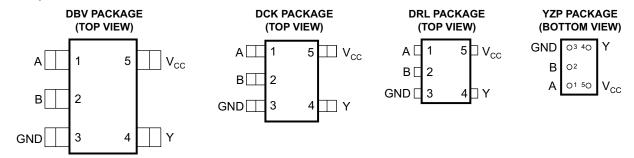
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SCES3680-SEPTEMBER 2001-REVISED JANUARY 2007

FEATURES

- Available in the Texas Instruments
 NanoFree™ Package
- Optimized for 1.8-V Operation and Is 3.6-V I/O Tolerant to Support Mixed-Mode Signal Operation
- I_{off} Supports Partial-Power-Down Mode Operation
- Sub 1-V Operable
- Max t_{pd} of 2.2 ns at 1.8 V

- Low Power Consumption, 10-μA Max I_{CC}
- ±8-mA Output Drive at 1.8 V
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)



See mechanical drawings for dimensions.

DESCRIPTION

This single 2-input positive-NAND gate is operational at 0.8-V to 2.7-V V_{CC} , but is designed specifically for 1.65-V to 1.95-V V_{CC} operation.

The SN74AUC1G00 performs the Boolean function $Y = \overline{A \cdot B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.

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

For more information about AUC Little Logic devices, please refer to the TI application report, *Applications of Texas Instruments AUC Sub-1-V Little Logic Devices*, literature number SCEA027.

ORDERING INFORMATION

T _A	PACKAGE ⁽¹⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING(2)
	NanoFree [™] – WCSP (DSBGA) 0.23-mm Large Bump – YZP (Pb-free)	Reel of 3000	SN74AUC1G00YZPR	UA_
-40°C to 85°C	SOT (SOT-23) - DBV	Reel of 3000	SN74AUC1G00DBVR	U00_
	SOT (SC-70) – DCK	Reel of 3000	SN74AUC1G00DCKR	UA_
	SOT (SOT-553) – DRL	Reel of 4000	SN74AUC1G00DRLR	UA_

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



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.

NanoFree is a trademark of Texas Instruments.

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



FUNCTION TABLE

INPU	INPUTS			
Α	В	Y		
Н	Н	L		
L	Χ	Н		
X	L	Н		

LOGIC DIAGRAM (POSITIVE LOGIC)



Absolute Maximum Ratings(1)

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		-0.5	3.6	V
VI	Input voltage range ⁽²⁾		-0.5	3.6	V
Vo	Voltage range applied to any output in the high-impedance or power-off state (2)		-0.5	3.6	V
Vo	Output voltage range ⁽²⁾		-0.5 V	_{CC} + 0.5	V
I _{IK}	Input clamp current		-50	mA	
I _{OK}	Output clamp current		-50	mA	
Io	Continuous output current		±20	mA	
	Continuous current through V _{CC} or GND			±100	mA
		DBV package		206	
	Package thermal impedance ⁽³⁾	DCK package		252	°C/W
θ_{JA}		DRL package		142	
		YZP 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.

SCES3680-SEPTEMBER 2001-REVISED JANUARY 2007

Recommended Operating Conditions⁽¹⁾

			MIN	MAX	UNIT
V _{CC}	Supply voltage		0.8	2.7	V
		V _{CC} = 0.8 V	V _{CC}		
V_{IH}	High-level input voltage	$V_{CC} = 1.1 \text{ V to } 1.95 \text{ V}$	$0.65 \times V_{CC}$		V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.7		
		V _{CC} = 0.8 V		0	
V_{IL}	Low-level input voltage	V _{CC} = 1.1 V to 1.95 V		$0.35 \times V_{CC}$	V
		V _{CC} = 2.3 V to 2.7 V		0.7	
VI	Input voltage		0	3.6	V
Vo	Output voltage		0	V_{CC}	V
		V _{CC} = 0.8 V		-0.7	
		V _{CC} = 1.1 V		-3	
I _{OH}	High-level output current	V _{CC} = 1.4 V		-5	mA
		V _{CC} = 1.65 V		-8	
		V _{CC} = 2.3 V		-9	
		V _{CC} = 0.8 V		0.7	
		V _{CC} = 1.1 V		3	
I _{OL}	Low-level output current	V _{CC} = 1.4 V		5	mA
		V _{CC} = 1.65 V		8	
		V _{CC} = 2.3 V		9	
41/4	Land to a March for a fall and	V _{CC} = 0.8 V to 1.95 V		20	A /
Δt/Δv	Input transition rise or fall rate	V _{CC} = 2.3 V to 2.7 V		10	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. 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)

