

# 74LVC245A; 74LVCH245A

Octal bus transceiver; 3-state

Rev. 13 — 8 August 2023

Product data sheet

## 1. General description

The 74LVC245A; 74LVCH245A is an 8-bit transceiver with 3-state outputs. The device features an output enable ( $\overline{OE}$ ) and send/receive (DIR) for direction control. A HIGH on  $\overline{OE}$  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

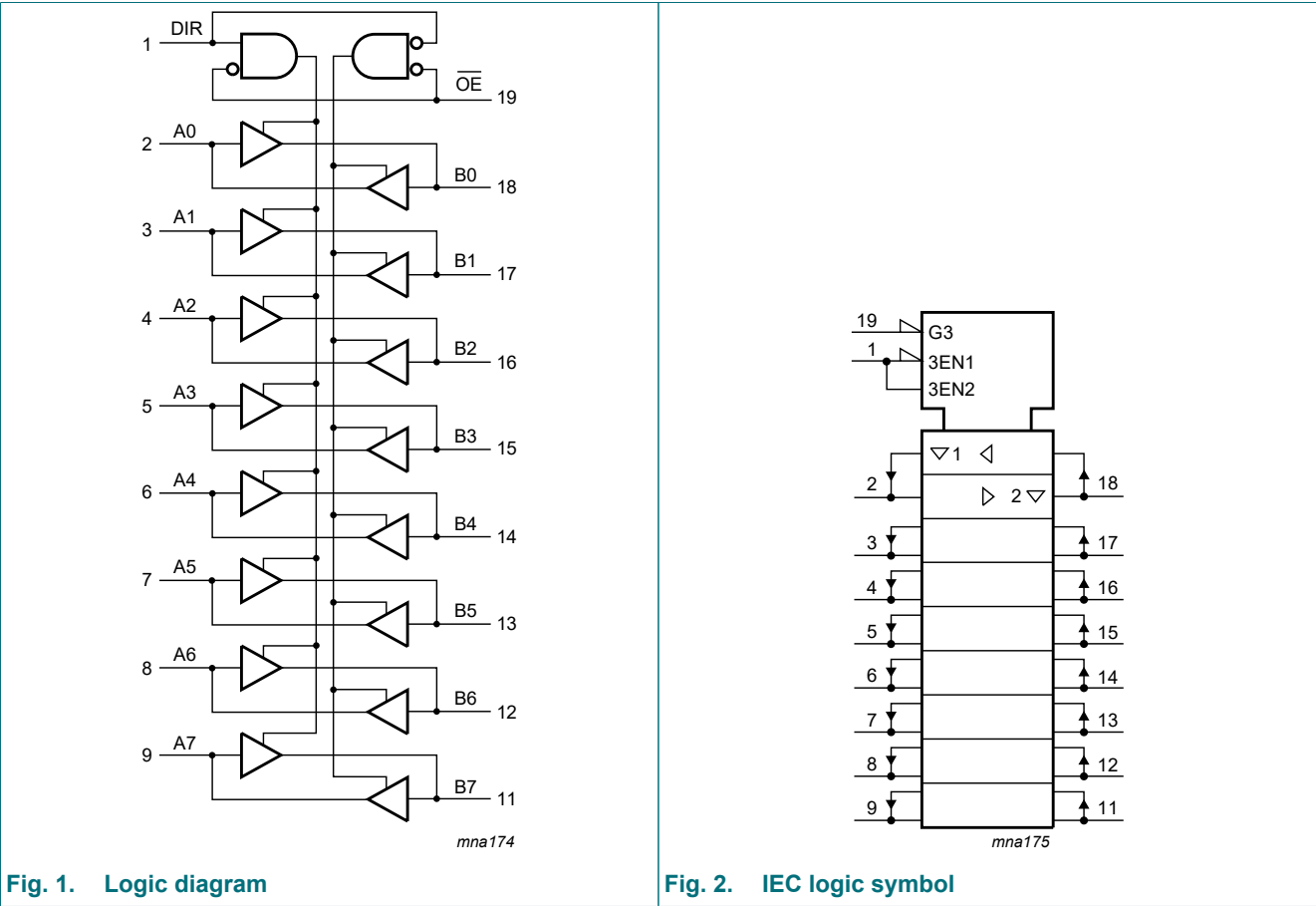
- Wide supply voltage range from 1.2 V to 3.6 V
- CMOS low-power consumption
- Direct interface with TTL levels
- Overvoltage tolerant inputs to 5.5 V
- Bus hold on all data inputs (74LVCH245A only)
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Complies with JEDEC standard:
  - 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: 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 and -40 °C to +125 °C

