# AiP74AVC4T245

# 4-bit Dual Supply Translating Transceiver; 3-state

# Product Specification

**Specification Revision History:**

| Version | Date | Description |
|---|---|---|
| 2019-10-A1 | 2019-10 | New |
| | | |
| | | |
| | | |

# Contents

## 1、General Description

The AiP74AVC4T245 is an 4-bit, dual supply transceiver that enables bidirectional level translation. The device can be used as two 2-bit transceivers or as a 4-bit transceiver. It features four 2-bit input-output ports (nAn and nBn), a direction control input (nDIR), a output enable input ($n\overline{OE}$) and dual supply pins ($V_{CC(A)}$ and $V_{CC(B)}$). Both $V_{CC(A)}$ and $V_{CC(B)}$ can be supplied at any voltage between 0.8V and 3.6V making the device suitable for translating between any of the low voltage nodes (0.8V, 1.2V, 1.5V, 1.8V, 2.5V and 3.3V). Pins nAn, $n\overline{OE}$ and nDIR are referenced to $V_{CC(A)}$ and pins nBn are referenced to $V_{CC(B)}$. A HIGH on nDIR allows transmission from nAn to nBn and a LOW on nDIR allows transmission from nBn to nAn. The output enable input ($n\overline{OE}$) can be used to disable the outputs so the buses are effectively isolated.

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

**Features:**

- Wide supply voltage range:
  $V_{CC(A)}$: 0.8V to 3.6V
  $V_{CC(B)}$: 0.8V to 3.6V
- Suspend mode
- Inputs accept voltages up to 3.6V
- $I_{OFF}$ circuitry provides partial Power-down mode operation
- Specified from -40℃ to +105℃
- Packaging information: SOP16/TSSOP16/DHVQFN16

**Ordering Information:**

**Tube packing specifications:**

| Type number | Packaging form | Marking code | Tube quantity | Boxed tube quantity | Boxed quantity | Notes |
|---|---|---|---|---|---|---|
| AiP74AVC4T245SA16.TB | SOP16 | 74AVC4T245 | 50 PCS/tube | 200 tube/box | 10000 PCS/box | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing: 1.27mm |
| AiP74AVC4T245TA16.TB | TSSOP16 | 74AVC4T245 | 96 PCS/tube | 200 tube/box | 19200 PCS/box | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing: 0.65mm |

**Reel packing specifications:**

| Type number | Packaging form | Marking code | Reel quantity | Boxed reel quantity | Notes |
|---|---|---|---|---|---|
| AiP74AVC4T245SA16.TR | SOP16 | 74AVC4T245 | 4000 PCS/reel | 8000 PCS/box | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing: 1.27mm |
| AiP74AVC4T245TA16.TR | TSSOP16 | 74AVC4T245 | 5000 PCS/reel | 10000 PCS/box | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing: 0.65mm |
| AiP74AVC4T245QE16.TR | DHVQFN16 | 74AVC4T245 | 3000 PCS/reel | 3000 PCS/box | Dimensions of plastic enclosure:<br>2.5mm×3.5mm<br>Pin spacing:0.5mm |

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

## 2、Block Diagram And Pin Description

### 2.1、Block Diagram

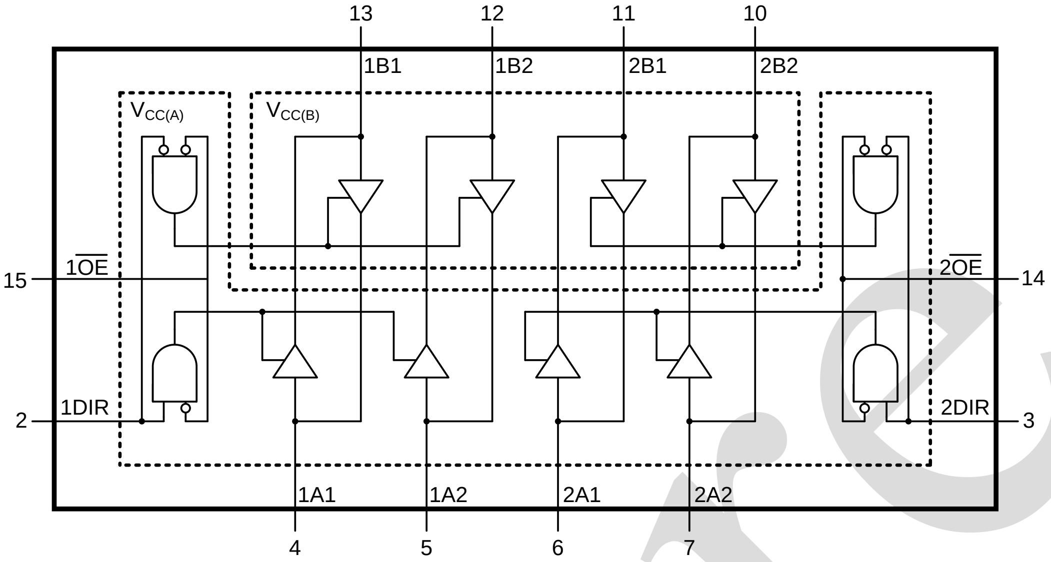


Figure 1. Logic symbol

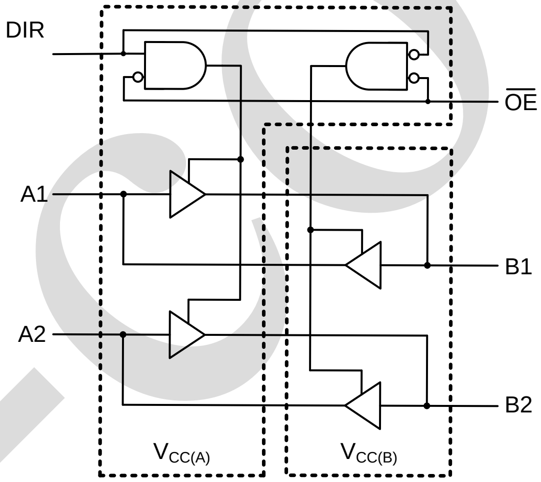
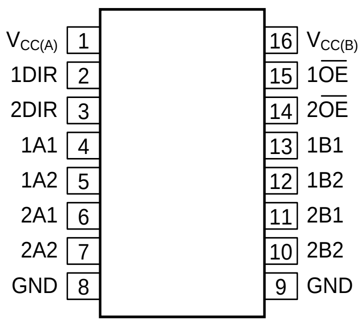
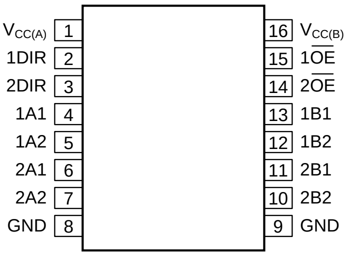


Figure 2. Logic diagram (one 2-bit transceiver)

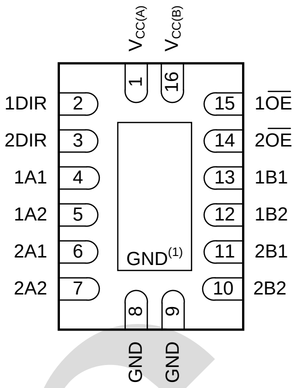
## 2.2、Pin Configurations



**SOP16**



**TSSOP16**



**DHVQFN16**

Note: (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.

## 2.3、Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | $V_{CC(A)}$ | supply voltage A (nAn, n$\overline{OE}$ and nDIR inputs are referenced to $V_{CC(A)}$) |
| 2 | 1DIR | direction control |
| 3 | 2DIR | direction control |
| 4 | 1A1 | data input or output |
| 5 | 1A2 | data input or output |
| 6 | 2A1 | data input or output |
| 7 | 2A2 | data input or output |
| 8 | GND | ground (0V) |
| 9 | GND | ground (0V) |
| 10 | 2B2 | data input or output |
| 11 | 2B1 | data input or output |
| 12 | 1B2 | data input or output |
| 13 | 1B1 | data input or output |
| 14 | 2$\overline{OE}$ | output enable input (active LOW) |
| 15 | 1$\overline{OE}$ | output enable input (active LOW) |
| 16 | $V_{CC(B)}$ | supply voltage B (nBn inputs are referenced to $V_{CC(B)}$) |

### 2.4、Function Table

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

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

Note:

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

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

## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

($T_{amb}$=25℃, All voltage referenced to GND, unless otherwise specified)

| **Characteristic** | **Symbol** | **Conditions** | **Min.** | **Max.** | **Unit** |
|---|---|---|---|---|---|
| supply voltage A | $V_{CC(A)}$ | - | -0.5 | +4.6 | V |
| supply voltage B | $V_{CC(B)}$ | - | -0.5 | +4.6 | V |
| input clamping current | $I_{IK}$ | $V_I$<0V | -50 | - | mA |
| input voltage | $V_I$ | - | -0.5 | +4.6 | V |
| output clamping current | $I_{OK}$ | $V_O$<0V | -50 | - | mA |
| output voltage | $V_O$ | Active mode[1][2][3] | -0.5 | $V_{CCO}$+0.5 | V |
| | | Suspend or 3-state mode[1] | -0.5 | +4.6 | V |
| output current | $I_O$ | $V_O$=0V to $V_{CCO}$[2] | - | ±50 | mA |
| supply current | $I_{CC}$ | per $V_{CC(A)}$ or $V_{CC(B)}$ pin | - | 100 | mA |
| ground current | $I_{GND}$ | per GND pin | -100 | - | mA |
| storage temperature | $T_{stg}$ | - | -65 | +150 | ℃ |
| total power dissipation | $P_{tot}$ | -[4] | - | 500 | mW |
| soldering temperature | $T_L$ | 10s DIP | 245 | | ℃ |
| | | SOP | 250 | | ℃ |

Note:

[1] The minimum input voltage ratings and output voltage ratings may be exceeded if the input and output current ratings are observed.

