1. General description

The 74LVC1G08 provides one 2-input AND 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)
 - JESD8-B/JESD36 (2.7 V to 3.6 V)
- ± 24 mA output drive (V_{CC} = 3.0 V)
- CMOS low power consumption
- Latch-up performance ≤ 250 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 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

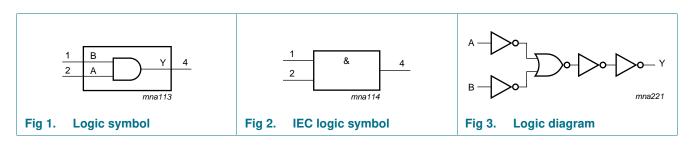
Type number	Package							
	Temperature range	Name	Description	Version				
74LVC1G08GW	–40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1				
74LVC1G08GV	–40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753				
74LVC1G08GM	–40 °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				
74LVC1G08GF	–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				
74LVC1G08GN	–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				
74LVC1G08GS	–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				
74LVC1G08GX	–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]
74LVC1G08GW	VE
74LVC1G08GV	V08
74LVC1G08GM	VE
74LVC1G08GF	VE
74LVC1G08GN	VE
74LVC1G08GS	VE
74LVC1G08GX	VE

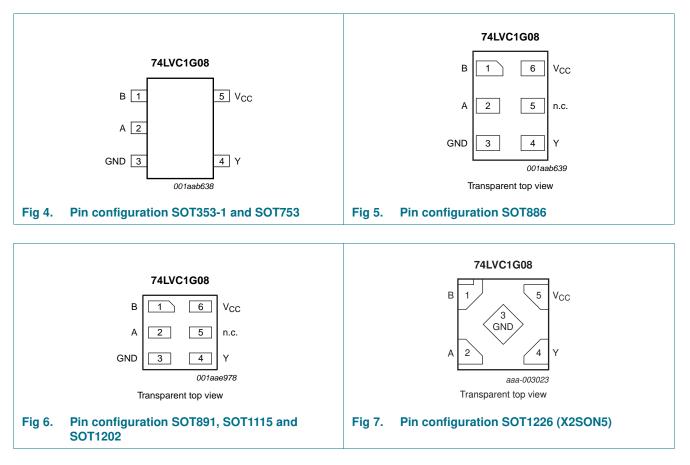
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description							
Symbol	Pin		Description				
	TSSOP5 and X2SON5	XSON6					
В	1	1	data input				
А	2	2	data input				
GND	3	3	ground (0 V)				
Y	4	4	data output				
n.c.	-	5	not connected				
V _{CC}	5	6	supply voltage				

