



74AUP3G3404

Low-power dual buffer and single inverter

Rev. 5 — 29 April 2024

Product data sheet

1. General description

The 74AUP3G3404 is a dual buffer and single inverter.

Schmitt trigger action at all inputs makes the circuit tolerant of slower input rise and fall times across the entire V_{CC} range from 0.8 V to 3.6 V.

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.

2. Features and benefits

- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- Low static power consumption; $I_{CC} = 0.9 \mu\text{A}$ (maximum)
- Latch-up performance exceeds 100 mA per JESD 78B 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
- 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: ANSI/ESDA/JEDEC JS-001 class 3A exceeds 5000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AUP3G3404DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP3G3404GT	-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
74AUP3G3404GN	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	SOT1116
74AUP3G3404GS	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203

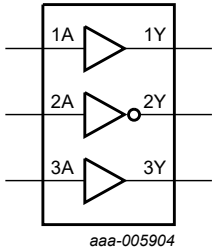
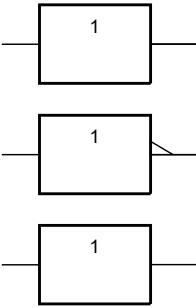
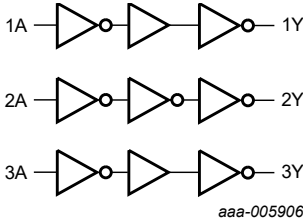
4. Marking

Table 2. Marking codes

Type number	Marking code[1]
74AUP3G3404DC	aZ
74AUP3G3404GT	aZ
74AUP3G3404GN	aZ
74AUP3G3404GS	aZ

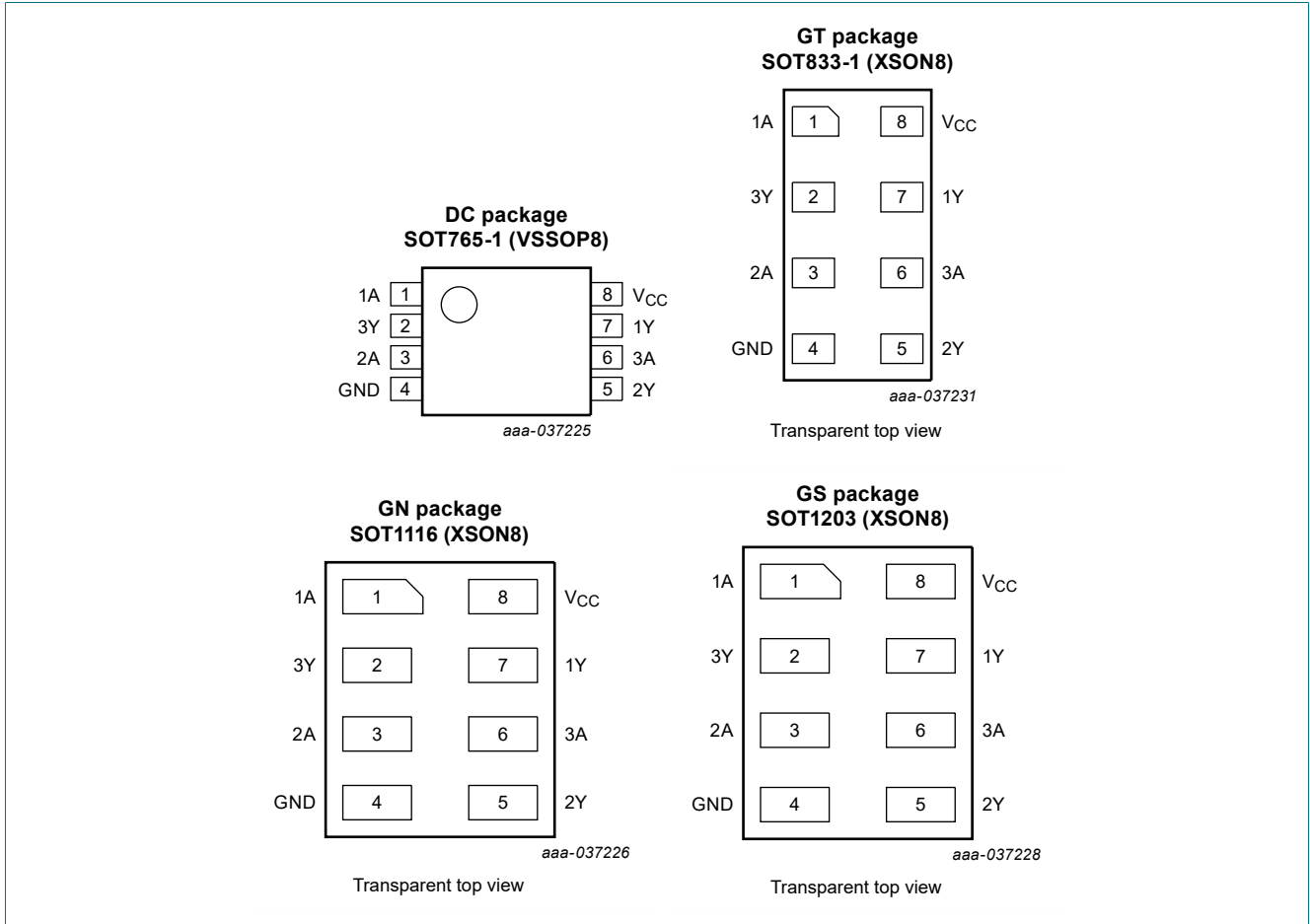
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram

 <p>aaa-005904</p>	 <p>aaa-005905</p>	 <p>aaa-005906</p>
Fig. 1. Logic symbol	Fig. 2. IEC logic symbol	Fig. 3. Logic diagram

6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
1A, 2A, 3A	1, 3, 6	data input
1Y, 2Y, 3Y	7, 5, 2	data output
GND	4	ground (0 V)
V _{CC}	8	supply voltage

7. Functional description

Table 4. Function table

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

Input	Output
1A, 3A	1Y, 3Y
L	L
H	H

Table 5. Function table

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

Input	Output
2A	2Y
L	H
H	L

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		-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	-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	-	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_{tot} derates linearly with 4.9 mW/K above 99 °C.
 For SOT833-1 (XSON8) package: P_{tot} derates linearly with 3.1 mW/K above 68 °C.
 For SOT1116 (XSON8) package: P_{tot} derates linearly with 4.2 mW/K above 90 °C.
 For SOT1203 (XSON8) package: P_{tot} derates linearly with 3.6 mW/K above 81 °C.

9. Recommended operating conditions

Table 7. 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	-	200	ns/V

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
T_{amb} = 25 °C						
V _{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	0.70V _{CC}	-	-	V
		V _{CC} = 0.9 V to 1.95 V	0.65V _{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	-	-	0.30V _{CC}	V
		V _{CC} = 0.9 V to 1.95 V	-	-	0.35V _{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 μA; V _{CC} = 0.8 V to 3.6 V	V _{CC} - 0.1	-	-	V
		I _O = -1.1 mA; V _{CC} = 1.1 V	0.75V _{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 μA; V _{CC} = 0.8 V to 3.6 V	-	-	0.1	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.3V _{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 _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.44	V		
I _I	input leakage current	V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.1	μA
I _{OFF}	power-off leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V	-	-	±0.2	μA
ΔI _{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	-	-	±0.2	μA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 0.8 V to 3.6 V	-	-	0.5	μA
ΔI _{CC}	additional supply current	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	-	-	40	μA
C _I	input capacitance	V _{CC} = 0 V to 3.6 V; V _I = GND or V _{CC}	-	1.0	-	pF
C _O	output capacitance	V _O = GND; V _{CC} = 0 V	-	1.8	-	pF

