

# 74LVT126

3.3 V quad buffer; 3-state

Rev. 7 — 18 April 2024

Product data sheet

## 1. General description

The 74LVT126 is a quad buffer/line driver with 3-state outputs controlled by the output enable inputs (nOE). A LOW on nOE causes the outputs to assume a high impedance OFF-state. Bus hold data inputs eliminate the need for external pull-up resistors to define unused inputs. 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

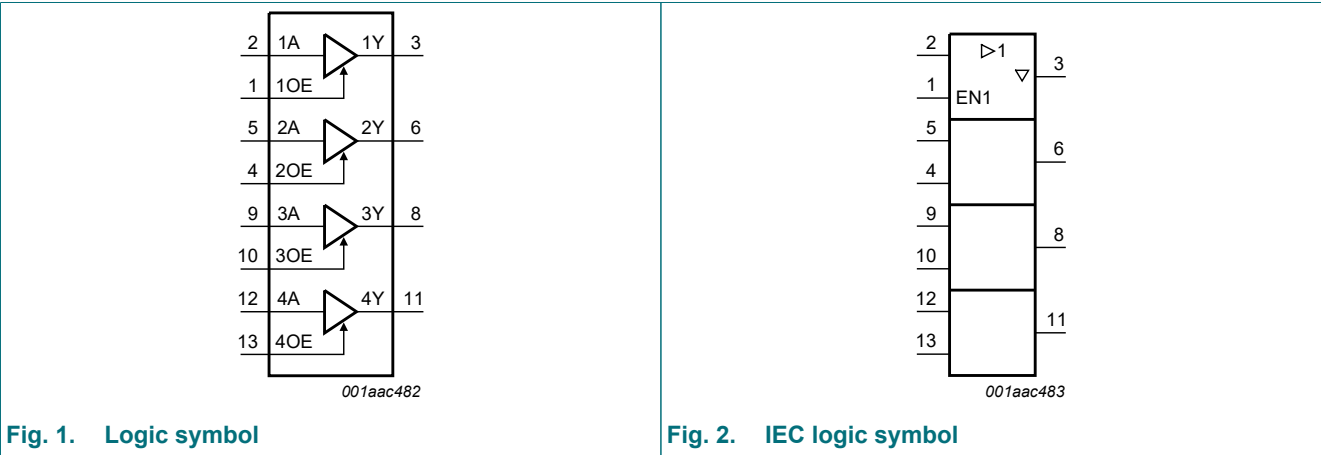
- Quad bus interface
- 3-state buffers
- Wide supply voltage range from 2.7 to 3.6 V
- Overvoltage tolerant inputs to 5.5 V
- BiCMOS high speed and output drive
- Output capability: +64 mA and -32 mA
- Direct interface with TTL levels
- Input and output interface capability to systems at 5 V supply
- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs
- Live insertion and extraction permitted
- No bus current loading when output is tied to 5 V bus
- Power-up 3-state
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 500 mA per JESD 78 Class II Level B
- Complies with JEDEC standard JESD8C (2.7 V to 3.6 V)
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +85 °C

