74LVC1G17

Single Schmitt trigger buffer Rev. 12 — 8 June 2018

Product data sheet

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.

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

Ordering information 3

Table 1. Ordering information

Type number	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	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

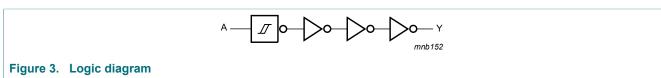
Table 2. Marking codes

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





74LVC1G17

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6 Pinning information

6.1 Pinning





6.2 Pin description

Table 3. Pin description

Symbol	Pin	Pin			
	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	

Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level

Input	Output
A	Υ
L	L
Н	Н

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
VI	input voltage		[1]	-0.5	+6.5	V
I _{OK}	output clamping current	V _O > V _{CC} or V _O < 0 V		-	±50	mA
Vo	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
Io	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 Ptot 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	Тур	Max	Unit
V _{CC}	supply voltage		1.65	-	5.5	V
VI	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} = -4	0 °C to +85 °C					
V_{OH}	HIGH-level output voltage	$V_I = V_{T+} \text{ or } V_{T-}$				
		I_{O} = -100 μ A; 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
		I _O = -32 mA; V _{CC} = 4.5 V	3.8	-	-	V
V _{OL}	LOW-level output voltage	$V_I = V_{T+} \text{ or } V_{T-}$				
		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 _O = 32 mA; V _{CC} = 4.5 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	μΑ
I _{OFF}	power-off leakage current	V _I or V _O = 5.5 V; V _{CC} = 0 V	-	±0.1	±2	μΑ
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	μΑ
ΔI _{CC}	additional supply current	per pin; $V_1 = V_{CC} - 0.6 \text{ V}$; $I_0 = 0 \text{ A}$; $V_{CC} = 2.3 \text{ V}$ to 5.5 V	-	5	500	μΑ
Cı	input capacitance		-	5	-	pF

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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 μ A; 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 vo	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	μΑ
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	μΑ
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	μΑ

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

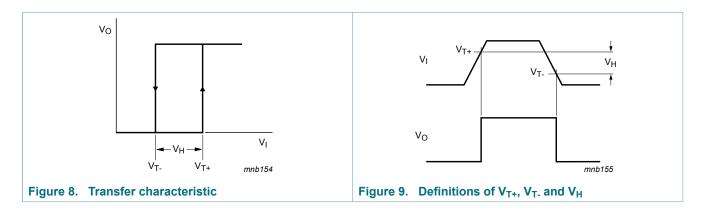
Table 8. Transfer characteristics

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	see Figure 8 and Figure 9						
	threshold voltage	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	see Figure 8 and Figure 9						
threshold voltage	threshold voltage	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.

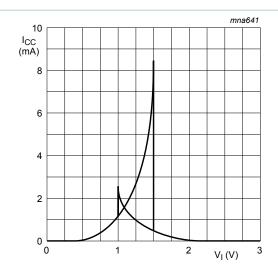
10.1 Transfer characteristic waveforms



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 $V_{CC} = 3.0 \text{ V}$

Figure 10. Typical transfer characteristics

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 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} ; [3] V_{CC} = 3.3 V	-	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).

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

 f_i = input frequency in MHz;

f_o = output frequency in MHz;

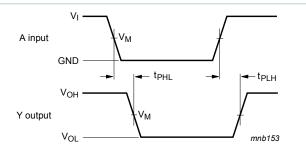
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

 $\sum (C_L \times V_{CC}^2 \times f_0) = \text{sum of outputs.}$

11.1 Waveform and test circuit



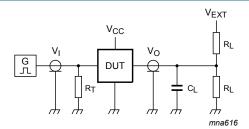
Measurement points are given in Table 10.

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

Figure 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 x V _{CC}	0.5 x V _{CC}				
2.3 V to 2.7 V	0.5 x V _{CC}	0.5 x 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 x V _{CC}	0.5 x 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_0 of the pulse generator.

