

# SN75LBC179, SN65LBC179, SN65LBC179Q

## LOW-POWER DIFFERENTIAL LINE DRIVER AND RECEIVER PAIRS

SLLS173F – JANUARY 1994 – REVISED APRIL 2006

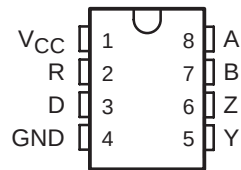
- Designed for High-Speed Multipoint Data Transmission Over Long Cables
- Operates With Pulse Widths as Low as 30 ns
- Low Supply Current . . . 5 mA Max
- Meets or Exceeds the Standard Requirements of ANSI RS-485 and ISO 8482:1987(E)
- Common-Mode Voltage Range of –7 V to 12 V
- Positive- and Negative-Output Current Limiting
- Driver Thermal Shutdown Protection
- Pin Compatible With the SN75179B

### description

The SN65LBC179, SN65LBC179Q, and SN75LBC179 differential driver and receiver pairs are monolithic integrated circuits designed for bidirectional data communication over long cables that take on the characteristics of transmission lines. They are balanced, or differential, voltage mode devices that meet or exceed the requirements of industry standards ANSI RS-485 and ISO 8482:1987(E). Both devices are designed using TI's proprietary LinBiCMOS™ with the low power consumption of CMOS and the precision and robustness of bipolar transistors in the same circuit.

The SN65LBC179, SN65LBC179Q, and SN75LBC179 combine a differential line driver and differential line receiver and operate from a single 5-V supply. The driver differential outputs and the receiver differential inputs are connected to separate terminals for full-duplex operation and are designed to present minimum loading to the bus when powered off ( $V_{CC} = 0$ ). These parts feature a wide common-mode voltage range making them suitable for point-to-point or multipoint data bus applications. The devices also provide positive- and negative-current limiting and thermal shutdown for protection from line fault conditions. The line driver shuts down at a junction temperature of approximately 172°C.

D OR P PACKAGE  
(TOP VIEW)



Function Tables

DRIVER

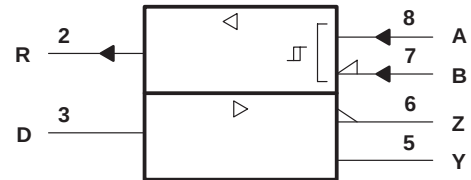
| INPUT<br>D | OUTPUTS |   |
|------------|---------|---|
|            | Y       | Z |
| H          | H       | L |
| L          | L       | H |

RECEIVER

| DIFFERENTIAL INPUTS<br>A–B                | OUTPUT<br>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 circuit                              | H           |

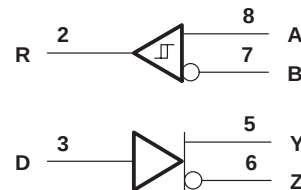
H = high level, L = low level,  
? = indeterminate

### logic symbol†



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

### logic diagram (positive logic)



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# SN75LBC179, SN65LBC179, SN65LBC179Q

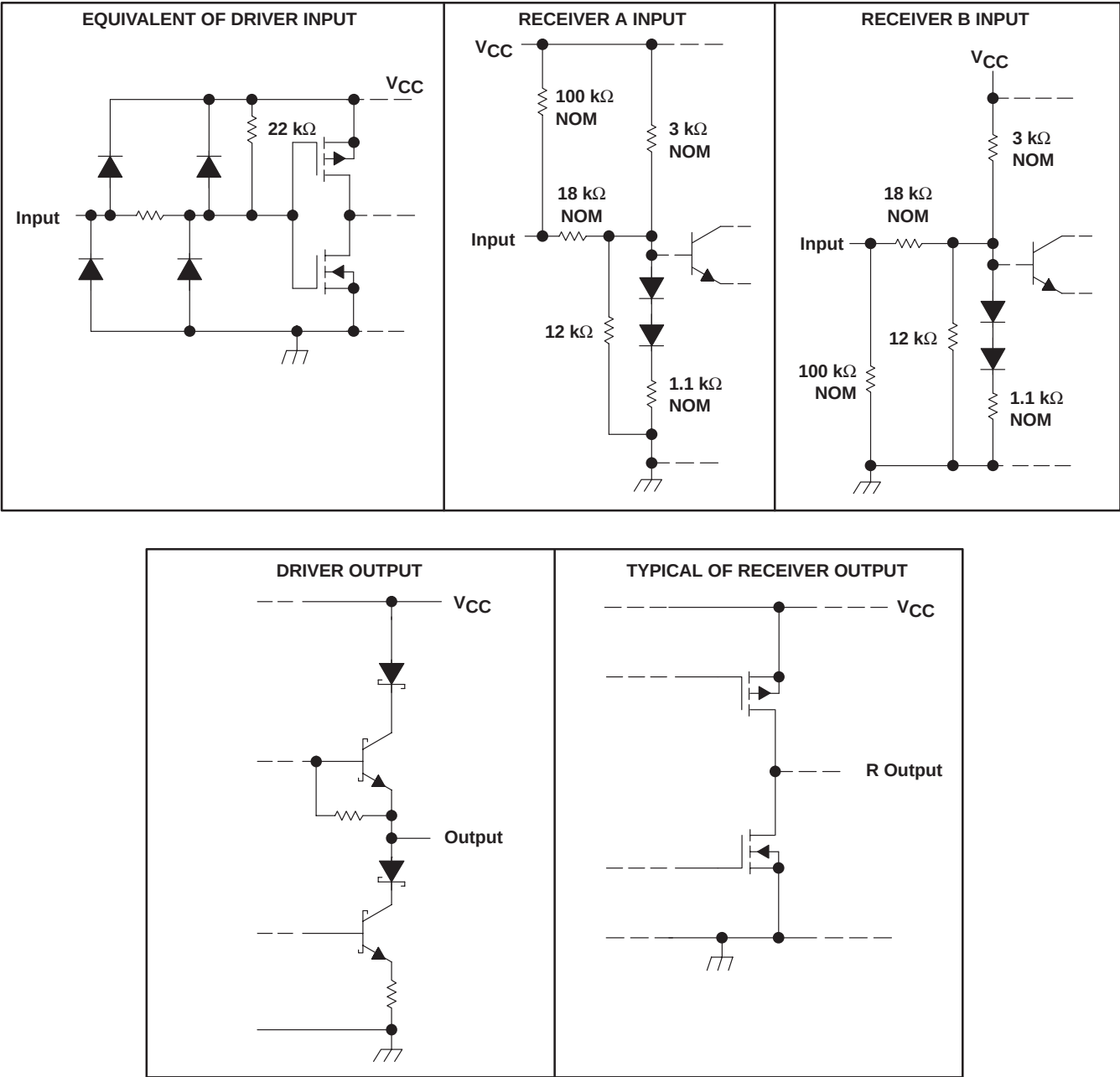
## LOW-POWER DIFFERENTIAL LINE DRIVER AND RECEIVER PAIRS

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### description (continued)

The SN65LBC179, SN65LBC179Q, and SN75LBC179 are available in the 8-pin dual-in-line and small-outline packages. The SN75LBC179 is characterized for operation over the commercial temperature range of 0°C to 70°C. The SN65LBC179 is characterized over the industrial temperature range of -40°C to 85°C. The SN65LBC179Q is characterized over the extended industrial or automotive temperature range of -40°C to 125°C.

### schematics of inputs and outputs



# SN75LBC179, SN65LBC179, SN65LBC179Q

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### absolute maximum ratings<sup>†</sup>

|                                                 |                              |
|-------------------------------------------------|------------------------------|
| Supply voltage range, $V_{CC}$                  | –0.3 V to 7 V                |
| Voltage range at A, B, Y, or Z (see Note 1)     | –10 V to 15 V                |
| Voltage range at D or R (see Note 1)            | –0.3 V to $V_{CC} + 0.5$ V   |
| Receiver output current, $I_O$                  | ±10 mA                       |
| Continuous total power dissipation (see Note 2) | Internally limited           |
| Total power dissipation                         | See Dissipation Rating Table |

<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 are with respect to GND.

