











SN74LVC1G125

SCES223T - APRIL 1999-REVISED OCTOBER 2014

# SN74LVC1G125 Single Bus Buffer Gate With 3-State Output

#### **Features**

- Available in the Ultra Small 0.64-mm<sup>2</sup> Package (DPW) With 0.5-mm Pitch
- Supports 5-V V<sub>CC</sub> Operation
- Inputs Accept Voltages to 5.5 V
- Provides Down Translation to V<sub>CC</sub>
- Max  $t_{pd}$  of 3.7 ns at 3.3 V
- Low Power Consumption, 10-µA Max I<sub>CC</sub>
- ±24-mA Output Drive at 3.3 V
- Ioff 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

- Cable Modem Termination System
- High-Speed Data Acquisition and Generation
- Military: Radar and Sonar
- Motor Control: High-Voltage
- Power Line Communication Modem
- SSD: Internal or External
- Video Broadcasting and Infrastructure: Scalable Platform
- Video Broadcasting: IP-Based Multi-Format Transcoder
- Video Communications System

#### 3 Description

This bus buffer gate is designed for 1.65-V to 5.5-V V<sub>CC</sub> operation.

The SN74LVC1G125 device is a single line driver with a 3-state output. The output is disabled when the output-enable  $(\overline{OE})$  input is high.

The CMOS device has high output drive while maintaining low static power dissipation over a broad V<sub>CC</sub> operating range.

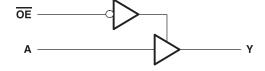
The SN74LVC1G125 device is available in a variety of packages including the ultra-small DPW package with a body size of  $0.8 \text{ mm} \times 0.8 \text{ mm}$ .

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

DEVICE NAME	PACKAGE	BODY SIZE (NOM)
	SOT-23 (5)	2.90 mm x 1.60 mm
	SC70 (5)	2.00 mm x 1.25 mm
SN74LVC1G125	SON (6)	1.45 mm × 1.00 mm
	DSBGA (5)	1.40 mm × 0.90 mm
	X2SON (4)	0.80 mm × 0.80 mm

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

# **Simplified Schematic**



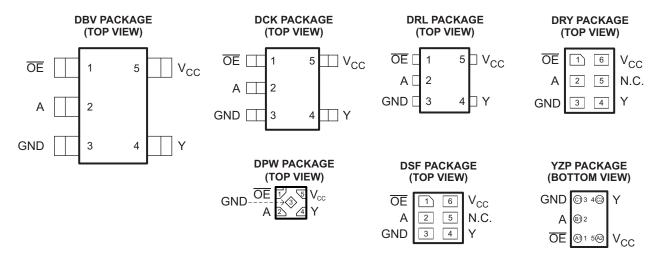


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# 6 Pin Configuration and Functions



N.C. – No internal connection
See mechanical drawings for dimensions.

#### **Pin Functions**

					iii i dilottorio					
		PIN								
NAME	DRL, DCK, DBV	DRY, DSF	DPW	YZP	DESCRIPTION					
ŌĒ	1	1	1	A1	Input					
Α	2	2	2	B1	Input					
GND	3	3	3	C1	Ground					
Υ	4	4	4	C2	Output					
V <sub>CC</sub>	5	6	5	A2	Power pin					
NC	-	5	-	_	Not connected					

Product Folder Links: SN74LVC1G125



#### 7 Specifications

# 7.1 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
VI	Input voltage range <sup>(2)</sup>	put voltage range (2)			
Vo	Voltage range applied to any output in the high	-0.5	6.5	V	
Vo	Voltage range applied to any output in the high	Voltage range applied to any output in the high or low state (2)(3)			
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
Io	Continuous output current		±50	mA	
	Continuous current through V <sub>CC</sub> or GND			±100	mA

<sup>(1)</sup> 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 is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

#### 7.2 Handling Ratings

			MIN	MAX	UNIT
T <sub>stg</sub>	Storage temperature rang	e	-65	150	°C
V	Flootroctotic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins (1)	0	2000	V
V(ESD)	Electrostatic discharge	Charged device model (CDM), per JEDEC specification JESD22-C101, all pins (2)	0	1000	V

<sup>(1)</sup> 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.

<sup>2)</sup> The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

<sup>(3)</sup> The value of V<sub>CC</sub> is provided in the *Recommended Operating* table.



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

			MIN	MAX	UNIT
,	Owner by see the see	Operating	1.65	5.5	
/ <sub>cc</sub>	Supply voltage	Data retention only	1.5		V
		V <sub>CC</sub> = 1.65 V to 1.95 V	0.65 × V <sub>CC</sub>		
,	LPak Israel Construction	V <sub>CC</sub> = 2.3 V to 2.7 V	1.7		
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 3 V to 3.6 V	2		V
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7 × V <sub>CC</sub>		
		V <sub>CC</sub> = 1.65 V to 1.95 V		0.35 × V <sub>CC</sub>	
.,	Law law Law Law at walkana	V <sub>CC</sub> = 2.3 V to 2.7 V		0.7	.,
$V_{IL}$	Low-level input voltage	V <sub>CC</sub> = 3 V to 3.6 V		0.8	V
		V <sub>CC</sub> = 4.5 V to 5.5 V		0.3 × V <sub>CC</sub>	
VI	Input voltage	•	0	5.5	V
Vo	Output voltage		0	V <sub>CC</sub>	V
		V <sub>CC</sub> = 1.65 V		-4	
		V <sub>CC</sub> = 2.3 V		-8	
ОН	High-level output current			-16	mA
		$V_{CC} = 3 V$		-24	
		V <sub>CC</sub> = 4.5 V		-32	
		V <sub>CC</sub> = 1.65 V		4	
		V <sub>CC</sub> = 2.3 V		8	
OL	Low-level output current	V 2.V		16	mA
		V <sub>CC</sub> = 3 V		24	
		V <sub>CC</sub> = 4.5 V		32	
		V <sub>CC</sub> = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V		20	
∆t/Δv	Input transition rise or fall rate	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		10	ns/V
		$V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$		5	
T <sub>A</sub>	Operating free-air temperature		-40	125	°C

<sup>(1)</sup> All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.

