

# SN74LVC1G126-Q1 Single Bus Buffer Gate With 3-State Output

## 1 Features

- Qualified for automotive applications
- Supports 5-V  $V_{CC}$  operation
- Inputs accept voltages to 5.5 V
- Provides down translation to  $V_{CC}$
- 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

## 2 Applications

- Cable modem termination systems
- High-speed data acquisition and generation
- 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

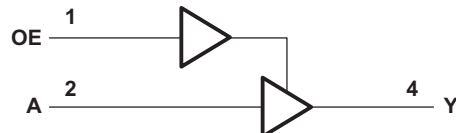
## 3 Description

The SN74LVC1G126-Q1 device is a single line driver with 3-state output. The output is disabled when the output-enable input is low.

### Device Information

| PART NUMBER    | PACKAGE (PIN) <sup>(1)</sup> | BODY SIZE         |
|----------------|------------------------------|-------------------|
| 1P1G126QDBVRQ1 | SOT-23 (5)                   | 2.90 mm × 1.60 mm |
| 1P1G126QDRYRQ1 | SON (6)                      | 1.00 mm × 1.00 mm |

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



**Simplified Schematic**



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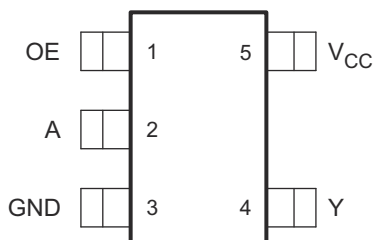
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## 4 Revision History

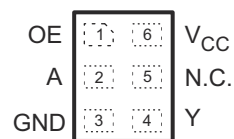
| Changes from Revision C (April 2019) to Revision D (August 2020)                                                                                                                                           | Page |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| • Corrected values in features list.....                                                                                                                                                                   | 1    |
| • Updated the numbering format for tables, figures and cross-references throughout the document.....                                                                                                       | 1    |
| • Updated <i>Description</i> and <i>Device Information</i> table.....                                                                                                                                      | 1    |
| • Deleted incorrect history tags from revision C: Changed 1.65-V to 3.6-V VCC to 1.65-V to 5-V VCC operation and Changed MAX operating temperature to 125°C in Recommended Operating Conditions table..... | 2    |
| • Changed ESD ratings table to automotive format.....                                                                                                                                                      | 4    |
| • Corrected $I_{OH}$ and $I_{OL}$ MAX values in <i>Recommended Operating Conditions</i> table .....                                                                                                        | 5    |
| • Corrected <i>Electrical Characteristics</i> table.....                                                                                                                                                   | 6    |
| • Removed <i>Switching Characteristics</i> , $CL = 15\text{ pF}$ and <i>Switching Characteristics</i> , $-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ tables.....                                          | 7    |
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| • Updated document to new TI data sheet format, removed Ordering Information table, and added <i>Applications</i> list and <i>Device Information</i> table..... | 1    |
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## 5 Pin Configuration and Functions



**Figure 5-1. DBV Package 5-Pin SOT-23 Top View**



N.C. is no connection

See all mechanical drawings at the end of this data sheet for package dimensions.

**Figure 5-2. DRY Package 6-Pin SON Transparent Top View**

**Table 5-1. Pin Functions**

| NAME            | PIN             |              | TYPE | DESCRIPTION     |
|-----------------|-----------------|--------------|------|-----------------|
|                 | DBV<br>(SOT-23) | DRY<br>(SON) |      |                 |
| A               | 2               | 2            | I    | A Input         |
| GND             | 3               | 3            | —    | Ground Pin      |
| NC              | —               | 5            | —    | No connection   |
| OE              | 1               | 1            | I    | OE Enable/Input |
| V <sub>CC</sub> | 5               | 6            | —    | Power Pin       |
| Y               | 4               | 4            | O    | Y Output        |

## 6 Specifications

### 6.1 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.

### 6.2 ESD Ratings

| PARAMETER          | DEFINITION              | VALUE                                                   | UNIT  |
|--------------------|-------------------------|---------------------------------------------------------|-------|
| V <sub>(ESD)</sub> | Electrostatic discharge | Human body model (HBM), per AEC Q100-002 <sup>(1)</sup> | ±2000 |
|                    |                         | Charged device model (CDM), per AEC Q100-011            | ±1000 |

- (1) AEC Q100-002 indicates that HBM stressing shall be in accordance with the ANSI/ESDA/JEDEC JS-001 specification.

## 6.3 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                         |                        | –24                    |      |
| 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                         |                        | 24                     |      |
| 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](#).

