74LVC1G157

Single 2-input multiplexer

Rev. 9 — 8 October 2019

Product data sheet

1. General description

The 74LVC1G157 is a single 2-input multiplexer which select data from two data inputs (I0 and I1) under control of a common data select input (S). The state of the common data select input determines the particular register from which the data comes. The output (Y) presents the selected data in the true (non-inverted) form.

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 applications.

This device is fully specified for partial power-down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

Schmitt-trigger action at all inputs makes the circuit highly tolerant to slower input rise and fall times.

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
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C



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3. Ordering information

Table 1. Ordering information

Type number	Package	Package						
	Temperature range	Name	Description	Version				
74LVC1G157GW	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363				
74LVC1G157GV	-40 °C to +125 °C	SC-74	plastic surface-mounted package (SC-74; TSOP6); 6 leads	SOT457				
74LVC1G157GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm	SOT886				
74LVC1G157GF	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm	SOT891				
74LVC1G157GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 x 1.0 x 0.35 mm	SOT1115				
74LVC1G157GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 x 1.0 x 0.35 mm	SOT1202				

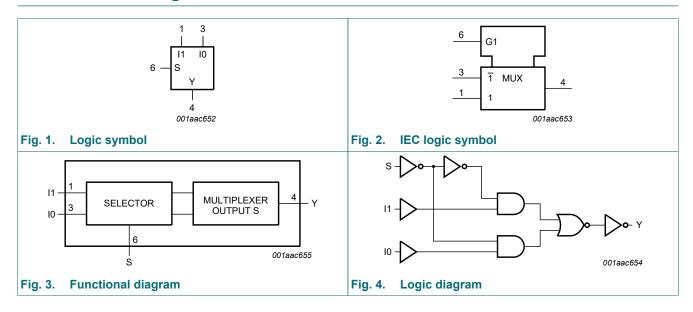
4. Marking

Table 2. Marking

Marking code [1]
YP

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

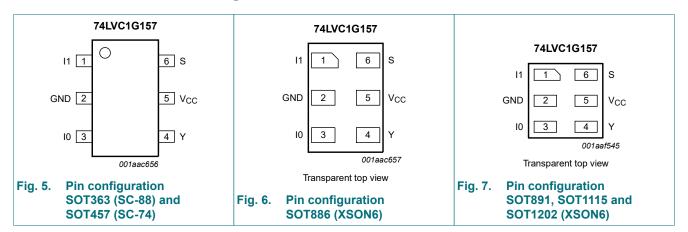
5. Functional diagram



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6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
I1	1	data input from source 1
GND	2	ground (0 V)
10	3	data input from source 0
Υ	4	multiplexer output
V _{CC}	5	supply voltage
S	6	common data select input

7. Functional description

Table 4. Function table

 $H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level; \ X = don't \ care.$

Inputs	Output		
S	l1	10	Υ
L	Х	L	L
L	Х	Н	Н
Н	L	X	L
Н	Н	X	Н

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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
I _O	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	$T_{amb} = -40 ^{\circ}\text{C to } +125 ^{\circ}\text{C}$ [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.

For SOT457 (TSOP6) packages: Ptot derates linearly with 4.1 mW/K above 89 °C.

For SOT886 (XSON6) packages: P_{tot} derates linearly with 3.3 mW/K above 74 °C.

For SOT891 (XSON6) packages: P_{tot} derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) packages: Ptot derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) packages: Ptot derates linearly with 3.3 mW/K above 74 °C.

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	-	-	V _{CC}	V
		Power-down mode; V _{CC} = 0 V	-	-	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

