

74ABT00

Quad 2-input NAND gate

Rev. 3 — 11 August 2016

Product data sheet

1. General description

The 74ABT00 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT00 is a quad 2-input NAND gate.

2. Features and benefits

- 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
- Multiple package options
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$

3. Ordering information

Table 1. Ordering information

| Type number | Package | | | |
|-------------|--|---------|--|----------|
| | Temperature range | Name | Description | Version |
| 74ABT00D | $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ | SO14 | plastic small outline package; 14 leads; body width 3.9 mm | SOT108-1 |
| 74ABT00DB | $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ | SSOP14 | plastic shrink small outline package; 14 leads; body width 5.3 mm | SOT337-1 |
| 74ABT00PW | $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ | 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 to 4A | 1, 4, 9, 12 | data input |
| 1B to 4B | 2, 5, 10, 13 | data input |
| 1Y to 4Y | 3, 6, 8, 11 | data output |
| GND | 7 | ground (0 V) |
| V _{CC} | 14 | supply voltage |

6. Functional description

Table 3. Function table^[1]

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

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

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] -1.2 | +7.0 | V |
| V_O | output voltage | output HIGH or LOW | ^[1] -0.5 | +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 | | ^[2] - | 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.

[2] The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150 °C.

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 | $V_{CC} = 4.5\text{ V}$; $I_{IK} = -18\text{ mA}$ | -1.2 | -0.9 | - | -1.2 | - | V |
| V_{OH} | HIGH-level output voltage | $V_{CC} = 4.5\text{ V}$; $I_{OH} = -15\text{ mA}$; $V_I = V_{IL}$ or V_{IH} | 2.5 | 2.9 | - | 2.5 | - | V |
| V_{OL} | LOW-level output voltage | $V_{CC} = 4.5\text{ V}$; $I_{OL} = 20\text{ mA}$; $V_I = V_{IL}$ or V_{IH} | - | 0.35 | 0.5 | - | 0.5 | V |
| I_I | input leakage current | $V_{CC} = 5.5\text{ V}$; $V_I = \text{GND}$ or 5.5 V | - | ± 0.01 | ± 1.0 | - | ± 1.0 | μA |
| I_{OFF} | power-off leakage current | $V_{CC} = 0\text{ V}$; V_I or $V_O \leq 4.5\text{ V}$ | - | ± 5.0 | ± 100 | - | ± 100 | μA |
| I_{CEX} | output high leakage current | HIGH-state; $V_O = 5.5\text{ V}$; $V_{CC} = 5.5\text{ V}$; $V_I = \text{GND}$ or V_{CC} | - | 5.0 | 50 | - | 50 | μA |
| I_O | output current | $V_{CC} = 5.5\text{ V}$; $V_O = 2.5\text{ V}$ [1] | -50 | -75 | -180 | -50 | -180 | mA |
| I_{CC} | supply current | $V_{CC} = 5.5\text{ V}$; $V_I = \text{GND}$ or V_{CC} | - | 2 | 50 | - | 50 | μA |
| ΔI_{CC} | additional supply current | per input pin; $V_{CC} = 5.5\text{ V}$; one input at 3.4 V ; other inputs at V_{CC} or GND [2] | - | 0.25 | 500 | - | 500 | μA |
| C_I | input capacitance | $V_I = 0\text{ V}$ 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

$\text{GND} = 0\text{ V}$; for test circuit, see [Figure 7](#).

| Symbol | Parameter | Conditions | 25 °C; $V_{CC} = 5.0\text{ V}$ | | | −40 °C to +85 °C; $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$ | | Unit |
|-------------|-------------------------------|--|--------------------------------|-----|-----|---|-----|------|
| | | | Min | Typ | Max | Min | Max | |
| t_{PLH} | LOW to HIGH propagation delay | nA, nB to nY; see Figure 6 | 1.0 | 2.5 | 3.6 | 1.0 | 4.1 | ns |
| t_{PHL} | HIGH to LOW propagation delay | nA, nB to nY; see Figure 6 | 1.0 | 2.0 | 2.8 | 1.0 | 3.4 | 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.

