Product data sheet

General description

The 74LVC1G11 provides a single 3-input AND gate.

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.

Schmitt-trigger action at all inputs makes the circuit highly tolerant to slower input rise and fall time.

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 2

- Wide supply voltage range from 1.65 V to 5.5 V
- 5 V tolerant inputs for interfacing with 5 V logic
- 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
- 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

Ordering information

Table 1. Ordering information

Type number	Package						
	Temperature range	Name	Description	Version			
74LVC1G11GW	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363			
74LVC1G11GV	-40 °C to +125 °C	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457			



Type number	Package						
	Temperature range	Name	Description	Version			
74LVC1G11GM	-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			
74LVC1G11GF	-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			
74LVC1G11GN	-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			
74LVC1G11GS	-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			
74LVC1G11GX	-40 °C to +125 °C	X2SON6	plastic thermal extremely thin small outline package; no leads; 6 terminals; body 1 x 0.8 x 0.35 mm	SOT1255			

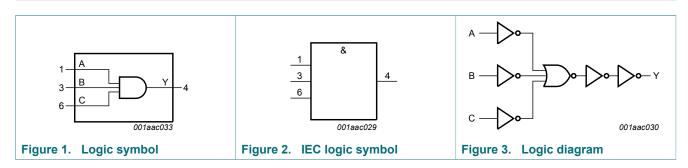
4 Marking

Table 2. Marking

Tuble 2. Marking	
Type number	Marking code ^[1]
74LVC1G11GW	VU
74LVC1G11GV	V11
74LVC1G11GM	VU
74LVC1G11GF	VU
74LVC1G11GN	VU
74LVC1G11GS	VU
74LVC1G11GX	VU

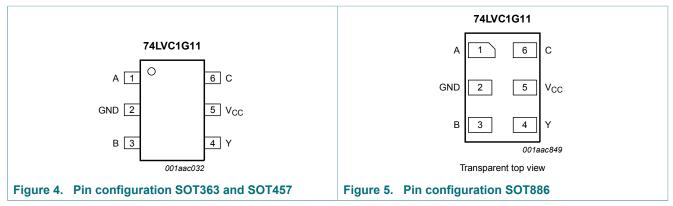
^[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

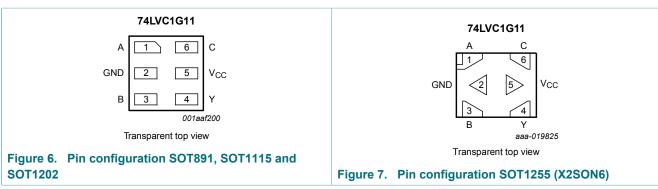
5 Functional diagram



6 Pinning information

6.1 Pinning





6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
A	1	data input
GND	2	ground (0 V)
В	3	data input
Υ	4	data output
V _{CC}	5	supply voltage
С	6	data input

7 Functional description

Table 4. Function table [1]

Input			Output
A	В	С	Υ
Н	Н	Н	Н
L	X	X	L
X	L	X	L
Х	X	L	L

^[1] H = HIGH voltage level; L = LOW voltage level; X = don't care.

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
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
I _O	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	$T_{amb} = -40 ^{\circ}\text{C to } +125 ^{\circ}\text{C}$ [3]	-	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 $V_{CC} = 0 \text{ V}$ (Power-down mode), the output voltage can be 5.5 V in normal operation.

