

NXU0202

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

Rev. 1 — 30 October 2024

Product data sheet

1. General description

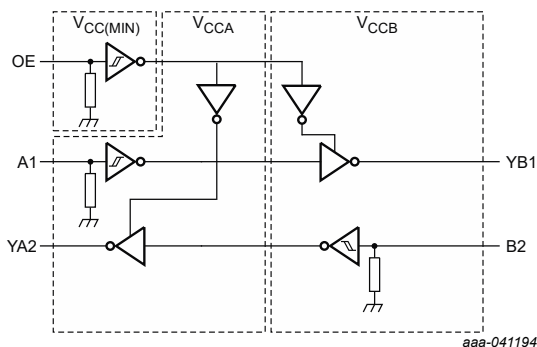
The NXU0202 is a 2-bit, dual-supply level translating buffer with Schmitt-trigger inputs and 3-state outputs. It features two data inputs (A1 and B2), two data outputs (YB1 and YA2), and an output enable input (OE).

Both V_{CCA} and V_{CCB} can be supplied at any voltage between 0.9 V and 5.5 V making the device suitable for translating between any of the voltage nodes (1.2 V, 1.5 V, 1.8 V, 2.5 V, 3.3 V and 5.0 V).

This device facilitates asynchronous communication between data buses. Transmit data with a fixed direction (unidirectionally) from the A bus to the B bus on three channels and from the B bus to the A bus on one channel. The OE pin can be referenced to V_{CCA} and V_{CCB} domain and when OE pin is set LOW the outputs are disabled and enter a high-impedance OFF-state which isolates the buses. The OE pin can be left floating or externally pulled down to ground to ensure the high-impedance state of the outputs during power up or power down.

This device ensures low static and dynamic power consumption across the entire supply range and is fully specified for partial power down applications using I_{OFF} . The I_{OFF} circuitry prevents potentially damaging backflow current through the device when it is powered down or if one of the power supplies is disconnected (floating).

No power supply sequencing is required and output glitches during power supply transitions are prevented. As a result, glitches will not appear on the outputs for supply transitions during power-up/down.



2. Features and benefits

- Wide supply voltage range:
 - V_{CCA} : 0.9 V to 5.5 V
 - V_{CCB} : 0.9 V to 5.5 V
- Low power consumption for supply voltage range 1.1 V to 5.5 V
 - 3 μ A ($T_{amb} = 25\text{ }^{\circ}\text{C}$)
 - 5 μ A ($T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$)
- Schmitt-trigger inputs with integrated static high ohmic pull-down resistor on the input
- Maximum data rates:
 - 250 Mbps ($\geq 1.8\text{ V}$ to 5 V translation)
- High output drive 12 mA at 5 V
- Output enable (OE) allows connection to V_{CCA} or V_{CCB} domain
- Suspend mode when either one of the supply voltages is below 100 mV or disconnected (floating)
- Low noise overshoot and undershoot $<10\%$ of V_{CCO}
- I_{OFF} circuitry provides partial power-down mode operation
- Latch-up performance exceeds 100 mA per JESD78D Class II
- Complies with JEDEC standard:
 - JESD8-12 (0.9 V to 1.3 V)
 - JESD8-11 (1.4 V to 1.6 V)
 - JESD8-7 (1.65 V to 1.95 V)
 - JESD8-5 (2.3 V to 2.7 V)
 - JESD8C (2.7 V to 3.6 V)
 - JESD12-6 (4.5 V to 5.5 V)
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2500 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1500 V
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and from $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$
- Similar function: NXU0102

3. Applications

- General purpose I/O level translation
- Noisy environments or slow input signals
- Supports push-pull voltage translation as 2-wire UART and 2-pin JTAG protocols
- Consumer

4. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
NXU0202DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
NXU0202GT	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm	SOT833-1
NXU0202GX	-40 °C to +125 °C	X2SON8	plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 × 0.8 × 0.32 mm	SOT1233-2

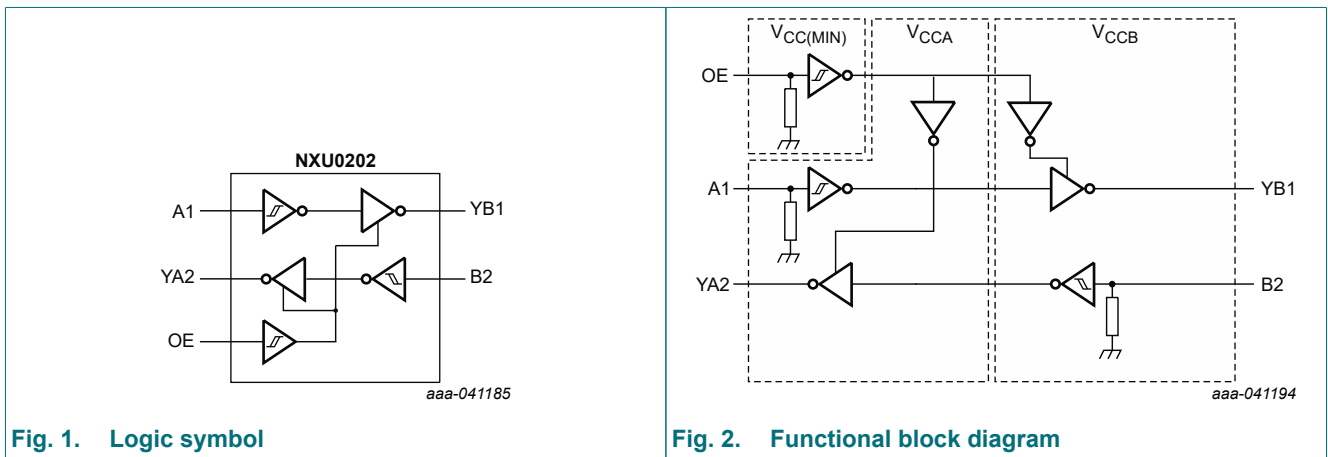
5. Marking

Table 2. Marking

Type number	Marking code ^[1]
NXU0202DC	L3
NXU0202GT	L3
NXU0202GX	L3

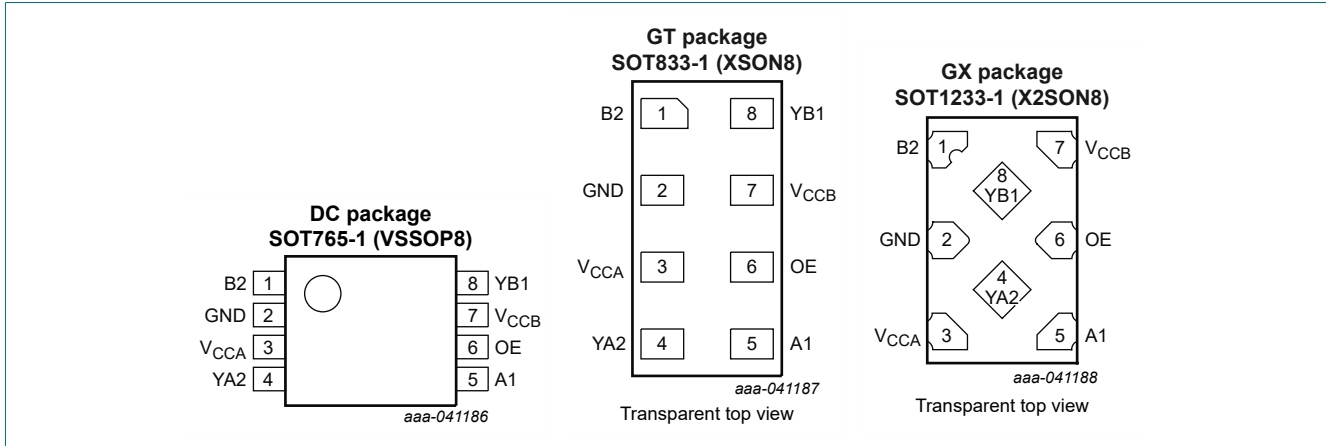
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

6. Functional diagram



7. Pinning information

7.1. Pinning



7.2. Pin description

Table 3. Pin description

Symbol	Pin	I/O	Description
B2	1	I	data input B-side and referenced to V_{CCB}
GND	2	supply	ground (0 V)
V_{CCA}	3	supply	supply voltage A-side (pins A1, YA2)
YA2	4	I	data output A-side and referenced to V_{CCA}
A1	5	I	data input A-side and referenced to V_{CCA}
OE	6	I	output enable input (active HIGH)
V_{CCB}	7	-	supply voltage B-side (pins YB1, B2)
YB1	8	O	data output B-side and referenced to V_{CCB}

8. Functional description

Table 4. Function table

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

Supply voltage	Input	Input	Output
V_{CCA}, V_{CCB}	OE	A1, B2	YB1, YA2
0.9 V to 5.5 V	H	L	L
0.9 V to 5.5 V	H	H	H
0.9 V to 5.5 V	L	X	Z
GND [1]	X	X	Z
Floating [2]	X	X	Z

[1] If either V_{CCA} or V_{CCB} is below 100 mV or GND, the device goes into suspend mode (Hi-Z).

[2] If either V_{CCA} or V_{CCB} disconnected (floating), the device goes into suspend mode (Hi-Z).

8.1. Overview

The NXU0202 is a 2-bit, dual-supply level translating buffer with Schmitt-trigger inputs and 3-state outputs. It features two data inputs (A1, B2), two data outputs (YB1, YA2), and an output enable input (OE). Both V_{CCA} and V_{CCB} can be supplied at any voltage between 0.9 V and 5.5 V.

8.2. Inputs

The inputs have integrated pull-down resistors of 6.5 M Ω (typical) which prevent an undefined state at the Schmitt-trigger input and the output. If an external pull-up is required, it should be no larger than 1 M Ω to avoid contention with the 6.5 M Ω internal pull-down.

Additionally, each input is provided with a through Schmitt-trigger which makes this device tolerant for slow and noisy input signals. Prolonged input slopes at a slow rate may lead to increased dynamic current consumption.

The output-enable input (OE) can be referenced to V_{CCA} and V_{CCB} domain by making use of the developed $V_{CC(MIN)}$ circuitry. When the OE pin is set LOW, the output is disabled and enters high-impedance OFF-state which isolates the output. The OE pin can be left floating or externally pulled down to ground to ensure outputs remain in the high-impedance state during power up or power down.

The input signals can be safely driven above the supply voltage, as long as the maximum input voltage value specified in the Recommended Operating Conditions is not exceeded.

