74LVC1G125 Bus buffer/line driver; 3-state Rev. 13 — 6 November 2017

Product data sheet

General description

The 74LVC1G125 provides one non-inverting buffer/line driver with 3-state output. The 3state output is controlled by the output enable input (\overline{OE}) . A HIGH-level at pin \overline{OE} causes the output to assume a high-impedance OFF-state.

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)
 - JESD8-B/JESD36 (2.7 V to 3.6 V)
- \pm 24 mA output drive (V_{CC} = 3.0 V)
- ESD protection:
 - HBM JESD22-A114F exceeds 2 000 V
 - MM JESD22-A115-A exceeds 200 V
- CMOS low power consumption
- Inputs accept voltages up to 5 V
- Latch-up performance exceeds 250 mA
- · Direct interface with TTL levels
- 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	Package							
	Temperature range	Name	Description	Version					
74LVC1G125GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1					
74LVC1G125GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753					
74LVC1G125GM	-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					
74LVC1G125GF	-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					
74LVC1G125GN	-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					
74LVC1G125GS	-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					
74LVC1G125GX	-40 °C to +125 °C	X2SON5	X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 x 0.8 x 0.35 mm	SOT1226					

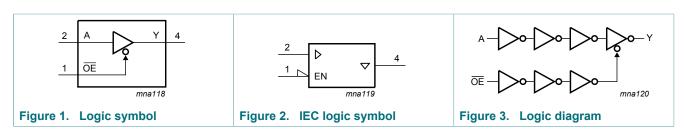
4 Marking

Table 2. Marking

Type number	Marking code ^[1]
74LVC1G125GW	VM
74LVC1G125GV	V25
74LVC1G125GM	VM
74LVC1G125GF	VM
74LVC1G125GN	VM
74LVC1G125GS	VM
74LVC1G125GX	VM

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

5 Functional diagram

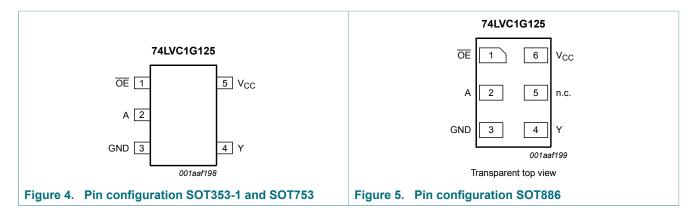


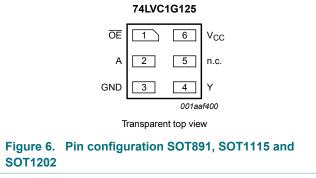
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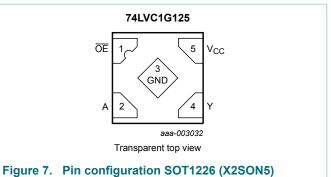
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6 Pinning information

6.1 Pinning







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6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description	
	TSSOP5, SC-74A and X2SON5	XSON6	
ŌĒ	1	1	output enable input
A	2	2	data input
GND	3	3	ground (0 V)
Υ	4	4	data output
n.c.	-	5	not connected
V _{CC}	5	6	supply voltage

Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.

Input	Output	
OE	A	Υ
L	L	L
L	Н	Н
Н	Х	Z

Limiting values 8

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] [2]	-0.5	V _{CC} + 0.5	V
		Power-down mode [1] [2]	-0.5	+6.5	V
Io	output current	$V_O = 0 V \text{ to } V_{CC}$	-	±50	mA
I _{CC}	supply current		-	100	mA
I _{GND}	ground current		-100	-	mA
P _{tot}	total power dissipation	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$ [3]	-	250	mW
T _{stg}	storage temperature		-65	+150	°C

Recommended operating conditions 9

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
Vo	output voltage	Active mode	0	-	V _{CC}	V
		V _{CC} = 0 V; Power-down mode	0	-	5.5	V
T _{amb}	ambient temperature		-40	-	+125	°C

