

# 74LVC1G17

## Single Schmitt trigger buffer

Rev. 13 — 4 May 2021

Product data sheet

## 1. General description

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The 74LVC1G17 is a single buffer Schmitt-trigger. 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 environments. 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

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- Wide supply voltage range from 1.65 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- CMOS low power dissipation
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- $\pm 24$  mA output drive ( $V_{CC} = 3.0$  V)
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Unlimited rise and fall times
- Complies with JEDEC standard:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
  - JESD36 (4.5 V to 5.5 V)
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 Class 2 exceeds 2000 V
  - MM: JESD22-A115-A exceeds 200 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
74LVC1G17GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74LVC1G17GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74LVC1G17GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
74LVC1G17GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115
74LVC1G17GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202
74LVC1G17GX	-40 °C to +125 °C	X2SON5	plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.32 mm	SOT1226-3
74LVC1G17GX4	-40 °C to +125 °C	X2SON4	plastic thermal enhanced extremely thin small outline package; no leads; 4 terminals; body 0.6 × 0.6 × 0.32 mm	SOT1269-2

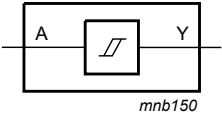
4. Marking

Table 2. Marking codes

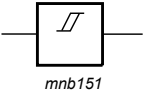
Type number	Marking [1]
74LVC1G17GW	VJ
74LVC1G17GV	V17
74LVC1G17GM	VJ
74LVC1G17GN	VJ
74LVC1G17GS	VJ
74LVC1G17GX	VJ
74LVC1G17GX4	VJ

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

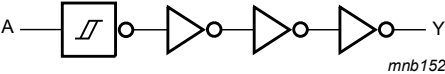
5. Functional diagram



**Fig. 1. Logic symbol**



**Fig. 2. IEC logic symbol**



**Fig. 3. Logic diagram**

6. Pinning information

6.1. Pinning

**74LVC1G17**

001aaf190

**Fig. 4. Pin configuration SOT353-1 (TSSOP5) and SOT753 (SC-74A)**

**74LVC1G17**

001aaf402

Transparent top view

**Fig. 5. Pin configuration SOT886, SOT1115 and SOT1202 (XSON6)**

**74LVC1G17**

aaa-003025

Transparent top view

**Fig. 6. Pin configuration SOT1226-3 (X2SON5)**

**74LVC1G17**

aaa-028399

Transparent top view

**Fig. 7. Pin configuration SOT1269-2 (X2SON4)**

6.2. Pin description

Table 3. Pin description

Symbol	Pin			Description
	TSSOP5, SC-74A and X2SON5	XSON6	X2SON4	
n.c.	1	1, 5	-	not connected
A	2	2	1	data input
GND	3	3	2	ground (0 V)
Y	4	4	3	data output
V <sub>CC</sub>	5	6	4	supply voltage

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level

Input	Output
A	Y
L	L
H	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		-0.5	+6.5	V
$I_{OK}$	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V	-	±50	mA
$V_O$	output voltage	Active mode	-0.5	$V_{CC} + 0.5$	V
		Power-down mode; $V_{CC} = 0$ V	-0.5	+6.5	V
$I_O$	output current	$V_O = 0$ V to $V_{CC}$	-	±50	mA
$I_{CC}$	supply current		-	100	mA
$I_{GND}$	ground current		-100	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to +125 °C			
		TSSOP5, SC-74A, XSON6 and X2SON5 package	-	250	mW
		X2SON4 package	-	150	mW

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

[2] For SOT353-1 (TSSOP5) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT753 (SC-74A) package:  $P_{tot}$  derates linearly with 3.8 mW/K above 85 °C.

For SOT886 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package:  $P_{tot}$  derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT1226-3 (X2SON5) package:  $P_{tot}$  derates linearly with 3.0 mW/K above 67 °C.

[3] For SOT1269-2 (X2SON4) package:  $P_{tot}$  derates linearly with 1.7 mW/K above 57 °C.

## 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

## 10. Static characteristics

**Table 7. Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ [1]	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>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V	-	±0.1	±1	µA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 5.5 V; V <sub>CC</sub> = 0 V	-	±0.1	±2	µA
I <sub>CC</sub>	supply current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 1.65 V to 5.5 V; I <sub>O</sub> = 0 A	-	0.1	4	µA
ΔI <sub>CC</sub>	additional supply current	per pin; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 2.3 V to 5.5 V	-	5	500	µA
C <sub>I</sub>	input capacitance		-	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	-	-	0.7	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	-	-	0.6	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

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
$I_I$	input leakage current	$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 0 \text{ V}$ to $5.5 \text{ V}$	-	-	$\pm 1$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_I$ or $V_O = 5.5 \text{ V}$ ; $V_{CC} = 0 \text{ V}$	-	-	$\pm 2$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 1.65 \text{ V}$ to $5.5 \text{ V}$ ; $I_O = 0 \text{ A}$	-	-	4	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per pin; $V_I = V_{CC} - 0.6 \text{ V}$ ; $I_O = 0 \text{ A}$ ; $V_{CC} = 2.3 \text{ V}$ to $5.5 \text{ V}$	-	-	500	$\mu\text{A}$

[1] All typical values are measured at maximum  $V_{CC}$  and  $T_{amb} = 25^\circ\text{C}$ .

