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

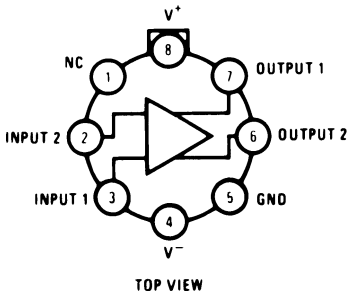
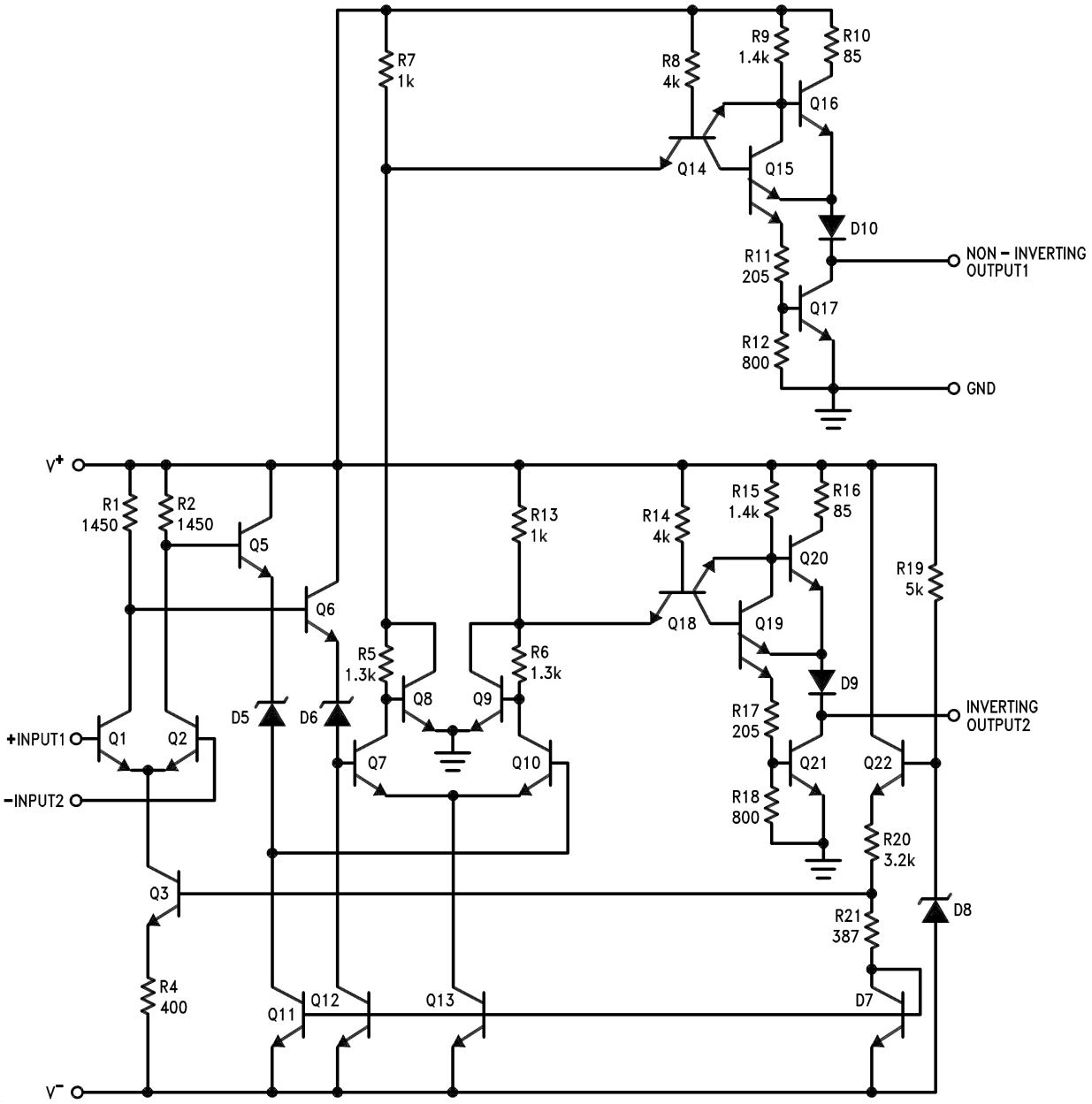