^[3] For SC-88 and SC-74 packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K. For X2SON6 and XSON6 package: above 118 °C the value of P_{tot} derates linearly with 7.8 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
Vo	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
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	-40	-40 °C to +85 °C			-40 °C to +125 °C	
			Min	Typ [1]	Max	Min	Max	
V _{IH}	HIGH-level	V _{CC} = 1.65 V to 1.95 V	0.65V _{CC}	-	-	0.65V _{CC}	-	V
	input voltage	V _{CC} = 2.3 V to 2.7 V	1.7	-	-	1.7	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
		V _{CC} = 4.5 V to 5.5 V	0.7V _{CC}	-	-	0.7V _{CC}	-	V
V _{IL}	LOW-level	V _{CC} = 1.65 V to 1.95 V	-	-	0.35V _{CC}	-	0.35V _{CC}	V
	input voltage	V _{CC} = 2.3 V to 2.7 V	-	-	0.7	-	0.7	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
		V _{CC} = 4.5 V to 5.5 V	-	-	0.3V _{CC}	-	0.3V _{CC}	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}						
		I_{O} = -100 μ A; V_{CC} = 1.65 V to 5.5 V	V _{CC} - 0.1	-	-	V _{CC} - 0.1	-	V
		I _O = -4 mA; V _{CC} = 1.65 V	1.2	1.54	-	0.95	-	V
		I_{O} = -8 mA; V_{CC} = 2.3 V	1.9	2.15	-	1.7	-	V
		I _O = -12 mA; V _{CC} = 2.7 V	2.2	2.50	-	1.9	-	V
		I _O = -24 mA; V _{CC} = 3.0 V	2.3	2.62	-	2.0	-	V
		I_{O} = -32 mA; V_{CC} = 4.5 V	3.8	4.11	-	3.4	-	V

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}						
	output voltage	I _O = 100 μA; V _{CC} = 1.65 V to 5.5 V	-	-	0.10	-	0.10	V
		I _O = 4 mA; V _{CC} = 1.65 V	-	0.07	0.45	-	0.70	V
		I _O = 8 mA; V _{CC} = 2.3 V	-	0.12	0.30	-	0.45	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	0.17	0.40	-	0.60	V
		I _O = 24 mA; V _{CC} = 3.0 V	-	0.33	0.55	-	0.80	V
		I _O = 32 mA; V _{CC} = 4.5 V	-	0.39	0.55	-	0.80	V
lı	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	±0.1	±1	-	±1	μA
l _{OFF}	power-off leakage current	V_{I} or V_{O} = 5.5 V; V_{CC} = 0 V	-	±0.1	±2	-	±2	μΑ
I _{CC}	supply current	V _I = 5.5 V or GND; I _O = 0 A; V _{CC} = 1.65 V to 5.5 V	-	0.1	4	-	4	μA
Δl _{CC}	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A};$ $V_{CC} = 2.3 \text{ V to } 5.5 \text{ V}; \text{ per pin}$	-	5	500	-	5 00	μA
Cı	input capacitance	V_{CC} = 3.3 V; V_I = GND to V_{CC}	-	4	-	-	-	pF

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

11 Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 9.

Symbol	Parameter	Conditions	-40	-40 °C to +85 °C			-40 °C to +125 °C	
			Min	Typ ^[1]	Max	Min	Max	
t _{pd}	propagation delay	A, B and C to Y; see Figure 8						
		V _{CC} = 1.65 V to 1.95 V	1.5	4.7	17.2	1.5	21.5	ns
		V _{CC} = 2.3 V to 2.7 V	1.0	3.0	6.2	1.0	7.8	ns
		V _{CC} = 2.7 V	1.0	3.0	6.0	1.0	7.5	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.6	4.9	1.0	6.2	ns
		V _{CC} = 4.5 V to 5.5 V	1.0	1.9	3.5	1.0	4.4	ns
C _{PD}	power dissipation capacitance	$V_1 = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [3]	-	13	-	-	-	pF

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.

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

 f_i = input frequency in MHz;

f_o = output frequency in MHz;

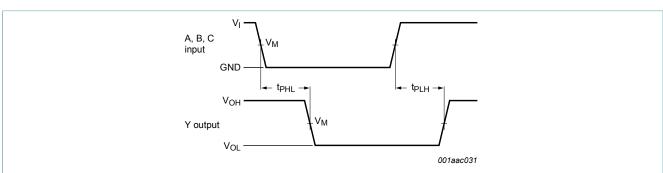
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

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

11.1 Waveform and test circuit



Measurement points are given in Table 9.

