

# 74AUP2G02

## Low-power dual 2-input NOR gate

Rev. 9 — 27 July 2021

Product data sheet

### 1. General description

The 74AUP2G02 is a dual 2-input NOR gate. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times. 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

- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.2 V to 1.95 V)
  - JESD8-5 (1.8 V to 2.7 V)
  - JESD8-B (2.7 V to 3.6 V)
- 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 JESD78B 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			Version
	Temperature range	Name	Description	
74AUP2G02DC	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP2G02GT	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body $1 \times 1.95 \times 0.5$ mm	SOT833-1
74AUP2G02GF	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$	XSON8	extremely thin small outline package; no leads; 8 terminals; body $1.35 \times 1 \times 0.5$ mm	SOT1089
74AUP2G02GN	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$	XSON8	extremely thin small outline package; no leads; 8 terminals; body $1.2 \times 1.0 \times 0.35$ mm	SOT1116
74AUP2G02GS	$-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$	XSON8	extremely thin small outline package; no leads; 8 terminals; body $1.35 \times 1.0 \times 0.35$ mm	SOT1203

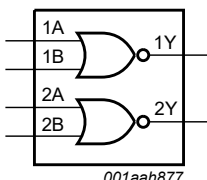
## 4. Marking

Table 2. Marking codes

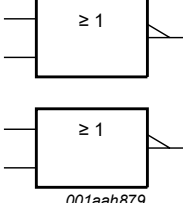
Type number	Marking code <sup>[1]</sup>
74AUP2G02DC	p02
74AUP2G02GT	p02
74AUP2G02GF	pB
74AUP2G02GN	pB
74AUP2G02GS	pB

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

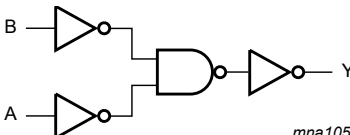
## 5. Functional diagram



**Fig. 1. Logic symbol**



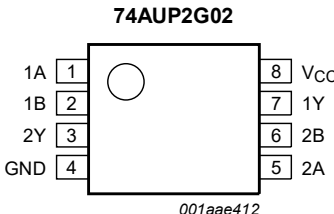
**Fig. 2. IEC logic symbol**



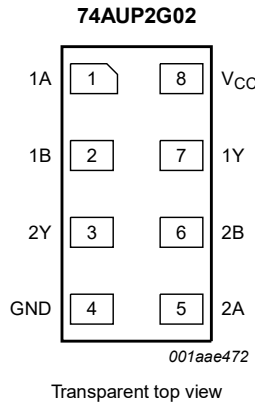
**Fig. 3. Logic diagram**

## 6. Pinning information

### 6.1. Pinning



**Fig. 4. Pin configuration SOT765-1 (VSSOP8)**



**Fig. 5. Pin configuration SOT833-1, SOT1089, SOT1116 and SOT1203 (XSON8)**

## 6.2. Pin description

Table 3. Pin description

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

## 7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level.

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

## 8. 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 <sub>CC</sub>	supply voltage		-0.5	+4.6	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V	-50	-	mA
V <sub>I</sub>	input voltage	[1]	-0.5	+4.6	V
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < 0 V	-50	-	mA
V <sub>O</sub>	output voltage	Active mode and Power-down mode [1]	-0.5	+4.6	V
I <sub>O</sub>	output current	V <sub>O</sub> = 0 V to V <sub>CC</sub>	-	±20	mA
I <sub>CC</sub>	supply current		-	+50	mA
I <sub>GND</sub>	ground current		-50	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -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 SOT765-1 (VSSOP8) package: P<sub>tot</sub> derates linearly with 4.9 mW/K above 99 °C.

For SOT833-1 (XSON8) package: P<sub>tot</sub> derates linearly with 3.1 mW/K above 68 °C.

For SOT1089 (XSON8) package: P<sub>tot</sub> derates linearly with 4.0 mW/K above 88 °C.

For SOT1116 (XSON8) package: P<sub>tot</sub> derates linearly with 4.2 mW/K above 90 °C.

For SOT1203 (XSON8) package: P<sub>tot</sub> derates linearly with 3.6 mW/K above 81 °C.

