

# 74LVC1G27

Single 3-input NOR gate

Rev. 3 — 19 April 2019

Product data sheet

## 1. General description

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The 74LVC1G27 provides one 3-input NOR function.

Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V applications.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall time.

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.

## 2. Features and benefits

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- Wide supply voltage range from 1.65 V to 5.5 V
- 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)
  - JESD8B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101-C exceeds 1000 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
- 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
74LVC1G27GW	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363
74LVC1G27GV	-40 °C to +125 °C	TSOP6	plastic surface-mounted package; 6 leads	SOT457
74LVC1G27GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
74LVC1G27GF	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm	SOT891
74LVC1G27GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115
74LVC1G27GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202

### 4. Marking

Table 2. Marking

Type number	Marking code [1]
74LVC1G27GW	Y7
74LVC1G27GV	Y27
74LVC1G27GM	Y7
74LVC1G27GF	Y7
74LVC1G27GN	Y7
74LVC1G27GS	Y7

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

### 5. Functional diagram

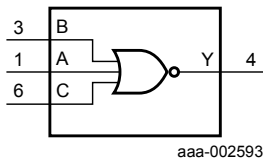


Fig. 1. Logic symbol

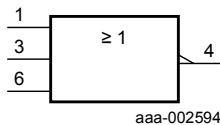


Fig. 2. IEC logic symbol

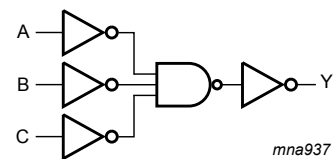
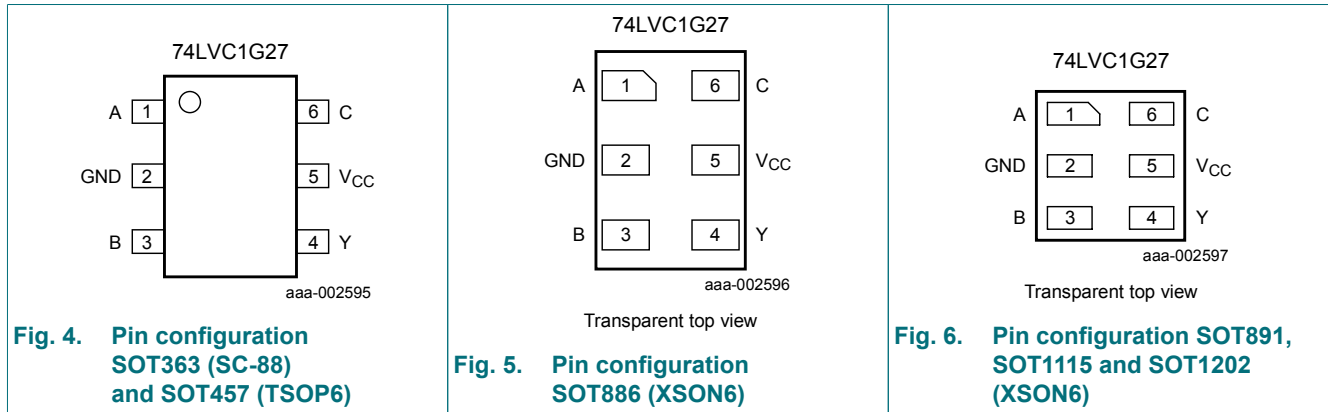


Fig. 3. Logic diagram

## 6. Pinning information

### 6.1. Pinning



### 6.2. Pin description

Table 3. Pin description

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

## 7. Functional description

Table 4. Function table

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

Input			Output
A	B	C	Y
H	X	X	L
X	H	X	L
X	X	H	L
L	L	L	H

## 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
$V_{CC}$	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]	-0.5	$V_{CC} + 0.5$	V
		Power-down mode; $V_{CC} = 0$ V [1]	-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 [2]	-	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] For SC-88 and TSOP6 packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K.

For XSON6 packages: above 118 °C the value of  $P_{tot}$  derates linearly with 7.8 mW/K.

