74AVC2T245

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

Rev. 2 — 6 April 2017 Product data sheet

1 General description

The 74AVC2T245 is a 2-bit, dual supply transceiver that enables bidirectional level translation. The device can be used as two 1-bit transceivers or as a 2-bit transceiver. It features two 2-bit input-output ports (An and Bn) and direction control inputs (DIRn), an output enable input ($\overline{OE}$) 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 0.8 V and 3.6 V making the device suitable for translating 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). Pins An, $\overline{OE}$ and DIRn are referenced to $V_{CC(A)}$ and pins Bn are referenced to $V_{CC(B)}$. A HIGH on DIRn allows transmission from An to Bn and a LOW on DIRn allows transmission from Bn to An. The output enable input ($\overline{OE}$) 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 An and Bn are in the high-impedance OFF-state.

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
  - CDM JESD22-C101C exceeds 1000 V
- Maximum data rates:
  - 380 Mbit/s (≥ 1.8 V to 3.3 V translation)
  - 200 Mbit/s (≥ 1.1 V to 3.3 V translation)
  - 200 Mbit/s (≥ 1.1 V to 2.5 V translation)
  - 200 Mbit/s (≥ 1.1 V to 1.8 V translation)
  - 150 Mbit/s (≥ 1.1 V to 1.5 V translation)
  - 100 Mbit/s (≥ 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

nexperia

- I_{OFF} circuitry provides partial Power-down mode operation
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3 Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AVC2T245GU	-40 °C to +125 °C	XQFN10	plastic, extremely thin quad flat package; no leads; 10 terminals; body 1.40 x 1.80 x 0.50 mm	SOT1160-1

4 Marking

Table 2. Marking codes

Type number	Marking code
74AVC2T245GU	B3

5 Functional diagram

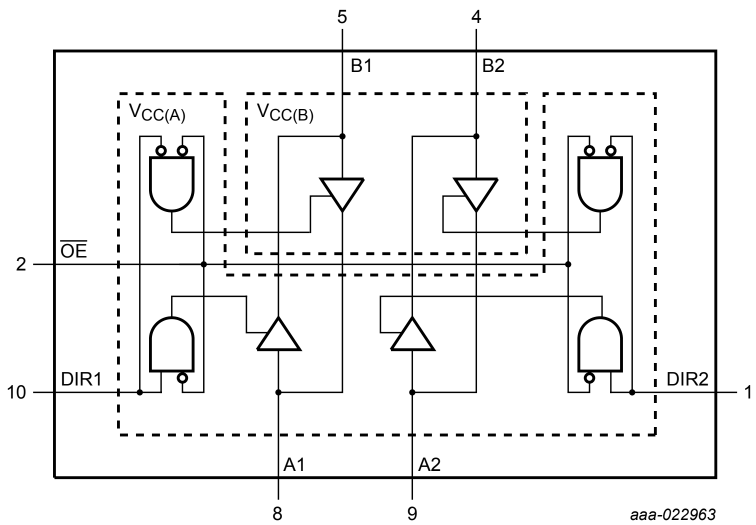


Figure 1. Logic symbol

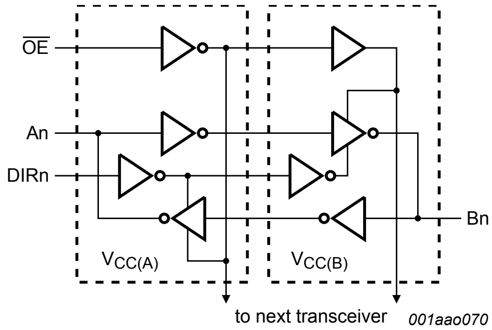


Figure 2. Logic diagram (one 1-bit transceiver)

6 Pinning information

6.1 Pinning

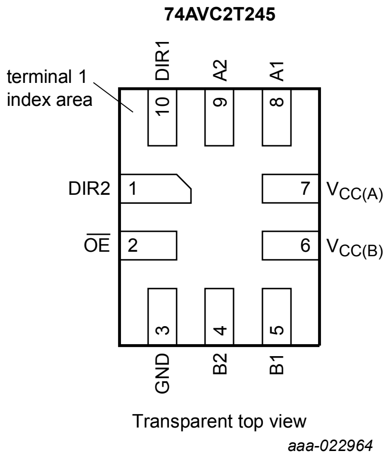


Figure 3. Pin configuration SOT1160-1 (XQFN10)

6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
DIR1, DIR2	10, 1	direction control
$\overline{OE}$	2	output enable input (active LOW)
$V_{CC(B)}$	6	supply voltage B (Bn inputs are referenced to $V_{CC(B)}$)
$V_{CC(A)}$	7	supply voltage A (An, $\overline{OE}$ and DIRn inputs are referenced to $V_{CC(A)}$)
A1, A2	8, 9	data input or output
B1, B2	5, 4	data input or output
GND	3	ground (0 V)

7 Functional description

Table 4. Function table [1]

Supply voltage	Input		Input/output	
$V_{CC(A)}$, $V_{CC(B)}$	$\overline{OE}$ [2]	DIRn [2]	An [2]	Bn [2]
0.8 V to 3.6 V	L	L	An = Bn	input
0.8 V to 3.6 V	L	H	input	Bn = An
0.8 V to 3.6 V	H	X	Z	Z
GND [3]	X	X	Z	Z

[1] H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.
[2] The An, DIRn and $\overline{OE}$ input circuit is referenced to $V_{CC(A)}$; The Bn input circuit is referenced to $V_{CC(B)}$.
[3] If at least one of $V_{CC(A)}$ or $V_{CC(B)}$ is at GND level, the device goes into suspend mode.

