LM160QML High Speed Differential Comparator

Check for Samples: LM160QML

FEATURES

- **Ensured 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**

DESCRIPTION

The LM160 is a very high speed differential input, complementary TTL output voltage comparator with improved characteristics over the µA760/µA760C, 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 convertors and zero-crossing detectors in disk file systems.

Connection Diagrams

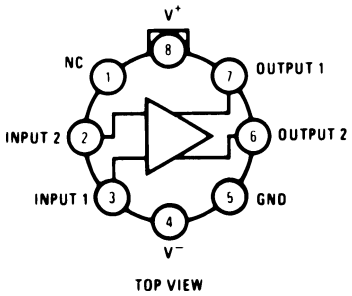
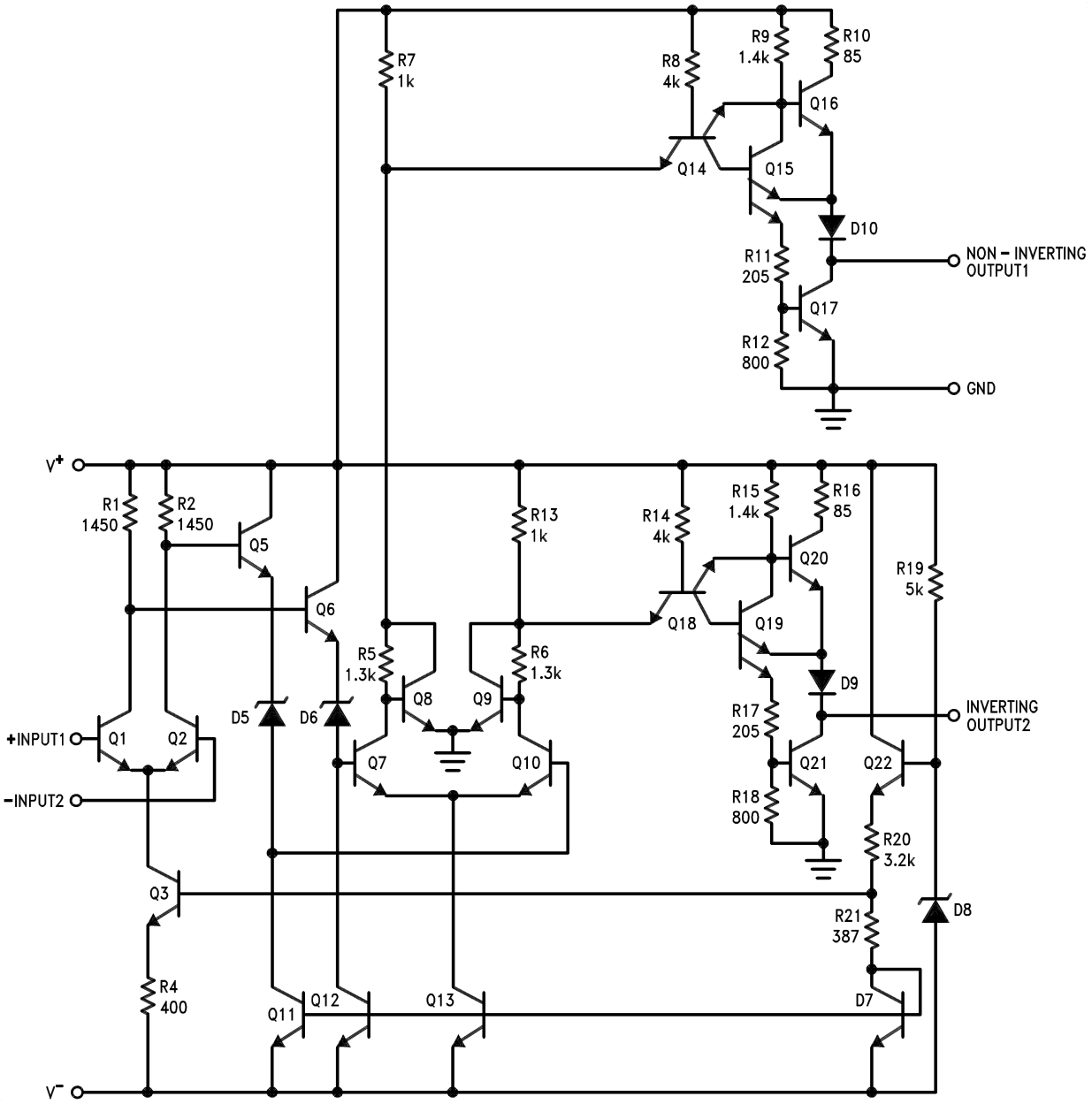


Figure 1. Metal Can Package
See Package Number LMC0008C

Schematic Diagram



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings(1)

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			$-55°C \leq T_A \leq +125°C$
Storage Temperature Range			$-65°C \leq T_A \leq +150°C$
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(2)			1,600V

(1) 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 ensure specific performance limits. For ensured specifications and test conditions, see the Electrical Characteristics. The ensured specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.

