

# 74VHC125; 74VHCT125

Quad buffer/line driver; 3-state

Rev. 02 — 13 October 2009

Product data sheet

## 1. General description

The 74VHC125; 74VHCT125 are high-speed Si-gate CMOS devices and are pin compatible with Low-power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard JESD7-A.

The 74VHC125; 74VHCT125 provides four non-inverting buffer/line drivers with 3-state outputs. The 3-state outputs (nY) are controlled by the output enable input (nOE). A HIGH at nOE causes the outputs to assume a high-impedance OFF-state.

The 74VHC125; 74VHCT125 are identical to the 74VHC126; 74VHCT126 but have active LOW enable inputs.

## 2. Features

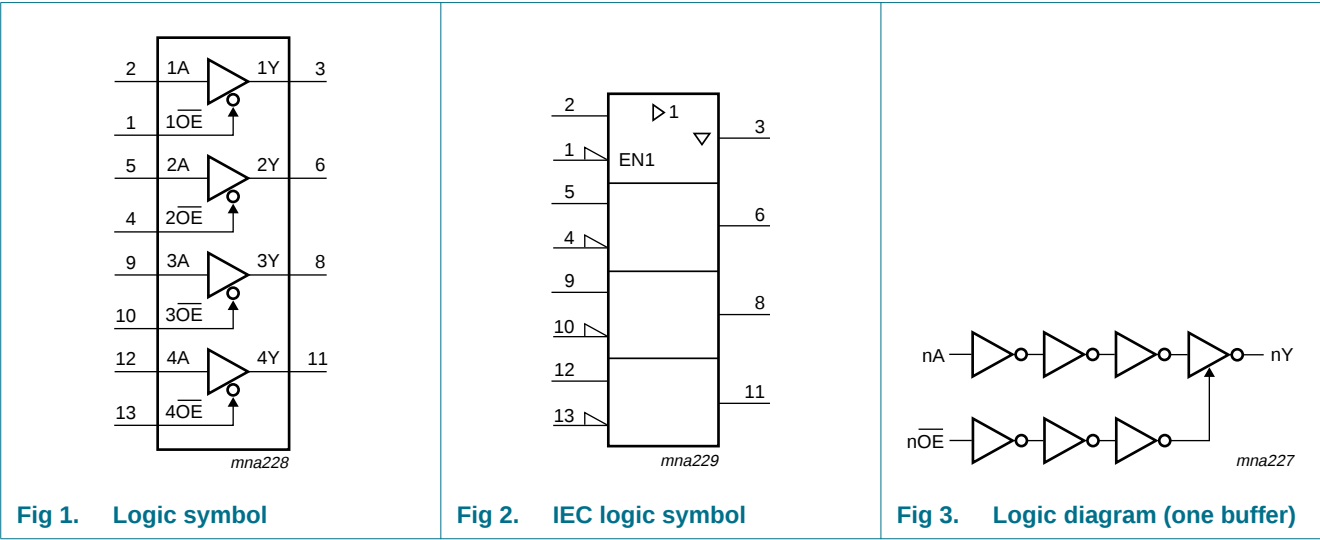
- Balanced propagation delays
- All inputs have a Schmitt-trigger action
- Inputs accepts voltages higher than  $V_{CC}$
- Input levels:
  - ◆ The 74VHC125 operates with CMOS logic levels
  - ◆ The 74VHCT125 operates with TTL logic levels
- ESD protection:
  - ◆ HBM JESD22-A114E exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101C exceeds 1000 V
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

## 3. Ordering information

Table 1. Ordering information

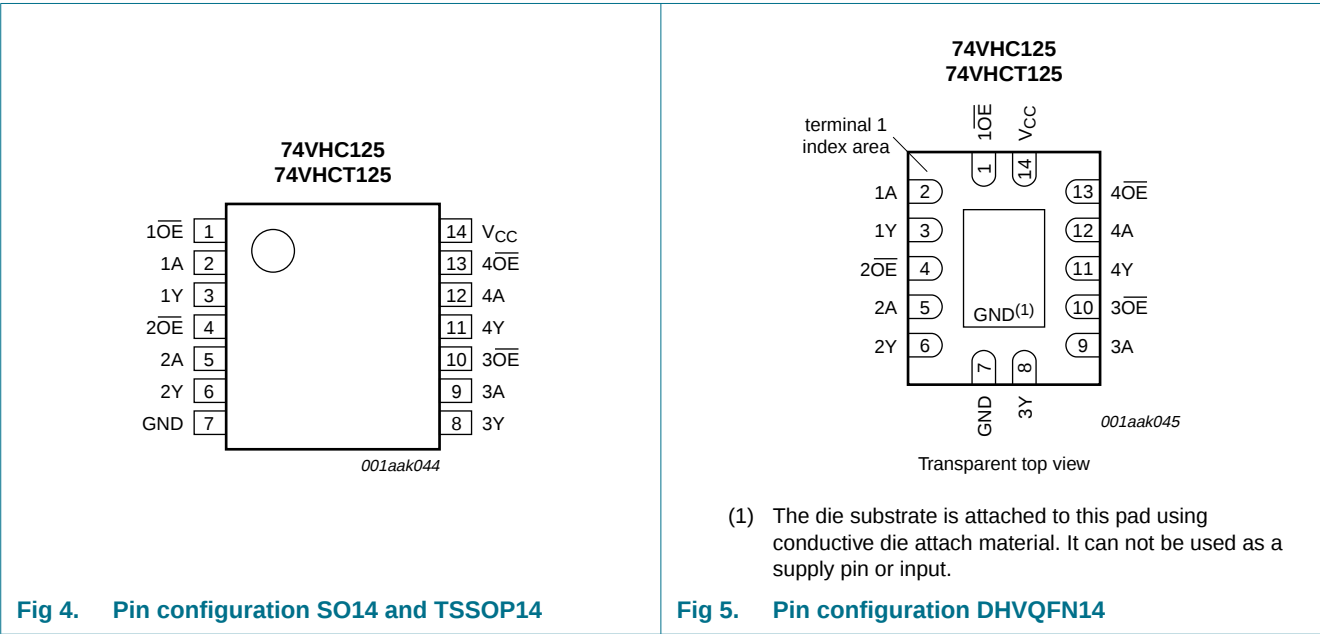
| Type number               | Package                                                         |          |                                                                                                                                                |          |
|---------------------------|-----------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|                           | Temperature range                                               | Name     | Description                                                                                                                                    | Version  |
| 74VHC125D<br>74VHCT125D   | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SO14     | plastic small outline package; 14 leads;<br>body width 3.9 mm                                                                                  | SOT108-1 |
| 74VHC125PW<br>74VHCT125PW | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | TSSOP14  | plastic thin shrink small outline package; 14 leads;<br>body width 4.4 mm                                                                      | SOT402-1 |
| 74VHC125BQ<br>74VHCT125BQ | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | DHVQFN14 | plastic dual in-line compatible thermal enhanced very<br>thin quad flat package; no leads; 14 terminals;<br>body $2.5 \times 3 \times 0.85$ mm | SOT762-1 |

