74AXP1T57

Dual supply configurable multiple function gate

Rev. 6 — 17 June 2022 Product data sheet

1. General description

The 74AXP1T57 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 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.

2. Features and benefits

- 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 µA (85 °C maximum)
- Low static power consumption; I_{CCO} = 1.8 µA (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:
  - 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
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AXP1T57DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AXP1T57GT	-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
74AXP1T57GN	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	SOT1116
74AXP1T57GS	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203
74AXP1T57GX	-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

4. Marking

Table 2. Marking

Type number	Marking code[1]
74AXP1T57DC	rD
74AXP1T57GT	rD
74AXP1T57GN	rD
74AXP1T57GS	rD
74AXP1T57GX	rD

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

5. Functional diagram

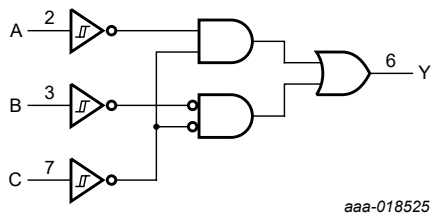


Fig. 1. Logic symbol

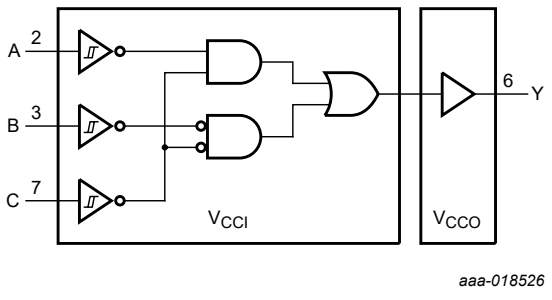


Fig. 2. Logic diagram

6. Pinning information

6.1. Pinning

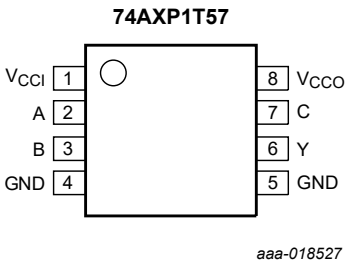


Fig. 3. Pin configuration SOT765-1 (VSSOP8)

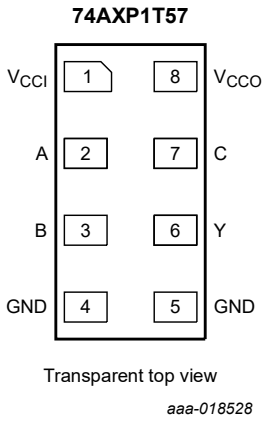


Fig. 4. Pin configuration SOT833-1, SOT1116 and SOT1203 (XSON8)

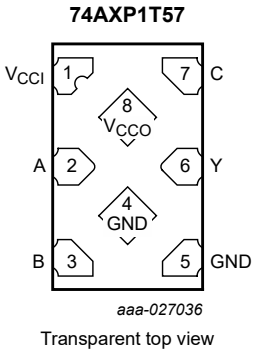


Fig. 5. Pin configuration SOT1233-2 (X2SON8)

6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
V_{CCI}	1	input supply voltage
A, B, C	2, 3, 7	data input
GND[1]	4, 5	ground (0 V)
Y	6	data output
V_{CCO}	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_{CCI}	V_{CCO}	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 Fig. 6
2-input AND with both inputs inverted	see Fig. 9
2-input NAND with inverted input	see Fig. 7 and Fig. 8
2-input OR with inverted input	see Fig. 7 and Fig. 8
2-input NOR	see Fig. 9
2-input NOR with both inputs inverted	see Fig. 6
2-input XNOR	see Fig. 10
Inverter	see Fig. 11
Buffer	see Fig. 12

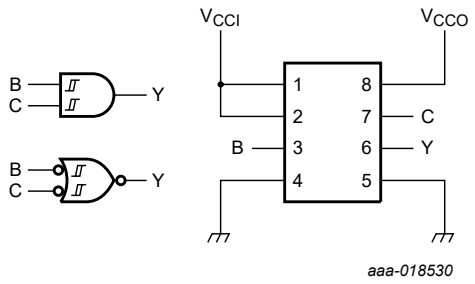


Fig. 6. 2-input AND gate or 2-input NOR gate with both inputs inverted

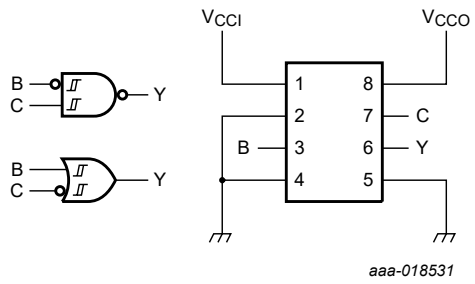


Fig. 7. 2-input NAND gate with input B inverted or 2-input OR gate with input C inverted

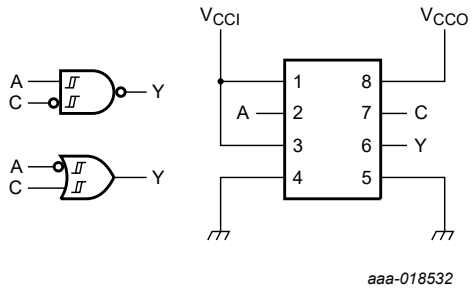


Fig. 8. 2-input NAND gate with input C inverted or 2-input OR gate with input A inverted

