



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



## Important notice

Dear Customer,

On 7 February 2017 the former NXP Standard Product business became a new company with the tradename **Nexperia**. Nexperia is an industry leading supplier of Discrete, Logic and PowerMOS semiconductors with its focus on the automotive, industrial, computing, consumer and wearable application markets

In data sheets and application notes which still contain NXP or Philips Semiconductors references, use the references to Nexperia, as shown below.

Instead of <http://www.nxp.com>, <http://www.philips.com/> or <http://www.semiconductors.philips.com/>, use <http://www.nexperia.com>

Instead of [sales.addresses@www.nxp.com](mailto:sales.addresses@www.nxp.com) or [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com), use [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com) (email)

Replace the copyright notice at the bottom of each page or elsewhere in the document, depending on the version, as shown below:

- © NXP N.V. (year). All rights reserved or © Koninklijke Philips Electronics N.V. (year). All rights reserved

Should be replaced with:

- © **Nexperia B.V. (year). All rights reserved.**

If you have any questions related to the data sheet, please contact our nearest sales office via e-mail or telephone (details via [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)). Thank you for your cooperation and understanding,

Kind regards,

Team Nexperia

# 74AVC20T245

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

Rev. 7 — 8 March 2012

Product data sheet

## 1. General description

The 74AVC20T245 is a 20-bit, dual supply transceiver that enables bi-directional voltage level translation. The device can be used as two 10-bit transceivers or as a single 20-bit transceiver. It features four 10-bit input-output ports (1An, 1Bn and 2An, 2Bn), two output enable inputs ( $\overline{\text{nOE}}$ ), two direction inputs ( $\overline{\text{nDIR}}$ ) and dual supplies ( $V_{\text{CC(A)}}$  and  $V_{\text{CC(B)}}$ ).  $V_{\text{CC(A)}}$  and  $V_{\text{CC(B)}}$  can be independently supplied at any voltage between 0.8 V and 3.6 V making the device suitable for bi-directional voltage level translation between any of the low voltage nodes: 0.8 V, 1.2 V, 1.5 V, 1.8 V, 2.5 V and 3.3 V. The 1An and 2An ports,  $\overline{\text{nOE}}$  and  $\overline{\text{nDIR}}$  are referenced to  $V_{\text{CC(A)}}$ , the 1Bn and 2Bn ports are referenced to  $V_{\text{CC(B)}}$ . A HIGH on a 1DIR allows transmission from 1An to 1Bn and a LOW on 1DIR allows transmission from 1Bn to 1An. A HIGH on  $\overline{\text{nOE}}$  causes the outputs to assume a HIGH impedance OFF-state.

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

## 2. Features and benefits

- Wide supply voltage range:
  - ◆  $V_{\text{CC(A)}}$ : 0.8 V to 3.6 V
  - ◆  $V_{\text{CC(B)}}$ : 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-C101C exceeds 1000 V
- Maximum data rates:
  - ◆ 380 Mbit/s ( $\geq$  1.8 V to 3.3 V translation)
  - ◆ 260 Mbit/s ( $\geq$  1.1 V to 3.3 V translation)
  - ◆ 260 Mbit/s ( $\geq$  1.1 V to 2.5 V translation)
  - ◆ 210 Mbit/s ( $\geq$  1.1 V to 1.8 V translation)



- ◆ 120 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
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- Multiple package options
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C

### 3. Ordering information

Table 1. Ordering information

| Type number    | Package               |                        |   | Version   |
|----------------|-----------------------|------------------------|---|-----------|
|                | Temperature range     | Name                   | Description   |           |
| 74AVC20T245DGG | $-40$ °C to $+125$ °C | TSSOP56                | plastic thin shrink small outline package; 56 leads; body width 6.1 mm  | SOT364-1  |
| 74AVC20T245DGV | $-40$ °C to $+125$ °C | TSSOP56 <sup>[1]</sup> | plastic thin shrink small outline package; 56 leads; body width 4.4 mm  | SOT481-2  |
| 74AVC20T245BX  | $-40$ °C to $+125$ °C | HXQFN60                | plastic compatible thermal enhanced extremely thin quad flat package; no leads; 60 terminals; body $4 \times 6 \times 0.5$ mm | SOT1134-2 |

[1] Also known as TVSOP56.

### 4. Functional diagram

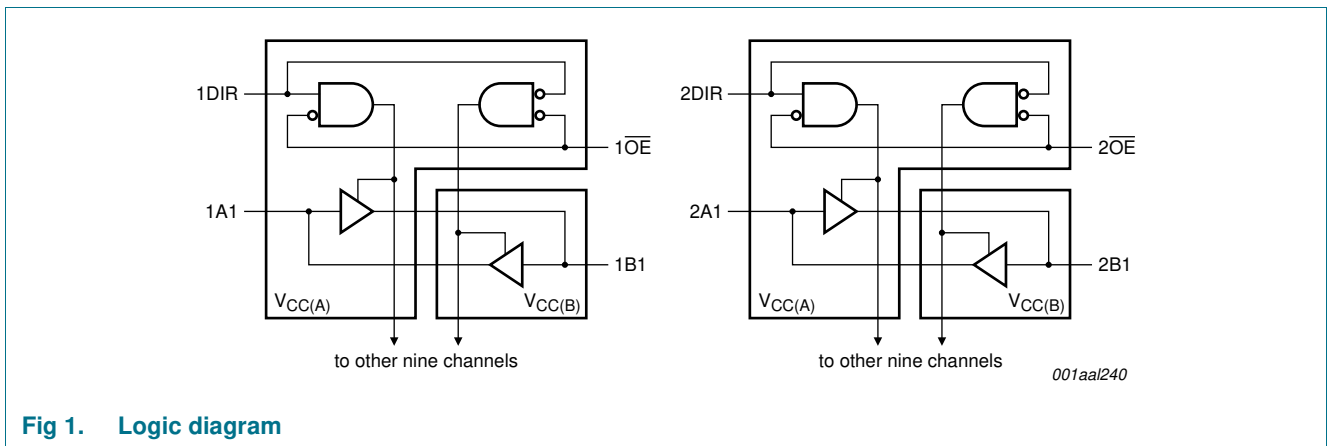
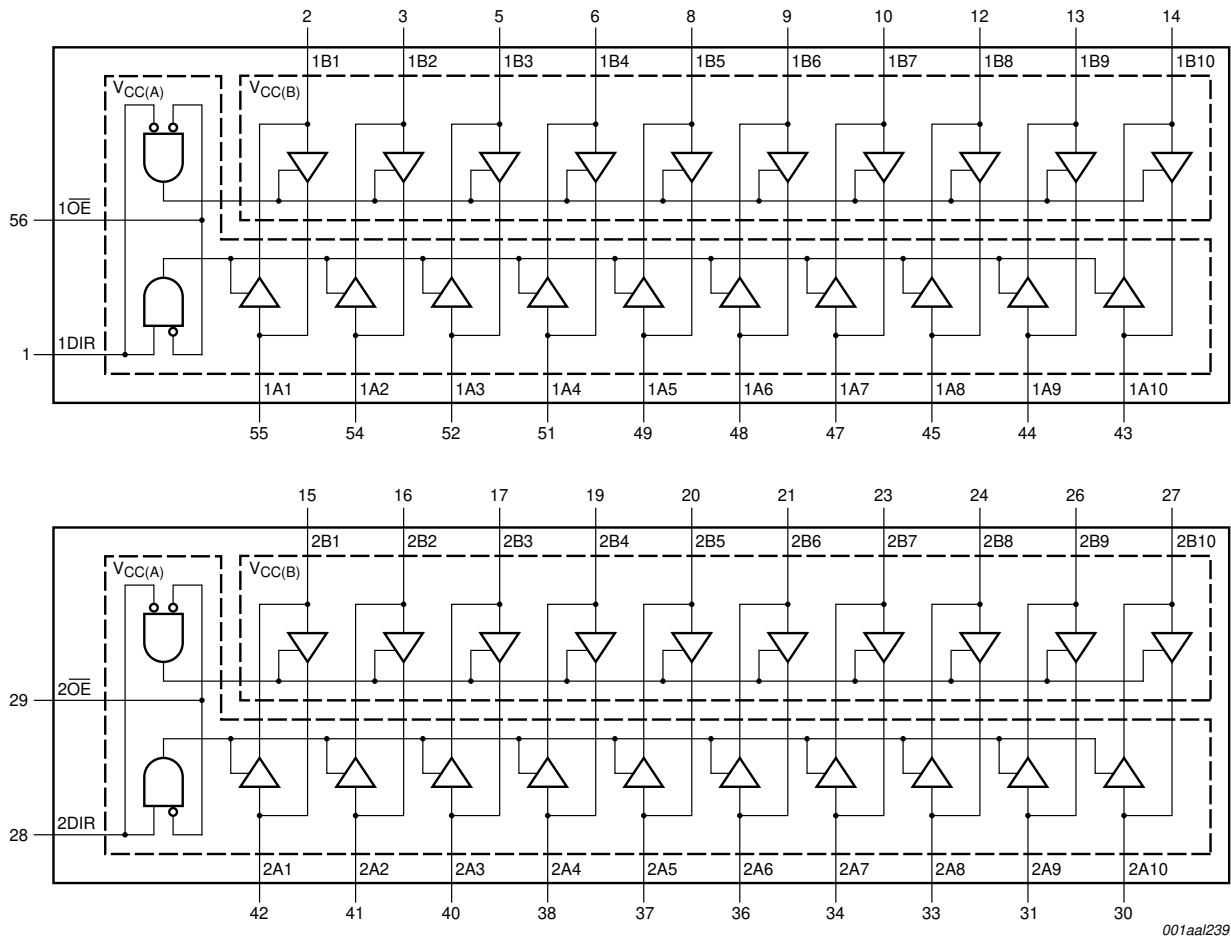


