

# 74AUP2G132

Low-power dual 2-input NAND Schmitt trigger

Rev. 7 — 8 February 2013

Product data sheet

## 1. General description

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The 74AUP2G132 provides the dual 2-input NAND Schmitt trigger function which accepts standard input signals. They can transform slowly changing input signals into sharply defined, jitter-free output signals.

This device ensures a 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 a damaging backflow current through the device when it is powered down.

The inputs switch at different points for positive and negative-going signals. The difference between the positive voltage  $V_{T+}$  and the negative voltage  $V_{T-}$  is defined as the input hysteresis voltage  $V_H$ .

## 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 Class 3A 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. Applications

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- Wave and pulse shaper
- Astable multivibrator
- Monostable multivibrator



### 4. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AUP2G132DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP2G132GT	-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
74AUP2G132GF	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1 × 0.5 mm	SOT1089
74AUP2G132GD	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 3 × 2 × 0.5 mm	SOT996-2
74AUP2G132GM	-40 °C to +125 °C	XQFN8	plastic, extremely thin quad flat package; no leads; 8 terminals; body 1.6 × 1.6 × 0.5 mm	SOT902-2
74AUP2G132GN	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	SOT1116
74AUP2G132GS	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203

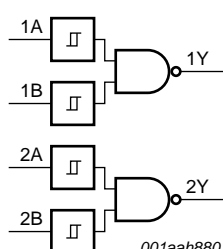
### 5. Marking

Table 2. Marking codes

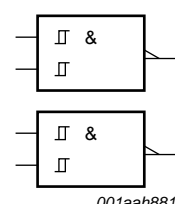
Type number	Marking code <sup>[1]</sup>
74AUP2G132DC	aE2
74AUP2G132GT	aE2
74AUP2G132GF	aE
74AUP2G132GD	aE2
74AUP2G132GM	aE2
74AUP2G132GN	aE
74AUP2G132GS	aE

