

# 74AVCH16T245

16-bit dual supply translating transceiver with configurable voltage translation; 3-state

Rev. 6 — 3 April 2019

Product data sheet

## 1. General description

The 74AVCH16T245 is a 16-bit transceiver with bidirectional level voltage translation and 3-state outputs. The device can be used as two 8-bit transceivers or as a 16-bit transceiver. It has dual supplies ( $V_{CC(A)}$  and  $V_{CC(B)}$ ) for voltage translation and four 8-bit input-output ports ( $nAn$ ,  $nBn$ ) each with its own output enable ( $nOE$ ) and send/receive ( $nDIR$ ) input for direction control.  $V_{CC(A)}$  and  $V_{CC(B)}$  can be independently supplied at any voltage between 0.8 V and 3.6 V making the device suitable for low voltage translation between any of the following voltages: 0.8 V, 1.2 V, 1.5 V, 1.8 V, 2.5 V and 3.3 V. A HIGH on  $nDIR$  selects transmission from  $nAn$  to  $nBn$  while a LOW on  $nDIR$  selects transmission from  $nBn$  to  $nAn$ . A HIGH on  $nOE$  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 the output, 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, both A and B outputs are in the high-impedance OFF-state. The bus-hold circuitry on the powered-up side always stays active.

The 74AVCH16T245 has active bus hold circuitry which is provided to hold unused or floating data inputs at a valid logic level. This feature eliminates the need for external pull-up or pull-down resistors.

## 2. Features and benefits

- Wide supply voltage range:  $V_{CC(A)}$ : 0.8 V to 3.6 V and  $V_{CC(B)}$ : 0.8 V to 3.6 V
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.2 V to 1.95 V)
  - JESD8-5 (1.8 V to 2.7 V)
  - JESD8-B (2.7 V to 3.6 V)
- ESD protection:
  - HBM JESD22-A114F Class 3B exceeds 8000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101D exceeds 1000 V
- Maximum data rates:
  - 380 Mbit/s ( $\geq 1.8$  V to 3.3 V translation)
  - 200 Mbit/s ( $\geq 1.1$  V to 3.3 V translation)
  - 200 Mbit/s ( $\geq 1.1$  V to 2.5 V translation)
  - 200 Mbit/s ( $\geq 1.1$  V to 1.8 V translation)
  - 150 Mbit/s ( $\geq 1.1$  V to 1.5 V translation)
  - 100 Mbit/s ( $\geq 1.1$  V to 1.2 V translation)
- Suspend mode
- Bus hold on data inputs
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- 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  |
| 74AVCH16T245DGG | -40 °C to +125 °C | TSSOP48 | plastic thin shrink small outline package;<br>48 leads; body width 6.1 mm | SOT362-1 |

