

# SN74AHCT1G02 单通道双输入正或非门 SN74AHCT1G02 单通道双输入正或非门

## 1 特性

- 工作电压范围为 4.5V 至 5.5V
- 电压为 5V 时,  $t_{pd}$  最大值为 6.5ns
- 低功耗,  $I_{CC}$  最大值为 10 $\mu$ A
- 5V 下的输出驱动为  $\pm 8$ mA
- 输入兼容 TTL 电压
- 闩锁性能超过 250mA, 符合 JESD 17 规范

## 2 应用

- [启用或禁用数字信号](#)
- [控制指示灯 LED](#)
- [通信模块和系统控制器之间的转换](#)

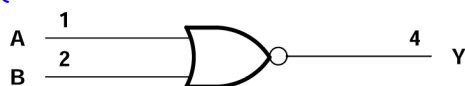
## 3 说明

该器件包含一个单通道双输入或非门, 以正逻辑执行布尔函数  $Y = \overline{A \times B}$  或  $Y = \overline{A + B}$ 。

### 封装信息

| 器件型号         | 封装 <sup>(1)</sup>  | 封装尺寸 <sup>(2)</sup> |
|--------------|--------------------|---------------------|
| SN74AHCT1G02 | DBV ( SOT-23 , 5 ) | 2.8 mm x 2.8 mm     |
|              | DCK ( SC-70 , 5 )  | 2.1 mm x 1.25 mm    |

- (1) 如需了解所有可用封装, 请参阅数据表末尾的可订购产品附录。
- (2) 封装尺寸 ( 长 × 宽 ) 为标称值, 并包括引脚 ( 如适用 )。



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## 4 Pin Configuration and Functions

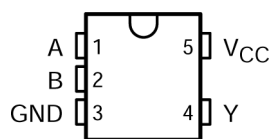


图 4-1. DBV or DCK Package (Top View)

表 4-1. 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   |

## 5 Specifications

### 5.1 Absolute Maximum Ratings

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

|                               |                                                   | MIN                                                       | MAX                   | UNIT |
|-------------------------------|---------------------------------------------------|-----------------------------------------------------------|-----------------------|------|
| V <sub>CC</sub>               | Supply voltage range                              | −0.5                                                      | 7                     | V    |
| V <sub>I</sub> <sup>(2)</sup> | Input voltage range                               | −0.5                                                      | 7                     | V    |
| V <sub>O</sub> <sup>(2)</sup> | Output voltage range                              | −0.5                                                      | V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>               | Input clamp current                               | (V <sub>I</sub> < 0)                                      | −20                   | mA   |
| I <sub>OK</sub>               | Output clamp current                              | (V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CC</sub> ) | ±20                   | mA   |
| I <sub>O</sub>                | Continuous output current                         | (V <sub>O</sub> = 0 to V <sub>CC</sub> )                  | ±25                   | mA   |
|                               | Continuous current through V <sub>CC</sub> or GND |                                                           | ±50                   | mA   |
| T <sub>stg</sub>              | 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.

### 5.2 ESD Ratings

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

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

### 5.3 Recommended Operating Conditions

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

|                 |                                    | MIN | MAX             | UNIT |
|-----------------|------------------------------------|-----|-----------------|------|
| V <sub>CC</sub> | Supply voltage                     | 4.5 | 5.5             | V    |
| V <sub>IH</sub> | High-level input voltage           | 2   |                 | V    |
| V <sub>IL</sub> | Low-level input voltage            |     | 0.8             | V    |
| V <sub>I</sub>  | Input voltage                      | 0   | 5.5             | V    |
| V <sub>O</sub>  | Output voltage                     | 0   | V <sub>CC</sub> | V    |
| I <sub>OH</sub> | High-level output current          |     | −8              | mA   |
| I <sub>OL</sub> | Low-level output current           |     | 8               | mA   |
| Δt/Δv           | Input transition rise or fall rate |     | 20              | ns/V |
| T <sub>A</sub>  | Operating free-air temperature     | −40 | 85              | °C   |

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

### 5.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |                                        | SN74AHCT1G02 |        | UNIT |
|-------------------------------|----------------------------------------|--------------|--------|------|
|                               |                                        | DBV          | DCK    |      |
|                               |                                        | 5 PINS       | 5 PINS |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance | 278          | 289.2  | °C/W |