11. Waveforms

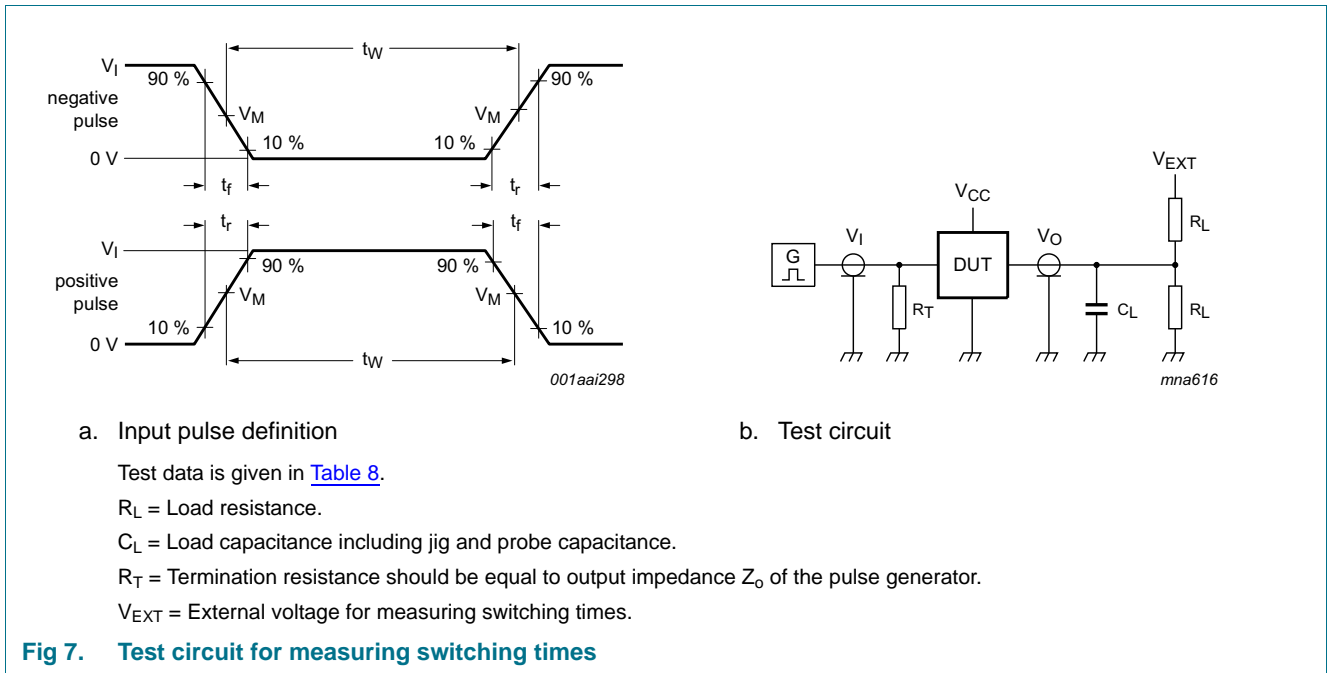
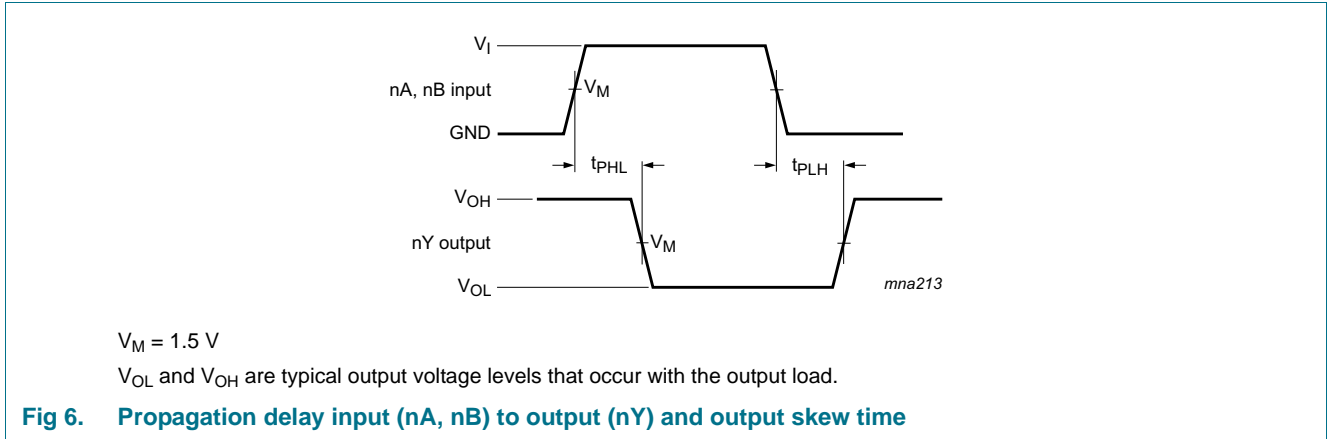


