



## 1.5-Gbps LVDS/LVPECL/CML-TO-CML TRANSLATOR/REPEATER

### FEATURES

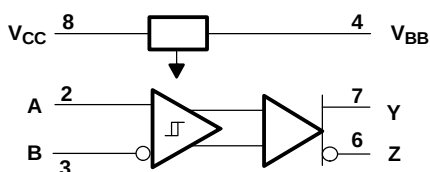
- Provides Level Translation From LVDS or LVPECL to CML, Repeating From CML to CML
- Signaling Rates<sup>(1)</sup> up to 1.5 Gbps
- CML Compatible Output Directly Drives Devices With 3.3-V, 2.5-V, or 1.8-V Supplies
- Total Jitter < 70 ps
- Low 100 ps (Max) Part-To-Part Skew
- Wide Common-Mode Receiver Capability Allows Direct Coupling of Input Signals
- 25 mV of Receiver Input Threshold Hysteresis Over 0-V to 4-V Common-Mode Range
- Propagation Delay Times, 800 ps Maximum
- 3.3-V Supply Operation
- Available in SOIC and MSOP Packages

### APPLICATIONS

- Level Translation
- 622-MHz Central Office Clock Distribution
- High-Speed Network Routing
- Wireless Basestations
- Low Jitter Clock Repeater<sup>(1)</sup>

(1) The signaling rate of a line is the number of voltage transitions that are made per second expressed in the units bps (bits per second).

### FUNCTIONAL DIAGRAM



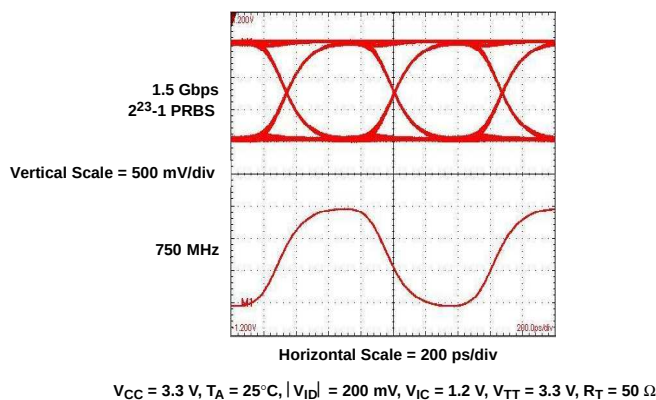
### DESCRIPTION

This high-speed translator/repeater is designed for signaling rates up to 1.5 Gbps to support various high-speed network routing applications. The driver output is compatible with current-mode logic (CML) levels, and directly drives 50-Ω or 25-Ω loads connected to 1.8-V, 2.5-V, or 3.3-V nominal supplies. The capability for direct connection to the loads may eliminate the need for coupling capacitors. The receiver input is compatible with LVDS (TIA/EIA-644), LVPECL, and CML signaling levels. The receiver tolerates a wide common-mode voltage range, and may also be directly coupled to the signal source. The internal data path from input to output is fully differential for low noise generation and low pulse-width distortion.

The  $V_{BB}$  pin is an internally generated voltage supply to allow operation with a single-ended LVPECL input. For single-ended LVPECL input operation, the unused differential input is connected to  $V_{BB}$  as a switching reference voltage. When used, decouple  $V_{BB}$  with a 0.01-μF capacitor and limit the current sourcing or sinking to 400 μA. When not used,  $V_{BB}$  should be left open.

This device is characterized for operation from -40°C to 85°C.

### EYE PATTERN



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## ORDERING INFORMATION

| PART NUMBER   | PART MARKING | PACKAGE | STATUS     |
|---------------|--------------|---------|------------|
| SN65CML100D   | CML100       | SOIC    | Production |
| SN65CML100DGK | NWB          | MSOP    | Production |

## ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range unless otherwise noted<sup>(1)</sup>

|                                                              |                                     |                     | UNIT                         |
|--------------------------------------------------------------|-------------------------------------|---------------------|------------------------------|
| $V_{CC}$                                                     | Supply voltage range <sup>(2)</sup> |                     | –0.5 V to 4 V                |
| $I_{BB}$                                                     | Sink/source                         |                     | ±0.5 mA                      |
| Voltage range, (A, B, Y, Z)                                  |                                     |                     | 0 V to 4.3 V                 |
| Electrostatic discharge                                      | Human Body Model <sup>(3)</sup>     | A, B, Y, Z, and GND | ±5 kV                        |
|                                                              |                                     | All pins            | ±2 kV                        |
|                                                              | Charged-Device Model <sup>(4)</sup> | All pins            | ±1500 V                      |
| Continuous power dissipation                                 |                                     |                     | See Dissipation Rating Table |
| $T_{stg}$                                                    | Storage temperature range           |                     | –65°C to 150°C               |
| 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 I/O bus voltages, are with respect to network ground terminal.
- (3) Tested in accordance with JEDEC Standard 22, Test Method A114-A.7.
- (4) Tested in accordance with JEDEC Standard 22, Test Method C101.

## RECOMMENDED OPERATING CONDITIONS

|            |                                                                 |                                    | MIN   | NOM | MAX   | UNIT |
|------------|-----------------------------------------------------------------|------------------------------------|-------|-----|-------|------|
| $V_{CC}$   | Supply voltage                                                  |                                    | 3     | 3.3 | 3.6   | V    |
| $V_{TT}$   | Terminator supply voltage                                       | 3.3-V nominal supply at terminator | 3     | 3.3 | 3.6   | V    |
|            |                                                                 | 2.5-V nominal supply at terminator | 2.375 | 2.5 | 2.625 |      |
|            |                                                                 | 1.8-V nominal supply at terminator | 1.7   |     | 1.9   |      |
| $ V_{ID} $ | Magnitude of differential input voltage                         |                                    | 0.1   |     | 1     | V    |
|            | Input voltage (any combination of common-mode or input signals) |                                    | 0     |     | 4     | V    |
| $V_{BB}$   | Output current                                                  |                                    |       |     | 400   | μA   |
| $T_A$      | Operating free-air temperature                                  |                                    | –40   |     | 85    | °C   |

## PACKAGE DISSIPATION RATINGS

| PACKAGE | $T_A \leq 25^\circ\text{C}$<br>POWER RATING | DERATING FACTOR <sup>(1)</sup><br>ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 85^\circ\text{C}$<br>POWER RATING |
|---------|---------------------------------------------|------------------------------------------------------------------|------------------------------------------|
| DGK     | 425 mW                                      | 3.4 mW/°C                                                        | 221 mW                                   |
| D       | 725 mW                                      | 5.8 mW/°C                                                        | 377 mW                                   |

- (1) This is the inverse of the junction-to-ambient thermal resistance when board-mounted and with no air flow.

## DEVICE CHARACTERISTICS

| PARAMETER |                                            | MIN  | NOM  | MAX  | UNIT |
|-----------|--------------------------------------------|------|------|------|------|
| $I_{CC}$  | Supply current, device only                |      | 9    | 12   | mA   |
| $V_{BB}$  | Switching reference voltage <sup>(1)</sup> | 1890 | 1950 | 2010 | mV   |

(1)  $V_{BB}$  parameter varies 1:1 with  $V_{CC}$

## INPUT ELECTRICAL CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

| PARAMETER     |                                                            | TEST CONDITIONS                                               |  | MIN  | TYP <sup>(1)</sup> | MAX | UNIT    |
|---------------|------------------------------------------------------------|---------------------------------------------------------------|--|------|--------------------|-----|---------|
| $V_{IT+}$     | Positive-going differential input voltage threshold        | See Figure 1 and Table 1                                      |  |      |                    | 100 | mV      |
| $V_{IT-}$     | Negative-going differential input voltage threshold        |                                                               |  | -100 |                    |     |         |
| $V_{ID(HYS)}$ | Differential input voltage hysteresis, $V_{IT+} - V_{IT-}$ |                                                               |  |      | 25                 |     | mV      |
| $I_I$         | Input current (A or B inputs)                              | $V_I = 0$ V or 2.4 V, Second input at 1.2 V                   |  | -20  |                    | 20  | $\mu$ A |
|               |                                                            | $V_I = 4$ V, Second input at 1.2 V                            |  |      |                    | 33  |         |
| $I_{I(OFF)}$  | Power off input current (A or B inputs)                    | $V_{CC} = 1.5$ V, $V_I = 0$ V or 2.4 V, Second input at 1.2 V |  | -20  |                    | 20  | $\mu$ A |
|               |                                                            | $V_{CC} = 1.5$ V, $V_I = 4$ V, Second input at 1.2 V          |  |      |                    | 33  |         |
| $I_{IO}$      | Input offset current ( $ I_{IA} - I_{IB} $ )               | $V_{IA} = V_{IB}$ , $0 \leq V_{IA} \leq 4$ V                  |  | -6   |                    | 6   | $\mu$ A |
| $C_i$         | Differential input capacitance                             | $V_I = 0.4 \sin(4E6\pi t) + 0.5$ V                            |  |      | 3                  |     | pF      |
|               |                                                            | $V_{CC} = 0$ V                                                |  |      | 3                  |     |         |

(1) All typical values are at 25°C and with a 3.3-V supply.

