# 74LVC1G18

# 1-of-2 non-inverting demultiplexer with 3-state deselected output

Rev. 4 — 20 January 2022

**Product data sheet** 

### 1. General description

The 74LVC1G18 is a 1-to-2 demultiplexer with 3-state outputs. The device buffers the data on input A and passes it to output 1Y or 2Y, depending on whether the state of the select input (S) is LOW or HIGH. The unused output assumes the high impedence OFF-state. 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.

#### 2. Features and benefits

- Wide supply voltage range from 1.65 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- · High noise immunity
- ±24 mA output drive (V<sub>CC</sub> = 3.0 V)
- · CMOS low power dissipation
- · Latch-up performance exceeds 250 mA
- · Direct interface with TTL levels
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- 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:
  - HBM EIA/JESD22-A114E exceeds 2000 V
  - MM EIA/JESD22-A115-A exceeds 200 V.
- Specified from -40 to +85 °C and -40 to +125 °C.

### 3. Ordering information

Table 1. Ordering information

Type number	Package	Package					
	Temperature range	Name	Description	Version			
74LVC1G18GW	-40 °C to +125 °C	TSSOP6	plastic thin shrink small outline package; 6 leads; body width 1.25 mm	SOT363-2			
74LVC1G18GV	-40 °C to +125 °C	SC-74; TSOP6	plastic surface-mounted package; 6 leads	SOT457			



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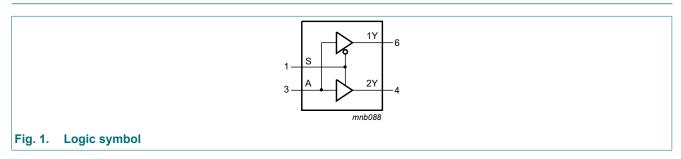
### 4. Marking

#### Table 2. Marking

Type number	Marking code [1]
74LVC1G18GW	VW
74LVC1G18GV	V18

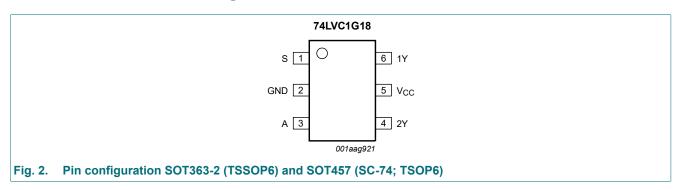
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

### 5. Functional diagram



### 6. Pinning information

### 6.1. Pinning



#### 6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
S	1	data select
GND	2	ground (0 V)
A	3	data input
2Y	4	data output
V <sub>CC</sub>	5	supply voltage
1Y	6	data output

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### 7. Functional description

#### **Table 4. Function table**

 $H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level; \ Z = high-impedance \ OFF-state.$ 

Input		Output		
S	A	1Y	2Y	
L	L	L	Z	
L	Н	Н	Z	
Н	L	Z	L	
Н	Н	Z	Н	

### 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 <sub>O</sub> > V <sub>CC</sub> or V <sub>O</sub> < 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	mA
I <sub>CC</sub>	supply current		-	100	mA
I <sub>GND</sub>	ground current		-100	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	$T_{amb} = -40  ^{\circ}\text{C} \text{ to } +125  ^{\circ}\text{C}$ [2]	-	250	mW

<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
$V_{CC}$	supply voltage		1.65	-	5.5	V
VI	input voltage		0	-	5.5	V
Vo	output voltage	Active mode	0	-	V <sub>CC</sub>	Vo
		Power-down mode; V <sub>CC</sub> = 0 V	0	-	5.5	Vo
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 SOT363-2 (TSSOP6) package: P<sub>tot</sub> derates linearly with 3.7 mW/K above 83 °C. For SOT457 (SC-74; TSOP6) package: P<sub>tot</sub> derates linearly with 4.1 mW/K above 89 °C.

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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	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	0.65V <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	0.7V <sub>CC</sub>	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	0.35V <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	-	-	0.3V <sub>CC</sub>	V
V <sub>OH</sub>	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -100 \mu A; V_{CC} = 1.65 V \text{ to } 5.5 V$	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V	1.2	-	-	V
		I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V	1.9	-	-	V
		$I_{O}$ = -12 mA; $V_{CC}$ = 2.7 V	2.2	-	-	V
		$I_{O}$ = -24 mA; $V_{CC}$ = 3.0 V	2.3	-	-	V
		$I_O = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.8	-	-	V
V <sub>OL</sub>	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 100 \mu A$ ; $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$	-	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	-	0.45	V
		$I_{O}$ = 8 mA; $V_{CC}$ = 2.3 V	-	-	0.3	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	-	0.4	V
		I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V	-	-	0.55	V
		I <sub>O</sub> = 32 mA; V <sub>CC</sub> = 4.5 V	-	-	0.55	V
l <sub>l</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	μA
I <sub>OFF</sub>	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 5.5 \text{ V}$	-	±0.1	±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	-	0.1	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	-	5	500	μA
Cı	input capacitance	$V_{CC}$ = 3.3 V; $V_I$ = GND to $V_{CC}$	-	2.5	-	pF

