



74LVC16244A-Q100; 74LVCH16244A-Q100

16-bit buffer/line driver; 5 V input/output tolerant; 3-state

Rev. 8 — 9 April 2024

Product data sheet

1. General description

The 74LVC16244A-Q100; 74LVCH16244A-Q100 is a 16-bit buffer/line driver with 3-state outputs. The device can be used as four 4-bit buffers, two 8-bit buffers or one 16-bit buffer. The device features four output enables (1OE, 2OE, 3OE and 4OE), each controlling four of the 3-state outputs. A HIGH on nOE causes the outputs to assume a high-impedance OFF-state. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times. This device is fully specified for partial power down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

The 74LVCH16244A-Q100 bus hold on data inputs eliminates the need for external pull-up resistors to hold unused inputs.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

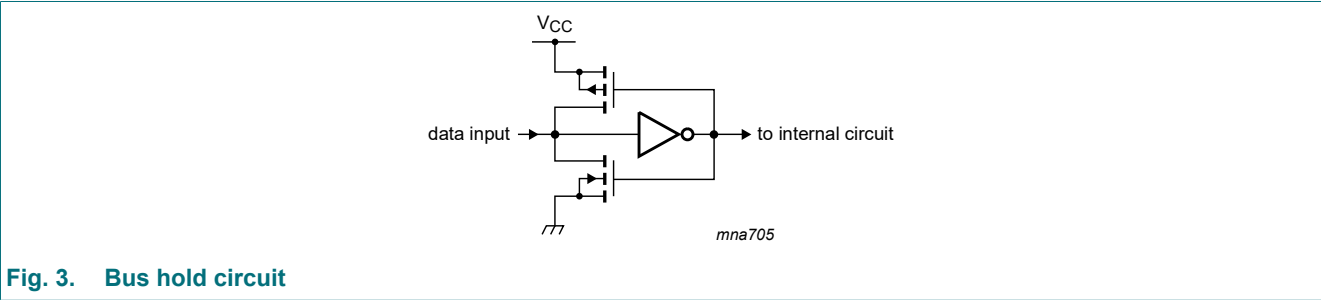
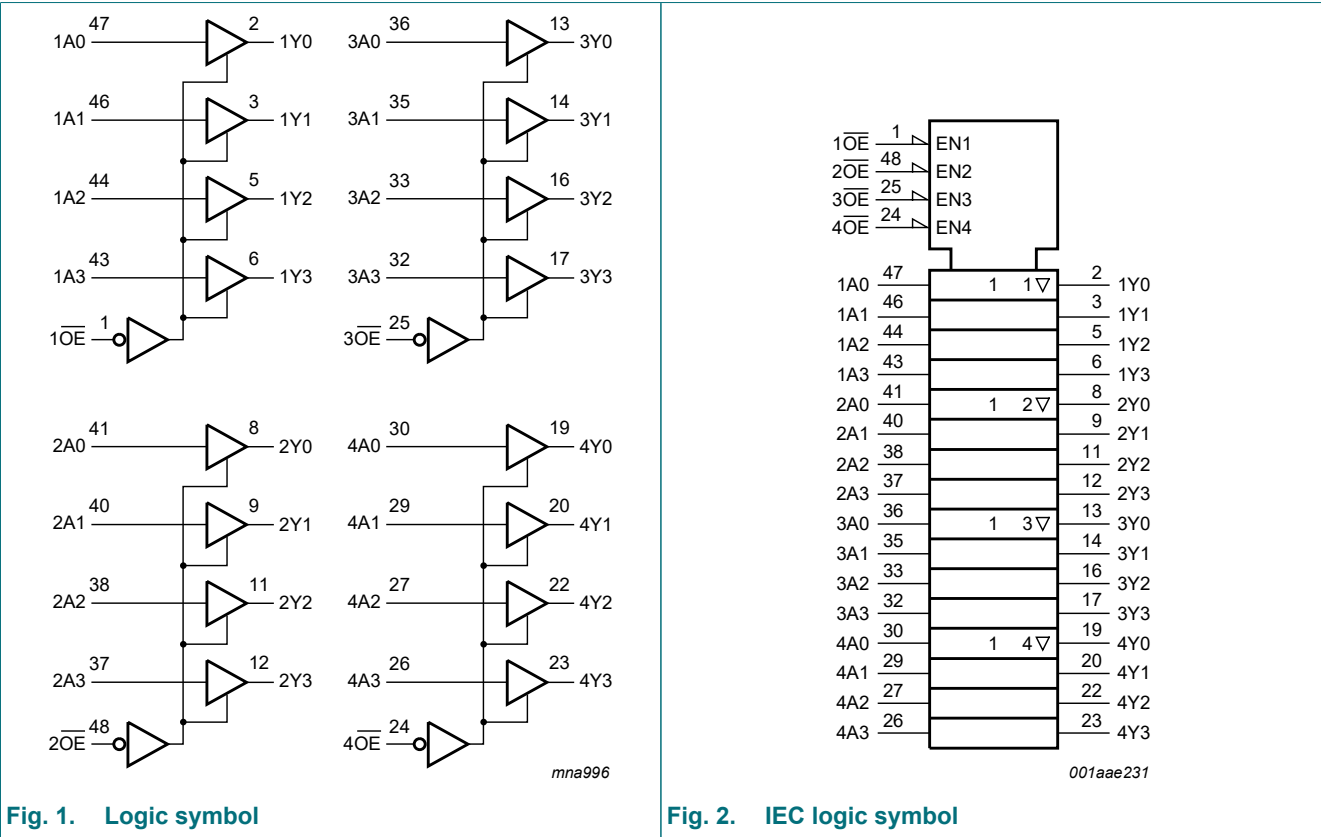
- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Wide supply voltage range from 1.2 V to 3.6 V
- 5 V tolerant inputs/outputs for interfacing with 5 V logic
- I_{OFF} circuitry provides partial Power-down mode operation
- CMOS low power consumption
- Multibyte flow-through standard pin-out architecture
- Low inductance multiple power and ground pins for minimum noise and ground bounce
- Direct interface with TTL levels
- High-impedance when $V_{CC} = 0$ V
- All data inputs have bus hold. (74LVCH16244A-Q100 only)
- 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