4. Functional diagram

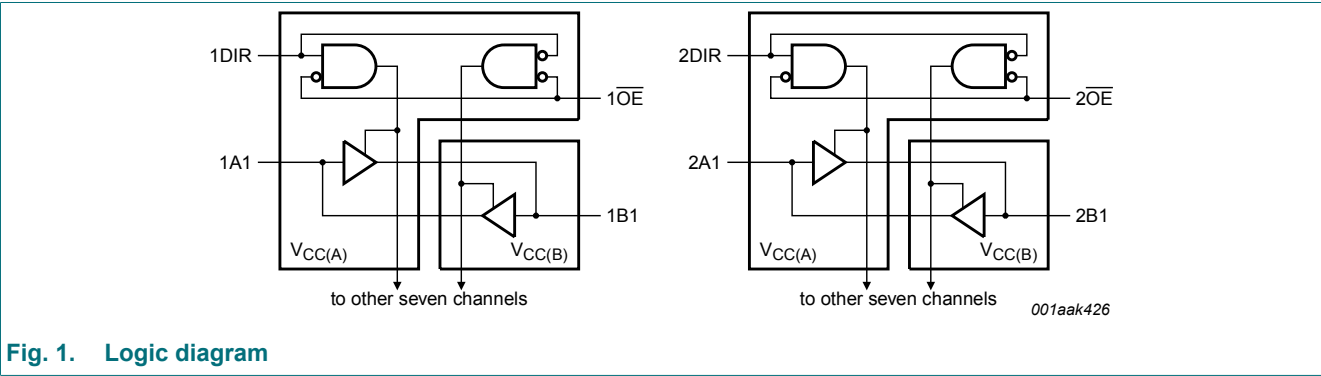


Fig. 1. Logic diagram

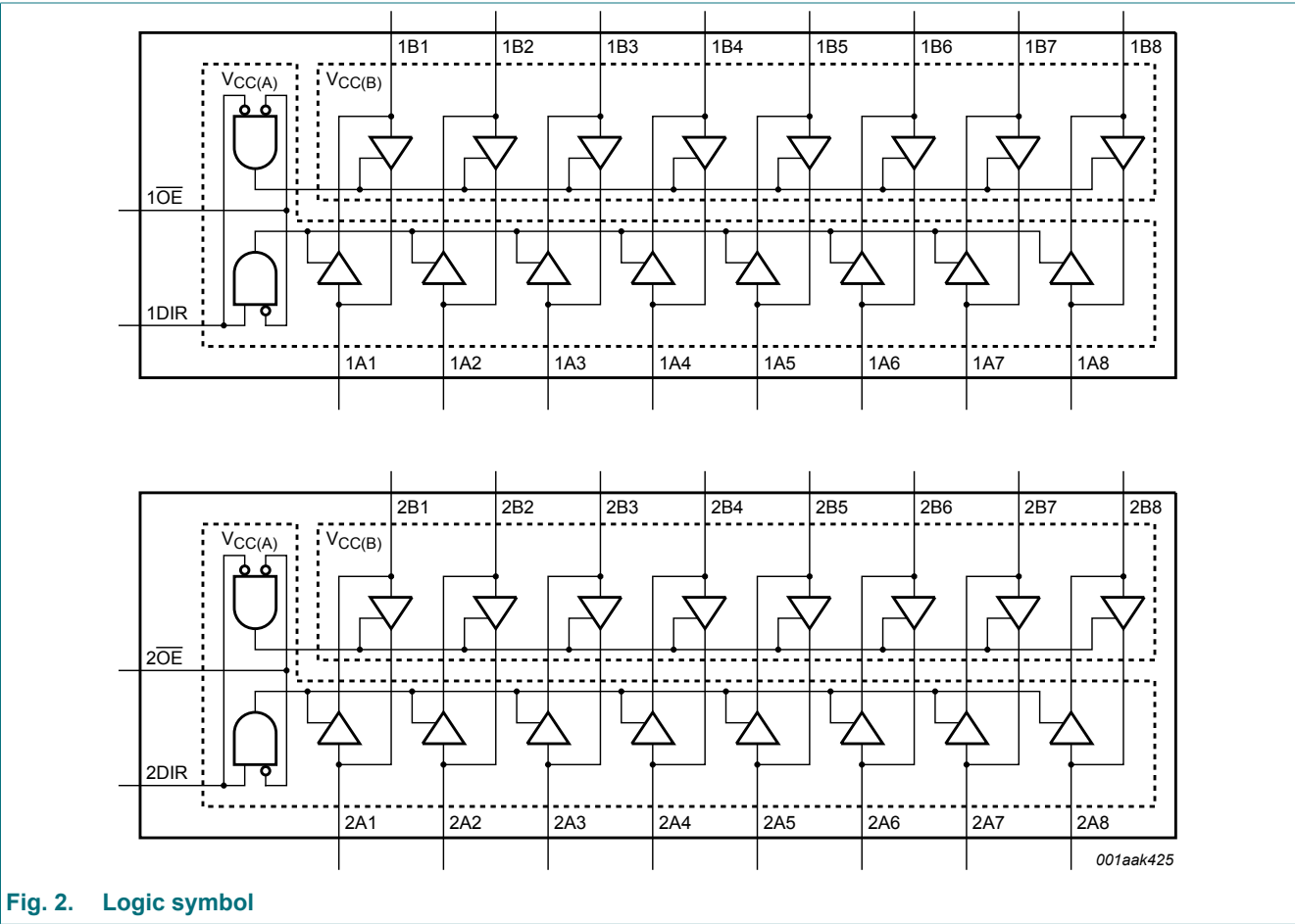


Fig. 2. Logic symbol

5. Pinning information

5.1. Pinning

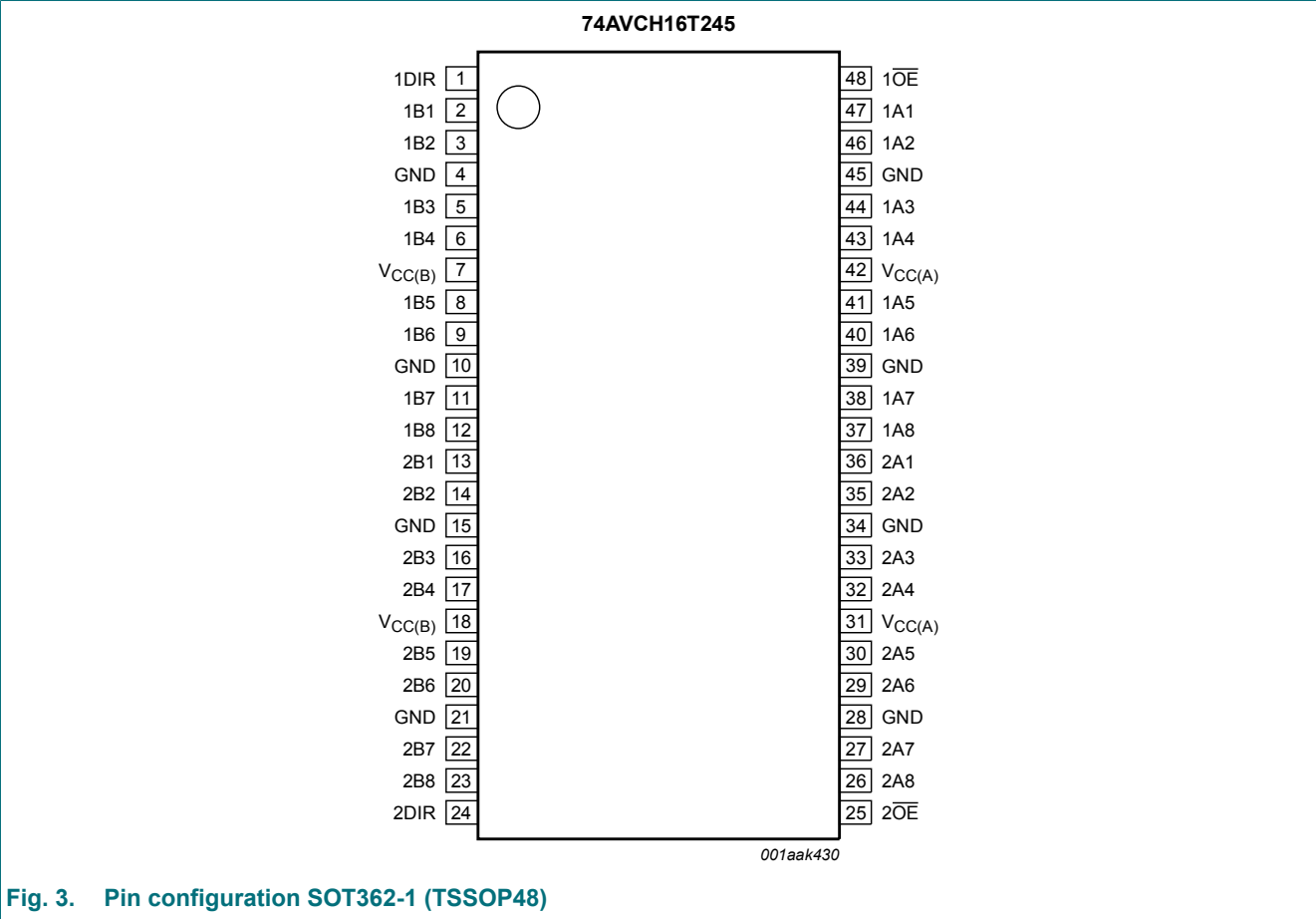


Fig. 3. Pin configuration SOT362-1 (TSSOP48)

5.2. Pin description

Table 2. Pin description

| Symbol                                 | Pin                            | Description                                                      |
|----------------------------------------|--------------------------------|------------------------------------------------------------------|
| 1DIR, 2DIR                             | 1, 24                          | direction control (referenced to $V_{CC(A)}$ )                   |
| 1B1, 1B2, 1B3, 1B4, 1B5, 1B6, 1B7, 1B8 | 2, 3, 5, 6, 8, 9, 11, 12       | data input or output (referenced to $V_{CC(B)}$ )                |
| 2B1, 2B2, 2B3, 2B4, 2B5, 2B6, 2B7, 2B8 | 13, 14, 16, 17, 19, 20, 22, 23 | data input or output (referenced to $V_{CC(B)}$ )                |
| GND [1]                                | 4, 10, 15, 21, 28, 34, 39, 45  | ground (0 V)                                                     |
| $V_{CC(B)}$                            | 7, 18                          | supply voltage B                                                 |
| 1OE, 2OE                               | 48, 25                         | output enable input (active LOW)<br>(referenced to $V_{CC(A)}$ ) |
| 1A1, 1A2, 1A3, 1A4, 1A5, 1A6, 1A7, 1A8 | 47, 46, 44, 43, 41, 40, 38, 37 | data input or output (referenced to $V_{CC(A)}$ )                |
| 2A1, 2A2, 2A3, 2A4, 2A5, 2A6, 2A7, 2A8 | 36, 35, 33, 32, 30, 29, 27, 26 | data input or output (referenced to $V_{CC(A)}$ )                |
| $V_{CC(A)}$                            | 31, 42                         | supply voltage A                                                 |

[1] All GND pins must be connected to ground (0 V).

## 6. Functional description

**Table 3. Function table**

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

| Supply voltage            | Input   |          | Input/output [1] |           |
|---------------------------|---------|----------|------------------|-----------|
| $V_{CC(A)}$ , $V_{CC(B)}$ | nOE [2] | nDIR [2] | nAn [2]          | nBn [2]   |
| 0.8 V to 3.6 V            | L       | L        | nAn = nBn        | input     |
| 0.8 V to 3.6 V            | L       | H        | input            | nBn = nAn |
| 0.8 V to 3.6 V            | H       | X        | Z                | Z         |
| GND [1]                   | X       | X        | Z                | Z         |

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

[2] The nAn, nDIR and nOE input circuit is referenced to  $V_{CC(A)}$ ; The nBn input circuit is referenced to  $V_{CC(B)}$ .

## 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 | +4.6            | V    |
| $V_{CC(B)}$ | supply voltage B        |                                    | -0.5 | +4.6            | V    |
| $I_{IK}$    | input clamping current  | $V_I < 0$ V                        | -50  | -               | mA   |
| $V_I$       | input voltage           | [1]                                | -0.5 | +4.6            | 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 | +4.6            | V    |
| $I_O$       | output current          | $V_O = 0$ V to $V_{CC}$ [2]        | -    | $\pm 50$        | mA   |
| $I_{CC}$    | supply current          | $I_{CC(A)}$ or $I_{CC(B)}$         | -    | 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; [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 4.6 V.

[4] Above 60 °C the value of  $P_{tot}$  derates linearly with 5.5 mW/K.

## 8. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol              | Parameter                           | Conditions                                      | Min | Max       | Unit |
|---------------------|-------------------------------------|-------------------------------------------------|-----|-----------|------|
| $V_{CC(A)}$         | supply voltage A                    |                                                 | 0.8 | 3.6       | V    |
| $V_{CC(B)}$         | supply voltage B                    |                                                 | 0.8 | 3.6       | V    |
| $V_I$               | input voltage                       |                                                 | 0   | 3.6       | V    |
| $V_O$               | output voltage                      | Active mode [1]                                 | 0   | $V_{CCO}$ | V    |
|                     |                                     | Suspend or 3-state mode                         | 0   | 3.6       | V    |
| $T_{amb}$           | ambient temperature                 |                                                 | -40 | +125      | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CCI} = 0.8 \text{ V to } 3.6 \text{ V}$ [2] | -   | 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  $T_{amb} = 25^\circ\text{C}$

At recommended operating conditions; voltages are referenced to GND (ground = 0 V). [1]

| Symbol     | Parameter                       | Conditions                                                                                                                            | Min | Typ         | Max        | Unit          |
|------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----|-------------|------------|---------------|
| $V_{OH}$   | HIGH-level output voltage       | $V_I = V_{IH}$ or $V_{IL}$ ; $I_O = -1.5 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 0.8 \text{ V}$                                        | -   | 0.69        | -          | V             |
| $V_{OL}$   | LOW-level output voltage        | $V_I = V_{IH}$ or $V_{IL}$ ; $I_O = 1.5 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 0.8 \text{ V}$                                         | -   | 0.07        | -          | V             |
| $I_I$      | input leakage current           | nDIR, $\overline{nOE}$ input; $V_I = 0 \text{ V or } 3.6 \text{ V}$ ;<br>$V_{CC(A)} = V_{CC(B)} = 0.8 \text{ V to } 3.6 \text{ V}$    | -   | $\pm 0.025$ | $\pm 0.25$ | $\mu\text{A}$ |
| $I_{BHL}$  | bus hold LOW current            | A or B port; $V_I = 0.42 \text{ V}$ ; $V_{CC(A)} = V_{CC(B)} = 1.2 \text{ V}$ [2]                                                     | -   | 26          | -          | $\mu\text{A}$ |
| $I_{BHH}$  | bus hold HIGH current           | A or B port; $V_I = 0.78 \text{ V}$ ; $V_{CC(A)} = V_{CC(B)} = 1.2 \text{ V}$ [3]                                                     | -   | -24         | -          | $\mu\text{A}$ |
| $I_{BHLO}$ | bus hold LOW overdrive current  | A or B port; $V_{CC(A)} = V_{CC(B)} = 1.2 \text{ V}$ [4]                                                                              | -   | 27          | -          | $\mu\text{A}$ |
| $I_{BHHO}$ | bus hold HIGH overdrive current | A or B port; $V_{CC(A)} = V_{CC(B)} = 1.2 \text{ V}$ [5]                                                                              | -   | -26         | -          | $\mu\text{A}$ |
| $I_{OZ}$   | OFF-state output current        | A or B port; $V_O = 0 \text{ V or } V_{CCO}$ ; $V_{CC(A)} = V_{CC(B)} = 3.6 \text{ V}$ [6]                                            | -   | $\pm 0.5$   | $\pm 2.5$  | $\mu\text{A}$ |
|            |                                 | suspend mode A port; $V_O = 0 \text{ V or } V_{CCO}$ ;<br>$V_{CC(A)} = 3.6 \text{ V}$ ; $V_{CC(B)} = 0 \text{ V}$ [6]                 | -   | $\pm 0.5$   | $\pm 2.5$  | $\mu\text{A}$ |
|            |                                 | suspend mode B port; $V_O = 0 \text{ V or } V_{CCO}$ ; $V_{CC(A)} = 0 \text{ V}$ ;<br>$V_{CC(B)} = 3.6 \text{ V}$ [6]                 | -   | $\pm 0.5$   | $\pm 2.5$  | $\mu\text{A}$ |
| $I_{OFF}$  | power-off leakage current       | A port; $V_I$ or $V_O = 0 \text{ V to } 3.6 \text{ V}$ ; $V_{CC(A)} = 0 \text{ V}$ ;<br>$V_{CC(B)} = 0.8 \text{ V to } 3.6 \text{ V}$ | -   | $\pm 0.1$   | $\pm 1$    | $\mu\text{A}$ |
|            |                                 | B port; $V_I$ or $V_O = 0 \text{ V to } 3.6 \text{ V}$ ; $V_{CC(B)} = 0 \text{ V}$ ;<br>$V_{CC(A)} = 0.8 \text{ V to } 3.6 \text{ V}$ | -   | $\pm 0.1$   | $\pm 1$    | $\mu\text{A}$ |
| $C_I$      | input capacitance               | nDIR, $\overline{nOE}$ input; $V_I = 0 \text{ V or } 3.3 \text{ V}$ ;<br>$V_{CC(A)} = V_{CC(B)} = 3.3 \text{ V}$                      | -   | 2.0         | -          | pF            |
| $C_{I/O}$  | input/output capacitance        | A and B port; $V_O = 3.3 \text{ V or } 0 \text{ V}$ ; $V_{CC(A)} = V_{CC(B)} = 3.3 \text{ V}$                                         | -   | 4.5         | -          | pF            |

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

[2] The bus hold circuit can sink at least the minimum low sustaining current at  $V_{IL}$  max.  $I_{BHL}$  should be measured after lowering  $V_I$  to GND and then raising it to  $V_{IL}$  max.