## 3. Ordering information

Table 1. Ordering information

| Type number                                                 | Package           |          |                                                                                                                                                                        |                           |
|-------------------------------------------------------------|-------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                                                             | Temperature range | Name     | Description                                                                                                                                                            | Version                   |
| <a href="#">74LVC245AD</a><br><a href="#">74LVCH245AD</a>   | -40 °C to +125 °C | SO20     | plastic small outline package; 20 leads;<br>body width 7.5 mm                                                                                                          | <a href="#">SOT163-1</a>  |
| <a href="#">74LVC245APW</a><br><a href="#">74LVCH245APW</a> | -40 °C to +125 °C | TSSOP20  | plastic thin shrink small outline package; 20 leads;<br>body width 4.4 mm                                                                                              | <a href="#">SOT360-1</a>  |
| <a href="#">74LVC245ABQ</a><br><a href="#">74LVCH245ABQ</a> | -40 °C to +125 °C | DHVQFN20 | plastic dual in-line compatible thermal enhanced<br>very thin quad flat package; no leads; 20 terminals;<br>body 2.5 × 4.5 × 0.85 mm                                   | <a href="#">SOT764-1</a>  |
| <a href="#">74LVC245ABZ</a>                                 | -40 °C to +125 °C | DHXQFN20 | plastic, leadless dual in-line compatible thermal<br>enhanced extreme thin quad flat package;<br>no leads; 20 terminals; 0.4 mm pitch;<br>body 2 mm × 3.2 mm × 0.48 mm | <a href="#">SOT8020-1</a> |

4. Functional diagram



5. Pinning information

5.1. Pinning

**D package**  
**SOT163-1 (SO20)**

aaa-035026

**PW package**  
**SOT360-1 (TSSOP20)**

aaa-035027

**BQ package**  
**SOT764-1 (DHVQFN20)**

aaa-035029

Transparent top view

**BZ package**  
**SOT8020-1 (DHXQFN20)**

aaa-035355

Transparent top view

(1) This is not a ground pin. There is no electrical or mechanical requirement to solder the pad. In case soldered, the solder land should remain floating or connected to GND.

5.2. Pin description

Table 2. Pin description

| Symbol                         | Pin                            | Description                      |
|--------------------------------|--------------------------------|----------------------------------|
| DIR                            | 1                              | direction control                |
| A0, A1, A2, A3, A4, A5, A6, A7 | 2, 3, 4, 5, 6, 7, 8, 9         | data input/output                |
| GND                            | 10                             | ground (0 V)                     |
| B0, B1, B2, B3, B4, B5, B6, B7 | 18, 17, 16, 15, 14, 13, 12, 11 | data input/output                |
| OE                             | 19                             | output enable input (active LOW) |
| VCC                            | 20                             | 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 |     | Inputs/outputs |         |
|--------|-----|----------------|---------|
| OE     | DIR | An             | Bn      |
| L      | L   | An = Bn        | inputs  |
| L      | H   | inputs         | Bn = An |
| H      | X   | Z              | Z       |

## 7. Limiting values

**Table 4. Limiting values**

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

| Symbol           | Parameter               | Conditions                                               | Min  | Max                   | Unit |
|------------------|-------------------------|----------------------------------------------------------|------|-----------------------|------|
| V <sub>CC</sub>  | supply voltage          |                                                          | -0.5 | +6.5                  | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < 0 V                                     | -50  | -                     | mA   |
| V <sub>I</sub>   | input voltage           | [1]                                                      | -0.5 | +6.5                  | V    |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> > V <sub>CC</sub> or V <sub>O</sub> < 0 V | -    | ±50                   | mA   |
| V <sub>O</sub>   | output voltage          | output HIGH or LOW [2]                                   | -0.5 | V <sub>CC</sub> + 0.5 | V    |
|                  |                         | output 3-state [2]                                       | -0.5 | +6.5                  | V    |
| I <sub>O</sub>   | output current          | V <sub>O</sub> = 0 V to V <sub>CC</sub>                  | -    | ±50                   | mA   |
| I <sub>CC</sub>  | supply current          |                                                          | -    | 100                   | mA   |
| I <sub>GND</sub> | ground current          |                                                          | -100 | -                     | mA   |
| T <sub>stg</sub> | storage temperature     |                                                          | -65  | +150                  | °C   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 °C to +125 °C                     |      |                       |      |
|                  |                         | SOT163-1 (SO20) [3]                                      | -    | 500                   | mW   |
|                  |                         | SOT360-1 (TSSOP20) [4]                                   |      |                       |      |
|                  |                         | SOT764-1 (DHVQFN20) [5]                                  |      |                       |      |
|                  |                         | SOT8020-1 (DHXQFN20)                                     | -    | 250                   | 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 SOT163-1 (SO20) package: P<sub>tot</sub> derates linearly with 12.3 mW/K above 109 °C.

[4] For SOT360-1 (TSSOP20) package: P<sub>tot</sub> derates linearly with 10.0 mW/K above 100 °C.

[5] For SOT764-1 (DHVQFN20) package: P<sub>tot</sub> derates linearly with 12.9 mW/K above 111 °C.

