

# 74AXP1T57-Q100

## Dual supply configurable multiple function gate

Rev. 2 — 17 June 2022

Product data sheet

## 1. General description

The 74AXP1T57-Q100 is a dual supply configurable multiple function gate with Schmitt-trigger inputs. It features three inputs (A, B and C), an output (Y) and dual supply pins ( $V_{CCI}$  and  $V_{CCO}$ ). The inputs are referenced to  $V_{CCI}$  and the output is referenced to  $V_{CCO}$ . All inputs can be connected directly to  $V_{CCI}$  or GND.  $V_{CCI}$  can be supplied at any voltage between 0.7 V and 2.75 V and  $V_{CCO}$  can be supplied at any voltage between 1.2 V and 5.5 V. This feature allows voltage level translation. The 74AXP1T57-Q100 can be configured as any of the following logic functions AND, OR, NAND, NOR, XNOR, inverter and buffer.

This device ensures very 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 disables the output, preventing the potentially 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:
  - $V_{CCI}$ : 0.7 V to 2.75 V
  - $V_{CCO}$ : 1.2 V to 5.5 V
- Low input capacitance;  $C_I = 0.6$  pF (typical)
- Low output capacitance;  $C_O = 1.8$  pF (typical)
- Low dynamic power consumption;  $C_{PD} = 0.6$  pF at  $V_{CCI} = 1.2$  V (typical)
- Low dynamic power consumption;  $C_{PD} = 7.1$  pF at  $V_{CCO} = 3.3$  V (typical)
- Low static power consumption;  $I_{CCI} = 0.5$   $\mu$ A (85 °C maximum)
- Low static power consumption;  $I_{CCO} = 1.8$   $\mu$ A (85 °C maximum)
- High noise immunity
- Complies with JEDEC standard:
  - JESD8-12A.01 (1.1 V to 1.3 V; A, B, C inputs)
  - JESD8-11A.01 (1.4 V to 1.6 V)
  - JESD8-7A (1.65 V to 1.95 V)
  - JESD8-5A.01 (2.3 V to 2.7 V)
  - JESD8-C (2.7 V to 3.6 V; Y output)
  - JESD12-6 (4.5 V to 5.5 V; Y output)
- ESD protection:
  - MIL-STD-883, method 3015 Class 2. Exceeds 2 kV
  - HBM ANSI/ESDA/JEDEC JS-001 Class 2 exceeds 2 kV
  - CDM JESD22-C101E exceeds 1 kV
- Latch-up performance exceeds 100 mA per JESD78D Class II
- Inputs accept voltages up to 2.75 V
- Low noise overshoot and undershoot < 10% of  $V_{CCO}$
- $I_{OFF}$  circuitry provides partial power-down mode operation

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
<a href="#">74AXP1T57DC-Q100</a>	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	<a href="#">SOT765-1</a>

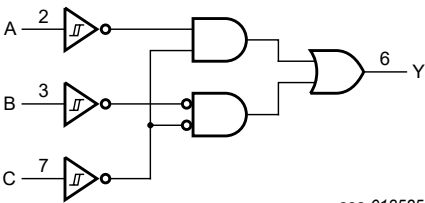
### 4. Marking

Table 2. Marking

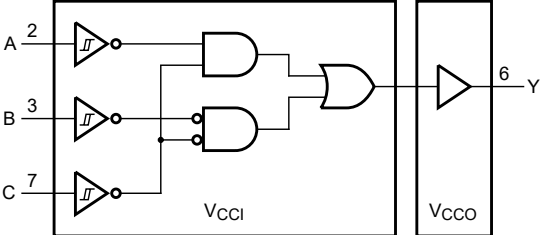
Type number	Marking code[1]
74AXP1T57DC-Q100	rD

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

### 5. Functional diagram



aaa-018525



aaa-018526

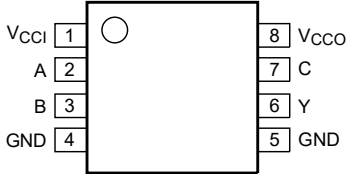
**Fig. 1. Logic symbol**

**Fig. 2. Logic diagram**

### 6. Pinning information

#### 6.1. Pinning

**74AXP1T57**



aaa-018527

**Fig. 3. Pin configuration SOT765-1 (VSSOP8)**

## 6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
V <sub>CCI</sub>	1	input supply voltage
A, B, C	2, 3, 7	data input
GND[1]	4, 5	ground (0 V)
Y	6	data output
V <sub>CCO</sub>	8	output supply voltage

[1] All GND pins must be connected to ground (0 V).

