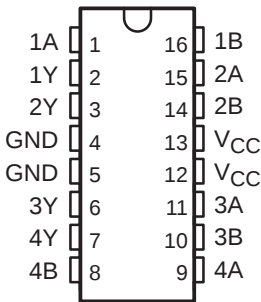


- Flow-Through Architecture Optimizes PCB Layout
- Center-Pin  $V_{CC}$  and GND Configurations Minimize High-Speed Switching Noise
- EPIC™ (Enhanced-Performance Implanted CMOS) 1- $\mu$ m Process
- 500-mA Typical Latch-Up Immunity at 125°C
- Package Options Include Plastic Small-Outline (D) and Thin Shrink Small-Outline (PW) Packages, and Standard Plastic 300-mil DIPs (N)

D, N, OR PW PACKAGE  
(TOP VIEW)



description

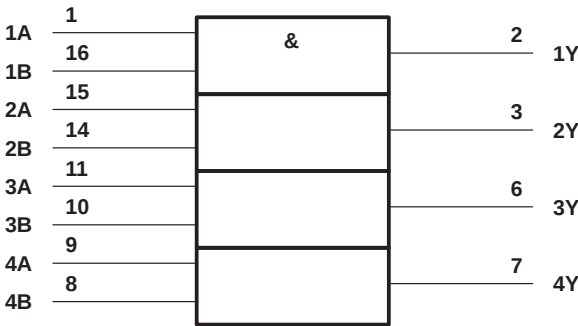
This device contains four independent 2-input AND gates. It performs the Boolean function  $Y = A \bullet B$  or  $Y = \overline{\overline{A} + \overline{B}}$  in positive logic.

The 74AC11008 is characterized for operation from –40°C to 85°C.

FUNCTION TABLE  
(each gate)

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

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.



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.

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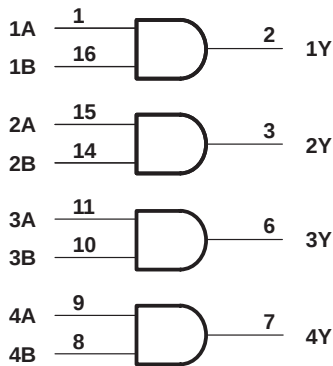
PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



74AC11008  
QUADRUPLE 2-INPUT POSITIVE-AND GATE

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logic diagram (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

|                                                                                      |                            |
|--------------------------------------------------------------------------------------|----------------------------|
| Supply voltage range, $V_{CC}$                                                       | –0.5 V to 7 V              |
| Input voltage range, $V_I$ (see Note 1)                                              | –0.5 V to $V_{CC} + 0.5$ V |
| Output voltage range, $V_O$ (see Note 1)                                             | –0.5 V to $V_{CC} + 0.5$ V |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ )                        | ±20 mA                     |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ )                       | ±50 mA                     |
| Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )                           | ±50 mA                     |
| Continuous current through $V_{CC}$ or GND                                           | ±100 mA                    |
| Maximum power dissipation at $T_A = 55^{\circ}\text{C}$ (in still air) (see Note 2): |                            |
| D package                                                                            | 1.3 W                      |
| N package                                                                            | 1.1 W                      |
| PW package                                                                           | 0.5 W                      |
| Storage temperature range, $T_{stg}$                                                 | –65°C to 150°C             |

<sup>†</sup> 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.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the N package, which has a trace length of zero.

**74AC11008**  
**QUADRUPLE 2-INPUT POSITIVE-AND GATE**

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**recommended operating conditions**