## 8. Recommended operating conditions

Table 5. Recommended operating conditions

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

| Symbol            | Parameter                       | Conditions                                                                                                       | T <sub>amb</sub> = -40 °C to +85 °C |         |     | T <sub>amb</sub> = -40 °C to +125 °C |      | Unit |
|-------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------|-----|--------------------------------------|------|------|
|                   |                                 |                                                                                                                  | Min                                 | Typ [1] | Max | Min                                  | Max  |      |
| I <sub>I</sub>    | input leakage current           | V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 3.6 V [2]                                                       | -                                   | ±0.1    | ±5  | -                                    | ±20  | µA   |
| I <sub>OZ</sub>   | OFF-state output current        | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 5.5 V or GND; V <sub>CC</sub> = 3.6 V [3] | -                                   | ±0.1    | ±5  | -                                    | ±20  | µA   |
| I <sub>OFF</sub>  | power-off leakage current       | V <sub>I</sub> or V <sub>O</sub> = 5.5 V; V <sub>CC</sub> = 0.0 V                                                | -                                   | ±0.1    | ±10 | -                                    | ±20  | 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> = 3.6 V                           | -                                   | 0.1     | 10  | -                                    | 40   | µA   |
| ΔI <sub>CC</sub>  | additional supply current       | per input pin; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 2.7 V to 3.6 V  | -                                   | 5       | 500 | -                                    | 5000 | µA   |
| C <sub>I</sub>    | input capacitance               | V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND to V <sub>CC</sub>                                          | -                                   | 4.0     | -   | -                                    | -    | pF   |
| C <sub>I/O</sub>  | input/output capacitance        | V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND to V <sub>CC</sub>                                          | -                                   | 10      | -   | -                                    | -    | pF   |
| I <sub>BHL</sub>  | bus hold LOW current            | V <sub>CC</sub> = 1.65; V <sub>I</sub> = 0.58 V [4] [5]                                                          | 10                                  | -       | -   | 10                                   | -    | µA   |
|                   |                                 | V <sub>CC</sub> = 2.3; V <sub>I</sub> = 0.7 V                                                                    | 30                                  | -       | -   | 25                                   | -    | µA   |
|                   |                                 | V <sub>CC</sub> = 3.0; V <sub>I</sub> = 0.8 V                                                                    | 75                                  | -       | -   | 60                                   | -    | µA   |
| I <sub>BHH</sub>  | bus hold HIGH current           | V <sub>CC</sub> = 1.65; V <sub>I</sub> = 1.07 V [4] [5]                                                          | -10                                 | -       | -   | -10                                  | -    | µA   |
|                   |                                 | V <sub>CC</sub> = 2.3; V <sub>I</sub> = 1.7 V                                                                    | -30                                 | -       | -   | -25                                  | -    | µA   |
|                   |                                 | V <sub>CC</sub> = 3.0; V <sub>I</sub> = 2.0 V                                                                    | -75                                 | -       | -   | -60                                  | -    | µA   |
| I <sub>BHLO</sub> | bus hold LOW overdrive current  | V <sub>CC</sub> = 1.95 V [4] [6]                                                                                 | 200                                 | -       | -   | 200                                  | -    | µA   |
|                   |                                 | V <sub>CC</sub> = 2.7 V                                                                                          | 300                                 | -       | -   | 300                                  | -    | µA   |
|                   |                                 | V <sub>CC</sub> = 3.6 V                                                                                          | 500                                 | -       | -   | 500                                  | -    | µA   |
| I <sub>BHHO</sub> | bus hold HIGH overdrive current | V <sub>CC</sub> = 1.95 V [4] [6]                                                                                 | -200                                | -       | -   | -200                                 | -    | µA   |
|                   |                                 | V <sub>CC</sub> = 2.7 V                                                                                          | -300                                | -       | -   | -300                                 | -    | µA   |
|                   |                                 | V <sub>CC</sub> = 3.6 V                                                                                          | -500                                | -       | -   | -500                                 | -    | µA   |

[1] All typical values are measured at V<sub>CC</sub> = 3.3 V (unless stated otherwise) and T<sub>amb</sub> = 25 °C.

[2] The bus hold circuit is switched off when V<sub>I</sub> > V<sub>CC</sub> allowing 5.5 V on the input terminal.

[3] For I/O ports the parameter I<sub>OZ</sub> includes the input leakage current.

[4] Valid for data inputs of bus hold parts only (74LVCH245A). Note that control inputs do not have a bus hold circuit.

[5] The specified sustaining current at the data input holds the input below the specified V<sub>I</sub> level.

[6] The specified overdrive current at the data input forces the data input to the opposite input state.

