

# 74ABT162244

16-bit buffer/line driver with 30  $\Omega$  series termination resistors;  
3-state

Rev. 7 — 2 July 2021

Product data sheet

## 1. General description

The 74ABT162244 is a 16-bit buffer/line driver with 30  $\Omega$  termination resistors and 3-state outputs. The device can be used as four 4-bit buffers, two 8-bit buffers or one 16-bit buffer. The device features four output enables (1OE, 2OE, 3OE and 4OE), each controlling four of the 3-state outputs. A HIGH on nOE causes the outputs to assume a high-impedance OFF-state. This device is fully specified for partial power down applications using I<sub>OFF</sub>. The I<sub>OFF</sub> 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
- Power-up 3-state
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- Latch-up protection exceeds 500 mA per JESD78B class II level A
- 16-bit bus interface
- Multiple V<sub>CC</sub> and GND pins minimize switching noise
- 3-state buffers
- Output capability: +12 mA and -32 mA
- Live insertion and extraction permitted
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - CDM JESD22-C101-C exceeds 1000 V
- Specified from -40 °C to +85 °C

## 3. Ordering information

Table 1. Ordering information

| Type number    | Package           |         |                                                                           |          |
|----------------|-------------------|---------|---------------------------------------------------------------------------|----------|
|                | Temperature range | Name    | Description                                                               | Version  |
| 74ABT162244DGG | -40 °C to +85 °C  | TSSOP48 | plastic thin shrink small outline package; 48 leads;<br>body width 6.1 mm | SOT362-1 |

