



## SINGLE M-LVDS RECEIVERS

### FEATURES

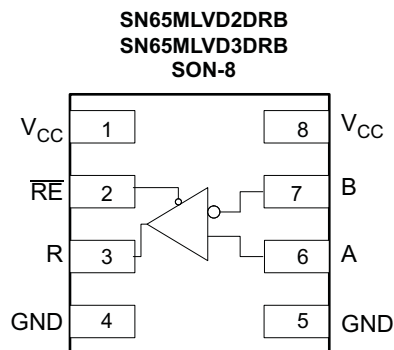
- Low-Voltage Differential 30-Ω to 55-Ω Line Receivers for Signaling Rates<sup>(1)</sup> up to 250Mbps; Clock Frequencies up to 125MHz
- SN65MLVD2 Type-1 Receiver Incorporates 25 mV of Input Threshold Hysteresis
- SN65MLVD3 Type-2 Receiver Provides 100 mV Offset Threshold to Detect Open-Circuit and Idle-Bus Conditions
- Wide Receiver Input Common-Mode Voltage Range, -1 V to 3.4 V, Allows 2 V of Ground Noise
- Improved  $V_{IT}$  (35 mV)
- Meets or Exceeds the M-LVDS Standard TIA/EIA-899 for Multipoint Topology
- High Input Impedance with Low Supply Voltage
- Bus-Pin HBM ESD Protection Exceeds 9 kV
- Packaged in 8-Pin SON (DRB) 70% Smaller Than 8-Pin SOIC

<sup>(1)</sup> 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).

### APPLICATIONS

- Parallel Multipoint Data and Clock Transmission via Backplanes and Cables
- Cellular Base Stations
- Central Office Switches
- Network Switches and Routers

### PACKAGE AND PIN-OUT



### DESCRIPTION

The SN65MLVD2 and SN65MLVD3 are single-channel M-LVDS receivers. These devices are designed in full compliance with the TIA/EIA-899 (M-LVDS) standard, which are optimized to operate at signaling rates up to 250 Mbps. Each receiver channel is controlled by a receive enable ( $\overline{RE}$ ). When  $\overline{RE}$  = low, the corresponding channel is enabled; when  $\overline{RE}$  = high, the corresponding channel is disabled.

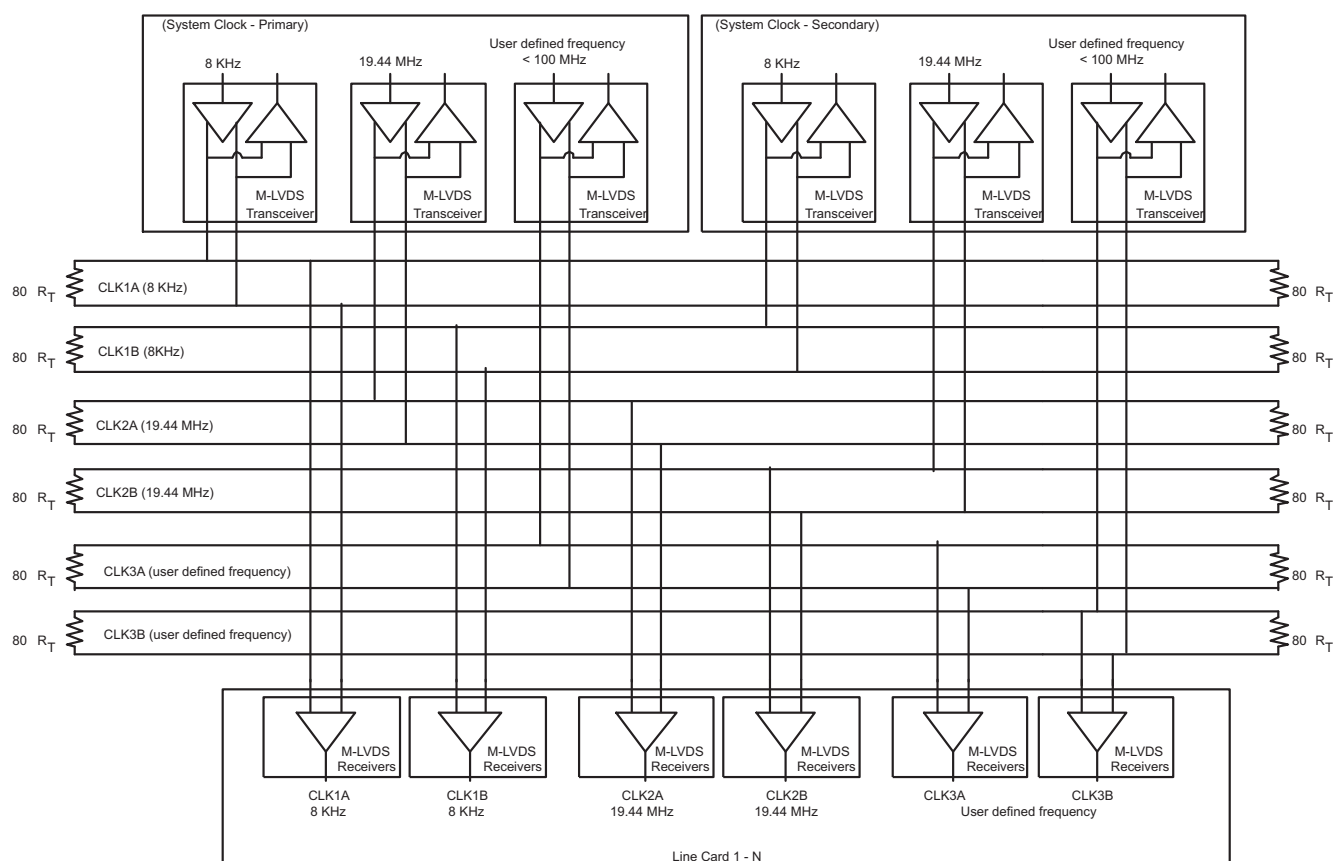
The M-LVDS standard defines two types of receivers, designated as Type-1 and Type-2. Type-1 receivers (SN65MLVD2) have thresholds centered about zero with 25 mV of hysteresis to prevent output oscillations with loss of input; Type-2 receivers (SN65MLVD3) implement a failsafe by using an offset threshold. Receiver outputs are slew rate controlled to reduce EMI and crosstalk effects associated with large current surges.

The devices are characterized for operation from -40°C to 85°C.



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.

## TYPICAL APPLICATION



AdvancedTCA Backplane - Synchronized System Clock



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<sup>(1)</sup>

| PART NUMBER   | FUNCTION               | PART MARKING | PACKAGE / CARRIER               |
|---------------|------------------------|--------------|---------------------------------|
| SN65MLVD2DRBT | M-LVDS Type 1 Receiver | MF2          | 8-Pin SON / Small Tape and Reel |
| SN65MLVD2DRBR | M-LVDS Type 1 Receiver | MF2          | 8-Pin SON / Tape and Reel       |
| SN65MLVD3DRBT | M-LVDS Type 2 Receiver | MF3          | 8-Pin SON / Small Tape and Reel |
| SN65MLVD3DRBR | M-LVDS Type 2 Receiver | MF3          | 8-Pin SON / Tape and Reel       |

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at [www.ti.com](http://www.ti.com).

## ABSOLUTE MAXIMUM RATINGS

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

|                              |                                                   | VALUE          | UNIT                         |
|------------------------------|---------------------------------------------------|----------------|------------------------------|
| V <sub>CC</sub>              | Supply voltage range <sup>(2)</sup>               | –0.5 to 4      | V                            |
| Input voltage range          | RE                                                | –0.5 to 4      | V                            |
|                              | A or B                                            | –1.8 to 4      | V                            |
| Output voltage range         | R                                                 | –0.3 to 4      | V                            |
| Electrostatic discharge      | Human-body model <sup>(3)</sup>                   | All other pins | ±7                           |
|                              |                                                   | A, B           | ±9                           |
|                              | Machine model <sup>(4)</sup>                      | All pins       | ±200                         |
|                              | Field-induced-charged-device model <sup>(5)</sup> | All pins       | ±2                           |
| Continuous power dissipation |                                                   |                | See Dissipation Rating Table |

(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. Bus pin stressed with respect to a common connection of GND and V<sub>CC</sub>.

(4) Tested in accordance with JEDEC Standard 22 Test Method A115-A.

(5) Tested in accordance with EIA-JEDEC JESD22-C101C.

## PACKAGE DISSIPATION RATINGS<sup>(1)</sup>

| PACKAGE   | PCB TYPE | T <sub>A</sub> ≤ 25°C<br>POWER RATING | DERATING FACTOR <sup>(2)</sup><br>ABOVE T <sub>A</sub> = 25°C | T <sub>A</sub> = 85°C<br>POWER RATING |
|-----------|----------|---------------------------------------|---------------------------------------------------------------|---------------------------------------|
| 8-SON DRB | Low-K    | 280 mW                                | 2.80 mW/°C                                                    | 112 mW                                |
|           | High-K   | 662 mW                                | 6.62 mW/°C                                                    | 264 mW                                |

(1) The thermal dissipations are in the consideration of soldering down the powerPAD without via on each type of boards.

