74LVC2G126

Dual bus buffer/line driver; 3-state

Rev. 12 — 8 April 2013

Product data sheet

1. General description

The 74LVC2G126 is a dual non-inverting buffer/line driver with 3-state outputs. Each 3-state output is controlled by an output enable input (pin nOE). A LOW-level at pin nOE causes the output to assume a high-impedance OFF-state. Schmitt trigger action at all inputs makes the circuit highly tolerant of slower input rise and fall times.

Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of the 74LVC2G126 as a translator in a mixed 3.3 V and 5 V environment.

It is fully specified for partial power-down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing a 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
- \pm 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



3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LVC2G126DP	–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
74LVC2G126DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74LVC2G126GT	–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
74LVC2G126GF	–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
74LVC2G126GD	–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
74LVC2G126GM	–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
74LVC2G126GN	–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
74LVC2G126GS	–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

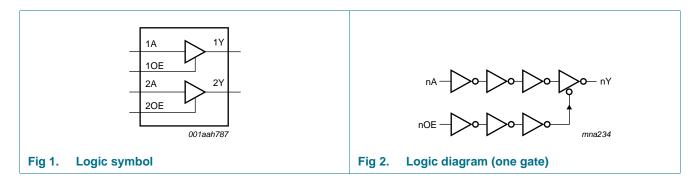
Type number	Marking code ^[1]
74LVC2G126DP	V26
74LVC2G126DC	V26
74LVC2G126GT	V26
74LVC2G126GF	VN
74LVC2G126GD	V26
74LVC2G126GM	V26
74LVC2G126GN	VN
74LVC2G126GS	VN

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

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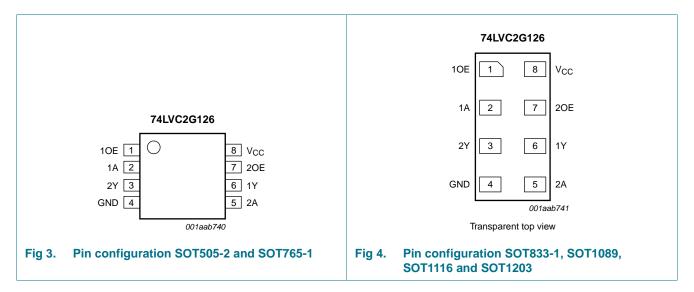
Dual bus buffer/line driver; 3-state

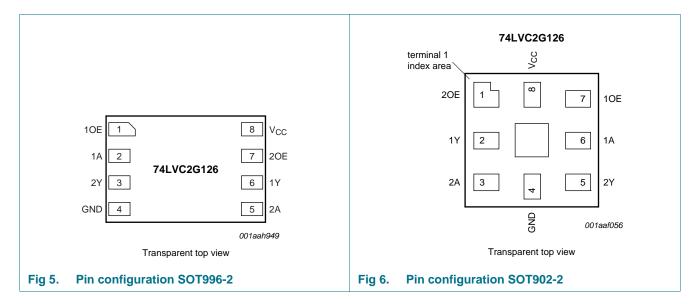
5. Functional diagram



6. Pinning information

6.1 Pinning





6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description	
	SOT505-2, SOT765-1, SOT833-1, SOT1089, SOT996-2, SOT1116 and SOT1203	SOT902-2	
10E, 20E	1, 7	7, 1	output enable input (active HIGH)
1A, 2A	2, 5	6, 3	data input
1Y, 2Y	6, 3	2, 5	data output
GND	4	4	ground (0 V)
V _{CC}	8	8	supply voltage

7. Functional description

Table 4. Function table[1]

Input	Output	
nOE	nA	nY
Н	L	L
Н	Н	Н
L	X	Z

 $^{[1] \}quad \ \ H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level; \ X = don't \ care; \ Z = high-impedance \ OFF-state.$

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
V_{I}	input voltage		<u>[1]</u> -0.5	+6.5	V
I _{OK}	output clamping current	$V_O > V_{CC}$ or $V_O < 0 V$	-	±50	mA
Vo	output voltage	Active mode	<u>[1]</u> -0.5	$V_{CC} + 0.5$	V
		Power-down mode	[1][2] -0.5	+6.5	V
Io	output current	$V_O = 0 V \text{ to } V_{CC}$	-	±50	mA
I _{CC}	supply current		-	+100	mA
I_{GND}	ground current		-100	-	mA
P _{tot}	total power dissipation	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$	<u>[3]</u> _	300	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.

