**Product data sheet** 

## 1 General description

The 74LVC1G332 provides one 3-input OR function.

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 applications.

Schmitt-trigger action at all inputs makes the circuit tolerant of 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.

### 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)
  - JESD8B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
  - HBM JESD22-A114F exceeds 2 000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101-C exceeds 1000 V
- ±24 mA output drive (V<sub>CC</sub> = 3.0 V)
- CMOS low power consumption
- · Latch-up performance exceeds 250 mA
- · Direct interface with TTL levels
- Inputs accept voltages up to 5 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				
74LVC1G332GW	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363				
74LVC1G332GV	-40 °C to +125 °C	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457				
74LVC1G332GM	-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				
74LVC1G332GF	-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				
74LVC1G332GN	-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				
74LVC1G332GS	-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				
74LVC1G332GX	-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				

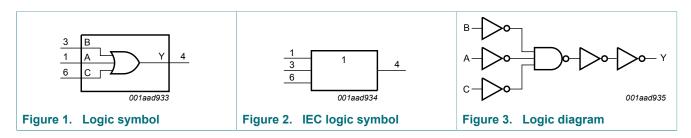
## 4 Marking

Table 2. Marking

Type number	Marking code <sup>[1]</sup>
74LVC1G332GW	YG
74LVC1G332GV	YG
74LVC1G332GM	YG
74LVC1G332GF	YG
74LVC1G332GN	YG
74LVC1G332GS	YG
74LVC1G332GX	YG

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

# 5 Functional diagram



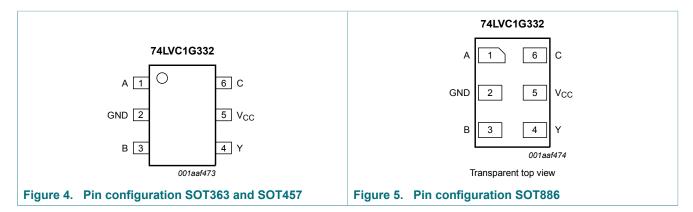
74LVC1G332

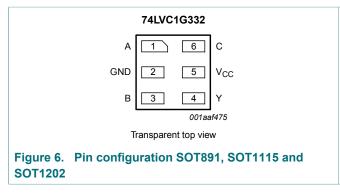
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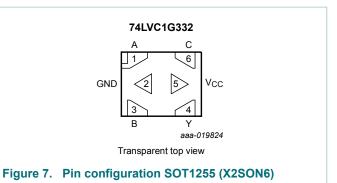
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## 6 Pinning information

## 6.1 Pinning







### 6.2 Pin description

#### Table 3. Pin description

Symbol	Pin	Description
Α	1	data input
GND	2	ground (0 V)
В	3	data input
Y	4	data output
V <sub>CC</sub>	5	supply voltage
С	6	data input

## **Functional description**

#### Table 4. Function table

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

Input	Output		
Α	В	С	Υ
Н	X	X	Н
X	Н	X	Н
X	X	Н	Н
L	L	L	L

# **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 <sub>CC</sub>	supply voltage			-0.5	+6.5	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V		-50	-	mA
VI	input voltage		[1]	-0.5	+6.5	V
lok	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V		-	±50	mA
Vo	output voltage	Active mode	[1] [2]	-0.5	V <sub>CC</sub> + 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 <sub>CC</sub>	supply current			-	100	mA
I <sub>GND</sub>	ground current			-100	-	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to +125 °C	[3]	-	250	mW
T <sub>stg</sub>	storage temperature			-65	+150	°C

<sup>[1]</sup> The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

# **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 <sub>O</sub>	output voltage	Active mode	0	-	V <sub>CC</sub>	V
		V <sub>CC</sub> = 0 V; Power-down mode	0	-	5.5	V
T <sub>amb</sub>	ambient temperature		-40	-	+125	°C