## 10.1. Transfer characteristics

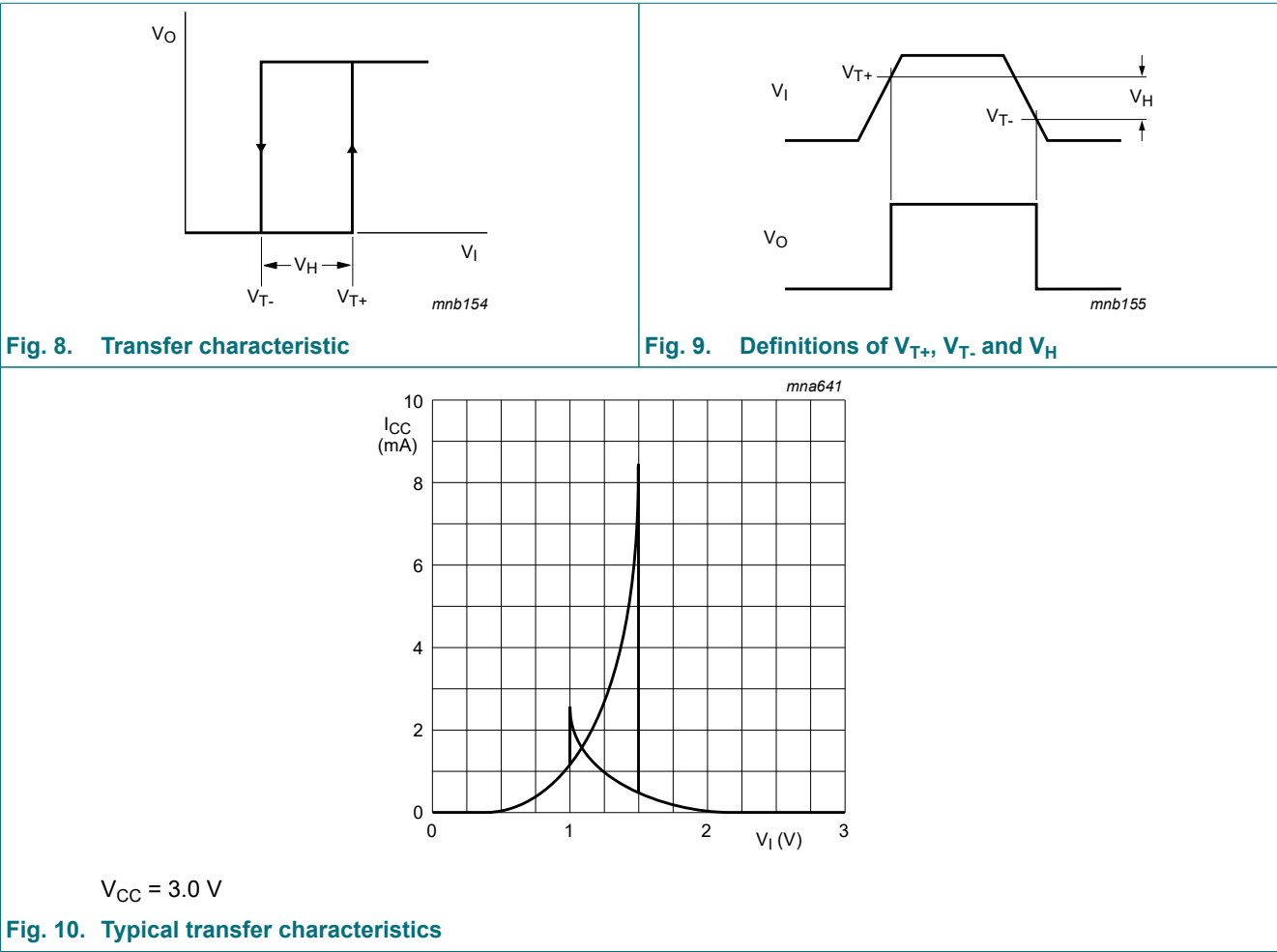
**Table 8. Transfer characteristics**

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	
$V_{T+}$	positive-going threshold voltage	see <a href="#">Fig. 8</a> and <a href="#">Fig. 9</a>						
		$V_{CC} = 1.8 \text{ V}$	0.82	1.0	1.14	0.79	1.14	V
		$V_{CC} = 2.3 \text{ V}$	1.03	1.2	1.40	1.00	1.40	V
		$V_{CC} = 3.0 \text{ V}$	1.29	1.5	1.71	1.26	1.71	V
		$V_{CC} = 4.5 \text{ V}$	1.84	2.1	2.36	1.81	2.36	V
		$V_{CC} = 5.5 \text{ V}$	2.19	2.5	2.79	2.16	2.79	V
$V_{T-}$	negative-going threshold voltage	see <a href="#">Fig. 8</a> and <a href="#">Fig. 9</a>						
		$V_{CC} = 1.8 \text{ V}$	0.46	0.6	0.75	0.46	0.78	V
		$V_{CC} = 2.3 \text{ V}$	0.65	0.8	0.96	0.65	0.99	V
		$V_{CC} = 3.0 \text{ V}$	0.88	1.0	1.24	0.88	1.27	V
		$V_{CC} = 4.5 \text{ V}$	1.32	1.5	1.84	1.32	1.87	V
		$V_{CC} = 5.5 \text{ V}$	1.58	1.8	2.24	1.58	2.27	V
$V_H$	hysteresis voltage	see <a href="#">Fig. 8</a> , <a href="#">Fig. 9</a> and <a href="#">Fig. 10</a>						
		$V_{CC} = 1.8 \text{ V}$	0.26	0.4	0.51	0.19	0.51	V
		$V_{CC} = 2.3 \text{ V}$	0.28	0.4	0.57	0.22	0.57	V
		$V_{CC} = 3.0 \text{ V}$	0.31	0.5	0.64	0.25	0.64	V
		$V_{CC} = 4.5 \text{ V}$	0.40	0.6	0.77	0.34	0.77	V
		$V_{CC} = 5.5 \text{ V}$	0.47	0.6	0.88	0.41	0.88	V

[1] All typical values are measured at  $T_{amb} = 25^\circ\text{C}$ .

