



**THE DATASHEET OF  
SN74AHC1G86DRLR**



## SN74AHC1G86 Single 2-Input Exclusive-OR Gate

### 1 Features

- Operating Range of 2 V to 5.5 V
- Max  $t_{pd}$  of 8 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
- 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

- Cameras
- Programmable Logic Controllers
- Telecom Infrastructure
- Wireless Headsets
- Motor Drives and Controls
- TVs
- Set-top-boxes
- Audio

### 3 Description

The SN74AHC1G86 is a single 2-input exclusive-OR gate. The device performs the Boolean function  $Y = A \times B$  or  $Y = \overline{A}B + A\overline{B}$  in positive logic.

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

| PART NUMBER | PACKAGE     | BODY SIZE (NOM)   |
|-------------|-------------|-------------------|
| SN74AHC1G86 | SOT-23 (5)  | 2.90 mm x 1.60 mm |
|             | SC-70 (5)   | 2.00 mm x 1.30 mm |
|             | SOT-553 (5) | 1.65 mm x 1.20 mm |

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

### 4 Simplified Schematic

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



These are five equivalent exclusive-OR symbols valid for an SN74AHC1G86 gate in positive logic; negation may be shown at any twoports.

#### LOGIC-IDENTITY ELEMENT



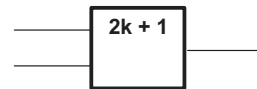
The output is active (low) if all inputs stand at the same logic level (that is,  $A = B$ ).

#### EVEN-PARITY ELEMENT



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

#### ODD-PARITY ELEMENT



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



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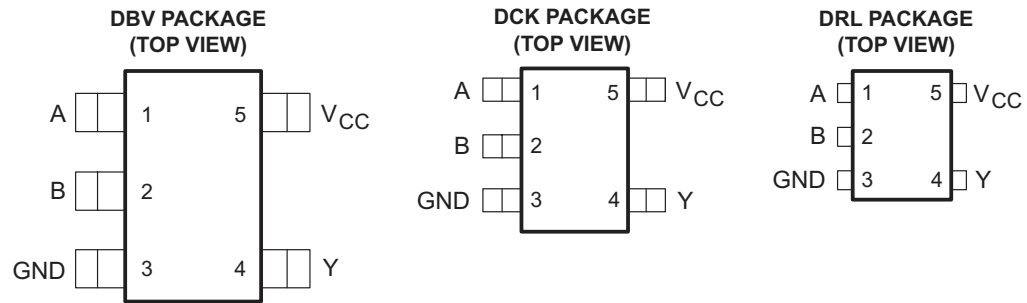
## 5 Revision History

### Changes from Revision M (June 2005) to Revision N

Page

|   |                 |
|---|-----------------|
| <ul style="list-style-type: none"> <li>• 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. ....</li> <li>• Deleted <i>Ordering Information</i> table. ....</li> <li>• Changed MAX operating temperature to 125°C in <i>Recommended Operating Conditions</i> table. ....</li> </ul> | <br>1<br>1<br>4 |
|---|-----------------|

## 6 Pin Configuration and Functions



See mechanical drawings for dimensions.

### Pin Functions

| PIN |                 | TYPE | 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   |

## 7 Specifications

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

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

|  |                                     | MIN                         | MAX            | UNIT |
|--|-------------------------------------|-----------------------------|----------------|------|
| $V_{CC}$   | Supply voltage range                | -0.5                        | 7              | V    |
| $V_I$  | Input voltage range <sup>(2)</sup>  | -0.5                        | 7              | V    |
| $V_O$  | Output voltage range <sup>(2)</sup> | -0.5                        | $V_{CC} + 0.5$ | V    |
| $I_{IK}$   | Input clamp current                 | $V_I < 0$                   | -20            | mA   |
| $I_{OK}$   | Output clamp current                | $V_O < 0$ or $V_O > V_{CC}$ | ±20            | mA   |
| $I_O$  | Continuous output current           | $V_O = 0$ to $V_{CC}$       | ±25            | mA   |
| Continuous channel current through $V_{CC}$ or GND |                                     |                             | ±50            | mA   |
| $T_{stg}$  | Storage temperature range           | -65                         | 150            | °C   |

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

### 7.2 ESD Ratings

|             |                         | VALUE  | UNIT |
|-------------|-------------------------|--|------|
| $V_{(ESD)}$ | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>              | 2000 |
|             |                         | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins <sup>(2)</sup> | 1000 |
|             |                         |  | V    |

- (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.

