TOSHIBA Digital Integrated Circuit Silicon Monolithic

TC7MPN3125FK,TC7MPN3125FTG

Low Voltage/Low Power 2-Bit × 2 Dual Supply Bus Transceiver

The TC7MPN3125FK/FTG is a dual supply, advanced high-speed CMOS 4-bit dual supply voltage interface bus transceiver fabricated with silicon gate CMOS technology.

It is also designed with over voltage tolerant inputs and outputs up to 3.6 V.

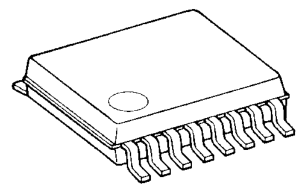
Designed for use as an interface between a 1.2-V, 1.5-V, 1.8-V, or 2.5-V bus and a 1.8-V, 2.5-V or 3.6-V bus in mixed 1.2-V, 1.5-V, 1.8-V or 2.5-V/1.8-V, 2.5-V or 3.6-V supply systems.

The A-port interfaces with the 1.2-V, 1.5-V, 1.8-V or 2.5-V bus, the B-port with the 1.8-V, 2.5-V, 3.3-V bus.

The direction of data transmission is determined by the level of the DIR input. The enable input ($\overline{OE}$) can be used to disable the device so that the buses are effectively isolated.

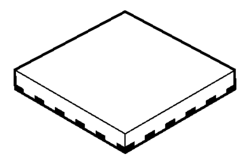
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

TC7MPN3125FK



VSSOP16-P-0030-0.50

TC7MPN3125FTG



VQON16-P-0303-0.50

Weight
VSSOP16-P-0030-0.50: 0.02 g (typ.)
VQON16-P-0303-0.50: 0.013 g (typ.)

Features

- Bidirectional interface between 1.2-V and 1.8-V, 1.2-V and 2.5-V, 1.2-V and 3.3-V, 1.5-V and 2.5-V, 1.5-V and 3.3-V, 1.8-V and 2.5-V, 1.8-V and 3.3-V or 2.5-V and 3.3-V buses.
- High-speed operation: t_{pd} = 13.7 ns (max) (V_{CCA} = 2.5 ± 0.2 V, V_{CCB} = 3.3 ± 0.3 V)
  t_{pd} = 14.8 ns (max) (V_{CCA} = 1.8 ± 0.15 V, V_{CCB} = 3.3 ± 0.3 V)
  t_{pd} = 16.0 ns (max) (V_{CCA} = 1.5 ± 0.1 V, V_{CCB} = 3.3 ± 0.3 V)
  t_{pd} = 61 ns (max) (V_{CCA} = 1.2 ± 0.1 V, V_{CCB} = 3.3 ± 0.3 V)
  t_{pd} = 18.5 ns (max) (V_{CCA} = 1.8 ± 0.15 V, V_{CCB} = 2.5 ± 0.2 V)
  t_{pd} = 19.7 ns (max) (V_{CCA} = 1.5 ± 0.15 V, V_{CCB} = 2.5 ± 0.2 V)
  t_{pd} = 60 ns (max) (V_{CCA} = 1.2 ± 0.15 V, V_{CCB} = 2.5 ± 0.2 V)
  t_{pd} = 58 ns (max) (V_{CCA} = 1.2 ± 0.1 V, V_{CCB} = 1.8 ± 0.15 V)
- Output current: I_{OHB}/I_{OLB} = ±3 mA (min) (V_{CCB} = 3.0 V)
  I_{OHB}/I_{OLB} = ±2 mA (min) (V_{CCB} = 2.3 V)
  I_{OHB}/I_{OLB} = ±0.5 mA (min) (V_{CCB} = 1.65 V)
  I_{OHA}/I_{OLA} = ±9 mA (min) (V_{CCA} = 2.3 V)
  I_{OHA}/I_{OLA} = ±3 mA (min) (V_{CCA} = 1.65 V)
  I_{OHA}/I_{OLA} = ±1 mA (min) (V_{CCA} = 1.4 V))
- Latch-up performance: ±300 mA
- ESD performance: Machine model ≥ ±200 V
  Human body model ≥ ±2000 V
- Ultra-small package: VSSOP (US16), VQON16
- Low current consumption: Using the new circuit significantly reduces current consumption when $\overline{OE}$ = "H".
  Suitable for battery-driven applications such as PDAs and cellular phones.
- Floating A-bus and B-bus are permitted. (when $\overline{OE}$ = "H")
  3.6-V tolerant function and power-down protection provided on all inputs and outputs.

Note 1: Do not apply a signal to any bus pins when it is in the output mode. Damage may result.

Note: When mounting VQON package, the type of recommended flux is RA or RMA.

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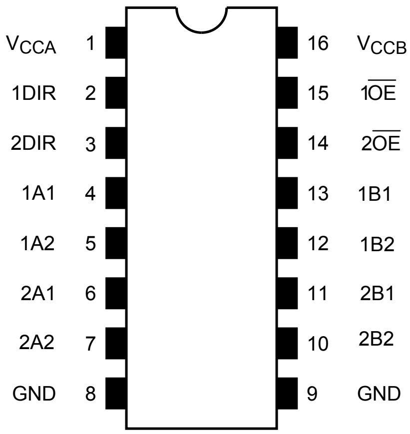
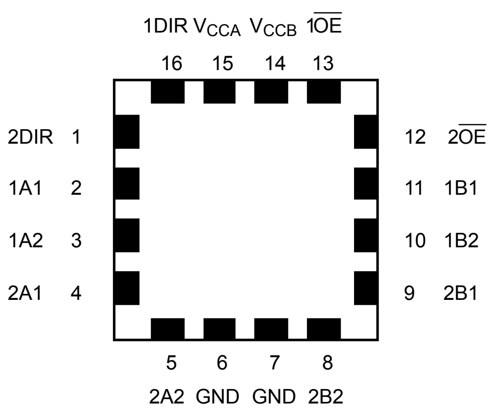
Pin Assignment (top view)

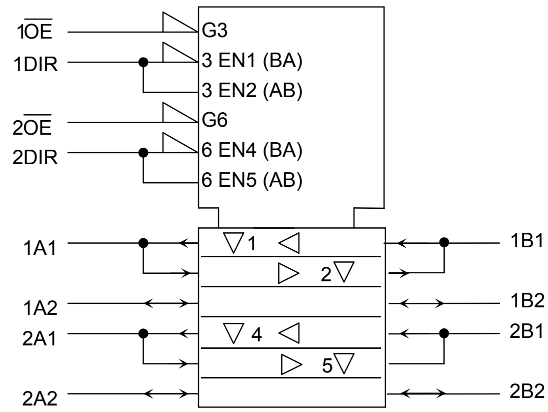
FK(VSSOP16-P-0030-0.50)



FTG (VQON16-P-0303-0.50)



