

# 74ABT162244

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

Rev. 6 — 3 November 2011

Product data sheet

## 1. General description

The 74ABT162244 high-performance Bipolar CMOS (BiCMOS) device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT162244 is a 16-bit buffer that is ideal for driving bus lines. The device features four output enable inputs ( $1\overline{OE}$ ,  $2\overline{OE}$ ,  $3\overline{OE}$ ,  $4\overline{OE}$ ), each controlling four of the 3-state outputs.

The 74ABT162244 is designed with 30  $\Omega$  series resistance in both the upper and lower output structures. This design reduces line noise in applications such as memory address drivers, clock drivers and bus receivers/transmitters.

## 2. Features and benefits

- 16-bit bus interface
- Multiple  $V_{CC}$  and GND pins minimize switching noise
- Power-up 3-state
- 3-state buffers
- Output capability: +12 mA and -32 mA
- Live insertion and extraction permitted
- Latch-up performance: JESD 78 Class II
- ESD protection:
  - ◆ HBM JESD-A114E exceeds 2000 V
  - ◆ CDM JESD 22-C101-C exceeds 1000 V

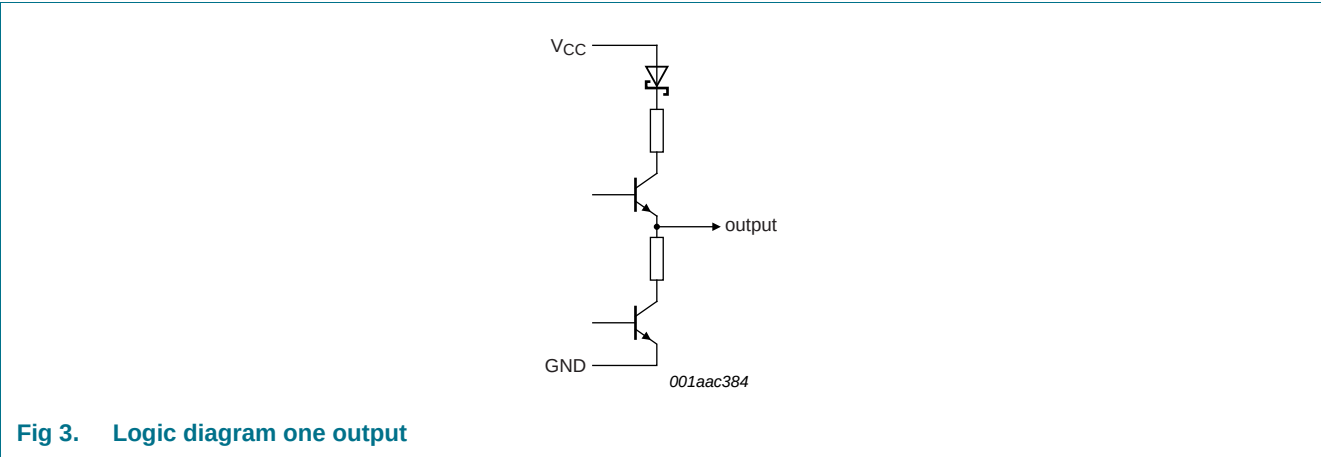
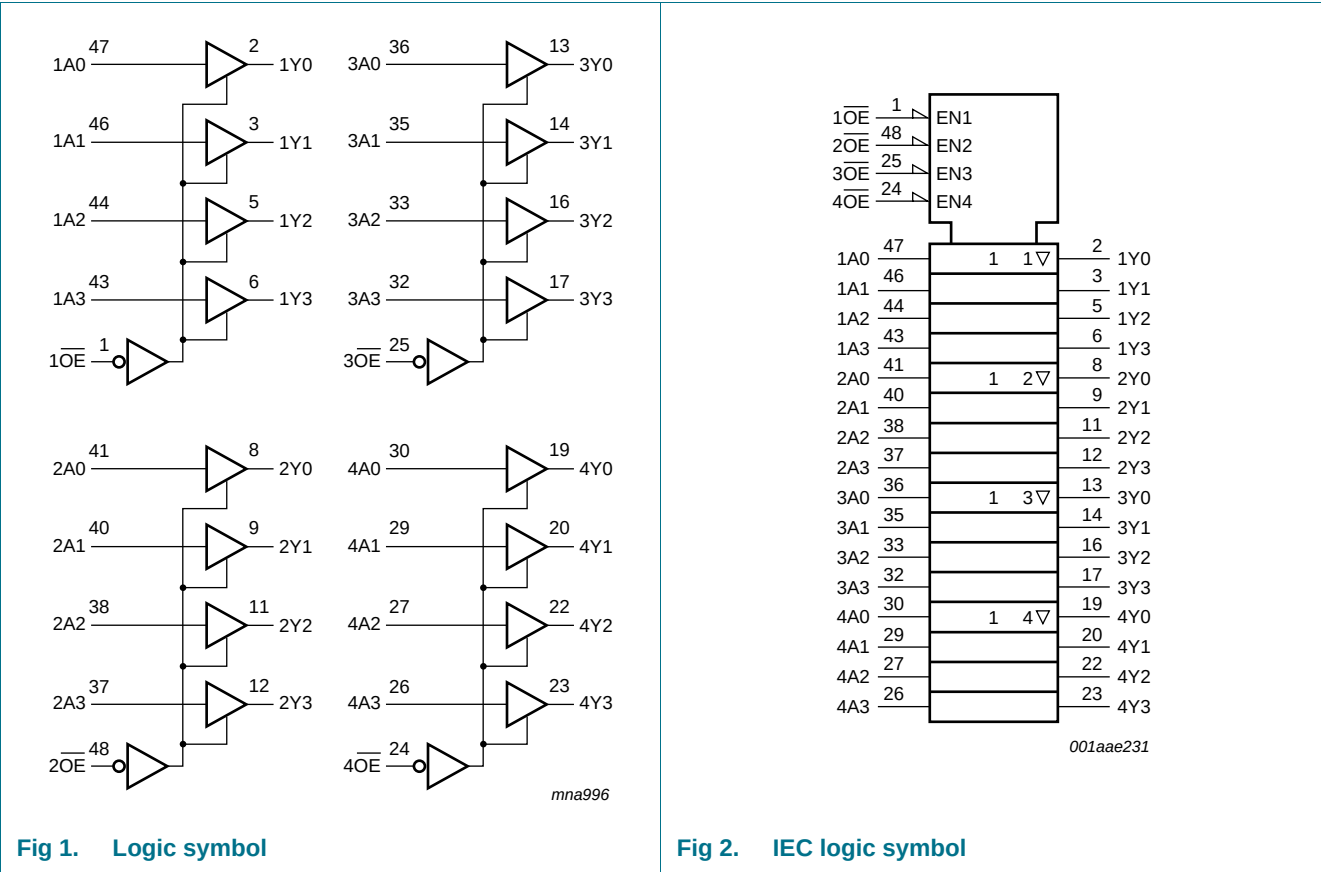
## 3. Ordering information

