# 74LVC1G126-Q100

Bus buffer/line driver; 3-state Rev. 5 — 18 January 2022

**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<sub>OFF</sub> circuitry provides partial Power-down mode operation
- ±24 mA output drive (V<sub>CC</sub> = 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 information							
Type number	Package	Package					
	Temperature range	Name	Description	Version			
74LVC1G126GW-Q100	-40 °C to +125 °C	TSSOP5	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			



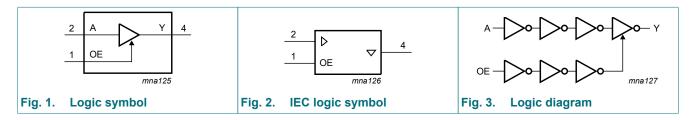
## 4. Marking

#### Table 2. Marking codes

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

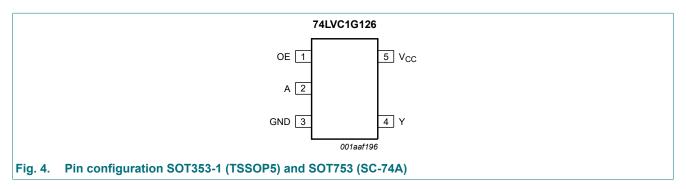
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

# 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
A	2	data input
GND	3	ground (0 V)
Υ	4	data output
V <sub>CC</sub>	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	Υ
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 <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>OK</sub>	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V	-	±50	mA
Vo	output voltage	Active mode [1]	-0.5	V <sub>CC</sub> + 0.5	V
		Power-down mode; V <sub>CC</sub> = 0 V [1]	-0.5	+6.5	V
Io	output current	$V_O = 0 V \text{ to } V_{CC}$	-	±50	mΑ
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

<sup>[1]</sup> 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 <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
		Power-down mode; V <sub>CC</sub> = 0 V	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

<sup>[2]</sup> For SOT353-1 (TSSOP5) package: P<sub>tot</sub> derates linearly with 3.3 mW/K above 74 °C. For SOT753 (SC-74A) package: P<sub>tot</sub> derates linearly with 3.8 mW/K above 85 °C.

## 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 <sub>amb</sub> = -	40 °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 × 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 × V <sub>CC</sub>	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	$V_I = V_{IH}$ or $V_{IL}$				
		$V_{CC}$ = 1.65 V to 5.5 V; $I_{O}$ = 100 $\mu$ A	-	-	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	$V_I = V_{IH}$ or $V_{IL}$				
		$V_{CC}$ = 1.65 V to 5.5 V; $I_{O}$ = -100 $\mu$ A	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
I <sub>I</sub>	input leakage current	V <sub>CC</sub> = 0 V to 5.5 V; V <sub>I</sub> = 5.5 V or GND	-	±0.1	±1	μΑ
I <sub>OZ</sub>	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
l <sub>OFF</sub>	power-off leakage current	V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 5.5 V	-	±0.1	±2	μΑ
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	-	0.1	4	μΑ
ΔI <sub>CC</sub>	additional supply current	per pin; $V_{CC} = 2.3 \text{ V to } 5.5 \text{ V};$ $V_1 = V_{CC} - 0.6 \text{ V};$ $I_0 = 0 \text{ A}$	-	5	500	μΑ
Cı	input capacitance		-	5	-	pF