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

## THERMAL CHARACTERISTICS

| PARAMETER                                            | TEST CONDITIONS                                                      | MIN | TYP | MAX | UNIT |
|------------------------------------------------------|----------------------------------------------------------------------|-----|-----|-----|------|
| θ <sub>JB</sub> Junction-to-board thermal resistance |                                                                      |     | 89  |     | °C/W |
| θ <sub>JC</sub> Junction-to-case thermal resistance  |                                                                      |     | 98  |     | °C/W |
| P <sub>D</sub> Device power dissipation              | RE at 0 V, C <sub>L</sub> = 15 pF, V <sub>ID</sub> = 400 mV, 125 MHz |     |     | 90  | mW   |

## RECOMMENDED OPERATING CONDITIONS

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

|                |                                         | MIN   | NOM | MAX      | UNIT     |
|----------------|-----------------------------------------|-------|-----|----------|----------|
| $V_{CC}$       | Supply voltage                          | 3     | 3.3 | 3.6      | V        |
| $V_{IH}$       | High-level input voltage                | 2     |     | $V_{CC}$ | V        |
| $V_{IL}$       | Low-level input voltage                 | GND   |     | 0.8      | V        |
| $V_A$ or $V_B$ | Voltage at any bus terminal             | –1.4  |     | 3.8      | V        |
| $ V_{ID} $     | Magnitude of differential input voltage | 0.035 |     | $V_{CC}$ | V        |
| $V_{IC}$       | Differential common-mode input voltage  | –1    |     | 3.4      | V        |
| $R_L$          | Differential load resistance            | 30    | 50  |          | $\Omega$ |
| $1/t_{UI}$     | Signaling rate                          |       |     | 250      | Mbps     |
| $T_A$          | Operating free-air temperature          | –40   |     | 85       | °C       |

## DEVICE ELECTRICAL CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

| PARAMETER | TEST CONDITIONS                                                                     | MIN | TYP <sup>(1)</sup> | MAX | UNIT |
|-----------|-------------------------------------------------------------------------------------|-----|--------------------|-----|------|
| $I_{CC}$  | Supply current<br>$\overline{RE}$ at 0 V, $C_L = 15$ pF, $V_{ID} = 400$ mV, 125 MHz |     |                    | 25  | mA   |

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

## RECEIVER 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           | Type 1                                                                                       |      |                    | 35   | mV      |
|                              |                                                               | Type 2                                                                                       |      |                    | 135  |         |
| $V_{IT-}$                    | Negative-going differential input voltage threshold           | Type 1                                                                                       |      |                    | –35  | mV      |
|                              |                                                               | Type 2                                                                                       |      |                    | 65   |         |
| $V_{HYS}$                    | Differential input voltage hysteresis ( $V_{IT+} - V_{IT-}$ ) | Type 1                                                                                       |      |                    | 25   | mV      |
|                              |                                                               | Type 2                                                                                       |      |                    | 0    |         |
| $V_{OH}$                     | High-level output voltage                                     | $I_{OH} = -8$ mA                                                                             | 2.4  |                    |      | V       |
| $V_{OL}$                     | Low-level output voltage                                      | $I_{OL} = 8$ mA                                                                              |      |                    | 0.4  | V       |
| $I_{IH}$                     | High-level input current                                      | $V_{IH} = 2$ V to $V_{CC}$                                                                   | –10  |                    |      | $\mu$ A |
| $I_{IL}$                     | Low-level input current                                       | $V_{IL} =$ GND to 0.8 V                                                                      | –10  |                    |      | $\mu$ A |
| $I_{OZ}$                     | High-impedance output current                                 | $V_O = 0$ V or $V_{CC}$                                                                      | –10  |                    | 15   | $\mu$ A |
| $I_A$ or $I_B$               | Receiver input current                                        | One input ( $V_A$ or $V_B$ ) = –1.4 V or 3.8 V, Other input = 1.2 V                          | –20  |                    | 20   | $\mu$ A |
| $I_{AB}$                     | Receiver differential input current ( $I_A - I_B$ )           | $V_A = V_B = -1.4$ V or 3.8 V                                                                | –4   |                    | 4    | $\mu$ A |
| $I_{A(OFF)}$ or $I_{B(OFF)}$ | Receiver input current                                        | One input ( $V_A$ or $V_B$ ) = –1.4 V or 3.8 V, Other input = 1.2 V, $V_{CC} =$ GND or 1.5 V | –20  |                    | 20   | $\mu$ A |
| $I_{AB(OFF)}$                | Receiver power-off differential input current ( $I_A - I_B$ ) | $V_A = V_B = -1.4$ V or 3.8 V, $V_{CC} =$ GND or 1.5 V                                       | –4   |                    | 4    | $\mu$ A |
| $C_A$ or $C_B$               | Input capacitance                                             | $V_I = 0.4\sin(30E6\pi t) + 0.5$ V, <sup>(2)</sup> Other input at 1.2 V                      |      | 3                  |      | pF      |
| $C_{AB}$                     | Differential input capacitance                                | $V_{AB} = 0.4\sin(30E6\pi t) + 0.5$ V <sup>(2)</sup>                                         |      |                    | 2.5  | pF      |
| $C_{A/B}$                    | Input capacitance balance, ( $C_A/C_B$ )                      |                                                                                              | 0.99 |                    | 1.01 |         |

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

(2) HP4194A impedance analyzer (or equivalent)

## RECEIVER SWITCHING CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

| PARAMETER             |                                                          |        | TEST CONDITIONS                                       | MIN | TYP <sup>(1)</sup> | MAX | UNIT |
|-----------------------|----------------------------------------------------------|--------|-------------------------------------------------------|-----|--------------------|-----|------|
| t <sub>PLH</sub>      | Propagation delay time, low-to-high-level output         |        | C <sub>L</sub> = 15 pF, See <a href="#">Figure 2</a>  | 2   |                    | 6   | ns   |
| t <sub>PHL</sub>      | Propagation delay time, high-to-low-level output         |        |                                                       | 2   |                    | 6   | ns   |
| t <sub>r</sub>        | Output signal rise time                                  |        |                                                       | 1   |                    | 2.3 |      |
| t <sub>f</sub>        | Output signal fall time                                  |        |                                                       | 1   |                    | 2.3 | ns   |
| t <sub>sk(p)</sub>    | Pulse skew ( t <sub>PHL</sub> – t <sub>PLH</sub>  )      | Type 1 |                                                       |     | 90                 | 210 | ps   |
|                       |                                                          | Type 2 |                                                       |     | 45                 | 250 |      |
| t <sub>sk(pp)</sub>   | Part-to-part skew                                        |        |                                                       |     |                    | 1   | ns   |
| t <sub>jit(per)</sub> | Period jitter, rms (1 standard deviation) <sup>(2)</sup> |        | 125 MHz clock input                                   |     |                    | 10  | ps   |
| t <sub>jit(c-c)</sub> | Cycle-to-cycle jitter, rms <sup>(3)</sup>                |        | 125 MHz clock input <sup>(4)</sup>                    |     |                    | 8   | ps   |
| t <sub>jit(det)</sub> | Deterministic jitter <sup>(2)</sup>                      | Type 1 | 250 Mbps 2 <sup>15</sup> -1 PRBS input <sup>(5)</sup> |     |                    | 500 | ps   |
|                       |                                                          | Type 2 |                                                       |     |                    | 450 | ps   |
| t <sub>jit(ran)</sub> | Random jitter <sup>(2)</sup>                             | Type 1 | 250 Mbps 2 <sup>15</sup> -1 PRBS input <sup>(5)</sup> |     |                    | 8   | ps   |
|                       |                                                          | Type 2 |                                                       |     |                    | 8   | ps   |
| t <sub>PZH</sub>      | Enable time, high-impedance-to-high-level output         |        | C <sub>L</sub> = 15 pF, See <a href="#">Figure 3</a>  |     |                    | 15  | ns   |
| t <sub>PZL</sub>      | Enable time, high-impedance-to-low-level output          |        | C <sub>L</sub> = 15 pF, See <a href="#">Figure 3</a>  |     |                    | 15  | ns   |
| t <sub>PHZ</sub>      | Disable time, high-level-to-high-impedance output        |        | C <sub>L</sub> = 15 pF, See <a href="#">Figure 3</a>  |     |                    | 10  | ns   |
| t <sub>PLZ</sub>      | Disable time, low-level-to-high-impedance output         |        | C <sub>L</sub> = 15 pF, See <a href="#">Figure 3</a>  |     |                    | 10  | ns   |

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

(2) Jitter measured by triggering off of the input source to track out the associated input jitter.

