1 General description

The 74LVC1G06 provides the inverting buffer.

Input can be driven from either 3.3 V or 5 V devices. These features allow the use of these devices 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 a damaging backflow current through the device when it is powered down.

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.

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)
- ±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
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +125 °C

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Inverter with open-drain output

3 Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LVC1G06GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74LVC1G06GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74LVC1G06GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
74LVC1G06GF	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm	SOT891
74LVC1G06GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115
74LVC1G06GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202
74LVC1G06GX	-40 °C to +125 °C	X2SON5	plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.35 mm	SOT1226

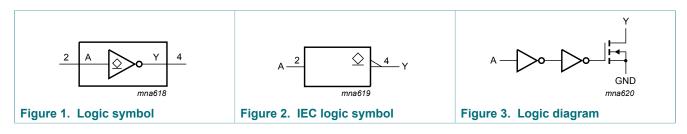
4 Marking

Table	2.	Marking	codes	
Tune		mhar		

Type number	Marking ^[1]
74LVC1G06GW	VR
74LVC1G06GV	V06
74LVC1G06GM	VR
74LVC1G06GF	VR
74LVC1G06GN	VR
74LVC1G06GS	VR
74LVC1G06GX	VR

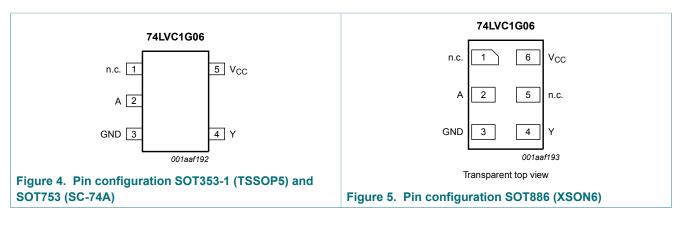
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

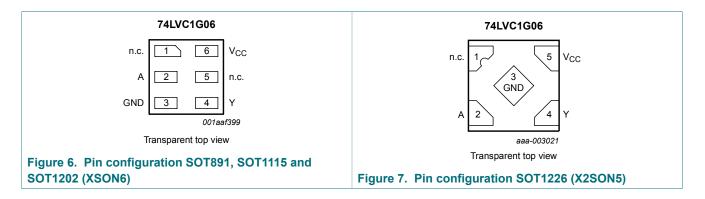
5 Functional diagram



6 Pinning information

6.1 Pinning





6.2 Pin description

Table 3. Pin description			
Symbol	Pin		Description
	TSSOP5 and X2SON5	XSON6	
n.c.	1	1	not connected
A	2	2	data input
GND	3	3	ground (0 V)
Y	4	4	data output
n.c.	-	5	not connected
V _{CC}	5	6	supply voltage

74LVC1G06 Product data sheet

7 Functional description

Table 4. Function table

Input ^[1]	Output
A	Y
L	Z
Н	L

[1] H = HIGH voltage level; L = LOW voltage level; 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 ₁ < 0 V		-50	-	mA
VI	input voltage		[1]	-0.5	+6.5	V
I _{ОК}	output clamping current	$V_{\rm O}$ > $V_{\rm CC}$ or $V_{\rm O}$ < 0 V		-	±50	mA
Vo	output voltage	Active mode and Power-down mode	[1]	-0.5	+6.5	V
I _{O(sink/source)}	output sink or source current	$V_{O} = 0 V \text{ to } V_{CC}$		-	±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 °C to +125 °C	[2]	-	250	mW

[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 $^\circ$ C the value of P_{tot} derates linearly with 4.0 mW/K.

For XSON6 and X2SON5 package: above 118 °C the value of Ptot derates linearly with 7.8 mW/K.

9 Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Тур	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

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10 Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	-40	°C to +8	5 °C	-40 °C to	+125 °C	Unit
			Min	Тур ^[1]	Max	Min	Мах	
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	$V_{I} = V_{IH} \text{ or } V_{IL}$						
	voltage	I _O = 100 μA; V _{CC} = 1.65 V to 5.5 V	-	-	0.10	-	0.10	V
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.45	-	0.70	V
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.30	-	0.45	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.40	-	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
lı	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	±0.1	±1	-	±1	μA
I _{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
I _{OFF}	power-off leakage current	$V_1 \text{ or } V_0 = 5.5 \text{ V}; V_{CC} = 0 \text{ V}$	-	±0.1	±2	-	±2	μA
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	$V_{I} = V_{CC} - 0.6 V; I_{O} = 0 A;$ $V_{CC} = 2.3 V to 5.5 V; per pin$	-	5	500	-	5 00	μA
CI	input capacitance	V_{CC} = 3.3 V; V_{I} = GND to V_{CC}	-	5	-	-	-	pF

[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 Figure 9.

