

# SN74AHCT1G86Q-Q1 Automotive Single 2-Input Exclusive-OR Gate

## 1 Features

- AEC-Q100 qualified for automotive applications:
  - Device temperature grade 1: -40°C to +125°C
  - Device HBM ESD classification level 2
  - Device CDM ESD classification level C4B
- Operating range of 4.5V to 5.5V
- Max  $t_{pd}$  of 8ns at 5V
- Low power consumption, 10µA max  $I_{CC}$
- ±8mA output drive at 5V
- Inputs are TTL-voltage compatible

## 2 Applications

- Enable or disable a digital signal
- Controlling an indicator LED
- Translation between communication modules and system controllers

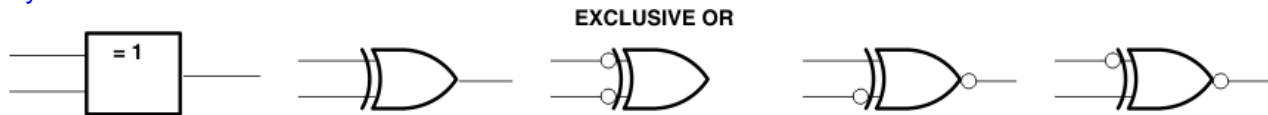
## 3 Description

The SN74AHCT1G86Q-Q1 is a single 2-input exclusive-OR gate. The device performs the Boolean function  $Y = A \oplus B$  or  $Y = \bar{A}B + A\bar{B}$  in positive logic.

### Package Information

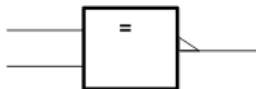
| PART NUMBER      | PACKAGE <sup>(1)</sup> | PACKAGE SIZE <sup>(2)</sup> | BODY SIZE <sup>(3)</sup> |
|------------------|------------------------|-----------------------------|--------------------------|
| SN74AHCT1G86Q-Q1 | DCK (SC-70, 5)         | 2 mm x 2.1 mm               | 2 mm x 1.25 mm           |
|                  | DBV (SOT-23, 5)        | 2.9 mm x 2.8 mm             | 2.9 mm x 1.6 mm          |

- For more information, see [Section 11](#).
- The package size (length x width) is a nominal value and includes pins, where applicable.
- The body size (length x width) is a nominal value and does not include pins.



These five equivalent exclusive-OR symbols are valid for an SN74AHCT1G86 gate in positive logic; negation may be shown at any two ports.

### LOGIC-IDENTITY ELEMENT



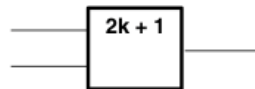
The output is active (low) if all inputs stand at the same logic level (i.e.,  $A = B$ ).

### EVEN-PARITY ELEMENT



The output is active (low) if an even number of inputs (i.e., 0 or 2) are active.

### ODD-PARITY ELEMENT



The output is active (high) if an odd number of inputs (i.e., only 1 of the 2) are active.

## Exclusive-OR Logic



## Table of Contents

|                                                  |          |                                                                  |           |
|--------------------------------------------------|----------|------------------------------------------------------------------|-----------|
| <b>1 Features</b> .....                          | <b>1</b> | 7.4 Device Functional Modes.....                                 | <b>8</b>  |
| <b>2 Applications</b> .....                      | <b>1</b> | <b>8 Application and Implementation</b> .....                    | <b>9</b>  |
| <b>3 Description</b> .....                       | <b>1</b> | 8.1 Application Information.....                                 | <b>9</b>  |
| <b>4 Pin Configuration and Functions</b> .....   | <b>3</b> | 8.2 Typical Application.....                                     | <b>9</b>  |
| <b>5 Specifications</b> .....                    | <b>4</b> | 8.3 Power Supply Recommendations.....                            | <b>11</b> |
| 5.1 Absolute Maximum Ratings.....                | <b>4</b> | 8.4 Layout.....                                                  | <b>11</b> |
| 5.2 Recommended Operating Conditions.....        | <b>4</b> | <b>9 Device and Documentation Support</b> .....                  | <b>13</b> |
| 5.3 Thermal Information.....                     | <b>4</b> | 9.1 Documentation Support (Analog).....                          | <b>13</b> |
| 5.4 Electrical Characteristics.....              | <b>4</b> | 9.2 Receiving Notification of Documentation Updates....          | <b>13</b> |
| 5.5 Switching Characteristics.....               | <b>5</b> | 9.3 Support Resources.....                                       | <b>13</b> |
| 5.6 Operating Characteristics.....               | <b>5</b> | 9.4 Trademarks.....                                              | <b>13</b> |
| <b>6 Parameter Measurement Information</b> ..... | <b>6</b> | 9.5 Electrostatic Discharge Caution.....                         | <b>13</b> |
| <b>7 Detailed Description</b> .....              | <b>7</b> | 9.6 Glossary.....                                                | <b>13</b> |
| 7.1 Overview.....                                | <b>7</b> | <b>10 Revision History</b> .....                                 | <b>13</b> |
| 7.2 Functional Block Diagram.....                | <b>7</b> | <b>11 Mechanical, Packaging, and Orderable Information</b> ..... | <b>14</b> |
| 7.3 Feature Description.....                     | <b>7</b> |                                                                  |           |

## 4 Pin Configuration and Functions

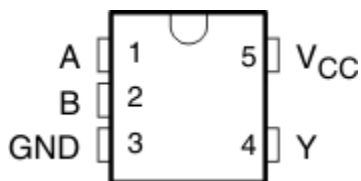


**Figure 4-1. SN74AHCT1G86Q-Q1 DBV Package, 5-Pin SOT-23; DCK Package, 5-Pin SC-70 (Top View)**

| PIN |      | TYPE <sup>(1)</sup> | DESCRIPTION |
|-----|------|---------------------|-------------|
| NO. | NAME |                     |             |
| 1   | A    | I                   | A input     |
| 2   | B    | I                   | B input     |
| 3   | GND  | –                   | Ground pin  |
| 4   | Y    | O                   | Output      |
| 5   | Vcc  | –                   | Power pin   |