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = -40 °C to +85 °C						
V _{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	0.70V _{CC}	-	-	V
		V _{CC} = 0.9 V to 1.95 V	0.65V _{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	-	-	0.30V _{CC}	V
		V _{CC} = 0.9 V to 1.95 V	-	-	0.35V _{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 µA; V _{CC} = 0.8 V to 3.6 V	V _{CC} - 0.1	-	-	V
		I _O = -1.1 mA; V _{CC} = 1.1 V	0.7V _{CC}	-	-	V
		I _O = -1.7 mA; V _{CC} = 1.4 V	1.03	-	-	V
		I _O = -1.9 mA; V _{CC} = 1.65 V	1.30	-	-	V
		I _O = -2.3 mA; V _{CC} = 2.3 V	1.97	-	-	V
		I _O = -3.1 mA; V _{CC} = 2.3 V	1.85	-	-	V
		I _O = -2.7 mA; V _{CC} = 3.0 V	2.67	-	-	V
		I _O = -4.0 mA; V _{CC} = 3.0 V	2.55	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}				
		I _O = 20 µA; V _{CC} = 0.8 V to 3.6 V	-	-	0.1	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.3V _{CC}	V
		I _O = 1.7 mA; V _{CC} = 1.4 V	-	-	0.37	V
		I _O = 1.9 mA; V _{CC} = 1.65 V	-	-	0.35	V
		I _O = 2.3 mA; V _{CC} = 2.3 V	-	-	0.33	V
		I _O = 3.1 mA; V _{CC} = 2.3 V	-	-	0.45	V
		I _O = 2.7 mA; V _{CC} = 3.0 V	-	-	0.33	V
		I _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.45	V
I _I	input leakage current	V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.5	µA
I _{OFF}	power-off leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V	-	-	±0.5	µA
ΔI _{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	-	-	±0.6	µA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 0.8 V to 3.6 V	-	-	0.9	µA
ΔI _{CC}	additional supply current	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	-	-	50	µA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = -40 °C to +125 °C						
V _{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	0.75V _{CC}	-	-	V
		V _{CC} = 0.9 V to 1.95 V	0.70V _{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	-	-	0.25V _{CC}	V
		V _{CC} = 0.9 V to 1.95 V	-	-	0.30V _{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 µA; V _{CC} = 0.8 V to 3.6 V	V _{CC} - 0.11	-	-	V
		I _O = -1.1 mA; V _{CC} = 1.1 V	0.6V _{CC}	-	-	V
		I _O = -1.7 mA; V _{CC} = 1.4 V	0.93	-	-	V
		I _O = -1.9 mA; V _{CC} = 1.65 V	1.17	-	-	V
		I _O = -2.3 mA; V _{CC} = 2.3 V	1.77	-	-	V
		I _O = -3.1 mA; V _{CC} = 2.3 V	1.67	-	-	V
		I _O = -2.7 mA; V _{CC} = 3.0 V	2.40	-	-	V
		I _O = -4.0 mA; V _{CC} = 3.0 V	2.30	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}				
		I _O = 20 µA; V _{CC} = 0.8 V to 3.6 V	-	-	0.11	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.33V _{CC}	V
		I _O = 1.7 mA; V _{CC} = 1.4 V	-	-	0.41	V
		I _O = 1.9 mA; V _{CC} = 1.65 V	-	-	0.39	V
		I _O = 2.3 mA; V _{CC} = 2.3 V	-	-	0.36	V
		I _O = 3.1 mA; V _{CC} = 2.3 V	-	-	0.50	V
		I _O = 2.7 mA; V _{CC} = 3.0 V	-	-	0.36	V
		I _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.50	V
I _I	input leakage current	V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.75	µA
I _{OFF}	power-off leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V	-	-	±0.75	µA
ΔI _{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	-	-	±0.75	µA
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	µA
ΔI _{CC}	additional supply current	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	-	-	75	µA

11. Dynamic characteristics

Table 9. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 5.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
C_L = 5 pF										
t _{pd}	propagation delay	nA to nY; see Fig. 4 [2]								
		V _{CC} = 0.8 V	-	16.0	-	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	2.4	5.0	10.3	2.0	11.4	2.0	12.6	ns
		V _{CC} = 1.4 V to 1.6 V	1.8	3.6	6.4	1.6	7.4	1.6	8.2	ns
		V _{CC} = 1.65 V to 1.95 V	1.5	2.9	5.0	1.4	5.9	1.4	6.5	ns
		V _{CC} = 2.3 V to 2.7 V	1.2	2.4	3.9	1.1	4.5	1.1	5.0	ns
C_L = 10 pF										
t _{pd}	propagation delay	nA to nY; see Fig. 4 [2]								
		V _{CC} = 0.8 V	-	19.8	-	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	2.8	5.9	12.2	2.3	13.7	2.3	15.1	ns
		V _{CC} = 1.4 V to 1.6 V	2.3	4.2	7.5	1.9	8.7	1.9	9.6	ns
		V _{CC} = 1.65 V to 1.95 V	2.0	3.5	5.9	1.7	7.0	1.7	7.7	ns
		V _{CC} = 2.3 V to 2.7 V	1.7	2.9	4.6	1.5	5.4	1.5	6.0	ns
C_L = 15 pF										
t _{pd}	propagation delay	nA to nY; see Fig. 4 [2]								
		V _{CC} = 0.8 V	-	23.3	-	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	3.2	6.7	13.0	2.6	15.8	2.6	17.4	ns
		V _{CC} = 1.4 V to 1.6 V	2.6	4.7	8.6	2.2	10.0	2.2	11.0	ns
		V _{CC} = 1.65 V to 1.95 V	2.3	4.0	6.7	2.0	8.0	2.0	8.8	ns
		V _{CC} = 2.3 V to 2.7 V	2.1	3.3	5.1	1.8	6.1	1.8	6.8	ns
C_L = 30 pF										
t _{pd}	propagation delay	nA to nY; see Fig. 4 [2]								
		V _{CC} = 0.8 V	-	33.6	-	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	4.4	8.9	16.3	3.6	19.0	3.6	20.9	ns
		V _{CC} = 1.4 V to 1.6 V	3.6	6.3	10.8	3.2	12.9	3.2	14.2	ns
		V _{CC} = 1.65 V to 1.95 V	3.2	5.3	9.0	2.9	10.5	2.9	11.6	ns
		V _{CC} = 2.3 V to 2.7 V	2.9	4.5	6.5	2.6	7.6	2.6	8.5	ns
C_L = 30 pF										
t _{pd}	propagation delay	V _{CC} = 3.0 V to 3.6 V	2.9	4.2	5.6	2.5	6.2	2.5	7.2	ns

