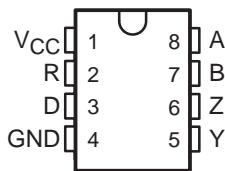


- Meets or Exceeds the Requirements of TIA/EIA-422-B, TIA/EIA-485-A, and ITU Recommendation V.11
- Bus Voltage Range . . . –7 V to 12 V
- Positive- and Negative-Current Limiting
- Driver Output Capability . . . 60 mA Max
- Driver Thermal-Shutdown Protection
- Receiver Input Impedance . . . 12 kΩ Min
- Receiver Input Sensitivity . . .  $\pm 200$  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  $\pm 200$  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
$V_{ID} \geq 0.2$ V	H
$-0.2$ V < $V_{ID} < 0.2$ V	?
$V_{ID} \leq -0.2$ V	L
Open	?

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

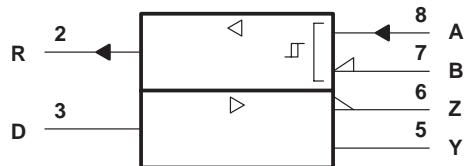


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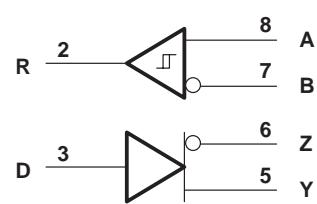
# SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

