74LVC1G07

Buffer with open-drain output

Rev. 16 — 3 February 2022

Product data sheet

1. General description

The 74LVC1G07 is a single buffer with open-drain output. 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

- Wide supply voltage range from 1.65 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- · High noise immunity
- · CMOS low power consumption
- I_{OFF} circuitry provides partial Power-down mode operation
- -24 mA output drive (V_{CC} = 3.0 V)
- Latch-up performance exceeds 250 mA
- · Direct interface with TTL levels
- · 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: ANSI/ESDA/JEDEC JS-001 Class 2 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



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3. Ordering information

Table 1. Ordering information

Type number	Package							
	Temperature range	Name	Description	Version				
74LVC1G07GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1				
74LVC1G07GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753				
74LVC1G07GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886				
74LVC1G07GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115				
74LVC1G07GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202				
74LVC1G07GX	-40 °C to +125 °C	X2SON5	plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.32 mm	SOT1226-3				
74LVC1G07GX4	-40 °C to +125 °C	X2SON4	plastic thermal enhanced extremely thin small outline package; no leads; 4 terminals; body 0.6 × 0.6 × 0.32 mm	SOT1269-2				

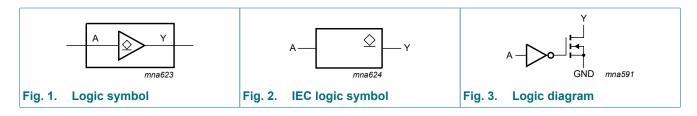
4. Marking

Table 2. Marking

Type number	Marking code[1]
74LVC1G07GW	VS
74LVC1G07GV	V07
74LVC1G07GM	VS
74LVC1G07GN	VS
74LVC1G07GS	VS
74LVC1G07GX	VS
74LVC1G07GX4	VS

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

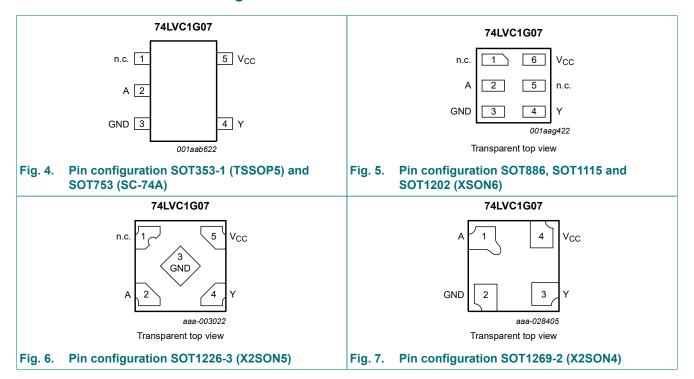
5. Functional diagram



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6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Pin				
	TSSOP5, SC-74A and X2SON5	XSON6	X2SON4			
n.c.	1	1, 5	-	not connected		
A	2	2	1	data input		
GND	3	3	2	ground (0 V)		
Υ	4	4	3	data output		
V _{CC}	5	6	4	supply voltage		

7. Functional description

Table 4. Function table

 $H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level; \ Z = high-impedance \ OFF-state.$

Input A	Output Y
L	L
Н	Z

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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 < 0 V		-50	-	mA
Vo	output voltage	Active mode	[1]	-0.5	+6.5	V
		Power-down mode; V _{CC} = 0 V	[1]	-0.5	+6.5	V
Io	output current	V _O = 0 V to 6.5 V		-	50	mA
I _{CC}	supply current			-	100	mA
I _{GND}	ground current			-100	-	mA
T _{stg}	storage temperature			-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C				
		TSSOP5, SC-74A, XSON6 and X2SON5 package	[2]	-	250	mW
		X2SON4 package	[3]	-	150	mW

The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.

For SOT753 (SC-74A) package: Ptot derates linearly with 3.8 mW/K above 85 °C.

For SOT886 (XSON6) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package: Ptot derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

For SOT1226-3 (X2SON5) package: Ptot derates linearly with 3.0 mW/K above 67 °C.

