

# 74AXP1T57

## Dual supply configurable multiple function gate

Rev. 4 — 28 October 2016

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;  $I_{CCI} = 0.5$   $\mu$ 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:
  - ◆ HBM ANSI/ESDA/JEDEC JS-001 Class 2 exceeds 2 kV
  - ◆ CDM JESD22-C101E exceeds 1000 V
- 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<sub>OFF</sub> circuitry provides partial power-down mode operation
- Multiple package options
- Specified from –40 °C to +85 °C

### 3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AXP1T57DC	–40 °C to +85 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AXP1T57GT	–40 °C to +85 °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 +85 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	SOT1116
74AXP1T57GS	–40 °C to +85 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203
74AXP1T57GX <sup>[1]</sup>	–40 °C to +85 °C	X2SON8	plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 × 0.8 × 0.35 mm	SOT1233

[1] Type number 74AXP1T57GX is in development.

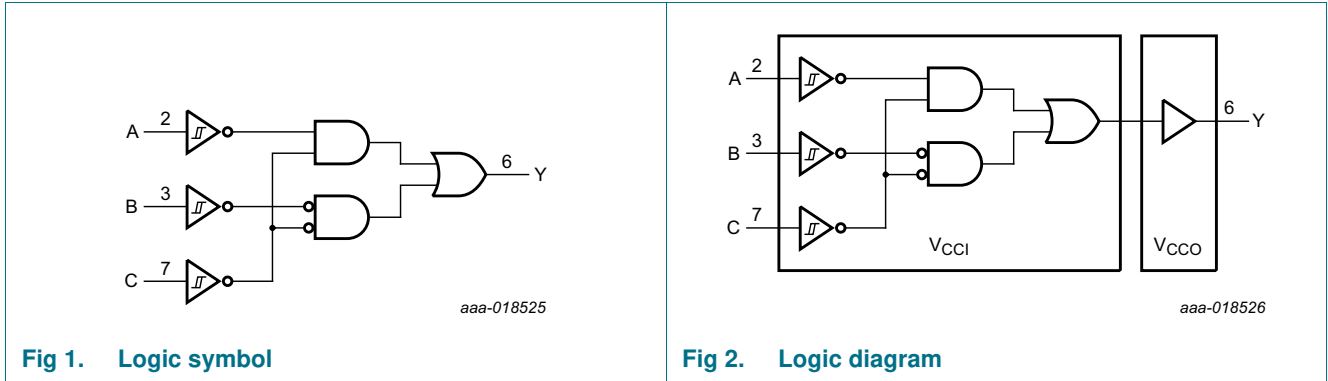
### 4. Marking

Table 2. Marking

Type number	Marking code <sup>[1]</sup>
74AXP1T57DC	rD
74AXP1T57GT	rD
74AXP1T57GN	rD
74AXP1T57GS	rD
74AXP1T57GX	rD

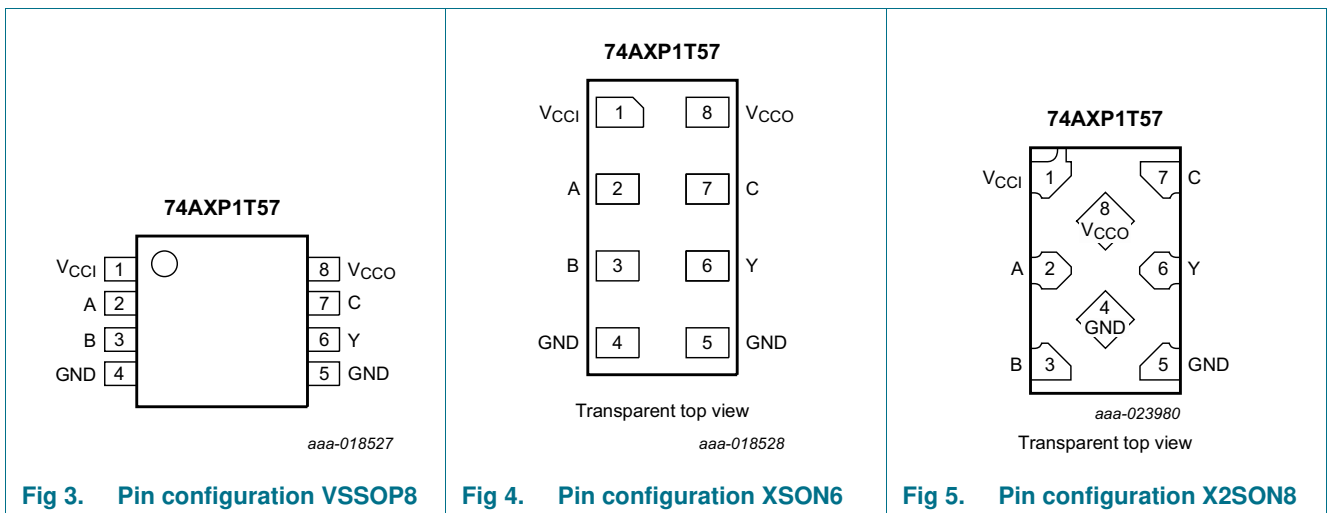
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

## 5. Functional diagram



## 6. Pinning information

### 6.1 Pinning



### 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 <sup>[1]</sup>	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<sup>[1]</sup>

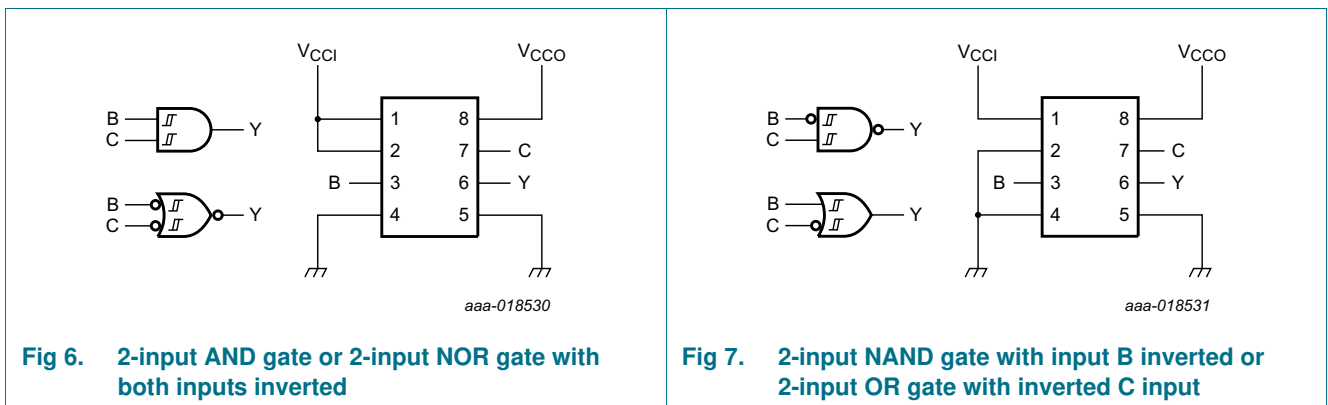
Supply voltage		Input			Output
V <sub>CCI</sub>	V <sub>CCO</sub>	C	B	A	Y
0.7 V to 2.75 V	1.2 V to 5.5 V	L	L	L	H
0.7 V to 2.75 V	1.2 V to 5.5 V	L	L	H	L
0.7 V to 2.75 V	1.2 V to 5.5 V	L	H	L	H
0.7 V to 2.75 V	1.2 V to 5.5 V	L	H	H	L
0.7 V to 2.75 V	1.2 V to 5.5 V	H	L	L	L
0.7 V to 2.75 V	1.2 V to 5.5 V	H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

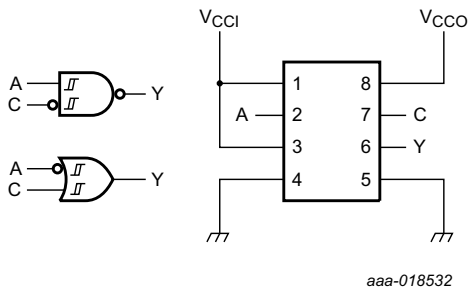
[1] H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.

