74LVC3G07

Triple buffer with open-drain output

Rev. 15 — 24 August 2023

Product data sheet

1. General description

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.

2. Features and benefits

- 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).
- -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
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C.



Triple buffer with open-drain output

3. Ordering information

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 × 1.95 × 0.5 mm	SOT833-1
74LVC3G07GF	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1 × 0.5 mm	SOT1089
74LVC3G07GN	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	<u>SOT1116</u>
74LVC3G07GS	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203

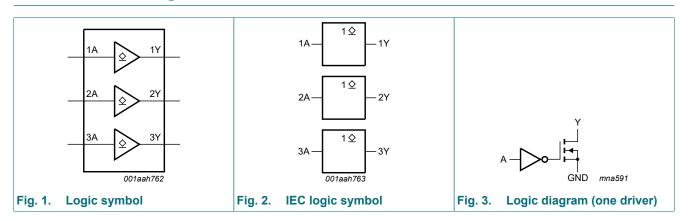
4. Marking

Table 2. Marking codes

Marking code [1]
V07
V07
V07
V7
V7
V7

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

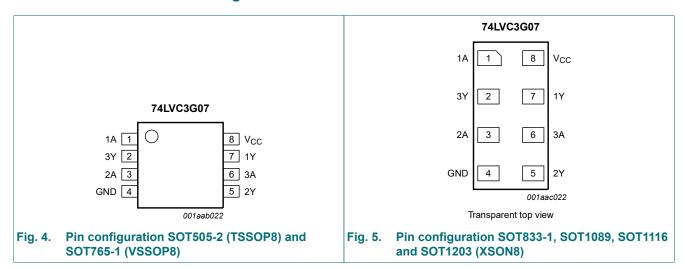
5. Functional diagram



Triple buffer with open-drain output

6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
1A, 2A, 3A	1, 3, 6	data input
GND	4	ground (0 V)
1Y, 2Y, 3Y	7, 5, 2	data output
V _{CC}	8	supply voltage

7. Functional description

Table 4. Function table

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

Input nA	Output nY
L	L
Н	Z

Triple buffer with open-drain output

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	$T_{amb} = -40 ^{\circ}\text{C to } +125 ^{\circ}\text{C}$ [2]	-	250	mW

^[1] The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.

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	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

^[2] For SOT505-2 (TSSOP8) package: Ptot derates linearly with 4.6 mW/K above 96 °C.

For SOT765-1 (VSSOP8) package: Ptot derates linearly with 4.9 mW/K above 99 °C.

For SOT833-1 (XSON8) package: P_{tot} derates linearly with 3.1 mW/K above 68 °C.

For SOT1089 (XSON8) package: Ptot derates linearly with 4.0 mW/K above 88 °C.

For SOT1116 (XSON8) package: P_{tot} derates linearly with 4.2 mW/K above 90 °C.

For SOT1203 (XSON8) package: Ptot derates linearly with 3.6 mW/K above 81 °C.

Triple buffer with open-drain output

10. Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	T _{amb} =	T _{amb} = -40 °C to +85 °C			T _{amb} = -40 °C to +125 °C	
			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	-	-	0.1	-	0.1	V
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.45	-	0.70	V
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.3	-	0.45	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.4	-	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	-	±0.1	±1	-	±1	μA
l _{OZ}	OFF-state output current $V_{I} = V_{IH} \text{ or } V_{IL};$ $V_{O} = V_{CC} \text{ or GND};$ $V_{CC} = 5.5 \text{ V}$		-	±0.1	±2	-	±2	μA
l _{OFF}	power-off leakage current	V_{I} or $V_{O} = 5.5 \text{ V}$; $V_{CC} = 0 \text{ V}$	-	±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	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	-	500	μA
Cı	input capacitance		-	2.5	-	-	-	pF

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

Triple buffer with open-drain output

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit see Fig. 7.

Symbol	Parameter	Conditions	T _{amb} =	T _{amb} = -40 °C to +85 °C			T _{amb} = -40 °C to +125 °C	
			Min	Typ [1]	Max	Min	Max	
t _{pd}	propagation	nA to nY; see Fig. 6 [2]						
	delay	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 V to 3.6 V	0.5	2.1	3.7	0.5	4.7	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	1.5	2.9	0.5	3.7	ns
C _{PD}	power dissipation capacitance	$V_{I} = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [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 μ W).

 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma (C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

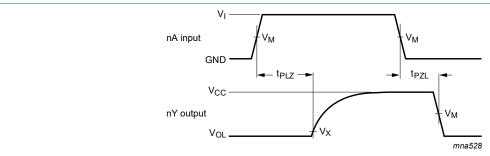
V_{CC} = supply voltage in V;

N = number of inputs switching;

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

Triple buffer with open-drain output

11.1. Waveforms and test circuit



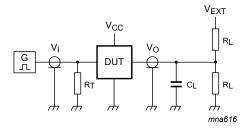
Measurement points are given in <u>Table 9</u>.

