LM1458/LM1558 Dual Operational Amplifier

Check for Samples: LM1458, LM1558

FEATURES

- **No Frequency Compensation Required**
- **Short-Circuit Protection**
- **Wide Common-Mode and Differential Voltage Ranges**
- **Low-Power Consumption**
- **8-Lead TO-99 and 8-Lead PDIP**
- **No Latch Up When Input Common Mode Range is Exceeded**

DESCRIPTION

The LM1458 and the LM1558 are general purpose dual operational amplifiers. The two amplifiers share a common bias network and power supply leads. Otherwise, their operation is completely independent.

The LM1458 is identical to the LM1558 except that the LM1458 has its specifications guaranteed over the temperature range from 0°C to +70°C instead of −55°C to +125°C.

Connection Diagram

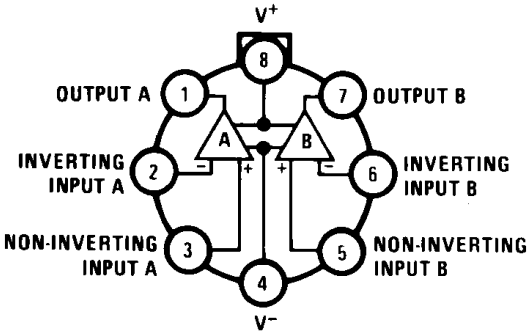


Figure 1. TO-99 Package (Top View) See Package Number LMC (O-MBCY-W8)

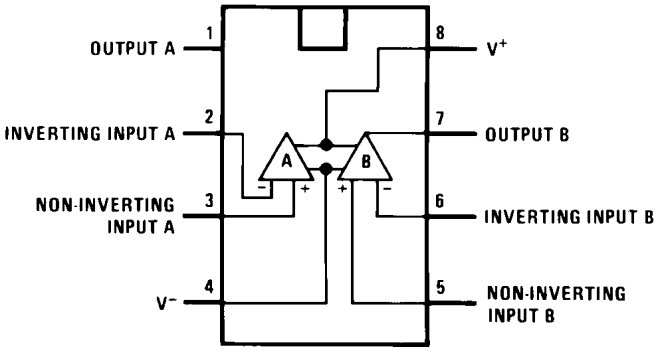


Figure 2. Dual-In-Line Package (Top View) See Package Number D (R-PDSO-G8) or P (R-PDIP-T8)

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) (2) (3)

Supply Voltage	
LM1558	±22V
LM1458	±18V
Power Dissipation (4)	
LM1558H/LM1458H	500 mW
LM1458N	400 mW
Differential Input Voltage	±30V
Input Voltage (5)	±15V
Output Short-Circuit Duration	Continuous
Operating Temperature Range LM1558 LM1458	 −55°C to +125°C 0°C to +70°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	260°C
Soldering Information	
PDIP Package	
Soldering (10 seconds)	260°C
SOIC Package	
Vapor Phase (60 seconds)	215°C
Infrared (15 seconds)	220°C
See AN-450 “Surface Mounting Methods and Their Effect on Product Reliability” for other methods of soldering surface mount devices.	
ESD tolerance (6)	300V

(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 guarantee specific performance limits.
(2) Refer to RETS 1558V for LM1558J and LM1558H military specifications.
(3) If Military/Aerospace specified devices are required, please contact the TI Sales Office/Distributors for availability and specifications.
(4) The maximum junction temperature of the LM1558 is 150°C, while that of the LM1458 is 100°C. For operating at elevated temperatures, devices in the LMC package must be derated based on a thermal resistance of 150°C/W, junction to ambient or 20°C/W, junction to case. For the PDIP the device must be derated based on a thermal resistance of 187°C/W, junction to ambient.
(5) For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
(6) Human body model, 1.5 kΩ in series with 100 pF.

