

74LVC1G17

Single Schmitt trigger buffer

Rev. 14 — 14 January 2022

Product data sheet

1. General description

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

- 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
- ± 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

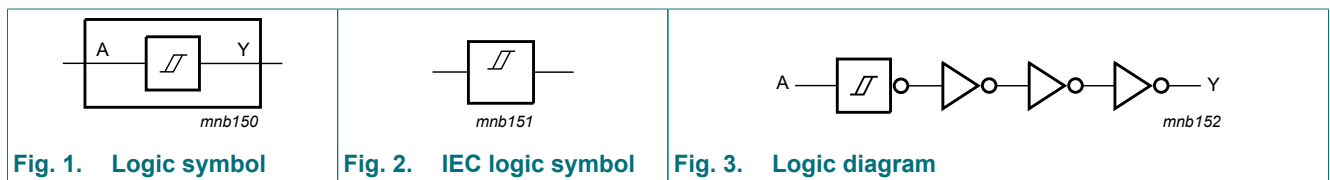
4. Marking

Table 2. Marking codes

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

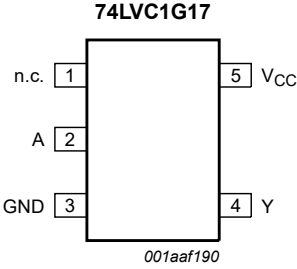
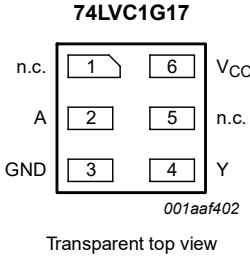
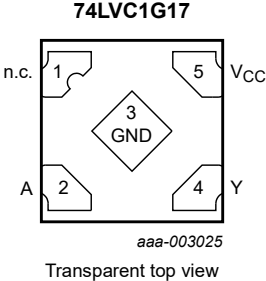
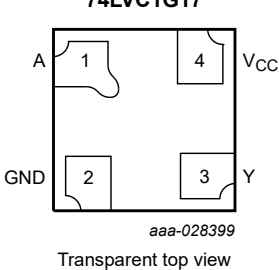
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1. Pinning

 <p>Fig. 4. Pin configuration SOT353-1 (TSSOP5) and SOT753 (SC-74A)</p>	 <p>Fig. 5. Pin configuration SOT886, SOT1115 and SOT1202 (XSON6)</p>
 <p>Fig. 6. Pin configuration SOT1226-3 (X2SON5)</p>	 <p>Fig. 7. Pin configuration SOT1269-2 (X2SON4)</p>

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 _{CC}	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	[1]	-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 [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}	-	± 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 [2]	-	250	mW
		X2SON4 package [3]	-	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		
T_{amb} = -40 °C to +85 °C								
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-}						
		I _O = -100 μA; V _{CC} = 1.65 V to 5.5 V	V _{CC} - 0.1	-	-	V		
		I _O = -4 mA; V _{CC} = 1.65 V	1.2	-	-	V		
		I _O = -8 mA; V _{CC} = 2.3 V	1.9	-	-	V		
		I _O = -12 mA; V _{CC} = 2.7 V	2.2	-	-	V		
		I _O = -24 mA; V _{CC} = 3.0 V	2.3	-	-	V		
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-}						
		I _O = 100 μA; V _{CC} = 1.65 V to 5.5 V	-	-	0.1	V		
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.45	V		
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.3	V		
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.4	V		
		I _O = 24 mA; V _{CC} = 3.0 V	-	-	0.55	V		
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	±0.1	±1	μA		
		I _{OFF}	power-off leakage current	V _I or V _O = 5.5 V; V _{CC} = 0 V	-	±0.1	±2	μA
		I _{CC}	supply current	V _I = 5.5 V or GND; V _{CC} = 1.65 V to 5.5 V; I _O = 0 A	-	0.1	4	μA
		ΔI _{CC}	additional supply current	per pin; V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 2.3 V to 5.5 V	-	5	500	μA
		C _I	input capacitance		-	5	-	pF
		T_{amb} = -40 °C to +125 °C						
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-}						
		I _O = -100 μA; V _{CC} = 1.65 V to 5.5 V	V _{CC} - 0.1	-	-	V		
		I _O = -4 mA; V _{CC} = 1.65 V	0.95	-	-	V		
		I _O = -8 mA; V _{CC} = 2.3 V	1.7	-	-	V		
		I _O = -12 mA; V _{CC} = 2.7 V	1.9	-	-	V		
		I _O = -24 mA; V _{CC} = 3.0 V	2.0	-	-	V		
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-}						
		I _O = 100 μA; V _{CC} = 1.65 V to 5.5 V	-	-	0.1	V		
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.7	V		
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.45	V		
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.6	V		
		I _O = 24 mA; V _{CC} = 3.0 V	-	-	0.80	V		
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	±0.1	±1	μA		
		I _{OFF}	power-off leakage current	V _I or V _O = 5.5 V; V _{CC} = 0 V	-	±0.1	±2	μA
		I _{CC}	supply current	V _I = 5.5 V or GND; V _{CC} = 1.65 V to 5.5 V; I _O = 0 A	-	0.1	4	μA
		ΔI _{CC}	additional supply current	per pin; V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 2.3 V to 5.5 V	-	5	500	μA
		C _I	input capacitance		-	5	-	pF

