



SN74AHC1GU04 Single Inverter Gate

1 Features

- Operating Range of 2-V to 5.5-V V_{CC}
- Unbuffered Output
- ± 8 -mA Output Drive at 5 V
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model
 - 200-V Machine Model
 - 1000-V Charged-Device Model

2 Applications

- Wireless and Telecom Infrastructure
- Audio Mixers
- TVs
- Set-Top-boxes
- Audio
- Servers
- Cameras: Surveillance
- Software Defined Radio (SDR)

3 Description

The SN74AHC1GU04 device contains a single inverter gate. The device performs the Boolean function $Y = \overline{A}$.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
SN74AHC1GU04DBV	SOT-23 (5)	2.90 mm x 1.60 mm
SN74AHC1GU04DCK	SC-70 (5)	2.00 mm x 1.30 mm
SN74AHC1GU04DRL	SOT (5)	1.65 mm x 1.20 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Logic Diagram (Positive Logic)



Copyright © 2016, Texas Instruments Incorporated



Table of Contents

1 Features	1	8.2 Functional Block Diagram	8
2 Applications	1	8.3 Feature Description	8
3 Description	1	8.4 Device Functional Modes	8
4 Revision History	2	9 Application and Implementation	9
5 Pin Configuration and Functions	3	9.1 Application Information	9
6 Specifications	4	9.2 Typical Application	9
6.1 Absolute Maximum Ratings	4	10 Power Supply Recommendations	10
6.2 ESD Ratings	4	11 Layout	11
6.3 Recommended Operating Conditions	4	11.1 Layout Guidelines	11
6.4 Thermal Information	5	11.2 Layout Example	11
6.5 Electrical Characteristics	5	12 Device and Documentation Support	12
6.6 Switching Characteristics, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	5	12.1 Receiving Notification of Documentation Updates	12
6.7 Switching Characteristics, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$	5	12.2 Community Resources	12
6.8 Operating Characteristics	6	12.3 Trademarks	12
6.9 Typical Characteristics	6	12.4 Electrostatic Discharge Caution	12
7 Parameter Measurement Information	7	12.5 Glossary	12
8 Detailed Description	8	13 Mechanical, Packaging, and Orderable Information	12
8.1 Overview	8		

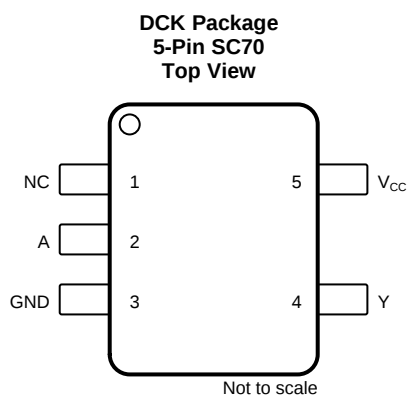
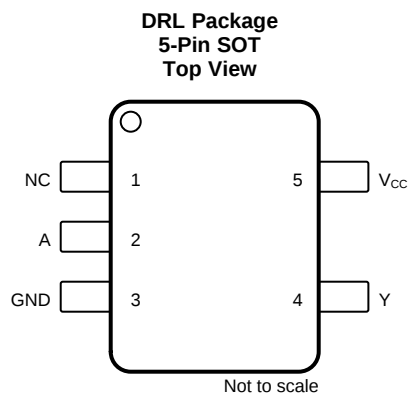
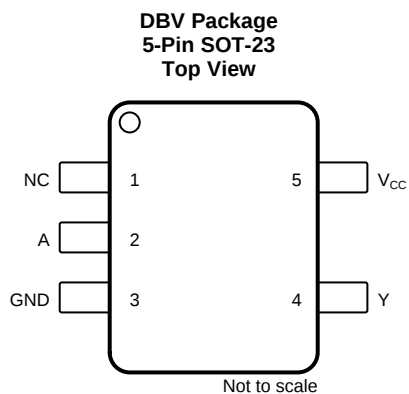
4 Revision History

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

Changes from Revision R (December 2014) to Revision S	Page
Deleted "2-Input" from data sheet title	1
Added missing package names	1
Changed "SOT-553" to "SOT"	1
Changed " $I_{OH} = 50\text{ }\mu\text{A}$ " to " $I_{OL} = 50\text{ }\mu\text{A}$ " for V_{OL} in <i>Electrical Characteristics</i> table	5
Changed <i>Typical Application Schematic</i> with a more accurate image	9
Added <i>Receiving Notification of Documentation Updates</i> section and <i>Community Resources</i> section	12

Changes from Revision Q (June 2005) to Revision R	Page
Added <i>Applications</i> , <i>Device Information</i> table, <i>Pin Functions</i> table, <i>ESD Ratings</i> table, <i>Thermal Information</i> table, <i>Typical Characteristics</i> , <i>Feature Description</i> section, <i>Device Functional Modes</i> , <i>Application and Implementation</i> section, <i>Power Supply Recommendations</i> section, <i>Layout</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section.	1
Deleted <i>Ordering Information</i> table.	1
Changed MAX operating temperature in <i>Recommended Operating Conditions</i> table.	4

5 Pin Configuration and Functions



NC – No internal connection

See mechanical drawings for dimensions.