PAR	RAMETER	TEST CONDIT	IONS	VCC	MIN	TYP(1)	MAX	UNIT
		$I_{OH} = -100 \mu A$		0.8 V to 2.7 V	V _{CC} - 0.1			
		$I_{OH} = -0.7 \text{ mA}$		0.8 V		0.55		
		$I_{OH} = -3 \text{ mA}$		1.1 V	0.8			
V _{OH}		$I_{OH} = -5 \text{ mA}$		1.4 V	1			V
	I _{OH} = -8 mA		1.65 V	1.2				
		I _{OH} = -9 mA						
		$I_{OL} = 100 \mu A$		0.8 V to 2.7 V			0.2	
		$I_{OL} = 0.7 \text{ mA}$	V 8.0			0.25		
V		I _{OL} = 3 mA		1.1 V			0.3	V
V _{OL}		I _{OL} = 5 mA		1.4 V			0.4	V
		I _{OL} = 8 mA		1.65 V			0.45	
		I _{OL} = 9 mA		2.3 V			0.6	
I _I	A or B input	$V_I = V_{CC}$ or GND		0 to 2.7 V			±5	μΑ
I _{off}		V_I or $V_O = 2.7 \text{ V}$		0			±10	μΑ
I _{CC}		$V_I = V_{CC}$ or GND,	I _O = 0	0.8 V to 2.7 V			10	μΑ
Ci		$V_I = V_{CC}$ or GND		2.5 V		3		pF

⁽¹⁾ All typical values are at $T_A = 25$ °C.

SN74AUC1G00 SINGLE 2-INPUT POSITIVE-NAND GATE





Switching Characteristics

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 0.8 V	V _{CC} = ± 0.	1.2 V 1 V	V _{CC} = ± 0.			_C = 1.8 : 0.15 V		V _{CC} = ± 0.		UNIT
	(INPOT)	(001F01)	TYP	MIN	MAX	MIN	MAX	MIN	TYP	MAX	MIN	MAX	
t _{pd}	A or B	Y	4.7	0.9	3.2	0.5	2.2	0.5	0.9	1.6	0.3	1.4	ns

Switching Characteristics

over recommended operating free-air temperature range, $C_L = 30 \text{ pF}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)		_C = 1.8 V : 0.15 V		V_{CC} = 2.5 V \pm 0.2 V		UNIT
	(INFOT)	(001701)	MIN	TYP	MAX	MIN	MAX	
t _{pd}	A or B	Y	0.7	1.3	2.2	0.5	2	ns

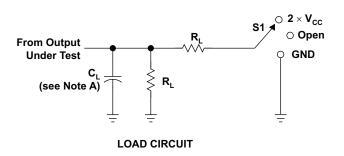
Operating Characteristics

 $T_A = 25^{\circ}C$

	PARAMETER	TEST CONDITIONS	V _{CC} = 0.8 V TYP	V _{CC} = 1.2 V TYP	V _{CC} = 1.5 V TYP	V _{CC} = 1.8 V TYP	V _{CC} = 2.5 V TYP	UNIT
C _{pd}	Power dissipation capacitance	f = 10 MHz	15	15	15	15	19	pF

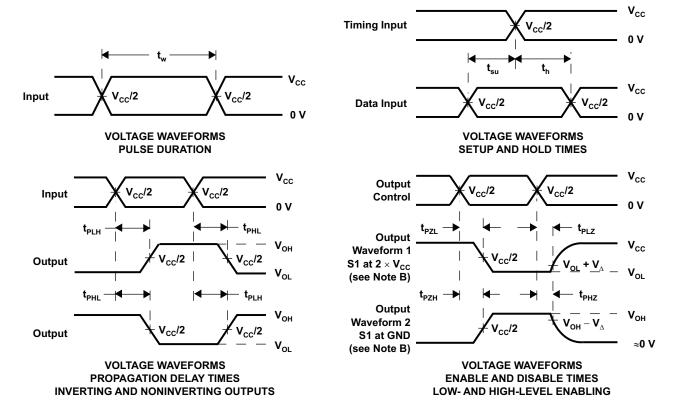


PARAMETER MEASUREMENT INFORMATION



TEST	S1
t _{PLH} /t _{PHL}	Open
t _{PLZ} /t _{PZL}	$2 \times \mathbf{V_{CC}}$
t _{PHZ} /t _{PZH}	GND