### 7.1 Logic configurations

Table 5. Function selection table

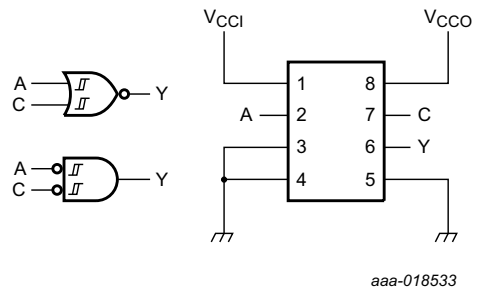
Logic function	Figure
2-input AND	see <a href="#">Figure 6</a>
2-input AND with both inputs inverted	see <a href="#">Figure 9</a>
2-input NAND with inverted input	see <a href="#">Figure 7</a> and <a href="#">Figure 8</a>
2-input OR with inverted input	see <a href="#">Figure 7</a> and <a href="#">Figure 8</a>
2-input NOR	see <a href="#">Figure 9</a>
2-input NOR with both inputs inverted	see <a href="#">Figure 6</a>
2-input XNOR	see <a href="#">Figure 10</a>
Inverter	see <a href="#">Figure 11</a>
Buffer	see <a href="#">Figure 12</a>





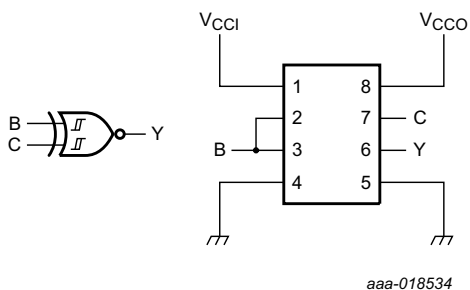
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**Fig 8. 2-input NAND gate with input C inverted or 2-input OR gate with inverted A input**



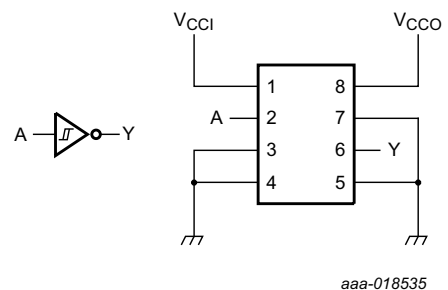
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**Fig 9. 2-input NOR gate or 2-input AND gate with both inputs inverted**



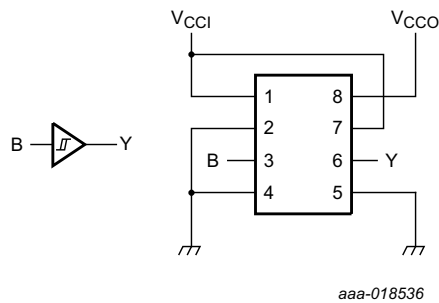
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**Fig 10. 2-input XNOR gate**



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**Fig 11. Inverter**



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**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		-0.5	+3.3	V
$I_{OK}$	output clamping current	$V_O < 0$ V	-50	-	mA
$V_O$	output voltage	Active mode	-0.5	$V_{CCO} + 0.5$	V
		Power-down or 3-state mode	-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 +85 °C	-	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 SOT833-1 package: above 70 °C the value of  $P_{tot}$  derates linearly with 3.2 mW/K.  
 For SOT1203 package: above 80 °C the value of  $P_{tot}$  derates linearly with 3.6 mW/K.  
 For X2SON8 package: above 118 °C the value of  $P_{tot}$  derates linearly with 7.7 mW/K.

## 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	+85	°C

## 10. Static characteristics

**Table 8. Static characteristics**

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

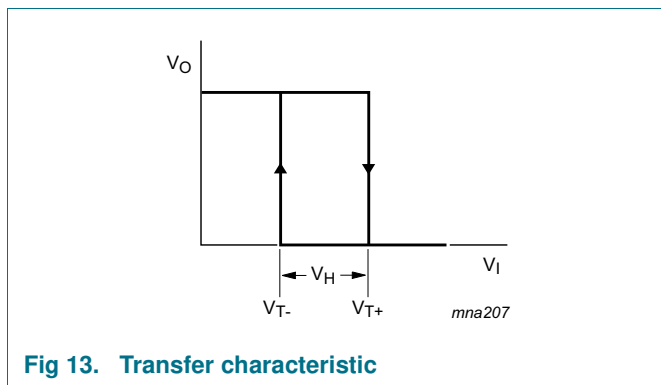
Symbol	Parameter	Conditions	$T_{amb} = -40\text{ °C to }+85\text{ °C}$				Unit
			Min	Typ 25 °C	Max 25 °C	Max 85 °C	
$V_{T+}$	positive-going threshold voltage	see <a href="#">Figure 13</a> and <a href="#">Figure 14</a>					
		$V_{CCI} = 0.75\text{ V to }0.85\text{ V}$	$0.3V_{CCI}$	-	$0.8V_{CCI}$	$0.8V_{CCI}$	V
		$V_{CCI} = 1.1\text{ V to }1.95\text{ V}$	$0.4V_{CCI}$	-	$0.7V_{CCI}$	$0.7V_{CCI}$	V
		$V_{CCI} = 2.3\text{ V to }2.7\text{ V}$	0.9	-	1.7	1.7	V
$V_{T-}$	negative-going threshold voltage	see <a href="#">Figure 13</a> and <a href="#">Figure 14</a>					
		$V_{CCI} = 0.75\text{ V to }0.85\text{ V}$	$0.2V_{CCI}$	-	$0.7V_{CCI}$	$0.7V_{CCI}$	V
		$V_{CCI} = 1.1\text{ V to }1.95\text{ V}$	$0.3V_{CCI}$	-	$0.6V_{CCI}$	$0.6V_{CCI}$	V
		$V_{CCI} = 2.3\text{ V to }2.7\text{ V}$	0.7	-	1.5	1.5	V
$V_H$	hysteresis voltage	see <a href="#">Figure 13</a> and <a href="#">Figure 14</a>					
		$V_{CCI} = 0.75\text{ V to }0.85\text{ V}$	$0.06V_{CCI}$	-	$0.5V_{CCI}$	$0.5V_{CCI}$	V
		$V_{CCI} = 1.1\text{ V to }1.95\text{ V}$	$0.1V_{CCI}$	-	$0.4V_{CCI}$	$0.4V_{CCI}$	V
		$V_{CCI} = 2.3\text{ V to }2.7\text{ V}$	0.2	-	1.0	1.0	V
$V_{OH}$	HIGH-level output voltage	$I_O = -2\text{ mA}; V_{CCO} = 1.2\text{ V}$ <a href="#">[1]</a>	-	1.05	-	-	V
		$I_O = -3\text{ mA}; V_{CCO} = 1.4\text{ V}$	1.05	-	-	-	V
		$I_O = -4.5\text{ mA}; V_{CCO} = 1.65\text{ V}$	1.2	-	-	-	V
		$I_O = -8\text{ mA}; V_{CCO} = 2.3\text{ V}$	1.7	-	-	-	V
		$I_O = -10\text{ mA}; V_{CCO} = 3.0\text{ V}$	2.2	-	-	-	V
		$I_O = -12\text{ mA}; V_{CCO} = 4.5\text{ V}$	3.7	-	-	-	V
$V_{OL}$	LOW-level output voltage	$I_O = 2\text{ mA}; V_{CCO} = 1.2\text{ V}$ <a href="#">[1]</a>	-	0.18	-	-	V
		$I_O = 3\text{ mA}; V_{CCO} = 1.4\text{ V}$	-	-	0.35	0.35	V
		$I_O = 4.5\text{ mA}; V_{CCO} = 1.65\text{ V}$	-	-	0.45	0.45	V
		$I_O = 8\text{ mA}; V_{CCO} = 2.3\text{ V}$	-	-	0.7	0.7	V
		$I_O = 10\text{ mA}; V_{CCO} = 3.0\text{ V}$	-	-	0.8	0.8	V
		$I_O = 12\text{ mA}; V_{CCO} = 4.5\text{ V}$	-	-	0.8	0.8	V
$I_I$	input leakage current	$V_I = 0\text{ V to }2.75\text{ V};$ $V_{CCI} = 0\text{ V to }2.75\text{ V}$ <a href="#">[1]</a>	-	$\pm 0.001$	$\pm 0.1$	$\pm 0.5$	$\mu\text{A}$
$I_{OZ}$	OFF-state output current	$V_O = 0\text{ V to }5.5\text{ V};$ $V_{CCO} = 1.2\text{ V to }5.5\text{ V}$	-	$\pm 0.001$	$\pm 0.1$	$\pm 0.5$	$\mu\text{A}$