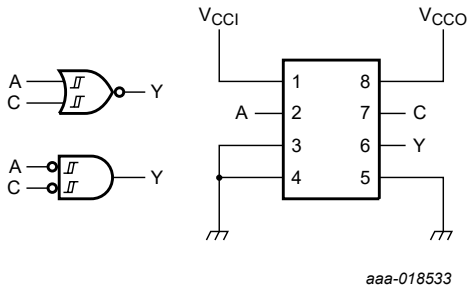


Fig. 9. 2-input NOR gate or 2-input AND gate with both inputs inverted

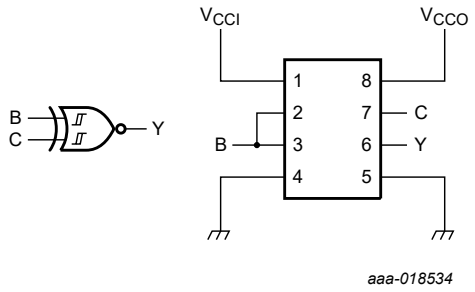


Fig. 10. 2-input XNOR gate

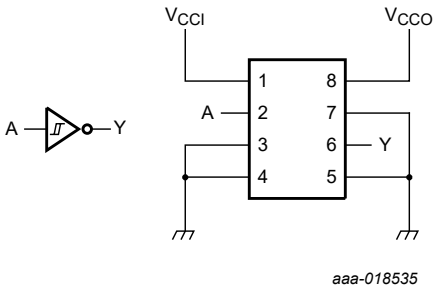


Fig. 11. Inverter

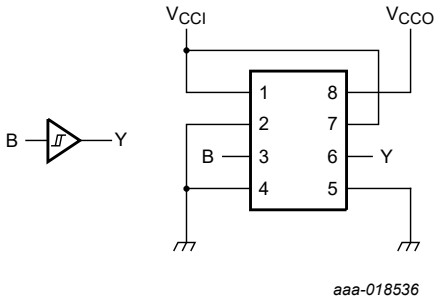


Fig. 12. Buffer

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}		-	±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				
		All packages except SOT1233-2	[3]	-	250	mW
		SOT1233-2 package	[4]	-	300	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.
For SOT833-1 (XSON8) package: P_{tot} derates linearly with 3.1 mW/K above 68 °C.
For SOT1116 (XSON8) package: P_{tot} derates linearly with 4.2 mW/K above 90 °C.
For SOT1203 (XSON8) package: P_{tot} derates linearly with 3.6 mW/K above 81 °C.
[4] For SOT1233-2 (X2SON8) package: P_{tot} derates linearly with 7.7 mW/K above 118 °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_{amb} = 25 °C			T_{amb} = -40 °C to +85 °C		T_{amb} = -40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
V_{T+}	positive-going threshold voltage	see Fig. 13 and Fig. 14								
		V_{CCI} = 0.75 V to 0.85 V	$0.3V_{CCI}$	-	$0.8V_{CCI}$	$0.3V_{CCI}$	$0.8V_{CCI}$	$0.3V_{CCI}$	$0.8V_{CCI}$	V
		V_{CCI} = 1.1 V to 1.95 V	$0.4V_{CCI}$	-	$0.7V_{CCI}$	$0.4V_{CCI}$	$0.7V_{CCI}$	$0.4V_{CCI}$	$0.7V_{CCI}$	V
		V_{CCI} = 2.3 V to 2.7 V	0.9	-	1.7	0.9	1.7	0.9	1.7	V
V_{T-}	negative-going threshold voltage	see Fig. 13 and Fig. 14								
		V_{CCI} = 0.75 V to 0.85 V	$0.2V_{CCI}$	-	$0.7V_{CCI}$	$0.2V_{CCI}$	$0.7V_{CCI}$	$0.2V_{CCI}$	$0.7V_{CCI}$	V
		V_{CCI} = 1.1 V to 1.95 V	$0.3V_{CCI}$	-	$0.6V_{CCI}$	$0.3V_{CCI}$	$0.6V_{CCI}$	$0.3V_{CCI}$	$0.6V_{CCI}$	V
		V_{CCI} = 2.3 V to 2.7 V	0.7	-	1.5	0.7	1.5	0.7	1.5	V
V_H	hysteresis voltage	see Fig. 13 and Fig. 14								
		V_{CCI} = 0.75 V to 0.85 V	$0.06V_{CCI}$	-	$0.5V_{CCI}$	$0.06V_{CCI}$	$0.5V_{CCI}$	$0.06V_{CCI}$	$0.5V_{CCI}$	V
		V_{CCI} = 1.1 V to 1.95 V	$0.1V_{CCI}$	-	$0.4V_{CCI}$	$0.1V_{CCI}$	$0.4V_{CCI}$	$0.1V_{CCI}$	$0.4V_{CCI}$	V
		V_{CCI} = 2.3 V to 2.7 V	0.2	-	1.0	0.2	1.0	0.2	1.0	V
V_{OH}	HIGH-level output voltage	I_O = -2 mA; V_{CCO} = 1.2 V	-	1.05	-	-	-	-	-	V
		I_O = -3 mA; V_{CCO} = 1.4 V	1.05	-	-	1.05	-	1.05	-	V
		I_O = -4.5 mA; V_{CCO} = 1.65 V	1.2	-	-	1.2	-	1.2	-	V
		I_O = -8 mA; V_{CCO} = 2.3 V	1.7	-	-	1.7	-	1.7	-	V
		I_O = -10 mA; V_{CCO} = 3.0 V	2.2	-	-	2.2	-	2.2	-	V
		I_O = -12 mA; V_{CCO} = 4.5 V	3.7	-	-	3.7	-	3.7	-	V