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

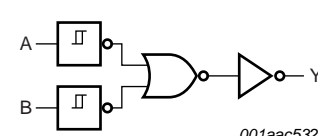
### 6. Functional diagram



**Fig 1. Logic symbol**



**Fig 2. IEC logic symbol**



**Fig 3. Logic diagram (one gate)**

7. Pinning information

7.1 Pinning

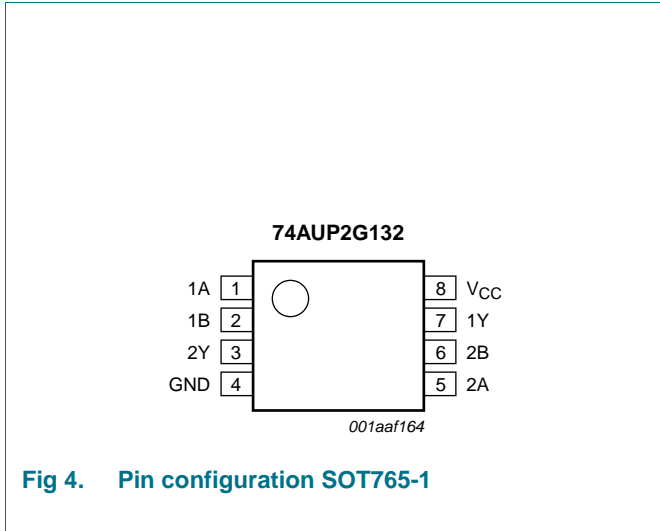


Fig 4. Pin configuration SOT765-1

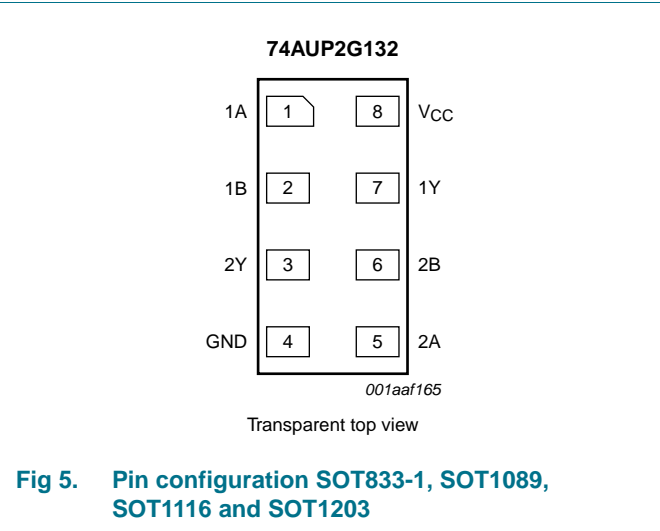


Fig 5. Pin configuration SOT833-1, SOT1089, SOT1116 and SOT1203

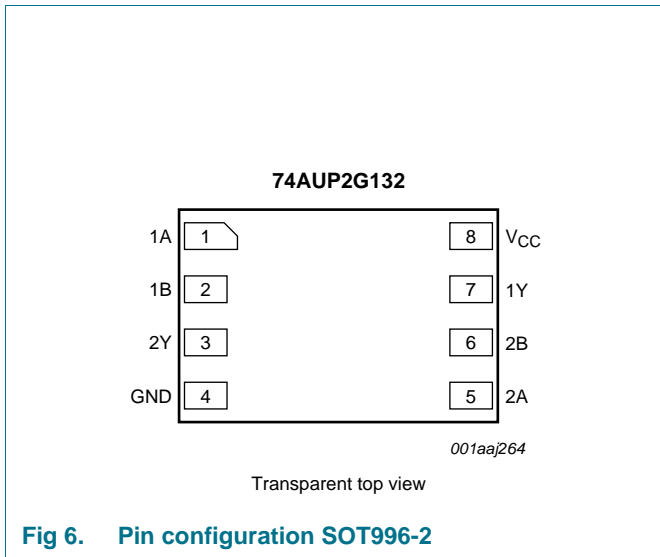


Fig 6. Pin configuration SOT996-2

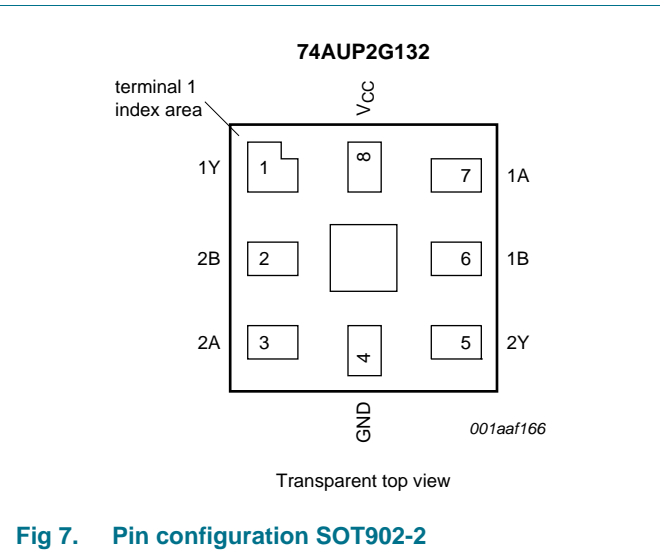


Fig 7. Pin configuration SOT902-2

7.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT765-1, SOT833-1, SOT1089, SOT996-2, SOT1116 and SOT1203	SOT902-2	
1A, 2A	1, 5	7, 3	data input
1B, 2B	2, 6	6, 2	data input
GND	4	4	ground (0 V)
1Y, 2Y	7, 3	1, 5	data output
VCC	8	8	supply voltage

## 8. Functional description

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

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

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

## 9. Limiting values

Table 5. 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 $V_{CC}$	-	±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 VSSOP8 packages: above 110 °C the value of  $P_{tot}$  derates linearly with 8.0 mW/K.  
For XSON8 and XQFN8 packages: above 118 °C the value of  $P_{tot}$  derates linearly with 7.8 mW/K.

## 10. Recommended operating conditions

Table 6. 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

## 11. Static characteristics

**Table 7. 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>I</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 0 V to 3.6 V	-	1.1	-	pF
C <sub>O</sub>	output capacitance	V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V	-	1.7	-	pF
<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

**Table 7. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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	<a href="#">[1]</a> -	-	50	μA
<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
I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.30	-	-	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>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.50	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	-	-	±0.75	μA

**Table 7. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$\Delta I_{OFF}$	additional power-off leakage current	$V_I$ or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	$\pm 0.75$	$\mu$ A
$I_{CC}$	supply current	$V_I = GND$ or $V_{CC}$ ; $I_O = 0$ A; $V_{CC} = 0.8$ V to 3.6 V	-	-	1.4	$\mu$ A
$\Delta I_{CC}$	additional supply current	$V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V	[1]	-	75	$\mu$ A

[1] One input at  $V_{CC} - 0.6$  V, other input at  $V_{CC}$  or GND.

## 12. Dynamic characteristics

**Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 9](#)).

Symbol	Parameter	Conditions	$T_{amb} = 25$ °C			$T_{amb} = -40$ °C to $+125$ °C			Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	

$C_L = 5$  pF

$t_{pd}$	propagation delay	nA or nB to nY; see <a href="#">Figure 8</a> [2]							
		$V_{CC} = 0.8$ V	-	22.5	-	-	-	-	ns
		$V_{CC} = 1.1$ V to 1.3 V	2.6	6.3	13.4	2.4	15.1	16.6	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.2	4.6	8.2	1.9	9.7	10.7	ns
		$V_{CC} = 1.65$ V to 1.95 V	1.9	3.9	6.6	1.7	7.9	8.7	ns
		$V_{CC} = 2.3$ V to 2.7 V	1.7	3.2	5.3	1.5	6.2	6.8	ns
		$V_{CC} = 3.0$ V to 3.6 V	1.6	2.9	4.7	1.4	5.6	6.2	ns

$C_L = 10$  pF

$t_{pd}$	propagation delay	nA or nB to nY; see <a href="#">Figure 8</a> [2]							
		$V_{CC} = 0.8$ V	-	26.1	-	-	-	-	ns
		$V_{CC} = 1.1$ V to 1.3 V	3.0	7.2	15.4	2.7	17.3	19.0	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.5	5.2	9.3	2.2	11.0	12.1	ns
		$V_{CC} = 1.65$ V to 1.95 V	2.3	4.5	7.5	2.0	9.0	9.9	ns
		$V_{CC} = 2.3$ V to 2.7 V	2.1	3.8	6.1	1.8	7.2	7.9	ns
		$V_{CC} = 3.0$ V to 3.6 V	2.0	3.5	5.5	1.8	6.5	7.2	ns

$C_L = 15$  pF

$t_{pd}$	propagation delay	nA or nB to nY; see <a href="#">Figure 8</a> [2]							
		$V_{CC} = 0.8$ V	-	29.6	-	-	-	-	ns
		$V_{CC} = 1.1$ V to 1.3 V	3.3	8.0	17.2	3.0	19.4	21.3	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.8	5.8	10.4	2.5	12.3	13.5	ns
		$V_{CC} = 1.65$ V to 1.95 V	2.6	5.0	8.3	2.3	10.0	11.0	ns
		$V_{CC} = 2.3$ V to 2.7 V	2.3	4.2	6.7	2.1	7.9	8.7	ns
		$V_{CC} = 3.0$ V to 3.6 V	2.2	3.9	6.1	2.0	7.3	8.0	ns

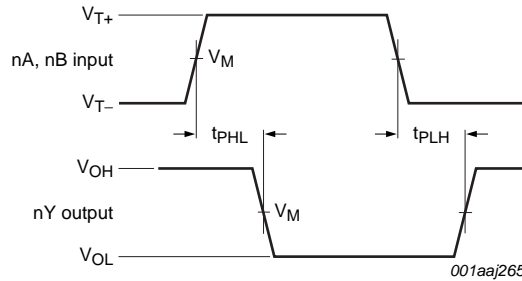
**Table 8. Dynamic characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 9](#).

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> = 30 pF</b>									
t <sub>pd</sub>	propagation delay	nA or nB to nY; see <a href="#">Figure 8</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	39.9	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.3	10.2	22.6	3.8	25.4	27.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.6	7.3	13.3	3.2	15.8	17.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.2	6.3	10.6	2.9	12.8	14.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.0	5.3	8.5	2.7	10.1	11.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.8	5.0	7.8	2.7	9.2	10.1	ns
<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	-	2.6	-	-	-	-	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;  
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.