8 Limiting values

Table 5. 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	-	250	mW

[1] The minimum input voltage ratings and output voltage ratings may be exceeded if the input and output current ratings are observed.
[2] V_{CCO} is the supply voltage associated with the output port.
[3] V_{CCO} + 0.5 V should not exceed 4.6 V.

9 Recommended operating conditions

Table 6. Recommended operating conditions
Voltages are referenced to GND (ground = 0 V).

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.

10 Static characteristics

Table 7. Typical static characteristics at T_{amb} = 25 °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}					
		I_O = -1.5 mA; $V_{CC(A)} = V_{CC(B)}$ = 0.8 V		-	0.69	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}					
		I_O = 1.5 mA; $V_{CC(A)} = V_{CC(B)}$ = 0.8 V		-	0.07	-	V
I_I	input leakage current	DIRn, $\overline{OE}$ input; V_I = 0 V or 3.6 V; $V_{CC(A)} = V_{CC(B)}$ = 0.8 V to 3.6 V		-	±0.025	±0.25	μA
I_{OZ}	OFF-state output current	A or B port; V_O = 0 V or V_{CCO}; $V_{CC(A)} = V_{CC(B)}$ = 3.6 V	[3]	-	±0.5	±2.5	μA
		suspend mode A port; V_O = 0 V or V_{CCO}; $V_{CC(A)}$ = 3.6 V; $V_{CC(B)}$ = 0 V	[3]	-	±0.5	±2.5	μA
		suspend mode B port; V_O = 0 V or V_{CCO}; $V_{CC(A)}$ = 0 V; $V_{CC(B)}$ = 3.6 V	[3]	-	±0.5	±2.5	μA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V		-	±0.1	±1	μA
		A port; $V_{CC(A)}$ = 0 V; $V_{CC(B)}$ = 0.8 V to 3.6 V		-	±0.1	±1	μA
		B port; $V_{CC(B)}$ = 0 V; $V_{CC(A)}$ = 0.8 V to 3.6 V		-	±0.1	±1	μA
C_I	input capacitance	DIRn, $\overline{OE}$ input; V_I = 0 V or 3.3 V; $V_{CC(A)} = V_{CC(B)}$ = 3.3 V		-	2.0	-	pF
$C_{I/O}$	input/output capacitance	A and B port; V_O = 3.3 V or 0 V; $V_{CC(A)} = V_{CC(B)}$ = 3.3 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 8. 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 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
		DIRn, $\overline{OE}$ 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
		DIRn, $\overline{OE}$ 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

Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
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	DIRn, $\overline{OE}$ 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
I_{OZ}	OFF-state output current	A or B port; V_O = 0 V or V_{CCO}; $V_{CC(A)} = V_{CC(B)}$ = 3.6 V [3]	-	±5	-	±30	μA
		suspend mode A port; V_O = 0 V or V_{CCO}; $V_{CC(A)}$ = 3.6 V; $V_{CC(B)}$ = 0 V [3]	-	±5	-	±30	μA
		suspend mode B port; V_O = 0 V or V_{CCO}; $V_{CC(A)}$ = 0 V; $V_{CC(B)}$ = 3.6 V [3]	-	±5	-	±30	μA
I_{OFF}	power-off leakage current	A port; V_I or V_O = 0 V to 3.6 V; $V_{CC(A)}$ = 0 V; $V_{CC(B)}$ = 0.8 V to 3.6 V	-	±5	-	±30	μA
		B port; V_I or V_O = 0 V to 3.6 V; $V_{CC(B)}$ = 0 V; $V_{CC(A)}$ = 0.8 V to 3.6 V	-	±5	-	±30	μA
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	-	10	-	55	μA
		$V_{CC(A)}$ = 1.1 V to 3.6 V; $V_{CC(B)}$ = 1.1 V to 3.6 V	-	8	-	50	μA
		$V_{CC(A)}$ = 3.6 V; $V_{CC(B)}$ = 0 V	-	8	-	50	μA
		$V_{CC(A)}$ = 0 V; $V_{CC(B)}$ = 3.6 V	-2	-	-12	-	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	-	10	-	55	μA
		$V_{CC(A)}$ = 1.1 V to 3.6 V; $V_{CC(B)}$ = 1.1 V to 3.6 V	-	8	-	50	μA
		$V_{CC(A)}$ = 3.6 V; $V_{CC(B)}$ = 0 V	-2	-	-12	-	μA
		$V_{CC(A)}$ = 0 V; $V_{CC(B)}$ = 3.6 V	-	8	-	50	μA

Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
		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	-	20	-	70	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	-	16	-	65	μA
ΔI_{CC}	additional supply current	V_I = 3.0 V; $V_{CC(A)} = V_{CC(B)}$ = 3.6 V	-	500	-	650	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] For I/O ports, the parameter I_{OZ} includes the input leakage current.