9. Recommended operating conditions

Table 6. Operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		1.65	5.5	V
V_{I}	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
Δt/ΔV	input transition rise and fall rate	$V_{CC} = 1.65 \text{ V to } 2.7 \text{ V}$	-	20	ns/V
		$V_{CC} = 2.7 \text{ V to } 5.5 \text{ V}$	-	10	ns/V

^[2] When $V_{CC} = 0 \text{ V}$ (Power-down mode), the output voltage can be 5.5 V in normal operation.

^[3] For TSSOP8 packages: above 55 °C the value of P_{tot} derates linearly at 2.5 mW/K.
For VSSOP8 packages: above 110 °C the value of P_{tot} derates linearly at 8.0 mW/K.
For XSON8 and XQFN8 packages: above 118 °C the value of P_{tot} derates linearly with 7.8 mW/K.

10. Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	Min	Typ[1]	Max	Unit
T _{amb} = -	-40 °C to +85 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		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 voltage	V _{CC} = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		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 voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 100 μ A; V_{CC} = 1.65 V to 5.5 V	-	-	0.1	V
		$I_{O} = 4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.45	V
		$I_{O} = 8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.3	V
		I_{O} = 12 mA; V_{CC} = 2.7 V	-	-	0.4	V
		$I_{O} = 24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.55	V
		$I_{O} = 32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.55	V
V _{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_{O} = -100 \ \mu A; \ V_{CC} = 1.65 \ V \ to \ 5.5 \ V$	$V_{CC}-0.1$	-	-	V
		$I_{O} = -4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.2	-	-	V
		$I_O = -8$ mA; $V_{CC} = 2.3$ V	1.9	-	-	V
		$I_{O} = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	2.2	-	-	V
		$I_{O} = -24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.3	-	-	V
		$I_{O} = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.8	-	-	V
I _I	input leakage current	$V_I = 5.5 \text{ V or GND}$; $V_{CC} = 0 \text{ V to } 5.5 \text{ V}$	-	±0.1	±5	μΑ
I _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = 5.5$ V or GND; $V_{CC} = 3.6$ V	-	±0.1	±10	μΑ
I _{OFF}	power-off leakage current	V_{I} or $V_{O} = 5.5 \text{ V}$; $V_{CC} = 0 \text{ V}$	-	±0.1	±10	μΑ
I _{CC}	supply current	$V_I = 5.5 \text{ V or GND};$ $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V; } I_O = 0 \text{ A}$	-	0.1	10	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	-	5	500	μΑ
C_{I}	input capacitance		-	2	-	pF

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 Table 7.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Typ[1]	Max	Unit
T _{amb} = -	-40 °C to +125 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		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 voltage	V _{CC} = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	-	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 voltage	$V_{I} = V_{IH}$ or V_{IL}				
		I_{O} = 100 μ A; V_{CC} = 1.65 V to 5.5 V	-	-	0.1	V
		$I_{O} = 4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.70	V
		$I_{O} = 8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.45	V
		I_{O} = 12 mA; V_{CC} = 2.7 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
V _{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_{O} = -100 \mu A$; $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$	$V_{CC}-0.1$	-	-	V
		$I_{O} = -4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	0.95	-	-	V
		$I_{O} = -8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.7	-	-	V
		$I_{O} = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	1.9	-	-	V
		$I_{O} = -24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.0	-	-	V
		$I_{O} = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.4	-	-	V
l _l	input leakage current	$V_I = 5.5 \text{ V or GND}$; $V_{CC} = 0 \text{ V to } 5.5 \text{ V}$	-	-	±20	μΑ
l _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = 5.5$ V or GND; $V_{CC} = 3.6$ V	-	-	±20	μΑ
I _{OFF}	power-off leakage current	V_{I} or $V_{O} = 5.5 \text{ V}$; $V_{CC} = 0 \text{ V}$	-	-	±20	μΑ
I _{CC}	supply current	V _I = 5.5 V or GND; V _{CC} = 1.65 V to 5.5 V; I _O = 0 A	-	-	40	μА
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	-	-	5	mA

^[1] 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 test circuit see Figure 9.