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

## 5 Specifications

### 5.1 Absolute Maximum Ratings

|                      |                                                        | MIN                           | MAX            | UNIT   |
|----------------------|--------------------------------------------------------|-------------------------------|----------------|--------|
| $V_{CC}$             | Supply voltage                                         | -0.5                          | 7              | V      |
| $V_I$ <sup>(1)</sup> | Input voltage                                          | -0.5                          | 7              | V      |
| $V_O$ <sup>(1)</sup> | Output voltage range applied in the high- or low-state | -0.5                          | $V_{CC} + 0.5$ | V      |
| $I_{IK}$             | Input clamp current                                    | $V_I < 0$ V                   |                | -20 V  |
| $I_{OK}$             | Output clamp current                                   | $V_O < 0$ V or $V_O > V_{CC}$ |                | ±20 mA |
| $I_O$                | Continuous output current                              | $V_O = 0$ V to $V_{CC}$       |                | ±25 mA |
|                      | Continuous current through $V_{CC}$ or GND             |                               |                | ±50 mA |
| $T_{stg}$            | Storage temperature range                              | -65                           | 150            | °C     |

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

### 5.2 Recommended Operating Conditions

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

|                     |                                    | MIN | MAX      | UNIT |
|---------------------|------------------------------------|-----|----------|------|
| $V_{CC}$            | Supply voltage                     | 4.5 | 5.5      | V    |
| $V_{IH}$            | High-level input voltage           | 2   |          | V    |
| $V_{IL}$            | Low-level input voltage            |     | 0.8      | V    |
| $V_I$               | Input voltage                      | 0   | 5.5      | V    |
| $V_O$               | Output voltage                     | 0   | $V_{CC}$ | V    |
| $I_{OH}$            | High-level output current          |     | -8       | mA   |
| $I_{OL}$            | Low-level output current           |     | 8        | mA   |
| $\Delta t/\Delta V$ | Input transition rise or fall rate |     | 20       | ns/V |
| $T_A$               | Operating free-air temperature     | -40 | 125      | °C   |

### 5.3 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |                                        | DBV (SOT-23) | DCK (SC-70) | UNIT |
|-------------------------------|----------------------------------------|--------------|-------------|------|
|                               |                                        | 5 PINS       | 5 PINS      |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance | 278.0        | 289.2       | °C/W |

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

### 5.4 Electrical Characteristics

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

| PARAMETER                      | TEST CONDITIONS                                     | $V_{CC}$     | $T_A = 25^\circ\text{C}$ |     |      | MIN | MAX  | UNIT          |
|--------------------------------|-----------------------------------------------------|--------------|--------------------------|-----|------|-----|------|---------------|
|                                |                                                     |              | MIN                      | TYP | MAX  |     |      |               |
| $V_{OH}$                       | $I_{OH} = -50$ $\mu\text{A}$                        | 4.5 V        | 4.4                      | 4.5 |      | 4.4 |      | V             |
|                                | $I_{OH} = -8$ mA                                    |              | 3.94                     |     |      | 3.8 |      |               |
| $V_{OL}$                       | $I_{OL} = 50$ $\mu\text{A}$                         | 4.5 V        |                          |     | 0.1  |     | 0.1  | V             |
|                                | $I_{OL} = 8$ mA                                     |              |                          |     | 0.36 |     | 0.44 |               |
| $I_I$                          | $V_I = 5.5$ V or GND                                | 0 V to 5.5 V |                          |     | ±0.1 |     | ±1   | $\mu\text{A}$ |
| $I_{CC}$                       | $V_I = V_{CC}$ or GND, $I_O = 0$ A                  | 5.5 V        |                          |     | 1    |     | 10   | $\mu\text{A}$ |
| $\Delta I_{CC}$ <sup>(1)</sup> | One input at 3.4 V, Other inputs at GND or $V_{CC}$ | 5.5 V        |                          |     | 1.35 |     | 1.5  | mA            |
| $C_I$                          | $V_I = V_{CC}$ or GND                               | 5 V          |                          |     | 10   |     | 10   | pF            |

(1) This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or  $V_{CC}$ .

## 5.5 Switching Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ ,  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ , see [Load Circuit and Voltage Waveforms](#)

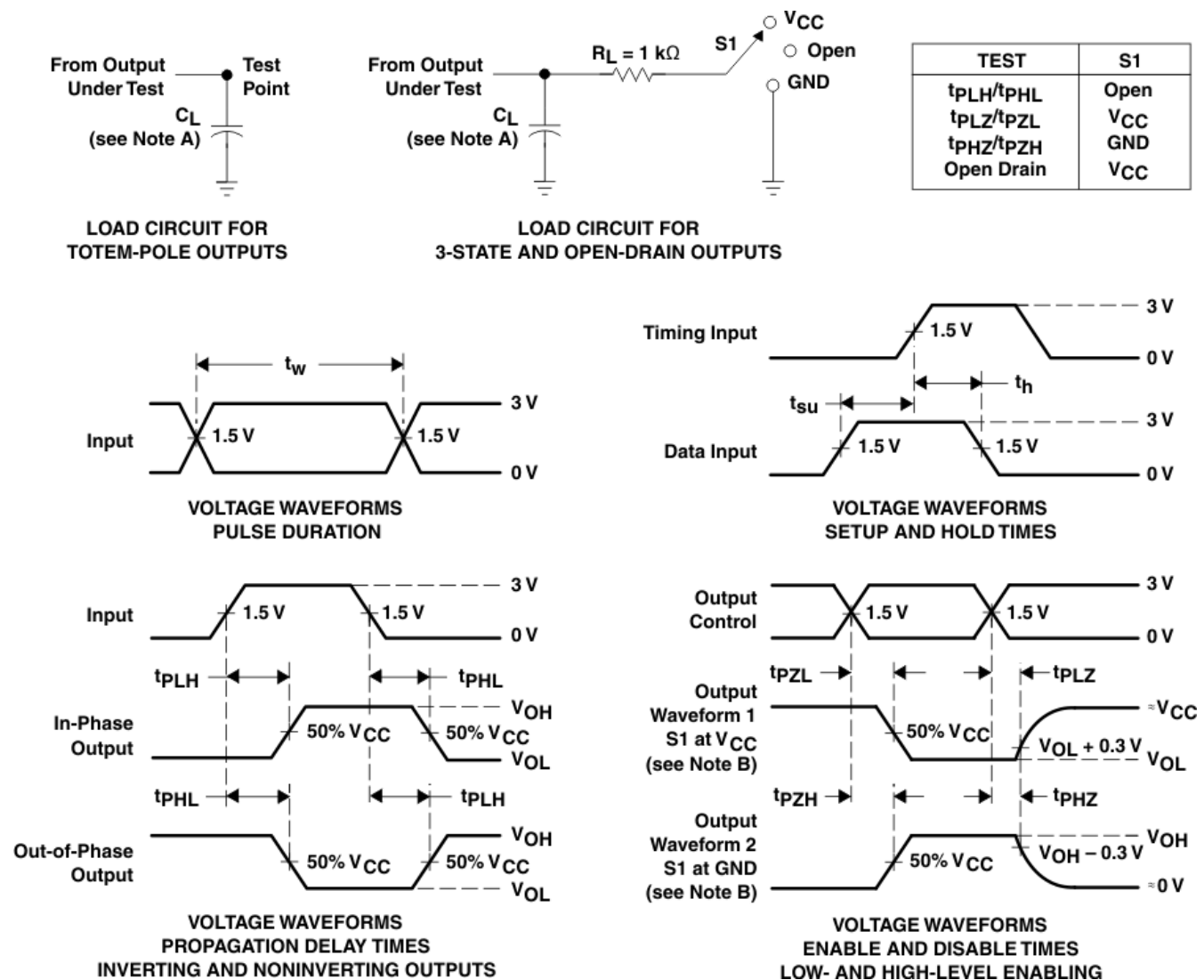
| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | LOAD<br>CAPACITANCE  | $T_A = 25^\circ\text{C}$ |     |     | MIN | MAX | UNIT |
|-----------|-----------------|----------------|----------------------|--------------------------|-----|-----|-----|-----|------|
|           |                 |                |                      | MIN                      | TYP | MAX |     |     |      |
| $t_{PLH}$ | A or B          | Y              | $C_L = 50\text{ pF}$ |                          | 5.5 | 7.9 | 1   | 9   | ns   |
| $t_{PHL}$ |                 |                |                      |                          | 5.5 | 7.9 | 1   | 9   |      |