2. The maximum operating junction temperature is internally limited. Uses the dissipation rating table to operate below this temperature.

### recommended operating conditions

|                                                                                      |               | MIN             | NOM | MAX  | UNIT |
|--------------------------------------------------------------------------------------|---------------|-----------------|-----|------|------|
| Supply voltage, $V_{CC}$                                                             |               | 4.75            | 5   | 5.25 | V    |
| High-level input voltage, $V_{IH}$                                                   | D             | 2               |     |      | V    |
| Low-level input voltage, $V_{IL}$                                                    | D             |                 |     | 0.8  | V    |
| Differential input voltage, $V_{ID}$                                                 |               | –6 <sup>‡</sup> |     | 6    | V    |
| Voltage at any bus terminal (separately or common-mode), $V_O$ , $V_I$ , or $V_{IC}$ | A, B, Y, or Z | –7              |     | 12   | V    |
| High-level output current, $I_{OH}$                                                  | Y or Z        |                 |     | –60  | mA   |
|                                                                                      | R             |                 |     | –8   |      |
| Low-level output current, $I_{OL}$                                                   | Y or Z        |                 |     | 60   | mA   |
|                                                                                      | R             |                 |     | 8    |      |
| Junction temperature, $T_J$                                                          |               |                 |     | 140  | °C   |
| Operating free-air temperature, $T_A$                                                | SN65LBC179    | –40             |     | 85   | °C   |
|                                                                                      | SN65LBC179Q   | –40             |     | 125  |      |
|                                                                                      | SN75LBC179    | 0               |     | 70   |      |

<sup>‡</sup> The algebraic convention, in which the least positive (most negative) limit is designated as minimum, is used in this data sheet for differential input voltage, voltage at any bus terminal (separately or common mode), operating temperature, input threshold voltage, and common-mode output voltage.

DISSIPATION RATING TABLE

| PACKAGE | THERMAL MODEL     | $T_A < 25^\circ\text{C}$<br>POWER RATING | DERATING FACTOR<br>ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$<br>POWER RATING | $T_A = 85^\circ\text{C}$<br>POWER RATING |
|---------|-------------------|------------------------------------------|---------------------------------------------------|------------------------------------------|------------------------------------------|
| D       | Low $K^\dagger$   | 526 mW                                   | 5.0 mW/°C                                         | 301 mW                                   | 226 mW                                   |
|         | High $K^\ddagger$ | 882 mW                                   | 8.4 mW/°C                                         | 504 mW                                   | 378 mW                                   |
| P       |                   | 840 mW                                   | 8.0 mW/°C                                         | 480 mW                                   | 360 mW                                   |

<sup>†</sup> In accordance with the low effective thermal conductivity metric definitions of EIA/JESD 51–3.

<sup>‡</sup> In accordance with the high effective thermal conductivity metric definitions of EIA/JESD 51–7.



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## LOW-POWER DIFFERENTIAL LINE DRIVER AND RECEIVER PAIRS

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### DRIVER SECTION

#### electrical characteristics over recommended operating conditions (unless otherwise noted)

| PARAMETER        |                                                                 | TEST CONDITIONS                                      |                            | MIN | TYP <sup>†</sup> | MAX       | UNIT          |
|------------------|-----------------------------------------------------------------|------------------------------------------------------|----------------------------|-----|------------------|-----------|---------------|
| $V_{IK}$         | Input clamp voltage                                             | $I_I = -18 \text{ mA}$                               |                            |     |                  | -1.5      | V             |
| $ V_{OD} $       | Differential output voltage (see Note 3)                        | $R_L = 54 \Omega$ ,<br>See Figure 1                  | SN65LBC179,<br>SN65LBC179Q | 1.1 | 2.2              | 5         | V             |
|                  |                                                                 |                                                      | SN75LBC179                 | 1.5 | 2.2              | 5         |               |
|                  |                                                                 | $R_L = 60 \Omega$ ,<br>See Figure 2                  | SN65LBC179,<br>SN65LBC179Q | 1.1 | 2.2              | 5         |               |
|                  |                                                                 |                                                      | SN75LBC179                 | 1.5 | 2.2              | 5         |               |
| $\Delta V_{OD} $ | Change in magnitude of differential output voltage (see Note 4) | See Figures 1 and 2                                  |                            |     |                  | $\pm 0.2$ | V             |
| $V_{OC}$         | Common-mode output voltage                                      | $R_L = 54 \Omega$ ,      See Figure 1                |                            | 1   | 2.5              | 3         | V             |
| $\Delta V_{OC} $ | Change in magnitude of common-mode output voltage (see Note 4)  |                                                      |                            |     |                  | $\pm 0.2$ | V             |
| $I_O$            | Output current with power off                                   | $V_{CC} = 0$ , $V_O = -7 \text{ V to } 12 \text{ V}$ |                            |     |                  | $\pm 100$ | $\mu\text{A}$ |
| $I_{IH}$         | High-level input current                                        | $V_I = 2.4 \text{ V}$                                |                            |     |                  | -100      | $\mu\text{A}$ |
| $I_{IL}$         | Low-level input current                                         | $V_I = 0.4 \text{ V}$                                |                            |     |                  | -100      | $\mu\text{A}$ |
| $I_{OS}$         | Short-circuit output current                                    | $-7 \text{ V} \leq V_O \leq 12 \text{ V}$            |                            |     |                  | $\pm 250$ | mA            |
| $I_{CC}$         | Supply current                                                  | No load                                              | SN65LBC179,<br>SN75LBC179  |     | 4.2              | 5         | mA            |
|                  |                                                                 |                                                      | SN65LBC179Q                |     | 4.2              | 7         | mA            |

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

NOTES: 3. The minimum  $V_{OD}$  specification of the SN65179 may not fully comply with ANSI RS-485 at operating temperatures below  $0^\circ\text{C}$ . System designers should take the possibly lower output signal into account in determining the maximum signal transmission distance.

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

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

| PARAMETER   |                                | TEST CONDITIONS                       |  | MIN | MAX | UNIT |
|-------------|--------------------------------|---------------------------------------|--|-----|-----|------|
| $t_{d(OD)}$ | Differential-output delay time | $R_L = 54 \Omega$ ,      See Figure 3 |  | 7   | 18  | ns   |
| $t_{t(OD)}$ | Differential transition time   |                                       |  | 5   | 20  | ns   |



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### RECEIVER SECTION

electrical characteristics over recommended operating conditions (unless otherwise noted)

