

# 74LVC1G99

Ultra-configurable multiple function gate; 3-state

Rev. 5 — 21 October 2010

Product data sheet

## 1. General description

The 74LVC1G99 provides a low voltage, ultra-configurable, multiple function gate with 3-state output. The device can be configured as one of several logic functions including, AND, OR, NAND, NOR, XOR, XNOR, inverter, buffer and MUX. No external components are required to configure the device as all inputs can be connected directly to  $V_{CC}$  or  $\overline{GND}$ . The 3-state output is controlled by the output enable input ( $\overline{OE}$ ). A HIGH level at  $\overline{OE}$  causes the output (Y) to assume a high-impedance OFF-state. When  $\overline{OE}$  is LOW, the output state is determined by the signals applied to the Schmitt-trigger inputs (A, B, C and D).

Due to the use of Schmitt-trigger inputs the device is tolerant of slowly changing input signals, transforming them into sharply defined, jitter free output signals. By eliminating leakage current paths to  $V_{CC}$  and GND, the inputs and disabled output are also over-voltage tolerant, making the device suitable for mixed-voltage applications.

This device is fully specified for partial power-down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

The 74LVC1G99 is fully specified over the supply range from 1.65 V to 5.5 V.

## 2. Features and benefits

- Wide supply voltage range from 1.65 V to 5.5 V
- 5 V tolerant inputs for interfacing with 5 V logic
- High noise immunity
- Complies with JEDEC standard:
  - ◆ JESD8-7 (1.65 V to 1.95 V)
  - ◆ JESD8-5 (2.3 V to 2.7 V)
  - ◆ JESD8-B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- $\pm 24$  mA output drive ( $V_{CC} = 3.0$  V)
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 5 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			
	Temperature range	Name	Description	Version
74LVC1G99DP	-40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74LVC1G99GT	-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
74LVC1G99GF	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1 × 0.5 mm	SOT1089
74LVC1G99GD	-40 °C to +125 °C	XSON8U	plastic extremely thin small outline package; no leads; 8 terminals; UTLP based; body 3 × 2 × 0.5 mm	SOT996-2
74LVC1G99GM	-40 °C to +125 °C	XQFN8U	plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 × 1.6 × 0.5 mm	SOT902-1
74LVC1G99GN	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	SOT1116
74LVC1G99GS	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203

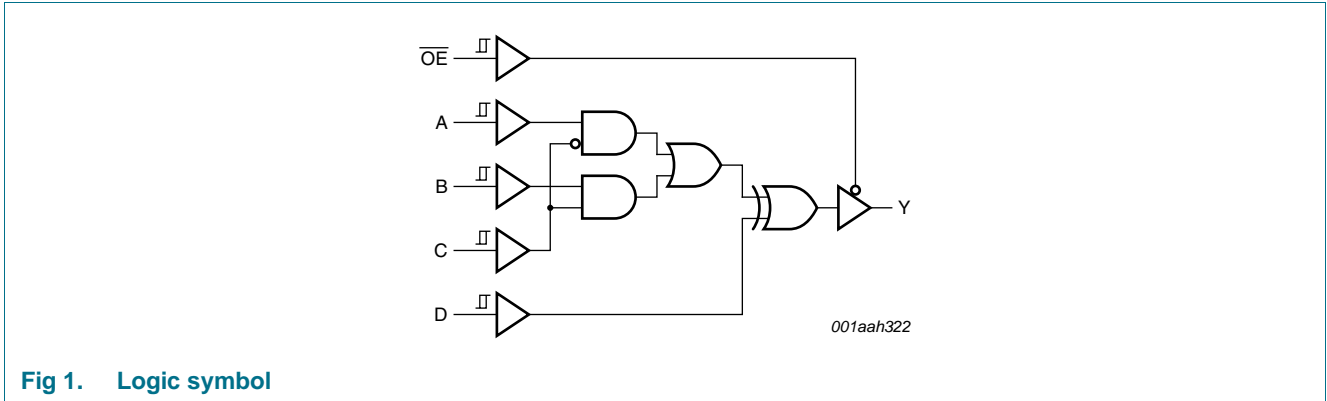
### 4. Marking

Table 2. Marking codes

Type number	Marking code <sup>[1]</sup>
74LVC1G99DP	V99
74LVC1G99GT	V99
74LVC1G99GF	YF
74LVC1G99GD	V99
74LVC1G99GM	V99
74LVC1G99GN	YF
74LVC1G99GS	YF

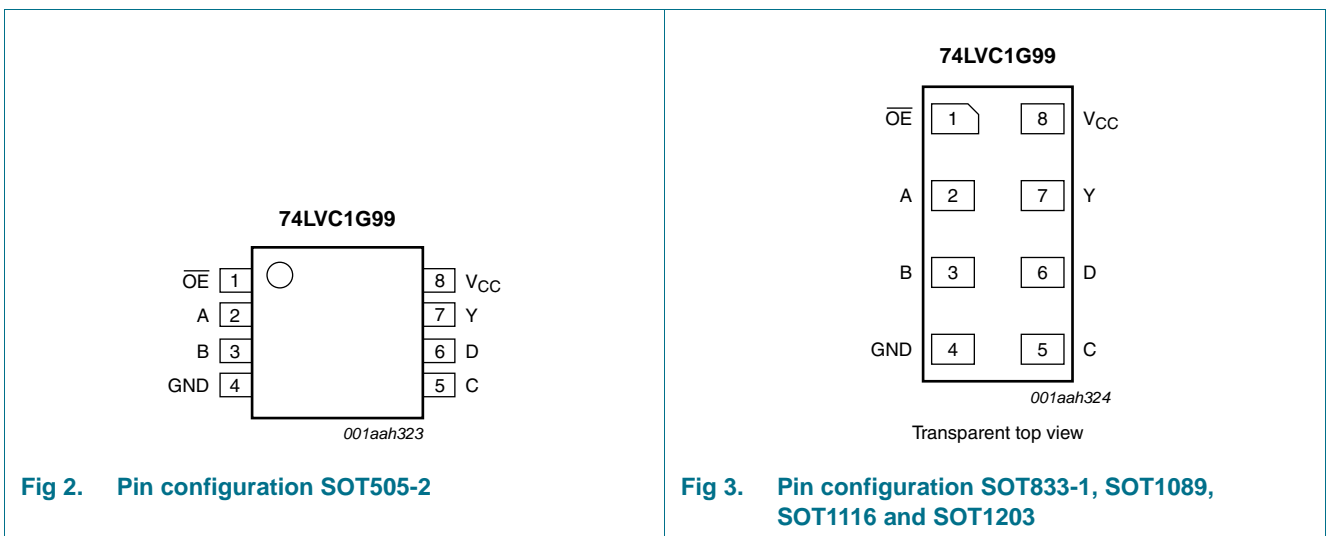
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

## 5. Functional diagram



## 6. Pinning information

### 6.1 Pinning



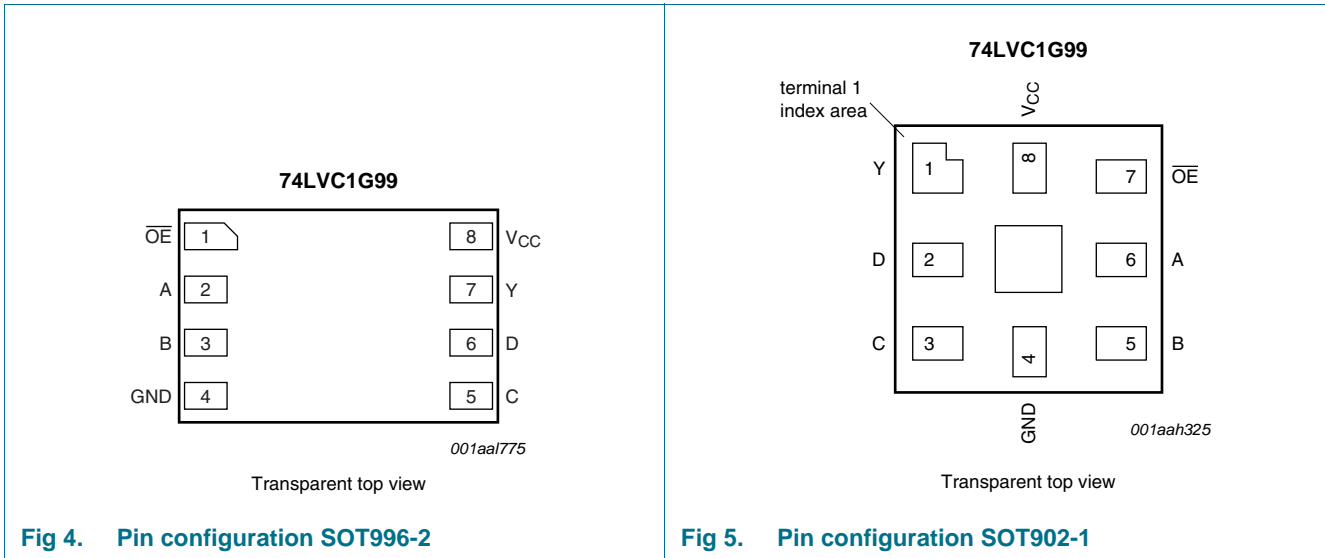


Fig 4. Pin configuration SOT996-2

Fig 5. Pin configuration SOT902-1

### 6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT505-2, SOT833-1, SOT1089, SOT1116, SOT1203 and SOT996-2	SOT902-1	
$\overline{OE}$	1	7	output enable input $\overline{OE}$ (active LOW)
A	2	6	data input
B	3	5	data input
GND	4	4	ground (0 V)
C	5	3	data input
D	6	2	data input
Y	7	1	data output
V <sub>CC</sub>	8	8	supply voltage

## 7. Functional description

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

Input					Output
$\overline{\text{OE}}$	D	C	B	A	Y
L	L	L	L	L	L
L	L	L	L	H	H
L	L	L	H	L	L
L	L	L	H	H	H
L	L	H	L	L	L
L	L	H	L	H	L
L	L	H	H	L	H
L	L	H	H	H	H
L	H	L	L	L	H
L	H	L	L	H	L
L	H	L	H	L	H
L	H	L	H	H	L
L	H	H	L	L	H
L	H	H	L	H	H
L	H	H	H	L	L
L	H	H	H	H	L
H	X	X	X	X	Z

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

### 7.1 Logic configurations

Table 5. Function selection table

Primary function	Complementary function
3-state buffer	
3-state inverter	
3-state 2-input multiplexer	
3-state 2-input multiplexer with inverting output	
3-state 2-input AND	3-state 2-input NOR with two inverting inputs
3-state 2-input AND with one inverting input	3-state 2-input NOR with one inverting input
3-state 2-input AND with two inverting inputs	3-state 2-input NOR
3-state 2-input NAND	3-state 2-input OR with two inverting inputs
3-state 2-input NAND with one inverting input	3-state 2-input OR with one inverting input
3-state 2-input NAND with two inverting inputs	3-state 2-input OR
3-state 2-input XOR	
3-state 2-input XNOR	3-state 2-input XOR with one inverting input

### 7.2 3-state buffer functions available

Table 6. Function table<sup>[1]</sup>

See Figure 6.

