# 74LVC3G07

# Triple buffer with open-drain output

Rev. 14 — 28 January 2021

**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).
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 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.



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	SOT1116
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

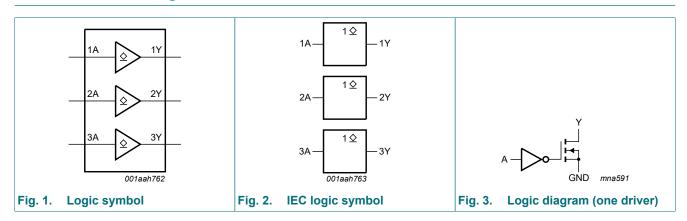
## 4. Marking

Table 2. Marking codes

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

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

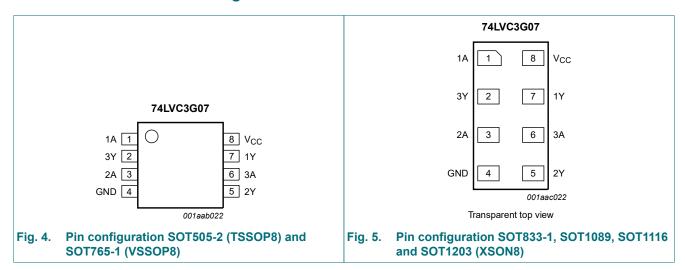
# 5. Functional diagram



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
Vcc	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

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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 <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V		-50	-	mA
VI	input voltage		[1]	-0.5	+6.5	V
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < 0 V		-50	-	mA
Vo	output voltage	Active mode	[1]	-0.5	+6.5	V
		Power-down mode; V <sub>CC</sub> = 0 V	[1]	-0.5	+6.5	V
Io	output current	V <sub>O</sub> = 0 V to 6.5 V		-	50	mA
I <sub>CC</sub>	supply current			-	100	mA
$I_{GND}$	ground current			-100	-	mA
T <sub>stg</sub>	storage temperature			-65	+150	°C
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to +125 °C	[2]	-	250	mW

<sup>[1]</sup> 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 <sub>CC</sub>	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 <sub>CC</sub> = 0 V	0	5.5	V
T <sub>amb</sub>	ambient temperature		-40	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 1.65 V to 2.7 V	-	20	ns/V
		V <sub>CC</sub> = 2.7 V to 5.5 V	-	10	ns/V

<sup>[2]</sup> 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 $T_{amb} = -40 ^{\circ}\text{C to } +85 ^{\circ}\text{C}$ $T_{amb} = -40 ^{\circ}\text{C to } +125 ^{\circ}\text{C}$						Unit
			Min	Typ [1]	Max	Min	Max	
V <sub>IH</sub>	HIGH-level input	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65V <sub>CC</sub>	-	-	0.65V <sub>CC</sub>	-	V
	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 <sub>IL</sub>	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>OL</sub>	LOW-level output	$V_I = V_{IH}$ or $V_{IL}$						
	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 <sub>O</sub> = 8 mA; V <sub>CC</sub> = 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
l <sub>l</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V	-	±0.1	±1	-	±1	μΑ
l <sub>OZ</sub>	OFF-state output current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	±0.1	±2	-	±2	μA
I <sub>OFF</sub>	power-off leakage current	$V_{I}$ or $V_{O} = 5.5 \text{ V}$ ; $V_{CC} = 0 \text{ V}$	-	±0.1	±2	-	±2	μΑ
I <sub>CC</sub>	supply current	supply current $V_I = 5.5 \text{ V or GND}$ ; $I_O = 0 \text{ A}$ ; $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$		0.1	4	-	4	μA
ΔI <sub>CC</sub>	additional supply current	per pin; V <sub>CC</sub> = 2.3 V to 5.5 V; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A	-	5	500	-	500	μA
Cı	input capacitance		-	2.5	-	-	-	pF

<sup>[1]</sup> 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	Symbol Parameter Conditions		T <sub>amb</sub> =	= -40 °C to	+85 °C		<sub>nb</sub> = 0 +125 °C	Unit
			Min	Typ [1]	Max	Min	Max	
t <sub>pd</sub>	propagation	nA to nY; see Fig. 6 [2]						
	delay	V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	2.9	6.7	1.0	8.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.5	1.7	4.3	0.5	5.5	ns
		V <sub>CC</sub> = 2.7 V	1.0	2.3	4.2	1.0	5.3	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.5	2.1	3.7	0.5	4.7	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.5	1.5	2.9	0.5	3.7	ns
C <sub>PD</sub>	power dissipation capacitance	$V_1 = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [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  $\mu$ 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<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

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

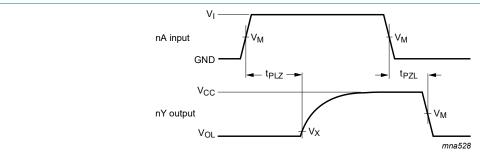
V<sub>CC</sub> = supply voltage in V;

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



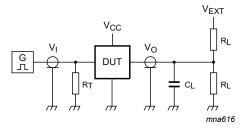
Measurement points are given in <u>Table 9</u>.