## 9. Recommended operating conditions

**Table 6. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Typ	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 $5.5$ V	-	-	10	ns/V

## 10. Static characteristics

**Table 7. Static characteristics**

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

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65V <sub>CC</sub>	-	-	0.65V <sub>CC</sub>	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	-	-	1.7	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7V <sub>CC</sub>	-	-	0.7V <sub>CC</sub>	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	0.35V <sub>CC</sub>	-	0.35V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	-	0.7	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.3V <sub>CC</sub>	-	0.3V <sub>CC</sub>	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> = -100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	V <sub>CC</sub> - 0.1	-	-	V <sub>CC</sub> - 0.1	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V	1.2	-	-	0.95	-	V
		I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V	1.9	-	-	1.7	-	V
		I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V	2.2	-	-	1.9	-	V
		I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V	2.3	-	-	2.0	-	V
		I <sub>O</sub> = -32 mA; V <sub>CC</sub> = 4.5 V	3.8	-	-	3.4	-	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> = 100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	-	-	0.1	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	-	0.45	-	0.70	V
		I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V	-	-	0.3	-	0.45	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	-	0.4	-	0.60	V
		I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V	-	-	0.55	-	0.80	V
		I <sub>O</sub> = 32 mA; V <sub>CC</sub> = 4.5 V	-	-	0.55	-	0.80	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	±1	-	±1	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	±2	-	±2	μA
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 1.65 V to 5.5 V; V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	-	0.1	4	-	4	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	-	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>	-	3	-	-	-	pF

[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 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 8.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
t <sub>pd</sub>	propagation delay	A, B and C to Y; see Fig. 7 [2]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	4.7	20.5	1.5	25.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	3.0	7.1	1.0	8.9	ns
		V <sub>CC</sub> = 2.7 V	1.0	3.0	6.7	1.0	8.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	2.6	5.4	1.0	6.8	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.0	1.9	3.6	1.0	4.5	ns
C <sub>PD</sub>	power dissipation capacitance	V <sub>I</sub> = GND to V <sub>CC</sub> ; V <sub>CC</sub> = 3.3 V [3]	-	12	-	-	-	pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.

[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).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

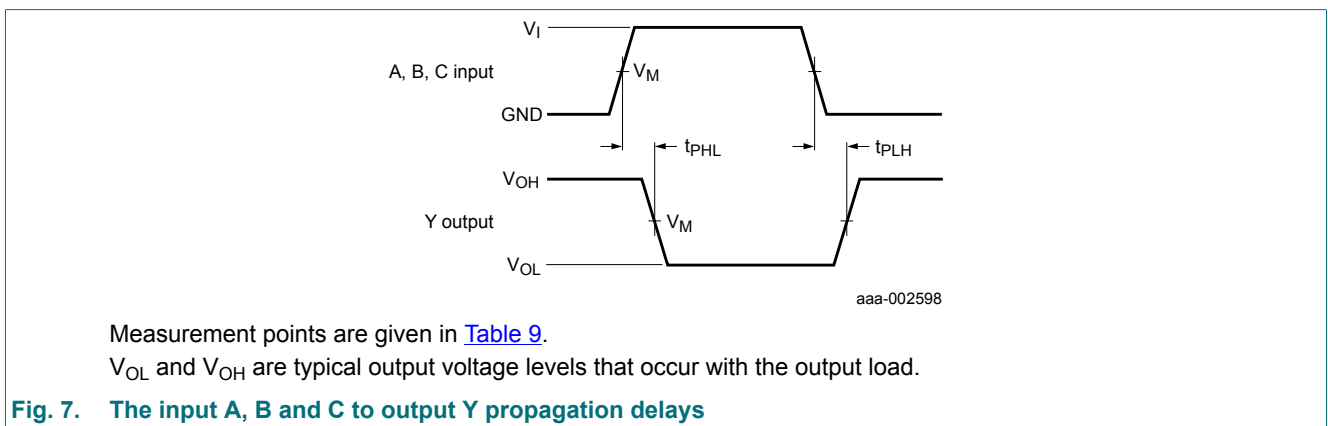
C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

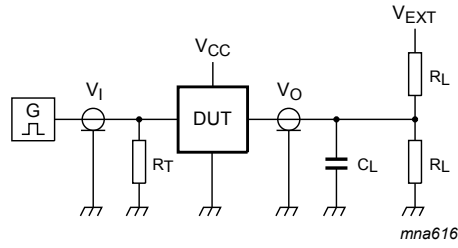
Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of outputs.

