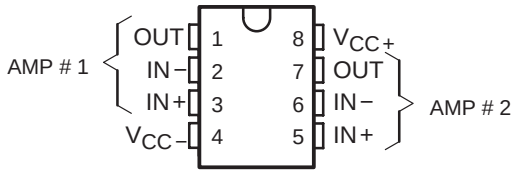
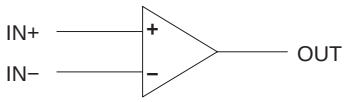
SLOS074 − D2785, OCTOBER 1983 — REVISED JUNE 1988

- **Matched Gain and Offset Between Amplifiers**
- **Unity-Gain Bandwidth . . . 3 MHz Min**
- **Slew Rate . . . 1.5 V/ns Min**
- **Low Equivalent Input Noise Voltage 2 μV/Hz Max (20 Hz to 20 kHz)**
- **No Frequency Compensation Required**
- **No Latch Up**
- **Wide Common-Mode Voltage Range**
- **Low Power Consumption**
- **Designed to be Interchangeable with Raytheon RC4559**

D OR P PACKAGE
(TOP VIEW)



symbol (each amplifier)



AVAILABLE OPTIONS

SYMBOLIZATION		OPERATING TEMPERATURE RANGE	V_{IO} max at 25°C
DEVICE	PACKAGE SUFFIX		
RC4559	D, P	−0°C to 70°C	6 mV

The D packages are available taped and reeled. Add the suffix R to the device type when ordering. (i.e.,RC4559DR)

description

The RC4559 is a dual high-performance operational amplifier. The high common-mode input voltage and the absence of latch-up make this amplifier ideal for low-noise signal applications such as audio preamplifiers and signal conditioners. This amplifier features a guaranteed dynamic performance and output drive capability that far exceeds that of the general-purpose type amplifiers.

The RC4559 is characterized for operation from 0°C to 70°C.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage V_{CC+} (see Note 1) . . . . . 18 V
Supply voltage V_{CC-} (see Note 1) . . . . . −18 V
Differential input voltage (see Note 2) . . . . . ±30 V
Input voltage (any input, see Notes 1 and 3) . . . . . ±15 V
Duration of output short-circuit to ground, one amplifier at a time (see Note 4) . . . . . unlimited
Continuous total dissipation . . . . . 500 mW
Operating free-air temperature range . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 125°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

NOTES: 1. All voltage values, unless otherwise noted, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is the midpoint between V_{CC+} and V_{CC-}.
2. Differential voltages are at the noninverting input terminal with respect to the inverting input terminal.
3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
4. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

electrical characteristics at specified free-air temperature, V_{CC+} = 15 V, V_{CC-} = −15 V

PARAMETER		TEST CONDITIONS†	T_A‡	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	V_O = 0	25°C		2	6	mV
			Full Range			7.5	
I_{IO}	Input offset current	V_O = 0	25°C		5	100	nA
			Full range			200	
$I_{IB}I$	nput bias current	V_O = 0	25°C		40	250	nA
			Full range			500	
V_I	Input voltage range		25°C	±12	±13		V
V_{OM}	Maximum peak output voltlage swing	$R_L \geq 3\ k\Omega$	25°C	±12	±13		V
		R_L = 600 Ω	25°C	±9.5	±10		
		$R_L \geq 2\ k\Omega$	Full range	±10			
V_I	Input voltage range	V_O = ±10 V, R_L = 2 kΩ	25°C	20	300		V/mV
			Full range	15			
B_{OM}	Maximum output-swing bandwidth	V_{OPP} = 20 V, R_L = 2 kΩ	25°C	24	32		kHz
B_1	Unity-gain bandwidth		25°C	3	4		MHz
r_i	Input resistance		25°C	0.3	1		MΩ
CMRR	Common-mode rejection ratio	V_O = 0	25°C	80	100		dB
k_{SVS}	Supply voltage sensitivity ($\Delta V_{IO}/\Delta V_{CC}$)	V_O = 0	25°C		10	75	μV/V
V_n	Equivalent input noise voltage (closed loop)	A_{VD} = 100, R_S = 1 kΩ, f = 20 Hz to 20 kHz	25°C		1.4	2	μV
I_n	Equivalent input noise current	f = 20 Hz to 20 kHz	25°C		25		pA
I_{CC}	Supply current (both amplifiers)	No load, No signal	25°C		3.3	5.6	mA
			0°C		4	6.6	
			70°C		3	5	
V_{o1}/V_{o2}	Crosstalk attentuation	A_{VD} = 100, R_S = 1 kΩ, f = 10 kHz	25°C		90		dB