## 9. 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
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 0.8$ V to 3.6 V	0	200	ns/V

## 10. 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><math>T_{amb} = 25</math> °C</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 0.8$ V	$0.70 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9$ V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3$ V to 2.7 V	1.6	-	-	V
		$V_{CC} = 3.0$ V to 3.6 V	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 0.8$ V	-	-	$0.30 \times V_{CC}$	V
		$V_{CC} = 0.9$ V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3$ V to 2.7 V	-	-	0.7	V
		$V_{CC} = 3.0$ V to 3.6 V	-	-	0.9	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -20$ $\mu$ A; $V_{CC} = 0.8$ V to 3.6 V	$V_{CC} - 0.1$	-	-	V
		$I_O = -1.1$ mA; $V_{CC} = 1.1$ V	$0.75 \times V_{CC}$	-	-	V
		$I_O = -1.7$ mA; $V_{CC} = 1.4$ V	1.11	-	-	V
		$I_O = -1.9$ mA; $V_{CC} = 1.65$ V	1.32	-	-	V
		$I_O = -2.3$ mA; $V_{CC} = 2.3$ V	2.05	-	-	V
		$I_O = -3.1$ mA; $V_{CC} = 2.3$ V	1.9	-	-	V
		$I_O = -2.7$ mA; $V_{CC} = 3.0$ V	2.72	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 20$ $\mu$ A; $V_{CC} = 0.8$ V to 3.6 V	-	-	0.1	V
		$I_O = 1.1$ mA; $V_{CC} = 1.1$ V	-	-	$0.3 \times V_{CC}$	V
		$I_O = 1.7$ mA; $V_{CC} = 1.4$ V	-	-	0.31	V
		$I_O = 1.9$ mA; $V_{CC} = 1.65$ V	-	-	0.31	V
		$I_O = 2.3$ mA; $V_{CC} = 2.3$ V	-	-	0.31	V
		$I_O = 3.1$ mA; $V_{CC} = 2.3$ V	-	-	0.44	V
		$I_O = 2.7$ mA; $V_{CC} = 3.0$ V	-	-	0.31	V
$I_I$	input leakage current	$V_I = GND$ to 3.6 V; $V_{CC} = 0$ V to 3.6 V	-	-	$\pm 0.1$	$\mu$ A

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{OFF}$	power-off leakage current	$V_I$ or $V_O = 0\text{ V}$ to $3.6\text{ V}$ ; $V_{CC} = 0\text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$\Delta I_{OFF}$	additional power-off leakage current	$V_I$ or $V_O = 0\text{ V}$ to $3.6\text{ V}$ ; $V_{CC} = 0\text{ V}$ to $0.2\text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = \text{GND}$ or $V_{CC}$ ; $I_O = 0\text{ A}$ ; $V_{CC} = 0.8\text{ V}$ to $3.6\text{ V}$	-	-	0.5	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	$V_I = V_{CC} - 0.6\text{ V}$ ; $I_O = 0\text{ A}$ ; $V_{CC} = 3.3\text{ V}$ [1]	-	-	40	$\mu\text{A}$
$C_I$	input capacitance	$V_{CC} = 0\text{ V}$ to $3.6\text{ V}$ ; $V_I = \text{GND}$ or $V_{CC}$	-	0.8	-	$\text{pF}$
$C_O$	output capacitance	$V_O = \text{GND}$ ; $V_{CC} = 0\text{ V}$	-	1.7	-	$\text{pF}$
<b><math>T_{amb} = -40\text{ }^\circ\text{C}</math> to <math>+85\text{ }^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 0.8\text{ V}$	$0.70 \times V_{CC}$	-	-	$\text{V}$
		$V_{CC} = 0.9\text{ V}$ to $1.95\text{ V}$	$0.65 \times V_{CC}$	-	-	$\text{V}$
		$V_{CC} = 2.3\text{ V}$ to $2.7\text{ V}$	1.6	-	-	$\text{V}$
		$V_{CC} = 3.0\text{ V}$ to $3.6\text{ V}$	2.0	-	-	$\text{V}$
$V_{IL}$	LOW-level input voltage	$V_{CC} = 0.8\text{ V}$	-	-	$0.30 \times V_{CC}$	$\text{V}$
		$V_{CC} = 0.9\text{ V}$ to $1.95\text{ V}$	-	-	$0.35 \times V_{CC}$	$\text{V}$
		$V_{CC} = 2.3\text{ V}$ to $2.7\text{ V}$	-	-	0.7	$\text{V}$
		$V_{CC} = 3.0\text{ V}$ to $3.6\text{ V}$	-	-	0.9	$\text{V}$
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -20\text{ }\mu\text{A}$ ; $V_{CC} = 0.8\text{ V}$ to $3.6\text{ V}$	$V_{CC} - 0.1$	-	-	$\text{V}$
		$I_O = -1.1\text{ mA}$ ; $V_{CC} = 1.1\text{ V}$	$0.7 \times V_{CC}$	-	-	$\text{V}$
		$I_O = -1.7\text{ mA}$ ; $V_{CC} = 1.4\text{ V}$	1.03	-	-	$\text{V}$
		$I_O = -1.9\text{ mA}$ ; $V_{CC} = 1.65\text{ V}$	1.30	-	-	$\text{V}$
		$I_O = -2.3\text{ mA}$ ; $V_{CC} = 2.3\text{ V}$	1.97	-	-	$\text{V}$
		$I_O = -3.1\text{ mA}$ ; $V_{CC} = 2.3\text{ V}$	1.85	-	-	$\text{V}$
		$I_O = -2.7\text{ mA}$ ; $V_{CC} = 3.0\text{ V}$	2.67	-	-	$\text{V}$
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 20\text{ }\mu\text{A}$ ; $V_{CC} = 0.8\text{ V}$ to $3.6\text{ V}$	-	-	0.1	$\text{V}$
		$I_O = 1.1\text{ mA}$ ; $V_{CC} = 1.1\text{ V}$	-	-	$0.3 \times V_{CC}$	$\text{V}$
		$I_O = 1.7\text{ mA}$ ; $V_{CC} = 1.4\text{ V}$	-	-	0.37	$\text{V}$
		$I_O = 1.9\text{ mA}$ ; $V_{CC} = 1.65\text{ V}$	-	-	0.35	$\text{V}$
		$I_O = 2.3\text{ mA}$ ; $V_{CC} = 2.3\text{ V}$	-	-	0.33	$\text{V}$
		$I_O = 3.1\text{ mA}$ ; $V_{CC} = 2.3\text{ V}$	-	-	0.45	$\text{V}$
		$I_O = 2.7\text{ mA}$ ; $V_{CC} = 3.0\text{ V}$	-	-	0.33	$\text{V}$
	$I_O = 4.0\text{ mA}$ ; $V_{CC} = 3.0\text{ V}$	-	-	0.45	$\text{V}$	
$I_I$	input leakage current	$V_I = \text{GND}$ to $3.6\text{ V}$ ; $V_{CC} = 0\text{ V}$ to $3.6\text{ V}$	-	-	$\pm 0.5$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_I$ or $V_O = 0\text{ V}$ to $3.6\text{ V}$ ; $V_{CC} = 0\text{ V}$	-	-	$\pm 0.5$	$\mu\text{A}$
$\Delta I_{OFF}$	additional power-off leakage current	$V_I$ or $V_O = 0\text{ V}$ to $3.6\text{ V}$ ; $V_{CC} = 0\text{ V}$ to $0.2\text{ V}$	-	-	$\pm 0.6$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = \text{GND}$ or $V_{CC}$ ; $I_O = 0\text{ A}$ ; $V_{CC} = 0.8\text{ V}$ to $3.6\text{ V}$	-	-	0.9	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	$V_I = V_{CC} - 0.6\text{ V}$ ; $I_O = 0\text{ A}$ ; $V_{CC} = 3.3\text{ V}$ [1]	-	-	50	$\mu\text{A}$

