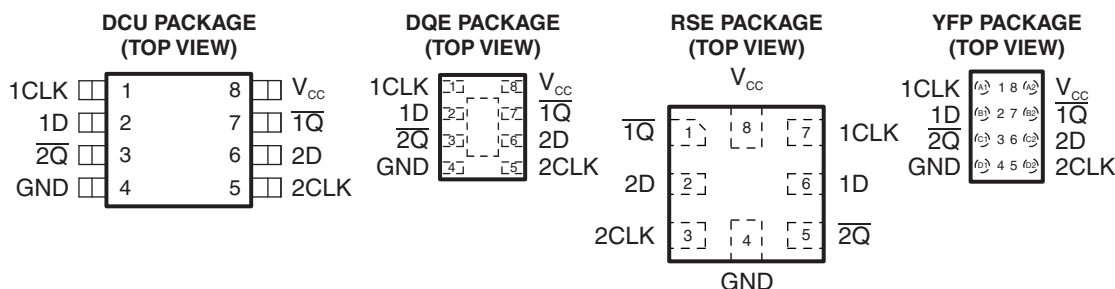


# LOW-POWER DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOP

Check for Samples: [SN74AUP2G80](#)

## FEATURES

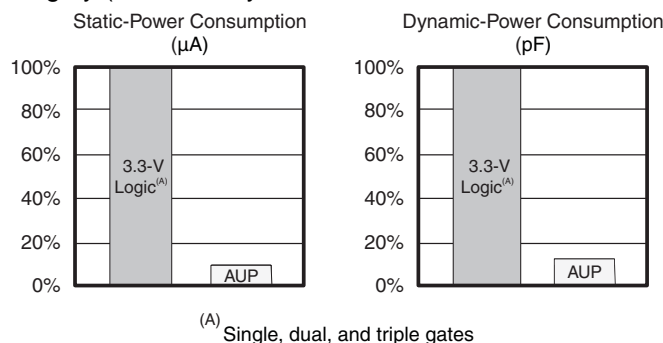
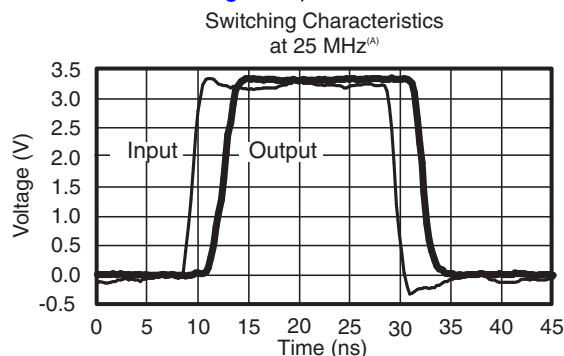
- Available in the Texas Instruments NanoStar™ Package
- Low Static-Power Consumption ( $I_{CC} = 0.9 \mu A$  Maximum)
- Low Dynamic-Power Consumption ( $C_{pd} = 4.3 pF$  Typ at 3.3 V)
- Low Input Capacitance ( $C_i = 1.5 pF$  Typical)
- Low Noise – Overshoot and Undershoot <10% of  $V_{CC}$
- $I_{off}$  Supports Partial-Power-Down Mode Operation
- Wide Operating  $V_{CC}$  Range of 0.8 V to 3.6 V
- Optimized for 3.3-V Operation
- 3.6-V I/O Tolerant to Support Mixed-Mode Signal Operation
- $t_{pd} = 4.4 ns$  Maximum at 3.3 V
- Suitable for Point-to-Point Applications
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Performance Tested Per JESD 22
  - 2000-V Human-Body Model (A114-B, Class II)
  - 1000-V Charged-Device Model (C101)



See mechanical drawings for dimensions.

## DESCRIPTION/ORDERING INFORMATION

The AUP family is TI's premier solution to the industry's low-power needs in battery-powered portable applications. This family ensures a very low static- and dynamic-power consumption across the entire  $V_{CC}$  range of 0.8 V to 3.6 V, resulting in increased battery life (see [Figure 1](#)). This product also maintains excellent signal integrity (see the very low undershoot and overshoot characteristics shown in [Figure 2](#)).


**Figure 1. AUP – The Lowest-Power Family**

(A) SN74AUP2Gxx data at  $C_L = 15 pF$ .

**Figure 2. Excellent Signal Integrity**


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.

NanoStar™ 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  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

