

# DATA SHEET

**74ALS08**

Quad 2-Input AND gate

Product specification

1991 Feb 08

IC05 Data Handbook

Quad 2-input AND gate

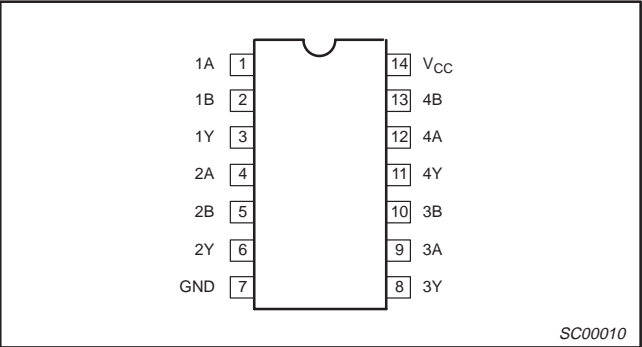
74ALS08

| TYPE    | TYPICAL<br>PROPAGATION DELAY | TYPICAL<br>SUPPLY CURRENT<br>(TOTAL) |
|---------|------------------------------|--------------------------------------|
| 74ALS08 | 5.0ns                        | 1.8mA                                |

ORDERING INFORMATION

| DESCRIPTION                    | ORDER CODE  | DRAWING<br>NUMBER |
|--------------------------------|---|-------------------|
|                                | COMMERCIAL RANGE<br>V <sub>CC</sub> = 5V ±10%,<br>T <sub>amb</sub> = 0°C to +70°C |                   |
| 14-pin plastic DIP             | 74ALS08N  | SOT27-1           |
| 14-pin plastic SO              | 74ALS08D  | SOT108-1          |
| 14-pin plastic SSOP<br>Type II | 74ALS08DB   | SOT337-1          |

PIN CONFIGURATION

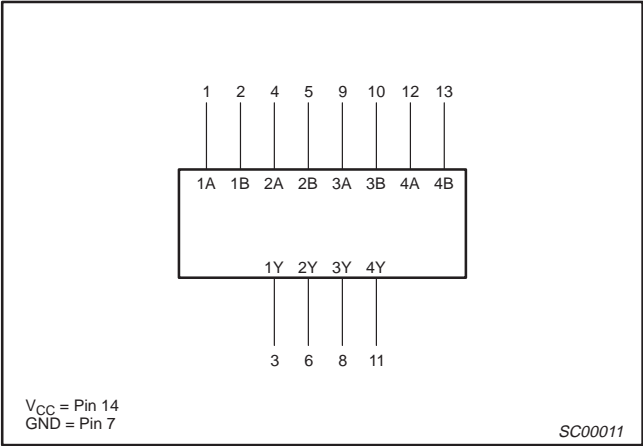


INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

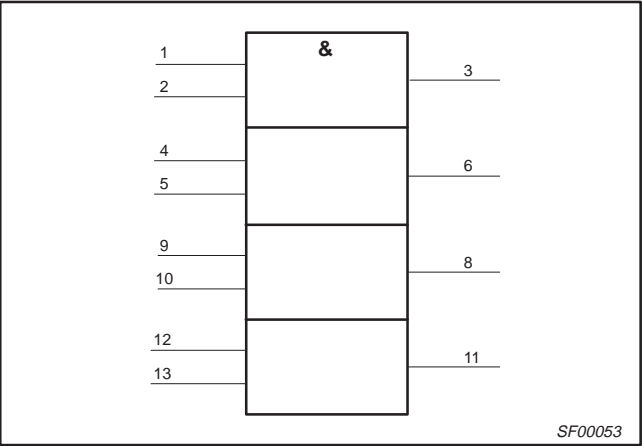
| PINS   | DESCRIPTION  | 74ALS (U.L.)<br>HIGH/LOW | LOAD VALUE<br>HIGH/LOW |
|--------|--------------|--------------------------|------------------------|
| nA, nB | Data inputs  | 1.0/1.0                  | 20µA/0.1mA             |
| nY     | Data outputs | 20/80                    | 0.4mA/8mA              |

NOTE: One (1.0) ALS unit load is defined as: 20µA in the High state and 0.1mA in the Low state.