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

## 5.5 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 |     |      | MIN | MAX  | UNIT |
|---------------------------------|-------------------------------------------------------------|-----------------|-----------------------|-----|------|-----|------|------|
|                                 |                                                             |                 | MIN                   | TYP | MAX  |     |      |      |
| V <sub>OH</sub>                 | I <sub>OH</sub> = -50 µA                                    | 4.5 V           | 4.4                   | 4.5 |      | 4.4 |      | V    |
|                                 | I <sub>OH</sub> = -8 mA                                     |                 | 3.94                  |     |      | 3.8 |      |      |
| V <sub>OL</sub>                 | I <sub>OL</sub> = 50 µA                                     | 4.5 V           |                       |     | 0.1  |     | 0.1  | V    |
|                                 | I <sub>OL</sub> = 8 mA                                      |                 |                       |     | 0.36 |     | 0.44 |      |
| I <sub>I</sub>                  | V <sub>I</sub> = 5.5 V or GND                               | 0 V to 5.5 V    |                       |     | ±0.1 |     | ±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   | µA   |
| ΔI <sub>CC</sub> <sup>(1)</sup> | One input at 3.4 V, Other inputs at GND or V <sub>CC</sub>  | 5.5 V           |                       |     | 1.35 |     | 1.5  | mA   |
| C <sub>i</sub>                  | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V             |                       | 4   | 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<sub>CC</sub>.

## 5.6 Switching Characteristics

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

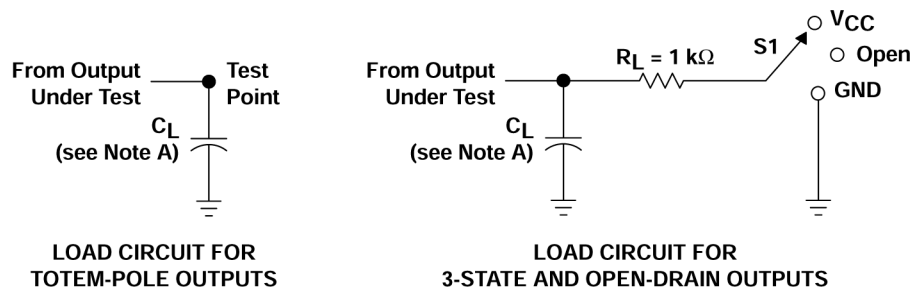
| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE       | T <sub>A</sub> = 25°C |     |     | MIN | MAX | UNIT |
|------------------|--------------|-------------|------------------------|-----------------------|-----|-----|-----|-----|------|
|                  |              |             |                        | MIN                   | TYP | MAX |     |     |      |
| t <sub>PLH</sub> | A or B       | Y           | C <sub>L</sub> = 15 pF |                       | 2.4 | 5.5 | 1   | 6.5 | ns   |
| t <sub>PHL</sub> |              |             |                        |                       | 3.5 | 5.5 | 1   | 6.5 |      |
| t <sub>PLH</sub> | A or B       | Y           | C <sub>L</sub> = 50 pF |                       | 3.4 | 7.5 | 1   | 8.5 | ns   |
| t <sub>PHL</sub> |              |             |                        |                       | 4.5 | 7.5 | 1   | 8.5 |      |

