

74LVT244B; 74LVTH244B

3.3 V octal buffer/line driver; 3-state

Rev. 4 — 14 June 2017

Product data sheet

1 General description

The 74LVT244B; 74LVTH244B is a high-performance BiCMOS product designed for V_{CC} operation at 3.3 V.

This device is an octal buffer that is ideal for driving bus lines. The device features two output enable inputs ($1\overline{OE}$ and $2\overline{OE}$), each controlling four of the 3-state outputs.

2 Features and benefits

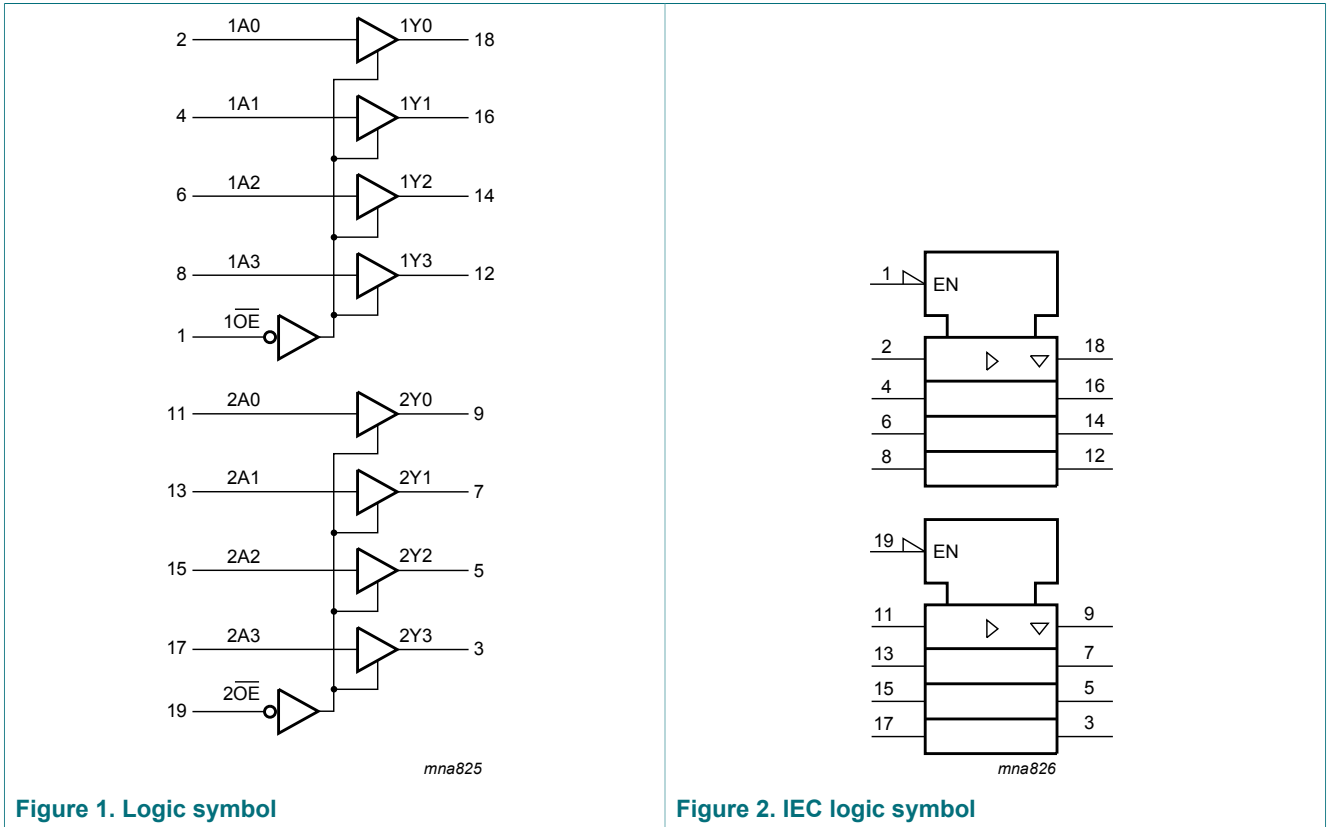
- Octal bus interface
- 3-state buffers
- Speed upgrade of 74LVT244A
- Output capability: +64 mA and -32 mA
- TTL input and output switching levels
- Input and output interface capability to systems at 5 V supply
- Bus hold data inputs eliminate need for external pull-up resistors to hold unused inputs
- Power-up 3-state
- Live insertion and extraction permitted
- No bus current loading when output is tied to 5 V bus
- Latch-up protection:
 - JESD78: exceeds 500 mA
- ESD protection:
 - HBM EIA/JESD22-A114-C exceeds 2000 V
 - MM EIA/JESD22-A115-A 200 V

