

74LVC126A

Quad buffer/line driver with 5 V tolerant input/outputs; 3-state
Rev. 11 — 20 September 2021

Product data sheet

1. General description

The 74LVC126A 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. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times.

This device is fully specified for partial power down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

2. Features and benefits

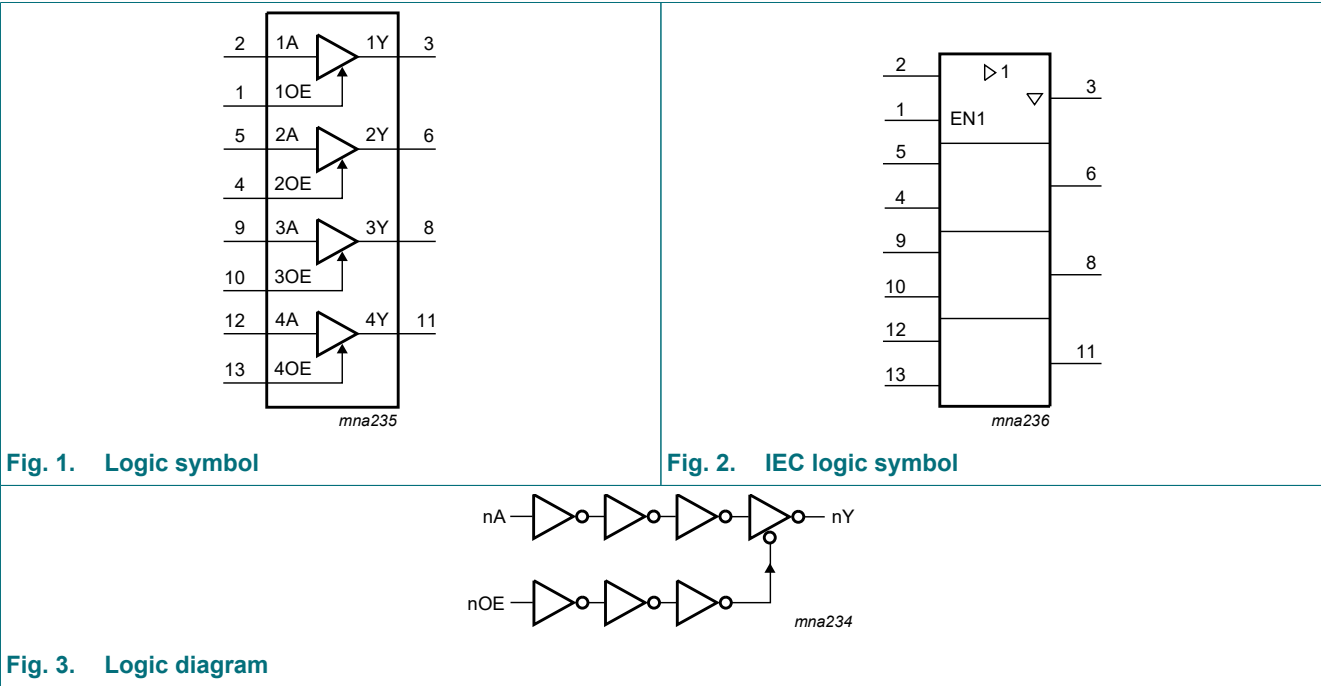
- Overvoltage tolerant inputs to 5.5 V
- Wide supply voltage range from 1.2 V to 3.6 V
- CMOS low power consumption
- Direct interface with TTL levels
- Complies with JEDEC standard:
 - JESD8-7A (1.65 V to 1.95 V)
 - JESD8-5A (2.3 V to 2.7 V)
 - JESD8-C/JESD36 (2.7 V to 3.6 V)
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115B exceeds 200 V
 - CDM JESD22-C101E exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