### 7.3 Recommended Operating Conditions

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

|                     |                                    | MIN                      | MAX      | UNIT |
|---------------------|------------------------------------|--------------------------|----------|------|
| $V_{CC}$            | Supply voltage                     | 2                        | 5.5      | V    |
| $V_{IH}$            | High-level input voltage           | $V_{CC} = 2$ V           | 1.5      | V    |
|                     |                                    | $V_{CC} = 3$ V           | 2.1      |      |
|                     |                                    | $V_{CC} = 5.5$ V         | 3.85     |      |
| $V_{IL}$            | Low-level input voltage            | $V_{CC} = 2$ V           | 0.5      | V    |
|                     |                                    | $V_{CC} = 3$ V           | 0.9      |      |
|                     |                                    | $V_{CC} = 5.5$ V         | 1.65     |      |
| $V_I$               | Input voltage                      | 0                        | 5.5      | V    |
| $V_O$               | Output voltage                     | 0                        | $V_{CC}$ | V    |
| $I_{OH}$            | High-level output current          | $V_{CC} = 2$ V           | -50      | μA   |
|                     |                                    | $V_{CC} = 3.3$ V ± 0.3 V | -4       | mA   |
|                     |                                    | $V_{CC} = 5$ V ± 0.5 V   | -8       |      |
| $I_{OL}$            | Low-level output current           | $V_{CC} = 2$ V           | 50       | μA   |
|                     |                                    | $V_{CC} = 3.3$ V ± 0.3 V | 4        | mA   |
|                     |                                    | $V_{CC} = 5$ V ± 0.5 V   | 8        |      |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | $V_{CC} = 3.3$ V ± 0.3 V | 100      | ns/V |
|                     |                                    | $V_{CC} = 5$ V ± 0.5 V   | 20       |      |
| $T_A$               | Operating free-air temperature     | -40                      | 125      | °C   |

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

## 7.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |  | SN74AHC1G86 |       |       | UNIT |
|-------------------------------|--|-------------|-------|-------|------|
|                               |  | DBV         | DCK   | DRL   |      |
|                               |  | 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 |      |
| R <sub>θJB</sub>              | Junction-to-board thermal resistance         | 60.6        | 65.   | 150.3 |      |
| ψ <sub>JT</sub>               | Junction-to-top characterization parameter   | 17.8        | 2.0   | 6.9   |      |
| ψ <sub>JB</sub>               | Junction-to-board characterization parameter | 60.1        | 64.2  | 148.4 |      |

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

## 7.5 Electrical Characteristics

over recommended 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             | 1.9                   | 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             |                       |     |      | 2.48          |      | 2.48           |     |      |
|                 |   | 4.5 V           |                       |     |      | 3.8           |      | 3.8            |     |      |
| V <sub>OL</sub> | I <sub>OL</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           |     |      |
|                 |   | 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             |                       | 4   | 10   |               | 10   | 10             | pF  |      |

## 7.6 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 (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE       | T <sub>A</sub> = 25°C |     |      | –40°C to 85°C |      | –40°C to 125°C |      | UNIT |
|------------------|--------------|-------------|------------------------|-----------------------|-----|------|---------------|------|----------------|------|------|
|                  |              |             |                        | MIN                   | TYP | MAX  | MIN           | MAX  | MIN            | MAX  |      |
| t <sub>PLH</sub> | A or B       | Y           | C <sub>L</sub> = 15 pF |                       | 7   | 11   | 1             | 13   | 1              | 14   | ns   |
| t <sub>PHL</sub> |              |             |                        |                       | 7   | 11   | 1             | 13   | 1              | 14   |      |
| t <sub>PLH</sub> | A or B       | Y           | C <sub>L</sub> = 50 pF |                       | 9.5 | 14.5 | 1             | 16.5 | 1              | 17.5 | ns   |
| t <sub>PHL</sub> |              |             |                        |                       | 9.5 | 14.5 | 1             | 16.5 | 1              | 17.5 |      |

