

74AVCH20T245

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

Rev. 6 — 14 January 2019

Product data sheet

1. General description

The 74AVCH20T245 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{nOE}), two direction inputs (nDIR) and dual supplies ($V_{CC(A)}$ and $V_{CC(B)}$). $V_{CC(A)}$ and $V_{CC(B)}$ can be independently supplied at any voltage between 0.8 V and 3.6 V making the device suitable for 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{nOE} and nDIR are referenced to $V_{CC(A)}$, the 1Bn and 2Bn ports are referenced to $V_{CC(B)}$. 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{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, all output ports will assume a high impedance OFF-state. The bus hold circuitry on the powered-up side always stays active.

The 74AVCH20T245 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
 - $V_{CC(B)}$: 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-A114E Class 3B exceeds 8000 V
 - MM JESD22-A115-A exceeds 200 V
 - CDM JESD22-C101C exceeds 1000 V

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- Maximum data rates:
 - 380 Mbit/s (≥ 1.8 V to 3.3 V translation)
 - 260 Mbit/s (≥ 1.1 V to 3.3 V translation)
 - 260 Mbit/s (≥ 1.1 V to 2.5 V translation)
 - 210 Mbit/s (≥ 1.1 V to 1.8 V translation)
 - 120 Mbit/s (≥ 1.1 V to 1.5 V translation)
 - 100 Mbit/s (≥ 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
- 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 | |
| 74AVCH20T245DGG | -40 °C to +125 °C | TSSOP56 | plastic thin shrink small outline package; 56 leads; body width 6.1 mm | SOT364-1 |

4. Functional diagram

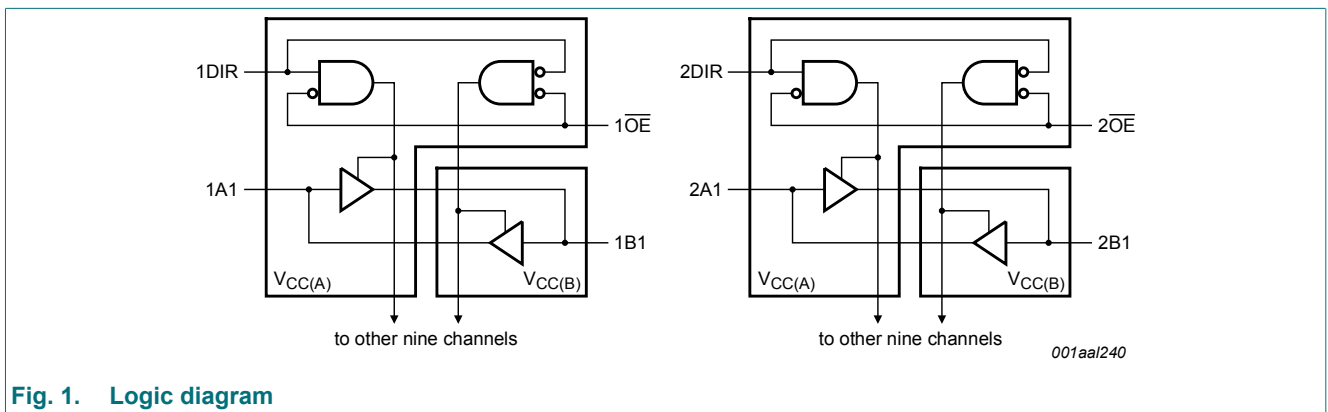


Fig. 1. Logic diagram

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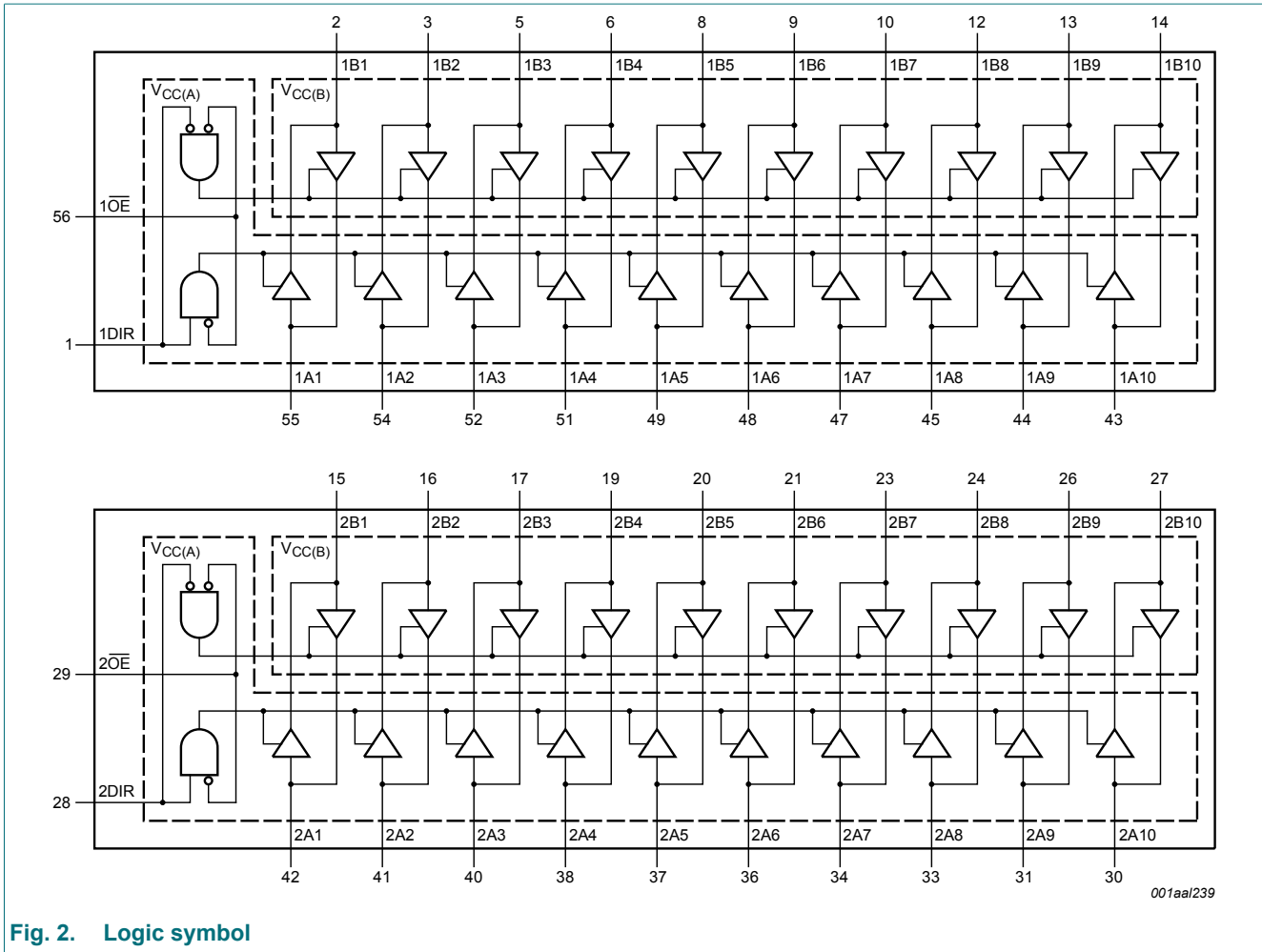