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.75 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.70 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.25 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.30 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</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>IH</sub> or V <sub>IL</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
		V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.75	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	-	-	±0.75	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 8. Dynamic characteristics**

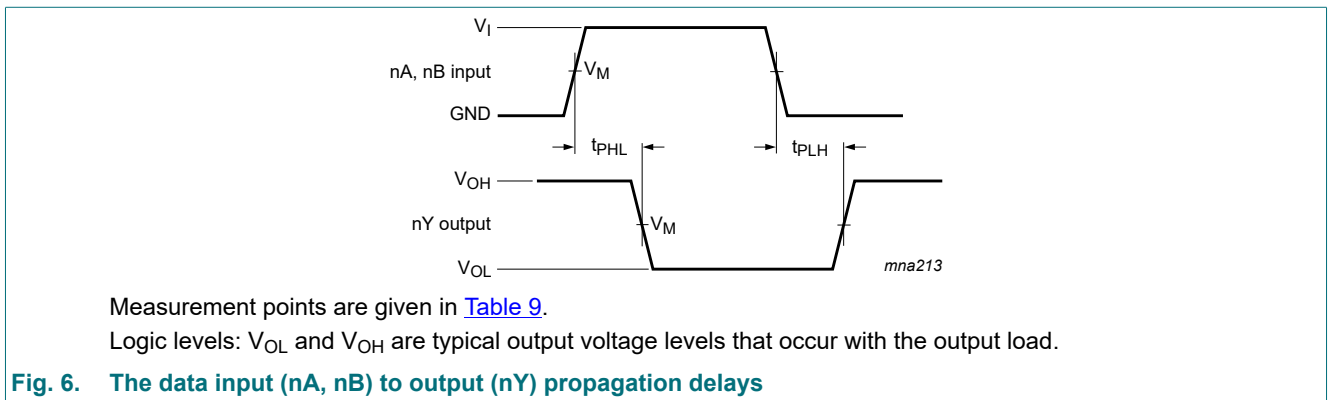
Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 7.

