

## SN74AHC1GU04 Single Inverter Gate

### 1 Features

- Operating Range of 2-V to 5.5-V  $V_{CC}$
- Unbuffered Output
- $\pm 8$ -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

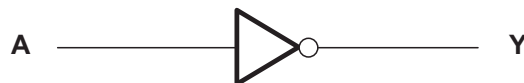
The SN74AHC1GU04 device contains a single inverter gate. The device performs the Boolean function  $Y = \bar{A}$ .

#### Device Information<sup>(1)</sup>

| 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)



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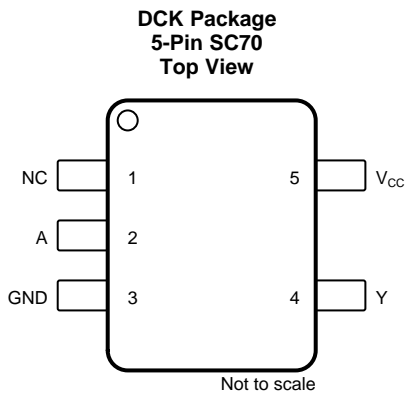
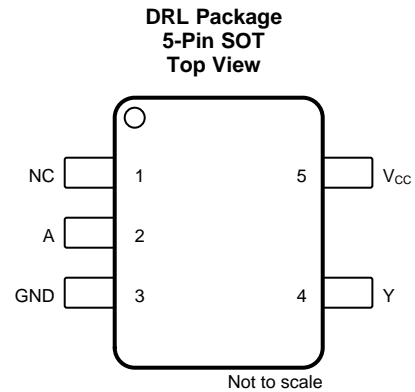
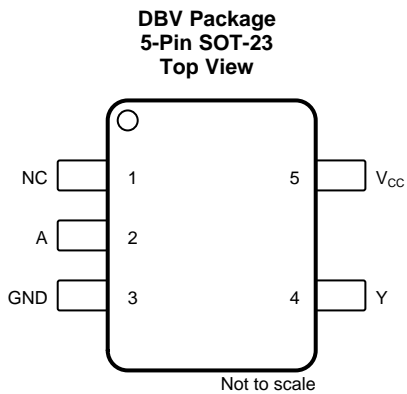
## 4 Revision History

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

| <b>Changes from Revision R (December 2014) to Revision S</b>   | <b>Page</b> |
|--|-------------|
| • Deleted "2-Input" from data sheet title .....  | <b>1</b>    |
| • Added missing package names .....  | <b>1</b>    |
| • Changed "SOT-553" to "SOT" .....   | <b>1</b>    |
| • 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 ..... | <b>5</b>    |
| • Changed <i>Typical Application Schematic</i> with a more accurate image .....  | <b>9</b>    |
| • Added <i>Receiving Notification of Documentation Updates</i> section and <i>Community Resources</i> section .....                                  | <b>12</b>   |

| <b>Changes from Revision Q (June 2005) to Revision R</b>   | <b>Page</b> |
|--|-------------|
| • 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. .... | <b>1</b>    |
| • Deleted <i>Ordering Information</i> table. ....  | <b>1</b>    |
| • Changed MAX operating temperature in <i>Recommended Operating Conditions</i> table. ....   | <b>4</b>    |

## 5 Pin Configuration and Functions



NC – No internal connection

See mechanical drawings for dimensions.

### Pin Functions

| NO. | PIN             |  | TYPE | DESCRIPTION   |
|-----|-----------------|--|------|---------------|
|     | NAME            |  |      |               |
| 1   | NC              |  | —    | No connection |
| 2   | A               |  | I    | Input A       |
| 3   | GND             |  | —    | Ground pin    |
| 4   | Y               |  | O    | Output Y      |
| 5   | V <sub>CC</sub> |  | —    | Power pin     |

## 6 Specifications

### 6.1 Absolute Maximum Ratings

 over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup>

|  |                               | MIN  | MAX                   | UNIT |    |
|--|-------------------------------|--|-----------------------|------|----|
| V <sub>CC</sub>  | Supply voltage                | -0.5   | 7                     | V    |    |
| V <sub>I</sub>   | Input voltage <sup>(2)</sup>  | -0.5   | 7                     | V    |    |
| V <sub>O</sub>   | Output voltage <sup>(2)</sup> | -0.5   | V <sub>CC</sub> + 0.5 | V    |    |
| I <sub>IK</sub>  | Input clamp current           | V <sub>I</sub> < 0                                     |                       | -20  | mA |
| I <sub>OK</sub>  | Output clamp current          | V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CC</sub> |                       | ±20  | mA |
| I <sub>O</sub>   | Continuous output current     | V <sub>O</sub> = 0 to V <sub>CC</sub>                  |                       | ±25  | mA |
| Continuous current through each V <sub>CC</sub> or GND |                               |  |                       | ±50  | mA |
| T <sub>J</sub>   | Junction temperature          |  |                       | 150  | °C |
| T <sub>stg</sub>                                       | 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 <sub>(ESD)</sub> | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 <sup>(1)</sup>              | 2000 |
|                    |                         | Charged device model (CDM), per JEDEC specification JESD22-C101 <sup>(2)</sup> | 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)<sup>(1)</sup>

