

# SN74LVC2G14-Q1 Automotive Dual Schmitt-Trigger Inverter

## 1 Features

- Qualified for automotive applications
- Supports 5V  $V_{CC}$  operation
- Inputs accept voltages to 5.5V
- Max  $t_{pd}$  of 5.4ns at 3.3V
- Low power consumption, 10 $\mu$ A max  $I_{CC}$
- $\pm 24$ mA output drive at 3.3V
- Typical  $V_{OLP}$  (output ground bounce) <0.8V at  $V_{CC} = 3.3V$ ,  $T_A = 25^\circ C$
- Typical  $V_{OHV}$  (output  $V_{OH}$  undershoot) >2V at  $V_{CC} = 3.3V$ ,  $T_A = 25^\circ C$
- $I_{off}$  feature supports partial-power-down mode operation
- Latch-up performance exceeds 100mA per JESD 78, class II

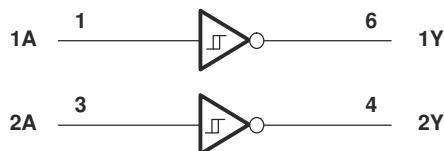
## 2 Description

This dual Schmitt-trigger inverter is designed for 1.65V to 5.5V  $V_{CC}$  operation.

### Package Information

PART NUMBER	PACKAGE <sup>(1)</sup>	PACKAGE SIZE <sup>(2)</sup>	BODY SIZE <sup>(3)</sup>
SN74LVC2G14-Q1	DBV (SOT-23, 6)	2.9mm $\times$ 2.8mm	2.90mm $\times$ 1.60mm
	DCK (SC70, 6)	2mm $\times$ 2.1mm	2.00mm $\times$ 1.25mm

- (1) For more information, see [Mechanical, Packaging, and Orderable Information](#).
- (2) The package size (length  $\times$  width) is a nominal value and includes pins, where applicable.
- (3) The body size (length  $\times$  width) is a nominal value and does not include pins.



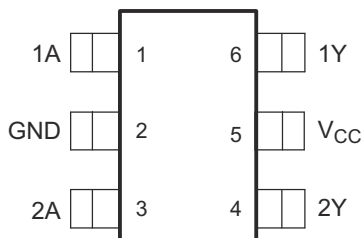
Logic Diagram (Positive Logic)



## Table of Contents

<b>1 Features</b> .....	<b>1</b>	6.3 Feature Description.....	<b>9</b>
<b>2 Description</b> .....	<b>1</b>	6.4 Device Functional Modes.....	<b>9</b>
<b>3 Pin Configuration and Functions</b> .....	<b>3</b>	<b>7 Application and Implementation</b> .....	<b>10</b>
<b>4 Specifications</b> .....	<b>4</b>	7.1 Application Information.....	<b>10</b>
4.1 Absolute Maximum Ratings.....	<b>4</b>	7.2 Power Supply Recommendations.....	<b>13</b>
4.2 ESD Ratings.....	<b>4</b>	7.3 Layout.....	<b>13</b>
4.3 Recommended Operating Conditions.....	<b>5</b>	<b>8 Device and Documentation Support</b> .....	<b>15</b>
4.4 Thermal Information.....	<b>5</b>	8.1 Documentation Support.....	<b>15</b>
4.5 Electrical Characteristics.....	<b>6</b>	8.2 Receiving Notification of Documentation Updates....	<b>15</b>
4.6 Switching Characteristics, –40°C to 85°C.....	<b>7</b>	8.3 Support Resources.....	<b>15</b>
4.7 Switching Characteristics, –40°C to 125°C.....	<b>7</b>	8.4 Trademarks.....	<b>15</b>
4.8 Operating Characteristics.....	<b>7</b>	8.5 Electrostatic Discharge Caution.....	<b>15</b>
<b>5 Parameter Measurement Information</b> .....	<b>8</b>	8.6 Glossary.....	<b>15</b>
<b>6 Detailed Description</b> .....	<b>9</b>	<b>9 Revision History</b> .....	<b>15</b>
6.1 Overview.....	<b>9</b>	<b>10 Mechanical, Packaging, and Orderable Information</b> .....	<b>15</b>
6.2 Functional Block Diagram.....	<b>9</b>		

