

# SN74LVC1G126 Single Bus Buffer Gate With 3-State Output

## 1 Features

- Available in the Texas Instruments NanoFree™ Package
- Supports 5-V  $V_{CC}$  Operation
- Inputs Accept Voltages to 5.5 V
- Provides Down Translation to  $V_{CC}$
- Max  $t_{pd}$  of 3.7 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
  - 200-V Machine Model
  - 1000-V Charged-Device Model

## 2 Applications

- Cable Modem Termination Systems
- High-Speed Data Acquisition and Generation
- Military: Radars and Sonars
- Motor Controls: High-Voltage
- Power Line Communication Modems
- SSDs: Internal or External
- Video Broadcasting and Infrastructure: Scalable Platforms
- Video Broadcasting: IP-Based Multi-Format Transcoders
- Video Communication Systems

## 3 Description

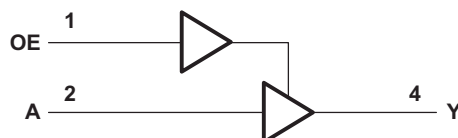
This single buffer is designed for 1.65-V to 3.6-V  $V_{CC}$  operation. The LVC1G126 device is a single line driver with 3-state output. The output is disabled when the output-enable input is low.

### Device Information<sup>(1)</sup>

| PART NUMBER  | PACKAGE (PIN) | BODY SIZE         |
|--------------|---------------|-------------------|
| SN74LVC1G126 | SOT-23 (5)    | 2.90 mm × 1.60 mm |
|              | SC70 (5)      | 2.00 mm × 1.25 mm |
|              | SOT (5)       | 1.60 mm × 1.20 mm |
|              | SON (6)       | 1.00 mm × 1.00 mm |
|              | XBGA (5)      | 1.40 mm × 0.90 mm |

(1) For all available packages, see the orderable addendum at the end of the data sheet.

## 4 Simplified Schematic



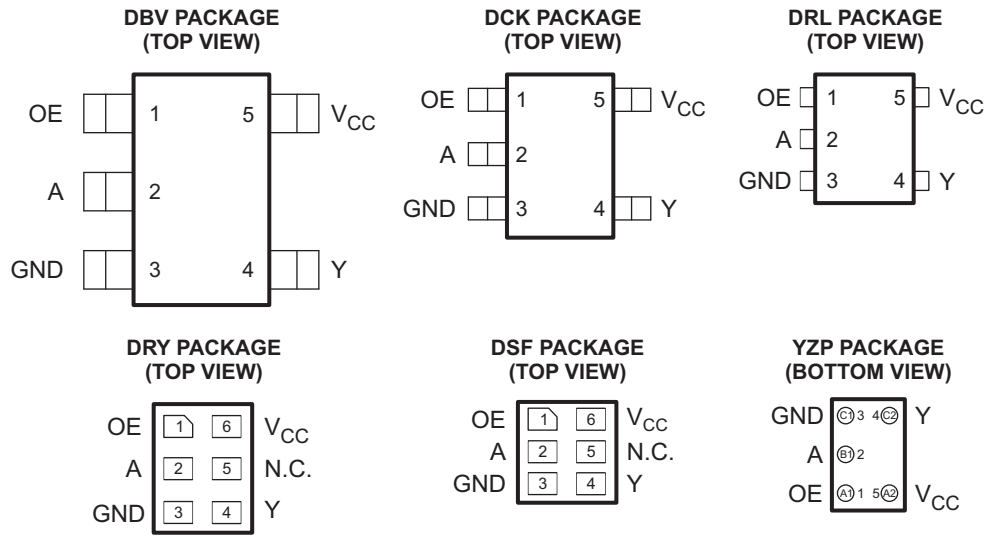
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## 5 Revision History

| Changes from Revision Q (December 2013) to Revision R                                                                                                                                                                                                                                                                                                                                                                                                          | Page         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <ul style="list-style-type: none"> <li>Added <i>Applications</i>, <i>Device Information</i> table, <i>Handling Ratings</i> table, <i>Feature Description</i> section, <i>Device Functional Modes</i>, <i>Application and Implementation</i> section, <i>Power Supply Recommendations</i> section, <i>Layout</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section. ....</li> </ul> | 1            |
| Changes from Revision P (November 2012) to Revision Q                                                                                                                                                                                                                                                                                                                                                                                                          | Page         |
| <ul style="list-style-type: none"> <li>Updated document to new TI data sheet format. ....</li> <li>Changed MAX operating temperature to <math>125^{\circ}\text{C}</math> in <i>Recommended Operating Conditions</i> table. ....</li> <li>Added ESD warning. ....</li> </ul>                                                                                                                                                                                    | 1<br>5<br>13 |
| Changes from Revision O (March 2011) to Revision P                                                                                                                                                                                                                                                                                                                                                                                                             | Page         |
| <ul style="list-style-type: none"> <li>Removed Ordering Information table. ....</li> </ul>                                                                                                                                                                                                                                                                                                                                                                     | 1            |
| Changes from Revision N (February 2007) to Revision O                                                                                                                                                                                                                                                                                                                                                                                                          | Page         |
| <ul style="list-style-type: none"> <li>Added DSF package option to the data sheet. ....</li> </ul>                                                                                                                                                                                                                                                                                                                                                             | 3            |

## 6 Pin Configuration and Functions



See mechanical drawings for dimensions.

### Pin Functions

| PIN             |                       |          | TYPE | DESCRIPTION     |
|-----------------|-----------------------|----------|------|-----------------|
| NAME            | SN74LVC1G126          |          |      |                 |
|                 | DBV, DCK,<br>DRL, YZP | DRY, DSF |      |                 |
| A               | 2                     | 2        | I    | A Input         |
| GND             | 3                     | 3        | —    | Ground Pin      |
| NC              | —                     | 5        | —    | Do not connect  |
| OE              | 1                     | 1        | I    | OE Enable/Input |
| V <sub>CC</sub> | 5                     | 6        | —    | Power Pin       |
| Y               | 4                     | 4        | O    | Y Output        |

## 7 Specifications

### 7.1 Absolute Maximum Ratings

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

|                  |                                                                                             | 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     |
| 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<sub>CC</sub> is provided in the *Recommended Operating Conditions* table.

### 7.2 ESD Ratings

| PARAMETER                                  | DEFINITION                                                                               | VALUE | UNIT |
|--------------------------------------------|------------------------------------------------------------------------------------------|-------|------|
| V <sub>(ESD)</sub> Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>              | 2000  | V    |
|                                            | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins <sup>(2)</sup> | 1000  |      |

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

### 7.3 Recommended Operating Conditions

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

|                 |                                    |                                                 | MIN                    | MAX                    | UNIT |
|-----------------|------------------------------------|-------------------------------------------------|------------------------|------------------------|------|
| V <sub>CC</sub> | Supply voltage                     | Operating                                       | 1.65                   | 5.5                    | V    |
|                 |                                    | 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                    |      |
|                 |                                    |                                                 |                        | –24                    |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V                         |                        | –32                    |      |
| I <sub>OL</sub> | Low-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                     |      |
|                 |                                    |                                                 |                        | 24                     |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V                         |                        | 32                     |      |
| 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                   |                        | 5                      |      |
| 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](#).

### 7.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |                                        | SN74LVC1G126 |        |        |        |        | UNIT |
|-------------------------------|----------------------------------------|--------------|--------|--------|--------|--------|------|
|                               |                                        | DBV          | DCK    | DRL    | DRY    | YZP    |      |
|                               |                                        | 5 PINS       | 5 PINS | 5 PINS | 6 PINS | 5 PINS |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance | 206          | 252    | 142    | 234    | 132    | °C/W |

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, [SPRA953](#).

## 7.5 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>   | A or OE 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>OZ</sub>  |                           | V <sub>O</sub> = 0 to 5.5 V                                                     | 3.6 V           | 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           | 4                     |                    |     | 4                     |                    |     | pF   |

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

## 7.6 Switching Characteristics, C<sub>L</sub> = 15 pF

over recommended operating free-air temperature range, C<sub>L</sub> = 15 pF (unless otherwise noted) (see Figure 3)

| PARAMETER       | FROM<br>(INPUT) | TO<br>(OUTPUT) | –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               | Y              | 1.7                                 | 6.9 | 0.6                                | 4.6 | 0.6                                | 3.7 | 0.5                              | 3.4 | ns   |

## 7.7 Switching Characteristics, –40°C to 85°C

over recommended operating free-air temperature range, C<sub>L</sub> = 30 pF or 50 pF (unless otherwise noted) (see Figure 4)

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | –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               | Y              | 2.6                                 | 8   | 1.1                                | 5.5 | 1                                  | 4.5 | 1                                | 4   | ns   |
| t <sub>en</sub>  | OE              | Y              | 2.8                                 | 9.4 | 1.3                                | 6.6 | 1.2                                | 5.3 | 1                                | 5   | ns   |
| t <sub>dis</sub> | OE              | Y              | 1.6                                 | 9.8 | 1                                  | 5.5 | 1                                  | 5.5 | 1                                | 4.2 | ns   |

## 7.8 Switching Characteristics, –40°C to 125°C

over recommended operating free-air temperature range,  $C_L = 30$  pF or 50 pF (unless otherwise noted) (see Figure 4)

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | –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               | Y              | 2.6                                 | 9   | 1.1                                | 5.7 | 1                                  | 4.7 | 1                                | 4.2 | ns   |
| t <sub>en</sub>  | OE              | Y              | 2.8                                 | 9.6 | 1.3                                | 6.8 | 1.2                                | 5.5 | 1                                | 5.2 | ns   |
| t <sub>dis</sub> | OE              | Y              | 1.6                                 | 10  | 1                                  | 5.7 | 1                                  | 5.7 | 1                                | 4.4 | ns   |

## 7.9 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<br>capacitance | Outputs enabled  | $f = 10\text{ MHz}$ |                    | 19                      | 19                      | 19                      | 21                    | pF   |
|                                           | Outputs disabled |                     |                    | 2                       | 2                       | 3                       | 4                     |      |

