

## SN74LVC1G86-Q1 Single 2-Input Exclusive-OR Gate

### 1 Features

- Qualified for Automotive Applications
- AEC-Q100 Qualified With the Following Results:
  - $\pm 4000$ -V Human-Body Model (HBM) ESD Classification Level 3A
  - $\pm 1000$ -V Charged-Device Model (CDM) ESD Classification Level C5
- Supports 5-V  $V_{CC}$  Operation
- Inputs Accept Voltages to 5.5 V
- Supports Down Translation to  $V_{CC}$
- Low Power Consumption, 15- $\mu$ A Maximum  $I_{CC}$
- Maximum  $t_{pd}$  of 6 ns at 3.3 V and 50-pF load
- $\pm 24$ -mA Output Drive at 3.3 V
- $I_{off}$  Supports Partial-Power-Down Mode, and Back-Drive Protection
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II

### 2 Applications

- Automotive HEV/EV and Powertrain
- Automotive Infotainment and Cluster
- Automotive Advanced Driver Assistance Systems
- Automotive Body Electronics

### 3 Description

The SN74LVC1G86-Q1 is an automotive qualified device that performs the Boolean function  $Y = \overline{A}B + A\overline{B}$  in positive logic. This single 2-input exclusive-OR gate is designed for 1.65-V to 5.5-V  $V_{CC}$  operation.

If the input is low, the other input is reproduced in true form at the output. If the input is high, the signal on the other input is reproduced inverted at the output. This device has low power consumption with maximum  $t_{pd}$  of 6 ns at 3.3 V and 50-pF capacitive load. The max output drive is  $\pm 32$ -mA at 4.5 V and  $\pm 24$ -mA at 3.3 V.

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

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

| PART NUMBER        | PACKAGE  | BODY SIZE (NOM)   |
|--------------------|----------|-------------------|
| SN74LVC1G86QDCKRQ1 | SC70 (5) | 2.00 mm x 1.25 mm |

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

#### Functional Block Diagram



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An exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.

These are five equivalent exclusive-OR symbols valid for an SN74LVC1G86-Q1 gate in positive logic; negation may be shown at any two ports.



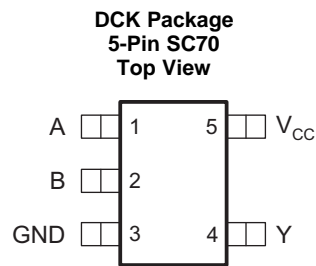
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## 4 Revision History

| DATE       | REVISION | NOTES            |
|------------|----------|------------------|
| March 2017 | *        | Initial release. |

## 5 Pin Configuration and Functions



**Pin Functions<sup>(1)</sup>**

| PIN |                 | I/O | DESCRIPTION     |
|-----|-----------------|-----|-----------------|
| NO. | NAME            |     |                 |
| 1   | A               | I   | Input A         |
| 2   | B               | I   | Input B         |
| 3   | GND             | —   | Ground          |
| 4   | Y               | O   | Output Y        |
| 5   | V <sub>CC</sub> | —   | Positive Supply |

(1) See mechanical drawings for dimensions.

## 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  | -0.5               | 6.5                   | V    |
| V <sub>I</sub>   | Input voltage <sup>(2)</sup>  | -0.5               | 6.5                   | V    |
| V <sub>O</sub>   | Voltage 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 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>J</sub>   | Junction temperature  |                    | 150                   | °C   |
| 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) The input negative-voltage and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- (3) The value of V<sub>CC</sub> is provided in the *Recommended Operating Conditions* table.