Symbol	Parameter	Conditions	-40	0 °C to +85	°C	-40 °C to	+125 °C	Unit
			Min	Тур ^[1]	Мах	Min	Max	
t _{pd}	propagation delay	A to Y; see Figure 8 [2]						
		V _{CC} = 1.65 V to 1.95 V	1.0	3	6.5	1.0	8.5	ns
		V _{CC} = 2.3 V to 2.7 V	0.5	1.9	4	0.5	5.5	ns
		V _{CC} = 2.7 V	0.5	2.5	4.5	0.5	6	ns
		V _{CC} = 3.0 V to 3.6 V	0.5	2.3	4	0.5	5.5	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	1.7	3	0.5	4	ns
C _{PD}	power dissipation capacitance	V_{I} = GND to V_{CC} ; V_{CC} = 3.3 V ^[3]	-	14	-	-	-	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).

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

 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.

11.1 Waveforms and test circuit

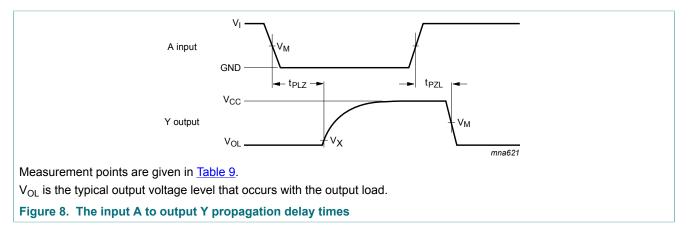


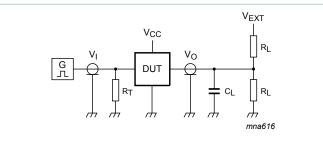
Table 9. Measurement points

Supply voltage	Input	Output	
V _{cc}	V _M	V _M	V _X
1.65 V to 1.95 V	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.15 V
2.3 V to 2.7 V	0.5V _{CC}	0.5V _{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	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.3 V

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Test data is given in Table 10.

Definitions test circuit:

R_L = Load resistance.

 C_L = Load capacitance including jig and probe capacitance.

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

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

Figure 9. Test circuit for measuring switching times

Table 10. Test data					
Supply voltage	Input		Load		V _{EXT}
V _{cc}	VI	t _r = t _f	CL	RL	t _{PZL} , t _{PLZ}
1.65 V to 1.95 V	V _{CC}	≤ 2.0 ns	30 pF	1 kΩ	2V _{CC}
2.3 V to 2.7 V	V _{CC}	≤ 2.0 ns	30 pF	500 Ω	2V _{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	2V _{CC}