## OUTPUT ELECTRICAL CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

| PARAMETER  |                                       | TEST CONDITIONS                                                                            |  | MIN           | TYP <sup>(1)</sup> | MAX          | UNIT |
|------------|---------------------------------------|--------------------------------------------------------------------------------------------|--|---------------|--------------------|--------------|------|
| $V_{OH}$   | Output high voltage <sup>(2)</sup>    | $R_T = 50$ $\Omega$ , $V_{TT} = 3$ V to 3.6 V or $V_{TT} = 2.5$ V $\pm 5\%$ , See Figure 2 |  | $V_{TT}-60$   | $V_{TT}-10$        | $V_{TT}$     | mV   |
| $V_{OL}$   | Output low voltage <sup>(2)</sup>     |                                                                                            |  | $V_{TT}-1100$ | $V_{TT}-800$       | $V_{TT}-640$ | mV   |
| $ V_{OD} $ | Differential output voltage magnitude |                                                                                            |  | 640           | 780                | 1000         | mV   |
| $V_{OH}$   | Output high voltage <sup>(3)</sup>    | $R_T = 25$ $\Omega$ , $V_{TT} = 3$ V to 3.6 V or $V_{TT} = 2.5$ V $\pm 5\%$ , See Figure 2 |  | $V_{TT}-60$   | $V_{TT}-10$        | $V_{TT}$     | mV   |
| $V_{OL}$   | Output low voltage <sup>(3)</sup>     |                                                                                            |  | $V_{TT}-550$  | $V_{TT}-400$       | $V_{TT}-320$ | mV   |
| $ V_{OD} $ | Differential output voltage magnitude |                                                                                            |  | 320           | 390                | 500          | mV   |
| $V_{OH}$   | Output high voltage <sup>(2)</sup>    | $R_T = 50$ $\Omega$ , $V_{TT} = 1.8$ V $\pm 5\%$ , See Figure 2                            |  | $V_{TT}-170$  | $V_{TT}-10$        | $V_{TT}$     | mV   |
| $V_{OL}$   | Output low voltage <sup>(2)</sup>     |                                                                                            |  | $V_{TT}-1100$ | $V_{TT}-800$       | $V_{TT}-640$ | mV   |
| $ V_{OD} $ | Differential output voltage magnitude |                                                                                            |  | 570           | 780                | 1000         | mV   |
| $V_{OH}$   | Output high voltage <sup>(3)</sup>    | $R_T = 25$ $\Omega$ , $V_{TT} = 1.8$ V $\pm 5\%$ , See Figure 2                            |  | $V_{TT}-85$   | $V_{TT}-10$        | $V_{TT}$     | mV   |
| $V_{OL}$   | Output low voltage <sup>(3)</sup>     |                                                                                            |  | $V_{TT}-500$  | $V_{TT}-400$       | $V_{TT}-320$ | mV   |
| $ V_{OD} $ | Differential output voltage magnitude |                                                                                            |  | 285           | 390                | 500          | mV   |
| $C_o$      | Differential output capacitance       | $V_I = 0.4 \sin(4E6\pi t) + 0.5$ V                                                         |  |               | 3                  |              | pF   |
|            |                                       | $V_{CC} = 0$ V                                                                             |  |               | 3                  |              |      |

(1) All typical values are at 25°C and with a 3.3-V supply.

(2) Outputs are terminated through 50- $\Omega$  resistors to  $V_{TT}$ ; CML level specifications are referenced to  $V_{TT}$  and tracks 1:1 with variation of  $V_{TT}$ .

(3) Outputs are terminated through 25- $\Omega$  resistors to  $V_{TT}$ ; CML level specifications are referenced to  $V_{TT}$  and tracks 1:1 with variation of  $V_{TT}$ .

## SWITCHING CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

| PARAMETER      |                                                          | TEST CONDITIONS                                                         | MIN | NOM <sup>(1)</sup> | MAX | UNIT |
|----------------|----------------------------------------------------------|-------------------------------------------------------------------------|-----|--------------------|-----|------|
| $t_{PLH}$      | Propagation delay time, low-to-high-level output         | $R_T = 50\ \Omega$ or $R_T = 25\ \Omega$ , See <a href="#">Figure 4</a> | 250 |                    | 800 | ps   |
| $t_{PHL}$      | Propagation delay time, high-to-low-level output         |                                                                         | 250 |                    | 800 | ps   |
| $t_r$          | Differential output signal rise time (20%–80%)           |                                                                         |     |                    | 300 | ps   |
| $t_f$          | Differential output signal fall time (20%–80%)           |                                                                         |     |                    | 300 | ps   |
| $t_{sk(p)}$    | Pulse skew ( $ t_{PHL} - t_{PLH} $ ) <sup>(2)</sup>      |                                                                         |     | 0                  | 50  | ps   |
| $t_{sk(pp)}$   | Part-to-part skew <sup>(3)</sup>                         | $V_{ID} = 0.2\ V$                                                       |     |                    | 100 | ps   |
| $t_{jit(per)}$ | Period jitter, rms (1 standard deviation) <sup>(4)</sup> | 750 MHz clock input <sup>(5)</sup>                                      |     | 1                  | 5   | ps   |
| $t_{jit(cc)}$  | Cycle-to-cycle jitter (peak) <sup>(4)</sup>              | 750 MHz clock input <sup>(6)</sup>                                      |     | 8                  | 27  | ps   |
| $t_{jit(pp)}$  | Peak-to-peak jitter <sup>(4)</sup>                       | 1.5 Gbps 2 <sup>23</sup> -1 PRBS input <sup>(7)</sup>                   |     | 30                 | 70  | ps   |
| $t_{jit(det)}$ | Deterministic jitter, peak-to-peak <sup>(4)</sup>        | 1.5 Gbps 2 <sup>7</sup> -1 PRBS input <sup>(8)</sup>                    |     | 25                 | 65  | ps   |

(1) All typical values are at 25°C and with a 3.3-V supply.

(2)  $t_{sk(p)}$  is the magnitude of the time difference between the  $t_{PLH}$  and  $t_{PHL}$ .

(3)  $t_{sk(pp)}$  is the magnitude of the difference in propagation delay times between any specified terminals of two devices when both devices operate with the same supply voltages, at the same temperature, and have identical packages and test circuits.

(4) Jitter parameters are ensured by design and characterization. Measurements are made with a Tektronix TDS6604 oscilloscope running Tektronix TDSJIT3 software. Agilent E4862B stimulus system jitter 2 ps  $t_{jit(per)}$ , 16 ps  $t_{jit(cc)}$ , 25 ps  $t_{jit(pp)}$ , and 10 ps  $t_{jit(det)}$  has been subtracted from the values.

(5)  $V_{ID} = 200\ mV$ , 50% duty cycle,  $V_{IC} = 1.2\ V$ ,  $t_r = t_f \leq 25\ ns$  (20% to 80%), measured over 1000 samples.