Symbol	Parameter	Conditions	T_{amb} = 25 °C			T_{amb} = -40 °C to +85 °C		T_{amb} = -40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
V_{OL}	LOW-level output voltage	I_O = 2 mA; V_{CCO} = 1.2 V	-	0.18	-	-	-	-	-	V
		I_O = 3 mA; V_{CCO} = 1.4 V	-	-	0.35	-	0.35	-	0.35	V
		I_O = 4.5 mA; V_{CCO} = 1.65 V	-	-	0.45	-	0.45	-	0.45	V
		I_O = 8 mA; V_{CCO} = 2.3 V	-	-	0.7	-	0.7	-	0.7	V
		I_O = 10 mA; V_{CCO} = 3.0 V	-	-	0.8	-	0.8	-	0.8	V
		I_O = 12 mA; V_{CCO} = 4.5 V	-	-	0.8	-	0.8	-	0.8	V
I_I	input leakage current	V_I = 0 V to 2.75 V; V_{CCI} = 0 V to 2.75 V	-	±0.001	±0.1	-	±0.5	-	±1.0	µA
I_{OZ}	OFF-state output current	V_O = 0 V to 5.5 V; V_{CCO} = 1.2 V to 5.5 V	-	±0.001	±0.1	-	±0.5	-	±2.0	µA
I_{OFF}	power-off leakage current	inputs; V_I = 0 V to 2.75 V; V_{CCI} = 0 V; V_{CCO} = 0 V to 5.5 V	-	±0.01	±0.1	-	±0.5	-	±2.0	µA
		output; V_O = 0 V to 5.5 V; V_{CCO} = 0 V; V_{CCI} = 0 V to 2.75 V; V_I = 0 V to 2.75 V	-	±0.01	±0.1	-	±0.5	-	±2.0	µA
ΔI_{OFF}	additional power-off leakage current	inputs; V_I = 0 V or 2.75 V; V_{CCI} = 0 V to 0.1 V; V_{CCO} = 0 V to 5.5 V	-	±0.02	±0.1	-	±0.5	-	±2.0	µA
		output; V_O = 0 V or 5.5 V; V_{CCO} = 0 V to 0.1 V; V_{CCI} = 0 V to 2.75 V; V_I = 0 V or 2.75 V	-	±0.02	±0.1	-	±0.5	-	±2.0	µA

[1] Typical values are measured at V_{CCI} = V_{CCO} = 1.2 V unless otherwise specified.

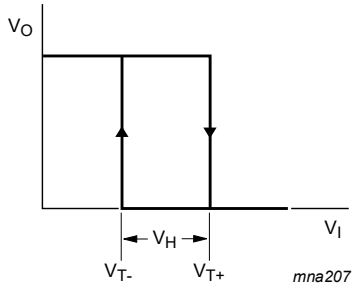


Fig. 13. Transfer characteristic

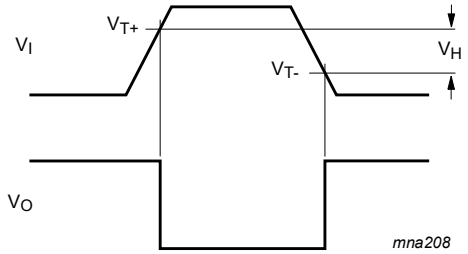


Fig. 14. Definition of V_{T+}, V_{T-}, and V_H

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_{amb} = 25 °C		T_{amb} = -40 °C to +85 °C		T_{amb} = -40 °C to +125 °C	Unit
			Typ	Max	Typ	Max	Max	
I_{CCI}	input supply current	V_I = 0 V or V_{CCI};						
		V_{CCI} = 0.7 V to 1.3 V [1]	1	100	10	300	500	nA
		V_{CCI} = 1.3 V to 2.75 V [2]	1	100	20	500	1000	nA
		V_{CCI} = 2.75 V; V_{CCO} = 0 V	1	100	20	500	1000	nA
		V_{CCI} = 0 V; V_{CCO} = 5.5 V	1	100	1	100	500	nA
I_{CCO}	output supply current	V_I = 0 V or V_{CCI}; I_O = 0 A; see Table 10						
		V_{CCO} = 1.2 V to 3.6 V [1]	0.001	1.0	0.01	1.2	1.3	µA
		V_{CCO} = 3.6 V to 5.5 V [3]	0.8	1.5	1.0	1.8	2.0	µA
		V_{CCI} = 2.75 V; V_{CCO} = 0 V	0.001	0.1	0.003	0.2	0.5	µA
		V_{CCI} = 0 V; V_{CCO} = 3.6 V	0.2	0.6	0.3	0.8	1.2	µA
		V_{CCI} = 0 V; V_{CCO} = 5.5 V	0.4	0.8	0.5	1.0	1.5	µA
ΔI_{CCI}	additional input supply current	V_I = V_{CCI} - 0.5 V; V_{CCI} = 2.5 V	2	100	14	150	200	µA

[1] Typical values are measured at V_{CCI} = V_{CCO} = 1.2 V unless otherwise specified.
[2] Typical values are measured at V_{CCI} = V_{CCO} = 2.5 V.
[3] Typical values are measured at V_{CCI} = 1.2 V and V_{CCO} = 5.0 V.

Table 10. Typical output supply current (I_{CCO})

V_{CCI}	V_{CCO}							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. 15; for additional propagation delay graphs see Fig. 16 to #unique_15/unique_15_Connect_42_fig_s4k_wyy_hnb; for test circuit, see Fig. 22 .

Symbol	Parameter	Conditions	V_{CCO} [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	
T_{amb} = 25 °C																			
t_{pd}	propagation delay	A, B and C to Y [2]																	
		V_{CCI} = 0.75 V to 0.85 V	25	4	20	76	4	18	72	3	16	72	3	16	80	3	17	92	ns
		V_{CCI} = 1.1 V to 1.3 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 V to 1.6 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 V to 1.95 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 V to 2.7 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
T_{amb} = -40 °C to +85 °C																			
t_{pd}	propagation delay	A, B and C to Y [2]																	
		V_{CCI} = 0.75 V to 0.85 V	25	3	20	151	3	18	148	2	16	167	2	16	194	2	17	225	ns
		V_{CCI} = 1.1 V to 1.3 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 V to 1.6 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 V to 1.95 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 V to 2.7 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
T_{amb} = -40 °C to +125 °C																			
t_{pd}	propagation delay	A, B and C to Y [2]																	
		V_{CCI} = 0.75 V to 0.85 V	25	3	20	151	3	18	148	2	16	167	2	16	194	2	17	225	ns
		V_{CCI} = 1.1 V to 1.3 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 V to 1.6 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 V to 1.95 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 V to 2.7 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_{CCO} [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	
t_t	transition time	V_{CCI} = 0.75 V to 2.7 V [3]	-	1.0	-	-	1.0	-	-	1.0	-	-	1.0	-	-	1.0	-	-	ns

[1] Typical values are measured at nominal supply voltages and T_{amb} = +25 °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 °C

Voltages are referenced to GND (ground = 0 V); for waveform, see Fig. 15; for additional propagation delay graphs see Fig. 16 to #unique_15/unique_15_Connect_42_fig_s4k_wyy_hnb; for test circuit, see Fig. 22 .

