

## SN74LVC1G66-Q1 Single Bilateral Analog Switch

### 1 Features

- Qualified for Automotive Applications
- AEC-Q100 Qualified With the Following Results:
  - Device Temperature Grade 1:  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  Ambient Operating Temperature Range
  - Device HBM Classification Level H2
  - Device CDM Classification Level C5
  - Device MM Classification Level M3
- 1.65-V to 5.5-V  $V_{\text{CC}}$  Operation
- Inputs Accept Voltages to 5.5 V
- Max  $t_{\text{pd}}$  of 0.8 ns at 3.3 V
- High On-Off Output Voltage Ratio
- High Degree of Linearity
- High Speed, Typically 0.5 ns ( $V_{\text{CC}} = 3\text{ V}$ ,  $C_{\text{L}} = 50\text{ pF}$ )
- Low ON-State Resistance, Typically  $\approx 5.5\ \Omega$  ( $V_{\text{CC}} = 4.5\text{ V}$ )
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II

### 2 Applications

- Infotainment Systems
- Wireless Devices
- Audio and Video Signal Routing
- Portable Computing
- Wearable Devices
- Signal Gating, Chopping, Modulation or Demodulation (Modem)
- Signal Multiplexing for Analog-to-Digital and Digital-to-Analog Conversion Systems

### 3 Description

This single analog switch is designed for 1.65-V to 5.5-V  $V_{\text{CC}}$  operation.

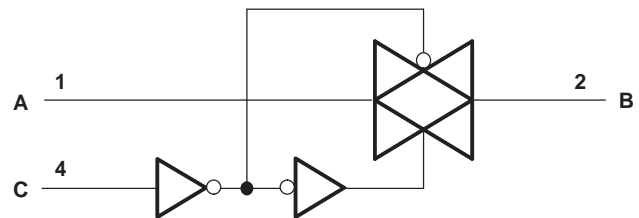
The SN74LVC1G66-Q1 device supports analog and digital signals. The device permits bidirectional transmission of signals with amplitudes of up to 5.5 V (peak).

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

| PART NUMBER    | PACKAGE    | BODY SIZE (NOM)   |
|----------------|------------|-------------------|
| SN74LVC1G66-Q1 | SOT-23 (5) | 2.90 mm × 1.60 mm |
|                | SC70 (5)   | 1.60 mm × 1.20 mm |

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

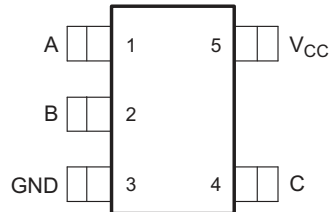
#### Logic Diagram (Positive Logic)





## 5 Pin Configuration and Functions

**DBV and DCK Packages  
5-Pin SOT-23 and SC70  
Top View**



**Pin Functions**

| PIN             |     | I/O | DESCRIPTION                           |
|-----------------|-----|-----|---------------------------------------|
| NAME            | NO. |     |                                       |
| A               | 1   | I/O | Bidirectional signal to be switched   |
| B               | 2   | I/O | Bidirectional signal to be switched   |
| C               | 4   | I   | Controls the switch (L = OFF, H = ON) |
| GND             | 3   | —   | Ground pin                            |
| V <sub>CC</sub> | 5   | —   | Power pin                             |

## 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 <sup>(2)</sup>                     | -0.5                                    | 6.5                   | V    |
| V <sub>I</sub>   | Input voltage <sup>(2)(3)</sup>                   | -0.5                                    | 6.5                   | V    |
| V <sub>I/O</sub> | Switch I/O voltage <sup>(2)(3)(4)</sup>           | -0.5                                    | V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>  | Control input clamp current                       | V <sub>I</sub> < 0                      | -50                   | mA   |
| I <sub>I/O</sub> | I/O port diode current                            | V <sub>I/O</sub> < 0                    | -50                   | mA   |
| I <sub>T</sub>   | ON-state switch current                           | V <sub>I/O</sub> < 0 to V <sub>CC</sub> | ±50                   | mA   |
|                  | Continuous current through V <sub>CC</sub> or GND |   | ±100                  | mA   |
| T <sub>stg</sub> | Storage temperature                               | -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) All voltages are with respect to ground, unless otherwise specified.
- (3) The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- (4) This value is limited to 5.5 V maximum.

### 6.2 ESD Ratings

|                    |                         | 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                          | 1.65                               | 5.5                    | V    |
| V <sub>I/O</sub> | I/O port voltage                        | 0                                  | V <sub>CC</sub>        | V    |
| V <sub>IH</sub>  | High-level input voltage, control input | V <sub>CC</sub> = 1.65 V to 1.95 V | V <sub>CC</sub> × 0.65 | V    |
|                  |   | V <sub>CC</sub> = 2.3 V to 2.7 V   | V <sub>CC</sub> × 0.7  |      |
|                  |   | V <sub>CC</sub> = 3 V to 3.6 V     | V <sub>CC</sub> × 0.7  |      |
|                  |   | V <sub>CC</sub> = 4.5 V to 5.5 V   | V <sub>CC</sub> × 0.7  |      |
| V <sub>IL</sub>  | Low-level input voltage, control input  | V <sub>CC</sub> = 1.65 V to 1.95 V | V <sub>CC</sub> × 0.35 | V    |
|                  |   | V <sub>CC</sub> = 2.3 V to 2.7 V   | V <sub>CC</sub> × 0.3  |      |
|                  |   | V <sub>CC</sub> = 3 V to 3.6 V     | V <sub>CC</sub> × 0.3  |      |
|                  |   | V <sub>CC</sub> = 4.5 V to 5.5 V   | V <sub>CC</sub> × 0.3  |      |
| V <sub>I</sub>   | Control input voltage                   | 0                                  | 5.5                    | V    |
| Δt/Δv            | Input transition rise and fall time     | V <sub>CC</sub> = 1.65 V to 1.95 V | 20                     | ns/V |
|                  |   | V <sub>CC</sub> = 2.3 V to 2.7 V   | 20                     |      |
|                  |   | V <sub>CC</sub> = 3 V to 3.6 V     | 10                     |      |
|                  |   | V <sub>CC</sub> = 4.5 V to 5.5 V   | 10                     |      |
| T <sub>A</sub>   | Operating free-air temperature          | -40                                | 125                    | °C   |

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

## 6.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |  | SN74LVC1G66-Q1 |            | UNIT |
|-------------------------------|--|----------------|------------|------|
|                               |  | DBV (SOT-23)   | DCK (SC70) |      |
|                               |  | 5 PINS         | 5 PINS     |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance | 206            | 252        | °C/W |