**Table 8. Static characteristics ...continued**

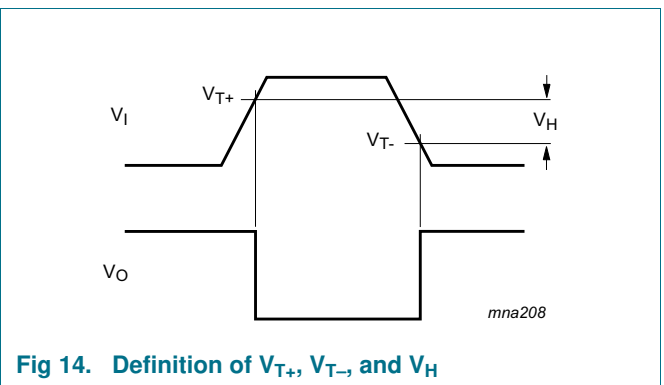
At recommended operating conditions, unless otherwise specified; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	$T_{amb} = -40\text{ °C to }+85\text{ °C}$				Unit
			Min	Typ 25 °C	Max 25 °C	Max 85 °C	
$I_{OFF}$	power-off leakage current	inputs; $V_I = 0\text{ V to }2.75\text{ V}$ ; $V_{CCI} = 0\text{ V}$ ; $V_{CCO} = 0\text{ V to }5.5\text{ V}$ <a href="#">[1]</a>	-	$\pm 0.01$	$\pm 0.1$	$\pm 0.5$	$\mu\text{A}$
		output; $V_O = 0\text{ V to }5.5\text{ V}$ ; $V_{CCO} = 0\text{ V}$ ; $V_{CCI} = 0\text{ V to }2.75\text{ V}$ ; $V_I = 0\text{ V to }2.75\text{ V}$ <a href="#">[1]</a>	-	$\pm 0.01$	$\pm 0.1$	$\pm 0.5$	$\mu\text{A}$
$\Delta I_{OFF}$	additional power-off leakage current	inputs; $V_I = 0\text{ V or }2.75\text{ V}$ ; $V_{CCI} = 0\text{ V to }0.1\text{ V}$ ; $V_{CCO} = 0\text{ V to }5.5\text{ V}$ <a href="#">[1]</a>	-	$\pm 0.02$	$\pm 0.1$	$\pm 0.5$	$\mu\text{A}$
		output; $V_O = 0\text{ V or }5.5\text{ V}$ ; $V_{CCO} = 0\text{ V to }0.1\text{ V}$ ; $V_{CCI} = 0\text{ V to }2.75\text{ V}$ ; $V_I = 0\text{ V or }2.75\text{ V}$ <a href="#">[1]</a>	-	$\pm 0.02$	$\pm 0.1$	$\pm 0.5$	$\mu\text{A}$

[1] Typical values are measured at  $V_{CCI} = V_{CCO} = 1.2\text{ V}$  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	$T_{amb} = -40\text{ °C to }+85\text{ °C}$				Unit
			Typ 25 °C	Max 25 °C	Typ 85 °C	Max 85 °C	
$I_{CCI}$	input supply current	$V_I = 0\text{ V or }V_{CCI}$ ;					
		$V_{CCI} = 0.7\text{ V to }1.3\text{ V}$ [1]	1	100	10	300	nA
		$V_{CCI} = 1.3\text{ V to }2.75\text{ V}$ [2]	1	100	20	500	nA
		$V_{CCI} = 2.75\text{ V}; V_{CCO} = 0\text{ V}$	1	100	20	500	nA
		$V_{CCI} = 0\text{ V}; V_{CCO} = 5.5\text{ V}$	1	100	1	100	nA
$I_{CCO}$	output supply current	$V_I = 0\text{ V or }V_{CCI}$ ; $I_O = 0\text{ A}$ ; see <a href="#">Table 10</a>					
		$V_{CCO} = 1.2\text{ V to }3.6\text{ V}$ [1]	0.001	1.0	0.01	1.2	$\mu\text{A}$
		$V_{CCO} = 3.6\text{ V to }5.5\text{ V}$ [3]	0.8	1.5	1.0	1.8	$\mu\text{A}$
		$V_{CCI} = 2.75\text{ V}; V_{CCO} = 0\text{ V}$	0.001	0.1	0.003	0.2	$\mu\text{A}$
		$V_{CCI} = 0\text{ V}; V_{CCO} = 3.6\text{ V}$	0.2	0.6	0.3	0.8	$\mu\text{A}$
		$V_{CCI} = 0\text{ V}; V_{CCO} = 5.5\text{ V}$	0.4	0.8	0.5	1.0	$\mu\text{A}$
$\Delta I_{CCI}$	additional input supply current	$V_I = V_{CCI} - 0.5\text{ V}; V_{CCI} = 2.5\text{ V}$	2	100	14	150	$\mu\text{A}$

[1] Typical values are measured at  $V_{CCI} = V_{CCO} = 1.2\text{ V}$ .

[2] Typical values are measured at  $V_{CCI} = V_{CCO} = 2.5\text{ V}$ .

[3] Typical values are measured at  $V_{CCI} = 1.2\text{ V}$  and  $V_{CCO} = 5.0\text{ V}$ .

**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 test circuit, see [Figure 22](#); for wave form, see [Figure 15](#).