## 3. Ordering information

Table 1. Ordering information

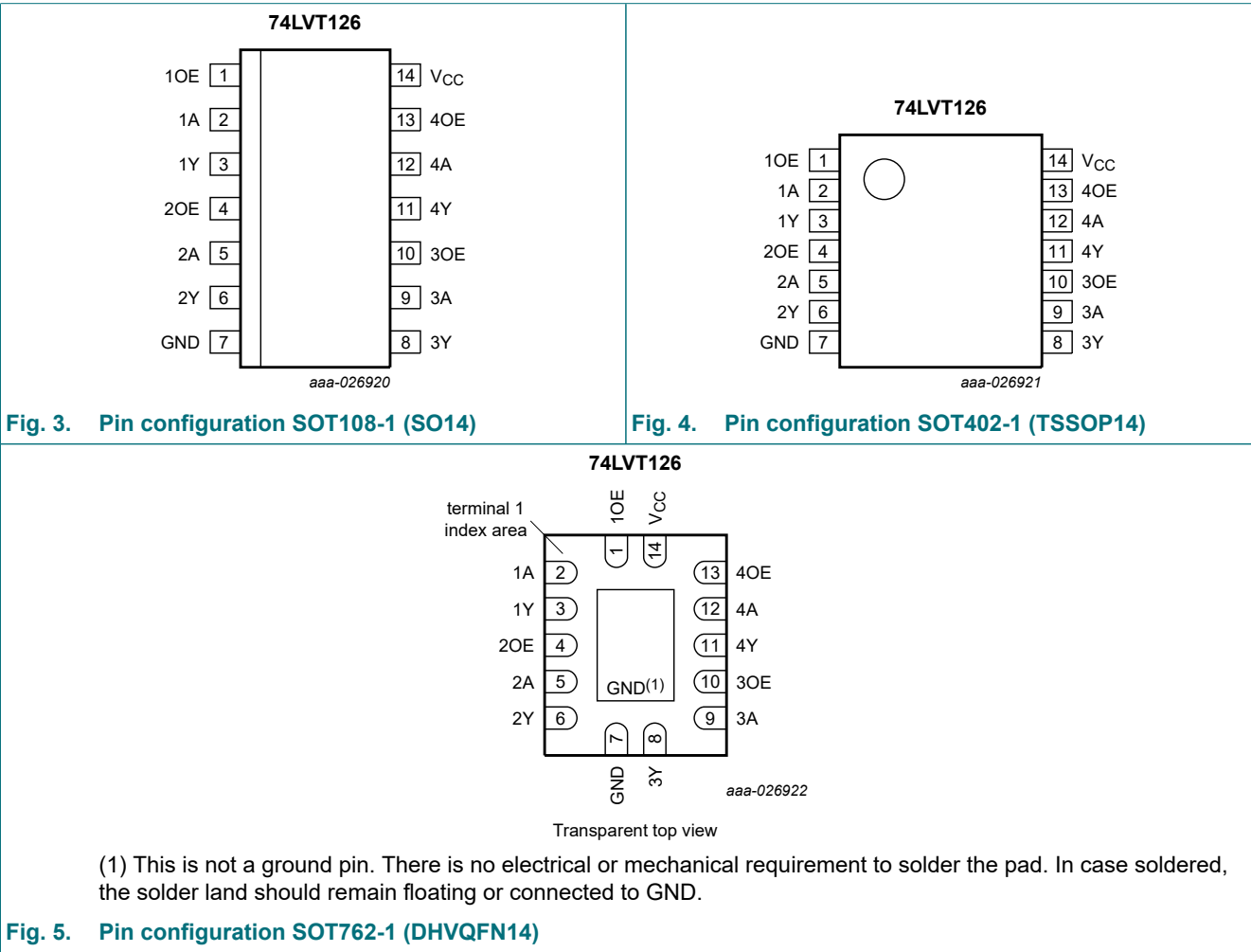
| Type number                | Package           |          |                                                                                                                              |                          |
|----------------------------|-------------------|----------|------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                            | Temperature range | Name     | Description                                                                                                                  | Version                  |
| <a href="#">74LVT126D</a>  | -40 °C to +85 °C  | SO14     | plastic small outline package; 14 leads; body width 3.9 mm                                                                   | <a href="#">SOT108-1</a> |
| <a href="#">74LVT126PW</a> | -40 °C to +85 °C  | TSSOP14  | plastic thin shrink small outline package; 14 leads; body width 4.4 mm                                                       | <a href="#">SOT402-1</a> |
| <a href="#">74LVT126BQ</a> | -40 °C to +85 °C  | DHVQFN14 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 × 3 × 0.85 mm | <a href="#">SOT762-1</a> |

4. Functional diagram



5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

| Symbol             | Pin          | Description          |
|--------------------|--------------|----------------------|
| 1OE, 2OE, 3OE, 4OE | 1, 4, 10, 13 | output enable inputs |
| 1A, 2A, 3A, 4A     | 2, 5, 9, 12  | data inputs          |
| 1Y, 2Y, 3Y, 4Y     | 3, 6, 8, 11  | data outputs         |
| GND                | 7            | ground (0 V)         |
| V <sub>CC</sub>    | 14           | supply voltage       |

6. Functional description

Table 3. Function table

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

| Input |    | Output |
|-------|----|--------|
| nOE   | nA | nY     |
| H     | L  | L      |
| H     | H  | H      |
| L     | X  | Z      |

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

| Symbol           | Parameter               | Conditions                            | Min  | Max  | Unit |
|------------------|-------------------------|---------------------------------------|------|------|------|
| V <sub>CC</sub>  | supply voltage          |                                       | -0.5 | +4.6 | V    |
| V <sub>I</sub>   | input voltage           | [1]                                   | -0.5 | +7.0 | V    |
| V <sub>O</sub>   | output voltage          | output in OFF-state or HIGH-state [1] | -0.5 | +7.0 | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < 0 V                  | -50  | -    | 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>stg</sub> | storage temperature     |                                       | -65  | +150 | °C   |
| T <sub>j</sub>   | junction temperature    | [2]                                   | -    | 150  | °C   |

- [1] The input and output negative voltage ratings may be exceeded if the input and output clamp 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

| Symbol           | Parameter                           | Conditions                           | Min | Typ | Max | Unit |
|------------------|-------------------------------------|--------------------------------------|-----|-----|-----|------|
| V <sub>CC</sub>  | supply voltage                      |                                      | 2.7 | -   | 3.6 | V    |
| V <sub>I</sub>   | input voltage                       |                                      | 0   | -   | 5.5 | V    |
| I <sub>OH</sub>  | HIGH-level output current           |                                      | -32 | -   | -   | mA   |
| I <sub>OL</sub>  | LOW-level output current            | none                                 | -   | -   | 32  | mA   |
|                  |                                     | current duty cycle ≤ 50 %; f ≥ 1 kHz | -   | -   | 64  | mA   |
| T <sub>amb</sub> | ambient temperature                 | in free air                          | -40 | -   | +85 | °C   |
| Δt/ΔV            | input transition rise and fall rate | outputs enabled                      | -   | -   | 10  | ns/V |