## 7.10 Typical Characteristics

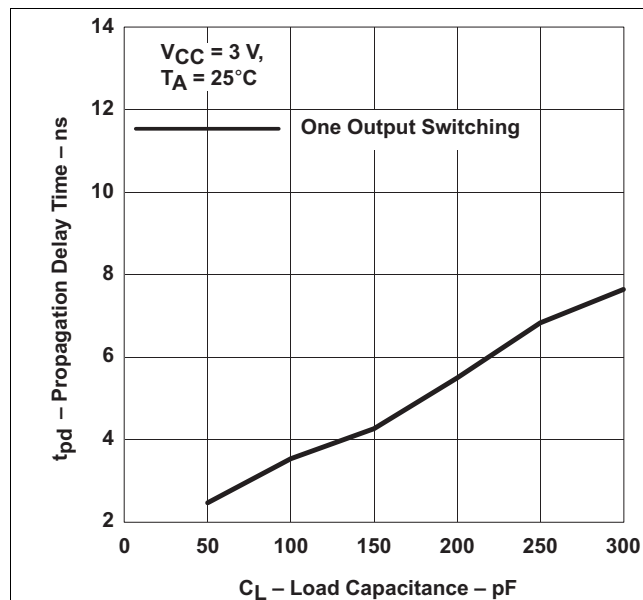


Figure 1. Propagation Delay (Low to High Transition) vs Load Capacitance

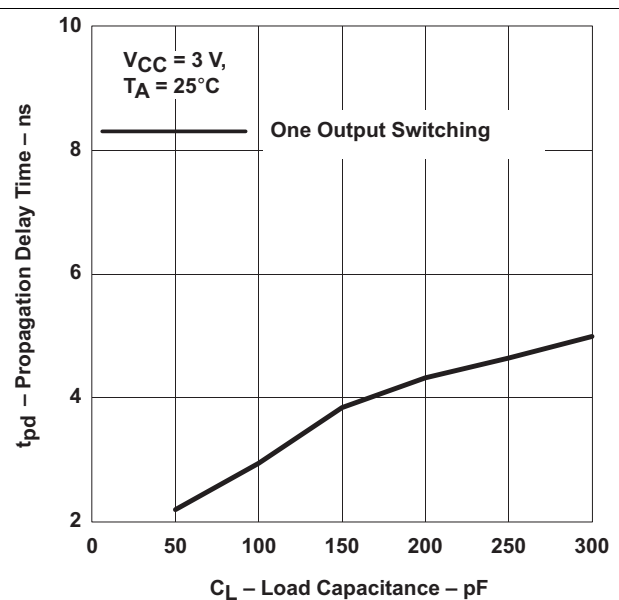
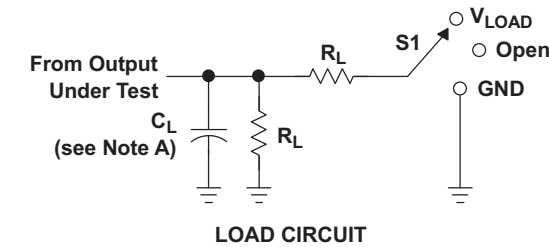


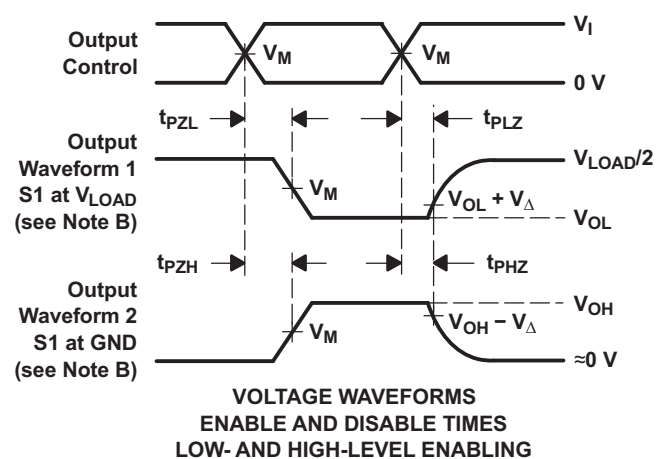
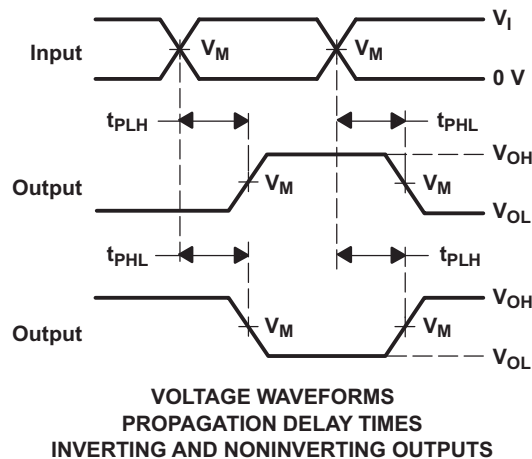
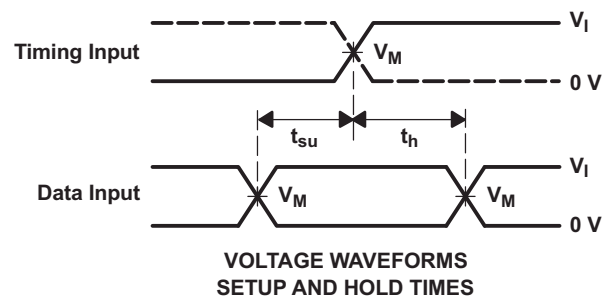
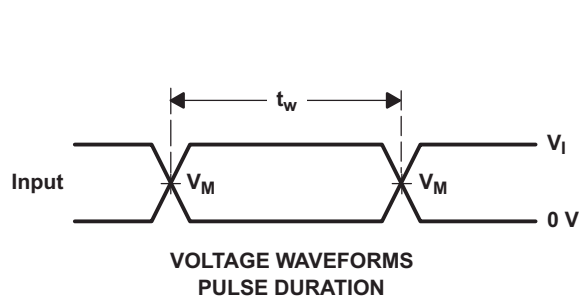
Figure 2. Propagation Delay (High to Low Transition) vs Load Capacitance

## 8 Parameter Measurement Information



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

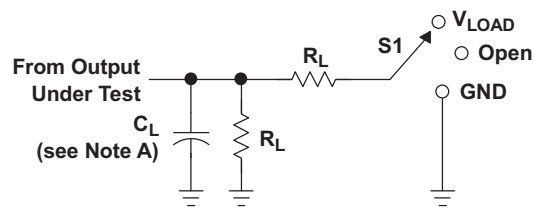
| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_r/t_f$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 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:
- $C_L$  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:  $PRR \leq 10\text{ MHz}$ ,  $Z_O = 50\text{ }\Omega$ .
  - 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 3. Load Circuit and Voltage Waveforms**

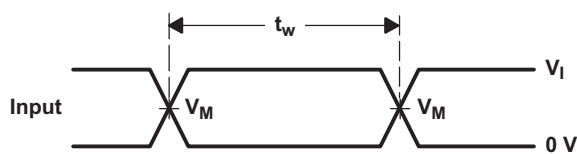
## Parameter Measurement Information (continued)



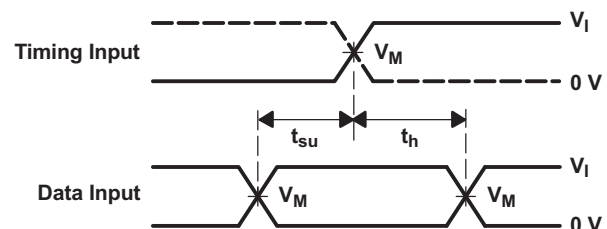
LOAD CIRCUIT

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

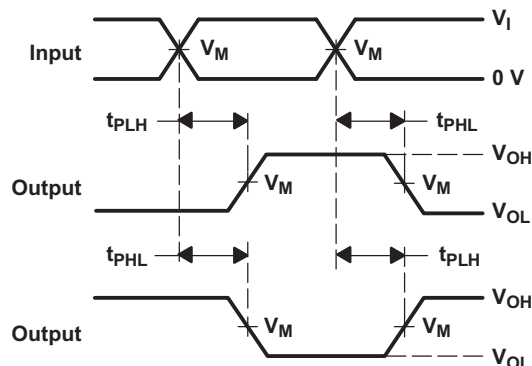
| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_r/t_f$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 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        |



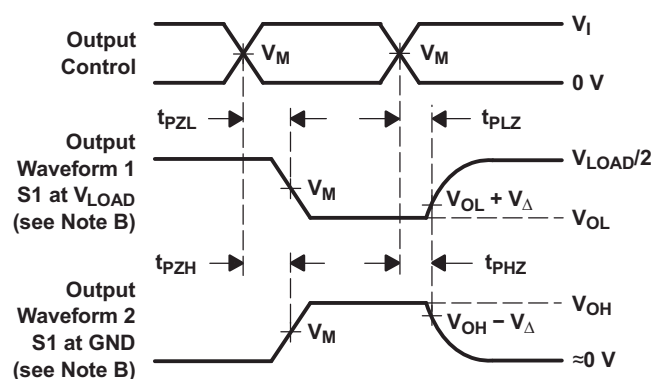
VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES  
LOW- AND HIGH-LEVEL ENABLING

- 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:  $PRR \leq 10\text{ MHz}$ ,  $Z_O = 50\text{ }\Omega$ .  
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 4. Load Circuit and Voltage Waveforms

## 9 Detailed Description

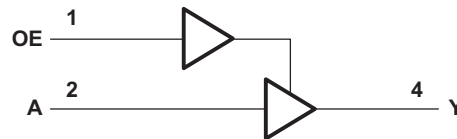
### 9.1 Overview

The SN74LVC1G126 device contains a dual buffer gate with output enable control and performs the Boolean function  $Y = A$ .

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.

To ensure the high-impedance state during power up or power down, OE should be tied to GND through a pull-down resistor; the minimum value of the resistor is determined by the current-sourcing capability of the driver.