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 V	-	-	± 1	μA
I_{OFF}	power-off leakage current	V_I or $V_O = 5.5 \text{ V}$; $V_{CC} = 0 \text{ V}$	-	-	± 2	μA
I_{CC}	supply current	$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 1.65 \text{ V}$ to 5.5 V ; $I_O = 0 \text{ A}$	-	-	4	μA
ΔI_{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 V	-	-	500	μA

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

10.1. Transfer characteristics

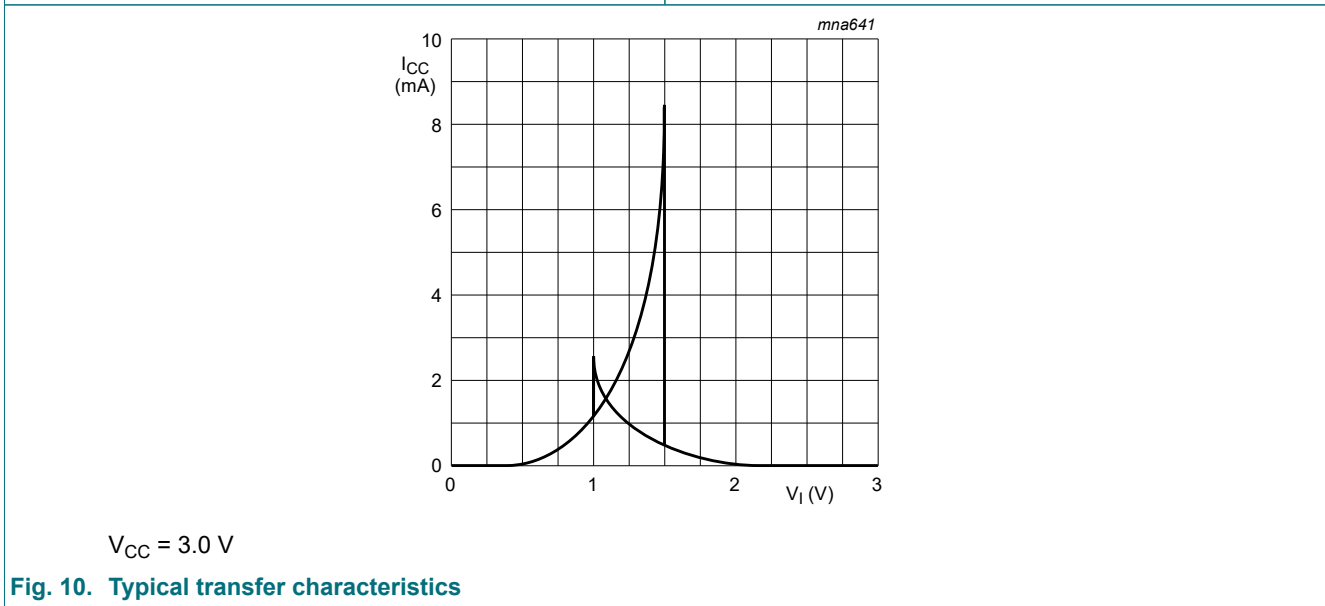
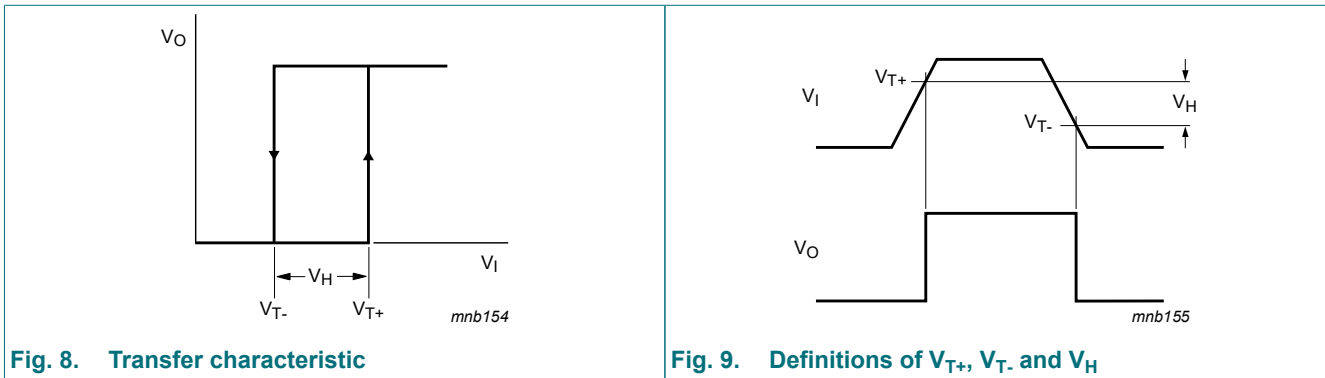
Table 8. Transfer characteristics

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 Fig. 8 and Fig. 9						
		$V_{CC} = 1.8 \text{ V}$	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_{T-}	negative-going threshold voltage	see Fig. 8 and Fig. 9						
		$V_{CC} = 1.8 \text{ V}$	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_H	hysteresis voltage	see Fig. 8 , Fig. 9 and Fig. 10						
		$V_{CC} = 1.8 \text{ V}$	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 $T_{amb} = 25 \text{ }^\circ\text{C}$.

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 V to 1.95 V	1.0	4.1	11.0	1.0	14.0	ns
		V _{CC} = 2.3 V to 2.7 V	0.7	2.8	6.5	0.7	8.5	ns
		V _{CC} = 2.7 V	0.7	3.2	6.5	0.7	8.5	ns
		V _{CC} = 3.0 V to 3.6 V	0.7	3.0	5.5	0.7	7.0	ns
		V _{CC} = 4.5 V to 5.5 V	0.7	2.2	5.0	0.7	6.5	ns
C _{PD}	power dissipation capacitance	V _I = GND to V _{CC} ; V _{CC} = 3.3 V [3]	-	16.6	-	-	-	pF

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

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

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;

∑(C_L × V_{CC}² × f_o) = sum of outputs.

