

DIFFERENTIAL VIDEO AMPLIFIER

FEATURES

- Adjustable Gain to 400 (Typ)
- No Frequency Compensation Required
- Low Noise . . . 3-mV V_n (Typ)

DESCRIPTION

This device is a monolithic two-stage video amplifier with differential inputs and differential outputs. It features internal series-shunt feedback that provides wide bandwidth, low phase distortion, and excellent gain stability. Emitter-follower outputs enable the device to drive capacitive loads. All stages are current-source biased to obtain high common-mode and supply-voltage rejection ratios.

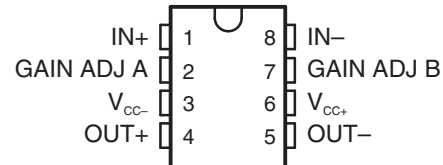
The differential gain is typically 400 when the gain adjust pins are connected together, or amplification may be adjusted for near 0 to 400 by the use of a single external resistor connected between the gain adjustment pins A and B. No external frequency-compensating components are required for any gain option.

The device is particularly useful in magnetic-tape or disk-file systems using phase or NRZ encoding and in high-speed thin-film or plated-wire memories. Other applications include general-purpose video and pulse amplifiers.

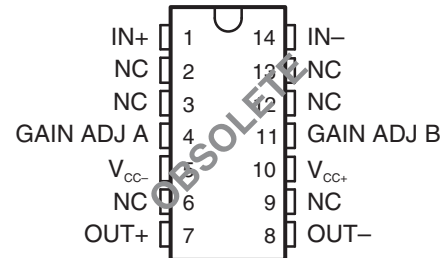
The device achieves low equivalent noise voltage through special processing and a new circuit layout incorporating input transistors with low base resistance.

The TL592B is characterized for operation from 0°C to 70°C.

**D8, P, OR PS PACKAGE
(TOP VIEW)**



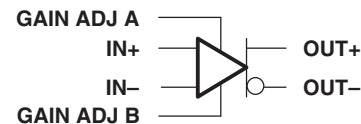
**D14 OR N PACKAGE
(TOP VIEW)**



NC – No internal connection

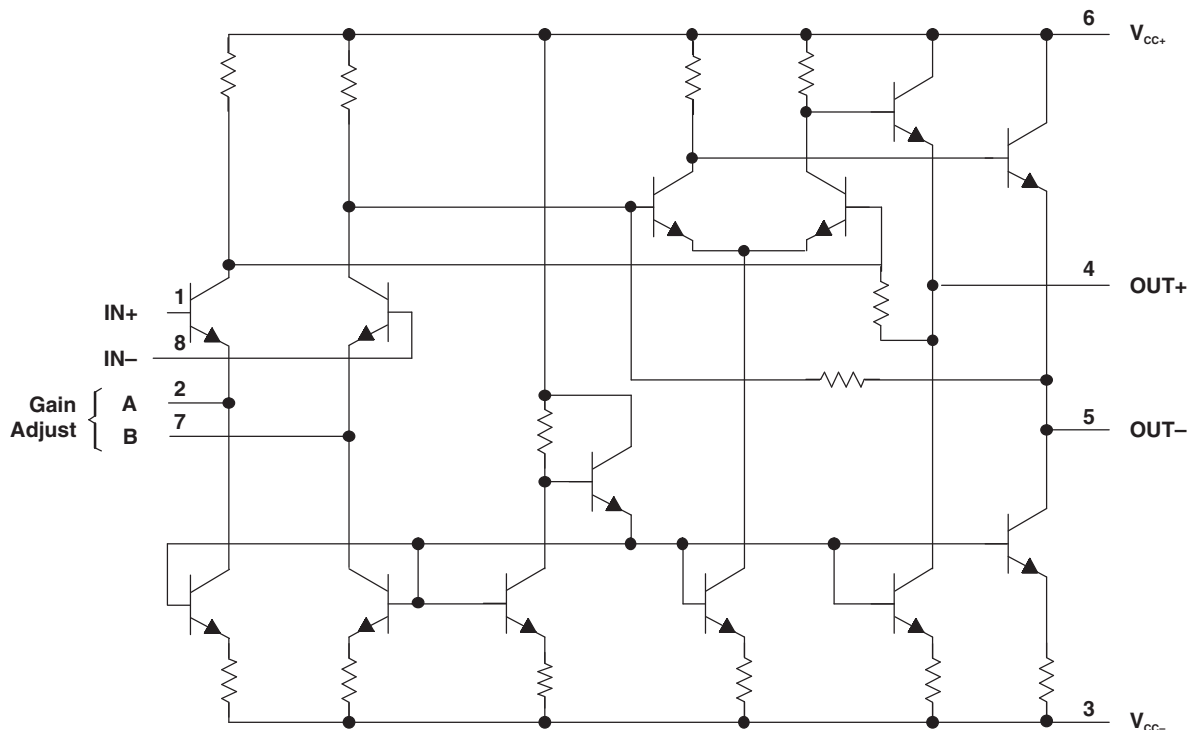
Note: D8 and D14 are the codes to differentiate the 8-pin and 14-pin versions, respectively.