IEC Logic Symbol



Truth Table

Inputs		Function		Outputs
$1\overline{OE}$	1DIR	Bus 1A1-1A2	Bus 1B1-1B2	
L	L	Output	Input	A = B
L	H	Input	Output	B = A
H	X	Z		Z

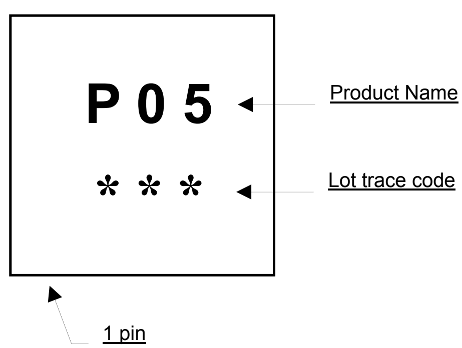
Inputs		Function		Outputs
$2\overline{OE}$	2DIR	Bus 2A1-2A2	Bus 2B1-2B2	
L	L	Output	Input	A = B
L	H	Input	Output	B = A
H	X	Z		Z

X: Don't care

Z: High impedance

Marking

FTG (VQON16-P-0303-0.50)



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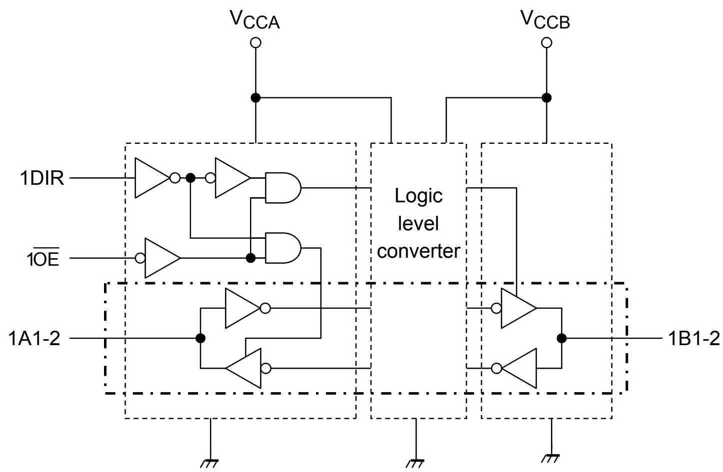
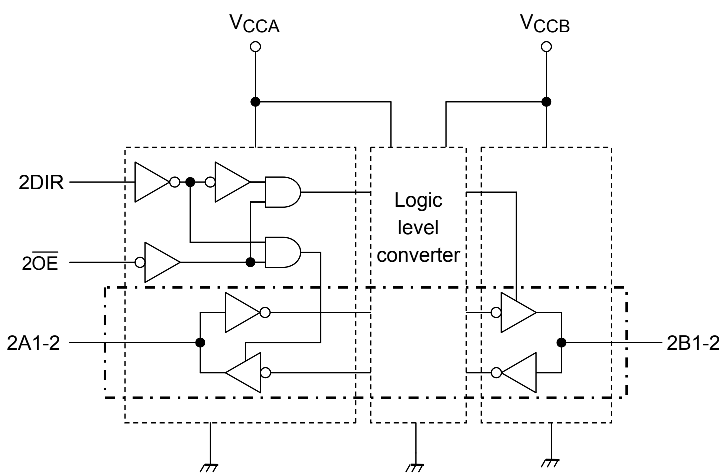
Block Diagram





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Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Power supply voltage (Note 2)	V_{CCA}	−0.5 to 4.6	V
	V_{CCB}	−0.5 to 4.6	
DC input voltage (DIR, $\overline{OE}$)	V_{IN}	−0.5 to 4.6	V
DC bus I/O voltage	$V_{I/OA}$	−0.5 to 4.6 (Note 3)	V
		−0.5 to V_{CCA} + 0.5 (Note 4)	
	$V_{I/OB}$	−0.5 to 4.6 (Note 3)	
		−0.5 to V_{CCB} + 0.5 (Note 4)	
Input diode current	I_{IK}	−50	mA
Output diode current	$I_{I/OK}$	±50 (Note 5)	mA
DC output current	I_{OUTA}	±25	mA
	I_{OUTB}	±6	
DC V_{CC}/ground current per supply pin	I_{CCA}	±50	mA
	I_{CCB}	±50	
Power dissipation	P_D	180	mW
Storage temperature	T_{stg}	−65 to 150	°C

Note 1: 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 2: Don’t supply a voltage to V_{CCB} pin when V_{CCA} is in the OFF state.

Note 3: Output in OFF state

Note 4: High or Low stats. I_{OUT} absolute maximum rating must be observed.

Note 5: $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

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Operating Ranges (Note 1)

Characteristics	Symbol	Rating	Unit
Power supply voltage (Note 2)	V_{CCA}	1.1 to 2.7	V
	V_{CCB}	1.65 to 3.6	
Input voltage (DIR, $\overline{OE}$)	V_{IN}	0 to 3.6	V
Bus I/O voltage	$V_{I/OA}$	0 to 3.6 (Note 3)	V
		0 to V_{CCA} (Note 4)	
	$V_{I/OB}$	0 to 3.6 (Note 3)	
		0 to V_{CCB} (Note 4)	
Output current	I_{OUTA}	±9 (Note 5)	mA
		±3 (Note 6)	
		±1 (Note 7)	
	I_{OUTB}	±3 (Note 8)	
		±2 (Note 9)	
		±0.5 (Note 10)	
Operating temperature	T_{opr}	−40 to 85	°C
Input rise and fall time	dt/dv	0 to 10 (Note 11)	ns/V

Note 1: The operating ranges must be maintained to ensure the normal operation of the device. Unused inputs and bus inputs must be tied to either VCC or GND. Please connect both bus inputs and the bus outputs with VCC or GND when the I/O of the bus terminal changes by the function. In this case, please note that the output is not short-circuited.