|                 |                                    |                         | MIN  | NOM | MAX             | UNIT |
|-----------------|------------------------------------|-------------------------|------|-----|-----------------|------|
| V <sub>CC</sub> | Supply voltage                     |                         | 3    | 5   | 5.5             | V    |
| V <sub>IH</sub> | High-level input voltage           | V <sub>CC</sub> = 3 V   | 2.1  |     |                 | V    |
|                 |                                    | V <sub>CC</sub> = 4.5 V | 3.15 |     |                 |      |
|                 |                                    | V <sub>CC</sub> = 5.5 V | 3.85 |     |                 |      |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 3 V   |      |     | 0.9             | V    |
|                 |                                    | V <sub>CC</sub> = 4.5 V |      |     | 1.35            |      |
|                 |                                    | V <sub>CC</sub> = 5.5 V |      |     | 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> = 3 V   |      |     | –4              | mA   |
|                 |                                    | V <sub>CC</sub> = 4.5 V |      |     | –24             |      |
|                 |                                    | V <sub>CC</sub> = 5.5 V |      |     | –24             |      |
| I <sub>OL</sub> | Low-level output current           | V <sub>CC</sub> = 3 V   |      |     | 12              | mA   |
|                 |                                    | V <sub>CC</sub> = 4.5 V |      |     | 24              |      |
|                 |                                    | V <sub>CC</sub> = 5.5 V |      |     | 24              |      |
| Δt/Δv           | Input transition rise or fall rate |                         | 0    |     | 10              | ns/V |
| T <sub>A</sub>  | Operating free-air temperature     |                         | –40  |     | 85              | °C   |

**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                                    | 3 V             | 2.9                   |     |      | 2.9  |      | V    |
|                 |                                                             | 4.5 V           | 4.4                   |     |      | 4.4  |      |      |
|                 |                                                             | 5.5 V           | 5.4                   |     |      | 5.4  |      |      |
|                 | I <sub>OH</sub> = –4 mA                                     | 3 V             | 2.58                  |     |      | 2.48 |      |      |
|                 |                                                             | 4.5 V           | 3.94                  |     |      | 3.8  |      |      |
|                 |                                                             | 5.5 V           | 4.94                  |     |      | 4.8  |      |      |
|                 | I <sub>OH</sub> = –75 mA <sup>†</sup>                       | 5.5 V           |                       |     |      | 3.85 |      |      |
| V <sub>OL</sub> | I <sub>OL</sub> = 50 μA                                     | 3 V             |                       |     | 0.1  |      | 0.1  | V    |
|                 |                                                             | 4.5 V           |                       |     | 0.1  |      | 0.1  |      |
|                 |                                                             | 5.5 V           |                       |     | 0.1  |      | 0.1  |      |
|                 | I <sub>OL</sub> = 12 mA                                     | 3 V             |                       |     | 0.36 |      | 0.44 |      |
|                 |                                                             | 4.5 V           |                       |     | 0.36 |      | 0.44 |      |
|                 |                                                             | 5.5 V           |                       |     | 0.36 |      | 0.44 |      |
|                 | I <sub>OL</sub> = 75 mA <sup>†</sup>                        | 5.5 V           |                       |     |      |      | 1.65 |      |
| I <sub>I</sub>  | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 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           |                       |     | 4    |      | 40   | μA   |
| C <sub>i</sub>  | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V             |                       | 3.5 |      |      |      | pF   |

<sup>†</sup> Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.



# 74AC11008

## QUADRUPLE 2-INPUT POSITIVE-AND GATE

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switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$  (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $T_A = 25^\circ\text{C}$ |     |     | MIN | MAX  | UNIT |
|-----------|-----------------|----------------|--------------------------|-----|-----|-----|------|------|
|           |                 |                | MIN                      | TYP | MAX |     |      |      |
| $t_{PLH}$ | A or B          | Y              | 1.5                      | 6.3 | 9   | 1.5 | 10.2 | ns   |
| $t_{PHL}$ |                 |                | 1.5                      | 5.6 | 7.8 | 1.5 | 8.6  |      |