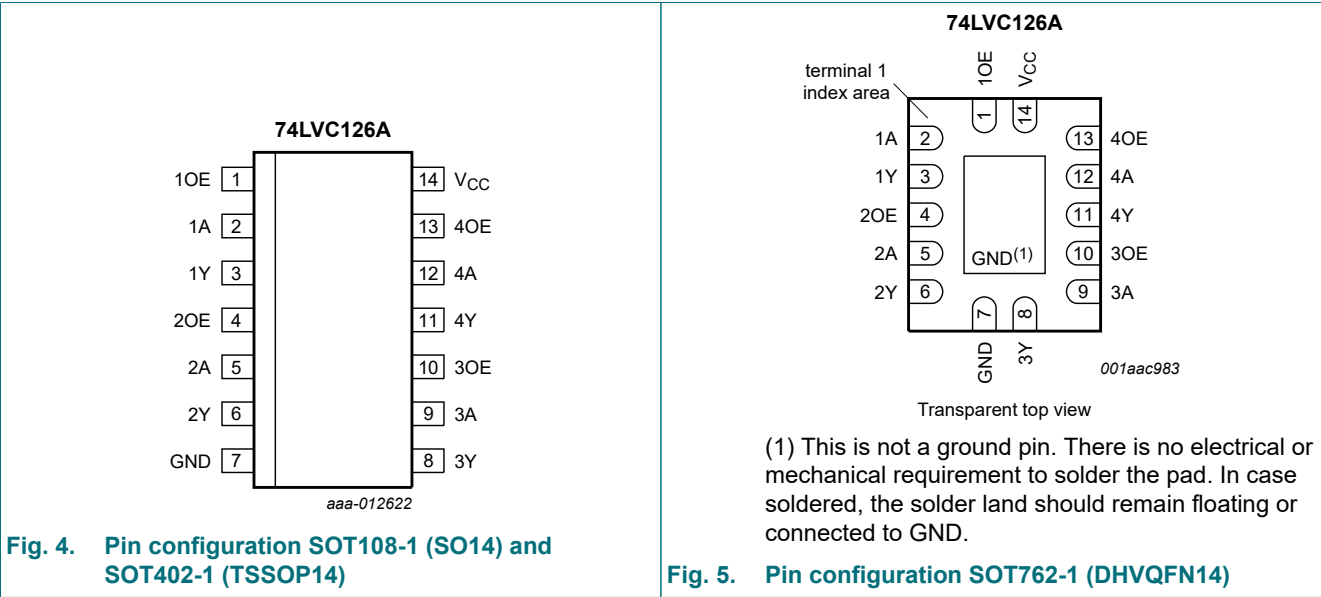
| Type number | Package | | | |
|-------------|-------------------|----------|--|----------|
| | Temperature range | Name | Description | Version |
| 74LVC126AD | -40 °C to +125 °C | SO14 | plastic small outline package; 14 leads; body width 3.9 mm | SOT108-1 |
| 74LVC126APW | -40 °C to +125 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | SOT402-1 |
| 74LVC126ABQ | -40 °C to +125 °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 | SOT762-1 |

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 | data enable input (active HIGH) |
| 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 selection

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

| Inputs | | 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).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|-------------------------|--|------|-----------------------|------|
| V _{CC} | supply voltage | | -0.5 | +6.5 | V |
| I _{IK} | input clamping current | V _I < 0 V | -50 | - | mA |
| V _I | input voltage | [1] | -0.5 | +6.5 | V |
| I _{OK} | output clamping current | V _O > V _{CC} or V _O < 0 V | - | ±50 | mA |
| V _O | output voltage | output HIGH or LOW-state [2] | -0.5 | V _{CC} + 0.5 | V |
| | | output 3-state [2] | -0.5 | +6.5 | V |
| I _O | output current | V _O = 0 V to V _{CC} | - | ±50 | mA |
| I _{CC} | supply current | | - | 100 | mA |
| I _{GND} | ground current | | -100 | - | mA |
| T _{stg} | storage temperature | | -65 | +150 | °C |
| P _{tot} | total power dissipation | T _{amb} = -40 °C to +125 °C [3] | - | 500 | mW |

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

[2] The output voltage ratings may be exceeded if the output current ratings are observed.