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; body width 6.1 mm | SOT362-1 |
| 74ABT162244DL  | -40 °C to +85 °C  | SSOP48  | plastic shrink small outline package; 48 leads; body width 7.5 mm      | SOT370-1 |



4. Functional diagram



5. Pinning information

5.1 Pinning

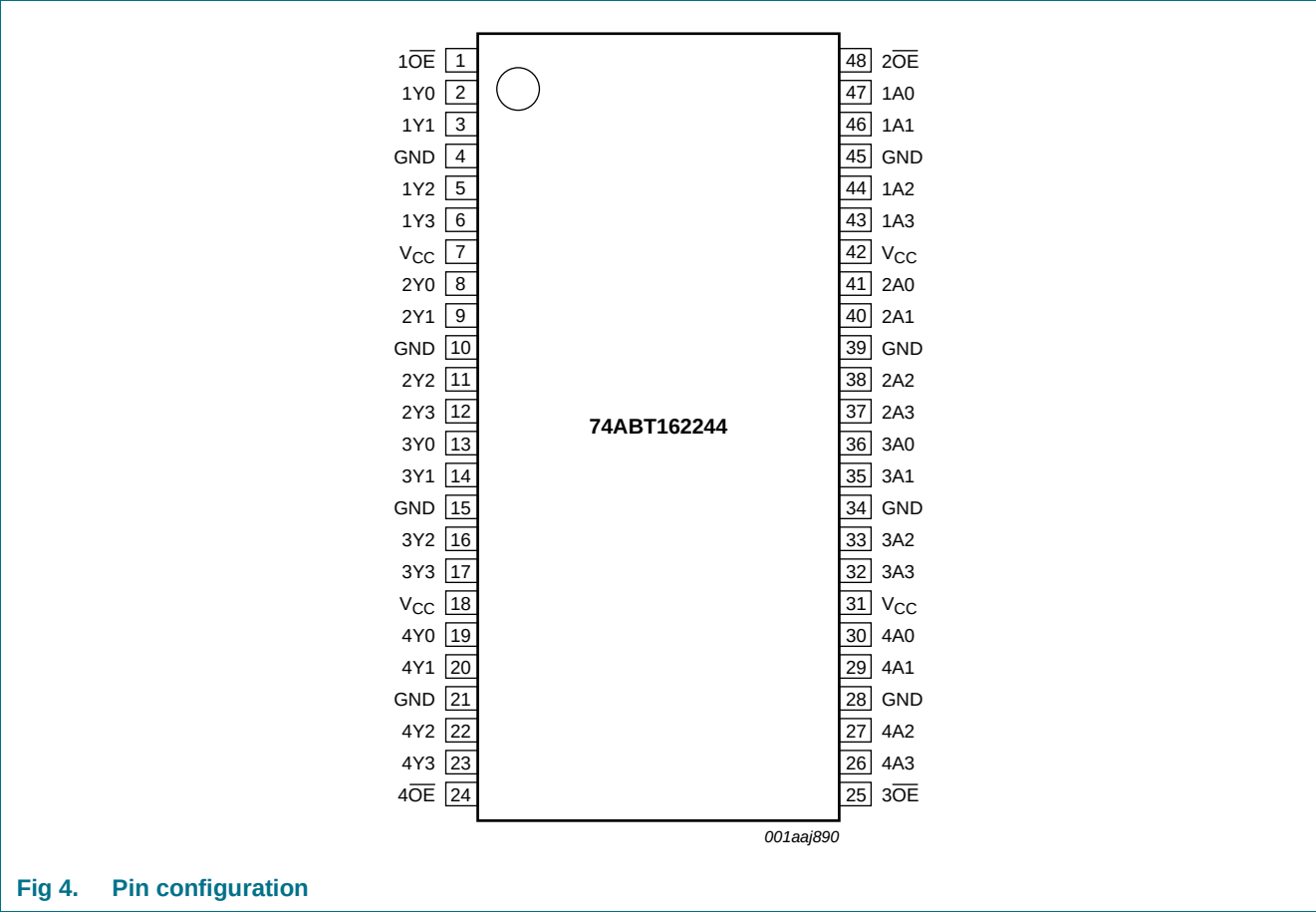


Fig 4. Pin configuration

5.2 Pin description

Table 2. Pin description

| Symbol  | Pin            | Description                  |
|---------|----------------|------------------------------|
| 1OE     | 1              | 1 output enable (LOW active) |
| 1Y[0:3] | 2, 3, 5, 6     | 1 data output 0 to output 3  |
| GND     | 4              | ground (0 V)                 |
| VCC     | 7              | supply voltage               |
| 2Y[0:3] | 8, 9, 11, 12   | 2 data output 0 to output 3  |
| GND     | 10             | ground (0 V)                 |
| 3Y[0:3] | 13, 14, 16, 17 | 3 data output 0 to output 3  |
| GND     | 15             | ground (0 V)                 |
| VCC     | 18             | supply voltage               |
| 4Y[0:3] | 19, 20, 22, 23 | 4 data output 0 to output 3  |
| GND     | 21             | ground (0 V)                 |
| 4OE     | 24             | 4 output enable (LOW active) |

Table 2. Pin description ...continued

| Symbol           | Pin            | Description                  |
|------------------|----------------|------------------------------|
| $\overline{3OE}$ | 25             | 3 output enable (LOW active) |
| GND              | 28             | ground (0 V)                 |
| 4A[0:3]          | 30, 29, 27, 26 | 4 data input 0 to input 3    |
| V <sub>CC</sub>  | 31             | supply voltage               |
| GND              | 34             | ground (0 V)                 |
| 3A[0:3]          | 36, 35, 33, 32 | 3 data input 0 to input 3    |
| GND              | 39             | ground (0 V)                 |
| 2A[0:3]          | 41, 40, 38, 37 | 2 data input 0 to input 3    |
| V <sub>CC</sub>  | 42             | supply voltage               |
| GND              | 45             | ground (0 V)                 |
| 1A[0:3]          | 47, 46, 44, 43 | 1 data input 0 to input 3    |
| $\overline{2OE}$ | 48             | 2 output enable (LOW active) |