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
C_L = 5 pF, 10 pF, 15 pF and 30 pF										
C _{PD}	power dissipation capacitance	f _i = 1 MHz; V _I = GND to V _{CC} [3] [4]								
		V _{CC} = 0.8 V	-	2.5	-	-	-	-	-	pF
		V _{CC} = 1.1 V to 1.3 V	-	2.7	-	-	-	-	-	pF
		V _{CC} = 1.4 V to 1.6 V	-	2.8	-	-	-	-	-	pF
		V _{CC} = 1.65 V to 1.95 V	-	3.0	-	-	-	-	-	pF
		V _{CC} = 2.3 V to 2.7 V	-	3.5	-	-	-	-	-	pF
		V _{CC} = 3.0 V to 3.6 V	-	4.0	-	-	-	-	-	pF

- [1] All typical values are measured at nominal V_{CC}.
- [2] t_{pd} is the same as t_{PLH} and t_{PHL}.
- [3] All specified values are the average typical values over all stated loads.
- [4] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$ where:
 f_i = input frequency in MHz;
 f_o = output frequency in MHz;
 C_L = load capacitance in pF;
 V_{CC} = supply voltage in V;
 N = number of inputs switching;
 $\sum(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

11.1. Waveforms and test circuit

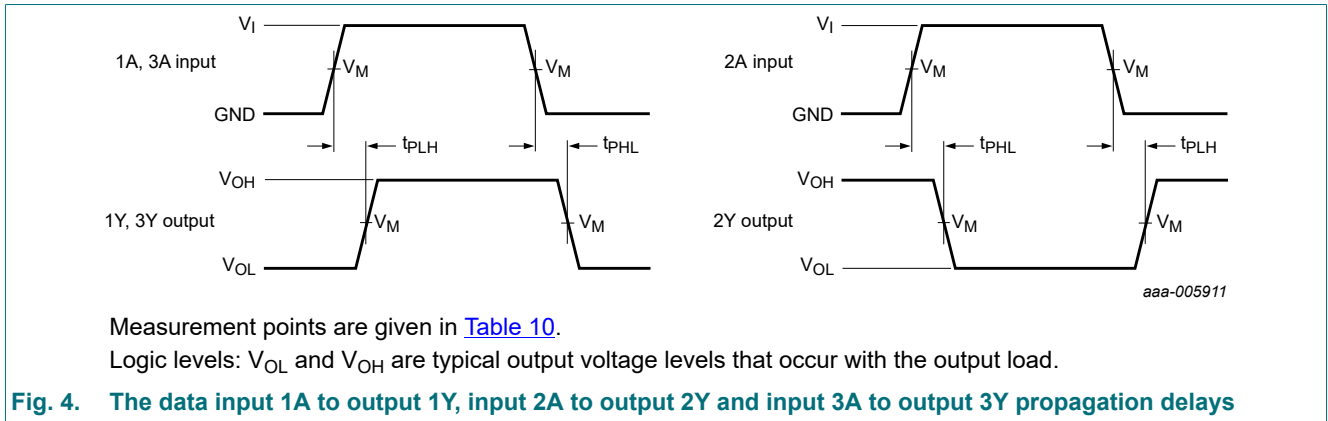


Table 10. Measurement points

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}	0.5V _{CC}	V _{CC}	≤ 3.0 ns

