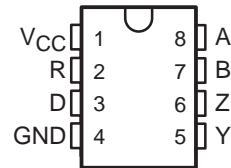


SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

SLLS003E – OCTOBER 1985 – REVISED JUNE 1998

- Meets or Exceeds the Requirements of TIA/EIA-422-B, TIA/EIA-485-A, and ITU Recommendation V.11
- Bus Voltage Range . . . -7 V to 12 V
- Positive- and Negative-Current Limiting
- Driver Output Capability . . . 60 mA Max
- Driver Thermal-Shutdown Protection
- Receiver Input Impedance . . . $12\text{ k}\Omega$ Min
- Receiver Input Sensitivity . . . $\pm 200\text{ mV}$
- Receiver Input Hysteresis . . . 50 mV Typ
- Operates From Single 5-V Supply
- Low Power Requirements

D OR P PACKAGE
(TOP VIEW)



description

The SN75179B is a differential driver and receiver pair designed for balanced transmission-line applications and meets TIA/EIA-422-B, TIA/EIA-485-A, and ITU Recommendation V.11. It is designed to improve the performance of full-duplex data communications over long bus lines.

The SN75179B driver output provides limiting for both positive and negative currents. The receiver features high input impedance, input hysteresis for increased noise immunity, and input sensitivity of $\pm 200\text{ mV}$ over a common-mode input voltage range of -7 V to 12 V . The driver provides thermal shutdown for protection from line fault conditions. Thermal shutdown is designed to occur at a junction temperature of approximately 150°C . The SN75179B is designed to drive current loads of up to 60 mA maximum.

The SN75179B is characterized for operation from 0°C to 70°C .

Function Tables

DRIVER

INPUT D	OUTPUTS	
	Y	Z
H	H	L
L	L	H

RECEIVER

DIFFERENTIAL INPUTS A – B	OUTPUT R
$V_{ID} \geq 0.2\text{ V}$	H
$-0.2\text{ V} < V_{ID} < 0.2\text{ V}$?
$V_{ID} \leq -0.2\text{ V}$	L
Open	?

H = high level, L = low level, ? = indeterminate



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

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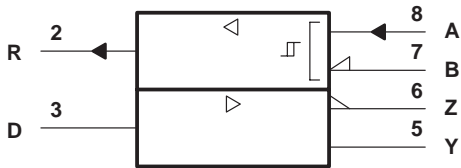
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SN75179B

DIFFERENTIAL DRIVER AND RECEIVER PAIR

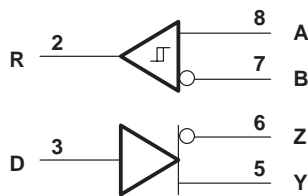
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logic symbol†

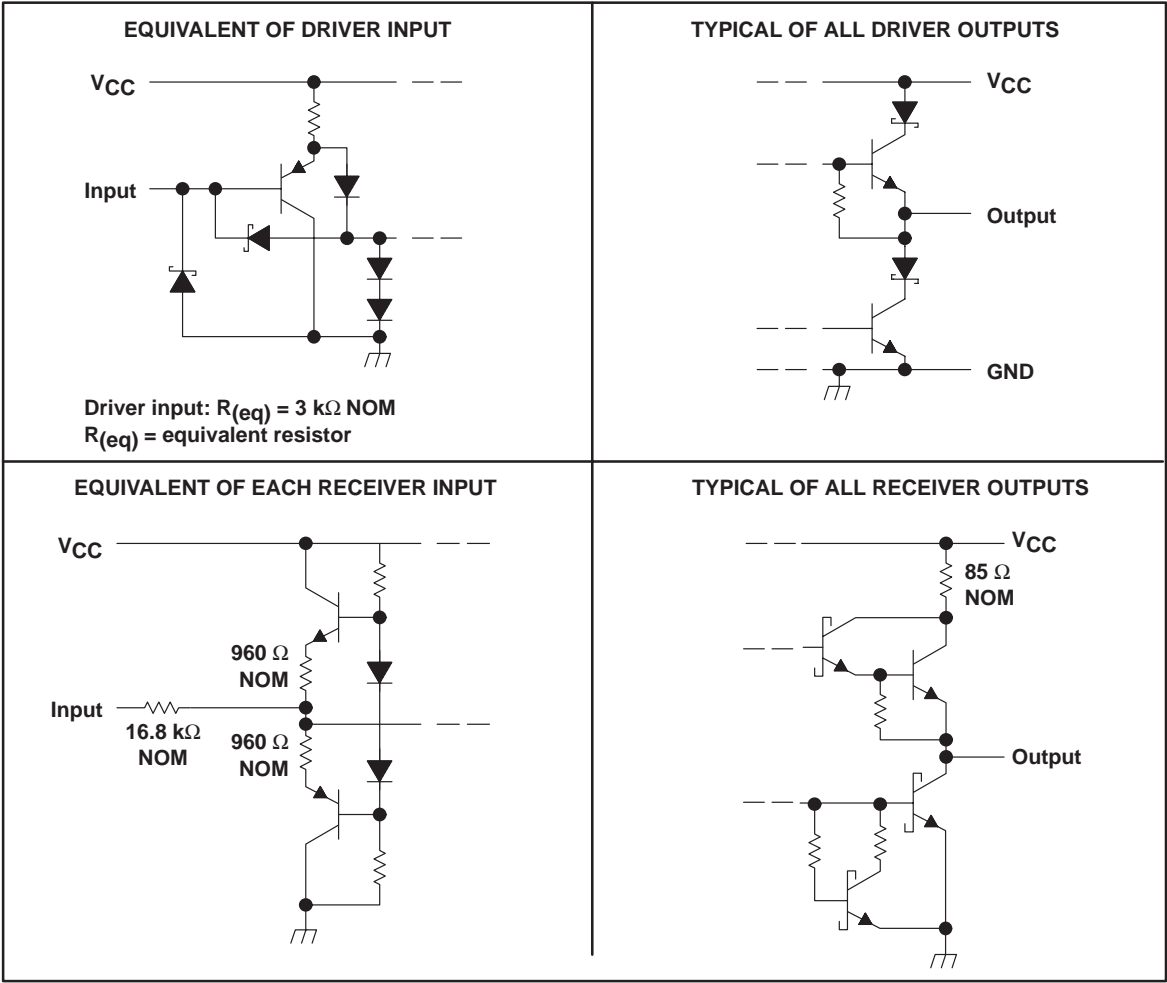


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



schematics of inputs and outputs



SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

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

Supply voltage, V_{CC} (see Note 1)	7 V
Voltage range at any bus terminal	–10 V to 15 V
Differential input voltage, V_{ID} (see Note 2)	± 25 V
Package thermal impedance, θ_{JA} (see Note 3): D package	197°C/W
P package	104°C/W
Storage temperature range, T_{stg}	–65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

[†] 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.

