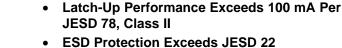


#### FEATURES

- Available in the Texas Instruments NanoFree<sup>™</sup> Package
- Optimized for 1.8-V Operation and Is 3.6-V I/O **Tolerant to Support Mixed-Mode Signal** Operation
- Ioff Supports Partial-Power-Down Mode Operation
- Sub 1-V Operable
- Max t<sub>pd</sub> of 2.2 ns at 1.8 V



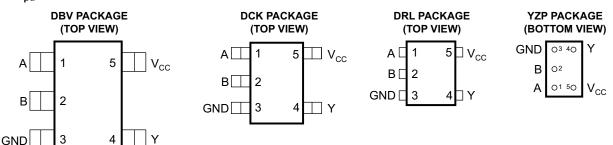
2000-V Human-Body Model (A114-A)

Low Power Consumption, 10-µA Max I<sub>cc</sub>

200-V Machine Model (A115-A)

±8-mA Output Drive at 1.8 V

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<sub>CC</sub>, 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<sup>™</sup> 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<sub>off</sub>. The I<sub>off</sub> 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.

T <sub>A</sub>	PACKAGE <sup>(1)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING <sup>(2)</sup>
	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_

#### **ORDERING INFORMATION**

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

DBV/DCK/DRL: The actual top-side marking has one additional character that designates the assembly/test site. (2)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).



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.

#### **FUNCTION TABLE**

INPU	INPUTS					
Α	В	Y				
Н	Н	L				
L	Х	Н				
Х	L	Н				

#### LOGIC DIAGRAM (POSITIVE LOGIC)



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

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

			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage range		-0.5	3.6	V
VI	Input voltage range <sup>(2)</sup>		-0.5	3.6	V
Vo	Voltage range applied to any output in the high-i	impedance or power-off state <sup>(2)</sup>	-0.5	3.6	V
Vo	Output voltage range <sup>(2)</sup>		-0.5 \	/ <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	Input clamp current	V <sub>1</sub> < 0		-50	mA
I <sub>OK</sub>	Output clamp current	V <sub>O</sub> < 0		-50	mA
I <sub>O</sub>	Continuous output current			±20	mA
	Continuous current through $V_{CC}$ or GND			±100	mA
		DBV package		206	
0	Declares the resulting of the resulting of (3)	DCK package		252	0000
$\theta_{JA}$	Package thermal impedance <sup>(3)</sup>	DRL package		142	°C/W
		YZP package		132	
T <sub>stg</sub>	Storage temperature range		-65	150	°C

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

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

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

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

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

PARAM	IETER	TEST CONDITIONS	VCC	MIN	TYP <sup>(1)</sup>	MAX	UNIT
		I <sub>OH</sub> = -100 μA	0.8 V to 2.7 V	V <sub>CC</sub> – 0.1			
		I <sub>OH</sub> = -0.7 mA	0.8 V		0.55		
M		$I_{OH} = -3 \text{ mA}$	1.1 V	0.8			V
V <sub>OH</sub>		I <sub>OH</sub> = -5 mA	1.4 V	1			V
		$I_{OH} = -8 \text{ mA}$	1.65 V	1.2			
		$I_{OH} = -9 \text{ mA}$	2.3 V	1.8			
		I <sub>OL</sub> = 100 μA	0.8 V to 2.7 V			0.2	
		I <sub>OL</sub> = 0.7 mA	0.8 V		0.25		
M		I <sub>OL</sub> = 3 mA	1.1 V			0.3	V
V <sub>OL</sub>		I <sub>OL</sub> = 5 mA	1.4 V			0.4	V
		I <sub>OL</sub> = 8 mA	1.65 V			0.45	
		I <sub>OL</sub> = 9 mA	2.3 V			0.6	
I <sub>I</sub> A c	or B input	$V_{I} = V_{CC}$ or GND	0 to 2.7 V			±5	μA
I <sub>off</sub>		$V_{I}$ or $V_{O}$ = 2.7 V	0			±10	μA
I <sub>CC</sub>		$V_{I} = V_{CC} \text{ or } GND, \qquad I_{O} = 0$	0.8 V to 2.7 V			10	μA
Ci		$V_{I} = V_{CC} \text{ or } GND$	2.5 V		3		pF

(1) All typical values are at  $T_A = 25^{\circ}C$ .