Function	Input				
	$\overline{OE}$	A	B	C	D
3-state buffer	L	input	H or L	L	L
	L	H or L	input	H	L
	L	L	H	input	L
	L	H	L	input	H
	L	H	H or L	L	input
	L	H or L	L	H	input
	L	L	L	H or L	input

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

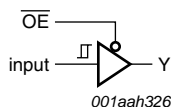


Fig 6. 3-state buffer function

### 7.3 3-state inverter functions available

Table 7. Function table<sup>[1]</sup>  
See Figure 7.

Function	Input				
	$\overline{\text{OE}}$	A	B	C	D
3-state inverter	L	input	H or L	L	H
	L	X	input	H	H
	L	L	H	input	H
	L	H	L	input	L
	L	H	H or L	L	input
	L	H or L	H	H	input
	L	H	H	H or L	input

[1] H = HIGH voltage level;  
L = LOW voltage level.  
X = don't care.

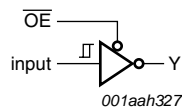


Fig 7. 3-state inverter function

### 7.4 3-state multiplexer functions available

Table 8. Function table<sup>[1]</sup>  
See Figure 8.

Function	Input				
	$\overline{\text{OE}}$	A	B	C	D
3-state 2-input multiplexer	L	input 1	input 2	$\overline{\text{input 1}}$ or input 2	L
	L	input 2	input 1	$\overline{\text{input 2}}$ or input 1	L
	L	input 1	input 2	$\overline{\text{input 1}}$ or input 2	H
	L	input 2	input 1	$\overline{\text{input 2}}$ or input 1	H

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

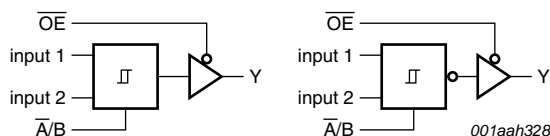


Fig 8. 3-state 2-input multiplexer function

7.5 3-state AND/NOR functions available

Table 9. Function table<sup>[1]</sup>

See Figure 9.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state AND	3-state NOR	L	L	input 1	input 2	L
2	3-state AND	3-state NOR	L	L	input 2	input 1	L

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

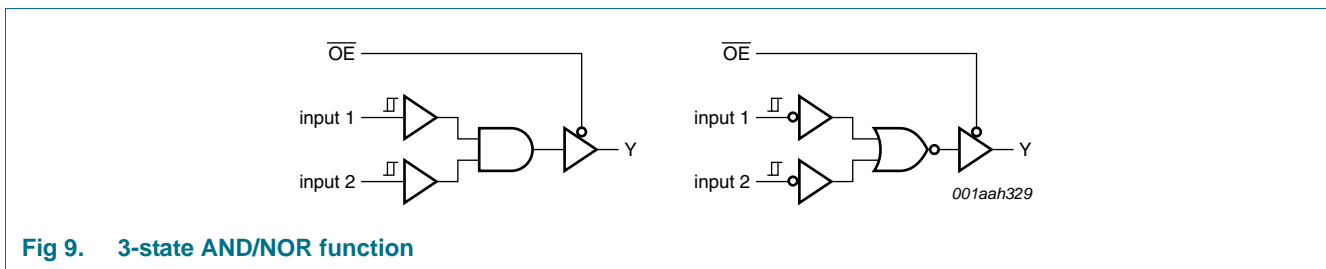


Fig 9. 3-state AND/NOR function

Table 10. Function table<sup>[1]</sup>

See Figure 10.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state AND	3-state NOR	L	input 2	L	input 1	L
2	3-state AND	3-state NOR	L	H	input 1	input 2	H

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

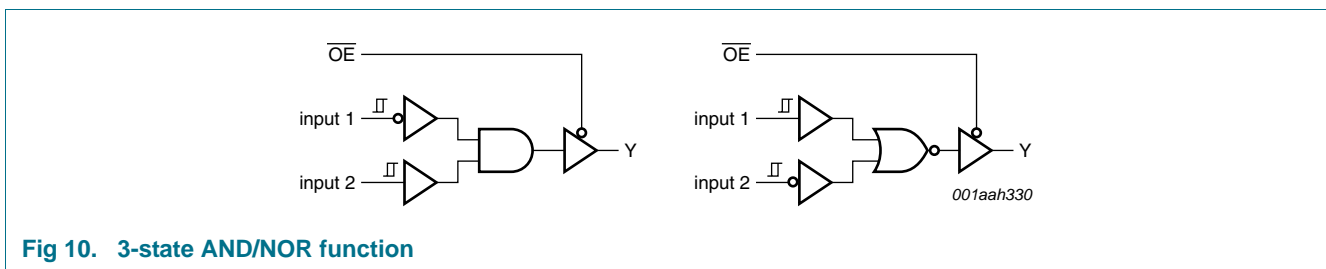


Fig 10. 3-state AND/NOR function



Table 11. Function table<sup>[1]</sup>

See Figure 11.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{\text{OE}}$	A	B	C	D
2	3-state AND	3-state NOR	L	input 1	L	input 2	L
2	3-state AND	3-state NOR	L	H	input 2	input 1	H

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

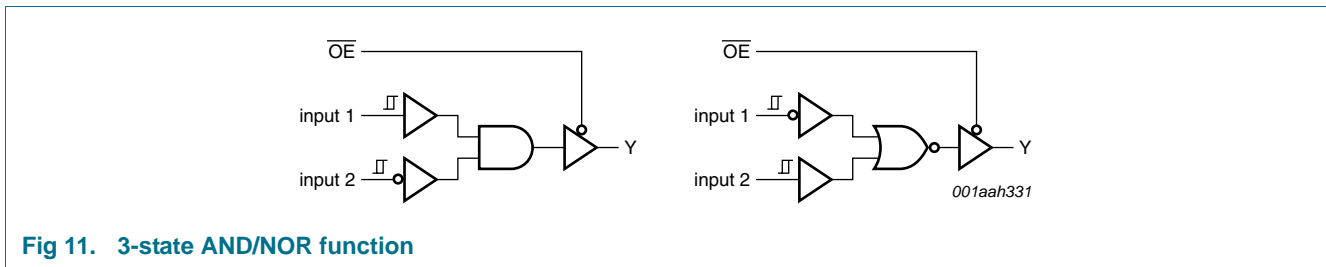


Fig 11. 3-state AND/NOR function

Table 12. Function table<sup>[1]</sup>

See Figure 12.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{\text{OE}}$	A	B	C	D
2	3-state AND	3-state NOR	L	input 1	H	input 2	L
2	3-state AND	3-state NOR	L	input 2	H	input 1	L

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

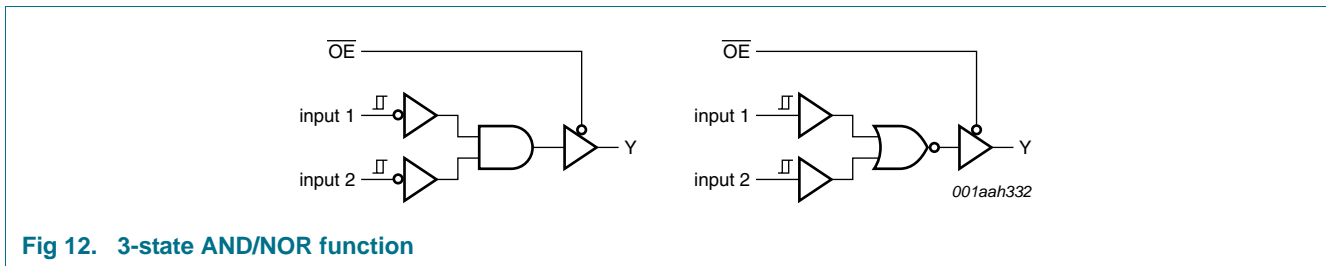


Fig 12. 3-state AND/NOR function

7.6 3-state NAND/OR functions available

Table 13. Function table<sup>[1]</sup>

See Figure 13.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state NAND	3-state OR	L	L	input 1	input 2	H
2	3-state NAND	3-state OR	L	L	input 2	input 1	H

