

74LVC1G17

Single Schmitt trigger buffer

Rev. 12 — 8 June 2018

Product data sheet

1 General description

The 74LVC1G17 provides a buffer function with Schmitt trigger input. It is capable of transforming slowly changing input signals into sharply defined outputs.

The input can be driven from either 3.3 V or 5 V devices. This feature allows the use of this device in a mixed 3.3 V and 5 V environment.

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

- 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: ANSI/ESDA/JEDEC JS-001 Class 2 exceeds 2000 V
 - MM: JESD22-A115-A exceeds 200 V
- ± 24 mA output drive ($V_{CC} = 3.0$ V)
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Unlimited rise and fall times
- Inputs accept voltages up to 5 V
- Multiple package options
- Specified from -40 °C to $+85$ °C and from -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

Type number	Package			
	Temperature range	Name	Description	Version
74LVC1G17GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm	SOT886
74LVC1G17GF	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm	SOT891
74LVC1G17GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 x 1.0 x 0.35 mm	SOT1115
74LVC1G17GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 x 1.0 x 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 x 0.8 x 0.35 mm	SOT1226
74LVC1G17GX4	-40 °C to +125 °C	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

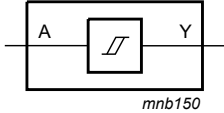
4 Marking

Table 2. Marking codes

Type number	Marking ^[1]
74LVC1G17GW	VJ
74LVC1G17GV	V17
74LVC1G17GM	VJ
74LVC1G17GF	VJ
74LVC1G17GN	VJ
74LVC1G17GS	VJ
74LVC1G17GX	VJ
74LVC1G17GX4	VJ

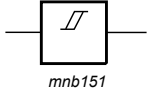
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5 Functional diagram



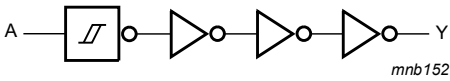
mnb150

Figure 1. Logic symbol



mnb151

Figure 2. IEC logic symbol

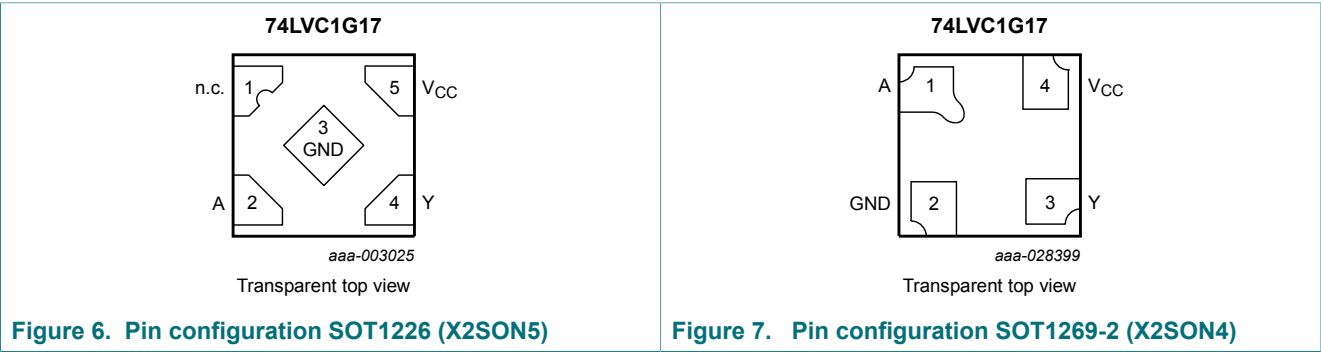
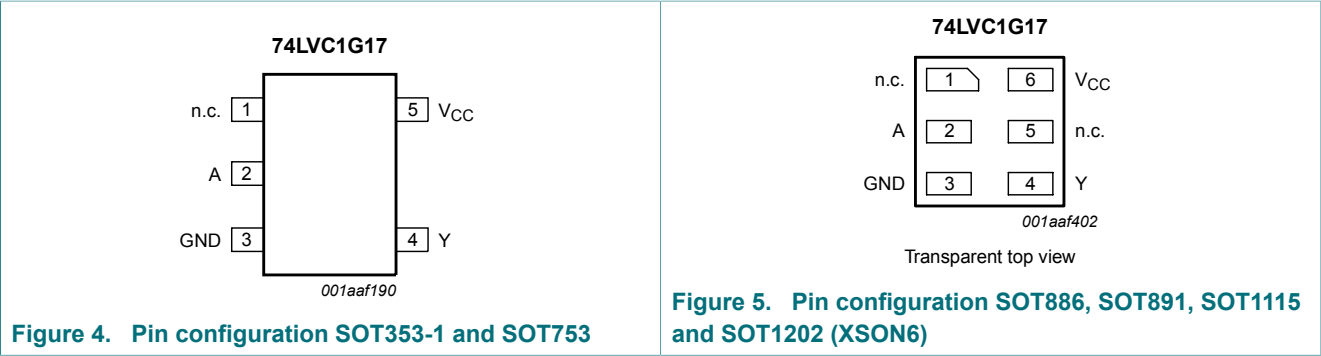


mnb152

Figure 3. Logic diagram

6 Pinning information

6.1 Pinning



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 TSSOP5 and SC-74A packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K.

For XSON6 and X2SON5 package: above 118 °C the value of P_{tot} derates linearly with 7.8 mW/K.

