CMOS Digital Integrated Circuits Silicon Monolithic

74AVC4T774MXA

1. Functional Description

- 4-Bit Dual-Supply Bus Transceiver with Configurable Power Supply

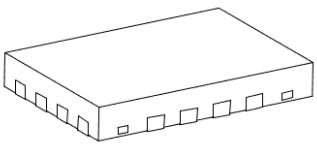
2. General

The 74AVC4T774MXA is a dual power supply type high-speed CMOS 4-bit bus transceiver that can bidirectional level translate between two systems with power supply voltages from 0.7 V to 3.6 V.
The two supply voltages can be user-configurable within the operating range and the sequence of supply voltage ON/OFF can be freely set.
The Enable input $\overline{OE}$ is H level, both A-bus and B-bus become floating state (high-impedance). When the transmission direction switching input DIR is set to "H", bus A becomes an input and bus B becomes an output, and when set to "L", bus A becomes an output and bus B becomes an input. The input (DIR and $\overline{OE}$) has a tolerant function that allows input of up to 3.6 V regardless of the supply voltage. When either power supply is at the GND level, the bus terminals are placed in a high impedance mode and a voltage of up to 3.6 V is allowed to be applied.
This function enables application to partial power-down interfaces.
All inputs are equipped with protection circuits to protect the devices from electrostatic discharge damage.

3. Features

(1) Wide operating temperature range: T_{opr} = -40 to 125 °C
(2) Wide supply voltage value: V_{CCA} = 0.7 to 3.6 V, V_{CCB} = 0.7 to 3.6 V
(3) Bidirectional interface
(4) High-speed operation: t_{pd} = 3.7 ns (max) (V_{CCA} = 3.3 ± 0.3 V, V_{CCB} = 3.3 ± 0.3 V)
(5) Output current: $|I_{OH}|/I_{OL}$ = ± 12 mA (min) (V_{CC} = 3.0 V)
$|I_{OH}|/I_{OL}$ = ± 9 mA (min) (V_{CC} = 2.3 V)
$|I_{OH}|/I_{OL}$ = ± 6 mA (min) (V_{CC} = 1.65 V)
$|I_{OH}|/I_{OL}$ = ± 4 mA (min) (V_{CC} = 1.4 V)
$|I_{OH}|/I_{OL}$ = ± 2 mA (min) (V_{CC} = 1.1 V)
$|I_{OH}|/I_{OL}$ = ± 0.5 mA (min) (V_{CC} = 0.85 V)
$|I_{OH}|/I_{OL}$ = ± 0.2 mA (min) (V_{CC} = 0.76 V)
$|I_{OH}|/I_{OL}$ = ± 0.1 mA (min) (V_{CC} = 0.7 V)
(6) Small package: XQFN16A (1.8 × 2.6 mm)
(7) Application: Servers, network equipment, SPI signals and GPIO signals, etc.
(8) 3.6 V tolerance and power-down protection are provided to all inputs and outputs.

4. Packaging

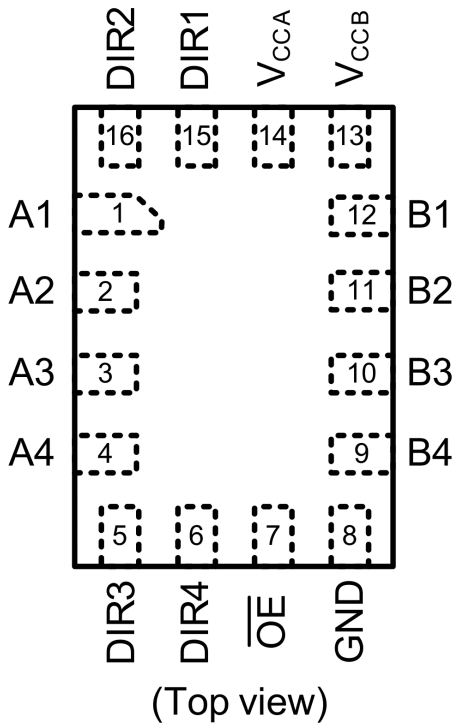


XQFN16A

Start of commercial production
2026-12

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5. Pin Assignment



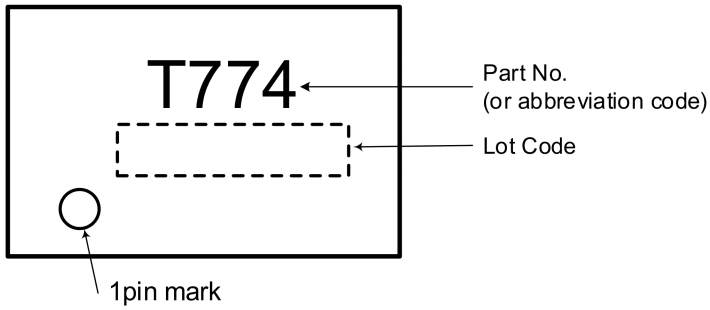
(Top view)