11.1. Waveform and test circuit

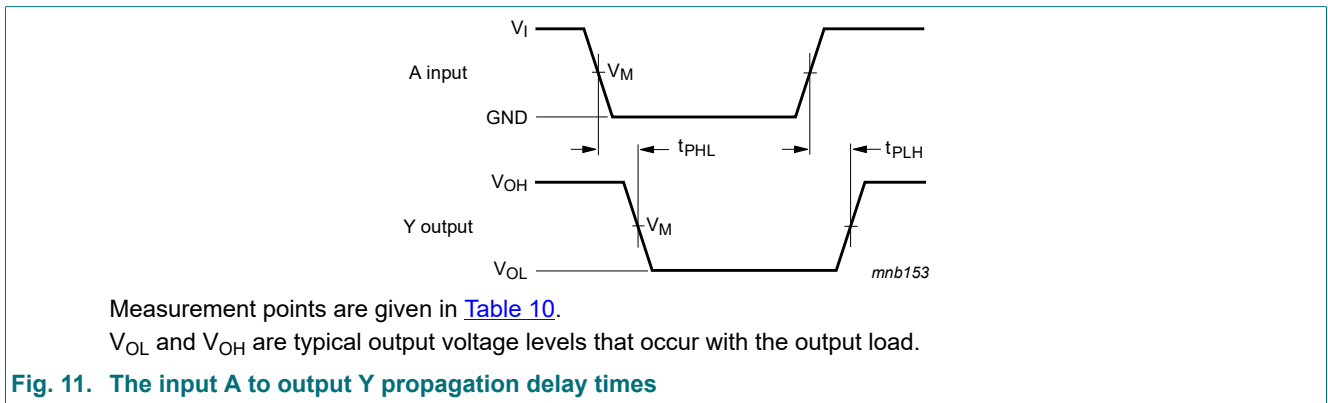
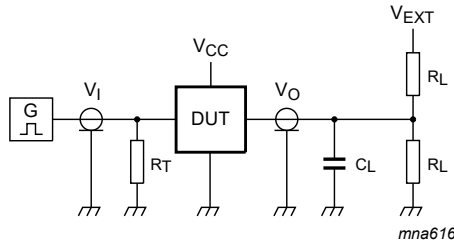


Table 10. Measurement points

Supply voltage	Input	Output
V _{CC}	V _M	V _M
1.65 V to 1.95 V	0.5 × V _{CC}	0.5 × V _{CC}
2.3 V to 2.7 V	0.5 × V _{CC}	0.5 × 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 × V _{CC}	0.5 × 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.

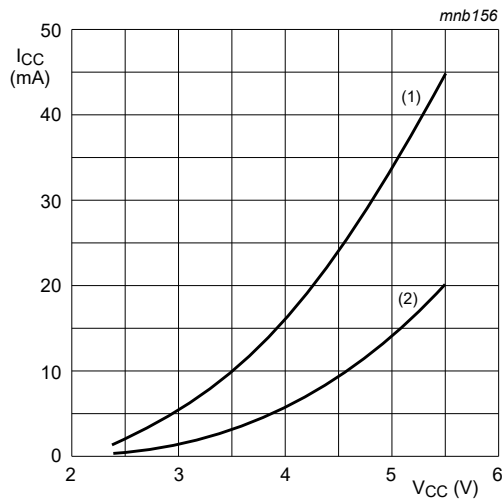
V_{EXT} = External voltage for measuring switching times.

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}	≤ 2.0 ns	30 pF	1 k Ω	open
2.3 V to 2.7 V	V_{CC}	≤ 2.0 ns	30 pF	500 Ω	open
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open
4.5 V to 5.5 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	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