4. Functional diagram



5. Pinning information

5.1 Pinning



## 5.2 Pin description

**Table 2.** Pin description

| Symbol                                                                    | Pin          | Description                      |
|---------------------------------------------------------------------------|--------------|----------------------------------|
| $1\overline{OE}$ , $2\overline{OE}$ , $3\overline{OE}$ , $4\overline{OE}$ | 1, 4, 10, 13 | output enable input (active LOW) |
| 1A, 2A, 3A, 4A                                                            | 2, 5, 9, 12  | 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<sup>[1]</sup>

| Control          | Input | Output |
|------------------|-------|--------|
| $\overline{nOE}$ | nA    | nY     |
| 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). Voltages are referenced to GND (ground = 0 V).

| Symbol    | Parameter               | Conditions                               | Min                | Max  | Unit |
|-----------|-------------------------|------------------------------------------|--------------------|------|------|
| $V_{CC}$  | supply voltage          |                                          | -0.5               | +7.0 | V    |
| $V_I$     | input voltage           |                                          | -0.5               | +7.0 | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5$ V                           | <sup>[1]</sup> -20 | -    | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V | <sup>[1]</sup> -   | ±20  | mA   |
| $I_O$     | output current          | $V_O = -0.5$ V to $(V_{CC} + 0.5$ V)     | -                  | ±25  | mA   |
| $I_{CC}$  | supply current          |                                          | -                  | 75   | mA   |
| $I_{GND}$ | ground current          |                                          | -75                | -    | mA   |
| $T_{stg}$ | storage temperature     |                                          | -65                | +150 | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40$ °C to +125 °C            |                    |      |      |
|           | SO14 package            |                                          | <sup>[2]</sup> -   | 500  | mW   |
|           | TSSOP14 package         |                                          | <sup>[3]</sup> -   | 500  | mW   |
|           | DHVQFN14 package        |                                          | <sup>[4]</sup> -   | 500  | mW   |

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

[2]  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.

[3]  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

[4]  $P_{tot}$  derates linearly with 4.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

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

| Symbol              | Parameter                           | Conditions                      | 74VHC125 |     |                 | 74VHCT125 |     |                 | Unit |
|---------------------|-------------------------------------|---------------------------------|----------|-----|-----------------|-----------|-----|-----------------|------|
|                     |                                     |                                 | Min      | Typ | Max             | Min       | Typ | Max             |      |
| V <sub>CC</sub>     | supply voltage                      |                                 | 2.0      | 5.0 | 5.5             | 4.5       | 5.0 | 5.5             | V    |
| V <sub>I</sub>      | input voltage                       |                                 | 0        | -   | 5.5             | 0         | -   | 5.5             | V    |
| V <sub>O</sub>      | output voltage                      |                                 | 0        | -   | V <sub>CC</sub> | 0         | -   | V <sub>CC</sub> | V    |
| T <sub>amb</sub>    | ambient temperature                 |                                 | -40      | +25 | +125            | -40       | +25 | +125            | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | V <sub>CC</sub> = 3.3 V ± 0.3 V | -        | -   | 100             | -         | -   | -               | ns/V |
|                     |                                     | V <sub>CC</sub> = 5.0 V ± 0.5 V | -        | -   | 20              | -         | -   | 20              | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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

| Symbol | Parameter | Conditions | 25 °C |     |     | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|--------|-----------|------------|-------|-----|-----|------------------|-----|-------------------|-----|------|
|        |           |            | Min   | Typ | Max | Min              | Max | Min               | Max |      |