NOTES: 1. All voltage values, except differential input voltage, are with respect to network ground terminal.
2. Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input.
3. The package thermal impedance is calculated in accordance with JEDEC 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}		4.75	5	5.25	V
High-level input voltage, V_{IH}	Driver	2			V
Low-level input voltage, V_{IL}	Driver			0.8	V
Common-mode input voltage, V_{IC}		–7 [‡]		12	V
Differential input voltage, V_{ID}				± 12	V
High-level output current, I_{OH}	Driver			–60	mA
	Receiver			–400	μ A
Low-level output current, I_{OL}	Driver			60	mA
	Receiver			8	
Operating free-air temperature, T_A		0		70	°C

[‡] The algebraic convention, where the less positive (more negative) limit is designated minimum, is used in this data sheet for common-mode input voltage and threshold voltage.



SN75179B

DIFFERENTIAL DRIVER AND RECEIVER PAIR

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DRIVER SECTION

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V_{IK} Input clamp voltage	$I_I = -18 \text{ mA}$			-1.5	V
V_O Output voltage	$I_O = 0$	0		6	V
$ V_{OD1} $ Differential output voltage	$I_O = 0$	1.5		6	V
$ V_{OD2} $ Differential output voltage	$R_L = 100 \Omega$, See Figure 1	$1/2 V_{OD1}$ or 2^\ddagger			V
	$R_L = 54 \Omega$, See Figure 1	1.5	2.5	5	V
$ V_{OD3} $ Differential output voltage	See Note 4	1.5		5	V
$\Delta V_{OD} $ Change in magnitude of common-mode output voltage§				± 0.2	V
V_{OC} Common-mode output voltage	$R_L = 54 \Omega$ or 100Ω , See Figure 1			$\begin{smallmatrix} 3 \\ -1 \end{smallmatrix}$	V
$\Delta V_{OC} $ Change in magnitude of common-mode output voltage§				± 0.2	V
I_O Output current	$V_{CC} = 0$, $V_O = -7 \text{ V to } 12 \text{ V}$			± 100	μA
I_{IH} High-level input current	$V_I = 2.4 \text{ V}$			20	μA
I_{IL} Low-level input current	$V_I = 0.4 \text{ V}$			-200	μA
I_{OS} Short-circuit output current	$V_O = -7 \text{ V}$			-250	mA
	$V_O = V_{CC}$ or 12 V			250	
I_{CC} Supply current (total package)	No load		57	70	mA

† All typical values are at $V_{CC} = 5 \text{ V}$ and $T_A = 25^\circ\text{C}$.

‡ The minimum V_{OD2} with $100\text{-}\Omega$ load is either $1/2 V_{OD2}$ or 2 V , whichever is greater.

§ $\Delta|V_{OD}|$ and $\Delta|V_{OC}|$ are the changes in magnitude of V_{OD} and V_{OC} , respectively, that occur when the input changes from a high level to a low level.

NOTE 4: See TIA/EIA-485-A, Figure 3.5, Test Termination Measurement 2.

switching characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_d(\text{OD})$ Differential output delay time	$R_L = 54 \Omega$, See Figure 3		15	22	ns
$t_t(\text{OD})$ Differential output transition time			20	30	ns

Symbol Equivalents

DATA-SHEET PARAMETER	TIA/EIA-422-B	TIA/EIA-485-A
V_O	V_{Oa}, V_{Ob}	V_{Oa}, V_{Ob}
$ V_{OD1} $	V_o	V_o
$ V_{OD2} $	$V_t (R_L = 100 \Omega)$	$V_t (R_L = 54 \Omega)$
$ V_{OD3} $		V_t (Test Termination Measurement 2)
$\Delta V_{OD} $	$ V_t - \bar{V}_t $	$ V_t - \bar{V}_t $
V_{OC}	$ V_{os} $	$ V_{os} $
$\Delta V_{OC} $	$ V_{os} - \bar{V}_{os} $	$ V_{os} - \bar{V}_{os} $
I_{OS}	$ I_{sa} , I_{sb} $	
I_O	$ I_{xa} , I_{xb} $	I_{ia}, I_{ib}

RECEIVER SECTION

electrical characteristics over recommended ranges of common-mode input voltage, supply voltage, and operating free-air temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V_{IT+} Positive-going input threshold voltage	$V_O = 2.7\text{ V}$, $I_O = -0.4\text{ mA}$			0.2	V
V_{IT-} Negative-going input threshold voltage	$V_O = 0.5\text{ V}$, $I_O = 8\text{ mA}$	-0.2‡			V
V_{hys} Hysteresis voltage ($V_{IT+} - V_{IT-}$)			50		mV
V_{OH} High-level output voltage	$V_{ID} = 200\text{ mV}$, $I_{OH} = -400\text{ }\mu\text{A}$, See Figure 2	2.7			V
V_{OL} Low-level output voltage	$V_{ID} = -200\text{ mV}$, $I_{OL} = 8\text{ mA}$, See Figure 2			0.45	V
I_I Line input current	Other input at 0 V, See Note 5				
	$V_I = 12\text{ V}$			1	mA
	$V_I = -7\text{ V}$			-0.8	mA
r_i Input resistance		12			k Ω
I_{OS} Short-circuit output current		-15		-85	mA
I_{CC} Supply current (total package)	No load		57	70	mA

† All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

‡ The algebraic convention, where the less positive (more negative) limit is designated minimum, is used in this data sheet for common-mode input voltage and threshold voltage levels only.