[3] For X2SON4 packages: above 57 °C the value of P_{tot} derates linearly with 1.7 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

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
$T_{amb} = -40\text{ °C to }+85\text{ °C}$						
V_{OH}	HIGH-level output voltage	$V_I = V_{T+}$ or V_{T-}				
		$I_O = -100\text{ }\mu\text{A}$; $V_{CC} = 1.65\text{ V to }5.5\text{ V}$	$V_{CC} - 0.1$	-	-	V
		$I_O = -4\text{ mA}$; $V_{CC} = 1.65\text{ V}$	1.2	-	-	V
		$I_O = -8\text{ mA}$; $V_{CC} = 2.3\text{ V}$	1.9	-	-	V
		$I_O = -12\text{ mA}$; $V_{CC} = 2.7\text{ V}$	2.2	-	-	V
		$I_O = -24\text{ mA}$; $V_{CC} = 3.0\text{ V}$	2.3	-	-	V
		$I_O = -32\text{ mA}$; $V_{CC} = 4.5\text{ V}$	3.8	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{T+}$ or V_{T-}				
		$I_O = 100\text{ }\mu\text{A}$; $V_{CC} = 1.65\text{ V to }5.5\text{ V}$	-	-	0.1	V
		$I_O = 4\text{ mA}$; $V_{CC} = 1.65\text{ V}$	-	-	0.45	V
		$I_O = 8\text{ mA}$; $V_{CC} = 2.3\text{ V}$	-	-	0.3	V
		$I_O = 12\text{ mA}$; $V_{CC} = 2.7\text{ V}$	-	-	0.4	V
		$I_O = 24\text{ mA}$; $V_{CC} = 3.0\text{ V}$	-	-	0.55	V
		$I_O = 32\text{ mA}$; $V_{CC} = 4.5\text{ V}$	-	-	0.55	V
I_I	input leakage current	$V_I = 5.5\text{ V or GND}$; $V_{CC} = 0\text{ V to }5.5\text{ V}$	-	± 0.1	± 1	μA
I_{OFF}	power-off leakage current	V_I or $V_O = 5.5\text{ V}$; $V_{CC} = 0\text{ V}$	-	± 0.1	± 2	μA
I_{CC}	supply current	$V_I = 5.5\text{ V or GND}$; $V_{CC} = 1.65\text{ V to }5.5\text{ V}$; $I_O = 0\text{ A}$	-	0.1	4	μA
ΔI_{CC}	additional supply current	per pin; $V_I = V_{CC} - 0.6\text{ V}$; $I_O = 0\text{ A}$; $V_{CC} = 2.3\text{ V to }5.5\text{ V}$	-	5	500	μA
C_I	input capacitance		-	5	-	pF

Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
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
		I _O = -32 mA; V _{CC} = 4.5 V	3.4	-	-	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 _O = 32 mA; V _{CC} = 4.5 V	-	-	0.80	V
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	±1	µA
I _{OFF}	power-off leakage current	V _I or V _O = 5.5 V; V _{CC} = 0 V	-	-	±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	-	-	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	-	-	500	µA

[1] All typical values are measured at maximum V_{CC} and T_{amb} = 25 °C.

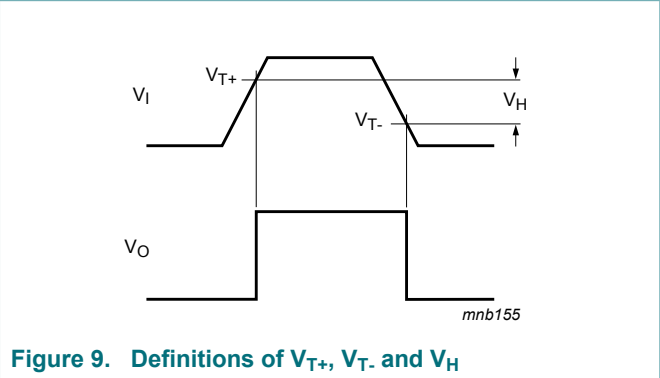
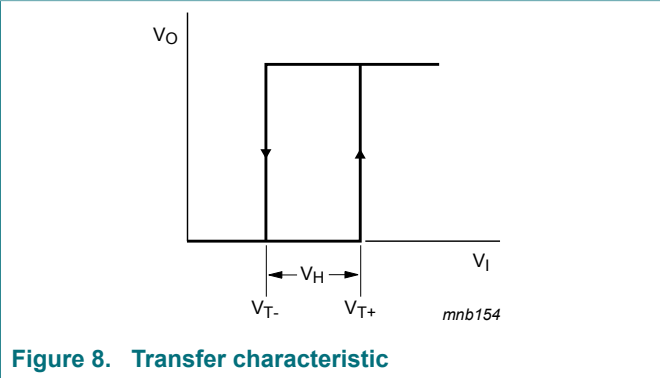
Table 8. Transfer characteristics

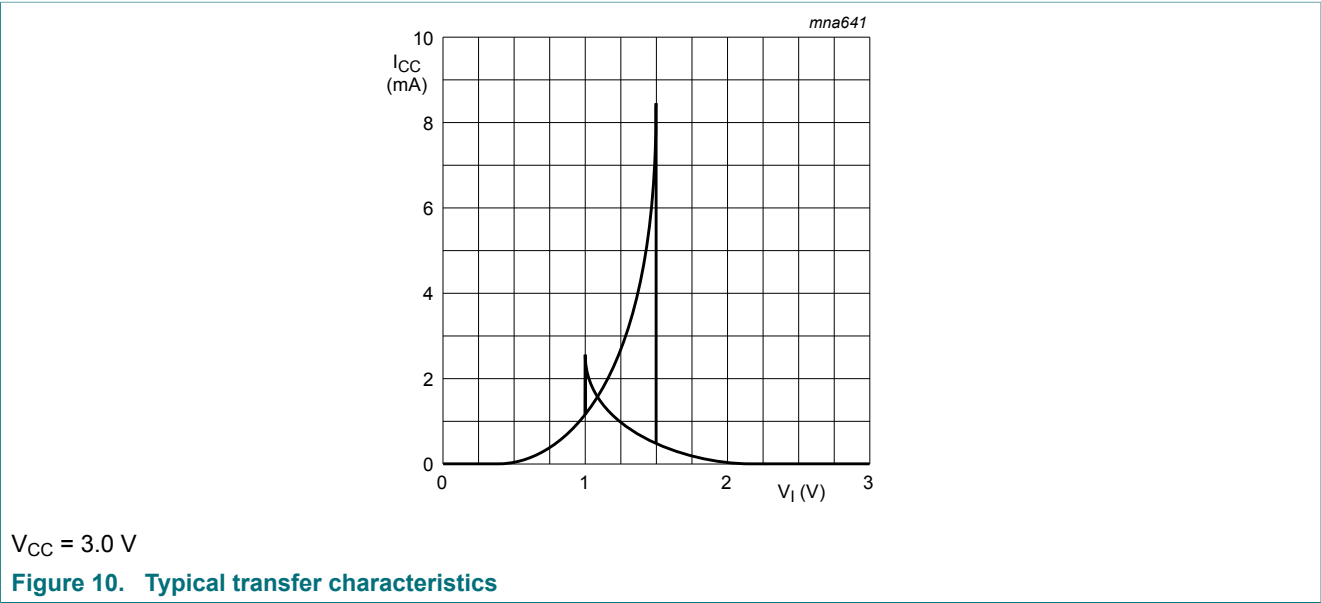
At recommended operating conditions. Voltages are referenced to GND (ground = 0 V).