|                 |                                | MIN                             | MAX             | UNIT |
|-----------------|--------------------------------|---------------------------------|-----------------|------|
| V <sub>CC</sub> | Supply voltage                 | 2                               | 5.5             | V    |
| V <sub>IH</sub> | High-level input voltage       | V <sub>CC</sub> = 2 V           | 1.7             | V    |
|                 |                                | V <sub>CC</sub> = 3 V           | 2.4             |      |
|                 |                                | V <sub>CC</sub> = 5.5 V         | 4.4             |      |
| V <sub>IL</sub> | Low-level input voltage        | V <sub>CC</sub> = 2 V           | 0.3             | V    |
|                 |                                | V <sub>CC</sub> = 3 V           | 0.6             |      |
|                 |                                | V <sub>CC</sub> = 5.5 V         | 1.1             |      |
| V <sub>IH</sub> | Input voltage                  | 0                               | 5.5             | V    |
| V <sub>O</sub>  | Output voltage                 | 0                               | V <sub>CC</sub> | V    |
| I <sub>OH</sub> | High-level output current      | V <sub>CC</sub> = 2 V           | -50             | μA   |
|                 |                                | V <sub>CC</sub> = 3.3 V ± 0.3 V | -4              | mA   |
|                 |                                | V <sub>CC</sub> = 5 V ± 0.5 V   | -8              |      |
| I <sub>OL</sub> | Low-level output current       | V <sub>CC</sub> = 2 V           | 50              | μA   |
|                 |                                | V <sub>CC</sub> = 3.3 V ± 0.3 V | 4               | mA   |
|                 |                                | V <sub>CC</sub> = 5 V ± 0.5 V   | 8               |      |
| T <sub>A</sub>  | Operating free-air temperature | -40                             | 125             | °C   |

- (1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. See *Implications of Slow or Floating CMOS Inputs* (SCBA004).

## 6.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |  | SN74AHC1GU04    |               |              | UNIT |
|-------------------------------|--|-----------------|---------------|--------------|------|
|                               |  | DBV<br>(SOT-23) | DCK<br>(SC70) | DRL<br>(SOT) |      |
|                               |  | 5 PINS          |               |              |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance       | 231.3           | 287.6         | 328.7        | °C/W |
| R <sub>θJC(top)</sub>         | Junction-to-case (top) thermal resistance    | 119.9           | 97.7          | 105.1        | °C/W |
| R <sub>θJB</sub>              | Junction-to-board thermal resistance         | 60.6            | 65.           | 150.3        | °C/W |
| ψ <sub>JT</sub>               | Junction-to-top characterization parameter   | 17.8            | 2.0           | 6.9          | °C/W |
| ψ <sub>JB</sub>               | 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 <sub>CC</sub> | T <sub>A</sub> = 25°C |     |      | –40°C to +85°C |      | –40°C to +125°C |     | UNIT |
|-----------------|---|-----------------|-----------------------|-----|------|----------------|------|-----------------|-----|------|
|                 |   |                 | MIN                   | TYP | MAX  | MIN            | MAX  | MIN             | MAX |      |
| V <sub>OH</sub> | I <sub>OH</sub> = –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 <sub>OH</sub> = –4 mA                                     | 3 V             | 2.58                  |     |      | 2.48           |      | 2.48            |     |      |
|                 |   | 4.5 V           | 3.94                  |     |      | 3.8            |      | 3.8             |     |      |
| V <sub>OL</sub> | I <sub>OL</sub> = 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 <sub>OL</sub> = 4 mA                                      | 3 V             |                       |     | 0.36 |                | 0.44 | 0.44            |     |      |
|                 |   | 4.5 V           |                       |     | 0.36 |                | 0.44 | 0.44            |     |      |
| I <sub>I</sub>  | V <sub>I</sub> = 5.5 V or GND                               | 0 V to 5.5 V    |                       |     | ±0.1 |                | ±1   | ±1              | μA  |      |
| I <sub>CC</sub> | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 | 5.5 V           |                       |     | 1    |                | 10   | 10              | μA  |      |
| C <sub>i</sub>  | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V             |                       | 2   | 10   |                | 10   | 10              | pF  |      |

## 6.6 Switching Characteristics, V<sub>CC</sub> = 3.3 V ± 0.3 V

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

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | OUTPUT<br>CAPACITANCE  | T <sub>A</sub> = 25°C |      |     | –40°C to<br>+85°C |     | –40°C to +125°C |     | UNIT |
|------------------|-----------------|----------------|------------------------|-----------------------|------|-----|-------------------|-----|-----------------|-----|------|
|                  |                 |                |                        | MIN                   | TYP  | MAX | MIN               | MAX | MIN             | MAX |      |
| t <sub>PLH</sub> | A               | Y              | C <sub>L</sub> = 15 pF | 5                     | 7.1  |     | 1                 | 8.5 | 1               | 9.5 | ns   |
| t <sub>PHL</sub> |                 |                |                        | 5                     | 7.1  |     | 1                 | 8.5 | 1               | 9.5 |      |
| t <sub>PLH</sub> | A               | Y              | C <sub>L</sub> = 50 pF | 7.5                   | 10.6 |     | 1                 | 12  | 1               | 13  | ns   |
| t <sub>PHL</sub> |                 |                |                        | 7.5                   | 10.6 |     | 1                 | 12  | 1               | 13  |      |

## 6.7 Switching Characteristics, V<sub>CC</sub> = 5 V ± 0.5 V

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

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | OUTPUT<br>CAPACITANCE  | T <sub>A</sub> = 25°C |     |     | –40°C to<br>+85°C |     | –40°C to +125°C |     | UNIT |
|------------------|-----------------|----------------|------------------------|-----------------------|-----|-----|-------------------|-----|-----------------|-----|------|
|                  |                 |                |                        | MIN                   | TYP | MAX | MIN               | MAX | MIN             | MAX |      |
| t <sub>PLH</sub> | A               | Y              | C <sub>L</sub> = 15 pF | 3.5                   | 5.5 |     | 1                 | 6   | 1               | 6.5 | ns   |
| t <sub>PHL</sub> |                 |                |                        | 3.5                   | 5.5 |     | 1                 | 6   | 1               | 6.5 |      |