[3] The bus hold circuit can source at least the minimum high sustaining current at  $V_{IH}$  min.  $I_{BHH}$  should be measured after raising  $V_I$  to  $V_{CC}$  and then lowering it to  $V_{IH}$  min.

[4] An external driver must source at least  $I_{BHLO}$  to switch this node from LOW to HIGH.

[5] An external driver must sink at least  $I_{BHHO}$  to switch this node from HIGH to LOW.

[6] For I/O ports, the parameter  $I_{OZ}$  includes the input leakage current.

## 16-bit dual supply translating transceiver with configurable voltage translation; 3-state

Table 7. Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V). [1] [2]

| 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                                                                                                            |                  |                 |                   |                 |               |
|          |                           | $V_{CCI} = 0.8 \text{ V}$                                                                                             | $0.70V_{CCI}$    | -               | $0.70V_{CCI}$     | -               | V             |
|          |                           | $V_{CCI} = 1.1 \text{ V to } 1.95 \text{ V}$                                                                          | $0.65V_{CCI}$    | -               | $0.65V_{CCI}$     | -               | V             |
|          |                           | $V_{CCI} = 2.3 \text{ V to } 2.7 \text{ V}$                                                                           | 1.6              | -               | 1.6               | -               | V             |
|          |                           | $V_{CCI} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                           | 2                | -               | 2                 | -               | V             |
|          |                           | nDIR, nOE input                                                                                                       |                  |                 |                   |                 |               |
|          |                           | $V_{CC(A)} = 0.8 \text{ V}$                                                                                           | $0.70V_{CC(A)}$  | -               | $0.70V_{CC(A)}$   | -               | V             |
|          |                           | $V_{CC(A)} = 1.1 \text{ V to } 1.95 \text{ V}$                                                                        | $0.65V_{CC(A)}$  | -               | $0.65V_{CC(A)}$   | -               | V             |
|          |                           | $V_{CC(A)} = 2.3 \text{ V to } 2.7 \text{ V}$                                                                         | 1.6              | -               | 1.6               | -               | V             |
|          |                           | $V_{CC(A)} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                         | 2                | -               | 2                 | -               | V             |
| $V_{IL}$ | LOW-level input voltage   | data input                                                                                                            |                  |                 |                   |                 |               |
|          |                           | $V_{CCI} = 0.8 \text{ V}$                                                                                             | -                | $0.30V_{CCI}$   | -                 | $0.30V_{CCI}$   | V             |
|          |                           | $V_{CCI} = 1.1 \text{ V to } 1.95 \text{ V}$                                                                          | -                | $0.35V_{CCI}$   | -                 | $0.35V_{CCI}$   | V             |
|          |                           | $V_{CCI} = 2.3 \text{ V to } 2.7 \text{ V}$                                                                           | -                | 0.7             | -                 | 0.7             | V             |
|          |                           | $V_{CCI} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                           | -                | 0.8             | -                 | 0.8             | V             |
|          |                           | nDIR, nOE input                                                                                                       |                  |                 |                   |                 |               |
|          |                           | $V_{CC(A)} = 0.8 \text{ V}$                                                                                           | -                | $0.30V_{CC(A)}$ | -                 | $0.30V_{CC(A)}$ | V             |
|          |                           | $V_{CC(A)} = 1.1 \text{ V to } 1.95 \text{ V}$                                                                        | -                | $0.35V_{CC(A)}$ | -                 | $0.35V_{CC(A)}$ | V             |
|          |                           | $V_{CC(A)} = 2.3 \text{ V to } 2.7 \text{ V}$                                                                         | -                | 0.7             | -                 | 0.7             | V             |
|          |                           | $V_{CC(A)} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                         | -                | 0.8             | -                 | 0.8             | V             |
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{IH} \text{ or } V_{IL}$                                                                                     |                  |                 |                   |                 |               |
|          |                           | $I_O = -100 \mu\text{A}$ ;<br>$V_{CC(A)} = V_{CC(B)} = 0.8 \text{ V to } 3.6 \text{ V}$                               | $V_{CCO} - 0.1$  | -               | $V_{CCO} - 0.1$   | -               | V             |
|          |                           | $I_O = -3 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 1.1 \text{ V}$                                                       | 0.85             | -               | 0.85              | -               | V             |
|          |                           | $I_O = -6 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 1.4 \text{ V}$                                                       | 1.05             | -               | 1.05              | -               | V             |
|          |                           | $I_O = -8 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 1.65 \text{ V}$                                                      | 1.2              | -               | 1.2               | -               | V             |
|          |                           | $I_O = -9 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 2.3 \text{ V}$                                                       | 1.75             | -               | 1.75              | -               | V             |
|          |                           | $I_O = -12 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 3.0 \text{ V}$                                                      | 2.3              | -               | 2.3               | -               | V             |
| $V_{OL}$ | LOW-level output voltage  | $V_I = V_{IH} \text{ or } V_{IL}$                                                                                     |                  |                 |                   |                 |               |
|          |                           | $I_O = 100 \mu\text{A}$ ;<br>$V_{CC(A)} = V_{CC(B)} = 0.8 \text{ V to } 3.6 \text{ V}$                                | -                | 0.1             | -                 | 0.1             | V             |
|          |                           | $I_O = 3 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 1.1 \text{ V}$                                                        | -                | 0.25            | -                 | 0.25            | V             |
|          |                           | $I_O = 6 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 1.4 \text{ V}$                                                        | -                | 0.35            | -                 | 0.35            | V             |
|          |                           | $I_O = 8 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 1.65 \text{ V}$                                                       | -                | 0.45            | -                 | 0.45            | V             |
|          |                           | $I_O = 9 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 2.3 \text{ V}$                                                        | -                | 0.55            | -                 | 0.55            | V             |
|          |                           | $I_O = 12 \text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 3.0 \text{ V}$                                                       | -                | 0.7             | -                 | 0.7             | V             |
| $I_I$    | input leakage current     | nDIR, nOE input; $V_I = 0 \text{ V or } 3.6 \text{ V}$ ;<br>$V_{CC(A)} = V_{CC(B)} = 0.8 \text{ V to } 3.6 \text{ V}$ | -                | $\pm 1$         | -                 | $\pm 5$         | $\mu\text{A}$ |

## 16-bit dual supply translating transceiver with configurable voltage translation; 3-state

| Symbol            | Parameter                                | Conditions                                                                                                                  | -40 °C to +85 °C |     | -40 °C to +125 °C |     | Unit |
|-------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------|-----|-------------------|-----|------|
|                   |                                          |                                                                                                                             | Min              | Max | Min               | Max |      |
| I <sub>BHL</sub>  | bus hold<br>LOW current                  | A or B port [3]                                                                                                             |                  |     |                   |     |      |
|                   |                                          | V <sub>I</sub> = 0.49 V; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.4 V                                                    | 15               | -   | 15                | -   | μA   |
|                   |                                          | V <sub>I</sub> = 0.58 V; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.65 V                                                   | 25               | -   | 25                | -   | μA   |
|                   |                                          | V <sub>I</sub> = 0.70 V; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 2.3 V                                                    | 45               | -   | 45                | -   | μA   |
|                   |                                          | V <sub>I</sub> = 0.80 V; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 3.0 V                                                    | 100              | -   | 90                | -   | μA   |
| I <sub>BHH</sub>  | bus hold<br>HIGH current                 | A or B port [4]                                                                                                             |                  |     |                   |     |      |
|                   |                                          | V <sub>I</sub> = 0.91 V; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.4 V                                                    | -15              | -   | -15               | -   | μA   |
|                   |                                          | V <sub>I</sub> = 1.07 V; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.65 V                                                   | -25              | -   | -25               | -   | μA   |
|                   |                                          | V <sub>I</sub> = 1.60 V; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 2.3 V                                                    | -45              | -   | -45               | -   | μA   |
|                   |                                          | V <sub>I</sub> = 2.00 V; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 3.0 V                                                    | -100             | -   | -100              | -   | μA   |
| I <sub>BHLO</sub> | bus hold<br>LOW<br>overdrive<br>current  | A or B port [5]                                                                                                             |                  |     |                   |     |      |
|                   |                                          | V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.6 V                                                                             | 125              | -   | 125               | -   | μA   |
|                   |                                          | V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.95 V                                                                            | 200              | -   | 200               | -   | μA   |
|                   |                                          | V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 2.7 V                                                                             | 300              | -   | 300               | -   | μA   |
|                   |                                          | V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 3.6 V                                                                             | 500              | -   | 500               | -   | μA   |
| I <sub>BHHO</sub> | bus hold<br>HIGH<br>overdrive<br>current | A or B port [6]                                                                                                             |                  |     |                   |     |      |
|                   |                                          | V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.6 V                                                                             | -125             | -   | -125              | -   | μA   |
|                   |                                          | V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.95 V                                                                            | -200             | -   | -200              | -   | μA   |
|                   |                                          | V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 2.7 V                                                                             | -300             | -   | -300              | -   | μA   |
|                   |                                          | V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 3.6 V                                                                             | -500             | -   | -500              | -   | μA   |
| I <sub>OZ</sub>   | OFF-state<br>output current              | A or B port; V <sub>O</sub> = 0 V or V <sub>CCO</sub> ;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 3.6 V [7]              | -                | ±5  | -                 | ±30 | μA   |
|                   |                                          | suspend mode A port; V <sub>O</sub> = 0 V or V <sub>CCO</sub> ;<br>V <sub>CC(A)</sub> = 3.6 V; V <sub>CC(B)</sub> = 0 V [7] | -                | ±5  | -                 | ±30 | μA   |
|                   |                                          | suspend mode B port; V <sub>O</sub> = 0 V or V <sub>CCO</sub> ;<br>V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 3.6 V [7] | -                | ±5  | -                 | ±30 | μA   |
| I <sub>OFF</sub>  | power-off<br>leakage<br>current          | A port; V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V;<br>V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 0.8 V to 3.6 V   | -                | ±5  | -                 | ±30 | μA   |
|                   |                                          | B port; V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V;<br>V <sub>CC(B)</sub> = 0 V; V <sub>CC(A)</sub> = 0.8 V to 3.6 V   | -                | ±5  | -                 | ±30 | μA   |