Symbol	Parameter	Conditions	V <sub>CC0</sub>							Unit	
			1.2 V	1.5 V ± 0.1 V			1.8 V ± 0.15 V				
			Typ <sup>[1]</sup>	Min	Typ <sup>[1]</sup>	Max	Min	Typ <sup>[1]</sup>	Max		
<b>T<sub>amb</sub> = 25 °C</b>											
t <sub>pd</sub>	propagation delay	A, B and C to Y <sup>[2]</sup>									
		V <sub>CCI</sub> = 0.75 V to 0.85 V	25	4	20	76	4	18	72	ns	
		V <sub>CCI</sub> = 1.1 V to 1.3 V	16.5	3.4	10.9	21.0	3.0	8.9	17.0	ns	
		V <sub>CCI</sub> = 1.4 V to 1.6 V	15.5	3.1	9.9	19.0	2.6	7.9	14.0	ns	
		V <sub>CCI</sub> = 1.65 V to 1.95 V	15.0	2.6	9.4	18.0	2.1	7.4	12.5	ns	
		V <sub>CCI</sub> = 2.3 V to 2.7 V	14.5	2.7	8.9	17.5	2.2	6.9	11.7	ns	
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>											
t <sub>pd</sub>	propagation delay	A, B and C to Y <sup>[2]</sup>									
		V <sub>CCI</sub> = 0.75 V to 0.85 V	25	3	20	151	3	18	148	ns	
		V <sub>CCI</sub> = 1.1 V to 1.3 V	16.5	3.4	10.9	21.0	3.0	8.9	17.0	ns	
		V <sub>CCI</sub> = 1.4 V to 1.6 V	15.5	3.1	9.9	19.0	2.6	7.9	14.0	ns	
		V <sub>CCI</sub> = 1.65 V to 1.95 V	15.0	2.6	9.4	18.0	2.1	7.4	12.5	ns	
		V <sub>CCI</sub> = 2.3 V to 2.7 V	14.5	2.7	8.9	17.5	2.2	6.9	11.7	ns	
t <sub>t</sub>	transition time	V <sub>CCI</sub> = 0.75 V to 2.7 V <sup>[3]</sup>	-	1.0	-	-	1.0	-	-	ns	

[1] Typical values are measured at nominal supply voltages and T<sub>amb</sub> = +25 °C.

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[3] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

**Table 12. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit, see [Figure 22](#); for wave form, see [Figure 15](#).

Symbol	Parameter	Conditions	V <sub>CC0</sub>									Unit
			2.5 V ± 0.2 V			3.3 V ± 0.3 V			5.0 V ± 0.5 V			
			Min	Typ <sup>[1]</sup>	Max	Min	Typ <sup>[1]</sup>	Max	Min	Typ <sup>[1]</sup>	Max	
<b>T<sub>amb</sub> = 25 °C</b>												
t <sub>pd</sub>	propagation delay	A, B and C to Y <a href="#">[2]</a>										
		V <sub>CCI</sub> = 0.75 V to 0.85 V	3	16	72	3	16	80	3	17	92	ns
		V <sub>CCI</sub> = 1.1 V to 1.3 V	2.6	7.3	12.0	2.5	6.7	10.7	2.4	6.4	10.2	ns
		V <sub>CCI</sub> = 1.4 V to 1.6 V	2.3	6.2	9.9	2.1	5.6	9.0	2.1	5.3	8.5	ns
		V <sub>CCI</sub> = 1.65 V to 1.95 V	1.7	5.7	9.3	1.6	5.1	8.3	1.5	4.8	7.9	ns
		V <sub>CCI</sub> = 2.3 V to 2.7 V	1.9	5.2	8.7	1.8	4.6	7.7	1.7	4.3	7.2	ns
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>												
t <sub>pd</sub>	propagation delay	A, B and C to Y <a href="#">[2]</a>										
		V <sub>CCI</sub> = 0.75 V to 0.85 V	2	16	167	2	16	194	2	17	225	ns
		V <sub>CCI</sub> = 1.1 V to 1.3 V	2.6	7.3	12.0	2.5	6.7	10.7	2.4	6.4	10.2	ns
		V <sub>CCI</sub> = 1.4 V to 1.6 V	2.3	6.2	9.9	2.1	5.6	9.0	2.1	5.3	8.5	ns
		V <sub>CCI</sub> = 1.65 V to 1.95 V	1.7	5.7	9.3	1.6	5.1	8.3	1.5	4.8	7.9	ns
		V <sub>CCI</sub> = 2.3 V to 2.7 V	1.9	5.2	8.7	1.8	4.6	7.7	1.7	4.3	7.2	ns
t <sub>t</sub>	transition time	V <sub>CCI</sub> = 0.75 V to 2.7 V <a href="#">[3]</a>	1.0	-	-	1.0	-	-	1.0	-	-	ns

[1] Typical values are measured at nominal supply voltages and t<sub>amb</sub> = +25 °C.

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[3] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

**Table 13. Typical dynamic characteristics at  $T_{amb} = 25\text{ °C}$** 

Voltages are referenced to GND (ground = 0 V); for test circuit, see [Figure 22](#); for wave form, see [Figure 15](#).

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	$f_i = 1\text{ MHz}$ ; $R_L = \infty\ \Omega$ ; $V_I = 0\text{ V to }V_{CCI}$ <a href="#">[1]</a>								
		input supply <a href="#">[2]</a>								
		$V_{CCI} = 0.8\text{ V}$	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 <a href="#">[3]</a>								
		$V_{CCO} = 0.8\text{ V}$	6.7	6.8	6.8	6.9	7.5	9.5	pF	
		$V_{CCO} = 1.2\text{ V}$	6.8	6.9	7.0	7.0	7.1	7.6	pF	
		$V_{CCO} = 1.5\text{ V}$	6.9	6.9	6.9	7.0	7.1	7.6	pF	
		$V_{CCO} = 1.8\text{ V}$	6.9	6.9	6.9	7.0	7.2	7.6	pF	
$V_{CCO} = 2.5\text{ V}$	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 ( $V_{CCO}$ )

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

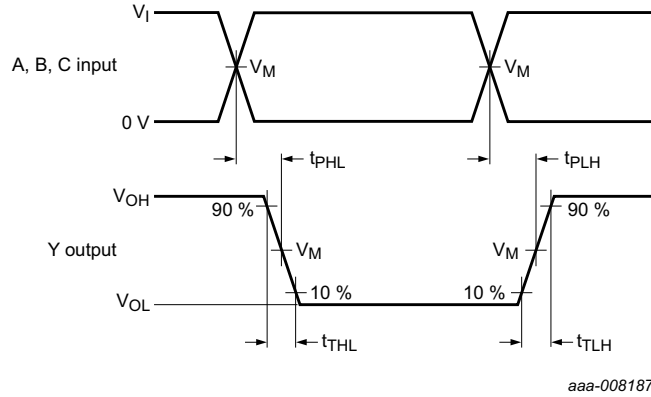
$C_L$  = load capacitance in pF;

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

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

$f_o$  = output frequency in MHz;

11.1 Waveforms and graphs

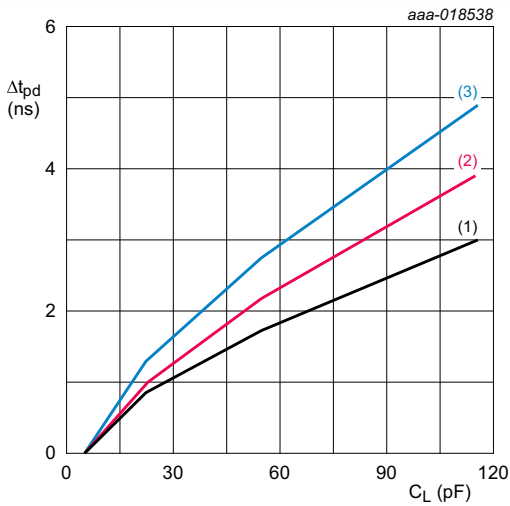


Measurement points are given in [Table 14](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage drops that occur with the output load.

