

74ABT08

Quad 2-input AND gate

Rev. 4 — 7 October 2020

Product data sheet

1. General description

The 74ABT08 is a quad 2-input AND gate. This device is fully specified for partial power down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

2. Features and benefits

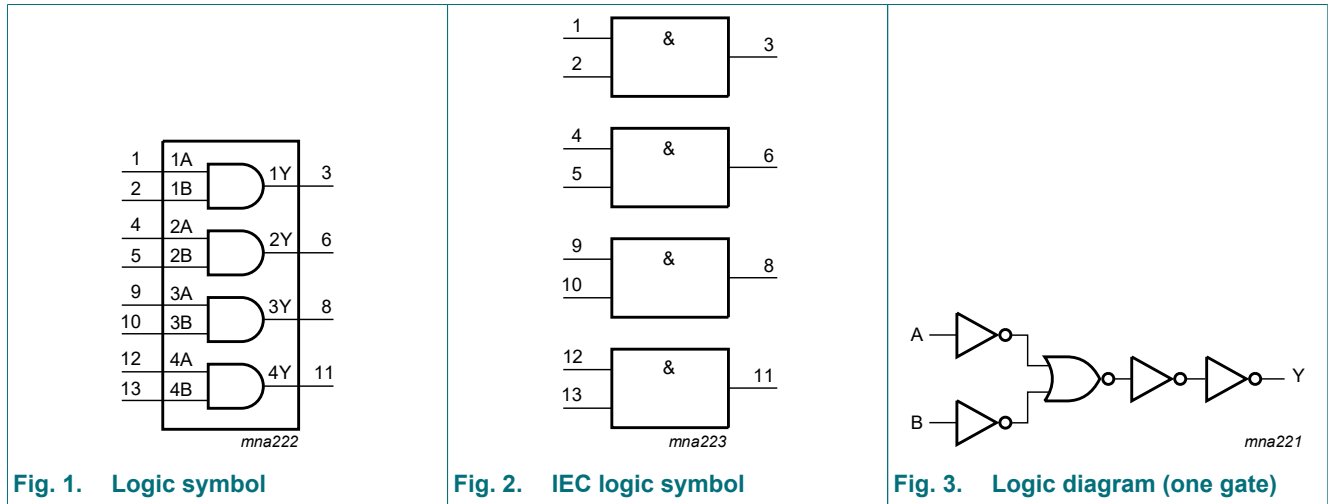
- Supply voltage range from 4.5 V to 5.5 V
- BiCMOS high speed and output drive
- Direct interface with TTL levels
- I_{OFF} circuitry provides partial Power-down mode operation
- Latch-up protection exceeds 500 mA per JESD78B class II level A
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +85 °C

3. Ordering information

Table 1. Ordering information

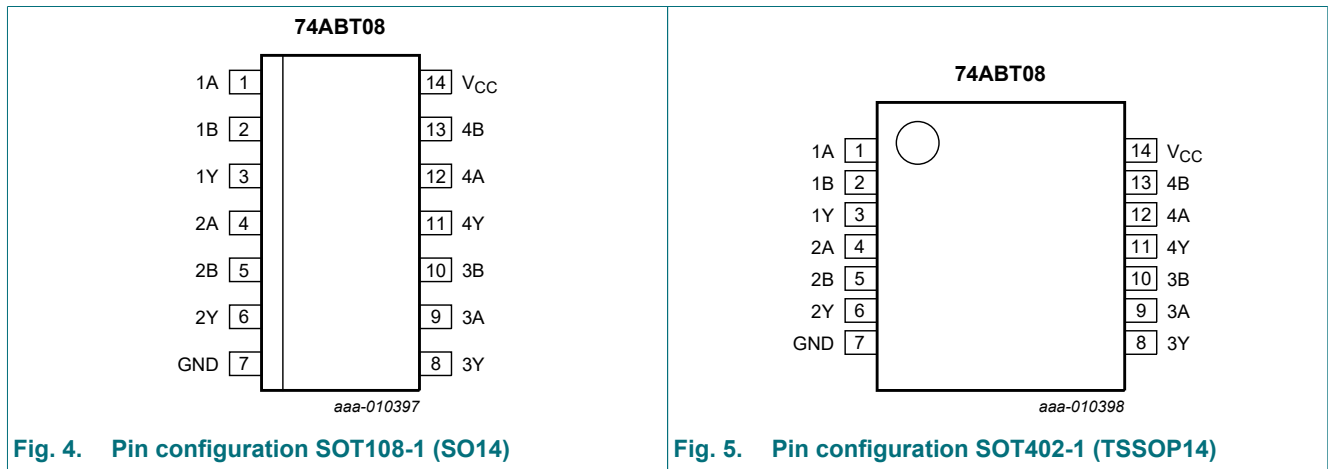
| Type number | Package | | | |
|-------------|-------------------|---------|---|----------|
| | Temperature range | Name | Description | Version |
| 74ABT08D | -40 °C to +85 °C | SO14 | plastic small outline package; 14 leads; body width 3.9 mm | SOT108-1 |
| 74ABT08PW | -40 °C to +85 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | SOT402-1 |

