

## SN74LVC3G17 Triple Schmitt-Trigger Buffer

### 1 Features

- Available in the Texas Instruments NanoFree™ Package
- Supports 5-V  $V_{CC}$  Operation
- Inputs Accept Voltages to 5.5 V
- Maximum  $t_{pd}$  of 5.4 ns at 3.3 V
- Low Power Consumption, 10- $\mu$ A Maximum  $I_{CC}$
- $\pm 24$ -mA Output Drive at 3.3 V
- Typical  $V_{OLP}$  (Output Ground Bounce)  $< 0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Typical  $V_{OHV}$  (Output  $V_{OH}$  Undershoot)  $> 2$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- $I_{off}$  Supports Live Insertion, Partial-Power-Down Mode and Back Drive Protection
- 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)

### 2 Applications

- AV Receivers
- Audio Docks: Portable
- Blu-ray® Players and Home Theater
- MP3 Players/Recorders
- Personal Digital Assistants (PDAs)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital
- Solid State Drives (SSDs): Client and Enterprise
- TVs: LCD/Digital and High-Definition (HDTVs)
- Tablets: Enterprise
- Video Analytics: Server
- Wireless Headsets, Keyboards, and Mice

### 3 Description

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

The SN74LVC3G17 device contains three buffers and performs the Boolean function  $Y = A$ . The device functions as three independent buffers 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.

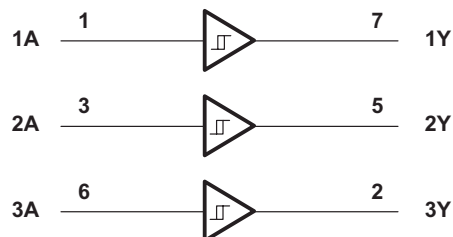
NanoFree package technology is a major breakthrough in IC packaging concepts, using the die as the package.

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

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN74LVC3G17DCT	SSOP (8)	2.95 mm x 2.80 mm
SN74LVC3G17DCU	VSSOP (8)	2.30 mm x 2.00 mm
SN74LVC3G17YZP	DSBGA (8)	1.91 mm x 0.91 mm

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

#### Simplified Schematic



## Table of Contents

<b>1 Features</b> .....	<b>1</b>	8.2 Functional Block Diagram .....	<b>9</b>
<b>2 Applications</b> .....	<b>1</b>	8.3 Feature Description .....	<b>9</b>
<b>3 Description</b> .....	<b>1</b>	8.4 Device Functional Modes .....	<b>9</b>
<b>4 Revision History</b> .....	<b>2</b>	<b>9 Application and Implementation</b> .....	<b>10</b>
<b>5 Pin Configuration and Functions</b> .....	<b>3</b>	9.1 Application Information .....	<b>10</b>
<b>6 Specifications</b> .....	<b>4</b>	9.2 Typical Application .....	<b>10</b>
6.1 Absolute Maximum Ratings .....	<b>4</b>	<b>10 Power Supply Recommendations</b> .....	<b>11</b>
6.2 ESD Ratings .....	<b>4</b>	<b>11 Layout</b> .....	<b>11</b>
6.3 Recommended Operating Conditions .....	<b>4</b>	11.1 Layout Guidelines .....	<b>11</b>
6.4 Thermal Information .....	<b>5</b>	11.2 Layout Example .....	<b>12</b>
6.5 Electrical Characteristics .....	<b>5</b>	<b>12 Device and Documentation Support</b> .....	<b>13</b>
6.6 Switching Characteristics .....	<b>6</b>	12.1 Documentation Support .....	<b>13</b>
6.7 Operating Characteristics .....	<b>6</b>	12.2 Community Resources .....	<b>13</b>
6.8 Typical Characteristics .....	<b>6</b>	12.3 Trademarks .....	<b>13</b>
<b>7 Parameter Measurement Information</b> .....	<b>7</b>	12.4 Electrostatic Discharge Caution .....	<b>13</b>
<b>8 Detailed Description</b> .....	<b>9</b>	12.5 Glossary .....	<b>13</b>
8.1 Overview .....	<b>9</b>	<b>13 Mechanical, Packaging, and Orderable Information</b> .....	<b>13</b>