6. Pin functions

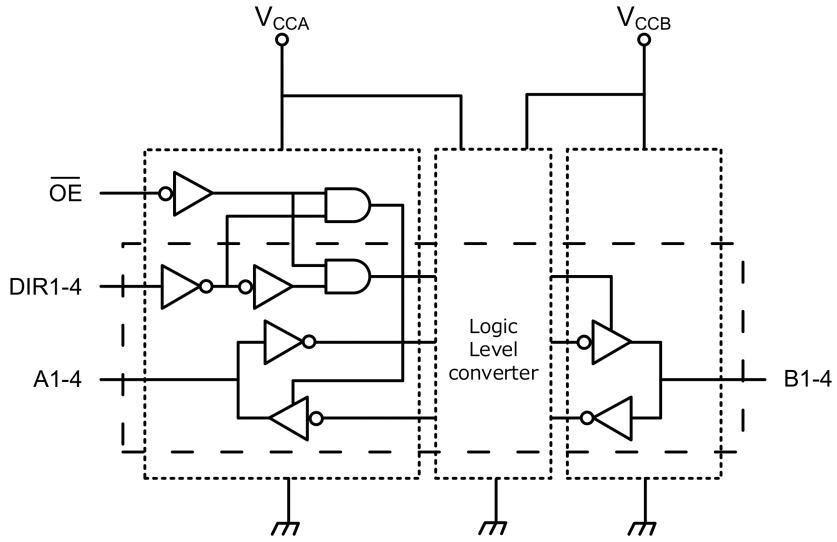
Pin name	Pin No.	Pin type	Description
A1	1	I/O	Input/output terminal A1 (referenced to V_{CCA})
A2	2	I/O	Input/output terminal A2 (referenced to V_{CCA})
A3	3	I/O	Input/output terminal A3 (referenced to V_{CCA})
A4	4	I/O	Input/output terminal A4 (referenced to V_{CCA})
DIR3	5	In	Direction control input for 3 port (referenced to V_{CCA})
DIR4	6	In	Direction control input for 4 port (referenced to V_{CCA})
$\overline{OE}$	7	In	Setting $\overline{OE}$ high puts all ports into the 3-state mode (referenced to V_{CCA})
GND	8	Ground	—
B4	9	I/O	Input/output terminal B4 (referenced to V_{CCB})
B3	10	I/O	Input/output terminal B3 (referenced to V_{CCB})
B2	11	I/O	Input/output terminal B2 (referenced to V_{CCB})
B1	12	I/O	Input/output terminal B1 (referenced to V_{CCB})
V_{CCB}	13	Power supply	Power supply terminal for Port B. When set to GND, I/Os become High-Z.
V_{CCA}	14	Power supply	Power supply terminal for Port A. When set to GND, I/Os become High-Z.
DIR1	15	In	Direction control input for 1 port (referenced to V_{CCA})
DIR2	16	In	Direction control input for 2 port (referenced to V_{CCA})

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7. Marking



8. Block Diagram



9. Truth Table

Supply voltage V_{CCA}	Supply voltage V_{CCB}	Input $\overline{OE}$	Input DIRn	Input/Output Bus An	Input/Output Bus Bn	Function
0.7 to 3.6 V	0.7 to 3.6 V	L	L	Output	Input	A = B
0.7 to 3.6 V	0.7 to 3.6 V	L	H	Input	Output	B = A
0.7 to 3.6 V	0.7 to 3.6 V	H	X	Z	Z	Z
GND	0.7 to 3.6 V	X	X	Z	Z	Z
0.7 to 3.6 V	GND	X	X	Z	Z	Z
GND	GND	X	X	Z	Z	Z

X: Don't care
Z: High impedance

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10. Absolute Maximum Ratings (Note)

Characteristics	Symbol	Note	Rating	Unit
Supply voltage	V_{CCA}		-0.5 to 4.6	V
	V_{CCB}		-0.5 to 4.6	
Input voltage (DIRn, $\overline{OE}$)	V_{IN}		-0.5 to 4.6	V
Bus I/O voltage	$V_{I/OA}$	(Note 1)	-0.5 to 4.6	V
		(Note 2)	-0.5 to V_{CCA} + 0.5	
	$V_{I/OB}$	(Note 1)	-0.5 to 4.6	
		(Note 2)	-0.5 to V_{CCB} + 0.5	
Input diode current	I_{IK}		-50	mA
I/O diode current	$I_{I/OK}$	(Note 3)	-50	mA
Output current	I_{OUTA}		±50	mA
	I_{OUTB}		±50	
V_{CC}/ground current per supply pin	I_{CCA}		100	mA
	I_{CCB}		100	
Power dissipation	P_D	(Note 4)	180	mW
Storage temperature	T_{stg}		-65 to 150	°C

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Input state or high impedance state.

Note 2: Output state. I_{OUT} absolute maximum rating must be observed.

Note 3: V_{OUT} < GND

Note 4: 180 mW in the range of T_a = -40 to 105 °C. From T_a = 105 to 125 °C a derating factor of -8.5 mW/°C shall be applied until 10 mW.

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11. Operating Ranges (Note)

Characteristics	Symbol	Note	Test Condition	Rating	Unit
Supply voltage	V_{CCA}		—	0.7 to 3.6	V
	V_{CCB}		—	0.7 to 3.6	
Input voltage(DIRn, $\overline{OE}$)	V_{IN}		—	0 to 3.6	V
Bus I/O voltage	$V_{I/OA}$	(Note 1)	—	0 to 3.6	V
		(Note 2)	—	0 to V_{CCA}	
	$V_{I/OB}$	(Note 1)	—	0 to 3.6	
		(Note 2)	—	0 to V_{CCB}	
Output current	I_{OUTA}		V_{CCA} = 3.0 to 3.6 V	±12	mA
			V_{CCA} = 2.3 to 2.7 V	±9	
			V_{CCA} = 1.65 to 1.95 V	±6	
			V_{CCA} = 1.4 to 1.6 V	±4	
			V_{CCA} = 1.1 to 1.3 V	±2	
			V_{CCA} = 0.85 to 0.95 V	±0.5	
			V_{CCA} = 0.76 to 0.84 V	±0.2	
			V_{CCA} = 0.7 V	±0.1	
	I_{OUTB}		V_{CCB} = 3.0 to 3.6 V	±12	
			V_{CCB} = 2.3 to 2.7 V	±9	
			V_{CCB} = 1.65 to 1.95 V	±6	
			V_{CCB} = 1.4 to 1.6 V	±4	
			V_{CCB} = 1.1 to 1.3 V	±2	
			V_{CCB} = 0.85 to 0.95 V	±0.5	
			V_{CCB} = 0.76 to 0.84 V	±0.2	
			V_{CCB} = 0.7 V	±0.1	
Operating temperature	T_{opr}		—	-40 to 125	°C
Input rise and fall times	dt/dv	(Note 3)	V_{CC} = 0.7 V	0 to 20	ns/V
			V_{CC} = 0.76 to 1.6 V	0 to 20	
			V_{CC} = 1.65 to 1.95 V	0 to 20	
			V_{CC} = 2.3 to 2.7 V	0 to 20	
			V_{CC} = 3.0 to 3.6 V	0 to 10	

Note: The operating ranges must be maintained to ensure the normal operation of the device.
Unused inputs and bus inputs must be tied to either V_{CC} or GND.

Note 1: Input state or high impedance state.

Note 2: Output state. I_{OUT} absolute maximum rating must be observed.