4. Functional diagram



5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

| Symbol | Pin | Description |
|-----------------|--------------|----------------|
| 1A, 2A, 3A, 4A | 1, 4, 9, 12 | data input |
| 1B, 2B, 3B, 4B | 2, 5, 10, 13 | data input |
| 1Y, 2Y, 3Y, 4Y | 3, 6, 8, 11 | data output |
| GND | 7 | ground (0 V) |
| V _{CC} | 14 | supply voltage |

6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care.

| Input | | Output |
|-------|----|--------|
| nA | nB | nY |
| L | X | L |
| X | L | L |
| H | H | H |

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|-------------------------|---------------------|------|------|------|
| V_{CC} | supply voltage | | -0.5 | +7.0 | V |
| V_I | input voltage | | [1] | +7.0 | V |
| V_O | output voltage | output HIGH or LOW | [1] | +5.5 | V |
| I_{IK} | input clamping current | $V_I < 0$ V | -18 | - | mA |
| I_{OK} | output clamping current | $V_O < 0$ V | -50 | - | mA |
| I_O | output current | output in LOW-state | - | 40 | mA |
| T_j | junction temperature | | - | 150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

8. Recommended operating conditions

Table 5. Operating conditions

Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------|-------------------------------------|-------------|-----|-----|----------|------|
| V_{CC} | supply voltage | | 4.5 | - | 5.5 | V |
| V_I | input voltage | | 0 | - | V_{CC} | V |
| V_{IH} | HIGH-level input voltage | | 2.0 | - | - | V |
| V_{IL} | LOW-level input voltage | | - | - | 0.8 | V |
| I_{OH} | HIGH-level output current | | -15 | - | - | mA |
| I_{OL} | LOW-level output current | | - | - | 20 | mA |
| $\Delta t/\Delta V$ | input transition rise and fall rate | | 0 | - | 5 | ns/V |
| T_{amb} | ambient temperature | in free air | -40 | - | +85 | °C |

9. Static characteristics

Table 6. Static characteristics

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | Unit |
|------------------|-----------------------------|--|-------|-------|------|------------------|------|------|
| | | | Min | Typ | Max | Min | Max | |
| V _{IK} | input clamping voltage | V _{CC} = 4.5 V; I _{IK} = -18 mA | -1.2 | -0.9 | - | -1.2 | - | V |
| V _{OH} | HIGH-level output voltage | V _{CC} = 4.5 V; I _{OH} = -15 mA; V _I = V _{IL} or V _{IH} | 2.5 | 2.9 | - | 2.5 | - | V |
| V _{OL} | LOW-level output voltage | V _{CC} = 4.5 V; I _{OL} = 20 mA; V _I = V _{IL} or V _{IH} | - | 0.35 | 0.5 | - | 0.5 | V |
| I _I | input leakage current | V _{CC} = 5.5 V; V _I = GND or 5.5 V | - | ±0.01 | ±1.0 | - | ±1.0 | µA |
| I _{OFF} | power-off leakage current | V _{CC} = 0 V; V _I or V _O ≤ 4.5 V | - | ±5.0 | ±100 | - | ±100 | µA |
| I _{CEX} | output high leakage current | HIGH-state; V _O = 5.5 V; V _{CC} = 5.5 V; V _I = GND or V _{CC} | - | 5.0 | 50 | - | 50 | µA |
| I _O | output current | V _{CC} = 5.5 V; V _O = 2.5 V [1] | -50 | -75 | -180 | -50 | -180 | mA |
| I _{CC} | supply current | V _{CC} = 5.5 V; V _I = GND or V _{CC} | - | 2 | 50 | - | 50 | µA |
| ΔI _{CC} | additional supply current | per input pin; V _{CC} = 5.5 V; one input at 3.4 V; other inputs at V _{CC} or GND [2] | - | 0.25 | 500 | - | 500 | µA |
| C _I | input capacitance | V _I = 0 V or V _{CC} | - | 3 | - | - | - | pF |