4. Functional diagram

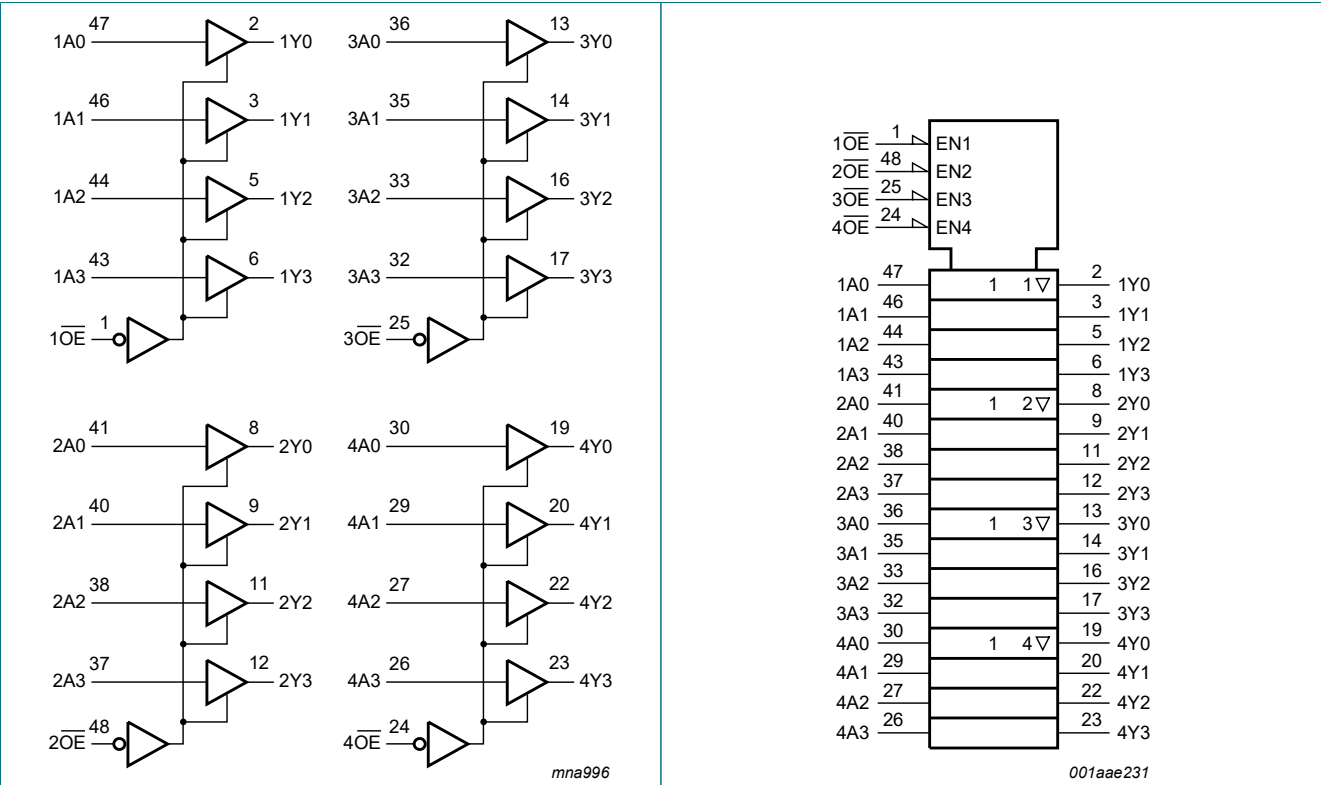


Fig. 1. Logic symbol

Fig. 2. IEC logic symbol

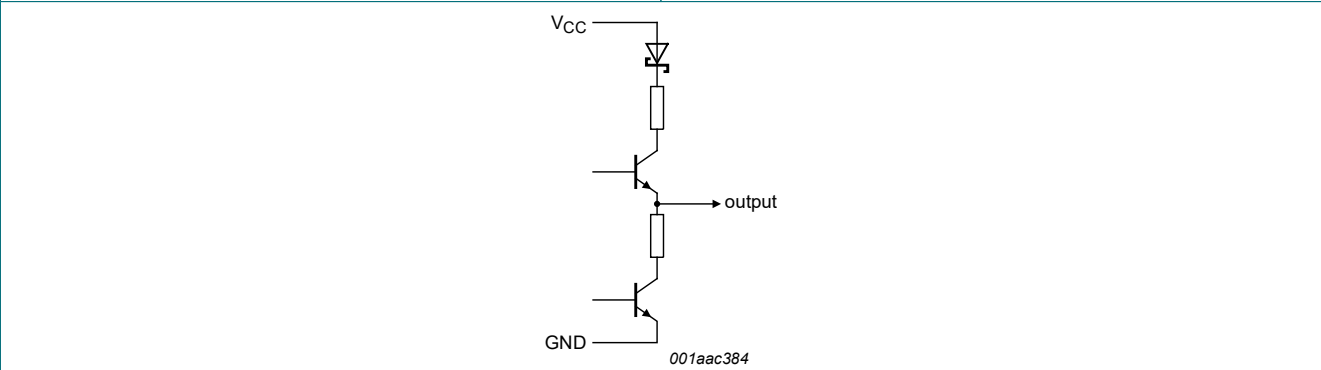


Fig. 3. Logic diagram one output

5. Pinning information

5.1. Pinning

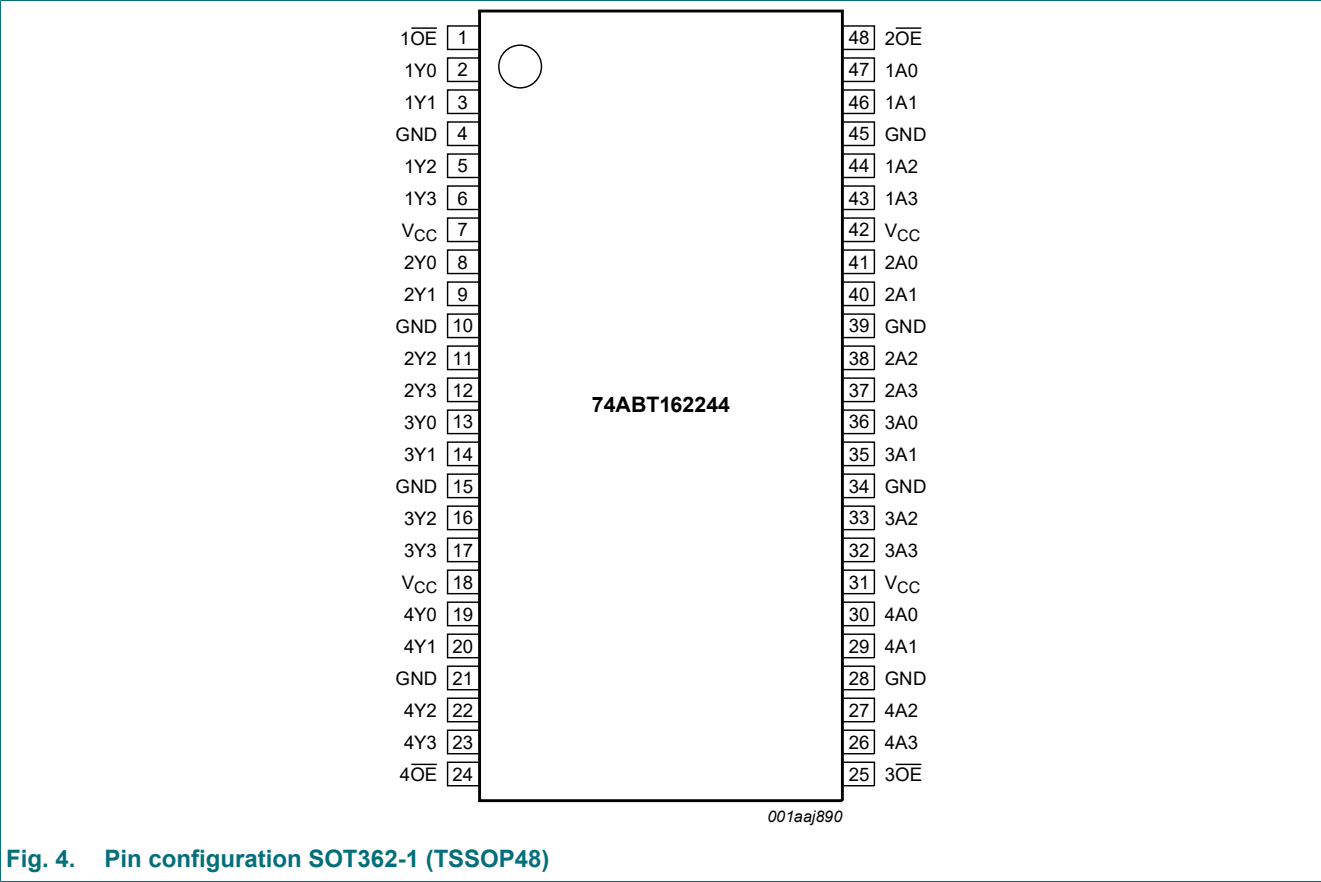


Fig. 4. Pin configuration SOT362-1 (TSSOP48)

5.2. Pin description

Table 2. Pin description

| Symbol             | Pin                           | Description                       |
|--------------------|-------------------------------|-----------------------------------|