#### 7.4 Thermal Information

	nonna miorination									
			SN74LVC1G125							
	THERMAL METRIC (1)	DBV	DCK	DRL	DRY	YZP	DPW	UNIT		
		5 PINS	5 PINS	5 PINS	6 PINS	5 PINS	4 PINS			
$R_{\theta JA}$	Junction-to-ambient thermal resistance	229	278	243	439	130	340			
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	164	93	78	277	54	215			
$R_{\theta JB}$	Junction-to-board thermal resistance	62	65	78	271	51	294	°C/W		
ΨЈТ	Junction-to-top characterization parameter	44	2	10	84	1	41	*C/VV		
$\Psi_{JB}$	Junction-to-board characterization parameter	62	64	77	271	50	294			
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	_	_	_	-	_	250			

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

Product Folder Links: SN74LVC1G125



#### 7.5 Electrical Characteristics

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

DADAMETED	TEGT COMPLETIONS	.,	–40 C to 85 °C	;	−40 C t	o 125 °C	LINUT	
PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	MIN TYP(1)	MAX	MIN	TYP <sup>(1)</sup> MAX	UNIT	
	$I_{OH} = -100 \ \mu A$	1.65 V to 5.5 V	V <sub>CC</sub> – 0.1		V <sub>CC</sub> – 0.1			
	$I_{OH} = -4 \text{ mA}$	1.65 V	1.2		1.2			
V	$I_{OH} = -8 \text{ mA}$	2.3 V	1.9		1.9		V	
V <sub>OH</sub>	$I_{OH} = -16 \text{ mA}$	3 V	2.4		2.4		V	
	$I_{OH} = -24 \text{ mA}$	3 V	2.3		2.3			
	$I_{OH} = -32 \text{ mA}$	4.5 V	3.8		3.8			
	I <sub>OL</sub> = 100 μA	1.65 V to 5.5 V		0.1		0.1		
	I <sub>OL</sub> = 4 mA	1.65 V		0.45		0.45		
V	I <sub>OL</sub> = 8 mA	2.3 V		0.3		0.3	V	
V <sub>OL</sub>	I <sub>OL</sub> = 16 mA	2.1/		0.4		0.4	V	
	I <sub>OL</sub> = 24 mA	3 V		0.55		0.55		
	I <sub>OL</sub> = 32 mA	4.5 V		0.55		0.55		
I <sub>I</sub> A or OE inputs	V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V		±5		±5	μA	
I <sub>off</sub>	$V_I$ or $V_O = 5.5 \text{ V}$	0		±10		±10	μΑ	
l <sub>OZ</sub>	V <sub>O</sub> = 0 to 5.5 V	3.6 V		10		10	μΑ	
Icc	$V_I = 5.5 \text{ V or GND}, \qquad I_O = 0$	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	μΑ	
C <sub>I</sub>	$V_I = V_{CC}$ or GND	3.3 V	4		4		pF	

<sup>(1)</sup> All typical values are at  $V_{CC}$  = 3.3 V,  $T_A$  = 25°C.

#### 7.6 Switching Characteristics, C<sub>L</sub> = 15 pF

over recommended operating free-air temperature range of  $-40^{\circ}$ C to 85°C,  $C_L = 15$  pF (unless otherwise noted) (see Figure 3)

PARAMETER	RAMETER FROM (INPUT)		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
	(1141 01)	(OUTPUT)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A	Y	1.9	6.9	0.7	4.6	0.6	3.7	0.5	3.4	ns

#### 7.7 Switching Characteristics, -40°C to 85°C

over recommended operating free-air temperature range  $-40^{\circ}$ C to 85°C,  $C_L = 30$  pF or 50 pF (unless otherwise noted) (see Figure 4)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = ± 0.1		V <sub>CC</sub> = 1 ± 0.2		V <sub>CC</sub> = 0.3	3.3 V 3 V	V <sub>CC</sub> = ± 0.5	5 V 5 V	UNIT
	(INFOT)	(001701)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	Α	Υ	2.8	9	1.2	5.5	1	4.5	1	4	ns
t <sub>en</sub>	ŌĒ	Υ	3.3	10.1	1.5	6.6	1	5.3	1	5	ns
t <sub>dis</sub>	ŌĒ	Υ	1.3	9.2	1	5	1	5	1	4.2	ns

Product Folder Links: SN74LVC1G125



#### 7.8 Switching Characteristics, -40°C to 125°C

over recommended operating free-air temperature range  $-40^{\circ}$ C to 125°C,  $C_L = 30$  pF or 50 pF (unless otherwise noted) (see Figure 4)