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

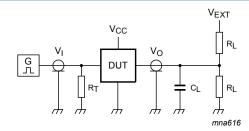
Figure 8. The input (A, B, C) to output (Y) propagation delays

74LVC1G11

 t_{pd} is the same as t_{PLH} and t_{PHL} . C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

Table 9. Measurement points

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



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 9. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load	V _{EXT}	
V _{CC}	VI	$t_r = t_f$	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 Package outline

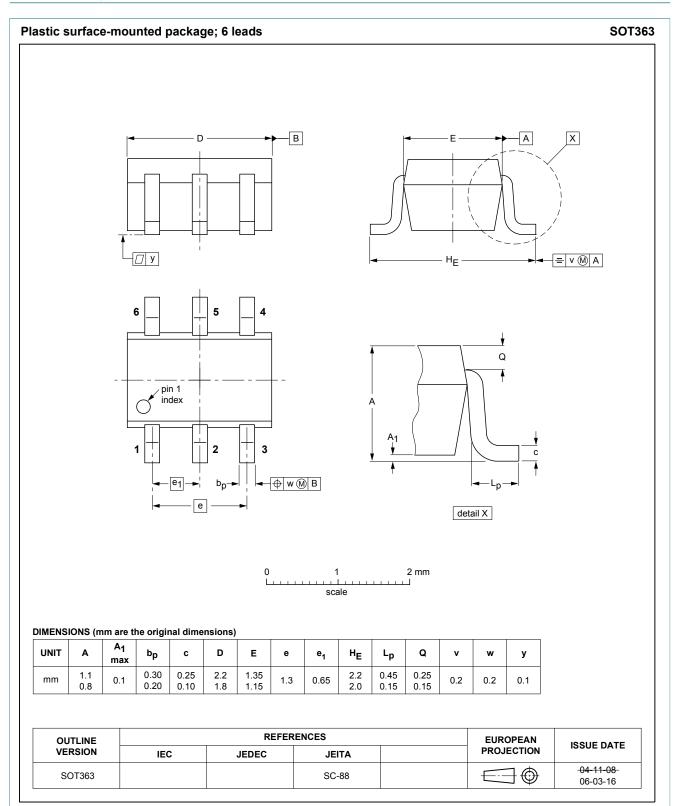


Figure 10. Package outline SOT363 (SC-88)