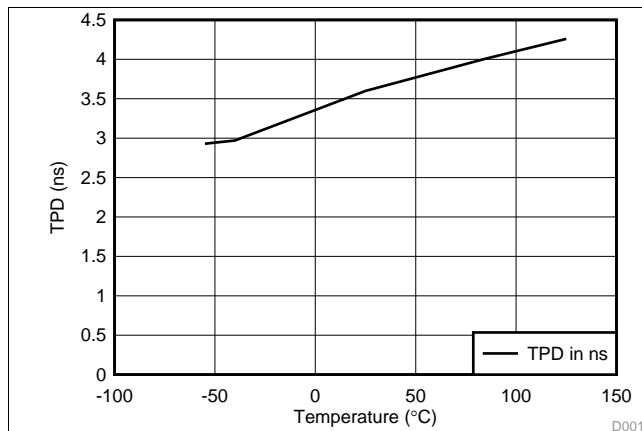
**Switching Characteristics,  $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (continued)**

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

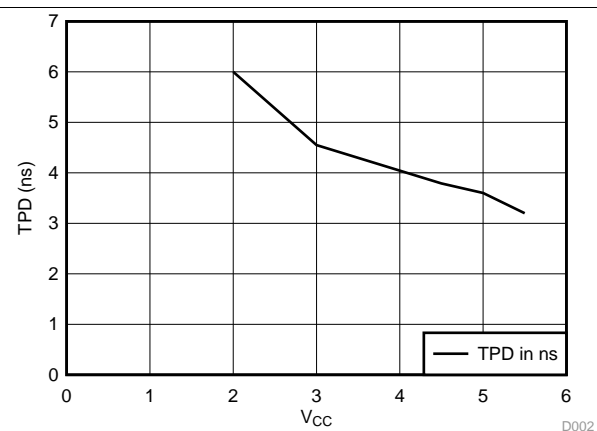
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | OUTPUT CAPACITANCE   | $T_A = 25^\circ\text{C}$ |     |     | $-40^\circ\text{C to } +85^\circ\text{C}$ |     | $-40^\circ\text{C to } +125^\circ\text{C}$ |     | UNIT |
|-----------|--------------|-------------|----------------------|--------------------------|-----|-----|---|-----|--|-----|------|
|           |              |             |                      | 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   |