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
T <sub>amb</sub> = -4	40 °C to +125 °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 × 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 × V <sub>CC</sub>	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	$V_I = V_{IH}$ or $V_{IL}$				
		$V_{CC}$ = 1.65 V to 5.5 V; $I_{O}$ = 100 $\mu$ A	-	-	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	$V_I = V_{IH}$ or $V_{IL}$				
		$V_{CC}$ = 1.65 V to 5.5 V; $I_{O}$ = -100 $\mu$ A	V <sub>CC</sub> - 0.1	-	-	V
		V <sub>CC</sub> = 1.65 V; I <sub>O</sub> = -4 mA	0.95	-	-	V
		$V_{CC} = 2.3 \text{ V}; I_{O} = -8 \text{ mA}$	1.7	-	-	V
		$V_{CC} = 2.7 \text{ V}; I_{O} = -12 \text{ mA}$	1.9	-	-	V
		$V_{CC} = 3.0 \text{ V}; I_{O} = -24 \text{ mA}$	2.0	-	-	V
		$V_{CC} = 4.5 \text{ V}; I_{O} = -32 \text{ mA}$	3.4	-	-	V
l <sub>l</sub>	input leakage current	$V_{CC} = 0 \text{ V to } 5.5 \text{ V}; V_{I} = 5.5 \text{ V or GND}$	-	-	±1	μΑ
l <sub>OZ</sub>	OFF-state output current	$V_{CC}$ = 3.6 V; $V_I$ = $V_{IH}$ or $V_{IL}$ ; $V_O$ = 5.5 V or GND	-	-	±2	μΑ
I <sub>OFF</sub>	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 5.5 \text{ V}$	-	-	±2	μΑ
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
Δl <sub>CC</sub>	additional supply current	per pin; V <sub>CC</sub> = 2.3 V to 5.5 V; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A	-	-	500	μΑ

<sup>[1]</sup> 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 +125 °C	
			Min	Typ [1]	Max	Min	Max	
t <sub>pd</sub>	propagation delay	A to Y; see <u>Fig. 5</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. 6 [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. 6 [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; $V_I = GND$ to $V_{CC}$ [5]						
	capacitance	output enabled	-	25	-	-	-	pF
		output disabled	-	6	-	-	-	pF

<sup>[1]</sup> 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<sub>o</sub> = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF;

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

N = number of inputs switching;

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

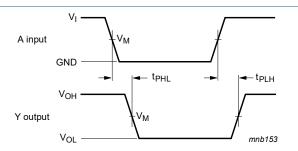
<sup>[2]</sup>  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .

<sup>[3]</sup>  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

<sup>[4]</sup>  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .

<sup>[5]</sup>  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).

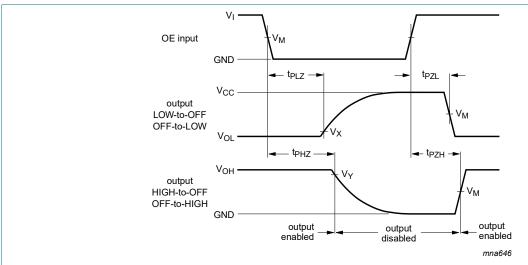
### 11.1. Waveforms and test circuit



Measurement points are given in Table 9.

V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

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



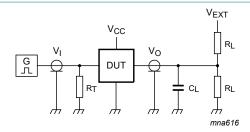
Measurement points are given in <u>Table 9</u>.

 $\ensuremath{V_{OL}}$  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 <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	



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<sub>T</sub> = Termination resistance should be equal to the output impedance Z<sub>o</sub> of the pulse generator;

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

### Fig. 7. Test circuit for measuring switching times

#### Table 10. Test data

Supply voltage	Input		Load		V <sub>EXT</sub>	V <sub>EXT</sub>		
V <sub>CC</sub>	VI	t <sub>r</sub> , t <sub>f</sub>	CL	R <sub>L</sub>	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>	

