

LM160QML

High Speed Differential Comparator

General Description

The LM160 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 3nS for overdrive variations of 5mV to 400mV.

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

Features

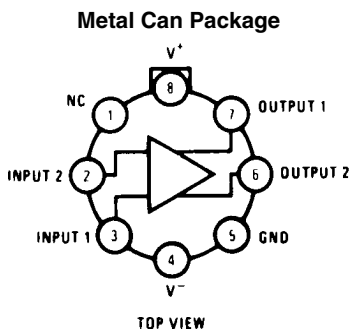
- Guaranteed high speed: 20nS max
- Tight delay matching on both outputs
- Complementary TTL outputs
- High input impedance
- Low speed variation with overdrive variation
- Fan-out of 4
- Low input offset voltage
- Series 74 TTL compatible

Ordering Information

NS Part Number	SMD Part Number	NS Package Number	Package Description
LM160H/883	5962-8767401GA	H08C	8LD Metal Can
LM160 MD8		(Note 1)	Bare Die

Note 1: FOR ADDITIONAL DIE INFORMATION, PLEASE VISIT THE HI REL WEB SITE AT: www.national.com/analog/space/level_die

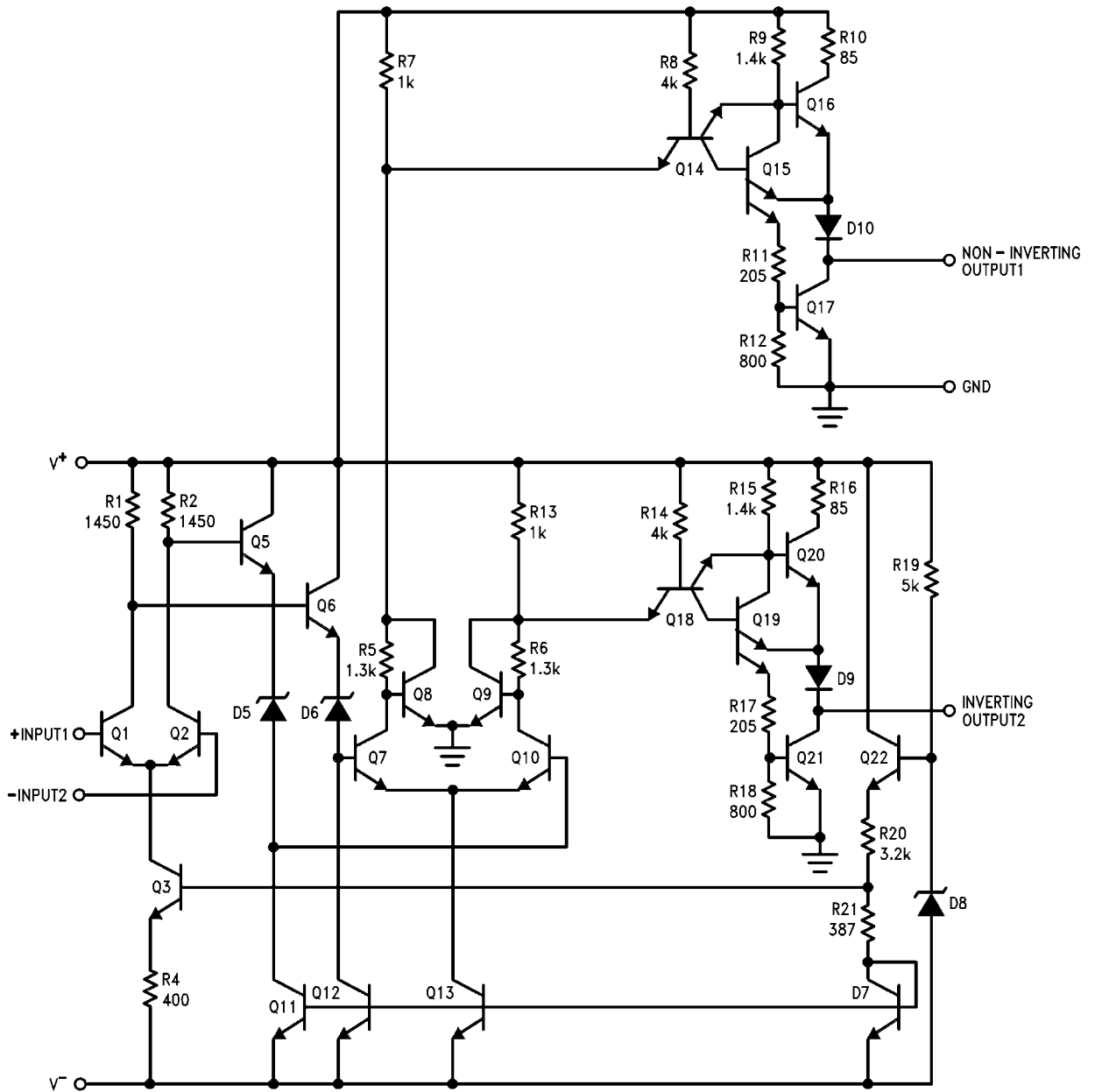
Connection Diagrams



See NS Package Number H08C

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Schematic Diagram



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Absolute Maximum Ratings *(Note 2)*

Positive Supply Voltage	+8V
Negative Supply Voltage	−8V
Peak Output Current	20 mA
Differential Input Voltage	±5V
Input Voltage	$V_+ \geq V_I \geq V_-$
Operating Temperature Range	$-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$
Storage Temperature Range	$-65^{\circ}\text{C} \leq T_A \leq +150^{\circ}\text{C}$
Thermal Resistance	
θ_{JA}	
Still Air	165°C/W
400 LF/min	67°C/W
θ_{JC}	25°C/W
Lead Temperature (Soldering, 10 sec.)	260°C
ESD Tolerance <i>(Note 3)</i>	1,600V

Quality Conformance Inspection

Mil-Std-883, Method 5005 - Group A