Note 3: V_{CC} = V_{CCA}, V_{CCB}

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12. Electrical Characteristics

12.1. DC Characteristics (Unless otherwise specified, T_a = -40 to 85 °C)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Min	Max	Unit
High-level input voltage	V_{IHA}	An, DIRn, $\overline{OE}$		0.7	0.7 to 3.6	V_{CCA} × 0.80	—	V
				0.8 to 1.95	0.7 to 3.6	V_{CCA} × 0.70	—	
				2.3 to 2.7	0.7 to 3.6	1.6	—	
				3.0 to 3.6	0.7 to 3.6	2.0	—	
	V_{IHB}	Bn		0.7 to 3.6	0.7	V_{CCB} × 0.80	—	
				0.7 to 3.6	0.8 to 1.95	V_{CCB} × 0.70	—	
				0.7 to 3.6	2.3 to 2.7	1.6	—	
				0.7 to 3.6	3.0 to 3.6	2.0	—	
Low-level input voltage	V_{ILA}	An, DIRn, $\overline{OE}$		0.7	0.7 to 3.6	—	V_{CCA} × 0.20	V
				0.8 to 1.95	0.7 to 3.6	—	V_{CCA} × 0.30	
				2.3 to 2.7	0.7 to 3.6	—	0.7	
				3.0 to 3.6	0.7 to 3.6	—	0.9	
	V_{ILB}	Bn		0.7 to 3.6	0.7	—	V_{CCB} × 0.20	
				0.7 to 3.6	0.8 to 1.95	—	V_{CCB} × 0.30	
				0.7 to 3.6	2.3 to 2.7	—	0.7	
				0.7 to 3.6	3.0 to 3.6	—	0.9	
High-level output voltage	V_{OH}	An, Bn Output H	I_{OH} = -0.1 mA	0.7 to 3.6	0.7 to 3.6	V_{CCO} -0.1	—	V
			I_{OH} = -0.2 mA	0.76	0.76	0.58	—	
			I_{OH} = -0.5 mA	0.85	0.85	0.65	—	
			I_{OH} = -2 mA	1.1	1.1	0.85	—	
			I_{OH} = -4 mA	1.4	1.4	1.05	—	
			I_{OH} = -6 mA	1.65	1.65	1.2	—	
			I_{OH} = -9 mA	2.3	2.3	1.75	—	
			I_{OH} = -12 mA	3.0	3.0	2.3	—	
Low-level output voltage	V_{OL}	An, Bn Output L	I_{OL} = 0.1 mA	0.7 to 3.6	0.7 to 3.6	—	0.1	V
			I_{OL} = 0.2 mA	0.76	0.76	—	0.18	
			I_{OL} = 0.5 mA	0.85	0.85	—	0.2	
			I_{OL} = 2 mA	1.1	1.1	—	0.25	
			I_{OL} = 4 mA	1.4	1.4	—	0.35	
			I_{OL} = 6 mA	1.65	1.65	—	0.45	
			I_{OL} = 9 mA	2.3	2.3	—	0.55	
			I_{OL} = 12 mA	3.0	3.0	—	0.7	

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Characteristics	Symbol	Note	Test Condition	V_{CCA} (V)	V_{CCB} (V)	Min	Max	Unit
3-state output OFF-state leakage current	I_{OZA}	(Note 1)	Function OFF State, V_{IOA} = 0 V or 3.6 V	0.7 to 3.6	0.7 to 3.6	—	±5	μA
	I_{OZB}	(Note 1)	Function OFF State, V_{IOB} = 0 V or 3.6 V	0.7 to 3.6	0.7 to 3.6	—	±5	
Input leakage current	I_{IN}	(Note 1)	Input = 0 V to 3.6 V	0.7 to 3.6	0 to 3.6	—	±1	μA
Power-OFF leakage current	I_{OFFA}	(Note 1)	V_{IOA} = 0 V to 3.6 V	0	0.7 to 3.6	—	±5	μA
	I_{OFFB}	(Note 1)	V_{IOB} = 0 V to 3.6 V	0.7 to 3.6	0	—	±5	
Quiescent supply current	I_{CCA}	(Note 1)	—	0.7 to 3.6	0.7 to 3.6	—	8	μA
				3.6	0	—	8	
	I_{CCB}	(Note 1)	—	0.7 to 3.6	0.7 to 3.6	—	8	
				0	3.6	—	8	
	I_{CCTA}		V_{CCA} - 0.6 V (per input)	3.0 to 3.6	0.7 to 3.6	—	500	
	I_{CCTB}		V_{CCB} - 0.6 V (per input)	0.7 to 3.6	3.0 to 3.6	—	500	

Note 1: Fix the input terminal to each power supply terminal or 0V.

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12.2. DC Characteristics (Unless otherwise specified, T_a = -40 to 125 °C)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Min	Max	Unit
High-level input voltage	V_{IHA}	An, DIRn, $\overline{OE}$		0.7	0.7 to 3.6	V_{CCA} × 0.80	—	V
				0.8 to 1.95	0.7 to 3.6	V_{CCA} × 0.70	—	
				2.3 to 2.7	0.7 to 3.6	1.6	—	
				3.0 to 3.6	0.7 to 3.6	2.0	—	
	V_{IHB}	Bn		0.7 to 3.6	0.7	V_{CCB} × 0.80	—	
				0.7 to 3.6	0.8 to 1.95	V_{CCB} × 0.70	—	
				0.7 to 3.6	2.3 to 2.7	1.6	—	
				0.7 to 3.6	3.0 to 3.6	2.0	—	
Low-level input voltage	V_{ILA}	An, DIRn, $\overline{OE}$		0.7	0.7 to 3.6	—	V_{CCA} × 0.20	V
				0.8 to 1.95	0.7 to 3.6	—	V_{CCA} × 0.30	
				2.3 to 2.7	0.7 to 3.6	—	0.7	
				3.0 to 3.6	0.7 to 3.6	—	0.9	
	V_{ILB}	Bn		0.7 to 3.6	0.7	—	V_{CCB} × 0.20	
				0.7 to 3.6	0.8 to 1.95	—	V_{CCB} × 0.30	
				0.7 to 3.6	2.3 to 2.7	—	0.7	
				0.7 to 3.6	3.0 to 3.6	—	0.9	
High-level output voltage	V_{OH}	An, Bn Output H	I_{OH} = -0.1 mA	0.7 to 3.6	0.7 to 3.6	V_{CCO} -0.1	—	V
			I_{OH} = -0.2 mA	0.76	0.76	0.58	—	
			I_{OH} = -0.5 mA	0.85	0.85	0.65	—	
			I_{OH} = -2 mA	1.1	1.1	0.85	—	
			I_{OH} = -4 mA	1.4	1.4	1.05	—	
			I_{OH} = -6 mA	1.65	1.65	1.2	—	
			I_{OH} = -9 mA	2.3	2.3	1.75	—	
			I_{OH} = -12 mA	3.0	3.0	2.3	—	
Low-level output voltage	V_{OL}	An, Bn Output L	I_{OL} = 0.1 mA	0.7 to 3.6	0.7 to 3.6	—	0.1	V
			I_{OL} = 0.2 mA	0.76	0.76	—	0.18	
			I_{OL} = 0.5 mA	0.85	0.85	—	0.2	
			I_{OL} = 2 mA	1.1	1.1	—	0.25	
			I_{OL} = 4 mA	1.4	1.4	—	0.35	
			I_{OL} = 6 mA	1.65	1.65	—	0.45	
			I_{OL} = 9 mA	2.3	2.3	—	0.55	
			I_{OL} = 12 mA	3.0	3.0	—	0.7	