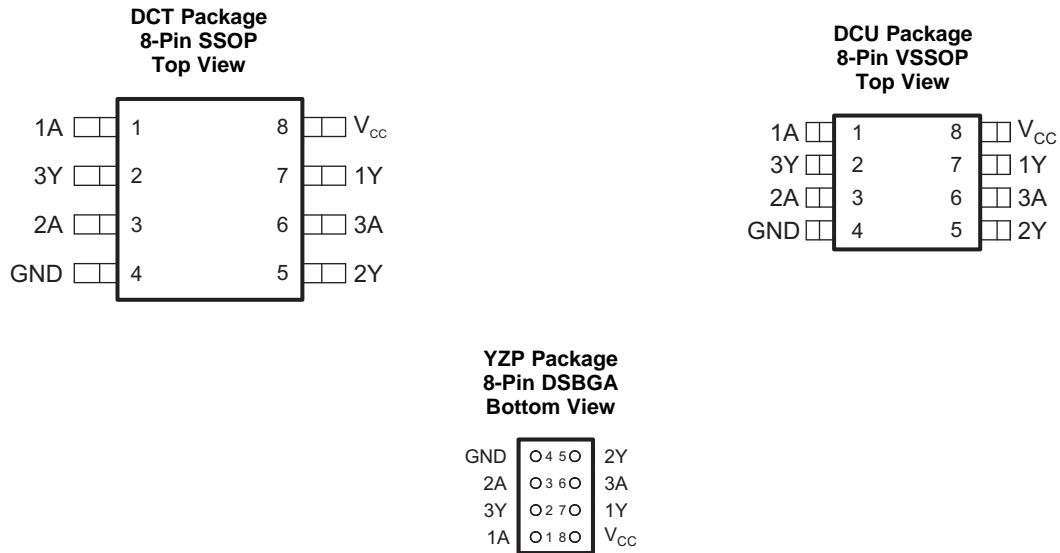
## 4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<b>Changes from Revision E (November 2013) to Revision F</b>	<b>Page</b>
• Added the <i>Device Information</i> table, <i>ESD Ratings</i> table, <i>Feature Description</i> section, <i>Device Functional Modes</i> , <i>Application and Implementation</i> section, <i>Power Supply Recommendations</i> section, <i>Layout</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section .....	<b>1</b>
• Moved $T_{stg}$ to <i>Absolute Maximum Ratings</i> table .....	<b>4</b>

<b>Changes from Revision D (February 2007) to Revision E</b>	<b>Page</b>
• Updated document to new TI data sheet format .....	<b>1</b>
• Updated operating temperature range .....	<b>4</b>

## 5 Pin Configuration and Functions



See mechanical drawing for dimensions.

### Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
1A	1	I	Input 1
1Y	7	O	Output 1
2A	3	I	Input 2
2Y	5	O	Output 2
3A	6	I	Input 3
3Y	2	O	Output 3
GND	4	—	Ground
V <sub>CC</sub>	8	—	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	-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>	Output voltage <sup>(2)(3)</sup>	-0.5	V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	Input clamp current	V <sub>I</sub> < 0		-50 mA
I <sub>OK</sub>	Output clamp current	V <sub>O</sub> < 0		-50 mA
I <sub>O</sub>	Continuous output current			±50 mA
	Continuous current through V <sub>CC</sub> or GND			±100 mA
T <sub>stg</sub>	Storage temperature	-65	150	°C

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of V<sub>CC</sub> is provided in the *Recommended Operating Conditions* table.

### 6.2 ESD Ratings

		VALUE	UNIT
V <sub>ESD</sub>	Electrostatic discharge	Human Body Model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>	+2000
		Charged-Device Model (CDM), per JEDEC specification JESD22-C101, all pins <sup>(2)</sup>	+1000

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

### 6.3 Recommended Operating Conditions

 See <sup>(1)</sup>.

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	Operating		1.65 5.5 V
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
		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
		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*, [SCBA004](#).

## 6.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>	SN74LVC3G17			UNIT
	DCT (SSOP)	DCU (VSSOP)	YZP (DSBGA)	
	6 PINS	6 PINS	6 PINS	
$R_{\theta JA}$ Junction-to-ambient thermal resistance <sup>(2)</sup>	220	227	102	°C/W

- (1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, [SPRA953](#).
- (2) The package thermal impedance is calculated in accordance with JESD 51-7.