### 3 Pin Configuration and Functions



**Figure 3-1. DBV or DCK Package, 6-Pin SOT-23 or SC70 (Top View)**

PIN		I/O <sup>(1)</sup>	DESCRIPTION
NAME	NO.		
1A	1	I	Gate 1 logic signal
1Y	6	O	Gate 1 inverted signal
2A	3	I	Gate 2 logic signal
2Y	4	O	Gate 2 inverted signal
GND	2	—	Ground
V <sub>CC</sub>	5	—	Supply/Power Pin

(1) I = input, O = output, P = power, FB = feedback, GND = ground, N/A = not applicable

## 4 Specifications

### 4.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage range	−0.5	6.5	V
$V_I$	Input voltage range <sup>(2)</sup>	−0.5	6.5	V
$V_O$	Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup>	−0.5	6.5	V
$V_O$	Voltage range applied to any output in the high or low state <sup>(2) (3)</sup>	−0.5	$V_{CC} + 0.5$	V
$I_{IK}$	Input clamp current	$V_I < 0$		−50 mA
$I_{OK}$	Output clamp current	$V_O < 0$		−50 mA
$I_O$	Continuous output current		±50	mA
	Continuous current through $V_{CC}$ or GND		±100	mA
$T_{stg}$	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 and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(3) The value of  $V_{CC}$  is provided in the recommended operating conditions table.

### 4.2 ESD Ratings

		VALUE	UNIT
$V_{(ESD)}$	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 must be in accordance with the ANSI/ESDA/JEDEC JS-001 specification.

### 4.3 Recommended Operating Conditions

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

For operating free-air temperature range (unless otherwise noted)			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	Operating	1.65	5.5	V
		Data retention only	1.5		
V <sub>I</sub>	Input voltage		0	5.5	V
V <sub>O</sub>	Output voltage		0	V <sub>CC</sub>	V
I <sub>OH</sub>	High-level output current	V <sub>CC</sub> = 1.65 V		−4	mA
		V <sub>CC</sub> = 2.3 V		−8	
		V <sub>CC</sub> = 3 V		−16	
				−24	
		V <sub>CC</sub> = 4.5 V		−32	
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 1.65 V		4	mA
		V <sub>CC</sub> = 2.3 V		8	
		V <sub>CC</sub> = 3 V		16	
				24	
		V <sub>CC</sub> = 4.5 V		32	
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.

### 4.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>		SN74LVC2G14-Q1		UNIT
		DBV (SOT23)	DCK (SC70)	
		6 PINS	6 PINS	
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	165	259	°C/W

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

## 4.5 Electrical Characteristics

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

PARAMETER		TEST CONDITIONS	V <sub>CC</sub>	–40°C to 85°C		–40°C to 125°C		UNIT		
				MIN	TYP <sup>(1)</sup>	MAX	MIN		TYP <sup>(1)</sup>	MAX
V <sub>T+</sub> Positive-going input threshold voltage			1.65 V	0.7		1.4	0.7		1.4	V
			2.3 V	1		1.7	1		1.7	
			3 V	1.3		2.2	1.3		2.2	
			4.5 V	1.9		3.1	1.9		3.1	
			5.5 V	2.2		3.7	2.2		3.7	
V <sub>T–</sub> Negative-going input threshold voltage			1.65 V	0.3		0.7	0.3		0.7	V
			2.3 V	0.4		1	0.4		1	
			3 V	0.6		1.3	0.6		1.3	
			4.5 V	1.1		2	1.1		2	
			5.5 V	1.4		2.5	1.4		2.5	
ΔV <sub>T</sub> Hysteresis (V <sub>T+</sub> – V <sub>T–</sub> )			1.65 V	0.3		0.8	0.3		0.8	V
			2.3 V	0.4		0.9	0.4		0.9	
			3 V	0.4		1.1	0.4		1.1	
			4.5 V	0.6		1.3	0.6		1.3	
			5.5 V	0.7		1.4	0.7		1.4	
V <sub>OH</sub>		I <sub>OH</sub> = –100 μA	1.65 V to 4.5 V	V <sub>CC</sub> – 0.1		V <sub>CC</sub> – 0.1				V
		I <sub>OH</sub> = –4 mA	1.65 V	1.2		1.2				
		I <sub>OH</sub> = –8 mA	2.3 V	1.9		1.9				
		I <sub>OH</sub> = –16 mA	3 V	2.4		2.4				
		I <sub>OH</sub> = –24 mA		2.3		2.3				
		I <sub>OH</sub> = –32 mA	4.5 V	3.8		3.8				
V <sub>OL</sub>		I <sub>OL</sub> = 100 μA	1.65 V to 4.5 V	0.1		0.1				V
		I <sub>OL</sub> = 4 mA	1.65 V	0.45		0.45				
		I <sub>OL</sub> = 8 mA	2.3 V	0.3		0.3				
		I <sub>OL</sub> = 16 mA	3 V	0.4		0.4				
		I <sub>OL</sub> = 24 mA		0.55		0.55				
		I <sub>OL</sub> = 32 mA	4.5 V	0.55		0.60				
I <sub>I</sub>	A inputs	V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V	±5		±5			μA	
I <sub>off</sub>		V <sub>I</sub> or V <sub>O</sub> = 5.5 V	0	±10		±10			μA	
I <sub>CC</sub>		V <sub>I</sub> = 5.5 V or GND, I <sub>O</sub> = 0	1.65 V to 5.5 V	10		10			μA	
ΔI <sub>CC</sub>		One input at V <sub>CC</sub> – 0.6 V, Other inputs at V <sub>CC</sub> or GND	3 V to 5.5 V	500		500			μA	
C <sub>i</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V	4		4			pF	