7. Functional description

Table 4. Function table ^[1]	
--	--

Input		Output
Α	В	Y
L	L	L
L	Н	L
Н	L	L
Н	Н	Н

[1] H = HIGH voltage level; L = LOW voltage level

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
Ι _{ΟΚ}	output clamping current	$V_{\rm O}$ > $V_{\rm CC}$ or $V_{\rm O}$ < 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
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	$T_{amb} = -40 \text{ °C to } +125 \text{ °C}$	<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 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
		$V_{CC} = 0 V$; 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	–40 °C to +85 °C			–40 °C to +125 °C		Unit
			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	$V_{CC} = 2.3 \text{ V} \text{ to } 2.7 \text{ V}$	1.7	-	-	1.7	-	V
		$V_{CC} = 2.7 \text{ V} \text{ to } 3.6 \text{ V}$	2.0	-	-	2.0	-	V
		$V_{CC} = 4.5 \text{ V}$ to 5.5 V	$0.7V_{CC}$	-	-	$0.7V_{CC}$	-	V
V _{IL}	LOW-level	$V_{CC} = 1.65 \text{ V}$ to 1.95 V	-	-	$0.35V_{CC}$	-	$0.35V_{CC}$	V
	input voltage	$V_{CC} = 2.3 \text{ V} \text{ to } 2.7 \text{ V}$	-	-	0.7	-	0.7	V
		$V_{CC} = 2.7 \text{ V} \text{ to } 3.6 \text{ V}$	-	-	0.8	-	0.8	V
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	-	-	$0.3V_{CC}$	-	$0.3V_{CC}$	V
V _{OH}	HIGH-level	$V_{I} = V_{IH} \text{ or } V_{IL}$						
	output voltage	$I_{O} = -100 \ \mu A;$ $V_{CC} = 1.65 \ V \text{ to } 5.5 \ V$	$V_{CC}-0.1$	-	-	$V_{CC}-0.1$	-	V
		$I_{O} = -4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.2	-	-	0.95	-	V
		$I_{O} = -8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.9	-	-	1.7	-	V
		$I_{O} = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	2.2	-	-	1.9	-	V
		$I_{O} = -24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.3	-	-	2.0	-	V
		$I_{O} = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.8	-	-	3.4	-	V
V _{OL}	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$						
		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
		$I_{O} = 8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.30	-	0.45	V
		$I_{O} = 12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	-	-	0.40	-	0.60	V
		$I_{O} = 24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.55	-	0.80	V
		$I_{O} = 32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.55	-	0.80	V
l _l	input leakage current	$V_I = 5.5 V \text{ or GND};$ $V_{CC} = 0 V \text{ to } 5.5 V$	-	±0.1	±5	-	±100	μA

Symbol	Parameter	Conditions	-40	–40 °C to +85 °C			–40 °C to +125 °C	
			Min	Typ[1]	Max	Min	Max	
I _{OFF}	power-off leakage current	$V_{CC} = 0$ V; V ₁ or V ₀ = 5.5 V	-	±0.1	±10	-	±200	μA
I _{CC}	supply current		-	0.1	10	-	200	μA
ΔI_{CC}	additional supply current	per pin; V _{CC} = 2.3 V to 5.5 V; V _I = V _{CC} - 0.6 V; I _O = 0 A	-	5	500	-	5000	μA
CI	input capacitance	V_{CC} = 3.3 V; V_{I} = GND to V_{CC}	-	5	-	-	-	pF

Table 7. Static characteristics ...continued

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

[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 load circuit see Figure 9.

Symbol	Parameter	Conditions		–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ <mark>[1]</mark>	Max	Min	Max	
t _{pd}	propagation delay	A, B to Y; see Figure 8	Ĺ					
	$V_{CC} = 1.65 \text{ V}$ to 1.95 V	1.0	3.4	8.0	1.0	10.5	ns	
		V_{CC} = 2.3 V to 2.7 V	0.5	2.2	5.5	0.5	7.0	ns
		$V_{CC} = 2.7 V$	0.5	2.5	5.5	0.5	7.0	ns
		$V_{CC} = 3.0$ V to 3.6 V	0.5	2.1	4.5	0.5	6.0	ns
		V_{CC} = 4.5 V to 5.5 V	0.5	1.7	4.0	0.5	5.5	ns
C _{PD}	power dissipation capacitance	$V_I = GND$ to V_{CC} ; $V_{CC} = 3.3$ V [3]	-	16	-	-	-	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_{PLZ} and t_{PZL} .

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μ W).

 $P_{D} = C_{PD} \times V_{CC}^{2} \times f_{i} \times N + \sum (C_{L} \times V_{CC}^{2} \times f_{o}) \text{ where:}$

 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;