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 ^[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
 [2] When V_{CC} = 0 V (Power-down mode), the output voltage can be 5.5 V in normal operation.
 [3] 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 Ptot derates linearly with 7.8 mW/K.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Δt/ΔV	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	Min	Typ ^[1]	Max	Unit
T _{amb} = -4	0 °C to +85 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	0.65 × V _{CC}	-	-	V
		V _{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		V _{CC} = 4.5 V to 5.5 V	0.7 × V _{CC}	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	0.35 × V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	V
		V _{CC} = 4.5 V to 5.5 V	-	-	0.3 × V _{CC}	V
V _{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_{O} = 100 μ A	-	-	0.1	V
		V _{CC} = 1.65 V; I _O = 4 mA	-	-	0.45	V
		V _{CC} = 2.3 V; I _O = 8 mA	-	-	0.3	V
		V _{CC} = 2.7 V; I _O = 12 mA	-	-	0.4	V
		V _{CC} = 3.0 V; I _O = 24 mA	-	-	0.55	V
		V _{CC} = 4.5 V; I _O = 32 mA	-	-	0.55	V
V _{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_{O} = -100 μ A	V _{CC} - 0.1	-	-	V
		V _{CC} = 1.65 V; I _O = -4 mA	1.2	-	-	V
		V_{CC} = 2.3 V; I_{O} = -8 mA	1.9	-	-	V
		V_{CC} = 2.7 V; I_{O} = -12 mA	2.2	-	-	V
		V _{CC} = 3.0 V; I _O = -24 mA	2.3	-		V
		V_{CC} = 4.5 V; I_{O} = -32 mA	3.8	-	-	V
I _I	input leakage current	V _{CC} = 0 V to 5.5 V; V _I = 5.5 V or GND	-	±0.1	±1	μΑ
I _{OZ}	OFF-state output current	$V_{CC} = 3.6 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};$ $V_O = 5.5 \text{ V or GND}$	-	±0.1	±2	μΑ
l _{OFF}	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 5.5 \text{ V}$	-	±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; $V_{CC} = 2.3 \text{ V to } 5.5 \text{ V};$ $V_I = V_{CC} - 0.6 \text{ V};$ $I_O = 0 \text{ A}$	-	5	500	μA
Cı	input capacitance		-	5	-	pF

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Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
T _{amb} = -4	0 °C to +125 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	0.65 × V _{CC}	-	-	V
		V _{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		V _{CC} = 4.5 V to 5.5 V	0.7 × V _{CC}	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	0.35 × V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	V
		V _{CC} = 4.5 V to 5.5 V	-	-	0.3 × V _{CC}	V
V _{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_{O} = 100 μ A	-	-	0.1	V
		V _{CC} = 1.65 V; I _O = 4 mA	-	-	0.70	V
		V _{CC} = 2.3 V; I _O = 8 mA	-	-	0.45	V
		V _{CC} = 2.7 V; I _O = 12 mA	-	-	0.60	V
		V _{CC} = 3.0 V; I _O = 24 mA	-	-	0.80	V
		V _{CC} = 4.5 V; I _O = 32 mA	-	-	0.80	V
V _{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_{O} = -100 μ A	V _{CC} - 0.1	-	-	V
		V _{CC} = 1.65 V; I _O = -4 mA	0.95	-	-	V
		V _{CC} = 2.3 V; I _O = -8 mA	1.7	-	-	V
		$V_{CC} = 2.7 \text{ V; } I_{O} = -12 \text{ mA}$	1.9	-	-	V
		V _{CC} = 3.0 V; I _O = -24 mA	2.0	-	-	V
		V _{CC} = 4.5 V; I _O = -32 mA	3.4	-	-	V
I _I	input leakage current	V _{CC} = 0 V to 5.5 V; V _I = 5.5 V or GND	-	-	±1	μΑ
l _{OZ}	OFF-state output current	$V_{CC} = 3.6 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};$ $V_O = 5.5 \text{ V or GND}$	-	-	±2	μΑ
I _{OFF}	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 5.5 \text{ V}$	-	-	±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	-	-	4	μΑ
ΔI _{CC}	additional supply current	per pin; $V_{CC} = 2.3 \text{ V to } 5.5 \text{ V};$ $V_1 = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}$	-	-	500	μΑ

^[1] All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 $^{\circ}C.$

11 Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit see Figure 10.