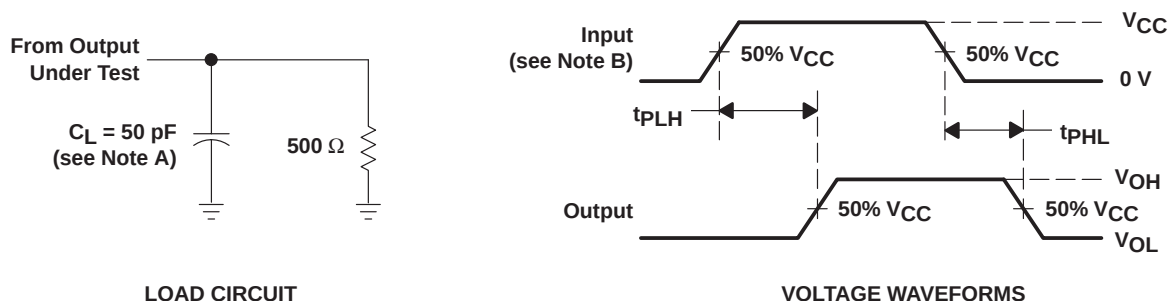
switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$  (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $T_A = 25^\circ\text{C}$ |     |     | MIN | MAX | UNIT |
|-----------|-----------------|----------------|--------------------------|-----|-----|-----|-----|------|
|           |                 |                | MIN                      | TYP | MAX |     |     |      |
| $t_{PLH}$ | A or B          | Y              | 1.5                      | 4.3 | 6.2 | 1.5 | 6.9 | ns   |
| $t_{PHL}$ |                 |                | 1.5                      | 5.6 | 5.9 | 1.5 | 6.5 |      |

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

| PARAMETER |                                        | TEST CONDITIONS                             | TYP | UNIT |
|-----------|----------------------------------------|---------------------------------------------|-----|------|
| $C_{pd}$  | Power dissipation capacitance per gate | $C_L = 50 \text{ pF}$ , $f = 1 \text{ MHz}$ | 29  | pF   |

### PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. Input pulses are supplied by generators having the following characteristics:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r = 3 \text{ ns}$ ,  $t_f = 3 \text{ ns}$ .  
 C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

## PACKAGING INFORMATION

| Orderable part number        | Status<br>(1) | Material type<br>(2) | Package   Pins  | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|------------------------------|---------------|----------------------|-----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">74AC11008D</a>   | Active        | Production           | SOIC (D)   16   | 40   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | AC11008             |
| 74AC11008D.A                 | Active        | Production           | SOIC (D)   16   | 40   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | AC11008             |
| <a href="#">74AC11008N</a>   | Active        | Production           | PDIP (N)   16   | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -40 to 85    | 74AC11008N          |
| 74AC11008N.A                 | Active        | Production           | PDIP (N)   16   | 25   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -40 to 85    | 74AC11008N          |
| <a href="#">74AC11008PWR</a> | Active        | Production           | TSSOP (PW)   16 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | AE008               |
| 74AC11008PWR.A               | Active        | Production           | TSSOP (PW)   16 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | AE008               |

