Triple buffer with open-drain output Rev. 11 — 9 April 2013

Product data sheet

General description 1.

The 74LVC3G07 provides three non-inverting buffers.

The output of the device is an open-drain and can be connected to other open-drain outputs to implement active-LOW wired-OR or active-HIGH wired-AND functions.

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 tolerant for 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 input/output 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).
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- -24 mA output drive (V_{CC} = 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.



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3. Ordering information

Table 1. Orde	Table 1. Ordering information			
Type number	Package			
	Temperature range	Name	Description	Version
74LVC3G07DP	–40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74LVC3G07DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74LVC3G07GT	–40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 \times 1.95 \times 0.5 mm	SOT833-1
74LVC3G07GF	–40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body $1.35 \times 1 \times 0.5$ mm	SOT1089
74LVC3G07GD	–40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body $3 \times 2 \times 0.5$ mm	SOT996-2
74LVC3G07GM	–40 °C to +125 °C	XQFN8	plastic, extremely thin quad flat package; no leads; 8 terminals; body $1.6 \times 1.6 \times 0.5$ mm	SOT902-2
74LVC3G07GN	–40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body $1.2 \times 1.0 \times 0.35$ mm	SOT1116
74LVC3G07GS	–40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body $1.35 \times 1.0 \times 0.35$ mm	SOT1203

4. Marking

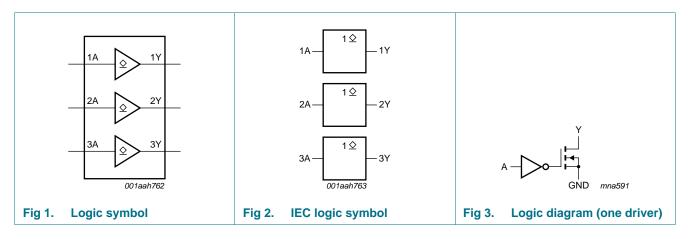
Table 2.Marking codes

Type number	Marking code ^[1]
74LVC3G07DP	V07
74LVC3G07DC	V07
74LVC3G07GT	V07
74LVC3G07GF	V7
74LVC3G07GD	V07
74LVC3G07GM	V07
74LVC3G07GN	V7
74LVC3G07GS	V7

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

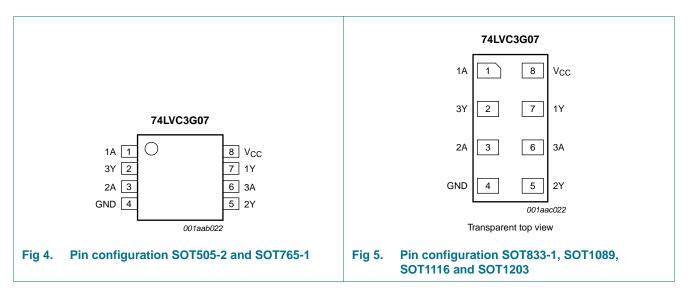
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5. Functional diagram



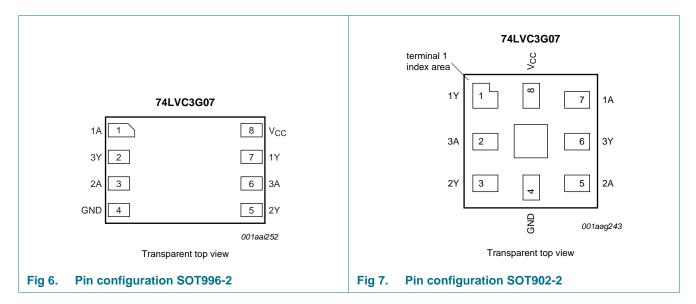
6. Pinning information

6.1 Pinning



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6.2 Pin description

Symbol	Pin	Description	
	SOT505-2, SOT765-1, SOT833-1, SOT1089, SOT996-2, SOT1116 and SOT1203	SOT902-2	
1A, 2A, 3A	1, 3, 6	7, 5, 2	data input
GND	4	4	ground (0 V)
1Y, 2Y, 3Y	7, 5, 2	1, 3, 6	data output
V _{CC}	8	8	supply voltage

7. Functional description

Table 4.Function table

Input nA	Output nY
L	L
Н	Z

[1] H = HIGH voltage level; L = LOW voltage level; Z = high-impedance OFF-state.