| 1OE, 2OE, 3OE, 4OE | 1, 48, 25, 24                 | 1 to 4 output enable (LOW active) |
| 1Y0, 1Y1, 1Y2, 1Y3 | 2, 3, 5, 6                    | 1 data output 0 to output 3       |
| GND                | 4, 10, 15, 21, 28, 34, 39, 45 | ground (0 V)                      |
| VCC                | 7, 18, 31, 42                 | supply voltage                    |
| 2Y0, 2Y1, 2Y2, 2Y3 | 8, 9, 11, 12                  | 2 data output 0 to output 3       |
| 3Y0, 3Y1, 3Y2, 3Y3 | 13, 14, 16, 17                | 3 data output 0 to output 3       |
| 4Y0, 4Y1, 4Y2, 4Y3 | 19, 20, 22, 23                | 4 data output 0 to output 3       |
| 4A0, 4A1, 4A2, 4A3 | 30, 29, 27, 26                | 4 data input 0 to input 3         |
| 3A0, 3A1, 3A2, 3A3 | 36, 35, 33, 32                | 3 data input 0 to input 3         |
| 2A0, 2A1, 2A2, 2A3 | 41, 40, 38, 37                | 2 data input 0 to input 3         |
| 1A0, 1A1, 1A2, 1A3 | 47, 46, 44, 43                | 1 data input 0 to input 3         |