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

[3] $V_{CCO}$+0.5V should not exceed 4.6V.

[4] For SO16 package: above 70℃ derates linearly with 8mW/K.
For TSSOP16 package: above 60℃ the value of $P_{tot}$ derates linearly at 5.5mW/K.
For DHVQFN16 package: above 60℃ the value of $P_{tot}$ derates linearly at 4.5mW/K.

### 3.2、Recommended Operating Conditions

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| supply voltage A | $V_{CC(A)}$ | - | 0.8 | - | 3.6 | V |
| supply voltage B | $V_{CC(B)}$ | - | 0.8 | - | 3.6 | V |
| input voltage | $V_I$ | - | 0 | - | 3.6 | V |
| output voltage | $V_O$ | Active mode[1] | 0 | - | $V_{CCO}$ | V |
| | | Suspend or 3-state mode | 0 | - | 3.6 | V |
| ambient temperature | $T_{amb}$ | - | -40 | - | +105 | ℃ |
| input transition rise and fall rate | Δt/ΔV | $V_{CCI}$=0.8V to 3.6V[2] | - | - | 5 | ns/V |

Note:

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

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

### 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

($T_{amb}$=25℃, voltages are referenced to GND (ground=0V), unless otherwise specified)[1][2]

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| HIGH-level output voltage | $V_{OH}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=-1.5mA; $V_{CC(A)}$=$V_{CC(B)}$=0.8V | - | 0.69 | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=1.5mA; $V_{CC(A)}$=$V_{CC(B)}$=0.8V | - | 0.07 | - | V |
| input leakage current | $I_I$ | nDIR, n$\overline{OE}$ input; $V_I$=0V or 3.6V; $V_{CC(A)}$=$V_{CC(B)}$=0.8V to 3.6V | | - | ±0.025 | ±0.25 | uA |
| OFF-state output current | $I_{OZ}$ | A or B port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=$V_{CC(B)}$=3.6V[3] | | - | ±0.5 | ±2.5 | uA |
| | | suspend mode A port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=3.6V; $V_{CC(B)}$=0V[3] | | - | ±0.5 | ±2.5 | uA |
| | | suspend mode B port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=0V; $V_{CC(B)}$=3.6V[3] | | - | ±0.5 | ±2.5 | uA |
| power-off leakage current | $I_{OFF}$ | A port; $V_I$ or $V_O$=0V to 3.6V; $V_{CC(A)}$=0V; $V_{CC(B)}$=0.8V to 3.6V | | - | ±0.1 | ±1 | uA |
| | | B port; $V_I$ or $V_O$=0V to 3.6V; $V_{CC(B)}$=0V; $V_{CC(A)}$=0.8V to 3.6V | | - | ±0.1 | ±1 | uA |
| input capacitance | $C_I$ | nDIR, n$\overline{OE}$ input; $V_I$=0V or 3.3V; $V_{CC(A)}$=$V_{CC(B)}$=3.3V | | - | 1.0 | - | pF |
| input/output capacitance | $C_{I/O}$ | A and B port; $V_O$=3.3V or 0V; $V_{CC(A)}$=$V_{CC(B)}$=3.3V | | - | 4.0 | - | pF |

Note:

[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.

### 3.3.2、DC Characteristics 2

($T_{amb}$=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified) [1][2]

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| HIGH-level input voltage | $V_{IH}$ | data input | $V_{CCI}$=0.8V | 0.70$V_{CCI}$ | - | - | V |
| | | | $V_{CCI}$=1.1V to 1.95V | 0.65$V_{CCI}$ | - | - | V |
| | | | $V_{CCI}$=2.3V to 2.7V | 1.6 | - | - | V |
| | | | $V_{CCI}$=3.0V to 3.6V | 2 | - | - | V |
| | | nDIR, $n\overline{OE}$ input | $V_{CC(A)}$=0.8V | 0.70$V_{CC(A)}$ | - | - | V |
| | | | $V_{CC(A)}$=1.1V to 1.95V | 0.65$V_{CC(A)}$ | - | - | V |
| | | | $V_{CC(A)}$=2.3V to 2.7V | 1.6 | - | - | V |
| | | | $V_{CC(A)}$=3.0V to 3.6V | 2 | - | - | V |
| LOW-level input voltage | $V_{IL}$ | data input | $V_{CCI}$=0.8V | - | - | 0.30$V_{CCI}$ | V |
| | | | $V_{CCI}$=1.1V to 1.95V | - | - | 0.35$V_{CCI}$ | V |
| | | | $V_{CCI}$=2.3V to 2.7V | - | - | 0.7 | V |
| | | | $V_{CCI}$=3.0V to 3.6V | - | - | 0.8 | V |
| | | nDIR, $n\overline{OE}$ input | $V_{CC(A)}$=0.8V | - | - | 0.30$V_{CC(A)}$ | V |
| | | | $V_{CC(A)}$=1.1V to 1.95V | - | - | 0.35$V_{CC(A)}$ | V |
| | | | $V_{CC(A)}$=2.3V to 2.7V | - | - | 0.7 | V |
| | | | $V_{CC(A)}$=3.0V to 3.6V | - | - | 0.8 | V |
| HIGH-level output voltage | $V_{OH}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=-100uA; $V_{CC(A)}$=$V_{CC(B)}$=0.8V to 3.6V | $V_{CCO}$-0.1 | - | - | V |
| | | | $I_O$=-3mA; $V_{CC(A)}$=$V_{CC(B)}$=1.1V | 0.85 | - | - | V |
| | | | $I_O$=-6mA; $V_{CC(A)}$=$V_{CC(B)}$=1.4V | 1.05 | - | - | V |
| | | | $I_O$=-8mA; $V_{CC(A)}$=$V_{CC(B)}$=1.65V | 1.2 | - | - | V |
| | | | $I_O$=-9mA; $V_{CC(A)}$=$V_{CC(B)}$=2.3V | 1.75 | - | - | V |
| | | | $I_O$=-12mA; $V_{CC(A)}$=$V_{CC(B)}$=3.0V | 2.3 | - | - | V |
| LOW-level output voltage | $V_{OL}$ | $V_I$=$V_{IH}$ or $V_{IL}$ | $I_O$=100uA; $V_{CC(A)}$=$V_{CC(B)}$=0.8V to 3.6V | - | - | 0.1 | V |
| | | | $I_O$=3mA; $V_{CC(A)}$=$V_{CC(B)}$=1.1V | - | - | 0.25 | V |
| | | | $I_O$=6mA; $V_{CC(A)}$=$V_{CC(B)}$=1.4V | - | - | 0.35 | V |
| | | | $I_O$=8mA; $V_{CC(A)}$=$V_{CC(B)}$=1.65V | - | - | 0.45 | V |
| | | | $I_O$=9mA; $V_{CC(A)}$=$V_{CC(B)}$=2.3V | - | - | 0.55 | V |
| | | | $I_O$=12mA; $V_{CC(A)}$=$V_{CC(B)}$=3.0V | - | - | 0.7 | V |
| input leakage current | $I_I$ | nDIR, $n\overline{OE}$ input; $V_I$=0V or 3.6V; $V_{CC(A)}$=$V_{CC(B)}$=0.8V to 3.6V | | - | - | ±1 | uA |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OFF-state output current | $I_{OZ}$ | A or B port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=$V_{CC(B)}$=3.6V[3] | | - | - | ±5 | uA |
| | | suspend mode A port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=3.6V; $V_{CC(B)}$=0V[3] | | - | - | ±5 | uA |
| | | suspend mode B port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=0V; $V_{CC(B)}$=3.6V[3] | | - | - | ±5 | uA |
| power-off leakage current | $I_{OFF}$ | A port; $V_I$ or $V_O$=0V to 3.6V; $V_{CC(A)}$=0V; $V_{CC(B)}$=0.8V to 3.6V | | - | - | ±5 | uA |
| | | B port; $V_I$ or $V_O$=0V to 3.6V; $V_{CC(B)}$=0V; $V_{CC(A)}$=0.8V to 3.6V | | - | - | ±5 | uA |
| supply current | $I_{CC}$ | A port; $V_I$=0V or $V_{CCI}$; $I_O$=0A | $V_{CC(A)}$=0.8V to 3.6V; $V_{CC(B)}$=0.8V to 3.6V | - | - | 10 | uA |
| | | | $V_{CC(A)}$=1.1V to 3.6V; $V_{CC(B)}$=1.1V to 3.6V | - | - | 8 | uA |
| | | | $V_{CC(A)}$=3.6V; $V_{CC(B)}$=0V | - | - | 8 | uA |
| | | | $V_{CC(A)}$=0V; $V_{CC(B)}$=3.6V | -2 | - | - | uA |
| | | B port; $V_I$=0V or $V_{CCI}$; $I_O$=0A | $V_{CC(A)}$=0.8V to 3.6V; $V_{CC(B)}$=0.8V to 3.6V | - | - | 10 | uA |
| | | | $V_{CC(A)}$=1.1V to 3.6V; $V_{CC(B)}$=1.1V to 3.6V | - | - | 8 | uA |
| | | | $V_{CC(A)}$=3.6V; $V_{CC(B)}$=0V | -2 | - | - | uA |
| | | | $V_{CC(A)}$=0V; $V_{CC(B)}$=3.6V | - | - | 8 | uA |
| | | A plus B port ($I_{CC(A)}$+$I_{CC(B)}$); $I_O$=0A; $V_I$=0V or $V_{CCI}$; $V_{CC(A)}$=0.8V to 3.6V; $V_{CC(B)}$=0.8V to 3.6V | | - | - | 20 | uA |
| | | A plus B port ($I_{CC(A)}$+$I_{CC(B)}$); $I_O$=0A; $V_I$=0V or $V_{CCI}$; $V_{CC(A)}$=1.1V to 3.6V; $V_{CC(B)}$=1.1V to 3.6V | | - | - | 16 | uA |