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

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

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

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

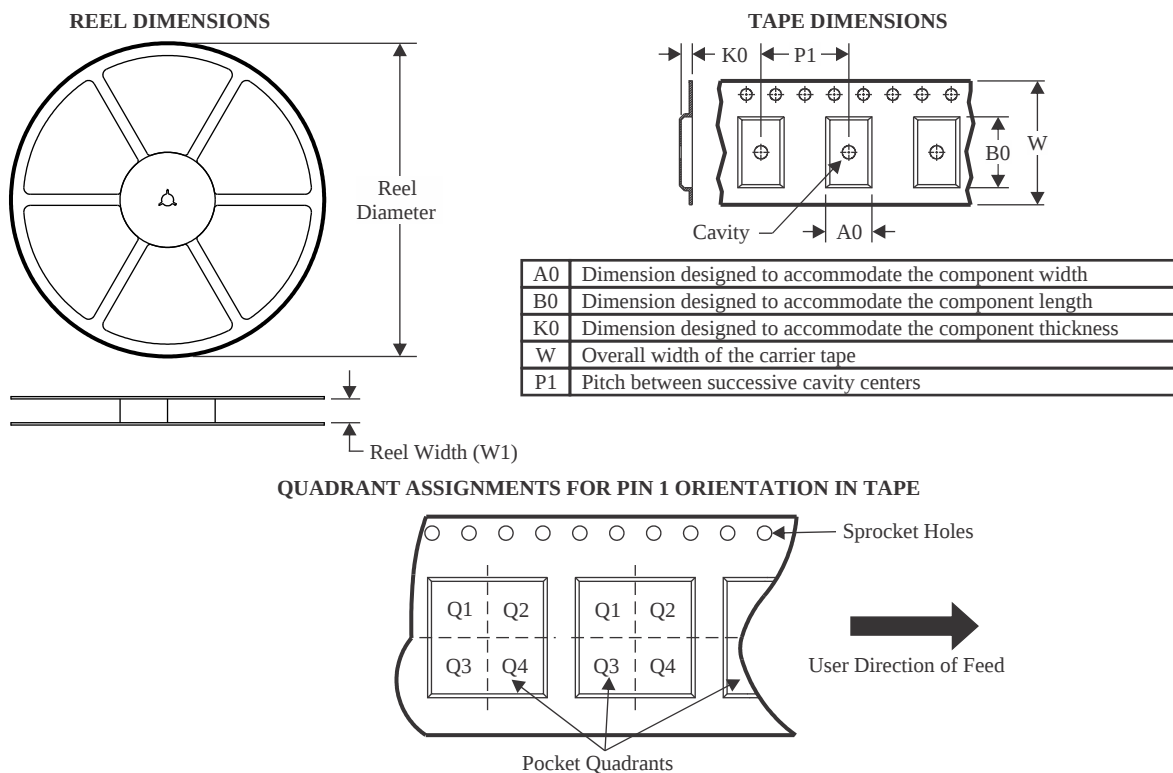
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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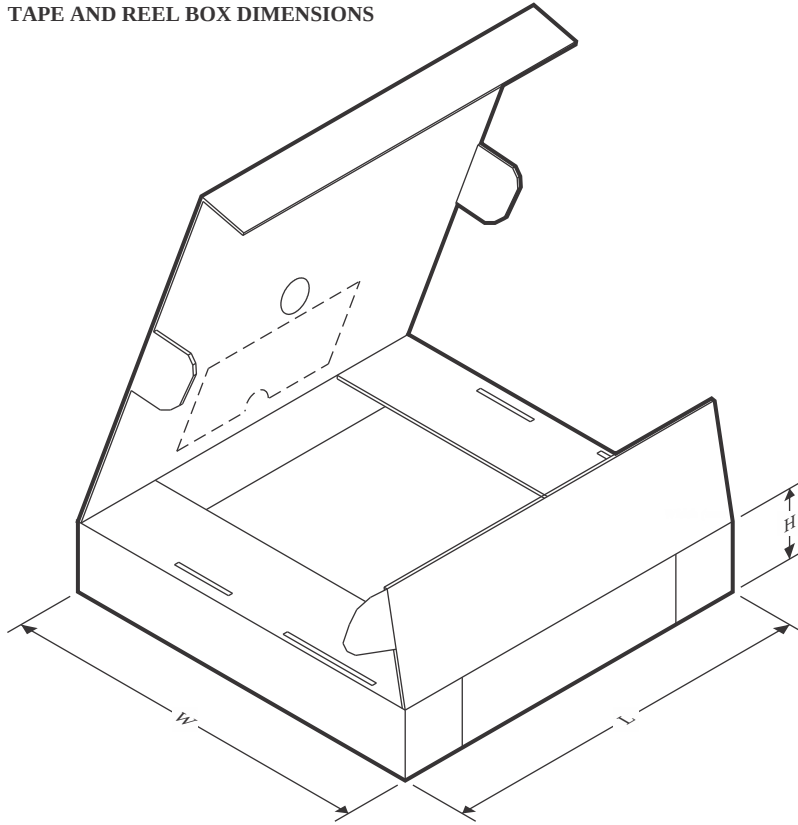
## TAPE AND REEL INFORMATION



\*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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| 74AC11008PWR | TSSOP        | PW              | 16   | 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

