

## SN74AHC1G02 Single 2-Input Positive-NOR Gate

### 1 Features

- Operating Range of 2 V to 5.5 V
- Max  $t_{pd}$  of 6.5 ns at 5 V
- Low Power Consumption, 10- $\mu$ A Max  $I_{CC}$
- $\pm$ 8-mA Output Drive at 5 V
- Schmitt Trigger Action at All Inputs Makes the Circuit Tolerant for Slower Input Rise and Fall Time

### 2 Applications

- Infotainment
- Printers
- Cameras
- PCs, Notebooks
- E-Meters
- Body Control Modules

### 3 Description

This device contains a single 2-input NOR gate that performs the Boolean function  $Y = \overline{A} \times \overline{B}$  or  $Y = \overline{A + B}$  in positive logic.

#### Package Information

| PART NUMBER | PACKAGE <sup>(1)</sup> | PACKAGE SIZE <sup>(2)</sup> | BODY SIZE <sup>(3)</sup> |
|-------------|------------------------|-----------------------------|--------------------------|
| SN74AHC1G02 | DBV (SOT-23, 5)        | 2.9 mm x 2.8 mm             | 2.9 mm x 1.6 mm          |
|             | DCK (SC-70, 5)         | 2 mm x 2.1 mm               | 2 mm x 1.25 mm           |
|             | DRL (SOT-553, 5)       | 1.6 mm x 1.6 mm             | 1.6 mm x 1.2 mm          |

- (1) For all available packages, see the orderable addendum at the end of the data sheet.
- (2) The package size (length x width) is a nominal value and includes pins, where applicable.
- (3) The body size (length x width) is a nominal value and does not include pins.



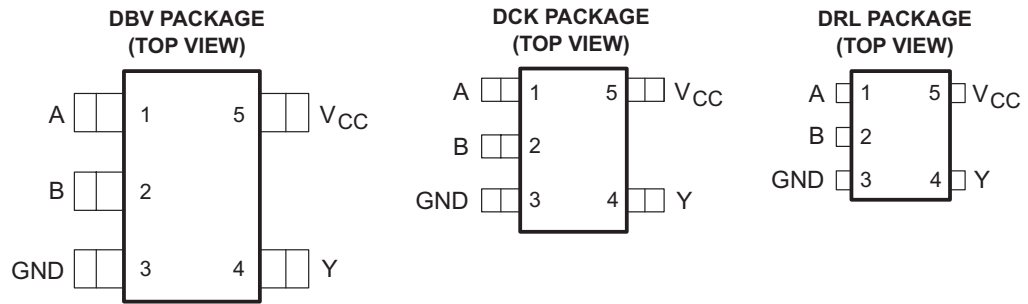
Simplified Schematic



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## 4 Pin Configuration and Functions



See mechanical drawings for dimensions.

**Table 4-1. Pin Functions**

| PIN |                 | TYPE <sup>(1)</sup> | DESCRIPTION |
|-----|-----------------|---------------------|-------------|
| NO. | NAME            |                     |             |
| 1   | A               | I                   | Input A     |
| 2   | B               | I                   | Input B     |
| 3   | GND             | —                   | Ground Pin  |
| 4   | Y               | O                   | Output Y    |
| 5   | V <sub>CC</sub> | —                   | Power Pin   |

(1) Signal Types: I = Input, O = Output, I/O = Input or Output

## 5 Specifications

### 5.1 Absolute Maximum Ratings

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

|                  |  | MIN  | MAX                   | UNIT   |
|------------------|--|--|-----------------------|--------|
| V <sub>CC</sub>  | Supply voltage range                                   | -0.5   | 7                     | V      |
| V <sub>I</sub>   | Input voltage range <sup>(2)</sup>                     | -0.5   | 7                     | V      |
| V <sub>O</sub>   | Output voltage range <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>stg</sub> | Storage temperature range                              | -65  | 150                   | °C     |
| T <sub>J</sub>   | Junction Temperature                                   |  | 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 [Section 5.3](#) 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.

### 5.2 ESD Ratings

|                    |  | VALUE | UNIT |
|--------------------|--|-------|------|
| V <sub>(ESD)</sub> | Electrostatic discharge  |       |      |
|                    | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>              | ±2000 | V    |
|                    | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins <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.

### 5.3 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           | 1.5             | V    |
|                 |                                    | V <sub>CC</sub> = 3 V           | 2.1             |      |
|                 |                                    | V <sub>CC</sub> = 5.5 V         | 3.85            |      |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 2 V           | 0.5             | V    |
|                 |                                    | V <sub>CC</sub> = 3 V           | 0.9             |      |
|                 |                                    | V <sub>CC</sub> = 5.5 V         | 1.65            |      |
| 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              |      |
|                 |                                    | 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               |      |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V   | 8               |      |
| Δt/Δv           | Input transition rise or fall rate | V <sub>CC</sub> = 3.3 V ± 0.3 V | 100             | ns/V |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V   | 20              |      |

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

|                |                                | MIN | MAX | UNIT |
|----------------|--------------------------------|-----|-----|------|
| 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. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs (SCBA004)*.