^[2] For SOT363 (TSSOP6) packages: Ptot derates linearly with 3.7 mW/K above 83 °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	-40	°C to +85	°C	-40 °C to	+125 °C	Unit
			Min	Typ [1]	Max	Min	Max	
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 _{OH}	HIGH-level output	$V_I = V_{IH}$ or V_{IL}						
	voltage	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	1.54	-	0.95	-	V
		I _O = -8 mA; V _{CC} = 2.3 V	1.9	2.15	-	1.7	-	V
		I_{O} = -12 mA; V_{CC} = 2.7 V	2.2	2.50	-	1.9	-	V
		I _O = -24 mA; V _{CC} = 3.0 V	2.3	2.62	-	2.0	-	V
		I_{O} = -32 mA; V_{CC} = 4.5 V	3.8	4.11	-	3.4	-	V
V _{OL}	LOW-level output	V _I = V _{IH} 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	-	0.07	0.45	-	0.70	V
		I _O = 8 mA; V _{CC} = 2.3 V	-	0.12	0.30	-	0.45	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	0.17	0.40	-	0.60	V
		I _O = 24 mA; V _{CC} = 3.0 V	-	0.33	0.55	-	0.80	V
		I _O = 32 mA; V _{CC} = 4.5 V	-	0.39	0.55	-	0.80	V
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	±0.1	±1	-	±1	μΑ
I _{OFF}	power-off leakage current	$V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 5.5 \text{ V}$	-	±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	per pin; V _{CC} = 2.3 V to 5.5 V; V _I = V _{CC} - 0.6 V; I _O = 0 A	-	5	500	-	500	μA
Cı	input capacitance	V_{CC} = 3.3 V; V_I = GND to V_{CC}	-	2.5	-	-	-	pF

^[1] All typical values are measured at 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. 9.

Symbol	Parameter	Conditions	-40	°C to +85	S°C	-40 °C to	+125 °C	Unit
			Min	Typ[1]	Max	Min	Max	
t _{pd}	propagation delay	I0, I1 to Y; see <u>Fig. 8</u> [2]						
		V _{CC} = 1.65 V to 1.95 V	1.5	4.3	11.0	1.5	13.0	ns
		V _{CC} = 2.3 V to 2.7 V	1.0	2.9	6.1	1.0	7.6	ns
		V _{CC} = 2.7 V	1.0	3.1	5.6	1.0	7.0	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.7	5.0	1.0	6.3	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	2.2	4.0	0.5	5.0	ns
		S to Y; see <u>Fig. 8</u> [2]						
		V _{CC} = 1.65 V to 1.95 V	1.5	4.3	11.0	1.5	13.0	ns
		V _{CC} = 2.3 V to 2.7 V	1.0	2.9	6.9	1.0	8.6	ns
		V _{CC} = 2.7 V	1.0	3.3	5.9	1.0	7.4	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	2.9	5.0	1.0	6.3	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	2.3	4.0	0.5	5.0	ns
C _{PD}	power dissipation capacitance	$V_1 = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [3]	-	18	-	-	-	pF

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.

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

N = number of inputs switching;

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

 t_{pd} is the same as t_{PLH} and t_{PHL} . C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

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11.1. Waveforms and test circuit

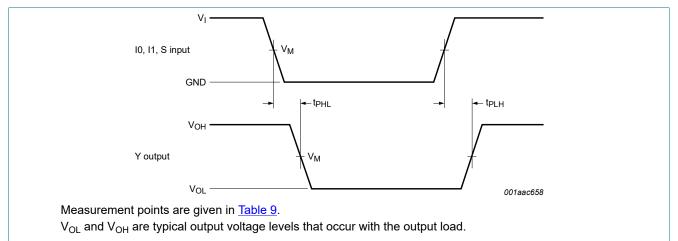
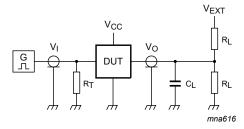


Fig. 8. Data inputs (I0, I1) and common data select input (S) to output (Y) propagation delays

Table 9. Measurement points

Supply voltage	Input	Output
V _{CC}	V _M	V _M
1.65 V to 1.95 V	0.5V _{CC}	0.5V _{CC}
2.3 V to 2.7 V	0.5V _{CC}	0.5V _{CC}
2.7 V	1.5 V	1.5 V
3.0 V to 3.6 V	1.5 V	1.5 V
4.5 V to 5.5 V	0.5V _{CC}	0.5V _{CC}



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. 9. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load		V _{EXT}
V _{CC}	V _I	$t_r = t_f$	CL	R _L	t _{PLH} , t _{PHL}
1.65 V to 1.95 V	V _{CC}	≤ 2.0 ns	30 pF	1 kΩ	open
2.3 V to 2.7 V	V _{CC}	≤ 2.0 ns	30 pF	500 Ω	open
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open
4.5 V to 5.5 V	V _{CC}	≤ 2.5 ns	50 pF	500 Ω	open

