Bus buffer/line driver; 3-state Rev. 14 — 15 March 2019

### 1. General description

The 74LVC1G126 provides one non-inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input (OE). A LOW-level at pin OE causes the output to assume a high-impedance OFF-state.

The 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.

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)
  - JESD8B/JESD36 (2.7 V to 3.6 V)
- $\pm 24$  mA output drive (V<sub>CC</sub> = 3.0 V)
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- CMOS low power consumption
- Inputs accept voltages up to 5 V
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

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# 3. Ordering information

Type number	Package							
	Temperature range	Name	Description	Version				
74LVC1G126GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1				
74LVC1G126GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753				
74LVC1G126GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm	SOT886				
74LVC1G126GF	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm	SOT891				
74LVC1G126GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 x 1.0 x 0.35 mm	SOT1115				
74LVC1G126GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 x 1.0 x 0.35 mm	SOT1202				
74LVC1G126GX	-40 °C to +125 °C	X2SON5	X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 x 0.8 x 0.35 mm	SOT1226				

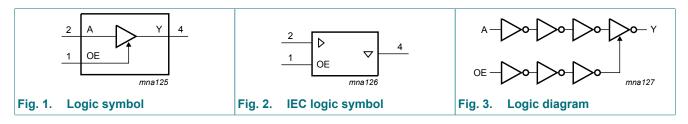
### 4. Marking

#### Table 2. Marking codes

Type number	Marking[1]
74LVC1G126GW	VN
74LVC1G126GV	V26
74LVC1G126GM	VN
74LVC1G126GF	VN
74LVC1G126GN	VN
74LVC1G126GS	VN
74LVC1G126GX	VN

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

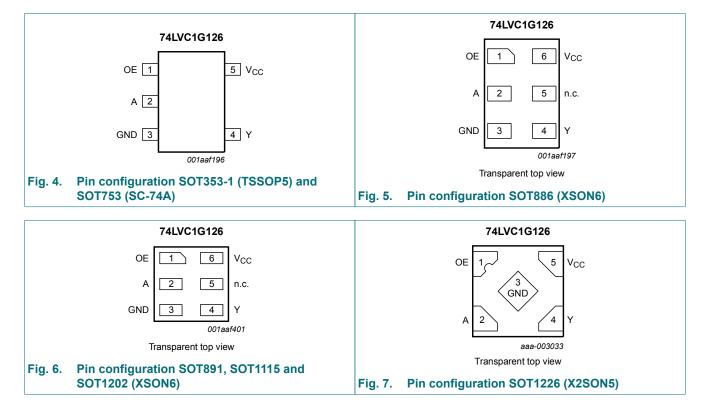
### 5. Functional diagram



74LVC1G126

### 6. Pinning information

6.1. Pinning



### 6.2. Pin description

Symbol	Pin	Pin		
	TSSOP5, SC-74A and X2SON5	XSON6		
OE	1	1	output enable input	
A	2	2	data input	
GND	3	3	ground (0 V)	
Y	4	4	data output	
n.c.	-	5	not connected	
V <sub>CC</sub>	5	6	supply voltage	

### 7. Functional description

#### Table 4. Function table

*H* = *HIGH* voltage level; *L* = *LOW* voltage level; *X* = don't care; *Z* = high-impedance OFF-state.

Input OE	Output	
OE	A	Y
н	L	L
н	Н	Н
L	X	Z

74LVC1G126

### 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 <sub>CC</sub>	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>ОК</sub>	output clamping current	$V_{\rm O}$ > $V_{\rm CC}$ or $V_{\rm O}$ < 0 V		-	±50	mA
Vo	output voltage	Active mode	[1]	-0.5	V <sub>CC</sub> + 0.5	V
		Power-down mode; $V_{CC}$ = 0 V	[1]	-0.5	+6.5	V
I <sub>O</sub>	output current	$V_{O} = 0 V \text{ to } V_{CC}$		-	±50	mA
I <sub>CC</sub>	supply current			-	100	mA
I <sub>GND</sub>	ground current			-100	-	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to +125 °C	[2]	-	250	mW
T <sub>stg</sub>	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] For TSSOP5 and SC-74A packages: above 87.5 °C the value of P<sub>tot</sub> derates linearly with 4.0 mW/K. For XSON6 and X2SON5 package: above 118 °C the value of P<sub>tot</sub> derates linearly with 7.8 mW/K.