Fig 1. Logic diagram



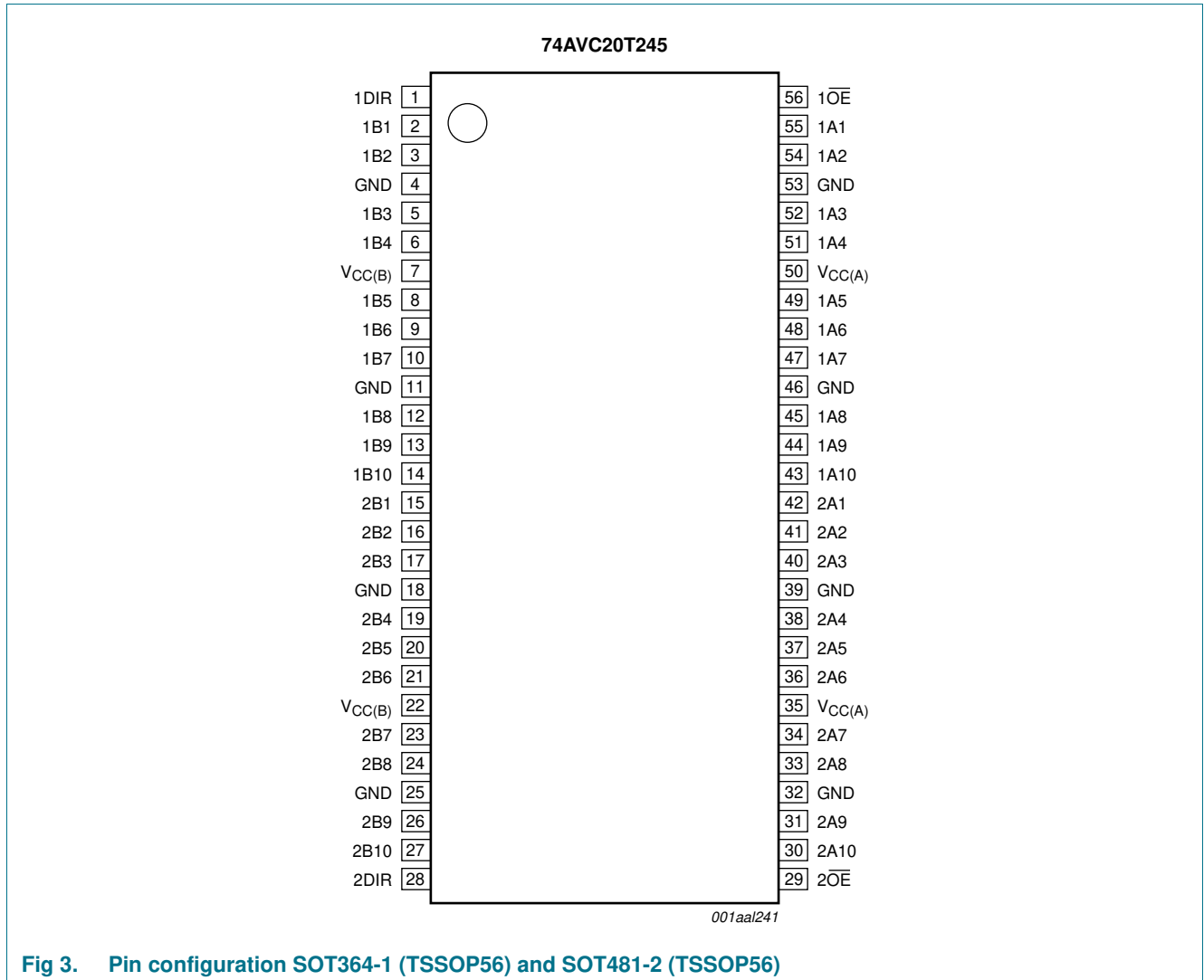


Pin numbers are shown for TSSOP56 packages only.

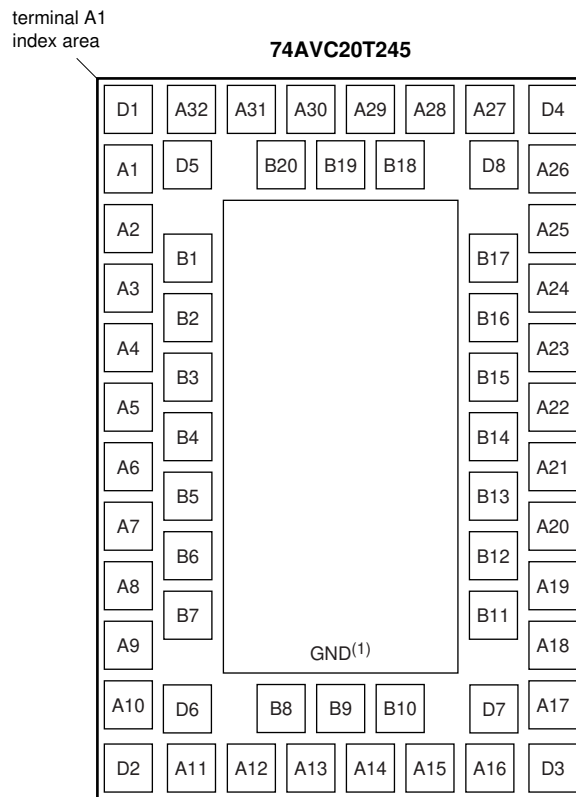
**Fig 2. Logic symbol**

## 5. Pinning information

### 5.1 Pinning



**Fig 3. Pin configuration SOT364-1 (TSSOP56) and SOT481-2 (TSSOP56)**



001aam129

- (1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to GND.

**Fig 4. Pin configuration SOT1134-2 (HXQFN60)**

## 5.2 Pin description

Table 2. Pin description

| Symbol                              | Pin                                    |  | Description  |
|-------------------------------------|--|--|--|
|                                     | SOT364-1 and SOT481-2                  | SOT1134-2                                      |  |
| 1DIR, 2DIR                          | 1, 28                                  | A30, A13                                       | direction control  |
| 1B1 to 1B10                         | 2, 3, 5, 6, 8, 9, 10, 12, 13, 14       | B20, A31, D5, D1, B1, A2, B2, A4, B3, A5       | data input or output   |
| 2B1 to 2B10                         | 15, 16, 17, 19, 20, 21, 23, 24, 26, 27 | A6, B5, A7, B6, A9, B7, D2, D6, A12, B8        | data input or output   |
| GND <sup>[1]</sup>                  | 4, 11, 18, 25, 32, 39, 46, 53          | A32, A3, A8, A11, A16, A19, A24, A27           | ground (0 V)   |
| V <sub>CC(B)</sub>                  | 7, 22                                  | A1, A10  | supply voltage B (nBn inputs are referenced to V <sub>CC(B)</sub> )                            |
| $\overline{1OE}$ , $\overline{2OE}$ | 56, 29                                 | A29, A14                                       | output enable input (active LOW)   |
| 1A1 to 1A10                         | 55, 54, 52, 51, 49, 48, 47, 45, 44, 43 | B18, A28, D8, D4, B17, A25, B16, A23, B15, A22 | data input or output   |
| 2A1 to 2A10                         | 42, 41, 40, 38, 37, 36, 34, 33, 31, 30 | A21, B13, A20, B12, A18, B11, D3, D7, A15, B10 | data input or output   |
| V <sub>CC(A)</sub>                  | 35, 50                                 | A17, A26                                       | supply voltage A (nAn, $\overline{nOE}$ and nDIR inputs are referenced to V <sub>CC(A)</sub> ) |
| n.c.                                | -                                      | B4, B9, B14, B19                               | not connected  |

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

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

| Supply voltage     | Input              |                     | Input/output <sup>[2]</sup> |                    |
|--------------------|--------------------|---------------------|-----------------------------|--------------------|
|                    | nOE <sup>[3]</sup> | nDIR <sup>[3]</sup> | nAn <sup>[3]</sup>          | nBn <sup>[3]</sup> |
| 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 <sup>[2]</sup> | X                  | X                   | Z                           | Z                  |

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

[2] If at least one of V<sub>CC(A)</sub> or V<sub>CC(B)</sub> is at GND level, the device goes into suspend mode.

[3] The nAn, nDIR and nOE input circuit is referenced to V<sub>CC(A)</sub>; The nBn input circuit is referenced to V<sub>CC(B)</sub>.



