

# 74AUP2G98

Low-power dual PCB configurable multiple function gate

Rev. 1 — 4 November 2014

Product data sheet

## 1. General description

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The 74AUP2G98 is a dual configurable multiple function gate with Schmitt-trigger inputs. Each gate within the device can be configured as any of the following logic functions MUX, AND, OR, NAND, NOR, inverter and buffer; using the 3-bit input. All inputs can be connected directly to  $V_{CC}$  or GND.

This device ensures very low static and dynamic power consumption across the entire  $V_{CC}$  range from 0.8 V to 3.6 V.

This device 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

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- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 5000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101E exceeds 1000 V
- Low static power consumption;  $I_{CC} = 0.9 \mu\text{A}$  (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Low noise overshoot and undershoot < 10 % of  $V_{CC}$
- $I_{OFF}$  circuitry provides partial power-down mode operation
- Multiple package options
- Specified from  $-40 \text{ }^\circ\text{C}$  to  $+85 \text{ }^\circ\text{C}$  and  $-40 \text{ }^\circ\text{C}$  to  $+125 \text{ }^\circ\text{C}$



### 3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AUP2G98DP	-40 °C to +85 °C	TSSOP10	plastic thin shrink small outline package; 10 leads; body width 3 mm	SOT552-1
74AUP2G98GM	-40 °C to +125 °C	XQFN10	plastic extremely thin quad flat package; no leads; 10 terminals; body 2 × 1.55 × 0.5 mm	SOT1049-3
74AUP2G98GU	-40 °C to +125 °C	XQFN10	plastic, extremely thin quad flat package; no leads; 10 terminals; body 1.40 × 1.80 × 0.50 mm	SOT1160-1
74AUP2G98GF	-40 °C to +125 °C	XSON10	plastic extremely thin small outline package; no leads; 10 terminals; body 1.0 × 1.7 × 0.5 mm	SOT1081-2

### 4. Marking

Table 2. Marking

Type number	Marking code <sup>[1]</sup>
74AUP2G98DP	a9
74AUP2G98GM	a9
74AUP2G98GU	a9
74AUP2G98GF	a9

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

### 5. Functional diagram

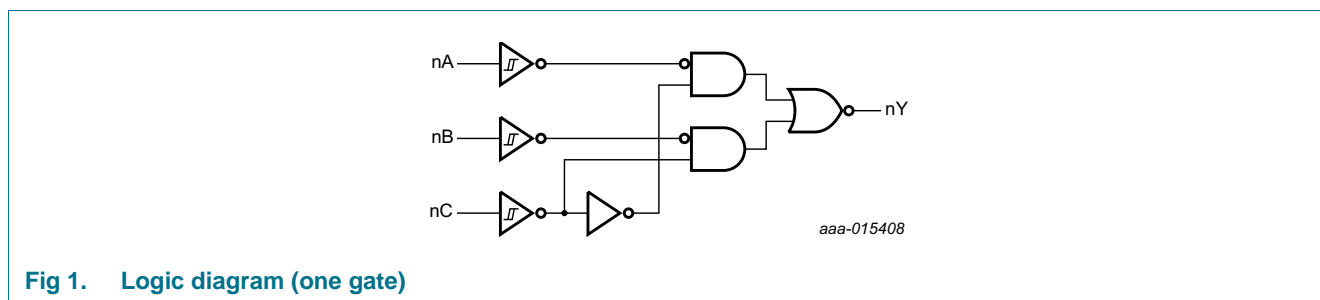
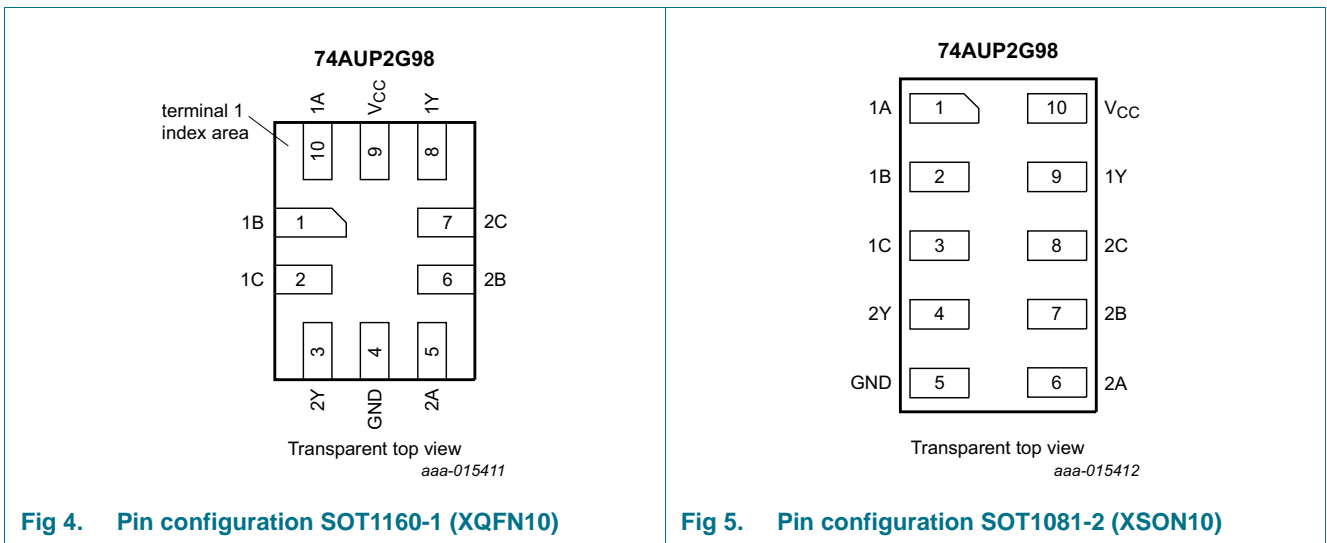
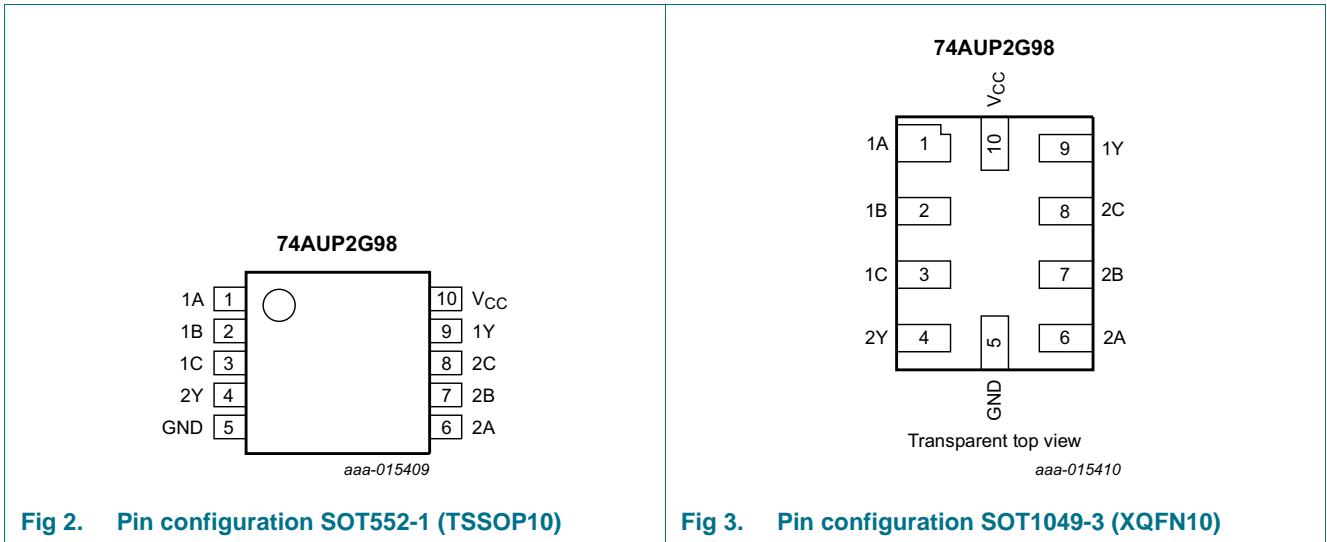