## 7. Functional description

Table 4. Function table

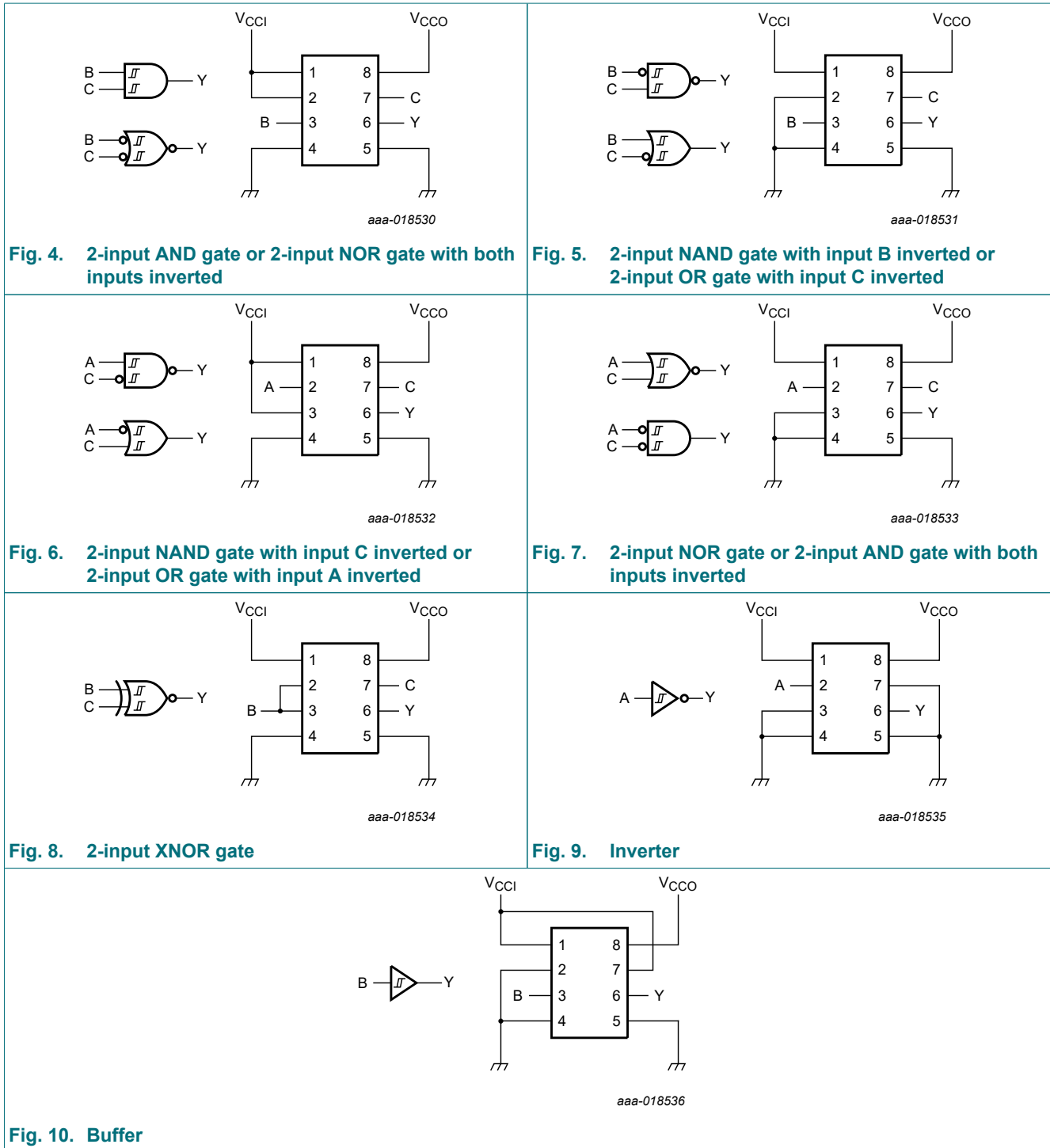
H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.

Supply voltage		Input			Output
V <sub>CCI</sub>	V <sub>CCO</sub>	C	B	A	Y
0.7 V to 2.75 V	1.2 V to 5.5 V	L	L	L	H
0.7 V to 2.75 V	1.2 V to 5.5 V	L	L	H	L
0.7 V to 2.75 V	1.2 V to 5.5 V	L	H	L	H
0.7 V to 2.75 V	1.2 V to 5.5 V	L	H	H	L
0.7 V to 2.75 V	1.2 V to 5.5 V	H	L	L	L
0.7 V to 2.75 V	1.2 V to 5.5 V	H	L	H	L
0.7 V to 2.75 V	1.2 V to 5.5 V	H	H	L	H
0.7 V to 2.75 V	1.2 V to 5.5 V	H	H	H	H
GND	1.2 V to 5.5 V	X	X	X	Z
0.7 V to 2.75 V	GND	X	X	X	Z
GND	GND	X	X	X	Z

### 7.1. Logic configurations

Table 5. Function selection table

Logic function	Figure
2-input AND	see <a href="#">Fig. 4</a>
2-input AND with both inputs inverted	see <a href="#">Fig. 7</a>
2-input NAND with inverted input	see <a href="#">Fig. 5</a> and <a href="#">Fig. 6</a>
2-input OR with inverted input	see <a href="#">Fig. 5</a> and <a href="#">Fig. 6</a>
2-input NOR	see <a href="#">Fig. 7</a>
2-input NOR with both inputs inverted	see <a href="#">Fig. 4</a>
2-input XNOR	see <a href="#">Fig. 8</a>
Inverter	see <a href="#">Fig. 9</a>
Buffer	see <a href="#">Fig. 10</a>



## 8. Limiting values

**Table 6. 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
$V_{CCI}$	input supply voltage		-0.5	+3.3	V
$V_{CCO}$	output supply voltage		-0.5	+6.0	V
$I_{IK}$	input clamping current	$V_I < 0$ V	-50	-	mA
$V_I$	input voltage	[1]	-0.5	+3.3	V
$I_{OK}$	output clamping current	$V_O < 0$ V	-50	-	mA
$V_O$	output voltage	Active mode [1] [2]	-0.5	$V_{CCO} + 0.5$	V
		Power-down or 3-state mode [1]	-0.5	+6.0	V
$I_O$	output current	$V_O = 0$ V to $V_{CCO}$	-	$\pm 25$	mA
$I_{CCI}$	input supply current		-	50	mA
$I_{CCO}$	output supply current		-	50	mA
$I_{GND}$	ground current		-50	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to +125 °C [3]	-	250	mW

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

[2]  $V_{CCO} + 0.5$  V should not exceed 6.0 V.

[3] For SOT765-1 (VSSOP8) package:  $P_{tot}$  derates linearly with 4.9 mW/K above 99 °C.