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

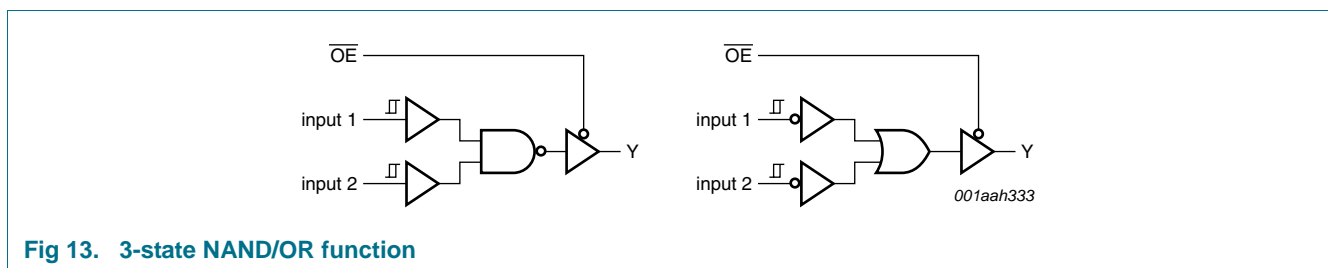


Fig 13. 3-state NAND/OR function

Table 14. Function table<sup>[1]</sup>

See Figure 14.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state NAND	3-state OR	L	input 2	L	input 1	H
2	3-state NAND	3-state OR	L	H	input 1	input 2	L

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

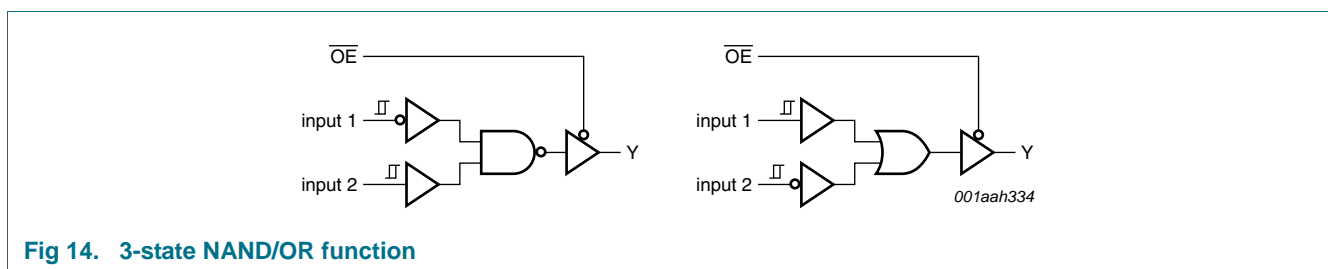


Fig 14. 3-state NAND/OR function

Table 15. Function table<sup>[1]</sup>

See Figure 15.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state NAND	3-state OR	L	input 1	L	input 2	H
2	3-state NAND	3-state OR	L	H	input 2	input 1	L

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

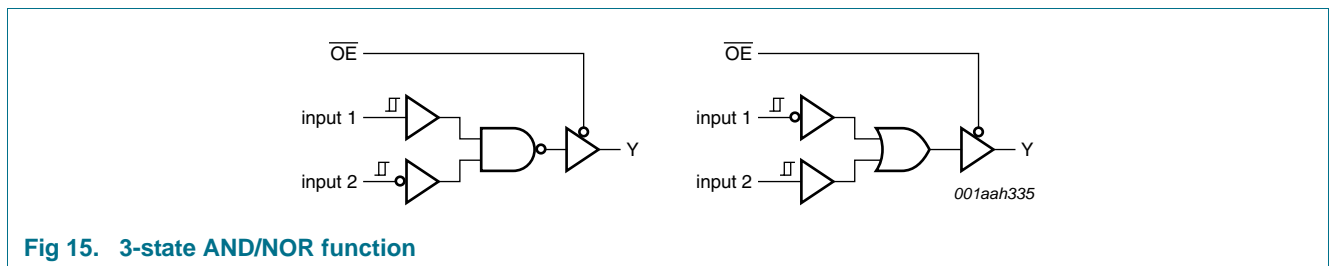


Fig 15. 3-state AND/NOR function

Table 16. Function table<sup>[1]</sup>

See Figure 16.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state NAND	3-state OR	L	input 1	H	input 2	L
2	3-state NAND	3-state OR	L	input 2	H	input 1	L

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

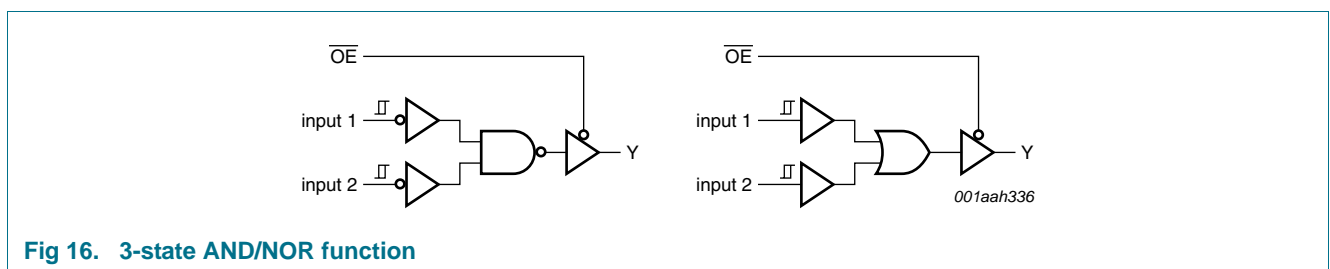


Fig 16. 3-state AND/NOR function

7.7 3-state XOR/XNOR functions available

Table 17. Function table<sup>[1]</sup>

See [Figure 17](#).

Function	Input				
	OE	A	B	C	D
3-state XOR	L	input 1	H or L	L	input 2
	L	input 2	H or L	L	input 1
	L	H or L	input 1	H	input 2
	L	H or L	input 2	H	input 1
	L	L	H	input 1	input 2
	L	L	H	input 2	input 1

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

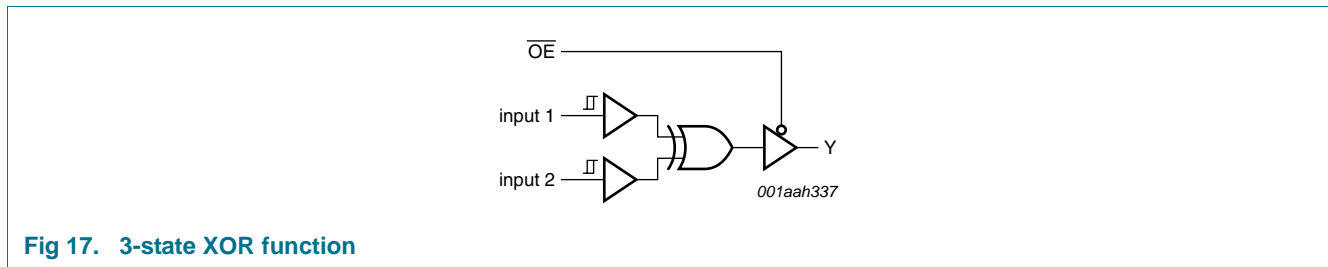


Fig 17. 3-state XOR function

Table 18. Function table<sup>[1]</sup>

See [Figure 18](#).

Function	Input				
	OE	A	B	C	D
3-state XOR	L	H	L	input 1	input 2

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

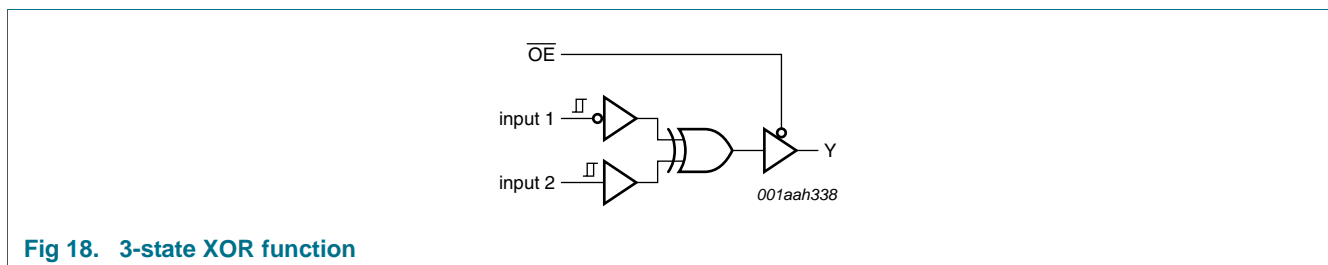


Fig 18. 3-state XOR function

Table 19. Function table<sup>[1]</sup>

See Figure 19.

Function	Input				
	OE	A	B	C	D
3-state XOR	L	H	L	input 1	input 2

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

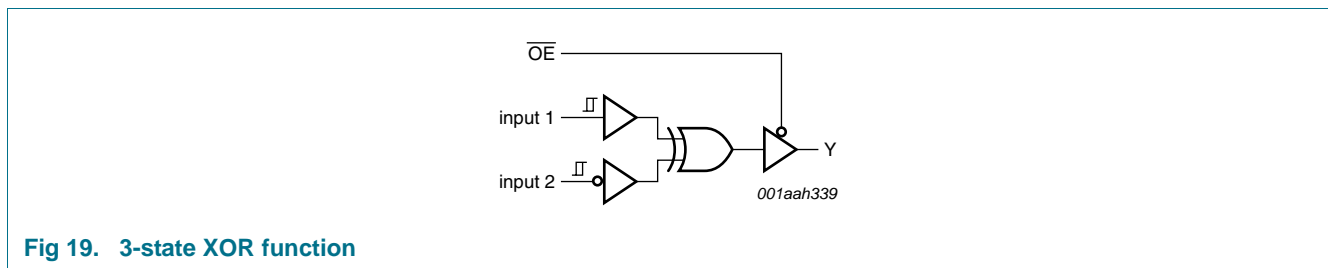


Fig 19. 3-state XOR function

Table 20. Function table<sup>[1]</sup>

See Figure 20.