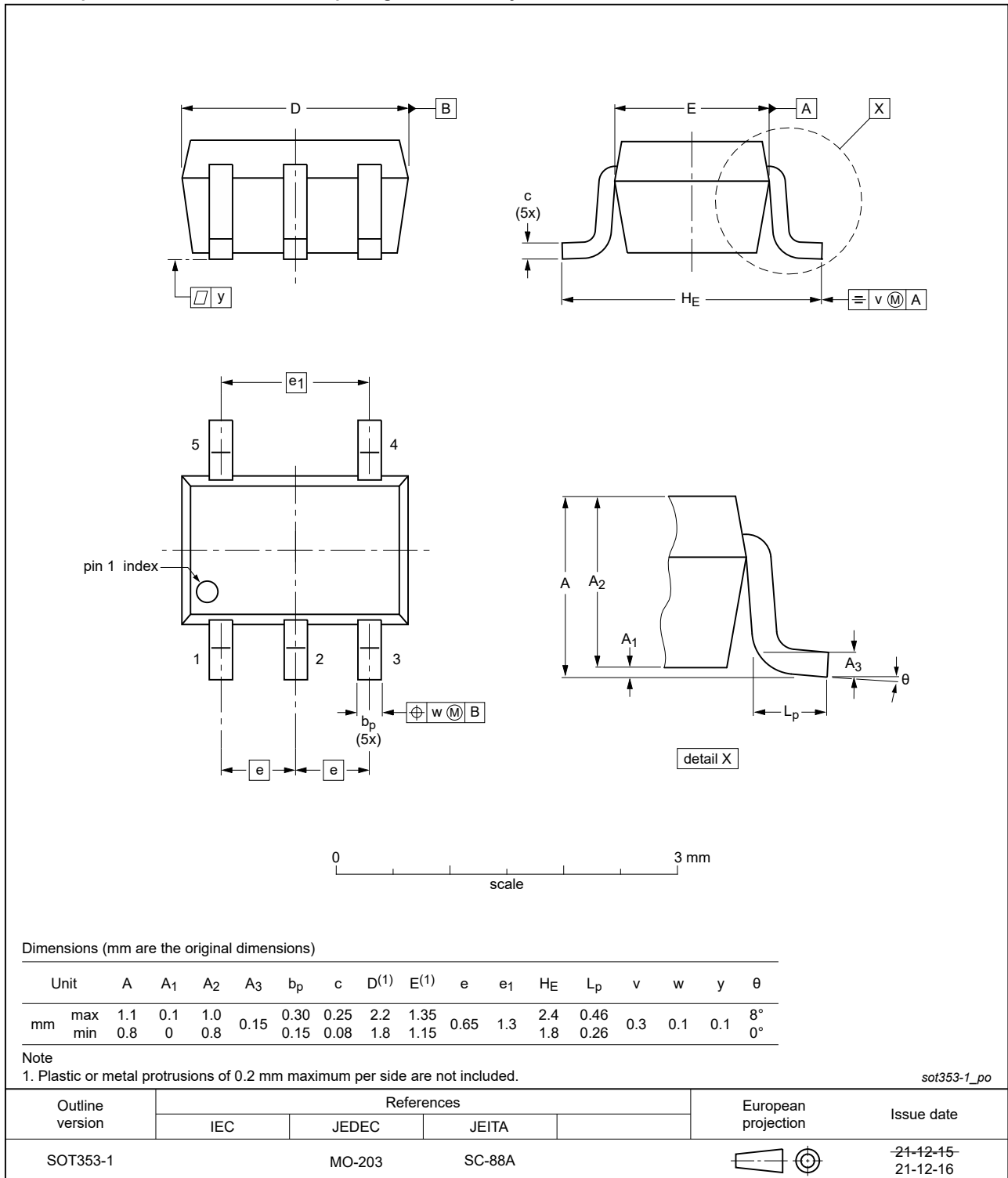


Fig. 14. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

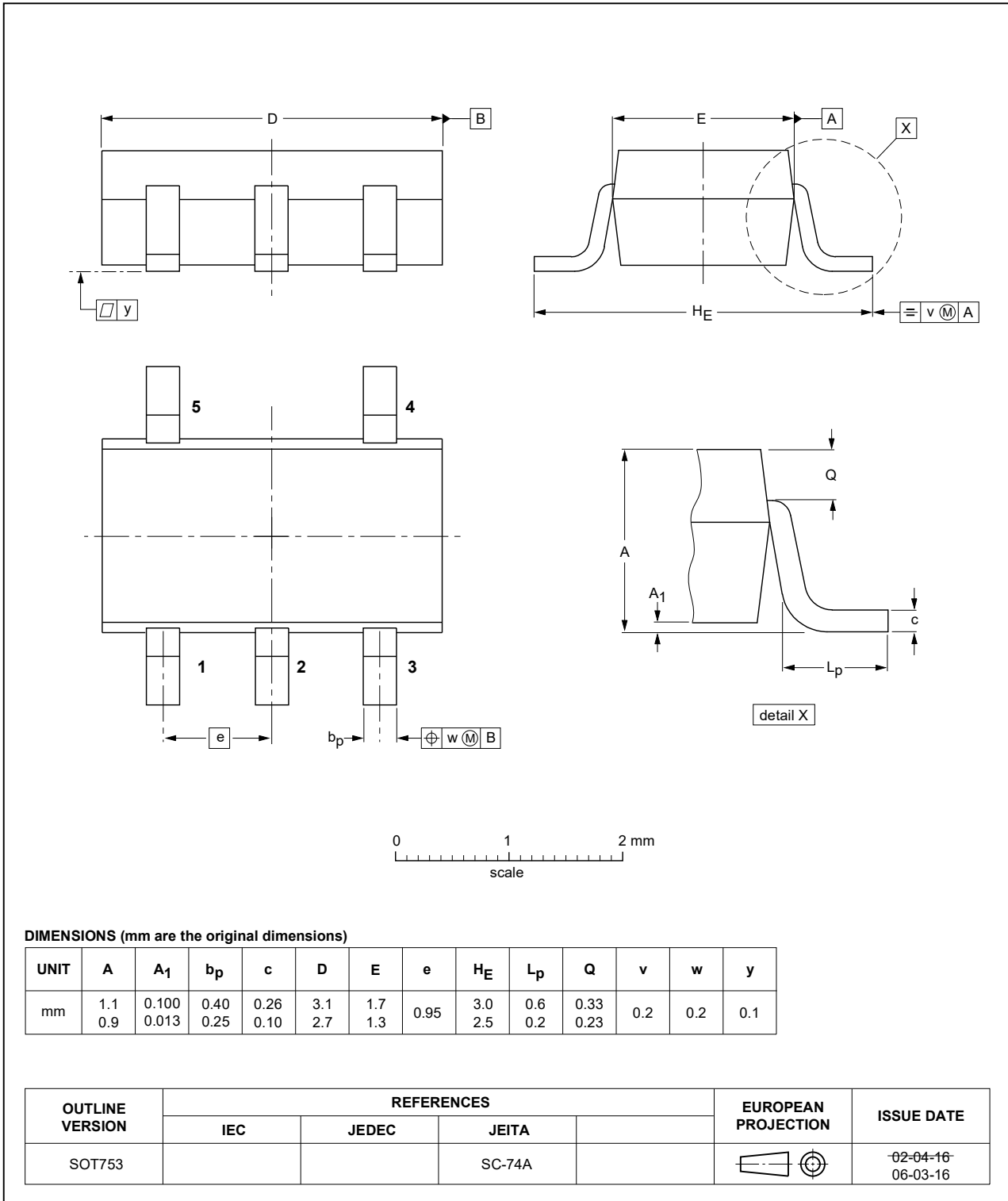


Fig. 15. Package outline SOT753 (SC-74A)