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

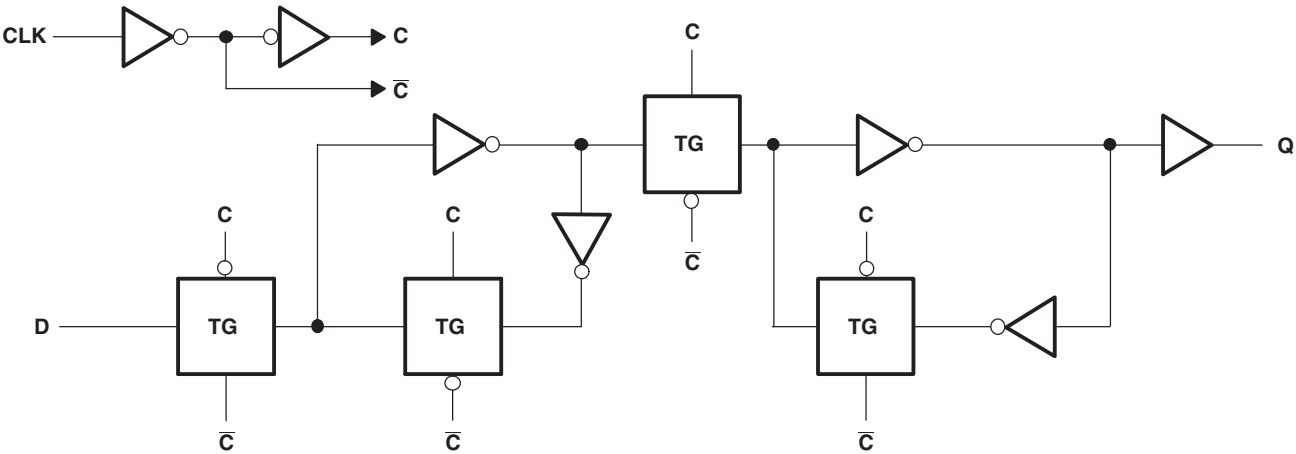
$T_A$	PACKAGE <sup>(2)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING <sup>(3)</sup>
–40°C to 85°C	NanoStar™ – WCSP (DSBGA) 0.23-mm Large Bump – YFP (Pb-free)	Reel of 3000	SN74AUP2G80YFPR	___ H X _
	uQFN – DQE	Reel of 5000	SN74AUP2G80DQER	PU
	QFN – RSE	Reel of 5000	SN74AUP2G80RSE	PU
	SSOP – DCU	Reel of 3000	SN74AUP2G80DCUR	H80_

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at [www.ti.com](http://www.ti.com).
- (2) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).
- (3) DCU: The actual top-side marking has one additional character that designates the wafer fab/assembly site.  
YFP: The actual top-side marking has three preceding characters to denote year, month, and sequence code, and one following character to designate the wafer fab/assembly site. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).

**FUNCTION TABLE**

INPUTS		OUTPUT Q
CLK	D	
↑	H	L
↑	L	H
L	X	$Q_0$

**LOGIC DIAGRAM (POSITIVE LOGIC)**



Pin numbers shown are for the DCU and DQE packages.

## 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	4.6	V
$V_I$	Input voltage range <sup>(2)</sup>		–0.5	4.6	V
$V_O$	Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup>		–0.5	4.6	V
$V_O$	Output voltage range in the high or low state <sup>(2)</sup>		–0.5	$V_{CC} + 0.5$	V
$I_{IK}$	Input clamp current	$V_I < 0$		–50	mA
$I_{OK}$	Output clamp current	$V_O < 0$		–50	mA
$I_O$	Continuous output current			±20	mA
	Continuous current through $V_{CC}$ or GND			±50	mA
$\theta_{JA}$	Package thermal impedance <sup>(3)</sup>	DCU package		220	°C/W
		DQE package		261	
		RSE package		253	
		YFP package		132	
$T_{stg}$	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 package thermal impedance is calculated in accordance with JESD 51-7.

**RECOMMENDED OPERATING CONDITIONS<sup>(1)</sup>**

RECOMMENDED OPERATING CONDITIONS			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage		0.8	3.6	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 0.8 V	V <sub>CC</sub>		V
		V <sub>CC</sub> = 1.1 V to 1.95 V	0.65 × V <sub>CC</sub>		
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6		
		V <sub>CC</sub> = 3 V to 3.6 V	2		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 0.8 V	0		V
		V <sub>CC</sub> = 1.1 V to 1.95 V	0.35 × V <sub>CC</sub>		
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.7		
		V <sub>CC</sub> = 3 V to 3.6 V	0.9		
V <sub>I</sub>	Input voltage		0	3.6	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> = 0.8 V	−20		μA
		V <sub>CC</sub> = 1.1 V	−1.1		mA
		V <sub>CC</sub> = 1.4 V	−1.7		
		V <sub>CC</sub> = 1.65	−1.9		
		V <sub>CC</sub> = 2.3 V	−3.1		
		V <sub>CC</sub> = 3 V	−4		
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 0.8 V	20		μA
		V <sub>CC</sub> = 1.1 V	1.1		mA
		V <sub>CC</sub> = 1.4 V	1.7		
		V <sub>CC</sub> = 1.65 V	1.9		
		V <sub>CC</sub> = 2.3 V	3.1		
		V <sub>CC</sub> = 3 V	4		
Δt/Δv	Input transition rise or fall rate	V <sub>CC</sub> = 0.8 V to 3.6 V	200		ns/V
T <sub>A</sub>	Operating free-air temperature		−40	85	°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.