(3) Stimulus jitter has been subtracted from the numbers.

(4) Measured over 75K samples

(5) Measured over BER = 10<sup>-6</sup>.

## TERMINAL FUNCTIONS

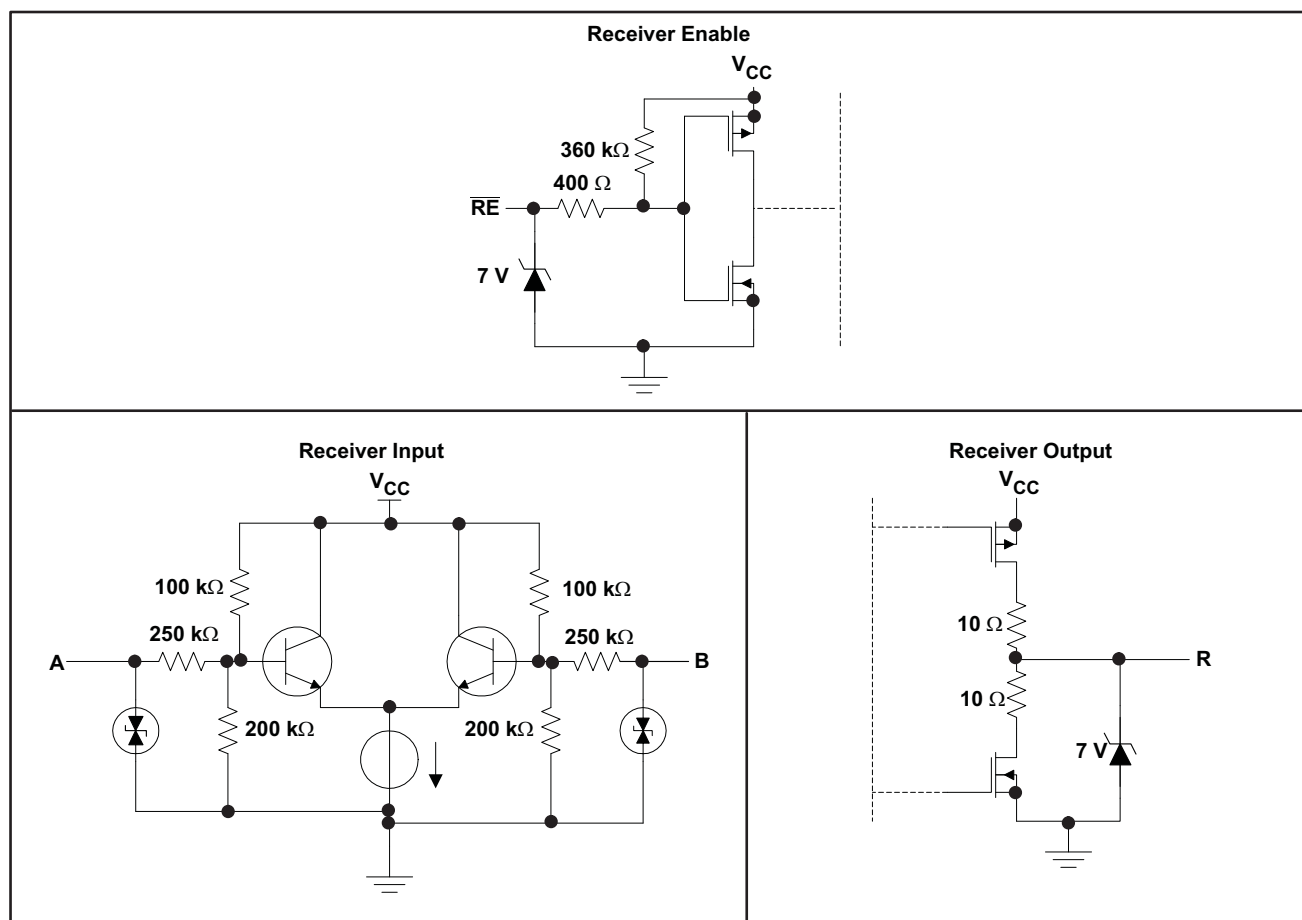
| TERMINAL        |      | I/O | DESCRIPTION                                        |
|-----------------|------|-----|----------------------------------------------------|
| NAME            | NO.  |     |                                                    |
| A               | 6    | I   | M-LVDS Non-inverting input                         |
| B               | 7    | I   | M-LVDS Inverting input                             |
| R               | 3    | O   | Data output from receivers                         |
| $\overline{RE}$ | 2    | I   | Receiver enable, active low, enables all receivers |
| GND             | 4, 5 |     | Circuit ground                                     |
| $V_{CC}$        | 1, 8 |     | Supply voltage                                     |

## DEVICE FUNCTION TABLES

| TYPE-1 RECEIVER (SN65MLVD2)                   |                 |                       | TYPE-2 RECEIVER (SN65MLVD3)                   |                 |                       |
|-----------------------------------------------|-----------------|-----------------------|-----------------------------------------------|-----------------|-----------------------|
| INPUTS <sup>(1)</sup>                         |                 | OUTPUT <sup>(1)</sup> | INPUTS <sup>(1)</sup>                         |                 | OUTPUT <sup>(1)</sup> |
| $V_{ID} = V_A - V_B$                          | $\overline{RE}$ | R                     | $V_{ID} = V_A - V_B$                          | $\overline{RE}$ | R                     |
| $V_{ID} \geq 35\text{ mV}$                    | L               | H                     | $V_{ID} \geq 135\text{ mV}$                   | L               | H                     |
| $-35\text{ mV} \leq V_{ID} \leq 35\text{ mV}$ | L               | ?                     | $65\text{ mV} \leq V_{ID} \leq 135\text{ mV}$ | L               | ?                     |
| $V_{ID} \leq -35\text{ mV}$                   | L               | L                     | $V_{ID} \leq 65\text{ mV}$                    | L               | L                     |
| X                                             | H               | Z                     | X                                             | H               | Z                     |
| X                                             | Open            | Z                     | X                                             | Open            | Z                     |
| Open Circuit                                  | L               | ?                     | Open Circuit                                  | L               | L                     |

(1) H=high level, L=low level, Z=high impedance, X=Don't care, ?=indeterminate

## EQUIVALENT INPUT AND OUTPUT SCHEMATIC DIAGRAMS



## PARAMETER MEASUREMENT INFORMATION

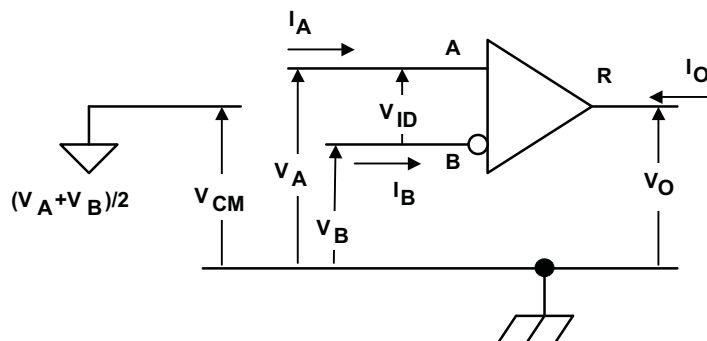


Figure 1. Receiver Voltage and Current Definitions

Table 1. Type-1 Receiver Input Threshold Test Voltages

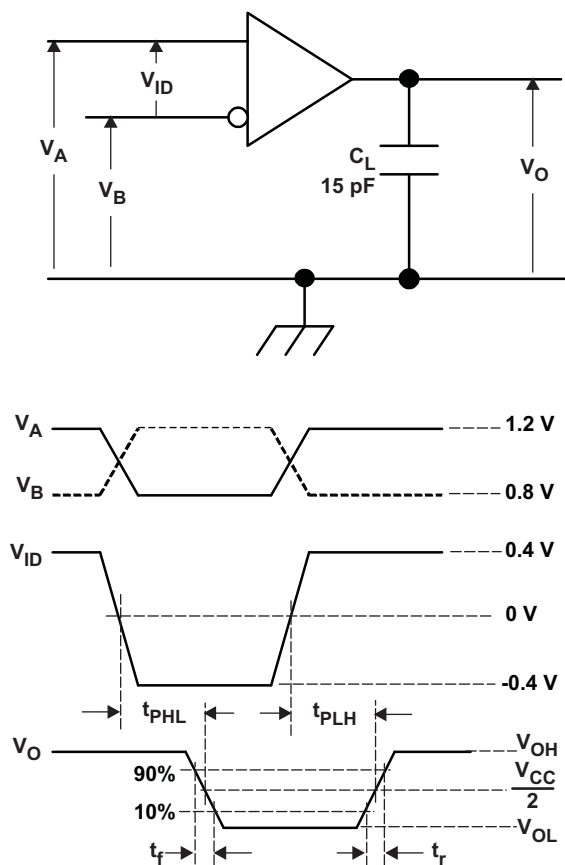
| APPLIED VOLTAGES |                 | RESULTING DIFFERENTIAL<br>INPUT VOLTAGE | RESULTING<br>COMMON-MODE INPUT<br>VOLTAGE | RECEIVER<br>OUTPUT <sup>(1)</sup> |
|------------------|-----------------|-----------------------------------------|-------------------------------------------|-----------------------------------|
| V <sub>IA</sub>  | V <sub>IB</sub> | V <sub>ID</sub>                         | V <sub>IC</sub>                           |                                   |
| 2.400            | 0.000           | 2.400                                   | 1.200                                     | H                                 |
| 0.000            | 2.400           | – 2.400                                 | 1.200                                     | L                                 |
| 3.400            | 3.365           | 0.035                                   | 3.3825                                    | H                                 |
| 3.365            | 3.400           | – 0.035                                 | 3.3825                                    | L                                 |
| –0.965           | –1              | 0.035                                   | –0.9825                                   | H                                 |
| –1               | –0.965          | – 0.035                                 | –0.9825                                   | L                                 |