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## logic symbol†

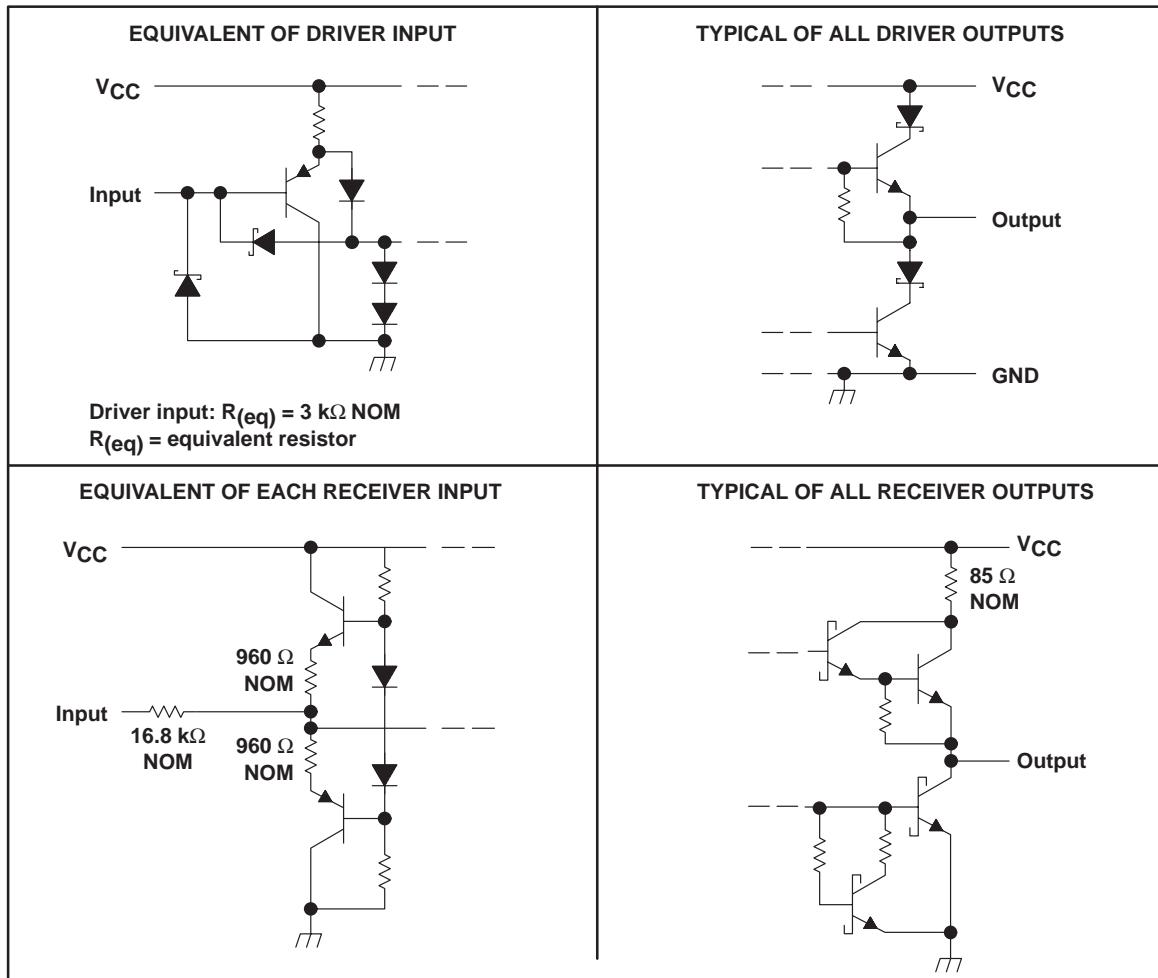


## logic diagram (positive logic)



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

## schematics of inputs and outputs



**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) . . . . .	$\pm 25$ V
Package thermal impedance, $\theta_{JA}$ (see Note 3): D package . . . . .	197°C/W
	P package . . . . .
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

<sup>†</sup> 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 JESD 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	µA
Low-level output current, $I_{OL}$	Driver			60	mA
	Receiver			8	
Operating free-air temperature, $T_A$		0		70	°C

<sup>‡</sup>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
$V_{IK}$	$I_I = -18 \text{ mA}$			-1.5	V
$V_O$	$I_O = 0$	0		6	V
$ V_{OD1} $	$I_O = 0$	1.5		6	V
$ V_{OD2} $	$R_L = 100 \Omega$ , See Figure 1	$1/2V_{OD1}$ or $2\ddagger$			V
	$R_L = 54 \Omega$ , See Figure 1	1.5	2.5	5	V
$ V_{OD3} $	See Note 4	1.5		5	V
$\Delta V_{OD} $	Change in magnitude of common-mode output voltage§			$\pm 0.2$	V
$V_{OC}$	$R_L = 54 \Omega$ or $100 \Omega$ , See Figure 1		$3$ $-1$		V
$\Delta V_{OC} $	Change in magnitude of common-mode output voltage§			$\pm 0.2$	V
$I_O$	$V_{CC} = 0$ , $V_O = -7 \text{ V}$ to $12 \text{ V}$		$\pm 100$		$\mu\text{A}$
$I_{IH}$	$V_I = 2.4 \text{ V}$		20		$\mu\text{A}$
$I_{IL}$	$V_I = 0.4 \text{ V}$		-200		$\mu\text{A}$
$I_{OS}$	$V_O = -7 \text{ V}$		-250		mA
	$V_O = V_{CC}$ or $12 \text{ V}$		250		
$I_{CC}$	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  $2 \text{ V}$ , 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
$t_d(\text{OD})$		15	22		ns
$t_t(\text{OD})$	$R_L = 54 \Omega$ , See Figure 3	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} $
$I_{OS}$	$  s_a  ,   s_b  $	
$I_O$	$  x_a  ,   x_b  $	$ i_a, i_b $

## 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	$V_{ID} = 200 \text{ mV}$ , $I_{OH} = -400 \mu\text{A}$ , 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		
$r_I$ Input resistance		12			k $\Omega$
$I_{OS}$ 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

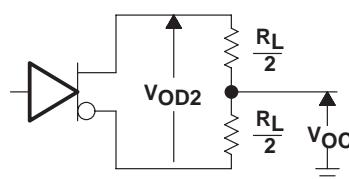


Figure 1. Driver  $V_{OD2}$  and  $V_{OC}$

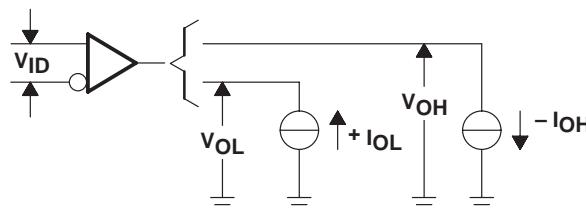
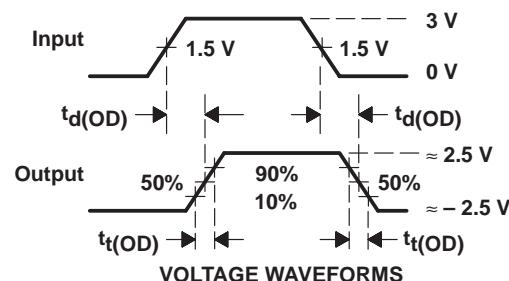
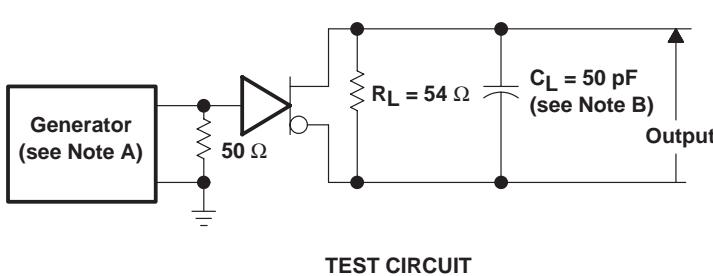