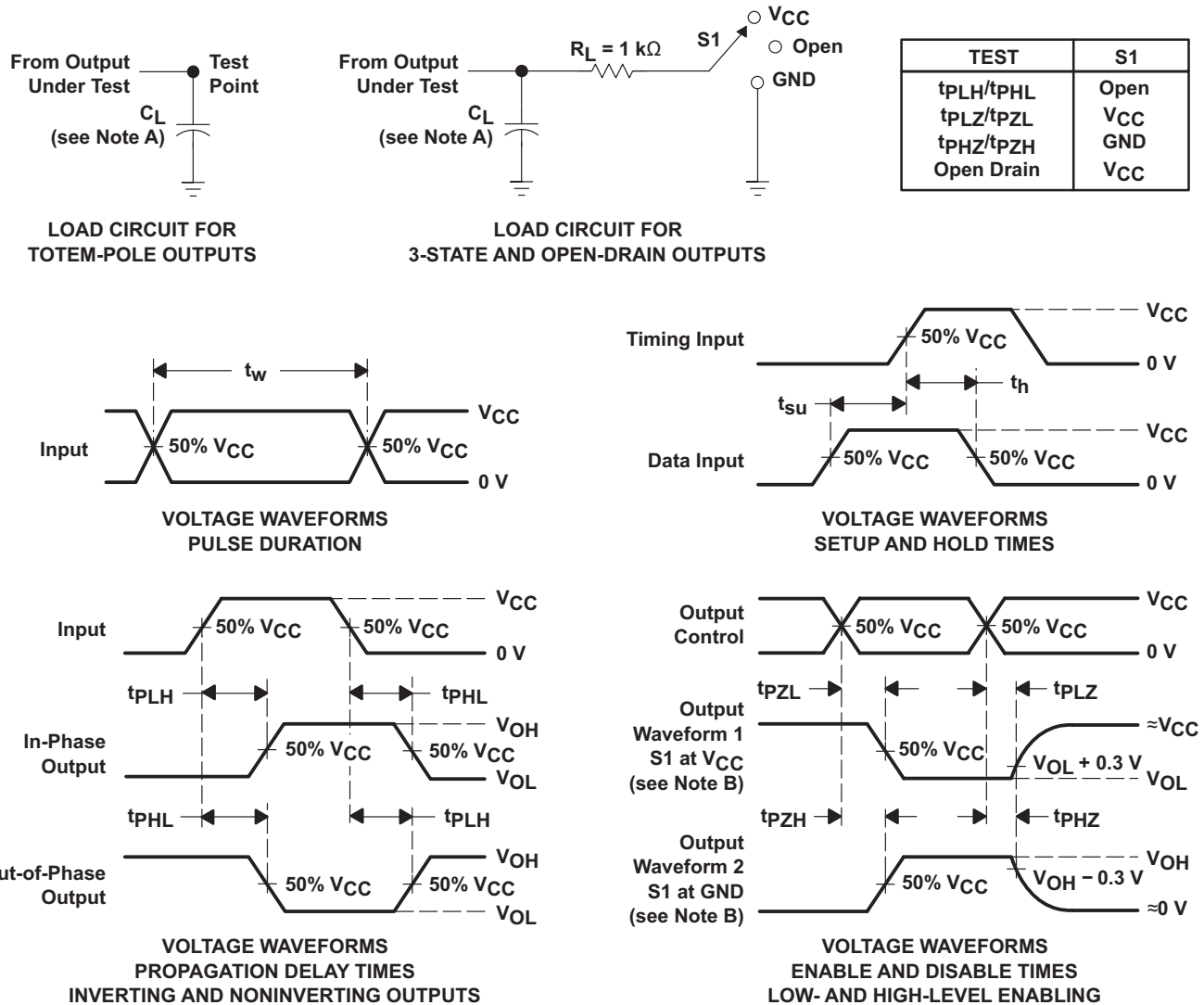
**6.9 Typical Characteristics**

**Figure 1. TPD vs Temperature**

D001


**Figure 2. TPD vs  $V_{CC}$  at  $25^\circ\text{C}$** 

D002

## 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



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**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<br>A | OUTPUT<br>Y |
|------------|-------------|
| H          | L           |
| L          | H           |



## 9 Application and Implementation

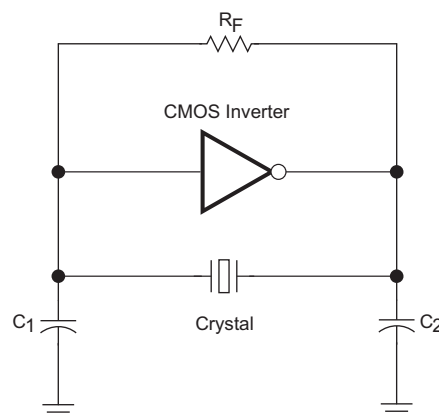
### NOTE

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



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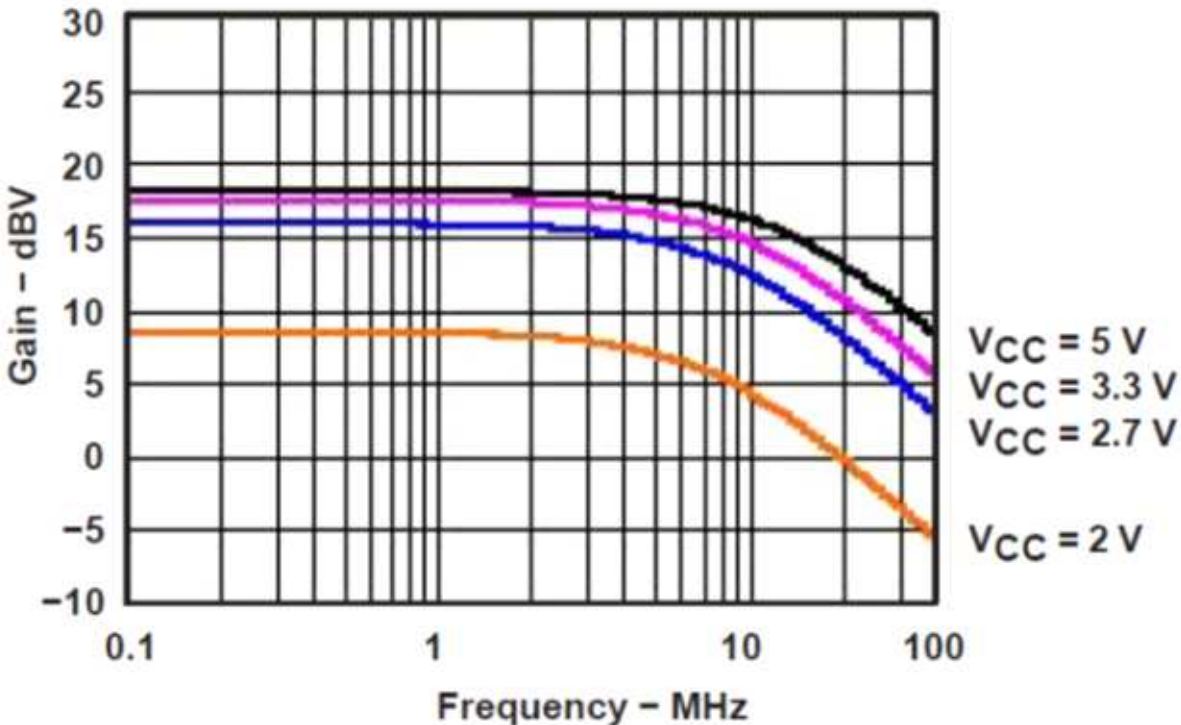
**Figure 5. Typical Application Schematic**

#### 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<sub>CC</sub> pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1 μF is recommended. If there are multiple V<sub>CC</sub> pins, 0.01 μF or 0.022 μF is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1 μF and 1 μF 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