NOTE 5: Refer to TIA/EIA-422-B for exact conditions.

switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH} Propagation delay time, low- to high-level output	$V_{ID} = -1.5\text{ V to }1.5\text{ V}$, $C_L = 15\text{ pF}$, See Figure 4		19	35	ns
t_{PHL} Propagation delay time, high- to low-level output			30	40	ns

PARAMETER MEASUREMENT INFORMATION

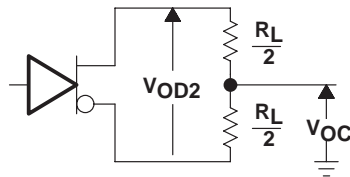


Figure 1. Driver V_{OD2} and V_{OC}

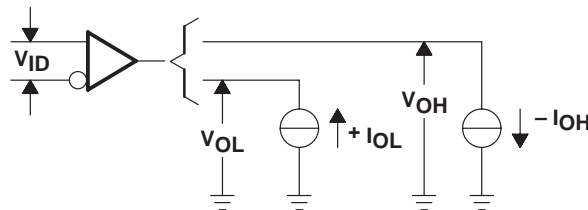
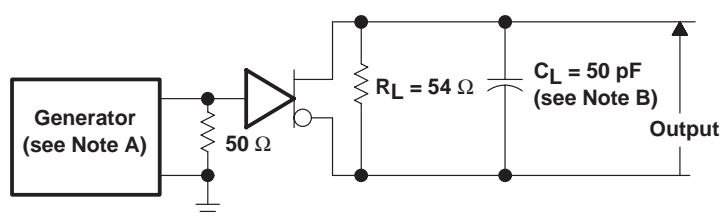


Figure 2. Receiver V_{OH} and V_{OL}

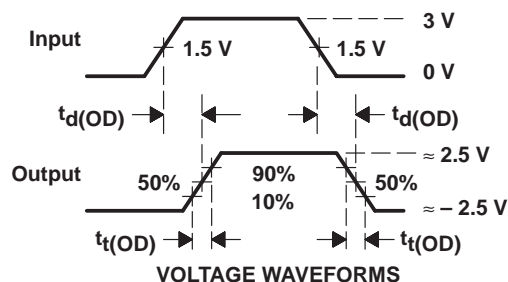
SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

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PARAMETER MEASUREMENT INFORMATION (CONTINUED)

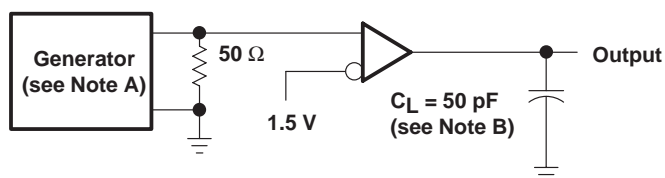


TEST CIRCUIT

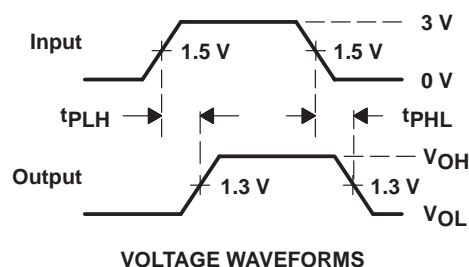


- NOTES: A. The input pulse is supplied by a generator having the following characteristics: $PRR \leq 1$ MHz, 50% duty cycle, $t_r \leq 6$ ns, $t_f \leq 6$ ns, $Z_O = 50 \Omega$.
B. C_L includes probe and jig capacitance.

Figure 3. Driver Test Circuit and Voltage Waveforms



TEST CIRCUIT



- NOTES: A. The input pulse is supplied by a generator having the following characteristics: $PRR \leq 1$ MHz, 50% duty cycle, $t_r \leq 6$ ns, $t_f \leq 6$ ns, $Z_O = 50 \Omega$.
B. C_L includes probe and jig capacitance.