13. Waveforms

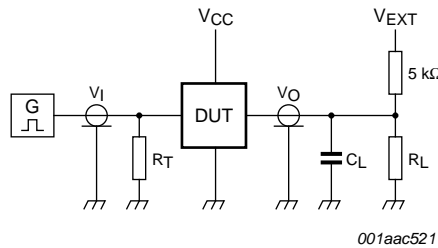


Measurement points are given in [Table 9](#).  
 Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

Fig 8. The data input (nA or nB) to output (nY) propagation delays

Table 9. 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	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{CC}$	$\leq 3.0$ ns



Test data is given in [Table 10](#).  
 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 9. Test circuit for measuring switching times

Table 10. 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	$2 \times V_{CC}$

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

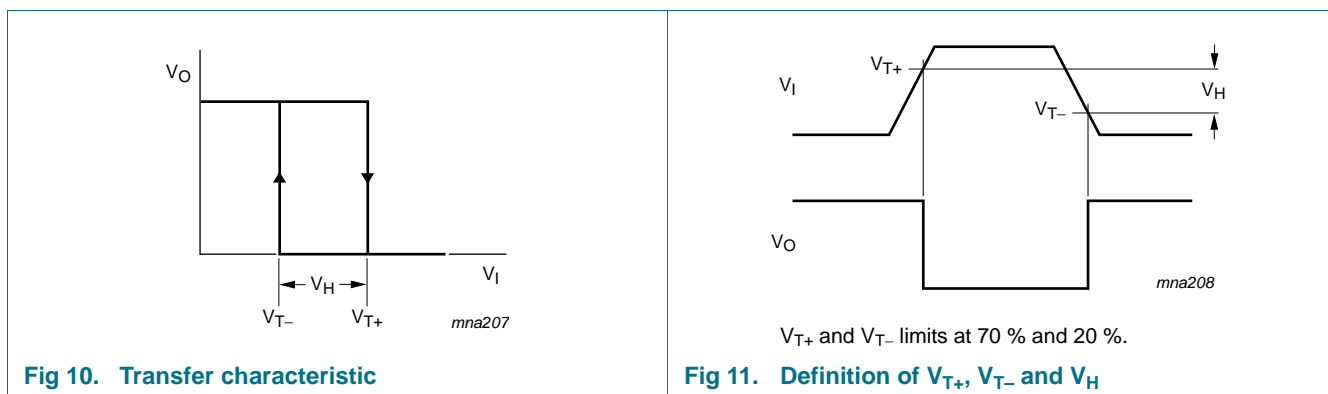
### 14. Transfer characteristics

**Table 11. Transfer characteristics**

Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 9](#)).

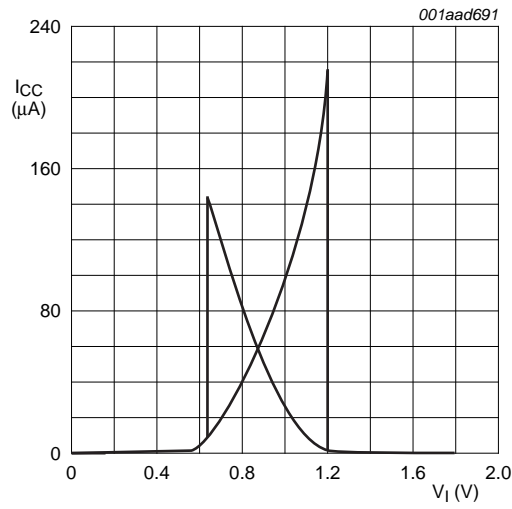
Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ	Max	Min	Max (85 °C)	Max (125 °C)	
V <sub>T+</sub>	positive-going threshold voltage	see <a href="#">Figure 10</a> and <a href="#">Figure 11</a>							
		V <sub>CC</sub> = 0.8 V	0.30	-	0.60	0.30	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>CC</sub> = 3.0 V	1.88	-	2.29	1.88	2.29	2.32	V
V <sub>T-</sub>	negative-going threshold voltage	see <a href="#">Figure 10</a> and <a href="#">Figure 11</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>CC</sub> = 3.0 V	0.88	-	1.24	0.88	1.24	1.24	V
V <sub>H</sub>	hysteresis voltage (V <sub>T+</sub> - V <sub>T-</sub> ); see <a href="#">Figure 10</a> , <a href="#">Figure 11</a> , <a href="#">Figure 12</a> and <a href="#">Figure 13</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>CC</sub> = 3.0 V	0.79	-	1.31	0.79	1.31	1.31	V

### 15. Waveforms transfer characteristics



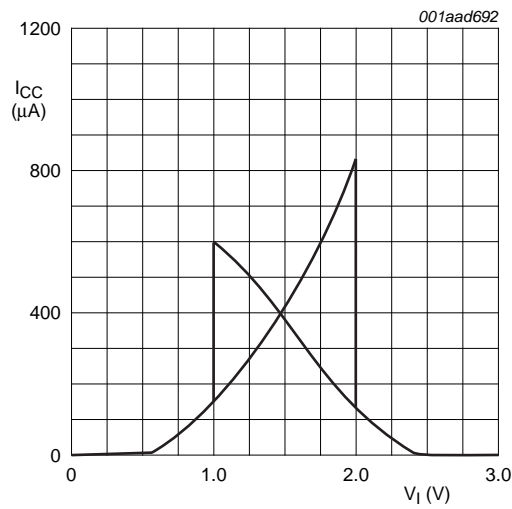
**Fig 10. Transfer characteristic**

**Fig 11. Definition of V<sub>T+</sub>, V<sub>T-</sub> and V<sub>H</sub>**



$V_{CC} = 3.0$  V.

Fig 12. Typical transfer characteristics;  $V_{CC} = 1.8$  V



$V_{CC} = 3.0$  V.