### 9.2 Functional Block Diagram



### 9.3 Feature Description

- 1.65 V to 5.5 V operating voltage range
- Allows down voltage translation
  - 5 V to 3.3 V
  - 5 V or 3.3 V to 1.8 V
- Inputs accept voltages to 5.5 V
  - 5.5-V tolerance on input pin when  $V_{CC} = 0$  V
- $I_{off}$  feature
  - Allows voltage on the inputs and outputs when  $V_{CC}$  is 0 V
  - Able to reduce leakage when  $V_{CC}$  is 0 V

### 9.4 Device Functional Modes

**Table 1. Function Table**

| INPUTS |   | OUTPUT<br>Y |
|--------|---|-------------|
| OE     | A |             |
| H      | H | H           |
| H      | L | L           |
| L      | X | Z           |

## 10 Application and Implementation

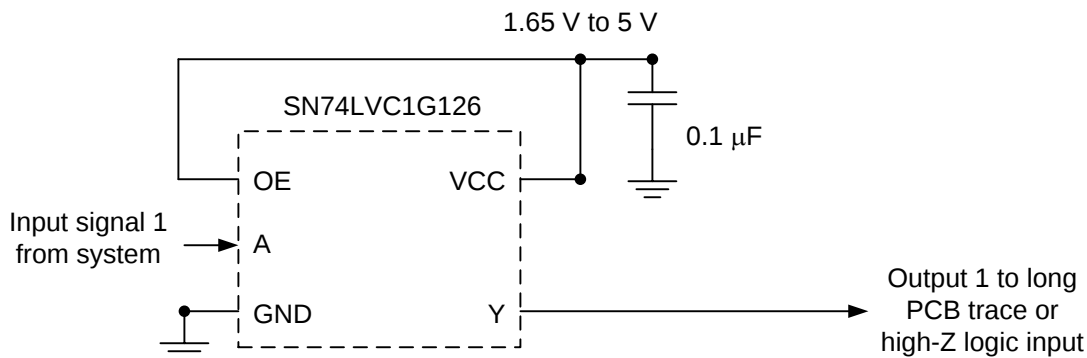
### NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

### 10.1 Application Information

The SN74LVC1G126 device is a high-drive CMOS device that can be used as an output enabled buffer with a high output drive, such as an LED application. It can produce 24 mA of drive current at 3.3 V, making it ideal for driving multiple outputs and good for high speed applications up to 100 MHz. The inputs are 5.5-V tolerant allowing it to translate down to  $V_{CC}$ .

### 10.2 Typical Application



**Figure 5. Application Schematic**

#### 10.2.1 Design Requirements

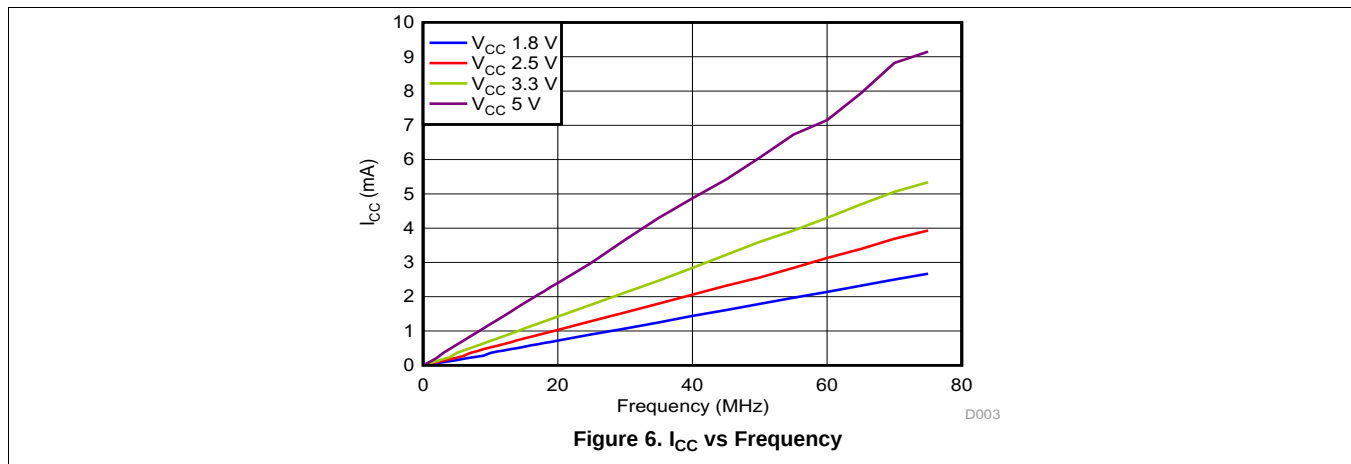
This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. Outputs can be combined to produce higher drive but the high drive will also create faster edges into light loads, so routing and load conditions should be considered to prevent ringing.

#### 10.2.2 Detailed Design Procedure

1. Recommended Input Conditions:
  - For rise time and fall time specifications, see  $\Delta t/\Delta V$  in the [Recommended Operating Conditions](#) table.
  - For specified high and low levels, see  $V_{IH}$  and  $V_{IL}$  in the [Recommended Operating Conditions](#) table.
  - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid  $V_{CC}$ .
2. Recommend Output Conditions:
  - Load currents should not exceed 50 mA per output and 100 mA total for the part.

## Typical Application (continued)

### 10.2.3 Application Curves



## 11 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the [Recommended Operating Conditions](#) table.

Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1- $\mu\text{F}$  capacitor is recommended. If there are multiple  $V_{CC}$  terminals, then 0.01- $\mu\text{F}$  or 0.022- $\mu\text{F}$  capacitors are recommended for each power terminal. It is ok to parallel multiple bypass capacitors to reject different frequencies of noise. Multiple bypass capacitors may be paralleled to reject different frequencies of noise. The bypass capacitor should be installed as close to the power terminal as possible for the best results.

## 12 Layout

### 12.1 Layout Guidelines

When using multiple bit logic devices, inputs should not float. In many cases, functions or parts of functions of digital logic devices are unused. Some examples are when only two inputs of a triple-input AND gate are used, or when only 3 of the 4-buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states.

Specified in [Figure 7](#) are rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or  $V_{CC}$ , whichever makes more sense or is more convenient. It is acceptable to float outputs unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the outputs section of the part when asserted. This will not disable the input section of the I/Os so they also cannot float when disabled.

### 12.2 Layout Example

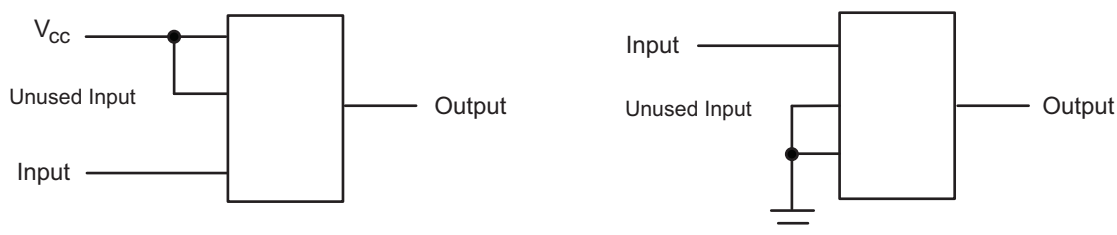


Figure 7. Layout Diagram

## 13 Device and Documentation Support

### 13.1 Trademarks

NanoFree is a trademark of Texas Instruments.  
All other trademarks are the property of their respective owners.

### 13.2 Electrostatic Discharge Caution



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.

### 13.3 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms and definitions.

## 14 Mechanical, Packaging, and Orderable Information

The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser based versions of this data sheet, refer to the left hand navigation.

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)                     | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|---------------------------------------------|-------------------------|
| 74LVC1G126DBVRE4 | ACTIVE        | SOT-23       | DBV                | 5    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | C26F                                        | <a href="#">Samples</a> |
| 74LVC1G126DBVRG4 | ACTIVE        | SOT-23       | DBV                | 5    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | C26F                                        | <a href="#">Samples</a> |
| 74LVC1G126DBVTE4 | ACTIVE        | SOT-23       | DBV                | 5    | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | C26F                                        | <a href="#">Samples</a> |
| 74LVC1G126DBVTG4 | ACTIVE        | SOT-23       | DBV                | 5    | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | C26F                                        | <a href="#">Samples</a> |
| 74LVC1G126DCKRE4 | ACTIVE        | SC70         | DCK                | 5    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | CN5                                         | <a href="#">Samples</a> |
| 74LVC1G126DCKRG4 | ACTIVE        | SC70         | DCK                | 5    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | CN5                                         | <a href="#">Samples</a> |
| 74LVC1G126DCKTG4 | ACTIVE        | SC70         | DCK                | 5    | 250            | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | CN5                                         | <a href="#">Samples</a> |
| 74LVC1G126DRLRG4 | ACTIVE        | SOT-5X3      | DRL                | 5    | 4000           | RoHS & Green    | NIPDAUAG                             | Level-1-260C-UNLIM   | -40 to 125   | (CN7, CNR)                                  | <a href="#">Samples</a> |
| SN74LVC1G126DBVR | ACTIVE        | SOT-23       | DBV                | 5    | 3000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 125   | (C265, C26F, C26J,<br>C26K, C26R, C<br>26T) | <a href="#">Samples</a> |
| SN74LVC1G126DBVT | ACTIVE        | SOT-23       | DBV                | 5    | 250            | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 125   | (C265, C26F, C26J,<br>C26K, C26R)           | <a href="#">Samples</a> |
| SN74LVC1G126DCKR | ACTIVE        | SC70         | DCK                | 5    | 3000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 125   | (CN5, CNF, CNJ, CN<br>K, CNR, CNT)          | <a href="#">Samples</a> |
| SN74LVC1G126DCKT | ACTIVE        | SC70         | DCK                | 5    | 250            | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 125   | (CN5, CNF, CNJ, CN<br>K, CNR)               | <a href="#">Samples</a> |
| SN74LVC1G126DRLR | ACTIVE        | SOT-5X3      | DRL                | 5    | 4000           | RoHS & Green    | NIPDAU   NIPDAUAG                    | Level-1-260C-UNLIM   | -40 to 125   | (CN7, CNR)                                  | <a href="#">Samples</a> |
| SN74LVC1G126DRYR | ACTIVE        | SON          | DRY                | 6    | 5000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | CN                                          | <a href="#">Samples</a> |
| SN74LVC1G126DSFR | ACTIVE        | SON          | DSF                | 6    | 5000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | CN                                          | <a href="#">Samples</a> |
| SN74LVC1G126YZPR | ACTIVE        | DSBGA        | YZP                | 5    | 3000           | RoHS & Green    | SNAGCU                               | Level-1-260C-UNLIM   | -40 to 85    | (CN7, CNN)                                  | <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.

