

# NXS0108-Q100

Dual supply translating transceiver; open drain;  
auto direction sensing

Rev. 1 — 15 September 2020

Product data sheet

## 1. General description

The NXS0108-Q100 is an 8-bit, dual supply translating transceiver with auto direction sensing, that enables bidirectional voltage level translation. It features two 8-bit input-output ports (An and Bn), one output enable input (OE) and two supply pins ( $V_{CC(A)}$  and  $V_{CC(B)}$ ).  $V_{CC(A)}$  can be supplied at any voltage between 1.2 V and 3.6 V and  $V_{CC(B)}$  can be supplied at any voltage between 1.65 V and 5.5 V, making the device suitable for translating between any of the voltage nodes (1.2 V, 1.8 V, 2.5 V, 3.3 V and 5.0 V). Pins An and OE are referenced to  $V_{CC(A)}$  and pins Bn are referenced to  $V_{CC(B)}$ . A LOW level at pin OE causes the outputs to assume a high-impedance OFF-state. This device is fully specified for partial power-down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

## 2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Wide supply voltage range:
  - $V_{CC(A)}$ : 1.2 V to 3.6 V and  $V_{CC(B)}$ : 1.65 V to 5.5 V
- Maximum data rates:
  - Push-pull: 110 Mbps
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Inputs accept voltages up to 5.5 V
- ESD protection:
  - HBM JESD22-A114E Class 2 exceeds 2.5 kV for A port
  - HBM JESD22-A114E Class 3B exceeds 15 kV for B port
  - CDM JESD22-C101E exceeds 1.5 kV
  - IEC61000-4-2 contact discharge exceeds 8 kV for B port
- Latch-up performance exceeds 100 mA per JESD 78B Class II
- DHVQFN package with Side-Wettable Flanks enabling Automatic Optical Inspection (AOI) of solder joints

## 3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
NXS0108PW-Q100	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
NXS0108BQ-Q100	-40 °C to +125 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm	SOT764-1

### 4. Functional diagram

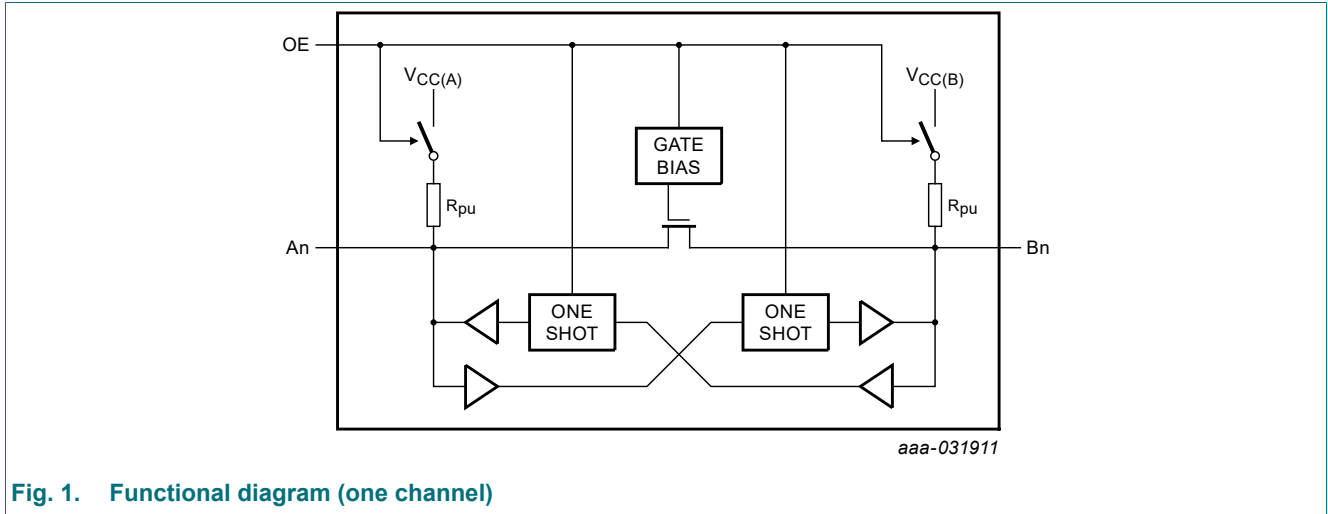


Fig. 1. Functional diagram (one channel)

### 5. Pinning information

#### 5.1. Pinning

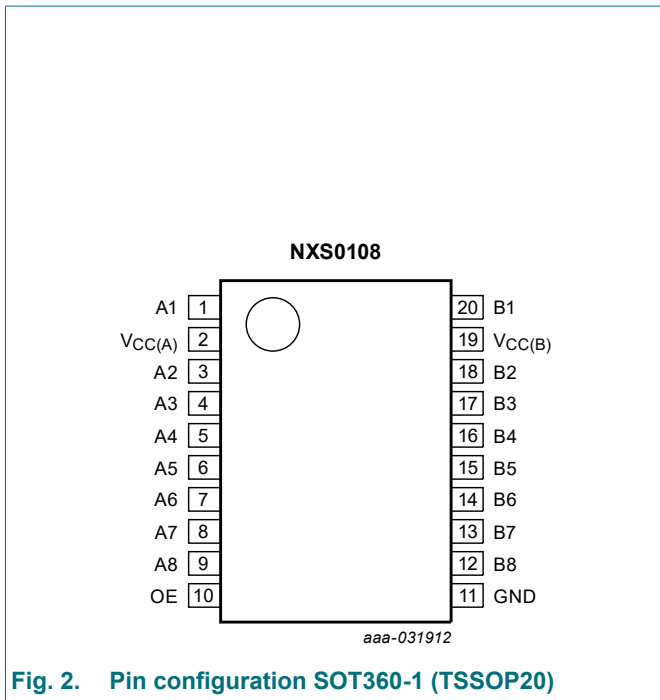


Fig. 2. Pin configuration SOT360-1 (TSSOP20)

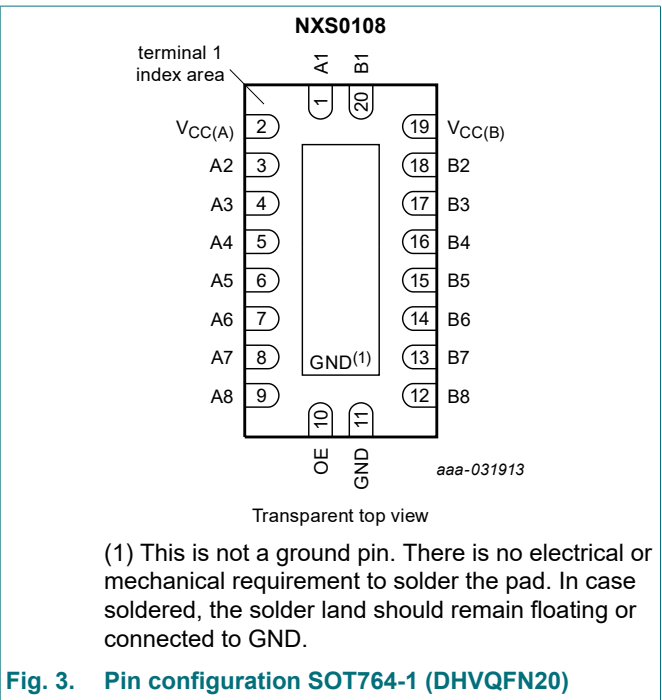


Fig. 3. Pin configuration SOT764-1 (DHVQFN20)

## 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
A1, A2, A3, A4, A5, A6, A7, A8	1, 3, 4, 5, 6, 7, 8, 9	data input or output (referenced to $V_{CC(A)}$ )
$V_{CC(A)}$	2	supply voltage A
OE	10	output enable input (active HIGH; referenced to $V_{CC(A)}$ )
GND	11	ground (0 V)
B1, B2, B3, B4, B5, B6, B7, B8	20, 18, 17, 16, 15, 14, 13, 12	data input or output (referenced to $V_{CC(B)}$ )
$V_{CC(B)}$	19	supply voltage B

## 6. Functional description

Table 3. Function table

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

Supply voltage		Input	Input/output	
$V_{CC(A)}$ [1]	$V_{CC(B)}$	OE	A	B
1.2 V to 3.6 V	1.65 V to 5.5 V	L	Z	Z
1.2 V to 3.6 V	1.65 V to 5.5 V	H	input or output	output or input
GND	1.65 V to 5.5 V	X	Z	Z
1.2 V to 3.6 V	GND	X	Z	Z

[1]  $V_{CC(A)}$  must be less than or equal to  $V_{CC(B)}$ .