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Characteristics	Symbol	Note	Test Condition	V_{CCA} (V)	V_{CCB} (V)	Min	Max	Unit
3-state output OFF-state leakage current	I_{OZA}	(Note 1)	Function OFF State, V_{IOA} = 0 V or 3.6 V	0.7 to 3.6	0.7 to 3.6	—	±7.5	μA
	I_{OZB}	(Note 1)	Function OFF State, V_{IOB} = 0 V or 3.6 V	0.7 to 3.6	0.7 to 3.6	—	±7.5	
Input leakage current	I_{IN}	(Note 1)	Input = 0 V to 3.6 V	0.7 to 3.6	0 to 3.6	—	±5	μA
Power-OFF leakage current	I_{OFFA}	(Note 1)	V_{IOA} = 0 V to 3.6 V	0	0.7 to 3.6	—	±10	μA
	I_{OFFB}	(Note 1)	V_{IOB} = 0 V to 3.6 V	0.7 to 3.6	0	—	±10	
Quiescent supply current	I_{CCA}	(Note 1)	—	0.7 to 3.6	0.7 to 3.6	—	18	μA
				3.6	0	—	18	
	I_{CCB}	(Note 1)	—	0.7 to 3.6	0.7 to 3.6	—	18	
				0	3.6	—	18	
	I_{CCTA}		V_{CCA} - 0.6 V (per input)	3.0 to 3.6	0.7 to 3.6	—	500	
	I_{CCTB}		V_{CCB} - 0.6 V (per input)	0.7 to 3.6	3.0 to 3.6	—	500	

Note 1: Fix the input terminal to each power supply terminal or 0V.

12.3. AC Characteristics (Note) (V_{CCA} = 0.7 V, T_a = 25 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Typ.	V_{CCB} 0.8 V Typ.	V_{CCB} 0.9 V Typ.	V_{CCB} 1.2 V Typ.	V_{CCB} 1.5 V Typ.	V_{CCB} 1.8 V Typ.	V_{CCB} 2.5 V Typ.	V_{CCB} 3.3 V Typ.	Unit
Propagation delay time(A → B)	t_{PLH}/t_{PHL}	17.4	15.5	14.4	13.2	11.9	11.1	11.0	11.6	ns
Propagation delay time (B → A)		17.4	14.0	12.2	9.9	8.9	8.3	7.4	6.9	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	27.7	27.9	27.8	28.0	27.9	28.5	29.7	32.3	
3-state output disable time ($\overline{OE}$ → B)		29.2	24.9	22.9	16.1	14.8	15.1	14.4	15.5	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	30.4	30.5	30.5	30.5	30.5	30.5	30.2	29.2	
3-state output enable time ($\overline{OE}$ → B)		51.0	39.1	33.0	26.1	23.4	22.3	22.1	22.9	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.4. AC Characteristics (Note) (V_{CCB} = 0.7 V, T_a = 25 °C)

Characteristics	Symbol	V_{CCA} 0.7 V Typ.	V_{CCA} 0.8 V Typ.	V_{CCA} 0.9 V Typ.	V_{CCA} 1.2 V Typ.	V_{CCA} 1.5 V Typ.	V_{CCA} 1.8 V Typ.	V_{CCA} 2.5 V Typ.	V_{CCA} 3.3 V Typ.	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	17.4	14.0	12.2	9.9	8.9	8.3	7.4	6.9	ns
Propagation delay time (B → A)		17.4	15.5	14.4	13.2	11.9	11.1	11.0	11.6	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	27.7	20.4	16.3	7.4	5.2	4.9	3.2	3.5	
3-state output disable time ($\overline{OE}$ → B)		29.2	25.9	23.9	21.5	20.6	19.8	19.2	19.6	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	30.4	21.2	16.2	10.5	8.1	7.1	6.6	6.8	
3-state output enable time ($\overline{OE}$ → B)		51.0	46.8	44.5	41.7	41.2	41.0	40.6	40.0	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