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

Fig. 6. The input (nA) to output (nY) propagation delays

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 × V _{CC}	0.5 × V _{CC}	V _{OL} + 0.15 V		
2.3 V to 2.7 V	0.5 × V _{CC}	0.5 × 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 × V _{CC}	0.5 × 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. 7. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input	nput		Load	
V _{CC}	V _I	$t_r = t_f$	CL	R_L	t _{PZL} , t _{PLZ}
1.65 V to 1.95 V	V _{CC}	≤ 2.0 ns	30 pF	1 kΩ	2 × V _{CC}
2.3 V to 2.7 V	V _{CC}	≤ 2.0 ns	30 pF	500 Ω	2 × V _{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	2 × V _{CC}

Triple buffer with open-drain output

12. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

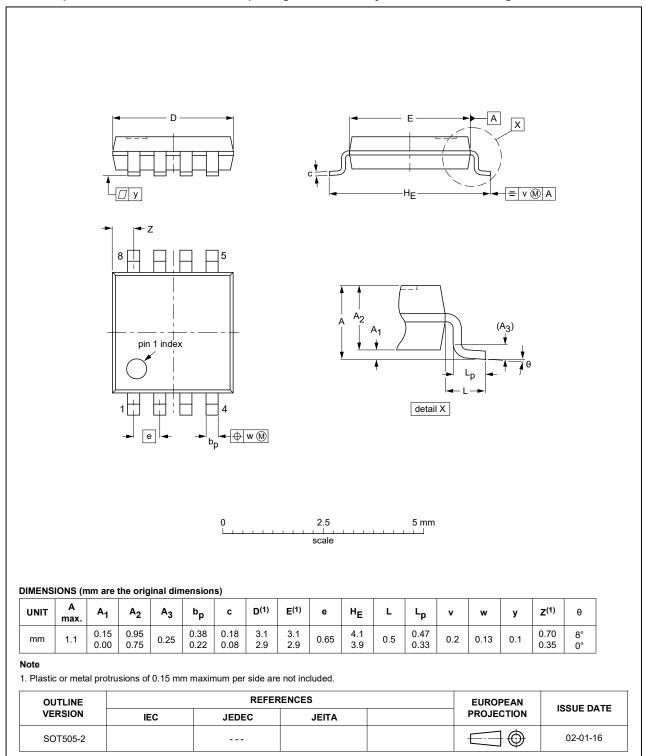


Fig. 8. Package outline SOT505-2 (TSSOP8)

Triple buffer with open-drain output

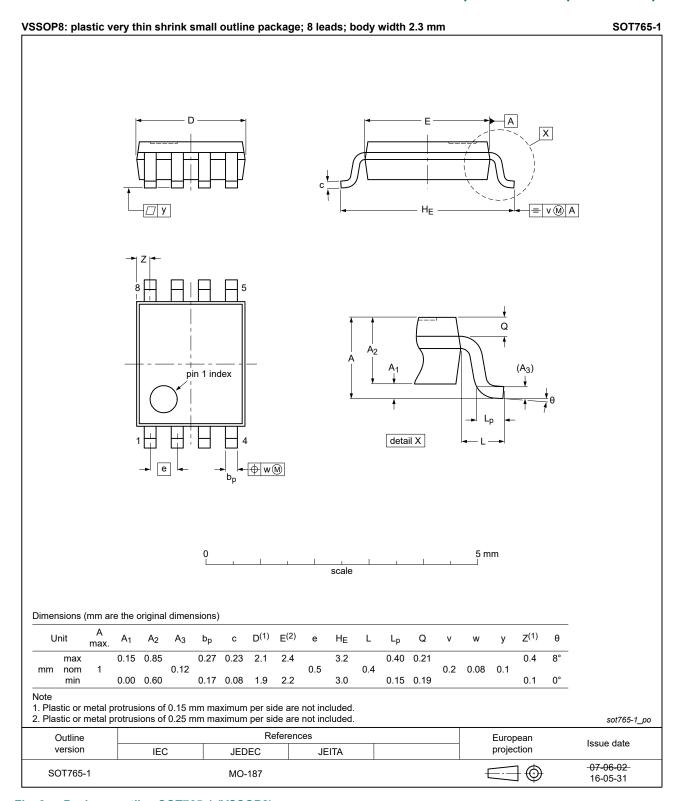


Fig. 9. Package outline SOT765-1 (VSSOP8)