### 11.1. Waveforms and test circuit



**Table 9. Measurement points**

Supply voltage	Input	Output
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>
1.65 V to 1.95 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>
2.3 V to 2.7 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>
2.7 V	1.5 V	1.5 V
3.0 V to 3.6 V	1.5 V	1.5 V
4.5 V to 5.5 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>



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. 8. Test circuit for measuring switching times**

**Table 10. Test data**

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

## 12. Package outline

Plastic surface-mounted package; 6 leads

SOT363

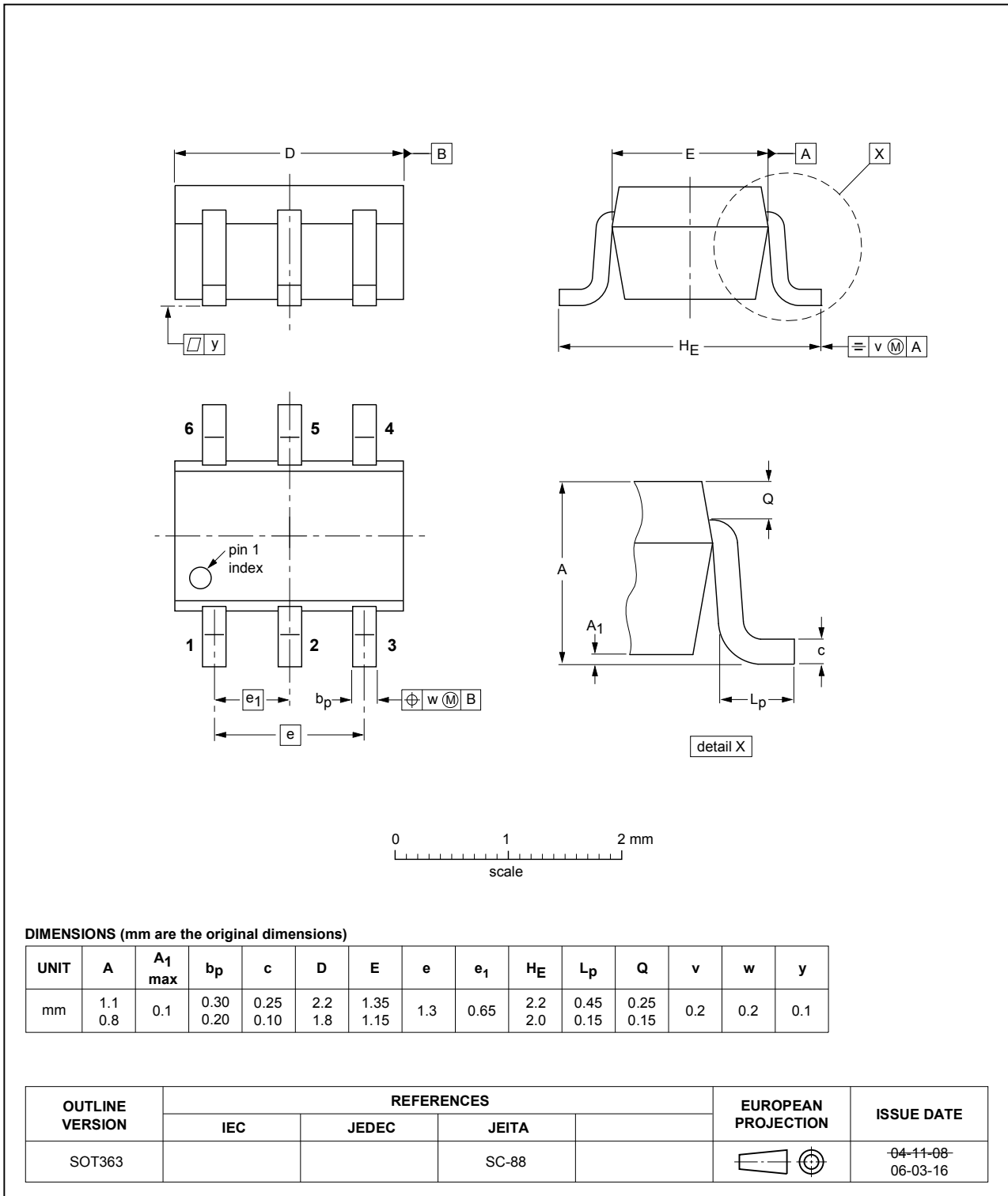


Fig. 9. Package outline SOT363 (SC-88)