Note:

[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.

### 3.3.3、DC Characteristics 3

($T_{amb}$=-40℃ to +105℃, voltages are referenced to GND (ground=0V), unless otherwise specified) [1][2]

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OFF-state output current | $I_{OZ}$ | A or B port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=$V_{CC(B)}$=3.6V[3] | | - | - | ±30 | uA |
| | | suspend mode A port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=3.6V; $V_{CC(B)}$=0V[3] | | - | - | ±30 | uA |
| | | suspend mode B port; $V_O$=0V or $V_{CCO}$; $V_{CC(A)}$=0V; $V_{CC(B)}$=3.6V[3] | | - | - | ±30 | uA |
| power-off leakage current | $I_{OFF}$ | A port; $V_I$ or $V_O$=0V to 3.6V; $V_{CC(A)}$=0V; $V_{CC(B)}$=0.8V to 3.6V | | - | - | ±30 | uA |
| | | B port; $V_I$ or $V_O$=0V to 3.6V; $V_{CC(B)}$=0V; $V_{CC(A)}$=0.8V to 3.6V | | - | - | ±30 | uA |
| supply current | $I_{CC}$ | A port; $V_I$=0V or $V_{CCI}$; $I_O$=0A | $V_{CC(A)}$=0.8V to 3.6V; $V_{CC(B)}$=0.8V to 3.6V | - | - | 55 | uA |
| | | | $V_{CC(A)}$=1.1V to 3.6V; $V_{CC(B)}$=1.1V to 3.6V | - | - | 50 | uA |
| | | | $V_{CC(A)}$=3.6V; $V_{CC(B)}$=0V | - | - | 50 | uA |
| | | | $V_{CC(A)}$=0V; $V_{CC(B)}$=3.6V | -12 | - | - | uA |
| | | B port; $V_I$=0V or $V_{CCI}$; $I_O$=0A | $V_{CC(A)}$=0.8V to 3.6V; $V_{CC(B)}$=0.8V to 3.6V | - | - | 55 | uA |
| | | | $V_{CC(A)}$=1.1V to 3.6V; $V_{CC(B)}$=1.1V to 3.6V | - | - | 50 | uA |
| | | | $V_{CC(A)}$=3.6V; $V_{CC(B)}$=0V | -12 | - | - | uA |
| | | | $V_{CC(A)}$=0V; $V_{CC(B)}$=3.6V | - | - | 50 | uA |
| | | A plus B port ($I_{CC(A)}$+$I_{CC(B)}$); $I_O$=0A; $V_I$=0V or $V_{CCI}$; $V_{CC(A)}$=0.8V to 3.6V; $V_{CC(B)}$=0.8V to 3.6V | | - | - | 70 | uA |
| | | A plus B port ($I_{CC(A)}$+$I_{CC(B)}$); $I_O$=0A; $V_I$=0V or $V_{CCI}$; $V_{CC(A)}$=1.1V to 3.6V; $V_{CC(B)}$=1.1V to 3.6V | | - | - | 65 | uA |

Note:

[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.

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

| $V_{CC(A)}$ | $V_{CC(B)}$ | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | 0V | 0.8V | 1.2V | 1.5V | 1.8V | 2.5V | 3.3V | |
| 0V | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | uA |
| 0.8V | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 1.6 | uA |
| 1.2V | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.8 | uA |
| 1.5V | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.4 | uA |
| 1.8V | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | uA |
| 2.5V | 0.1 | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | uA |
| 3.3V | 0.1 | 1.6 | 0.8 | 0.4 | 0.2 | 0.1 | 0.1 | uA |

### 3.3.4、AC Characteristics 1

($T_{amb}$=25℃, $V_{CC(A)}=V_{CC(B)}$, voltages are referenced to GND (ground=0V), unless otherwise specified)[1][2]

| Parameter | Symbol | Conditions | $V_{CC(A)}=V_{CC(B)}$ | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.8V | 1.2V | 1.5V | 1.8V | 2.5V | 3.3V | |
| power dissipation capacitance | $C_{PD}$ | A port: (direction nAn to nBn); output enabled | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | pF |
| | | A port: (direction nAn to nBn); output disabled | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | pF |
| | | A port: (direction nBn to nAn); output enabled | 9.5 | 9.7 | 9.8 | 9.9 | 10.7 | 11.9 | pF |
| | | A port: (direction nBn to nAn); output disabled | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | pF |
| | | B port: (direction nAn to nBn); output enabled | 9.5 | 9.7 | 9.8 | 9.9 | 10.7 | 11.9 | pF |
| | | B port: (direction nAn to nBn); output disabled | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | pF |
| | | B port: (direction nBn to nAn); output enabled | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | pF |
| | | B port: (direction nBn to nAn); output disabled | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | pF |

Note:

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

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

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

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

### 3.3.5、AC Characteristics 2

($T_{amb}$=25℃, $V_{CC(A)}$=0.8V, voltages are referenced to GND (ground=0V), unless otherwise specified)[1]

| Parameter | Symbol | Conditions | $V_{CC(B)}$ | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | **0.8V** | **1.2V** | **1.5V** | **1.8V** | **2.5V** | **3.3V** | |
| propagation delay | $t_{pd}$ | nAn to nBn | 14.5 | 7.3 | 6.5 | 6.2 | 5.9 | 6.0 | ns |
| | | nBn to nAn | 14.5 | 12.7 | 12.4 | 12.3 | 12.1 | 12.0 | ns |
| disable time | $t_{dis}$ | n$\overline{\text{OE}}$ to nAn | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | ns |
| | | n$\overline{\text{OE}}$ to nBn | 17.0 | 9.9 | 9.0 | 9.4 | 9.0 | 9.7 | ns |
| enable time | $t_{en}$ | n$\overline{\text{OE}}$ to nAn | 18.2 | 18.2 | 18.2 | 18.2 | 18.2 | 18.2 | ns |
| | | n$\overline{\text{OE}}$ to nBn | 19.2 | 10.7 | 9.8 | 9.6 | 9.7 | 10.2 | ns |

Note:

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

### 3.3.6、AC Characteristics 3

($T_{amb}$=25℃, $V_{CC(B)}$=0.8V, voltages are referenced to GND (ground=0V), unless otherwise specified)[1]

| Parameter | Symbol | Conditions | $V_{CC(A)}$ | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | **0.8V** | **1.2V** | **1.5V** | **1.8V** | **2.5V** | **3.3V** | |
| propagation delay | $t_{pd}$ | nAn to nBn | 14.5 | 12.7 | 12.4 | 12.3 | 12.1 | 12.0 | ns |
| | | nBn to nAn | 14.5 | 7.3 | 6.5 | 6.2 | 5.9 | 6.0 | ns |
| disable time | $t_{dis}$ | n$\overline{\text{OE}}$ to nAn | 14.3 | 5.5 | 4.1 | 4.0 | 3.0 | 3.5 | ns |
| | | n$\overline{\text{OE}}$ to nBn | 17.0 | 13.8 | 13.4 | 13.1 | 12.9 | 12.7 | ns |
| enable time | $t_{en}$ | n$\overline{\text{OE}}$ to nAn | 18.2 | 5.6 | 4.0 | 3.2 | 2.4 | 2.2 | ns |
| | | n$\overline{\text{OE}}$ to nBn | 19.2 | 14.6 | 14.1 | 13.9 | 13.7 | 13.6 | ns |

Note:

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

### 3.3.7、AC Characteristics 4

($T_{amb}$=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified)[1]

| Parameter | Symbol | Conditions | $V_{CC(B)}$ | | | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1.2V±0.1V | | 1.5V±0.1V | | 1.8V±0.15V | | 2.5V±0.2V | | 3.3V±0.3V | | |
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| **$V_{CC(A)}$=1.1V to 1.3V** | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | 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 |
| disable time | $t_{dis}$ | $n\overline{OE}$ to nAn | 1.8 | 10.9 | 1.8 | 10.9 | 1.8 | 10.9 | 1.8 | 10.9 | 1.8 | 10.9 | ns |
| | | $n\overline{OE}$ to nBn | 1.9 | 12.4 | 1.9 | 9.6 | 1.9 | 9.5 | 1.4 | 8.1 | 1.2 | 9.1 | ns |
| enable time | $t_{en}$ | $n\overline{OE}$ to nAn | 1.4 | 12.8 | 1.4 | 12.8 | 1.4 | 12.8 | 1.4 | 12.8 | 1.4 | 12.8 | ns |
| | | $n\overline{OE}$ to nBn | 1.1 | 13.3 | 1.1 | 10.0 | 1.1 | 8.9 | 1.0 | 7.9 | 1.0 | 7.7 | ns |
| **$V_{CC(A)}$=1.4V to 1.6V** | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | nAn to nBn | 0.3 | 8.9 | 0.3 | 6.3 | 0.3 | 5.2 | 0.3 | 4.2 | 0.3 | 4.2 | ns |
| | | nBn to nAn | 0.7 | 7.1 | 0.7 | 6.3 | 0.5 | 6.0 | 0.4 | 5.7 | 0.3 | 5.6 | ns |
| disable time | $t_{dis}$ | $n\overline{OE}$ to nAn | 1.8 | 10.2 | 1.8 | 10.2 | 1.5 | 10.2 | 1.3 | 10.2 | 1.6 | 10.2 | ns |
| | | $n\overline{OE}$ to nBn | 1.9 | 11.3 | 1.9 | 10.3 | 1.9 | 9.1 | 1.4 | 7.4 | 1.2 | 7.6 | ns |
| enable time | $t_{en}$ | $n\overline{OE}$ to nAn | 1.1 | 9.4 | 1.4 | 9.4 | 1.1 | 9.4 | 0.7 | 9.4 | 0.4 | 9.4 | ns |
| | | $n\overline{OE}$ to nBn | 1.4 | 12.1 | 1.4 | 9.6 | 1.1 | 7.7 | 0.9 | 5.8 | 0.9 | 5.6 | ns |
| **$V_{CC(A)}$=1.65V to 1.95V** | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | nAn to nBn | 0.1 | 8.7 | 0.1 | 6.0 | 0.1 | 4.9 | 0.1 | 3.9 | 0.3 | 3.9 | ns |
| | | nBn to nAn | 0.6 | 6.2 | 0.6 | 5.3 | 0.5 | 4.9 | 0.3 | 4.6 | 0.3 | 4.5 | ns |
| disable time | $t_{dis}$ | $n\overline{OE}$ to nAn | 1.8 | 8.6 | 1.6 | 8.6 | 1.8 | 8.6 | 1.3 | 8.6 | 1.6 | 8.6 | ns |
| | | $n\overline{OE}$ to nBn | 1.7 | 10.9 | 1.7 | 9.9 | 1.6 | 8.7 | 1.2 | 6.9 | 1.0 | 6.9 | ns |
| enable time | $t_{en}$ | $n\overline{OE}$ to nAn | 1.0 | 7.2 | 1.0 | 7.2 | 1.0 | 7.2 | 0.6 | 7.2 | 0.4 | 7.2 | ns |
| | | $n\overline{OE}$ to nBn | 1.2 | 11.7 | 1.2 | 9.2 | 1.0 | 7.4 | 0.8 | 5.3 | 0.8 | 4.6 | ns |
| **$V_{CC(A)}$=2.3V to 2.7V** | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | nAn to nBn | 0.1 | 8.4 | 0.1 | 5.7 | 0.1 | 4.6 | 0.2 | 3.5 | 0.1 | 3.6 | ns |
| | | nBn to nAn | 0.6 | 5.2 | 0.6 | 4.2 | 0.4 | 3.9 | 0.2 | 3.4 | 0.2 | 3.3 | ns |
| disable time | $t_{dis}$ | $n\overline{OE}$ to nAn | 1.0 | 6.2 | 1.0 | 6.2 | 1.0 | 6.2 | 1.0 | 6.2 | 1.0 | 6.2 | ns |
| | | $n\overline{OE}$ to nBn | 1.5 | 10.4 | 1.5 | 8.8 | 1.3 | 8.2 | 1.1 | 6.2 | 0.9 | 5.2 | ns |
| enable time | $t_{en}$ | $n\overline{OE}$ to nAn | 0.7 | 4.8 | 0.7 | 4.8 | 0.7 | 4.8 | 0.6 | 4.8 | 0.4 | 4.8 | ns |
| | | $n\overline{OE}$ to nBn | 0.9 | 11.3 | 0.9 | 8.8 | 0.8 | 7.0 | 0.6 | 4.8 | 0.6 | 4.0 | ns |
| **$V_{CC(A)}$=3.0V to 3.6V** | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | nAn to nBn | 0.1 | 8.2 | 0.1 | 5.6 | 0.1 | 4.5 | 0.1 | 3.3 | 0.1 | 2.9 | ns |
| | | nBn to nAn | 0.6 | 5.1 | 0.6 | 4.2 | 0.4 | 3.4 | 0.2 | 3.0 | 0.1 | 2.8 | ns |
| disable time | $t_{dis}$ | $n\overline{OE}$ to nAn | 0.7 | 5.6 | 0.7 | 5.6 | 0.7 | 5.6 | 0.7 | 5.6 | 0.7 | 5.6 | ns |
| | | $n\overline{OE}$ to nBn | 1.4 | 10.2 | 1.4 | 9.3 | 1.2 | 8.1 | 1.0 | 6.4 | 0.8 | 6.2 | ns |
| enable time | $t_{en}$ | $n\overline{OE}$ to nAn | 0.6 | 3.8 | 0.6 | 3.8 | 0.6 | 3.8 | 0.6 | 3.8 | 0.4 | 3.8 | ns |
| | | $n\overline{OE}$ to nBn | 0.8 | 11.3 | 0.8 | 8.7 | 0.6 | 6.8 | 0.5 | 4.7 | 0.5 | 3.8 | ns |

Note:

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

### 3.3.8、AC Characteristics 5

($T_{amb}$=-40℃ to +105℃, voltages are referenced to GND (ground=0V), unless otherwise specified)[1]