3. Ordering information

Table 1. Ordering information

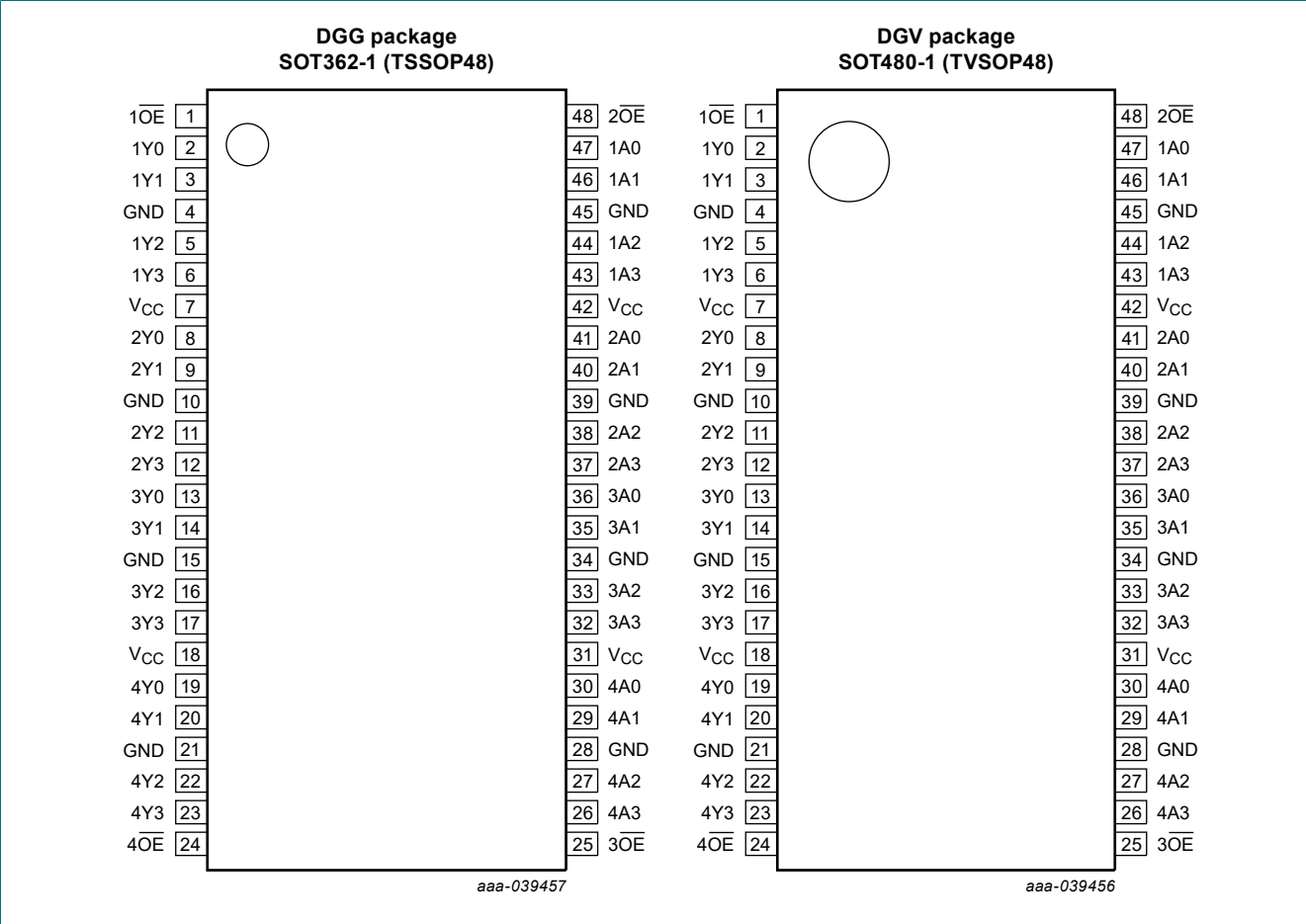
| Type number | Temperature range | Package | | |
|---|-------------------|---------|---|--------------------------|
| | | Name | Description | Version |
| 74LVC16244ADGG-Q100 74LVCH16244ADGG-Q100 | -40 °C to +125 °C | TSSOP48 | plastic thin shrink small outline package; 48 leads; body width 6.1 mm | SOT362-1 |
| 74LVC16244ADGV-Q100 74LVCH16244ADGV-Q100 | -40 °C to +125 °C | TVSOP48 | plastic thin shrink small outline package; 48 leads; body width 4.4 mm; lead pitch 0.4 mm | SOT480-1 |