[3] For SOT108-1 (SO14) package: P_{tot} derates linearly with 10.1 mW/K above 100 °C.
 For SOT402-1 (TSSOP14) package: P_{tot} derates linearly with 7.3 mW/K above 81 °C.
 For SOT762-1 (DHVQFN14) package: P_{tot} derates linearly with 9.6 mW/K above 98 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------------------------|-----------------------------------|------|-----|-----------------|------|
| V _{CC} | supply voltage | | 1.65 | - | 3.6 | V |
| | | functional | 1.2 | - | - | V |
| V _I | input voltage | | 0 | - | 5.5 | V |
| V _O | output voltage | output HIGH or LOW state | 0 | - | V _{CC} | V |
| | | output 3-state | 0 | - | 5.5 | V |
| T _{amb} | ambient temperature | in free air | -40 | - | +125 | °C |
| Δt/ΔV | input transition rise and fall rate | V _{CC} = 1.65 V to 2.7 V | 0 | - | 20 | ns/V |
| | | V _{CC} = 2.7 V to 3.6 V | 0 | - | 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 | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-----------------|---------------------------|---|-----------------------|---------|---------------------|-----------------------|---------------------|------|
| | | | Min | Typ [1] | Max | Min | Max | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 1.2 V | 1.08 | - | - | 1.08 | - | V |
| | | V _{CC} = 1.65 V to 1.95 V | 0.65V _{CC} | - | - | 0.65V _{CC} | - | V |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | - | - | 1.7 | - | V |
| | | V _{CC} = 2.7 V to 3.6 V | 2.0 | - | - | 2.0 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 1.2 V | - | - | 0.12 | - | 0.12 | V |
| | | V _{CC} = 1.65 V to 1.95 V | - | - | 0.35V _{CC} | - | 0.35V _{CC} | V |
| | | V _{CC} = 2.3 V to 2.7 V | - | - | 0.7 | - | 0.7 | V |
| | | V _{CC} = 2.7 V to 3.6 V | - | - | 0.8 | - | 0.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | |
| | | I _O = -100 μA; V _{CC} = 1.65 V to 3.6 V | V _{CC} - 0.2 | - | - | V _{CC} - 0.3 | - | V |
| | | I _O = -4 mA; V _{CC} = 1.65 V | 1.2 | - | - | 1.05 | - | V |
| | | I _O = -8 mA; V _{CC} = 2.3 V | 1.8 | - | - | 1.65 | - | V |
| | | I _O = -12 mA; V _{CC} = 2.7 V | 2.2 | - | - | 2.05 | - | V |
| | | I _O = -18 mA; V _{CC} = 3.0 V | 2.4 | - | - | 2.25 | - | V |
| | | I _O = -24 mA; V _{CC} = 3.0 V | 2.2 | - | - | 2.0 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | |
| | | I _O = 100 μA; V _{CC} = 1.65 V to 3.6 V | - | - | 0.2 | - | 0.3 | V |
| | | I _O = 4 mA; V _{CC} = 1.65 V | - | - | 0.45 | - | 0.65 | V |
| | | I _O = 8 mA; V _{CC} = 2.3 V | - | - | 0.6 | - | 0.8 | V |
| | | I _O = 12 mA; V _{CC} = 2.7 V | - | - | 0.4 | - | 0.6 | V |
| | | I _O = 24 mA; V _{CC} = 3.0 V | - | - | 0.55 | - | 0.8 | V |

Quad buffer/line driver with 5 V tolerant input/outputs; 3-state

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-----------------|---------------------------|--|------------------|-----------|----------|-------------------|----------|---------------|
| | | | Min | Typ [1] | Max | Min | Max | |
| I_I | input leakage current | $V_{CC} = 3.6 \text{ V}$; $V_I = 5.5 \text{ V}$ or GND | - | ± 0.1 | ± 5 | - | ± 20 | μA |
| I_{OZ} | OFF-state output current | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 3.6 \text{ V}$; $V_O = 5.5 \text{ V}$ or GND | - | ± 0.1 | ± 5 | - | ± 20 | μA |
| I_{OFF} | power-off leakage current | $V_{CC} = 0 \text{ V}$; V_I or $V_O = 5.5 \text{ V}$ | - | ± 0.1 | ± 10 | - | ± 20 | μA |
| I_{CC} | supply current | $V_{CC} = 3.6 \text{ V}$; $V_I = V_{CC}$ or GND; $I_O = 0 \text{ A}$ | - | 0.1 | 10 | - | 40 | μA |
| ΔI_{CC} | additional supply current | per input pin; $V_{CC} = 1.65 \text{ V}$ to 3.6 V ; $V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$ | - | 5 | 500 | - | 5000 | μA |
| C_I | input capacitance | $V_{CC} = 0 \text{ V}$ to 3.6 V ; $V_I = \text{GND}$ to V_{CC} | - | 4.0 | - | - | - | pF |

[1] All typical values are measured at $V_{CC} = 3.3 \text{ V}$ (unless stated otherwise) and $T_{amb} = 25 \text{ °C}$.