### 6.2 ESD Ratings

|                    |                         | VALUE   | UNIT  |
|--------------------|-------------------------|---|-------|
| V <sub>(ESD)</sub> | Electrostatic discharge | Human-body model (HBM), per AEC Q100-002 <sup>(1)</sup> | ±4000 |
|                    |                         | 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  |
|                 |                           | Data retention only                | 1.5                    |      |
| V <sub>IH</sub> | High-level input voltage  | V <sub>CC</sub> = 1.65 V to 1.95 V | 0.65 × V <sub>CC</sub> | V    |
|                 |                           | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.7                    |      |
|                 |                           | V <sub>CC</sub> = 3 V to 3.6 V     | 2                      |      |
|                 |                           | V <sub>CC</sub> = 4.5 V to 5.5 V   | 0.7 × V <sub>CC</sub>  |      |
| V <sub>IL</sub> | Low-level input voltage   | V <sub>CC</sub> = 1.65 V to 1.95 V | 0.35 × V <sub>CC</sub> | V    |
|                 |                           | V <sub>CC</sub> = 2.3 V to 2.7 V   | 0.7                    |      |
|                 |                           | V <sub>CC</sub> = 3 V to 3.6 V     | 0.8                    |      |
|                 |                           | V <sub>CC</sub> = 4.5 V to 5.5 V   | 0.3 × V <sub>CC</sub>  |      |
| V <sub>I</sub>  | Input voltage             | 0                                  | 5.5                    | V    |
| V <sub>O</sub>  | Output voltage            | 0                                  | V <sub>CC</sub>        | V    |
| I <sub>OH</sub> | High-level output current | V <sub>CC</sub> = 1.65 V           | -4                     | mA   |
|                 |                           | V <sub>CC</sub> = 2.3 V            | -8                     |      |
|                 |                           | V <sub>CC</sub> = 3 V              | -16                    |      |
|                 |                           | V <sub>CC</sub> = 4.5 V            | -24                    |      |

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

## Recommended Operating Conditions (continued)

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

|                 |                                    | MIN   | MAX | UNIT |    |
|-----------------|------------------------------------|---|-----|------|----|
| 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     | DCK package                                     | -40 | 125  | °C |

## 6.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |  | SN74LVC1G86-Q1 | UNIT |
|-------------------------------|--|----------------|------|
|                               |  | DCK (SC70)     |      |
|                               |  | 5 PINS         |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance       | 277.6          | °C/W |
| R <sub>θJC(top)</sub>         | Junction-to-case (top) thermal resistance    | 179.5          | °C/W |
| R <sub>θJB</sub>              | Junction-to-board thermal resistance         | 75.9           | °C/W |
| Ψ <sub>JT</sub>               | Junction-to-top characterization parameter   | 49.7           | °C/W |
| Ψ <sub>JB</sub>               | Junction-to-board characterization parameter | 75.1           | °C/W |

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

## 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                   |                    |     |      |
|                  |                           |  | 2.3                   |                    |     |      |
|                  | I <sub>OH</sub> = -32 mA  | 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                   |                    |     |      |
|                  |                           |  | 0.55                  |                    |     |      |
|                  | I <sub>OL</sub> = 32 mA   | 4.5 V  | 0.55                  |                    |     |      |
| I <sub>I</sub>   | A or B input              | 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>CC</sub>  |                           | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0                  | 1.65 V to 5.5 V       |                    | 15  | μA   |
| ΔI <sub>CC</sub> |                           | One input at V <sub>CC</sub> - 0.6 V, 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                 |                    | 6   | pF   |

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

### 6.6 Switching Characteristics, $C_L = 30\text{ pF}$ or $50\text{ pF}$

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

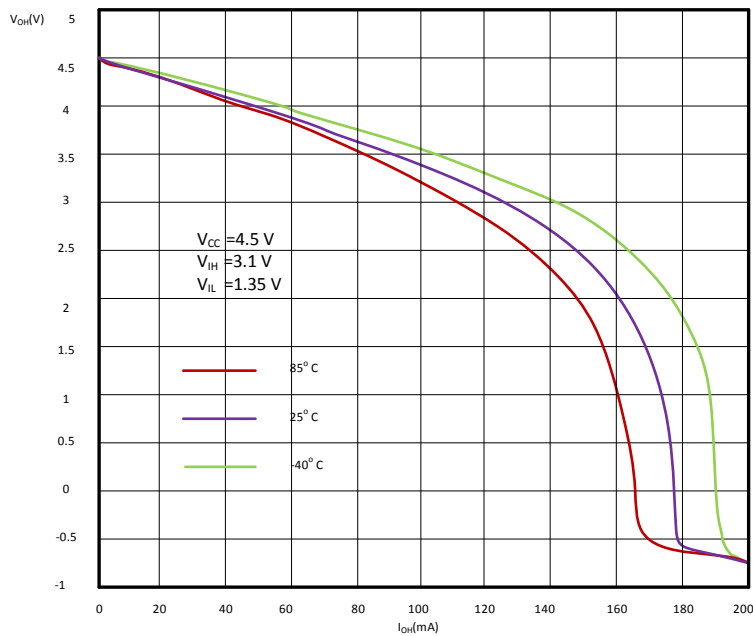
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS  | $V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$ |     | $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ |     | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ |     | $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ |     | UNIT |
|-----------|--------------|-------------|--|---|-----|--|-----|--|-----|--|-----|------|
|           |              |             |  | MIN                                       | MAX | MIN                                      | MAX | MIN                                      | MAX | MIN                                    | MAX |      |
| $t_{pd}$  | A or B       | Y           | $-40^\circ\text{C}$ to $125^\circ\text{C}$ temperature range, see <a href="#">Figure 2</a> | 3.5                                       | 12  | 1.8                                      | 7   | 1.3                                      | 6   | 1                                      | 5   | ns   |