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 MHz; R_L = ∞ Ω; V_I = 0 V to V_{CCI}; [1]							
		input supply [2]							
		V_{CCI} = 0.8 V	0.5	0.5	0.5	0.5	0.5	0.5	pF
		V_{CCI} = 1.2 V	0.6	0.6	0.6	0.6	0.6	0.6	pF
		V_{CCI} = 1.5 V	0.7	0.7	0.7	0.7	0.7	0.7	pF
		V_{CCI} = 1.8 V	0.8	0.8	0.8	0.8	0.8	0.8	pF
		V_{CCI} = 2.5 V	1.0	1.0	1.0	1.0	1.0	1.0	pF
		output supply [3]							
		V_{CCI} = 0.8 V	6.7	6.8	6.8	6.9	7.5	9.5	pF
		V_{CCI} = 1.2 V	6.8	6.9	7.0	7.0	7.1	7.6	pF
		V_{CCI} = 1.5 V	6.9	6.9	6.9	7.0	7.1	7.6	pF
		V_{CCI} = 1.8 V	6.9	6.9	6.9	7.0	7.2	7.6	pF
		V_{CCI} = 2.5 V	6.9	7.0	7.0	7.0	7.2	7.6	pF
C_I	input capacitance	V_I = 0 V or V_{CCI}; V_{CCI} = 0 V to 2.7 V	0.6	0.6	0.6	0.6	0.6	0.6	pF
C_O	output capacitance	V_O = 0 V; V_{CCO} = 0 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 µW).

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

$P_D = C_{PD} \times V_{CCI}^2 \times f_i \times N$ 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})

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

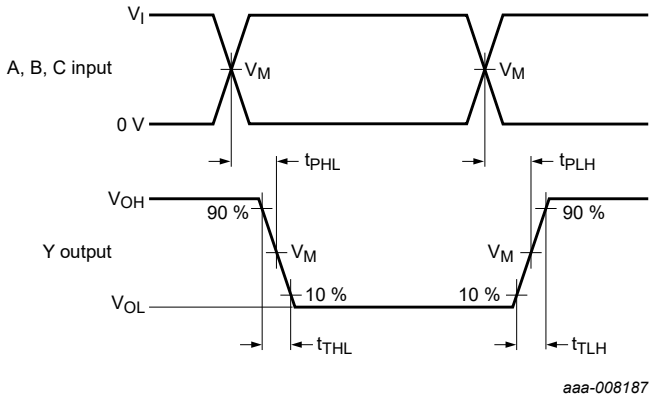
C_L = load capacitance in pF;

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



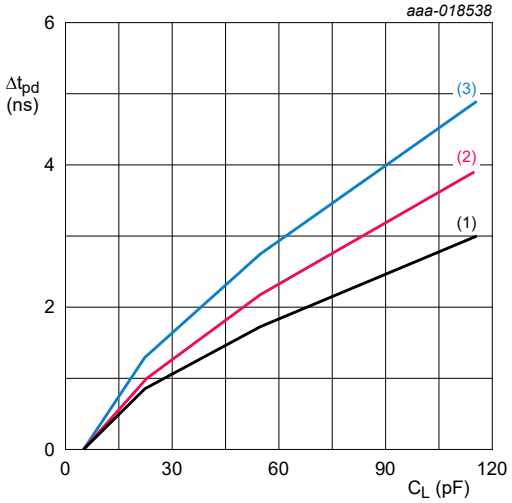
Measurement points are given in Table 13.

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

Fig. 15. 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}



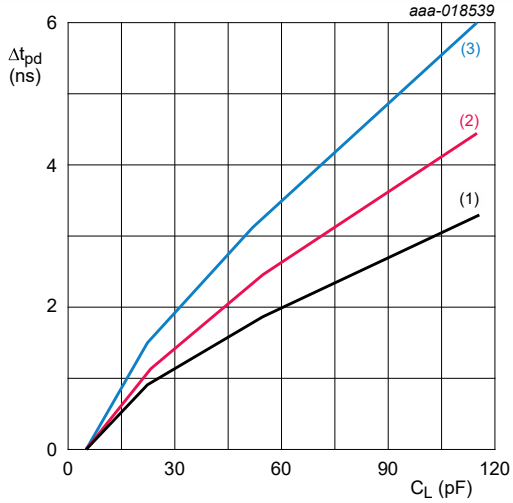
T_{amb} = -40 °C to +125 °C unless otherwise specified.

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

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

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

Fig. 16. Additional propagation delay versus load capacitance



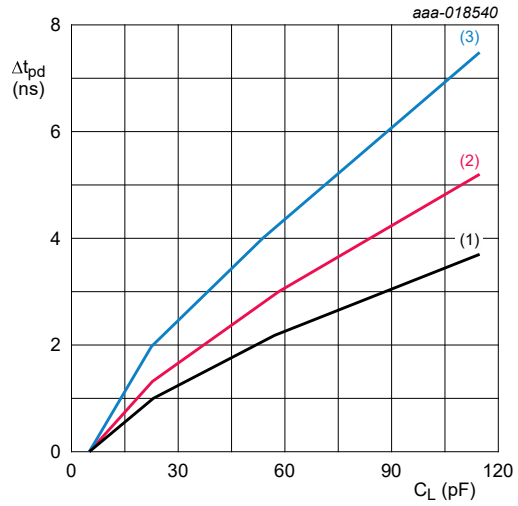
T_{amb} = -40 °C to +125 °C unless otherwise specified.

