

# 74LVC4T3144-Q100

4-bit dual supply buffer/line driver; 3-state

Rev. 2 — 3 August 2023

Product data sheet

## 1. General description

The 74LVC4T3144-Q100 is a 4-bit, dual-supply level translating buffer with 3-state outputs. It features four data inputs (An and B4), four data outputs (YBn and YA4), and an output enable input ( $\overline{OE}$ ). The device is configured to translate three inputs from  $V_{CC(A)}$  to  $V_{CC(B)}$  and one input from  $V_{CC(B)}$  to  $V_{CC(A)}$ .  $\overline{OE}$ , An and YA4 are referenced to  $V_{CC(A)}$  and YBn and B4 are referenced to  $V_{CC(B)}$ . A HIGH on  $\overline{OE}$  causes the outputs to assume a high-impedance OFF-state.

The device is fully specified for partial power-down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables outputs, preventing any damaging backflow current through the device when it is powered down. In suspend mode when either  $V_{CC(A)}$  or  $V_{CC(B)}$  are at GND level, all outputs are in the high-impedance OFF-state.

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:
  - $V_{CC(A)}$ : 1.2 V to 5.5 V
  - $V_{CC(B)}$ : 1.2 V to 5.5 V
- High noise immunity
- Maximum data rates:
  - 200 Mbps (3.3 V to 5.0 V translation)
  - 140 Mbps (translate to 3.3 V)
  - 100 Mbps (translate to 2.5 V)
  - 75 Mbps (translate to 1.8 V)
  - 60 Mbps (translate to 1.5 V)
- Suspend mode
- Latch-up performance exceeds 100 mA per JESD 78B Class II
- $\pm 24$  mA output drive ( $V_{CC} = 3.0$  V)
- Inputs accept voltages up to 5.5 V
- Low power consumption: 30  $\mu$ A maximum  $I_{CC}$
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Complies with JEDEC standards:
  - JESD8-11A (1.4 V to 1.6 V)
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (3.0 V to 3.6 V)
  - JESD12-6 (4.5 V to 5.5 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                        | Package           |         |  | Version                  |
|------------------------------------|-------------------|---------|--|--------------------------|
|                                    | Temperature range | Name    | Description  |                          |
| <a href="#">74LVC4T3144PW-Q100</a> | -40 °C to +125 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | <a href="#">SOT402-1</a> |

### 4. Functional diagram

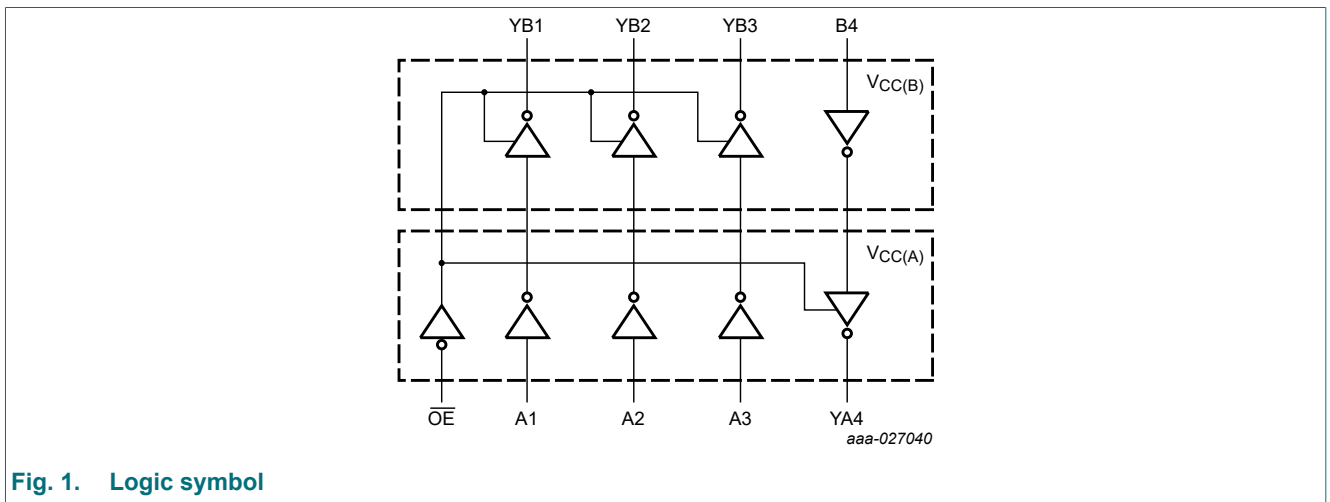
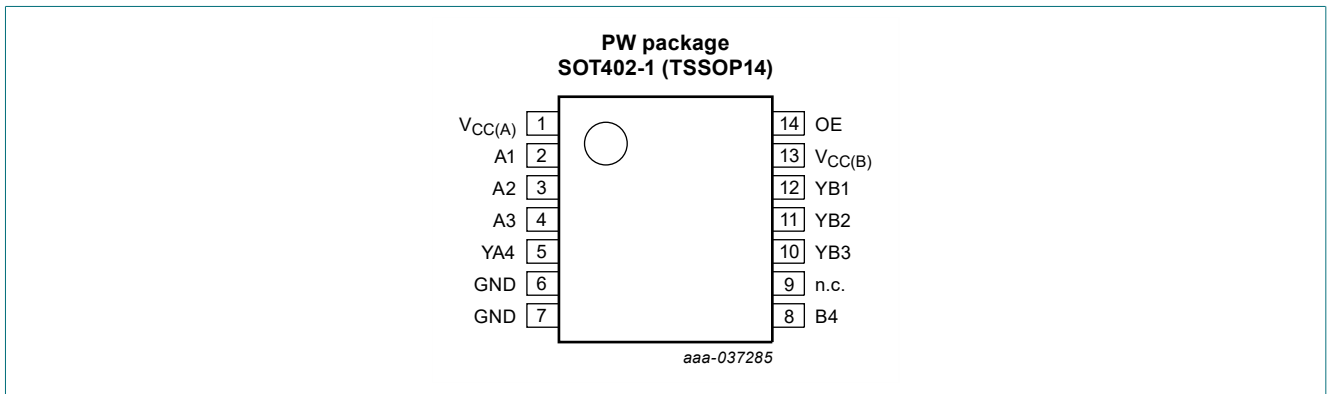


Fig. 1. Logic symbol

### 5. Pinning information

#### 5.1. Pinning



## 5.2. Pin description

Table 2. Pin description

| Symbol          | Pin        | Description   |
|-----------------|------------|---|
| $V_{CC(A)}$     | 1          | supply voltage A (An inputs, YA4 output and $\overline{OE}$ input are referenced to $V_{CC(A)}$ ) |
| A1, A2, A3      | 2, 3, 4    | data input  |
| YA4             | 5          | data output   |
| GND             | 6, 7       | ground (0 V)  |
| B4              | 8          | data input  |
| n.c.            | 9          | not connected   |
| YB3, YB2, YB1   | 10, 11, 12 | data output   |
| $V_{CC(B)}$     | 13         | supply voltage B (YBn outputs and B4 input are referenced to $V_{CC(B)}$ )                        |
| $\overline{OE}$ | 14         | output enable input (active LOW)  |

## 6. Functional description

Table 3. Function table [1]

| Supply voltage            | Control             | Input     | Output      |
|---------------------------|---------------------|-----------|-------------|
| $V_{CC(A)}$ , $V_{CC(B)}$ | $\overline{OE}$ [2] | An, B4[2] | YBn, YA4[2] |
| 1.2 V to 5.5 V            | L                   | L         | L           |
| 1.2 V to 5.5 V            | L                   | H         | H           |
| 1.2 V to 5.5 V            | H                   | X         | Z           |
| GND[3]                    | X                   | X         | Z           |

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

[2] The An inputs, YA4 output and  $\overline{OE}$  input are referenced to  $V_{CC(A)}$ ; The YBn outputs and B4 input are referenced to  $V_{CC(B)}$ .

[3] If at least one of  $V_{CC(A)}$  or  $V_{CC(B)}$  is at GND level, the device goes into suspend mode.

## 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 |
|-------------|-------------------------|---|------|-----------------|------|
| $V_{CC(A)}$ | supply voltage A        |   | -0.5 | +6.5            | V    |
| $V_{CC(B)}$ | supply voltage B        |   | -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 | $V_O < 0$ V                                   | -50  | -               | mA   |
| $V_O$       | output voltage          | Active mode [1] [2] [3]                       | -0.5 | $V_{CCO} + 0.5$ | V    |
|             |                         | Suspend or 3-state mode [1]                   | -0.5 | +6.5            | V    |
| $I_O$       | output current          | $V_O = 0$ V to $V_{CCO}$ [2]                  | -    | $\pm 50$        | mA   |
| $I_{CC}$    | supply current          | $I_{CC(A)}$ or $I_{CC(B)}$ ; per $V_{CC}$ pin | -    | 100             | mA   |
| $I_{GND}$   | ground current          | per GND pin                                   | -100 | -               | mA   |
| $T_{stg}$   | storage temperature     |   | -65  | +150            | °C   |
| $P_{tot}$   | total power dissipation | $T_{amb} = -40$ °C to +125 °C [4]             | -    | 500             | mW   |

- [1] The minimum input voltage ratings and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 [2]  $V_{CCO}$  is the supply voltage associated with the output port.  
 [3]  $V_{CCO} + 0.5$  V should not exceed 6.5 V.  
 [4] For SOT402-1 (TSSOP14) package:  $P_{tot}$  derates linearly with 7.3 mW/K above 81 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol              | Parameter                           | Conditions                  | Min | Max       | Unit |
|---------------------|-------------------------------------|-----------------------------|-----|-----------|------|
| $V_{CC(A)}$         | supply voltage A                    |                             | 1.2 | 5.5       | V    |
| $V_{CC(B)}$         | supply voltage B                    |                             | 1.2 | 5.5       | V    |
| $V_I$               | input voltage                       |                             | 0   | 5.5       | V    |
| $V_O$               | output voltage                      | Active mode [1]             | 0   | $V_{CCO}$ | V    |
|                     |                                     | Suspend or 3-state mode     | 0   | 5.5       | V    |
| $T_{amb}$           | ambient temperature                 |                             | -40 | +125      | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CCI} = 1.2$ V [2]       | -   | 20        | ns/V |
|                     |                                     | $V_{CCI} = 1.4$ V to 1.95 V | -   | 20        | ns/V |
|                     |                                     | $V_{CCI} = 2.3$ V to 2.7 V  | -   | 20        | ns/V |
|                     |                                     | $V_{CCI} = 3$ V to 3.6 V    | -   | 10        | ns/V |
|                     |                                     | $V_{CCI} = 4.5$ V to 5.5 V  | -   | 5         | ns/V |

- [1]  $V_{CCO}$  is the supply voltage associated with the output port.  
 [2]  $V_{CCI}$  is the supply voltage associated with the input port.