Function	Input				
	OE	A	B	C	D
3-state XNOR	L	H	L	input 1	input 2
	L	H	L	input 2	input 1

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

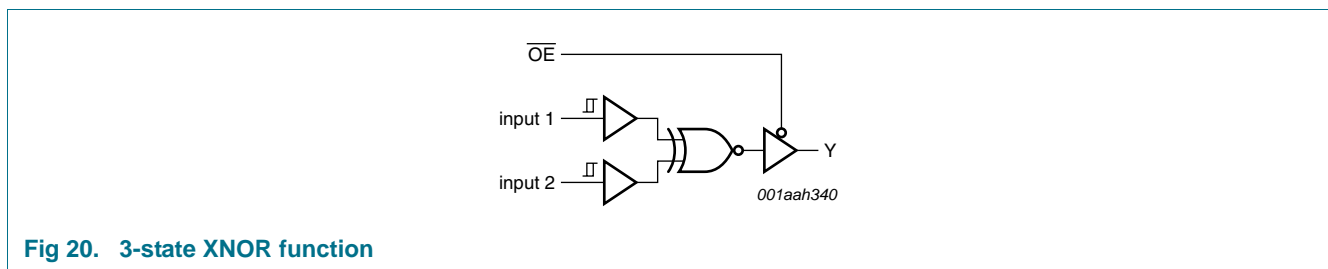


Fig 20. 3-state XNOR function

## 8. Limiting values

**Table 21. 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	+6.5	V
$I_{IK}$	input clamping current	$V_I < 0$ V	-50	-	mA
$V_I$	input voltage		[1] -0.5	+6.5	V
$I_{OK}$	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V	-	$\pm 50$	mA
$V_O$	output voltage	Active mode	[1][2] -0.5	$V_{CC} + 0.5$	V
		Power-down mode	[1][2] -0.5	+6.5	V
$I_O$	output current	$V_O = 0$ V to $V_{CC}$	-	$\pm 50$	mA
$I_{CC}$	supply current		-	100	mA
$I_{GND}$	ground current		-100	-	mA
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to $+125$ °C	[3] -	250	mW
$T_{stg}$	storage temperature		-65	+150	°C

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

[2] When  $V_{CC} = 0$  V (Power-down mode), the output voltage can be 5.5 V in normal operation.

[3] For TSSOP8 package: above 110 °C the value of  $P_{tot}$  derates linearly with 8.0 mW/K.

For XSON8, XSON8U and XQFN8U packages: above 118 °C the value of  $P_{tot}$  derates linearly with 7.8 mW/K.

## 9. Recommended operating conditions

**Table 22. Operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		1.65	5.5	V
$V_I$	input voltage		0	5.5	V
$V_O$	output voltage	Active mode	0	$V_{CC}$	V
		Power-down mode; $V_{CC} = 0$ V	0	5.5	V
$T_{amb}$	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 1.65$ V to 2.7 V	-	20	ns/V
		$V_{CC} = 2.7$ V to 4.5 V	-	10	ns/V
		$V_{CC} = 4.5$ V to 5.5 V	-	5	ns/V

## 10. Static characteristics

**Table 23. Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	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> = -100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V	1.2	-	-	V
		I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V	1.9	-	-	V
		I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V	2.2	-	-	V
		I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V	2.3	-	-	V
		I <sub>O</sub> = -32 mA; V <sub>CC</sub> = 4.5 V	3.8	-	-	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> = 100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	-	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	-	0.45	V
		I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V	-	-	0.3	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	-	0.4	V
		I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V	-	-	0.55	V
		I <sub>O</sub> = 32 mA; V <sub>CC</sub> = 4.5 V	-	-	0.55	V
I <sub>I</sub>	input leakage current	V <sub>CC</sub> = 0 V to 5.5 V; V <sub>I</sub> = 5.5 V or GND	-	±0.1	±5	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 5.5 V or GND	-	±0.1	±10	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 5.5 V	-	±0.1	±10	μA
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 1.65 V to 5.5 V; V <sub>I</sub> = 5.5 V or GND; I <sub>O</sub> = 0 A	-	0.1	10	μA
ΔI <sub>CC</sub>	additional supply current	per pin; V <sub>CC</sub> = 2.3 V to 5.5 V; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A	-	5	500	μA
C <sub>I</sub>	input capacitance	V <sub>CC</sub> = 3.3 V; V <sub>I</sub> = GND to V <sub>CC</sub>	-	2.5	-	pF
<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> = -100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V	0.95	-	-	V
		I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V	1.7	-	-	V
		I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V	1.9	-	-	V
		I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V	2.0	-	-	V
		I <sub>O</sub> = -32 mA; V <sub>CC</sub> = 4.5 V	3.4	-	-	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> = 100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	-	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	-	0.70	V
		I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V	-	-	0.45	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	-	0.60	V
		I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V	-	-	0.80	V
		I <sub>O</sub> = 32 mA; V <sub>CC</sub> = 4.5 V	-	-	0.80	V

**Table 23. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
I <sub>I</sub>	input leakage current	V <sub>CC</sub> = 0 V to 5.5 V; V <sub>I</sub> = 5.5 V or GND	-	-	±100	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 5.5 V or GND	-	-	±200	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 5.5 V	-	-	±200	μA
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 1.65 V to 5.5 V; V <sub>I</sub> = 5.5 V or GND; I <sub>O</sub> = 0 A	-	-	200	μA
ΔI <sub>CC</sub>	additional supply current	per pin; V <sub>CC</sub> = 2.3 V to 5.5 V; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A	-	-	5000	μA

[1] All typical values are measured at V<sub>CC</sub> = 3.3 V and T<sub>amb</sub> = 25 °C.

## 11. Dynamic characteristics

**Table 24. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 23](#)).

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
t <sub>pd</sub>	propagation delay	A to Y; see <a href="#">Figure 21</a>	<a href="#">[2]</a>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	7.5	-	2.8	30.8	38.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	5.0	-	2.0	11.7	14.6	ns
		V <sub>CC</sub> = 2.7 V	-	5.4	-	2.0	9.0	11.3	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.5	-	1.8	8.4	10.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	3.8	-	1.8	5.5	6.9	ns
		B to Y; see <a href="#">Figure 21</a>	<a href="#">[2]</a>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	7.5	-	2.8	28.9	36.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	5.0	-	2.0	11.3	14.2	ns
		V <sub>CC</sub> = 2.7 V	-	5.4	-	2.0	9.0	11.3	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.5	-	1.8	8.2	10.3	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	3.8	-	1.8	5.4	6.8	ns
		C to Y; see <a href="#">Figure 21</a>	<a href="#">[2]</a>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	7.8	-	3.2	29.8	37.3	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	5.2	-	2.3	12.3	15.4	ns
		V <sub>CC</sub> = 2.7 V	-	5.3	-	2.3	9.6	12.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.6	-	2.3	8.6	10.8	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	3.8	-	1.8	5.7	7.2	ns
		D to Y; see <a href="#">Figure 21</a>	<a href="#">[2]</a>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	7.0	-	2.8	25.7	32.2	ns
V <sub>CC</sub> = 2.3 V to 2.7 V	-	4.6	-	2.0	10.7	13.4	ns		
V <sub>CC</sub> = 2.7 V	-	4.8	-	2.0	9.2	11.5	ns		
V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.1	-	1.8	7.6	9.5	ns		
V <sub>CC</sub> = 4.5 V to 5.5 V	-	3.4	-	1.6	5.2	6.5	ns		



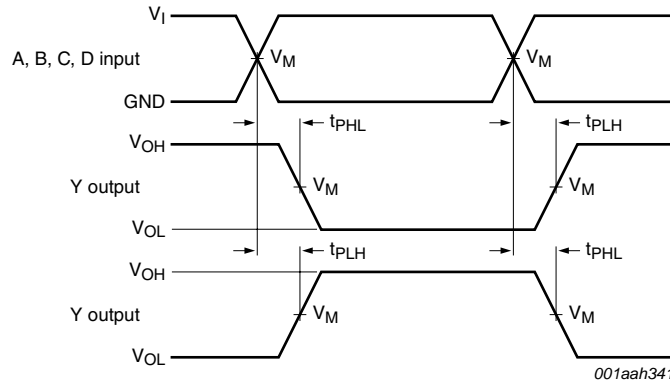
**Table 24. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 23](#)).

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
t <sub>en</sub>	enable time	OE to Y; see <a href="#">Figure 22</a> <sup>[3]</sup>							
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	5.7	-	2.0	25.2	32.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.8	-	1.4	11.3	14.0	ns
		V <sub>CC</sub> = 2.7 V	-	4.2	-	1.4	8.6	11.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	3.5	-	1.4	7.0	9.0	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	2.7	-	1.4	4.7	6.0	ns
t <sub>dis</sub>	disable time	OE to Y; see <a href="#">Figure 22</a> <sup>[4]</sup>							
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	5.7	-	3.0	15.0	19.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.6	-	2.0	5.8	7.3	ns
		V <sub>CC</sub> = 2.7 V	-	4.5	-	2.0	6.6	8.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.5	-	2.1	5.9	7.4	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	3.4	-	1.0	4.5	5.6	ns
C <sub>PD</sub>	power dissipation capacitance	per buffer (output enabled); <sup>[5]</sup> f <sub>i</sub> = 10 MHz; C <sub>L</sub> = 50 pF; V <sub>i</sub> = GND to V <sub>CC</sub>							
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	14	-	-	-	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	16	-	-	-	-	pF
		V <sub>CC</sub> = 2.7 V	-	18	-	-	-	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	25	-	-	-	-	pF
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	30	-	-	-	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] t<sub>en</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.
- [4] t<sub>dis</sub> is the same as t<sub>PHZ</sub> and t<sub>PLZ</sub>.
- [5] 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.