### 9. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Тур	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	-	V <sub>CC</sub>	V
		V <sub>CC</sub> = 0 V; Power-down mode	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

#### Table 6. Recommended operating conditions

### **10. Static characteristics**

#### Table 7. Static characteristics

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

Symbol	Parameter	Conditions	Min	Typ <mark>[1]</mark>	Мах	Unit
T <sub>amb</sub> = -4	0 °C to +85 °C		,			
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	-	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	$0.7 \times V_{CC}$	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.3 × V <sub>CC</sub>	V
V <sub>OL</sub> LOW-level output vol	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$V_{CC}$ = 1.65 V to 5.5 V; I <sub>O</sub> = 100 µA	-	-	0.1	V
		V <sub>CC</sub> = 1.65 V; I <sub>O</sub> = 4 mA	-	-	0.45	V
		V <sub>CC</sub> = 2.3 V; I <sub>O</sub> = 8 mA	-	-	0.3	V
		V <sub>CC</sub> = 2.7 V; I <sub>O</sub> = 12 mA	-	-	0.4	V
		V <sub>CC</sub> = 3.0 V; I <sub>O</sub> = 24 mA	-	-	0.55	V
		V <sub>CC</sub> = 4.5 V; I <sub>O</sub> = 32 mA	-	-	0.55	V
V <sub>OH</sub>	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$V_{CC}$ = 1.65 V to 5.5 V; I <sub>O</sub> = -100 µA	V <sub>CC</sub> - 0.1	-	-	V
		V <sub>CC</sub> = 1.65 V; I <sub>O</sub> = -4 mA	1.2	-	-	V
		V <sub>CC</sub> = 2.3 V; I <sub>O</sub> = -8 mA	1.9	-	-	V
		V <sub>CC</sub> = 2.7 V; I <sub>O</sub> = -12 mA	2.2	-	-	V
		V <sub>CC</sub> = 3.0 V; I <sub>O</sub> = -24 mA	2.3	-	-	V
		V <sub>CC</sub> = 4.5 V; I <sub>O</sub> = -32 mA	3.8	-	-	V
l <sub>l</sub>	input leakage current	$V_{CC}$ = 0 V to 5.5 V; V <sub>1</sub> = 5.5 V or GND	-	±0.1	±1	μA
I <sub>OZ</sub>	OFF-state output current	$V_{CC}$ = 3.6 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 5.5 V or GND	-	±0.1	±2	μA
OFF	power-off leakage current	$V_{CC}$ = 0 V; V <sub>I</sub> or V <sub>O</sub> = 5.5 V	-	±0.1	±2	μA
l <sub>cc</sub>	supply current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 1.65 V to 5.5 V; I <sub>O</sub> = 0 A	-	0.1	4	μA
ΔI <sub>CC</sub>	additional supply current	per pin; $V_{CC}$ = 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	μA
CI	input capacitance		-	5	-	pF

### Bus buffer/line driver; 3-state

Symbol	Parameter	Conditions	Min	Тур <mark>[1]</mark>	Мах	Unit
T <sub>amb</sub> = -4	0 °C to +125 °C					
VIH	HIGH-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	-	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.7 × V <sub>CC</sub>	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	V
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	0.3 × V <sub>CC</sub>	V
V <sub>OL</sub>	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$V_{CC}$ = 1.65 V to 5.5 V; I <sub>O</sub> = 100 µA	-	-	0.1	V
		V <sub>CC</sub> = 1.65 V; I <sub>O</sub> = 4 mA	-	-	0.70	V
		V <sub>CC</sub> = 2.3 V; I <sub>O</sub> = 8 mA	-	-	0.45	V
		V <sub>CC</sub> = 2.7 V; I <sub>O</sub> = 12 mA	-	-	0.60	V
		V <sub>CC</sub> = 3.0 V; I <sub>O</sub> = 24 mA	-	-	0.80	V
		V <sub>CC</sub> = 4.5 V; I <sub>O</sub> = 32 mA	-	-	0.80	V
V <sub>OH</sub>	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		$V_{CC}$ = 1.65 V to 5.5 V; I <sub>O</sub> = -100 µA	V <sub>CC</sub> - 0.1	-	-	V
		V <sub>CC</sub> = 1.65 V; I <sub>O</sub> = -4 mA	0.95	-	-	V
		V <sub>CC</sub> = 2.3 V; I <sub>O</sub> = -8 mA	1.7	-	-	V
		V <sub>CC</sub> = 2.7 V; I <sub>O</sub> = -12 mA	1.9	-	-	V
		V <sub>CC</sub> = 3.0 V; I <sub>O</sub> = -24 mA	2.0	-	-	V
		V <sub>CC</sub> = 4.5 V; I <sub>O</sub> = -32 mA	3.4	-	-	V
l <sub>l</sub>	input leakage current	$V_{CC}$ = 0 V to 5.5 V; V <sub>I</sub> = 5.5 V or GND	-	-	±1	μA
I <sub>OZ</sub>	OFF-state output current	$V_{CC}$ = 3.6 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 5.5 V or GND	-	-	±2	μA
I <sub>OFF</sub>	power-off leakage current	$V_{CC}$ = 0 V; V <sub>1</sub> or V <sub>0</sub> = 5.5 V	-	-	±2	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 1.65 V to 5.5 V; I <sub>O</sub> = 0 A	-	-	4	μA
ΔI <sub>CC</sub>	additional supply current	per pin; $V_{CC}$ = 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 00	μA