Inverter with open-drain output

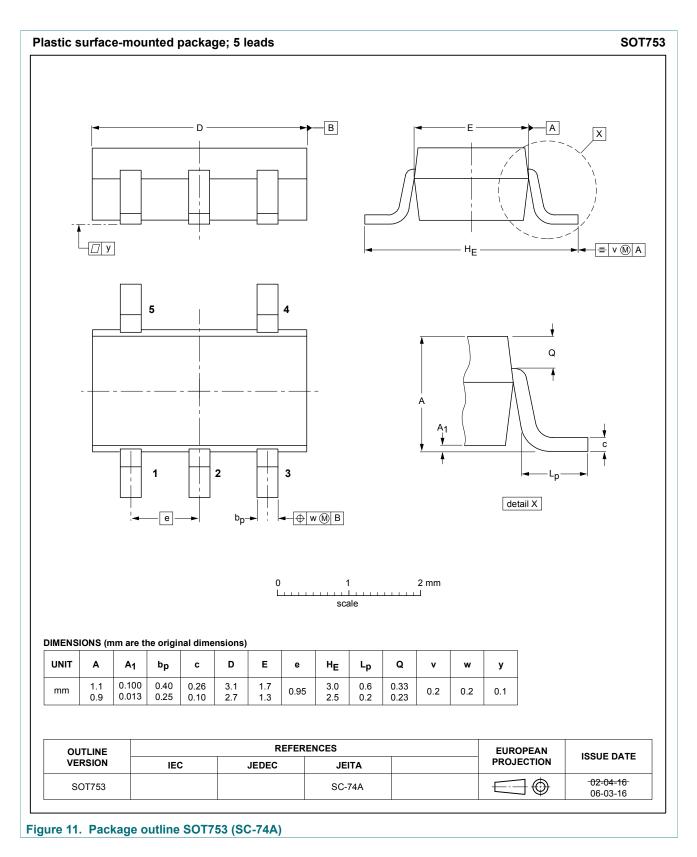
12 Package outline

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UNIT	A max.	A ₁	the orig	jinal din	0 bp	⊕ w s) c	1.: sca	E ⁽¹⁾	e	e ₁	HE	L	Lp	v	w	У	Z ⁽¹⁾	θ
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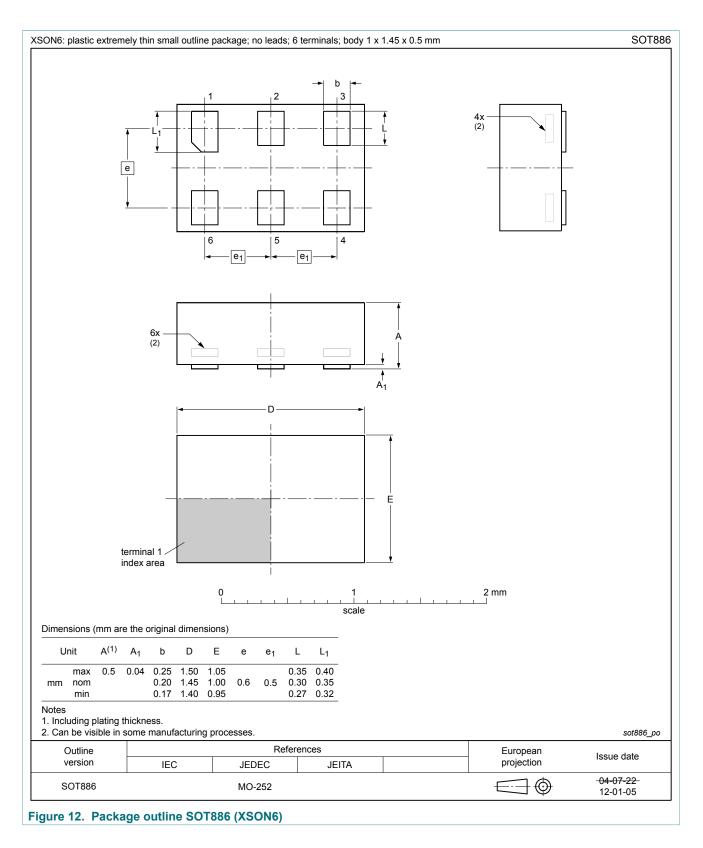
Figure 10. Package outline SOT353-1 (TSSOP5)