## 5.6 Operating Characteristics

$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ ,  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$

| PARAMETER |                               | TEST CONDITIONS             | TYP | UNIT |
|-----------|-------------------------------|-----------------------------|-----|------|
| $C_{pd}$  | Power dissipation capacitance | No load, $f = 1\text{ MHz}$ | 18  | pF   |

## 6 Parameter Measurement Information



- 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 transition per measurement.
- E. All parameters and waveforms are not applicable to all devices.

**Figure 6-1. Load Circuit and Voltage Waveforms**

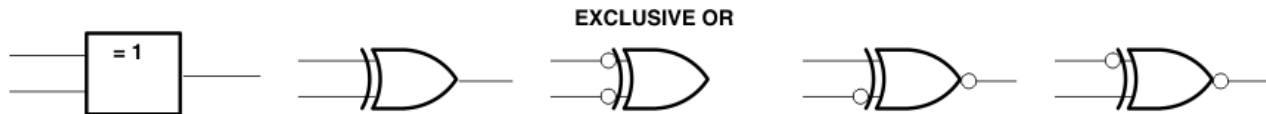
## 7 Detailed Description

### 7.1 Overview

The SN74AHCT1G86Q-Q1 contains four independent 2-input AND Gates with Schmitt-trigger inputs. Each gate performs the Boolean function  $Y = A \times B$  in positive logic. The output level is referenced to the supply voltage ( $V_{CC}$ ) and supports 1.8-V, 2.5-V, 3.3-V, and 5-V CMOS levels.

### 7.2 Functional Block Diagram

An exclusive-OR gate has many applications, some of which can be represented better by alternative logic symbols.



These five equivalent exclusive-OR symbols are valid for an SN74AHCT1G86 gate in positive logic; negation may be shown at any two ports.

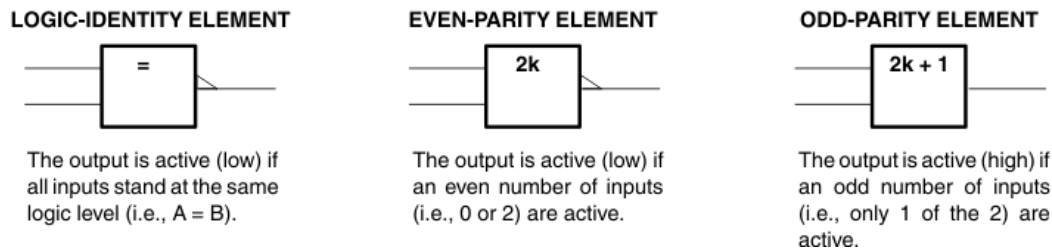


Figure 7-1. Exclusive-OR Logic

### 7.3 Feature Description

#### 7.3.1 TTL-Compatible CMOS Inputs

This device includes TTL-compatible CMOS inputs. These inputs are specifically designed to interface with TTL logic devices by having a reduced input voltage threshold.

TTL-compatible CMOS inputs are high impedance and are typically modeled as a resistor in parallel with the input capacitance given in the *Electrical Characteristics*. The worst case resistance is calculated with the maximum input voltage, given in the *Absolute Maximum Ratings*, and the maximum input leakage current, given in the *Electrical Characteristics*, using Ohm's law ( $R = V \div I$ ).

TTL-compatible CMOS inputs require that input signals transition between valid logic states quickly, as defined by the input transition time or rate in the *Recommended Operating Conditions* table. Failing to meet this specification will result in excessive power consumption and could cause oscillations. More details can be found in the [Implications of Slow or Floating CMOS Inputs](#) application report.

Do not leave TTL-compatible CMOS inputs floating at any time during operation. Unused inputs must be terminated at  $V_{CC}$  or GND. If a system will not be actively driving an input at all times, a pull-up or pull-down resistor can be added to provide a valid input voltage during these times. The resistor value will depend on multiple factors; however, a 10-k $\Omega$  resistor is recommended and will typically meet all requirements.

#### 7.3.2 Balanced CMOS Push-Pull Outputs

This device includes balanced CMOS push-pull outputs. The term *balanced* indicates that the device can sink and source similar currents. The drive capability of this device may create fast edges into light loads, so routing and load conditions should be considered to prevent ringing. Additionally, the outputs of this device are capable of driving larger currents than the device can sustain without being damaged. It is important to limit the output power of the device to avoid damage due to overcurrent. The electrical and thermal limits defined in the *Absolute Maximum Ratings* must be followed at all times.

Unused push-pull CMOS outputs should be left disconnected.