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12.5. AC Characteristics (Note) (V_{CCA} = 0.7 V, T_a = -40 to 85 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	50.7	41.6	34.8	30.5	29.6	30.0	33.7	40.6	ns
Propagation delay time (B → A)		50.7	42.5	36.3	31.6	30.3	29.8	29.6	29.6	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	60.0	59.4	59.6	57.2	57.0	56.1	54.3	56.3	
3-state output disable time ($\overline{OE}$ → B)		62.2	50.8	42.7	34.6	32.7	33.0	34.0	36.7	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	83.0	83.2	82.8	84.1	84.6	83.5	83.6	84.4	
3-state output enable time ($\overline{OE}$ → B)		144.3	106.0	77.5	56.7	50.6	49.0	50.3	51.5	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.6. AC Characteristics (Note) (V_{CCA} = 0.8 ± 0.04 V, T_a = -40 to 85 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	42.5	33.1	25.8	21.9	20.1	19.9	21.0	23.3	ns
Propagation delay time (B → A)		41.6	33.1	26.7	21.1	18.9	18.5	18.4	18.6	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	39.4	38.2	39.9	38.6	38.7	38.1	41.0	43.6	
3-state output disable time ($\overline{OE}$ → B)		54.7	43.3	35.2	25.8	23.9	23.5	23.2	24.5	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	54.3	54.1	54.1	53.8	55.1	56.0	56.5	57.1	
3-state output enable time ($\overline{OE}$ → B)		130.0	92.7	64.1	43.1	36.6	34.5	34.0	35.1	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.7. AC Characteristics (Note) (V_{CCA} = 0.9 ± 0.045 V, T_a = -40 to 85 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	36.3	26.7	19.7	16.1	14.1	13.4	13.3	13.7	ns
Propagation delay time (B → A)		34.8	25.8	19.7	14.3	12.9	12.2	11.3	11.9	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	28.1	26.9	27.2	27.7	28.0	28.9	31.5	35.9	
3-state output disable time ($\overline{OE}$ → B)		45.7	36.5	29.1	19.9	17.6	16.5	15.3	16.3	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	32.4	32.1	31.9	32.0	31.4	31.7	32.4	32.3	
3-state output enable time ($\overline{OE}$ → B)		122.6	84.5	54.9	35.4	28.1	25.5	23.1	23.1	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.8. AC Characteristics (Note) (V_{CCA} = 1.2 ± 0.1 V, T_a = -40 to 85 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	31.6	21.1	14.3	11.3	9.8	9.1	8.5	8.2	ns
Propagation delay time (B → A)		30.5	21.9	16.1	11.3	9.4	8.6	7.9	7.5	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	13.4	13.4	13.5	13.0	13.0	13.0	13.1	13.1	
3-state output disable time ($\overline{OE}$ → B)		41.4	29.2	23.4	14.7	11.7	11.2	9.6	10.2	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	18.7	18.7	18.5	18.3	18.5	18.6	18.1	18.1	
3-state output enable time ($\overline{OE}$ → B)		114.8	76.0	46.2	28.7	21.5	18.7	15.9	14.6	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

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12.9. AC Characteristics (Note) (V_{CCA} = 1.5 ± 0.1 V, T_a = -40 to 85 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	30.3	18.9	12.9	9.4	7.5	6.9	6.6	6.5	ns
Propagation delay time (B → A)		29.6	20.1	14.1	9.8	7.5	6.7	6.0	5.6	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	8.8	8.7	8.8	8.9	8.7	8.7	8.5	8.2	
3-state output disable time ($\overline{OE}$ → B)		38.8	28.2	20.0	12.5	9.7	9.0	7.3	7.8	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	13.1	12.7	12.3	12.5	12.2	12.2	12.5	12.7	
3-state output enable time ($\overline{OE}$ → B)		112.4	73.5	43.9	25.9	18.7	16.0	12.8	11.4	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.10. AC Characteristics (Note) (V_{CCA} = 1.8 ± 0.15 V, T_a = -40 to 85 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	29.8	18.5	12.2	8.6	6.7	6.0	5.8	5.7	ns
Propagation delay time (B → A)		30.0	19.9	13.4	9.1	6.9	6.0	5.1	4.7	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	7.4	7.4	7.5	7.6	7.5	7.5	7.4	7.3	
3-state output disable time ($\overline{OE}$ → B)		37.0	27.1	19.7	12.6	9.3	7.8	6.1	6.9	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	11.3	10.7	10.2	10.3	9.9	9.8	9.9	10.1	
3-state output enable time ($\overline{OE}$ → B)		113.2	73.4	43.4	24.9	17.7	14.8	11.6	10.1	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.11. AC Characteristics (Note) (V_{CCA} = 2.5 ± 0.2 V, T_a = -40 to 85 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	29.6	18.4	11.3	7.9	6.0	5.1	4.5	4.5	ns
Propagation delay time (B → A)		33.7	21.0	13.3	8.5	6.6	5.8	4.5	4.0	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	5.1	5.1	5.1	4.9	4.9	4.9	4.9	4.9	
3-state output disable time ($\overline{OE}$ → B)		37.3	26.7	19.4	11.8	8.5	7.0	5.3	5.6	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	9.8	9.2	8.0	7.6	7.4	7.3	7.2	7.1	
3-state output enable time ($\overline{OE}$ → B)		114.4	73.3	43.0	23.7	16.5	13.5	10.1	8.6	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.12. AC Characteristics (Note) (V_{CCA} = 3.3 ± 0.3 V, T_a = -40 to 85 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	29.6	18.6	11.9	7.5	5.6	4.7	4.0	3.7	ns
Propagation delay time (B → A)		40.6	23.3	13.7	8.2	6.5	5.7	4.5	3.7	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	5.2	5.2	5.2	5.0	5.0	5.0	5.0	5.0	
3-state output disable time ($\overline{OE}$ → B)		36.8	33.4	28.2	15.7	11.4	9.3	6.5	5.3	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	8.8	8.7	7.8	6.4	6.1	6.0	5.9	5.8	
3-state output enable time ($\overline{OE}$ → B)		115.7	73.0	42.7	23.7	16.0	13.1	9.6	8.1	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