Table 9. 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

11 Dynamic characteristics

Table 10. Typical power dissipation capacitance at $V_{CC(A)} = V_{CC(B)}$ and $T_{amb} = 25$ °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 An to Bn); output enabled	0.2	0.2	0.2	0.2	0.3	0.6	pF
		A port: (direction An to Bn); output disabled	0.2	0.2	0.2	0.2	0.3	0.6	pF
		A port: (direction Bn to An); output enabled	9	9	9	10	12	14	pF
		A port: (direction Bn to An); output disabled	0.6	0.7	0.7	0.7	0.8	0.9	pF
		B port: (direction An to Bn); output enabled	9	9	9	10	12	14	pF
		B port: (direction An to Bn); output disabled	0.6	0.7	0.7	0.7	0.8	0.9	pF
		B port: (direction Bn to An); output enabled	0.2	0.2	0.2	0.2	0.3	0.6	pF
		B port: (direction Bn to An); output disabled	0.2	0.2	0.2	0.2	0.3	0.6	pF

[1] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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 MHz; V_I = GND to V_{CC}; $t_r = t_f$ = 1 ns; C_L = 0 pF; $R_L = \infty\ \Omega$.

Table 11. Typical dynamic characteristics at $V_{CC(A)} = 0.8$ V and $T_{amb} = 25$ °C [1]

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 6; for waveforms see Figure 4 and Figure 5

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	An to Bn	17.5	8.0	7.0	6.7	6.6	6.7	ns
		Bn to An	17.6	14.8	14.4	14.2	14.0	13.8	ns
t_{dis}	disable time	$\overline{OE}$ to An	17.0	17.0	17.0	17.0	17.0	17.0	ns
		$\overline{OE}$ to Bn	19.7	10.9	9.8	10.0	9.3	9.9	ns
t_{en}	enable time	$\overline{OE}$ to An	30.3	30.2	30.2	30.2	30.1	30.1	ns
		$\overline{OE}$ to Bn	34.3	22.7	21.5	21.0	21.1	21.5	ns

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

Table 12. Typical dynamic characteristics at $V_{CC(B)}$ = 0.8 V and T_{amb} = 25 °C [1]

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 6; for waveforms see Figure 4 and Figure 5

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	An to Bn	17.5	14.8	14.3	14.1	13.9	13.8	ns
		Bn to An	17.6	8.0	7.1	6.8	6.6	6.7	ns
t_{dis}	disable time	$\overline{OE}$ to An	17.0	5.8	4.1	4.0	2.9	3.4	ns
		$\overline{OE}$ to Bn	19.7	15.6	15.0	14.7	14.4	14.1	ns
t_{en}	enable time	$\overline{OE}$ to An	30.3	6.2	4.1	3.1	2.2	1.8	ns
		$\overline{OE}$ to Bn	34.3	18.1	17.2	16.8	16.5	16.3	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 13. Dynamic characteristics for temperature range -40 °C to +85 °C [1]

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 6; for waveforms see Figure 4 and Figure 5

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	An to Bn	1.1	9.2	1.1	6.9	0.9	5.9	0.9	5.3	0.8	5.2	ns
		Bn to An	1.1	9.2	1	8.5	1	8.2	0.9	8.2	0.8	8	ns
t_{dis}	disable time	$\overline{OE}$ to An	2.4	10	2.4	10	2.4	10	2.4	10	2.4	10	ns
		$\overline{OE}$ to Bn	2.7	10.8	2.3	8.4	2.5	8	2.1	7	2.6	7.8	ns
t_{en}	enable time	$\overline{OE}$ to An	1.5	12.4	1.5	12.4	1.5	12.4	1.5	12.4	1.5	12.4	ns
		$\overline{OE}$ to Bn	1.9	12.6	1.7	9.3	1.6	8	1.5	6.9	1.4	6.7	ns
$V_{CC(A)}$ = 1.4 V to 1.6 V													
t_{pd}	propagation delay	An to Bn	1	8.5	1	5.5	0.9	4.7	0.9	3.8	0.8	3.5	ns
		Bn to An	1.1	6.9	1	5.5	1	5.3	0.9	5	0.8	4.8	ns
t_{dis}	disable time	$\overline{OE}$ to An	2	6.3	2	6.3	2	6.3	2	6.3	2	6.3	ns
		$\overline{OE}$ to Bn	2.6	9.8	2.2	6.7	2.5	6.5	2	5.4	2.5	6	ns
t_{en}	enable time	$\overline{OE}$ to An	1.2	6.8	1.2	6.8	1.2	6.8	1.2	6.8	1.2	6.8	ns
		$\overline{OE}$ to Bn	1.7	11	1.5	6.8	1.4	5.8	1.3	4.8	1.3	4.4	ns
$V_{CC(A)}$ = 1.65 V to 1.95 V													
t_{pd}	propagation delay	An to Bn	1	8.2	1	5.3	0.9	4.4	0.8	3.4	0.7	3.2	ns
		Bn to An	0.9	5.9	0.9	4.7	0.9	4.4	0.8	4.1	0.7	3.9	ns
t_{dis}	disable time	$\overline{OE}$ to An	2.1	5.9	2.1	5.9	2.1	5.9	2.1	5.9	2.1	5.9	ns
		$\overline{OE}$ to Bn	2.4	9.5	2.1	6.4	2.3	6.2	1.8	5	2.3	5.6	ns
t_{en}	enable time	$\overline{OE}$ to An	1.1	5.3	1.1	5.3	1.1	5.3	1.1	5.3	1.1	5.3	ns
		$\overline{OE}$ to Bn	1.6	10.5	1.4	6.3	1.3	5.3	1.2	4.3	1.1	3.9	ns