Pin Functions

PIN		TYPE	DESCRIPTION
NO.	NAME		
1	NC	—	No connection
2	A	I	Input A
3	GND	—	Ground pin
4	Y	O	Output Y
5	V _{CC}	—	Power pin

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	7	V
V _I	Input voltage ⁽²⁾		−0.5	7	V
V _O	Output voltage ⁽²⁾		−0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current	V _I < 0		−20	mA
I _{OK}	Output clamp current	V _O < 0 or V _O > V _{CC}		±20	mA
I _O	Continuous output current	V _O = 0 to V _{CC}		±25	mA
Continuous current through each 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 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
		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

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

		MIN	MAX	UNIT
V _{CC}	Supply voltage	2	5.5	V
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.7	V
		V _{CC} = 3 V	2.4	
		V _{CC} = 5.5 V	4.4	
V _{IL}	Low-level input voltage	V _{CC} = 2 V	0.3	V
		V _{CC} = 3 V	0.6	
		V _{CC} = 5.5 V	1.1	
V _{IH}	Input voltage	0	5.5	V
V _O	Output voltage	0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 2 V	−50	μA
		V _{CC} = 3.3 V ± 0.3 V	−4	mA
		V _{CC} = 5 V ± 0.5 V	−8	
I _{OL}	Low-level output current	V _{CC} = 2 V	50	μA
		V _{CC} = 3.3 V ± 0.3 V	4	mA
		V _{CC} = 5 V ± 0.5 V	8	
T _A	Operating free-air temperature	−40	125	°C

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

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74AHC1GU04			UNIT
		DBV (SOT-23)	DCK (SC70)	DRL (SOT)	
		5 PINS			
R _{θJA}	Junction-to-ambient thermal resistance	231.3	287.6	328.7	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	119.9	97.7	105.1	°C/W
R _{θJB}	Junction-to-board thermal resistance	60.6	65.	150.3	°C/W
Ψ _{JT}	Junction-to-top characterization parameter	17.8	2.0	6.9	°C/W
Ψ _{JB}	Junction-to-board characterization parameter	60.1	64.2	148.4	°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

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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			–40°C to +85°C		–40°C to +125°C		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	I _{OH} = –50 μA	2 V	1.8	2		1.8		1.9		V
		3 V	2.7	3		2.7		2.7		
		4.5 V	4	4.5		4		4.4		
	I _{OH} = –4 mA	3 V	2.58			2.48		2.48		
	I _{OH} = –8 mA	4.5 V	3.94			3.8		3.8		
V _{OL}	I _{OL} = 50 μA	2 V			0.2		0.2		0.1	V
		3 V			0.3		0.3		0.1	
		4.5 V			0.5		0.5		0.1	
	I _{OL} = 4 mA	3 V			0.36		0.44		0.44	
	I _{OL} = 8 mA	4.5 V			0.36		0.44		0.44	
I _I	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1		±1	μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V			1		10		10	μA
C _i	V _I = V _{CC} or GND	5 V		2	10		10		10	pF

6.6 Switching Characteristics, V_{CC} = 3.3 V ± 0.3 V

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	T _A = 25°C			–40°C to +85°C		–40°C to +125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A	Y	C _L = 15 pF		5	7.1	1	8.5	1	9.5	ns
t _{PHL}					5	7.1	1	8.5	1	9.5	
t _{PLH}	A	Y	C _L = 50 pF		7.5	10.6	1	12	1	13	ns
t _{PHL}					7.5	10.6	1	12	1	13	

6.7 Switching Characteristics, V_{CC} = 5 V ± 0.5 V

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	T _A = 25°C			–40°C to +85°C		–40°C to +125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A	Y	C _L = 15 pF		3.5	5.5	1	6	1	6.5	ns
t _{PHL}					3.5	5.5	1	6	1	6.5	

SN74AHC1GU04

SCLS343S – APRIL 1996 – REVISED OCTOBER 2016

www.ti.com

Switching Characteristics, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (continued)

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

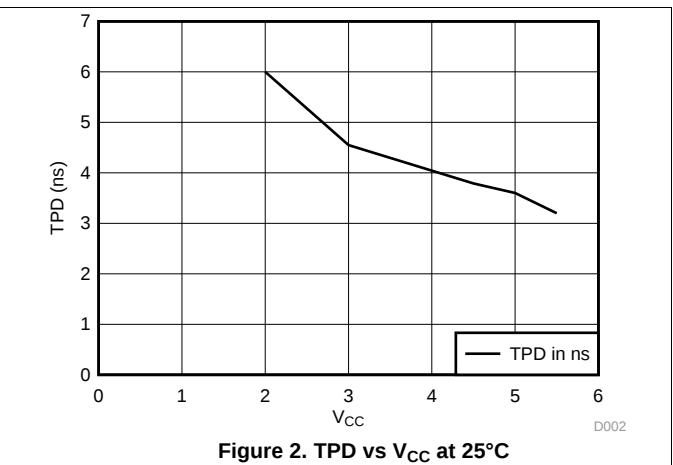
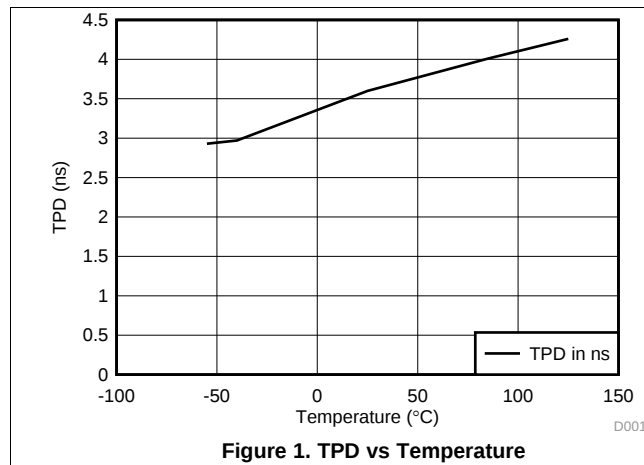
PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	$T_A = 25^\circ\text{C}$			$-40^\circ\text{C to } +85^\circ\text{C}$		$-40^\circ\text{C to } +125^\circ\text{C}$		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	$C_L = 50\text{ pF}$	5	7		1	8	1	8.5	ns
t_{PHL}				5	7		1	8	1	8.5	