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

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

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

## 7. Limiting values

Table 4. Limiting values

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

| Symbol           | Parameter               | Conditions                        | Min                 | Max  | Unit |
|------------------|-------------------------|-----------------------------------|---------------------|------|------|
| V <sub>CC</sub>  | supply voltage          |                                   | -0.5                | +7.0 | V    |
| V <sub>I</sub>   | input voltage           |                                   | <sup>[1]</sup> -1.2 | +7.0 | V    |
| V <sub>O</sub>   | output voltage          | output in OFF-state or HIGH-state | <sup>[1]</sup> -0.5 | +5.5 | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < 0 V              | -18                 | -    | mA   |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> < 0 V              | -50                 | -    | mA   |
| I <sub>O</sub>   | output current          | output in LOW-state               | -                   | 128  | mA   |
|                  |                         | output in HIGH-state              | -                   | -64  | mA   |
| T <sub>j</sub>   | junction temperature    |                                   | <sup>[2]</sup> -    | 150  | °C   |
| T <sub>stg</sub> | 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 <sub>CC</sub>     | supply voltage                      |             | 4.5 | -   | 5.5             | V    |
| V <sub>I</sub>      | input voltage                       |             | 0   | -   | V <sub>CC</sub> | V    |
| V <sub>IH</sub>     | HIGH-level input voltage            |             | 2.0 | -   | -               | V    |
| V <sub>IL</sub>     | LOW-level Input voltage             |             | -   | -   | 0.8             | V    |
| I <sub>OH</sub>     | HIGH-level output current           |             | -32 | -   | -               | mA   |
| I <sub>OL</sub>     | LOW-level output current            |             | -   | -   | 12              | mA   |
| $\Delta t/\Delta V$ | input transition rise and fall rate |             | -   | -   | 10              | ns/V |
| T <sub>amb</sub>    | 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 <sub>IK</sub>       | input clamping voltage             | V <sub>CC</sub> = 4.5 V; I <sub>IK</sub> = −18 mA                                                        | -                      | −0.9  | −1.2 | -                | −1.2 | V    |    |
| V <sub>OH</sub>       | HIGH-level output voltage          | V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                                                      |                        |       |      |                  |      |      |    |
|                       |                                    | V <sub>CC</sub> = 4.5 V; I <sub>OH</sub> = −3 mA                                                         | 2.5                    | 2.9   | -    | 2.5              | -    | V    |    |
|                       |                                    | V <sub>CC</sub> = 5.0 V; I <sub>OH</sub> = −3 mA                                                         | 3.0                    | 3.4   | -    | 3.0              | -    | V    |    |
|                       |                                    | V <sub>CC</sub> = 4.5 V; I <sub>OH</sub> = −32 mA                                                        | 2.0                    | 2.4   | -    | 2.0              | -    | V    |    |
| V <sub>OL</sub>       | LOW-level output voltage           | V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                                                      |                        |       |      |                  |      |      |    |
|                       |                                    | V <sub>CC</sub> = 4.5 V; I <sub>OL</sub> = 8 mA                                                          | -                      | -     | 0.65 | -                | 0.65 | V    |    |
|                       |                                    | V <sub>CC</sub> = 4.5 V; I <sub>OL</sub> = 12 mA                                                         | -                      | -     | 0.80 | -                | 0.80 | V    |    |
| I <sub>I</sub>        | input leakage current              | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>CC</sub> or GND                                         | -                      | ±0.01 | ±1.0 | -                | ±1.0 | μA   |    |
| I <sub>OFF</sub>      | power-off leakage current          | V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> ≤ 4.5 V                                          | -                      | ±5.0  | ±100 | -                | ±100 | μA   |    |
| I <sub>O(pu/pd)</sub> | power-up/power-down output current | V <sub>CC</sub> = 2.0 V; V <sub>O</sub> = 0.5 V;<br>V <sub>I</sub> = GND or V <sub>CC</sub> ; nOE = HIGH | <a href="#">[1]</a>    | -     | ±5.0 | ±50              | -    | ±50  | μA |
| I <sub>OZ</sub>       | OFF-state output current           | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                             |                        |       |      |                  |      |      |    |
|                       |                                    | output HIGH-state at V <sub>O</sub> = 5.5 V                                                              | -                      | 0.1   | 10   | -                | 10   | μA   |    |
|                       |                                    | output LOW-state at V <sub>O</sub> = 0 V                                                                 | -                      | −0.1  | −10  | -                | −10  | μA   |    |
| I <sub>LO</sub>       | output leakage current             | HIGH-state; V <sub>O</sub> = 5.5 V;<br>V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or V <sub>CC</sub>  | -                      | 5.0   | 50   | -                | 50   | μA   |    |
| I <sub>O</sub>        | output current                     | V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 2.5 V                                                          | <a href="#">[2]</a>    | −50   | −100 | −180             | −50  | −180 | mA |
| I <sub>CC</sub>       | supply current                     | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or V <sub>CC</sub>                                         |                        |       |      |                  |      |      |    |
|                       |                                    | 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   |    |
| ΔI <sub>CC</sub>      | additional supply current          | per input pin; V <sub>CC</sub> = 5.5 V; one input at 3.4 V and other inputs at V <sub>CC</sub> or GND    | <a href="#">[3][4]</a> | -     | 100  | 250              | -    | 250  | μA |
| C <sub>I</sub>        | input capacitance                  | V <sub>I</sub> = 0 V or V <sub>CC</sub>                                                                  | -                      | 3     | -    | -                | -    | pF   |    |
| C <sub>I/O</sub>      | input/output capacitance           | outputs disabled; V <sub>O</sub> = 0 V or V <sub>CC</sub>                                                | -                      | 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.