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	
$V_{CC(A)}$ = 2.3 V to 2.7 V													
t_{pd}	propagation delay	An to Bn	0.9	8.2	0.9	5	0.8	4.1	0.7	3.1	0.6	2.7	ns
		Bn to An	0.9	5.3	0.9	3.8	0.8	3.4	0.7	3.1	0.6	3	ns
t_{dis}	disable time	$\overline{OE}$ to An	1.5	4.3	1.5	4.3	1.5	4.3	1.5	4.3	1.5	4.3	ns
		$\overline{OE}$ to Bn	2.3	9	1.9	6	2.2	5.8	1.6	4.6	2.1	5.1	ns
t_{en}	enable time	$\overline{OE}$ to An	0.9	3.6	0.9	3.6	0.9	3.6	0.9	3.6	0.9	3.6	ns
		$\overline{OE}$ to Bn	1.3	10	1.3	5.8	1.2	4.8	1.1	3.7	1.1	3.3	ns
$V_{CC(A)}$ = 3.0 V to 3.6 V													
t_{pd}	propagation delay	An to Bn	0.8	8	0.8	4.8	0.7	3.9	0.6	3	0.5	2.6	ns
		Bn to An	0.8	5.2	0.8	3.5	0.7	3.2	0.6	2.7	0.5	2.6	ns
t_{dis}	disable time	$\overline{OE}$ to An	1.9	4.7	1.9	4.7	1.9	4.7	1.9	4.7	1.9	4.7	ns
		$\overline{OE}$ to Bn	2.2	8.6	1.9	5.8	2	5.6	1.5	4.4	2	5	ns
t_{en}	enable time	$\overline{OE}$ to An	0.9	2.9	0.9	2.9	0.9	2.9	0.9	2.9	0.9	2.9	ns
		$\overline{OE}$ to Bn	1.5	9.8	1.4	5.6	1.2	4.6	1.1	3.5	1.1	3.1	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}.

Table 14. Dynamic characteristics for temperature range -40 °C to +125 °C [1]

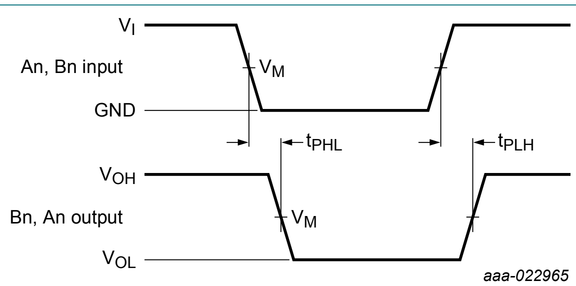
Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 6; for waveforms see Figure 4 and Figure 5

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	An to Bn	1.1	9.7	1.1	7.3	0.9	6.3	0.9	5.6	0.8	5.5	ns
		Bn to An	1.1	9.7	1	8.9	1	8.6	0.9	8.6	0.8	8.4	ns
t_{dis}	disable time	$\overline{OE}$ to An	2.4	10.5	2.4	10.5	2.4	10.5	2.4	10.5	2.4	10.5	ns
		$\overline{OE}$ to Bn	2.7	11.6	2.3	9.1	2.5	8.6	2.1	7.5	2.6	8.4	ns
t_{en}	enable time	$\overline{OE}$ to An	1.5	13	1.5	13	1.5	13	1.5	13	1.5	13	ns
		$\overline{OE}$ to Bn	1.9	13	1.7	9.6	1.6	8.4	1.5	7.2	1.4	7	ns
$V_{CC(A)}$ = 1.4 V to 1.6 V													
t_{pd}	propagation delay	An to Bn	1	8.9	1	5.7	0.9	4.9	0.9	4	0.8	3.7	ns
		Bn to An	1.1	7.3	1	5.7	1	5.5	0.9	5.2	0.8	5.1	ns
t_{dis}	disable time	$\overline{OE}$ to An	2	6.7	2	6.7	2	6.7	2	6.7	2	6.7	ns
		$\overline{OE}$ to Bn	2.6	10.2	2.2	7.1	2.5	6.9	2	5.7	2.5	6.3	ns
t_{en}	enable time	$\overline{OE}$ to An	1.2	7.3	1.2	7.3	1.2	7.3	1.2	7.3	1.2	7.3	ns

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	
		$\overline{OE}$ to Bn	1.7	11.4	1.5	7.1	1.4	6.1	1.3	5.1	1.3	4.7	ns
$V_{CC(A)}$ = 1.65 V to 1.95 V													
t_{pd}	propagation delay	An to Bn	1	8.6	1	5.5	0.9	4.6	0.8	3.6	0.7	3.4	ns
		Bn to An	0.9	6.3	0.9	4.9	0.9	4.6	0.8	4.3	0.7	4.1	ns
t_{dis}	disable time	$\overline{OE}$ to An	2.1	6.2	2.1	6.2	2.1	6.2	2.1	6.2	2.1	6.2	ns
		$\overline{OE}$ to Bn	2.4	10	2.1	6.8	2.3	6.6	1.8	5.3	2.3	5.9	ns
t_{en}	enable time	$\overline{OE}$ to An	1.1	5.7	1.1	5.7	1.1	5.7	1.1	5.7	1.1	5.7	ns
		$\overline{OE}$ to Bn	1.6	11	1.4	6.7	1.3	5.7	1.2	4.6	1.1	4.2	ns
$V_{CC(A)}$ = 2.3 V to 2.7 V													
t_{pd}	propagation delay	An to Bn	0.9	8.6	0.9	5.2	0.8	4.3	0.7	3.3	0.6	2.9	ns
		Bn to An	0.9	5.6	0.9	4	0.8	3.6	0.7	3.3	0.6	3.2	ns
t_{dis}	disable time	$\overline{OE}$ to An	1.5	4.6	1.5	4.6	1.5	4.6	1.5	4.6	1.5	4.6	ns
		$\overline{OE}$ to Bn	2.3	9.5	1.9	6.4	2.2	6.1	1.6	4.9	2.1	5.4	ns
t_{en}	enable time	$\overline{OE}$ to An	0.9	3.9	0.9	3.9	0.9	3.9	0.9	3.9	0.9	3.9	ns
		$\overline{OE}$ to Bn	1.3	10.5	1.3	6.2	1.2	5.1	1.1	4	1.1	3.6	ns
$V_{CC(A)}$ = 3.0 V to 3.6 V													
t_{pd}	propagation delay	An to Bn	0.8	8.4	0.8	5.1	0.7	4.1	0.6	3.2	0.5	2.7	ns
		Bn to An	0.8	5.5	0.8	3.7	0.7	3.4	0.6	2.9	0.5	2.7	ns
t_{dis}	disable time	$\overline{OE}$ to An	1.9	5	1.9	5	1.9	5	1.9	5	1.9	5	ns
		$\overline{OE}$ to Bn	2.2	9	1.9	6.2	2	5.9	1.5	4.7	2	5.2	ns
t_{en}	enable time	$\overline{OE}$ to An	0.9	3.1	0.9	3.1	0.9	3.1	0.9	3.1	0.9	3.1	ns
		$\overline{OE}$ to Bn	1.5	10.2	1.4	5.9	1.2	5	1.1	3.7	1.1	3.3	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}.