## 9. Static characteristics

**Table 6. Typical static characteristics at  $T_{amb} = 25\text{ °C}$**

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

| Symbol    | Parameter                 | Conditions   | Min | Typ  | Max     | Unit          |
|-----------|---------------------------|--|-----|------|---------|---------------|
| $V_{OH}$  | HIGH-level output voltage | YBn, YA4; $V_I = V_{IH}$ or $V_{IL}$ [1]   |     |      |         |               |
|           |                           | $I_O = -3\text{ mA}$ ; $V_{CCO} = 1.2\text{ V}$  | -   | 1.09 | -       | V             |
| $V_{OL}$  | LOW-level output voltage  | YBn, YA4; $V_I = V_{IH}$ or $V_{IL}$   |     |      |         |               |
|           |                           | $I_O = 3\text{ mA}$ ; $V_{CCO} = 1.2\text{ V}$ [1]   | -   | 0.07 | -       | V             |
| $I_I$     | input leakage current     | An, B4 and $\overline{OE}$ input; $V_I = 0\text{ V}$ to $5.5\text{ V}$ ; $V_{CCI} = 1.2\text{ V}$ to $5.5\text{ V}$ [2]                                  | -   | -    | $\pm 1$ | $\mu\text{A}$ |
| $I_{OZ}$  | OFF-state output current  | YBn, YA4; $V_O = 0\text{ V}$ or $V_{CCO}$ ; $V_{CCO} = 1.2\text{ V}$ to $5.5\text{ V}$ [1]   | -   | -    | $\pm 1$ | $\mu\text{A}$ |
|           |                           | YBn, YA4; suspend mode; $V_O = 0\text{ V}$ or $V_{CCO}$ ; $V_{CC(A)} = 5.5\text{ V}$ ; $V_{CC(B)} = 0\text{ V}$ [1]                                      | -   | -    | $\pm 1$ | $\mu\text{A}$ |
|           |                           | YBn, YA4; suspend mode; $V_O = 0\text{ V}$ or $V_{CCO}$ ; $V_{CC(A)} = 0\text{ V}$ ; $V_{CC(B)} = 5.5\text{ V}$ [1]                                      | -   | -    | $\pm 1$ | $\mu\text{A}$ |
| $I_{OFF}$ | power-off leakage current | A port; $V_I$ or $V_O = 0\text{ V}$ to $5.5\text{ V}$ ; $V_{CC(A)} = 0\text{ V}$ ; $V_{CC(B)} = 1.2\text{ V}$ to $5.5\text{ V}$                          | -   | -    | $\pm 1$ | $\mu\text{A}$ |
|           |                           | B port; $V_I$ or $V_O = 0\text{ V}$ to $5.5\text{ V}$ ; $V_{CC(B)} = 0\text{ V}$ ; $V_{CC(A)} = 1.2\text{ V}$ to $5.5\text{ V}$                          | -   | -    | $\pm 1$ | $\mu\text{A}$ |
| $C_I$     | input capacitance         | An, B4 and $\overline{OE}$ input; $V_I = 0\text{ V}$ or $3.3\text{ V}$ ; $V_{CC(A)} = 3.3\text{ V}$ ; $V_{CC(B)} = 3.3\text{ V}$                         | -   | 3    | -       | pF            |
| $C_O$     | output capacitance        | YBn, YA4 output; $V_O = 0\text{ V}$ or $3.3\text{ V}$ ; $\overline{OE}$ input = $3.3\text{ V}$ ; $V_{CC(A)} = 3.3\text{ V}$ ; $V_{CC(B)} = 3.3\text{ V}$ | -   | 6.5  | -       | pF            |

[1]  $V_{CCO}$  is the supply voltage associated with the output port.

[2]  $V_{CCI}$  is the supply voltage associated with the input port.

**Table 7. 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              | Max | Min               | Max |      |
| $V_{IH}$ | HIGH-level input voltage | data input [1]                              |                  |     |                   |     |      |
|          |                          | $V_{CCI} = 1.2\text{ V}$                    | $0.8V_{CCI}$     | -   | $0.8V_{CCI}$      | -   | V    |
|          |                          | $V_{CCI} = 1.4\text{ V}$ to $1.95\text{ V}$ | $0.65V_{CCI}$    | -   | $0.65V_{CCI}$     | -   | V    |
|          |                          | $V_{CCI} = 2.3\text{ V}$ to $2.7\text{ V}$  | 1.7              | -   | 1.7               | -   | V    |
|          |                          | $V_{CCI} = 3.0\text{ V}$ to $3.6\text{ V}$  | 2.0              | -   | 2.0               | -   | V    |
|          |                          | $V_{CCI} = 4.5\text{ V}$ to $5.5\text{ V}$  | $0.7V_{CCI}$     | -   | $0.7V_{CCI}$      | -   | V    |
|          |                          | $\overline{OE}$ input                       |                  |     |                   |     |      |
|          |                          | $V_{CCI} = 1.2\text{ V}$                    | $0.8V_{CC(A)}$   | -   | $0.8V_{CC(A)}$    | -   | V    |
|          |                          | $V_{CCI} = 1.4\text{ V}$ to $1.95\text{ V}$ | $0.65V_{CC(A)}$  | -   | $0.65V_{CC(A)}$   | -   | V    |
|          |                          | $V_{CCI} = 2.3\text{ V}$ to $2.7\text{ V}$  | 1.7              | -   | 1.7               | -   | V    |
|          |                          | $V_{CCI} = 3.0\text{ V}$ to $3.6\text{ V}$  | 2.0              | -   | 2.0               | -   | V    |
|          |                          | $V_{CCI} = 4.5\text{ V}$ to $5.5\text{ V}$  | $0.7V_{CC(A)}$   | -   | $0.7V_{CC(A)}$    | -   | V    |

| Symbol  | Parameter                 | Conditions   | -40 °C to +85 °C       |                        | -40 °C to +125 °C      |                        | Unit |
|---|---------------------------|--|------------------------|------------------------|------------------------|------------------------|------|
|   |                           |  | Min                    | Max                    | Min                    | Max                    |      |
| V <sub>IL</sub>                                   | LOW-level input voltage   | data input [1]   |                        |                        |                        |                        |      |
|   |                           | V <sub>CCI</sub> = 1.2 V   | -                      | 0.2V <sub>CCI</sub>    | -                      | 0.2V <sub>CCI</sub>    | V    |
|   |                           | V <sub>CCI</sub> = 1.4 V to 1.95 V   | -                      | 0.35V <sub>CCI</sub>   | -                      | 0.35V <sub>CCI</sub>   | V    |
|   |                           | V <sub>CCI</sub> = 2.3 V to 2.7 V  | -                      | 0.7                    | -                      | 0.7                    | V    |
|   |                           | V <sub>CCI</sub> = 3.0 V to 3.6 V  | -                      | 0.8                    | -                      | 0.8                    | V    |
|   |                           | V <sub>CCI</sub> = 4.5 V to 5.5 V  | -                      | 0.3V <sub>CCI</sub>    | -                      | 0.3V <sub>CCI</sub>    | V    |
|   |                           | OE input   |                        |                        |                        |                        |      |
|   |                           | V <sub>CCI</sub> = 1.2 V   | -                      | 0.2V <sub>CC(A)</sub>  | -                      | 0.2V <sub>CC(A)</sub>  | V    |
|   |                           | V <sub>CCI</sub> = 1.4 V to 1.95 V   | -                      | 0.35V <sub>CC(A)</sub> | -                      | 0.35V <sub>CC(A)</sub> | V    |
|   |                           | V <sub>CCI</sub> = 2.3 V to 2.7 V  | -                      | 0.7                    | -                      | 0.7                    | V    |
|   |                           | V <sub>CCI</sub> = 3.0 V to 3.6 V  | -                      | 0.8                    | -                      | 0.8                    | V    |
|   |                           | V <sub>CCI</sub> = 4.5 V to 5.5 V  | -                      | 0.3V <sub>CC(A)</sub>  | -                      | 0.3V <sub>CC(A)</sub>  | V    |
| V <sub>OH</sub>                                   | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub>   |                        |                        |                        |                        |      |
|   |                           | I <sub>O</sub> = -100 µA; V <sub>CCO</sub> = 1.2 V to 4.5 V [2]  | V <sub>CCO</sub> - 0.1 | -                      | V <sub>CCO</sub> - 0.1 | -                      | V    |
|   |                           | I <sub>O</sub> = -6 mA; V <sub>CCO</sub> = 1.4 V   | 1.0                    | -                      | 1.0                    | -                      | V    |
|   |                           | I <sub>O</sub> = -8 mA; V <sub>CCO</sub> = 1.65 V  | 1.2                    | -                      | 1.2                    | -                      | V    |
|   |                           | I <sub>O</sub> = -12 mA; V <sub>CCO</sub> = 2.3 V  | 1.9                    | -                      | 1.9                    | -                      | V    |
|   |                           | I <sub>O</sub> = -24 mA; V <sub>CCO</sub> = 3.0 V  | 2.4                    | -                      | 2.4                    | -                      | V    |
|   |                           | I <sub>O</sub> = -24 mA; V <sub>CCO</sub> = 4.5 V  | 3.85                   | -                      | 3.85                   | -                      | V    |
| I <sub>O</sub> = -32 mA; V <sub>CCO</sub> = 4.5 V | 3.8                       | -  | 3.8                    | -                      | V                      |                        |      |
| V <sub>OL</sub>                                   | LOW-level output voltage  | V <sub>I</sub> = V <sub>IL</sub> [2]   |                        |                        |                        |                        |      |
|   |                           | I <sub>O</sub> = 100 µA; V <sub>CCO</sub> = 1.2 V to 4.5 V   | -                      | 0.1                    | -                      | 0.1                    | V    |
|   |                           | I <sub>O</sub> = 6 mA; V <sub>CCO</sub> = 1.4 V  | -                      | 0.3                    | -                      | 0.3                    | V    |
|   |                           | I <sub>O</sub> = 8 mA; V <sub>CCO</sub> = 1.65 V   | -                      | 0.45                   | -                      | 0.45                   | V    |
|   |                           | I <sub>O</sub> = 12 mA; V <sub>CCO</sub> = 2.3 V   | -                      | 0.3                    | -                      | 0.3                    | V    |
|   |                           | I <sub>O</sub> = 24 mA; V <sub>CCO</sub> = 3.0 V   | -                      | 0.55                   | -                      | 0.55                   | V    |
|   |                           | I <sub>O</sub> = 24 mA; V <sub>CCO</sub> = 4.5 V   | -                      | 0.50                   | -                      | 0.50                   | V    |
| I <sub>O</sub> = 32 mA; V <sub>CCO</sub> = 4.5 V  | -                         | 0.55   | -                      | 0.55                   | V                      |                        |      |
| I <sub>I</sub>                                    | input leakage current     | V <sub>I</sub> = 0 V to 5.5 V; V <sub>CCI</sub> = 1.2 V to 5.5 V   | -                      | ±2                     | -                      | ±10                    | µA   |
| I <sub>OZ</sub>                                   | OFF-state output current  | V <sub>O</sub> = 0 V or V <sub>CCO</sub> ; V <sub>CCO</sub> = 1.2 V to 5.5 V [2]                                       | -                      | ±2                     | -                      | ±10                    | µA   |
|   |                           | suspend mode; V <sub>O</sub> = 0 V or V <sub>CCO</sub> ; V <sub>CC(A)</sub> = 5.5 V; V <sub>CC(B)</sub> = 0 V [2]      | -                      | ±2                     | -                      | ±10                    | µA   |
|   |                           | suspend mode; V <sub>O</sub> = 0 V or V <sub>CCO</sub> ; V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 5.5 V [2]      | -                      | ±2                     | -                      | ±10                    | µA   |
| I <sub>OFF</sub>                                  | power-off leakage current | A port; V <sub>I</sub> or V <sub>O</sub> = 0 V to 5.5 V; V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 1.2 V to 5.5 V | -                      | ±2                     | -                      | ±10                    | µA   |
|   |                           | B port; V <sub>I</sub> or V <sub>O</sub> = 0 V to 5.5 V; V <sub>CC(B)</sub> = 0 V; V <sub>CC(A)</sub> = 1.2 V to 5.5 V | -                      | ±2                     | -                      | ±10                    | µA   |