## 16-bit dual supply translating transceiver with configurable voltage translation; 3-state

| 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                                                                                                                                   |                  |     |                   |     |      |
|                 |                | V <sub>CC(A)</sub> = 0.8 V to 3.6 V;<br>V <sub>CC(B)</sub> = 0.8 V to 3.6 V                                                                                                                               | -                | 30  | -                 | 125 | μA   |
|                 |                | V <sub>CC(A)</sub> = 1.1 V to 3.6 V;<br>V <sub>CC(B)</sub> = 1.1 V to 3.6 V                                                                                                                               | -                | 25  | -                 | 100 | μA   |
|                 |                | V <sub>CC(A)</sub> = 3.6 V; V <sub>CC(B)</sub> = 0 V                                                                                                                                                      | -                | 25  | -                 | 100 | μA   |
|                 |                | V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 3.6 V                                                                                                                                                      | -5               | -   | -20               | -   | 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> = 0.8 V to 3.6 V;<br>V <sub>CC(B)</sub> = 0.8 V to 3.6 V                                                                                                                               | -                | 30  | -                 | 125 | μA   |
|                 |                | V <sub>CC(A)</sub> = 1.1 V to 3.6 V;<br>V <sub>CC(B)</sub> = 1.1 V to 3.6 V                                                                                                                               | -                | 25  | -                 | 100 | μA   |
|                 |                | V <sub>CC(A)</sub> = 3.6 V; V <sub>CC(B)</sub> = 0 V                                                                                                                                                      | -5               | -   | -20               | -   | μA   |
|                 |                | V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 3.6 V                                                                                                                                                      | -                | 25  | -                 | 100 | μA   |
|                 |                | A plus B port (I <sub>CC(A)</sub> + I <sub>CC(B)</sub> ); I <sub>O</sub> = 0 A;<br>V <sub>I</sub> = 0 V or V <sub>CCI</sub> ; V <sub>CC(A)</sub> = 0.8 V to 3.6 V;<br>V <sub>CC(B)</sub> = 0.8 V to 3.6 V | -                | 55  | -                 | 185 | μA   |
|                 |                | A plus B port (I <sub>CC(A)</sub> + I <sub>CC(B)</sub> ); I <sub>O</sub> = 0 A;<br>V <sub>I</sub> = 0 V or V <sub>CCI</sub> ; V <sub>CC(A)</sub> = 1.1 V to 3.6 V;<br>V <sub>CC(B)</sub> = 1.1 V to 3.6 V | -                | 45  | -                 | 150 | μA   |

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

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

[3] The bus hold circuit can sink at least the minimum low sustaining current at V<sub>IL</sub> max. I<sub>BHL</sub> should be measured after lowering V<sub>I</sub> to GND and then raising it to V<sub>IL</sub> max.

[4] The bus hold circuit can source at least the minimum high sustaining current at V<sub>IH</sub> min. I<sub>BHH</sub> should be measured after raising V<sub>I</sub> to V<sub>CC</sub> and then lowering it to V<sub>IH</sub> min.

[5] An external driver must source at least I<sub>BHLO</sub> to switch this node from LOW to HIGH.

[6] An external driver must sink at least I<sub>BHHO</sub> to switch this node from HIGH to LOW.

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

**Table 8. Typical total supply current (I<sub>CC(A)</sub> + I<sub>CC(B)</sub>)**

| V <sub>CC(A)</sub> | V <sub>CC(B)</sub> |       |       |       |       |       |       | Unit |
|--------------------|--------------------|-------|-------|-------|-------|-------|-------|------|
|                    | 0 V                | 0.8 V | 1.2 V | 1.5 V | 1.8 V | 2.5 V | 3.3 V |      |
| 0 V                | 0                  | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | μA   |
| 0.8 V              | 0.1                | 0.1   | 0.1   | 0.1   | 0.1   | 0.3   | 1.6   | μA   |
| 1.2 V              | 0.1                | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.8   | μA   |
| 1.5 V              | 0.1                | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.4   | μA   |
| 1.8 V              | 0.1                | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.2   | μA   |
| 2.5 V              | 0.1                | 0.3   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | μA   |
| 3.3 V              | 0.1                | 1.6   | 0.8   | 0.4   | 0.2   | 0.1   | 0.1   | μA   |

## 10. Dynamic characteristics

**Table 9. Typical power dissipation capacitance at  $V_{CC(A)} = V_{CC(B)}$  and  $T_{amb} = 25\text{ }^{\circ}\text{C}$**

Voltages are referenced to GND (ground = 0 V). [1] [2]

| Symbol   | Parameter                     | Conditions                                      | $V_{CC(A)} = V_{CC(B)}$ |       |       |       |       |       | Unit |
|----------|-------------------------------|-------------------------------------------------|-------------------------|-------|-------|-------|-------|-------|------|
|          |                               |                                                 | 0.8 V                   | 1.2 V | 1.5 V | 1.8 V | 2.5 V | 3.3 V |      |
| $C_{PD}$ | power dissipation capacitance | A port: (direction nAn to nBn); output enabled  | 0.2                     | 0.2   | 0.2   | 0.2   | 0.3   | 0.4   | pF   |
|          |                               | A port: (direction nAn to nBn); output disabled | 0.2                     | 0.2   | 0.2   | 0.2   | 0.3   | 0.4   | pF   |
|          |                               | A port: (direction nBn to nAn); output enabled  | 9                       | 9.7   | 9.8   | 10.3  | 11.7  | 13.7  | pF   |
|          |                               | A port: (direction nBn to nAn); output disabled | 0.6                     | 0.6   | 0.6   | 0.7   | 0.7   | 0.7   | pF   |
|          |                               | B port: (direction nAn to nBn); output enabled  | 9                       | 9.7   | 9.8   | 10.3  | 11.7  | 13.7  | pF   |
|          |                               | B port: (direction nAn to nBn); output disabled | 0.6                     | 0.6   | 0.6   | 0.7   | 0.7   | 0.7   | pF   |
|          |                               | B port: (direction nBn to nAn); output enabled  | 0.2                     | 0.2   | 0.2   | 0.2   | 0.3   | 0.4   | pF   |
|          |                               | B port: (direction nBn to nAn); output disabled | 0.2                     | 0.2   | 0.2   | 0.2   | 0.3   | 0.4   | 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]  $f_i = 10\text{ MHz}$ ;  $V_i = \text{GND to } V_{CC}$ ;  $t_r = t_f = 1\text{ ns}$ ;  $C_L = 0\text{ pF}$ ;  $R_L = \infty\text{ }\Omega$ .

**Table 10. Typical dynamic characteristics at  $V_{CC(A)} = 0.8\text{ V}$  and  $T_{amb} = 25\text{ }^{\circ}\text{C}$**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 6; for waveforms see Fig. 4 and Fig. 5. [1]

| Symbol    | Parameter         | Conditions | $V_{CC(B)}$ |       |       |       |       |       | Unit |
|-----------|-------------------|------------|-------------|-------|-------|-------|-------|-------|------|
|           |                   |            | 0.8 V       | 1.2 V | 1.5 V | 1.8 V | 2.5 V | 3.3 V |      |
| $t_{pd}$  | propagation delay | nAn to nBn | 14.4        | 7.0   | 6.2   | 6.0   | 5.9   | 6.0   | ns   |
|           |                   | nBn to nAn | 14.4        | 12.4  | 12.1  | 11.9  | 11.8  | 11.8  | ns   |
| $t_{dis}$ | disable time      | nOE to nAn | 16.2        | 16.2  | 16.2  | 16.2  | 16.2  | 16.2  | ns   |
|           |                   | nOE to nBn | 17.6        | 10.0  | 9.0   | 9.1   | 8.7   | 9.3   | ns   |
| $t_{en}$  | enable time       | nOE to nAn | 21.9        | 21.9  | 21.9  | 21.9  | 21.9  | 21.9  | ns   |
|           |                   | nOE to nBn | 22.2        | 11.1  | 9.8   | 9.4   | 9.4   | 9.6   | 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 11. Typical dynamic characteristics at  $V_{CC(B)} = 0.8\text{ V}$  and  $T_{amb} = 25\text{ }^{\circ}\text{C}$**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 6; for waveforms see Fig. 4 and Fig. 5. [1]

| Symbol    | Parameter         | Conditions | $V_{CC(A)}$ |       |       |       |       |       | Unit |
|-----------|-------------------|------------|-------------|-------|-------|-------|-------|-------|------|
|           |                   |            | 0.8 V       | 1.2 V | 1.5 V | 1.8 V | 2.5 V | 3.3 V |      |
| $t_{pd}$  | propagation delay | nAn to nBn | 14.4        | 12.4  | 12.1  | 11.9  | 11.8  | 11.8  | ns   |
|           |                   | nBn to nAn | 14.4        | 7.0   | 6.2   | 6.0   | 5.9   | 6.0   | ns   |
| $t_{dis}$ | disable time      | nOE to nAn | 16.2        | 5.9   | 4.4   | 4.2   | 3.1   | 3.5   | ns   |
|           |                   | nOE to nBn | 17.6        | 14.2  | 13.7  | 13.6  | 13.3  | 13.1  | ns   |
| $t_{en}$  | enable time       | nOE to nAn | 21.9        | 6.4   | 4.4   | 3.5   | 2.6   | 2.3   | ns   |
|           |                   | nOE to nBn | 22.2        | 17.7  | 17.2  | 17.0  | 16.8  | 16.7  | 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  $t_{PZH}$ .