## 7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC(A)}$	supply voltage A		-0.5	+6.5	V
$V_{CC(B)}$	supply voltage B		-0.5	+6.5	V
$V_I$	input voltage	OE [1]	-0.5	+6.5	V
		An, Bn; Power-down or 3-state mode [1]	-0.5	+6.5	V
		An, Bn; Active mode [1] [2] [3]	-0.5	$V_{CCI} + 0.5$	V
$V_O$	output voltage	An, Bn; Power-down or 3-state mode [1]	-0.5	+6.5	V
		An, Bn; Active mode [1] [3] [4]	-0.5	$V_{CCO} + 0.5$	V

## Dual supply translating transceiver; open drain; auto direction sensing

Symbol	Parameter	Conditions	Min	Max	Unit
$I_{IK}$	input clamping current	$V_I < 0\text{ V}$	-50	-	mA
$I_{OK}$	output clamping current	$V_O < 0\text{ V}$	-50	-	mA
$I_O$	output current	$V_O = 0\text{ V}$ to $V_{CCO}$ [4]	-	$\pm 50$	mA
$I_{CC}$	supply current	$I_{CC(A)}$ or $I_{CC(B)}$	-	100	mA
$I_{GND}$	ground current		-100	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ [5]	-	500	mW

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

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

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

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

[5] For SOT360-1 (TSSOP20) package:  $P_{tot}$  derates linearly with 10.0 mW/K above 100 °C.  
For SOT764-1 (DHVQFN20) package:  $P_{tot}$  derates linearly with 12.9 mW/K above 111 °C.

## 8. Recommended operating conditions

Table 5. Recommended operating conditions [1] [2]

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC(A)}$	supply voltage A		1.2	3.6	V
$V_{CC(B)}$	supply voltage B		1.65	5.5	V
$V_I$	input voltage	OE	0	5.5	V
		Power-down or 3-state mode			
		An	0	3.6	V
		Bn	0	5.5	V
		Active mode			
	An, Bn	[3]	0	$V_{CCI}$	V
$V_O$	output voltage	Power-down or 3-state mode			
		An	0	3.6	V
		Bn	0	5.5	V
		Active mode			
		An, Bn	[4]	0	$V_{CCO}$
$T_{amb}$	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	A or B port; push-pull driving			
		$V_{CC(A)} = 1.2\text{ V}$ to $3.6\text{ V}$ ; $V_{CC(B)} = 1.65\text{ V}$ to $5.5\text{ V}$	-	10	ns/V
		OE input			
		$V_{CC(A)} = 1.2\text{ V}$ to $3.6\text{ V}$ ; $V_{CC(B)} = 1.65\text{ V}$ to $5.5\text{ V}$	-	10	ns/V

[1] The A and B sides of an unused I/O pair must be held in the same state, both at  $V_{CCI}$  or both at GND.

[2]  $V_{CC(A)}$  must be less than or equal to  $V_{CC(B)}$ .

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

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

## 9. Static characteristics

**Table 6. Typical static characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $T_{amb} = 25\text{ }^{\circ}\text{C}$ . [1]

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{OL}$	LOW-level output voltage	A port; $V_I \leq 0.15\text{ V}$ ; $V_{CC(B)} = 1.65\text{ V to } 5.5\text{ V}$ ; $V_{CC(A)} = 1.2\text{ V}$ ; $I_O = -135\text{ }\mu\text{A}$	-	0.25	-	V	
$I_I$	input leakage current	OE input; $V_I = 0\text{ V to } 3.6\text{ V}$ ; $V_{CC(A)} = 1.2\text{ V to } 3.6\text{ V}$ ; $V_{CC(B)} = 1.65\text{ V to } 5.5\text{ V}$	-	-	$\pm 1$	$\mu\text{A}$	
$I_{OZ}$	OFF-state output current	A or B port; $V_O = 0\text{ V or } V_{CCO}$ ; $V_{CC(A)} = 1.2\text{ V to } 3.6\text{ V}$ ; $V_{CC(B)} = 1.65\text{ V to } 5.5\text{ V}$ [2]	-	-	$\pm 1$	$\mu\text{A}$	
$I_{OFF}$	power-off leakage current	A port; $V_I$ or $V_O = 0\text{ V to } 3.6\text{ V}$ ; $V_{CC(A)} = 0\text{ V}$ ; $V_{CC(B)} = 0\text{ V to } 5.5\text{ V}$	-	-	$\pm 1$	$\mu\text{A}$	
		B port; $V_I$ or $V_O = 0\text{ V to } 5.5\text{ V}$ ; $V_{CC(B)} = 0\text{ V}$ ; $V_{CC(A)} = 0\text{ V to } 3.6\text{ V}$	-	-	$\pm 1$	$\mu\text{A}$	
$C_I$	input capacitance	OE input; $V_{CC(A)} = 3.3\text{ V}$ ; $V_{CC(B)} = 3.3\text{ V}$	-	2.6	-	pF	
$C_{I/O}$	input/output capacitance	A port; $V_{CC(A)} = 3.3\text{ V}$ ; $V_{CC(B)} = 3.3\text{ V}$					
		enabled	-	9	-	pF	
		disabled	-	5.2	-	pF	
		B port; $V_{CC(A)} = 3.3\text{ V}$ ; $V_{CC(B)} = 3.3\text{ V}$					
		enabled	-	10.5	-	pF	
disabled	-	9	-	pF			

[1]  $V_{CC(A)}$  must be less than or equal to  $V_{CC(B)}$ .

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

**Table 7. Typical supply current**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

$V_{CC(A)}$	$V_{CC(B)}$								Unit
	1.8 V		2.5 V		3.3 V		5.0 V		
	$I_{CC(A)}$	$I_{CC(B)}$	$I_{CC(A)}$	$I_{CC(B)}$	$I_{CC(A)}$	$I_{CC(B)}$	$I_{CC(A)}$	$I_{CC(B)}$	
1.2 V	0.1	0.3	0.1	0.9	0.1	1.9	0.1	5.6	$\mu\text{A}$
1.5 V	0.1	0.1	0.1	0.7	0.1	1.7	0.1	5	$\mu\text{A}$
1.8 V	0.1	0.1	0.1	0.5	0.1	1.5	0.1	4.6	$\mu\text{A}$
2.5 V	-	-	0.1	0.1	0.1	0.8	0.1	3.8	$\mu\text{A}$
3.3 V	-	-	-	-	0.1	0.1	0.1	2.8	$\mu\text{A}$

## Dual supply translating transceiver; open drain; auto direction sensing

Table 8. Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).[1]

Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
V <sub>IH</sub>	HIGH-level input voltage	A port					
		V <sub>CC(A)</sub> = 1.2 V to 1.95 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	V <sub>CC(A)</sub> - 0.2	-	V <sub>CC(A)</sub> - 0.2	-	V
		V <sub>CC(A)</sub> = 1.95 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	V <sub>CC(A)</sub> - 0.4	-	V <sub>CC(A)</sub> - 0.4	-	V
		B port					
		V <sub>CC(A)</sub> = 1.2 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	V <sub>CC(B)</sub> - 0.4	-	V <sub>CC(B)</sub> - 0.4	-	V
		OE input					
		V <sub>CC(A)</sub> = 1.2 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	0.65V <sub>CC(A)</sub>	-	0.65V <sub>CC(A)</sub>	-	V
V <sub>IL</sub>	LOW-level input voltage	A or B port					
		V <sub>CC(A)</sub> = 1.2 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	-	0.15	-	0.15	V
		OE input					
		V <sub>CC(A)</sub> = 1.2 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	-	0.35V <sub>CC(A)</sub>	-	0.35V <sub>CC(A)</sub>	V
V <sub>OH</sub>	HIGH-level output voltage	A port; I <sub>O</sub> = -20 µA; V <sub>I</sub> ≥ V <sub>CC(B)</sub> - 0.4 V					
		V <sub>CC(A)</sub> = 1.2 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	0.67V <sub>CC(A)</sub>	-	0.67V <sub>CC(A)</sub>	-	V
		B port; I <sub>O</sub> = -20 µA; V <sub>I</sub> ≥ V <sub>CC(A)</sub> - 0.2 V					
		V <sub>CC(A)</sub> = 1.2 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	0.67V <sub>CC(B)</sub>	-	0.67V <sub>CC(B)</sub>	-	V
V <sub>OL</sub>	LOW-level output voltage	A port; V <sub>I</sub> ≤ 0.15 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V					
		V <sub>CC(A)</sub> = 1.4 V; I <sub>O</sub> = -180 µA	-	0.4	-	0.4	V
		V <sub>CC(A)</sub> = 1.65 V; I <sub>O</sub> = -220 µA	-	0.4	-	0.4	V
		V <sub>CC(A)</sub> = 2.3 V; I <sub>O</sub> = -300 µA	-	0.4	-	0.4	V
		V <sub>CC(A)</sub> = 3.0 V; I <sub>O</sub> = -400 µA	-	0.55	-	0.55	V
		B port; V <sub>I</sub> ≤ 0.15 V; V <sub>CC(A)</sub> = 1.2 V to 3.6 V					
		V <sub>CC(B)</sub> = 1.65 V; I <sub>O</sub> = -220 µA	-	0.4	-	0.4	V
		V <sub>CC(B)</sub> = 2.3 V; I <sub>O</sub> = -300 µA	-	0.4	-	0.4	V
		V <sub>CC(B)</sub> = 3.0 V; I <sub>O</sub> = -400 µA	-	0.55	-	0.55	V
V <sub>CC(B)</sub> = 4.5 V; I <sub>O</sub> = -620 µA	-	0.55	-	0.55	V		
I <sub>I</sub>	input leakage current	OE input; V <sub>I</sub> = 0 V to 3.6 V; V <sub>CC(A)</sub> = 1.2 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	-	±2	-	±12	µA
I <sub>OZ</sub>	OFF-state output current	A or B port; V <sub>O</sub> = 0 V or V <sub>CCO</sub> ; V <sub>CC(A)</sub> = 1.2 V to 3.6 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	[2]	±2	-	±12	µA
I <sub>OFF</sub>	power-off leakage current	A port; V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 0 V to 5.5 V	-	±2	-	±12	µA
		B port; V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC(B)</sub> = 0 V; V <sub>CC(A)</sub> = 0 V to 5.5 V	-	±2	-	±12	µA

## Dual supply translating transceiver; open drain; auto direction sensing

Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
I <sub>CC</sub>	supply current	OE = 0 V or V <sub>CC(A)</sub> ; An, Bn open					
		I <sub>CC(A)</sub>					
		V <sub>CC(A)</sub> = 1.2 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	-5	0.5	-5	1	μA
		V <sub>CC(A)</sub> = 1.5 V to 3.6 V; V <sub>CC(B)</sub> = 2.3 V to 5.5 V	-2	1.2	-2	2	μA
		V <sub>CC(A)</sub> = 3.6 V; V <sub>CC(B)</sub> = 0 V	-	1.0	-	2	μA
		V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 5.5 V	-1	-	-1	-	μA
		I <sub>CC(B)</sub>					
		V <sub>CC(A)</sub> = 1.2 V; V <sub>CC(B)</sub> = 1.65 V to 5.5 V	-	22	-	60	μA
		V <sub>CC(A)</sub> = 1.5 V to 3.6 V; V <sub>CC(B)</sub> = 2.3 V to 5.5 V	-	20	-	20	μA
		V <sub>CC(A)</sub> = 3.6 V; V <sub>CC(B)</sub> = 0 V	-1	-	-1	-	μA
		V <sub>CC(A)</sub> = 0 V; V <sub>CC(B)</sub> = 5.5 V	-	2	-	12	μA
		I <sub>CC(A)</sub> + I <sub>CC(B)</sub>					
		V <sub>CC(A)</sub> = 1.2 V; V <sub>CC(B)</sub> = 2.3 V to 5.5 V	-	17	-	65	μA
		V <sub>CC(A)</sub> = 1.5 V to 3.6 V; V <sub>CC(B)</sub> = 2.3 V to 5.5 V	-	20	-	20	μA

[1] V<sub>CC(A)</sub> must be less than or equal to V<sub>CC(B)</sub>.

[2] V<sub>CCO</sub> is the supply voltage associated with the output.

## 10. Dynamic characteristics

**Table 9. Typical dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 7; for waveforms see Fig. 4 and Fig. 6.

Symbol	Parameter	Conditions	V <sub>CC(B)</sub>				Unit
			1.8 V ± 0.15 V	2.5 V ± 0.2 V	3.3 V ± 0.3 V	5.0 V ± 0.5 V	
<b>V<sub>CC(A)</sub> = 1.2 V; T<sub>amb</sub> = 25 °C</b>							
t <sub>PHL</sub>	HIGH to LOW propagation delay	A to B	6.5	5.9	5.7	5.5	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	A to B	7.1	6.3	6.2	6.6	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	B to A	6.2	5.4	5.1	5	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	B to A	5.6	4.1	3.6	3.2	ns
t <sub>en</sub>	enable time	OE to A; B [1]	200	200	200	200	ns
t <sub>dis</sub>	disable time	OE to A; no external load [1]	12	12	12	12	ns
		OE to B; no external load [2]	12	12	12	12	ns
		OE to A; see Fig. 5	90	90	90	90	ns
		OE to B; see Fig. 5	95	75	100	75	ns
t <sub>TLH</sub>	LOW to HIGH output transition time	A port	6.5	5.2	4.8	4.4	ns
		B port	6.6	4.3	2.1	1.5	ns
t <sub>THL</sub>	HIGH to LOW output transition time	A port	5.8	4.8	4.3	3.8	ns
		B port	3.6	2.2	1.8	1.5	ns
t <sub>sk(o)</sub>	output skew time	between channels [3]	1	1	1	1	ns
t <sub>W</sub>	pulse width	data inputs	20	16.7	16.7	16.7	ns
f <sub>data</sub>	data rate		50	60	60	60	Mbps

[1] t<sub>en</sub> is the same as t<sub>pZL</sub> and t<sub>pZH</sub>; t<sub>dis</sub> is the same as t<sub>pLZ</sub> and t<sub>pHZ</sub>.

[2] These values are guaranteed by design.

[3] Skew between any two outputs of the same package switching in the same direction.



Dual supply translating transceiver; open drain; auto direction sensing

Table 10. Dynamic characteristics for temperature range -40 °C to +85 °C

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 7; for waveforms see Fig. 4 and Fig. 6.