## 5.7 Operating Characteristics

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

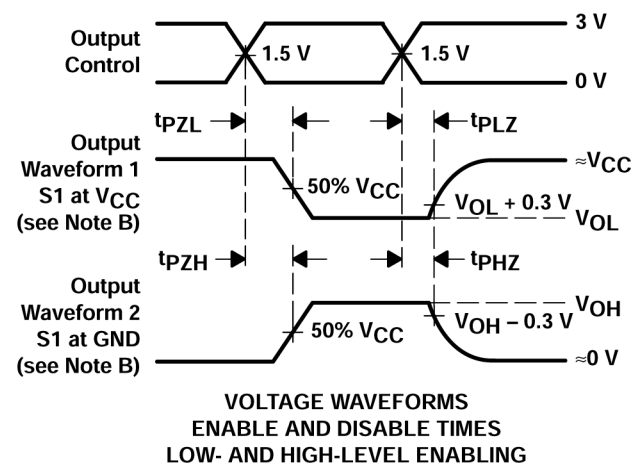
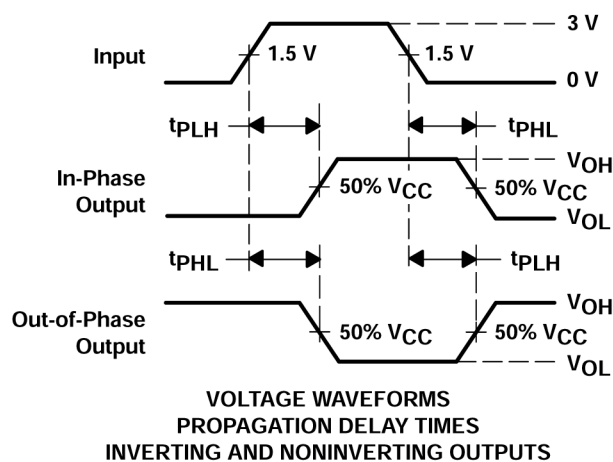
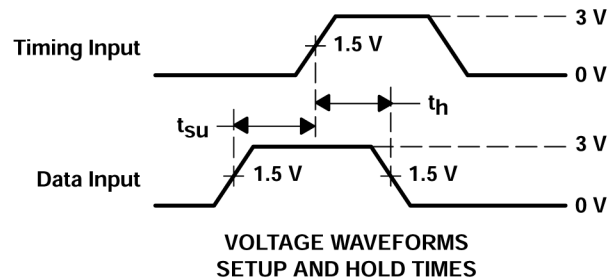
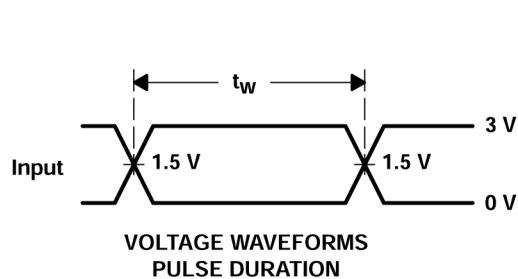
| PARAMETER                                     | TEST CONDITIONS    | TYP | UNIT |
|-----------------------------------------------|--------------------|-----|------|
| C <sub>pd</sub> Power dissipation capacitance | No load, f = 1 MHz | 17  | pF   |

## 6 Parameter Measurement Information



LOAD CIRCUIT FOR  
TOTEM-POLE OUTPUTS

LOAD CIRCUIT FOR  
3-STATE AND OPEN-DRAIN OUTPUTS



- 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.

图 6-1. Load Circuit and Voltage Waveforms

| TEST              | S1       |
|-------------------|----------|
| $t_{PLH}/t_{PHL}$ | Open     |
| $t_{PLZ}/t_{PZL}$ | $V_{CC}$ |
| $t_{PHZ}/t_{PZH}$ | GND      |
| Open Drain        | $V_{CC}$ |

## 7 Detailed Description

### 7.1 Overview

The SN74AHCT1G02 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

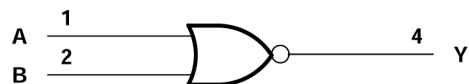


图 7-1. Logic Diagram (Positive Logic)

### 7.3 Feature Description

#### 7.3.1 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 图 7-2.

小心

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.

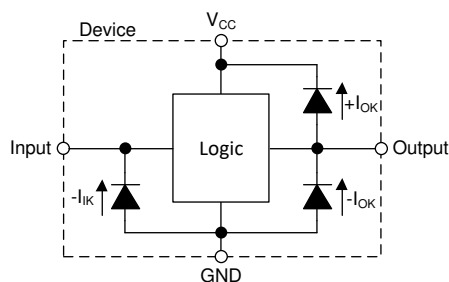


图 7-2. Electrical Placement of Clamping Diodes for Each Input and Output

### 7.4 Device Functional Modes

表 7-1. Function Table (Each Gate)

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

## 8 Application Information Disclaimer

### 备注

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, three 2-input AND gates are combined to produce a 4-input AND gate function as shown in [图 8-1](#). The fourth gate can be used for another application in the system, or the inputs can be grounded and the channel left unused.

The SN74AHCT1G02 is used to directly control the  $\overline{\text{RESET}}$  pin of a motor controller. The controller requires four input signals to all be HIGH before being enabled, and should be disabled in the event that any one signal goes LOW. The 4-input AND gate function combines the four individual reset signals into a single active-low reset signal.