### SN74AUC1G00 SINGLE 2-INPUT POSITIVE-NAND GATE

SCES3680-SEPTEMBER 2001-REVISED JANUARY 2007

#### **Switching Characteristics**

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

PARAMETER	FROM (INPUT)	TO	V <sub>CC</sub> = 0.8 V	$\begin{array}{c} V_{CC} = 1.2 \ V\\ \pm \ 0.1 \ V \end{array}$		$V_{CC}$ = 1.5 V $\pm$ 0.1 V		V <sub>CC</sub> = 1.8 V ± 0.15 V			$V_{CC}$ = 2.5 V $\pm$ 0.2 V		UNIT
		(INFOT)	(OUTPUT)	(001901)	TYP	MIN	MAX	MIN	MAX	MIN	TYP	MAX	MIN
t <sub>pd</sub>	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)

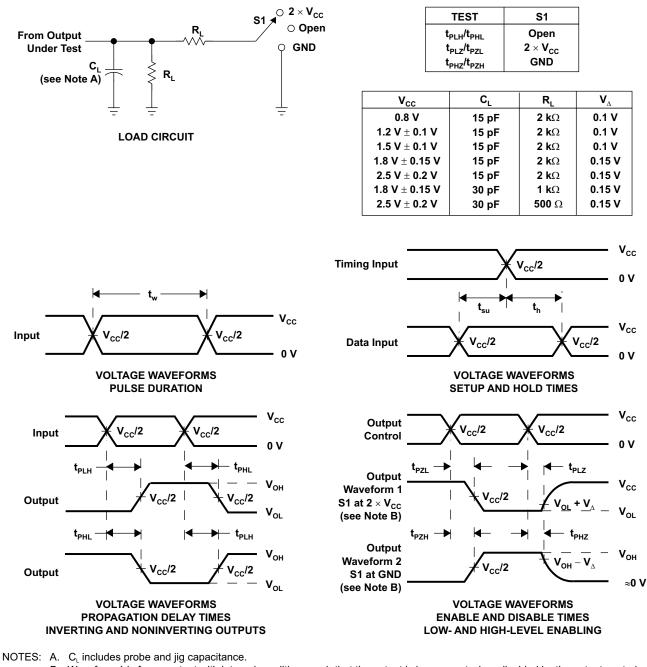
ſ	PARAMETER	FROM (INPUT)	TO (OUTPUT)		<sub>C</sub> = 1.8 V 0.15 V		$V_{CC}$ = 2.5 V ± 0.2 V		UNIT
		(INFOT)		MIN	TYP	MAX	MIN	MAX	
	t <sub>pd</sub>	A or B	Y	0.7	1.3	2.2	0.5	2	ns

#### **Operating Characteristics**

 $T_A = 25^{\circ}C$ 

	PARAMETER	TEST CONDITIONS	V <sub>CC</sub> = 0.8 V TYP	V <sub>CC</sub> = 1.2 V TYP	V <sub>CC</sub> = 1.5 V TYP	V <sub>CC</sub> = 1.8 V TYP	V <sub>CC</sub> = 2.5 V TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance	f = 10 MHz	15	15	15	15	19	pF

#### PARAMETER MEASUREMENT INFORMATION



- B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10 MHz, Z<sub>o</sub> = 50  $\Omega$ , slew rate  $\geq$  1 V/ns. D. The outputs are measured one at a time, with one transition per measurement.
- D. The outputs are measured one
- 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.  $t_{\text{PLH}}$  and  $t_{\text{PHL}}$  are the same as  $t_{\text{pd}}$ .
- H. All parameters and waveforms are not applicable to all devices.