10. Dynamic characteristics

Table 7. Dynamic characteristics

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

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-----------|-------------------|---|------------------|---------|------|-------------------|------|------|
| | | | Min | Typ [1] | Max | Min | Max | |
| t_{pd} | propagation delay | nA to nY; see Fig. 6 [2] | | | | | | |
| | | $V_{CC} = 1.2 \text{ V}$ | - | 11.0 | - | - | - | ns |
| | | $V_{CC} = 1.65 \text{ V}$ to 1.95 V | 1.5 | 5.2 | 10.8 | 1.5 | 12.6 | ns |
| | | $V_{CC} = 2.3 \text{ V}$ to 2.7 V | 1.0 | 2.8 | 5.6 | 1.0 | 6.6 | ns |
| | | $V_{CC} = 2.7 \text{ V}$ | 1.5 | 2.7 | 5.2 | 1.5 | 6.5 | ns |
| | | $V_{CC} = 3.0 \text{ V}$ to 3.6 V | 1.0 | 2.4 | 4.7 | 1.0 | 6.0 | ns |
| t_{en} | enable time | nOE to nY; see Fig. 7 [2] | | | | | | |
| | | $V_{CC} = 1.2 \text{ V}$ | - | 15.0 | - | - | - | ns |
| | | $V_{CC} = 1.65 \text{ V}$ to 1.95 V | 2.4 | 6.7 | 12.9 | 2.4 | 15.0 | ns |
| | | $V_{CC} = 2.3 \text{ V}$ to 2.7 V | 2.0 | 3.8 | 7.1 | 2.0 | 8.3 | ns |
| | | $V_{CC} = 2.7 \text{ V}$ | 1.5 | 3.1 | 6.3 | 1.5 | 8.0 | ns |
| | | $V_{CC} = 3.0 \text{ V}$ to 3.6 V | 1.0 | 3.1 | 5.7 | 1.0 | 7.5 | ns |
| t_{dis} | disable time | nOE to nY; see Fig. 7 [2] | | | | | | |
| | | $V_{CC} = 1.2 \text{ V}$ | - | 8.0 | - | - | - | ns |
| | | $V_{CC} = 1.65 \text{ V}$ to 1.95 V | 1.0 | 3.3 | 10.0 | 1.0 | 11.5 | ns |
| | | $V_{CC} = 2.3 \text{ V}$ to 2.7 V | 0.5 | 1.8 | 5.6 | 0.5 | 6.5 | ns |
| | | $V_{CC} = 2.7 \text{ V}$ | 1.5 | 3.4 | 6.7 | 1.5 | 8.5 | ns |
| | | $V_{CC} = 3.0 \text{ V}$ to 3.6 V | 1.3 | 2.5 | 6.0 | 1.3 | 7.5 | ns |

Quad buffer/line driver with 5 V tolerant input/outputs; 3-state

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-------------|-------------------------------|---|------------------|---------|-----|-------------------|-----|------|
| | | | Min | Typ [1] | Max | Min | Max | |
| $t_{sk(o)}$ | output skew time | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ [3] | - | - | 1.0 | - | 1.5 | ns |
| C_{PD} | power dissipation capacitance | per buffer; $V_I = \text{GND to } V_{CC}$ [4] | | | | | | |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | 6.0 | - | - | - | pF |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | 9.3 | - | - | - | pF |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | - | 12.2 | - | - | - | pF |

[1] Typical values are measured at $T_{amb} = 25\text{ °C}$ and $V_{CC} = 1.2\text{ V}, 1.8\text{ V}, 2.5\text{ V}, 2.7\text{ V}$, and 3.3 V respectively.

[2] t_{pd} is the same as t_{PLH} and t_{PHL} .

t_{en} is the same as t_{PZL} and t_{PZH} .

t_{dis} is the same as t_{PLZ} and t_{PHZ} .

[3] Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

[4] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz; f_o = output frequency in MHz