(6)  $V_{ID} = 200\ mV$ , 50% duty cycle,  $V_{IC} = 1.2\ V$ ,  $t_r = t_f \leq 25\ ns$  (20% to 80%).

(7)  $V_{ID} = 200\ mV$ ,  $V_{IC} = 1.2\ V$ ,  $t_r = t_f \leq 0.25\ ns$  (20% to 80%), measured over 100k samples.

(8)  $V_{ID} = 200\ mV$ ,  $V_{IC} = 1.2\ V$ ,  $t_r = t_f \leq 0.25\ ns$  (20% to 80%). Deterministic jitter is sum of pattern dependent jitter and pulse width distortion.

## PARAMETER MEASUREMENT INFORMATION

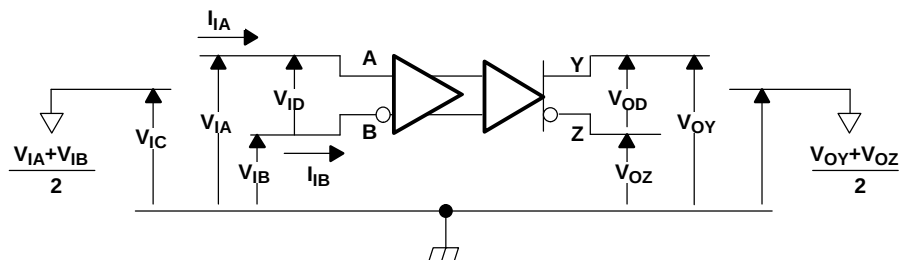


Figure 1. Voltage and Current Definitions

Table 1. Maximum Receiver Input Voltage Threshold

| APPLIED VOLTAGES |          | RESULTING DIFFERENTIAL<br>INPUT VOLTAGE | RESULTING COMMON-<br>MODE INPUT VOLTAGE | OUTPUT <sup>(1)</sup> |
|------------------|----------|-----------------------------------------|-----------------------------------------|-----------------------|
| $V_{IA}$         | $V_{IB}$ | $V_{ID}$                                | $V_{IC}$                                |                       |
| 1.25 V           | 1.15 V   | 100 mV                                  | 1.2 V                                   | H                     |
| 1.15 V           | 1.25 V   | -100 mV                                 | 1.2 V                                   | L                     |
| 4.0 V            | 3.9 V    | 100 mV                                  | 3.95 V                                  | H                     |
| 3.9 V            | 4.0 V    | -100 mV                                 | 3.95 V                                  | L                     |
| 0.1 V            | 0.0 V    | 100 mV                                  | 0.5 V                                   | H                     |
| 0.0 V            | 0.1 V    | -100 mV                                 | 0.5 V                                   | L                     |
| 1.7 V            | 0.7 V    | 1000 mV                                 | 1.2 V                                   | H                     |
| 0.7 V            | 1.7 V    | -1000 mV                                | 1.2 V                                   | L                     |
| 4.0 V            | 3.0 V    | 1000 mV                                 | 3.5 V                                   | H                     |
| 3.0 V            | 4.0 V    | -1000 mV                                | 3.5 V                                   | L                     |
| 1.0 V            | 0.0 V    | 1000 mV                                 | 0.5 V                                   | H                     |
| 0.0 V            | 1.0 V    | -1000 mV                                | 0.5 V                                   | L                     |

(1) H = high level, L = low level

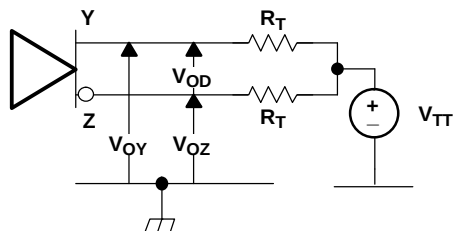


Figure 2. Output Voltage Test Circuit

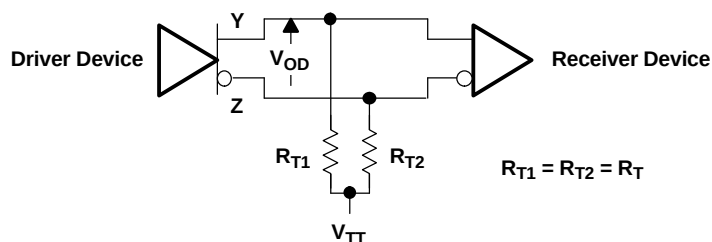
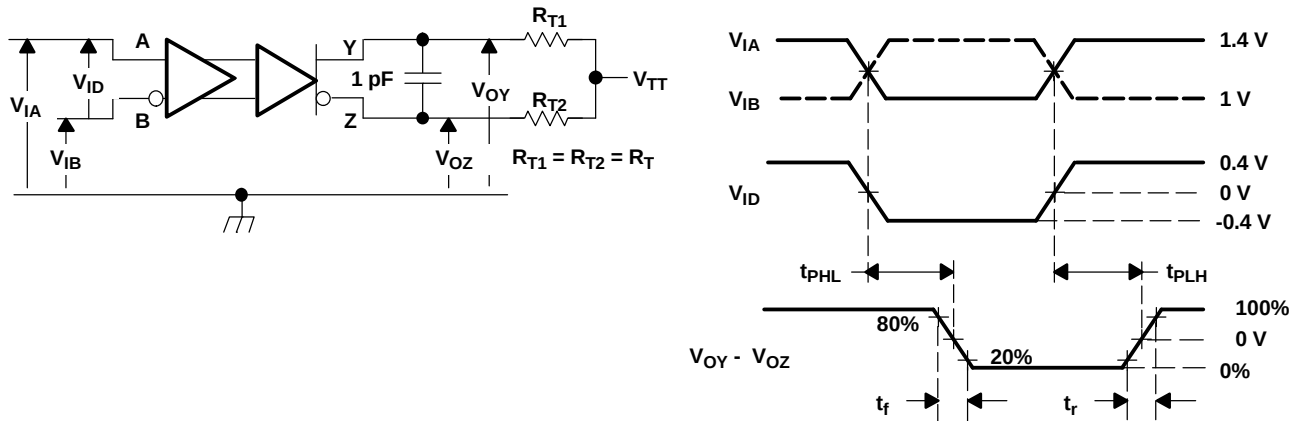


Figure 3. Typical Termination for Output Driver



NOTE: All input pulses are supplied by a generator having the following characteristics:  $t_r$  or  $t_f \leq 0.25$  ns, pulse repetition rate (PRR) = 50 Mpps, pulse width =  $10 \pm 0.2$  ns.  $C_L$  includes instrumentation and fixture capacitance within 0,06 mm of the D.U.T. Measurement equipment provides a bandwidth of 5 GHz minimum.

**Figure 4. Timing Test Circuit and Waveforms**

### PIN ASSIGNMENTS

D AND DGK PACKAGE  
(TOP VIEW)