| Symbol   | Parameter                 | Conditions  | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|--|---------------------------|---|------------------|-----|-------------------|-----|------|
|  |                           |   | Min              | Max | Min               | Max |      |
| I <sub>CC</sub>  | supply current            | A port; V <sub>I</sub> = 0 V or V <sub>CCI</sub> ; I <sub>O</sub> = 0 A [1]   |                  |     |                   |     |      |
|  |                           | V <sub>CC(A)</sub> , V <sub>CC(B)</sub> = 1.2 V to 5.5 V  | -                | 15  | -                 | 20  | μA   |
|  |                           | V <sub>CC(A)</sub> = 5.5 V; V <sub>CC(B)</sub> = 0 V  | -                | 15  | -                 | 20  | μA   |
|  |                           | V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 5.5 V  | -2               | -   | -4                | -   | μA   |
|  |                           | B port; V <sub>I</sub> = 0 V or V <sub>CCI</sub> ; I <sub>O</sub> = 0 A   |                  |     |                   |     |      |
|  |                           | V <sub>CC(A)</sub> , V <sub>CC(B)</sub> = 1.2 V to 5.5 V  | -                | 15  | -                 | 20  | μA   |
|  |                           | V <sub>CC(B)</sub> = 0 V; V <sub>CC(A)</sub> = 5.5 V  | -2               | -   | -4                | -   | μA   |
|  |                           | V <sub>CC(B)</sub> = 5.5 V; V <sub>CC(A)</sub> = 0 V  | -                | 15  | -                 | 20  | μA   |
|  |                           | A plus B port (I <sub>CC(A)</sub> + I <sub>CC(B)</sub> );<br>I <sub>O</sub> = 0 A; V <sub>I</sub> = 0 V or V <sub>CCI</sub> |                  |     |                   |     |      |
| V <sub>CC(A)</sub> , V <sub>CC(B)</sub> = 1.2 V to 5.5 V | -                         | 25  | -                | 30  | μA                |     |      |
| ΔI <sub>CC</sub>   | additional supply current | per input;<br>V <sub>CC(A)</sub> , V <sub>CC(B)</sub> = 3.0 V to 5.5 V  |                  |     |                   |     |      |
|  |                           | OE input;<br>OE input at V <sub>CC(A)</sub> - 0.6 V;<br>A port at V <sub>CC(A)</sub> or GND;<br>B port = open               | -                | 50  | -                 | 75  | μA   |
|  |                           | A port; A port at V <sub>CC(A)</sub> - 0.6 V;<br>B port = open  | -                | 50  | -                 | 75  | μA   |
|  |                           | B port; B port at V <sub>CC(B)</sub> - 0.6 V;<br>A port = open  | -                | 50  | -                 | 75  | μA   |

[1] V<sub>CCI</sub> is the supply voltage associated with the input port.

[2] V<sub>CCO</sub> is the supply voltage associated with the output port.

## 10. Dynamic characteristics

**Table 8. Typical dynamic characteristics at  $V_{CC(A)} = 1.2\text{ V}$  and  $T_{amb} = 25\text{ °C}$  [1]**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 4; for waveforms see Fig. 2 and Fig. 3.

| Symbol    | Parameter         | Conditions             | $V_{CC(B)}$ |       |       |       |       |       | Unit |
|-----------|-------------------|------------------------|-------------|-------|-------|-------|-------|-------|------|
|           |                   |                        | 1.2 V       | 1.5 V | 1.8 V | 2.5 V | 3.3 V | 5.0 V |      |
| $t_{pd}$  | propagation delay | An to YBn              | 15.6        | 11.6  | 9.8   | 7.8   | 6.9   | 6.3   | ns   |
|           |                   | B4 to YA4              | 15.6        | 14.5  | 14.0  | 13.5  | 13.3  | 13.8  | ns   |
| $t_{dis}$ | disable time      | $\overline{OE}$ to YA4 | 8.7         | 8.7   | 8.7   | 8.7   | 8.7   | 8.7   | ns   |
|           |                   | $\overline{OE}$ to YBn | 11.9        | 9.2   | 8.7   | 7.4   | 7.7   | 6.8   | ns   |
| $t_{en}$  | enable time       | $\overline{OE}$ to YA4 | 17.5        | 17.5  | 17.5  | 17.5  | 17.5  | 17.5  | ns   |
|           |                   | $\overline{OE}$ to YBn | 18.3        | 13.6  | 11.5  | 9.5   | 8.8   | 8.5   | ns   |

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

**Table 9. Typical dynamic characteristics at  $V_{CC(B)} = 1.2\text{ V}$  and  $T_{amb} = 25\text{ °C}$  [1]**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 4; for waveforms see Fig. 2 and Fig. 3.

| Symbol    | Parameter         | Conditions             | $V_{CC(A)}$ |       |       |       |       |       | Unit |
|-----------|-------------------|------------------------|-------------|-------|-------|-------|-------|-------|------|
|           |                   |                        | 1.2 V       | 1.5 V | 1.8 V | 2.5 V | 3.3 V | 5.0 V |      |
| $t_{pd}$  | propagation delay | An to YBn              | 15.6        | 14.5  | 14.0  | 13.5  | 13.3  | 13.1  | ns   |
|           |                   | B4 to YA4              | 15.6        | 11.6  | 9.8   | 7.8   | 6.9   | 6.3   | ns   |
| $t_{dis}$ | disable time      | $\overline{OE}$ to YA4 | 8.7         | 6.1   | 5.5   | 3.9   | 4.1   | 2.9   | ns   |
|           |                   | $\overline{OE}$ to YBn | 11.9        | 10.5  | 9.9   | 9.2   | 8.9   | 8.4   | ns   |
| $t_{en}$  | enable time       | $\overline{OE}$ to YA4 | 17.5        | 11.6  | 9.0   | 5.7   | 4.6   | 3.8   | ns   |
|           |                   | $\overline{OE}$ to YBn | 18.3        | 17.0  | 16.4  | 15.8  | 15.6  | 15.4  | ns   |

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

**Table 10. Typical power dissipation capacitance at  $V_{CC(A)} = V_{CC(B)}$  and  $T_{amb} = 25\text{ °C}$  [1] [2]**

Voltages are referenced to GND (ground = 0 V).

| Symbol   | Parameter                     | Conditions       | $V_{CC(A)}$ and $V_{CC(B)}$ |       |       |       |       |       | Unit |
|----------|-------------------------------|------------------|-----------------------------|-------|-------|-------|-------|-------|------|
|          |                               |                  | 1.2 V                       | 1.5 V | 1.8 V | 2.5 V | 3.3 V | 5.0 V |      |
| $C_{PD}$ | power dissipation capacitance | inputs An, B4    | 0.5                         | 0.5   | 0.5   | 0.7   | 0.9   | 1.3   | pF   |
|          |                               | outputs YBn, YA4 | 12                          | 12    | 12    | 12    | 12    | 12    | pF   |

[1]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

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

[2]  $f_i = 10\text{ MHz}$ ;  $V_i = \text{GND to } V_{CC}$ ;  $t_r = t_f = 1\text{ ns}$ ;  $C_L = 0\text{ pF}$ ;  $R_L = \infty\ \Omega$ .



Table 11. Dynamic characteristics for temperature range -40 °C to +85 °C [1]

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 4; for waveforms see Fig. 2 and Fig. 3.