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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	0.65V <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	0.7V <sub>CC</sub>	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	0.35V <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	-	-	0.3V <sub>CC</sub>	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		$I_O = -100 \ \mu A; \ V_{CC} = 1.65 \ V \ to \ 5.5 \ V$	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V	0.95	-	-	V
		$I_{O}$ = -8 mA; $V_{CC}$ = 2.3 V	1.7	-	-	V
		$I_O = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	1.9	-	-	V
		I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V	2.0	-	-	V
		$I_O = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.4	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		$I_O = 100 \mu A; V_{CC} = 1.65 V \text{ to } 5.5 V$	-	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	-	0.70	V
		I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V	-	-	0.45	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	-	0.60	V
		I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V	-	-	0.80	V
		I <sub>O</sub> = 32 mA; V <sub>CC</sub> = 4.5 V	-	-	0.80	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	-	-	±1	μA
l <sub>OZ</sub>	OFF-state output current	$V_{CC} = 3.6 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};$ $V_O = 5.5 \text{ V or GND}$	-	-	±2	μA
I <sub>OFF</sub>	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 5.5 \text{ V}$	-	-	±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; $V_{CC} = 2.3 \text{ V to } 5.5 \text{ V};$ $V_1 = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}$	-	-	500	μA

<sup>[1]</sup> All typical values are measured at  $V_{CC}$  = 3.3 V and  $T_{amb}$  = 25 °C.

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### 11. Dynamic characteristics

#### **Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V). For test circuit see Fig. 5.

Symbol	Parameter	Conditions	-40	°C to +85	°C	-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
t <sub>pd</sub>	propagation delay	A to nY; see Fig. 3 [2]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	5.1	10.0	1.0	12.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	3.2	5.5	0.5	6.9	ns
		V <sub>CC</sub> = 2.7 V	1.0	3.2	5.4	0.5	6.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	3.0	5.0	0.5	6.3	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.0	2.3	3.8	0.5	4.8	ns
t <sub>en</sub>	enable time	S to nY; see Fig. 4 [3]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	5.8	11.0	1.0	13.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	3.6	6.2	0.5	7.8	ns
		V <sub>CC</sub> = 2.7 V	1.0	3.6	6.0	0.5	7.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	3.1	5.2	0.5	6.5	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	1.0	2.4	3.6	0.5	4.5	ns
t <sub>dis</sub>	disable time	S to nY; see Fig. 4 [4]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	4.8	9.0	1.0	11.3	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	2.7	5.3	0.5	6.6	ns
		V <sub>CC</sub> = 2.7 V	1.0	3.5	5.2	0.5	6.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	3.3	4.9	0.5	6.1	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.5	2.2	3.3	0.5	4.1	ns
C <sub>PD</sub>	power dissipation capacitance	$V_{I} = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [5]	-	28.8	-	-	-	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]  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .
- [5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).

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

 $f_i$  = input frequency in MHz;

 $f_o$  = output frequency in MHz;

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

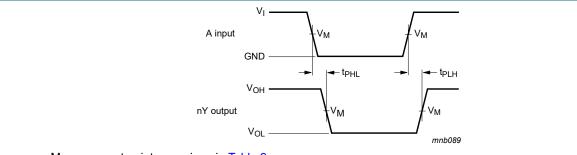
 $V_{CC}$  = supply voltage in V;

N = number of inputs switching;

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

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#### 11.1. Waveforms and test circuit



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

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

Fig. 3. Input A to output Y propagation delays

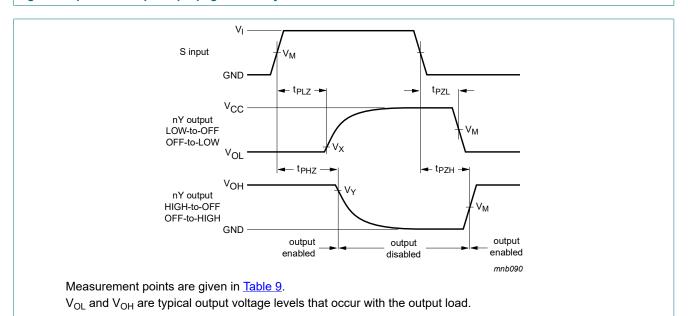
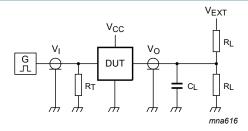


Fig. 4. 3-state enable and disable times

**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

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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<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. 5. Test circuit for measuring switching times

#### Table 10. Test data

V <sub>cc</sub>	Input		Load	Load		V <sub>EXT</sub>		
	VI	$t_r = t_f$	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>	