### 7.3.3 Clamp Diode Structure

The outputs to this device have both positive and negative clamping diodes, and the inputs to this device have negative clamping diodes only as shown in Figure 7-2.

#### CAUTION

Voltages beyond the values specified in the *Absolute Maximum Ratings* table can cause damage to the device. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

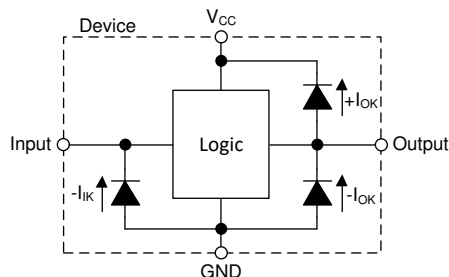


Figure 7-2. Electrical Placement of Clamping Diodes for Each Input and Output

### 7.4 Device Functional Modes

Functional Table

| INPUTS |   | OUTPUT<br>Y |
|--------|---|-------------|
| A      | B |             |
| L      | L | L           |
| L      | H | H           |
| H      | L | H           |
| H      | H | L           |

## 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

In this application, a 2-input XOR gate is used as a phase difference detector as shown in [Figure 8-1](#).

The SN74AHCT1G86Q-Q1 is used to identify phase difference between a reference clock and another input clock. Whenever the clock states are different, the XOR output will pulse HIGH until the clocks return to the same state. The output is fed into a low-pass filter to obtain a DC representation of the phase difference.

Typically, clock signals have fast transition rates, but additional filtering can be added to the clock signals which can lead to slower transitions rates. This makes the SN74AHCT1G86Q-Q1 an excellent choice for the application because it has Schmitt-trigger inputs that do not have input transition rate requirements.

### 8.2 Typical Application

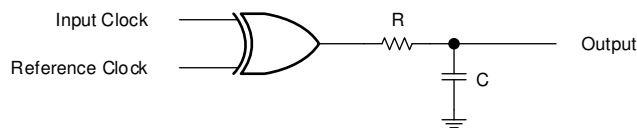


**Figure 8-1. Typical Application Block Diagram**

#### 8.2.1 Design Requirements

##### 8.2.1.1 Power Considerations

Ensure the desired supply voltage is within the range specified in the *Recommended Operating Conditions*. The supply voltage sets the electrical characteristics of the device as described in the *Electrical Characteristics* section.

The positive voltage supply must be capable of sourcing current equal to the maximum static supply current,  $I_{CC}$ , listed in the *Electrical Characteristics*, and any transient current required for switching.

The ground must be capable of sinking current equal to the total current to be sunk by all outputs of the SN74AHCT1G86Q-Q1 plus the maximum supply current,  $I_{CC}$ , listed in the *Electrical Characteristics*, and any transient current required for switching. The logic device can only sink as much current that can be sunk into its ground connection. Be sure to not exceed the maximum total current through GND listed in the *Absolute Maximum Ratings*.

The SN74AHCT1G86Q-Q1 can drive a load with a total capacitance less than or equal to 50 pF while still meeting all of the data sheet specifications. Larger capacitive loads can be applied; however, it is not recommended to exceed 50 pF.

The SN74AHCT1G86Q-Q1 can drive a load with total resistance described by  $R_L \geq V_O / I_O$ , with the output voltage and current defined in the *Electrical Characteristics* table with  $V_{OL}$ . When outputting in the HIGH state, the output voltage in the equation is defined as the difference between the measured output voltage and the supply voltage at the  $V_{CC}$  pin.

Total power consumption can be calculated using the information provided in the [CMOS Power Consumption and Cpd Calculation](#) application note.

Thermal increase can be calculated using the information provided in the [Thermal Characteristics of Standard Linear and Logic \(SLL\) Packages and Devices](#) application note.

**CAUTION**

The maximum junction temperature,  $T_{J(max)}$  listed in the *Absolute Maximum Ratings*, is an additional limitation to prevent damage to the device. Do not violate any values listed in the *Absolute Maximum Ratings*. These limits are provided to prevent damage to the device.

**8.2.1.2 Input Considerations**

Input signals must cross to be considered a logic LOW, and to be considered a logic HIGH. Do not exceed the maximum input voltage range found in the *Absolute Maximum Ratings*.

Unused inputs must be terminated to either  $V_{CC}$  or ground. The unused inputs can be directly terminated if the input is completely unused, or they can be connected with a pull-up or pull-down resistor if the input will be used sometimes, but not always. A pull-up resistor is used for a default state of HIGH, and a pull-down resistor is used for a default state of LOW. The drive current of the controller, leakage current into the SN74AHCT1G86Q-Q1 (as specified in the *Electrical Characteristics*), and the desired input transition rate limits the resistor size. A 10-k $\Omega$  resistor value is often used due to these factors.

Refer to the *Feature Description* section for additional information regarding the inputs for this device.

**8.2.1.3 Output Considerations**

The ground voltage is used to produce the output LOW voltage. Sinking current into the output will increase the output voltage as specified by the  $V_{OL}$  specification in the *Electrical Characteristics*.

Unused outputs can be left floating. Do not connect outputs directly to  $V_{CC}$  or ground.

Refer to the *Feature Description* section for additional information regarding the outputs for this device.

## 8.2.2 Detailed Design Procedure

1. Add a decoupling capacitor from  $V_{CC}$  to GND. The capacitor needs to be placed physically close to the device and electrically close to both the  $V_{CC}$  and GND pins. An example layout is shown in the *Layout* section.
2. Ensure the capacitive load at the output is  $\leq 50$  pF. This is not a hard limit; it will, however, ensure optimal performance. This can be accomplished by providing short, appropriately sized traces from the SN74AHCT1G86Q-Q1 to one or more of the receiving devices.
3. Ensure the resistive load at the output is larger than  $(V_{CC} / I_{O(max)}) \Omega$ , so that the maximum output current from the *Absolute Maximum Ratings* is not violated. Most CMOS inputs have a resistive load measured in  $M\Omega$ ; much larger than the minimum calculated previously.
4. Thermal issues are rarely a concern for logic gates; the power consumption and thermal increase, however, can be calculated using the steps provided in the application report, [CMOS Power Consumption and Cpd Calculation](#).