Figure 4. Receiver Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

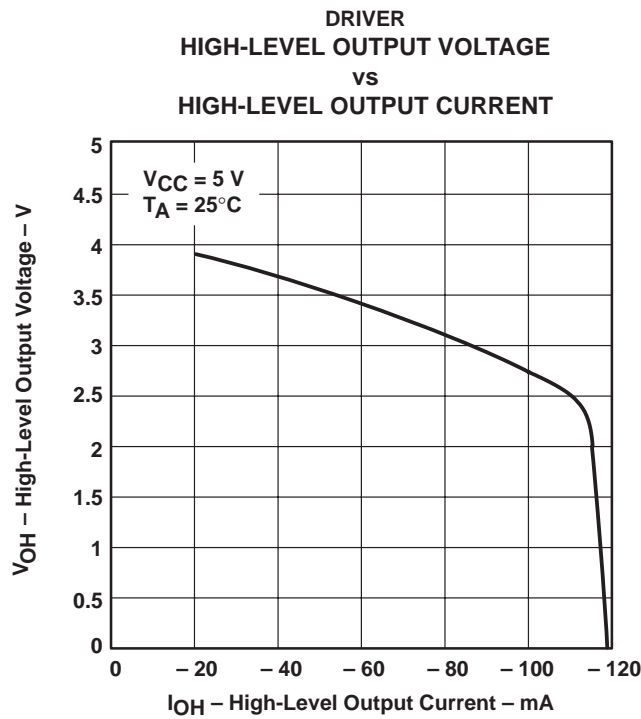


Figure 5

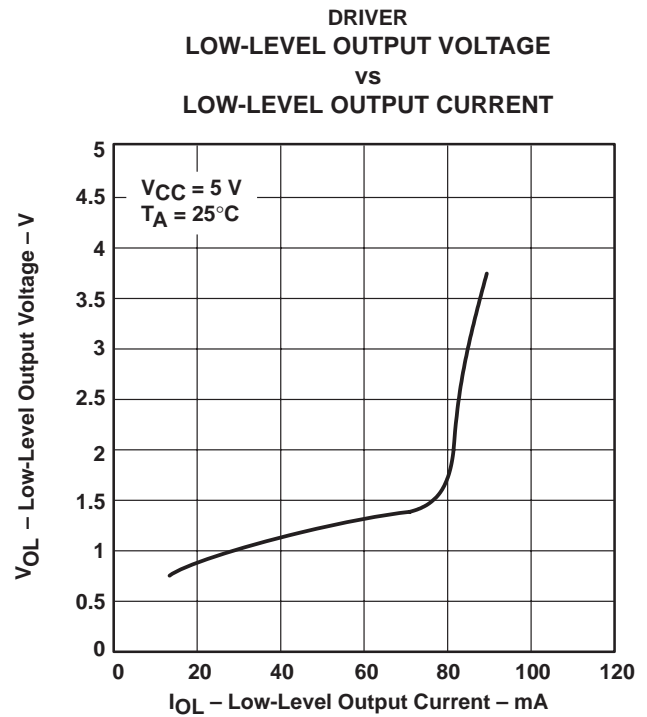


Figure 6

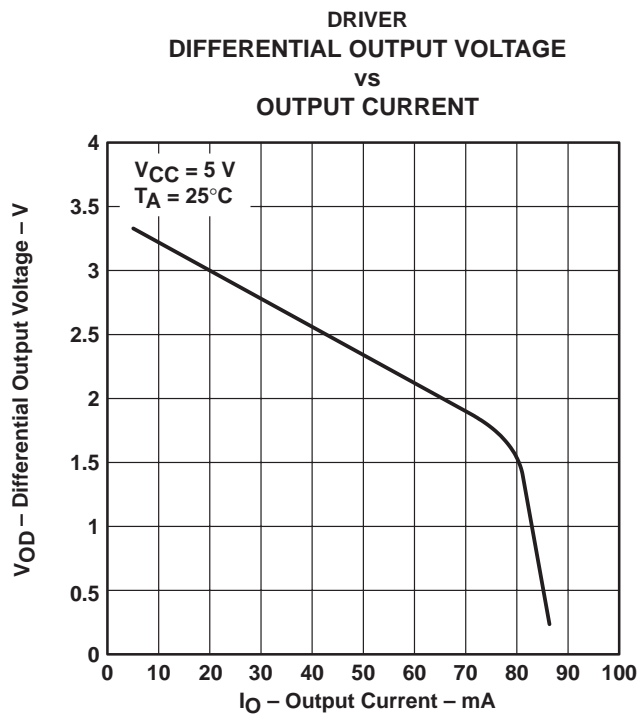


Figure 7

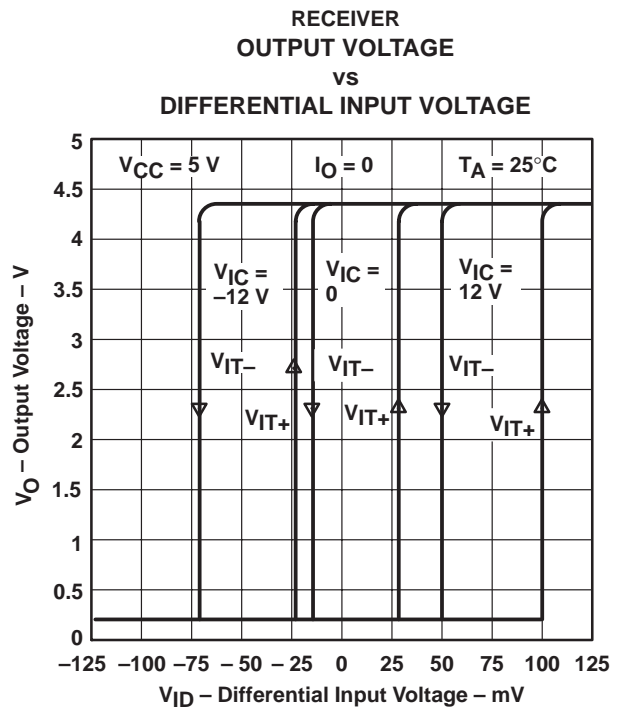


Figure 8

SN75179B
DIFFERENTIAL DRIVER AND RECEIVER PAIR

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TYPICAL CHARACTERISTICS

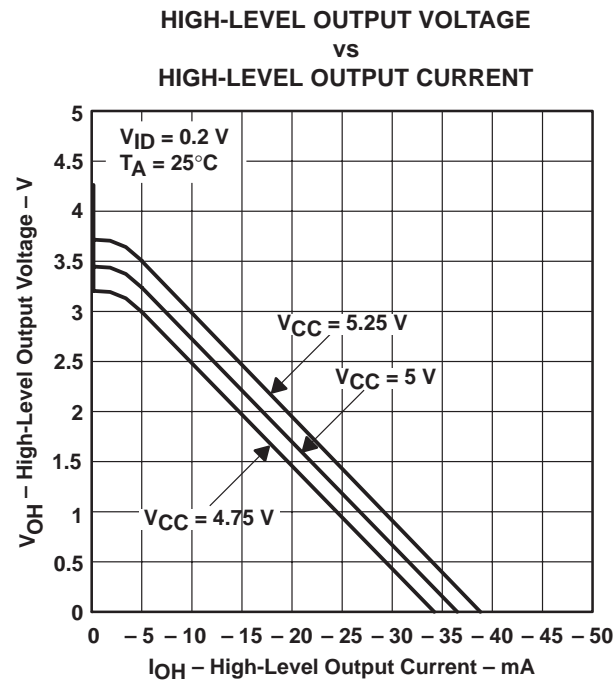


Figure 9

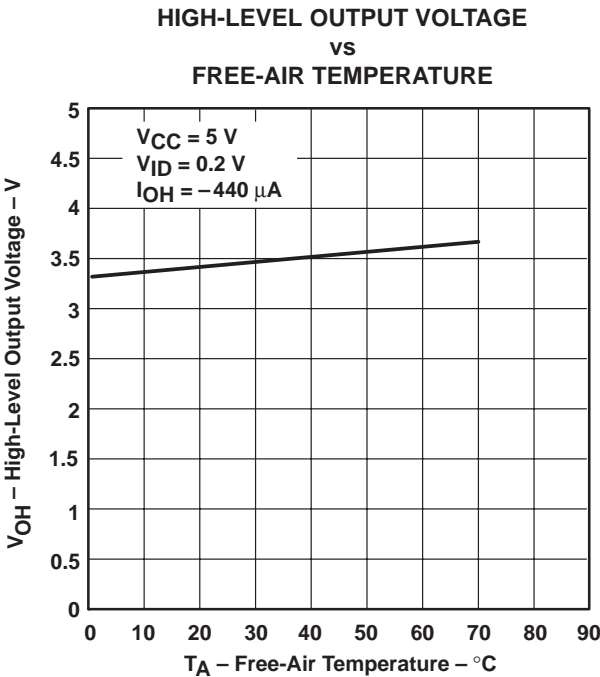


Figure 10

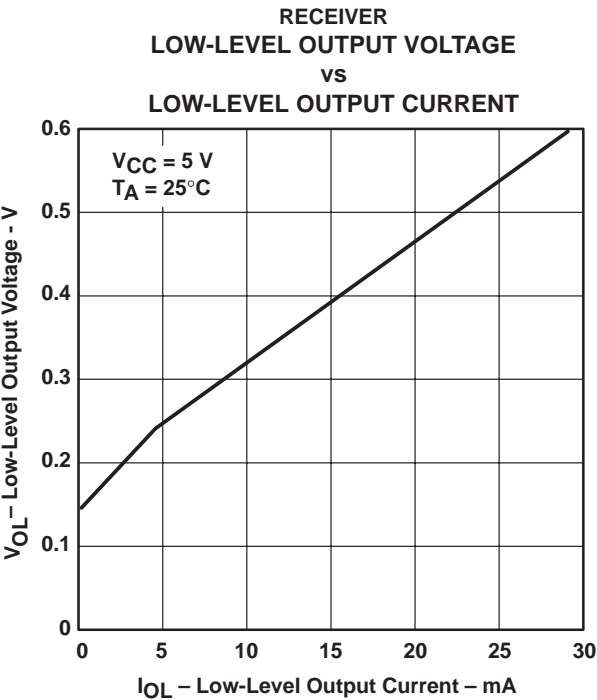


Figure 11

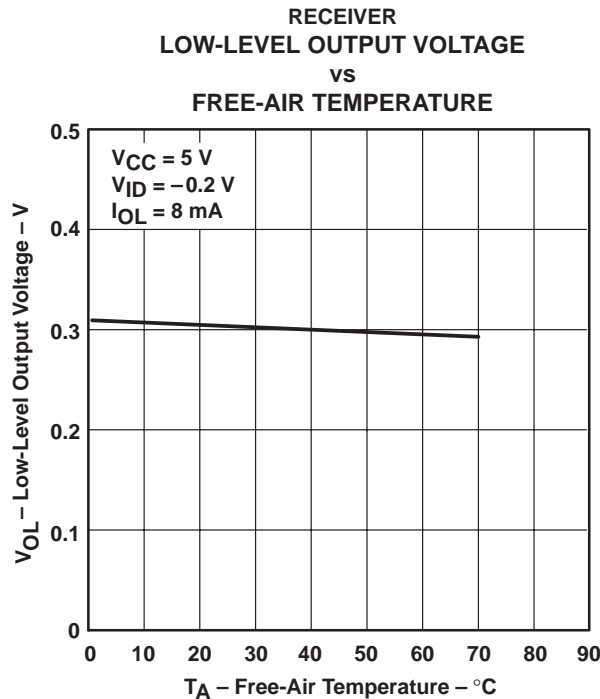


Figure 12

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
SN75179BD	ACTIVE	SOIC	D	8	75	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	75179B	Samples