3 Ordering information

Table 1. Ordering information

| Type number | Package | | | Version |
|--------------|-------------------|---------|---|----------|
| | Temperature range | Name | Description | |
| 74LVT244BD | -40 °C to +85 °C | SO20 | plastic small outline package; 20 leads; body width 7.5 mm | SOT163-1 |
| 74LVTH244BD | | | | |
| 74LVT244BDB | -40 °C to +85 °C | SSOP20 | plastic shrink small outline package; 20 leads; body width 5.3 mm | SOT339-1 |
| 74LVTH244BDB | | | | |
| 74LVT244BPW | -40 °C to +85 °C | TSSOP20 | plastic thin shrink small outline package; 20 leads; body width 4.4 mm | SOT360-1 |
| 74LVTH244BPW | | | | |

4 Functional diagram



5 Pinning information

5.1 Pinning

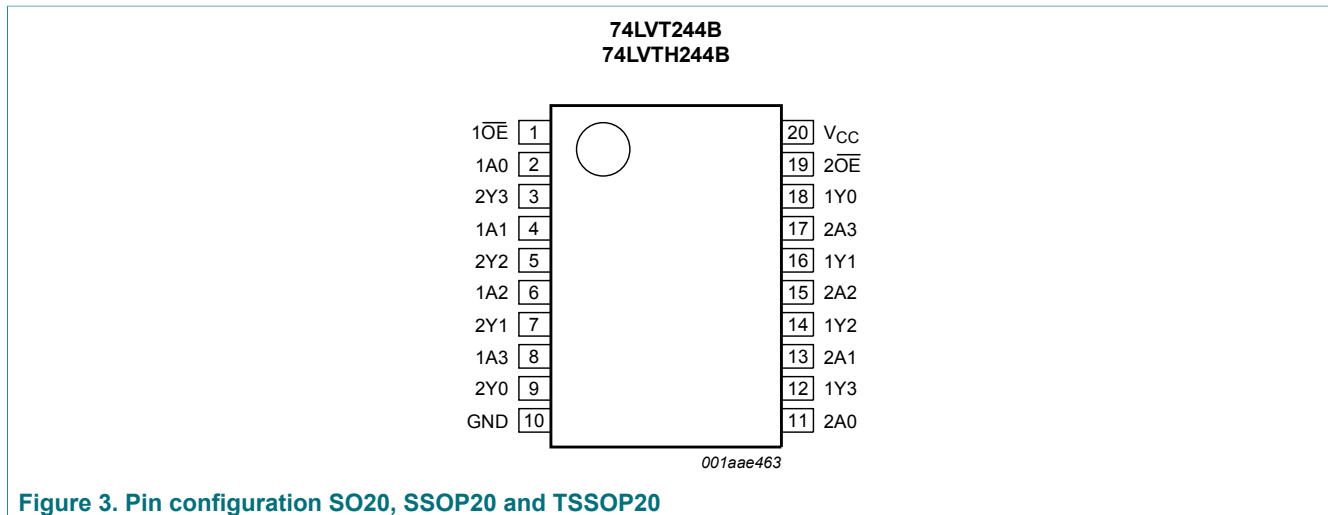


Figure 3. Pin configuration SO20, SSOP20 and TSSOP20

5.2 Pin description

Table 2. Pin description

| Symbol | Pin | Description |
|-------------------------------------|----------------|----------------------------------|
| $\overline{1OE}$, $\overline{2OE}$ | 1, 19 | output enable input (active low) |
| 1A0, 1A1, 1A2, 1A3 | 2, 4, 6, 8 | data input |
| 2Y0, 2Y1, 2Y2, 2Y3 | 9, 7, 5, 3 | data output |
| GND | 10 | ground (0 V) |
| 2A0, 2A1, 2A2, 2A3 | 11, 13, 15, 17 | data input |
| 1Y0, 1Y1, 1Y2, 1Y3 | 18, 16, 14, 12 | data output |
| V _{CC} | 20 | supply voltage |

6 Functional description

Table 3. Function table ^[1]

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|-------------------------|-----------------------------------|----------|------|------|
| V _{CC} | supply voltage | | -0.5 | +4.6 | V |
| V _I | input voltage | | [1] -0.5 | +7.0 | V |
| V _O | output voltage | output in OFF-state or HIGH-state | [1] -0.5 | +7.0 | V |
| I _{IK} | input clamping current | V _I < 0 V | -50 | - | mA |
| I _{OK} | output clamping current | V _O < 0 V | -50 | - | mA |
| I _O | output current | output in LOW-state | - | 128 | mA |
| | | output in HIGH-state | -64 | - | mA |
| T _{stg} | storage temperature | | -65 | +150 | °C |
| T _j | junction temperature | | [2] - | 150 | °C |
| P _{tot} | total power dissipation | T _{amb} = -40 to +85 °C | [3] - | 500 | mW |

[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.

[3] For SO20 packages: above 70 °C derate linearly with 8 mW/K.
For SSOP20 and TSSOP20 packages: above 60 °C derate linearly with 5.5 mW/K.