Figure 1. Metal Can Package
See Package Number LMC0008C

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

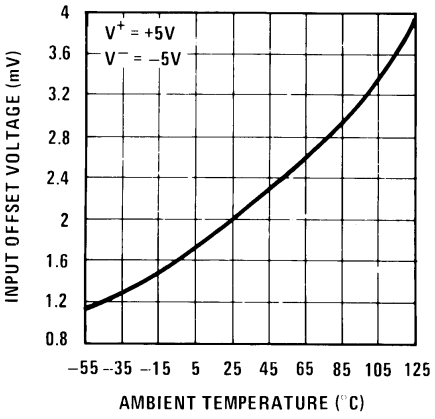


Figure 2.

Input Current vs Ambient Temperature

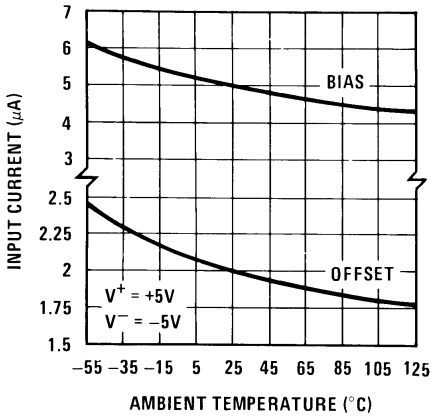


Figure 3.

Input Characteristics

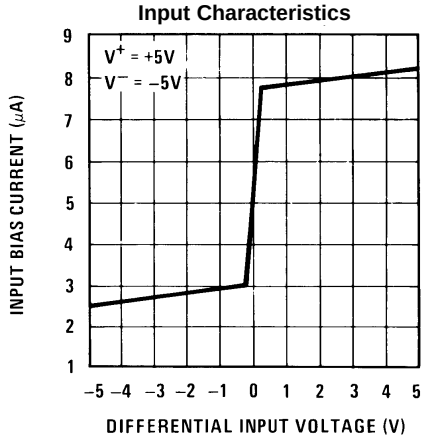


Figure 4.

Supply Current vs Ambient Temperature

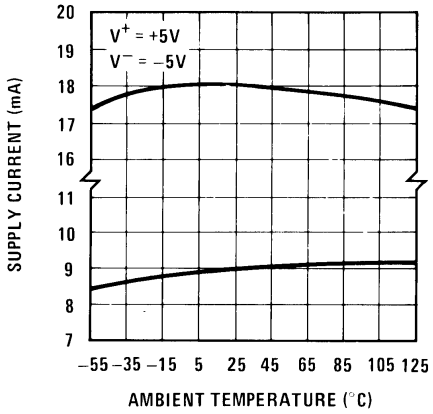


Figure 5.

Propagation Delay vs Ambient Temperature

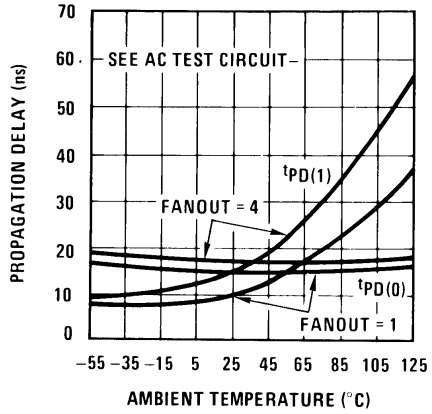


Figure 6.

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

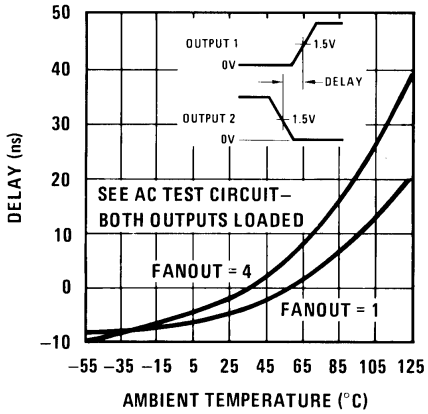


Figure 7.