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V). For test circuit see Fig. 5.

| Symbol             | Parameter                     | Conditions                                             | T <sub>amb</sub> = -40 °C to +85 °C |         |      | T <sub>amb</sub> = -40 °C to +125 °C |      | Unit |
|--------------------|-------------------------------|--------------------------------------------------------|-------------------------------------|---------|------|--------------------------------------|------|------|
|                    |                               |                                                        | Min                                 | Typ [1] | Max  | Min                                  | Max  |      |
| t <sub>pd</sub>    | propagation delay             | nAn to nBn; nBn to nAn; see Fig. 3 [2]                 |                                     |         |      |                                      |      |      |
|                    |                               | V <sub>CC</sub> = 1.2 V                                | -                                   | 17.0    | -    | -                                    | -    | ns   |
|                    |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                     | 1.5                                 | 6.5     | 14.6 | 1.5                                  | 16.9 | ns   |
|                    |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                       | 1.0                                 | 3.4     | 7.6  | 1.0                                  | 8.7  | ns   |
|                    |                               | V <sub>CC</sub> = 2.7 V                                | 1.5                                 | 3.4     | 7.3  | 1.5                                  | 9.5  | ns   |
|                    |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                       | 1.5                                 | 2.9     | 6.3  | 1.5                                  | 8.0  | ns   |
| t <sub>en</sub>    | enable time                   | n $\overline{\text{OE}}$ to nAn, nBn; see Fig. 4 [2]   |                                     |         |      |                                      |      |      |
|                    |                               | V <sub>CC</sub> = 1.2 V                                | -                                   | 22.0    | -    | -                                    | -    | ns   |
|                    |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                     | 1.9                                 | 8.3     | 19.5 | 1.9                                  | 22.5 | ns   |
|                    |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                       | 1.5                                 | 4.6     | 10.7 | 1.5                                  | 12.4 | ns   |
|                    |                               | V <sub>CC</sub> = 2.7 V                                | 1.5                                 | 4.8     | 9.5  | 1.5                                  | 12.0 | ns   |
|                    |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                       | 1.5                                 | 3.7     | 8.5  | 1.5                                  | 11.0 | ns   |
| t <sub>dis</sub>   | disable time                  | n $\overline{\text{OE}}$ to nAn, nBn; see Fig. 4 [2]   |                                     |         |      |                                      |      |      |
|                    |                               | V <sub>CC</sub> = 1.2 V                                | -                                   | 12.0    | -    | -                                    | -    | ns   |
|                    |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                     | 2.9                                 | 5.5     | 12.3 | 2.9                                  | 14.2 | ns   |
|                    |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                       | 1.0                                 | 3.1     | 7.1  | 1.0                                  | 8.2  | ns   |
|                    |                               | V <sub>CC</sub> = 2.7 V                                | 1.5                                 | 3.9     | 8.0  | 1.5                                  | 10.0 | ns   |
|                    |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                       | 1.7                                 | 3.6     | 7.0  | 1.7                                  | 9.0  | ns   |
| t <sub>sk(o)</sub> | output skew time              | [3]                                                    | -                                   | -       | 1.0  | -                                    | 1.5  | ns   |
| C <sub>PD</sub>    | power dissipation capacitance | per input; V <sub>I</sub> = GND to V <sub>CC</sub> [4] |                                     |         |      |                                      |      |      |
|                    |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                     | -                                   | 7.7     | -    | -                                    | -    | pF   |
|                    |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                       | -                                   | 11.3    | -    | -                                    | -    | pF   |
|                    |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                       | -                                   | 14.4    | -    | -                                    | -    | pF   |

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.2 V, 1.8 V, 2.5 V, 2.7 V and 3.3 V respectively.

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

[4] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> 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<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