8 Recommended operating conditions

Table 5. Operating conditions

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------------------------|---|-----|-----|-----|------|
| V _{CC} | supply voltage | | 2.7 | - | 3.6 | V |
| V _I | input voltage | | 0 | - | 5.5 | V |
| I _{OH} | HIGH-level output current | | -32 | - | - | mA |
| I _{OL} | LOW-level output current | none | - | - | 32 | mA |
| | | current duty cycle ≤ 50 %; f _i ≥ 1 kHz | - | - | 64 | mA |
| T _{amb} | 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 |
|--|------------------------------------|---|----------------|--------------------|------|---------------|
| $T_{amb} = -40\text{ °C to }+85\text{ °C}$ | | | | | | |
| V_{IK} | input clamping voltage | $V_{CC} = 2.7\text{ V}; I_{IK} = -18\text{ mA}$ | -1.2 | -0.9 | - | V |
| V_{IH} | HIGH-level input voltage | | 2.0 | - | - | V |
| V_{IL} | LOW-level input voltage | | - | - | 0.8 | V |
| V_{OH} | HIGH-level output voltage | $V_{CC} = 2.7\text{ V}; I_{OH} = -100\text{ }\mu\text{A}$ | $V_{CC} - 2.0$ | $V_{CC} - 2.1$ | - | V |
| | | $V_{CC} = 2.7\text{ V}; I_{OH} = -8\text{ mA}$ | 2.4 | 2.5 | - | V |
| | | $V_{CC} = 3.0\text{ V}; I_{OH} = -32\text{ mA}$ | 2.0 | 2.2 | - | V |
| V_{OL} | LOW-level output voltage | $V_{CC} = 2.7\text{ V}; I_{OL} = 100\text{ }\mu\text{A}$ | - | 0.1 | 0.2 | V |
| | | $V_{CC} = 2.7\text{ V}; I_{OL} = 24\text{ mA}$ | - | 0.3 | 0.5 | V |
| | | $V_{CC} = 3.0\text{ V}; I_{OL} = 16\text{ mA}$ | - | 0.25 | 0.4 | V |
| | | $V_{CC} = 3.0\text{ V}; I_{OL} = 32\text{ mA}$ | - | 0.3 | 0.5 | V |
| | | $V_{CC} = 3.0\text{ V}; I_{OL} = 64\text{ mA}$ | - | 0.4 | 0.55 | V |
| I_I | input leakage current | all input pins | | | | |
| | | $V_{CC} = 0\text{ V or }3.6\text{ V}; V_I = 5.5\text{ V}$ | - | 0.1 | 10 | μA |
| | | control pins | | | | |
| | | $V_{CC} = 3.6\text{ V}; V_I = V_{CC}\text{ or GND}$ | -1 | ± 0.1 | 1 | μA |
| | | data pins ^[2] | | | | |
| | | $V_{CC} = 3.6\text{ V}; V_I = V_{CC}$ | - | 0.1 | 1 | μA |
| | | $V_{CC} = 3.6\text{ V}; V_I = 0\text{ V}$ | -5 | -1 | - | μA |
| I_{OFF} | power-off leakage current | $V_{CC} = 0\text{ V}; V_I\text{ or }V_O = 0\text{ V to }4.5\text{ V}$ | -100 | 1 | +100 | μA |
| I_{BHL} | bus hold LOW current | $V_{CC} = 3\text{ V}; V_I = 0.8\text{ V}$ | 75 | 130 | - | μA |
| I_{BHH} | bus hold HIGH current | $V_{CC} = 3\text{ V}; V_I = 2.0\text{ V}$ | - | -140 | -75 | μA |
| I_{BHLO} | bus hold LOW overdrive current | $V_{CC} = 3.6\text{ V}; V_I = 0\text{ V to }3.6\text{ V}$ ^[3] | 500 | - | - | μA |
| I_{BHHO} | bus hold HIGH overdrive current | $V_{CC} = 3.6\text{ V}; V_I = 0\text{ V to }3.6\text{ V}$ | - | - | -500 | μA |
| I_{EX} | external current | nYn output in HIGH-state when $V_O > V_{CC}; V_O = 5.5\text{ V}; V_{CC} = 3.3\text{ V}$ | - | 60 | 125 | μA |
| $I_{O(pu/pd)}$ | power-up/power-down output current | $V_{CC} \leq 1.2\text{ V}; V_O = 0.5\text{ V to }V_{CC}; V_I = \text{GND or }V_{CC}; n\overline{OE} = \text{don't care}$ ^[4] | -100 | ± 1 | +100 | μA |
| I_{OZ} | OFF-state output current | $V_{CC} = 3.6\text{ V}; V_I = V_{IH}\text{ or }V_{IL}$ | | | | |
| | | $V_O = 3.0\text{ V}$ | - | 1 | 5 | μA |
| | | $V_O = 0.5\text{ V}$ | -5 | -1 | - | μA |
| I_{CC} | supply current | $V_{CC} = 3.6\text{ V}; V_I = \text{GND or }V_{CC}; I_O = 0\text{ A}$ | | | | |
| | | output HIGH | - | 0.13 | 0.19 | mA |