| Symbol   | Parameter         | Conditions             | $V_{CC(B)}$   |      |                |      |               |      |               |      |               |      | Unit |
|--|-------------------|------------------------|---------------|------|----------------|------|---------------|------|---------------|------|---------------|------|------|
|  |                   |                        | 1.5 V ± 0.1 V |      | 1.8 V ± 0.15 V |      | 2.5 V ± 0.2 V |      | 3.3 V ± 0.3 V |      | 5.0 V ± 0.5 V |      |      |
|  |                   |                        | Min           | Max  | Min            | Max  | Min           | Max  | Min           | Max  | Min           | Max  |      |
| <b><math>V_{CC(A)} = 1.5 \text{ V} \pm 0.1 \text{ V}</math></b>  |                   |                        |               |      |                |      |               |      |               |      |               |      |      |
| $t_{pd}$   | propagation delay | An to YBn              | 1.7           | 20.7 | 1.6            | 17.1 | 1.3           | 12.9 | 1.1           | 11.1 | 1.0           | 9.5  | ns   |
|  |                   | B4 to YA4              | 1.7           | 20.7 | 1.6            | 19.8 | 1.6           | 19.0 | 1.5           | 18.5 | 1.5           | 18.3 | ns   |
| $t_{dis}$  | disable time      | $\overline{OE}$ to YA4 | 1.3           | 11.6 | 1.3            | 11.6 | 1.3           | 11.6 | 1.3           | 11.6 | 1.3           | 11.6 | ns   |
|  |                   | $\overline{OE}$ to YBn | 1.5           | 14.4 | 1.6            | 13.2 | 1.3           | 10.4 | 1.5           | 10.7 | 1.2           | 9.4  | ns   |
| $t_{en}$   | enable time       | $\overline{OE}$ to YA4 | 2.1           | 21.8 | 2.1            | 21.8 | 2.1           | 21.8 | 2.1           | 21.8 | 2.1           | 21.8 | ns   |
|  |                   | $\overline{OE}$ to YBn | 2.1           | 22.2 | 1.8            | 18.4 | 1.5           | 14.2 | 1.3           | 12.5 | 1.2           | 11.4 | ns   |
| <b><math>V_{CC(A)} = 1.8 \text{ V} \pm 0.15 \text{ V}</math></b> |                   |                        |               |      |                |      |               |      |               |      |               |      |      |
| $t_{pd}$   | propagation delay | An to YBn              | 1.6           | 19.8 | 1.4            | 16.2 | 1.2           | 11.9 | 1.0           | 10.2 | 0.9           | 8.5  | ns   |
|  |                   | B4 to YA4              | 1.6           | 17.1 | 1.4            | 16.2 | 1.3           | 15.3 | 1.2           | 14.9 | 1.2           | 14.5 | ns   |
| $t_{dis}$  | disable time      | $\overline{OE}$ to YA4 | 1.4           | 10.1 | 1.4            | 10.1 | 1.4           | 10.1 | 1.4           | 10.1 | 1.4           | 10.1 | ns   |
|  |                   | $\overline{OE}$ to YBn | 1.4           | 13.7 | 1.5            | 12.3 | 1.2           | 9.5  | 1.4           | 9.7  | 1.1           | 8.2  | ns   |
| $t_{en}$   | enable time       | $\overline{OE}$ to YA4 | 1.8           | 17.2 | 1.8            | 17.2 | 1.8           | 17.2 | 1.8           | 17.2 | 1.8           | 17.2 | ns   |
|  |                   | $\overline{OE}$ to YBn | 2.0           | 21.4 | 1.7            | 17.4 | 1.4           | 12.9 | 1.2           | 11.1 | 1.1           | 9.8  | ns   |
| <b><math>V_{CC(A)} = 2.5 \text{ V} \pm 0.2 \text{ V}</math></b>  |                   |                        |               |      |                |      |               |      |               |      |               |      |      |
| $t_{pd}$   | propagation delay | An to YBn              | 1.6           | 19.0 | 1.3            | 15.3 | 1.0           | 11.0 | 0.9           | 9.1  | 0.7           | 7.2  | ns   |
|  |                   | B4 to YA4              | 1.3           | 12.9 | 1.2            | 11.9 | 1.0           | 11.0 | 0.9           | 10.6 | 0.9           | 10.2 | ns   |
| $t_{dis}$  | disable time      | $\overline{OE}$ to YA4 | 0.9           | 7.2  | 0.9            | 7.2  | 0.9           | 7.2  | 0.9           | 7.2  | 0.9           | 7.2  | ns   |
|  |                   | $\overline{OE}$ to YBn | 1.3           | 12.8 | 1.4            | 11.3 | 1.1           | 8.4  | 1.3           | 8.5  | 1.0           | 6.9  | ns   |
| $t_{en}$   | enable time       | $\overline{OE}$ to YA4 | 1.4           | 11.7 | 1.4            | 11.7 | 1.4           | 11.7 | 1.4           | 11.7 | 1.4           | 11.7 | ns   |
|  |                   | $\overline{OE}$ to YBn | 2.0           | 20.8 | 1.6            | 16.6 | 1.3           | 11.9 | 1.2           | 9.9  | 1.0           | 8.2  | ns   |
| <b><math>V_{CC(A)} = 3.3 \text{ V} \pm 0.3 \text{ V}</math></b>  |                   |                        |               |      |                |      |               |      |               |      |               |      |      |
| $t_{pd}$   | propagation delay | An to YBn              | 1.5           | 18.5 | 1.2            | 14.9 | 0.9           | 10.6 | 0.8           | 8.5  | 0.7           | 6.6  | ns   |
|  |                   | B4 to YA4              | 1.1           | 11.1 | 1.0            | 10.2 | 0.9           | 9.1  | 0.8           | 8.5  | 0.7           | 8.1  | ns   |
| $t_{dis}$  | disable time      | $\overline{OE}$ to YA4 | 1.1           | 7.2  | 1.1            | 7.2  | 1.1           | 7.2  | 1.1           | 7.2  | 1.1           | 7.2  | ns   |
|  |                   | $\overline{OE}$ to YBn | 1.2           | 12.3 | 1.3            | 10.9 | 1.0           | 8.0  | 1.2           | 8.0  | 0.9           | 6.3  | ns   |
| $t_{en}$   | enable time       | $\overline{OE}$ to YA4 | 1.2           | 9.3  | 1.2            | 9.3  | 1.2           | 9.3  | 1.2           | 9.3  | 1.2           | 9.3  | ns   |
|  |                   | $\overline{OE}$ to YBn | 2.0           | 20.4 | 1.7            | 16.5 | 1.4           | 11.5 | 1.2           | 9.4  | 1.0           | 7.5  | ns   |
| <b><math>V_{CC(A)} = 5.0 \text{ V} \pm 0.5 \text{ V}</math></b>  |                   |                        |               |      |                |      |               |      |               |      |               |      |      |
| $t_{pd}$   | propagation delay | An to YBn              | 1.5           | 18.3 | 1.2            | 14.5 | 0.9           | 10.2 | 0.7           | 8.1  | 0.6           | 6.3  | ns   |
|  |                   | B4 to YA4              | 1.0           | 9.5  | 0.9            | 8.5  | 0.7           | 7.2  | 0.7           | 6.6  | 0.6           | 6.3  | ns   |
| $t_{dis}$  | disable time      | $\overline{OE}$ to YA4 | 0.7           | 5.3  | 0.7            | 5.3  | 0.7           | 5.3  | 0.7           | 5.3  | 0.7           | 5.3  | ns   |
|  |                   | $\overline{OE}$ to YBn | 1.2           | 12.0 | 1.3            | 10.5 | 0.9           | 7.6  | 1.2           | 7.6  | 0.8           | 5.8  | ns   |
| $t_{en}$   | enable time       | $\overline{OE}$ to YA4 | 1.1           | 7.0  | 1.1            | 7.0  | 1.1           | 7.0  | 1.1           | 7.0  | 1.1           | 7.0  | ns   |
|  |                   | $\overline{OE}$ to YBn | 2.0           | 20.5 | 1.7            | 16.4 | 1.4           | 11.4 | 1.2           | 9.2  | 1.0           | 7.2  | ns   |

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

Table 12. Dynamic characteristics for temperature range -40 °C to +125 °C [1]

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 4; for waveforms see Fig. 2 and Fig. 3.

| Symbol                                    | Parameter         | Conditions             | V <sub>CC(B)</sub> |      |                |      |               |      |               |      |               |      | Unit |
|---|-------------------|------------------------|--------------------|------|----------------|------|---------------|------|---------------|------|---------------|------|------|
|   |                   |                        | 1.5 V ± 0.1 V      |      | 1.8 V ± 0.15 V |      | 2.5 V ± 0.2 V |      | 3.3 V ± 0.3 V |      | 5.0 V ± 0.5 V |      |      |
|   |                   |                        | Min                | Max  | Min            | Max  | Min           | Max  | Min           | Max  | Min           | Max  |      |
| <b>V<sub>CC(A)</sub> = 1.5 V ± 0.1 V</b>  |                   |                        |                    |      |                |      |               |      |               |      |               |      |      |
| t <sub>pd</sub>                           | propagation delay | An to YBn              | 1.7                | 22.0 | 1.6            | 18.3 | 1.3           | 14.0 | 1.1           | 12.2 | 1.0           | 10.5 | ns   |
|   |                   | B4 to YA4              | 1.7                | 22.0 | 1.6            | 21.0 | 1.6           | 20.1 | 1.5           | 19.5 | 1.5           | 19.4 | ns   |
| t <sub>dis</sub>                          | disable time      | $\overline{OE}$ to YA4 | 1.3                | 12.8 | 1.3            | 12.8 | 1.3           | 12.8 | 1.3           | 12.8 | 1.3           | 12.8 | ns   |
|   |                   | $\overline{OE}$ to YBn | 1.5                | 15.8 | 1.6            | 14.5 | 1.3           | 11.5 | 1.5           | 11.1 | 1.2           | 9.7  | ns   |
| t <sub>en</sub>                           | enable time       | $\overline{OE}$ to YA4 | 2.1                | 23.2 | 2.1            | 23.2 | 2.1           | 23.2 | 2.1           | 23.2 | 2.1           | 23.2 | ns   |
|   |                   | $\overline{OE}$ to YBn | 2.1                | 23.6 | 1.8            | 19.6 | 1.5           | 15.4 | 1.3           | 13.7 | 1.2           | 12.6 | ns   |
| <b>V<sub>CC(A)</sub> = 1.8 V ± 0.15 V</b> |                   |                        |                    |      |                |      |               |      |               |      |               |      |      |
| t <sub>pd</sub>                           | propagation delay | An to YBn              | 1.6                | 21.0 | 1.4            | 17.4 | 1.2           | 13.0 | 1.0           | 11.2 | 0.9           | 9.3  | ns   |
|   |                   | B4 to YA4              | 1.6                | 18.3 | 1.4            | 17.4 | 1.3           | 16.4 | 1.2           | 16.0 | 1.2           | 15.6 | ns   |
| t <sub>dis</sub>                          | disable time      | $\overline{OE}$ to YA4 | 1.4                | 11.2 | 1.4            | 11.2 | 1.4           | 11.2 | 1.4           | 11.2 | 1.4           | 11.2 | ns   |
|   |                   | $\overline{OE}$ to YBn | 1.4                | 15.2 | 1.5            | 13.5 | 1.2           | 10.5 | 1.4           | 10.0 | 1.1           | 8.5  | ns   |
| t <sub>en</sub>                           | enable time       | $\overline{OE}$ to YA4 | 1.8                | 18.4 | 1.8            | 18.4 | 1.8           | 18.4 | 1.8           | 18.4 | 1.8           | 18.4 | ns   |
|   |                   | $\overline{OE}$ to YBn | 2.0                | 22.7 | 1.7            | 18.7 | 1.4           | 14.1 | 1.2           | 12.2 | 1.1           | 10.8 | ns   |
| <b>V<sub>CC(A)</sub> = 2.5 V ± 0.2 V</b>  |                   |                        |                    |      |                |      |               |      |               |      |               |      |      |
| t <sub>pd</sub>                           | propagation delay | An to YBn              | 1.6                | 20.1 | 1.3            | 16.4 | 1.0           | 11.9 | 0.9           | 9.9  | 0.7           | 7.9  | ns   |
|   |                   | B4 to YA4              | 1.3                | 14.0 | 1.2            | 13.0 | 1.0           | 11.9 | 0.9           | 11.5 | 0.9           | 11.1 | ns   |
| t <sub>dis</sub>                          | disable time      | $\overline{OE}$ to YA4 | 0.9                | 8.0  | 0.9            | 8.0  | 0.9           | 8.0  | 0.9           | 8.0  | 0.9           | 8.0  | ns   |
|   |                   | $\overline{OE}$ to YBn | 1.3                | 14.0 | 1.4            | 12.5 | 1.1           | 9.3  | 1.3           | 9.3  | 1.0           | 7.5  | ns   |
| t <sub>en</sub>                           | enable time       | $\overline{OE}$ to YA4 | 1.4                | 12.7 | 1.4            | 12.7 | 1.4           | 12.7 | 1.4           | 12.7 | 1.4           | 12.7 | ns   |
|   |                   | $\overline{OE}$ to YBn | 2.0                | 22.0 | 1.6            | 17.9 | 1.3           | 13.0 | 1.2           | 10.8 | 1.0           | 9.0  | ns   |
| <b>V<sub>CC(A)</sub> = 3.3 V ± 0.3 V</b>  |                   |                        |                    |      |                |      |               |      |               |      |               |      |      |
| t <sub>pd</sub>                           | propagation delay | An to YBn              | 1.5                | 19.5 | 1.2            | 16.0 | 0.9           | 11.5 | 0.8           | 9.3  | 0.7           | 7.3  | ns   |
|   |                   | B4 to YA4              | 1.1                | 12.2 | 1.0            | 11.2 | 0.9           | 9.9  | 0.8           | 9.3  | 0.7           | 8.8  | ns   |
| t <sub>dis</sub>                          | disable time      | $\overline{OE}$ to YA4 | 1.1                | 7.8  | 1.1            | 7.8  | 1.1           | 7.8  | 1.1           | 7.8  | 1.1           | 7.8  | ns   |
|   |                   | $\overline{OE}$ to YBn | 1.2                | 13.6 | 1.3            | 12.1 | 1.0           | 8.8  | 1.2           | 8.3  | 0.9           | 6.5  | ns   |
| t <sub>en</sub>                           | enable time       | $\overline{OE}$ to YA4 | 1.2                | 10.1 | 1.2            | 10.1 | 1.2           | 10.1 | 1.2           | 10.1 | 1.2           | 10.1 | ns   |
|   |                   | $\overline{OE}$ to YBn | 2.0                | 21.6 | 1.7            | 17.5 | 1.4           | 12.6 | 1.2           | 10.3 | 1.0           | 8.3  | ns   |
| <b>V<sub>CC(A)</sub> = 5.0 V ± 0.5 V</b>  |                   |                        |                    |      |                |      |               |      |               |      |               |      |      |
| t <sub>pd</sub>                           | propagation delay | An to YBn              | 1.5                | 19.4 | 1.2            | 15.6 | 0.9           | 11.1 | 0.7           | 8.8  | 0.6           | 6.8  | ns   |
|   |                   | B4 to YA4              | 1.0                | 10.5 | 0.9            | 9.3  | 0.7           | 7.9  | 0.7           | 7.3  | 0.6           | 6.8  | ns   |
| t <sub>dis</sub>                          | disable time      | $\overline{OE}$ to YA4 | 0.7                | 5.7  | 0.7            | 5.7  | 0.7           | 5.7  | 0.7           | 5.7  | 0.7           | 5.7  | ns   |
|   |                   | $\overline{OE}$ to YBn | 1.2                | 13.3 | 1.3            | 11.7 | 0.9           | 8.4  | 1.2           | 7.9  | 0.8           | 6.0  | ns   |
| t <sub>en</sub>                           | enable time       | $\overline{OE}$ to YA4 | 1.1                | 7.7  | 1.1            | 7.7  | 1.1           | 7.7  | 1.1           | 7.7  | 1.1           | 7.7  | ns   |
|   |                   | $\overline{OE}$ to YBn | 2.0                | 21.7 | 1.7            | 17.4 | 1.4           | 12.5 | 1.2           | 10.1 | 1.0           | 7.9  | ns   |

[1] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>; t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>; t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.