Typical Performance Characteristics (continued)

Common-Mode Pulse Response

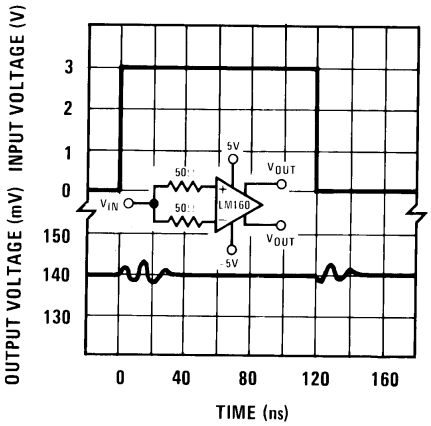
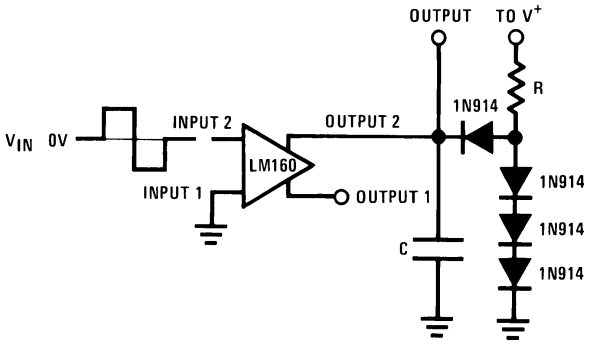


Figure 8.

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 part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
LM160H/883	Obsolete	Production	TO-99 (LMC) | 8	-	-	Call TI	Call TI	-	LM160H/883 5962-8767401GA Q A CO 5962-8767401GA Q > T

(1) Status: For more details on status, see our product life cycle.

(2) Material type: When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) Lead finish/Ball material: Parts 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.

(5) MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

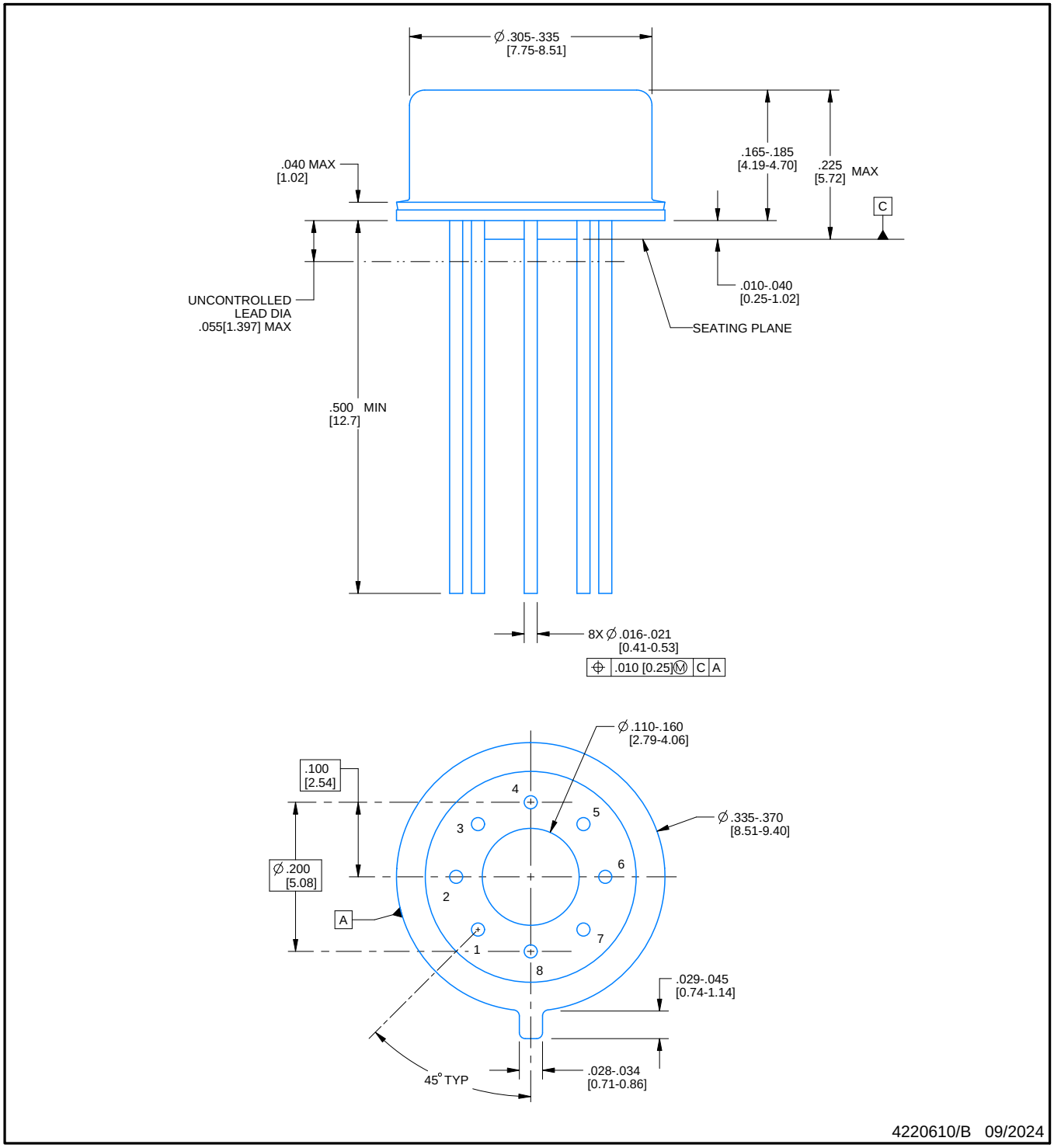
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

