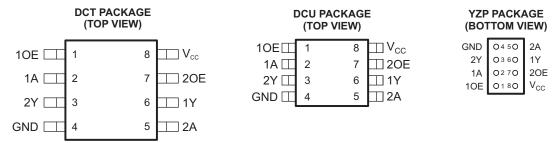


#### **FEATURES**

- Available in the Texas Instruments
   NanoFree<sup>™</sup> Package
- Supports 5-V V<sub>CC</sub> Operation
- Inputs Accept Voltages to 5.5 V
- Max t<sub>nd</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
- Typical V<sub>OLP</sub> (Output Ground Bounce)
   <0.8 V at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C
- Typical V<sub>OHV</sub> (Output V<sub>OH</sub> Undershoot)
   >2 V at V<sub>CC</sub> = 3.3 V, T<sub>Δ</sub> = 25°C

- 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

This dual bus buffer gate is designed for 1.65-V to 5.5-V  $V_{CC}$  operation.

NanoFree<sup>™</sup> package technology is a major breakthrough in IC packaging concepts, using the die as the package.

The SN74LVC2G126 is a dual bus driver/line driver with 3-state outputs. The outputs are disabled when the associated output-enable (OE) input is low.

To ensure the high-impedance state during power up or power down, OE should be tied to GND through a pulldown resistor; the minimum value of the resistor is determined by the current-sourcing capability of the driver.

#### ORDERING INFORMATION

T <sub>A</sub>	PACKAGE <sup>(1)</sup> NanoFree <sup>™</sup> – WCSP (DSBGA) 0.23-mm Large Bump – YZP (Pb-free)		ORDERABLE PART NUMBER	TOP-SIDE MARKING(2)
	NanoFree™ – WCSP (DSBGA) 0.23-mm Large Bump – YZP (Pb-free)	Reel of 3000	SN74LVC2G126YZPR	CN_
-40°C to 85°C	SSOP - DCT	Reel of 3000	SN74LVC2G126DCTR	C26
	VSSOP – DCU	Reel of 3000	SN74LVC2G126DCUR	C26
	V330F - DC0	Reel of 250	SN74LVC2G126DCUT	C20_

<sup>(1)</sup> Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

<sup>(2)</sup> DCT: The actual top-side marking has three additional characters that designate the year, month, and assembly/test site. DCU: The actual top-side marking has one additional character that designates the assembly/test site. YZP: The actual top-side marking has three preceding characters to denote year, month, and sequence code, and one following character to designate the assembly/test site. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).



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NanoFree is a trademark of Texas Instruments.



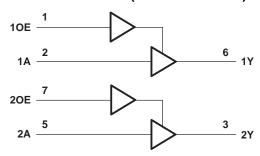
## **DESCRIPTION/ORDERING INFORMATION (CONTINUED)**

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.

# FUNCTION TABLE (EACH BUFFER)

INP	JTS	OUTPUT
OE	Α	Y
Н	Н	Н
Н	L	L
L	Χ	Z

## **LOGIC DIAGRAM (POSITIVE LOGIC)**



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

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

			MIN	MAX	UNIT
$V_{CC}$	Supply voltage range		-0.5	6.5	V
VI	Input voltage range <sup>(2)</sup>		-0.5	6.5	V
Vo	Voltage range applied to any output in the	e high-impedance or power-off state <sup>(2)</sup>	-0.5	6.5	V
Vo	Voltage range applied to any output in the	e high or low state (2)(3)	-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	
Io	Continuous output current			±50	mA
	Continuous current through V <sub>CC</sub> or GND			±100	mA
		DCT package		220	
$\theta_{JA}$	Package thermal impedance (4)	DCU package		227	°C/W
		YZP package		102	
T <sub>stg</sub>	Storage temperature range		-65	150	°C

<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 conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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

<sup>(3)</sup> The value of V<sub>CC</sub> is provided in the recommended operating conditions table.

<sup>(4)</sup> The package thermal impedance is calculated in accordance with JESD 51-7.