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**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of  $\leq 1000$ ppm threshold. Antimony trioxide based flame retardants must also meet the  $\leq 1000$ ppm threshold requirement.

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

<sup>(4)</sup> There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

<sup>(5)</sup> Multiple Device Markings will be inside parentheses. Only one Device 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 Device Marking for that device.

<sup>(6)</sup> Lead finish/Ball material - Orderable Devices 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.

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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.

**OTHER QUALIFIED VERSIONS OF SN74LVC1G126 :**

- Automotive: [SN74LVC1G126-Q1](#)
- Enhanced Product: [SN74LVC1G126-EP](#)

NOTE: Qualified Version Definitions:

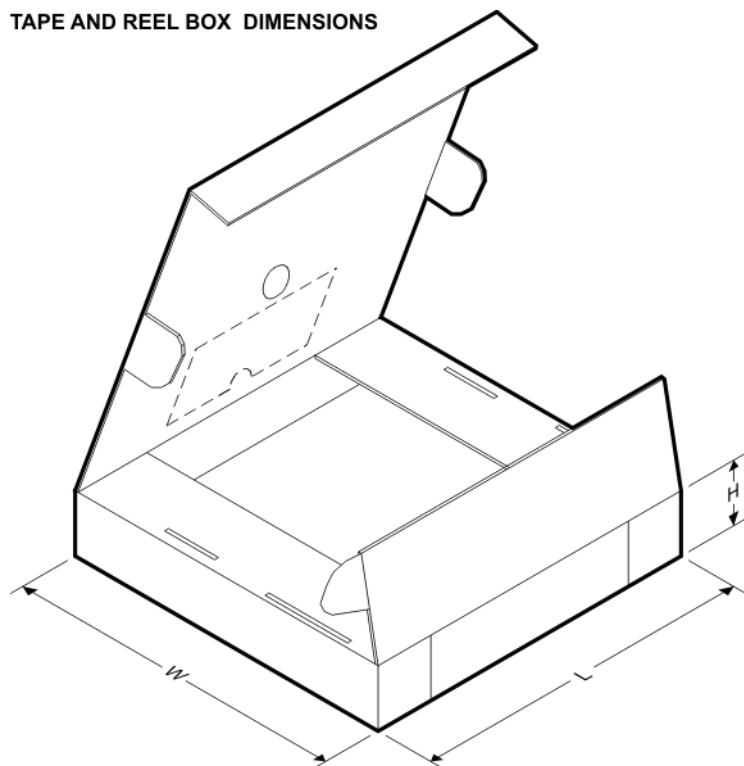
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

**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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 74LVC1G126DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| 74LVC1G126DBVTG4 | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| 74LVC1G126DCKRG4 | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| 74LVC1G126DCKTG4 | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.2                | 3.3     | 3.23    | 1.55    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DBVT | SOT-23       | DBV             | 5    | 250  | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.2                | 3.3     | 3.23    | 1.55    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DCKR | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DCKR | SC70         | DCK             | 5    | 3000 | 180.0              | 8.4                | 2.47    | 2.3     | 1.25    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DCKT | SC70         | DCK             | 5    | 250  | 180.0              | 8.4                | 2.47    | 2.3     | 1.25    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DRLR | SOT-5X3      | DRL             | 5    | 4000 | 180.0              | 9.5                | 1.78    | 1.78    | 0.69    | 4.0     | 8.0    | Q3            |

| 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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LVC1G126DRLR | SOT-5X3      | DRL             | 5    | 4000 | 180.0              | 8.4                | 1.98    | 1.78    | 0.69    | 4.0     | 8.0    | Q3            |
| SN74LVC1G126DRYR | SON          | DRY             | 6    | 5000 | 180.0              | 8.4                | 1.2     | 1.65    | 0.69    | 4.0     | 8.0    | Q1            |
| SN74LVC1G126DSFR | SON          | DSF             | 6    | 5000 | 180.0              | 9.5                | 1.16    | 1.16    | 0.5     | 4.0     | 8.0    | Q2            |
| SN74LVC1G126YZPR | DSBGA        | YZP             | 5    | 3000 | 178.0              | 9.2                | 1.02    | 1.52    | 0.63    | 4.0     | 8.0    | Q1            |

**TAPE AND REEL BOX DIMENSIONS**


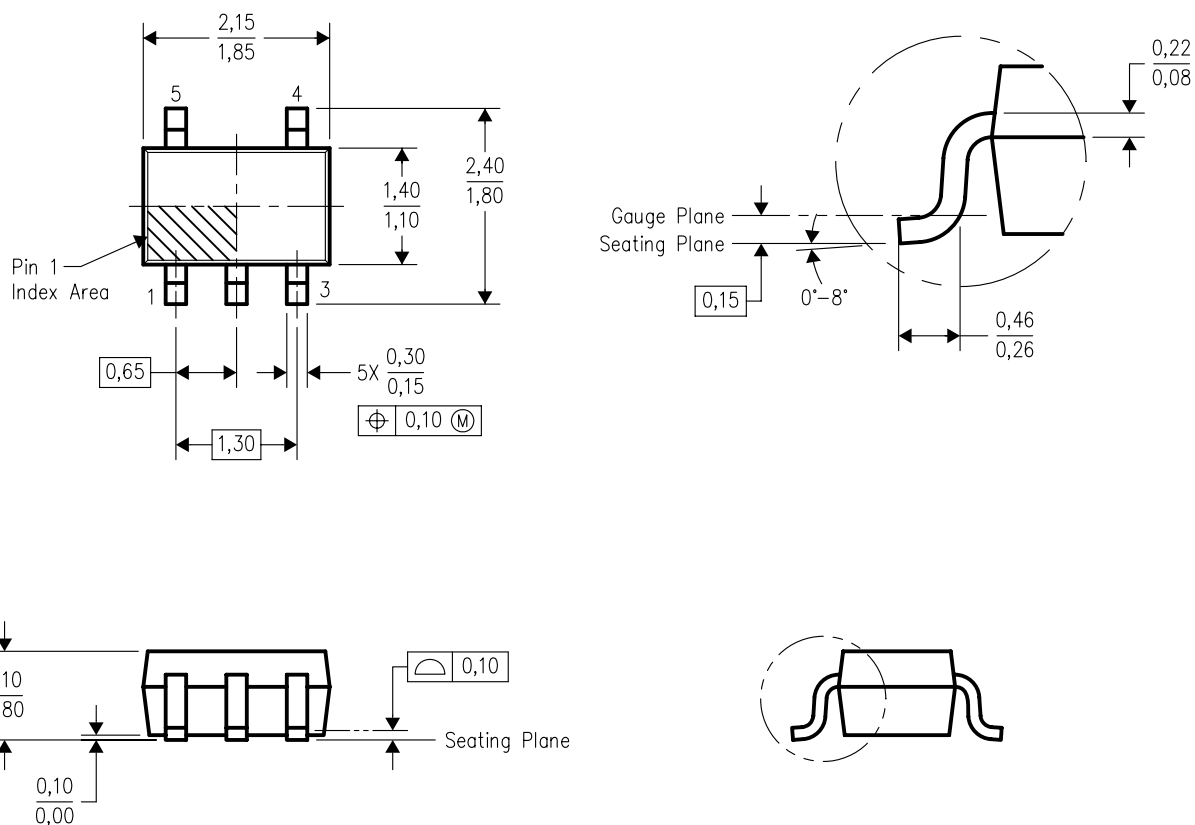
\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 74LVC1G126DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| 74LVC1G126DBVTG4 | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| 74LVC1G126DCKRG4 | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| 74LVC1G126DCKTG4 | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DBVR | SOT-23       | DBV             | 5    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74LVC1G126DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DBVT | SOT-23       | DBV             | 5    | 250  | 202.0       | 201.0      | 28.0        |
| SN74LVC1G126DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |

| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LVC1G126DCKR | SC70         | DCK             | 5    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74LVC1G126DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G126DCKT | SC70         | DCK             | 5    | 250  | 202.0       | 201.0      | 28.0        |
| SN74LVC1G126DRLR | SOT-5X3      | DRL             | 5    | 4000 | 184.0       | 184.0      | 19.0        |
| SN74LVC1G126DRLR | SOT-5X3      | DRL             | 5    | 4000 | 202.0       | 201.0      | 28.0        |
| SN74LVC1G126DRYR | SON          | DRY             | 6    | 5000 | 200.0       | 183.0      | 25.0        |
| SN74LVC1G126DSFR | SON          | DSF             | 6    | 5000 | 184.0       | 184.0      | 19.0        |
| SN74LVC1G126YZPR | DSBGA        | YZP             | 5    | 3000 | 220.0       | 220.0      | 35.0        |