10.2. Transfer characteristic waveforms



## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V). For test circuit see Fig. 12.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
$t_{pd}$	propagation delay	A to Y; see Fig. 11 [2]						
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	1.0	4.1	11.0	1.0	14.0	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	0.7	2.8	6.5	0.7	8.5	ns
		$V_{CC} = 2.7 \text{ V}$	0.7	3.2	6.5	0.7	8.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	0.7	3.0	5.5	0.7	7.0	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	0.7	2.2	5.0	0.7	6.5	ns
$C_{PD}$	power dissipation capacitance	$V_I = \text{GND to } V_{CC}$ ; $V_{CC} = 3.3 \text{ V}$ [3]	-	16.6	-	-	-	pF

[1] Typical values are measured at  $T_{amb} = 25 \text{ °C}$  and  $V_{CC} = 1.8 \text{ V}, 2.5 \text{ V}, 2.7 \text{ V}, 3.3 \text{ V}$  and  $5.0 \text{ V}$  respectively.

[2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .

[3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

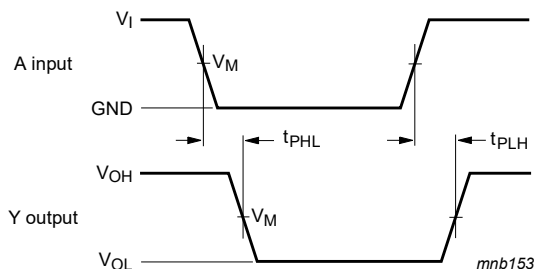
$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

$\sum (C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

### 11.1. Waveform and test circuit



Measurement points are given in Table 10.

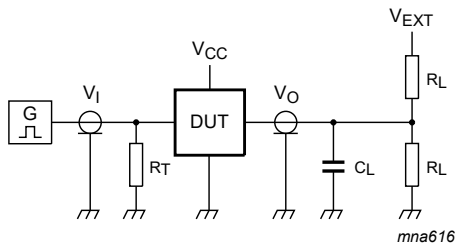
$V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig. 11. The input A to output Y propagation delay times**

**Table 10. Measurement points**

Supply voltage	Input	Output
$V_{CC}$	$V_M$	$V_M$
1.65 V to 1.95 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.3 V to 2.7 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
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	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$





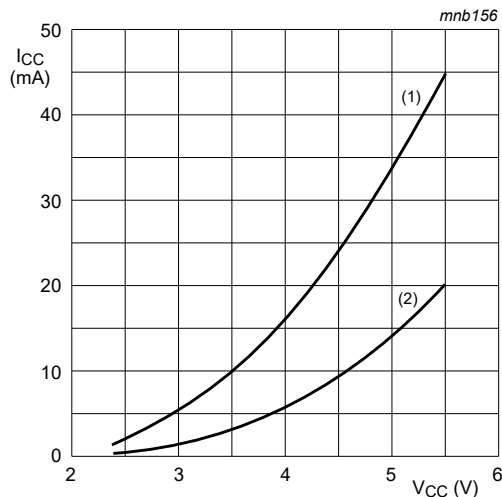
Test data is given in [Table 11](#).  
Definitions for test circuit:  
 $R_L$  = Load resistance.  
 $C_L$  = Load capacitance including jig and probe capacitance.  
 $R_T$  = Termination resistance should be equal to the output impedance  $Z_o$  of the pulse generator.  
 $V_{EXT}$  = External voltage for measuring switching times.

Fig. 12. Test circuit for measuring switching times

Table 11. 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. Application information



Linear change of  $V_I$  between 0.8 V to 2.0 V.  
(1) Positive-going edge  
(2) Negative-going edge