9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol                | Parameter                          | Conditions                                                                                                                          | Min                   | Typ[1]                | Max  | Unit |
|-----------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|------|------|
| V <sub>IK</sub>       | input clamping voltage             | V <sub>CC</sub> = 2.7 V; I <sub>IK</sub> = -18 mA                                                                                   | -1.2                  | -0.9                  | -    | V    |
| V <sub>IH</sub>       | HIGH-level input voltage           |                                                                                                                                     | 2.0                   | -                     | -    | V    |
| V <sub>IL</sub>       | LOW-level input voltage            |                                                                                                                                     | -                     | -                     | 0.8  | V    |
| V <sub>OH</sub>       | HIGH-level output voltage          | V <sub>CC</sub> = 2.7 V to 3.6 V; I <sub>OH</sub> = -100 μA                                                                         | V <sub>CC</sub> - 0.2 | V <sub>CC</sub> - 0.1 | -    | V    |
|                       |                                    | V <sub>CC</sub> = 2.7 V; I <sub>OH</sub> = -8 mA                                                                                    | 2.4                   | 2.5                   | -    | V    |
|                       |                                    | V <sub>CC</sub> = 3.0 V; I <sub>OH</sub> = -32 mA                                                                                   | 2.0                   | 2.2                   | -    | V    |
| V <sub>OL</sub>       | LOW-level output voltage           | V <sub>CC</sub> = 2.7 V; I <sub>OL</sub> = 100 μA                                                                                   | -                     | 0.1                   | 0.2  | V    |
|                       |                                    | V <sub>CC</sub> = 2.7 V; I <sub>OL</sub> = 24 mA                                                                                    | -                     | 0.3                   | 0.5  | V    |
|                       |                                    | V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 16 mA                                                                                    | -                     | 0.25                  | 0.4  | V    |
|                       |                                    | V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 32 mA                                                                                    | -                     | 0.3                   | 0.5  | V    |
|                       |                                    | V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 64 mA                                                                                    | -                     | 0.4                   | 0.55 | V    |
| I <sub>I</sub>        | input leakage current              | all input pins                                                                                                                      |                       |                       |      |      |
|                       |                                    | V <sub>CC</sub> = 0 V or 3.6 V; V <sub>I</sub> = 5.5 V                                                                              | -                     | 1                     | 10   | μA   |
|                       |                                    | control pins                                                                                                                        |                       |                       |      |      |
|                       |                                    | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub> or GND                                                                    | -                     | ±0.1                  | ±1   | μA   |
|                       |                                    | data pins                                                                                                                           |                       |                       |      |      |
|                       |                                    | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub> [2]                                                                       | -                     | 0.1                   | 1    | μA   |
| I <sub>OFF</sub>      | power-off leakage current          | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = 0 V [2]                                                                                   | -                     | -1                    | -5   | μA   |
|                       |                                    | V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 0 V to 4.5 V                                                              | -                     | 1                     | ±100 | μA   |
|                       |                                    | V <sub>CC</sub> = 3 V; V <sub>I</sub> = 0.8 V                                                                                       | 75                    | 150                   | -    | μA   |
|                       |                                    | V <sub>CC</sub> = 3 V; V <sub>I</sub> = 2.0 V                                                                                       | -75                   | -150                  | -    | μA   |
|                       |                                    | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = 0 V to 3.6 V [3]                                                                          | 500                   | -                     | -    | μA   |
|                       |                                    | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = 0 V to 3.6 V [3]                                                                          | -                     | -                     | -500 | μA   |
| I <sub>EX</sub>       | external current                   | output in HIGH-state when V <sub>O</sub> > V <sub>CC</sub> ; V <sub>O</sub> = 5.5 V; V <sub>CC</sub> = 3.0 V                        | -                     | 60                    | 125  | μA   |
| I <sub>O(pu/pd)</sub> | power-up/power-down output current | V <sub>CC</sub> ≤ 1.2 V; V <sub>O</sub> = 0.5 V to V <sub>CC</sub> ; V <sub>I</sub> = GND or V <sub>CC</sub> ; nOE = don't care [4] | -                     | ±1                    | ±100 | μA   |

| Symbol           | Parameter                 | Conditions                                                                                                                               | Min | Typ[1] | Max  | Unit |
|------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|------|------|
| I <sub>OZ</sub>  | OFF-state output current  | V <sub>CC</sub> = 3.6 V                                                                                                                  |     |        |      |      |
|                  |                           | output HIGH: V <sub>O</sub> = 3.0 V                                                                                                      | -   | 1      | 5    | μA   |
|                  |                           | output LOW: V <sub>O</sub> = 0.5 V                                                                                                       | -   | -1     | -5   | μA   |
| I <sub>CC</sub>  | supply current            | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A                                                  |     |        |      |      |
|                  |                           | outputs HIGH                                                                                                                             | -   | 0.13   | 0.19 | mA   |
|                  |                           | outputs LOW                                                                                                                              | -   | 2      | 7    | mA   |
|                  |                           | outputs disabled [5]                                                                                                                     | -   | 0.13   | 0.19 | mA   |
| ΔI <sub>CC</sub> | additional supply current | per input pin; V <sub>CC</sub> = 3 V to 3.6 V;<br>one input at V <sub>CC</sub> - 0.6 V and<br>other inputs at V <sub>CC</sub> or GND [6] | -   | 0.1    | 0.2  | mA   |
| C <sub>I</sub>   | input capacitance         | V <sub>I</sub> = 0 V or V <sub>CC</sub>                                                                                                  | -   | 4      | -    | pF   |
| C <sub>O</sub>   | output capacitance        | outputs disabled; V <sub>O</sub> = 0 V or 3.0 V                                                                                          | -   | 8      | -    | pF   |