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

10.1. Waveforms and test circuit

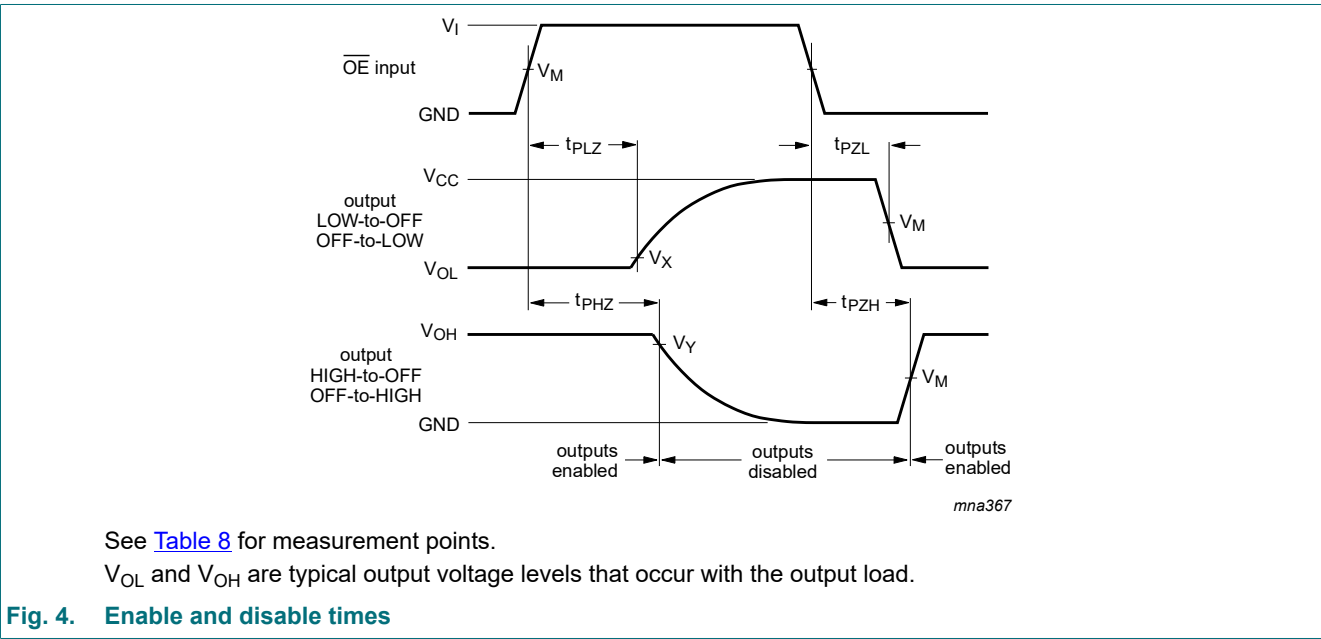
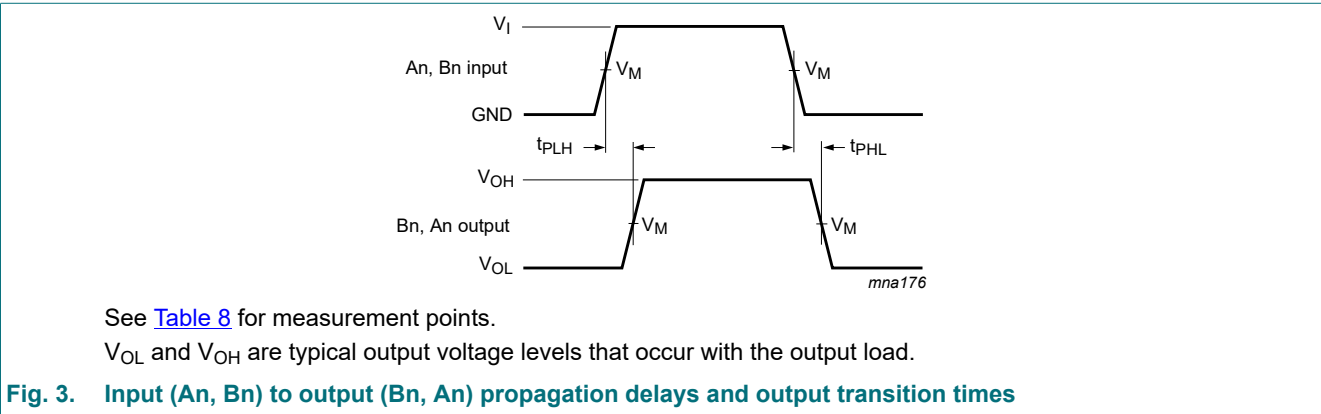
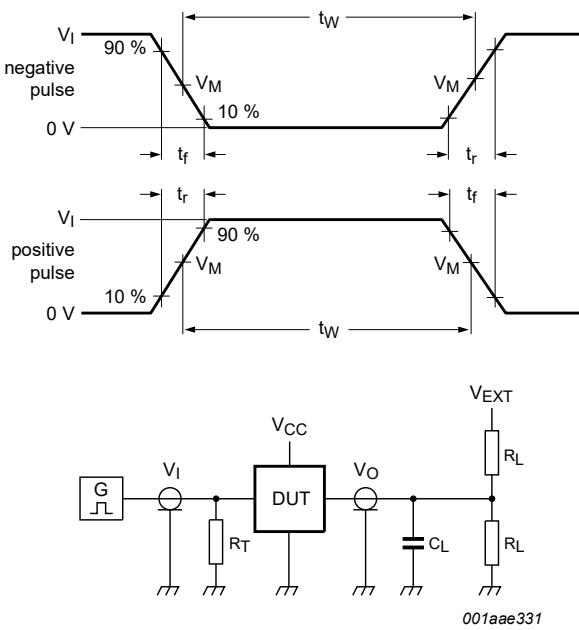