Plastic, surface-mounted package (SC-74; TSOP6); 6 leads

SOT457

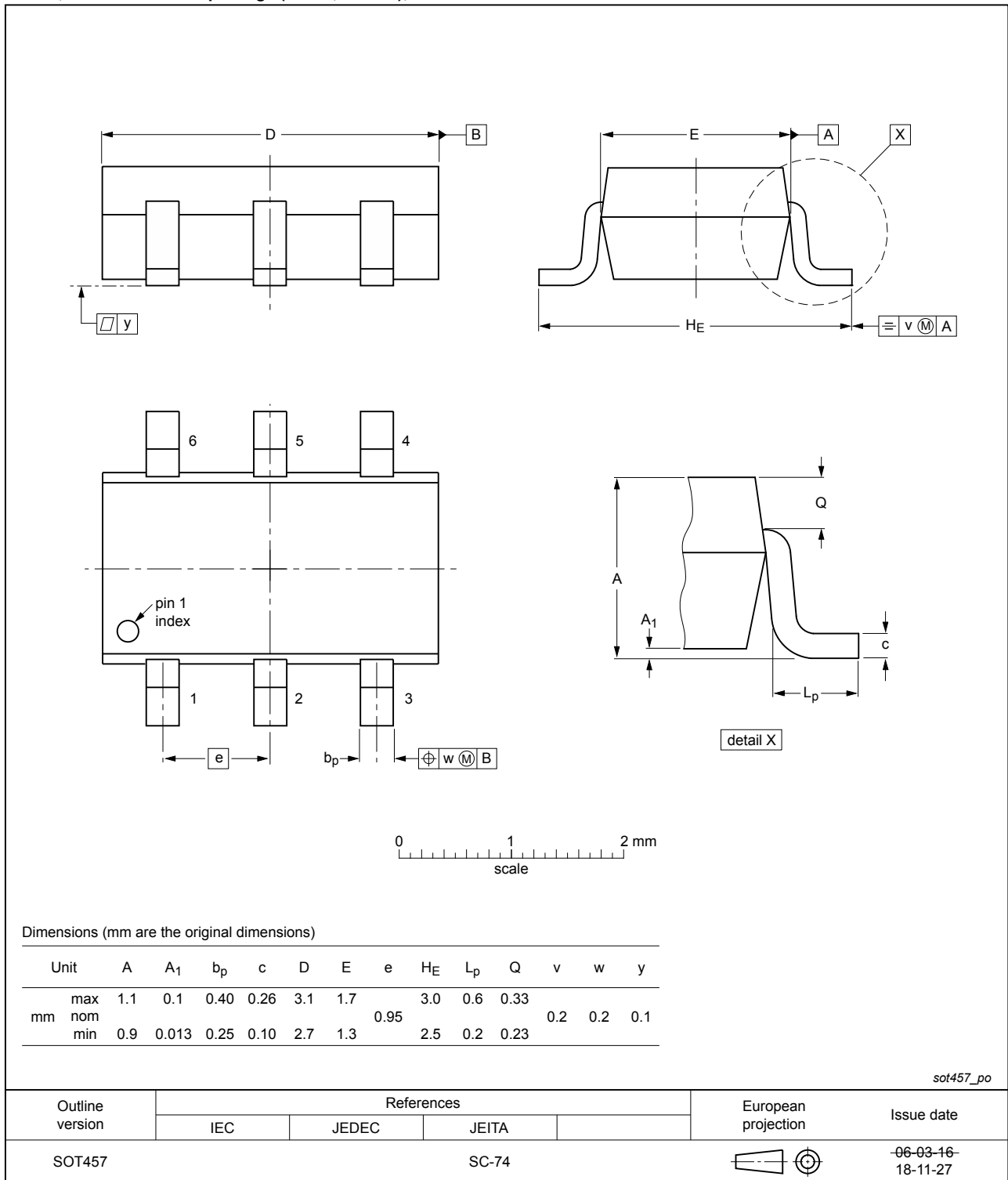


Fig. 10. Package outline SOT457 (TSOP6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886