Fig. 13. Average supply current as a function of supply voltage

13. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

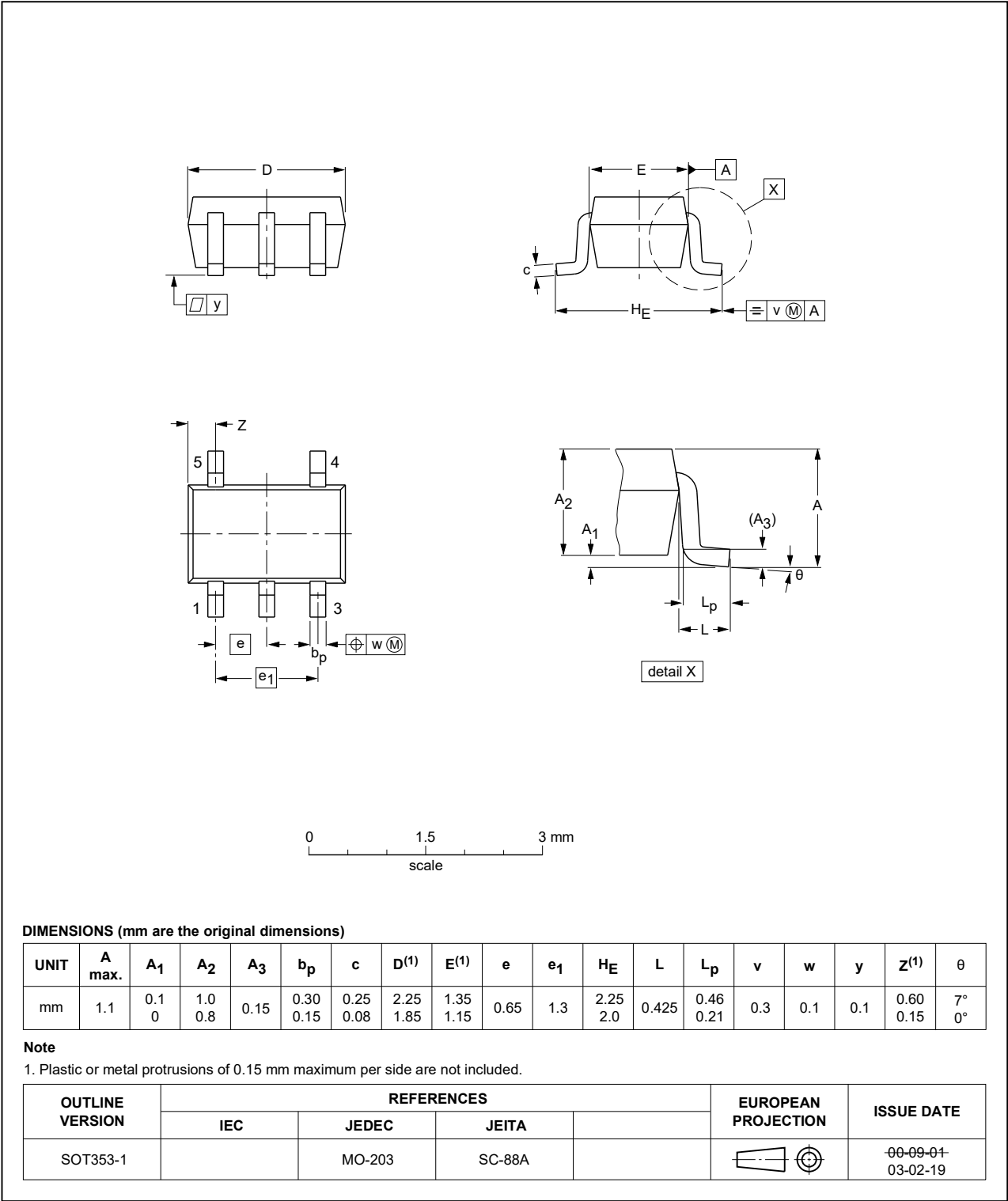


Fig. 14. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

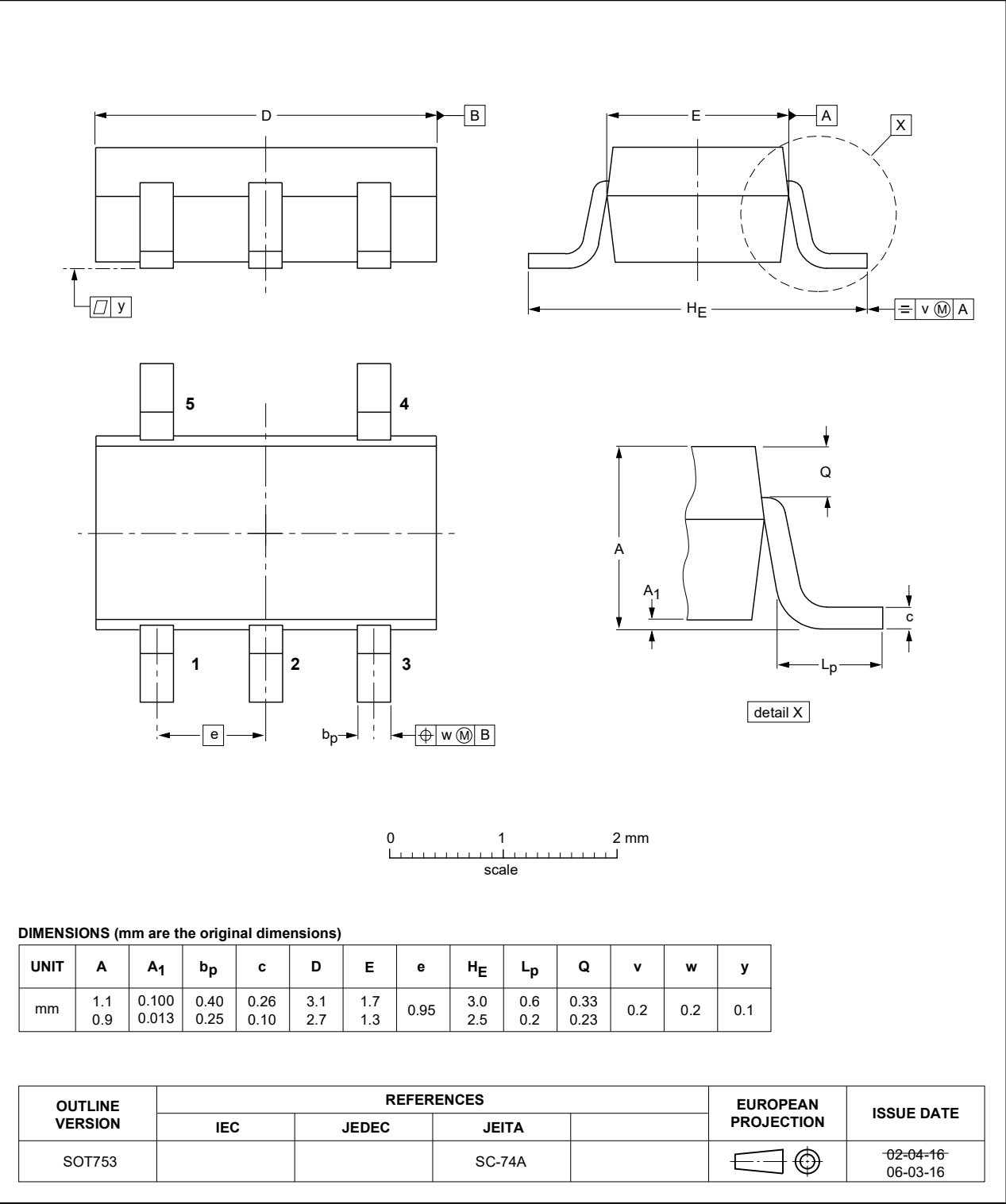


Fig. 15. Package outline SOT753 (SC-74A)