## 6.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	$V_{CC}$	–40°C to 85°C			–40°C to 125°C			UNIT
			MIN	TYP <sup>(1)</sup>	MAX	MIN	TYP <sup>(1)</sup>	MAX	
$V_{T+}$ Positive-going input threshold voltage		1.65 V	0.79	1.16	0.79	1.16	V		
		2.3 V	1.11	1.56	1.11	1.56			
		3 V	1.5	1.87	1.5	1.87			
		4.5 V	2.16	2.74	2.16	2.74			
		5.5 V	2.61	3.33	2.61	3.33			
$V_{T-}$ Negative-going input threshold voltage		1.65 V	0.39	0.62	0.39	0.62	V		
		2.3 V	0.58	0.87	0.58	0.87			
		3 V	0.84	1.14	0.84	1.14			
		4.5 V	1.41	1.79	1.41	1.79			
		5.5 V	1.87	2.29	1.87	2.29			
$\Delta V_T$ Hysteresis $V_{T+} - V_{T-}$		1.65 V	0.37	0.62	0.37	0.62	V		
		2.3 V	0.48	0.77	0.48	0.77			
		3 V	0.56	0.87	0.56	0.87			
		4.5 V	0.71	1.04	0.71	1.04			
		5.5 V	0.71	1.11	0.71	1.11			
$V_{OH}$	$I_{OH} = -100 \mu A$	1.65 V to 5.5 V	$V_{CC} - 0.1$		$V_{CC} - 0.1$		V		
	$I_{OH} = -4 \text{ mA}$	1.65 V	1.2		1.2				
	$I_{OH} = -8 \text{ mA}$	2.3 V	1.9		1.9				
	$I_{OH} = -16 \text{ mA}$	3 V	2.4		2.4				
	$I_{OH} = -24 \text{ mA}$		2.3		2.3				
	$I_{OH} = -32 \text{ mA}$	4.5 V	3.8		3.8				
$V_{OL}$	$I_{OL} = 100 \mu A$	1.65 V to 5.5 V	0.1		0.1		V		
	$I_{OL} = 4 \text{ mA}$	1.65 V	0.45		0.45				
	$I_{OL} = 8 \text{ mA}$	2.3 V	0.3		0.3				
	$I_{OL} = 16 \text{ mA}$	3 V	0.4		0.4				
	$I_{OL} = 24 \text{ mA}$		0.55		0.75				
	$I_{OL} = 32 \text{ mA}$	4.5 V	0.55		0.75				
$I_I$	$V_I = 5.5 \text{ V or GND}$	0 to 5.5 V	$\pm 1$		$\pm 5$		$\mu A$		
$I_{off}$	$V_I \text{ or } V_O = 5.5 \text{ V}$	0	$\pm 5$		$\pm 10$		$\mu A$		
$I_{CC}$	$V_I = 5.5 \text{ V or GND, } I_O = 0$	1.65 V to 5.5 V	10		10		$\mu A$		
$\Delta I_{CC}$	One input at $V_{CC} - 0.6 \text{ V}$ , Other inputs at $V_{CC}$ or GND	3 V to 5.5 V	500		500		$\mu A$		
$C_I$	$V_I = V_{CC} \text{ or GND}$	3.3 V	4				pF		

- (1) All typical values are at  $V_{CC} = 3.3 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

# SN74LVC3G17

SCES470F – AUGUST 2003 – REVISED AUGUST 2015

www.ti.com

## 6.6 Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 30\text{ pF}$  or  $50\text{ pF}$  (unless otherwise noted)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	-40°C to 85°C								UNIT
				$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$		
				MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
$t_{pd}$	A	Y	See Figure 3	4.3	9.2	2	6.2	1.2	5.4	1	4.1	ns
			See Figure 3	4.3	10.2	2	7.2	1.2	6.4	1	5.1	