† All characteristics are specified under open-loop operation, unless otherwise noted.
‡ Full range operating free-air temperature range is 0°C to 70°C.

matching characteristics at V_{CC+} = 15 V, V_{CC-} = −15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	V_O = 0		±0.2		mV
I_{IO}	Input offset current	V_O = 0		±7.5		nA
I_{IB}	Input bias current	V_O = 0		±15		nA
A_{VD}	Large-signal differential voltage amplification	V_O = ±10 V, R_L = 2 kΩ		±1		dB

operating characteristics, V_{CC+} = 15 V, V_{CC-} = −15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_r	Rise time	V_I = 20 mV, R_L = 2 kΩ, C_L = 100 pF		80		μs
	Overshoot			18%		
SR	Slew rate at unity gain	V_I = 10 mV, R_L = 2 kΩ, C_L = 100 pF	1.5	2		V/μs

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
RC4559D	ACTIVE	SOIC	D	8	75	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	RC4559	Samples
RC4559DR	ACTIVE	SOIC	D	8	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	RC4559	Samples
RC4559P	ACTIVE	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	RC4559P	Samples
RC4559PE4	ACTIVE	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	RC4559P	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.

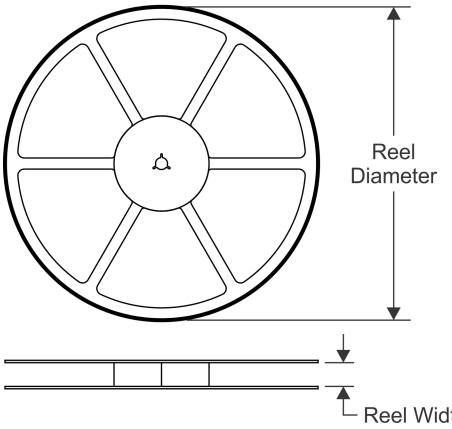
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals.
TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

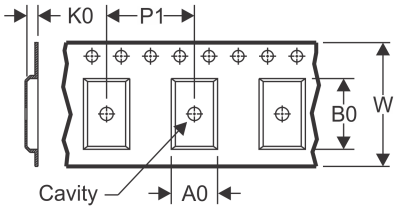
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