## 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 $V_{CCO}$      | [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 |                |                 |      |
|             |                         | TSSOP56 package               | [4] -          | 600             | mW   |
|             |                         | HXQFN60 package               | [5] -          | 1000            | mW   |

[1] The minimum input and minimum output voltage ratings may be exceeded if the input and output clamping 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 55 °C the value of  $P_{tot}$  derates linearly with 8.0 mW/K.

[5] Above 70 °C the value of  $P_{tot}$  derates linearly with 1.8 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 | $V_{CCI} = 0.8$ V to 3.6 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  $T_{amb} = 25\text{ °C}$  [1][2]**

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 | $V_I = V_{IH}$ or $V_{IL}$<br>$I_O = -1.5\text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 0.8\text{ V}$                                      | -   | 0.69        | -          | V             |               |
| $V_{OL}$  | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$<br>$I_O = 1.5\text{ mA}$ ; $V_{CC(A)} = V_{CC(B)} = 0.8\text{ V}$                                       | -   | 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 $3.6\text{ V}$   | -   | $\pm 0.025$ | $\pm 0.25$ | $\mu\text{A}$ |               |
| $I_{OZ}$  | OFF-state output current  | A or B port; $V_O = 0\text{ V}$ or $V_{CCO}$ ;<br>$V_{CC(A)} = V_{CC(B)} = 3.6\text{ V}$   | [3] | -           | $\pm 0.5$  | $\pm 2.5$     | $\mu\text{A}$ |
|           |                           | suspend mode A port; $V_O = 0\text{ V}$ or $V_{CCO}$ ;<br>$V_{CC(A)} = 3.6\text{ V}$ ; $V_{CC(B)} = 0\text{ V}$                    | [3] | -           | $\pm 0.5$  | $\pm 2.5$     | $\mu\text{A}$ |
|           |                           | suspend mode B port; $V_O = 0\text{ V}$ or $V_{CCO}$ ;<br>$V_{CC(A)} = 0\text{ V}$ ; $V_{CC(B)} = 3.6\text{ V}$                    | [3] | -           | $\pm 0.5$  | $\pm 2.5$     | $\mu\text{A}$ |
| $I_{OFF}$ | power-off leakage current | A port; $V_I$ or $V_O = 0\text{ V}$ to $3.6\text{ V}$ ;<br>$V_{CC(A)} = 0\text{ V}$ ; $V_{CC(B)} = 0.8\text{ V}$ to $3.6\text{ V}$ | -   | $\pm 0.1$   | $\pm 1$    | $\mu\text{A}$ |               |
|           |                           | B port; $V_I$ or $V_O = 0\text{ V}$ to $3.6\text{ V}$ ;<br>$V_{CC(B)} = 0\text{ V}$ ; $V_{CC(A)} = 0.8\text{ V}$ 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 $0\text{ V}$ ;<br>$V_{CC(A)} = V_{CC(B)} = 3.3\text{ V}$                                     | -   | 4.0         | -          | pF            |               |

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

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

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

**Table 7. Static characteristics [1][2]**

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                                    |                  |     |                   |     |      |
|          |                          | $V_{CCI} = 0.8\text{ V}$                      | $0.70V_{CCI}$    | -   | $0.70V_{CCI}$     | -   | 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, $\overline{nOE}$ 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    |

**Table 7. Static characteristics ...continued** [\[1\]\[2\]](#)

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 <sub>IL</sub> | LOW-level input voltage   | data input   |                        |                        |                        |                        |          |         |
|                 |                           | V <sub>CCI</sub> = 0.8 V   | -                      | 0.30V <sub>CCI</sub>   | -                      | 0.30V <sub>CCI</sub>   | V        |         |
|                 |                           | V <sub>CCI</sub> = 1.1 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        |         |
|                 |                           | nDIR, n $\overline{\text{OE}}$ input   |                        |                        |                        |                        |          |         |
|                 |                           | V <sub>CC(A)</sub> = 0.8 V   | -                      | 0.30V <sub>CC(A)</sub> | -                      | 0.30V <sub>CC(A)</sub> | V        |         |
|                 |                           | V <sub>CC(A)</sub> = 1.1 V to 1.95 V   | -                      | 0.35V <sub>CC(A)</sub> | -                      | 0.35V <sub>CC(A)</sub> | V        |         |
| V <sub>OH</sub> | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |                        |                        |                        |                        |          |         |
|                 |                           | I <sub>O</sub> = -100 $\mu$ A;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 0.8 V to 3.6 V                                       | V <sub>CCO</sub> - 0.1 | -                      | V <sub>CCO</sub> - 0.1 | -                      | V        |         |
|                 |                           | I <sub>O</sub> = -3 mA;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.1 V   | 0.85                   | -                      | 0.85                   | -                      | V        |         |
|                 |                           | I <sub>O</sub> = -6 mA;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.4 V   | 1.05                   | -                      | 1.05                   | -                      | V        |         |
|                 |                           | I <sub>O</sub> = -8 mA;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.65 V  | 1.2                    | -                      | 1.2                    | -                      | V        |         |
|                 |                           | I <sub>O</sub> = -9 mA;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 2.3 V   | 1.75                   | -                      | 1.75                   | -                      | V        |         |
|                 |                           | I <sub>O</sub> = -12 mA;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 3.0 V  | 2.3                    | -                      | 2.3                    | -                      | V        |         |
| V <sub>OL</sub> | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>  |                        |                        |                        |                        |          |         |
|                 |                           | I <sub>O</sub> = 100 $\mu$ A;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 0.8 V to 3.6 V  | -                      | 0.1                    | -                      | 0.1                    | V        |         |
|                 |                           | I <sub>O</sub> = 3 mA; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.1 V   | -                      | 0.25                   | -                      | 0.25                   | V        |         |
|                 |                           | I <sub>O</sub> = 6 mA; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.4 V   | -                      | 0.35                   | -                      | 0.35                   | V        |         |
|                 |                           | I <sub>O</sub> = 8 mA;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 1.65 V   | -                      | 0.45                   | -                      | 0.45                   | V        |         |
|                 |                           | I <sub>O</sub> = 9 mA; V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 2.3 V   | -                      | 0.55                   | -                      | 0.55                   | V        |         |
| I <sub>I</sub>  | input leakage current     | I <sub>O</sub> = 12 mA;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 3.0 V   | -                      | 0.7                    | -                      | 0.7                    | V        |         |
|                 |                           | nDIR, n $\overline{\text{OE}}$ input; V <sub>I</sub> = 0 V or 3.6 V;<br>V <sub>CC(A)</sub> = V <sub>CC(B)</sub> = 0.8 V to 3.6 V | -                      | $\pm 1$                | -                      | $\pm 5$                | $\mu$ A  |         |
|                 |                           | 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                       | <a href="#">[3]</a>    | -                      | $\pm 5$                | -                      | $\pm 30$ | $\mu$ A |
| I <sub>OZ</sub> | OFF-state output current  | suspend mode A port;<br>V <sub>O</sub> = 0 V or V <sub>CCO</sub> ; V <sub>CC(A)</sub> = 3.6 V;<br>V <sub>CC(B)</sub> = 0 V       | <a href="#">[3]</a>    | -                      | $\pm 5$                | -                      | $\pm 30$ | $\mu$ A |
|                 |                           | suspend mode B port;<br>V <sub>O</sub> = 0 V or V <sub>CCO</sub> ; V <sub>CC(A)</sub> = 0 V;<br>V <sub>CC(B)</sub> = 3.6 V       | <a href="#">[3]</a>    | -                      | $\pm 5$                | -                      | $\pm 30$ | $\mu$ A |

**Table 7. Static characteristics ...continued** [1][2]

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 |      |
| I <sub>OFF</sub>  | power-off leakage current | A port; V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; 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; V <sub>CC(B)</sub> = 0 V; V <sub>CC(A)</sub> = 0.8 V to 3.6 V | -                | ±5  | -                 | ±30 | μA   |
| 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; V <sub>CC(B)</sub> = 0.8 V to 3.6 V   | -                | 45  | -                 | 190 | μA   |
|   |                           | V <sub>CC(A)</sub> = 1.1 V to 3.6 V; V <sub>CC(B)</sub> = 1.1 V to 3.6 V   | -                | 35  | -                 | 140 | μA   |
|   |                           | V <sub>CC(A)</sub> = 3.6 V; V <sub>CC(B)</sub> = 0 V   | -                | 35  | -                 | 140 | 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; V <sub>CC(B)</sub> = 0.8 V to 3.6 V   | -                | 45  | -                 | 190 | μA   |
|   |                           | V <sub>CC(A)</sub> = 1.1 V to 3.6 V; V <sub>CC(B)</sub> = 1.1 V to 3.6 V   | -                | 35  | -                 | 140 | 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   | -                | 35  | -                 | 140 | μA   |
| A plus B port (I <sub>CC(A)</sub> + I <sub>CC(B)</sub> ); I <sub>O</sub> = 0 A; V <sub>I</sub> = 0 V or V <sub>CCI</sub> ; V <sub>CC(A)</sub> = 0.8 V to 3.6 V; V <sub>CC(B)</sub> = 0.8 V to 3.6 V | -                         | 80   | -                | 270 | μA                |     |      |
| A plus B port (I <sub>CC(A)</sub> + I <sub>CC(B)</sub> ); I <sub>O</sub> = 0 A; V <sub>I</sub> = 0 V or V <sub>CCI</sub> ; V <sub>CC(A)</sub> = 1.1 V to 3.6 V; V <sub>CC(B)</sub> = 1.1 V to 3.6 V | -                         | 65   | -                | 220 | 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] 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  $T_{amb} = 25\text{ °C}$  [1][2]

