Rev. 11 — 2 July 2012

Product data sheet

1. General description

The 74LVC1G125 provides one non-inverting buffer/line driver with 3-state output. The 3-state 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)
- ± 24 mA output drive (V_{CC} = 3.0 V)
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 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

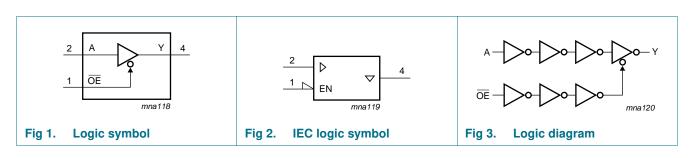
Table 1. Ordering in	nformation							
Type number	Package							
	Temperature range	Name	Description	Version				
74LVC1G125GW	–40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1				
74LVC1G125GV	–40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753				
74LVC1G125GM	–40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1.45 \times 0.5$ mm	SOT886				
74LVC1G125GF	–40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1 \times 0.5$ mm	SOT891				
74LVC1G125GN	–40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body $0.9 \times 1.0 \times 0.35$ mm	SOT1115				
74LVC1G125GS	–40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body $1.0 \times 1.0 \times 0.35$ mm	SOT1202				
74LVC1G125GX	–40 °C to +125 °C	X2SON5	X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body $0.8 \times 0.8 \times 0.35$ 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

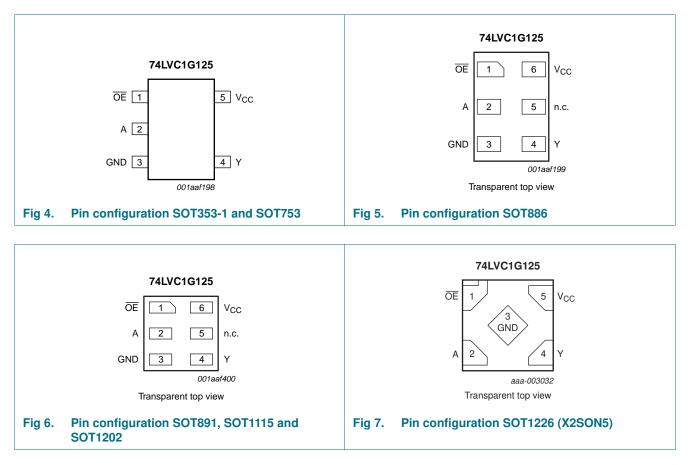
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1 Pinning



6.2 Pin description

n description		
Pin		Description
TSSOP5 and X2SON5	XSON6	
1	1	output enable input
2	2	data input
3	3	ground (0 V)
4	4	data output
-	5	not connected
5	6	supply voltage
	Pin TSSOP5 and X2SON5 1 2 3 4 -	Pin TSSOP5 and X2SON5 XSON6 1 1 2 2 3 3 4 4 - 5

7. Functional description

	Table 4	. F	unction	table ^[1]
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Input OE		Output
OE	Α	Y
L	L	L
L	Н	Н
Н	Х	Z

[1] H = HIGH voltage level;

L = LOW voltage level;

X = don't care;

Z = high-impedance OFF-state.

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 ₁ < 0 V	-50	-	mA
VI	input voltage		<u>[1]</u> –0.5	+6.5	V
Ι _{ΟΚ}	output clamping current	$V_{\rm O}$ > $V_{\rm CC}$ or $V_{\rm O}$ < 0 V	-	±50	mA
Vo	output voltage	Active mode	<u>[1][2]</u> –0.5	$V_{CC} + 0.5$	V
		Power-down mode	<u>[1][2]</u> –0.5	+6.5	V
Ι _Ο	output current	$V_{O} = 0 V$ to V_{CC}	-	±50	mA
I _{CC}	supply current		-	100	mA
I _{GND}	ground current		-100	-	mA
P _{tot}	total power dissipation	$T_{amb} = -40 \degree C \text{ to } +125 \degree C$	<u>[3]</u> _	250	mW
T _{stg}	storage temperature		-65	+150	°C

[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 P_{tot} derates linearly with 7.8 mW/K.