SYMBOL



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SCHEMATIC



NOTE: Pin numbers shown are for D, P, and PS packages.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾⁽²⁾

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

V_{CC+}	Positive supply voltage	8 V
V_{CC-}	Negative supply voltage	–8 V
V_{DI}	Differential input voltage	±5 V
V_I	Voltage range, any input	V_{CC+} to V_{CC-}
I_O	Output current	10 mA
P_D	Continuous total power dissipation	See Dissipation Rating Table
T_A	Operating free-air temperature range	0°C to 70°C
T_{stg}	Storage temperature range	–65°C to 150°C
T_{lead}	Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- (1) Stresses beyond those listed under *absolute maximum ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *recommended operating conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) All voltage values except differential input voltages are with respect to the midpoint between V_{CC+} and V_{CC-} .

DISSIPATION RATINGS

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR	DERATE ABOVE T_A	$T_A = 70^\circ\text{C}$ POWER RATING
D8	530 mW	5.8 mW/°C	59	464 mW
D14	530 mW	N/A	N/A	530 mW
N	530 mW	N/A	N/A	530 mW
P	530 mW	N/A	N/A	530 mW
PS	530 mW	N/A	N/A	530 mW

RECOMMENDED OPERATING CONDITIONS

		MIN	NOM	MAX	UNIT
V_{CC+}	Positive supply voltage	3	6	8	V
V_{CC-}	Negative supply voltage	–3	–6	–8	V
T_A	Operating free-air temperature	0		70	°C

ELECTRICAL CHARACTERISTICS

at specified free-air temperature, $V_{CC\pm} = \pm 6$ V, $R_L = 2$ k Ω (unless otherwise noted)

PARAMETER	TEST FIGURE	TEST CONDITIONS ⁽¹⁾	T_A	MIN	TYP	MAX	UNIT
A_{VD}	1	$V_{OPP} = 3$ V, $R_L = 2$ k Ω	25°C	300	400	500	V/V
			0°C to 70°C	250		600	
			25°C		13		
BW	2	$V_{OPP} = 1$ V, $R_{AB} = 0$	25°C		50		MHz
I_{IO}			25°C		0.4	5	μ A
			0°C to 70°C			6	
I_{IB}			25°C		9	30	μ A
			0°C to 70°C			40	
V_{ICR}	3		25°C	± 1			V
			0°C to 70°C	± 1			
V_{OC}	1	$R_L = \infty$	25°C	2.4	2.9	3.4	V
V_{OO}	1	$V_{ID} = 0$, $R_{AB} = \infty$, $R_L = \infty$	25°C		0.35	0.75	V
			0°C to 70°C			1.5	
V_{OPP}	1	$R_L = 2$ k Ω , $R_{AB} = 0$	25°C	3	4		V
			0°C to 70°C	2.8			
r_i		$V_{OD} = 1$ V, $R_{AB} = 0$	25°C		4		k Ω
			0°C to 70°C		3.6		
r_o			0°C to 70°C			30	Ω
C_i			0°C to 70°C		5		pF
CMRR	3	$V_{IC} = \pm 1$ V, $R_{AB} = 0$	25°C	f = 100 kHz	60	86	dB
				f = 5 MHz		60	
			0°C to 70°C	f = 100 kHz	50		
				f = 5 MHz		60	
k_{SVR}	4	$\Delta V_{CC+} = \pm 0.5$ V, $\Delta V_{CC-} = \pm 0.5$ V, $R_{AB} = 0$	25°C		50	70	dB
			0°C to 70°C		50		
V_n	4	BW = 1 kHz to 10 MHz	25°C		3		μ V
t_{pd}	2	$\Delta V_O = 1$ V	25°C		7.5		ns
t_r	2	$\Delta V_O = 1$ V	25°C		10.5		ns
$I_{sink(max)}$		$V_{ID} = 1$ V, $V_O = 3$ V		3	4		mA
I_{CC}		No load, No signal	25°C		18	24	mA
			0°C to 70°C			27	

(1) R_{AB} is the gain-adjustment resistor connected between gain-adjust pins A and B. If not specified for a particular parameter, its value is irrelevant to that parameter.

PARAMETER MEASUREMENT INFORMATION

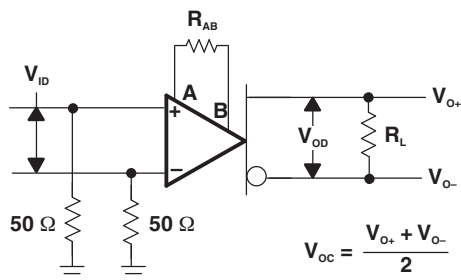


Figure 1.

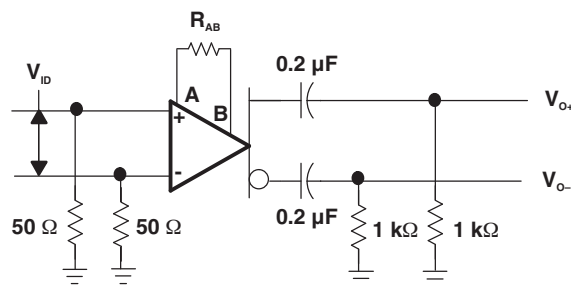


Figure 2.