10.1. Waveforms and test circuit

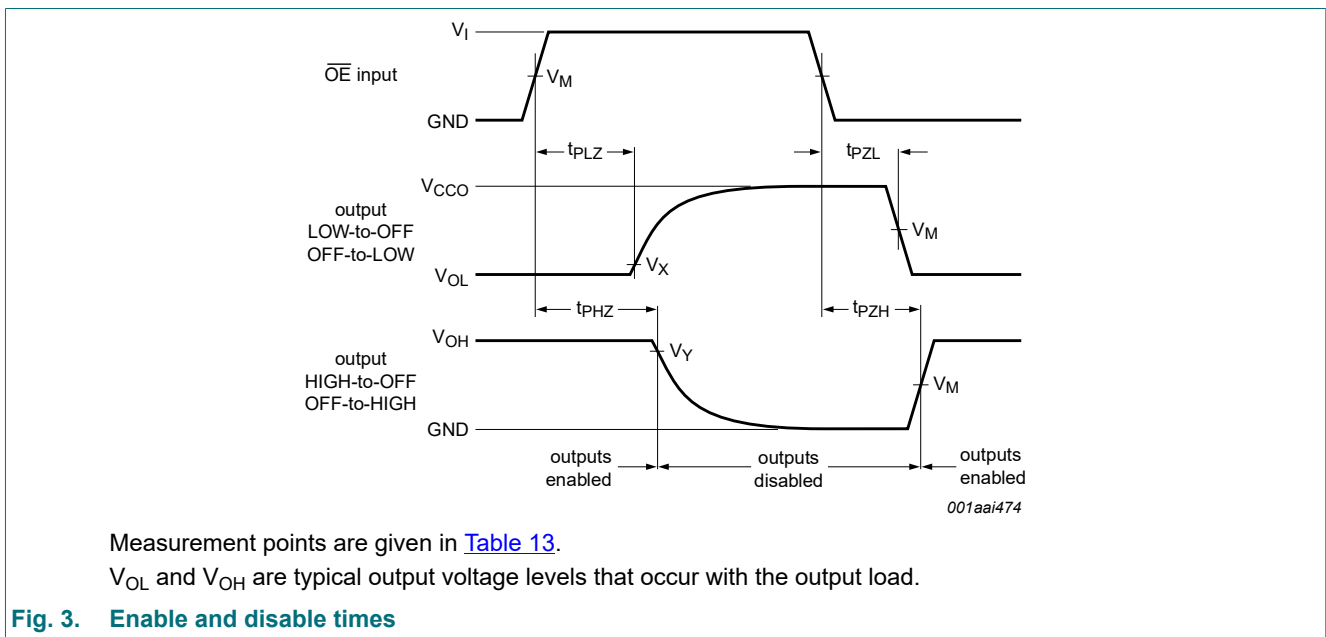
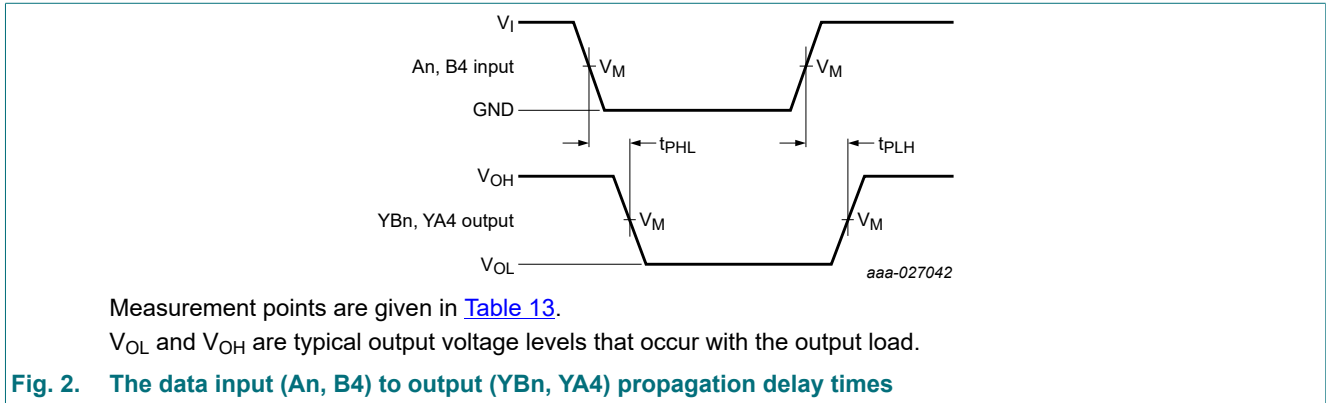


Table 13. Measurement points

| Supply voltage         | Input [1]            | Output [2]           |                           |                           |
|------------------------|----------------------|----------------------|---------------------------|---------------------------|
| $V_{CC(A)}, V_{CC(B)}$ | $V_M$                | $V_M$                | $V_X$                     | $V_Y$                     |
| 1.2 V to 1.6 V         | $0.5 \times V_{CCI}$ | $0.5 \times V_{CCO}$ | $V_{OL} + 0.1 \text{ V}$  | $V_{OH} - 0.1 \text{ V}$  |
| 1.65 V to 2.7 V        | $0.5 \times V_{CCI}$ | $0.5 \times V_{CCO}$ | $V_{OL} + 0.15 \text{ V}$ | $V_{OH} - 0.15 \text{ V}$ |
| 3.0 V to 5.5 V         | $0.5 \times V_{CCI}$ | $0.5 \times V_{CCO}$ | $V_{OL} + 0.3 \text{ V}$  | $V_{OH} - 0.3 \text{ V}$  |

[1]  $V_{CCI}$  is the supply voltage associated with the input port.  
 [2]  $V_{CCO}$  is the supply voltage associated with the output port.

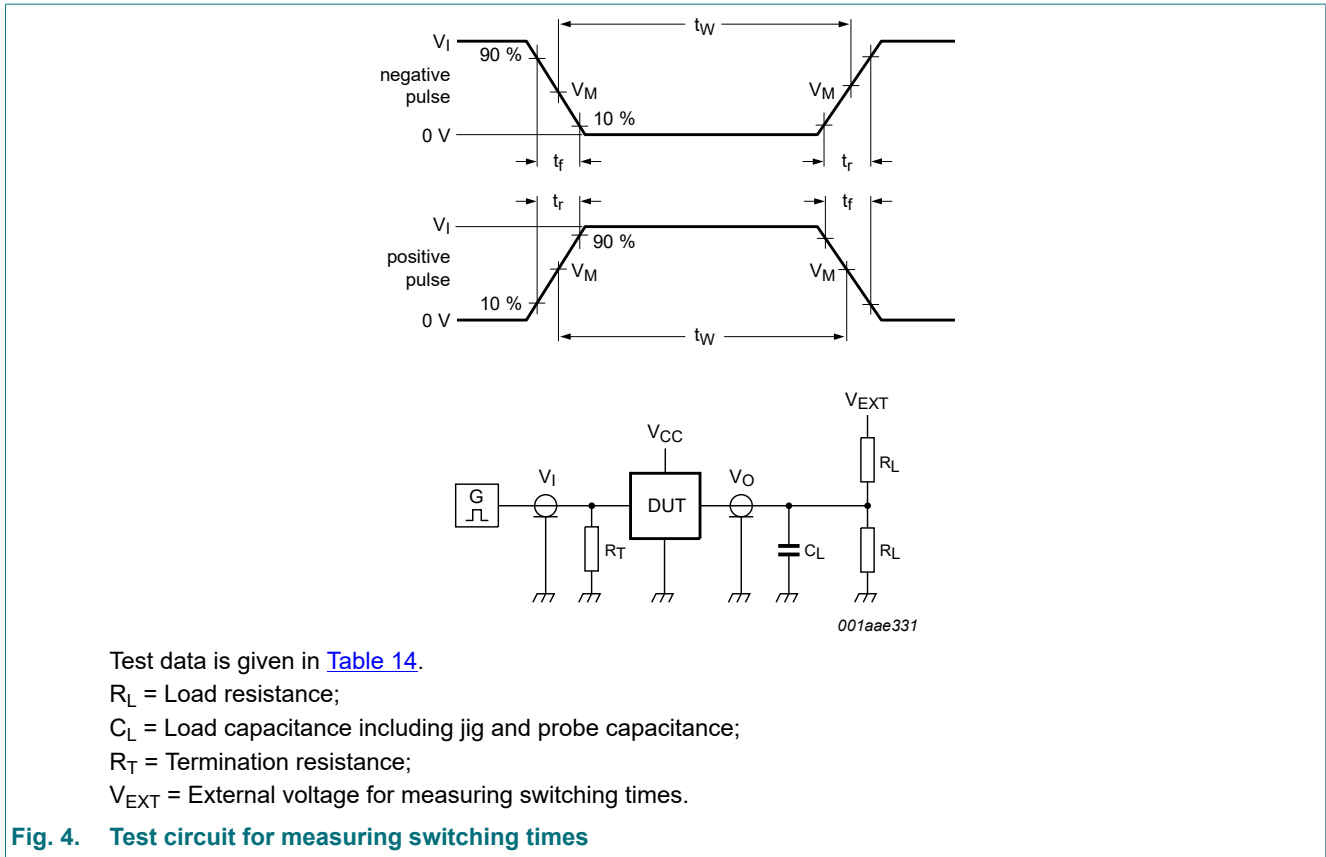
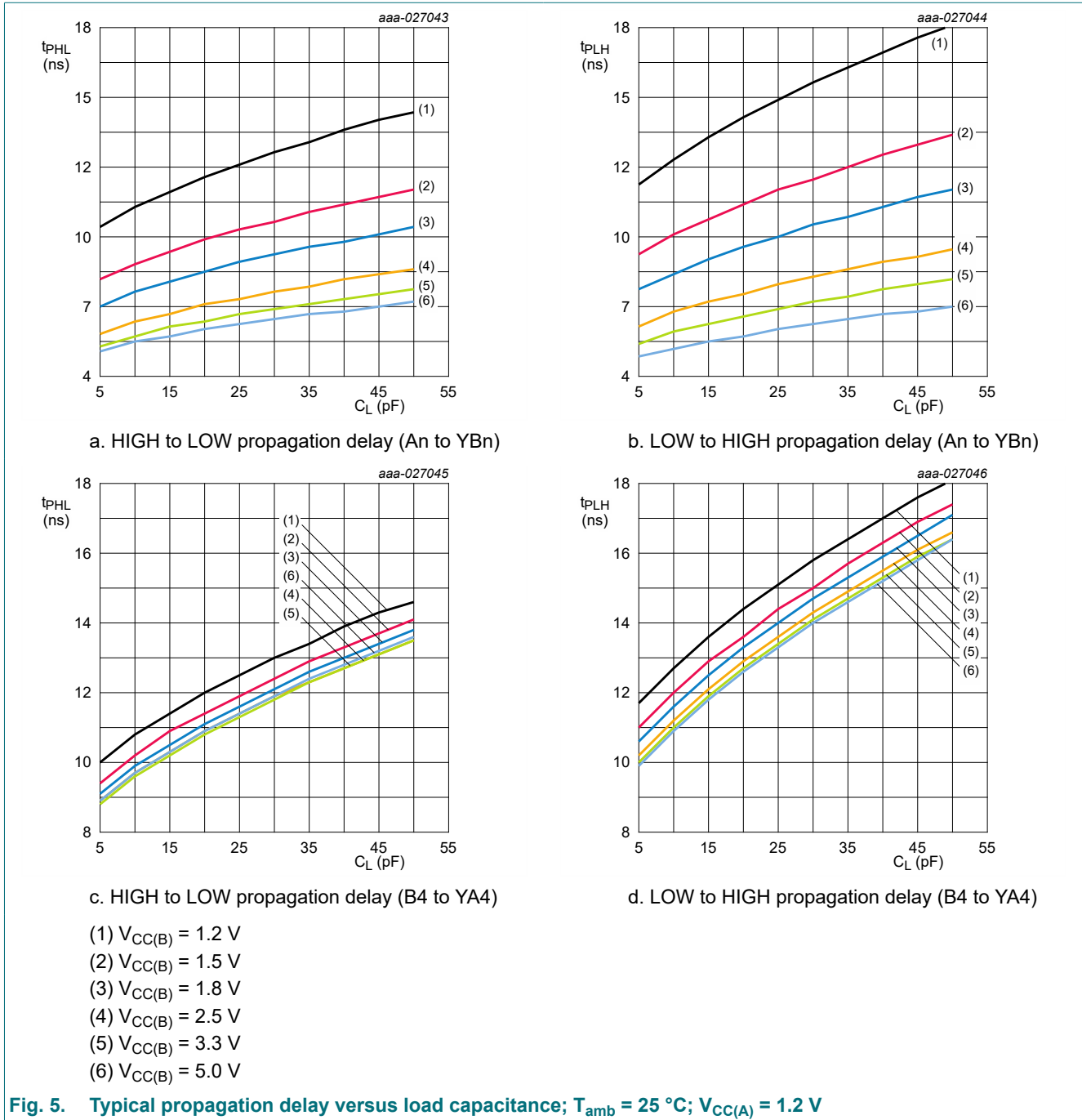