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 5 pF</b>										
t <sub>pd</sub>	propagation delay	nA, nB to nY; see Fig. 6 [2]								
		V <sub>CC</sub> = 0.8 V	-	17.0	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.5	5.1	10.8	2.1	12.1	2.1	13.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.6	3.7	6.7	1.4	7.8	1.4	8.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.3	3.0	5.3	1.1	6.2	1.1	6.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	2.4	3.9	0.9	4.6	0.9	5.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	2.2	3.4	0.8	4.0	0.8	4.4	ns
<b>C<sub>L</sub> = 10 pF</b>										
t <sub>pd</sub>	propagation delay	nA, nB to nY; see Fig. 6 [2]								
		V <sub>CC</sub> = 0.8 V	-	20.4	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	6.0	12.8	2.2	14.3	2.2	15.8	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.9	4.3	7.9	1.7	9.2	1.7	10.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.6	3.6	6.2	1.5	7.3	1.5	8.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.4	3.0	4.7	1.2	5.6	1.2	6.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.3	2.7	4.2	1.2	5.0	1.2	5.5	ns
<b>C<sub>L</sub> = 15 pF</b>										
t <sub>pd</sub>	propagation delay	nA, nB to nY; see Fig. 6 [2]								
		V <sub>CC</sub> = 0.8 V	-	23.9	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.4	6.8	14.6	3.1	16.4	3.1	18.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	4.8	8.9	2.0	10.4	2.0	11.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.9	4.0	7.0	1.7	8.3	1.7	9.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	3.4	5.4	1.5	6.3	1.5	7.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.6	3.2	4.8	1.4	5.7	1.4	6.3	ns
<b>C<sub>L</sub> = 30 pF</b>										
t <sub>pd</sub>	propagation delay	nA, nB to nY; see Fig. 6 [2]								
		V <sub>CC</sub> = 0.8 V	-	34.2	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.6	9.0	19.9	4.1	22.4	4.1	24.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.4	6.4	11.8	2.9	13.9	2.9	15.3	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.6	5.3	9.3	2.3	11.1	2.3	12.3	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.4	4.5	7.1	2.1	8.5	2.1	9.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.3	4.2	6.4	2.1	7.7	2.1	8.5	ns

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
<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> [3]								
		V <sub>CC</sub> = 0.8 V	-	2.6	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	2.7	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	2.8	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	2.9	-	-	-	-	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.3	-	-	-	-	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	3.8	-	-	-	-	-	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.

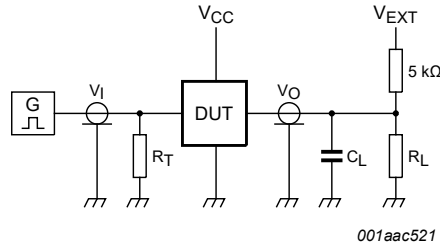
### 11.1. Waveform and test circuit



**Table 9. Measurement points**

Supply voltage	Output	Input		
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>	V <sub>I</sub>	t <sub>r</sub> = t <sub>f</sub>
0.8 V to 3.6 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>	V <sub>CC</sub>	≤ 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. 7. 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]  $R_L = 5 \text{ k}\Omega$  when measuring enable and disable times.

$R_L = 1 \text{ M}\Omega$  when measuring propagation delays, set-up and hold times and pulse width.