9. Recommended operating conditions

Table 6.	Recommended operating condi	tions				
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
0		$V_{CC} = 0 V$; Power-down mode	0	-	5.5	V
T _{amb}	ambient temperature		-40	-	+125	°C
$\Delta t / \Delta V$	input transition rise and fall rate	$V_{CC} = 1.65 \text{ V to } 2.7 \text{ V}$	-	-	20	ns/V
		$V_{CC} = 2.7 \text{ V} \text{ to } 5.5 \text{ V}$	-	-	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 <mark>[1]</mark>	Max	Unit
T _{amb} = -	40 °C to +85 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	$0.65 imes V_{CC}$	-	-	V
		V_{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		$V_{CC} = 2.7 \text{ V} \text{ to } 3.6 \text{ V}$	2.0	-	-	V
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	$0.7\times V_{CC}$	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	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
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	-	-	$0.3 \times V_{CC}$	V
V _{OL}	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		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
		$V_{CC} = 2.3 \text{ V}; \text{ I}_{O} = 8 \text{ mA}$	-	-	0.3	V
		$V_{CC} = 2.7 \text{ V}; I_{O} = 12 \text{ mA}$	-	-	0.4	V
		$V_{CC} = 3.0 \text{ V}; \text{ I}_{O} = 24 \text{ mA}$	-	-	0.55	V
		$V_{CC} = 4.5 \text{ V}; \text{ I}_{O} = 32 \text{ mA}$	-	-	0.55	V
V _{OH}	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		V_{CC} = 1.65 V to 5.5 V; I_O = -100 μ A	V _{CC} – 0.1	-	-	V
		$V_{CC} = 1.65 \text{ V}; \text{ I}_{O} = -4 \text{ mA}$	1.2	-	-	V
		$V_{CC} = 2.3 \text{ V}; \text{ I}_{O} = -8 \text{ mA}$	1.9	-	-	V
		$V_{CC} = 2.7 \text{ V}; I_{O} = -12 \text{ mA}$	2.2	-	-	V
		$V_{CC} = 3.0 \text{ V}; \text{ I}_{O} = -24 \text{ mA}$	2.3	-	-	V
		$V_{\rm CC}$ = 4.5 V; I _O = -32 mA	3.8	-	-	V
I _I	input leakage current	$V_{CC} = 0$ V to 5.5 V; $V_1 = 5.5$ V or GND	-	±0.1	±5	μA
I _{OZ}	OFF-state output current	$V_{CC} = 3.6 \text{ V}; \text{ V}_{I} = \text{V}_{IH} \text{ or } \text{V}_{IL};$ $V_{O} = 5.5 \text{ V} \text{ or GND}$	-	±0.1	±10	μA