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

| 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 A to B);<br>output enabled  | 0.2                     | 0.2   | 0.2   | 0.2   | 0.3   | 0.4   | pF   |
|          |                               | A port: (direction A to B);<br>output disabled | 0.2                     | 0.2   | 0.2   | 0.2   | 0.3   | 0.4   | pF   |
|          |                               | A port: (direction B to A);<br>output enabled  | 9.5                     | 9.7   | 9.8   | 9.9   | 10.7  | 11.9  | pF   |
|          |                               | A port: (direction B to A);<br>output disabled | 0.6                     | 0.6   | 0.6   | 0.6   | 0.7   | 0.7   | pF   |
|          |                               | B port: (direction A to B);<br>output enabled  | 9.5                     | 9.7   | 9.8   | 9.9   | 10.7  | 11.9  | pF   |
|          |                               | B port: (direction A to B);<br>output disabled | 0.6                     | 0.6   | 0.6   | 0.6   | 0.7   | 0.7   | pF   |
|          |                               | B port: (direction B to A);<br>output enabled  | 0.2                     | 0.2   | 0.2   | 0.2   | 0.3   | 0.4   | pF   |
|          |                               | B port: (direction B to A);<br>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]  $f_i = 10\text{ MHz}$ ;  $V_i = \text{GND to } V_{CC}$ ;  $t_r = t_f = 1\text{ ns}$ ;  $C_L = 0\text{ pF}$ ;  $R_L = \infty\ \Omega$ .

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

*Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#); for wave forms see [Figure 5](#) and [Figure 6](#)*

| 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      | $\overline{nOE}$ to nAn | 16.2        | 16.2  | 16.2  | 16.2  | 16.2  | 16.2  | ns   |
|           |                   | $\overline{nOE}$ to nBn | 17.6        | 10.0  | 9.0   | 9.1   | 8.7   | 9.3   | ns   |
| $t_{en}$  | enable time       | $\overline{nOE}$ to nAn | 21.9        | 21.9  | 21.9  | 21.9  | 21.9  | 21.9  | ns   |
|           |                   | $\overline{nOE}$ 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  $T_{amb} = 25\text{ °C}$**

*Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#); for wave forms see [Figure 5](#) and [Figure 6](#)*

| 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      | $\overline{nOE}$ to nAn | 16.2        | 5.9   | 4.4   | 4.2   | 3.1   | 3.5   | ns   |
|           |                   | $\overline{nOE}$ to nBn | 17.6        | 14.2  | 13.7  | 13.6  | 13.3  | 13.1  | ns   |
| $t_{en}$  | enable time       | $\overline{nOE}$ to nAn | 21.9        | 6.4   | 4.4   | 3.5   | 2.6   | 2.3   | ns   |
|           |                   | $\overline{nOE}$ 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  $t_{PZH}$ .



**Table 12. Dynamic characteristics for temperature range –40 °C to +85 °C [1]**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#); for wave forms see [Figure 5](#) and [Figure 6](#).

| 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  |      |
| <b>V<sub>CC(A)</sub> = 1.1 V to 1.3 V</b>   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 9.4  | 0.5           | 7.1  | 0.5            | 6.2  | 0.5           | 5.2  | 0.5           | 5.1  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 9.4  | 0.5           | 8.9  | 0.5            | 8.7  | 0.5           | 8.4  | 0.5           | 8.2  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 2.0                | 11.9 | 2.0           | 11.9 | 2.0            | 11.9 | 2.0           | 11.9 | 2.0           | 11.9 | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 12.7 | 1.5           | 9.8  | 1.5            | 9.6  | 1.0           | 8.1  | 1.0           | 9.0  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 1.5                | 15.3 | 1.5           | 15.3 | 1.5            | 15.3 | 1.5           | 15.3 | 1.5           | 15.3 | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 15.6 | 1.0           | 11.5 | 1.0            | 10.0 | 0.5           | 8.4  | 0.5           | 8.0  | ns   |
| <b>V<sub>CC(A)</sub> = 1.4 V to 1.6 V</b>   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 8.9  | 0.5           | 6.4  | 0.5            | 5.4  | 0.5           | 4.3  | 0.5           | 3.9  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 7.1  | 0.5           | 6.4  | 0.5            | 6.1  | 0.5           | 5.8  | 0.5           | 5.7  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 2.0                | 9.0  | 2.0           | 9.0  | 2.0            | 9.0  | 2.0           | 9.0  | 2.0           | 9.0  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 11.7 | 1.5           | 9.0  | 1.5            | 7.8  | 1.0           | 6.4  | 1.0           | 6.0  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 1.5                | 10.3 | 1.5           | 10.3 | 1.5            | 10.3 | 1.5           | 10.2 | 1.5           | 10.2 | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 14.3 | 1.0           | 10.3 | 1.0            | 8.4  | 0.5           | 6.1  | 0.5           | 5.3  | ns   |
| <b>V<sub>CC(A)</sub> = 1.65 V to 1.95 V</b> |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 8.7  | 0.5           | 6.1  | 0.5            | 5.0  | 0.5           | 3.9  | 0.5           | 3.5  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 6.2  | 0.5           | 5.4  | 0.5            | 5.0  | 0.5           | 4.7  | 0.5           | 4.6  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 2.0                | 7.4  | 2.0           | 7.4  | 2.0            | 7.4  | 2.0           | 7.4  | 2.0           | 7.4  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 11.3 | 1.5           | 8.7  | 1.5            | 7.4  | 1.0           | 5.8  | 1.0           | 5.6  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 1.0                | 8.1  | 1.0           | 8.1  | 1.0            | 7.9  | 1.0           | 7.9  | 1.0           | 7.9  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 0.5                | 13.8 | 0.5           | 10.0 | 0.5            | 7.9  | 0.5           | 5.7  | 0.5           | 4.8  | ns   |
| <b>V<sub>CC(A)</sub> = 2.3 V to 2.7 V</b>   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 8.4  | 0.5           | 5.8  | 0.5            | 4.7  | 0.5           | 3.5  | 0.5           | 3.0  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 5.2  | 0.5           | 4.3  | 0.5            | 3.9  | 0.5           | 3.5  | 0.5           | 3.4  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 1.1                | 5.2  | 1.1           | 5.2  | 1.1            | 5.2  | 1.1           | 5.2  | 1.1           | 5.2  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.2                | 10.8 | 1.2           | 8.2  | 1.2            | 6.9  | 1.0           | 5.3  | 1.0           | 5.2  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 0.5                | 5.4  | 0.5           | 5.4  | 0.5            | 5.3  | 0.5           | 5.2  | 0.5           | 5.2  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 0.5                | 13.3 | 0.5           | 9.6  | 0.5            | 7.6  | 0.5           | 5.3  | 0.5           | 4.3  | ns   |
| <b>V<sub>CC(A)</sub> = 3.0 V to 3.6 V</b>   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 8.2  | 0.5           | 5.7  | 0.5            | 4.6  | 0.5           | 3.4  | 0.5           | 2.9  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 5.1  | 0.5           | 3.9  | 0.5            | 3.5  | 0.5           | 3.0  | 0.5           | 2.9  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 0.8                | 5.0  | 0.8           | 5.0  | 0.8            | 5.0  | 0.8           | 5.0  | 0.8           | 5.0  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.2                | 10.5 | 1.2           | 8.1  | 1.2            | 6.7  | 1.0           | 5.1  | 0.8           | 5.0  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 0.5                | 4.4  | 0.5           | 4.4  | 0.5            | 4.3  | 0.5           | 4.2  | 0.5           | 4.1  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 13.1 | 1.0           | 9.6  | 0.5            | 7.5  | 0.5           | 5.1  | 0.5           | 4.1  | 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>.