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

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

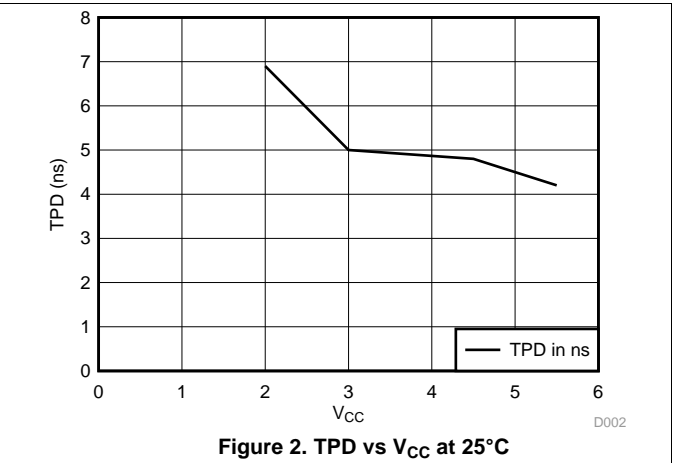
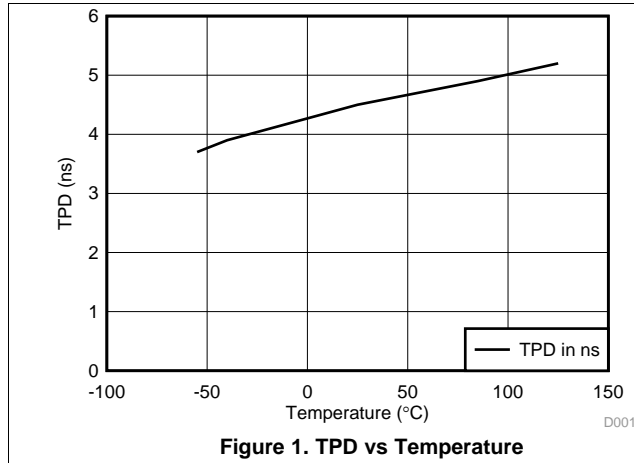
| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE       | T <sub>A</sub> = 25°C |     |     | –40°C to 85°C |     | –40°C to 125°C |     | UNIT |
|------------------|--------------|-------------|------------------------|-----------------------|-----|-----|---------------|-----|----------------|-----|------|
|                  |              |             |                        | MIN                   | TYP | MAX | MIN           | MAX | MIN            | MAX |      |
| t <sub>PLH</sub> | A or B       | Y           | C <sub>L</sub> = 15 pF |                       | 4.8 | 6.8 | 1             | 8   | 1              | 8.6 | ns   |
| t <sub>PHL</sub> |              |             |                        |                       | 4.8 | 6.8 | 1             | 8   | 1              | 8.6 |      |
| t <sub>PLH</sub> | A or B       | Y           | C <sub>L</sub> = 50 pF |                       | 6.3 | 8.8 | 1             | 10  | 1              | 11  | ns   |
| t <sub>PHL</sub> |              |             |                        |                       | 6.3 | 8.8 | 1             | 10  | 1              | 11  |      |

## 7.8 Operating Characteristics

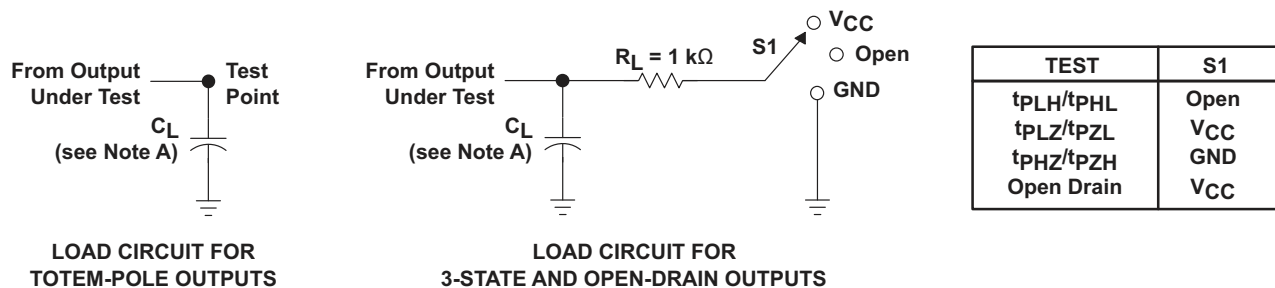
 $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ 