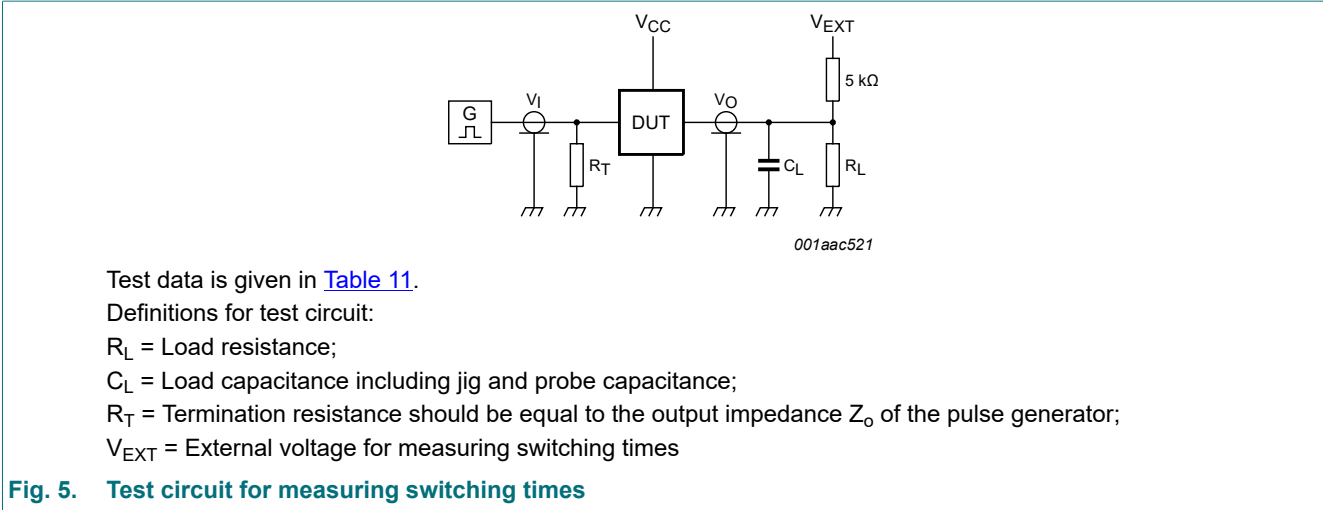


Fig. 5. Test circuit for measuring switching times

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, $R_L = 5\text{ k}\Omega$.
 For measuring propagation delays, setup and hold times, and pulse width, $R_L = 1\text{ M}\Omega$.