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and 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                |    |
|----------------------|-------------------------------------|---|------------------------|----------------------------|------|---------------------|----|
|                      |                                     |   |                        |                            |      |                     |    |
| r <sub>on</sub>      | ON-state switch resistance          | V <sub>I</sub> = V <sub>CC</sub> or GND,<br>V <sub>C</sub> = V <sub>IH</sub><br>(see <a href="#">Figure 2</a> and<br><a href="#">Figure 1</a> )   | I <sub>S</sub> = 4 mA  | 1.65 V                     | 12   | 35                  | Ω  |
|                      |                                     |   | I <sub>S</sub> = 8 mA  | 2.3 V                      | 9    | 30                  |    |
|                      |                                     |   | I <sub>S</sub> = 16 mA | 3 V                        | 9    | 30                  |    |
|                      |                                     |   | I <sub>S</sub> = 16 mA | 4.5 V                      | 5.5  | 25                  |    |
| r <sub>on(p)</sub>   | Peak on resistance                  | V <sub>I</sub> = V <sub>CC</sub> or GND,<br>V <sub>C</sub> = V <sub>IH</sub><br>(see <a href="#">Figure 2</a> and<br><a href="#">Figure 1</a> )   | I <sub>S</sub> = 4 mA  | 1.65 V                     | 74.5 | 165                 | Ω  |
|                      |                                     |   | I <sub>S</sub> = 8 mA  | 2.3 V                      | 20   | 60                  |    |
|                      |                                     |   | I <sub>S</sub> = 16 mA | 3 V                        | 12.5 | 35                  |    |
|                      |                                     |   | I <sub>S</sub> = 16 mA | 4.5 V                      | 7.5  | 25                  |    |
| I <sub>S(off)</sub>  | OFF-state switch leakage current    | V <sub>I</sub> = V <sub>CC</sub> and V <sub>O</sub> = GND or<br>V <sub>I</sub> = GND and V <sub>O</sub> = V <sub>CC</sub> ,<br>V <sub>C</sub> = V <sub>IL</sub> (see <a href="#">Figure 3</a> ) | 5.5 V                  |                            | ±1   | ±0.1 <sup>(1)</sup> | μA |
| I <sub>S(on)</sub>   | ON-state switch leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND, V <sub>C</sub> = V <sub>IH</sub> , V <sub>O</sub> = Open<br>(see <a href="#">Figure 4</a> )  | 5.5 V                  |                            | ±1   | ±0.1 <sup>(1)</sup> | μA |
| I <sub>I</sub>       | Control input current               | V <sub>C</sub> = V <sub>CC</sub> or GND   | 5.5 V                  |                            | ±1   | ±0.1 <sup>(1)</sup> | μA |
| I <sub>CC</sub>      | Supply current                      | V <sub>C</sub> = V <sub>CC</sub> or GND   | 5.5 V                  |                            | 10   | 1 <sup>(1)</sup>    | μA |
| ΔI <sub>CC</sub>     | Supply current change               | V <sub>C</sub> = V <sub>CC</sub> – 0.6 V  | 5.5 V                  |                            |      | 500                 | μA |
| C <sub>ic</sub>      | Control input capacitance           |   | 5 V                    |                            | 2    |                     | pF |
| C <sub>io(off)</sub> | Switch input and output capacitance |   | 5 V                    |                            | 6    |                     | pF |
| C <sub>io(on)</sub>  | Switch input and output capacitance |   | 5 V                    |                            | 13   |                     | pF |

(1) T<sub>A</sub> = 25°C

## 6.6 Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 5](#))

| PARAMETER                       | FROM<br>(INPUT) | TO<br>(OUTPUT) | 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 |     | UNIT |     |
|---------------------------------|-----------------|----------------|-------------------------------------|-------------------|------------------------------------|--------|------------------------------------|-----|----------------------------------|-----|------|-----|
|                                 |                 |                | MIN                                 | MAX               | MIN                                | MAX    | MIN                                | MAX | MIN                              | MAX |      |     |
|                                 |                 |                | t <sub>pd</sub> <sup>(1)</sup>      | Propagation delay | A or B                             | B or A | 5.5                                |     | 3.2                              |     |      | 2.8 |
| t <sub>en</sub> <sup>(2)</sup>  | Enable time     | C              | A or B                              | 2.5               | 14                                 | 1.9    | 9.5                                | 1.8 | 8                                | 1.5 | 7.2  | ns  |
| t <sub>dis</sub> <sup>(3)</sup> | Disable time    | C              | A or B                              | 2.2               | 12                                 | 1.4    | 8.9                                | 2   | 8.4                              | 1.4 | 6.9  | ns  |

(1) t<sub>PLH</sub> and t<sub>PHL</sub> are the same as t<sub>pd</sub>. The propagation delay is the calculated RC time constant of the typical ON-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

(2) t<sub>PZL</sub> and t<sub>PZH</sub> are the same as t<sub>en</sub>.

(3) t<sub>PLZ</sub> and t<sub>PHZ</sub> are the same as t<sub>dis</sub>.

## 6.7 Analog Switch Characteristics

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

| PARAMETER  | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS  | $V_{CC}$ | TYP    | UNIT |
|--|--------------|-------------|--|----------|--------|------|
| Frequency response <sup>(1)</sup><br>(switch ON)       | A or B       | B or A      | $C_L = 50\text{ pF}$ , $R_L = 600\ \Omega$ ,<br>$f_{in} = \text{sine wave}$<br>(see Figure 6)                | 1.65 V   | 35     | MHz  |
|  |              |             |  | 2.3 V    | 120    |      |
|  |              |             |  | 3 V      | 175    |      |
|  |              |             |  | 4.5 V    | 195    |      |
|  |              |             | $C_L = 5\text{ pF}$ , $R_L = 50\ \Omega$ ,<br>$f_{in} = \text{sine wave}$<br>(see Figure 6)                  | 1.65 V   | >300   |      |
|  |              |             |  | 2.3 V    | >300   |      |
|  |              |             |  | 3 V      | >300   |      |
|  |              |             |  | 4.5 V    | >300   |      |
| Crosstalk<br>(control input to signal output)          | C            | A or B      | $C_L = 50\text{ pF}$ , $R_L = 600\ \Omega$ ,<br>$f_{in} = 1\text{ MHz}$ (square wave)<br>(see Figure 7)      | 1.65 V   | 35     | mV   |
|  |              |             |  | 2.3 V    | 50     |      |
|  |              |             |  | 3 V      | 70     |      |
|  |              |             |  | 4.5 V    | 100    |      |
| Feedthrough attenuation <sup>(2)</sup><br>(switch OFF) | A or B       | B or A      | $C_L = 50\text{ pF}$ , $R_L = 600\ \Omega$ ,<br>$f_{in} = 1\text{ MHz}$ (sine wave)<br>(see Figure 8)        | 1.65 V   | -58    | dB   |
|  |              |             |  | 2.3 V    | -58    |      |
|  |              |             |  | 3 V      | -58    |      |
|  |              |             |  | 4.5 V    | -58    |      |
|  |              |             | $C_L = 5\text{ pF}$ , $R_L = 50\ \Omega$ ,<br>$f_{in} = 1\text{ MHz}$ (sine wave)<br>(see Figure 8)          | 1.65 V   | -42    |      |
|  |              |             |  | 2.3 V    | -42    |      |
|  |              |             |  | 3 V      | -42    |      |
|  |              |             |  | 4.5 V    | -42    |      |
| Sine-wave distortion                                   | A or B       | B or A      | $C_L = 50\text{ pF}$ , $R_L = 10\text{ k}\Omega$ ,<br>$f_{in} = 1\text{ kHz}$ (sine wave)<br>(see Figure 9)  | 1.65 V   | 0.1%   |      |
|  |              |             |  | 2.3 V    | 0.025% |      |
|  |              |             |  | 3 V      | 0.015% |      |
|  |              |             |  | 4.5 V    | 0.01%  |      |
|  |              |             | $C_L = 50\text{ pF}$ , $R_L = 10\text{ k}\Omega$ ,<br>$f_{in} = 10\text{ kHz}$ (sine wave)<br>(see Figure 9) | 1.65 V   | 0.15%  |      |
|  |              |             |  | 2.3 V    | 0.025% |      |
|  |              |             |  | 3 V      | 0.015% |      |
|  |              |             |  | 4.5 V    | 0.01%  |      |