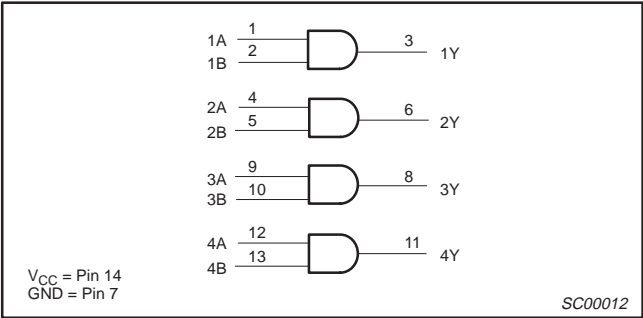
LOGIC SYMBOL



IEC/IEEE SYMBOL



LOGIC DIAGRAM



FUNCTION TABLE

| INPUTS |    | OUTPUT |
|--------|----|--------|
| nA     | nB | nY     |
| H      | H  | L      |
| L      | X  | H      |
| X      | L  | H      |

H = High voltage level  
L = Low voltage level  
X = Don't care

## Quad 2-input AND gate

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**ABSOLUTE MAXIMUM RATINGS**

(Operation beyond the limit set forth in this table may impair the useful life of the device.  
Unless otherwise noted these limits are over the operating free-air temperature range.)

| SYMBOL    | PARAMETER                                      | RATING           | UNIT |
|-----------|--|------------------|------|
| $V_{CC}$  | Supply voltage                                 | -0.5 to +7.0     | V    |
| $V_{IN}$  | Input voltage                                  | -0.5 to +7.0     | V    |
| $I_{IN}$  | Input current                                  | -30 to +5        | mA   |
| $V_{OUT}$ | Voltage applied to output in High output state | -0.5 to $V_{CC}$ | V    |
| $I_{OUT}$ | Current applied to output in Low output state  | 16               | mA   |
| $T_{amb}$ | Operating free-air temperature range           | 0 to +70         | °C   |
| $T_{stg}$ | Storage temperature range                      | -65 to +150      | °C   |

**RECOMMENDED OPERATING CONDITIONS**

| SYMBOL    | PARAMETER                            | LIMITS |     |      | UNIT |
|-----------|--------------------------------------|--------|-----|------|------|
|           |                                      | MIN    | NOM | MAX  |      |
| $V_{CC}$  | Supply voltage                       | 4.5    | 5.0 | 5.5  | V    |
| $V_{IH}$  | High-level input voltage             | 2.0    |     |      | V    |
| $V_{IL}$  | Low-level input voltage              |        |     | 0.8  | V    |
| $I_{IK}$  | Input clamp current                  |        |     | -18  | mA   |
| $I_{OH}$  | High-level output current            |        |     | -0.4 | mA   |
| $I_{OL}$  | Low-level output current             |        |     | 8    | mA   |
| $T_{amb}$ | Operating free-air temperature range | 0      |     | +70  | °C   |

**DC ELECTRICAL CHARACTERISTICS**

(Over recommended operating free-air temperature range unless otherwise noted.)

| SYMBOL   | PARAMETER                              | TEST CONDITIONS <sup>1</sup>   | LIMITS                |                  |      | UNIT |
|----------|--|--|-----------------------|------------------|------|------|
|          |  |  | MIN                   | TYP <sup>2</sup> | MAX  |      |
| $V_{OH}$ | High-level output voltage              | $V_{CC} \pm 10\%$ , $V_{IL} = \text{MAX}$ , $V_{IH} = \text{MIN}$ , $I_{OH} = -0.4\text{mA}$ | $V_{CC} - 2$          |                  |      | V    |
| $V_{OL}$ | Low-level output voltage               | $V_{CC} = \text{MIN}$ , $V_{IL} = \text{MAX}$ ,<br>$V_{IH} = \text{MIN}$                     | $I_{OL} = 4\text{mA}$ | 0.25             | 0.40 | V    |
|          |  |  | $I_{OL} = 8\text{mA}$ | 0.35             | 0.50 | V    |
| $V_{IK}$ | Input clamp voltage                    | $V_{CC} = \text{MIN}$ , $I_I = I_{IK}$   |                       | -0.73            | -1.5 | V    |
| $I_I$    | Input current at maximum input voltage | $V_{CC} = \text{MAX}$ , $V_I = 7.0\text{V}$  |                       |                  | 0.1  | mA   |
| $I_{IH}$ | High-level input current               | $V_{CC} = \text{MAX}$ , $V_I = 2.7\text{V}$  |                       |                  | 20   | μA   |
| $I_{IL}$ | Low-level input current                | $V_{CC} = \text{MAX}$ , $V_I = 0.5\text{V}$  |                       |                  | -0.1 | mA   |
| $I_O$    | Output current <sup>3</sup>            | $V_{CC} = \text{MAX}$ , $V_O = 2.25\text{V}$   | -30                   |                  | -112 | mA   |
| $I_{CC}$ | Supply current (total)                 | $I_{CCH}$  | $V_I = 4.5\text{V}$   | 1.3              | 2.4  | mA   |
|          |  | $I_{CCL}$  | $V_I = 0\text{V}$     | 2.2              | 4.0  | mA   |

**NOTES:**

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at  $V_{CC} = 5\text{V}$ ,  $T_{amb} = 25^\circ\text{C}$ .
- The output conditions have been chosen to produce a current that closely approximate one half of the true short-circuit output current,  $I_{OS}$ .