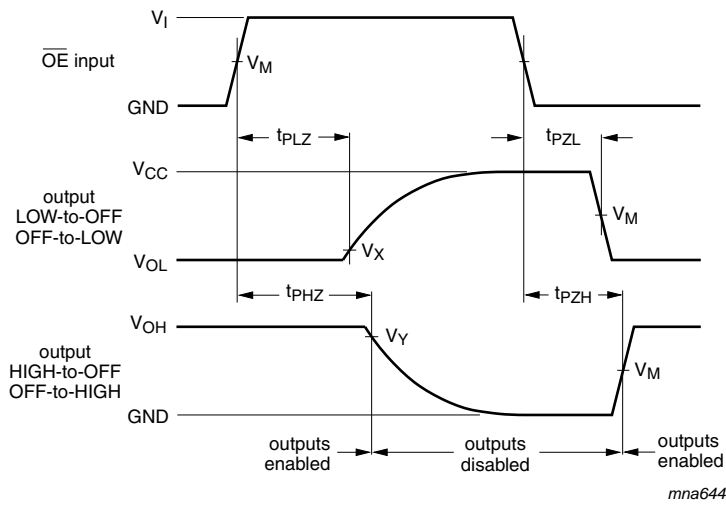
12. Waveforms



Measurement points are given in Table 25.

Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage drop that occur with the output load.

Fig 21. The data input (A, B, C, D) to output (Y) propagation delays



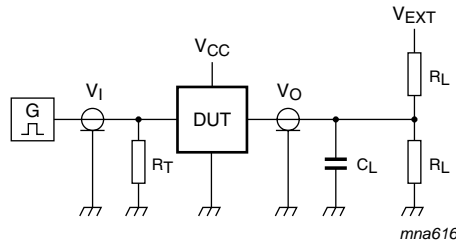
Measurement points are given in Table 25.

Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage drop that occur with the output load.

Fig 22. 3-state enable and disable times

Table 25. Measurement points

Supply voltage	Input	Output		
$V_{CC}$	$V_M$	$V_M$	$V_X$	$V_Y$
1.65 V to 1.95 V	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.15 V$	$V_{OH} - 0.15 V$
2.3 V to 2.7 V	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.15 V$	$V_{OH} - 0.15 V$
2.7 V	1.5 V	1.5 V	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$
3.0 V to 3.6 V	1.5 V	1.5 V	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$
4.5 V to 5.5 V	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$



Test data is given in [Table 26](#).

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 23. Test circuit for measuring switching times**

**Table 26. Test data**

Supply voltage	Input		Load		$V_{EXT}$		
	$V_I$	$t_r = t_f$	$C_L$	$R_L$	$t_{PLH}, t_{PHL}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
1.65 V to 1.95 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	1 k $\Omega$	open	GND	$2V_{CC}$
2.3 V to 2.7 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	500 $\Omega$	open	GND	$2V_{CC}$
2.7 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	6 V
3.0 V to 3.6 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	6 V
4.5 V to 5.5 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	GND	$2V_{CC}$

### 13. Transfer characteristics

**Table 27. Transfer characteristics**

Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 23](#))

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$V_{T+}$	positive-going threshold voltage	see <a href="#">Figure 24</a> , <a href="#">Figure 25</a> , <a href="#">Figure 26</a> , <a href="#">Figure 27</a> and <a href="#">Figure 28</a>						
		$V_{CC} = 1.8$ V	0.70	1.02	1.20	0.67	1.20	V
		$V_{CC} = 2.3$ V	1.11	1.42	1.60	1.08	1.60	V
		$V_{CC} = 3.0$ V	1.50	1.79	2.00	1.47	2.00	V
		$V_{CC} = 4.5$ V	2.16	2.52	2.74	2.13	2.74	V
		$V_{CC} = 5.5$ V	2.61	2.99	3.33	2.58	3.33	V

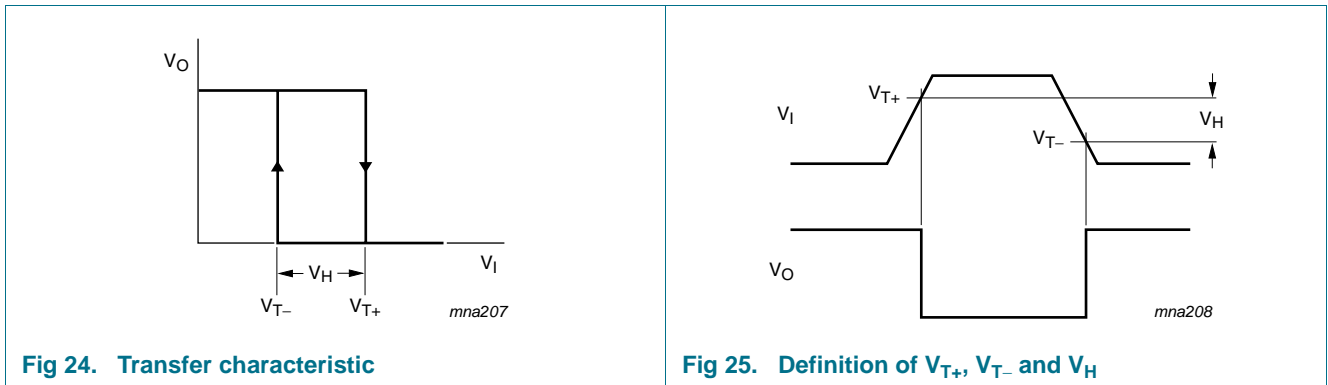
**Table 27. Transfer characteristics ...continued**

Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 23](#))

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
V <sub>T-</sub>	negative-going threshold voltage	see <a href="#">Figure 24</a> , <a href="#">Figure 25</a> , <a href="#">Figure 26</a> , <a href="#">Figure 27</a> and <a href="#">Figure 28</a>						
		V <sub>CC</sub> = 1.8 V	0.30	0.53	0.72	0.30	0.75	V
		V <sub>CC</sub> = 2.3 V	0.58	0.77	1.00	0.58	1.03	V
		V <sub>CC</sub> = 3.0 V	0.80	1.04	1.30	0.80	1.33	V
		V <sub>CC</sub> = 4.5 V	1.21	1.55	1.90	1.21	1.93	V
		V <sub>CC</sub> = 5.5 V	1.45	1.86	2.29	1.45	2.32	V
V <sub>H</sub>	hysteresis voltage (V <sub>T+</sub> - V <sub>T-</sub> ); see <a href="#">Figure 24</a> , <a href="#">Figure 25</a> , <a href="#">Figure 26</a> , <a href="#">Figure 27</a> and <a href="#">Figure 28</a>							
		V <sub>CC</sub> = 1.8 V	0.30	0.48	0.62	0.23	0.62	V
		V <sub>CC</sub> = 2.3 V	0.40	0.64	0.80	0.34	0.80	V
		V <sub>CC</sub> = 3.0 V	0.50	0.75	1.00	0.44	1.00	V
		V <sub>CC</sub> = 4.5 V	0.71	0.97	1.20	0.65	1.20	V
		V <sub>CC</sub> = 5.5 V	0.71	1.13	1.40	0.65	1.40	V