Fig 13. Typical transfer characteristics;  $V_{CC} = 3.0$  V

## 16. Application information

The slow input rise and fall times cause additional power dissipation which can be calculated using the following formula:

$$P_{\text{add}} = f_i \times (t_r \times \Delta I_{\text{CC(AV)}} + t_f \times \Delta I_{\text{CC(AV)}}) \times V_{\text{CC}} \text{ where:}$$

$P_{\text{add}}$  = additional power dissipation ( $\mu\text{W}$ );

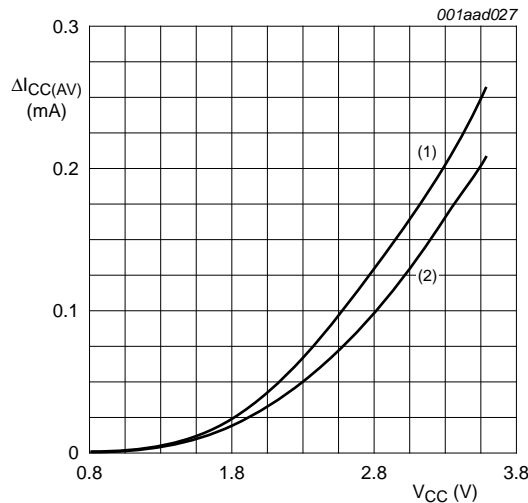
$f_i$  = input frequency (MHz);

$t_r$  = input rise time (ns); 10 % to 90 %;

$t_f$  = input fall time (ns); 90 % to 10 %;

$\Delta I_{\text{CC(AV)}}$  = average additional supply current ( $\mu\text{A}$ ).

Average  $\Delta I_{\text{CC(AV)}}$  differs with positive or negative input transitions, as shown in [Figure 14](#).



- (1) Positive-going edge.
- (2) Negative-going edge.

Linear change of  $V_I$  between 0.8 V and 2.0 V. All values given are typical, unless otherwise specified.