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

12. AC waveforms

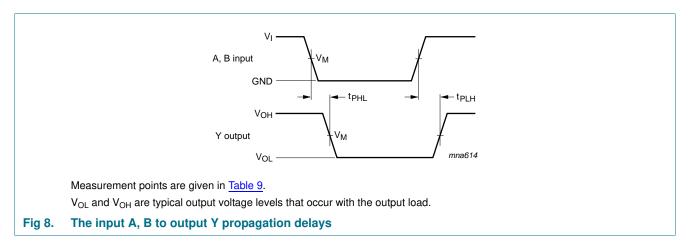


Table 9.Measurement points

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}

Single 2-input AND gate

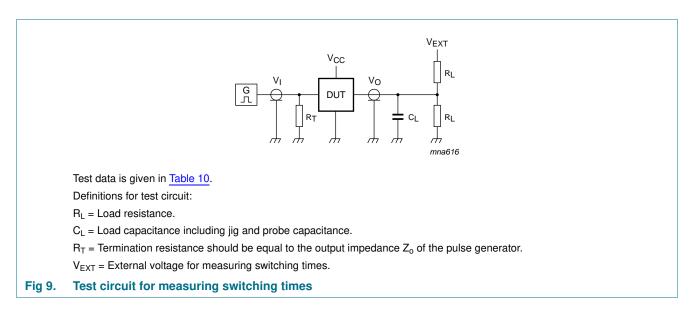


Table 10. Test data

Supply voltage	Input		Load		V _{EXT}
V _{cc}	VI	$t_r = t_f$	CL	RL	t _{PLH} , t _{PHL}
1.65 V to 1.95 V	V _{CC}	\leq 2.0 ns	30 pF	1 kΩ	open
2.3 V to 2.7 V	V _{CC}	\leq 2.0 ns	30 pF	500 Ω	open
2.7 V	2.7 V	\leq 2.5 ns	50 pF	500 Ω	open
3.0 V to 3.6 V	2.7 V	\leq 2.5 ns	50 pF	500 Ω	open
4.5 V to 5.5 V	V _{CC}	\leq 2.5 ns	50 pF	500 Ω	open

Single 2-input AND gate

13. Package outline

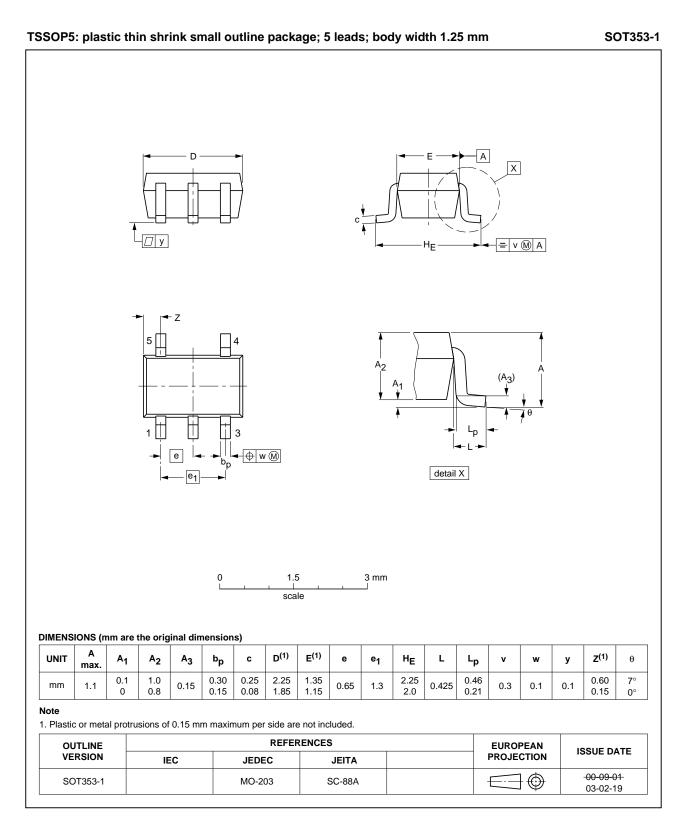
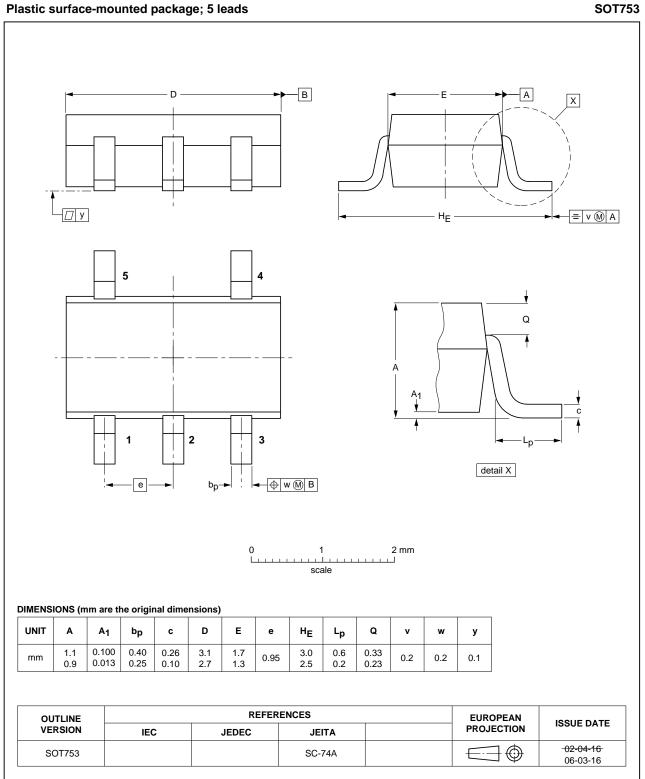