[1] Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

[2] This is the increase in supply current for each input at 3.4 V.

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND = 0 V; for test circuit, see Fig. 7.

| Symbol | Parameter | Conditions | 25 °C; V _{CC} = 5.0 V | | | -40 °C to +85 °C; V _{CC} = 5.0 V ± 0.5 V | | Unit |
|--------------------|-------------------------------|--------------------------|--------------------------------|-----|-----|--|-----|------|
| | | | Min | Typ | Max | Min | Max | |
| t _{PLH} | LOW to HIGH propagation delay | nA, nB to nY; see Fig. 6 | 1.0 | 2.4 | 3.4 | 1.0 | 4.0 | ns |
| t _{PHL} | HIGH to LOW propagation delay | nA, nB to nY; see Fig. 6 | 1.0 | 1.9 | 2.8 | 1.0 | 3.0 | ns |
| t _{sk(o)} | output skew time [1] | | - | 0.4 | 0.5 | - | 0.5 | ns |

[1] Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

10.1. Waveforms and test circuit

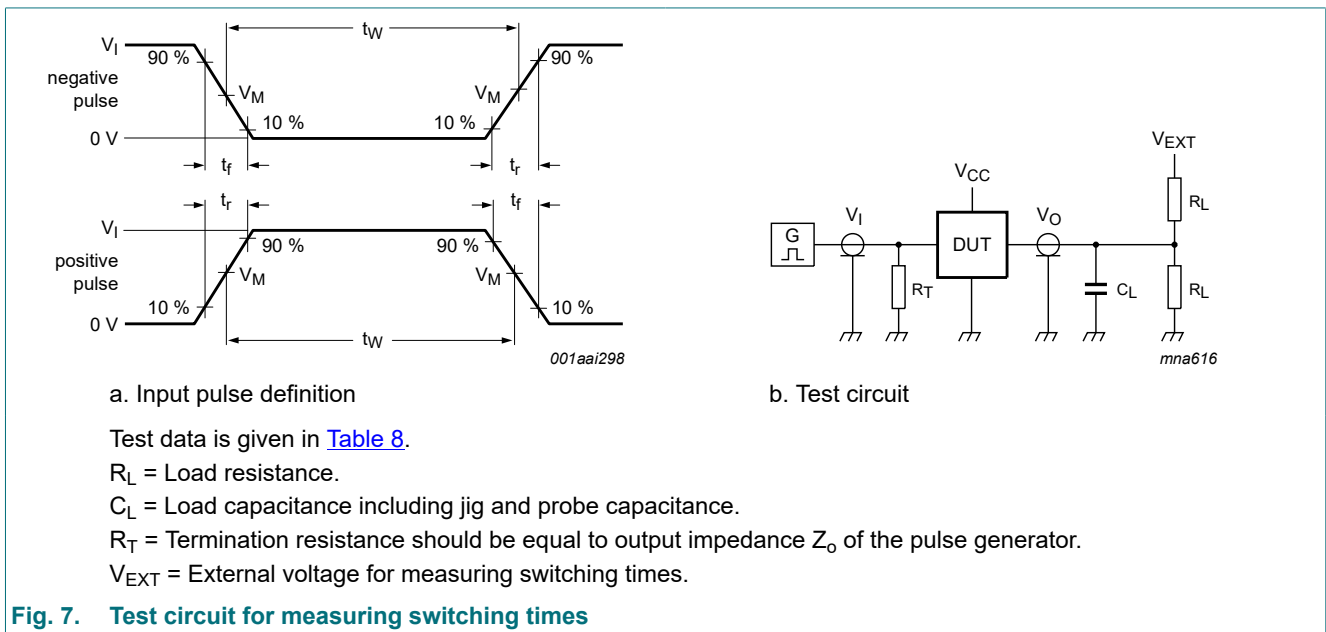
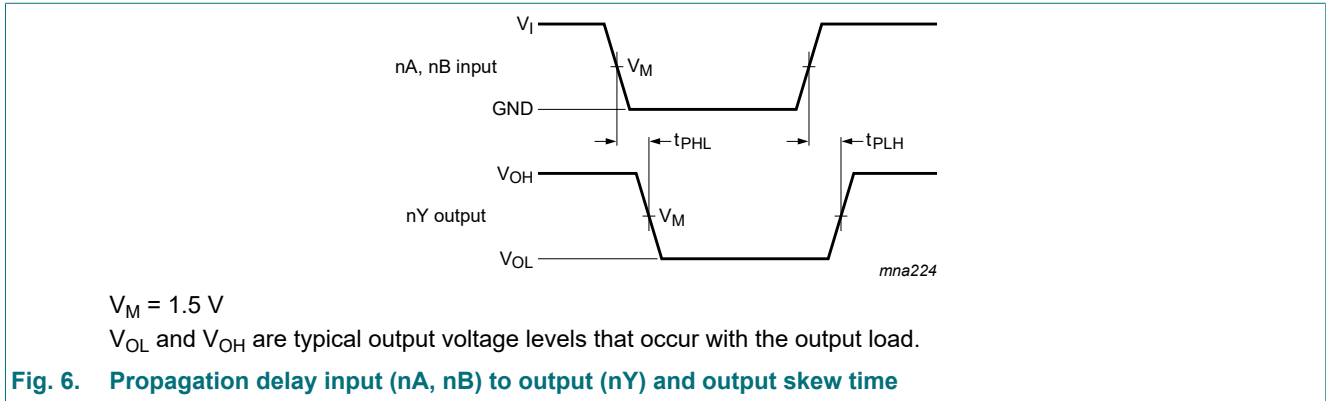


Table 8. Test data

| Input | | | | Load | | V_{EXT} |
|-------|-------|--------|----------------------|-------|--------------|--------------------|
| V_I | f_i | t_w | t_r, t_f | C_L | R_L | t_{PHL}, t_{PLH} |
| 3.0 V | 1 MHz | 500 ns | $\leq 2.5\text{ ns}$ | 50 pF | 500 Ω | open |