## DCK (R-PDSO-G5)

## PLASTIC SMALL-OUTLINE PACKAGE

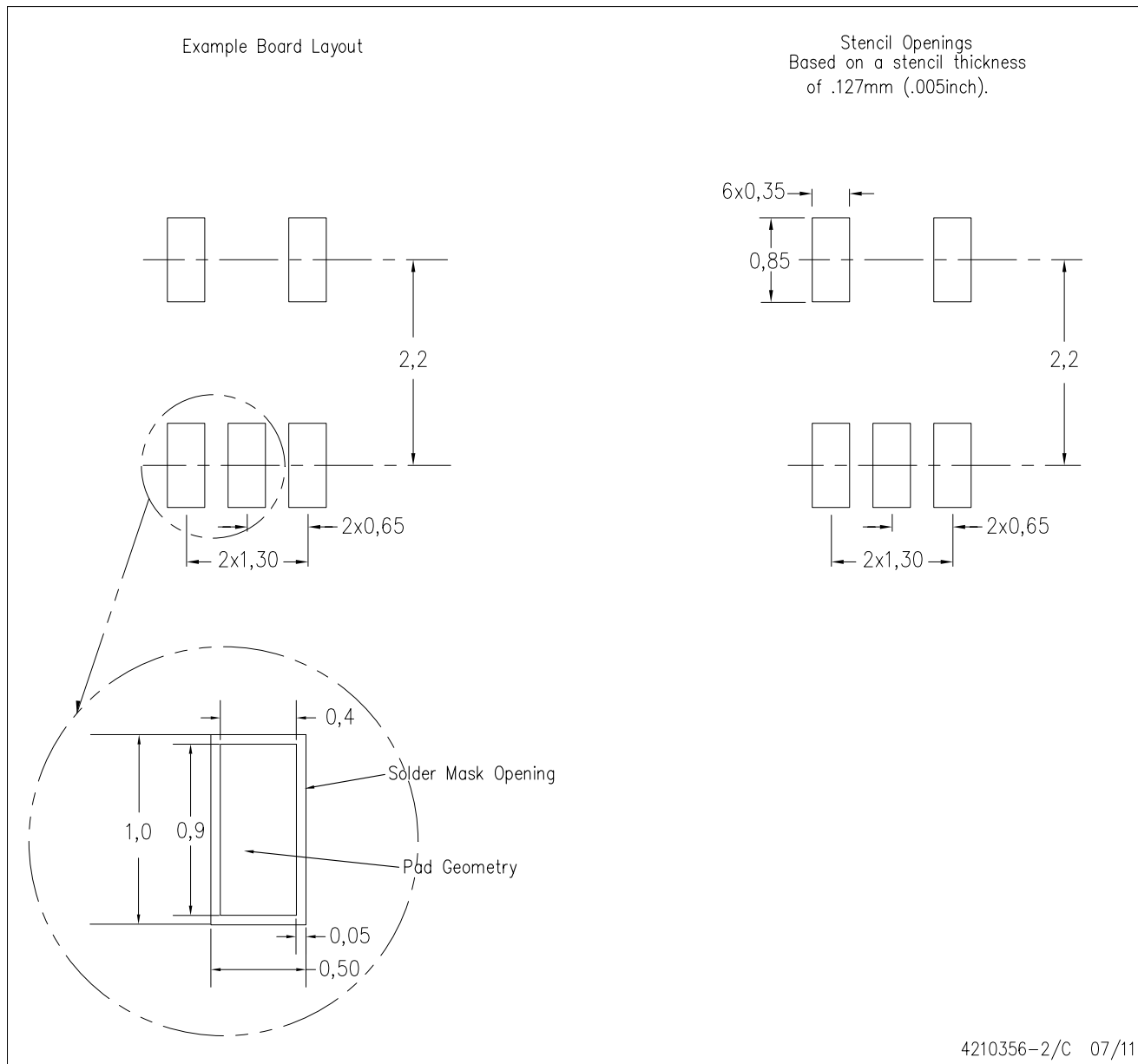


4093553-3/G 01/2007

- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
  - Falls within JEDEC MO-203 variation AA.

DCK (R-PDSO-G5)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
  - D. Publication IPC-7351 is recommended for alternate designs.
  - E. 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. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

## GENERIC PACKAGE VIEW

**DRY 6**

**USON - 0.6 mm max height**

PLASTIC SMALL OUTLINE - NO LEAD



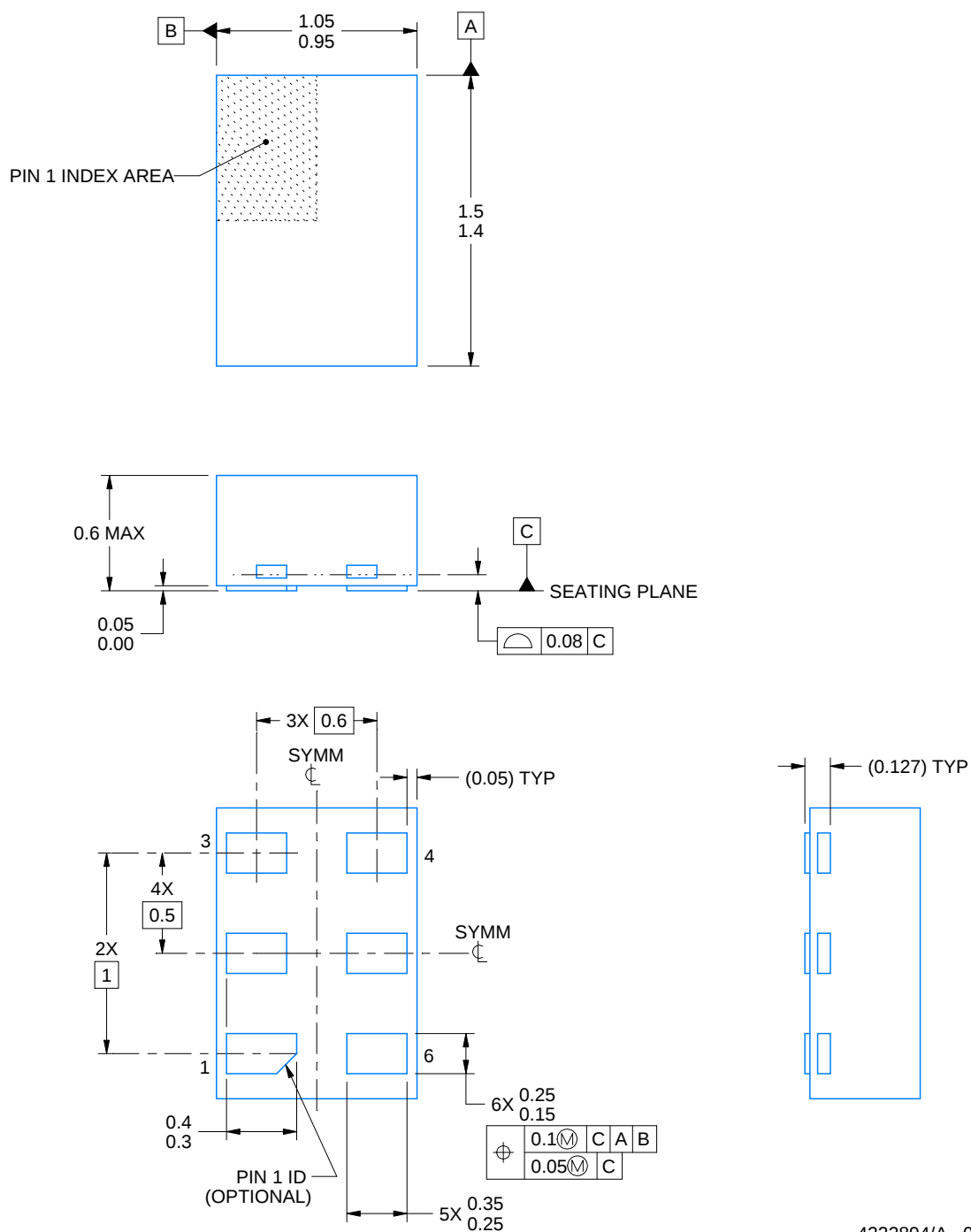
Images above are just a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.

4207181/G



### USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



4222894/A 01/2018

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

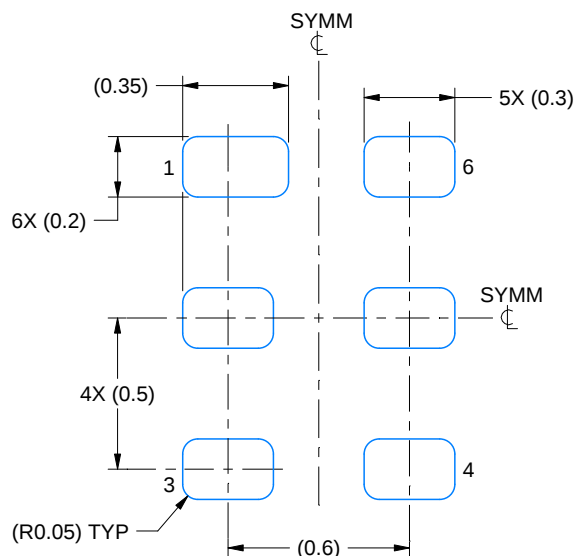
2. This drawing is subject to change without notice.

# EXAMPLE BOARD LAYOUT

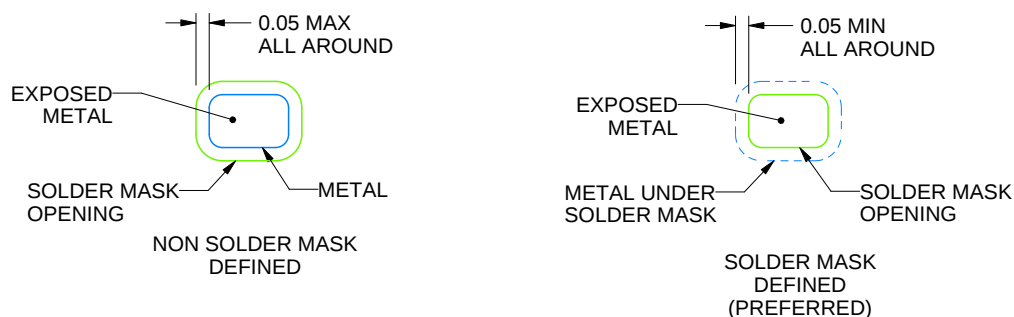
DRY0006A

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)

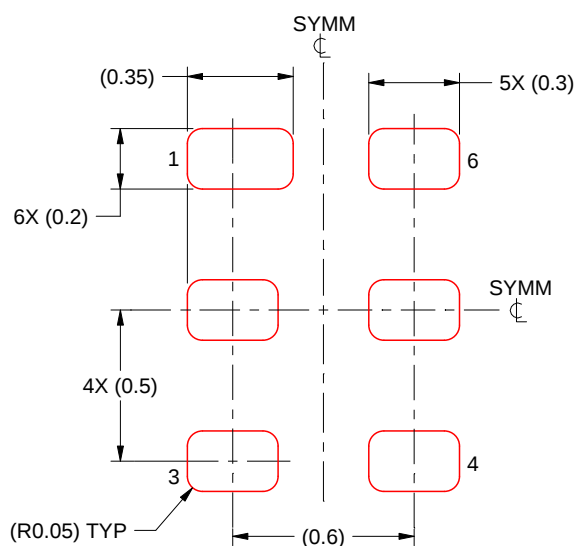
3. For more information, see QFN/SON PCB application report in literature No. SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).

