

# 74LVT2244

3.3 V octal buffer/line driver with 30  $\Omega$  termination resistors;  
3-state

Rev. 5 — 8 July 2024

Product data sheet

## 1. General description

The 74LVT2244 is an 8-bit buffer/line driver with 3-state outputs. The device can be used as two 4-bit buffers or one 8-bit buffer. The device features two output enables (1OE and 2OE), each controlling four of the 3-state outputs. A HIGH 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.

The 74LVT2244 is designed with 30  $\Omega$  series resistance in both the HIGH and LOW states of the output. This design reduces line noise in applications such as memory address drivers, clock drivers, and bus receivers/transmitters.

## 2. Features and benefits

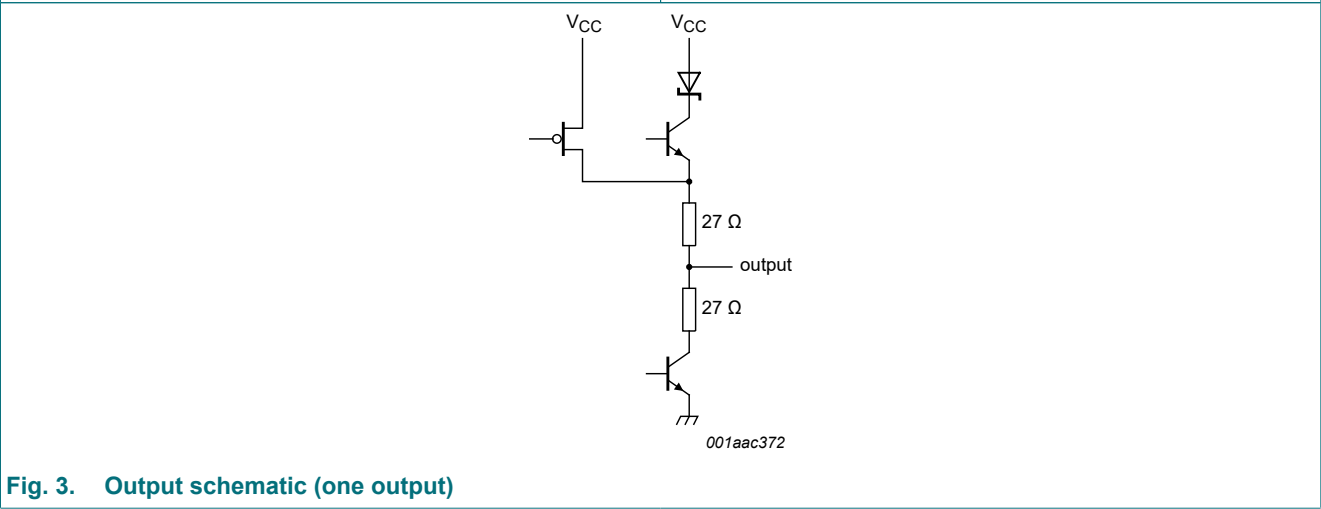
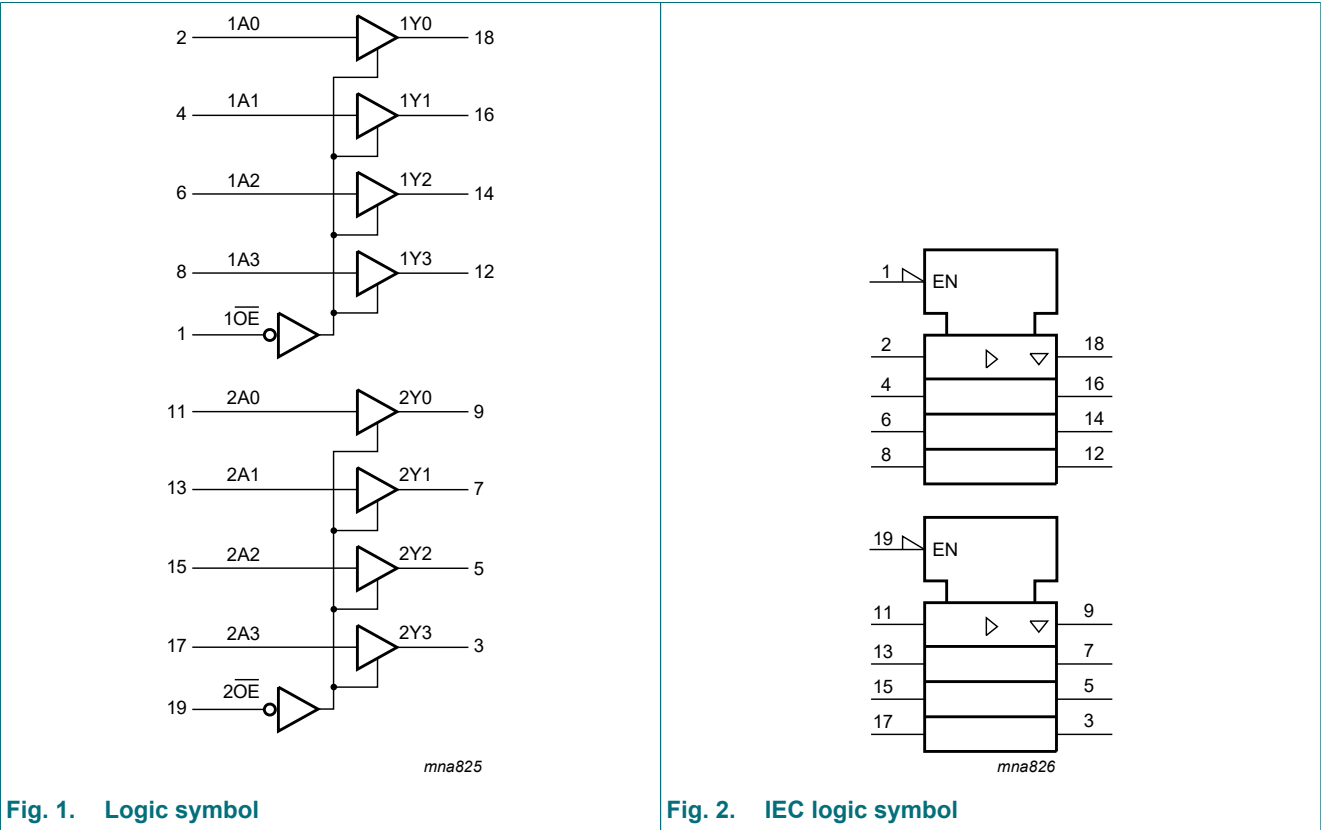
- Octal bus interface
- 3-state buffers
- Wide supply voltage range from 2.7 V to 3.6 V
- Overvoltage tolerant inputs to 5.5 V
- BiCMOS high speed and output drive
- Output capability: +12 mA and -12 mA
- Direct interface with TTL levels
- No bus current loading when output is tied to 5 V bus
- Bus hold on data inputs
- Power-up 3-state
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- Live insertion and extraction permitted
- Latch-up performance exceeds 500 mA per JESD 78 Class II Level B
- 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