#### Figure 1. Load Circuit and Voltage Waveforms



#### PACKAGING INFORMATION

Orderable Device	Status	Package Type	•	Pins	•	Eco Plan	Lead finish/	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	Ball material	(3)		(4/5)	
SN74AUC1G00DBVR	ACTIVE	SOT-23	DBV	5	3000	RoHS & Green	NIPDAU   SN	Level-1-260C-UNLIM	-40 to 85	(U00F, U00R)	Samples
SN74AUC1G00DCKR	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(UA5, UAF, UAR)	Samples
SN74AUC1G00DCKRE4	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(UA5, UAF, UAR)	Samples
SN74AUC1G00DRLR	ACTIVE	SOT-5X3	DRL	5	4000	RoHS & Green	NIPDAU   NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	(UA7, UAR)	Samples
SN74AUC1G00YZPR	ACTIVE	DSBGA	YZP	5	3000	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-40 to 85	UAN	Samples

<sup>(1)</sup> The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> RoHS: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (CI) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

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

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

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



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10-Dec-2020

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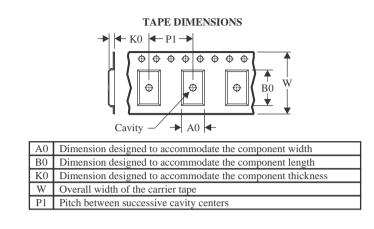


Texas

STRUMENTS

#### TAPE AND REEL INFORMATION





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



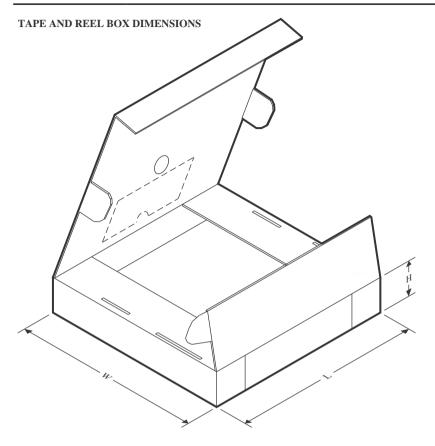
*All dimensions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AUC1G00DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
SN74AUC1G00DCKR	SC70	DCK	5	3000	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
SN74AUC1G00DCKR	SC70	DCK	5	3000	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74AUC1G00DRLR	SOT-5X3	DRL	5	4000	180.0	9.5	1.78	1.78	0.69	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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### PACKAGE MATERIALS INFORMATION

20-Apr-2023



\*All dimensions are nominal

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	184.0	184.0	19.0
SN74AUC1G00DRLR	SOT-5X3	DRL	5	4000	202.0	201.0	28.0
SN74AUC1G00YZPR	DSBGA	YZP	5	3000	220.0	220.0	35.0