Table 8. Measurement points

| Supply voltage   | Input               |          | Output              |                           |                           |
|------------------|---------------------|----------|---------------------|---------------------------|---------------------------|
| $V_{CC}$         | $V_M$               | $V_I$    | $V_M$               | $V_X$                     | $V_Y$                     |
| 1.2 V            | $0.5 \times V_{CC}$ | $V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15 \text{ V}$ | $V_{OH} - 0.15 \text{ V}$ |
| 1.65 V to 1.95 V | $0.5 \times V_{CC}$ | $V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15 \text{ V}$ | $V_{OH} - 0.15 \text{ V}$ |
| 2.3 V to 2.7 V   | $0.5 \times V_{CC}$ | $V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15 \text{ V}$ | $V_{OH} - 0.15 \text{ V}$ |
| 2.7 V            | 1.5 V               | 2.7 V    | 1.5 V               | $V_{OL} + 0.3 \text{ V}$  | $V_{OH} - 0.3 \text{ V}$  |
| 3.0 V to 3.6 V   | 1.5 V               | 2.7 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. 5. Test circuit for measuring switching times

Table 9. Test data

| Supply voltage   | Input           |                                 | Load           |                | V <sub>EXT</sub>                    |                                     |                                     |
|------------------|-----------------|---------------------------------|----------------|----------------|-------------------------------------|-------------------------------------|-------------------------------------|
|                  | V <sub>I</sub>  | t <sub>r</sub> , t <sub>f</sub> | C <sub>L</sub> | R <sub>L</sub> | t <sub>PLH</sub> , t <sub>PHL</sub> | t <sub>PLZ</sub> , t <sub>PZL</sub> | t <sub>PHZ</sub> , t <sub>PZH</sub> |
| 1.2 V            | V <sub>CC</sub> | ≤ 2 ns                          | 30 pF          | 1 kΩ           | open                                | 2 × V <sub>CC</sub>                 | GND                                 |
| 1.65 V to 1.95 V | V <sub>CC</sub> | ≤ 2 ns                          | 30 pF          | 1 kΩ           | open                                | 2 × V <sub>CC</sub>                 | GND                                 |
| 2.3 V to 2.7 V   | V <sub>CC</sub> | ≤ 2 ns                          | 30 pF          | 500 Ω          | open                                | 2 × V <sub>CC</sub>                 | GND                                 |
| 2.7 V            | 2.7 V           | ≤ 2.5 ns                        | 50 pF          | 500 Ω          | open                                | 2 × V <sub>CC</sub>                 | GND                                 |
| 3.0 V to 3.6 V   | 2.7 V           | ≤ 2.5 ns                        | 50 pF          | 500 Ω          | open                                | 2 × V <sub>CC</sub>                 | GND                                 |

11. Package outline

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

SOT163-1



Fig. 6. Package outline SOT163-1 (SO20)

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

SOT360-1



Fig. 7. Package outline SOT360-1 (TSSOP20)

DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads;  
20 terminals; body 2.5 x 4.5 x 0.85 mm