### 8.2 Typical Application

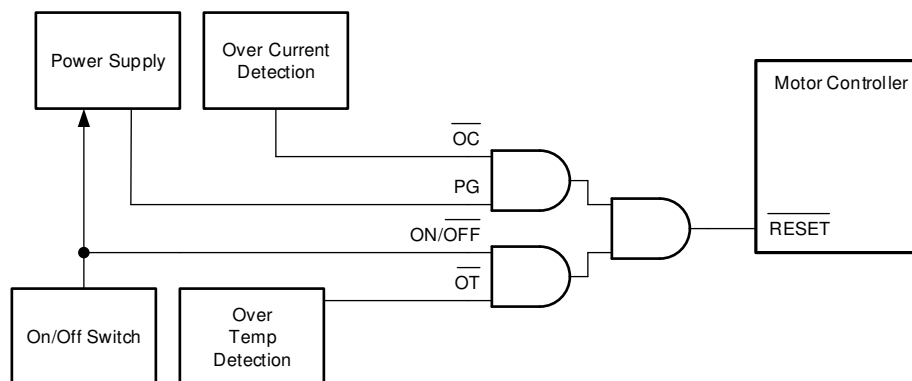


图 8-1. Typical Application Block Diagram

#### 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 total current to be sourced by all outputs of the SN74AHCT1G02 plus the maximum static supply current,  $I_{CC}$ , listed in the *Electrical Characteristics*, and any transient current required for switching. The logic device can only source as much current that is provided by the positive supply source. Be sure to not exceed the maximum total current through  $V_{CC}$  listed in the *Absolute Maximum Ratings*.

The ground must be capable of sinking current equal to the total current to be sunk by all outputs of the SN74AHCT1G02 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 SN74AHCT1G02 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 SN74AHCT1G02 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  $V_{OH}$  and  $V_{OL}$ . 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.

#### 小心

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  $V_{IL(max)}$   $V_{t-(min)}$  to be considered a logic LOW, and  $V_{IH(min)}$   $V_{t+(max)}$  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 SN74AHCT1G02 (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.

The SN74AHCT1G02 has CMOS inputs and thus requires fast input transitions to operate correctly, as defined in the *Recommended Operating Conditions* table. Slow input transitions can cause oscillations, additional power consumption, and reduction in device reliability.

The SN74AHCT1G02 has no input signal transition rate requirements because it has Schmitt-trigger inputs.

Another benefit to having Schmitt-trigger inputs is the ability to reject noise. Noise with a large enough amplitude can still cause issues. To know how much noise is too much, please refer to the  $\Delta V_{T(min)}$  in the *Electrical Characteristics*. This hysteresis value will provide the peak-to-peak limit.

Unlike what happens with standard CMOS inputs, Schmitt-trigger inputs can be held at any valid value without causing huge increases in power consumption. The typical additional current caused by holding an input at a value other than  $V_{CC}$  or ground is plotted in the *Typical Characteristics*.

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

### 8.2.1.3 Output Considerations

The positive supply voltage is used to produce the output HIGH voltage. Drawing current from the output will decrease the output voltage as specified by the  $V_{OH}$  specification in the *Electrical Characteristics*. 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*.

Push-pull outputs that could be in opposite states, even for a very short time period, should never be connected directly together. This can cause excessive current and damage to the device.

Two channels within the same device with the same input signals can be connected in parallel for additional output drive strength.

Open-drain outputs can be connected together directly to produce a wired-AND configuration or for additional output drive strength.

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 SN74AHCT1G02 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

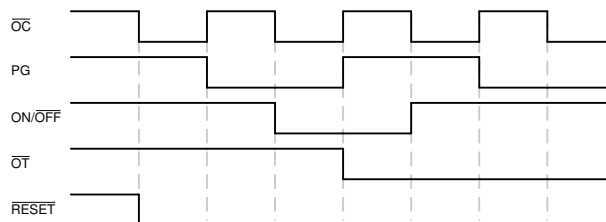


图 8-2. Application Timing Diagram

## 8.3 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. A 0.1- $\mu$ F capacitor is recommended for this device. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. The 0.1- $\mu$ F and 1- $\mu$ F capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results, as shown in the following layout example.