## 9. Recommended operating conditions

**Table 7. Recommended operating conditions**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CCI}$	input supply voltage		0.7	2.75	V
$V_{CCO}$	output supply voltage		1.2	5.5	V
$V_I$	input voltage		0	2.75	V
$V_O$	output voltage	Active mode	0	$V_{CCO}$	V
		Power-down or 3-state mode	0	5.5	V
$T_{amb}$	ambient temperature		-40	+125	°C

## 10. Static characteristics

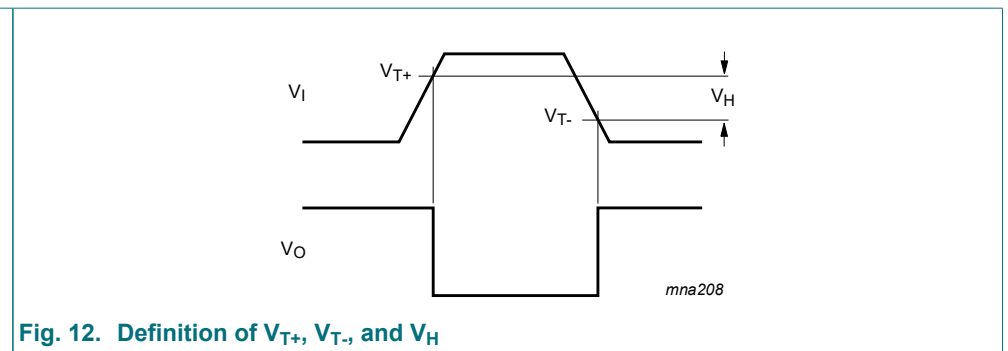
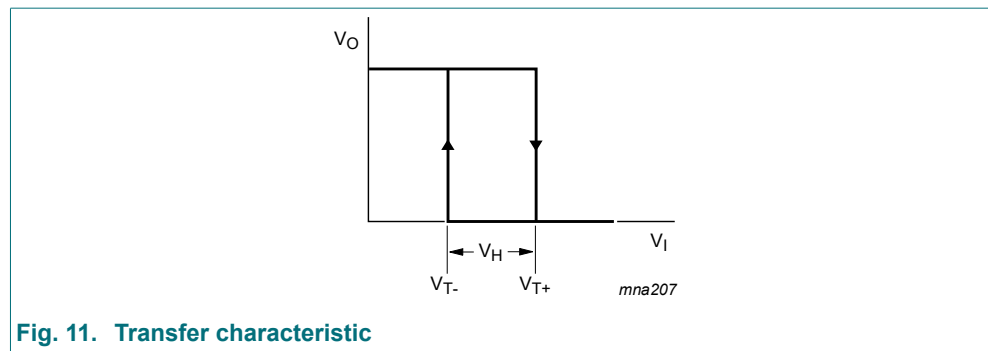
**Table 8. Static characteristics**

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

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +85 °C		T <sub>amb</sub> = -40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
V <sub>T+</sub>	positive-going threshold voltage	see <a href="#">Fig. 11</a> and <a href="#">Fig. 12</a>								
		V <sub>CCI</sub> = 0.75 V to 0.85 V	0.3V <sub>CCI</sub>	-	0.8V <sub>CCI</sub>	0.3V <sub>CCI</sub>	0.8V <sub>CCI</sub>	0.3V <sub>CCI</sub>	0.8V <sub>CCI</sub>	V
		V <sub>CCI</sub> = 1.1 V to 1.95 V	0.4V <sub>CCI</sub>	-	0.7V <sub>CCI</sub>	0.4V <sub>CCI</sub>	0.7V <sub>CCI</sub>	0.4V <sub>CCI</sub>	0.7V <sub>CCI</sub>	V
		V <sub>CCI</sub> = 2.3 V to 2.7 V	0.9	-	1.7	0.9	1.7	0.9	1.7	V
V <sub>T-</sub>	negative-going threshold voltage	see <a href="#">Fig. 11</a> and <a href="#">Fig. 12</a>								
		V <sub>CCI</sub> = 0.75 V to 0.85 V	0.2V <sub>CCI</sub>	-	0.7V <sub>CCI</sub>	0.2V <sub>CCI</sub>	0.7V <sub>CCI</sub>	0.2V <sub>CCI</sub>	0.7V <sub>CCI</sub>	V
		V <sub>CCI</sub> = 1.1 V to 1.95 V	0.3V <sub>CCI</sub>	-	0.6V <sub>CCI</sub>	0.3V <sub>CCI</sub>	0.6V <sub>CCI</sub>	0.3V <sub>CCI</sub>	0.6V <sub>CCI</sub>	V
		V <sub>CCI</sub> = 2.3 V to 2.7 V	0.7	-	1.5	0.7	1.5	0.7	1.5	V
V <sub>H</sub>	hysteresis voltage	see <a href="#">Fig. 11</a> and <a href="#">Fig. 12</a>								
		V <sub>CCI</sub> = 0.75 V to 0.85 V	0.06V <sub>CCI</sub>	-	0.5V <sub>CCI</sub>	0.06V <sub>CCI</sub>	0.5V <sub>CCI</sub>	0.06V <sub>CCI</sub>	0.5V <sub>CCI</sub>	V
		V <sub>CCI</sub> = 1.1 V to 1.95 V	0.1V <sub>CCI</sub>	-	0.4V <sub>CCI</sub>	0.1V <sub>CCI</sub>	0.4V <sub>CCI</sub>	0.1V <sub>CCI</sub>	0.4V <sub>CCI</sub>	V
		V <sub>CCI</sub> = 2.3 V to 2.7 V	0.2	-	1.0	0.2	1.0	0.2	1.0	V
V <sub>OH</sub>	HIGH-level output voltage	I <sub>O</sub> = -2 mA; V <sub>CCO</sub> = 1.2 V	-	1.05	-	-	-	-	-	V
		I <sub>O</sub> = -3 mA; V <sub>CCO</sub> = 1.4 V	1.05	-	-	1.05	-	1.05	-	V
		I <sub>O</sub> = -4.5 mA; V <sub>CCO</sub> = 1.65 V	1.2	-	-	1.2	-	1.2	-	V
		I <sub>O</sub> = -8 mA; V <sub>CCO</sub> = 2.3 V	1.7	-	-	1.7	-	1.7	-	V
		I <sub>O</sub> = -10 mA; V <sub>CCO</sub> = 3.0 V	2.2	-	-	2.2	-	2.2	-	V
		I <sub>O</sub> = -12 mA; V <sub>CCO</sub> = 4.5 V	3.7	-	-	3.7	-	3.7	-	V

