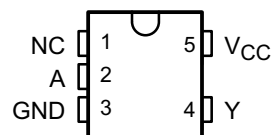


## SINGLE SCHMITT-TRIGGER INVERTER GATE

Check for Samples: [SN74AHCT1G14](#)

### FEATURES

- Operating Range 4.5-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
- Inputs Are TTL-Voltage Compatible
- Latch-Up Performance Exceeds 250 mA Per JESD 17

**DBV OR DCK PACKAGE  
(TOP VIEW)**


NC – No internal connection

See mechanical drawings for dimensions.

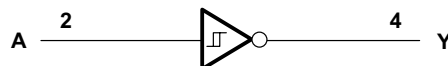
### DESCRIPTION

description/ordering information The SN74AHCT1G14 contains a single inverter gate. The device performs the Boolean function  $Y = \overline{A}$ .

The device functions as an independent inverter gate, but because of the Schmitt action, gates may have different input threshold levels for positive- ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals.

**FUNCTION TABLE**

| INPUTS | OUTPUT |
|--------|--------|
| A      | Y      |
| H      | L      |
| L      | H      |

**LOGIC DIAGRAM (POSITIVE LOGIC)**


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

# SN74AHCT1G14

SCLS322P – MARCH 1996–REVISED JUNE 2013

[www.ti.com](http://www.ti.com)

## ABSOLUTE MAXIMUM RATINGS

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

|                                                                | VALUE                  | UNIT |
|----------------------------------------------------------------|------------------------|------|
| Supply voltage range, $V_{CC}$                                 | –0.5 to 7              | V    |
| Input voltage range, $V_I$ <sup>(2)</sup>                      | –0.5 to 7              | V    |
| Output voltage range, $V_O$ <sup>(2)</sup>                     | –0.5 to $V_{CC} + 0.5$ | V    |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ )                    | –20                    | mA   |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) | ±20                    | mA   |
| Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )     | ±25                    | mA   |
| Continuous current through $V_{CC}$ or GND                     | ±50                    | mA   |
| Package thermal impedance, $\theta_{JA}$ <sup>(3)</sup>        | DBV package            | 206  |
|                                                                | DCK package            | 252  |
| Storage temperature range, $T_{stg}$                           | –65 to 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.
- (3) The package thermal impedance is calculated in accordance with JESD 51-7.

## RECOMMENDED OPERATING CONDITIONS<sup>(1)</sup>

|                                      | MIN | MAX      | UNIT |
|--------------------------------------|-----|----------|------|
| $V_{CC}$ Supply voltage              | 4.5 | 5.5      | 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   |
| $T_A$ 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*, literature number [SCBA004](#).