Subgroup	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55
12	Settling time at	+25
13	Settling time at	+125
14	Settling time at	-55

LM160H/883 Electrical Characteristics

DC Parameters

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
$V_{OH\ B}$	Logical "1" Output Voltage	$V_{CC} \pm 4.5V$, $I_O = -320\mu A$		2.4		V	1, 2, 3
$V_{OH\ A}$	Logical "1" Output Voltage	$V_{CC} \pm 4.5V$, $I_O = -320\mu A$		2.4		V	1, 2, 3
$V_{OL\ A}$	Logical "0" Output Voltage	$V_{CC} \pm 4.5V$, $I_O = 6.4mA$			0.4	V	1, 2, 3
$V_{OL\ B}$	Logical "0" Output Voltage	$V_{CC} = 4.5V$, $I_O = 6.4mA$			0.4	V	1, 2, 3
I_{IB}	Input Bias Current	$V_{CC} = \pm 5V$, $V_{IN} = 5V$			20	μA	1, 2, 3
I_{CC+}	Positive Supply Current	$V_{CC} = \pm 6.5V$			32	mA	1, 2, 3
I_{CC-}	Negative Supply Current	$V_{CC} = \pm 6.5V$			-16	mA	1, 2, 3
$I_{OS\ B}$	Short Circuit Current	$V_{CC} = \pm 4.5V$		-15	-52	mA	1, 2, 3
$I_{OS\ A}$	Short Circuit Current	$V_{CC} = \pm 4.5V$		-15	-52	mA	1, 2, 3
V_{IO}	Input Offset Voltage	$V_{CC} = \pm 5V$		-5.0	5.0	mV	1, 2, 3
I_{IO}	Input Offset Current	$V_{CC} = \pm 5V$		-3.0	3.0	μA	1, 2, 3
$I_I\ (1)$	Unbalanced Input Current	$V_{CC} = \pm 5V$, $V_{IN}(1) = 0$, $V_{IN}(2) = 5V$	(Note 4)		-1.0	mA	1, 2, 3
$I_I\ (2)$	Unbalanced Input Current	$V_{CC} = \pm 5V$, $V_{IN}(1) = 5V$, $V_{IN}(2) = 0V$	(Note 4)		-1.0	mA	1, 2, 3
V_{CC}	Supply Voltage		(Note 4)	± 4.5	± 6.5	V	1, 2, 3
BV_{CC}	Supply Breakdown Voltage		(Note 4)	± 8.0		V	1, 2, 3
V_{CM}	Common Mode Input Voltage Range	$V_{CC} = \pm 6.5V$	(Note 4)	± 4.0		V	1, 2, 3
V_{Diff}	Differential Input Voltage Range		(Note 4)	± 5.0		V	1, 2, 3