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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).

		5, (0	10	,
Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+6.5	V
I _{IK}	input clamping current	V ₁ < 0 V	-50	-	mA
VI	input voltage		<u>[1]</u> –0.5	+6.5	V
I _{OK}	output clamping current	V _O < 0 V	-50	-	mA
Vo	output voltage	Active mode	<u>[1]</u> –0.5	+6.5	V
		Power-down mode	<u>[1][2]</u> –0.5	+6.5	V
lo	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	$T_{amb} = -40 \ ^{\circ}C \ to \ +125 \ ^{\circ}C$	[3] _	250	mW

[1] The minimum 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 TSSOP8 package: above 55 °C the value of P_{tot} derates linearly with 2.5 mW/K.
 For VSSOP8 package: above 110 °C the value of P_{tot} derates linearly with 8 mW/K.
 For XSON8 and XQFN8 packages: above 118 °C the value of P_{tot} derates linearly with 7.8 mW/K.

9. Recommended operating conditions

Table 6.	Operating conditions				
Symbol	Parameter	Conditions	Min	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.	5.5	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	Min	Тур	Max	Unit
T _{amb} = -40	°C to +85 °C[<u>1]</u>					
V _{IH}	HIGH-level input	$V_{CC} = 1.65 \text{ V} \text{ to } 1.95 \text{ V}$	$0.65\times V_{CC}$	-	-	V
	voltage	V_{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V_{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		V_{CC} = 4.5 V to 5.5 V	$0.7\times V_{CC}$	-	-	V
VIL	LOW-level input	V_{CC} = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
	voltage	V_{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V_{CC} = 2.7 V to 3.6 V	-	-	0.8	V
		V_{CC} = 4.5 V to 5.5 V	-	-	$0.3\times V_{CC}$	V
V _{OL}	LOW-level output	$V_I = V_{IH} \text{ or } V_{IL}$				
	voltage	I _O = 100 μA; V _{CC} = 1.65 V to 5.5 V	-	-	0.1	V
		$I_0 = 4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.45	V
		$I_0 = 8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.3	V
		$I_0 = 12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	-	-	0.4	V
		$I_0 = 24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.55	V
		$I_0 = 32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.55	V
I	input leakage current	$V_1 = 5.5 V \text{ or GND};$ $V_{CC} = 0 V \text{ to } 5.5 V$	[2] _	±0.1	±5	μΑ
I _{OZ}	OFF-state output current	$\label{eq:VI} \begin{array}{l} V_{I} = V_{IH} \text{ or } V_{IL}; V_{O} = V_{CC} \text{ or } GND; \\ V_{CC} = 5.5 \ V \end{array}$	-	±0.1	±10	μΑ
OFF	power-off leakage current	$V_{\rm I}~\text{or}~V_{\rm O}$ = 5.5 V; V_{CC} = 0 V	-	±0.1	±10	μΑ
сс	supply current	$V_{I} = 5.5 V \text{ or GND}; I_{O} = 0 A;$ $V_{CC} = 1.65 V \text{ to } 5.5 V$	-	0.1	10	μΑ
Alcc	additional supply current	per pin; $V_{CC} = 2.3 \text{ V}$ to 5.5 V; $V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$	[2] -	5	500	μΑ
Ci	input capacitance		-	2.5	-	pF