(1) Adjust  $f_{in}$  voltage to obtain 0 dBm at output. Increase  $f_{in}$  frequency until dB meter reads -3 dB.

(2) Adjust  $f_{in}$  voltage to obtain 0 dBm at input.

## 6.8 Operating Characteristics

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

| PARAMETER                              | TEST CONDITIONS     | $V_{CC} = 1.8\text{ V}$ | $V_{CC} = 2.5\text{ V}$ | $V_{CC} = 3.3\text{ V}$ | $V_{CC} = 5\text{ V}$ | UNIT |
|--|---------------------|-------------------------|-------------------------|-------------------------|-----------------------|------|
|  |                     | TYP                     | TYP                     | TYP                     | TYP                   |      |
| $C_{pd}$ Power dissipation capacitance | $f = 10\text{ MHz}$ | 8                       | 9                       | 9                       | 11                    | pF   |

## 6.9 Typical Characteristics

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

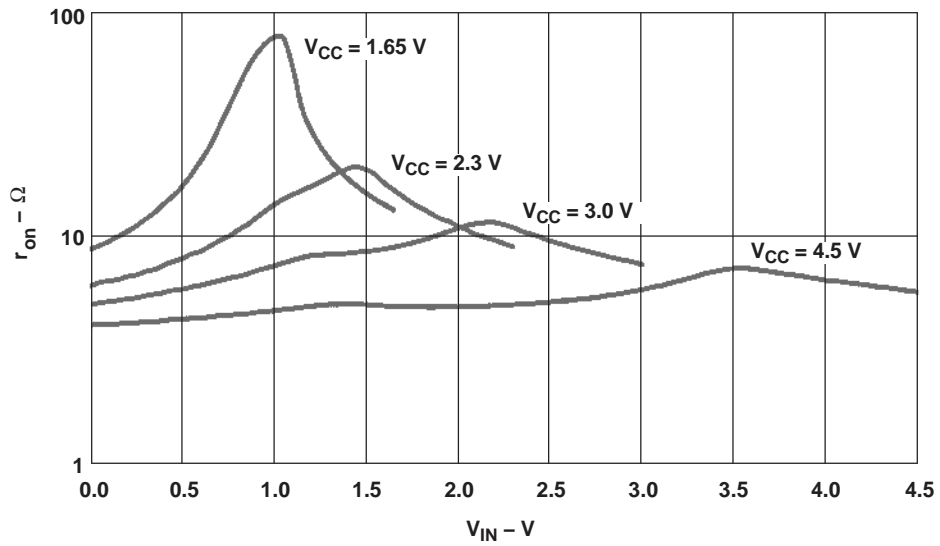


Figure 1. Typical  $r_{on}$  as a Function of Input Voltage ( $V_I$ ) for  $V_I = 0$  to  $V_{CC}$