### 6.7 Operating Characteristics

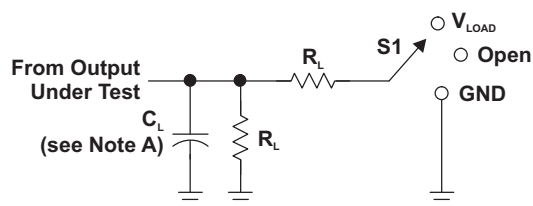
$T_A = 25^\circ\text{C}$

| 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 | $f = 10\text{ MHz}$ | 22                      | 22                      | 22                      | 24                    | pF   |

### 6.8 Typical Characteristics



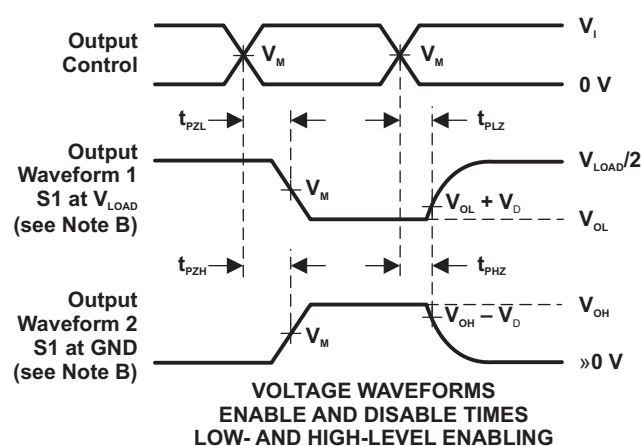
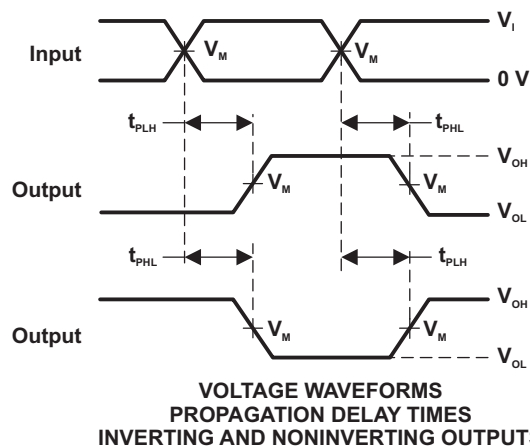
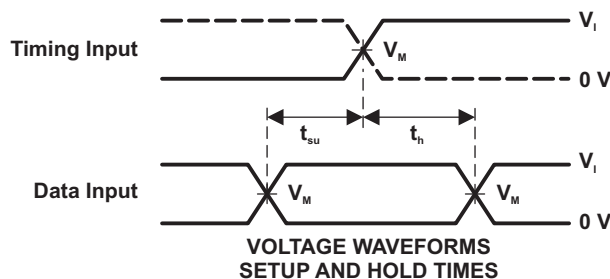
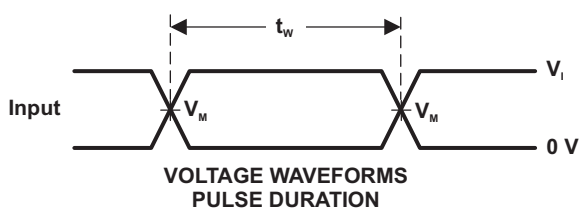
## 7 Parameter Measurement Information



