

## Single 3-Input Positive-OR Gate

Check for Samples: [SN74LVC1G332](#)

### FEATURES

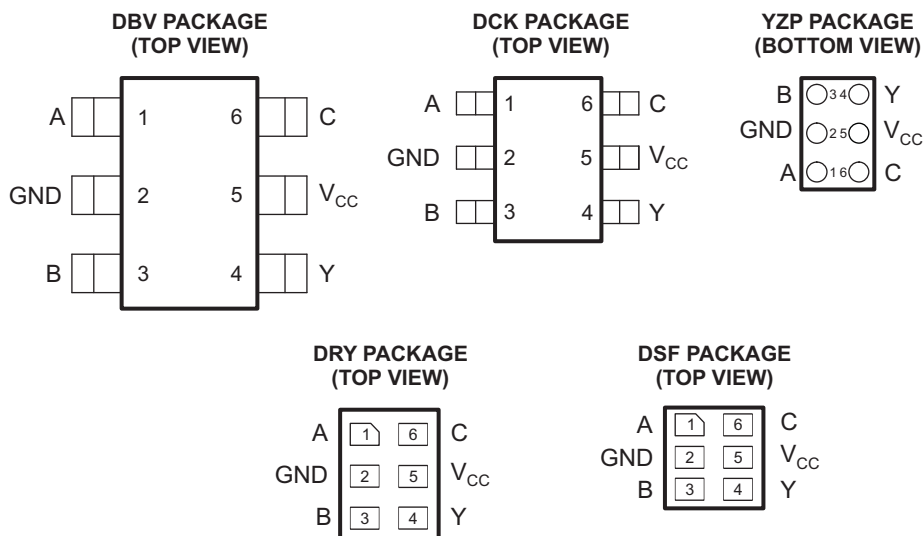
- Available in the Texas Instruments NanoStar™ and NanoFree™ Packages
- Supports 5-V  $V_{CC}$  Operation
- Inputs Accept Voltages to 5.5 V
- Supports Down Translation to  $V_{CC}$
- Max  $t_{pd}$  of 4.5 ns at 3.3 V
- Low Power Consumption, 10- $\mu$ A Max  $I_{CC}$
- $\pm 24$ -mA Output Drive at 3.3 V
- $I_{off}$  Supports Live Insertion, Partial-Power-Down Mode, and Back-Drive Protection
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

### DESCRIPTION

The SN74LVC1G332 device performs the Boolean function in  $Y = A + B + C$  or  $Y = \overline{A} \cdot \overline{B} \cdot \overline{C}$  positive logic.

NanoStar™ and NanoFree™ package technology is a major breakthrough in IC packaging concepts, using the die as the package.

This device is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.



See mechanical drawings for dimensions.



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.

NanoStar, NanoFree are trademarks of Texas Instruments.



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.

**Function Table**

| INPUTS |   |   | OUTPUT<br>Y |
|--------|---|---|-------------|
| A      | B | C |             |
| H      | X | X | H           |
| X      | H | X | H           |
| X      | X | H | H           |
| L      | L | L | L           |

**Logic Diagram (Positive Logic)****Absolute Maximum Ratings<sup>(1)</sup>**

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

|                  |                                                                                             |                    | MIN  | MAX                   | UNIT |
|------------------|---------------------------------------------------------------------------------------------|--------------------|------|-----------------------|------|
| V <sub>CC</sub>  | Supply voltage range                                                                        |                    | −0.5 | 6.5                   | V    |
| V <sub>I</sub>   | Input voltage range <sup>(2)</sup>                                                          |                    | −0.5 | 6.5                   | V    |
| V <sub>O</sub>   | Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup> |                    | −0.5 | 6.5                   | V    |
| V <sub>O</sub>   | Voltage range applied to any output in the high or low state <sup>(2)(3)</sup>              |                    | −0.5 | V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>  | Input clamp current                                                                         | V <sub>I</sub> < 0 |      | −50                   | mA   |
| I <sub>OK</sub>  | Output clamp current                                                                        | V <sub>O</sub> < 0 |      | −50                   | mA   |
| I <sub>O</sub>   | Continuous output current                                                                   |                    |      | ±50                   | mA   |
|                  | Continuous current through V <sub>CC</sub> or GND                                           |                    |      | ±100                  | mA   |
| θ <sub>JA</sub>  | Package thermal impedance <sup>(4)</sup>                                                    | DBV package        |      | 165                   | °C/W |
|                  |                                                                                             | DCK package        |      | 259                   |      |
|                  |                                                                                             | YEP or YZP package |      | 123                   |      |
| T <sub>stg</sub> | Storage temperature range                                                                   |                    | −65  | 150                   | °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) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of  $V_{CC}$  is provided in the recommended operating conditions table.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.

**Recommended Operating Conditions<sup>(1)</sup>**

|                 |                                    | MIN                                             | MAX                    | UNIT |
|-----------------|------------------------------------|-------------------------------------------------|------------------------|------|
| V <sub>CC</sub> | Supply voltage                     | Operating                                       | 1.65                   | 5.5  |
|                 |                                    | Data retention only                             | 1.5                    |      |
| V <sub>IH</sub> | High-level input voltage           | V <sub>CC</sub> = 1.65 V to 1.95 V              | 0.65 × V <sub>CC</sub> | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V                | 1.7                    |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V                  | 2                      |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V                | 0.7 × V <sub>CC</sub>  |      |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 1.65 V to 1.95 V              | 0.35 × V <sub>CC</sub> | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V                | 0.7                    |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V                  | 0.8                    |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V                | 0.3 × V <sub>CC</sub>  |      |
| V <sub>I</sub>  | Input voltage                      | 0                                               | 5.5                    | V    |
| V <sub>O</sub>  | Output voltage                     | 0                                               | V <sub>CC</sub>        | V    |
| I <sub>OH</sub> | High-level output current          | V <sub>CC</sub> = 1.65 V                        | –4                     | mA   |
|                 |                                    | V <sub>CC</sub> = 2.3 V                         | –8                     |      |
|                 |                                    | V <sub>CC</sub> = 3 V                           | –16                    |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V                         | –24                    |      |
| I <sub>OL</sub> | Low-level output current           | V <sub>CC</sub> = 1.65 V                        | –32                    | mA   |
|                 |                                    | V <sub>CC</sub> = 2.3 V                         | 4                      |      |
|                 |                                    | V <sub>CC</sub> = 3 V                           | 8                      |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V                         | 16                     |      |
| Δt/Δv           | Input transition rise or fall rate | V <sub>CC</sub> = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V | 20                     | ns/V |
|                 |                                    | V <sub>CC</sub> = 3.3 V ± 0.3 V                 | 10                     |      |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V                   | 10                     |      |
| T <sub>A</sub>  | Operating free-air temperature     | –40                                             | 125                    | °C   |

(1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number [SCBA004](#).

## Electrical Characteristics

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

| PARAMETER        |            | TEST CONDITIONS                                                                 | V <sub>CC</sub> | –40°C to 85°C         |                    |     | –40°C to 125°C        |                    |     | UNIT |
|------------------|------------|---------------------------------------------------------------------------------|-----------------|-----------------------|--------------------|-----|-----------------------|--------------------|-----|------|
|                  |            |                                                                                 |                 | MIN                   | TYP <sup>(1)</sup> | MAX | MIN                   | TYP <sup>(1)</sup> | MAX |      |
| V <sub>OH</sub>  |            | I <sub>OH</sub> = –100 μA                                                       | 1.65 V to 5.5 V | V <sub>CC</sub> – 0.1 |                    |     | V <sub>CC</sub> – 0.1 |                    |     | V    |
|                  |            | I <sub>OH</sub> = –4 mA                                                         | 1.65 V          | 1.2                   |                    |     | 1.2                   |                    |     |      |
|                  |            | I <sub>OH</sub> = –8 mA                                                         | 2.3 V           | 1.9                   |                    |     | 1.9                   |                    |     |      |
|                  |            | I <sub>OH</sub> = –16 mA                                                        | 3 V             | 2.4                   |                    |     | 2.4                   |                    |     |      |
|                  |            | I <sub>OH</sub> = –24 mA                                                        |                 | 2.3                   |                    |     | 2.3                   |                    |     |      |
|                  |            | I <sub>OH</sub> = –32 mA                                                        | 4.5 V           | 3.8                   |                    |     | 3.8                   |                    |     |      |
| V <sub>OL</sub>  |            | I <sub>OL</sub> = 100 μA                                                        | 1.65 V to 5.5 V | 0.1                   |                    |     | 0.1                   |                    |     | V    |
|                  |            | I <sub>OL</sub> = 4 mA                                                          | 1.65 V          | 0.45                  |                    |     | 0.45                  |                    |     |      |
|                  |            | I <sub>OL</sub> = 8 mA                                                          | 2.3 V           | 0.3                   |                    |     | 0.3                   |                    |     |      |
|                  |            | I <sub>OL</sub> = 16 mA                                                         | 3 V             | 0.4                   |                    |     | 0.4                   |                    |     |      |
|                  |            | I <sub>OL</sub> = 24 mA                                                         |                 | 0.55                  |                    |     | 0.55                  |                    |     |      |
|                  |            | I <sub>OL</sub> = 32 mA                                                         | 4.5 V           | 0.55                  |                    |     | 0.55                  |                    |     |      |
| I <sub>I</sub>   | All inputs | V <sub>I</sub> = 5.5 V or GND                                                   | 0 to 5.5 V      | ±5                    |                    |     | ±5                    |                    |     | μA   |
| I <sub>off</sub> |            | V <sub>I</sub> or V <sub>O</sub> = 5.5 V                                        | 0               | ±10                   |                    |     | ±10                   |                    |     | μA   |
| I <sub>CC</sub>  |            | V <sub>I</sub> = 5.5 V or GND, I <sub>O</sub> = 0                               | 1.65 V to 5.5 V | 10                    |                    |     | 10                    |                    |     | μA   |
| ΔI <sub>CC</sub> |            | One input at V <sub>CC</sub> – 0.6 V,<br>Other inputs at V <sub>CC</sub> or GND | 3 V to 5.5 V    | 500                   |                    |     | 500                   |                    |     | μA   |
| C <sub>i</sub>   |            | V <sub>I</sub> = V <sub>CC</sub> or GND                                         | 3.3 V           | 3.5                   |                    |     |                       |                    |     | pF   |

(1) All typical values are at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C.

## Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 15$  pF (unless otherwise noted) (see [Figure 1](#))

| PARAMETER       | FROM<br>(INPUT) | TO<br>(OUTPUT) | SN74LVC1G332<br>–40°C to 85°C       |     |                                    |     |                                    |     |                                  |     | UNIT |
|-----------------|-----------------|----------------|-------------------------------------|-----|------------------------------------|-----|------------------------------------|-----|----------------------------------|-----|------|
|                 |                 |                | V <sub>CC</sub> = 1.8 V<br>± 0.15 V |     | V <sub>CC</sub> = 2.5 V<br>± 0.2 V |     | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |     | V <sub>CC</sub> = 5 V<br>± 0.5 V |     |      |
|                 |                 |                | MIN                                 | MAX | MIN                                | MAX | MIN                                | MAX | MIN                              | MAX |      |
| t <sub>pd</sub> | A, B, or C      | Y              | 2.4                                 | 17  | 1.4                                | 6   | 1.2                                | 4.5 | 0.8                              | 3   | ns   |

## Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 30$  pF or 50 pF (unless otherwise noted) (see [Figure 2](#))

| PARAMETER       | FROM<br>(INPUT) | TO<br>(OUTPUT) | SN74LVC1G332<br>–40°C to 85°C       |      |                                    |     |                                    |     |                                  |     | UNIT |
|-----------------|-----------------|----------------|-------------------------------------|------|------------------------------------|-----|------------------------------------|-----|----------------------------------|-----|------|
|                 |                 |                | V <sub>CC</sub> = 1.8 V<br>± 0.15 V |      | V <sub>CC</sub> = 2.5 V<br>± 0.2 V |     | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |     | V <sub>CC</sub> = 5 V<br>± 0.5 V |     |      |
|                 |                 |                | MIN                                 | MAX  | MIN                                | MAX | MIN                                | MAX | MIN                              | MAX |      |
| t <sub>pd</sub> | A, B, or C      | Y              | 2.8                                 | 17.2 | 1.5                                | 6.2 | 1.4                                | 4.8 | 1                                | 3.5 | ns   |

## Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 30$  pF or 50 pF (unless otherwise noted) (see [Figure 2](#))

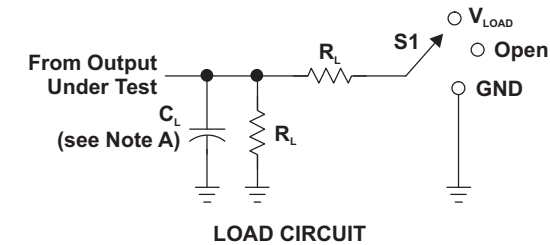
| PARAMETER       | FROM<br>(INPUT) | TO<br>(OUTPUT) | SN74LVC1G332<br>–40°C to 125°C      |      |                                    |     |                                    |     |                                  |     | UNIT |
|-----------------|-----------------|----------------|-------------------------------------|------|------------------------------------|-----|------------------------------------|-----|----------------------------------|-----|------|
|                 |                 |                | V <sub>CC</sub> = 1.8 V<br>± 0.15 V |      | V <sub>CC</sub> = 2.5 V<br>± 0.2 V |     | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |     | V <sub>CC</sub> = 5 V<br>± 0.5 V |     |      |
|                 |                 |                | MIN                                 | MAX  | MIN                                | MAX | MIN                                | MAX | MIN                              | MAX |      |
| t <sub>pd</sub> | A, B, or C      | Y              | 2.8                                 | 20.0 | 1.5                                | 7.8 | 1.4                                | 6.2 | 1.0                              | 4.5 | ns   |

## Operating Characteristics

$T_A = 25^\circ\text{C}$

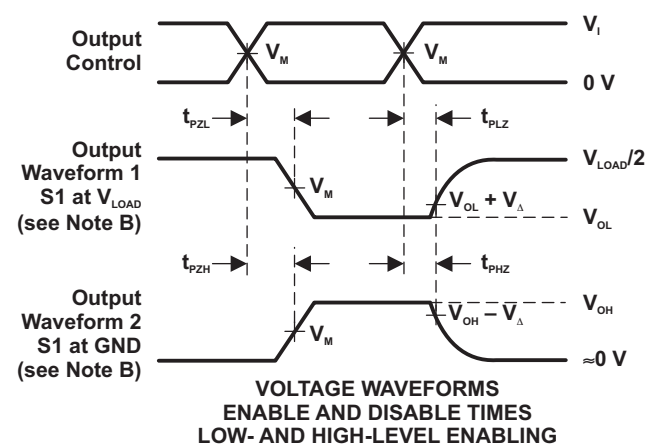
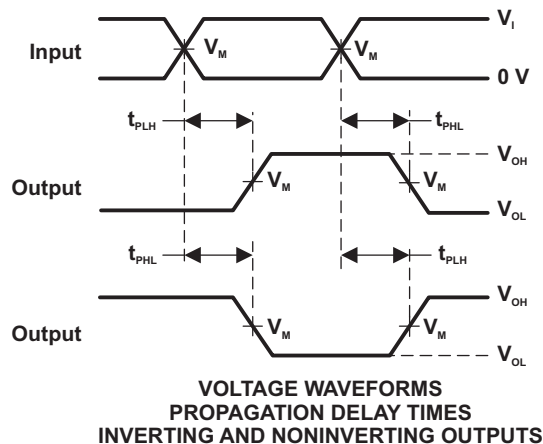
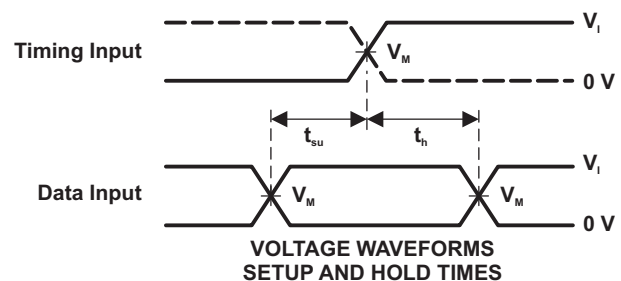
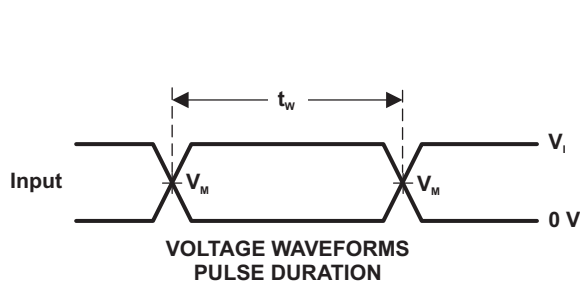
| PARAMETER |                               | TEST<br>CONDITIONS  | $V_{CC} = 1.8\text{ V}$ | $V_{CC} = 2.5\text{ V}$ | $V_{CC} = 3.3\text{ V}$ | $V_{CC} = 5\text{ V}$ | UNIT |
|-----------|-------------------------------|---------------------|-------------------------|-------------------------|-------------------------|-----------------------|------|
|           |                               |                     | TYP                     | TYP                     | TYP                     | TYP                   |      |
| $C_{pd}$  | Power dissipation capacitance | $f = 10\text{ MHz}$ | 18                      | 19                      | 20                      | 23                    | pF   |

## Parameter Measurement Information



| TEST              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

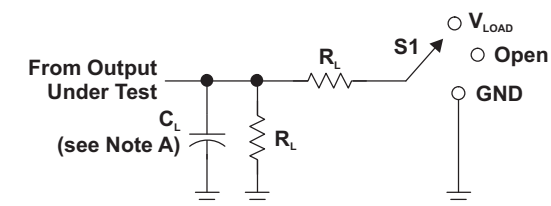
| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_r/t_f$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M $\Omega$ | 0.15 V       |
| $2.5\text{ V} \pm 0.2\text{ V}$  | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M $\Omega$ | 0.15 V       |
| $3.3\text{ V} \pm 0.3\text{ V}$  | 3 V      | $\leq 2.5\text{ ns}$ | 1.5 V      | 6 V               | 15 pF | 1 M $\Omega$ | 0.3 V        |
| $5\text{ V} \pm 0.5\text{ V}$    | $V_{CC}$ | $\leq 2.5\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M $\Omega$ | 0.3 V        |



- NOTES:
- A.  $C_L$  includes probe and jig capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
  - C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq 10\text{ MHz}$ ,  $Z_o = 50\ \Omega$ .
  - D. The outputs are measured one at a time, with one transition per measurement.
  - E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - H. All parameters and waveforms are not applicable to all devices.