## ELECTRICAL CHARACTERISTICS

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

| PARAMETER                                                             | TEST CONDITIONS                                             | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     |      | T <sub>A</sub> = –40°C to 85°C |      | Recommended                     |      | UNIT |
|-----------------------------------------------------------------------|-------------------------------------------------------------|-----------------|-----------------------|-----|------|--------------------------------|------|---------------------------------|------|------|
|                                                                       |                                                             |                 | MIN                   | TYP | MAX  | MIN                            | MAX  | T <sub>A</sub> = –40°C to 125°C |      |      |
|                                                                       |                                                             |                 |                       |     |      |                                |      | MIN                             | MAX  |      |
| V <sub>T+</sub><br>Positive-going<br>input threshold<br>voltage       |                                                             | 4.5 V           | 0.9                   |     | 2    | 0.9                            |      | 0.9                             | 2.0  | V    |
|                                                                       |                                                             | 5.5 V           | 1.1                   |     | 2    | 1.1                            |      | 1.1                             | 2.0  |      |
| V <sub>T–</sub><br>Negative-going<br>input threshold<br>voltage       |                                                             | 4.5 V           | 0.5                   |     | 1.6  | 0.5                            |      | 0.5                             | 1.6  | V    |
|                                                                       |                                                             | 5.5 V           | 0.6                   |     | 1.5  | 0.6                            |      | 0.6                             | 1.5  |      |
| ΔV <sub>T</sub><br>Hysteresis (V <sub>T+</sub> –<br>V <sub>T–</sub> ) |                                                             | 4.5 V           | 0.4                   |     | 1.4  | 0.4                            |      | 0.4                             | 1.4  | V    |
|                                                                       |                                                             | 5.5 V           | 0.5                   |     | 1.6  | 0.4                            |      | 0.5                             | 1.6  |      |
| V <sub>OH</sub>                                                       | I <sub>OH</sub> = –50 mA                                    | 4.5 V           | 4.4                   | 4.5 |      | 4.4                            |      | 4.4                             |      | V    |
|                                                                       | I <sub>OH</sub> = –8 mA                                     |                 | 3.94                  |     |      | 3.88                           |      | 3.7                             |      |      |
| V <sub>OL</sub>                                                       | I <sub>OL</sub> = 50 mA                                     | 4.5 V           |                       |     | 0.1  |                                | 0.1  |                                 | 0.1  | V    |
|                                                                       | I <sub>OL</sub> = 8 mA                                      |                 |                       |     | 0.36 |                                | 0.44 |                                 | 0.55 |      |
| I <sub>I</sub>                                                        | V <sub>I</sub> = 5.5 V or GND                               | 0 V to 5.5 V    |                       |     | ±0.1 |                                | ±1   |                                 | ±1   | μA   |
| I <sub>CC</sub>                                                       | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 | 5.5 V           |                       |     | 1    |                                | 10   |                                 | 10   | μA   |
| C <sub>i</sub>                                                        | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V             |                       | 2   | 10   |                                | 10   |                                 | 10   | pF   |

## SWITCHING CHARACTERISTICS

over recommended operating free-air temperature range, V<sub>CC</sub> = 5 V ± 0.5 V (unless otherwise noted) (see [Figure 1](#))