## 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.

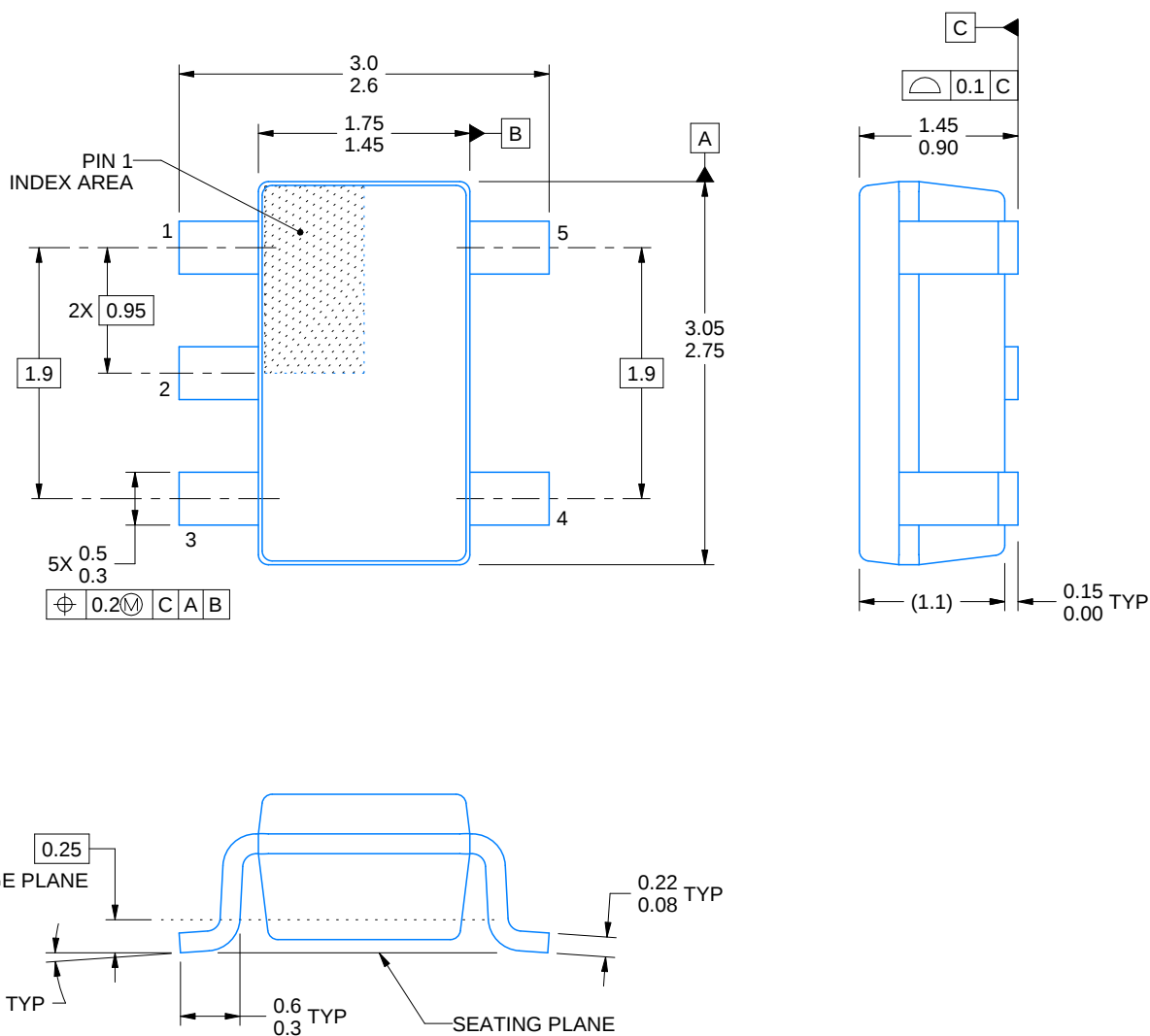


**DBV0005A**

# PACKAGE OUTLINE

**SOT-23 - 1.45 mm max height**

SMALL OUTLINE TRANSISTOR



4214839/F 06/2021

## NOTES:

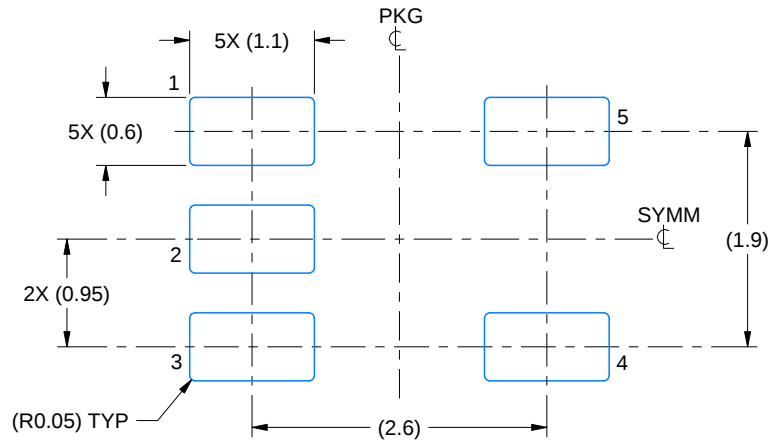
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.
4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25 mm per side.

# EXAMPLE BOARD LAYOUT

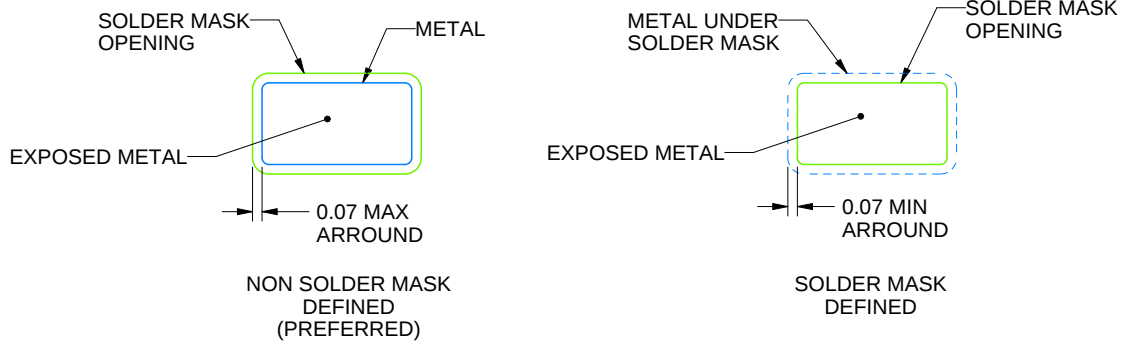
DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4214839/F 06/2021

NOTES: (continued)

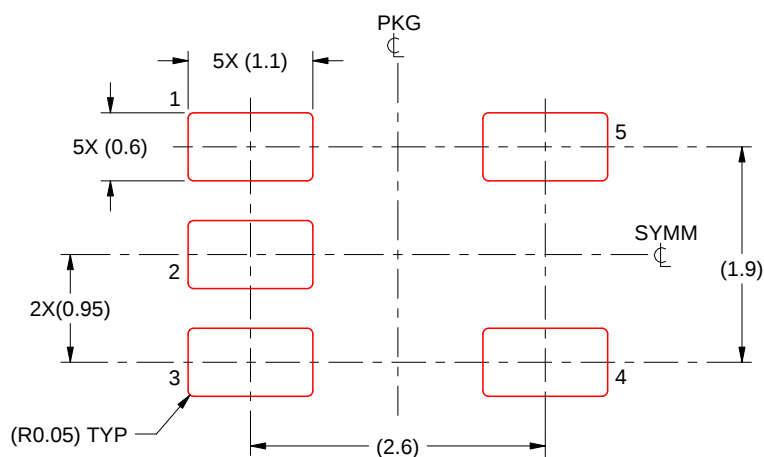
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



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

4214839/F 06/2021

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.