4. Functional diagram



5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

| Symbol | Pin | Description |
|--------------------|-------------------------------|----------------------------------|
| 1OE, 2OE, 3OE, 4OE | 1, 48, 25, 24 | output enable input (active LOW) |
| 1Y0 to 1Y3 | 2, 3, 5, 6 | data output |
| 2Y0 to 2Y3 | 8, 9, 11, 12 | data output |
| 3Y0 to 3Y3 | 13, 14, 16, 17 | data output |
| 4Y0 to 4Y3 | 19, 20, 22, 23 | data output |
| GND | 4, 10, 15, 21, 28, 34, 39, 45 | ground (0 V) |
| VCC | 7, 18, 31, 42 | supply voltage |
| 1A0 to 1A3 | 47, 46, 44, 43 | data input |
| 2A0 to 2A3 | 41, 40, 38, 37 | data input |
| 3A0 to 3A3 | 36, 35, 33, 32 | data input |
| 4A0 to 4A3 | 30, 29, 27, 26 | data input |

6. Functional description

Table 3. Function table

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

| Control | Input | Output |
|---------|-------|--------|
| nOE | nAn | nYn |
| L | L | L |
| L | H | H |
| H | X | 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 _{CC} | supply voltage | | -0.5 | +6.5 | V |
| I _{IK} | input clamping current | V _I < 0 V | -50 | - | mA |
| V _I | input voltage | [1] | -0.5 | +6.5 | V |
| I _{OK} | output clamping current | V _O > V _{CC} or V _O < 0 V | - | ±50 | mA |
| V _O | output voltage | output HIGH or LOW [2] | -0.5 | V _{CC} + 0.5 | V |
| | | output 3-state [2] | -0.5 | +6.5 | V |
| I _O | output current | V _O = 0 V to V _{CC} | - | ±50 | mA |
| I _{CC} | supply current | | - | 100 | mA |
| I _{GND} | ground current | | -100 | - | mA |
| T _{stg} | storage temperature | | -65 | +150 | °C |
| P _{tot} | total power dissipation | T _{amb} = -40 °C to +125 °C; [3] | - | 500 | mW |

- [1] The minimum input voltage ratings may be exceeded if the input current ratings are observed.
[2] The output voltage ratings may be exceeded if the output current ratings are observed.
[3] For SOT362-1 (TSSOP48) packages: P_{tot} derates linearly with 12.2 mW/K above 109 °C.
For SOT480-1 (TVSOP48) packages: P_{tot} derates linearly with 5.5 mW/K above 60 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------------------------|----------------------------------|------|-----|-----------------|------|
| V _{CC} | supply voltage | | 1.65 | - | 3.6 | V |
| | | functional | 1.2 | - | 3.6 | V |
| V _I | input voltage | | 0 | - | 5.5 | V |
| V _O | output voltage | output HIGH or LOW | 0 | - | V _{CC} | V |
| | | output 3-state | 0 | - | 5.5 | V |
| T _{amb} | ambient temperature | in free air | -40 | - | +125 | °C |
| Δt/ΔV | input transition rise and fall rate | V _{CC} = 1.2 V to 2.7 V | 0 | - | 20 | ns/V |
| | | V _{CC} = 2.7 V to 3.6 V | 0 | - | 10 | ns/V |

