

#### SCES498E-OCTOBER 2003-REVISED DECEMBER 2013

## Dual Positive-Edge-Triggered D-Type Flip-Flop

Check for Samples: SN74LVC2G79

#### **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>pd</sub> of 4.2 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  $V_{CC}$  = 3.3 V,  $T_A$  = 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>A</sub> = 25°C
- Ioff Feature Supports Live Insertion, Partial-**Power-Down Mode Operation 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)

#### DESCRIPTION

This dual positive-edge-triggered D-type flip-flop is designed for 1.65-V to 5.5-V V<sub>CC</sub> operation.

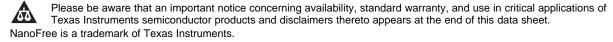
When data at the data (D) input meets the setup time requirement, the data is transferred to the Q output on the positive-going edge of the clock pulse. Clock triggering occurs at a voltage level and is not directly related to the rise time of the clock pulse. Following the hold-time interval, data at the D input can be changed without affecting the levels at the outputs.

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

This device is fully specified for partial-power-down applications using  $I_{\text{off}}.$  The  $I_{\text{off}}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

DCT PACKAGE (TOP VIEW)			I		YZP PACKAGE (BOTTOM VIEW)				
	1 8		1CLK Ⅲ 1D Ⅲ	1	8 7	⊥ V <sub>cc</sub> ∏ 1Q	GND 2Q	O4 5O O3 6O	2CLK 2D
1D 🗔	2 7	1Q	2Q 🗔	3	6	∐ 2D	1D 1CLK	O2 7O O1 8O	1Q V <sub>CC</sub>
2Q 🗖	3 6	2D	GND 🗌	4	5	∏ 2CLK			,
GND 🖂	4 5	🗀 2CLK							

See mechanical drawings for dimensions.



SCES498E -OCTOBER 2003-REVISED DECEMBER 2013

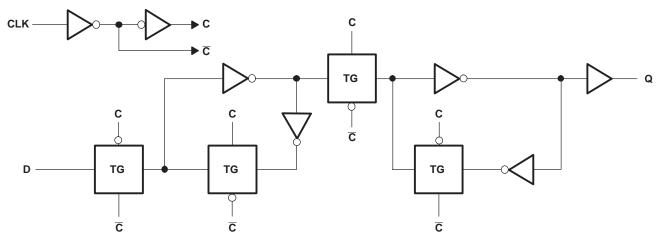




These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Function Table									
INPU	JTS	OUTPUT							
CLK	D	Q							
Ť	Н	Н							
↑	L	L							
L	Х	Q <sub>0</sub>							

#### Logic Diagram, Each Flip-Flop (Positive Logic)



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

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

			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage range		-0.5	6.5	V
VI	Input voltage range <sup>(2)</sup>		-0.5	6.5	V
Vo	Output voltage range <sup>(2)(3)</sup>		-0.5	V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	Input clamp current	V <sub>1</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 GN	ID		±100	mA
		DCT package		220	
$\theta_{JA}$	Package thermal impedance <sup>(4)</sup>	DCU package		227	°C/W
		YZP package		102	
T <sub>stg</sub>	Storage temperature range		-65	150	°C

(1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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