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

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

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 1.8 V ± 0.15 V		V <sub>CC</sub> = 2.5 V ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A	Y	3.9	9.5	1.9	5.7	2	5.4	1.5	4.3	ns

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

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

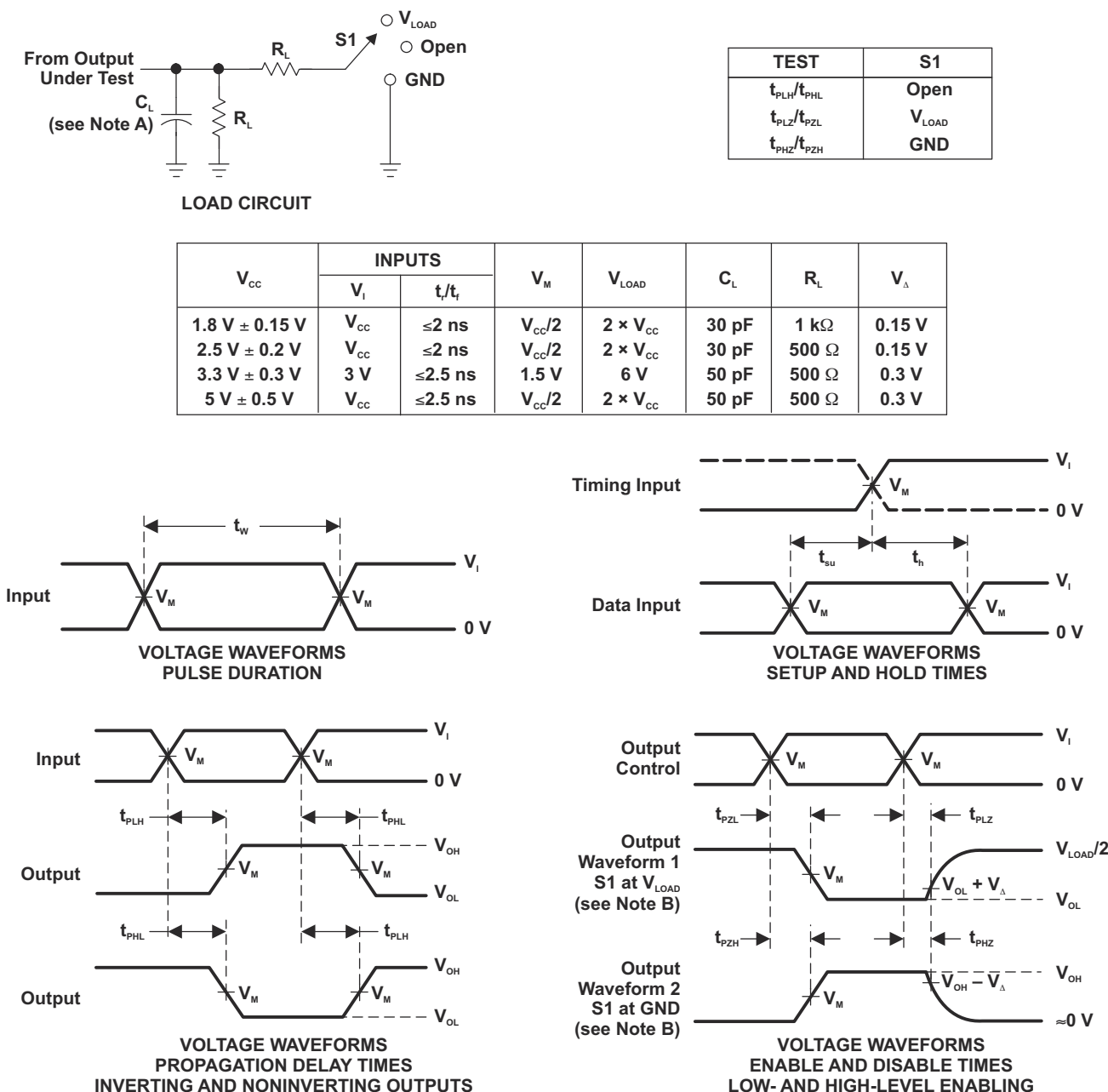
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 1.8 V ± 0.15 V		V <sub>CC</sub> = 2.5 V ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A	Y	3.9	10.5	1.9	6.5	2	6	1.5	4.7	ns