PACKAGE OUTLINE

LMC0008A

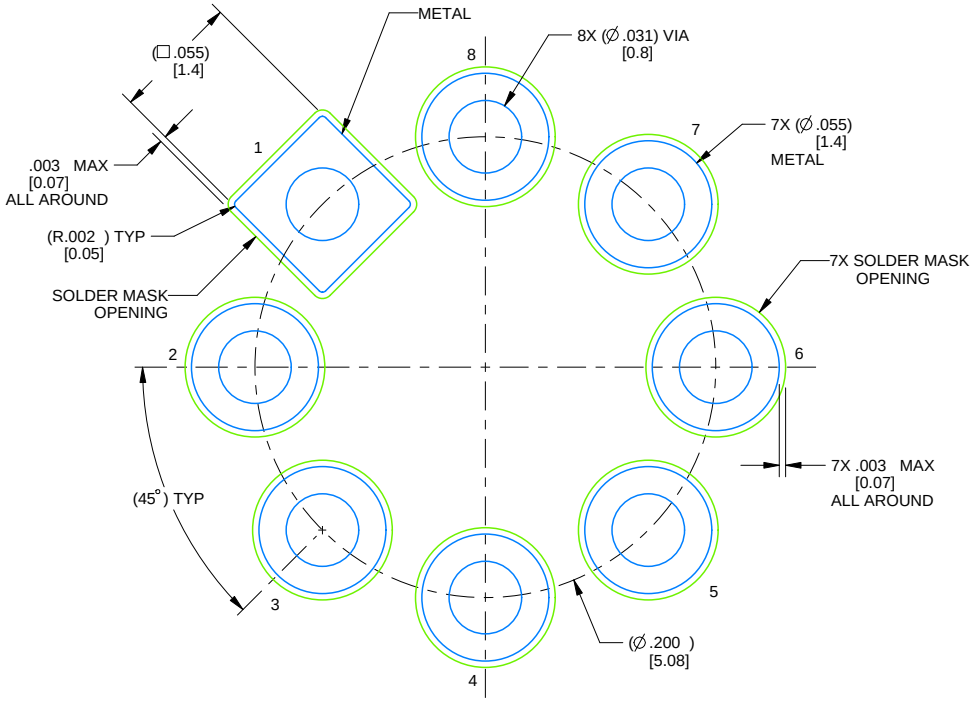
TO-CAN - 5.72 mm max height

TRANSISTOR OUTLINE



NOTES:

1. All linear dimensions are in inches [millimeters]. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Pin numbers shown for reference only. Numbers may not be marked on package.
4. Reference JEDEC registration MO-002/TO-99.



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 12X

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