9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions. Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|------------------|---------------------------|---|----------------------|--------|---------------------|----------------------|---------------------|------|
| | | | Min | Typ[1] | Max | Min | Max | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 1.2 V | 1.08 | - | - | 1.08 | - | V |
| | | V _{CC} = 1.65 V to 1.95 V | 0.65V _{CC} | - | - | 0.65V _{CC} | - | V |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | - | - | 1.7 | - | V |
| | | V _{CC} = 2.7 V to 3.6 V | 2.0 | - | - | 2.0 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 1.2 V | - | - | 0.12 | - | 0.12 | V |
| | | V _{CC} = 1.65 V to 1.95 V | - | - | 0.35V _{CC} | - | 0.35V _{CC} | V |
| | | V _{CC} = 2.3 V to 2.7 V | - | - | 0.7 | - | 0.7 | V |
| | | V _{CC} = 2.7 V to 3.6 V | - | - | 0.8 | - | 0.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | |
| | | I _O = -100 µA; V _{CC} = 1.65 V to 3.6 V | V _{CC} -0.2 | - | - | V _{CC} -0.3 | - | V |
| | | I _O = -4 mA; V _{CC} = 1.65 V | 1.2 | - | - | 1.05 | - | V |
| | | I _O = -8 mA; V _{CC} = 2.3 V | 1.8 | - | - | 1.65 | - | V |
| | | I _O = -12 mA; V _{CC} = 2.7 V | 2.2 | - | - | 2.05 | - | V |
| | | I _O = -18 mA; V _{CC} = 3.0 V | 2.4 | - | - | 2.25 | - | V |
| | | I _O = -24 mA; V _{CC} = 3.0 V | 2.2 | - | - | 2.0 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | |
| | | I _O = 100 µA; V _{CC} = 1.65 V to 3.6 V | - | - | 0.2 | - | 0.3 | V |
| | | I _O = 4 mA; V _{CC} = 1.65 V | - | - | 0.45 | - | 0.65 | V |
| | | I _O = 8 mA; V _{CC} = 2.3 V | - | - | 0.6 | - | 0.8 | V |
| | | I _O = 12 mA; V _{CC} = 2.7 V | - | - | 0.4 | - | 0.6 | V |
| | | I _O = 24 mA; V _{CC} = 3.0 V | - | - | 0.55 | - | 0.8 | V |
| I _I | input leakage current | V _{CC} = 3.6 V; V _I = 5.5 V or GND | - | ±0.1 | ±5 | - | ±20 | µA |
| I _{OZ} | OFF-state output current | V _I = V _{IH} or V _{IL} ; V _{CC} = 3.6 V; V _O = 5.5 V or GND [2] | - | ±0.1 | ±5 | - | ±20 | µA |
| I _{OFF} | power-off leakage current | V _{CC} = 0 V; V _I or V _O = 5.5 V | - | ±0.1 | ±10 | - | ±20 | µA |
| I _{CC} | supply current | V _{CC} = 3.6 V; I _O = 0 A; V _I = V _{CC} or GND | - | 0.1 | 20 | - | 80 | µA |
| ΔI _{CC} | additional supply current | per input pin; V _{CC} = 2.7 V to 3.6 V; V _I = V _{CC} - 0.6 V; I _O = 0 A | - | 5 | 500 | - | 5000 | µA |
| C _I | input capacitance | V _{CC} = 0 V to 3.6 V; V _I = GND to V _{CC} | - | 5.0 | - | - | - | pF |
| I _{BHL} | bus hold LOW current | V _{CC} = 1.65; V _I = 0.58 V [3][4] | 10 | - | - | 10 | - | µA |
| | | V _{CC} = 2.3; V _I = 0.7 V | 30 | - | - | 25 | - | µA |
| | | V _{CC} = 3.0; V _I = 0.8 V | 75 | - | - | 60 | - | µA |
| I _{BHH} | bus hold HIGH current | V _{CC} = 1.65; V _I = 1.07 V [3] [4] | -10 | - | - | -10 | - | µA |
| | | V _{CC} = 2.3; V _I = 1.7 V | -30 | - | - | -25 | - | µA |
| | | V _{CC} = 3.0; V _I = 2.0 V | -75 | - | - | -60 | - | µA |

16-bit buffer/line driver; 5 V input/output tolerant; 3-state

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-------------------|---------------------------------|----------------------------------|------------------|--------|-----|-------------------|-----|------|
| | | | Min | Typ[1] | Max | Min | Max | |
| I _{BHLO} | bus hold LOW overdrive current | V _{CC} = 1.95 V [3] [5] | 200 | - | - | 200 | - | μA |
| | | V _{CC} = 2.7 V | 300 | - | - | 300 | - | μA |
| | | V _{CC} = 3.6 V | 500 | - | - | 500 | - | μA |
| I _{BHHO} | bus hold HIGH overdrive current | V _{CC} = 1.95 V [3] [5] | -200 | - | - | -200 | - | μA |
| | | V _{CC} = 2.7 V | -300 | - | - | -300 | - | μA |
| | | V _{CC} = 3.6 V | -500 | - | - | -500 | - | μA |

[1] All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

[2] The bus hold circuit is switched off when V_I > V_{CC} allowing 5.5 V on the input terminal.