## 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	$f = 10\text{ MHz}$	18	19	19	22	pF

## 6.8 Typical Characteristics

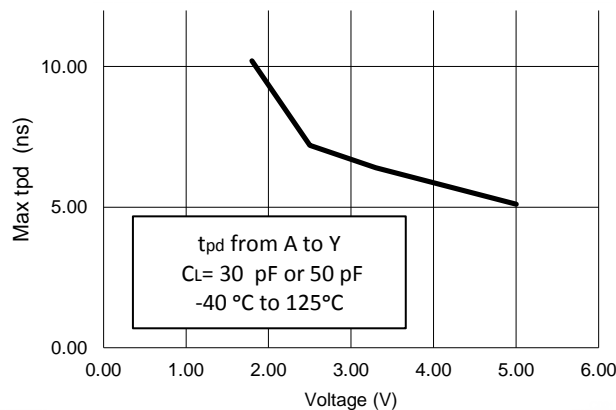


Figure 1. Maximum Propagation vs Delay  $V_{CC}$  Voltage

## 7 Parameter Measurement Information



LOAD CIRCUIT

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

$V_{CC}$	INPUTS		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_i$	$t_i/t_r$					
$1.8\text{ V} \pm 0.15\text{ V}$	$V_{CC}$	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	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



VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



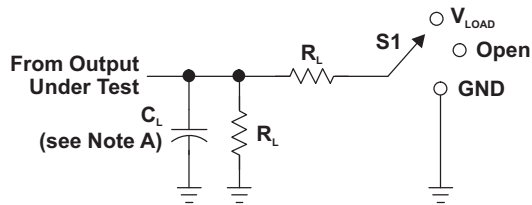
VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES LOW- AND HIGH-LEVEL ENABLING

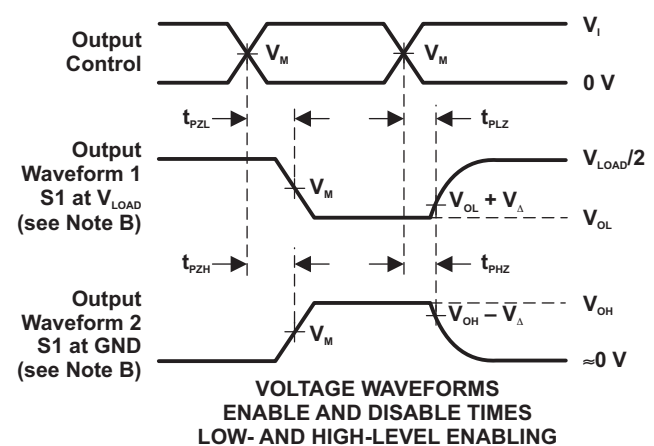
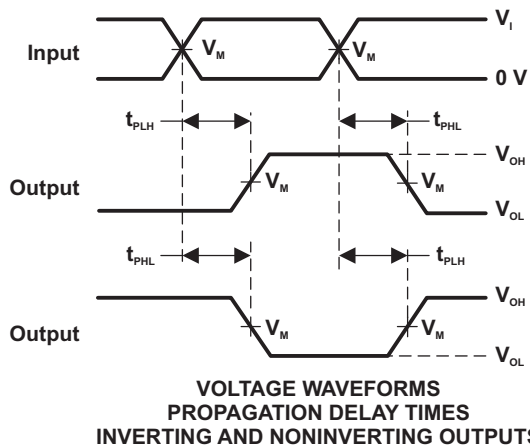
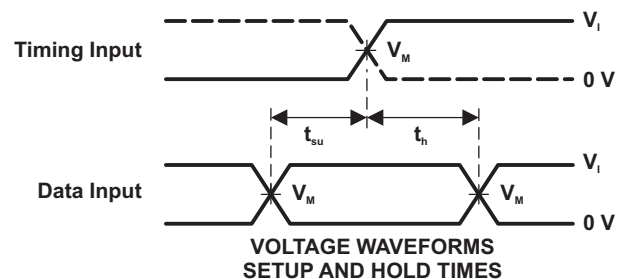
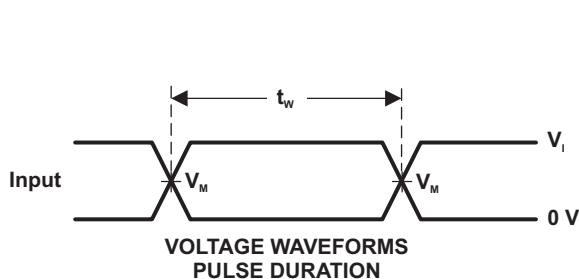
- NOTES:
- A.  $C_L$  includes probe and jig capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the 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 2. Load Circuit and Voltage Waveforms

**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
$3.3\text{ V} \pm 0.3\text{ V}$	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.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{on}$ .
  - G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - H. All parameters and waveforms are not applicable to all devices.