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

SOT886

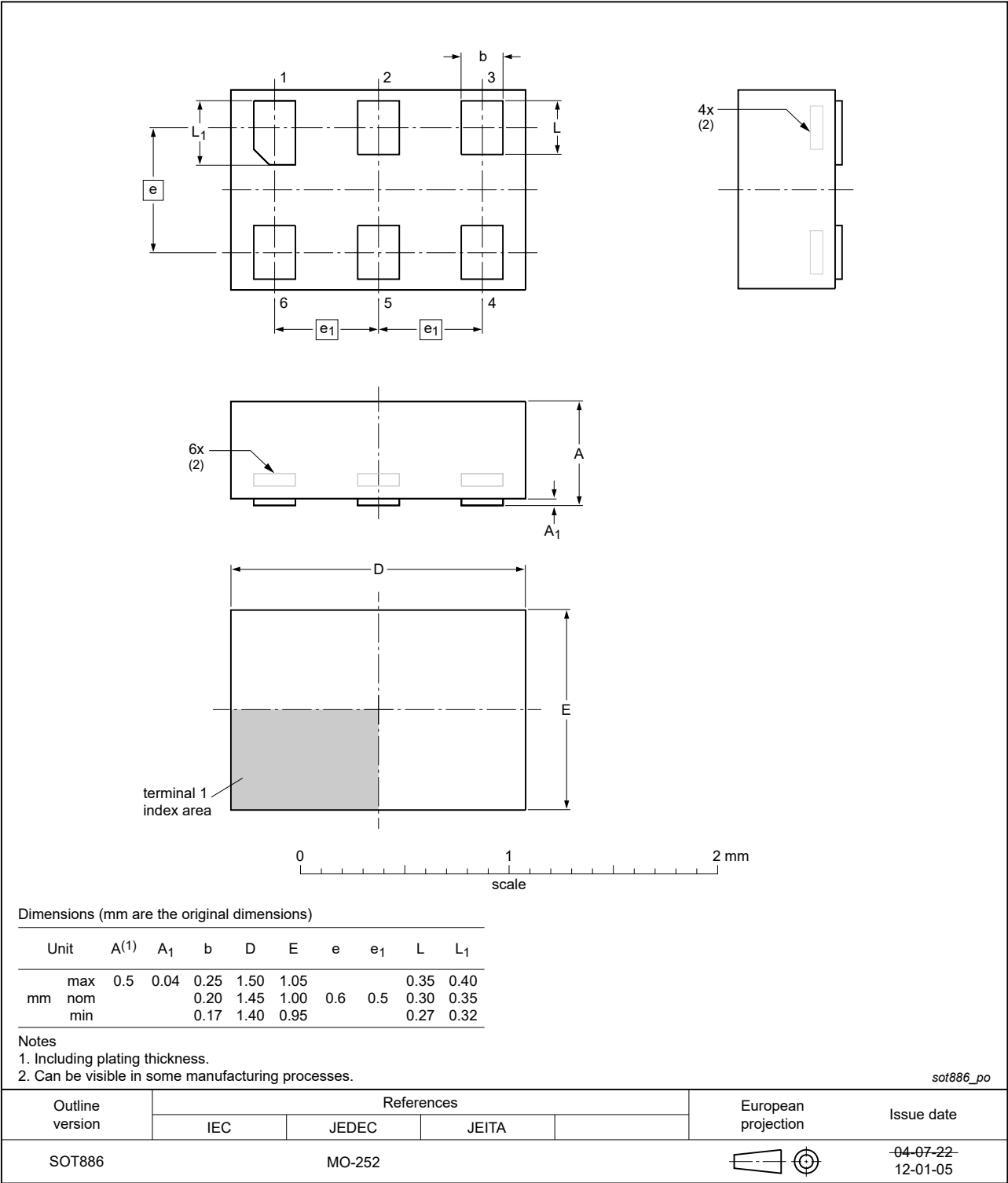


Fig. 16. Package outline SOT886 (XSON6)