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 Figure 8 and Figure 9						
		V _{CC} = 1.8 V	0.82	1.0	1.14	0.79	1.14	V
		V _{CC} = 2.3 V	1.03	1.2	1.40	1.00	1.40	V
		V _{CC} = 3.0 V	1.29	1.5	1.71	1.26	1.71	V
		V _{CC} = 4.5 V	1.84	2.1	2.36	1.81	2.36	V
		V _{CC} = 5.5 V	2.19	2.5	2.79	2.16	2.79	V
V _{T-}	negative-going threshold voltage	see Figure 8 and Figure 9						
		V _{CC} = 1.8 V	0.46	0.6	0.75	0.46	0.78	V
		V _{CC} = 2.3 V	0.65	0.8	0.96	0.65	0.99	V
		V _{CC} = 3.0 V	0.88	1.0	1.24	0.88	1.27	V
		V _{CC} = 4.5 V	1.32	1.5	1.84	1.32	1.87	V
		V _{CC} = 5.5 V	1.58	1.8	2.24	1.58	2.27	V
V _H	hysteresis voltage	see Figure 8 , Figure 9 and Figure 10						
		V _{CC} = 1.8 V	0.26	0.4	0.51	0.19	0.51	V
		V _{CC} = 2.3 V	0.28	0.4	0.57	0.22	0.57	V
		V _{CC} = 3.0 V	0.31	0.5	0.64	0.25	0.64	V
		V _{CC} = 4.5 V	0.40	0.6	0.77	0.34	0.77	V
		V _{CC} = 5.5 V	0.47	0.6	0.88	0.41	0.88	V

[1] All typical values are measured at T_{amb} = 25 °C.

10.1 Transfer characteristic waveforms





11 Dynamic characteristics

Table 9. Dynamic characteristics

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

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

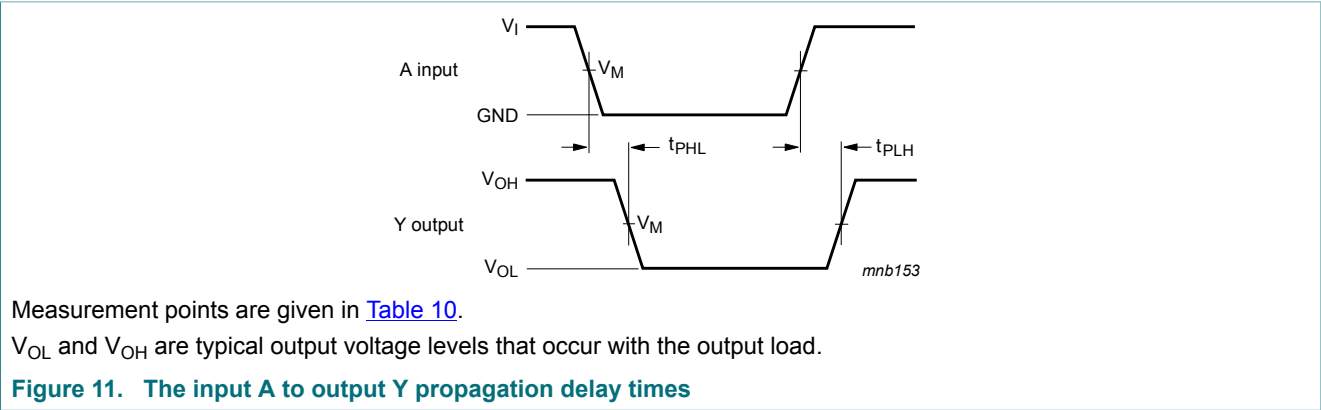


Table 10. Measurement points

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	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

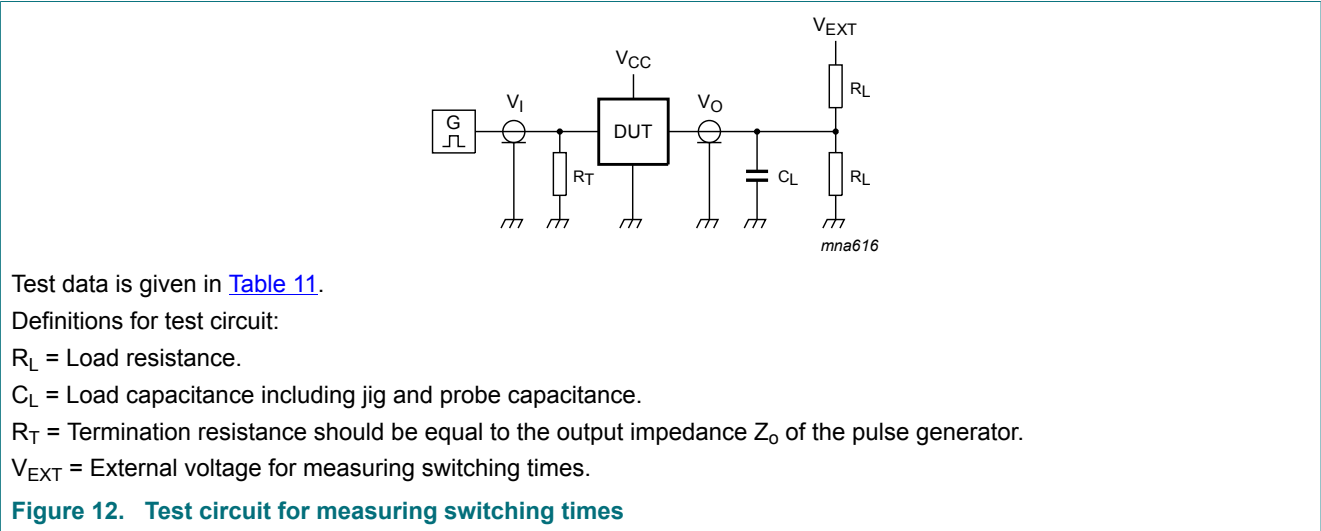
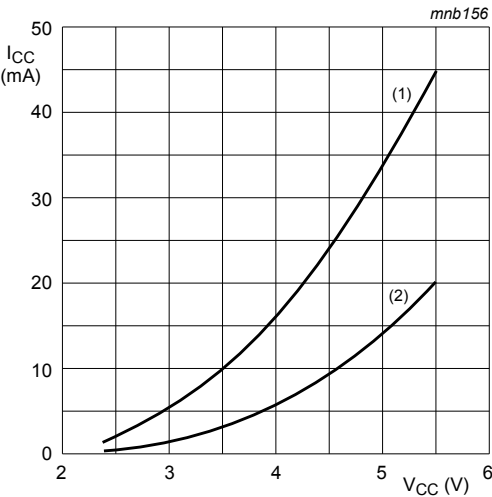