[3] Valid for data inputs only. Control inputs do not have a bus hold circuit.

[4] The specified sustaining current at the data input holds the input below the specified V_I level.

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

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit see Fig. 6.

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|------------------|-------------------------------|--|------------------|--------|------|-------------------|------|------|
| | | | Min | Typ[1] | Max | Min | Max | |
| t _{pd} | propagation delay | nAn to nYn; see Fig. 4 [2] | | | | | | |
| | | V _{CC} = 1.2 V | - | 11.0 | - | - | - | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 1.5 | 4.8 | 10.7 | 1.5 | 11.3 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.0 | 2.6 | 5.3 | 1.0 | 5.9 | ns |
| | | V _{CC} = 2.7 V | 1.0 | 2.6 | 4.7 | 1.0 | 6.0 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.1 | 2.2 | 4.1 | 1.1 | 5.5 | ns |
| t _{en} | enable time | nOE to nYn; see Fig. 5 [2] | | | | | | |
| | | V _{CC} = 1.2 V | - | 15.0 | - | - | - | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 1.5 | 6.2 | 12.1 | 1.5 | 12.7 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.0 | 3.5 | 6.4 | 1.0 | 7.1 | ns |
| | | V _{CC} = 2.7 V | 1.0 | 3.3 | 5.8 | 1.0 | 7.5 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.0 | 2.8 | 4.6 | 1.0 | 6.0 | ns |
| t _{dis} | disable time | nOE to nYn; see Fig. 5 [2] | | | | | | |
| | | V _{CC} = 1.2 V | - | 10.0 | - | - | - | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.5 | 4.4 | 8.7 | 2.5 | 9.4 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.0 | 2.4 | 4.9 | 1.0 | 5.3 | ns |
| | | V _{CC} = 2.7 V | 1.0 | 3.2 | 6.2 | 1.0 | 8.0 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.8 | 3.1 | 5.2 | 1.8 | 6.5 | ns |
| C _{PD} | power dissipation capacitance | per input; V _I = GND to V _{CC} [3] | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | - | 4.8 | - | - | - | pF |
| | | V _{CC} = 2.3 V to 2.7 V | - | 8.3 | - | - | - | pF |
| | | V _{CC} = 3.0 V to 3.6 V | - | 11.4 | - | - | - | pF |

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

[2] t_{pd} is the same as t_{PLH} and t_{PHL}; t_{en} is the same as t_{PZL} and t_{PZH}; t_{dis} is the same as t_{PLZ} and t_{PHZ}.

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW). P_D = C_{PD} × V_{CC}² × f_i × N + Σ(C_L × V_{CC}² × f_o) where:

f_i = input frequency in MHz; f_o = output frequency in MHz; C_L = output load capacitance in pF

V_{CC} = supply voltage in Volts; N = number of inputs switching; Σ(C_L × V_{CC}² × f_o) = sum of the outputs.