## 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

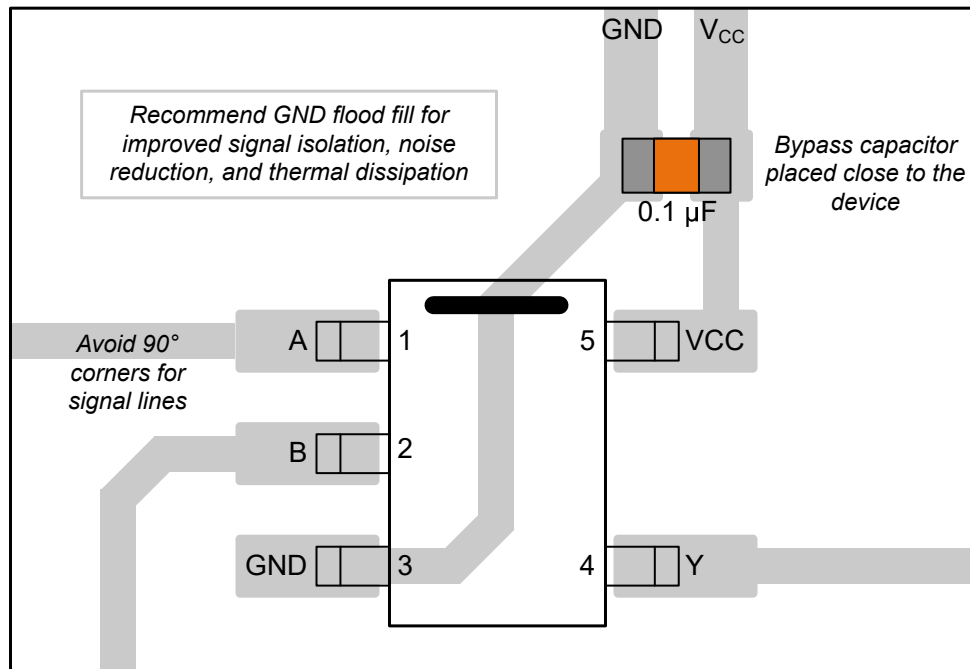


图 8-3. Example Layout for the SN74AHCT1G02

## 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 接收文档更新通知

要接收文档更新通知，请导航至 [ti.com](http://ti.com) 上的器件产品文件夹。点击 [订阅更新](#) 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

### 9.3 支持资源

**E2E™ 支持论坛** 是工程师的重要参考资料，可直接从专家处获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题，获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的 [使用条款](#)。

### 9.4 Trademarks

E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

### 9.5 静电放电警告



静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

### 9.6 术语表

#### TI 术语表

本术语表列出并解释了术语、首字母缩略词和定义。

## 10 Revision History

### Changes from Revision L (October 2023) to Revision M (February 2024) Page

- Updated RθJA values: DBV = 206 to 278, all values in °C/W..... **4**

### Changes from Revision K (February 2003) to Revision L (October 2023) Page

- 添加了应用部分、封装信息表、引脚功能表、ESD 等级表、热性能信息表、器件功能模式、应用和实施部分、器件和文档支持部分以及机械、封装和可订购信息部分 ..... **1**

## 11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<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                 |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|--------------------------------------|----------------------|--------------|--------------------------|-------------------------|
| 74AHCT1G02DBVRG4 | ACTIVE        | SOT-23       | DBV                | 5    | 3000           | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | B02G                     | <a href="#">Samples</a> |
| SN74AHCT1G02DBVR | ACTIVE        | SOT-23       | DBV                | 5    | 3000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 85    | (B023, B02G, B02J, B02S) | <a href="#">Samples</a> |
| SN74AHCT1G02DCKR | ACTIVE        | SC70         | DCK                | 5    | 3000           | RoHS & Green    | NIPDAU   SN                          | Level-1-260C-UNLIM   | -40 to 85    | (BB3, BBG, BBJ, BB S)    | <a href="#">Samples</a> |

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBsolete:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

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

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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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 SN74AHCT1G02 :**

- Automotive : [SN74AHCT1G02-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

## 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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 74AHCT1G02DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G02DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0              | 8.4                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G02DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.3     | 3.2     | 1.4     | 4.0     | 8.0    | Q3            |
| SN74AHCT1G02DCKR | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74AHCT1G02DCKR | 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) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 74AHCT1G02DBVRG4 | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G02DBVR | SOT-23       | DBV             | 5    | 3000 | 202.0       | 201.0      | 28.0        |
| SN74AHCT1G02DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G02DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74AHCT1G02DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |



## SOT-23 - 1.45 mm max height

## SMALL OUTLINE TRANSISTOR



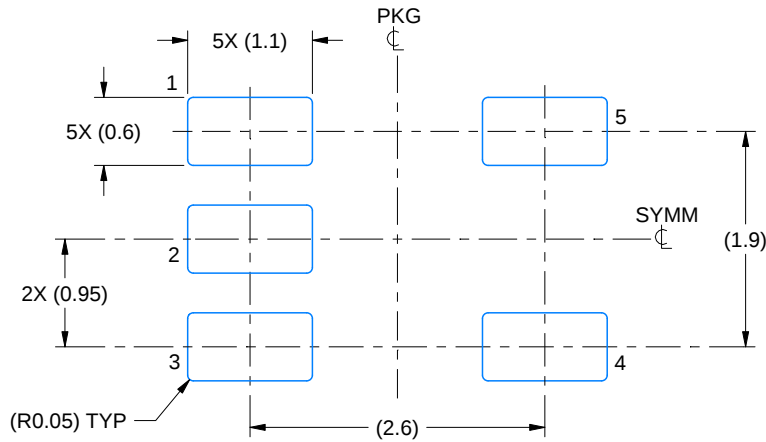
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.
4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25 mm per side.
5. Support pin may differ or may not be present.

# EXAMPLE BOARD LAYOUT

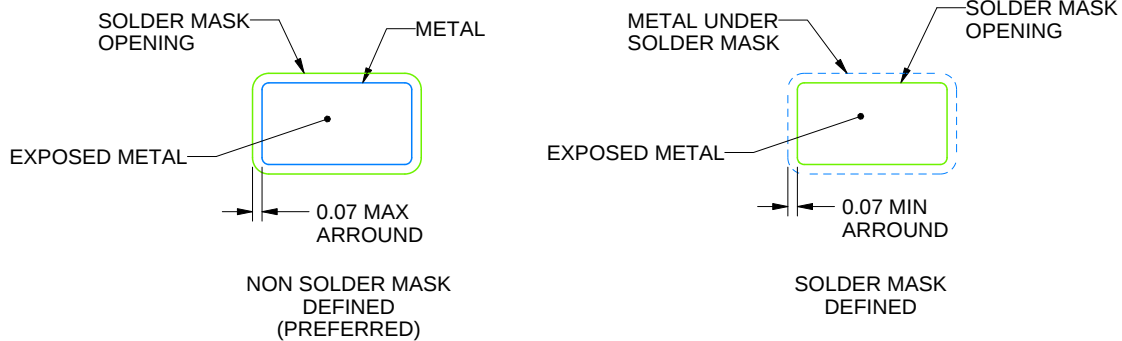
DBV0005A

SOT-23 - 1.45 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:15X



SOLDER MASK DETAILS

4214839/H 09/2023

NOTES: (continued)

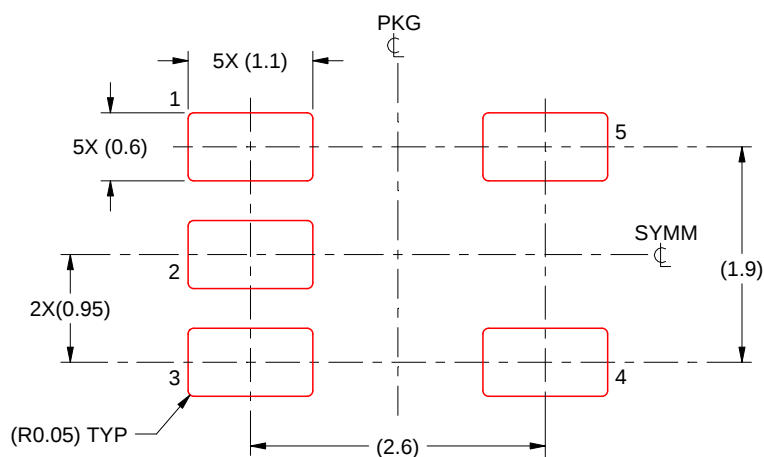
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## 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/H 09/2023

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.