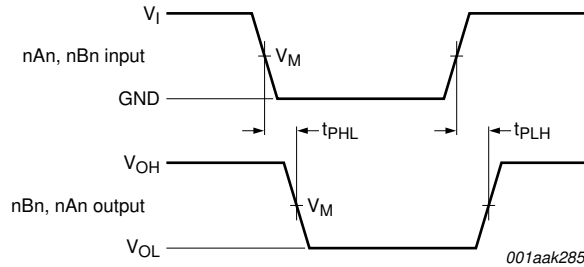
**Table 13. Dynamic characteristics for temperature range –40 °C to +125 °C [1]**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#); for wave forms see [Figure 5](#) and [Figure 6](#)

| 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  |      |
| <b>V<sub>CC(A)</sub> = 1.1 V to 1.3 V</b>   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 10.4 | 0.5           | 7.9  | 0.5            | 6.9  | 0.5           | 5.8  | 0.5           | 5.7  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 10.4 | 0.5           | 9.8  | 0.5            | 9.6  | 0.5           | 9.3  | 0.5           | 9.1  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 2.0                | 13.1 | 2.0           | 13.1 | 2.0            | 13.1 | 2.0           | 13.1 | 2.0           | 13.1 | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 14.0 | 1.5           | 10.8 | 1.5            | 10.6 | 1.0           | 9.0  | 1.0           | 9.9  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 1.5                | 16.9 | 1.5           | 16.9 | 1.5            | 16.9 | 1.5           | 16.9 | 1.5           | 16.9 | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 17.2 | 1.0           | 12.7 | 1.0            | 11.0 | 0.5           | 9.3  | 0.5           | 8.8  | ns   |
| <b>V<sub>CC(A)</sub> = 1.4 V to 1.6 V</b>   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 9.8  | 0.5           | 7.1  | 0.5            | 6.0  | 0.5           | 4.8  | 0.5           | 4.3  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 7.9  | 0.5           | 7.1  | 0.5            | 6.8  | 0.5           | 6.4  | 0.5           | 6.3  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 2.0                | 9.9  | 2.0           | 9.9  | 2.0            | 9.9  | 2.0           | 9.9  | 2.0           | 9.9  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 12.9 | 1.5           | 9.9  | 1.5            | 8.6  | 1.0           | 7.1  | 1.0           | 6.6  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 1.5                | 11.4 | 1.5           | 11.4 | 1.5            | 11.4 | 1.5           | 11.3 | 1.5           | 11.3 | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 15.8 | 1.0           | 11.4 | 1.0            | 9.3  | 0.5           | 6.8  | 0.5           | 5.9  | ns   |
| <b>V<sub>CC(A)</sub> = 1.65 V to 1.95 V</b> |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 9.6  | 0.5           | 6.8  | 0.5            | 5.5  | 0.5           | 4.3  | 0.5           | 3.9  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 6.9  | 0.5           | 6.0  | 0.5            | 5.5  | 0.5           | 5.2  | 0.5           | 5.1  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 2.0                | 8.2  | 2.0           | 8.2  | 2.0            | 8.2  | 2.0           | 8.2  | 2.0           | 8.2  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.5                | 12.5 | 1.5           | 9.6  | 1.5            | 8.2  | 1.0           | 6.4  | 1.0           | 6.2  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 1.0                | 9.0  | 1.0           | 9.0  | 1.0            | 8.7  | 1.0           | 8.7  | 1.0           | 8.7  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 0.5                | 15.2 | 0.5           | 11.0 | 0.5            | 8.7  | 0.5           | 6.3  | 0.5           | 5.3  | ns   |
| <b>V<sub>CC(A)</sub> = 2.3 V to 2.7 V</b>   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 9.3  | 0.5           | 6.4  | 0.5            | 5.2  | 0.5           | 3.9  | 0.5           | 3.3  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 5.8  | 0.5           | 4.8  | 0.5            | 4.3  | 0.5           | 3.9  | 0.5           | 3.8  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 1.1                | 5.8  | 1.1           | 5.8  | 1.1            | 5.8  | 1.1           | 5.8  | 1.1           | 5.8  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.2                | 11.9 | 1.2           | 9.1  | 1.2            | 7.6  | 1.0           | 5.9  | 1.0           | 5.8  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 0.5                | 6.0  | 0.5           | 6.0  | 0.5            | 5.9  | 0.5           | 5.8  | 0.5           | 5.8  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 0.5                | 14.7 | 0.5           | 10.6 | 0.5            | 8.4  | 0.5           | 5.9  | 0.5           | 4.8  | ns   |
| <b>V<sub>CC(A)</sub> = 3.0 V to 3.6 V</b>   |                   |                                 |                    |      |               |      |                |      |               |      |               |      |      |
| t <sub>pd</sub>                             | propagation delay | nAn to nBn                      | 0.5                | 9.1  | 0.5           | 6.3  | 0.5            | 5.1  | 0.5           | 3.8  | 0.5           | 3.2  | ns   |
|   |                   | nBn to nAn                      | 0.5                | 5.7  | 0.5           | 4.3  | 0.5            | 3.9  | 0.5           | 3.3  | 0.5           | 3.2  | ns   |
| t <sub>dis</sub>                            | disable time      | n $\overline{\text{OE}}$ to nAn | 0.8                | 5.5  | 0.8           | 5.5  | 0.8            | 5.5  | 0.8           | 5.5  | 0.8           | 5.5  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.2                | 11.6 | 1.2           | 9.0  | 1.2            | 7.4  | 1.0           | 5.7  | 0.8           | 5.5  | ns   |
| t <sub>en</sub>                             | enable time       | n $\overline{\text{OE}}$ to nAn | 0.5                | 4.9  | 0.5           | 4.9  | 0.5            | 4.8  | 0.5           | 4.7  | 0.5           | 4.6  | ns   |
|   |                   | n $\overline{\text{OE}}$ to nBn | 1.0                | 14.5 | 1.0           | 10.6 | 0.5            | 8.3  | 0.5           | 5.7  | 0.5           | 4.6  | ns   |

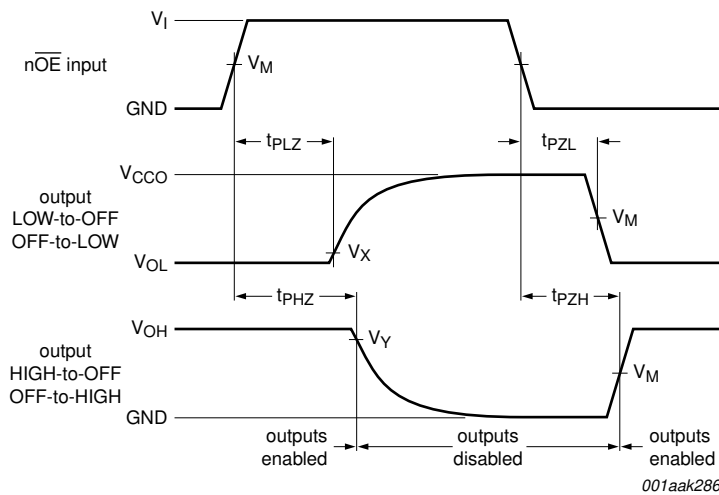
[1] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>; t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>; t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>.

11. Waveforms



Measurement points are given in [Table 14](#).  
 VOL and VOH are typical output voltage levels that occur with the output load.

Fig 5. The data input (nAn, nBn) to output (nBn, nAn) propagation delay times



Measurement points are given in [Table 14](#).  
 VOL and VOH are typical output voltage levels that occur with the output load.

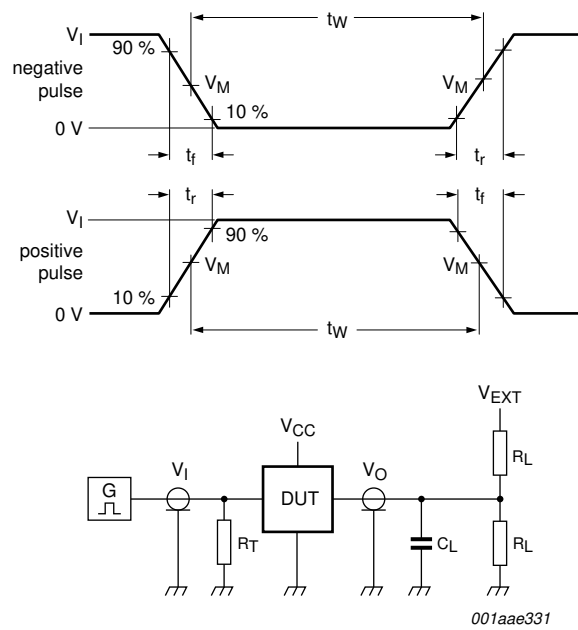
Fig 6. Enable and disable times

Table 14. Measurement points

| Supply voltage                          | Input <sup>[1]</sup> | Output <sup>[2]</sup> |                          |                          |
|---|----------------------|-----------------------|--------------------------|--------------------------|
| V <sub>CC(A)</sub> , V <sub>CC(B)</sub> | V <sub>M</sub>       | V <sub>M</sub>        | V <sub>X</sub>           | V <sub>Y</sub>           |
| 0.8 V to 1.6 V                          | 0.5V <sub>CCI</sub>  | 0.5V <sub>CCO</sub>   | V <sub>OL</sub> + 0.1 V  | V <sub>OH</sub> - 0.1 V  |
| 1.65 V to 2.7 V                         | 0.5V <sub>CCI</sub>  | 0.5V <sub>CCO</sub>   | V <sub>OL</sub> + 0.15 V | V <sub>OH</sub> - 0.15 V |
| 3.0 V to 3.6 V                          | 0.5V <sub>CCI</sub>  | 0.5V <sub>CCO</sub>   | V <sub>OL</sub> + 0.3 V  | V <sub>OH</sub> - 0.3 V  |

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

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



Test data is given in [Table 15](#).  
 $R_L$  = Load resistance.  
 $C_L$  = Load capacitance including jig and probe capacitance.  
 $R_T$  = Termination resistance.  
 $V_{EXT}$  = External voltage for measuring switching times.