LOAD CIRCUIT

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

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



- NOTES:
- A.  $C_L$  includes probe and jig capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
  - C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10 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 2. Load Circuit and Voltage Waveforms

## 8 Detailed Description

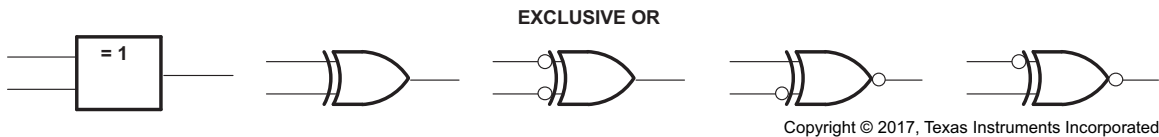
### 8.1 Overview

The SN74LVC1G86-Q1 is an automotive qualified device that performs the Boolean function  $Y = \bar{A}B + A\bar{B}$  in positive logic. This single 2-input exclusive-OR gate is designed for 1.65-V to 5.5-V  $V_{CC}$  operation.

A common application is as a true and complement element. If the input is low, the other input is reproduced in true form at the output. If the input is high, the signal on the other input is reproduced inverted at the output.

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.

### 8.2 Functional Block Diagram



These are five equivalent exclusive-OR symbols valid for an SN74LVC1G86-Q1 gate in positive logic; negation may be shown at any two ports.

### 8.3 Feature Description

#### 8.3.1 Balanced High-Drive CMOS Push-Pull Outputs

A balanced output allows the device to sink and source similar currents. The high drive capability of this device creates 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 power output of the device to be limited to avoid thermal runaway and damage due to over-current. The electrical and thermal limits defined in the [Absolute Maximum Ratings](#) must be followed at all times.

#### 8.3.2 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 [Recommended Operating Conditions](#), and the maximum input leakage current, given in the [Electrical Characteristics](#), using ohm's law ( $R = V \div I$ ).

Signals applied to the inputs need to have fast edge rates, as defined by  $\Delta t/\Delta v$  in [Recommended Operating Conditions](#) to avoid excessive currents and oscillations. If tolerance to a slow or noisy input signal is required, a device with a Schmitt-trigger input should be utilized to condition the input signal prior to the standard CMOS input.



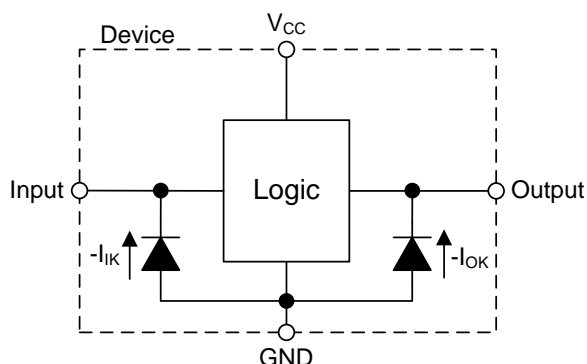
## Feature Description (continued)

### 8.3.3 Clamp Diodes

The inputs and outputs to this device have negative clamping diodes.

**CAUTION**

Avoid any voltage below or above the input or output voltage specified in the [Absolute Maximum Ratings](#). In this event, the current must be limited to the maximum input or output clamp current value indicated in the [Absolute Maximum Ratings](#) to avoid damage to the device.



**Figure 3. Electrical Placement of Clamping Diodes for Each Input and Output**

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

The inputs and outputs for this device enter a high impedance state when the supply voltage is 0 V. The maximum leakage into or out of any input or output pin on the device is specified by  $I_{off}$  in the [Electrical Characteristics](#).

### 8.3.5 Over-voltage Tolerant Inputs

Input signals to this device can be driven above the supply voltage so long as they remain below the maximum input voltage value specified in the [Recommended Operating Conditions](#).

## 8.4 Function Table

Table 1 lists the functional modes of the SN74LVC1G86-Q1.