## 6. Functional description

**Table 3. Function table**

*H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.*

| Control | Input | Output |
|---------|-------|--------|
| nOE     | nAn   | nYn    |
| L       | L     | L      |
| L       | H     | H      |
| H       | X     | Z      |

## 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 in OFF-state or HIGH-state | [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               | -        | 128  | mA   |
|           |                         | output in HIGH-state              | -        | -64  | 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.

## 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           |             | -32 | -   | -        | mA   |
| $I_{OL}$            | LOW-level output current            |             | -   | -   | 12       | mA   |
| $\Delta t/\Delta V$ | input transition rise and fall rate |             | -   | -   | 10       | 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             | $V_{CC} = 4.5 \text{ V}$ ; $I_{IK} = -18 \text{ mA}$                                                                      | -     | -0.9       | -1.2      | -                | -1.2      | V             |
| $V_{OH}$        | HIGH-level output voltage          | $V_I = V_{IL}$ or $V_{IH}$                                                                                                |       |            |           |                  |           |               |
|                 |                                    | $V_{CC} = 4.5 \text{ V}$ ; $I_{OH} = -3 \text{ mA}$                                                                       | 2.5   | 2.9        | -         | 2.5              | -         | V             |
|                 |                                    | $V_{CC} = 5.0 \text{ V}$ ; $I_{OH} = -3 \text{ mA}$                                                                       | 3.0   | 3.4        | -         | 3.0              | -         | V             |
|                 |                                    | $V_{CC} = 4.5 \text{ V}$ ; $I_{OH} = -32 \text{ mA}$                                                                      | 2.0   | 2.4        | -         | 2.0              | -         | V             |
| $V_{OL}$        | LOW-level output voltage           | $V_I = V_{IL}$ or $V_{IH}$                                                                                                |       |            |           |                  |           |               |
|                 |                                    | $V_{CC} = 4.5 \text{ V}$ ; $I_{OL} = 8 \text{ mA}$                                                                        | -     | -          | 0.65      | -                | 0.65      | V             |
|                 |                                    | $V_{CC} = 4.5 \text{ V}$ ; $I_{OL} = 12 \text{ mA}$                                                                       | -     | -          | 0.80      | -                | 0.80      | V             |
| $I_I$           | input leakage current              | $V_{CC} = 5.5 \text{ V}$ ; $V_I = V_{CC}$ or GND                                                                          | -     | $\pm 0.01$ | $\pm 1.0$ | -                | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{OFF}$       | power-off leakage current          | $V_{CC} = 0 \text{ V}$ ; $V_I$ or $V_O \leq 4.5 \text{ V}$                                                                | -     | $\pm 5.0$  | $\pm 100$ | -                | $\pm 100$ | $\mu\text{A}$ |
| $I_{O(pu/pd)}$  | power-up/power-down output current | $V_{CC} = 2.0 \text{ V}$ ; $V_O = 0.5 \text{ V}$ ;<br>$V_I = \text{GND}$ or $V_{CC}$ ; $n\overline{OE} = \text{HIGH}$ [1] | -     | $\pm 5.0$  | $\pm 50$  | -                | $\pm 50$  | $\mu\text{A}$ |
| $I_{OZ}$        | OFF-state output current           | $V_{CC} = 5.5 \text{ V}$ ; $V_I = V_{IL}$ or $V_{IH}$                                                                     |       |            |           |                  |           |               |
|                 |                                    | output HIGH-state at $V_O = 5.5 \text{ V}$                                                                                | -     | 0.1        | 10        | -                | 10        | $\mu\text{A}$ |
|                 |                                    | output LOW-state at $V_O = 0 \text{ V}$                                                                                   | -     | -0.1       | -10       | -                | -10       | $\mu\text{A}$ |
| $I_{CEX}$       | output high leakage current        | HIGH-state; $V_O = 5.5 \text{ V}$ ;<br>$V_{CC} = 5.5 \text{ V}$ ; $V_I = \text{GND}$ or $V_{CC}$                          | -     | 5.0        | 50        | -                | 50        | $\mu\text{A}$ |
| $I_O$           | output current                     | $V_{CC} = 5.5 \text{ V}$ ; $V_O = 2.5 \text{ V}$ [2]                                                                      | -50   | -100       | -180      | -50              | -180      | mA            |
| $I_{CC}$        | supply current                     | $V_{CC} = 5.5 \text{ V}$ ; $V_I = \text{GND}$ or $V_{CC}$                                                                 |       |            |           |                  |           |               |
|                 |                                    | outputs HIGH-state                                                                                                        | -     | 0.50       | 1.0       | -                | 1.0       | mA            |
|                 |                                    | outputs LOW-state                                                                                                         | -     | 10         | 19        | -                | 19        | mA            |
|                 |                                    | outputs 3-state                                                                                                           | -     | 0.50       | 1.0       | -                | 1.0       | mA            |
| $\Delta I_{CC}$ | additional supply current          | per input pin; $V_{CC} = 5.5 \text{ V}$ ;<br>one input at 3.4 V and other inputs at $V_{CC}$ or GND [3]<br>[4]            | -     | 100        | 250       | -                | 250       | $\mu\text{A}$ |
| $C_I$           | input capacitance                  | $V_I = 0 \text{ V}$ or $V_{CC}$                                                                                           | -     | 3          | -         | -                | -         | pF            |
| $C_{I/O}$       | input/output capacitance           | outputs disabled; $V_O = 0 \text{ V}$ or $V_{CC}$                                                                         | -     | 7          | -         | -                | -         | pF            |