SN75179BDE4	ACTIVE	SOIC	D	8	75	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	75179B	Samples
SN75179BDR	ACTIVE	SOIC	D	8	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	75179B	Samples
SN75179BDRG4	ACTIVE	SOIC	D	8	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	75179B	Samples
SN75179BP	ACTIVE	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN75179BP	Samples
SN75179BPE4	ACTIVE	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN75179BP	Samples
SN75179BPSR	ACTIVE	SO	PS	8	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	A179B	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.

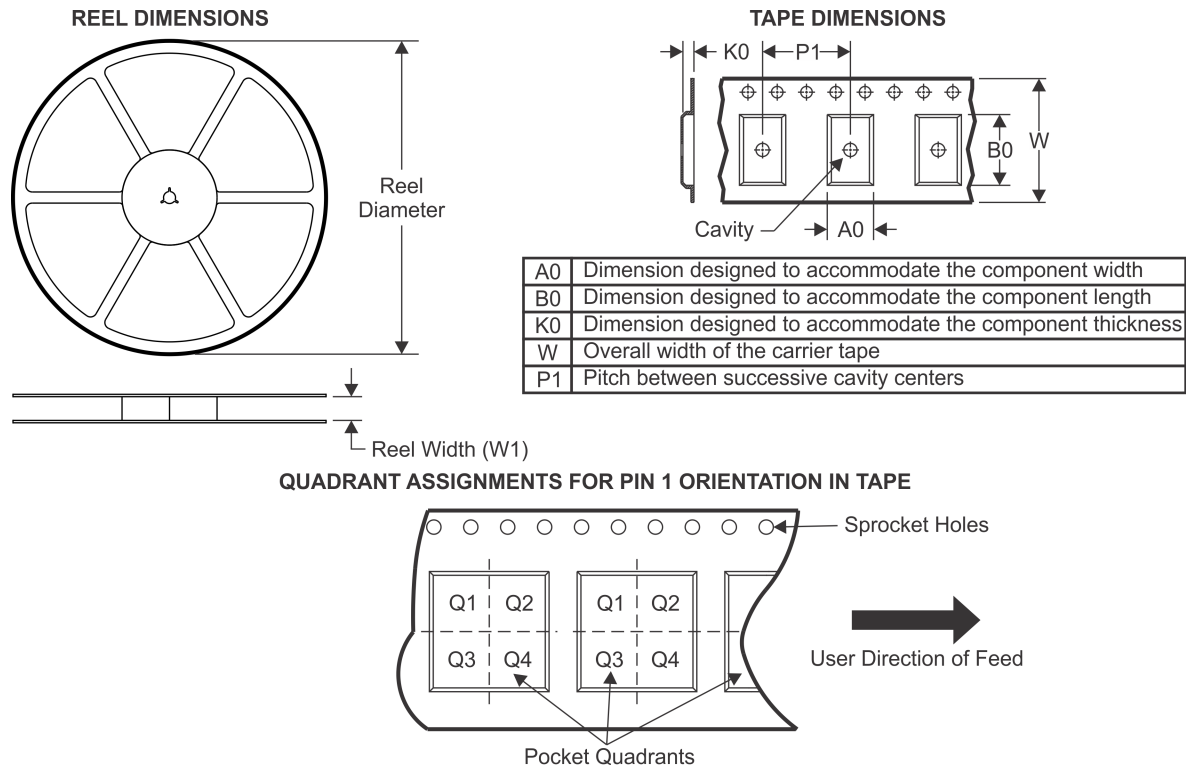
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