6.8 Operating Characteristics

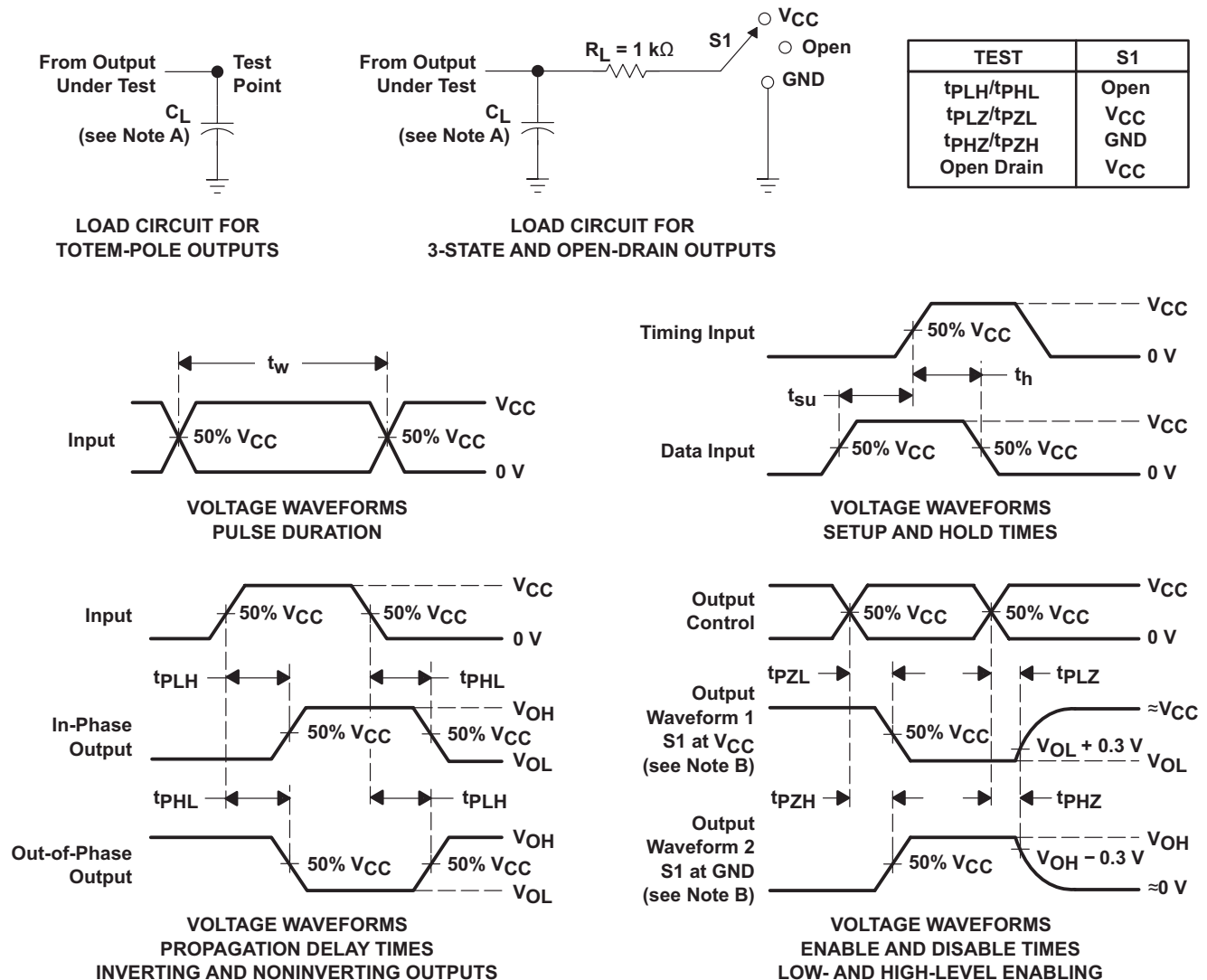
$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load, $f = 1\text{ MHz}$	7.3	pF

6.9 Typical Characteristics



7 Parameter Measurement Information



- 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: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
- D. The outputs are measured one at a time with one input transition per measurement.