- [1] Typical values are measured at nominal V<sub>CC</sub> and T<sub>amb</sub> = 25 °C.
- [2] Unused pins at V<sub>CC</sub> or GND.
- [3] This is the bus hold overdrive current required to force the input to the opposite logic state.
- [4] This parameter is valid for any V<sub>CC</sub> between 0 V and 1.2 V with a transition time of up to 10 ms.  
From V<sub>CC</sub> = 1.2 V to V<sub>CC</sub> = 3.3 V ± 0.3 V a transition time of 100 μs is permitted. This parameter is valid for T<sub>amb</sub> = 25 °C only.
- [5] Measured with outputs pulled up to V<sub>CC</sub> or GND.
- [6] This is the increase in supply current for each input at the specified voltage level other than V<sub>CC</sub> or GND.

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit see Fig. 8.

| Symbol           | Parameter                           | Conditions                      | T <sub>amb</sub> = -40 °C to +85 °C |        |     | Unit |
|------------------|-------------------------------------|---------------------------------|-------------------------------------|--------|-----|------|
|                  |                                     |                                 | Min                                 | Typ[1] | Max |      |
| t <sub>PLH</sub> | LOW to HIGH propagation delay       | nA to nY; see Fig. 6            |                                     |        |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V         | -                                   | -      | 4.5 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.3 V ± 0.3 V | 1.0                                 | 2.3    | 3.8 | ns   |
| t <sub>PHL</sub> | HIGH to LOW propagation delay       | nA to nY; see Fig. 6            |                                     |        |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V         | -                                   | -      | 4.4 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.3 V ± 0.3 V | 1.0                                 | 2.4    | 3.9 | ns   |
| t <sub>PZH</sub> | OFF-state to HIGH propagation delay | nOE to nY; see Fig. 7           |                                     |        |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V         | -                                   | -      | 6.1 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.3 V ± 0.3 V | 1.0                                 | 3.6    | 5.4 | ns   |
| t <sub>PZL</sub> | OFF-state to LOW propagation delay  | nOE to nY; see Fig. 7           |                                     |        |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V         | -                                   | -      | 5.8 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.3 V ± 0.3 V | 1.1                                 | 3.6    | 5.2 | ns   |
| t <sub>PHZ</sub> | HIGH to OFF-state propagation delay | nOE to nY; see Fig. 7           |                                     |        |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V         | -                                   | -      | 4.3 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.3 V ± 0.3 V | 1.0                                 | 2.2    | 3.8 | ns   |
| t <sub>PLZ</sub> | LOW to OFF-state propagation delay  | nOE to nY; see Fig. 7           |                                     |        |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V         | -                                   | -      | 6.1 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.3 V ± 0.3 V | 1.3                                 | 3.6    | 5.5 | ns   |

- [1] Typical values are measured at V<sub>CC</sub> = 3.3 V and T<sub>amb</sub> = 25 °C.