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

SOT1115

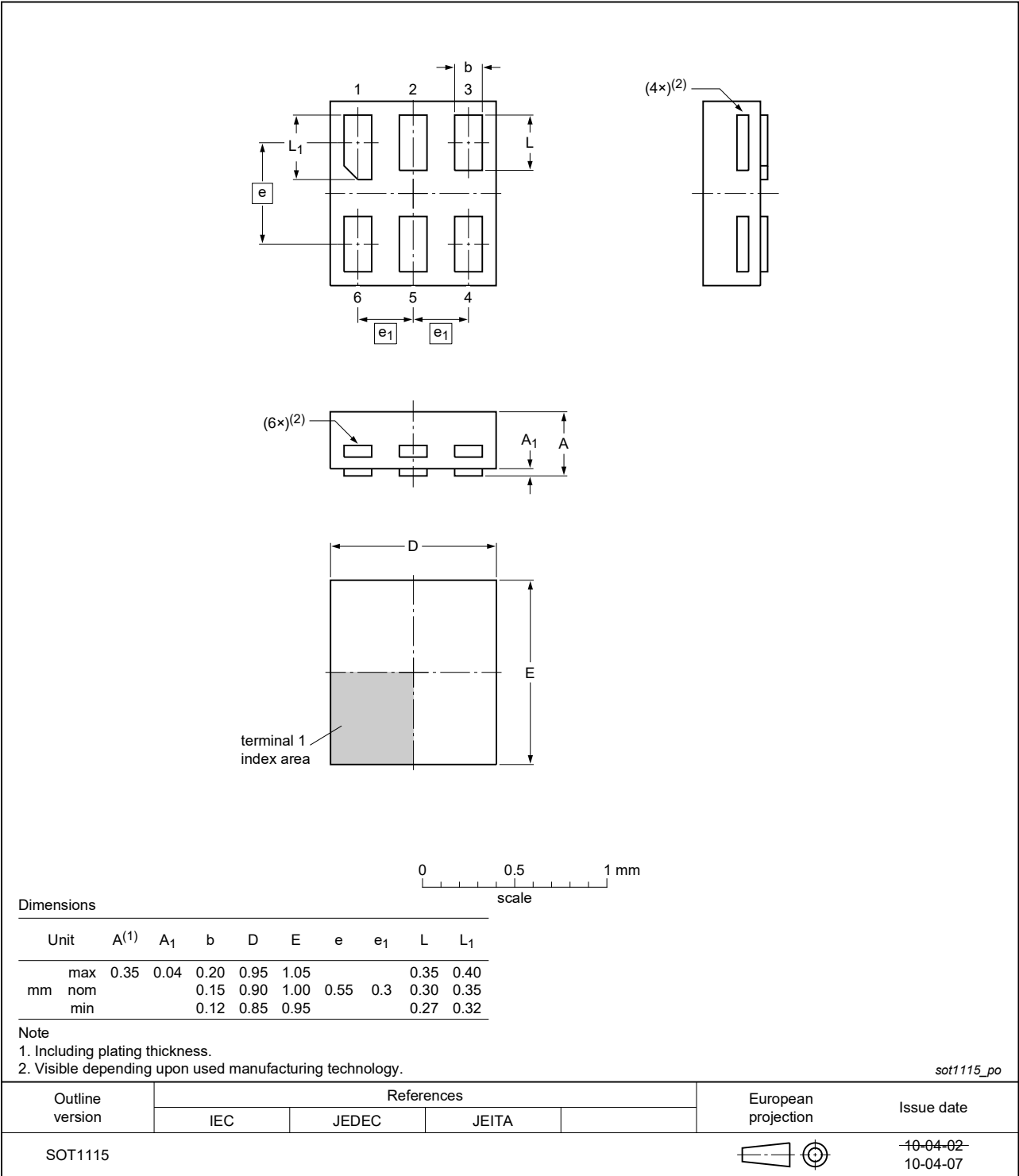


Fig. 17. Package outline SOT1115 (XSON6)