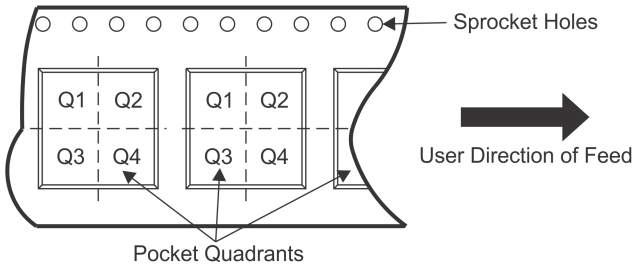


TAPE DIMENSIONS



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

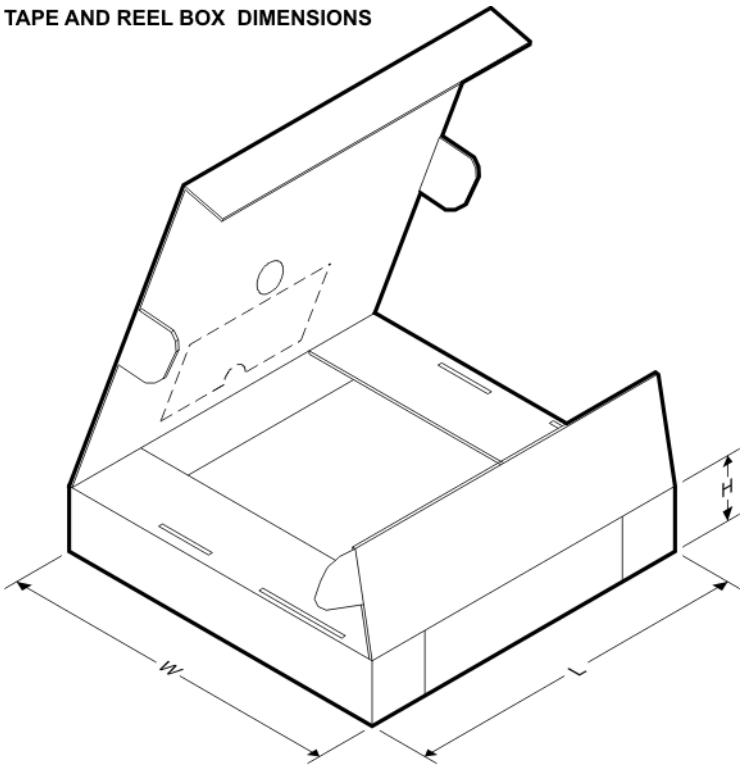
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

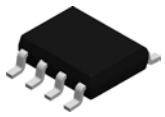
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
RC4559DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
RC4559DR	SOIC	D	8	2500	340.5	336.1	25.0