[1] This parameter is valid for any  $V_{CC}$  between 0 V and 2.1 V, with a transition time of up to 10 ms.

From  $V_{CC} = 2.1 \text{ V}$  to  $V_{CC} = 5 \text{ V} \pm 10 \%$ , a transition time of up to 100  $\mu\text{s}$  is permitted.

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

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

[4] This data sheet limit may vary among suppliers.

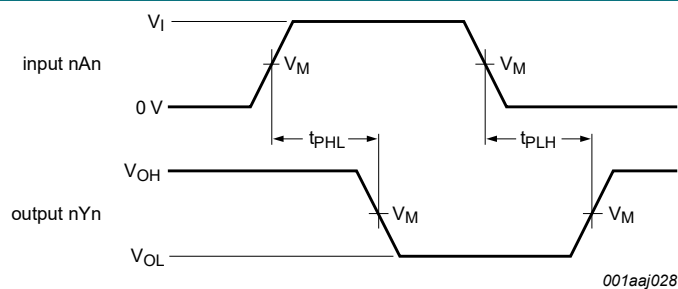
## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

$GND = 0\text{ V}$ . For test circuit, see Fig. 7.

| Symbol    | Parameter                           | Conditions                           | 25 °C; $V_{CC} = 5.0\text{ V}$ |     |     | -40 °C to +85 °C;<br>$V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$ |     | Unit |
|-----------|-------------------------------------|--------------------------------------|--------------------------------|-----|-----|---------------------------------------------------------------|-----|------|
|           |                                     |                                      | Min                            | Typ | Max | Min                                                           | Max |      |
| $t_{PLH}$ | LOW to HIGH propagation delay       | nAn to nYn, see Fig. 5               | 1.0                            | 1.8 | 2.4 | 1.0                                                           | 2.7 | ns   |
| $t_{PHL}$ | HIGH to LOW propagation delay       | nAn to nYn, see Fig. 5               | 1.6                            | 3.2 | 4.0 | 1.6                                                           | 4.4 | ns   |
| $t_{PZH}$ | OFF-state to HIGH propagation delay | n $\overline{OE}$ to nYn; see Fig. 6 | 1.2                            | 2.7 | 3.5 | 1.2                                                           | 4.3 | ns   |
| $t_{PZL}$ | OFF-state to LOW propagation delay  | n $\overline{OE}$ to nYn; see Fig. 6 | 2.6                            | 5.0 | 6.2 | 2.6                                                           | 7.3 | ns   |
| $t_{PHZ}$ | HIGH to OFF-state propagation delay | n $\overline{OE}$ to nYn; see Fig. 6 | 1.5                            | 3.0 | 3.8 | 1.5                                                           | 4.5 | ns   |
| $t_{PLZ}$ | LOW to OFF-state propagation delay  | n $\overline{OE}$ to nYn; see Fig. 6 | 1.3                            | 2.6 | 3.3 | 1.3                                                           | 4.6 | ns   |

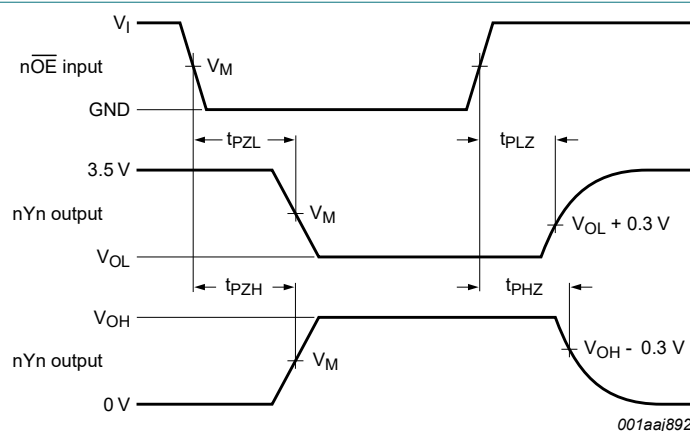
### 10.1. Waveforms and test circuit



$V_M = 1.5\text{ V}$

$V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig. 5. Input (nAn) to output (nYn) propagation delay**



$V_M = 1.5\text{ V}$

$V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig. 6. 3-state output enable and disable times**