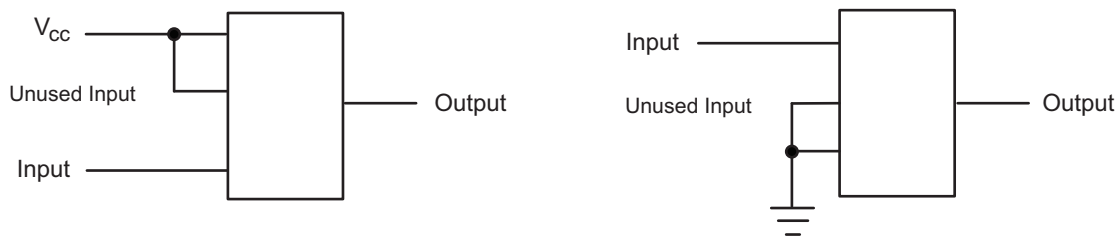


Figure 7. Layout Diagram

## 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 Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan<br>(2)         | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)        | Samples                 |
|------------------|---------------|--------------|-----------------|------|-------------|-------------------------|-------------------------|----------------------|--------------|--------------------------------|-------------------------|
| 74AHC1GU04DBVRG4 | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | Green (RoHS & no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 125   | AU4G                           | <a href="#">Samples</a> |
| 74AHC1GU04DBVTG4 | ACTIVE        | SOT-23       | DBV             | 5    | 250         | Green (RoHS & no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 125   | AU4G                           | <a href="#">Samples</a> |
| 74AHC1GU04DCKTG4 | ACTIVE        | SC70         | DCK             | 5    | 250         | Green (RoHS & no Sb/Br) | NIPDAU                  | Level-1-260C-UNLIM   | -40 to 125   | AD3                            | <a href="#">Samples</a> |
| SN74AHC1GU04DBVR | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | Green (RoHS & no Sb/Br) | NIPDAU   SN             | Level-1-260C-UNLIM   | -40 to 125   | (AU43, AU4G, AU4J, AU4L, AU4S) | <a href="#">Samples</a> |
| SN74AHC1GU04DBVT | ACTIVE        | SOT-23       | DBV             | 5    | 250         | Green (RoHS & no Sb/Br) | NIPDAU   SN             | Level-1-260C-UNLIM   | -40 to 125   | (AU43, AU4G, AU4J, AU4L, AU4S) | <a href="#">Samples</a> |
| SN74AHC1GU04DCK3 | ACTIVE        | SC70         | DCK             | 5    | 3000        | Pb-Free (RoHS)          | SNBI                    | Level-1-260C-UNLIM   | -40 to 85    | ADY                            | <a href="#">Samples</a> |
| SN74AHC1GU04DCKR | ACTIVE        | SC70         | DCK             | 5    | 3000        | Green (RoHS & no Sb/Br) | NIPDAU   SN             | Level-1-260C-UNLIM   | -40 to 125   | (AD3, ADG, ADJ, ADL, ADS)      | <a href="#">Samples</a> |
| SN74AHC1GU04DCKT | ACTIVE        | SC70         | DCK             | 5    | 250         | Green (RoHS & no Sb/Br) | NIPDAU   SN             | Level-1-260C-UNLIM   | -40 to 125   | (AD3, ADG, ADJ, ADL, ADS)      | <a href="#">Samples</a> |
| SN74AHC1GU04DRLR | ACTIVE        | SOT-5X3      | DRL             | 5    | 4000        | Green (RoHS & no Sb/Br) | NIPDAUAG                | Level-1-260C-UNLIM   | -40 to 125   | ADS                            | <a href="#">Samples</a> |

(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.

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## TAPE AND REEL INFORMATION



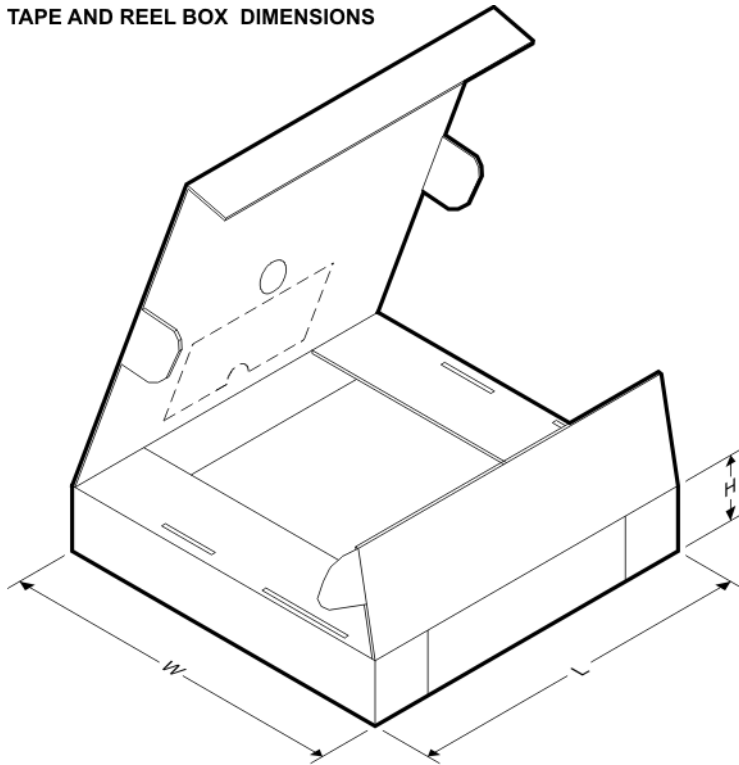
### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 74AHC1GU04DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| 74AHC1GU04DBVTG4 | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| 74AHC1GU04DCKTG4 | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 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            |
| SN74AHC1GU04DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.2                | 3.3     | 3.23    | 1.55    | 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            |
| SN74AHC1GU04DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHC1GU04DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHC1GU04DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.2                | 3.3     | 3.23    | 1.55    | 4.0     | 8.0    | Q3            |
| SN74AHC1GU04DBVT | SOT-23       | DBV             | 5    | 250  | 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            |
| SN74AHC1GU04DCKR | SC70         | DCK             | 5    | 3000 | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHC1GU04DCKR | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHC1GU04DCKR | SC70         | DCK             | 5    | 3000 | 180.0              | 8.4                | 2.47    | 2.3     | 1.25    | 4.0     | 8.0    | Q3            |
| SN74AHC1GU04DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHC1GU04DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHC1GU04DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |

| 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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 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        |
| 74AHC1GU04DBVTG4 | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| 74AHC1GU04DCKTG4 | SC70         | DCK             | 5    | 250  | 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        |
| SN74AHC1GU04DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DBVT | SOT-23       | DBV             | 5    | 250  | 202.0       | 201.0      | 28.0        |
| SN74AHC1GU04DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DCKR | SC70         | DCK             | 5    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74AHC1GU04DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |

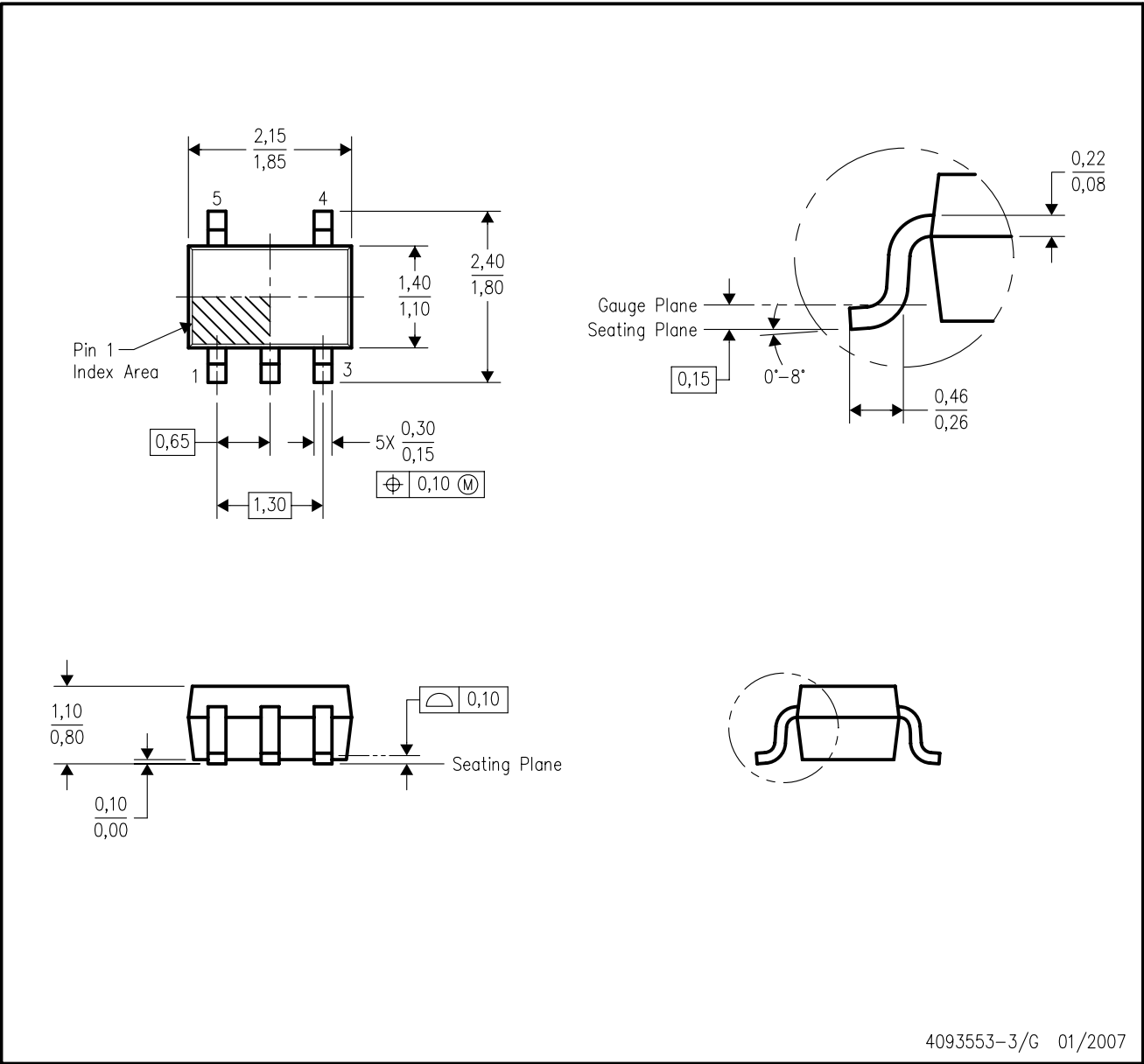


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| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AHC1GU04DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1GU04DRLR | SOT-5X3      | DRL             | 5    | 4000 | 202.0       | 201.0      | 28.0        |

DCK (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



- 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.