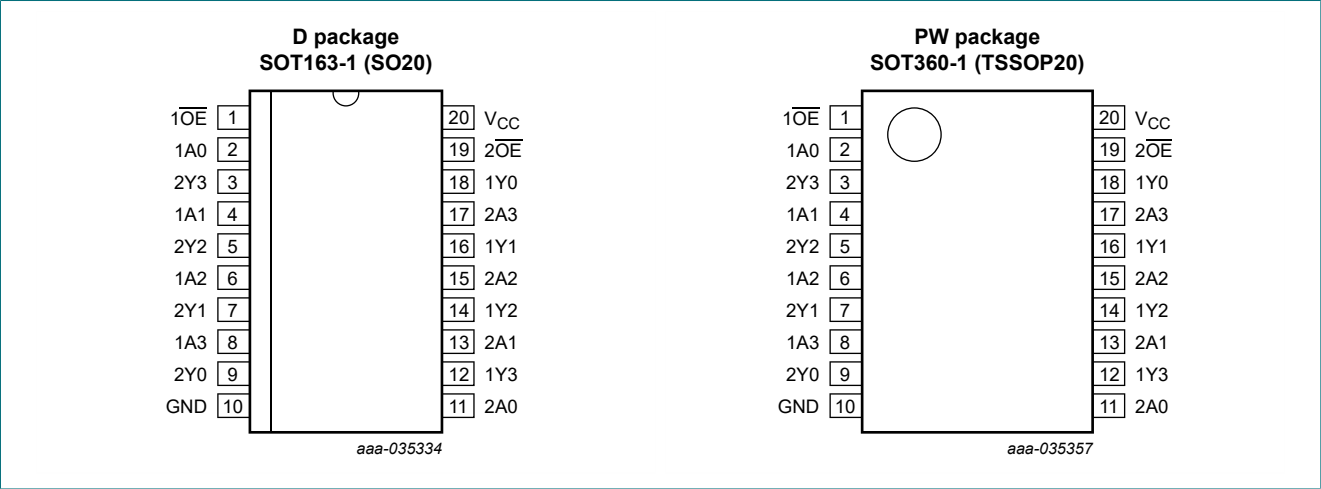
| Type number                 | Package           |         |                                                                        |                          |
|-----------------------------|-------------------|---------|------------------------------------------------------------------------|--------------------------|
|                             | Temperature range | Name    | Description                                                            | Version                  |
| <a href="#">74LVT2244D</a>  | -40 °C to +85 °C  | SO20    | plastic small outline package; 20 leads; body width 7.5 mm             | <a href="#">SOT163-1</a> |
| <a href="#">74LVT2244PW</a> | -40 °C to +85 °C  | TSSOP20 | plastic thin shrink small outline package; 20 leads; body width 4.4 mm | <a href="#">SOT360-1</a> |