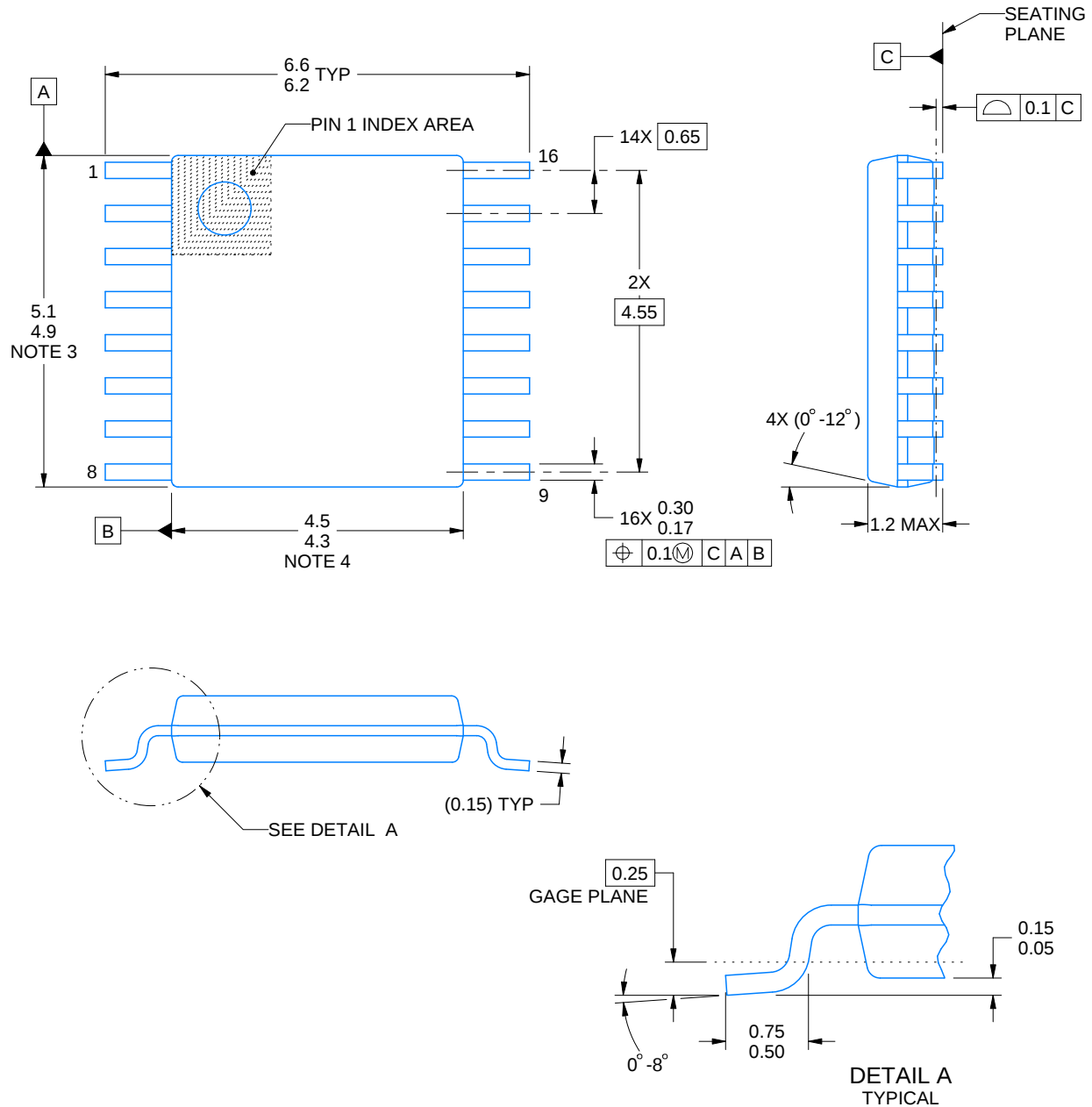
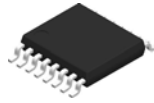
| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| 74AC11008PWR | TSSOP        | PW              | 16   | 2000 | 353.0       | 353.0      | 32.0        |

## TUBE



\*All dimensions are nominal

| Device       | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|--------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 74AC11008D   | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| 74AC11008D.A | D            | SOIC         | 16   | 40  | 507    | 8      | 3940   | 4.32   |
| 74AC11008N   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| 74AC11008N   | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| 74AC11008N.A | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |
| 74AC11008N.A | N            | PDIP         | 16   | 25  | 506    | 13.97  | 11230  | 4.32   |



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## NOTES:

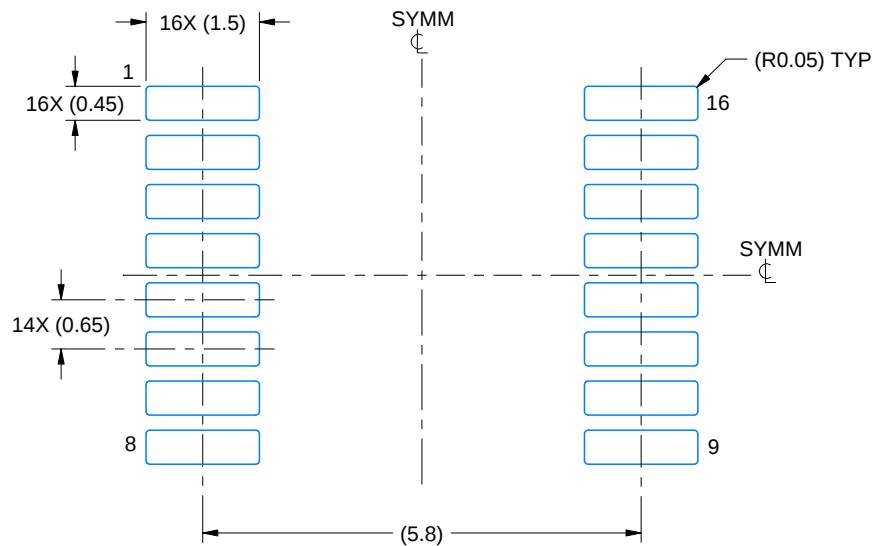
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

# EXAMPLE BOARD LAYOUT

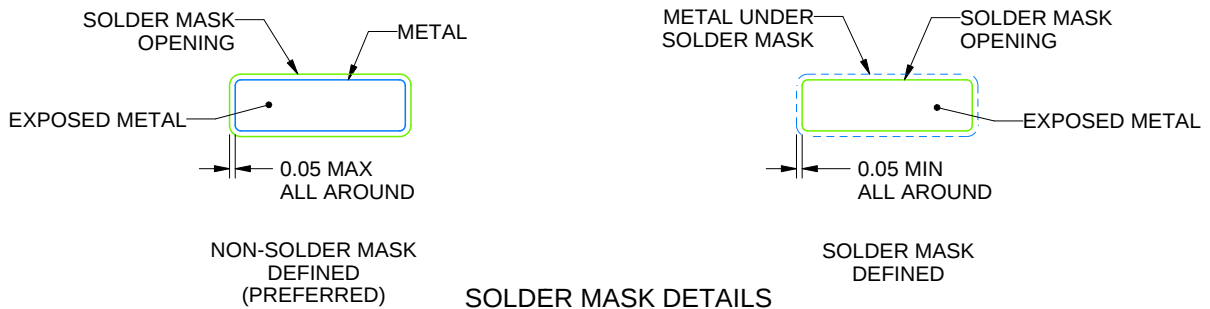
PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



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NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

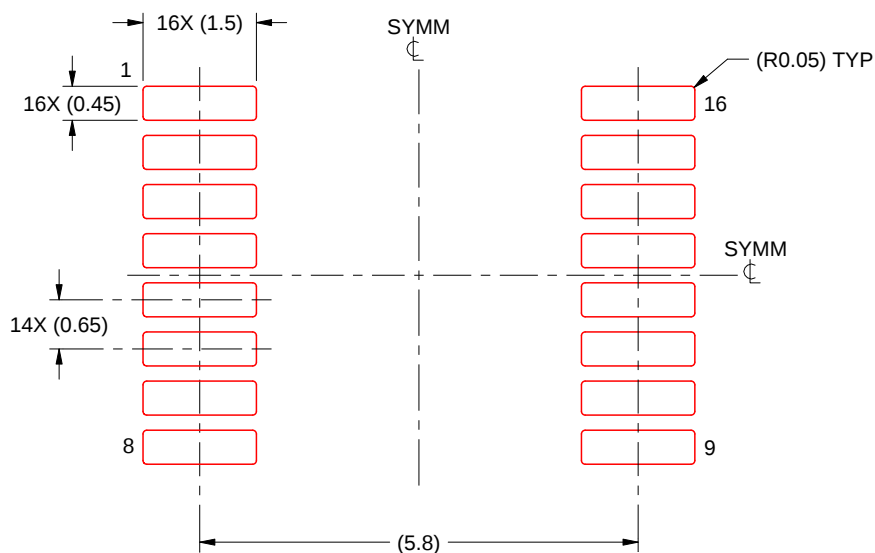
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

