74LVC1G126-Q100

Bus buffer/line driver; 3-state

Rev. 4 — 3 May 2021

Product data sheet

1. General description

The 74LVC1G126-Q100 is a single buffer/line driver with 3-state output. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times. This device is fully specified for partial power down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Wide supply voltage range from 1.65 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- · High noise immunity
- · CMOS low power dissipation
- I_{OFF} circuitry provides partial Power-down mode operation
- ±24 mA output drive (V_{CC} = 3.0 V)
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Complies with JEDEC standard:
 - JESD8-7 (1.65 V to 1.95 V)
 - JESD8-5 (2.3 V to 2.7 V)
 - JESD8C (2.7 V to 3.6 V)JESD36 (4.5 V to 5.5 V)
- ESD protection:
 - MIL-STD-883, method 3015 exceeds 2000 V
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)

3. Ordering information

Table 1. Ordering information

	Table 1. Ordering inform	ation	table 1. Ordering information												
	Type number	Package													
		Temperature range	Name	Description	Version										
	74LVC1G126GW-Q100	-40 °C to +125 °C		plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1										
	74LVC1G126GV-Q100	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753										



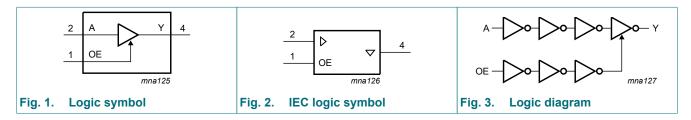
4. Marking

Table 2. Marking codes

Type number	Marking[1]
74LVC1G126GW-Q100	VN
74LVC1G126GV-Q100	V26

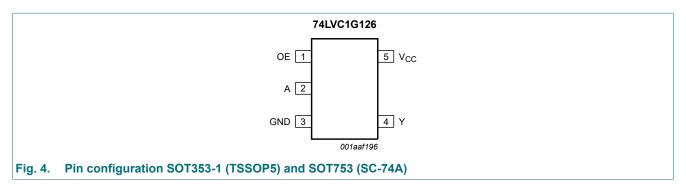
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
OE	1	output enable input
А	2	data input
GND	3	ground (0 V)
Υ	4	data output
V _{CC}	5	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		Output				
OE	A	Y				
Н	L	L				
Н	Н	Н				
L	X	Z				

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	$V_O > V_{CC}$ or $V_O < 0 V$	-	±50	mA
Vo	output voltage	Active mode [1]	-0.5	V _{CC} + 0.5	V
		Power-down mode; $V_{CC} = 0 V$ [1]	-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	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$ [2]	-	250	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.	Recommended operating conditions					
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	-	V _{CC}	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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^[2] For SOT353-1 (TSSOP5) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C. For SOT753 (SC-74A) package: P_{tot} derates linearly with 3.8 mW/K above 85 °C.

[.] o. oo . . oo (oo) paalaage . . _(o) aaraaaaa...**)** oo

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 × 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 × V _{CC}	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	0.35 × 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 × V _{CC}	V
V _{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_{O} = 100 μ A	-	-	0.1	V
		V _{CC} = 1.65 V; I _O = 4 mA	-	-	0.45	V
		V _{CC} = 2.3 V; I _O = 8 mA	-	-	0.3	V
		V _{CC} = 2.7 V; I _O = 12 mA	-	-	0.4	V
		V _{CC} = 3.0 V; I _O = 24 mA	-	-	0.55	V
		V _{CC} = 4.5 V; I _O = 32 mA	-	-	0.55	V
V _{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_{O} = -100 μ A	V _{CC} - 0.1	-	-	V
		V _{CC} = 1.65 V; I _O = -4 mA	1.2	-	-	V
		V _{CC} = 2.3 V; I _O = -8 mA	1.9	-	-	V
		V _{CC} = 2.7 V; I _O = -12 mA	2.2	-	-	V
		V _{CC} = 3.0 V; I _O = -24 mA	2.3	-	-	V
		V _{CC} = 4.5 V; I _O = -32 mA	3.8	-	-	V
l _l	input leakage current	V _{CC} = 0 V to 5.5 V; V _I = 5.5 V or GND	-	±0.1	±1	μΑ
l _{OZ}	OFF-state output current	$V_{CC} = 3.6 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};$ $V_O = 5.5 \text{ V or GND}$	-	±0.1	±2	μΑ
I _{OFF}	power-off leakage current	V _{CC} = 0 V; V _I or V _O = 5.5 V	-	±0.1	±2	μΑ
I _{CC}	supply current	$V_{CC} = 0.5 \text{ V}$, $V_{CC} = 0.5 \text{ V}$ $V_{CC} = 0.5 \text{ V}$ $V_{CC} = 0.65 \text{ V}$ to 0.5 V ; $V_{CC} = 0.65 \text{ V}$ to 0.5 V ; $V_{CC} = 0.65 \text{ V}$ to 0.5 V ; $V_{CC} = 0.65 \text{ V}$ to 0.5 V ; $V_{CC} = 0.65 \text{ V}$		4	μΑ	
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	μΑ
Cı	input capacitance		-	5	-	pF