## 12. Package outline

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

SOT765-1

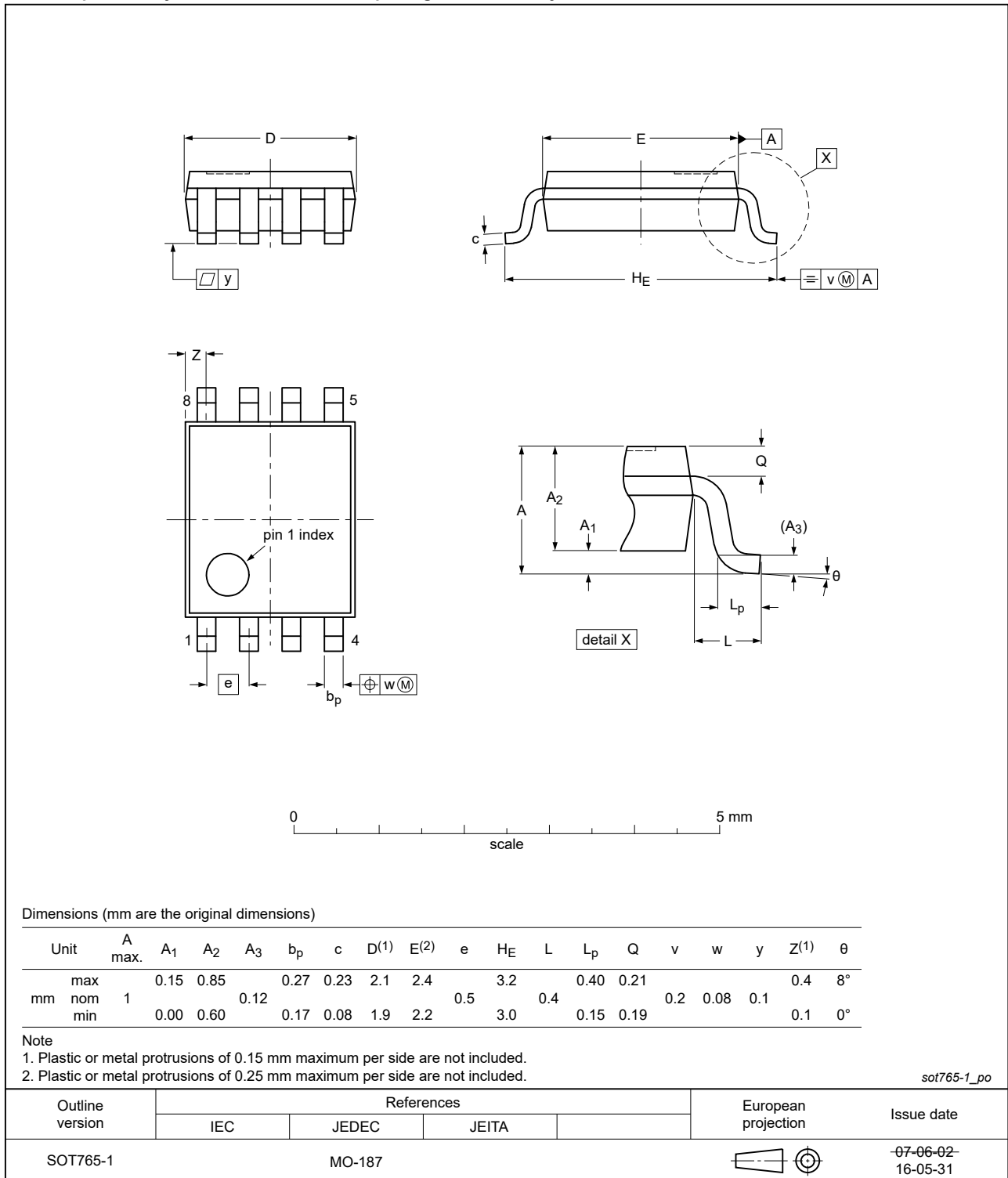


Fig. 8. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