Symbol Parameter		Conditions	-40 °C to +85 °C			-40 °C to	Unit	
			Min	Typ ^[1]	Max	Min	Max	
t _{pd}	propagation delay	A to Y; see Figure 8 [2]						
		V _{CC} = 1.65 V to 1.95 V	1.0	3.3	8.0	1.0	10.5	ns
		V _{CC} = 2.3 V to 2.7 V	0.5	2.2	5.5	0.5	7	ns
		V _{CC} = 2.7 V	0.5	2.5	5.5	0.5	7	ns
		V _{CC} = 3.0 V to 3.6 V	0.5	2.1	4.5	0.5	6	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	1.7	4.0	0.5	5.5	ns
t _{en}	enable time	OE to Y; see Figure 9 [3]						
		V _{CC} = 1.65 V to 1.95 V	1.0	4.1	9.4	1.0	12	ns
		V _{CC} = 2.3 V to 2.7 V	0.5	2.8	6.6	0.5	8.5	ns
		V _{CC} = 2.7 V	0.5	3.3	6.6	0.5	8.5	ns
		V _{CC} = 3.0 V to 3.6 V	0.5	2.4	5.3	0.5	7	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	2.1	5.0	0.5	6.5	ns
t _{dis}	disable time	OE to Y; see Figure 9 [4]						
		V _{CC} = 1.65 V to 1.95 V	1.0	4.3	9.2	1.0	12	ns
		V _{CC} = 2.3 V to 2.7 V	0.5	2.7	5.0	0.5	6.5	ns
		V _{CC} = 2.7 V	0.5	3.0	5.0	0.5	6.5	ns
		V _{CC} = 3.0 V to 3.6 V	0.5	3.1	5.0	0.5	6.5	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	2.2	4.2	0.5	5.5	ns
C _{PD}	power dissipation	per buffer; V _I = GND to V _{CC} ^[5]						
	capacitance	output enabled	-	25	-	-	-	pF
		output disabled	-	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.

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

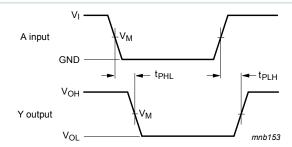
 V_{CC} = supply voltage in V;

N = number of inputs switching;

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

 ^[1] Typical values are measured at T_{amb} = 25° C and V_{CC} = 1.6 V, 2.5 V
 [2] t_{pd} is the same as t_{PLH} and t_{PLL}
 [3] t_{en} is the same as t_{PZH} and t_{PLZ}
 [4] t_{dis} is the same as t_{PZ} and t_{PHZ}
 [5] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

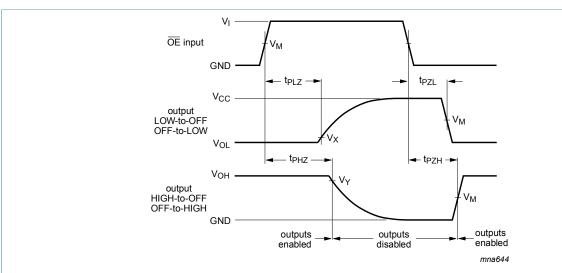
11.1 Waveforms and test circuit



Measurement points are given in Table 9.

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

Figure 8. Input A to output Y propagation delay times



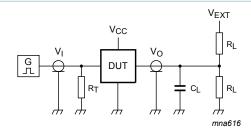
Measurement points are given in Table 9.

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

Figure 9. 3-state enable and disable times

Table 9. Measurement points

Supply voltage	Input	Output				
V _{CC}	V _M	V _M	V _X	\mathbf{V}_{Y}		
1.65 V to 1.95 V	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.15 V	V _{OH} - 0.15 V		
2.3 V to 2.7 V	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.15 V	V _{OH} - 0.15 V		
2.7 V	1.5 V	1.5 V	V _{OL} + 0.3 V	V _{OH} - 0.3 V		
3.0 V to 3.6 V	1.5 V	1.5 V	V _{OL} + 0.3 V	V _{OH} - 0.3 V		
4.5 V to 5.5 V	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.3 V	V _{OH} - 0.3 V		



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_0 of the pulse generator.