Bus buffer/line driver; 3-state

Symbol	Parameter	Conditions	Min	Typ <mark>[1]</mark>	Max	Unit
OFF	power-off leakage current	V_{CC} = 0 V; V _I or V _O = 5.5 V	-	±0.1	±10	μA
CC	supply current	$V_{I} = 5.5 V \text{ or GND};$ $V_{CC} = 1.65 V \text{ to } 5.5 V; I_{O} = 0 \text{ A}$	-	0.1	10	μA
7I ^{CC}	additional supply current	per pin; $V_{CC} = 2.3 \text{ V}$ to 5.5 V; V _I = V _{CC} - 0.6 V; I _O = 0 A	-	5	500	μA
Cı	input capacitance		-	5	-	pF
Γ _{amb} = −	40 °C to +125 °C					
VIH	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.7	-	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		V _{CC} = 4.5 V to 5.5 V	$0.7\times V_{CC}$	-	-	V
/ _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	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	-	-	$0.3 \times V_{CC}$	V
V _{OL}	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		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
		$V_{CC} = 2.3 \text{ V}; I_{O} = 8 \text{ mA}$	-	-	0.45	V
		$V_{CC} = 2.7 \text{ V}; I_{O} = 12 \text{ mA}$	-	-	0.60	V
		$V_{CC} = 3.0 \text{ V}; \text{ I}_{O} = 24 \text{ mA}$	-	-	0.80	V
		$V_{CC} = 4.5 \text{ V}; I_{O} = 32 \text{ mA}$	-	-	0.80	V
/ _{ОН}	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		V_{CC} = 1.65 V to 5.5 V; I_O = $-100~\mu A$	$V_{CC}-0.1$	-	-	V
		$V_{CC} = 1.65 \text{ V}; I_{O} = -4 \text{ mA}$	0.95	-	-	V
		$V_{CC} = 2.3 \text{ V}; I_{O} = -8 \text{ mA}$	1.7	-	-	V
		$V_{CC} = 2.7 \text{ V}; I_{O} = -12 \text{ mA}$	1.9	-	-	V
		$V_{CC} = 3.0 \text{ V}; \text{ I}_{O} = -24 \text{ mA}$	2.0	-	-	V
		$V_{CC} = 4.5 \text{ V}; I_{O} = -32 \text{ mA}$	3.4	-	-	V
I	input leakage current	V_{CC} = 0 V to 5.5 V; V_I = 5.5 V or GND	-	-	±100	μA
OZ	OFF-state output current	V_{CC} = 3.6 V; V_I = V_{IH} or V_{IL} ; V_O = 5.5 V or GND	-	-	±200	μA
OFF	power-off leakage current	V_{CC} = 0 V; V _I or V _O = 5.5 V	-	-	±200	μA
СС	supply current	$V_{I} = 5.5 V \text{ or GND};$ $V_{CC} = 1.65 V \text{ to } 5.5 V; I_{O} = 0 A$	-	-	200	μA
VI _{CC}	additional supply current	per pin; $V_{CC} = 2.3 \text{ V}$ to 5.5 V; $V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$	-	-	5000	μA

Table 7. Static characteristics ...continued

[1] All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 °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	
			I	Min	Typ <mark>[1]</mark>	Max	Min	Max	
t _{pd}	propagation delay	A to Y; see Figure 8	2]						
Ma 1 - 1 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9 -		V _{CC} = 1.65 V to 1.95 V		1.0	3.3	8.0	1.0	10.5	ns
		$V_{CC} = 2.3 \text{ V} \text{ to } 2.7 \text{ V}$		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
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$		0.5	2.1	4.5	0.5	6	ns
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$		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
		$V_{CC} = 2.3 \text{ V} \text{ to } 2.7 \text{ V}$		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
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$		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
		$V_{CC} = 2.3 \text{ V} \text{ to } 2.7 \text{ V}$		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
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$	(0.5	3.1	5.0	0.5	6.5	ns
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	(0.5	2.2	4.2	0.5	5.5	ns
C _{PD}	power dissipation	per buffer; $V_1 = GND$ 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.

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

- $[3] \quad t_{en} \mbox{ is the same as } t_{PZH} \mbox{ and } t_{PZL}$
- $[4] \quad t_{dis} \mbox{ is the same as } t_{PLZ} \mbox{ and } t_{PHZ}$
- [5] C_{PD} is used to determine the dynamic power dissipation (P_D in μ W).
 - $P_{D} = C_{PD} \times V_{CC}{}^2 \times f_i \times N + \sum (C_L \times V_{CC}{}^2 \times f_o)$ where:

 $f_i = input frequency in MHz;$

 $f_o = output frequency in MHz;$

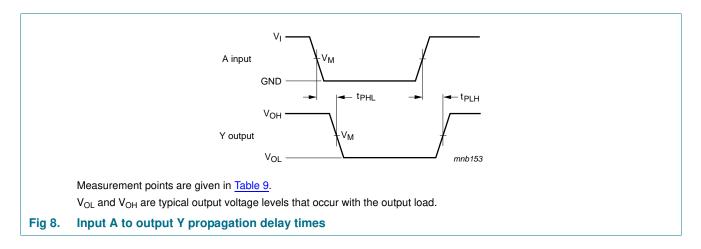
 C_L = output load capacitance in pF;