Symbol	Parameter	Conditions		-40	°C to +85	°C	–40 °C to	Unit	
				Min	Typ[1]	Max	Min	Max	
t _{pd}	propagation delay	nA to nY; see Figure 7	[2]						
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$		1.0	3.9	9.8	1.0	12.3	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		0.5	2.6	4.9	0.5	6.3	ns
		$V_{CC} = 2.7 \text{ V}$		1.0	2.8	4.7	1.0	5.9	ns
	$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$		0.5	2.4	4.3	0.5	5.4	ns	
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$		0.5	1.9	3.2	0.5	4.0	ns
t _{en}	enable time	nOE to nY; see Figure 8	[3]						
		V_{CC} = 1.65 V to 1.95 V		1.0	4.1	10.0	1.0	12.5	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		1.0	2.6	5.0	1.0	6.3	ns
		$V_{CC} = 2.7 \text{ V}$		1.0	2.8	4.7	1.0	5.9	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$		1.0	2.4	4.1	1.0	5.1	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$		0.5	1.8	3.1	0.5	3.9	ns
t _{dis}	disable time	nOE to nY; see Figure 8	<u>[4]</u>						
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$		1.0	3.3	12.6	1.0	15.4	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		0.5	1.9	5.7	0.5	7.5	ns
		$V_{CC} = 2.7 \text{ V}$		1.5	3.0	4.8	1.5	6.2	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$		1.0	2.5	4.4	1.0	5.7	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$		0.5	1.8	3.3	0.5	4.4	ns
C_{PD}	power dissipation	per buffer; $V_I = GND$ to V_{CC}	<u>[5]</u>						
	capacitance	output enabled		-	17	-	-	-	pF
		output disabled		-	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.

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

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

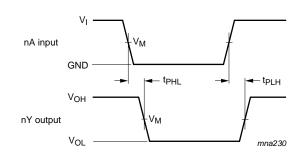
^[2] t_{pd} is the same as t_{PLH} and t_{PHL}

^[3] t_{en} is the same as t_{PZH} and t_{PZL}

^[4] t_{dis} is the same as t_{PLZ} and t_{PHZ}

^[5] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

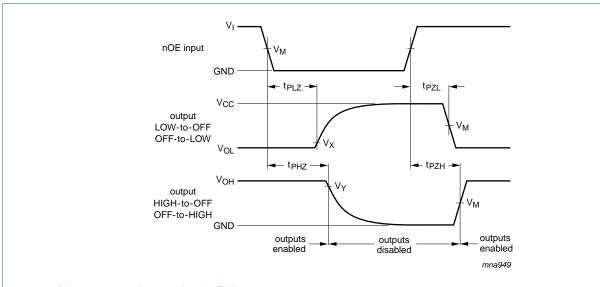
12. Waveforms



Measurement points are given in Table 9.

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig 7. The data input (nA) to output (nY) propagation delays



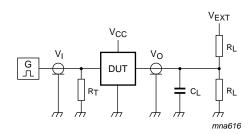
Measurement points are given in Table 9.

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig 8. 3-state enable and disable times

Table 9. Measurement points

Supply voltage	Input	Output	Output					
V _{CC}	V _M	V _M	V _X	V _Y				
1.65 V to 1.95 V	$0.5 \times V_{\text{CC}}$	$0.5 \times V_{CC}$	V _{OL} + 0.15 V	$V_{OH}-0.15\ V$				
2.3 V to 2.7 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V _{OL} + 0.15 V	$V_{OH}-0.15\ V$				
2.7 V	1.5 V	1.5 V	V_{OL} + 0.3 V	$V_{OH}-0.3\ V$				
3.0 V to 3.6 V	1.5 V	1.5 V	V _{OL} + 0.3 V	$V_{OH} - 0.3 V$				
4.5 V to 5.5 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V _{OL} + 0.3 V	$V_{OH} - 0.3 V$				