### For type 74VHC125

|                 |                           |                                                                                                                        |      |     |       |      |      |      |       |    |
|-----------------|---------------------------|------------------------------------------------------------------------------------------------------------------------|------|-----|-------|------|------|------|-------|----|
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                                                | 1.5  | -   | -     | 1.5  | -    | 1.5  | -     | V  |
|                 |                           | V <sub>CC</sub> = 3.0 V                                                                                                | 2.1  | -   | -     | 2.1  | -    | 2.1  | -     | V  |
|                 |                           | V <sub>CC</sub> = 5.5 V                                                                                                | 3.85 | -   | -     | 3.85 | -    | 3.85 | -     | V  |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                                                | -    | -   | 0.5   | -    | 0.5  | -    | 0.5   | V  |
|                 |                           | V <sub>CC</sub> = 3.0 V                                                                                                | -    | -   | 0.9   | -    | 0.9  | -    | 0.9   | V  |
|                 |                           | V <sub>CC</sub> = 5.5 V                                                                                                | -    | -   | 1.65  | -    | 1.65 | -    | 1.65  | V  |
| V <sub>OH</sub> | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                    |      |     |       |      |      |      |       |    |
|                 |                           | I <sub>O</sub> = -50 µA; V <sub>CC</sub> = 2.0 V                                                                       | 1.9  | 2.0 | -     | 1.9  | -    | 1.9  | -     | V  |
|                 |                           | I <sub>O</sub> = -50 µA; V <sub>CC</sub> = 3.0 V                                                                       | 2.9  | 3.0 | -     | 2.9  | -    | 2.9  | -     | V  |
|                 |                           | I <sub>O</sub> = -50 µA; V <sub>CC</sub> = 4.5 V                                                                       | 4.4  | 4.5 | -     | 4.4  | -    | 4.4  | -     | V  |
|                 |                           | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V                                                                      | 2.58 | -   | -     | 2.48 | -    | 2.40 | -     | V  |
| V <sub>OL</sub> | LOW-level output voltage  | I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V                                                                      | 3.94 | -   | -     | 3.8  | -    | 3.70 | -     | V  |
|                 |                           | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                    |      |     |       |      |      |      |       |    |
|                 |                           | I <sub>O</sub> = 50 µA; V <sub>CC</sub> = 2.0 V                                                                        | -    | 0   | 0.1   | -    | 0.1  | -    | 0.1   | V  |
|                 |                           | I <sub>O</sub> = 50 µA; V <sub>CC</sub> = 3.0 V                                                                        | -    | 0   | 0.1   | -    | 0.1  | -    | 0.1   | V  |
|                 |                           | I <sub>O</sub> = 50 µA; V <sub>CC</sub> = 4.5 V                                                                        | -    | 0   | 0.1   | -    | 0.1  | -    | 0.1   | V  |
| I <sub>OZ</sub> | OFF-state output current  | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V                                                                       | -    | -   | 0.36  | -    | 0.44 | -    | 0.55  | V  |
|                 |                           | I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V                                                                       | -    | -   | 0.36  | -    | 0.44 | -    | 0.55  | V  |
| I <sub>I</sub>  | input leakage current     | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V | -    | -   | ±0.25 | -    | ±2.5 | -    | ±10.0 | µA |
| I <sub>CC</sub> | supply current            | V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V                                                          | -    | -   | 0.1   | -    | 1.0  | -    | 2.0   | µA |
| I <sub>CC</sub> | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V                                 | -    | -   | 2.0   | -    | 20   | -    | 40    | µA |

**Table 6. Static characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V).

| Symbol                    | Parameter                 | Conditions                                                                                                                                                                                             | 25 °C |     |       | –40 °C to +85 °C |      | –40 °C to +125 °C |       | Unit |
|---------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----|-------|------------------|------|-------------------|-------|------|
|                           |                           |                                                                                                                                                                                                        | Min   | Typ | Max   | Min              | Max  | Min               | Max   |      |
| C <sub>I</sub>            | input capacitance         |                                                                                                                                                                                                        | -     | 3.0 | 10    | -                | 10   | -                 | 10    | pF   |
| C <sub>O</sub>            | output capacitance        |                                                                                                                                                                                                        | -     | 4.0 | -     | -                | -    | -                 | -     | pF   |
| <b>For type 74VHCT125</b> |                           |                                                                                                                                                                                                        |       |     |       |                  |      |                   |       |      |
| V <sub>IH</sub>           | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                                                                       | 2.0   | -   | -     | 2.0              | -    | 2.0               | -     | V    |
| V <sub>IL</sub>           | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                                                                                       | -     | -   | 0.8   | -                | 0.8  | -                 | 0.8   | V    |
| V <sub>OH</sub>           | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                                                                                                                          |       |     |       |                  |      |                   |       |      |
|                           |                           | I <sub>O</sub> = –50 µA                                                                                                                                                                                | 4.4   | 4.5 | -     | 4.4              | -    | 4.4               | -     | V    |
|                           |                           | I <sub>O</sub> = –8.0 mA                                                                                                                                                                               | 3.94  | -   | -     | 3.8              | -    | 3.70              | -     | V    |
| V <sub>OL</sub>           | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                                                                                                                          |       |     |       |                  |      |                   |       |      |
|                           |                           | I <sub>O</sub> = 50 µA                                                                                                                                                                                 | -     | 0   | 0.1   | -                | 0.1  | -                 | 0.1   | V    |
|                           |                           | I <sub>O</sub> = 8.0 mA                                                                                                                                                                                | -     | -   | 0.36  | -                | 0.44 | -                 | 0.55  | V    |
| I <sub>OZ</sub>           | OFF-state output current  | per input pin; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 5.5 V; I <sub>O</sub> = 0 A<br>V <sub>O</sub> = V <sub>CC</sub> or GND;<br>other pins at V <sub>CC</sub> or GND | -     | -   | ±0.25 | -                | ±2.5 | -                 | ±10.0 | µA   |
| I <sub>I</sub>            | input leakage current     | V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V                                                                                                                                          | -     | -   | 0.1   | -                | 1.0  | -                 | 2.0   | µA   |
| I <sub>CC</sub>           | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V                                                                                                                 | -     | -   | 2.0   | -                | 20   | -                 | 40    | µA   |
| ΔI <sub>CC</sub>          | additional supply current | per input pin; V <sub>I</sub> = V <sub>CC</sub> – 2.1 V; I <sub>O</sub> = 0 A; other pins at V <sub>CC</sub> or GND; V <sub>CC</sub> = 4.5 V to 5.5 V                                                  | -     | -   | 1.35  | -                | 1.5  | -                 | 1.5   | mA   |
| C <sub>I</sub>            | input capacitance         |                                                                                                                                                                                                        | -     | 3.0 | 10    | -                | 10   | -                 | 10    | pF   |
| C <sub>O</sub>            | output capacitance        |                                                                                                                                                                                                        | -     | 4.0 | -     | -                | -    | -                 | -     | pF   |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**  
*GND = 0 V; For test circuit see [Figure 8](#).*

