SN74AUP1G125 Low-Power Single Bus Buffer Gate With 3-State Output

1 Features

- Available in the Texas Instruments NanoStar™ Package
- Low Static-Power Consumption (I_{CC} = 0.9 µA Maximum)
- Low Dynamic-Power Consumption (C_{pd} = 4 pF Typical at 3.3 V)
- Low Input Capacitance (C_I = 1.5 pF Typical)
- Low Noise – Overshoot and Undershoot < 10% of V_{CC}
- Input-Disable Feature Allows Floating Input Conditions
- I_{off} Supports Partial-Power-Down Mode Operation
- Input Hysteresis Allows Slow Input Transition and Better Switching Noise Immunity at Input
- Wide Operating V_{CC} Range of 0.8 V to 3.6 V
- 3.6-V I/O Tolerant to Support Mixed-Mode Signal Operation
- t_{pd} = 4.6 ns Maximum at 3.3 V

2 Applications

- Audio Dock: Portable
- BluRay™ Players and Home Theaters
- Personal Digital Assistant (PDA)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital
- Solid-State Drive (SSD): Client and Enterprise
- TV: LCD/Digital and High-Definition (HDTV)
- Tablet: Enterprise
- Wireless Headsets, Keyboards, and Mice

3 Description

The SN74AUP1G125 bus buffer gate is a single line driver with a 3-state output. The output is disabled when the output-enable ($\overline{OE}$) input is high. This device has the input-disable feature, which allows floating input signals.

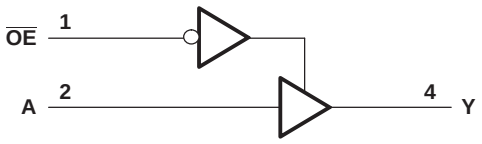
To ensure the high-impedance state during power up or power down, $\overline{OE}$ must be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN74AUP1G125DBV	SOT-23 (5)	2.90 mm × 1.60 mm
SN74AUP1G125DCK	SC70 (5)	2.00 mm × 1.25 mm
SN74AUP1G125DRL	SOT (5)	1.60 mm × 1.20 mm
SN74AUP1G125DRY	SON (6)	1.45 mm × 1.00 mm
SN74AUP1G125DSF		1.00 mm × 1.00 mm
SN74AUP1G125YFP	DSBGA (6)	0.76 mm × 1.16 mm
SN74AUP1G125YZP	DSBGA (5)	0.89 mm × 1.39 mm
SN74AUP1G125YZT	DSBGA (5)	0.89 mm × 1.39 mm
SN74AUP1G125DPW	X2SON (5)	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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4 Revision History

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

Changes from Revision M (December 2015) to Revision N — **Page**

- Added DPW (X2SON) package ... 1
- Deleted *Device Comparison* table, see *Mechanical, Packaging, and Orderable Information* section at the end of the data sheet ... 1
- Changed *Simplified Schematic* with a new schematic ... 1
- Added column for X2SON (DPW) package and separated columns for DSBGA packages in *Pin Functions* table ... 3
- Changed values in the *Thermal Information* table to align with JEDEC standards ... 5
- Added *Balanced High-Drive CMOS Push-Pull Outputs*, *Standard CMOS Inputs*, *Clamp Diodes*, *Partial Power Down* (I_{off}), and *Over-voltage Tolerant Inputs* ... 15
- Added *Trace Example* and revised *Layout Guidelines* ... 18
- Added *Receiving Notification of Documentation Updates* section ... 20

Changes from Revision L (February 2013) to Revision M — **Page**

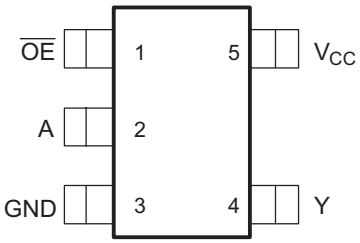
- Added *Applications* section, *Device Information* table, *Pin Configuration and Functions* section, *ESD Ratings* table, *Thermal Information* table, *Typical Characteristics* section, *Feature Description* section, *Device Functional Modes*, *Application and Implementation* section, *Power Supply Recommendations* section, *Layout* section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section ... 1

Changes from Revision K (November 2012) to Revision L — **Page**

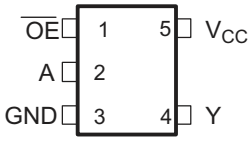
- Changed $\overline{Y}$ to Y for pin 4 in DSF Package pin out ... 3

5 Pin Configuration and Functions

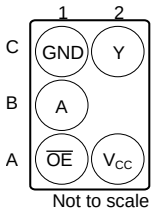
DBV Package
5-Pin SOT-23
Top View



DRL Package
5-Pin SOT
Top View

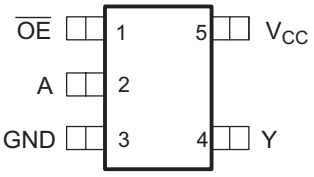


YZP or YZT Package
5-Pin DSBGA
Bottom View

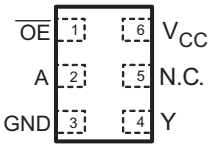


Not to scale

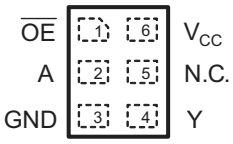
DCK Package
5-Pin SC70
Top View



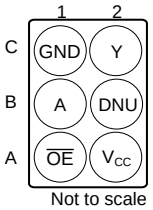
DSF Package
6-Pin SON
Top View



DRY Package
6-Pin SON
Top View

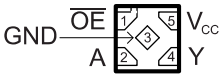


YFP Package
6-Pin DSBGA
Bottom View



Not to scale

DPW Package
5-Pin X2SON
Top View



Pin Functions

PIN					I/O	DESCRIPTION
NAME	SOT-23 (DBV), SC70 (DCK), SOT (DRL), X2SON (DPW)	SON (DRY or DSF)	DSBGA (YZP or YZT)	DSBGA (YFP)		
A	2	2	B1	B1	I	Input
DNU	—	—	—	B2	—	Do not use
GND	3	3	C1	C1	—	Ground
N.C.	—	5	—	—	—	No connection
$\overline{OE}$	1	1	A1	A1	I	Output enable (active low)
V_{CC}	5	6	A2	A2	—	Positive supply
Y	4	4	C2	C2	O	Output

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

			MIN	MAX	UNIT
V_{CC}	Supply voltage		–0.5	4.6	V
V_I	Input voltage(2)		–0.5	4.6	V
V_O	Voltage applied to any output in the high-impedance or power-off state(2)		–0.5	4.6	V
V_O	Output voltage in the high or low state(2)		–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
T_J	Junction temperature			150	°C
T_{stg}	Storage temperature		–65	150	°C

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

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	2000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101(2)	1000	

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

6.3 Recommended Operating Conditions

See (1)

			MIN	MAX	UNIT
V_{CC}	Supply voltage		0.8	3.6	V
V_{IH}	High-level input voltage	V_{CC} = 0.8 V	V_{CC}	3.6	V
		V_{CC} = 1.1 V to 1.95 V	0.65 × V_{CC}	3.6	
		V_{CC} = 2.3 V to 2.7 V	1.6	3.6	
		V_{CC} = 3 V to 3.6 V	2	3.6	
V_{IL}	Low-level input voltage	V_{CC} = 0.8 V		0	V
		V_{CC} = 1.1 V to 1.95 V	0	0.35 × V_{CC}	
		V_{CC} = 2.3 V to 2.7 V	0	0.7	
		V_{CC} = 3 V to 3.6 V	0	0.9	
V_O	Output voltage	Active state	0	V_{CC}	V
		3-state	0	3.6	
I_{OH}	High-level output current	V_{CC} = 0.8 V		–20	μA
		V_{CC} = 1.1 V		–1.1	mA
		V_{CC} = 1.4 V		–1.7	
		V_{CC} = 1.65 V		–1.9	
		V_{CC} = 2.3 V		–3.1	
		V_{CC} = 3 V		–4	
I_{OL}	Low-level output current	V_{CC} = 0.8 V		20	μA
		V_{CC} = 1.1 V		1.1	mA
		V_{CC} = 1.4 V		1.7	
		V_{CC} = 1.65 V		1.9	
		V_{CC} = 2.3 V		3.1	
		V_{CC} = 3 V		4	
Δt/Δv	Input transition rise or fall rate	V_{CC} = 0.8 V to 3.6 V		200	ns/V
T_A	Operating free-air temperature		–40	85	°C

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. See the TI application report, *Implications of Slow of Floating CMOS Inputs*, SCBA004.

6.4 Thermal Information

THERMAL METRIC(1)		SN74AUP1G125								UNIT
		DCK (SC70)	DBV (SOT-23)	DRL (SOT)	DRY (SON)	DSF (SON)	YFP (DSBGA)	YZP (DSBGA)	DPW (X2SON)	
		5 PINS	5 PINS	5 PINS	6 PINS	6 PINS	6 PINS	5 PINS	5 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	303.6	230.5	295.1	342.1	377.1	125.4	146.2	504.3	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	203.8	172.7	131.0	233.1	187.7	1.9	1.4	234.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	100.9	62.2	143.9	206.7	236.6	37.2	39.3	370.3	°C/W
$\psi_{\theta Jt}$	Junction-to-top characterization parameter	76.1	49.3	14.7	63.4	29.0	0.5	0.7	44.5	°C/W
$\psi_{\theta JB}$	Junction-to-board characterization parameter	99.3	61.6	144.4	206.7	236.3	37.5	39.8	369.7	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	165.2	°C/W

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

6.5 Electrical Characteristics, T_A = 25°C

PARAMETER		TEST CONDITIONS	V_{CC}	MIN	TYP	MAX	UNIT
V_{OH}		I_{OH} = –20 µA	0.8 V to 3.6 V	V_{CC} – 0.1			V
		I_{OH} = –1.1 mA	1.1 V	0.75 × V_{CC}			
		I_{OH} = –1.7 mA	1.4 V	1.11			
		I_{OH} = –1.9 mA	1.65 V	1.32			
		I_{OH} = –2.3 mA	2.3 V	2.05			
		I_{OH} = –3.1 mA		1.9			
		I_{OH} = –2.7 mA	3 V	2.72			
		I_{OH} = –4 mA		2.6			
V_{OL}		I_{OL} = 20 µA	0.8 V to 3.6 V			0.1	V
		I_{OL} = 1.1 mA	1.1 V			0.3 × V_{CC}	
		I_{OL} = 1.7 mA	1.4 V			0.31	
		I_{OL} = 1.9 mA	1.65 V			0.31	
		I_{OL} = 2.3 mA	2.3 V			0.31	
		I_{OL} = 3.1 mA				0.44	
		I_{OL} = 2.7 mA	3 V			0.31	
		I_{OL} = 4 mA				0.44	
I_I	A or $\overline{OE}$ input	V_I = GND to 3.6 V	0 V to 3.6 V			0.1	µA
I_{off}		V_I or V_O = 0 V to 3.6 V	0 V			0.2	µA
ΔI_{off}		V_I or V_O = 0 V to 3.6 V	0 V to 0.2 V			0.2	µA
I_{OZ}		V_O = V_{CC} or GND	3.6 V			0.1	µA
I_{CC}		V_I = GND or (V_{CC} to 3.6 V), $\overline{OE}$ = GND, I_O = 0	0.8 V to 3.6 V			0.5	µA
ΔI_{CC}	A input	V_I = V_{CC} – 0.6 V[1], I_O = 0	3.3 V			40	µA
	$\overline{OE}$ input					110	
	All inputs	V_I = GND to 3.6 V, $\overline{OE}$ = V_{CC} [2]	0.8 V to 3.6 V			0	
C_I		V_I = V_{CC} or GND	0 V		1.5		pF
			3.6 V		1.5		
C_o		V_O = V_{CC} or GND	3.6 V		3		pF

(1) One input at V_{CC} – 0.6 V, other input at V_{CC} or GND
(2) To show I_{CC} is very low when the input-disable feature is enabled

6.6 Electrical Characteristics, T_A = –40°C to +85°C

PARAMETER		TEST CONDITIONS	V_{CC}	MIN	TYP	MAX	UNIT
V_{OH}		I_{OH} = –20 µA	0.8 V to 3.6 V	V_{CC} – 0.1			V
		I_{OH} = –1.1 mA	1.1 V	0.7 × V_{CC}			
		I_{OH} = –1.7 mA	1.4 V	1.03			
		I_{OH} = –1.9 mA	1.65 V	1.3			
		I_{OH} = –2.3 mA	2.3 V	1.97			
		I_{OH} = –3.1 mA		1.85			
		I_{OH} = –2.7 mA	3 V	2.67			
		I_{OH} = –4 mA		2.55			
V_{OL}		I_{OL} = 20 µA	0.8 V to 3.6 V			0.1	V
		I_{OL} = 1.1 mA	1.1 V			0.3 × V_{CC}	
		I_{OL} = 1.7 mA	1.4 V			0.37	
		I_{OL} = 1.9 mA	1.65 V			0.35	
		I_{OL} = 2.3 mA	2.3 V			0.33	
		I_{OL} = 3.1 mA				0.45	
		I_{OL} = 2.7 mA	3 V			0.33	
		I_{OL} = 4 mA				0.45	
I_I	A or $\overline{OE}$ input	V_I = GND to 3.6 V	0 V to 3.6 V			0.5	µA
I_{off}		V_I or V_O = 0 V to 3.6 V	0 V			0.6	µA
ΔI_{off}		V_I or V_O = 0 V to 3.6 V	0 V to 0.2 V			0.6	µA
I_{OZ}		V_O = V_{CC} or GND	3.6 V			0.5	µA
I_{CC}		V_I = GND or (V_{CC} to 3.6 V), $\overline{OE}$ = GND, I_O = 0	0.8 V to 3.6 V			0.9	µA
ΔI_{CC}	A input	V_I = V_{CC} – 0.6 V[1], I_O = 0	3.3 V			50	µA
	$\overline{OE}$ input					120	
	All inputs	V_I = GND to 3.6 V, $\overline{OE}$ = V_{CC} [2]	0.8 V to 3.6 V			0	

(1) One input at V_{CC} – 0.6 V, other input at V_{CC} or GND
(2) To show I_{CC} is very low when the input-disable feature is enabled