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_0 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 _{EXT}			
V _{CC}	VI	V_l t_r, t_f		R_L	t _{PLH} , t _{PHL}	t _{PZH} , t _{PHZ}	t_{PZL}, t_{PLZ}		
1.65 V to 1.95 V	V_{CC}	\leq 2.0 ns	30 pF	1 k Ω	open	GND	$2\times V_{CC}$		
2.3 V to 2.7 V	V_{CC}	\leq 2.0 ns	30 pF	500Ω	open	GND	$2\times V_{CC}$		
2.7 V	2.7 V	\leq 2.5 ns	50 pF	500Ω	open	GND	6 V		
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500Ω	open	GND	6 V		
4.5 V to 5.5 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	$2\times V_{CC}$		

13. Package outline

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

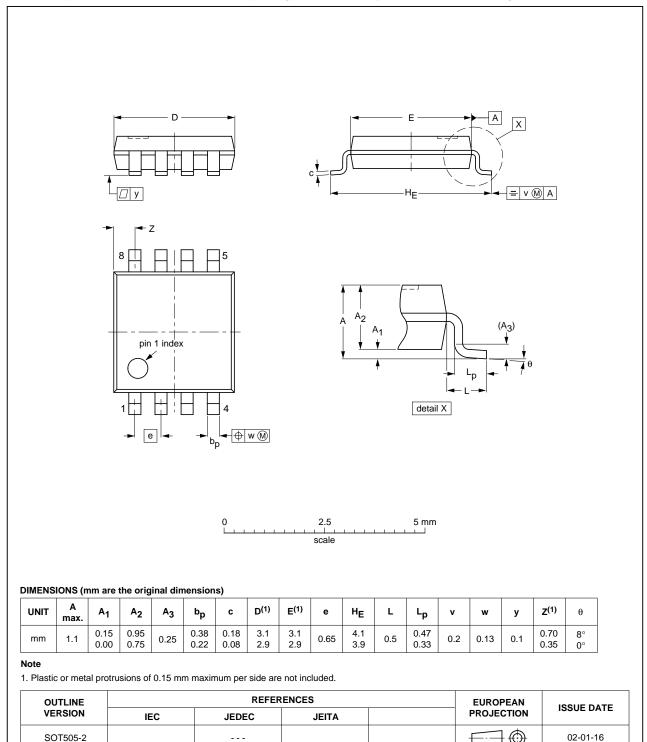
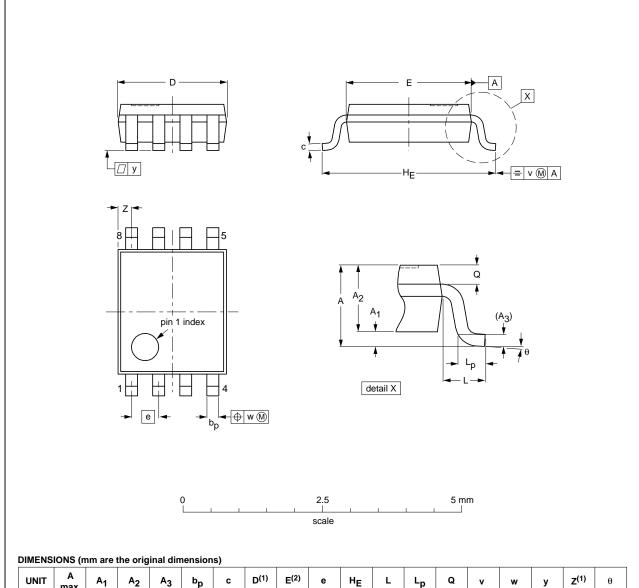


Fig 10. Package outline SOT505-2 (TSSOP8)

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VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1



UNIT	A max.	A ₁	A ₂	А3	bp	С	D ⁽¹⁾	E ⁽²⁾	е	HE	L	Lp	Q	٧	w	у	Z ⁽¹⁾	θ
mm	1	0.15 0.00	0.85 0.60	0.12	0.27 0.17	0.23 0.08	2.1 1.9	2.4 2.2	0.5	3.2 3.0	0.4	0.40 0.15	0.21 0.19	0.2	0.13	0.1	0.4 0.1	8° 0°

Notes

- Plastic or metal protrusions of 0.15 mm maximum per side are not included.
- 2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE	REFERENCES				EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT765-1		MO-187				02-06-07

Fig 11. Package outline SOT765-1 (VSSOP8)