Fig 1. Logic diagram (one gate)

## 6. Pinning information

### 6.1 Pinning



## 6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT552-1, SOT1049-3 and SOT1081-2	SOT1160-1	
1A, 2A	1, 6	10, 5	data input
1B, 2B	2, 7	1, 6	data input
1C, 2C	3, 8	2, 7	data input
1Y, 2Y	9, 4	8, 3	data output
GND	5	4	ground (0 V)
V <sub>CC</sub>	10	9	supply voltage

## 7. Functional description

Table 4. Function table<sup>[1]</sup>

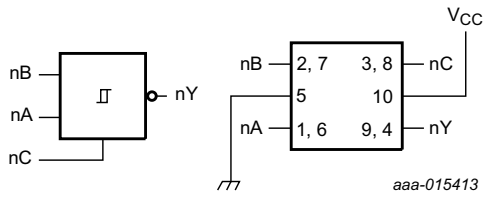
Input				Output
nC	nB	nA	nY	
L	L	L	H	
L	L	H	H	
L	H	L	L	
L	H	H	L	
H	L	L	H	
H	L	H	L	
H	H	L	H	
H	H	H	L	

[1] H = HIGH voltage level; L = LOW voltage level.

### 7.1 Logic configurations

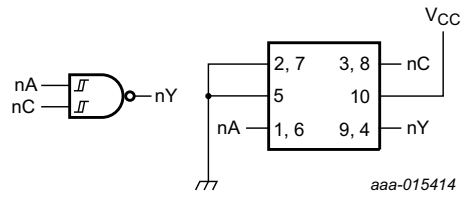
Table 5. Function selection table

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



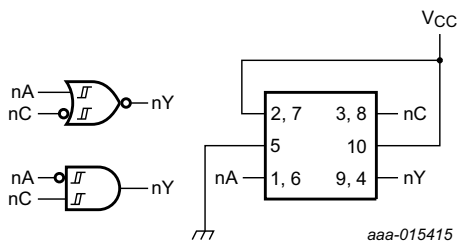
Pin numbers are not valid for SOT1160-1 package

**Fig 6. 2-input MUX with inverted output**



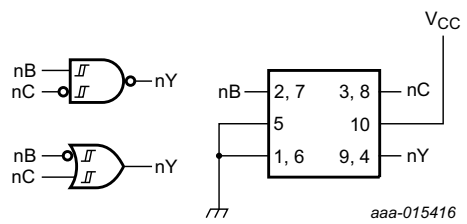
Pin numbers are not valid for SOT1160-1 package