Figure 2. Receiver  $V_{OH}$  and  $V_{OL}$

# SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

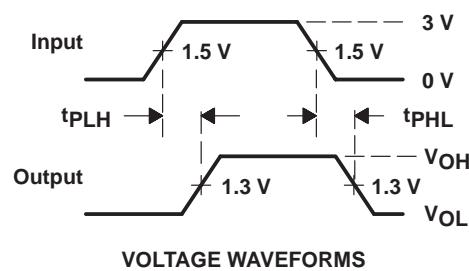
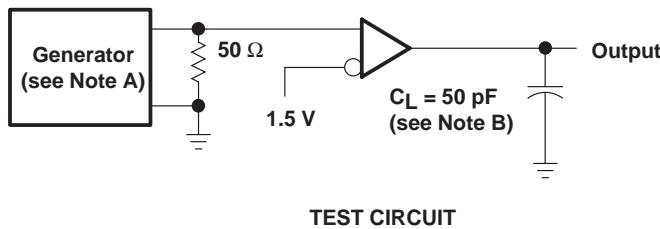
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## PARAMETER MEASUREMENT INFORMATION (CONTINUED)



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



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

DRIVER  
HIGH-LEVEL OUTPUT VOLTAGE  
vs  
HIGH-LEVEL OUTPUT CURRENT

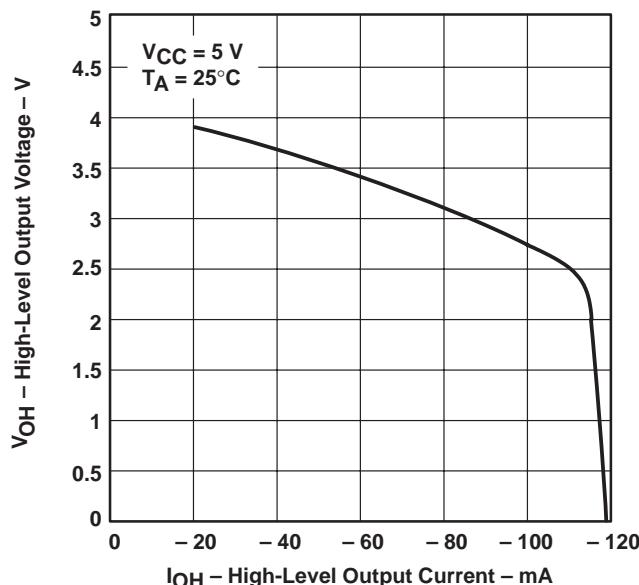


Figure 5

DRIVER  
LOW-LEVEL OUTPUT VOLTAGE  
vs  
LOW-LEVEL OUTPUT CURRENT

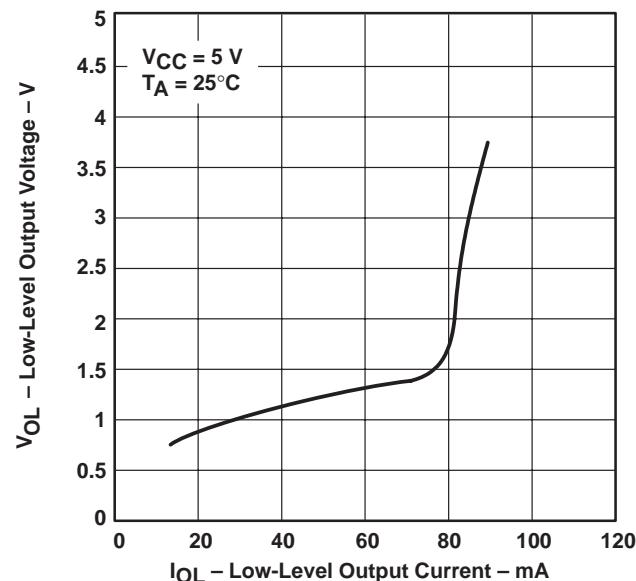


Figure 6

DRIVER  
DIFFERENTIAL OUTPUT VOLTAGE  
vs  
OUTPUT CURRENT

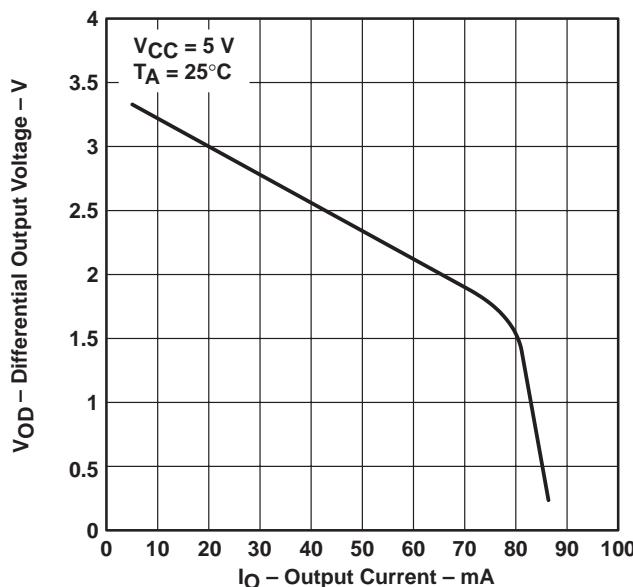


Figure 7

RECEIVER  
OUTPUT VOLTAGE  
vs  