## 6.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |                                              | SN74LVC1G126-Q1 |        | UNIT |
|-------------------------------|----------------------------------------------|-----------------|--------|------|
|                               |                                              | DBV             | DRY    |      |
|                               |                                              | 5 PINS          | 6 PINS |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance       | 240.9           | 279.0  | °C/W |
| R <sub>θJC(top)</sub>         | Junction-to-case (top) thermal resistance    | 165.8           | 182.7  | °C/W |
| R <sub>θJB</sub>              | Junction-to-board thermal resistance         | 143.2           | 154.5  | °C/W |
| ψ <sub>JT</sub>               | Junction-to-top characterization parameter   | 84.4            | 31.3   | °C/W |
| ψ <sub>JB</sub>               | Junction-to-board characterization parameter | 142.5           | 153.8  | °C/W |
| R <sub>θJC(bot)</sub>         | Junction-to-case (bottom) thermal resistance | –               | –      | °C/W |

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

## 6.5 Electrical Characteristics

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

| PARAMETER        |                | TEST CONDITIONS                                                                 | V <sub>CC</sub> | MIN                   | TYP <sup>(1)</sup> | MAX  | UNIT |
|------------------|----------------|---------------------------------------------------------------------------------|-----------------|-----------------------|--------------------|------|------|
| V <sub>OH</sub>  |                | I <sub>OH</sub> = –100 µA                                                       | 1.65 V to 5.5 V | V <sub>CC</sub> – 0.1 |                    |      | V    |
|                  |                | I <sub>OH</sub> = –4 mA                                                         | 1.65 V          | 1.2                   |                    |      |      |
|                  |                | I <sub>OH</sub> = –8 mA                                                         | 2.3 V           | 1.9                   |                    |      |      |
|                  |                | I <sub>OH</sub> = –16 mA                                                        | 3 V             | 2.4                   |                    |      |      |
|                  |                | I <sub>OH</sub> = –24 mA                                                        | 3 V             | 2.3                   |                    |      |      |
|                  |                |                                                                                 | 4.5 V           | 3.8                   |                    |      |      |
| V <sub>OL</sub>  |                | I <sub>OL</sub> = 100 µA                                                        | 1.65 V to 5.5 V |                       |                    | 0.1  | V    |
|                  |                | I <sub>OL</sub> = 4 mA                                                          | 1.65 V          |                       |                    | 0.45 |      |
|                  |                | I <sub>OL</sub> = 8 mA                                                          | 2.3 V           |                       |                    | 0.3  |      |
|                  |                | I <sub>OL</sub> = 16 mA                                                         | 3 V             |                       |                    | 0.4  |      |
|                  |                | I <sub>OL</sub> = 24 mA                                                         | 3 V             |                       |                    | 0.55 |      |
|                  |                |                                                                                 | 4.5 V           |                       |                    | 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   | µA   |
| I <sub>off</sub> |                | V <sub>I</sub> or V <sub>O</sub> = 5.5 V                                        | 0               |                       |                    | ±10  | µA   |
| I <sub>OZ</sub>  |                | V <sub>O</sub> = 0 to 5.5 V                                                     | 3.6 V           |                       |                    | 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   | 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  | µA   |
| C <sub>i</sub>   |                | V <sub>I</sub> = V <sub>CC</sub> or GND                                         | 3.3 V           |                       | 4                  |      | pF   |

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

## 6.6 Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 50$  pF (unless otherwise noted) (see Figure 7-1)

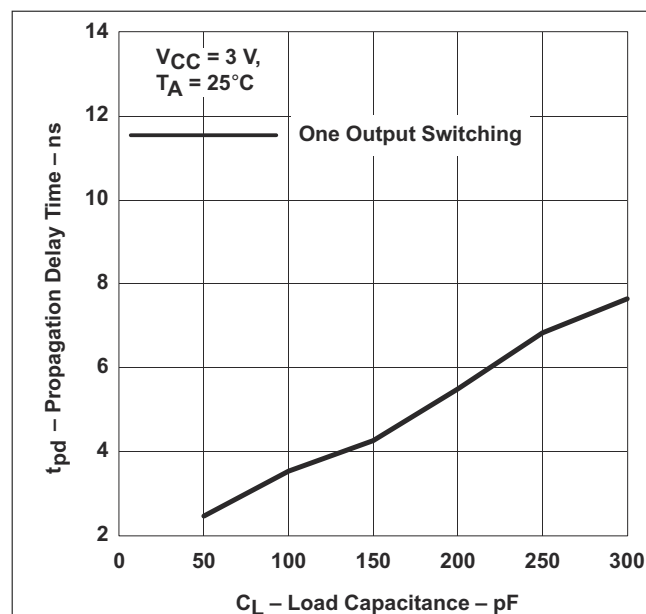
| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $V_{CC} = 3.3\text{ V}$<br>$\pm 0.3\text{ V}$ |     | $V_{CC} = 5\text{ V}$<br>$\pm 0.5\text{ V}$ |     | UNIT |
|-----------|-----------------|----------------|-----------------------------------------------|-----|---------------------------------------------|-----|------|
|           |                 |                | MIN                                           | MAX | MIN                                         | MAX |      |
| $t_{pd}$  | A               | Y              | 1                                             | 5.8 | 1                                           | 4.5 | ns   |
| $t_{en}$  | OE              | Y              | 1.2                                           | 5.8 | 1                                           | 5   | ns   |
| $t_{dis}$ | OE              | Y              | 1                                             | 6   | 1                                           | 4.2 | ns   |