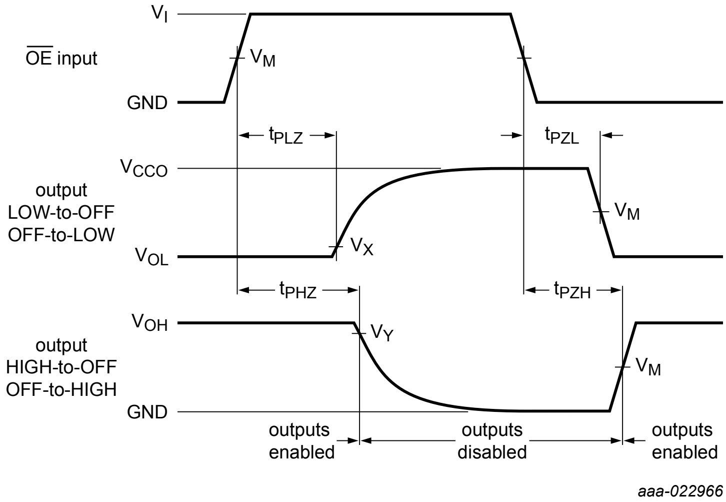
11.1 Waveforms and test circuit



Measurement points are given in Table 15.

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

Figure 4. The data input (An, Bn) to output (Bn, An) propagation delay times



Measurement points are given in Table 15.

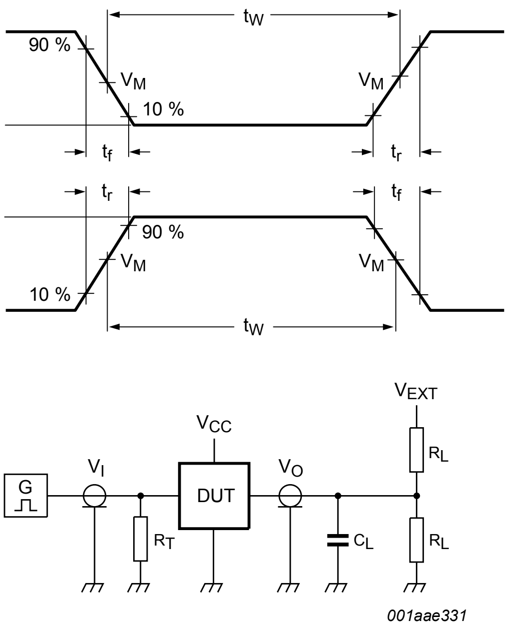
V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 5. Enable and disable times

Table 15. Measurement points

Supply voltage	Input [1]	Output [2]		
$V_{CC(A)}$, $V_{CC(B)}$	V_M	V_M	V_X	V_Y
0.8 V to 1.6 V	$0.5V_{CCI}$	$0.5V_{CCO}$	V_{OL} + 0.1 V	V_{OH} - 0.1 V
1.65 V to 2.7 V	$0.5V_{CCI}$	$0.5V_{CCO}$	V_{OL} + 0.15 V	V_{OH} - 0.15 V
3.0 V to 3.6 V	$0.5V_{CCI}$	$0.5V_{CCO}$	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_{CCO} is the supply voltage associated with the output port.



Test data is given in Table 16.

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

R_T = termination resistance should be equal to output impedance Z_o of the pulse generator.