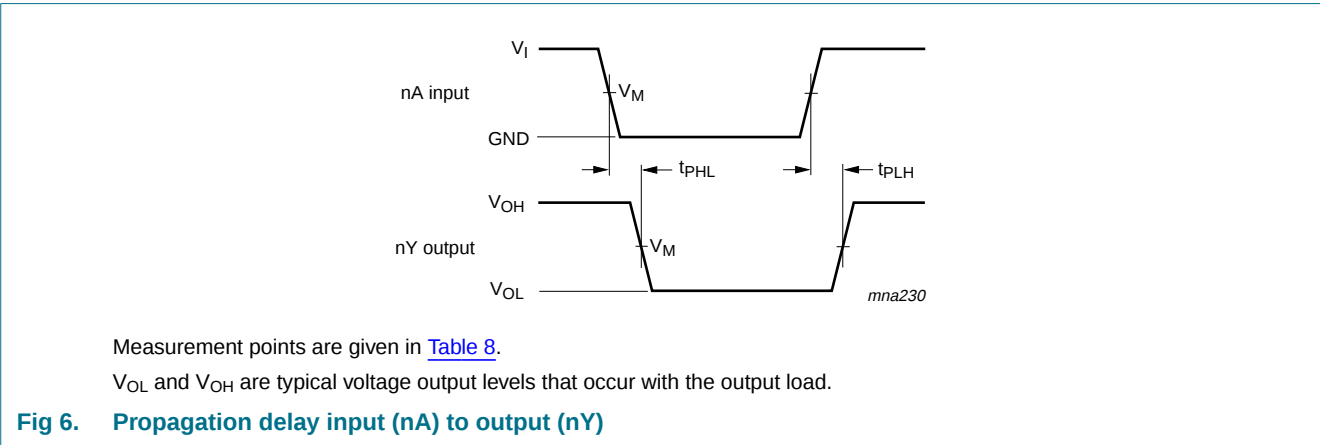
| Symbol            | Parameter                     | Conditions                                                                                             | 25 °C |                    |      | −40 °C to +85 °C |      | −40 °C to +125 °C |      | Unit |
|-------------------|-------------------------------|--------------------------------------------------------------------------------------------------------|-------|--------------------|------|------------------|------|-------------------|------|------|
|                   |                               |                                                                                                        | Min   | Typ <sup>[1]</sup> | Max  | Min              | Max  | Min               | Max  |      |
| For type 74VHC125 |                               |                                                                                                        |       |                    |      |                  |      |                   |      |      |
| t <sub>pd</sub>   | propagation delay             | nA to nY; see <a href="#">Figure 6</a> <sup>[2]</sup>                                                  |       |                    |      |                  |      |                   |      |      |
|                   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                       |       |                    |      |                  |      |                   |      |      |
|                   |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 4.4                | 8.0  | 1.0              | 9.5  | 1.0               | 11.5 | ns   |
|                   |                               | C <sub>L</sub> = 50 pF                                                                                 | -     | 6.2                | 11.5 | 1.0              | 13.0 | 1.0               | 14.5 | ns   |
|                   |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                       |       |                    |      |                  |      |                   |      |      |
|                   |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 3.0                | 5.5  | 1.0              | 6.5  | 1.0               | 7.0  | ns   |
| t <sub>en</sub>   | enable time                   | nOE to nY; see <a href="#">Figure 7</a> <sup>[2]</sup>                                                 |       |                    |      |                  |      |                   |      |      |
|                   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                       |       |                    |      |                  |      |                   |      |      |
|                   |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 4.7                | 8.0  | 1.0              | 9.5  | 1.0               | 11.5 | ns   |
|                   |                               | C <sub>L</sub> = 50 pF                                                                                 | -     | 6.8                | 11.5 | 1.0              | 13.0 | 1.0               | 14.5 | ns   |
|                   |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                       |       |                    |      |                  |      |                   |      |      |
|                   |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 3.3                | 5.1  | 1.0              | 6.0  | 1.0               | 6.5  | ns   |
| t <sub>dis</sub>  | disable time                  | nOE to nY; see <a href="#">Figure 7</a> <sup>[2]</sup>                                                 |       |                    |      |                  |      |                   |      |      |
|                   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                       |       |                    |      |                  |      |                   |      |      |
|                   |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 6.7                | 9.7  | 1.0              | 11.5 | 1.0               | 12.5 | ns   |
|                   |                               | C <sub>L</sub> = 50 pF                                                                                 | -     | 9.6                | 13.2 | 1.0              | 15.0 | 1.0               | 16.5 | ns   |
|                   |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                       |       |                    |      |                  |      |                   |      |      |
|                   |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 4.8                | 6.8  | 1.0              | 8.0  | 1.0               | 8.5  | ns   |
| C <sub>PD</sub>   | power dissipation capacitance | C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[3]</sup> | -     | 10                 | -    | -                | -    | -                 | -    | pF   |