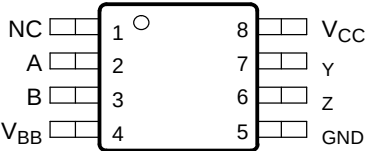


**Table 2. PIN DESCRIPTIONS**

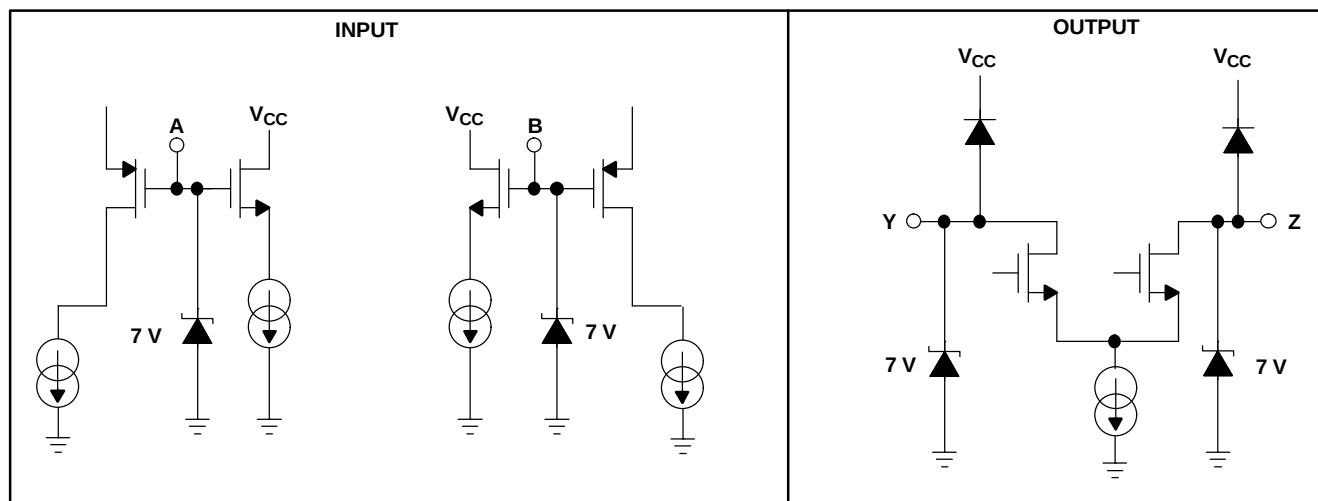
| PIN             | FUNCTION                 |
|-----------------|--------------------------|
| A, B            | Differential inputs      |
| Y, Z            | Differential outputs     |
| V <sub>BB</sub> | Reference voltage output |
| V <sub>CC</sub> | Power supply             |
| GND             | Ground                   |
| NC              | No connect               |

**Table 3. FUNCTION TABLE**

| DIFFERENTIAL INPUT            | OUTPUTS <sup>(1)</sup> |   |
|-------------------------------|------------------------|---|
| $V_{ID} = V_A - V_B$          | Y                      | Z |
| $V_{ID} \geq 100$ mV          | H                      | L |
| $-100$ mV $< V_{ID} < 100$ mV | ?                      | ? |
| $V_{ID} \leq -100$ mV         | L                      | H |
| Open                          | ?                      | ? |

(1) H = high level, L = low level, ? = intermediate

## EQUIVALENT INPUT AND OUTPUT SCHEMATIC DIAGRAMS



## TYPICAL CHARACTERISTICS

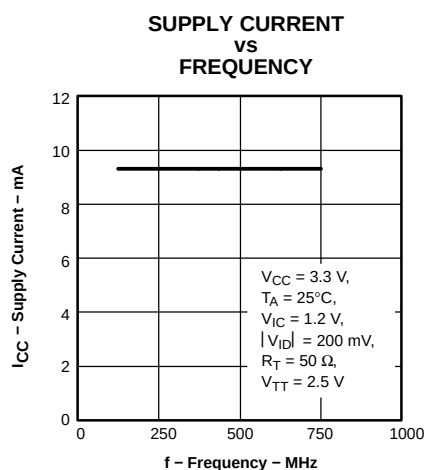


Figure 5.

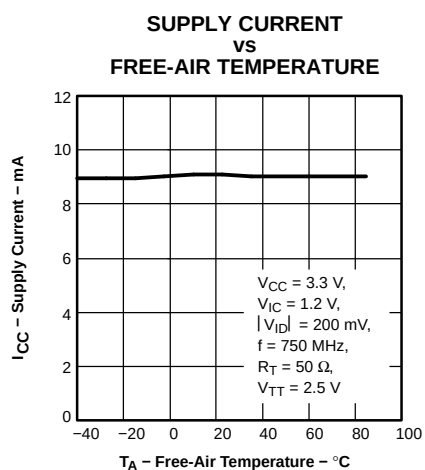


Figure 6.

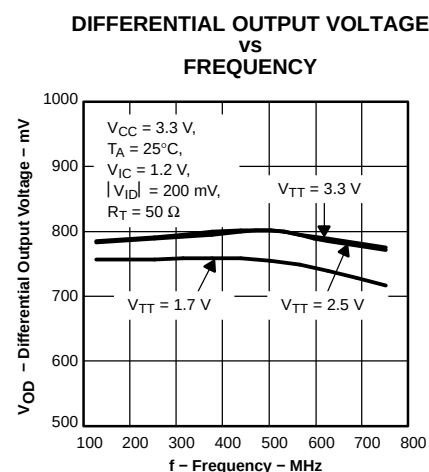


Figure 7.

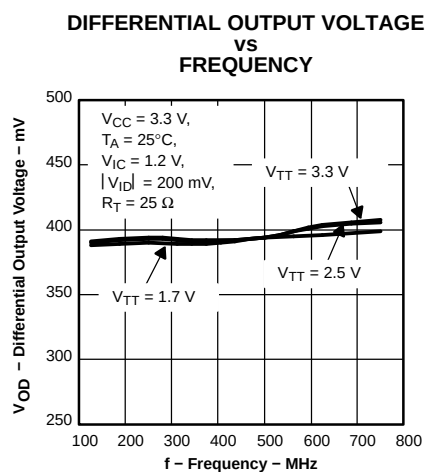


Figure 8.

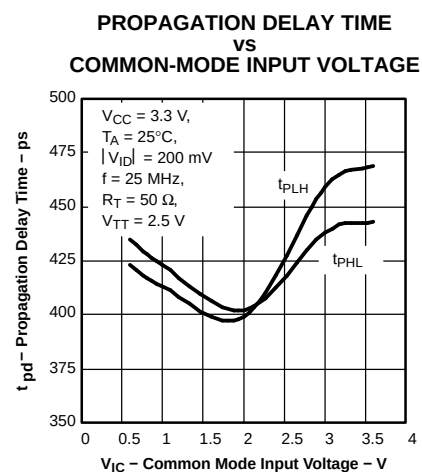


Figure 9.

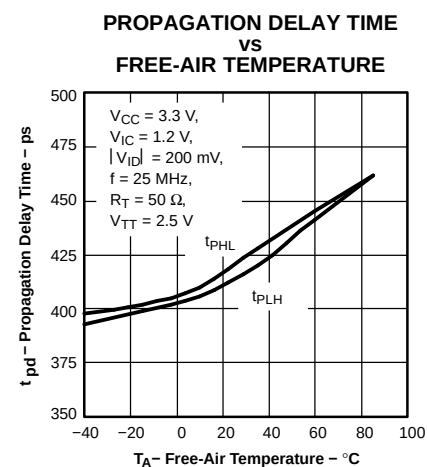


Figure 10.

## TYPICAL CHARACTERISTICS (continued)

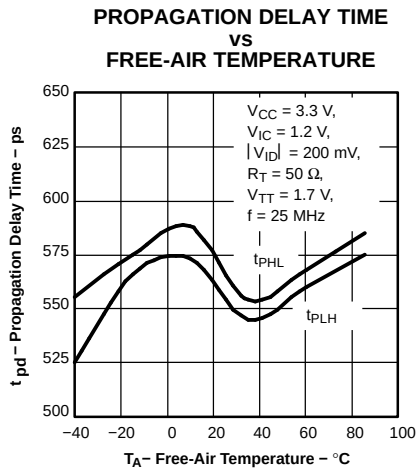


Figure 11.

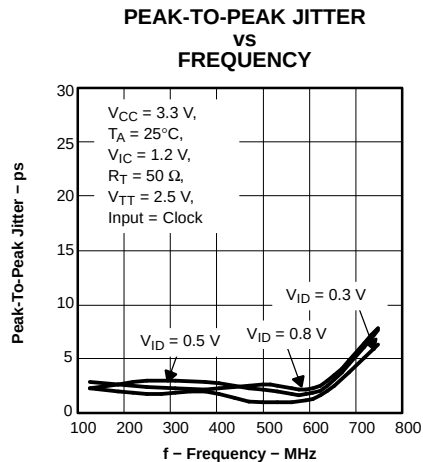


Figure 12.

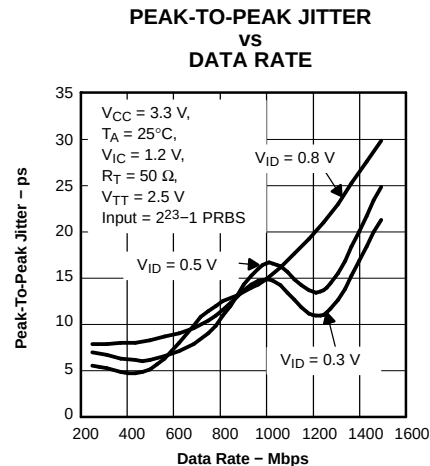


Figure 13.