**Fig 14. Average  $I_{\text{CC}}$  as a function of  $V_{\text{CC}}$**

17. Package outline

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

SOT765-1

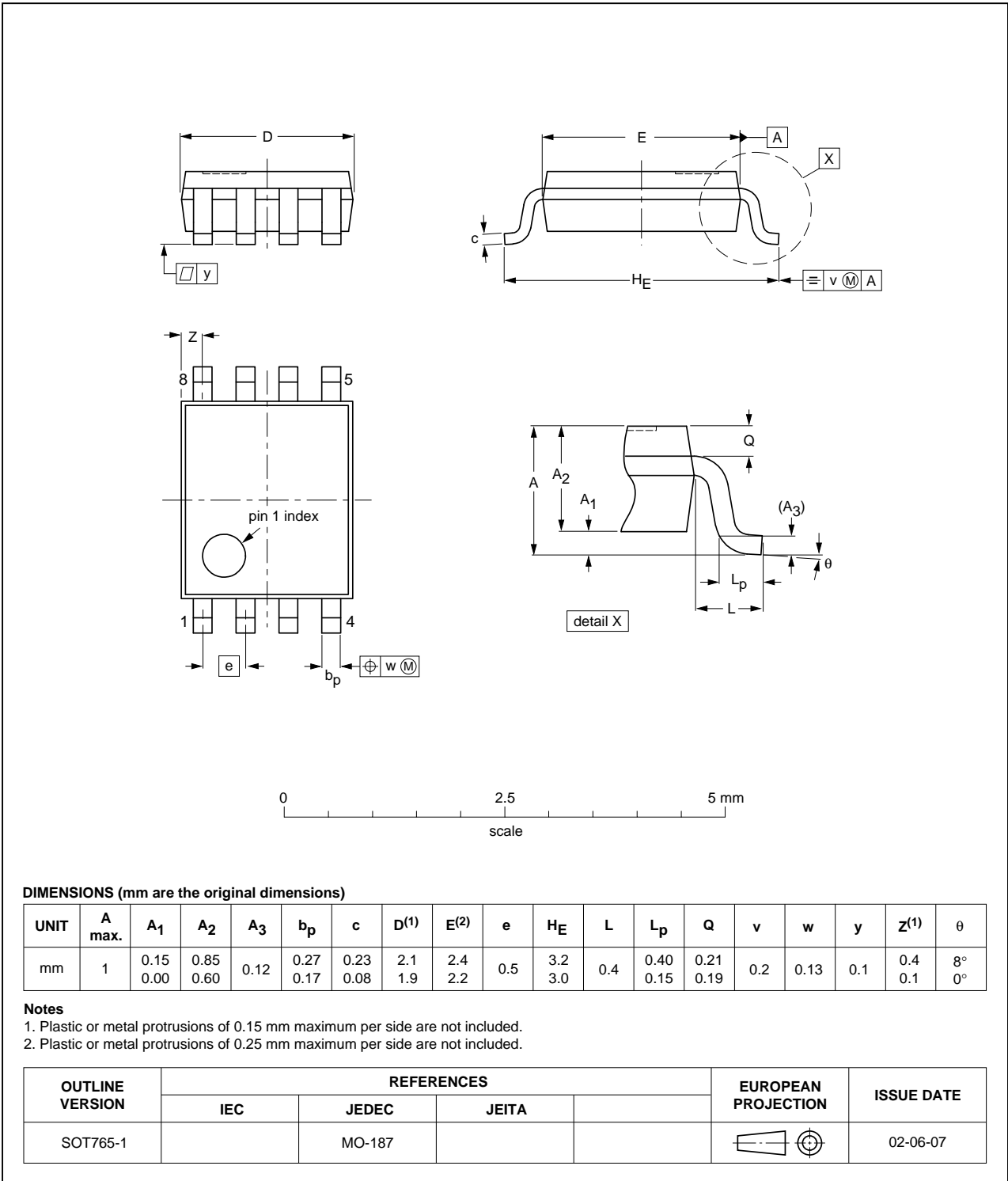


Fig 15. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

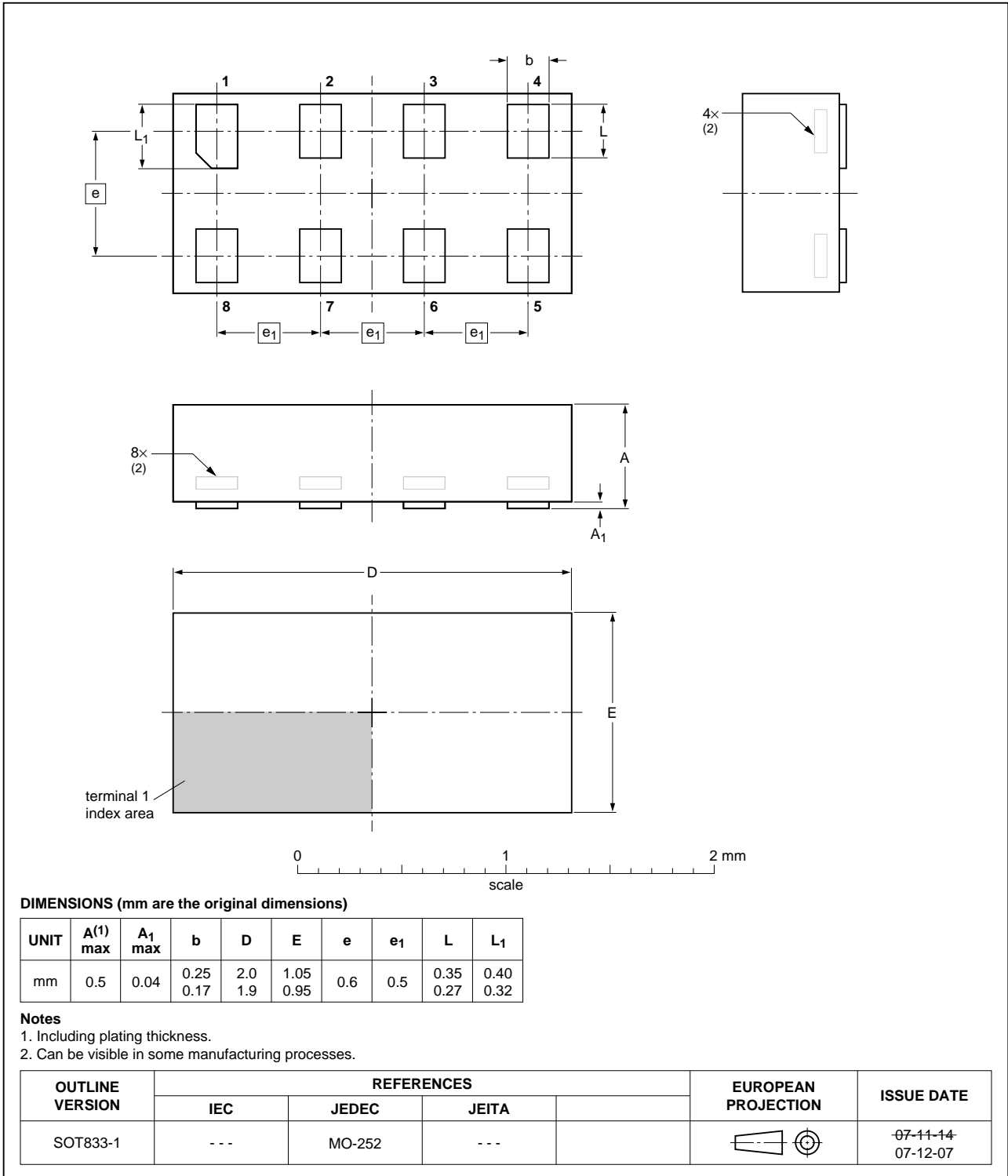


Fig 16. Package outline SOT833-1 (XSON8)