Note 2: Don't use in $V_{CCA} > V_{CCB}$

Note 3: Output in OFF state

Note 4: High or low state

Note 5: V_{CCB}= 2.3 to 2.7 V

Note 6: V_{CCB} = 1.65 to 1.95 V

Note 7: V_{CCB} = 1.4 to 1.6 V

Note 8: V_{CCA} = 3.0 to 3.6 V

Note 9: V_{CCA} = 2.3 to 2.7 V

Note 10: V_{CCA} = 1.65 to 1.95 V

Note 11: V_{IN} = 0.8 to 2.0 V, V_{CCA} = 2.5 V, V_{CCB} = 3.0 V

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Electrical Characteristics

DC Characteristics (2.3 V ≤ V_{CCA} ≤ 2.7 V, 2.7 V < V_{CCB} ≤ 3.6 V)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Ta = –40 to 85°C		Unit
						Min	Max	
H-level input voltage	V_{IHA}	DIR, $\overline{OE}$, An		2.3 to 2.7	2.7 to 3.6	1.6	—	V
	V_{IHB}	Bn		2.3 to 2.7	2.7 to 3.6	2.0	—	
L-level input voltage	V_{ILA}	DIR, $\overline{OE}$, An		2.3 to 2.7	2.7 to 3.6	—	0.7	V
	V_{ILB}	Bn		2.3 to 2.7	2.7 to 3.6	—	0.8	
H-level output voltage	V_{OHA}	V_{IN} = V_{IH} or V_{IL}	I_{OHA} = –100 μA	2.3 to 2.7	2.7 to 3.6	V_{CCA} – 0.2	—	V
			I_{OHA} = –9 mA	2.3	2.7 to 3.6	1.7	—	
	V_{OHB}		I_{OHB} = –100 μA	2.3 to 2.7	2.7 to 3.6	V_{CCB} – 0.2	—	
			I_{OHB} = –3 mA	2.3 to 2.7	3.0	2.2	—	
L-level output voltage	V_{OLA}	V_{IN} = V_{IH} or V_{IL}	I_{OLA} = 100 μA	2.3 to 2.7	2.7 to 3.6	—	0.2	V
			I_{OLA} = 9 mA	2.3	2.7 to 3.6	—	0.6	
	V_{OLB}		I_{OLB} = 100 μA	2.3 to 2.7	2.7 to 3.6	—	0.2	
			I_{OLB} = 3 mA	2.3 to 2.7	3.0	—	0.55	
3-state output OFF state current	I_{OZA}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		2.3 to 2.7	2.7 to 3.6	—	±2.0	μA
	I_{OZB}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		2.3 to 2.7	2.7 to 3.6	—	±2.0	
Input leakage current	I_{IN}	V_{IN} (DIR, $\overline{OE}$) = 0 to 3.6 V		2.3 to 2.7	2.7 to 3.6	—	±1.0	μA
Power-off leakage current	I_{OFF1}	V_{IN}, V_{OUT} = 0 to 3.6 V		0	0	—	2.0	μA
	I_{OFF2}			2.3 to 2.7	0	—	2.0	
	I_{OFF3}			2.3 to 2.7	Open	—	2.0	
Quiescent supply current	I_{CCA}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		2.3 to 2.7	2.7 to 3.6	—	2.0	μA
	I_{CCB}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		2.3 to 2.7	2.7 to 3.6	—	2.0	
	I_{CCA}	V_{CCA} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		2.3 to 2.7	2.7 to 3.6	—	±2.0	μA
	I_{CCB}	V_{CCB} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		2.3 to 2.7	2.7 to 3.6	—	±2.0	
	I_{CCTB}	V_{INB} = V_{CCB} – 0.6 V per input		2.3 to 2.7	2.7 to 3.6	—	750.0	μA

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DC Characteristics (1.65 V ≤ V_{CCA} < 2.3 V, 2.7 V < V_{CCB} ≤ 3.6 V)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Ta = –40 to 85°C		Unit
						Min	Max	
H-level input voltage	V_{IHA}	DIR, $\overline{OE}$, An		1.65 to 2.3	2.7 to 3.6	0.65 × V_{CCA}	—	V
	V_{IHB}	Bn		1.65 to 2.3	2.7 to 3.6	2.0	—	
L-level input voltage	V_{ILA}	DIR, $\overline{OE}$, An		1.65 to 2.3	2.7 to 3.6	—	0.35 × V_{CCA}	V
	V_{ILB}	Bn		1.65 to 2.3	2.7 to 3.6	—	0.8	
H-level output voltage	V_{OHA}	V_{IN} = V_{IH} or V_{IL}	I_{OHA} = –100 μA	1.65 to 2.3	2.7 to 3.6	V_{CCA} – 0.2	—	V
			I_{OHA} = –3 mA	1.65	2.7 to 3.6	1.25	—	
	V_{OHB}		I_{OHB} = –100 μA	1.65 to 2.3	2.7 to 3.6	V_{CCB} – 0.2	—	
			I_{OHB} = –3 mA	1.65 to 2.3	3.0	2.2	—	
L-level output voltage	V_{OLA}	V_{IN} = V_{IH} or V_{IL}	I_{OLA} = 100 μA	1.65 to 2.3	2.7 to 3.6	—	0.2	V
			I_{OLA} = 3 mA	1.65	2.7 to 3.6	—	0.3	
	V_{OLB}		I_{OLB} = 100 μA	1.65 to 2.3	2.7 to 3.6	—	0.2	
			I_{OLB} = 3 mA	1.65 to 2.3	3.0	—	0.55	
3-state output OFF state current	I_{OZA}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		1.65 to 2.3	2.7 to 3.6	—	±2.0	μA
	I_{OZB}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		1.65 to 2.3	2.7 to 3.6	—	±2.0	
Input leakage current	I_{IN}	V_{IN} (DIR, $\overline{OE}$) = 0 to 3.6 V		1.65 to 2.3	2.7 to 3.6	—	±1.0	μA
Power-off leakage current	I_{OFF1}	V_{IN}, V_{OUT} = 0 to 3.6 V		0	0	—	2.0	μA
	I_{OFF2}			1.65 to 2.3	0	—	2.0	
	I_{OFF3}			1.65 to 2.3	Open	—	2.0	
Quiescent supply current	I_{CCA}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		1.65 to 2.3	2.7 to 3.6	—	2.0	μA
	I_{CCB}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		1.65 to 2.3	2.7 to 3.6	—	2.0	
	I_{CCA}	V_{CCA} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		1.65 to 2.3	2.7 to 3.6	—	±2.0	μA
	I_{CCB}	V_{CCB} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		1.65 to 2.3	2.7 to 3.6	—	±2.0	
	I_{CCTB}	V_{INB} = V_{CCB} – 0.6 V per input		1.65 to 2.3	2.7 to 3.6	—	750.0	μA