## 5.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |  | SN74AHC1G02 |       |       | UNIT |
|-------------------------------|--|-------------|-------|-------|------|
|                               |  | DBV         | DCK   | DRL   |      |
|                               |  | 5 PINS      |       |       |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance       | 278         | 289.2 | 328.7 | °C/W |
| R <sub>θJC(top)</sub>         | Junction-to-case (top) thermal resistance    | 180.5       | 205.8 | 105.1 |      |
| R <sub>θJB</sub>              | Junction-to-board thermal resistance         | 184.4       | 176.2 | 150.3 |      |
| ψ <sub>JT</sub>               | Junction-to-top characterization parameter   | 115.4       | 117.6 | 6.9   |      |
| ψ <sub>JB</sub>               | Junction-to-board characterization parameter | 183.4       | 175.1 | 148.4 |      |
| R <sub>θJC(bot)</sub>         | Junction-to-case (bot) thermal resistance    | N/A         | N/A   | N/A   |      |

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report ([SPRA953](#)).

## 5.5 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> | High level output voltage | I <sub>OH</sub> = -50 μA                                    | 2 V                   | 1.9  | 2    | 1.9           | 1.9 | V              |     |      |
|                 |                           |   | 3 V                   | 2.9  | 3    | 2.9           | 2.9 |                |     |      |
|                 |                           |   | 4.5 V                 | 4.4  | 4.5  | 4.4           | 4.4 |                |     |      |
|                 | I <sub>OH</sub> = -4 mA   | 3 V   | 2.58                  |      | 2.48 | 2.48          |     |                |     |      |
|                 | I <sub>OH</sub> = -8 mA   | 4.5 V   | 3.94                  |      | 3.8  | 3.8           |     |                |     |      |
| V <sub>OL</sub> | Low level output voltage  | I <sub>OH</sub> = 50 μA                                     | 2 V                   |      | 0.1  | 0.1           | 0.1 | V              |     |      |
|                 |                           |   | 3 V                   |      | 0.1  | 0.1           | 0.1 |                |     |      |
|                 |                           |   | 4.5 V                 |      | 0.1  | 0.1           | 0.1 |                |     |      |
|                 | I <sub>OL</sub> = 4 mA    | 3 V   |                       | 0.36 | 0.44 | 0.44          |     |                |     |      |
|                 | I <sub>OL</sub> = 8 mA    | 4.5 V   |                       | 0.36 | 0.44 | 0.44          |     |                |     |      |
| I <sub>I</sub>  | Input leakage current     | V <sub>I</sub> = 5.5 V or GND                               | 0 V to 5.5 V          |      | ±0.1 |               | ±1  | ±1             | μA  |      |
| I <sub>CC</sub> | Supply current            | 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>  | Input capacitance         | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V                   |      | 4    | 10            | 10  | 10             | pF  |      |

### 5.6 Switching Characteristics, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit And Voltage Waveforms](#))

| 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           | $C_L = 15\text{ pF}$ | 5.6                      | 7.9  |     | 1  | 9.5 | 1   | 10.5 | ns   |
| $t_{PHL}$ |              |             |                      | 5.6                      | 7.9  |     | 1  | 9.5 | 1   | 10.5 |      |
| $t_{PLH}$ | A            | Y           | $C_L = 50\text{ pF}$ | 8.1                      | 11.4 |     | 1  | 13  | 1   | 14   | ns   |
| $t_{PHL}$ |              |             |                      | 8.1                      | 11.4 |     | 1  | 13  | 1   | 14   |      |

### 5.7 Switching Characteristics, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$

over recommended operating free-air temperature range (unless otherwise noted) (see [Load Circuit And Voltage Waveforms](#))

| 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           | $C_L = 15\text{ pF}$ | 3.6                      | 5.5 |     | 1  | 6.5 | 1   | 7   | ns   |
| $t_{PHL}$ |              |             |                      | 3.6                      | 5.5 |     | 1  | 6.5 | 1   | 7   |      |
| $t_{PLH}$ | A            | Y           | $C_L = 50\text{ pF}$ | 5.1                      | 7.5 |     | 1  | 8.5 | 1   | 9   | ns   |
| $t_{PHL}$ |              |             |                      | 5.1                      | 7.5 |     | 1  | 8.5 | 1   | 9   |      |