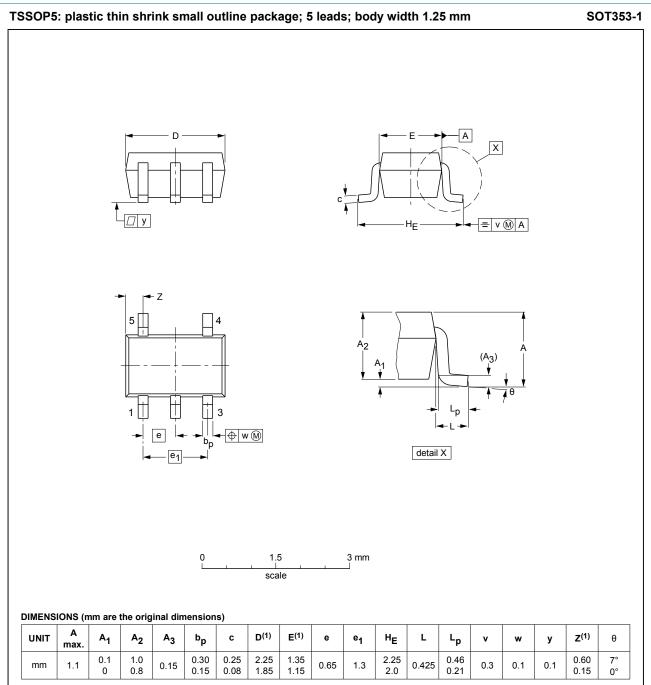
 V_{EXT} = External voltage for measuring switching times.

Figure 10. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load	Load		V _{EXT}		
V _{CC}	V _I	t _r , t _f	C _L	R _L	t _{PLH} , t _{PHL}	t _{PZH} , t _{PHZ}	t_{PZL}, t_{PLZ}	
1.65 V to 1.95 V	V _{CC}	≤ 2.0 ns	30 pF	1 kΩ	open	GND	2V _{CC}	
2.3 V to 2.7 V	V _{CC}	≤ 2.0 ns	30 pF	500 Ω	open	GND	2V _{CC}	
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	GND	6 V	
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	GND	6 V	
4.5 V to 5.5 V	V _{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	2V _{CC}	

12 Package outline



Note

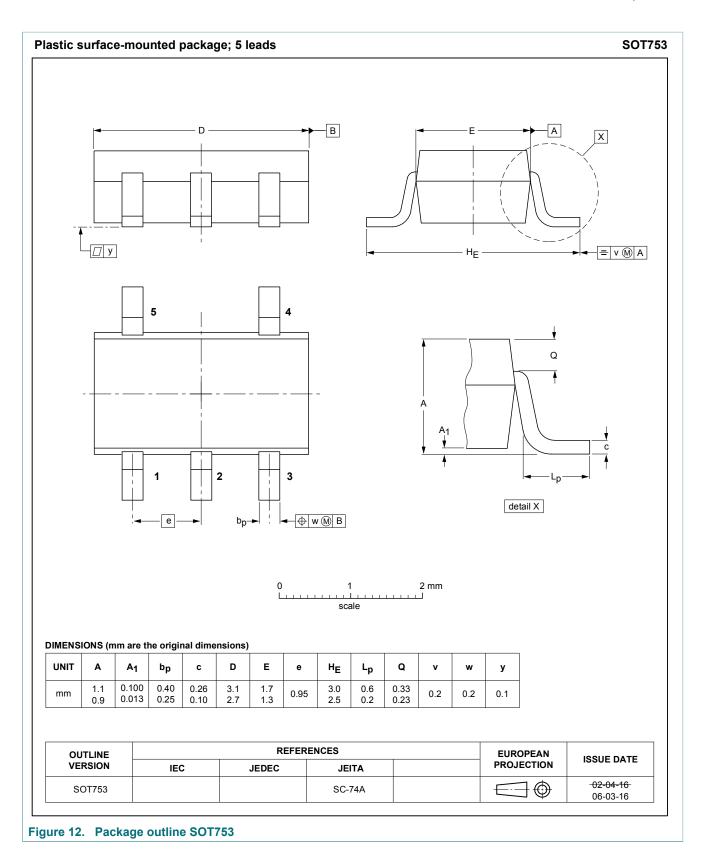
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