Fig. 2. Logic symbol

5. Pinning information

5.1. Pinning

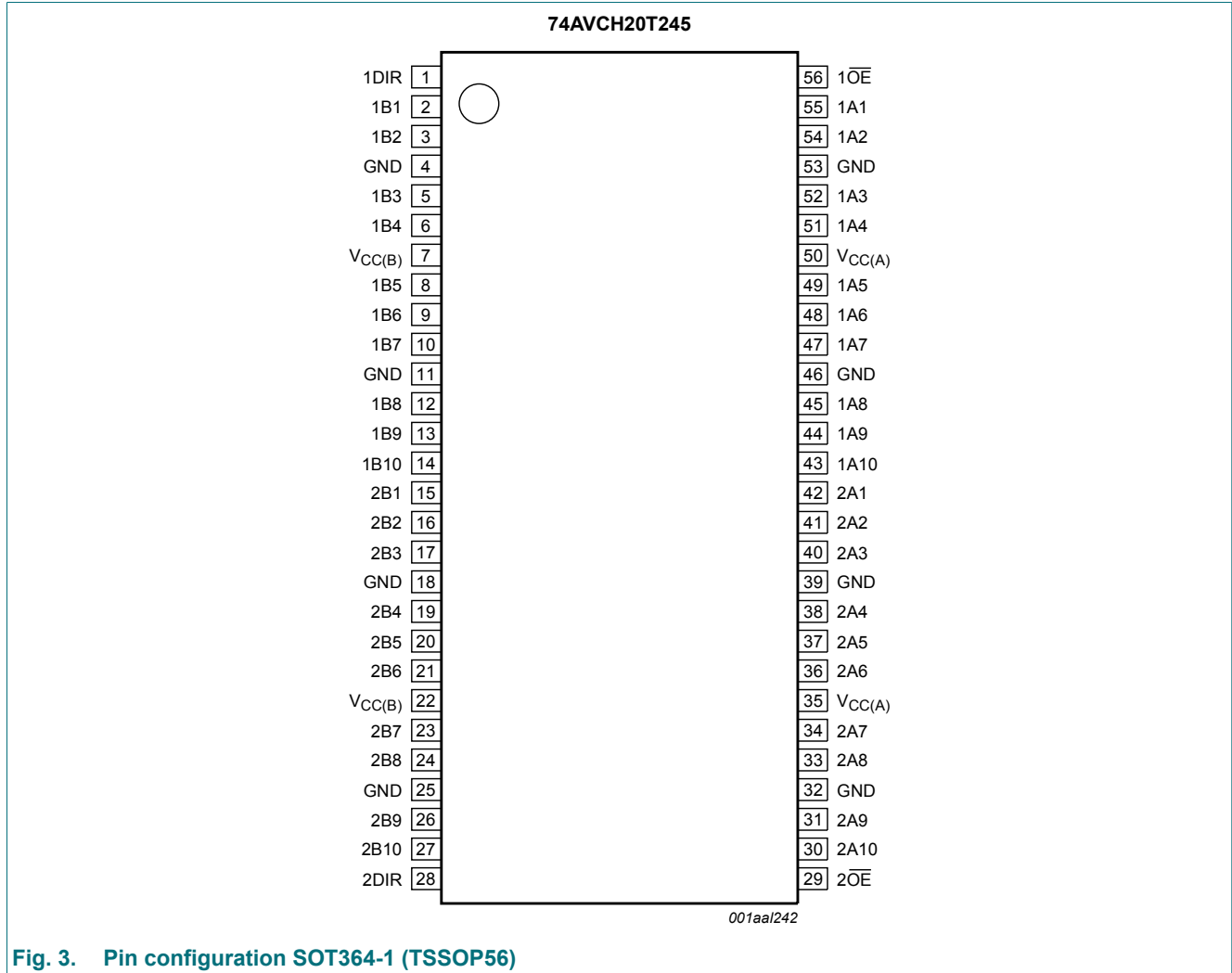


Fig. 3. Pin configuration SOT364-1 (TSSOP56)

5.2. Pin description

Table 2. Pin description

| Symbol | Pin | Description |
|---|---------------------------------------|--|
| 1DIR, 2DIR | 1, 28 | direction control |
| 1B1 to 1B10 | 2, 3, 5, 6, 8, 9, 10, 12, 13, 14 | data input or output |
| 2B1 to 2B10 | 15, 16, 17, 19, 20, 21, 23, 24,26, 27 | data input or output |
| GND[1] | 4, 11, 18, 25, 32, 39, 46, 53 | ground (0 V) |
| V _{CC(B)} | 7, 22 | supply voltage B (nBn inputs are referenced to V _{CC(B)}) |
| 1 $\overline{\text{OE}}$, 2 $\overline{\text{OE}}$ | 56, 29 | output enable input (active LOW) |
| 1A1 to 1A10 | 55, 54, 52, 51, 49, 48, 47, 45,44, 43 | data input or output |
| 2A1 to 2A10 | 42, 41, 40, 38, 37, 36, 34, 33,31, 30 | data input or output |
| V _{CC(A)} | 35, 50 | supply voltage A (nAn, n $\overline{\text{OE}}$ and nDIR inputs are referenced to V _{CC(A)}) |

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

6. Functional description

Table 3. Function table

[1]

| Supply voltage | Input | | Input/output [2] | |
|---|------------------------------|----------|------------------|-----------|
| | n $\overline{\text{OE}}$ [3] | nDIR [3] | nAn [3] | nBn [3] |
| V _{CC(A)} , V _{CC(B)} | | | | |
| 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 [2] | 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_{CC(A)} or V_{CC(B)} is at GND level, the device goes into suspend mode.

[3] The nAn, nDIR and n $\overline{\text{OE}}$ 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_{CCO} [2] | - | ± 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] | - | 600 | 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.

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 $T_{amb} = 25\text{ }^{\circ}\text{C}$

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

| 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 V ; $V_{CC(A)} = V_{CC(B)} = 0.8\text{ V}$ to 3.6 V | - | ± 0.025 | ± 0.25 | μA |
| I_{BHL} | bus hold LOW current | A or B port; $V_I = 0.42\text{ V}$; $V_{CC(A)} = V_{CC(B)} = 1.2\text{ V}$ [3] | - | 26 | - | μA |
| I_{BHH} | bus hold HIGH current | A or B port; $V_I = 0.78\text{ V}$; $V_{CC(A)} = V_{CC(B)} = 1.2\text{ V}$ [4] | - | -24 | - | μA |
| I_{BHLO} | bus hold LOW overdrive current | A or B port; $V_{CC(A)} = V_{CC(B)} = 1.2\text{ V}$ [5] | - | 27 | - | μA |
| I_{BHHO} | bus hold HIGH overdrive current | A or B port; $V_{CC(A)} = V_{CC(B)} = 1.2\text{ V}$ [6] | - | -26 | - | μA |
| I_{OZ} | OFF-state output current | A or B port; $V_O = 0\text{ V}$ or V_{CCO} ; $V_{CC(A)} = V_{CC(B)} = 3.6\text{ V}$ [7] | - | ± 0.5 | ± 2.5 | μA |
| | | suspend mode A port; $V_O = 0\text{ V}$ or V_{CCO} ; $V_{CC(A)} = 3.6\text{ V}$; $V_{CC(B)} = 0\text{ V}$ [7] | - | ± 0.5 | ± 2.5 | μA |
| | | suspend mode B port; $V_O = 0\text{ V}$ or V_{CCO} ; $V_{CC(A)} = 0\text{ V}$; $V_{CC(B)} = 3.6\text{ V}$ [7] | - | ± 0.5 | ± 2.5 | μA |
| I_{OFF} | power-off leakage current | A port; V_I or $V_O = 0\text{ V}$ to 3.6 V ; $V_{CC(A)} = 0\text{ V}$; $V_{CC(B)} = 0.8\text{ V}$ to 3.6 V | - | ± 0.1 | ± 1 | μA |
| | | B port; V_I or $V_O = 0\text{ V}$ to 3.6 V ; $V_{CC(B)} = 0\text{ V}$; $V_{CC(A)} = 0.8\text{ V}$ to 3.6 V | - | ± 0.1 | ± 1 | μA |
| C_I | input capacitance | nDIR, \overline{nOE} input; $V_I = 0\text{ V}$ or 3.3 V ; $V_{CC(A)} = V_{CC(B)} = 3.3\text{ V}$ | - | 2.0 | - | pF |
| $C_{I/O}$ | input/output capacitance | A and B port; $V_O = 3.3\text{ V}$ or 0 V ; $V_{CC(A)} = V_{CC(B)} = 3.3\text{ V}$ | - | 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] 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.