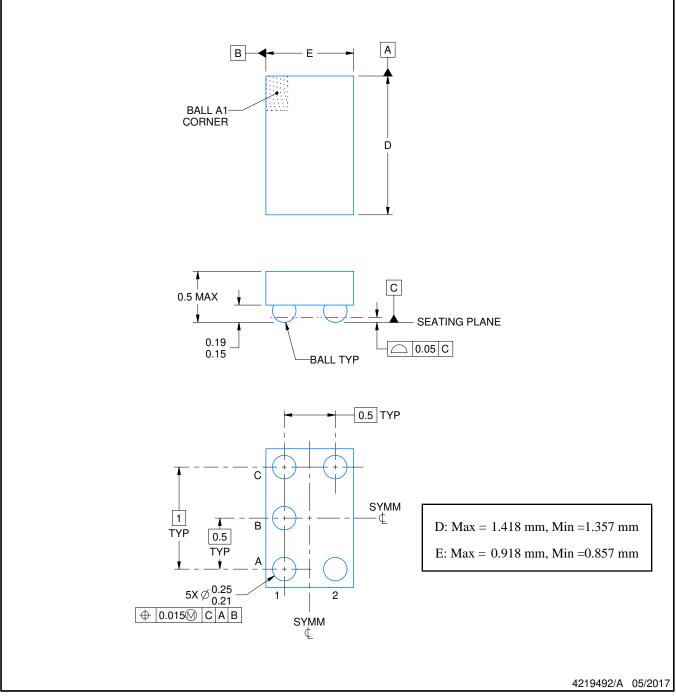
# **YZP0005**



## **PACKAGE OUTLINE**

#### DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



NOTES:

- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M. 2. This drawing is subject to change without notice.

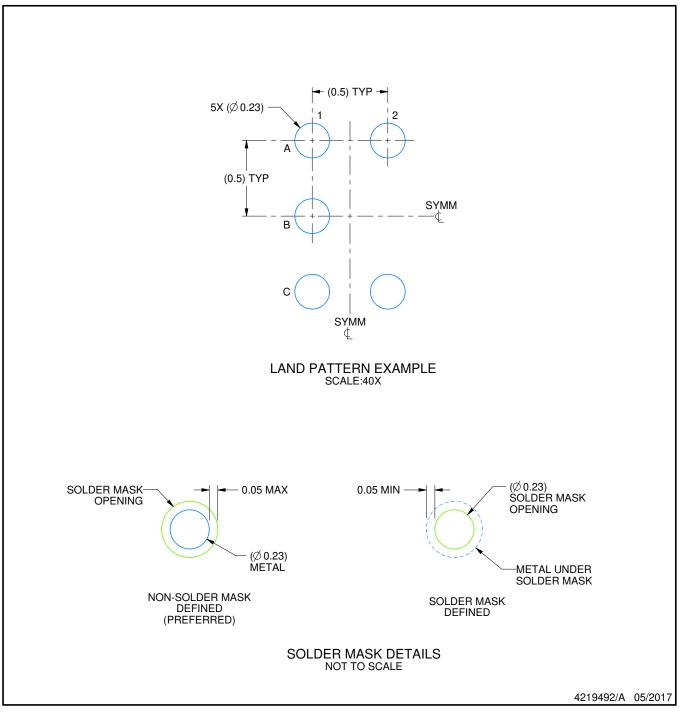


## YZP0005

# **EXAMPLE BOARD LAYOUT**

#### DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



NOTES: (continued)

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

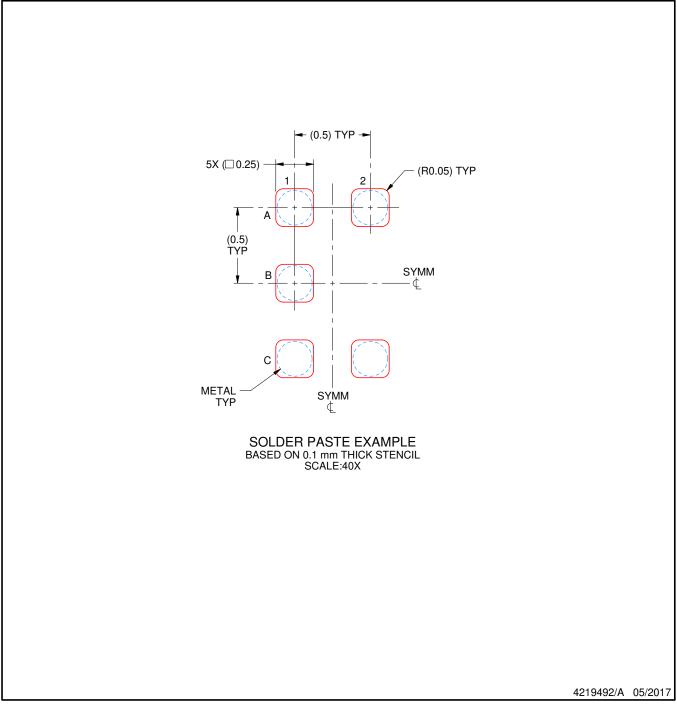


## YZP0005

# **EXAMPLE STENCIL DESIGN**

#### DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



NOTES: (continued)