| Parameter | Symbol | Conditions | $V_{CC(B)}$ | | | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1.2V±0.1V | | 1.5V±0.1V | | 1.8V±0.15V | | 2.5V±0.2V | | 3.3V±0.3V | | |
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| $V_{CC(A)}$=1.1V to 1.3V | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | 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 |
| disable time | $t_{dis}$ | n$\overline{OE}$ to nAn | 1.8 | 12.0 | 1.8 | 12.0 | 1.8 | 12.0 | 1.8 | 12.0 | 1.8 | 12.0 | ns |
| | | n$\overline{OE}$ to nBn | 1.9 | 13.7 | 1.9 | 10.6 | 1.9 | 10.5 | 1.4 | 9.0 | 1.2 | 10.1 | ns |
| enable time | $t_{en}$ | n$\overline{OE}$ to nAn | 1.4 | 14.1 | 1.4 | 14.1 | 1.4 | 14.1 | 1.4 | 14.1 | 1.4 | 14.1 | ns |
| | | n$\overline{OE}$ to nBn | 1.1 | 14.7 | 1.1 | 11.0 | 1.1 | 9.8 | 1.0 | 8.7 | 1.0 | 8.5 | ns |
| $V_{CC(A)}$=1.4V to 1.6V | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | nAn to nBn | 0.3 | 9.8 | 0.3 | 7.0 | 0.3 | 5.8 | 0.3 | 4.7 | 0.3 | 4.7 | ns |
| | | nBn to nAn | 0.7 | 7.9 | 0.7 | 7.0 | 0.5 | 6.6 | 0.4 | 6.3 | 0.3 | 6.2 | ns |
| disable time | $t_{dis}$ | n$\overline{OE}$ to nAn | 1.8 | 11.3 | 1.8 | 11.3 | 1.5 | 11.3 | 1.3 | 11.3 | 1.6 | 11.3 | ns |
| | | n$\overline{OE}$ to nBn | 1.9 | 12.5 | 1.9 | 11.4 | 1.9 | 10.1 | 1.4 | 8.2 | 1.2 | 8.4 | ns |
| enable time | $t_{en}$ | n$\overline{OE}$ to nAn | 1.1 | 10.4 | 1.4 | 10.4 | 1.1 | 10.4 | 0.7 | 10.4 | 0.4 | 10.4 | ns |
| | | n$\overline{OE}$ to nBn | 1.4 | 13.3 | 1.4 | 10.6 | 1.1 | 8.5 | 0.9 | 6.4 | 0.9 | 6.2 | ns |
| $V_{CC(A)}$=1.65V to 1.95V | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | nAn to nBn | 0.1 | 9.6 | 0.1 | 6.6 | 0.1 | 5.4 | 0.1 | 4.3 | 0.3 | 4.3 | ns |
| | | nBn to nAn | 0.6 | 6.9 | 0.6 | 5.9 | 0.5 | 5.4 | 0.3 | 5.1 | 0.3 | 5.0 | ns |
| disable time | $t_{dis}$ | n$\overline{OE}$ to nAn | 1.8 | 9.5 | 1.6 | 9.5 | 1.8 | 9.5 | 1.3 | 9.5 | 1.6 | 9.5 | ns |
| | | n$\overline{OE}$ to nBn | 1.7 | 12.0 | 1.7 | 10.9 | 1.6 | 9.6 | 1.2 | 7.6 | 1.0 | 7.6 | ns |
| enable time | $t_{en}$ | n$\overline{OE}$ to nAn | 1.0 | 8.0 | 1.0 | 8.0 | 1.0 | 8.0 | 0.6 | 8.0 | 0.4 | 8.0 | ns |
| | | n$\overline{OE}$ to nBn | 1.2 | 12.9 | 1.2 | 10.2 | 1.0 | 8.2 | 0.8 | 5.9 | 0.8 | 5.1 | ns |
| $V_{CC(A)}$=2.3V to 2.7V | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | nAn to nBn | 0.1 | 9.3 | 0.1 | 6.3 | 0.1 | 5.1 | 0.2 | 4.0 | 0.1 | 4.0 | ns |
| | | nBn to nAn | 0.6 | 5.8 | 0.6 | 4.7 | 0.4 | 4.3 | 0.2 | 3.9 | 0.2 | 3.8 | ns |
| disable time | $t_{dis}$ | n$\overline{OE}$ to nAn | 1.0 | 6.9 | 1.0 | 6.9 | 1.0 | 6.9 | 1.0 | 6.9 | 1.0 | 6.9 | ns |
| | | n$\overline{OE}$ to nBn | 1.5 | 11.5 | 1.5 | 10.4 | 1.3 | 9.1 | 1.1 | 6.9 | 0.9 | 5.8 | ns |
| enable time | $t_{en}$ | n$\overline{OE}$ to nAn | 0.7 | 5.3 | 0.7 | 5.3 | 0.7 | 5.3 | 0.6 | 5.3 | 0.4 | 5.3 | ns |
| | | n$\overline{OE}$ to nBn | 0.9 | 12.4 | 0.9 | 9.7 | 0.8 | 7.7 | 0.6 | 5.3 | 0.6 | 4.4 | ns |
| $V_{CC(A)}$=3.0V to 3.6V | | | | | | | | | | | | | |
| propagation delay | $t_{pd}$ | nAn to nBn | 0.1 | 9.1 | 0.1 | 6.2 | 0.1 | 5.0 | 0.1 | 3.8 | 0.1 | 3.3 | ns |
| | | nBn to nAn | 0.6 | 5.7 | 0.6 | 4.7 | 0.4 | 3.9 | 0.2 | 3.4 | 0.1 | 3.3 | ns |
| disable time | $t_{dis}$ | n$\overline{OE}$ to nAn | 0.7 | 6.2 | 0.7 | 6.2 | 0.7 | 6.2 | 0.7 | 6.2 | 0.7 | 6.2 | ns |
| | | n$\overline{OE}$ to nBn | 1.4 | 11.3 | 1.4 | 10.3 | 1.2 | 9.0 | 1.0 | 7.1 | 0.8 | 6.9 | ns |
| enable time | $t_{en}$ | n$\overline{OE}$ to nAn | 0.6 | 4.2 | 0.6 | 4.2 | 0.6 | 4.2 | 0.6 | 4.2 | 0.4 | 4.2 | ns |
| | | n$\overline{OE}$ to nBn | 0.8 | 12.4 | 0.8 | 9.6 | 0.6 | 7.5 | 0.5 | 5.2 | 0.5 | 4.2 | ns |

Note:

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

# 4、Testing Circuit

## 4.1、AC Testing Circuit

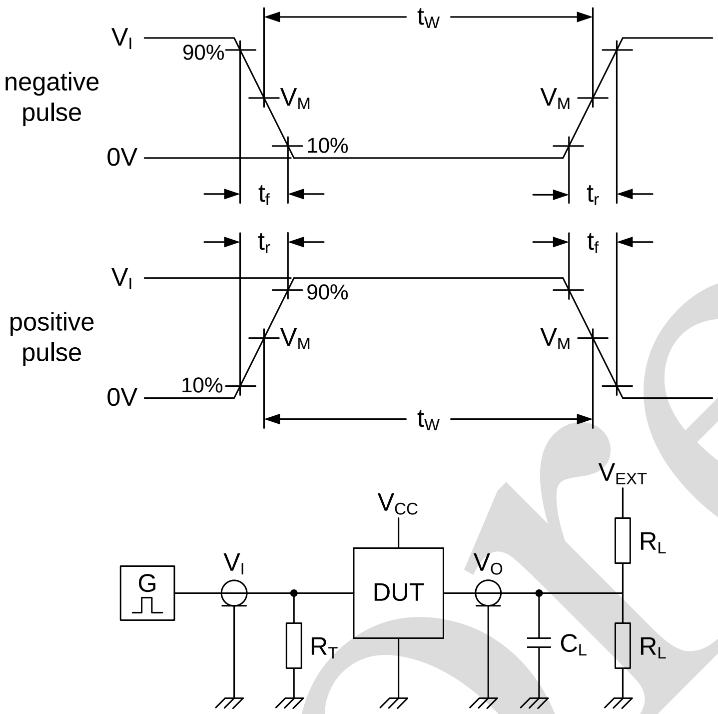


Figure 3. Test circuit for measuring switching times

$R_L$=Load resistance.

$C_L$=Load capacitance including jig and probe capacitance.

$R_T$=Termination resistance.

$V_{EXT}$=External voltage for measuring switching times.

## 4.2、AC Testing Waveforms

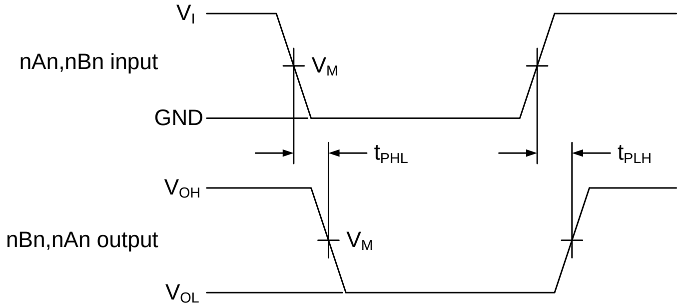


Figure 4. The data input (nAn, nBn) to output (nBn, nAn) propagation delay times

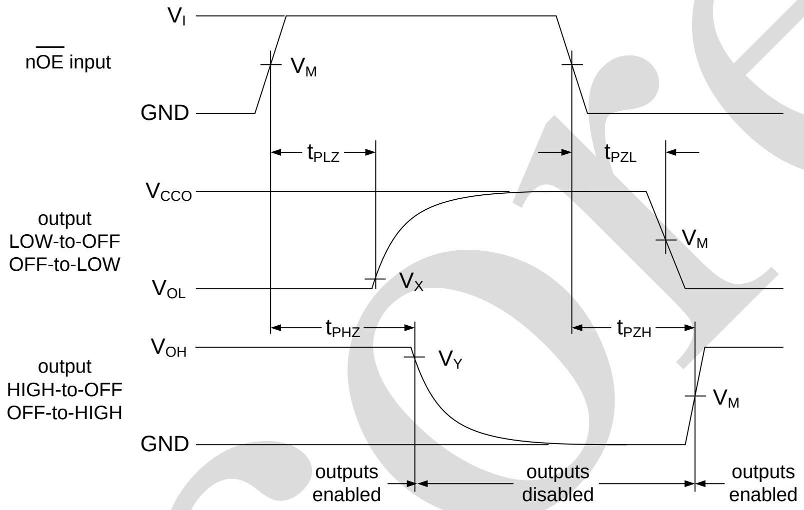


Figure 5. Enable and disable times

## 4.3、Measurement Points

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

Note:

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

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

### 4.4、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] |
| 0.8V to 1.6V | $V_{CCI}$ | ≤1.0ns/V | 15pF | 2kΩ | open | GND | $2V_{CCO}$ |
| 1.65V to 2.7V | $V_{CCI}$ | ≤1.0ns/V | 15pF | 2kΩ | open | GND | $2V_{CCO}$ |
| 3.0V to 3.6V | $V_{CCI}$ | ≤1.0ns/V | 15pF | 2kΩ | open | GND | $2V_{CCO}$ |