### 5.8 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, $f = 1\text{ MHz}$ | 15  | pF   |

### 5.9 Typical Characteristics

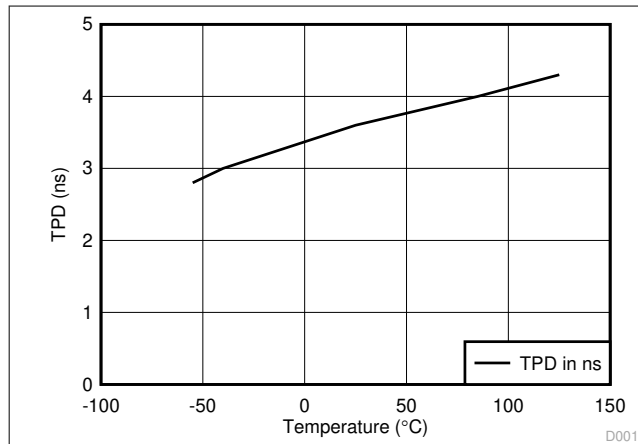


Figure 5-1. TPD vs Temperature

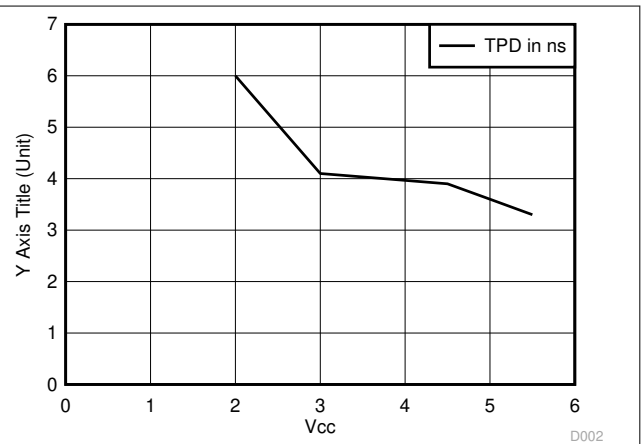
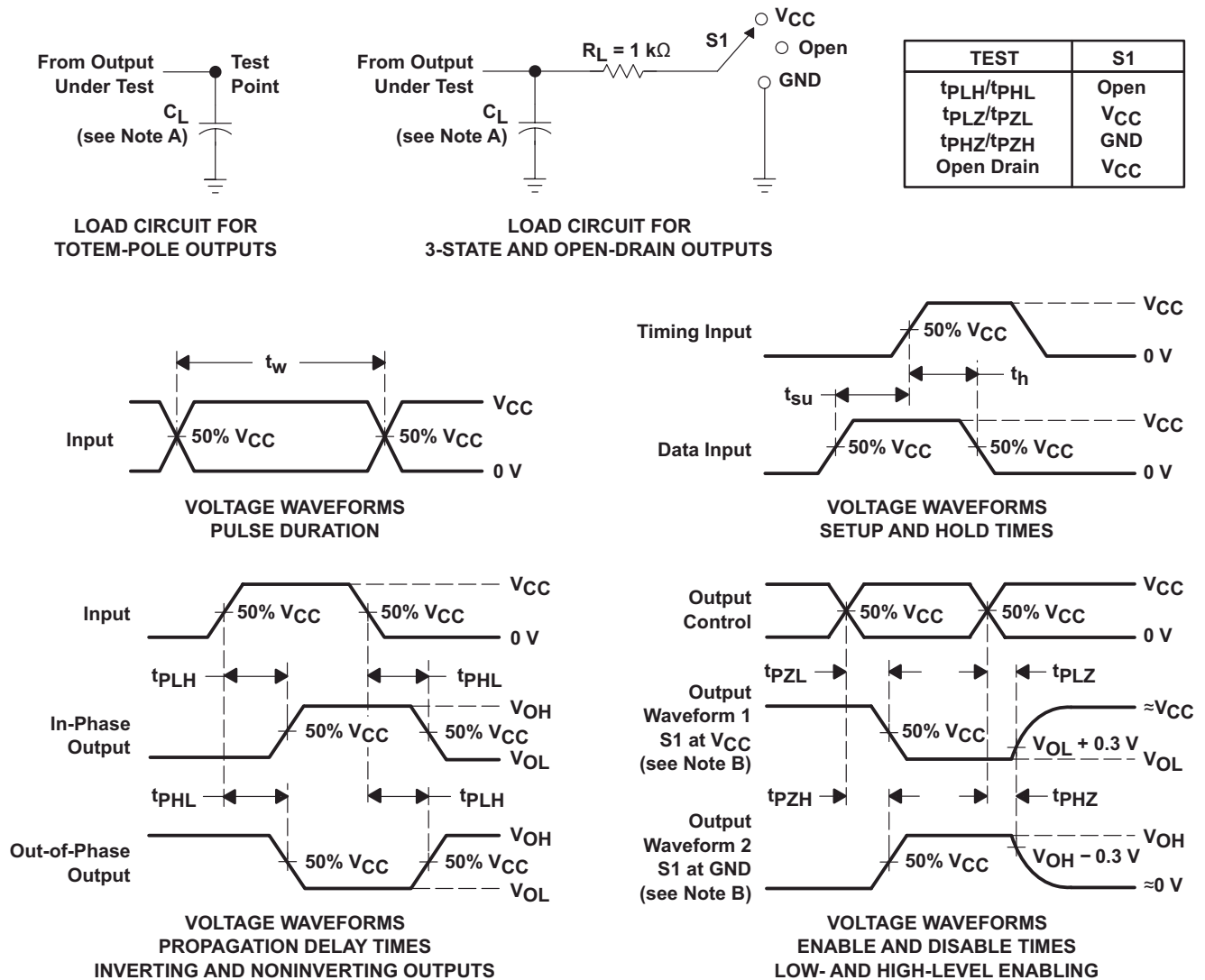


Figure 5-2. TPD vs  $V_{CC}$  at  $25^\circ\text{C}$

## 6 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.  
 E. All parameters and waveforms are not applicable to all devices.