Product data sheet

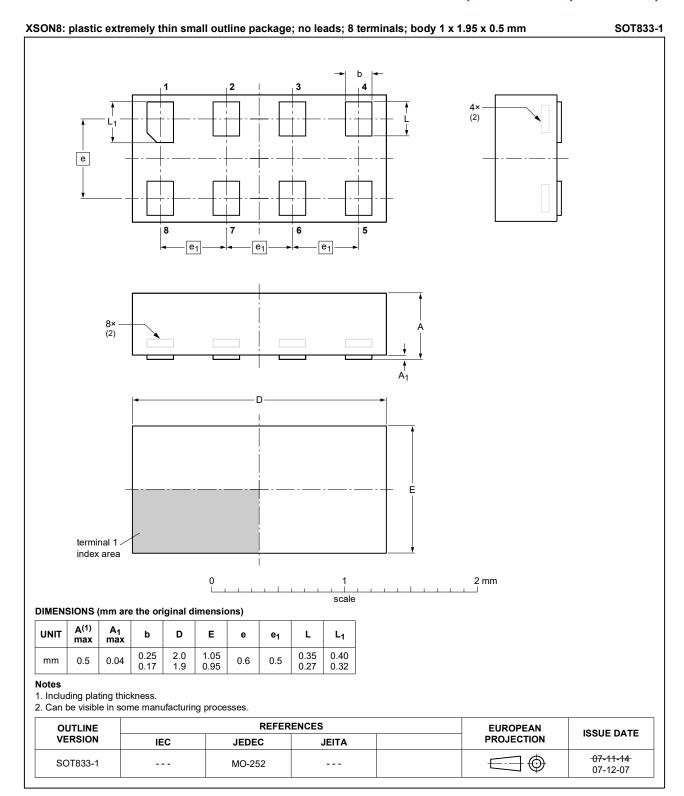


Fig. 10. Package outline SOT833-1 (XSON8)

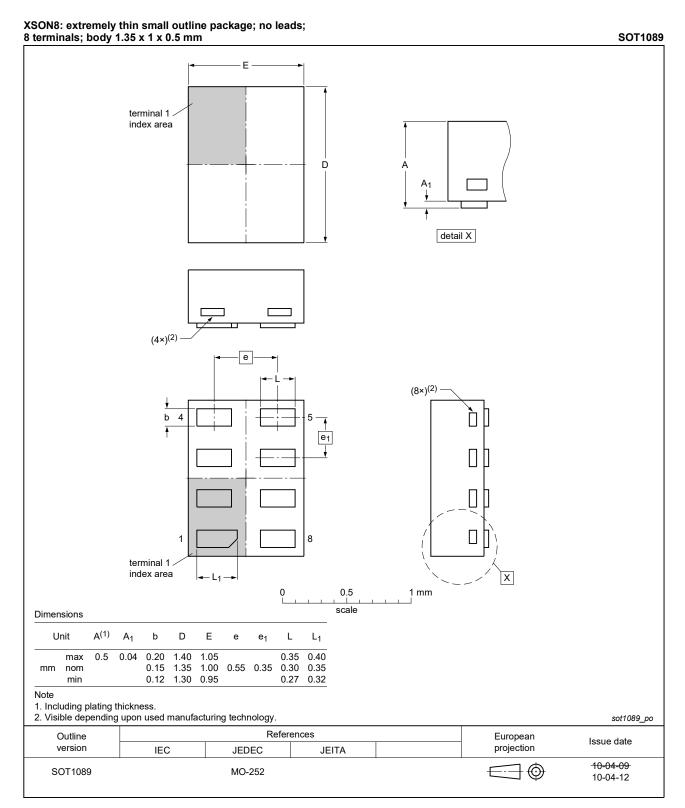


Fig. 11. Package outline SOT1089 (XSON8)