74LVC1G06 Product data sheet

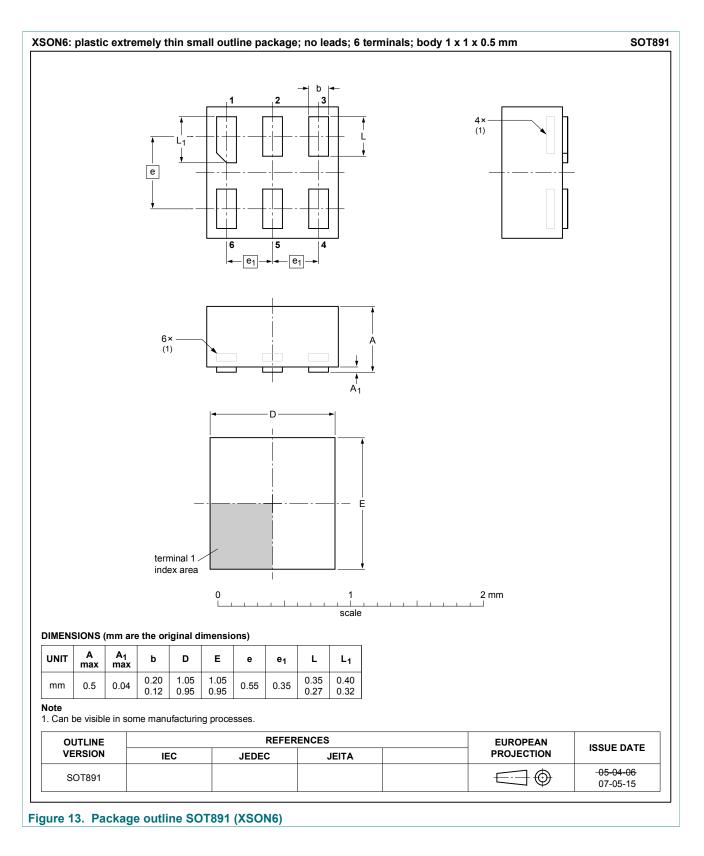
Inverter with open-drain output



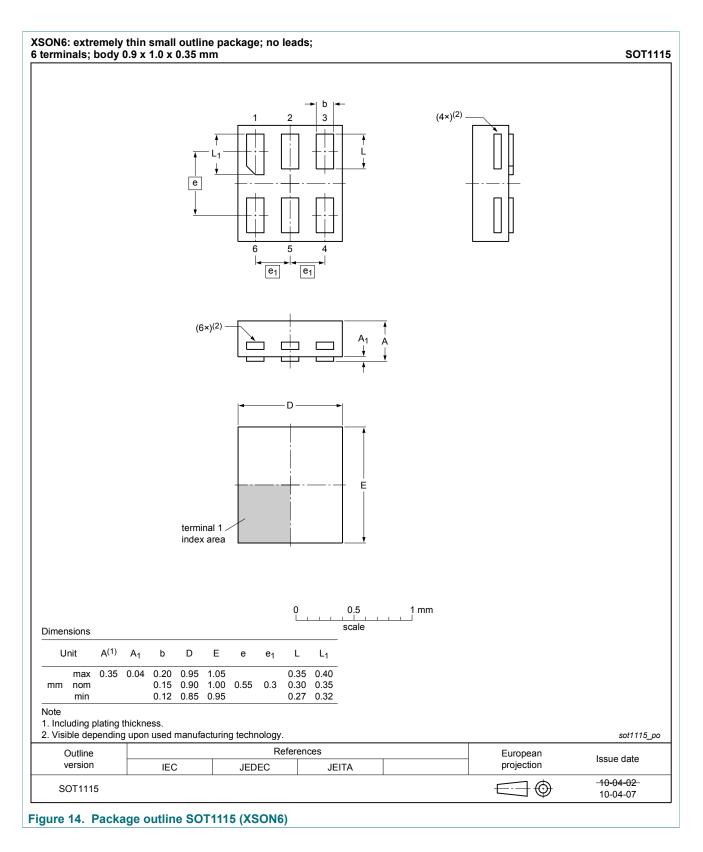
Inverter with open-drain output



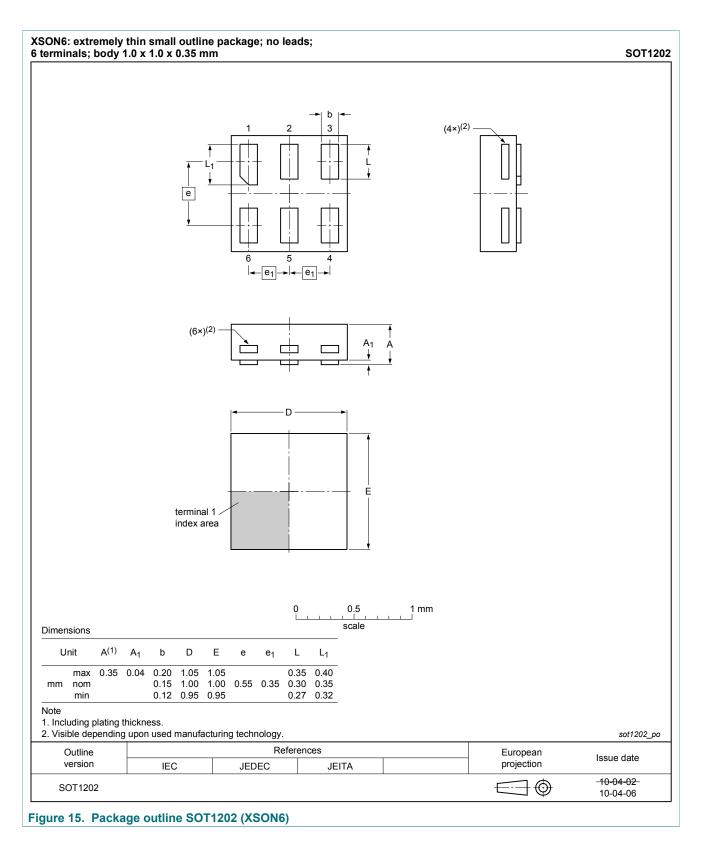
Inverter with open-drain output



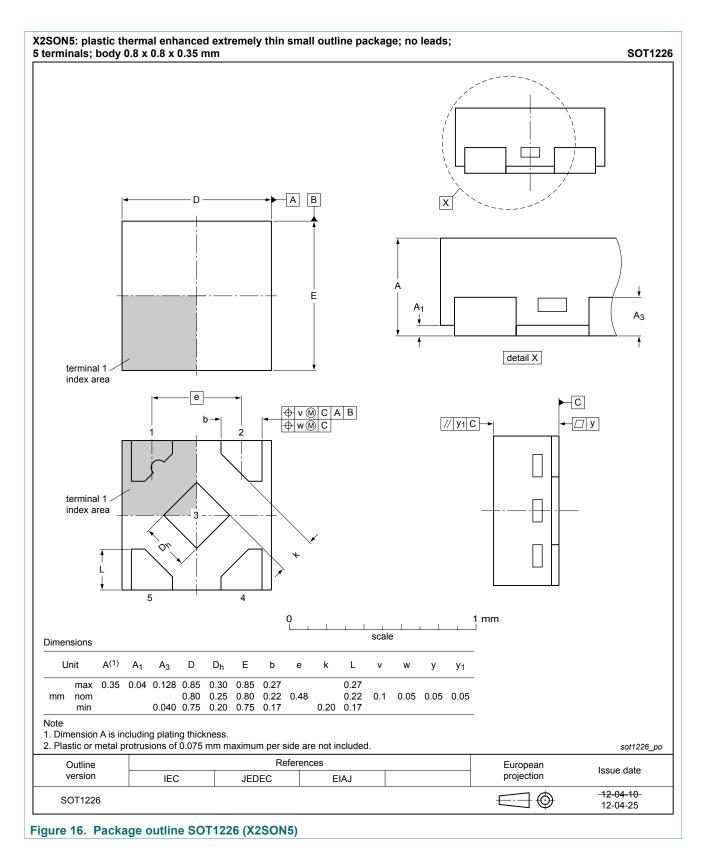
Inverter with open-drain output



Inverter with open-drain output



Inverter with open-drain output



Inverter 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			
74LVC1G06 v.12	20180522	Product data sheet	-	74LVC1G06 v.11			
Modifications:	Nexperia.	 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. 					
74LVC1G06 v.11	20161128	Product data sheet	-	74LVC1G06 v.10			
Modifications:		 <u>Table 7</u>: The maximum limits for leakage current and supply current have changed. <u>Table 7</u>: OFF-state output current parameter added. 					
74LVC1G06 v.10	20120629	Product data sheet	-	74LVC1G06 v.9			
Modifications:		 Added type number 74LVC1G06GX (SOT1226) Package outline drawing of SOT886 (Figure 12) modified. 					
74LVC1G06 v.9	20111207	Product data sheet	-	74LVC1G06 v.8			
Modifications:	 Legal pages u 	Legal pages updated.					
74LVC1G06 v.8	20101026	Product data sheet	-	74LVC1G06 v.7			
74LVC1G06 v.7	20070712	Product data sheet	-	74LVC1G06 v.6			
74LVC1G06 v.6	20060912	Product data sheet	-	74LVC1G06 v.5			
74LVC1G06 v.5	20040907	Product specification	-	74LVC1G06 v.4			
74LVC1G06 v.4	20030303	Product specification	-	74LVC1G06 v.3			
74LVC1G06 v.3	20020529	Product specification	-	74LVC1G06 v.2			
74LVC1G06 v.2	20010405	Product specification	-	74LVC1G06 v.1			
74LVC1G06 v.1	20001121	Product specification	-	-			

15 Legal information

15.1 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.

Please consult the most recently issued document before initiating or completing a design. [1]

The term 'short data sheet' is explained in section "Definitions".

[2] [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.nexperia.com.

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Inverter with open-drain output

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Date of release: 22 May 2018 Document identifier: 74LVC1G06

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