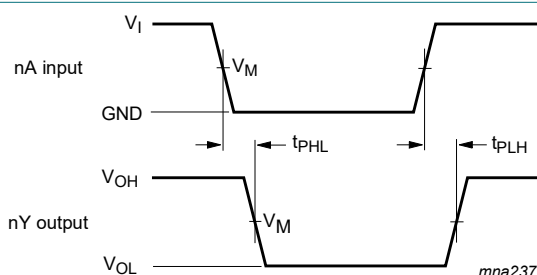
C_L = output load capacitance in pF

V_{CC} = supply voltage in Volts

N = number of inputs switching

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs

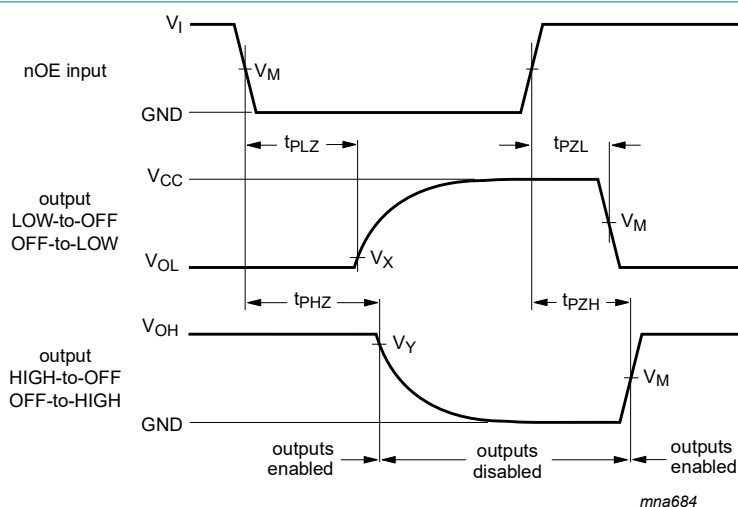
10.1. Waveforms and test circuit



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

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

Fig. 6. The input nA to output nY propagation delays



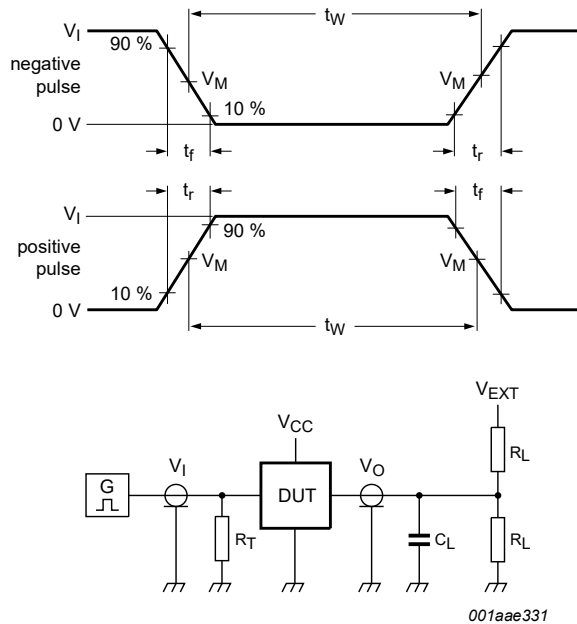
Measurement points are given in [Table 8](#).

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

Fig. 7. 3-state enable and disable times

Table 8. Measurement points

| Supply voltage | Input | Output | | |
|----------------------------|---------------------|---------------------|--------------------------|--------------------------|
| V_{CC} | V_M | V_M | V_X | V_Y |
| $V_{CC} < 2.7\text{ V}$ | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15\text{ V}$ | $V_{OH} - 0.15\text{ V}$ |
| $V_{CC} \geq 2.7\text{ V}$ | 1.5 V | 1.5 V | $V_{OL} + 0.3\text{ V}$ | $V_{OH} - 0.3\text{ V}$ |



Test data is given in [Table 9](#).

Definitions for test circuit:

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

R_T = Termination resistance should be equal to output impedance Z_o of the pulse generator.

V_{EXT} = External voltage for measuring switching times.

Fig. 8. Test circuit for measuring switching times

Table 9. Test data

| Supply voltage | Input | | Load | | V_{EXT} | | |
|------------------|----------|----------------------|-------|--------------|--------------------|--------------------|--------------------|
| | V_I | t_r, t_f | C_L | R_L | t_{PLH}, t_{PHL} | t_{PLZ}, t_{PZL} | t_{PHZ}, t_{PZH} |
| 1.2 V | V_{CC} | $\leq 2\text{ ns}$ | 30 pF | 1 k Ω | open | $2 \times V_{CC}$ | GND |
| 1.65 V to 1.95 V | V_{CC} | $\leq 2\text{ ns}$ | 30 pF | 1 k Ω | open | $2 \times V_{CC}$ | GND |
| 2.3 V to 2.7 V | V_{CC} | $\leq 2\text{ ns}$ | 30 pF | 500 Ω | open | $2 \times V_{CC}$ | GND |
| 2.7 V | 2.7 V | $\leq 2.5\text{ ns}$ | 50 pF | 500 Ω | open | $2 \times V_{CC}$ | GND |
| 3.0 V to 3.6 V | 2.7 V | $\leq 2.5\text{ ns}$ | 50 pF | 500 Ω | open | $2 \times V_{CC}$ | GND |

