

## SN74AC08-Q1 Automotive Quadruple 2-Input Positive-and Gate

### 1 Features

- Qualified for automotive applications
- 2V to 6V  $V_{CC}$  operation
- Inputs accept voltages to 6V
- Max  $t_{pd}$  of 7.5ns at 5V

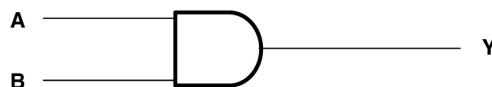
### 2 Description

The SN74AC08 device is a quadruple 2-input positive-AND gate. This device performs the Boolean function  $Y = A \cdot B$  or  $Y = \bar{A} + \bar{B}$  in positive logic.

#### Package Information

| PART NUMBER | PACKAGE <sup>(1)</sup> | PACKAGE SIZE <sup>(2)</sup> | BODY SIZE <sup>(3)</sup> |
|-------------|------------------------|-----------------------------|--------------------------|
| SN74AC08-Q1 | D (SOIC, 14)           | 8.65 mm × 6mm               | 8.65 mm × 3.9mm          |
|             | PW (TSSOP, 14)         | 5mm × 6.4mm                 | 5mm × 4.4mm              |

- (1) For more information, see [Section 10](#).
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.
- (3) The body size (length × width) is a nominal value and does not include pins.



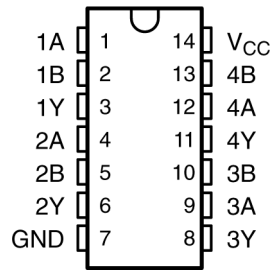
Logic Diagram, Each Gate (Positive Logic)



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### 3 Pin Configuration and Functions



**Figure 3-1. D or PW Package, 14-Pin SOIC or TSSOP (Top View)**

**Table 3-1. Pin Functions**

| PIN             |     | TYPE   | DESCRIPTION         |
|-----------------|-----|--------|---------------------|
| NAME            | NO. |        |                     |
| 1A              | 1   | Input  | Channel 1, Input A  |
| 1B              | 2   | Input  | Channel 1, Input B  |
| 1Y              | 3   | Output | Channel 1, Output Y |
| 2A              | 4   | Input  | Channel 2, Input A  |
| 2B              | 5   | Input  | Channel 2, Input B  |
| 2Y              | 6   | Output | Channel 2, Output Y |
| GND             | 7   | —      | Ground              |
| 3Y              | 8   | Output | Channel 3, Output Y |
| 3A              | 9   | Input  | Channel 3, Input A  |
| 3B              | 10  | Input  | Channel 3, Input B  |
| 4Y              | 11  | Output | Channel 4, Output Y |
| 4A              | 12  | Input  | Channel 4, Input A  |
| 4B              | 13  | Input  | Channel 4, Input B  |
| V <sub>CC</sub> | 14  | —      | Positive Supply     |

## 4 Specifications

### 4.1 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  | V <sub>CC</sub> + 0.5 | 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 or V <sub>I</sub> > V <sub>CC</sub> ) |                       | ±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> )                  |                       | ±50 mA  |
| Continuous current through V <sub>CC</sub> or GND |                           |   |                       | ±200 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.