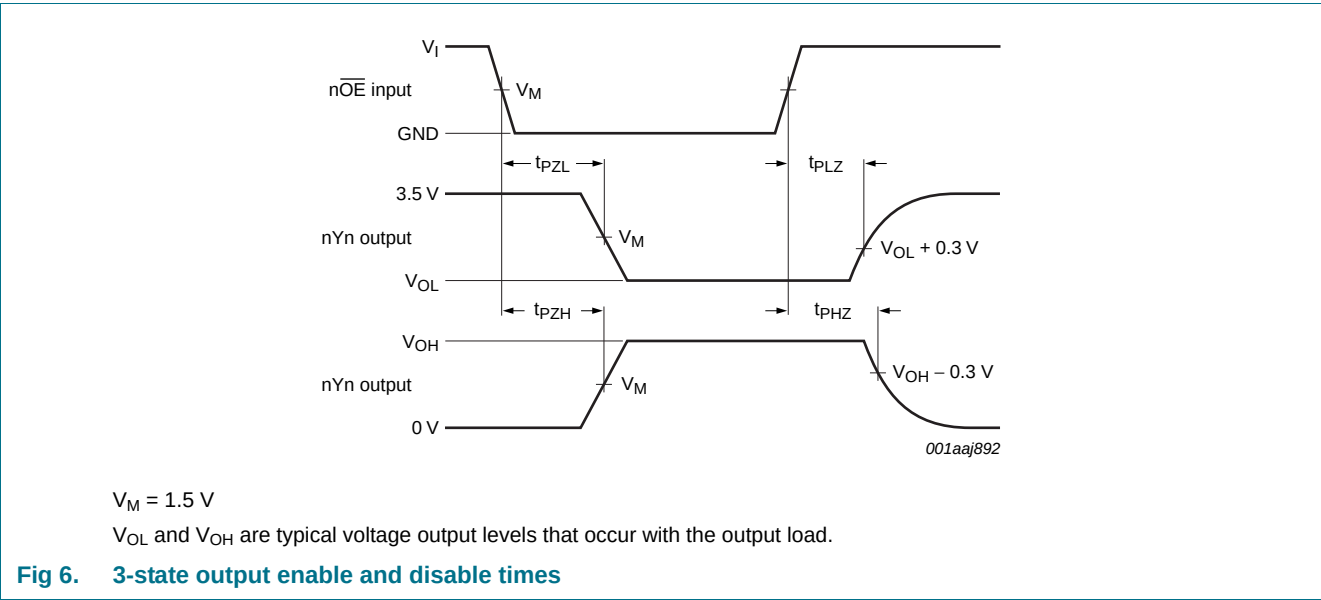
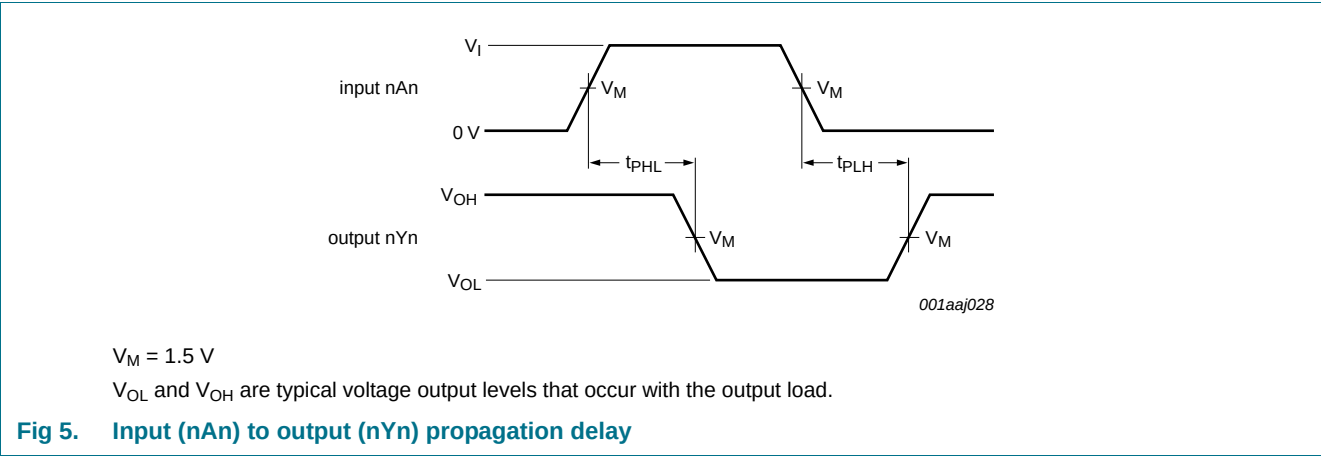
[4] This data sheet limit may vary among suppliers.