Figure 6-1. Load Circuit And Voltage Waveforms

## 7 Detailed Description

### 7.1 Overview

This device contains a single 2-input NOR gate that performs the Boolean function  $Y = \overline{A} \times \overline{B}$  or  $Y = \overline{A + B}$  in positive logic.

### 7.2 Functional Block Diagram



Figure 7-1. Logic Diagram (Positive Logic)

### 7.3 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 low drive and slow edge rates will minimize overshoot and undershoot on the outputs

### 7.4 Device Functional Modes

Table 7-1. Function Table

| INPUTS <sup>(1)</sup> |   | OUTPUT <sup>(2)</sup> |
|-----------------------|---|-----------------------|
| A                     | B | Y                     |
| H                     | X | L                     |
| X                     | H | L                     |
| L                     | L | H                     |

(1) H = High Voltage Level, L = Low Voltage Level, X = Don't Care

(2) H = Driving High, L = Driving Low, Z = High Impedance State



## 8 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, as well as validating and testing their design implementation to confirm system functionality.

### 8.1 Application Information

SN74AHC1G02 is a low-drive CMOS device that can be used for a multitude of bus interface type applications where output ringing is a concern. The low drive and slow edge rates will minimize overshoot and undershoot on the outputs. The inputs can accept voltages to 5.5 V at any valid  $V_{CC}$  making it ideal for down translation.

### 8.2 Typical Application

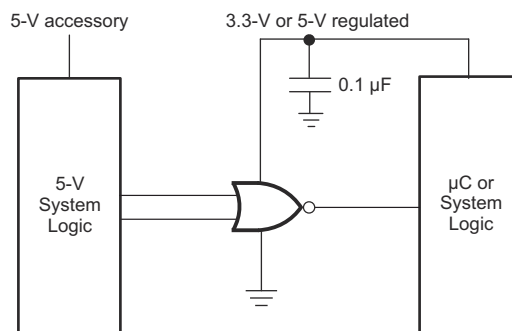


Figure 8-1. Typical Application Schematic

#### 8.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Care should be taken 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.

#### 8.2.2 Detailed Design Procedure

1. Recommended Input Conditions
  - For rise time and fall time specifications, see  $\Delta t/\Delta V$  in the [Section 5.3](#) table.
  - For specified High and low levels, see  $V_{IH}$  and  $V_{IL}$  in the [Section 5.3](#) table.
  - Inputs are overvoltage tolerant allowing them to go as high as 5.5 V at any valid  $V_{CC}$ .
2. Recommend Output Conditions
  - Load currents should not exceed 25 mA per output and 50 mA total for the part.
  - Outputs should not be pulled above  $V_{CC}$ .

## 8.2.3 Application Curves

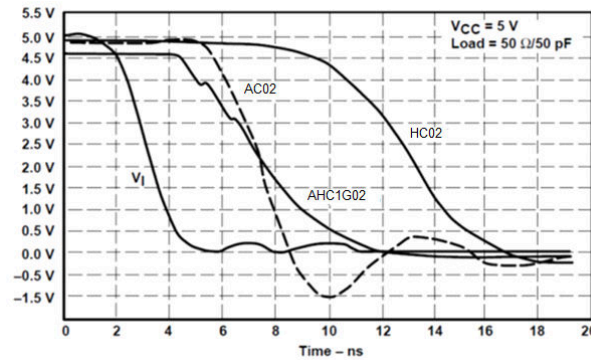


Figure 8-2.

## 8.3 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in the [Section 5.3](#) table.

Each  $V_{CC}$  pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1  $\mu\text{F}$  is recommended. If there are multiple  $V_{CC}$  pins, 0.01  $\mu\text{F}$  or 0.022  $\mu\text{F}$  is recommended for each power pin. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. A 0.1  $\mu\text{F}$  and 1  $\mu\text{F}$  are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

## 8.4 Layout

### 8.4.1 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 8-3](#) 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.