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

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

(3) Maximum: V_{CCO} = 3 V

Fig. 17. Additional propagation delay versus load capacitance



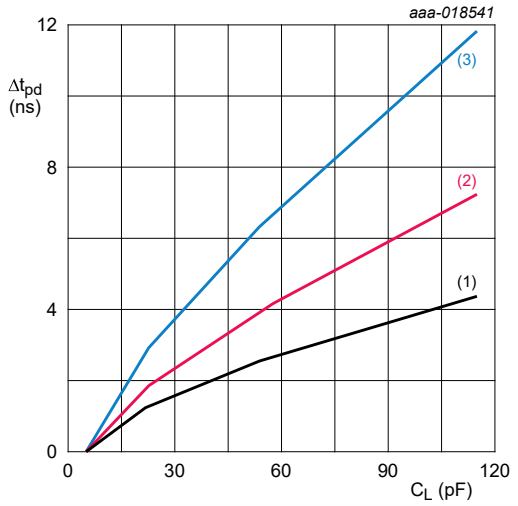
T_{amb} = -40 °C to +125 °C unless otherwise specified.

(1) Minimum: V_{CCO} = 2.7 V

(2) Typical: T_{amb} = 25 °C; V_{CCO} = 2.5 V

(3) Maximum: V_{CCO} = 2.3 V

Fig. 18. Additional propagation delay versus load capacitance



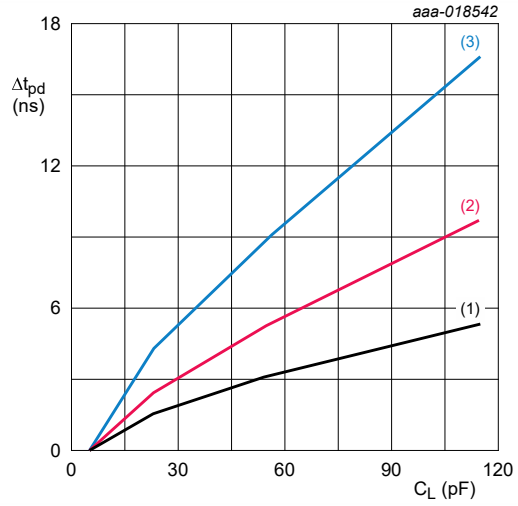
T_{amb} = -40 °C to +125 °C unless otherwise specified.

(1) Minimum: V_{CCO} = 1.95 V

(2) Typical: T_{amb} = 25 °C; V_{CCO} = 1.8 V

(3) Maximum: V_{CCO} = 1.65 V

Fig. 19. Additional propagation delay versus load capacitance



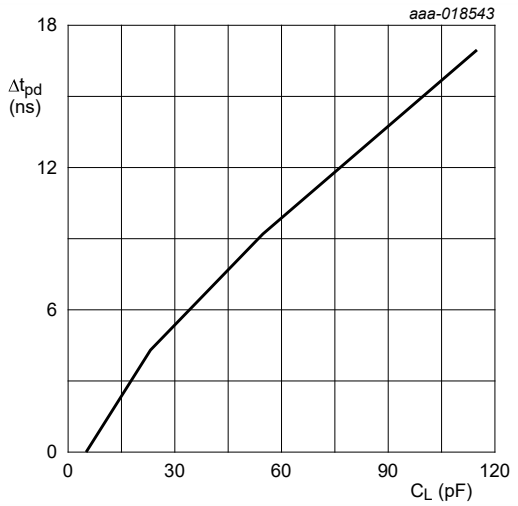
T_{amb} = -40 °C to +125 °C unless otherwise specified.

(1) Minimum: V_{CCO} = 1.6 V

(2) Typical: T_{amb} = 25 °C; V_{CCO} = 1.5 V

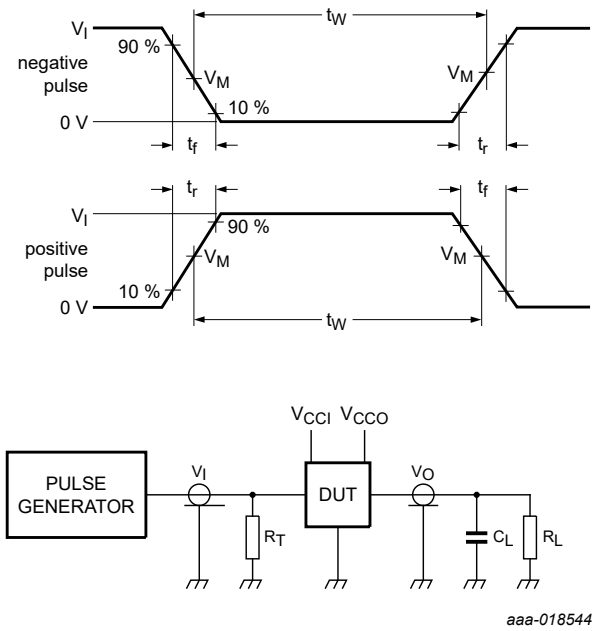
(3) Maximum: V_{CCO} = 1.4 V

Fig. 20. Additional propagation delay versus load capacitance



T_{amb} = 25 °C; V_{CCO} = 1.2 V.

Fig. 21. Additional propagation delay versus load capacitance



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.