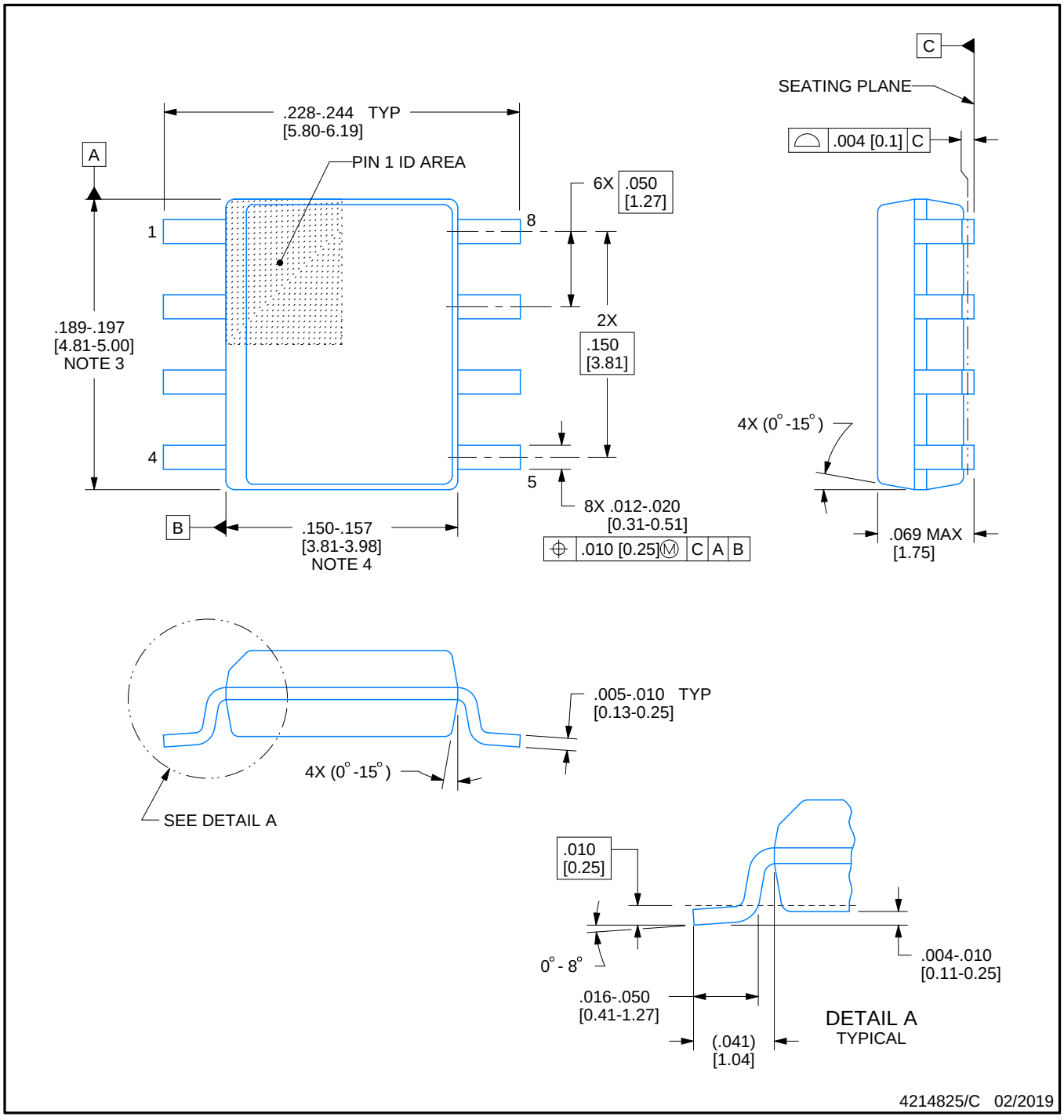


PACKAGE OUTLINE

D0008A

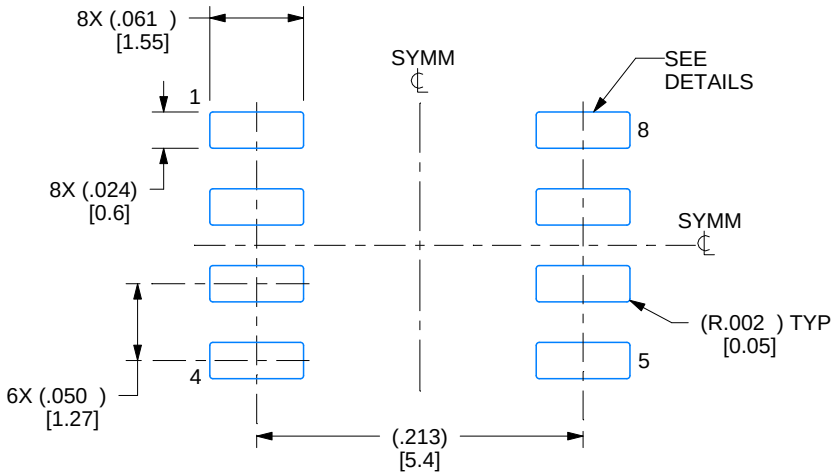
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

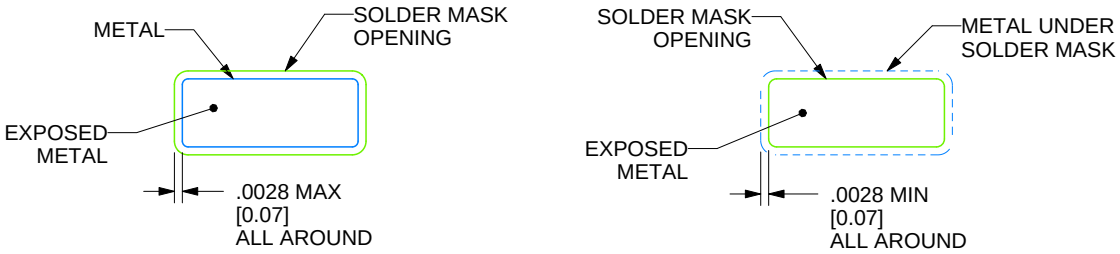


NOTES:

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)

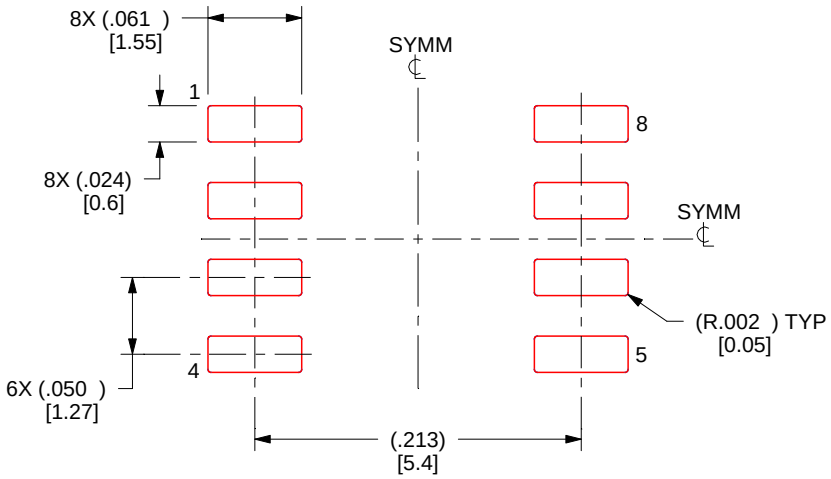
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