10.1. Waveforms and test circuit

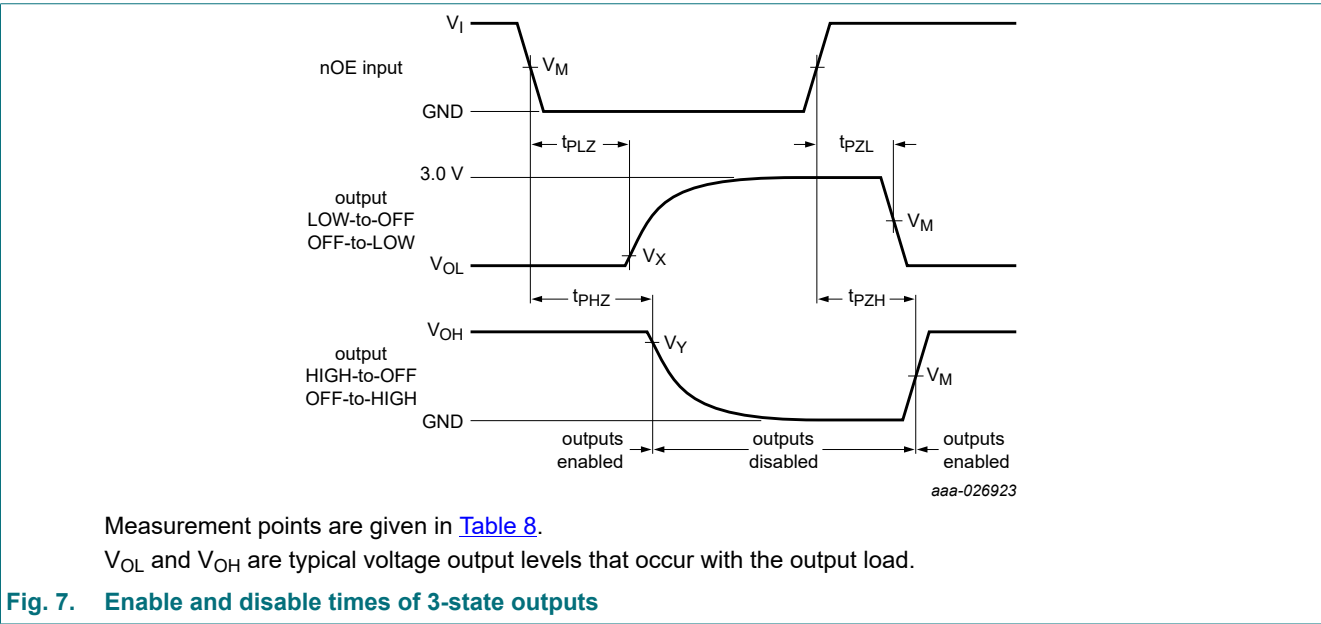
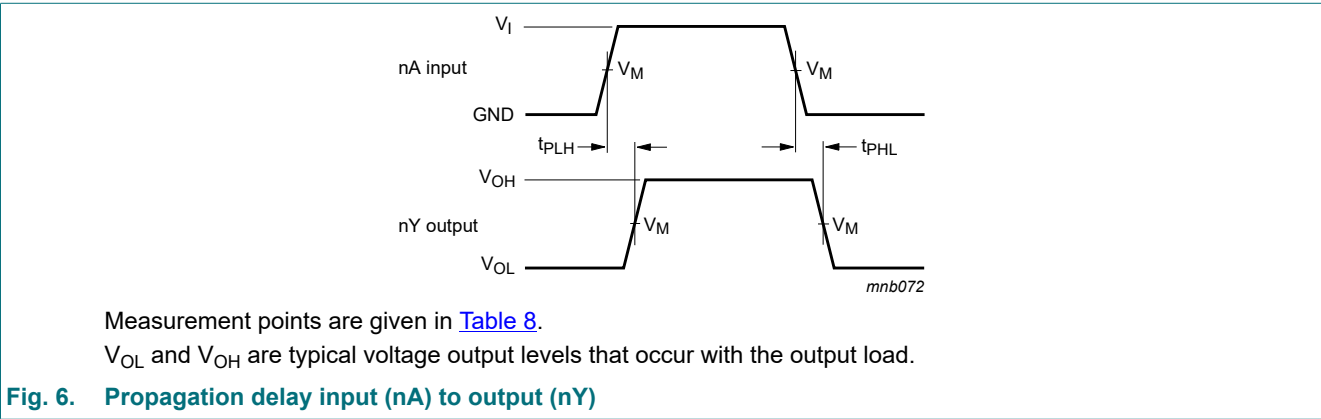


Table 8. Measurement points

| Input | Output |                          |                          |
|-------|--------|--------------------------|--------------------------|
| $V_M$ | $V_M$  | $V_X$                    | $V_Y$                    |
| 1.5 V | 1.5 V  | $V_{OL} + 0.3 \text{ V}$ | $V_{OH} - 0.3 \text{ V}$ |