Input transfer characteristics

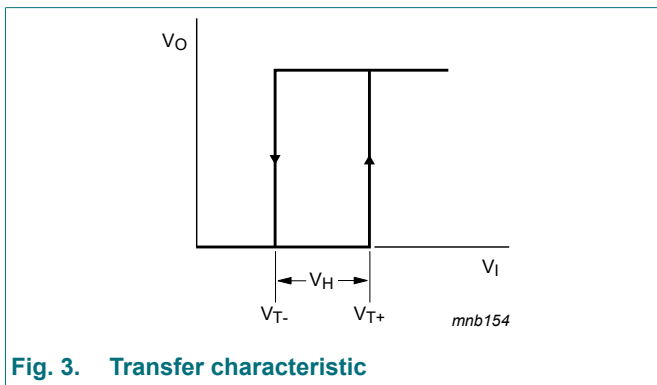


Fig. 3. Transfer characteristic

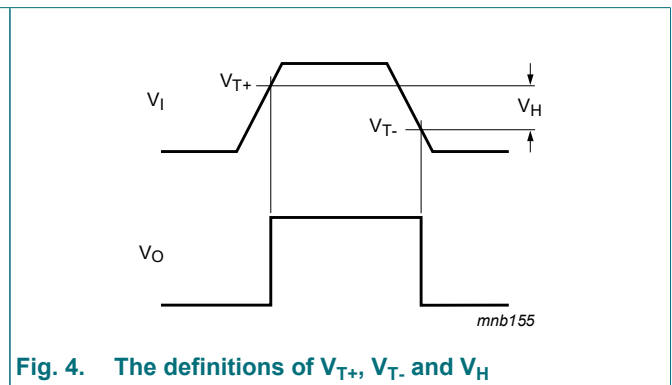
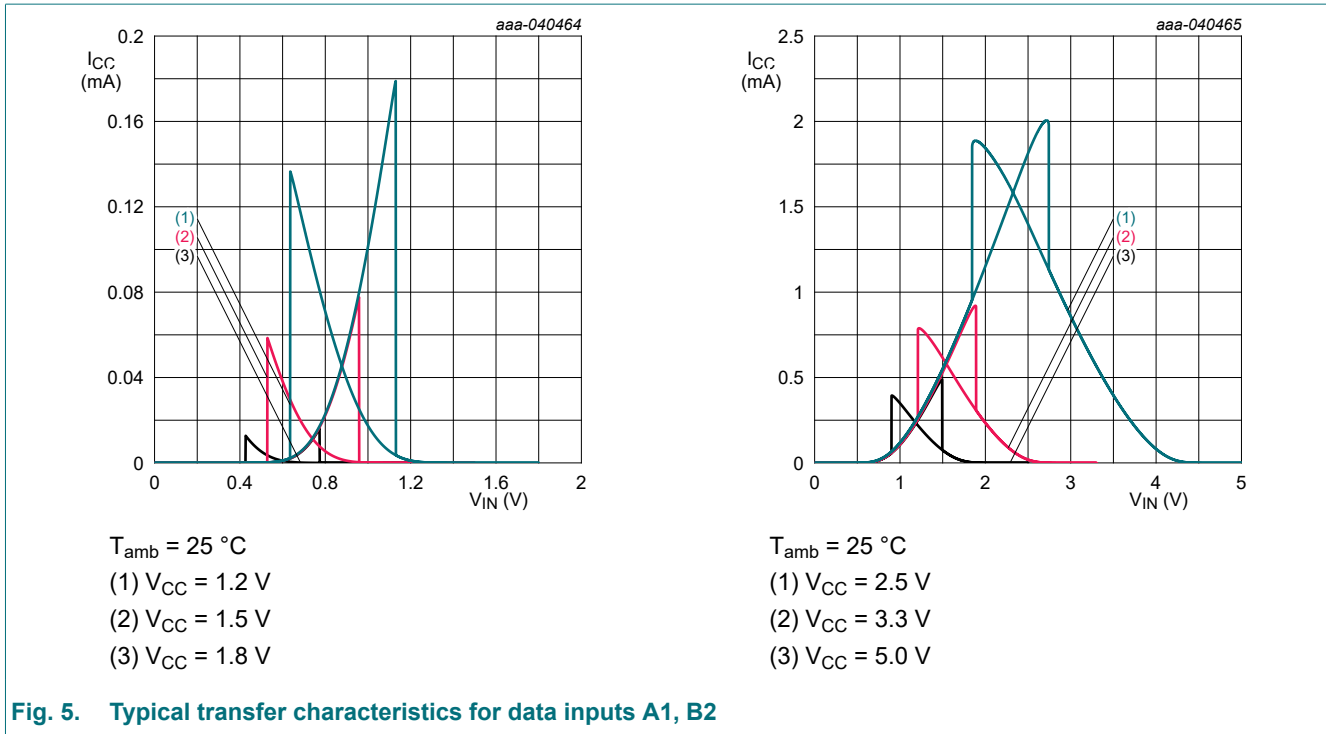


Fig. 4. The definitions of V_{T+} , V_{T-} and V_H

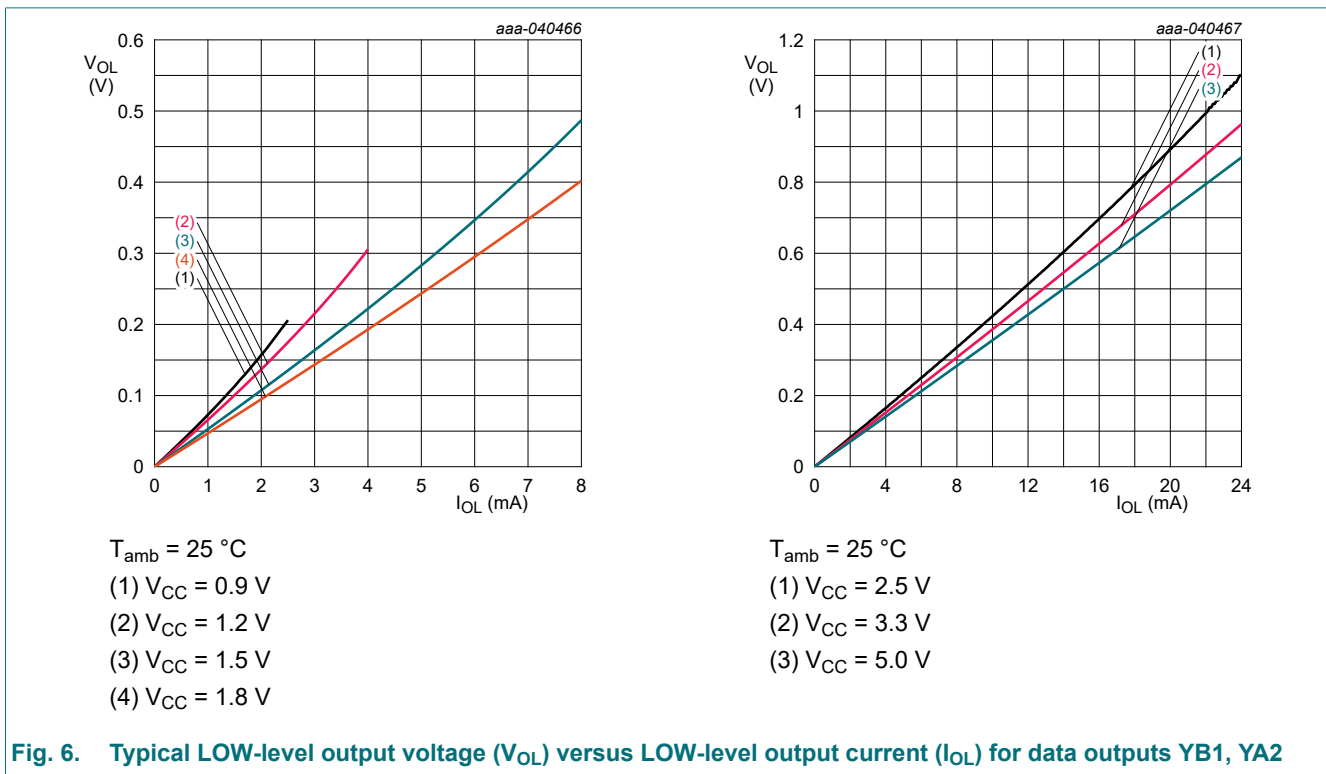
2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state



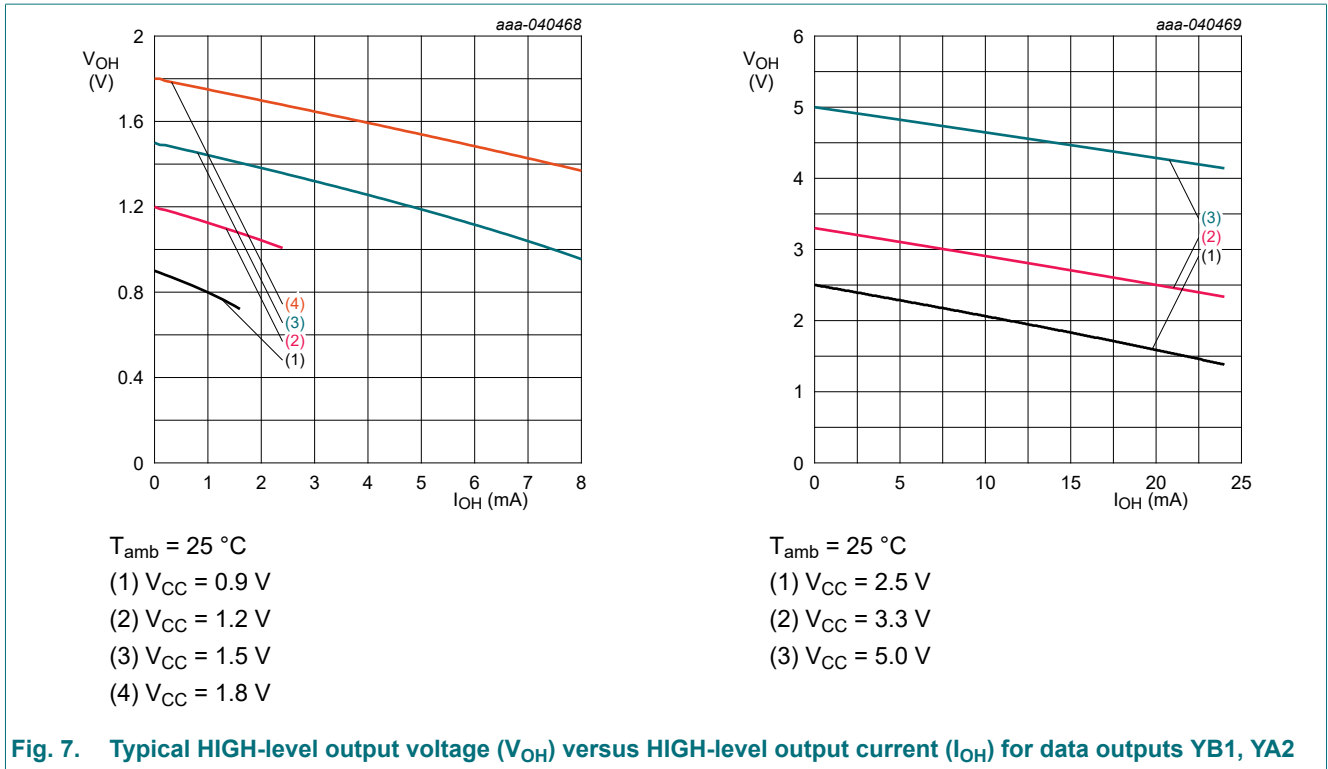
8.3. Outputs

Balanced output enables the device to both sink and source similar currents. The high drive capability of this device creates fast edges and capable of driving larger currents.

Output transfer characteristics



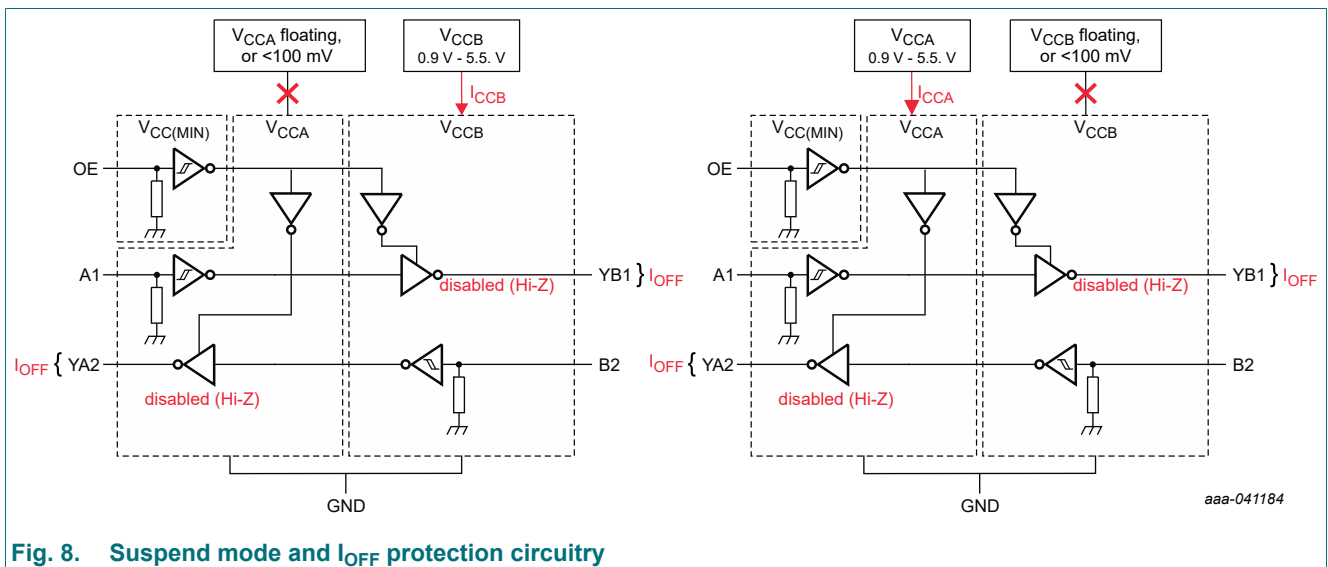
2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state



8.4. Suspend mode and I_{OFF} protection circuitry

When either V_{CCA} or V_{CCB} drops below 100 mV or becomes disconnected (floating) the product enters suspend mode (Hi-Z). All outputs are disabled and in transition to a high-impedance OFF-state. The I_{OFF} circuitry prevents potentially damaging backflow current through the device when it is powered down or if one of the power supplies is disconnected (floating). It is advisable to keep the data inputs in low state before disconnecting (floating) either supply.