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

## 7.9 Typical Characteristics

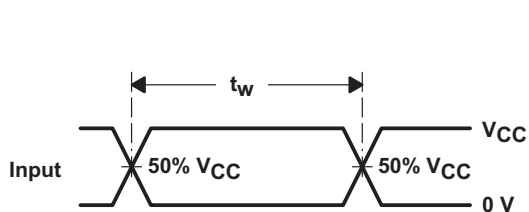


## 8 Parameter Measurement Information

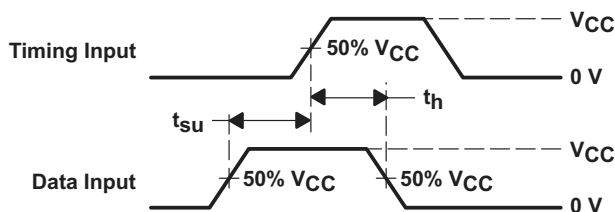


LOAD CIRCUIT FOR TOTEM-POLE OUTPUTS

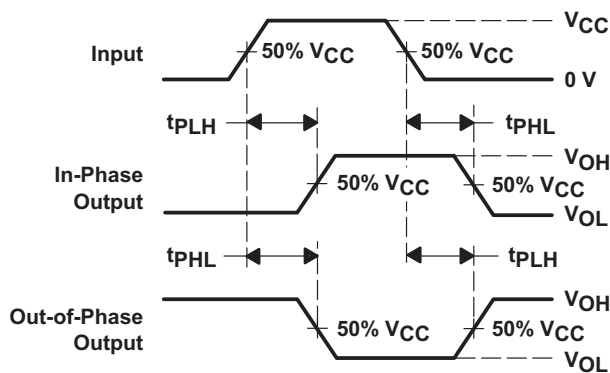
LOAD CIRCUIT FOR 3-STATE AND OPEN-DRAIN OUTPUTS



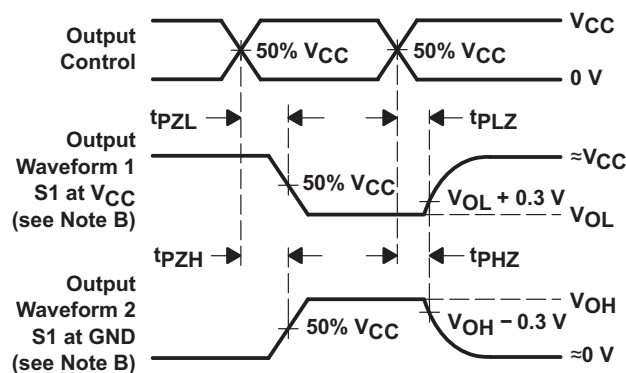
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES LOW- AND HIGH-LEVEL ENABLING

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

Figure 3. Load Circuit and Voltage Waveforms

## 9 Detailed Description

### 9.1 Overview

The SN74AHC1G86 is a single 2-input exclusive-OR gate. The device performs the Boolean function  $Y = A \times B$  or  $Y = \overline{A}B + A\overline{B}$  in positive logic.

A common application is as a true or complementary element. If one of the inputs is low, the other input is reproduced in true form at the output. If one of the inputs is high, the signal on the other input is reproduced inverted at the output.

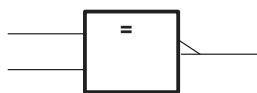
### 9.2 Functional Block Diagram

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



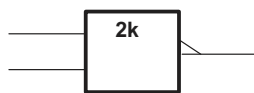
These are five equivalent exclusive-OR symbols valid for an SN74AHC1G86 gate in positive logic; negation may be shown at any twoports.

**LOGIC-IDENTITY ELEMENT**



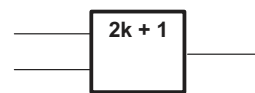
The output is active (low) if all inputs stand at the same logic level (that is,  $A = B$ ).

**EVEN-PARITY ELEMENT**



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

**ODD-PARITY ELEMENT**



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

**Figure 4. Exclusive-OR Logic**

### 9.3 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

### 9.4 Device Functional Modes

**Table 1. Function Table**

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

## 10 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.

### 10.1 Application Information

SN74AHCT1G125 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.