| PARAMETER        |                                                           | TEST CONDITIONS                                                         |                           | MIN  | TYP  | MAX  | UNIT |
|------------------|-----------------------------------------------------------|-------------------------------------------------------------------------|---------------------------|------|------|------|------|
| V <sub>IT+</sub> | Positive-going input threshold voltage                    | I <sub>O</sub> = −8 mA                                                  |                           |      |      | 0.2  | V    |
| V <sub>IT−</sub> | Negative-going input threshold voltage                    | I <sub>O</sub> = 8 mA                                                   |                           | −0.2 |      |      | V    |
| V <sub>hys</sub> | Hysteresis voltage (V <sub>IT+</sub> − V <sub>IT−</sub> ) |                                                                         |                           |      | 45   |      | mV   |
| V <sub>OH</sub>  | High-level output voltage                                 | V <sub>ID</sub> = 200 mV, I <sub>OH</sub> = −8 mA                       |                           | 3.5  | 4.5  |      | V    |
| V <sub>OL</sub>  | Low-level output voltage                                  | V <sub>ID</sub> = −200 mV, I <sub>OL</sub> = 8 mA                       |                           |      | 0.3  | 0.5  | V    |
| I <sub>I</sub>   | Bus input current                                         | V <sub>I</sub> = 12 V,<br>Other inputs at 0 V,<br>V <sub>CC</sub> = 5 V | SN65LBC179,<br>SN75LBC179 |      | 0.7  | 1    | mA   |
|                  |                                                           |                                                                         | SN65LBC179Q               |      | 0.7  | 1.2  | mA   |
|                  |                                                           | V <sub>I</sub> = 12 V,<br>Other inputs at 0 V,<br>V <sub>CC</sub> = 0 V | SN65LBC179,<br>SN75LBC179 |      | 0.8  | 1    | mA   |
|                  |                                                           |                                                                         | SN65LBC179Q               |      | 0.8  | 1.2  | mA   |
|                  |                                                           | V <sub>I</sub> = −7 V,<br>Other inputs at 0 V,<br>V <sub>CC</sub> = 5 V | SN65LBC179,<br>SN75LBC179 |      | −0.5 | −0.8 | mA   |
|                  |                                                           |                                                                         | SN65LBC179Q               |      | −0.5 | −1.0 | mA   |
|                  |                                                           | V <sub>I</sub> = −7 V,<br>Other inputs at 0 V,<br>V <sub>CC</sub> = 0 V | SN65LBC179,<br>SN75LBC179 |      | −0.5 | −0.8 | mA   |
|                  |                                                           |                                                                         | SN65LBC179Q               |      | −0.5 | −1.0 | mA   |

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

| PARAMETER                                                   | TEST CONDITIONS                                            | MIN | TYP | MAX | UNIT |
|-------------------------------------------------------------|------------------------------------------------------------|-----|-----|-----|------|
| $t_{PHL}$ Propagation delay time, high- to low-level output | $V_{ID} = -1.5 \text{ V to } 1.5 \text{ V}$ , See Figure 4 | 15  |     | 30  | ns   |
| $t_{PLH}$ Propagation delay time, low- to high-level output |                                                            | 15  |     | 30  | ns   |
| $t_{sk(p)}$ Pulse skew ( $ t_{PHL} - t_{PLH} $ )            | See Figure 4                                               |     | 3   | 6   | ns   |
| $t_t$ Transition time                                       |                                                            |     | 3   | 5   | ns   |

### PARAMETER MEASUREMENT INFORMATION

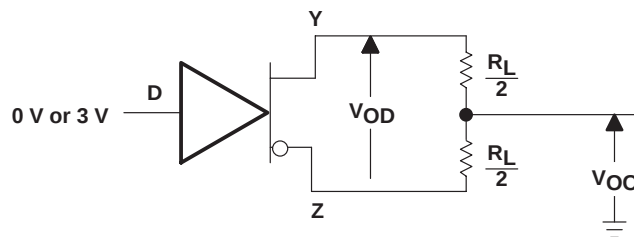


Figure 1. Differential and Common-Mode Output Voltage Test Circuit

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### PARAMETER MEASUREMENT INFORMATION

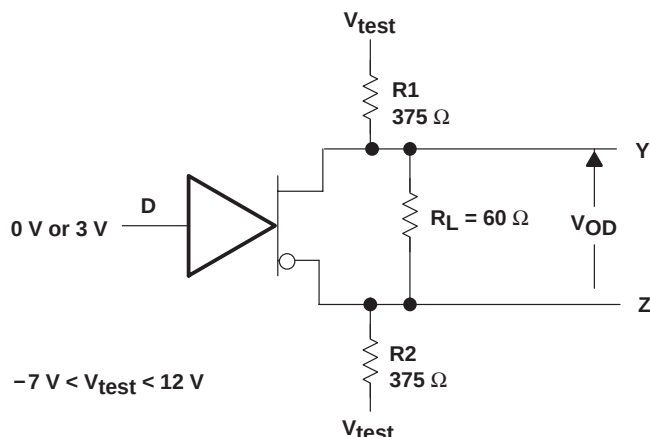
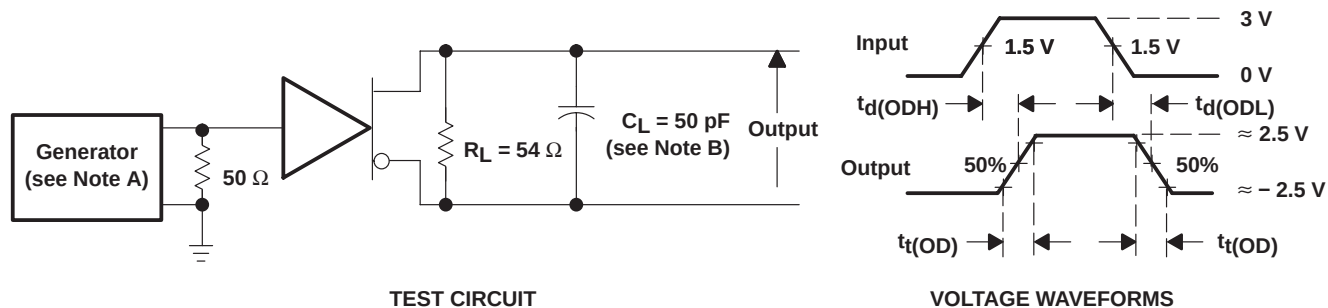
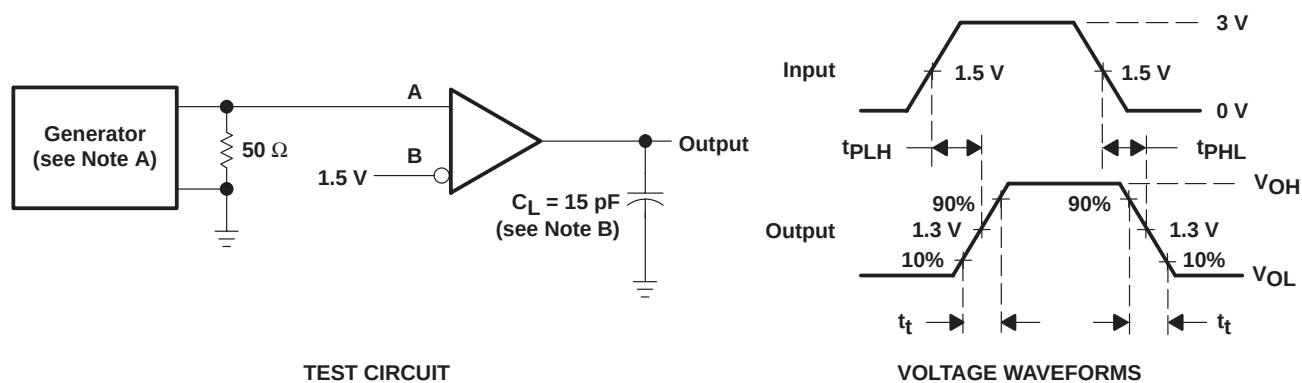


Figure 2. Differential Output Voltage Test Circuit



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

Figure 3. Driver Test Circuits and Differential Output Delay and Transition Time Voltage Waveforms



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

Figure 4. Receiver Test Circuit and Propagation Delay and Transition Time Voltage Waveforms