10.1. Waveforms and test circuit

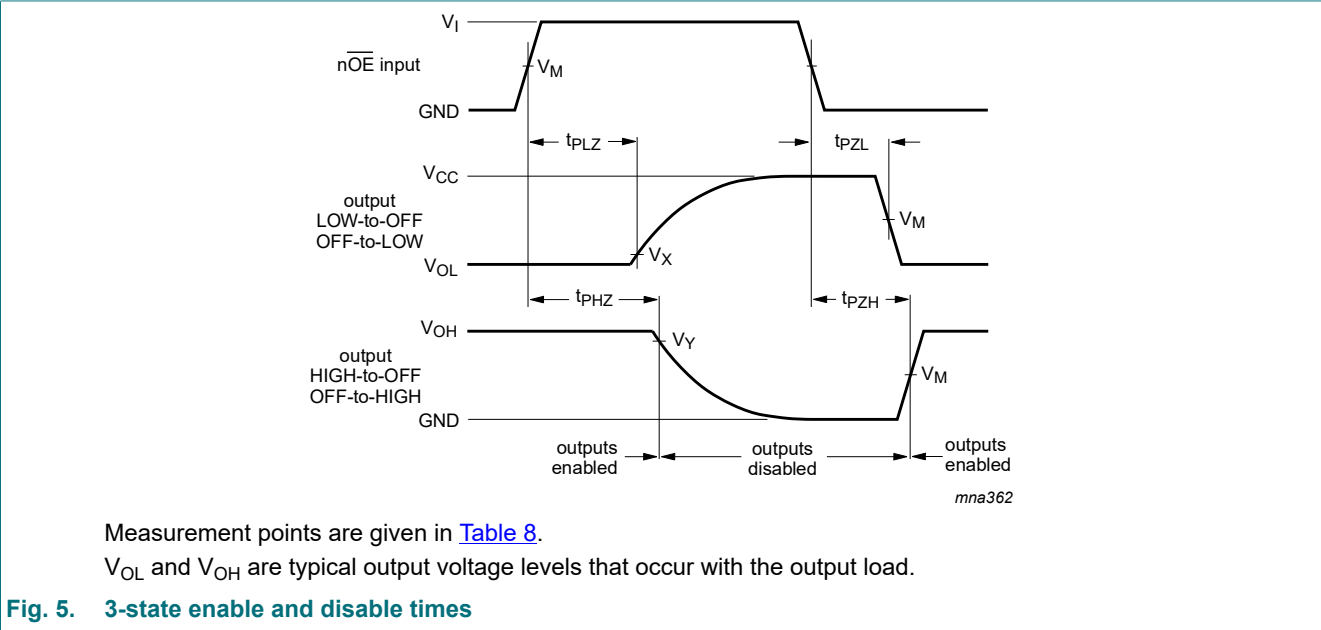
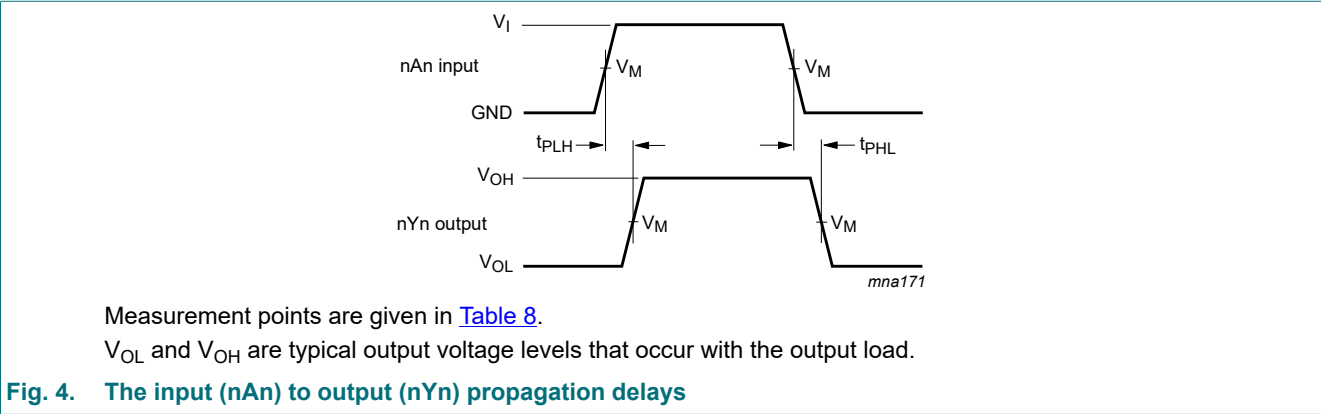
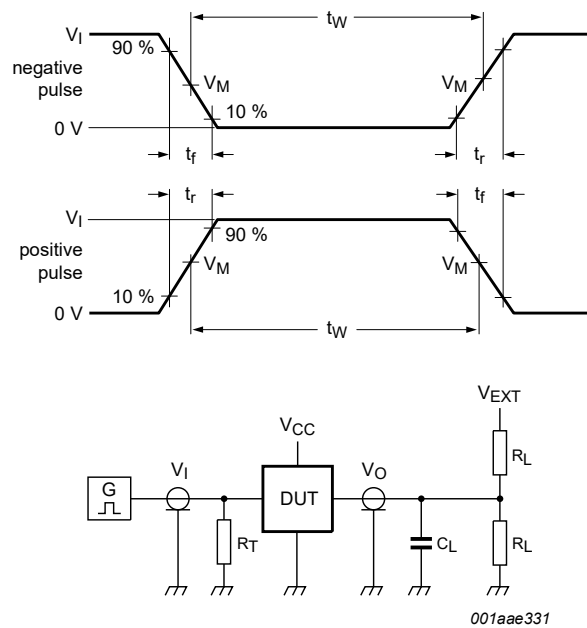


Table 8. Measurement points

| 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 | $V_{OL} + 0.3 \text{ V}$ | $V_{OH} - 0.3 \text{ V}$ |

16-bit buffer/line driver; 5 V input/output tolerant; 3-state



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. 6. Test circuit for measuring switching times