6.7 Switching Characteristics, C_L = 5 pF

over recommended operating free-air temperature range, C_L = 5 pF (unless otherwise noted) (see Figure 2 and Figure 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A	MIN	TYP	MAX	UNIT
t_{pd}	A	Y	0.8 V	T_A = 25°C		18.1		ns
			1.2 V ± 0.1 V	T_A = 25°C	4.3	7.4	12.6	
				T_A = –40°C to +85°C	2.7		15.3	
			1.5 V ± 0.1 V	T_A = 25°C	3.3	5.2	8.5	
				T_A = –40°C to +85°C	1		10.2	
			1.8 V ± 0.15 V	T_A = 25°C	2.6	4.1	6.8	
				T_A = –40°C to +85°C	1.3		8.3	
			2.5 V ± 0.2 V	T_A = 25°C	2	2.9	4.7	
				T_A = –40°C to +85°C	1.1		5.8	
			3.3 V ± 0.3 V	T_A = 25°C	1.7	2.4	3.8	
				T_A = –40°C to +85°C	1		4.6	
t_{en}	$\overline{OE}$	Y	0.8 V	T_A = 25°C		19.1		ns
			1.2 V ± 0.1 V	T_A = 25°C	5.1	9.3	15.9	
				T_A = –40°C to +85°C	3.6		19.2	
			1.5 V ± 0.1 V	T_A = 25°C	4.1	6.6	10.5	
				T_A = –40°C to +85°C	2.5		12.7	
			1.8 V ± 0.15 V	T_A = 25°C	3.2	5.3	8.7	
				T_A = –40°C to +85°C	2.1		10.3	
			2.5 V ± 0.2 V	T_A = 25°C	2.5	3.8	6	
				T_A = –40°C to +85°C	1.6		7.2	
			3.3 V ± 0.3 V	T_A = 25°C	2.1	3.2	4.9	
				T_A = –40°C to +85°C	1.4		5.9	
t_{dis}	$\overline{OE}$	Y	0.8 V	T_A = 25°C		12.1		ns
			1.2 V ± 0.1 V	T_A = 25°C	2.4	4.1	6.9	
				T_A = –40°C to +85°C	2.2		7.7	
			1.5 V ± 0.1 V	T_A = 25°C	1.8	2.9	4.5	
				T_A = –40°C to +85°C	1.7		5.1	
			1.8 V ± 0.15 V	T_A = 25°C	1	2.9	4.3	
				T_A = –40°C to +85°C	1.5		4.7	
			2.5 V ± 0.2 V	T_A = 25°C	1	1.8	2.7	
				T_A = –40°C to +85°C	1		3.3	
			3.3 V ± 0.3 V	T_A = 25°C	1.2	2.2	3.2	
				T_A = –40°C to +85°C	1.1		4	

6.8 Switching Characteristics, C_L = 10 pF

over recommended operating free-air temperature range, C_L = 10 pF (unless otherwise noted) (see Figure 2 and Figure 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A	MIN	TYP	MAX	UNIT
t_{pd}	A or B	Y	0.8 V	T_A = 25°C		20.5		ns
			1.2 V ± 0.1 V	T_A = 25°C	4.6	8.4	13.7	
				T_A = –40°C to +85°C	3.6		16.6	
			1.5 V ± 0.1 V	T_A = 25°C	3.5	5.9	9.3	
				T_A = –40°C to +85°C	2.4		11.1	
			1.8 V ± 0.15 V	T_A = 25°C	3.9	4.7	7.5	
				T_A = –40°C to +85°C	1.3		9.1	
			2.5 V ± 0.2 V	T_A = 25°C	2.3	3.4	5.3	
				T_A = –40°C to +85°C	1.6		6.4	
			3.3 V ± 0.3 V	T_A = 25°C	2.1	2.8	4.3	
				T_A = –40°C to +85°C	1.4		5.2	
t_{en}	$\overline{OE}$	Y	0.8 V	T_A = 25°C		21.8		ns
			1.2 V ± 0.1 V	T_A = 25°C	4.9	10.2	16.8	
				T_A = –40°C to +85°C	4.4		20.2	
			1.5 V ± 0.1 V	T_A = 25°C	3.9	7.3	11.2	
				T_A = –40°C to +85°C	3.3		13.5	
			1.8 V ± 0.15 V	T_A = 25°C	3.4	5.8	9.2	
				T_A = –40°C to +85°C	2.7		11	
			2.5 V ± 0.2 V	T_A = 25°C	2.5	4.3	6.4	
				T_A = –40°C to +85°C	2.1		7.8	
			3.3 V ± 0.3 V	T_A = 25°C	2.1	3.7	5.4	
				T_A = –40°C to +85°C	1.9		6.4	
t_{dis}	$\overline{OE}$	Y	0.8 V	T_A = 25°C		13		ns
			1.2 V ± 0.1 V	T_A = 25°C	3.8	6.6	11.7	
				T_A = –40°C to +85°C	1.2		14	
			1.5 V ± 0.1 V	T_A = 25°C	2.2	4.7	7.9	
				T_A = –40°C to +85°C	1.3		9.3	
			1.8 V ± 0.15 V	T_A = 25°C	2.4	4.4	6.4	
				T_A = –40°C to +85°C	2.2		7.5	
			2.5 V ± 0.2 V	T_A = 25°C	1.3	3.1	4.9	
				T_A = –40°C to +85°C	1.2		5.4	
			3.3 V ± 0.3 V	T_A = 25°C	1.9	3.4	5	
				T_A = –40°C to +85°C	1.9		5.6	

6.9 Switching Characteristics, C_L = 15 pF

over recommended operating free-air temperature range, C_L = 15 pF (unless otherwise noted) (see Figure 2 and Figure 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A	MIN	TYP	MAX	UNIT
t_{pd}	A or B	Y	0.8 V	T_A = 25°C		22.5		ns
			1.2 V ± 0.1 V	T_A = 25°C	5.8	9.3	15.1	
				T_A = –40°C to +85°C	4.3		17.9	
			1.5 V ± 0.1 V	T_A = 25°C	4.4	6.6	10.2	
				T_A = –40°C to +85°C	3		12.1	
			1.8 V ± 0.15 V	T_A = 25°C	3.5	5.3	8.3	
				T_A = –40°C to +85°C	2.3		9.9	
			2.5 V ± 0.2 V	T_A = 25°C	2.7	3.9	5.8	
				T_A = –40°C to +85°C	1.9		7	
			3.3 V ± 0.3 V	T_A = 25°C	2.4	3.2	4.7	
				T_A = –40°C to +85°C	1.8		5.7	
t_{en}	$\overline{OE}$	Y	0.8 V	T_A = 25°C		25.2		ns
			1.2 V ± 0.1 V	T_A = 25°C	7	11.3	18.1	
				T_A = –40°C to +85°C	5.4		21.4	
			1.5 V ± 0.1 V	T_A = 25°C	5.5	8.1	12.2	
				T_A = –40°C to +85°C	4.1		14.5	
			1.8 V ± 0.15 V	T_A = 25°C	4.3	6.5	10.1	
				T_A = –40°C to +85°C	3.3		12	
			2.5 V ± 0.2 V	T_A = 25°C	3.4	4.8	7.1	
				T_A = –40°C to +85°C	2.6		8.4	
			3.3 V ± 0.3 V	T_A = 25°C	2.9	4.1	5.9	
				T_A = –40°C to +85°C	2.3		6.9	
t_{dis}	$\overline{OE}$	Y	0.8 V	T_A = 25°C		14		ns
			1.2 V ± 0.1 V	T_A = 25°C	3.7	5.8	8.2	
				T_A = –40°C to +85°C	3.3		11	
			1.5 V ± 0.1 V	T_A = 25°C	5.5	3.9	5.9	
				T_A = –40°C to +85°C	2.1		8	
			1.8 V ± 0.15 V	T_A = 25°C	3.3	4.5	6.6	
				T_A = –40°C to +85°C	2.9		7.4	
			2.5 V ± 0.2 V	T_A = 25°C	2.3	3.2	4.3	
				T_A = –40°C to +85°C	1.8		5.1	
			3.3 V ± 0.3 V	T_A = 25°C	2.4	4.8	6.2	
				T_A = –40°C to +85°C	3.1		6.7	

6.10 Switching Characteristics, C_L = 30 pF

over recommended operating free-air temperature range, C_L = 30 pF (unless otherwise noted) (see Figure 2 and Figure 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A	MIN	TYP	MAX	UNIT
t_{pd}	A or B	Y	0.8 V	T_A = 25°C		29		ns
			1.2 V ± 0.1 V	T_A = 25°C	7.4	12	18.7	
				T_A = –40°C to +85°C	6.6		21.4	
			1.5 V ± 0.1 V	T_A = 25°C	5.7	8.6	12.5	
				T_A = –40°C to +85°C	4.9		14.7	
			1.8 V ± 0.15 V	T_A = 25°C	4.8	6.9	10.1	
				T_A = –40°C to +85°C	3.1		12	
			2.5 V ± 0.2 V	T_A = 25°C	3.9	5.1	7.2	
				T_A = –40°C to +85°C	3.3		8.7	
			3.3 V ± 0.3 V	T_A = 25°C	3.5	4.8	6	
				T_A = –40°C to +85°C	3		7	
t_{en}	$\overline{OE}$	Y	0.8 V	T_A = 25°C		33.4		ns
			1.2 V ± 0.1 V	T_A = 25°C	8.8	14.1	21.8	
				T_A = –40°C to +85°C	7.4		25.5	
			1.5 V ± 0.1 V	T_A = 25°C	6.9	10.1	14.6	
				T_A = –40°C to +85°C	5.6		17.4	
			1.8 V ± 0.15 V	T_A = 25°C	5.6	8.1	12	
				T_A = –40°C to +85°C	4.7		14.1	
			2.5 V ± 0.2 V	T_A = 25°C	4.3	6.1	8.5	
				T_A = –40°C to +85°C	3.8		10	
			3.3 V ± 0.3 V	T_A = 25°C	3.7	5.2	7.1	
				T_A = –40°C to +85°C	3.4		8.3	
t_{dis}	$\overline{OE}$	Y	0.8 V	T_A = 25°C		17.7		ns
			1.2 V ± 0.1 V	T_A = 25°C	5.8	10	16	
				T_A = –40°C to +85°C	3.7		16	
			1.5 V ± 0.1 V	T_A = 25°C	5.7	7.7	10.9	
				T_A = –40°C to +85°C	1		10.7	
			1.8 V ± 0.15 V	T_A = 25°C	4.5	7.7	9.8	
				T_A = –40°C to +85°C	4.4		12.5	
			2.5 V ± 0.2 V	T_A = 25°C	3.9	5.6	7.4	
				T_A = –40°C to +85°C	3.2		9	
			3.3 V ± 0.3 V	T_A = 25°C	3.3	8.4	10.7	
				T_A = –40°C to +85°C	6.6		10.8	

6.11 Operating Characteristics

T_A = 25°c

PARAMETER			TEST CONDITIONS	V_{CC}	TYP	UNIT
C_{pd}	Power dissipation capacitance	Outputs enabled	f = 10 MHz	0.8 V	3.8	pF
				1.2 V ± 0.1 V	3.8	
				1.5 V ± 0.1 V	3.7	
				1.8 V ± 0.15 V	3.8	
				2.5 V ± 0.2 V	3.9	
				3.3 V ± 0.3 V	4	
		Outputs disabled	f = 10 MHz	0.8 V	0	
				1.2 V ± 0.1 V	0	
				1.5 V ± 0.1 V	0	
				1.8 V ± 0.15 V	0	
				2.5 V ± 0.2 V	0	
				3.3 V ± 0.3 V	0	

6.12 Typical Characteristics

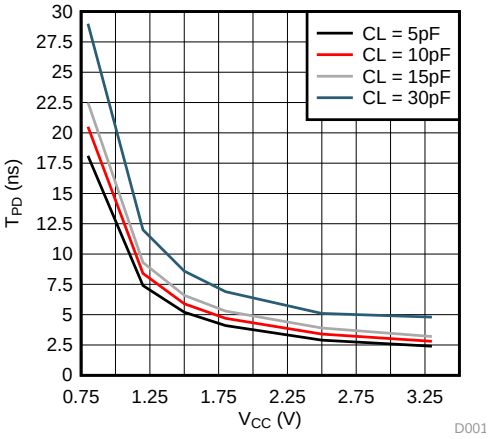
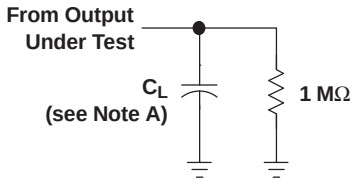


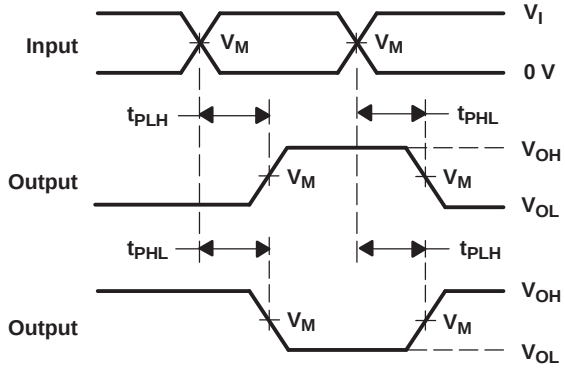
Figure 1. Propagation Delay vs. Supply Voltage and Load Capacitance

7 Parameter Measurement Information

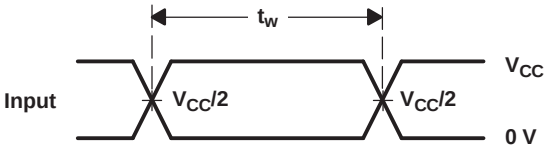


LOAD CIRCUIT

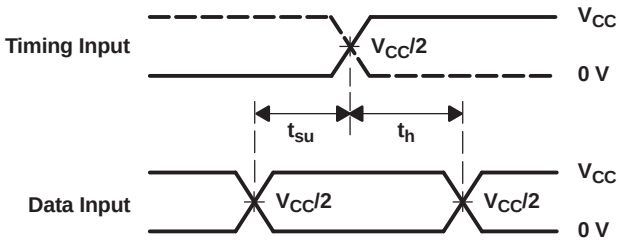
	V_{CC} = 0.8 V	V_{CC} = 1.2 V ± 0.1 V	V_{CC} = 1.5 V ± 0.1 V	V_{CC} = 1.8 V ± 0.15 V	V_{CC} = 2.5 V ± 0.2 V	V_{CC} = 3.3 V ± 0.3 V
C_L	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF
V_M	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$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



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
PULSE DURATION

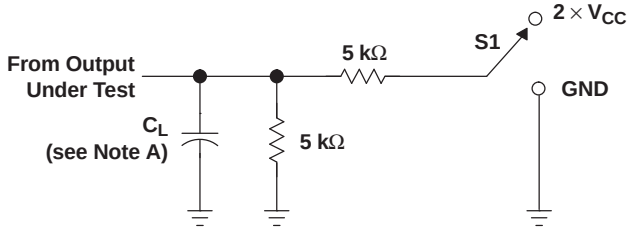


VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES

NOTES: A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r/t_f = 3 ns.
C. The outputs are measured one at a time, with one transition per measurement.
D. t_{PLH} and t_{PHL} are the same as t_{pd}.
E. All parameters and waveforms are not applicable to all devices.