 V_{CC} = supply voltage in V;

$$\begin{split} N &= \text{number of inputs switching;} \\ \sum (C_L \times V_{CC}{}^2 \times f_o) &= \text{sum of outputs.} \end{split}$$

Bus buffer/line driver; 3-state

12. Waveforms



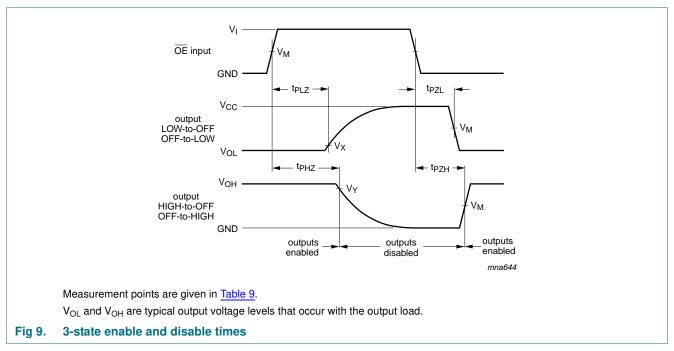


Table 9.Measurement points

Supply voltage	Input	Output	Output				
V _{CC}	V _M	V _M	V _X	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	$V_{OH} - 0.3 \ V$			

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Bus buffer/line driver; 3-state

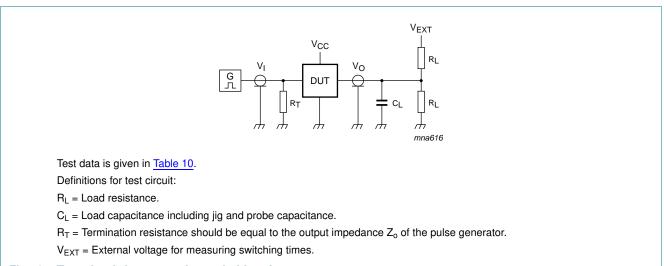


Fig 10. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input	Input		Load		V _{EXT}		
V _{CC}	VI	t _r , t _f	CL	RL	t _{PLH} , t _{PHL}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}	
1.65 V to 1.95 V	V _{CC}	\leq 2.0 ns	30 pF	1 kΩ	open	GND	2V _{CC}	
2.3 V to 2.7 V	V _{CC}	\leq 2.0 ns	30 pF	500 Ω	open	GND	$2V_{CC}$	
2.7 V	2.7 V	\leq 2.5 ns	50 pF	500 Ω	open	GND	6 V	
3.0 V to 3.6 V	2.7 V	\leq 2.5 ns	50 pF	500 Ω	open	GND	6 V	
4.5 V to 5.5 V	V _{CC}	\leq 2.5 ns	50 pF	500 Ω	open	GND	2V _{CC}	