11. Package outline

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

SOT108-1

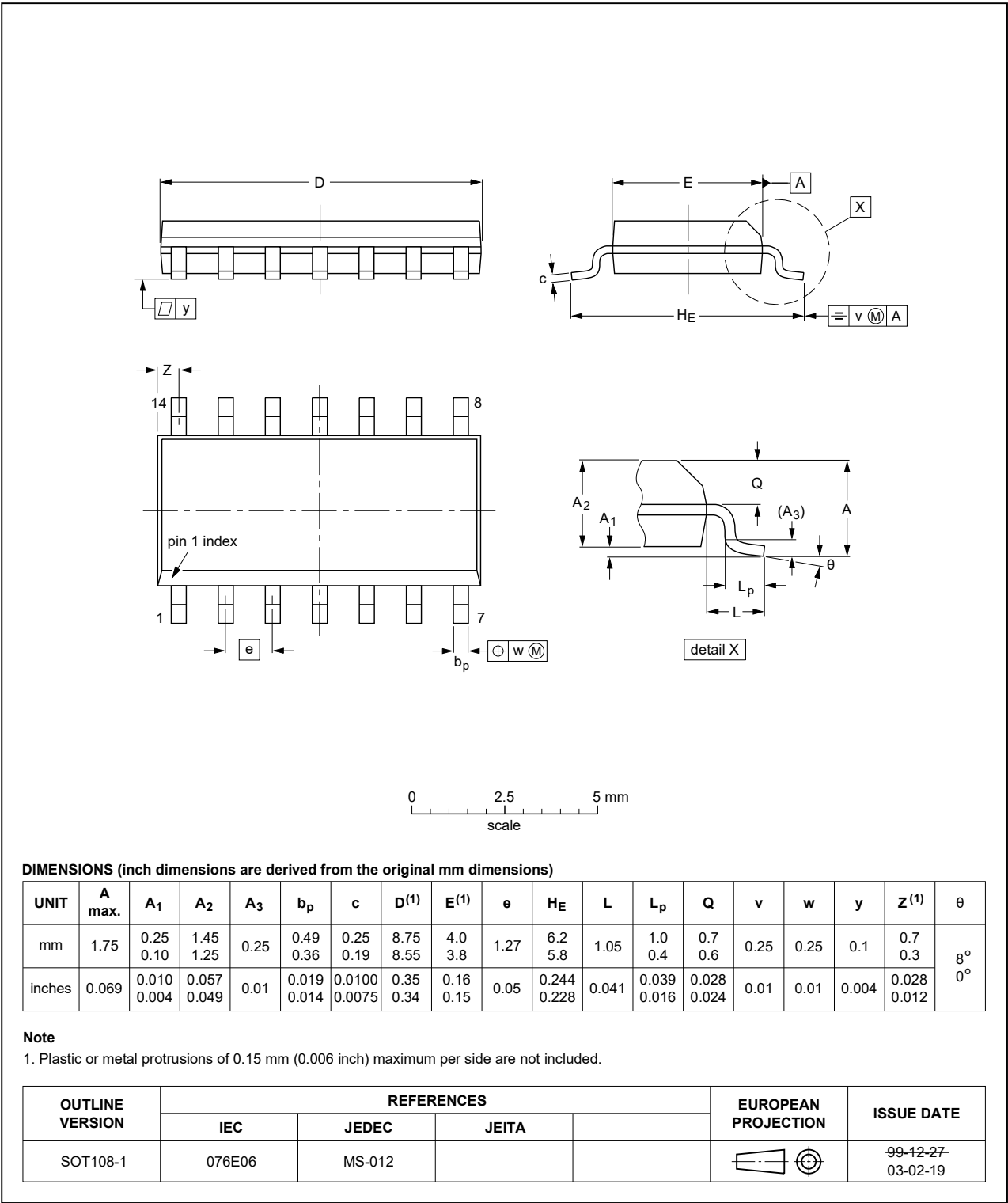


Fig. 9. Package outline SOT108-1 (SO14)