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12. Package outline

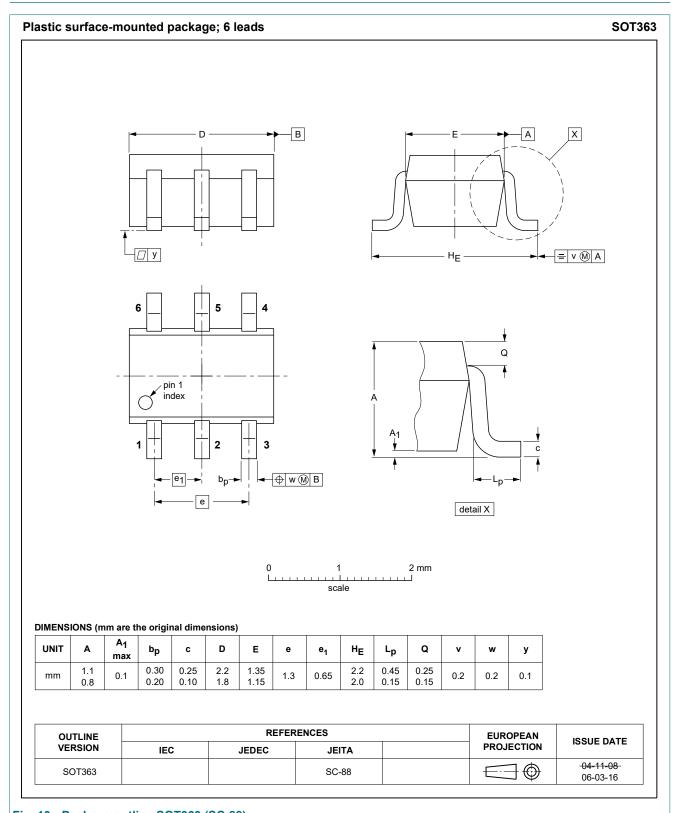


Fig. 10. Package outline SOT363 (SC-88)

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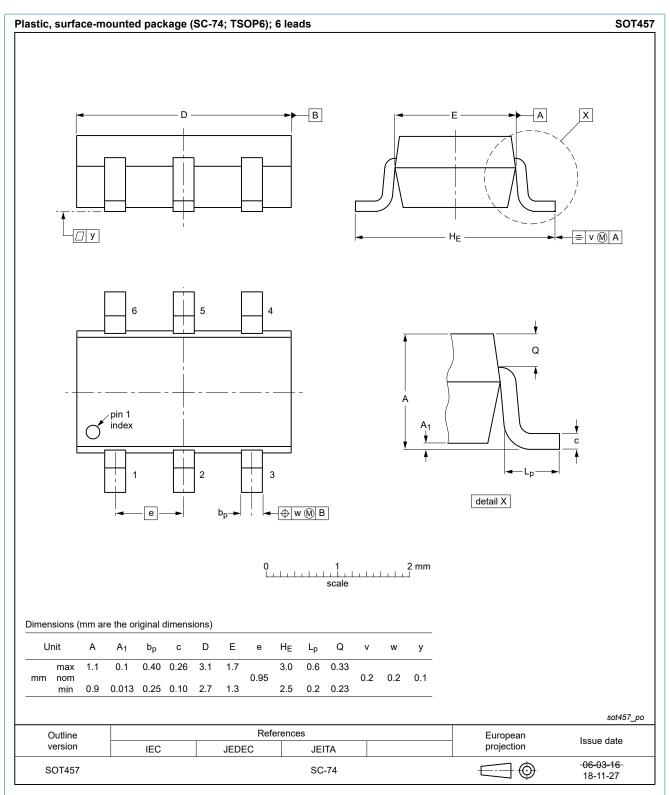


Fig. 11. Package outline SOT457 (SC-74)