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

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



### SN74LVC2G79

#### www.ti.com

SCES498E - OCTOBER 2003-REVISED DECEMBER 2013

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

			MIN	MAX	UNIT
V	Supply voltage	Operating	1.65	5.5	V
V <sub>CC</sub>	Supply voltage	Data retention only	1.5		v
		$V_{CC} = 1.65 \text{ V} \text{ to } 1.95 \text{ V}$	$0.65 \times V_{CC}$		
V	High lovel input voltage	$V_{CC}$ = 2.3 V to 2.7 V	1.7		V
V <sub>IH</sub>	High-level input voltage	$V_{CC}$ = 3 V to 3.6 V	2		v
		$V_{CC}$ = 4.5 V to 5.5 V	$0.7 \times V_{CC}$		
		$V_{CC}$ = 1.65 V to 1.95 V		$0.35 \times V_{CC}$	
V		$V_{CC}$ = 2.3 V to 2.7 V		0.7	V
V <sub>IL</sub>	Low-level input voltage	$V_{CC} = 3 V \text{ to } 3.6 V$		0.8	v
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$		$0.3 \times V_{CC}$	
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	
I <sub>OH</sub>	High-level output current	$V_{CC} = 3 V$		-16	mA
		$v_{CC} = 3 v$		-24	
		$V_{CC} = 4.5 V$		-32	
		V <sub>CC</sub> = 1.65 V		4	
		V <sub>CC</sub> = 2.3 V		8	
I <sub>OL</sub>	Low-level output current	$V_{CC} = 3 V$		16	mA
		$v_{CC} = 3 v$		24	
		$V_{CC} = 4.5 V$		32	
		$V_{CC} = 1.8 \text{ V} \pm 0.15 \text{ V}, 2.5 \text{ V} \pm 0.2 \text{ V}$		20	
Δt/Δv	Input transition rise or fall rate	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		10	ns/V
		$V_{CC} = 5 V \pm 0.5 V$		5	
T <sub>A</sub>	Operating free-air temperature		-40	125	°C

(1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004. SCES498E -OCTOBER 2003-REVISED DECEMBER 2013

#### TEXAS INSTRUMENTS

www.ti.com

#### **Electrical Characteristics**

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

	TEAT CONDITIONS		-40°0	C to 85°C		–40°C	to 125°C					
PARAMETER	TEST CONDITIONS	V <sub>cc</sub>	MIN	TYP <sup>(1)</sup>	MAX	MIN	TYP <sup>(1)</sup>	MAX	UNI			
	I <sub>OH</sub> = -100 μA	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			1			
V <sub>OH</sub>	I <sub>OH</sub> = -8 mA	2.3 V	1.9			1.9			v			
	I <sub>OH</sub> = -16 mA		3 V	2.1/	3.V	2.1/	2.4			2.4		
	$I_{OH} = -24 \text{ mA}$	3 V	2.3			2.3						
	I <sub>OH</sub> = -32 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 <sub>OL</sub>	I <sub>OL</sub> = 8 mA	2.3 V			0.3			0.3	v			
	I <sub>OL</sub> = 16 mA	3 V			0.4			0.4				
	I <sub>OL</sub> = 24 mA	- 3 V	3 V	3 V	3 V			0.55			0.65	
	I <sub>OL</sub> = 32 mA	4.5 V			0.55			0.65				
I D input	$V_{I} = 5.5 V \text{ or GND}$	0 to 5.5 V			±1			±1	μA			
off	$V_{I} \text{ or } V_{O} = 5.5 \text{ V}$	0			±1			±10	μA			
сс	$V_{I} = 5.5 V \text{ or GND}, I_{O} = 0$	1.65 V to 5.5 V			5			5	μA			
ΔI <sub>CC</sub>	One input at $V_{CC} - 0.6 V$ , Other inputs at $V_{CC}$ or GND	3 V to 5.5 V			500			500	μA			
C <sub>i</sub>	$V_{I} = V_{CC}$ or GND	0		3.5					pF			

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

#### **Timing Requirements**

over recommended operating free-air temperature range (unless otherwise noted) (see Figure 2)

				SN74LVC2G79 -40°C to 85°C							
			V <sub>CC</sub> = 1.8 V ± 0.15 V		V <sub>CC</sub> = 2 ± 0.2				V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f <sub>clock</sub>	Clock frequency			160		160		160		160	MHz
tw	Pulse duration, CLK high or low		2.5		2.5		2.5		2.5		ns
	Satur time before CLKA	Data high	2.2		1.4		1.1		0.9		22
t <sub>su</sub>	Setup time before CLK↑	Data low	2.2		1.4		1.1		0.9		ns
t <sub>h</sub>	Hold time, data after CLK↑	· · ·	1.4		0.8		0.7		0.5		ns

### **Timing Requirements**

over recommended operating free-air temperature range (unless otherwise noted) (see Figure 2)