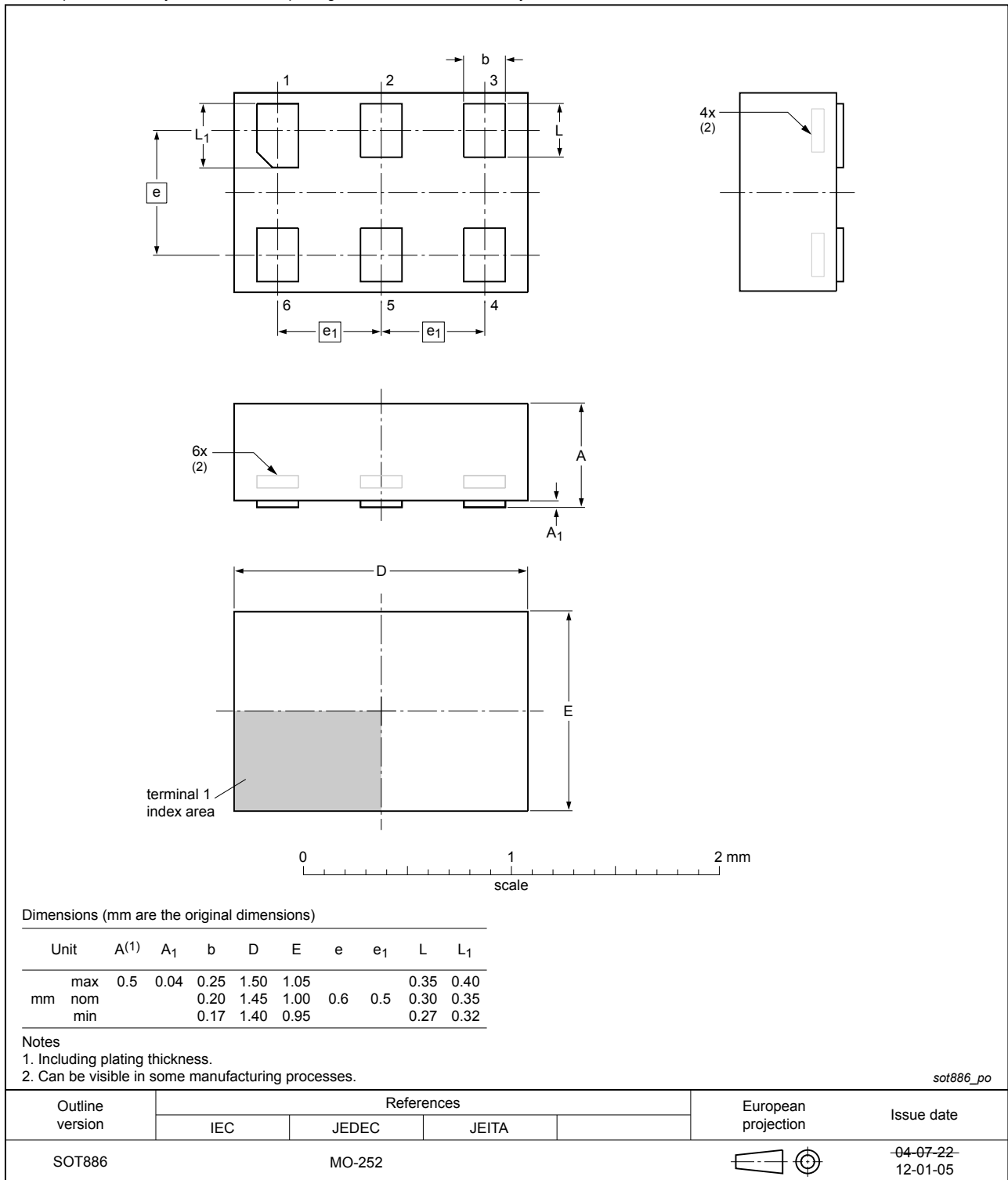


Fig. 11. Package outline SOT886 (XSON6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm

SOT891

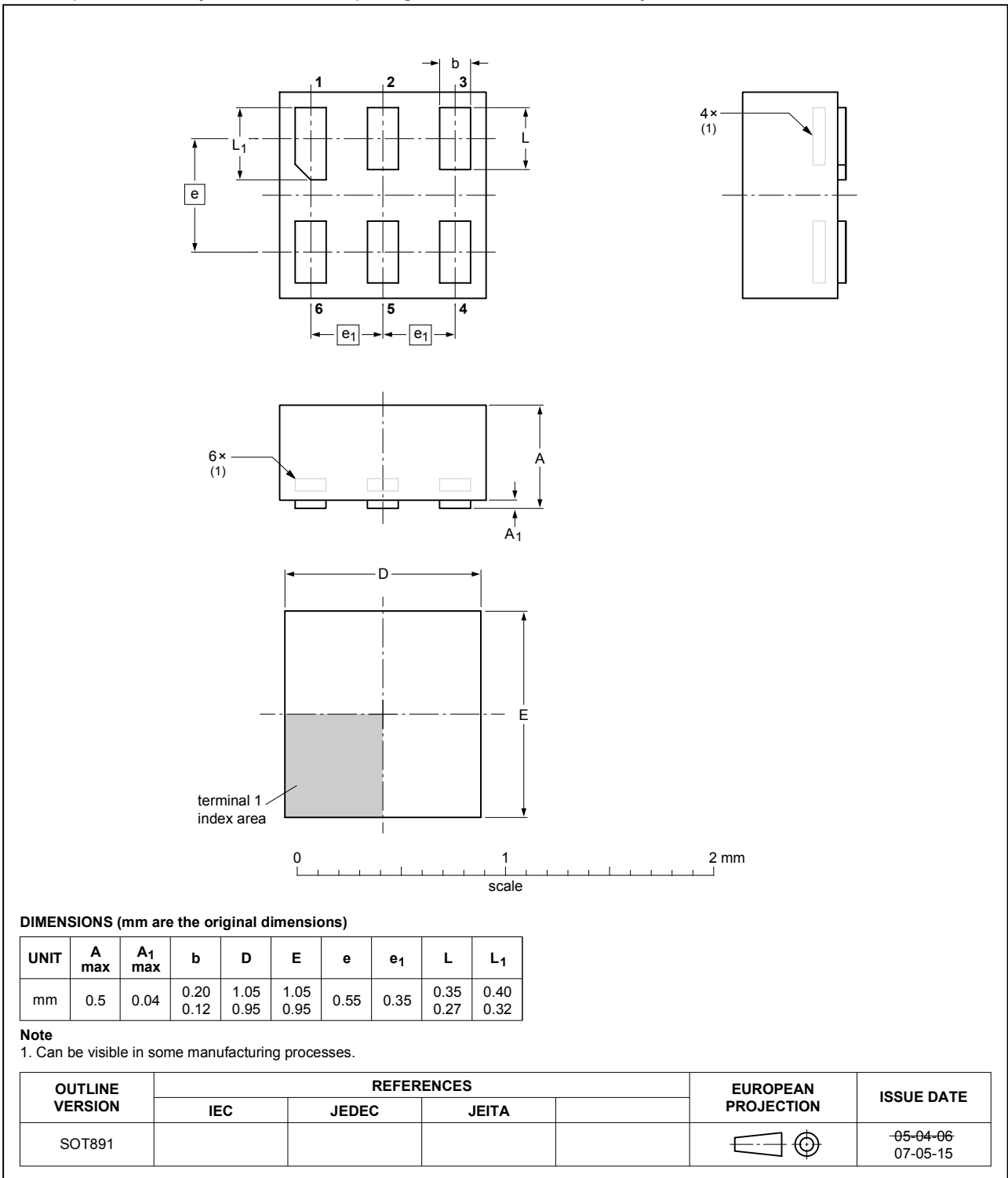


Fig. 12. Package outline SOT891 (XSON6)

XSON6: extremely thin small outline package; no leads;  
6 terminals; body 0.9 x 1.0 x 0.35 mm