Figure 2. Load Circuit and Voltage Waveforms

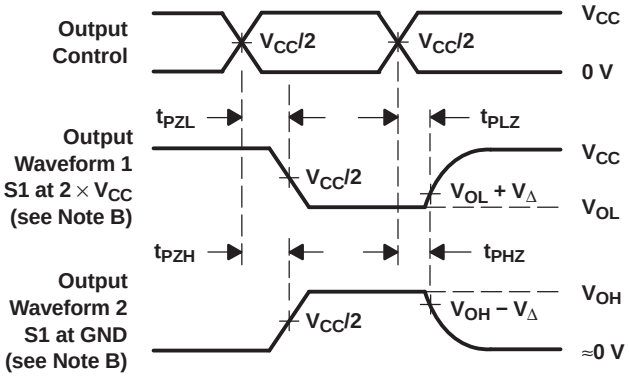
Parameter Measurement Information (continued)



LOAD CIRCUIT

TEST	S1
t_{PLZ}/t_{PZL} t_{PHZ}/t_{PZH}	2 × V_{CC} GND

	V_{CC} = 0.8 V	V_{CC} = 1.2 V ± 0.1 V	V_{CC} = 1.5 V ± 0.1 V	V_{CC} = 1.8 V ± 0.15 V	V_{CC} = 2.5 V ± 0.2 V	V_{CC} = 3.3 V ± 0.3 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_Δ	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

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 ≤ 10 MHz, Z_O = 50 Ω, t_r/t_f = 3 ns.
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. All parameters and waveforms are not applicable to all devices.

Figure 3. Load Circuit and Voltage Waveforms (Enable and Disable Times)

8 Detailed Description

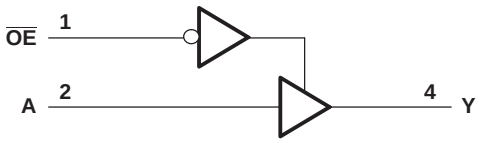
8.1 Overview

The AUP family is TI's premier solution to the industry's low-power needs in battery-powered portable applications. This family of devices is specified for low static and dynamic power consumption across the entire V_{CC} range of 0.8 V to 3.6 V, resulting in an increased battery life. This product also maintains excellent signal integrity (see Figure 2 and Figure 3).

The SN74AUP1G125 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 I_{off}. The I_{off} circuitry disables the outputs when the device is powered down. This inhibits current backflow into the device, which prevents damage to the device.

To assure the high-impedance state during power up or power down, $\overline{OE}$ must 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.

8.2 Functional Block Diagram



8.3 Feature Description

8.3.1 Balanced High-Drive CMOS Push-Pull Outputs

A balanced output allows the device to sink and source similar currents. The high drive capability of this device creates fast edges into light loads so routing and load conditions should be considered to prevent ringing. Additionally, the outputs of this device are capable of driving larger currents than the device can sustain without being damaged. It is important for the power output of the device to be limited to avoid thermal runaway and damage due to over-current. The electrical and thermal limits defined the in the *Absolute Maximum Ratings* table must be followed at all times.

8.3.2 Standard CMOS Inputs

Standard CMOS inputs are high impedance and are typically modelled as a resistor in parallel with the input capacitance given in the *Electrical Characteristics, T_A = 25°C* table. The worst case resistance is calculated with the maximum input voltage, given in the *Absolute Maximum Ratings* table, and the maximum input leakage current, given in the *Electrical Characteristics, T_A = 25°C* table, using ohm's law (R = V ÷ I).

Signals applied to the inputs need to have fast edge rates, as defined by $\Delta t/\Delta v$ in the *Recommended Operating Conditions* table to avoid excessive currents and oscillations. If a slow or noisy input signal is required, a device with a Schmitt-trigger input should be used to condition the input signal prior to the standard CMOS input.

8.3.3 Clamp Diodes

The inputs and outputs to this device have negative clamping diodes.

CAUTION

Voltages beyond the values specified in the *Absolute Maximum Ratings* table can cause damage to the device. The input negative-voltage and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

Feature Description (continued)

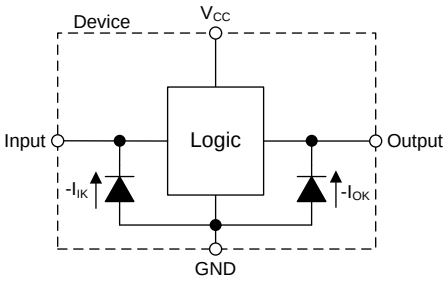


Figure 4. Electrical Placement of Clamping Diodes for Each Input and Output

8.3.4 Partial Power Down (I_{off})

The inputs and outputs for this device enter a high impedance state when the supply voltage is 0 V. The maximum leakage into or out of any input or output pin on the device is specified by I_{off} in the *Electrical Characteristics, T_A = 25°C* table.

8.3.5 Over-voltage Tolerant Inputs

Input signals to this device can be driven above the supply voltage so long as they remain below the maximum input voltage value specified in the *Absolute Maximum Ratings* table.

8.4 Device Functional Modes

Table 1 lists the functional modes for SN74AUP1G125.

Table 1. Function Table

INPUTS		OUTPUT
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Hi-Z

9 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The SN74AUP1G125 device is a high-drive CMOS device that is used as a output enabled buffer with a high output drive, such as an LED application. The device can produce 24 mA of drive current at 3.3 V, which is 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_{CC}.

9.2 Typical Application

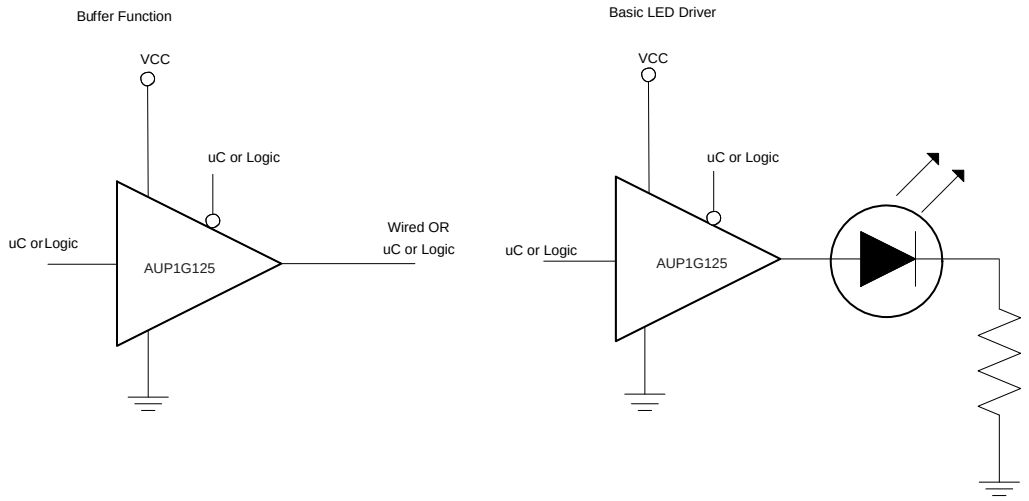


Figure 5. Application Schematic

9.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Take care to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive also creates fast edges into light loads so routing and load conditions should be considered to prevent ringing.

9.2.2 Detailed Design Procedure

1. Recommended Input Conditions
   - Rise time and fall time specs. See ($\Delta t/\Delta V$) in the *Recommended Operating Conditions* table.
   - Specified high and low levels. See (V_{IH} and V_{IL}) in the *Recommended Operating Conditions* table.
   - Inputs are overvoltage tolerant allowing them to go as high as (V_I max) in the *Recommended Operating Conditions* table at any valid V_{CC}.
2. Recommended Output Conditions
   - Load currents should not exceed (I_O max) per output and should not exceed (Continuous current through V_{CC} or GND) total current for the part. These limits are located in the *Absolute Maximum Ratings* table.
   - Outputs should not be pulled above V_{CC}.

Typical Application (continued)

9.2.3 Application Curve

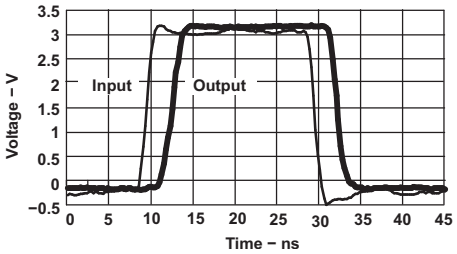


Figure 6. Switching Characteristics at 25 MHz

10 Power Supply Recommendations

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

The VCC pin must have a good bypass capacitor to prevent power disturbance. TI recommends to use a 0.1-µF capacitor for this device. 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. Install the bypass capacitor as close to the power pin as possible for best results.

11 Layout

11.1 Layout Guidelines

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

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

Even low data rate digital signals can have high frequency signal components due to fast edge rates. When a printed-circuit board (PCB) trace turns a corner at a 90° angle, a reflection can occur. A reflection occurs primarily because of the change of width of the trace. At the apex of the turn, the trace width increases to 1.414 times the width. This increase upsets the transmission-line characteristics, especially the distributed capacitance and self–inductance of the trace which results in the reflection. Not all PCB traces can be straight and therefore some traces must turn corners. Figure 8 shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

11.2 Layout Example

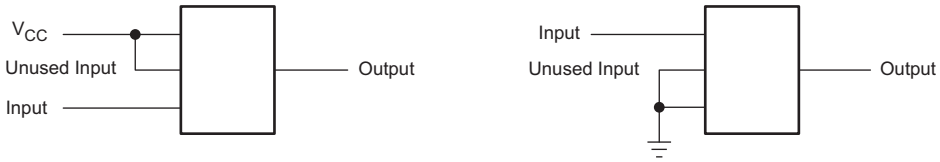


Figure 7. Proper Multi-Gate Input Termination Diagram

Layout Example (continued)

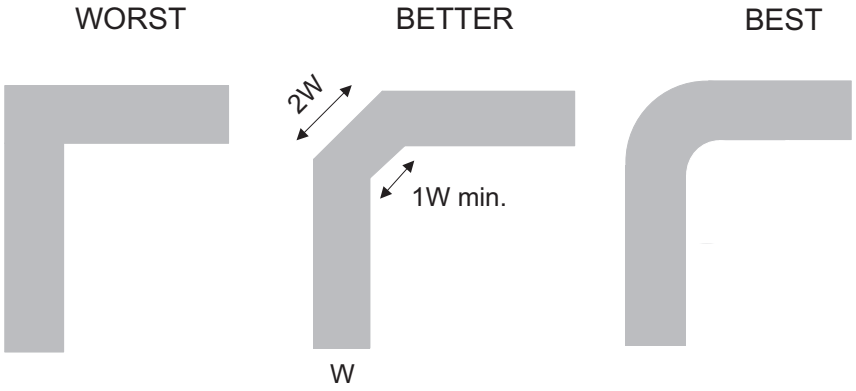


Figure 8. Trace Example

12 Device and Documentation Support

12.1 Documentation Support

12.1.1 Related Documentation

For related documentation, see the following:

Implications of Slow or Floating CMOS Inputs, SCBA004

12.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

12.3 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

12.4 Trademarks

NanoStar, E2E are trademarks of Texas Instruments.
BluRay is a trademark of Blu-ray Disc Association (BDA).
All other trademarks are the property of their respective owners.

12.5 Electrostatic Discharge Caution

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

12.6 Glossary

SLYZ022 — *TI Glossary*.

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

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
74AUP1G125DBVRG4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	H25R	Samples
74AUP1G125DCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	(HM5, HMF, HMK, HMR)	Samples
74AUP1G125DRLRG4	ACTIVE	SOT-5X3	DRL	5	4000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	(HM7, HMR)	Samples
SN74AUP1G125DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	H25R	Samples
SN74AUP1G125DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	H25R	Samples
SN74AUP1G125DCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	(HM5, HMF, HMK, HMR)	Samples
SN74AUP1G125DCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	(HM5, HMR)	Samples
SN74AUP1G125DPWR	ACTIVE	X2SON	DPW	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	B1	Samples
SN74AUP1G125DRLR	ACTIVE	SOT-5X3	DRL	5	4000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	(HM7, HMR)	Samples
SN74AUP1G125DRYR	ACTIVE	SON	DRY	6	5000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HM	Samples
SN74AUP1G125DSFR	ACTIVE	SON	DSF	6	5000	Green (RoHS & no Sb/Br)	CU NIPDAU | CU NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	HM	Samples
SN74AUP1G125YFPR	ACTIVE	DSBGA	YFP	6	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM		HMN	Samples
SN74AUP1G125YZPR	ACTIVE	DSBGA	YZP	5	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	HMN	Samples
SN74AUP1G125YZTR	LIFEBUY	DSBGA	YZT	5		Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	HM	

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) RoHS: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

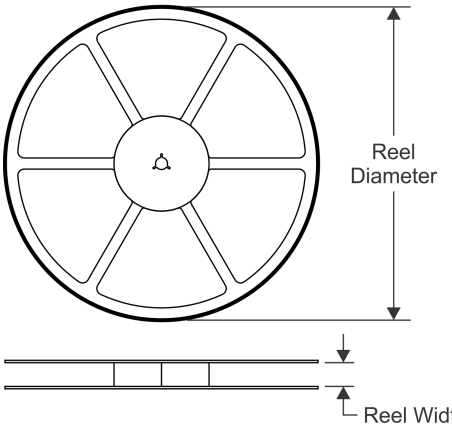
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

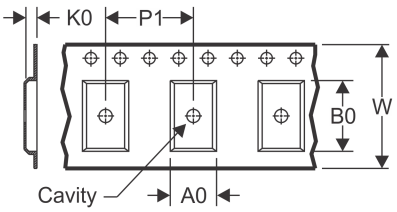
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