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

SOT1202

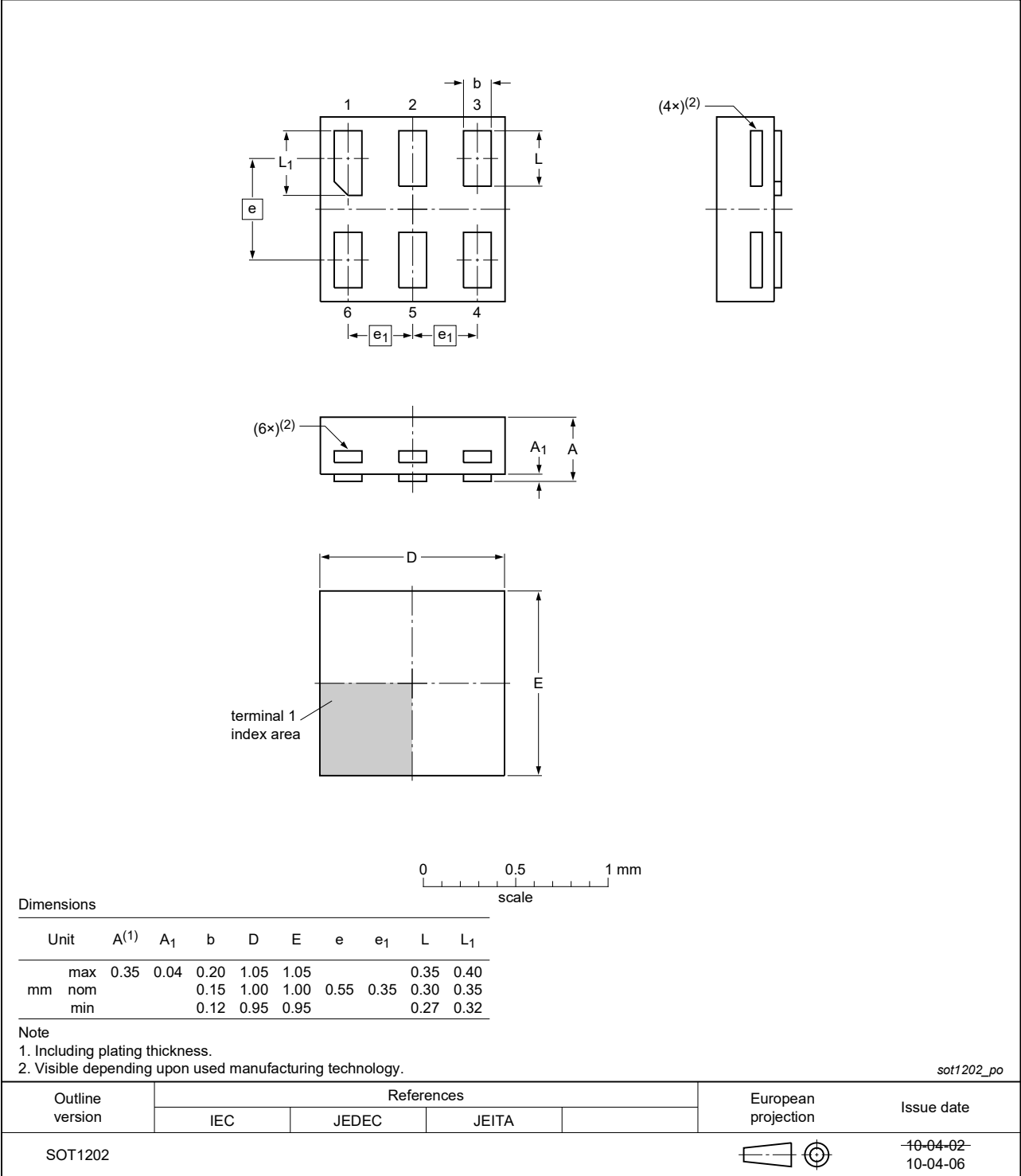


Fig. 18. Package outline SOT1202 (XSON6)

X2SON5: plastic thermal enhanced extremely thin small outline package; no leads;  
5 terminals; body 0.8 x 0.8 x 0.32 mm

SOT1226-3

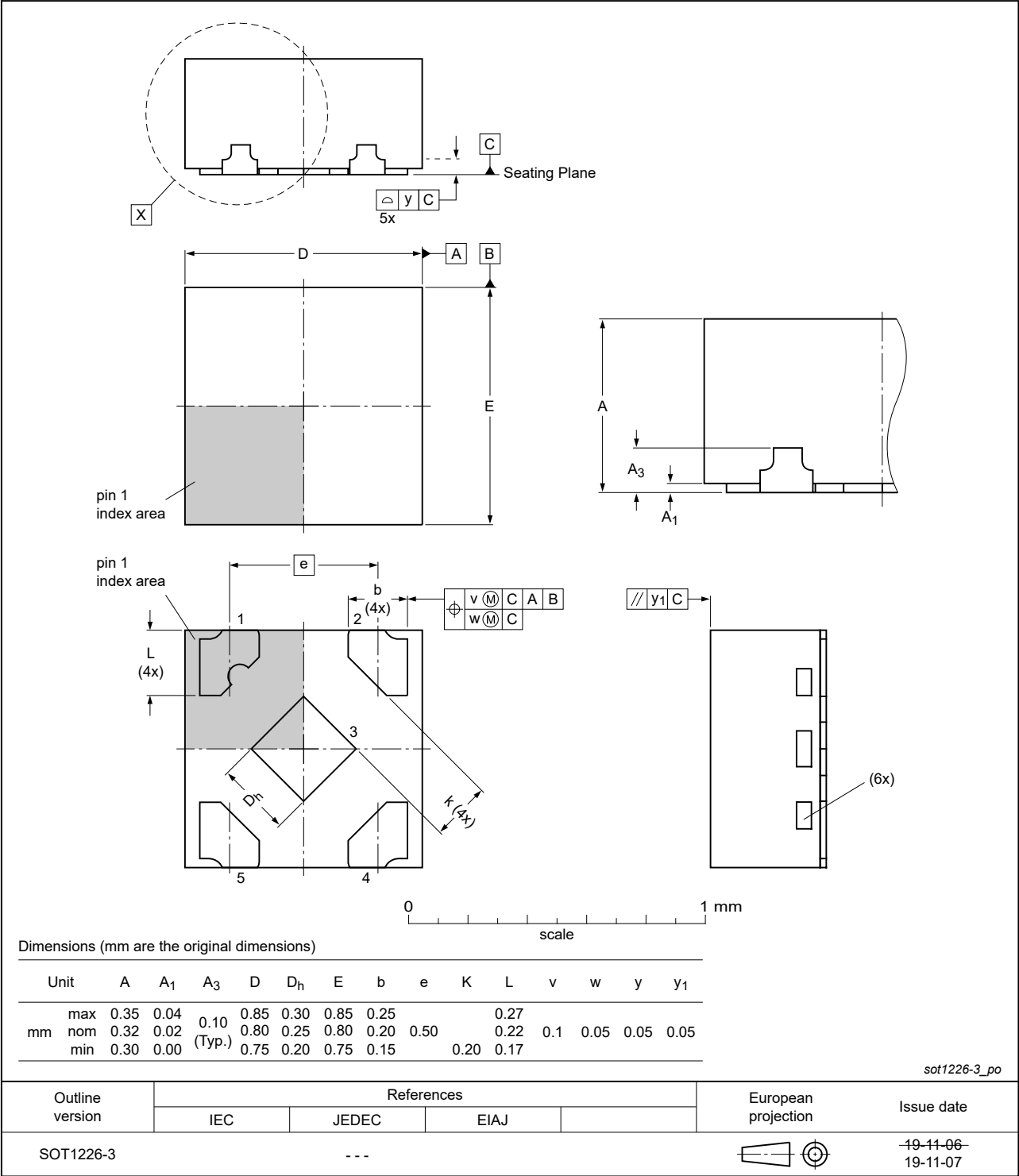


Fig. 19. Package outline SOT1226-3 (X2SON5)

X2SON4: plastic thermal enhanced extremely thin small outline package; no leads;  
4 terminals; body 0.6 x 0.6 x 0.32 mm