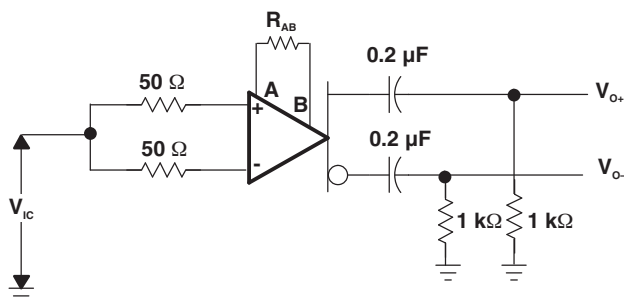


Figure 3.

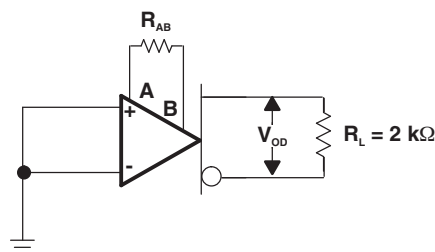


Figure 4.

TYPICAL CHARACTERISTICS

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION
vs
SUPPLY VOLTAGE

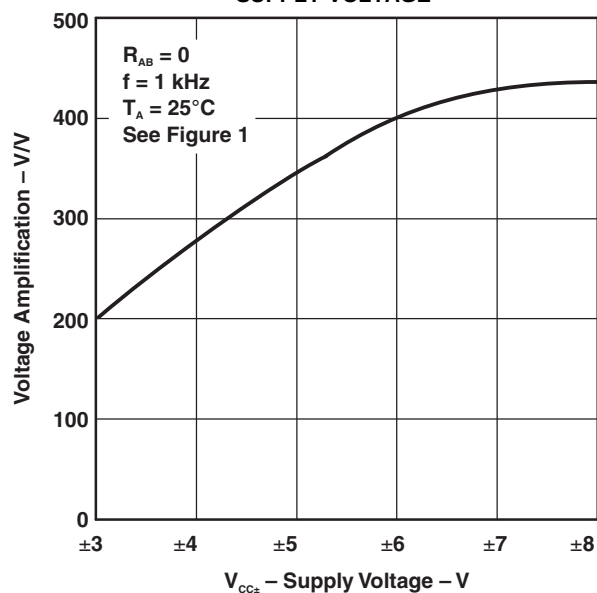


Figure 5.

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION
vs
GAIN-ADJUSTMENT RESISTANCE

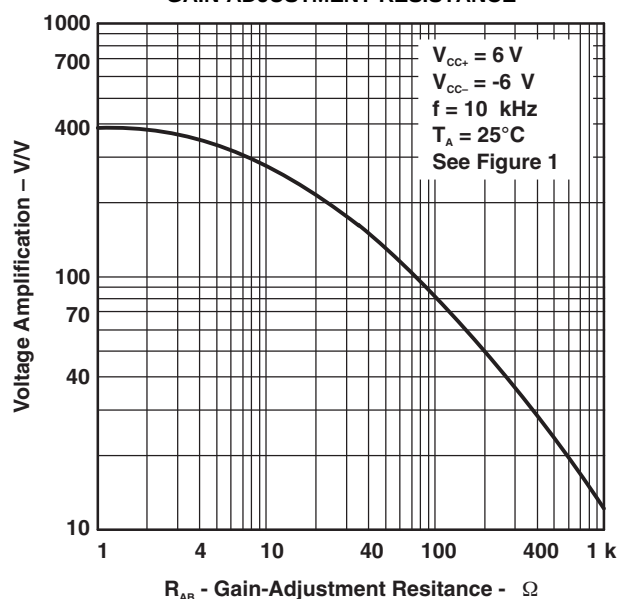


Figure 6.

SUPPLY CURRENT
vs
SUPPLY VOLTAGE

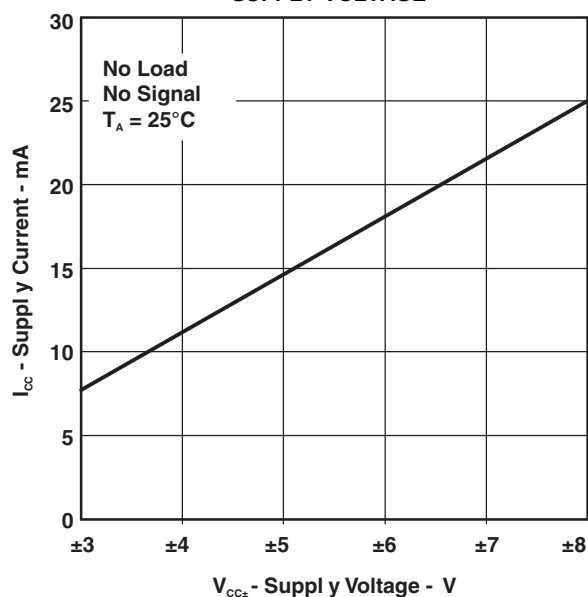


Figure 7.

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)
TL592B-8D	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	TL592B
TL592B-8D.A	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	TL592B
TL592B-8DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	TL592B
TL592B-8DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	TL592B
TL592BP	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	TL592BP
TL592BP.A	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	TL592BP
TL592BPSR	Active	Production	SO (PS) 8	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	T592B
TL592BPSR.A	Active	Production	SO (PS) 8	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	T592B

⁽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.