DIFFERENTIAL INPUT VOLTAGE

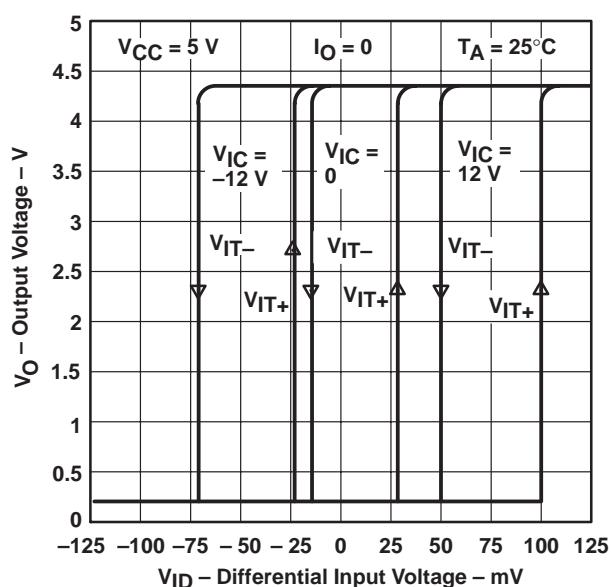


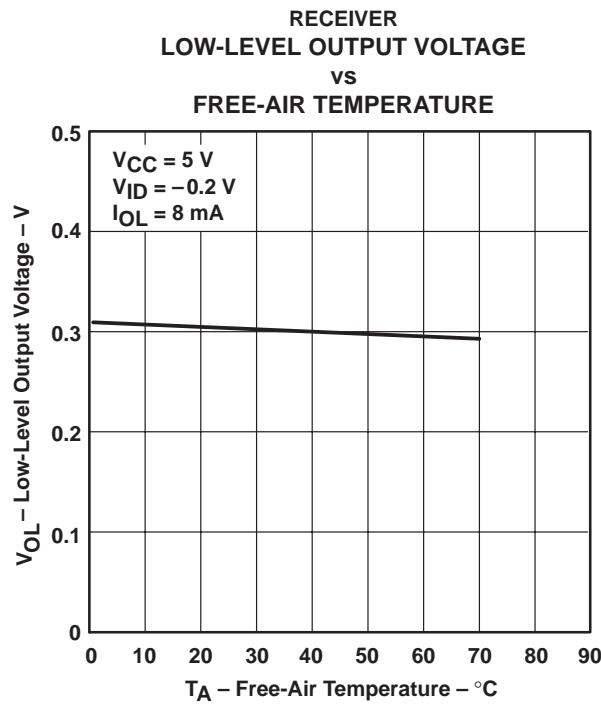
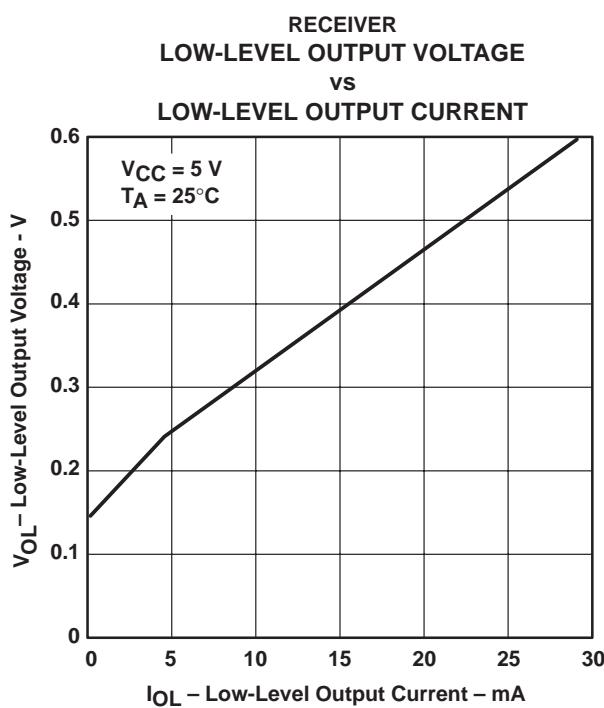
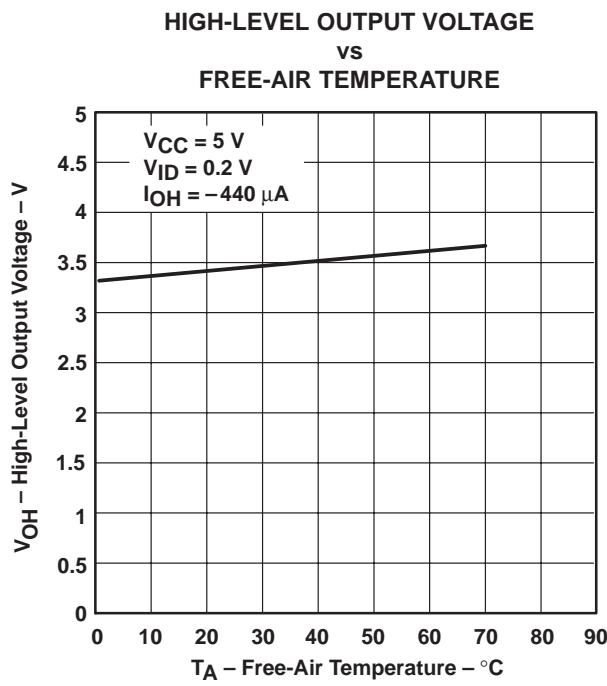
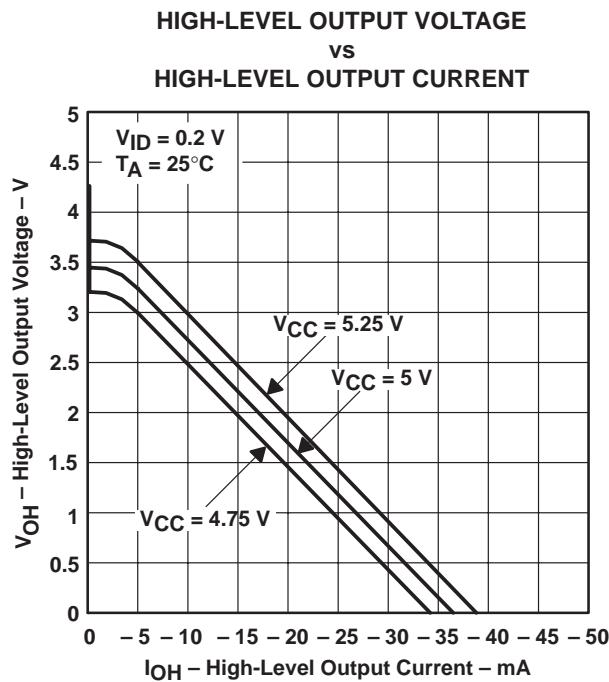
Figure 8

# SN75179B

## DIFFERENTIAL DRIVER AND RECEIVER PAIR

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### TYPICAL CHARACTERISTICS



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**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN75179BD	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75179BDE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75179BDG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75179BDR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75179BDRE4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75179BDRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75179BP	