4. Functional diagram



5. Pinning information

5.1. Pinning



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   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 to +85 °C      |      | 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. The maximum junction temperature of this integrated circuit should not exceed 150 °C.

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           |                 | -   | -   | -12 | mA   |
| I <sub>OL</sub>  | LOW-level output current            |                 | -   | -   | 12  | 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                                                                                                                           | T <sub>amb</sub> = -40 °C to +85 °C |         |      | Unit    |
|--------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------|------|---------|
|                          |                                    |                                                                                                                                      | Min                                 | Typ [1] | Max  |         |
| 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> = 3.0 V; I <sub>OH</sub> = -12 mA                                                                                    | 2.0                                 | 2.5     | -    | V       |
| V <sub>OL</sub>          | LOW-level output voltage           | V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 12 mA                                                                                     | -                                   | -       | 0.8  | 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   | $\mu$ A |
|                          |                                    | control pins                                                                                                                         |                                     |         |      |         |
|                          |                                    | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub> or GND                                                                     | -                                   | ±0.1    | ±1   | $\mu$ A |
|                          |                                    | data pins [2]                                                                                                                        |                                     |         |      |         |
|                          |                                    | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub>                                                                            | -                                   | 0.1     | 1    | $\mu$ A |
|                          |                                    | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = 0 V                                                                                        | -5                                  | -1      | -    | $\mu$ A |
| I <sub>OFF</sub>         | power-off leakage current          | V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 0 V to 4.5 V                                                               | -                                   | 1       | ±100 | $\mu$ A |
| I <sub>BHL</sub>         | bus hold LOW current               | V <sub>CC</sub> = 3 V; V <sub>I</sub> = 0.8 V [3]                                                                                    | 75                                  | 150     | -    | $\mu$ A |
| I <sub>BHH</sub>         | bus hold HIGH current              | V <sub>CC</sub> = 3 V; V <sub>I</sub> = 2.0 V                                                                                        | -                                   | -150    | -75  | $\mu$ A |
| I <sub>BHLO</sub>        | bus hold LOW overdrive current     | nAn input; V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = 3.6 V                                                                    | 500                                 | -       | -    | $\mu$ A |
| I <sub>BHHO</sub>        | bus hold HIGH overdrive current    | nAn input; V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = 3.6 V                                                                    | -                                   | -       | -500 | $\mu$ A |
| I <sub>EX</sub>          | external current                   | nYn 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  | $\mu$ A |
| 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 | $\mu$ A |
| I <sub>OZ</sub>          | OFF-state output current           | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                         |                                     |         |      |         |
|                          |                                    | V <sub>O</sub> = 3.0 V                                                                                                               | -                                   | 1       | 5    | $\mu$ A |
|                          |                                    | V <sub>O</sub> = 0.5 V                                                                                                               | -5                                  | -1      | -    | $\mu$ A |
| 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                                              |                                     |         |      |         |
|                          |                                    | output HIGH                                                                                                                          | -                                   | 0.12    | 0.19 | mA      |
|                          |                                    | outputs LOW                                                                                                                          | -                                   | 3       | 12   | mA      |
|                          |                                    | outputs disabled [5]                                                                                                                 | -                                   | 0.12    | 0.19 | mA      |
| $\Delta$ I <sub>CC</sub> | additional supply current          | per input pin; V <sub>CC</sub> = 3.0 V to 3.6 V; one input at V <sub>CC</sub> - 0.6 V and 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 3.0 V                                                                                                        | -                                   | 4       | -    | pF      |
| C <sub>O</sub>           | output capacitance                 | outputs disabled; V <sub>O</sub> = 0 V or 3.0 V                                                                                      | -                                   | 7       | -    | pF      |