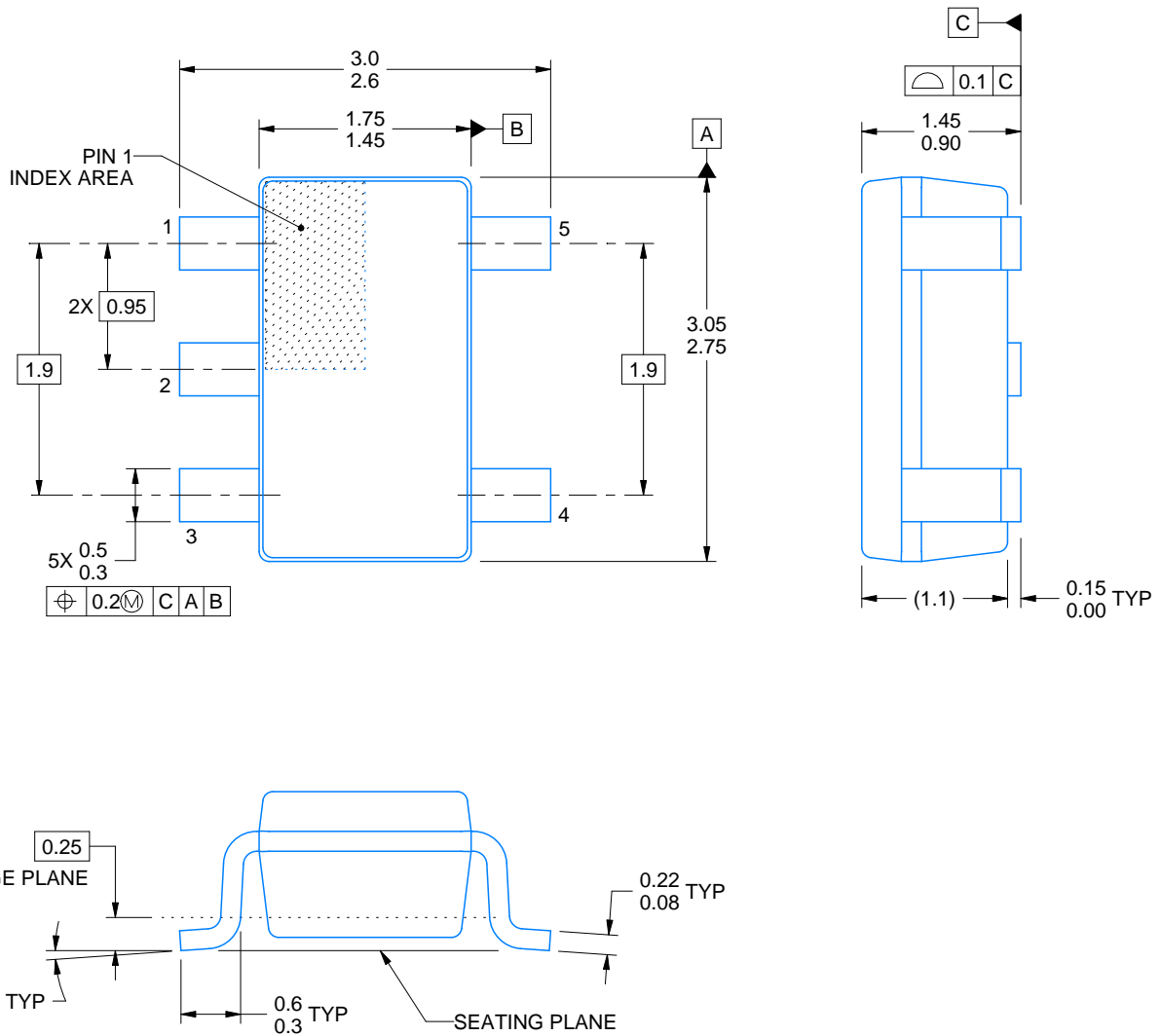
DBV0005A



# PACKAGE OUTLINE

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



4214839/E 09/2019

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. 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 0.15 mm per side.