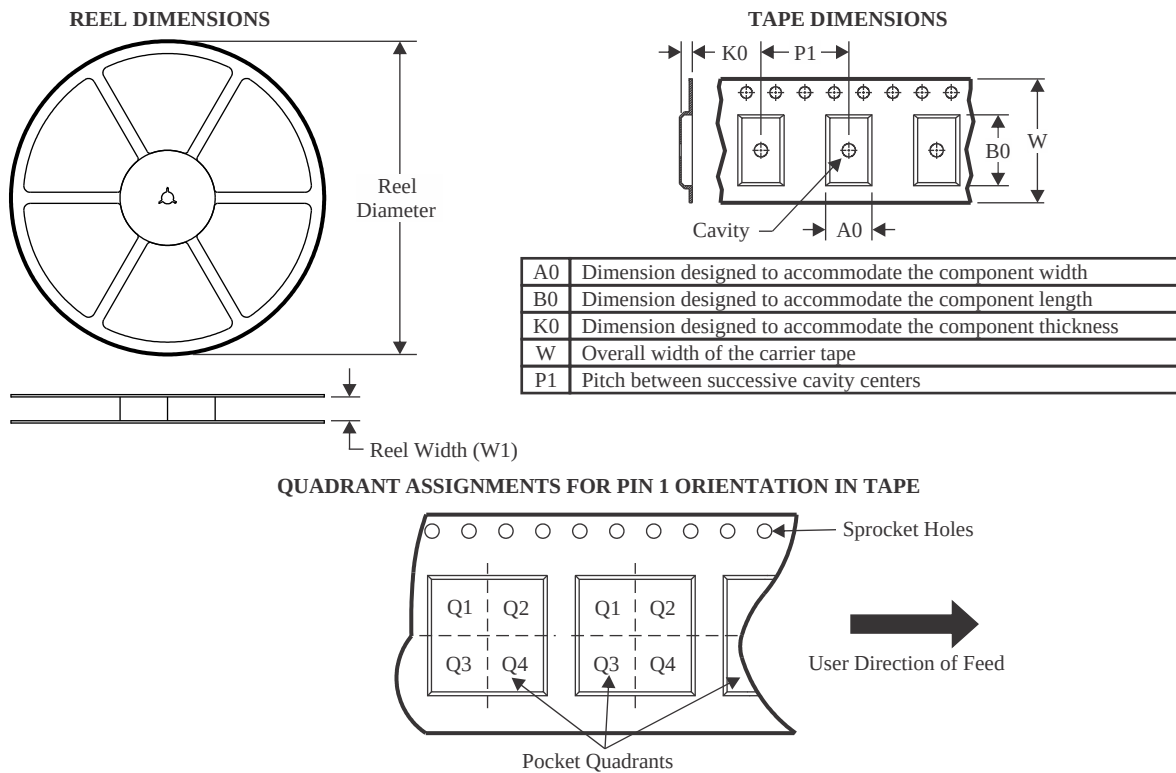
⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

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.

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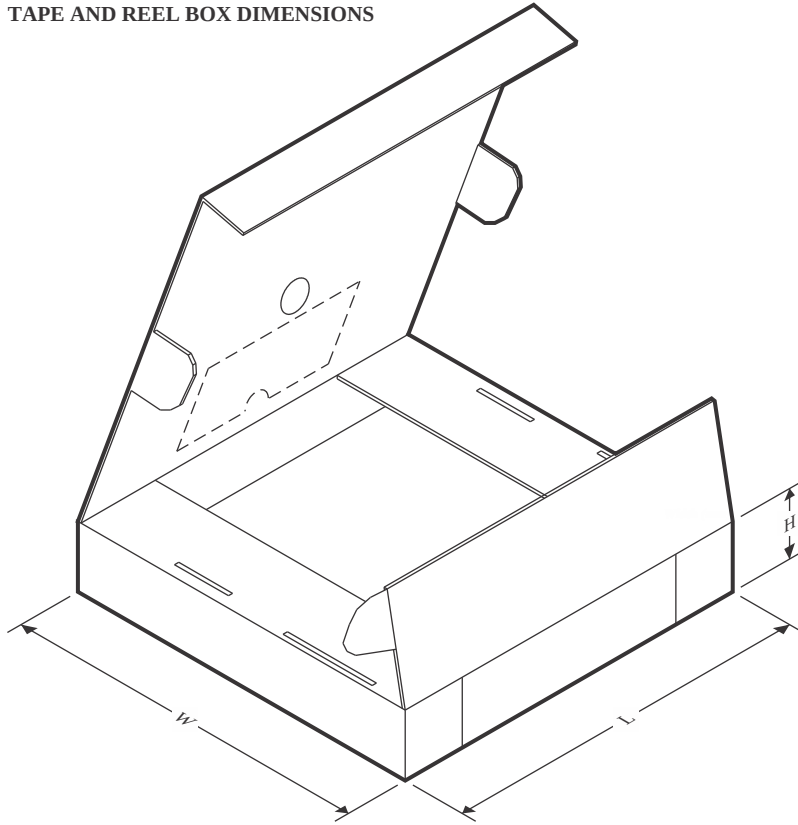
TAPE AND REEL INFORMATION



