

# 74LVC1G11

## Single 3-input AND gate

Rev. 13 — 9 May 2023

Product data sheet

## 1. General description

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The 74LVC1G11 is a single 3-input AND gate. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times.

This device is fully specified for partial power down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

## 2. Features and benefits

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- Wide supply voltage range from 1.65 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- $\pm 24$  mA output drive ( $V_{CC} = 3.0$  V)
- CMOS low power dissipation
- Direct interface with TTL levels
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 250 mA
- Complies with JEDEC standard:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
  - JESD36 (4.5 V to 5.5 V)
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- 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			
	Temperature range	Name	Description	Version
<a href="#">74LVC1G11GW</a>	-40 °C to +125 °C	TSSOP6	plastic thin shrink small outline package; 6 leads; body width 1.25 mm	<a href="#">SOT363-2</a>
<a href="#">74LVC1G11GV</a>	-40 °C to +125 °C	SC-74; TSOP6	plastic surface-mounted package; 6 leads	<a href="#">SOT457</a>
<a href="#">74LVC1G11GM</a>	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	<a href="#">SOT886</a>
<a href="#">74LVC1G11GN</a>	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	<a href="#">SOT1115</a>
<a href="#">74LVC1G11GS</a>	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	<a href="#">SOT1202</a>
<a href="#">74LVC1G11GX</a>	-40 °C to +125 °C	X2SON6	plastic thermal enhanced extremely thin small outline package; no leads; 6 terminals; body 1.0 × 0.8 × 0.32 mm	<a href="#">SOT1255-2</a>

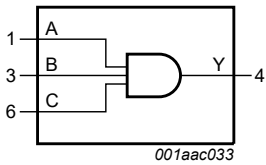
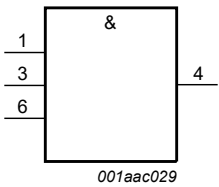
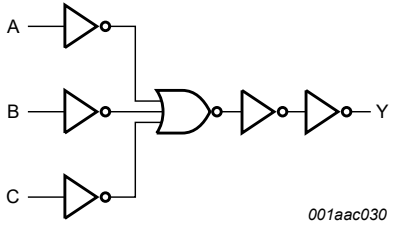
### 4. Marking

Table 2. Marking

Type number	Marking code <sup>[1]</sup>
74LVC1G11GW	VU
74LVC1G11GV	V11
74LVC1G11GM	VU
74LVC1G11GN	VU
74LVC1G11GS	VU
74LVC1G11GX	VU

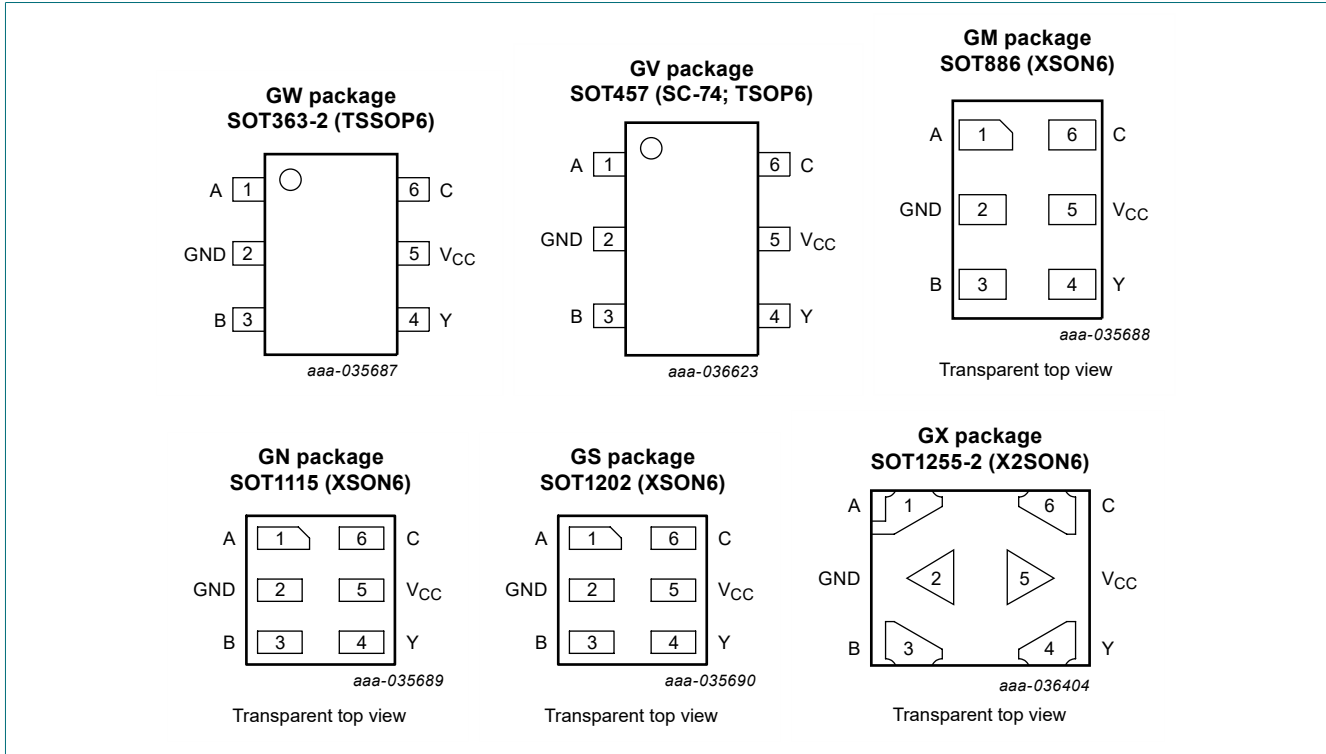
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

