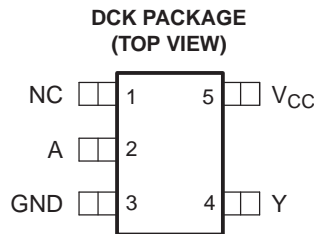


## FEATURES

- **Controlled Baseline**
    - One Assembly Site
    - One Test Site
    - One Fabrication Site
  - **Extended Temperature Performance of –55°C to 125°C**
  - **Enhanced Diminishing Manufacturing Sources (DMS) Support**
  - **Enhanced Product-Change Notification**
  - **Qualification Pedigree <sup>(1)</sup>**
  - **Available in the Texas Instruments NanoStar™ and NanoFree™ Packages**
  - **Supports 5-V V<sub>CC</sub> Operation**
  - **Input and Open-Drain Output Accept**
- (1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

### Voltages up to 5.5 V

- **Max t<sub>pd</sub> of 4 ns at 3.3 V**
- **Low Power Consumption, 10-μA Max I<sub>CC</sub>**
- **±24-mA Output Drive at 3.3 V**
- **I<sub>off</sub> Supports Partial-Power-Down Mode Operation**
- **Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II**
- **ESD Protection Exceeds JESD 22**
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)



See mechanical drawings for dimensions.

## DESCRIPTION/ORDERING INFORMATION

The SN74LVC1G06 is a single inverter buffer/driver that is designed for 1.65-V to 5.5-V V<sub>CC</sub> operation.

NanoStar™ and NanoFree™ package technology is a major breakthrough in IC packaging concepts, using the die as the package.

The output of the SN74LVC1G06 device is open drain and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions. The maximum sink current is 32 mA.

This device is fully specified for partial-power-down applications using I<sub>off</sub>. The I<sub>off</sub> circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.



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# SN74LVC1G06-EP

## SINGLE INVERTER BUFFER/DRIVER

### WITH OPEN-DRAIN OUTPUT

SCES669A – JULY 2006 – REVISED MARCH 2007

#### ORDERING INFORMATION<sup>(1)</sup>

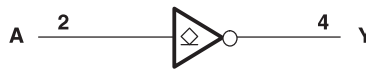
T <sub>A</sub>	PACKAGE <sup>(2)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING <sup>(3)</sup>
-55°C to 125°C	SOT (SC-70) – DCK	Reel of 3000	SN74LVC1G06MDCKREP <sup>(4)</sup>	CBA

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI Web site at [www.ti.com](http://www.ti.com).
- (2) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).
- (3) The actual top-side marking has one additional character that designates the assembly/test site.
- (4) Product Preview

#### FUNCTION TABLE

INPUT A	OUTPUT Y
H	L
L	H

#### LOGIC DIAGRAM (POSITIVE LOGIC)



#### Absolute Maximum Ratings<sup>(1)</sup>

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

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage range	-0.5	6.5	V
V <sub>I</sub>	Input voltage range <sup>(2)</sup>	-0.5	6.5	V
V <sub>O</sub>	Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup>	-0.5	6.5	V
V <sub>O</sub>	Voltage range applied to any output in the high or low state <sup>(2)(3)</sup>	-0.5	6.5	V
I <sub>IK</sub>	Input clamp current	V <sub>I</sub> < 0 V		-50 mA
I <sub>OK</sub>	Output clamp current	V <sub>O</sub> < 0 V		-50 mA
I <sub>O</sub>	Continuous output current			±50 mA
Continuous current through V <sub>CC</sub> or GND				±100 mA
θ <sub>JA</sub>	Package thermal impedance <sup>(4)</sup>			252 °C/W
T <sub>stg</sub>	Storage temperature range	-65	150	°C

- (1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of V<sub>CC</sub> is provided in the recommended operating conditions table.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.

#### Recommended Operating Conditions<sup>(1)</sup>

		MIN	MAX	UNIT	
V <sub>CC</sub>	Supply voltage	Operating	1.65	5.5	V
		Data retention only	1.5		
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65 × V <sub>CC</sub>		V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7		
		V <sub>CC</sub> = 3 V to 3.6 V	2		
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7 × V <sub>CC</sub>		

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

### Recommended Operating Conditions (continued)

		MIN	MAX	UNIT
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V		V
		V <sub>CC</sub> = 2.3 V to 2.7 V		
		V <sub>CC</sub> = 3 V to 3.6 V		
		V <sub>CC</sub> = 4.5 V to 5.5 V		
V <sub>I</sub>	Input voltage	0	5.5	V
V <sub>O</sub>	Output voltage	0	5.5	V
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 1.65 V		mA
		V <sub>CC</sub> = 2.3 V		
		V <sub>CC</sub> = 3 V		
		V <sub>CC</sub> = 4.5 V		
Δt/Δv	Input transition rise or fall rate	V <sub>CC</sub> = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V		ns/V
		V <sub>CC</sub> = 3.3 V ± 0.3 V		
		V <sub>CC</sub> = 5 V ± 0.5 V		
T <sub>A</sub>	Operating free-air temperature	–55	125	°C