## ELECTRICAL CHARACTERISTICS

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

PARAMETER		TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			T <sub>A</sub> = −40°C to 85°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
V <sub>OH</sub>		I <sub>OH</sub> = −20 μA	0.8 V to 3.6 V	V <sub>CC</sub> − 0.1			V <sub>CC</sub> − 0.1		V
		I <sub>OH</sub> = −1.1 mA	1.1 V	0.75 × V <sub>CC</sub>			0.7 × V <sub>CC</sub>		
		I <sub>OH</sub> = −1.7 mA	1.4 V	1.11			1.03		
		I <sub>OH</sub> = −1.9 mA	1.65 V	1.32			1.3		
		I <sub>OH</sub> = −2.3 mA	2.3 V	2.05			1.97		
		I <sub>OH</sub> = −3.1 mA		1.9			1.85		
		I <sub>OH</sub> = −2.7 mA	3 V	2.72			2.67		
		I <sub>OH</sub> = −4 mA		2.6			2.55		
V <sub>OL</sub>		I <sub>OL</sub> = 20 μA	0.8 V to 3.6 V	0.1			0.1		V
		I <sub>OL</sub> = 1.1 mA	1.1 V	0.3 × V <sub>CC</sub>			0.3 × V <sub>CC</sub>		
		I <sub>OL</sub> = 1.7 mA	1.4 V	0.31			0.37		
		I <sub>OL</sub> = 1.9 mA	1.65 V	0.31			0.35		
		I <sub>OL</sub> = 2.3 mA	2.3 V	0.31			0.33		
		I <sub>OL</sub> = 3.1 mA		0.44			0.45		
		I <sub>OL</sub> = 2.7 mA	3 V	0.31			0.33		
		I <sub>OL</sub> = 4 mA		0.44			0.45		
I <sub>I</sub>	A or B input	V <sub>I</sub> = GND to 3.6 V	0 V to 3.6 V		0.1		0.5		μA
I <sub>off</sub>		V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V	0 V		0.2		0.6		μA
ΔI <sub>off</sub>		V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V	0 V to 0.2 V		0.2		0.6		μA
I <sub>CC</sub>		V <sub>I</sub> = GND or (V <sub>CC</sub> to 3.6 V), I <sub>O</sub> = 0	0.8 V to 3.6 V		0.5		0.9		μA
ΔI <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> − 0.6 V <sup>(1)</sup> , I <sub>O</sub> = 0	3.3 V		40		50		μA
C <sub>i</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND	0 V		1.5				pF
			3.6 V		1.5				
C <sub>o</sub>		V <sub>O</sub> = GND	0 V		3				pF

(1) One input at  $V_{CC} - 0.6\ \text{V}$ , other input at  $V_{CC}$  or GND

## TIMING REQUIREMENTS

over recommended operating free-air temperature range (unless otherwise noted) (see [Figure 3](#))

		$V_{CC}$	$T_A = 25^{\circ}\text{C}$	$T_A = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$		UNIT
			TYP	MIN	MAX	
$f_{\text{clock}}$	Clock frequency	0.8 V			20	MHz
		1.2 V $\pm$ 0.1 V			80	
		1.5 V $\pm$ 0.1 V			120	
		1.8 V $\pm$ 0.15 V			160	
		2.5 V $\pm$ 0.2 V			220	
		3.3 V $\pm$ 0.3 V			260	
$t_w$	Pulse duration, CLK high or low	0.8 V		5.5		
		1.2 V $\pm$ 0.1 V		2.5		
		1.5 V $\pm$ 0.1 V		1.5		
		1.8 V $\pm$ 0.15 V		1.6		
		2.5 V $\pm$ 0.2 V		1.7		
		3.3 V $\pm$ 0.3 V		1.9		
$t_{\text{su}}$	Data high	0.8 V	3.4	6.7		ns
		1.2 V $\pm$ 0.1 V		2.4		
		1.5 V $\pm$ 0.1 V		1.2		
		1.8 V $\pm$ 0.15 V		0.8		
		2.5 V $\pm$ 0.2 V		0.6		
		3.3 V $\pm$ 0.3 V		0.4		
	Data low	0.8 V	3.4	8.9		ns
		1.2 V $\pm$ 0.1 V		2		
		1.5 V $\pm$ 0.1 V		1.3		
		1.8 V $\pm$ 0.15 V		1.1		
		2.5 V $\pm$ 0.2 V		0.8		
		3.3 V $\pm$ 0.3 V		0.7		
$t_h$	Hold time, data after CLK $\uparrow$	0.8 V	0	1		ns
		1.2 V $\pm$ 0.1 V		0		
		1.5 V $\pm$ 0.1 V		0		
		1.8 V $\pm$ 0.15 V		0		
		2.5 V $\pm$ 0.2 V		0		
		3.3 V $\pm$ 0.3 V		0		

## SWITCHING CHARACTERISTICS

over recommended operating free-air temperature range,  $C_L = 5 \text{ pF}$  (unless otherwise noted) (see [Figure 3](#) and [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	
$f_{\max}$			0.8 V		91		90		MHz
			1.2 V $\pm$ 0.1 V		175		220		
			1.5 V $\pm$ 0.1 V		237		230		
			1.8 V $\pm$ 0.15 V		269		240		
			2.5 V $\pm$ 0.2 V		280		250		
			3.3 V $\pm$ 0.3 V		280		260		
$t_{pd}$	CLK	$\bar{Q}$	0.8 V		17.2				ns
			1.2 V $\pm$ 0.1 V	3.2	7.1	14.9	2.7	16.3	
			1.5 V $\pm$ 0.1 V	1.9	5	9.8	2.1	10.3	
			1.8 V $\pm$ 0.15 V	1.7	3.9	7.6	1.6	8.1	
			2.5 V $\pm$ 0.2 V	1.4	2.8	5.3	1.2	5.6	
			3.3 V $\pm$ 0.3 V	1.2	2.2	4.1	1	4.4	