**Figure 3. Load Circuit and Voltage Waveforms**

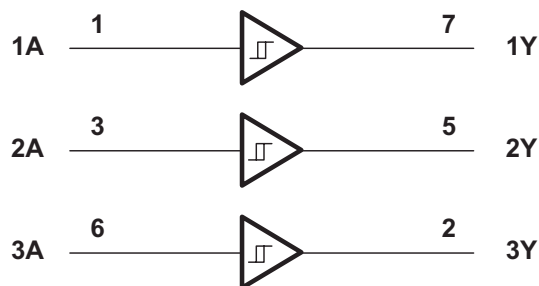


## 8 Detailed Description

### 8.1 Overview

This triple Schmitt-trigger buffer is designed for 1.65-V to 5.5-V  $V_{CC}$  operation. The SN74LVC3G17 device contains three buffers and performs the Boolean function  $Y = A$ . The device functions as three independent buffers 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. NanoFree™ package technology is a major breakthrough in IC packaging concepts, using the die as the package.

### 8.2 Functional Block Diagram



### 8.3 Feature Description

SN74LVC3G17 is available in NanoFree package. NanoFree is a major breakthrough in IC packaging concepts, it is a bare die package developed for applications that require the smallest possible package. The device supports 5-V  $V_{CC}$  Operation. All Inputs accept voltages up to 5.5 V.  $\pm 24$ -mA Output Drive at 3.3 V. The maximum time propagation delay ( $t_{pd}$ ) is 5.4 ns at 3.3 V. Low Power Consumption, 10- $\mu$ A Max  $I_{CC}$ . Typical output ground bounce ( $V_{OLP}$ ) and Output  $V_{OH}$  Undershoot ( $V_{OHV}$ ). This device is fully specified for partial-powerdown applications using  $I_{off}$ . The  $I_{off}$  feature ensures that damaging current will not backflow through the device when it is powered down. The SN74LVC3G17 device has isolation during power off.  $I_{off}$  supports live insertion, partial-power-down mode and back drive protection. The device is latch-up resistant with 100 mA exceeding the JESD 78 standard, class II, providing protection from destruction due to latch-up. This device is protected against electrostatic discharge. It is tested per JESD 22 using 2000-V human-body model (A114-B), 200-V machine model (A115-A), and 1000-V charged-device model (C101).

### 8.4 Device Functional Modes

Table 1 lists the functional modes of the SN74LVC3G17.

Table 1. Function Table

INPUT A	OUTPUT Y
H	H
L	L

## 9 Application and Implementation

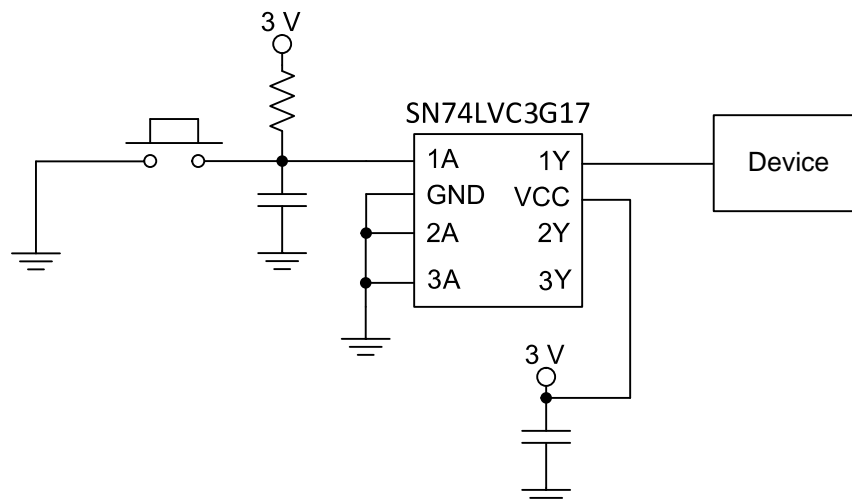
### NOTE

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 SN74LVC3G17 device contains three buffers and performs the Boolean function  $Y = A$ . The device functions as three independent buffers, but because of Schmitt action, it may have different input threshold levels for positive-going ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals. In this application, the engineer chooses to use just a single Schmitt Trigger buffer. In this case, the other two inputs should be tied to VCC or GND.