### SOT - 1.1 max height

PIN 1 INDEX AREA

1.8

1.4

1.1

B

1

2X 0.65

1.3

2

3

5X 0.33 0.15

5

NOTE 4

(0.15)

(0.1)

4

1.3

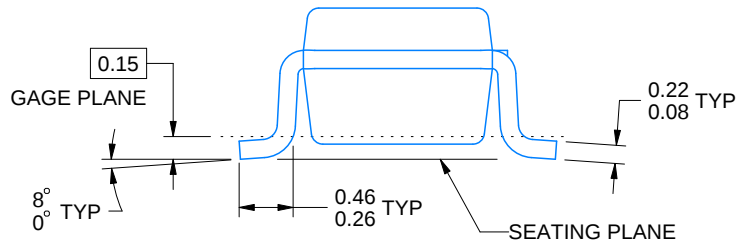
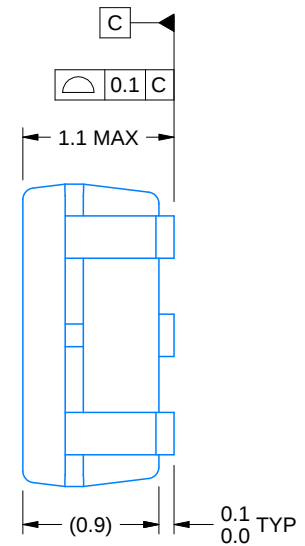
2.15

1.85

A

NOTE 5

⊕ 0.1 M C A B

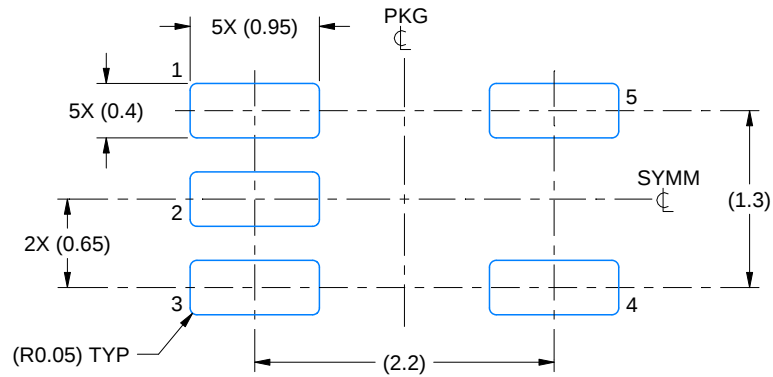


# EXAMPLE BOARD LAYOUT

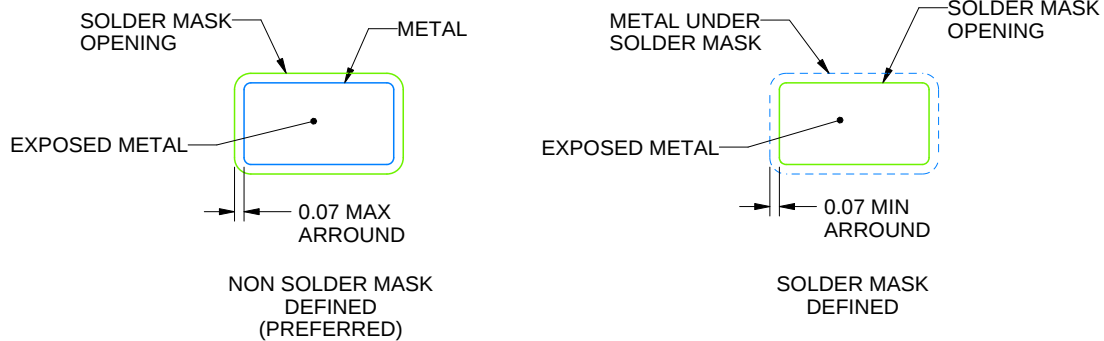
DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X

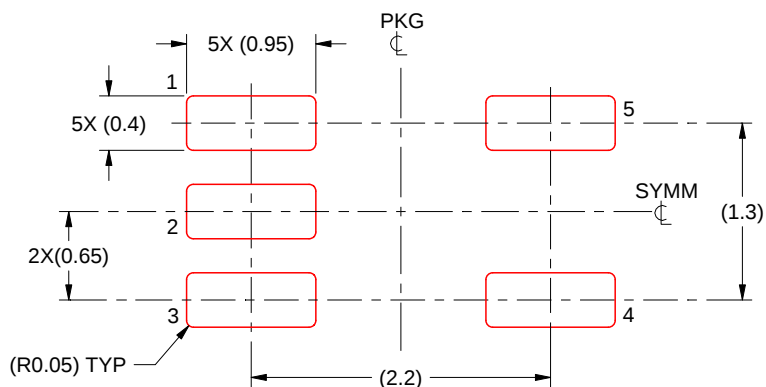


SOLDER MASK DETAILS

4214834/D 07/2023

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.



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

4214834/D 07/2023

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.

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