Symbol	Parameter	Conditions	V <sub>CC(B)</sub>								Unit
			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	
<b>V<sub>CC(A)</sub> = 1.5 V ± 0.1 V</b>											
t <sub>PHL</sub>	HIGH to LOW propagation delay	A to B	-	11	-	9.2	-	8.6	-	8.6	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	A to B	-	12.6	-	10	-	9.8	-	9.7	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	B to A	-	12.7	-	11.1	-	11	-	12	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	B to A	-	10.5	-	6.9	-	5.6	-	4.6	ns
t <sub>en</sub>	enable time	OE to A; B [1]	-	200	-	200	-	200	-	200	ns
t <sub>dis</sub>	disable time	OE to A; no external load [1]	-	17	-	17	-	17	-	17	ns
		OE to B; no external load [2]	-	18	-	17	-	17	-	17	ns
		OE to A; see Fig. 5	-	120	-	120	-	120	-	125	ns
		OE to B; see Fig. 5	-	170	-	125	-	175	-	125	ns
t <sub>TLH</sub>	LOW to HIGH output transition time	A port	2.6	13.1	2.8	9.8	2.0	9.0	2.0	8.3	ns
		B port	2.9	11.4	1.9	8.1	0.9	5.3	0.7	3	ns
t <sub>THL</sub>	HIGH to LOW output transition time	A port	2.1	9.9	1.5	7.7	1.2	6.8	0.8	6.0	ns
		B port	1.5	8.7	1.0	5.5	0.9	3.8	0.8	3.1	ns
t <sub>sk(o)</sub>	output skew time	between channels [3]	-	1	-	1	-	1.1	-	1	ns
t <sub>W</sub>	pulse width	data inputs	20	-	20	-	20	-	20	-	ns
f <sub>data</sub>	data rate		-	50	-	50	-	50	-	50	Mbps
<b>V<sub>CC(A)</sub> = 1.8 V ± 0.15 V</b>											
t <sub>PHL</sub>	HIGH to LOW propagation delay	A to B	-	9.7	-	7.3	-	6.5	-	5.9	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	A to B	-	11.3	-	8.4	-	7.4	-	6.5	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	B to A	-	9.8	-	8.0	-	7.4	-	7.0	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	B to A	-	10.2	-	7.0	-	5.8	-	5.0	ns
t <sub>en</sub>	enable time	OE to A; B [1]	-	200	-	200	-	200	-	200	ns
t <sub>dis</sub>	disable time	OE to A; no external load [1]	-	13	-	13	-	13	-	13	ns
		OE to B; no external load [2]	-	16	-	13	-	13	-	13	ns
		OE to A; see Fig. 5	-	140	-	140	-	140	-	145	ns
		OE to B; see Fig. 5	-	165	-	125	-	175	-	125	ns
t <sub>TLH</sub>	LOW to HIGH output transition time	A port	2.2	11.9	2.0	8.6	1.9	7.8	1.9	7.2	ns
		B port	2.8	12.2	1.8	7.7	1.2	5.3	0.7	2.9	ns
t <sub>THL</sub>	HIGH to LOW output transition time	A port	1.8	8.8	1.3	6.6	0.9	5.7	0.6	4.9	ns
		B port	1.3	8.3	1.0	5.4	0.9	3.9	0.7	3.0	ns
t <sub>sk(o)</sub>	output skew time	between channels [3]	-	1	-	1	-	1	-	1	ns
t <sub>W</sub>	pulse width	data inputs	22.2	-	16.7	-	16.7	-	16.7	-	ns
f <sub>data</sub>	data rate		-	45	-	60	-	60	-	60	Mbps

## Dual supply translating transceiver; open drain; auto direction sensing

Symbol	Parameter	Conditions	$V_{CC(B)}$								Unit
			1.8 V $\pm 0.15$ V		2.5 V $\pm 0.2$ V		3.3 V $\pm 0.3$ V		5.0 V $\pm 0.5$ V		
			Min	Max	Min	Max	Min	Max	Min	Max	
$V_{CC(A)} = 2.5$ V $\pm 0.2$ V											
$t_{PHL}$	HIGH to LOW propagation delay	A to B	-	-	-	6.2	-	5.3	-	4.7	ns
$t_{PLH}$	LOW to HIGH propagation delay	A to B	-	-	-	6.8	-	5.9	-	5.2	ns
$t_{PHL}$	HIGH to LOW propagation delay	B to A	-	-	-	5.9	-	4.8	-	4.2	ns
$t_{PLH}$	LOW to HIGH propagation delay	B to A	-	-	-	6.2	-	4.6	-	3.6	ns
$t_{en}$	enable time	OE to A; B [1]	-	-	-	200	-	200	-	200	ns
$t_{dis}$	disable time	OE to A; no external load [1]	-	-	-	9	-	9	-	9	ns
		OE to B; no external load [2]	-	-	-	11	-	9	-	9	ns
		OE to A; see Fig. 5	-	-	-	105	-	105	-	105	ns
		OE to B; see Fig. 5	-	-	-	125	-	175	-	120	ns
$t_{TLH}$	LOW to HIGH output transition time	A port	-	-	1.7	7.3	1.7	6.4	1.8	5.8	ns
		B port	-	-	1.8	7.3	1.3	5.4	0.8	3.3	ns
$t_{THL}$	HIGH to LOW output transition time	A port	-	-	1.3	5.7	0.8	4.7	0.6	3.8	ns
		B port	-	-	1.1	5.4	0.9	4.1	0.7	3.0	ns
$t_{sk(o)}$	output skew time	between channels [3]	-	-	-	1	-	1.2	-	1	ns
$t_W$	pulse width	data inputs	-	-	14	-	11	-	11	-	ns
$f_{data}$	data rate		-	-	-	70	-	90	-	90	Mbps

## Dual supply translating transceiver; open drain; auto direction sensing

Symbol	Parameter	Conditions	V <sub>CC(B)</sub>								Unit
			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	
<b>V<sub>CC(A)</sub> = 3.3 V ± 0.3 V</b>											
t <sub>PHL</sub>	HIGH to LOW propagation delay	A to B	-	-	-	-	-	4.9	-	4.2	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	A to B	-	-	-	-	-	5.2	-	4.6	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	B to A	-	-	-	-	-	4.7	-	3.8	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	B to A	-	-	-	-	-	4.7	-	4.3	ns
t <sub>en</sub>	enable time	OE to A; B [1]	-	-	-	-	-	200	-	200	ns
t <sub>dis</sub>	disable time	OE to A; no external load [1]	-	-	-	-	-	8	-	8	ns
		OE to B; no external load [2]	-	-	-	-	-	8	-	8	ns
		OE to A; see Fig. 5	-	-	-	-	-	150	-	150	ns
		OE to B; see Fig. 5	-	-	-	-	-	170	-	120	ns
t <sub>TLH</sub>	LOW to HIGH output transition time	A port	-	-	-	-	1.6	5.7	1.8	5.0	ns
		B port	-	-	-	-	1.5	5.4	0.9	3.9	ns
t <sub>THL</sub>	HIGH to LOW output transition time	A port	-	-	-	-	1.0	4.5	0.6	3.5	ns
		B port	-	-	-	-	1.0	4.2	0.8	3.1	ns
t <sub>sk(o)</sub>	output skew time	between channels [3]	-	-	-	-	-	1	-	1	ns
t <sub>W</sub>	pulse width	data inputs	-	-	-	-	11	-	9	-	ns
f <sub>data</sub>	data rate		-	-	-	-	-	90	-	110	Mbps

[1] t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>; t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.

[2] These values are guaranteed by design.

[3] Skew between any two outputs of the same package switching in the same direction.

## Dual supply translating transceiver; open drain; auto direction sensing

Table 11. Dynamic characteristics for temperature range -40 °C to +125 °C

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 7; for waveforms see Fig. 4 and Fig. 6.

Symbol	Parameter	Conditions	V <sub>CC(B)</sub>								Unit
			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	
<b>V<sub>CC(A)</sub> = 1.5 V ± 0.1 V</b>											
t <sub>PHL</sub>	HIGH to LOW propagation delay	A to B	-	13.8	-	11.5	-	10.8	-	10.8	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	A to B	-	15.8	-	12.5	-	12.3	-	12.1	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	B to A	-	15.9	-	13.9	-	13.8	-	15.0	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	B to A	-	13.1	-	8.6	-	7.0	-	5.8	ns
t <sub>en</sub>	enable time	OE to A; B [1]	-	200	-	200	-	200	-	200	ns
t <sub>dis</sub>	disable time	OE to A; no external load [1]	-	18	-	18	-	18	-	18	ns
		OE to B; no external load [2]	-	19	-	18	-	18	-	18	ns
		OE to A; see Fig. 5	-	120	-	120	-	120	-	125	ns
		OE to B; see Fig. 5	-	170	-	125	-	175	-	125	ns
t <sub>TLH</sub>	LOW to HIGH output transition time	A port	2.6	16.4	2.8	12.3	2.0	11.3	2.0	10.4	ns
		B port	2.9	16.1	1.9	10.1	0.9	6.6	0.7	3.8	ns
t <sub>THL</sub>	HIGH to LOW output transition time	A port	2.1	12.4	1.5	9.6	1.2	8.5	0.8	7.5	ns
		B port	1.5	10.9	1.0	6.9	0.9	4.8	0.8	3.9	ns
t <sub>sk(o)</sub>	output skew time	between channels [3]	-	1.1	-	1.1	-	1.2	-	1.1	ns
t <sub>W</sub>	pulse width	data inputs	25	-	25	-	25	-	25	-	ns
f <sub>data</sub>	data rate		-	40	-	40	-	40	-	40	Mbps
<b>V<sub>CC(A)</sub> = 1.8 V ± 0.15 V</b>											
t <sub>PHL</sub>	HIGH to LOW propagation delay	A to B	-	12.1	-	9.1	-	8.1	-	7.4	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	A to B	-	14.1	-	10.5	-	9.3	-	8.1	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	B to A	-	12.3	-	10.0	-	9.3	-	8.8	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	B to A	-	12.8	-	8.8	-	7.3	-	6.3	ns
t <sub>en</sub>	enable time	OE to A; B [1]	-	200	-	200	-	200	-	200	ns
t <sub>dis</sub>	disable time	OE to A; no external load [1]	-	14	-	14	-	14	-	14	ns
		OE to B; no external load [2]	-	17	-	14	-	14	-	14	ns
		OE to A; see Fig. 5	-	140	-	140	-	140	-	145	ns
		OE to B; see Fig. 5	-	165	-	125	-	175	-	125	ns
t <sub>TLH</sub>	LOW to HIGH output transition time	A port	2.2	14.9	2.0	10.8	1.9	9.8	1.9	9.0	ns
		B port	2.8	15.3	1.8	9.6	1.2	6.6	0.7	3.6	ns
t <sub>THL</sub>	HIGH to LOW output transition time	A port	1.8	11.0	1.3	8.3	0.9	7.1	0.6	6.1	ns
		B port	1.3	10.4	1.0	6.8	0.9	4.9	0.7	3.8	ns
t <sub>sk(o)</sub>	output skew time	between channels [3]	-	1.1	-	1.1	-	1.1	-	1.1	ns
t <sub>W</sub>	pulse width	data inputs	25	-	20	-	20	-	20	-	ns
f <sub>data</sub>	data rate		-	40	-	50	-	50	-	50	Mbps