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DC Characteristics ($1.4\ V \le V_{CCA} < 1.65\ V$, $2.7\ V < V_{CCB} \le 3.6\ V$)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Ta = −40 to 85°C		Unit
						Min	Max	
H-level input voltage	V_{IHA}	DIR, $\overline{OE}$, An		1.4 to 1.65	2.7 to 3.6	0.65 × V_{CCA}	—	V
	V_{IHB}	Bn		1.4 to 1.65	2.7 to 3.6	2.0	—	
L-level input voltage	V_{ILA}	DIR, $\overline{OE}$, An		1.4 to 1.65	2.7 to 3.6	—	0.30 × V_{CCA}	V
	V_{ILB}	Bn		1.4 to 1.65	2.7 to 3.6	—	0.8	
H-level output voltage	V_{OHA}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OHA} = -100\ \mu A$	1.4 to 1.65	2.7 to 3.6	$V_{CCA} - 0.2$	—	V
			$I_{OHA} = -1\ mA$	1.4	2.7 to 3.6	1.05	—	
	V_{OHB}		$I_{OHB} = -100\ \mu A$	1.4 to 1.65	2.7 to 3.6	$V_{CCB} - 0.2$	—	
			$I_{OHB} = -3\ mA$	1.4 to 1.65	3.0	2.2	—	
L-level output voltage	V_{OLA}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OLA} = 100\ \mu A$	1.4 to 1.65	2.7 to 3.6	—	0.2	V
			$I_{OLA} = 1\ mA$	1.4	2.7 to 3.6	—	0.35	
	V_{OLB}		$I_{OLB} = 100\ \mu A$	1.4 to 1.65	2.7 to 3.6	—	0.2	
			$I_{OLB} = 3\ mA$	1.4 to 1.65	3.0	—	0.55	
3-state output OFF state current	I_{OZA}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = 0$ to 3.6 V		1.4 to 1.65	2.7 to 3.6	—	±2.0	μA
	I_{OZB}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = 0$ to 3.6 V		1.4 to 1.65	2.7 to 3.6	—	±2.0	
Input leakage current	I_{IN}	V_{IN} (DIR, $\overline{OE}$) = 0 to 3.6 V		1.4 to 1.65	2.7 to 3.6	—	±1.0	μA
Power-off leakage current	I_{OFF1}	V_{IN}, V_{OUT} = 0 to 3.6 V		0	0	—	2.0	μA
	I_{OFF2}			1.4 to 1.65	0	—	2.0	
	I_{OFF3}			1.4 to 1.65	Open	—	2.0	
Quiescent supply current	I_{CCA}	$V_{INA} = V_{CCA}$ or GND $V_{INB} = V_{CCB}$ or GND		1.4 to 1.65	2.7 to 3.6	—	2.0	μA
	I_{CCB}	$V_{INA} = V_{CCA}$ or GND $V_{INB} = V_{CCB}$ or GND		1.4 to 1.65	2.7 to 3.6	—	2.0	
	I_{CCA}	$V_{CCA} \le (V_{IN}, V_{OUT}) \le 3.6\ V$		1.4 to 1.65	2.7 to 3.6	—	±2.0	μA
	I_{CCB}	$V_{CCB} \le (V_{IN}, V_{OUT}) \le 3.6\ V$		1.4 to 1.65	2.7 to 3.6	—	±2.0	
	I_{CCTB}	$V_{INB} = V_{CCB} - 0.6\ V$ per input		1.4 to 1.65	2.7 to 3.6	—	750.0	μA

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DC Characteristics (1.1 V ≤ V_{CCA} < 1.4 V, 2.7 V < V_{CCB} ≤ 3.6 V)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Ta = −40 to 85°C Min	Ta = −40 to 85°C Max	Unit
H-level input voltage	V_{IHA}	DIR, $\overline{OE}$, An		1.1 to 1.4	2.7 to 3.6	0.65 × V_{CCA}	—	V
	V_{IHB}	Bn		1.1 to 1.4	2.7 to 3.6	2.0	—	
L-level input voltage	V_{ILA}	DIR, $\overline{OE}$, An		1.1 to 1.4	2.7 to 3.6	—	0.30 × V_{CCA}	V
	V_{ILB}	Bn		1.1 to 1.4	2.7 to 3.6	—	0.8	
H-level output voltage	V_{OHA}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OHA} = -100$ μA	1.1 to 1.4	2.7 to 3.6	V_{CCA} − 0.2	—	V
	V_{OHB}		$I_{OHB} = -100$ μA	1.1 to 1.4	2.7 to 3.6	V_{CCB} − 0.2	—	
			$I_{OHB} = -3$ mA	1.1 to 1.4	3.0	2.2	—	
L-level output voltage	V_{OLA}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OLA} = 100$ μA	1.1 to 1.4	2.7 to 3.6	—	0.2	V
	V_{OLB}		$I_{OLB} = 100$ μA	1.1 to 1.4	2.7 to 3.6	—	0.2	
			$I_{OLB} = 3$ mA	1.1 to 1.4	3.0	—	0.55	
3-state output OFF state current	I_{OZA}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = 0$ to 3.6 V		1.1 to 1.4	2.7 to 3.6	—	±2.0	μA
	I_{OZB}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = 0$ to 3.6 V		1.1 to 1.4	2.7 to 3.6	—	±2.0	
Input leakage current	I_{IN}	V_{IN} (DIR, $\overline{OE}$) = 0 to 3.6 V		1.1 to 1.4	2.7 to 3.6	—	±1.0	μA
Power-off leakage current	I_{OFF}	V_{IN}, V_{OUT} = 0 to 3.6 V		0	0	—	2.0	μA
	I_{OFF}			1.1 to 1.4	0	—	2.0	
	I_{OFF}			1.1 to 1.4	Open	—	2.0	
Quiescent supply current	I_{CCA}	$V_{INA} = V_{CCA}$ or GND $V_{INB} = V_{CCB}$ or GND		1.1 to 1.4	2.7 to 3.6	—	2.0	μA
	I_{CCB}	$V_{INA} = V_{CCA}$ or GND $V_{INB} = V_{CCB}$ or GND		1.1 to 1.4	2.7 to 3.6	—	2.0	
	I_{CCA}	$V_{CCA} \le (V_{IN}, V_{OUT}) \le 3.6$ V		1.1 to 1.4	2.7 to 3.6	—	±2.0	μA
	I_{CCB}	$V_{CCB} \le (V_{IN}, V_{OUT}) \le 3.6$ V		1.1 to 1.4	2.7 to 3.6	—	±2.0	
	I_{CCTB}	$V_{INB} = V_{CCA} - 0.6$ V per input		1.1 to 1.4	2.7 to 3.6	—	750.0	