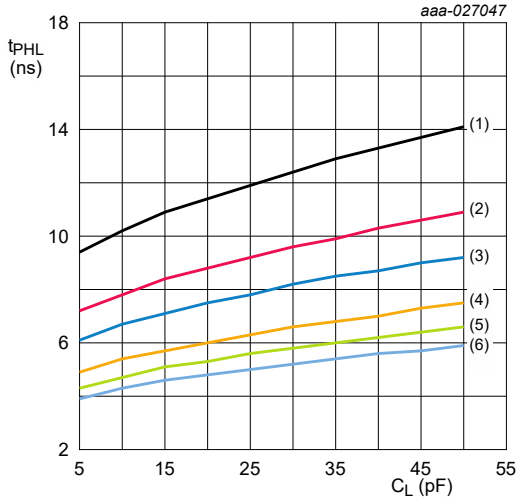
Table 14. Test data

| Supply voltage         | Input     |                         | Load  |              | $V_{EXT}$          |                    |                        |
|------------------------|-----------|-------------------------|-------|--------------|--------------------|--------------------|------------------------|
| $V_{CC(A)}, V_{CC(B)}$ | $V_I$ [1] | $\Delta t/\Delta V$ [2] | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ [3] |
| 1.2 V to 5.5 V         | $V_{CCI}$ | $\leq 1.0$ ns/V         | 15 pF | 2 k $\Omega$ | open               | GND                | $2 \times V_{CCO}$     |

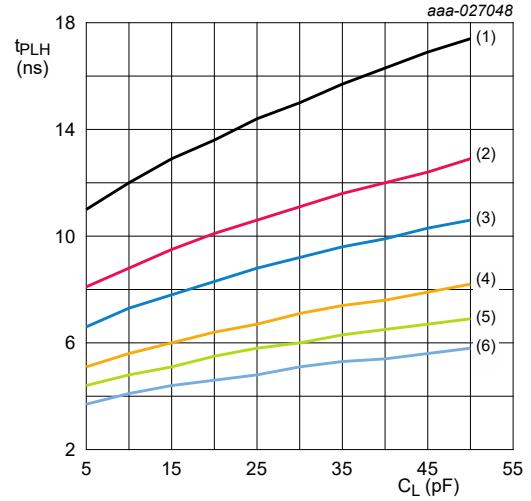
- [1]  $V_{CCI}$  is the supply voltage associated with the input port.
- [2]  $dV/dt \geq 1.0$  V/ns.
- [3]  $V_{CCO}$  is the supply voltage associated with the output port.

10.2. Typical propagation delay characteristics

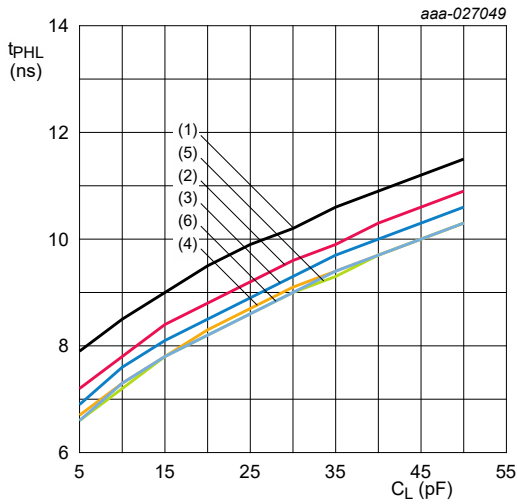




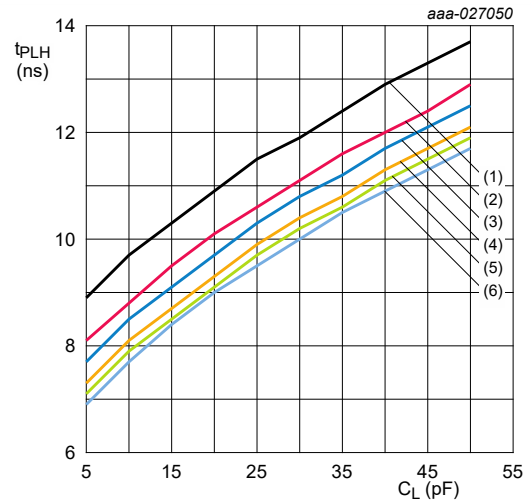
a. HIGH to LOW propagation delay (An to YBn)



b. LOW to HIGH propagation delay (An to YBn)



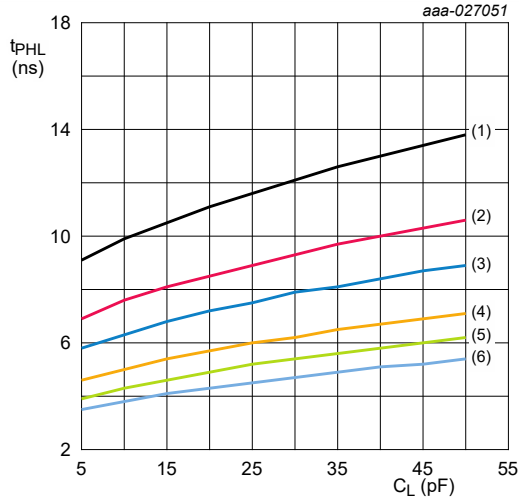
c. HIGH to LOW propagation delay (B4 to YA4)



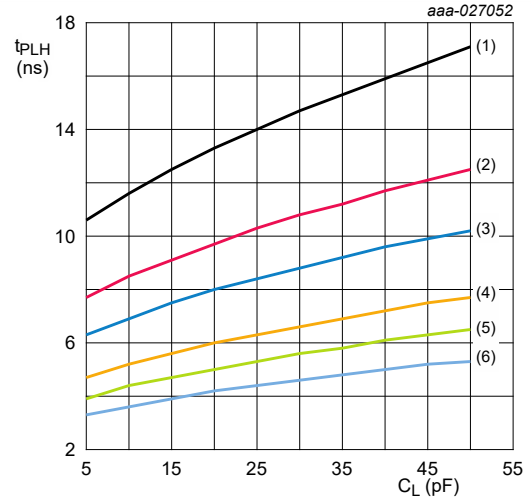
d. LOW to HIGH propagation delay (B4 to YA4)

- (1)  $V_{CC(B)} = 1.2$  V
- (2)  $V_{CC(B)} = 1.5$  V
- (3)  $V_{CC(B)} = 1.8$  V
- (4)  $V_{CC(B)} = 2.5$  V
- (5)  $V_{CC(B)} = 3.3$  V
- (6)  $V_{CC(B)} = 5.0$  V

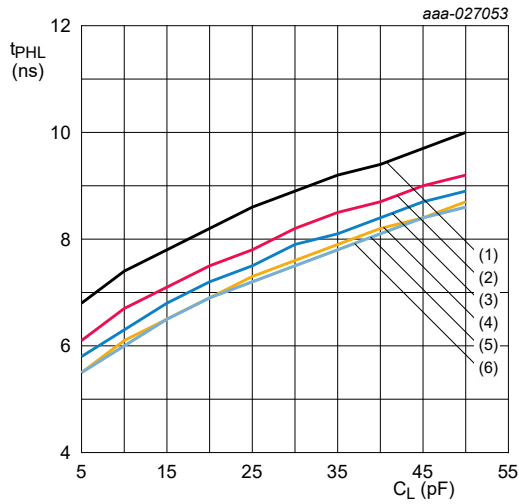
Fig. 6. Typical propagation delay versus load capacitance;  $T_{amb} = 25$  °C;  $V_{CC(A)} = 1.5$  V



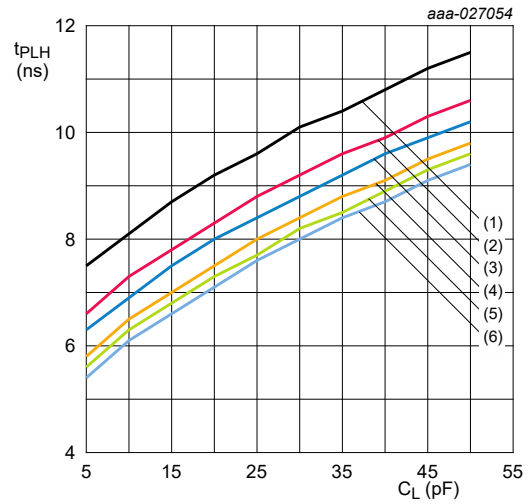
a. HIGH to LOW propagation delay (An to YBn)



b. LOW to HIGH propagation delay (An to YBn)