**Product data sheet** 

# 12. Package outline

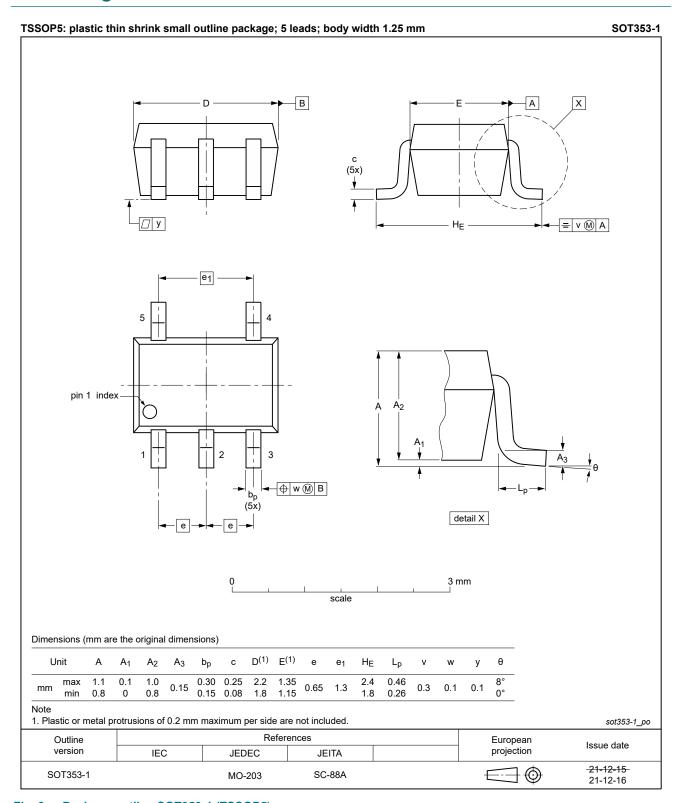
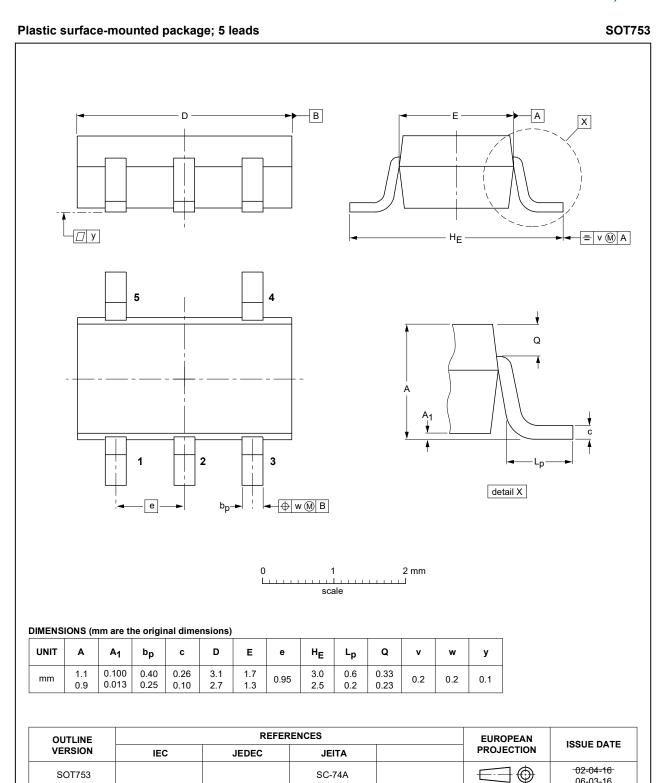


Fig. 8. Package outline SOT353-1 (TSSOP5)



Package outline SOT753 (SC-74A)

06-03-16

## 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.5	20220118	Product data sheet	-	74LVC1G126_Q100 v.4		
Modifications:	• <u>Fig. 8</u> : Pack	Fig. 8: Package outline drawing SOT353-1 (TSSOP5) has changed.				
74LVC1G126_Q100 v.4	20210503	Product data sheet	-	74LVC1G126_Q100 v.3		
Modifications:	• <u>Table 5</u> : De	<u>Table 5</u> : Derating values for P <sub>tot</sub> total power dissipation updated.				
74LVC1G126_Q100 v.3	20190315	Product data sheet	-	74LVC1G126_Q100 v.2		
Modifications:	guidelines o	<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_Q100 v.2	20161208	Product data sheet	-	74LVC1G126_Q100 v.1		
Modifications:	• <u>Table 7</u> : The	<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".
- 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 <a href="https://www.nexperia.com">https://www.nexperia.com</a>.

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