### 8.4.2 Layout Example

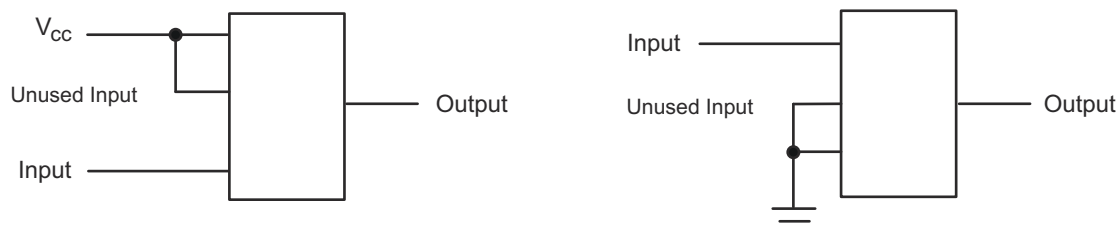


Figure 8-3. Layout Diagram

## 9 Device and Documentation Support

### 9.1 Documentation Support (Analog)

#### 9.1.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, [CMOS Power Consumption and Cpd Calculation application note](#)
- Texas Instruments, [Designing With Logic application note](#)
- Texas Instruments, [Thermal Characteristics of Standard Linear and Logic \(SLL\) Packages and Devices application note](#)
- Texas Instruments, [Implications of Slow or Floating CMOS Inputs application note](#)

### 9.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](http://ti.com). Click on *Notifications* 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.

### 9.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is 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](#).

### 9.4 Trademarks

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

### 9.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### 9.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

## 10 Revision History

| <b>Changes from Revision N (October 2023) to Revision O (February 2024)</b>  | <b>Page</b> |
|--|-------------|
| • Updated thermal values for DBV package from RθJA = 231.3 to 278, RθJC(top) = 119.9 to 180.5, RθJB = 60.6 to 184.4, ΨJT = 17.8 to 115.4, ΨJB = 60.1 to 183.4, RθJC(bot) = N/A, all values in °C/W ..... | 5           |

| <b>Changes from Revision M (August 2022) to Revision N (October 2023)</b>  | <b>Page</b> |
|--|-------------|
| • Updated the numbering format for tables, figures, and cross-references throughout the document.....  | 1           |
| • Updated thermal values for DCK package from RθJA = 287.6 to 289.2, RθJC(top) = 97.7 to 205.8, RθJB = 65 to 176.2, ΨJT = 2 to 117.6, ΨJB = 64.2 to 175.1, RθJC(bot) = N/A, all values in °C/W ..... | 5           |

## 11 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 finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)              | Samples                 |
|-------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|--------------------------------------|-------------------------|
| SN74AHC1G02DBVR   | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | RoHS & Green    | SN                                   | Level-1-260C-UNLIM   | -40 to 125   | (38AH, 3BTF, A023, A02G, A02J, A02S) | <a href="#">Samples</a> |
| SN74AHC1G02DBVRE4 | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | A02G                                 | <a href="#">Samples</a> |
| SN74AHC1G02DBVRG4 | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | A02G                                 | <a href="#">Samples</a> |
| SN74AHC1G02DBVT   | OBSOLETE      | SOT-23       | DBV             | 5    |             | TBD             | Call TI                              | Call TI              | -40 to 125   | (A023, A02G, A02J, A02S)             |                         |
| SN74AHC1G02DCKR   | ACTIVE        | SC70         | DCK             | 5    | 3000        | RoHS & Green    | SN                                   | Level-1-260C-UNLIM   | -40 to 125   | (1R5, AB3, ABG, ABJ, ABL, ABS)       | <a href="#">Samples</a> |
| SN74AHC1G02DCKRG4 | ACTIVE        | SC70         | DCK             | 5    | 3000        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | AB3                                  | <a href="#">Samples</a> |
| SN74AHC1G02DCKT   | OBSOLETE      | SC70         | DCK             | 5    |             | TBD             | Call TI                              | Call TI              | -40 to 125   | (AB3, ABG, ABJ, ABS)                 |                         |
| SN74AHC1G02DRLR   | ACTIVE        | SOT-5X3      | DRL             | 5    | 4000        | RoHS & Green    | NIPDAU   NIPDAUAG                    | Level-1-260C-UNLIM   | -40 to 125   | (ABB, ABS)                           | <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 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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**OTHER QUALIFIED VERSIONS OF SN74AHC1G02 :**

- Automotive : [SN74AHC1G02-Q1](#)
- Enhanced Product : [SN74AHC1G02-EP](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

**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 |
|-------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AHC1G02DBVR   | SOT-23       | DBV             | 5    | 3000 | 180.0              | 8.4                | 3.2     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHC1G02DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHC1G02DCKR   | SC70         | DCK             | 5    | 3000 | 180.0              | 8.4                | 2.3     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHC1G02DCKRG4 | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHC1G02DRLR   | 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) |
|-------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AHC1G02DBVR   | SOT-23       | DBV             | 5    | 3000 | 210.0       | 185.0      | 35.0        |
| SN74AHC1G02DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G02DCKR   | SC70         | DCK             | 5    | 3000 | 210.0       | 185.0      | 35.0        |
| SN74AHC1G02DCKRG4 | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G02DRLR   | SOT-5X3      | DRL             | 5    | 4000 | 202.0       | 201.0      | 28.0        |