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

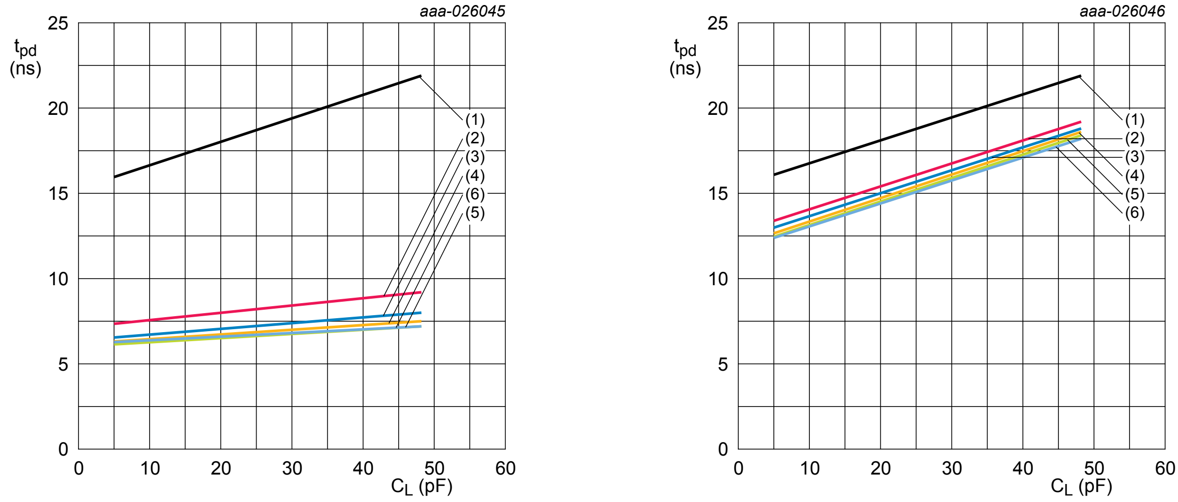
Figure 6. Test circuit for measuring switching times

Table 16. Test data

Supply voltage	Input		Load		V_{EXT}		
$V_{CC(A)}$, $V_{CC(B)}$	V_I [1]	Δt/ΔV [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 kΩ	open	GND	$2V_{CCO}$
1.65 V to 2.7 V	V_{CCI}	≤ 1.0 ns/V	15 pF	2 kΩ	open	GND	$2V_{CCO}$
3.0 V to 3.6 V	V_{CCI}	≤ 1.0 ns/V	15 pF	2 kΩ	open	GND	$2V_{CCO}$

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

12 Typical propagation delay characteristics



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

(1) $V_{CC(B)}$ = 0.8 V

(2) $V_{CC(B)}$ = 1.2 V

(3) $V_{CC(B)}$ = 1.5 V

(4) $V_{CC(B)}$ = 1.8 V

(5) $V_{CC(B)}$ = 2.5 V

(6) $V_{CC(B)}$ = 3.3 V

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

(1) $V_{CC(A)}$ = 0.8 V

(2) $V_{CC(A)}$ = 1.2 V

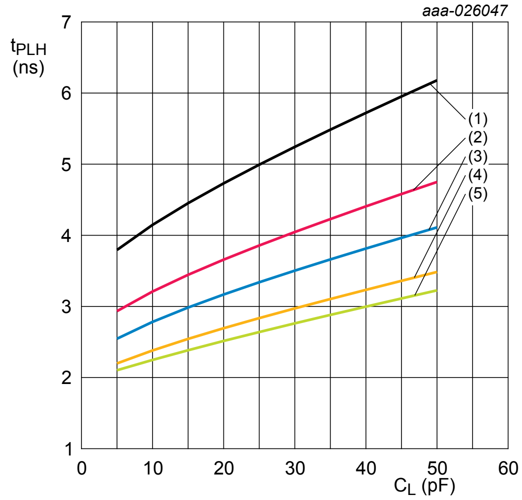
(3) $V_{CC(A)}$ = 1.5 V

(4) $V_{CC(A)}$ = 1.8 V

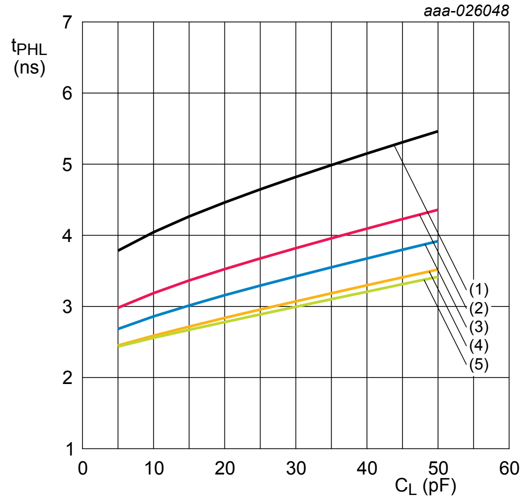
(5) $V_{CC(A)}$ = 2.5 V

(6) $V_{CC(A)}$ = 3.3 V

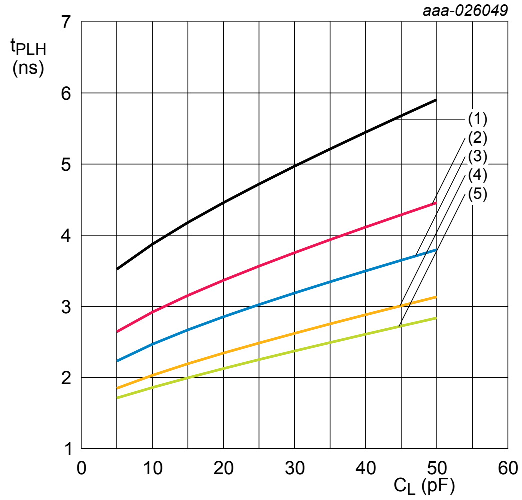
Figure 7. Typical propagation delay versus load capacitance; T_{amb} = 25 °C



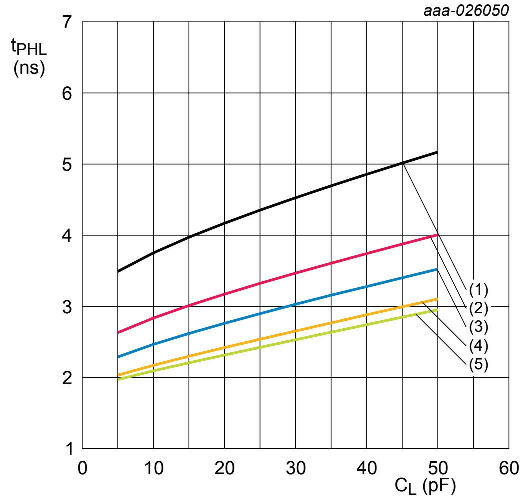
a. LOW to HIGH propagation delay (A to B); $V_{CC(A)}$ = 1.2 V