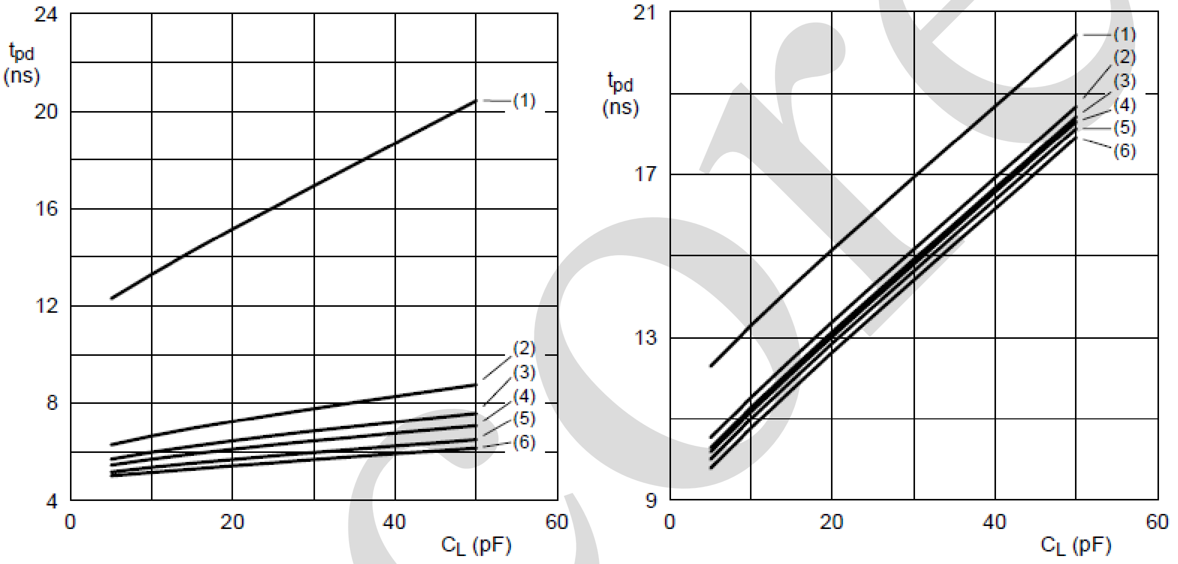
Note:

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

[2] dV/dt≥1.0V/ns

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

## 5、Characteristic Curve



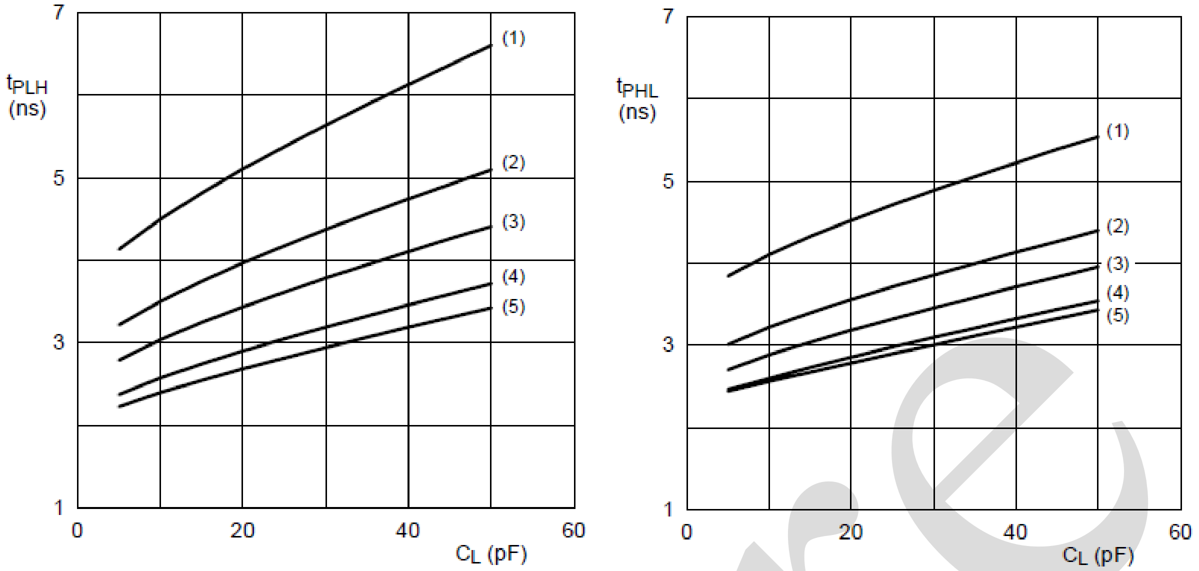
a. Propagation delay (A to B); $V_{CC(A)}$=0.8V

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

b. Propagation delay (A to B); $V_{CC(B)}$=0.8V

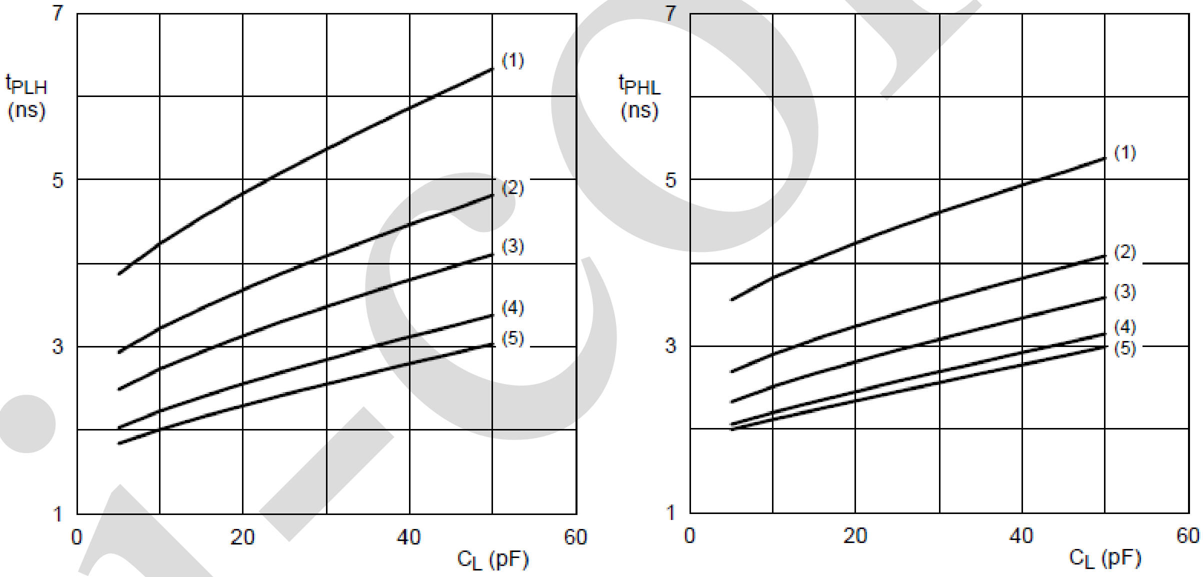
(1) $V_{CC(B)}$=0.8V
(2) $V_{CC(B)}$=1.2V
(3) $V_{CC(B)}$=1.5V
(4) $V_{CC(B)}$=1.8V
(5) $V_{CC(B)}$=2.5V
(6) $V_{CC(B)}$=3.3V