(1) H= high level, L = low level, output state assumes receiver is enabled ( $\overline{RE} = L$ )

Table 2. Type-2 Receiver Input Threshold Test Voltages

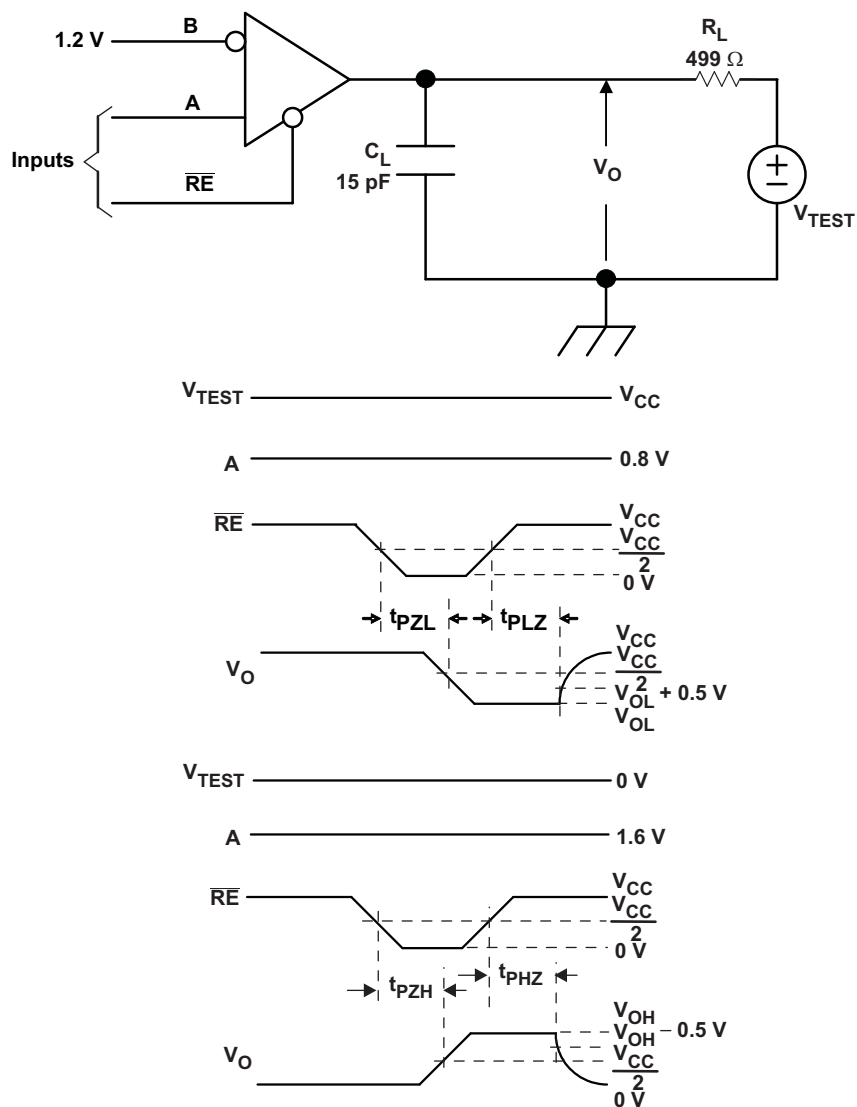
| APPLIED VOLTAGES |                 | RESULTING DIFFERENTIAL<br>INPUT VOLTAGE | RESULTING<br>COMMON-MODE INPUT<br>VOLTAGE | RECEIVER<br>OUTPUT <sup>(1)</sup> |
|------------------|-----------------|-----------------------------------------|-------------------------------------------|-----------------------------------|
| V <sub>IA</sub>  | V <sub>IB</sub> | V <sub>ID</sub>                         | V <sub>IC</sub>                           |                                   |
| 2.400            | 0.000           | 2.400                                   | 1.200                                     | H                                 |
| 0.000            | 2.400           | – 2.400                                 | 1.200                                     | L                                 |
| 3.400            | 3.265           | 0.135                                   | 3.3325                                    | H                                 |
| 3.4000           | 3.335           | 0.065                                   | 3.3675                                    | L                                 |
| –0.865           | –1              | 0.135                                   | –0.9325                                   | H                                 |
| –0.935           | –1              | 0.065                                   | –0.9675                                   | L                                 |

(1) H= high level, L = low level, output state assumes receiver is enabled ( $\overline{RE} = L$ )



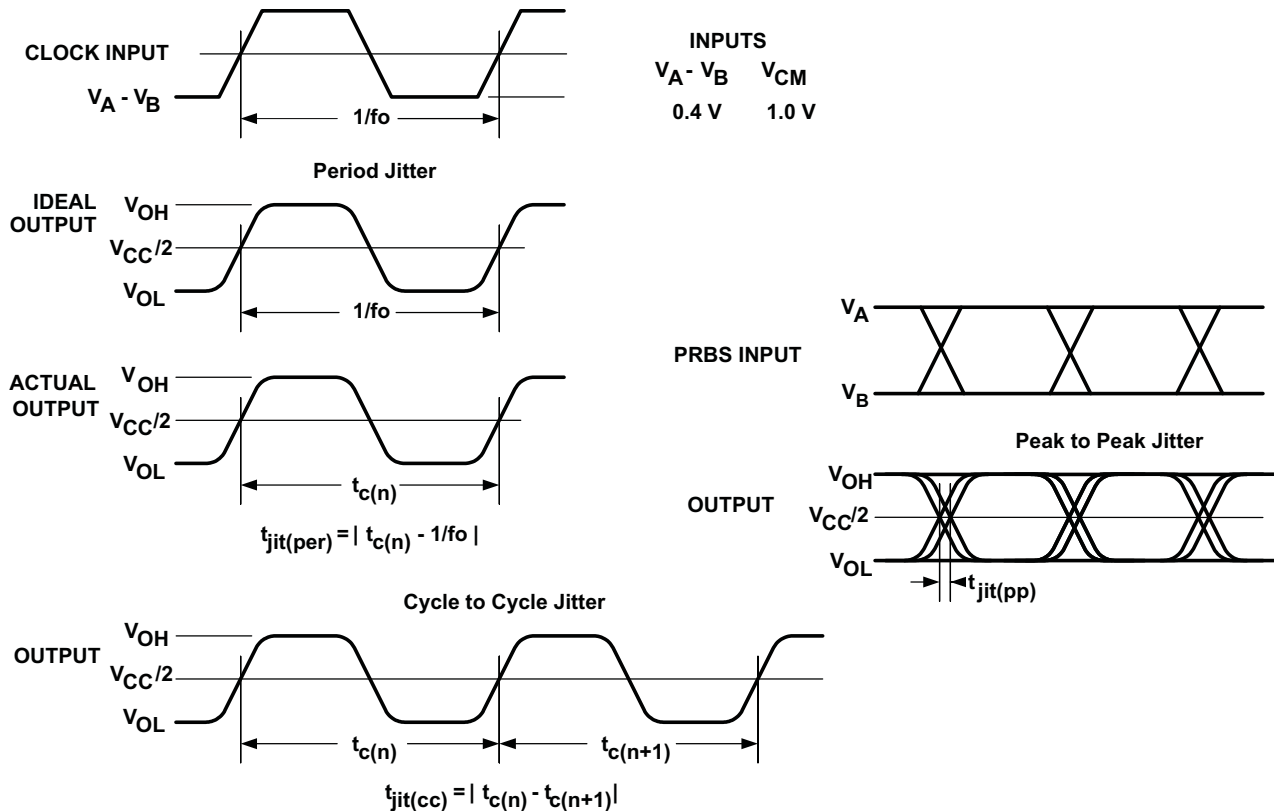
- A. All input pulses are supplied by a generator having the following characteristics:  $t_r$  or  $t_f \leq 1 \text{ ns}$ , Frequency = 1 MHz, duty cycle =  $50 \pm 5\%$ .  $C_L$  is a combination of a 20%-tolerance, low-loss ceramic, surface-mount capacitor and fixture capacitance within 2 cm of the D.U.T.
- B. The measurement is made on test equipment with a -3dB bandwidth of at least 1 GHz.