V _{cc}	C _L	R _L	$\mathbf{V}_{\!\scriptscriptstyle \Delta}$
0.8 V	15 pF	2 k Ω	0.1 V
1.2 V \pm 0.1 V	15 pF	2 k Ω	0.1 V
1.5 V \pm 0.1 V	15 pF	2 k Ω	0.1 V
1.8 V \pm 0.15 V	15 pF	2 k Ω	0.15 V
2.5 V \pm 0.2 V	15 pF	2 k Ω	0.15 V
1.8 V \pm 0.15 V	30 pF	1 k Ω	0.15 V
2.5 V \pm 0.2 V	30 pF	500 Ω	0.15 V



NOTES: A. C_L includes probe and jig capacitance.

- B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, Z_0 = 50 Ω , slew rate \geq 1 V/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. t_{PLH} and t_{PHL} are the same as t_{pd} .
- H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

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PACKAGING INFORMATION

Orderable part number	Status	Material type	Package Pins	Package qty Carrier	RoHS	Lead finish/	MSL rating/	Op temp (°C)	Part marking
	(1)	(2)			(3)	Ball material	Peak reflow		(6)
						(4)	(5)		
SN74AUC1G00DBVR	Active	Production	SOT-23 (DBV) 5	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(U00F, U00R)
SN74AUC1G00DBVR.Z	Active	Production	SOT-23 (DBV) 5	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(U00F, U00R)
SN74AUC1G00DCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU NIPDAU	Level-1-260C-UNLIM	-40 to 85	(UA5, UAF, UAR)
SN74AUC1G00DCKR.Z	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(UA5, UAF, UAR)
SN74AUC1G00DCKRE4	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(UA5, UAF, UAR)
SN74AUC1G00DRLR	Active	Production	SOT-5X3 (DRL) 5	4000 LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	(UA7, UAR)
SN74AUC1G00DRLR.Z	Active	Production	SOT-5X3 (DRL) 5	4000 LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	(UA7, UAR)
SN74AUC1G00YZPR	Active	Production	DSBGA (YZP) 5	3000 LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	UAN
SN74AUC1G00YZPR.Z	Active	Production	DSBGA (YZP) 5	3000 LARGE T&R	Yes	SNAGCU	Level-1-260C-UNLIM	-40 to 85	UAN

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

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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⁽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.



PACKAGE OPTION ADDENDUM

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TAPE AND REEL INFORMATION



TAPE DIMENSIONS KO PI BO Cavity A0

A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

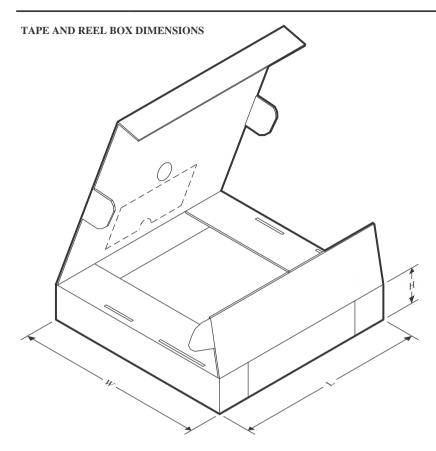


*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AUC1G00DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
SN74AUC1G00DCKR	SC70	DCK	5	3000	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74AUC1G00DCKR	SC70	DCK	5	3000	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
SN74AUC1G00DRLR	SOT-5X3	DRL	5	4000	180.0	8.4	1.98	1.78	0.69	4.0	8.0	Q3
SN74AUC1G00YZPR	DSBGA	YZP	5	3000	178.0	9.2	1.02	1.52	0.63	4.0	8.0	Q1