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75179BPE4	ACTIVE	PDIP	P	8	50	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75179BPSR	ACTIVE	SO	PS	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75179BPSRE4	ACTIVE	SO	PS	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75179BPSRG4	ACTIVE	SO	PS	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

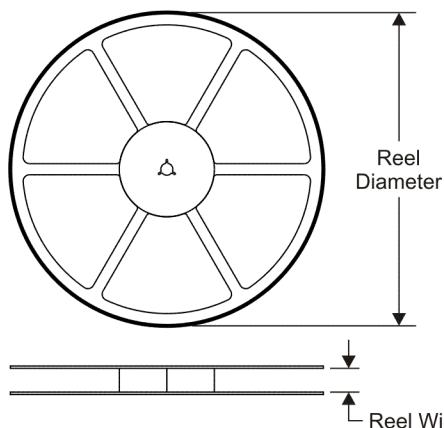
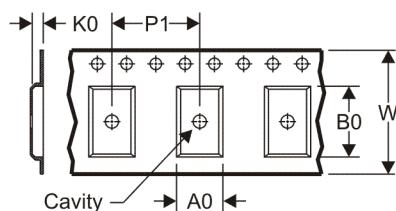
<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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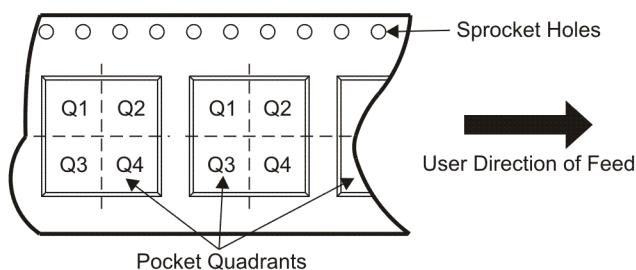
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**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