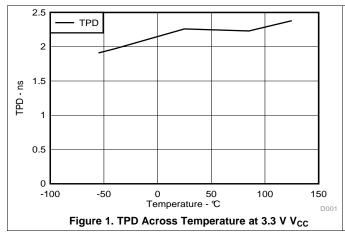
	PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = ± 0.1		V <sub>CC</sub> = 2 ± 0.2		V <sub>CC</sub> = 0.3		V <sub>CC</sub> =		UNIT
	(INFOT)	(001701)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
	$t_{pd}$	Α	Υ	2.8	9.3	1.2	5.8	1	4.7	1	4.2	ns
	t <sub>en</sub>	ŌĒ	Υ	3.3	10.4	1.5	6.9	1	5.6	1	5.2	ns
	t <sub>dis</sub>	ŌĒ	Υ	1.3	9.3	1	5.2	1	5.2	1	4.4	ns

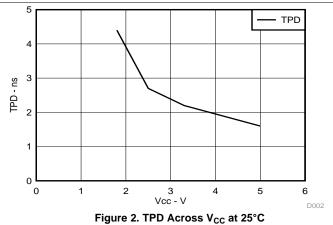
#### 7.9 Operating Characteristics

 $T_A = 25^{\circ}C$ 

	PARAMETER		TEST CONDITIONS	V <sub>CC</sub> = 1.8 V TYP	V <sub>CC</sub> = 2.5 V TYP	V <sub>CC</sub> = 3.3 V TYP	V <sub>CC</sub> = 5 V TYP	UNIT	
_	Power dissipation	Outputs enabled	f 10 MHz	18	18	19	21	۲	
Cpd	capacitance	Outputs disabled	f = 10 MHz	2	2	2	4	pF	

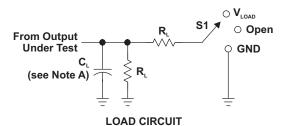
# 7.10 Typical Characteristics





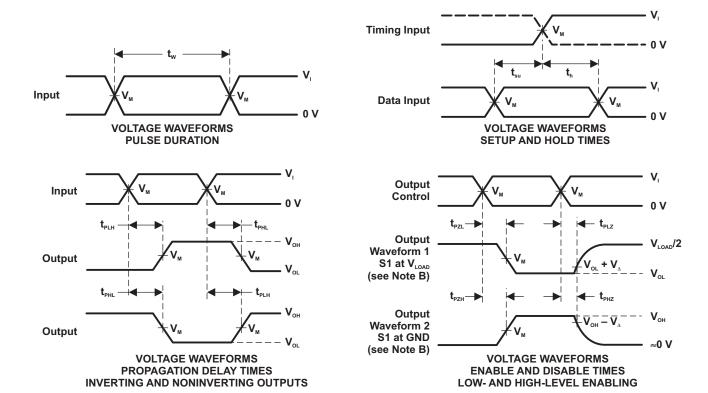


#### 8 Parameter Measurement Information



TEST	S1
t <sub>PLH</sub> /t <sub>PHL</sub>	Open
t <sub>PLZ</sub> /t <sub>PZL</sub>	V <sub>LOAD</sub>
t <sub>PHZ</sub> /t <sub>PZH</sub>	GND

.,	IN	PUTS		.,		_	.,
V <sub>cc</sub>	V,	t,/t,	V <sub>M</sub>	<b>V</b> <sub>LOAD</sub>	C <sub>L</sub>	R <sub>⊾</sub>	$V_{\scriptscriptstyle{\Delta}}$
1.8 V ± 0.15 V	V <sub>cc</sub>	≤2 ns	V <sub>cc</sub> /2	2 × V <sub>cc</sub>	15 pF	<b>1 Μ</b> Ω	0.15 V
$2.5~V~\pm~0.2~V$	$V_{cc}$	≤2 ns	V <sub>cc</sub> /2	2 × V <sub>cc</sub>	15 pF	<b>1 M</b> Ω	0.15 V
$3.3~V\pm0.3~V$	3 V	≤2.5 ns	1.5 V	6 V	15 pF	<b>1 M</b> Ω	0.3 V
5 V ± 0.5 V	Vcc	≤2.5 ns	V/2	2 × V	15 pF	1 MΩ	0.3 V



NOTES: A. C<sub>L</sub> 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,  $Z_{\circ}$  = 50  $\Omega$ .
- D. The outputs are measured one at a time, with one transition per measurement.
- E.  $t_{\mbox{\tiny PLZ}}$  and  $t_{\mbox{\tiny PHZ}}$  are the same as  $t_{\mbox{\tiny dis}}.$
- 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.

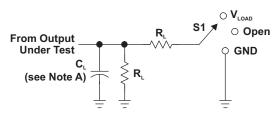
Figure 3. Load Circuit and Voltage Waveforms

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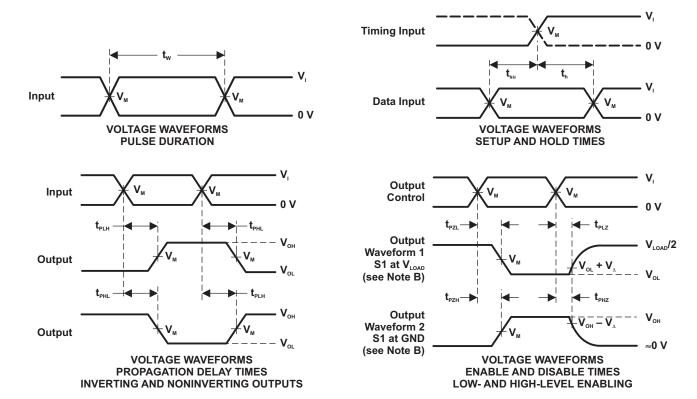
#### **Parameter Measurement Information (continued)**



TEST	S1
t <sub>PLH</sub> /t <sub>PHL</sub>	Open
t <sub>PLZ</sub> /t <sub>PZL</sub>	<b>V</b> <sub>LOAD</sub>
t <sub>PHZ</sub> /t <sub>PZH</sub>	GND