## 6.7 Operating Characteristics

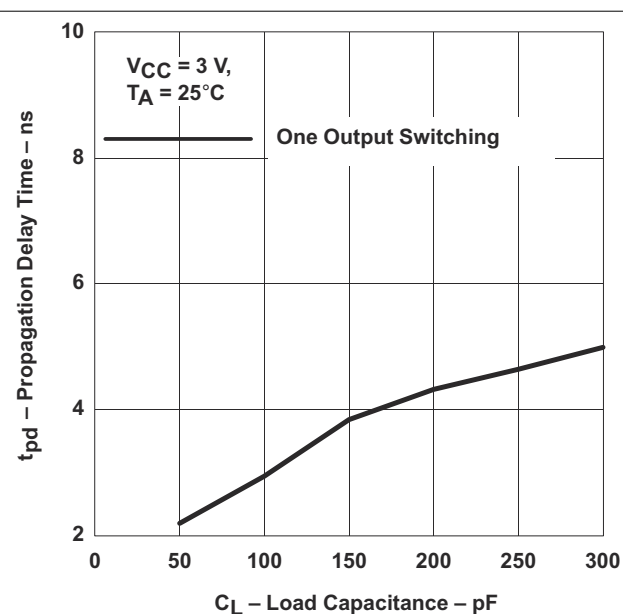
$T_A = 25^\circ\text{C}$

| PARAMETER       |                               |                  | TEST<br>CONDITIONS | V <sub>CC</sub> = 3.3 V | V <sub>CC</sub> = 5 V | UNIT |
|-----------------|-------------------------------|------------------|--------------------|-------------------------|-----------------------|------|
|                 |                               |                  |                    | TYP                     | TYP                   |      |
| C <sub>pd</sub> | Power dissipation capacitance | Outputs enabled  | f = 10 MHz         | 19                      | 21                    | pF   |
|                 |                               | Outputs disabled |                    | 3                       | 4                     |      |

## 6.8 Typical Characteristics

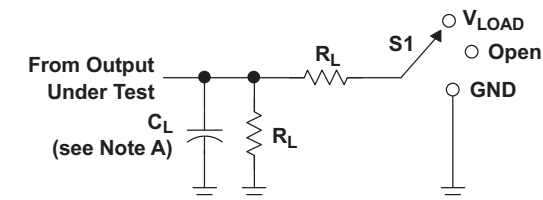


**Figure 6-1. Propagation Delay (Low to High Transition) vs Load Capacitance**



**Figure 6-2. Propagation Delay (High to Low Transition) vs Load Capacitance**

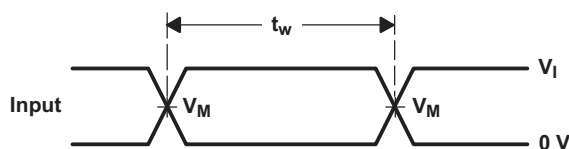
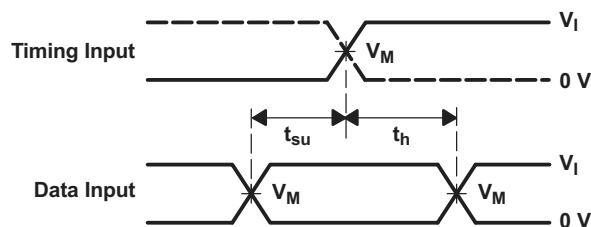
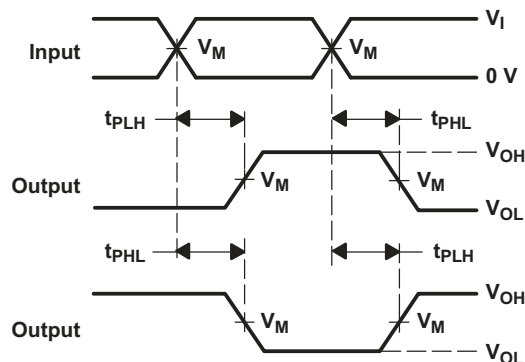
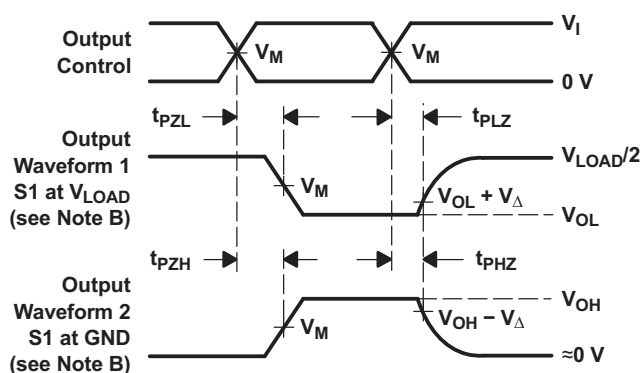
## 7 Parameter Measurement Information



LOAD CIRCUIT

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

| $V_{CC}$                        | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|---------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                 | $V_I$    | $t_r/t_f$            |            |                   |       |              |              |
| $3.3\text{ V} \pm 0.3\text{ V}$ | 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 DURATIONVOLTAGE WAVEFORMS  
SETUP AND HOLD TIMESVOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTSVOLTAGE 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 7-1. Load Circuit and Voltage Waveforms



## 8 Detailed Description

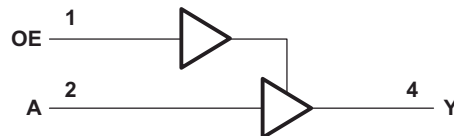
### 8.1 Overview

The SN74LVC1G126-Q1 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.