**Figure 2. Receiver Timing Test Circuit and Waveforms**



- All input pulses are supplied by a generator having the following characteristics:  $t_f$  or  $t_r \leq 1$  ns, frequency = 1 MHz, duty cycle =  $50 \pm 5\%$ .
- $R_L$  is 1% tolerance, metal film, surface mount, and located within 2 cm of the D.U.T
- $C_L$  is the instrumentation and fixture capacitance within 2 cm of the D.U.T. and  $\pm 20\%$ . The measurement is made on test equipment with a -3dB bandwidth of at least 1GHz.

**Figure 3. Receiver Enable/Disable Time Test Circuit and Waveforms**



- All input pulses are supplied by the Agilent 81250 Parallel BERT Stimulus System with plug-in E4832A.
- The cycle-to-cycle jitter measurement is made on a TEK TDS6604 running TDSJIT3 application software
- Period jitter is measured using a 125-MHz  $50 \pm 1\%$  duty cycle clock input.
- Deterministic jitter and random jitter are measured using a 250-Mbps  $2^{15-1}$  PRBS input

**Figure 4. Receiver Jitter Measurement Waveforms**

## TYPICAL CHARACTERISTICS

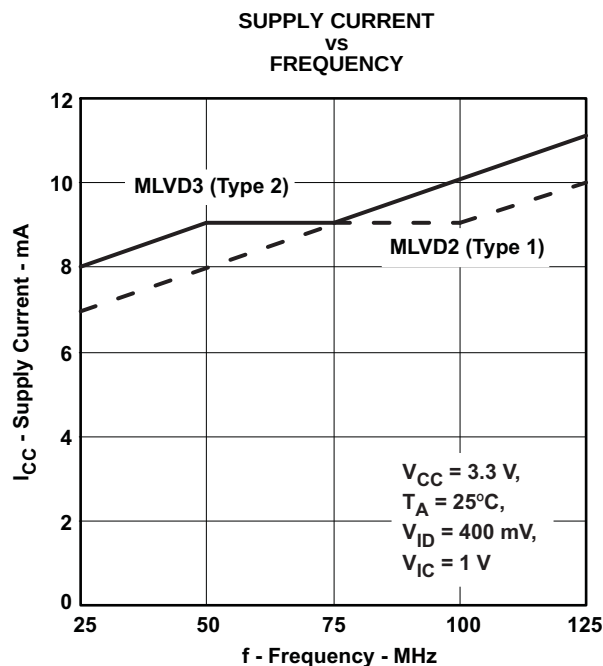


Figure 5.

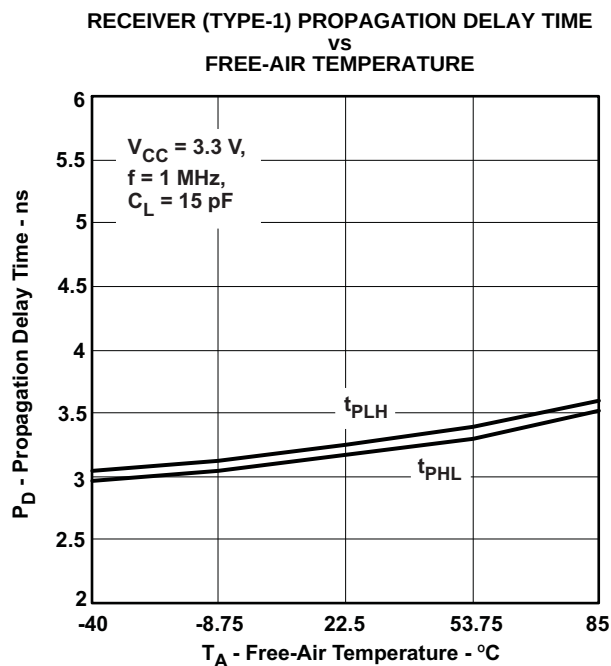


Figure 6.

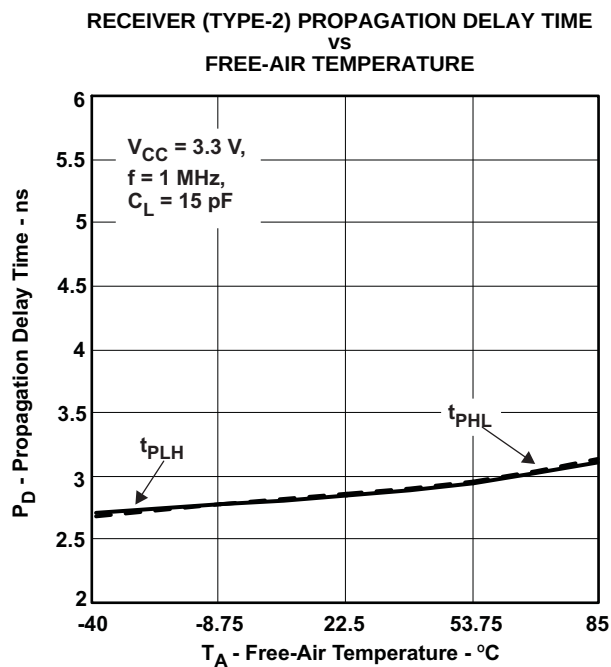


Figure 7.

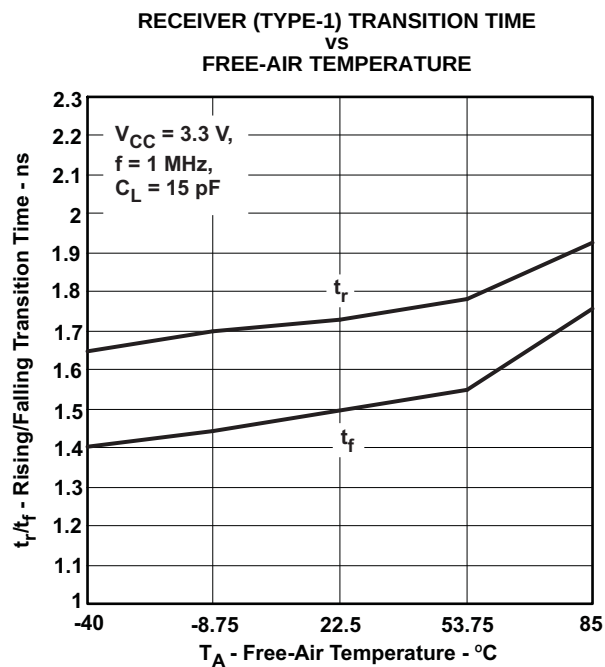


Figure 8.

# TYPICAL CHARACTERISTICS (continued)

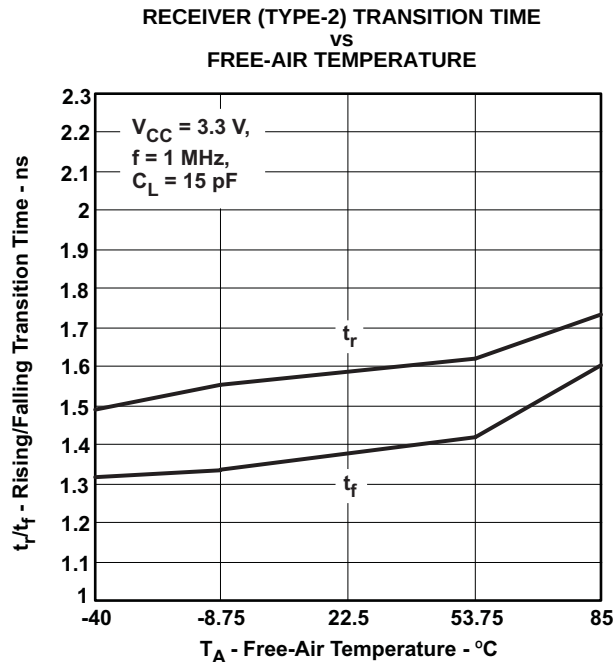


Figure 9.