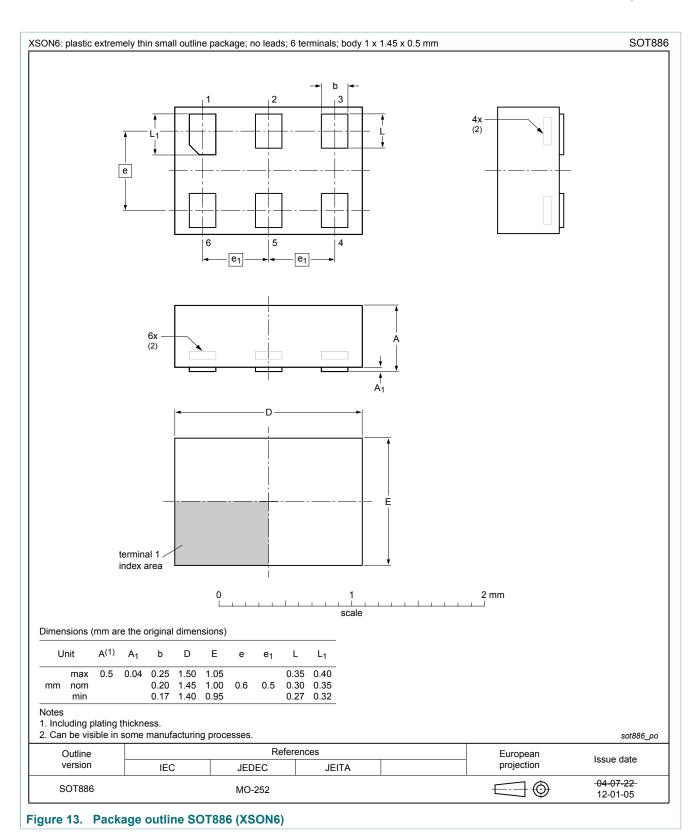
OUTLINE VERSION	REFERENCES				EUROPEAN	ISSUE DATE
	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT353-1		MO-203	SC-88A			-00-09-01- 03-02-19

Figure 11. Package outline SOT353-1 (TSSOP5)