## 8.2.3 Application Curves

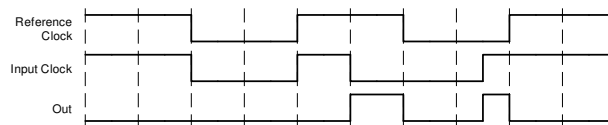


**Figure 8-2. Application Timing Diagram**

## 8.3 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the [Section 5.2](#).

Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, TI recommends a 0.1- $\mu$ F capacitor and if there are multiple  $V_{CC}$  terminals then TI recommends a 0.01- $\mu$ F or 0.022- $\mu$ F capacitor for each power terminal. Multiple bypass capacitors can be paralleled to reject different frequencies of noise. Frequencies of 0.1  $\mu$ F and 1  $\mu$ F are commonly used in parallel. The bypass capacitor should be installed as close as possible to the power terminal for best results.

## 8.4 Layout

### 8.4.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices, inputs must never be left floating. In many cases, functions or parts of functions of digital logic devices are unused (for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used). Such unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or  $V_{CC}$ , whichever makes more sense for the logic function or is more convenient.

#### 8.4.1.1 Layout Example

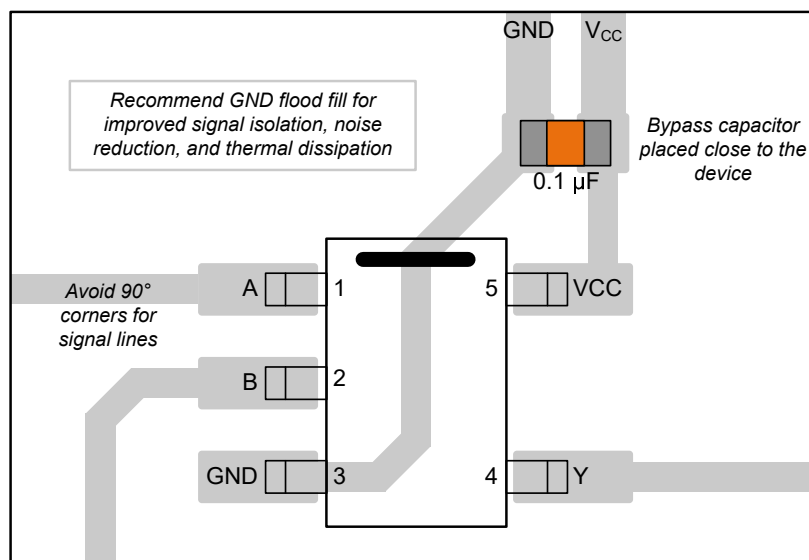


Figure 8-3. Example Layout for the SN74AHCT1G86Q-Q1

## 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](#). 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

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

| Changes from Revision A (October 2023) to Revision B (January 2024)                                               | Page |
|-------------------------------------------------------------------------------------------------------------------|------|
| • Added DBV package to <i>Package Information</i> table; added ESD classification to <i>Features</i> section..... | 1    |
| • Added DBV package to <i>Pin Configuration and Functions</i> section.....                                        | 3    |
| • Added thermal values for DBV package: R $\theta$ JA = 278.0, all values in °C/W.....                            | 4    |
| • Updated <i>Layout Example</i> ; removed <i>Typical Application</i> section.....                                 | 12   |

| Changes from Revision * (December 2010) to Revision A (October 2023)                                                                                                                                                                                                                                                                            | Page |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| • Added <i>Applications</i> section, <i>Package Information</i> table, <i>Pin Functions</i> table, <i>Thermal Information</i> table, <i>Device Functional Modes</i> , <i>Application and Implementation</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section ..... | 1    |

- 
- Updated R $\theta$ JA values: DCK = 252 to 289.2, all values in °C/W .....4
- 

## 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 part number            | Status<br>(1) | Material type<br>(2) | Package   Pins   | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|----------------------------------|---------------|----------------------|------------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">CAHCT1G86QDBVRQ1</a> | Active        | Production           | SOT-23 (DBV)   5 | 3000   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | 39FH                |
| CAHCT1G86QDBVRQ1.A               | Active        | Production           | SOT-23 (DBV)   5 | 3000   LARGE T&R      | Yes         | SN                                   | Level-1-260C-UNLIM                | -40 to 125   | 39FH                |
| <a href="#">CAHCT1G86QDCKRQ1</a> | Active        | Production           | SC70 (DCK)   5   | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | B5S                 |
| CAHCT1G86QDCKRQ1.A               | Active        | Production           | SC70 (DCK)   5   | 3000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 125   | B5S                 |

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

<sup>(2)</sup> **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.

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

<sup>(4)</sup> **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.

<sup>(5)</sup> **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.

<sup>(6)</sup> **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.