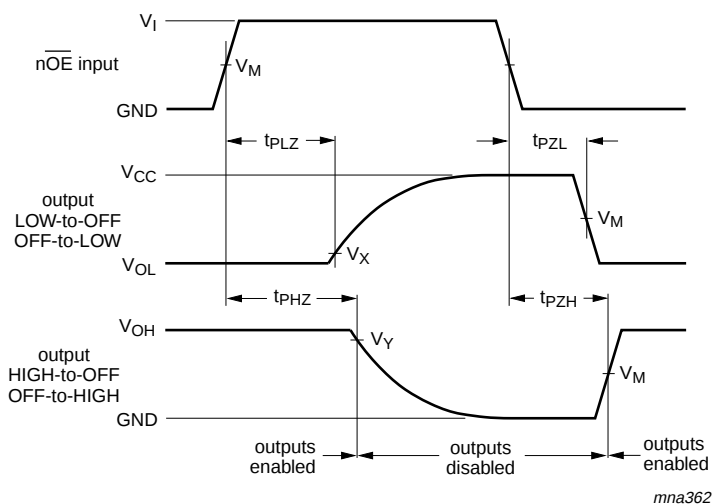
Table 7. Dynamic characteristics ...continued  
GND = 0 V; For test circuit see Figure 8.

| Symbol             | Parameter                     | Conditions                                                                                             | 25 °C |                    |     | −40 °C to +85 °C |      | −40 °C to +125 °C |      | Unit |
|--------------------|-------------------------------|--------------------------------------------------------------------------------------------------------|-------|--------------------|-----|------------------|------|-------------------|------|------|
|                    |                               |                                                                                                        | Min   | Typ <sup>[1]</sup> | Max | Min              | Max  | Min               | Max  |      |
| For type 74VHCT125 |                               |                                                                                                        |       |                    |     |                  |      |                   |      |      |
| t <sub>pd</sub>    | propagation delay             | nA to nY; see <a href="#">Figure 6</a> <sup>[2]</sup>                                                  |       |                    |     |                  |      |                   |      |      |
|                    |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                       |       |                    |     |                  |      |                   |      |      |
|                    |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 3.0                | 5.5 | 1.0              | 6.5  | 1.0               | 7.0  | ns   |
|                    |                               | C <sub>L</sub> = 50 pF                                                                                 | -     | 4.3                | 7.5 | 1.0              | 8.5  | 1.0               | 9.5  | ns   |
| t <sub>en</sub>    | enable time                   | n $\overline{\text{OE}}$ to nY; see <a href="#">Figure 7</a>                                           |       |                    |     |                  |      |                   |      |      |
|                    |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                       |       |                    |     |                  |      |                   |      |      |
|                    |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 3.4                | 5.1 | 1.0              | 6.0  | 1.0               | 6.5  | ns   |
|                    |                               | C <sub>L</sub> = 50 pF                                                                                 | -     | 4.9                | 7.3 | 1.0              | 8.3  | 1.0               | 9.5  | ns   |
| t <sub>dis</sub>   | disable time                  | n $\overline{\text{OE}}$ to nY; see <a href="#">Figure 7</a> <sup>[2]</sup>                            |       |                    |     |                  |      |                   |      |      |
|                    |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                       |       |                    |     |                  |      |                   |      |      |
|                    |                               | C <sub>L</sub> = 15 pF                                                                                 | -     | 4.5                | 6.8 | 1.0              | 8.0  | 1.0               | 8.5  | ns   |
|                    |                               | C <sub>L</sub> = 50 pF                                                                                 | -     | 6.5                | 8.8 | 1.0              | 10.0 | 1.0               | 11.0 | ns   |
| C <sub>PD</sub>    | power dissipation capacitance | C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[3]</sup> | -     | 12                 | -   | -                | -    | -                 | -    | pF   |

- [1] Typical values are measured at nominal supply voltage (V<sub>CC</sub> = 3.3 V and V<sub>CC</sub> = 5.0 V).
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.  
t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.  
t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.
- [3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> × N + Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) where:  
f<sub>i</sub> = input frequency in MHz, f<sub>o</sub> = output frequency in MHz  
C<sub>L</sub> = output load capacitance in pF  
V<sub>CC</sub> = supply voltage in Volts  
N = number of inputs switching  
Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.

11. Waveforms





Measurement points are given in [Table 8](#).

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

**Fig 7. Enable and disable times**

### Table 8. Measurement points

| Type      | Input       | Output      |                         |                         |
|-----------|-------------|-------------|-------------------------|-------------------------|
|           | $V_M$       | $V_M$       | $V_X$                   | $V_Y$                   |
| 74VHC125  | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.3\text{ V}$ | $V_{OL} - 0.3\text{ V}$ |
| 74VHCT125 | 1.5 V       | $0.5V_{CC}$ | $V_{OL} + 0.3\text{ V}$ | $V_{OL} - 0.3\text{ V}$ |