## 7 Parameter Measurement Information

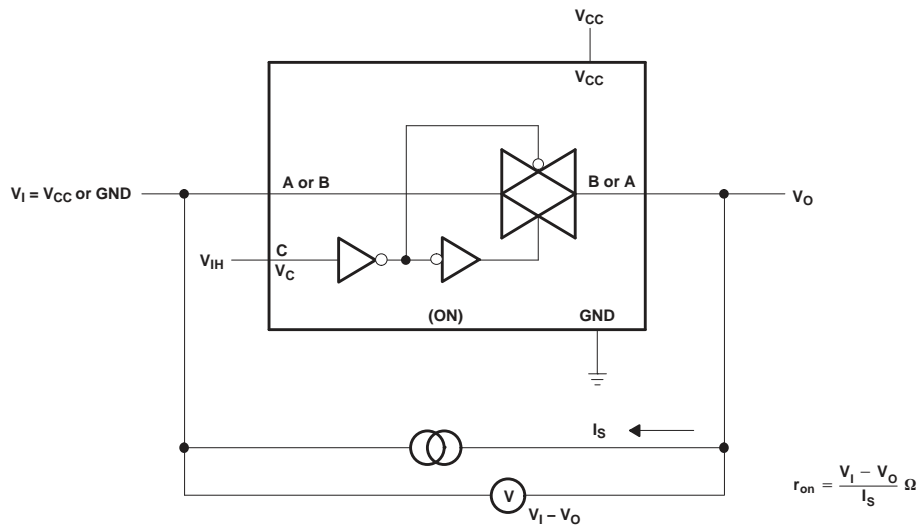


Figure 2. ON-State Resistance Test Circuit

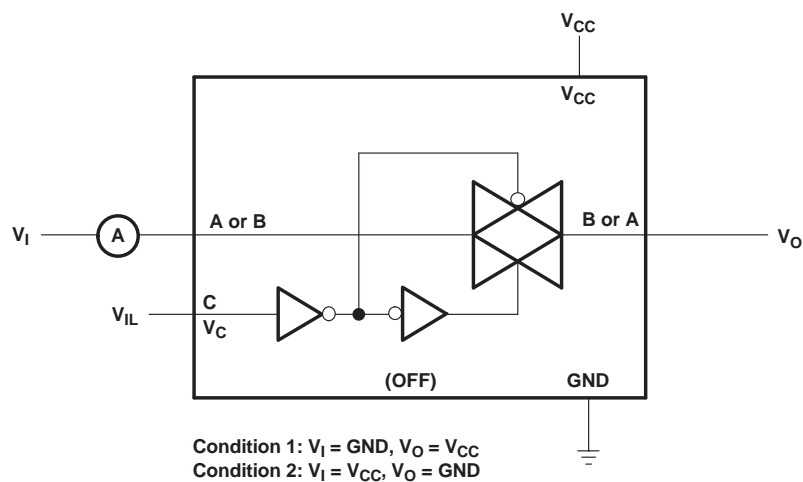


Figure 3. OFF-State Switch Leakage-Current Test Circuit

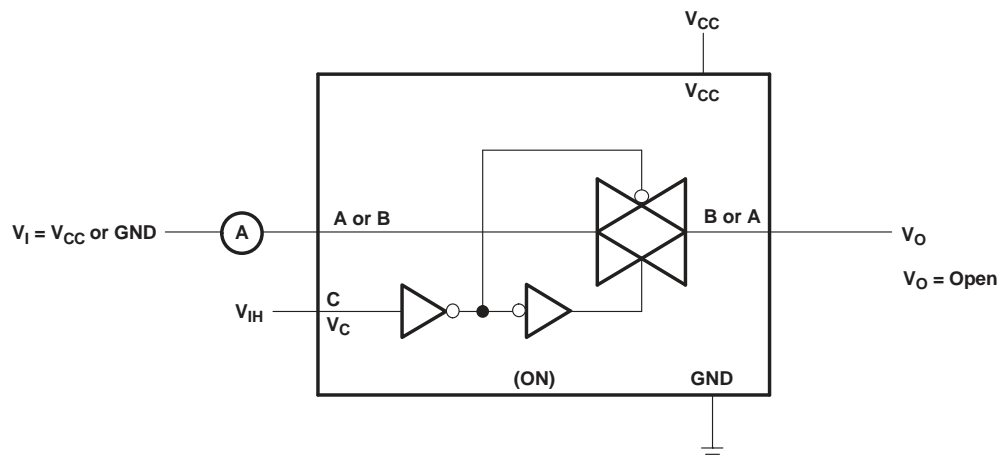
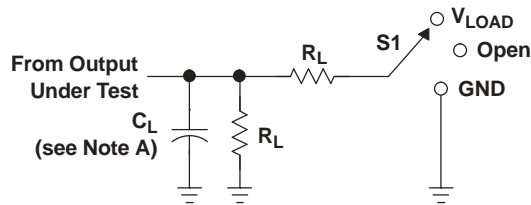


Figure 4. ON-State Switch Leakage-Current Test Circuit



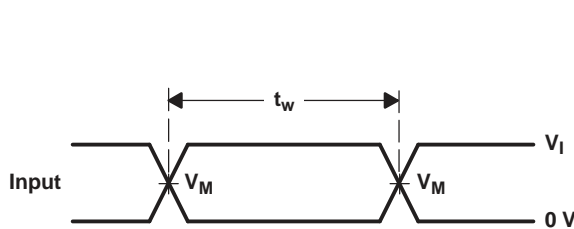
Parameter Measurement Information (continued)



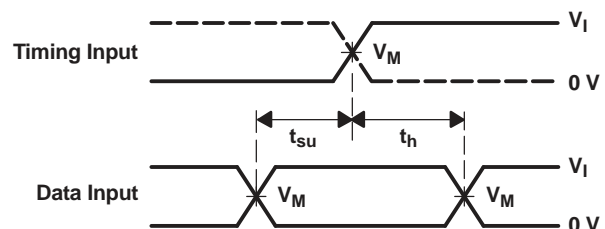
LOAD CIRCUIT

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

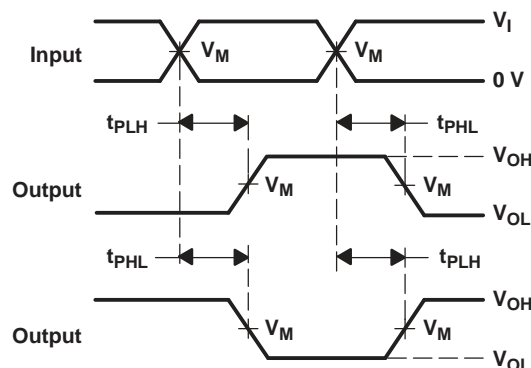
| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_r/t_f$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 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       |
| $3.3\text{ V} \pm 0.3\text{ V}$  | $V_{CC}$ | $\leq 2.5\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 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        |



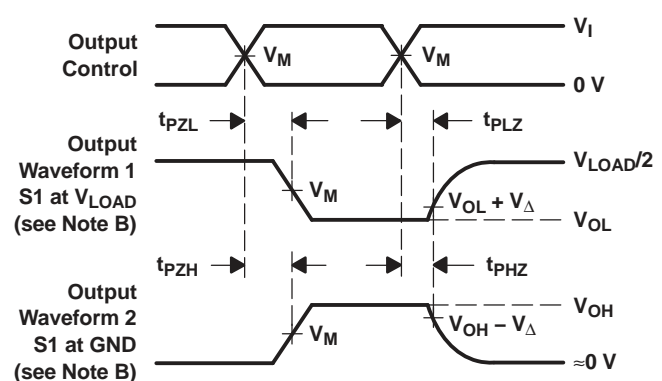
VOLTAGE WAVEFORMS PULSE DURATION



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

Parameter Measurement Information (continued)

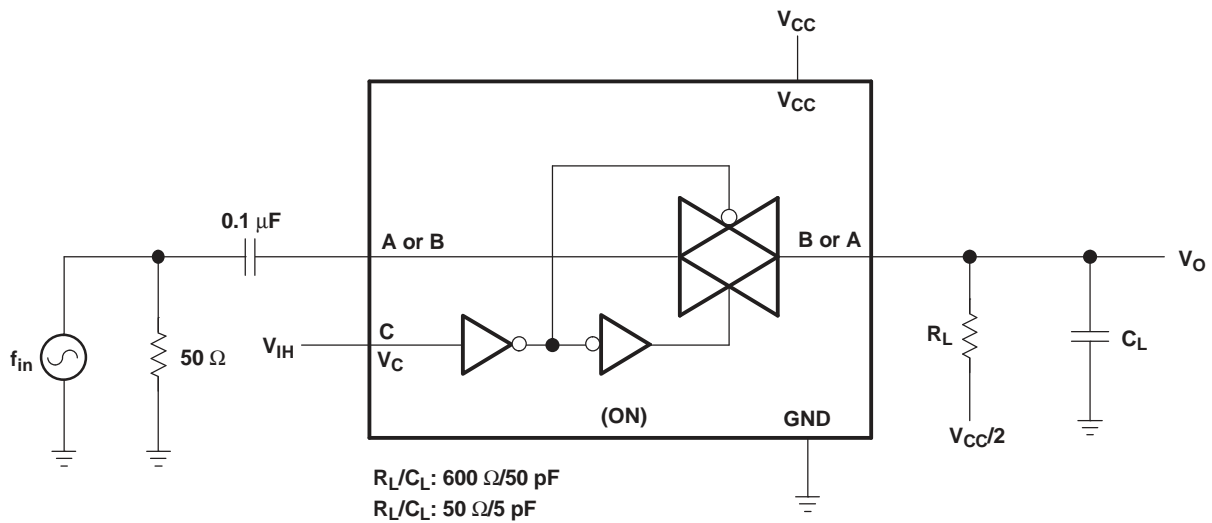


Figure 6. Frequency Response (Switch ON)