| Symbol | Parameter | Conditions | Min | Typ ^[1] | Max | Unit |
|-----------------|---------------------------|--|-----|--------------------|------|------|
| | | output LOW | - | 2 | 5 | mA |
| | | outputs disabled ^[5] | - | 0.13 | 0.19 | mA |
| ΔI_{CC} | additional supply current | per input pin; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$; one input at $V_{CC} - 0.6\text{ V}$ and other inputs at V_{CC} or GND ^[6] | - | 0.1 | 0.2 | mA |
| C_I | input capacitance | $V_I = 0\text{ V or }3.0\text{ V}$ | - | 4 | - | pF |
| C_O | output capacitance | outputs disabled; $V_O = 0\text{ V or }3.0\text{ V}$ | - | 8 | - | pF |

[1] Typical values are measured at $T_{amb} = 25\text{ }^\circ\text{C}$.

[2] Unused pins at V_{CC} 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_{CC} between 0 V and 1.2 V with a transition time of up to 10 ms. From $V_{CC} = 1.2\text{ V to }V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ a transition time of 100 μs is permitted. This parameter is valid for $T_{amb} = 25\text{ }^\circ\text{C}$ only.

[5] I_{CC} is measured with outputs pulled to V_{CC} or GND.

[6] This is the increase in supply current for each input at $V_{CC} - 0.6\text{ V}$.

10 Dynamic characteristics

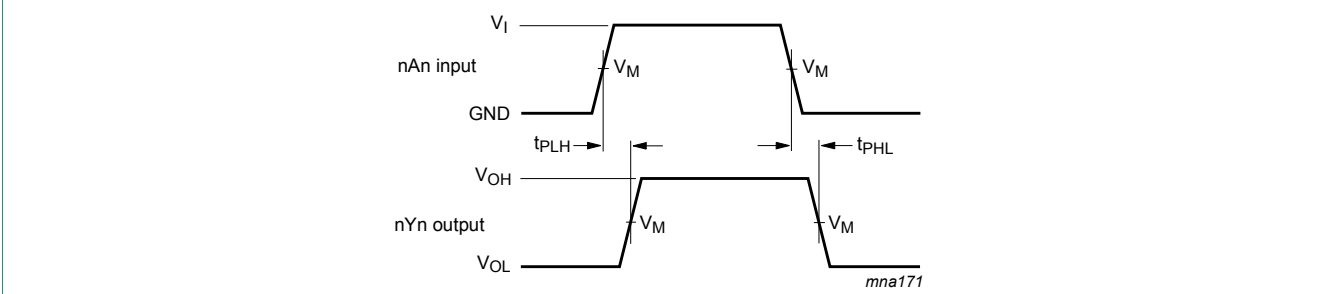
Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 6](#).

| Symbol | Parameter | Conditions | Min | Typ ^[1] | Max | Unit |
|--|-------------------------------------|---|-----|--------------------|-----|------|
| $T_{amb} = -40\text{ }^\circ\text{C to }+85\text{ }^\circ\text{C}$ | | | | | | |
| t_{PLH} | LOW to HIGH propagation delay | nAn to nYn; see Figure 4 | | | | |
| | | $V_{CC} = 2.7\text{ V}$ | - | - | 3.8 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.1 | 1.9 | 3.5 | ns |
| t_{PHL} | HIGH to LOW propagation delay | nAn to nYn; see Figure 4 | | | | |
| | | $V_{CC} = 2.7\text{ V}$ | - | - | 3.6 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.3 | 2.0 | 3.3 | ns |
| t_{PZH} | OFF-state to HIGH propagation delay | $n\overline{OE}$ to nYn; see Figure 5 | | | | |
| | | $V_{CC} = 2.7\text{ V}$ | - | - | 5.3 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.1 | 2.8 | 4.5 | ns |
| t_{PZL} | OFF-state to LOW propagation delay | $n\overline{OE}$ to nYn; see Figure 5 | | | | |
| | | $V_{CC} = 2.7\text{ V}$ | - | - | 4.9 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.4 | 2.3 | 4.4 | ns |
| t_{PHZ} | HIGH to OFF-state propagation delay | $n\overline{OE}$ to nYn; see Figure 5 | | | | |
| | | $V_{CC} = 2.7\text{ V}$ | - | - | 4.5 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.9 | 2.9 | 4.4 | ns |
| t_{PLZ} | LOW to OFF-state propagation delay | $n\overline{OE}$ to nYn; see Figure 5 | | | | |
| | | $V_{CC} = 2.7\text{ V}$ | - | - | 4.4 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.8 | 2.5 | 4.4 | ns |

[1] Typical values are measured at $V_{CC} = 3.3\text{ V}$ and $T_{amb} = 25\text{ }^\circ\text{C}$.

