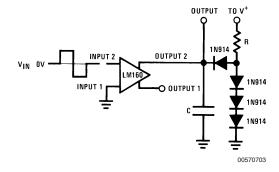


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Common-Mode Pulse Response

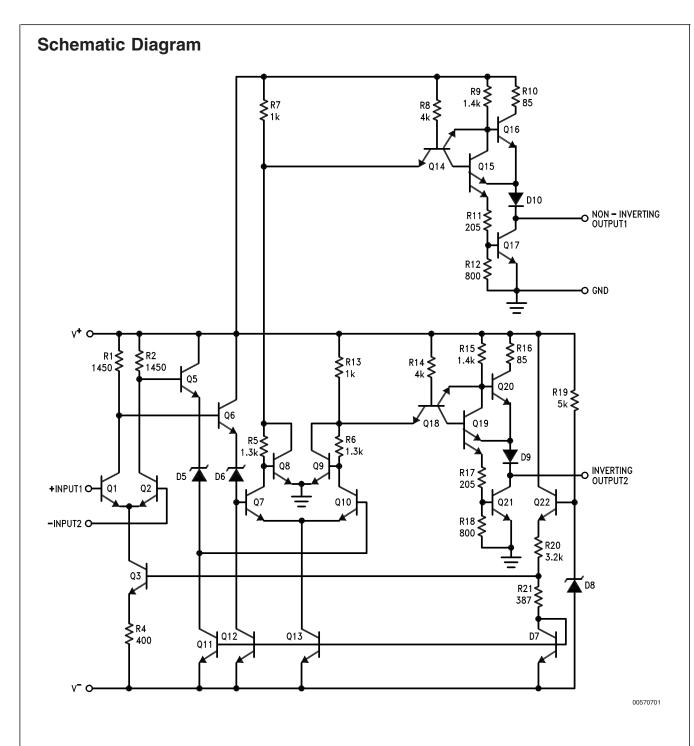


AC Test Circuit

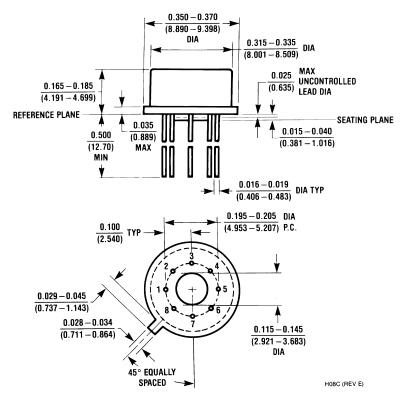


 V_{IN} =±50 mV FANOUT=1 FANOUT=4 V^+ =+5V R=2.4k R=630 Ω

V⁻=-5V C=15 pF C=30 pF



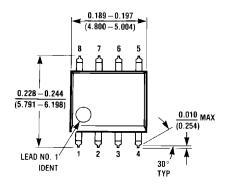
Physical Dimensions inches (millimeters) unless otherwise noted

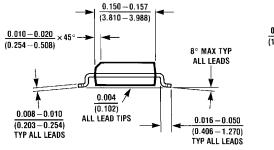


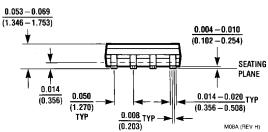
Metal Can Package (H) Order Number LM160H/883 **NS Package Number H08C**

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Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

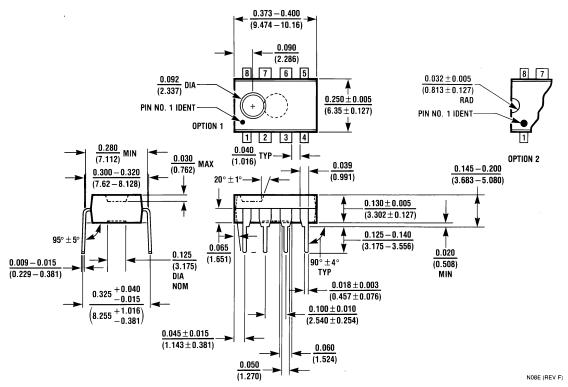






Molded Dual-In-Line Package (M)
Order Number LM360M or LM360MX
NS Package Number M08A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



Molded Dual-In-Line Package (N) Order Number LM360N NS Package Number N08E

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