[1] All typical values are at 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  $\mu$ s is permitted. This parameter is valid for T<sub>amb</sub> = 25 °C only.

[5] I<sub>CC</sub> is measured with outputs pulled 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. 6.

| 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       | nAn to nYn; see Fig. 4                      |                                     |         |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V                     | -                                   | -       | 5.3 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.0 V to 3.6 V            | 1                                   | 2.9     | 4.4 | ns   |
| t <sub>PHL</sub> | HIGH to LOW propagation delay       | nAn to nYn; see Fig. 4                      |                                     |         |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V                     | -                                   | -       | 4.4 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.0 V to 3.6 V            | 1                                   | 2.9     | 4.1 | ns   |
| t <sub>PZH</sub> | OFF-state to HIGH propagation delay | n $\overline{\text{OE}}$ to nYn; see Fig. 5 |                                     |         |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V                     | -                                   | -       | 7.7 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.0 V to 3.6 V            | 1                                   | 3.7     | 5.9 | ns   |
| t <sub>PZL</sub> | OFF-state to LOW propagation delay  | n $\overline{\text{OE}}$ to nYn; see Fig. 5 |                                     |         |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V                     | -                                   | -       | 6.2 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.0 V to 3.6 V            | 1.1                                 | 3.7     | 5.5 | ns   |
| t <sub>PHZ</sub> | HIGH to OFF-state propagation delay | n $\overline{\text{OE}}$ to nYn; see Fig. 5 |                                     |         |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V                     | -                                   | -       | 6.8 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.0 V to 3.6 V            | 1.9                                 | 4.3     | 6.1 | ns   |
| t <sub>PLZ</sub> | LOW to OFF-state propagation delay  | n $\overline{\text{OE}}$ to nYn; see Fig. 5 |                                     |         |     |      |
|                  |                                     | V <sub>CC</sub> = 2.7 V                     | -                                   | -       | 4.5 | ns   |
|                  |                                     | V <sub>CC</sub> = 3.0 V to 3.6 V            | 1.8                                 | 3.3     | 4.5 | ns   |