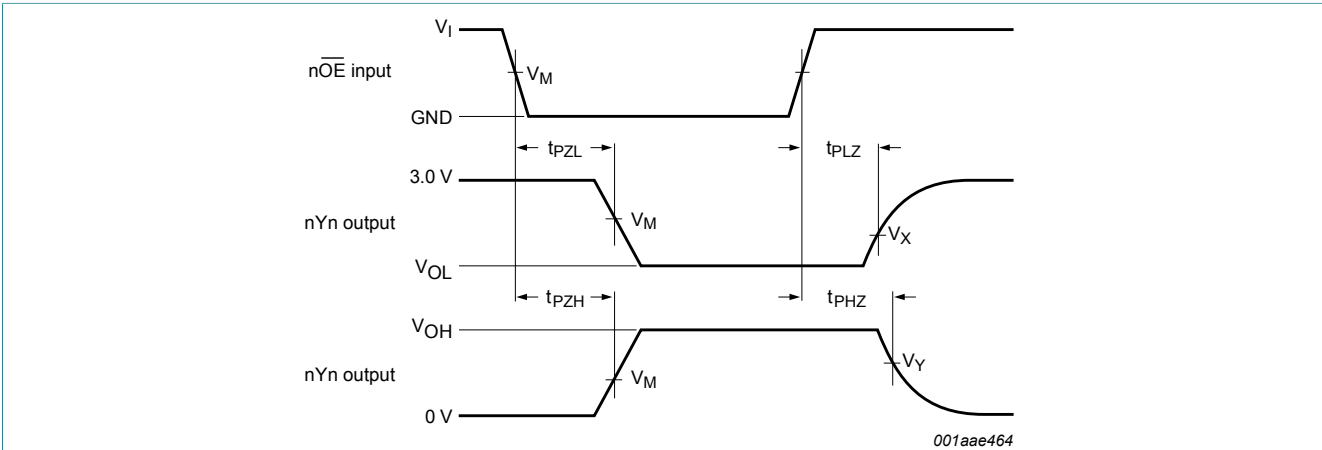
10.1 Waveforms and test circuit



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

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

Figure 4. Propagation delay input (nAn) to output (nYn)