11. Package outline

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

SOT108-1

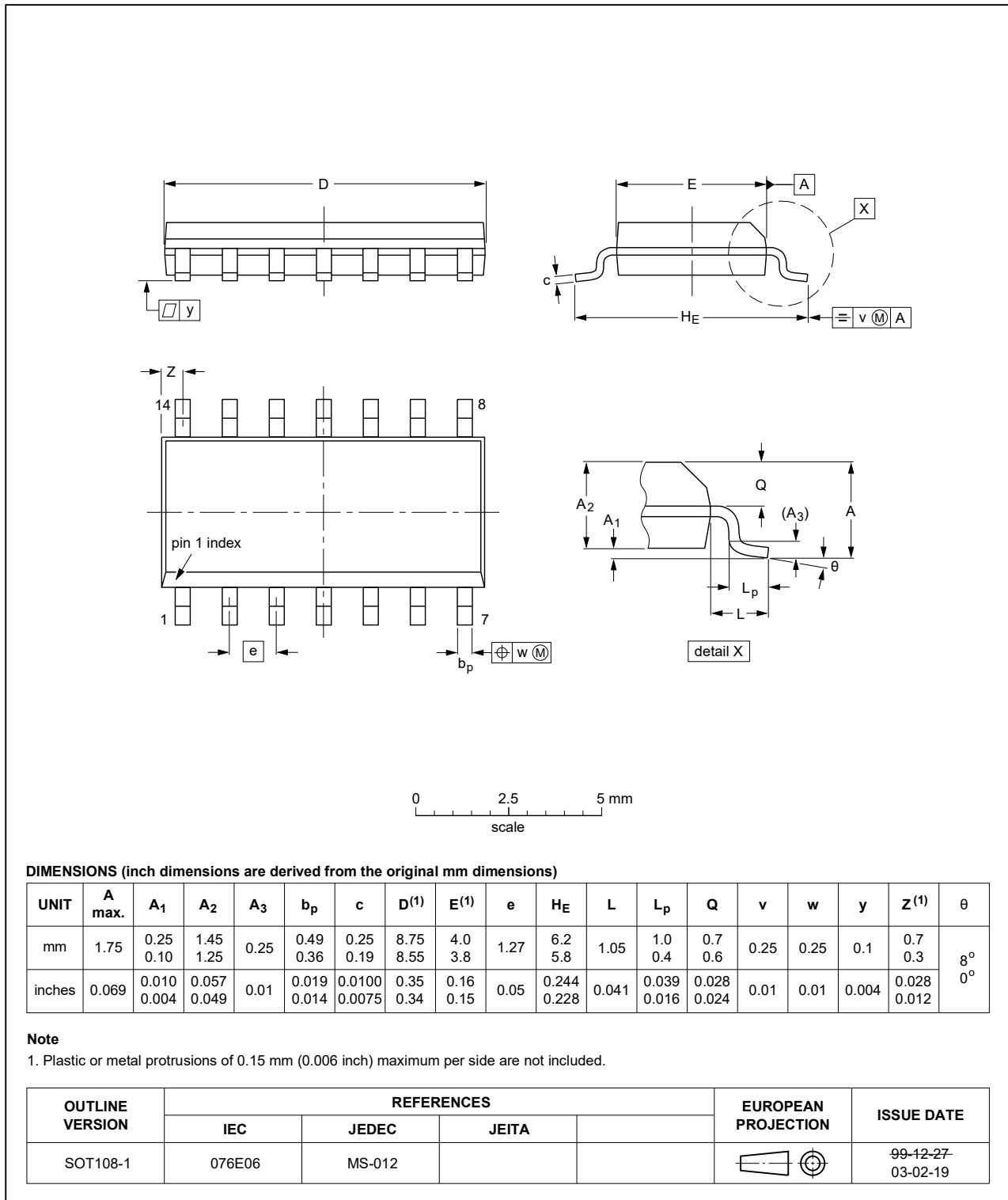


Fig. 8. Package outline SOT108-1 (SO14)