[4] 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.

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

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

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

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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 V | 0.70V _{CCI} | - | 0.70V _{CCI} | - | V |
| | | V _{CCI} = 1.1 V to 1.95 V | 0.65V _{CCI} | - | 0.65V _{CCI} | - | V |
| | | V _{CCI} = 2.3 V to 2.7 V | 1.6 | - | 1.6 | - | V |
| | | V _{CCI} = 3.0 V to 3.6 V | 2 | - | 2 | - | V |
| | | nDIR, nOE input | | | | | |
| | | V _{CC(A)} = 0.8 V | 0.70V _{CC(A)} | - | 0.70V _{CC(A)} | - | V |
| | | V _{CC(A)} = 1.1 V to 1.95 V | 0.65V _{CC(A)} | - | 0.65V _{CC(A)} | - | V |
| | | V _{CC(A)} = 2.3 V to 2.7 V | 1.6 | - | 1.6 | - | V |
| V _{CC(A)} = 3.0 V to 3.6 V | 2 | - | 2 | - | V | | |
| V _{IL} | LOW-level input voltage | data input | | | | | |
| | | V _{CCI} = 0.8 V | - | 0.30V _{CCI} | - | 0.30V _{CCI} | V |
| | | V _{CCI} = 1.1 V to 1.95 V | - | 0.35V _{CCI} | - | 0.35V _{CCI} | V |
| | | V _{CCI} = 2.3 V to 2.7 V | - | 0.7 | - | 0.7 | V |
| | | V _{CCI} = 3.0 V to 3.6 V | - | 0.8 | - | 0.8 | V |
| | | nDIR, nOE input | | | | | |
| | | V _{CC(A)} = 0.8 V | - | 0.30V _{CC(A)} | - | 0.30V _{CC(A)} | V |
| | | V _{CC(A)} = 1.1 V to 1.95 V | - | 0.35V _{CC(A)} | - | 0.35V _{CC(A)} | V |
| | | V _{CC(A)} = 2.3 V to 2.7 V | - | 0.7 | - | 0.7 | V |
| V _{CC(A)} = 3.0 V to 3.6 V | - | 0.8 | - | 0.8 | V | | |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | | |
| | | I _O = -100 μA; V _{CC(A)} = V _{CC(B)} = 0.8 V to 3.6 V | V _{CCO} - 0.1 | - | V _{CCO} - 0.1 | - | V |
| | | I _O = -3 mA; V _{CC(A)} = V _{CC(B)} = 1.1 V | 0.85 | - | 0.85 | - | V |
| | | I _O = -6 mA; V _{CC(A)} = V _{CC(B)} = 1.4 V | 1.05 | - | 1.05 | - | V |
| | | I _O = -8 mA; V _{CC(A)} = V _{CC(B)} = 1.65 V | 1.2 | - | 1.2 | - | V |
| | | I _O = -9 mA; V _{CC(A)} = V _{CC(B)} = 2.3 V | 1.75 | - | 1.75 | - | V |
| | | I _O = -12 mA; V _{CC(A)} = V _{CC(B)} = 3.0 V | 2.3 | - | 2.3 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | | |
| | | I _O = 100 μA; V _{CC(A)} = V _{CC(B)} = 0.8 V to 3.6 V | - | 0.1 | - | 0.1 | V |
| | | I _O = 3 mA; V _{CC(A)} = V _{CC(B)} = 1.1 V | - | 0.25 | - | 0.25 | V |
| | | I _O = 6 mA; V _{CC(A)} = V _{CC(B)} = 1.4 V | - | 0.35 | - | 0.35 | V |
| | | I _O = 8 mA; V _{CC(A)} = V _{CC(B)} = 1.65 V | - | 0.45 | - | 0.45 | V |
| | | I _O = 9 mA; V _{CC(A)} = V _{CC(B)} = 2.3 V | - | 0.55 | - | 0.55 | V |
| | | I _O = 12 mA; V _{CC(A)} = V _{CC(B)} = 3.0 V | - | 0.7 | - | 0.7 | V |
| I _I | input leakage current | nDIR, nOE input; V _I = 0 V or 3.6 V; V _{CC(A)} = V _{CC(B)} = 0.8 V to 3.6 V | - | ±1 | - | ±5 | μA |

20-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 _{BHL} | bus hold LOW current | A or B port [3] | | | | | |
| | | $V_I = 0.49 \text{ V}; V_{CC(A)} = V_{CC(B)} = 1.4 \text{ V}$ | 15 | - | 15 | - | μA |
| | | $V_I = 0.58 \text{ V}; V_{CC(A)} = V_{CC(B)} = 1.65 \text{ V}$ | 25 | - | 25 | - | μA |
| | | $V_I = 0.70 \text{ V}; V_{CC(A)} = V_{CC(B)} = 2.3 \text{ V}$ | 45 | - | 45 | - | μA |
| | | $V_I = 0.80 \text{ V}; V_{CC(A)} = V_{CC(B)} = 3.0 \text{ V}$ | 100 | - | 90 | - | μA |
| I _{BHH} | bus hold HIGH current | A or B port [4] | | | | | |
| | | $V_I = 0.91 \text{ V}; V_{CC(A)} = V_{CC(B)} = 1.4 \text{ V}$ | -15 | - | -15 | - | μA |
| | | $V_I = 1.07 \text{ V}; V_{CC(A)} = V_{CC(B)} = 1.65 \text{ V}$ | -25 | - | -25 | - | μA |
| | | $V_I = 1.60 \text{ V}; V_{CC(A)} = V_{CC(B)} = 2.3 \text{ V}$ | -45 | - | -45 | - | μA |
| | | $V_I = 2.00 \text{ V}; V_{CC(A)} = V_{CC(B)} = 3.0 \text{ V}$ | -100 | - | -100 | - | μA |
| I _{BHLO} | bus hold LOW overdrive current | A or B port [5] | | | | | |
| | | $V_{CC(A)} = V_{CC(B)} = 1.6 \text{ V}$ | 125 | - | 125 | - | μA |
| | | $V_{CC(A)} = V_{CC(B)} = 1.95 \text{ V}$ | 200 | - | 200 | - | μA |
| | | $V_{CC(A)} = V_{CC(B)} = 2.7 \text{ V}$ | 300 | - | 300 | - | μA |
| | | $V_{CC(A)} = V_{CC(B)} = 3.6 \text{ V}$ | 500 | - | 500 | - | μA |
| I _{BHHO} | bus hold HIGH overdrive current | A or B port [6] | | | | | |
| | | $V_{CC(A)} = V_{CC(B)} = 1.6 \text{ V}$ | -125 | - | -125 | - | μA |
| | | $V_{CC(A)} = V_{CC(B)} = 1.95 \text{ V}$ | -200 | - | -200 | - | μA |
| | | $V_{CC(A)} = V_{CC(B)} = 2.7 \text{ V}$ | -300 | - | -300 | - | μA |
| | | $V_{CC(A)} = V_{CC(B)} = 3.6 \text{ V}$ | -500 | - | -500 | - | μA |
| I _{OZ} | OFF-state output current | A or B port; $V_O = 0 \text{ V}$ or V_{CCO} ; $V_{CC(A)} = V_{CC(B)} = 3.6 \text{ V}$ [7] | - | ±5 | - | ±30 | μA |
| | | suspend mode A port; $V_O = 0 \text{ V}$ or V_{CCO} ; $V_{CC(A)} = 3.6 \text{ V}$; $V_{CC(B)} = 0 \text{ V}$ [7] | - | ±5 | - | ±30 | μA |
| | | suspend mode B port; $V_O = 0 \text{ V}$ or V_{CCO} ; $V_{CC(A)} = 0 \text{ V}$; $V_{CC(B)} = 3.6 \text{ V}$ [7] | - | ±5 | - | ±30 | μA |
| I _{OFF} | power-off leakage current | A port; V_I or $V_O = 0 \text{ V}$ to 3.6 V ; $V_{CC(A)} = 0 \text{ V}$; $V_{CC(B)} = 0.8 \text{ V}$ to 3.6 V | - | ±5 | - | ±30 | μA |
| | | B port; V_I or $V_O = 0 \text{ V}$ to 3.6 V ; $V_{CC(B)} = 0 \text{ V}$; $V_{CC(A)} = 0.8 \text{ V}$ to 3.6 V | - | ±5 | - | ±30 | μA |