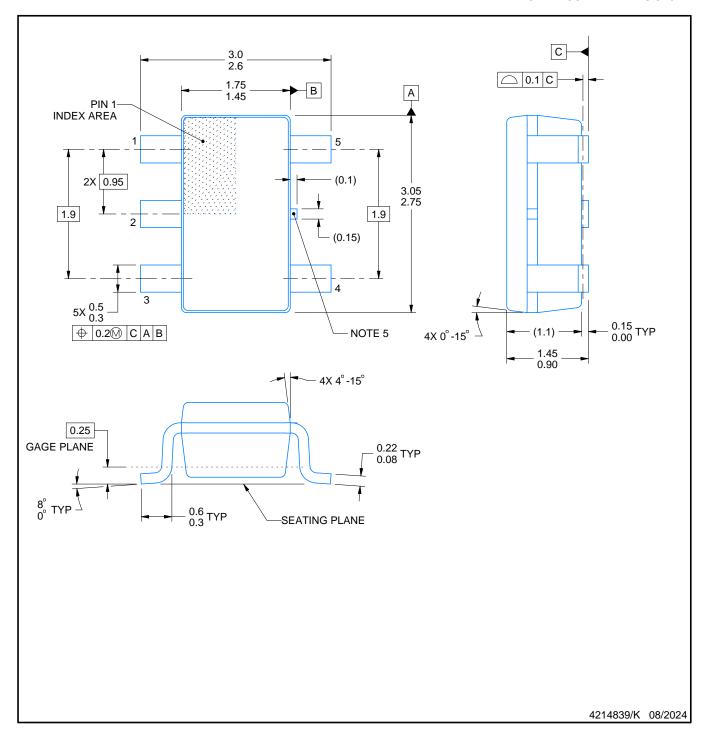
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*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AUC1G00DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
SN74AUC1G00DCKR	SC70	DCK	5	3000	180.0	180.0	18.0
SN74AUC1G00DCKR	SC70	DCK	5	3000	180.0	180.0	18.0
SN74AUC1G00DRLR	SOT-5X3	DRL	5	4000	202.0	201.0	28.0
SN74AUC1G00YZPR	DSBGA	YZP	5	3000	220.0	220.0	35.0



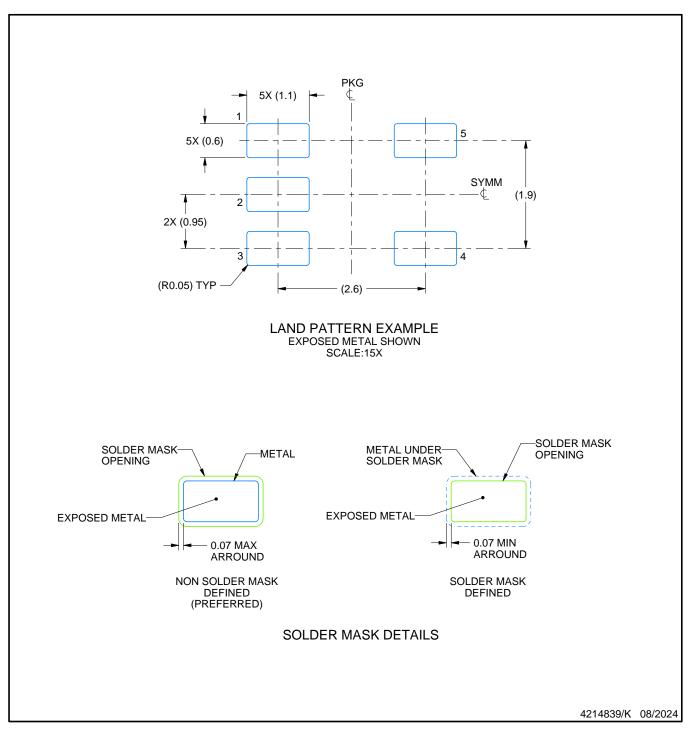


NOTES:

- 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 MO-178.

- 4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25 mm per side.
- 5. Support pin may differ or may not be present.