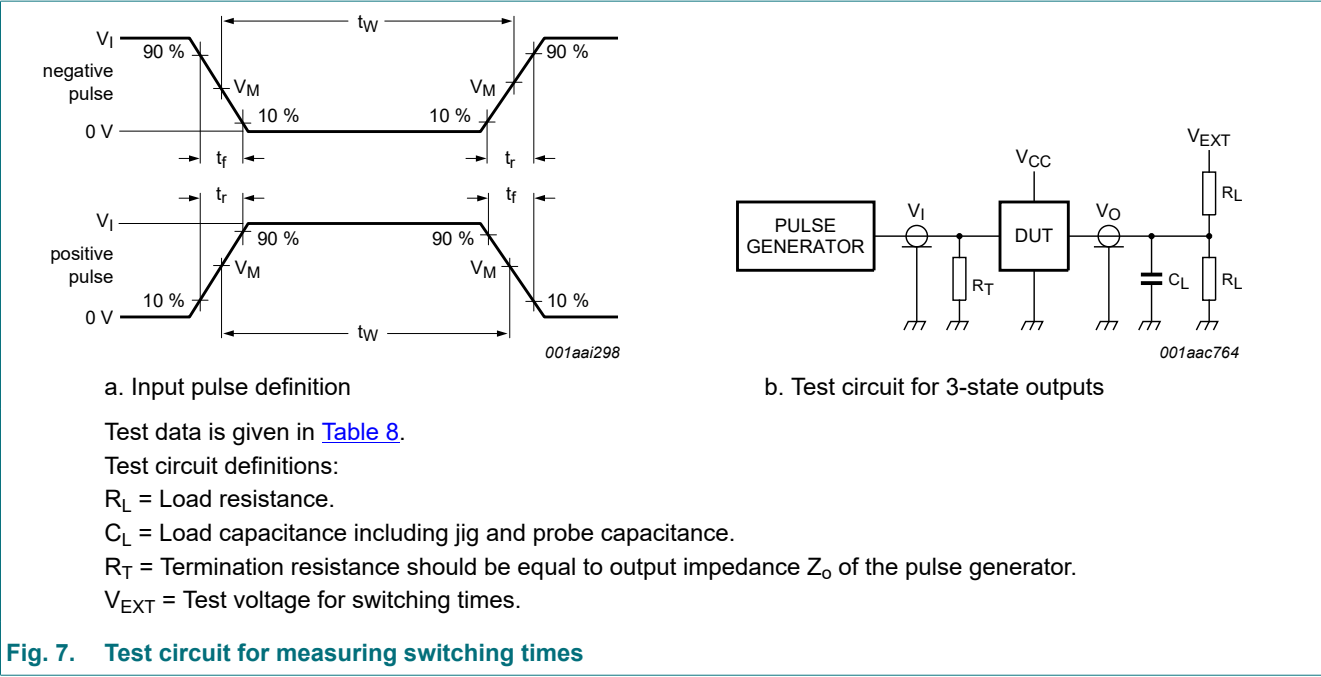


Fig. 7. Test circuit for measuring switching times

Table 8. Test data

| Input |       |        |            | Load  |       | $V_{EXT}$          |                    |                    |
|-------|-------|--------|------------|-------|-------|--------------------|--------------------|--------------------|
| $V_I$ | $f_i$ | $t_W$  | $t_r, t_f$ | $C_L$ | $R_L$ | $t_{PHZ}, t_{PZH}$ | $t_{PLZ}, t_{PZL}$ | $t_{PLH}, t_{PHL}$ |
| 3.0 V | 1 MHz | 500 ns | 2.5 ns     | 50 pF | 500 Ω | open               | 7.0 V              | open               |