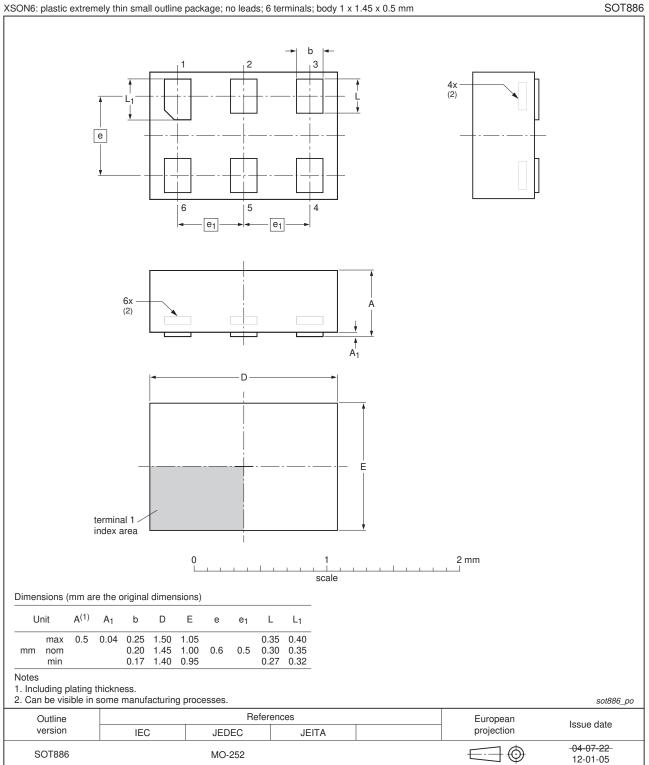
Fig 10. Package outline SOT353-1 (TSSOP5)

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Plastic surface-mounted package; 5 leads