**Table 1. Function Table**

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

## 9 Application and Implementation

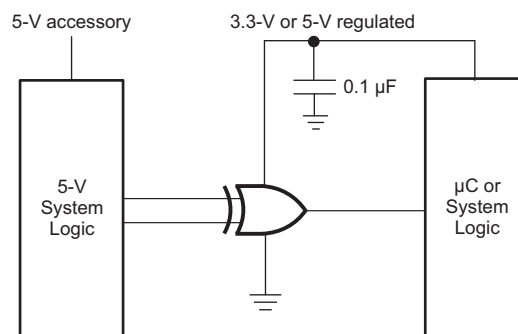
### NOTE

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 SN74LVC1G86-Q1 device can accept input voltages up to 5.5 V at any valid  $V_{CC}$  which makes the device suitable for down translation. This feature of the SN74LVC1G86-Q1 makes it ideal for various bus interface applications.

### 9.2 Typical Application



**Figure 4. Typical Application Schematic**

#### 9.2.1 Design Requirements

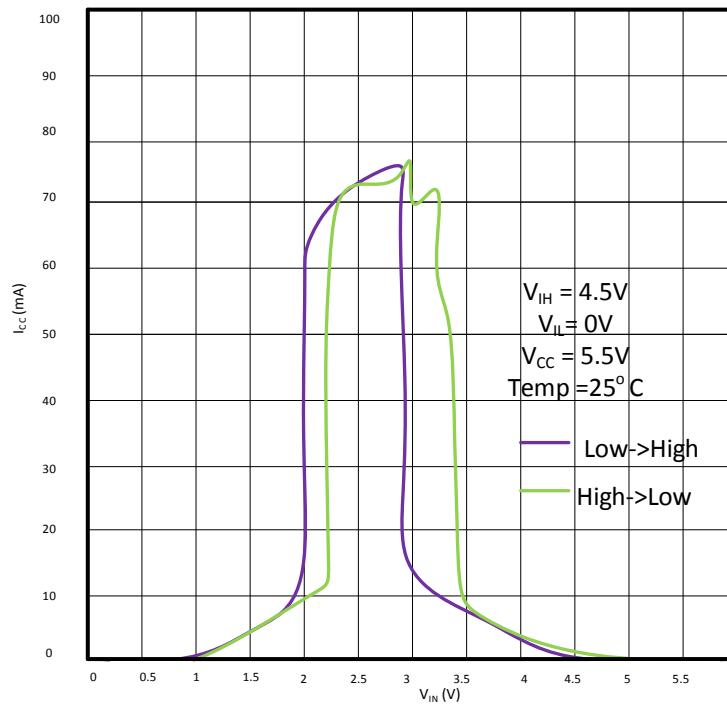
This device uses CMOS technology and has balanced output drive. Take care to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads, so routing and load conditions should be considered to prevent ringing.

#### 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. Recommended Output Conditions
  - Load currents should not exceed 32 mA per output and 50 mA total for the part.
  - Outputs should not be pulled above  $V_{CC}$ .

**Typical Application (continued)**

**9.2.3 Application Curve**



**Figure 5.  $I_{CC}$  vs.  $V_{IN}$**

**10 Power Supply Recommendations**

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

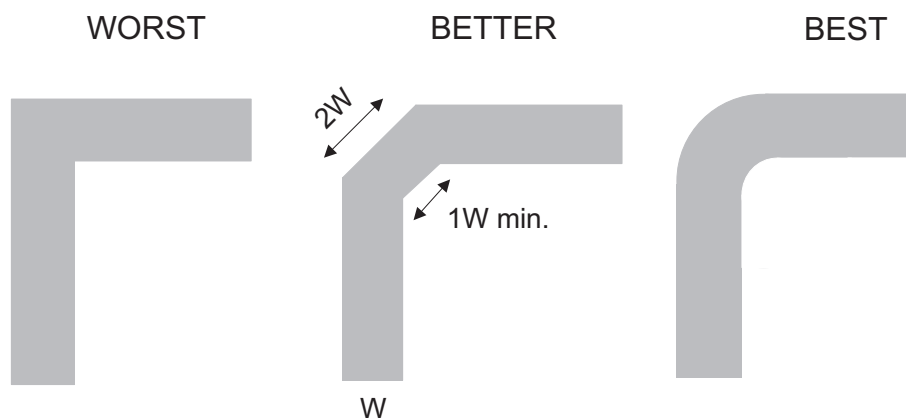
Each  $V_{CC}$  pin must have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1  $\mu F$  is recommended. If there are multiple  $V_{CC}$  pins, 0.01  $\mu F$  or 0.022  $\mu F$  is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1- $\mu F$  and 1- $\mu F$  are commonly used in parallel. The bypass capacitor must be installed as close to the power pin as possible for best results.