**Fig 7. 2-input NAND gate**



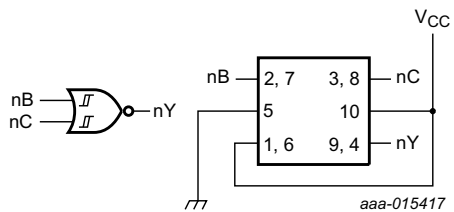
Pin numbers are not valid for SOT1160-1 package

**Fig 8. 2-input AND gate with input A inverted or 2-input NOR gate with inverted C input**



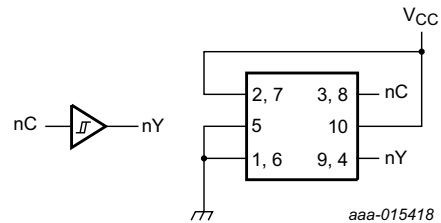
Pin numbers are not valid for SOT1160-1 package

**Fig 9. 2-input OR gate with input B inverted or 2-input NAND gate with input C inverted**



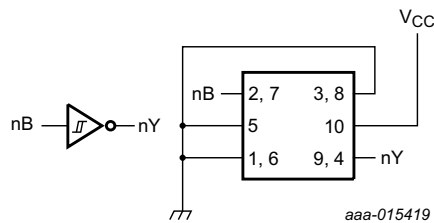
Pin numbers are not valid for SOT1160-1 package

**Fig 10. 2-input NOR gate**



Pin numbers are not valid for SOT1160-1 package

**Fig 11. Buffer**



Pin numbers are not valid for SOT1160-1 package

**Fig 12. Inverter**

## 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
$V_{CC}$	supply voltage		-0.5	+4.6	V
$I_{IK}$	input clamping current	$V_I < 0$ V	-50	-	mA
$V_I$	input voltage		[1] -0.5	+4.6	V
$I_{OK}$	output clamping current	$V_O < 0$ V	-50	-	mA
$V_O$	output voltage	Active mode and Power-down mode	[1] -0.5	+4.6	V
$I_O$	output current	$V_O = 0$ V to $V_{CC}$	-	$\pm 20$	mA
$I_{CC}$	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	[2] -	250	mW

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

[2] For TSSOP10 package: above 55 °C the value of  $P_{tot}$  derates linearly with 2.5 mW/K.

For XQFN10 (SOT1049-3) package: above 132 °C the value of  $P_{tot}$  derates linearly with 14.1 mW/K.

For XQFN10 (SOT1160-1) package: above 128 °C the value of  $P_{tot}$  derates linearly with 11.5 mW/K.

For XSON10 package: above 45 °C the value of  $P_{tot}$  derates linearly with 2.4 mW/K.

## 9. Recommended operating conditions

**Table 7. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		0.8	3.6	V
$V_I$	input voltage		0	3.6	V
$V_O$	output voltage	Active mode	0	$V_{CC}$	V
		Power-down mode; $V_{CC} = 0$ V	0	3.6	V
$T_{amb}$	ambient temperature		-40	+125	°C

## 10. Static characteristics

**Table 8. Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.75 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	1.11	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.32	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	2.05	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.9	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.72	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.6	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.3 × V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.31	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.31	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.31	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.44	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.31	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.44	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.1	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.2	μA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.2	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.5	μA
ΔI <sub>CC</sub>	additional supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	<a href="#">[1]</a>	-	40	μA
C <sub>I</sub>	input capacitance	V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub>	-	1.1	-	pF
C <sub>O</sub>	output capacitance	V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V	-	1.7	-	pF

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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.7 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	1.03	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.30	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.97	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.85	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.67	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.55	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.3 × V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.37	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.35	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.33	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.45	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.33	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.45	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.5	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.5	μA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.6	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.9	μA
ΔI <sub>CC</sub>	additional supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	[1]	-	50	μA



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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.11	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.6 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	0.93	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.17	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.77	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.67	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.40	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.11	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.33 × V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.41	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.39	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.36	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.50	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.36	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.75	μA
		I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.75	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	1.4	μA
ΔI <sub>CC</sub>	additional supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	[1]	-	75	μA

[1] One input at V<sub>CC</sub> - 0.6 V, other input at V<sub>CC</sub> or GND.

## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit, see [Figure 14](#).

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
<b>C<sub>L</sub> = 5 pF</b>									
t <sub>pd</sub>	propagation delay	nA, nB, nC to nY; see <a href="#">Figure 13</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	23.3	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.9	6.7	12.9	2.7	13.2	13.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.4	4.8	7.7	2.4	8.3	8.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.2	4.0	6.3	1.9	7.0	7.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.0	3.2	4.6	1.8	5.2	5.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.9	2.9	4.0	1.6	4.2	4.4	ns
<b>C<sub>L</sub> = 10 pF</b>									
t <sub>pd</sub>	propagation delay	nA, nB, nC to nY; see <a href="#">Figure 13</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	27.1	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.3	7.6	14.5	3.0	15.1	15.3	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.7	5.4	8.8	2.8	9.5	9.9	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.5	4.6	7.2	2.3	8.0	8.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.4	3.8	5.3	2.2	5.9	6.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.3	3.5	4.7	2.0	4.9	5.2	ns
<b>C<sub>L</sub> = 15 pF</b>									
t <sub>pd</sub>	propagation delay	nA, nB, nC to nY; see <a href="#">Figure 13</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	30.6	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.6	8.4	16.1	3.3	16.9	17.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.0	6.0	9.7	3.1	10.5	11.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.8	5.1	7.9	2.5	8.9	9.3	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.7	4.2	5.9	2.5	6.6	7.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.5	3.9	5.2	2.2	5.5	5.8	ns
<b>C<sub>L</sub> = 30 pF</b>									
t <sub>pd</sub>	propagation delay	nA, nB, nC to nY; see <a href="#">Figure 13</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	38.7	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.5	10.7	21.1	4.1	22.0	22.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.8	7.6	12.3	3.8	13.5	14.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.5	6.3	10.1	3.1	11.3	11.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.4	5.3	7.5	3.2	8.4	8.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	3.2	5.0	6.7	2.9	7.1	7.5	ns