**LOAD CIRCUIT** 

.,	INF	PUTS		V		-	.,	
V <sub>cc</sub>	V,	t,/t,	V <sub>M</sub>	<b>V</b> <sub>LOAD</sub>	C <sub>L</sub>	$R_{\scriptscriptstyle L}$	V <sub>A</sub>	
1.8 V ± 0.15 V	V <sub>cc</sub>	≤2 ns	V <sub>cc</sub> /2	2 × V <sub>cc</sub>	30 pF	<b>1 k</b> Ω	0.15 V	
2.5 V ± 0.2 V	V <sub>cc</sub>	≤2 ns	V <sub>cc</sub> /2	2 × V <sub>cc</sub>	30 pF	500 $\Omega$	0.15 V	
3.3 V ± 0.3 V	3 V	≤2.5 ns	1.5 V	6 V	50 pF	500 $\Omega$	0.3 V	
5 V ± 0.5 V	V <sub>cc</sub>	≤2.5 ns	V <sub>cc</sub> /2	2 × V <sub>cc</sub>	50 pF	500 $\Omega$	0.3 V	



NOTES: A. C<sub>L</sub> 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,  $Z_0 = 50 \,\Omega$ .
- D. The outputs are measured one at a time, with one transition per measurement.
- E.  $t_{PLZ}$  and  $\dot{t}_{PHZ}$  are the same as  $t_{dis}$ .
- F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
- G.  $t_{\text{PLH}}$  and  $t_{\text{PHL}}$  are the same as  $t_{\text{pd}}$ .
- H. All parameters and waveforms are not applicable to all devices.

Figure 4. Load Circuit and Voltage Waveforms



#### 9 Detailed Description

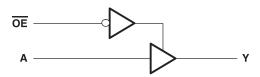
#### 9.1 Overview

The SN74LVC1G125 device contains one buffer gate device with output enable control and performs the Boolean function Y = A. This device is fully specified for partial-power-down applications using Ioff. The Ioff circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The DPW package technology is a major breakthrough in IC packaging. Its tiny 0.64 mm square footprint saves significant board space over other package options while still retaining the traditional manufacturing friendly lead pitch of 0.5 mm.

#### 9.2 Functional Block Diagram



#### 9.3 Feature Description

- · Wide operating voltage range
  - Operates from 1.65 V to 5.5 V
- Allows down voltage translation
- Inputs accept voltages to 5.5 V
- $I_{\text{off}}$  feature allows voltages on the inputs and outputs, when  $V_{\text{CC}}$  is 0 V

#### 9.4 Device Functional Modes

**Table 1. Function Table** 

INP	UTS	OUTPUT
ŌĒ	Α	Υ
L	Н	Н
L	L	L
Н	X	Z

Product Folder Links: SN74LVC1G125



## 10 Application and Implementation

#### 10.1 Application Information

The SN74LVC1G125 device is a high drive CMOS device that can be used as a output enabled buffer with a high output drive, such as an LED application. It can produce 24 mA of drive current at 3.3 V making it Ideal for driving multiple outputs and good for high speed applications up to 100 MHz. The inputs are 5.5 V tolerant allowing it to translate down to  $V_{\rm CC}$ .

#### 10.2 Typical Application

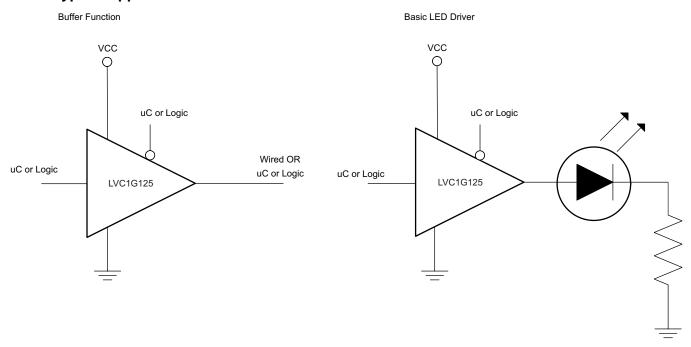


Figure 5. Application Schematic

#### 10.2.1 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. The high drive will also create fast edges into light loads so routing and load conditions should be considered to prevent ringing.

#### 10.2.2 Detailed Design Procedure

- 1. Recommended Input Conditions
  - Rise time and fall time specs. See (Δt/ΔV) in the Recommended Operating Conditions table.
  - Specified high and low levels. See (V<sub>IH</sub> and V<sub>IL</sub>) in the Recommended Operating Conditions table.
  - Inputs are overvoltage tolerant allowing them to go as high as (V<sub>1</sub> max) in the Recommended Operating
     Conditions table at any valid V<sub>CC</sub>.

#### 2. Recommend Output Conditions

Load currents should not exceed (I<sub>O</sub> max) per output and should not exceed (Continuous current through V<sub>CC</sub> or GND) total current for the part. These limits are located in the *Absolute Maximum Ratings* table.

Product Folder Links: SN74LVC1G125

Outputs should not be pulled above V<sub>CC</sub>.



#### **Typical Application (continued)**

#### 10.2.3 Application Curves

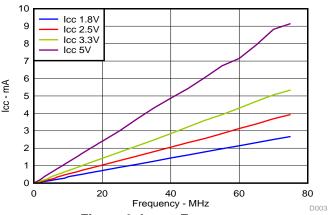


Figure 6. I<sub>CC</sub> vs Frequency

## 11 Power Supply Recommendations

The power supply can be any voltage between the min and max supply voltage rating located in the *Recommended Operating Conditions* table.