### 9.2 Typical Application



**Figure 4. Device Power Button Circuit**

#### 9.2.1 Design Requirements

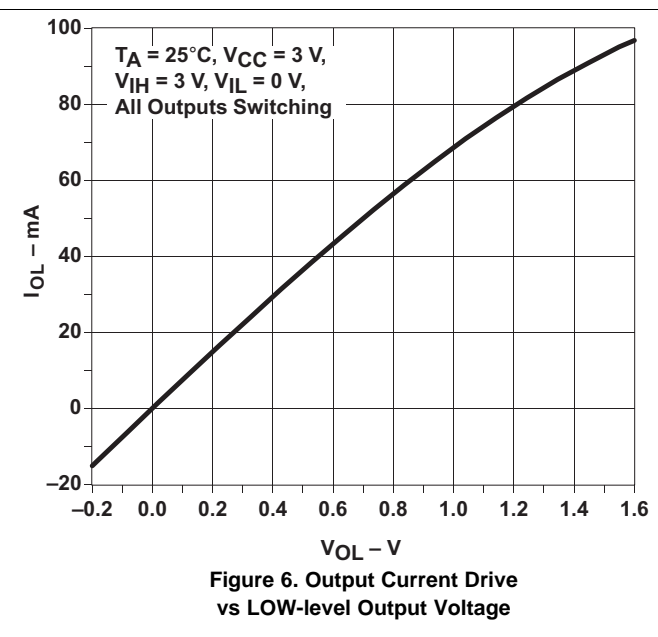
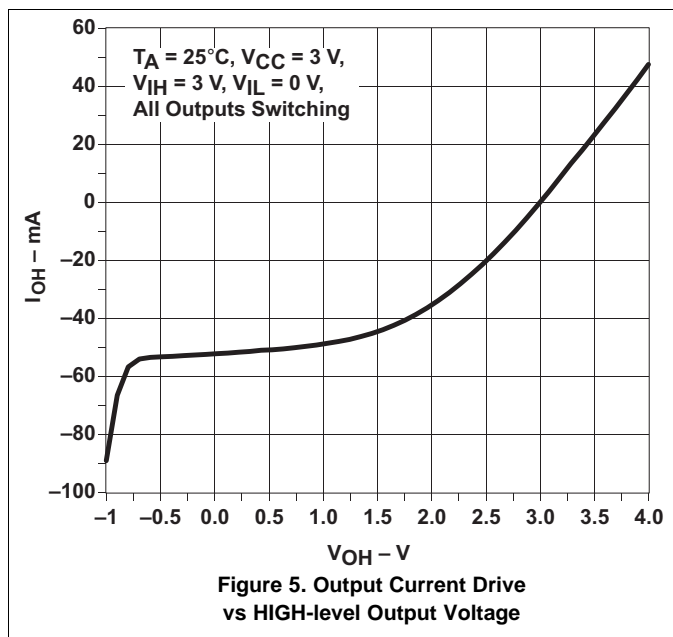
This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. Outputs can be combined to produce higher drive but the high drive will also create faster edges into light loads so routing and load conditions should be considered to prevent ringing.

#### 9.2.2 Detailed Design Procedure

1. Recommended Input Conditions:
  - For specified high and low levels, see ( $V_{IH}$  and  $V_{IL}$ ) in [Recommended Operating Conditions](#) table.
  - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid  $V_{CC}$ .
2. Recommend Output Conditions:
  - Load currents should not exceed 50 mA per output and 100 mA total for the part.
  - Series resistors on the output may be used if the user desires to slow the output edge signal or limit the output current.

## Typical Application (continued)

### 9.2.3 Application Curves



## 10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the [Absolute Maximum Ratings](#) table.

Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1- $\mu\text{F}$  capacitor is recommended. If there are multiple  $V_{CC}$  terminals then 0.01- $\mu\text{F}$  or 0.022- $\mu\text{F}$  capacitors are recommended for each power terminal. It is ok to parallel multiple bypass capacitors to reject different frequencies of noise. Multiple bypass capacitors may be paralleled to reject different frequencies of noise. The bypass capacitor should be installed as close to the power terminal as possible for the best results.