### 5. Functional diagram

		
<b>Fig. 1. Logic symbol</b>	<b>Fig. 2. IEC logic symbol</b>	<b>Fig. 3. Logic diagram</b>

## 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)
B	3	data input
Y	4	data output
V <sub>CC</sub>	5	supply voltage
C	6	data input

## 7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care.

Input			Output
A	B	C	Y
H	H	H	H
L	X	X	L
X	L	X	L
X	X	L	L

## 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
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to +125 °C	[2] -	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] For SOT363-2 (TSSOP6) package:  $P_{tot}$  derates linearly with 3.7 mW/K above 83 °C.

For SOT457 (SC-74; TSOP6) package:  $P_{tot}$  derates linearly with 4.1 mW/K above 89 °C.

For SOT886 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package:  $P_{tot}$  derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT1255-2 (X2SON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 75 °C.

## 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
$\Delta t/\Delta V$	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 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65 × V <sub>CC</sub>	-	-	0.65 × V <sub>CC</sub>	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	-	-	1.7	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7 × V <sub>CC</sub>	-	-	0.7 × V <sub>CC</sub>	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	0.35 × V <sub>CC</sub>	-	0.35 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	-	0.7	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.3 × V <sub>CC</sub>	-	0.3 × V <sub>CC</sub>	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>						
		I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	V <sub>CC</sub> - 0.1	-	-	V <sub>CC</sub> - 0.1	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V	1.2	1.54	-	0.95	-	V
		I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V	1.9	2.15	-	1.7	-	V
		I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V	2.2	2.50	-	1.9	-	V
		I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V	2.3	2.62	-	2.0	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>						
		I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	-	-	0.10	-	0.10	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	0.07	0.45	-	0.70	V
		I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V	-	0.12	0.30	-	0.45	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	0.17	0.40	-	0.60	V
		I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V	-	0.33	0.55	-	0.80	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V	-	±0.1	±1	-	±1	μA
		V <sub>I</sub> or V <sub>O</sub> = 5.5 V; V <sub>CC</sub> = 0 V	-	±0.1	±2	-	±2	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = 5.5 V or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 1.65 V to 5.5 V	-	0.1	4	-	4	μA
ΔI <sub>CC</sub>	additional supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 2.3 V to 5.5 V; per pin	-	5	500	-	500	μA
C <sub>I</sub>	input capacitance	V <sub>CC</sub> = 3.3 V; V <sub>I</sub> = GND to V <sub>CC</sub>	-	4	-	-	-	pF

[1] All typical values are measured at T<sub>amb</sub> = 25 °C.

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 5.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
t <sub>pd</sub>	propagation delay	A, B and C to Y; see Fig. 4 [2]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	4.7	17.2	1.5	21.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	3.0	6.2	1.0	7.8	ns
		V <sub>CC</sub> = 2.7 V	1.0	3.0	6.0	1.0	7.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	2.6	4.9	1.0	6.2	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.0	1.9	3.5	1.0	4.4	ns
C <sub>PD</sub>	power dissipation capacitance	V <sub>I</sub> = GND to V <sub>CC</sub> ; V <sub>CC</sub> = 3.3 V [3]	-	13	-	-	-	pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> 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<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