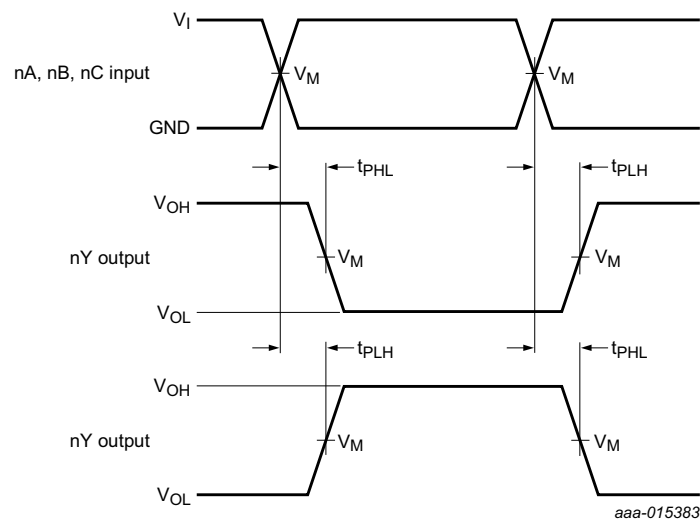
**Table 9. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V); for test circuit, see [Figure 14](#).

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
<b>C<sub>L</sub> = 5 pF, 10 pF, 15 pF and 30 pF</b>									
C <sub>PD</sub>	power dissipation capacitance	f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[3]</sup>							
		V <sub>CC</sub> = 0.8 V	-	2.7	-	-	-	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	2.9	-	-	-	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	3.0	-	-	-	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	3.2	-	-	-	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.8	-	-	-	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.4	-	-	-	pF	

- [1] All typical values are measured at nominal V<sub>CC</sub>.
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
- [3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  where:  
 f<sub>i</sub> = input frequency in MHz;  
 f<sub>o</sub> = output frequency in MHz;  
 C<sub>L</sub> = output load capacitance in pF;  
 V<sub>CC</sub> = supply voltage in V;  
 N = number of inputs switching;  
 Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.

## 12. Waveforms

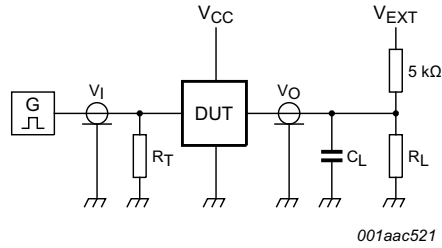


Measurement points are given in [Table 10](#).  
 V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

**Fig 13. Input nA, nB and nC to output nY propagation delay times.**

Table 10. Measurement points

Supply voltage	Output	Input		
$V_{CC}$	$V_M$	$V_M$	$V_I$	$t_r = t_f$
0.8 V to 3.6 V	$0.5V_{CC}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$\leq 3.0$ ns



Test data is given in [Table 11](#).

Definitions for test circuit:

$R_L$  = Load resistance.

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

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

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

Fig 14. Test circuit for measuring switching times

Table 11. Test data

Supply voltage	Load		$V_{EXT}$		
$V_{CC}$	$C_L$	$R_L$ [1]	$t_{PLH}, t_{PHL}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
0.8 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	5 kΩ or 1 MΩ	open	GND	$2V_{CC}$

[1] For measuring enable and disable times,  $R_L = 5$  kΩ, for measuring propagation delays, setup and hold times and pulse width  $R_L = 1$  MΩ.

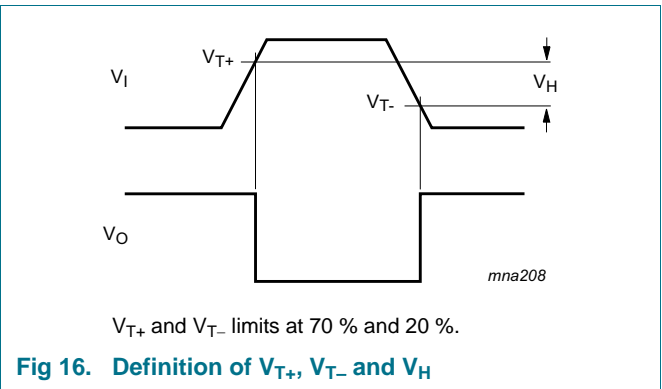
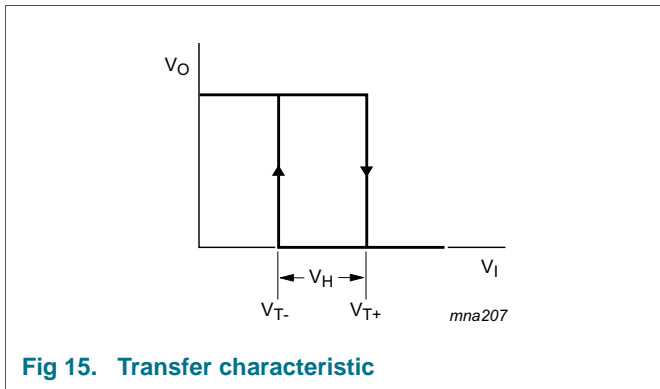
### 13. Transfer characteristics

**Table 12. Transfer characteristics**

Voltages are referenced to GND (ground = 0 V; for test circuit, see [Figure 14](#)).