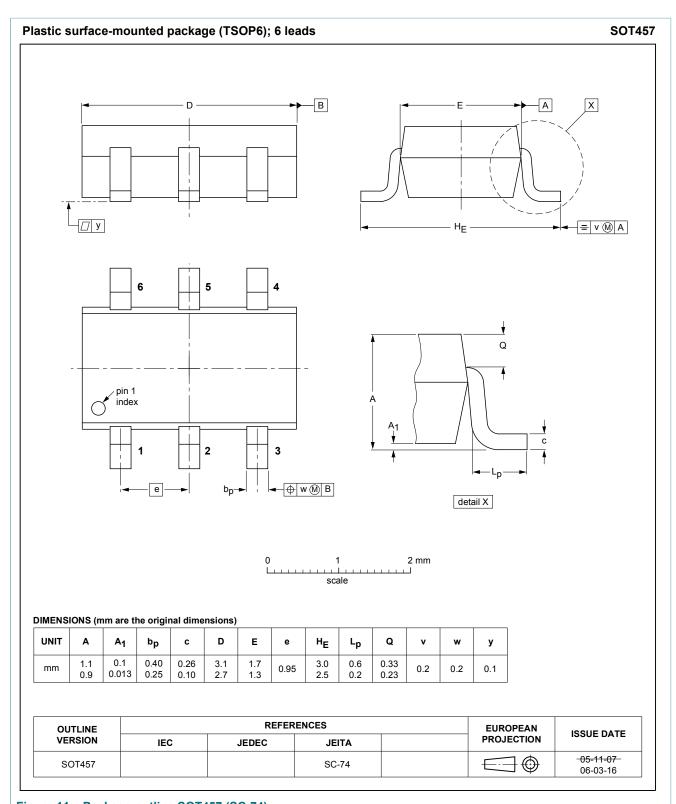
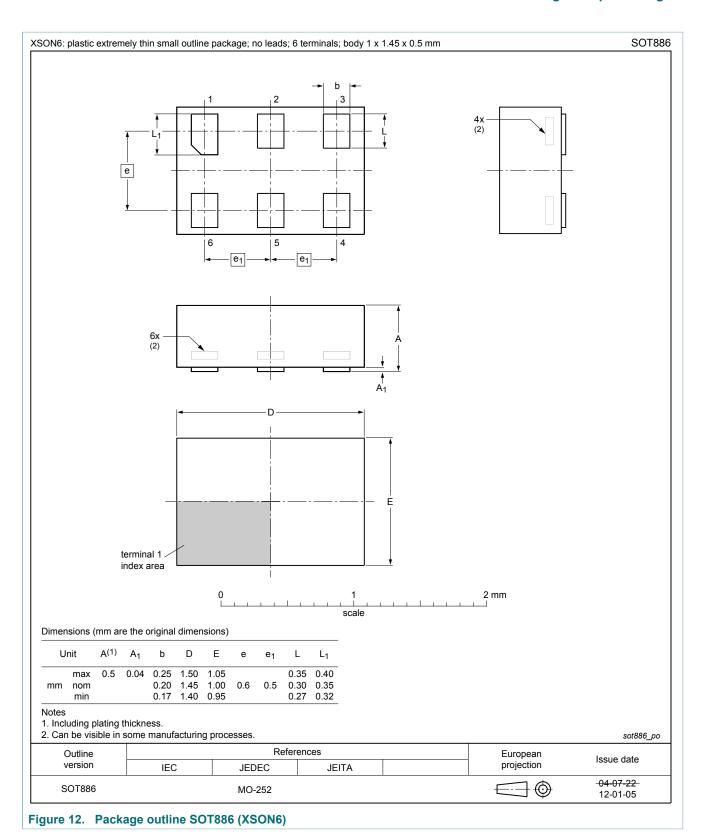


Figure 11. Package outline SOT457 (SC-74)



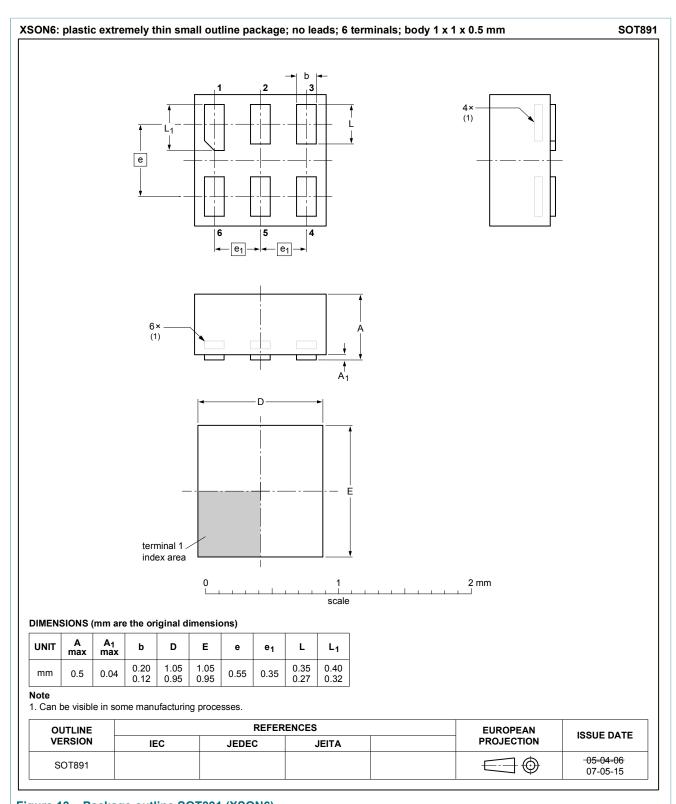


Figure 13. Package outline SOT891 (XSON6)