### 10.2 Typical Application

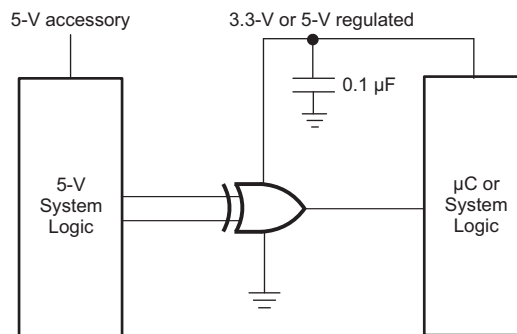


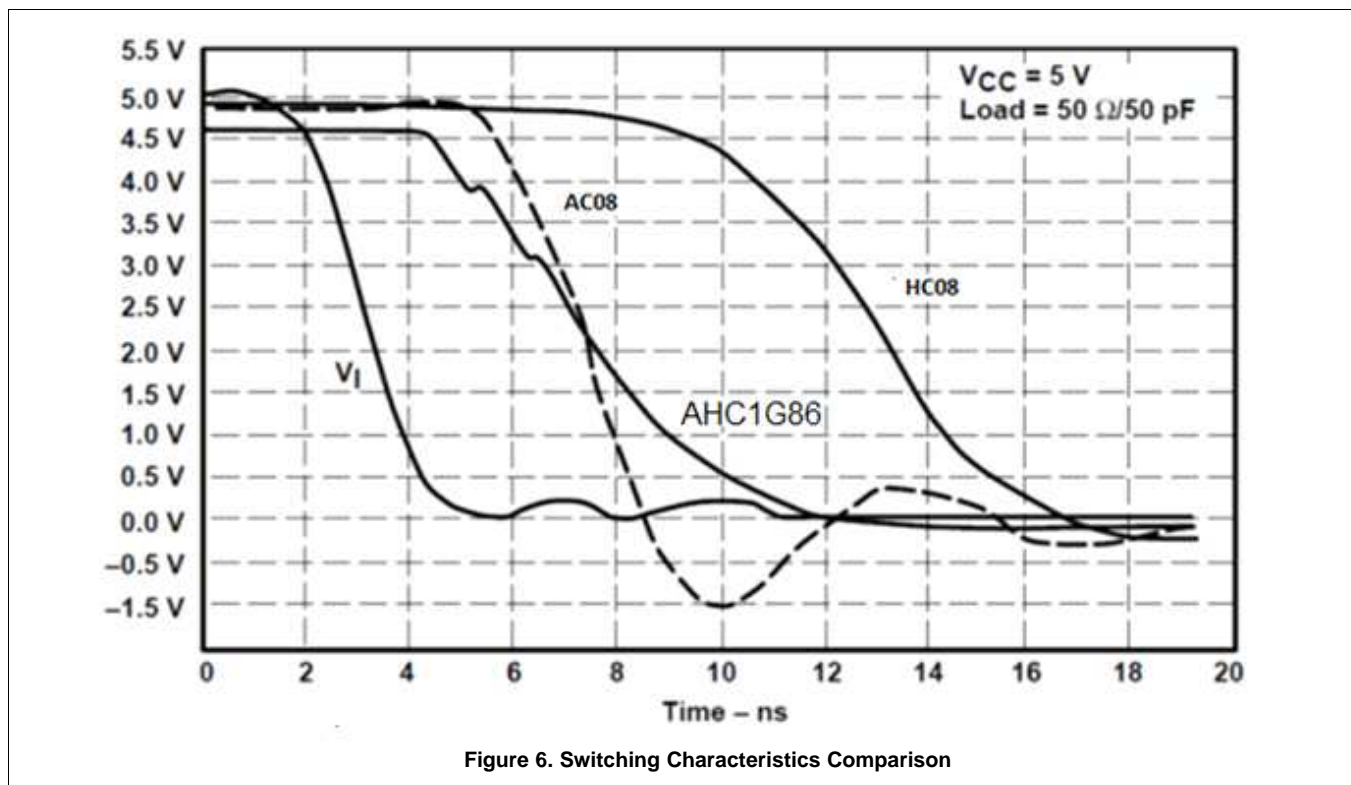
Figure 5. Typical Application Schematic

#### 10.2.1 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.

#### 10.2.2 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. 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  $V_{CC}$ .

**Typical Application (continued)**
**10.2.3 Application Curves**

**11 Power Supply Recommendations**

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

Each  $V_{CC}$  pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1  $\mu\text{F}$  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.

## 12 Layout

### 12.1 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.

### 12.2 Layout Example

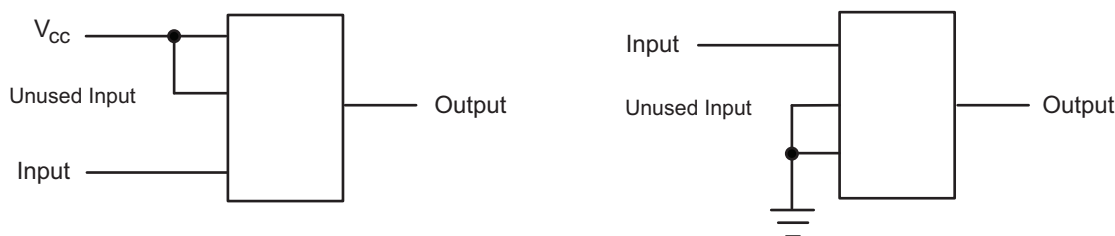


Figure 7. Layout Diagram

## 13 Device and Documentation Support

### 13.1 Trademarks

All trademarks are the property of their respective owners.