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| Symbol | Parameter | Conditions | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|-----------------|----------------|--|------------------|-----|-------------------|-----|------|
| | | | Min | Max | Min | Max | |
| I _{CC} | supply current | A port; V _I = 0 V or V _{CCI} ; I _O = 0 A | | | | | |
| | | V _{CC(A)} = 0.8 V to 3.6 V; V _{CC(B)} = 0.8 V to 3.6 V | - | 45 | - | 190 | μA |
| | | V _{CC(A)} = 1.1 V to 3.6 V; V _{CC(B)} = 1.1 V to 3.6 V | - | 35 | - | 140 | μA |
| | | V _{CC(A)} = 3.6 V; V _{CC(B)} = 0 V | - | 35 | - | 140 | μA |
| | | V _{CC(A)} = 0 V; V _{CC(B)} = 3.6 V | -5 | - | -20 | - | μA |
| | | B port; V _I = 0 V or V _{CCI} ; I _O = 0 A | | | | | |
| | | V _{CC(A)} = 0.8 V to 3.6 V; V _{CC(B)} = 0.8 V to 3.6 V | - | 45 | - | 190 | μA |
| | | V _{CC(A)} = 1.1 V to 3.6 V; V _{CC(B)} = 1.1 V to 3.6 V | - | 35 | - | 140 | μA |
| | | V _{CC(A)} = 3.6 V; V _{CC(B)} = 0 V | -5 | - | -20 | - | μA |
| | | V _{CC(A)} = 0 V; V _{CC(B)} = 3.6 V | - | 35 | - | 140 | μA |
| | | A plus B port (I _{CC(A)} + I _{CC(B)}); I _O = 0 A; V _I = 0 V or V _{CCI} ; V _{CC(A)} = 0.8 V to 3.6 V; V _{CC(B)} = 0.8 V to 3.6 V | - | 80 | - | 270 | μA |
| | | A plus B port (I _{CC(A)} + I _{CC(B)}); I _O = 0 A; V _I = 0 V or V _{CCI} ; V _{CC(A)} = 1.1 V to 3.6 V; V _{CC(B)} = 1.1 V to 3.6 V | - | 65 | - | 220 | μA |

- [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] 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.
- [4] 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.
- [5] An external driver must source at least I_{BHLO} to switch this node from LOW to HIGH.
- [6] An external driver must sink at least I_{BHHO} to switch this node from HIGH to LOW.
- [7] For I/O ports, the parameter I_{OZ} includes the input leakage current.

Table 8. Typical total supply current (I_{CC(A)} + I_{CC(B)})

| V _{CC(A)} | V _{CC(B)} | | | | | | | 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 $T_{amb} = 25\text{ °C}$

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 A to B); output enabled | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | pF |
| | | A port: (direction A to B); output disabled | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | pF |
| | | A port: (direction B to A); output enabled | 9.5 | 9.7 | 9.8 | 9.9 | 10.7 | 11.9 | pF |
| | | A port: (direction B to A); output disabled | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | pF |
| | | B port: (direction A to B); output enabled | 9.5 | 9.7 | 9.8 | 9.9 | 10.7 | 11.9 | pF |
| | | B port: (direction A to B); output disabled | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | pF |
| | | B port: (direction B to A); output enabled | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | pF |
| | | B port: (direction B to A); 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 μW).

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

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 Fig. 6; for wave forms 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 | \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 Fig. 6; for wave forms 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 | \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} .

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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 wave forms see Fig. 4 and Fig. 5. [1]