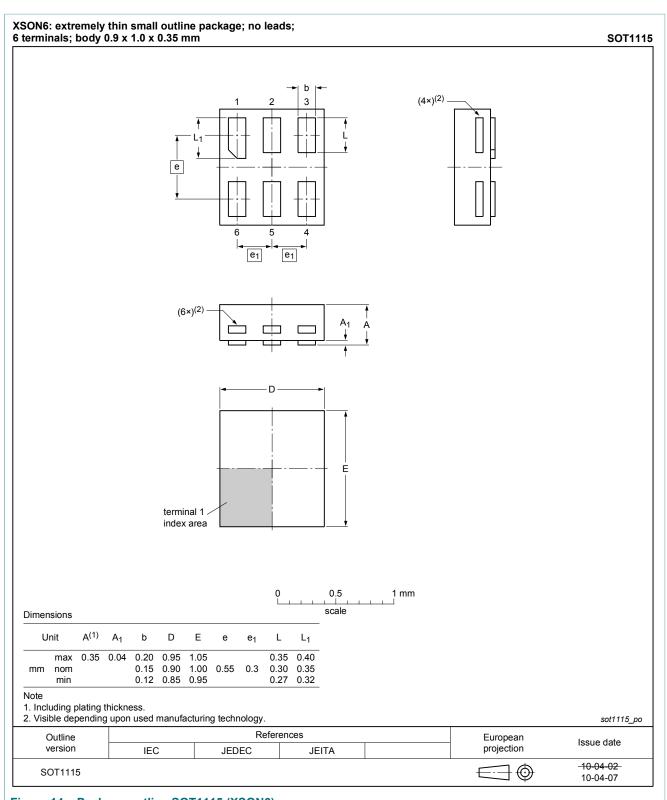
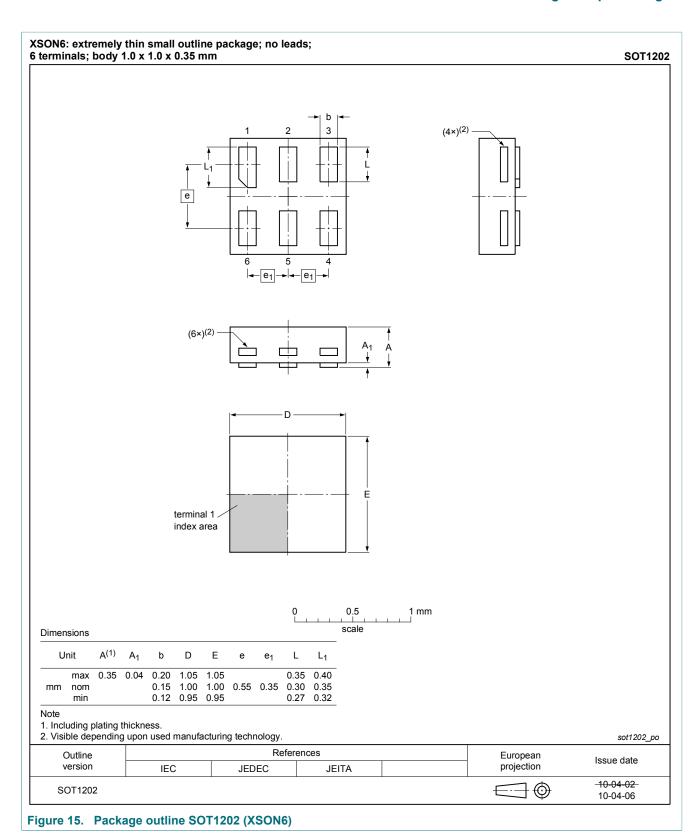
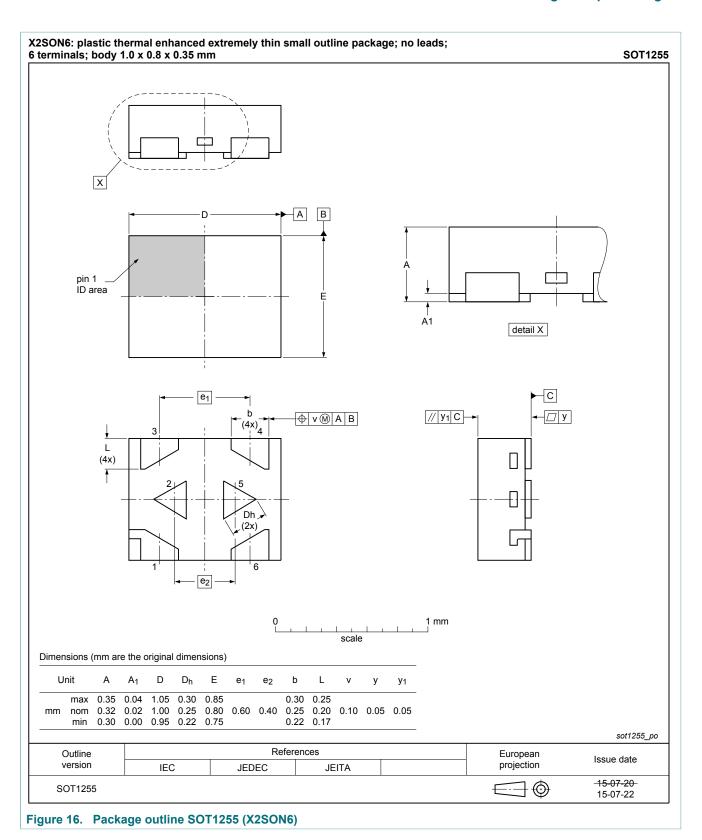