SOT1115

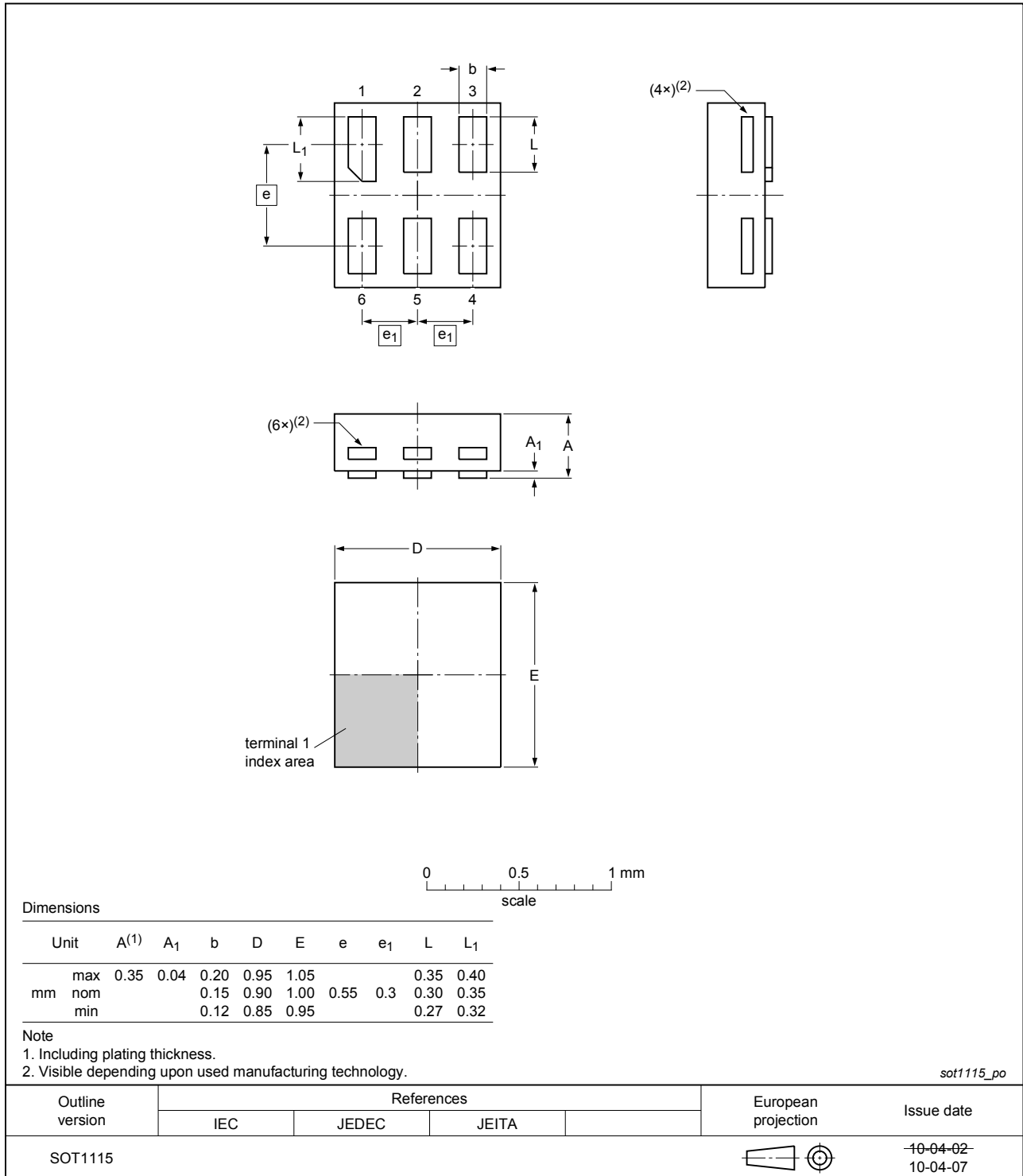


Fig. 13. Package outline SOT1115 (XSON6)

XSON6: extremely thin small outline package; no leads;  
6 terminals; body 1.0 x 1.0 x 0.35 mm