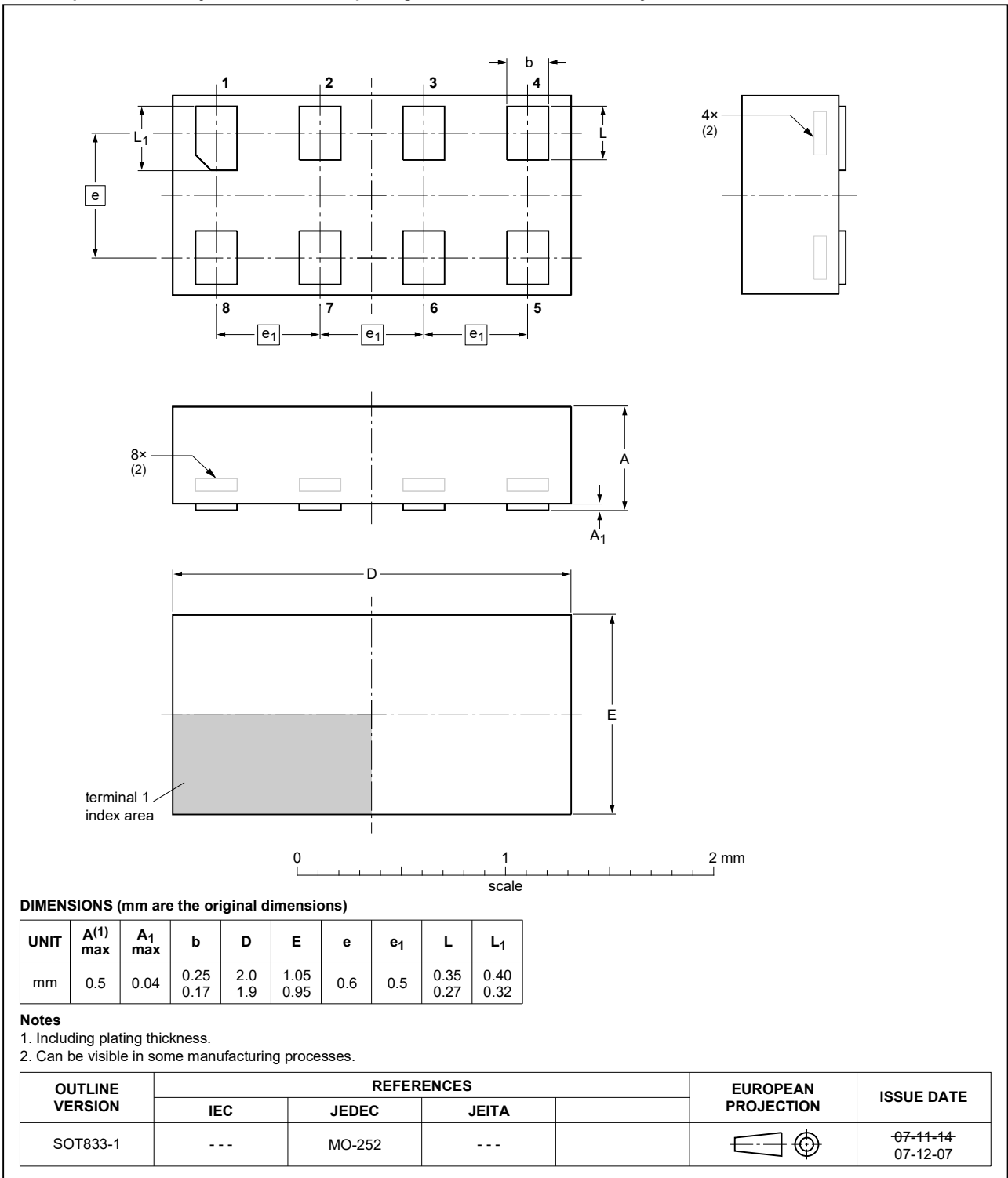


Fig. 9. Package outline SOT833-1 (XSON8)

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

SOT1089

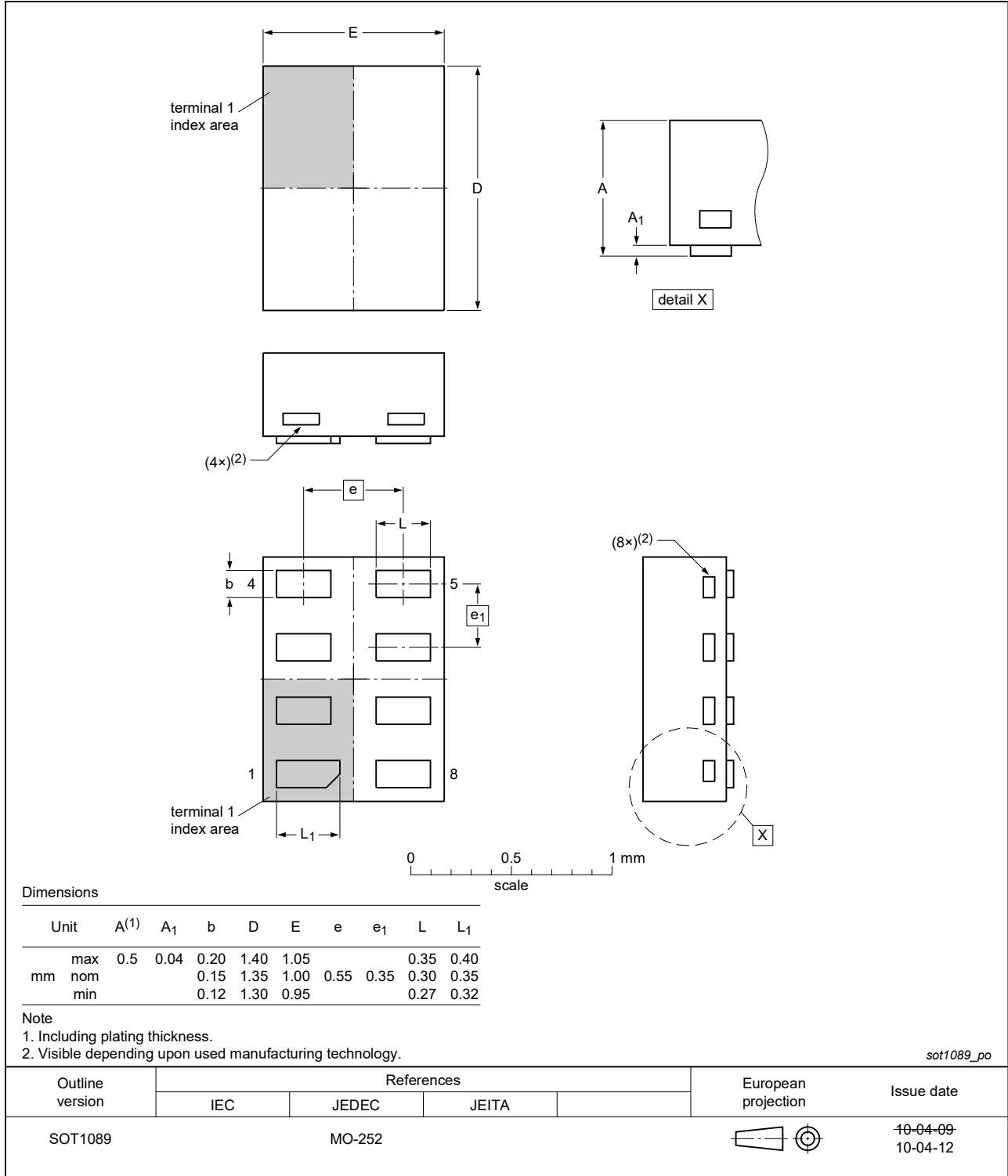


Fig. 10. Package outline SOT1089 (XSON8)