| Symbol | Parameter | Conditions | $V_{CC(B)}$ | | | | | | | | | | 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 | |
| $V_{CC(A)} = 1.1 \text{ V to } 1.3 \text{ V}$ | | | | | | | | | | | | | |
| t_{pd} | 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_{dis} | disable time | \overline{nOE} to nAn | 2.0 | 11.9 | 2.0 | 11.9 | 2.0 | 11.9 | 2.0 | 11.9 | 2.0 | 11.9 | ns |
| | | \overline{nOE} to nBn | 1.5 | 12.7 | 1.5 | 9.8 | 1.5 | 9.6 | 1.0 | 8.1 | 1.0 | 9.0 | ns |
| t_{en} | enable time | \overline{nOE} to nAn | 1.5 | 15.3 | 1.5 | 15.3 | 1.5 | 15.3 | 1.5 | 15.3 | 1.5 | 15.3 | ns |
| | | \overline{nOE} to nBn | 1.0 | 15.6 | 1.0 | 11.5 | 1.0 | 10.0 | 0.5 | 8.4 | 0.5 | 8.0 | ns |
| $V_{CC(A)} = 1.4 \text{ V to } 1.6 \text{ V}$ | | | | | | | | | | | | | |
| t_{pd} | 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_{dis} | disable time | \overline{nOE} to nAn | 2.0 | 9.0 | 2.0 | 9.0 | 2.0 | 9.0 | 2.0 | 9.0 | 2.0 | 9.0 | ns |
| | | \overline{nOE} to nBn | 1.5 | 11.7 | 1.5 | 9.0 | 1.5 | 7.8 | 1.0 | 6.4 | 1.0 | 6.0 | ns |
| t_{en} | enable time | \overline{nOE} to nAn | 1.5 | 10.3 | 1.5 | 10.3 | 1.5 | 10.3 | 1.5 | 10.2 | 1.5 | 10.2 | ns |
| | | \overline{nOE} to nBn | 1.0 | 14.3 | 1.0 | 10.3 | 1.0 | 8.4 | 0.5 | 6.1 | 0.5 | 5.3 | ns |
| $V_{CC(A)} = 1.65 \text{ V to } 1.95 \text{ V}$ | | | | | | | | | | | | | |
| t_{pd} | 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_{dis} | disable time | \overline{nOE} to nAn | 2.0 | 7.4 | 2.0 | 7.4 | 2.0 | 7.4 | 2.0 | 7.4 | 2.0 | 7.4 | ns |
| | | \overline{nOE} to nBn | 1.5 | 11.3 | 1.5 | 8.7 | 1.5 | 7.4 | 1.0 | 5.8 | 1.0 | 5.6 | ns |
| t_{en} | enable time | \overline{nOE} to nAn | 1.0 | 8.1 | 1.0 | 8.1 | 1.0 | 7.9 | 1.0 | 7.9 | 1.0 | 7.9 | ns |
| | | \overline{nOE} to nBn | 0.5 | 13.8 | 0.5 | 10.0 | 0.5 | 7.9 | 0.5 | 5.7 | 0.5 | 4.8 | ns |
| $V_{CC(A)} = 2.3 \text{ V to } 2.7 \text{ V}$ | | | | | | | | | | | | | |
| t_{pd} | 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_{dis} | disable time | \overline{nOE} to nAn | 1.1 | 5.2 | 1.1 | 5.2 | 1.1 | 5.2 | 1.1 | 5.2 | 1.1 | 5.2 | ns |
| | | \overline{nOE} to nBn | 1.2 | 10.8 | 1.2 | 8.2 | 1.2 | 6.9 | 1.0 | 5.3 | 1.0 | 5.2 | ns |
| t_{en} | enable time | \overline{nOE} to nAn | 0.5 | 5.4 | 0.5 | 5.4 | 0.5 | 5.3 | 0.5 | 5.2 | 0.5 | 5.2 | ns |
| | | \overline{nOE} to nBn | 0.5 | 13.3 | 0.5 | 9.6 | 0.5 | 7.6 | 0.5 | 5.3 | 0.5 | 4.3 | ns |
| $V_{CC(A)} = 3.0 \text{ V to } 3.6 \text{ V}$ | | | | | | | | | | | | | |
| t_{pd} | 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_{dis} | disable time | \overline{nOE} to nAn | 0.8 | 5.0 | 0.8 | 5.0 | 0.8 | 5.0 | 0.8 | 5.0 | 0.8 | 5.0 | ns |
| | | \overline{nOE} to nBn | 1.2 | 10.5 | 1.2 | 8.1 | 1.2 | 6.7 | 1.0 | 5.1 | 0.8 | 5.0 | ns |
| t_{en} | enable time | \overline{nOE} to nAn | 0.5 | 4.4 | 0.5 | 4.4 | 0.5 | 4.3 | 0.5 | 4.2 | 0.5 | 4.1 | ns |
| | | \overline{nOE} 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_{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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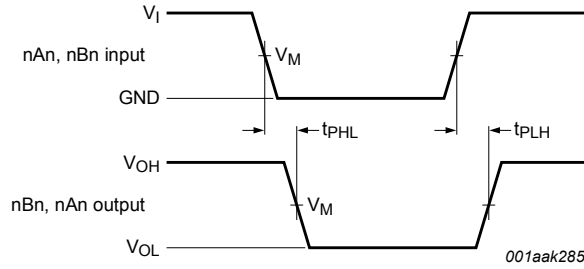
Table 13. Dynamic characteristics for temperature range -40 °C to +125 °C

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

| Symbol | Parameter | Conditions | V _{CC(B)} | | | | | | | | | | 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_{CC(A)} = 1.1 V to 1.3 V | | | | | | | | | | | | | |
| t _{pd} | 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 _{dis} | 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 _{en} | 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 |
| V_{CC(A)} = 1.4 V to 1.6 V | | | | | | | | | | | | | |
| t _{pd} | 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 _{dis} | 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 _{en} | 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 |
| V_{CC(A)} = 1.65 V to 1.95 V | | | | | | | | | | | | | |
| t _{pd} | 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 _{dis} | 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 _{en} | 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 |
| V_{CC(A)} = 2.3 V to 2.7 V | | | | | | | | | | | | | |
| t _{pd} | 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 _{dis} | 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 _{en} | 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 |
| V_{CC(A)} = 3.0 V to 3.6 V | | | | | | | | | | | | | |
| t _{pd} | 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 _{dis} | 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 _{en} | 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_{pd} is the same as t_{PLH} and t_{PHL}; t_{dis} is the same as t_{PLZ} and t_{PZH}; t_{en} is the same as t_{PZL} and t_{PZH}.

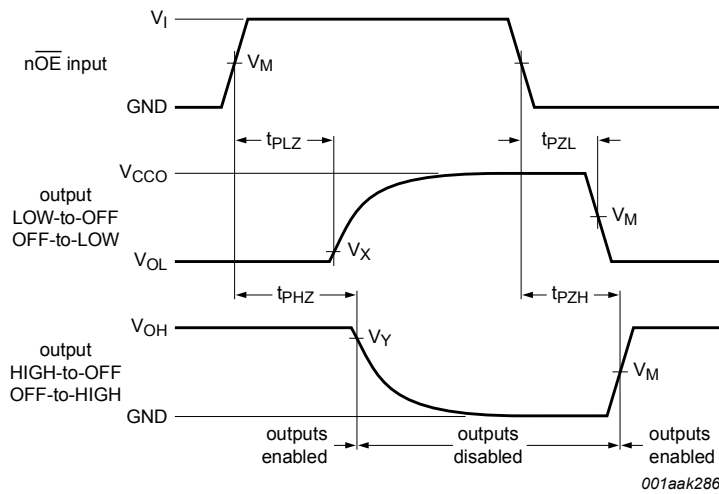
10.1. Waveforms and test circuit



Measurement points are given in [Table 14](#).

V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig. 4. The data input (nAn, nBn) to output (nBn, nAn) propagation delay times



Measurement points are given in [Table 14](#).

V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig. 5. Enable and disable times

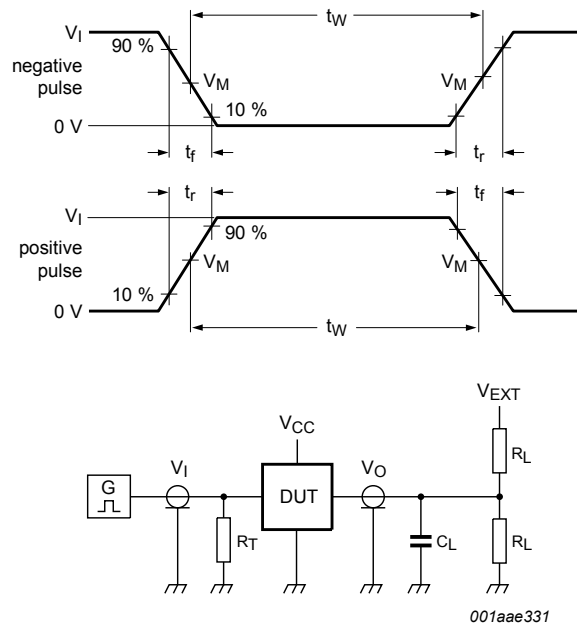
Table 14. Measurement points

| 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 | $0.5V_{CCI}$ | $0.5V_{CC0}$ | $V_{OL} + 0.1 V$ | $V_{OH} - 0.1 V$ |
| 1.65 V to 2.7 V | $0.5V_{CCI}$ | $0.5V_{CC0}$ | $V_{OL} + 0.15 V$ | $V_{OH} - 0.15 V$ |
| 3.0 V to 3.6 V | $0.5V_{CCI}$ | $0.5V_{CC0}$ | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |

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

[2] V_{CC0} is the supply voltage associated with the output port.