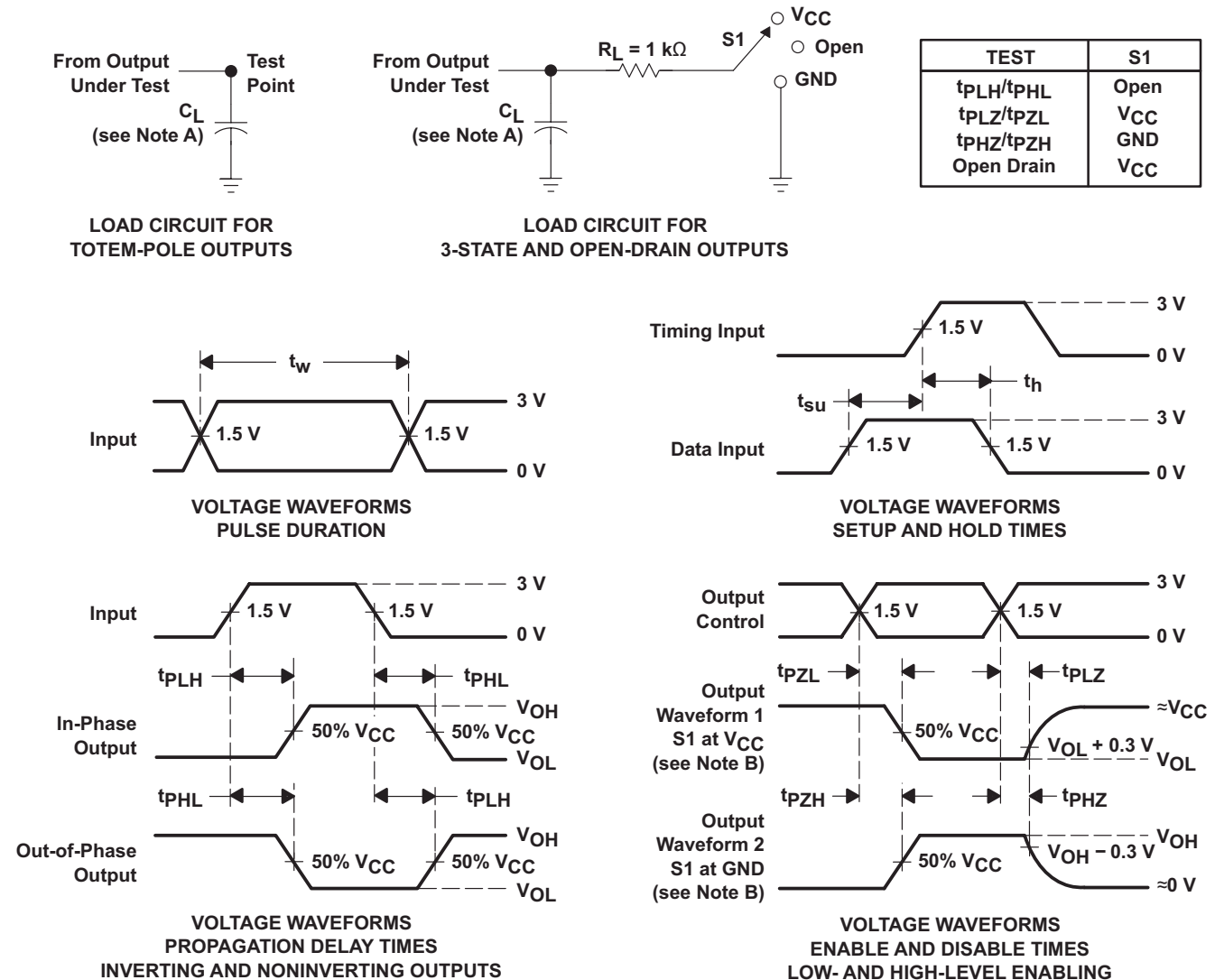
| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | OUTPUT<br>CAPACITANCE  | T <sub>A</sub> = 25°C |     | T <sub>A</sub> = –40°C to<br>85°C |     | Recommended<br>T <sub>A</sub> = –40°C to<br>125°C |     | UNIT |
|------------------|-----------------|----------------|------------------------|-----------------------|-----|-----------------------------------|-----|---------------------------------------------------|-----|------|
|                  |                 |                |                        | TYP                   | MAX | MIN                               | MAX | MIN                                               | MAX |      |
|                  |                 |                |                        |                       |     |                                   |     |                                                   |     |      |
| t <sub>PLH</sub> | A               | Y              | C <sub>L</sub> = 15 pF | 4                     | 7   | 1                                 | 8   | 1                                                 | 9   | ns   |
| t <sub>PHL</sub> |                 |                |                        | 4                     | 7   | 1                                 | 8   | 1                                                 | 9   |      |
| t <sub>PLH</sub> | A               | Y              | C <sub>L</sub> = 50 pF | 5.5                   | 8   | 1                                 | 9   | 1                                                 | 10  | ns   |
| t <sub>PHL</sub> |                 |                |                        | 5.5                   | 8   | 1                                 | 9   | 1                                                 | 10  |      |

## OPERATING CHARACTERISTICS

V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

| PARAMETER                                     | TEST CONDITIONS    | TYP | UNIT |
|-----------------------------------------------|--------------------|-----|------|
| C <sub>pd</sub> Power dissipation capacitance | No load, f = 1 MHz | 12  | pF   |

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

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

## REVISION HISTORY

| Changes from Revision O (January 2003) to Revision P        | Page              |
|-------------------------------------------------------------|-------------------|
| • Changed document format from Quicksilver to DocZone. .... | <a href="#">1</a> |
| • Extended operating temperature range to 125°C .....       | <a href="#">2</a> |