**Figure 1. Load Circuit and Voltage Waveforms**

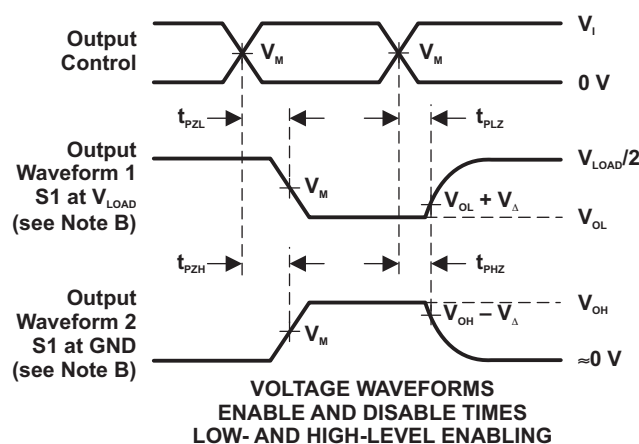
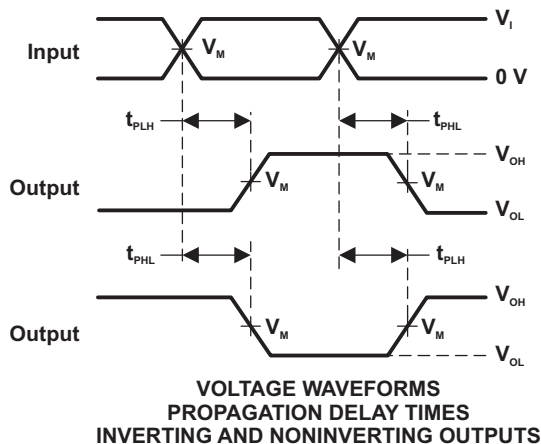
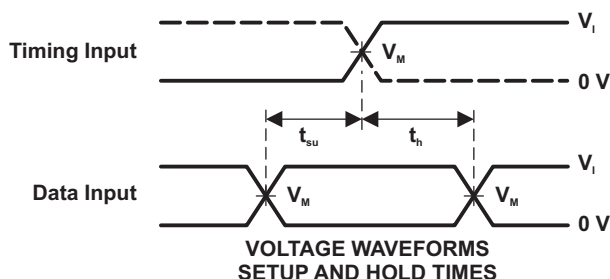
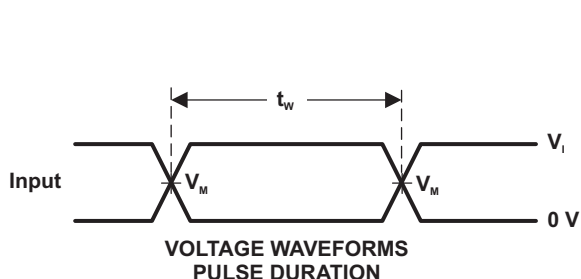
## Parameter Measurement Information



LOAD CIRCUIT

| TEST              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_f/t_r$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 1 k $\Omega$ | 0.15 V       |
| $2.5\text{ V} \pm 0.2\text{ V}$  | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 500 $\Omega$ | 0.15 V       |
| $3.3\text{ V} \pm 0.3\text{ V}$  | 3 V      | $\leq 2.5\text{ ns}$ | 1.5 V      | 6 V               | 50 pF | 500 $\Omega$ | 0.3 V        |
| $5\text{ V} \pm 0.5\text{ V}$    | $V_{CC}$ | $\leq 2.5\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 50 pF | 500 $\Omega$ | 0.3 V        |



- NOTES:
- $C_L$  includes probe and jig capacitance.
  - Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
  - All input pulses are supplied by generators having the following characteristics: PRR  $\leq 10\text{ MHz}$ ,  $Z_o = 50\ \Omega$ .
  - The outputs are measured one at a time, with one transition per measurement.
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - All parameters and waveforms are not applicable to all devices.

Figure 2. Load Circuit and Voltage Waveforms

REVISION HISTORY

| Changes from Revision D (September 2006) to Revision E | Page              |
|--------------------------------------------------------|-------------------|
| • Updated document to new TI data sheet format. ....   | <a href="#">1</a> |
| • Updated Features. ....                               | <a href="#">1</a> |
| • Removed Ordering Information table. ....             | <a href="#">1</a> |
| • Added ESD warning. ....                              | <a href="#">2</a> |
| • Updated operating temperature range. ....            | <a href="#">3</a> |

## 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="#">74LVC1G332DBVRG4</a>   | Active        | Production           | SOT-23 (DBV)   6  | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | C2CF                 |
| 74LVC1G332DBVRG4.B                 | Active        | Production           | SOT-23 (DBV)   6  | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | C2CF                 |
| 74LVC1G332DCKRE4                   | Active        | Production           | SC70 (DCK)   6    | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZF                  |
| <a href="#">SN74LVC1G332DBVR</a>   | Active        | Production           | SOT-23 (DBV)   6  | 3000   LARGE T&R      | Yes         | NIPDAU   SN                          | Level-1-260C-UNLIM                | -40 to 125   | (C2CF, C2CK, C2CR)   |
| SN74LVC1G332DBVR.B                 | Active        | Production           | SOT-23 (DBV)   6  | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | (C2CF, C2CK, C2CR)   |
| SN74LVC1G332DBVRG4.B               | Active        | Production           | SOT-23 (DBV)   6  | 3000   LARGE T&R      | -           | Call TI                              | Call TI                           | -40 to 125   |                      |
| <a href="#">SN74LVC1G332DCKR</a>   | Active        | Production           | SC70 (DCK)   6    | 3000   LARGE T&R      | Yes         | NIPDAU   SN                          | Level-1-260C-UNLIM                | -40 to 125   | (CZF, CZJ, CZK, CZR) |
| SN74LVC1G332DCKR.B                 | Active        | Production           | SC70 (DCK)   6    | 3000   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | (CZF, CZJ, CZK, CZR) |
| <a href="#">SN74LVC1G332DCKRG4</a> | Active        | Production           | SC70 (DCK)   6    | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZF                  |
| SN74LVC1G332DCKRG4.B               | Active        | Production           | SC70 (DCK)   6    | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZF                  |
| <a href="#">SN74LVC1G332DRLR</a>   | Active        | Production           | SOT-5X3 (DRL)   6 | 4000   LARGE T&R      | Yes         | NIPDAU   NIPDAUAG                    | Level-1-260C-UNLIM                | -40 to 125   | (1K1, CZ7, CZR)      |
| SN74LVC1G332DRLR.B                 | Active        | Production           | SOT-5X3 (DRL)   6 | 4000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | (1K1, CZ7, CZR)      |
| SN74LVC1G332DRLRG4.B               | Active        | Production           | SOT-5X3 (DRL)   6 | 4000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | 1K1                  |
| <a href="#">SN74LVC1G332DRY2</a>   | Active        | Production           | SON (DRY)   6     | 5000   LARGE T&R      | Yes         | NIPDAU   NIPDAUAG                    | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| SN74LVC1G332DRY2.B                 | Active        | Production           | SON (DRY)   6     | 5000   LARGE T&R      | Yes         | NIPDAUAG                             | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| <a href="#">SN74LVC1G332DRYR</a>   | Active        | Production           | SON (DRY)   6     | 5000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| SN74LVC1G332DRYR.B                 | Active        | Production           | SON (DRY)   6     | 5000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| SN74LVC1G332DRYRG4.B               | Active        | Production           | SON (DRY)   6     | 5000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| <a href="#">SN74LVC1G332DSF2</a>   | Active        | Production           | SON (DSF)   6     | 5000   LARGE T&R      | Yes         | NIPDAU   NIPDAUAG                    | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| SN74LVC1G332DSF2.B                 | Active        | Production           | SON (DSF)   6     | 5000   LARGE T&R      | Yes         | NIPDAUAG                             | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| <a href="#">SN74LVC1G332DSFR</a>   | Active        | Production           | SON (DSF)   6     | 5000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| SN74LVC1G332DSFR.B                 | Active        | Production           | SON (DSF)   6     | 5000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| SN74LVC1G332DSFRG4.B               | Active        | Production           | SON (DSF)   6     | 5000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | CZ                   |
| <a href="#">SN74LVC1G332YZPR</a>   | Active        | Production           | DSBGA (YZP)   6   | 3000   LARGE T&R      | Yes         | SNAGCU                               | Level-1-260C-UNLIM                | -40 to 85    | CZN                  |
| SN74LVC1G332YZPR.B                 | Active        | Production           | DSBGA (YZP)   6   | 3000   LARGE T&R      | Yes         | SNAGCU                               | Level-1-260C-UNLIM                | -40 to 125   | CZN                  |

<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.