## 4.8 Operating Characteristics

T<sub>A</sub> = 25°C

PARAMETER		TEST CONDITIONS	V <sub>CC</sub> = 1.8 V ± 0.15 V	V <sub>CC</sub> = 2.5 V ± 0.2 V	V <sub>CC</sub> = 3.3 V ± 0.3 V	V <sub>CC</sub> = 5 V ± 0.5 V	UNIT
			TYP	TYP	TYP	TYP	
C <sub>pd</sub>	Power dissipation capacitance	f = 10 MHz	16	17	18	21	pF

## 5 Parameter Measurement Information



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

**Figure 5-1. Load Circuit and Voltage Waveforms**



## 6 Detailed Description

### 6.1 Overview

The contains two inverters and performs the Boolean function  $Y = \overline{A}$ . The device functions as two independent inverters, but because of Schmitt action, it may have different input threshold levels for positive-going ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals.

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.

### 6.2 Functional Block Diagram

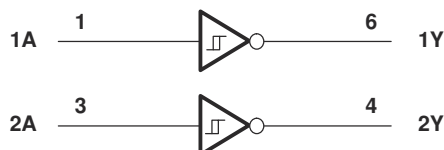


Figure 6-1. Logic Diagram (Positive Logic)

### 6.3 Feature Description

#### 6.3.1 CMOS Schmitt-Trigger Inputs

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

The Schmitt-trigger input architecture provides hysteresis as defined by  $\Delta V_T$  in the *Electrical Characteristics* table, which makes this device extremely tolerant to slow or noisy inputs. While the inputs can be driven much slower than standard CMOS inputs, it is still recommended to properly terminate unused inputs. Driving the inputs with slow transitioning signals will increase dynamic current consumption of the device. For additional information regarding Schmitt-trigger inputs, please see [Understanding Schmitt Triggers](#).

### 6.4 Device Functional Modes

[Table 6-1](#) lists the functional modes of the .

**Table 6-1. Functional  
Table  
(Each Inverter)**

INPUT A	OUTPUT Y
H	L
L	H

## 7 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.

### 7.1 Application Information

The device is a high-drive CMOS device that can be used for a multitude of buffer type functions where the input is slow or noisy. The device can produce 24mA of drive current at 3.3V, making it ideal for driving multiple outputs and good for high-speed applications up to 100MHz. The inputs are 5.5V tolerant allowing it to translate down to  $V_{CC}$ .