Each VCC pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply a 0.1-µF capacitor is recommended and if there are multiple VCC pins then a 0.01-µF or 0.022-µF capacitor is recommended for each power pin. It is ok to parallel multiple bypass caps to reject different frequencies of noise. 0.1-µF and 1-µF capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

#### 12 Layout

#### 12.1 Layout Guidelines

When using multiple bit logic devices inputs should not ever float. In many cases, functions or parts of functions of digital logic devices are unused; for example, when only two inputs of a triple-input AND gate are used or 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. Figure 7 shows the 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 VCC, whichever makes more sense or is more convenient.

#### 12.2 Layout Example



Figure 7. Package Layout



## 13 Device and Documentation Support

#### 13.1 Trademarks

All trademarks are the property of their respective owners.

#### 13.2 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.

#### 13.3 Glossary

SLYZ022 — TI Glossary.

This glossary lists and explains terms, acronyms, and definitions.

#### 14 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.

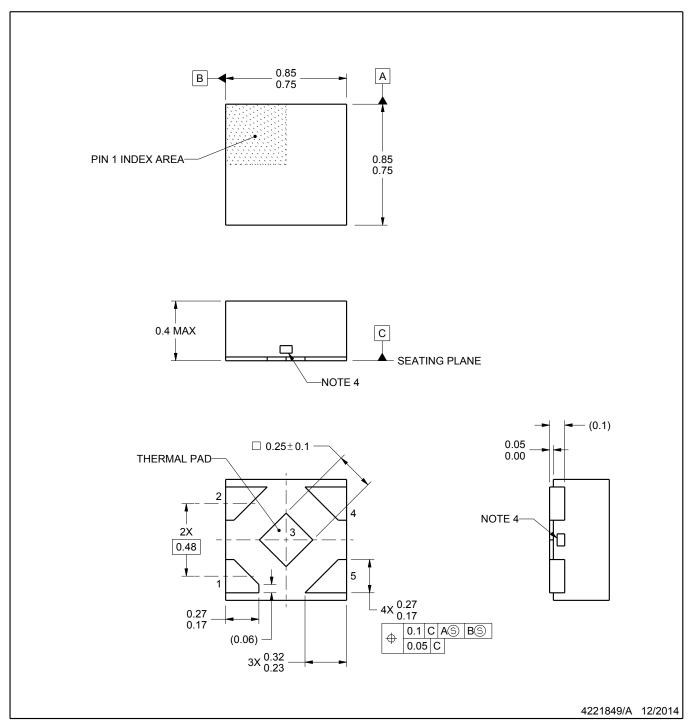
Product Folder Links: SN74LVC1G125



# **PACKAGE OUTLINE**

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



#### NOTES:

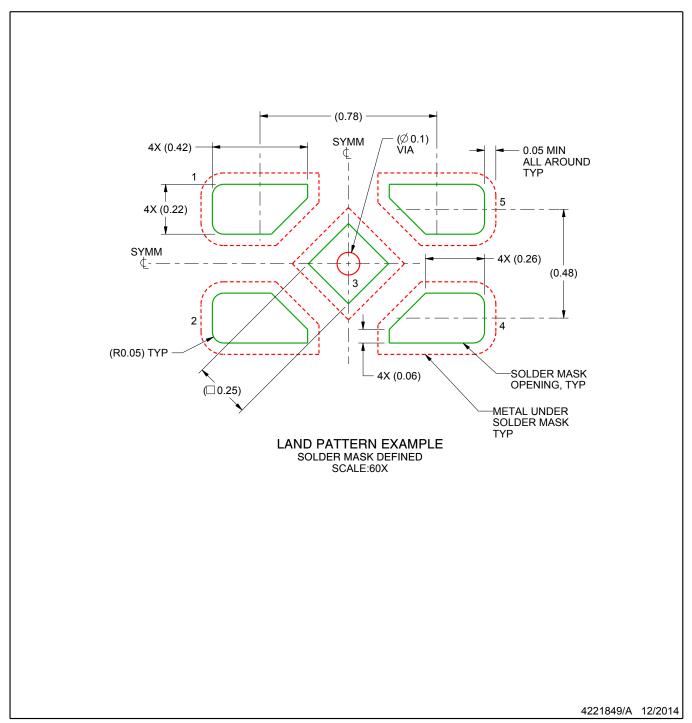
- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

  2. This drawing is subject to change without notice.
- 3. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.

  4. The size and shape of this feature may vary.



PLASTIC SMALL OUTLINE - NO LEAD

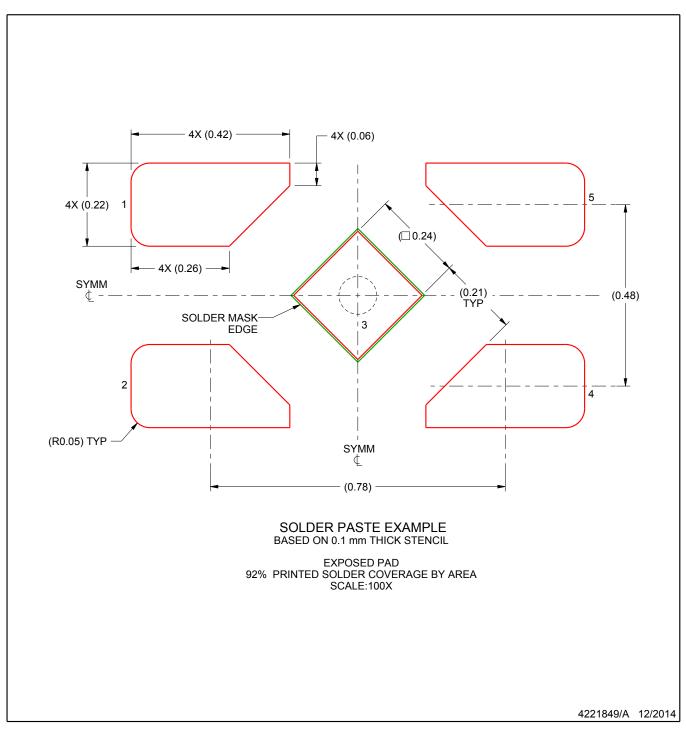


NOTES: (continued)