Fig 15. Input A, B and C to output Y propagation delay times and output transition times

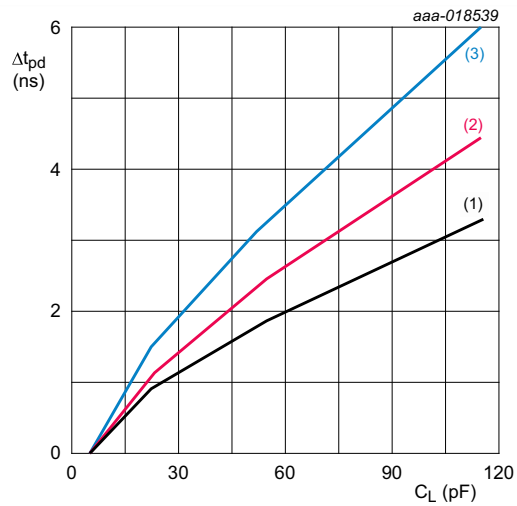
Table 14. Measurement points

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	$0.5V_{CCO}$	$0.5V_{CCI}$	$V_{CCI}$



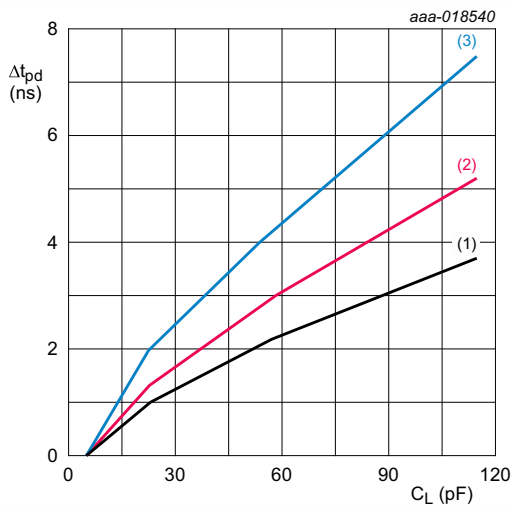
- $T_{amb} = -40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  unless otherwise specified.
- (1) Minimum:  $V_{CCO} = 5.5\text{ V}$
  - (2) Typical:  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $V_{CCO} = 5\text{ V}$
  - (3) Maximum:  $V_{CCO} = 4.5\text{ V}$

Fig 16. Additional propagation delay versus load capacitance



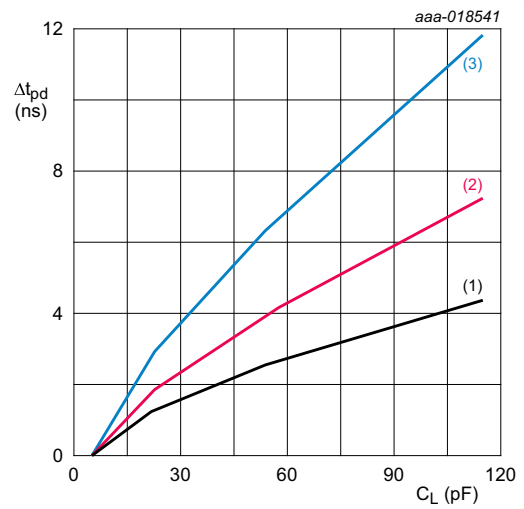
- $T_{amb} = -40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  unless otherwise specified.
- (1) Minimum:  $V_{CCO} = 3.6\text{ V}$
  - (2) Typical:  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $V_{CCO} = 3.3\text{ V}$
  - (3) Maximum:  $V_{CCO} = 3\text{ V}$

Fig 17. Additional propagation delay versus load capacitance



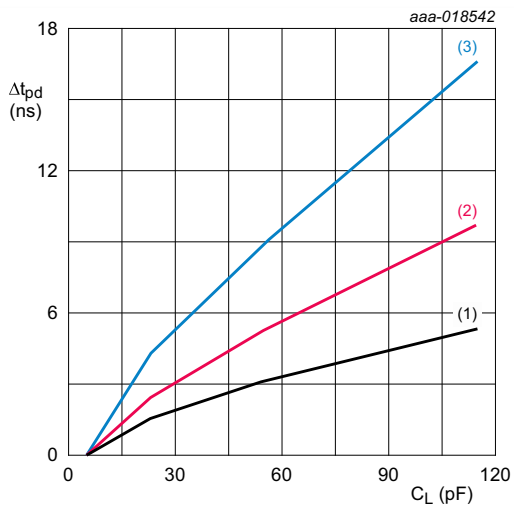
- $T_{amb} = -40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  unless otherwise specified.
- (1) Minimum:  $V_{CCO} = 2.7\text{ V}$
  - (2) Typical:  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $V_{CCO} = 2.5\text{ V}$
  - (3) Maximum:  $V_{CCO} = 2.3\text{ V}$

**Fig 18. Additional propagation delay versus load capacitance**



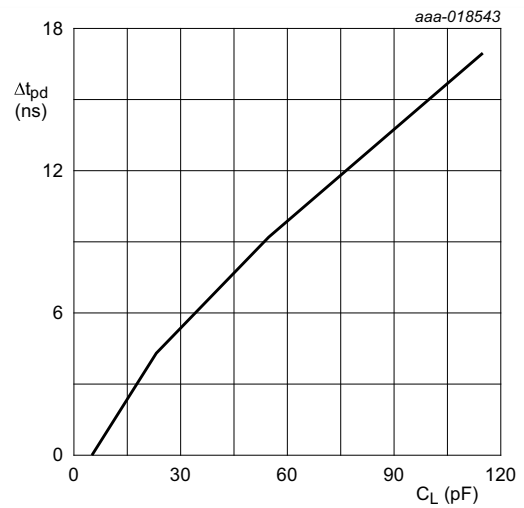
- $T_{amb} = -40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  unless otherwise specified.
- (1) Minimum:  $V_{CCO} = 1.95\text{ V}$
  - (2) Typical:  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $V_{CCO} = 1.8\text{ V}$
  - (3) Maximum:  $V_{CCO} = 1.65\text{ V}$

**Fig 19. Additional propagation delay versus load capacitance**



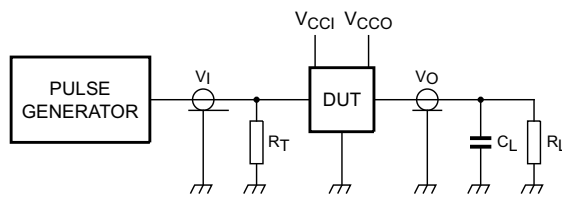
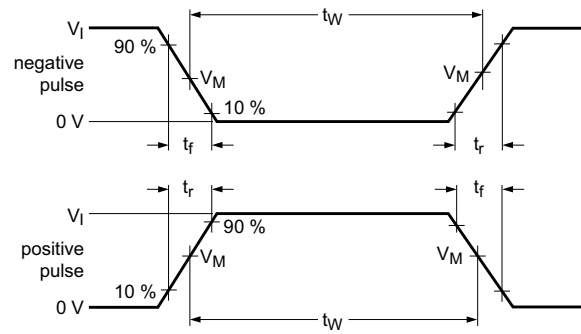
- $T_{amb} = -40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  unless otherwise specified.
- (1) Minimum:  $V_{CCO} = 1.6\text{ V}$
  - (2) Typical:  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $V_{CCO} = 1.5\text{ V}$
  - (3) Maximum:  $V_{CCO} = 1.4\text{ V}$

**Fig 20. Additional propagation delay versus load capacitance**



$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $V_{CCO} = 1.2\text{ V}$ .