⁽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.

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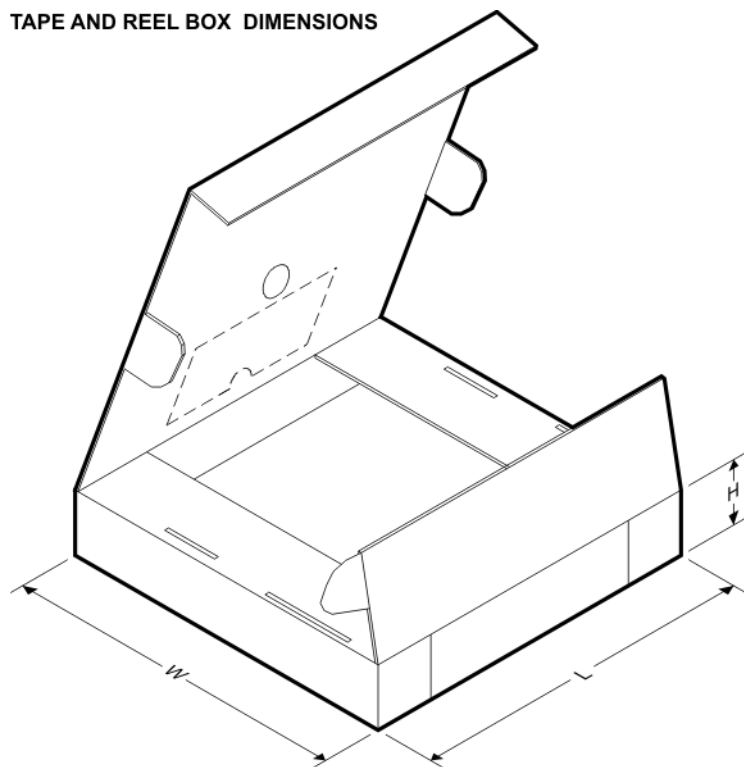
TAPE AND REEL INFORMATION



*All dimensions are nominal

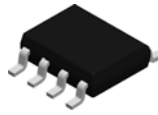
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75179BDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
SN75179BPSR	SO	PS	8	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS