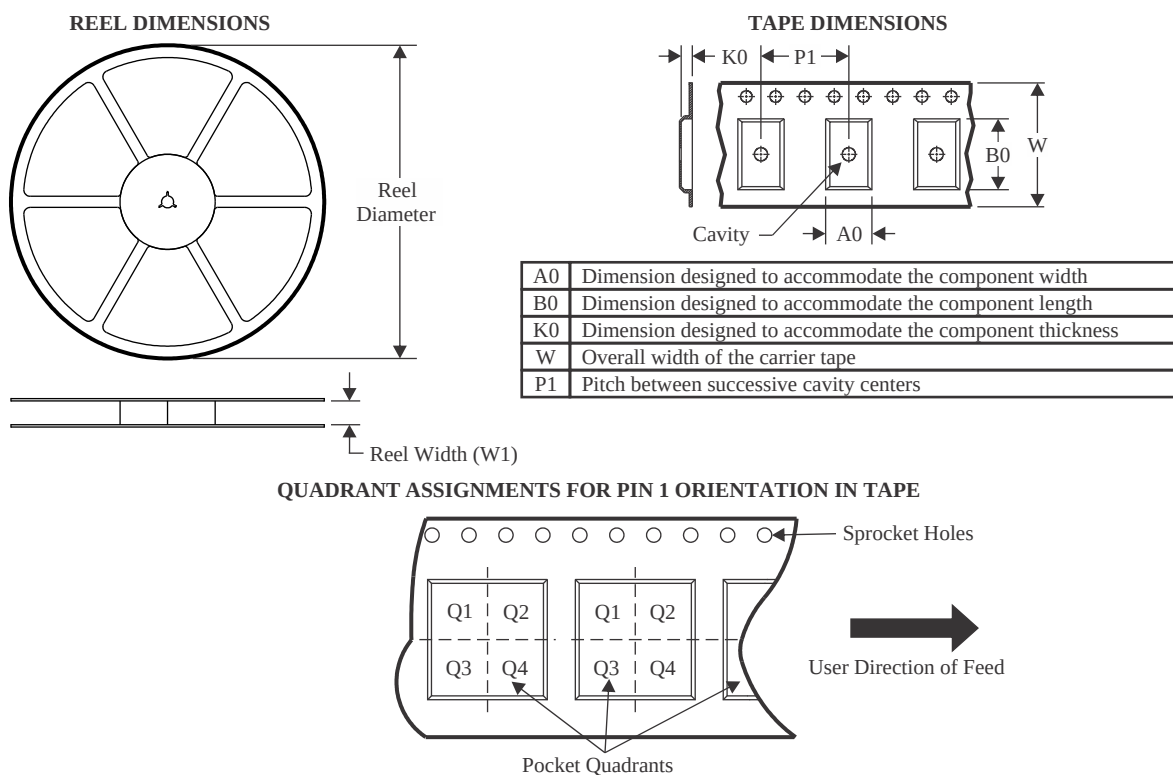
<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

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.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

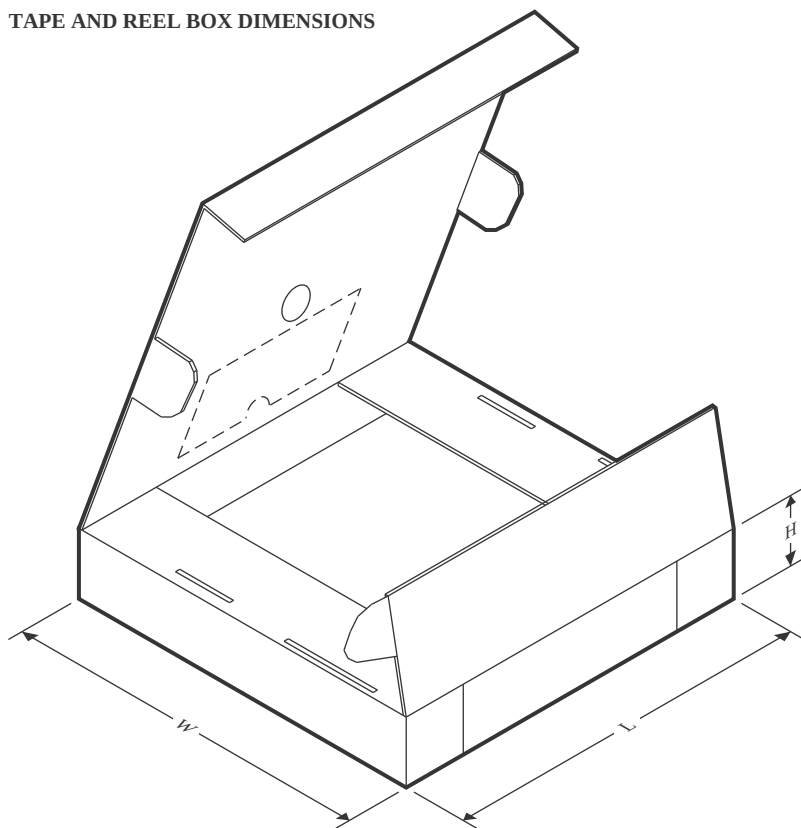
## TAPE AND REEL INFORMATION



\*All dimensions are nominal

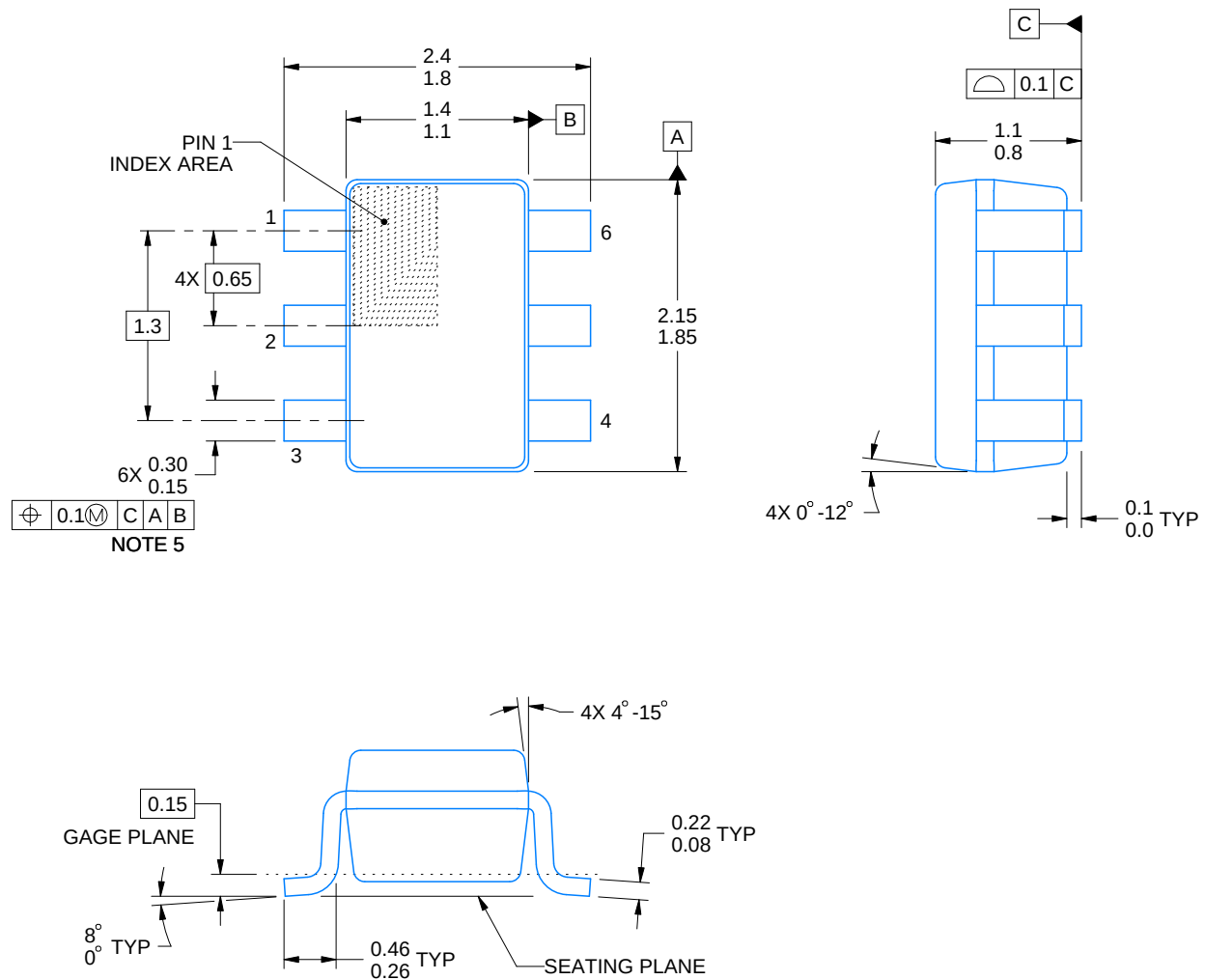
| Device             | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 74LVC1G332DBVRG4   | SOT-23       | DBV             | 6    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DBVR   | SOT-23       | DBV             | 6    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DCKR   | SC70         | DCK             | 6    | 3000 | 180.0              | 8.4                | 2.3     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DCKRG4 | SC70         | DCK             | 6    | 3000 | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DRLR   | SOT-5X3      | DRL             | 6    | 4000 | 180.0              | 8.4                | 2.0     | 1.8     | 0.75    | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DRY2   | SON          | DRY             | 6    | 5000 | 180.0              | 9.5                | 1.6     | 1.15    | 0.75    | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DRY2   | SON          | DRY             | 6    | 5000 | 180.0              | 8.4                | 1.65    | 1.2     | 0.7     | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DRYR   | SON          | DRY             | 6    | 5000 | 180.0              | 9.5                | 1.15    | 1.6     | 0.75    | 4.0     | 8.0    | Q1            |
| SN74LVC1G332DSF2   | SON          | DSF             | 6    | 5000 | 180.0              | 8.4                | 1.16    | 1.16    | 0.63    | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DSF2   | SON          | DSF             | 6    | 5000 | 180.0              | 9.5                | 1.16    | 1.16    | 0.5     | 4.0     | 8.0    | Q3            |
| SN74LVC1G332DSFR   | SON          | DSF             | 6    | 5000 | 180.0              | 9.5                | 1.16    | 1.16    | 0.5     | 4.0     | 8.0    | Q2            |
| SN74LVC1G332YZPR   | DSBGA        | YZP             | 6    | 3000 | 178.0              | 9.2                | 1.02    | 1.52    | 0.63    | 4.0     | 8.0    | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