### 8.2 Functional Block Diagram



### 8.3 Feature Description

#### 8.3.1 Balanced CMOS 3-State Outputs

This device includes balanced CMOS 3-State outputs. The three states that these outputs can be in are driving high, driving low, and high impedance. The term "balanced" indicates that the device can sink and source similar currents. The drive capability of this device may create fast edges into light loads so routing and load conditions should be considered to prevent ringing. Additionally, the outputs of this device are capable of driving larger currents than the device can sustain without being damaged. It is important for the output power of the device to be limited to avoid damage due to overcurrent. The electrical and thermal limits defined in the *Absolute Maximum Ratings* must be followed at all times.

When placed into the high-impedance mode, the output will neither source nor sink current, with the exception of minor leakage current as defined in the *Electrical Characteristics* table. In the high-impedance state, the output voltage is not controlled by the device and is dependent on external factors. If no other drivers are connected to the node, then this is known as a floating node and the voltage is unknown. A pull-up or pull-down resistor can be connected to the output to provide a known voltage at the output while it is in the high-impedance state. The value of the resistor will depend on multiple factors, including parasitic capacitance and power consumption limitations. Typically, a 10 k $\Omega$  resistor can be used to meet these requirements.

Unused 3-state CMOS outputs should be left disconnected.

#### 8.3.2 Partial Power Down ( $I_{off}$ )

This device includes circuitry to disable all outputs when the supply pin is held at 0 V. When disabled, the outputs will neither source nor sink current, regardless of the input voltages applied. The amount of leakage current at each output is defined by the  $I_{off}$  specification in the *Electrical Characteristics* table.

#### 8.3.3 Standard CMOS Inputs

This device includes standard CMOS inputs. Standard CMOS inputs are high impedance and are typically modeled as a resistor in parallel with the input capacitance given in the *Electrical Characteristics*. The worst case resistance is calculated with the maximum input voltage, given in the *Absolute Maximum Ratings*, and the maximum input leakage current, given in the *Electrical Characteristics*, using Ohm's law ( $R = V \div I$ ).

Standard CMOS inputs require that input signals transition between valid logic states quickly, as defined by the input transition time or rate in the *Recommended Operating Conditions* table. Failing to meet this specification will result in excessive power consumption and could cause oscillations. More details can be found in [Implications of Slow or Floating CMOS Inputs](#).

Do not leave standard CMOS inputs floating at any time during operation. Unused inputs must be terminated at  $V_{CC}$  or GND. If a system will not be actively driving an input at all times, a pull-up or pull-down resistor can

be added to provide a valid input voltage during these times. The resistor value will depend on multiple factors, however a 10-k $\Omega$  resistor is recommended and will typically meet all requirements.

### 8.3.4 Clamp Diode Structure

The inputs and outputs to this device have negative clamping diodes only as depicted in [Figure 8-1](#).

#### CAUTION

Voltages beyond the values specified in the *Absolute Maximum Ratings* table can cause damage to the device. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

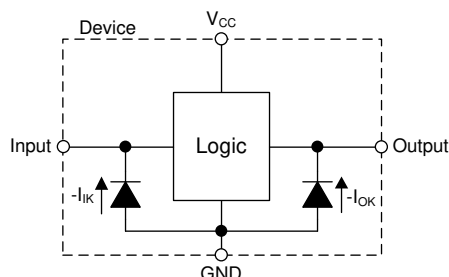


Figure 8-1. Electrical Placement of Clamping Diodes for Each Input and Output

## 8.4 Device Functional Modes

Table 8-1. Function Table

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

## 9 Application and Implementation

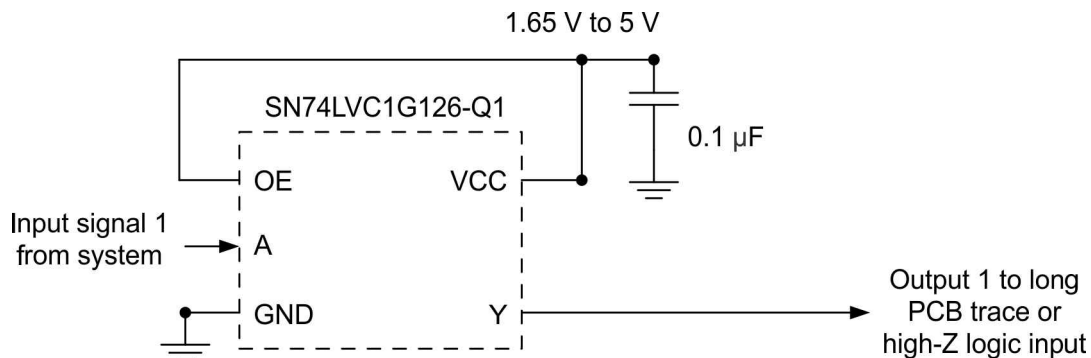
### Note

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, as well as validating and testing their design implementation to confirm system functionality.