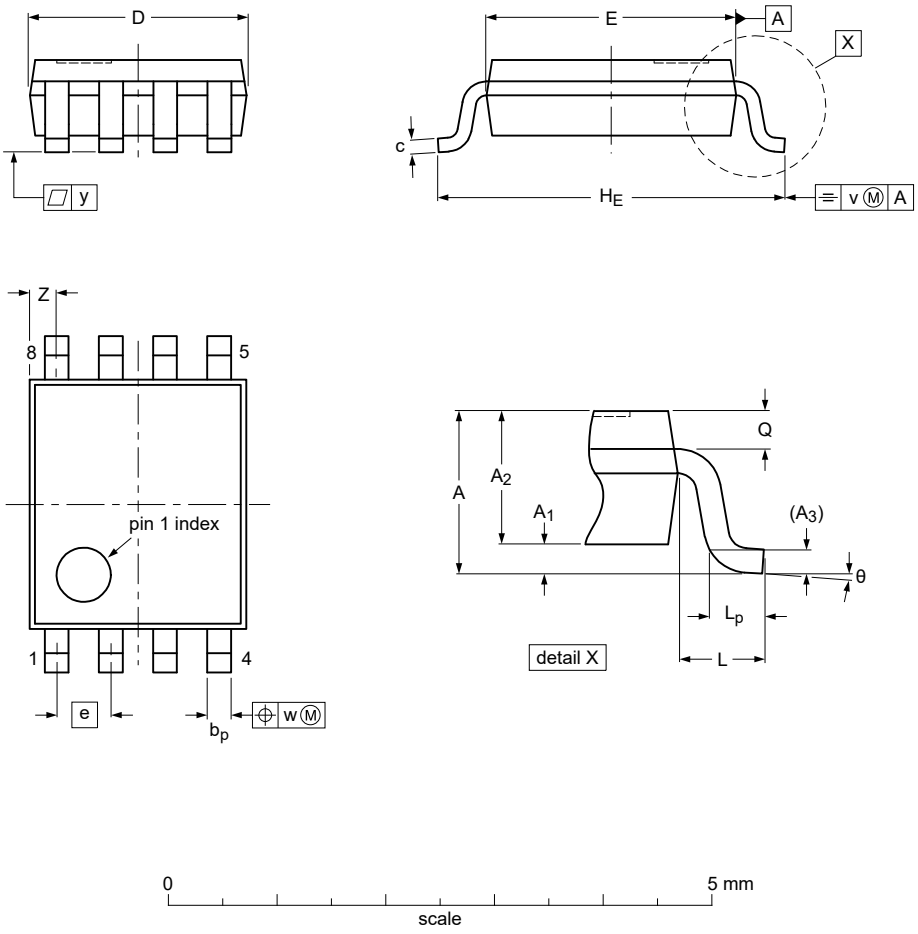
Fig. 22. Test circuit for measuring switching times

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 kΩ	≤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**



Dimensions (mm are the original dimensions)

Unit	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
max		0.15	0.85		0.27	0.23	2.1	2.4		3.2		0.40	0.21				0.4	8°
mm nom	1			0.12					0.5		0.4			0.2	0.08	0.1		
min		0.00	0.60		0.17	0.08	1.9	2.2		3.0		0.15	0.19				0.1	0°

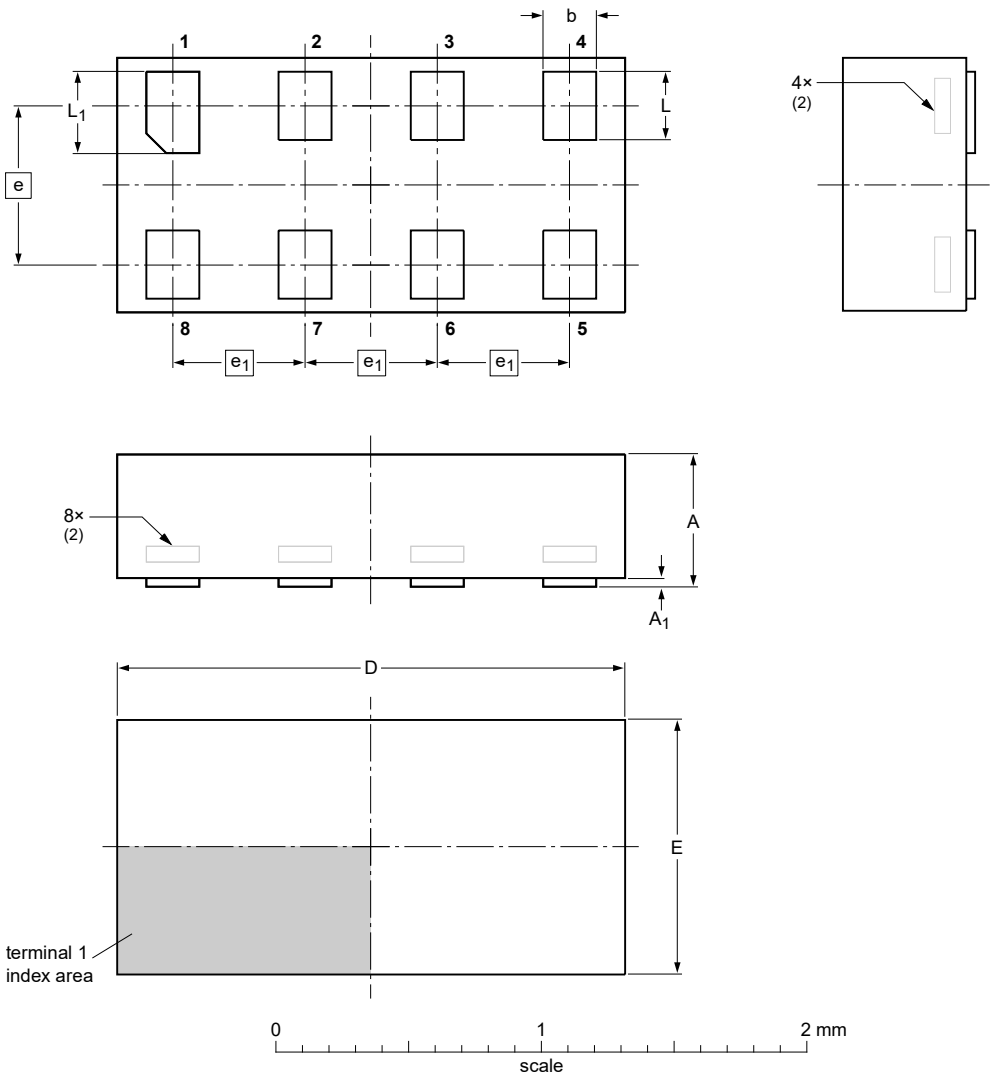
Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

sot765-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT765-1		MO-187				~~07-06-02~~ 16-05-31

Fig. 23. Package outline SOT765-1 (VSSOP8)

XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm **SOT833-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A(1) max	A_1 max	b	D	E	e	e_1	L	L_1
mm	0.5	0.04	0.25 0.17	2.0 1.9	1.05 0.95	0.6	0.5	0.35 0.27	0.40 0.32