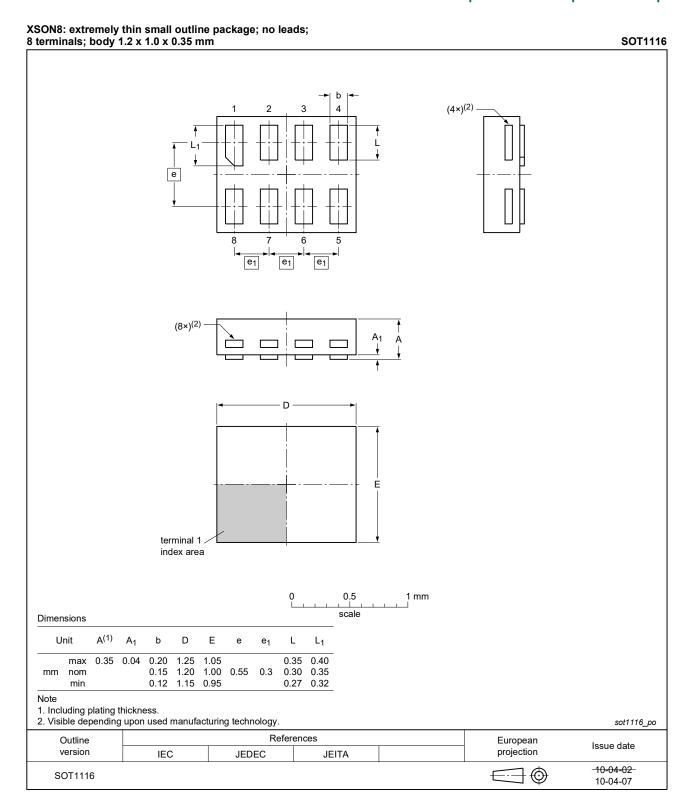


Fig. 12. Package outline SOT1116 (XSON8)

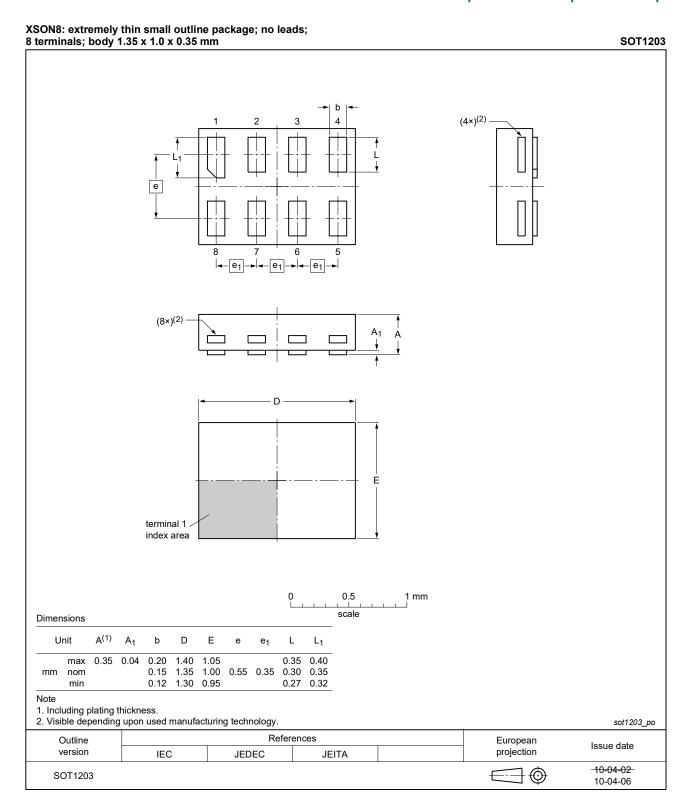


Fig. 13. Package outline SOT1203 (XSON8)

Triple buffer with open-drain output

13. Abbreviations

Table 11. Abbreviations

Acronym	Description
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	Human Body Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes			
74LVC3G07 v.15	20230824	Product data sheet	-	74LVC3G07 v.14			
Modifications:	Section 2: E	ESD specification update	d according to the la	atest JEDEC standard.			
74LVC3G07 v.14	20210128	Product data sheet	-	74LVC3G07 v.13			
Modifications:	7.	Type named 7 12 00007 am (00 1002 27 Agr 110) followed.					
74LVC3G07 v.13	20181023	Product data sheet	-	74LVC3G07 v.12			
Modifications:	guidelines o Legal texts	 The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Type number 74LVC3G07GD (SOT996-2) removed. 					
74LVC3G07 v.12	20161215	Product data sheet	-	74LVC3G07 v.11			
Modifications:	• <u>Table 7</u> : The	e maximum limits for lea	kage current and su	pply current have changed.			
74LVC3G07 v.11	20130409	Product data sheet	-	74LVC3G07 v.10			
Modifications:	For type nu	mber 74LVC3G07GD XS	SON8U has changed	d to XSON8.			
74LVC3G07 v.10	20120627	Product data sheet	-	74LVC3G07 v.9			
Modifications:	For type nu	mber 74LVC3G07GM th	e SOT code has cha	anged to SOT902-2.			
74LVC3G07 v.9	20111123	Product data sheet	-	74LVC3G07 v.8			
Modifications:	Legal page:	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	-	-			

Product data sheet

Triple buffer with open-drain output

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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Triple buffer with open-drain output

Contents

1.	General description	1
2.	Features and benefits	1
3.	Ordering information	2
4.	Marking	2
5.	Functional diagram	2
6.	Pinning information	3
6.1	. Pinning	3
6.2	Pin description	3
7.	Functional description	3
8.	Limiting values	4
9.	Recommended operating conditions	4
10.	Static characteristics	5
11.	Dynamic characteristics	6
11.	Waveforms and test circuit	7
12.	Package outline	8
13.	Abbreviations	. 14
14.	Revision history	.14
15.	Legal information	.15

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