Quad 2-input AND gate

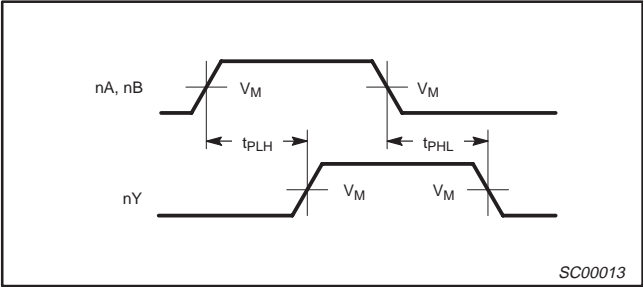
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AC ELECTRICAL CHARACTERISTICS

| SYMBOL                 | PARAMETER                           | TEST CONDITION | LIMITS  |              | UNIT |
|------------------------|-------------------------------------|----------------|---|--------------|------|
|                        |                                     |                | $T_{amb} = 0^{\circ}C \text{ to } +70^{\circ}C$<br>$V_{CC} = +5.0V \pm 10\%$<br>$C_L = 50pF, R_L = 500\Omega$ |              |      |
|                        |                                     |                | MIN   | MAX          |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>nA or nB to nY | Waveform 1     | 2.0<br>3.0  | 14.0<br>10.0 | ns   |

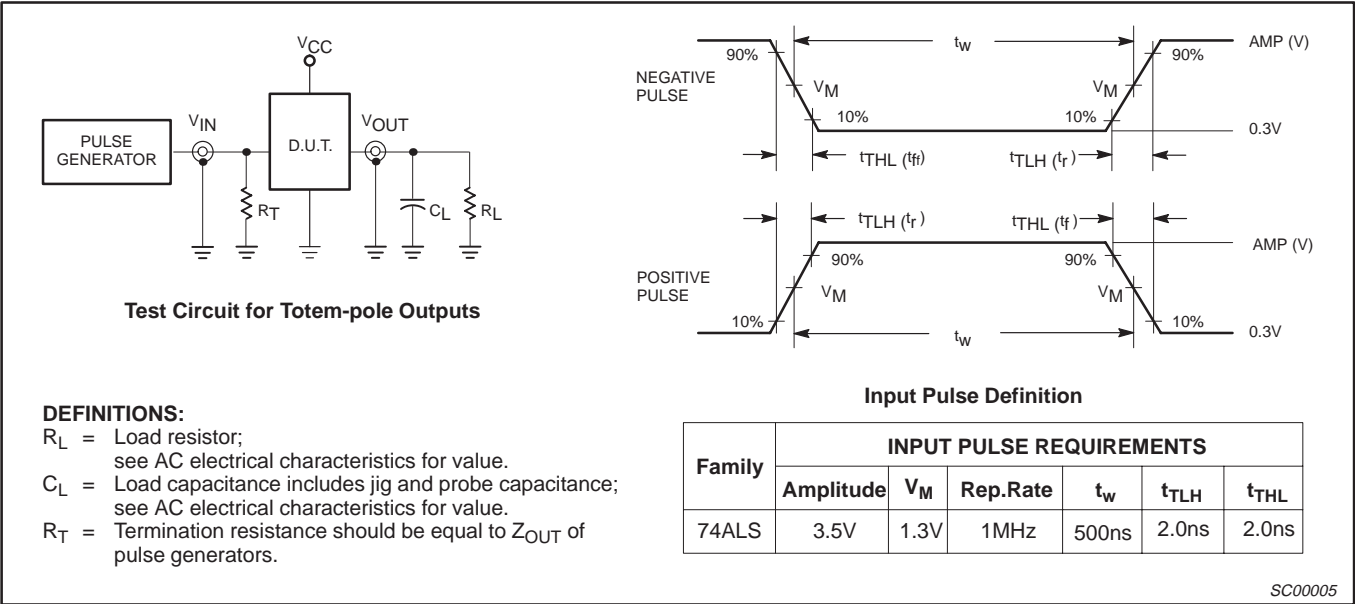
AC WAVEFORMS

For all waveforms,  $V_M = 1.3V$ .