**Fig 21. Additional propagation delay versus load capacitance**



aaa-018544

Test data is given in [Table 15](#).

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 15. 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	$V_{CCI}$

12. Package outline

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

SOT765-1

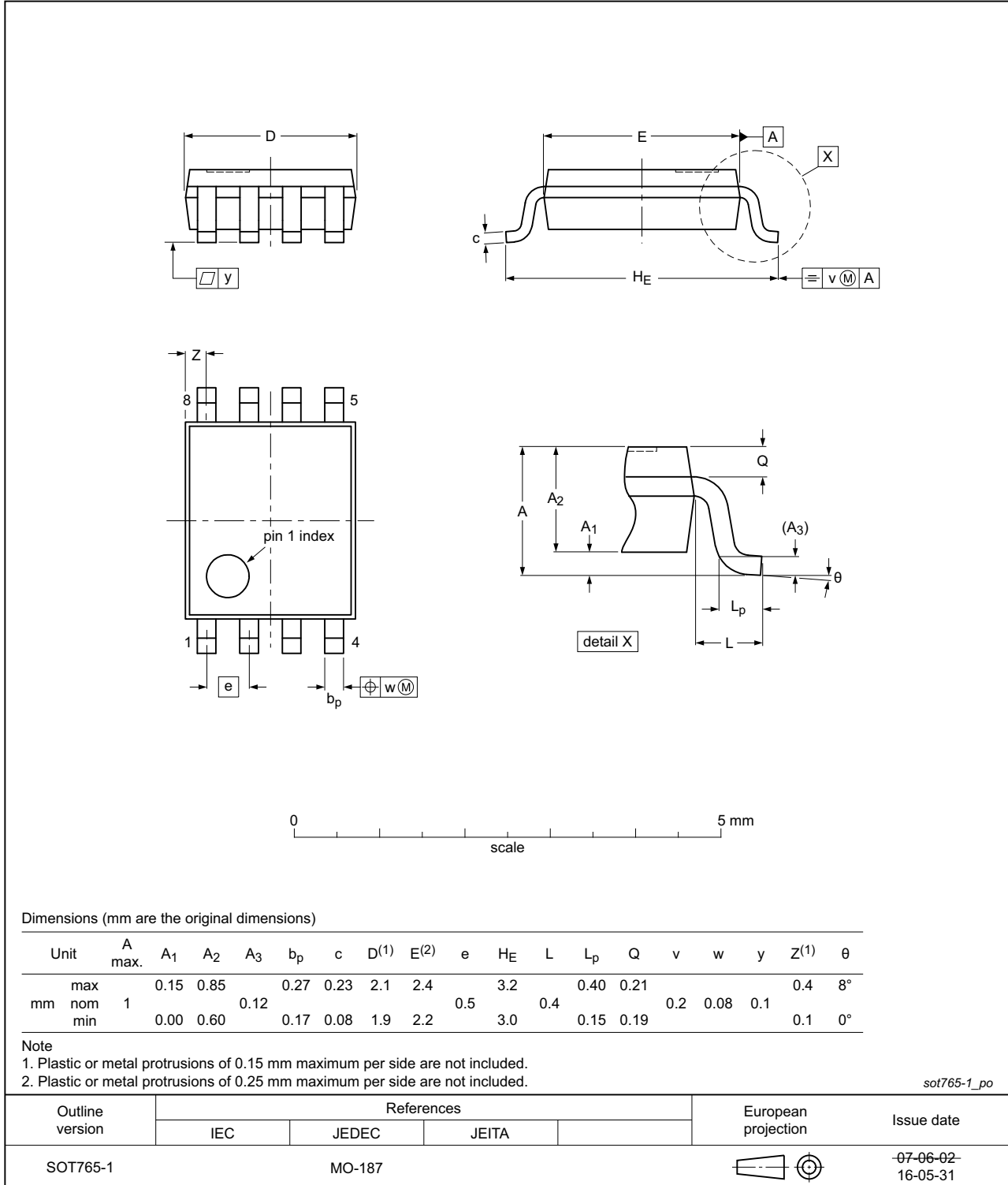


Fig 23. Package outline SOT765-1 (VSSOP8)