SOT764-1

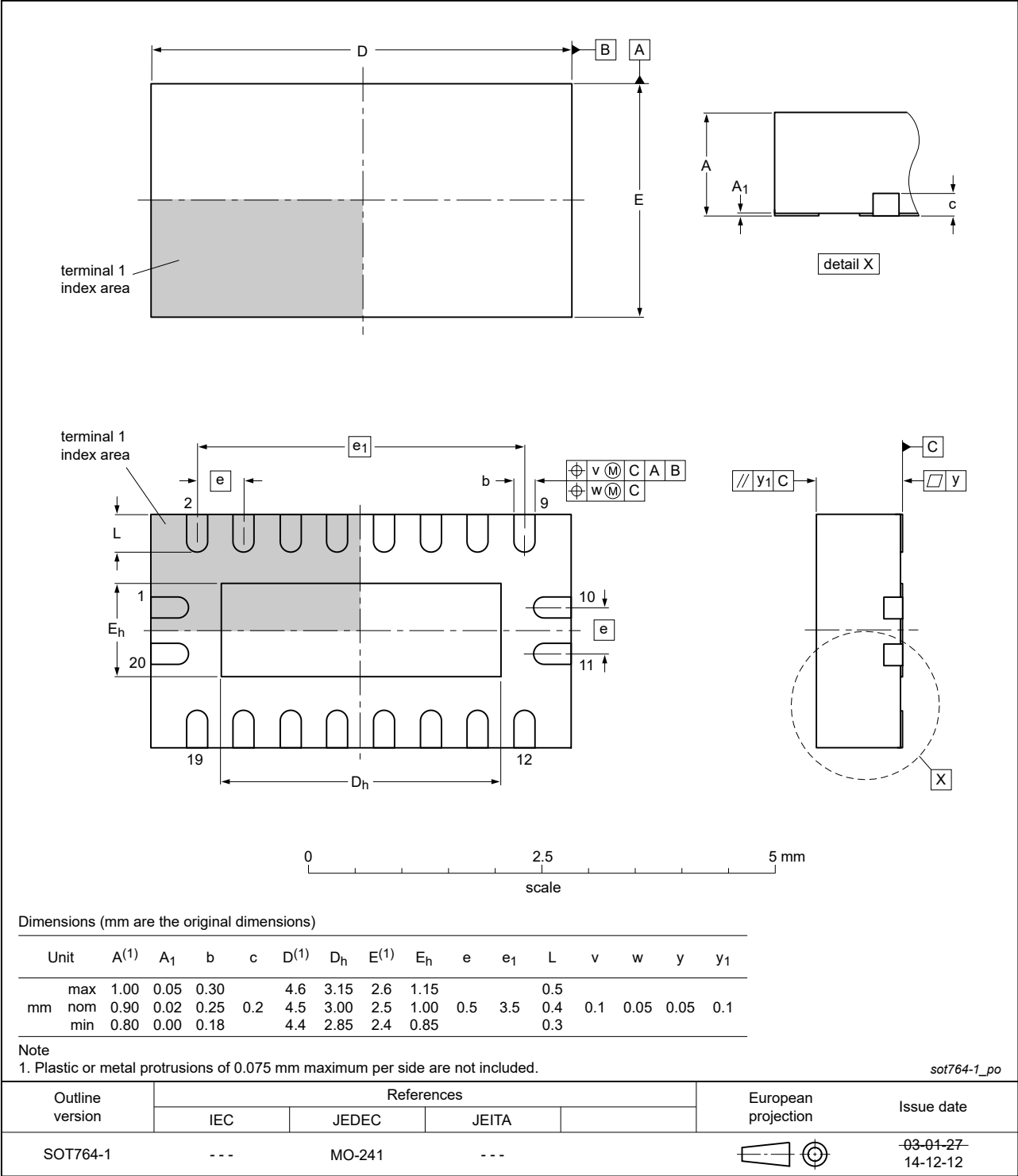


Fig. 8. Package outline SOT764-1 (DHVQFN20)

DHXQFN20: plastic, leadless dual in-line compatible thermal enhanced extreme thin quad flat package;  
no leads; 20 terminals; 0.4 mm pitch; body 2 mm x 3.2 mm x 0.48 mm