Bus buffer/line driver; 3-state

13. Package outline

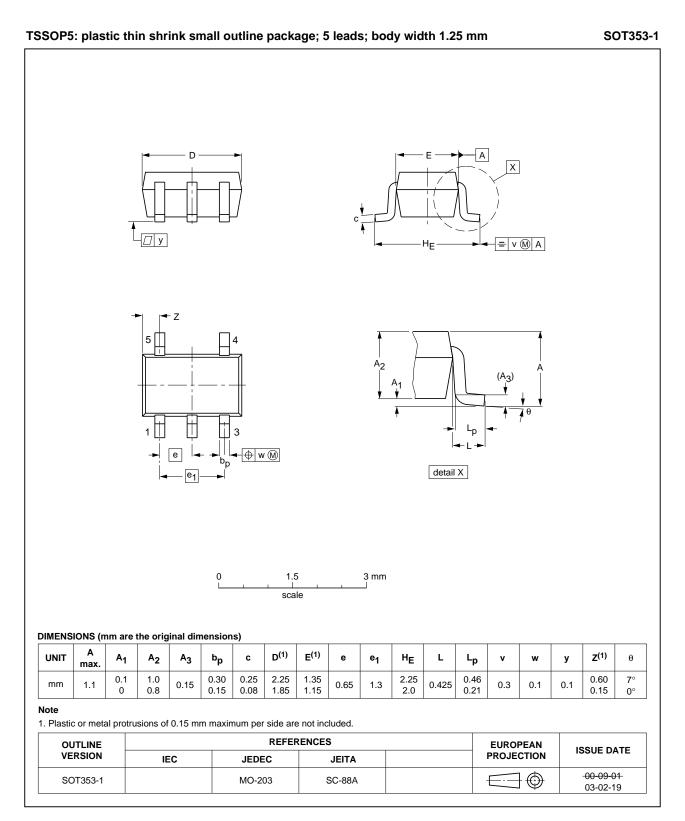


Fig 11. Package outline SOT353-1 (TSSOP5)

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74LVC1G125

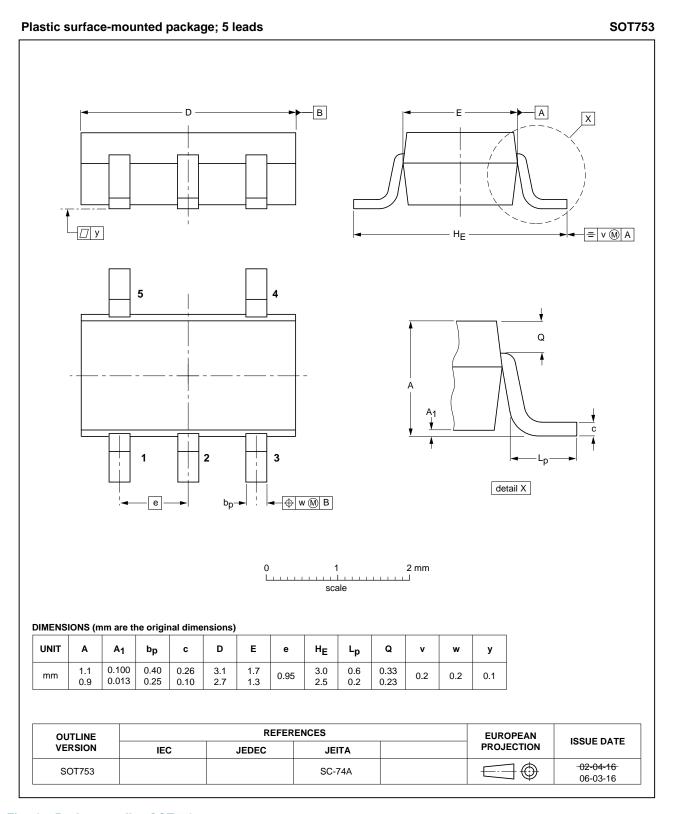


Fig 12. Package outline SOT753

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74LVC1G125

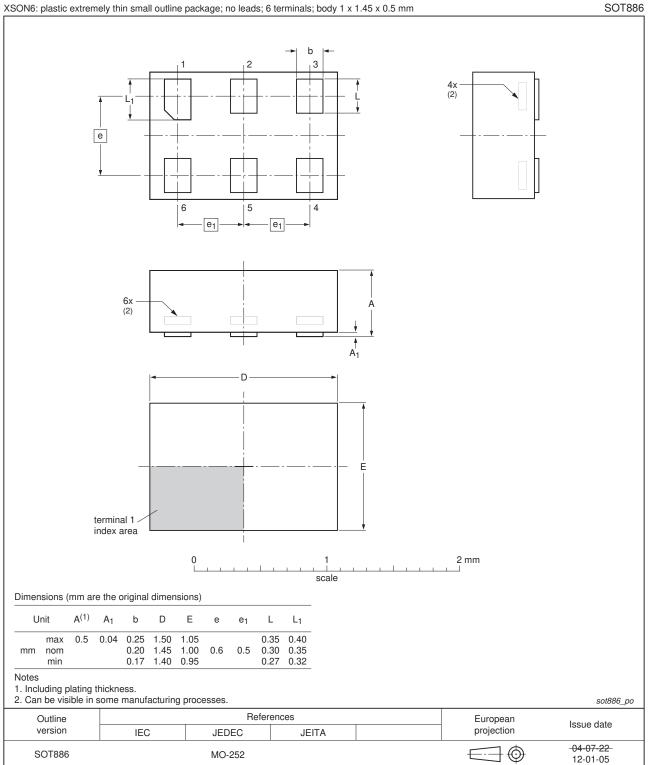


Fig 13. Package outline SOT886 (XSON6)