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ	Max	Min	Max (85 °C)	Max (125 °C)	
V <sub>T+</sub>	positive-going threshold voltage	see <a href="#">Figure 15</a> and <a href="#">Figure 16</a>							
		V <sub>CC</sub> = 0.8 V	0.30	-	0.60	0.30	0.60	0.62	V
		V <sub>CC</sub> = 1.1 V	0.53	-	0.90	0.53	0.90	0.92	V
		V <sub>CC</sub> = 1.4 V	0.74	-	1.11	0.74	1.11	1.13	V
		V <sub>CC</sub> = 1.65 V	0.91	-	1.29	0.91	1.29	1.31	V
		V <sub>CC</sub> = 2.3 V	1.37	-	1.77	1.37	1.77	1.80	V
V <sub>T-</sub>	negative-going threshold voltage	see <a href="#">Figure 15</a> and <a href="#">Figure 16</a>							
		V <sub>CC</sub> = 0.8 V	0.10	-	0.60	0.10	0.60	0.60	V
		V <sub>CC</sub> = 1.1 V	0.26	-	0.65	0.26	0.65	0.65	V
		V <sub>CC</sub> = 1.4 V	0.39	-	0.75	0.39	0.75	0.75	V
		V <sub>CC</sub> = 1.65 V	0.47	-	0.84	0.47	0.84	0.84	V
		V <sub>CC</sub> = 2.3 V	0.69	-	1.04	0.69	1.04	1.04	V
V <sub>H</sub>	hysteresis voltage	(V <sub>T+</sub> - V <sub>T-</sub> ); see <a href="#">Figure 15</a> , <a href="#">Figure 16</a> , <a href="#">Figure 17</a> and <a href="#">Figure 18</a>							
		V <sub>CC</sub> = 0.8 V	0.07	-	0.50	0.07	0.50	0.50	V
		V <sub>CC</sub> = 1.1 V	0.08	-	0.46	0.08	0.46	0.46	V
		V <sub>CC</sub> = 1.4 V	0.18	-	0.56	0.18	0.56	0.56	V
		V <sub>CC</sub> = 1.65 V	0.27	-	0.66	0.27	0.66	0.66	V
		V <sub>CC</sub> = 2.3 V	0.53	-	0.92	0.53	0.92	0.92	V
V <sub>H</sub>	hysteresis voltage	V <sub>CC</sub> = 3.0 V	0.79	-	1.31	0.79	1.31	1.31	V