#### 7.1.1 Typical Application

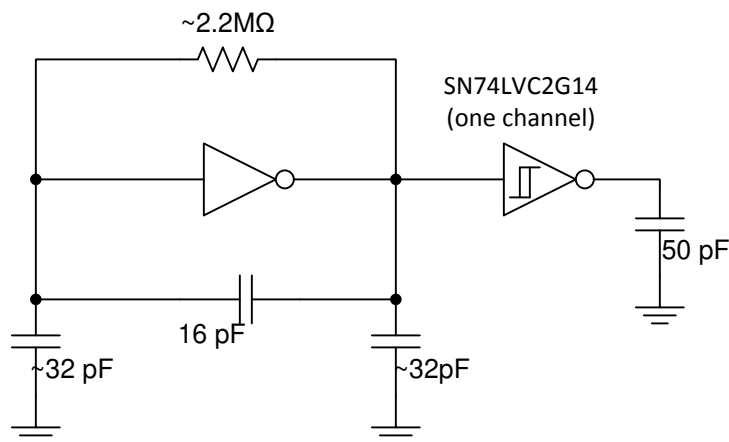


Figure 7-1. Typical Application Schematic

### 7.1.1.1 Design Requirements

#### 7.1.1.1.1 Power Considerations

Ensure the desired supply voltage is within the range specified in the *Recommended Operating Conditions*. The supply voltage sets the device's electrical characteristics of the device as described in the *Electrical Characteristics* section.

The positive voltage supply must be capable of sourcing current equal to the maximum static supply current,  $I_{CC}$ , listed in the *Electrical Characteristics*, and any transient current required for switching.

The ground must be capable of sinking current equal to the total current to be sunk by all outputs of the SN74LVC2G14-Q1 plus the maximum supply current,  $I_{CC}$ , listed in the *Electrical Characteristics*, and any transient current required for switching. The logic device can only sink as much current that can be sunk into its ground connection. Ensure the maximum total current through GND listed in the *Absolute Maximum Ratings* is not exceeded.

The SN74LVC2G14-Q1 can drive a load with a total capacitance less than or equal to 50pF while still meeting all of the data sheet specifications. Larger capacitive loads can be applied; however, it is not recommended to exceed 50pF.

The SN74LVC2G14-Q1 can drive a load with total resistance described by  $R_L \geq V_O / I_O$ , with the output voltage and current defined in the *Electrical Characteristics* table with  $V_{OL}$ . When outputting in the HIGH state, the output voltage in the equation is defined as the difference between the measured output voltage and the supply voltage at the  $V_{CC}$  pin.

Total power consumption can be calculated using the information provided in [CMOS Power Consumption and Cpd Calculation](#).

Thermal increase can be calculated using the information provided in [Thermal Characteristics of Standard Linear and Logic \(SLL\) Packages and Devices](#).

#### CAUTION

The maximum junction temperature,  $T_{J(max)}$  listed in the *Absolute Maximum Ratings*, is an additional limitation to prevent damage to the device. Do not violate any values listed in the *Absolute Maximum Ratings*. These limits are provided to prevent damage to the device.

#### 7.1.1.1.2 Input Considerations

Input signals must cross  $V_{t-(min)}$  to be considered a logic LOW, and  $V_{t+(max)}$  to be considered a logic HIGH. Do not exceed the maximum input voltage range found in the *Absolute Maximum Ratings*.

Unused inputs must be terminated to either  $V_{CC}$  or ground. The unused inputs can be directly terminated if the input is completely unused, or they can be connected with a pull-up or pull-down resistor if the input will be used sometimes, but not always. A pull-up resistor is used for a default state of HIGH, and a pull-down resistor is used for a default state of LOW. The drive current of the controller, leakage current into the SN74LVC2G14-Q1 (as specified in the *Electrical Characteristics*), and the desired input transition rate limits the resistor size. A 10k $\Omega$  resistor value is often used due to these factors.

The SN74LVC2G14-Q1 has no input signal transition rate requirements because it has Schmitt-Trigger inputs.

Another benefit to having Schmitt-Trigger inputs is the ability to reject noise. Noise with a large enough amplitude can still cause issues. To know how much noise is too much, please refer to the  $\Delta V_{T(min)}$  in the *Electrical Characteristics*. This hysteresis value will provide the peak-to-peak limit.

Unlike what happens with standard CMOS inputs, Schmitt-Trigger inputs can be held at any valid value without causing huge increases in power consumption. The typical additional current caused by holding an input at a value other than  $V_{CC}$  or ground is plotted in the *Typical Characteristics*.

Refer to the *Feature Description* section for additional information regarding the inputs for this device.