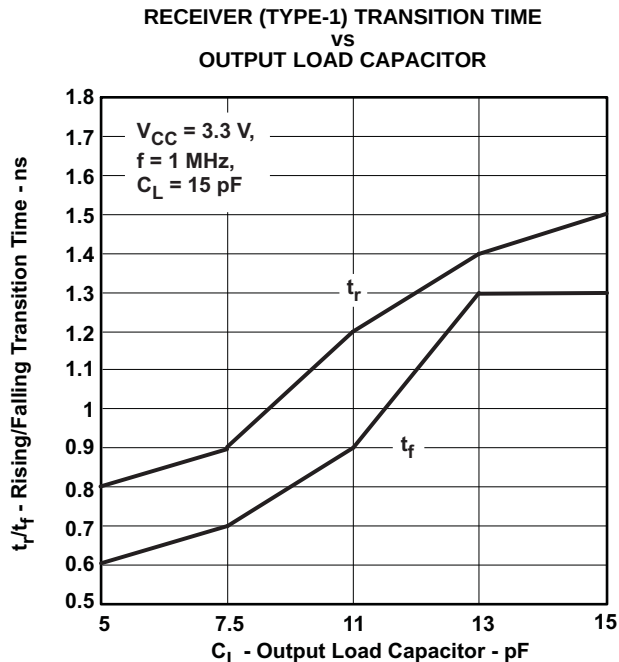


Figure 10.

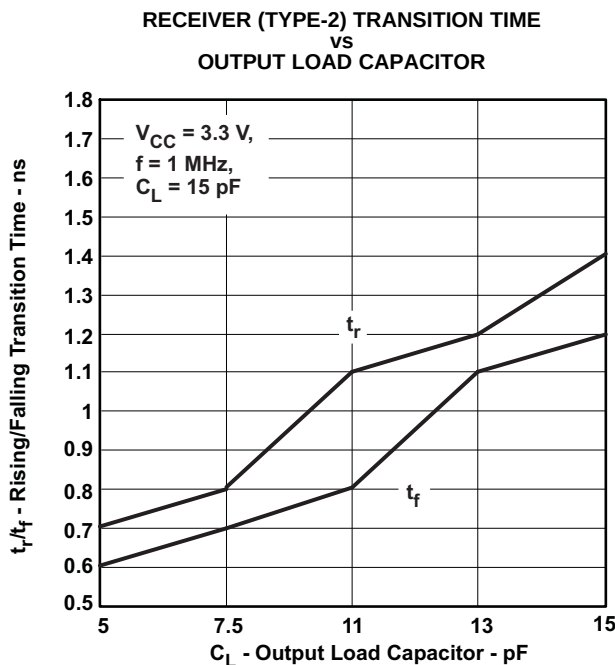


Figure 11.

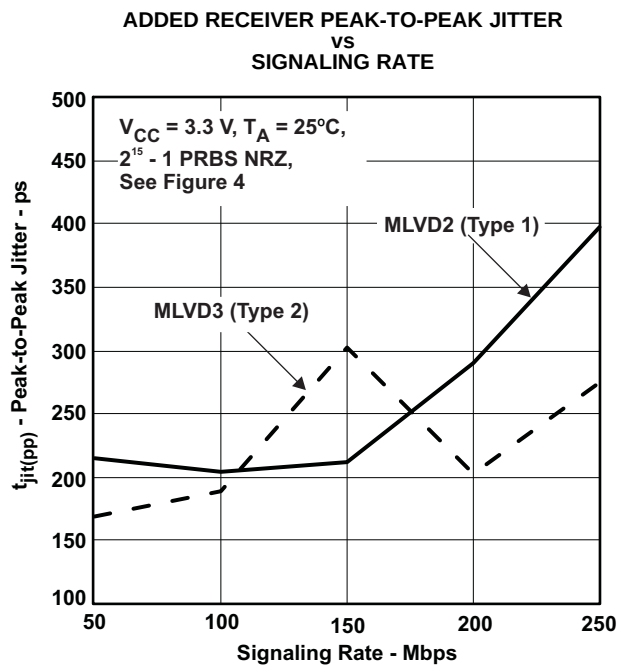


Figure 12.

## TYPICAL CHARACTERISTICS (continued)

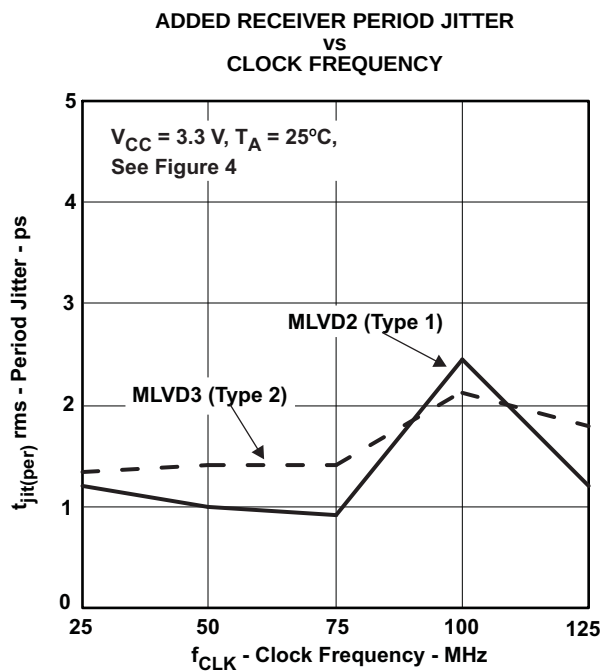


Figure 13.

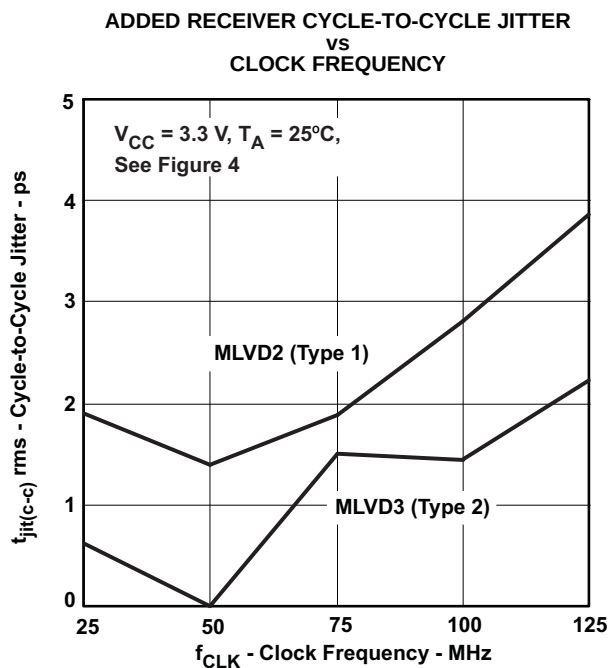


Figure 14.

## EYE PATTERNS

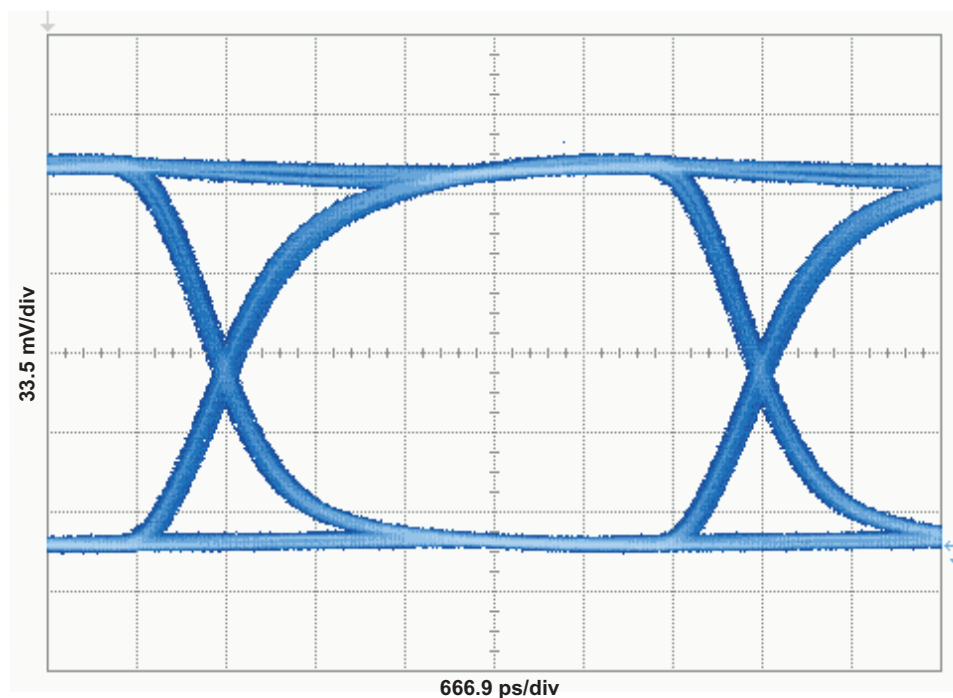


Figure 15. SN65MLVD2 Output ( $V_{CC} = 3.3\text{ V}$ ,  $C_L = 15\text{ pF}$ ) 250 Mbps  $2^{15}-1$  PRBS