*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
TL592B-8DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
TL592BPSR	SO	PS	8	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1

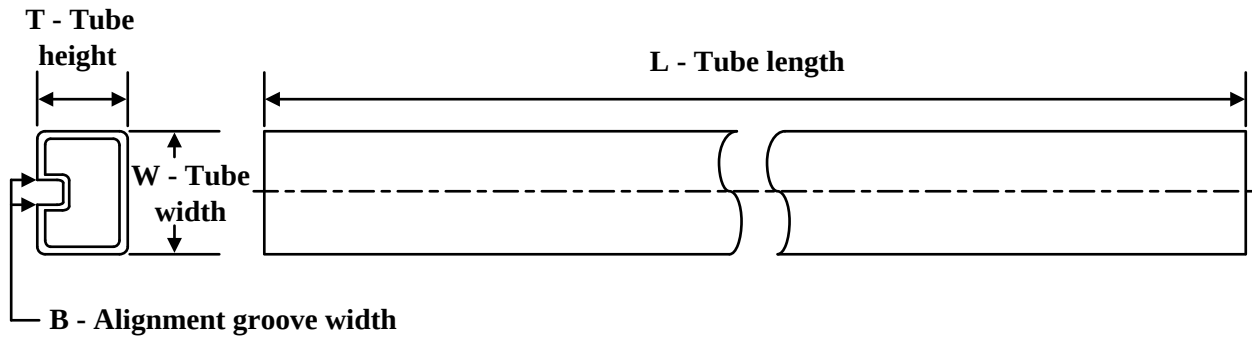
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

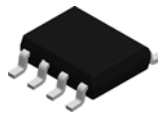
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TL592B-8DR	SOIC	D	8	2500	353.0	353.0	32.0
TL592BPSR	SO	PS	8	2000	356.0	356.0	35.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
TL592B-8D	D	SOIC	8	75	507	8	3940	4.32
TL592B-8D.A	D	SOIC	8	75	507	8	3940	4.32
TL592BP	P	PDIP	8	50	506	13.97	11230	4.32
TL592BP.A	P	PDIP	8	50	506	13.97	11230	4.32