5. This package is designed to be soldered to a thermal pad on the board. For more information, refer to QFN/SON PCB application note in literature No. SLUA271 (www.ti.com/lit/slua271).



PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.







18-Jan-2015

#### **PACKAGING INFORMATION**

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
74LVC1G125DBVRE4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	(6) CU NIPDAU	(3) Level-1-260C-UNLIM	-40 to 125	(C252 ~ C255 ~ C25F ~ C25K ~ C25R ~ C25T)	Samples
74LVC1G125DBVRG4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(C252 ~ C255 ~ C25F ~ C25K ~ C25R ~ C25T)	Samples
74LVC1G125DBVTG4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(C255 ~ C25F ~ C25K ~ C25R)	Samples
74LVC1G125DCKRE4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(CM5 ~ CMF ~ CMK ~ CMR ~ CMT)	Samples
74LVC1G125DCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(CM5 ~ CMF ~ CMK ~ CMR ~ CMT)	Samples
74LVC1G125DCKTE4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(CM5 ~ CMF ~ CMK ~ CMR ~ CMT)	Samples
74LVC1G125DCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(CM5 ~ CMF ~ CMK ~ CMR ~ CMT)	Samples
74LVC1G125DRLRG4	ACTIVE	SOT	DRL	5	4000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(CM7 ~ CMR)	Samples
SN74LVC1G125DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(C252 ~ C255 ~ C25F ~ C25K ~ C25R ~ C25T)	Samples
SN74LVC1G125DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(C255 ~ C25F ~ C25K ~ C25R)	Samples
SN74LVC1G125DCKJ	ACTIVE	SC70	DCK	5	10000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	CM5	Samples
SN74LVC1G125DCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(CM5 ~ CMF ~ CMK ~ CMR ~ CMT)	Samples
SN74LVC1G125DCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(CM5 ~ CMF ~ CMK ~ CMR ~ CMT)	Samples
SN74LVC1G125DPWR	ACTIVE	X2SON	DPW	4	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	R4	Samples
SN74LVC1G125DRLR	ACTIVE	SOT	DRL	5	4000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(CM7 ~ CMR)	Samples
SN74LVC1G125DRY2	PREVIEW	SON	DRY	6	5000	TBD	Call TI	Call TI	-40 to 85		



#### PACKAGE OPTION ADDENDUM

18-Jan-2015

Orderable Device	Status	Package Type	Package	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74LVC1G125DRYR	ACTIVE	SON	DRY	6	5000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	СМ	Samples
SN74LVC1G125DSF2	PREVIEW	SON	DSF	6	5000	TBD	Call TI	Call TI	-40 to 85		
SN74LVC1G125DSFR	ACTIVE	SON	DSF	6	5000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	СМ	Samples
SN74LVC1G125YZPR	ACTIVE	DSBGA	YZP	5	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	(CM2 ~ CM7 ~ CMN)	Samples

(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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

- (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/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish 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



#### **PACKAGE OPTION ADDENDUM**

18-Jan-2015

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 SN74LVC1G125:

• Automotive: SN74LVC1G125-Q1

● Enhanced Product: SN74LVC1G125-EP

NOTE: Qualified Version Definitions:

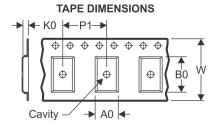
- Automotive Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product Supports Defense, Aerospace and Medical Applications

# **PACKAGE MATERIALS INFORMATION**

www.ti.com 21-Oct-2014

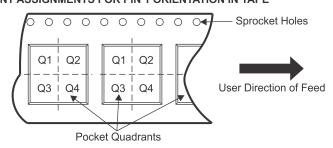
#### TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

## QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LVC1G125DBVR	SOT-23	DBV	5	3000	178.0	9.2	3.3	3.2	1.55	4.0	8.0	Q3
SN74LVC1G125DBVR	SOT-23	DBV	5	3000	180.0	9.2	3.17	3.23	1.37	4.0	8.0	Q3
SN74LVC1G125DBVR	SOT-23	DBV	5	3000	180.0	8.4	3.23	3.17	1.37	4.0	8.0	Q3
SN74LVC1G125DBVT	SOT-23	DBV	5	250	178.0	9.2	3.3	3.2	1.55	4.0	8.0	Q3
SN74LVC1G125DCKJ	SC70	DCK	5	10000	330.0	8.4	2.4	2.4	1.22	4.0	8.0	Q3
SN74LVC1G125DCKR	SC70	DCK	5	3000	180.0	9.2	2.3	2.55	1.2	4.0	8.0	Q3
SN74LVC1G125DCKR	SC70	DCK	5	3000	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74LVC1G125DCKT	SC70	DCK	5	250	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74LVC1G125DCKT	SC70	DCK	5	250	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
SN74LVC1G125DCKT	SC70	DCK	5	250	180.0	9.2	2.3	2.55	1.2	4.0	8.0	Q3
SN74LVC1G125DPWR	X2SON	DPW	4	3000	180.0	8.4	0.91	0.91	0.5	4.0	8.0	Q3
SN74LVC1G125DRLR	SOT	DRL	5	4000	180.0	9.5	1.78	1.78	0.69	4.0	8.0	Q3
SN74LVC1G125DRLR	SOT	DRL	5	4000	180.0	8.4	1.98	1.78	0.69	4.0	8.0	Q3
SN74LVC1G125DRYR	SON	DRY	6	5000	179.0	8.4	1.2	1.65	0.7	4.0	8.0	Q1
SN74LVC1G125DSFR	SON	DSF	6	5000	180.0	9.5	1.16	1.16	0.5	4.0	8.0	Q2
SN74LVC1G125YZPR	DSBGA	YZP	5	3000	178.0	9.2	1.02	1.52	0.63	4.0	8.0	Q1