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>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                 |
|------------------|---------------|--------------|--------------------|------|----------------|------------------|--------------------------------------|----------------------|--------------|--------------------------------|-------------------------|
| 74AHCT1G14DBVRG4 | ACTIVE        | SOT-23       | DBV                | 5    | 3000           | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | B14G                           | <a href="#">Samples</a> |
| 74AHCT1G14DBVTE4 | ACTIVE        | SOT-23       | DBV                | 5    | 250            | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | B14G                           | <a href="#">Samples</a> |
| 74AHCT1G14DCKTE4 | ACTIVE        | SC70         | DCK                | 5    | 250            | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | BF3                            | <a href="#">Samples</a> |
| 74AHCT1G14DCKTG4 | ACTIVE        | SC70         | DCK                | 5    | 250            | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | BF3                            | <a href="#">Samples</a> |
| SN74AHCT1G14DBVR | ACTIVE        | SOT-23       | DBV                | 5    | 3000           | RoHS & Green     | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 125   | (B143, B14G, B14J, B14L, B14S) | <a href="#">Samples</a> |
| SN74AHCT1G14DBVT | ACTIVE        | SOT-23       | DBV                | 5    | 250            | RoHS & Green     | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 125   | (B143, B14G, B14J, B14L, B14S) | <a href="#">Samples</a> |
| SN74AHCT1G14DCK3 | ACTIVE        | SC70         | DCK                | 5    | 3000           | RoHS & Non-Green | SNBI                                 | Level-1-260C-UNLIM   | -40 to 125   | BFY                            | <a href="#">Samples</a> |
| SN74AHCT1G14DCKR | ACTIVE        | SC70         | DCK                | 5    | 3000           | RoHS & Green     | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 125   | (BF3, BFG, BFJ, BFL, BFS)      | <a href="#">Samples</a> |
| SN74AHCT1G14DCKT | ACTIVE        | SC70         | DCK                | 5    | 250            | RoHS & Green     | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 125   | (BF3, BFG, BFJ, BFL, BFS)      | <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.

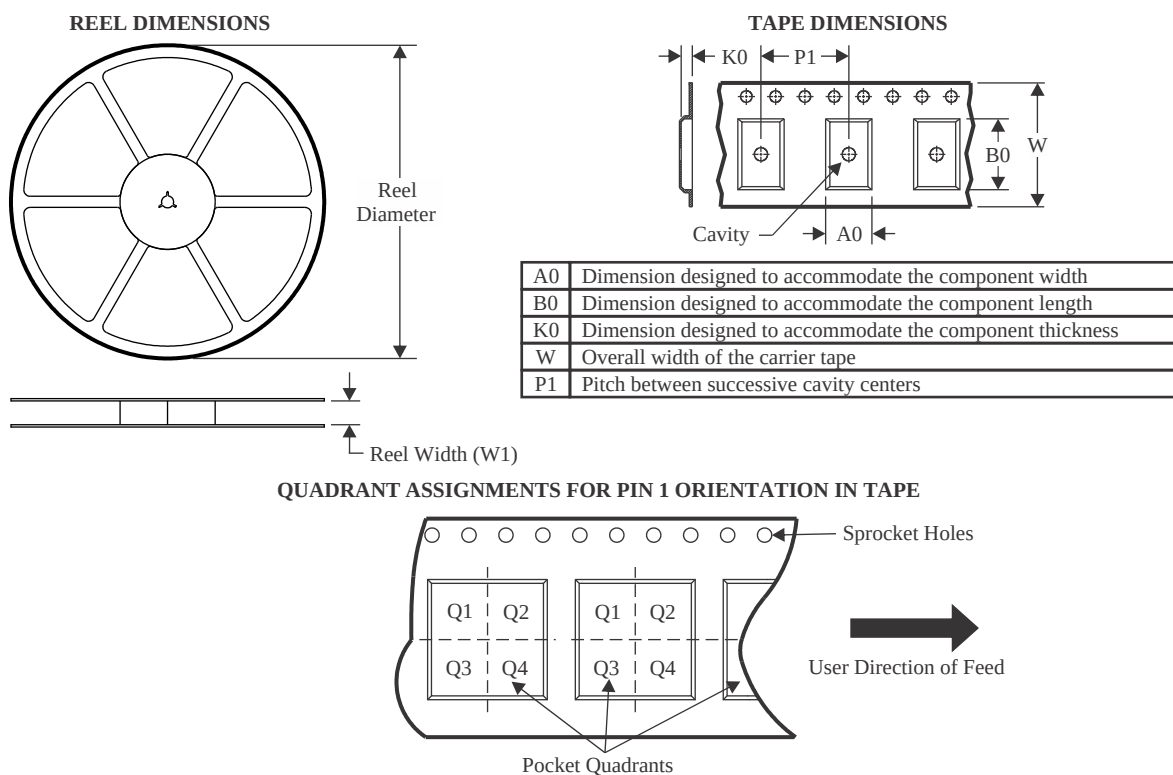
<sup>(5)</sup> Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