SOT1269-2

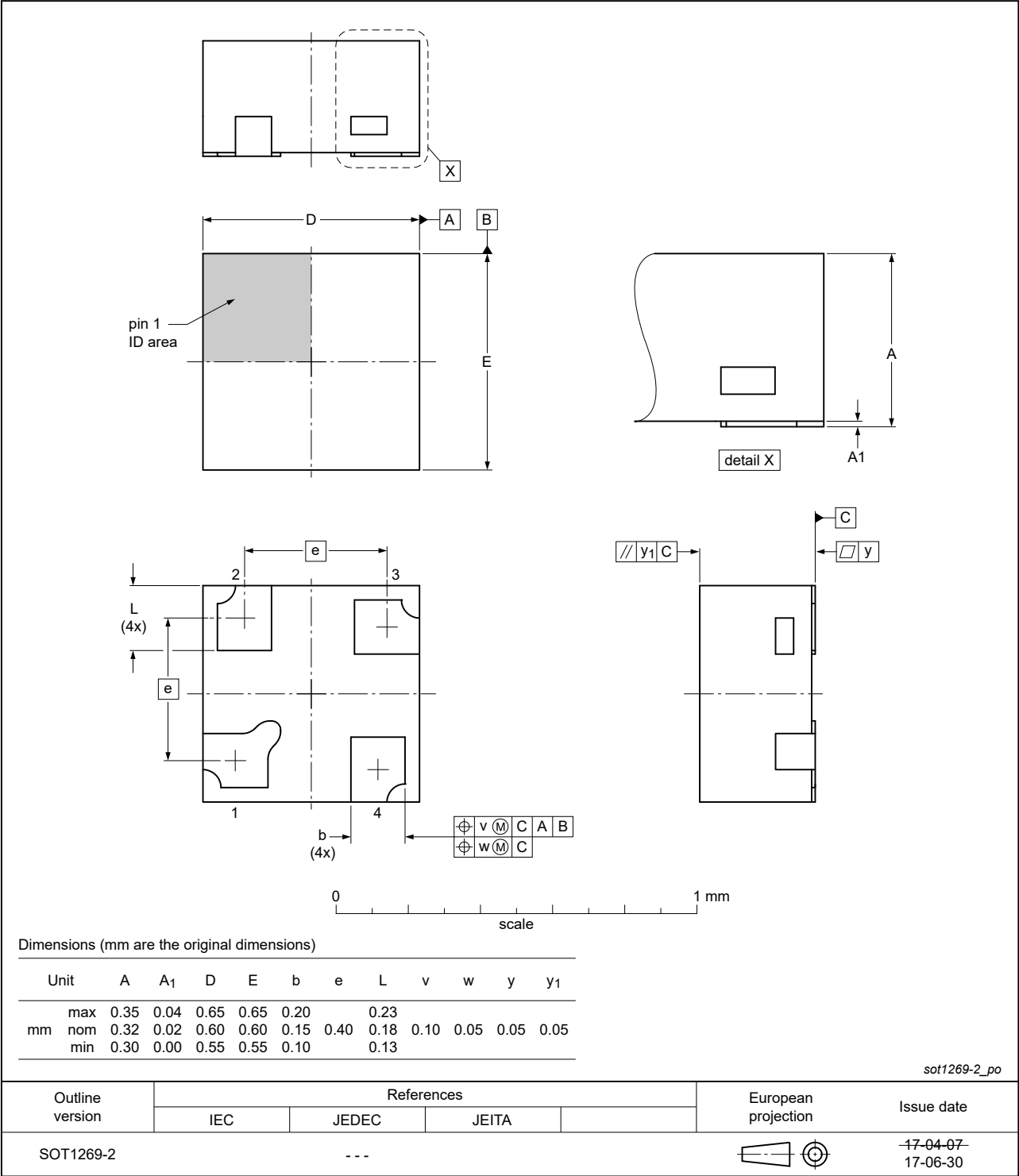


Fig. 20. Package outline SOT1269-2 (X2SON4)



## 14. Abbreviations

Table 12. 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

## 15. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G17 v.13	20210504	Product data sheet	-	74LVC1G17 v.12
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 1</a> and <a href="#">Section 2</a> updated.</li> <li>• SOT1226 (X2SON5) package changed to SOT1226-3 (X2SON5) package.</li> <li>• Type number 74LVC1G17GF (SOT891/XSON6) removed.</li> <li>• <a href="#">Table 5</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul>			
74LVC1G17 v.12	20180608	Product data sheet	-	74LVC1G17 v.11
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>• Added type number 74LVC1G17GX4 (SOT1269-2)</li> </ul>			
74LVC1G17 v.11	20161202	Product data sheet	-	74LVC1G17 v.10
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>			
74LVC1G17 v.10	20120629	Product data sheet	-	74LVC1G17 v.9
Modifications:	<ul style="list-style-type: none"> <li>• Added type number 74LVC1G17GX (SOT1226)</li> <li>• Package outline drawing of SOT886 (<a href="#">Fig. 16</a>) modified.</li> </ul>			
74LVC1G17 v.9	20111206	Product data sheet	-	74LVC1G17 v.8
Modifications:	<ul style="list-style-type: none"> <li>• Legal pages updated.</li> </ul>			
74LVC1G17 v.8	20110920	Product data sheet	-	74LVC1G17 v.7
74LVC1G17 v.7	20101110	Product data sheet	-	74LVC1G17 v.6
74LVC1G17 v.6	20070827	Product data sheet	-	74LVC1G17 v.5
74LVC1G17 v.5	20061006	Product data sheet	-	74LVC1G17 v.4
74LVC1G17 v.4	20041130	Product specification	-	74LVC1G17 v.3
74LVC1G17 v.3	20041018	Product specification	-	74LVC1G17 v.2
74LVC1G17 v.2	20040407	Product specification	-	74LVC1G17 v.1
74LVC1G17 v.1	20040324	Product specification	-	-

## 16. 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.
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