## 11 Layout

### 11.1 Layout Guidelines

Even low data rate digital signals can have high frequency signal components due to fast edge rates. 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 6](#) shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

### 11.2 Layout Example



**Figure 6. Trace Example**

## 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. In the upper right corner, click on *Alert me* 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 Community Resources

The following links connect to TI community resources. Linked contents are 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](#).

**TI E2E™ Online Community** *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

**Design Support** *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

### 12.3 Trademarks

E2E is a trademark of Texas Instruments.  
All other trademarks are the property of their respective owners.

### 12.4 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.

### 12.5 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<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        |
|--------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|----------------|
| SN74LVC1G86QDCKRQ1 | ACTIVE        | SC70         | DCK                | 5    | 3000           | RoHS & Green    | SN                                   | Level-2-260C-1 YEAR  | -40 to 125   | 16T                     | <b>Samples</b> |
| SN74LVC1G86QDCKTQ1 | ACTIVE        | SC70         | DCK                | 5    | 250            | RoHS & Green    | SN                                   | Level-2-260C-1 YEAR  | -40 to 125   | 16T                     | <b>Samples</b> |

(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 SN74LVC1G86-Q1 :**

- Catalog: [SN74LVC1G86](#)
- Enhanced Product: [SN74LVC1G86-EP](#)

## NOTE: Qualified Version Definitions:

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

## 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 |
|--------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LVC1G86QDCKRQ1 | SC70         | DCK             | 5    | 3000 | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74LVC1G86QDCKTQ1 | SC70         | DCK             | 5    | 250  | 178.0              | 9.0                | 2.4     | 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) |
|--------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LVC1G86QDCKRQ1 | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G86QDCKTQ1 | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |

DCK0005A



# PACKAGE OUTLINE

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



4214834/C 03/2023

## NOTES:

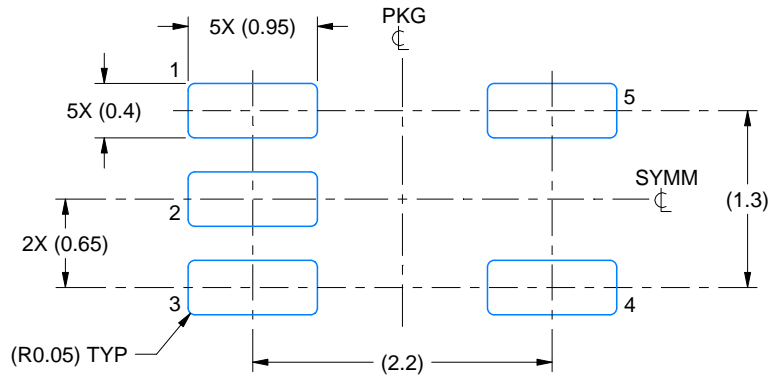
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-203.
4. Support pin may differ or may not be present.

# EXAMPLE BOARD LAYOUT

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X



SOLDER MASK DETAILS

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NOTES: (continued)

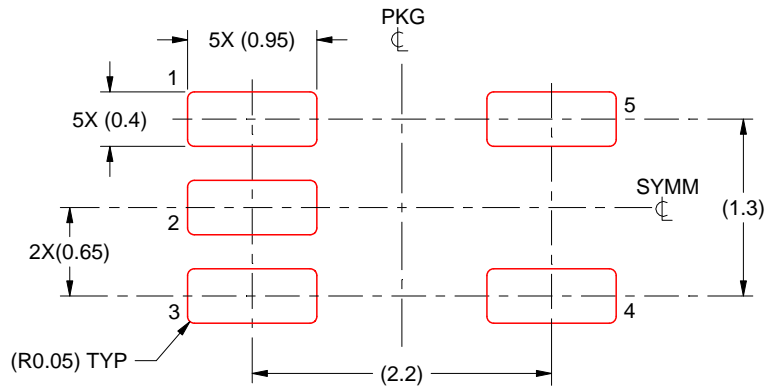
- 4. Publication IPC-7351 may have alternate designs.
- 5. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



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

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NOTES: (continued)

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

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