### 9.1 Application Information

The SN74LVC1G126-Q1 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  $V_{CC}$ .

### 9.2 Typical Application



**Figure 9-1. Application Schematic**

#### 9.2.1 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.

#### 9.2.2 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.

### 9.2.3 Application Curves

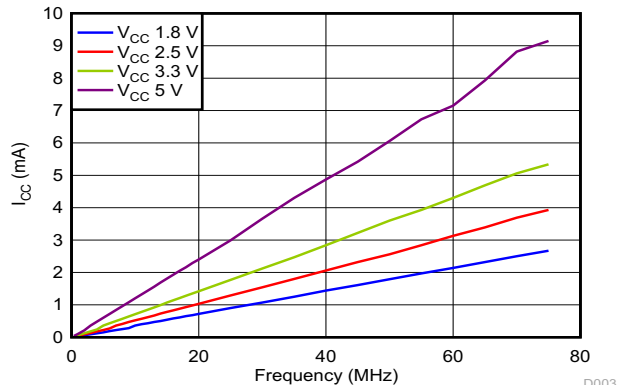


Figure 9-2.  $I_{CC}$  vs Frequency

## 10 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- $\mu$ F capacitor is recommended. If there are multiple  $V_{CC}$  terminals, then 0.01- $\mu$ F or 0.022- $\mu$ 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.

## 11 Layout

### 11.1 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 [Recommended Operating Conditions](#) 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.

### 11.2 Layout Example

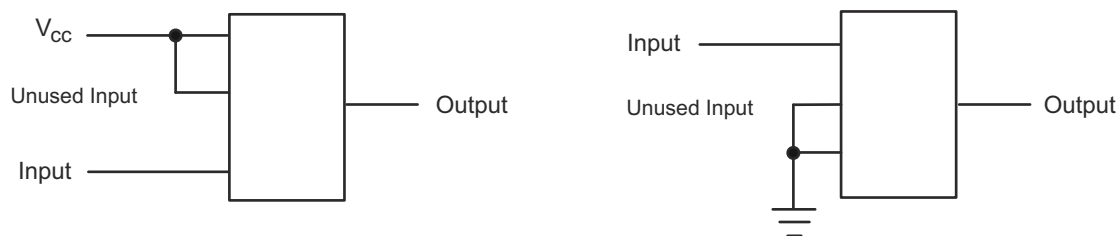


Figure 11-1. Layout Diagram

## 12 Device and Documentation Support

### 12.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](http://ti.com). Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

### 12.2 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

### 12.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

### 12.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 12.5 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

## 13 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                 |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| 1P1G126QDBVRQ1   | ACTIVE        | SOT-23       | DBV                | 5    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | (34Q5, C26O)            | <a href="#">Samples</a> |
| 1P1G126QDRYRQ1   | ACTIVE        | SON          | DRY                | 6    | 5000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | HN                      | <a href="#">Samples</a> |

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

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

(2) **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 <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

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

(5) 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.

(6) 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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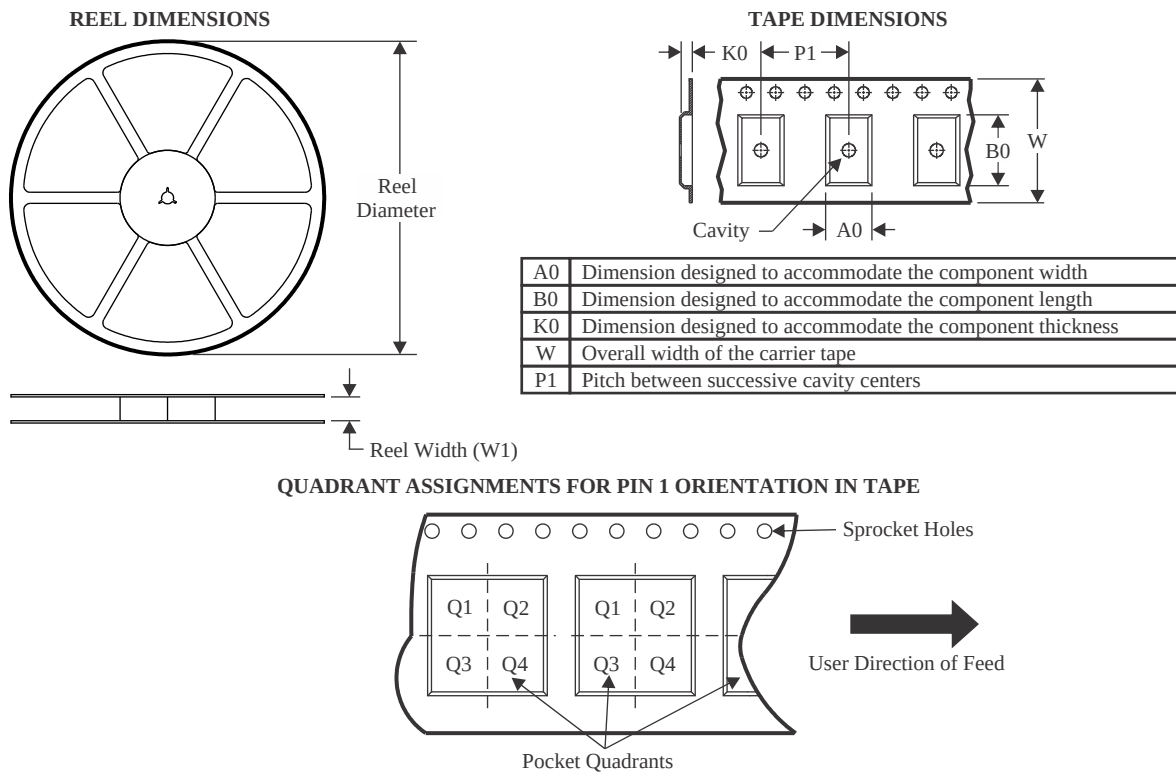
**OTHER QUALIFIED VERSIONS OF SN74LVC1G126-Q1 :**