Electrical Characteristics (1)

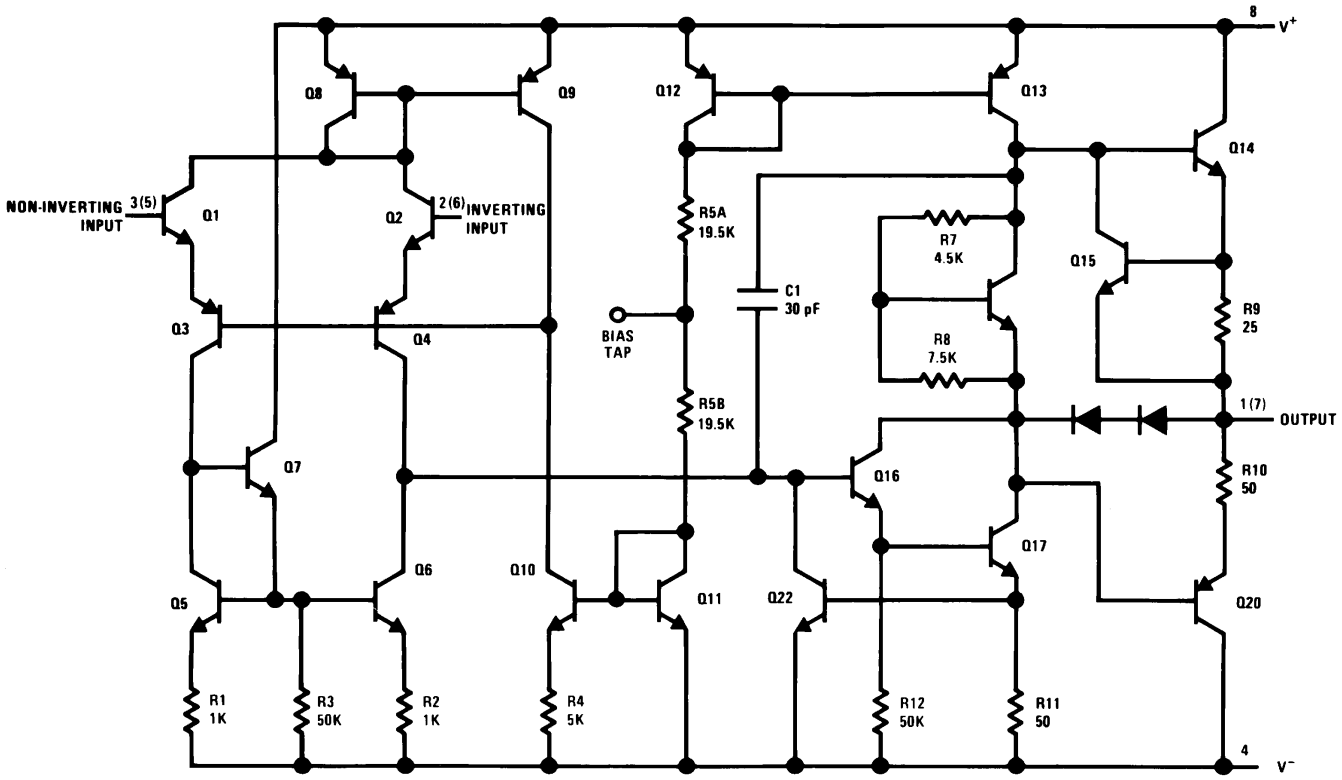
Parameter	Conditions	LM1558			LM1458			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	T_A = 25°C, R_S ≤ 10 kΩ		1.0	5.0		1.0	6.0	mV
Input Offset Current	T_A = 25°C		80	200		80	200	nA
Input Bias Current	T_A = 25°C		200	500		200	500	nA
Input Resistance	T_A = 25°C	0.3	1.0		0.3	1.0		MΩ
Supply Current Both Amplifiers	T_A = 25°C, V_S = ±15V		3.0	5.0		3.0	5.6	mA
Large Signal Voltage Gain	T_A = 25°C, V_S = ±15V V_{OUT} = ±10V, R_L ≥ 2 kΩ	50	160		20	160		V/mV
Input Offset Voltage	R_S ≤ 10 kΩ			6.0			7.5	mV
Input Offset Current				500			300	nA
Input Bias Current				1.5			0.8	µA
Large Signal Voltage Gain	V_S = ±15V, V_{OUT} = ±10V R_L ≥ kΩ	25			15			V/mV
Output Voltage Swing	V_S = ±15V, R_L = 10 kΩ R_L = 2 kΩ	±12 ±10	±14 ±13		±12 ±10	±14 ±13		V V

(1) These specifications apply for V_S = ±15V and −55°C ≤ T_A ≤ 125°C, unless otherwise specified. With the LM1458, however, all specifications are limited to 0°C ≤ T_A ≤ 70°C and V_S = ±15V.