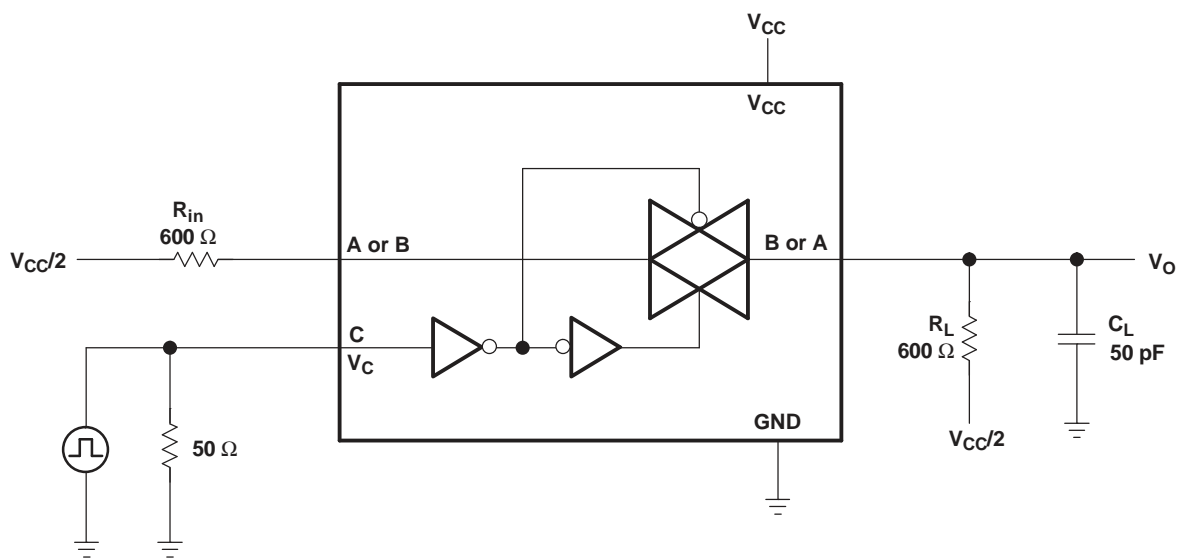


Figure 7. Crosstalk (Control Input – Switch Output)

Parameter Measurement Information (continued)

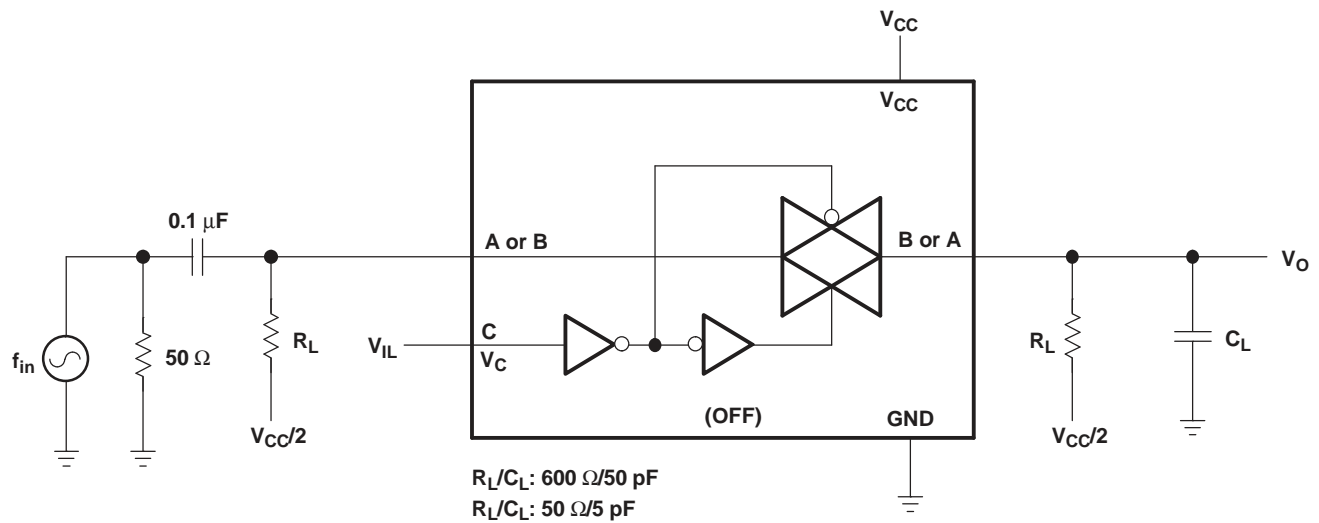


Figure 8. Feedthrough (Switch OFF)