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Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T _{amb} = -40	°C to +125 °C					
V _{IH}	HIGH-level input	$V_{CC} = 1.65 \text{ V} \text{ to } 1.95 \text{ V}$	$0.65 \times V_{CC}$	-	-	V
	voltage	V_{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V_{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		V_{CC} = 4.5 V to 5.5 V	$0.7\times V_{CC}$	-	-	V
V _{IL}	LOW-level input	$V_{CC} = 1.65 \text{ V} \text{ to } 1.95 \text{ V}$	-	-	$0.35\times V_{CC}$	V
	voltage	V_{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		$V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$	-	-	0.8	V
		V_{CC} = 4.5 V to 5.5 V	-	-	$0.3\times V_{CC}$	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	-	-	0.1	V
		$I_0 = 4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.70	V
		$I_0 = 8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.45	V
		$I_{O} = 12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	-	-	0.60	V
		$I_{O} = 24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.80	V
		$I_{O} = 32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.80	V
I	input leakage current	$V_{I} = 5.5 \text{ V or GND};$ $V_{CC} = 0 \text{ V to } 5.5 \text{ V}$	-	-	±20	μA
l _{oz}	OFF-state output current		-	-	±10	μΑ
I _{OFF}	power-off leakage current	$V_{I} \text{ or } V_{O} = 5.5 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	±20	μA
lcc	supply current	$V_{I} = 5.5 \text{ V or GND}; I_{O} = 0 \text{ A};$ $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$	-	-	40	μA
Δl _{CC}	additional supply current	per pin; $V_{CC} = 2.3 \text{ V}$ to 5.5 V; $V_1 = V_{CC} - 0.6 \text{ V}$; $I_0 = 0 \text{ A}$	-	-	5000	μΑ

Table 7. Static characteristics ...continued

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

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

[2] These typical values are measured at V_{CC} = 3.3 V.

11. Dynamic characteristics

Dynamic characteristics Table 8.

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

Symbol	Parameter	Conditions		-40) °C to +85	S °C	–40 °C to	o +125 °C	Unit
				Min	Typ <mark>[1]</mark>	Мах	Min	Max	
t _{pd}	propagation delay	nA to nY; see Figure 8	[2]						
		V_{CC} = 1.65 V to 1.95 V		1.0	2.9	6.7	1.0	8.4	ns
		V_{CC} = 2.3 V to 2.7 V		0.5	1.7	4.3	0.5	5.5	ns
		$V_{CC} = 2.7 V$		1.0	2.3	4.2	1.0	5.3	ns
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$		0.5	2.1	3.7	0.5	4.7	ns
		$V_{CC} = 4.5 V \text{ to } 5.5 V$		0.5	1.5	2.9	0.5	3.7	ns
C _{PD}	power dissipation capacitance	$V_{\rm I}$ = GND to $V_{CC};V_{CC}$ = 3.3 V	[3]	-	6.5	-	-	-	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 μW).

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

 f_i = input frequency in MHz;

 $f_o = output frequency in MHz;$

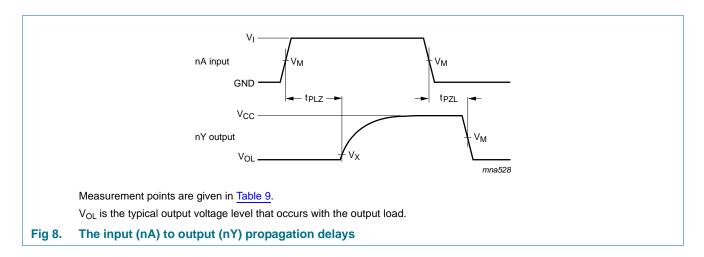
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

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

12. Waveforms

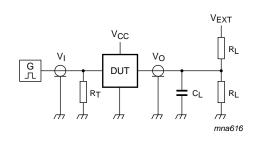


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74LVC3G07

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Table 9. Measurement points						
Supply voltage	Input	Output	Output			
V _{CC}	V _M	V _M	V _X			
1.65 V to 1.95 V	$0.5\times V_{CC}$	$0.5\times V_{CC}$	V _{OL} + 0.15 V			
2.3 V to 2.7 V	$0.5\times V_{CC}$	$0.5\times V_{CC}$	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	$0.5\times V_{CC}$	$0.5\times V_{CC}$	V _{OL} + 0.3 V			