Electrical Characteristics [1] (continued)

Parameter	Conditions	LM1558			LM1458			Units
		Min	Typ	Max	Min	Typ	Max	
Input Voltage Range	V_S = ±15V	±12			±12			V
Common Mode Rejection Ratio	R_S ≤ 10 kΩ	70	90		70	90		dB
Supply Voltage Rejection Ratio	R_S ≤ 10 kΩ	77	96		77	96		dB

SCHEMATIC DIAGRAM



Numbers in parentheses are pin numbers for amplifier B.

REVISION HISTORY

Changes from Revision C (March 2013) to Revision D	Page
• Changed layout of National Data Sheet to TI format	3

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
LM1458 MWC	ACTIVE	WAFERSALE	YS	0	1	Green (RoHS & no Sb/Br)	Call TI	Level-1-NA-UNLIM	-40 to 85		Samples
LM1458M	NRND	SOIC	D	8	95	TBD	Call TI	Call TI	0 to 70	LM 1458M	
LM1458M/NOPB	ACTIVE	SOIC	D	8	95	Green (RoHS & no Sb/Br)	SN	Level-1-260C-UNLIM	0 to 70	LM 1458M	Samples
LM1458MX	NRND	SOIC	D	8	2500	TBD	Call TI	Call TI	0 to 70	LM 1458M	
LM1458MX/NOPB	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	SN	Level-1-260C-UNLIM	0 to 70	LM 1458M	Samples
LM1458N/NOPB	ACTIVE	PDIP	P	8	40	Green (RoHS & no Sb/Br)	Call TI | SN	Level-1-NA-UNLIM	0 to 70	LM1458N	Samples
LM1558H	ACTIVE	TO-99	LMC	8	500	TBD	Call TI	Call TI	-55 to 125	(LM1558H, LM1558H)	Samples
LM1558H/NOPB	ACTIVE	TO-99	LMC	8	500	Green (RoHS & no Sb/Br)	Call TI	Level-1-NA-UNLIM	-55 to 125	(LM1558H, LM1558H)	Samples
MC1558G	ACTIVE	TO-99	LMC	8	500	TBD	Call TI	Call TI	-55 to 125	(LM1558H, LM1558H)	Samples

(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.

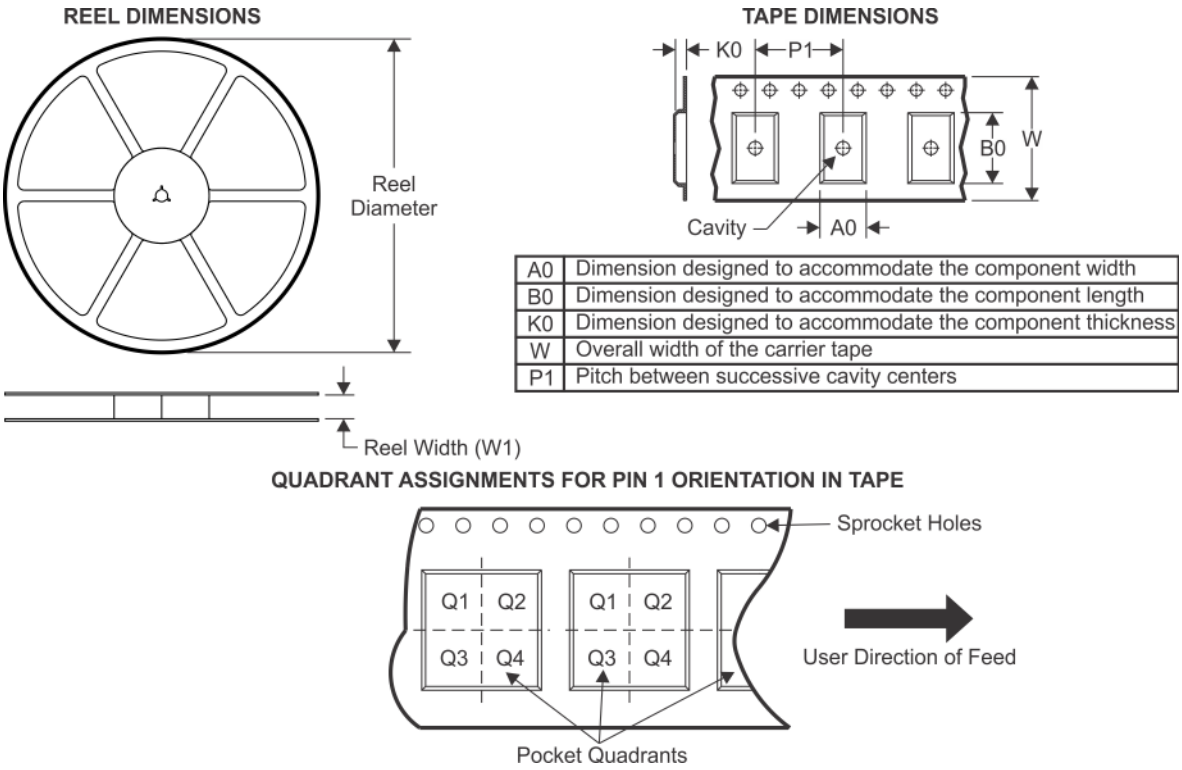
(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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