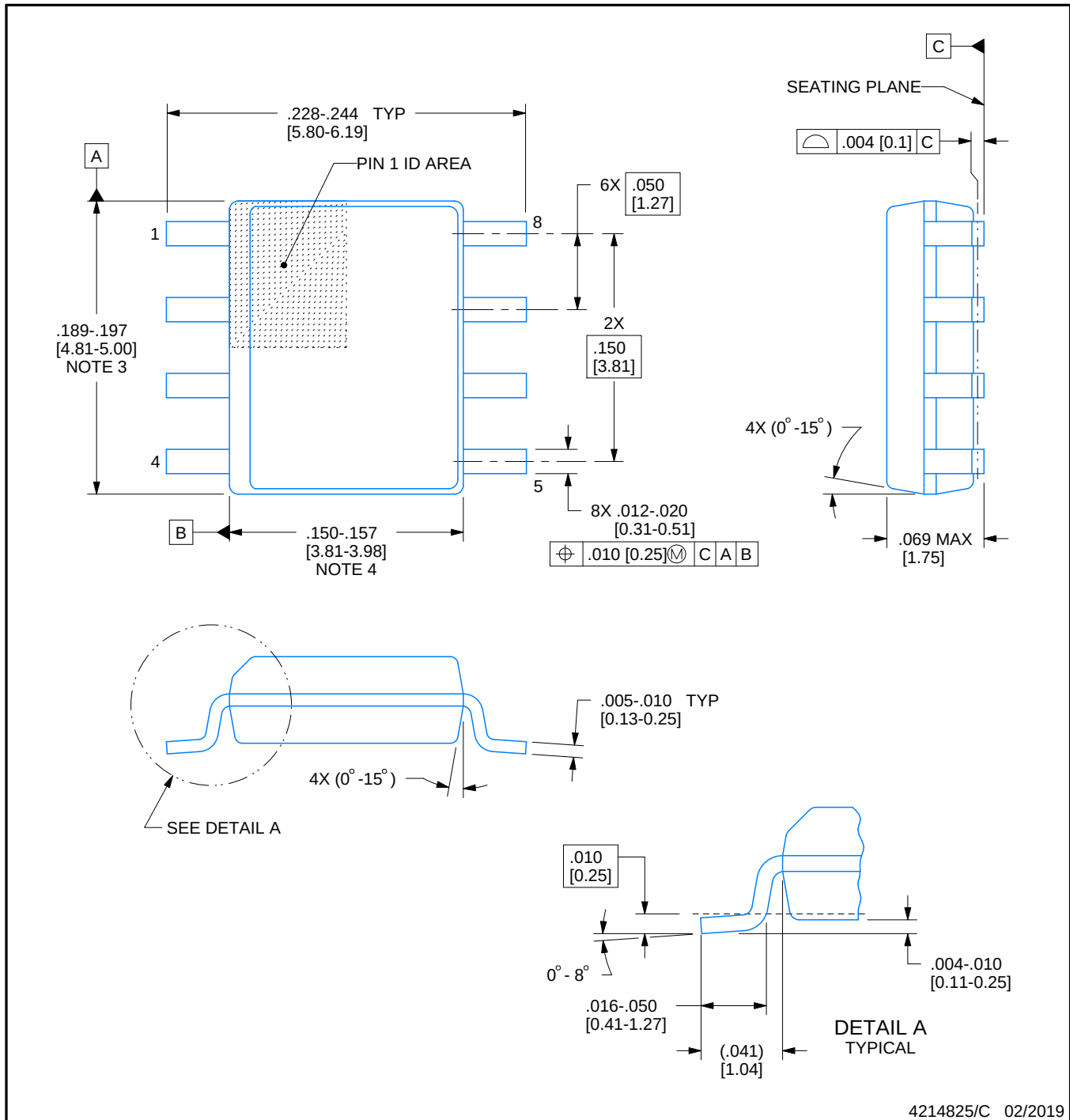


D0008A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4214825/C 02/2019

NOTES:

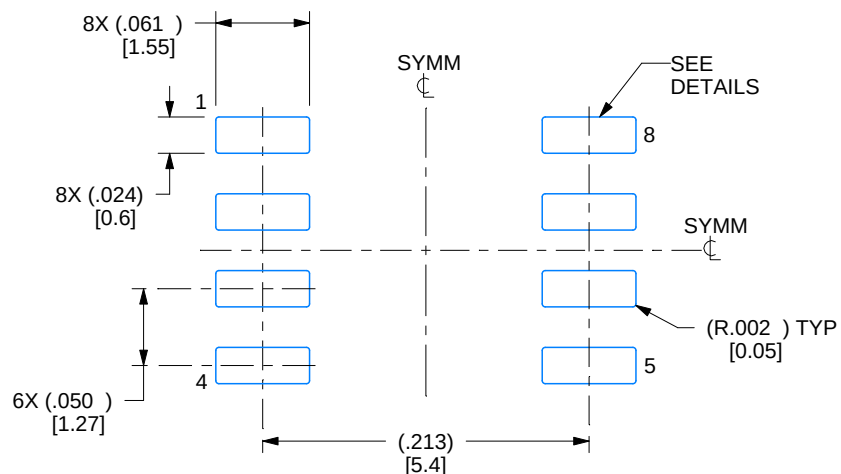
1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate 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.

EXAMPLE BOARD LAYOUT

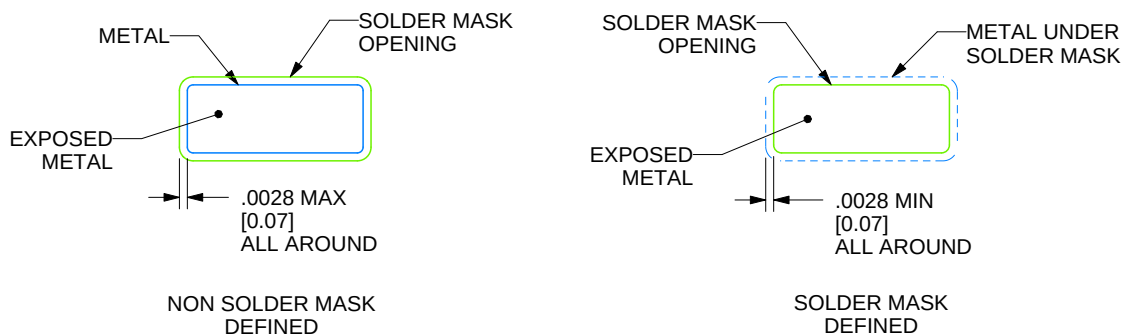
D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

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NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

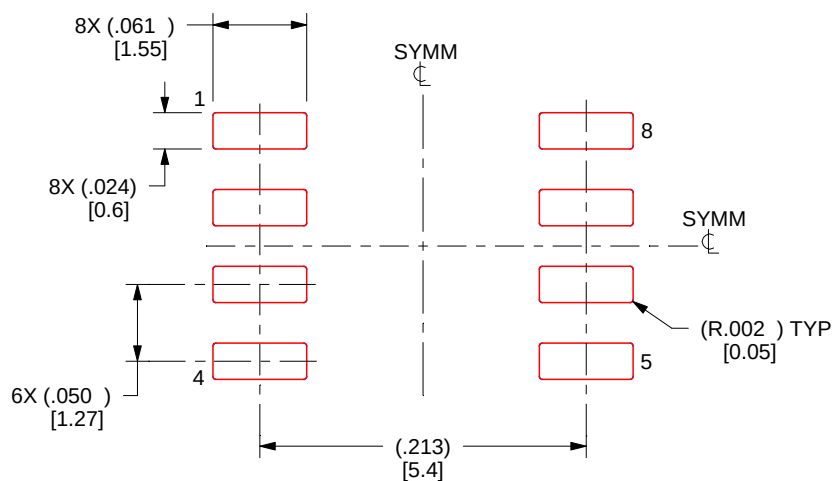
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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