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	Input			V _{EXT}
V _{cc}	VI	$t_r = t_f$	CL	RL	t _{PZL} , t _{PLZ}
1.65 V to 1.95 V	V _{CC}	\leq 2.0 ns	30 pF	1 kΩ	$2 \times V_{CC}$
2.3 V to 2.7 V	V _{CC}	\leq 2.0 ns	30 pF	500 Ω	$2 \times V_{CC}$
2.7 V	2.7 V	\leq 2.5 ns	50 pF	500 Ω	6 V
3.0 V to 3.6 V	2.7 V	\leq 2.5 ns	50 pF	500 Ω	6 V
4.5 V to 5.5 V	V _{CC}	\leq 2.5 ns	50 pF	500 Ω	$2 \times V_{CC}$

Triple buffer with open-drain output

13. Package outline

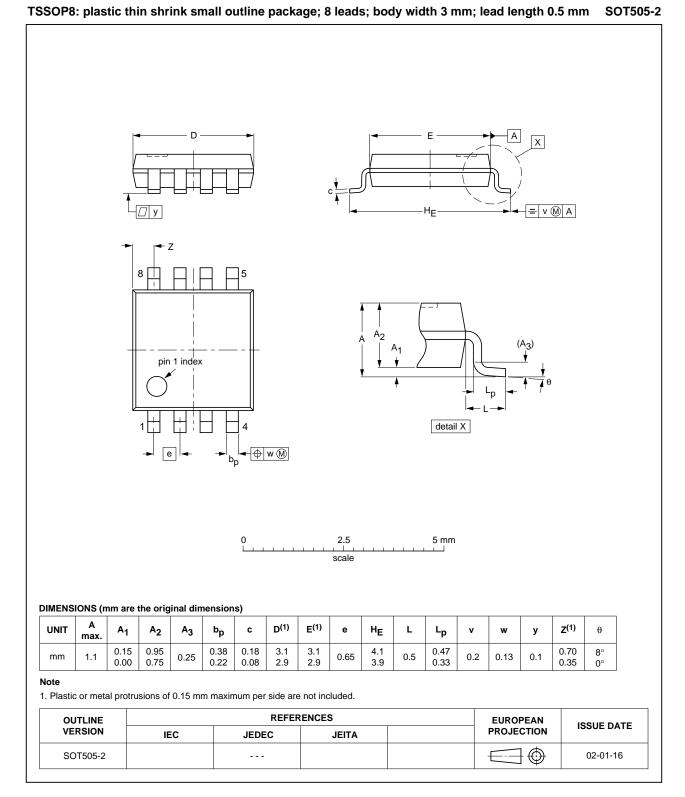


Fig 10. Package outline SOT505-2 (TSSOP8)

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Triple buffer with open-drain output

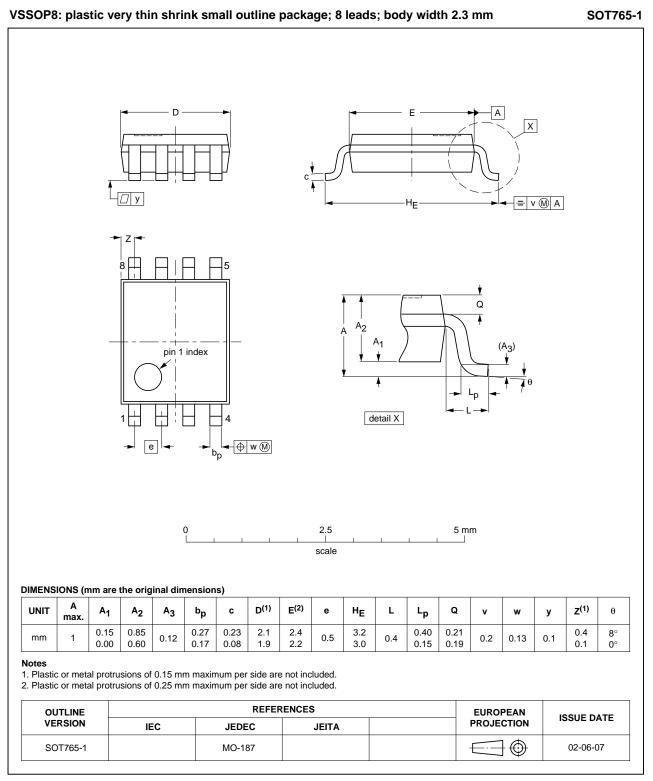


Fig 11. Package outline SOT765-1 (VSSOP8)