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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. 6. Test circuit for measuring switching times

Table 15. Test data

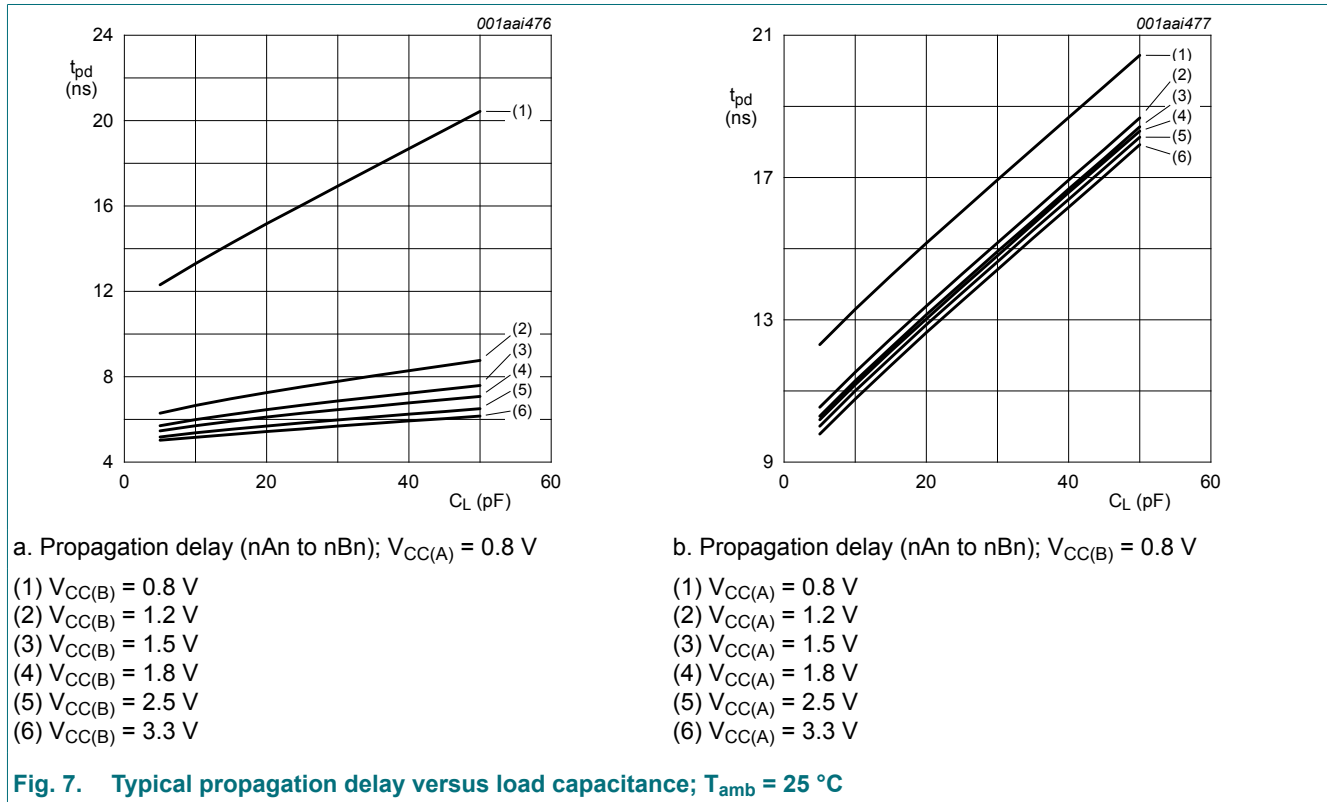
| Supply voltage | Input | | Load | | V_{EXT} | | |
|------------------------|-----------|-------------------------|-------|--------------|--------------------|--------------------|------------------------|
| $V_{CC(A)}, V_{CC(B)}$ | V_I [1] | $\Delta t/\Delta V$ [2] | C_L | R_L | t_{PLH}, t_{PHL} |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

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

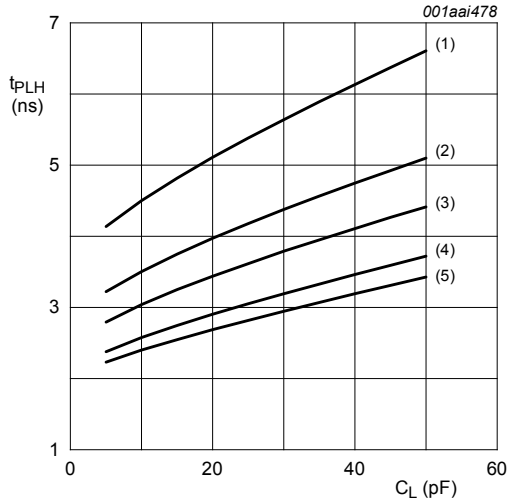
[2] $dV/dt \geq 1.0$ V/ns

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

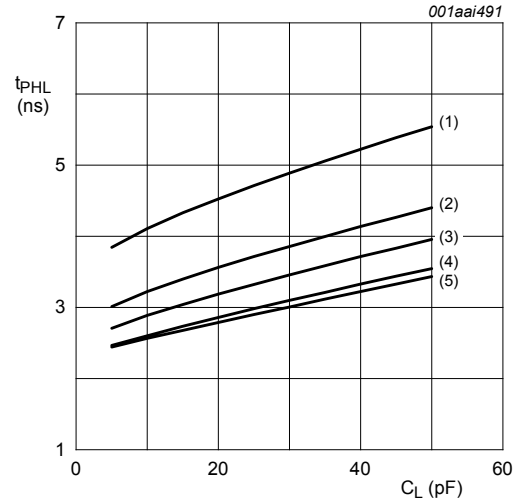
11. Typical propagation delay characteristics



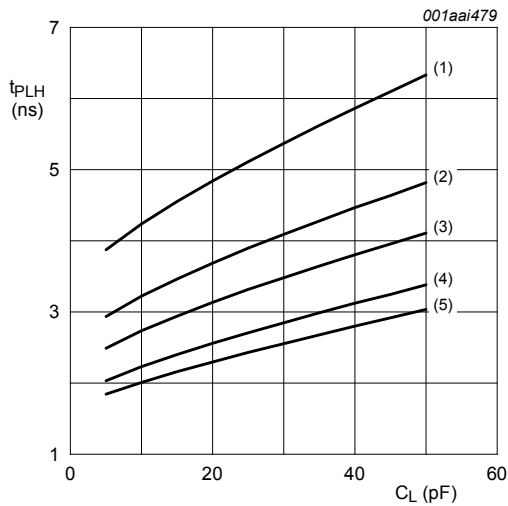
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a. LOW to HIGH propagation delay (nAn to nBn);
 $V_{CC(A)} = 1.2\text{ V}$