Below a graphical explanation:



9. 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_{CCA}	supply voltage A		-0.5	+6.5	V
V_{CCB}	supply voltage B		-0.5	+6.5	V
I_{IK}	input clamping current	$V_I < 0$ V	-50	-	mA
V_I	input voltage	[1]	-0.5	+6.5	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	+6.5	V
I_O	output current	$V_O = 0$ V to V_{CCO} [2]	-	± 25	mA
I_{CC}	supply current	I_{CCA} or I_{CCB} ; per V_{CC} pin	-	100	mA
I_{GND}	ground current	per GND pin	-100	-	mA
T_{stg}	storage temperature		-65	+150	°C
P_{tot}	total power dissipation	[4]	-	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 pins (YB1, YA2).

[3] $V_{CCO} + 0.5$ V should not exceed 6.5 V.

[4] For SOT765-1 (VSSOP8) package: P_{tot} derates linearly with 5.3 mW/K above 103 °C.

For SOT833-1 (XSON8) package: P_{tot} derates linearly with 3.6 mW/K above 81 °C.

For SOT1233-2 (X2SON8) package: P_{tot} derates linearly with 4.6 mW/K above 95 °C.

10. ESD ratings

Table 6. ESD ratings

Symbol	Parameter	Conditions	Value	Unit
V_{ESD}	electrostatic discharge voltage	HBM: ANSI/ESDA/JEDEC JS-001 class 2	± 2500	V
		CDM: ANSI/ESDA/JEDEC JS-002 class C3	± 1500	V

11. Recommended operating conditions

Table 7. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CCA}	supply voltage A		0.9	5.5	V
V_{CCB}	supply voltage B		0.9	5.5	V
V_I	input voltage		0	5.5	V
V_O	output voltage	Active mode [1]	0	V_{CCO}	V
		Suspend or 3-state mode	0	5.5	V
T_{amb}	ambient temperature		-40	+125	°C

[1] V_{CCO} is the supply voltage associated with the output pins (YB1, YA2).

12. Thermal characteristics

Table 8. Thermal characteristics

Symbol	Parameter	Condition	SOT765-1	SOT833-1	SOT1233-2	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air; JEDEC test board	189	276	219	°C/W
$R_{th(j-c)}$	thermal resistance from case (top) of package	in free air; JEDEC test board	98	121	118	°C/W
Ψ_{j-top}	thermal characterization parameter from junction to top of package	in free air; JEDEC test board	25	3.3	4.5	°C/W

13. Static characteristics

Table 9. Static characteristics

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

Symbol	Parameter	Conditions	+25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit	
			Min	Typ	Max	Min	Max	Min	Max		
V _{T+}	positive-going threshold voltage	A1, B2 inputs									
		V _{CCA} = V _{CCB} = 0.9 V	-	0.58	-	-	-	-	-	V	
		V _{CCA} = V _{CCB} = 1.1 V	-	0.71	-	0.44	0.88	0.44	0.88	V	
		V _{CCA} = V _{CCB} = 1.4 V	-	0.89	-	0.60	0.98	0.60	0.98	V	
		V _{CCA} = V _{CCB} = 1.65 V	-	1.05	-	0.76	1.13	0.76	1.13	V	
		V _{CCA} = V _{CCB} = 2.3 V	-	1.39	-	1.08	1.56	1.08	1.56	V	
		V _{CCA} = V _{CCB} = 3.0 V	-	1.75	-	1.48	1.92	1.48	1.92	V	
		V _{CCA} = V _{CCB} = 4.5 V	-	2.50	-	2.19	2.74	2.19	2.74	V	
		V _{CCA} = V _{CCB} = 5.5 V	-	3.02	-	2.65	3.33	2.65	3.33	V	
		OE input (referenced to V _{CCA} or V _{CCB})									
		V _{CCA} = V _{CCB} = 0.9 V	-	0.58	-	-	-	-	-	V	
		V _{CCA} = V _{CCB} = 1.1 V	-	0.70	-	0.44	0.88	0.44	0.88	V	
		V _{CCA} = V _{CCB} = 1.4 V	-	0.89	-	0.60	0.98	0.60	0.98	V	
		V _{CCA} = V _{CCB} = 1.65 V	-	1.04	-	0.76	1.13	0.76	1.13	V	
		V _{CCA} = V _{CCB} = 2.3 V	-	1.38	-	1.08	1.56	1.08	1.56	V	
		V _{CCA} = V _{CCB} = 3.0 V	-	1.74	-	1.48	1.92	1.48	1.92	V	
		V _{CCA} = V _{CCB} = 4.5 V	-	2.50	-	2.19	2.74	2.19	2.74	V	
		V _{CCA} = V _{CCB} = 5.5 V	-	3.03	-	2.65	3.33	2.65	3.33	V	

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

Symbol	Parameter	Conditions	+25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V _T	negative-going threshold voltage	A1, B2 inputs								
		V _{CCA} = V _{CCB} = 0.9 V	-	0.33	-	-	-	-	-	V
		V _{CCA} = V _{CCB} = 1.1 V	-	0.40	-	0.17	0.48	0.17	0.48	V
		V _{CCA} = V _{CCB} = 1.4 V	-	0.50	-	0.28	0.59	0.28	0.59	V
		V _{CCA} = V _{CCB} = 1.65 V	-	0.59	-	0.35	0.69	0.35	0.69	V
		V _{CCA} = V _{CCB} = 2.3 V	-	0.84	-	0.56	0.97	0.56	0.97	V
		V _{CCA} = V _{CCB} = 3.0 V	-	1.12	-	0.89	1.5	0.89	1.5	V
		V _{CCA} = V _{CCB} = 4.5 V	-	1.71	-	1.51	1.97	1.51	1.97	V
		V _{CCA} = V _{CCB} = 5.5 V	-	2.10	-	1.88	2.4	1.88	2.4	V
		OE input (referenced to V _{CCA} or V _{CCB})								
		V _{CCA} = V _{CCB} = 0.9 V	-	0.33	-	-	-	-	-	V
		V _{CCA} = V _{CCB} = 1.1 V	-	0.41	-	0.17	0.48	0.17	0.48	V
		V _{CCA} = V _{CCB} = 1.4 V	-	0.51	-	0.28	0.59	0.28	0.59	V
		V _{CCA} = V _{CCB} = 1.65 V	-	0.59	-	0.35	0.69	0.35	0.69	V
		V _{CCA} = V _{CCB} = 2.3 V	-	0.84	-	0.56	0.97	0.56	0.97	V
		V _{CCA} = V _{CCB} = 3.0 V	-	1.12	-	0.89	1.5	0.89	1.5	V
		V _{CCA} = V _{CCB} = 4.5 V	-	1.69	-	1.51	1.97	1.51	1.97	V
		V _{CCA} = V _{CCB} = 5.5 V	-	2.07	-	1.88	2.46	1.88	2.46	V

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

Symbol	Parameter	Conditions	+25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V _H	hysteresis voltage	A1, B2 inputs								
		V _{CCA} = V _{CCB} = 0.9 V	-	0.25	-	-	-	-	-	V
		V _{CCA} = V _{CCB} = 1.1 V	-	0.31	-	0.2	0.4	0.2	0.4	V
		V _{CCA} = V _{CCB} = 1.4 V	-	0.39	-	0.25	0.5	0.25	0.5	V
		V _{CCA} = V _{CCB} = 1.65 V	-	0.46	-	0.3	0.55	0.3	0.55	V
		V _{CCA} = V _{CCB} = 2.3 V	-	0.59	-	0.38	0.65	0.38	0.65	V
		V _{CCA} = V _{CCB} = 3.0 V	-	0.63	-	0.46	0.72	0.46	0.72	V
		V _{CCA} = V _{CCB} = 4.5 V	-	0.79	-	0.58	0.93	0.58	0.93	V
		V _{CCA} = V _{CCB} = 5.5 V	-	0.93	-	0.69	1.06	0.69	1.06	V
		OE input (referenced to V _{CCA} or V _{CCB})								
		V _{CCA} = V _{CCB} = 0.9 V	-	0.25	-	-	-	-	-	V
		V _{CCA} = V _{CCB} = 1.1 V	-	0.30	-	0.15	0.41	0.15	0.41	V
		V _{CCA} = V _{CCB} = 1.4 V	-	0.39	-	0.2	0.5	0.2	0.5	V
		V _{CCA} = V _{CCB} = 1.65 V	-	0.44	-	0.23	0.55	0.23	0.55	V
		V _{CCA} = V _{CCB} = 2.3 V	-	0.54	-	0.32	0.65	0.32	0.65	V
		V _{CCA} = V _{CCB} = 3.0 V	-	0.62	-	0.39	0.72	0.39	0.72	V
		V _{CCA} = V _{CCB} = 4.5 V	-	0.81	-	0.57	0.97	0.57	0.97	V
		V _{CCA} = V _{CCB} = 5.5 V	-	0.96	-	0.69	1.18	0.69	1.18	V
V _{OH}	HIGH-level output voltage	V _I = V _{T+(MAX)} [1][2]								
		I _O = -0.1 mA; V _{CCO} = 0.9 V to 5.5 V	V _{CCO} - 0.1	0.9	-	V _{CCO} - 0.1	-	V _{CCO} - 0.1	-	V
		I _O = -1.5 mA; V _{CCO} = 1.1 V	0.825	1.0	-	0.825	-	0.825	-	V
		I _O = -3 mA; V _{CCO} = 1.4 V	1.05	1.2	-	1.05	-	1.05	-	V
		I _O = -4.5 mA; V _{CCO} = 1.65 V	1.2	1.4	-	1.2	-	1.2	-	V
		I _O = -8 mA; V _{CCO} = 2.3 V	1.7	1.94	-	1.7	-	1.7	-	V
		I _O = -10 mA; V _{CCO} = 3.0 V	2.2	2.6	-	2.2	-	2.2	-	V
		I _O = -12 mA; V _{CCO} = 4.5 V	3.7	4.1	-	3.7	-	3.7	-	V

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

Symbol	Parameter	Conditions	+25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V _{OL}	LOW-level output voltage	V _I = V _{T-(MIN)} [1][2]								
		I _O = 0.1 mA; V _{CCO} = 0.9 V to 5.5 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 1.5 mA; V _{CCO} = 1.1 V	-	0.12	0.275	-	0.275	-	0.275	V
		I _O = 3 mA; V _{CCO} = 1.4 V	-	0.17	0.35	-	0.35	-	0.35	V
		I _O = 4.5 mA; V _{CCO} = 1.65 V	-	0.23	0.45	-	0.45	-	0.45	V
		I _O = 8 mA; V _{CCO} = 2.3 V	-	0.35	0.7	-	0.7	-	0.7	V
		I _O = 10 mA; V _{CCO} = 3.0 V	-	0.39	0.8	-	0.8	-	0.8	V
		I _O = 8 mA; V _{CCO} = 4.5 V	-	0.28	0.5	-	0.5	-	0.5	V
		I _O = 12 mA; V _{CCO} = 4.5 V	-	0.43	0.8	-	0.8	-	0.8	V
I _I	input leakage current	A1, B2 input; V _I = 0 V to 5.5 V; V _{CCI} = 0.9 V to 5.5 V [3]	-0.1	1	1.5	-0.1	1.85	-0.1	2	μA
		OE input; V _I = 0 V to 5.5 V; V _{CCI} = 0.9 V to 5.5 V [3]	-0.1	1	1.5	-0.1	1.85	-0.1	2	μA
I _{OZ}	OFF-state output current	suspend mode YB1 or YA2 output; V _{CCA} = V _{CCB} = 0.9 V to 5.5 V; V _I = 0 V or V _{CCI} ; V _O = 0 V or V _{CCO} OE = GND [1]	-0.1	-	0.1	-0.5	0.5	-2	2	μA
I _{OFF}	power-off leakage current	YB1 or YA2 output; V _I or V _O = 0 V to 5.5 V; V _{CCA} = 0 V; V _{CCB} = 0.9 V to 5.5 V	-1.5	-	1.5	-1.85	1.85	-2	2	μA
		YB1 or YA2 output; V _I or V _O = 0 V to 5.5 V; V _{CCB} = 0 V; V _{CCA} = 0.9 V to 5.5 V	-1.5	-	1.5	-1.85	1.85	-2	2	μA
		YB1 or YA2 output; V _I or V _O = GND; V _{CCA} = floating; V _{CCB} = 0.9 V to 5.5 V [4]	-1.5	-	1.5	-1.85	1.85	-2	2	μA
		YB1 or YA2 output; V _I or V _O = GND; V _{CCB} = floating; V _{CCA} = 0.9 V to 5.5 V [4]	-1.5	-	1.5	-1.85	1.85	-2	2	μA