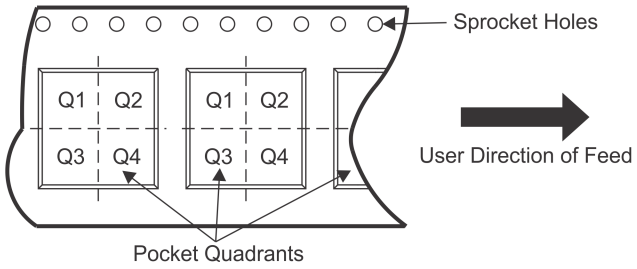


TAPE DIMENSIONS



A0	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

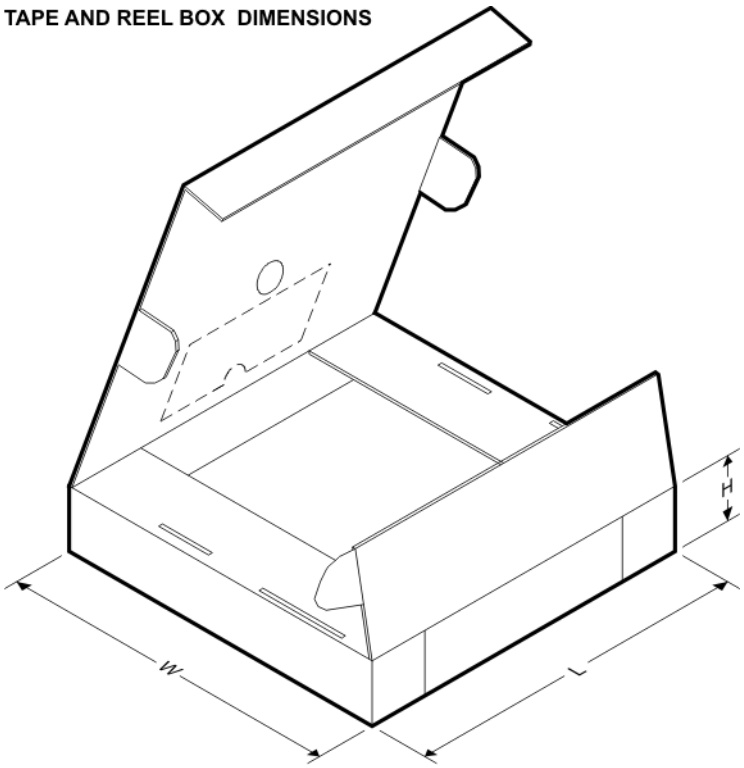
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AUP1G125DBVR	SOT-23	DBV	5	3000	180.0	8.4	3.23	3.17	1.37	4.0	8.0	Q3
SN74AUP1G125DBVT	SOT-23	DBV	5	250	180.0	8.4	3.23	3.17	1.37	4.0	8.0	Q3
SN74AUP1G125DCKR	SC70	DCK	5	3000	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74AUP1G125DCKR	SC70	DCK	5	3000	180.0	8.4	2.47	2.3	1.25	4.0	8.0	Q3
SN74AUP1G125DCKR	SC70	DCK	5	3000	180.0	9.2	2.3	2.55	1.2	4.0	8.0	Q3
SN74AUP1G125DCKT	SC70	DCK	5	250	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74AUP1G125DPWR	X2SON	DPW	5	3000	178.0	8.4	0.91	0.91	0.5	2.0	8.0	Q3
SN74AUP1G125DRLR	SOT-5X3	DRL	5	4000	180.0	9.5	1.78	1.78	0.69	4.0	8.0	Q3
SN74AUP1G125DRLR	SOT-5X3	DRL	5	4000	180.0	8.4	1.98	1.78	0.69	4.0	8.0	Q3
SN74AUP1G125DRYR	SON	DRY	6	5000	180.0	9.5	1.15	1.6	0.75	4.0	8.0	Q1
SN74AUP1G125DSFR	SON	DSF	6	5000	180.0	9.5	1.16	1.16	0.5	4.0	8.0	Q2
SN74AUP1G125YFPR	DSBGA	YFP	6	3000	178.0	9.2	0.89	1.29	0.62	4.0	8.0	Q1
SN74AUP1G125YZPR	DSBGA	YZP	5	3000	178.0	9.2	1.02	1.52	0.63	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS

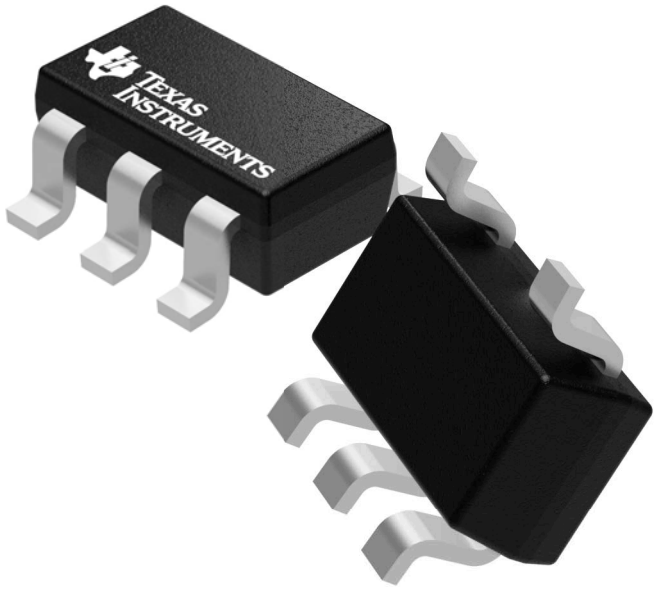


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AUP1G125DBVR	SOT-23	DBV	5	3000	202.0	201.0	28.0
SN74AUP1G125DBVT	SOT-23	DBV	5	250	202.0	201.0	28.0
SN74AUP1G125DCKR	SC70	DCK	5	3000	180.0	180.0	18.0
SN74AUP1G125DCKR	SC70	DCK	5	3000	202.0	201.0	28.0
SN74AUP1G125DCKR	SC70	DCK	5	3000	205.0	200.0	33.0
SN74AUP1G125DCKT	SC70	DCK	5	250	180.0	180.0	18.0
SN74AUP1G125DPWR	X2SON	DPW	5	3000	205.0	200.0	33.0
SN74AUP1G125DRLR	SOT-5X3	DRL	5	4000	184.0	184.0	19.0
SN74AUP1G125DRLR	SOT-5X3	DRL	5	4000	202.0	201.0	28.0
SN74AUP1G125DRYR	SON	DRY	6	5000	184.0	184.0	19.0
SN74AUP1G125DSFR	SON	DSF	6	5000	184.0	184.0	19.0
SN74AUP1G125YFPR	DSBGA	YFP	6	3000	220.0	220.0	35.0
SN74AUP1G125YZPR	DSBGA	YZP	5	3000	220.0	220.0	35.0

DBV 5 SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



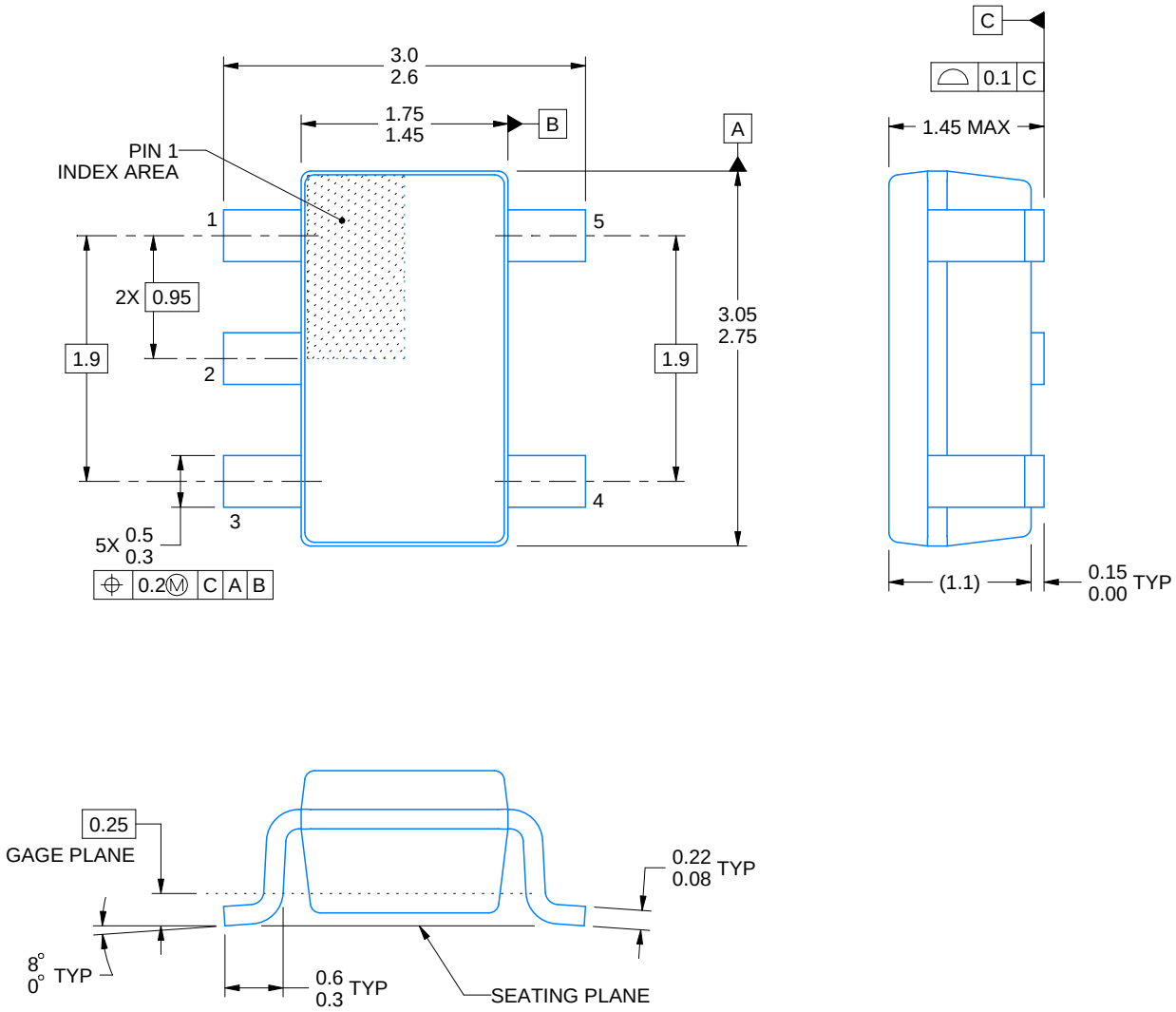
Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

PACKAGE OUTLINE

DBV0005A

SOT-23 - 1.45 mm max height

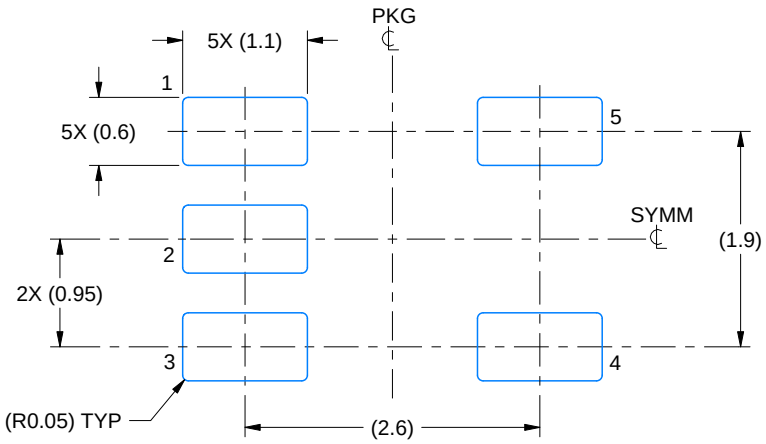
SMALL OUTLINE TRANSISTOR



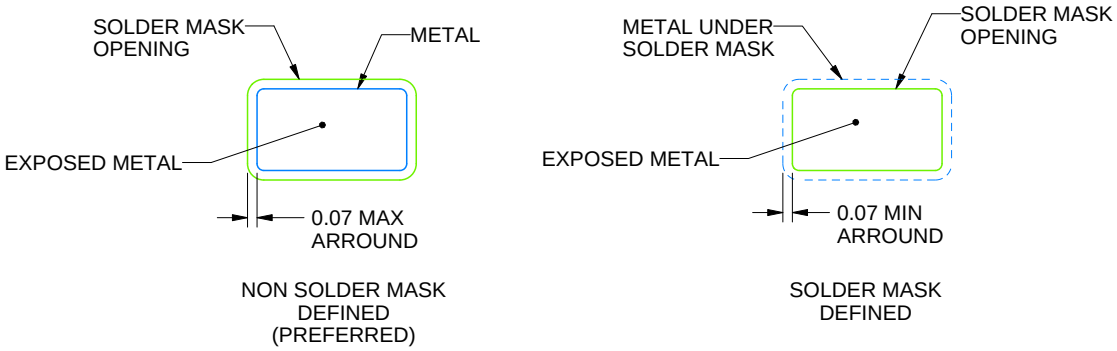
4214839/C 04/2017

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. Refernce JEDEC MO-178.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:15X

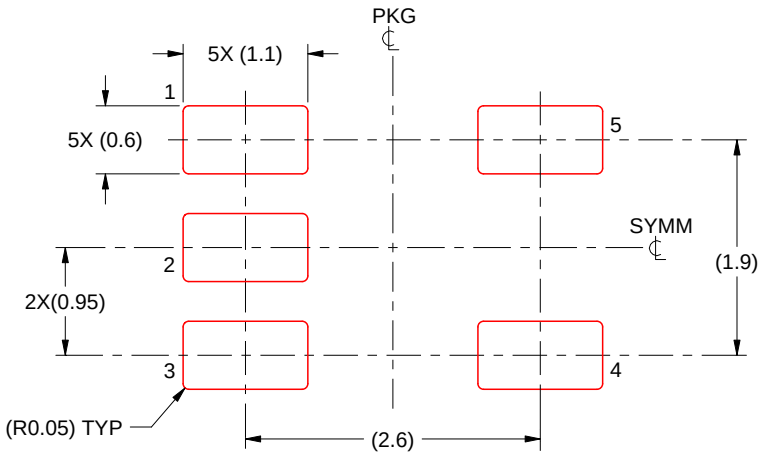


SOLDER MASK DETAILS

4214839/C 04/2017

NOTES: (continued)