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



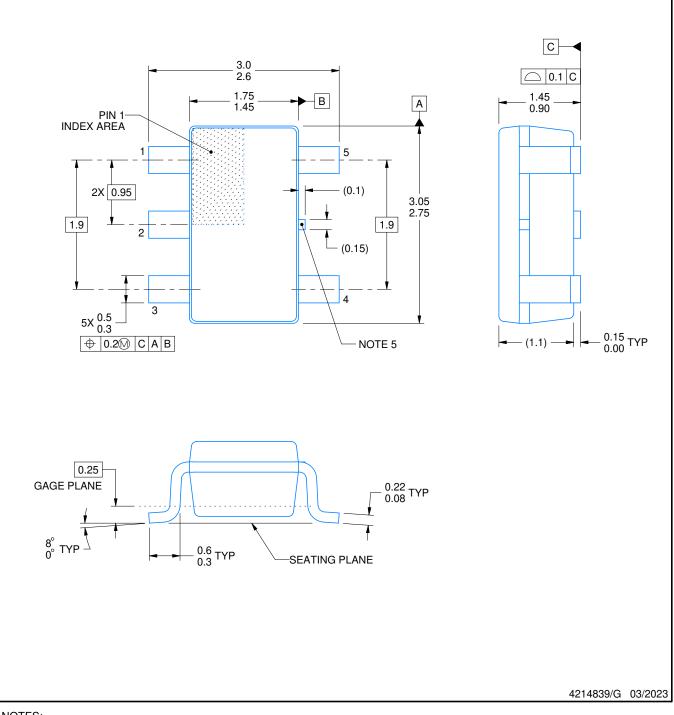
## **DBV0005A**



## **PACKAGE OUTLINE**

#### SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



NOTES:

- 1. 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.Refernce 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.

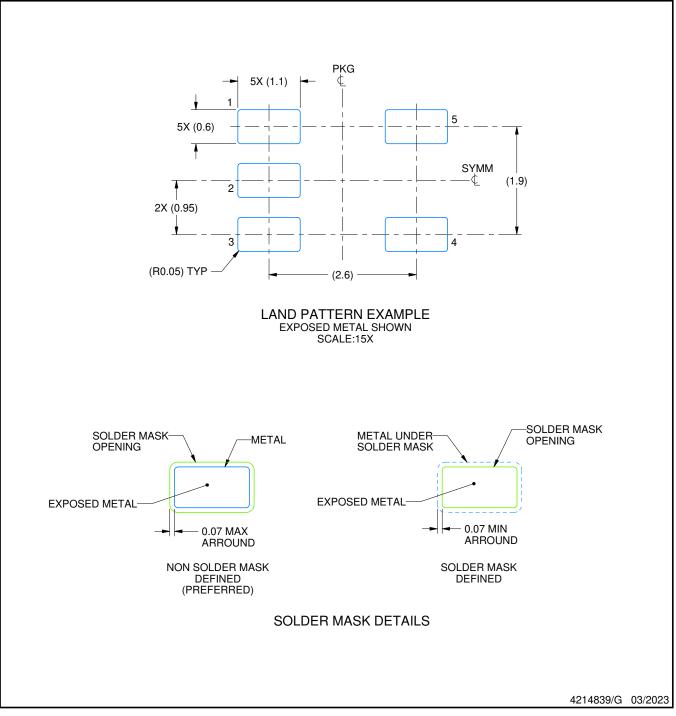


## **DBV0005A**

# **EXAMPLE BOARD LAYOUT**

#### SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



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.