74LVC1G332

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When  $V_{CC}$  = 0 V (Power-down mode), the output voltage can be 5.5 V in normal operation. For SC-88 and SC-74A packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K. For X2SON6 and XSON6 packages: 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		V <sub>CC</sub> = 1.65 V to 2.7 V	-	-	20	ns/V
	rate	V <sub>CC</sub> = 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 <sup>[1]</sup>	Max	Min	Max	
V <sub>IH</sub>	HIGH-level	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65V <sub>CC</sub>	-	-	0.65V <sub>CC</sub>	-	V
ļi	input voltage	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	0.7V <sub>CC</sub>	-	-	0.7V <sub>CC</sub>	-	V
$V_{IL}$	LOW-level input	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	0.35V <sub>CC</sub>	-	0.35V <sub>CC</sub>	V
	voltage	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	-	-	0.3V <sub>CC</sub>	-	0.3V <sub>CC</sub>	V
V <sub>OH</sub>	HIGH-level	$V_I = V_{IH}$ or $V_{IL}$						
	output voltage	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	-	-	0.95	-	V
		$I_{O}$ = -8 mA; $V_{CC}$ = 2.3 V	1.9	-	-	1.7	-	V
		$I_{O}$ = -12 mA; $V_{CC}$ = 2.7 V	2.2	-	-	1.9	-	V
		$I_{O}$ = -24 mA; $V_{CC}$ = 3.0 V	2.3	-	-	2.0	-	V
		$I_{O}$ = -32 mA; $V_{CC}$ = 4.5 V	3.8	-	-	3.4	-	V
V <sub>OL</sub>	LOW-level	$V_I = V_{IH}$ or $V_{IL}$						
	output voltage	I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	-	-	0.1	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	-	0.45	-	0.70	V
		$I_{O}$ = 8 mA; $V_{CC}$ = 2.3 V	-	-	0.3	-	0.45	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	-	0.4	-	0.60	V
		I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V	-	-	0.55	-	0.80	V
		I <sub>O</sub> = 32 mA; V <sub>CC</sub> = 4.5 V	-	-	0.55	-	0.80	V
I <sub>I</sub>	input leakage current	V <sub>CC</sub> = 0 V to 5.5 V; V <sub>I</sub> = 5.5 V or GND	-	±0.1	±1	-	±1	μA
I <sub>OFF</sub>	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 5.5 \text{ V}$	-	±0.1	±2	-	±2	μA

Symbol	Parameter	-40 °C to +85 °C			-40 °C to	Unit		
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 1.65 V to 5.5 V; V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	-	0.1	4	-	4	μA
ΔI <sub>CC</sub>	additional supply current	per pin; $V_{CC}$ = 2.3 V to 5.5 V; V <sub>I</sub> = $V_{CC}$ - 0.6 V; I <sub>O</sub> = 0 A	-	5	500	-	500	μA
C <sub>I</sub>	input capacitance	$V_{CC}$ = 3.3 V; $V_{I}$ = GND to $V_{CC}$	-	3	-	-	-	pF

<sup>[1]</sup> 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 9.

Symbol	Parameter	Conditions -40 °C to +85 °C		-40 °C to	Unit			
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
t <sub>pd</sub>	propagation delay	A, B and C to Y; see Figure 8 [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	4.8	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	$V_1 = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [3]	-	12	-	-	-	pF

<sup>[1]</sup> 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.

<sup>[2]</sup> 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;

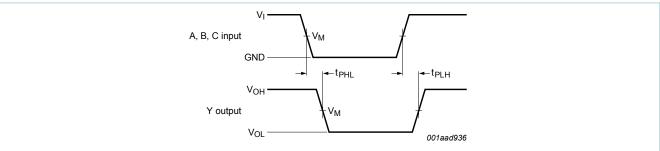
C<sub>L</sub> = output load capacitance in pF;

 $V_{CC}$  = supply voltage in V;

N = number of inputs switching;

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

### 11.1 Waveforms and test circuit



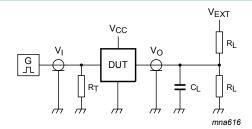
Measurement points are given in Table 9.