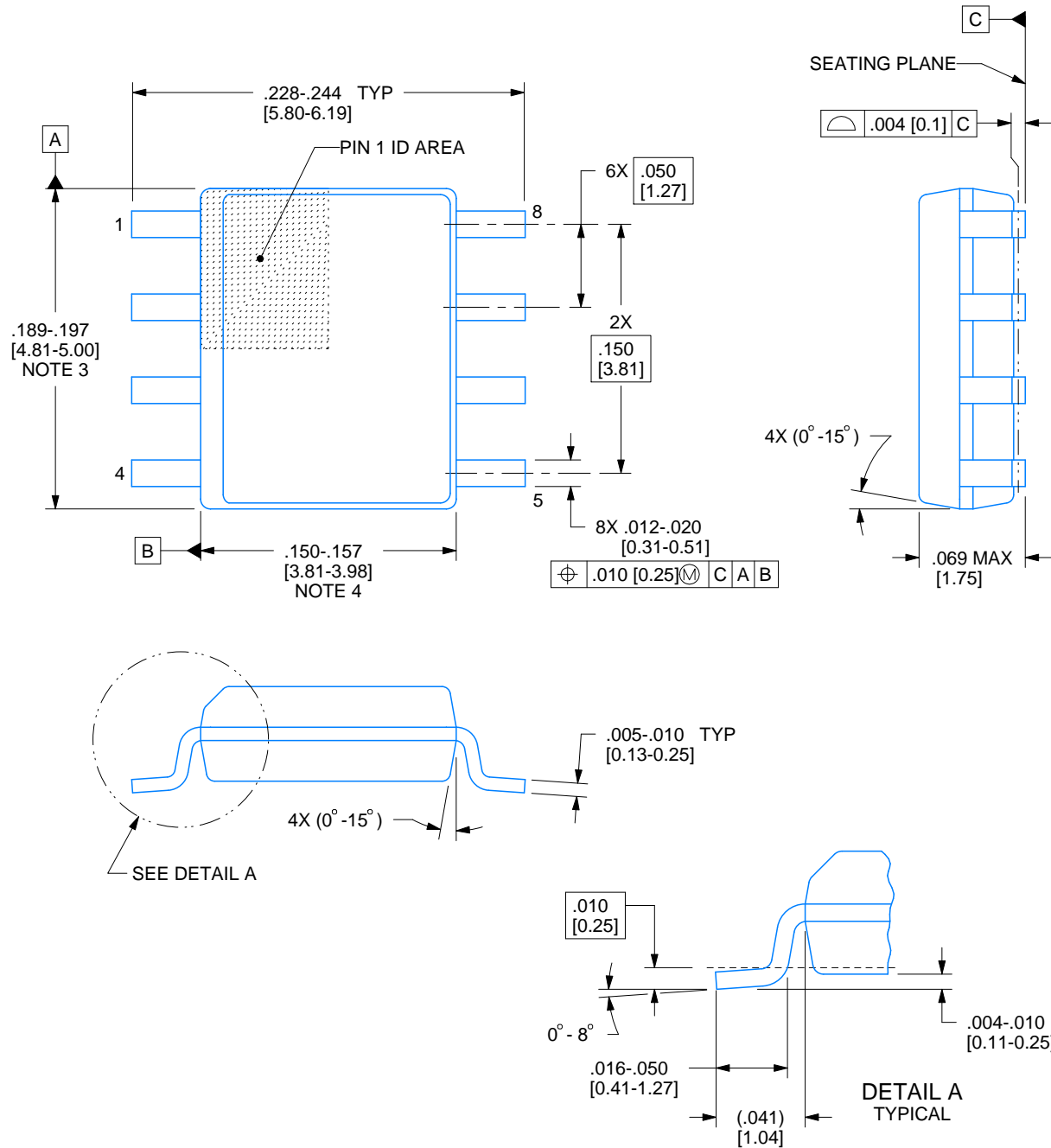


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75179BDR	SOIC	D	8	2500	340.5	338.1	20.6
SN75179BPSR	SO	PS	8	2000	853.0	449.0	35.0

D0008A**PACKAGE OUTLINE****SOIC - 1.75 mm max height**

SMALL OUTLINE INTEGRATED CIRCUIT



4214825/C 02/2019

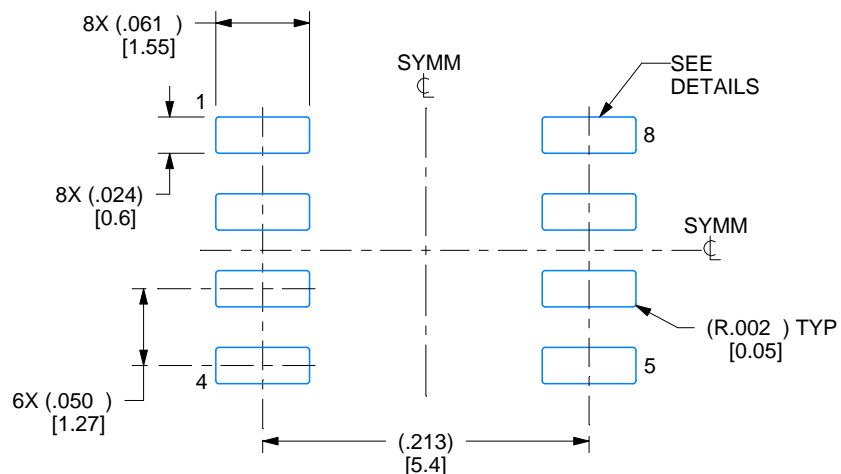
NOTES:

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.

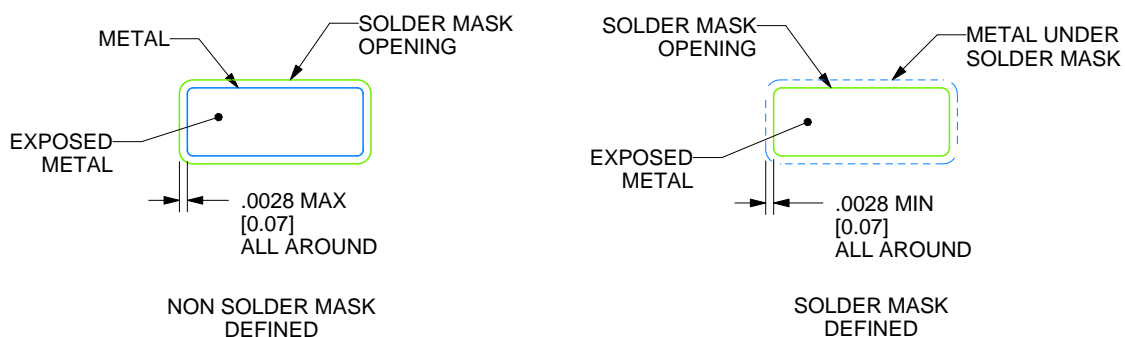
D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



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.

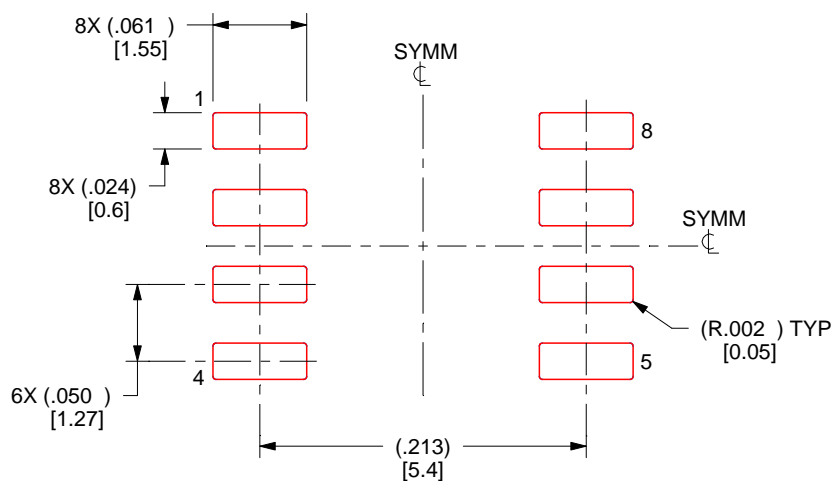
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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