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



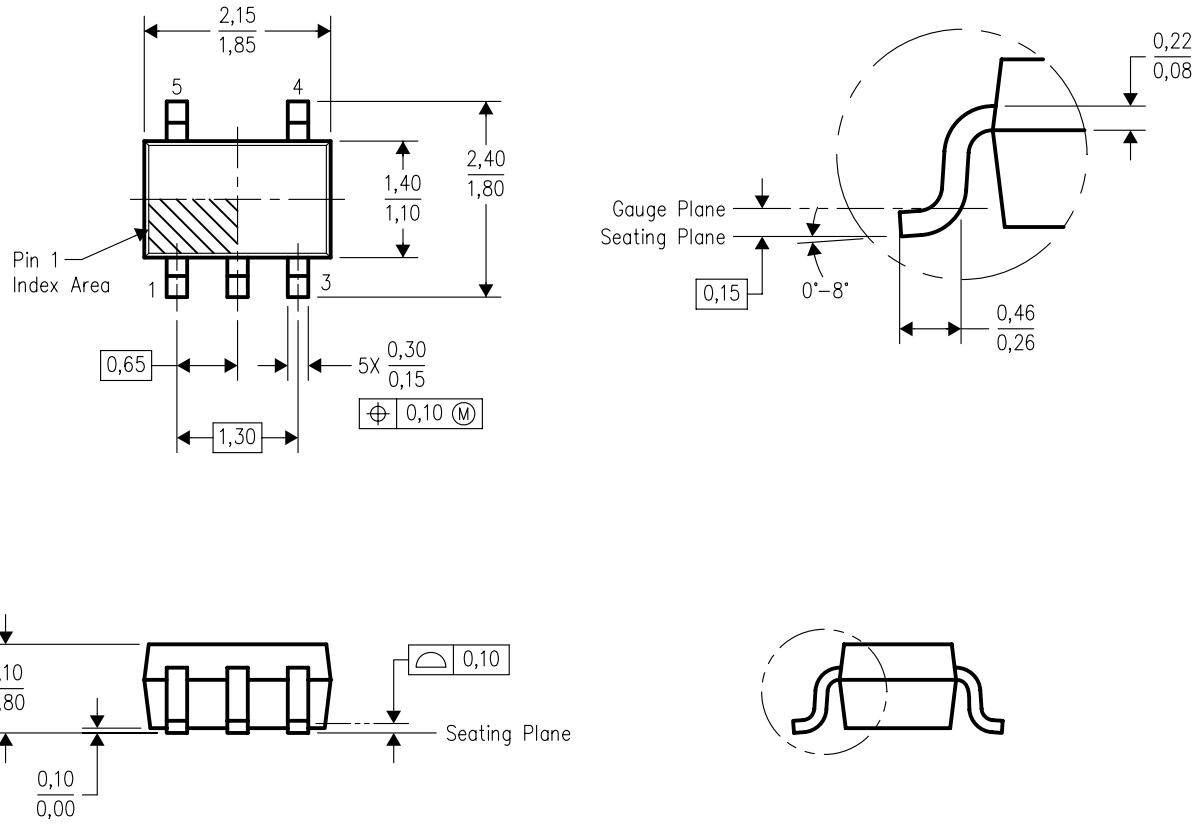
SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:15X

4214839/C 04/2017

NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
7. Board assembly site may have different recommendations for stencil design.

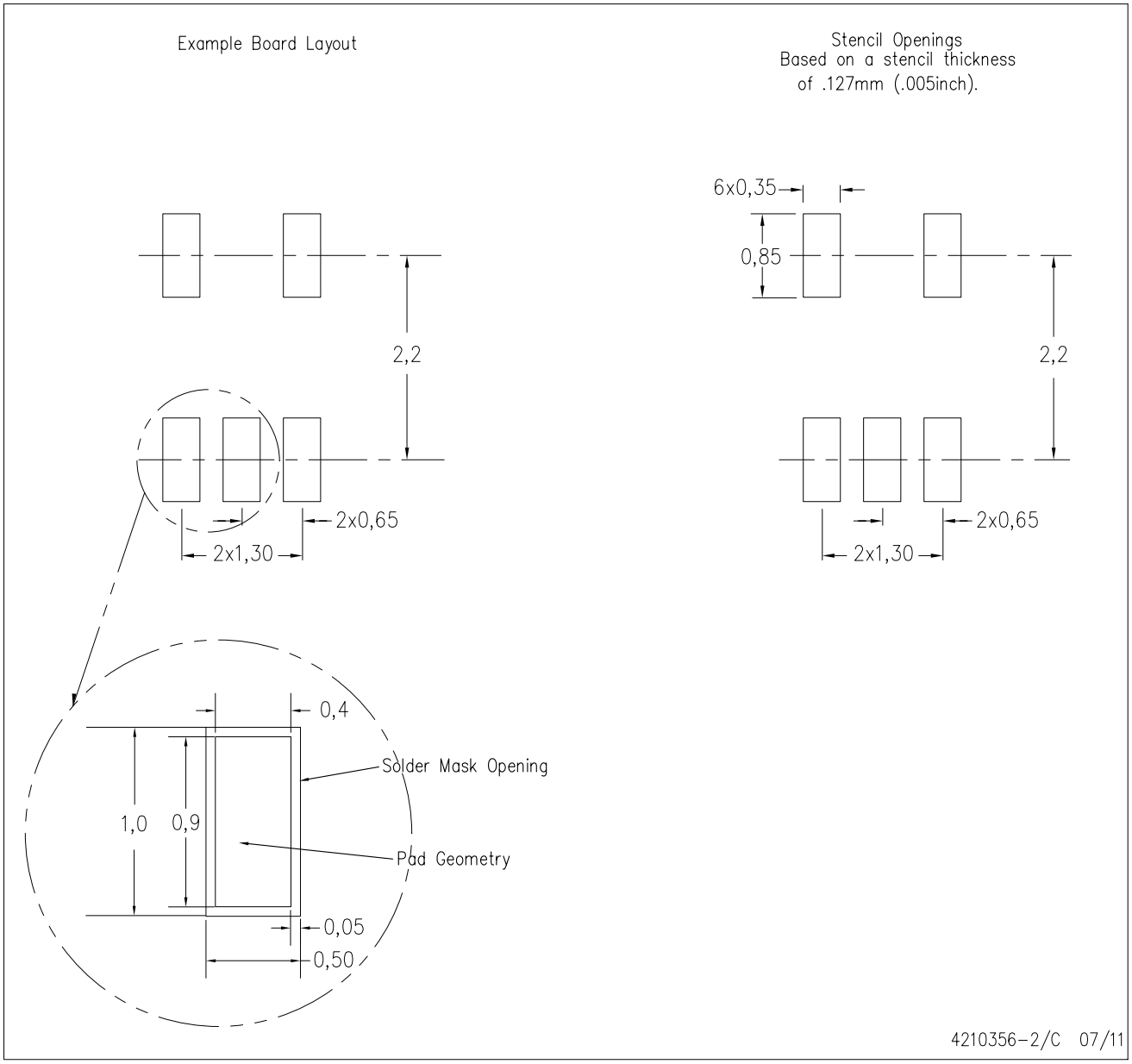
DCK (R–PDSO–G5) PLASTIC SMALL–OUTLINE PACKAGE



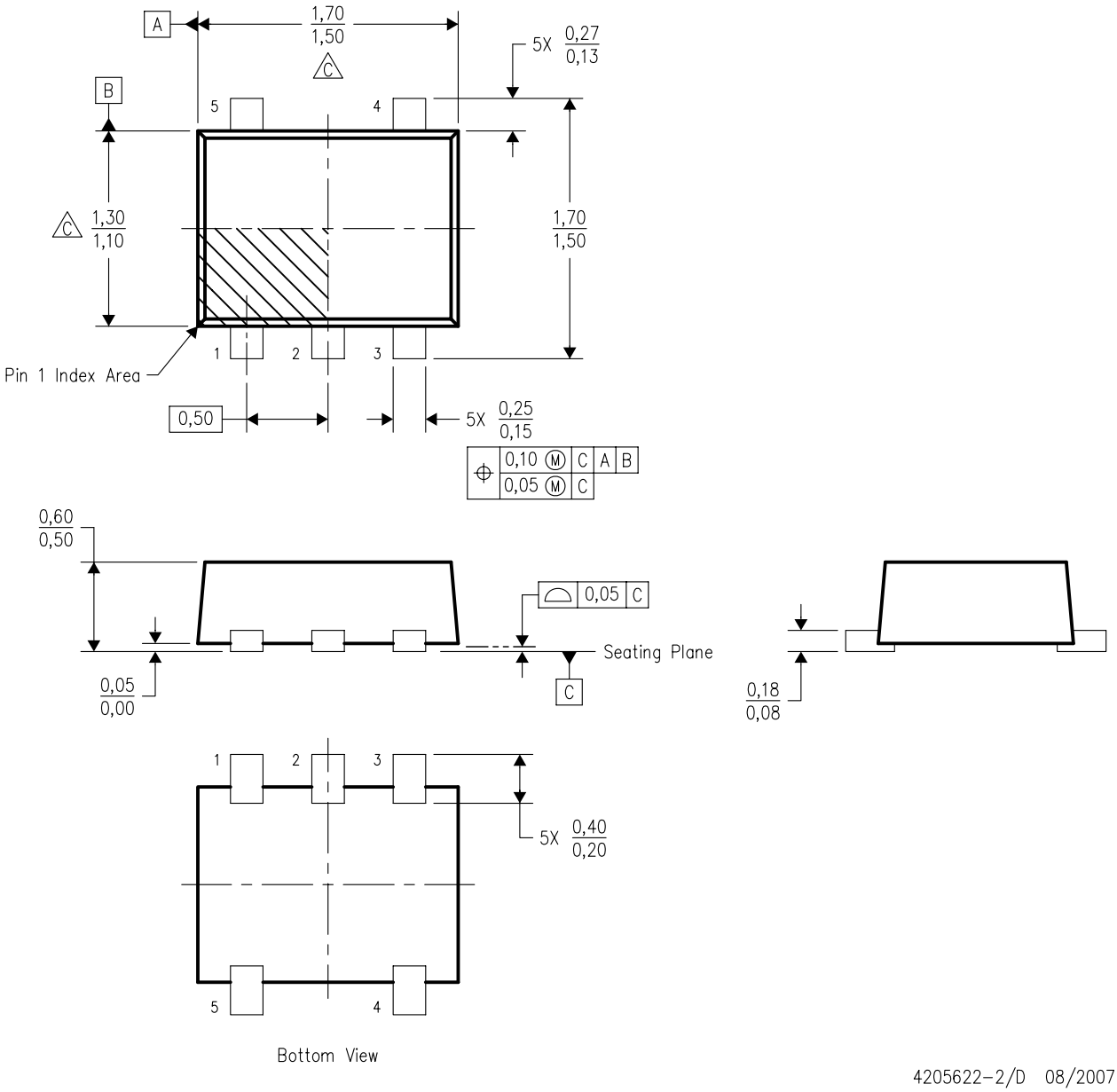
4093553–3/G 01/2007

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



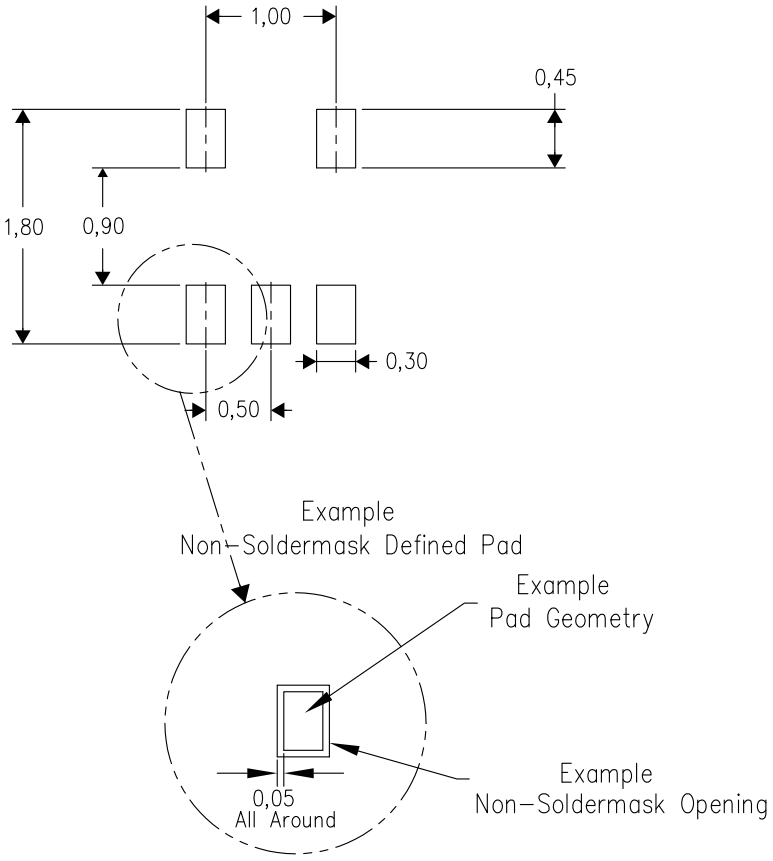
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
D. Publication IPC–7351 is recommended for alternate designs.
E. Laser cutting 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.



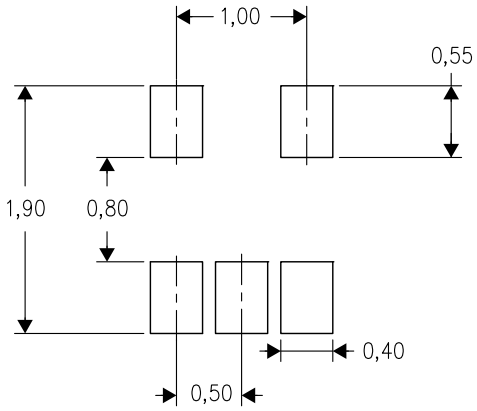
NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash, interlead flash, protrusions, or gate burrs. Mold flash, interlead flash, protrusions, or gate burrs shall not exceed 0,15 per end or side.
D. JEDEC package registration is pending.

DRL (R–PDSO–N5) PLASTIC SMALL OUTLINE

Example Board Layout



Example Stencil Design
(Note E)



4208207–2/E 06/12

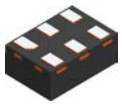
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate designs.
D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.
E. Maximum stencil 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.