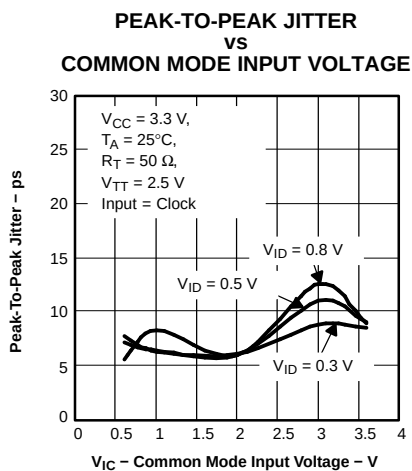


Figure 14.

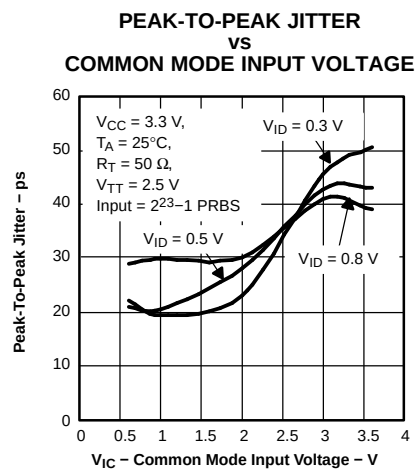


Figure 15.

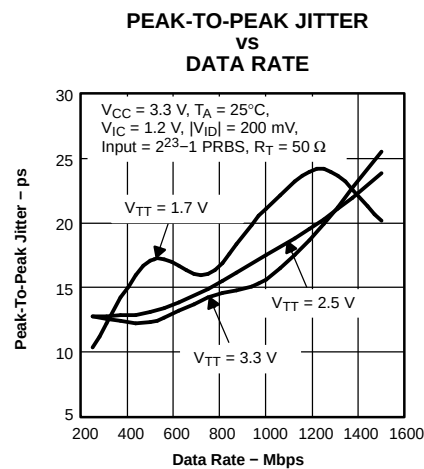


Figure 16.

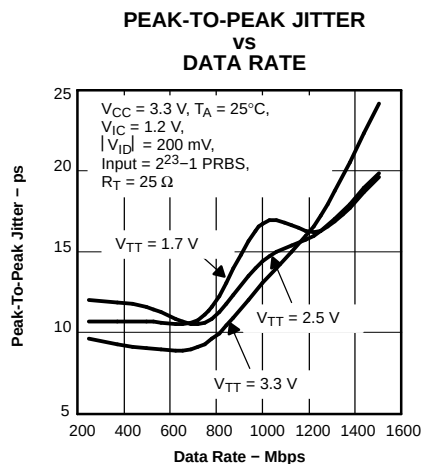


Figure 17.

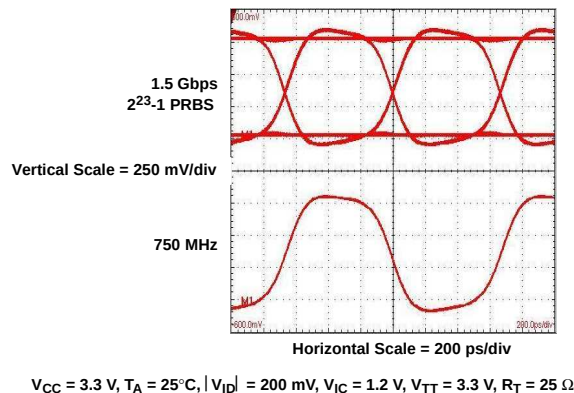
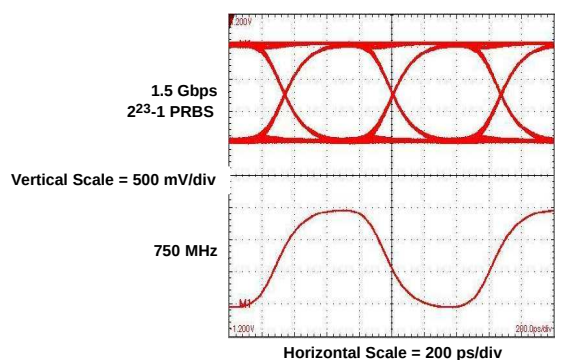


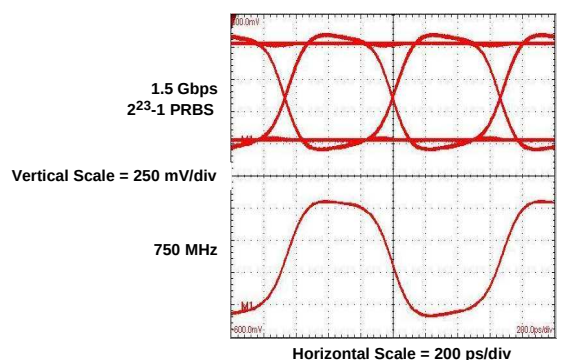
Figure 18.

## TYPICAL CHARACTERISTICS (continued)



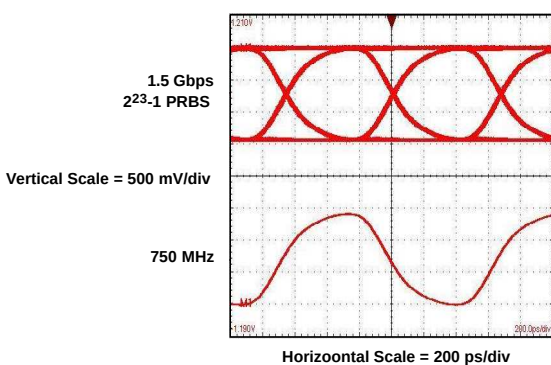
$V_{CC} = 3.3 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $|V_{ID}| = 200 \text{ mV}$ ,  $V_{IC} = 1.2 \text{ V}$ ,  $V_{TT} = 2.5 \text{ V}$ ,  $R_T = 50 \Omega$

Figure 19.



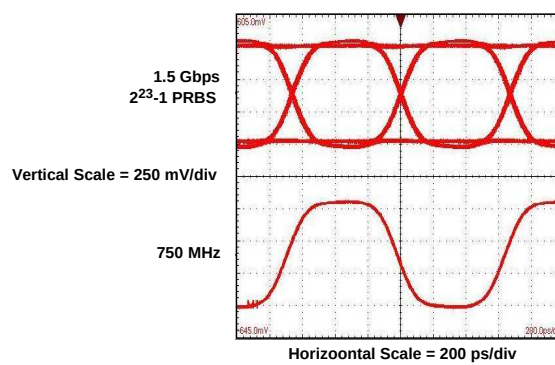
$V_{CC} = 3.3 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $|V_{ID}| = 200 \text{ mV}$ ,  $V_{IC} = 1.2 \text{ V}$ ,  $V_{TT} = 2.5 \text{ V}$ ,  $R_T = 25 \Omega$

Figure 20.



$V_{CC} = 3.3 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $V_{IC} = 1.2 \text{ V}$ ,  $|V_{ID}| = 200 \text{ mV}$ ,  $V_{TT} = 1.7 \text{ V}$ ,  $R_T = 50 \Omega$

Figure 21.



$V_{CC} = 3.3 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $V_{IC} = 1.2 \text{ V}$ ,  $|V_{ID}| = 200 \text{ mV}$ ,  $V_{TT} = 1.7 \text{ V}$ ,  $R_T = 25 \Omega$

Figure 22.