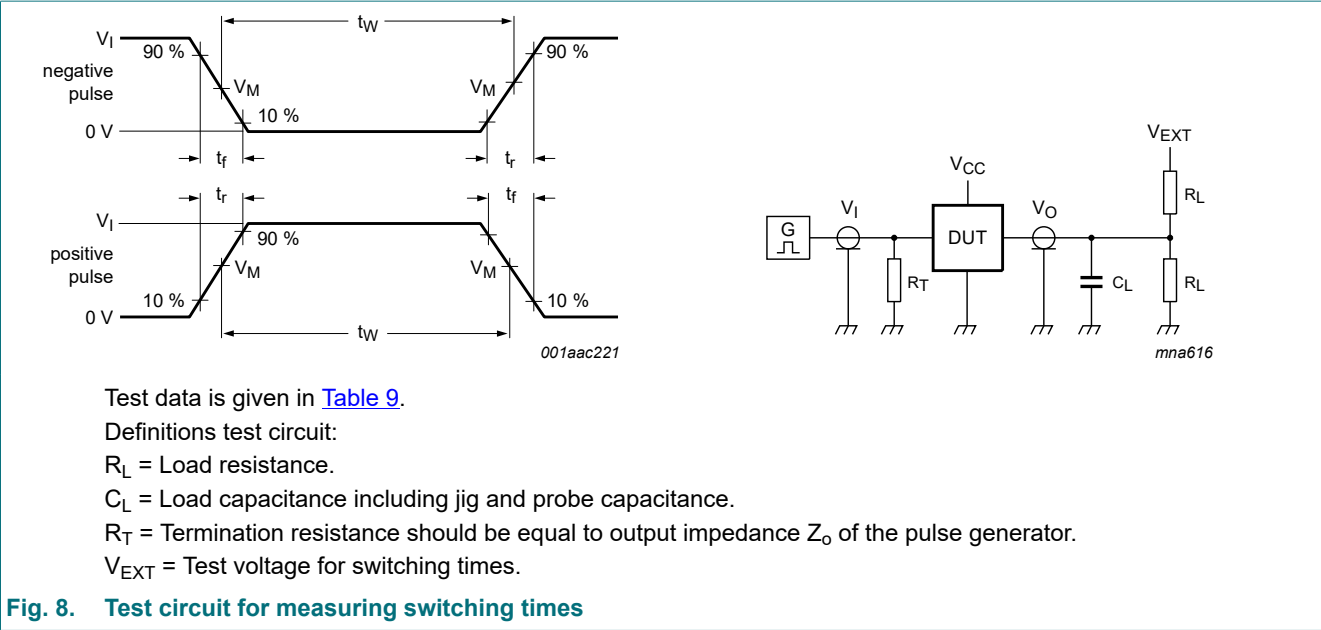


Table 9. Test data

| Input |               |        |               | Load  |              | $V_{EXT}$          |                    |                    |
|-------|---------------|--------|---------------|-------|--------------|--------------------|--------------------|--------------------|
| $V_I$ | $f_i$         | $t_W$  | $t_r, t_f$    | $C_L$ | $R_L$        | $t_{PHZ}, t_{PZH}$ | $t_{PLZ}, t_{PZL}$ | $t_{PLH}, t_{PHL}$ |
| 2.7 V | $\leq 10$ MHz | 500 ns | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | GND                | 6 V                | open               |

11. Package outline

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

SOT108-1

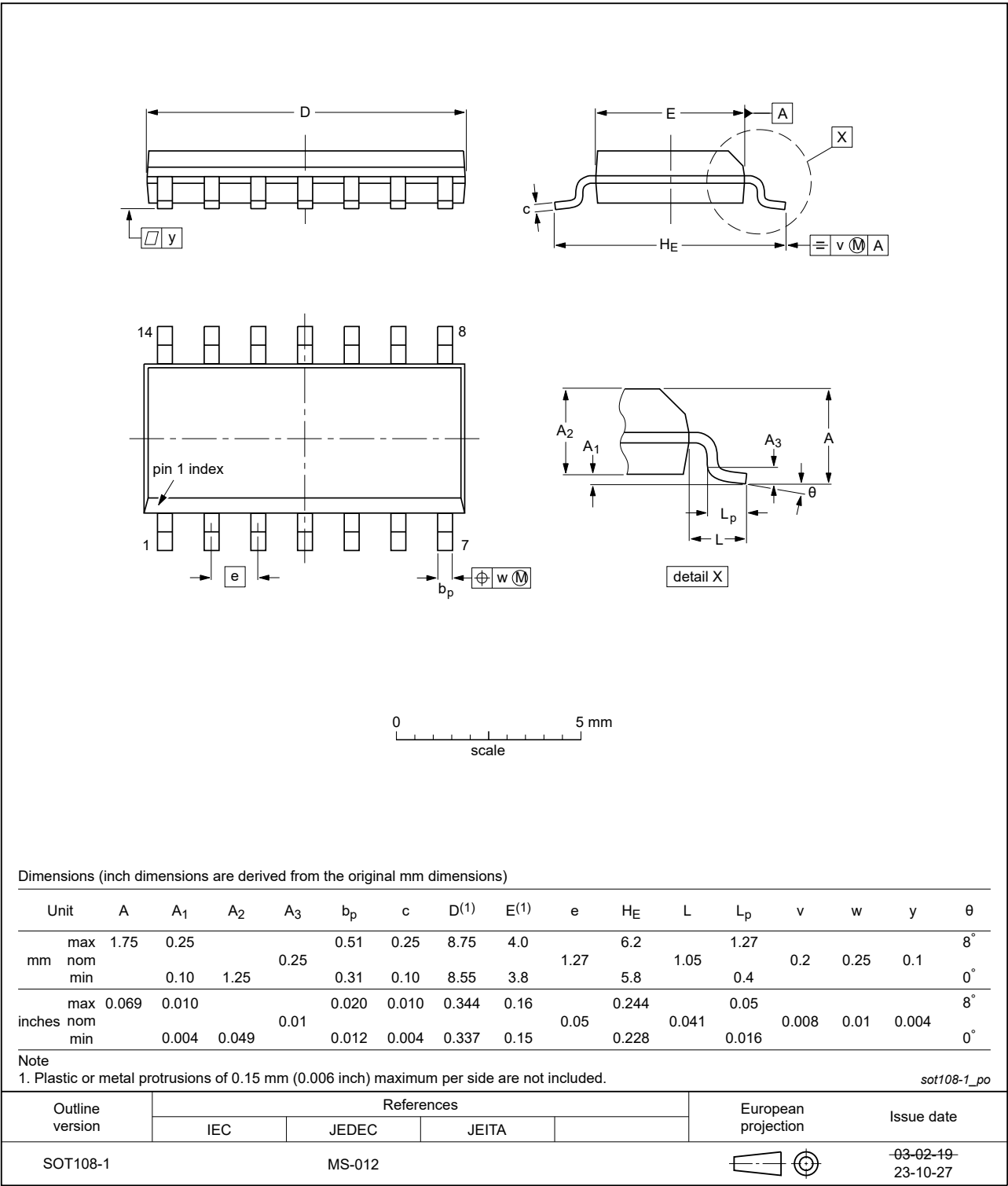


Fig. 9. Package outline SOT108-1 (SO14)