### 14. Waveforms transfer characteristics



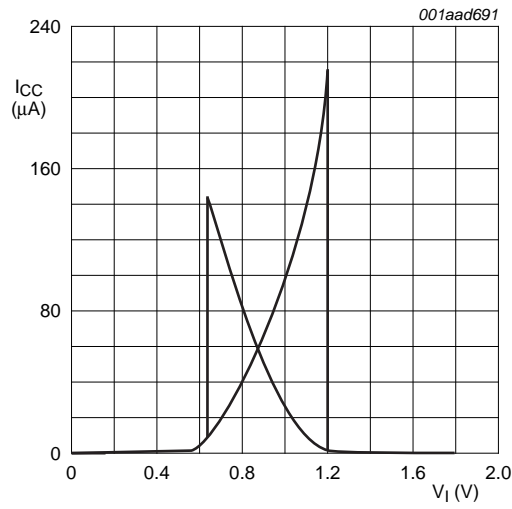


Fig 17. Typical transfer characteristics;  $V_{CC} = 1.8 V$

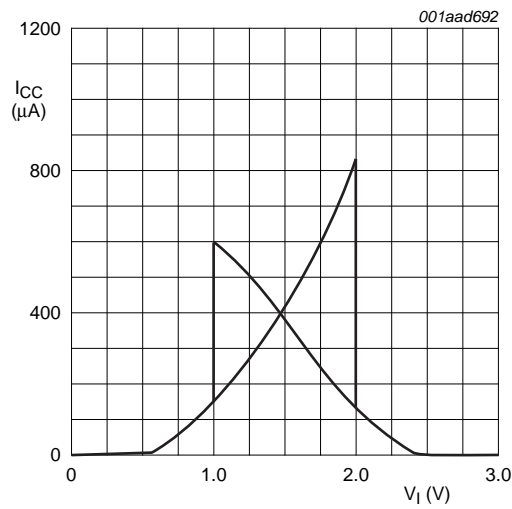


Fig 18. Typical transfer characteristics;  $V_{CC} = 3.0 V$

15. Package outline

TSSOP10: plastic thin shrink small outline package; 10 leads; body width 3 mm

SOT552-1

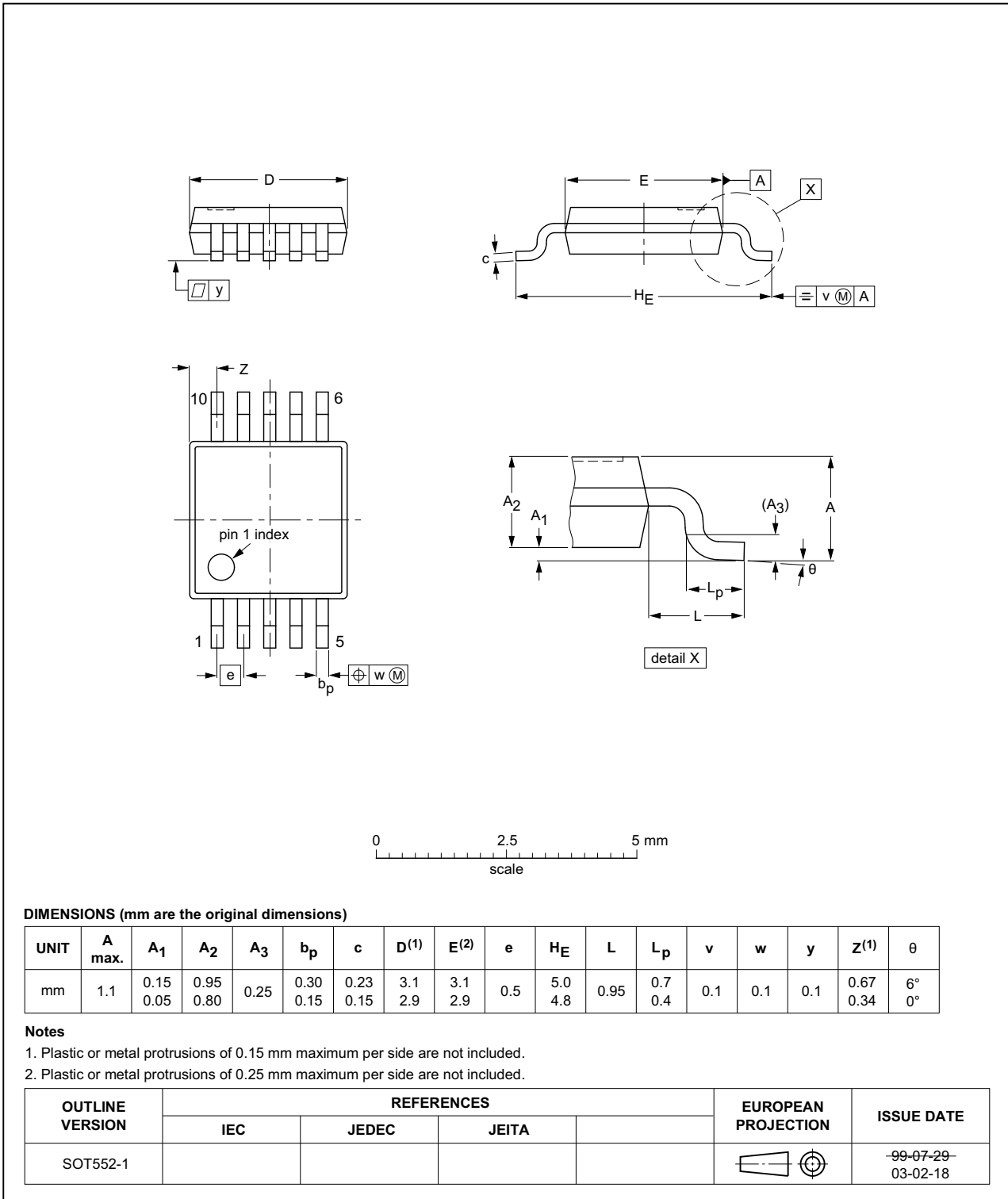


Fig 19. Package outline SOT552-1 (TSSOP10)