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DC Characteristics (1.65 V ≤ V_{CCA} < 2.3 V, 2.3 V ≤ V_{CCB} ≤ 2.7 V)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Ta = –40 to 85°C		Unit
						Min	Max	
H-level input voltage	V_{IHA}	DIR, $\overline{OE}$, An		1.65 to 2.3	2.3 to 2.7	0.65 × V_{CCA}	—	V
	V_{IHB}	Bn		1.65 to 2.3	2.3 to 2.7	1.6	—	
L-level input voltage	V_{ILA}	DIR, $\overline{OE}$, An		1.65 to 2.3	2.3 to 2.7	—	0.35 × V_{CCA}	V
	V_{ILB}	Bn		1.65 to 2.3	2.3 to 2.7	—	0.7	
H-level output voltage	V_{OHA}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OHA} = -100\ \mu A$	1.65 to 2.3	2.3 to 2.7	V_{CCA} – 0.2	—	V
			$I_{OHA} = -3$ mA	1.65	2.3 to 2.7	1.25	—	
	V_{OHB}		$I_{OHB} = -100\ \mu A$	1.65 to 2.3	2.3 to 2.7	V_{CCB} – 0.2	—	
			$I_{OHB} = -2$ mA	1.65 to 2.3	2.3	1.7	—	
L-level output voltage	V_{OLA}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OLA} = 100\ \mu A$	1.65 to 2.3	2.3 to 2.7	—	0.2	V
			$I_{OLA} = 3$ mA	1.65	2.3 to 2.7	—	0.3	
	V_{OLB}		$I_{OLB} = 100\ \mu A$	1.65 to 2.3	2.3 to 2.7	—	0.2	
			$I_{OLB} = 2$ mA	1.65 to 2.3	2.3	—	0.6	
3-state output OFF state current	I_{OZA}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = 0$ to 3.6 V		1.65 to 2.3	2.3 to 2.7	—	±2.0	μA
	I_{OZB}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = 0$ to 3.6 V		1.65 to 2.3	2.3 to 2.7	—	±2.0	
Input leakage current	I_{IN}	V_{IN} (DIR, $\overline{OE}$) = 0 to 3.6 V		1.65 to 2.3	2.3 to 2.7	—	±1.0	μA
Power-off leakage current	I_{OFF1}	V_{IN}, $V_{OUT} = 0$ to 3.6 V		0	0	—	2.0	μA
	I_{OFF2}			1.65 to 2.3	0	—	2.0	
	I_{OFF3}			1.65 to 2.3	Open	—	2.0	
Quiescent supply current	I_{CCA}	$V_{INA} = V_{CCA}$ or GND $V_{INB} = V_{CCB}$ or GND		1.65 to 2.3	2.3 to 2.7	—	2.0	μA
	I_{CCB}	$V_{INA} = V_{CCA}$ or GND $V_{INB} = V_{CCB}$ or GND		1.65 to 2.3	2.3 to 2.7	—	2.0	
	I_{CCA}	$V_{CCA} \le (V_{IN}, V_{OUT}) \le 3.6$ V		1.65 to 2.3	2.3 to 2.7	—	±2.0	μA
	I_{CCB}	$V_{CCB} \le (V_{IN}, V_{OUT}) \le 3.6$ V		1.65 to 2.3	2.3 to 2.7	—	±2.0	

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DC Characteristics (1.4 V ≤ V_{CCA} < 1.65 V, 2.3 V ≤ V_{CCB} ≤ 2.7 V)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Ta = −40 to 85°C Min	Ta = −40 to 85°C Max	Unit
H-level input voltage	V_{IHA}	DIR, $\overline{OE}$, An		1.4 to 1.65	2.3 to 2.7	0.65 × V_{CCA}	—	V
	V_{IHB}	Bn		1.4 to 1.65	2.3 to 2.7	1.6	—	
L-level input voltage	V_{ILA}	DIR, $\overline{OE}$, An		1.4 to 1.65	2.3 to 2.7	—	0.30 × V_{CCA}	V
	V_{ILB}	Bn		1.4 to 1.65	2.3 to 2.7	—	0.7	
H-level output voltage	V_{OHA}	V_{IN} = V_{IH} or V_{IL}	I_{OHA} = −100 μA	1.4 to 1.65	2.3 to 2.7	V_{CCA} − 0.2	—	V
			I_{OHA} = −1 mA	1.4	2.3 to 2.7	1.05	—	
	V_{OHB}		I_{OHB} = −100 μA	1.4 to 1.65	2.3 to 2.7	V_{CCB} − 0.2	—	
			I_{OHB} = −2 mA	1.4 to 1.65	2.3	1.7	—	
L-level output voltage	V_{OLA}	V_{IN} = V_{IH} or V_{IL}	I_{OLA} = 100 μA	1.4 to 1.65	2.3 to 2.7	—	0.2	V
			I_{OLA} = 1 mA	1.4	2.3 to 2.7	—	0.35	
	V_{OLB}		I_{OLB} = 100 μA	1.4 to 1.65	2.3 to 2.7	—	0.2	
			I_{OLB} = 2 mA	1.4 to 1.65	2.3	—	0.6	
3-state output OFF state current	I_{OZA}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		1.4 to 1.65	2.3 to 2.7	—	±2.0	μA
	I_{OZB}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		1.4 to 1.65	2.3 to 2.7	—	±2.0	
Input leakage current	I_{IN}	V_{IN} (DIR, $\overline{OE}$) = 0 to 3.6 V		1.4 to 1.65	2.3 to 2.7	—	±1.0	μA
Power-off leakage current	I_{OFF1}	V_{IN}, V_{OUT} = 0 to 3.6 V		0	0	—	2.0	μA
	I_{OFF2}			1.4 to 1.65	0	—	2.0	
	I_{OFF3}			1.4 to 1.65	Open	—	2.0	
Quiescent supply current	I_{CCA}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		1.4 to 1.65	2.3 to 2.7	—	2.0	μA
	I_{CCB}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		1.4 to 1.65	2.3 to 2.7	—	2.0	
	I_{CCA}	V_{CCA} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		1.4 to 1.65	2.3 to 2.7	—	±2.0	μA
	I_{CCB}	V_{CCB} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		1.4 to 1.65	2.3 to 2.7	—	±2.0	

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DC Characteristics (1.1 V ≤ V_{CCA} < 1.4 V, 2.3 V ≤ V_{CCB} ≤ 2.7 V)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Ta = −40 to 85°C		Unit
						Min	Max	
H-level input voltage	V_{IHA}	DIR, $\overline{OE}$, An		1.1 to 1.4	2.3 to 2.7	0.65 × V_{CCA}	—	V
	V_{IHB}	Bn		1.1 to 1.4	2.3 to 2.7	1.6	—	
L-level input voltage	V_{ILA}	DIR, $\overline{OE}$, An		1.1 to 1.4	2.3 to 2.7	—	0.30 × V_{CCA}	V
	V_{ILB}	Bn		1.1 to 1.4	2.3 to 2.7	—	0.7	
H-level output voltage	V_{OHA}	V_{IN} = V_{IH} or V_{IL}	I_{OHA} = −100 μA	1.1 to 1.4	2.3 to 2.7	V_{CCA} − 0.2	—	V
	V_{OHB}		I_{OHB} = −100 μA	1.1 to 1.4	2.3 to 2.7	V_{CCB} − 0.2	—	
			I_{OHB} = −2 mA	1.1 to 1.4	2.3	1.7	—	
L-level output voltage	V_{OLA}	V_{IN} = V_{IH} or V_{IL}	I_{OLA} = 100 μA	1.1 to 1.4	2.3 to 2.7	—	0.2	V
	V_{OLB}		I_{OLB} = 100 μA	1.1 to 1.4	2.3 to 2.7	—	0.2	
			I_{OLB} = 2 mA	1.1 to 1.4	2.3	—	0.6	
3-state output OFF state current	I_{OZA}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		1.1 to 1.4	2.3 to 2.7	—	±2.0	μA
	I_{OZB}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		1.1 to 1.4	2.3 to 2.7	—	±2.0	
Input leakage current	I_{IN}	V_{IN} (DIR, $\overline{OE}$) = 0 to 3.6 V		1.1 to 1.4	2.3 to 2.7	—	±1.0	μA
Power-off leakage current	I_{OFF}	V_{IN}, V_{OUT} = 0 to 3.6 V		0	0	—	2.0	μA
	I_{OFF}			1.1 to 1.4	0	—	2.0	
	I_{OFF}			1.1 to 1.4	Open	—	2.0	
Quiescent supply current	I_{CCA}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		1.1 to 1.4	2.3 to 2.7	—	2.0	μA
	I_{CCB}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		1.1 to 1.4	2.3 to 2.7	—	2.0	
	I_{CCA}	V_{CCA} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		1.1 to 1.4	2.3 to 2.7	—	±2.0	μA
	I_{CCB}	V_{CCB} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		1.1 to 1.4	2.3 to 2.7	—	±2.0	