### 4.2 Recommended Operating Conditions

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

|                 |                                    | MIN                    | MAX             | UNIT   |
|-----------------|------------------------------------|------------------------|-----------------|--------|
| V <sub>CC</sub> | Supply voltage                     | 2                      | 6               | V      |
| V <sub>IH</sub> | High-level input voltage           | V <sub>CC</sub> = 3V   | 2.1             | V      |
|                 |                                    | V <sub>CC</sub> = 4.5V | 3.15            |        |
|                 |                                    | V <sub>CC</sub> = 5.5V | 3.85            |        |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 3V   | 0.9             | V      |
|                 |                                    | V <sub>CC</sub> = 4.5V | 1.35            |        |
|                 |                                    | V <sub>CC</sub> = 5.5V | 1.65            |        |
| V <sub>I</sub>  | Input voltage                      | 0                      | V <sub>CC</sub> | V      |
| V <sub>O</sub>  | Output voltage                     | 0                      | V <sub>CC</sub> | V      |
| I <sub>OH</sub> | High-level output current          | V <sub>CC</sub> = 3V   | -12             | mA     |
|                 |                                    | V <sub>CC</sub> = 4.5V | -24             |        |
|                 |                                    | V <sub>CC</sub> = 5.5V | -24             |        |
| I <sub>OL</sub> | Low-level output current           | V <sub>CC</sub> = 3V   | 12              | mA     |
|                 |                                    | V <sub>CC</sub> = 4.5V | 24              |        |
|                 |                                    | V <sub>CC</sub> = 5.5V | 24              |        |
| Δt/Δv           | Input transition rise or fall rate |                        |                 | 8 ns/V |
| T <sub>A</sub>  | Operating free-air temperature     | -40                    | 125             | °C     |

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

### 4.3 Thermal Information

| THERMAL METRIC <sup>(1)</sup> |  | SN74AC08-Q1 |            | UNIT |
|-------------------------------|--|-------------|------------|------|
|                               |  | D (SOIC)    | PW (TSSOP) |      |
|                               |  | 14 PINS     | 14 PINS    |      |
| R <sub>θJA</sub>              | Junction-to-ambient thermal resistance | 119.9       | 145.7      | °C/W |

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

#### 4.4 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 |       |      | T <sub>A</sub> = -40°C TO 125°C |     | T <sub>A</sub> = -40°C TO 85°C |     | UNIT |
|-----------------|-------------------------|---|-----------------------|-------|------|---------------------------------|-----|--------------------------------|-----|------|
|                 |                         |   | MIN                   | TYP   | MAX  | MIN                             | MAX | MIN                            | MAX |      |
| V <sub>OH</sub> | I <sub>OH</sub> = -50μA | 3V  | 2.9                   |       |      | 2.9                             |     | 2.9                            | V   |      |
|                 |                         | 4.5V  | 4.4                   |       |      | 4.4                             |     | 4.4                            |     |      |
|                 |                         | 5.5V  | 5.4                   |       |      | 5.4                             |     | 5.4                            |     |      |
|                 | I <sub>OH</sub> = -12mA | 3V  | 2.56                  |       |      | 2.4                             |     | 2.46                           |     |      |
|                 |                         | 4.5V  | 3.86                  |       |      | 3.7                             |     | 3.76                           |     |      |
|                 |                         | 5.5V  | 4.86                  |       |      | 4.7                             |     | 4.76                           |     |      |
| V <sub>OL</sub> | I <sub>OL</sub> = 50μA  | 3V  |                       | 0.002 | 0.1  |                                 | 0.1 | 0.1                            | V   |      |
|                 |                         | 4.5V  |                       | 0.001 | 0.1  |                                 | 0.1 | 0.1                            |     |      |
|                 |                         | 5.5V  |                       | 0.001 | 0.1  |                                 | 0.1 | 0.1                            |     |      |
|                 | I <sub>OL</sub> = 12mA  | 3V  |                       |       | 0.36 |                                 | 0.5 | 0.44                           |     |      |
|                 |                         | 4.5V  |                       |       | 0.36 |                                 | 0.5 | 0.44                           |     |      |
|                 |                         | 5.5V  |                       |       | 0.36 |                                 | 0.5 | 0.44                           |     |      |
| I <sub>I</sub>  | A or B ports            | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5.5V                  |       | ±0.1 |                                 | ±1  | ±1                             | μA  |      |
| I <sub>CC</sub> |                         | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 | 5.5V                  |       | 2    |                                 | 40  | 20                             | μA  |      |
| C <sub>i</sub>  |                         | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5V                    |       | 4.5  |                                 |     |                                | pF  |      |