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

SOT402-1

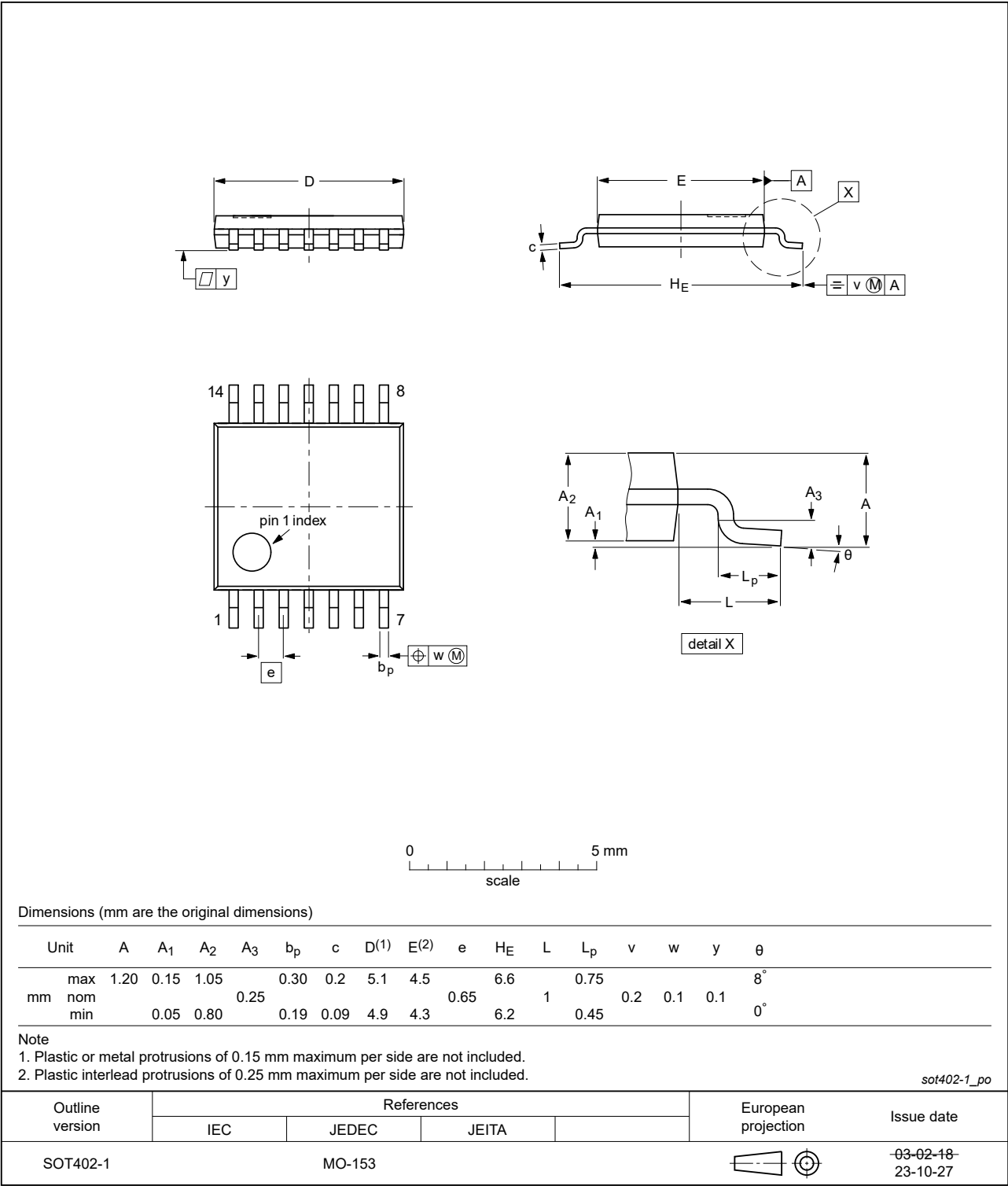


Fig. 10. Package outline SOT402-1 (TSSOP14)

DHVQFN14: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads;  
14 terminals; body 2.5 x 3 x 0.85 mm