## 16-bit dual supply translating transceiver with configurable voltage translation; 3-state

Table 12. Dynamic characteristics for temperature range -40 °C to +85 °C

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 6; for waveforms see Fig. 4 and Fig. 5. [1]

| Symbol                                | Parameter         | Conditions                      | V <sub>CC(B)</sub> |      |               |      |                |      |               |      |               |      | Unit |
|---------------------------------------|-------------------|---------------------------------|--------------------|------|---------------|------|----------------|------|---------------|------|---------------|------|------|
|                                       |                   |                                 | 1.2 V ± 0.1 V      |      | 1.5 V ± 0.1 V |      | 1.8 V ± 0.15 V |      | 2.5 V ± 0.2 V |      | 3.3 V ± 0.3 V |      |      |
|                                       |                   |                                 | Min                | Max  | Min           | Max  | Min            | Max  | Min           | Max  | Min           | Max  |      |
| V <sub>CC(A)</sub> = 1.1 V to 1.3 V   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 9.2  | 0.5           | 6.9  | 0.5            | 6.0  | 0.5           | 5.1  | 0.5           | 4.9  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 9.2  | 0.5           | 8.7  | 0.5            | 8.5  | 0.5           | 8.2  | 0.5           | 8.0  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 1.5                | 11.6 | 1.5           | 11.6 | 1.5            | 11.6 | 1.5           | 11.6 | 1.5           | 11.6 | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 12.5 | 1.5           | 9.7  | 1.5            | 9.5  | 1.0           | 8.1  | 1.0           | 8.9  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 1.0                | 14.5 | 1.0           | 14.5 | 1.0            | 14.5 | 1.0           | 14.5 | 1.0           | 14.5 | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.1                | 14.9 | 1.1           | 11.0 | 1.1            | 9.6  | 1.0           | 8.1  | 1.0           | 7.7  | ns   |
| V <sub>CC(A)</sub> = 1.4 V to 1.6 V   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 8.7  | 0.5           | 6.2  | 0.5            | 5.2  | 0.5           | 4.1  | 0.5           | 3.7  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 6.9  | 0.5           | 6.2  | 0.5            | 5.9  | 0.5           | 5.6  | 0.5           | 5.5  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 1.5                | 9.1  | 1.5           | 9.1  | 1.5            | 9.1  | 1.5           | 9.1  | 1.5           | 9.1  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 11.4 | 1.5           | 8.7  | 1.5            | 7.5  | 1.0           | 6.5  | 1.0           | 6.3  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 1.0                | 10.1 | 1.0           | 10.1 | 1.0            | 10.1 | 1.0           | 10.1 | 1.0           | 10.1 | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 13.5 | 1.0           | 10.1 | 0.5            | 8.1  | 0.5           | 5.9  | 0.5           | 5.2  | ns   |
| V <sub>CC(A)</sub> = 1.65 V to 1.95 V |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 8.5  | 0.5           | 5.9  | 0.5            | 4.8  | 0.5           | 3.7  | 0.5           | 3.3  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 6.0  | 0.5           | 5.2  | 0.5            | 4.8  | 0.5           | 4.5  | 0.5           | 4.4  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 1.5                | 7.7  | 1.5           | 7.7  | 1.5            | 7.7  | 1.5           | 7.7  | 1.5           | 7.7  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 11.1 | 1.5           | 8.4  | 1.5            | 7.1  | 1.0           | 5.9  | 1.0           | 5.7  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 1.0                | 7.8  | 1.0           | 7.8  | 1.0            | 7.8  | 1.0           | 7.8  | 1.0           | 7.8  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 13.0 | 1.0           | 9.2  | 0.5            | 7.4  | 0.5           | 5.3  | 0.5           | 4.5  | ns   |
| V <sub>CC(A)</sub> = 2.3 V to 2.7 V   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 8.2  | 0.5           | 5.6  | 0.5            | 4.6  | 0.5           | 3.3  | 0.5           | 2.8  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 5.1  | 0.5           | 4.1  | 0.5            | 3.7  | 0.5           | 3.4  | 0.5           | 3.2  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 1.0                | 6.1  | 1.0           | 6.1  | 1.0            | 6.1  | 1.0           | 6.1  | 1.0           | 6.1  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 10.6 | 1.0           | 7.9  | 1.0            | 6.6  | 1.0           | 6.1  | 1.0           | 5.2  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 0.5                | 5.3  | 0.5           | 5.3  | 0.5            | 5.3  | 0.5           | 5.3  | 0.5           | 5.3  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 0.5                | 12.5 | 0.5           | 9.4  | 0.5            | 7.3  | 0.5           | 5.1  | 0.5           | 4.5  | ns   |
| V <sub>CC(A)</sub> = 3.0 V to 3.6 V   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 8.0  | 0.5           | 5.5  | 0.5            | 4.4  | 0.5           | 3.2  | 0.5           | 2.7  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 4.9  | 0.5           | 3.7  | 0.5            | 3.3  | 0.5           | 2.9  | 0.5           | 2.7  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 0.5                | 5.0  | 0.5           | 5.0  | 0.5            | 5.0  | 0.5           | 5.0  | 0.5           | 5.0  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 10.3 | 1.0           | 7.7  | 1.0            | 6.5  | 1.0           | 5.2  | 0.5           | 5.0  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 0.5                | 4.3  | 0.5           | 4.3  | 0.5            | 4.2  | 0.5           | 4.1  | 0.5           | 4.0  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 0.5                | 12.4 | 0.5           | 9.3  | 0.5            | 7.2  | 0.5           | 4.9  | 0.5           | 4.0  | 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  $t_{PZH}$ .

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Table 13. Dynamic characteristics for temperature range -40 °C to +125 °C

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 6; for waveforms see Fig. 4 and Fig. 5. [1]

| Symbol                                | Parameter         | Conditions                      | V <sub>CC(B)</sub> |      |               |      |                |      |               |      |               |      | Unit |
|---------------------------------------|-------------------|---------------------------------|--------------------|------|---------------|------|----------------|------|---------------|------|---------------|------|------|
|                                       |                   |                                 | 1.2 V ± 0.1 V      |      | 1.5 V ± 0.1 V |      | 1.8 V ± 0.15 V |      | 2.5 V ± 0.2 V |      | 3.3 V ± 0.3 V |      |      |
|                                       |                   |                                 | Min                | Max  | Min           | Max  | Min            | Max  | Min           | Max  | Min           | Max  |      |
| V <sub>CC(A)</sub> = 1.1 V to 1.3 V   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 10.2 | 0.5           | 7.6  | 0.5            | 6.6  | 0.5           | 5.7  | 0.5           | 5.4  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 10.2 | 0.5           | 9.6  | 0.5            | 9.4  | 0.5           | 9.1  | 0.5           | 8.8  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 1.5                | 12.8 | 1.5           | 12.8 | 1.5            | 12.8 | 1.5           | 12.8 | 1.5           | 12.8 | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 13.8 | 1.5           | 10.7 | 1.5            | 10.5 | 1.0           | 9.0  | 1.5           | 9.8  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 1.0                | 16.0 | 1.0           | 16.0 | 1.0            | 16.0 | 1.0           | 16.0 | 1.0           | 16.0 | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.1                | 16.4 | 1.1           | 12.1 | 1.1            | 10.6 | 1.0           | 9.0  | 1.0           | 8.5  | ns   |
| V <sub>CC(A)</sub> = 1.4 V to 1.6 V   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 9.6  | 0.5           | 6.9  | 0.5            | 5.8  | 0.5           | 4.6  | 0.5           | 4.1  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 7.6  | 0.5           | 6.9  | 0.5            | 6.5  | 0.5           | 6.2  | 0.5           | 6.1  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 1.5                | 10.1 | 1.5           | 10.1 | 1.5            | 10.1 | 1.5           | 10.1 | 1.5           | 10.1 | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 12.6 | 1.5           | 9.6  | 1.5            | 8.3  | 1.0           | 7.2  | 1.0           | 7.0  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 1.0                | 11.2 | 1.0           | 11.2 | 1.0            | 11.2 | 1.0           | 11.2 | 1.0           | 11.2 | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 14.9 | 1.0           | 11.2 | 0.5            | 9.0  | 0.5           | 6.5  | 0.5           | 5.8  | ns   |
| V <sub>CC(A)</sub> = 1.65 V to 1.95 V |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 9.4  | 0.5           | 6.5  | 0.5            | 5.3  | 0.5           | 4.1  | 0.5           | 3.7  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 6.6  | 0.5           | 5.8  | 0.5            | 5.3  | 0.5           | 5.0  | 0.5           | 4.9  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 1.5                | 8.5  | 1.5           | 8.5  | 1.5            | 8.5  | 1.5           | 8.5  | 1.5           | 8.5  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 12.3 | 1.5           | 9.3  | 1.5            | 7.9  | 1.0           | 6.5  | 1.0           | 6.3  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 1.0                | 8.6  | 1.0           | 8.6  | 1.0            | 8.6  | 1.0           | 8.6  | 1.0           | 8.6  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 14.3 | 1.0           | 10.2 | 0.5            | 8.2  | 0.5           | 5.9  | 0.5           | 5.0  | ns   |
| V <sub>CC(A)</sub> = 2.3 V to 2.7 V   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 9.1  | 0.5           | 6.2  | 0.5            | 5.1  | 0.5           | 3.7  | 0.5           | 3.1  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 5.7  | 0.5           | 4.6  | 0.5            | 4.1  | 0.5           | 3.8  | 0.5           | 3.6  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 1.0                | 6.8  | 1.0           | 6.8  | 1.0            | 6.8  | 1.0           | 6.8  | 1.0           | 6.8  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 11.7 | 1.0           | 8.7  | 1.0            | 7.3  | 1.0           | 6.8  | 1.0           | 5.8  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 0.5                | 5.9  | 0.5           | 5.9  | 0.5            | 5.9  | 0.5           | 5.9  | 0.5           | 5.9  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 0.5                | 13.8 | 0.5           | 10.4 | 0.5            | 8.1  | 0.5           | 5.7  | 0.5           | 5.0  | ns   |
| V <sub>CC(A)</sub> = 3.0 V to 3.6 V   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                       | propagation delay | nAn to nBn                      | 0.5                | 8.8  | 0.5           | 6.1  | 0.5            | 4.9  | 0.5           | 3.6  | 0.5           | 3.0  | ns   |
|                                       |                   | nBn to nAn                      | 0.5                | 5.4  | 0.5           | 4.1  | 0.5            | 3.7  | 0.5           | 3.2  | 0.5           | 3.0  | ns   |
| t <sub>dis</sub>                      | disable time      | n $\overline{\text{OE}}$ to nAn | 0.5                | 5.5  | 0.5           | 5.5  | 0.5            | 5.5  | 0.5           | 5.5  | 0.5           | 5.5  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 11.4 | 1.0           | 8.5  | 1.0            | 7.2  | 1.0           | 5.8  | 0.5           | 5.5  | ns   |
| t <sub>en</sub>                       | enable time       | n $\overline{\text{OE}}$ to nAn | 0.5                | 4.8  | 0.5           | 4.8  | 0.5            | 4.7  | 0.5           | 4.6  | 0.5           | 4.4  | ns   |
|                                       |                   | n $\overline{\text{OE}}$ to nBn | 0.5                | 13.7 | 0.5           | 10.3 | 0.5            | 8.0  | 0.5           | 5.4  | 0.5           | 4.4  | 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  $t_{PZH}$ .