12. Package outline

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

SOT765-1

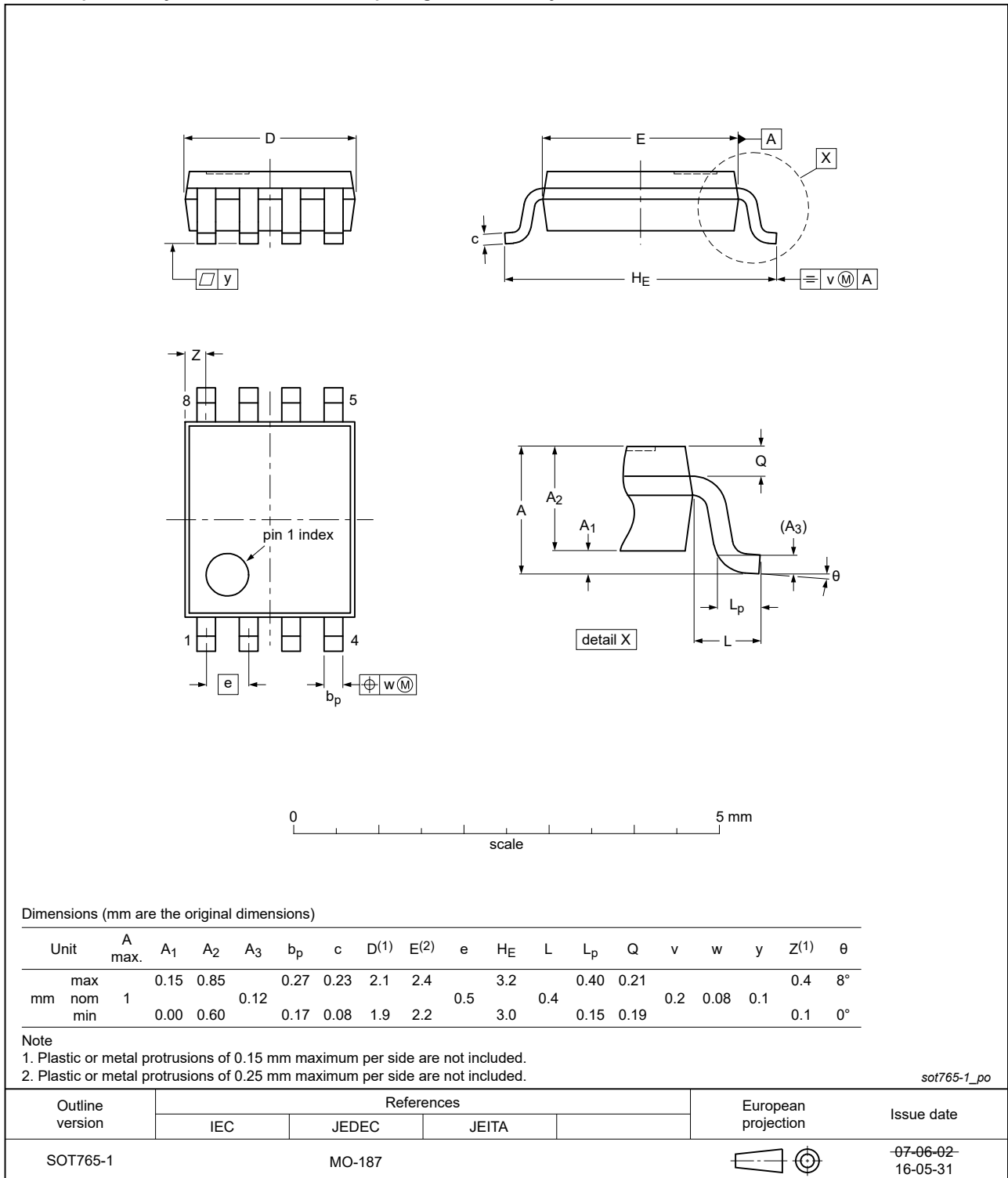


Fig. 6. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

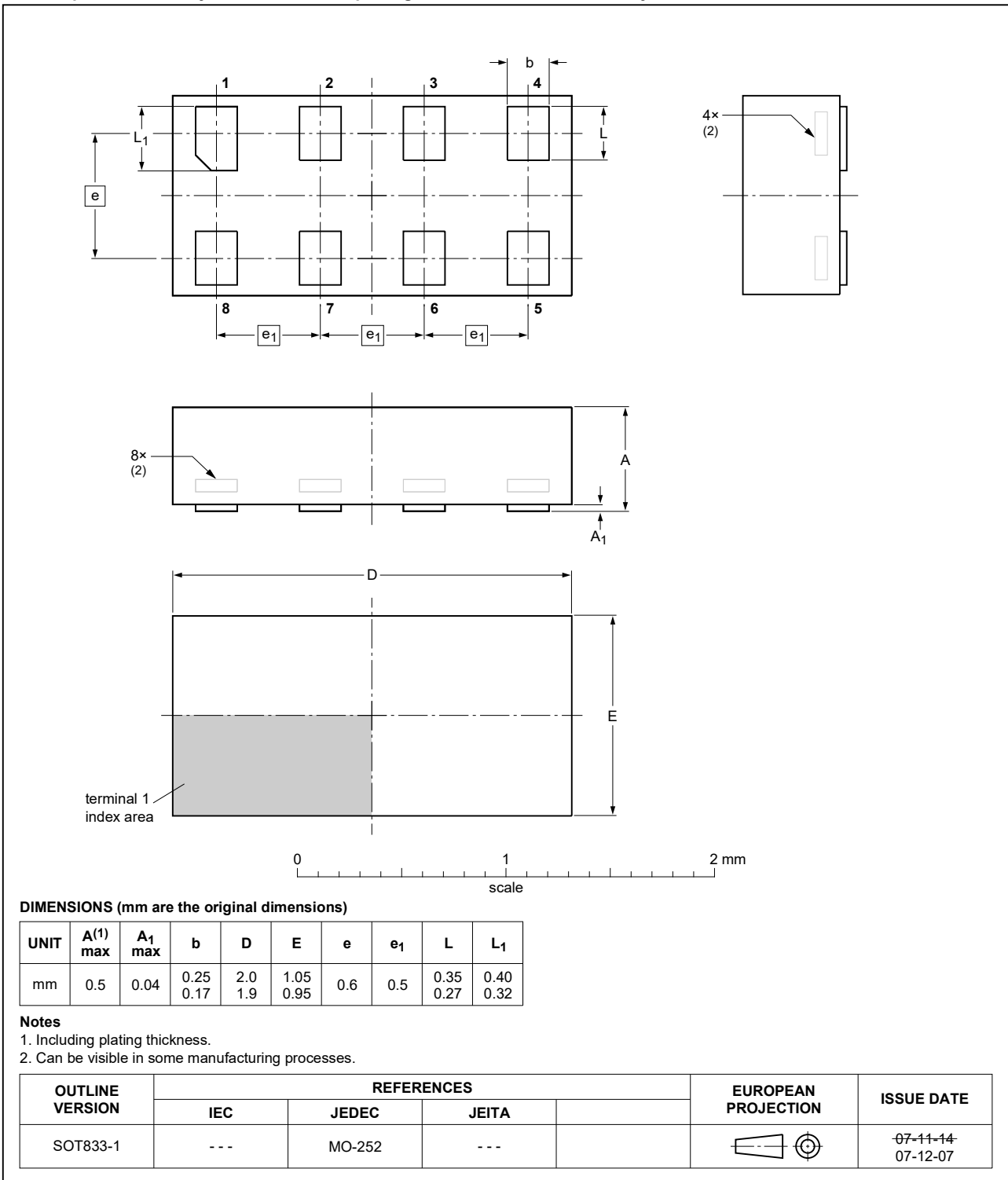


Fig. 7. Package outline SOT833-1 (XSON8)