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

Symbol	Parameter	Conditions	+25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
I _{CC}	supply current	I _{CCA} ; V _I = 0 V or V _{CCI} ; I _O = 0 A [3]								
		V _{CCA} , V _{CCB} = 0.9 V to 5.5 V	-	1	1.8	-	2.5	-	3	μA
		V _{CCA} = 5.5 V; V _{CCB} = 0 V	-	1	1.8	-	2.5	-	3	μA
		V _{CCA} = 0 V; V _{CCB} = 5.5 V	-0.1	-	0.1	-0.4	0.4	-1	1	μA
		I _{CCB} ; V _I = 0 V or V _{CCI} ; I _O = 0 A [3]								
		V _{CCA} , V _{CCB} = 0.9 V to 5.5 V	-	1	1.8	-	2.5	-	3	μA
		V _{CCB} = 5.5 V; V _{CCA} = 0 V	-	1	1.8	-	2.5	-	3	μA
		V _{CCB} = 0 V; V _{CCA} = 5.5 V	-0.1	-	0.1	-0.4	0.4	-1	1	μA
		I _{CCA} or I _{CCB} ; V _I or V _O = GND; I _O = 0 A								
		I _{CCA} ; V _{CCB} = floating; V _{CCA} = 5.5 V [4]	-	1	1.5	-	2.5	-	3	μA
		I _{CCB} ; V _{CCA} = floating; V _{CCB} = 5.5 V [4]	-	1	1.5	-	2.5	-	3	μA
		I _{CCA} + I _{CCB} combined; V _I = 0 V or V _{CCI} ; I _O = 0 A; V _{CCA} = V _{CCB} = 0.9 V to 5.5 V [3]	-	2	3	-	4.5	-	5	μA

[1] V_{CCO} is the supply voltage associated with the output pins (YB1, YA2).

[2] Typical values for V_{OL} and V_{OH} are measured at V_{CCO} is 0.9 V.

[3] V_{CCI} is the supply voltage associated with the control input or input pins (A1, B2).

[4] Floating is defined, if one of the supply pins is not actively driven externally and has a leakage not exceeding 10 nA

Table 10. Typical total supply current I_{CCA} at $T_{amb} = 25\text{ °C}$

Voltages are referenced to GND (ground = 0 V).

V_{CCA}	V_{CCB}								Unit
	0 V	0.9 V	1.2 V	1.5 V	1.8 V	2.5 V	3.3 V	5.0 V	
0 V	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	μA
0.9 V	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	μA
1.2 V	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	μA
1.5 V	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	μA
1.8 V	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	μA
2.5 V	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	μA
3.3 V	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	μA
5.0 V	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	μA

Table 11. Typical total supply current I_{CCB} at $T_{amb} = 25\text{ °C}$

Voltages are referenced to GND (ground = 0 V).

V_{CCA}	V_{CCB}								Unit
	0 V	0.9 V	1.2 V	1.5 V	1.8 V	2.5 V	3.3 V	5.0 V	
0 V	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	μA
0.9 V	0.01	0.2	0.25	0.3	0.4	0.45	0.5	0.7	μA
1.2 V	0.01	0.2	0.25	0.3	0.4	0.45	0.5	0.7	μA
1.5 V	0.01	0.2	0.25	0.3	0.4	0.45	0.5	0.7	μA
1.8 V	0.01	0.2	0.25	0.3	0.4	0.45	0.5	0.7	μA
2.5 V	0.01	0.2	0.25	0.3	0.4	0.45	0.5	0.7	μA
3.3 V	0.01	0.2	0.25	0.3	0.4	0.45	0.5	0.7	μA
5.0 V	0.01	0.2	0.25	0.3	0.4	0.45	0.5	0.9	μA

14. Dynamic characteristics

Table 12. Maximum data rate and output skew

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 12.

Symbol	Parameter	Conditions	T _{amb} = -40 °C to +125 °C			Unit
			Min	Typ	Max	
f _{data}	data rate	50% duty cycle input; one channel switching; 20% of pulse > 0.7xV _{CCO} ; 20% of pulse < 0.3xV _{CCO} [1]				
		Up translation [1][2]				
		V _{CCI} = 3.0 V to 3.6 V; V _{CCO} = 4.5 V to 5.5 V	-	350	250	Mbps
		V _{CCI} = 1.65 V to 1.95 V; V _{CCO} = 4.5 V to 5.5 V	-	350	250	Mbps
		V _{CCI} = 1.1 V to 1.3 V; V _{CCO} = 4.5 V to 5.5 V	-	220	100	Mbps
		V _{CCI} = 1.65 V to 1.95 V; V _{CCO} = 3.0 V to 3.6 V	-	230	150	Mbps
		V _{CCI} = 1.1 V to 1.3 V; V _{CCO} = 3.0 V to 3.6 V	-	300	140	Mbps
		V _{CCI} = 1.1 V to 1.3 V; V _{CCO} = 1.65 V to 1.95 V	-	100	40	Mbps
		Down translation [1][2]				
		V _{CCI} = 4.5 V to 5.5 V; V _{CCO} = 3.0 V to 3.6 V	-	250	170	Mbps
		V _{CCI} = 4.5 V to 5.5 V; V _{CCO} = 1.65 V to 1.95 V	-	150	60	Mbps
		V _{CCI} = 4.5 V to 5.5 V; V _{CCO} = 1.1 V to 1.3 V	-	80	30	Mbps
		V _{CCI} = 3.0 V to 3.6 V; V _{CCO} = 1.65 V to 1.95 V	-	150	60	Mbps
		V _{CCI} = 3.0 V to 3.6 V; V _{CCO} = 1.1 V to 1.3 V	-	80	30	Mbps
V _{CCI} = 1.65 V to 1.95 V; V _{CCO} = 1.1 V to 1.3 V	-	70	30	Mbps		
t _{sk(o)}	output skew time	Timing skew between any switching outputs on the rising or falling edge				
		Up translation [1][2]				
		V _{CCI} = 3.0 V to 3.6 V; V _{CCO} = 4.5 V to 5.5 V	-	0.15	0.7	ns
		V _{CCI} = 1.65 V to 1.95 V; V _{CCO} = 4.5 V to 5.5 V	-	0.25	1	ns
		V _{CCI} = 1.1 V to 1.3 V; V _{CCO} = 4.5 V to 5.5 V	-	0.5	2.1	ns
		V _{CCI} = 1.65 V to 1.95 V; V _{CCO} = 3.0 V to 3.6 V	-	0.25	1	ns
		V _{CCI} = 1.1 V to 1.3 V; V _{CCO} = 3.0 V to 3.6 V	-	0.5	2.1	ns
		V _{CCI} = 1.1 V to 1.3 V; V _{CCO} = 1.65 V to 1.95 V	-	0.5	2.1	ns
		Down translation [1][2]				
		V _{CCI} = 4.5 V to 5.5 V; V _{CCO} = 3.0 V to 3.6 V	-	0.15	0.8	ns
		V _{CCI} = 4.5 V to 5.5 V; V _{CCO} = 1.65 V to 1.95 V	-	0.25	1.1	ns
		V _{CCI} = 4.5 V to 5.5 V; V _{CCO} = 1.1 V to 1.3 V	-	0.6	2.5	ns
		V _{CCI} = 3.0 V to 3.6 V; V _{CCO} = 1.65 V to 1.95 V	-	0.25	2.5	ns
		V _{CCI} = 3.0 V to 3.6 V; V _{CCO} = 1.1 V to 1.3 V	-	0.6	2.5	ns
V _{CCI} = 1.65 V to 1.95 V; V _{CCO} = 1.1 V to 1.3 V	-	0.6	2.5	ns		

[1] V_{CCO} is the supply voltage associated with the output pins (YB1, YA2).

[2] V_{CCI} is the supply voltage associated with the input pins (A1, B2).

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Table 13. Typical dynamic characteristics at $V_{CCA} = 0.9\text{ V}$ and $T_{amb} = 25\text{ °C}$

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 12; for waveforms see Fig. 9, Fig. 11 and Fig. 10.

Symbol	Parameter	Conditions	V_{CCB}							Unit
			0.9 V	1.2 V	1.5 V	1.8 V	2.5 V	3.3 V	5.0 V	
t_{pd}	propagation delay	A1 to YB1 [1]	61	44	41	39.5	38.5	38.5	39.4	ns
		B2 to YA2 [1]	55.4	34.1	29.8	28.1	27.1	26.5	27.5	ns
t_{dis}	disable time	OE to YA2 [1]	65	67	68	70	74	79	92	ns
		OE to YB1 [1]	67	51	47	47	44	44	42	ns
t_{en}	enable time	OE to YA2 [1]	70	58	58	58	58	58.2	58.2	ns
		OE to YB1 [1]	67	51	47	47	44	44	42	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. Typical dynamic characteristics at $V_{CCB} = 0.9\text{ V}$ and $T_{amb} = 25\text{ °C}$**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 12; for waveforms see Fig. 9, Fig. 11 and Fig. 10.

Symbol	Parameter	Conditions	V_{CCA}							Unit
			0.9 V	1.2 V	1.5 V	1.8 V	2.5 V	3.3 V	5.0 V	
t_{pd}	propagation delay	A1 to YB1 [1]	61	44	41	39.5	38.5	38.5	39.4	ns
		B2 to YA2 [1]	54.5	43.7	40.3	39.2	38.5	38.6	39.5	ns
t_{dis}	disable time	OE to YA2 [1]	65	51	47	47	44	45	44	ns
		OE to YB1 [1]	67	68	70	72	76	81	94	ns
t_{en}	enable time	OE to YA2 [1]	60	52	52	52	52	50	70	ns
		OE to YB1 [1]	70	60	52	52	52	50	50	ns

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

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Table 15. Typical dynamic characteristics at $T_{amb} = 25\text{ }^{\circ}\text{C}$

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 12.