				SN74LVC2G79 –40°C to 125°C							
				V <sub>CC</sub> = 1.8 V ± 0.15 V		2.5 V 2 V	V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f <sub>clock</sub>	Clock frequency			160		160		160		160	MHz
tw	Pulse duration, CLK high or low		2.2		2.5		2.5		2.5		ns
	Satur time before CLIVA	Data high	2.2		1.4		1.1		0.9		
τ <sub>su</sub>	Setup time before CLK↑	Data low	2.2		1.4		1.1		0.9		ns
t <sub>h</sub>	Hold time, data after CLK↑		1.4		0.8		0.7		0.5		ns



SCES498E-OCTOBER 2003-REVISED DECEMBER 2013

#### www.ti.com

#### **Switching Characteristics**

over recommended operating free-air temperature range,  $C_L = 15 \text{ pF}$  (unless otherwise noted) (see Figure 1)

PARAMETER						SN74LV -40°C t					
	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 1 ± 0.1		V <sub>CC</sub> = 2 ± 0.2		V <sub>CC</sub> = 3 ± 0.3		V <sub>CC</sub> = ± 0.5		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f <sub>max</sub>			160		160		160		160		MHz
t <sub>pd</sub>	CLK	Q	3	9.1	1.5	6	1.3	4.2	1.1	3.7	ns

#### **Switching Characteristics**

over recommended operating free-air temperature range,  $C_L = 30 \text{ pF}$  or 50 pF (unless otherwise noted) (see Figure 2)

PARAMETER						SN74LV -40°C t					
	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 1 ± 0.1		V <sub>CC</sub> = 2 ± 0.2	2.5 V 2 V	V <sub>CC</sub> = 3 ± 0.3		V <sub>CC</sub> = ± 0.5	5 V 5 V	UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f <sub>max</sub>			160		160		160		160		MHz
t <sub>pd</sub>	CLK	Q	4.4	9.9	2.3	7	2	5.2	1.3	4.5	ns

#### **Switching Characteristics**

over recommended operating free-air temperature range, C<sub>L</sub> = 30 pF or 50 pF (unless otherwise noted) (see Figure 2)

PARAMETER						SN74LV –40°C to					UNIT
	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 1 ± 0.1		V <sub>CC</sub> = 2 ± 0.2		V <sub>CC</sub> = 3 ± 0.3		V <sub>CC</sub> = ± 0.5	5 V V	UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f <sub>max</sub>			160		160		160		160		MHz
t <sub>pd</sub>	CLK	Q	4.4	10.5	2.3	7.5	2	5.8	1.3	5	ns

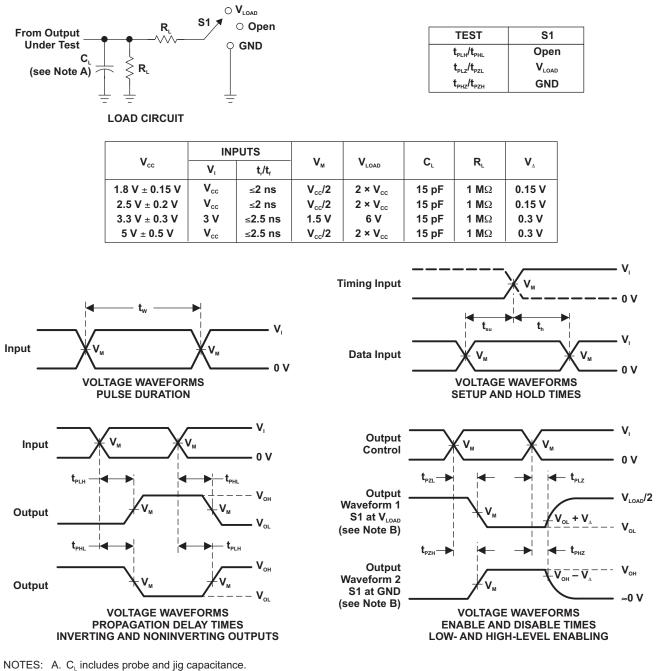
### **Operating Characteristics**

 $T_A = 25^{\circ}C$ 

	PARAMETER	TEST CONDITIONS	V <sub>CC</sub> = 1.8 V	V <sub>CC</sub> = 2.5 V	$V_{CC} = 3.3 V$	$V_{CC} = 5 V$	UNIT	
	PARAMETER	TEST CONDITIONS	TYP	TYP	TYP	TYP	UNIT	
C <sub>pc</sub>	d Power dissipation capacitance	f = 10 MHz	23	23	24	28	pF	