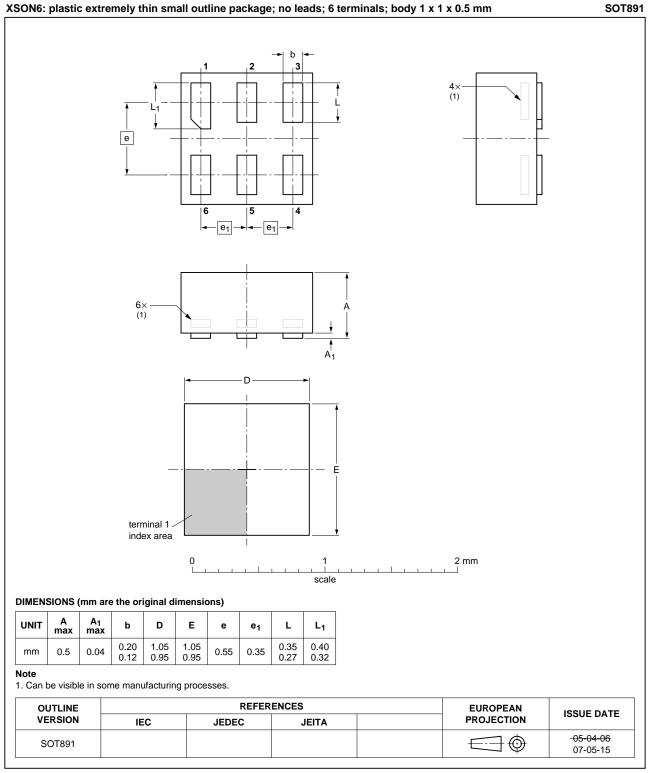
Fig 11. Package outline SOT753 (SC-74A)



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

Fig 12. Package outline SOT886 (XSON6)

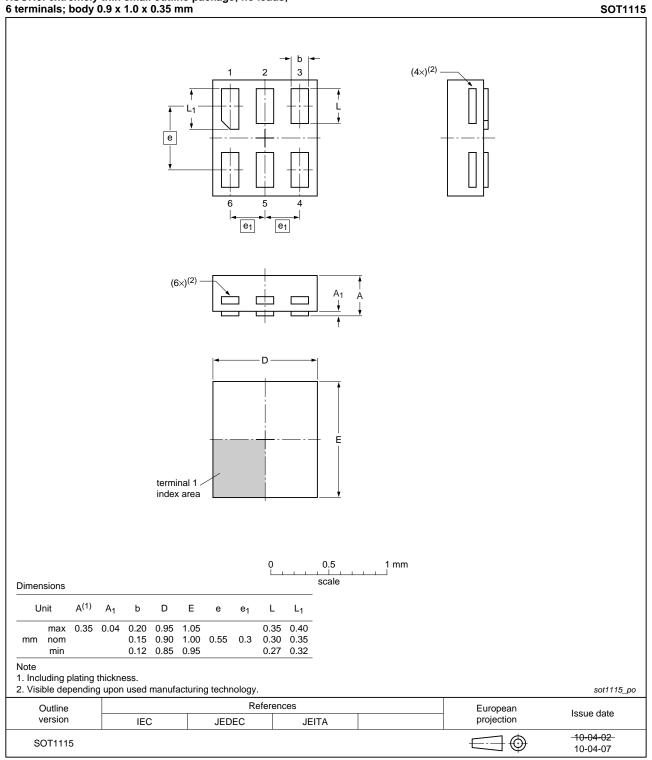
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XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm

Fig 13. Package outline SOT891 (XSON6)