- Catalog : [SN74LVC1G126](#)
- Enhanced Product : [SN74LVC1G126-EP](#)

**NOTE:** Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

## TAPE AND REEL INFORMATION

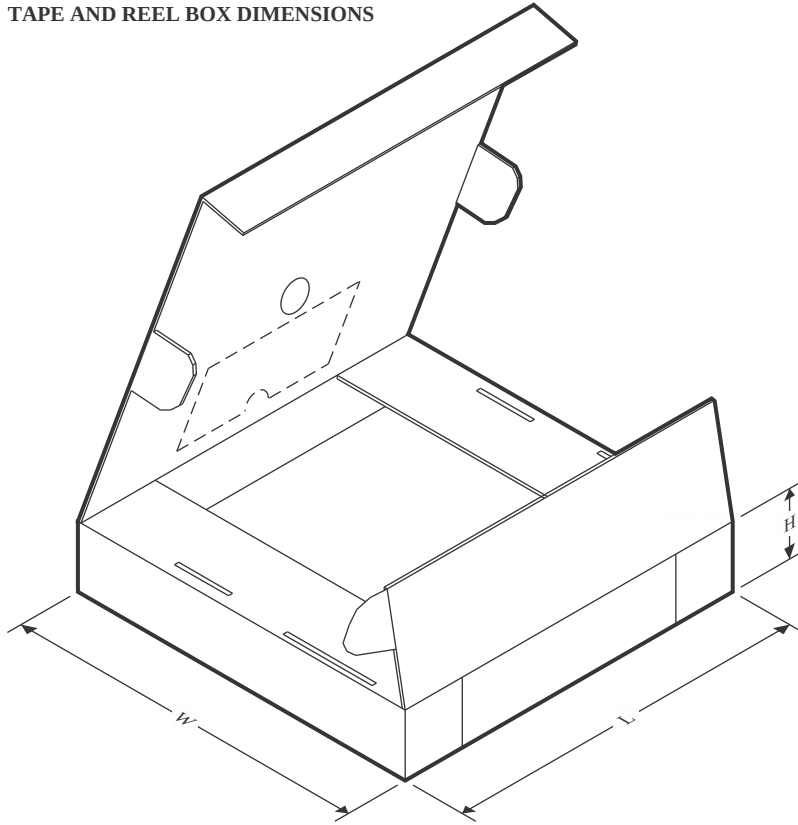


\*All dimensions are nominal

| 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 |
|----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 1P1G126QDBVRQ1 | SOT-23       | DBV             | 5    | 3000 | 179.0              | 8.4                | 3.2     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| 1P1G126QDRYRQ1 | SON          | DRY             | 6    | 5000 | 180.0              | 9.5                | 1.2     | 1.65    | 0.7     | 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) |
|----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 1P1G126QDBVRQ1 | SOT-23       | DBV             | 5    | 3000 | 200.0       | 183.0      | 25.0        |
| 1P1G126QDRYRQ1 | SON          | DRY             | 6    | 5000 | 189.0       | 185.0      | 36.0        |



## SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



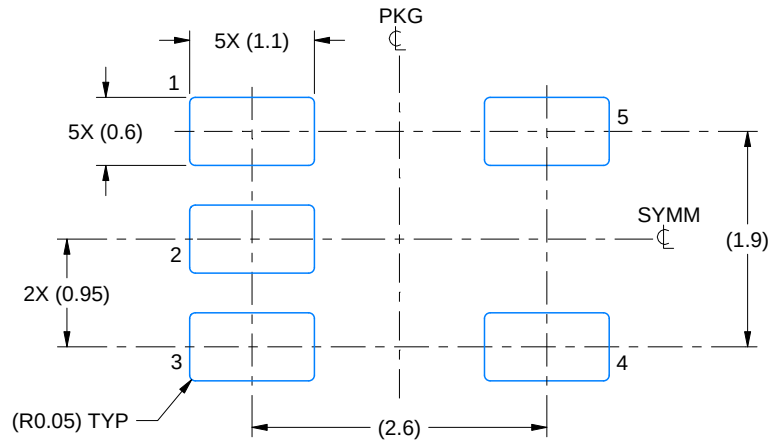
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.
4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold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