[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 test circuit see Fig. 10.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to	Unit	
			Min	Typ[1]	Мах	Min	Max	
t <sub>pd</sub>	propagation delay	A to Y; see <u>Fig. 8</u> [2]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	3	8.0	1.0	10.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.5	2.1	5.5	0.5	7	ns
		V <sub>CC</sub> = 2.7 V	0.5	2.3	5.5	0.5	7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.5	2.0	4.5	0.5	6	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.5	1.7	4.0	0.5	5.5	ns
t <sub>en</sub>	enable time	OE to Y; see Fig. 9 [3]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	3.2	9.4	1.0	12	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.5	2.2	6.6	0.5	8.5	ns
		V <sub>CC</sub> = 2.7 V	0.5	2.4	6.6	0.5	8.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.5	2.1	5.3	0.5	7	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.5	1.6	5.0	0.5	6.5	ns
t <sub>dis</sub>	disable time	OE to Y; see Fig. 9 [4]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	4.3	9.2	1.0	12	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.5	2.7	5.5	0.5	7	ns
		V <sub>CC</sub> = 2.7 V	0.5	3.4	5.5	0.5	7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.5	3.0	5.5	0.5	7	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.5	2.2	4.2	0.5	5.5	ns
C <sub>PD</sub>	power dissipation	per buffer; $V_1$ = GND to $V_{CC}$ [5]						
	capacitance	output enabled	-	25	-	-	-	pF
		output disabled	-	6	-	-	-	pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.

[2]  $t_{pd}$  is the same as  $t_{PLH}$  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<sub>D</sub> in  $\mu$ 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;

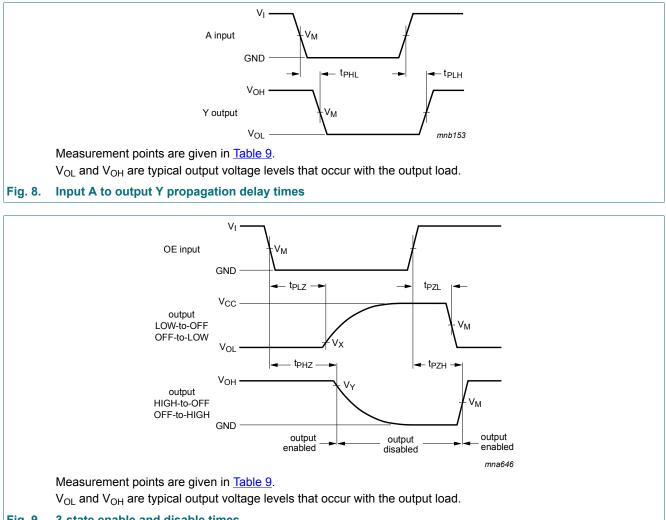
 $C_L$  = output load capacitance in pF;

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

N = number of inputs switching;  $\sum (C_L \times V_{CC}^2 \times f_0)$  = sum of outputs.