# 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/E 09/2019

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

DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR

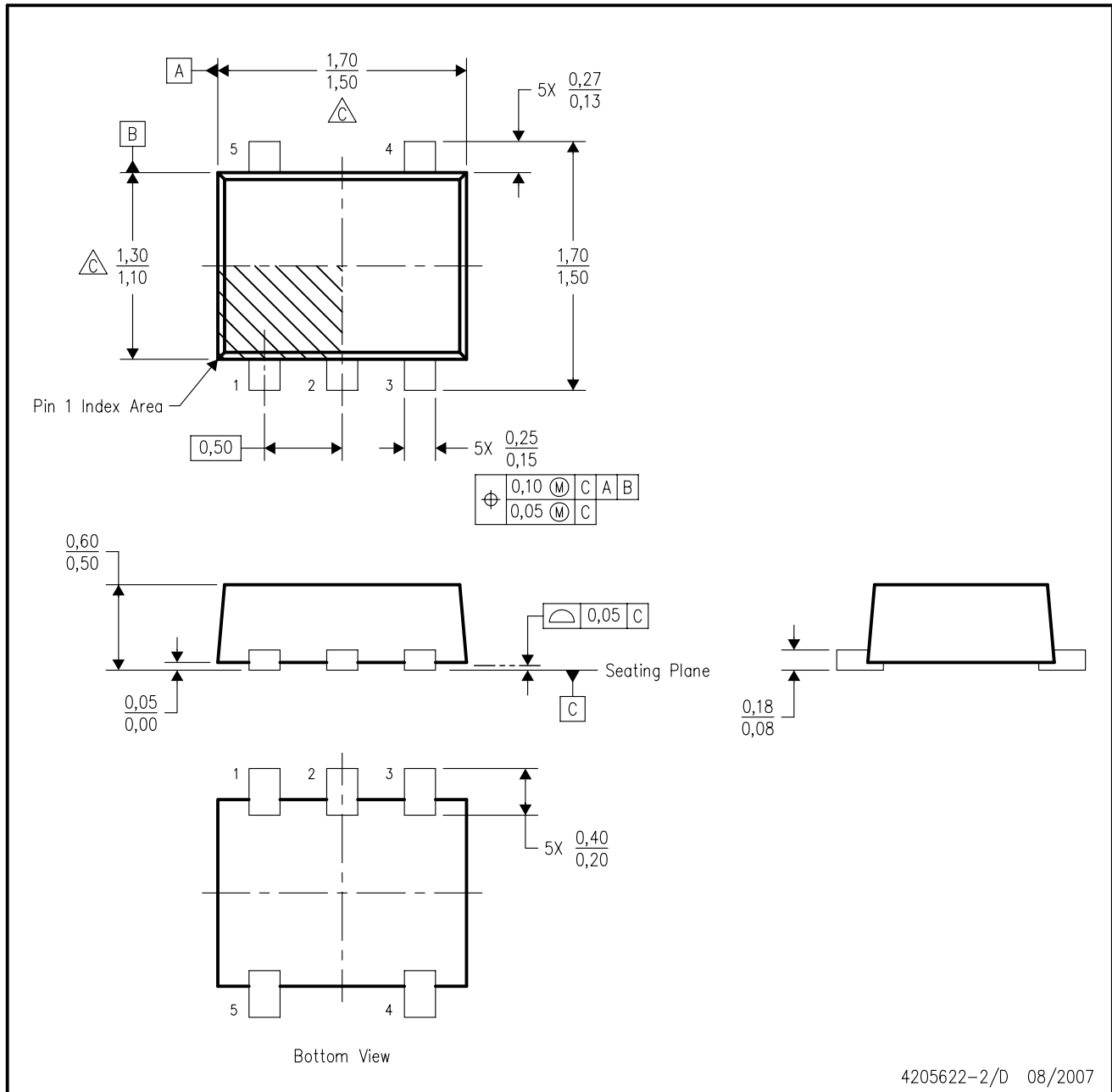


SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:15X

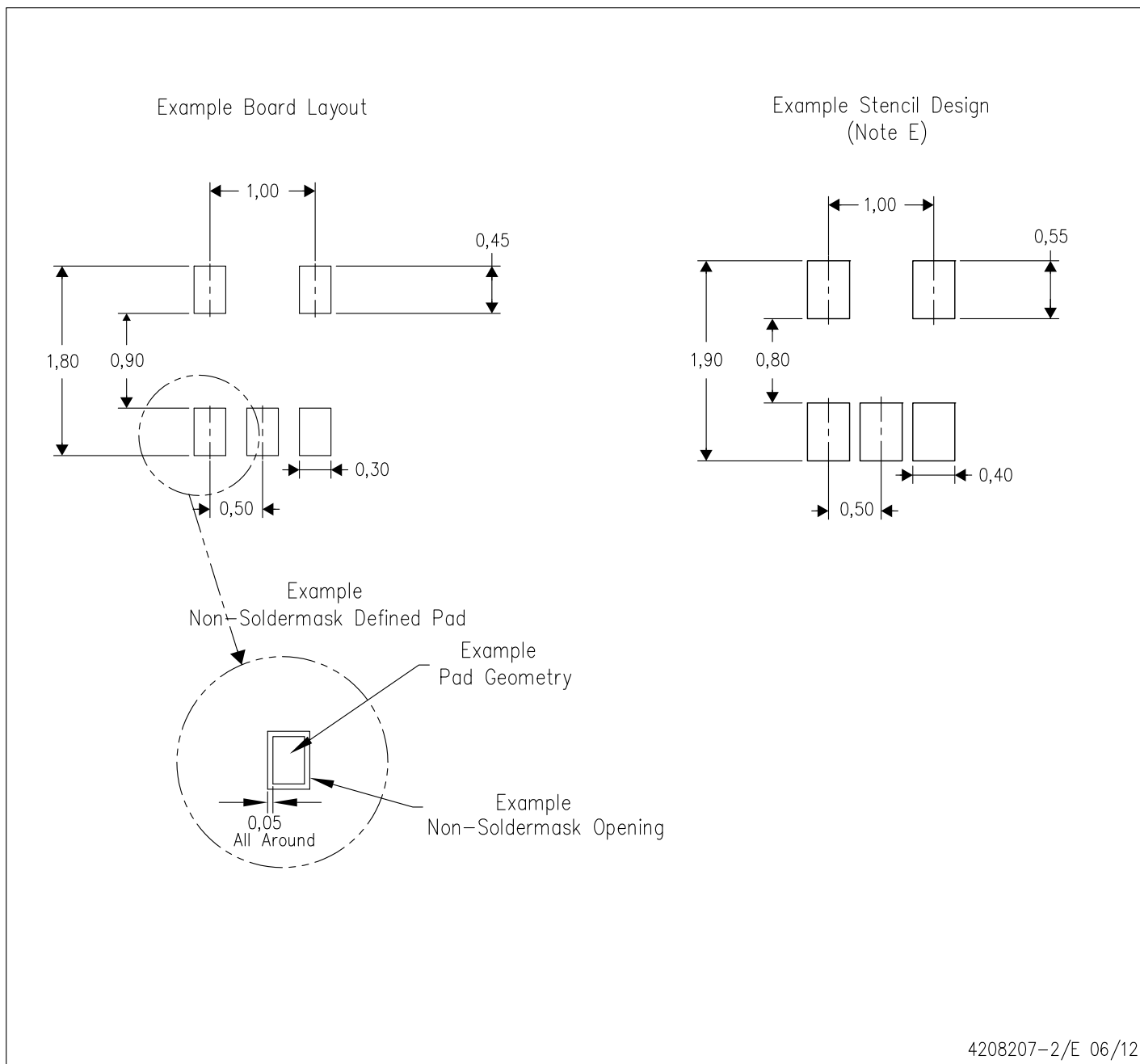
4214839/E 09/2019

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.



- 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.



- 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.



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