## SWITCHING CHARACTERISTICS

over recommended operating free-air temperature range,  $C_L = 10 \text{ pF}$  (unless otherwise noted) (see [Figure 3](#) and [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	
$f_{\max}$			0.8 V		68		70		MHz
			1.2 V $\pm$ 0.1 V		128		170		
			1.5 V $\pm$ 0.1 V		189		220		
			1.8 V $\pm$ 0.15 V		234		240		
			2.5 V $\pm$ 0.2 V		273		250		
			3.3 V $\pm$ 0.3 V		280		260		
$t_{pd}$	CLK	$\bar{Q}$	0.8 V		19.4				ns
			1.2 V $\pm$ 0.1 V	4.4	8.2	16.2	3.4	17.7	
			1.5 V $\pm$ 0.1 V	3.6	5.8	10.7	2.6	11.3	
			1.8 V $\pm$ 0.15 V	2.9	4.6	8.4	2.1	3	
			2.5 V $\pm$ 0.2 V	2.2	3.3	5.9	1.7	6.3	
			3.3 V $\pm$ 0.3 V	1.9	2.7	4.7	1.4	4.9	

## SWITCHING CHARACTERISTICS

over recommended operating free-air temperature range,  $C_L = 15$  pF (unless otherwise noted) (see [Figure 3](#) and [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	
$f_{\max}$			0.8 V		52		50		MHz
			1.2 V $\pm$ 0.1 V		98		130		
			1.5 V $\pm$ 0.1 V		148		180		
			1.8 V $\pm$ 0.15 V		196		240		
			2.5 V $\pm$ 0.2 V		249		250		
			3.3 V $\pm$ 0.3 V		280		260		
$t_{pd}$	CLK	$\bar{Q}$	0.8 V		21.5				ns
			1.2 V $\pm$ 0.1 V	3	9.1	17.4	4.1	19	
			1.5 V $\pm$ 0.1 V	3.2	6.5	11.7	3.2	12.3	
			1.8 V $\pm$ 0.15 V	2.7	4.2	9.2	2.6	9.8	
			2.5 V $\pm$ 0.2 V	2.2	3.8	6.5	2.1	6.9	
			3.3 V $\pm$ 0.3 V	1.9	3.1	5.1	1.8	5.5	

## SWITCHING CHARACTERISTICS

over recommended operating free-air temperature range,  $C_L = 30$  pF (unless otherwise noted) (see [Figure 3](#) and [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	
$f_{\max}$			0.8 V		32		20		MHz
			1.2 V $\pm$ 0.1 V		71		80		
			1.5 V $\pm$ 0.1 V		104		120		
			1.8 V $\pm$ 0.15 V		133		160		
			2.5 V $\pm$ 0.2 V		181		220		
			3.3 V $\pm$ 0.3 V		257		260		
$t_{pd}$	CLK	$\bar{Q}$	0.8 V		28.4				ns
			1.2 V $\pm$ 0.1 V	5.1	11.8	20.7	6.2	28.7	
			1.5 V $\pm$ 0.1 V	4.8	8.5	14.1	6.9	16.7	
			1.8 V $\pm$ 0.15 V	4	6.9	11.2	2	13.3	
			2.5 V $\pm$ 0.2 V	3.3	5.1	7.9	3.2	9.3	
			3.3 V $\pm$ 0.3 V	2.9	4.2	6.4	2.8	7.5	

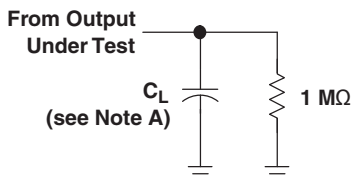
## OPERATING CHARACTERISTICS

$T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	$V_{CC}$	TYP	UNIT
$C_{pd}$	Power dissipation capacitance	$f = 10$ MHz	0.8 V	4	pF
			1.2 V $\pm$ 0.1 V	4	
			1.5 V $\pm$ 0.1 V	4	
			1.8 V $\pm$ 0.15 V	4	
			2.5 V $\pm$ 0.2 V	4.1	
			3.3 V $\pm$ 0.3 V	4.3	