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

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

Figure 5. 3-state output enable and disable times

Table 8. Measurement points

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

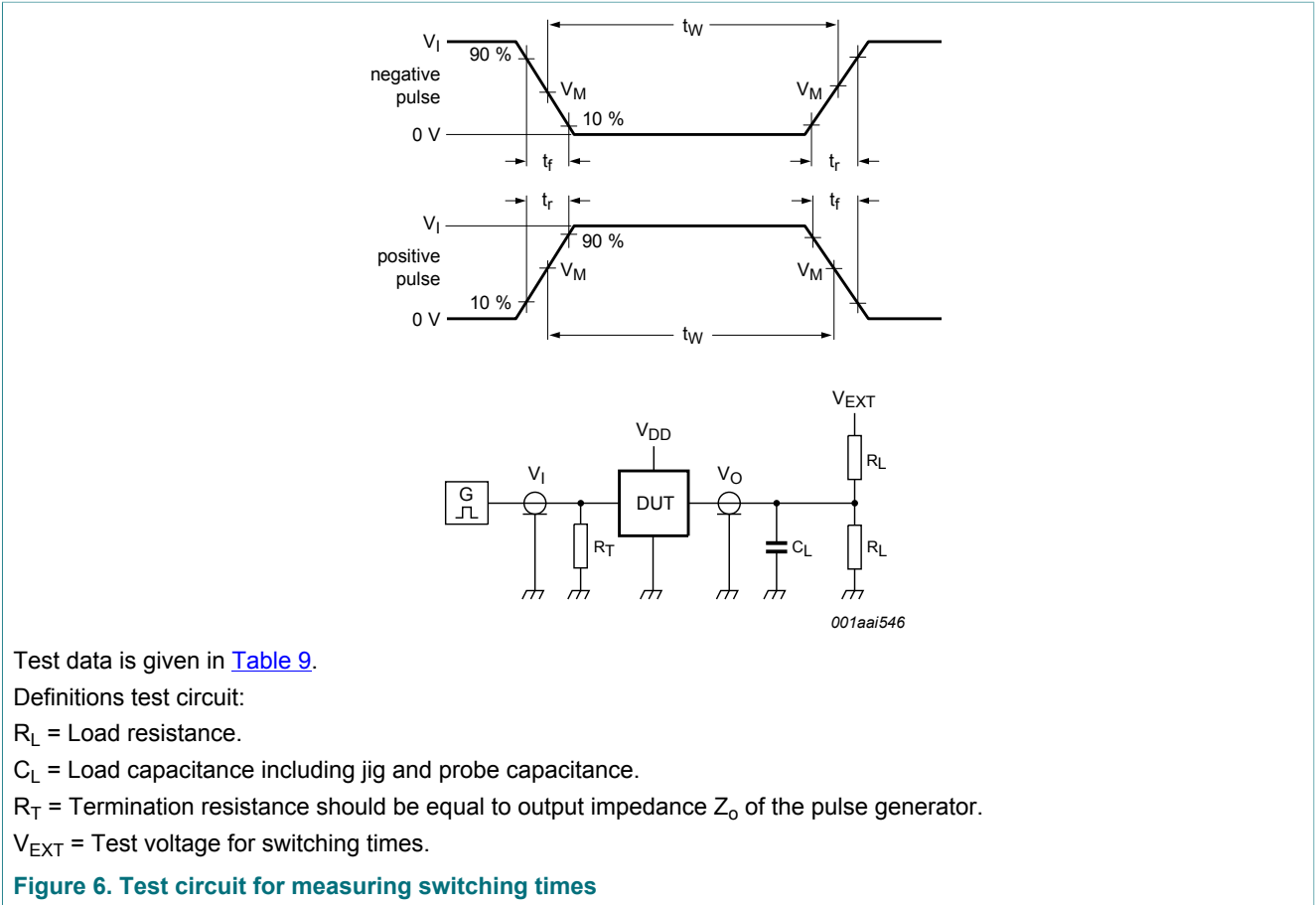


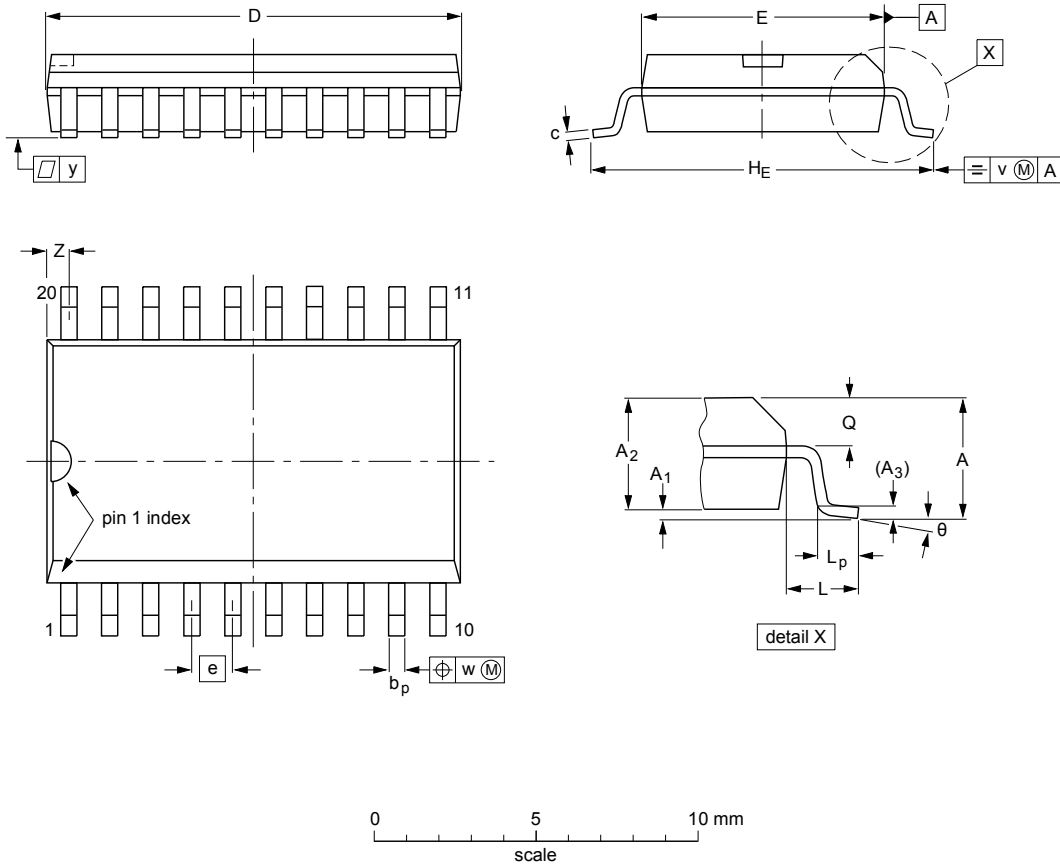
Table 9. Test data

| 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 | ≤ 10 MHz | 500 ns | ≤ 2.5 ns | 50 pF | 500 Ω | GND | 6 V | open |