Table 9. Test data

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

11. Package outline

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1 mm

SOT362-1

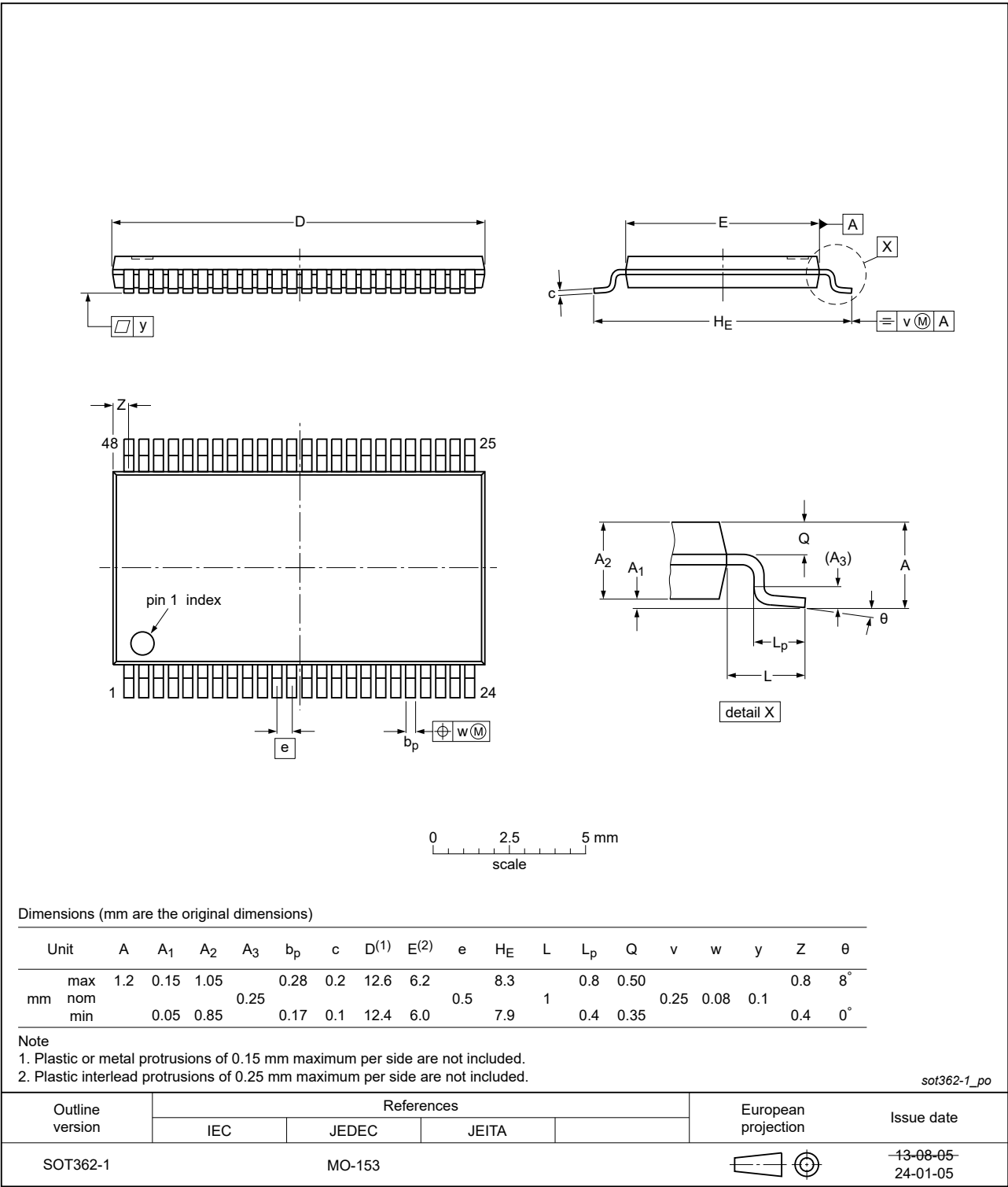


Fig. 7. Package outline SOT362-1 (TSSOP48)

16-bit buffer/line driver; 5 V input/output tolerant; 3-state

TVSOP48: plastic thin shrink small outline package; 48 leads;
body width 4.4 mm; lead pitch 0.4 mm