TAPE AND REEL INFORMATION

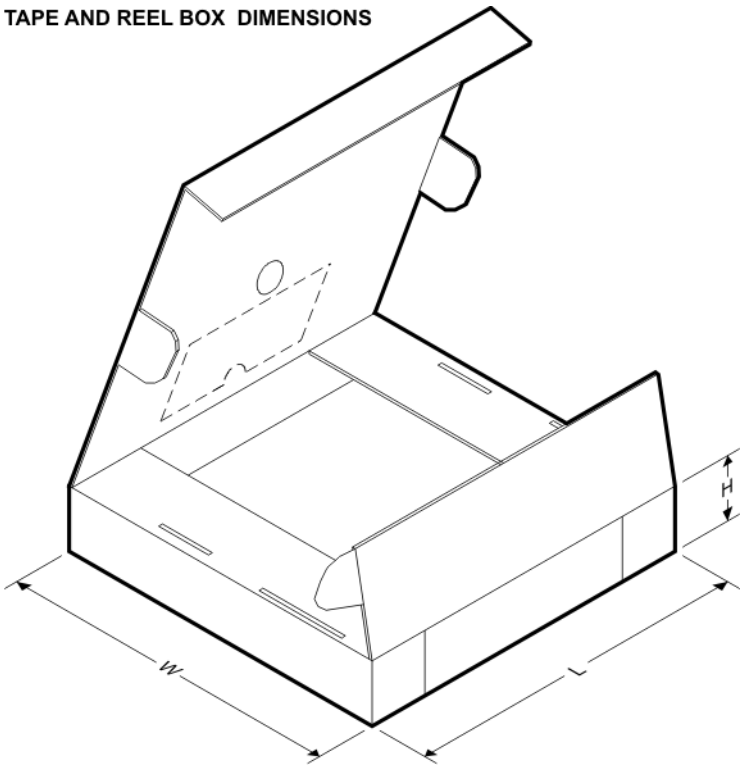


A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

*All dimensions are nominal

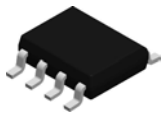
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LM1458MX	SOIC	D	8	2500	330.0	12.4	6.5	5.4	2.0	8.0	12.0	Q1
LM1458MX/NOPB	SOIC	D	8	2500	330.0	12.4	6.5	5.4	2.0	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM1458MX	SOIC	D	8	2500	367.0	367.0	35.0
LM1458MX/NOPB	SOIC	D	8	2500	367.0	367.0	35.0