## TYPICAL CHARACTERISTICS (continued)

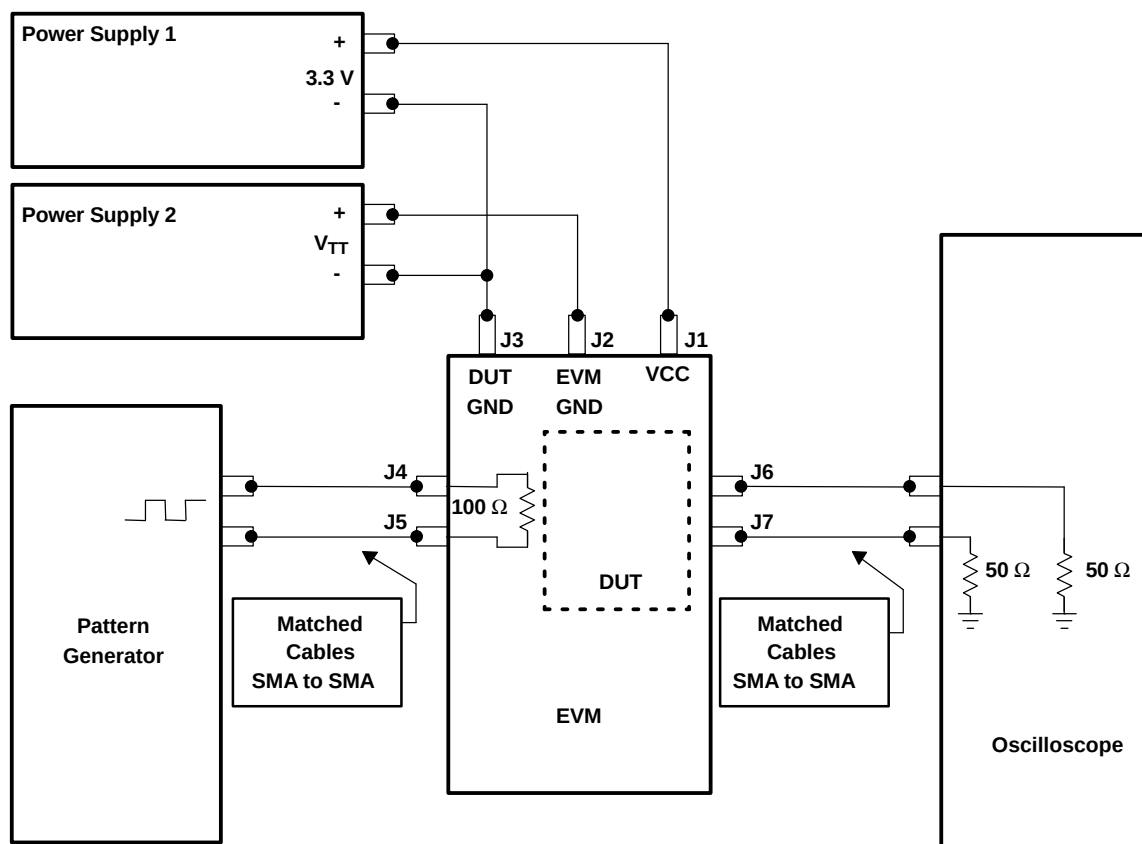


Figure 23. Jitter Setup Connections for SN65CML100

## APPLICATION INFORMATION

For single-ended input conditions, the unused differential input is connected to  $V_{BB}$  as a switching reference voltage. When  $V_{BB}$  is used, decouple  $V_{BB}$  via a 0.01- $\mu$ F capacitor and limit the current sourcing or sinking to 0.4 mA. When not used,  $V_{BB}$  should be left open.

### TYPICAL APPLICATION CIRCUITS (ECL, PECL, LVDS, etc.)

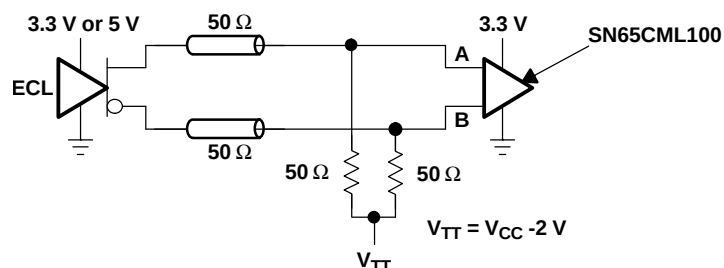


Figure 24. Low-Voltage Positive Emitter-Coupled Logic (LVPECL)

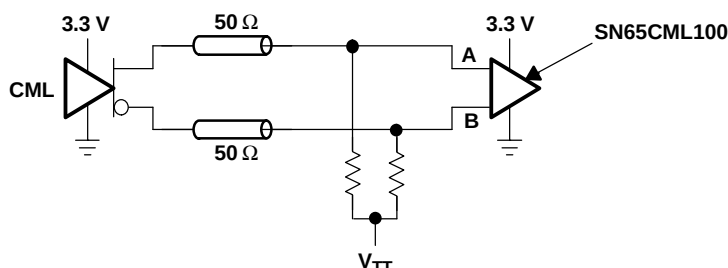


Figure 25. Current-Mode Logic (CML)

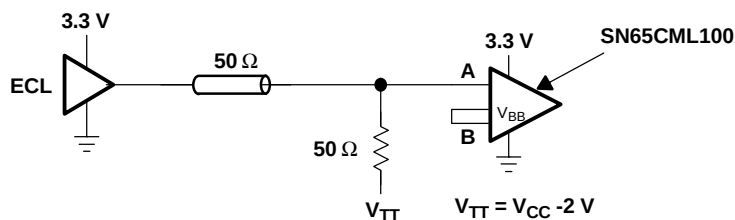


Figure 26. Single-Ended (LVPECL)

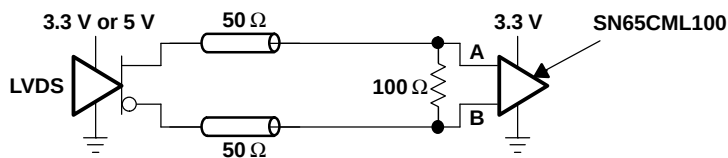


Figure 27. Low-Voltage Differential Signaling (LVDS)

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| SN65CML100D      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | CML100                   | <a href="#">Samples</a> |
| SN65CML100DG4    | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | CML100                   | <a href="#">Samples</a> |
| SN65CML100DGK    | ACTIVE        | VSSOP        | DGK                | 8    | 80             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | NWB                      | <a href="#">Samples</a> |
| SN65CML100DGKG4  | ACTIVE        | VSSOP        | DGK                | 8    | 80             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | NWB                      | <a href="#">Samples</a> |
| SN65CML100DGKR   | ACTIVE        | VSSOP        | DGK                | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | NWB                      | <a href="#">Samples</a> |
| SN65CML100DGKRG4 | ACTIVE        | VSSOP        | DGK                | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | NWB                      | <a href="#">Samples</a> |
| SN65CML100DR     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | CML100                   | <a href="#">Samples</a> |
| SN65CML100DRG4   | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | CML100                   | <a href="#">Samples</a> |

(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) 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.