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

Figure 8. The input A, B and 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	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>
2.3 V to 2.7 V	0.5V <sub>CC</sub>	0.5V <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	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>



Test data is given in Table 10.

Definitions for test circuit:

R<sub>L</sub> = 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.

Figure 9. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load	Load		
V <sub>CC</sub>	V <sub>I</sub>	$t_r = t_f$	CL	$R_L$	t <sub>PLH</sub> , t <sub>PHL</sub>	
1.65 V to 1.95 V	V <sub>CC</sub>	≤ 2.0 ns	30 pF	1 kΩ	open	
2.3 V to 2.7 V	V <sub>CC</sub>	≤ 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 <sub>CC</sub>	≤ 2.5 ns	50 pF	500 Ω	open	

# 12 Package outline

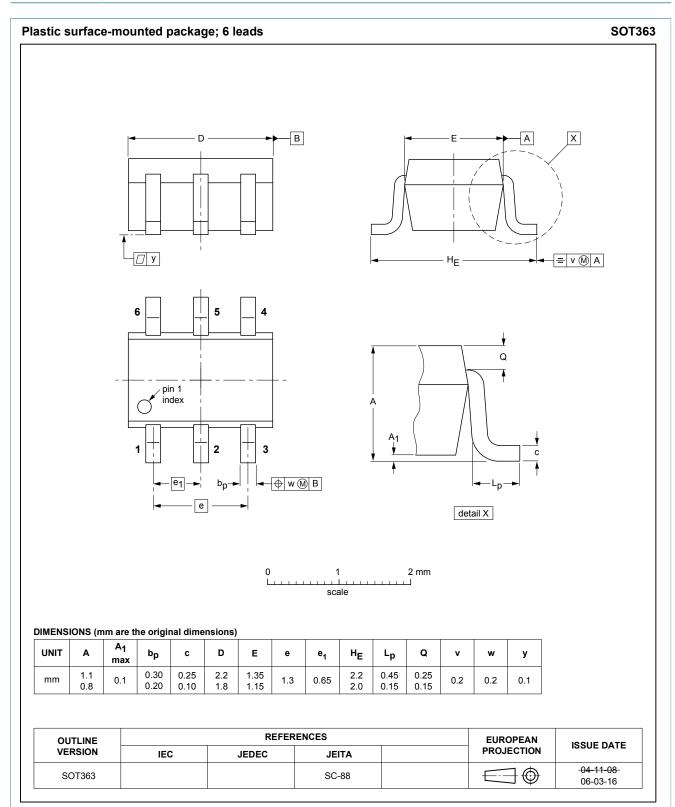


Figure 10. Package outline SOT363 (SC-88)