11 Package outline

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽¹⁾ | e | H _E | L | L _p | Q | v | w | y | Z ⁽¹⁾ | θ |
|--------|--------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm | 2.65 | 0.3 0.1 | 2.45 2.25 | 0.25 | 0.49 0.36 | 0.32 0.23 | 13.0 12.6 | 7.6 7.4 | 1.27 | 10.65 10.00 | 1.4 | 1.1 0.4 | 1.1 1.0 | 0.25 | 0.25 | 0.1 | 0.9 0.4 | 8° 0° |
| inches | 0.1 | 0.012 0.004 | 0.096 0.089 | 0.01 | 0.019 0.014 | 0.013 0.009 | 0.51 0.49 | 0.30 0.29 | 0.05 | 0.419 0.394 | 0.055 | 0.043 0.016 | 0.043 0.039 | 0.01 | 0.01 | 0.004 | 0.035 0.016 | |

Note

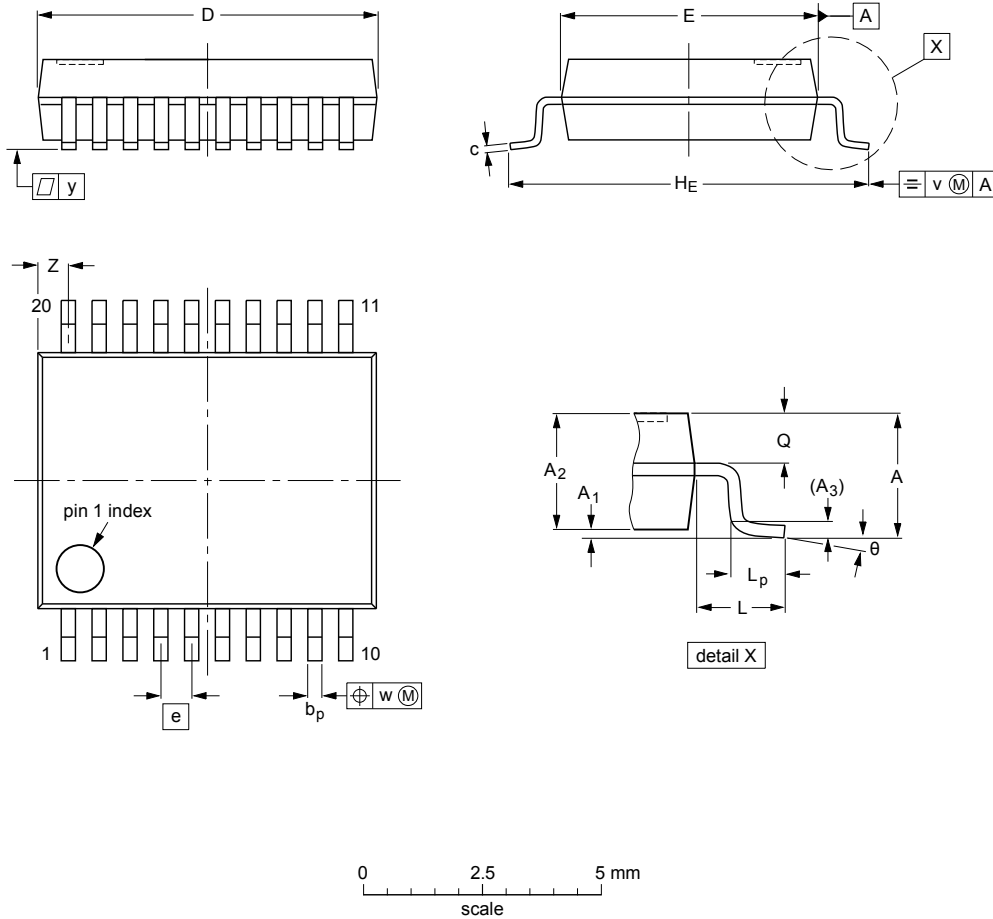
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT163-1 | 075E04 | MS-013 | | | 99-12-27 03-02-19 |

Figure 7. Package outline SOT163-1 (SO20)

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1



DIMENSIONS (mm are the original dimensions)

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽¹⁾ | e | H _E | L | L _p | Q | v | w | y | Z ⁽¹⁾ | θ |
|------|--------|----------------|----------------|----------------|----------------|--------------|------------------|------------------|------|----------------|------|----------------|------------|-----|------|-----|------------------|----------|
| mm | 2 | 0.21 0.05 | 1.80 1.65 | 0.25 | 0.38 0.25 | 0.20 0.09 | 7.4 7.0 | 5.4 5.2 | 0.65 | 7.9 7.6 | 1.25 | 1.03 0.63 | 0.9 0.7 | 0.2 | 0.13 | 0.1 | 0.9 0.5 | 8° 0° |

Note

1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|--|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT339-1 | | MO-150 | | | | 99-12-27 03-02-19 |

Figure 8. Package outline SOT339-1 (SSOP20)