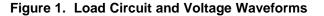
#### SCES498E -OCTOBER 2003-REVISED DECEMBER 2013





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>0</sub> = 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.  $t_{\mbox{\tiny PLH}}$  and  $t_{\mbox{\tiny PHL}}$  are the same as  $t_{\mbox{\tiny pd}}$
- H. All parameters and waveforms are not applicable to all devices.

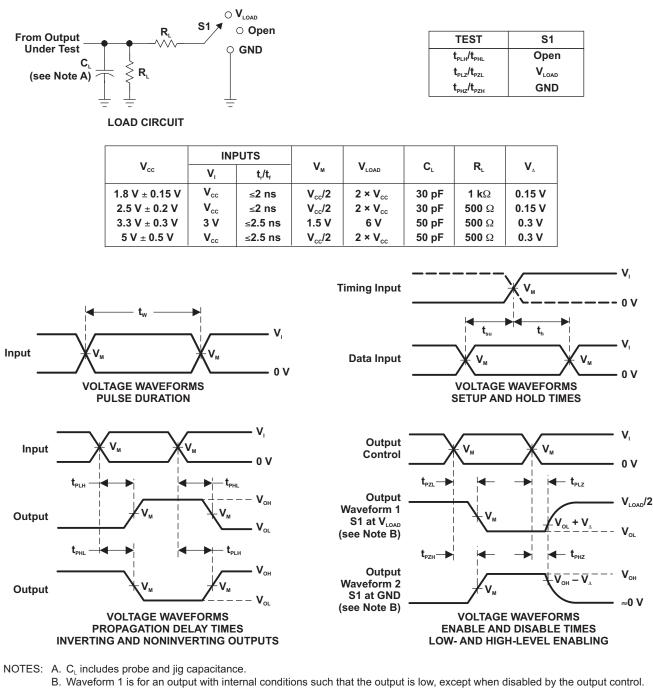




### SN74LVC2G79

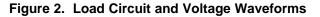
#### SCES498E-OCTOBER 2003-REVISED DECEMBER 2013

#### Parameter Measurement Information (continued)



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.  $t_{\mbox{\tiny PLH}}$  and  $t_{\mbox{\tiny PHL}}$  are the same as  $t_{\mbox{\tiny pd}}$
- H. All parameters and waveforms are not applicable to all devices.



SCES498E -OCTOBER 2003-REVISED DECEMBER 2013

8

### **REVISION HISTORY**

# Changes from Revision D (Feburary 2007) to Revision E

•	Updated document to new TI data sheet format.	1
•	Removed Ordering Information table.	1
•	Added ESD warning.	2
•	Updated operating temperature range.	3

#### TEXAS INSTRUMENTS

Copyright © 2003–2013, Texas Instruments Incorporated

www.ti.com

Page



#### 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
SN74LVC2G79DCTR	ACTIVE	SM8	DCT	8	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	C79 (R, Z)	Samples
SN74LVC2G79DCUR	ACTIVE	VSSOP	DCU	8	3000	RoHS & Green	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 125	(C79J, C79Q, C79R)	Samples
SN74LVC2G79DCURG4	ACTIVE	VSSOP	DCU	8	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	C79R	Samples
SN74LVC2G79YZPR	ACTIVE	DSBGA	YZP	8	3000	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-40 to 85	CRN	Samples

<sup>(1)</sup> 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.

<sup>(2)</sup> 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 (CI) 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.

<sup>(3)</sup> MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

<sup>(4)</sup> There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

<sup>(5)</sup> 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



10-Dec-2020

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.