#### 7.1.1.1.3 Output Considerations

The ground voltage is used to produce the output LOW voltage. Sinking current into the output will increase the output voltage as specified by the  $V_{OL}$  specification in the *Electrical Characteristics*.

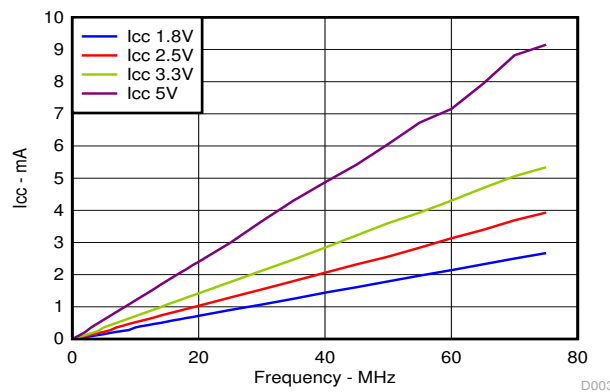
Unused outputs can be left floating. Do not connect outputs directly to  $V_{CC}$  or ground.

Refer to the *Feature Description* section for additional information regarding the outputs for this device.

### 7.1.1.2 Detailed Design Procedure

1. Add a decoupling capacitor from  $V_{CC}$  to GND. The capacitor needs to be placed physically close to the device and electrically close to both the  $V_{CC}$  and GND pins. An example layout is shown in the *Layout* section.
2. Ensure the capacitive load at the output is  $\leq 50\text{pF}$ . This is not a hard limit; by design, however, it will optimize performance. This can be accomplished by providing short, appropriately sized traces from the SN74LVC2G14-Q1 to one or more of the receiving devices.
3. Ensure the resistive load at the output is larger than  $(V_{CC} / I_{O(max)})\Omega$ . Doing this will prevent the maximum output current from the *Absolute Maximum Ratings* from being violated. Most CMOS inputs have a resistive load measured in  $\text{M}\Omega$ ; much larger than the minimum calculated previously.
4. Thermal issues are rarely a concern for logic gates; the power consumption and thermal increase, however, can be calculated using the steps provided in the application report, [CMOS Power Consumption and Cpd Calculation](#).

### 7.1.1.3 Application Curve



**Figure 7-2. ICC vs Frequency**

## 7.2 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. A  $0.1\mu\text{F}$  capacitor is recommended for this device. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. The  $0.1\mu\text{F}$  and  $1\mu\text{F}$  capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

## 7.3 Layout

### 7.3.1 Layout Guidelines

- Bypass capacitor placement
  - Place near the positive supply terminal of the device
  - Provide an electrically short ground return path
  - Use wide traces to minimize impedance
  - Keep the device, capacitors, and traces on the same side of the board whenever possible
- Signal trace geometry
  - 8mil to 12mil trace width
  - Lengths less than 12cm to minimize transmission line effects
  - Avoid 90° corners for signal traces
  - Use an unbroken ground plane below signal traces
  - Flood fill areas around signal traces with ground
  - For traces longer than 12cm
    - Use impedance controlled traces
    - Source-terminate using a series damping resistor near the output