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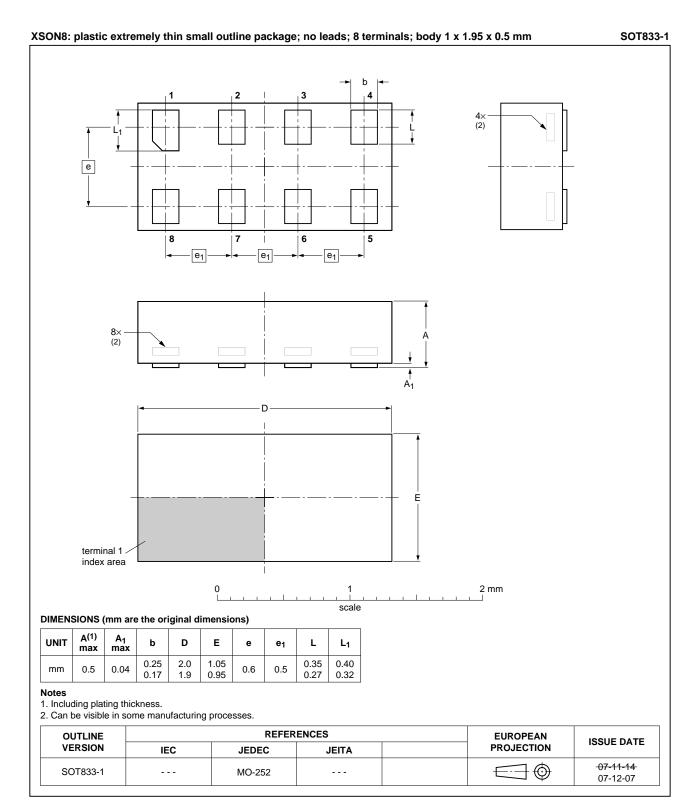


Fig 12. Package outline SOT833-1 (XSON8)

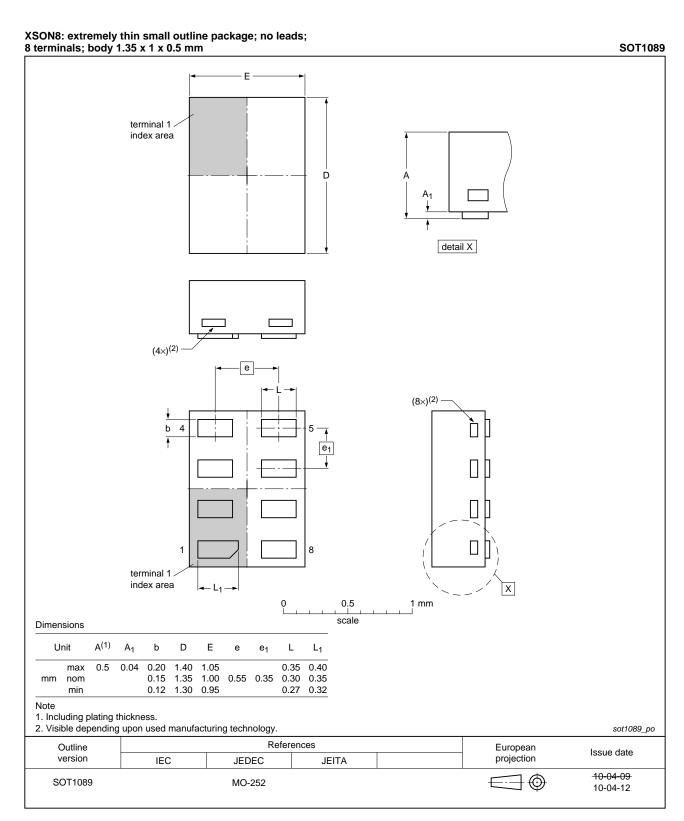


Fig 13. Package outline SOT1089 (XSON8)