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## LOW-POWER DIFFERENTIAL LINE DRIVER AND RECEIVER PAIRS

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### TYPICAL CHARACTERISTICS

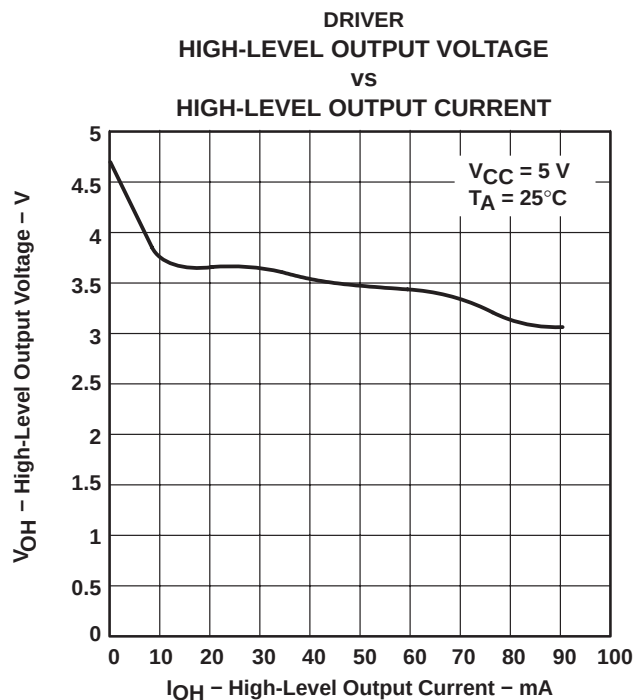


Figure 5

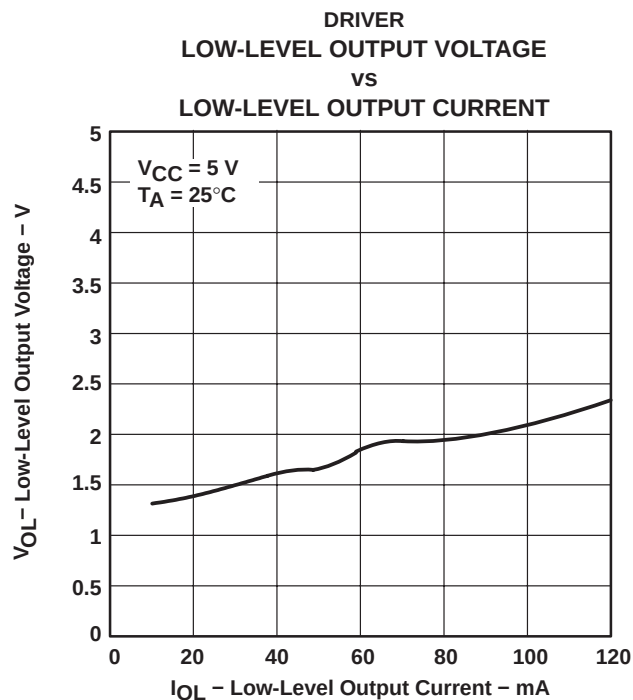


Figure 6

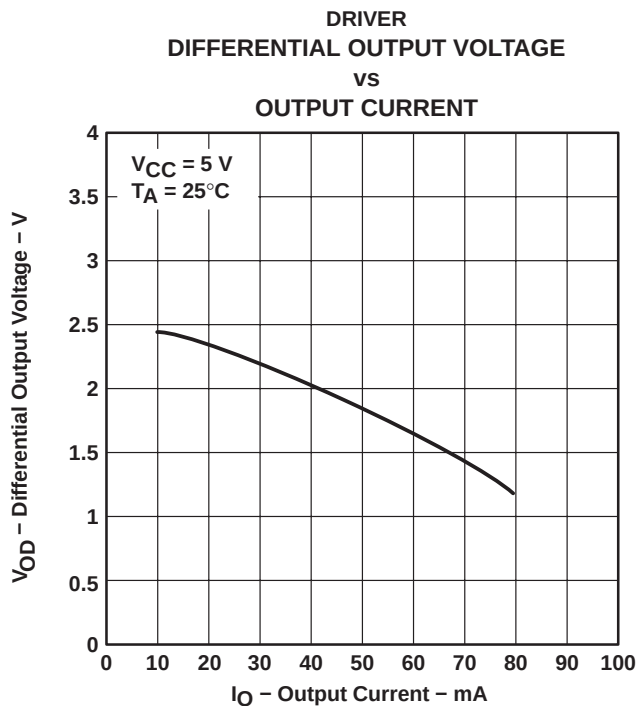


Figure 7

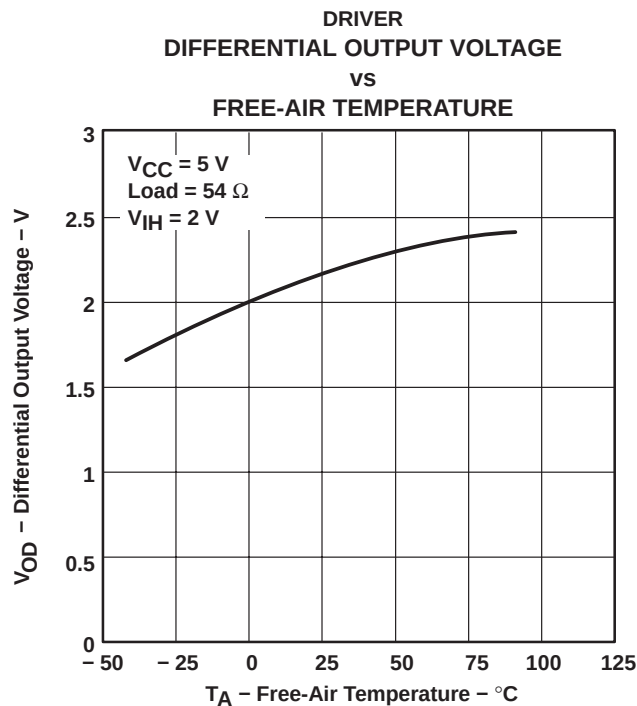


Figure 8

# SN75LBC179, SN65LBC179, SN65LBC179Q

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### TYPICAL CHARACTERISTICS

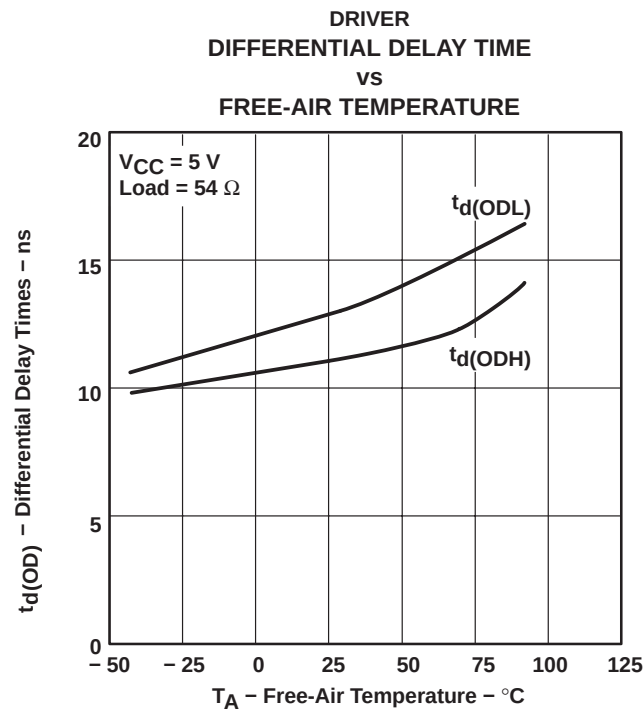


Figure 9

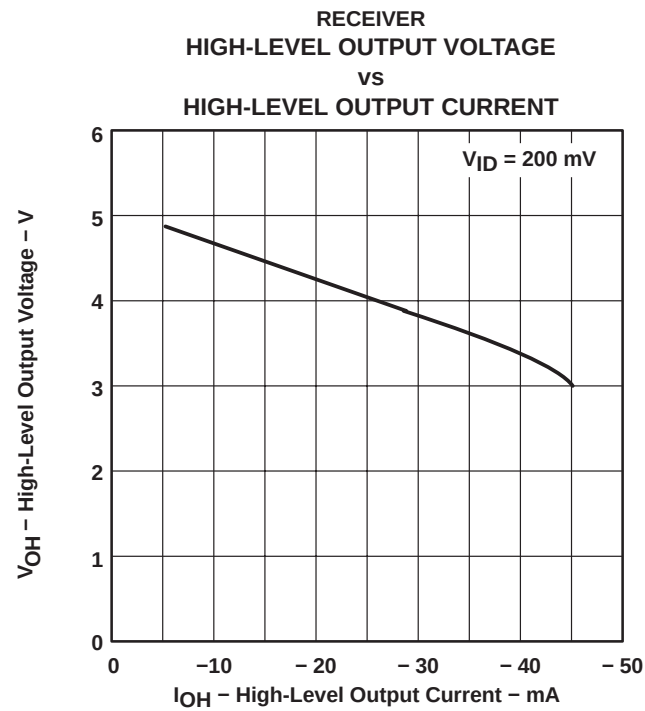


Figure 10