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

SOT1116

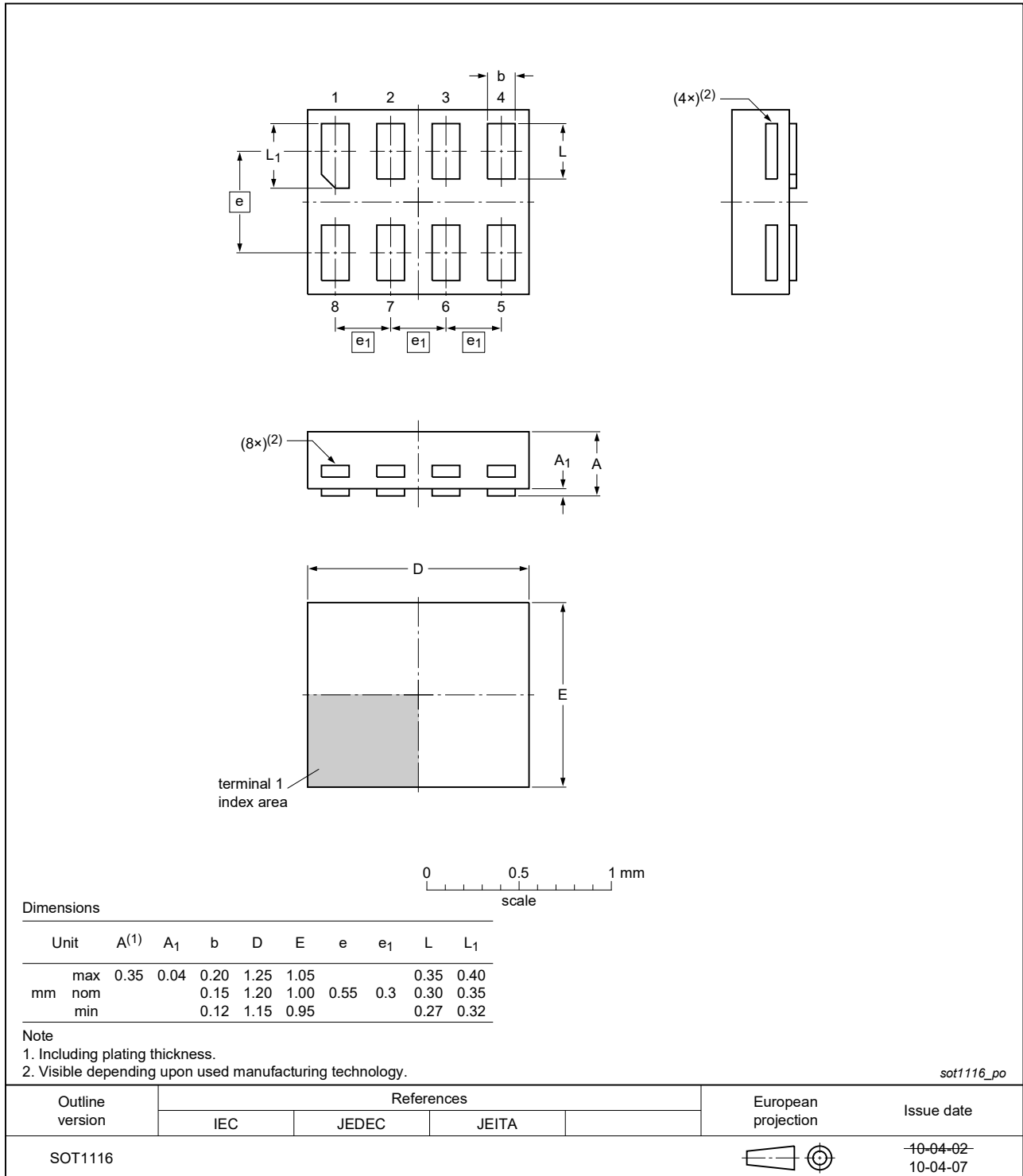


Fig. 11. Package outline SOT1116 (XSON8)