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



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



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

(1) $V_{CC(B)}$ = 1.2 V

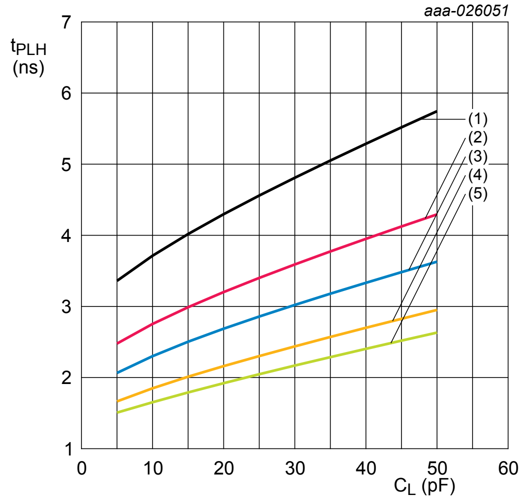
(2) $V_{CC(B)}$ = 1.5 V

(3) $V_{CC(B)}$ = 1.8 V

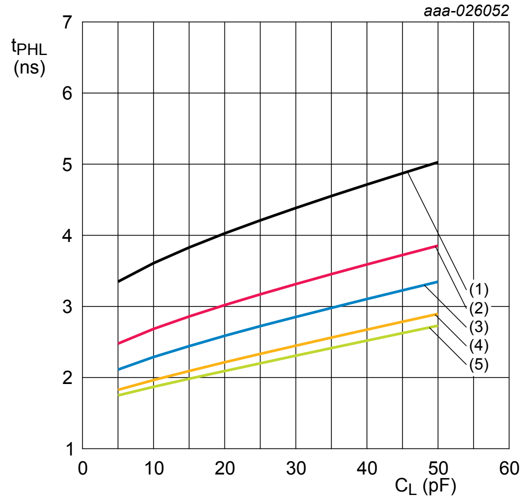
(4) $V_{CC(B)}$ = 2.5 V

(5) $V_{CC(B)}$ = 3.3 V

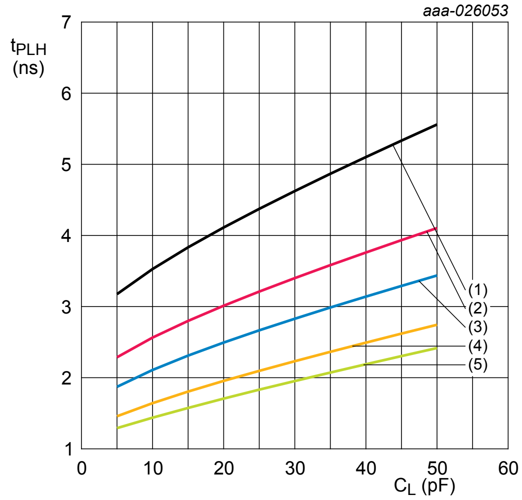
Figure 8. Typical propagation delay versus load capacitance; T_{amb} = 25 °C



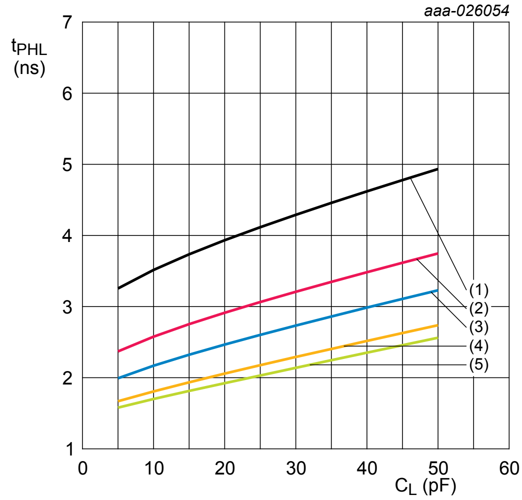
a. LOW to HIGH propagation delay (A to B); $V_{CC(A)}$ = 1.8 V