74LVC1G126

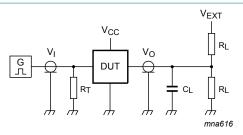
### 11.1. Waveforms and test circuit



#### Fig. 9. 3-state enable and disable times

Supply voltage	Input	Output		
V <sub>cc</sub>	V <sub>M</sub>	V <sub>M</sub>	V <sub>X</sub>	V <sub>Y</sub>
1.65 V to 1.95 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V	V <sub>OH</sub> - 0.15 V
2.3 V to 2.7 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V	V <sub>OH</sub> - 0.15 V
2.7 V	1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> - 0.3 V
3.0 V to 3.6 V	1.5 V	1.5 V	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> - 0.3 V
4.5 V to 5.5 V	0.5V <sub>CC</sub>	0.5V <sub>CC</sub>	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> - 0.3 V

#### Bus buffer/line driver; 3-state



Test data is given in Table 10.

Definitions for test circuit:

R<sub>L</sub> = Load resistance.

 $C_{\text{L}}$  = Load capacitance including jig and probe capacitance.

 $R_T$  = Termination resistance should be equal to the output impedance  $Z_0$  of the pulse generator.

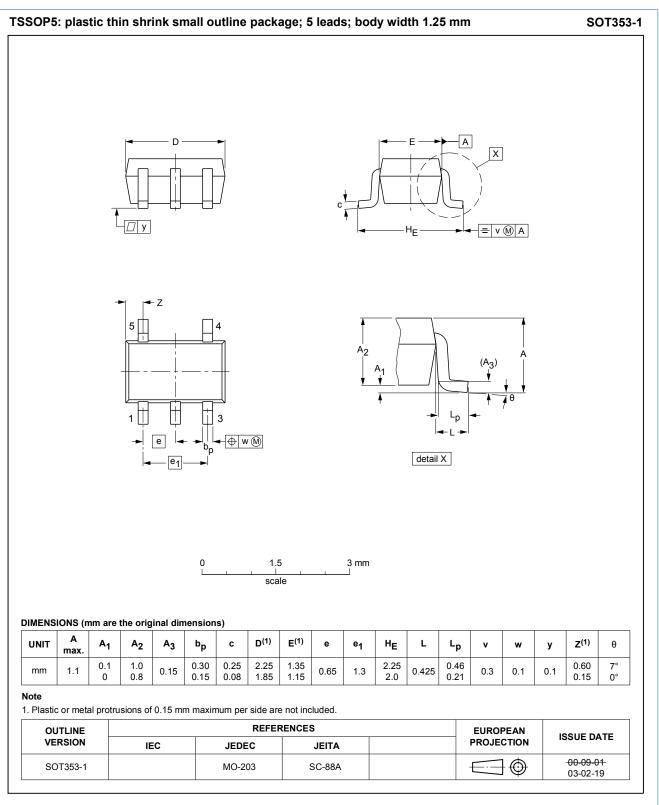
 $V_{EXT}$  = External voltage for measuring switching times.