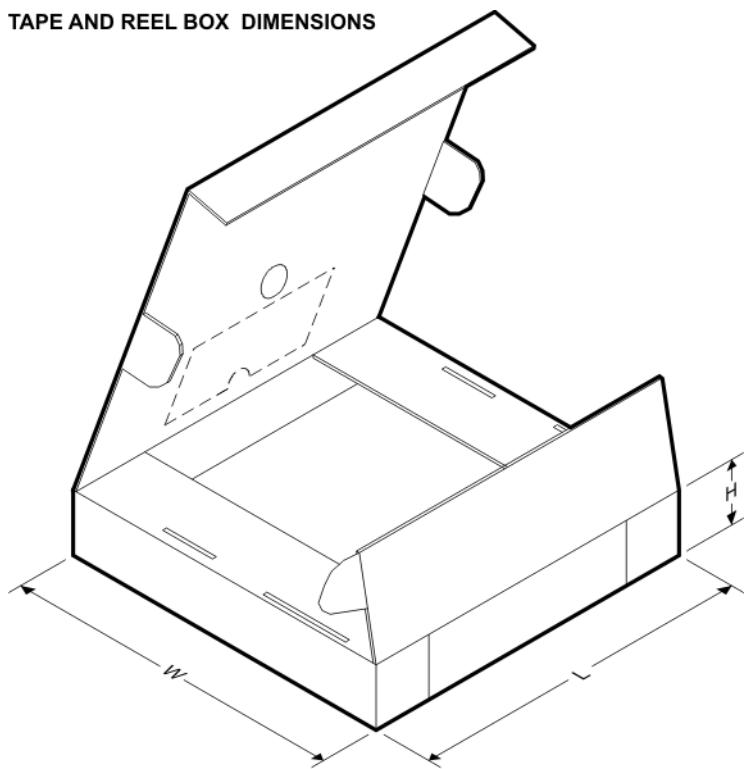
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

**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
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	8.2	6.6	2.5	12.0	16.0	Q1

**TAPE AND REEL BOX DIMENSIONS**



\*All dimensions are nominal

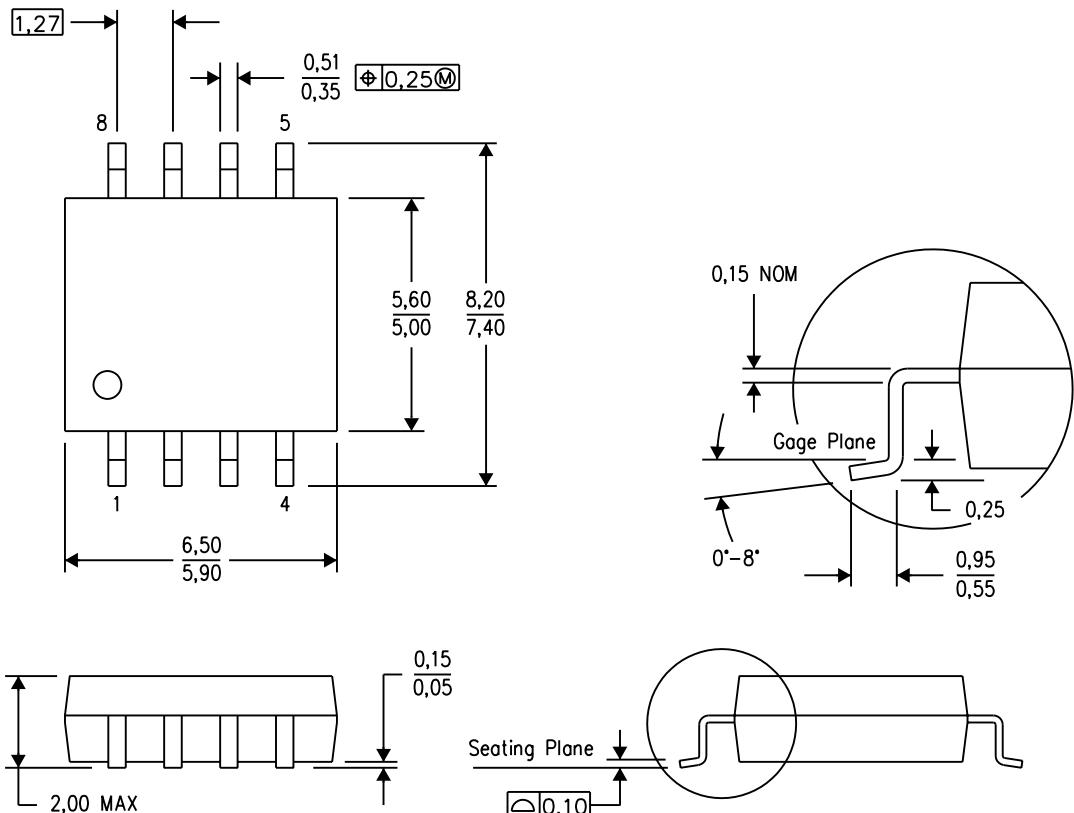
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75179BDR	SOIC	D	8	2500	340.5	338.1	20.6
SN75179BPSR	SO	PS	8	2000	346.0	346.0	33.0