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

SOT1116

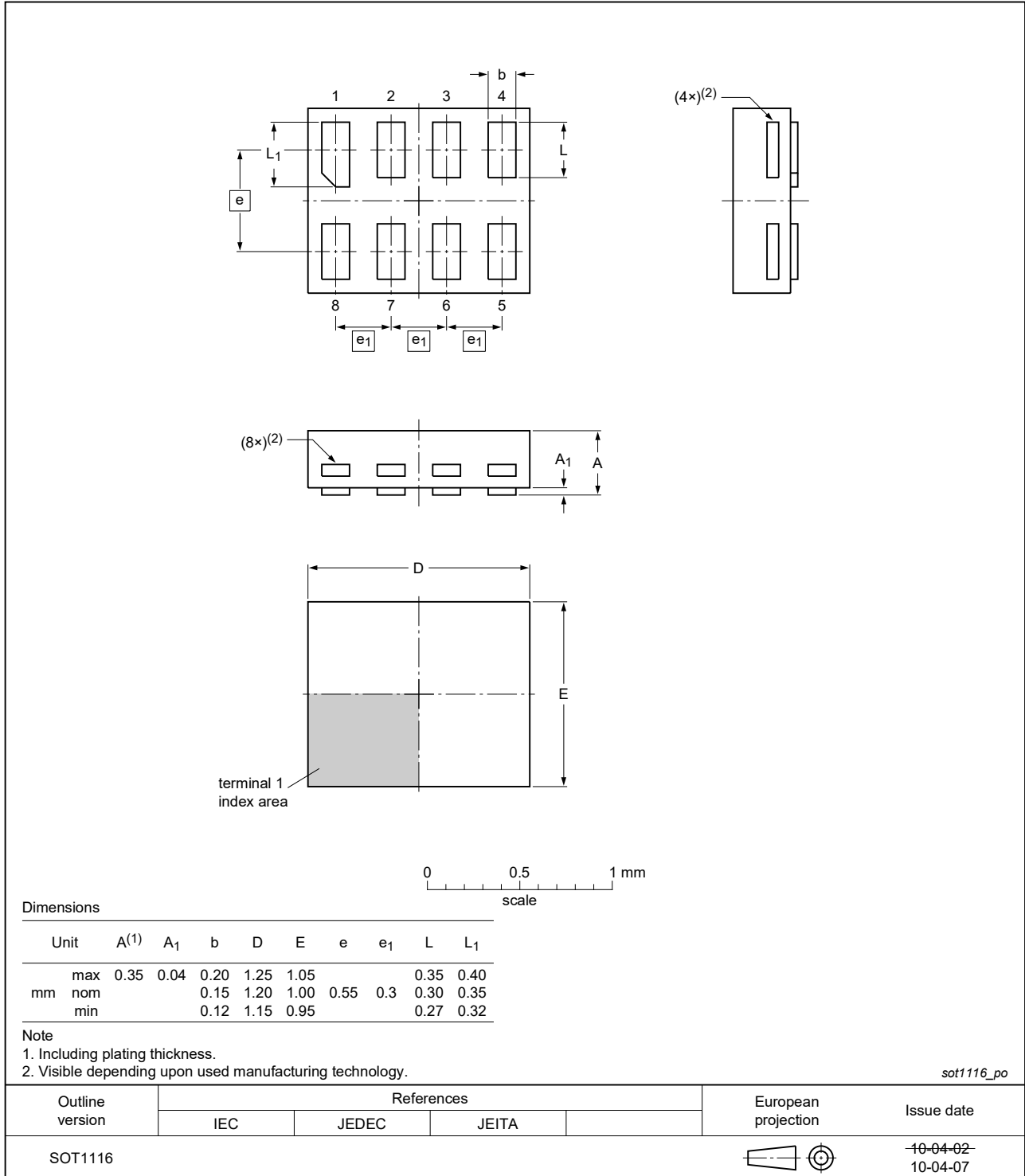


Fig. 8. Package outline SOT1116 (XSON8)