10.1. Waveforms and test circuit

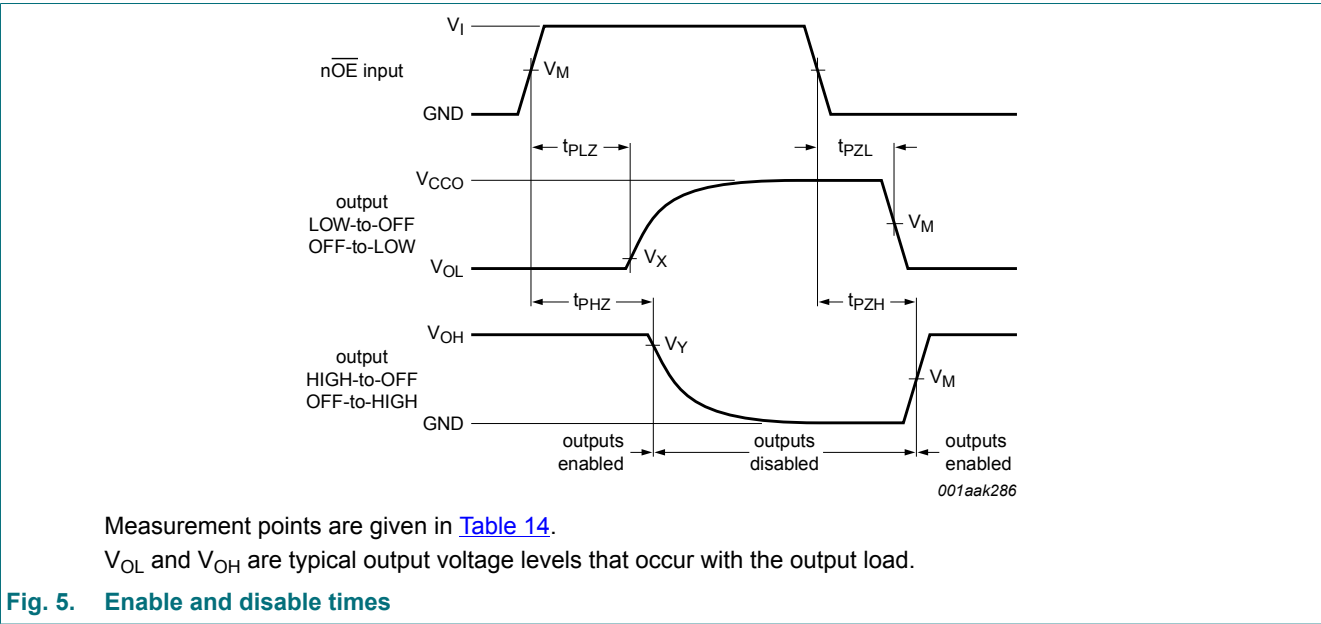
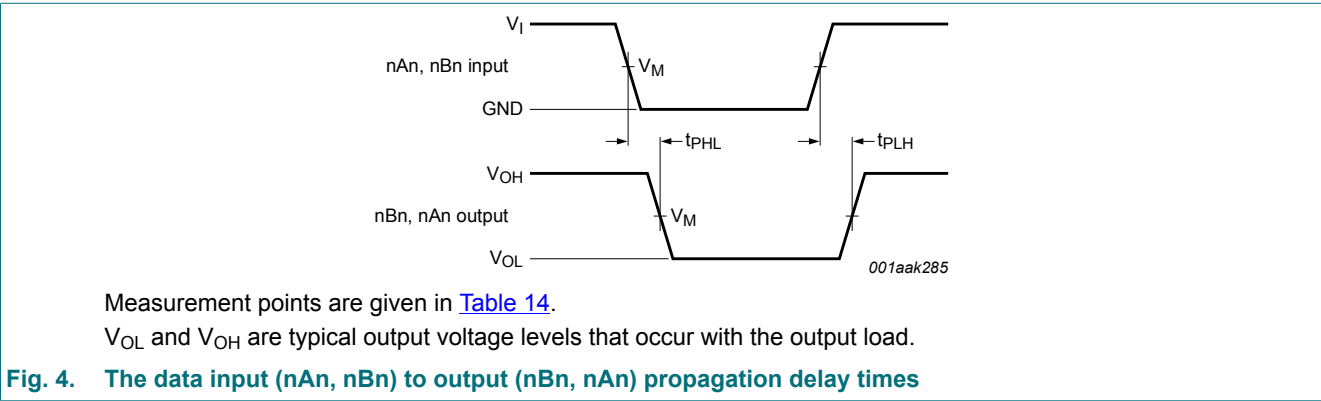


Table 14. Measurement points

| Supply voltage         | Input [1]    | Output [2]   |                          |                          |
|------------------------|--------------|--------------|--------------------------|--------------------------|
| $V_{CC(A)}, V_{CC(B)}$ | $V_M$        | $V_M$        | $V_X$                    | $V_Y$                    |
| 0.8 V to 1.6 V         | $0.5V_{CCI}$ | $0.5V_{CCO}$ | $V_{OL} + 0.1\text{ V}$  | $V_{OH} - 0.1\text{ V}$  |
| 1.65 V to 2.7 V        | $0.5V_{CCI}$ | $0.5V_{CCO}$ | $V_{OL} + 0.15\text{ V}$ | $V_{OH} - 0.15\text{ V}$ |
| 3.0 V to 3.6 V         | $0.5V_{CCI}$ | $0.5V_{CCO}$ | $V_{OL} + 0.3\text{ V}$  | $V_{OH} - 0.3\text{ V}$  |