Figure 14. Package outline SOT1115 (XSON6)



74LVC1G11



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		
74LVC1G11 v.10	20170719	Product data sheet	-	74LVC1G11 v.9		
Modifications:	Nexperia.	 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. 				
74LVC1G11 v.9	20161128	Product data sheet	-	74LVC1G11 v.8		
Modifications:	<u>Table 7</u> : The maximum limits for leakage current and supply current have changed.					
74LVC1G11 v.8	20150917	Product data sheet	-	74LVC1G11 v.7		
Modifications:	Added type number 74LVC1G11GX (SOT1255/X2SON6).					
74LVC1G11 v.7	20120704	Product data sheet	-	74LVC1G11 v.6		
Modifications:	Package outline drawing of SOT886 (<u>Figure 12</u>) modified.					
74LVC1G11 v.6	20111209	Product data sheet	-	74LVC1G11 v.5		
Modifications:	Legal pages updated.					
74LVC1G11 v.5	20100730	Product data sheet	-	74LVC1G11 v.4		
74LVC1G11 v.4	20070801	Product data sheet	-	74LVC1G11 v.3		
74LVC1G11 v.3	20060906	Product data sheet	-	74LVC1G11 v.2		
74LVC1G11 v.2	20050503	Product data sheet	-	74LVC1G11 v.1		
74LVC1G11 v.1	20041130	Product data sheet	-	-		

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.

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- The term 'short data sheet' is explained in section "Definitions". [2] [3]
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Contents

1	General description	1
2	Features and benefits	
3	Ordering information	1
4	Marking	2
5	Functional diagram	
6	Pinning information	3
6.1	Pinning	
6.2	Pin description	
7	Functional description	
8	Limiting values	4
9	Recommended operating conditions	5
10	Static characteristics	5
11	Dynamic characteristics	7
11.1	Waveform and test circuit	7
12	Package outline	9
13	Abbreviations	16
14	Revision history	16
15	Legal information	17

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