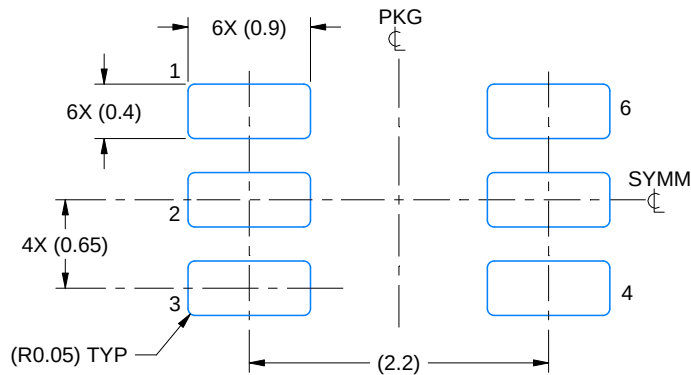
| Device             | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 74LVC1G332DBVRG4   | SOT-23       | DBV             | 6    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G332DBVR   | SOT-23       | DBV             | 6    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G332DCKR   | SC70         | DCK             | 6    | 3000 | 210.0       | 185.0      | 35.0        |
| SN74LVC1G332DCKRG4 | SC70         | DCK             | 6    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G332DRLR   | SOT-5X3      | DRL             | 6    | 4000 | 210.0       | 185.0      | 35.0        |
| SN74LVC1G332DRY2   | SON          | DRY             | 6    | 5000 | 184.0       | 184.0      | 19.0        |
| SN74LVC1G332DRY2   | SON          | DRY             | 6    | 5000 | 202.0       | 201.0      | 28.0        |
| SN74LVC1G332DRYR   | SON          | DRY             | 6    | 5000 | 184.0       | 184.0      | 19.0        |
| SN74LVC1G332DSF2   | SON          | DSF             | 6    | 5000 | 202.0       | 201.0      | 28.0        |
| SN74LVC1G332DSF2   | SON          | DSF             | 6    | 5000 | 184.0       | 184.0      | 19.0        |
| SN74LVC1G332DSFR   | SON          | DSF             | 6    | 5000 | 184.0       | 184.0      | 19.0        |
| SN74LVC1G332YZPR   | DSBGA        | YZP             | 6    | 3000 | 220.0       | 220.0      | 35.0        |



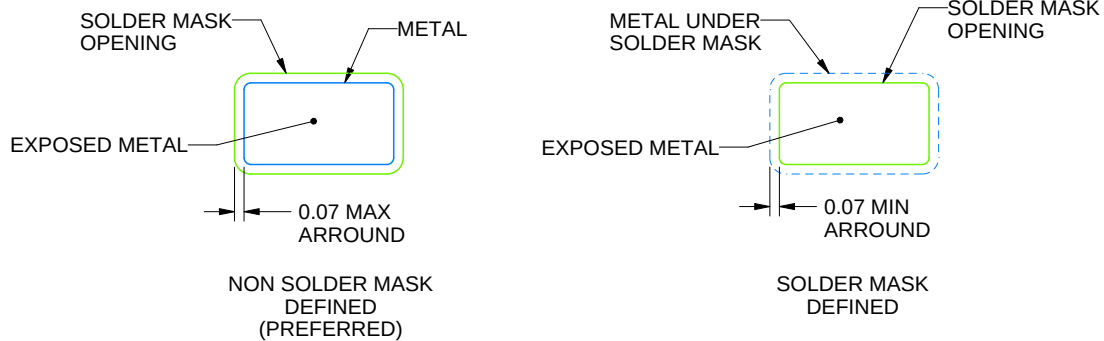
4214835/D 11/2024

## NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
4. Falls within JEDEC MO-203 variation AB.



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X

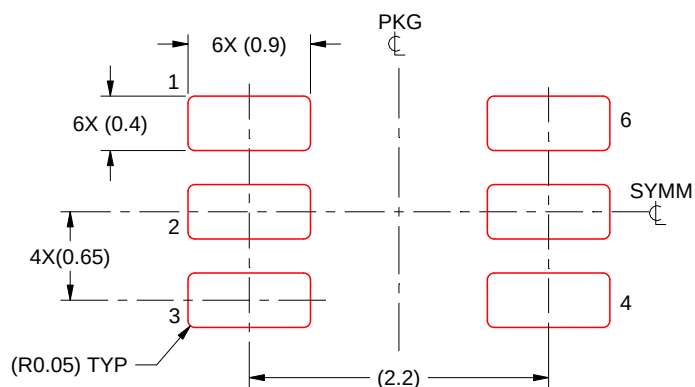


SOLDER MASK DETAILS

4214835/D 11/2024

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE  
 BASED ON 0.125 THICK STENCIL  
 SCALE:18X

4214835/D 11/2024

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

## GENERIC PACKAGE VIEW

**DRY 6**

**USON - 0.6 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.

4207181/G

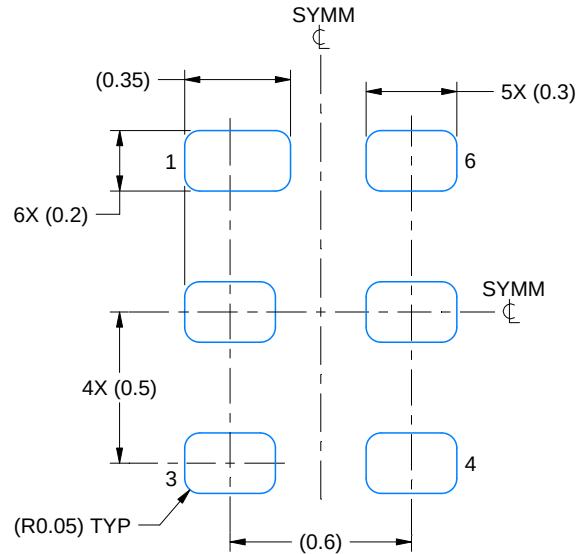


# EXAMPLE BOARD LAYOUT

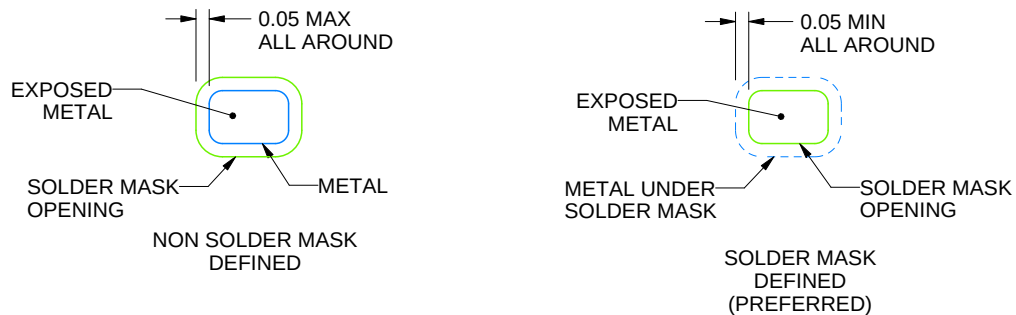
DRY0006A

USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



**LAND PATTERN EXAMPLE**  
1:1 RATIO WITH PKG SOLDER PADS  
EXPOSED METAL SHOWN  
SCALE:40X



**SOLDER MASK DETAILS**

4222894/A 01/2018

NOTES: (continued)

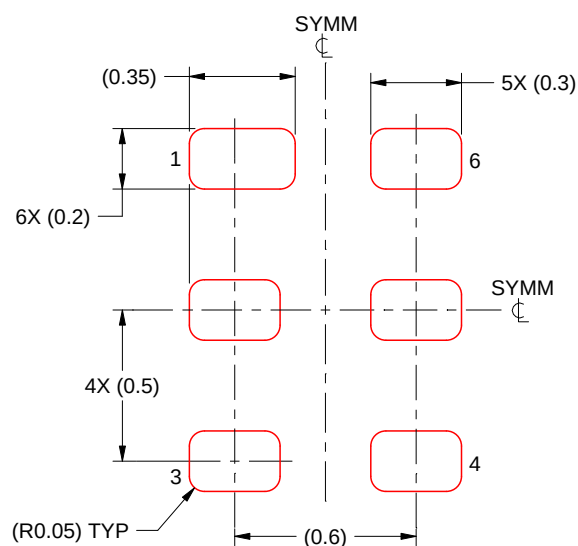
3. For more information, see QFN/SON PCB application report in literature No. SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).