Figure 3. Load Circuit And Voltage Waveforms

8 Detailed Description

8.1 Overview

The SN74AHC1GU04 device contains a single inverter gate. The device performs the Boolean function $Y = \bar{A}$. Internal circuitry consists of a single-stage inverter that can be used in analog applications, such as crystal oscillators.

8.2 Functional Block Diagram



Copyright © 2016, Texas Instruments Incorporated

Figure 4. Logic Diagram (Positive Logic)

8.3 Feature Description

- Wide operating voltage range
 - Operates from 2 V to 5.5 V
- Allows down-voltage translation
 - Inputs accept voltages to 5.5 V
- The unbuffered output is ideal for use in oscillator circuits

8.4 Device Functional Modes

[Table 1](#) lists the functional modes of SN74AHC1GU04.

Table 1. Function Table

INPUT A	OUTPUT Y
H	L
L	H

9 Application and Implementation

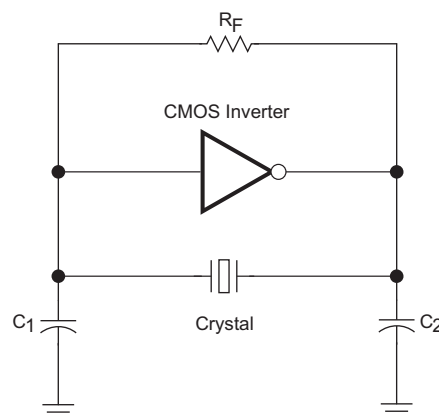
NOTE

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

A CMOS inverter is used as a linear amplifier in oscillator applications. Similar to a conventional amplifier, their open-loop gain is a critical characteristic. The bandwidth of an inverter decreases as the operating voltage decreases. The open-loop gain of the AHC1GU04 device is shown in [Figure 6](#).

9.2 Typical Application



Copyright © 2016, Texas Instruments Incorporated

Figure 5. Typical 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 will also create 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
 - For rise time and fall time specifications, see $\Delta t/\Delta V$ in the [Recommended Operating Conditions](#) table.
 - For 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 5.5 V at any valid V_{CC} .
2. Recommended Output Conditions
 - Load currents should not exceed 25 mA per output and 50 mA total for the part.
 - Outputs should not be pulled above V_{CC} .

Typical Application (continued)

9.2.3 Application Curve

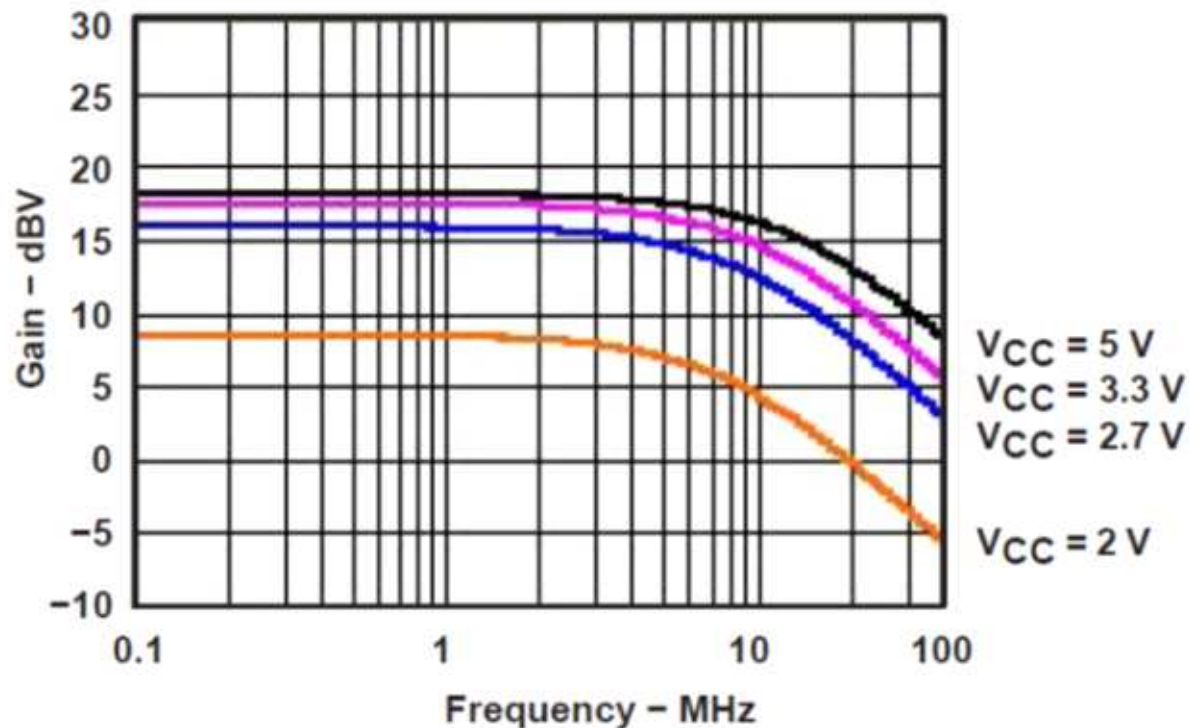


Figure 6. Open-Loop Gain

10 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the [Recommended Operating Conditions](#) table.