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



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



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

(1) $V_{CC(B)}$ = 1.2 V

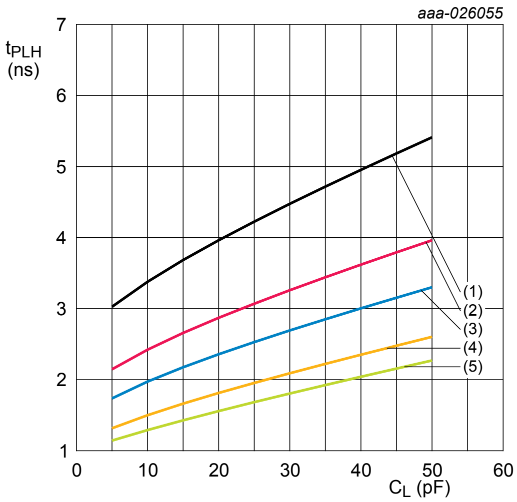
(2) $V_{CC(B)}$ = 1.5 V

(3) $V_{CC(B)}$ = 1.8 V

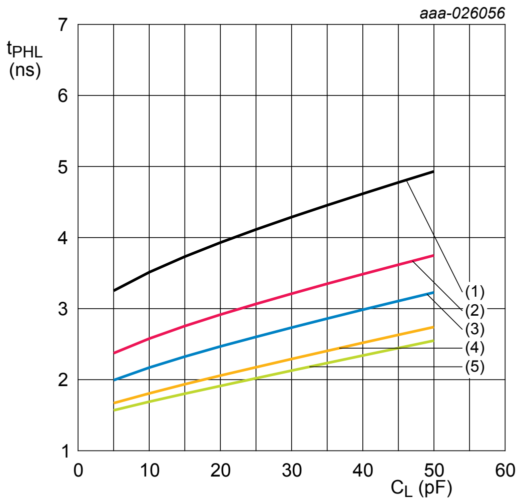
(4) $V_{CC(B)}$ = 2.5 V

(5) $V_{CC(B)}$ = 3.3 V

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



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



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

(1) $V_{CC(B)}$ = 1.2 V

(2) $V_{CC(B)}$ = 1.5 V

(3) $V_{CC(B)}$ = 1.8 V

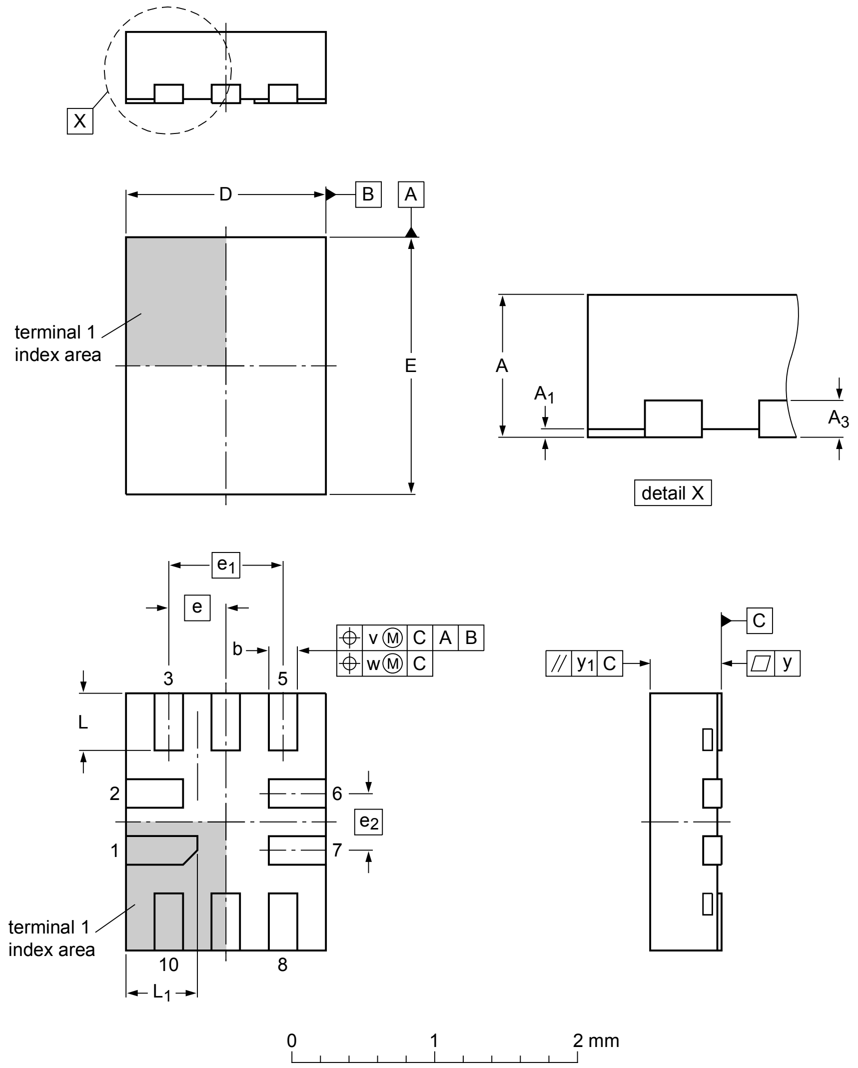
(4) $V_{CC(B)}$ = 2.5 V

(5) $V_{CC(B)}$ = 3.3 V

Figure 10. Typical propagation delay versus load capacitance; T_{amb} = 25 °C

13 Package outline

XQFN10: plastic, extremely thin quad flat package; no leads; 10 terminals; body 1.40 x 1.80 x 0.50 mm **SOT1160-1**



Dimensions

Unit[(1)]		A	A_1	A_3	b	D	E	e	e_1	e_2	L	L_1	v	w	y	y_1
	max	0.5	0.05		0.25	1.5	1.9				0.45	0.55				
mm	nom			0.127	0.20	1.4	1.8	0.4	0.8	0.4	0.40	0.50	0.1	0.05	0.05	0.05
	min		0.00		0.15	1.3	1.7				0.35	0.45				

Note
1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

sot1160-1_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT1160-1	- - -	- - -	- - -		~~09-12-28~~ 09-12-29

Figure 11. Package outline SOT1160-1 (XQFN10)

14 Abbreviations

Table 17. Abbreviations

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

15 Revision history

Table 18. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AVC2T245 v.2	20170406	Product data sheet	-	74AVC2T245 v.1
Modifications:	• 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.			
74AVC2T245 v.1	20161219	Product data sheet	-	-

16 Legal information

16.1 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 URL http://www.nexperia.com.

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Date of release: 6 April 2017
Document identifier: 74AVC2T245