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

SOT1203

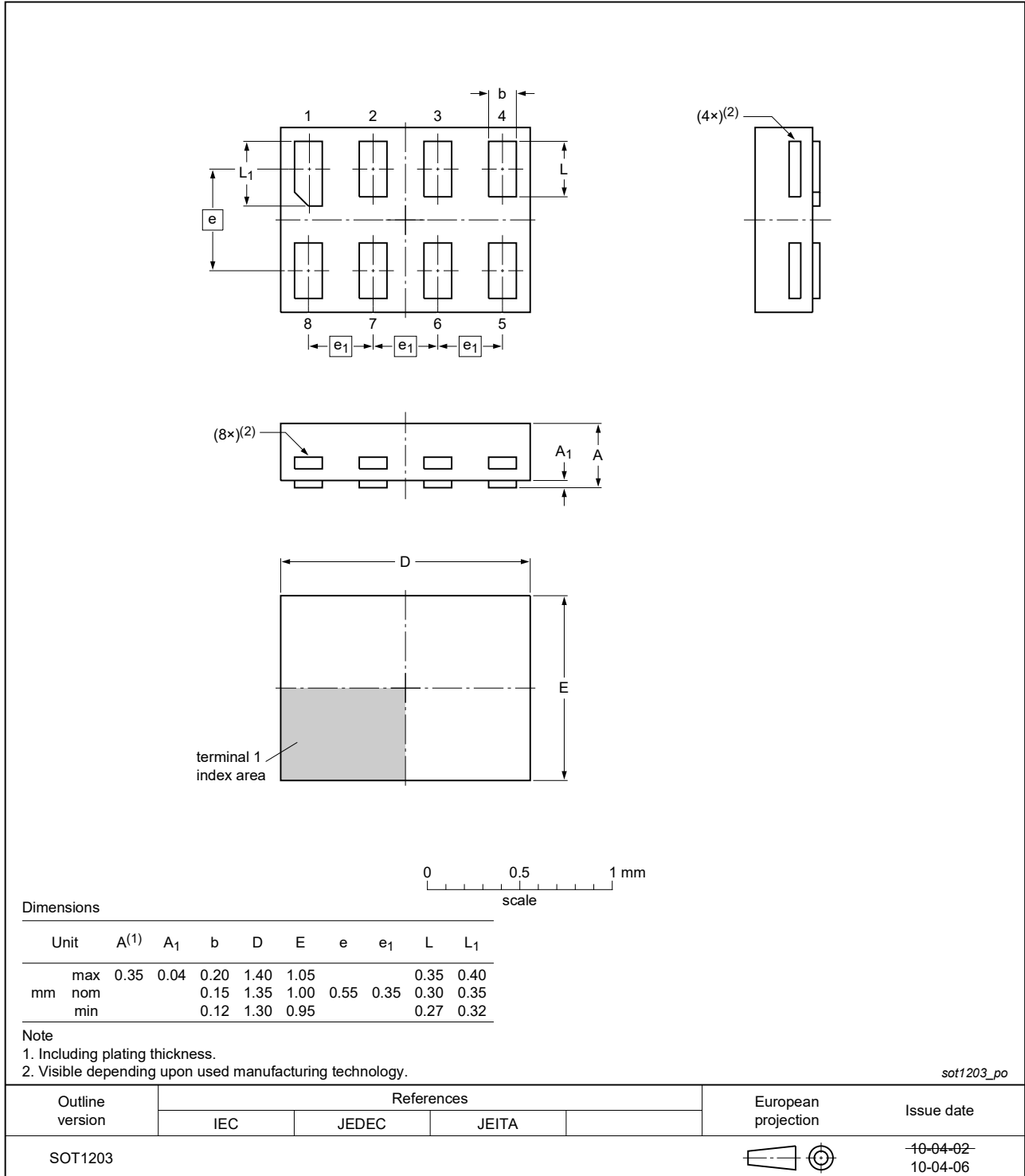


Fig. 9. Package outline SOT1203 (XSON8)

13. Abbreviations

Table 12. Abbreviations

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

14. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP3G3404 v.5	20240429	Product data sheet	-	74AUP3G3404 v.4
Modifications:	<ul style="list-style-type: none"> Type number 74AUP3G3404GF (SOT1089/XSON8) removed. 			
74AUP3G3404 v.4	20230728	Product data sheet	-	74AUP3G3404 v.3
Modifications:	<ul style="list-style-type: none"> Section 2: ESD specification updated according to the latest JEDEC standard. 			
74AUP3G3404 v.3	20210113	Product data sheet	-	74AUP3G3404 v.2
Modifications:	<ul style="list-style-type: none"> Type number 74AUP3G3404GM (SOT902-2/XQFN8) removed. Section 8: Derating values for P_{tot} total power dissipation updated. 			
74AUP3G3404 v.2	20190426	Product data sheet	-	74AUP3G3404 v.1
Modifications:	<ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Type number 74AUP3G3404GD (SOT996-2/XSON8) removed. Package outline drawing SOT765-1 and SOT902-2 updated. 			
74AUP3G3404 v.1	20130114	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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