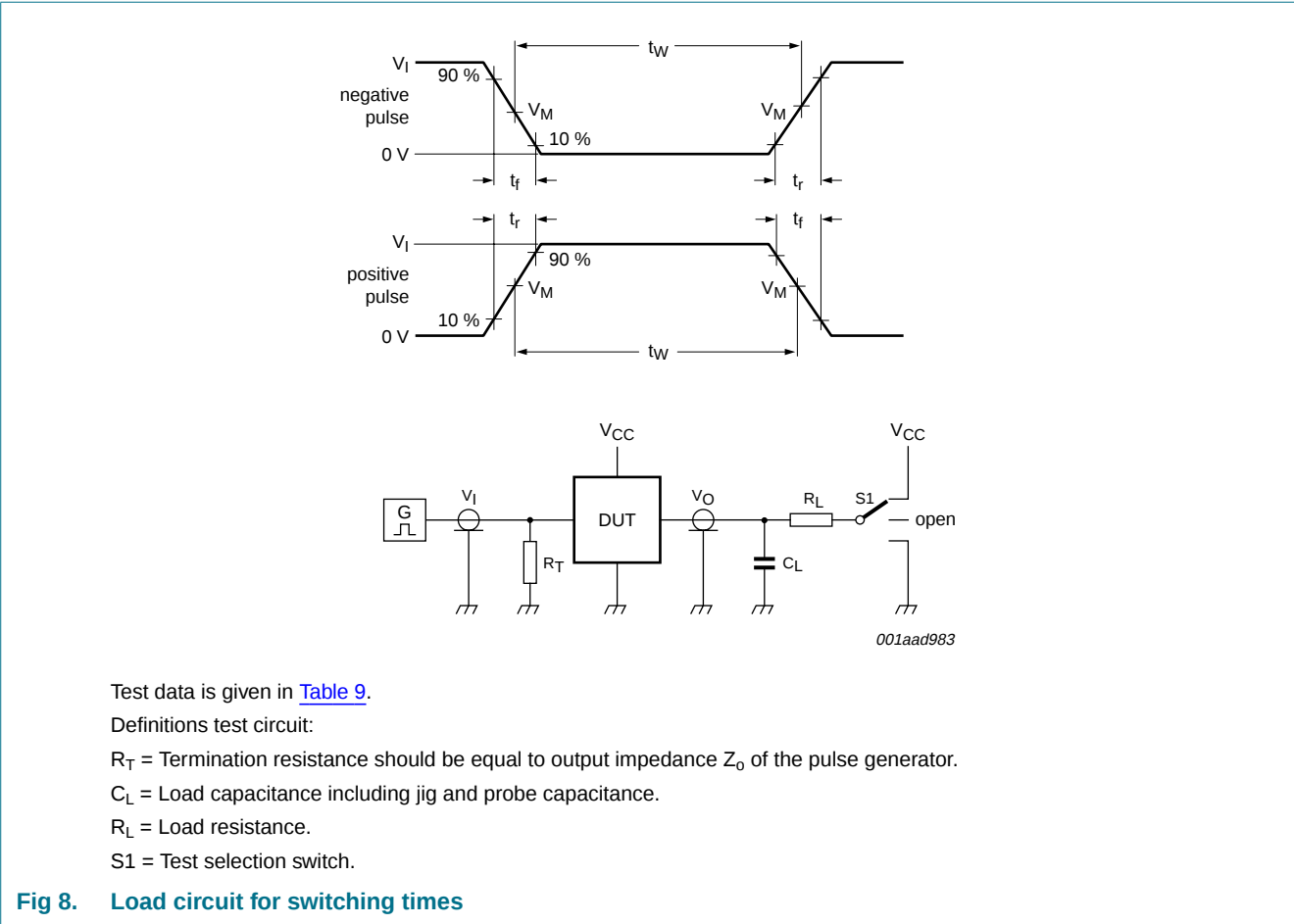


Fig 8. Load circuit for switching times

Table 9. Test data

| Type      | Input    |                       | Load         |              | S1 position        |                    |                    |
|-----------|----------|-----------------------|--------------|--------------|--------------------|--------------------|--------------------|
|           | $V_I$    | $t_r, t_f$            | $C_L$        | $R_L$        | $t_{PHL}, t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 74VHC125  | $V_{CC}$ | $\leq 3.0 \text{ ns}$ | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |
| 74VHCT125 | 3.0 V    | $\leq 3.0 \text{ ns}$ | 15 pF, 50 pF | 1 k $\Omega$ | open               | GND                | $V_{CC}$           |