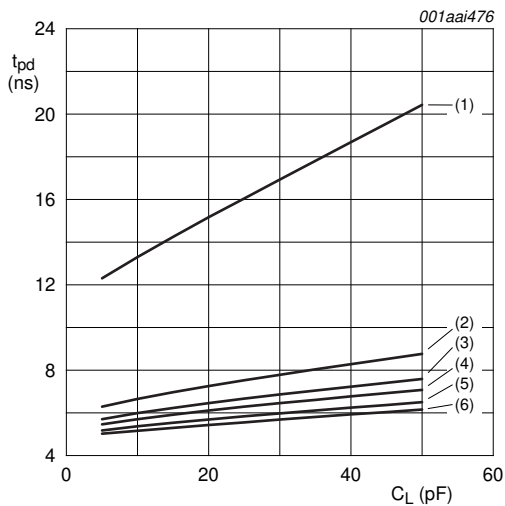
**Fig 7. Test circuit for measuring switching times**

**Table 15. Test data**

| Supply voltage         | Input                |                                    | Load  |              | $V_{EXT}$          |                    |                                   |
|------------------------|----------------------|------------------------------------|-------|--------------|--------------------|--------------------|-----------------------------------|
| $V_{CC(A)}, V_{CC(B)}$ | $V_I$ <sup>[1]</sup> | $\Delta t/\Delta V$ <sup>[2]</sup> | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ <sup>[3]</sup> |
| 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                | $2V_{CCO}$                        |

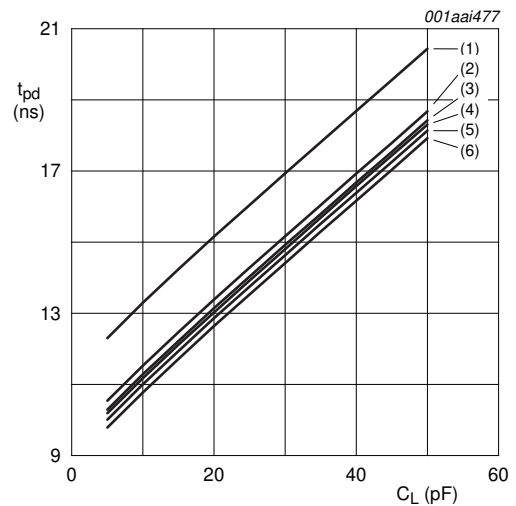
- [1]  $V_{CCI}$  is the supply voltage associated with the data input port.
- [2]  $dV/dt \geq 1.0 \text{ V/ns}$
- [3]  $V_{CCO}$  is the supply voltage associated with the output port.

## 12. Typical propagation delay characteristics



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

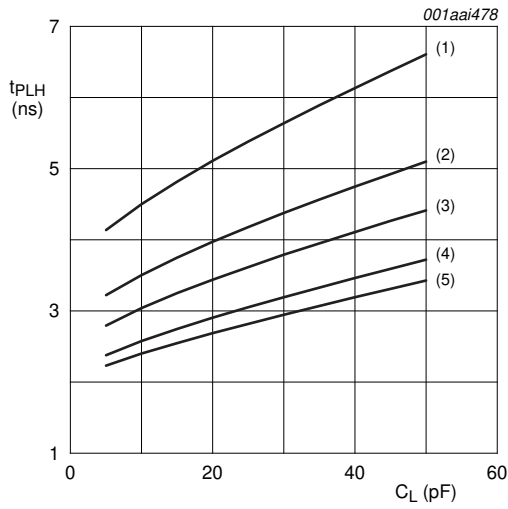
- (1)  $V_{CC(B)} = 0.8\text{ V}$ .
- (2)  $V_{CC(B)} = 1.2\text{ V}$ .
- (3)  $V_{CC(B)} = 1.5\text{ V}$ .
- (4)  $V_{CC(B)} = 1.8\text{ V}$ .
- (5)  $V_{CC(B)} = 2.5\text{ V}$ .
- (6)  $V_{CC(B)} = 3.3\text{ V}$ .



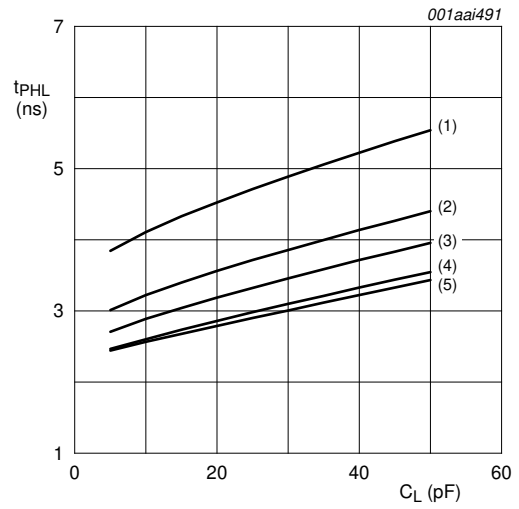
b. Propagation delay (nAn to nBn);  $V_{CC(B)} = 0.8\text{ V}$

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

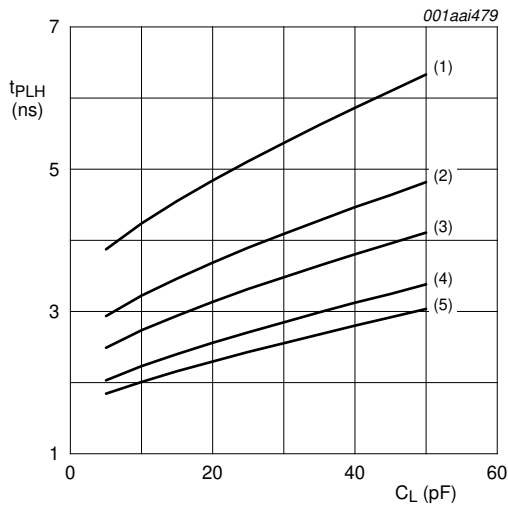
**Fig 8. Typical propagation delay versus load capacitance;  $T_{amb} = 25\text{ °C}$**



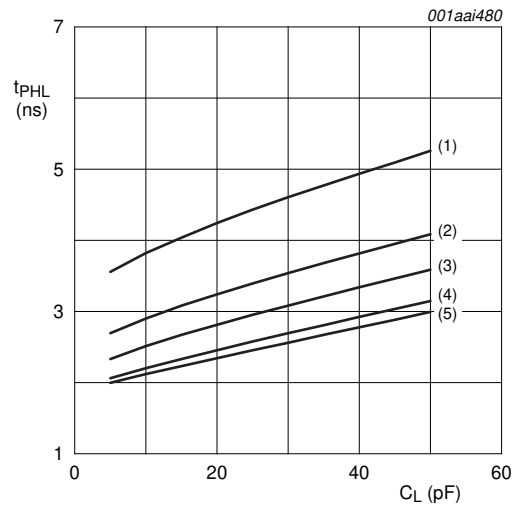
a. LOW to HIGH propagation delay (nAn to nBn);  
V<sub>CC(A)</sub> = 1.2 V



b. HIGH to LOW propagation delay (nAn to nBn);  
V<sub>CC(A)</sub> = 1.2 V



c. LOW to HIGH propagation delay (nAn to nBn);  
V<sub>CC(A)</sub> = 1.5 V

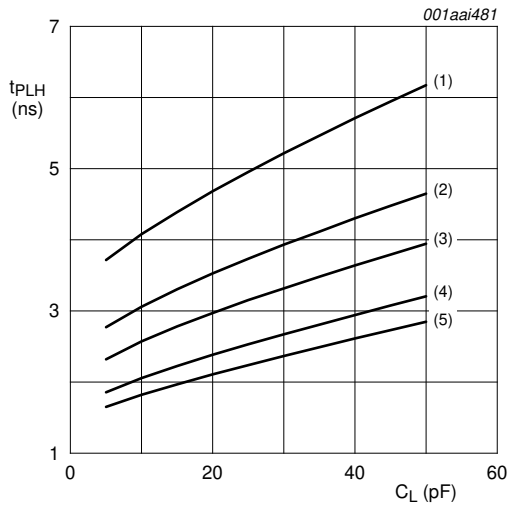


d. HIGH to LOW propagation delay (nAn to nBn);  
V<sub>CC(A)</sub> = 1.5 V

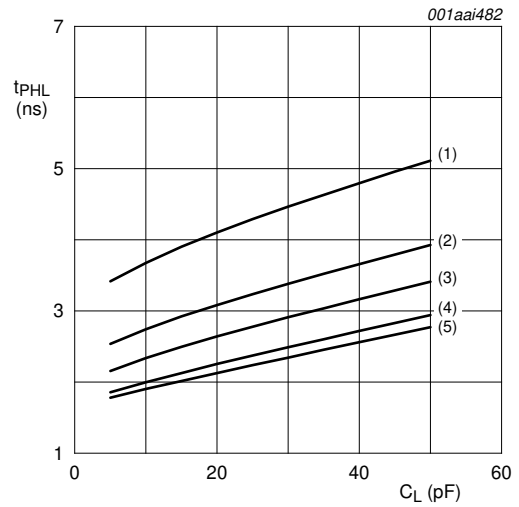
- (1) V<sub>CC(B)</sub> = 1.2 V.
- (2) V<sub>CC(B)</sub> = 1.5 V.
- (3) V<sub>CC(B)</sub> = 1.8 V.
- (4) V<sub>CC(B)</sub> = 2.5 V.
- (5) V<sub>CC(B)</sub> = 3.3 V.