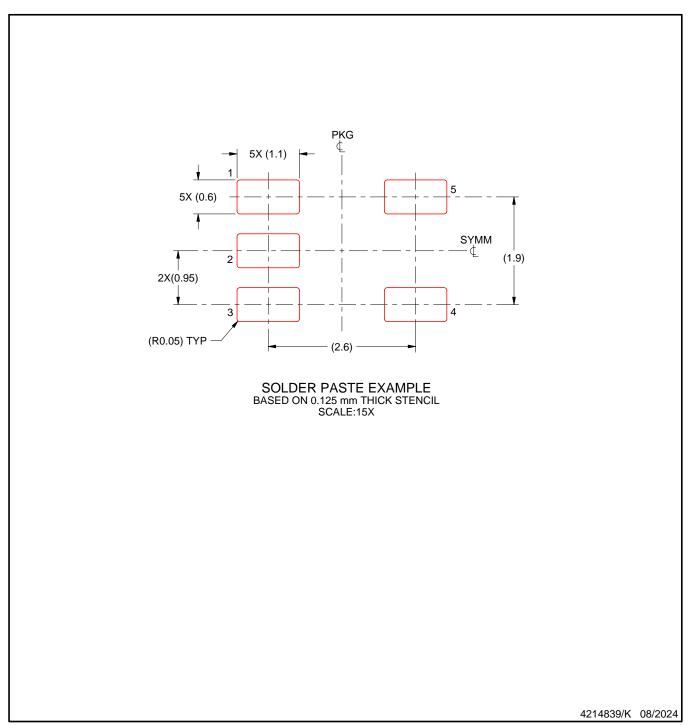


NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.





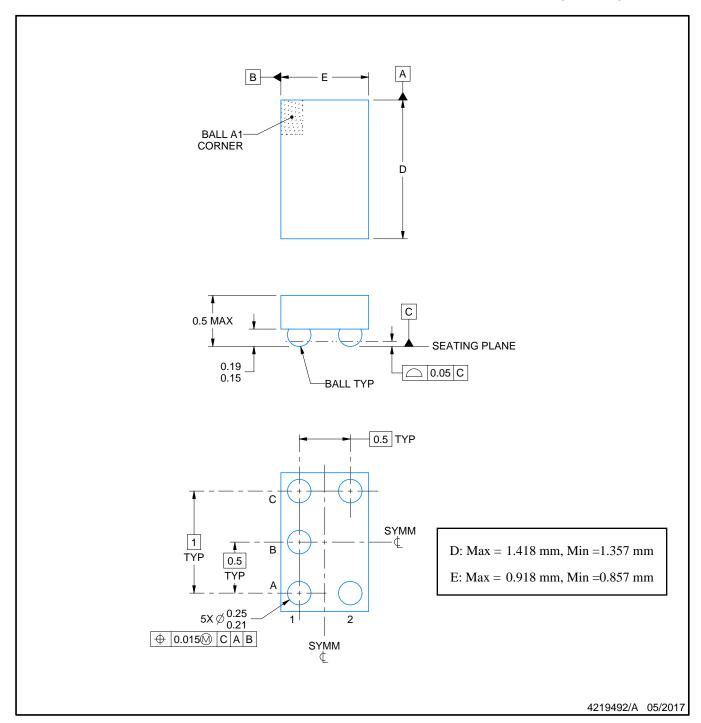
NOTES: (continued)

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





DIE SIZE BALL GRID ARRAY

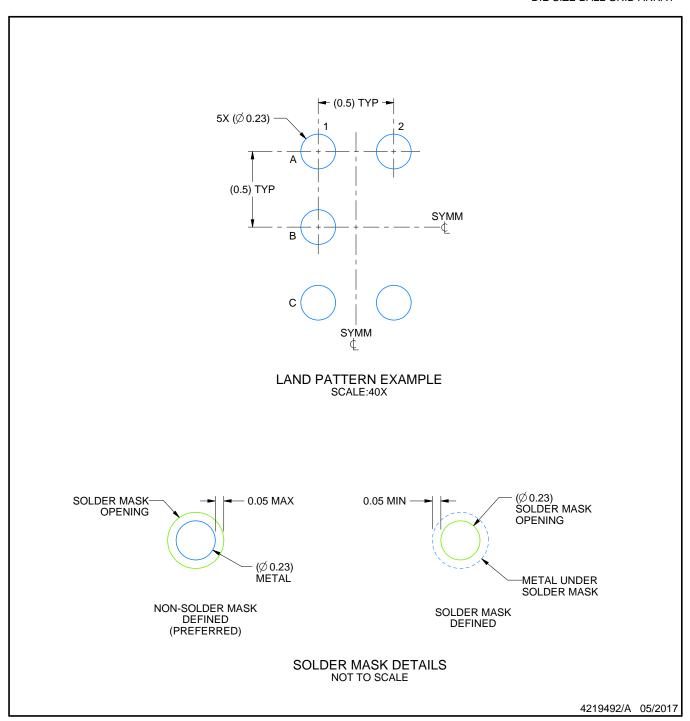


NOTES:

- 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.