## TYPICAL CHARACTERISTICS (continued)

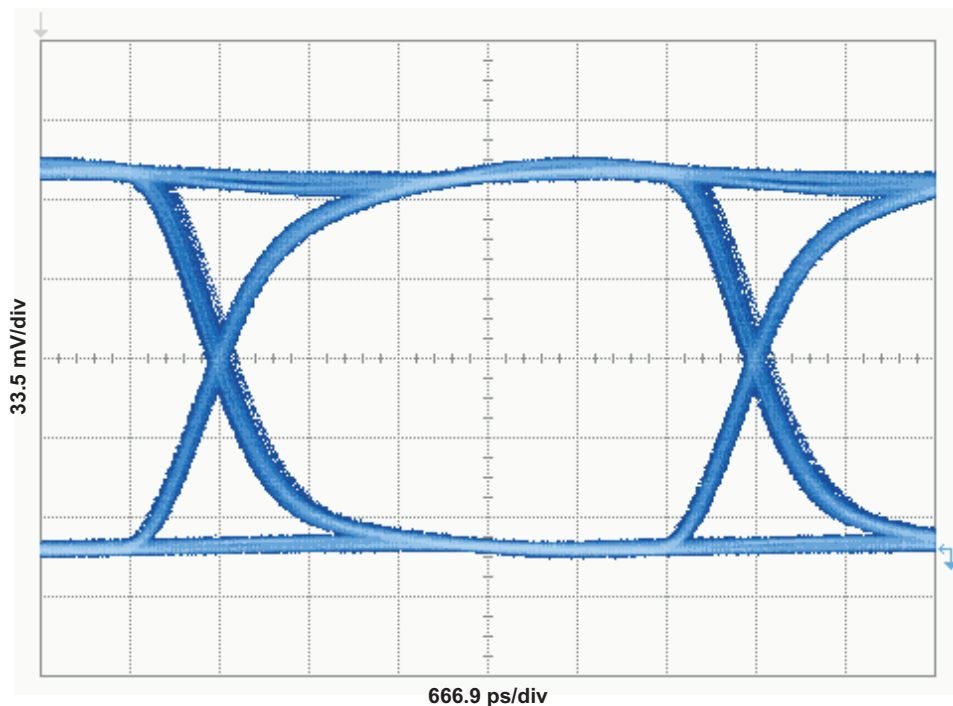


Figure 16. SN65MLVD3 Output ( $V_{CC} = 3.3\text{ V}$ ,  $C_L = 15\text{ pF}$ ) 250 Mbps  $2^{15}-1$  PRBS

## PACKAGING INFORMATION

| Orderable part number         | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|-------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">SN65MLVD2DRBR</a> | Active        | Production           | SON (DRB)   8  | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF2                 |
| SN65MLVD2DRBR.B               | Active        | Production           | SON (DRB)   8  | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF2                 |
| <a href="#">SN65MLVD2DRBT</a> | Active        | Production           | SON (DRB)   8  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF2                 |
| SN65MLVD2DRBT.B               | Active        | Production           | SON (DRB)   8  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF2                 |
| SN65MLVD2DRBTG4               | Active        | Production           | SON (DRB)   8  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF2                 |
| SN65MLVD2DRBTG4.B             | Active        | Production           | SON (DRB)   8  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF2                 |
| <a href="#">SN65MLVD3DRBR</a> | Active        | Production           | SON (DRB)   8  | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF3                 |
| SN65MLVD3DRBR.B               | Active        | Production           | SON (DRB)   8  | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF3                 |
| <a href="#">SN65MLVD3DRBT</a> | Active        | Production           | SON (DRB)   8  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF3                 |
| SN65MLVD3DRBT.B               | Active        | Production           | SON (DRB)   8  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF3                 |
| SN65MLVD3DRBTG4               | Active        | Production           | SON (DRB)   8  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF3                 |
| SN65MLVD3DRBTG4.B             | Active        | Production           | SON (DRB)   8  | 250   SMALL T&R       | Yes         | NIPDAU                               | Level-2-260C-1 YEAR               | -40 to 85    | MF3                 |

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

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

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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## TAPE AND REEL INFORMATION



\*All dimensions are nominal

| Device          | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN65MLVD2DRBR   | SON          | DRB             | 8    | 3000 | 330.0              | 12.4               | 3.3     | 3.3     | 1.1     | 8.0     | 12.0   | Q2            |
| SN65MLVD2DRBT   | SON          | DRB             | 8    | 250  | 180.0              | 12.4               | 3.3     | 3.3     | 1.1     | 8.0     | 12.0   | Q2            |
| SN65MLVD2DRBTG4 | SON          | DRB             | 8    | 250  | 180.0              | 12.4               | 3.3     | 3.3     | 1.1     | 8.0     | 12.0   | Q2            |
| SN65MLVD3DRBR   | SON          | DRB             | 8    | 3000 | 330.0              | 12.4               | 3.3     | 3.3     | 1.1     | 8.0     | 12.0   | Q2            |
| SN65MLVD3DRBT   | SON          | DRB             | 8    | 250  | 180.0              | 12.4               | 3.3     | 3.3     | 1.1     | 8.0     | 12.0   | Q2            |
| SN65MLVD3DRBTG4 | SON          | DRB             | 8    | 250  | 180.0              | 12.4               | 3.3     | 3.3     | 1.1     | 8.0     | 12.0   | Q2            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

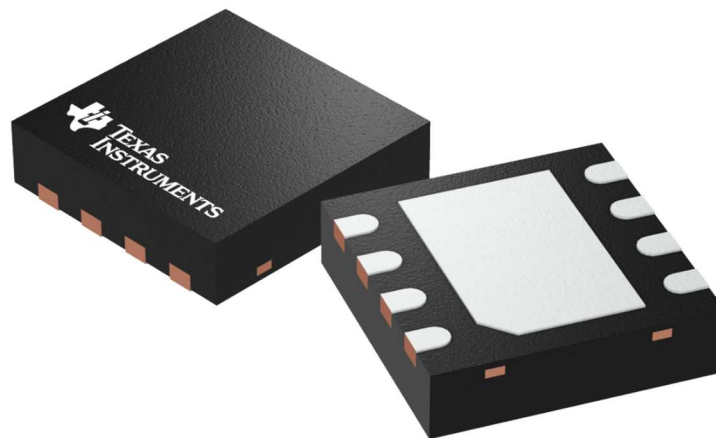
| Device          | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN65MLVD2DRBR   | SON          | DRB             | 8    | 3000 | 353.0       | 353.0      | 32.0        |
| SN65MLVD2DRBT   | SON          | DRB             | 8    | 250  | 213.0       | 191.0      | 35.0        |
| SN65MLVD2DRBTG4 | SON          | DRB             | 8    | 250  | 213.0       | 191.0      | 35.0        |
| SN65MLVD3DRBR   | SON          | DRB             | 8    | 3000 | 353.0       | 353.0      | 32.0        |
| SN65MLVD3DRBT   | SON          | DRB             | 8    | 250  | 213.0       | 191.0      | 35.0        |
| SN65MLVD3DRBTG4 | SON          | DRB             | 8    | 250  | 213.0       | 191.0      | 35.0        |