(2) Human body model, 1.5 kΩ in series with 100 pF.

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} ±4.5V, I_O = -320µA		2.4		V	1, 2, 3
V_{OH} A	Logical "1" Output Voltage	V_{CC} ±4.5V, I_O = -320µA		2.4		V	1, 2, 3
V_{OL}A	Logical "0" Output Voltage	V_{CC} ±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} = ±5V, V_{IN} = 5V			20	µA	1, 2, 3
I_{CC}+	Positive Supply Current	V_{CC} = ±6.5V			32	mA	1, 2, 3
I_{CC}-	Negative Supply Current	V_{CC} = ±6.5V			-16	mA	1, 2, 3
I_{OS} B	Short Circuit Current	V_{CC} = ±4.5V		-15	-52	mA	1, 2, 3
I_{OS} A	Short Circuit Current	V_{CC} = ±4.5V		-15	-52	mA	1, 2, 3
V_{IO}	Input Offset Voltage	V_{CC} = ±5V		-5.0	5.0	mV	1, 2, 3
I_{IO}	Input Offset Current	V_{CC} = ±5V		-3.0	3.0	µA	1, 2, 3
I_I (1)	Unbalanced Input Current	V_{CC} = ±5V, V_{IN}(1) = 0, V_{IN} (2) = 5V	See(1)		-1.0	mA	1, 2, 3
I_I (2)	Unbalanced Input Current	V_{CC} = ±5V, V_{IN} (1) = 5V, V_{IN} (2) = 0V	See(1)		-1.0	mA	1, 2, 3
V_{CC}	Supply Voltage		See(1)	±4.5	±6.5	V	1, 2, 3
BV_{CC}	Supply Breakdown Voltage		See(1)	±8.0		V	1, 2, 3
V_{CM}	Common Mode Input Voltage Range	V_{CC} = ±6.5V	See(1)	±4.0		V	1, 2, 3
V_{Diff}	Differential Input Voltage Range		See(1)	±5.0		V	1, 2, 3

(1) Parameter tested go−no−go, only.

LM160H/883 Electrical Characteristics AC Parameters

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

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
t_{Resp}	Response Time	V_{IN} = 30mV_{P-P}	See(1)		25	nS	9
t_{Resp}	Response Time	V_{IN} = 2 V_{P-P}	See(1)		20	nS	9

(1) Bench test, use 70256644.

Typical Performance Characteristics

Offset Voltage

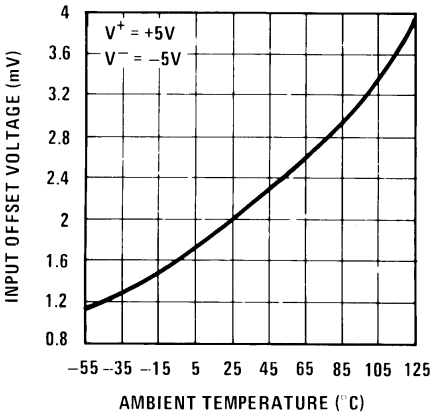


Figure 2.

Input Current vs Ambient Temperature

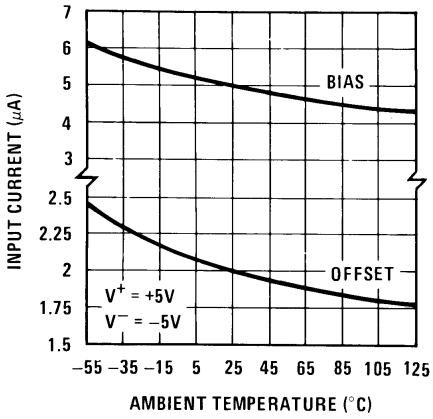


Figure 3.