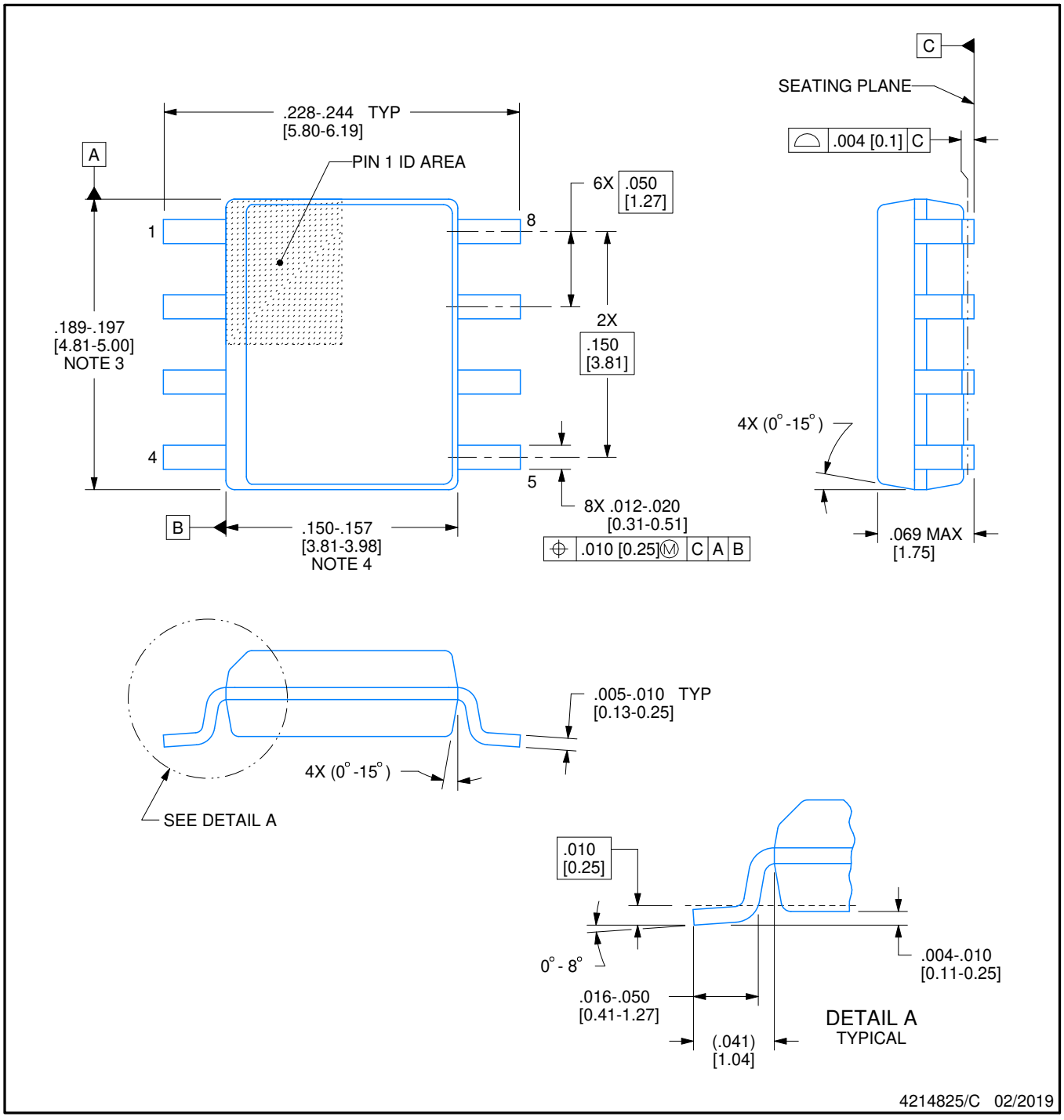


PACKAGE OUTLINE

D0008A

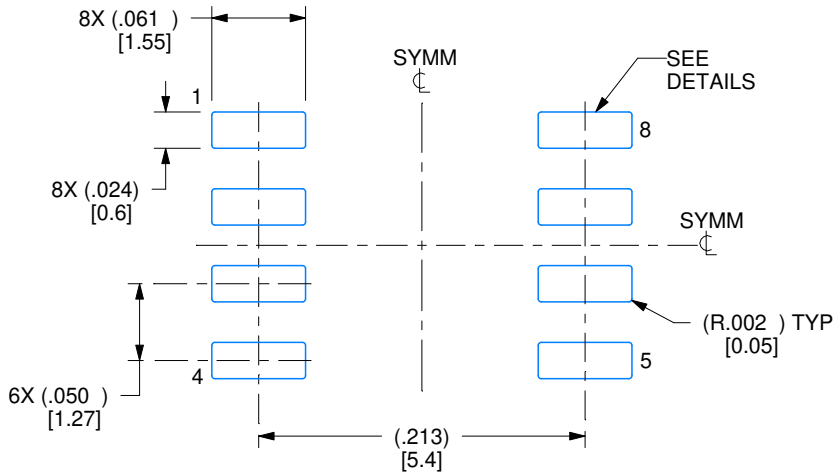
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