### 13.2 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.

### 13.3 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

## 14 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                 |
|-------------------|---------------|--------------|-----------------|------|-------------|-------------------------|-------------------------|----------------------|--------------|--------------------------|-------------------------|
| SN74AHC1G86DBVR   | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU   CU SN       | Level-1-260C-UNLIM   | -40 to 125   | (A863, A86G, A86J, A86S) | <a href="#">Samples</a> |
| SN74AHC1G86DBVRE4 | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 125   | A86G                     | <a href="#">Samples</a> |
| SN74AHC1G86DBVRG4 | ACTIVE        | SOT-23       | DBV             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 125   | A86G                     | <a href="#">Samples</a> |
| SN74AHC1G86DBVT   | ACTIVE        | SOT-23       | DBV             | 5    | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU   CU SN       | Level-1-260C-UNLIM   | -40 to 125   | (A863, A86G, A86J, A86S) | <a href="#">Samples</a> |
| SN74AHC1G86DCKR   | ACTIVE        | SC70         | DCK             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU   CU SN       | Level-1-260C-UNLIM   | -40 to 125   | (AH3, AHG, AHJ, AH S)    | <a href="#">Samples</a> |
| SN74AHC1G86DCKRE4 | ACTIVE        | SC70         | DCK             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 125   | AH3                      | <a href="#">Samples</a> |
| SN74AHC1G86DCKRG4 | ACTIVE        | SC70         | DCK             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 125   | AH3                      | <a href="#">Samples</a> |
| SN74AHC1G86DCKT   | ACTIVE        | SC70         | DCK             | 5    | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU   CU SN       | Level-1-260C-UNLIM   | -40 to 125   | (AH3, AHG, AHJ, AH S)    | <a href="#">Samples</a> |
| SN74AHC1G86DCKTG4 | ACTIVE        | SC70         | DCK             | 5    | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | -40 to 125   | AH3                      | <a href="#">Samples</a> |
| SN74AHC1G86DRLR   | ACTIVE        | SOT-5X3      | DRL             | 5    | 4000        | Green (RoHS & no Sb/Br) | CU NIPDAUAG             | Level-1-260C-UNLIM   | -40 to 125   | AHS                      | <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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**OTHER QUALIFIED VERSIONS OF SN74AHC1G86 :**

- Automotive: [SN74AHC1G86-Q1](#)
- Enhanced Product: [SN74AHC1G86-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

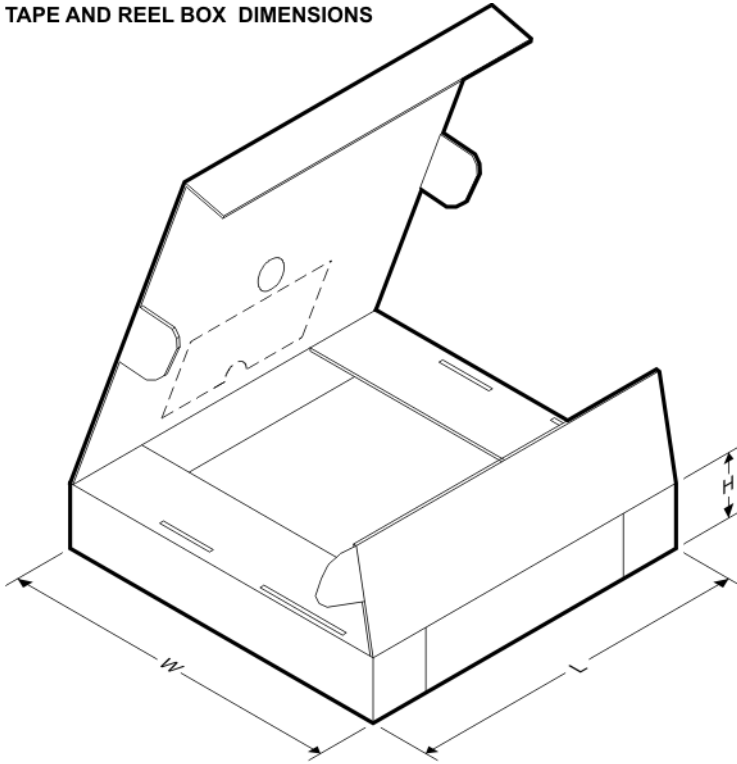


### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*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 |
|-------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AHC1G86DBVR   | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.2                | 3.3     | 3.23    | 1.55    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DBVR   | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DBVR   | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DBVR   | SOT-23       | DBV             | 5    | 3000 | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DBVT   | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DBVT   | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.2                | 3.3     | 3.23    | 1.55    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DBVT   | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DBVT   | SOT-23       | DBV             | 5    | 250  | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DCKR   | SC70         | DCK             | 5    | 3000 | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DCKR   | SC70         | DCK             | 5    | 3000 | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DCKR   | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DCKRG4 | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DCKT   | SC70         | DCK             | 5    | 250  | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DCKT   | SC70         | DCK             | 5    | 250  | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DCKT   | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DCKTG4 | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHC1G86DRLR   | SOT-5X3      | DRL             | 5    | 4000 | 180.0              | 8.4                | 1.98    | 1.78    | 0.69    | 4.0     | 8.0    | Q3            |