DIE SIZE BALL GRID ARRAY

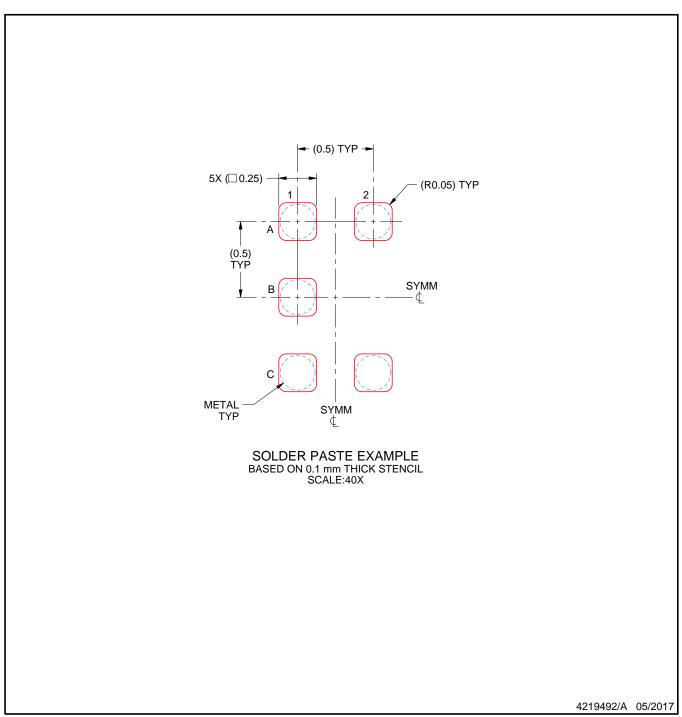


NOTES: (continued)

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).



DIE SIZE BALL GRID ARRAY

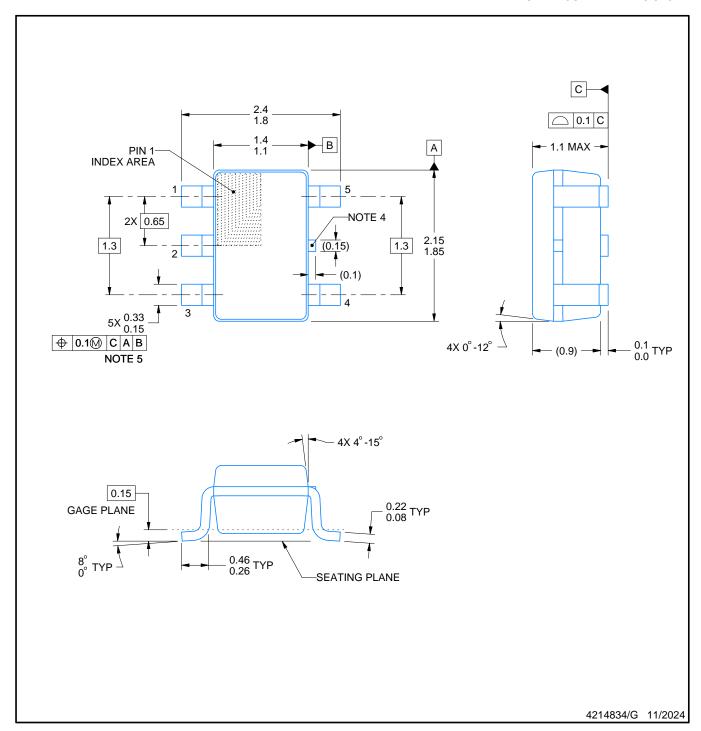


NOTES: (continued)