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

10.1. Waveforms and test circuit

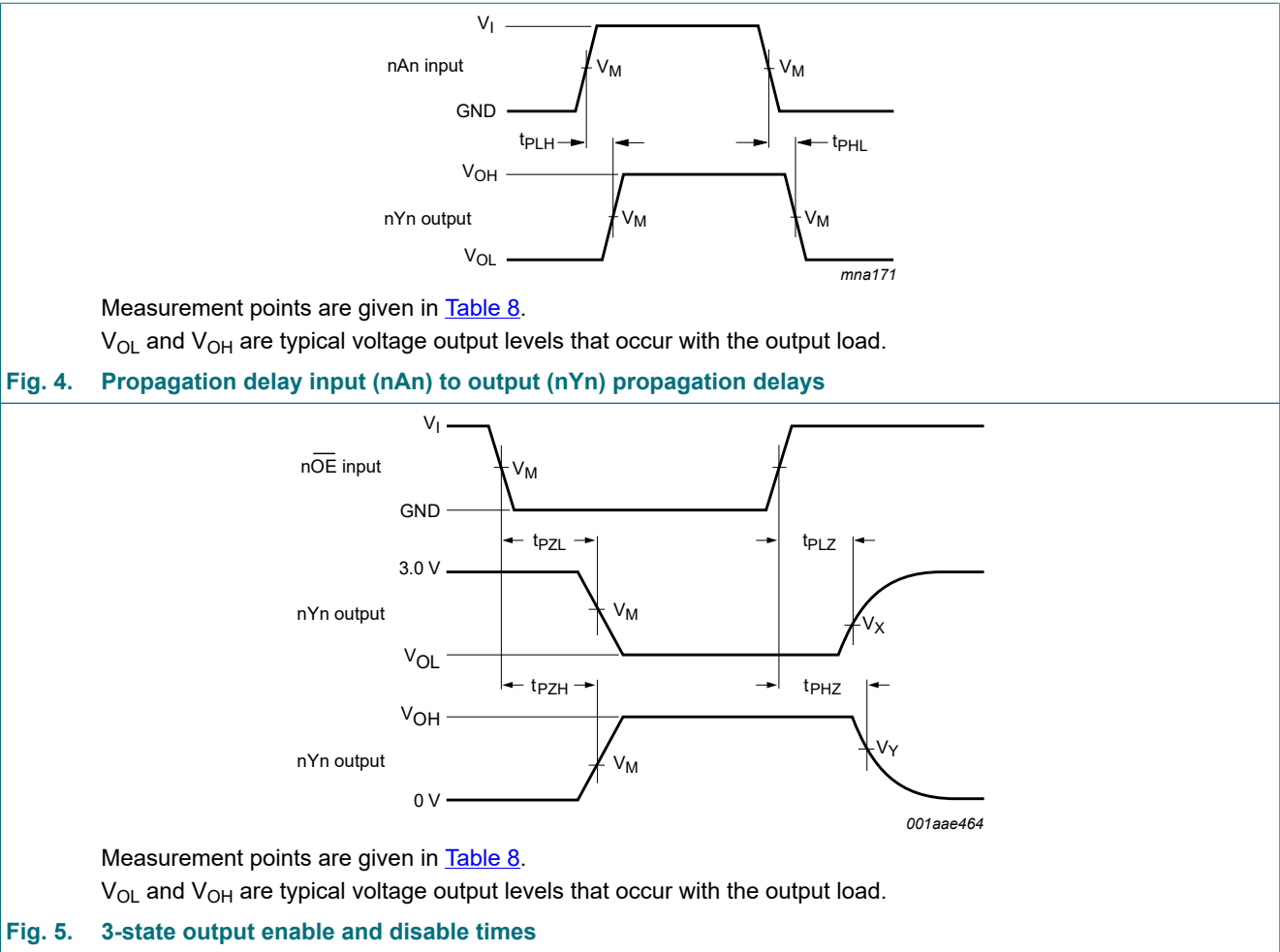


Table 8. Measurement points

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

3.3 V octal buffer/line driver with 30 Ω termination resistors; 3-state