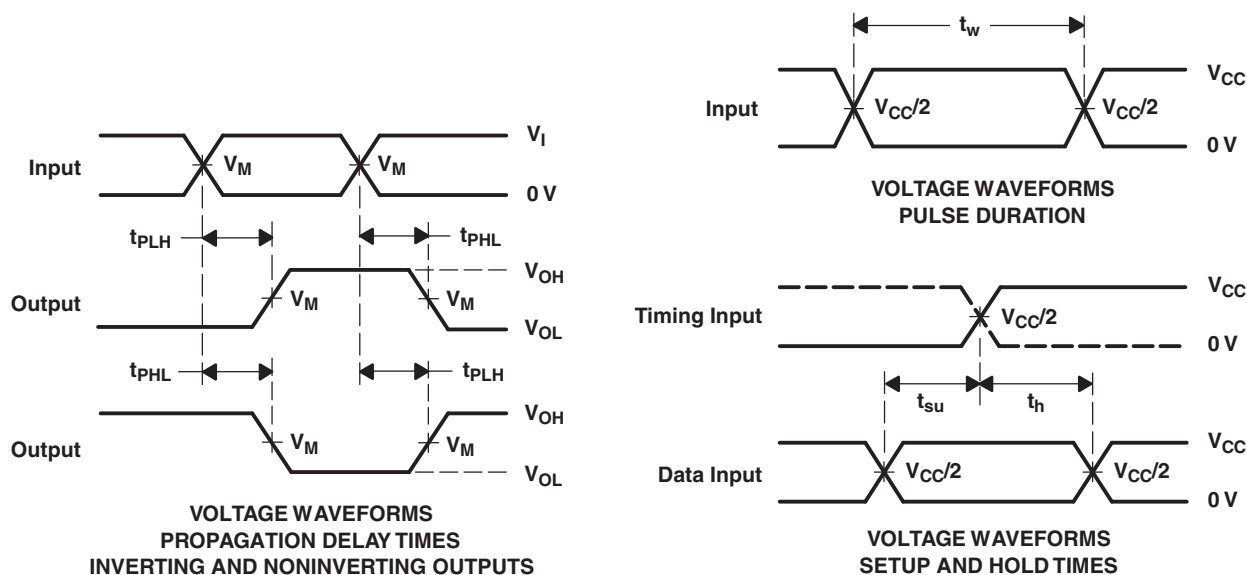


## PARAMETER MEASUREMENT INFORMATION (Propagation Delays, Setup and Hold Times, and Pulse Width)



LOAD CIRCUIT

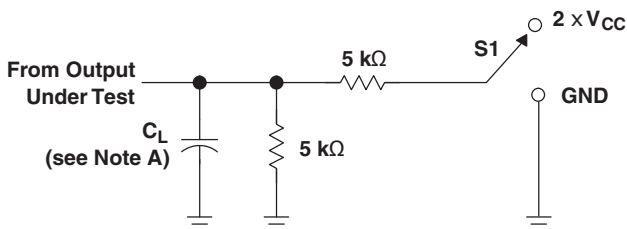
	$V_{CC} = 0.8\text{ V}$	$V_{CC} = 1.2\text{ V}$ $\pm 0.1\text{ V}$	$V_{CC} = 1.5\text{ V}$ $\pm 0.1\text{ V}$	$V_{CC} = 1.8\text{ V}$ $\pm 0.15\text{ V}$	$V_{CC} = 2.5\text{ V}$ $\pm 0.2\text{ V}$	$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$
$C_L$	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF
$V_M$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$
$V_I$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$



- $C_L$  includes probe and jig capacitance.
- 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.
- All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10\text{ MHz}$ ,  $Z_O = 50\ \Omega$ , for propagation delays  $t_r/t_f = 3\text{ ns}$ , for setup and hold times and pulse width  $t_r/t_f = 1.2\text{ ns}$ .
- The outputs are measured one at a time, with one transition per measurement.
- $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
- All parameters and waveforms are not applicable to all devices.

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

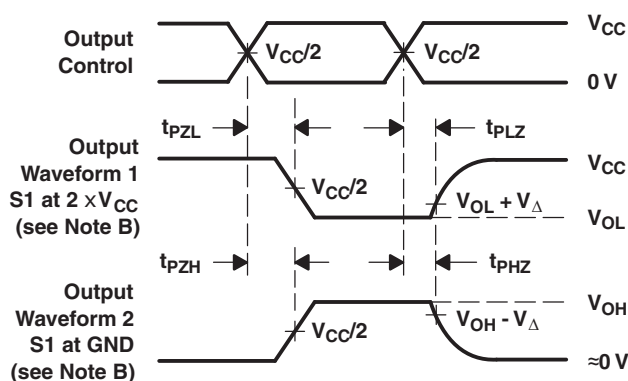
## PARAMETER MEASUREMENT INFORMATION (Enable and Disable Times)



LOAD CIRCUIT

TEST	S1
$t_{PLZ}/t_{PZL}$	$2 \times V_{CC}$
$t_{PHZ}/t_{PZH}$	GND

	$V_{CC} = 0.8 \text{ V}$	$V_{CC} = 1.2 \text{ V}$ $\pm 0.1 \text{ V}$	$V_{CC} = 1.5 \text{ V}$ $\pm 0.1 \text{ V}$	$V_{CC} = 1.8 \text{ V}$ $\pm 0.15 \text{ V}$	$V_{CC} = 2.5 \text{ V}$ $\pm 0.2 \text{ V}$	$V_{CC} = 3.3 \text{ V}$ $\pm 0.3 \text{ V}$
$C_L$	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF
$V_M$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$
$V_I$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$	$V_{CC}$
$V_{\Delta}$	0.1 V	0.1 V	0.1 V	0.15 V	0.15 V	0.3 V



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

- $C_L$  includes probe and jig capacitance.
- 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.
- All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r/t_f = 3 \text{ ns}$ .
- The outputs are measured one at a time, with one transition per measurement.
- $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
- $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
- All parameters and waveforms are not applicable to all devices.