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 × 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 × V _{CC}	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	0.35 × 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 × V _{CC}	V
V _{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_{O} = 100 μ A	-	-	0.1	V
		V _{CC} = 1.65 V; I _O = 4 mA	-	-	0.70	V
		V _{CC} = 2.3 V; I _O = 8 mA	-	-	0.45	V
		V _{CC} = 2.7 V; I _O = 12 mA	-	-	0.60	V
		V _{CC} = 3.0 V; I _O = 24 mA	-	-	0.80	V
		V _{CC} = 4.5 V; I _O = 32 mA	-	-	0.80	V
V _{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 1.65 V to 5.5 V; I_{O} = -100 μ A	V _{CC} - 0.1	-	-	V
		V _{CC} = 1.65 V; I _O = -4 mA	0.95	-	-	V
		V _{CC} = 2.3 V; I _O = -8 mA	1.7	-	-	V
		V _{CC} = 2.7 V; I _O = -12 mA	1.9	-	-	V
		V _{CC} = 3.0 V; I _O = -24 mA	2.0	-	-	V
		V _{CC} = 4.5 V; I _O = -32 mA	3.4	-	-	V
lį	input leakage current	V _{CC} = 0 V to 5.5 V; V _I = 5.5 V or GND	-	-	±1	μΑ
l _{OZ}	OFF-state output current	$V_{CC} = 3.6 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};$ $V_O = 5.5 \text{ V or GND}$	-	-	±2	μΑ
l _{OFF}	power-off leakage current	V _{CC} = 0 V; V _I or V _O = 5.5 V	-	-	±2	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	-	-	4	μΑ
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	-	-	500	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. 7.

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

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

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

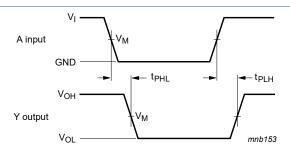
^[2] t_{pd} is the same as t_{PLH} and t_{PHL}

^{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 μ W).

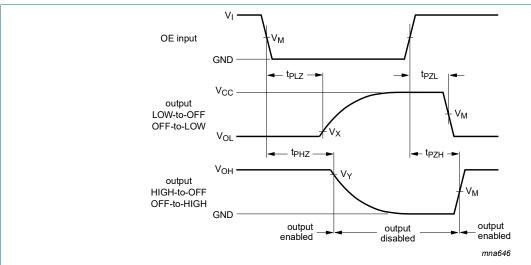
11.1. Waveforms and test circuit



Measurement points are given in Table 9.

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

Fig. 5. Input A to output Y propagation delay times



Measurement points are given in Table 9.

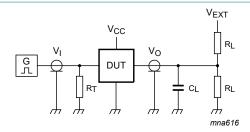
 $\ensuremath{V_{OL}}$ and $\ensuremath{V_{OH}}$ are typical output voltage levels that occur with the output load.

Fig. 6. 3-state enable and disable times

Table 9. Measurement points

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

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Test data is given in Table 10.

Definitions for test circuit:

 R_L = Load resistance.