# EXAMPLE BOARD LAYOUT

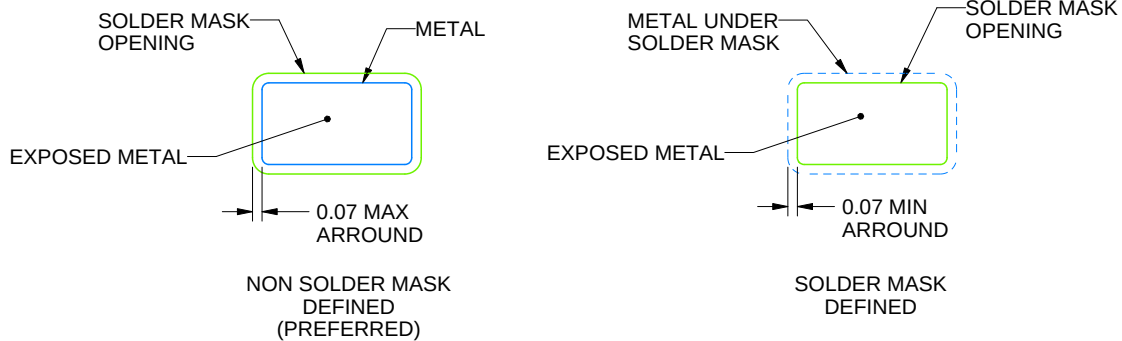
DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4214839/J 02/2024

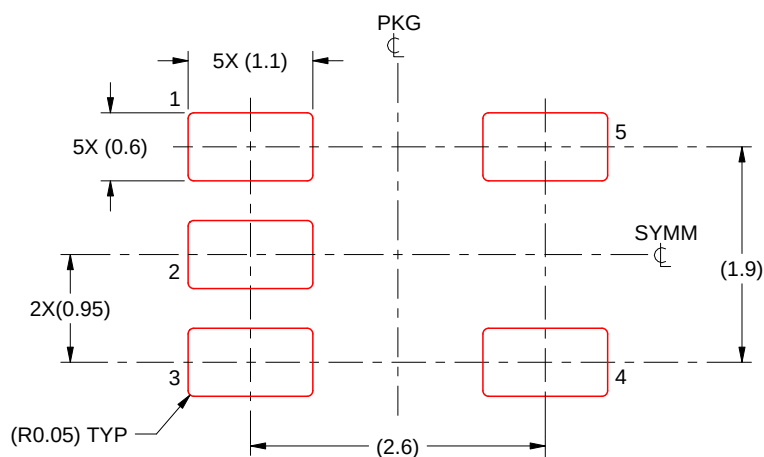
NOTES: (continued)

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

**DBV0005A**

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

## SMALL OUTLINE TRANSISTOR



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

4214839/J 02/2024

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.