Dual supply translating transceiver; open drain; auto direction sensing

Symbol	Parameter	Conditions	V <sub>CC(B)</sub>								Unit
			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	
<b>V<sub>CC(A)</sub> = 2.5 V ± 0.2 V</b>											
t <sub>PHL</sub>	HIGH to LOW propagation delay	A to B	-	-	-	7.8	-	6.6	-	5.9	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	A to B	-	-	-	8.5	-	7.4	-	6.5	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	B to A	-	-	-	7.4	-	6.0	-	5.3	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	B to A	-	-	-	7.8	-	5.8	-	4.5	ns
t <sub>en</sub>	enable time	OE to A; B [1]	-	-	-	200	-	200	-	200	ns
t <sub>dis</sub>	disable time	OE to A; no external load [1]	-	-	-	10	-	10	-	10	ns
		OE to B; no external load [2]	-	-	-	12	-	10	-	10	ns
		OE to A; see Fig. 5	-	-	-	105	-	105	-	105	ns
		OE to B; see Fig. 5	-	-	-	125	-	175	-	120	ns
t <sub>TLH</sub>	LOW to HIGH output transition time	A port	-	-	1.7	9.1	1.7	8.0	1.8	7.3	ns
		B port	-	-	1.8	9.1	1.3	6.8	0.9	4.1	ns
t <sub>THL</sub>	HIGH to LOW output transition time	A port	-	-	1.3	7.1	0.8	5.9	0.6	4.8	ns
		B port	-	-	1.1	6.8	0.9	5.1	0.7	3.8	ns
t <sub>sk(o)</sub>	output skew time	between channels [3]	-	-	-	1.1	-	1.3	-	1.1	ns
t <sub>W</sub>	pulse width	data inputs	-	-	16.7	-	12.5	-	12.5	-	ns
f <sub>data</sub>	data rate		-	-	-	60	-	80	-	80	Mbps

Dual supply translating transceiver; open drain; auto direction sensing

Symbol	Parameter	Conditions	V <sub>CC(B)</sub>								Unit
			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	
<b>V<sub>CC(A)</sub> = 3.3 V ± 0.3 V</b>											
t <sub>PHL</sub>	HIGH to LOW propagation delay	A to B	-	-	-	-	-	6.1	-	5.3	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	A to B	-	-	-	-	-	6.5	-	5.8	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	B to A	-	-	-	-	-	5.9	-	4.8	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	B to A	-	-	-	-	-	5.9	-	5.4	ns
t <sub>en</sub>	enable time	OE to A; B [1]	-	-	-	-	-	200	-	200	ns
t <sub>dis</sub>	disable time	OE to A; no external load [1]	-	-	-	-	-	9	-	9	ns
		OE to B; no external load [2]	-	-	-	-	-	9	-	9	ns
		OE to A; see Fig. 5	-	-	-	-	-	150	-	150	ns
		OE to B; see Fig. 5	-	-	-	-	-	170	-	120	ns
t <sub>TLH</sub>	LOW to HIGH output transition time	A port	-	-	-	-	1.6	7.1	1.8	6.3	ns
		B port	-	-	-	-	1.5	6.8	0.9	4.9	ns
t <sub>THL</sub>	HIGH to LOW output transition time	A port	-	-	-	-	1.0	5.6	0.7	4.4	ns
		B port	-	-	-	-	1.0	5.3	0.8	3.9	ns
t <sub>sk(o)</sub>	output skew time	between channels [3]	-	-	-	-	-	1.1	-	1.1	ns
t <sub>W</sub>	pulse width	data inputs	-	-	-	-	13	-	10	-	ns
f <sub>data</sub>	data rate		-	-	-	-	-	80	-	100	Mbps

[1] t<sub>en</sub> is the same as t<sub>PZL</sub> and t<sub>PZH</sub>; t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.  
 [2] These values are guaranteed by design.  
 [3] Skew between any two outputs of the same package switching in the same direction.

Dual supply translating transceiver; open drain; auto direction sensing

Table 12. Typical power dissipation capacitance

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 7 [1] [2]

Symbol	Parameter	Conditions	V <sub>CC(A)</sub>							Unit	
			1.2 V	1.2 V	1.5 V	1.8 V	2.5 V	2.5 V	3.3 V		
			V <sub>CC(B)</sub>								
			1.8 V	5.0 V	1.8 V	1.8 V	2.5 V	5.0 V	3.3 V to 5.0 V		
<b>T<sub>amb</sub> = 25 °C</b>											
C <sub>PD</sub>	power dissipation capacitance	outputs enabled; OE = V <sub>CC(A)</sub>									
		A port: (direction A to B)	7.7	7.4	8.0	8.3	8.4	8.0	8.7	pF	
		A port: (direction B to A)	5.9	6.3	6.6	7.5	8.2	7.0	8.5	pF	
		B port: (direction A to B)	20.8	26.6	19.9	19.7	20.0	24.3	22.2	pF	
		B port: (direction B to A)	18.9	23.8	18.4	18.4	19.0	21.2	20.3	pF	
		outputs disabled; OE = GND									
		A port: (direction A to B)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	pF	
		A port: (direction B to A)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	pF	
		B port: (direction A to B)	0.01	0.02	0.01	0.01	0.01	0.01	0.01	pF	
		B port: (direction B to A)	0.01	0.03	0.01	0.01	0.01	0.01	0.01	pF	

[1] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

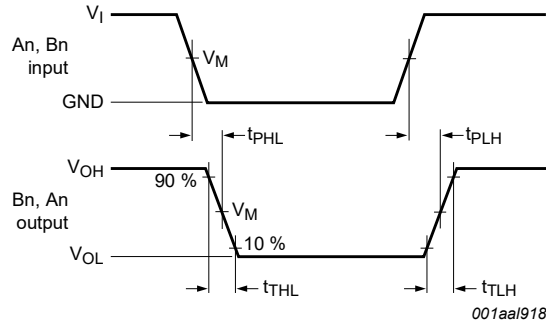
$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f<sub>i</sub> = input frequency in MHz; f<sub>o</sub> = output frequency in MHz; C<sub>L</sub> = load capacitance in pF;

V<sub>CC</sub> = supply voltage in V; N = number of inputs switching;  $\sum(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.

[2] f<sub>i</sub> = 10 MHz; V<sub>I</sub> = GND to V<sub>CC</sub>; t<sub>r</sub> = t<sub>f</sub> = 1 ns; C<sub>L</sub> = 0 pF; R<sub>L</sub> = ∞ Ω.