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

SOT886

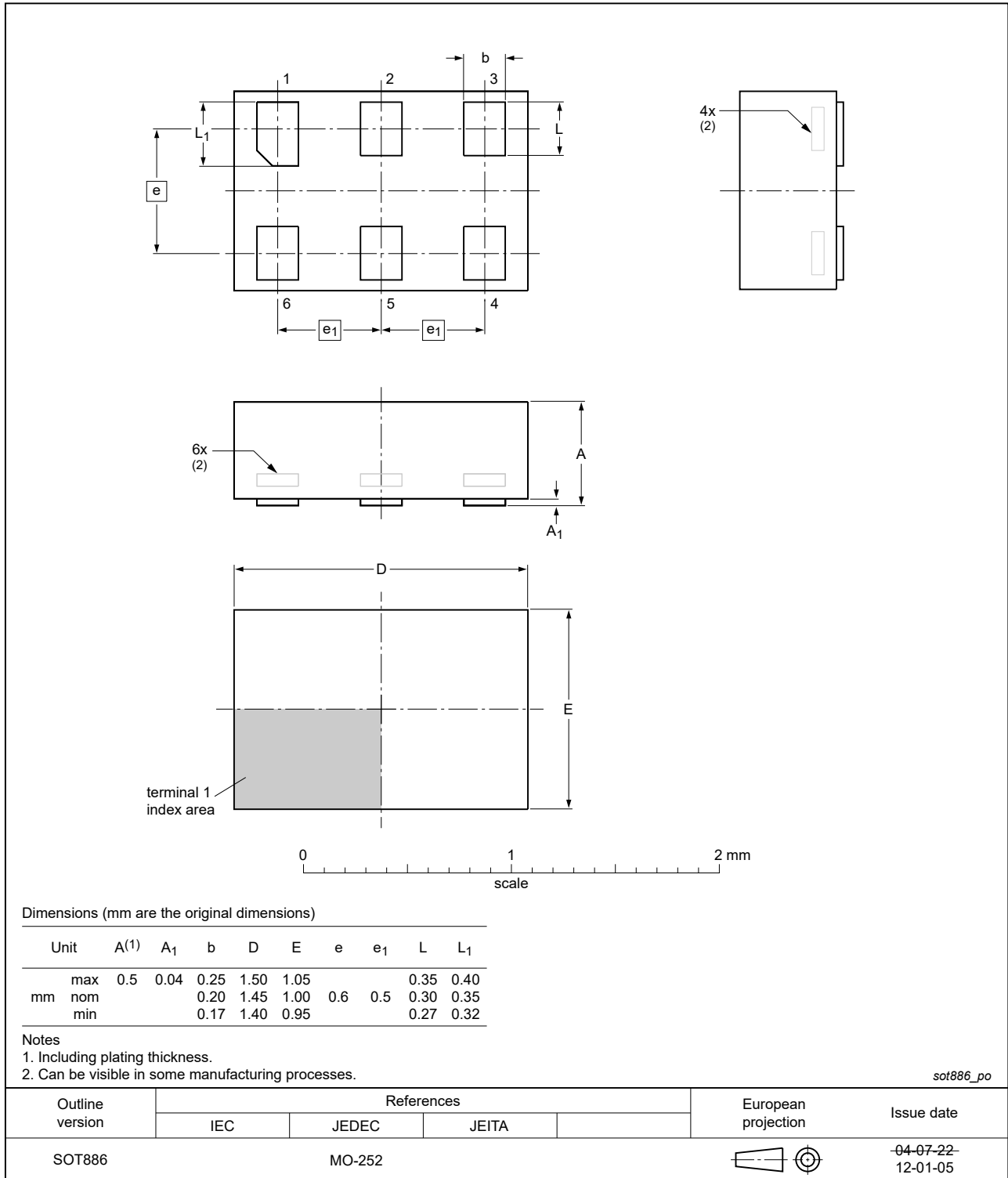


Fig. 16. Package outline SOT886 (XSON6)