Table 11. Test data

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 kΩ	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



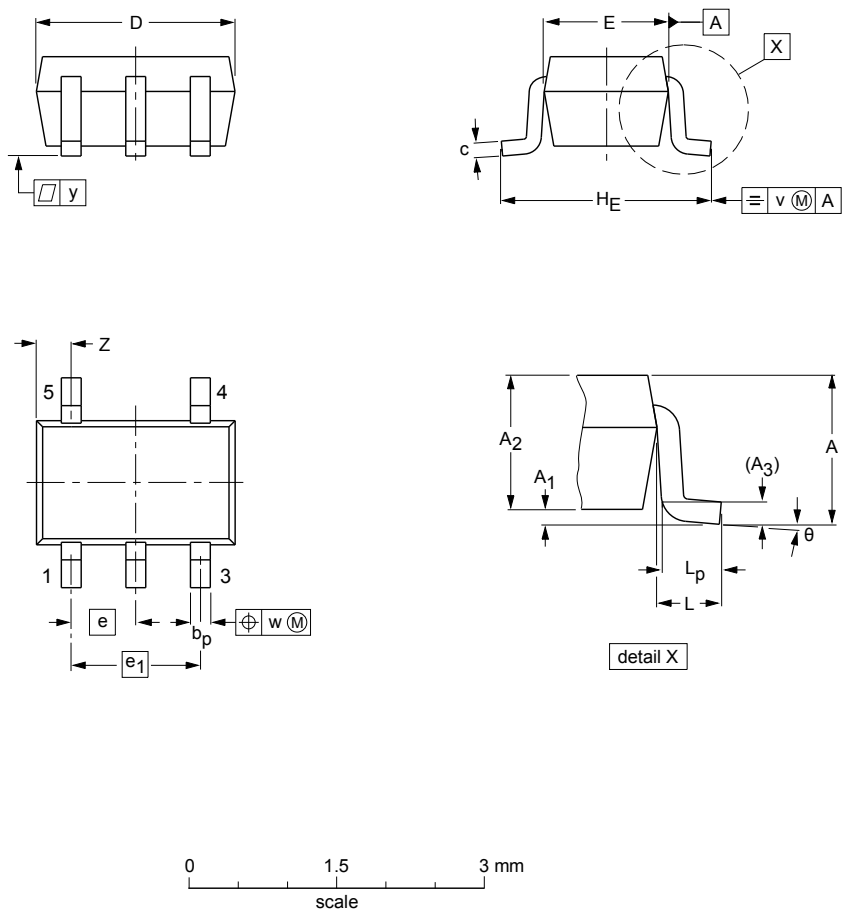
Linear change of V_I between 0.8 V to 2.0 V.

- (1) Positive-going edge
- (2) Negative-going edge

Figure 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



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	e ₁	H _E	L	L _p	v	w	y	Z ⁽¹⁾	θ
mm	1.1	0.1 0	1.0 0.8	0.15	0.30 0.15	0.25 0.08	2.25 1.85	1.35 1.15	0.65	1.3	2.25 2.0	0.425	0.46 0.21	0.3	0.1	0.1	0.60 0.15	7° 0°