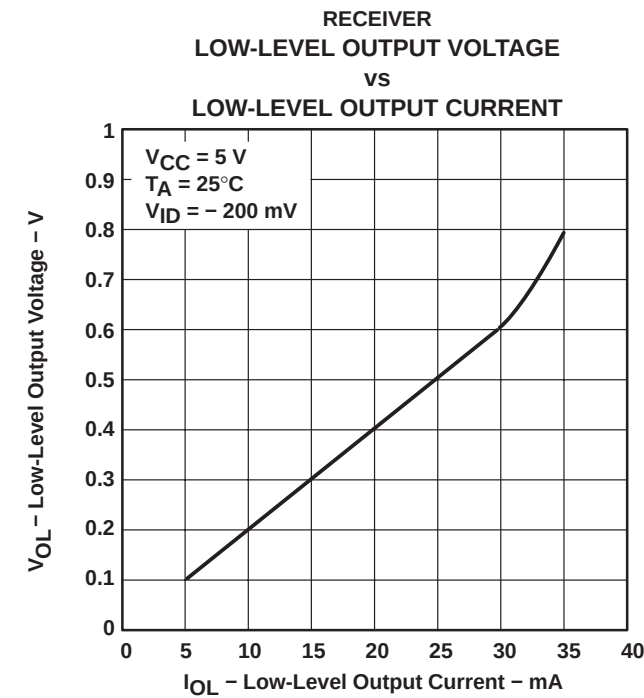


Figure 11

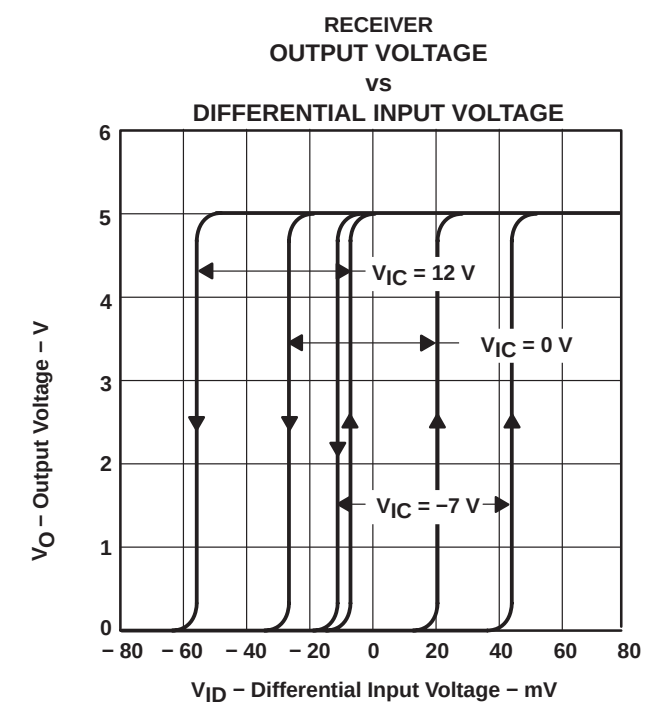


Figure 12



# SN75LBC179, SN65LBC179, SN65LBC179Q

## LOW-POWER DIFFERENTIAL LINE DRIVER AND RECEIVER PAIRS

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### TYPICAL CHARACTERISTICS

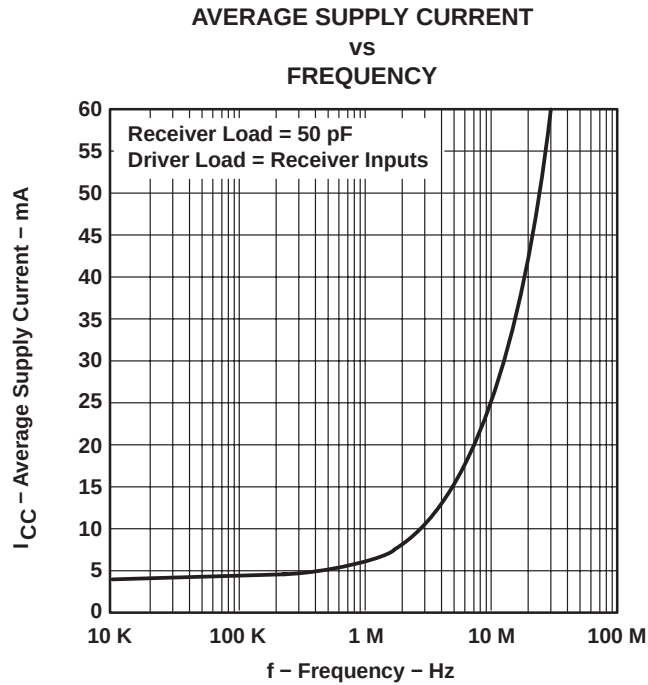


Figure 13

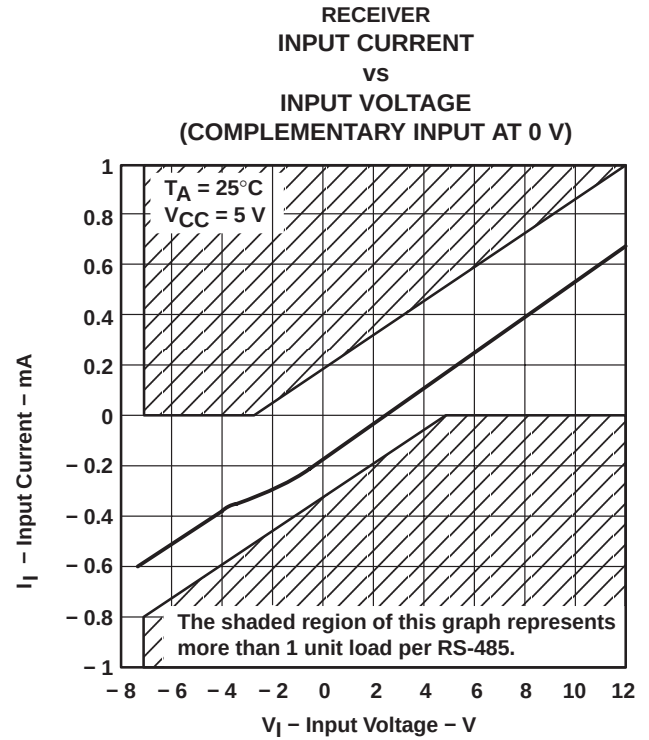


Figure 14

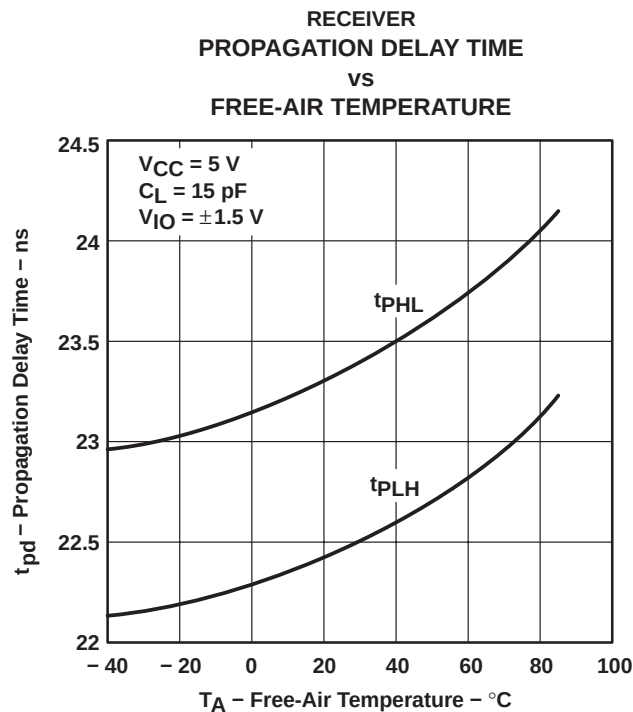


Figure 15

# SN75LBC179, SN65LBC179, SN65LBC179Q

## LOW-POWER DIFFERENTIAL LINE DRIVER AND RECEIVER PAIRS

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### THERMAL CHARACTERISTICS – D PACKAGE