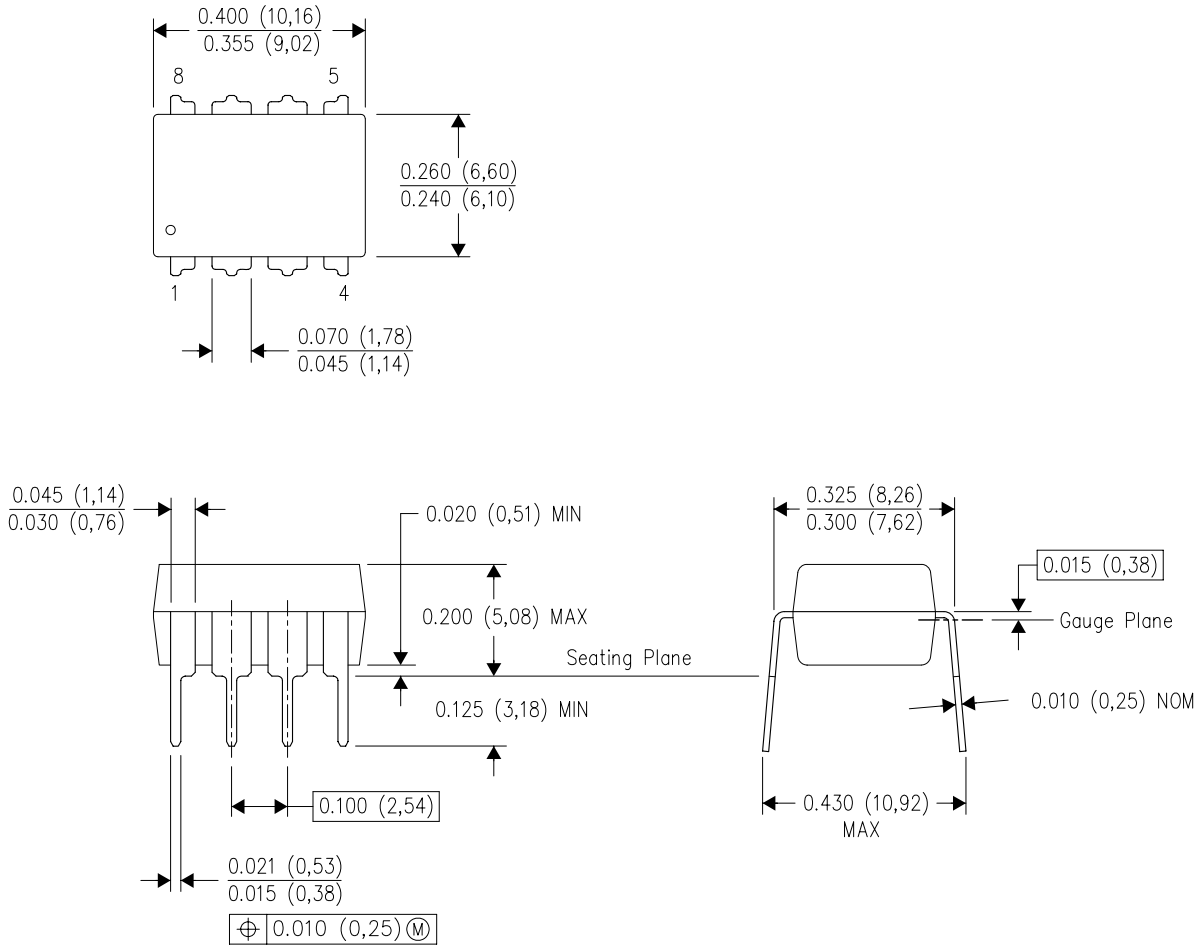
SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

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.

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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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265