**DRB 8**

**GENERIC PACKAGE VIEW**

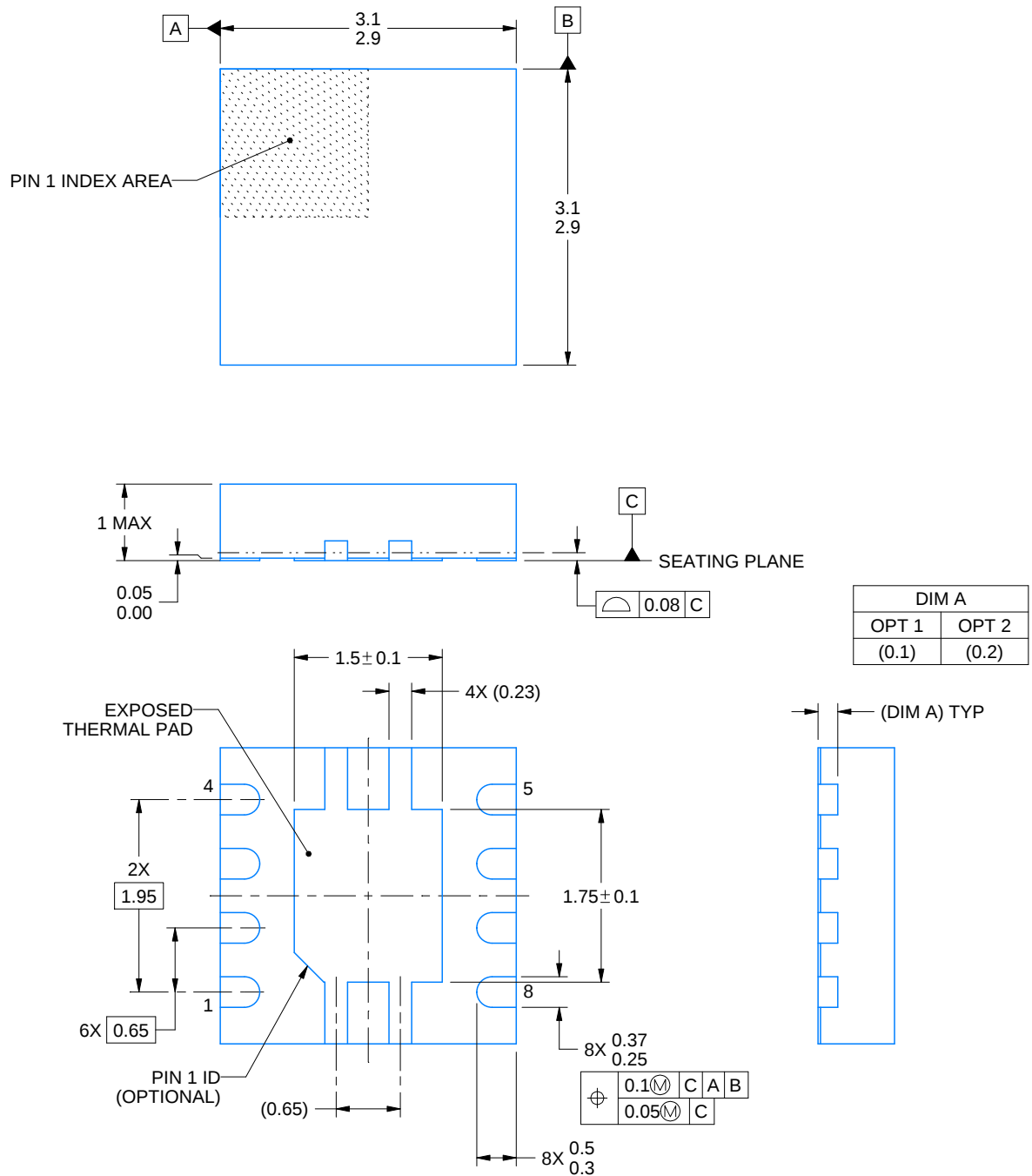
**VSON - 1 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



Images above are just a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.

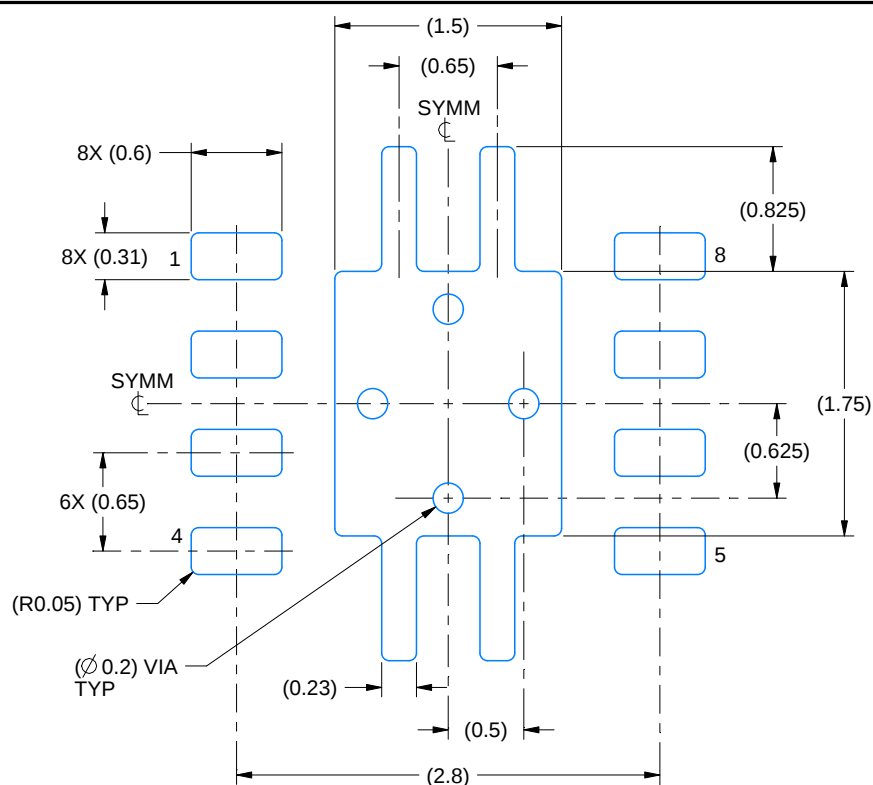
4203482/L



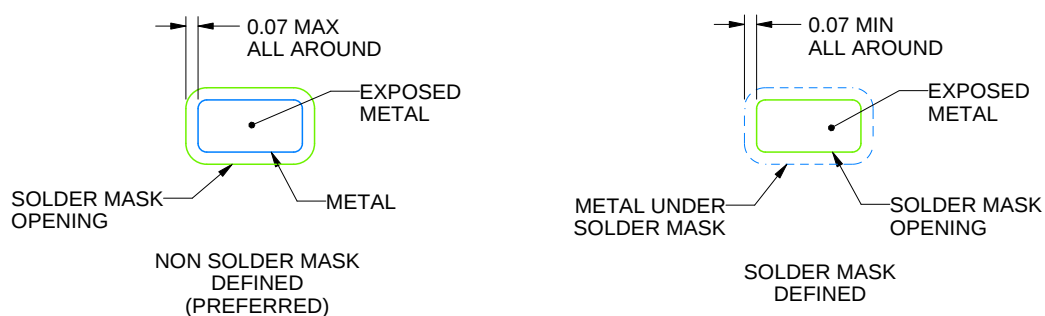
**DRB0008A**

**VSON - 1 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:20X



## SOLDER MASK DETAILS

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NOTES: (continued)

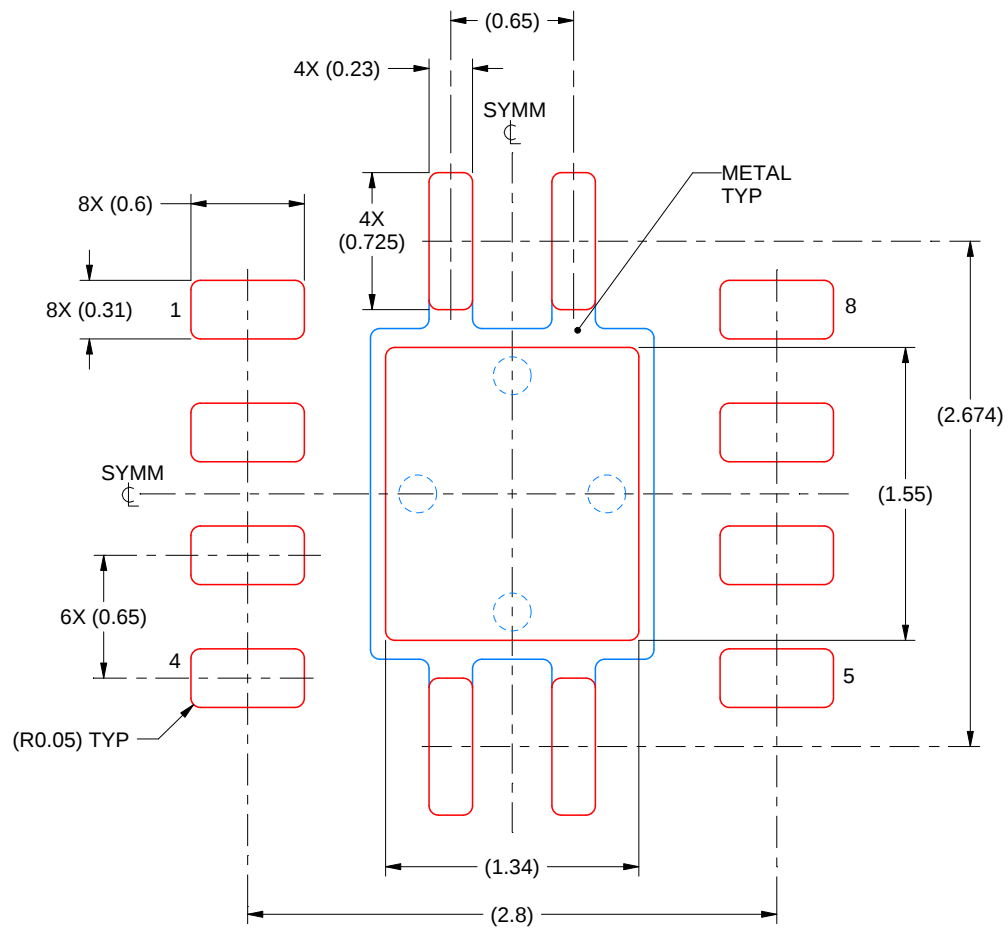
4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/slua271](http://www.ti.com/lit/slua271)).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

# EXAMPLE STENCIL DESIGN

DRB0008A

VSON - 1 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD  
84% PRINTED SOLDER COVERAGE BY AREA  
SCALE:25X

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NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

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