**PACKAGE MATERIALS INFORMATION** 

www.ti.com 21-Oct-2014



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC1G125DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
SN74LVC1G125DBVR	SOT-23	DBV	5	3000	205.0	200.0	33.0
SN74LVC1G125DBVR	SOT-23	DBV	5	3000	202.0	201.0	28.0
SN74LVC1G125DBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
SN74LVC1G125DCKJ	SC70	DCK	5	10000	338.0	343.0	30.0
SN74LVC1G125DCKR	SC70	DCK	5	3000	205.0	200.0	33.0
SN74LVC1G125DCKR	SC70	DCK	5	3000	180.0	180.0	18.0
SN74LVC1G125DCKT	SC70	DCK	5	250	180.0	180.0	18.0
SN74LVC1G125DCKT	SC70	DCK	5	250	180.0	180.0	18.0
SN74LVC1G125DCKT	SC70	DCK	5	250	205.0	200.0	33.0
SN74LVC1G125DPWR	X2SON	DPW	4	3000	205.0	200.0	33.0
SN74LVC1G125DRLR	SOT	DRL	5	4000	184.0	184.0	19.0
SN74LVC1G125DRLR	SOT	DRL	5	4000	202.0	201.0	28.0
SN74LVC1G125DRYR	SON	DRY	6	5000	203.0	203.0	35.0
SN74LVC1G125DSFR	SON	DSF	6	5000	184.0	184.0	19.0
SN74LVC1G125YZPR	DSBGA	YZP	5	3000	220.0	220.0	35.0

DBV (R-PDSO-G5)

# PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO-178 Variation AA.



# DBV (R-PDSO-G5)

# PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
- D. Publication IPC-7351 is recommended for alternate designs.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



# DCK (R-PDSO-G5)

# PLASTIC SMALL-OUTLINE PACKAGE



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO-203 variation AA.



# DCK (R-PDSO-G5)

# PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
- D. Publication IPC-7351 is recommended for alternate designs.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



# DRL (R-PDSO-N5)

# PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body dimensions do not include mold flash, interlead flash, protrusions, or gate burrs.

  Mold flash, interlead flash, protrusions, or gate burrs shall not exceed 0,15 per end or side.
- D. JEDEC package registration is pending.



# DRL (R-PDSO-N5)

#### PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.
- E. Maximum stencil thickness 0,127 mm (5 mils). All linear dimensions are in millimeters.
- F. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
- G. Side aperture dimensions over—print land for acceptable area ratio > 0.66. Customer may reduce side aperture dimensions if stencil manufacturing process allows for sufficient release at smaller opening.





NOTES: A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.

- B. This drawing is subject to change without notice.
- C. SON (Small Outline No-Lead) package configuration.
- The exposed lead frame feature on side of package may or may not be present due to alternative lead frame designs.
- E. This package complies to JEDEC MO-287 variation UFAD.
- $frac{f}{K}$  See the additional figure in the Product Data Sheet for details regarding the pin 1 identifier shape.



# DRY (R-PUSON-N6)

## PLASTIC SMALL OUTLINE NO-LEAD



NOTES: A.

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.
- E. Maximum stencil thickness 0,127 mm (5 mils). All linear dimensions are in millimeters.
- F. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
- G. Side aperture dimensions over—print land for acceptable area ratio > 0.66. Customer may reduce side aperture dimensions if stencil manufacturing process allows for sufficient release at smaller opening.





#### 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 registration MO-287, variation X2AAF.





# PLASTIC SMALL OUTLINE NO-LEAD



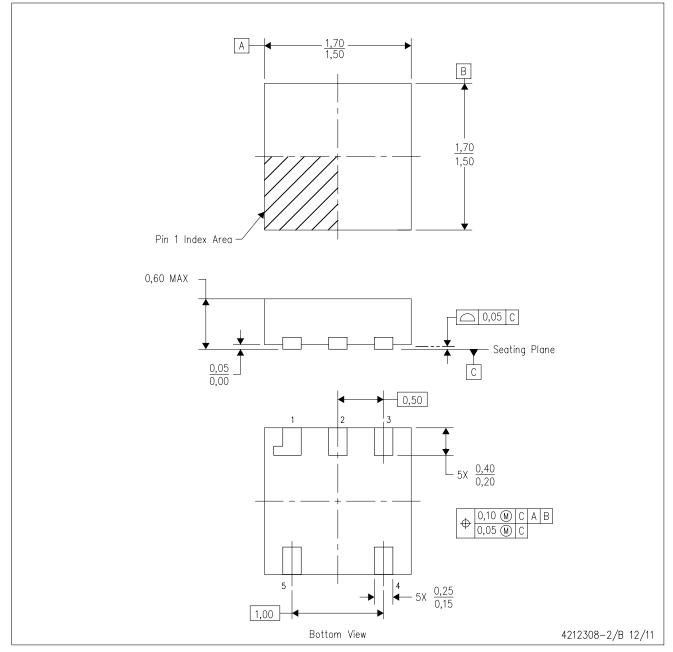
NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads. If 2 mil solder mask is outside PCB vendor capability, it is advised to omit solder mask.
- E. Maximum stencil thickness 0,1016 mm (4 mils). All linear dimensions are in millimeters.
- F. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
- G. Suggest stencils cut with lasers such as Fiber Laser that produce the greatest positional accuracy.
- H. Component placement force should be minimized to prevent excessive paste block deformation.