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	-	5.5	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

For SOT353-1 (TSSOP5) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

For SOT1269-2 (X2SON4) package: Ptot derates linearly with 1.7 mW/K above 57 °C.

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10. Static characteristics

Table 7. Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol Para	Parameter	Conditions		-40	°C to +8	5 °C	-40 °C to	Unit	
				Min	Typ[1]	Max	Min	Max	
V _{IH}	HIGH-level input	V _{CC} = 1.65 V to 1.95 V		0.65V _{CC}	-	-	0.65V _{CC}	-	V
	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 input	V _{CC} = 1.65 V to 1.95 V		-	-	0.35V _{CC}	-	0.35V _{CC}	V
	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 _{OL}	LOW-level output	$V_I = V_{IH}$ or V_{IL}							
	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		-	-	0.45	-	0.70	V
		I _O = 8 mA; V _{CC} = 2.3 V		-	-	0.30	-	0.45	V
		I _O = 12 mA; V _{CC} = 2.7 V		-	-	0.40	-	0.60	V
		I _O = 24 mA; V _{CC} = 3.0 V		-	-	0.55	-	0.80	V
		I _O = 32 mA; V _{CC} = 4.5 V		-	-	0.55	-	0.80	V
l _l	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	[2]	-	±0.1	±1	-	±1	μΑ
I _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5$ V		-	±0.1	±2	-	±2	μΑ
l _{OFF}	power-off leakage current	$V_1 \text{ or } V_0 = 5.5 \text{ V}; V_{CC} = 0 \text{ V}$		-	±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	μΑ
ΔI _{CC}	additional supply current	per pin; $V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$; $V_{CC} = 2.3 \text{ V}$ to 5.5 V	[2]	-	5	500	-	500	μΑ
Cı	input capacitance	V_{CC} = 3.3 V; V_I = GND to V_{CC}		-	5.0	-	-	-	pF

^[1] All typical values are measured at T_{amb} = 25 °C. [2] These typical values are measured at V_{CC} = 3.3 V.

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11. Dynamic characteristics

Table 8. Dynamic characteristics

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

Symbol	Parameter	Conditions		-40 °C to +85 °C		5 °C	-40 °C to	Unit	
				Min	Typ[1]	Max	Min	Max	
t _{pd}	propagation delay	A to Y; see Fig. 8	2]						
		V _{CC} = 1.65 V to 1.95 V		1.0	2.6	6.7	1.0	8.4	ns
		V _{CC} = 2.3 V to 2.7 V		0.5	1.7	5.5	0.5	7.0	ns
		V _{CC} = 2.7 V		0.5	2.3	4.7	0.5	6.0	ns
		V _{CC} = 3.0 V to 3.6 V		0.5	2.2	4.2	0.5	5.5	ns
		V _{CC} = 4.5 V to 5.5 V		0.5	1.6	3.5	0.5	4.5	ns
C _{PD}	power dissipation capacitance	$V_I = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [3]	3]	-	7.0	-	-	-	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.
- t_{pd} is the same as t_{PLZ} and t_{PZL} . C_{PD} is used to determine the dynamic power dissipation (P_D 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_i = input frequency in MHz;

 f_o = output frequency in MHz;

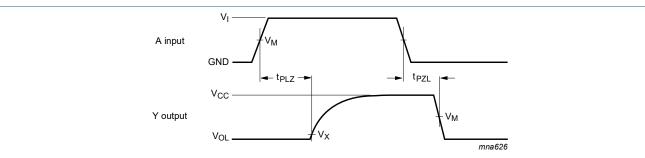
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

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

11.1. Waveforms and test circuit



Measurement points are given in Table 9.

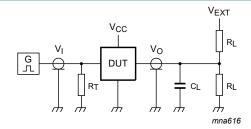
V_{OL} is the typical output voltage level that occurs with the output load.