## GENERIC PACKAGE VIEW

**DRY 6**

**USON - 0.6 mm max height**

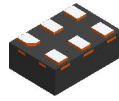
PLASTIC SMALL OUTLINE - NO LEAD



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

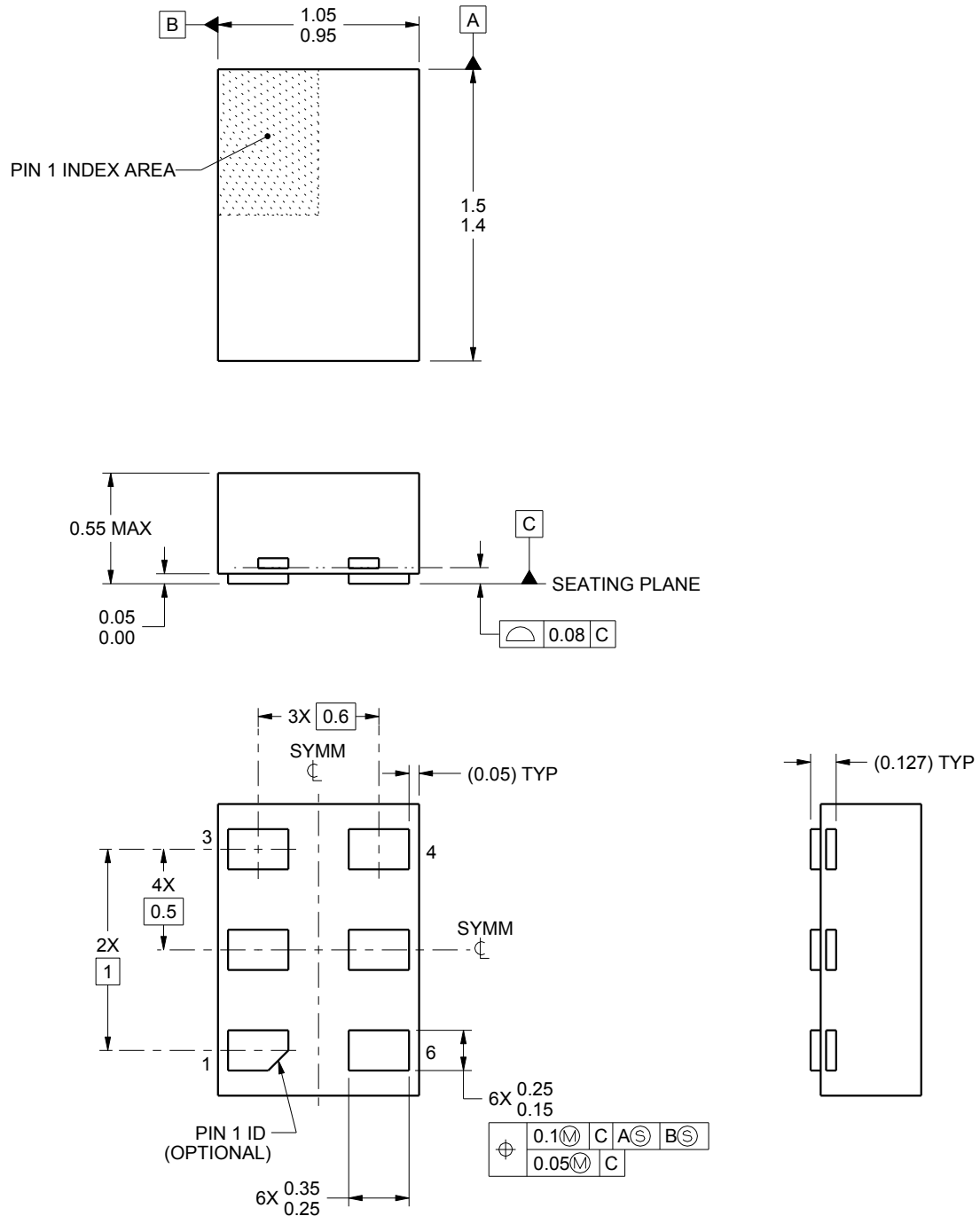
DRY0006B



# PACKAGE OUTLINE

USON - 0.55 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



4222207/B 02/2016

## NOTES:

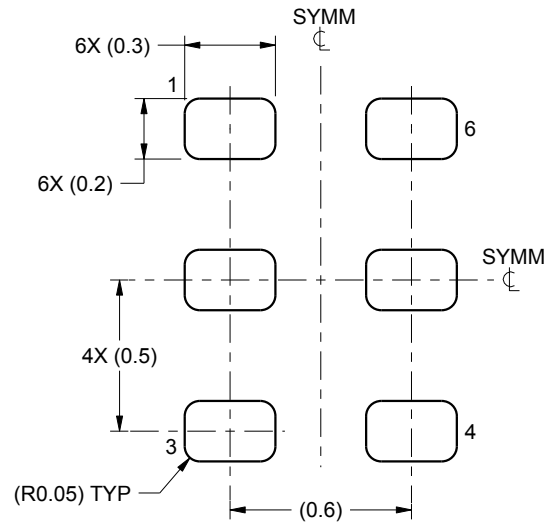
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.

# EXAMPLE BOARD LAYOUT

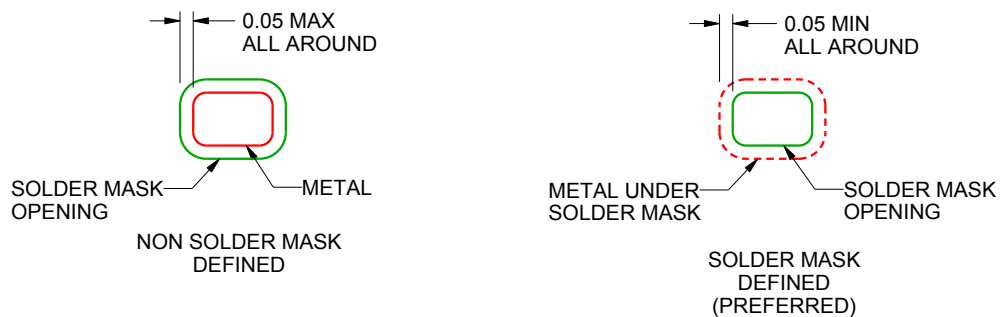
DRY0006B

USON - 0.55 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE  
1:1 RATIO WITH PKG SOLDER PADS  
SCALE:40X



SOLDER MASK DETAILS

4222207/B 02/2016

NOTES: (continued)

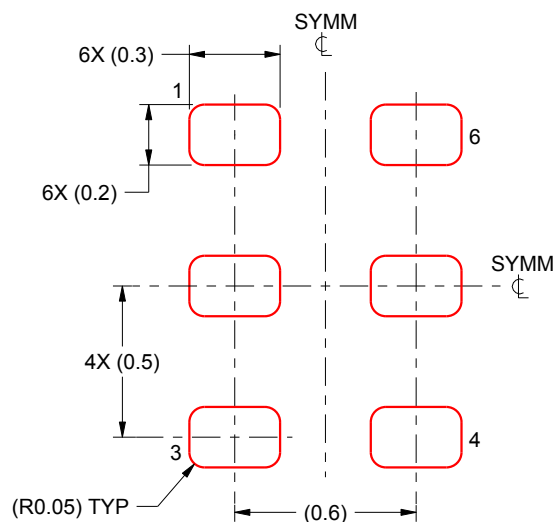
3. For more information, see QFN/SON PCB application report in literature No. SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).

## EXAMPLE STENCIL DESIGN

DRY0006B

USON - 0.55 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



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

4222207/B 02/2016

NOTES: (continued)

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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