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

SOT402-1

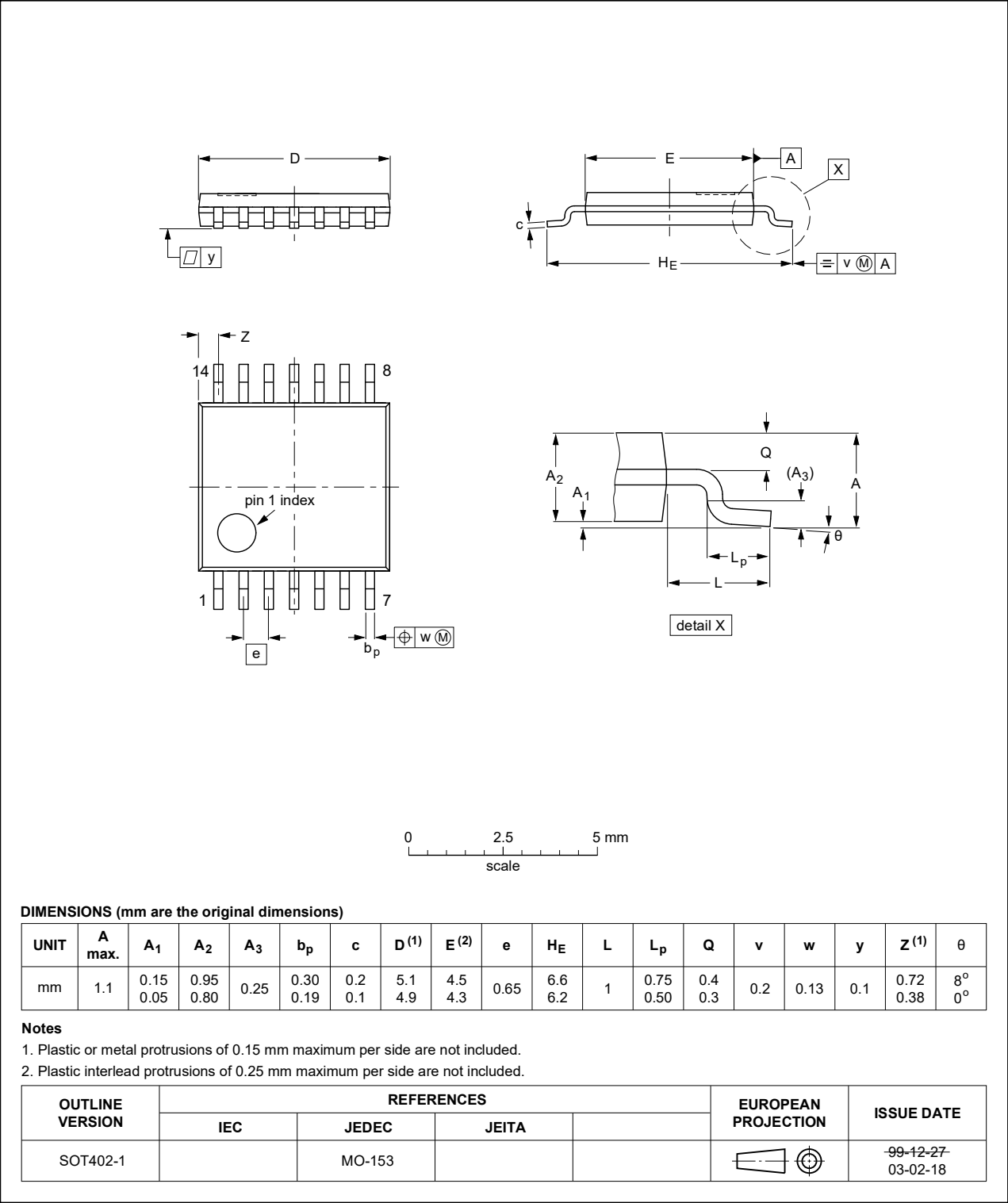


Fig. 10. Package outline SOT402-1 (TSSOP14)