<sup>(6)</sup> 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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## TAPE AND REEL INFORMATION

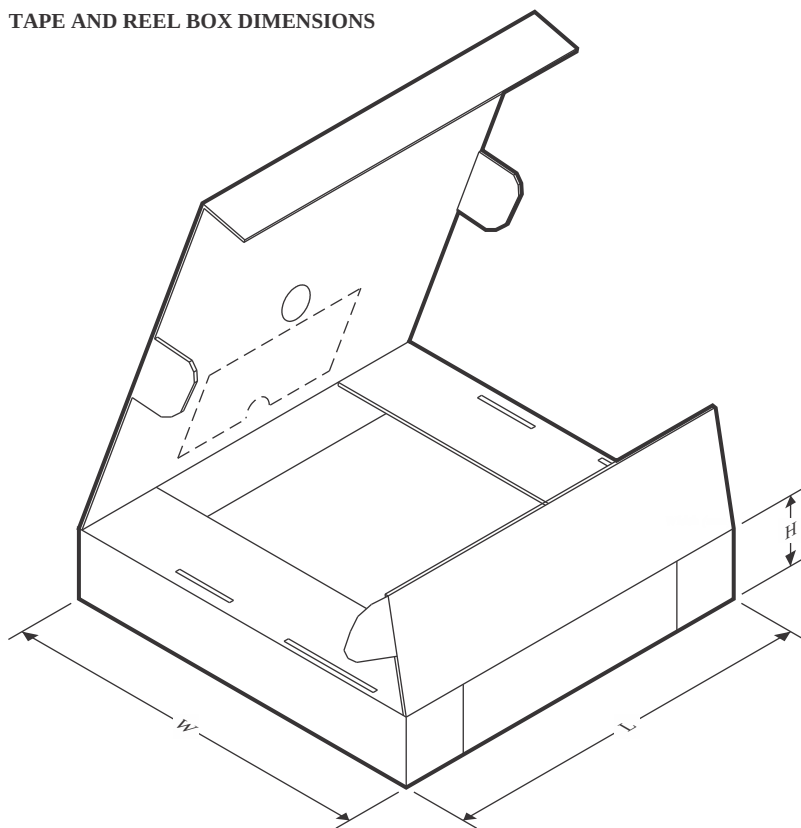


\*All dimensions are nominal

| 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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 74AHCT1G14DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| 74AHCT1G14DCKTG4 | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.2                | 3.3     | 3.23    | 1.55    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.2                | 3.3     | 3.23    | 1.55    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DBVT | SOT-23       | DBV             | 5    | 250  | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DCKR | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DCKR | SC70         | DCK             | 5    | 3000 | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DCKT | SC70         | DCK             | 5    | 250  | 180.0              | 8.4                | 2.47    | 2.3     | 1.25    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74AHCT1G14DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |



## TAPE AND REEL BOX DIMENSIONS

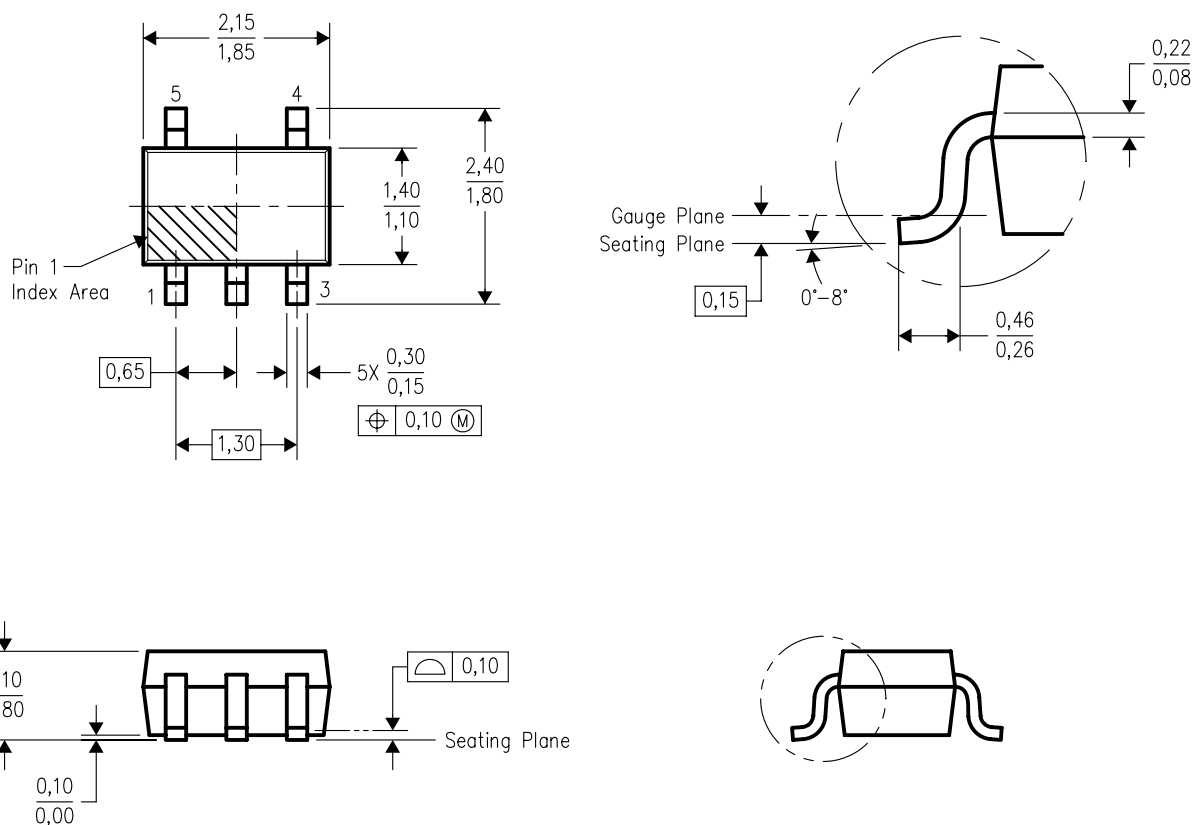


\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 74AHCT1G14DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| 74AHCT1G14DCKTG4 | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DBVR | SOT-23       | DBV             | 5    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74AHCT1G14DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DBVT | SOT-23       | DBV             | 5    | 250  | 202.0       | 201.0      | 28.0        |
| SN74AHCT1G14DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DCKT | SC70         | DCK             | 5    | 250  | 202.0       | 201.0      | 28.0        |
| SN74AHCT1G14DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G14DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |

## DCK (R-PDSO-G5)

## PLASTIC SMALL-OUTLINE PACKAGE

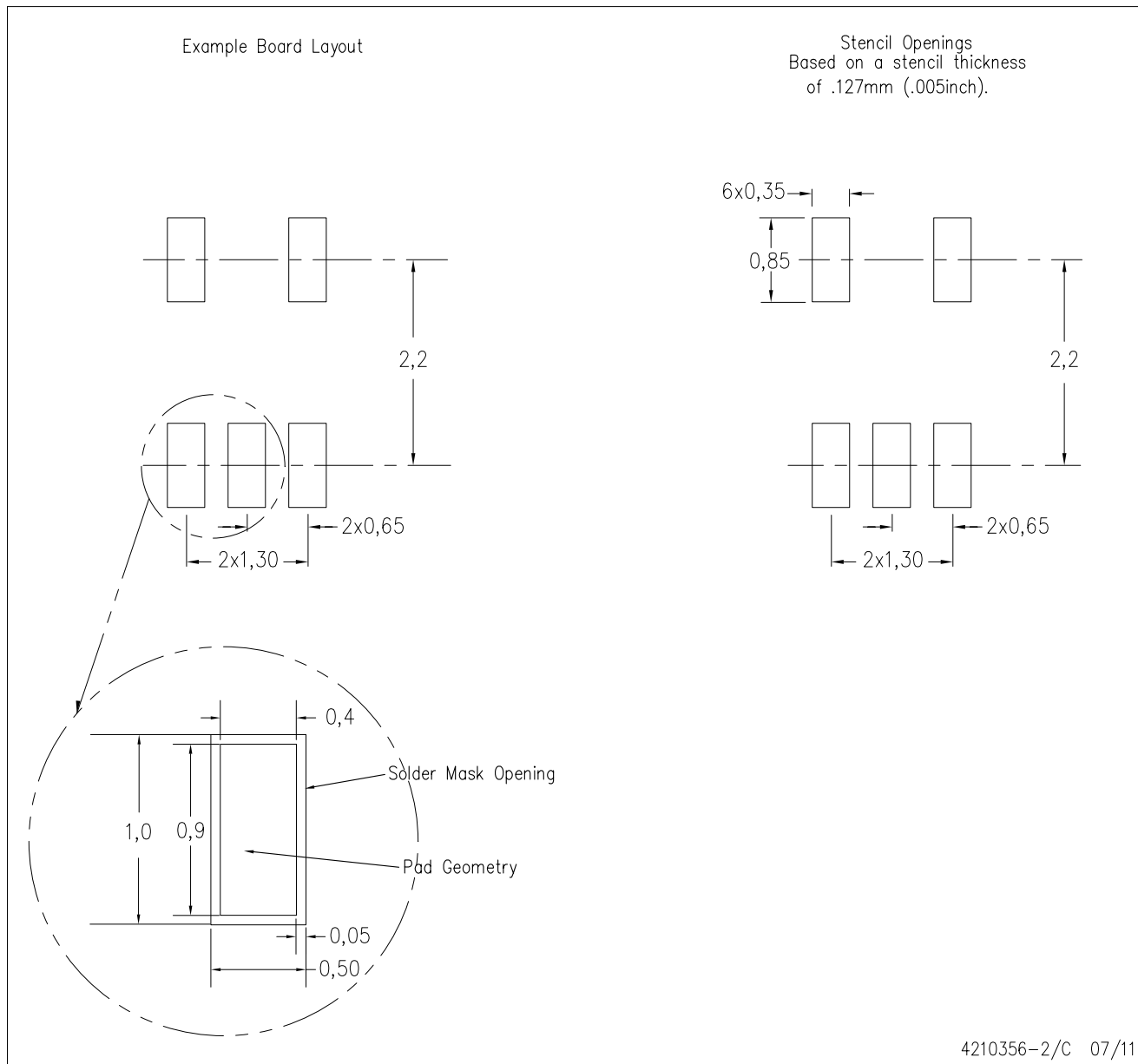


4093553-3/G 01/2007

- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
  - Falls within JEDEC MO-203 variation AA.