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

SOT1115

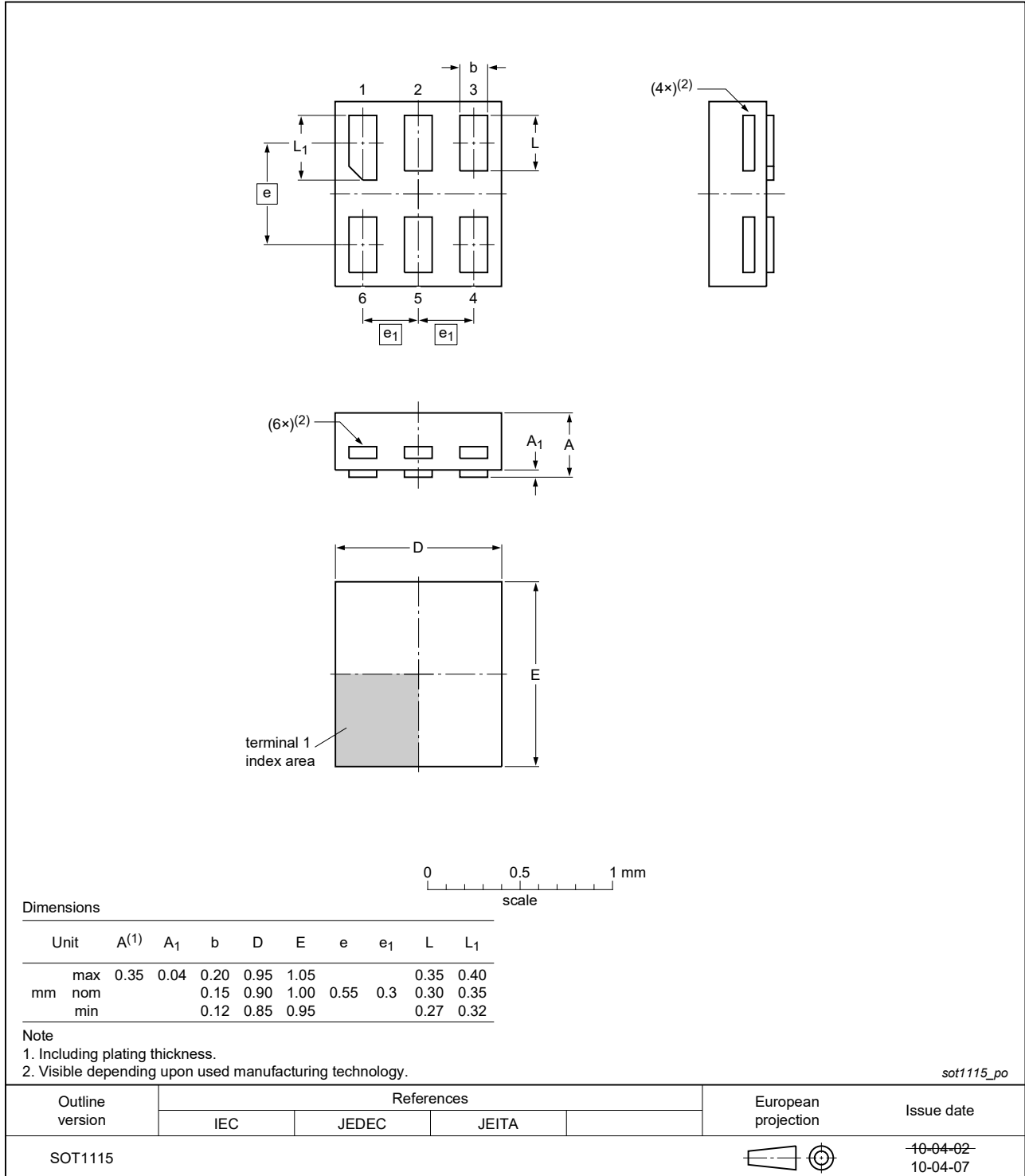


Fig. 17. Package outline SOT1115 (XSON6)