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

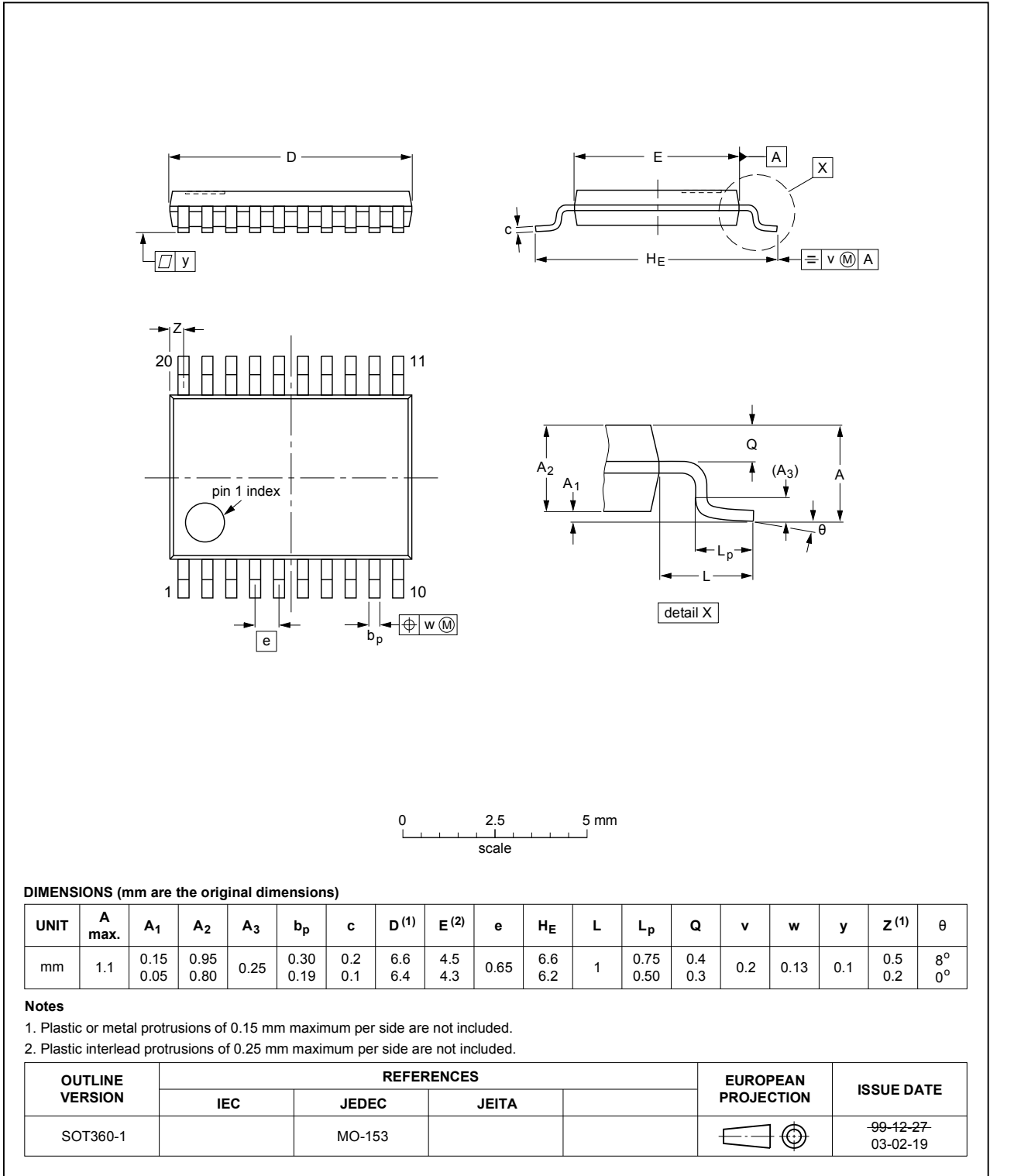


Figure 9. Package outline SOT360-1 (TSSOP20)

12 Abbreviations

Table 10. Abbreviations

| Acronym | Description |
|---------|---|
| BiCMOS | Bipolar 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 |
|--------------------|--|-----------------------|---------------|--------------------|
| 74LVT_LVTH244B v.4 | 20170614 | Product data sheet | - | 74LVT_LVTH244B v.3 |
| 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. | | | |
| 74LVT_LVTH244B v.3 | 20060303 | Product data sheet | - | 74LVT244B v.2 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. Section 3: Added type numbers 74LVTH244BD, 74LVTH244BDB and 74LVTH244BPW. | | | |
| 74LVT244B v.2 | 20030919 | Product specification | - | 74LVT244B v.1 |
| 74LVT244B v.1 | 19981101 | Product specification | - | - |

14 Legal information

14.1 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 URL <http://www.nexperia.com>.

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Date of release: 14 June 2017

Document identifier: 74LVT_LVTH244B