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12.13. AC Characteristics (Note) (V_{CCA} = 0.7 V, T_a = -40 to 125 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	50.7	41.6	34.8	30.5	29.6	30.0	33.7	40.6	ns
Propagation delay time (B → A)		50.7	42.5	36.3	31.6	30.3	29.8	29.6	29.6	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	60.0	59.4	59.6	57.2	57.0	56.1	54.3	56.3	
3-state output disable time ($\overline{OE}$ → B)		62.2	50.8	42.7	34.6	32.7	33.0	34.0	36.7	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	83.0	83.2	82.8	84.1	84.6	83.5	83.6	84.4	
3-state output enable time ($\overline{OE}$ → B)		144.3	106.0	77.5	56.7	50.6	49.0	50.3	51.5	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.14. AC Characteristics (Note) (V_{CCA} = 0.8 ± 0.04 V, T_a = -40 to 125 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	42.5	33.1	25.8	21.9	20.1	19.9	21.0	23.3	ns
Propagation delay time (B → A)		41.6	33.1	26.7	21.1	18.9	18.5	18.4	18.6	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	39.4	38.2	39.9	38.6	38.7	38.1	41.0	43.6	
3-state output disable time ($\overline{OE}$ → B)		54.7	43.3	35.2	25.8	23.9	23.5	23.2	24.5	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	54.3	54.1	54.1	53.8	55.1	56.0	56.5	57.1	
3-state output enable time ($\overline{OE}$ → B)		130.0	92.7	64.1	43.1	36.6	34.5	34.0	35.1	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.15. AC Characteristics (Note) (V_{CCA} = 0.9 ± 0.045 V, T_a = -40 to 125 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	36.3	26.7	19.7	16.2	14.3	13.4	13.3	13.7	ns
Propagation delay time (B → A)		34.8	25.8	19.7	14.3	13.1	12.5	11.4	11.9	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	28.1	26.9	27.2	27.7	28.0	28.9	31.5	35.9	
3-state output disable time ($\overline{OE}$ → B)		45.7	36.5	29.1	20.2	17.7	16.8	15.4	16.3	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	32.4	32.1	31.9	32.0	31.4	31.7	32.4	32.3	
3-state output enable time ($\overline{OE}$ → B)		122.6	84.5	54.9	35.7	28.5	25.7	23.3	23.1	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.16. AC Characteristics (Note) (V_{CCA} = 1.2 ± 0.1 V, T_a = -40 to 125 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	31.6	21.1	14.3	11.6	10.3	9.6	8.9	8.7	ns
Propagation delay time (B → A)		30.5	21.9	16.2	11.6	9.7	8.9	8.3	7.9	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	13.8	14.0	14.0	13.7	13.7	13.6	13.7	13.7	
3-state output disable time ($\overline{OE}$ → B)		41.4	29.2	23.9	15.0	12.5	11.7	9.9	10.6	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	19.3	19.3	19.1	19.0	19.2	19.2	18.6	18.7	
3-state output enable time ($\overline{OE}$ → B)		114.8	76.0	46.2	29.7	22.5	19.7	16.8	15.4	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

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12.17. AC Characteristics (Note) (V_{CCA} = 1.5 ± 0.1 V, T_a = -40 to 125 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	30.3	18.9	13.1	9.7	7.9	7.4	7.1	6.9	ns
Propagation delay time (B → A)		29.6	20.1	14.3	10.3	7.9	7.1	6.4	6.0	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	9.1	9.0	9.1	9.3	9.1	9.1	8.8	8.7	
3-state output disable time ($\overline{OE}$ → B)		38.8	28.2	20.0	12.8	10.5	9.5	7.6	8.3	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	13.5	13.2	12.9	13.5	13.0	13.0	13.2	13.5	
3-state output enable time ($\overline{OE}$ → B)		112.4	73.5	43.9	27.0	19.8	17.0	13.8	12.3	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.18. AC Characteristics (Note) (V_{CCA} = 1.8 ± 0.15 V, T_a = -40 to 125 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	29.8	18.5	12.5	8.9	7.1	6.3	6.0	5.9	ns
Propagation delay time (B → A)		30.0	19.9	13.4	9.6	7.4	6.3	5.6	5.2	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	7.7	7.8	7.7	7.9	7.9	7.8	7.8	7.5	
3-state output disable time ($\overline{OE}$ → B)		37.0	27.1	19.7	13.4	9.8	8.1	6.4	7.5	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	11.8	11.2	10.7	11.0	10.7	10.6	10.7	10.9	
3-state output enable time ($\overline{OE}$ → B)		113.2	73.4	43.4	25.9	18.8	15.9	12.5	10.9	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.19. AC Characteristics (Note) (V_{CCA} = 2.5 ± 0.2 V, T_a = -40 to 125 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	29.6	18.4	11.4	8.3	6.4	5.6	4.7	4.7	ns
Propagation delay time (B → A)		33.7	21.0	13.3	8.9	7.1	6.0	4.7	4.3	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	5.4	5.4	5.4	5.2	5.2	5.2	5.2	5.2	
3-state output disable time ($\overline{OE}$ → B)		37.3	26.7	19.6	12.6	8.9	7.3	5.6	6.0	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	10.1	9.6	8.4	8.3	7.9	7.9	7.8	7.6	
3-state output enable time ($\overline{OE}$ → B)		114.4	73.3	43.0	24.5	17.4	14.5	11.0	9.3	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

12.20. AC Characteristics (Note) (V_{CCA} = 3.3 ± 0.3 V, T_a = -40 to 125 °C)

Characteristics	Symbol	V_{CCB} 0.7 V Max	V_{CCB} 0.8 ± 0.04 V Max	V_{CCB} 0.9 ± 0.045 V Max	V_{CCB} 1.2 ± 0.1 V Max	V_{CCB} 1.5 ± 0.1 V Max	V_{CCB} 1.8 ± 0.15 V Max	V_{CCB} 2.5 ± 0.2 V Max	V_{CCB} 3.3 ± 0.3 V Max	Unit
Propagation delay time (A → B)	t_{PLH}/t_{PHL}	29.6	18.6	11.9	7.9	6.0	5.2	4.3	3.9	ns
Propagation delay time (B → A)		40.6	23.3	13.7	8.7	6.9	5.9	4.7	3.9	
3-state output disable time ($\overline{OE}$ → A)	t_{PLZ}/t_{PHZ}	5.4	5.4	5.4	5.2	5.2	5.2	5.2	5.2	
3-state output disable time ($\overline{OE}$ → B)		36.8	33.8	29.1	16.3	11.8	9.6	6.7	5.5	
3-state output enable time ($\overline{OE}$ → A)	t_{PZL}/t_{PZH}	9.1	8.9	8.1	6.9	6.6	6.6	6.4	6.5	
3-state output enable time ($\overline{OE}$ → B)		115.7	73.0	42.7	24.5	16.9	14.0	10.4	8.7	

Note: See Figure 13.1, 14.1, 14.2, table 13.1.1, 13.1.2, 14.1.1 for the measurement circuit.