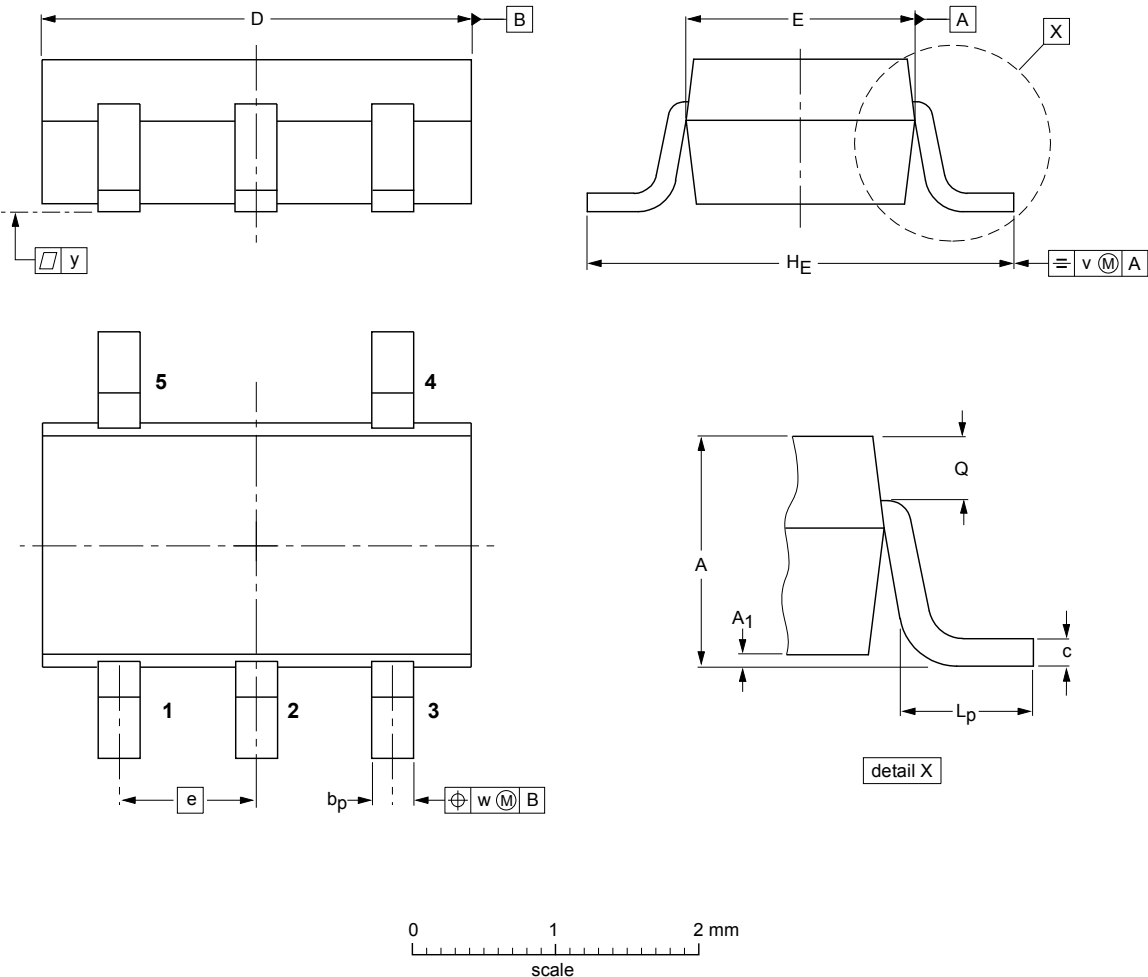
Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT353-1		MO-203	SC-88A			00-09-01 03-02-19

Figure 14. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753



DIMENSIONS (mm are the original dimensions)

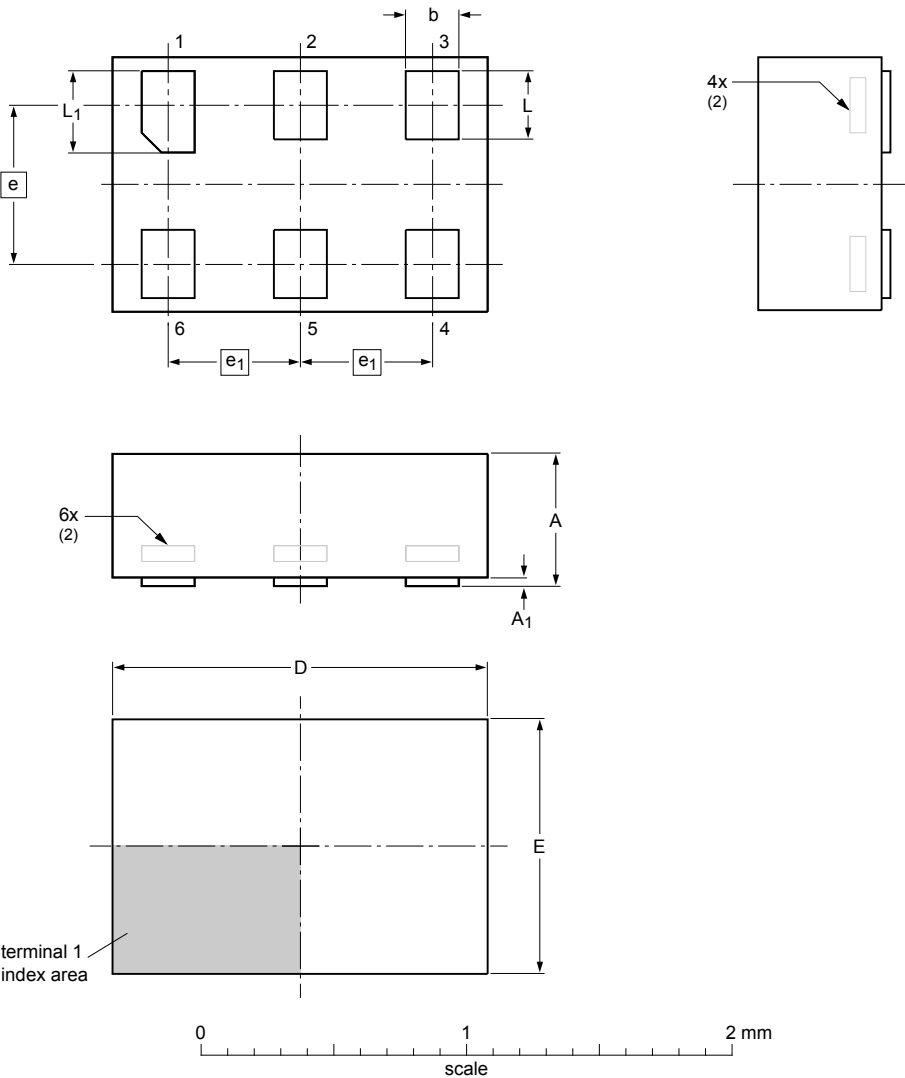
UNIT	A	A ₁	b _p	c	D	E	e	H _E	L _p	Q	v	w	y
mm	1.1 0.9	0.100 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT753			SC-74A			-02-04-16 06-03-16

Figure 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



Dimensions (mm are the original dimensions)

Unit	A ⁽¹⁾	A ₁	b	D	E	e	e ₁	L	L ₁
mm	max	0.5	0.04	0.25	1.50	1.05		0.35	0.40
	nom			0.20	1.45	1.00	0.6	0.30	0.35
	min			0.17	1.40	0.95		0.27	0.32

