74LVC2G126-Q100

Bus buffer/line driver; 3-state Rev. 4 — 28 April 2020

1. General description

The 74LVC2G126-Q100 is a dual buffer/line driver with 3-state outputs controlled by the output enable inputs (nOE). 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
- 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:
 - 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)
- ± 24 mA output drive (V_{CC} = 3.0 V)
- CMOS low power consumption
- IOFF circuitry provides partial Power-down mode operation
- · Latch-up performance exceeds 250 mA
- Direct interface with TTL levels

3. Ordering information

Table 1. Ordering information

Type number	Package						
	Temperature range	Name	Description	Version			
74LVC2G126DP-Q100	-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-Q100	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1			

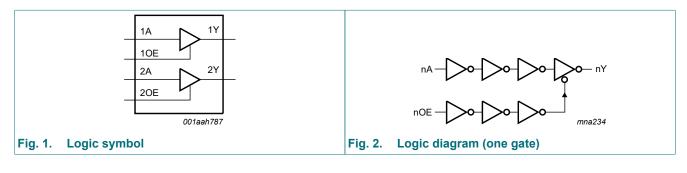
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4. Marking

Table 2. Marking codes					
Type number	Marking code [1]				
74LVC2G126DP-Q100	V26				
74LVC2G126DC-Q100	V26				

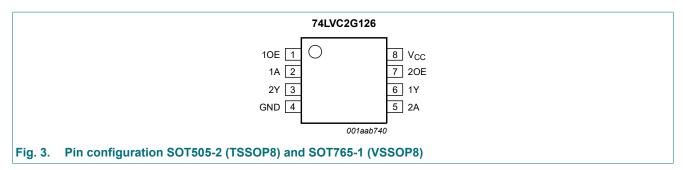
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1. Pinning



6.2. Pin description

Symbol	Pin	Description
10E, 20E	1, 7	output enable input (active HIGH)
1A, 2A	2, 5	data input
1Y, 2Y	6, 3	data output
GND	4	ground (0 V)
V _{CC}	8	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 nOE	Output	
nOE	nA	nY
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	Mir	n	Мах	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] -0.9	5	+6.5	V
I _{OK}	output clamping current	$V_{\rm O}$ > $V_{\rm CC}$ or $V_{\rm O}$ < 0 V	-		±50	mA
Vo	output voltage	Active mode [1] -0.9	5	V _{CC} + 0.5	V
		Power-down mode; $V_{CC} = 0 V$ [1] -0.	5	+6.5	V
I _O	output current	$V_{O} = 0 V$ to V_{CC}	-		±50	mA
I _{CC}	supply current		-		+100	mA
I _{GND}	ground current		-10	0	-	mA
P _{tot}	total power dissipation	$T_{amb} = -40 \text{ °C to } +125 \text{ °C}$ [2] -		250	mW
T _{stg}	storage temperature		-65	5	+150	°C

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SOT505-2 (TSSOP8) package: P_{tot} 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.

9. Recommended operating conditions

Symbol	Parameter	Conditions	Min	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

10. Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	-40	-40 °C to +85 °C			-40 °C to +125 °C		
			Min	Тур [1]	Мах	Min	Мах		
VIH	HIGH-level	V _{CC} = 1.65 V to 1.95 V	0.65V _{CC}	-	-	0.65V _{CC}	-	V	
	input 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	$V_{I} = V_{IH} \text{ or } V_{IL}$							
	output voltage	I _O = 100 μA; V _{CC} = 1.65 V to 5.5 V	-	-	0.1	-	0.1	V	
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.45	-	0.70	V	
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.3	-	0.45	V	
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.4	-	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	
V _{OH}	V _{OH} HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$							
		I _O = -100 μA; V _{CC} = 1.65 V to 5.5 V	V _{CC} - 0.1	-	-	V _{CC} - 0.1	-	V	
		I _O = -4 mA; V _{CC} = 1.65 V	1.2	-	-	0.95	-	V	
		I _O = -8 mA; V _{CC} = 2.3 V	1.9	-	-	1.7	-	V	
		I _O = -12 mA; V _{CC} = 2.7 V	2.2	-	-	1.9	-	V	
		I _O = -24 mA; V _{CC} = 3.0 V	2.3	-	-	2.0	-	V	
		I _O = -32 mA; V _{CC} = 4.5 V	3.8	-	-	3.4	-	V	
I	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} or V _{IL} ; V _O = 5.5 V or GND; V _{CC} = 3.6 V	-	±0.1	±2	-	±2	μA	
I _{OFF}	power-off leakage current	$V_{I} \text{ or } V_{O} = 5.5 \text{ V}; V_{CC} = 0 \text{ V}$	-	±0.1	±2	-	±2	μA	
I _{CC}	supply current	V _I = 5.5 V or GND; V _{CC} = 1.65 V to 5.5 V; I _O = 0 A	-	0.1	4	-	4	μA	
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	-	500	μA	
CI	input capacitance		-	2	-	-	-	pF	