12. Package outline

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

SOT108-1

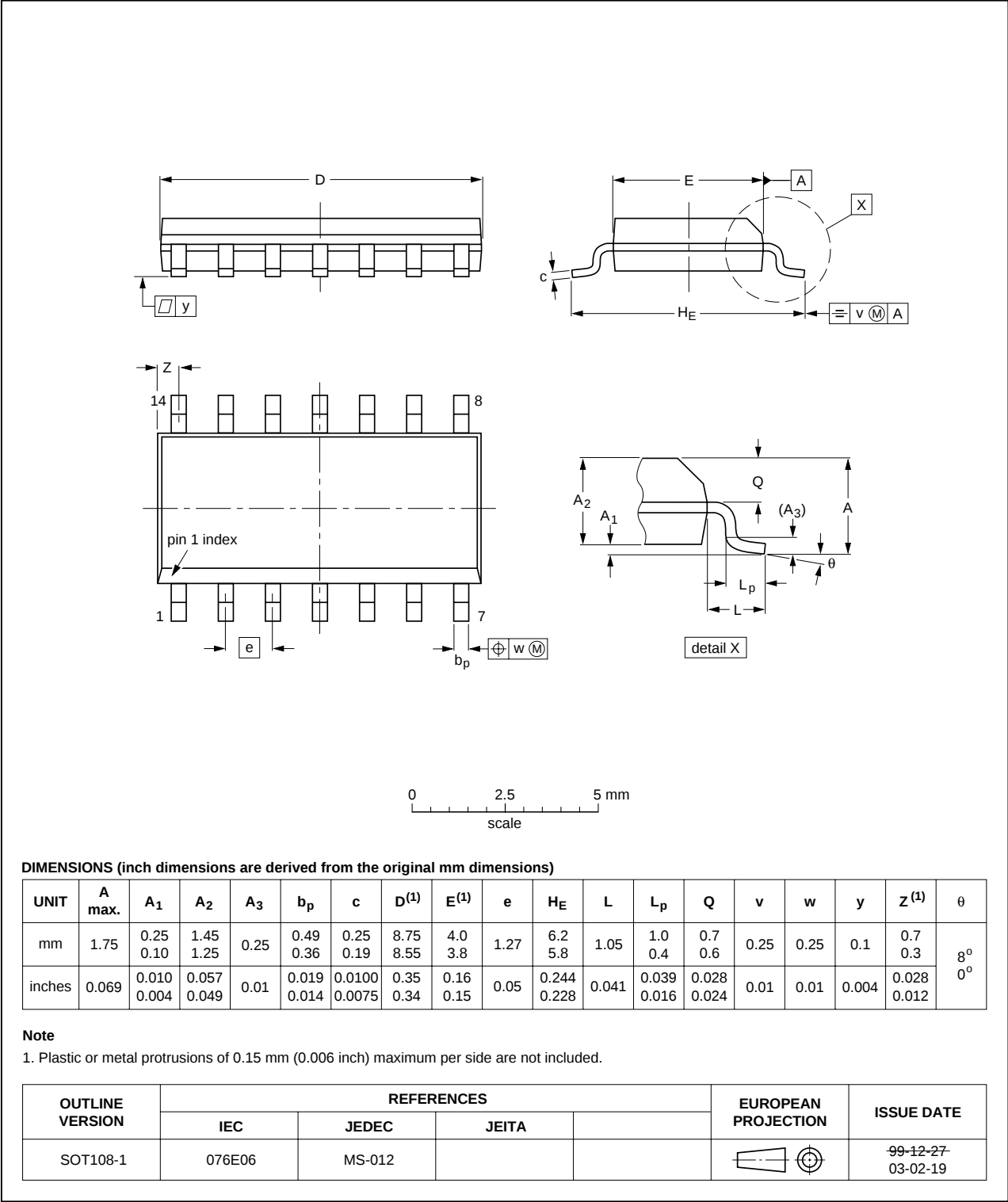
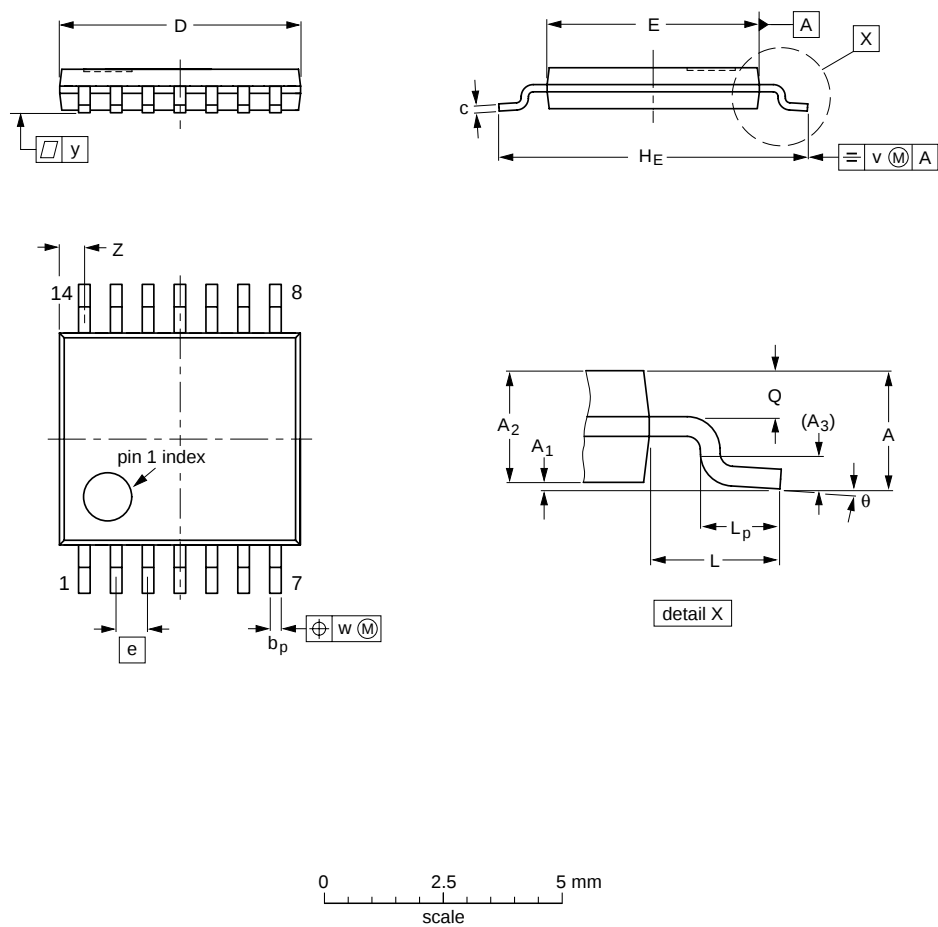


Fig 9. Package outline SOT108-1 (SO14)

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

SOT402-1



DIMENSIONS (mm are the original dimensions)

| UNIT | A<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c          | D <sup>(1)</sup> | E <sup>(2)</sup> | e    | H <sub>E</sub> | L | L <sub>p</sub> | Q          | v   | w    | y   | z <sup>(1)</sup> | θ        |
|------|-----------|----------------|----------------|----------------|----------------|------------|------------------|------------------|------|----------------|---|----------------|------------|-----|------|-----|------------------|----------|
| mm   | 1.1       | 0.15<br>0.05   | 0.95<br>0.80   | 0.25           | 0.30<br>0.19   | 0.2<br>0.1 | 5.1<br>4.9       | 4.5<br>4.3       | 0.65 | 6.6<br>6.2     | 1 | 0.75<br>0.50   | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.72<br>0.38     | 8°<br>0° |