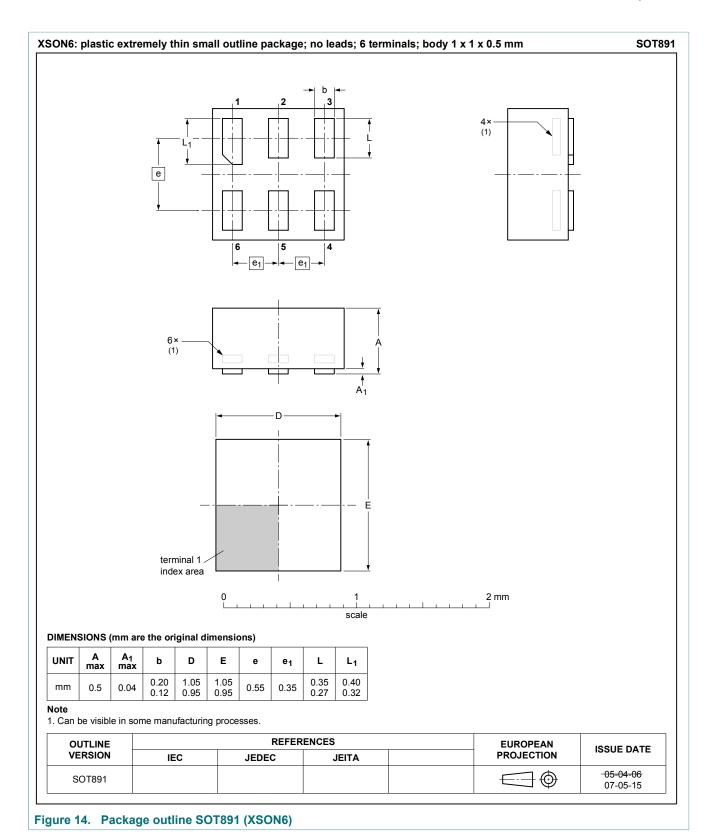
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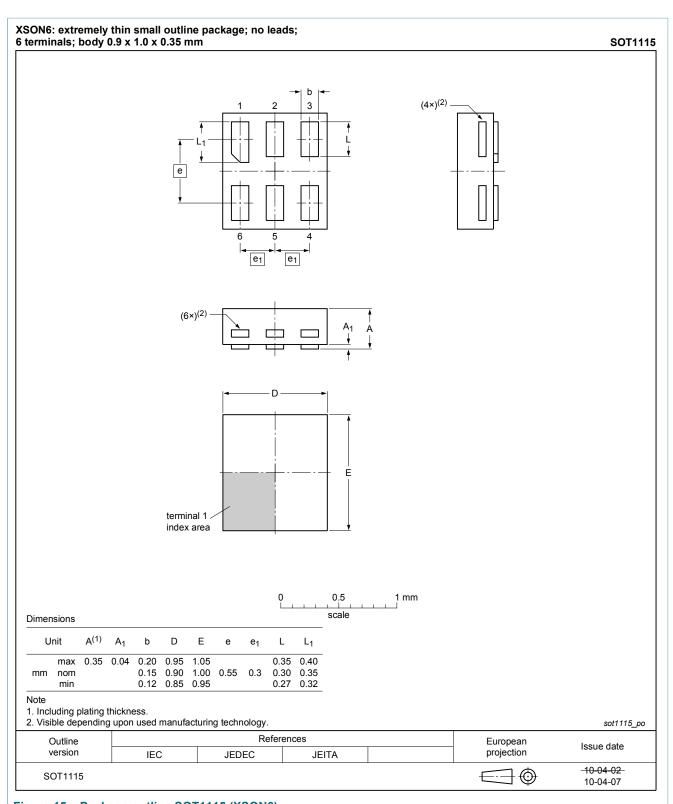
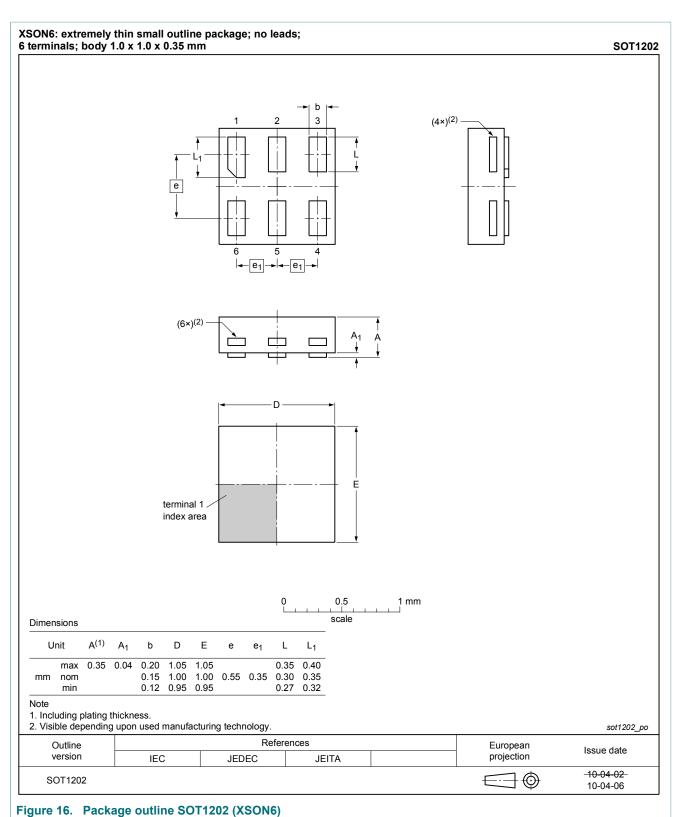
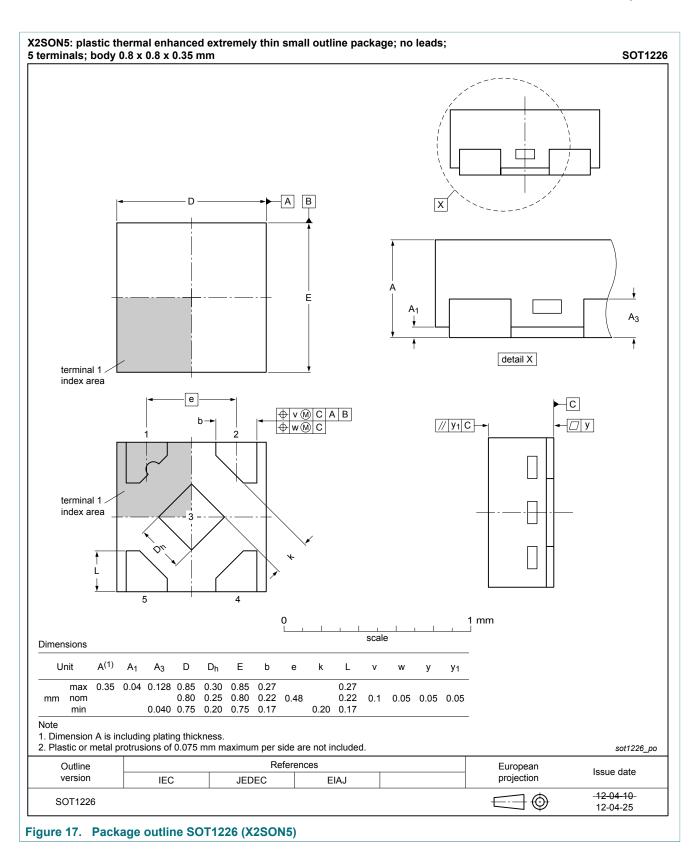