Each V_{CC} pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μ F is recommended. If there are multiple V_{CC} pins, 0.01 μ F or 0.022 μ F is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μ F and 1 μ F are commonly used in parallel. The bypass capacitor should be installed 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 them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they will be tied to GND or V_{CC} , whichever makes more sense or is more convenient. It is acceptable to float outputs unless the part is a transceiver. If the transceiver has an output enable pin, it will disable the outputs section of the part when asserted. This will not disable the input section of the I/Os so they also cannot float when disabled.

11.2 Layout Example

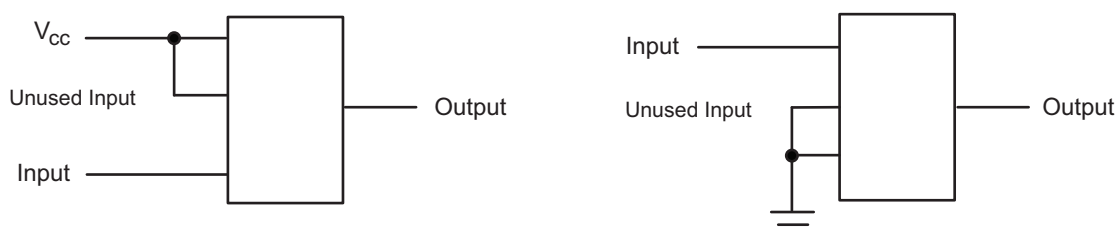


Figure 7. Layout Diagram

12 Device and Documentation Support

12.1 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.

12.2 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.

12.3 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

12.4 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.

12.5 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 part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
74AHC1GU04DBVRG4	Active	Production	SOT-23 (DBV) 5	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AU4G
74AHC1GU04DBVTG4	Obsolete	Production	SOT-23 (DBV) 5	-	-	Call TI	Call TI	-40 to 125	AU4G
74AHC1GU04DCKTG4	Obsolete	Production	SC70 (DCK) 5	-	-	Call TI	Call TI	-40 to 125	AD3
SN74AHC1GU04DBVR	Active	Production	SOT-23 (DBV) 5	3000 LARGE T&R	Yes	NIPDAU SN NIPDAU	Level-1-260C-UNLIM	-40 to 125	(AU43, AU4G, AU4J, AU4L, AU4S)
SN74AHC1GU04DBVT	Obsolete	Production	SOT-23 (DBV) 5	-	-	Call TI	Call TI	-40 to 125	(AU43, AU4G, AU4J, AU4L, AU4S)
SN74AHC1GU04DCK3	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SNBI	Level-1-260C-UNLIM	-40 to 85	ADY
SN74AHC1GU04DCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SN NIPDAU	Level-1-260C-UNLIM	-40 to 125	(AD3, ADG, ADJ, AD L, ADS)
SN74AHC1GU04DCKT	Obsolete	Production	SC70 (DCK) 5	-	-	Call TI	Call TI	-40 to 125	(AD3, ADG, ADJ, AD L, ADS)
SN74AHC1GU04DRLR	Active	Production	SOT-5X3 (DRL) 5	4000 LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	ADS

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

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

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

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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

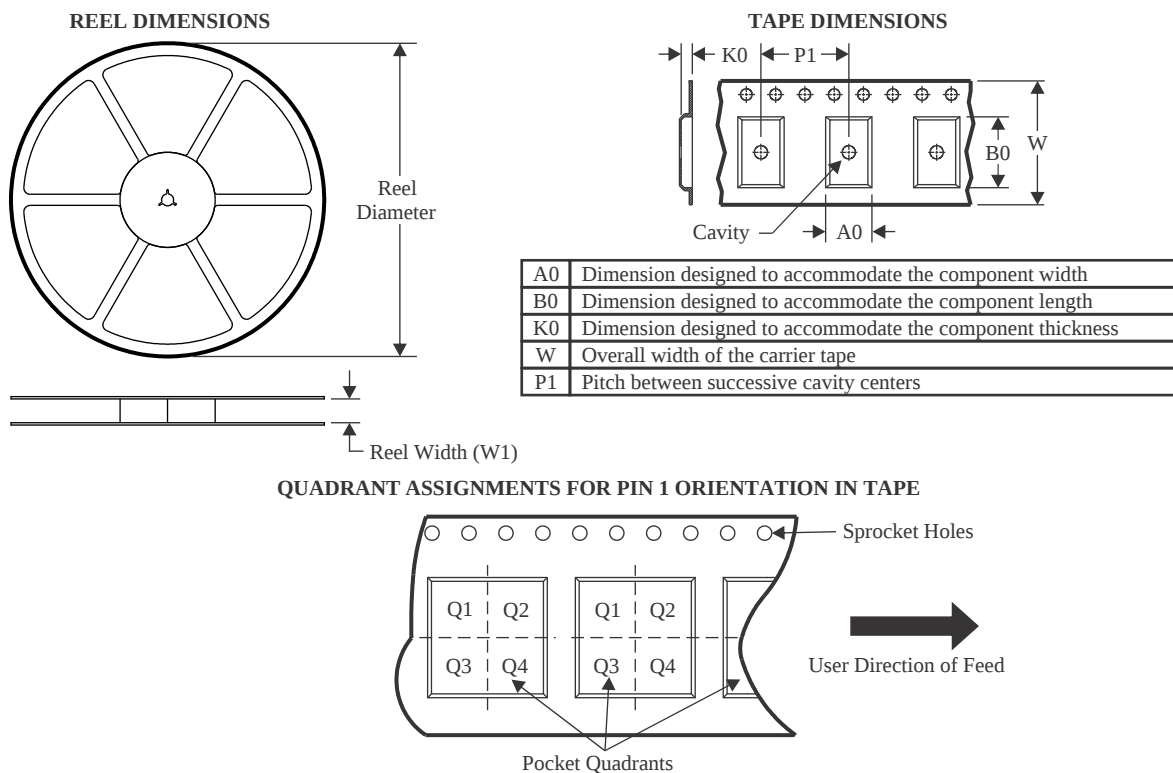
⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