DRY 6 USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD

Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

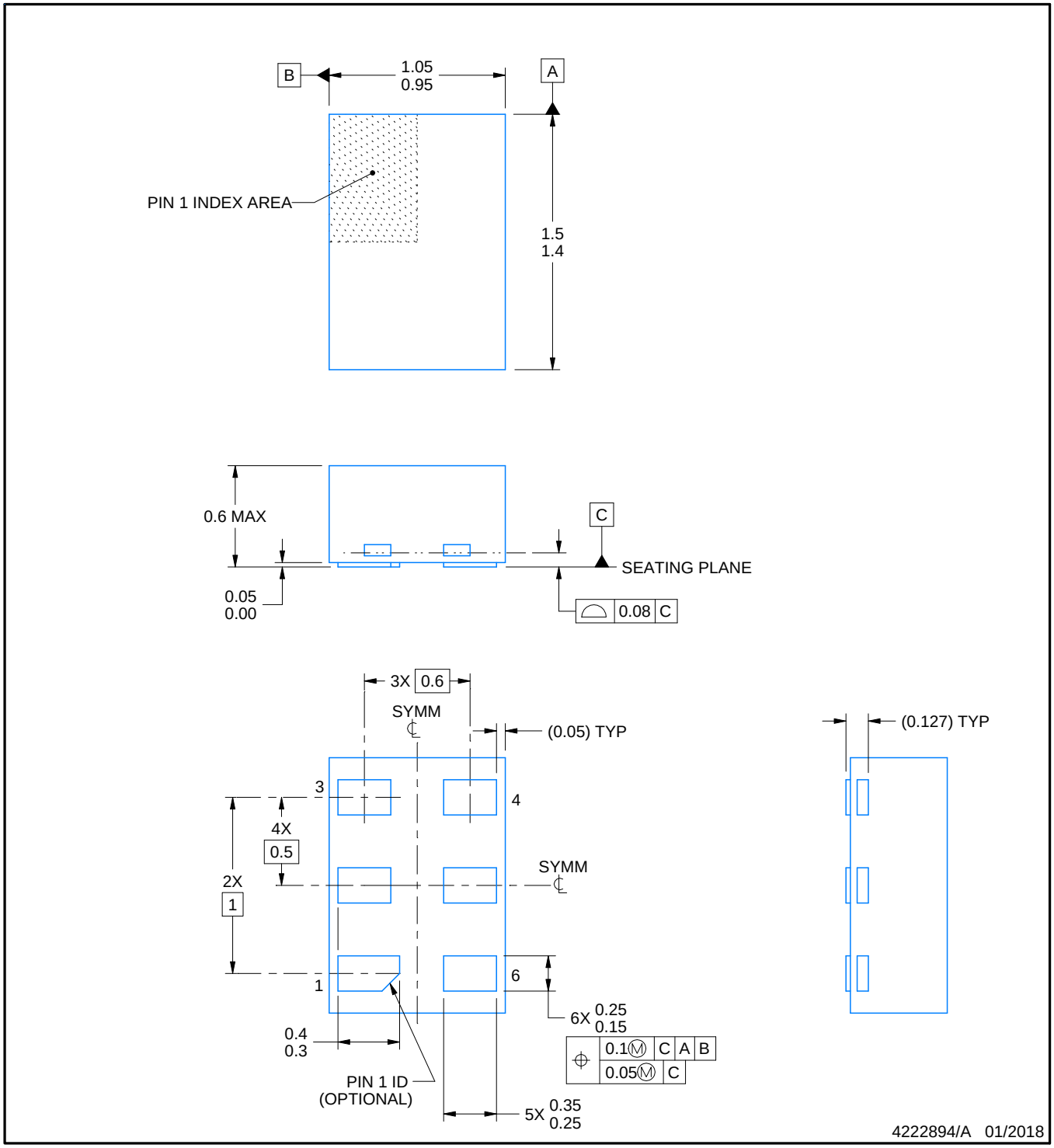
DRY0006A



PACKAGE OUTLINE

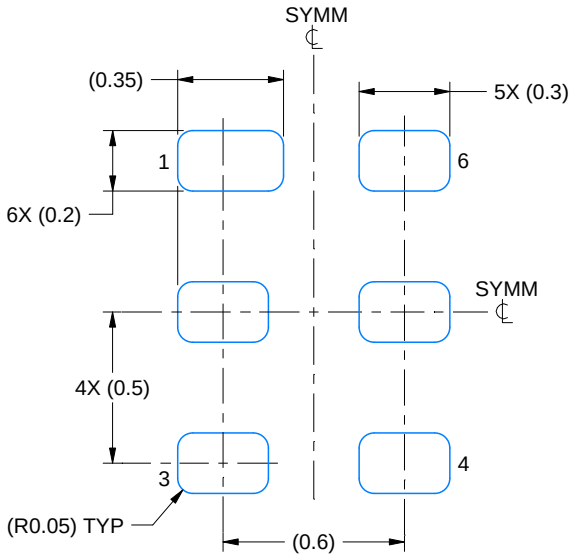
USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD

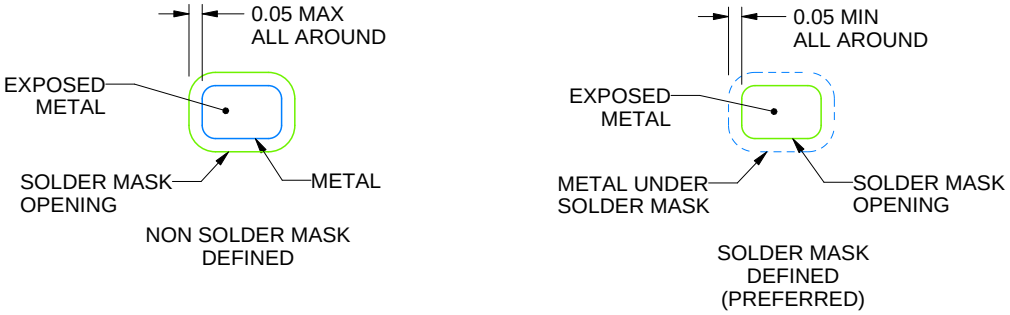


NOTES:

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.



LAND PATTERN EXAMPLE
1:1 RATIO WITH PKG SOLDER PADS
EXPOSED METAL SHOWN
SCALE:40X



SOLDER MASK DETAILS

4222894/A 01/2018

NOTES: (continued)

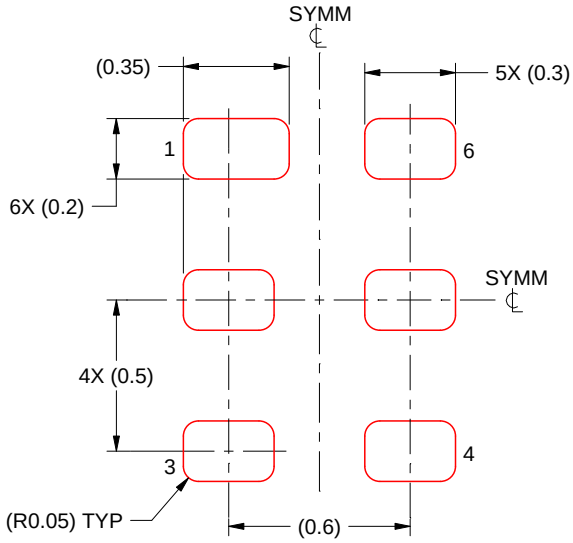
3. For more information, see QFN/SON PCB application report in literature No. SLUA271 (www.ti.com/lit/slua271).

EXAMPLE STENCIL DESIGN

DRY0006A

USON - 0.6 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



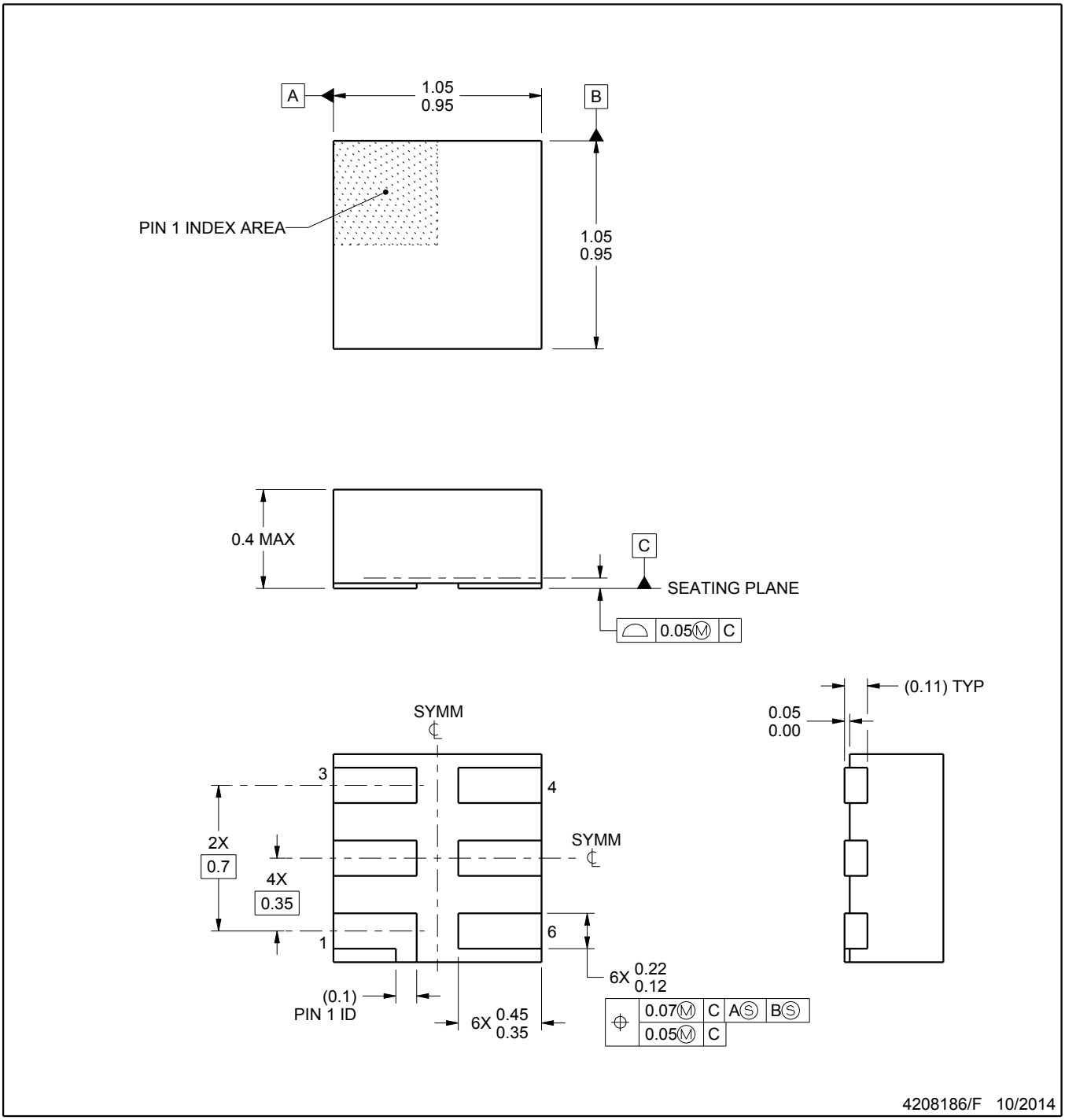
SOLDER PASTE EXAMPLE
BASED ON 0.075 - 0.1 mm THICK STENCIL
SCALE:40X

4222894/A 01/2018

NOTES: (continued)

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

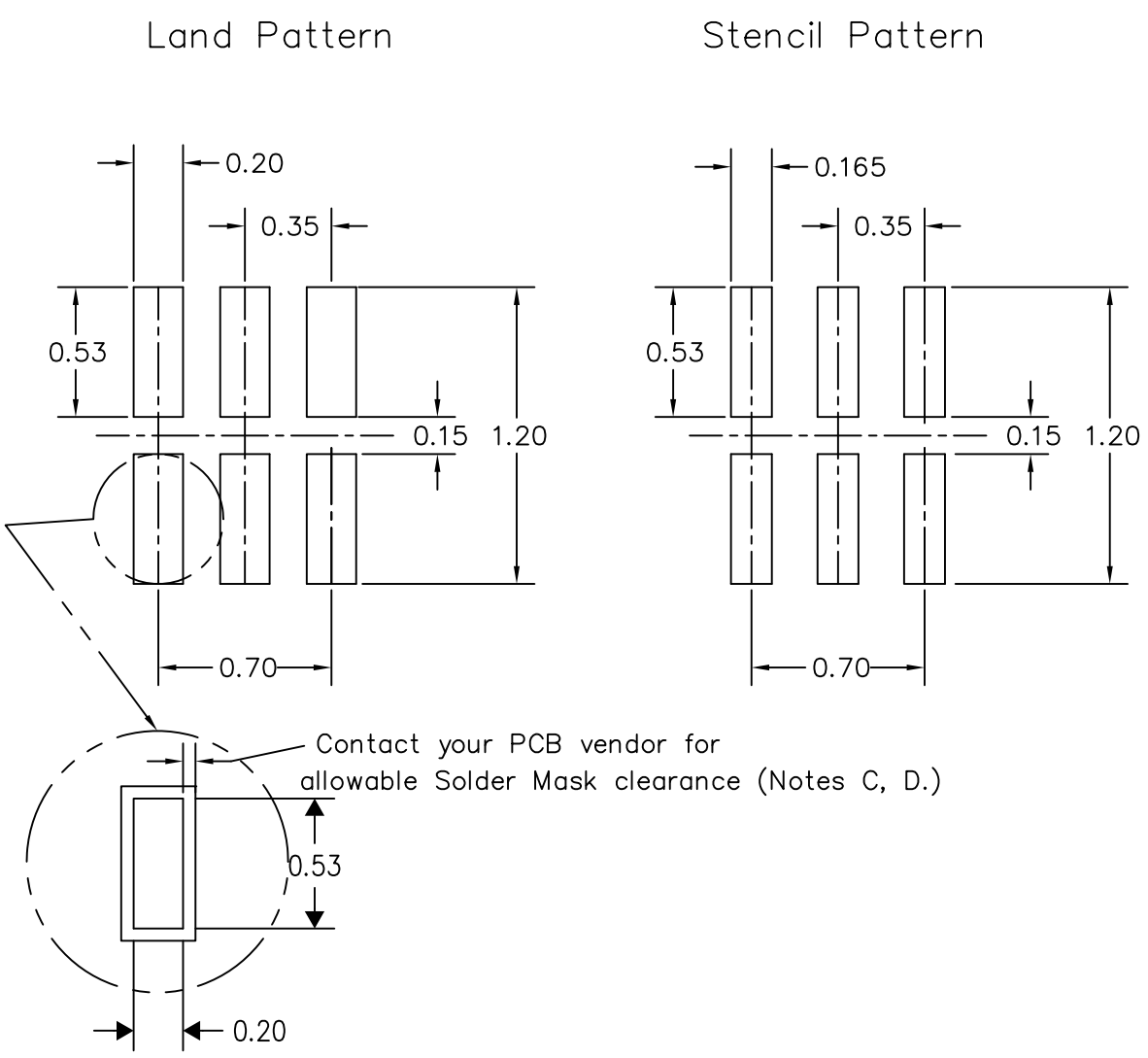
DSF (S-PX2SON-N6) PLASTIC SMALL OUTLINE NO-LEAD



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. Reference JEDEC registration MO-287, variation X2AAF.