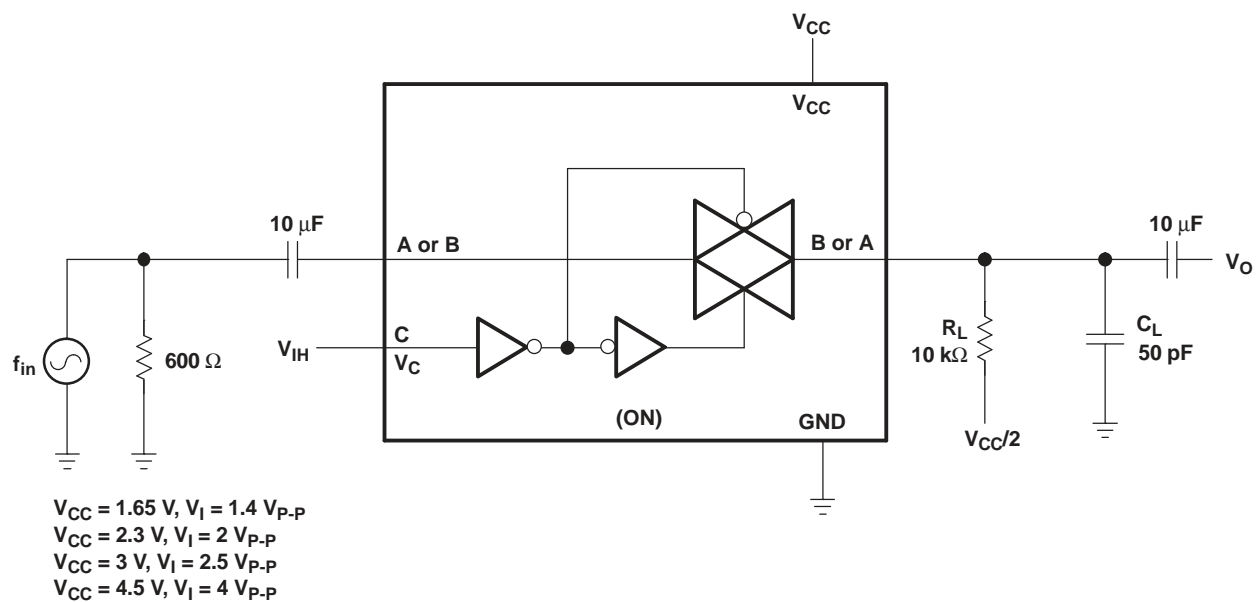


Figure 9. Sine-Wave Distortion

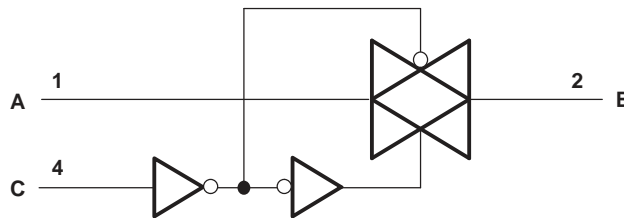
## 8 Detailed Description

### 8.1 Overview

This single analog switch is designed for 1.65-V to 5.5-V  $V_{CC}$  operation in automotive applications.

The SN74LVC1G66-Q1 device supports analog and digital signals. The device permits bidirectional transmission of signals with amplitudes of up to 5.5 V (peak). Like all analog switches, the SN74LVC1G66-Q1 is bidirectional.

### 8.2 Functional Block Diagram



**Figure 10. Logic Diagram (Positive Logic)**

### 8.3 Feature Description

This device is tested for operation in automotive applications. The SN74LVC1G66-Q1 has a wide  $V_{CC}$  range, allowing rail-to-rail operation of signals anywhere from a 1.8-V system to a 5-V system. In addition, the control input (C Pin) is 5.5-V tolerant, allowing higher-voltage logic to interface to the switch control system.

### 8.4 Device Functional Modes

**Table 1. Function Table**

| CONTROL INPUT (C) | SWITCH |
|-------------------|--------|
| L                 | OFF    |
| H                 | ON     |

## 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. Customers should validate and test their design implementation to confirm system functionality.

### 9.1 Application Information

The SN74LVC1G66-Q1 device can be used in any situation where an SPST switch would be used and a solid-state, voltage-controlled version is preferred.

### 9.2 Typical Application

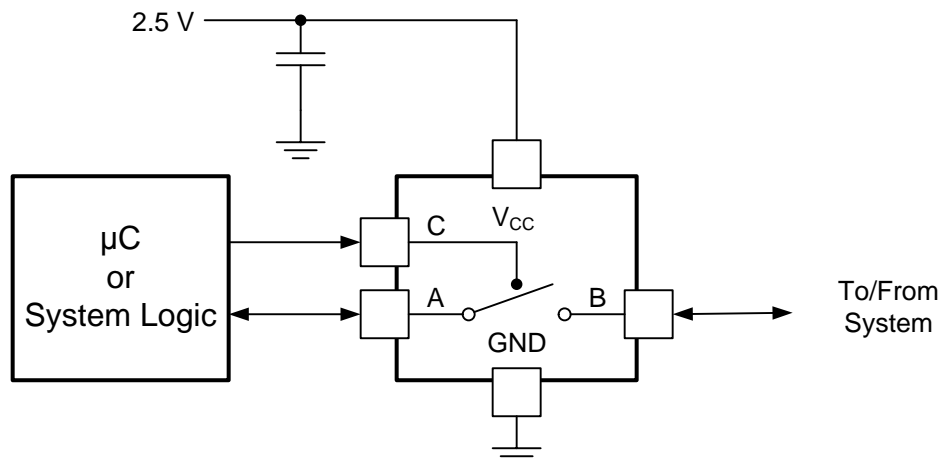


Figure 11. Typical Application Schematic

#### 9.2.1 Design Requirements

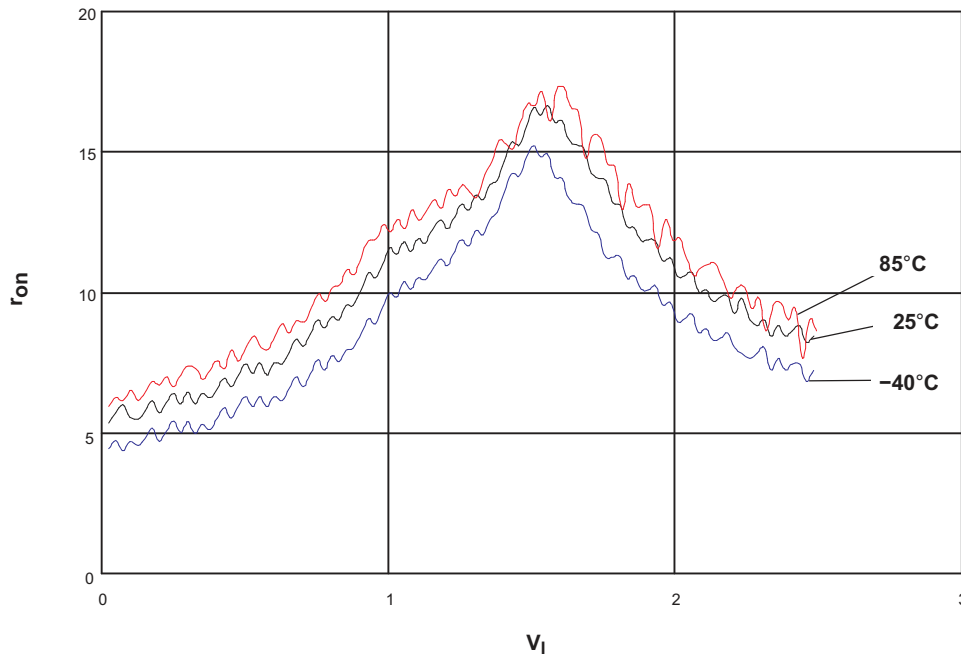
The SN74LVC1G66-Q1 device allows on and off control of analog and digital signals with a digital control signal. All input signals must be between 0 V and  $V_{CC}$  for optimal operation.