| PARAMETER                                                          | TEST CONDITIONS                                                                                                               | MIN | TYP   | MAX | UNIT |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----|-------|-----|------|
| Junction-to-ambient thermal resistance, $\theta_{JA}$ <sup>†</sup> | Low-K board, no air flow                                                                                                      |     | 199.4 |     | °C/W |
|                                                                    | High-K board, no air flow                                                                                                     |     | 119   |     |      |
| Junction-to-board thermal resistance, $\theta_{JB}$                | High-K board, no air flow                                                                                                     |     | 67    |     |      |
| Junction-to-case thermal resistance, $\theta_{JC}$                 |                                                                                                                               |     | 46.6  |     |      |
| Average power dissipation, $P_{(AVG)}$                             | $R_L = 54 \Omega$ , input to D is 10 Mbps 50% duty cycle square wave, $V_{CC} = 5.25 \text{ V}$ , $T_J = 130^\circ\text{C}$ . |     |       | 330 | mW   |
| Thermal shutdown junction temperature, $T_{SD}$                    |                                                                                                                               |     | 165   |     | °C   |

<sup>†</sup> See TI application note literature number SZZA003, Package Thermal Characterization Methodologies, for an explanation of this parameter.



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## THERMAL CHARACTERISTICS OF IC PACKAGES

$\Theta_{JA}$  (Junction-to-Ambient Thermal Resistance) is defined as the difference in junction temperature to ambient temperature divided by the operating power

$\Theta_{JA}$  is NOT a constant and is a strong function of

- the PCB design (50% variation)
- altitude (20% variation)
- device power (5% variation)

$\Theta_{JA}$  can be used to compare the thermal performance of packages if the specific test conditions are defined and used. Standardized testing includes specification of PCB construction, test chamber volume, sensor locations, and the thermal characteristics of holding fixtures.  $\Theta_{JA}$  is often misused when it is used to calculate junction temperatures for other installations.

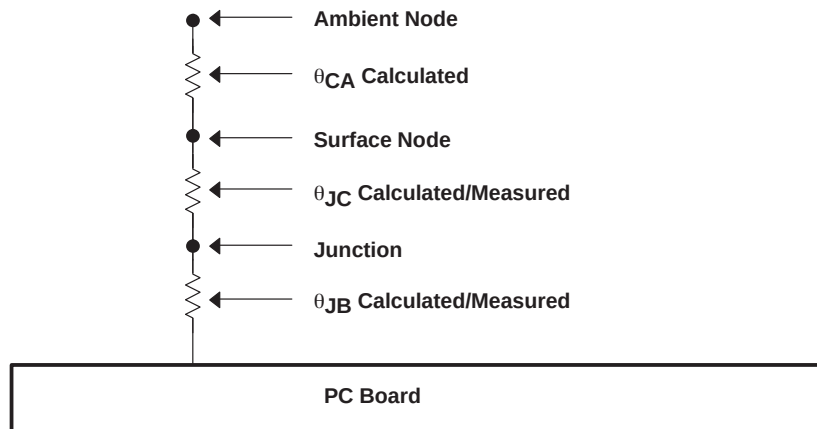
TI uses two test PCBs as defined by JEDEC specifications. The low-k board gives *average* in-use condition thermal performance and consists of a single trace layer 25 mm long and 2-oz thick copper. The high-k board gives *best case* in-use condition and consists of two 1-oz buried power planes with a single trace layer 25 mm long with 2-oz thick copper. A 4% to 50% difference in  $\Theta_{JA}$  can be measured between these two test cards

$\Theta_{JC}$  (Junction-to-Case Thermal Resistance) is defined as difference in junction temperature to case divided by the operating power. It is measured by putting the mounted package up against a copper block cold plate to force heat to flow from die, through the mold compound into the copper block.

$\Theta_{JC}$  is a useful thermal characteristic when a heatsink is applied to package. It is NOT a useful characteristic to predict junction temperature as it provides pessimistic numbers if the case temperature is measured in a non-standard system and junction temperatures are backed out. It can be used with  $\Theta_{JB}$  in 1-dimensional thermal simulation of a package system.

$\Theta_{JB}$  (Junction-to-Board Thermal Resistance) is defined to be the difference in the junction temperature and the PCB temperature at the center of the package (closest to the die) when the PCB is clamped in a cold-plate structure.  $\Theta_{JB}$  is only defined for the high-k test card.

$\Theta_{JB}$  provides an overall thermal resistance between the die and the PCB. It includes a bit of the PCB thermal resistance (especially for BGA's with thermal balls) and can be used for simple 1-dimensional network analysis of package system (see Figure 16).



**Figure 16. Thermal Resistance**

**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> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| SN65LBC179D      | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65LBC179DG4    | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65LBC179DR     | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65LBC179DRG4   | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65LBC179P      | ACTIVE                | PDIP         | P               | 8    | 50          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN65LBC179PE4    | ACTIVE                | PDIP         | P               | 8    | 50          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN65LBC179QD     | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65LBC179QDG4   | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65LBC179QDR    | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65LBC179QDRG4  | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75LBC179D      | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75LBC179DG4    | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75LBC179DR     | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75LBC179DRG4   | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75LBC179P      | ACTIVE                | PDIP         | P               | 8    | 50          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN75LBC179PE4    | ACTIVE                | PDIP         | P               | 8    | 50          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |

<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.