**XQFN10: plastic, extremely thin quad flat package; no leads; 10 terminals; body 1.55 x 2.00 x 0.50 mm**

SOT1049-3

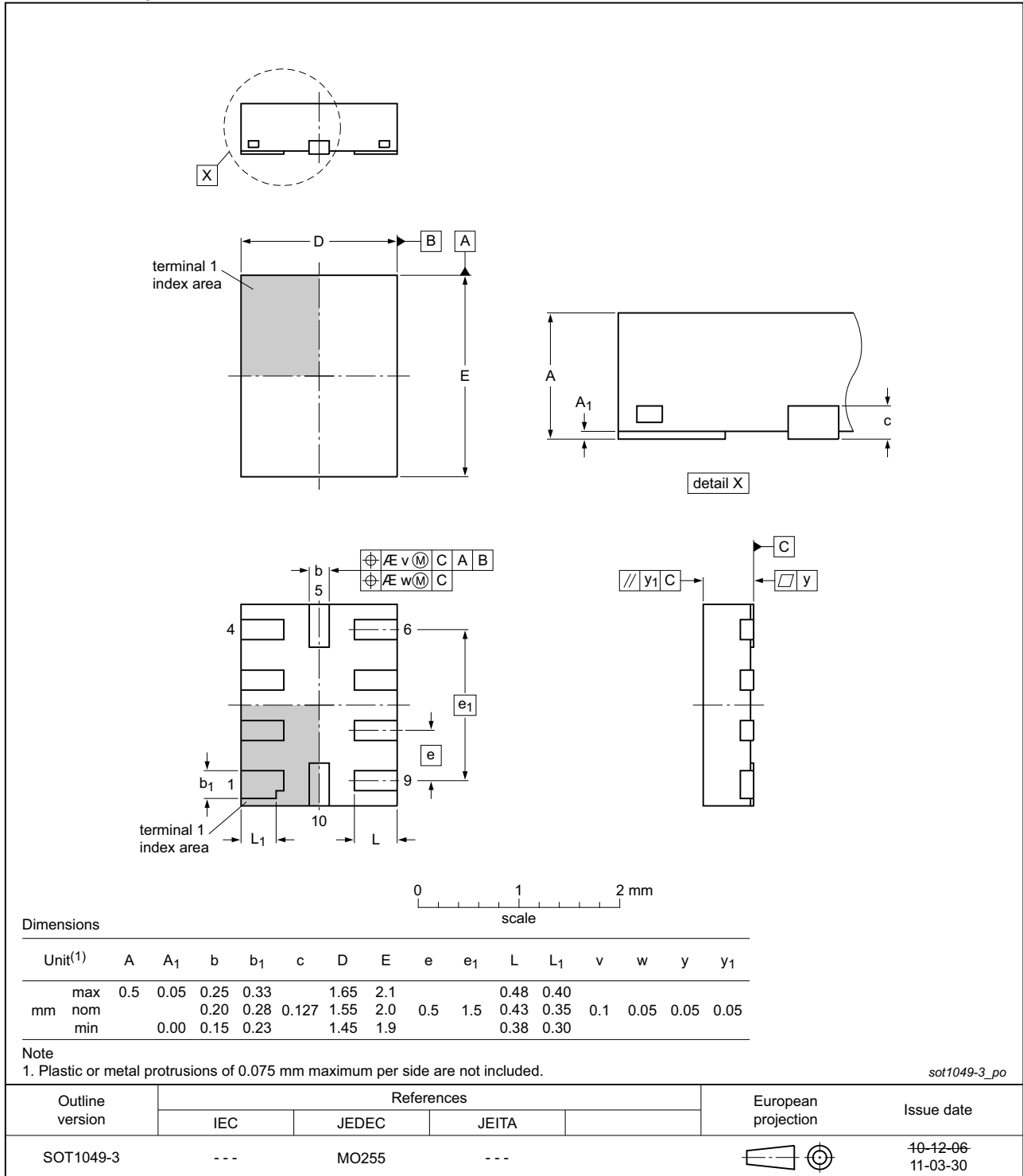


Fig 20. Package outline SOT1049-3 (XQFN10)



XQFN10: plastic, extremely thin quad flat package; no leads; 10 terminals; body 1.40 x 1.80 x 0.50 mm