SOT1202

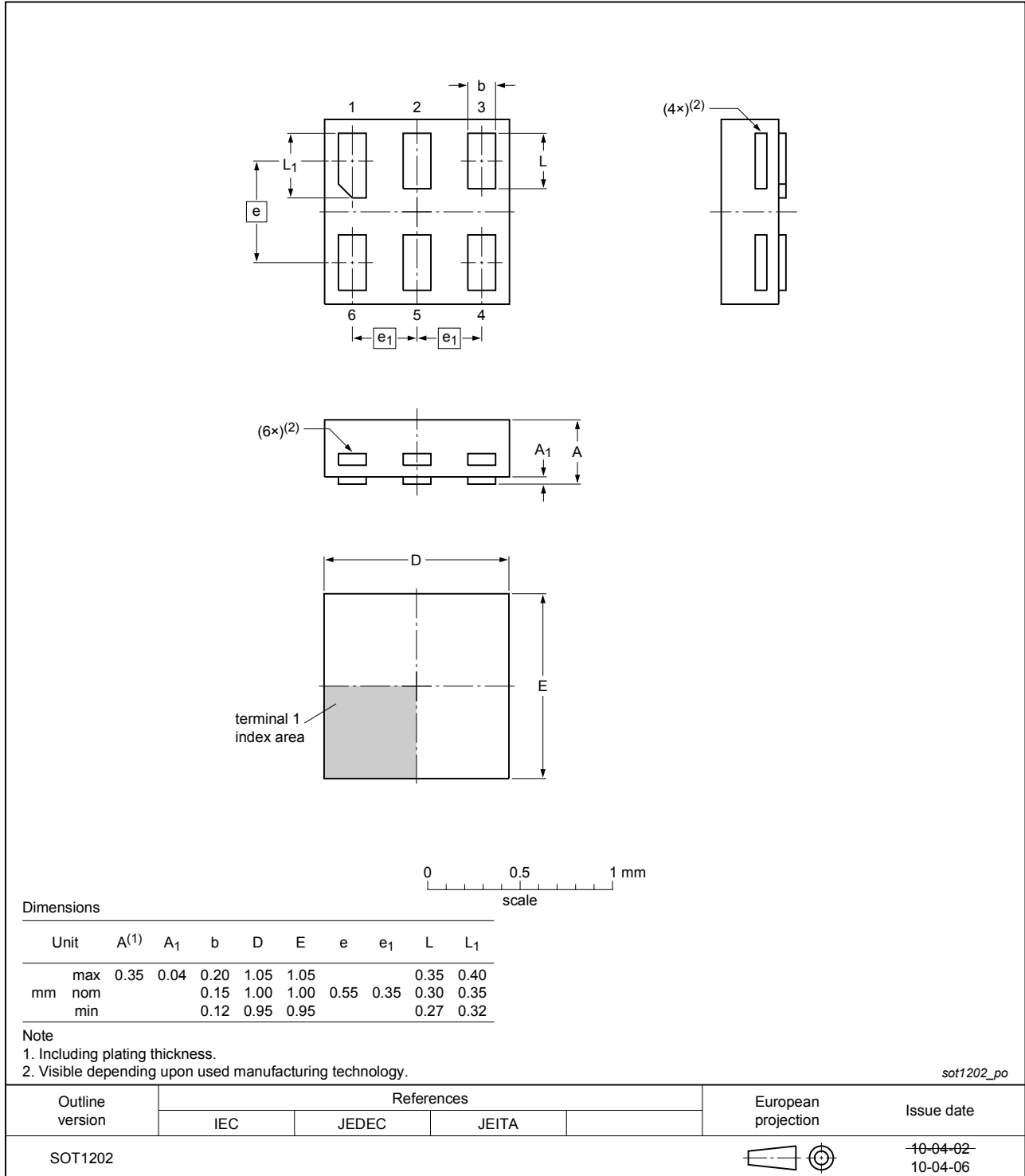


Fig. 14. Package outline SOT1202 (XSON6)

## 13. Abbreviations

Table 11. Abbreviations

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

## 14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G27 v.3	20190419	Product data sheet	-	74LVC1G27 v.2
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>Package outline drawing <a href="#">SOT457</a> (TSOP6) updated.</li> </ul>			
74LVC1G27 v.2	20161202	Product data sheet	-	74LVC1G27 v.1
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Table 7</a>: The maximum limits for leakage current and supply current have changed.</li> </ul>			
74LVC1G27 v.1	20120223	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".
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## Contents

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<b>1. General description</b> .....	<b>1</b>
<b>2. Features and benefits</b> .....	<b>1</b>
<b>3. Ordering information</b> .....	<b>2</b>
<b>4. Marking</b> .....	<b>2</b>
<b>5. Functional diagram</b> .....	<b>2</b>
<b>6. Pinning information</b> .....	<b>3</b>
6.1. Pinning.....	3
6.2. Pin description.....	3
<b>7. Functional description</b> .....	<b>3</b>
<b>8. Limiting values</b> .....	<b>4</b>
<b>9. Recommended operating conditions</b> .....	<b>4</b>
<b>10. Static characteristics</b> .....	<b>5</b>
<b>11. Dynamic characteristics</b> .....	<b>6</b>
11.1. Waveforms and test circuit.....	6
<b>12. Package outline</b> .....	<b>8</b>
<b>13. Abbreviations</b> .....	<b>14</b>
<b>14. Revision history</b> .....	<b>14</b>
<b>15. Legal information</b> .....	<b>15</b>

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