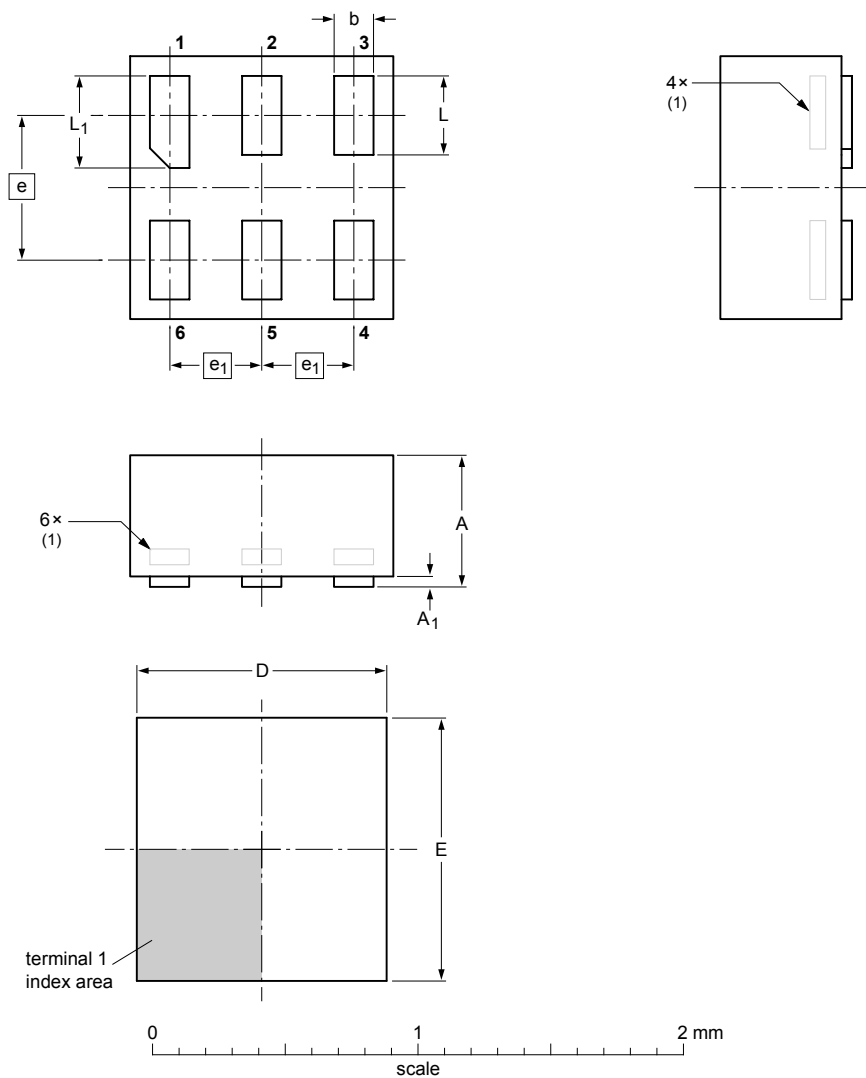
- Notes
- 1. Including plating thickness.
 - 2. Can be visible in some manufacturing processes.

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT886	MO-252					04-07-22 12-01-05

Figure 16. Package outline SOT886 (XSON6)

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

SOT891



DIMENSIONS (mm are the original dimensions)

UNIT	A max	A ₁ max	b	D	E	e	e ₁	L	L ₁
mm	0.5	0.04	0.20 0.12	1.05 0.95	1.05 0.95	0.55	0.35	0.35 0.27	0.40 0.32

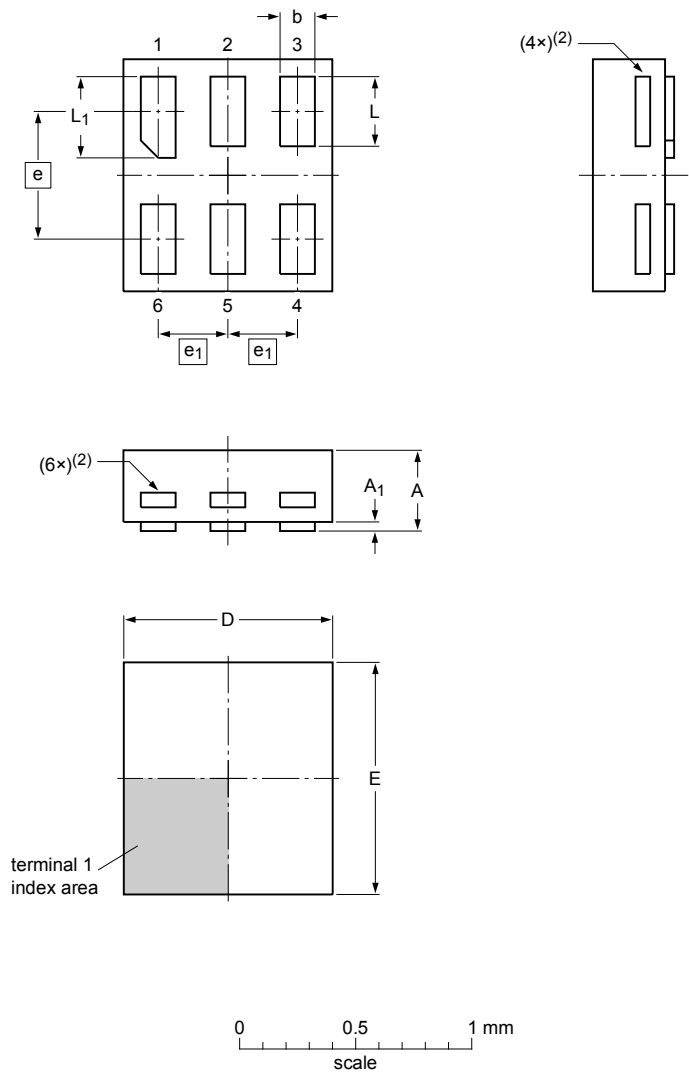
Note
1. Can be visible in some manufacturing processes.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT891						05-04-06 07-05-15