Single 2-input multiplexer

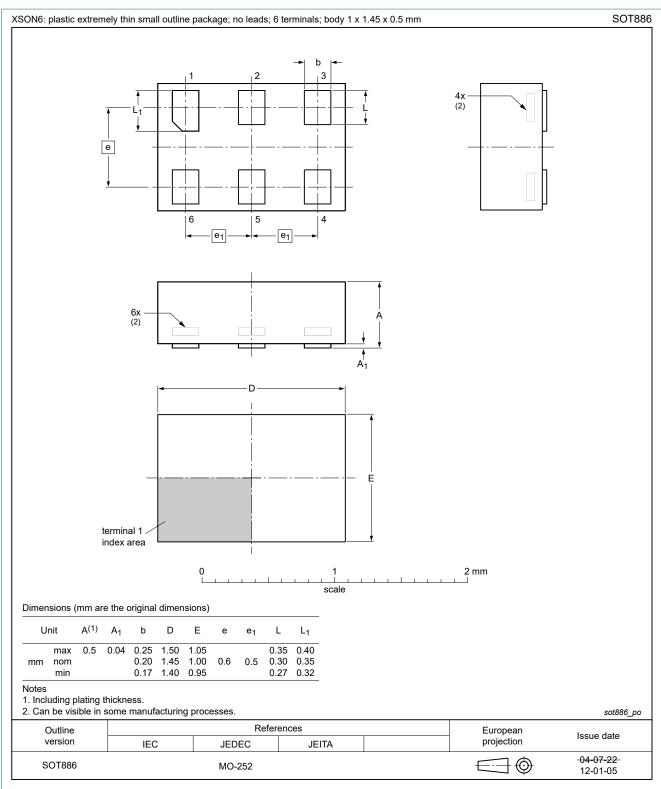


Fig. 12. Package outline SOT886 (XSON6)

Single 2-input multiplexer

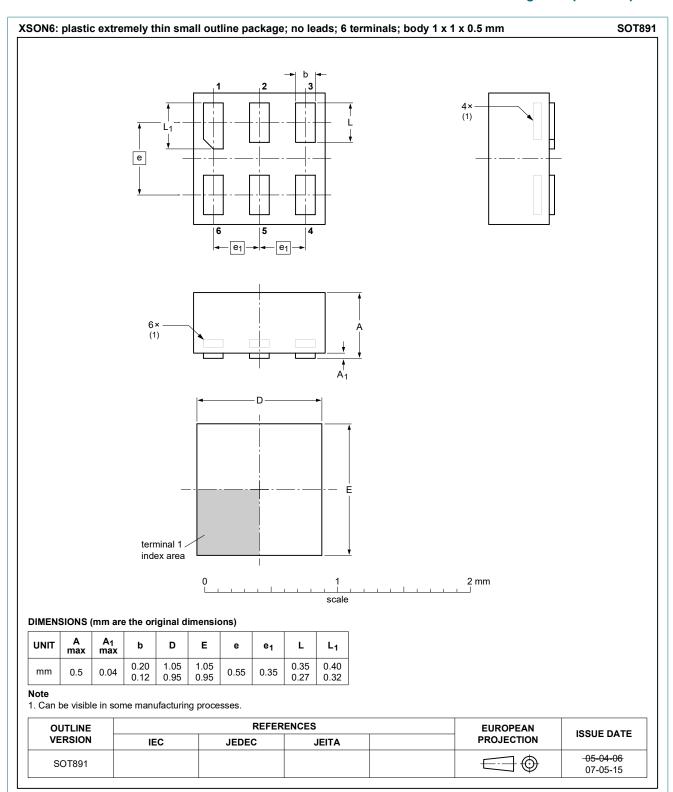


Fig. 13. Package outline SOT891 (XSON6)