The input (A) to output (Y) propagation delays

Table 9. Measurement points

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

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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. 9. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load		V _{EXT}
V _{CC}	Vı	t _r , t _f	CL	R _L	t _{PZL} , t _{PLZ}
1.65 V to 1.95 V	V _{CC}	≤ 2.0 ns	30 pF	1 kΩ	2V _{CC}
2.3 V to 2.7 V	V _{CC}	≤ 2.0 ns	30 pF	500 Ω	2V _{CC}
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	6 V
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	6 V
4.5 V to 5.5 V	V _{CC}	≤ 2.5 ns	50 pF	500 Ω	2V _{CC}

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12. Package outline

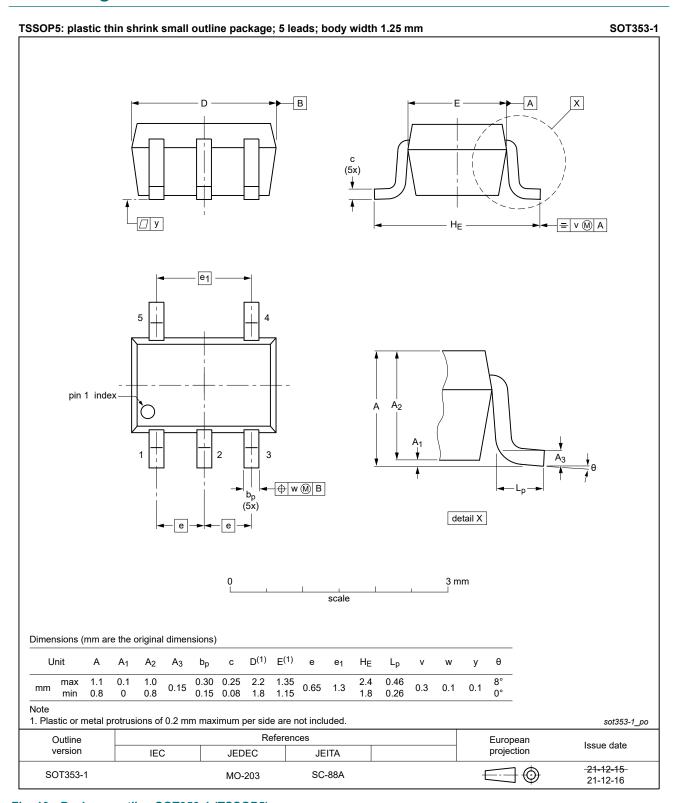


Fig. 10. Package outline SOT353-1 (TSSOP5)

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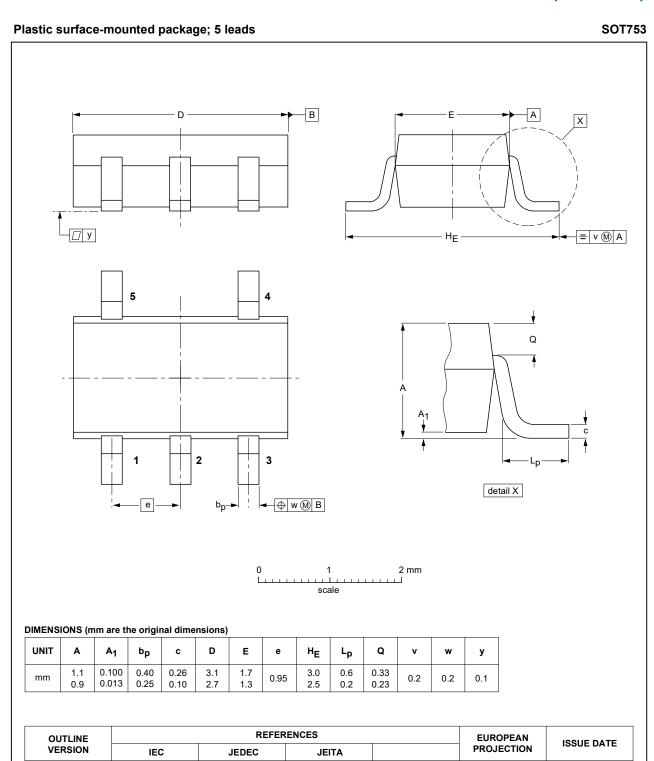


Fig. 11. Package outline SOT753 (SC-74A)