DSF (S–PX2SON–N6) PLASTIC SMALL OUTLINE NO–LEAD



4210277/D 05/12

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.

GENERIC PACKAGE VIEW

DPW 5 X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD

Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

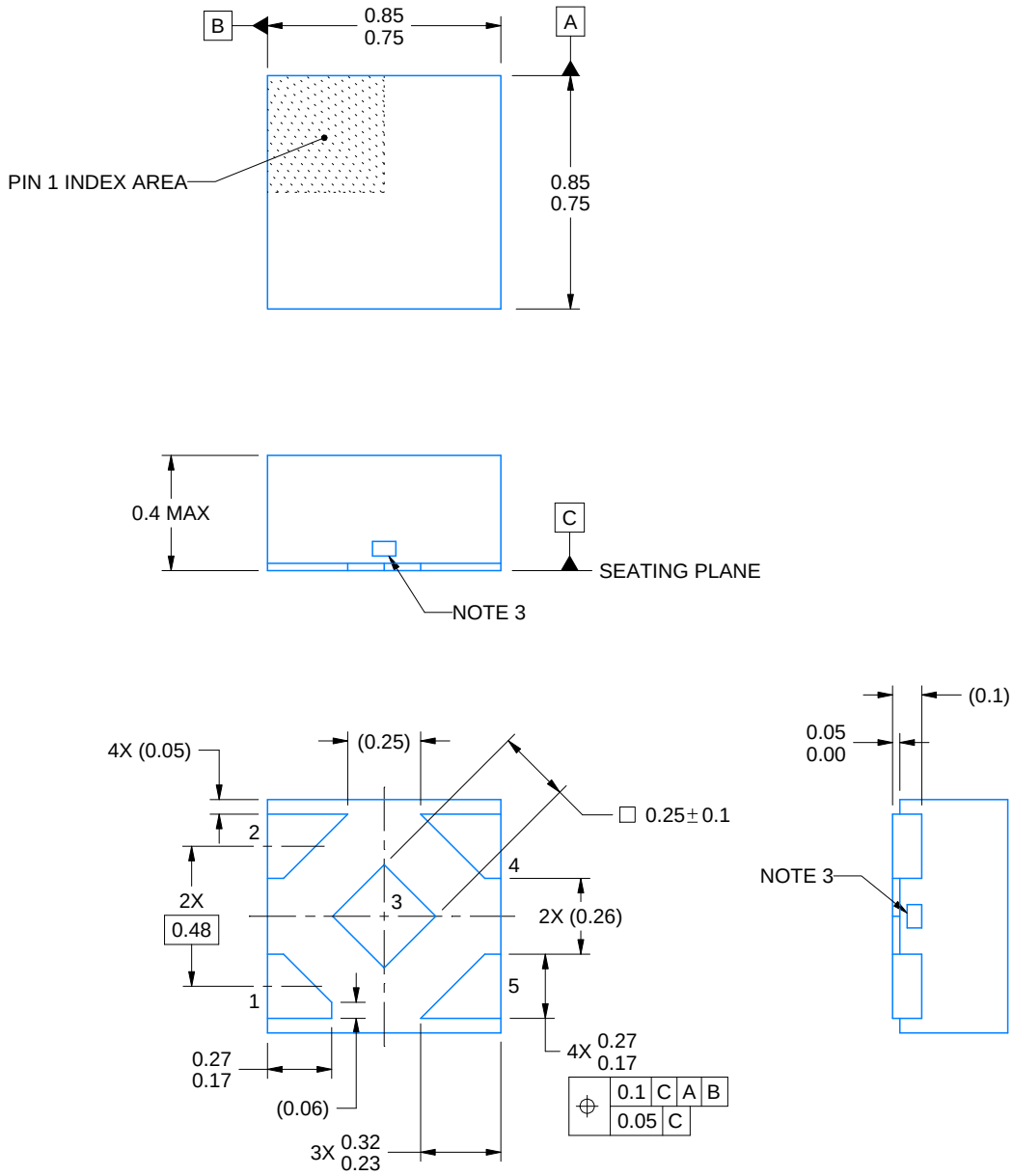
4211218-3/D

PACKAGE OUTLINE

DPW0005A

X2SON - 0.4 mm max height

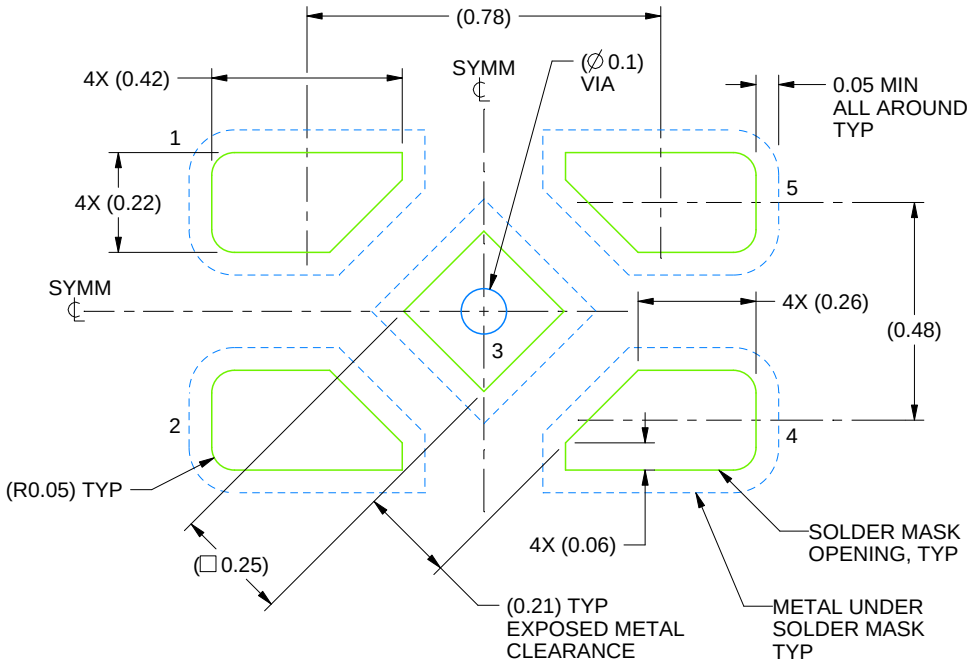
PLASTIC SMALL OUTLINE - NO LEAD



4223102/B 09/2017

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 size and shape of this feature may vary.

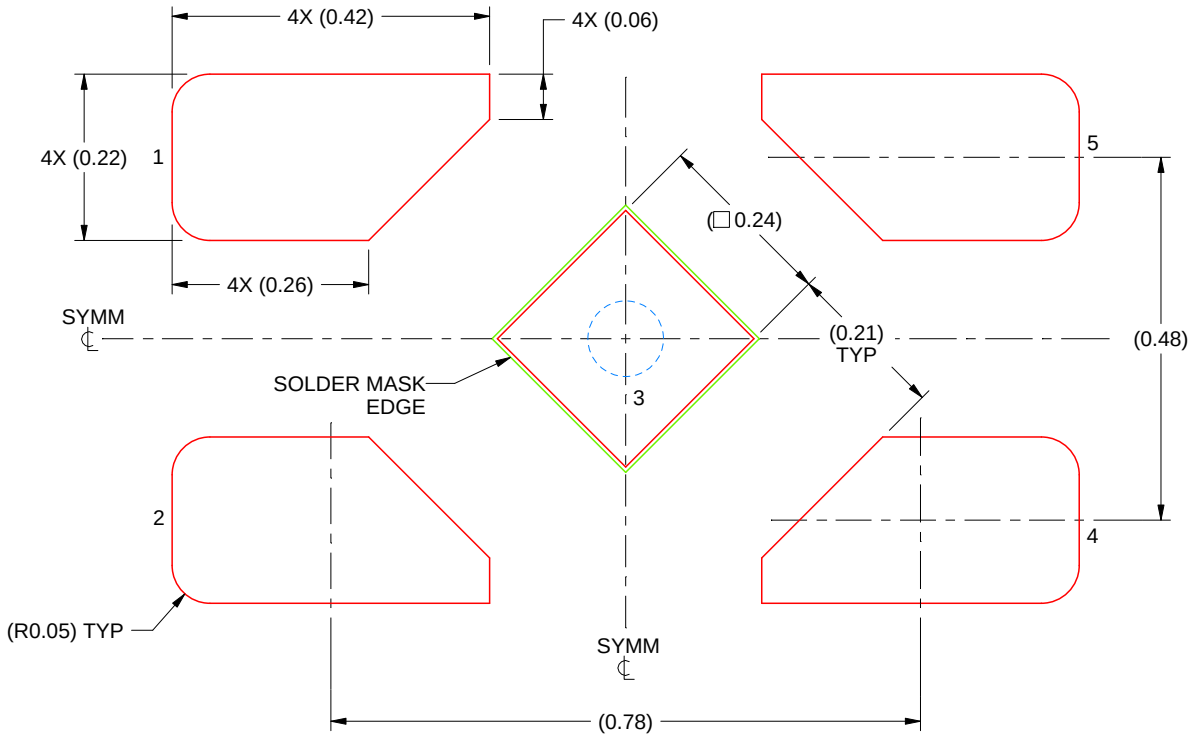


LAND PATTERN EXAMPLE
SOLDER MASK DEFINED
SCALE:60X

4223102/B 09/2017

NOTES: (continued)

4. 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).



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL

EXPOSED PAD
92% PRINTED SOLDER COVERAGE BY AREA
SCALE:100X

4223102/B 09/2017

NOTES: (continued)

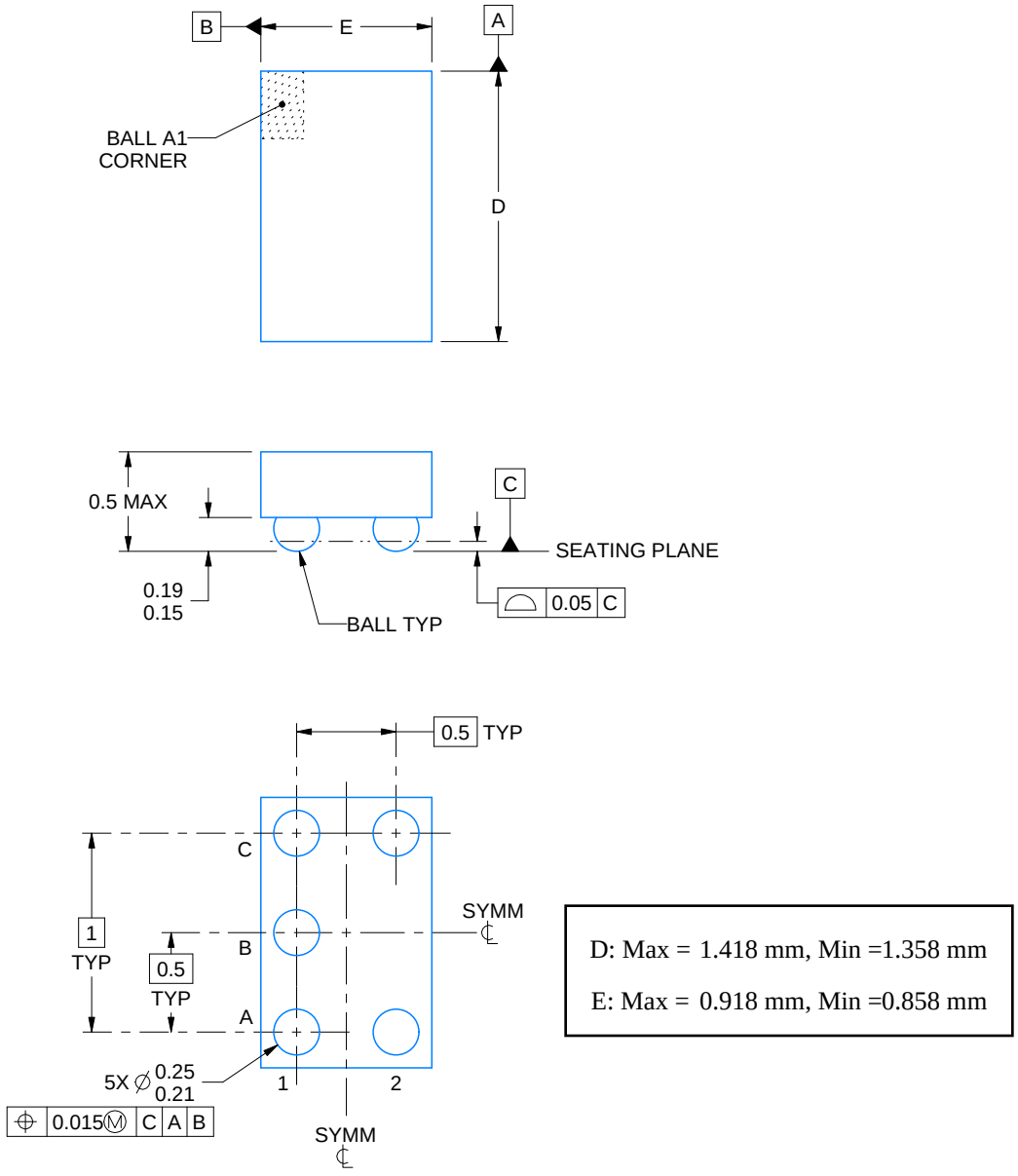
5. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

PACKAGE OUTLINE

YZP0005

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



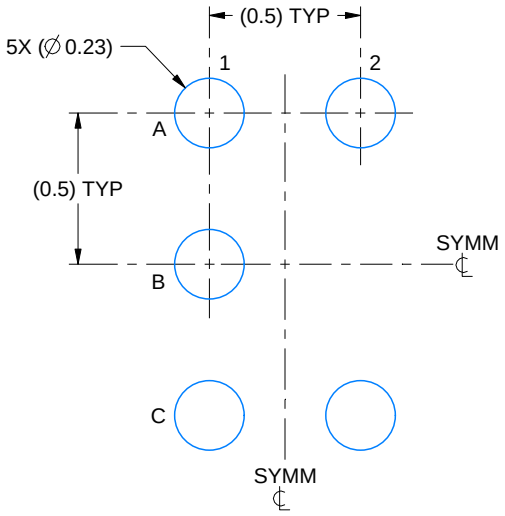
D: Max = 1.418 mm, Min =1.358 mm

E: Max = 0.918 mm, Min =0.858 mm

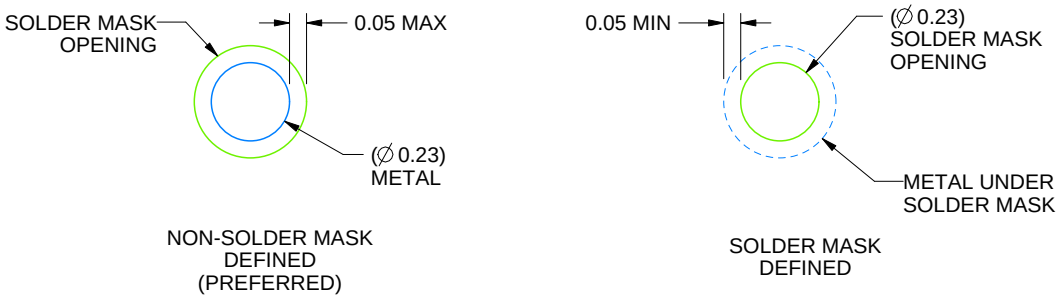
4219492/A 05/2017

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.