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

SOT1203

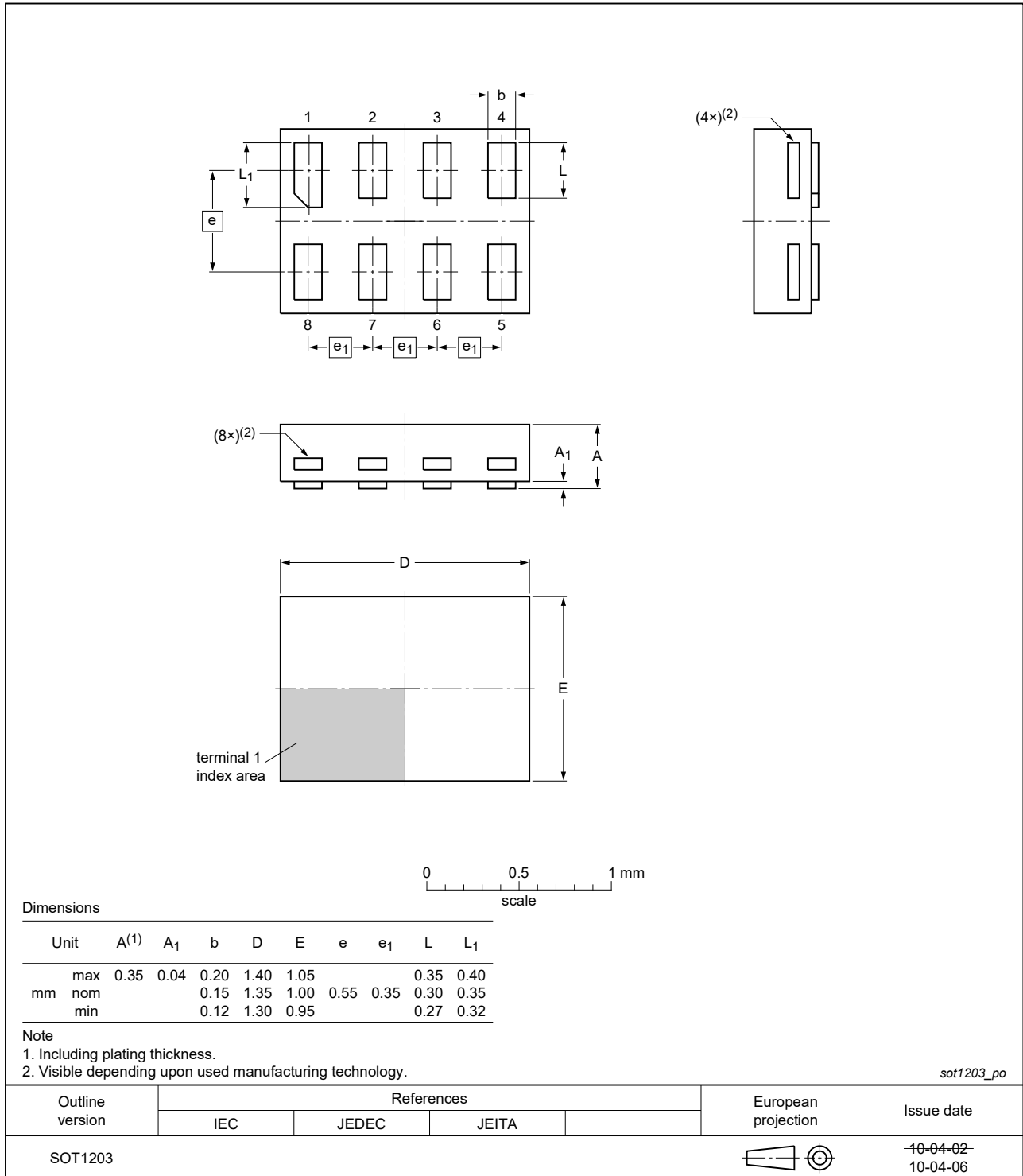


Fig. 12. Package outline SOT1203 (XSON8)

## 13. Abbreviations

Table 11. Abbreviations

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

## 14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP2G02 v.9	20210727	Product data sheet	-	74AUP2G02 v.8
Modifications:	<ul style="list-style-type: none"> <li>Type number 74AUP2G02GM SOT902-2 (XQFN8) removed.</li> <li><a href="#">Section 1</a> updated.</li> <li><a href="#">Section 8</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul>			
74AUP2G02 v.8	20190212	Product data sheet	-	74AUP2G02 v.7
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Type number 74AUP2G02GD SOT996-2 (XSON8) removed.</li> <li>Package outline drawing <a href="#">Fig. 8</a> SOT765-1 (VSSOP8) updated.</li> <li>Package outline drawing SOT902-2 (XQFN8) updated.</li> </ul>			
74AUP2G02 v.7	20130204	Product data sheet	-	74AUP2G02 v.6
Modifications:	<ul style="list-style-type: none"> <li>For type number 74AUP2G02GD XSON8U has changed to XSON8.</li> </ul>			
74AUP2G02 v.6	20120803	Product data sheet	-	74AUP2G02 v.5
74AUP2G02 v.5	20111202	Product data sheet	-	74AUP2G02 v.4
74AUP2G02 v.4	20101109	Product data sheet	-	74AUP2G02 v.3
74AUP2G02 v.3	20081211	Product data sheet	-	74AUP2G02 v.2
74AUP2G02 v.2	20080319	Product data sheet	-	74AUP2G02 v.1
74AUP2G02 v.1	20060828	Product data sheet	-	-

## 15. 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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