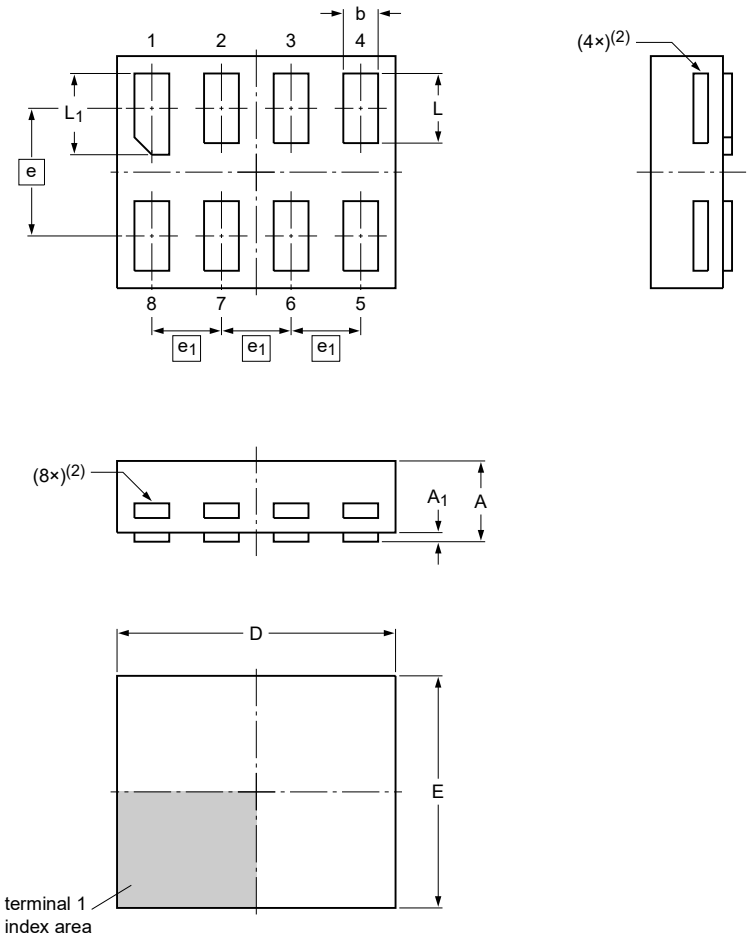
Notes

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT833-1	- - -	MO-252	- - -			~~07-11-14~~ 07-12-07

Fig. 24. Package outline SOT833-1 (XSON8)

XSON8: extremely thin small outline package; no leads;
8 terminals; body 1.2 x 1.0 x 0.35 mm **SOT1116**



Dimensions

Unit		A(1)	A_1	b	D	E	e	e_1	L	L_1
mm	max	0.35	0.04	0.20	1.25	1.05			0.35	0.40
	nom			0.15	1.20	1.00	0.55	0.3	0.30	0.35
	min			0.12	1.15	0.95			0.27	0.32

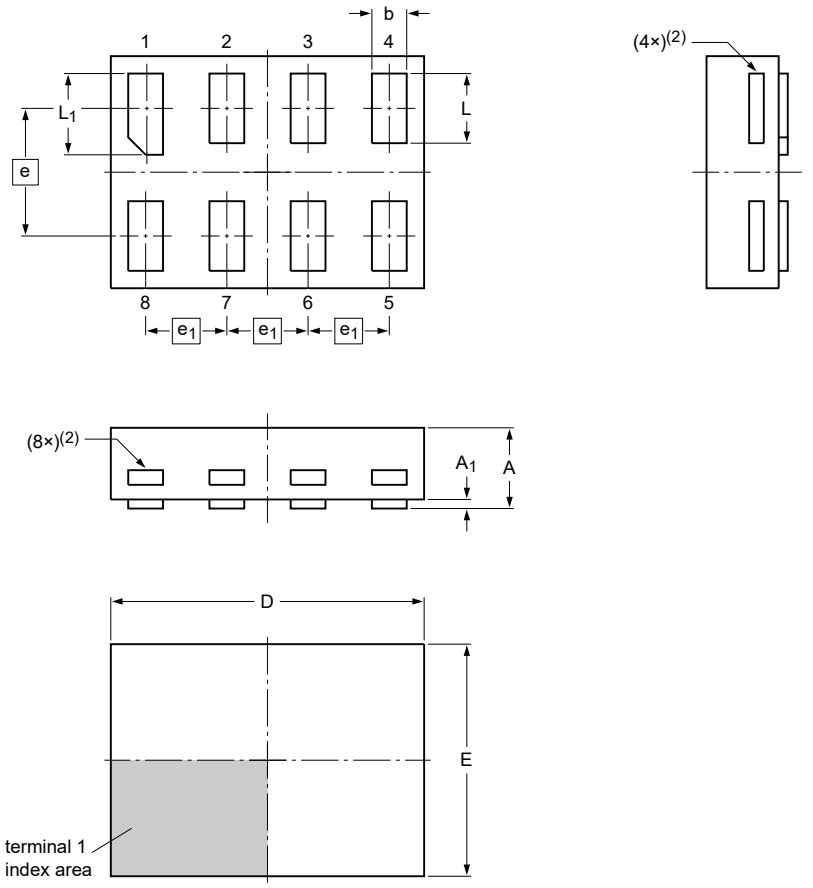
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1116_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1116						~~10-04-02~~ 10-04-07

Fig. 25. Package outline SOT1116 (XSON8)

XSON8: extremely thin small outline package; no leads;
8 terminals; body 1.35 x 1.0 x 0.35 mm **SOT1203**



Dimensions

Unit		A(1)	A_1	b	D	E	e	e_1	L	L_1
mm	max	0.35	0.04	0.20	1.40	1.05			0.35	0.40
	nom			0.15	1.35	1.00	0.55	0.35	0.30	0.35
	min			0.12	1.30	0.95			0.27	0.32