Table 8. Test data

| 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 |

12. Package outline

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

SOT108-1

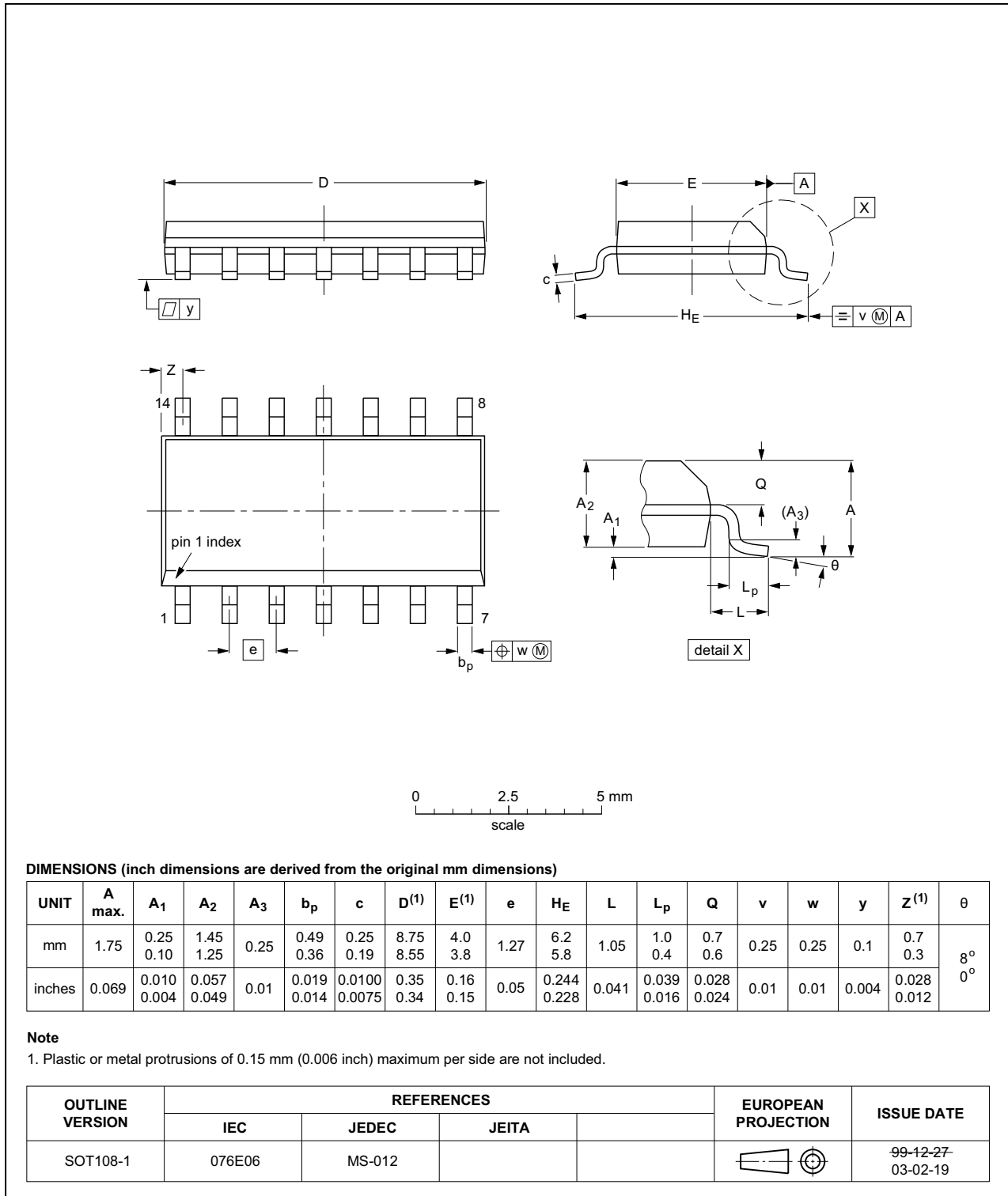


Fig 8. Package outline SOT108-1 (SO14)

SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

SOT337-1



Fig 9. Package outline SOT337-1 (SSOP14)

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

SOT402-1



Fig 10. Package outline SOT402-1 (TSSOP14)

13. 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 |

14. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|-----------------------|---------------|-------------|
| 74ABT00 v.3 | 20160811 | Product data sheet | - | 74ABT00 v.2 |
| 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. | | | |
| 74ABT00 v.2 | 19950918 | Product specification | - | - |

15. Legal information

15.1 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. |

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17. 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 |
| 11 | Waveforms | 5 |
| 12 | Package outline | 6 |
| 13 | Abbreviations | 9 |
| 14 | Revision history | 9 |
| 15 | Legal information | 10 |
| 15.1 | Data sheet status | 10 |
| 15.2 | Definitions | 10 |
| 15.3 | Disclaimers | 10 |
| 15.4 | Trademarks | 11 |
| 16 | Contact information | 11 |
| 17 | Contents | 12 |

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