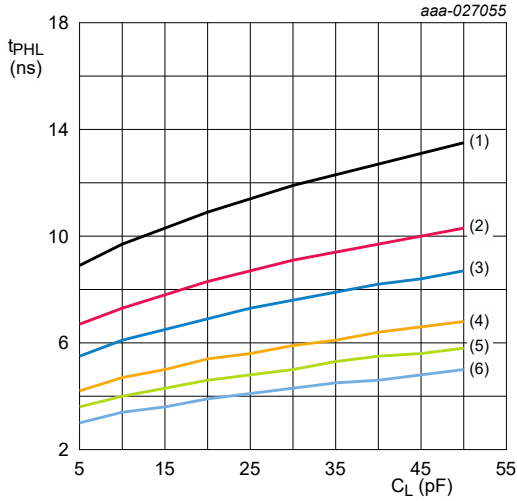
c. HIGH to LOW propagation delay (B4 to YA4)



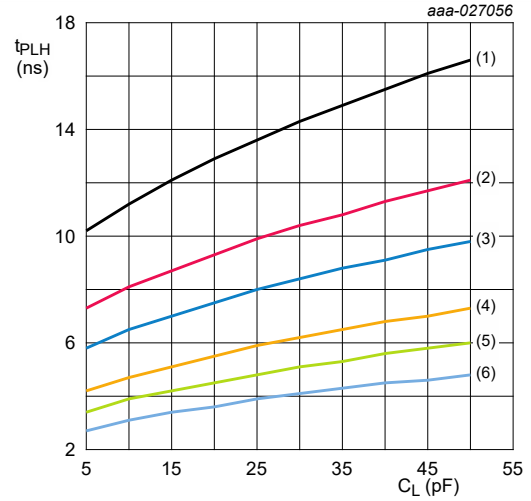
d. LOW to HIGH propagation delay (B4 to YA4)

- (1)  $V_{CC(B)} = 1.2\text{ V}$
- (2)  $V_{CC(B)} = 1.5\text{ V}$
- (3)  $V_{CC(B)} = 1.8\text{ V}$
- (4)  $V_{CC(B)} = 2.5\text{ V}$
- (5)  $V_{CC(B)} = 3.3\text{ V}$
- (6)  $V_{CC(B)} = 5.0\text{ V}$

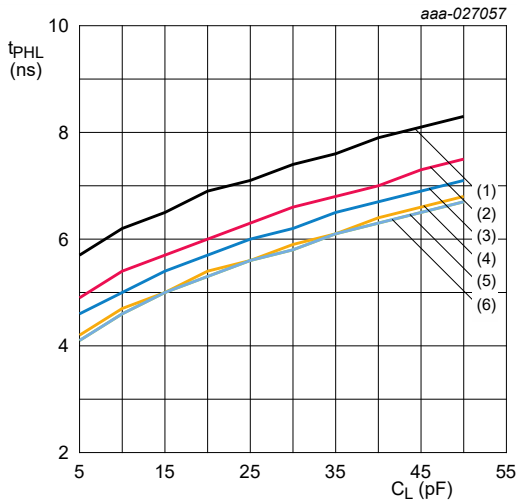
Fig. 7. Typical propagation delay versus load capacitance;  $T_{amb} = 25\text{ }^\circ\text{C}$ ;  $V_{CC(A)} = 1.8\text{ V}$



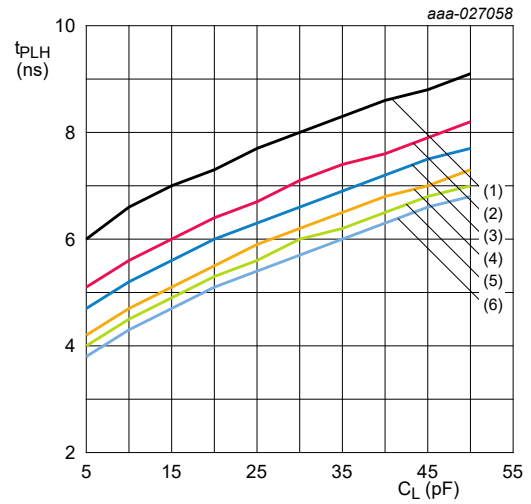
a. HIGH to LOW propagation delay (An to YBn)



b. LOW to HIGH propagation delay (An to YBn)



c. HIGH to LOW propagation delay (B4 to YA4)

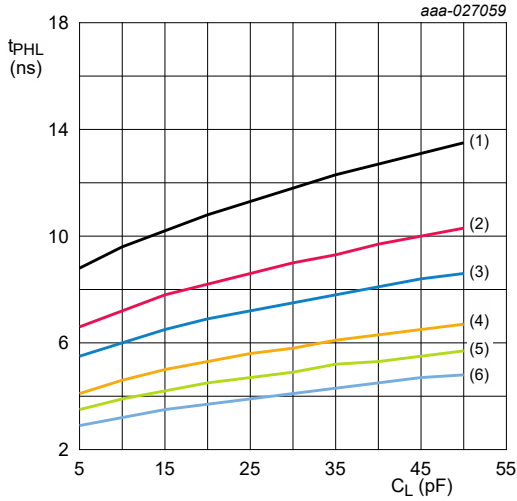


d. LOW to HIGH propagation delay (B4 to YA4)

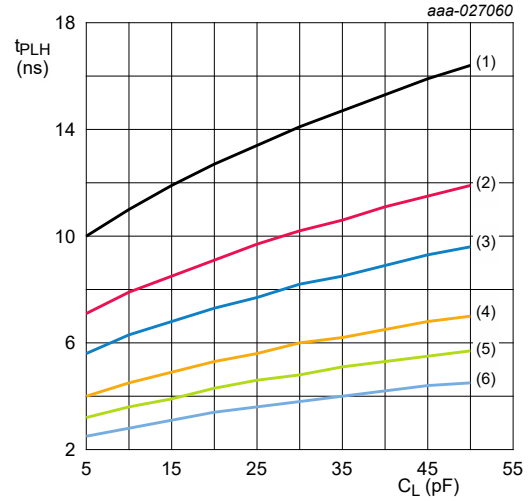
- (1)  $V_{CC(B)} = 1.2\text{ V}$
- (2)  $V_{CC(B)} = 1.5\text{ V}$
- (3)  $V_{CC(B)} = 1.8\text{ V}$
- (4)  $V_{CC(B)} = 2.5\text{ V}$
- (5)  $V_{CC(B)} = 3.3\text{ V}$
- (6)  $V_{CC(B)} = 5.0\text{ V}$

Fig. 8. Typical propagation delay versus load capacitance;  $T_{amb} = 25\text{ }^\circ\text{C}$ ;  $V_{CC(A)} = 2.5\text{ V}$

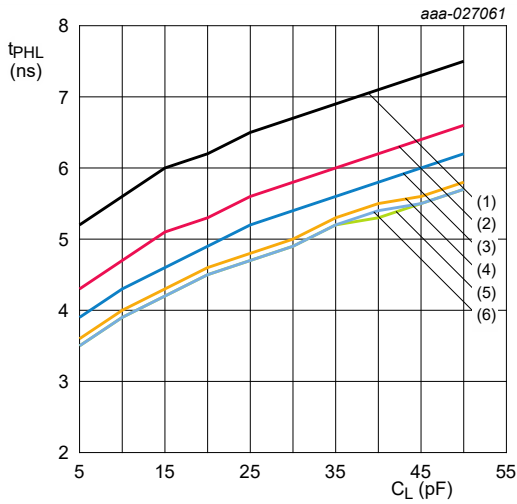




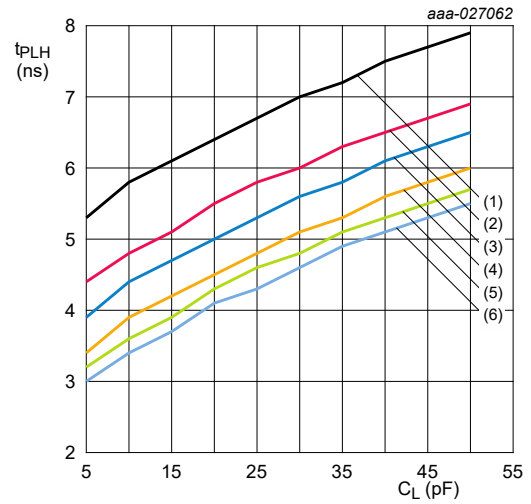
a. HIGH to LOW propagation delay (An to YBn)



b. LOW to HIGH propagation delay (An to YBn)



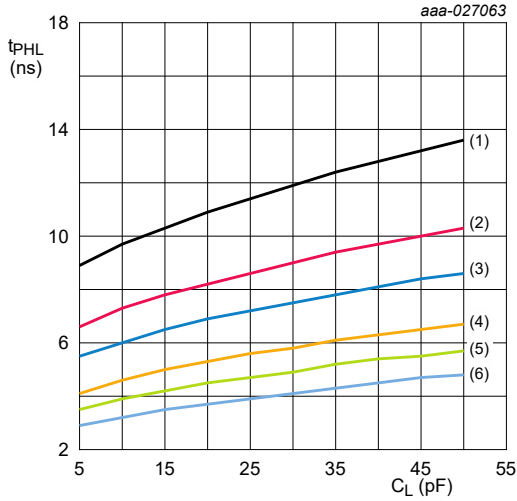
c. HIGH to LOW propagation delay (B4 to YA4)



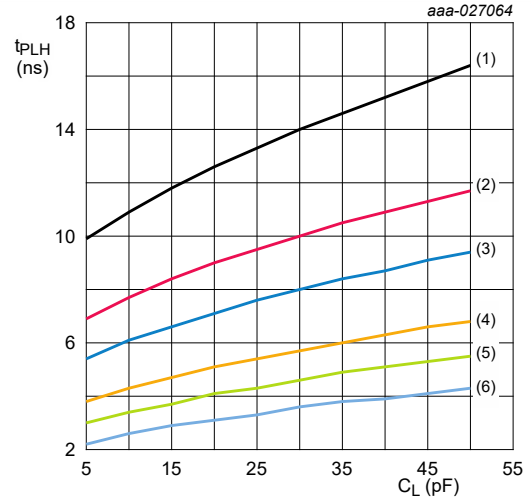
d. LOW to HIGH propagation delay (B4 to YA4)

- (1)  $V_{CC(B)} = 1.2\text{ V}$
- (2)  $V_{CC(B)} = 1.5\text{ V}$
- (3)  $V_{CC(B)} = 1.8\text{ V}$
- (4)  $V_{CC(B)} = 2.5\text{ V}$
- (5)  $V_{CC(B)} = 3.3\text{ V}$
- (6)  $V_{CC(B)} = 5.0\text{ V}$

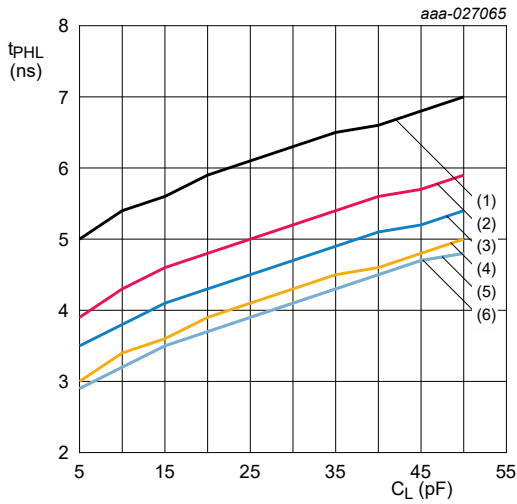
Fig. 9. Typical propagation delay versus load capacitance;  $T_{amb} = 25\text{ }^\circ\text{C}$ ;  $V_{CC(A)} = 3.3\text{ V}$