Texas

STRUMENTS

#### TAPE AND REEL INFORMATION





#### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

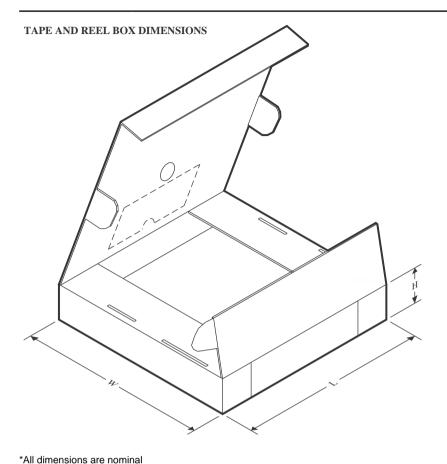


*All dimensions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LVC2G79DCTR	SM8	DCT	8	3000	180.0	13.0	3.35	4.5	1.55	4.0	12.0	Q3
SN74LVC2G79DCUR	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC2G79DCUR	VSSOP	DCU	8	3000	178.0	9.5	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC2G79DCUR	VSSOP	DCU	8	3000	178.0	9.0	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC2G79DCURG4	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74LVC2G79YZPR	DSBGA	YZP	8	3000	178.0	9.2	1.02	2.02	0.63	4.0	8.0	Q1



## PACKAGE MATERIALS INFORMATION

25-Mar-2023



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)	
SN74LVC2G79DCTR	SM8	DCT	8	3000	182.0	182.0	20.0	
SN74LVC2G79DCUR	VSSOP	DCU	8	3000	202.0	201.0	28.0	
SN74LVC2G79DCUR	VSSOP	DCU	8	3000	202.0	201.0	28.0	
SN74LVC2G79DCUR	VSSOP	DCU	8	3000	180.0	180.0	18.0	
SN74LVC2G79DCURG4	VSSOP	DCU	8	3000	202.0	201.0	28.0	
SN74LVC2G79YZPR	DSBGA	YZP	8	3000	220.0	220.0	35.0	

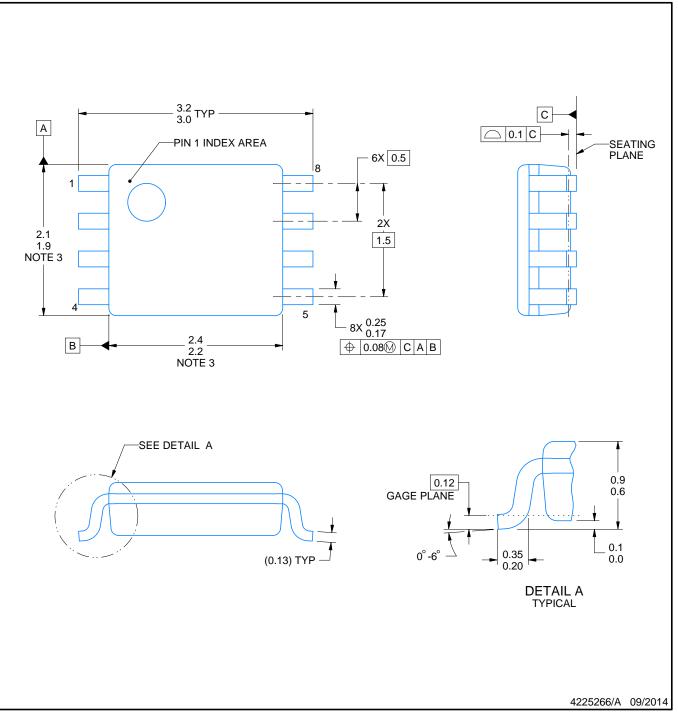
## **DCU0008A**



## **PACKAGE OUTLINE**

### VSSOP - 0.9 mm max height

SMALL OUTLINE PACKAGE



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.



## DCU0008A

## **EXAMPLE BOARD LAYOUT**

### VSSOP - 0.9 mm max height

SMALL OUTLINE PACKAGE



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.