Symbol	Parameter	Conditions	Supply voltage ($V_{CCA} = V_{CCB}$)						Unit	
			0.9 V	1.2 V	1.5 V	1.8 V	2.5 V	3.3 V		5.0 V
C_{PD}	power dissipation capacitance	V_{CCA} [1][2][3] $f_i = 10\text{ MHz}$; $V_I = \text{GND to } V_{CCI}$; $t_r = t_f = 1\text{ ns}$; $C_L = 0\text{ pF}$; $R_L = \infty\ \Omega$								
		A1 to YB1; outputs disabled	1.5	1.6	1.7	1.7	1.9	2.1	2.7	pF
		B2 to YA2; outputs disabled	1.5	1.6	1.7	1.7	1.9	2.1	2.7	pF
		A1 to YB1; outputs enabled	1.5	1.6	1.7	1.7	1.9	2.1	2.7	pF
		B2 to YA2; outputs enabled	10	10.4	10.6	10.7	10.9	11.3	12.1	pF
		V_{CCB} [1][2][3] $f_i = 10\text{ MHz}$; $V_I = \text{GND to } V_{CCI}$; $t_r = t_f = 1\text{ ns}$; $C_L = 0\text{ pF}$; $R_L = \infty\ \Omega$								
		A1 to YB1; outputs disabled	1.5	1.6	1.7	1.7	1.9	2.1	2.7	pF
		B2 to YA2; outputs disabled	1.5	1.6	1.7	1.7	1.9	2.1	2.7	pF
		A1 to YB1; outputs enabled	10	10.4	10.6	10.7	10.9	11.3	12.1	pF
		B2 to YA2; outputs enabled	1.5	1.6	1.7	1.7	1.9	2.1	2.7	pF
C_I	input capacitance	$V_I = 0\text{ V or } V_{CCI}$ [2]	1.9	1.9	1.9	1.9	1.9	1.9	1.9	pF
C_O	output capacitance	OE = GND; $V_{CCA} = 3.3\text{ V}$; $V_{CCB} = 3.3\text{ V}$; $V_O = 0\text{ V or } V_{CCI}$	3.2	3.2	3.2	3.2	3.2	3.2	3.2	pF

[1] C_{PD} per channel is used to determine the dynamic power dissipation (P_{DYN} in μW).

$$P_{DYN} = N \times (C_{PD} \times V_{CCI}^2 \times f_i) + N \times (C_L \times V_{CCO}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = load capacitance in pF;

V_{CCI} = the supply voltage associated with the input pins in V;

V_{CCO} = the supply voltage associated with the output pins in V;

N = total number of inputs or outputs switching.

[2] V_{CCI} is the supply voltage associated with the input pins (A1, B2).

[3] V_{CCO} is the supply voltage associated with the output pins (YB1, YA2).

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Table 16. Dynamic characteristics for temperature range -40 °C to +85 °C

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 12; for waveforms see Fig. 9, Fig. 11 and Fig. 10.

Symbol	Parameter	Conditions	V_{CCB}												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		5.0 V ± 0.5 V			
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
t_{pd}	propagation delay	A1 to YB1 [1]														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	6.0	42.1	5.3	30.1	5.0	26.5	4.7	22.8	4.7	21.5	4.7	21.9	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	5.3	33.4	4.6	21.4	4.2	18.1	3.8	14.6	3.8	13.3	3.8	12.7	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	5.0	31.3	4.3	19.2	3.5	15.6	3.4	12.4	3.4	11.2	3.4	10.1	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	4.6	29.5	3.7	17.3	3.4	13.6	3.0	10.1	2.9	8.8	2.9	7.7	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	4.6	29.1	3.8	16.6	3.5	12.9	3.1	9.4	2.9	7.9	2.8	6.8	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	4.8	29.6	4.1	16.3	3.7	12.5	3.2	8.7	2.9	7.3	2.6	6.1	ns	
		B2 to YA2														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	6.7	42.1	5.9	34.4	5.5	32.3	5.1	30.4	5.1	29.8	5.1	30.3	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	6.1	30.6	5.2	22.5	4.5	20.3	4.1	18.2	4.1	17.4	4.1	17.1	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	5.7	27.4	4.7	19.1	4.0	16.4	3.5	14.1	3.5	13.3	3.5	12.8	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	5.4	23.7	4.4	15.3	3.6	12.7	3.2	10.3	3.2	9.6	3.3	8.9	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	5.3	22.3	4.3	13.9	3.5	11.3	3.0	9.1	3.1	8.1	3.1	7.4	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	5.1	22.7	4.1	13.3	3.5	10.4	3.0	7.9	2.8	6.9	2.7	6.2	ns	

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Symbol	Parameter	Conditions	V_{CCB}												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		5.0 V ± 0.5 V			
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
t_{en}	enable time	OE to YB1 [1]														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	8.5	42.8	7.7	31.8	7.4	28.5	7.2	25.5	7.2	24.6	7.2	24.2	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	7.9	39.4	6.4	23.1	5.8	19.8	5.6	16.7	5.6	15.7	5.6	15.2	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	7.5	38.5	6.1	22.2	5.2	17.2	4.7	13.7	4.6	12.5	4.6	11.8	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	7.1	37.5	5.3	21.3	4.4	16.1	3.9	10.7	3.7	9.5	3.7	8.6	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	6.6	37.1	5.1	20.8	4.1	15.5	3.4	10.1	3.3	8.2	3.2	7.3	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	6.2	36.5	4.5	20.2	3.6	15.1	2.9	9.4	2.6	7.4	2.6	6.2	ns	
		OE to YA2														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	8.5	42.8	8.7	42.7	8.7	42.7	8.7	42.7	8.5	42.7	8.5	42.7	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	7.4	38.6	6.4	28.2	6.5	28.2	6.5	28.2	6.4	28.2	6.4	28.2	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	6.5	33.3	5.6	23.8	5.2	23.8	5.2	23.8	5.2	23.8	5.2	23.8	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	5.6	28.6	4.7	19.6	4.3	17.7	4.1	15.8	4.1	15.8	3.4	15.8	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	5.2	27.8	4.2	18.2	3.7	16.1	3.4	9.2	3.4	8.3	3.0	8.3	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	4.8	25.7	3.8	16.0	3.3	9.7	2.8	7.4	2.7	6.6	2.7	6.2	ns	

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Symbol	Parameter	Conditions	V_{CCB}												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		5.0 V ± 0.5 V			
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
t_{dis}	disable time	OE to YB1 [1]														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	11.7	44.1	10.9	37.2	11.5	36.2	10.6	32.9	10.8	33.7	9.9	32.2	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	11.6	44.2	8.5	26.4	8.9	25.1	7.4	21.6	7.4	22.1	7.4	20.2	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	11.6	44.4	8.4	26.3	6.9	21.3	5.3	18.1	5.3	18.4	6.3	16.3	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	11.6	44.9	8.3	26.4	7.1	21.3	4.7	17.9	6.0	15.3	4.6	13.7	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	11.3	45.6	8.2	26.6	6.7	21.4	4.1	15.1	4.9	14.6	4.1	12.2	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	11.3	47.1	8.4	27.2	6.4	24.6	3.4	16.7	4.9	17.1	3.1	12.7	ns	
		OE to YA2														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	11.6	58.7	11.6	58.7	11.6	58.7	11.6	58.7	11.6	58.7	11.6	58.7	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	10.8	50.5	8.5	39.4	8.5	39.4	8.5	39.4	8.7	39.4	8.7	39.4	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	7.5	49.5	7.5	37.9	7.5	34.3	5.0	34.3	5.0	34.3	4.0	27.0	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	7.5	44.5	7.5	32.5	5.0	28.9	5.0	25.1	5.0	16.1	2.6	19.5	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	7.5	39.6	7.5	27.2	5.0	22.4	5.0	15.0	5.0	14.9	4.7	18.1	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	7.5	33.7	7.5	20.4	4.9	16.5	4.9	12.3	4.9	11.9	3.6	12.3	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} .

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

Table 17. Dynamic characteristics for temperature range -40 °C to +125 °C

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 12; for waveforms see Fig. 9, Fig. 11 and Fig. 10.

Symbol	Parameter	Conditions	V_{CCB}												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		5.0 V ± 0.5 V			
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
t_{pd}	propagation delay	A1 to YB1 [1]														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	6.0	42.1	5.3	31.1	5.0	27.4	4.7	23.6	4.7	22.2	4.7	22.3	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	5.3	34.1	4.6	22.6	4.2	19.2	3.8	15.7	3.8	14.2	3.8	13.4	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	5.0	31.8	4.3	20.4	3.5	16.6	3.4	13.3	3.4	12.1	3.4	10.7	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	4.6	29.9	3.7	18.3	3.4	14.5	3.0	10.9	2.9	9.4	2.9	8.2	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	4.6	29.5	3.8	17.6	3.5	13.7	3.1	10.1	2.9	8.5	2.8	7.2	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	4.8	29.9	4.1	17.2	3.7	13.2	3.2	9.3	2.9	7.7	2.6	6.4	ns	
		B2 to YA2														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	6.7	42.7	5.9	35.2	5.5	32.7	5.1	30.6	5.1	30.1	5.1	30.7	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	6.1	31.9	5.2	24.2	4.5	21.5	4.1	19.1	4.1	18.3	4.1	17.8	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	5.7	28.6	4.7	20.3	4.0	17.5	3.5	15.1	3.5	14.2	3.5	13.6	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	5.4	24.6	4.4	16.3	3.6	13.6	3.2	11.2	3.2	10.2	3.3	9.6	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	5.3	23.2	4.3	14.9	3.5	12.2	3.0	9.6	3.1	8.6	3.1	7.9	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	5.1	23.2	4.1	14.2	3.5	11.1	3.0	8.4	2.8	7.4	2.7	6.6	ns	

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

Symbol	Parameter	Conditions	V_{CCB}												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		5.0 V ± 0.5 V			
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
t_{en}	enable time	OE to YB1 [1]														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	8.5	43.3	7.7	32.7	7.4	29.4	7.2	26.2	7.2	25.3	7.2	24.8	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	7.9	39.8	6.4	24.3	6.1	21.1	5.6	17.6	5.6	16.5	5.6	15.9	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	7.5	38.9	6.1	23.4	5.2	18.2	4.7	14.6	4.6	13.3	4.6	12.6	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	7.1	37.9	5.3	22.4	4.4	17.2	3.9	11.5	3.7	10.2	3.7	9.2	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	6.6	37.4	5.1	21.9	4.1	16.5	3.4	10.8	3.3	8.8	3.2	7.7	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	6.2	36.9	4.5	21.4	3.6	16.1	2.9	10.2	2.6	8.1	2.6	6.5	ns	
		OE to YA2														
		$V_{CCA} = 1.2 \text{ V} \pm 0.1 \text{ V}$	8.5	43.2	8.7	43.2	8.7	43.2	8.7	43.2	8.5	43.2	8.5	43.2	ns	
		$V_{CCA} = 1.5 \text{ V} \pm 0.1 \text{ V}$	7.4	39.7	6.4	29.4	6.5	29.4	6.5	29.4	6.4	29.4	6.4	29.4	ns	
		$V_{CCA} = 1.8 \text{ V} \pm 0.15 \text{ V}$	6.5	34.3	5.6	24.9	5.2	23.2	5.2	23.2	5.2	23.2	5.2	23.2	ns	
		$V_{CCA} = 2.5 \text{ V} \pm 0.2 \text{ V}$	5.6	29.0	4.7	20.5	4.3	18.6	4.1	16.6	4.1	16.6	3.4	16.6	ns	
		$V_{CCA} = 3.3 \text{ V} \pm 0.3 \text{ V}$	5.2	28.0	4.2	19.1	3.7	16.7	3.4	9.6	3.4	8.9	3.0	8.9	ns	
		$V_{CCA} = 5.0 \text{ V} \pm 0.5 \text{ V}$	4.8	28.4	3.8	16.6	3.3	10.4	2.8	7.9	2.7	7.2	2.7	6.5	ns	

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

Symbol	Parameter	Conditions	V_{CCB}												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		5.0 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
t_{dis}	disable time	OE to YB1 [1]													
		$V_{CCA} = 1.2\text{ V} \pm 0.1\text{ V}$	11.7	45.2	10.9	38.2	11.5	36.8	10.6	33.2	10.8	33.9	9.9	33.4	ns
		$V_{CCA} = 1.5\text{ V} \pm 0.1\text{ V}$	11.6	45.2	8.5	27.8	8.9	26.3	7.4	22.6	7.4	23.2	7.4	21.2	ns
		$V_{CCA} = 1.8\text{ V} \pm 0.15\text{ V}$	11.6	45.4	8.4	27.8	6.9	22.6	5.3	19.2	5.3	19.5	6.3	17.3	ns
		$V_{CCA} = 2.5\text{ V} \pm 0.2\text{ V}$	11.6	45.8	8.3	27.9	7.1	22.6	4.7	18.9	6.0	16.0	4.6	14.1	ns
		$V_{CCA} = 3.3\text{ V} \pm 0.3\text{ V}$	11.3	46.4	8.2	28.2	6.7	22.7	4.1	15.5	4.9	15.0	4.1	12.8	ns
		$V_{CCA} = 5.0\text{ V} \pm 0.5\text{ V}$	11.3	59.2	8.4	28.8	6.4	25.6	3.4	16.9	4.9	17.1	3.1	13.3	ns
		OE to YA2													
		$V_{CCA} = 1.2\text{ V} \pm 0.1\text{ V}$	11.6	59.6	11.6	59.6	11.6	59.6	11.6	59.6	11.6	59.6	11.6	58.9	ns
		$V_{CCA} = 1.5\text{ V} \pm 0.1\text{ V}$	10.8	51.3	8.5	40.8	8.5	40.8	8.5	40.8	8.7	40.8	8.7	40.8	ns
		$V_{CCA} = 1.8\text{ V} \pm 0.15\text{ V}$	7.5	50.3	7.5	40.8	7.5	39.4	5.0	39.4	5.0	39.4	4.0	39.4	ns
		$V_{CCA} = 2.5\text{ V} \pm 0.2\text{ V}$	7.5	44.8	7.5	33.7	5.0	30.1	5.0	25.9	5.0	25.9	2.6	19.2	ns
		$V_{CCA} = 3.3\text{ V} \pm 0.3\text{ V}$	7.5	39.9	7.5	28.3	5.0	23.5	5.0	16.2	5.0	15.0	4.7	17.1	ns
		$V_{CCA} = 5.0\text{ V} \pm 0.5\text{ V}$	7.5	34.2	7.5	21.5	4.9	17.5	4.9	12.9	4.9	11.6	3.6	11.9	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} .