**SN74LVC2G126** 



## **Recommended Operating Conditions**(1)

			MIN	MAX	UNIT
.,	Complexications	Operating	1.65	5.5	V
$V_{CC}$	Supply voltage	Data retention only	1.5		V
		V <sub>CC</sub> = 1.65 V to 1.95 V	$0.65 \times V_{CC}$		
.,	I Park Toward Computer on Norway	V <sub>CC</sub> = 2.3 V to 2.7 V	1.7		
$V_{IH}$	High-level input voltage	V <sub>CC</sub> = 3 V to 3.6 V			V
		V <sub>CC</sub> = 4.5 V to 5.5 V	$0.7 \times V_{CC}$		
		V <sub>CC</sub> = 1.65 V to 1.95 V		$0.35 \times V_{CC}$	
.,	Law laval innut valtage	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		$0.3 \times V_{CC}$	
VI	Input voltage		0	5.5	V
.,	Outrout walte no	High or low state	0	V <sub>CC</sub>	V
V <sub>O</sub>	Output voltage	3-state	0	5.5	V
		V <sub>CC</sub> = 1.65 V		-4	
		V <sub>CC</sub> = 2.3 V		-8	
I <sub>OH</sub>	High-level output current	V 2V		-16	mA
		V <sub>CC</sub> = 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	
$I_{OL}$	Low-level output current	V 2V		16	mA
		V <sub>CC</sub> = 3 V			
		V <sub>CC</sub> = 4.5 V		32	
		$V_{CC} = 1.8 \text{ V} \pm 0.15 \text{ V}, 2.5 \text{ V} \pm 0.2 \text{ V}$		20	
Δt/Δν	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	85	°C

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

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## **Electrical Characteristics**

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

PA	RAMETER	TEST CONDITIONS	V <sub>cc</sub>	MIN TYP(1) MAX	UNIT		
		$I_{OH} = -100 \mu A$	1.65 V to 5.5 V	V <sub>CC</sub> - 0.1			
		$I_{OH} = -4 \text{ mA}$	1.65 V	1.2			
		$I_{OH} = -8 \text{ mA}$	2.3 V	1.9	V		
V <sub>OH</sub>		$I_{OH} = -16 \text{ mA}$	3 V	2.4	V		
		$I_{OH} = -24 \text{ mA}$	3 V	2.3			
		$I_{OH} = -32 \text{ mA}$	4.5 V	3.8			
		I <sub>OL</sub> = 100 μA	1.65 V to 5.5 V	0.1			
		I <sub>OL</sub> = 4 mA	1.65 V	0.45			
V		I <sub>OL</sub> = 8 mA	2.3 V	0.3	V		
V <sub>OL</sub>		I <sub>OL</sub> = 16 mA	3 V	0.4			
		I <sub>OL</sub> = 24 mA	3 V	0.55			
		I <sub>OL</sub> = 32 mA	4.5 V	0.55			
I	A or OE inputs	V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V	±5	μА		
I <sub>off</sub>		$V_I$ or $V_O = 5.5 \text{ V}$	0	±10	μΑ		
$I_{OZ}$		$V_0 = 0 \text{ to } 5.5 \text{ V}$	3.6 V	10	μΑ		
$I_{CC}$		$V_I = 5.5 \text{ V or GND}, \qquad I_O = 0$	1.65 V to 5.5 V	10	μΑ		
$\Delta I_{CC}$		One input at $V_{CC} - 0.6 \text{ V}$ , Other inputs at $V_{CC}$ or GND	3 V to 5.5 V	500	μΑ		
	Data inputs			3.5			
Cı	Control inputs	$V_I = V_{CC}$ or GND	3.3 V	4	pF		
Co		$V_{O} = V_{CC}$ or GND	3.3 V	6.5	pF		

<sup>(1)</sup> All typical values are at  $V_{CC}$  = 3.3 V,  $T_A$  = 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 ± 0.1		V <sub>CC</sub> = ± 0.2		V <sub>CC</sub> = : ± 0.3		V <sub>CC</sub> = ± 0.5		UNIT
	(INFOT)	(001701)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	Α	Y	3.5	9.8	1.7	4.9	1.4	4	1	3.2	ns
t <sub>en</sub>	OE	Y	3.5	10	1.7	5	1.5	4.1	1	3.1	ns
t <sub>dis</sub>	OE	Υ	1.7	12.6	1	5.7	1	4.4	1	3.3	ns

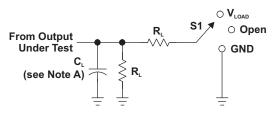
## **Operating Characteristics**

 $T_A = 25^{\circ}$ 

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 40 MH-	19	19	20	22	
C <sub>pd</sub> capacitance	Outputs disabled	f = 10 MHz	2	2	2	3	pF	