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12.21. Capacitive Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Note	Test Condition	V_{CCA}, V_{CCB} 0.7 V Typ.	V_{CCA}, V_{CCB} 0.8 V Typ.	V_{CCA}, V_{CCB} 0.9 V Typ.	V_{CCA}, V_{CCB} 1.2 V Typ.	V_{CCA}, V_{CCB} 1.5 V Typ.	V_{CCA}, V_{CCB} 1.8 V Typ.	V_{CCA}, V_{CCB} 2.5 V Typ.	V_{CCA}, V_{CCB} 3.3 V Typ.	Unit
Input capacitance	C_{IN}		V_{IN} = 0 V or 3.3 V	—	—	—	—	—	—	—	4	pF
Bus I/O capacitance	$C_{I/OA}$		An = OFF, V_{IOA} = 0 V or 3.3 V	—	—	—	—	—	—	—	5	pF
	$C_{I/OB}$		Bn = OFF, V_{IOB} = 0 V or 3.3 V	—	—	—	—	—	—	—	5	
Power dissipation capacitance	C_{PDA}	(Note 1)	A → B	1.5	1.5	1.5	1.5	2	2	2	2.5	pF
			B → A	13	13	13	13.5	13.5	14	14.5	15	
	C_{PDB}	(Note 1)	A → B	13	13	13	13.5	13.5	14	14.5	15	
			B → A	1.5	1.5	1.5	1.5	2	2	2	2.5	

Note 1: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation.

$I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/4$ (per bit)

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13. AC Test Circuit

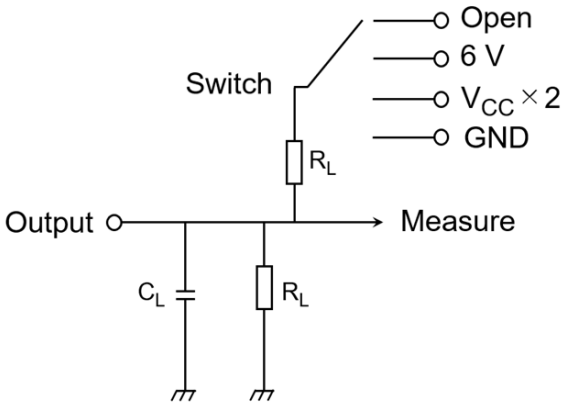


Fig. 13.1 AC Test Circuit

Table 13.1.1 Parameter for AC Test Circuit

Parameter	Switch
t_{PLH}, t_{PHL}	Open
t_{PLZ}, t_{PZL}	$V_{CC} \times 2$
t_{PHZ}, t_{PZH}	GND

Table 13.1.2 Parameter for AC Test Circuit

Symbol	V_{CC} = 3.3 ± 0.3 V	V_{CC} = 2.5 ± 0.2 V	V_{CC} = 1.8 ± 0.15 V	V_{CC} = 1.5 ± 0.1 V	V_{CC} = 1.2 ± 0.1 V	V_{CC} = 0.9 ± 0.045 V	V_{CC} = 0.8 ± 0.04 V	V_{CC} = 0.7 V
R_L	2 kΩ	2 kΩ	2 kΩ	2 kΩ	2 kΩ	10 kΩ	10 kΩ	10 kΩ
C_L	15 pF	15 pF	15 pF	15 pF	15 pF	5 pF	5 pF	5 pF