### 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>OL</sub>	I <sub>OL</sub> = 100 μA	1.65 V to 5.5 V			0.1	V
	I <sub>OL</sub> = 4 mA	1.65 V			0.45	
	I <sub>OL</sub> = 8 mA	2.3 V			0.3	
	I <sub>OL</sub> = 16 mA	3 V			0.4	
	I <sub>OL</sub> = 24 mA				0.55	
	I <sub>OL</sub> = 32 mA	4.5 V			0.55	
I <sub>I</sub>	A input	V <sub>I</sub> = 5.5 V or GND	0 V to 5.5 V		±1	μA
I <sub>off</sub>		V <sub>I</sub> or V <sub>O</sub> = 5.5 V	0 V		±10	μA
I <sub>CC</sub>		V <sub>I</sub> = 5.5 V or GND, I <sub>O</sub> = 0	1.65 V to 5.5 V		10	μA
ΔI <sub>CC</sub>		One input at V <sub>CC</sub> – 0.6 V, Other inputs at V <sub>CC</sub> or GND	3 V to 5.5 V		500	μA
C <sub>i</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V		4	pF
C <sub>o</sub>		V <sub>O</sub> = V <sub>CC</sub> or GND	3.3 V		5	pF

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

### Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

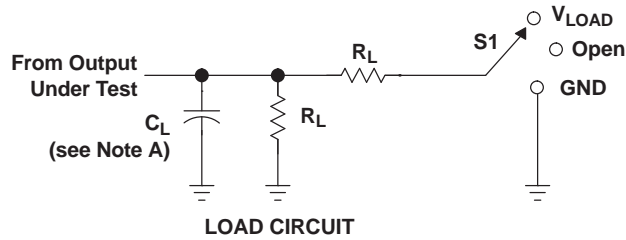
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 1.8 V ± 0.15 V		V <sub>CC</sub> = 2.5 V ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A	Y	2.2	8	1.1	6	1.2	6	1	5.5	ns

### Operating Characteristics

T<sub>A</sub> = 25°C

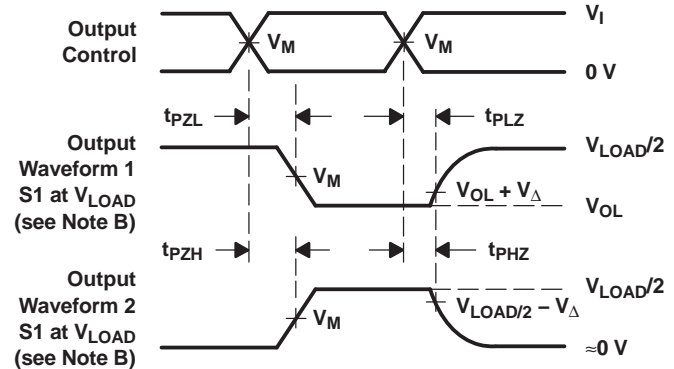
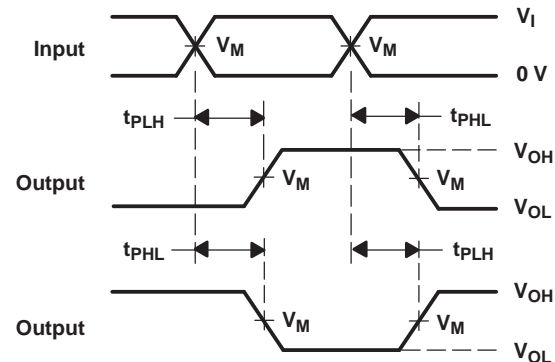
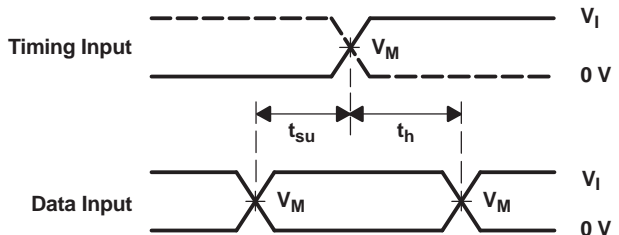
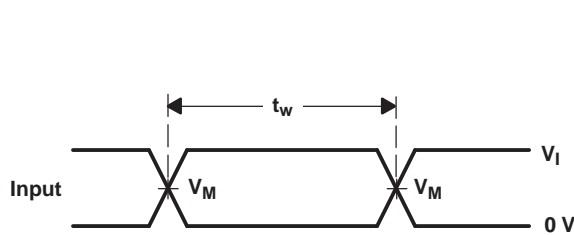
PARAMETER	TEST CONDITIONS	V <sub>CC</sub> = 1.8 V	V <sub>CC</sub> = 2.5 V	V <sub>CC</sub> = 3.3 V	V <sub>CC</sub> = 5 V	UNIT	
		TYP	TYP	TYP	TYP		
C <sub>pd</sub>	Power dissipation capacitance	f = 10 MHz	3	3	4	6	pF