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





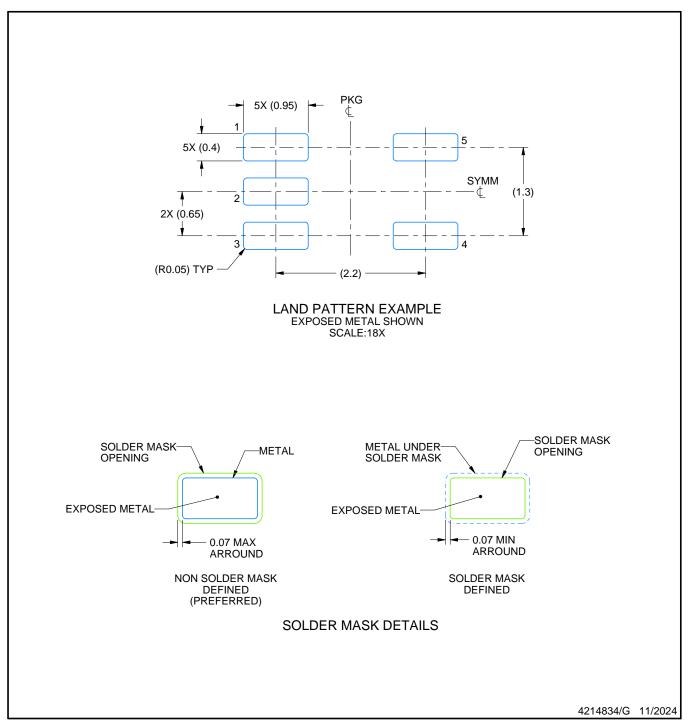


NOTES:

- 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 MO-203.

- 4. Support pin may differ or may not be present.5. Lead width does not comply with JEDEC.
- 6. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25mm per side

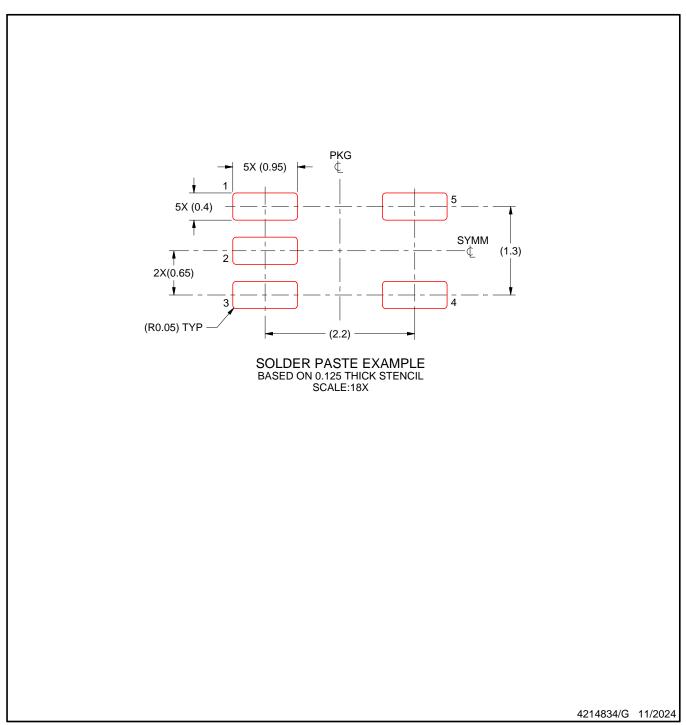




NOTES: (continued)

7. Publication IPC-7351 may have alternate designs.8. Solder mask tolerances between and around signal pads can vary based on board fabrication site.





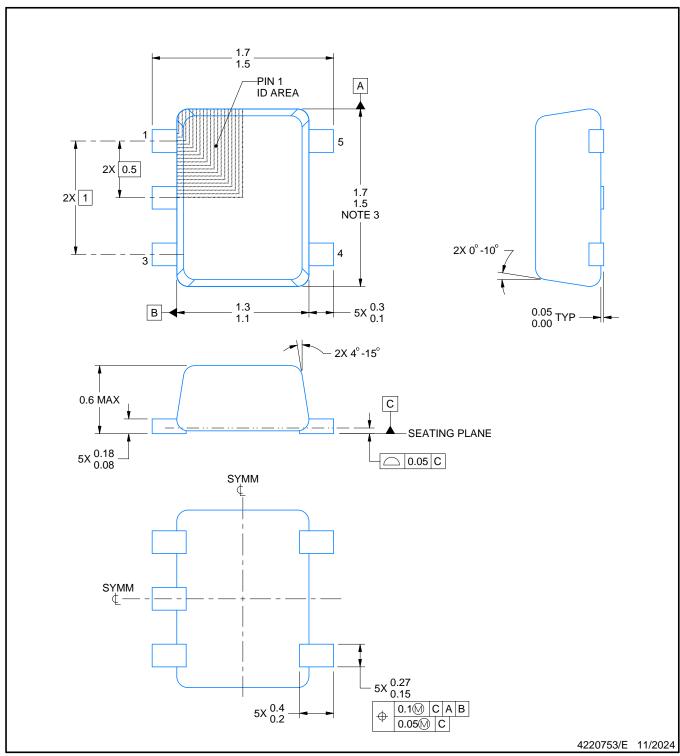
NOTES: (continued)