#### 4.5 Switching Characteristics, V<sub>CC</sub> = 3.3V ± 0.3V

over recommended operating free-air temperature range, V<sub>CC</sub> = 3.3V ± 0.3V (unless otherwise noted) (see [Load Circuit and Voltage Waveforms](#))

| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | T <sub>A</sub> = 25°C |     |     | T <sub>A</sub> = -40°C TO 125°C |      | T <sub>A</sub> = -40°C TO 85°C |     | UNIT |
|------------------|--------------|-------------|-----------------------|-----|-----|---------------------------------|------|--------------------------------|-----|------|
|                  |              |             | MIN                   | TYP | MAX | MIN                             | MAX  | MIN                            | MAX |      |
| t <sub>PLH</sub> | A or B       | Y           | 1.5                   | 7.5 | 9.5 | 1                               | 12.5 | 1                              | 10  | ns   |
| t <sub>PHL</sub> |              |             | 1.5                   | 7   | 8.5 | 1                               | 11.5 | 1                              | 9   |      |

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

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

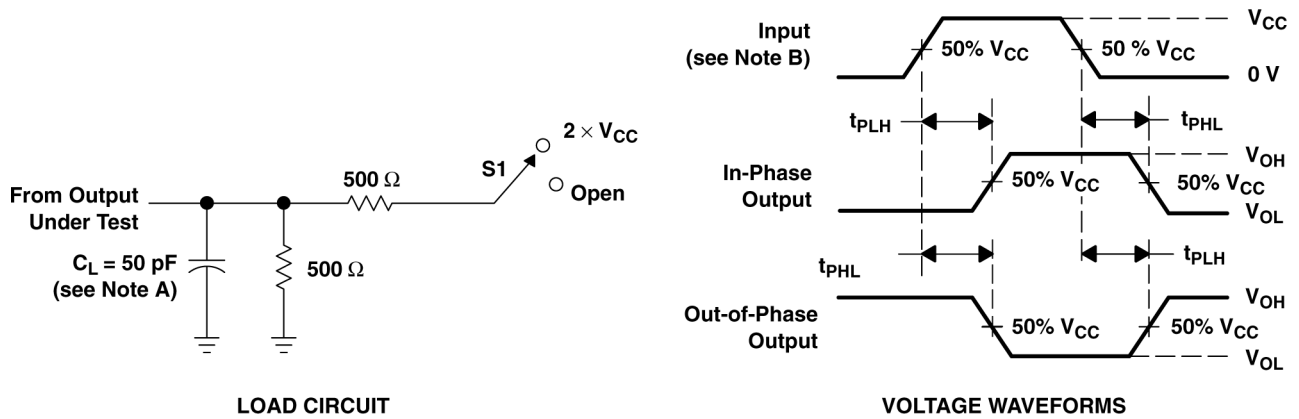
| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | T <sub>A</sub> = 25°C |     |     | T <sub>A</sub> = -40°C TO 125°C |      | T <sub>A</sub> = -40°C TO 85°C |     | UNIT |
|------------------|--------------|-------------|-----------------------|-----|-----|---------------------------------|------|--------------------------------|-----|------|
|                  |              |             | MIN                   | TYP | MAX | MIN                             | MAX  | MIN                            | MAX |      |
| t <sub>PLH</sub> | A or B       | Y           | 1.5                   | 5.5 | 7.5 | 1                               | 9    | 1                              | 8.5 | ns   |
| t <sub>PHL</sub> |              |             | 1.5                   | 7   | 8.5 | 1                               | 11.5 | 1                              | 9   |      |

#### 4.7 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<br>C <sub>L</sub> = 50pF, f = 1 MHz | 20  | pF   |

## 5 Parameter Measurement Information



- A.  $C_L$  includes probe and jig capacitance.
- B. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5$  ns,  $t_f \leq 2.5$  ns.
- C. The outputs are measured one at a time, with one input transition per measurement.

**Figure 5-1. Load Circuit and Voltage Waveforms**

| TEST              | S1   |
|-------------------|------|
| $t_{PLH}/t_{PHL}$ | Open |

## 6 Detailed Description

### 6.1 Functional Block Diagram

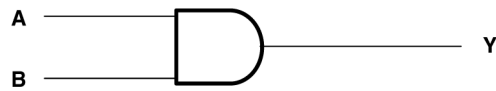


Figure 6-1. Logic Diagram, Each Gate (Positive Logic)

### 6.2 Device Functional Modes

Table 6-1. Function Table (Each Gate)

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

## 7 Application and Implementation

### Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

### 7.1 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.

### 7.2 Layout

#### 7.2.1 Layout Guidelines

When using multiple bit logic devices, inputs should never float.