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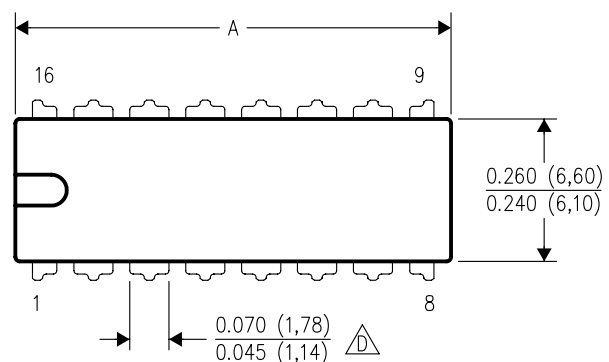
NOTES: (continued)

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.

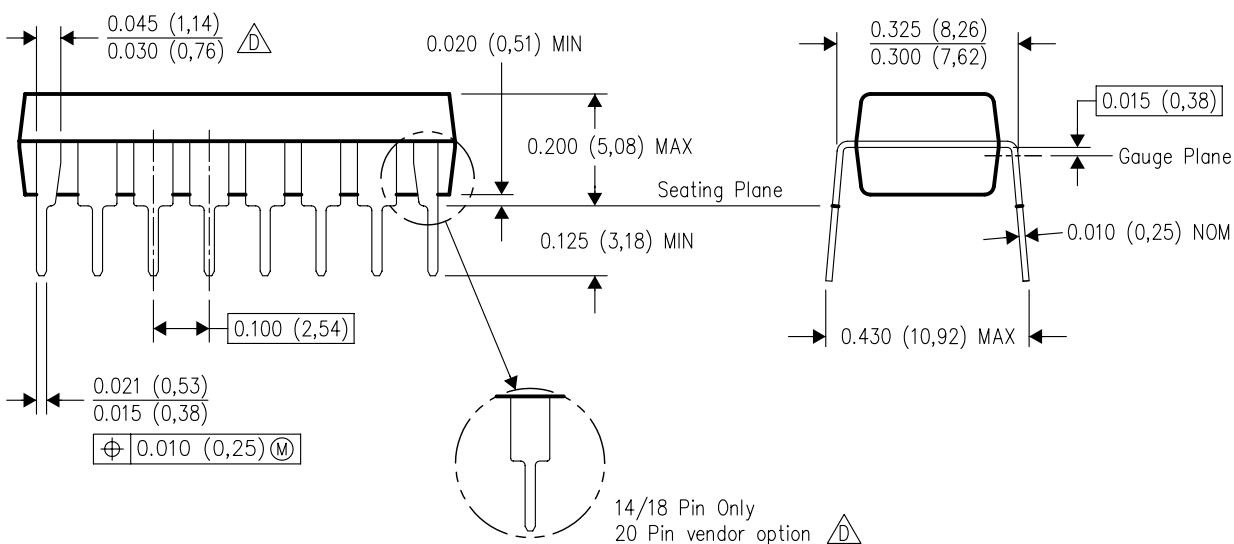
N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



| PINS **<br>DIM      | 14               | 16               | 18               | 20               |
|---------------------|------------------|------------------|------------------|------------------|
| A MAX               | 0.775<br>(19,69) | 0.775<br>(19,69) | 0.920<br>(23,37) | 1.060<br>(26,92) |
| A MIN               | 0.745<br>(18,92) | 0.745<br>(18,92) | 0.850<br>(21,59) | 0.940<br>(23,88) |
| MS-001<br>VARIATION | AA               | BB               | AC               | AD               |