SOT753

SC-74A

02-04-16

06-03-16

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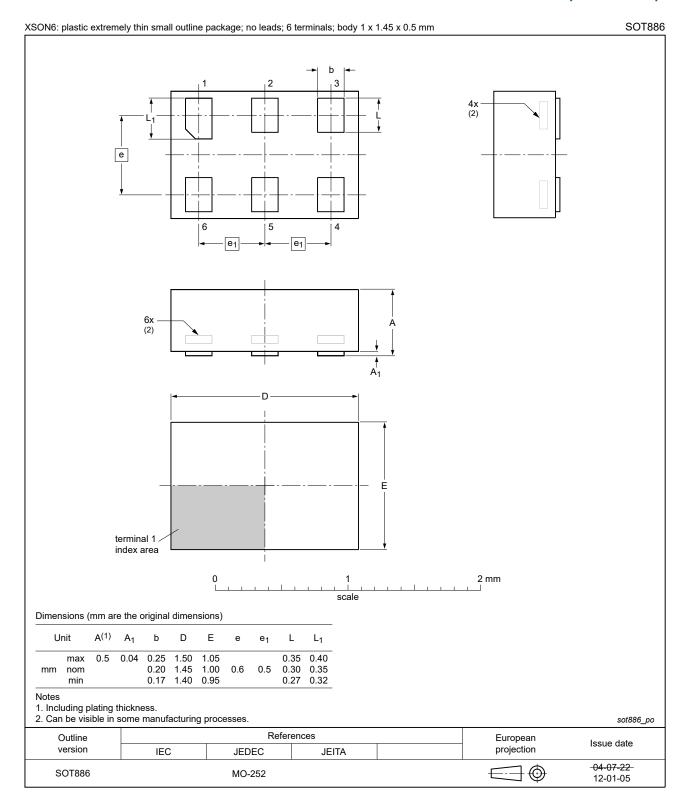


Fig. 12. Package outline SOT886 (XSON6)

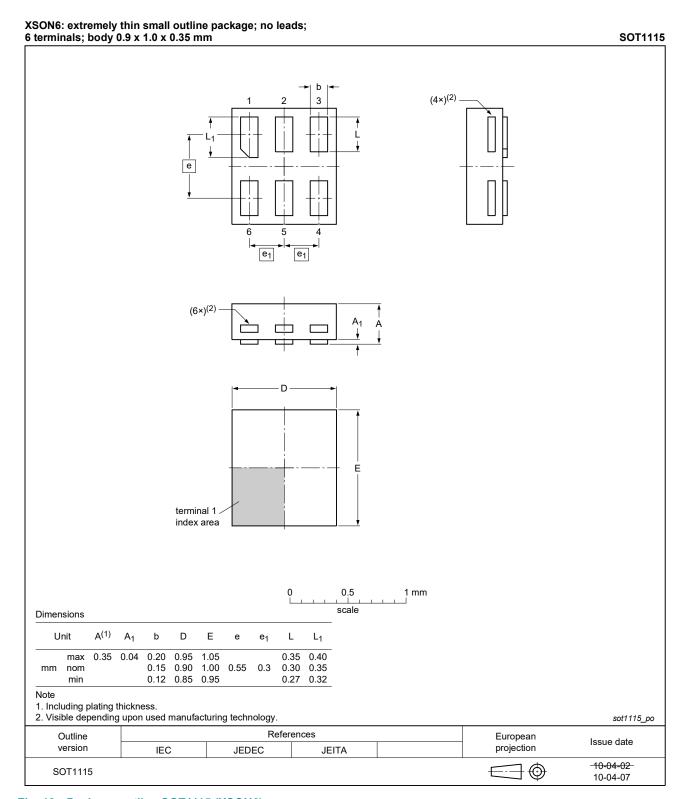


Fig. 13. Package outline SOT1115 (XSON6)