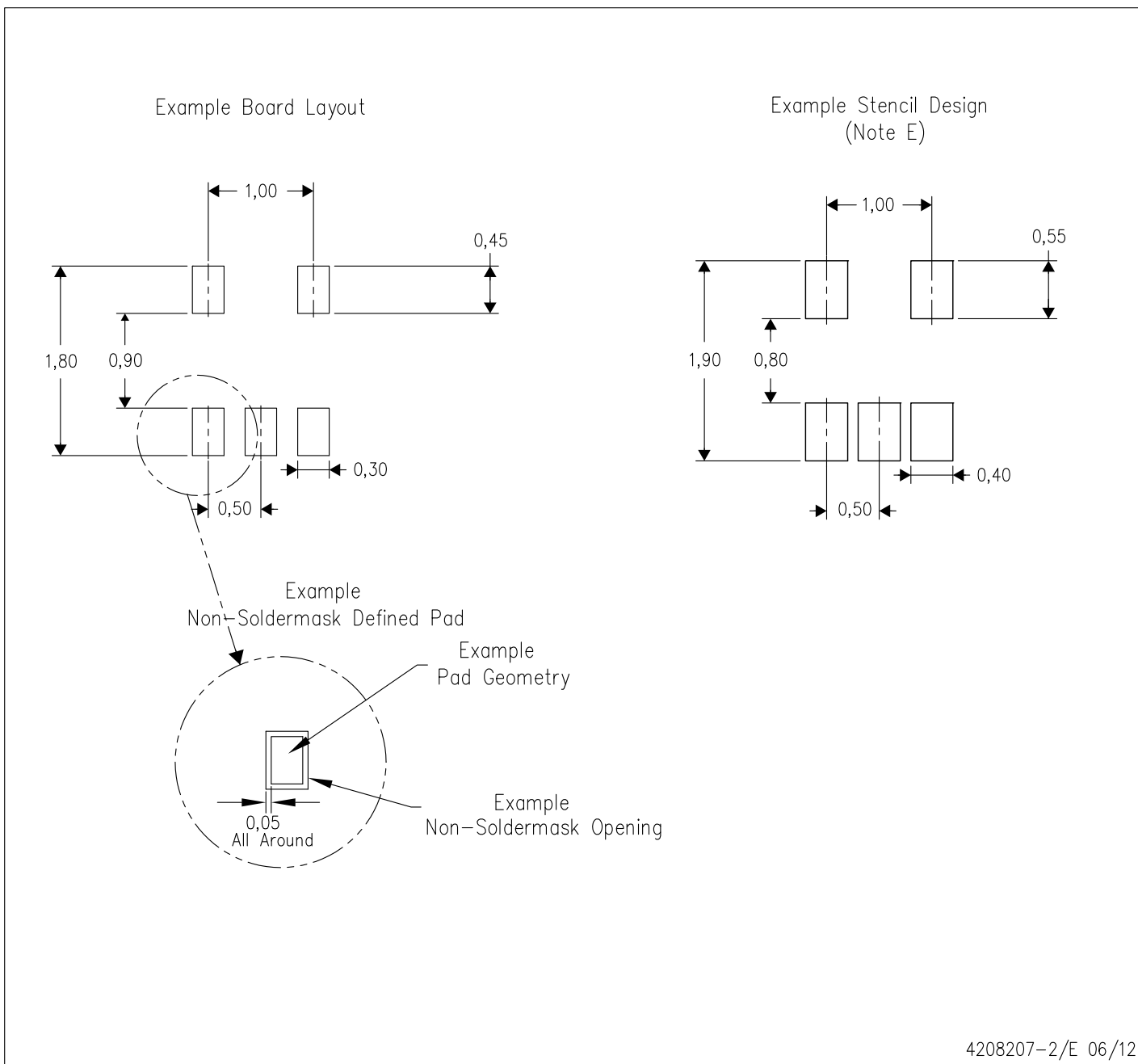
**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

| Device            | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AHC1G86DBVR   | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DBVR   | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DBVR   | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DBVR   | SOT-23       | DBV             | 5    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74AHC1G86DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DBVT   | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DBVT   | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DBVT   | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DBVT   | SOT-23       | DBV             | 5    | 250  | 202.0       | 201.0      | 28.0        |
| SN74AHC1G86DCKR   | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DCKR   | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DCKR   | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DCKRG4 | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DCKT   | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DCKT   | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DCKT   | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DCKTG4 | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHC1G86DRLR   | SOT-5X3      | DRL             | 5    | 4000 | 202.0       | 201.0      | 28.0        |



- 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.