DCK (R-PDSO-G5)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
  - D. Publication IPC-7351 is recommended for alternate designs.
  - E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

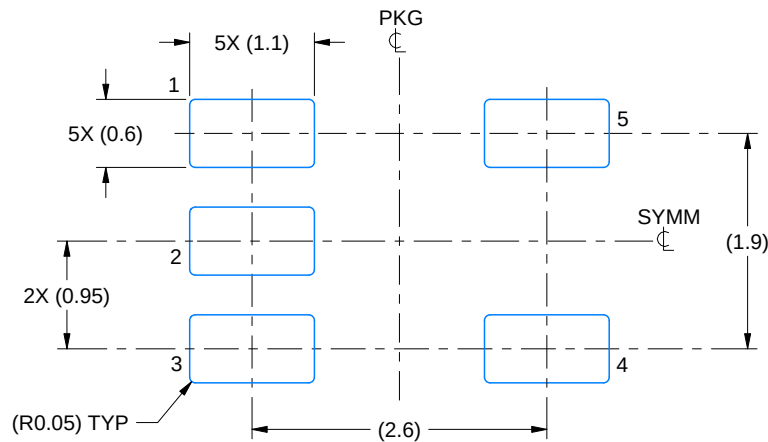


# EXAMPLE BOARD LAYOUT

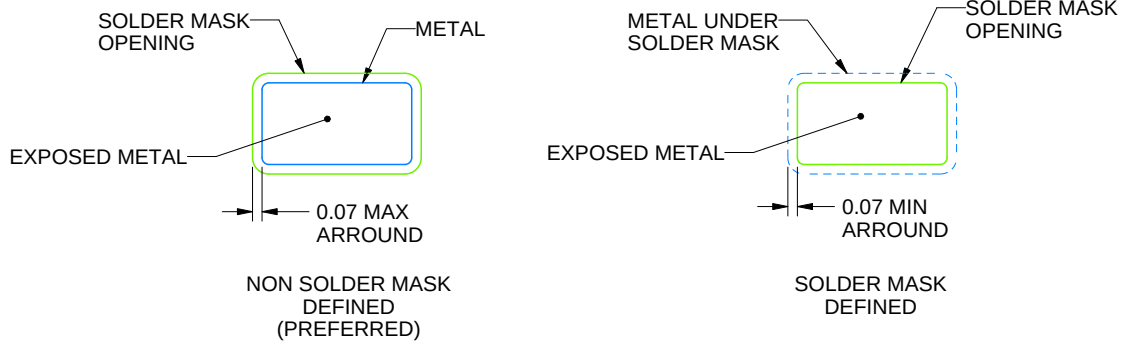
DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4214839/F 06/2021

NOTES: (continued)

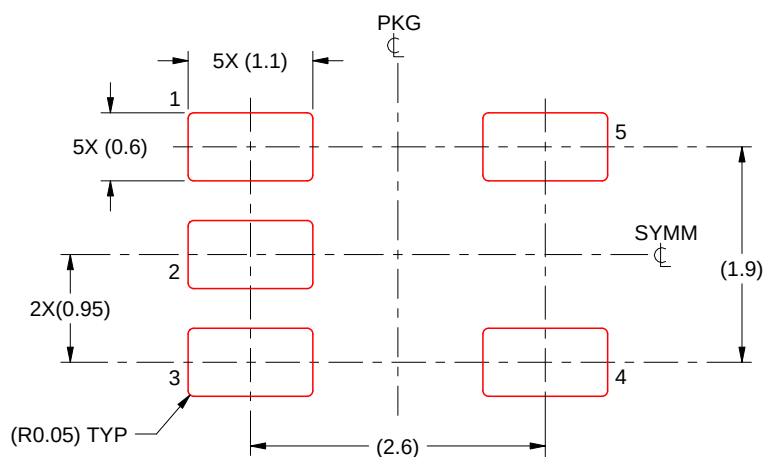
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## 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/F 06/2021

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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