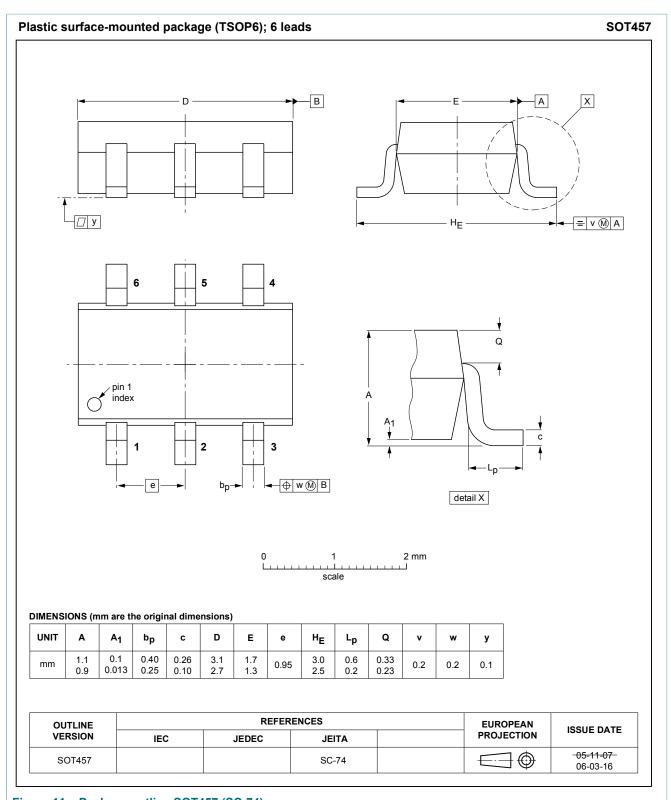
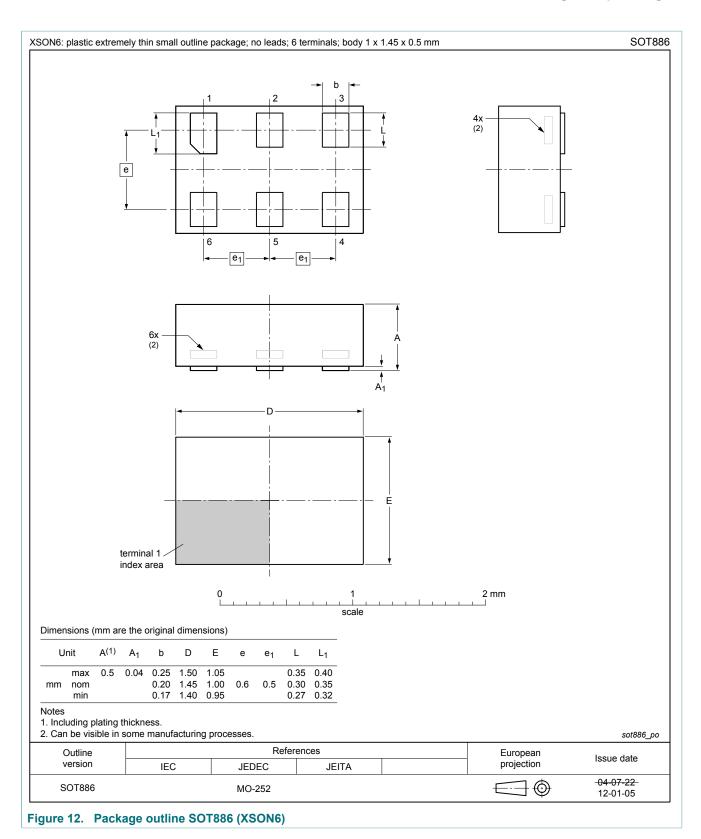


Figure 11. Package outline SOT457 (SC-74)