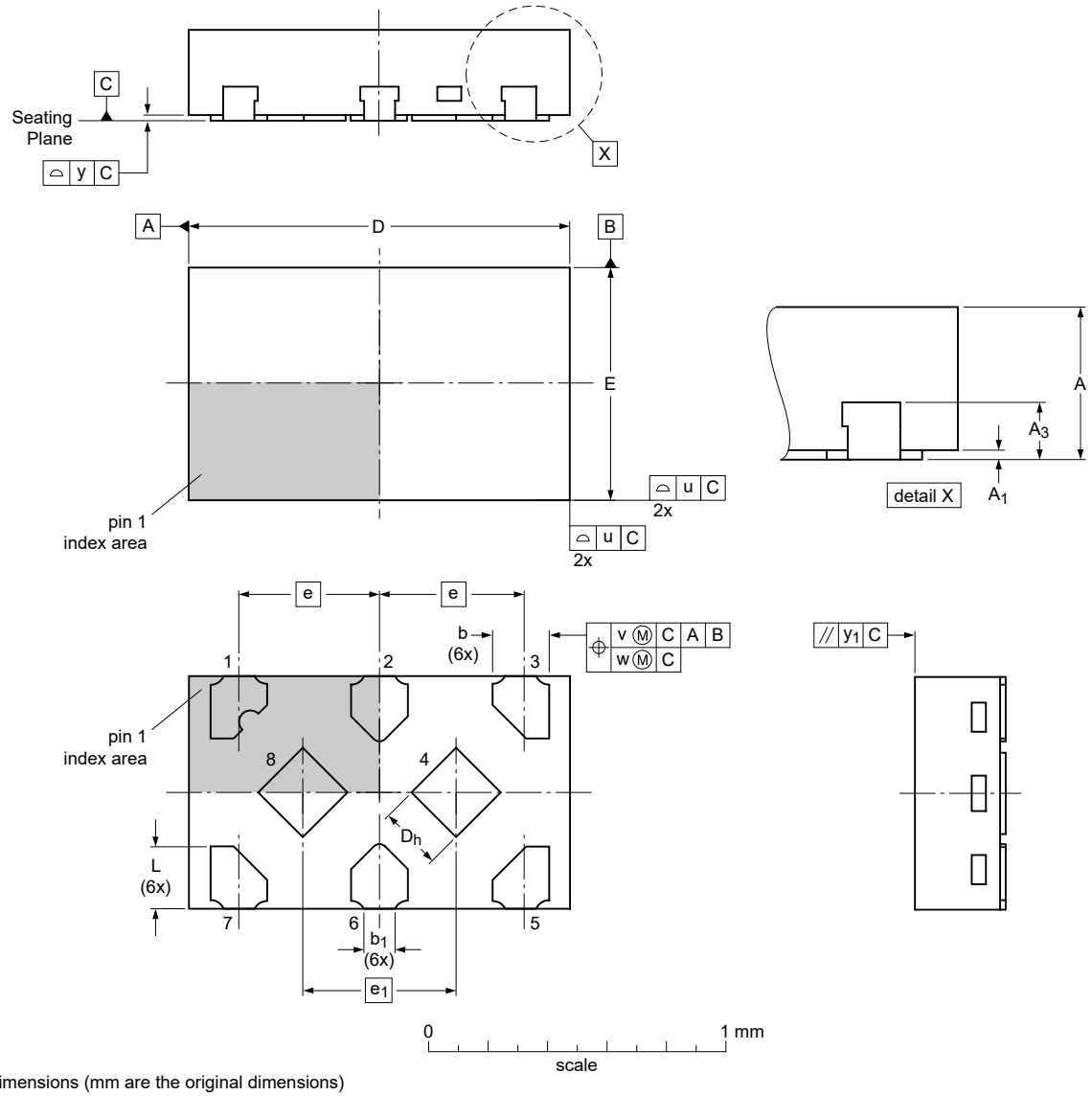
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1203_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1203						~~10-04-02~~ 10-04-06

Fig. 26. Package outline SOT1203 (XSON8)

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**



Dimensions (mm are the original dimensions)

Unit	A	A_1	A_3	b	b_1	D	D_h	E	e	e_1	L	u	v	w	y	y_1
max	0.35	0.04		0.25			0.27				0.27					
mm nom	0.32	0.02	0.10 (Typ.)	0.20	0.11 (ref)	1.35	0.22	0.80	0.50	0.54	0.22	0.05	0.10	0.05	0.05	0.05
min	0.30	0.00		0.15			0.17				0.17					

sot1233-2_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1233-2		---				19-11-12

Fig. 27. Package outline SOT1233-2 (X2SON8)

14. Abbreviations

Table 15. Abbreviations

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

15. Revision history

Table 16. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AXP1T57 v.6	20220617	Product data sheet	-	74AXP1T57 v.5
Modifications:	• SOT1233 (X2SON8) package changed to SOT1233-2 (X2SON8) package. • Values added for T_{amb} = -40 °C to +125 °C temperature range throughout the data sheet. • Table 6: Derating values for P_{tot} total power dissipation have been updated.			
74AXP1T57 v.5	20170703	Product data sheet	-	74AXP1T57 v.4
Modifications:	• Fig. 27: Package outline drawing for SOT1233 / X2SON8) has changed.			
74AXP1T57 v.4	20161028	Product data sheet	-	74AXP1T57 v.3
Modifications:	• Added type number 74AXP1T57GX (SOT1233/X2SON8)			
74AXP1T57 v.3	20161007	Product data sheet	-	74AXP1T57 v.2
Modifications:	• Type numbers 74AXP1T57DP and 74AXP1T57GD removed.			
74AXP1T57 v.2	20151222	Product data sheet	-	74AXP1T57 v.1
Modifications:	• Table 6: Conditions V_O corrected (errata). • Table 6: Derating values for packages added (errata). • Table 7: Conditions V_O corrected (errata). • Table 8: Conditions I_{OZ} corrected (errata). • Table 9: Conditions ΔI_{CCI} corrected (errata). • Table 11: Conditions t_t corrected (errata). • Table 12: Removed "leadless packages" from conditions (errata).			
74AXP1T57 v.1	20150803	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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