#### 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 and outputs are overvoltage tolerant and can therefore go as high as 5.5 V at any valid  $V_{CC}$ .
2. Recommended output conditions:
  - Load currents should not exceed  $\pm 50$  mA.
3. Frequency selection criterion:
  - Maximum frequency tested is 150 MHz.
  - Added trace resistance and capacitance can reduce maximum frequency capability; follow the layout practices listed in the [Layout](#) section.

## Typical Application (continued)

### 9.2.3 Application Curve



**Figure 12.**  $r_{on}$  vs  $V_I$ ,  $V_{CC} = 2.5$  V (SN74LVC1G66-Q1)

## 10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating listed in the [Recommended Operating Conditions](#) table.

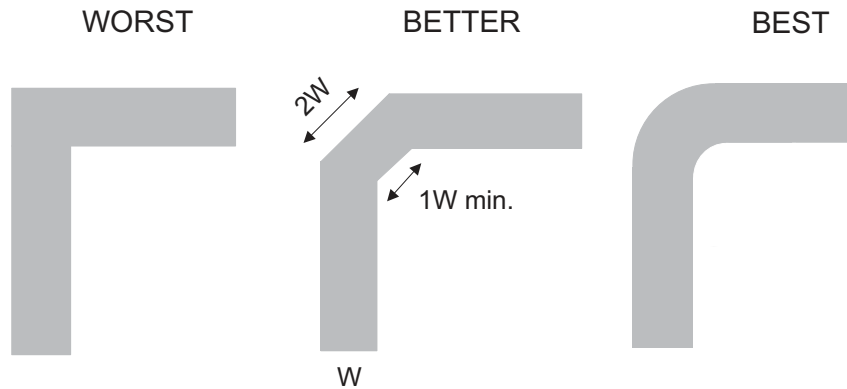
Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1- $\mu$ F bypass capacitor is recommended. If multiple pins are labeled  $V_{CC}$ , then a 0.01- $\mu$ F or 0.022- $\mu$ F capacitor is recommended for each  $V_{CC}$  because the  $V_{CC}$  pins are tied together internally. For devices with dual supply pins operating at different voltages, for example  $V_{CC}$  and  $V_{DD}$ , a 0.1- $\mu$ F bypass capacitor is recommended for each supply pin. To reject different frequencies of noise, use multiple bypass capacitors in parallel. Capacitors with values of 0.1  $\mu$ F and 1  $\mu$ F are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

## 11 Layout

### 11.1 Layout Guidelines

Reflections and matching are closely related to the loop antenna theory but are different enough to be discussed separately from the theory. When a PCB trace turns a corner at a 90° angle, a reflection can occur. A reflection occurs primarily because of the change of width of the trace. At the apex of the turn, the trace width increases to 1.414 times the width. This increase upsets the transmission-line characteristics, especially the distributed capacitance and self-inductance of the trace which results in the reflection. Not all PCB traces can be straight and therefore some traces must turn corners. [Figure 13](#) shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

## 11.2 Layout Example



**Figure 13. Trace Example**

## 12 Device and Documentation Support

### 12.1 Documentation Support

#### 12.1.1 Related Documentation

For related documentation see the following:

- *Implications of Slow or Floating CMOS Inputs*, [SCBA004](#)
- *Selecting the Right Texas Instruments Signal Switch*, [SZZA030](#)

### 12.2 Trademarks

All trademarks are the property of their respective owners.

### 12.3 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.

### 12.4 Glossary

[SLYZ022](#) — *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 Drawing | Pins | Package 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                 |
|--------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| 1P1G66QDBVRG4Q1    | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | C66R                    | <a href="#">Samples</a> |
| 1P1G66QDBVRQ1      | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | C66R                    | <a href="#">Samples</a> |
| SN74LVC1G66QDCKRQ1 | ACTIVE        | SC70         | DCK             | 5    | 3000        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | C6O                     | <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 SN74LVC1G66-Q1 :**

- Catalog: [SN74LVC1G66](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*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 |
|--------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 1P1G66QDBVRG4Q1    | SOT-23       | DBV             | 5    | 3000 | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| 1P1G66QDBVRQ1      | SOT-23       | DBV             | 5    | 3000 | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G66QDCKRQ1 | SC70         | DCK             | 5    | 3000 | 179.0              | 8.4                | 2.2     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

| Device             | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 1P1G66QDBVRG4Q1    | SOT-23       | DBV             | 5    | 3000 | 202.0       | 201.0      | 28.0        |
| 1P1G66QDBVRQ1      | SOT-23       | DBV             | 5    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74LVC1G66QDCKRQ1 | SC70         | DCK             | 5    | 3000 | 200.0       | 183.0      | 25.0        |