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

SOT833-1

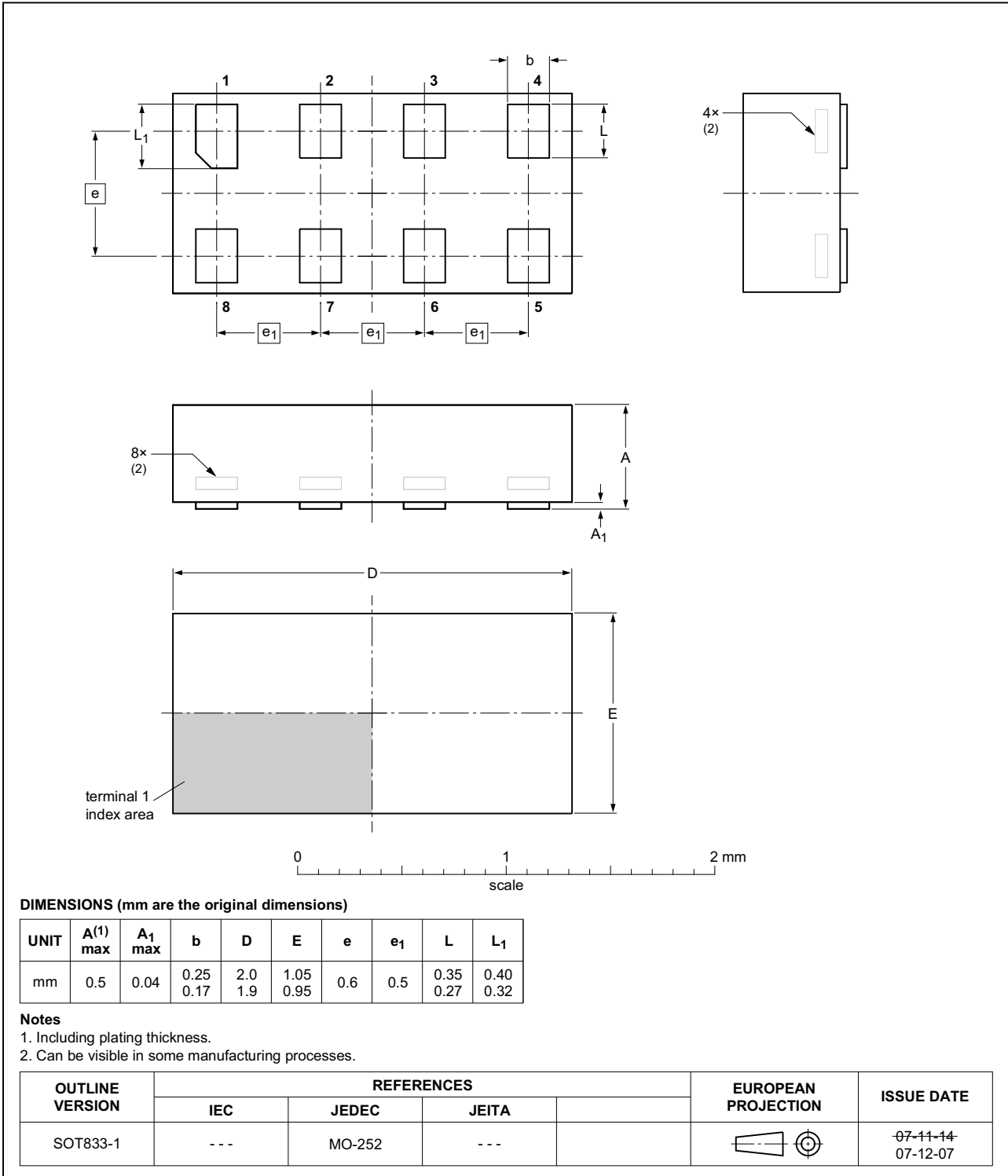


Fig 24. Package outline SOT833-1 (XSON8)

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

SOT1116

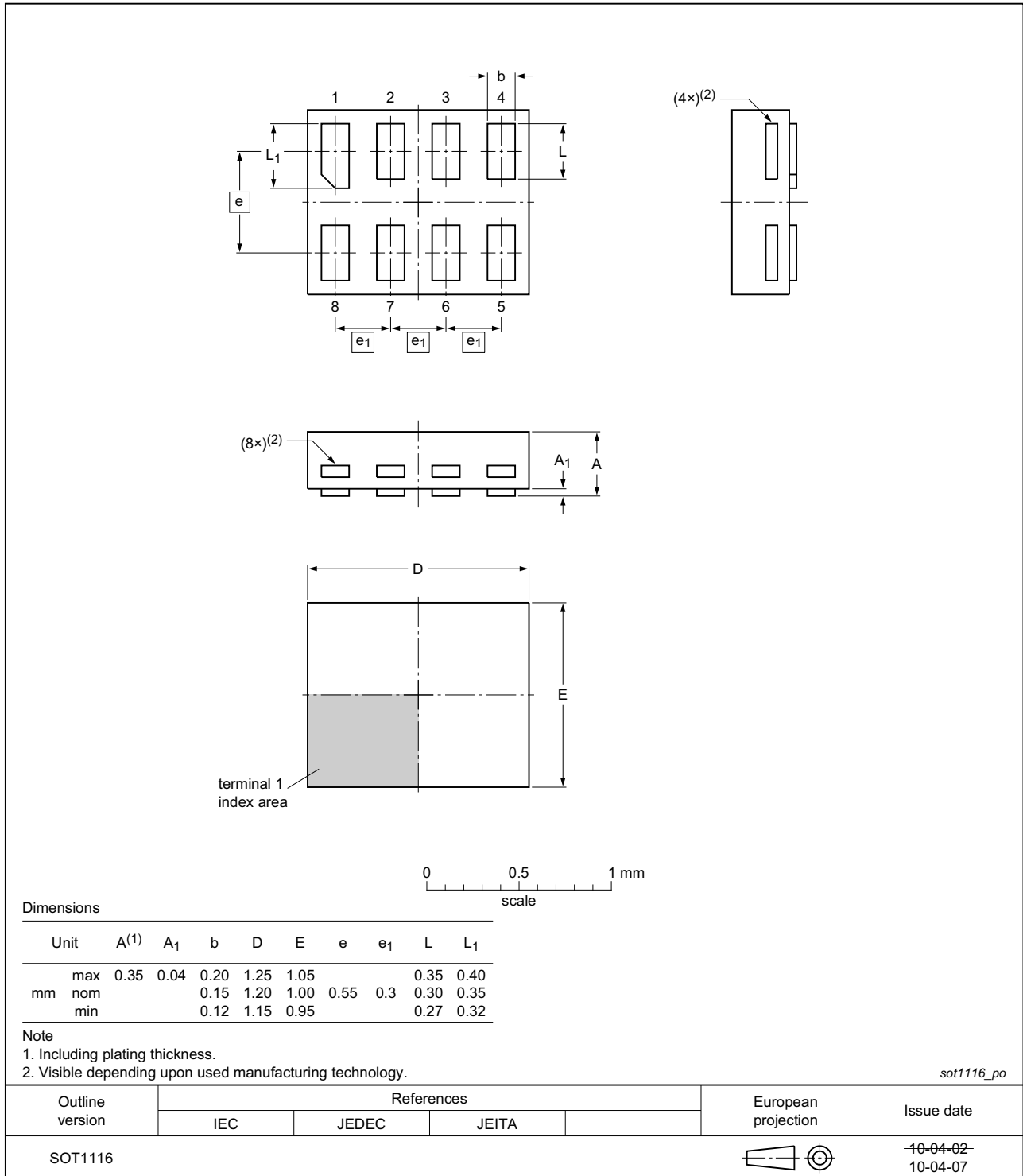


Fig 25. Package outline SOT1116 (XSON8)