# DCK0005A



## PACKAGE OUTLINE

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



4214834/G 11/2024

### NOTES:

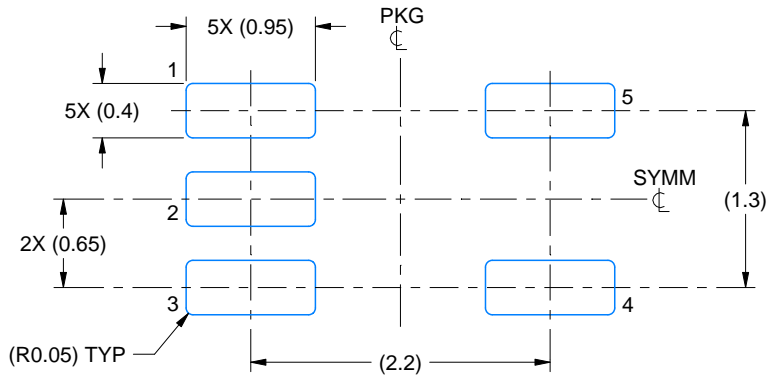
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-203.
4. Support pin may differ or may not be present.
5. Lead width does not comply 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

# EXAMPLE BOARD LAYOUT

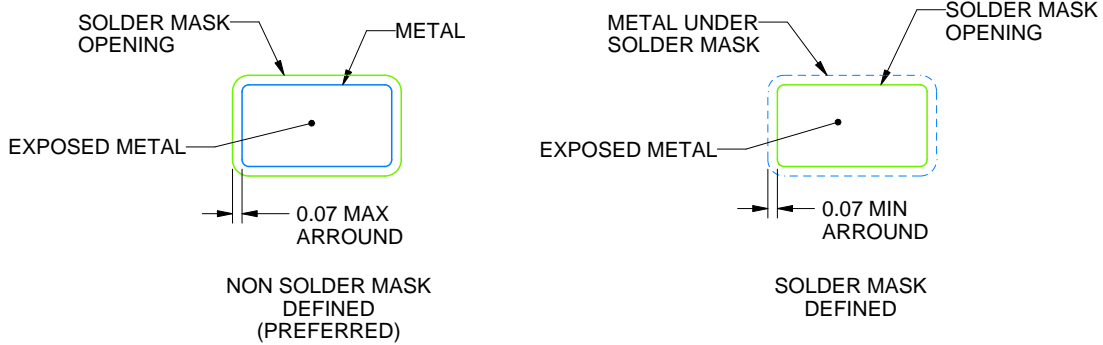
DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



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.

# EXAMPLE STENCIL DESIGN

DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



SOLDER PASTE EXAMPLE  
BASED ON 0.125 THICK STENCIL  
SCALE: 18X

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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.