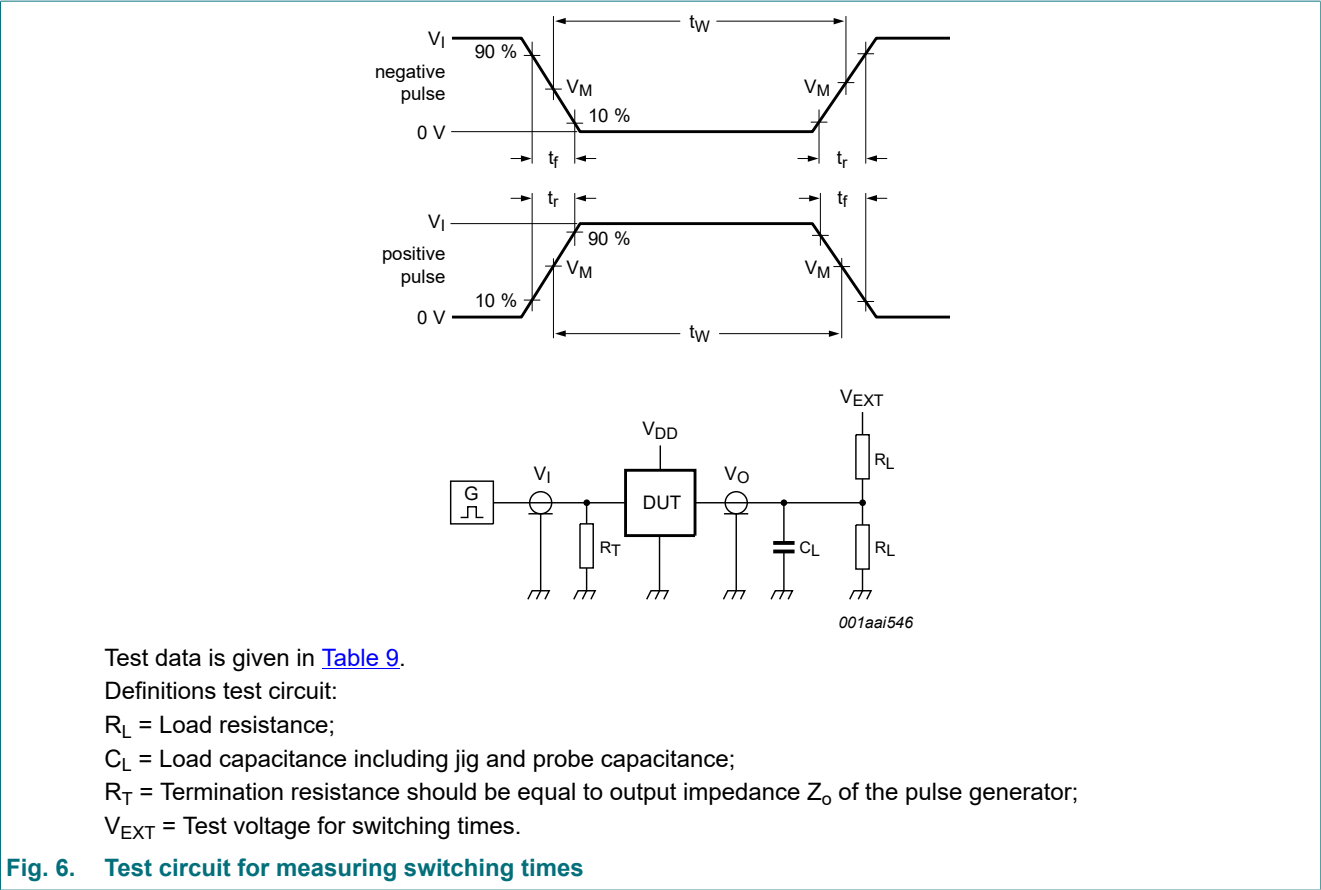


Table 9. Test data

| 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 Ω | GND                | 6 V                | open               |

11. Package outline

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

SOT163-1



Fig. 7. Package outline SOT163-1 (SO20)