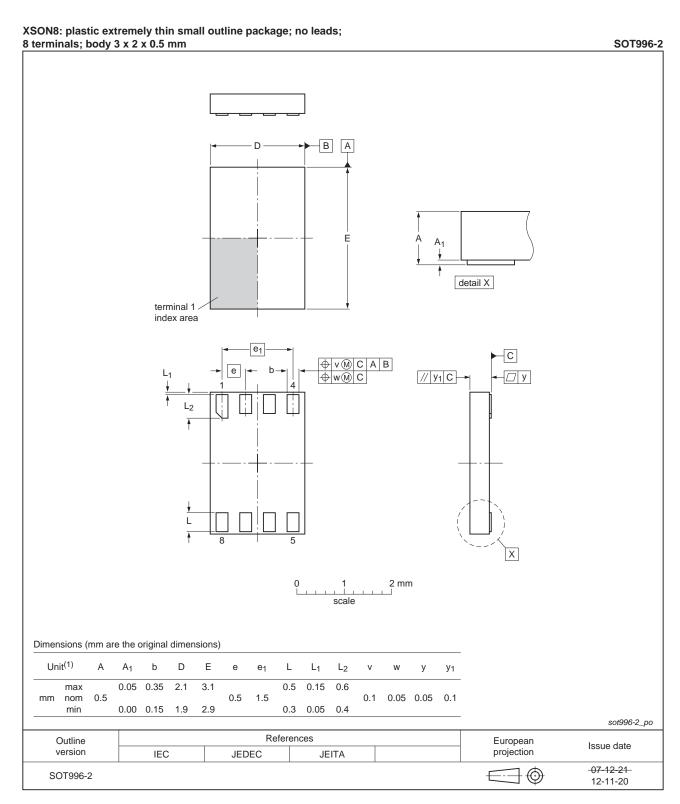


Fig 14. Package outline SOT996-2 (XSON8)

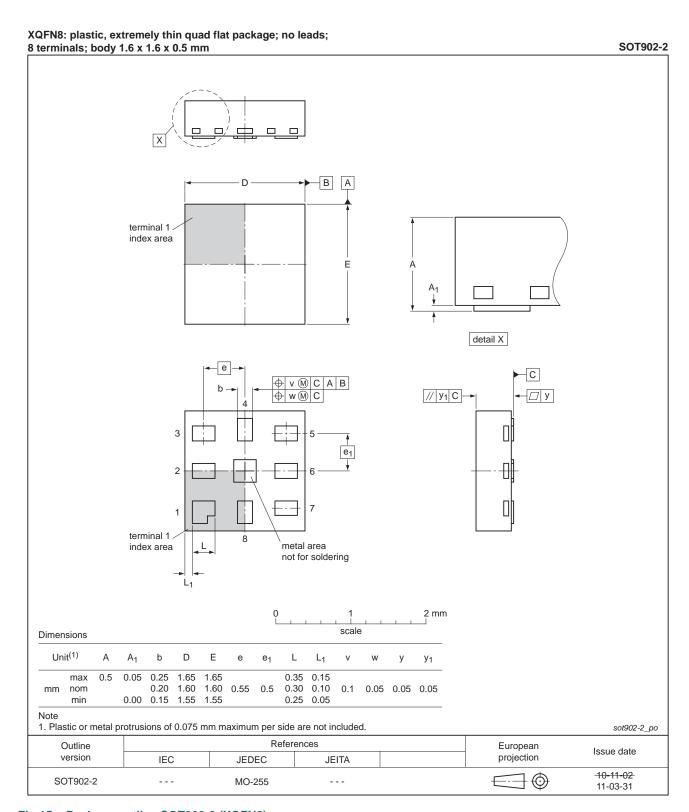


Fig 15. Package outline SOT902-2 (XQFN8)