**XSON8: extremely thin small outline package; no leads;  
8 terminals; body 1.35 x 1 x 0.5 mm**

SOT1089

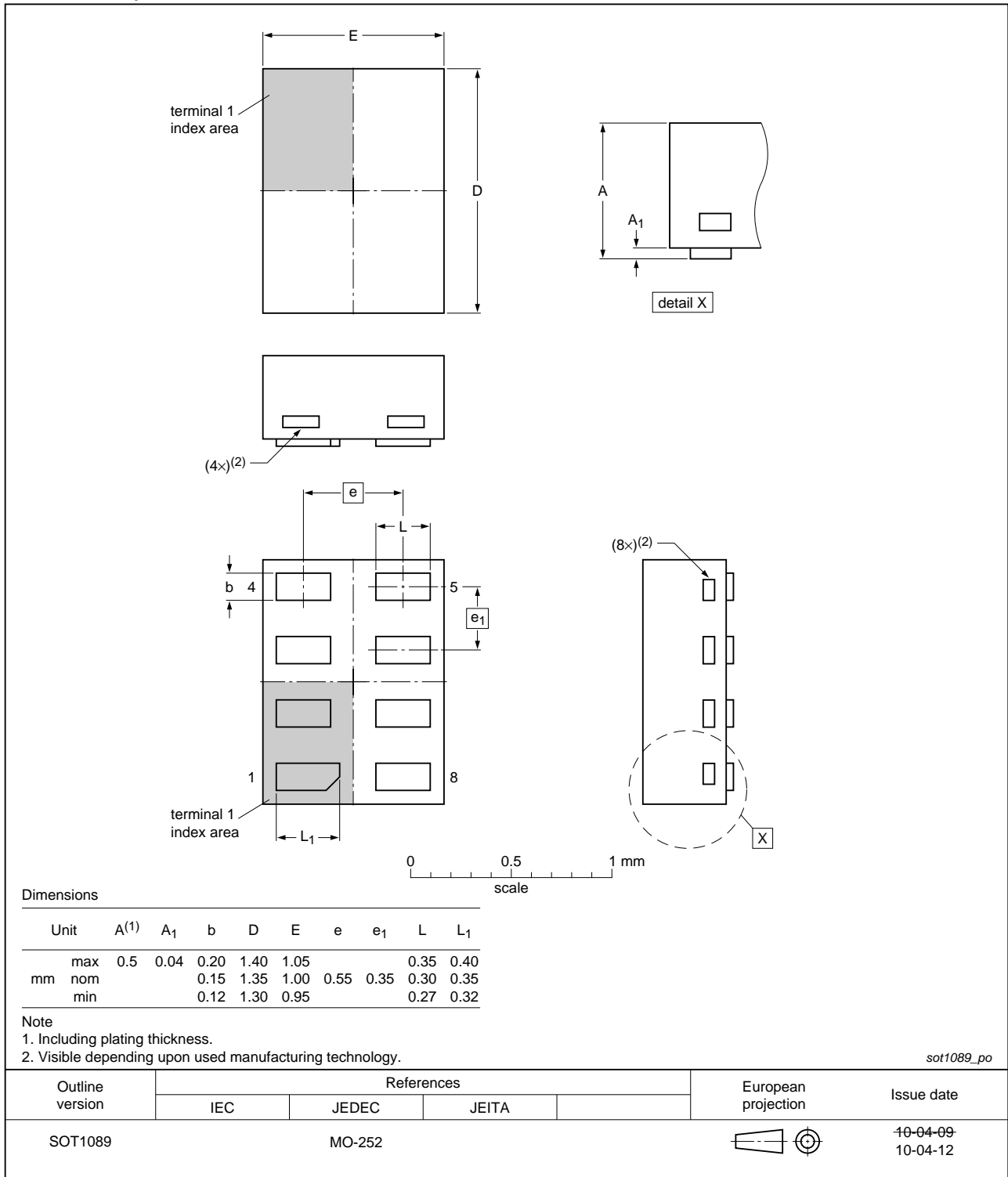


Fig 17. Package outline SOT1089 (XSON8)

XSON8: plastic extremely thin small outline package; no leads;  
8 terminals; body 3 x 2 x 0.5 mm

SOT996-2

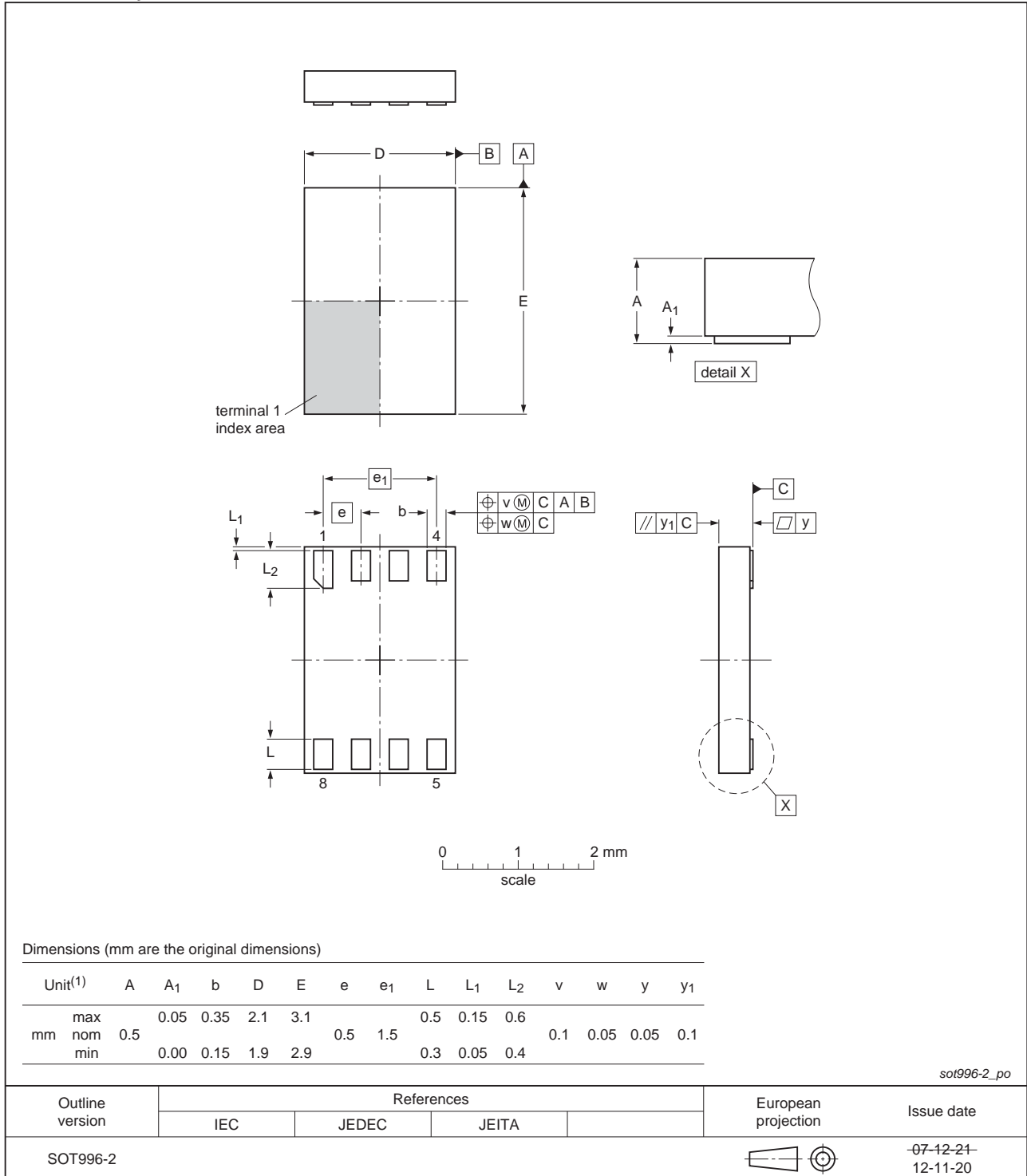


Fig 18. Package outline SOT996-2 (XSON8)



XQFN8: plastic, extremely thin quad flat package; no leads;  
8 terminals; body 1.6 x 1.6 x 0.5 mm