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +85 °C		T <sub>amb</sub> = -40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
V <sub>OL</sub>	LOW-level output voltage	I <sub>O</sub> = 2 mA; V <sub>CCO</sub> = 1.2 V	-	0.18	-	-	-	-	-	V
		I <sub>O</sub> = 3 mA; V <sub>CCO</sub> = 1.4 V	-	-	0.35	-	0.35	-	0.35	V
		I <sub>O</sub> = 4.5 mA; V <sub>CCO</sub> = 1.65 V	-	-	0.45	-	0.45	-	0.45	V
		I <sub>O</sub> = 8 mA; V <sub>CCO</sub> = 2.3 V	-	-	0.7	-	0.7	-	0.7	V
		I <sub>O</sub> = 10 mA; V <sub>CCO</sub> = 3.0 V	-	-	0.8	-	0.8	-	0.8	V
		I <sub>O</sub> = 12 mA; V <sub>CCO</sub> = 4.5 V	-	-	0.8	-	0.8	-	0.8	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = 0 V to 2.75 V; V <sub>CCI</sub> = 0 V to 2.75 V	-	±0.001	±0.1	-	±0.5	-	±1.0	µA
I <sub>OZ</sub>	OFF-state output current	V <sub>O</sub> = 0 V to 5.5 V; V <sub>CCO</sub> = 1.2 V to 5.5 V	-	±0.001	±0.1	-	±0.5	-	±2.0	µA
I <sub>OFF</sub>	power-off leakage current	inputs; V <sub>I</sub> = 0 V to 2.75 V; V <sub>CCI</sub> = 0 V; V <sub>CCO</sub> = 0 V to 5.5 V	-	±0.01	±0.1	-	±0.5	-	±2.0	µA
		output; V <sub>O</sub> = 0 V to 5.5 V; V <sub>CCO</sub> = 0 V; V <sub>CCI</sub> = 0 V to 2.75 V; V <sub>I</sub> = 0 V to 2.75 V	-	±0.01	±0.1	-	±0.5	-	±2.0	µA
ΔI <sub>OFF</sub>	additional power-off leakage current	inputs; V <sub>I</sub> = 0 V or 2.75 V; V <sub>CCI</sub> = 0 V to 0.1 V; V <sub>CCO</sub> = 0 V to 5.5 V	-	±0.02	±0.1	-	±0.5	-	±2.0	µA
		output; V <sub>O</sub> = 0 V or 5.5 V; V <sub>CCO</sub> = 0 V to 0.1 V; V <sub>CCI</sub> = 0 V to 2.75 V; V <sub>I</sub> = 0 V or 2.75 V	-	±0.02	±0.1	-	±0.5	-	±2.0	µA

[1] Typical values are measured at V<sub>CCI</sub> = V<sub>CCO</sub> = 1.2 V unless otherwise specified.



**Table 9. Static characteristics supply current**

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

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C		T <sub>amb</sub> = -40 °C to +85 °C		T <sub>amb</sub> = -40 °C to +125 °C	Unit
			Typ	Max	Typ	Max	Max	
I <sub>CCI</sub>	input supply current	V <sub>I</sub> = 0 V or V <sub>CCI</sub> ;						
		V <sub>CCI</sub> = 0.7 V to 1.3 V [1]	1	100	10	300	500	nA
		V <sub>CCI</sub> = 1.3 V to 2.75 V [2]	1	100	20	500	1000	nA
		V <sub>CCI</sub> = 2.75 V; V <sub>CCO</sub> = 0 V	1	100	20	500	1000	nA
		V <sub>CCI</sub> = 0 V; V <sub>CCO</sub> = 5.5 V	1	100	1	100	500	nA
I <sub>CCO</sub>	output supply current	V <sub>I</sub> = 0 V or V <sub>CCI</sub> ; I <sub>O</sub> = 0 A; see <a href="#">Table 10</a>						
		V <sub>CCO</sub> = 1.2 V to 3.6 V [1]	0.001	1.0	0.01	1.2	1.3	µA
		V <sub>CCO</sub> = 3.6 V to 5.5 V [3]	0.8	1.5	1.0	1.8	2.0	µA
		V <sub>CCI</sub> = 2.75 V; V <sub>CCO</sub> = 0 V	0.001	0.1	0.003	0.2	0.5	µA
		V <sub>CCI</sub> = 0 V; V <sub>CCO</sub> = 3.6 V	0.2	0.6	0.3	0.8	1.2	µA
		V <sub>CCI</sub> = 0 V; V <sub>CCO</sub> = 5.5 V	0.4	0.8	0.5	1.0	1.5	µA
ΔI <sub>CCI</sub>	additional input supply current	V <sub>I</sub> = V <sub>CCI</sub> - 0.5 V; V <sub>CCI</sub> = 2.5 V	2	100	14	150	200	µA

[1] Typical values are measured at V<sub>CCI</sub> = V<sub>CCO</sub> = 1.2 V unless otherwise specified.

[2] Typical values are measured at V<sub>CCI</sub> = V<sub>CCO</sub> = 2.5 V.

[3] Typical values are measured at V<sub>CCI</sub> = 1.2 V and V<sub>CCO</sub> = 5.0 V.

**Table 10. Typical output supply current (I<sub>CCO</sub>)**

V <sub>CCI</sub>	V <sub>CCO</sub>							Unit
	0 V	1.2 V	1.5 V	1.8 V	2.5 V	3.3 V	5.0 V	
0 V	0	1	5	20	100	200	400	nA
0.8 V	1	10	150	200	300	500	800	nA
1.2 V	1	1	5	200	300	500	800	nA
1.5 V	1	1	5	100	300	500	800	nA
1.8 V	1	1	5	100	300	500	800	nA
2.5 V	1	1	5	100	100	500	800	nA



## 11. Dynamic characteristics

**Table 11. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for waveform, see [Fig. 13](#); for additional propagation delay graphs see [Fig. 14](#) to [#unique\\_15/unique\\_15\\_Connect\\_42\\_fig\\_s4k\\_wyy\\_hnb](#); for test circuit, see [Fig. 20](#).