Triple buffer with open-drain output

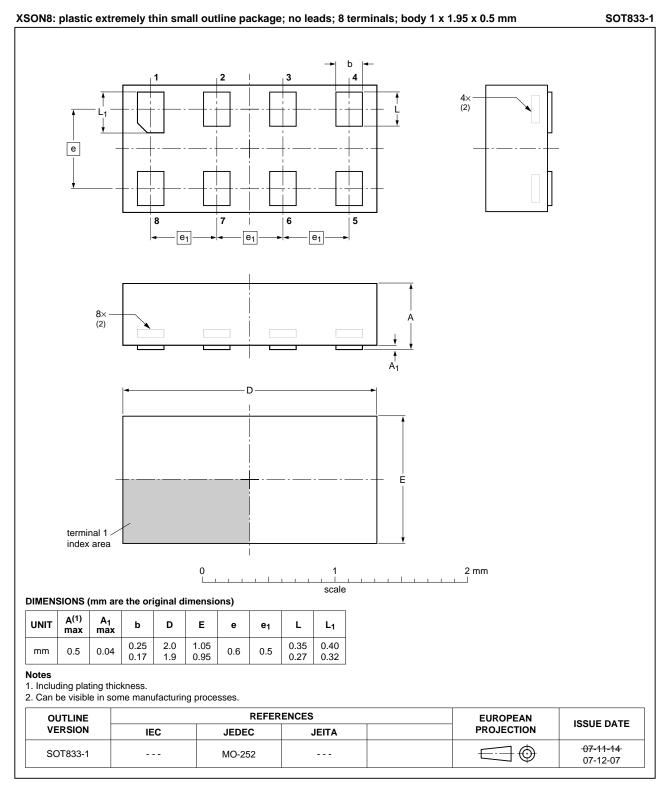
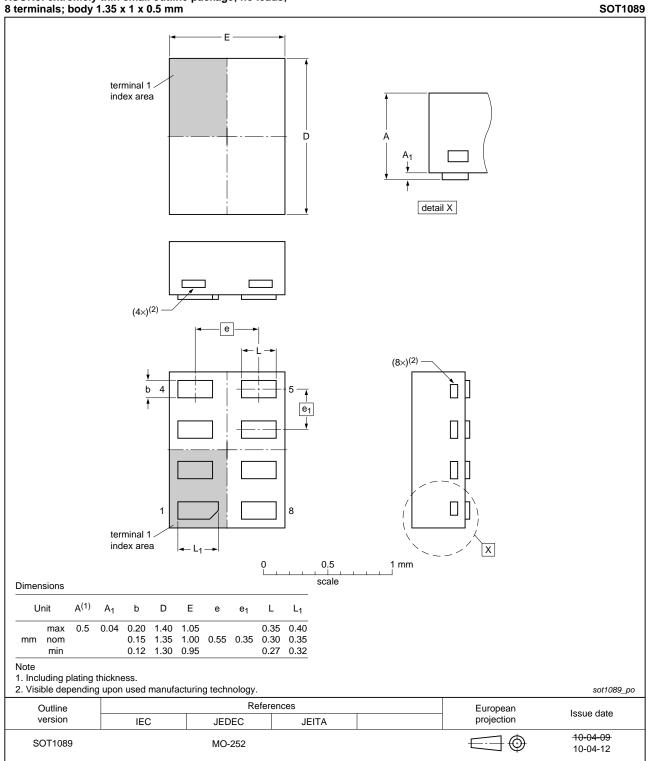


Fig 12. Package outline SOT833-1 (XSON8)