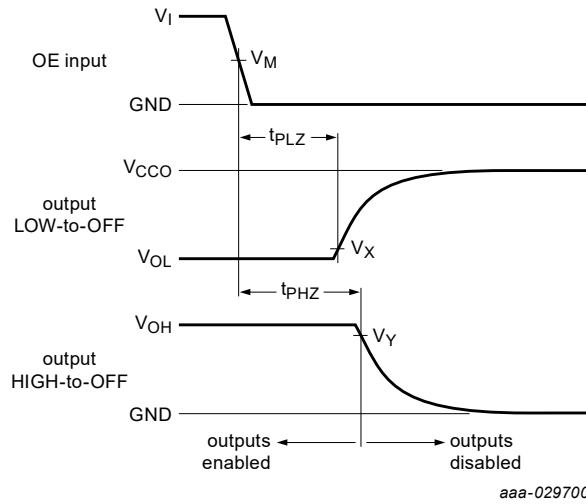
10.1. Waveforms and test circuit



Measurement points are given in [Table 13](#).

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

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



Measurement points are given in [Table 13](#).

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

$V_{CCO}$  is the supply voltage associated with the output.

**Fig. 5. Disable times**



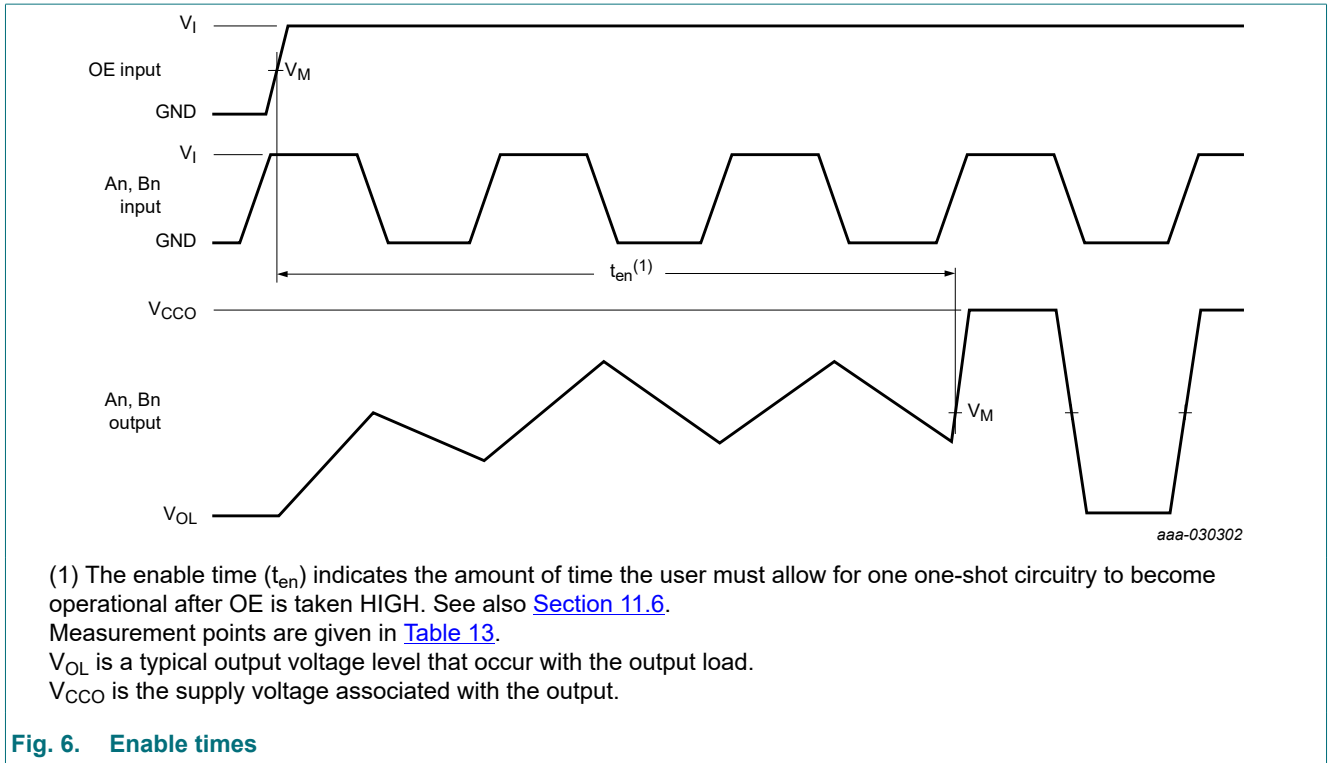


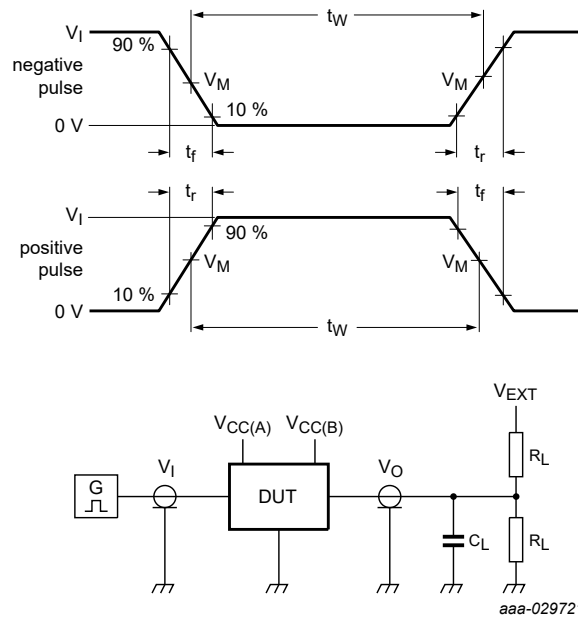
Fig. 6. Enable times

Table 13. Measurement points [1] [2]

Supply voltage	Input	Output		
	$V_M$	$V_M$	$V_X$	$V_Y$
1.2 V	$0.5V_{CCI}$	$0.5V_{CCO}$	$V_{OL} + 0.1 V$	$V_{OH} - 0.1 V$
$1.5 V \pm 0.1 V$	$0.5V_{CCI}$	$0.5V_{CCO}$	$V_{OL} + 0.1 V$	$V_{OH} - 0.1 V$
$1.8 V \pm 0.15 V$	$0.5V_{CCI}$	$0.5V_{CCO}$	$V_{OL} + 0.15 V$	$V_{OH} - 0.15 V$
$2.5 V \pm 0.2 V$	$0.5V_{CCI}$	$0.5V_{CCO}$	$V_{OL} + 0.15 V$	$V_{OH} - 0.15 V$
$3.3 V \pm 0.3 V$	$0.5V_{CCI}$	$0.5V_{CCO}$	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$
$5.0 V \pm 0.5 V$	$0.5V_{CCI}$	$0.5V_{CCO}$	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$

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

Dual supply translating transceiver; open drain; auto direction sensing



Test data is given in [Table 14](#).

All input pulses are supplied by generators having the following characteristics:

PRR  $\leq$  10 MHz;  $Z_O = 50 \Omega$ ;  $dV/dt \geq 1.0$  V/ns.

$R_L$  = Load resistance.

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

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

Fig. 7. Test circuit for measuring switching times

Table 14. Test data

Supply voltage		Input		Load		$V_{EXT}$		
$V_{CC(A)}$	$V_{CC(B)}$	$V_I$ [1]	$\Delta t/\Delta V$	$C_L$	$R_L$ [2]	$t_{PLH}$ , $t_{PHL}$	$t_{PZH}$ , $t_{PHZ}$	$t_{PZL}$ , $t_{PLZ}$ [3]
1.2 V to 3.6 V	1.65 V to 5.5 V	$V_{CCI}$	$\leq 1.0$ ns/V	15 pF	50 k $\Omega$ , 1 M $\Omega$	open	open	$2V_{CCO}$

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

[2] For measuring data rate, pulse width, propagation delay and output rise and fall measurements,  $R_L = 1$  M $\Omega$ ; for measuring enable and disable times,  $R_L = 50$  k $\Omega$ .