Fig 9. Typical propagation delay versus load capacitance; T<sub>amb</sub> = 25 °C

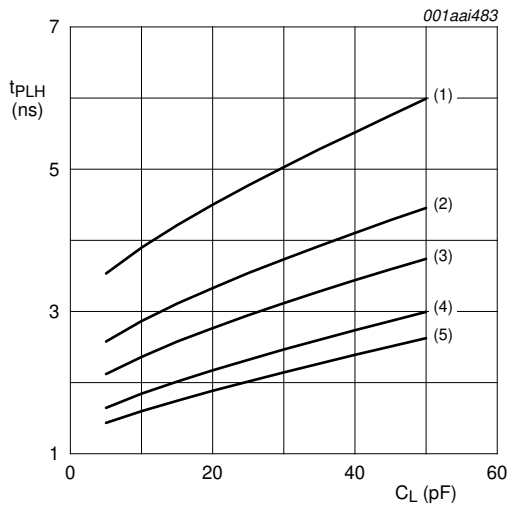




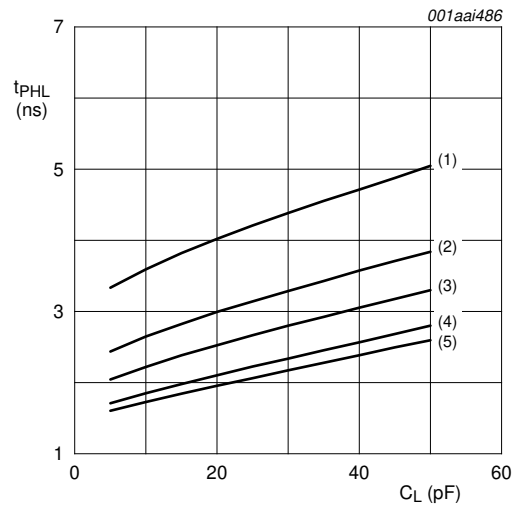
a. LOW to HIGH propagation delay (nAn to nBn);  
V<sub>CC(A)</sub> = 1.8 V



b. HIGH to LOW propagation delay (nAn to nBn);  
V<sub>CC(A)</sub> = 1.8 V



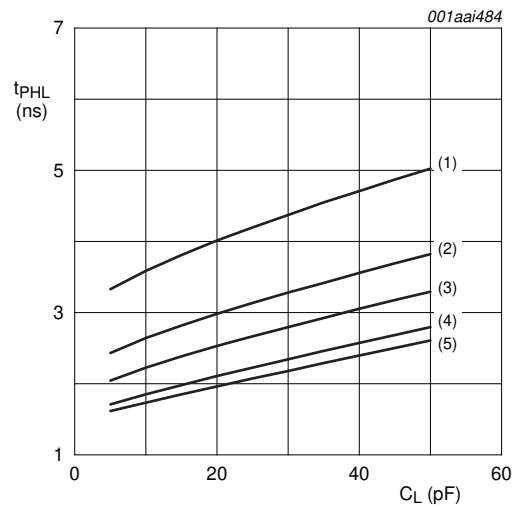
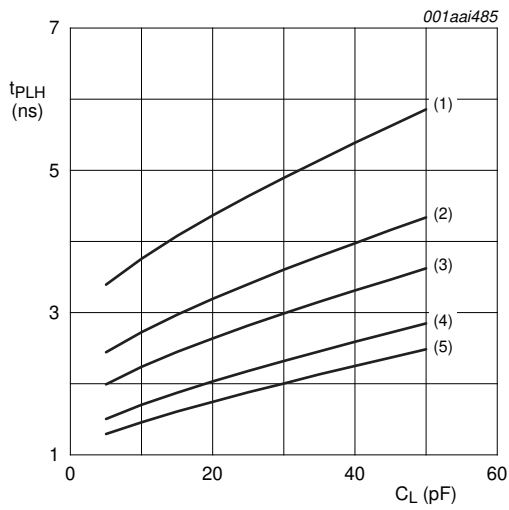
c. LOW to HIGH propagation delay (nAn to nBn);  
V<sub>CC(A)</sub> = 2.5 V



d. HIGH to LOW propagation delay (nAn to nBn);  
V<sub>CC(A)</sub> = 2.5 V

- (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.

Fig 10. Typical propagation delay versus load capacitance; T<sub>amb</sub> = 25 °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 11. Typical propagation delay versus load capacitance;  $T_{amb} = 25 \text{ }^\circ\text{C}$

13. Package outline

TSSOP56: plastic thin shrink small outline package; 56 leads; body width 6.1 mm

SOT364-1

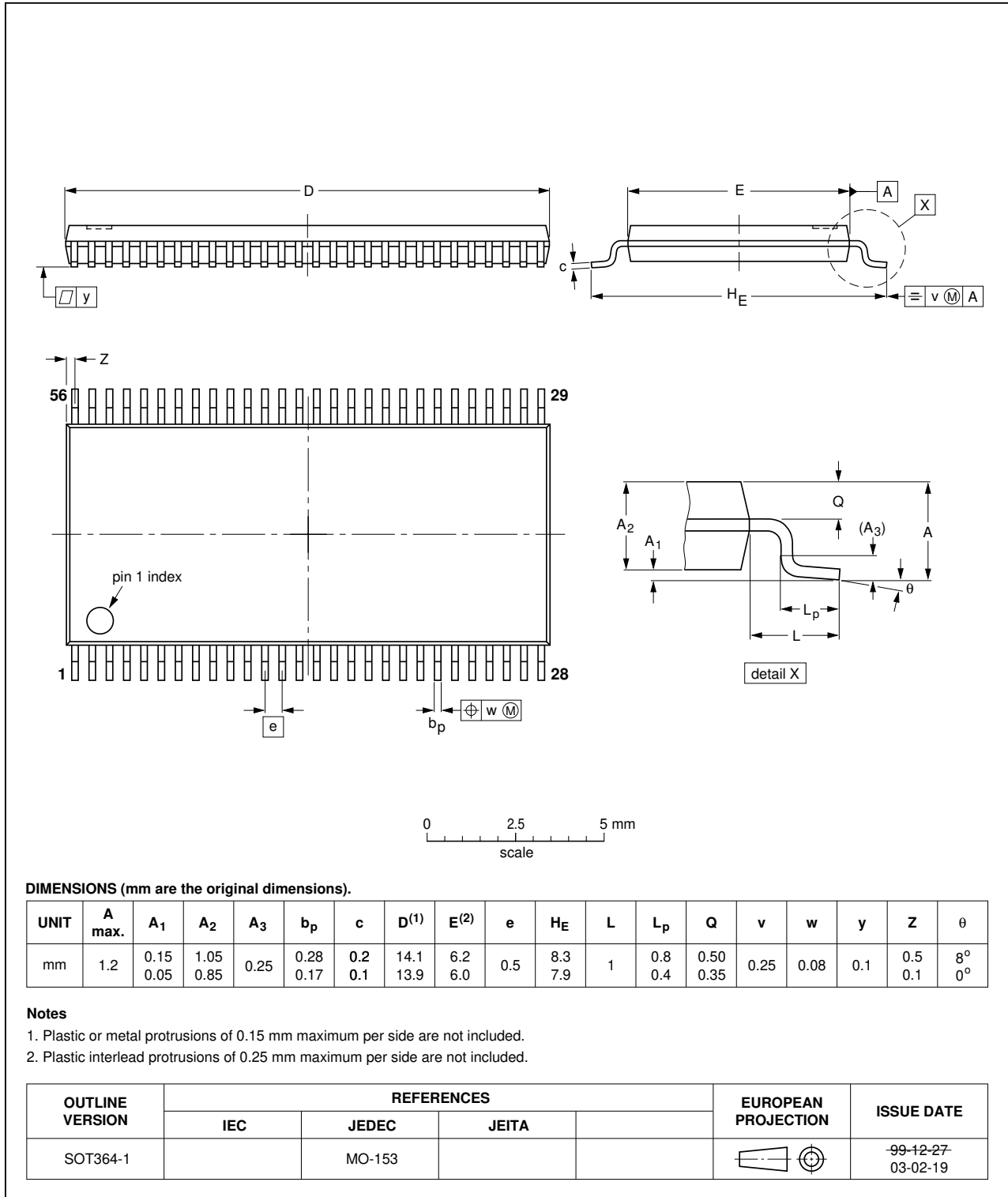


Fig 12. Package outline SOT364-1 (TSSOP56)