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

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

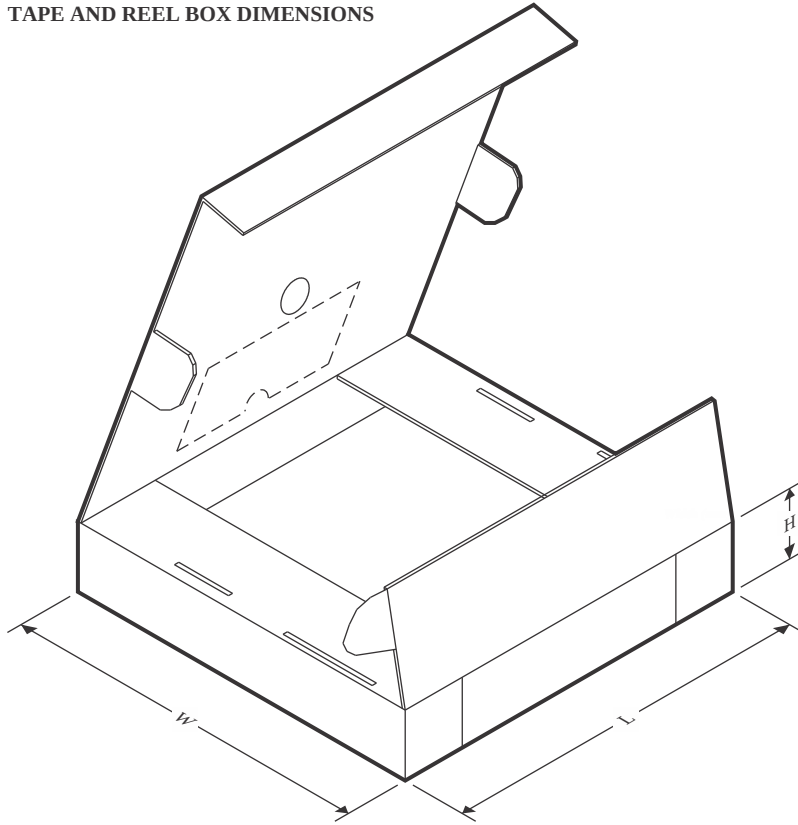
TAPE AND REEL INFORMATION



*All dimensions are nominal

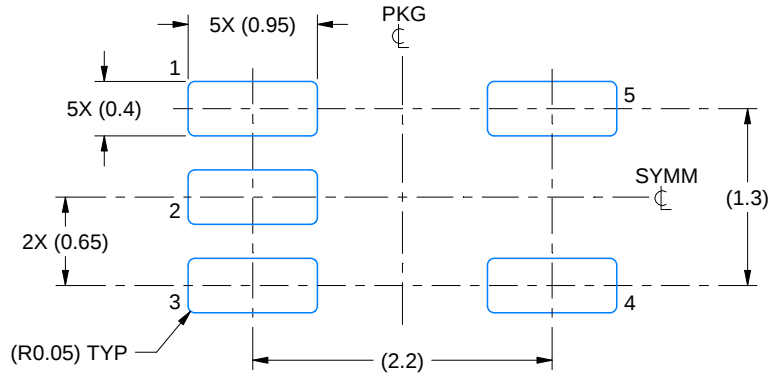
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
74AHC1GU04DBVRG4	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
SN74AHC1GU04DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
SN74AHC1GU04DBVR	SOT-23	DBV	5	3000	180.0	8.4	3.23	3.17	1.37	4.0	8.0	Q3
SN74AHC1GU04DCKR	SC70	DCK	5	3000	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
SN74AHC1GU04DRLR	SOT-5X3	DRL	5	4000	180.0	8.4	1.98	1.78	0.69	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS

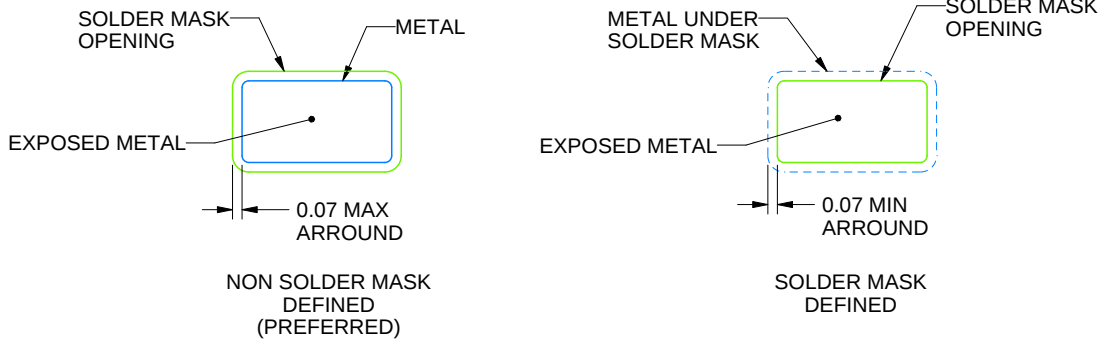


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74AHC1GU04DBVRG4	SOT-23	DBV	5	3000	180.0	180.0	18.0
SN74AHC1GU04DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
SN74AHC1GU04DBVR	SOT-23	DBV	5	3000	202.0	201.0	28.0
SN74AHC1GU04DCKR	SC70	DCK	5	3000	180.0	180.0	18.0
SN74AHC1GU04DRLR	SOT-5X3	DRL	5	4000	202.0	201.0	28.0



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:18X



SOLDER MASK DETAILS

4214834/G 11/2024

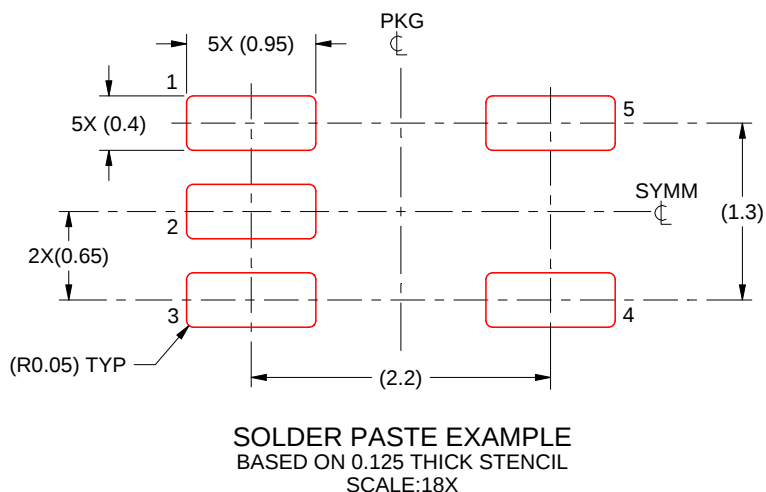
NOTES: (continued)

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

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



4214834/G 11/2024

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.



SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



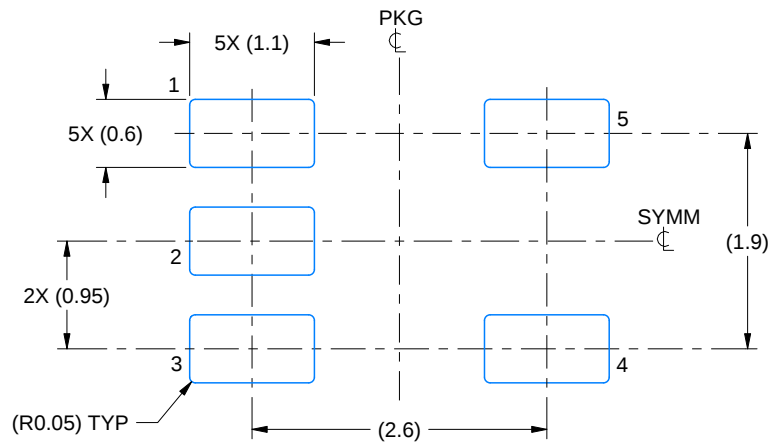
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.
4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25 mm per side.
5. Support pin may differ or may not be present.

EXAMPLE BOARD LAYOUT

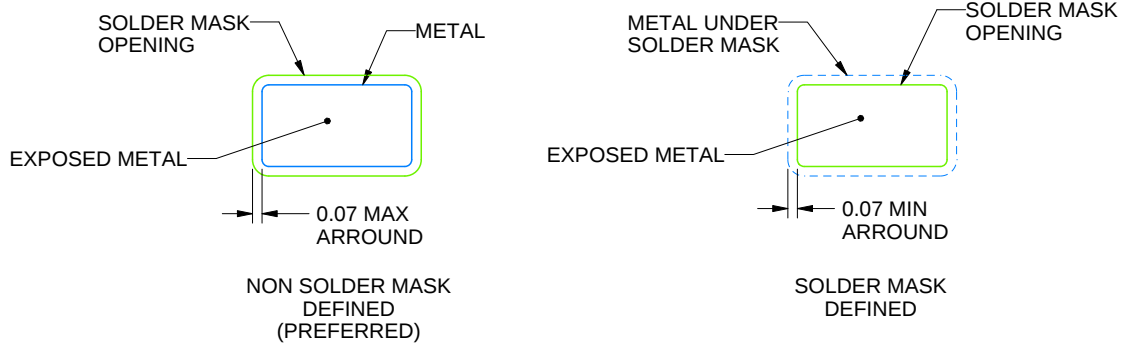
DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:15X



SOLDER MASK DETAILS

4214839/K 08/2024

NOTES: (continued)