Figure 15. Package outline SOT1115 (XSON6)



rigure to: Tackage outline 0011202 (x00110



13 Abbreviations

Table 11. 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

14 Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74LVC1G125 v.13	20171107	Product data sheet	-	74LVC1G125 v.12		
Modifications:	Nexperia.	his data sheet has been redeve been adapted to the new o		, ,		
74LVC1G125 v.12	20161202	Product data sheet	-	74LVC1G125 v.11		
Modifications:	• Table 7: The n	• <u>Table 7</u> : The maximum limits for leakage current and supply current have changed.				
74LVC1G125 v.11	20120702	Product data sheet	-	74LVC1G125 v.10		
Modifications:		 Added type number 74LVC1G125GX (SOT1226) Package outline drawing of SOT886 (Figure 13) modified. 				
74LVC1G125 v.10	20111207	Product data sheet	-	74LVC1G125 v.9		
Modifications:	Legal pages u	odated.		·		
74LVC1G125 v.9	20101229	Product data sheet	-	74LVC1G125 v.8		
74LVC1G125 v.8	20100824	Product data sheet	-	74LVC1G125 v.7		
74LVC1G125 v.7	20070830	Product data sheet	-	74LVC1G125 v.6		
74LVC1G125 v.6	20060912	Product data sheet	-	74LVC1G125 v.5		
74LVC1G125 v.5	20040915	Product specification	-	74LVC1G125 v.4		
74LVC1G125 v.4	20021118	Product specification	-	74LVC1G125 v.3		
74LVC1G125 v.3	20020528	Product specification	-	74LVC1G125 v.2		
74LVC1G125 v.2	20010406	Product specification	-	74LVC1G125 v.1		
74LVC1G125 v.1	20001222	Product specification	-	-		

15 Legal information

15.1 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]
- 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.

15.2 Definitions

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Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

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Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru_6 moschip.ru 4 moschip.ru 9