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





PLASTIC SMALL OUTLINE

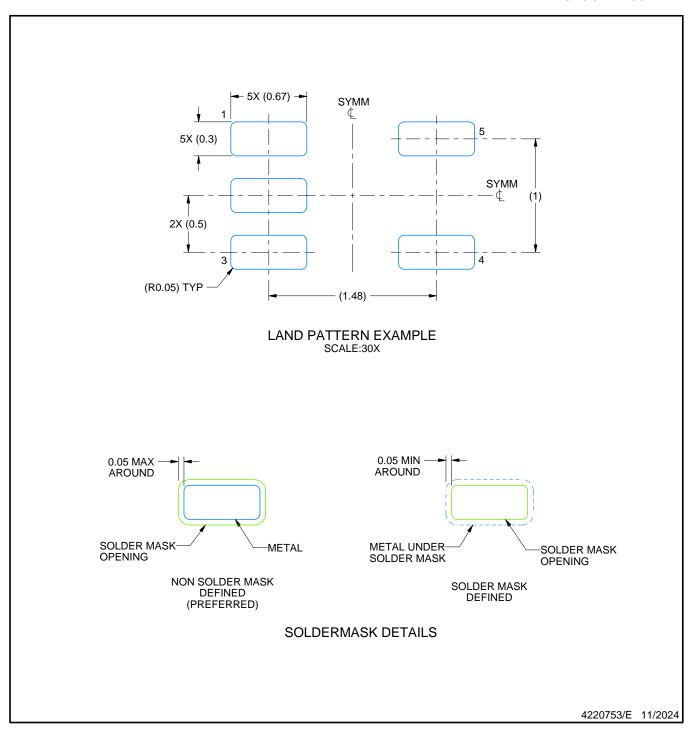


NOTES:

- All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
 This drawing is subject to change without notice.
 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-293 Variation UAAD-1



PLASTIC SMALL OUTLINE

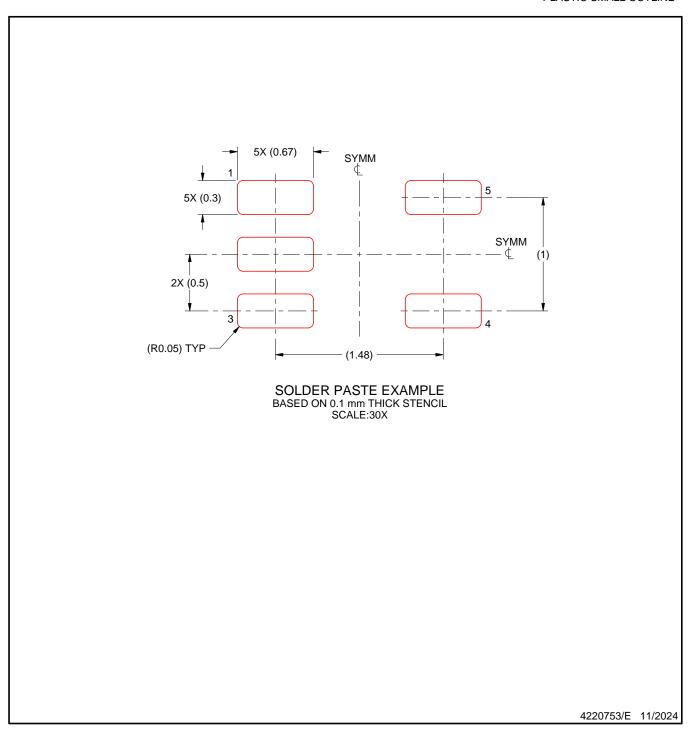


NOTES: (continued)

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



PLASTIC SMALL OUTLINE



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.



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