**Figure 4. Load Circuit and Voltage Waveforms**

## PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">SN74AUP2G80DCUR</a>	Active	Production	VSSOP (DCU)   8	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	H80R
SN74AUP2G80DCUR.B	Active	Production	VSSOP (DCU)   8	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	H80R
SN74AUP2G80DCURG4	Active	Production	VSSOP (DCU)   8	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	H80R
SN74AUP2G80DCURG4.B	Active	Production	VSSOP (DCU)   8	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	H80R
<a href="#">SN74AUP2G80DQER</a>	Active	Production	X2SON (DQE)   8	5000   LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	PU
SN74AUP2G80DQER.B	Active	Production	X2SON (DQE)   8	5000   LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	PU
<a href="#">SN74AUP2G80RSER</a>	Active	Production	UQFN (RSE)   8	5000   LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	PU
SN74AUP2G80RSER.B	Active	Production	UQFN (RSE)   8	5000   LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	PU

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts 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.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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## TAPE AND REEL INFORMATION



\*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
SN74AUP2G80DCUR	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74AUP2G80DCURG4	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74AUP2G80DQER	X2SON	DQE	8	5000	180.0	8.4	1.2	1.6	0.55	4.0	8.0	Q1
SN74AUP2G80RSER	UQFN	RSE	8	5000	180.0	8.4	1.7	1.7	0.7	4.0	8.0	Q2

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AUP2G80DCUR	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74AUP2G80DCURG4	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74AUP2G80DQER	X2SON	DQE	8	5000	202.0	201.0	28.0
SN74AUP2G80RSER	UQFN	RSE	8	5000	202.0	201.0	28.0



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

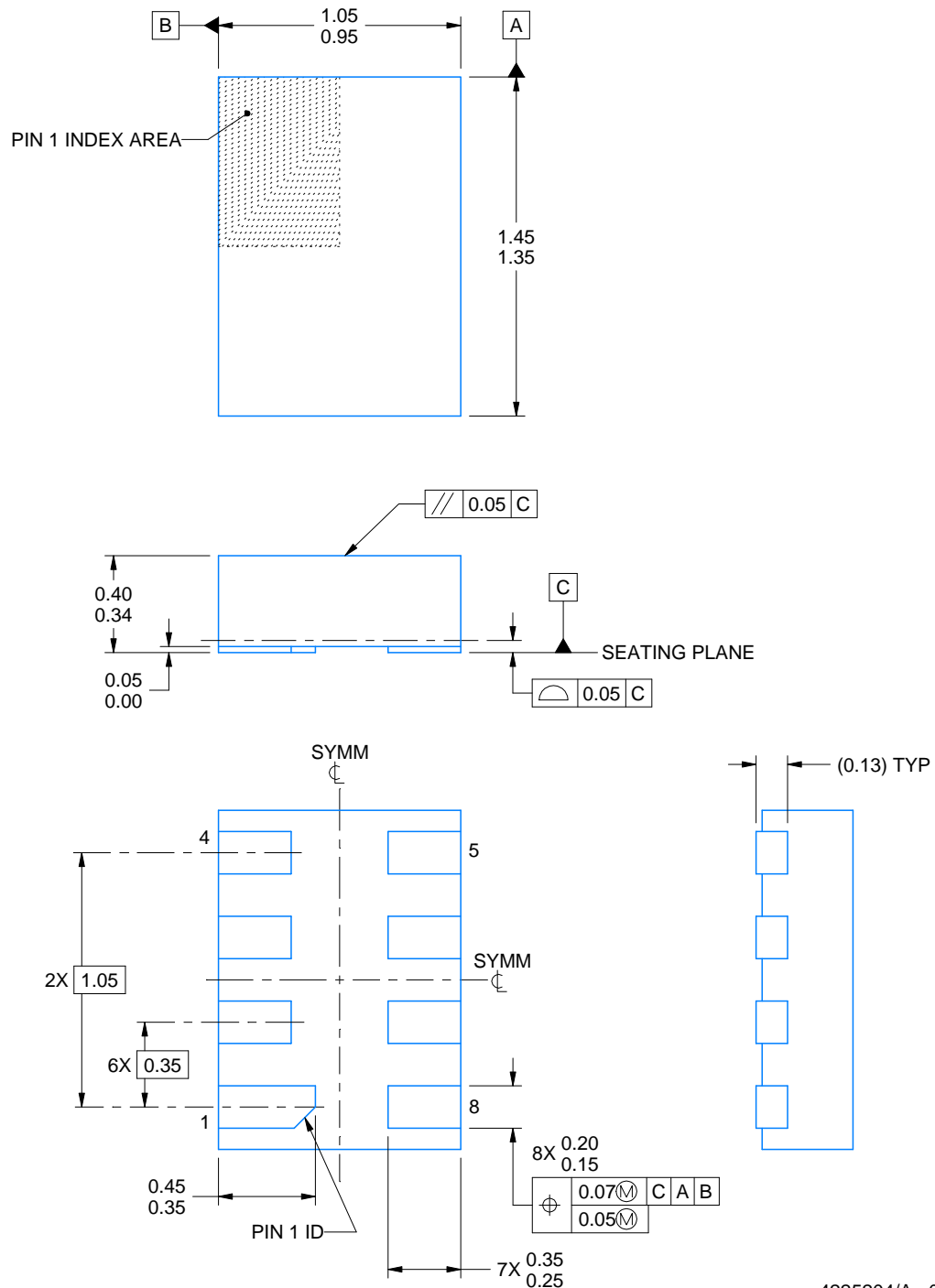
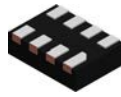


SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 25X

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.