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**  
*GND = 0 V. For test circuit, see [Figure 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 <a href="#">Figure 5</a>              | 1.0                            | 1.8 | 2.4 | 1.0                                                           | 2.7 | ns   |
| $t_{PHL}$ | HIGH to LOW propagation delay       | nAn to nYn; see <a href="#">Figure 5</a>              | 1.6                            | 3.2 | 4.0 | 1.6                                                           | 4.4 |      |
| $t_{PZH}$ | OFF-state to HIGH propagation delay | $\overline{nOE}$ to nYn; see <a href="#">Figure 6</a> | 1.2                            | 2.7 | 3.5 | 1.2                                                           | 4.3 | ns   |
| $t_{PZL}$ | OFF-state to LOW propagation delay  | $\overline{nOE}$ to nYn; see <a href="#">Figure 6</a> | 2.6                            | 5.0 | 6.2 | 2.6                                                           | 7.3 | ns   |
| $t_{PHZ}$ | HIGH to OFF-state propagation delay | $\overline{nOE}$ to nYn; see <a href="#">Figure 6</a> | 1.5                            | 3.0 | 3.8 | 1.5                                                           | 4.5 | ns   |
| $t_{PLZ}$ | LOW to OFF-state propagation delay  | $\overline{nOE}$ to nYn; see <a href="#">Figure 6</a> | 1.3                            | 2.6 | 3.3 | 1.3                                                           | 4.6 | ns   |