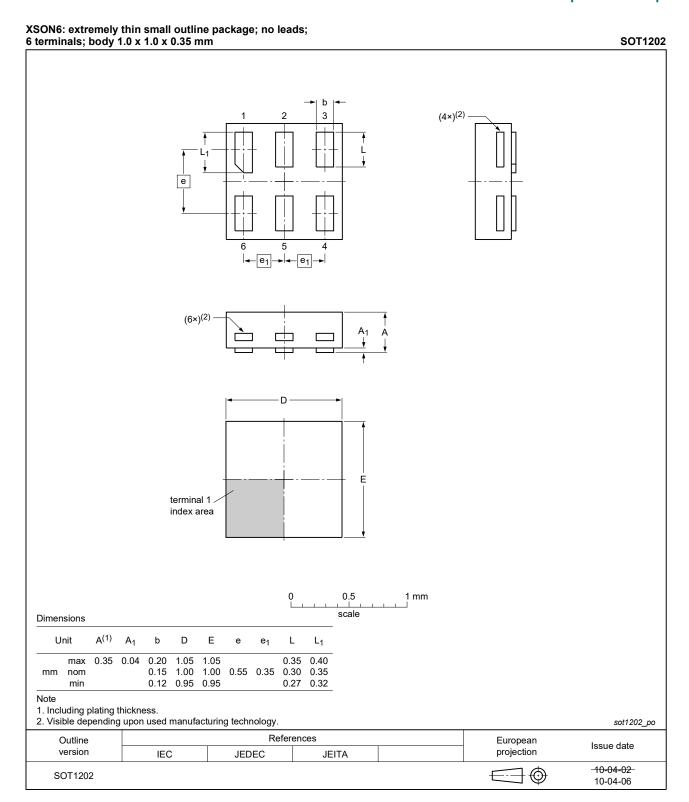


Fig. 14. Package outline SOT1202 (XSON6)

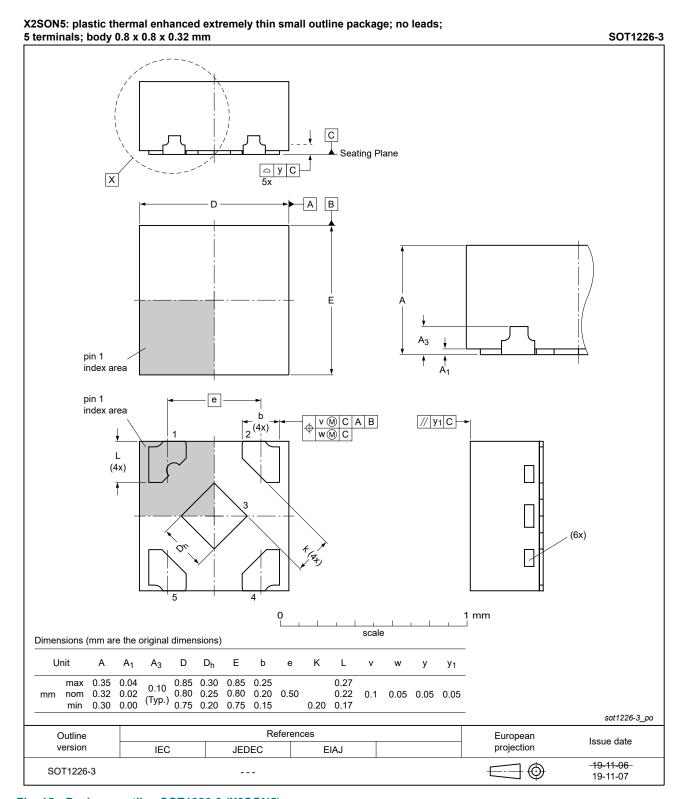


Fig. 15. Package outline SOT1226-3 (X2SON5)