**PARAMETER MEASUREMENT INFORMATION**  
**(Open Drain)**



TEST	S1
$t_{pZL}$ (see Notes E and F)	$V_{LOAD}$
$t_{pLZ}$ (see Notes E and G)	$V_{LOAD}$
$t_{PHZ}/t_{PZH}$	$V_{LOAD}$

$V_{CC}$	INPUT		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_I$	$t_r/t_f$					
$1.8\text{ V} \pm 0.15\text{ V}$	$V_{CC}$	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 k $\Omega$	0.15 V
$2.5\text{ V} \pm 0.2\text{ V}$	$V_{CC}$	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	500 $\Omega$	0.15 V
$3.3\text{ V} \pm 0.3\text{ V}$	3 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	50 pF	500 $\Omega$	0.3 V
$5\text{ V} \pm 0.5\text{ V}$	$V_{CC}$	$\leq 2.5\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	50 pF	500 $\Omega$	0.3 V



- 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. Since this device has open-drain outputs,  $t_{pLZ}$  and  $t_{pZL}$  are the same as  $t_{pd}$ .  
F.  $t_{pZL}$  is measured at  $V_M$ .  
G.  $t_{pLZ}$  is measured at  $V_{OL} + V_{\Delta}$ .  
H. All parameters and waveforms are not applicable to all devices.

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

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74LVC1G06MDCKREP	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CBF	<a href="#">Samples</a>
V62/06655-01XE	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CBF	<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 SN74LVC1G06-EP :**

- Catalog: [SN74LVC1G06](#)

## 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
SN74LVC1G06MDCKREP	SC70	DCK	5	3000	180.0	8.4	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)
SN74LVC1G06MDCKREP	SC70	DCK	5	3000	202.0	201.0	28.0



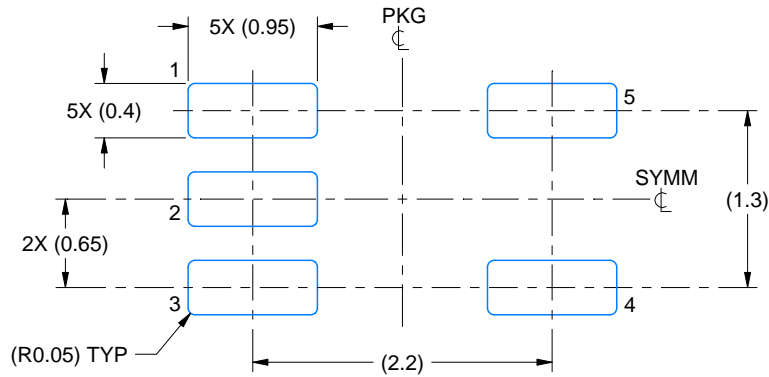


# EXAMPLE BOARD LAYOUT

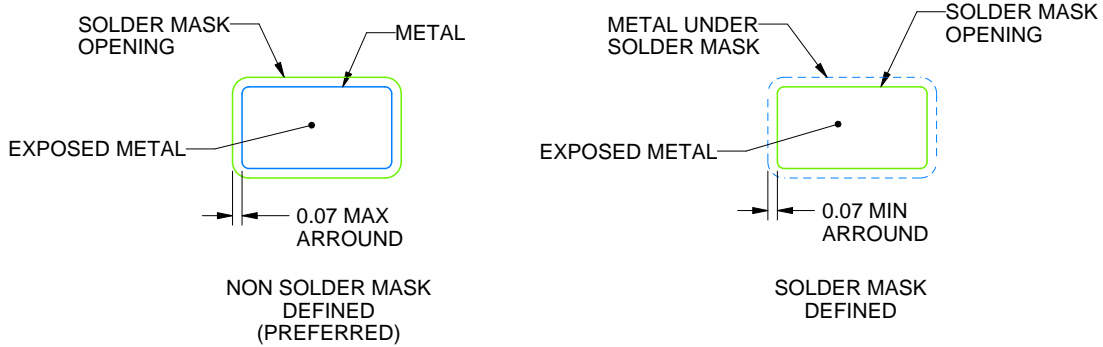
DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X



SOLDER MASK DETAILS

4214834/D 07/2023

NOTES: (continued)

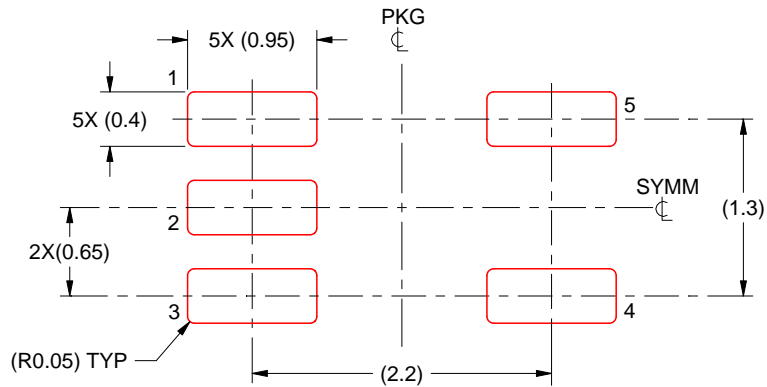
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



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

4214834/D 07/2023

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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