- Notes
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
  2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

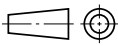
| OUTLINE<br>VERSION | REFERENCES |        |       |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE           |
|--------------------|------------|--------|-------|--|---------------------------------------------------------------------------------------|----------------------|
|                    | IEC        | JEDEC  | JEITA |  |                                                                                       |                      |
| SOT402-1           |            | MO-153 |       |  |  | 99-12-27<br>03-02-18 |

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

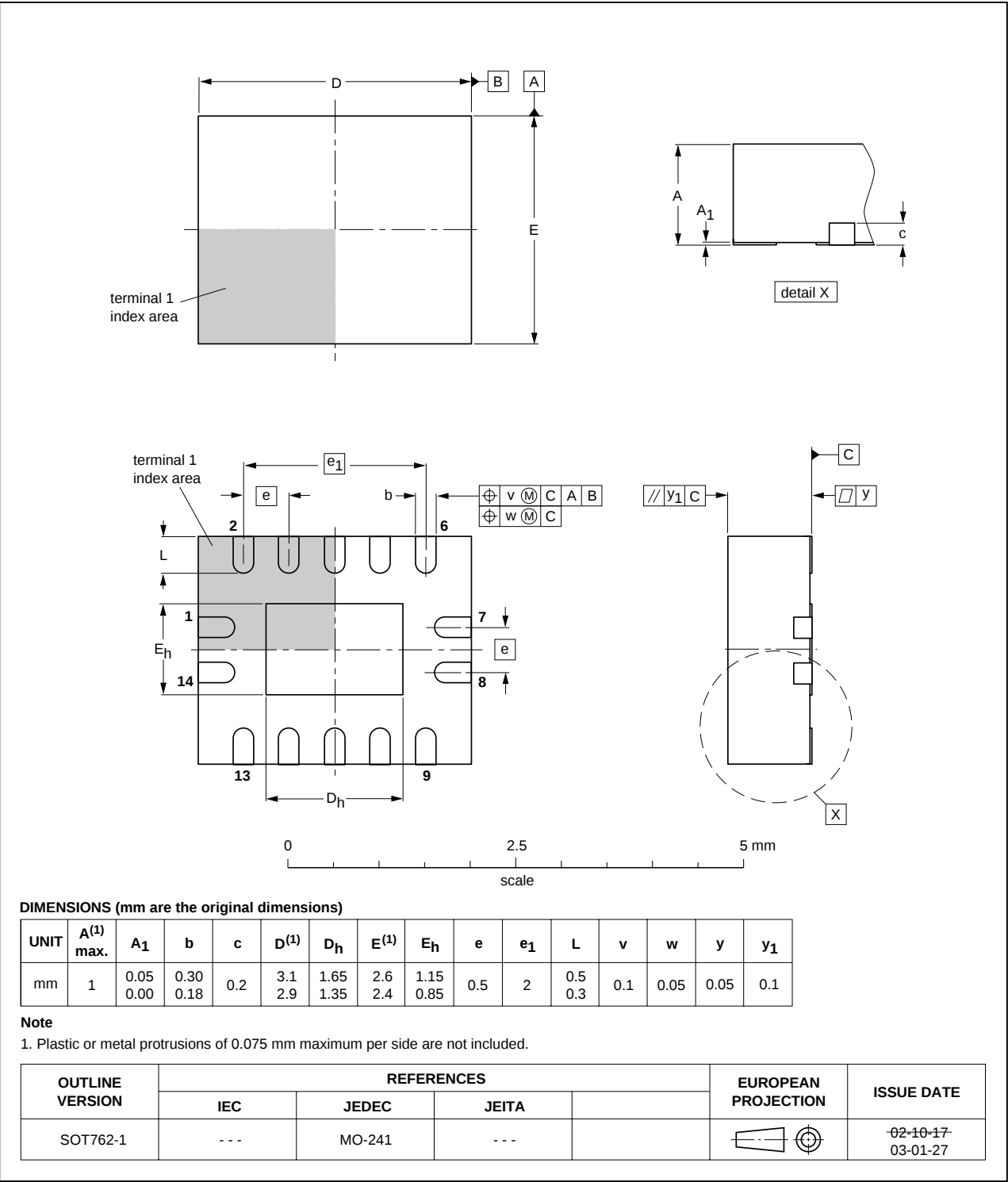


Fig 11. Package outline SOT762-1 (DHVQFN14)

## 13. Abbreviations

Table 10. Abbreviations

| Acronym | Description                                    |
|---------|------------------------------------------------|
| CMOS    | Complementary Metal Oxide Semiconductor        |
| LSTTL   | Low-power Schottky Transistor-Transistor Logic |
| ESD     | ElectroStatic Discharge                        |
| HBM     | Human Body Model                               |
| MM      | Machine Model                                  |
| CDM     | Charge-Device Model                            |
| TTL     | Transistor-Transistor Logic                    |

## 14. Revision history

Table 11. Revision history

| Document ID     | Release date                         | Data sheet status  | Change notice | Supersedes      |
|-----------------|--------------------------------------|--------------------|---------------|-----------------|
| 74VHC_VHCT125_2 | 20091013                             | Product data sheet | -             | 74VHC_VHCT125_1 |
| Modifications:  | • Errata in features list corrected. |                    |               |                 |
| 74VHC_VHCT125_1 | 20090630                             | Product data sheet | -             | -               |

## 15. Legal information

### 15.1 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.                       |
| 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 URL <http://www.nexperia.com>.

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