SOT480-1

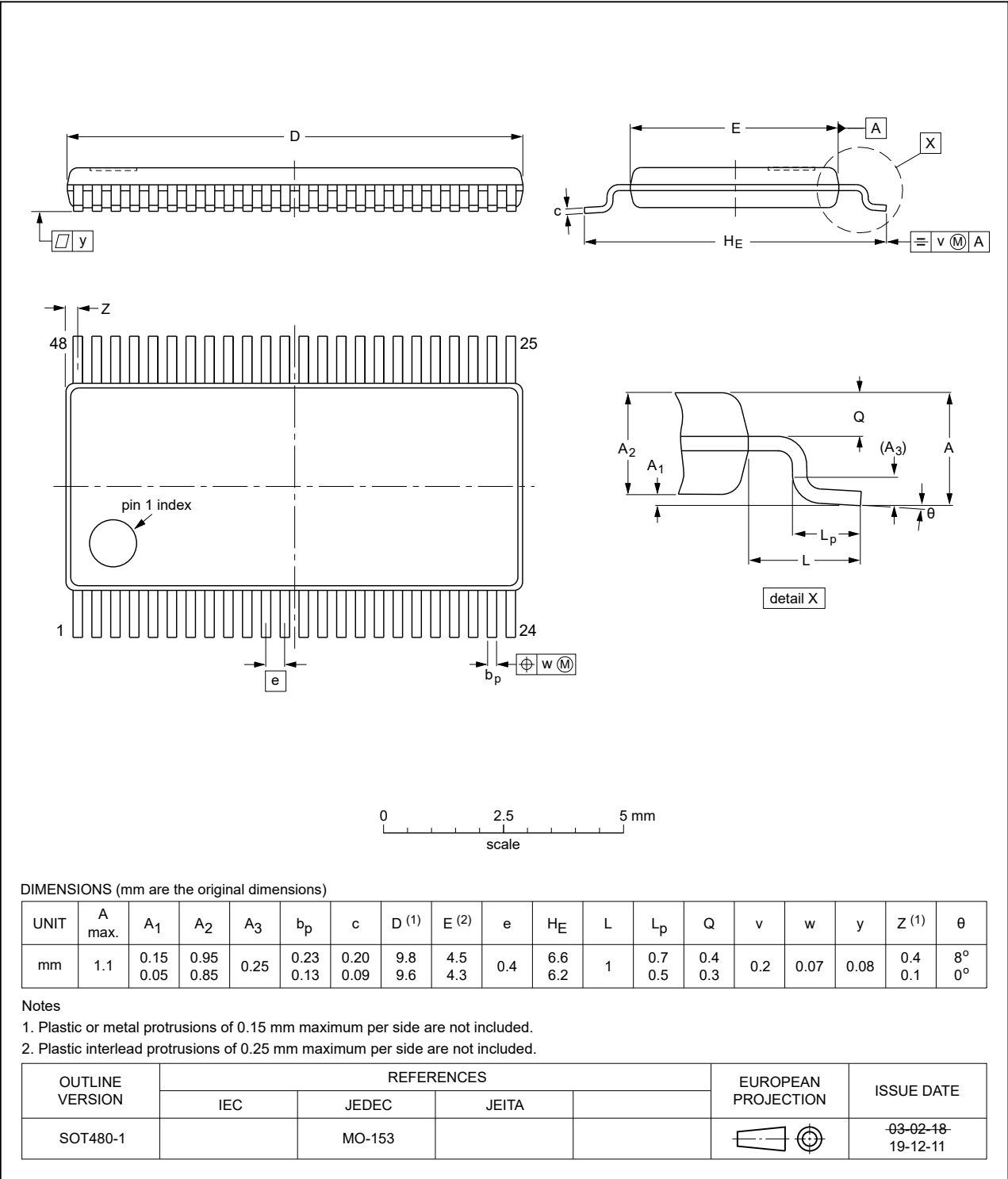


Fig. 8. Package outline SOT480-1 (TVSOP48)

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_LVCH16244A_Q100 v.8 | 20240409 | Product data sheet | - | 74LVC_LVCH16244A_Q100 v.7 |
| Modifications: | <ul style="list-style-type: none">Fig. 7: Updated package outline drawing SOT362-1 (TSSOP48). | | | |
| 74LVC_LVCH16244A_Q100 v.7 | 20230801 | Product data sheet | - | 74LVC_LVCH16244A_Q100 v.6 |
| Modifications: | <ul style="list-style-type: none">Section 2: ESD specification updated according to the latest JEDEC standard. | | | |
| 74LVC_LVCH16244A_Q100 v.6 | 20210921 | Product data sheet | - | 74LVC_LVCH16244A_Q100 v.5 |
| Modifications: | <ul style="list-style-type: none">Section 1 and Section 2 updated. | | | |
| 74LVC_LVCH16244A_Q100 v.5 | 20190215 | Product data sheet | - | 74LVC_LVCH16244A_Q100 v.4 |
| Modifications: | <ul style="list-style-type: none">Type numbers 74LVC16244ADGV-Q100 and 74LVCH16244ADGV-Q100 (SOT480-1) added. | | | |
| 74LVC_LVCH16244A_Q100 v.4 | 20170616 | Product data sheet | - | 74LVC_LVCH16244A_Q100 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.Fig. 1 updated. | | | |
| 74LVC_LVCH16244A_Q100 v.3 | 20140207 | Product data sheet | - | 74LVC_LVCH16244A_Q100 v.2 |
| Modifications: | <ul style="list-style-type: none">Table 5: Minimum V_{CC} changed from 2.3 V to 1.65 V (errata). | | | |
| 74LVC_LVCH16244A_Q100 v.2 | 20130927 | Product data sheet | - | 74LVC_LVCH16244A_Q100 v.1 |
| Modifications: | <ul style="list-style-type: none">Typo removed from the title header. | | | |
| 74LVC_LVCH16244A_Q100 v.1 | 20130923 | Product data sheet | - | - |

16-bit buffer/line driver; 5 V input/output tolerant; 3-state

14. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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Date of release: 9 April 2024