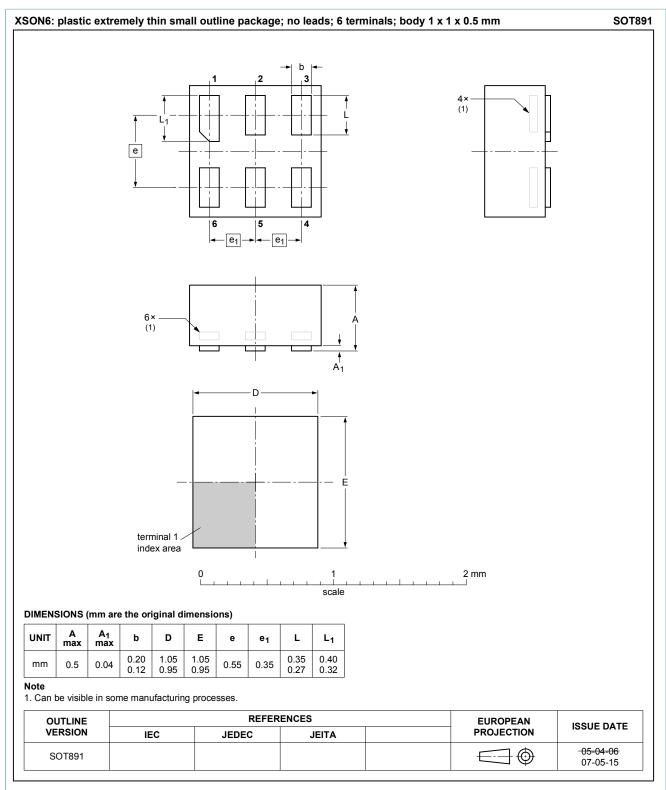
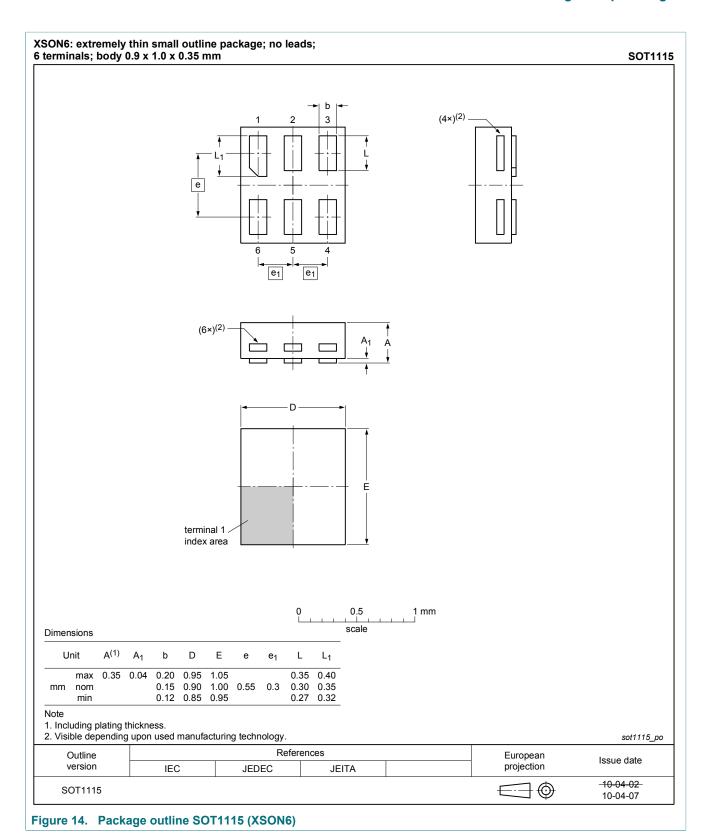
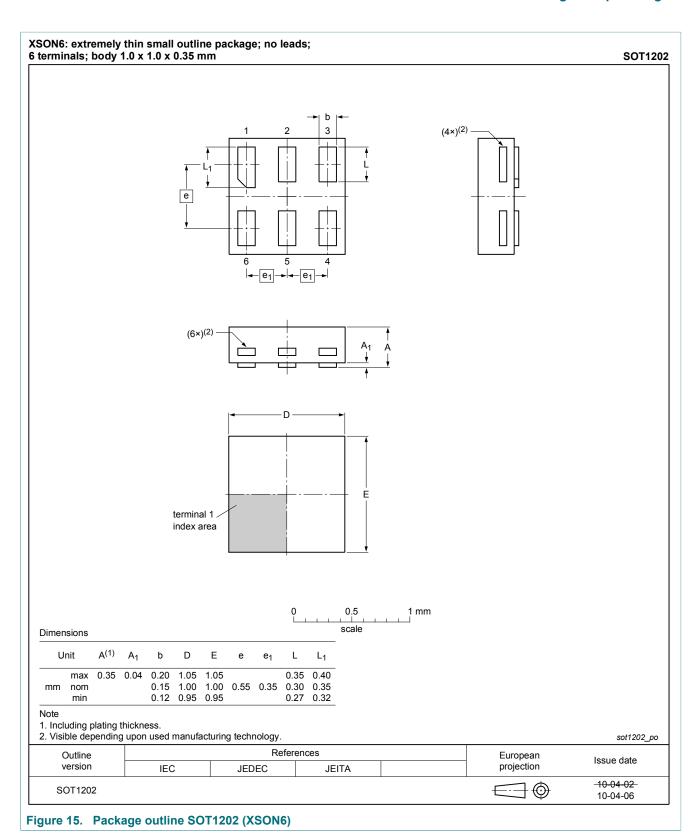