14.1. Waveforms and test circuit

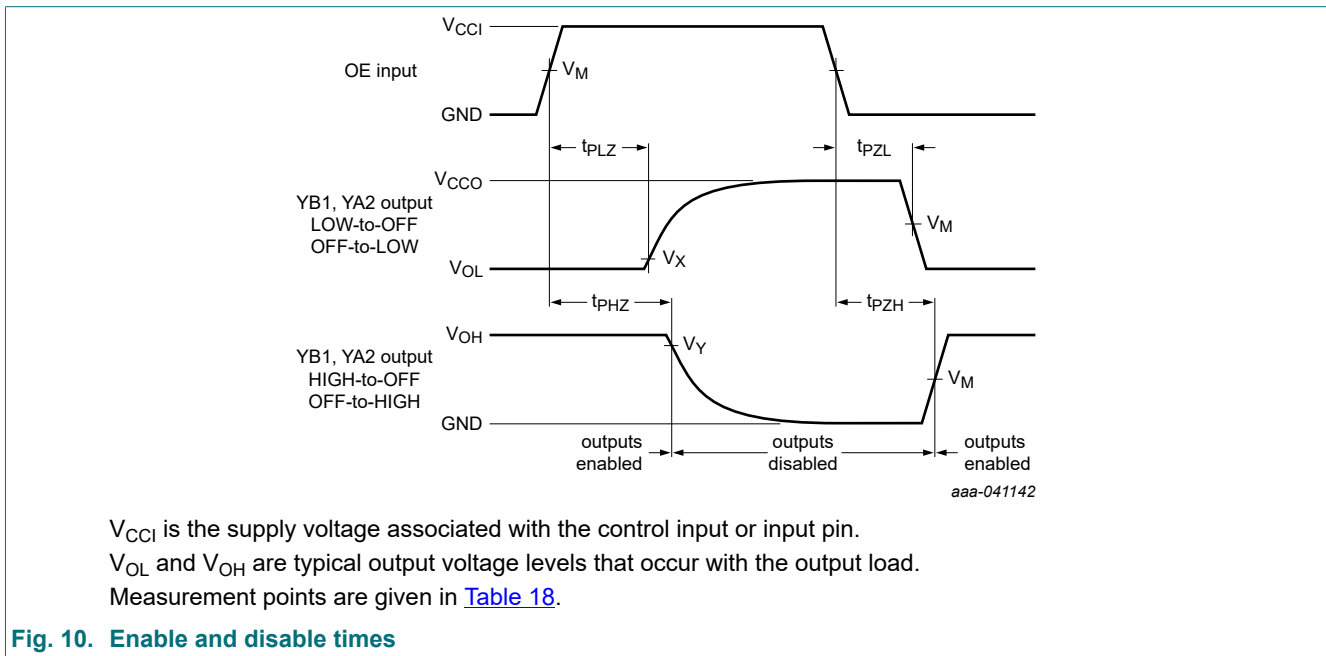
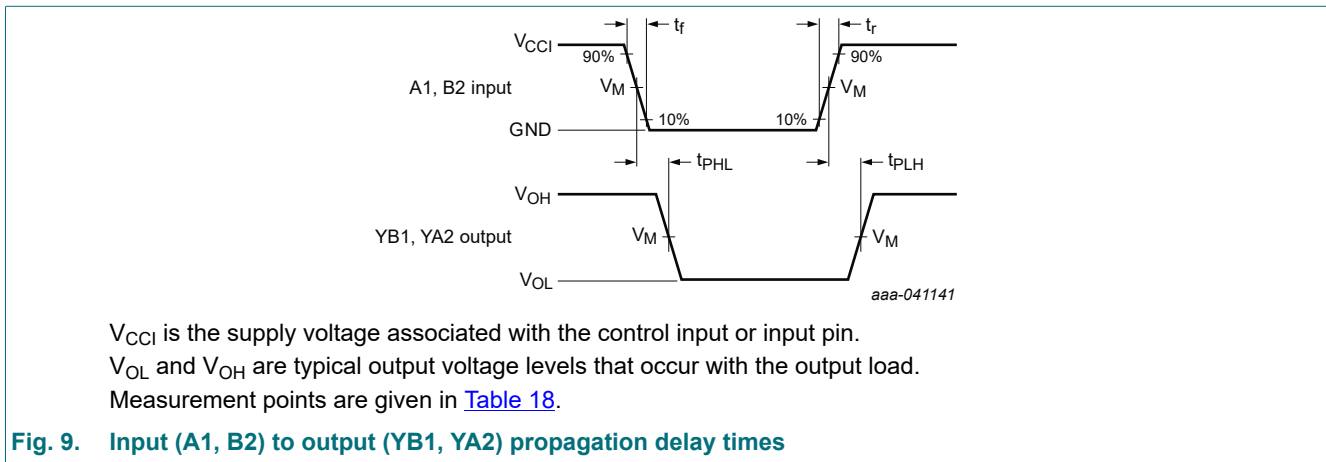


Table 18. Measurement points

Supply voltage	Input[1]	Output[2]		
V_{CCA}, V_{CCB}	V_M	V_M	V_X	V_Y
0.9 V to 1.6 V	$0.5 \times V_{CCI}$	$0.5 \times V_{CCO}$	$V_{OL} + 0.1 \text{ V}$	$V_{OH} - 0.1 \text{ V}$
1.65 V to 2.7 V	$0.5 \times V_{CCI}$	$0.5 \times V_{CCO}$	$V_{OL} + 0.15 \text{ V}$	$V_{OH} - 0.15 \text{ V}$
3.0 V to 5.5 V	$0.5 \times V_{CCI}$	$0.5 \times V_{CCO}$	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$

[1] V_{CCI} is the supply voltage associated with the control input or input pins (A1, B2).
 [2] V_{CCO} is the supply voltage associated with the output pins (YB1, YA2).