SOT8020-1

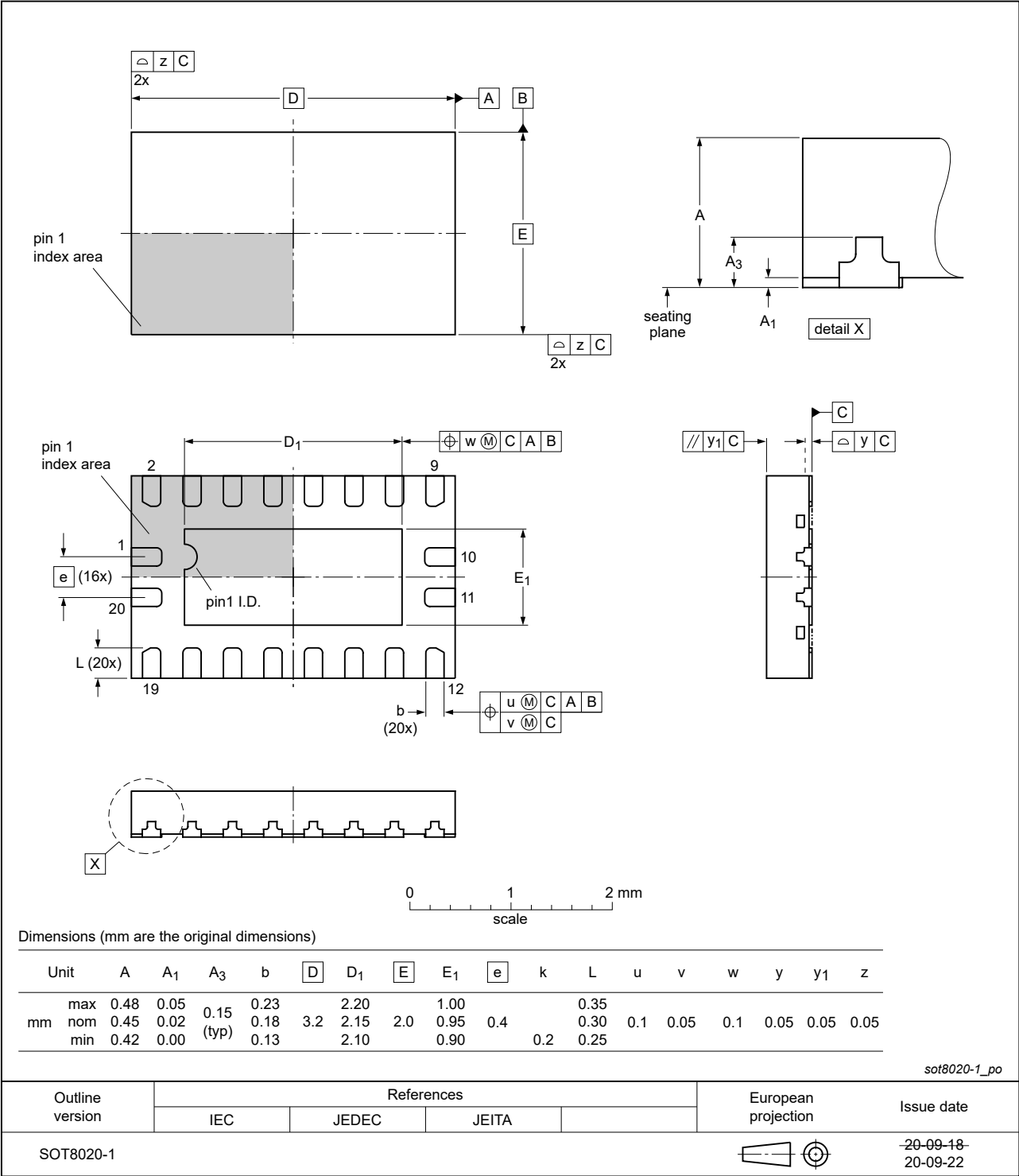


Fig. 9. Package outline SOT8020-1 (DHXQFN20)

## 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                        |
| TTL     | Transistor-Transistor Logic             |

## 13. Revision history

Table 11. Revision history

| Document ID              | Release date                                                                                                                                                                                                                                                                                                                                                                                    | Data sheet status     | Change notice | Supersedes               |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|--------------------------|
| 74LVC_LVCH245A v.13      | 20230808                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.12      |
| Modifications:           | <ul style="list-style-type: none"> <li><a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li> </ul>                                                                                                                                                                                                                                                  |                       |               |                          |
| 74LVC_LVCH245A v.12      | 20210916                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.11      |
| Modifications:           | <ul style="list-style-type: none"> <li>Type numbers 74LVC245ADB and 74LVCH245ADB (SOT339-1/SSOP20) removed.</li> </ul>                                                                                                                                                                                                                                                                          |                       |               |                          |
| 74LVC_LVCH245A v.11      | 20210429                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.10      |
| Modifications:           | <ul style="list-style-type: none"> <li>Type number 74LVC245ABZ (SOT8020-1 / DHXQFN20) added.</li> </ul>                                                                                                                                                                                                                                                                                         |                       |               |                          |
| 74LVC_LVCH245A v.10      | 20200805                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.9       |
| Modifications:           | <ul style="list-style-type: none"> <li><a href="#">Section 1</a> updated.</li> <li><a href="#">Table 4</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> <li><a href="#">Table 8</a> corrected (Errata).</li> </ul>                                                                                                                                           |                       |               |                          |
| 74LVC_LVCH245A v.9       | 20180911                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.8       |
| 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 numbers 74LVC245ABX and 74LVCH245ABX (SOT1045-2) removed.</li> <li><a href="#">Fig. 8</a>: Package outline drawing of SOT764-1 updated.</li> </ul> |                       |               |                          |
| 74LVC_LVCH245A v.8       | 20130628                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.7       |
| Modifications:           | <ul style="list-style-type: none"> <li>For type numbers 74LVC245ABX and 74LVCH245ABX DHXQFN20U (SOT1045-1) has changed to DHXQFN20 (SOT1045-2).</li> </ul>                                                                                                                                                                                                                                      |                       |               |                          |
| 74LVC_LVCH245A v.7       | 20120405                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.6       |
| Modifications:           | <ul style="list-style-type: none"> <li>Table note 4 of <a href="#">Table 6</a>: corrected (errata)</li> </ul>                                                                                                                                                                                                                                                                                   |                       |               |                          |
| 74LVC_LVCH245A v.6       | 20111125                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.5       |
| Modifications:           | <ul style="list-style-type: none"> <li><a href="#">Table 4</a>, <a href="#">Table 5</a>, <a href="#">Table 6</a>, <a href="#">Table 7</a>, and <a href="#">Table 9</a>: values added for lower voltage ranges.</li> </ul>                                                                                                                                                                       |                       |               |                          |
| 74LVC_LVCH245A v.5       | 20090825                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.4       |
| 74LVC_LVCH245A v.4       | 20090703                                                                                                                                                                                                                                                                                                                                                                                        | Product data sheet    | -             | 74LVC_LVCH245A v.3       |
| 74LVC_LVCH245A v.3       | 20030507                                                                                                                                                                                                                                                                                                                                                                                        | Product specification | -             | 74LVC245A_74LVCH245A v.2 |
| 74LVC245A_74LVCH245A v.2 | 20020620                                                                                                                                                                                                                                                                                                                                                                                        | Product specification | -             | 74LVC245A_74LVCH245A v.1 |
| 74LVC245A_74LVCH245A v.1 | 19971219                                                                                                                                                                                                                                                                                                                                                                                        | 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.
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