- Avoid branches; buffer signals that must branch separately

### 7.3.2 Layout Example

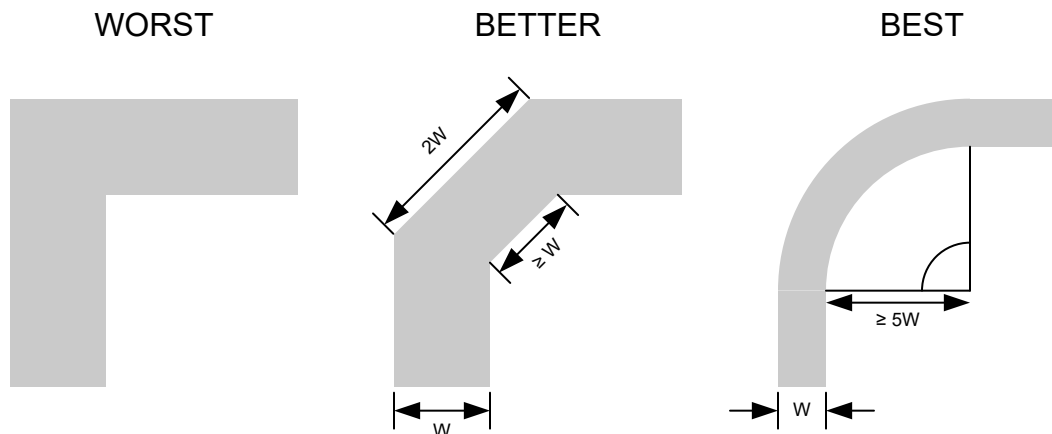


Figure 7-3. Example Trace Corners for Improved Signal Integrity

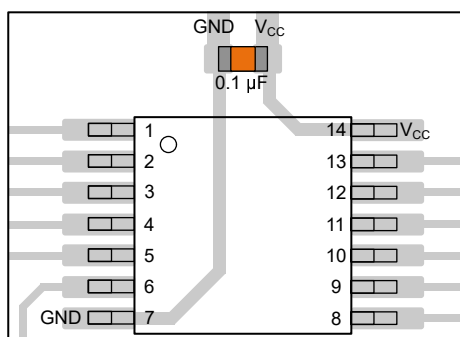


Figure 7-4. Example Bypass Capacitor Placement for TSSOP and Similar Packages

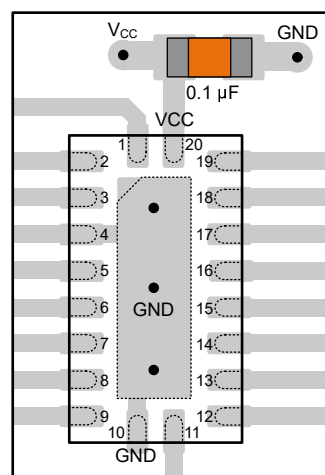


Figure 7-5. Example Bypass Capacitor Placement for WQFN and Similar Packages

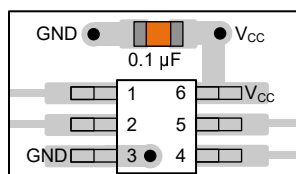


Figure 7-6. Example Bypass Capacitor Placement for SOT, SC70 and Similar Packages

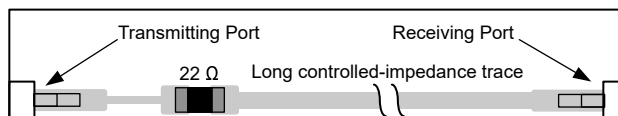


Figure 7-7. Example Damping Resistor Placement for Improved Signal Integrity

## 8 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

### 8.1 Documentation Support

#### 8.1.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, [CMOS Power Consumption and  \$C\_{pd}\$  Calculation application report](#)
- Texas Instruments, [Designing With Logic application report](#)
- Texas Instruments, [Thermal Characteristics of Standard Linear and Logic \(SLL\) Packages and Devices application report](#)

### 8.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](#). Click on *Notifications* 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.

### 8.3 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](#).

### 8.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

### 8.5 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.

### 8.6 Glossary

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

## 9 Revision History

Changes from Revision D (April 2008) to Revision E (January 2025)	Page
• Updated <i>Electrical Characteristics</i> , <i>Switching Characteristics</i> , and <i>Recommended Operating Conditions</i> tables to reflect change in operating free air temperature: 85°C to 125°C.....	1
• Added <i>Package Information</i> table, <i>Pin Functions</i> table, <i>ESD Ratings</i> table, <i>Thermal Information</i> table, <i>Device Functional Modes</i> , <i>Application and Implementation</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section .....	1

## 10 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 part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">SN74LVC2G14IDCKRQ1</a>	Active	Production	SC70 (DCK)   6	3000   LARGE T&R	Yes	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	(CFJ, CFO)
SN74LVC2G14IDCKRQ1.B	Active	Production	SC70 (DCK)   6	3000   LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(CFJ, CFO)

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

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

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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

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

### OTHER QUALIFIED VERSIONS OF SN74LVC2G14-Q1 :

- Catalog : [SN74LVC2G14](#)



NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

## 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
SN74LVC2G14IDCKRQ1	SC70	DCK	6	3000	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)
SN74LVC2G14IDCKRQ1	SC70	DCK	6	3000	180.0	180.0	18.0