 $\ensuremath{C_L}$ = 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

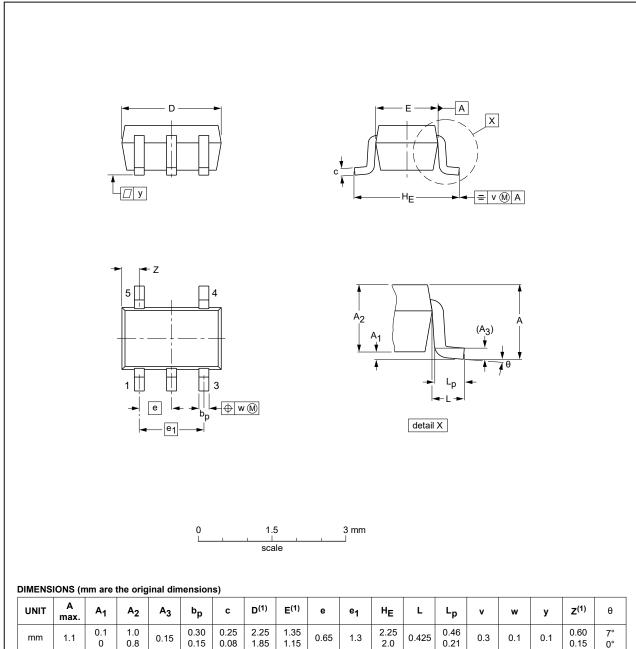
Table 10. Test data

Supply voltage	pply voltage Input		Load		V _{EXT}				
V _{CC}	V_l t_r, t_f		CL	R _L	t _{PLH} , t _{PHL}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}		
1.65 V to 1.95 V	V _{CC}	≤ 2.0 ns	30 pF	1 kΩ	open	GND	2V _{CC}		
2.3 V to 2.7 V	V _{CC}	≤ 2.0 ns	30 pF	500 Ω	open	GND	2V _{CC}		
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 _{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	2V _{CC}		

12. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

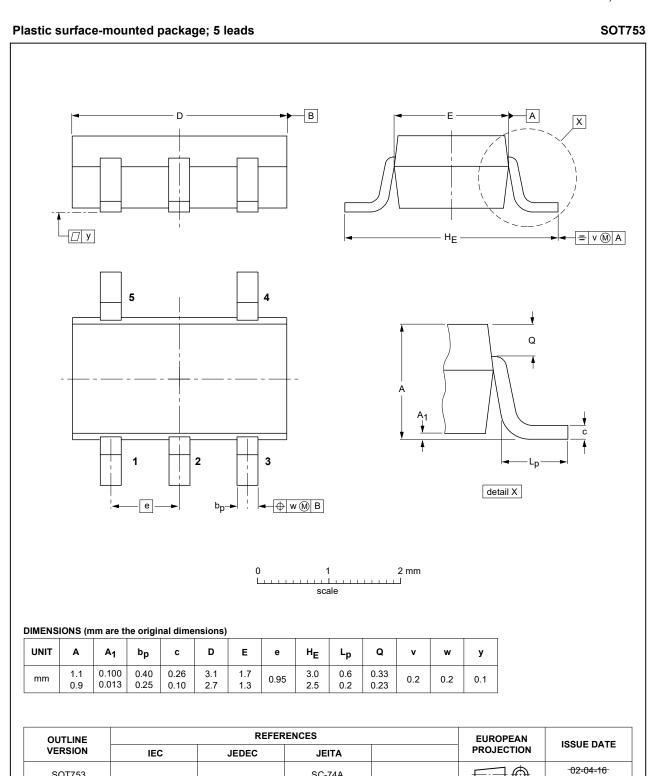


UNI	Γ A max.	A ₁	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽¹⁾	е	e ₁	HE	L	Lp	٧	w	у	Z ⁽¹⁾	θ
mm	1.1	0.1 0	1.0 0.8	0.15	0.30 0.15	0.25 0.08	2.25 1.85	1.35 1.15	0.65	1.3	2.25 2.0	0.425	0.46 0.21	0.3	0.1	0.1	0.60 0.15	7° 0°

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

	OUTLINE VERSION	REFERENCES			EUROPEAN	ISSUE DATE	
		IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
	SOT353-1		MO-203	SC-88A			00-09-01 03-02-19

Fig. 8. Package outline SOT353-1 (TSSOP5)



Package outline SOT753 (SC-74A)

SOT753

SC-74A

06-03-16

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13. Abbreviations

Table 11. Abbreviations

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

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74LVC1G126_Q100 v.4	20210503	Product data sheet	-	74LVC1G126_Q100 v.3		
Modifications:	• <u>Table 5</u> : De	rating values for P _{tot} total _l	oower dissipation	updated.		
74LVC1G126_Q100 v.3	20190315	Product data sheet	-	74LVC1G126_Q100 v.2		
Modifications:	guidelines	 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. 				
74LVC1G126_Q100 v.2	20161208	Product data sheet	-	74LVC1G126_Q100 v.1		
Modifications:	• <u>Table 7</u> : Th	• <u>Table 7</u> : The maximum limits for leakage current and supply current have changed.				
74LVC1G126_Q100 v.1	20121001	Product data sheet	-	-		

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".
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