Single 2-input multiplexer

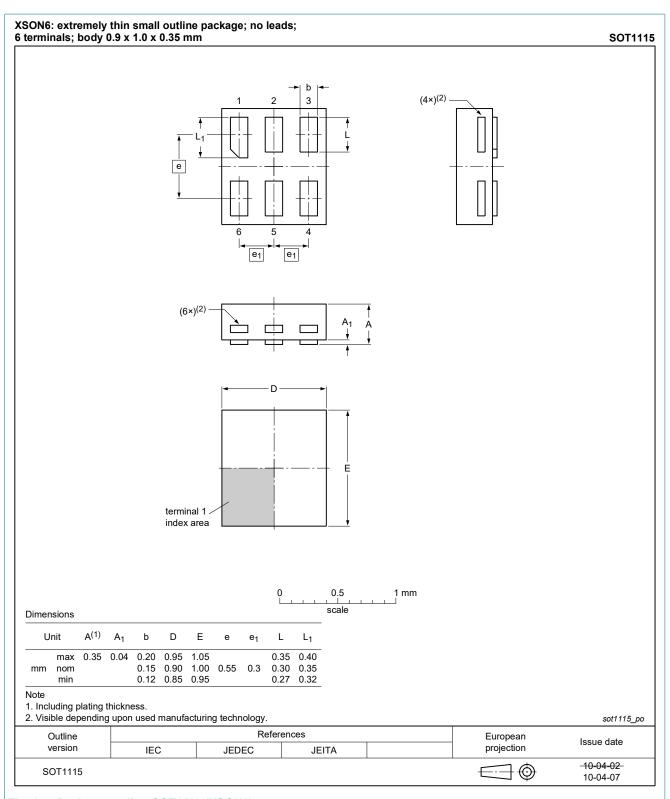


Fig. 14. Package outline SOT1115 (XSON6)

Single 2-input multiplexer

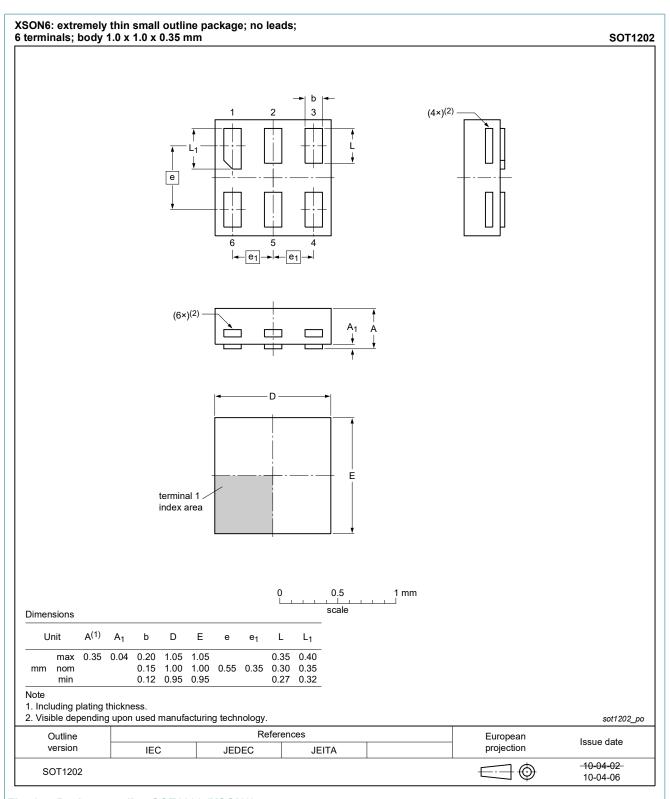


Fig. 15. Package outline SOT1202 (XSON6)

Single 2-input multiplexer

13. Abbreviations

Table 11. Abbreviations

Acronym	Description
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	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			
74LVC1G157 v.9	20191008	Product data sheet	-	74LVC1G157 v.8			
Modifications:	 <u>Table 5</u>: Derating values for P_{tot} total power dissipation updated. Package outline drawing <u>SOT457</u> (SC-74) updated 						
74LVC1G157 v.8	20171031	Product data sheet	-	74LVC1G157 v.7			
Modifications:	guidelines o	of this data sheet has been f Nexperia. nave been adapted to the r	· ·				
74LVC1G157 v.7	20161202	Product data sheet	-	74LVC1G157 v.6			
Modifications:	• Table 7: The	maximum limits for leaka	ge current and su	oply current have changed.			
74LVC1G157 v.6	20121231	Product data sheet	-	74LVC1G157 v.5			
Modifications:	 Package ou 	tline drawing of SOT886 (F	ig. 12) modified.				
74LVC1G157 v.5	20111206	Product data sheet	-	74LVC1G157 v.4			
Modifications:	 Legal pages 	updated.					
74LVC1G157 v.4	20101028	Product data sheet	-	74LVC1G157 v.3			
74LVC1G157 v.3	20070712	Product data sheet	-	74LVC1G157 v.2			
74LVC1G157 v.2	20061011	Product data sheet	-	74LVC1G157 v.1			
74LVC1G157 v.1	20050425	Product data sheet	-	-			

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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.

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