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 input pins should not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. [Section 7.2.2](#) shows the 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 generally acceptable to float outputs unless the part is a transceiver. If the transceiver has an output enable pin, then it will disable the outputs section of the part when asserted. This will not disable the input section of the IOs, so they cannot float when disabled.

#### 7.2.2 Layout Example

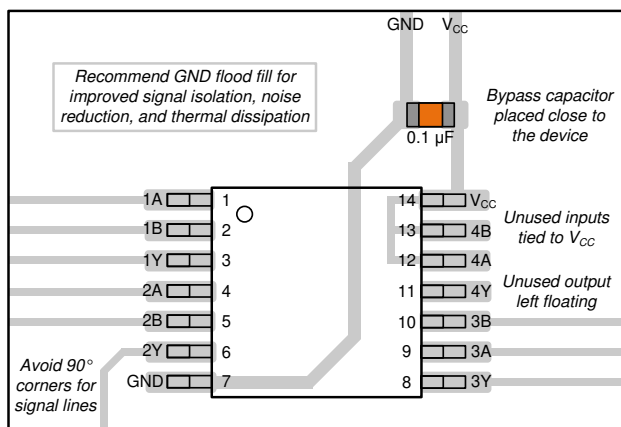


Figure 7-1. Example Layout for the SN74AC08-Q1



## 8 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

### 8.1 Documentation Support

#### 8.1.1 Related Documentation

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

**Table 8-1. Related Links**

| PARTS       | PRODUCT FOLDER             | SAMPLE & BUY               | TECHNICAL DOCUMENTS        | TOOLS & SOFTWARE           | SUPPORT & COMMUNITY        |
|-------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| SN74AC08-Q1 | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> |

### 8.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](http://ti.com). Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

### 8.3 Support Resources

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

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

### 8.4 Trademarks

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

### 8.5 Electrostatic Discharge Caution



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

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

### 8.6 Glossary

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

## 9 Revision History

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

| Changes from Revision A (January 2008) to Revision B (July 2024)  | Page |
|---|------|
| • Added <i>Package Information</i> table, <i>Pin Functions</i> table, <i>ESD Ratings</i> table, <i>Thermal Information</i> table, <i>Device Functional Modes</i> , Application and Implementation section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section ..... | 1    |
| • Updated RθJA values: D = 86 to 119.9, PW = 113 to 145.7, all values in °C/W .....   | 4    |

## 10 Mechanical, Packaging, and Orderable Information

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

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan<br>(2) | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74AC08QDRG4Q1  | ACTIVE        | SOIC         | D               | 14   | 2500        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | AC08Q                   | <a href="#">Samples</a> |
| SN74AC08QPWRG4Q1 | ACTIVE        | TSSOP        | PW              | 14   | 2000        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | AC08Q                   | <a href="#">Samples</a> |
| SN74AC08QPWRQ1   | ACTIVE        | TSSOP        | PW              | 14   | 2000        | RoHS & Green    | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 125   | AC08Q                   | <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.

**Important Information and Disclaimer:**The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF SN74AC08-Q1 :**

- Catalog : [SN74AC08](#)
- Enhanced Product : [SN74AC08-EP](#)
- Military : [SN54AC08](#)

## NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- Military - QML certified for Military and Defense 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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74AC08QPWRG4Q1 | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| SN74AC08QPWRQ1   | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74AC08QPWRG4Q1 | TSSOP        | PW              | 14   | 2000 | 356.0       | 356.0      | 35.0        |
| SN74AC08QPWRQ1   | TSSOP        | PW              | 14   | 2000 | 356.0       | 356.0      | 35.0        |

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AB.

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4040064-3/G 02/11

- 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 length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153



PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



4211284-2/G 08/15

- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - 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. Refer to IPC-7525 for other stencil recommendations.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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