Figure 6. Typical propagation delay versus load capacitance; $T_{amb}$=25℃



a. LOW to HIGH propagation delay (A to B);
$V_{CC(A)}$=1.2V

b. HIGH to LOW propagation delay (A to B);
$V_{CC(A)}$=1.2V

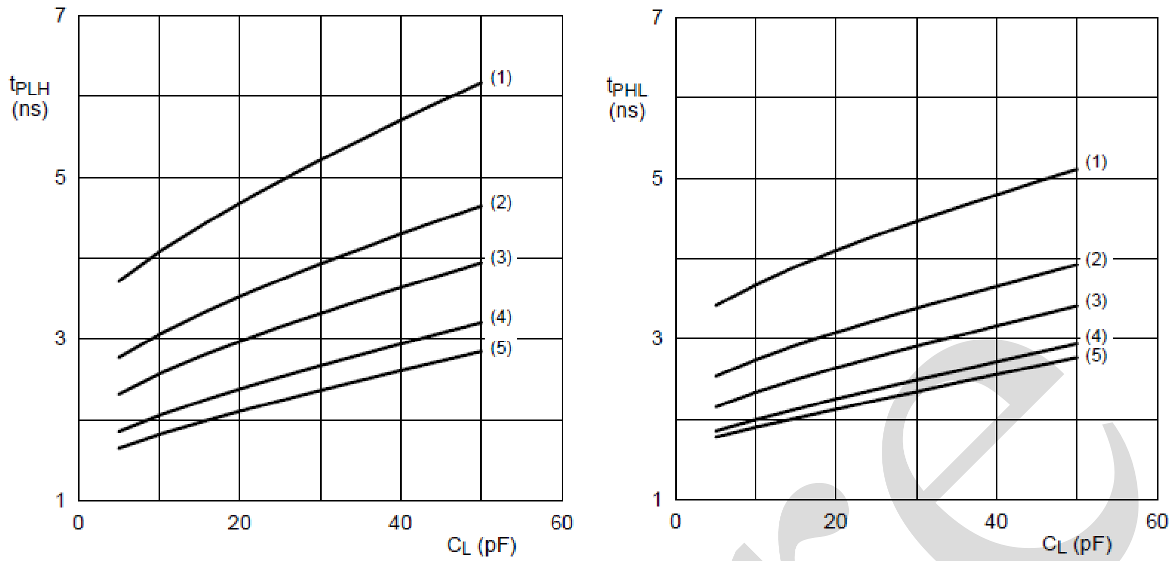


c. LOW to HIGH propagation delay (A to B);
$V_{CC(A)}$=1.5V

d. HIGH to LOW propagation delay (A to B);
$V_{CC(A)}$=1.5V

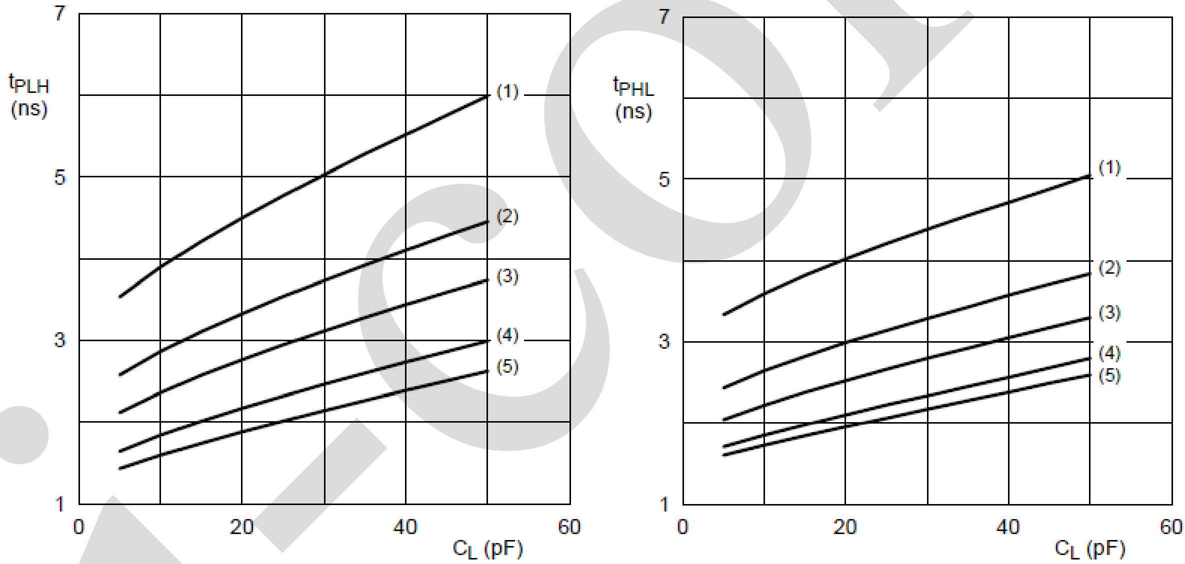
(1) $V_{CC(B)}$=1.2V
(2) $V_{CC(B)}$=1.5V
(3) $V_{CC(B)}$=1.8V
(4) $V_{CC(B)}$=2.5V
(5) $V_{CC(B)}$=3.3V

Figure 7. Typical propagation delay versus load capacitance; $T_{amb}$=25℃



a. LOW to HIGH propagation delay (A to B); $V_{CC(A)}$=1.8V

b. HIGH to LOW propagation delay (A to B); $V_{CC(A)}$=1.8V

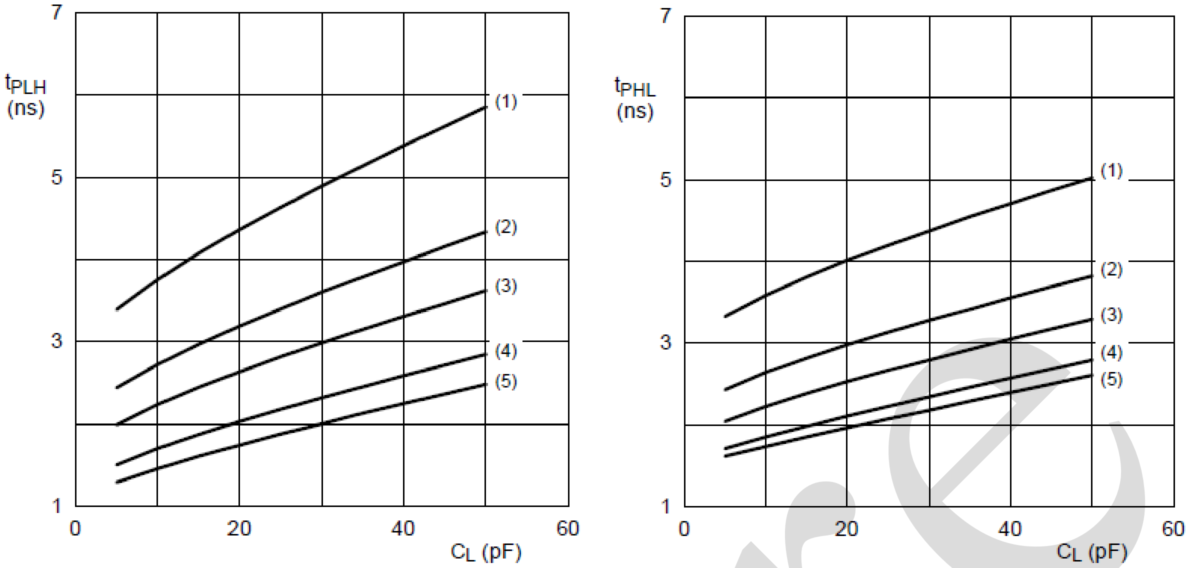


c. LOW to HIGH propagation delay (A to B); $V_{CC(A)}$=2.5V

d. HIGH to LOW propagation delay (A to B); $V_{CC(A)}$=2.5V

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

Figure 8. Typical propagation delay versus load capacitance; $T_{amb}$=25℃



a. LOW to HIGH propagation delay (A to B);
$V_{CC(A)}$=3.3V

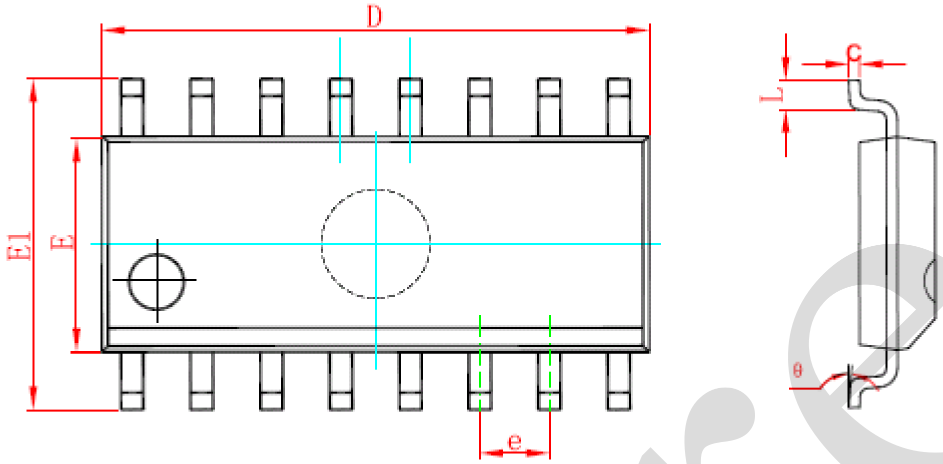
b. HIGH to LOW propagation delay (A to B);
$V_{CC(A)}$=3.3V

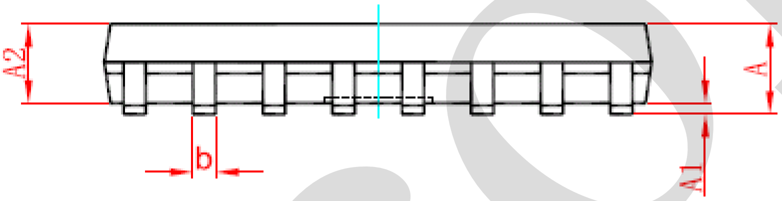
(1) $V_{CC(B)}$=1.2V
(2) $V_{CC(B)}$=1.5V
(3) $V_{CC(B)}$=1.8V
(4) $V_{CC(B)}$=2.5V
(5) $V_{CC(B)}$=3.3V