V<sub>OL</sub> 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	
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>	V <sub>X</sub>
1.65 V to 1.95 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V
2.3 V to 2.7 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V
2.7 V	1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V
3.0 V to 3.6 V	1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V
4.5 V to 5.5 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>	V <sub>OL</sub> + 0.3 V



Test data is given in Table 10.

Definitions for test circuit:

 $R_L$  = Load resistance.

C<sub>L</sub> = 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<sub>EXT</sub> = External voltage for measuring switching times.

Fig. 7. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load		V <sub>EXT</sub>
V <sub>CC</sub>	V <sub>I</sub>	$t_r = t_f$	CL	$R_L$	t <sub>PZL</sub> , t <sub>PLZ</sub>
1.65 V to 1.95 V	V <sub>CC</sub>	≤ 2.0 ns	30 pF	1 kΩ	2 × V <sub>CC</sub>
2.3 V to 2.7 V	V <sub>CC</sub>	≤ 2.0 ns	30 pF	500 Ω	2 × V <sub>CC</sub>
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 <sub>CC</sub>	≤ 2.5 ns	50 pF	500 Ω	2 × V <sub>CC</sub>

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

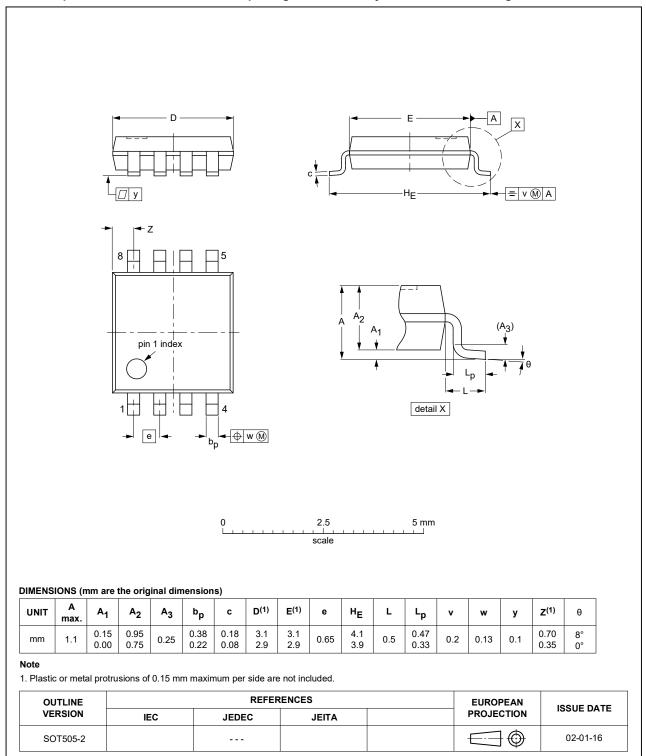


Fig. 8. Package outline SOT505-2 (TSSOP8)

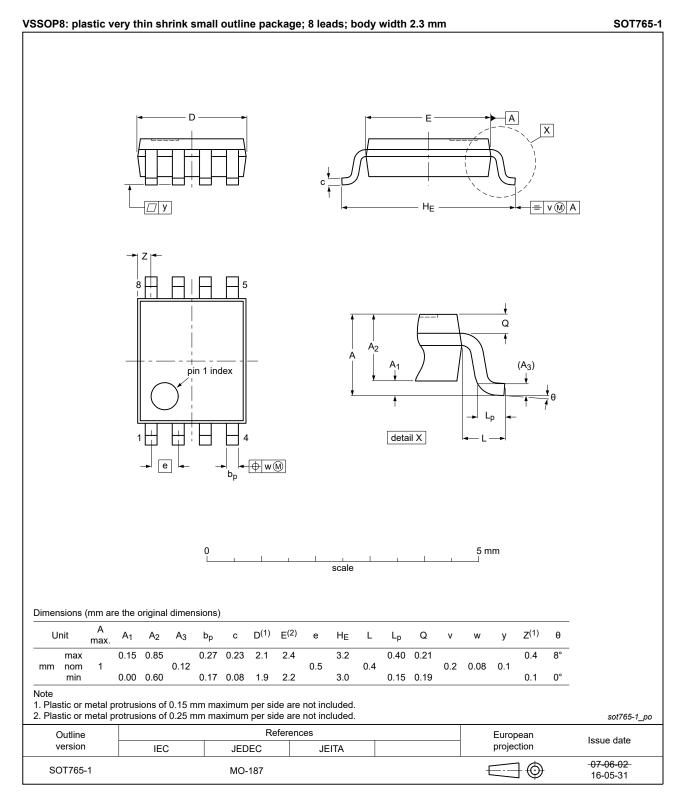


Fig. 9. Package outline SOT765-1 (VSSOP8)