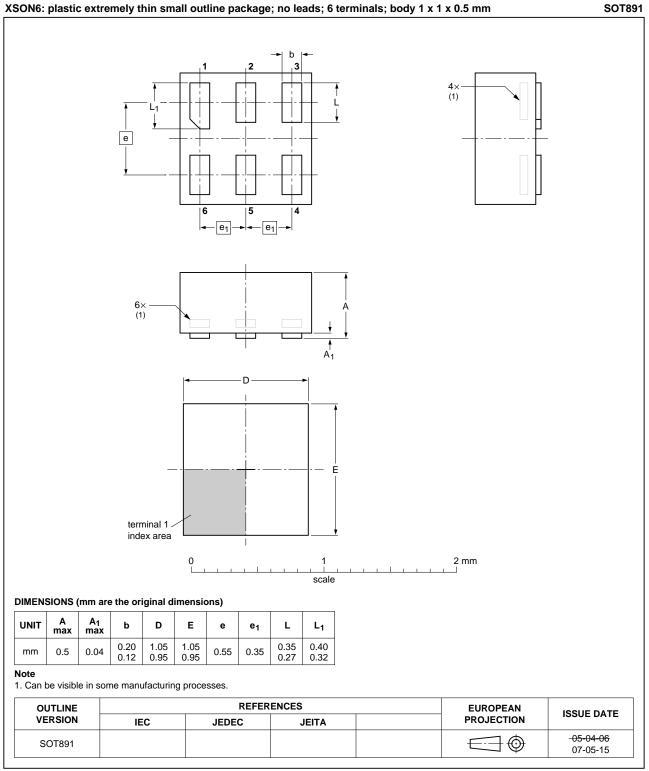
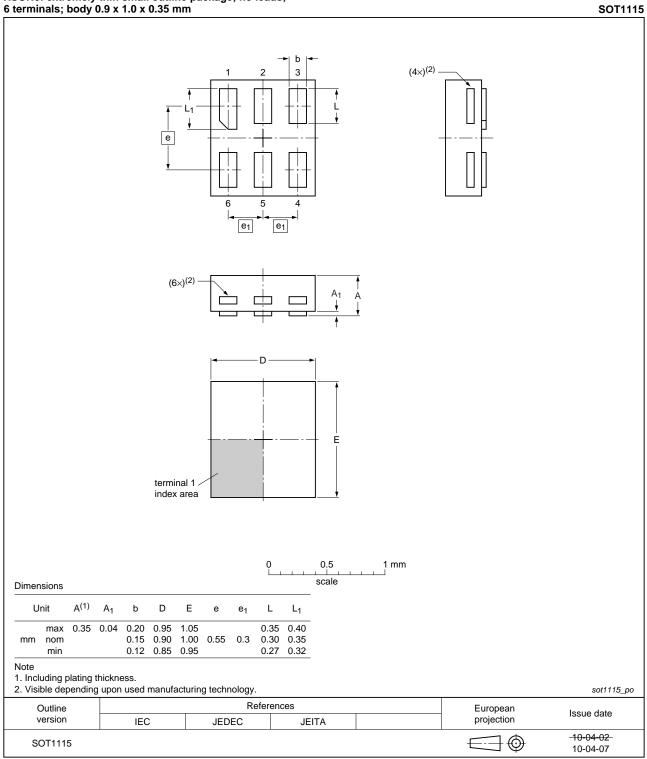