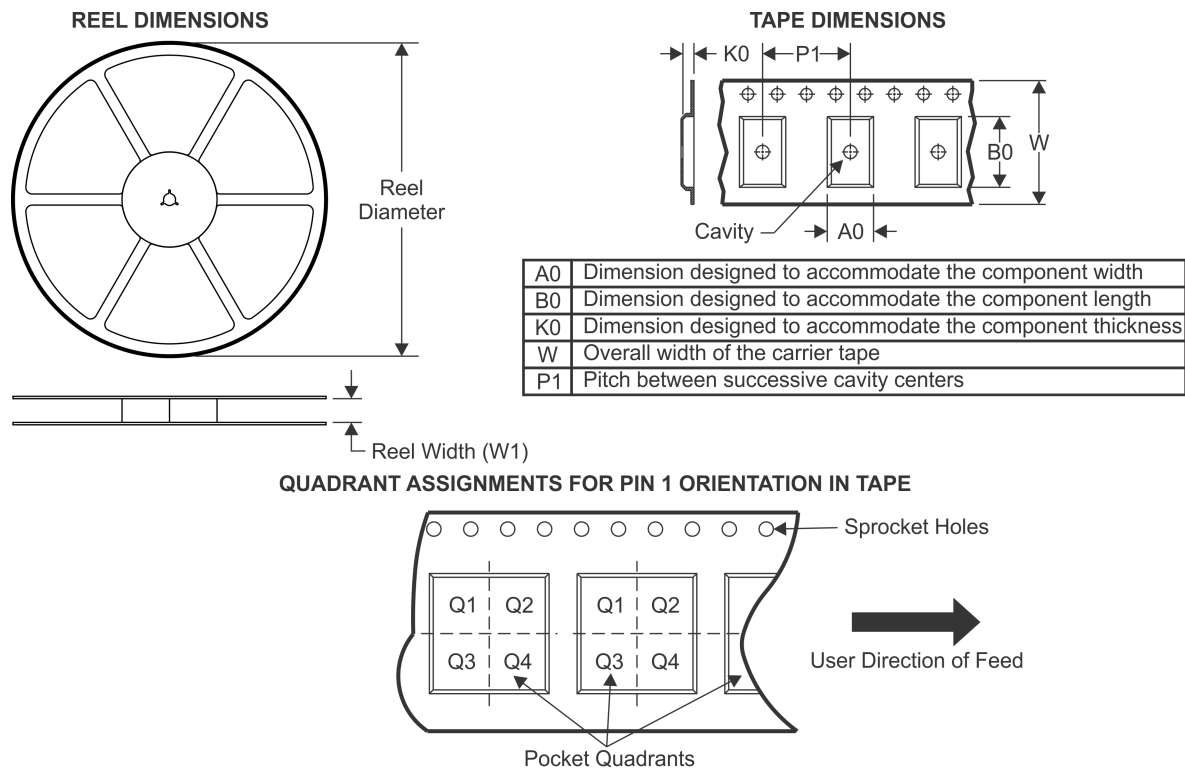
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

<sup>(4)</sup> Multiple Top-Side Markings will be inside parentheses. Only one Top-Side 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 Top-Side Marking for that device.

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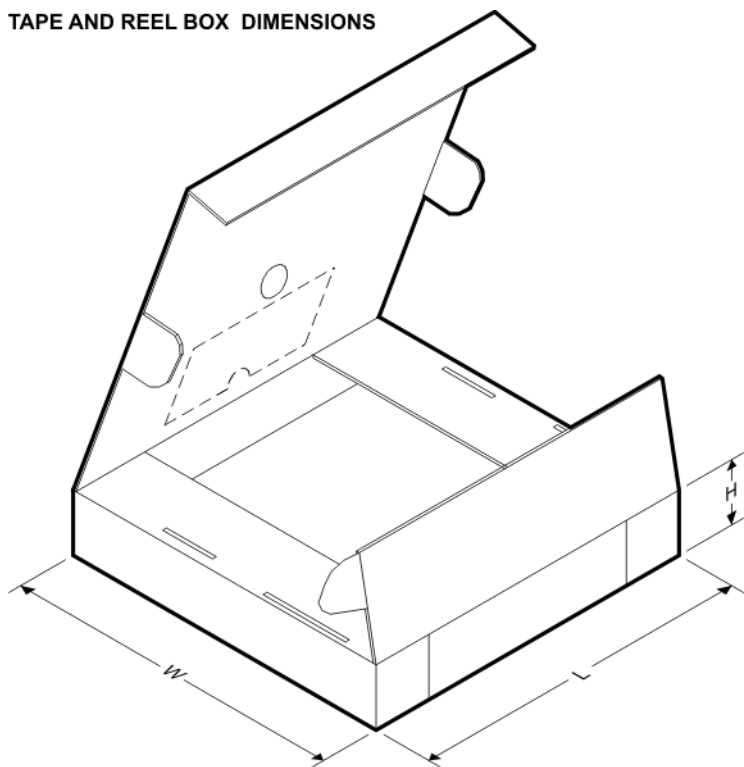
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**TAPE AND REEL INFORMATION**


\*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 |
|----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN65CML100DGKR | VSSOP        | DGK             | 8    | 2500 | 330.0              | 12.4               | 5.3     | 3.4     | 1.4     | 8.0     | 12.0   | Q1            |
| SN65CML100DR   | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS

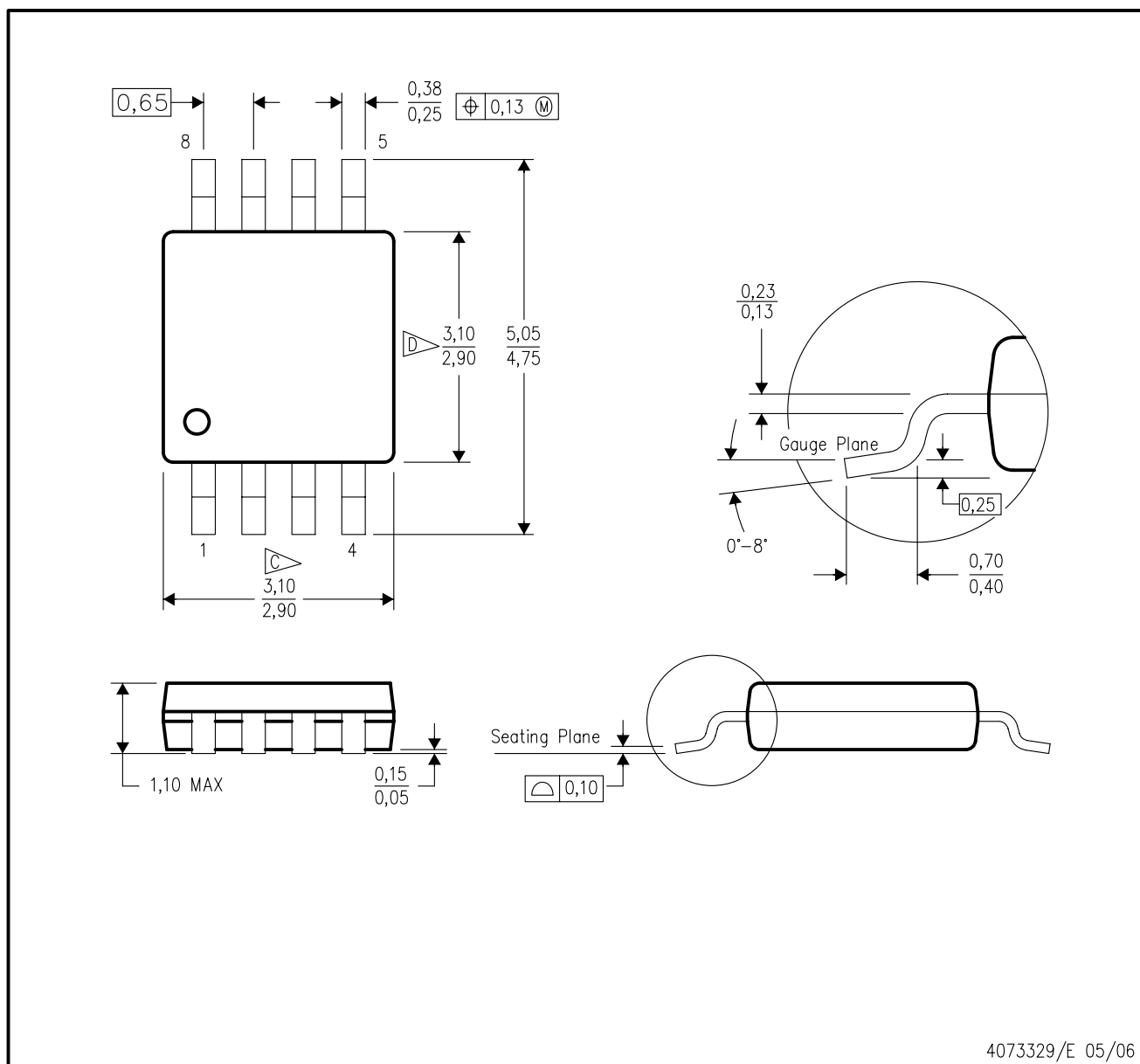


\*All dimensions are nominal

| Device         | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN65CML100DGKR | VSSOP        | DGK             | 8    | 2500 | 358.0       | 335.0      | 35.0        |
| SN65CML100DR   | SOIC         | D               | 8    | 2500 | 340.5       | 338.1      | 20.6        |