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### 12. Package outline

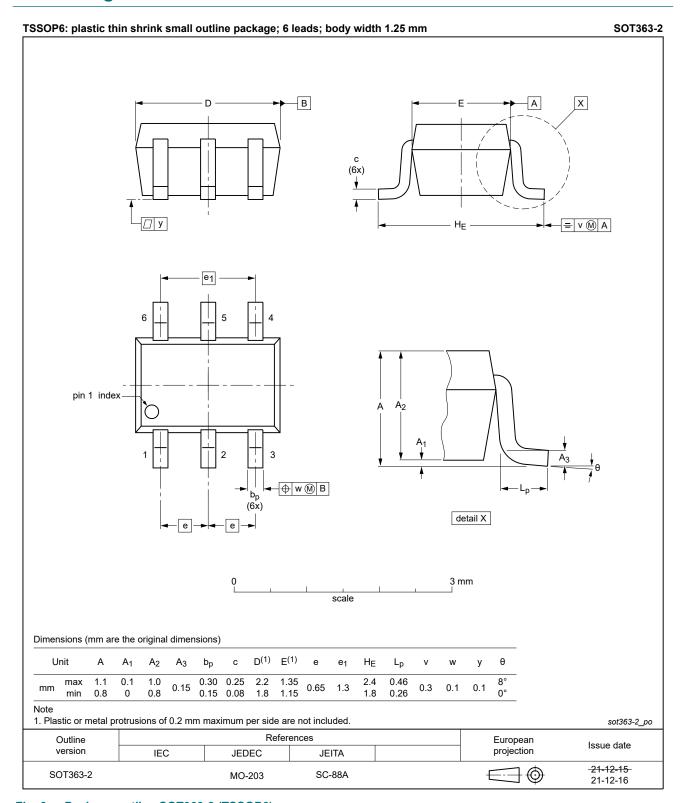


Fig. 6. Package outline SOT363-2 (TSSOP6)

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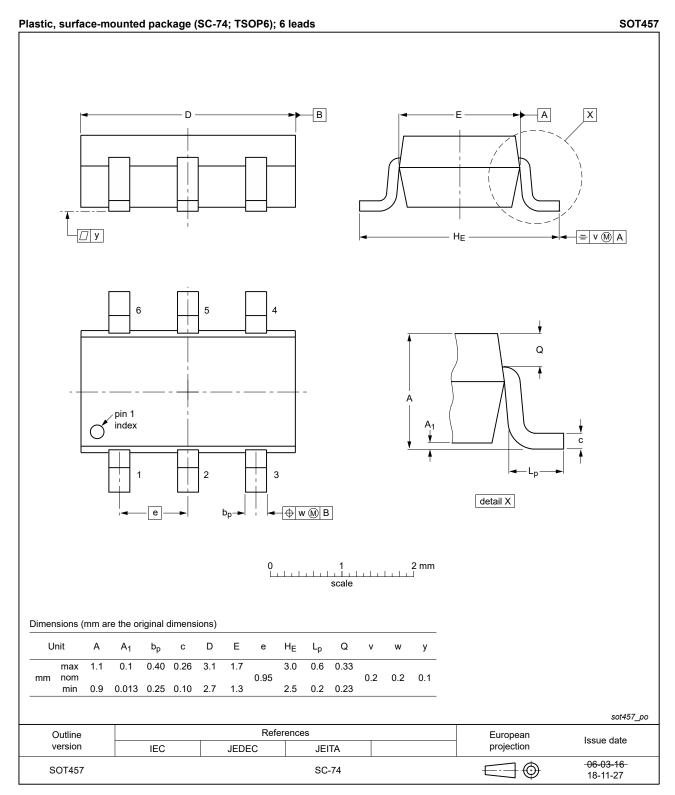


Fig. 7. Package outline SOT457 (SC-74; TSOP6)

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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
MM	Machine Model
TTL	Transistor-Transistor Logic

# 14. Revision history

#### Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74LVC1G18 v.4	20220120	Product data sheet	-	74LVC1G18 v.3		
Modifications:	guidelines of Legal texts  Legal texts  Package So  Section 1 a  Section 8: F  Table 9 con	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.  Package SOT363 (SC-88) changed to SOT363-2 (TSSOP6).  Section 1 and Section 2 updated.  Section 8: P <sub>tot</sub> total power dissipation and its derating values updated.  Table 9 corrected.  Fig. 7: Package outline drawing SOT457 (SC-74; TSOP6) updated.				
74LVC1G18 v.3	20161202	Product data sheet	-	74LVC1G18 v.2		
Modifications:	• <u>Table 7</u> : Th	<u>Table 7</u> : The maximum limits for leakage current and supply current have changed.				
74LVC1G18 v.2	20070830	Product data sheet	-	74LVC1G18 v.1		
Modifications:	guidelines o Legal texts	<ul> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>In Section 10, changed conditions for input leakage and supply current.</li> </ul>				
74LVC1G18 v.1	20030725	Product specification	-	-		

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### 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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#### 1-of-2 non-inverting demultiplexer with 3-state deselected output

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