[1] Typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 $^\circ C.$

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 6.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to	Unit	
			Min	Тур [1]	Мах	Min	Max	1
t _{pd}	propagation delay	nA to nY; see Fig. 4 [2]						
		V _{CC} = 1.65 V to 1.95 V	1.0	3.9	9.8	1.0	12.3	ns
		V _{CC} = 2.3 V to 2.7 V	0.5	2.6	4.9	0.5	6.3	ns
		V _{CC} = 2.7 V	1.0	2.8	4.7	1.0	5.9	ns
		V _{CC} = 3.0 V to 3.6 V	0.5	2.4	4.3	0.5	5.4	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	1.9	3.2	0.5	4.0	ns
t _{en}	enable time	nOE to nY; see Fig. 5 [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 V to 2.7 V	1.0	2.6	5.0	1.0	6.3	ns
		V _{CC} = 2.7 V	1.0	2.8	4.7	1.0	5.9	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.4	4.1	1.0	5.1	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	1.8	3.1	0.5	3.9	ns
t _{dis}	disable time	nOE to nY; see Fig. 5 [4]						
		V _{CC} = 1.65 V to 1.95 V	1.0	3.3	12.6	1.0	15.4	ns
		V _{CC} = 2.3 V to 2.7 V	0.5	1.9	5.7	0.5	7.5	ns
		V _{CC} = 2.7 V	1.5	3.0	4.8	1.5	6.2	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.5	4.4	1.0	5.7	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	1.8	3.3	0.5	4.4	ns
C _{PD}	power dissipation	per buffer; $V_I = GND$ to V_{CC} [5]						
	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.

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

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

 $[4] \quad t_{dis} \text{ is the same as } t_{PLZ} \text{ and } t_{PHZ}$

[5] 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;

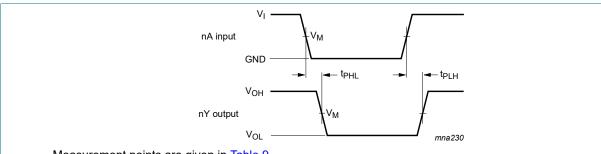
V_{CC} = supply voltage in V;

N = number of inputs switching;

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

Bus buffer/line driver; 3-state





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

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

Fig. 4. The data input (nA) to output (nY) propagation delays

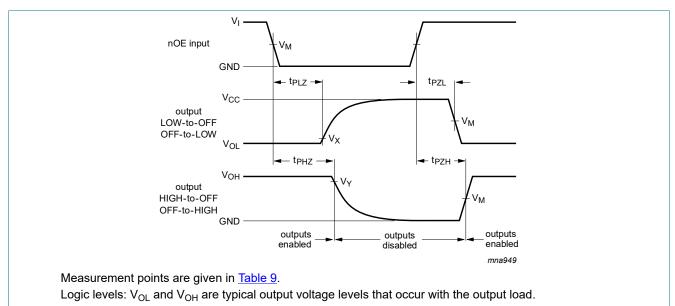
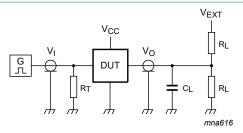


Fig. 5. 3-state enable and disable times

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 × V _{CC}	0.5 × V _{CC}	V _{OL} + 0.15 V	V _{OH} - 0.15 V			
2.3 V to 2.7 V	0.5 × 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 × V _{CC}	$0.5 \times V_{CC}$	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.