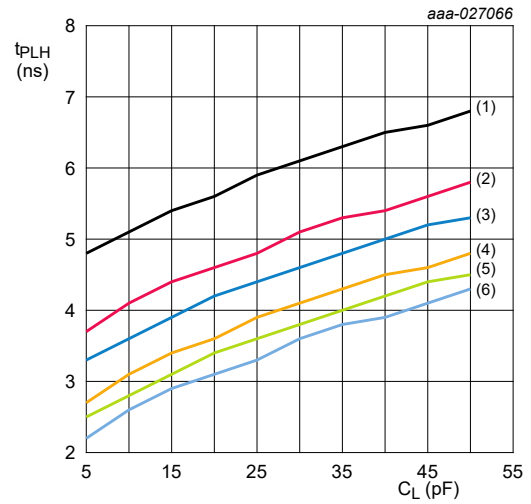
a. HIGH to LOW propagation delay (An to YBn)



b. LOW to HIGH propagation delay (An to YBn)



c. HIGH to LOW propagation delay (B4 to YA4)



d. LOW to HIGH propagation delay (B4 to YA4)

- (1) V<sub>CC(B)</sub> = 1.2 V
- (2) V<sub>CC(B)</sub> = 1.5 V
- (3) V<sub>CC(B)</sub> = 1.8 V
- (4) V<sub>CC(B)</sub> = 2.5 V
- (5) V<sub>CC(B)</sub> = 3.3 V
- (6) V<sub>CC(B)</sub> = 5.0 V

Fig. 10. Typical propagation delay versus load capacitance; T<sub>amb</sub> = 25 °C; V<sub>CC(A)</sub> = 5 V

## 11. Application information

### 11.1. Unidirectional logic level-shifting application

The circuit given in Fig. 11 is an example of the 74LVC4T3144 being used in an unidirectional logic level-shifting application.

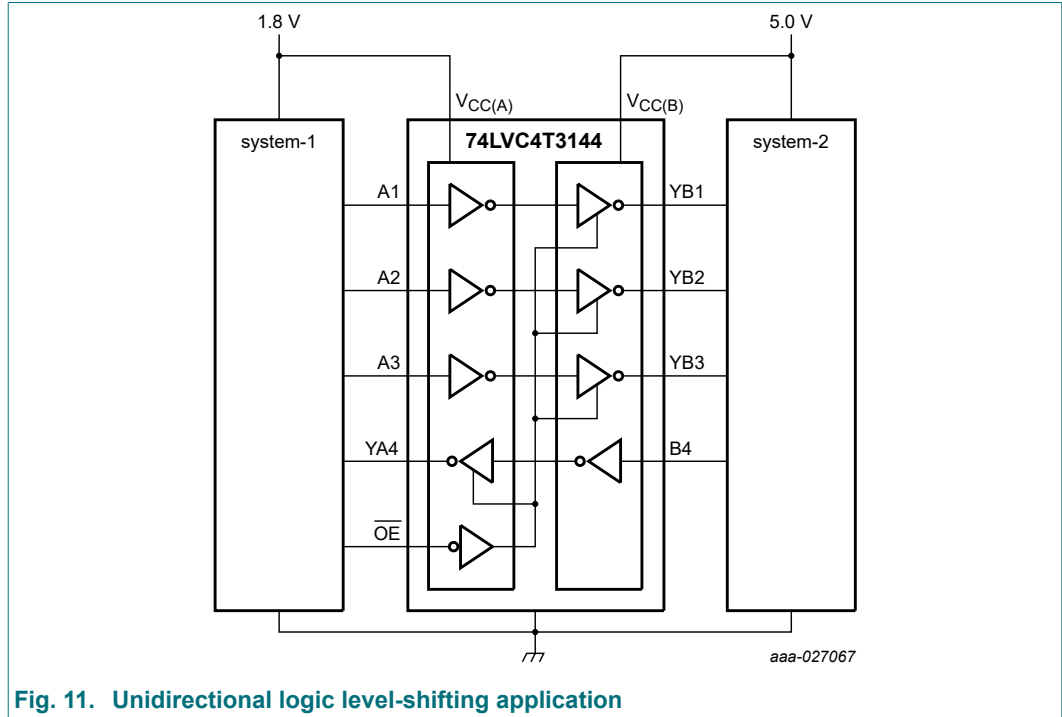


Fig. 11. Unidirectional logic level-shifting application

Table 15. Description unidirectional logic level-shifting application

| Name            | Description                                 |
|-----------------|---|
| $V_{CC(A)}$     | supply voltage of system-1 (1.2 V to 5.5 V) |
| $V_{CC(B)}$     | supply voltage of system-2 (1.2 V to 5.5 V) |
| A1, A2, A3      | input level depends on $V_{CC(A)}$ voltage  |
| YA4             | output level depends on $V_{CC(A)}$ voltage |
| YB1, YB2, YB3   | output level depends on $V_{CC(B)}$ voltage |
| B4              | input level depends on $V_{CC(B)}$ voltage  |
| $\overline{OE}$ | input level depends on $V_{CC(A)}$ voltage  |
| GND             | device GND                                  |

## 11.2. Power-up considerations

The device is designed such that no special power-up sequence is required other than GND being applied first.

**Table 16. Typical total supply current ( $I_{CC(A)} + I_{CC(B)}$ )**

| $V_{CC(A)}$ | $V_{CC(B)}$ |       |       |       |       |       |       | Unit          |
|-------------|-------------|-------|-------|-------|-------|-------|-------|---------------|
|             | 0 V         | 1.2 V | 1.5 V | 1.8 V | 2.5 V | 3.3 V | 5.0 V |               |
| 0 V         | 0           | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | $\mu\text{A}$ |
| 1.2 V       | < 1         | < 1   | < 1   | < 1   | < 1   | < 1   | 1     | $\mu\text{A}$ |
| 1.5 V       | < 1         | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | $\mu\text{A}$ |
| 1.8 V       | < 1         | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | $\mu\text{A}$ |
| 2.5 V       | < 1         | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | $\mu\text{A}$ |
| 3.3 V       | < 1         | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | $\mu\text{A}$ |
| 5.0 V       | < 1         | 1     | < 1   | < 1   | < 1   | < 1   | < 1   | $\mu\text{A}$ |

12. Package outline

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

SOT402-1

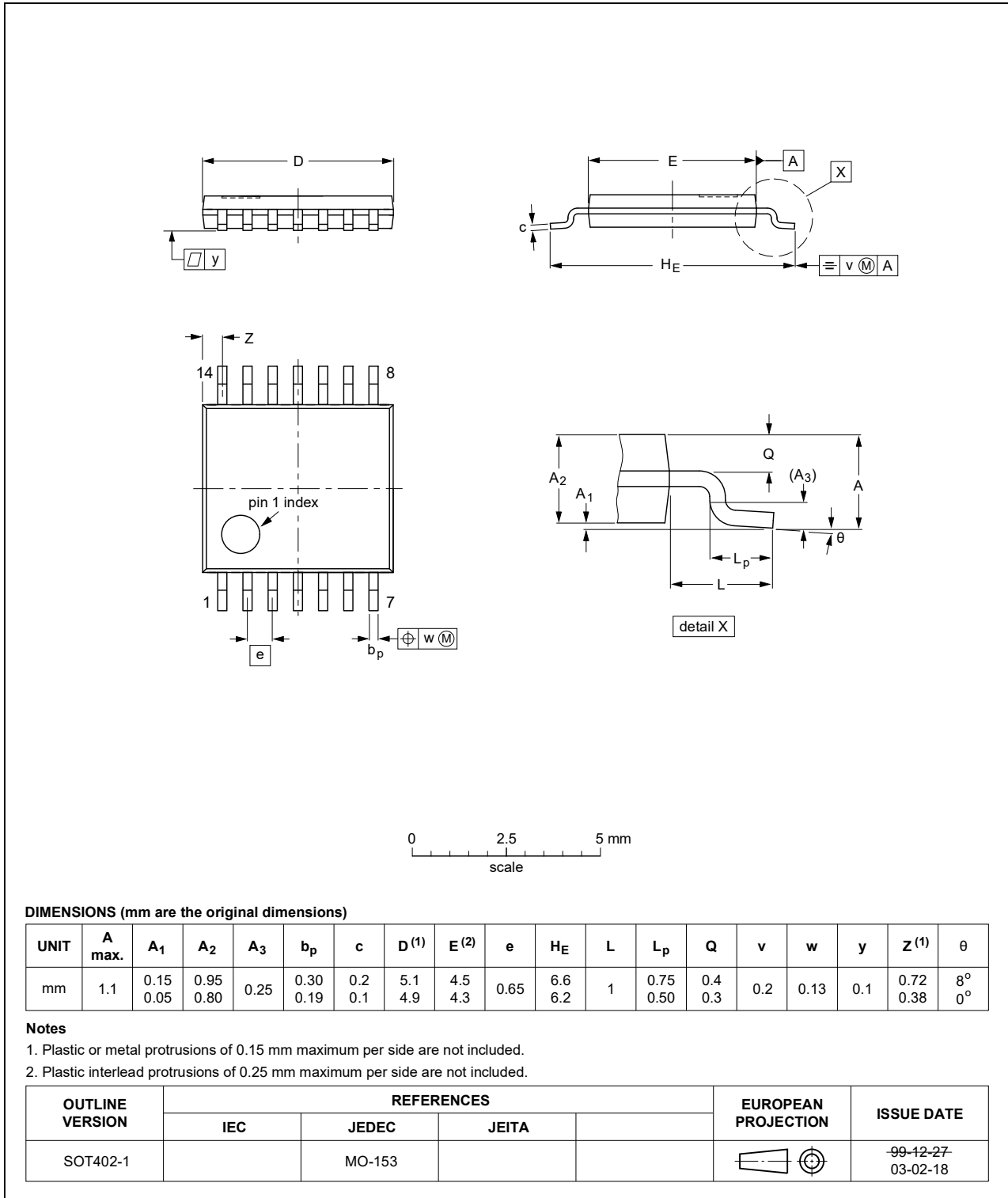


Fig. 12. Package outline SOT402-1 (TSSOP14)

## 13. Abbreviations

Table 17. Abbreviations

| Acronym | Description             |
|---------|-------------------------|
| CDM     | Charged Device Model    |
| DUT     | Device Under Test       |
| ESD     | ElectroStatic Discharge |
| HBM     | Human Body Model        |

## 14. Revision history

Table 18. Revision history

| Document ID          | Release date  | Data sheet status  | Change notice | Supersedes           |
|----------------------|---|--------------------|---------------|----------------------|
| 74LVC4T3144_Q100 v.2 | 20230803  | Product data sheet | -             | 74LVC4T3144_Q100 v.1 |
| Modifications:       | <ul style="list-style-type: none"><li>• <a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li><li>• <a href="#">Section 7</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li></ul> |                    |               |                      |
| 74LVC4T3144_Q100 v.1 | 20170814  | Product data sheet | -             | -                    |

## 15. 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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