4225204/A 08/2019

## NOTES:

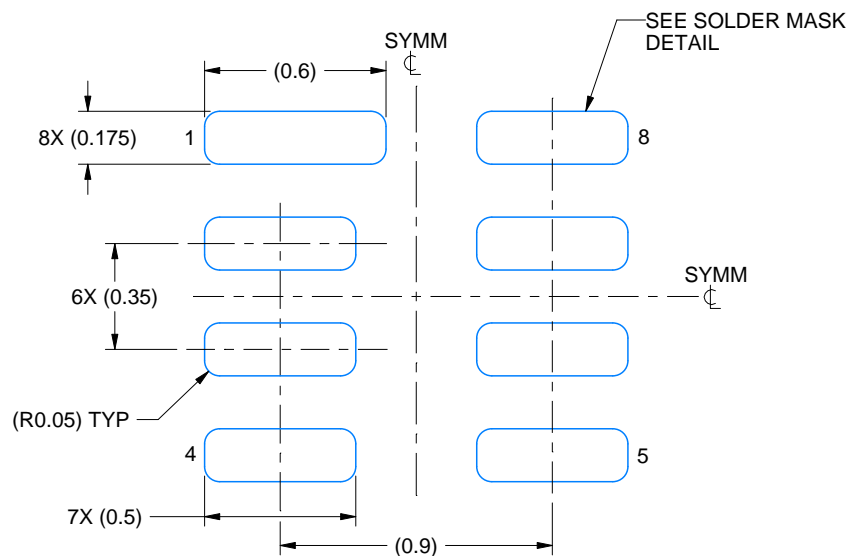
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package complies to JEDEC MO-287 variation X2EAF.

# EXAMPLE BOARD LAYOUT

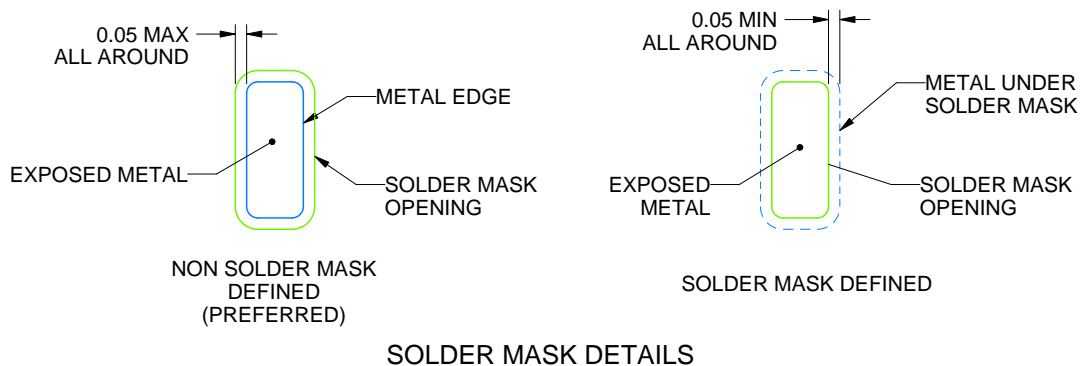
DQE0008A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 40X



SOLDER MASK DETAILS

4225204/A 08/2019

NOTES: (continued)

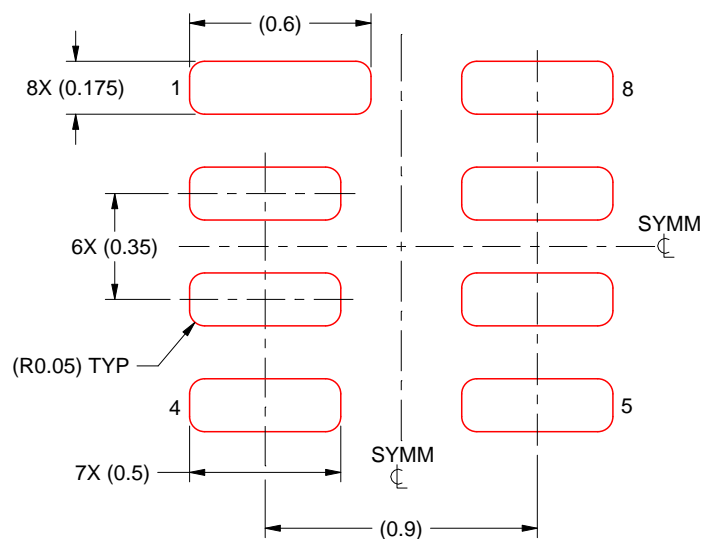
- This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/sluea271](http://www.ti.com/lit/sluea271)).