 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. 6. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load	Load		V _{EXT}		
V _{cc}	VI	t _r , t _f	CL	RL	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	$2 \times V_{CC}$	
2.3 V to 2.7 V	V _{CC}	≤ 2.0 ns	30 pF	500 Ω	open	GND	$2 \times V_{CC}$	
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	2 × V _{CC}	

Bus buffer/line driver; 3-state

12. Package outline

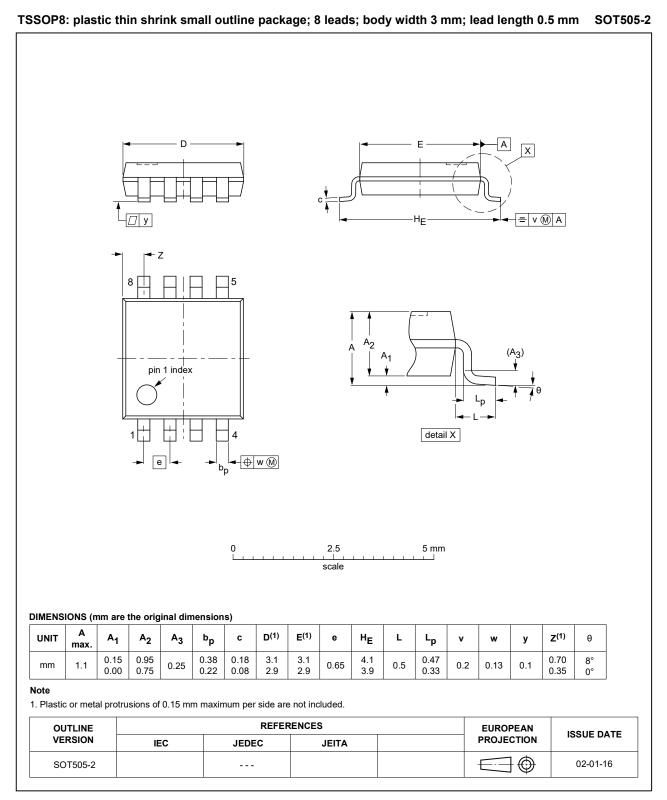
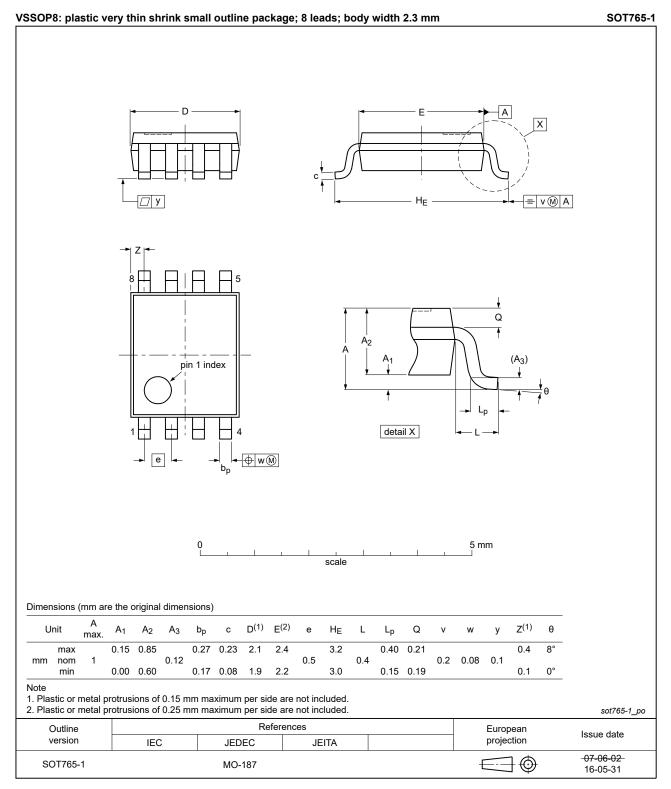


Fig. 7. Package outline SOT505-2 (TSSOP8)

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Bus buffer/line driver; 3-state





13. Abbreviations

Table 11. Abbreviations					
Acronym	Description				
CMOS	Complementary Metal-Oxide Semiconductor				
DUT	Device Under Test				
ESD	ElectroStatic Discharge				
HBM	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			
74LVC2G126_Q100 v.4	20210428	Product data sheet	-	74LVC2G126_Q100 v.3			
Modifications:	 <u>Section 1</u> and <u>Section 2</u> updated. <u>Section 8</u>: Derating values for P_{tot} total power dissipation updated. 						
74LVC2G126_Q100 v.3	20190110	Product data sheet	-	74LVC2G126_Q100 v.2			
Modifications:	 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. 						
74LVC2G126_Q100 v.2	20161214	Product data sheet	-	74LVC2G126_Q100 v.1			
Modifications:	• <u>Table 7</u> : The maximum limits for leakage current and supply current have changed.						
74LVC2G126_Q100 v.1	20150512	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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