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## MECHANICAL DATA

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



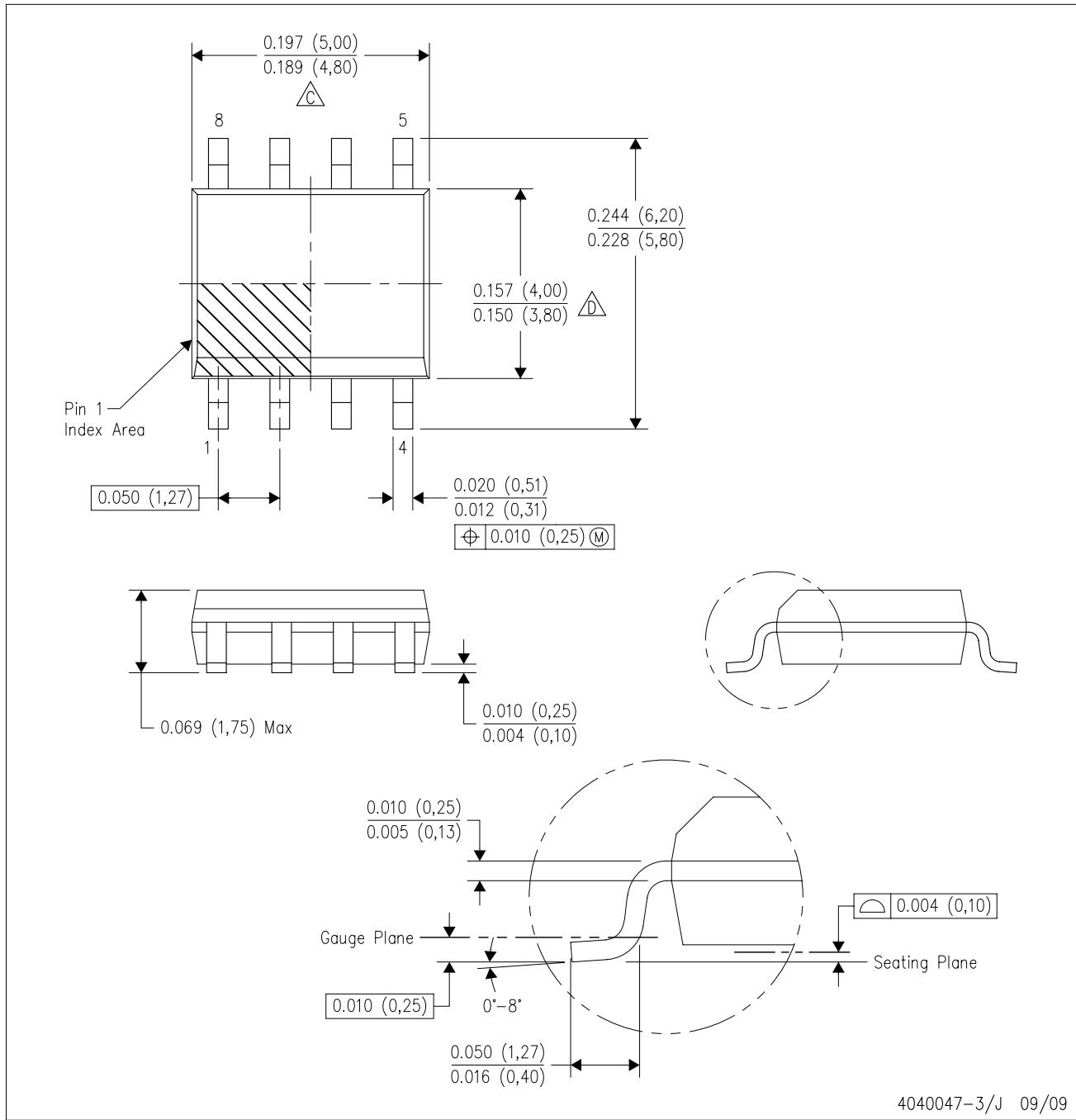
4040063/C 03/03

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.