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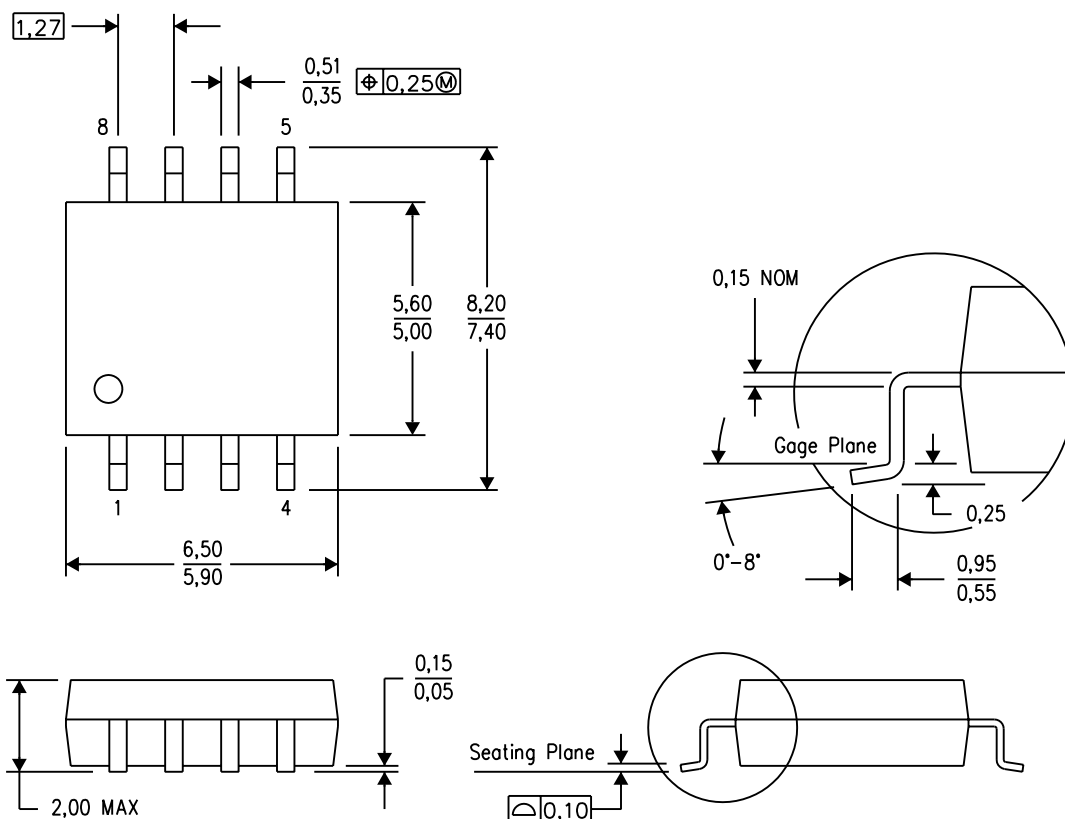
NOTES: (continued)

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.