LAND PATTERN EXAMPLE
SCALE:40X

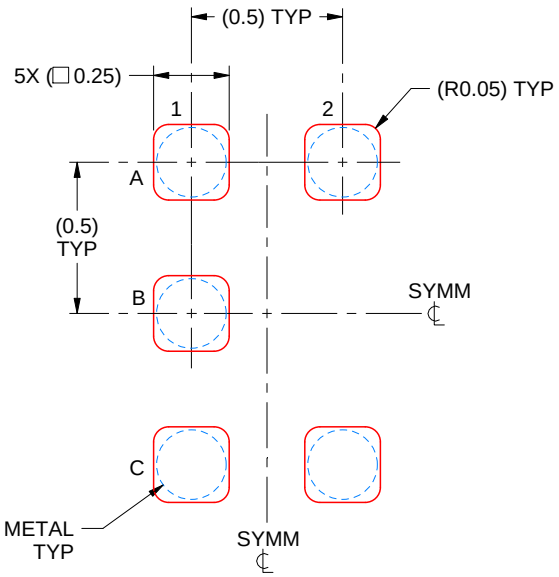


SOLDER MASK DETAILS
NOT TO SCALE

4219492/A 05/2017

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).



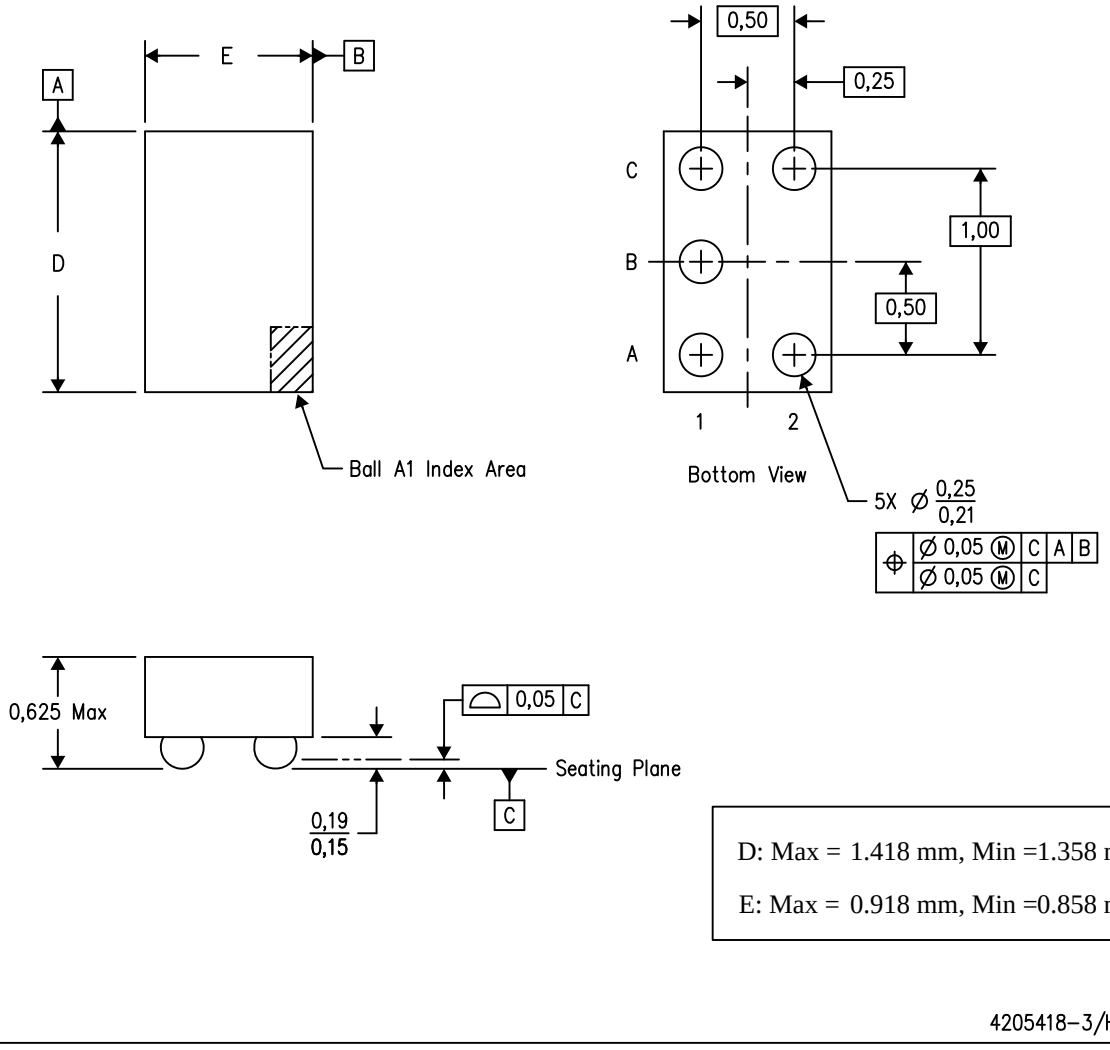
SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:40X

4219492/A 05/2017

NOTES: (continued)

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

YZT (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™ package configuration.

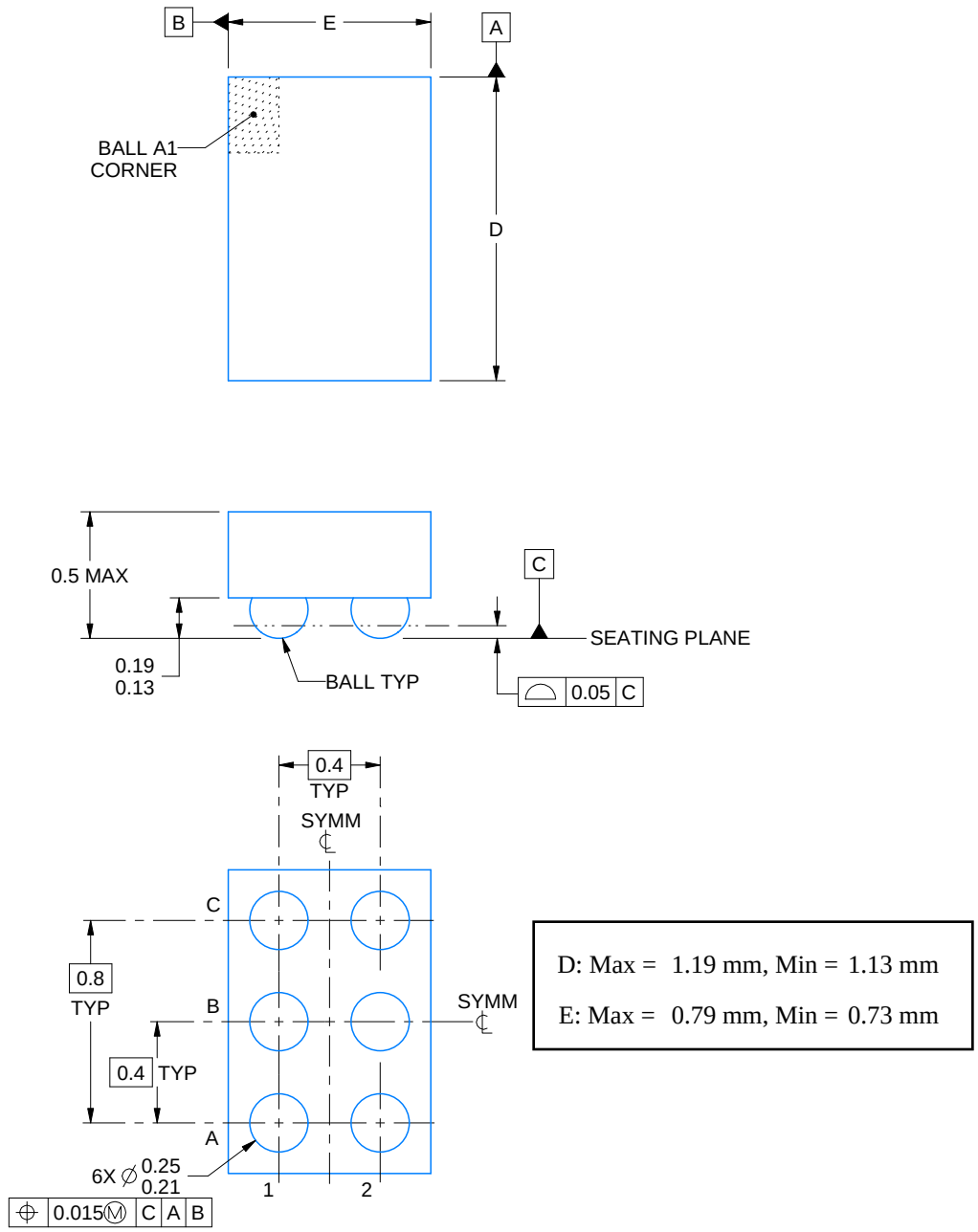
NanoFree is a trademark of Texas Instruments.

PACKAGE OUTLINE

YFP0006

DSBGA - 0.5 mm max height

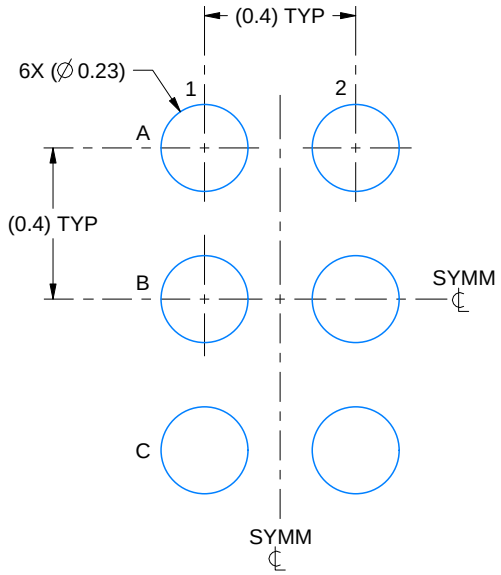
DIE SIZE BALL GRID ARRAY



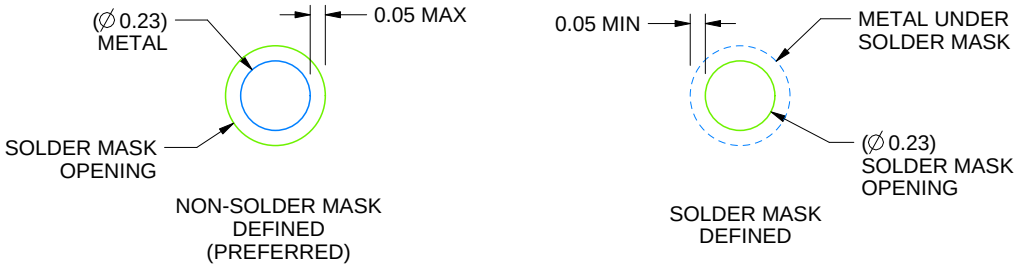
4223410/A 11/2016

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.



LAND PATTERN EXAMPLE
SCALE:50X

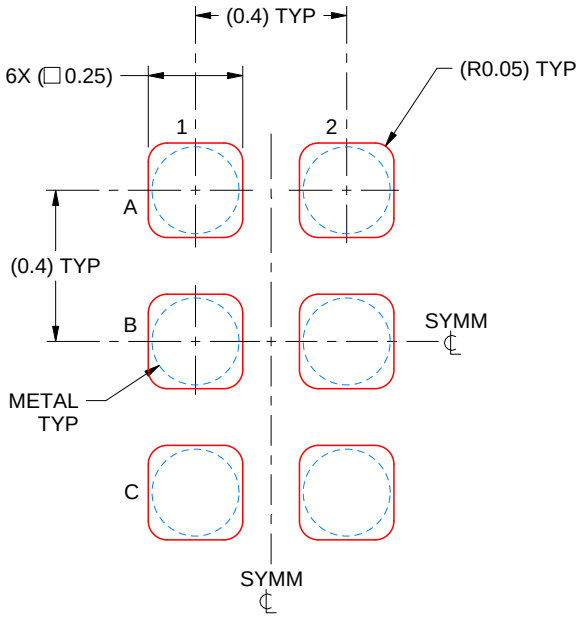


SOLDER MASK DETAILS
NOT TO SCALE

4223410/A 11/2016

NOTES: (continued)

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



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:50X

4223410/A 11/2016

NOTES: (continued)

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

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