## EXAMPLE STENCIL DESIGN

DRY0006A

USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE  
BASED ON 0.075 - 0.1 mm THICK STENCIL  
SCALE:40X

4222894/A 01/2018

NOTES: (continued)

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

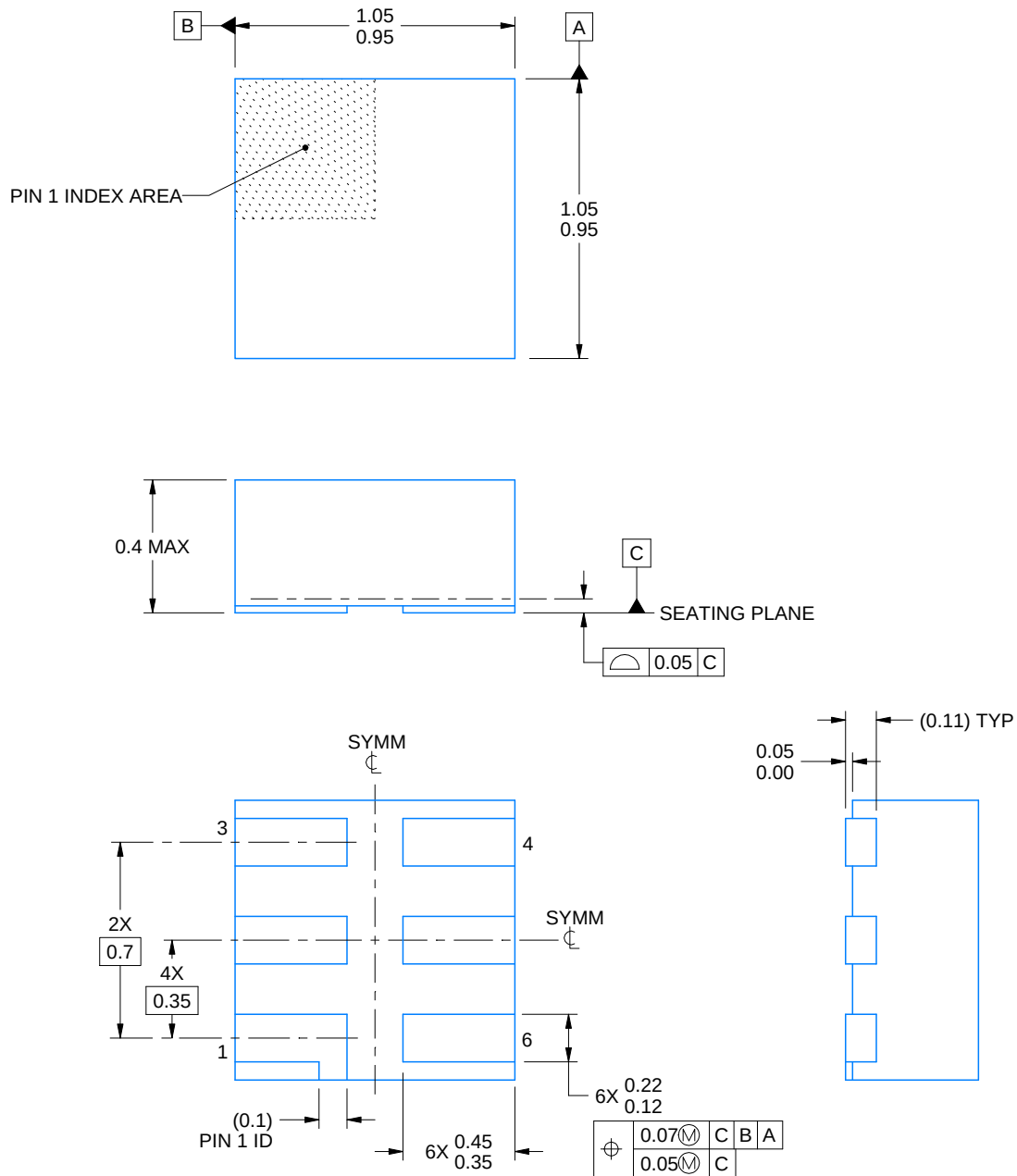


DSF0006A

## PACKAGE OUTLINE

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



4220597/B 06/2022

### NOTES:

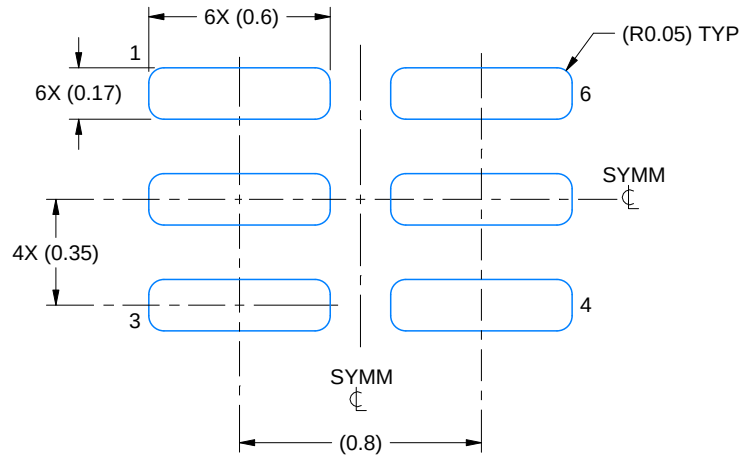
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration MO-287, variation X2AAF.

# EXAMPLE BOARD LAYOUT

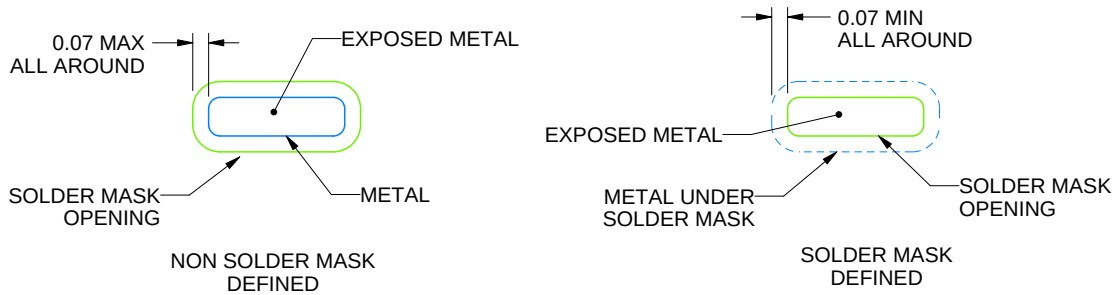
DSF0006A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:40X



SOLDER MASK DETAILS

4220597/B 06/2022

NOTES: (continued)

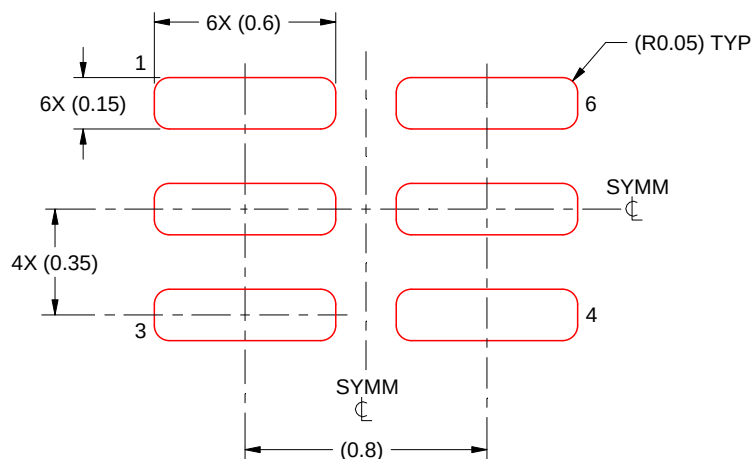
4. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).