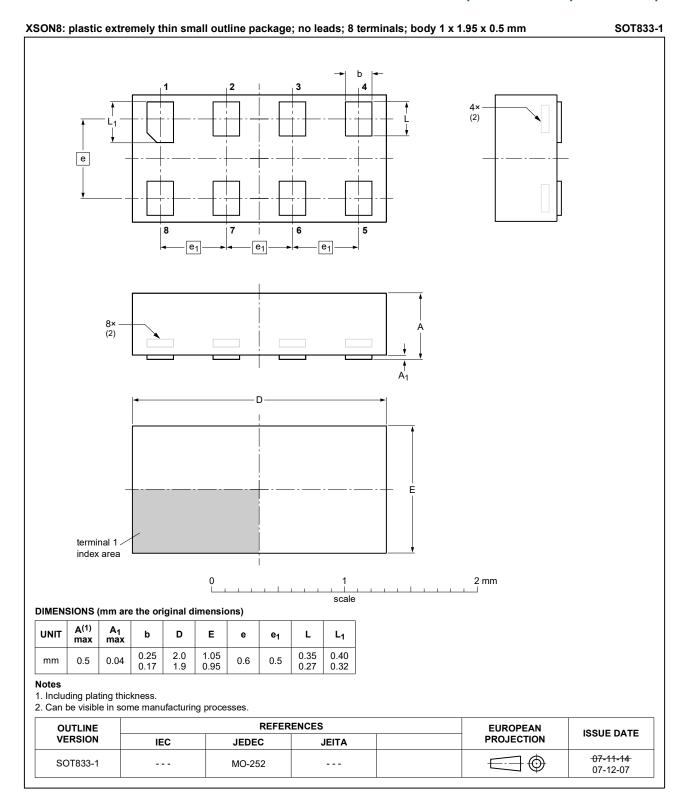


Fig. 10. Package outline SOT833-1 (XSON8)

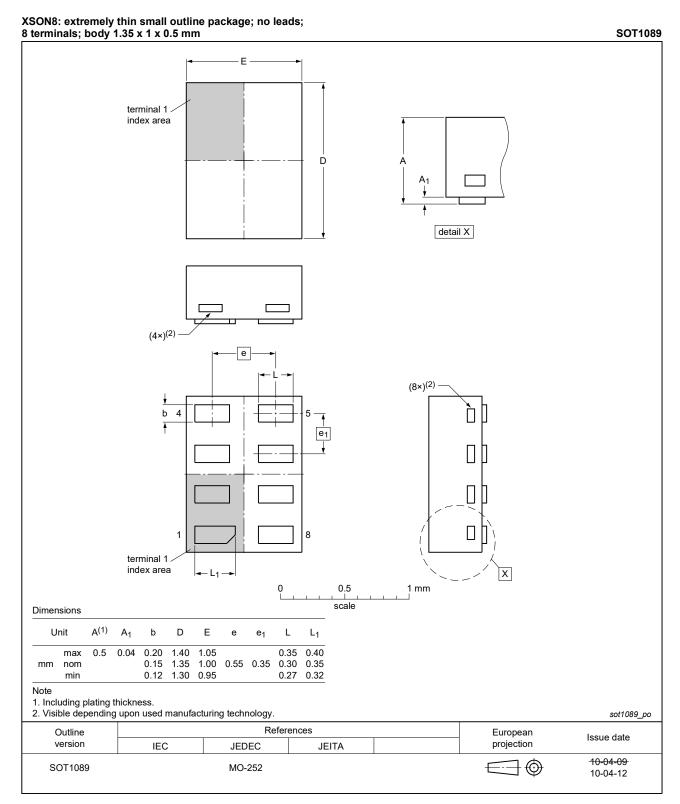


Fig. 11. Package outline SOT1089 (XSON8)