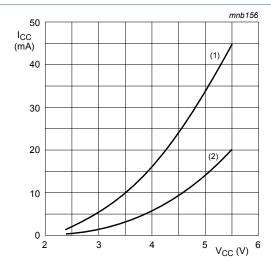
 V_{EXT} = External voltage for measuring switching times.

Figure 12. Test circuit for measuring switching times

Table 11. Test data

Supply voltage	Input		Load		V _{EXT}
V _{CC}	Vı	$t_r = t_f$	CL	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 = v (M) A detail X DIMENSIONS (mm are the original dimensions) D(1) E⁽¹⁾ Z⁽¹⁾ UNIT С ΗE Lp θ max. 0.30 0.25 1.35 2.25 0.46 0.1 1.0 2.25 0.60 0.15 0.65 0.425 mm 1.1 0.15 0.08 1.85 1.15

Note

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

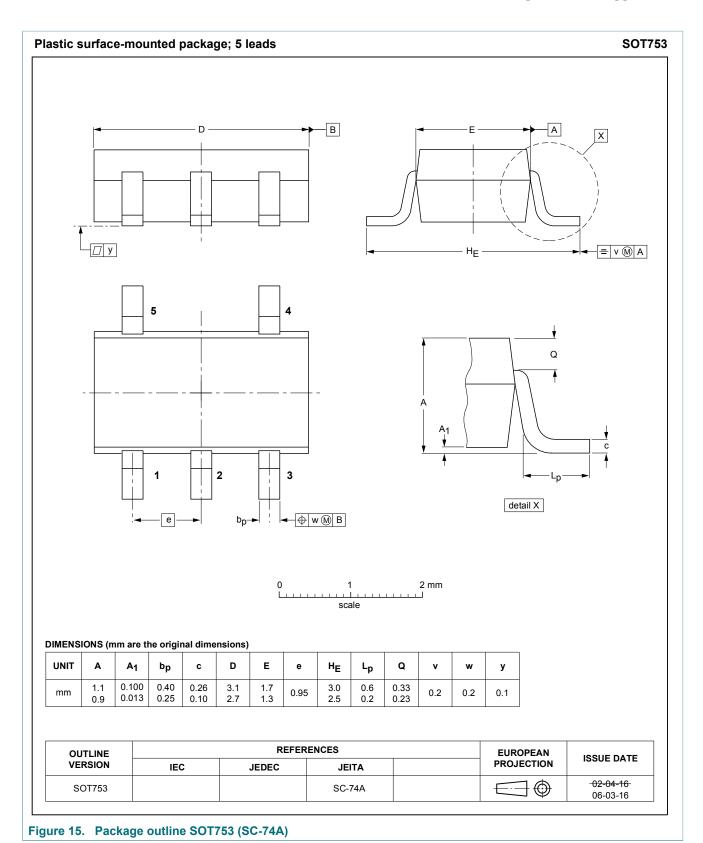
OUTLINE	REFERENCES				EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT353-1		MO-203	SC-88A			-00-09-01- 03-02-19