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

## 11. Application information

### 11.1. Voltage level-translation applications

The NXS0108-Q100 can be used in point-to-point applications to interface between devices or systems operating at different supply voltages. The device is primarily targeted at I<sup>2</sup>C or 1-wire which use open-drain drivers, it may also be used in applications where push-pull drivers are connected to the ports, however the NXB0108-Q100 may be more suitable.

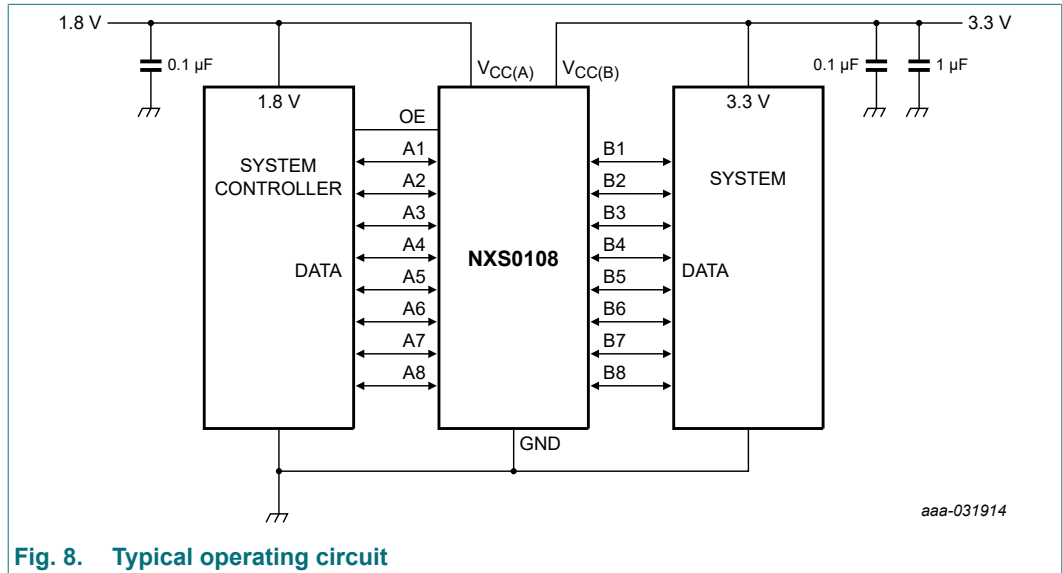


Fig. 8. Typical operating circuit

### 11.2. Architecture

The architecture of the NXS0108-Q100 is shown in Fig. 9. The device does not require an extra input signal to control the direction of data flow from A to B or B to A.

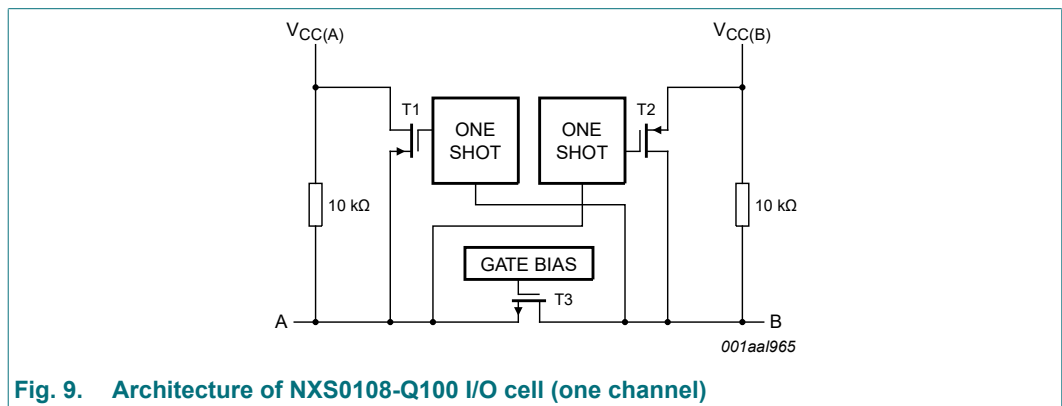


Fig. 9. Architecture of NXS0108-Q100 I/O cell (one channel)

The NXS0108-Q100 is a "switch" type voltage translator, it employs two key circuits to enable voltage translation:

1. A pass-gate transistor (N-channel) that ties the ports together.
2. An output edge-rate accelerator that detects and accelerates rising edges on the I/O pins.

The gate bias voltage of the pass gate transistor (T3) is set at approximately one threshold voltage above the V<sub>CC</sub> level of the low-voltage side. During a LOW-to-HIGH transition the output one-shot accelerates the output transition by switching on the PMOS transistors (T1, T2) bypassing the 10 kΩ pull-up resistors and increasing current drive capability. The one-shot is activated once the input transition reaches approximately V<sub>CC</sub>/2; it is de-activated approximately 50 ns after the output

## Dual supply translating transceiver; open drain; auto direction sensing

reaches  $V_{CC0}/2$ . During the acceleration time the driver output resistance is between approximately  $50\ \Omega$  and  $70\ \Omega$ . To avoid signal contention and minimize dynamic  $I_{CC}$ , the user should wait for the one-shot circuit to turn-off before applying a signal in the opposite direction. Pull-up resistors are included in the device for DC current sourcing capability.

### 11.3. Input driver requirements

As the NXS0108-Q100 is a switch type translator, properties of the input driver directly effect the output signal. The external open-drain or push-pull driver applied to an I/O determines the static current sinking capability of the system; the max data rate, HIGH-to-LOW output transition time ( $t_{THL}$ ) and propagation delay ( $t_{PHL}$ ) are dependent upon the output impedance and edge-rate of the external driver. The limits provided for these parameters in the datasheet assume a driver with output impedance below  $50\ \Omega$  is used.

### 11.4. Output load considerations

The maximum lumped capacitive load that can be driven is dependant upon the one-shot pulse duration. In cases with very heavy capacitive loading there is a risk that the output will not reach the positive rail within the one-shot pulse duration. To avoid excessive capacitive loading and to ensure correct triggering of the one-shot it's recommended to use short trace lengths and low capacitance connectors on NXS0108-Q100 PCB layouts. To ensure low impedance termination and avoid output signal oscillations and one-shot re-triggering, the length of the PCB trace should be such that the round trip delay of any reflection is within the one-shot pulse duration (approximately  $50\ \text{ns}$ ).

### 11.5. Power up

During operation  $V_{CC(A)}$  must never be higher than  $V_{CC(B)}$ , however during power-up  $V_{CC(A)} \geq V_{CC(B)}$  does not damage the device, so either power supply can be ramped up first. There is no special power-up sequencing required. The NXS0108-Q100 includes circuitry that disables all output ports when either  $V_{CC(A)}$  or  $V_{CC(B)}$  is switched off.

### 11.6. Enable and disable

An output enable input (OE) is used to disable the device. Setting OE = LOW causes all I/Os to assume the high-impedance OFF-state. The disable time ( $t_{dis}$  with no external load) indicates the delay between when OE goes LOW and when outputs actually become disabled. The enable time ( $t_{en}$ ) indicates the amount of time the user must allow for one one-shot circuitry to become operational after OE is taken HIGH. To ensure the high-impedance OFF-state during power-up or power-down, pin OE should be tied to GND through a pull-down resistor, the minimum value of the resistor is determined by the current-sourcing capability of the driver.

### 11.7. Pull-up or pull-down resistors on I/O lines

The NXS0108-Q100 has the pull-up resistors dynamically change value based on whether a low or a high is being passed through the I/O line. Each A-port I/O has a pull-up resistor ( $R_{PUA}$ ) to  $V_{CCA}$  and each B-port I/O has a pull-up resistor ( $R_{PUB}$ ) to  $V_{CCB}$ .  $R_{PUA}$  and  $R_{PUB}$  have a value of  $40\ \text{k}\Omega$  when the output is driving LOW.  $R_{PUA}$  and  $R_{PUB}$  have a value of  $4\ \text{k}\Omega$  when the output is driving HIGH.  $R_{PUA}$  and  $R_{PUB}$  are disabled when OE = LOW. This feature provides lower static power consumption (when the I/Os are passing a LOW) and supports lower  $V_{OL}$  values for the same size pass-gate transistor and helps improve simultaneous switching performance.