Triple buffer with open-drain output

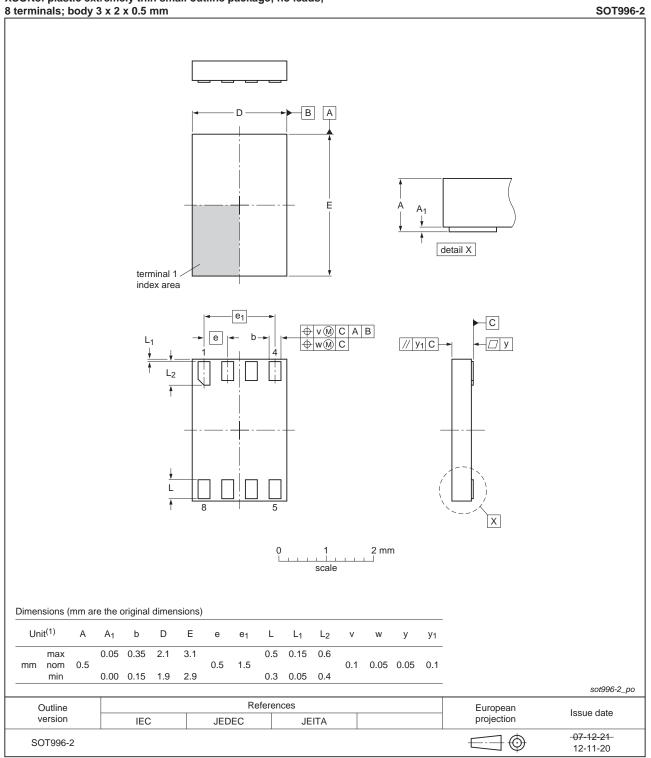


XSON8: extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1 x 0.5 mm

Fig 13. Package outline SOT1089 (XSON8)

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Triple buffer with open-drain output

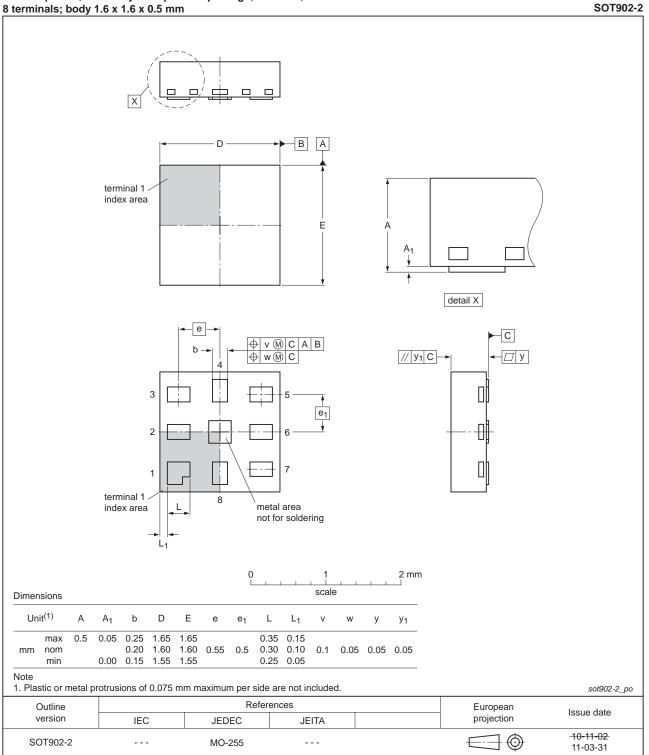


XSON8: plastic extremely thin small outline package; no leads;

Fig 14. Package outline SOT996-2 (XSON8)

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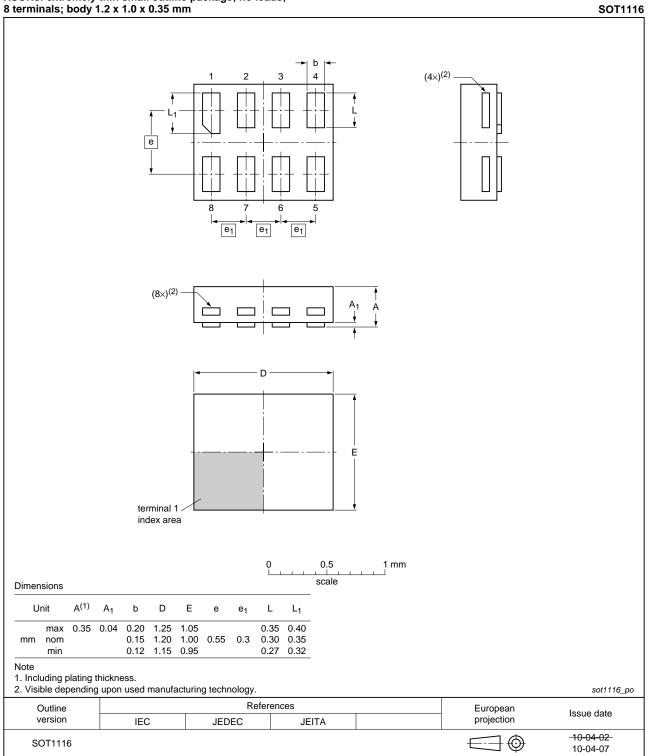