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

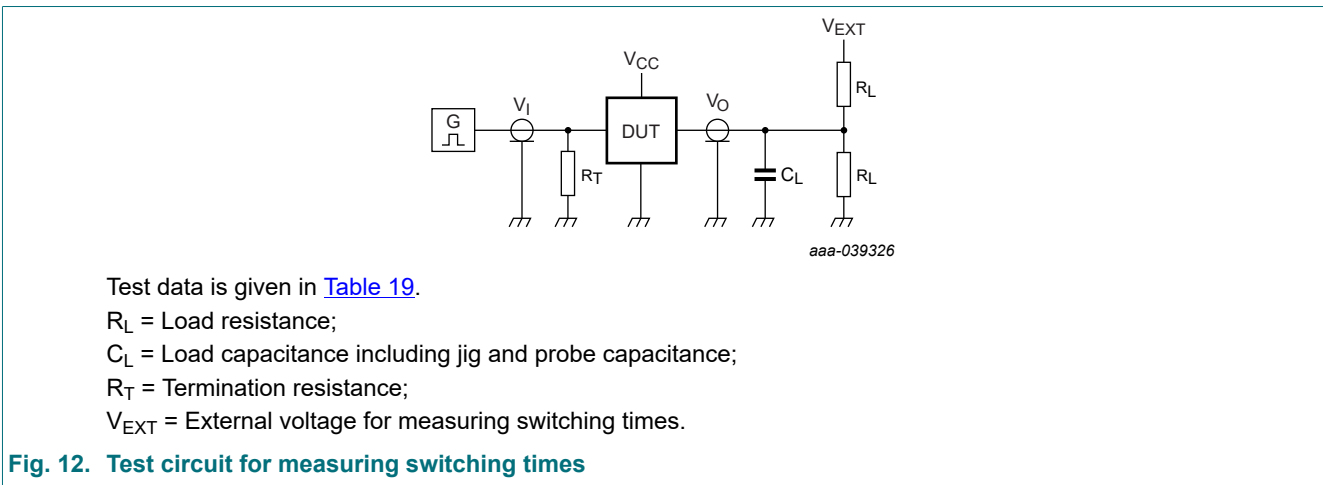
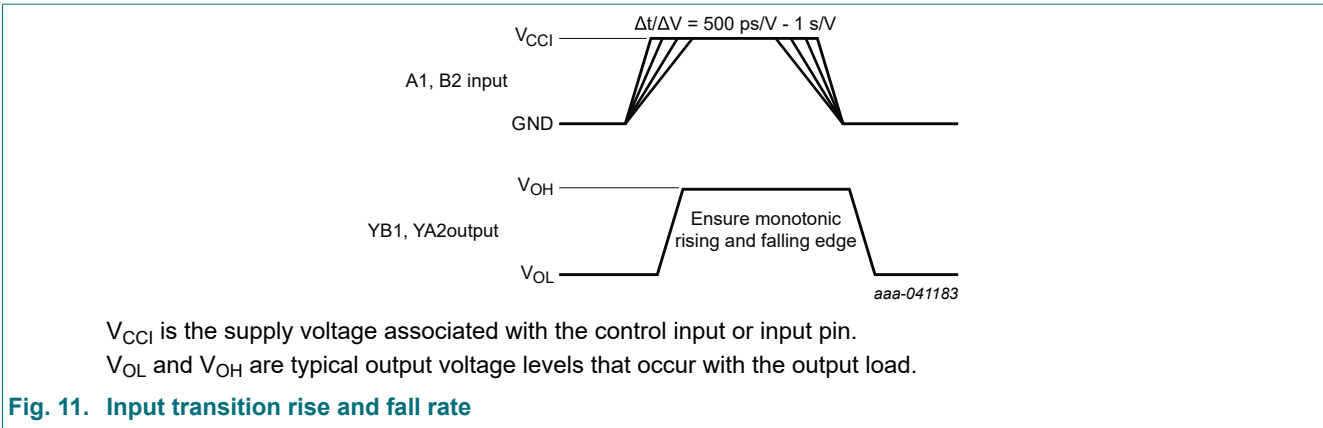
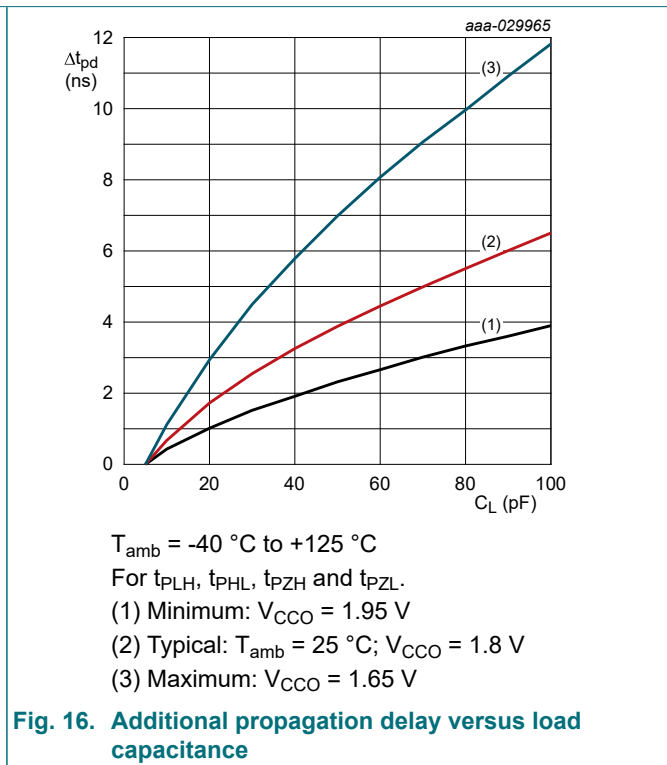
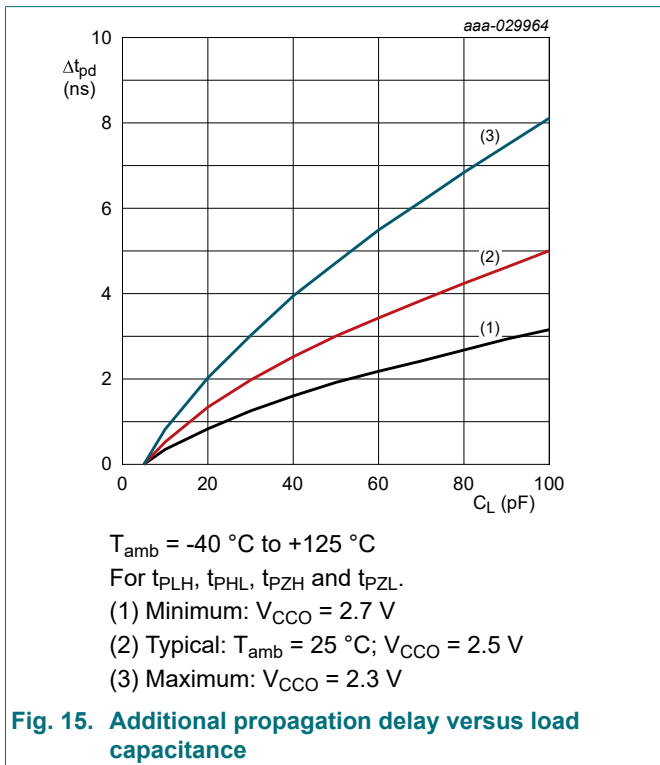
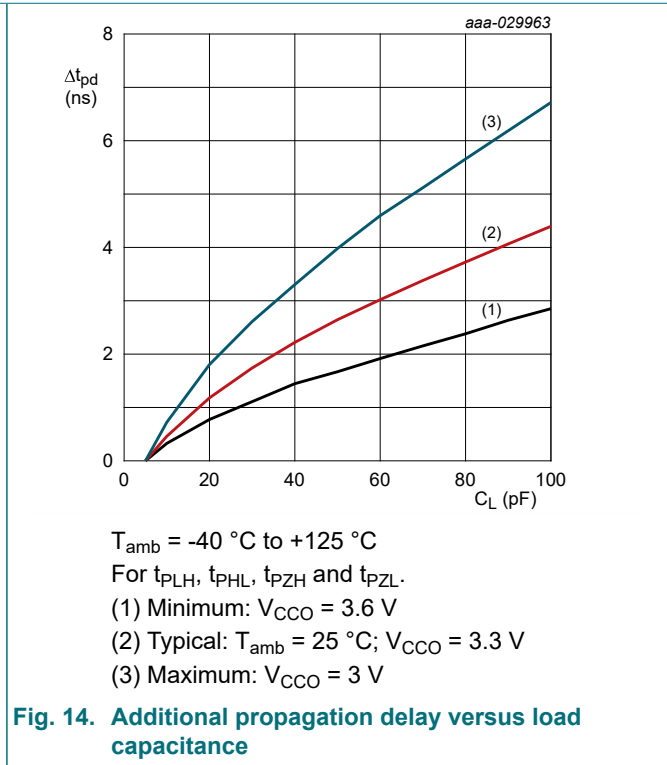
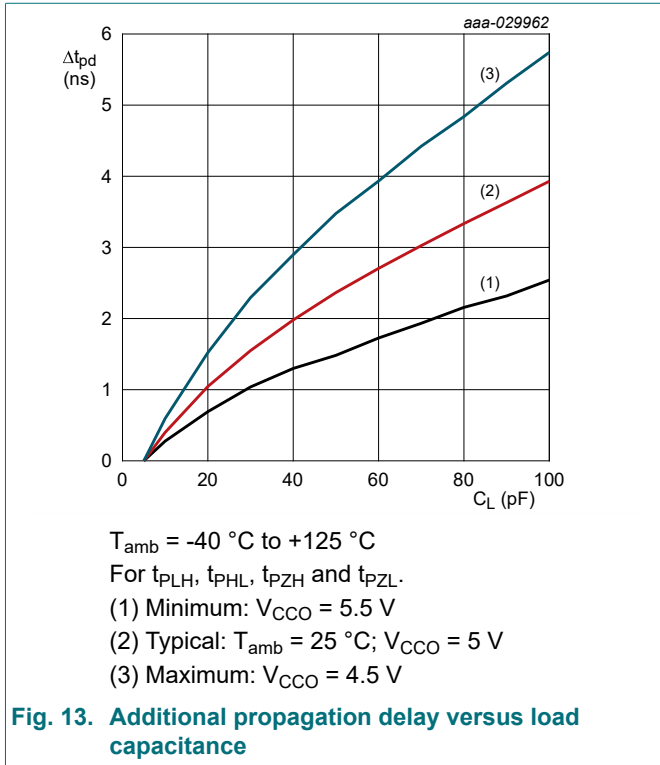


Table 19. Test data

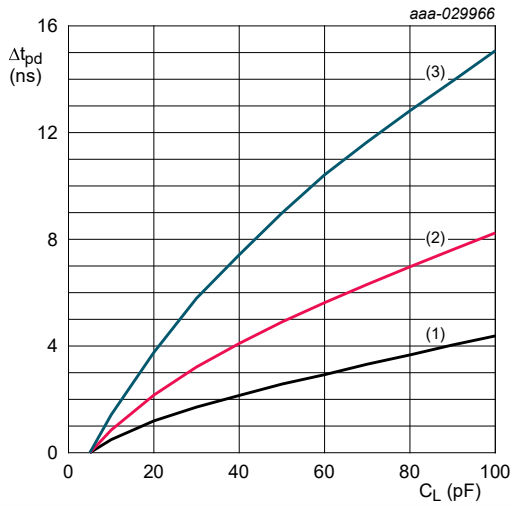
Supply voltage	Load		Input		V_{EXT}		
V_{CCA}, V_{CCB}	C_L	R_L	t_r, t_f	V_I [1]	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ} [2]
0.9 V to 5.5 V	5 pF	10 k Ω	$\leq 1.0 \text{ ns/V}$	V_{CCI}	open	GND	$2 \times V_{CCO}$

[1] V_{CCI} is the supply voltage associated with the control input or input pins (A1, B2).
[2] V_{CCO} is the supply voltage associated with the output pins (YB1, YA2).

14.2. Additional propagation delay versus load capacitance graphs

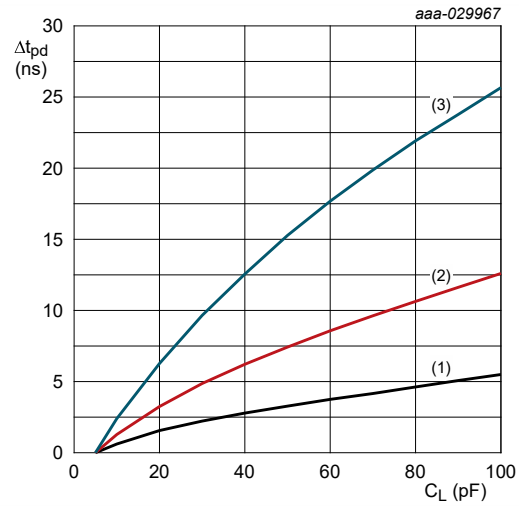


2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state



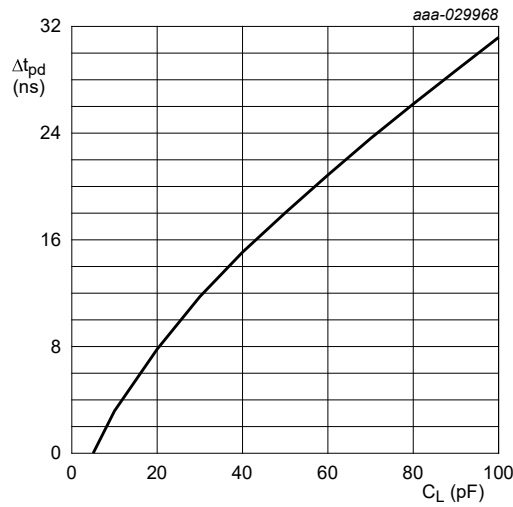
T_{amb} = -40 °C to +125 °C
 For t_{PLH}, t_{PHL}, t_{PZH} and t_{PZL}.
 (1) Minimum: V_{CCO} = 1.6 V
 (2) Typical: T_{amb} = 25 °C; V_{CCO} = 1.5 V
 (3) Maximum: V_{CCO} = 1.4 V

Fig. 17. Additional propagation delay versus load capacitance



T_{amb} = -40 °C to +125 °C
 For t_{PLH}, t_{PHL}, t_{PZH} and t_{PZL}.
 (1) Minimum: V_{CCO} = 1.3 V
 (2) Typical: T_{amb} = 25 °C; V_{CCO} = 1.2 V
 (3) Maximum: V_{CCO} = 1.1 V

Fig. 18. Additional propagation delay versus load capacitance



T_{amb} = 25 °C;
 For t_{PLH}, t_{PHL}, t_{PZH} and t_{PZL}.
 V_{CCO} = 0.9 V

Fig. 19. Additional propagation delay versus load capacitance

15. Application information

NXU0202

The NXU0202 is a 2-bit level-shifting transceiver suitable for level-translation purposes. This device is ideal in any application requiring level-shifting between two voltage domains and especially designed for applications where push-pull drivers are utilized to the data inputs pins. Below an example of a 2-wire UART configuration for translating from 1.8V to a 5V device.