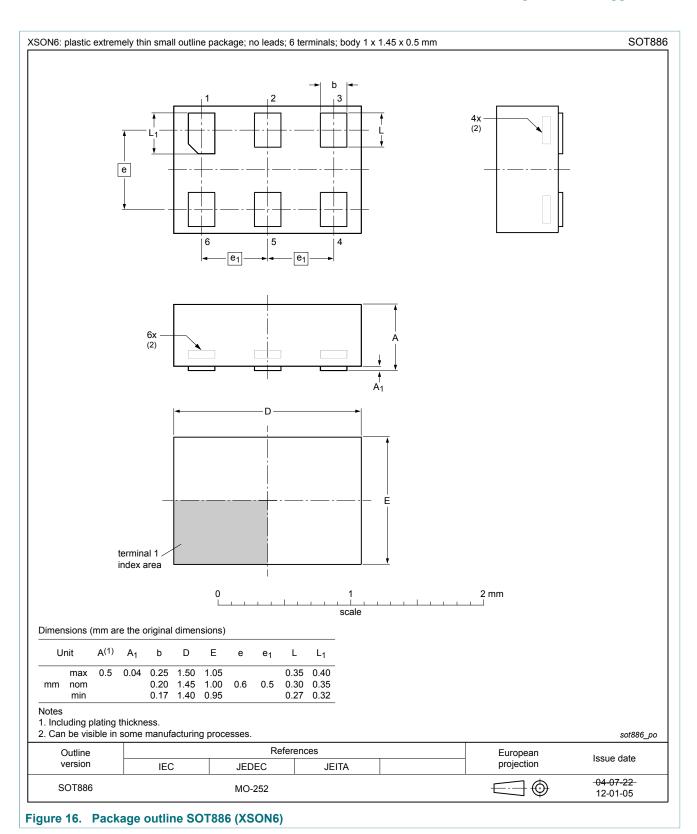
Figure 14. Package outline SOT353-1 (TSSOP5)

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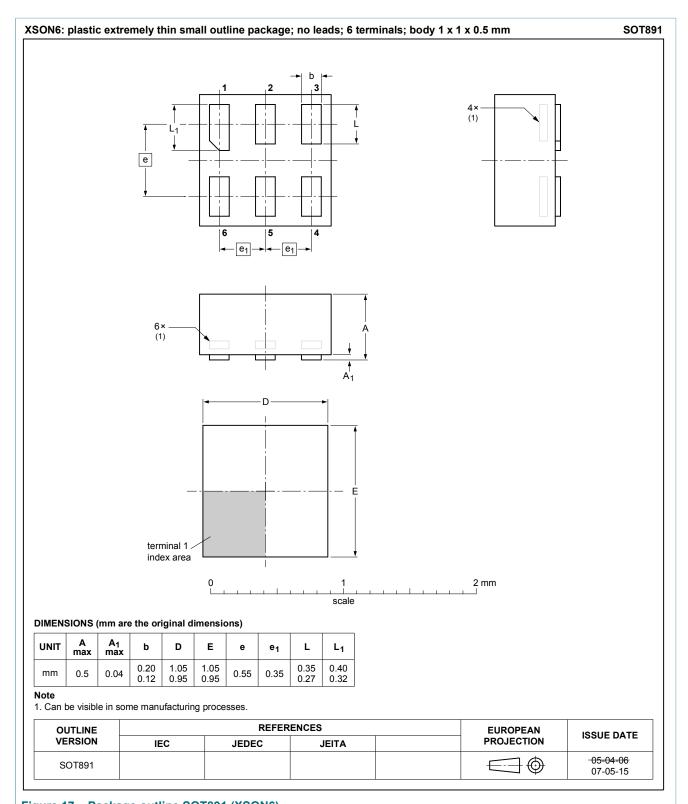


Figure 17. Package outline SOT891 (XSON6)