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

SOT1202

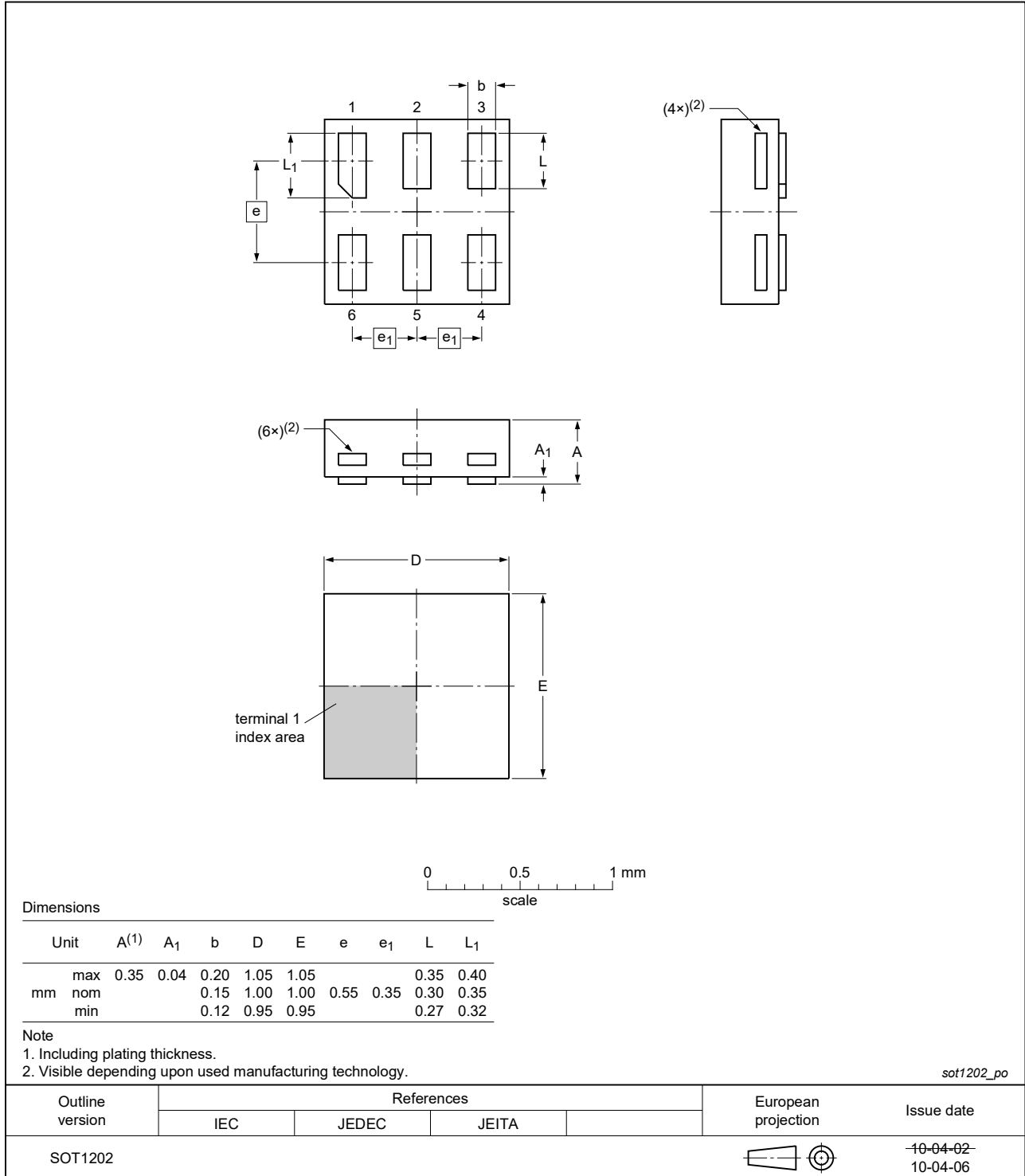


Fig. 18. Package outline SOT1202 (XSON6)

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

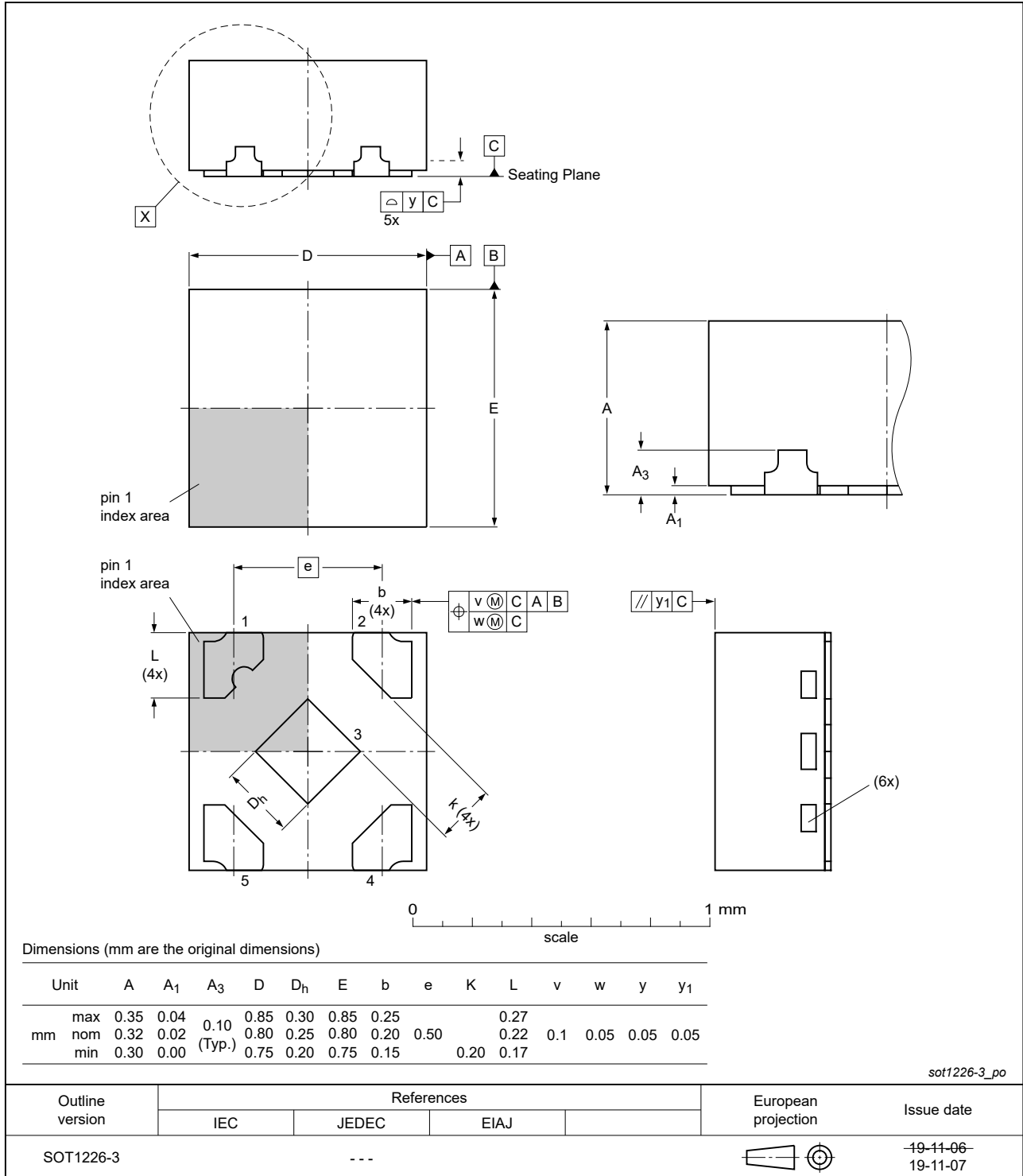


Fig. 19. Package outline SOT1226-3 (X2SON5)