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

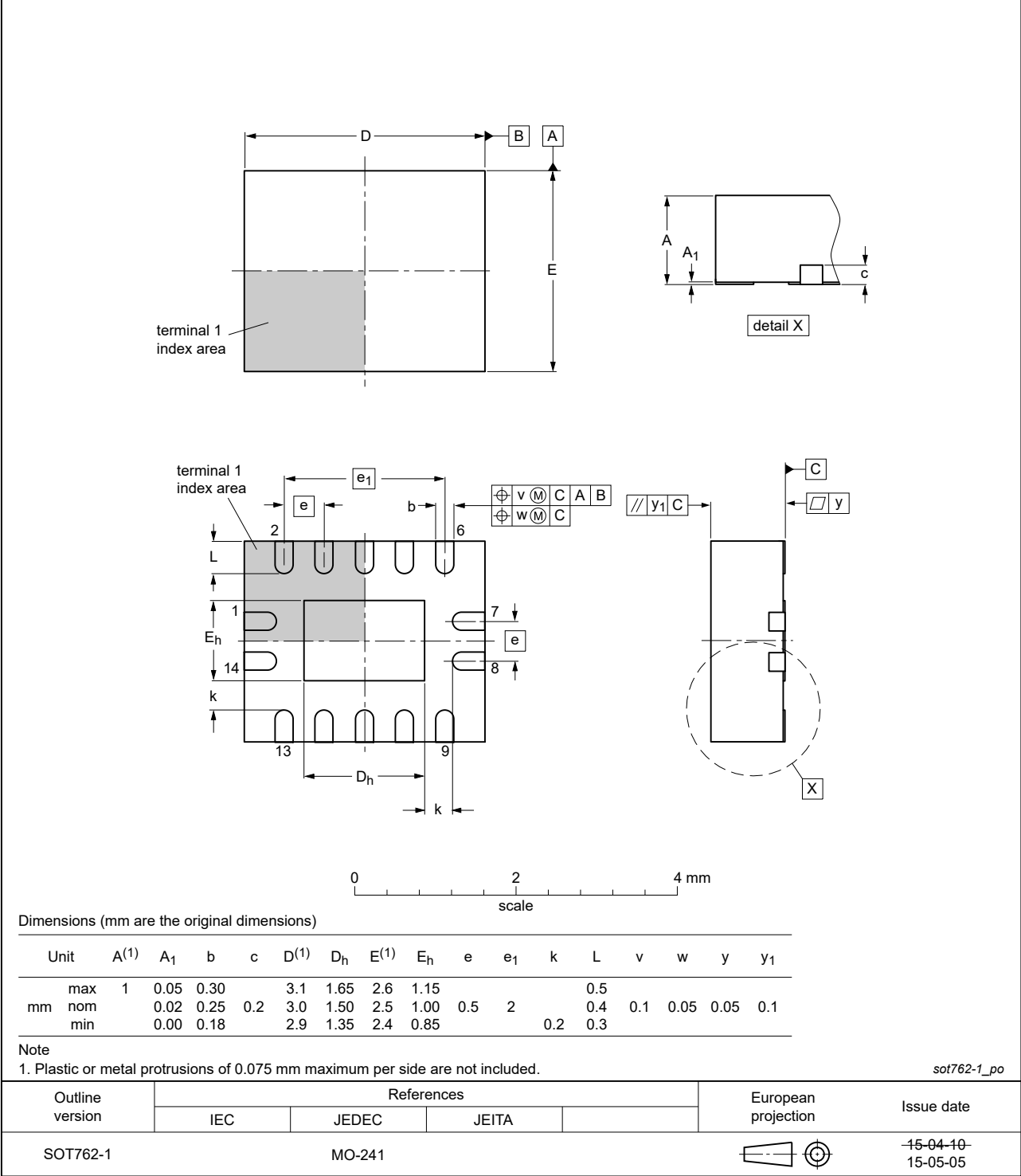


Fig. 11. Package outline SOT762-1 (DHVQFN14)

12. Abbreviations

Table 10. Abbreviations

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

13. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|-----------------------|---------------|----------------|
| 74LVC126A v.11 | 20210920 | Product data sheet | - | 74LVC126A v.10 |
| Modifications: | <ul style="list-style-type: none"> Type number 74LVC126ADB (SOT337-1/SSOP14) removed. | | | |
| 74LVC126A v.10 | 20200828 | Product data sheet | - | 74LVC126A v.9 |
| Modifications: | <ul style="list-style-type: none"> Section 1 updated. Table 4: Derating values for P_{tot} total power dissipation updated. | | | |
| 74LVC126A v.9 | 20180821 | Product data sheet | - | 74LVC126A v.8 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. | | | |
| 74LVC126A v.8 | 20140408 | Product data sheet | - | 74LVC126A v.7 |
| Modifications: | <ul style="list-style-type: none"> Legal pages updated. | | | |
| 74LVC126A v.7 | 20111209 | Product data sheet | - | 74LVC126A v.6 |
| Modifications: | <ul style="list-style-type: none"> Legal pages updated. | | | |
| 74LVC126A v.6 | 20110926 | Product data sheet | - | 74LVC126A v.5 |
| 74LVC126A v.5 | 20030228 | Product specification | - | 74LVC126A v.4 |
| 74LVC126A v.4 | 20020308 | Product specification | - | 74LVC126A v.3 |
| 74LVC126A v.3 | 19980428 | Product specification | - | 74LVC126A v.2 |
| 74LVC126A v.2 | 19970801 | Product specification | - | 74LVC126A v.1 |
| 74LVC126A v.1 | 19961226 | Product specification | - | - |

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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