MECHANICAL DATA

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE

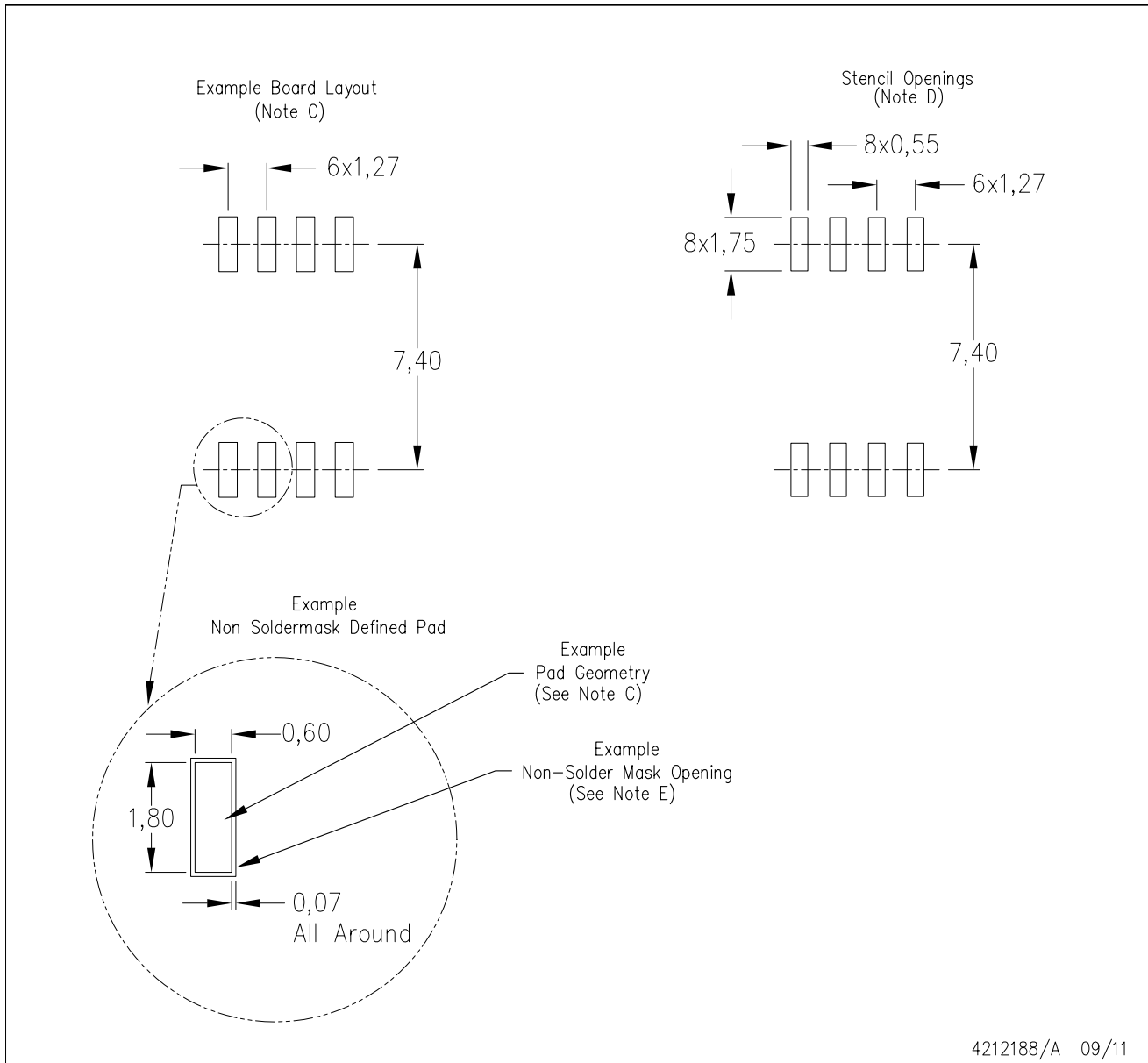


4040063/C 03/03

- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

PS (R-PDSO-G8)

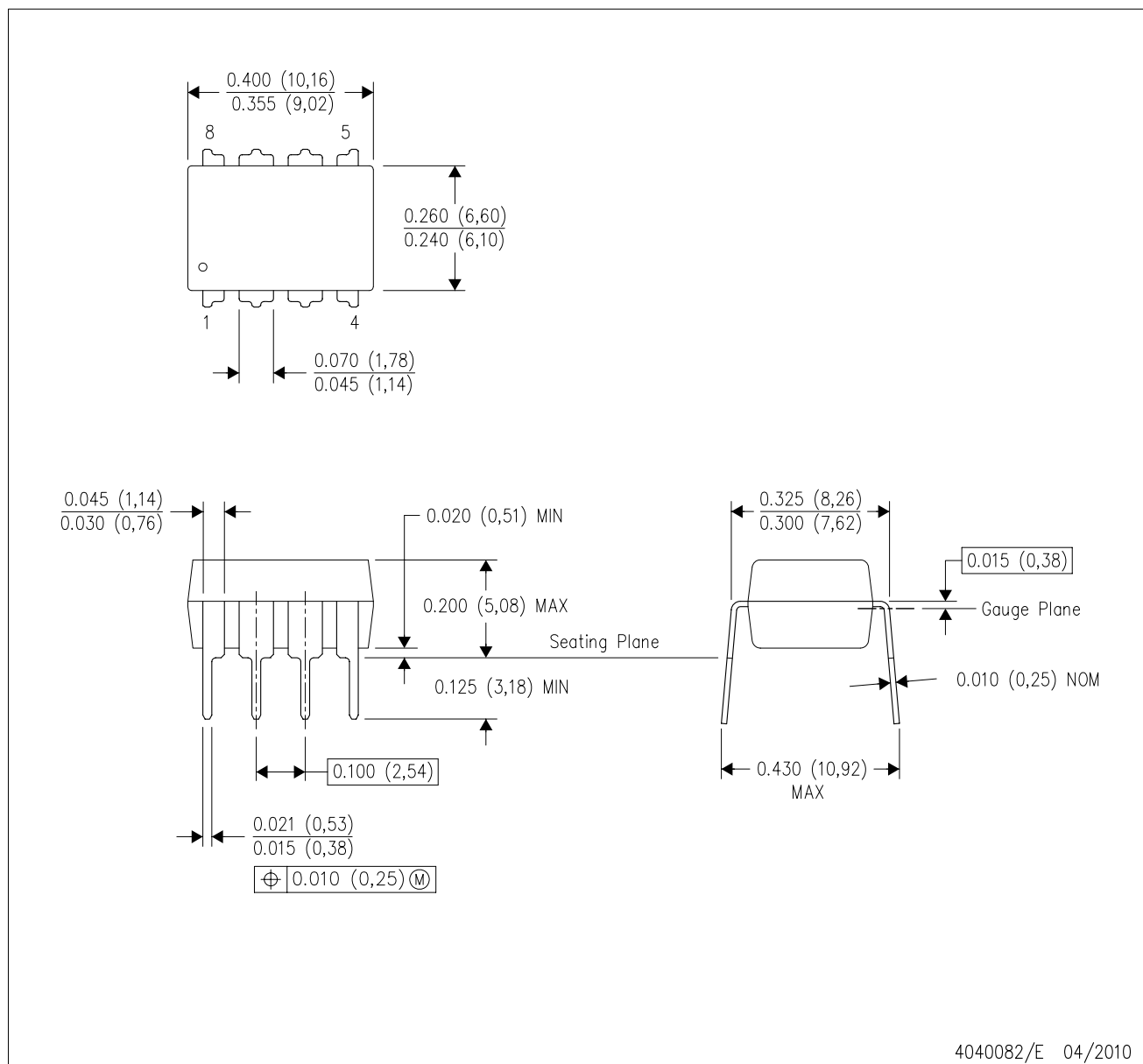
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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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