XQFN8: plastic, extremely thin quad flat package; no leads;

Fig 15. Package outline SOT902-2 (XQFN8)

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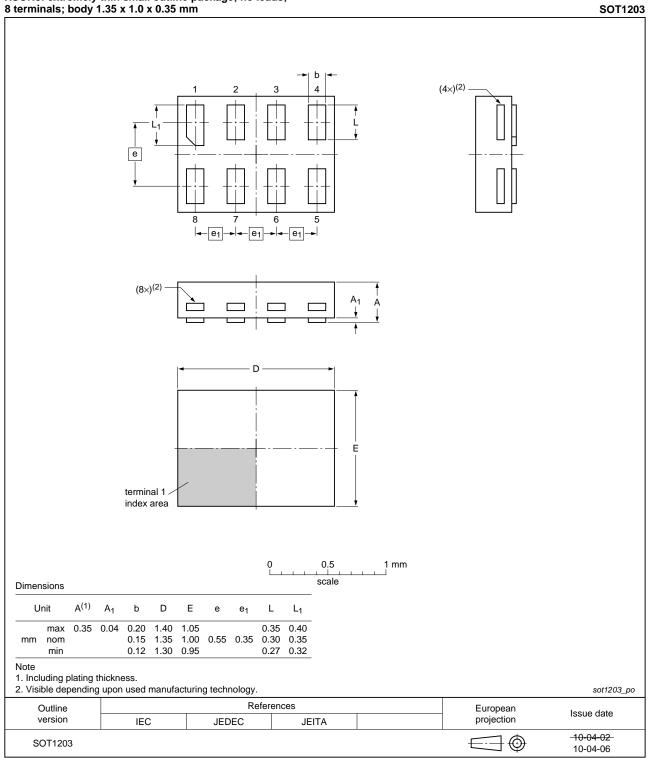


XSON8: extremely thin small outline package; no leads; 8 terminals; body 1.2 x 1.0 x 0.35 mm

Fig 16. Package outline SOT1116 (XSON8)

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Triple buffer with open-drain output



XSON8: extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1.0 x 0.35 mm

Fig 17. Package outline SOT1203 (XSON8)

Triple buffer with open-drain output

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
74LVC3G07 v.11	20130409	Product data sheet	-	74LVC3G07 v.10
Modifications:	 For type nu 	mber 74LVC3G07GD XSC	N8U has changed to XS	SON8.
74LVC3G07 v.10	20120627	Product data sheet	-	74LVC3G07 v.9
Modifications:	 For type nu 	mber 74LVC3G07GM the	SOT code has changed	to SOT902-2.
74LVC3G07 v.9	20111123	Product data sheet	-	74LVC3G07 v.8
Modifications:	 Legal pages 	s updated.		
74LVC3G07 v.8	20111019	Product data sheet	-	74LVC3G07 v.7
74LVC3G07 v.7	20100809	Product data sheet	-	74LVC3G07 v.6
74LVC3G07 v.6	20080616	Product data sheet	-	74LVC3G07 v.5
74LVC3G07 v.5	20080219	Product data sheet	-	74LVC3G07 v.4
74LVC3G07 v.4	20070521	Product data sheet	-	74LVC3G07 v.3
74LVC3G07 v.3	20050201	Product data sheet	-	74LVC3G07 v.2
74LVC3G07 v.2	20041027	Product data sheet	-	74LVC3G07 v.1
74LVC3G07 v.1	20040608	Product data sheet	-	-

16. Legal information

16.1 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.

[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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