DBV0005A



# PACKAGE OUTLINE

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



4214839/D 11/2018

## 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/D 11/2018

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/D 11/2018

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.

DCK (R-PDSO-G5)

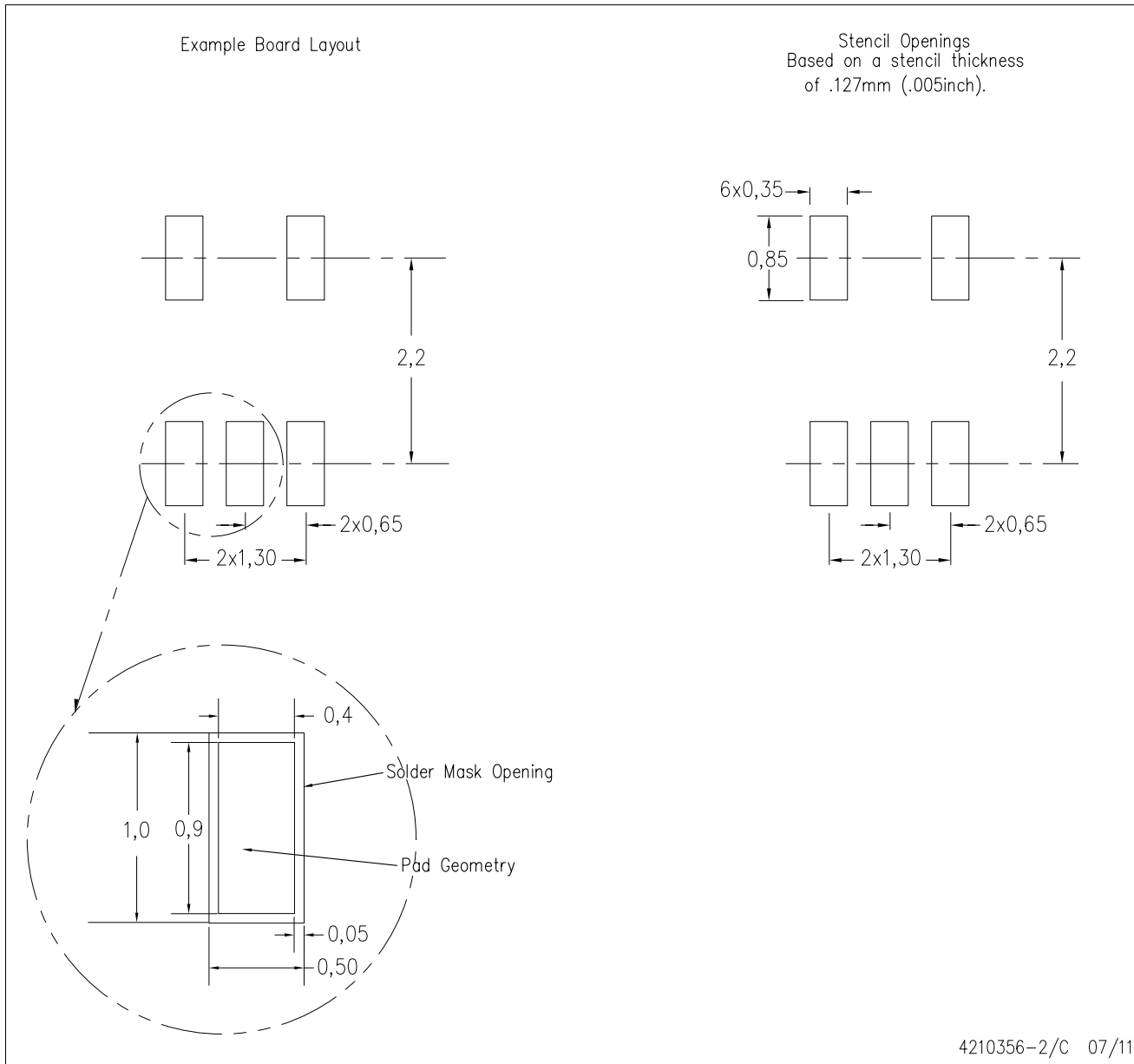
PLASTIC SMALL-OUTLINE PACKAGE



- 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:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
  - Publication IPC-7351 is recommended for alternate designs.
  - 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.

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