Typical application schematic

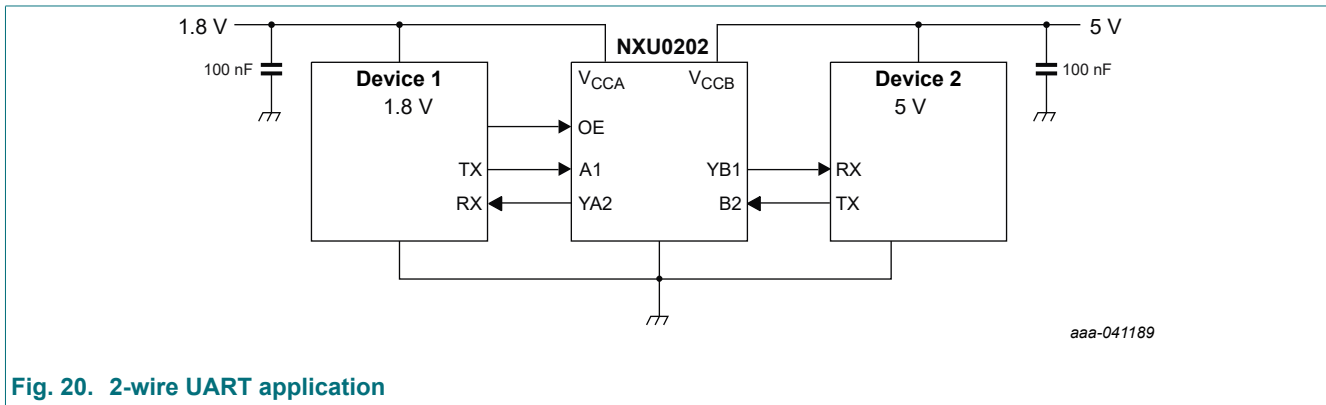


Fig. 20. 2-wire UART application

16. Package outline

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1

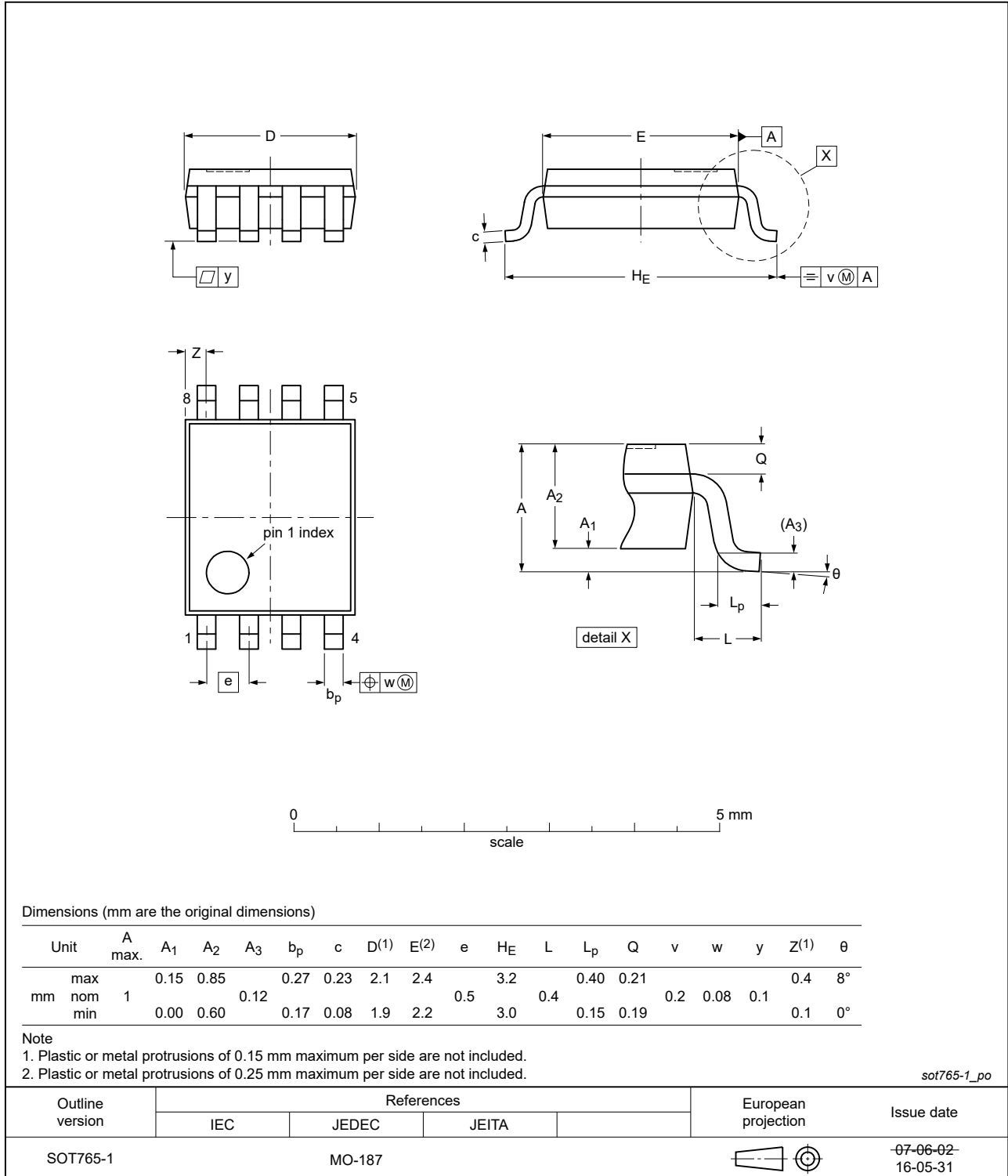


Fig. 21. Package outline SOT765-1 (VSSOP8)

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm

SOT833-1

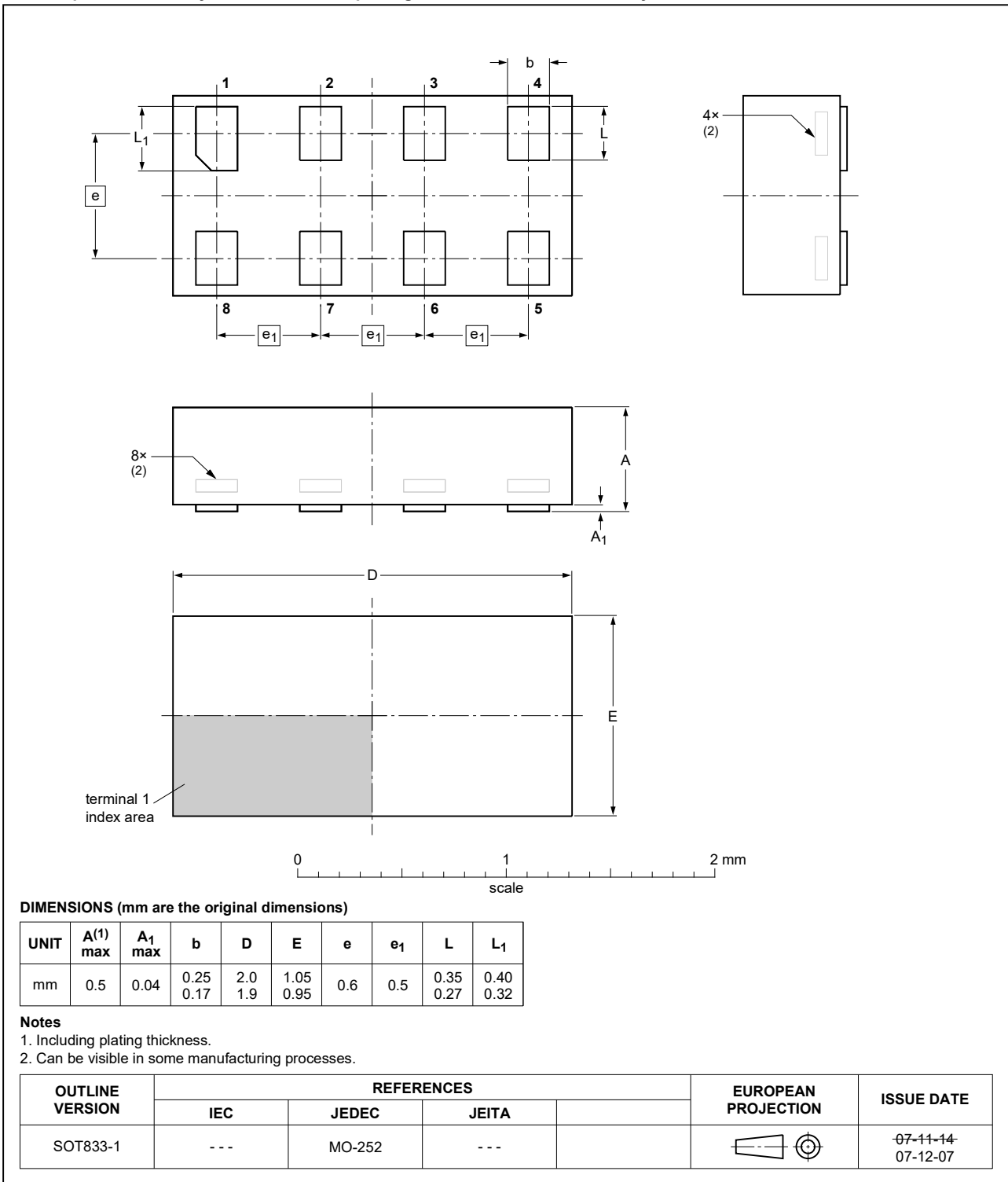


Fig. 22. Package outline SOT833-1 (XSON8)

2-bit dual-supply buffer/level translator with Schmitt-trigger; 3-state

X2SON8: plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 x 0.8 x 0.32 mm

SOT1233-2

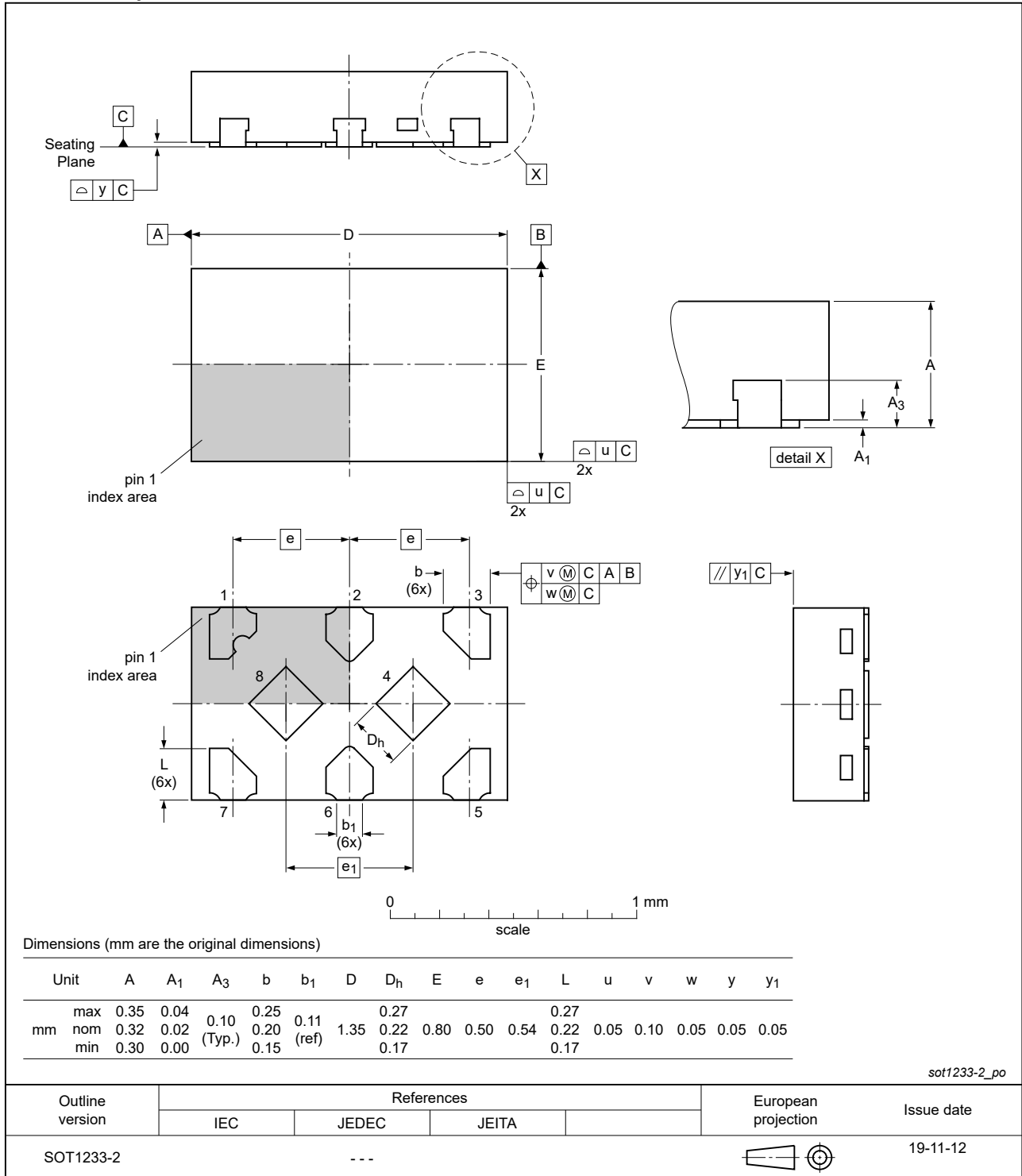


Fig. 23. Package outline SOT1233-2 (X2SON8)

17. Abbreviations

Table 20. Abbreviations

Acronym	Description
ANSI	American National Standards Institute
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
ESDA	Earth Sciences Data Standards
HBM	Human Body Model
JEDEC	Joint Electron Device Engineering Council
JTAG	Joint Test Action Group
UART	Universal Asynchronous Receiver/Transmitter

18. Revision history

Table 21. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NXU0202 v.1	20241030	Product data sheet	-	-

19. Legal information

Data sheet status

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

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

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