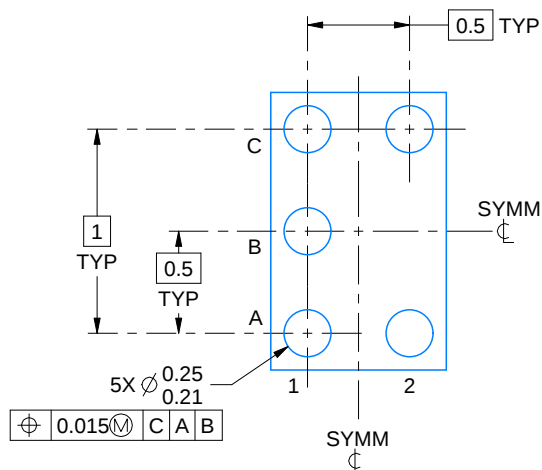
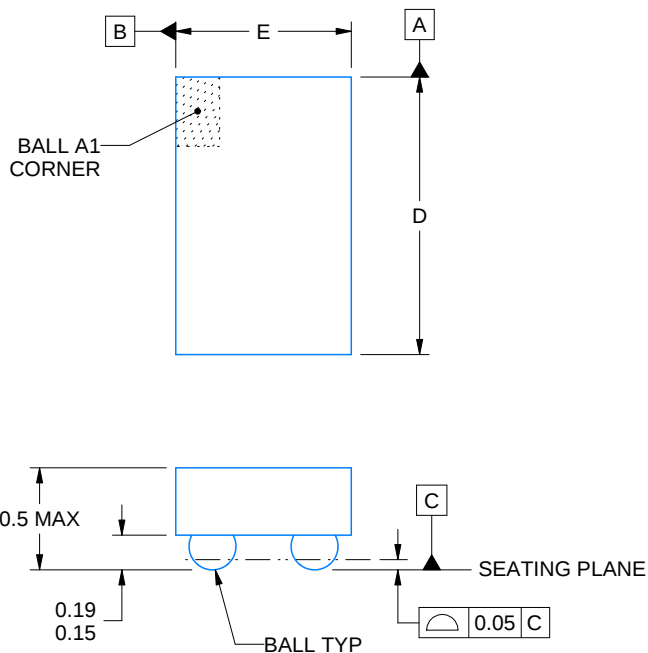
YZP0005



# PACKAGE OUTLINE

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



D: Max = 1.44 mm, Min = 1.38 mm  
E: Max = 0.94 mm, Min = 0.88 mm

4219492/A 05/2017

## NOTES:

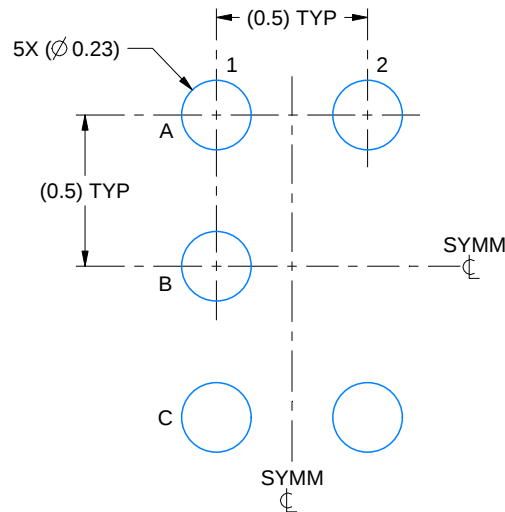
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

# EXAMPLE BOARD LAYOUT

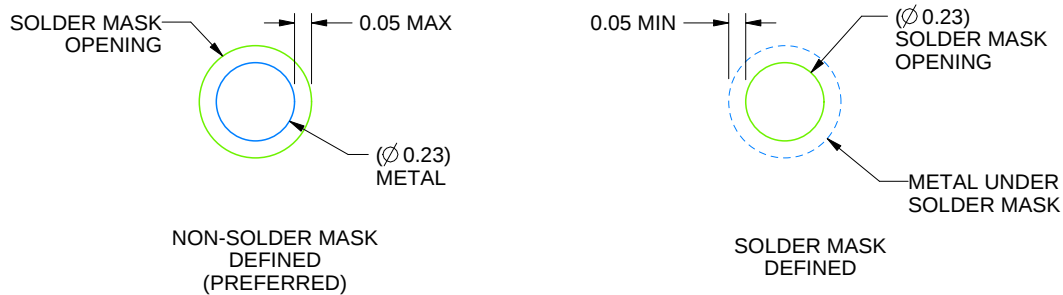
YZP0005

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE  
SCALE:40X



SOLDER MASK DETAILS  
NOT TO SCALE

4219492/A 05/2017

NOTES: (continued)

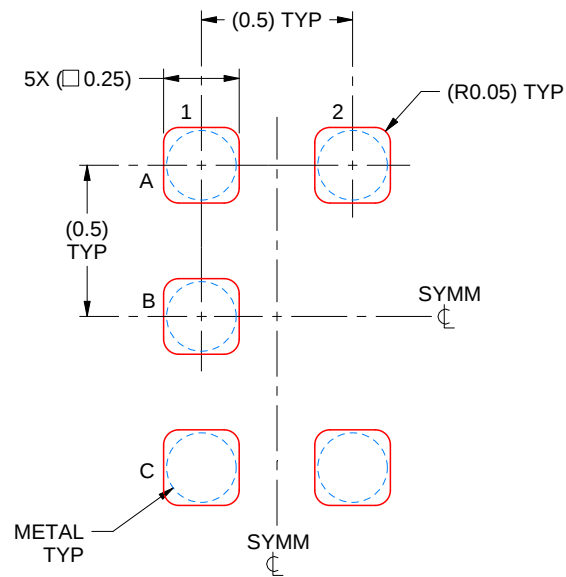
- Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SNVA009 ([www.ti.com/lit/snva009](http://www.ti.com/lit/snva009)).

## EXAMPLE STENCIL DESIGN

YZP0005

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



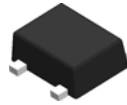
SOLDER PASTE EXAMPLE  
BASED ON 0.1 mm THICK STENCIL  
SCALE:40X

4219492/A 05/2017

NOTES: (continued)

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

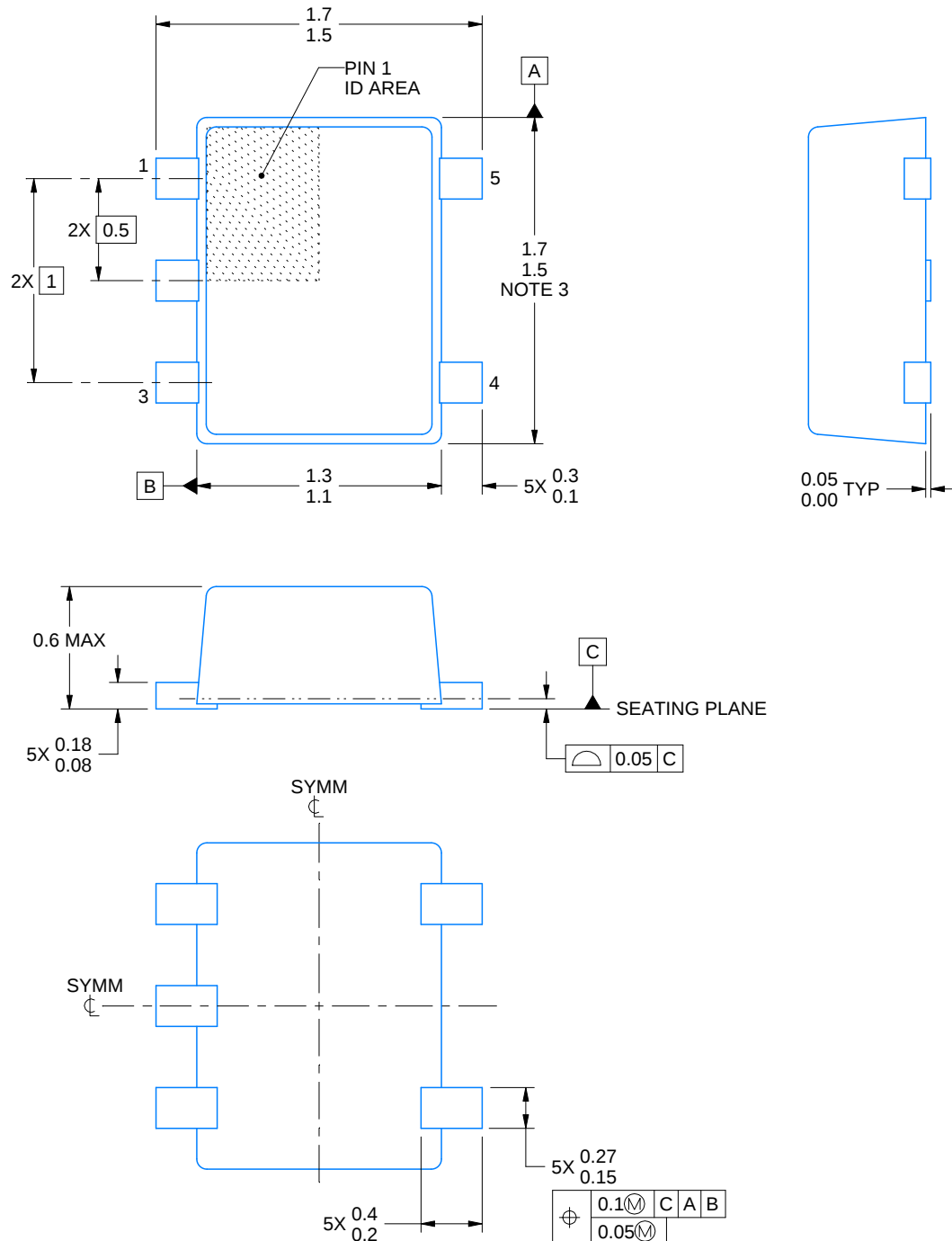
DRL0005A



## PACKAGE OUTLINE

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



4220753/B 12/2020

### NOTES:

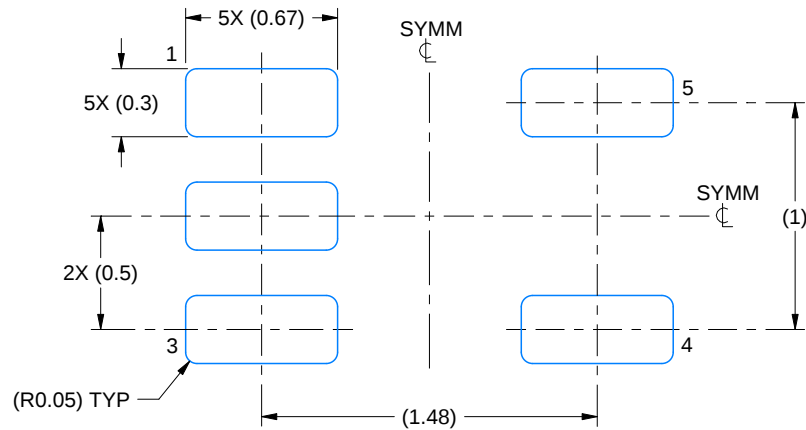
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or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