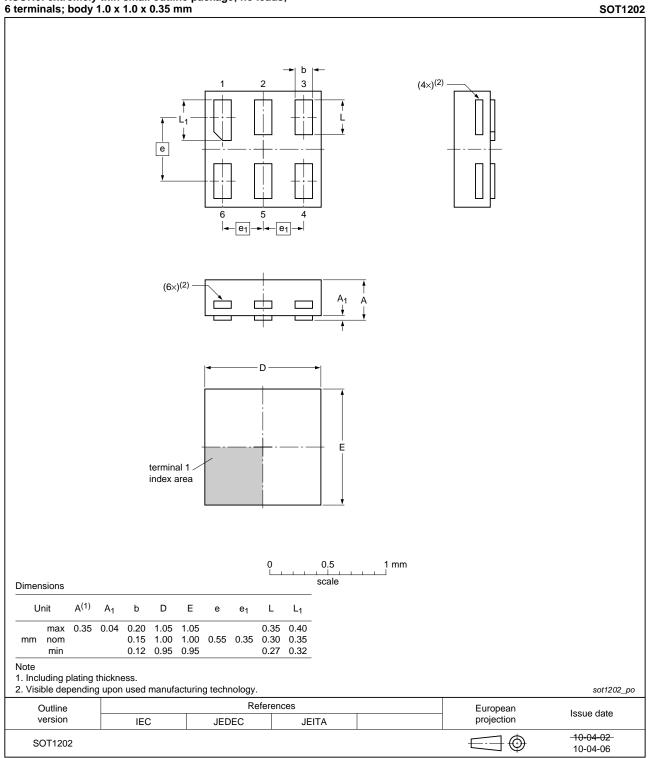
Fig 14. Package outline SOT891 (XSON6)



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

Fig 15. Package outline SOT1115 (XSON6)

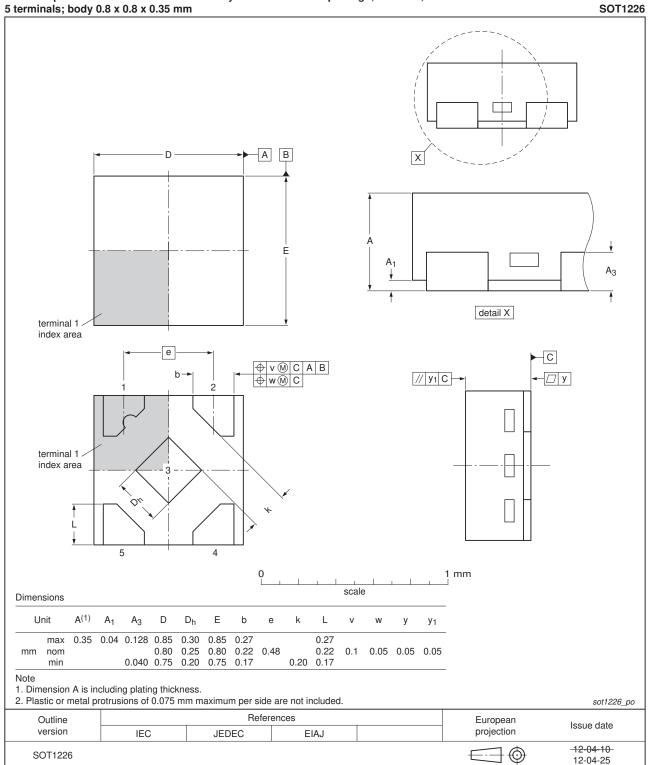
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XSON6: extremely thin small outline package; no leads; 6 terminals; body 1.0 x 1.0 x 0.35 mm

Fig 16. Package outline SOT1202 (XSON6)

15 of 20



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

Fig 17. Package outline SOT1226 (X2SON5)

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74LVC1G125



14. Abbreviations

Table 11. 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 12. Revision h	istory			
Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G125 v.11	20120702	Product data sheet	-	74LVC1G125 v.10
Modifications:	 Added type 	number 74LVC1G125GX (S	SOT1226)	
	 Package ou 	Itline drawing of SOT886 (Fi	gure 13) modified.	
74LVC1G125 v.10	20111207	Product data sheet	-	74LVC1G125 v.9
Modifications:	 Legal pages 	s updated.		
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	-	-

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".

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