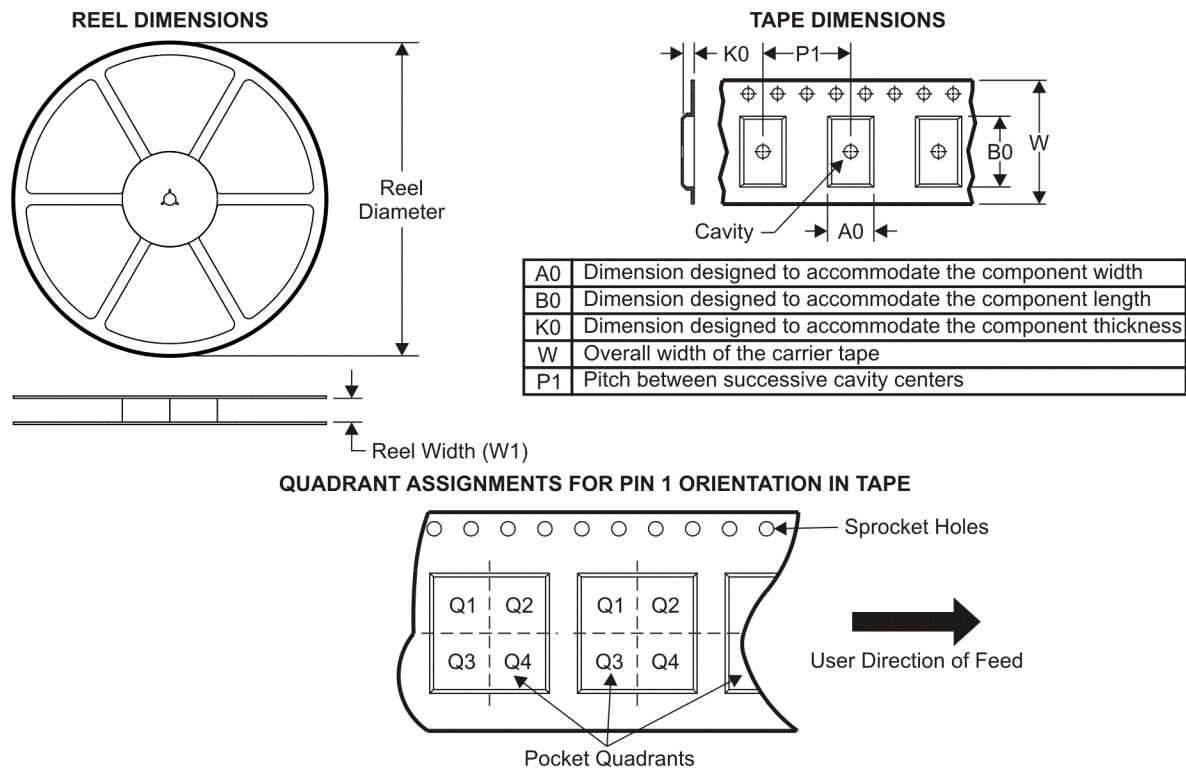
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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<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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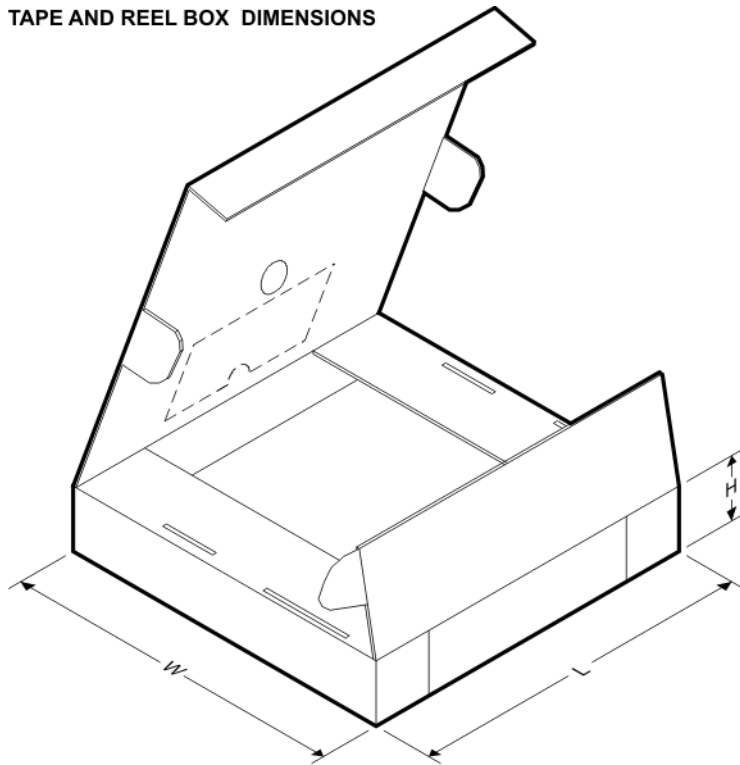
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**TAPE AND REEL INFORMATION**


\*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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN65LBC179DR | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| SN75LBC179DR | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS

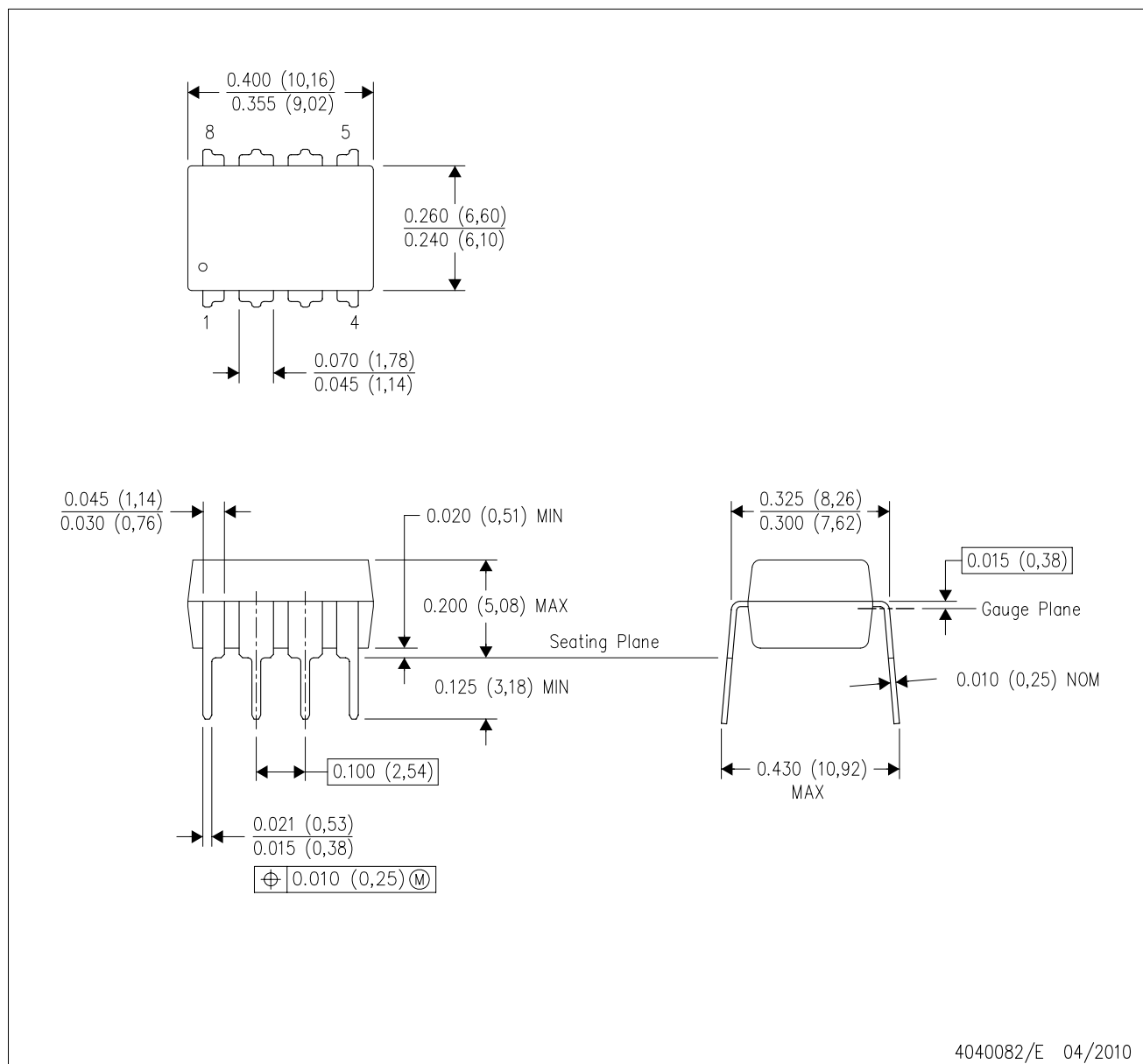


\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN65LBC179DR | SOIC         | D               | 8    | 2500 | 340.5       | 338.1      | 20.6        |
| SN75LBC179DR | SOIC         | D               | 8    | 2500 | 340.5       | 338.1      | 20.6        |