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

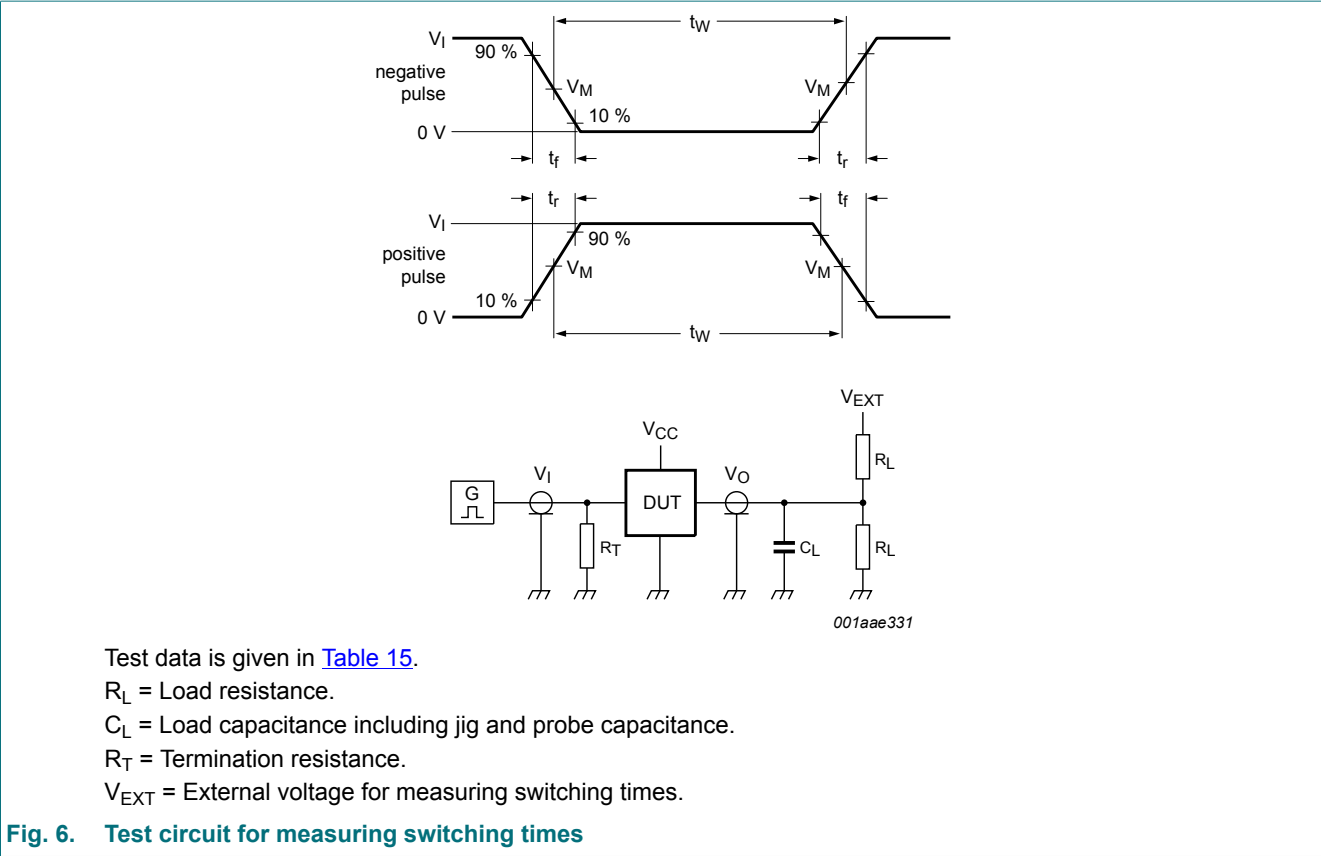


Table 15. Test data

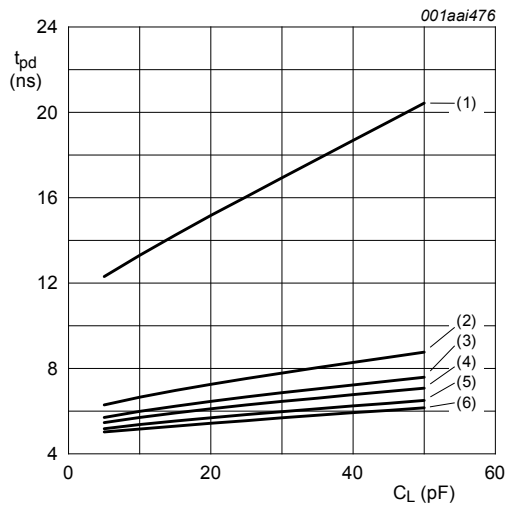
| Supply voltage         | Input     |                         | Load  |              | $V_{EXT}$          |                    |                        |
|------------------------|-----------|-------------------------|-------|--------------|--------------------|--------------------|------------------------|
| $V_{CC(A)}, V_{CC(B)}$ | $V_I$ [1] | $\Delta t/\Delta V$ [2] | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ [3] |
| 0.8 V to 1.6 V         | $V_{CCI}$ | $\leq 1.0 \text{ ns/V}$ | 15 pF | 2 k $\Omega$ | open               | GND                | $2V_{CCO}$             |
| 1.65 V to 2.7 V        | $V_{CCI}$ | $\leq 1.0 \text{ ns/V}$ | 15 pF | 2 k $\Omega$ | open               | GND                | $2V_{CCO}$             |
| 3.0 V to 3.6 V         | $V_{CCI}$ | $\leq 1.0 \text{ ns/V}$ | 15 pF | 2 k $\Omega$ | open               | GND                | $2V_{CCO}$             |

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

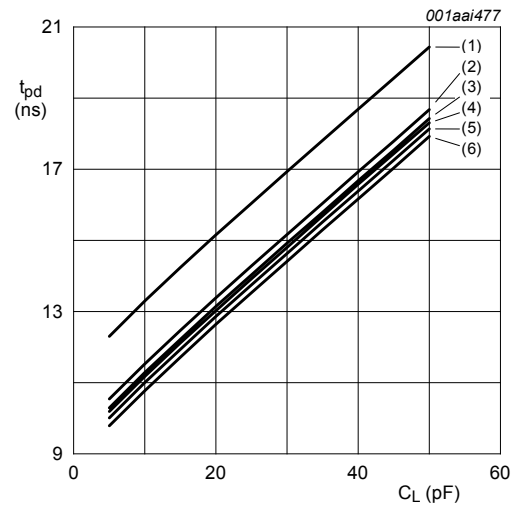
[2]  $dV/dt \geq 1.0 \text{ V/ns}$

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

## 10.2. Typical propagation delay characteristics

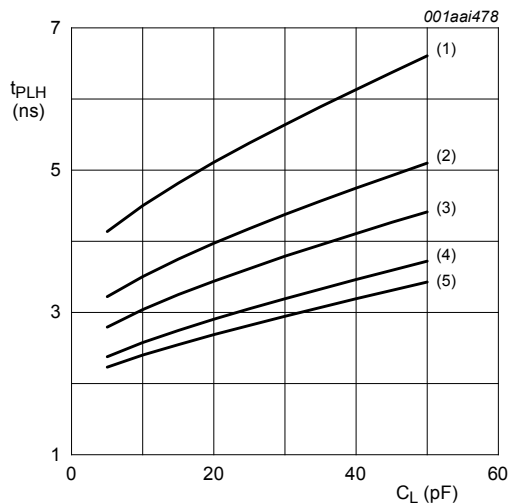
a. Propagation delay (nAn to nBn);  $V_{CC(A)} = 0.8 \text{ V}$ 

- (1)  $V_{CC(B)} = 0.8 \text{ V}$ .
- (2)  $V_{CC(B)} = 1.2 \text{ V}$ .
- (3)  $V_{CC(B)} = 1.5 \text{ V}$ .
- (4)  $V_{CC(B)} = 1.8 \text{ V}$ .
- (5)  $V_{CC(B)} = 2.5 \text{ V}$ .
- (6)  $V_{CC(B)} = 3.3 \text{ V}$ .

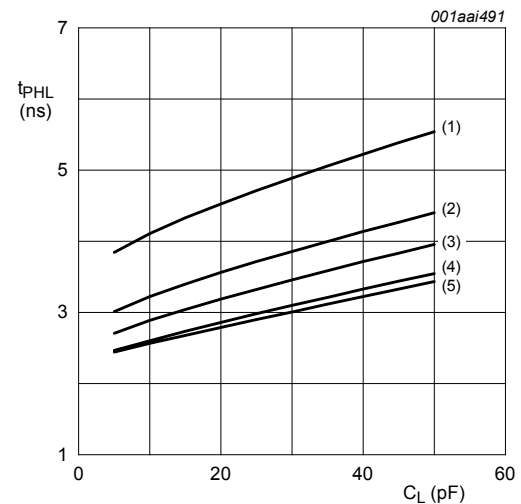
b. Propagation delay (nAn to nBn);  $V_{CC(B)} = 0.8 \text{ V}$ 

- (1)  $V_{CC(A)} = 0.8 \text{ V}$ .
- (2)  $V_{CC(A)} = 1.2 \text{ V}$ .
- (3)  $V_{CC(A)} = 1.5 \text{ V}$ .
- (4)  $V_{CC(A)} = 1.8 \text{ V}$ .
- (5)  $V_{CC(A)} = 2.5 \text{ V}$ .
- (6)  $V_{CC(A)} = 3.3 \text{ V}$ .

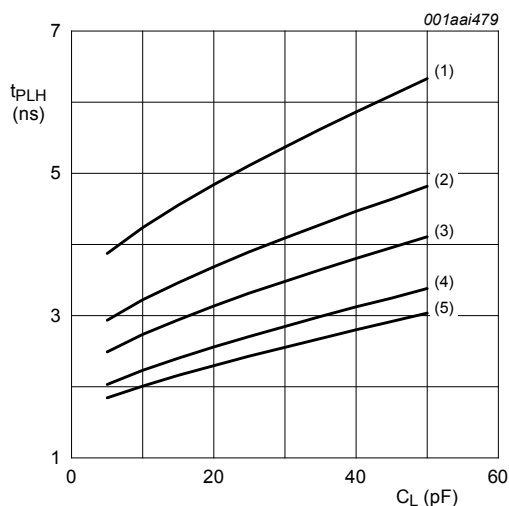
Fig. 7. Typical propagation delay versus load capacitance;  $T_{amb} = 25^\circ\text{C}$



a. LOW to HIGH propagation delay (nAn to nBn);  
 $V_{CC(A)} = 1.2 \text{ V}$

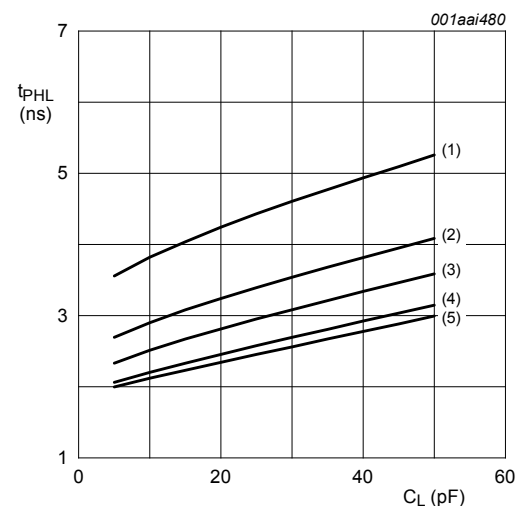


b. HIGH to LOW propagation delay (nAn to nBn);  
 $V_{CC(A)} = 1.2 \text{ V}$



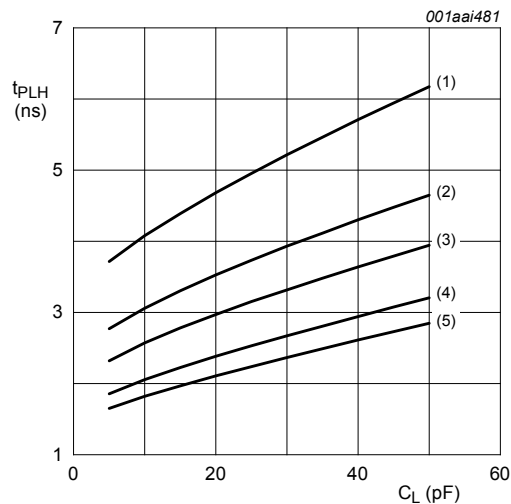
c. LOW to HIGH propagation delay (nAn to nBn);  
 $V_{CC(A)} = 1.5 \text{ V}$

- (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)  $V_{CC(B)} = 3.3 \text{ V}$ .