Waveform 1. Propagation Delay for Data to Output

TEST CIRCUIT AND WAVEFORMS

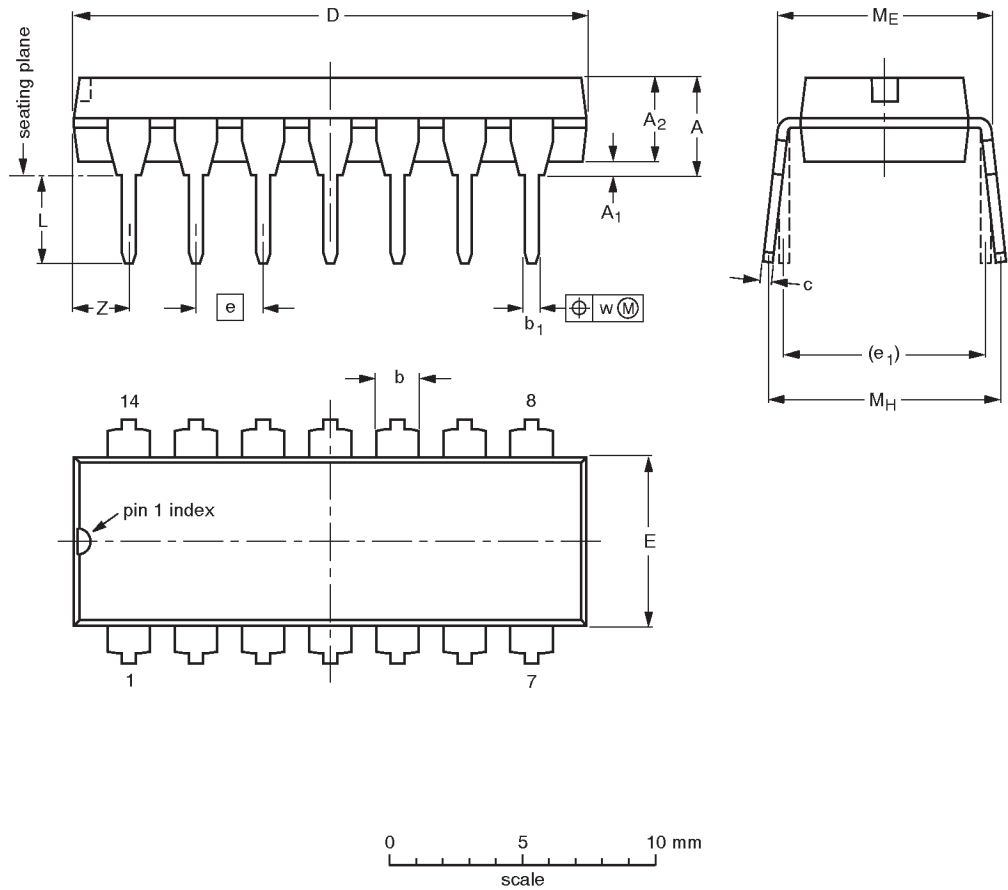


Quad 2-input AND gate

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DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1




DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT   | A<br>max. | A <sub>1</sub><br>min. | A <sub>2</sub><br>max. | b              | b <sub>1</sub> | c              | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | e <sub>1</sub> | L            | M <sub>E</sub> | M <sub>H</sub> | w     | Z <sup>(1)</sup><br>max. |
|--------|-----------|------------------------|------------------------|----------------|----------------|----------------|------------------|------------------|------|----------------|--------------|----------------|----------------|-------|--------------------------|
| mm     | 4.2       | 0.51                   | 3.2                    | 1.73<br>1.13   | 0.53<br>0.38   | 0.36<br>0.23   | 19.50<br>18.55   | 6.48<br>6.20     | 2.54 | 7.62           | 3.60<br>3.05 | 8.25<br>7.80   | 10.0<br>8.3    | 0.254 | 2.2                      |
| inches | 0.17      | 0.020                  | 0.13                   | 0.068<br>0.044 | 0.021<br>0.015 | 0.014<br>0.009 | 0.77<br>0.73     | 0.26<br>0.24     | 0.10 | 0.30           | 0.14<br>0.12 | 0.32<br>0.31   | 0.39<br>0.33   | 0.01  | 0.087                    |