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE

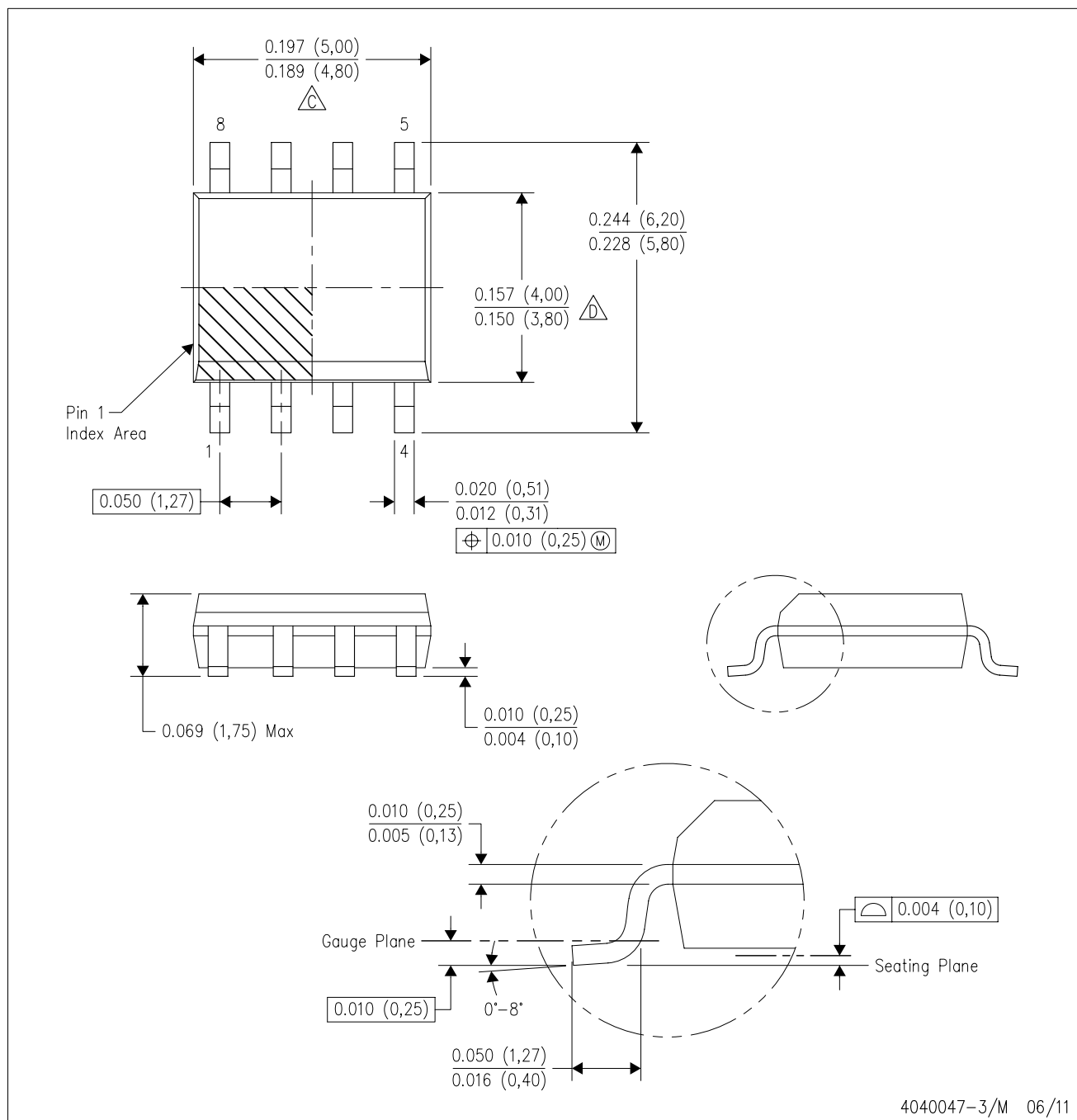


- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Falls within JEDEC MS-001 variation BA.



D (R-PDSO-G8)

PLASTIC SMALL OUTLINE

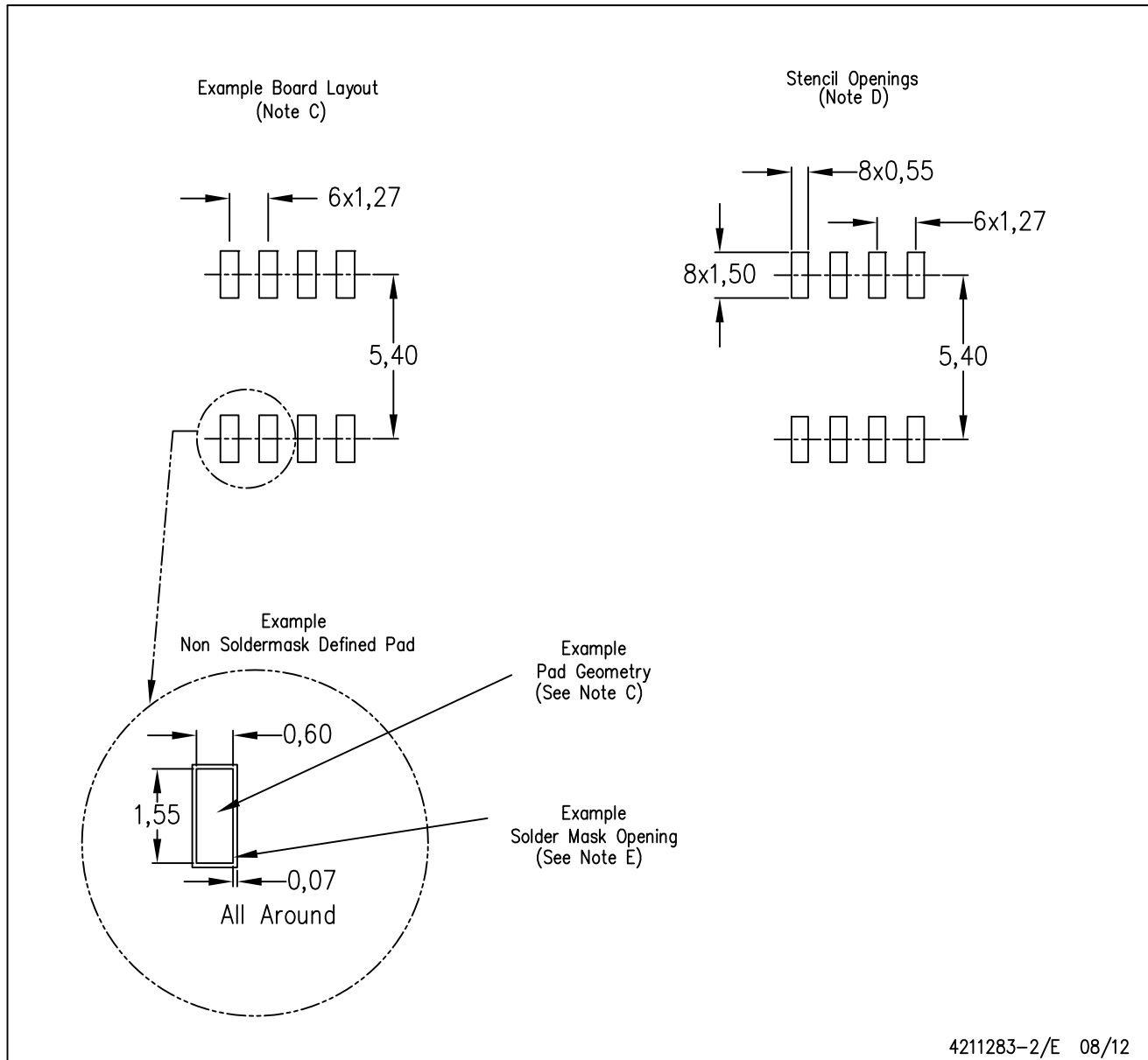


## NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- $\triangle C$  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- $\triangle D$  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AA.

D (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.

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|                               |                                                                                          |
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