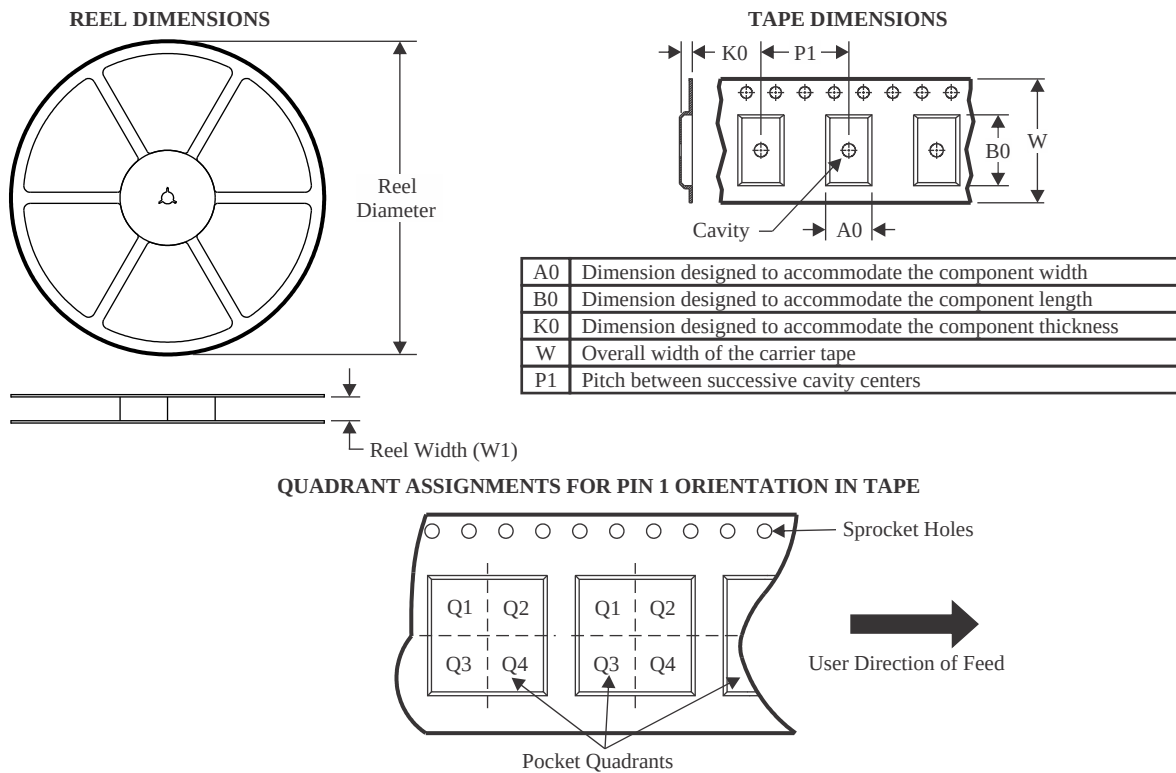
**OTHER QUALIFIED VERSIONS OF SN74AHCT1G86-Q1 :**

- Catalog : [SN74AHCT1G86](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

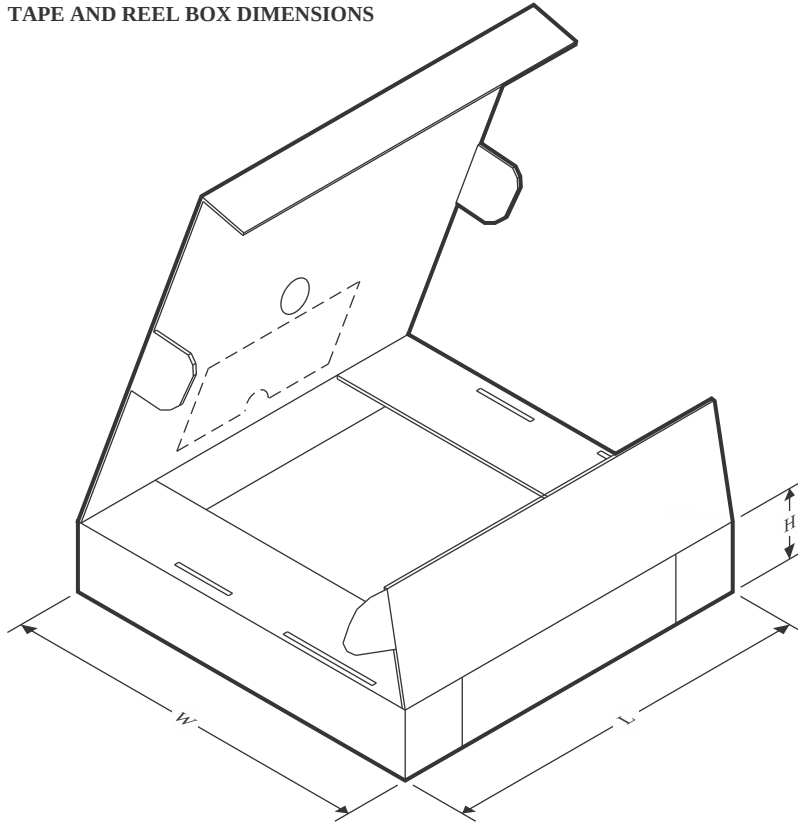
## TAPE AND REEL INFORMATION



\*All dimensions are nominal

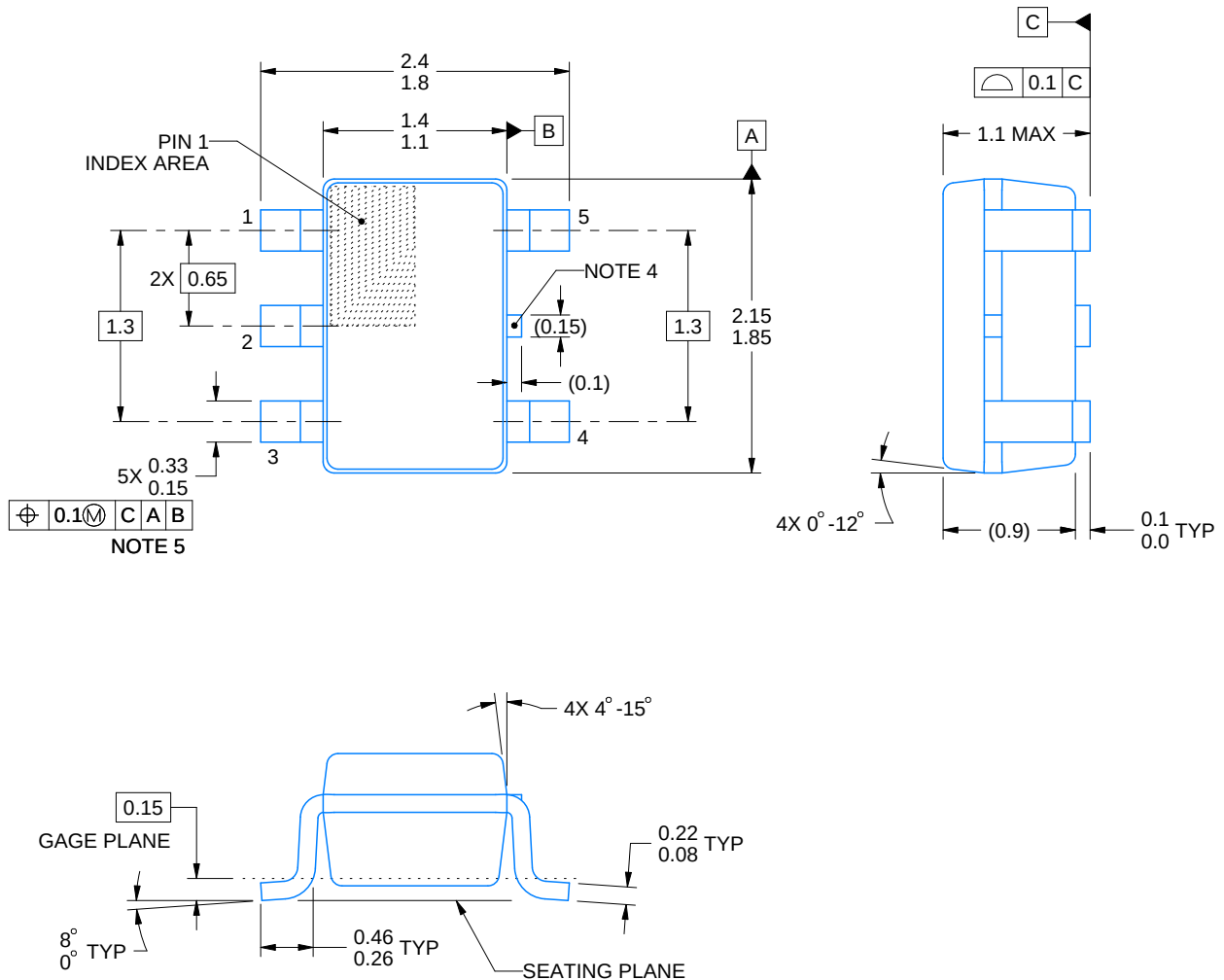
| Device           | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CAHCT1G86QDBVRQ1 | SOT-23       | DBV             | 5    | 3000 | 180.0              | 8.4                | 3.2     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| CAHCT1G86QDCKRQ1 | SC70         | DCK             | 5    | 3000 | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