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

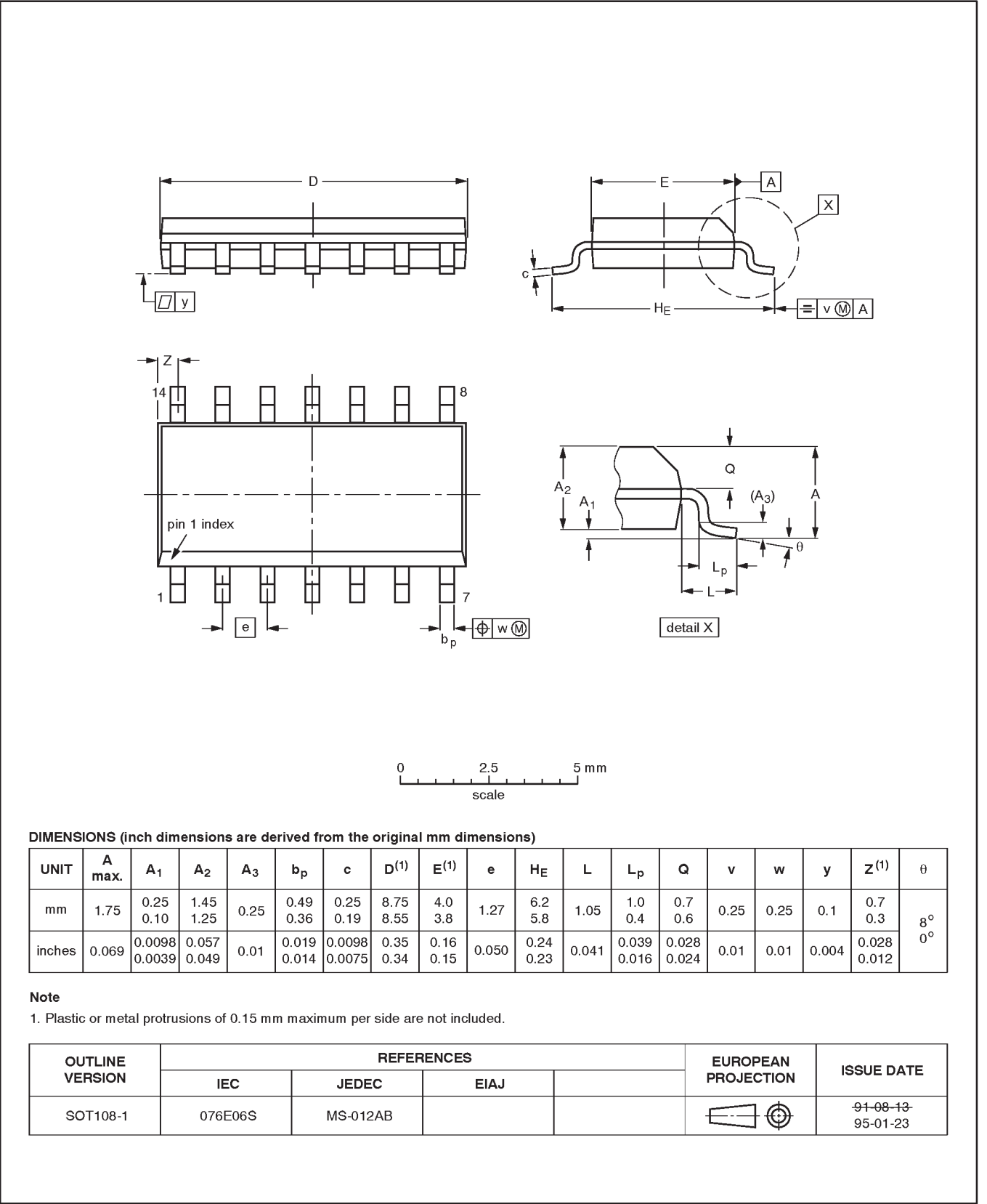
| OUTLINE<br>VERSION | REFERENCES |          |      |  | EUROPEAN<br>PROJECTION  | ISSUE DATE           |
|--------------------|------------|----------|------|--|---|----------------------|
|                    | IEC        | JEDEC    | EIAJ |  |   |                      |
| SOT27-1            | 050G04     | MO-001AA |      |  |  | 92-11-17<br>95-03-11 |

Quad 2-input AND gate

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SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



Quad 2-input AND gate

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| DEFINITIONS               |                        |  |
|---------------------------|------------------------|--|
| Data Sheet Identification | Product Status         | Definition   |
| Objective Specification   | Formative or in Design | This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.   |
| Preliminary Specification | Preproduction Product  | This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |
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