SOT902-2

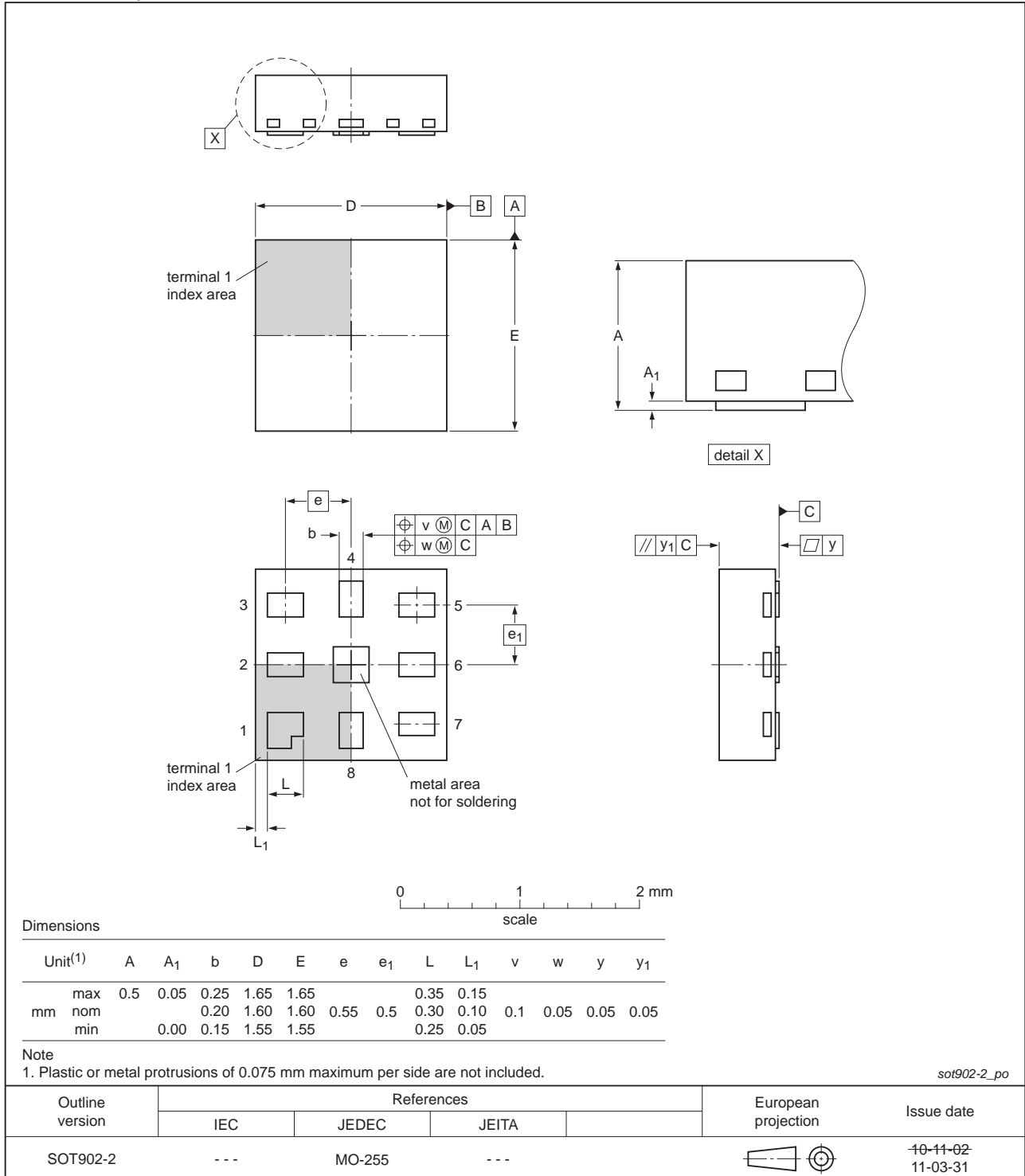


Fig 19. Package outline SOT902-2 (XQFN8)