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DC Characteristics (1.1 V ≤ V_{CCA} < 1.4 V, 1.65 V ≤ V_{CCB} < 2.3 V)

Characteristics	Symbol	Test Condition		V_{CCA} (V)	V_{CCB} (V)	Ta = −40 to 85°C		Unit
						Min	Max	
H-level input voltage	V_{IHA}	DIR, $\overline{OE}$, An		1.1 to 1.4	1.65 to 2.3	0.65 × V_{CCA}	—	V
	V_{IHB}	Bn		1.1 to 1.4	1.65 to 2.3	0.65 × V_{CCB}	—	
L-level input voltage	V_{ILA}	DIR, $\overline{OE}$, An		1.1 to 1.4	1.65 to 2.3	—	0.30 × V_{CCA}	V
	V_{ILB}	Bn		1.1 to 1.4	1.65 to 2.3	—	0.35 × V_{CCB}	
H-level output voltage	V_{OHA}	V_{IN} = V_{IH} or V_{IL}	I_{OHA} = −100 μA	1.1 to 1.4	1.65 to 2.3	V_{CCA} − 0.2	—	V
	V_{OHB}		I_{OHB} = −100 μA	1.1 to 1.4	1.65 to 2.3	V_{CCB} − 0.2	—	
			I_{OHB} = −0.5 mA	1.1 to 1.4	1.65	1.25	—	
L-level output voltage	V_{OLA}	V_{IN} = V_{IH} or V_{IL}	I_{OLA} = 100 μA	1.1 to 1.4	1.65 to 2.3	—	0.2	V
	V_{OLB}		I_{OLB} = 100 μA	1.1 to 1.4	1.65 to 2.3	—	0.2	
			I_{OLB} = 0.5 mA	1.1 to 1.4	1.65	—	0.3	
3-state output OFF state current	I_{OZA}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		1.1 to 1.4	1.65 to 2.3	—	±2.0	μA
	I_{OZB}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 to 3.6 V		1.1 to 1.4	1.65 to 2.3	—	±2.0	
Input leakage current	I_{IN}	V_{IN} (DIR, $\overline{OE}$) = 0 to 3.6 V		1.1 to 1.4	1.65 to 2.3	—	±1.0	μA
Power-off leakage current	I_{OFF1}	V_{IN}, V_{OUT} = 0 to 3.6 V		0	0	—	2.0	μA
	I_{OFF2}			1.1 to 1.4	0	—	2.0	
	I_{OFF3}			1.1 to 1.4	Open	—	2.0	
Quiescent supply current	I_{CCA}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		1.1 to 1.4	1.65 to 2.3	—	2.0	μA
	I_{CCB}	V_{INA} = V_{CCA} or GND V_{INB} = V_{CCB} or GND		1.1 to 1.4	1.65 to 2.3	—	2.0	
	I_{CCA}	V_{CCA} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		1.1 to 1.4	1.65 to 2.3	—	±2.0	μA
	I_{CCB}	V_{CCB} ≤ (V_{IN}, V_{OUT}) ≤ 3.6 V		1.1 to 1.4	1.65 to 2.3	—	±2.0	

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AC Characteristics (Ta = −40 to 85°C, Input: $t_r = t_f = 2.0$ ns)

$V_{CCA} = 2.5 \pm 0.2$ V, $V_{CCB} = 3.3 \pm 0.3$ V

Characteristics	Symbol	Test Condition	Min	Max	Unit
Propagation delay time (Bn → An)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	5.4	ns
3-state output enable time ($\overline{OE}$ → An)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	8.4	
3-state output disable time ($\overline{OE}$ → An)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	6.7	
Propagation delay time (An → Bn)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	13.7	ns
3-state output enable time ($\overline{OE}$ → Bn)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	16.6	
3-state output disable time ($\overline{OE}$ → Bn)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	7.2	
Output to output skew	t_{osLH} t_{osHL}	(Note)	—	0.5	ns

Note: Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

$V_{CCA} = 1.8 \pm 0.15$ V, $V_{CCB} = 3.3 \pm 0.3$ V

Characteristics	Symbol	Test Condition	Min	Max	Unit
Propagation delay time (Bn → An)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	8.9	ns
3-state output enable time ($\overline{OE}$ → An)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	13.4	
3-state output disable time ($\overline{OE}$ → An)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	10.9	
Propagation delay time (An → Bn)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	14.8	ns
3-state output enable time ($\overline{OE}$ → Bn)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	18.9	
3-state output disable time ($\overline{OE}$ → Bn)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	8.7	
Output to output skew	t_{osLH} t_{osHL}	(Note)	—	0.5	ns

Note: Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

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V_{CCA} = 1.5 ± 0.1 V, V_{CCB} = 3.3 ± 0.3 V

Characteristics	Symbol	Test Condition	Min	Max	Unit
Propagation delay time (Bn → An)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	10.3	ns
3-state output enable time ($\overline{OE}$ → An)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	18.5	
3-state output disable time ($\overline{OE}$ → An)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	13.0	
Propagation delay time (An → Bn)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	16.0	ns
3-state output enable time ($\overline{OE}$ → Bn)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	22.8	
3-state output disable time ($\overline{OE}$ → Bn)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	10.2	
Output to output skew	t_{osLH} t_{osHL}	(Note)	—	1.5	ns

Note: Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

V_{CCA} = 1.2 ± 0.1 V, V_{CCB} = 3.3 ± 0.3 V

Characteristics	Symbol	Test Condition	Min	Max	Unit
Propagation delay time (Bn → An)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	61	ns
3-state output enable time ($\overline{OE}$ → An)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	95	
3-state output disable time ($\overline{OE}$ → An)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	44	
Propagation delay time (An → Bn)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	29	ns
3-state output enable time ($\overline{OE}$ → Bn)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	63	
3-state output disable time ($\overline{OE}$ → Bn)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	23	
Output to output skew	t_{osLH} t_{osHL}	(Note)	—	1.5	ns