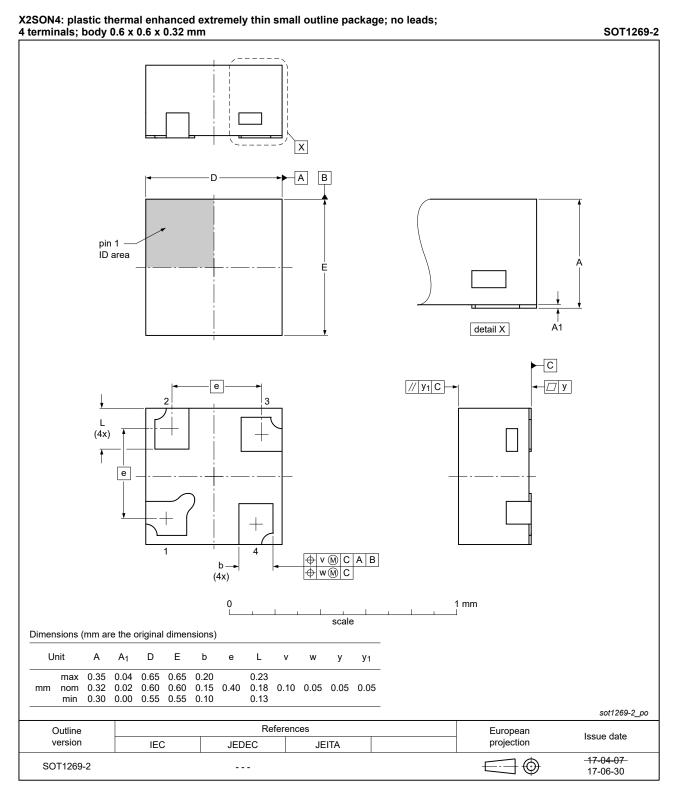


Fig. 16. Package outline SOT1269-2 (X2SON4)

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13. Abbreviations

Table 11. Abbreviations

Acronym	Description			
CMOS	omplementary Metal Oxide Semiconductor			
DUT	vice 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					
74LVC1G07 v.16	20220203	Product data sheet	-	74LVC1G07 v.15					
Modifications:	• <u>Fig. 10</u> : Pa	ckage outline drawing for S	OT353-1 (TSSOF	P5) has changed.					
74LVC1G07 v.15	20210803	Product data sheet	-	74LVC1G07 v.14					
Modifications:	SOT1226 (Section 1 a	 Type number 74LVC1G07GF (SOT891/XSON6) removed. SOT1226 (X2SON5) package changed to SOT1226-3 (X2SON5) package. Section 1 and Section 2 updated. Table 5: Derating values for P_{tot} total power dissipation updated. 							
74LVC1G07 v.14	20180608	Product data sheet	-	74LVC1G07 v.13					
Modifications:	Added type	number 74LVC1G07GX4	(SOT1269-2)						
74LVC1G07 v.13	20170511	Product data sheet	-	74LVC1G07 v.12					
Modifications:	guidelines o	of this data sheet has been of Nexperia. have been adapted to the	· ·						
74LVC1G07 v.12	20161128	Product data sheet	-	74LVC1G07 v.11					
Modifications:	• <u>Table 7</u> : Th	e maximum limits for leaka	ge current and su	pply current have changed.					
74LVC1G07 v.11	20120629	Product data sheet	-	74LVC1G07 v.10					
Modifications:		number 74LVC1G07GX (utline drawing of SOT886 (,						
74LVC1G07 v.10	20111207	Product data sheet	-	74LVC1G07 v.9					
Modifications:	Legal page	s updated.							
74LVC1G07 v.9	20100824	Product data sheet	-	74LVC1G07 v.8					
74LVC1G07 v.8	20070717	Product data sheet	-	74LVC1G07 v.7					
74LVC1G07 v.7	20070515	Product data sheet	-	74LVC1G07 v.6					
74LVC1G07 v.6	20040907	Product specification	-	74LVC1G07 v.5					
74LVC1G07 v.5	20030307	Product specification	-	74LVC1G07 v.4					
74LVC1G07 v.4	20021002	Product specification	-	74LVC1G07 v.3					
74LVC1G07 v.3	20020528	Product specification	-	74LVC1G07 v.2					
74LVC1G07 v.2	20010406	Product specification	-	74LVC1G07 v.1					
74LVC1G07 v.1	20001122	Product specification	-	-					

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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.
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Product [short] data sheet	Production	This document contains the product specification.

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