## DCU0008A

## **EXAMPLE STENCIL DESIGN**

### VSSOP - 0.9 mm max height

SMALL OUTLINE PACKAGE



NOTES: (continued)

8. Board assembly site may have different recommendations for stencil design.



<sup>7.</sup> Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

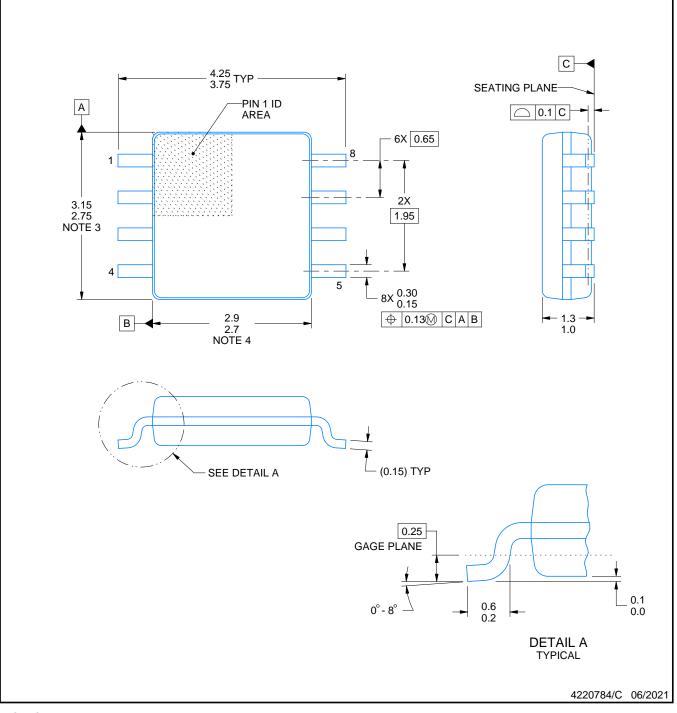
## **DCT0008A**



## **PACKAGE OUTLINE**

### SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE



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.

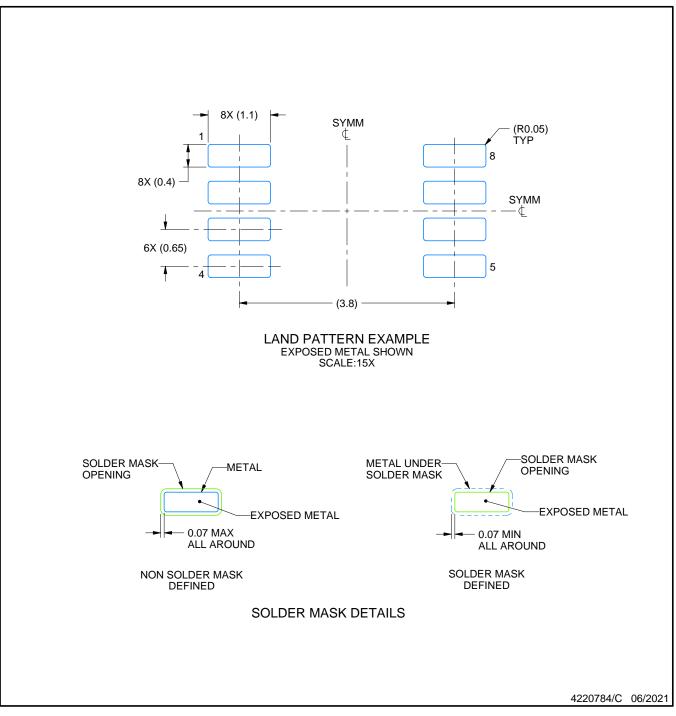


## **DCT0008A**

## **EXAMPLE BOARD LAYOUT**

### SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE



NOTES: (continued)

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



## **DCT0008A**

## **EXAMPLE STENCIL DESIGN**

### SSOP - 1.3 mm max height

SMALL OUTLINE PACKAGE



NOTES: (continued)

8. Board assembly site may have different recommendations for stencil design.



<sup>7.</sup> Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

## 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.



## YZP0008

## **EXAMPLE BOARD LAYOUT**

### DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



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).



## YZP0008

## **EXAMPLE STENCIL DESIGN**

### DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



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 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