[1] All typical values are measured at T<sub>amb</sub> = 25 °C

## 14. Waveforms transfer characteristics



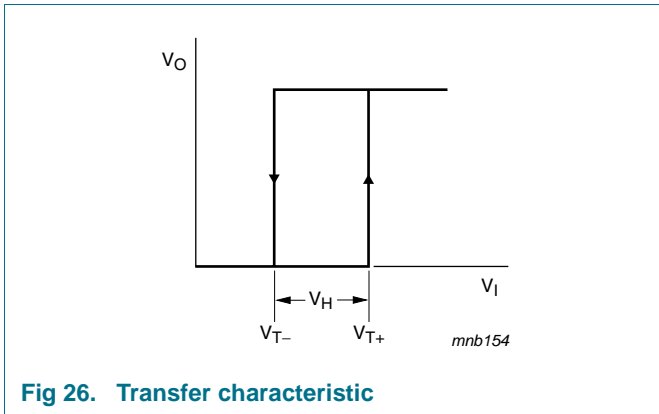


Fig 26. Transfer characteristic

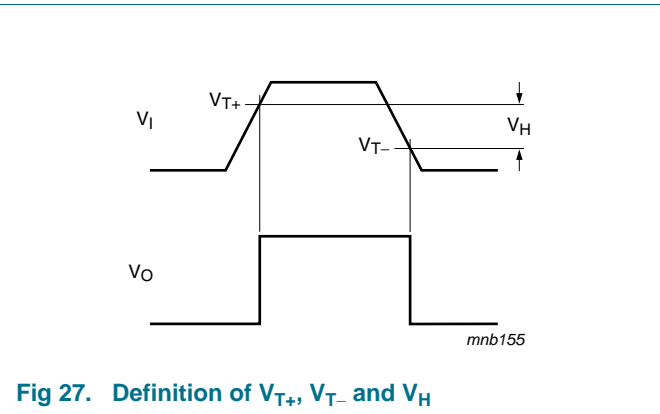


Fig 27. Definition of  $V_{T+}$ ,  $V_{T-}$  and  $V_H$

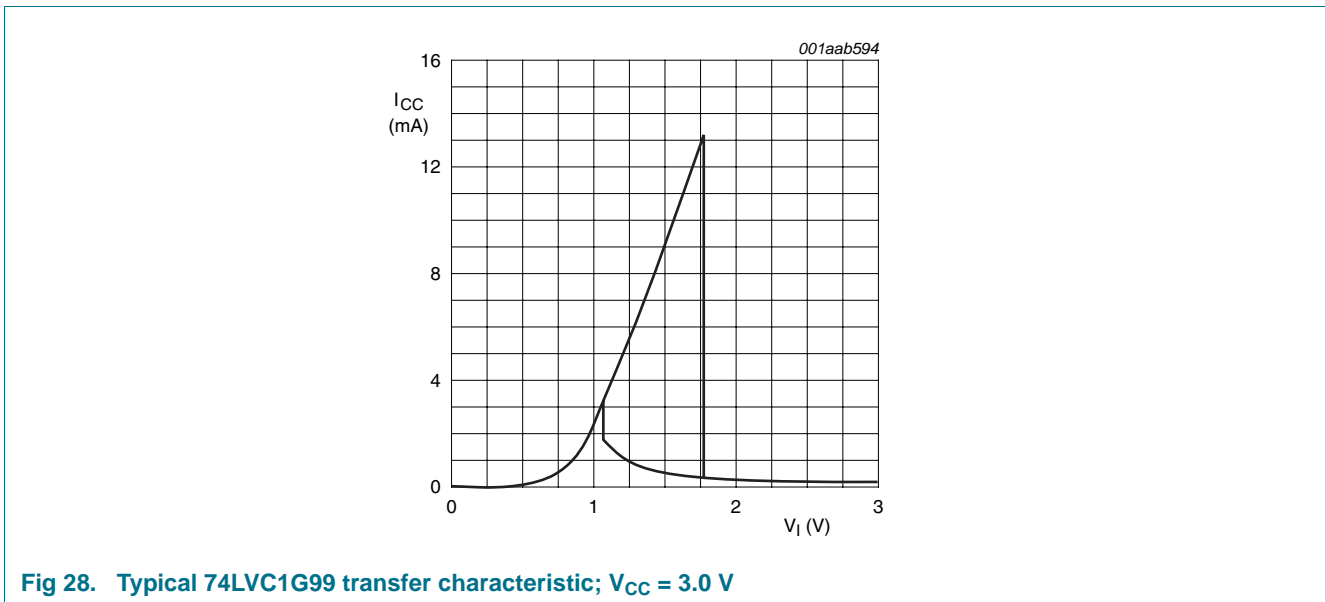


Fig 28. Typical 74LVC1G99 transfer characteristic;  $V_{CC} = 3.0$  V

15. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

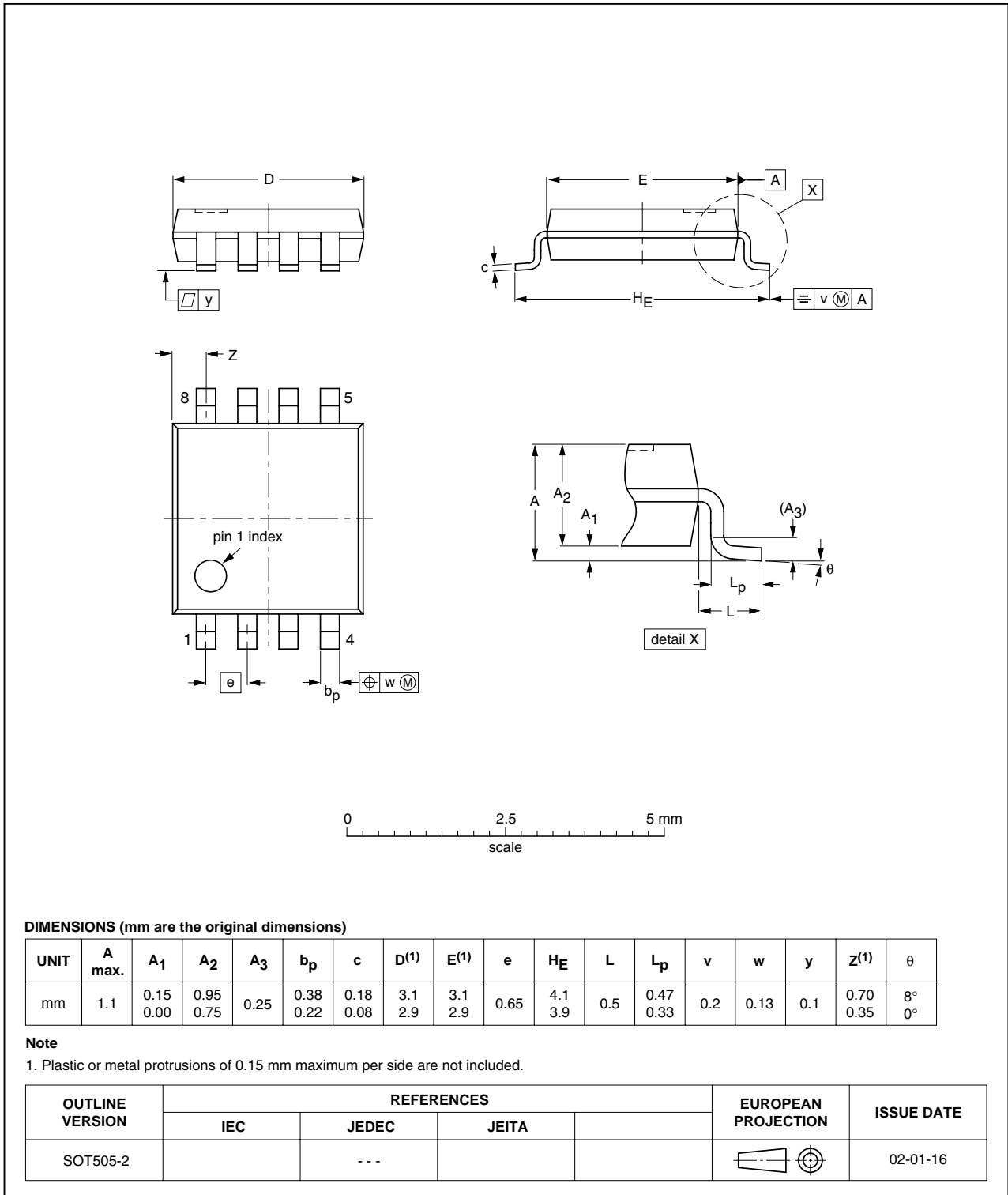


Fig 29. Package outline SOT505-2 (TSSOP8)

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

SOT833-1

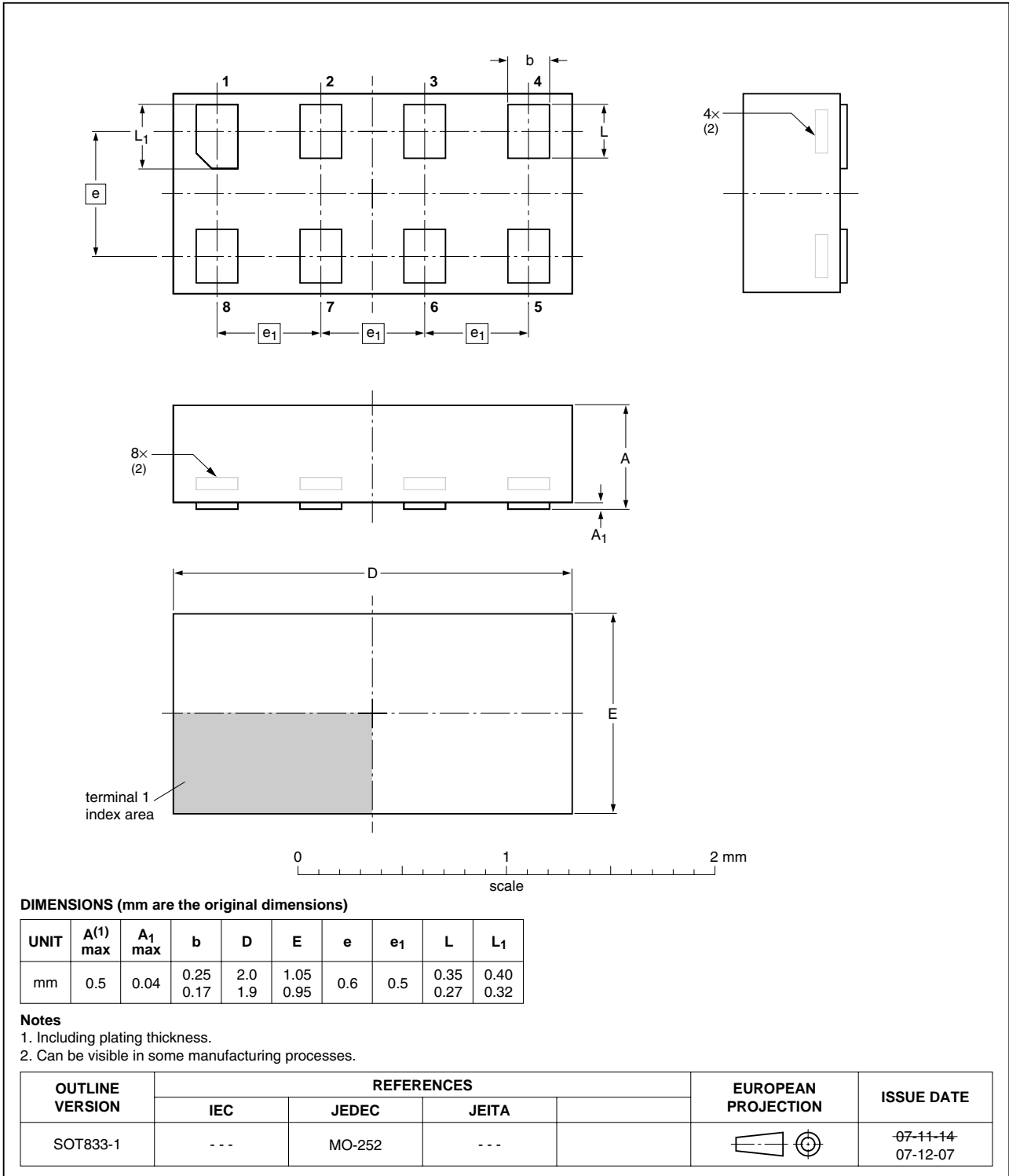
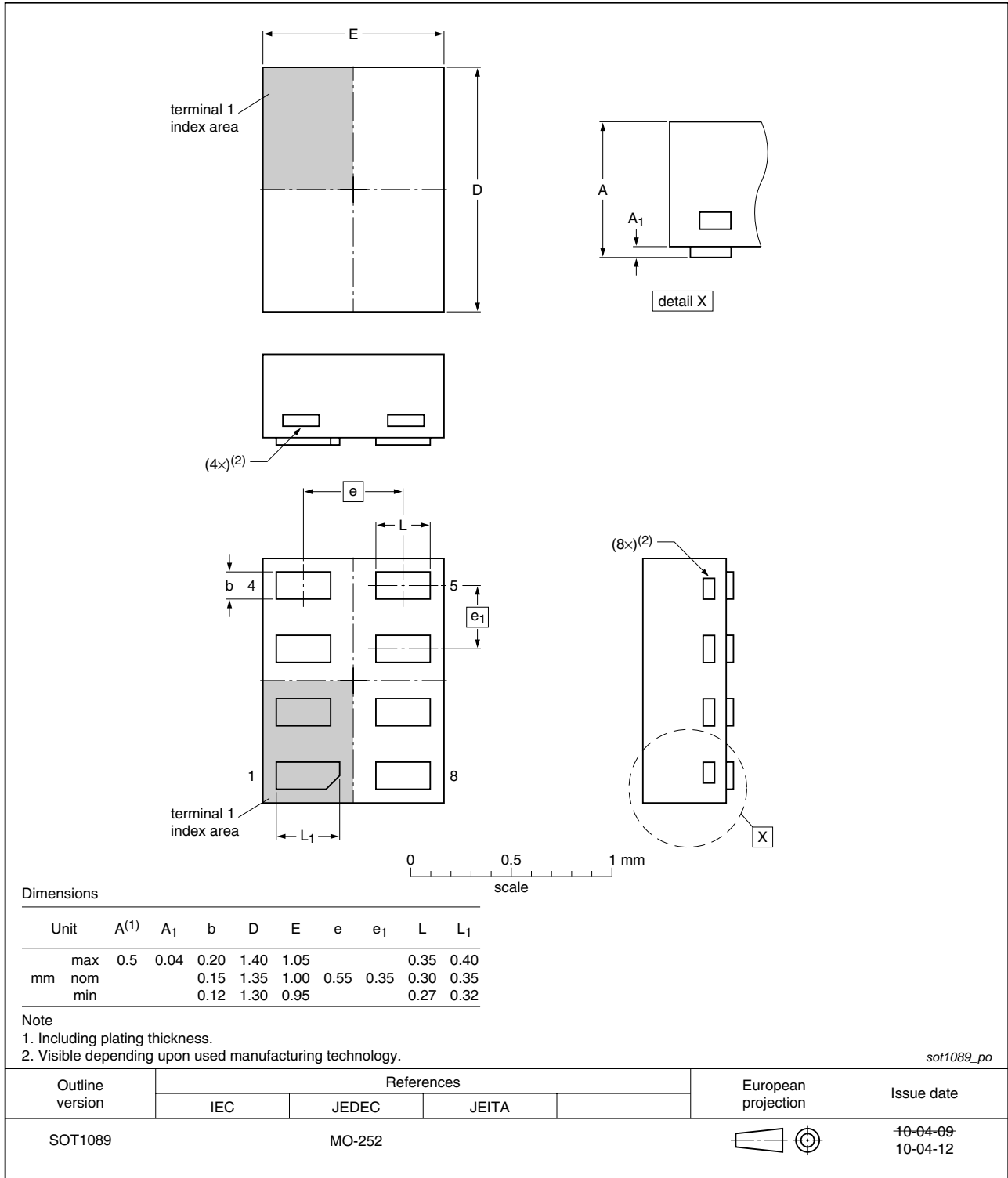