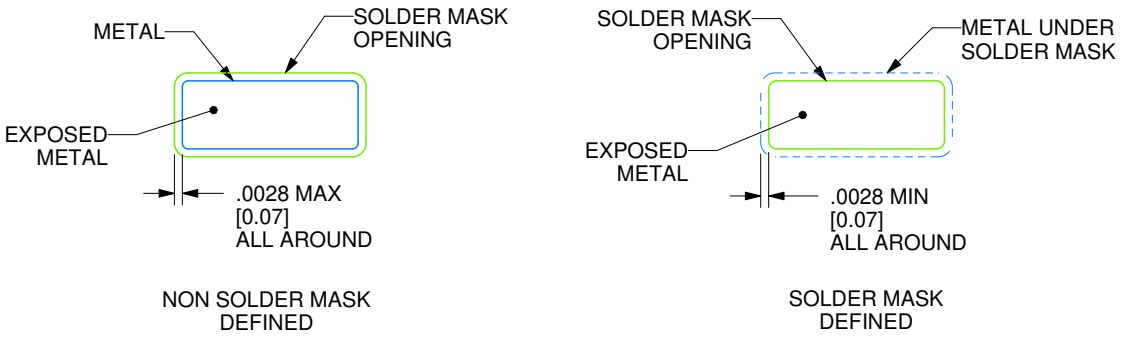


NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

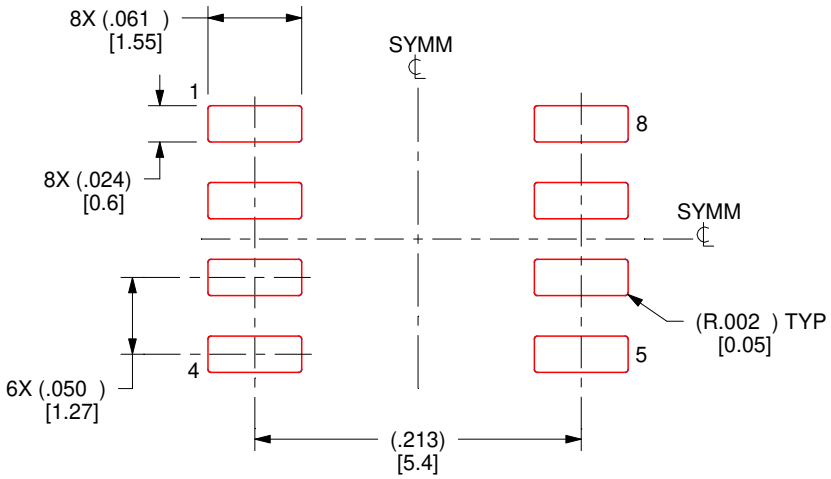
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



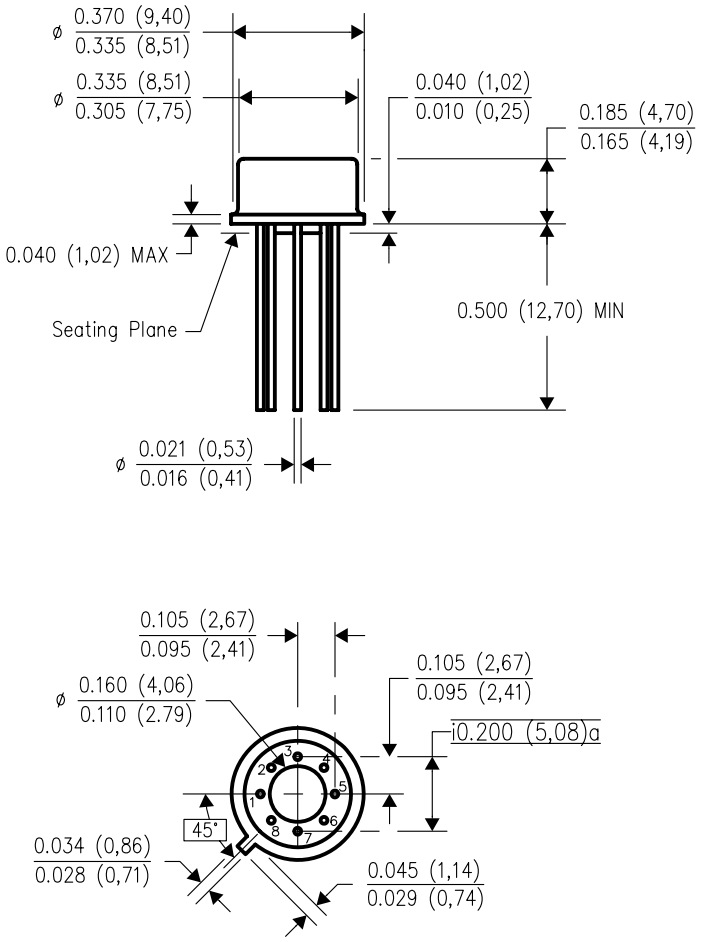
SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