11. Waveforms





12. Test information

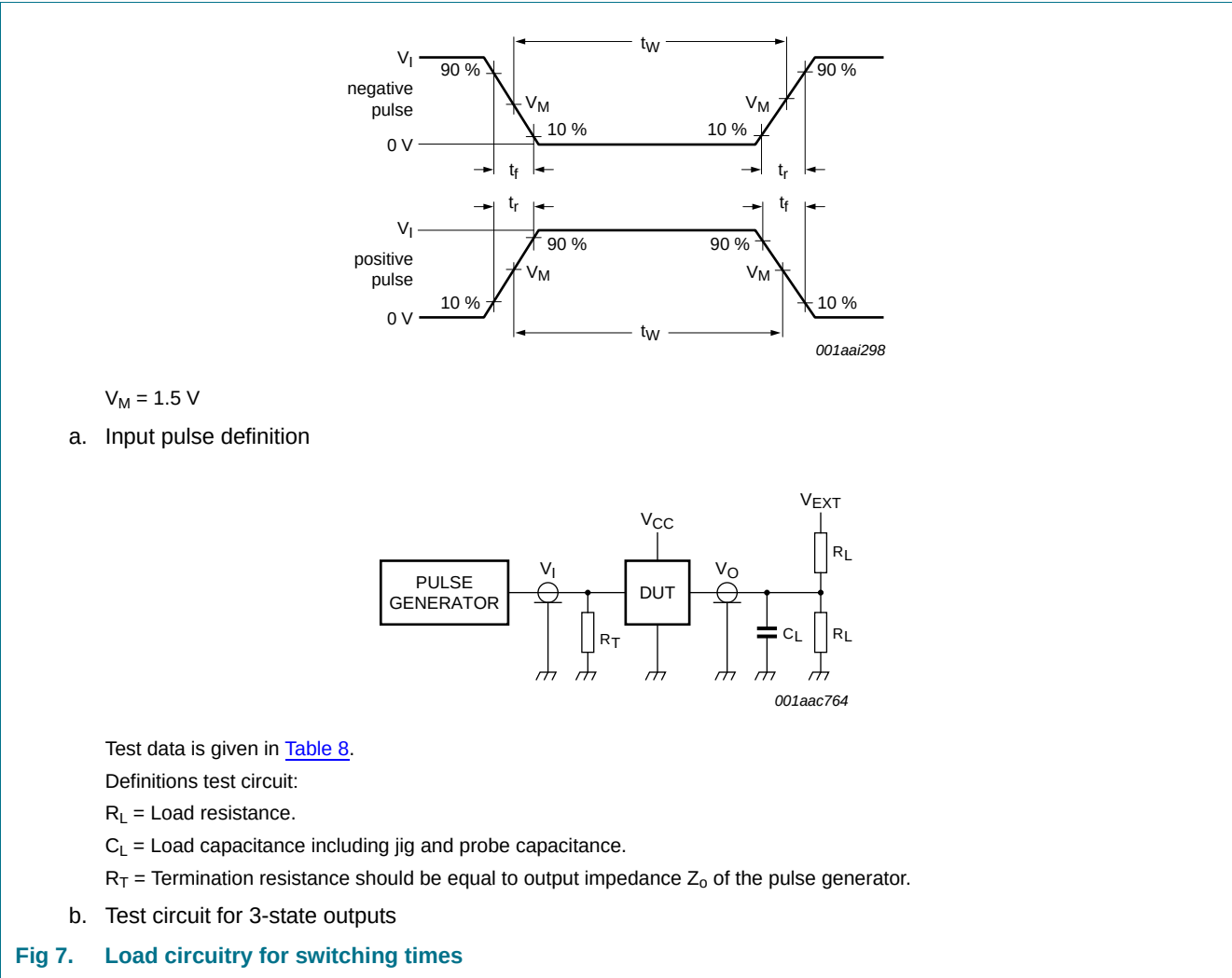


Fig 7. Load circuitry for switching times

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               |