Figure 17. 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



Dimensions

Unit	A ⁽¹⁾	A ₁	b	D	E	e	e ₁	L	L ₁
mm	max	0.35	0.04	0.20	0.95	1.05		0.35	0.40
	nom			0.15	0.90	1.00	0.55	0.30	0.35
	min			0.12	0.85	0.95		0.27	0.32

Note

- 1. Including plating thickness.
- 2. Visible depending upon used manufacturing technology.

sot1115_po

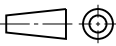
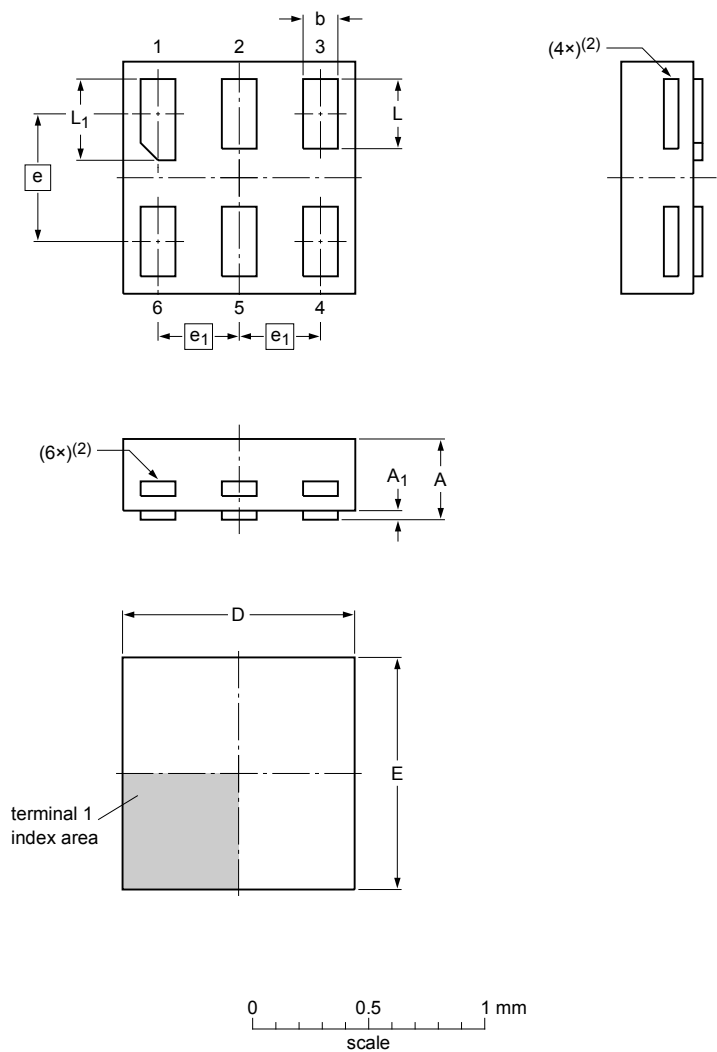
Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1115						10-04-02- 10-04-07

Figure 18. 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



Dimensions

Unit	A ⁽¹⁾	A ₁	b	D	E	e	e ₁	L	L ₁
mm	max	0.35	0.04	0.20	1.05	1.05		0.35	0.40
	nom			0.15	1.00	1.00	0.55	0.30	0.35
	min			0.12	0.95	0.95		0.27	0.32

Note

- 1. Including plating thickness.
- 2. Visible depending upon used manufacturing technology.

sot1202_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1202						10-04-02 10-04-06

Figure 19. Package outline SOT1202 (XSON6)

X2SON5: plastic thermal enhanced extremely thin small outline package; no leads;
5 terminals; body 0.8 x 0.8 x 0.35 mm