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

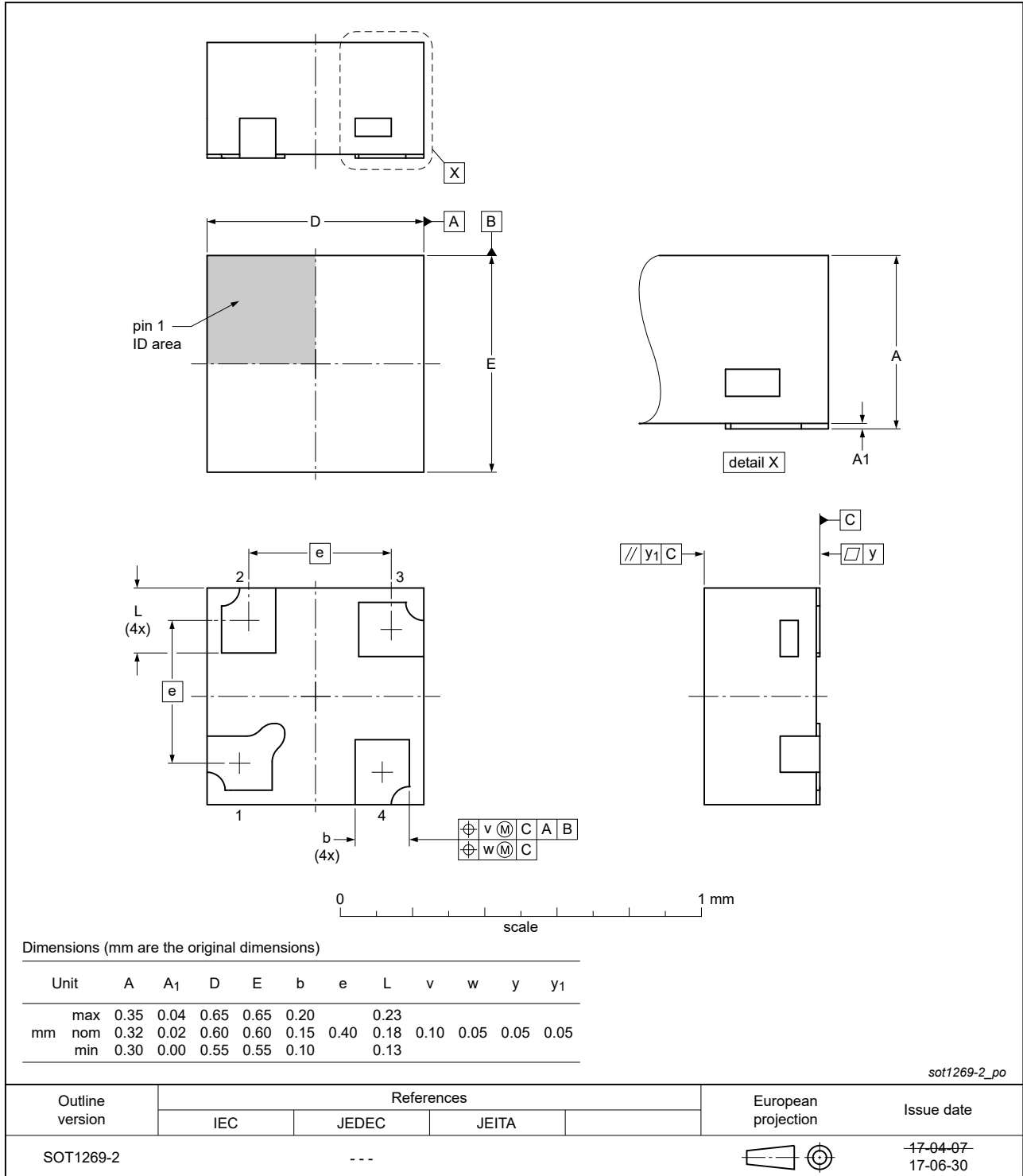


Fig. 20. Package outline SOT1269-2 (X2SON4)

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.14	20220114	Product data sheet	-	74LVC1G17 v.13
Modifications:	<ul style="list-style-type: none"> • Fig. 14: Package outline drawing for SOT353-1 (TSSOP5) has changed. 			
74LVC1G17 v.13	20210504	Product data sheet	-	74LVC1G17 v.12
Modifications:	<ul style="list-style-type: none"> • Section 1 and Section 2 updated. • SOT1226 (X2SON5) package changed to SOT1226-3 (X2SON5) package. • Type number 74LVC1G17GF (SOT891/XSON6) removed. • Table 5: Derating values for P_{tot} total power dissipation updated. 			
74LVC1G17 v.12	20180608	Product data sheet	-	74LVC1G17 v.11
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. • Added type number 74LVC1G17GX4 (SOT1269-2) 			
74LVC1G17 v.11	20161202	Product data sheet	-	74LVC1G17 v.10
Modifications:	<ul style="list-style-type: none"> • Table 7: The maximum limits for leakage current and supply current have changed. 			
74LVC1G17 v.10	20120629	Product data sheet	-	74LVC1G17 v.9
Modifications:	<ul style="list-style-type: none"> • Added type number 74LVC1G17GX (SOT1226) • Package outline drawing of SOT886 (Fig. 16) modified. 			
74LVC1G17 v.9	20111206	Product data sheet	-	74LVC1G17 v.8
Modifications:	<ul style="list-style-type: none"> • Legal pages updated. 			
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.
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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Date of release: 14 January 2022