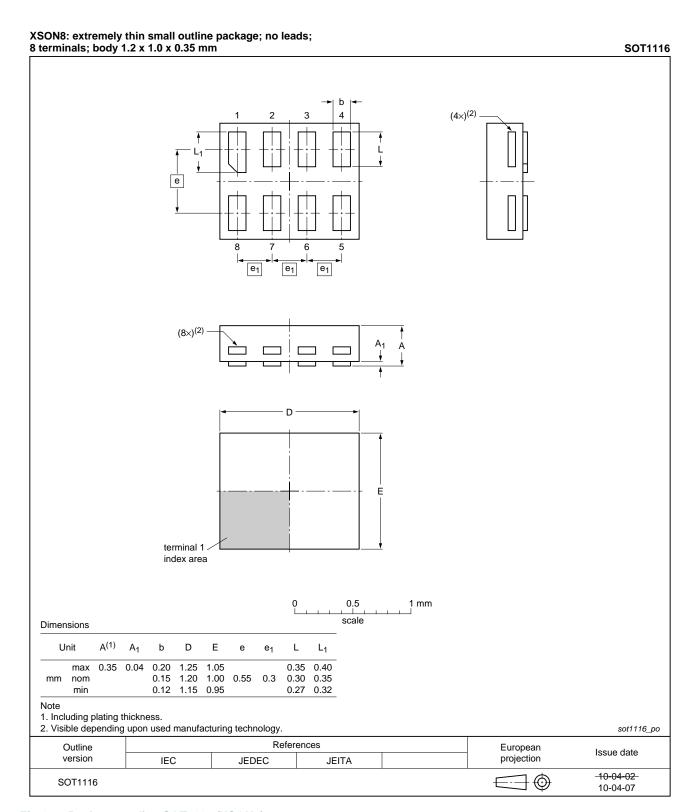


Fig 16. Package outline SOT1116 (XSON8)

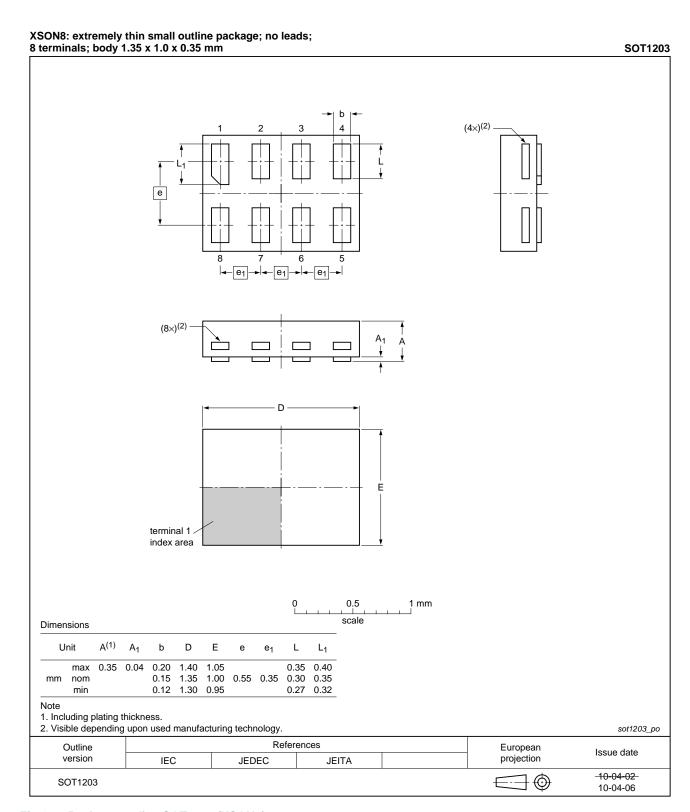


Fig 17. Package outline SOT1203 (XSON8)

14. 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

15. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC2G126 v.12	20130408	Product data sheet	-	74LVC2G126 v.11
Modifications:	 For type nu 	mber 74LVC2G126GD XSC	N8U has changed to X	SON8.
74LVC2G126 v.11	20120622	Product data sheet	-	74LVC2G126 v.10
Modifications:	 For type nu 	mber 74LVC2G126GM the	SOT code has changed	d to SOT902-2.
74LVC2G126 v.10	20111201	Product data sheet	-	74LVC2G126 v.9
Modifications:	 Legal pages 	s updated.		
74LVC2G126 v.9	20100913	Product data sheet	-	74LVC2G126 v.8
74LVC2G126 v.8	20080505	Product data sheet	-	74LVC2G126 v.7
74LVC2G126 v.7	20080228	Product data sheet	-	74LVC2G126 v.6
74LVC2G126 v.6	20070907	Product data sheet	-	74LVC2G126 v.5
74LVC2G126 v.5	20061006	Product data sheet	-	74LVC2G126 v.4
74LVC2G126 v.4	20050201	Product specification	-	74LVC2G126 v.3
74LVC2G126 v.3	20040922	Product specification	-	74LVC2G126 v.2
74LVC2G126 v.2	20030901	Product specification	-	74LVC2G126 v.1
74LVC2G126 v.1	20030310	Product specification	-	-
-				

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.

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- [2] The term 'short data sheet' is explained in section "Definitions"
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Dual bus buffer/line driver; 3-state

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