Note: Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

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V_{CCA} = 1.8 ± 0.15 V, V_{CCB} = 2.5 ± 0.2 V

Characteristics	Symbol	Test Condition	Min	Max	Unit
Propagation delay time (Bn → An)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	9.1	ns
3-state output enable time ($\overline{OE}$ → An)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	13.5	
3-state output disable time ($\overline{OE}$ → An)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	11.8	
Propagation delay time (An → Bn)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	18.5	ns
3-state output enable time ($\overline{OE}$ → Bn)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	23.6	
3-state output disable time ($\overline{OE}$ → Bn)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	6.9	
Output to output skew	t_{osLH} t_{osHL}	(Note)	—	0.5	ns

Note: Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

V_{CCA} = 1.5 ± 0.1 V, V_{CCB} = 2.5 ± 0.2 V

Characteristics	Symbol	Test Condition	Min	Max	Unit
Propagation delay time (Bn → An)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	10.8	ns
3-state output enable time ($\overline{OE}$ → An)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	18.3	
3-state output disable time ($\overline{OE}$ → An)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	14.2	
Propagation delay time (An → Bn)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	19.7	ns
3-state output enable time ($\overline{OE}$ → Bn)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	26.6	
3-state output disable time ($\overline{OE}$ → Bn)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	8.3	
Output to output skew	t_{osLH} t_{osHL}	(Note)	—	1.5	ns

Note: Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

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$V_{CCA} = 1.2 \pm 0.1$ V, $V_{CCB} = 2.5 \pm 0.2$ V

Characteristics	Symbol	Test Condition	Min	Max	Unit
Propagation delay time (Bn → An)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	60	ns
3-state output enable time ($\overline{OE}$ → An)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	95	
3-state output disable time ($\overline{OE}$ → An)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	45	
Propagation delay time (An → Bn)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	33	ns
3-state output enable time ($\overline{OE}$ → Bn)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	66	
3-state output disable time ($\overline{OE}$ → Bn)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	20	
Output to output skew	t_{osLH} t_{osHL}	(Note)	—	1.5	ns

Note: Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

$V_{CCA} = 1.2 \pm 0.1$ V, $V_{CCB} = 1.8 \pm 0.15$ V

Characteristics	Symbol	Test Condition	Min	Max	Unit
Propagation delay time (Bn → An)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	58	ns
3-state output enable time ($\overline{OE}$ → An)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	92	
3-state output disable time ($\overline{OE}$ → An)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	47	
Propagation delay time (An → Bn)	t_{pLH} t_{pHL}	Figure 1, Figure 2	1.0	43	ns
3-state output enable time ($\overline{OE}$ → Bn)	t_{pZL} t_{pZH}	Figure 1, Figure 3	1.0	78	
3-state output disable time ($\overline{OE}$ → Bn)	t_{pLZ} t_{pHZ}	Figure 1, Figure 3	1.0	20	
Output to output skew	t_{osLH} t_{osHL}	(Note)	—	1.5	ns

Note: Parameter guaranteed by design.
($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

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Dynamic Switching Characteristics (Ta = 25°C, Input: $t_r = t_f = 2.0$ ns, $C_L = 30$ pF)

Characteristics		Symbol	Test Condition	V_{CCA} (V)	V_{CCB} (V)	Typ.	Unit
Quiet output maximum dynamic V_{OL}	A → B	V_{OLP}	$V_{IH} = V_{CC}$, $V_{IL} = 0$ V (Note)	2.5	3.3	0.35	V
				1.8	3.3	0.35	
				1.8	2.5	0.25	
	B → A			2.5	3.3	0.6	
				1.8	3.3	0.25	
				1.8	2.5	0.25	
Quiet output minimum dynamic V_{OL}	A → B	V_{OLV}	$V_{IH} = V_{CC}$, $V_{IL} = 0$ V (Note)	2.5	3.3	−0.35	V
				1.8	3.3	−0.35	
				1.8	2.5	−0.25	
	B → A			2.5	3.3	−0.6	
				1.8	3.3	−0.25	
				1.8	2.5	−0.25	
Quiet output maximum dynamic V_{OH}	A → B	V_{OHP}	$V_{IH} = V_{CC}$, $V_{IL} = 0$ V (Note)	2.5	3.3	3.95	V
				1.8	3.3	3.95	
				1.8	2.5	2.95	
	B → A			2.5	3.3	3.3	
				1.8	3.3	2.3	
				1.8	2.5	2.3	
Quiet output minimum dynamic V_{OH}	A → B	V_{OHV}	$V_{IH} = V_{CC}$, $V_{IL} = 0$ V (Note)	2.5	3.3	2.65	V
				1.8	3.3	2.65	
				1.8	2.5	2.05	
	B → A			2.5	3.3	1.7	
				1.8	3.3	1.3	
				1.8	2.5	1.3	

Note: Parameter guaranteed by design.

Capacitive Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Circuit		V_{CCA} (V)	V_{CCB} (V)	Typ.	Unit
Input capacitance	C_{IN}	DIR, $\overline{OE}$		2.5	3.3	7	pF
Bus I/O capacitance	$C_{I/O}$	An, Bn		2.5	3.3	8	pF
Power dissipation capacitance (Note)	C_{PDA}	$\overline{OE}$ = "L"	A → B (DIR = "H")	2.5	3.3	3	pF
			B → A (DIR = "L")	2.5	3.3	16	
		$\overline{OE}$ = "H"	A → B (DIR = "H")	2.5	3.3	0	
			B → A (DIR = "L")	2.5	3.3	0	
	C_{PDB}	$\overline{OE}$ = "L"	A → B (DIR = "H")	2.5	3.3	16	
			B → A (DIR = "L")	2.5	3.3	5	
		$\overline{OE}$ = "H"	A → B (DIR = "H")	2.5	3.3	0	
			B → A (DIR = "L")	2.5	3.3	0	

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

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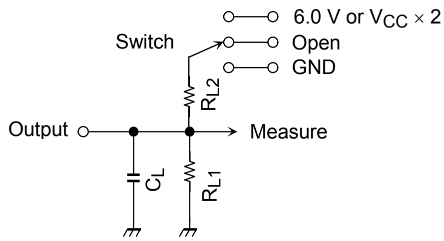
AC Test Circuit



Parameter	Switch	
t_{pLH}, t_{pHL}	Open	
t_{pLZ}, t_{pZL}	6.0 V	@ V_{CC} = 3.3 ± 0.3 V
	V_{CC} × 2	@ 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
t_{pHZ}, t_{pZH}	GND	