AC Parameters

The following conditions apply, unless otherwise specified. $V_{CC} = \pm 5V$, $f = 10MHz$ (sinusoidal)

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
t_{Resp}	Response Time	$V_{IN} = 30mV_{P-P}$	(Note 5)		25	nS	9
t_{Resp}	Response Time	$V_{IN} = 2 V_{P-P}$	(Note 5)		20	nS	9

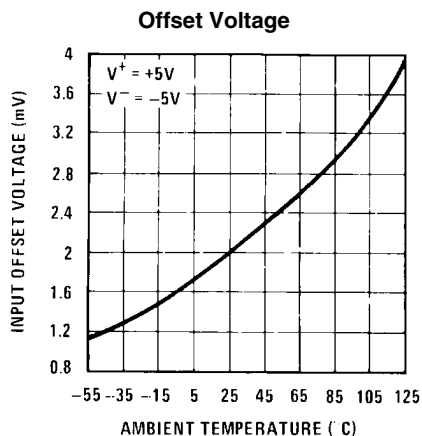
Note 2: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.

Note 3: Human body model, 1.5 k Ω in series with 100 pF.

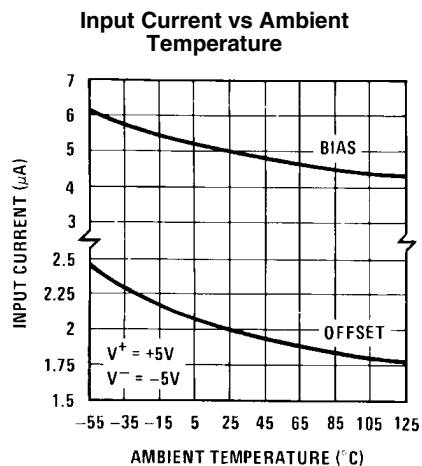
Note 4: Parameter tested go-no-go, only.

Note 5: Bench test, use 70256644.

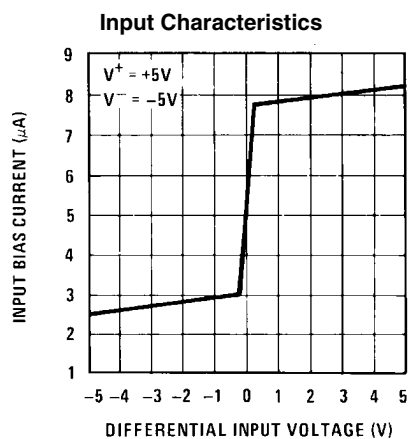
Typical Performance Characteristics



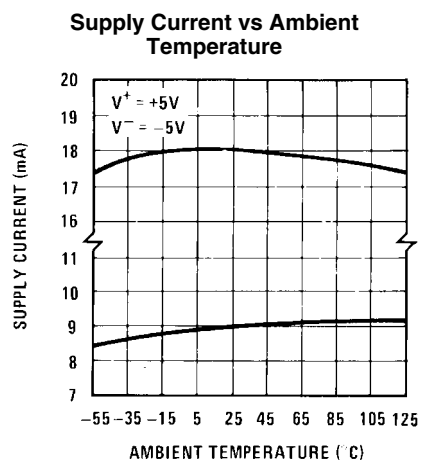
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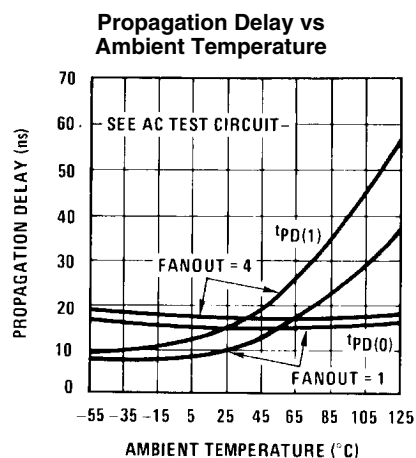
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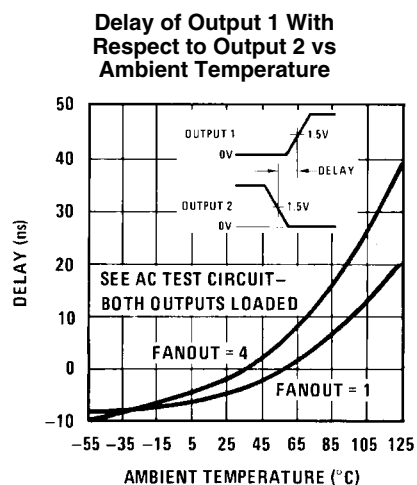
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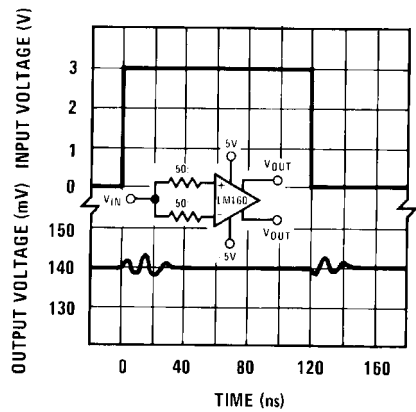