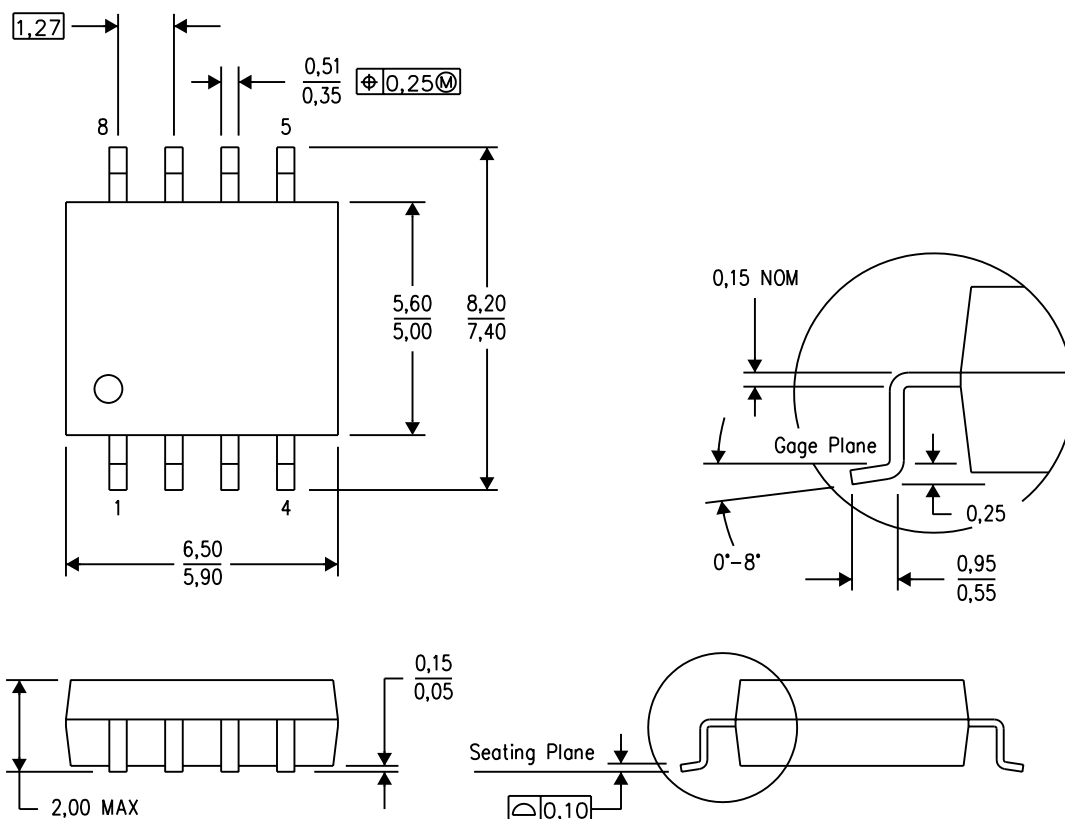
NOTES: (continued)

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.

MECHANICAL DATA

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE

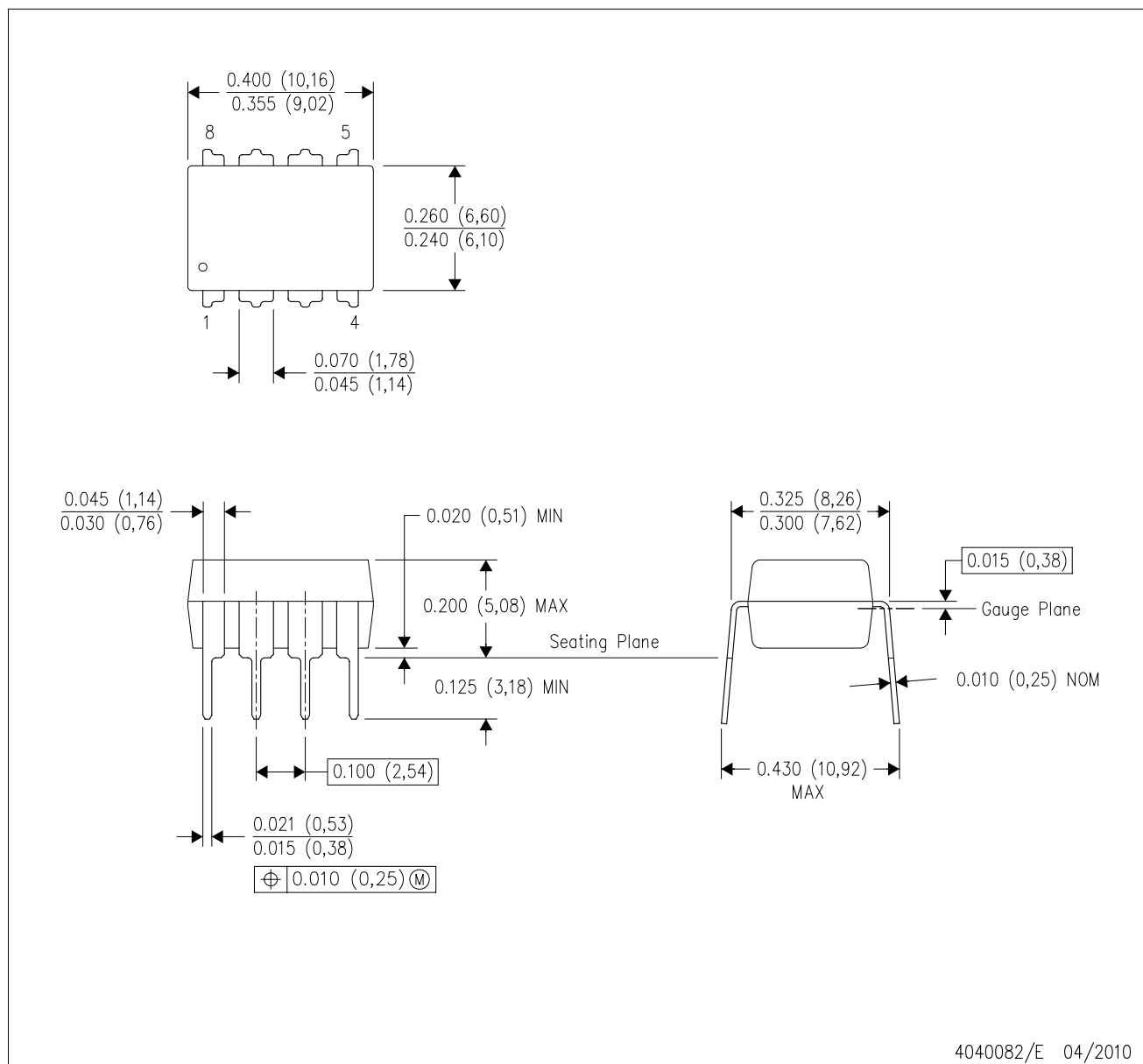


4040063/C 03/03

- 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.

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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