Symbol	Parameter	Conditions	$V_{CC0}$ [1]															Unit	
			1.2 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				
			Typ	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ		Max
<b><math>T_{amb} = 25\text{ °C}</math></b>																			
$t_{pd}$	propagation delay	A, B and C to Y [2]																	
		$V_{CCI} = 0.75\text{ V to }0.85\text{ V}$	25	4	20	76	4	18	72	3	16	72	3	16	80	3	17	92	ns
		$V_{CCI} = 1.1\text{ V to }1.3\text{ V}$	16.5	3.4	10.9	21.0	3.0	8.9	17.0	2.6	7.3	12.0	2.5	6.7	10.7	2.4	6.4	10.2	ns
		$V_{CCI} = 1.4\text{ V to }1.6\text{ V}$	15.5	3.1	9.9	19.0	2.6	7.9	14.0	2.3	6.2	9.9	2.1	5.6	9.0	2.1	5.3	8.5	ns
		$V_{CCI} = 1.65\text{ V to }1.95\text{ V}$	15.0	2.6	9.4	18.0	2.1	7.4	12.5	1.7	5.7	9.3	1.6	5.1	8.3	1.5	4.8	7.9	ns
		$V_{CCI} = 2.3\text{ V to }2.7\text{ V}$	14.5	2.7	8.9	17.5	2.2	6.9	11.7	1.9	5.2	8.7	1.8	4.6	7.7	1.7	4.3	7.2	ns
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math></b>																			
$t_{pd}$	propagation delay	A, B and C to Y [2]																	
		$V_{CCI} = 0.75\text{ V to }0.85\text{ V}$	25	3	20	151	3	18	148	2	16	167	2	16	194	2	17	225	ns
		$V_{CCI} = 1.1\text{ V to }1.3\text{ V}$	16.5	3.4	10.9	21.0	3.0	8.9	17.0	2.6	7.3	12.0	2.5	6.7	10.7	2.4	6.4	10.2	ns
		$V_{CCI} = 1.4\text{ V to }1.6\text{ V}$	15.5	3.1	9.9	19.0	2.6	7.9	14.0	2.3	6.2	9.9	2.1	5.6	9.0	2.1	5.3	8.5	ns
		$V_{CCI} = 1.65\text{ V to }1.95\text{ V}$	15.0	2.6	9.4	18.0	2.1	7.4	12.5	1.7	5.7	9.3	1.6	5.1	8.3	1.5	4.8	7.9	ns
		$V_{CCI} = 2.3\text{ V to }2.7\text{ V}$	14.5	2.7	8.9	17.5	2.2	6.9	11.7	1.9	5.2	8.7	1.8	4.6	7.7	1.7	4.3	7.2	ns
<b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b>																			
$t_{pd}$	propagation delay	A, B and C to Y [2]																	
		$V_{CCI} = 0.75\text{ V to }0.85\text{ V}$	25	3	20	151	3	18	148	2	16	167	2	16	194	2	17	225	ns
		$V_{CCI} = 1.1\text{ V to }1.3\text{ V}$	16.5	3.4	10.9	21.0	3.0	8.9	17.5	2.6	7.3	15.0	2.5	6.7	13.0	2.4	6.4	12.0	ns
		$V_{CCI} = 1.4\text{ V to }1.6\text{ V}$	15.5	3.1	9.9	20.0	2.6	7.9	16.5	2.3	6.2	12.0	2.1	5.6	10.9	2.1	5.3	10.3	ns
		$V_{CCI} = 1.65\text{ V to }1.95\text{ V}$	15.0	2.6	9.4	19.0	2.1	7.4	15.5	1.7	5.7	11.3	1.6	5.1	10.4	1.5	4.8	9.7	ns
		$V_{CCI} = 2.3\text{ V to }2.7\text{ V}$	14.5	2.7	8.9	18.0	2.2	6.9	14.5	1.9	5.2	10.6	1.8	4.6	9.6	1.7	4.3	8.9	ns

Symbol	Parameter	Conditions	$V_{CC0}$ [1]																	Unit		
			1.2 V			1.5 V $\pm$ 0.1 V			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				
			Typ	Min	Max	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max	Typ	Min		Max	
$t_t$	transition time	$V_{CCI} = 0.75 \text{ V to } 2.7 \text{ V}$ [3]	-	1.0	-	-	1.0	-	-	1.0	-	-	1.0	-	-	1.0	-	-	1.0	-	-	ns

[1] Typical values are measured at nominal supply voltages and  $T_{amb} = +25 \text{ }^\circ\text{C}$ .

[2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .

[3]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

Table 12. Typical dynamic characteristics at  $T_{amb} = 25\text{ °C}$ 

Voltages are referenced to GND (ground = 0 V); for waveform, see Fig. 13; for additional propagation delay graphs see Fig. 14 to #unique\_15/unique\_15\_Connect\_42\_fig\_s4k\_wyy\_hnb; for test circuit, see Fig. 20 .

Symbol	Parameter	Conditions	$V_{CCO}$						Unit	
			1.2 V	1.5 V	1.8 V	2.5 V	3.3 V	5.0 V		
$C_{PD}$	power dissipation capacitance	$f_i = 1\text{ MHz}$ ; $R_L = \infty\ \Omega$ ; $V_I = 0\text{ V}$ to $V_{CCI}$ ; [1]								
		input supply [2]								
		$V_{CCI} = 0.8\text{ V}$	0.5	0.5	0.5	0.5	0.5	0.5	pF	
		$V_{CCI} = 1.2\text{ V}$	0.6	0.6	0.6	0.6	0.6	0.6	pF	
		$V_{CCI} = 1.5\text{ V}$	0.7	0.7	0.7	0.7	0.7	0.7	pF	
		$V_{CCI} = 1.8\text{ V}$	0.8	0.8	0.8	0.8	0.8	0.8	pF	
		$V_{CCI} = 2.5\text{ V}$	1.0	1.0	1.0	1.0	1.0	1.0	pF	
		output supply [3]								
		$V_{CCI} = 0.8\text{ V}$	6.7	6.8	6.8	6.9	7.5	9.5	pF	
		$V_{CCI} = 1.2\text{ V}$	6.8	6.9	7.0	7.0	7.1	7.6	pF	
		$V_{CCI} = 1.5\text{ V}$	6.9	6.9	6.9	7.0	7.1	7.6	pF	
		$V_{CCI} = 1.8\text{ V}$	6.9	6.9	6.9	7.0	7.2	7.6	pF	
$V_{CCI} = 2.5\text{ V}$	6.9	7.0	7.0	7.0	7.2	7.6	pF			
$C_I$	input capacitance	$V_I = 0\text{ V}$ or $V_{CCI}$ ; $V_{CCI} = 0\text{ V}$ to $2.7\text{ V}$	0.6	0.6	0.6	0.6	0.6	0.6	pF	
$C_O$	output capacitance	$V_O = 0\text{ V}$ ; $V_{CCO} = 0\text{ V}$	1.8	1.8	1.8	1.8	1.8	1.8	pF	