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

SOT1203

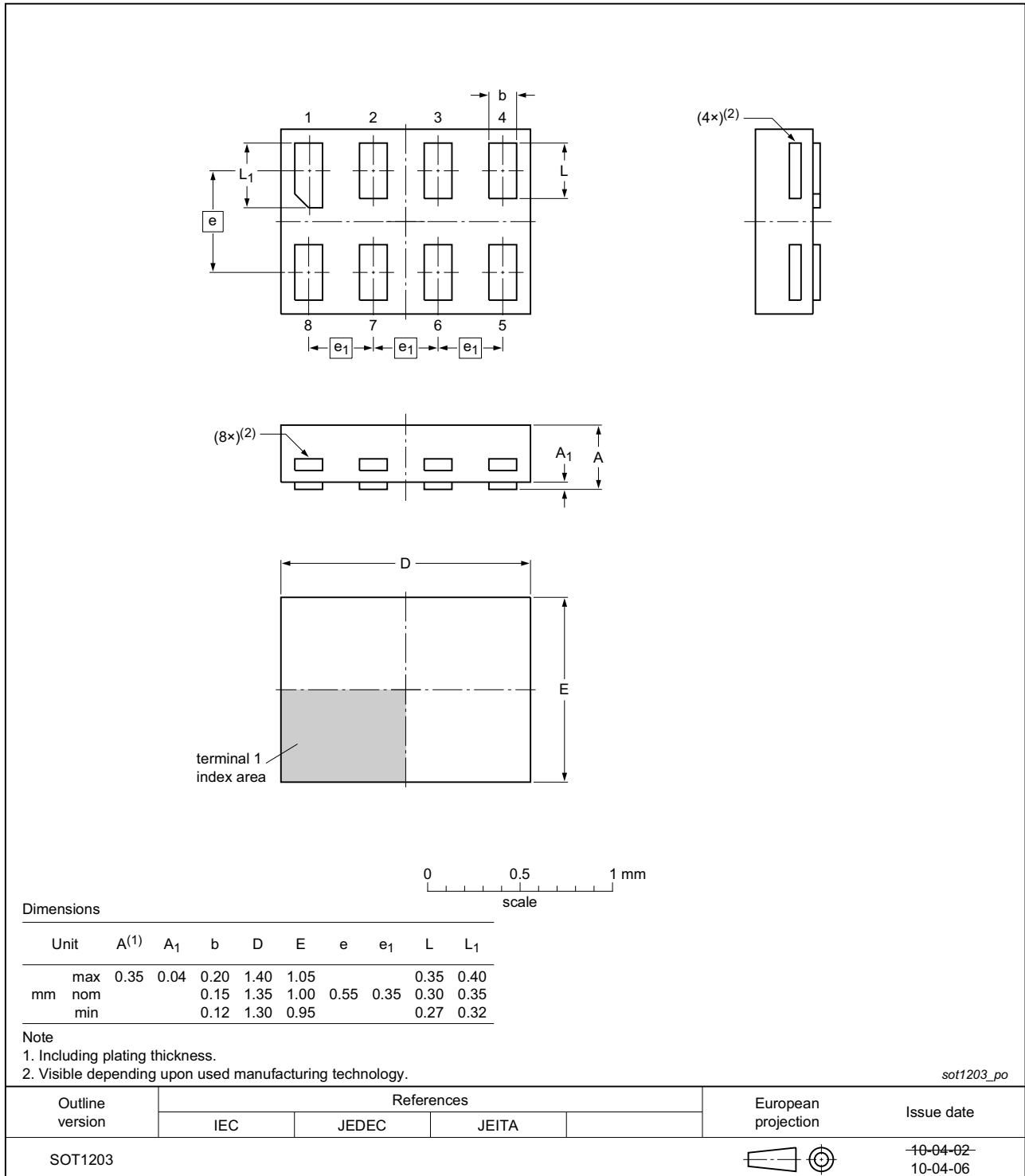


Fig 26. Package outline SOT1203 (XSON8)

**X2SON8: plastic thermal enhanced extremely thin small outline package; no leads;**  
**8 terminals; body 1.35 x 0.8 x 0.35 mm**

SOT1233

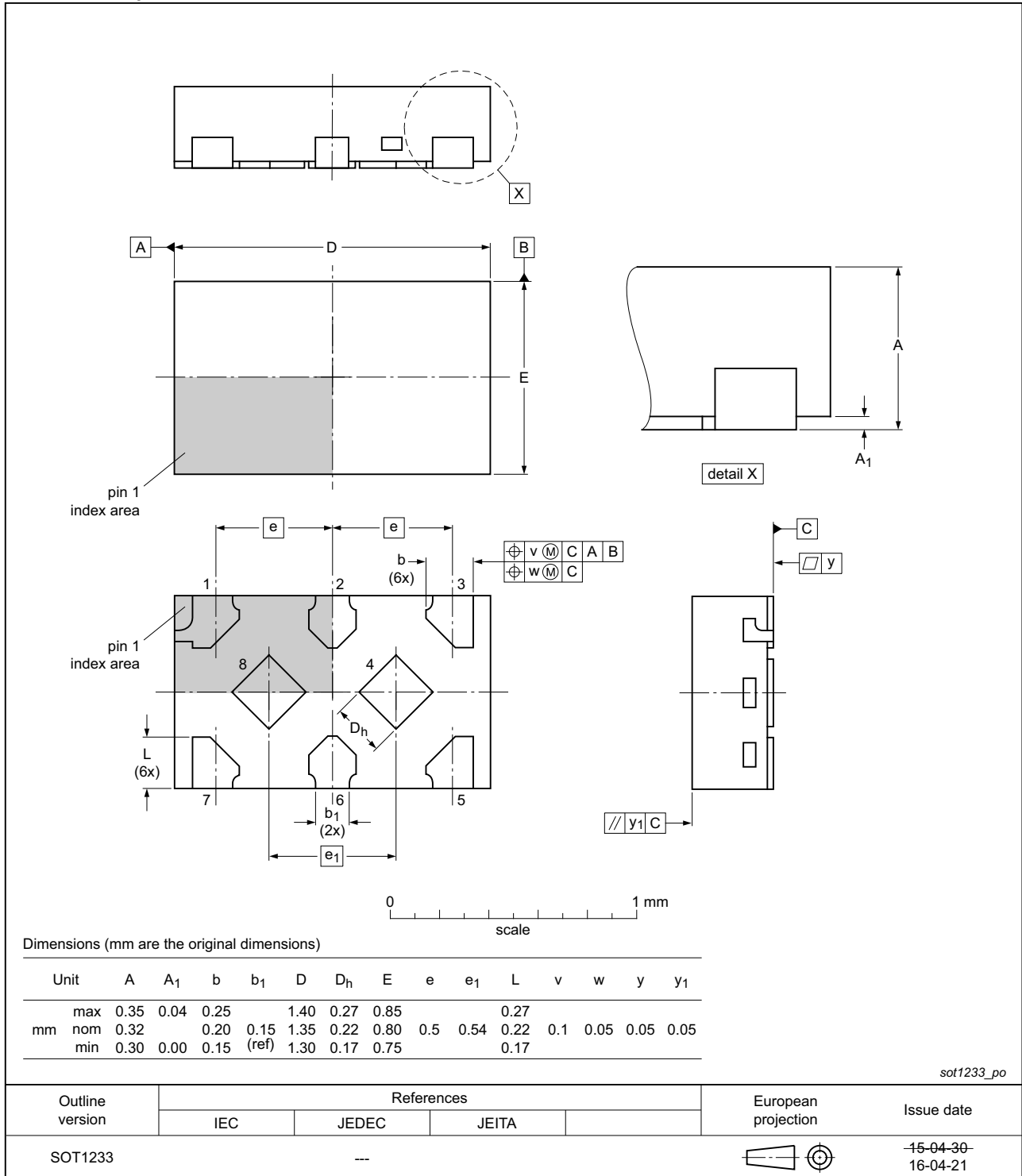


Fig 27. Package outline SOT1233 (X2SON8)

## 13. Abbreviations

Table 16. Abbreviations

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

## 14. Revision history

Table 17. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AXP1T57 v.4	20161028	Product data sheet	-	74AXP1T57 v.3
Modifications:	<ul style="list-style-type: none"> <li>Added type number 74AXP1T57GX (SOT1233/X2SON8)</li> </ul>			
74AXP1T57 v.3	20161007	Product data sheet	-	74AXP1T57 v.2
Modifications:	<ul style="list-style-type: none"> <li>Type numbers 74AXP1T57DP and 74AXP1T57GD removed.</li> </ul>			
74AXP1T57 v.2	20151222	Product data sheet	-	74AXP1T57 v.1
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Table 6</a>: Conditions <math>V_O</math> corrected (errata).</li> <li><a href="#">Table 6</a>: Derating values for packages added (errata).</li> <li><a href="#">Table 7</a>: Conditions <math>V_O</math> corrected (errata).</li> <li><a href="#">Table 8</a>: Conditions <math>I_{OZ}</math> corrected (errata).</li> <li><a href="#">Table 9</a>: Conditions <math>\Delta I_{CCI}</math> corrected (errata).</li> <li><a href="#">Table 11</a> and <a href="#">Table 12</a>: Conditions <math>t_r</math> corrected (errata).</li> <li><a href="#">Table 11</a>: Conditions <math>t_r</math> corrected (errata).</li> <li><a href="#">Table 13</a>: Removed “leadless packages” from conditions (errata).</li> </ul>			
74AXP1T57 v.1	20150803	Product data sheet	-	-

## 15. Legal information

### 15.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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 URL <http://www.nexperia.com>.

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