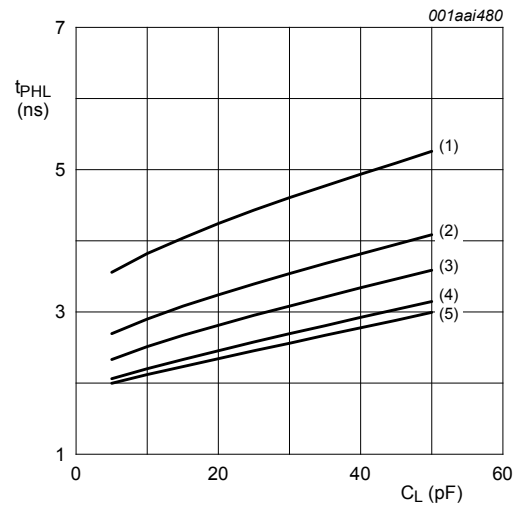


b. HIGH to LOW propagation delay (nAn to nBn);
 $V_{CC(A)} = 1.2\text{ V}$



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

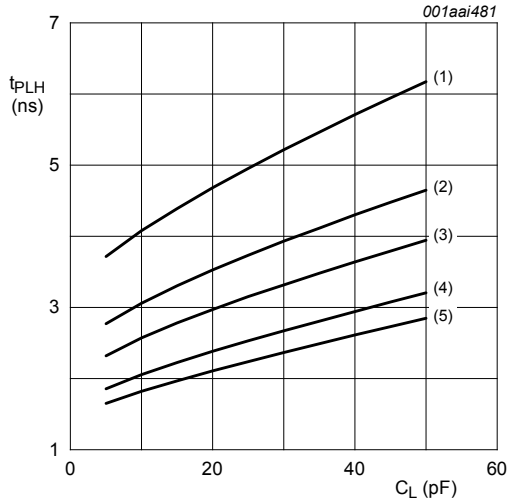
- (1) $V_{CC(B)} = 1.2\text{ V}$
- (2) $V_{CC(B)} = 1.5\text{ V}$
- (3) $V_{CC(B)} = 1.8\text{ V}$
- (4) $V_{CC(B)} = 2.5\text{ V}$
- (5) $V_{CC(B)} = 3.3\text{ V}$



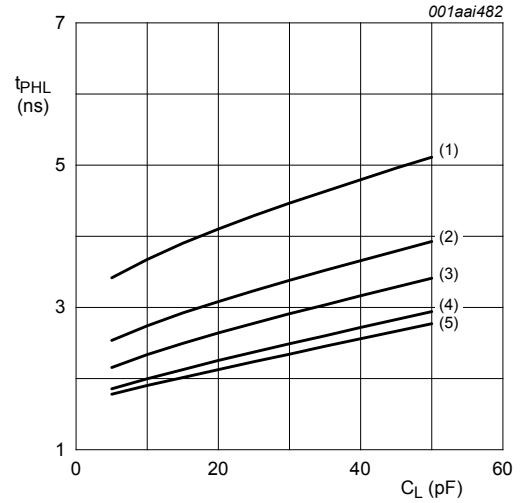
d. HIGH to LOW propagation delay (nAn to nBn);
 $V_{CC(A)} = 1.5\text{ V}$

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

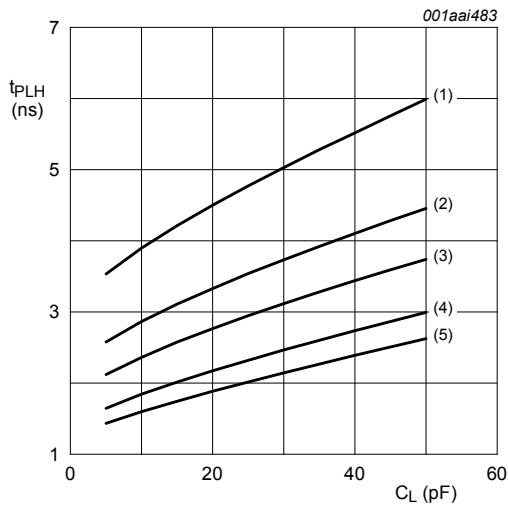
20-bit dual supply translating transceiver with configurable voltage translation; 3-state



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

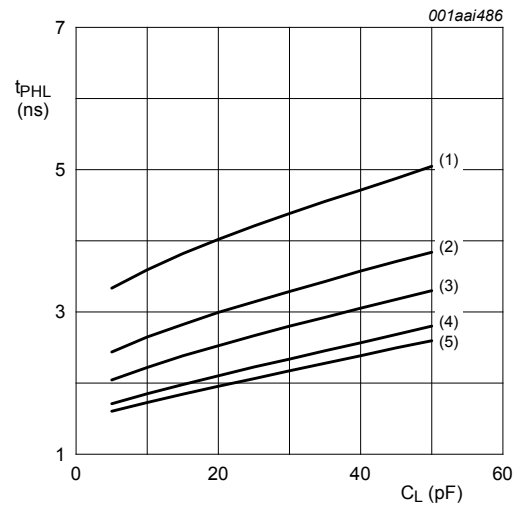


b. HIGH to LOW propagation delay (nAn to nBn); $V_{CC(A)} = 1.8\text{ V}$



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

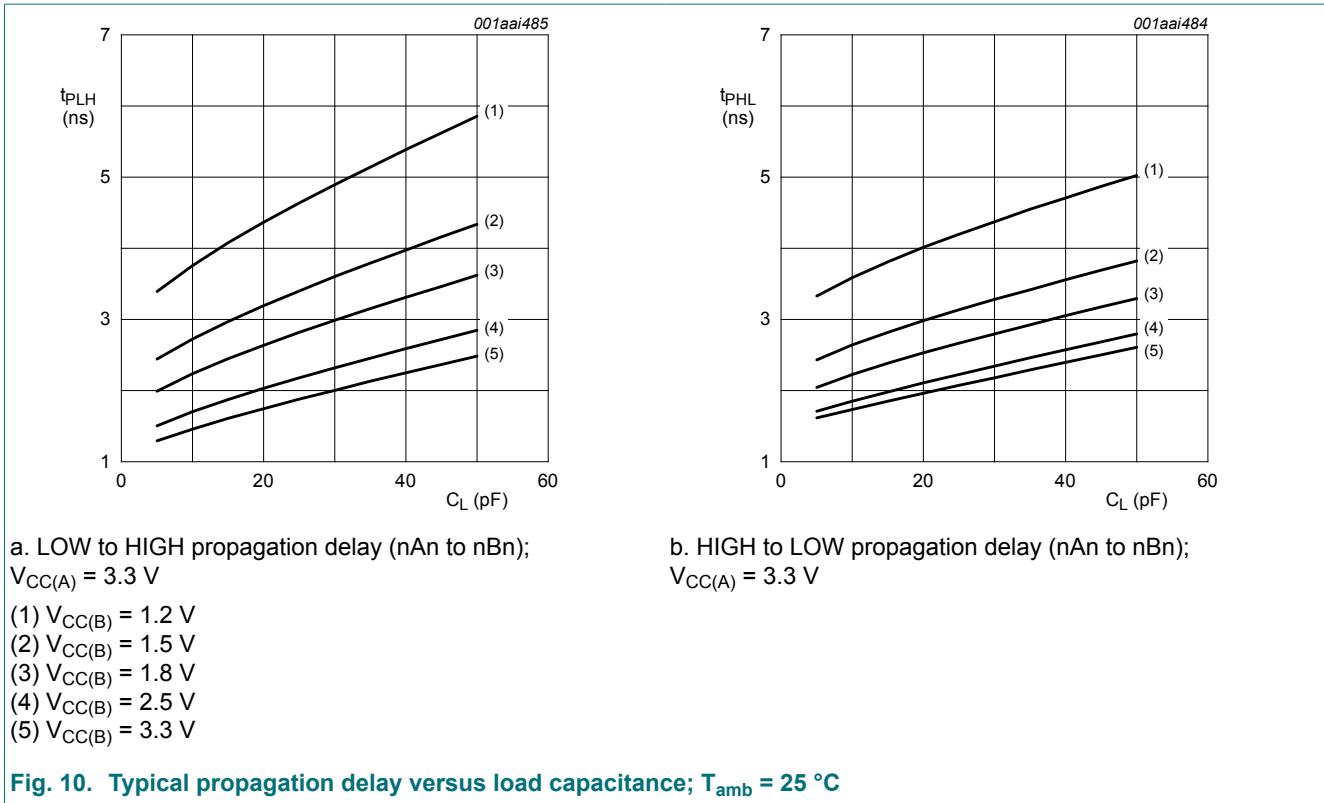
- (1) $V_{CC(B)} = 1.2\text{ V}$
- (2) $V_{CC(B)} = 1.5\text{ V}$
- (3) $V_{CC(B)} = 1.8\text{ V}$
- (4) $V_{CC(B)} = 2.5\text{ V}$
- (5) $V_{CC(B)} = 3.3\text{ V}$