# DPK (S-PUSON-N5)

# PLASTIC SMALL OUTLINE NO-LEAD

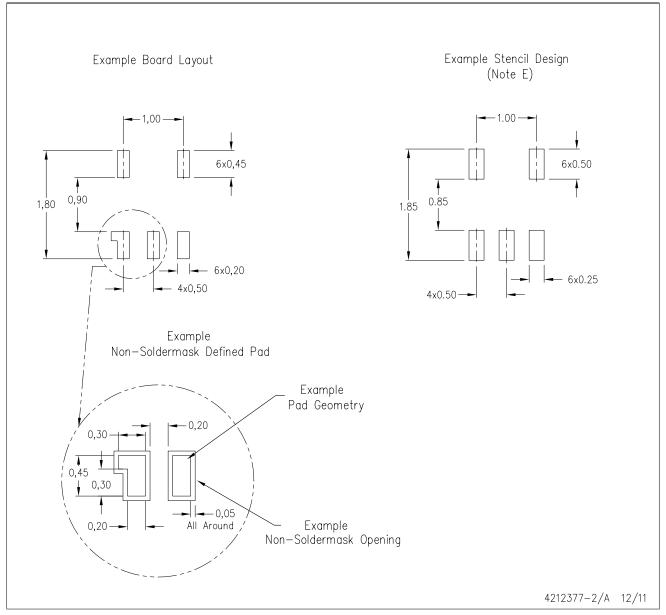


 A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 B. This drawing is subject to change without notice. NOTES:



# DPK (S-PUSON-N5)

# PLASTIC SMALL OUTLINE NO-LEAD



- NOTES: A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.
  - E. Maximum stencil thickness 0,127 mm (5 mils). All linear dimensions are in millimeters.
  - F. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
  - G. Side aperture dimensions over-print land for acceptable area ratio > 0.66. Customer may reduce side aperture dimensions if stencil manufacturing process allows for sufficient release at smaller opening.



# YEA (R-XBGA-N5)

# DIE-SIZE BALL GRID ARRAY



NOTES: A. All linear dimensions are in millimeters.

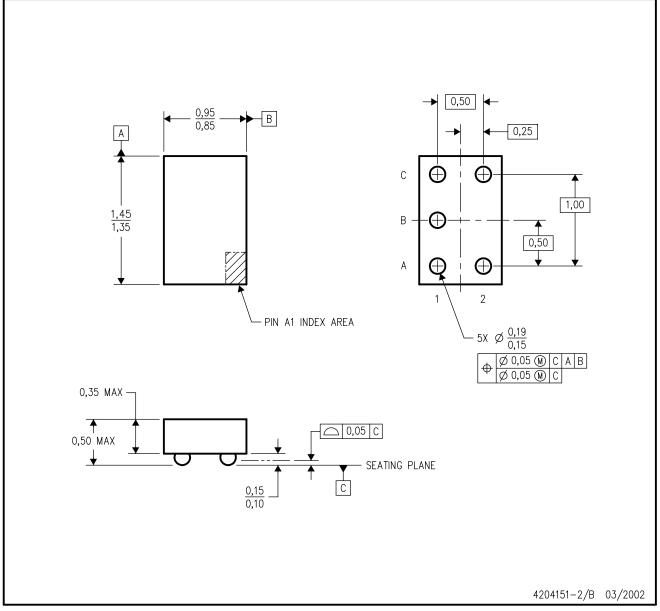
- B. This drawing is subject to change without notice.
- C. NanoStar  $\mathbf{M}$  package configuration.
- D. Package complies to JEDEC MO-211 variation EA.
- E. This package is tin-lead (SnPb). Refer to the 5 YZA package (drawing 4204151) for lead-free.

NanoStar is a trademark of Texas Instruments.



# YZA (R-XBGA-N5)

# DIE-SIZE BALL GRID ARRAY



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. NanoFree  $^{\text{TM}}$  package configuration.
- D. Package complies to JEDEC MO-211 variation EA.
- E. This package is lead-free. Refer to the 5 YEA package (drawing 4203167) for tin-lead (SnPb).

NanoFree is a trademark of Texas Instruments.



YZP (R-XBGA-N5)

DIE-SIZE BALL GRID ARRAY



NOTES: A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.

- B. This drawing is subject to change without notice.
- C. NanoFree  $\mathbf{M}$  package configuration.

NanoFree is a trademark of Texas Instruments.



# YEP (R-XBGA-N5)

# DIE-SIZE BALL GRID ARRAY



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. NanoStar  $\mathbf{M}$  package configuration.
- D. This package is tin-lead (SnPb). Refer to the 5 YZP package (drawing 4204741) for lead-free.

NanoStar is a trademark of Texas Instruments.



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TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

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