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14. AC Waveform

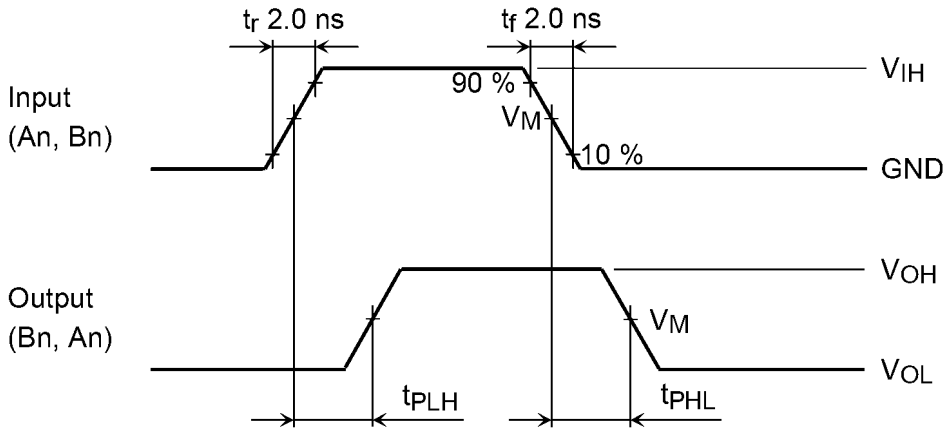


Fig. 14.1 t_{PLH}, t_{PHL}

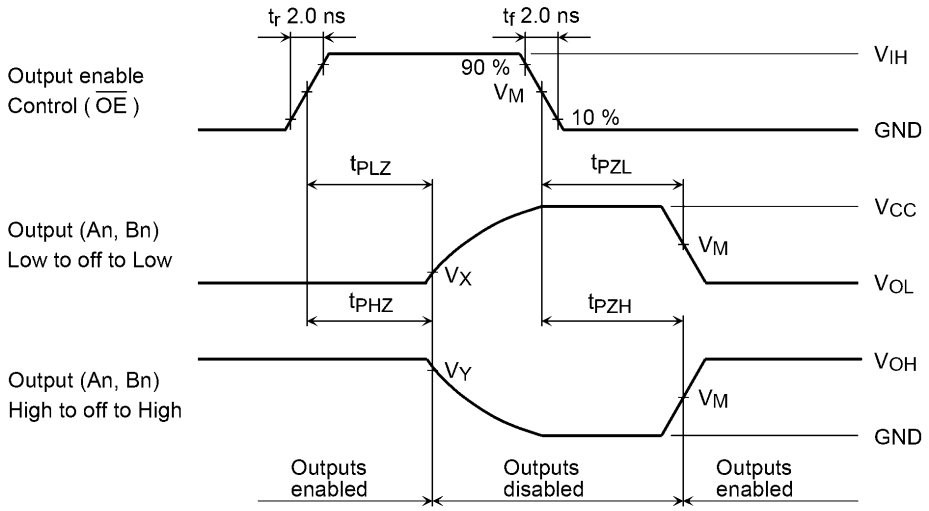


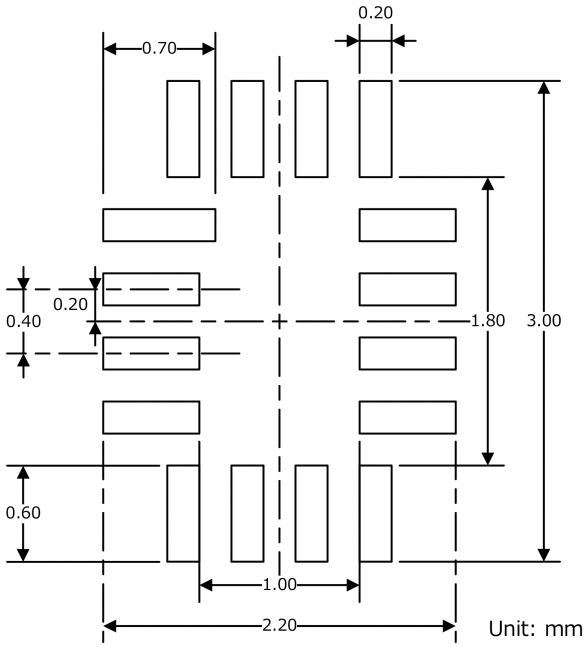
Fig. 14.2 t_{PLZ}, t_{PHZ}, t_{PZL}, t_{PZH}

Table 14.1.1 AC Waveform Symbols

Symbol	V_{CC} = 3.3 ± 0.3 V	V_{CC} = 2.5 ± 0.2 V V_{CC} = 1.8 ± 0.15 V	V_{CC} = 1.5 ± 0.1 V V_{CC} = 1.2 ± 0.1 V	V_{CC} = 0.9 ± 0.045 V V_{CC} = 0.8 ± 0.04 V V_{CC} = 0.7 V
V_{IH}	V_{CC}	V_{CC}	V_{CC}	V_{CC}
V_M	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$
V_X	V_{OL} + 0.3 V	V_{OL} + 0.15 V	V_{OL} + 0.1 V	V_{OL} + 0.1 V
V_Y	V_{OH} - 0.3 V	V_{OH} - 0.15 V	V_{OH} - 0.1 V	V_{OH} - 0.1 V

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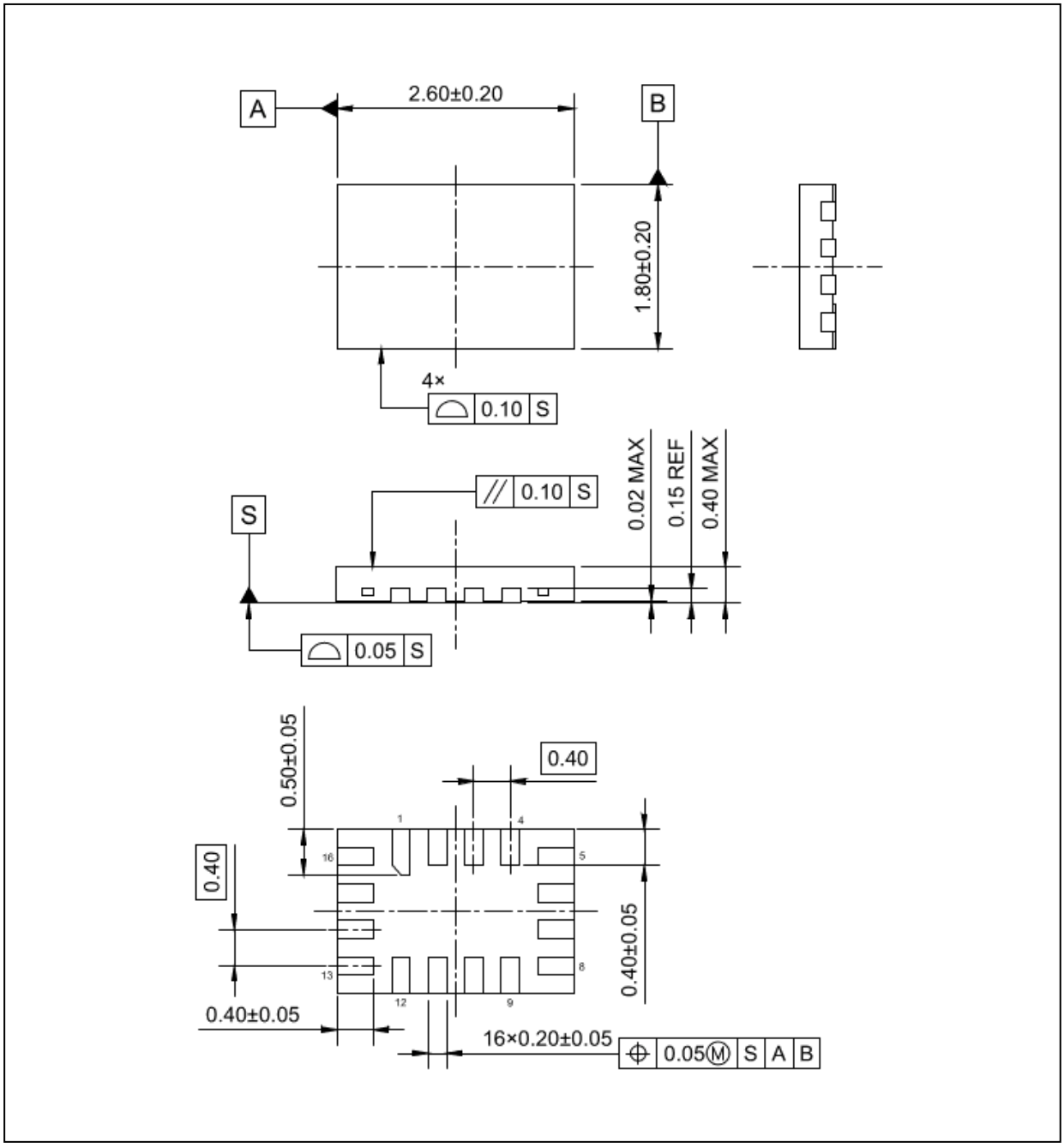
15. Land Pattern Dimensions (for reference only)



(Top View)

Package Dimensions

Unit: mm



Weight: 4.34 mg (typ.)

Package Name(s)
TOSHIBA: P-XQFN16-0302-0.40-002
Nickname: XQFN16A

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