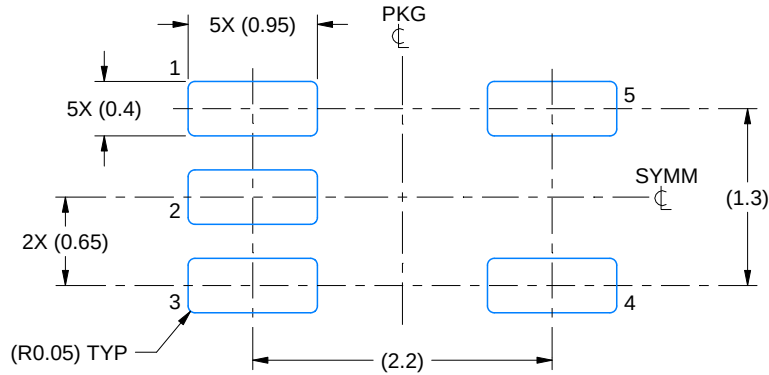
| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CAHCT1G86QDBVRQ1 | SOT-23       | DBV             | 5    | 3000 | 210.0       | 185.0      | 35.0        |
| CAHCT1G86QDCKRQ1 | SC70         | DCK             | 5    | 3000 | 190.0       | 190.0      | 30.0        |



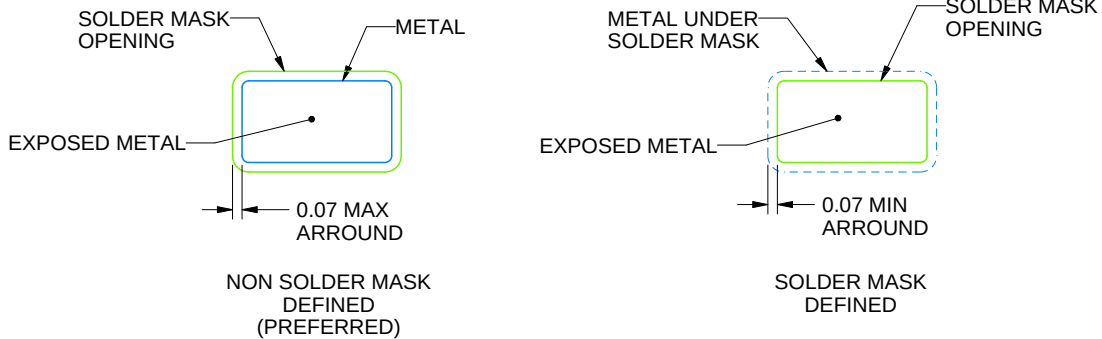
4214834/G 11/2024

## 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



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X

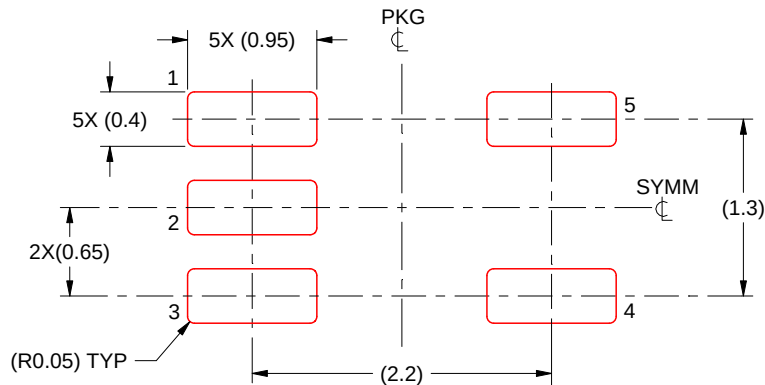


SOLDER MASK DETAILS

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.