[1]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

[2] Power dissipated from input supply ( $V_{CCI}$ )

$$P_D = C_{PD} \times V_{CCI}^2 \times f_i \times N \text{ where:}$$

$C_{PD}$  = power dissipation capacitance of the input supply;

$V_{CCI}$  = input supply voltage in V;

$f_i$  = input frequency in MHz;

$N$  = number of inputs switching.

[3] Power dissipated from output supply ( $V_{CCO}$ )

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

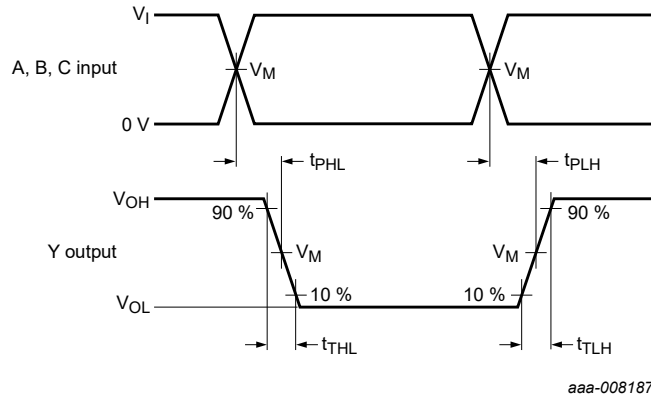
$C_L$  = load capacitance in pF;

$C_{PD}$  = power dissipation capacitance of the output supply;

$V_{CCO}$  = output supply voltage in V;

$f_o$  = output frequency in MHz.

## 12. Waveform, graphs and test circuit



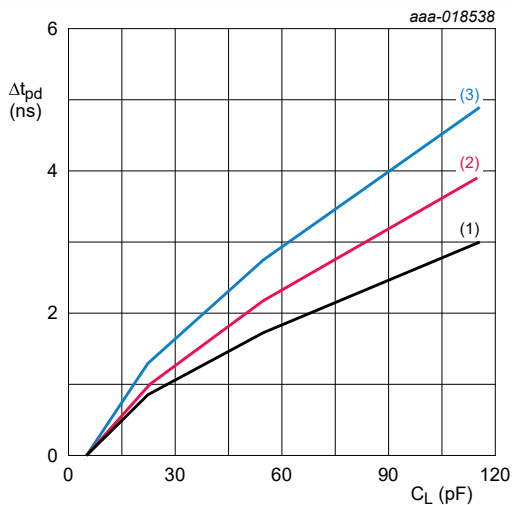
Measurement points are given in [Table 13](#).

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

**Fig. 13. Input A, B and C to output Y propagation delay times and output transition times**

**Table 13. Measurement points**

Supply voltage		Output	Input	
$V_{CCI}$	$V_{CCO}$	$V_M$	$V_M$	$V_I$
0.75 V to 2.7 V	1.2 V to 5.5 V	$0.5V_{CCO}$	$0.5V_{CCI}$	$V_{CCI}$



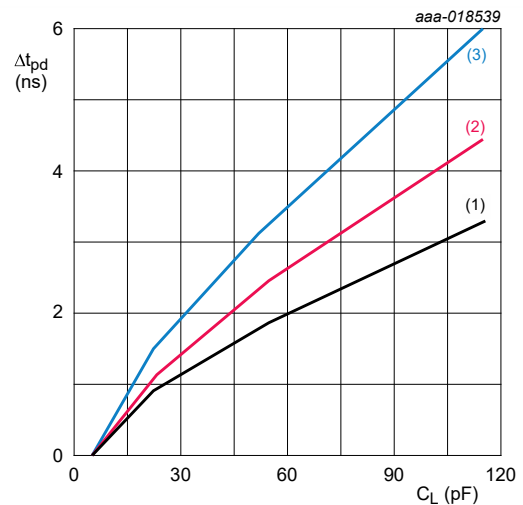
$T_{amb} = -40\text{ °C}$  to  $+125\text{ °C}$  unless otherwise specified.