## 11 Layout

### 11.1 Layout Guidelines

When using multiple bit logic devices, inputs should not float. In many cases, functions or parts of functions of digital logic devices are unused. Some examples are when only two inputs of a triple-input AND gate are used, or when only 3 of the 4-buffer gates are used. Such input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states.

Specified in [Figure 7](#) are rules that must be observed under all circumstances. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or  $V_{CC}$ , whichever makes more sense or is more convenient.

## 11.2 Layout Example



**Figure 7. Layout Diagram**

## 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](#)

### 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.

Blu-ray is a registered trademark of Blu-ray Disc Association.

NanoFree 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 (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
SN74LVC3G17DCTR	ACTIVE	SM8	DCT	8	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	C17 (R, Z)	<a href="#">Samples</a>
SN74LVC3G17DCTRE4	ACTIVE	SM8	DCT	8	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	C17 (R, Z)	<a href="#">Samples</a>
SN74LVC3G17DCTRG4	ACTIVE	SM8	DCT	8	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	C17 (R, Z)	<a href="#">Samples</a>
SN74LVC3G17DCUR	ACTIVE	VSSOP	DCU	8	3000	RoHS & Green	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	(17, C17J, C17Q, C 17R) CZ	<a href="#">Samples</a>
SN74LVC3G17DCURG4	ACTIVE	VSSOP	DCU	8	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	C17R	<a href="#">Samples</a>
SN74LVC3G17YZPR	ACTIVE	DSBGA	YZP	8	3000	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-40 to 85	C7N	<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.

<sup>(6)</sup> 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.

**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.

**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
SN74LVC3G17DCTR	SM8	DCT	8	3000	180.0	13.0	3.35	4.5	1.55	4.0	12.0	Q3
SN74LVC3G17DCTR	SM8	DCT	8	3000	177.8	12.4	3.45	4.4	1.45	4.0	12.0	Q3
SN74LVC3G17DCUR	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC3G17DCUR	VSSOP	DCU	8	3000	178.0	9.0	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC3G17DCUR	VSSOP	DCU	8	3000	180.0	9.0	2.25	3.4	1.0	4.0	8.0	Q3
SN74LVC3G17DCUR	VSSOP	DCU	8	3000	178.0	9.5	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC3G17DCURG4	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC3G17YZPR	DSBGA	YZP	8	3000	178.0	9.2	1.02	2.02	0.63	4.0	8.0	Q1



**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC3G17DCTR	SM8	DCT	8	3000	182.0	182.0	20.0
SN74LVC3G17DCTR	SM8	DCT	8	3000	183.0	183.0	20.0
SN74LVC3G17DCUR	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74LVC3G17DCUR	VSSOP	DCU	8	3000	180.0	180.0	18.0
SN74LVC3G17DCUR	VSSOP	DCU	8	3000	182.0	182.0	20.0
SN74LVC3G17DCUR	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74LVC3G17DCURG4	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74LVC3G17YZPR	DSBGA	YZP	8	3000	220.0	220.0	35.0



4225266/A 09/2014

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. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-187 variation CA.

# EXAMPLE BOARD LAYOUT

DCU0008A

VSSOP - 0.9 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 25X



4225266/A 09/2014

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.

# EXAMPLE STENCIL DESIGN

DCU0008A

VSSOP - 0.9 mm max height

SMALL OUTLINE PACKAGE

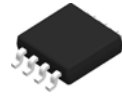


SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 25X

4225266/A 09/2014

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.



4220784/C 06/2021

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.

# EXAMPLE BOARD LAYOUT

DCT0008A

SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4220784/C 06/2021

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.

# EXAMPLE STENCIL DESIGN

DCT0008A

SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE



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

4220784/C 06/2021

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.