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

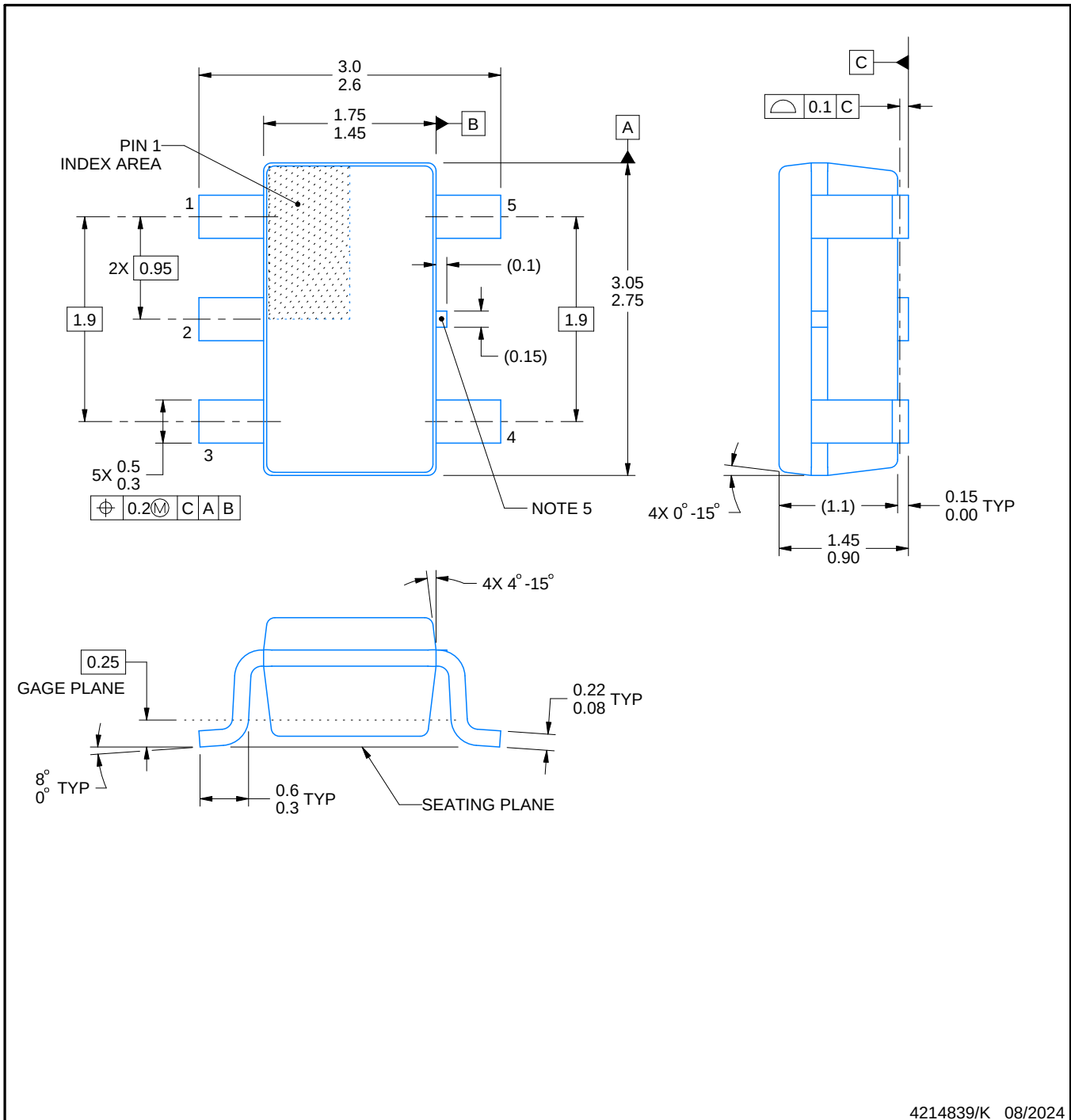
4214834/G 11/2024

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.

**DBV0005A****PACKAGE OUTLINE****SOT-23 - 1.45 mm max height**

SMALL OUTLINE TRANSISTOR



4214839/K 08/2024

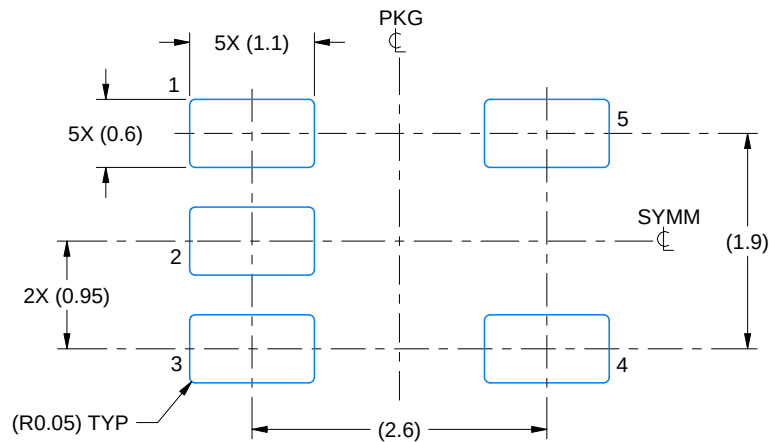
**NOTES:**

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.

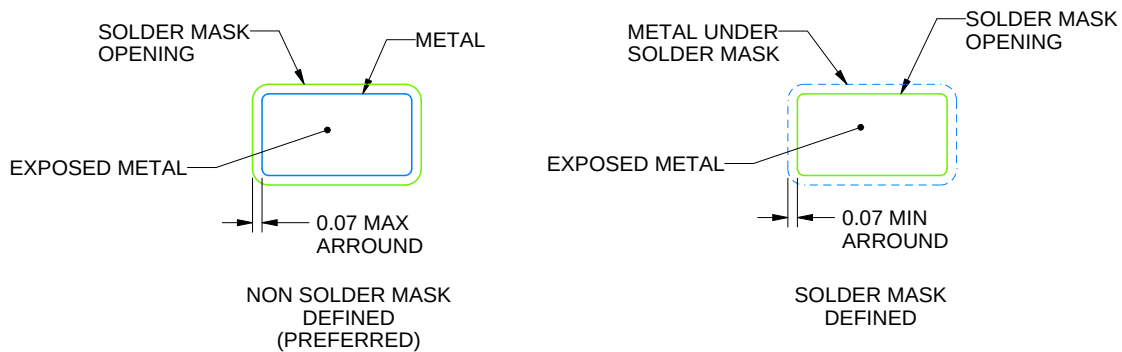
**DBV0005A**

**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)

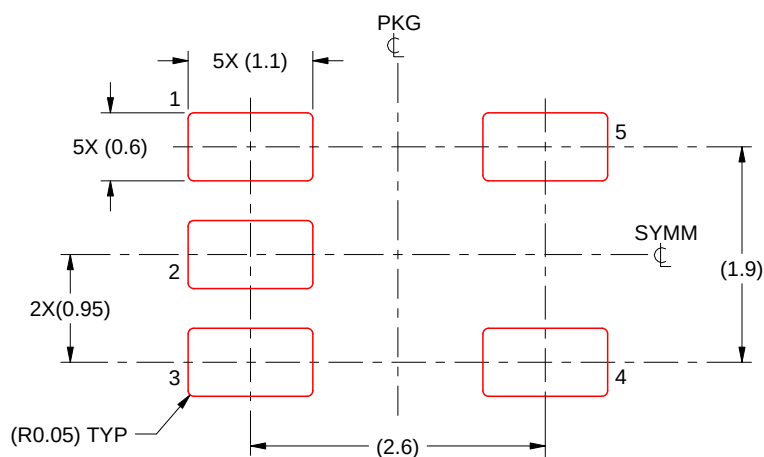
6. Publication IPC-7351 may have alternate designs.  
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## 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.

## IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), 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 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](#), [TI's General Quality Guidelines](#), 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. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

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

Copyright © 2025, Texas Instruments Incorporated

Last updated 10/2025