Fig 30. Package outline SOT833-1 (XSON8)

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

**SOT1089**



**Fig 31. Package outline SOT1089 (XSON8)**



XSON8U: plastic extremely thin small outline package; no leads;  
8 terminals; UTLP based; body 3 x 2 x 0.5 mm

SOT996-2

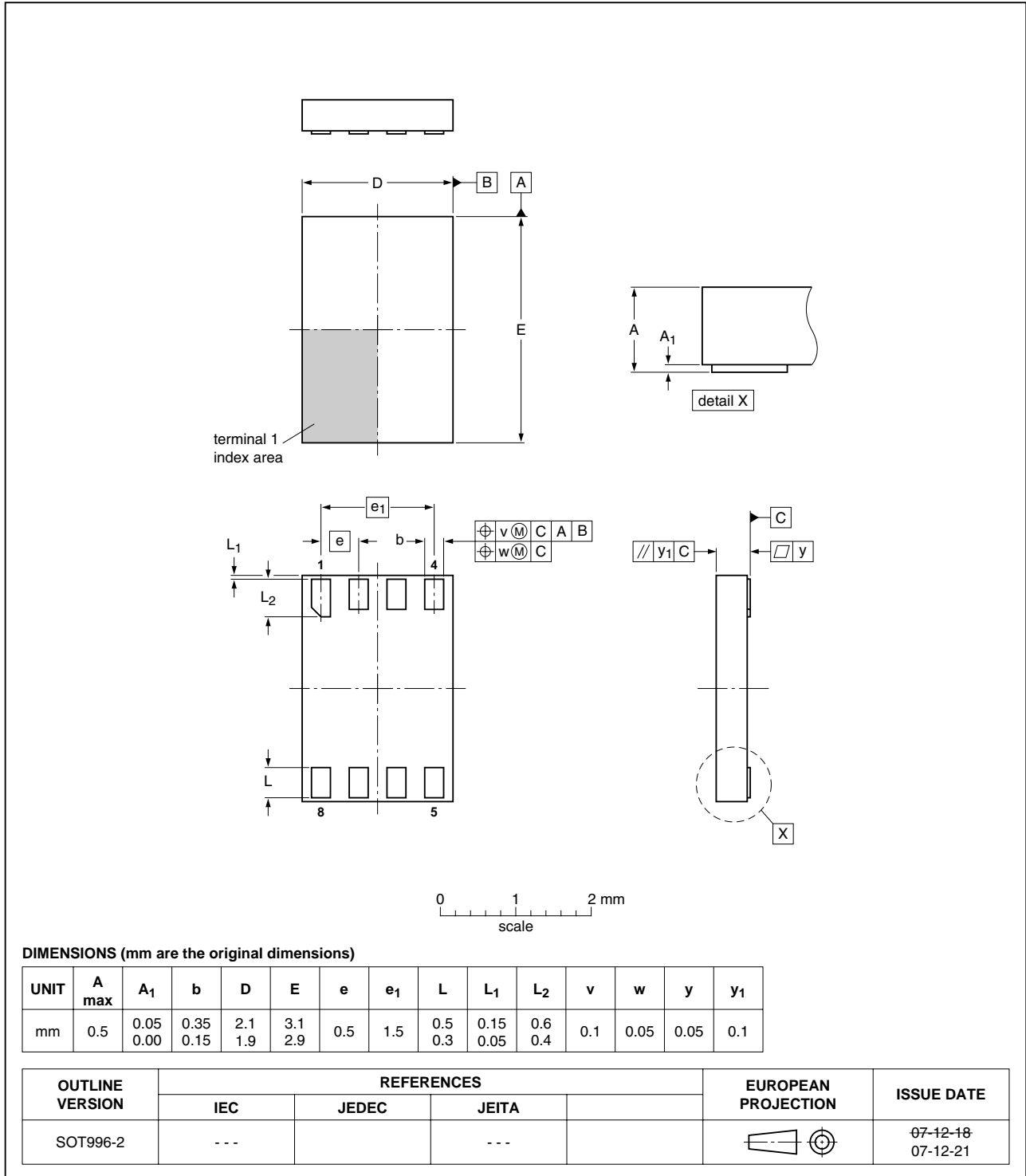


Fig 32. Package outline SOT996-2 (XSON8U)

XQFN8U: plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 x 1.6 x 0.5 mm

SOT902-1

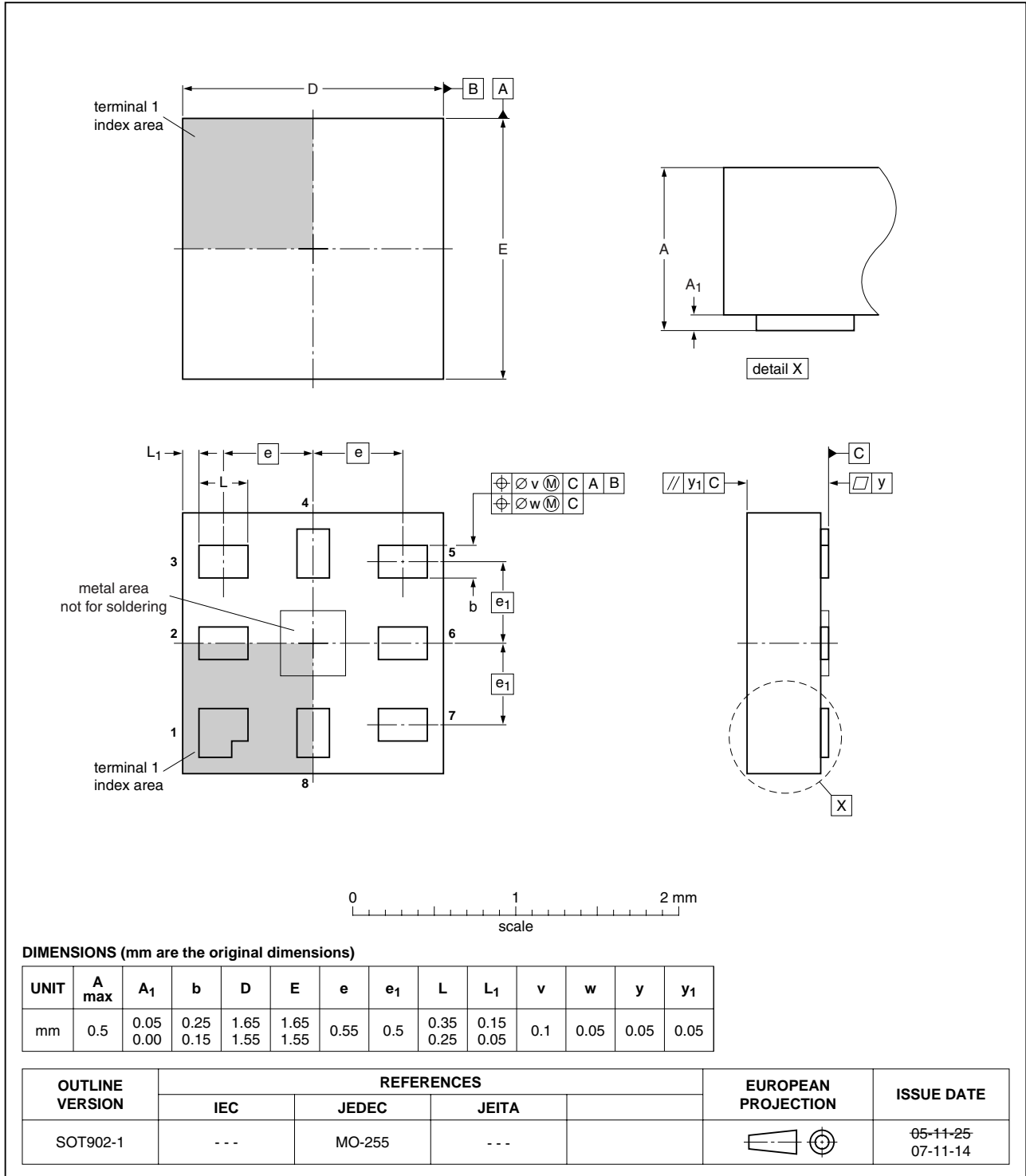


Fig 33. Package outline SOT902-1 (XQFN8U)