74LVC1G08 **Product data sheet**

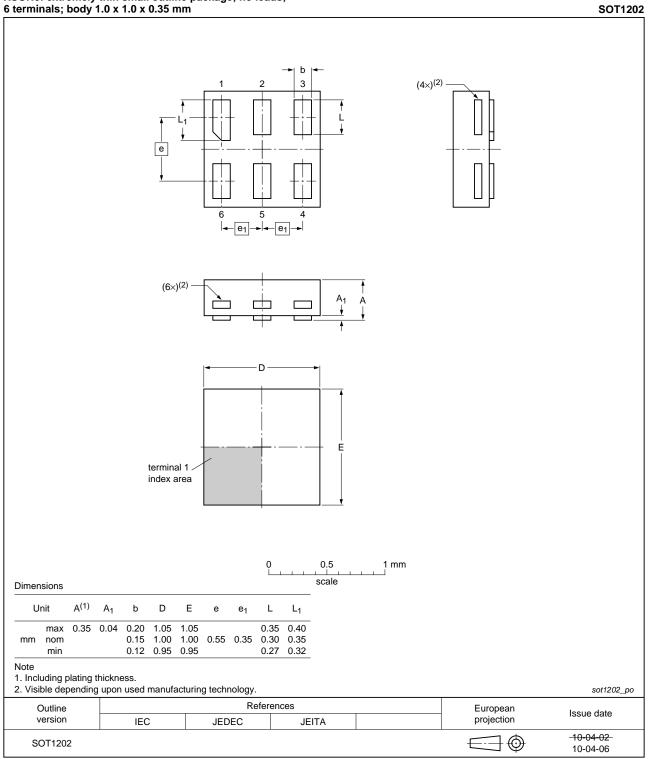


XSON6: extremely thin small outline package; no leads; 6 terminals; body 0.9 x 1.0 x 0.35 mm

Fig 14. Package outline SOT1115 (XSON6)

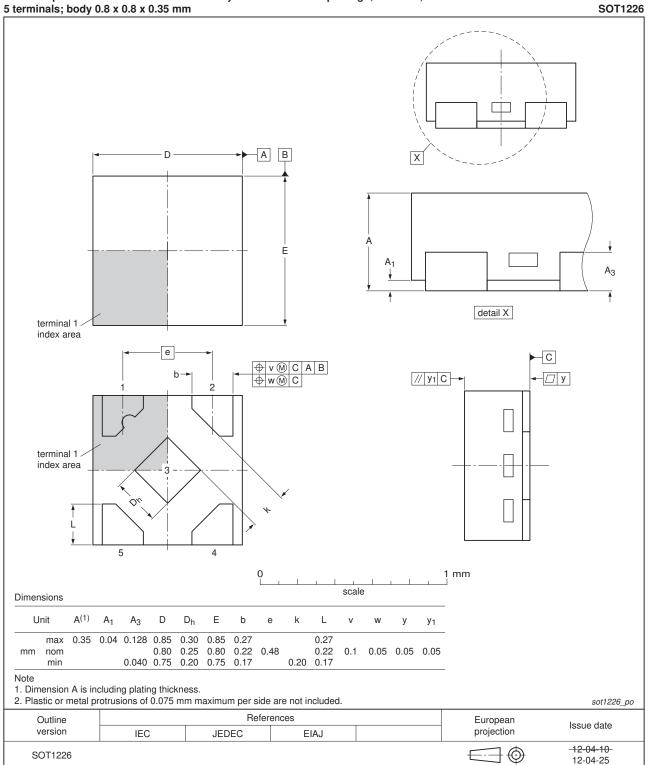
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All



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

Fig 15. Package outline SOT1202 (XSON6)



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

Fig 16. Package outline SOT1226 (X2SON5)

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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 history** Document ID **Release date** Data sheet status Change notice Supersedes 74LVC1G08 v.10 20120629 Product data sheet 74LVC1G08 v.9 Modifications: Added type number 74LVC1G08GX (SOT1226) • Package outline drawing of SOT886 (Figure 12) modified. 74LVC1G08 v.9 20111209 Product data sheet -74LVC1G08 v.8 Modifications: · Legal pages updated. 74LVC1G08 v.8 74LVC1G08 v.7 20101019 Product data sheet _ 74LVC1G08 v.7 Product data sheet 74LVC1G08 v.6 20070717 -74LVC1G08 v.6 20060619 Product data sheet -74LVC1G08 v.5 74LVC1G08 v.5 Product specification 74LVC1G08 v.4 20040915 _ 74LVC1G08 v.4 20021002 Product specification -74LVC1G08 v.3 74LVC1G08 v.3 20020517 Product specification 74LVC1G08 v.2 -74LVC1G08 v.2 20010406 Product specification 74LVC1G08 v.1 _ 74LVC1G08 v.1 20001121 Product specification --

16. Legal information

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Document status[1][2]	Product status ^[3]	Definition
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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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[2] The term 'short data sheet' is explained in section "Definitions".

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Single 2-input AND gate

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