13. Package outline

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1 mm SOT362-1

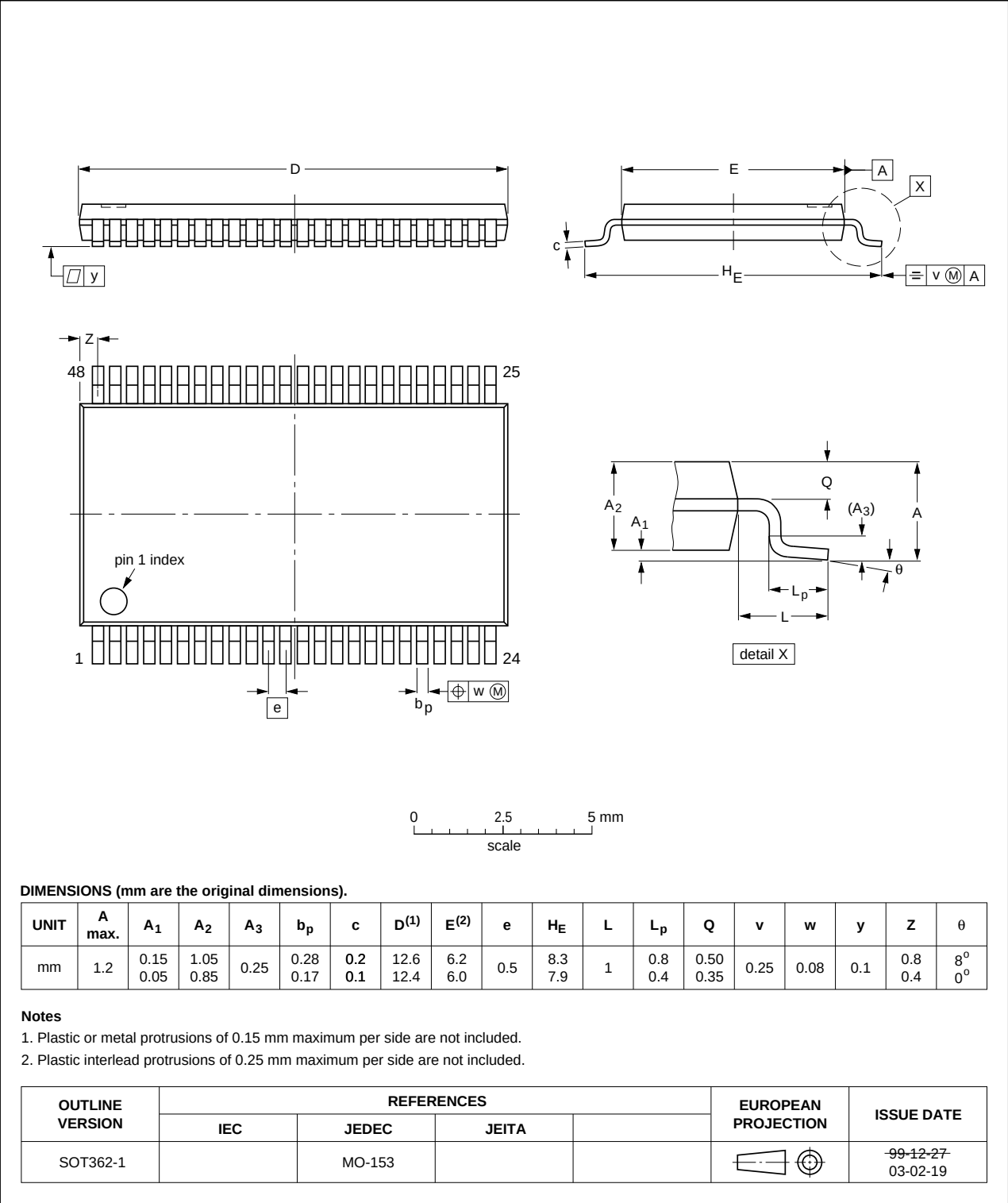


Fig 8. Package outline SOT362-1 (TSSOP48)