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1

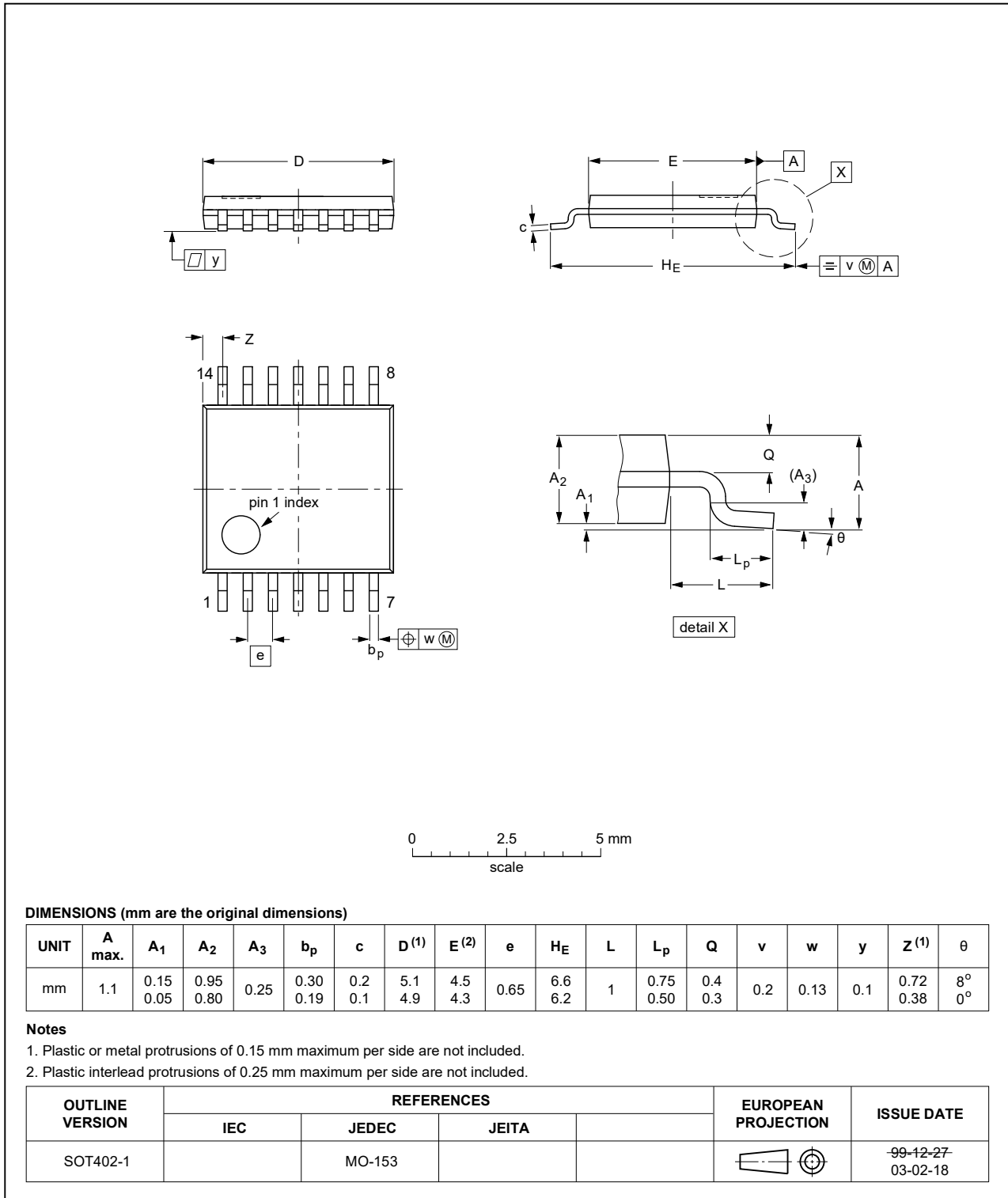


Fig. 9. Package outline SOT402-1 (TSSOP14)

12. Abbreviations

Table 9. Abbreviations

| Acronym | Description |
|---------|---|
| BiCMOS | Bipolar Complementary Metal-Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| MM | Machine Model |
| TTL | Transistor-Transistor Logic |

13. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|-----------------------|---------------|-------------|
| 74ABT08 v.4 | 20201007 | Product data sheet | - | 74ABT08 v.3 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Section 1 and Section 2 updated. Type number 74ABT08DB (SOT337-1 / SSOP14) removed. | | | |
| 74ABT08 v.3 | 20151120 | Product data sheet | - | 74ABT08 v.2 |
| Modifications: | <ul style="list-style-type: none"> Type number 74ABT08N (SOT27-1) removed. | | | |
| 74ABT08 v.2 | 20140314 | Product data sheet | - | 74ABT08 v.1 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. Legal texts have been adapted to the new company name where appropriate. | | | |
| 74ABT08 v.1 | 19950918 | Product specification | - | - |

14. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

| | |
|--|----------|
| 1. General description | 1 |
| 2. Features and benefits | 1 |
| 3. Ordering information | 1 |
| 4. Functional diagram | 2 |
| 5. Pinning information | 2 |
| 5.1. Pinning..... | 2 |
| 5.2. Pin description..... | 2 |
| 6. Functional description | 3 |
| 7. Limiting values | 3 |
| 8. Recommended operating conditions | 3 |
| 9. Static characteristics | 4 |
| 10. Dynamic characteristics | 4 |
| 10.1. Waveforms and test circuit..... | 5 |
| 11. Package outline | 6 |
| 12. Abbreviations | 8 |
| 13. Revision history | 8 |
| 14. Legal information | 9 |

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