(1) Minimum:  $V_{CCO} = 5.5\text{ V}$

(2) Typical:  $T_{amb} = 25\text{ °C}$ ;  $V_{CCO} = 5\text{ V}$

(3) Maximum:  $V_{CCO} = 4.5\text{ V}$

**Fig. 14. Additional propagation delay versus load capacitance**



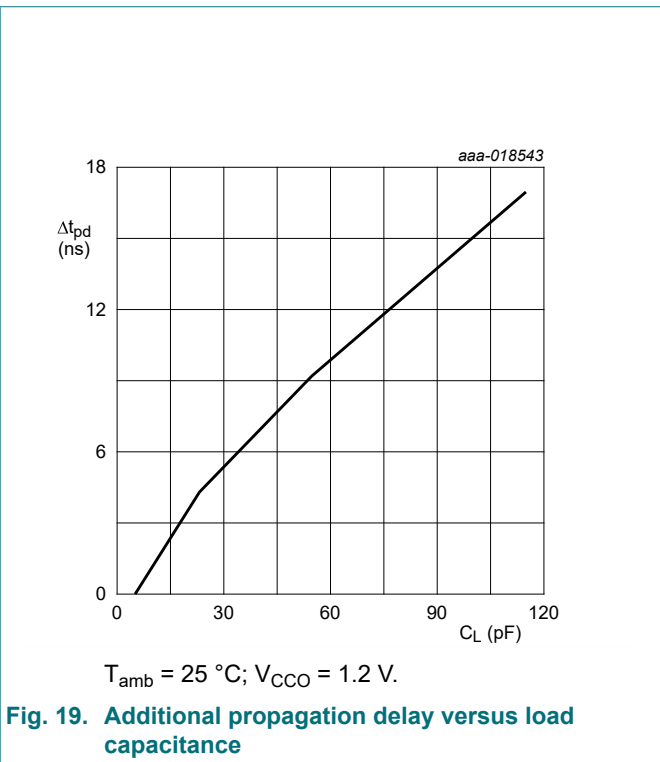
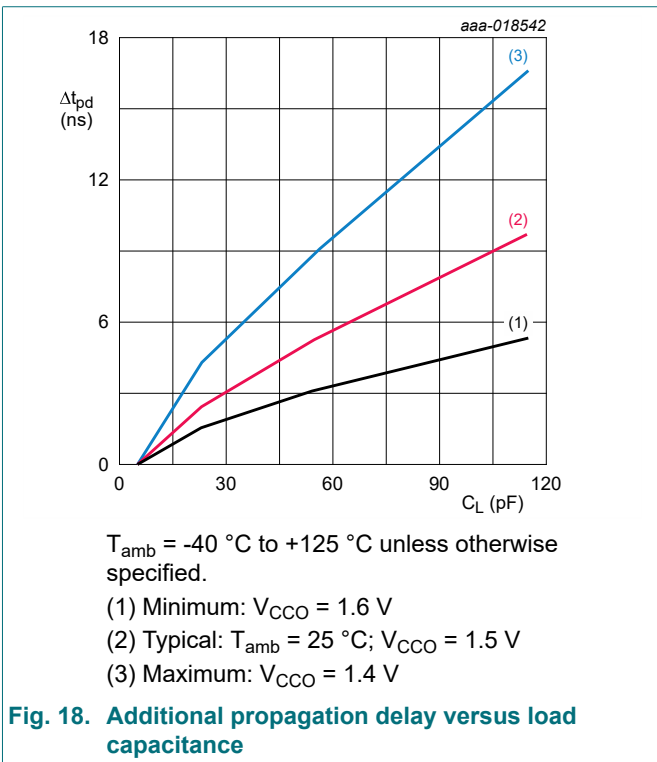
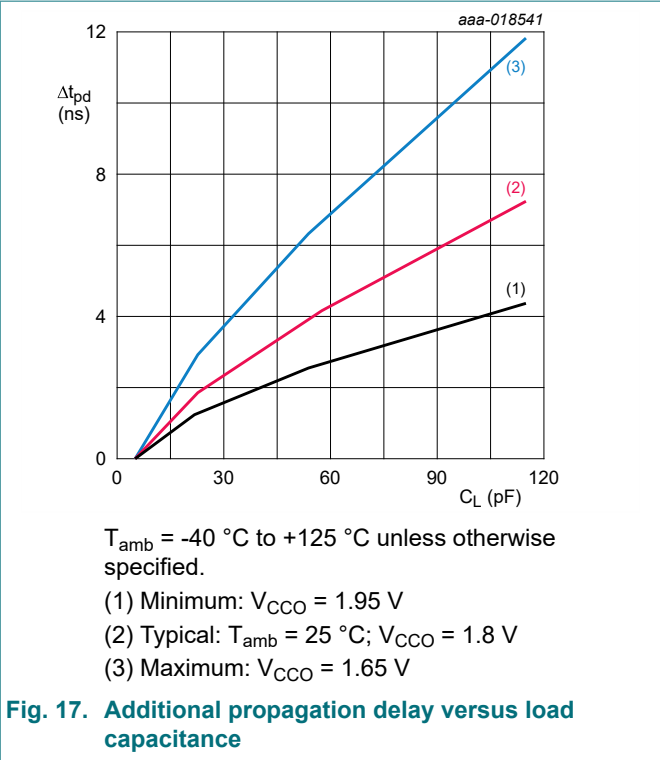
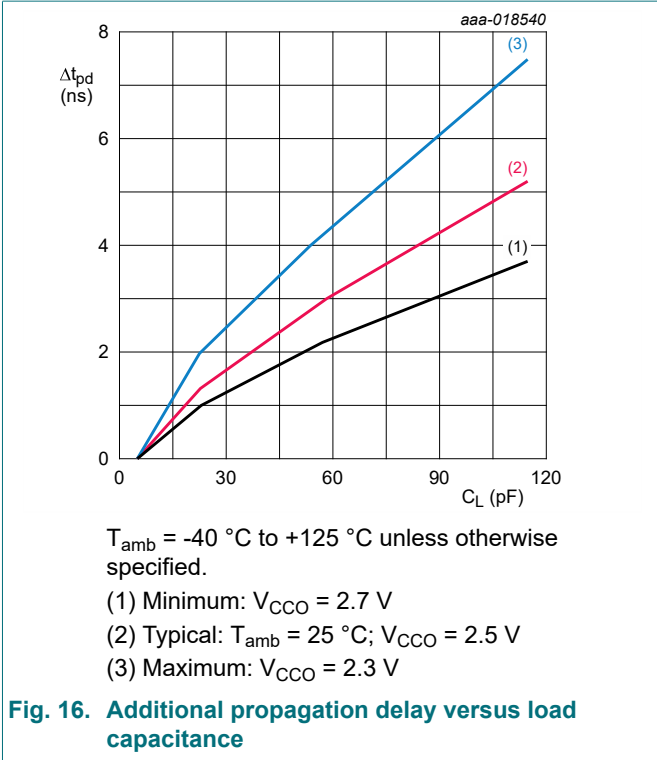
$T_{amb} = -40\text{ °C}$  to  $+125\text{ °C}$  unless otherwise specified.