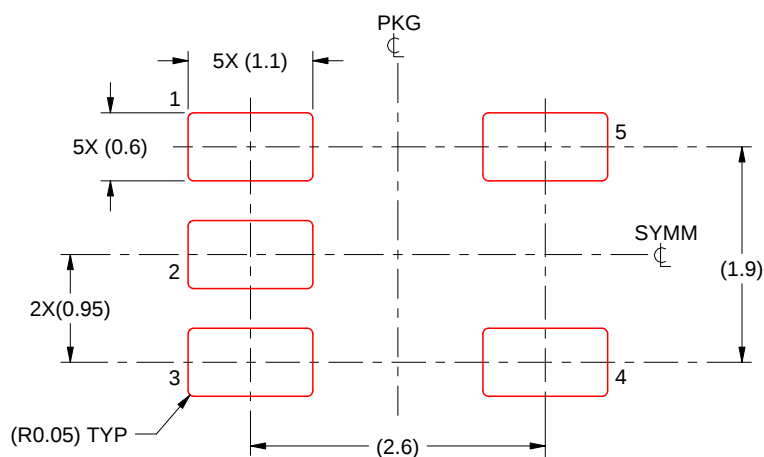
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



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

4214839/K 08/2024

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.



SOT - 0.6 mm max height

[illegible]

NOTES:

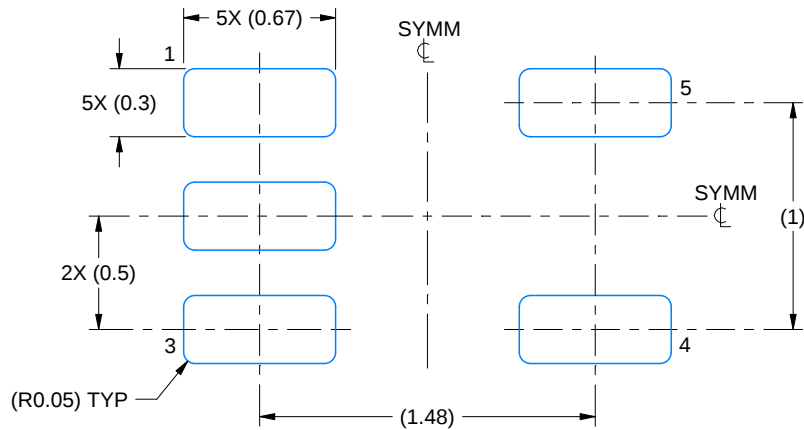
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-293 Variation UAAD-1

EXAMPLE BOARD LAYOUT

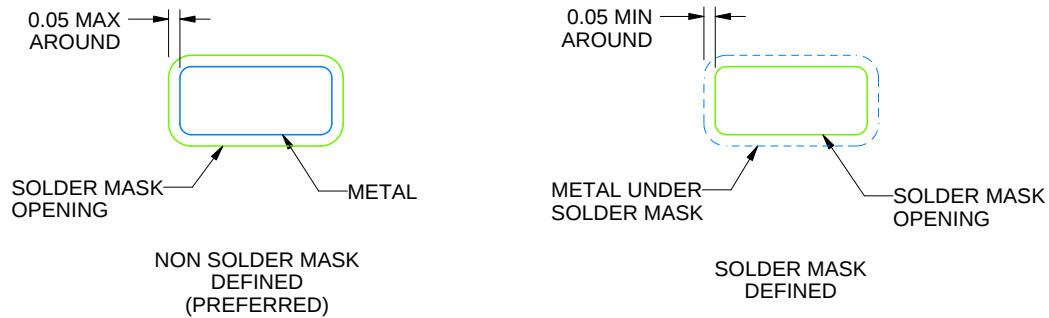
DRL0005A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



LAND PATTERN EXAMPLE
SCALE:30X



SOLDERMASK DETAILS

4220753/E 11/2024

NOTES: (continued)

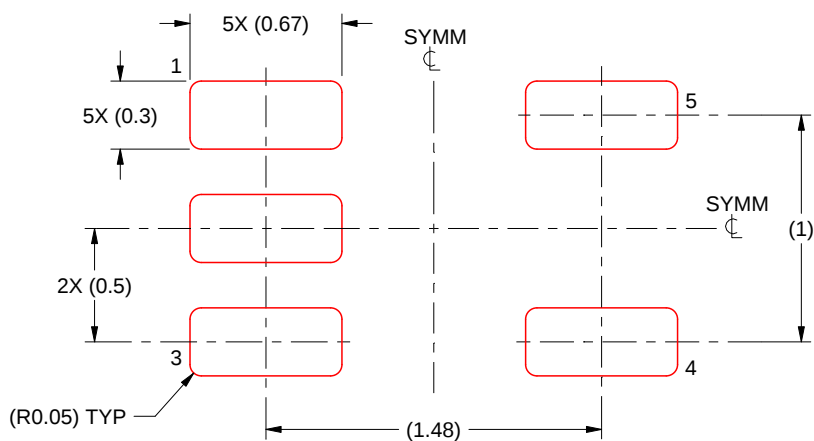
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DRL0005A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:30X

4220753/E 11/2024

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.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2025, Texas Instruments Incorporated