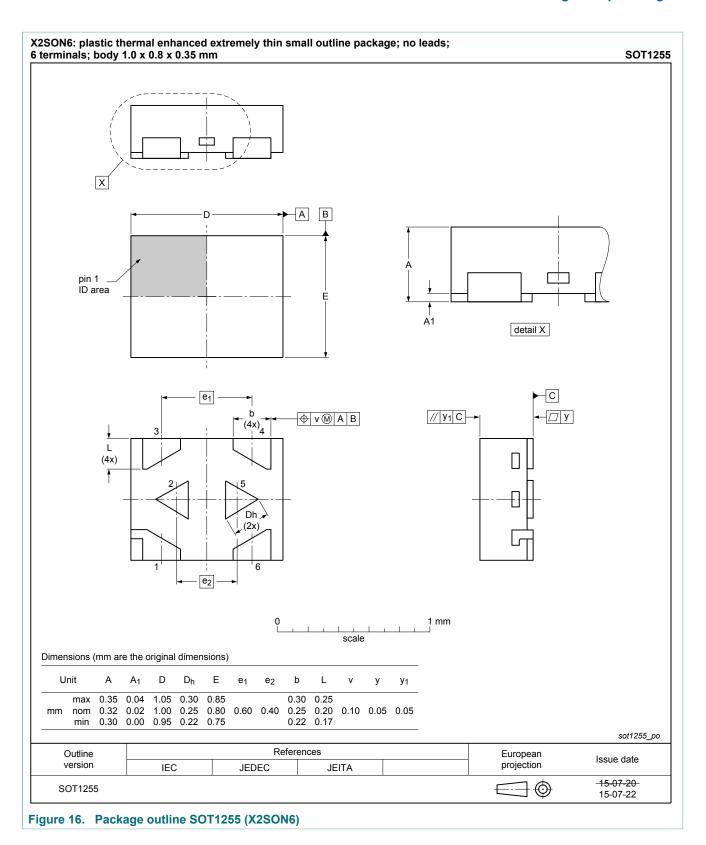
Figure 13. Package outline SOT891 (XSON6)



74LVC1G332



74LVC1G332



74LVC1G332

## 13 Abbreviations

#### **Table 11. Abbreviations**

Acronym	Description
CDM	Charged Device Model
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	
74LVC1G332 v.8	20171204	Product data sheet	-	74LVC1G332 v.7	
Modifications:	<ul> <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>				
74LVC1G332 v.7	20161205	Product data sheet	-	74LVC1G332 v.6	
Modifications:	• <u>Table 7</u> : The maximum limits for leakage current and supply current have changed.				
74LVC1G332 v.6	20150917	Product data sheet	-	74LVC1G332 v.5	
Modifications:	Added type number 74LVC1G332GX (SOT1255/X2SON6).				
74LVC1G332 v.5	20140910	Product data sheet	-	74LVC1G332 v.4	
Modifications:	Package outline drawing of SOT886 ( <u>Figure 12</u> ) modified.				
74LVC1G332 v.4	20111206	Product data sheet	-	74LVC1G332 v.3	
74LVC1G332 v.3	20101026	Product data sheet	-	74LVC1G332 v.2	
74LVC1G332 v.2	20070719	Product data sheet	-	74LVC1G332 v.1	
74LVC1G332 v.1	20061011	Product data sheet	-	-	

### 15 Legal information

#### 15.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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