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

SOT1116

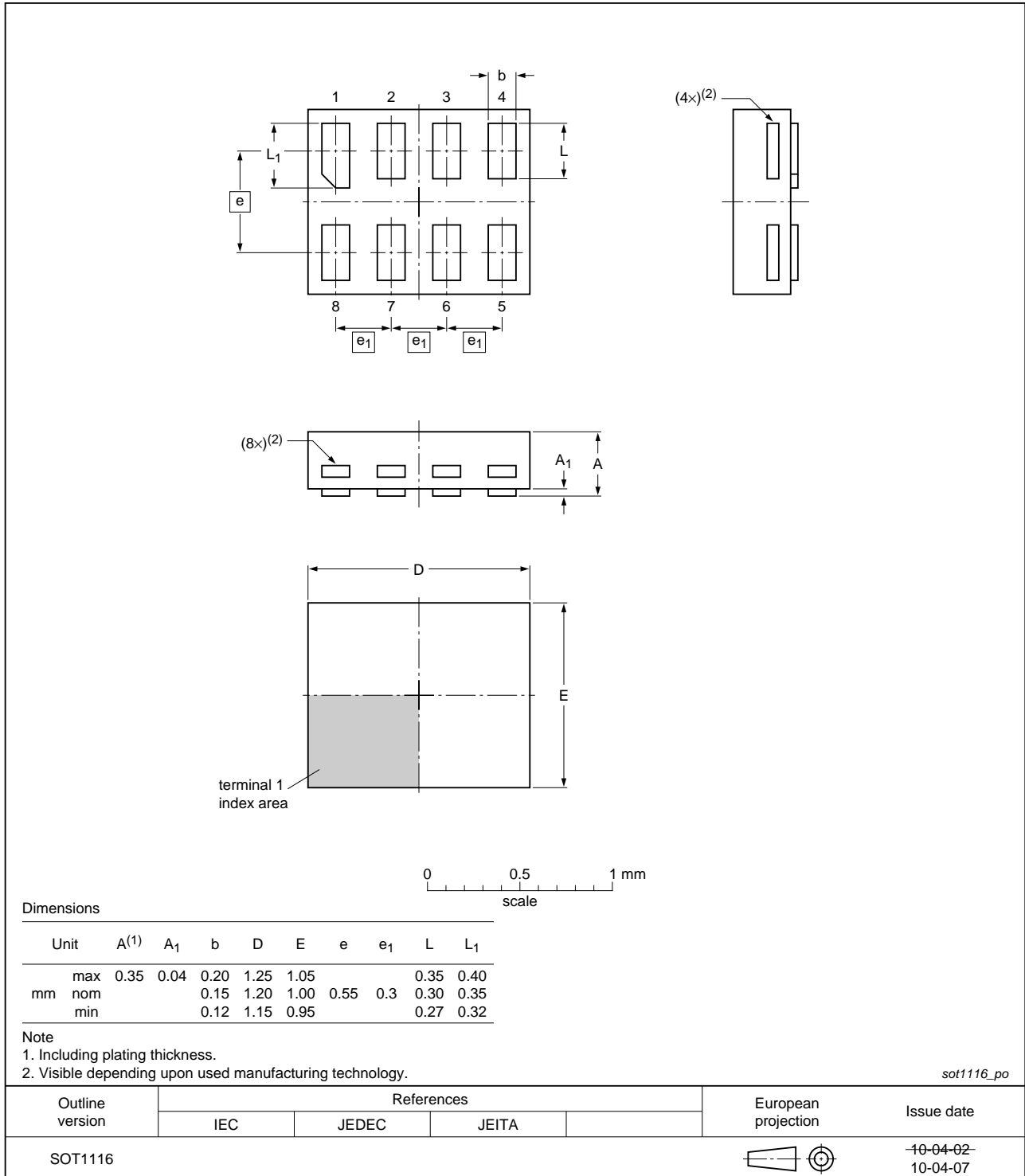


Fig 20. Package outline SOT1116 (XSON8)

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

SOT1203

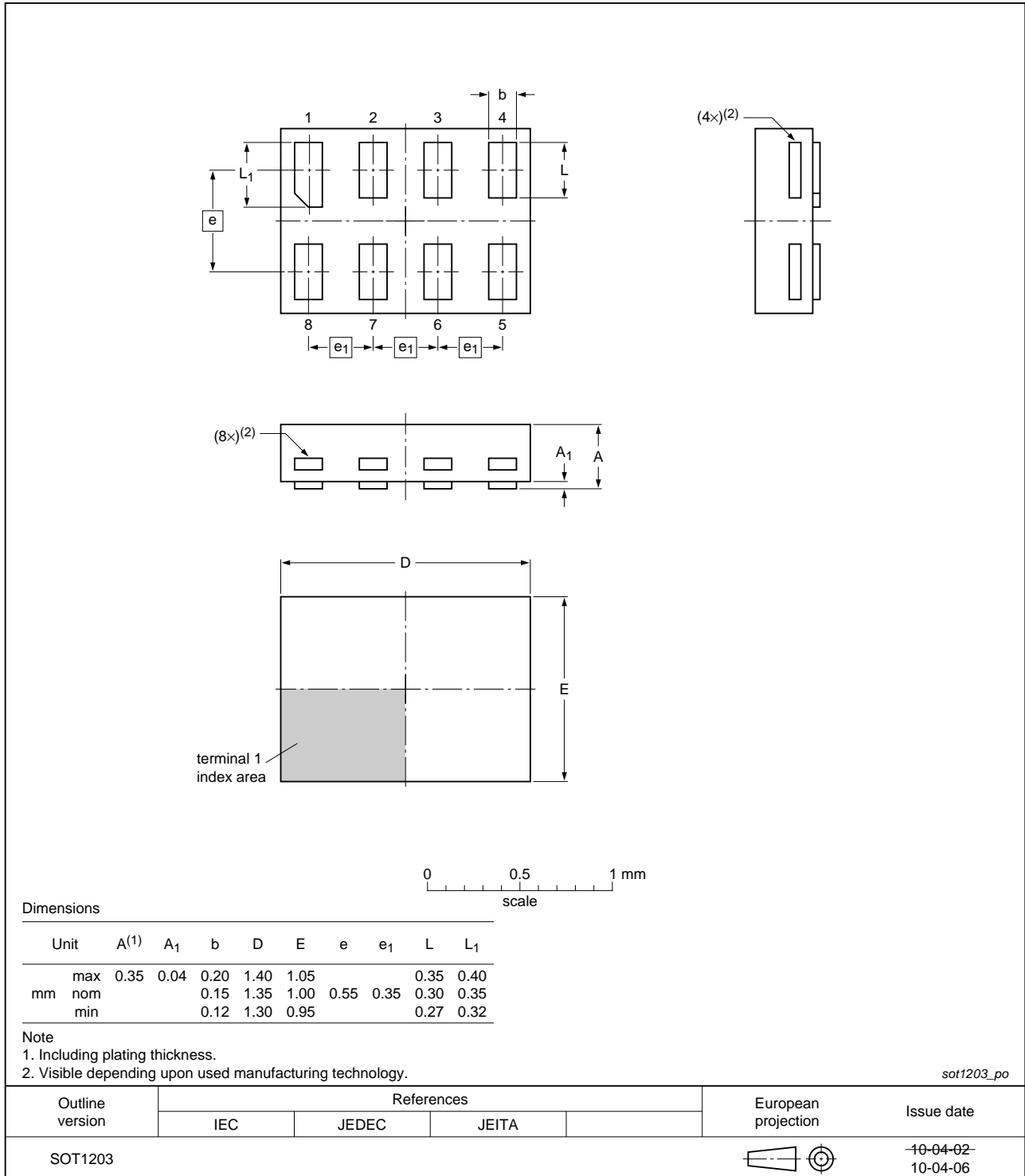


Fig 21. Package outline SOT1203 (XSON8)

## 18. Abbreviations

Table 12. Abbreviations

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

## 19. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP2G132 v.7	20130208	Product data sheet	-	74AUP2G132 v.6
Modifications:	<ul style="list-style-type: none"> <li>For type number 74AUP2G132GD XSON8U has changed to XSON8.</li> </ul>			
74AUP2G132 v.6	20120803	Product data sheet	-	74AUP2G132 v.5
74AUP2G132 v.5	20111201	Product data sheet	-	74AUP2G132 v.4
74AUP2G132 v.4	20101104	Product data sheet	-	74AUP2G132 v.3
74AUP2G132 v.3	20081215	Product data sheet	-	74AUP2G132 v.2
74AUP2G132 v.2	20080314	Product data sheet	-	74AUP2G132 v.1
74AUP2G132 v.1	20061018	Product data sheet	-	-

## 20. Legal information

### 20.1 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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