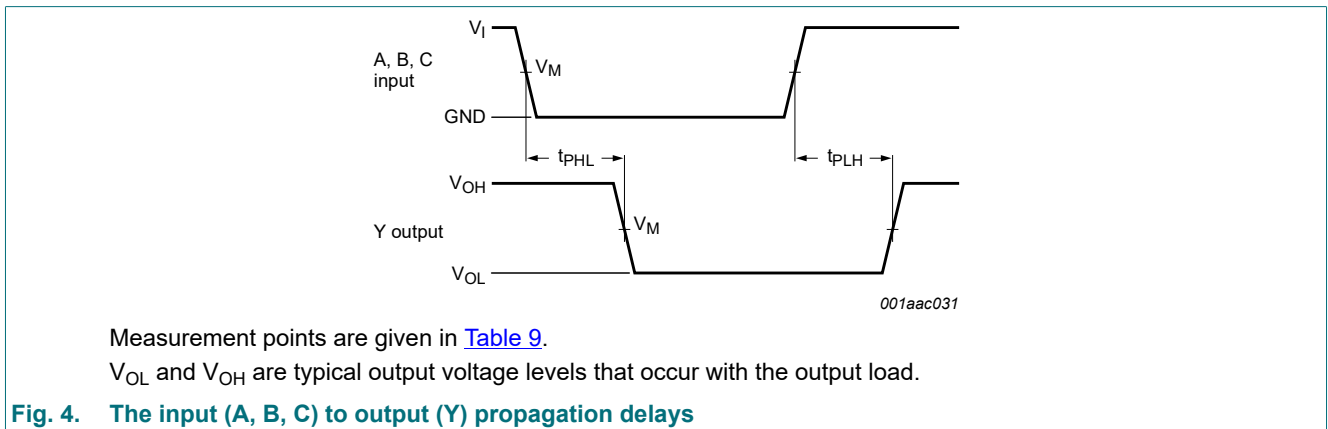
C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

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

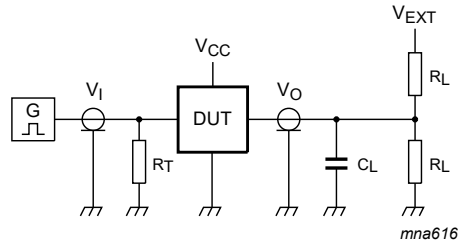
### 11.1. Waveform and test circuit



**Fig. 4. The input (A, B, C) to output (Y) propagation delays**

**Table 9. Measurement points**

Supply voltage	Input	Output
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>
1.65 V to 1.95 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>
2.3 V to 2.7 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>
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 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>



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  $Z_o$  of the pulse generator;

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

**Fig. 5. Test circuit for measuring switching times**

**Table 10. 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	$V_{CC}$	$\leq 2.0$ ns	30 pF	1 k $\Omega$	open
2.3 V to 2.7 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	500 $\Omega$	open
2.7 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open
3.0 V to 3.6 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open
4.5 V to 5.5 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open

## 12. Package outline

TSSOP6: plastic thin shrink small outline package; 6 leads; body width 1.25 mm

SOT363-2



Fig. 6. Package outline SOT363-2 (TSSOP6)



Plastic, surface-mounted package (SC-74; TSOP6); 6 leads

SOT457



Fig. 7. Package outline SOT457 (SC-74; TSOP6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886



Fig. 8. Package outline SOT886 (XSON6)

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

SOT1115



Fig. 9. 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



Fig. 10. Package outline SOT1202 (XSON6)

X2SON6: plastic thermal enhanced extremely thin small outline package; no leads; 6 terminals; body 1.0 x 0.8 x 0.32 mm