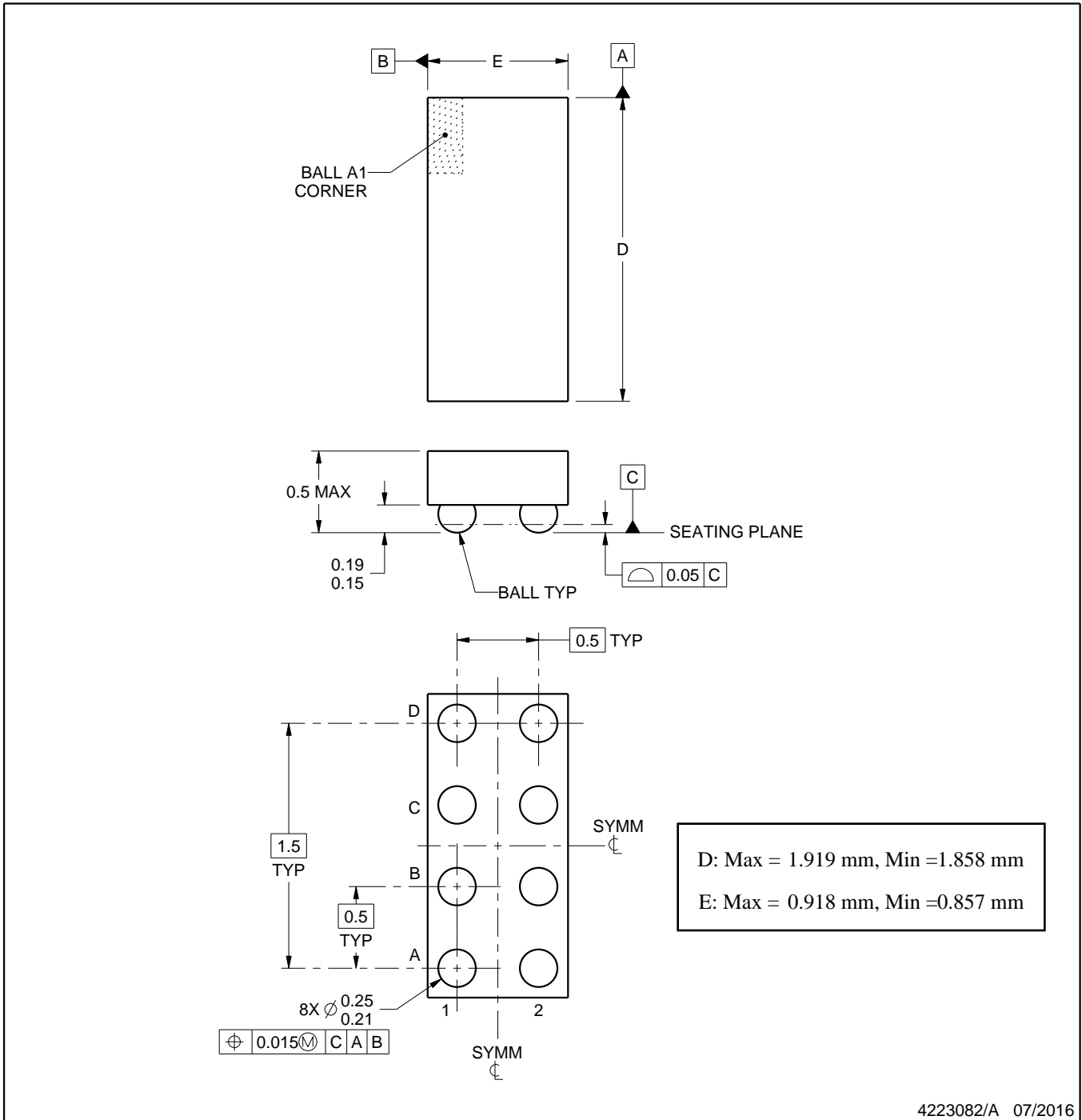
YZP0008



PACKAGE OUTLINE

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



NOTES:

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



# EXAMPLE BOARD LAYOUT

YZP0008

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



LAND PATTERN EXAMPLE  
SCALE:40X



SOLDER MASK DETAILS  
NOT TO SCALE

4223082/A 07/2016

NOTES: (continued)

3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SNVA009 ([www.ti.com/lit/snva009](http://www.ti.com/lit/snva009)).

# EXAMPLE STENCIL DESIGN

YZP0008

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



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

4223082/A 07/2016

NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

## 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 © 2023, Texas Instruments Incorporated