11. Package outline

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1 mm

SOT362-1

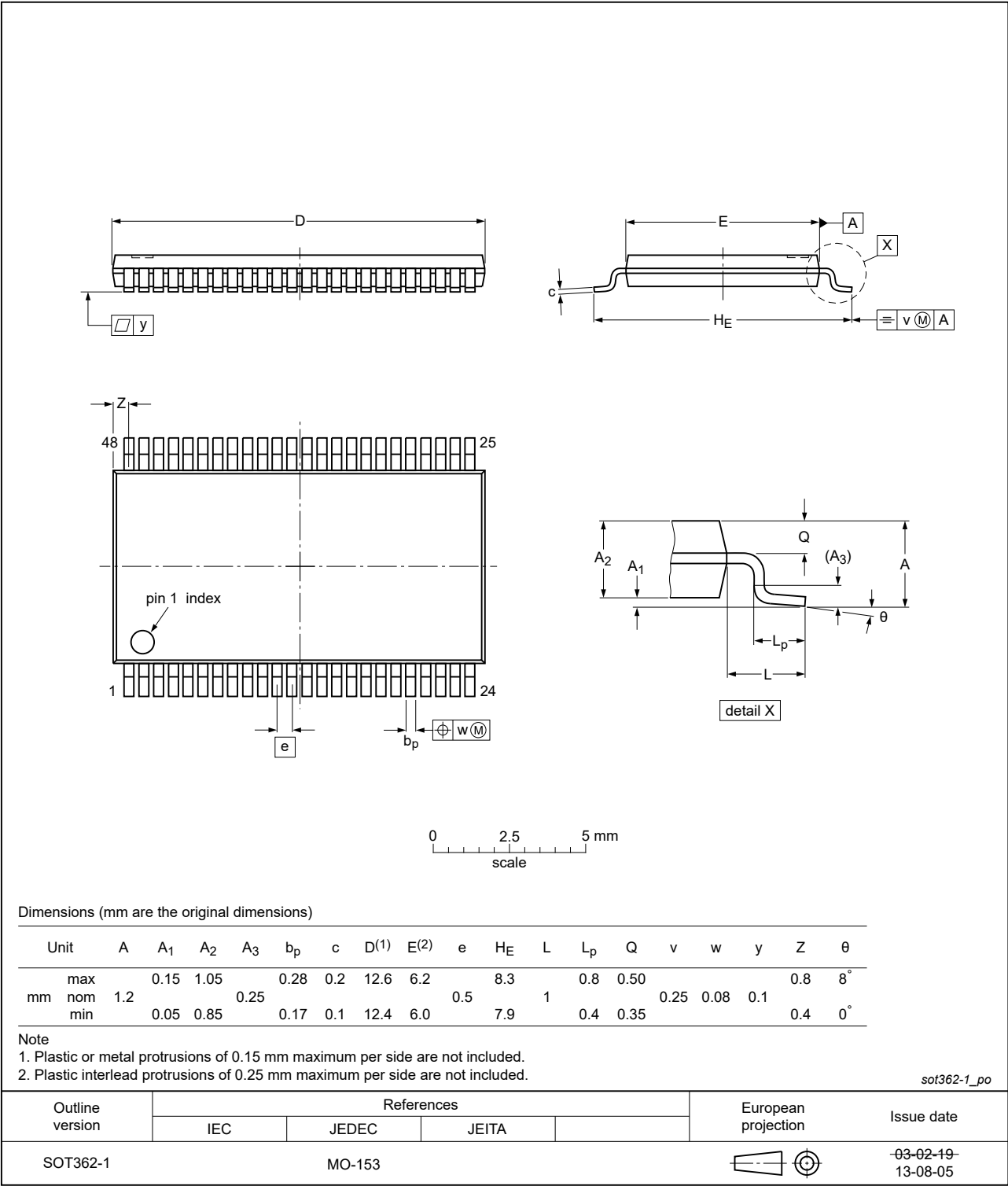


Fig. 8. Package outline SOT362-1 (TSSOP48)

## 12. Abbreviations

Table 9. Abbreviations

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

## 13. Revision history

Table 10. Revision history

| Document ID       | Release date                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Data sheet status     | Change notice | Supersedes        |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|-------------------|
| 74ABT162244 v.7   | 20210702                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Product data sheet    | -             | 74ABT162244 v.6   |
| Modifications:    | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li><a href="#">Fig. 8</a>: Package outline drawing SOT362-1 (TSSOP48) updated.</li> <li>Type number 74ABT162244DL (SOT370-1/SSOP48) removed.</li> <li><a href="#">Section 1</a> and <a href="#">Section 2</a> updated.</li> </ul> |                       |               |                   |
| 74ABT162244 v.6   | 20111103                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Product data sheet    | -             | 74ABT162244 v.5   |
| Modifications:    | <ul style="list-style-type: none"> <li>Legal pages updated</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                  |                       |               |                   |
| 74ABT162244 v.5   | 20100525                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Product data sheet    | -             | 74ABT162244 v.4   |
| 74ABT162244 v.4   | 20090409                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Product data sheet    | -             | 74ABT_H162244 v.3 |
| 74ABT_H162244 v.3 | 19981022                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Product specification | -             | 74ABT_H162244 v.2 |
| 74ABT_H162244 v.2 | 19980225                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Product specification | -             | 74ABT_H162244 v.1 |
| 74ABT_H162244 v.1 | 19961023                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Product specification | -             | -                 |

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### 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. |
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| Product [short] data sheet     | Production         | This document contains the product specification.                                     |

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