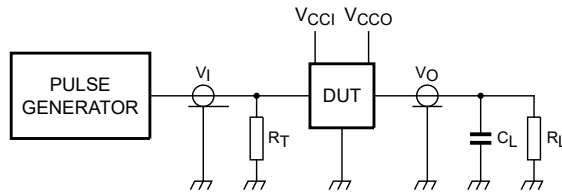
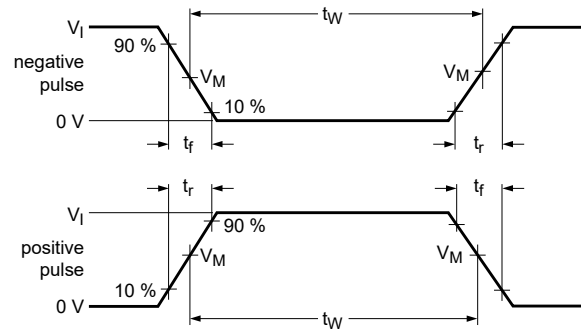
(1) Minimum:  $V_{CCO} = 3.6\text{ V}$

(2) Typical:  $T_{amb} = 25\text{ °C}$ ;  $V_{CCO} = 3.3\text{ V}$

(3) Maximum:  $V_{CCO} = 3\text{ V}$

**Fig. 15. Additional propagation delay versus load capacitance**





aaa-018544

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

Definitions test circuit:

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

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

$R_L$  = Load resistance.

**Fig. 20. Test circuit for measuring switching times**

**Table 14. Test data**

Supply voltage		Load		Input	
$V_{CCI}$	$V_{CCO}$	$C_L$	$R_L$	$t_r, t_f$	$V_I$
0.75 V to 2.7 V	1.2 V to 5.5 V	5 pF	5 k $\Omega$	$\leq 3.0$ ns	$V_{CCI}$

13. Package outline

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

SOT765-1

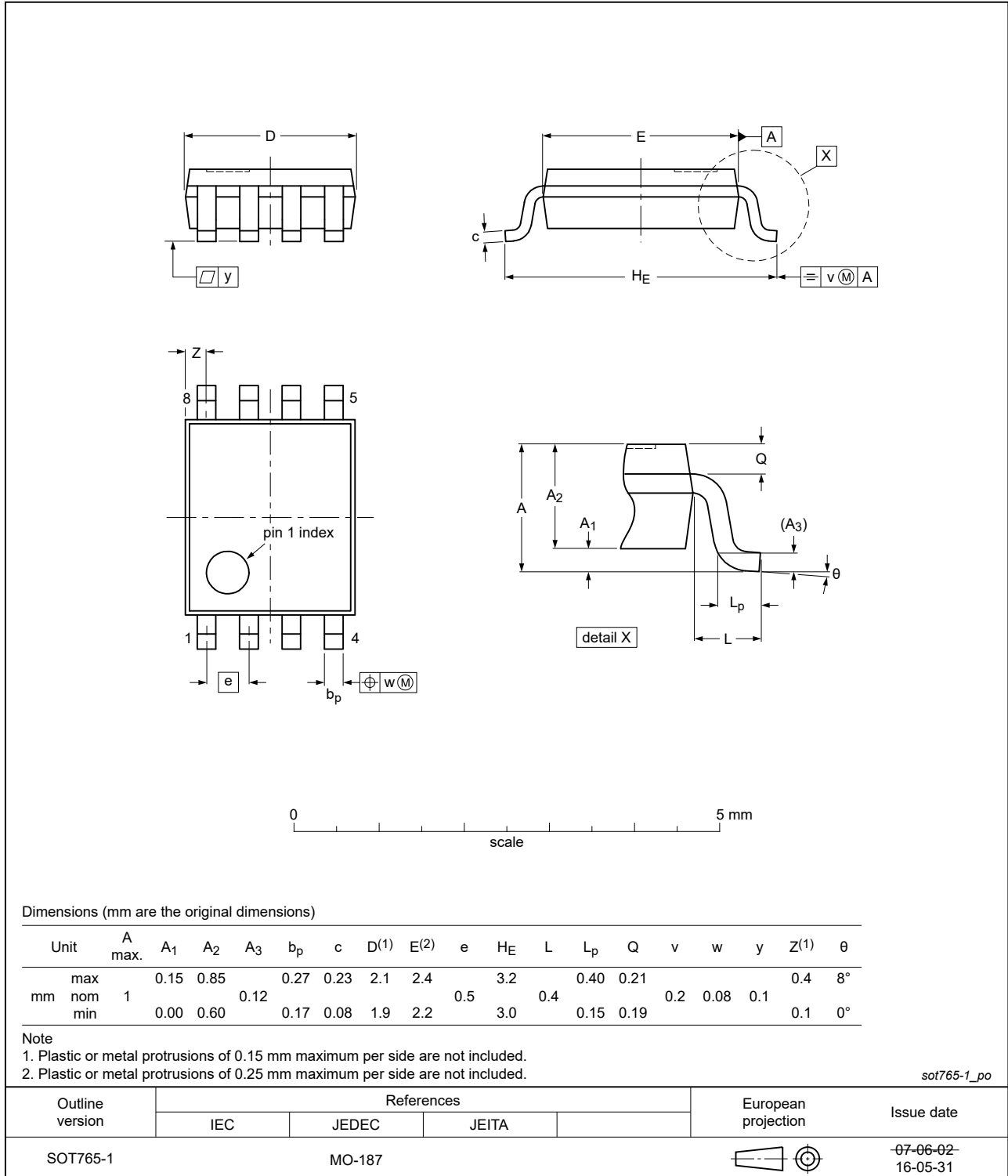


Fig. 21. Package outline SOT765-1 (VSSOP8)



## 14. Abbreviations

Table 15. Abbreviations

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

## 15. Revision history

Table 16. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AXP1T57_Q100 v.2	20220617	Product data sheet	-	74AXP1T57_Q100 v.1
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li><a href="#">Table 6</a>: Derating values for <math>P_{tot}</math> total power dissipation have been updated.</li> </ul>			
74AXP1T57_Q100 v.1	20160914	Product data sheet	-	-

## 16. 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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