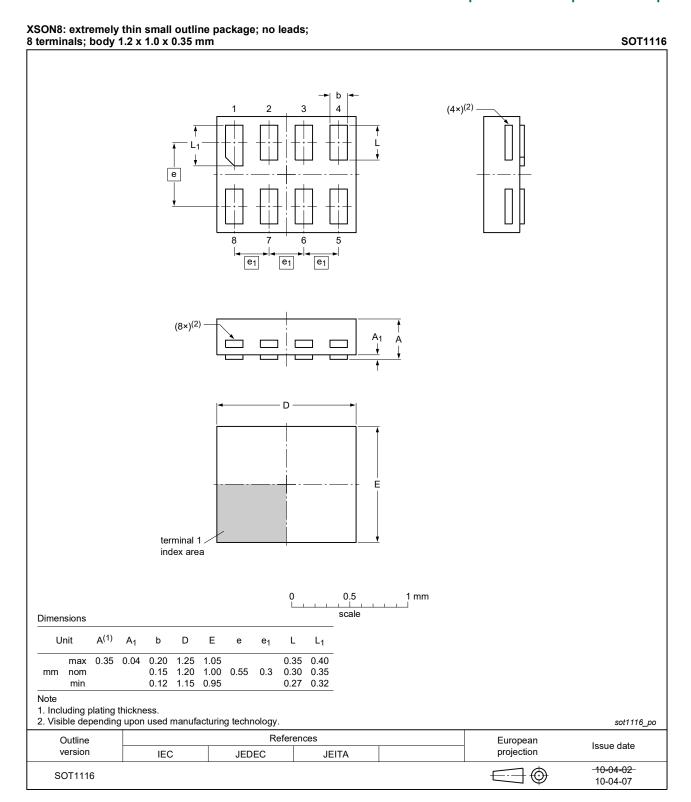


Fig. 12. Package outline SOT1116 (XSON8)

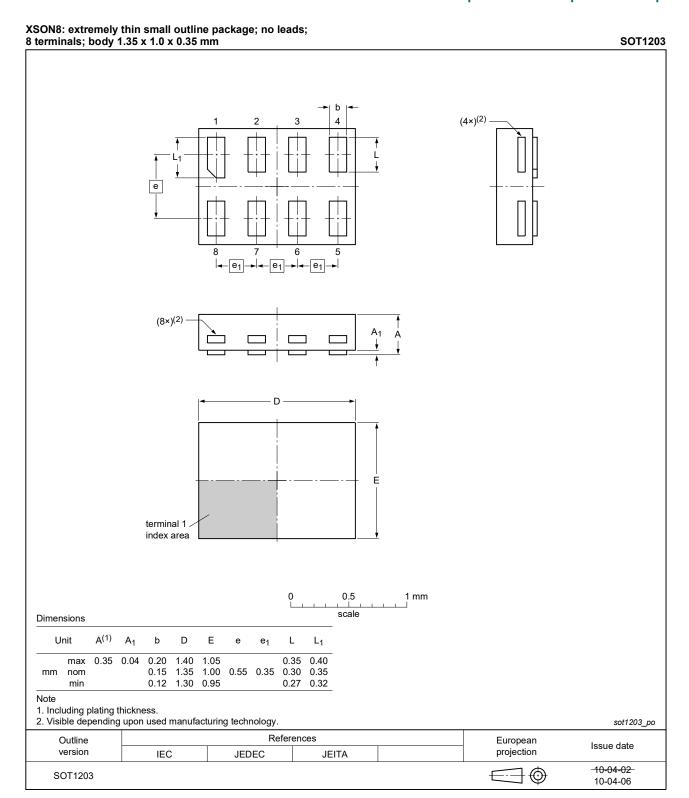


Fig. 13. Package outline SOT1203 (XSON8)

### 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
MM	Machine Model
TTL	Transistor-Transistor Logic

# 14. Revision history

### Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74LVC3G07 v.14	20210128	Product data sheet	-	74LVC3G07 v.13		
Modifications:	Type numb	er 74LVC3G07GM (SOT9	902-2 / XQFN8) ren	noved.		
	• <u>Table 5</u> : De	rating values for P <sub>tot</sub> total	power dissipation	updated.		
74LVC3G07 v.13	20181023	Product data sheet	-	74LVC3G07 v.12		
Modifications:	guidelines o Legal texts	of this data sheet has been of Nexperia. have been adapted to the er 74LVC3G07GD (SOT9	e new company nar			
74LVC3G07 v.12	20161215	Product data sheet	-	74LVC3G07 v.11		
Modifications:	• <u>Table 7</u> : Th	• <u>Table 7</u> : The maximum limits for leakage current and supply current have changed.				
74LVC3G07 v.11	20130409	Product data sheet	-	74LVC3G07 v.10		
Modifications:	For type nu	mber 74LVC3G07GD XS	ON8U has change	d to XSON8.		
74LVC3G07 v.10	20120627	Product data sheet	-	74LVC3G07 v.9		
Modifications:	For type nu	mber 74LVC3G07GM the	SOT code has cha	anged to SOT902-2.		
74LVC3G07 v.9	20111123	Product data sheet	-	74LVC3G07 v.8		
Modifications:	<ul> <li>Legal page</li> </ul>	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	-	-		

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

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### Triple buffer with open-drain output

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