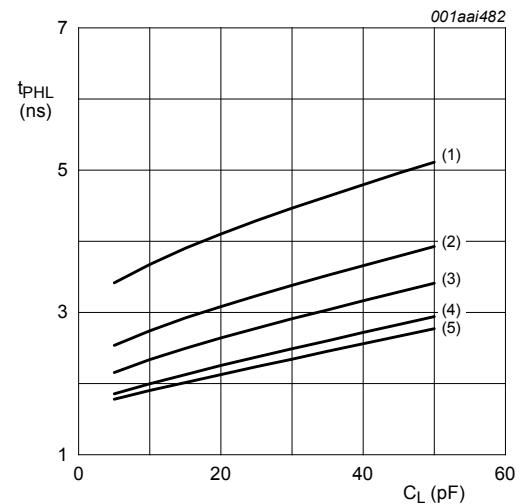


d. HIGH to LOW propagation delay (nAn to nBn);  
 $V_{CC(A)} = 1.5 \text{ V}$

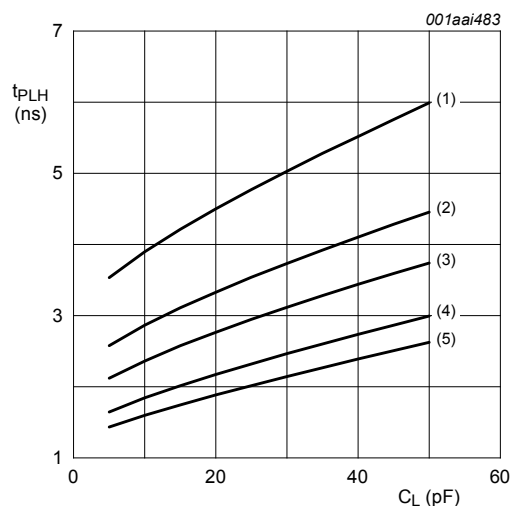
**Fig. 8. Typical propagation delay versus load capacitance;  $T_{amb} = 25^\circ\text{C}$**



a. LOW to HIGH propagation delay (nAn to nBn);  
 $V_{CC(A)} = 1.8 \text{ V}$

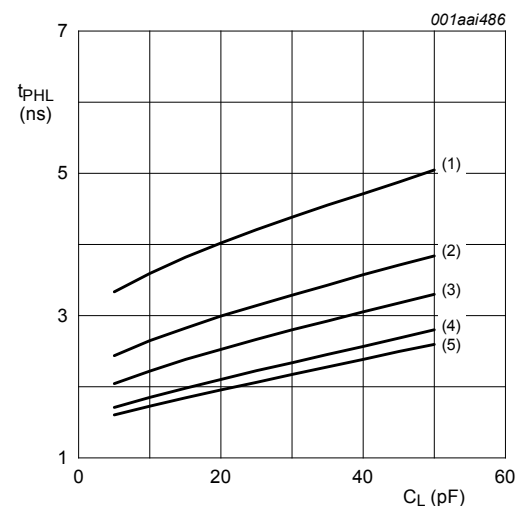


b. HIGH to LOW propagation delay (nAn to nBn);  
 $V_{CC(A)} = 1.8 \text{ V}$



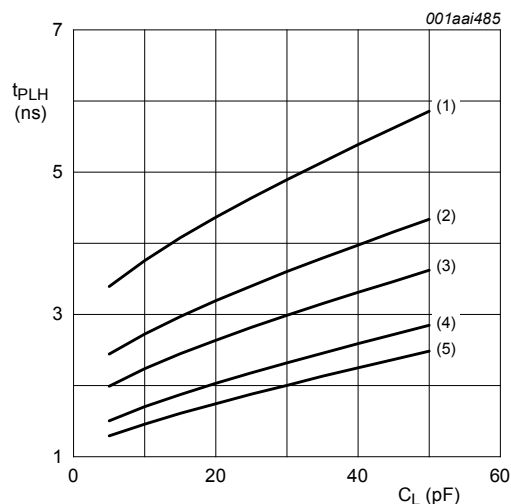
c. LOW to HIGH propagation delay (nAn to nBn);  
 $V_{CC(A)} = 2.5 \text{ V}$

- (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)  $V_{CC(B)} = 3.3 \text{ V}$ .



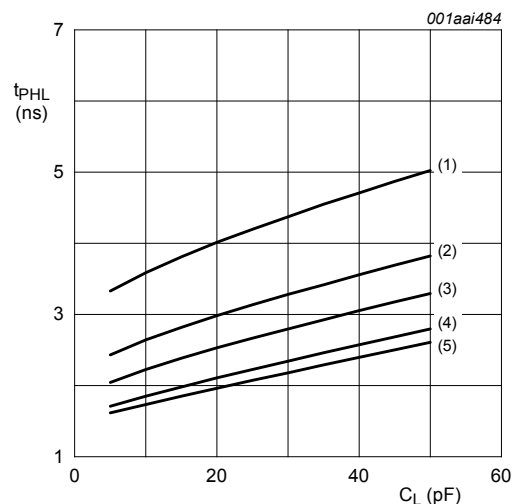
d. HIGH to LOW propagation delay (nAn to nBn);  
 $V_{CC(A)} = 2.5 \text{ V}$

**Fig. 9.** Typical propagation delay versus load capacitance;  $T_{amb} = 25^\circ\text{C}$



a. LOW to HIGH propagation delay (nAn to nBn);  
 $V_{CC(A)} = 3.3 \text{ V}$

- (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)  $V_{CC(B)} = 3.3 \text{ V}$ .



b. HIGH to LOW propagation delay (nAn to nBn);  
 $V_{CC(A)} = 3.3 \text{ V}$

**Fig. 10. Typical propagation delay versus load capacitance;  $T_{amb} = 25^\circ\text{C}$**

11. Package outline

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1 mm SOT362-1

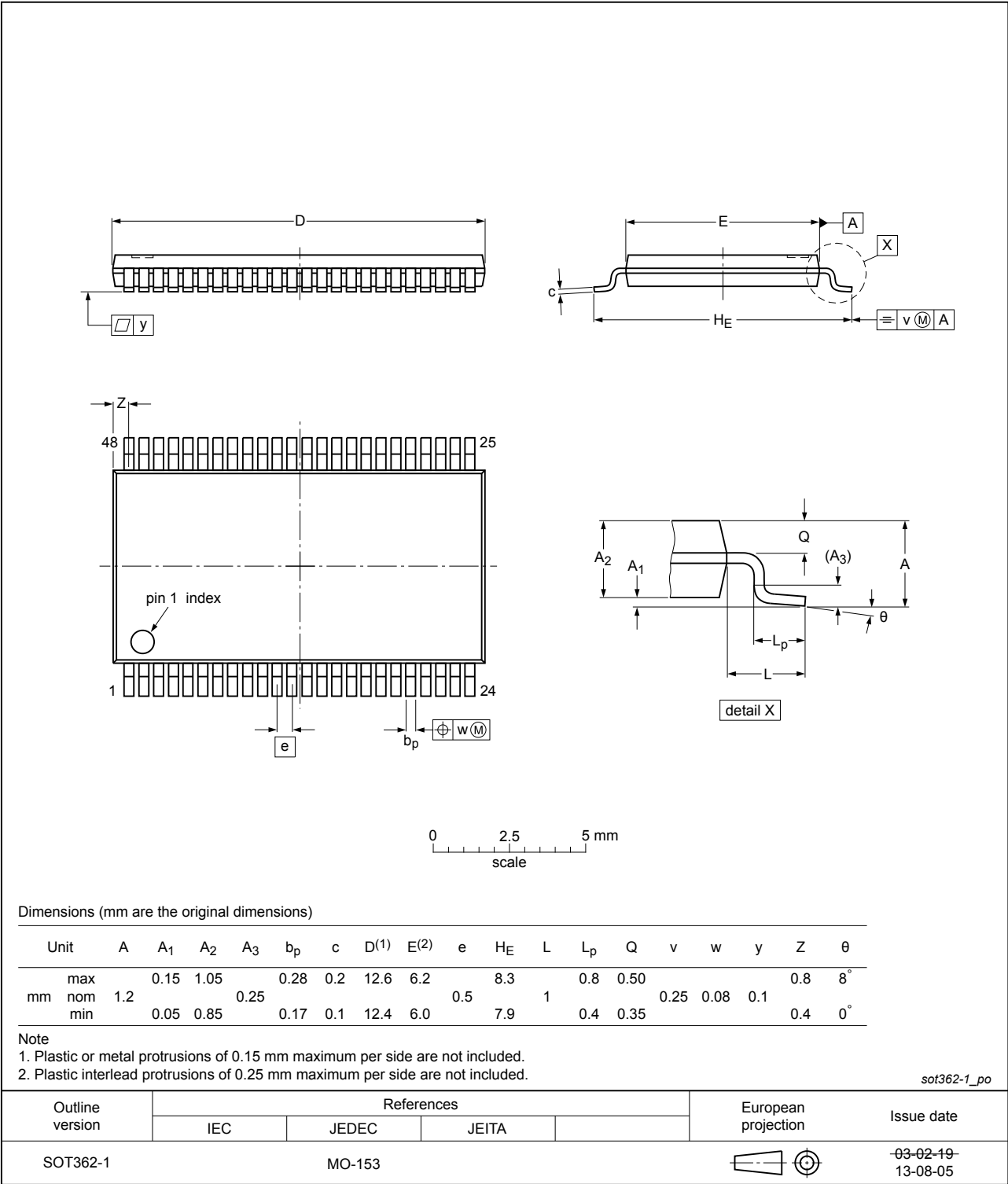


Fig. 11. Package outline SOT362-1 (TSSOP48)

## 12. Abbreviations

Table 16. Abbreviations

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

## 13. Revision history

Table 17. Revision history

| Document ID      | Release date                                                                                                                                                                                                                                                                                                                                                                                                                               | Data sheet status  | Change notice | Supersedes       |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|------------------|
| 74AVCH16T245 v.6 | 20190403                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet | -             | 74AVCH16T245 v.5 |
| 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 74AVCH16T245DGV (SOT480-1), 74AVCH16T245EV (SOT702-1) and 74AVCH16T245BX (SOT1134-2) removed.</li> <li>Package outline drawing <a href="#">SOT362-1</a> (TSSOP48) updated.</li> </ul> |                    |               |                  |
| 74AVCH16T245 v.5 | 20120301                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet | -             | 74AVCH16T245 v.4 |
| Modifications:   | <ul style="list-style-type: none"> <li>For type number 74AVCH16T245BX the SOT code has changed to SOT1134-2.</li> </ul>                                                                                                                                                                                                                                                                                                                    |                    |               |                  |
| 74AVCH16T245 v.4 | 20111207                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet | -             | 74AVCH16T245 v.3 |
| Modifications:   | <ul style="list-style-type: none"> <li>Legal pages updated.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                     |                    |               |                  |
| 74AVCH16T245 v.3 | 20110616                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet | -             | 74AVCH16T245 v.2 |
| 74AVCH16T245 v.2 | 20100329                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet | -             | 74AVCH16T245 v.1 |
| 74AVCH16T245 v.1 | 20091014                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet | -             | -                |

## 14. Legal information

### Data sheet status

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