SOT1226

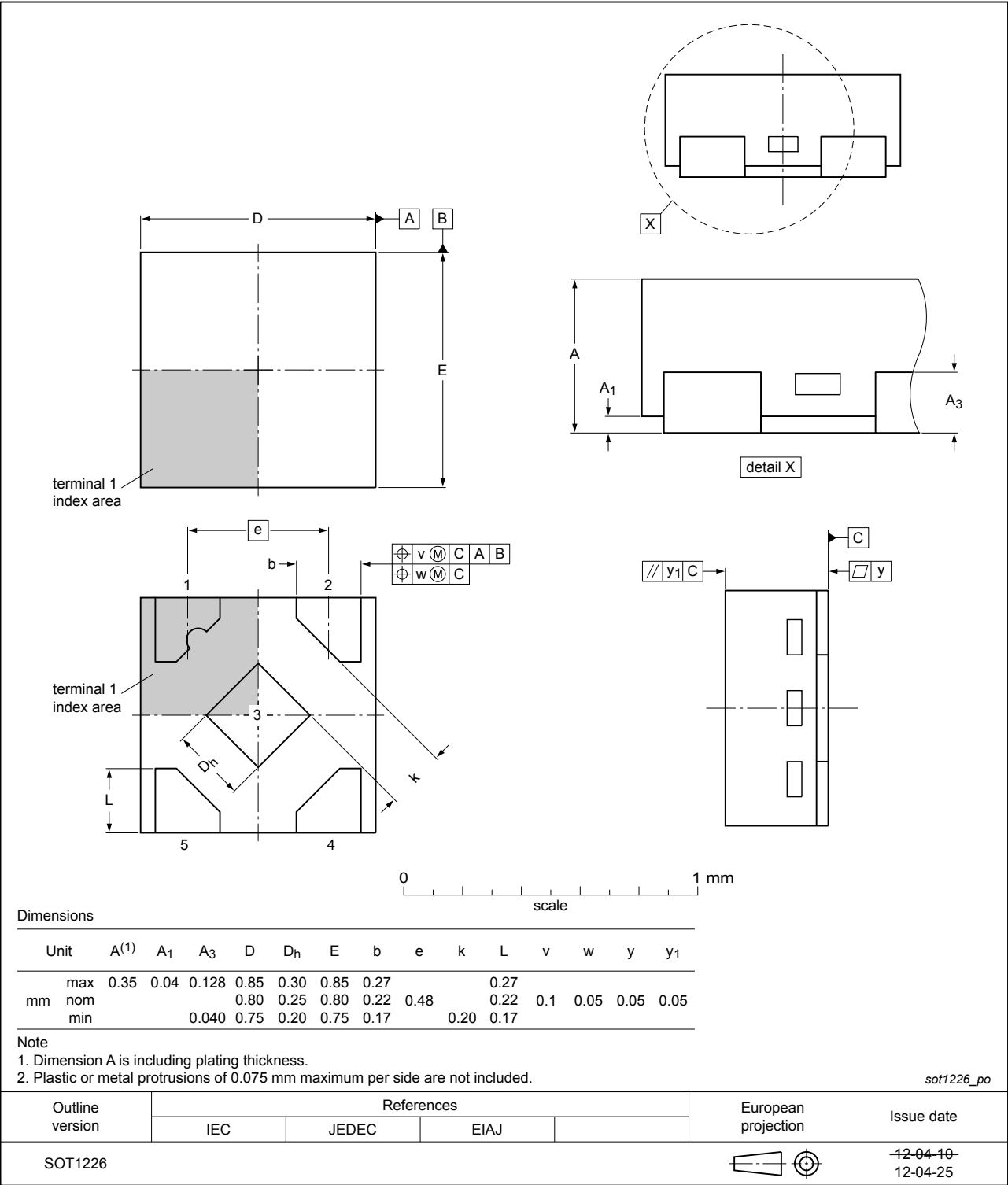


Figure 20. Package outline SOT1226 (X2SON5)

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

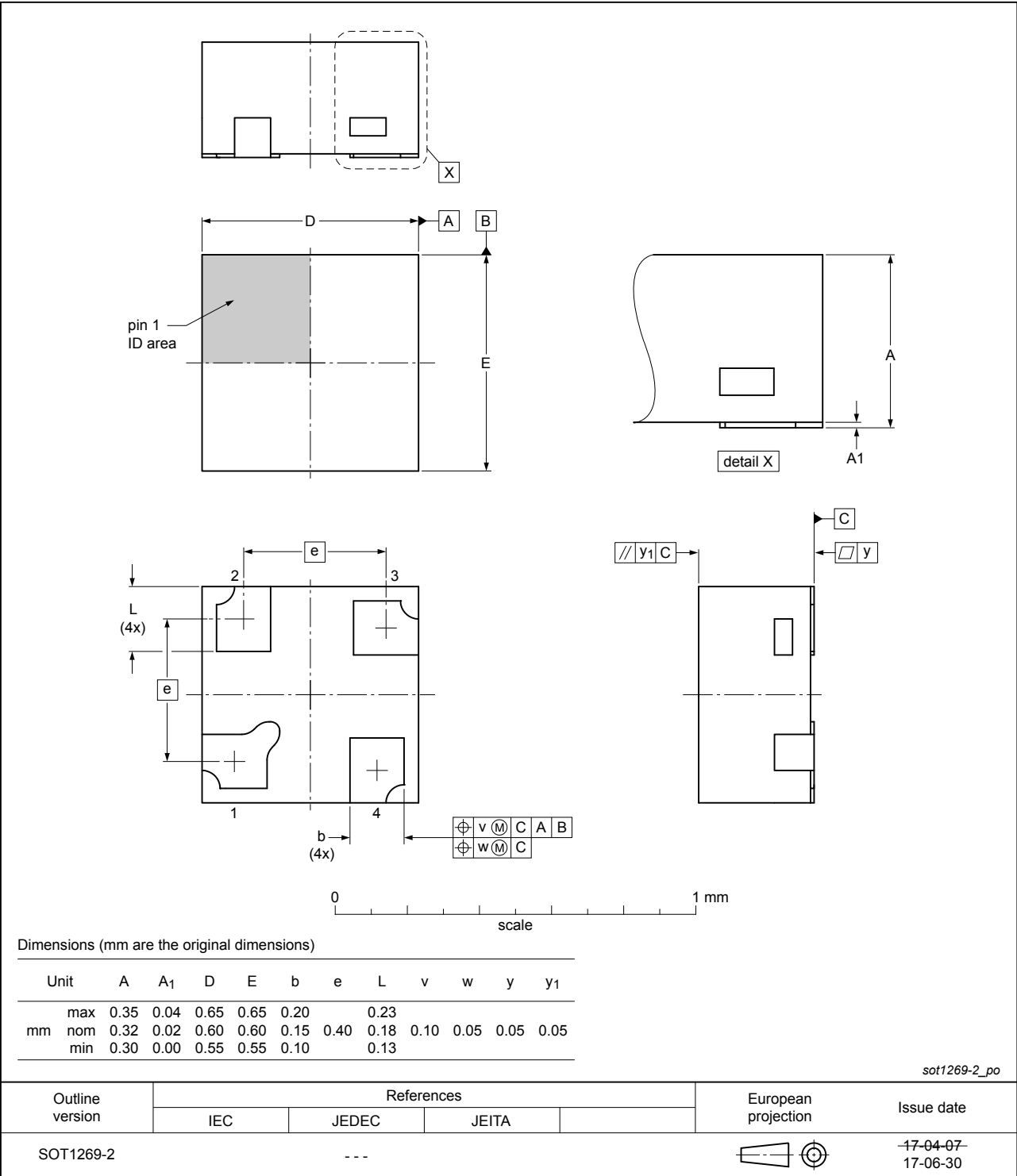


Figure 21. Package outline SOT1269-2 (X2SON4)

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.12	20180608	Product data sheet	-	74LVC1G17 v.11
Modifications:	- 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:	Table 7: The maximum limits for leakage current and supply current have changed.			
74LVC1G17 v.10	20120629	Product data sheet	-	74LVC1G17 v.9
Modifications:	- Added type number 74LVC1G17GX (SOT1226) - Package outline drawing of SOT886 (Figure 16) modified.			
74LVC1G17 v.9	20111206	Product data sheet	-	74LVC1G17 v.8
Modifications:	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

16.1 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 URL <http://www.nexperia.com>.

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For sales office addresses, please send an email to: salesaddresses@nexperia.com

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