SOT1160-1

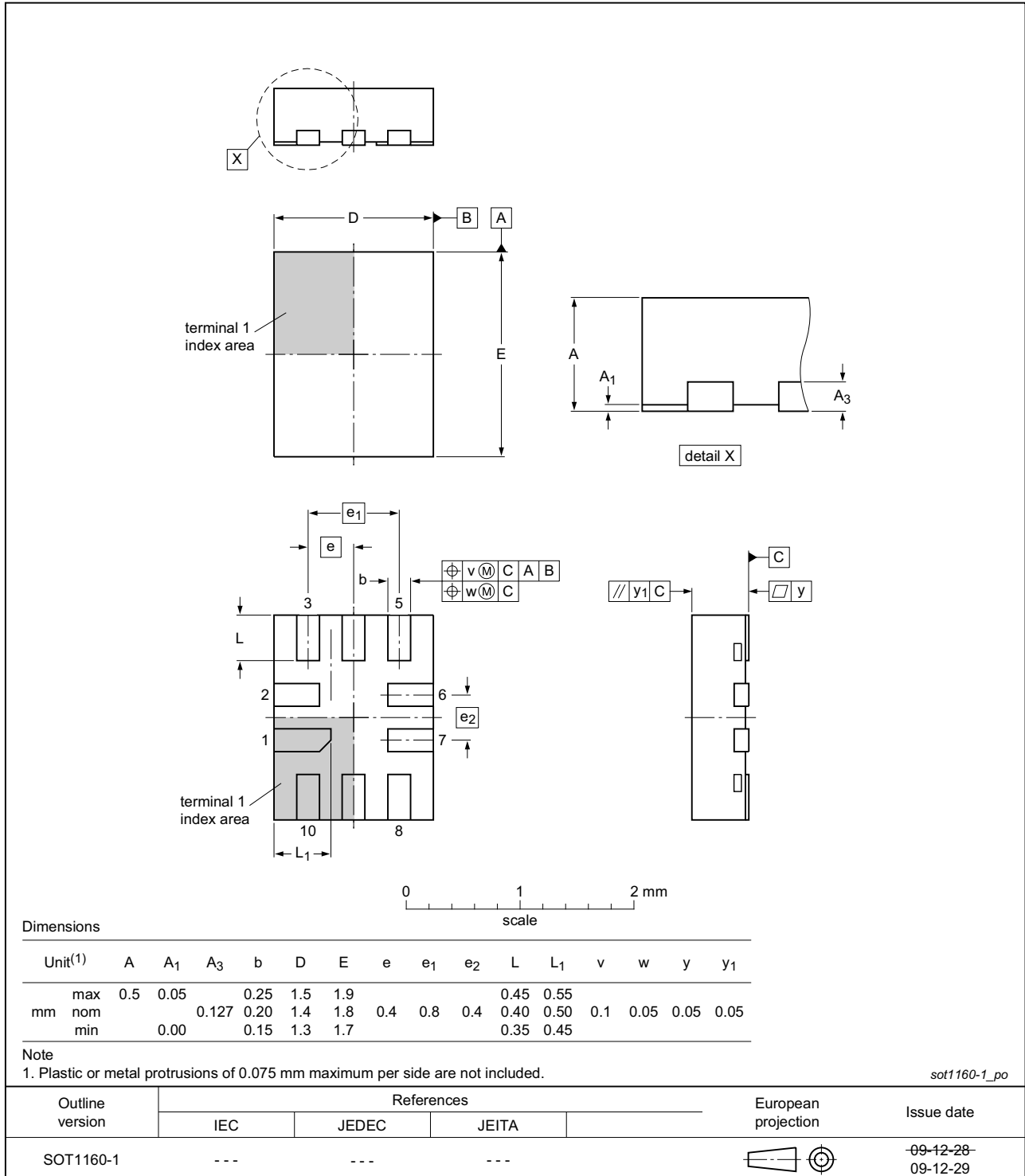


Fig 21. Package outline SOT1160-1 (XQFN10)

XSON10: plastic extremely thin small outline package; no leads;  
10 terminals; body 1.0 x 1.7 x 0.5 mm

SOT1081-2

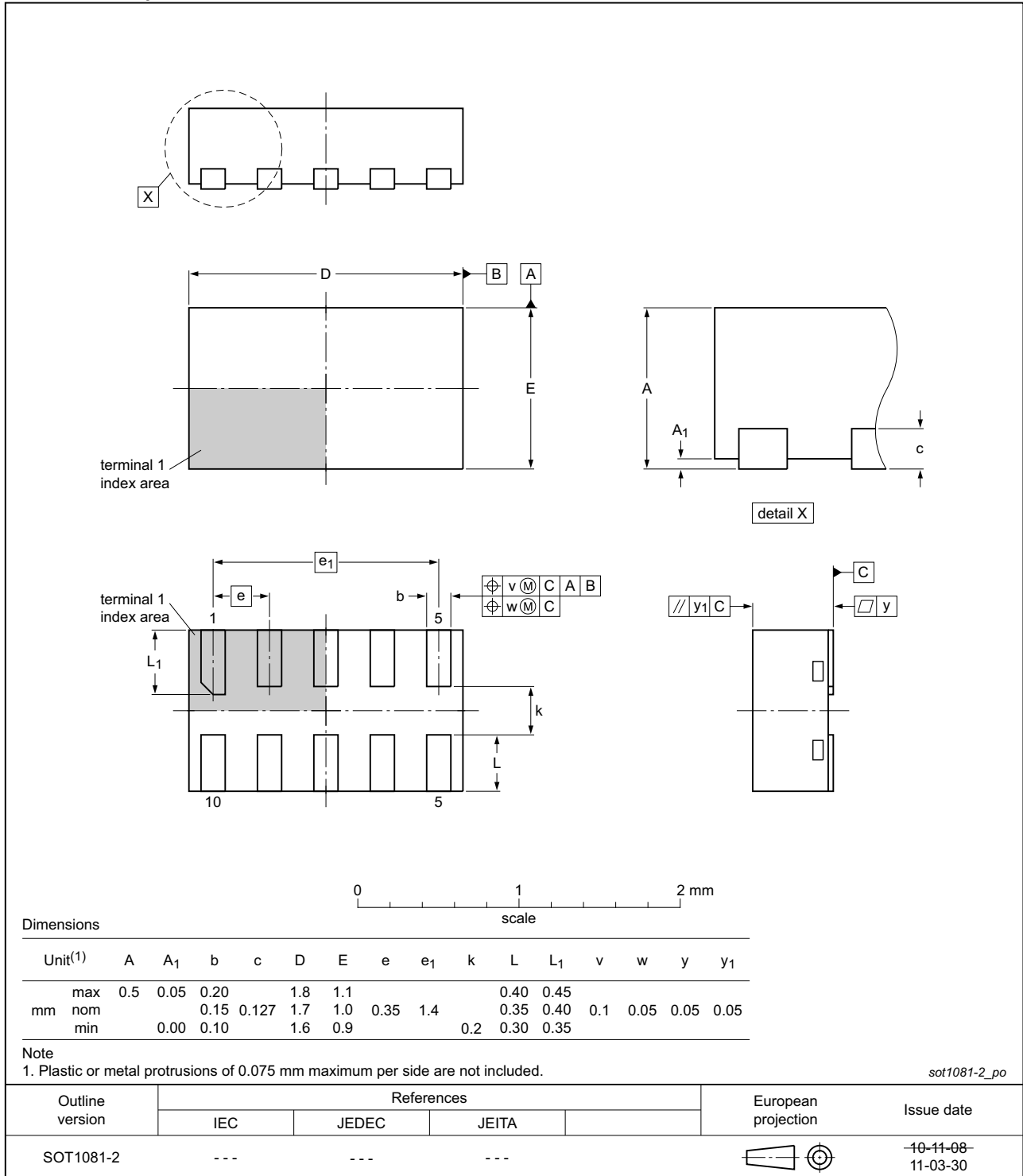


Fig 22. Package outline SOT1081-2 (XSON10)

## 16. Abbreviations

Table 13. Abbreviations

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
PCB	Printed-Circuit Board

## 17. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP2G98 v.1	20141104	Product data sheet	-	-

## 18. Legal information

### 18.1 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".

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