Figure 9. Typical propagation delay versus load capacitance; $T_{amb}$=25℃

## 6、Package Information

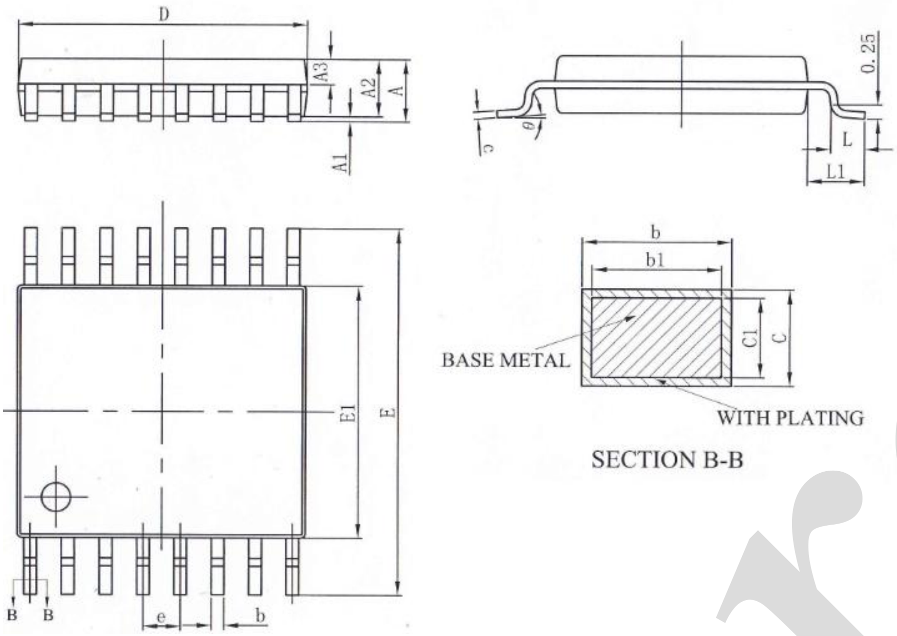
### 6.1、SOP16

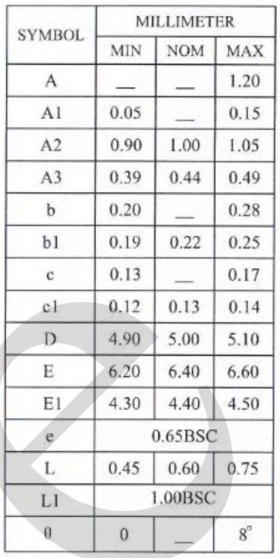




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1. 350 | 1. 750 | 0. 053 | 0. 069 |
| A1 | 0. 100 | 0. 250 | 0. 004 | 0. 010 |
| A2 | 1. 350 | 1. 550 | 0. 053 | 0. 061 |
| b | 0. 330 | 0. 510 | 0. 013 | 0. 020 |
| c | 0. 170 | 0. 250 | 0. 007 | 0. 010 |
| D | 9. 800 | 10. 200 | 0. 386 | 0. 402 |
| E | 3. 800 | 4. 000 | 0. 150 | 0. 157 |
| E1 | 5. 800 | 6. 200 | 0. 228 | 0. 244 |
| e | 1. 270(BSC) | | 0. 050(BSC) | |
| L | 0. 400 | 1. 270 | 0. 016 | 0. 050 |
| θ | 0° | 8° | 0° | 8° |

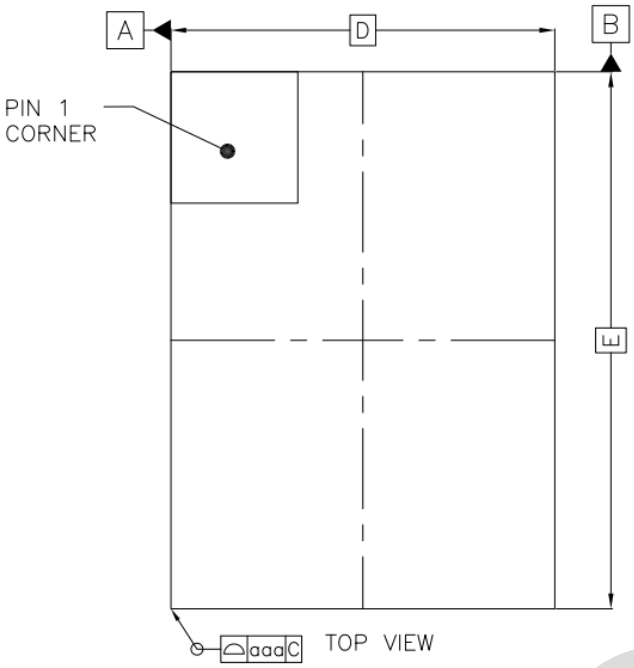
## 6.2、TSSOP16

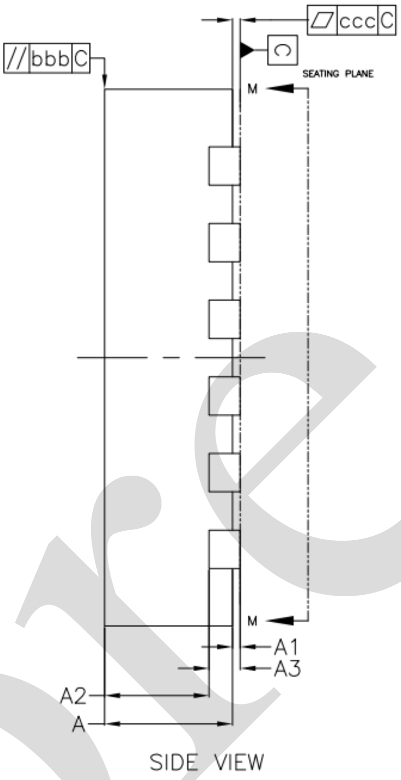


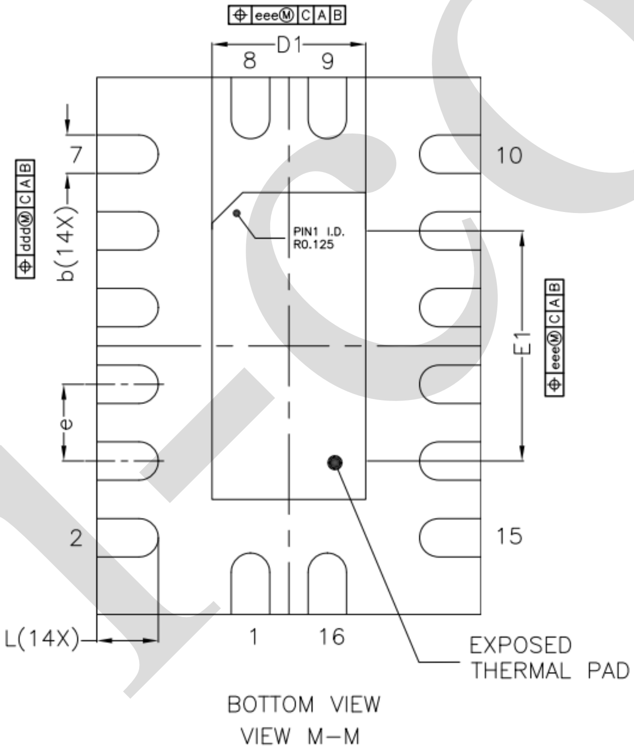


| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | — | — | 1.20 |
| A1 | 0.05 | — | 0.15 |
| A2 | 0.90 | 1.00 | 1.05 |
| A3 | 0.39 | 0.44 | 0.49 |
| b | 0.20 | — | 0.28 |
| b1 | 0.19 | 0.22 | 0.25 |
| c | 0.13 | — | 0.17 |
| c1 | 0.12 | 0.13 | 0.14 |
| D | 4.90 | 5.00 | 5.10 |
| E | 6.20 | 6.40 | 6.60 |
| E1 | 4.30 | 4.40 | 4.50 |
| e | 0.65BSC | | |
| L | 0.45 | 0.60 | 0.75 |
| L1 | 1.00BSC | | |
| θ | 0 | — | 8° |

## 6.3、DHVQFN16







| DESCRIPTION | | SYMBOL | MILLIMETER | | |
|---|---|---|---|---|---|
| | | | MIN | NOM | MAX |
| TOTAL THICKNESS | | A | 0.80 | 0.85 | 1.00 |
| STAND OFF | | A1 | 0.00 | -- | 0.05 |
| MOLD THICKNESS | | A2 | 0.60 | 0.65 | 0.70 |
| L/F THICKNESS | | A3 | 0.203 REF | | |
| BODY SIZE | X | D | 2.40 | 2.50 | 2.60 |
| | Y | E | 3.40 | 3.50 | 3.60 |
| LEAD PITCH | | e | 0.50 BSC | | |
| LEAD WIDTH | | b | 0.18 | 0.25 | 0.30 |
| LEAD LENGTH | | L | 0.30 | 0.40 | 0.50 |
| EP SIZE | | D1 | 0.85 | 1.00 | 1.15 |
| | | E1 | 1.85 | 2.00 | 2.15 |
| Tolerance of form and position | | | | | |
| PKG EDGE TOLERANCE | | aaa | 0.1 | | |
| MOLD FLATNESS | | bbb | 0.1 | | |
| COPLANARITY | | ccc | 0.05 | | |
| LEAD OFFSET | | ddd | 0.1 | | |
| EXPOSED PAD OFFSET | | eee | 0.1 | | |

NOTES

1.0 COPLANARITY APPLIES TO LEADS, CORNER LEADS AND DIE ATTACH PAD.

## 7、Statements And Notes

### 7.1、The name and content of Hazardous substances or Elements in the product

| Part name | Hazardous substances or Elements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Lead and lead compounds | Mercury and mercury compounds | Cadmium and cadmium compounds | Hexavalent chromium compounds | Polybrominated biphenyls | Polybrominated biphenyl ethers | Dibutyl phthalate | Butylbenzyl phthalate | Di-2-ethylhexyl phthalate | Diisobutyl phthalate |
| Lead frame | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Plastic resin | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Chip | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The lead | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Plastic sheet installed | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| explanation | ○：Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard.<br>×：Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements. | | | | | | | | | |

### 7.2、Notion

Recommended carefully reading this information before the use of this product;

The information in this document are subject to change without notice;

This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.