12. Package outline

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

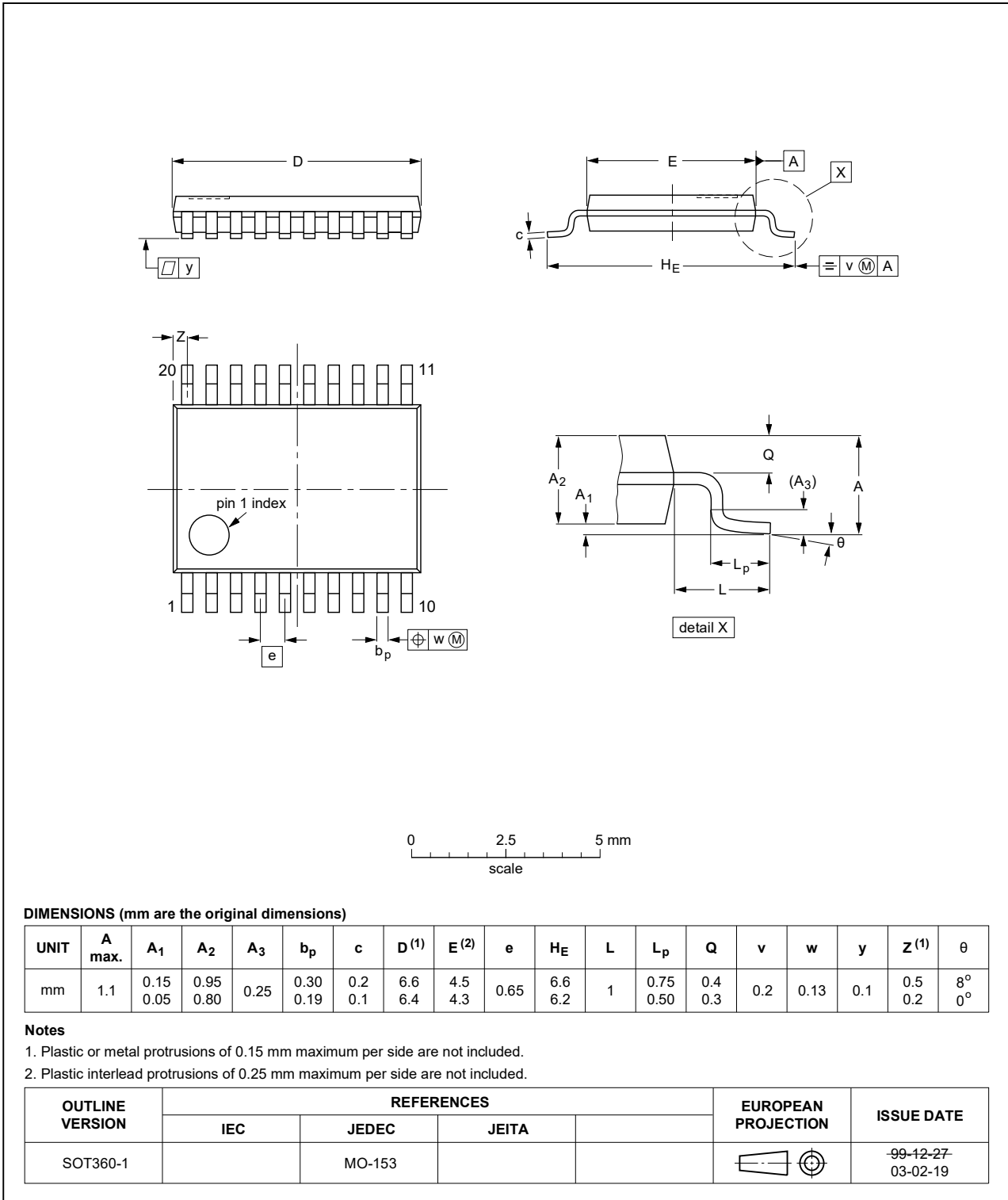


Fig. 10. Package outline SOT360-1 (TSSOP20)

Dual supply translating transceiver; open drain; auto direction sensing

DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm

SOT764-1

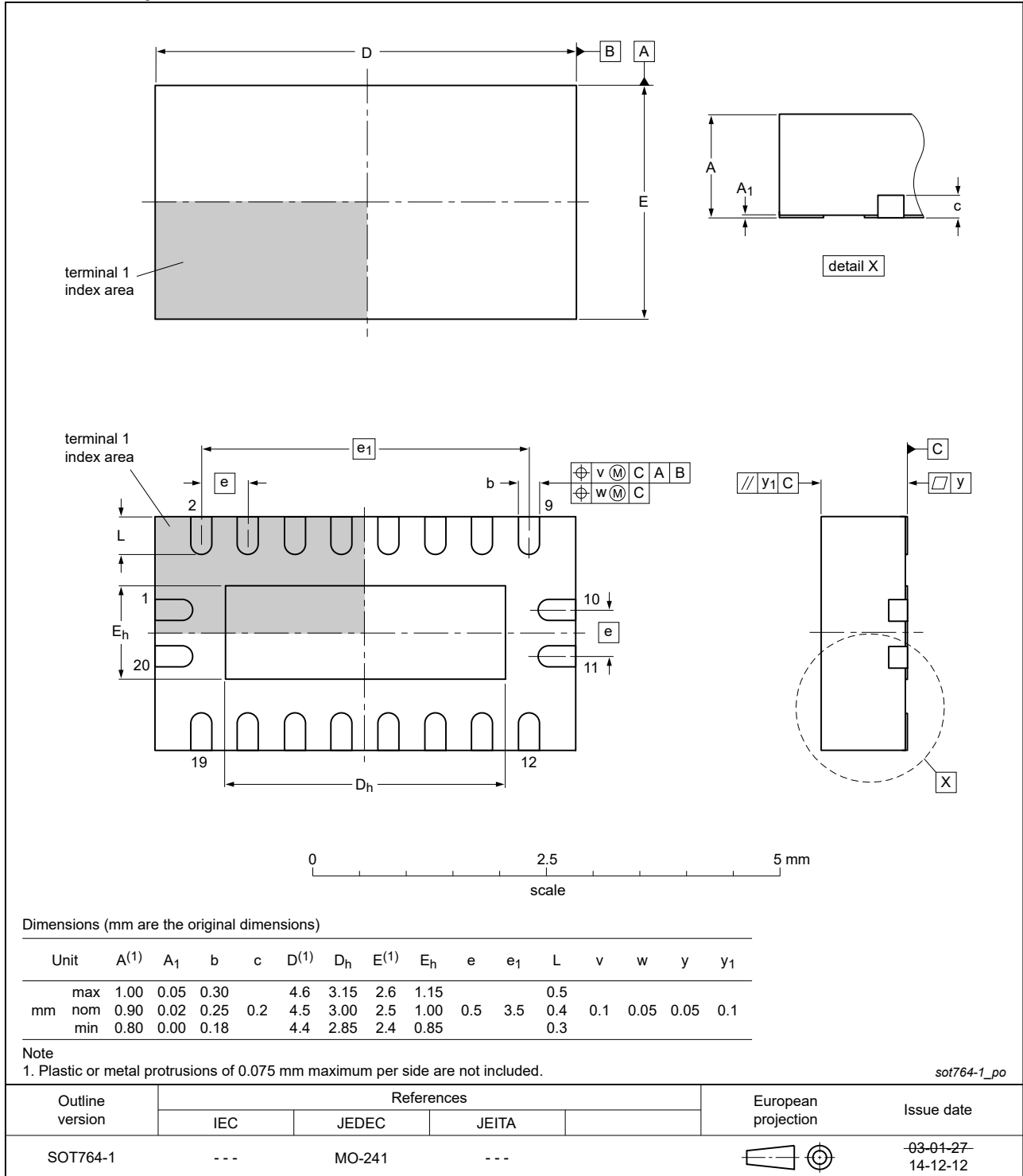


Fig. 11. Package outline SOT764-1 (DHVQFN20)

## 13. Abbreviations

**Table 15. Abbreviations**

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
I <sup>2</sup> C	Inter-Integrated Circuit
MM	Machine Model
SMBus	System Management Bus

## 14. Revision history

**Table 16. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
NXS0108_Q100 v.1	20200915	Product data sheet	-	-

## 15. 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".
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