D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES: A. All linear dimensions are in inches (millimeters).

B. This drawing is subject to change without notice.

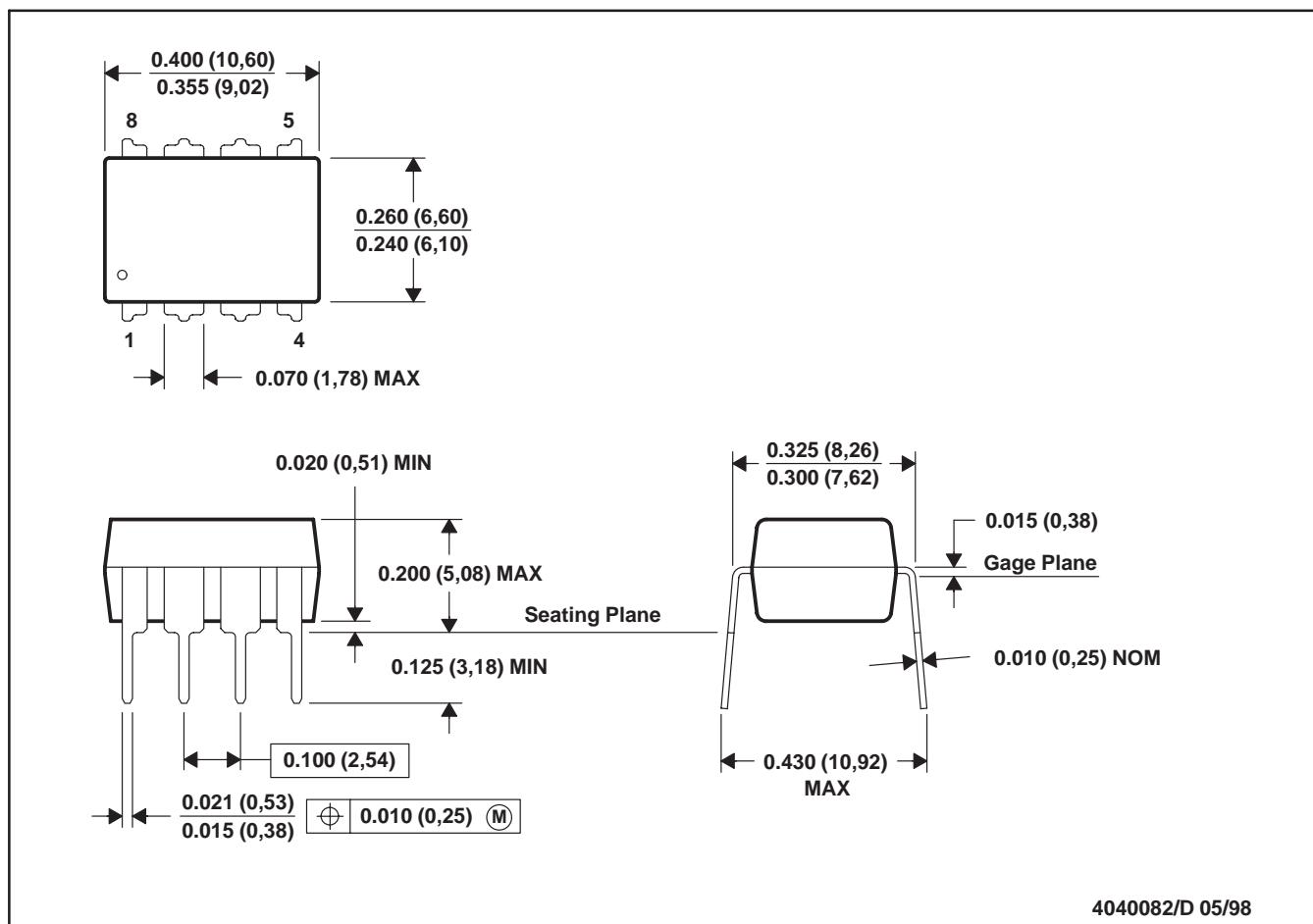
△C Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.

△D Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.

E. Reference JEDEC MS-012 variation AA.

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



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

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