SOT762-1

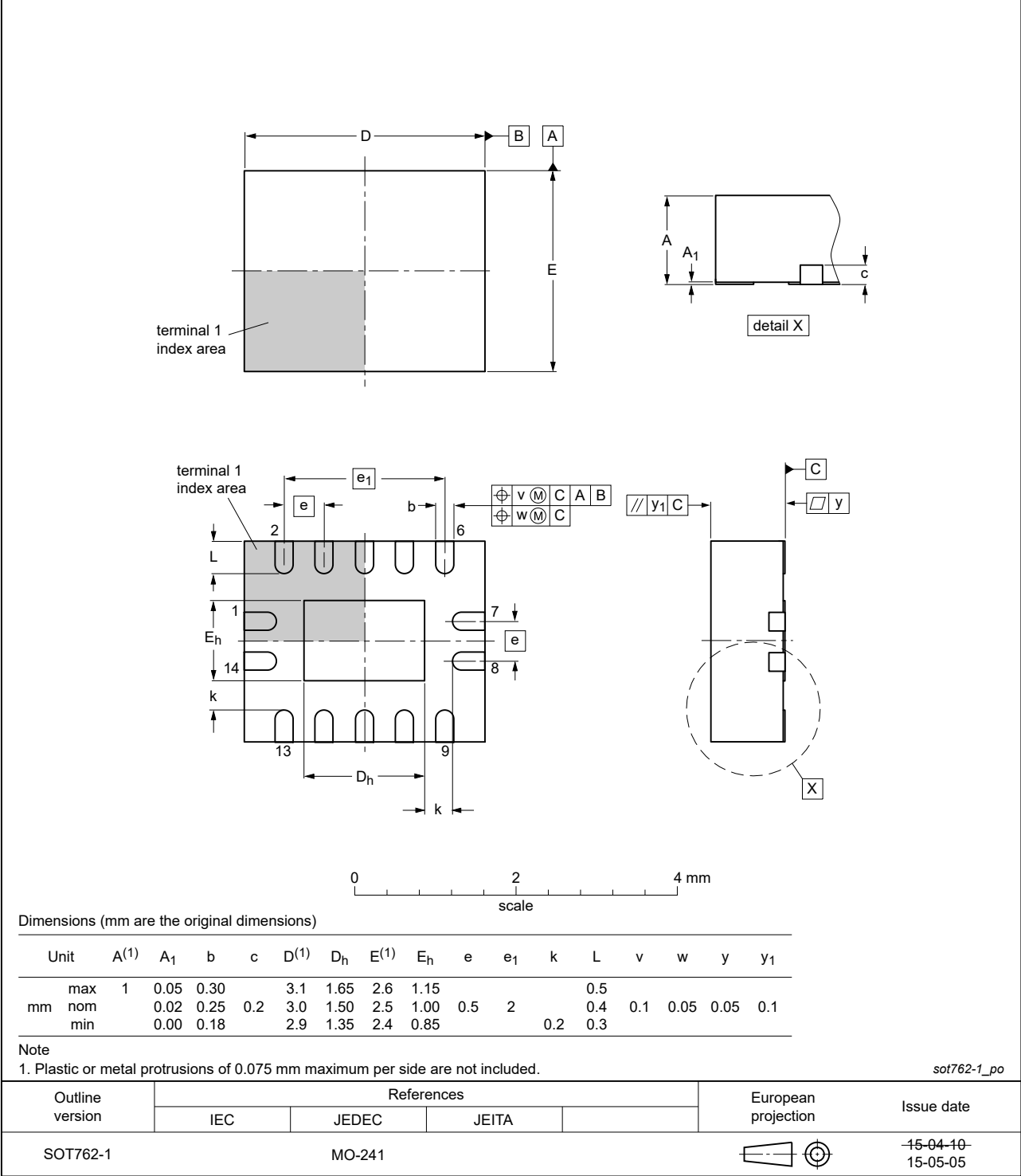


Fig. 11. Package outline SOT762-1 (DHVQFN14)

12. Abbreviations

Table 10. 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 11. Revision history

| Document ID    | Release date                                                                                                                                                                                                                                                                    | Data sheet status     | Change notice | Supersedes   |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|--------------|
| 74LVT126 v.7   | 20240418                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVT126 v.6 |
| Modifications: | <ul style="list-style-type: none"><li><a href="#">Fig. 9</a>, <a href="#">Fig. 10</a>: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153.</li><li><a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li></ul> |                       |               |              |
| 74LVT126 v.6   | 20210727                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVT126 v.5 |
| Modifications: | <ul style="list-style-type: none"><li>Type number 74LVT126DB (SOT337-1/SSOP14) removed.</li><li><a href="#">Section 1</a> and <a href="#">Section 2</a> updated.</li></ul>                                                                                                      |                       |               |              |
| 74LVT126 v.5   | 20170614                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVT126 v.4 |
| 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></ul>                                          |                       |               |              |
| 74LVT126 v.4   | 20050211                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVT126 v.3 |
| Modifications: | <ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.</li><li><a href="#">Fig. 5</a>: added note 1.</li></ul>                                         |                       |               |              |
| 74LVT126 v.3   | 20040624                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVT126 v.2 |
| 74LVT126 v.2   | 19980219                                                                                                                                                                                                                                                                        | Product specification | -             | 74LVT126 v.1 |
| 74LVT126 v.1   | 19951221                                                                                                                                                                                                                                                                        | -                     | -             | -            |

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".
- [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 <https://www.nexperia.com>.

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