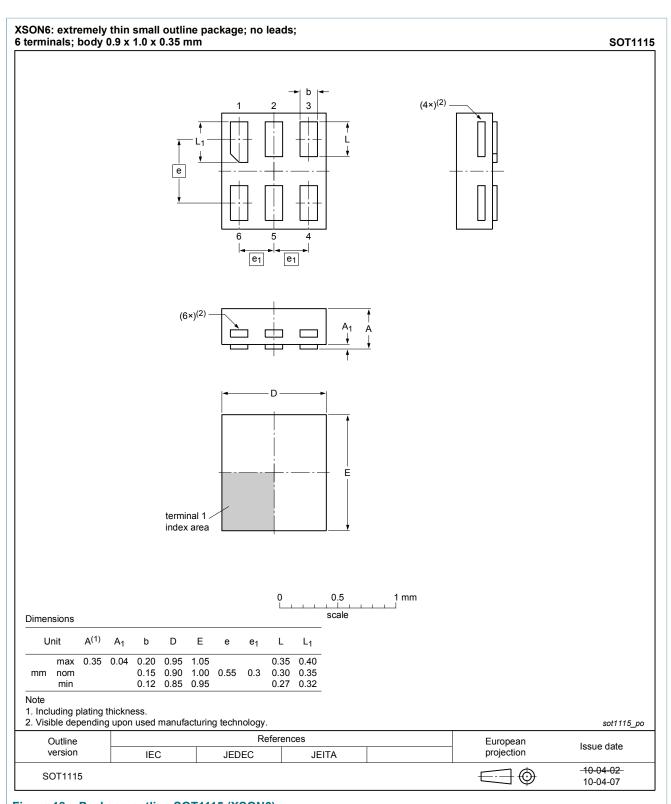
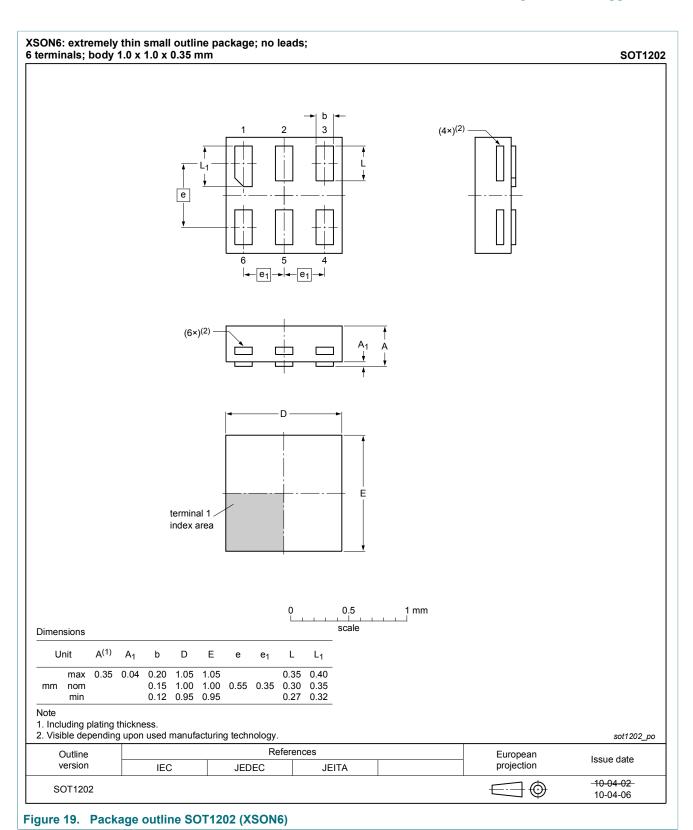
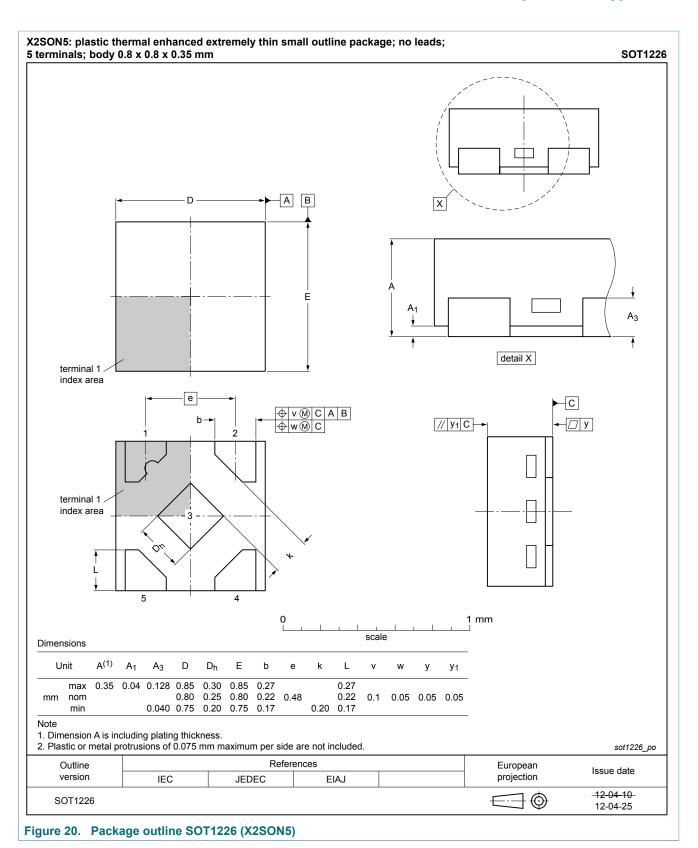
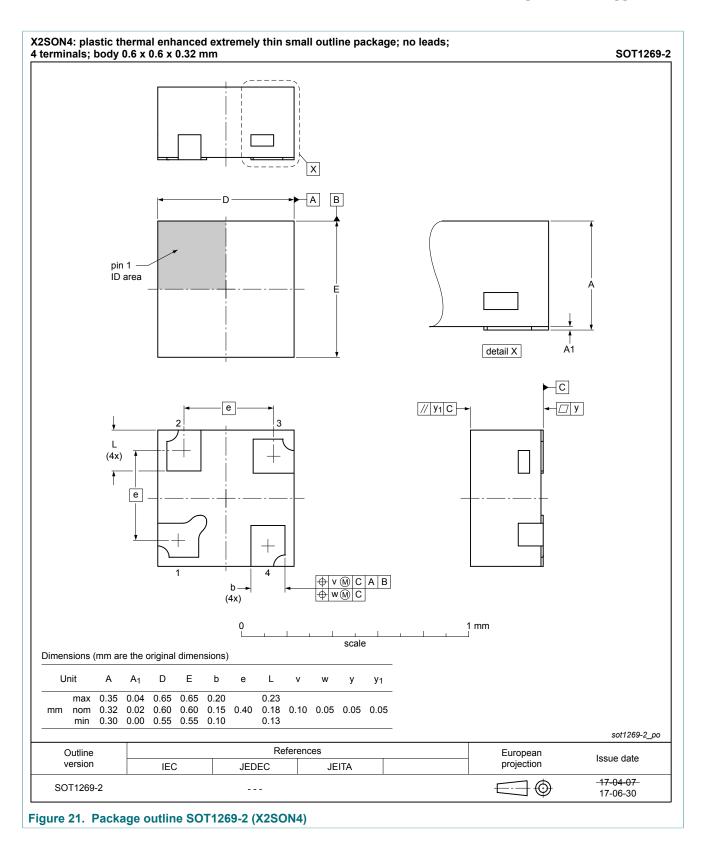


Figure 18. Package outline SOT1115 (XSON6)



74LVC1G17





14 Abbreviations

Table 12. Abbreviations

Acronym	Description
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	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:	Nexperia. • Legal texts have	this data sheet has been redes we been adapted to the new co nmber 74LVC1G17GX4 (SOT1	mpany name where	
74LVC1G17 v.11	20161202	Product data sheet	-	74LVC1G17 v.10
Modifications:	• Table 7: The m	naximum limits for leakage curr	ent and supply curre	nt have changed.
74LVC1G17 v.10	20120629	Product data sheet	-	74LVC1G17 v.9
Modifications:		mber 74LVC1G17GX (SOT12) ne drawing of SOT886 (<u>Figure</u>	•	_
74LVC1G17 v.9	20111206	Product data sheet	-	74LVC1G17 v.8
Modifications:	 Legal pages u 	pdated.		
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.

- Please consult the most recently issued document before initiating or completing a design.
- The term 'short data sheet' is explained in section "Definitions". [2] [3]
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Nexperia 74LVC1G17

Single Schmitt trigger buffer

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