LMC (O–MBCY–W8) METAL CYLINDRICAL PACKAGE



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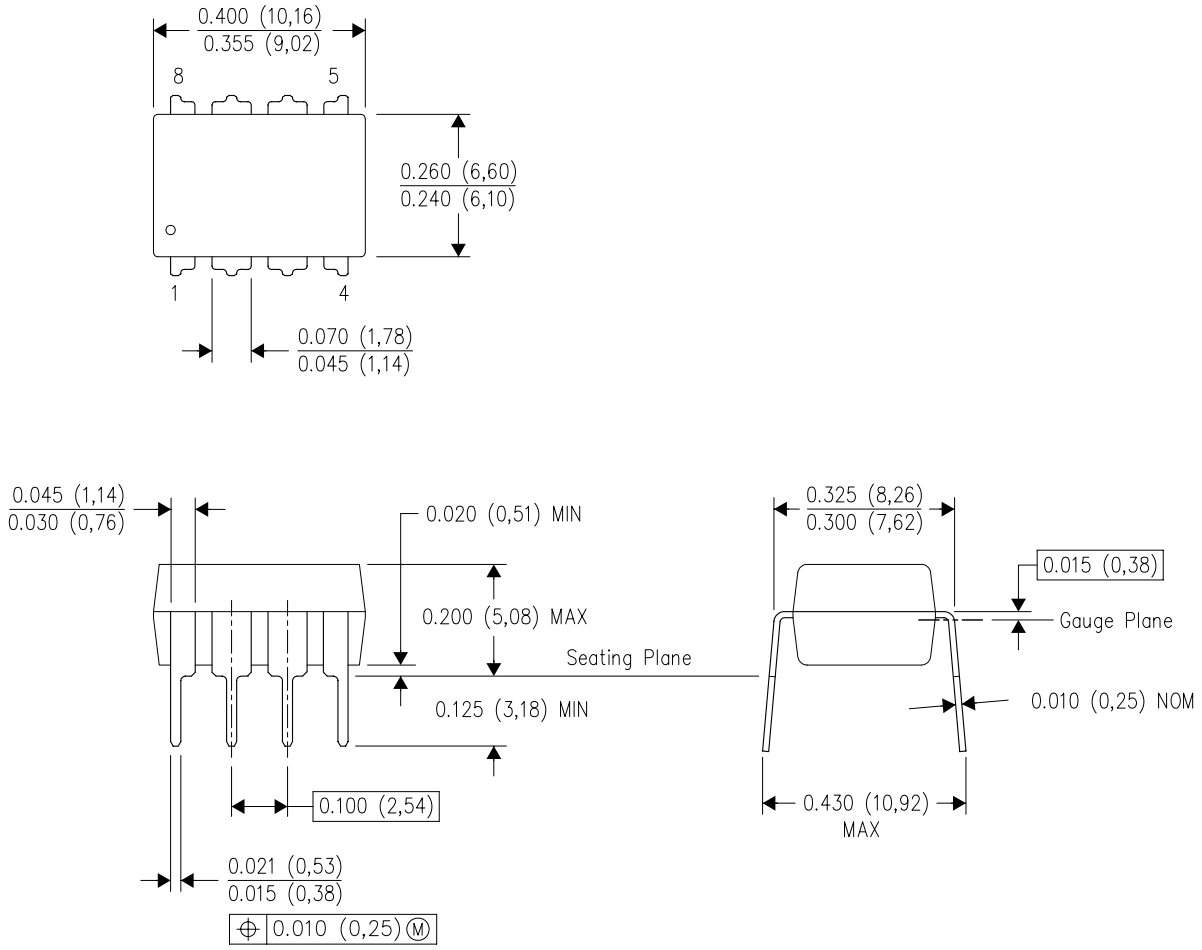
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Leads in true position within 0.010 (0,25) R @ MMC at seating plane.
D. Pin numbers shown for reference only. Numbers may not be marked on package.
E. Falls within JEDEC MO–002/TO–99.

P (R–PDIP–T8) PLASTIC DUAL–IN–LINE PACKAGE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001 variation BA.

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