SOT1255-2

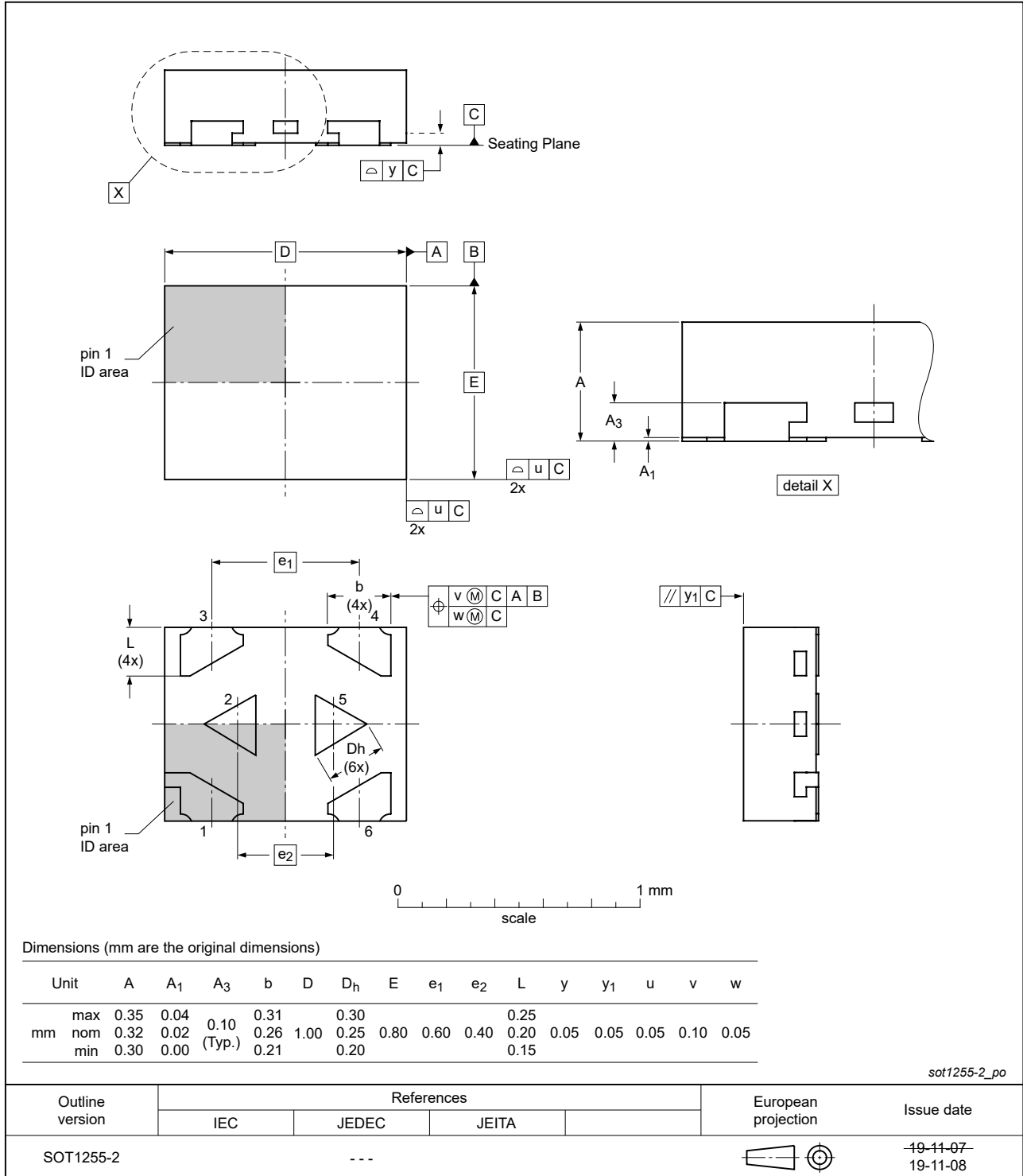


Fig. 11. Package outline SOT1255-2 (X2SON6)

## 13. 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

## 14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G11 v.13	20230509	Product data sheet	-	74LVC1G11 v.12
Modifications:	<ul style="list-style-type: none"> <li>Package SOT1255 (X2SON6) changed to SOT1255-2 (X2SON6).</li> </ul>			
74LVC1G11 v.12	20220204	Product data sheet	-	74LVC1G11 v.11
Modifications:	<ul style="list-style-type: none"> <li>SOT363 (SC-88) package changed to SOT363-2 (TSSOP6) package.</li> </ul>			
74LVC1G11 v.11	20210921	Product data sheet	-	74LVC1G11 v.10
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Section 2</a> updated.</li> <li>Type number 74LVC1G11GF (SOT891/XSON6) removed.</li> <li><a href="#">Table 5</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> <li><a href="#">Fig. 7</a>: Package outline drawing SOT457 (SC-74; TSOP6) updated.</li> </ul>			
74LVC1G11 v.10	20170719	Product data sheet	-	74LVC1G11 v.9
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
74LVC1G11 v.9	20161128	Product data sheet	-	74LVC1G11 v.8
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Table 7</a>: The maximum limits for leakage current and supply current have changed.</li> </ul>			
74LVC1G11 v.8	20150917	Product data sheet	-	74LVC1G11 v.7
Modifications:	<ul style="list-style-type: none"> <li>Added type number 74LVC1G11GX (SOT1255/X2SON6).</li> </ul>			
74LVC1G11 v.7	20120704	Product data sheet	-	74LVC1G11 v.6
Modifications:	<ul style="list-style-type: none"> <li>Package outline drawing of SOT886 (<a href="#">Fig. 8</a>) modified.</li> </ul>			
74LVC1G11 v.6	20111209	Product data sheet	-	74LVC1G11 v.5
Modifications:	<ul style="list-style-type: none"> <li>Legal pages updated.</li> </ul>			
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

### 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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