#### Fig. 10. Test circuit for measuring switching times

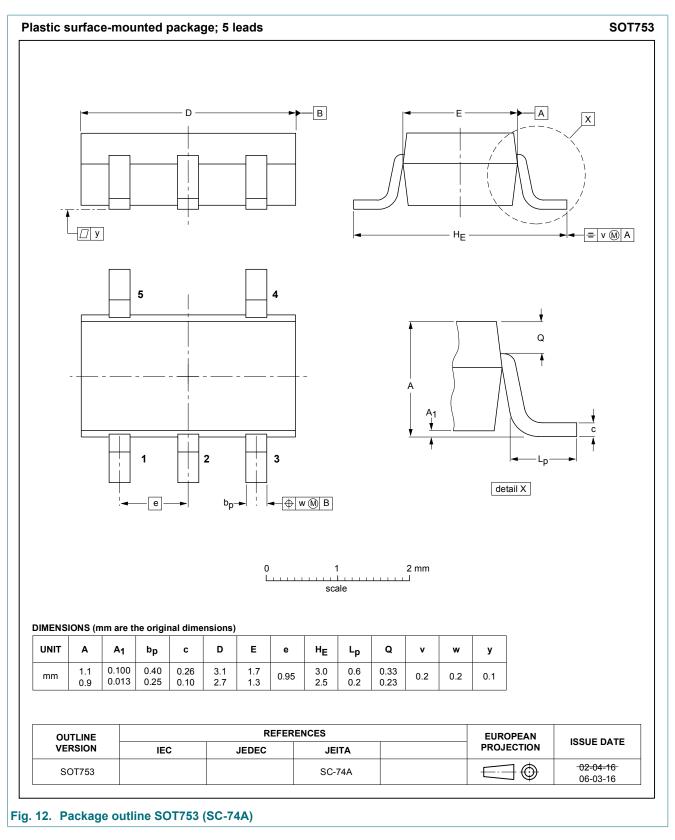
#### Table 10. Test data

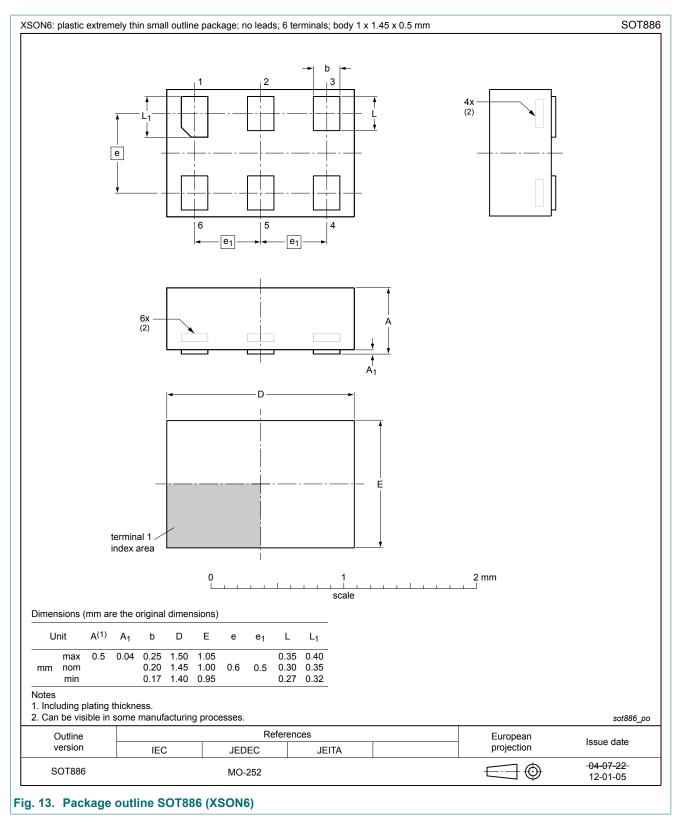
Supply voltage	Input	out		Load		V <sub>EXT</sub>		
V <sub>cc</sub>	VI	t <sub>r</sub> , t <sub>f</sub>	CL	RL	t <sub>PLH</sub> , t <sub>PHL</sub>	t <sub>PZH</sub> , t <sub>PHZ</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>	
1.65 V to 1.95 V	V <sub>CC</sub>	≤ 2.0 ns	30 pF	1 kΩ	open	GND	2V <sub>CC</sub>	
2.3 V to 2.7 V	V <sub>CC</sub>	≤ 2.0 ns	30 pF	500 Ω	open	GND	2V <sub>CC</sub>	
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	GND	6 V	
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	GND	6 V	
4.5 V to 5.5 V	V <sub>CC</sub>	≤ 2.5 ns	50 pF	500 Ω	open	GND	2V <sub>CC</sub>	