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

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

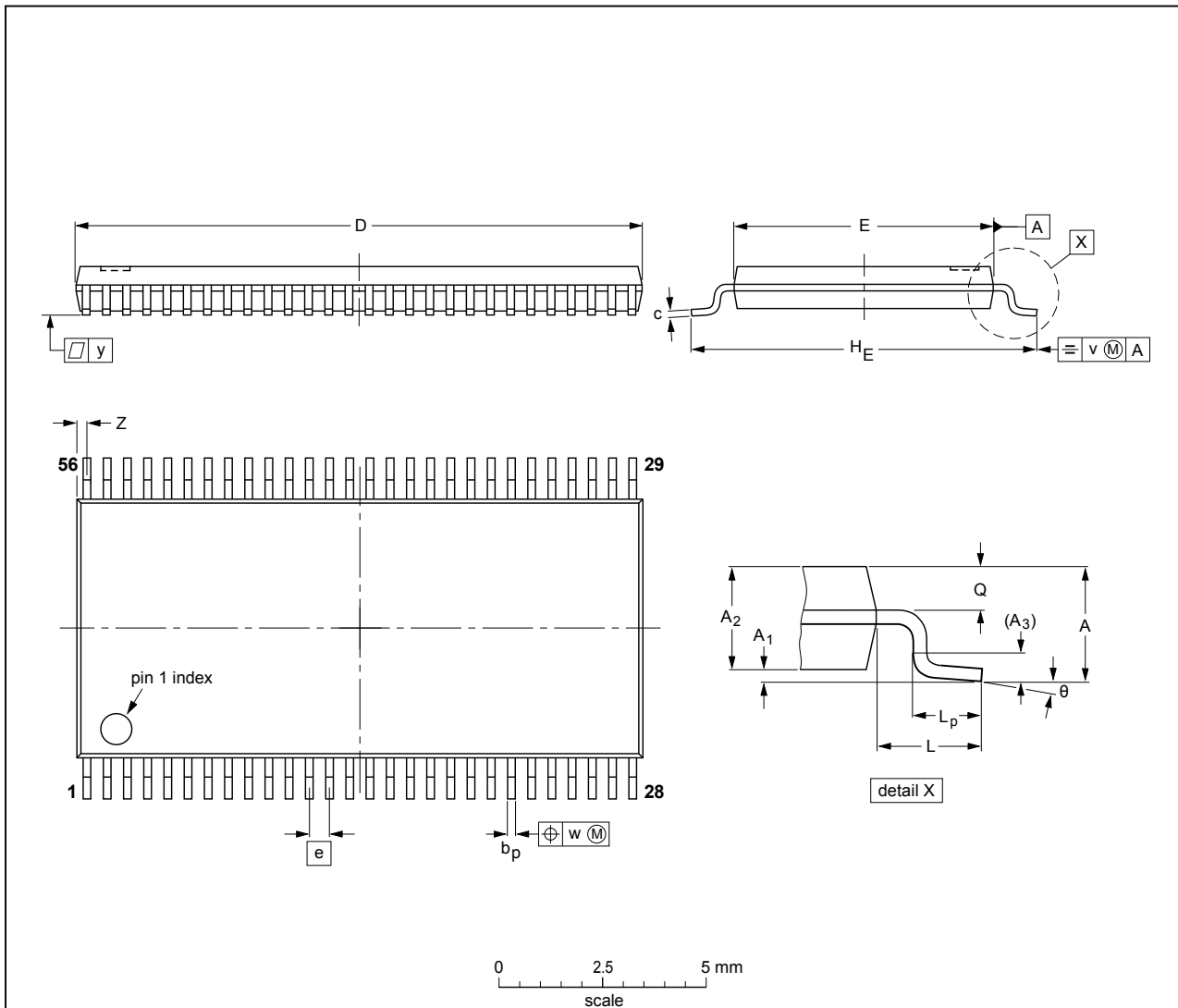
20-bit dual supply translating transceiver with configurable voltage translation; 3-state



12. Package outline

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

SOT364-1



DIMENSIONS (mm are the original dimensions).

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽²⁾ | e | H _E | L | L _p | Q | v | w | y | Z | θ |
|------|--------|----------------|----------------|----------------|----------------|------------|------------------|------------------|-----|----------------|---|----------------|--------------|------|------|-----|------------|----------|
| mm | 1.2 | 0.15 0.05 | 1.05 0.85 | 0.25 | 0.28 0.17 | 0.2 0.1 | 14.1 13.9 | 6.2 6.0 | 0.5 | 8.3 7.9 | 1 | 0.8 0.4 | 0.50 0.35 | 0.25 | 0.08 | 0.1 | 0.5 0.1 | 8° 0° |

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|--|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT364-1 | | MO-153 | | | | 99-12-27 03-02-19 |

Fig. 11. Package outline SOT364-1 (TSSOP56)

13. Abbreviations

Table 16. Abbreviations

| Acronym | Description |
|---------|---|
| CDM | Charged Device Model |
| CMOS | Complementary Metal Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| MM | Machine Model |

14. Revision history

Table 17. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|---|--------------------|---------------|------------------|
| 74AVCH20T245 v.6 | 20190114 | Product data sheet | - | 74AVCH20T245 v.5 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Type numbers 74AVCH20T245DGV and 74AVCH20T245BX removed. | | | |
| 74AVCH20T245 v.5 | 20160223 | Product data sheet | - | 74AVCH20T245 v.4 |
| Modifications: | <ul style="list-style-type: none"> General description updated. | | | |
| 74AVCH20T245 v.4 | 20111214 | Product data sheet | - | 74AVCH20T245 v.3 |
| Modifications: | <ul style="list-style-type: none"> Legal pages updated. | | | |
| 74AVCH20T245 v.3 | 20110623 | Product data sheet | - | 74AVCH20T245 v.2 |
| 74AVCH20T245 v.2 | 20100315 | Product data sheet | - | 74AVCH20T245 v.1 |
| 74AVCH20T245 v.1 | 20100113 | Product data sheet | - | - |

15. Legal information

Data sheet status

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

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

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