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

SOT1116

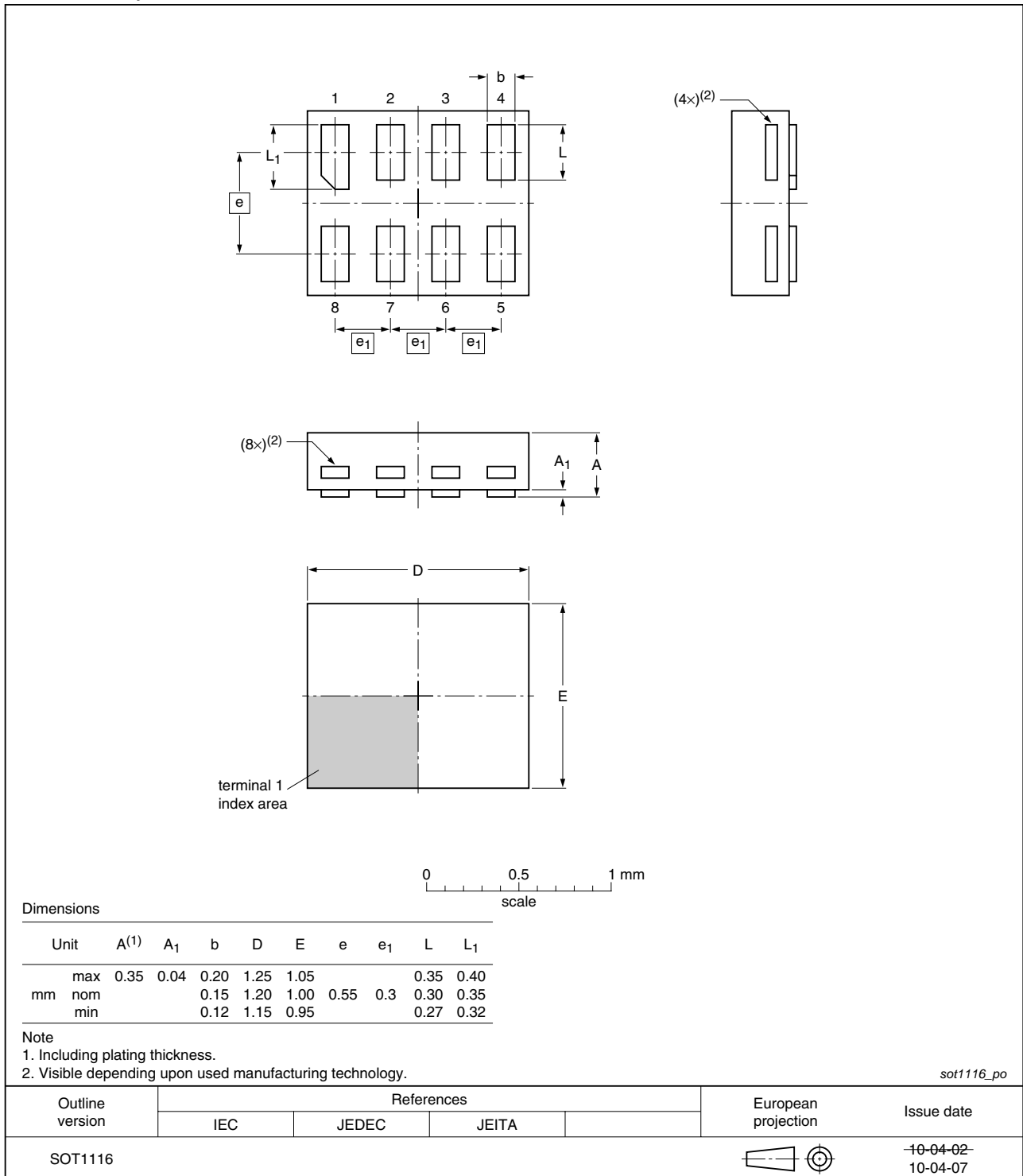
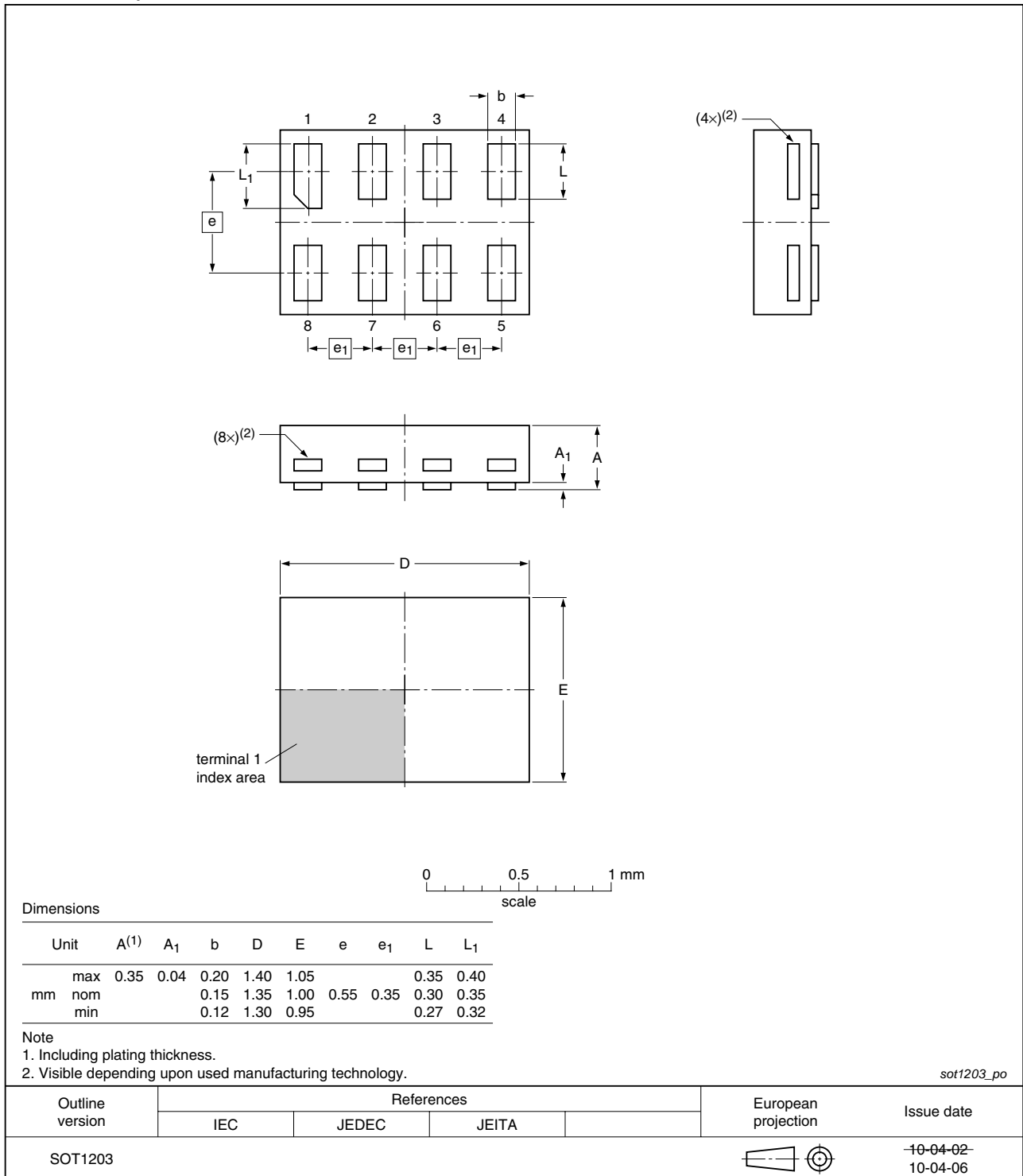


Fig 34. Package outline SOT1116 (XSON8)

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

**SOT1203**



**Fig 35. Package outline SOT1203 (XSON8)**

## 16. Abbreviations

Table 28. Abbreviations

Acronym	Description
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

## 17. Revision history

Table 29. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G99 v.5	20101021	Product data sheet	-	74LVC1G99 v.4
Modifications:	<ul style="list-style-type: none"> <li>• Added type number 74LVC1G99GN (SOT1116/XSON8 package).</li> <li>• Added type number 74LVC1G99GS (SOT1203/XSON8 package).</li> </ul>			
74LVC1G99 v.4	20100416	Product data sheet	-	74LVC1G99 v.3
74LVC1G99 v.3	20091203	Product data sheet	-	74LVC1G99 v.2
74LVC1G99 v.2	20080208	Product data sheet	-	74LVC1G99 v.1
74LVC1G99 v.1	20080103	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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