## EXAMPLE STENCIL DESIGN

DQE0008A

X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE  
BASED ON 0.075 MM THICK STENCIL  
SCALE: 40X

4225204/A 08/2019

NOTES: (continued)

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

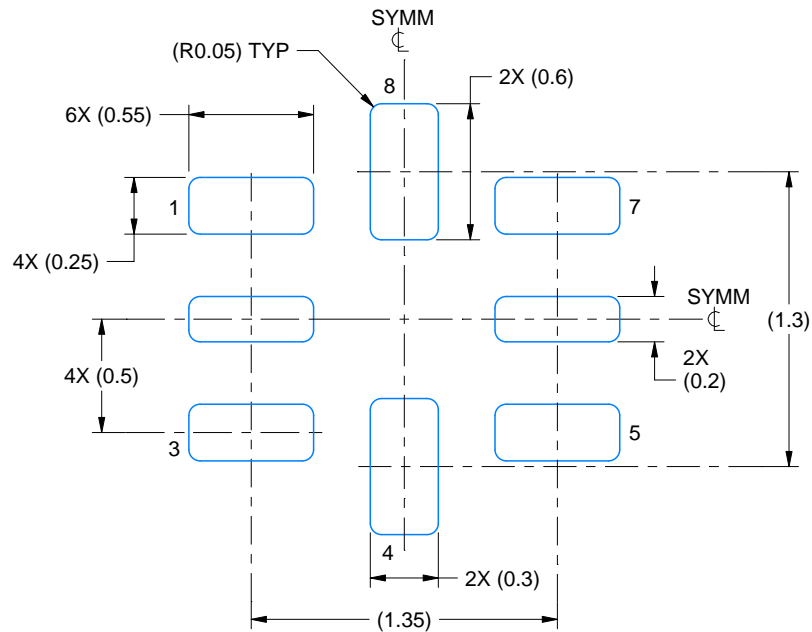


# EXAMPLE BOARD LAYOUT

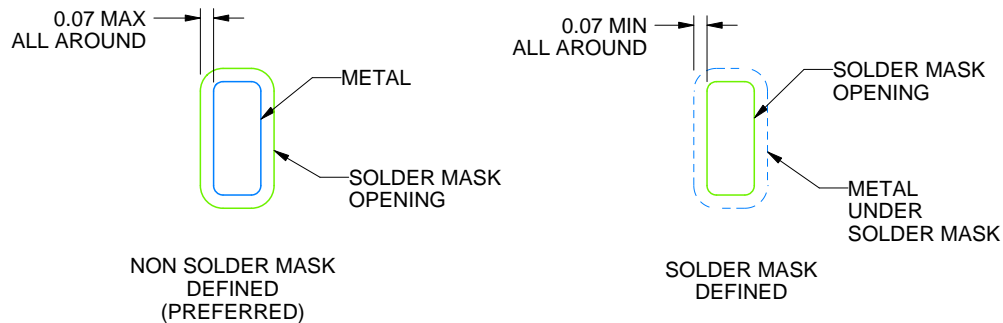
RSE0008A

UQFN - 0.6 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



LAND PATTERN EXAMPLE  
SCALE:30X



SOLDER MASK DETAILS  
NOT TO SCALE

4220323/B 03/2018

NOTES: (continued)

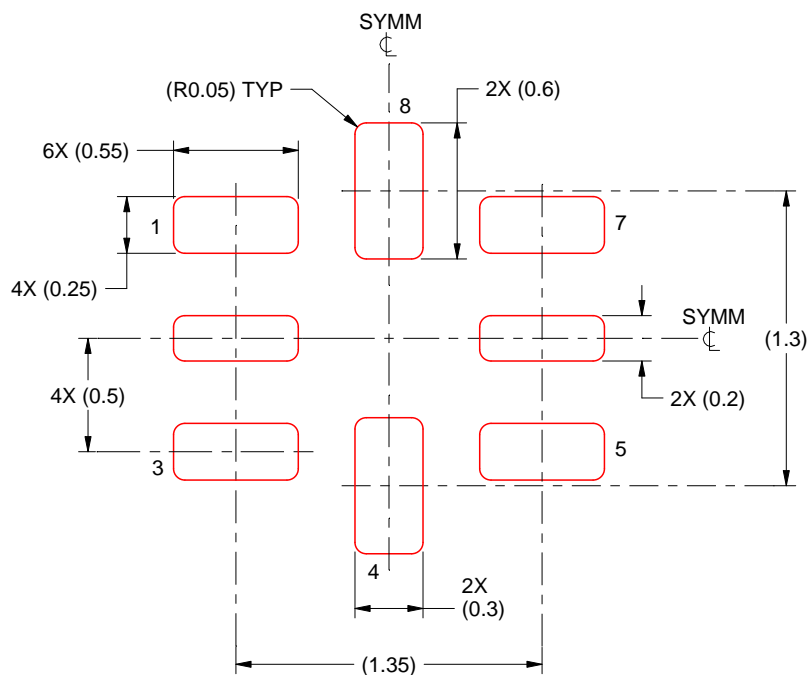
3. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/slua271](http://www.ti.com/lit/slua271)).

# EXAMPLE STENCIL DESIGN

RSE0008A

UQFN - 0.6 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



SOLDER PASTE EXAMPLE  
BASED ON 0.1 mm THICKNESS  
SCALE: 30X

4220323/B 03/2018

NOTES: (continued)

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

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