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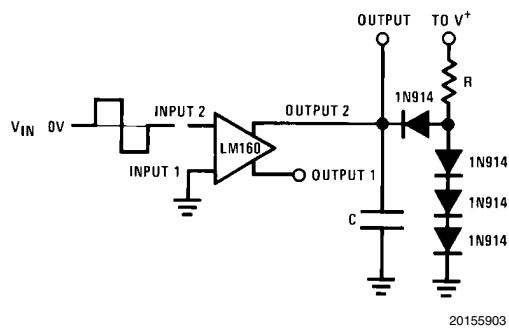
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Common-Mode Pulse Response



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AC Test Circuit

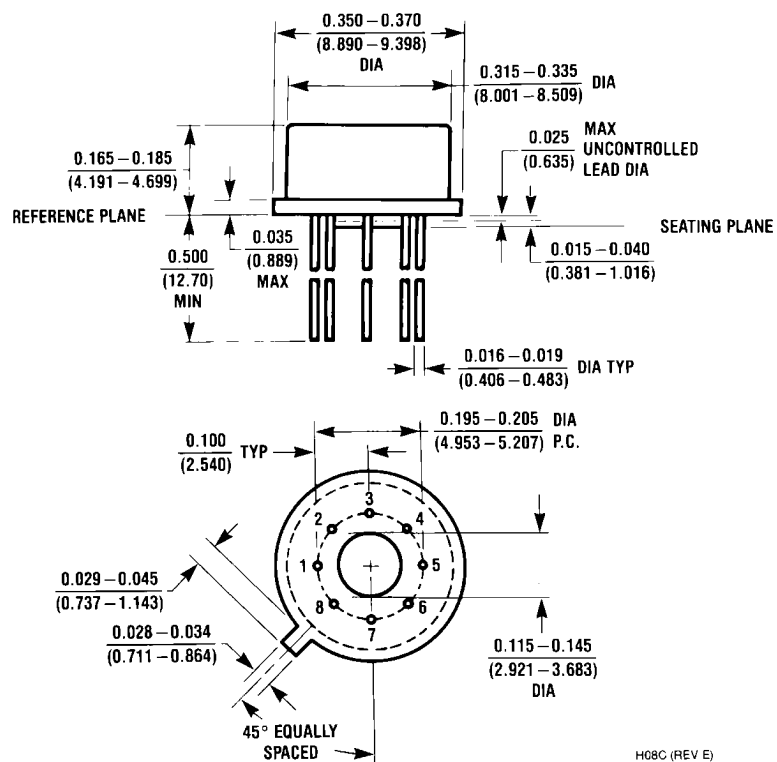


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$V_I = \pm 50 \text{ mV}$	FANOUT=1	FANOUT=4
$V^+ = +5\text{V}$	$R = 2.4 \text{ K}\Omega$	$R = 630 \Omega$
$V^- = -5\text{V}$	$C = 15 \text{ pF}$	$C = 30 \text{ pF}$

Revision History

Released	Revision	Section	Changes
11/30/2010	A	New Release, Corporate format	1 MDS data sheets converted into one Corp. data sheet format. The drift table was eliminated since it did not apply MNL160-X Rev 0BL will be archived.

Physical Dimensions inches (millimeters) unless otherwise noted

Metal Can Package (H)
NS Package Number H08C

H08C (REV E)

Notes

Notes

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