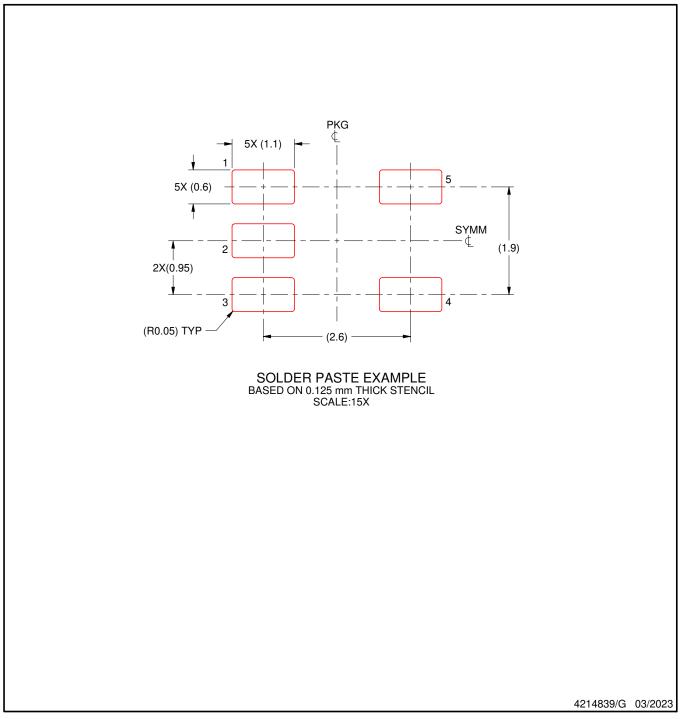


### **DBV0005A**

# **EXAMPLE STENCIL DESIGN**

#### SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



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.