## EXAMPLE STENCIL DESIGN

DSF0006A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD

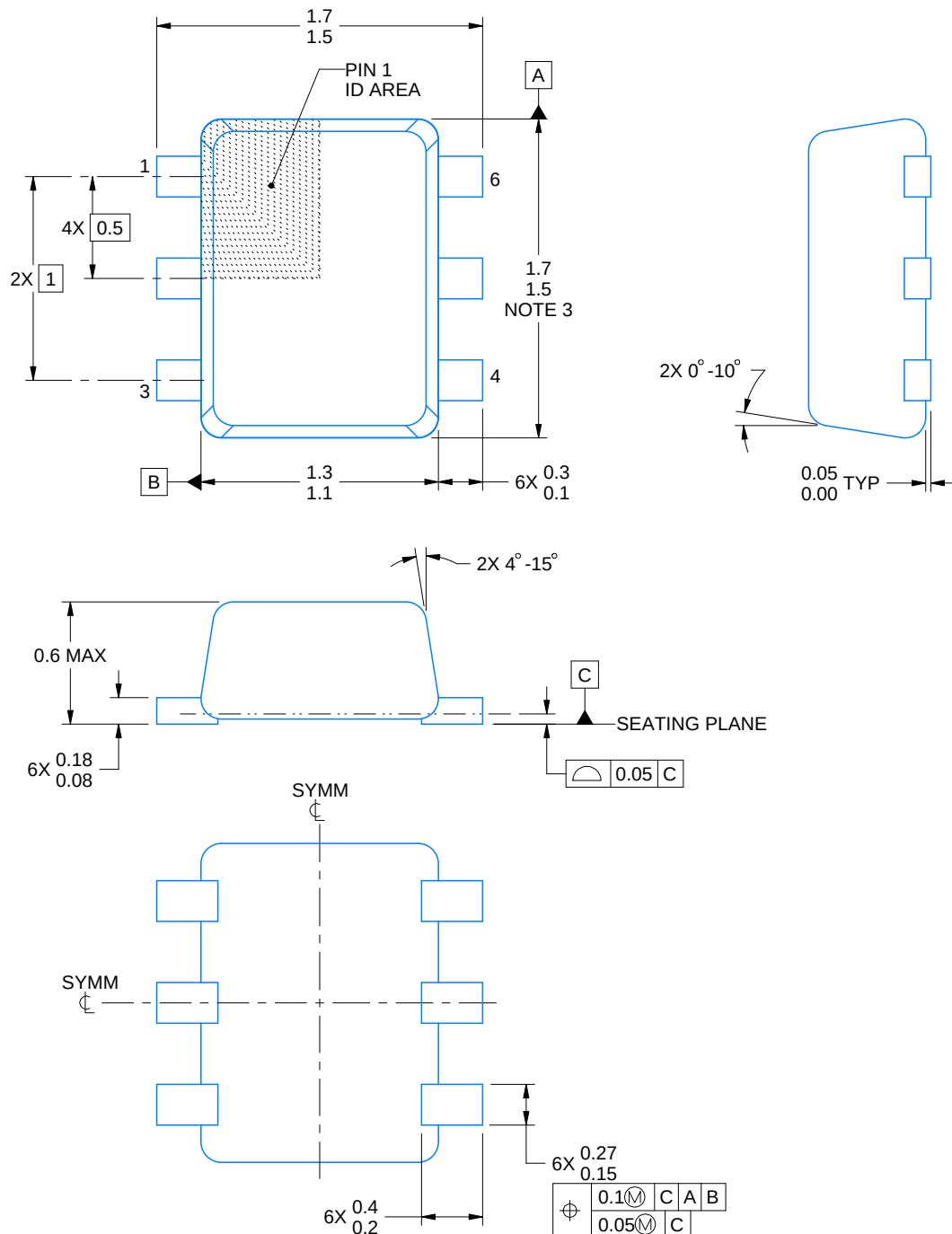


SOLDER PASTE EXAMPLE  
BASED ON 0.09 mm THICK STENCIL

PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE  
SCALE:40X

4220597/B 06/2022

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



4223266/F 11/2024

## NOTES:

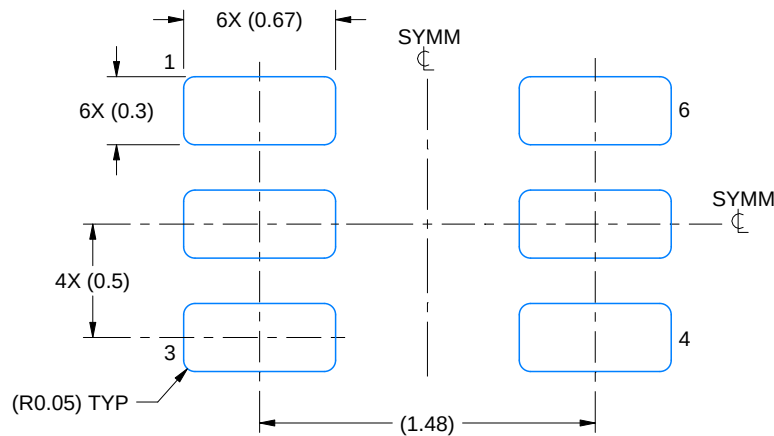
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-293 Variation UAAD

# EXAMPLE BOARD LAYOUT

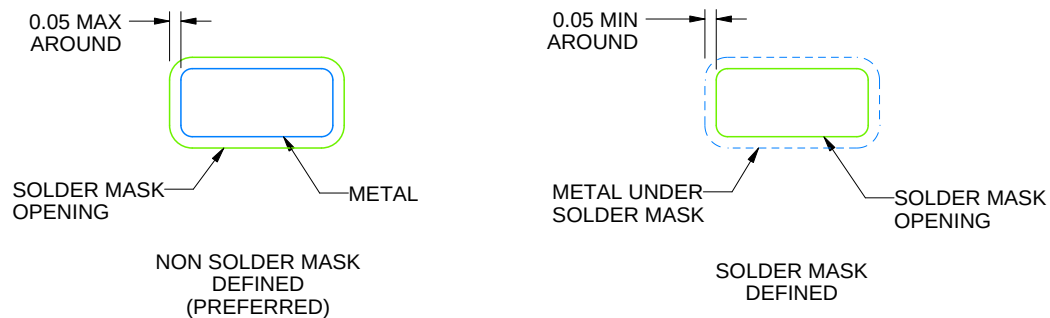
DRL0006A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



LAND PATTERN EXAMPLE  
SCALE:30X



SOLDERMASK DETAILS

4223266/F 11/2024

NOTES: (continued)

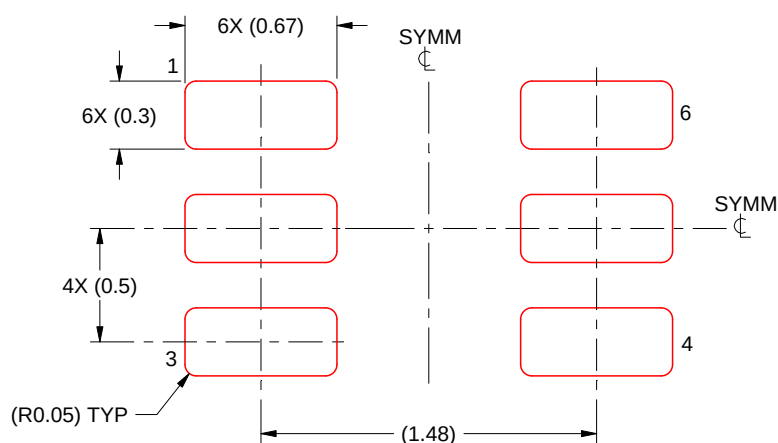
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
7. Land pattern design aligns to IPC-610, Bottom Termination Component (BTC) solder joint inspection criteria.

# EXAMPLE STENCIL DESIGN

DRL0006A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



SOLDER PASTE EXAMPLE  
BASED ON 0.1 mm THICK STENCIL  
SCALE:30X

4223266/F 11/2024

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.



## SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



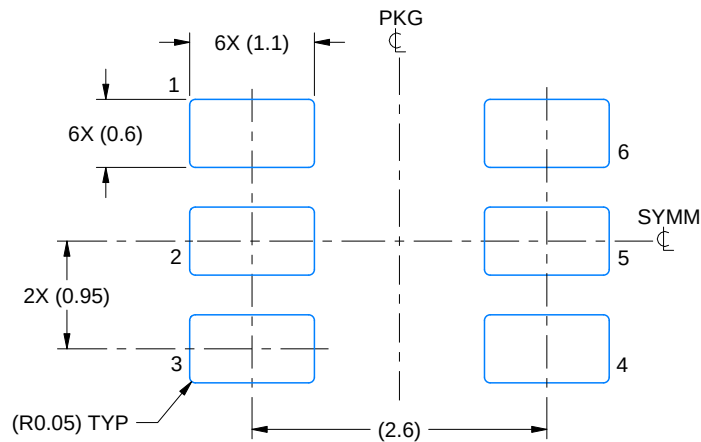
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.25 per side.
4. Leads 1,2,3 may be wider than leads 4,5,6 for package orientation.
5. Reference JEDEC MO-178.