SSOP48: plastic shrink small outline package; 48 leads; body width 7.5 mm

SOT370-1

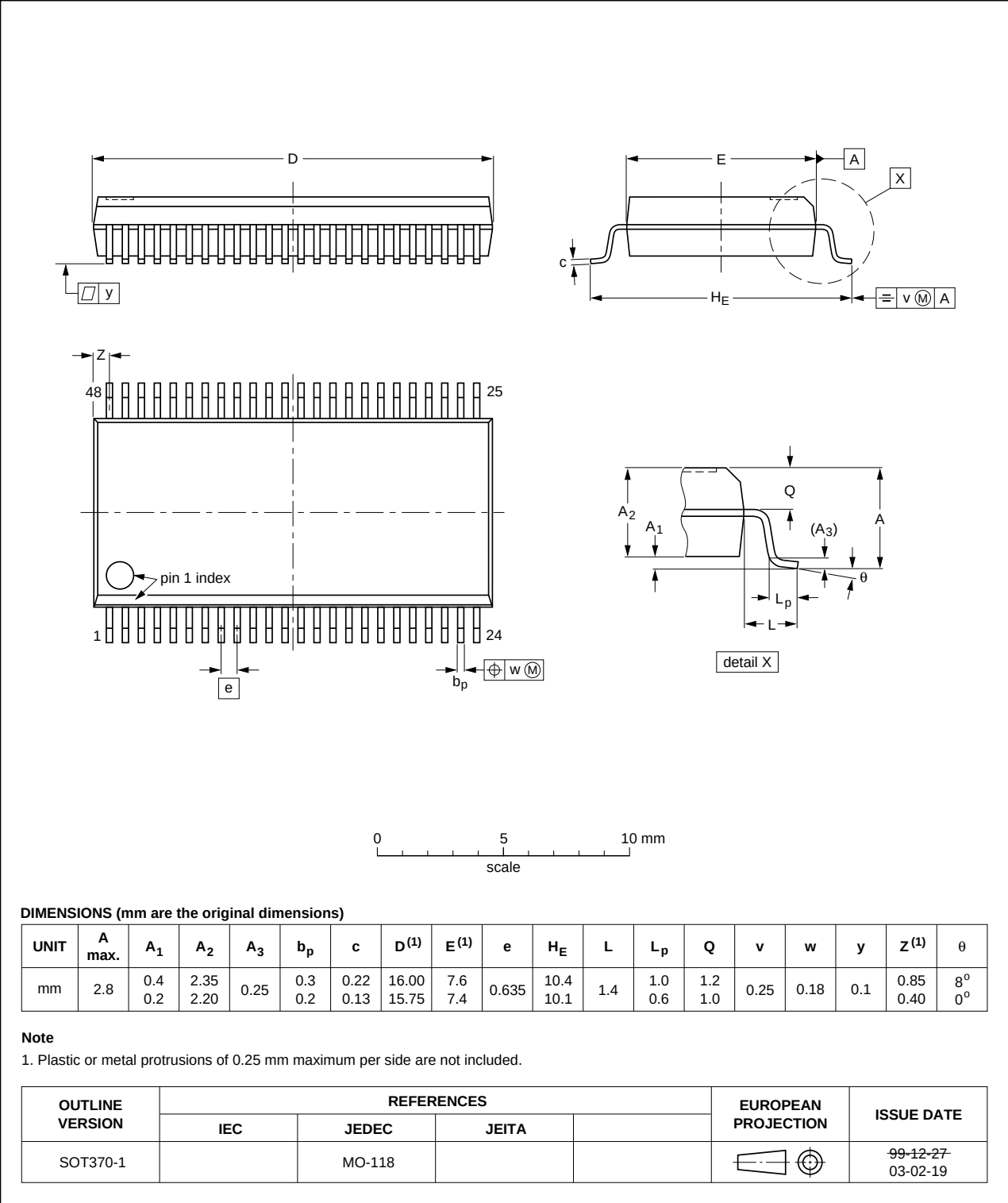


Fig 9. Package outline SOT370-1 (SSOP48)

## 14. Abbreviations

Table 9. Abbreviations

| Acronym | Description             |
|---------|-------------------------|
| CDM     | Charged Device Model    |
| ESD     | ElectroStatic Discharge |
| HBM     | Human Body Model        |

## 15. Revision history

Table 10. Revision history

| Document ID       | Release date          | Data sheet status     | Change notice | Supersedes        |
|-------------------|-----------------------|-----------------------|---------------|-------------------|
| 74ABT162244 v.6   | 20111103              | Product data sheet    | -             | 74ABT162244 v.5   |
| Modifications:    | • Legal pages updated |                       |               |                   |
| 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 | -             | -                 |

## 16. Legal information

### 16.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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.                       |
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[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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