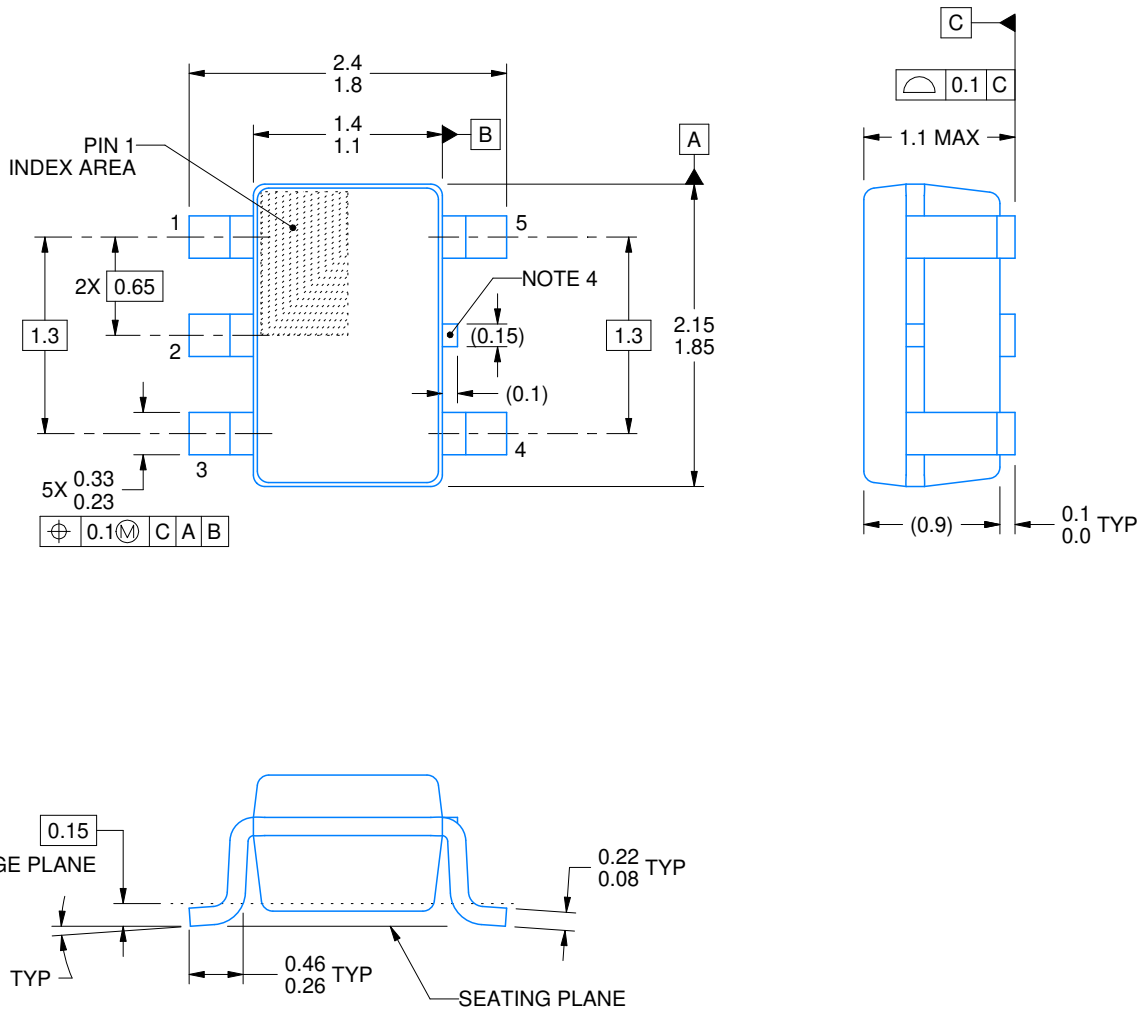
DCK0005A



# PACKAGE OUTLINE

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



4214834/C 03/2023

NOTES:

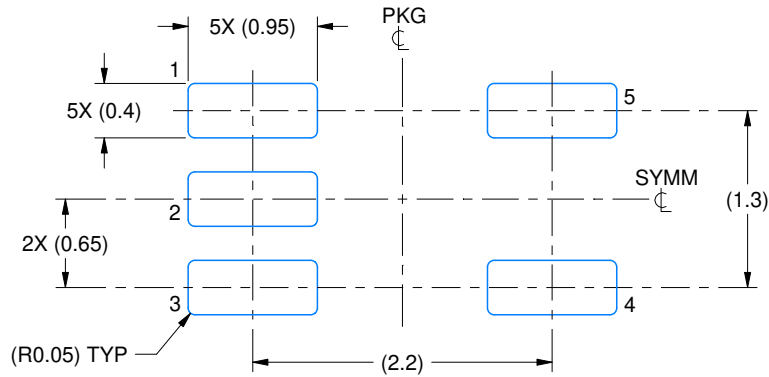
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-203.
4. Support pin may differ or may not be present.

# EXAMPLE BOARD LAYOUT

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X



SOLDER MASK DETAILS

4214834/C 03/2023

NOTES: (continued)

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

# EXAMPLE STENCIL DESIGN

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



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

4214834/C 03/2023

NOTES: (continued)

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

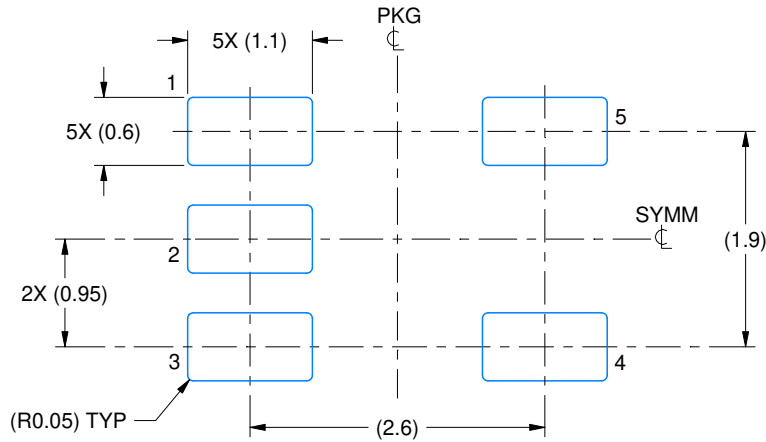


# EXAMPLE BOARD LAYOUT

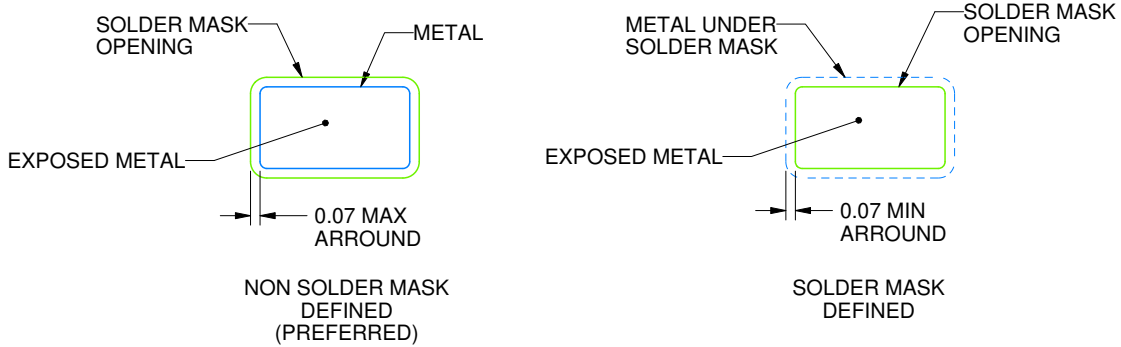
DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4214839/H 09/2023

NOTES: (continued)

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

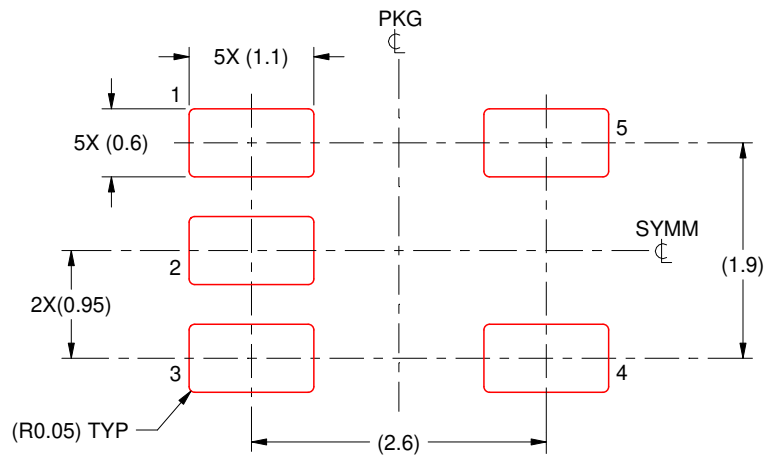


# EXAMPLE STENCIL DESIGN

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



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

4214839/H 09/2023

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.

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