# EXAMPLE BOARD LAYOUT

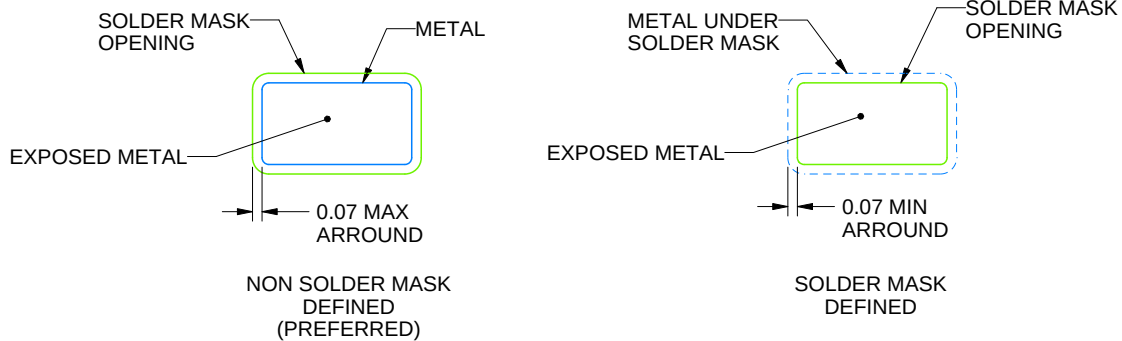
DBV0006A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4214840/G 08/2024

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

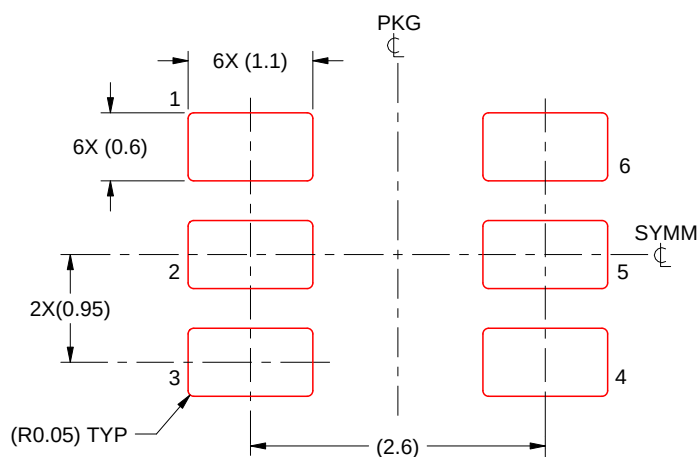
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

DBV0006A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



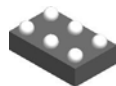
SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:15X

4214840/G 08/2024

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

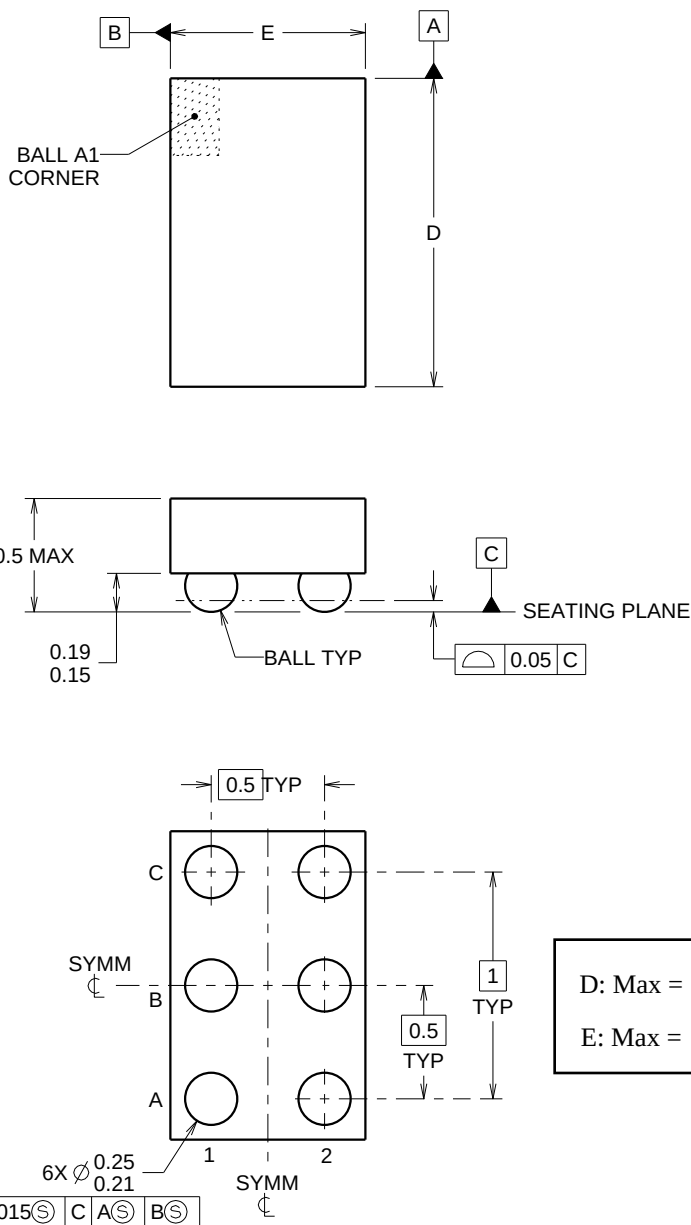
YZP0006



# PACKAGE OUTLINE

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



4219524/A 06/2014

## NOTES:

NanoFree Is a trademark of Texas Instruments.

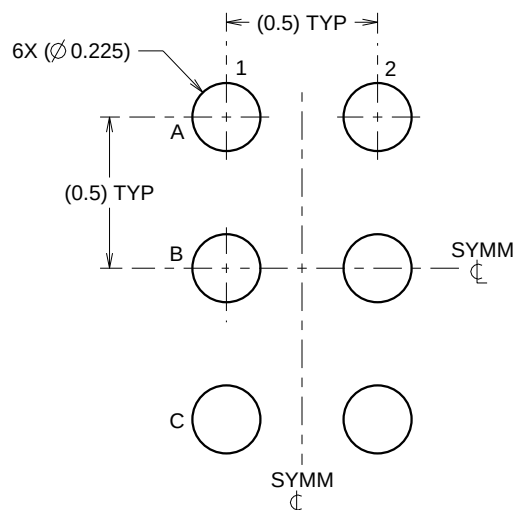
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. NanoFree™ package configuration.

# EXAMPLE BOARD LAYOUT

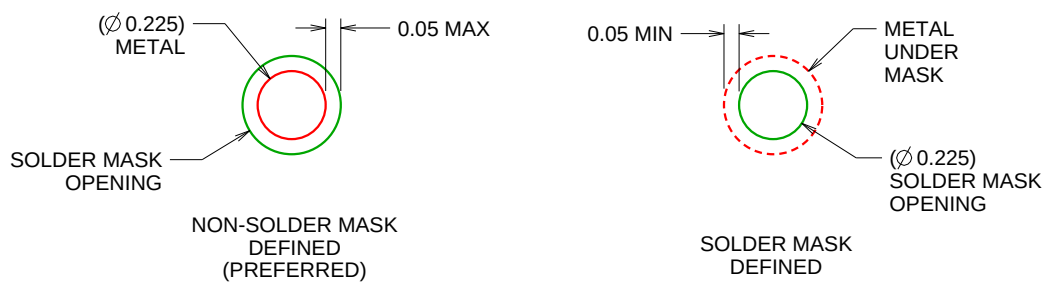
YZP0006

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE  
SCALE:40X



SOLDER MASK DETAILS  
NOT TO SCALE

4219524/A 06/2014

NOTES: (continued)

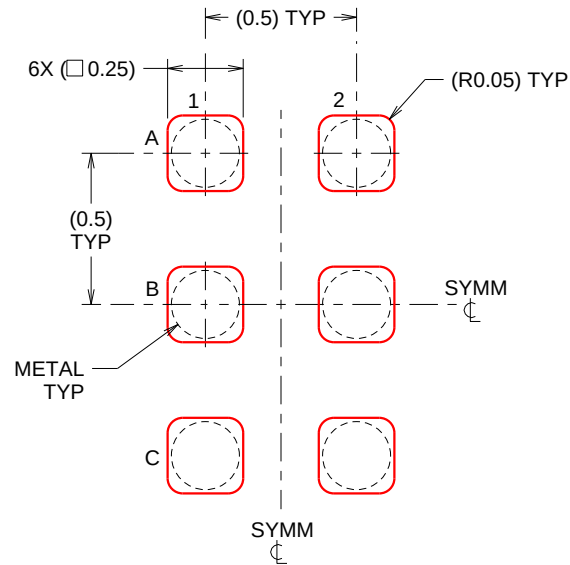
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SBVA017 ([www.ti.com/lit/sbva017](http://www.ti.com/lit/sbva017)).

## EXAMPLE STENCIL DESIGN

YZP0006

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



SOLDER PASTE EXAMPLE  
BASED ON 0.1 mm THICK STENCIL  
SCALE:40X

4219524/A 06/2014

NOTES: (continued)

5. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

## IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2025, Texas Instruments Incorporated