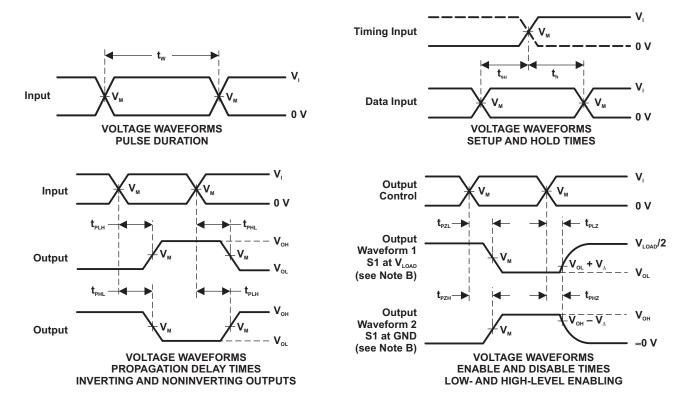
### PARAMETER MEASUREMENT INFORMATION



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

LOAD CIRCUIT

.,	INF	PUTS	V	V		Б	
V <sub>cc</sub>	V,	t,/t,	V <sub>M</sub>	V <sub>LOAD</sub>	C <sub>L</sub>	R <sub>L</sub>	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 Ω	0.15 V
3.3 V ± 0.3 V	3 V	≤2.5 ns	1.5 V	6 V	50 pF	500 Ω	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 Ω	0.3 V



NOTES: A.  $C_L$  includes probe and jig capacitance.

- B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10 MHz, Z<sub>o</sub> = 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.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
- H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms







### **PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
74LVC2G126DCTRE4	ACTIVE	SM8	DCT	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74LVC2G126DCTRG4	ACTIVE	SM8	DCT	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74LVC2G126DCURE4	ACTIVE	US8	DCU	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74LVC2G126DCURG4	ACTIVE	US8	DCU	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74LVC2G126DCUTE4	ACTIVE	US8	DCU	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74LVC2G126DCUTG4	ACTIVE	US8	DCU	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC2G126DCTR	ACTIVE	SM8	DCT	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC2G126DCUR	ACTIVE	US8	DCU	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC2G126DCUT	ACTIVE	US8	DCU	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC2G126YZPR	ACTIVE	DSBGA	YZP	8	3000	TBD	Call TI	Call TI

(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.

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## TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
	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 Drawing			Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LVC2G126DCUR	US8	DCU	8	3000	180.0	9.2	2.25	3.35	1.05	4.0	8.0	Q3





## \*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC2G126DCUR	US8	DCU	8	3000	202.0	201.0	28.0

## DCU (R-PDSO-G8)

## PLASTIC SMALL-OUTLINE PACKAGE (DIE DOWN)



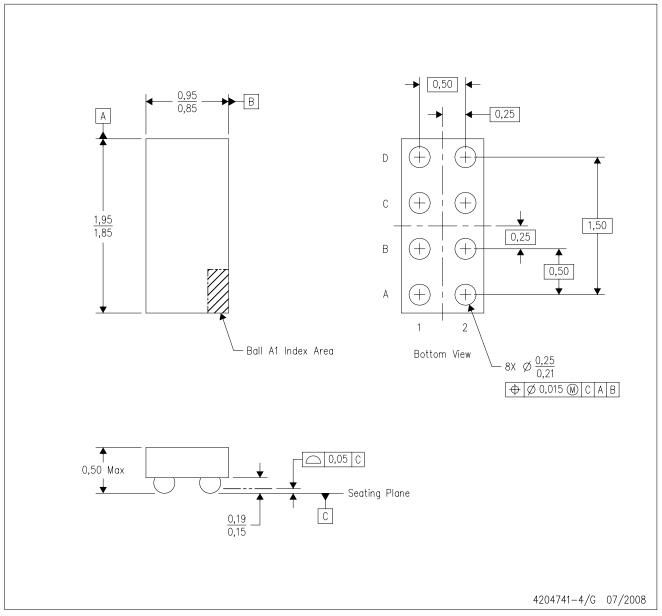
NOTES:

- 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-187 variation CA.



YZP (R-XBGA-N8)

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  $^{\text{TM}}$  package configuration.
- D. This package is lead-free. Refer to the 8 YEP package (drawing 4204725) for tin-lead (SnPb).

NanoFree is a trademark of Texas Instruments.



## DCT (R-PDSO-G8)

## 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
- D. Falls within JEDEC MO-187 variation DA.

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