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

SOT360-1

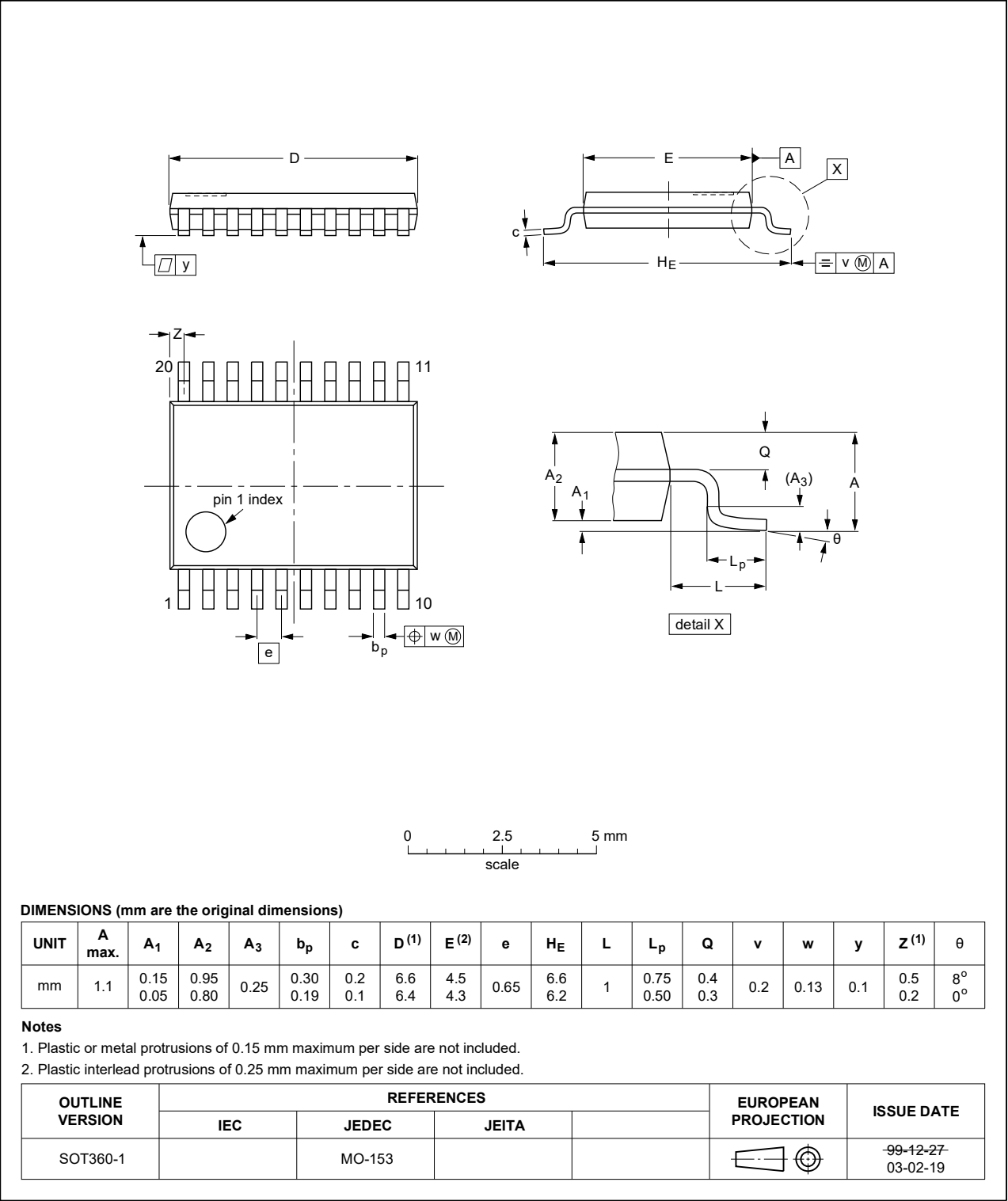


Fig. 8. Package outline SOT360-1 (TSSOP20)

12. Abbreviations

Table 10. Abbreviations

| Acronym | Description                                      |
|---------|--------------------------------------------------|
| ANSI    | American National Standards Institute            |
| BiCMOS  | Bi-polar Complementary Metal Oxide Semiconductor |
| CDM     | Charged Device Model                             |
| DUT     | Device Under Test                                |
| ESD     | ElectroStatic Discharge                          |
| ESDA    | ElectroStatic Discharge Association              |
| HBM     | Human Body Model                                 |
| JEDEC   | Joint Electron Device Engineering Council        |
| TTL     | Transistor-Transistor Logic                      |

13. Revision history

Table 11. Revision history

| Document ID    | Release date                                                                                                                                                                                                                                                                                                                                                                                                                                  | Data sheet status     | Change notice | Supersedes    |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|---------------|
| 74LVT2244 v.5  | 20240708                                                                                                                                                                                                                                                                                                                                                                                                                                      | Product data sheet    | -             | 74LVT2244 v.4 |
| Modifications: | <ul style="list-style-type: none"><li>Section 2: ESD specification updated according to the latest JEDEC standard.</li></ul>                                                                                                                                                                                                                                                                                                                  |                       |               |               |
| 74LVT2244 v.4  | 20210517                                                                                                                                                                                                                                                                                                                                                                                                                                      | Product data sheet    | -             | 74LVT2244 v.3 |
| 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><li>Type number 74LVT2244DB (SOT339-1 / SSOP20) removed.</li><li>Section 1 and Section 2 updated.</li><li>Section 7: Derating values for P<sub>tot</sub> total power dissipation removed (errata).</li></ul> |                       |               |               |
| 74LVT2244 v.3  | 20160901                                                                                                                                                                                                                                                                                                                                                                                                                                      | Product data sheet    | -             | 74LVT2244 v.2 |
| Modifications: | <ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>Legal texts have been adapted to the new company name where appropriate.</li></ul>                                                                                                                                                                                          |                       |               |               |
| 74LVT2244 v.2  | 19980219                                                                                                                                                                                                                                                                                                                                                                                                                                      | Product specification | -             | 74LVT2244 v.1 |
| 74LVT2244 v.1  | 19960828                                                                                                                                                                                                                                                                                                                                                                                                                                      | Product specification | -             | -             |

## 14. Legal information

### Data sheet status

| Document status<br>[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.                       |
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- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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