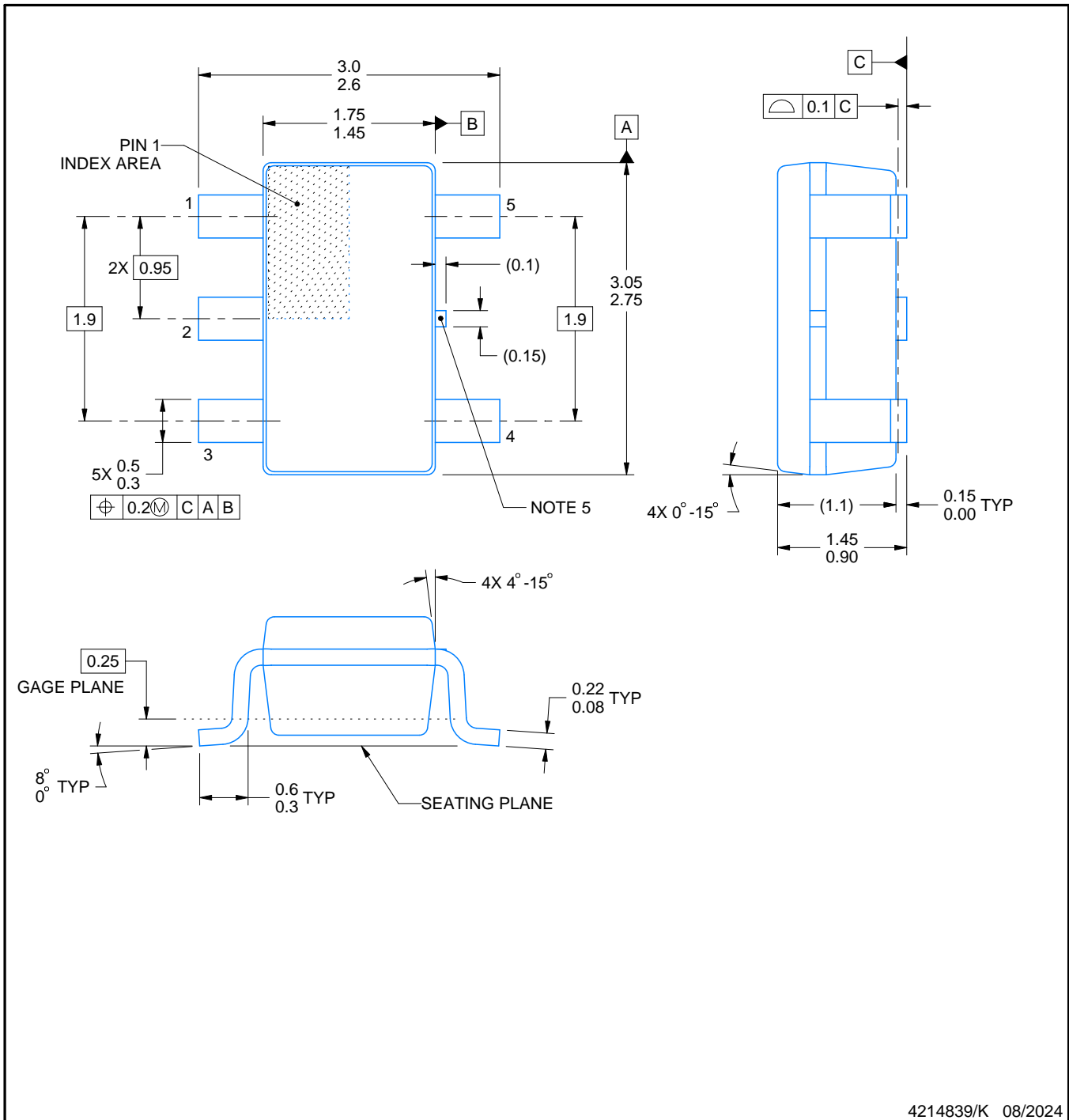
# DBV0005A



# PACKAGE OUTLINE

## SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



4214839/K 08/2024

### 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.

# 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

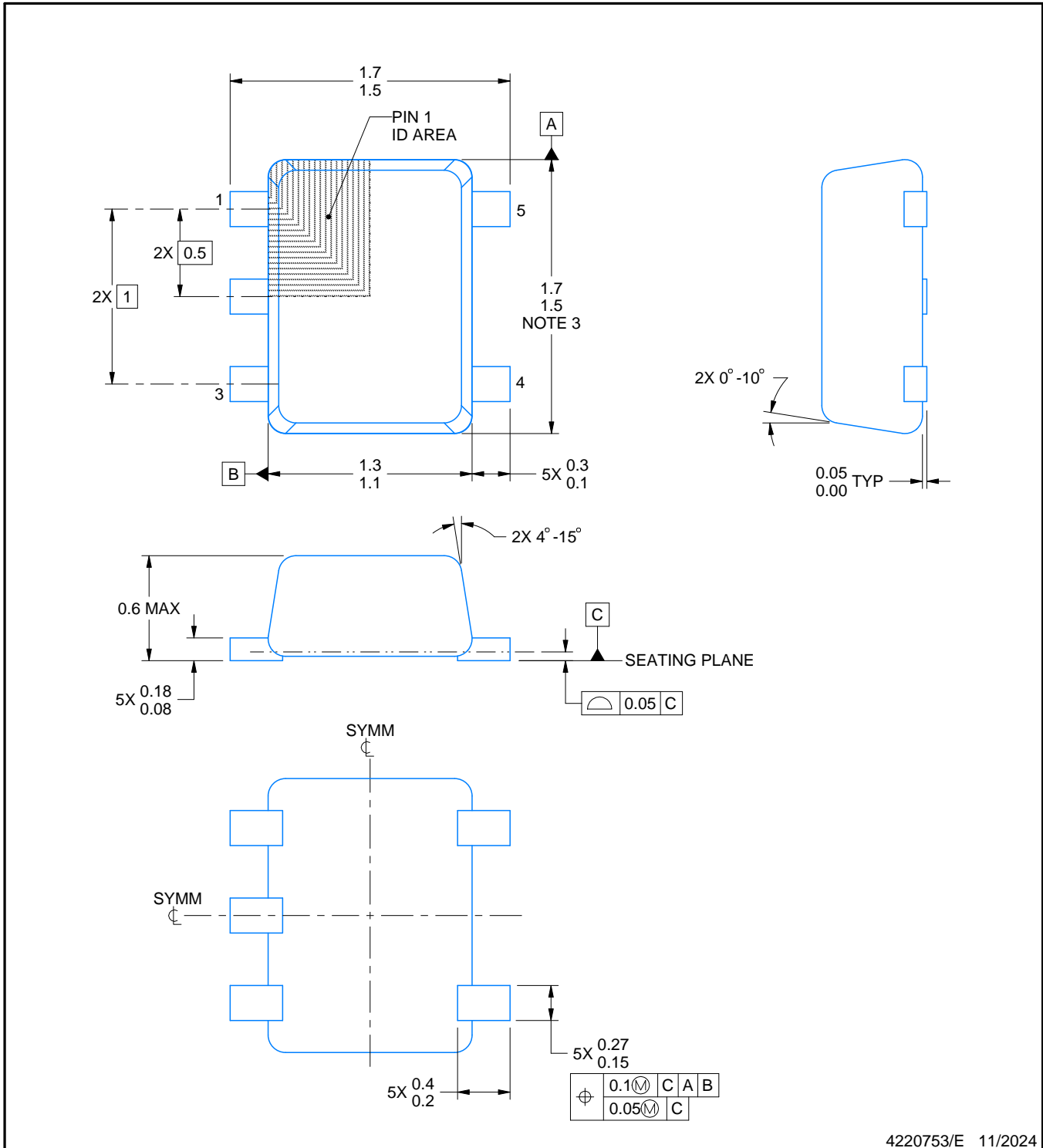
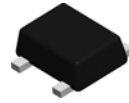


SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:15X

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.



4220753/E 11/2024

NOTES:

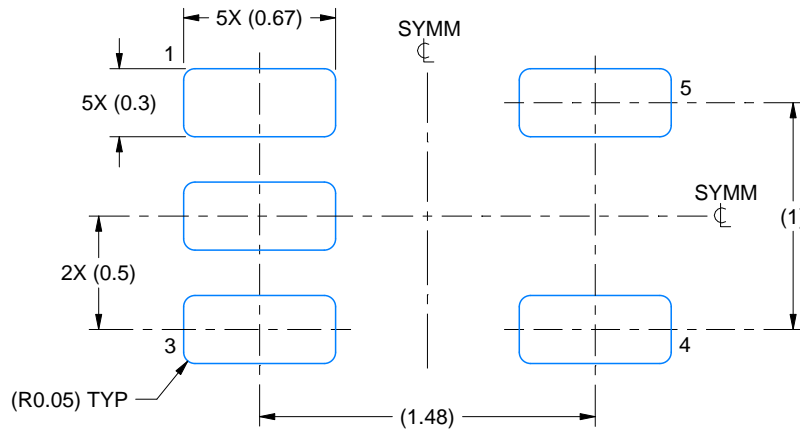
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or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

# EXAMPLE BOARD LAYOUT

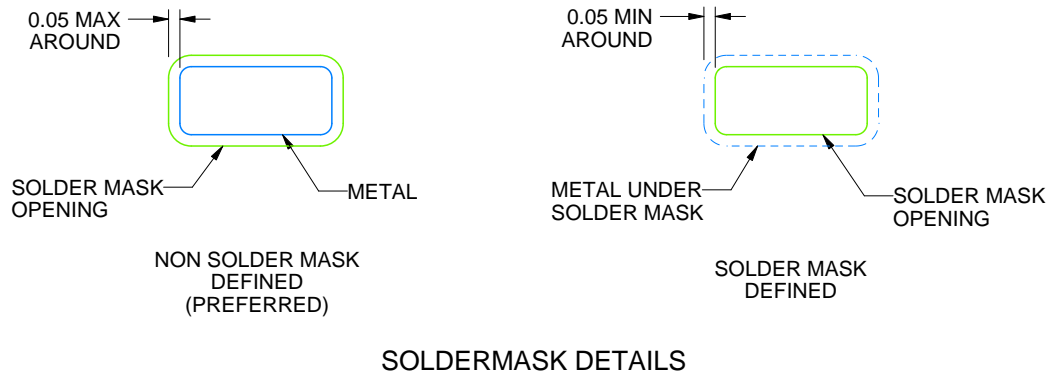
DRL0005A

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.

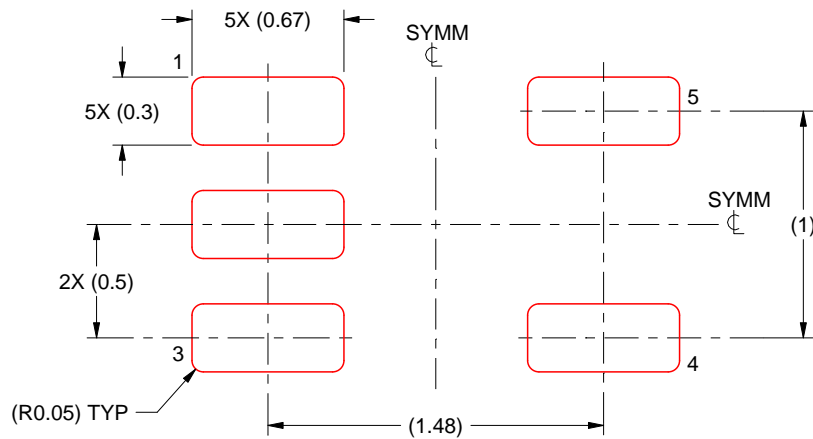


# EXAMPLE STENCIL DESIGN

DRL0005A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



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

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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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