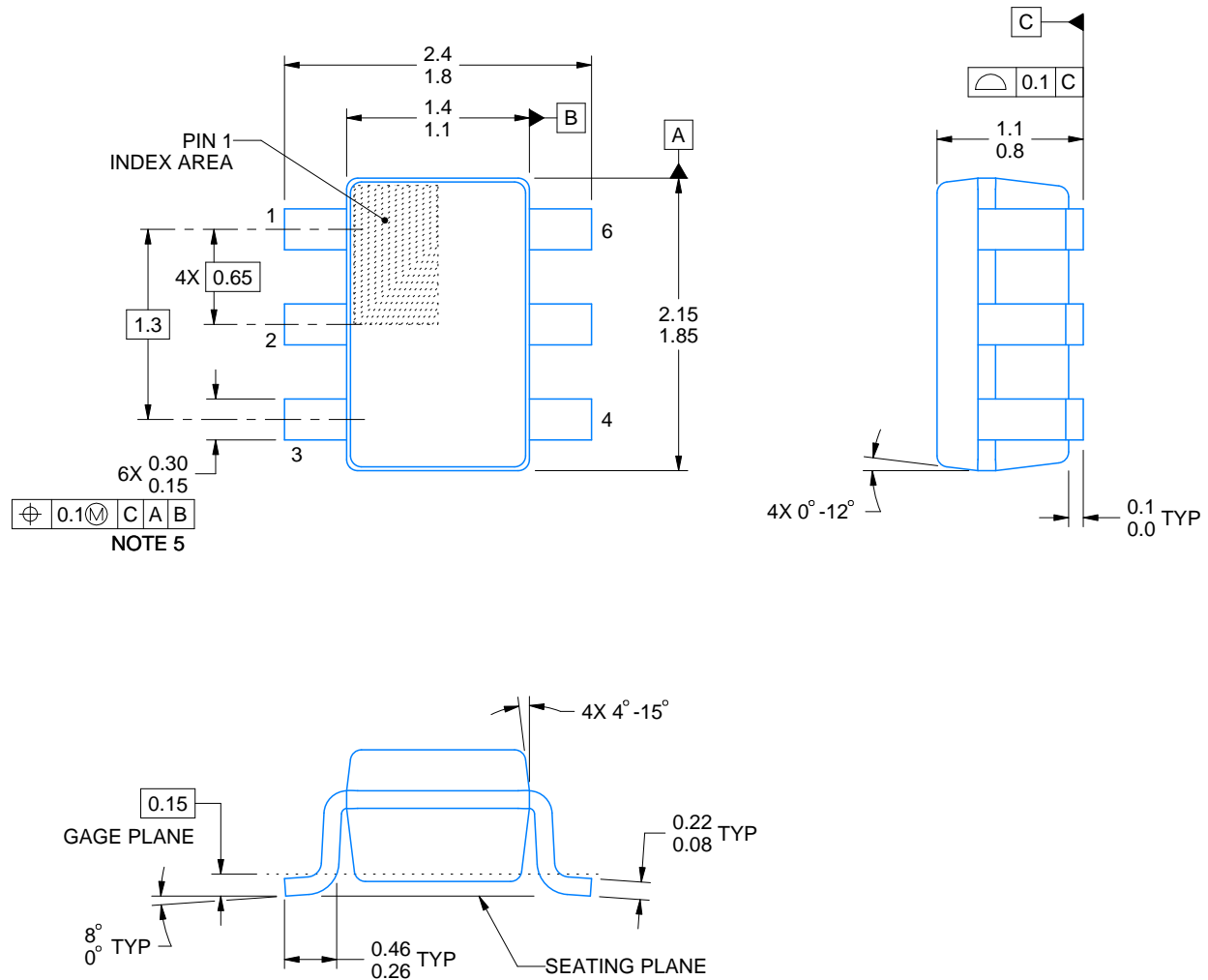
DCK0006A



## PACKAGE OUTLINE

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



4214835/D 11/2024

### NOTES:

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



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X



SOLDER MASK DETAILS

4214835/D 11/2024

NOTES: (continued)

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



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

4214835/D 11/2024

NOTES: (continued)

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

## IMPORTANT NOTICE AND DISCLAIMER

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

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

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

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

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

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