Input Characteristics

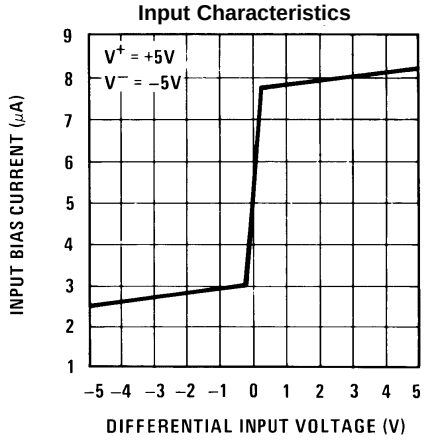


Figure 4.

Supply Current vs Ambient Temperature

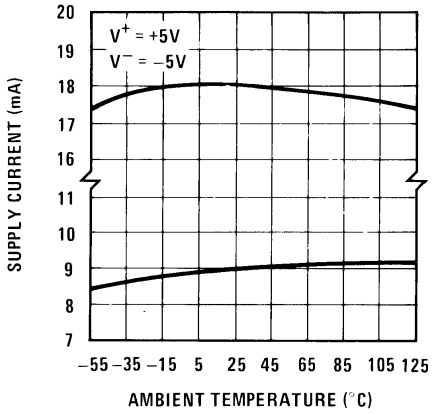


Figure 5.

Propagation Delay vs Ambient Temperature

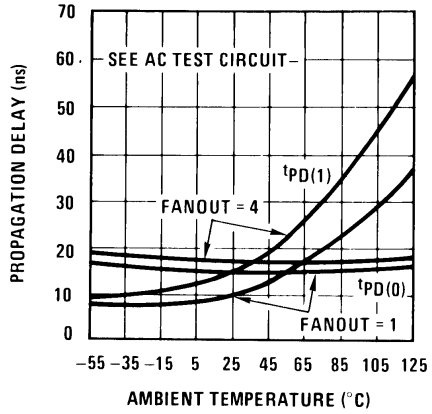


Figure 6.

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

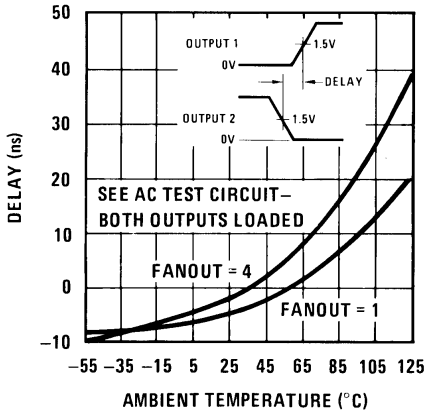


Figure 7.

Typical Performance Characteristics (continued)

Common-Mode Pulse Response

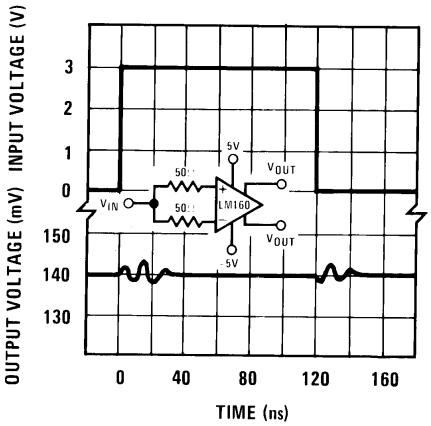
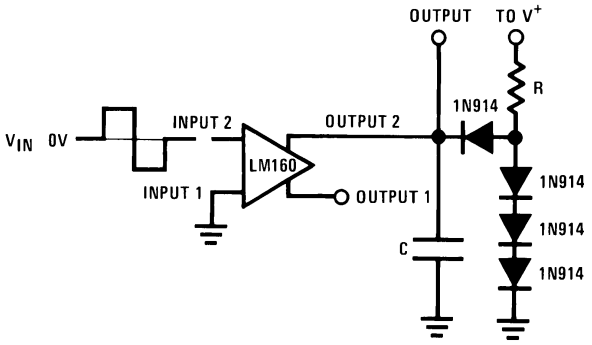


Figure 8.

AC Test Circuit



V_I=±50 mV	FANOUT=1	FANOUT=4
V^+=+5V	R=2.4KΩ	R=630Ω
V^-=−5V	C=15 pF	C=30 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 MNLM160-X Rev 0BL will be archived.
03/26/2013	A	All Sections	Changed layout of National Data Sheet to TI format

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LM160H/883	OBSOLETE					TBD	Call TI	Call TI		LM160H/883 5962-8767401GA Q A CO 5962-8767401GA Q > T	

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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