TSSOP56: plastic thin shrink small outline package; 56 leads; body width 4.4 mm

SOT481-2

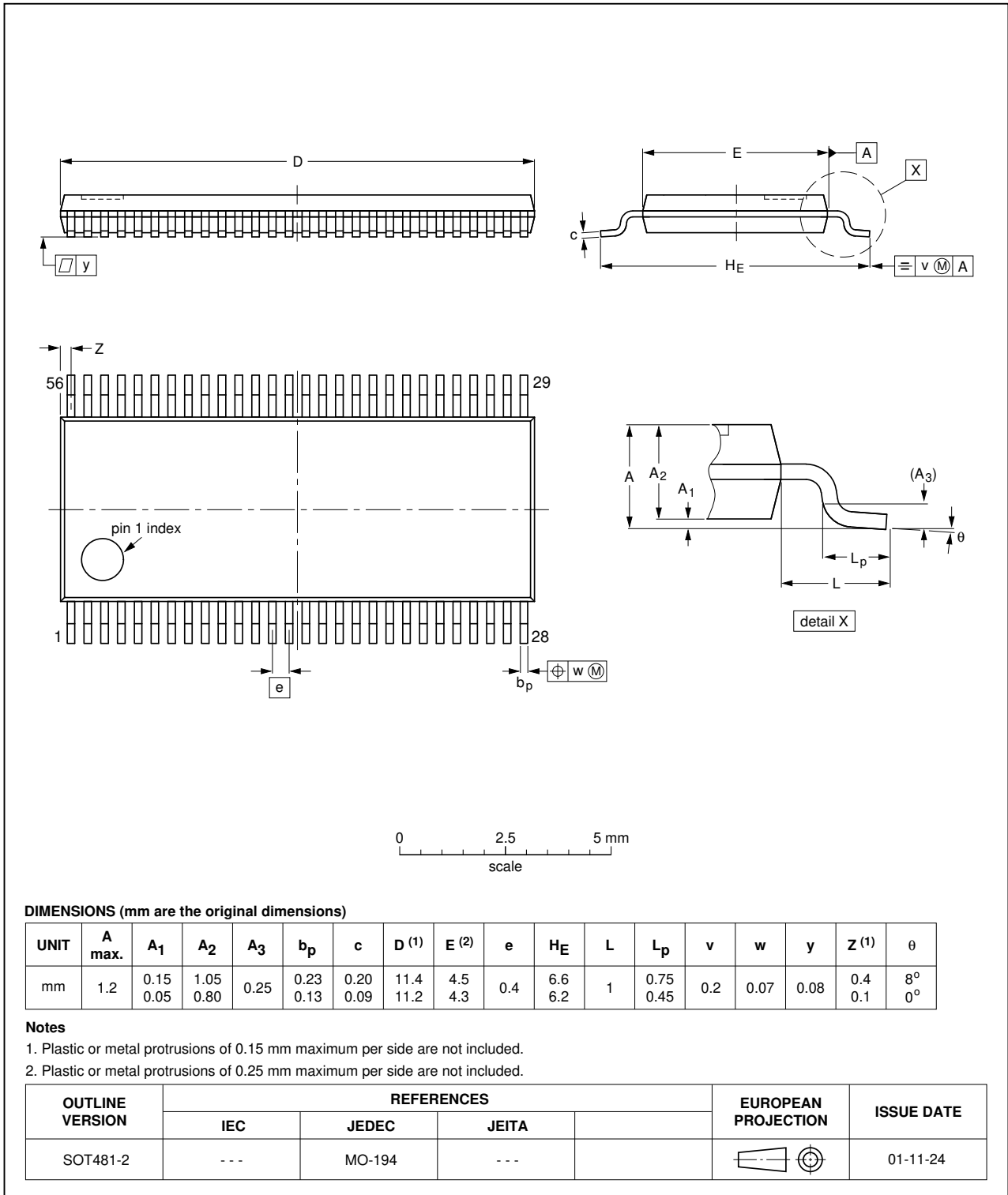


Fig 13. Package outline SOT481-2 (TSSOP56)

HXQFN60: plastic compatible thermal enhanced extremely thin quad flat package; no leads; 60 terminals; body 4 x 6 x 0.5 mm

SOT1134-2

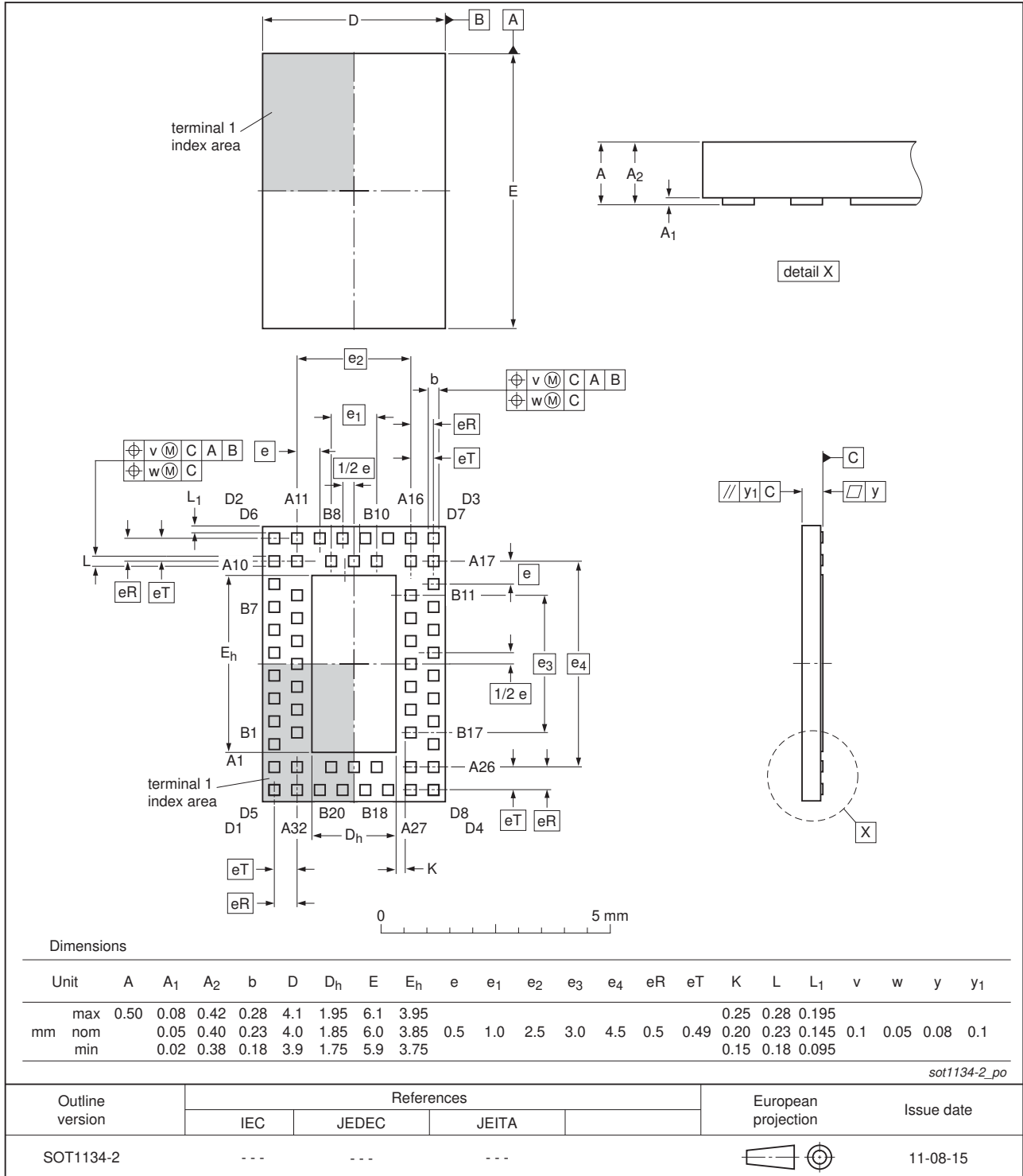


Fig 14. Package outline SOT1134-2 (HXQFN60)

## 14. Abbreviations

Table 16. Abbreviations

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

## 15. Revision history

Table 17. Revision history

| Document ID     | Release date   | Data sheet status  | Change notice | Supersedes      |
|-----------------|--|--------------------|---------------|-----------------|
| 74AVC20T245 v.7 | 20120308   | Product data sheet | -             | 74AVC20T245 v.6 |
| Modifications:  | <ul style="list-style-type: none"> <li>For type number 74AVC20T245BX the sot code has changed to SOT1134-2.</li> </ul> |                    |               |                 |
| 74AVC20T245 v.6 | 20111207   | Product data sheet | -             | 74AVC20T245 v.5 |
| Modifications:  | <ul style="list-style-type: none"> <li>Legal pages updated.</li> </ul>   |                    |               |                 |
| 74AVC20T245 v.5 | 20110616   | Product data sheet | -             | 74AVC20T245 v.4 |
| 74AVC20T245 v.4 | 20101124   | Product data sheet | -             | 74AVC20T245 v.3 |
| 74AVC20T245 v.3 | 20100622   | Product data sheet | -             | 74AVC20T245 v.2 |
| 74AVC20T245 v.2 | 20100318   | Product data sheet | -             | 74AVC20T245 v.1 |
| 74AVC20T245 v.1 | 20100111   | Product data sheet | -             | -               |