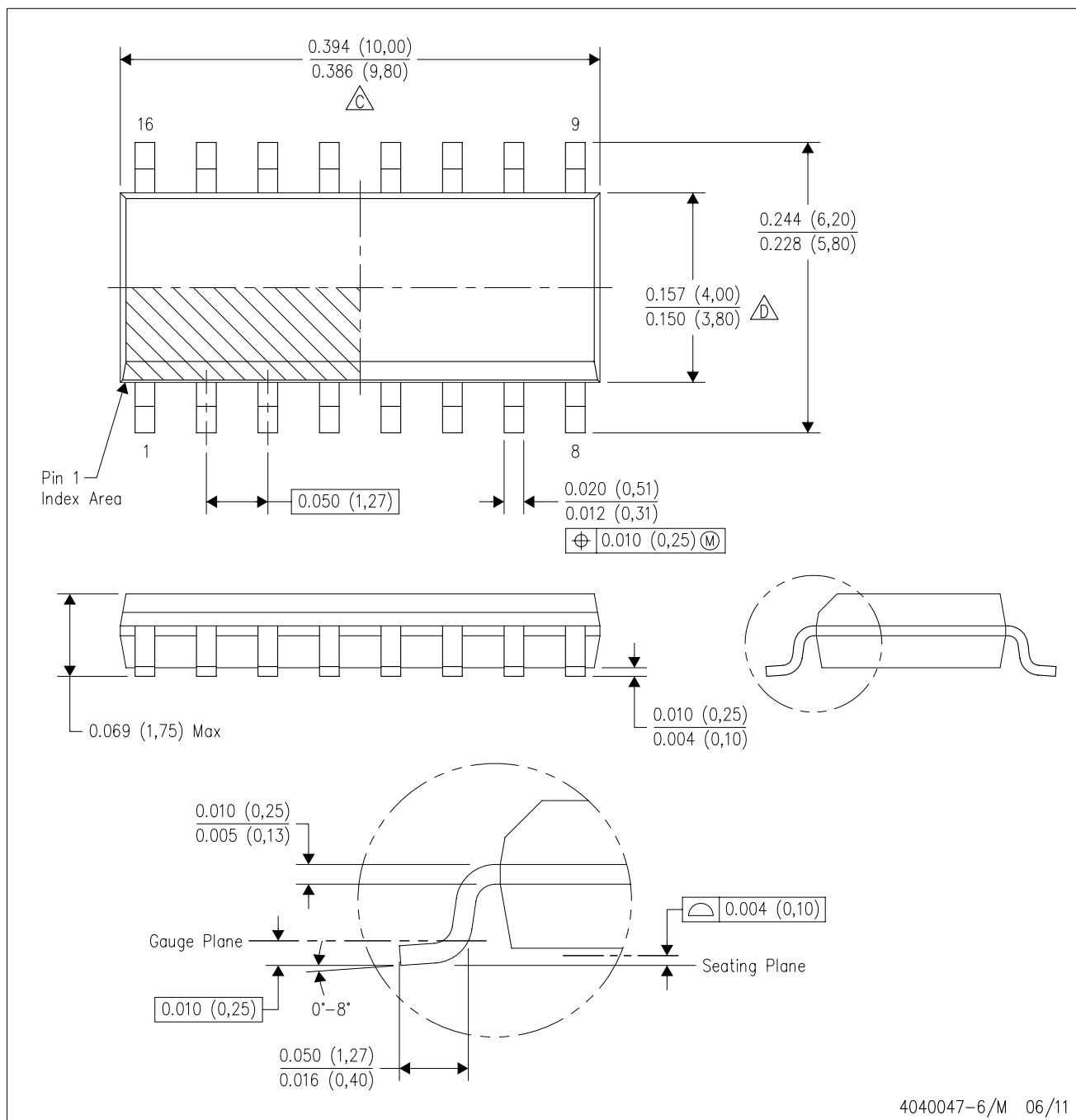
4040049/E 12/2002

NOTES:

- A. All linear dimensions are in inches (millimeters).  
B. This drawing is subject to change without notice.
-  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).  
 The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - $\triangle C$  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.
  - $\triangle D$  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AC.

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