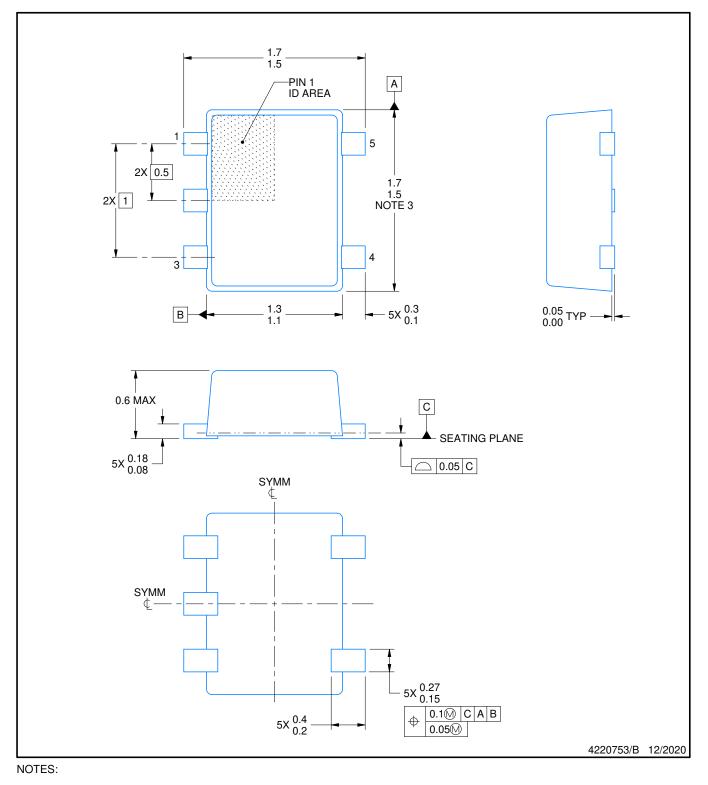
# **DRL0005A**



## **PACKAGE OUTLINE**

#### SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



- 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

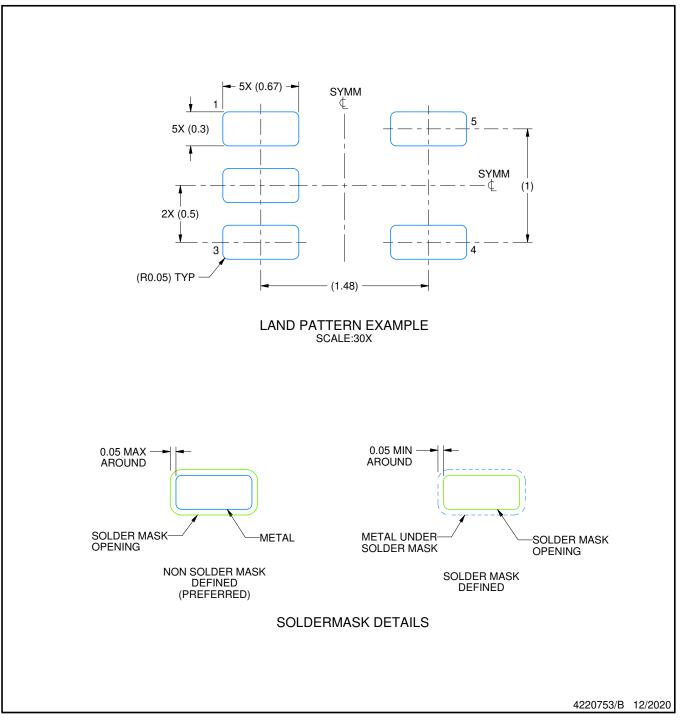


## **DRL0005A**

# **EXAMPLE BOARD LAYOUT**

# SOT - 0.6 mm max height

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.

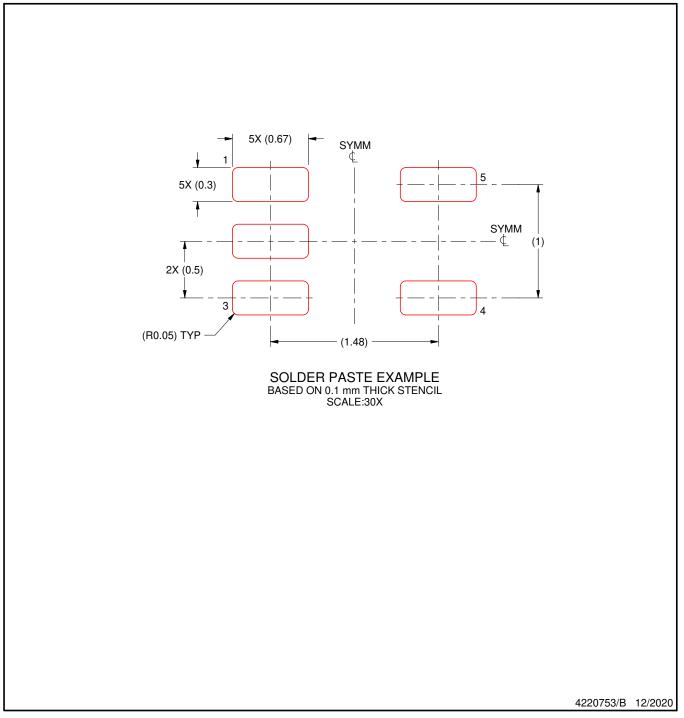


### **DRL0005A**

# **EXAMPLE STENCIL DESIGN**

#### SOT - 0.6 mm max height

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.



# DCK0005A



# **PACKAGE OUTLINE**

#### SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



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.
  Reference JEDEC MO-203.
  Support pin may differ or may not be present.



## **DCK0005A**

# **EXAMPLE BOARD LAYOUT**

#### SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



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.



## DCK0005A

# **EXAMPLE STENCIL DESIGN**

### SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



NOTES: (continued)



<sup>6.</sup> Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

<sup>7.</sup> Board assembly site may have different recommendations for stencil design.

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