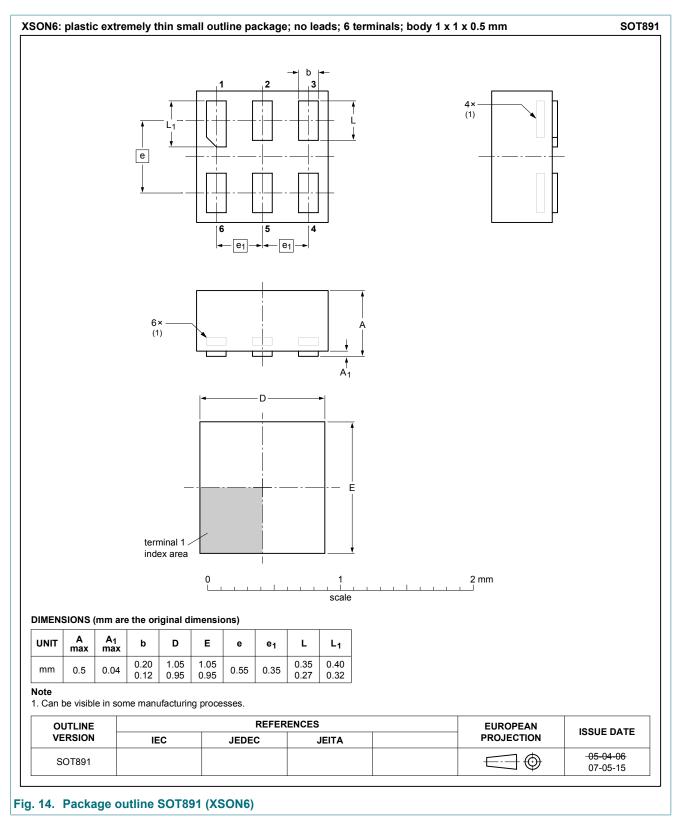
### 12. Package outline

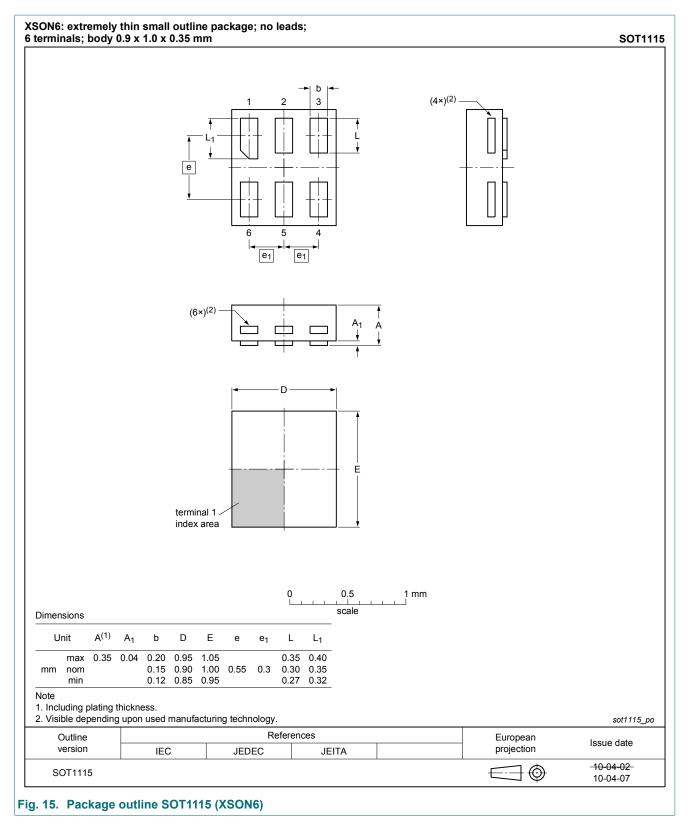


#### Fig. 11. Package outline SOT353-1 (TSSOP5)

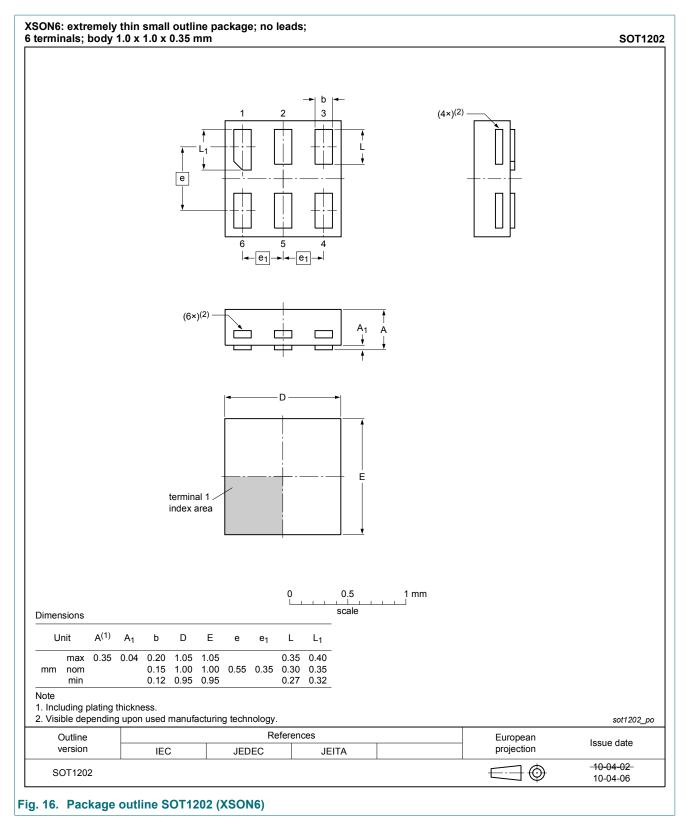




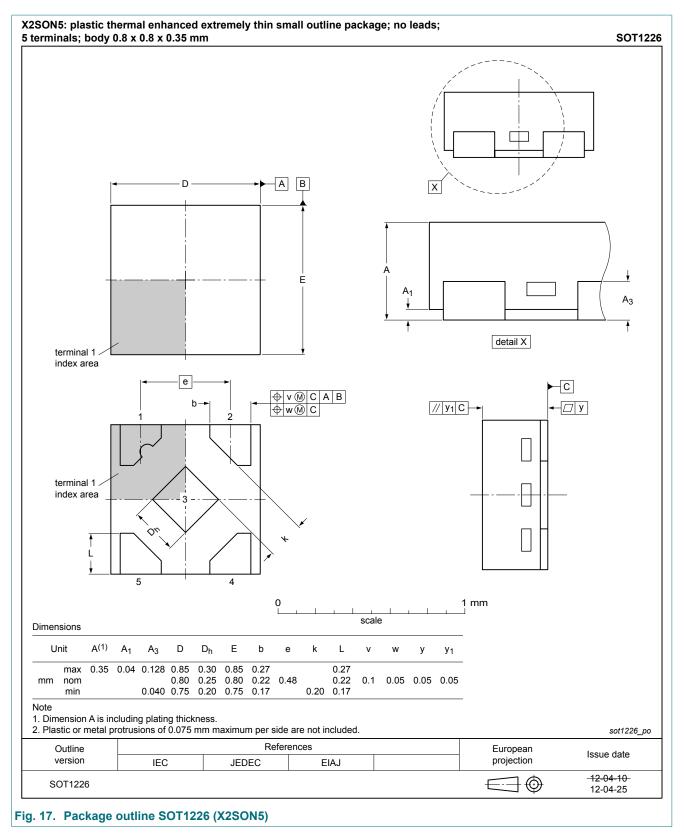




#### Bus buffer/line driver; 3-state



**Product data sheet** 



### 13. Abbreviations

Table 11. Abbrev	Table 11. Abbreviations					
Acronym	Description					
CMOS	Complementary Metal Oxide Semiconductor					
DUT	Device Under Test					
ESD	ElectroStatic Discharge					
НВМ	Human Body Model					
ММ	Machine Model					
TTL	Transistor-Transistor Logic					

# 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G126 v.14	20190315	Product data sheet	-	74LVC1G126 v.13
Modifications:	<ul> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
74LVC1G126 v.13	20161202	Product data sheet	-	74LVC1G126 v.12
Modifications:	• <u>Table 7</u> : The	maximum limits for leakage	current and supply cur	rent have changed.
74LVC1G126 v.12	20120702	Product data sheet	-	74LVC1G126 v.11
Modifications:	<ul> <li>Added type number 74LVC1G126GX (SOT1226)</li> <li>Package outline drawing of SOT886 (Fig. 13) modified.</li> </ul>			
74LVC1G126 v.11	20111208	Product data sheet	-	74LVC1G126 v.10
Modifications:	Legal pages	updated.		'
74LVC1G126 v.10	20101229	Product data sheet	-	74LVC1G126 v.9
74LVC1G126 v.9	20100825	Product data sheet	-	74LVC1G126 v.8
74LVC1G126 v.8	20090409	Product data sheet	-	74LVC1G126 v.7
74LVC1G126 v.7	20070830	Product data sheet	-	74LVC1G126 v.6
74LVC1G126 v.6	20061009	Product data sheet	-	74LVC1G126 v.5
74LVC1G126 v.5	20040921	Product specification	-	74LVC1G126 v.4
74LVC1G126 v.4	20021002	Product specification	-	74LVC1G126 v.3
74LVC1G126 v.3	20020528	Product specification	-	74LVC1G126 v.2
74LVC1G126 v.2	20010406	Preliminary specification	-	74LVC1G126 v.1
74LVC1G126 v.1	20001222	Preliminary specification	-	-

### 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

 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 <u>https://www.nexperia.com</u>.

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