DGK (S-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE

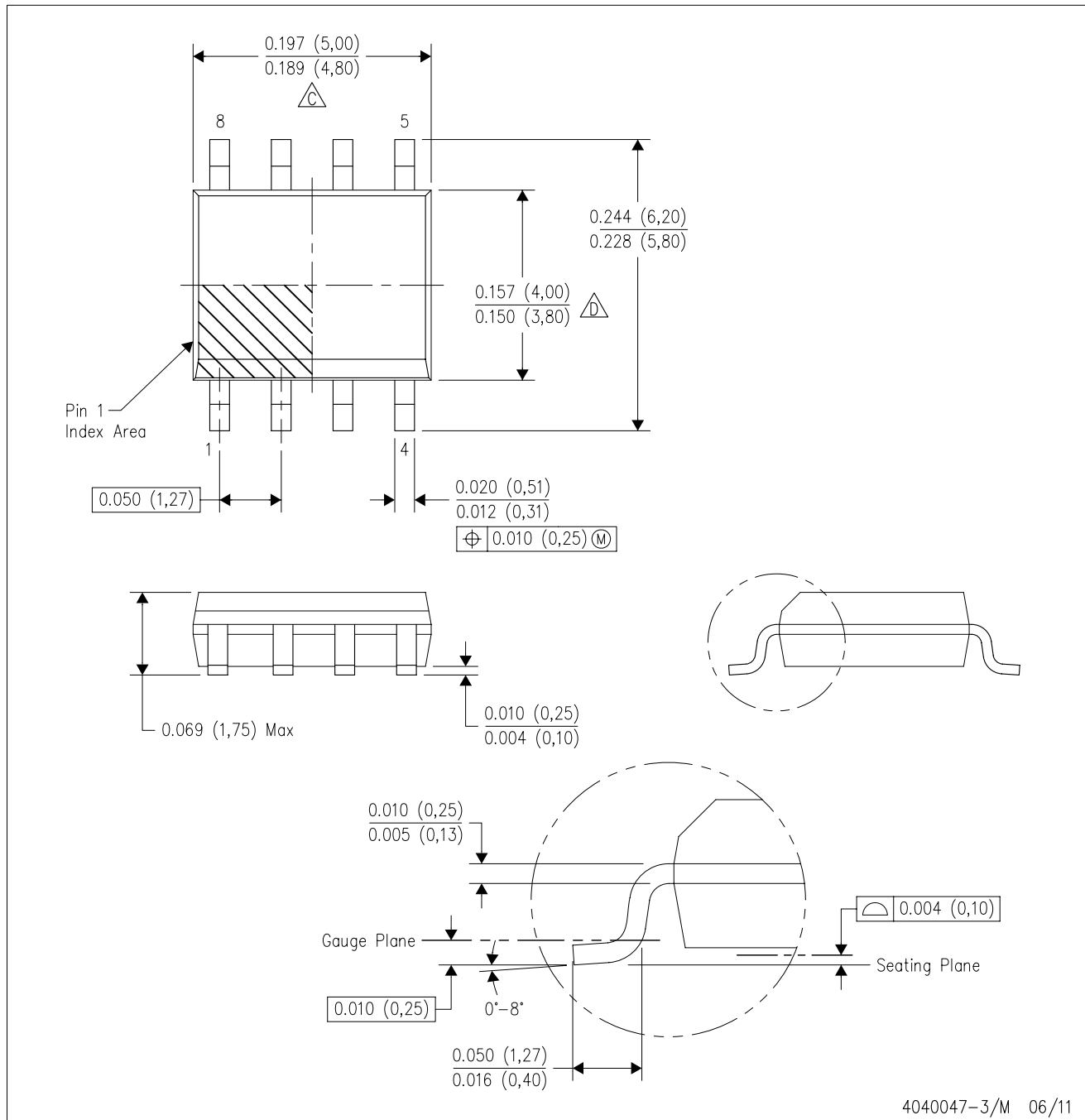


## NOTES:

- A. All linear dimensions are in 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 0.15 per end.
- D. Body width does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
- E. Falls within JEDEC MO-187 variation AA, except interlead flash.

D (R-PDSO-G8)

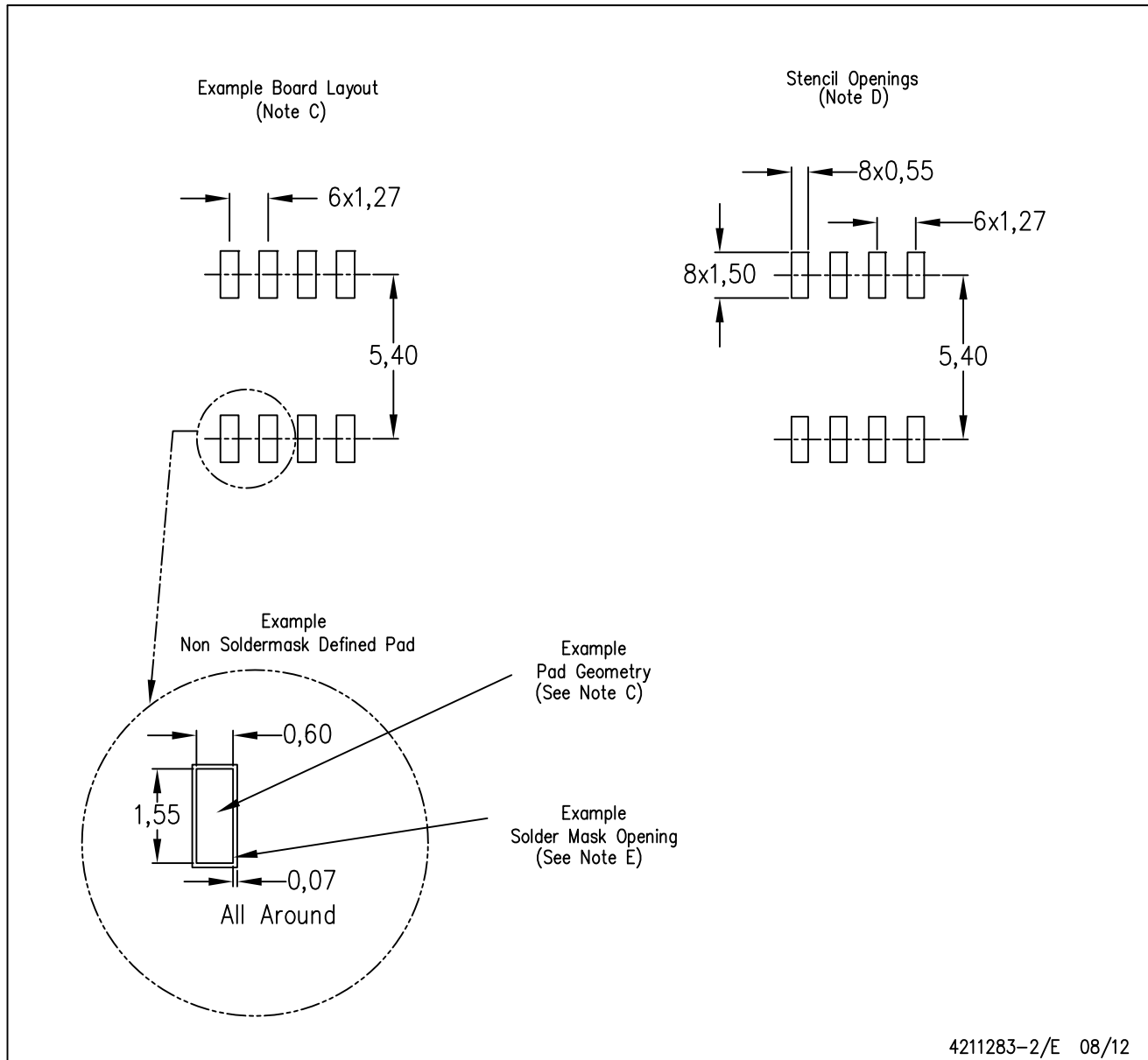
PLASTIC SMALL OUTLINE



- 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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