# EXAMPLE BOARD LAYOUT

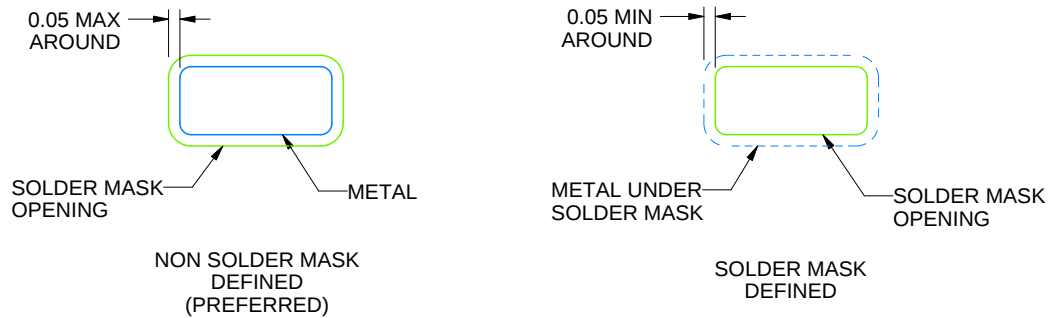
DRL0005A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



LAND PATTERN EXAMPLE  
SCALE:30X



SOLDERMASK DETAILS

4220753/B 12/2020

NOTES: (continued)

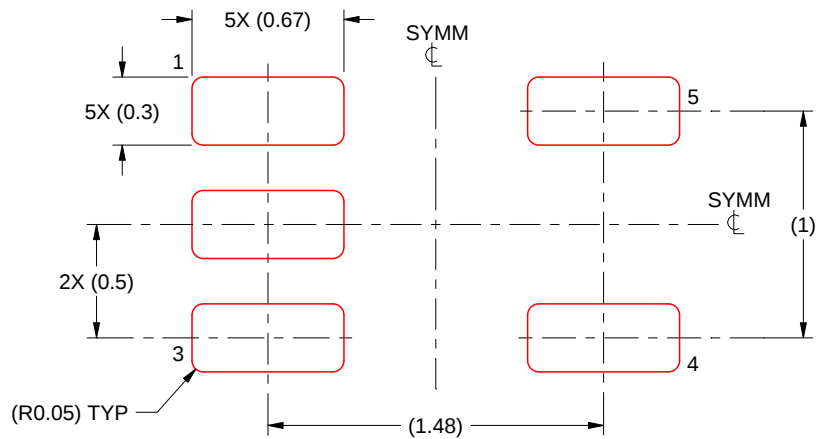
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DRL0005A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE

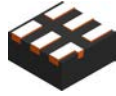


SOLDER PASTE EXAMPLE  
BASED ON 0.1 mm THICK STENCIL  
SCALE:30X

4220753/B 12/2020

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.

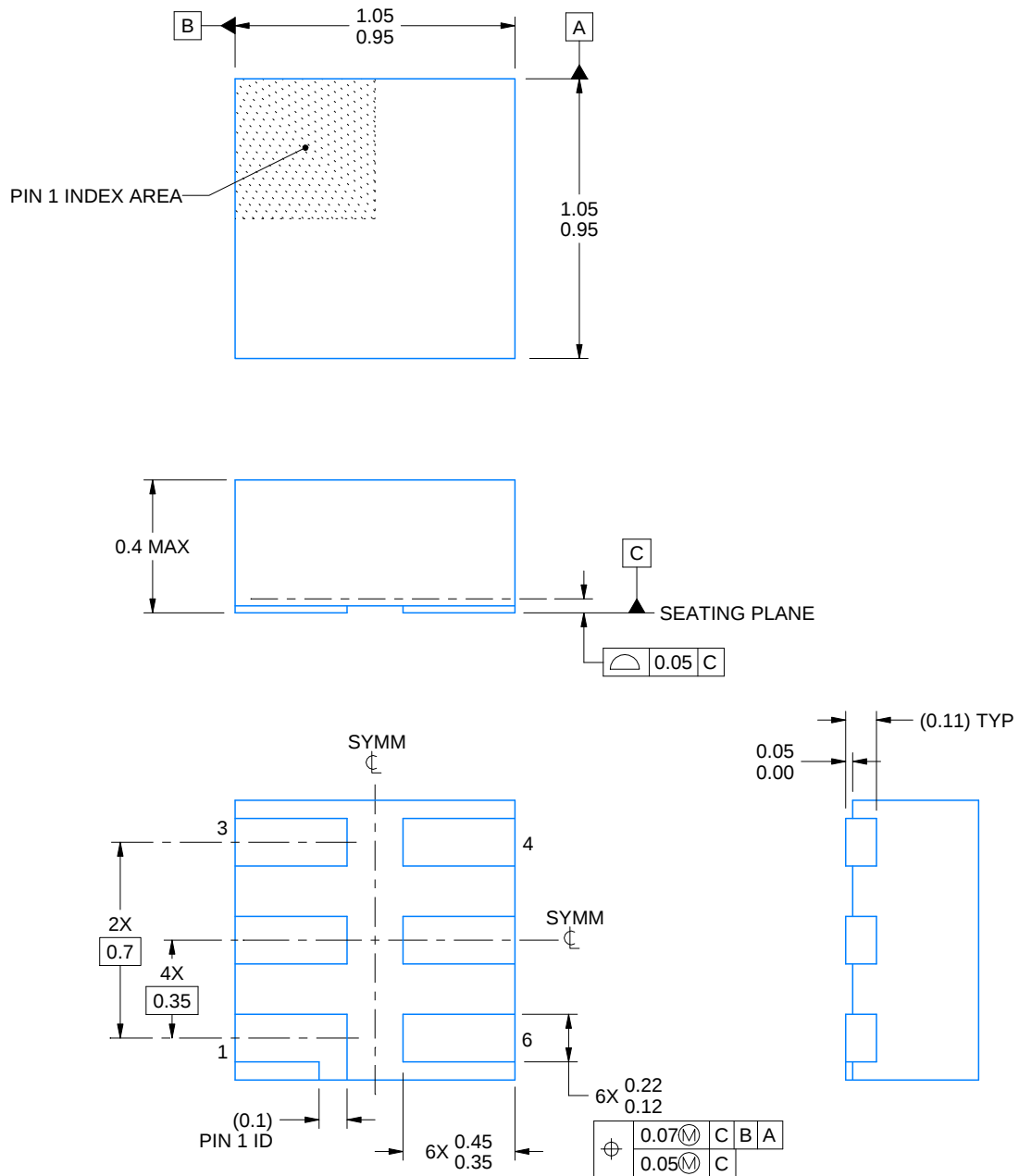


DSF0006A

## PACKAGE OUTLINE

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



4220597/A 06/2017

### NOTES:

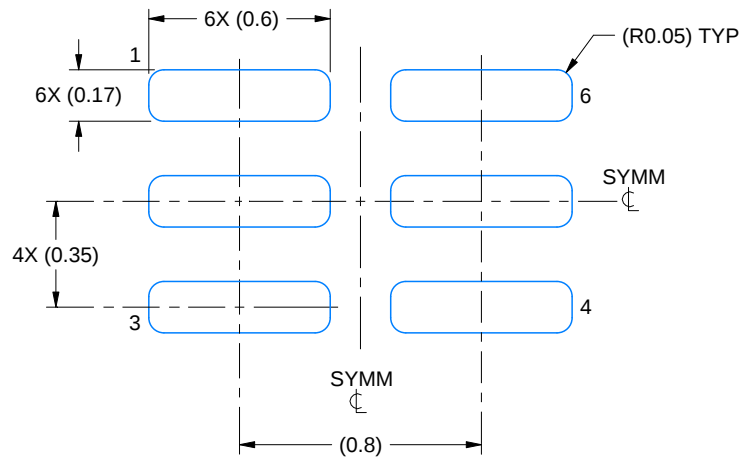
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration MO-287, variation X2AAF.

# EXAMPLE BOARD LAYOUT

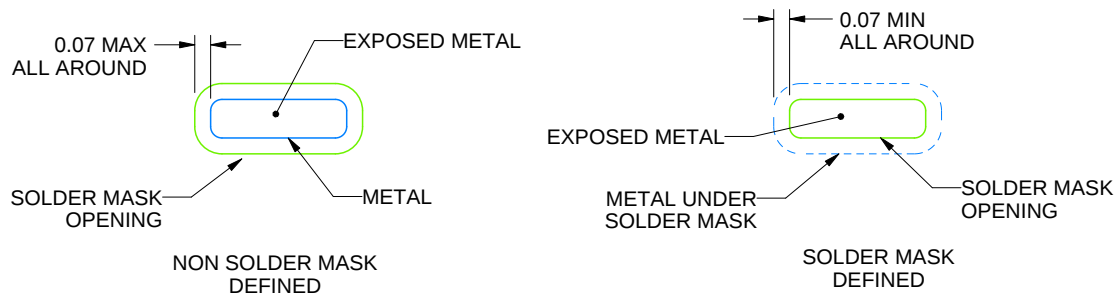
DSF0006A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:40X



SOLDER MASK DETAILS

4220597/A 06/2017

NOTES: (continued)

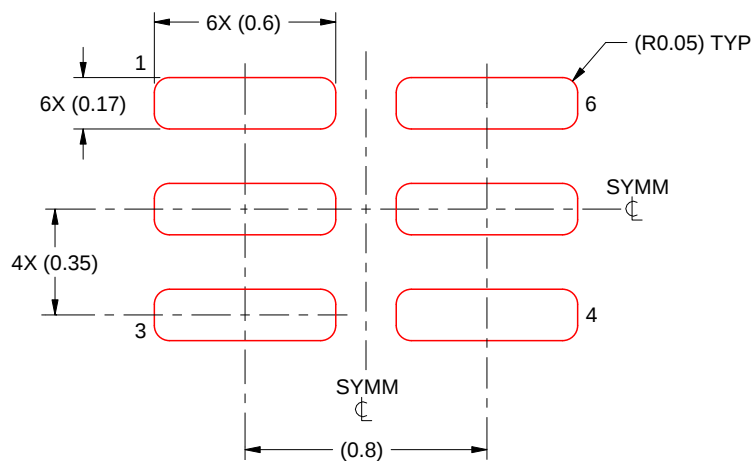
4. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).

## EXAMPLE STENCIL DESIGN

DSF0006A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL

PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE  
SCALE:40X

4220597/A 06/2017

4. 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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