Symbol	V_{CC} (output)			
	3.3 ± 0.3 V 2.5 ± 0.2 V	1.8 ± 0.15 V	1.5 ± 0.1 V	1.2 ± 0.1 V
$R_{L1/2A}$	500 Ω	1 kΩ	2 kΩ	10 kΩ
C_{LA}	30 pF	30 pF	15 pF	15 pF
R_{L1B}	—	—	—	—
R_{L2B}	1 kΩ	1 kΩ	1 kΩ	1 kΩ
C_{LB}	30 pF	30 pF	30 pF	30 pF

Figure 1

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AC Waveform

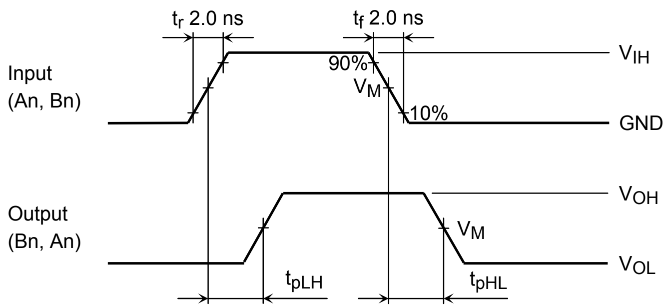

Figure 2 t_{pLH}, t_{pHL}

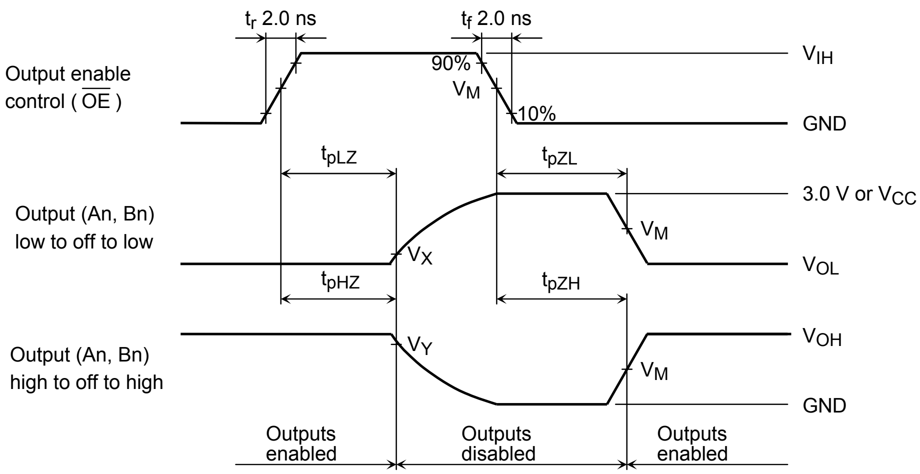

Figure 3 t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}

Symbol	V_{CC}		
	3.3 ± 0.3 V	2.5 ± 0.2 V 1.8 ± 0.15 V	1.5 ± 0.1 V 1.2 ± 0.1 V
V_{IH}	2.7 V	V_{CC}	V_{CC}
V_M	1.5 V	$V_{CC}/2$	$V_{CC}/2$
V_X	V_{OL} + 0.3 V	V_{OL} + 0.15 V	V_{OL} + 0.1 V
V_Y	V_{OH} − 0.3 V	V_{OH} − 0.15 V	V_{OH} − 0.1 V

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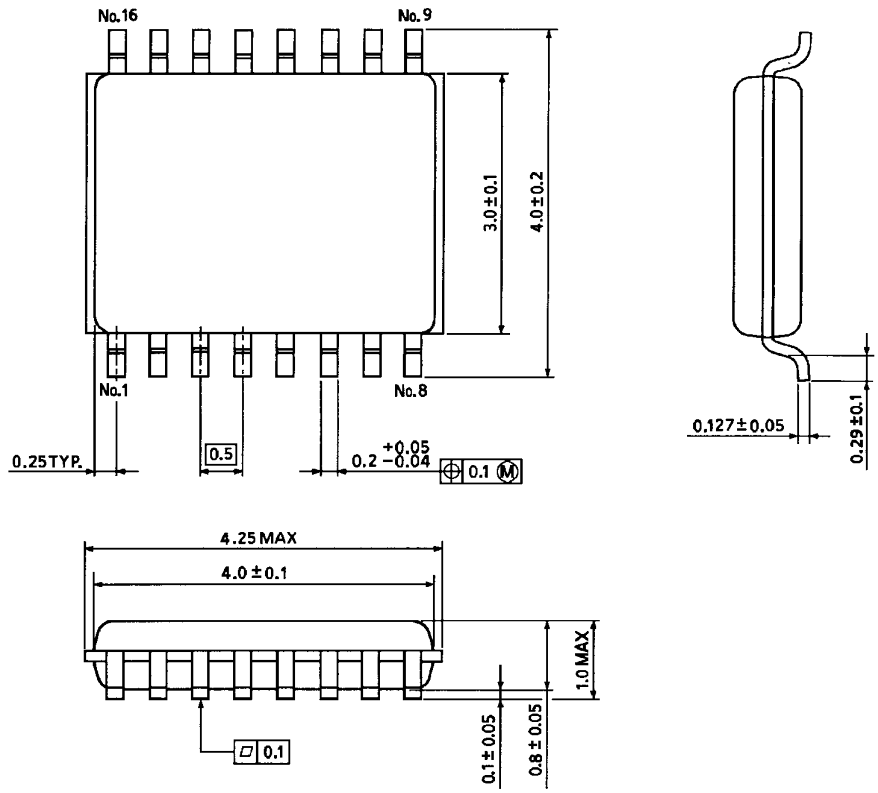
Package Dimensions

VSSOP16-P-0030-0.50 Unit : mm



Weight: 0.02 g (typ.)

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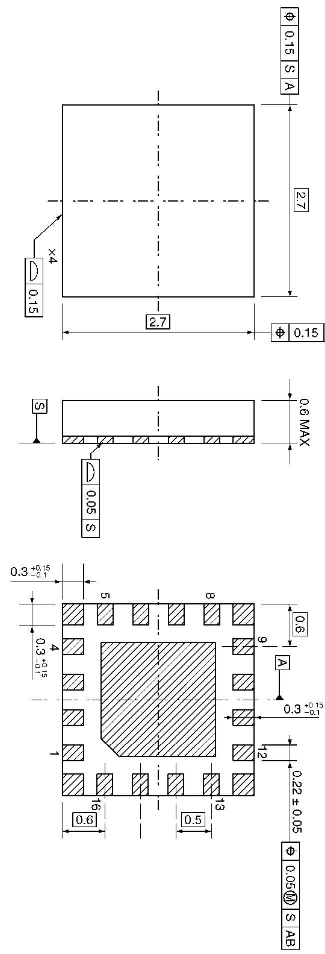
Package Dimensions

VQON16-P-0303-0.50 Unit: mm



Weight: 0.013 g (typ.)

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