

74LVC1G157-Q100

Single 2-input multiplexer

Rev. 2 — 8 December 2016

Product data sheet

1. General description

The 74LVC1G157-Q100 is a single 2-input multiplexer which selects 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.

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
- 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:
 - ◆ 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)
- Multiple package options

3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74LVC1G157GW-Q100	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363
74LVC1G157GV-Q100	-40 °C to +125 °C	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457

4. Marking

Table 2. Marking

Type number	Marking code ^[1]
74LVC1G157GW-Q100	YP
74LVC1G157GV-Q100	YP

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

5. Functional diagram

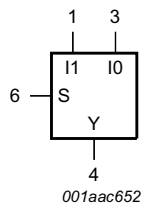


Fig 1. Logic symbol

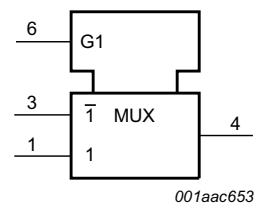


Fig 2. IEC logic symbol

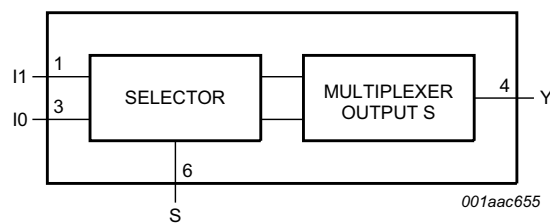


Fig 3. Functional diagram

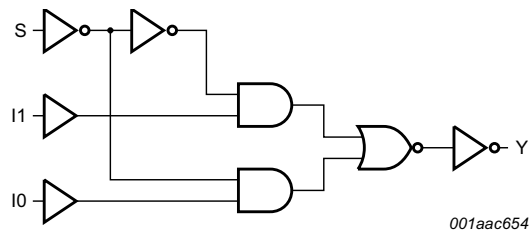


Fig 4. Logic diagram

6. Pinning information

6.1 Pinning

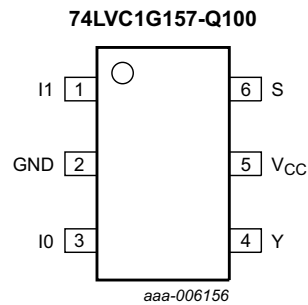


Fig 5. Pin configuration SOT363 and SOT457

6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
I1	1	data input from source 1
GND	2	ground (0 V)
I0	3	data input from source 0
Y	4	multiplexer output
V _{CC}	5	supply voltage
S	6	common data select input

7. Functional description

Table 4. Function table^[1]

Inputs			Output
S	I1	I0	Y
L	X	L	L
L	X	H	H
H	L	X	L
H	H	X	H

- [1] H = HIGH voltage level;
L = LOW voltage level;
X = don't care.

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
V_I	input voltage		-0.5	+6.5	V
I_{OK}	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V	-	± 50	mA
V_O	output voltage	Active mode	-0.5	$V_{CC} + 0.5$	V
		Power-down mode	-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		-100	-	mA
P_{tot}	total power dissipation	$T_{amb} = -40$ °C to +125 °C	-	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.

[2] When $V_{CC} = 0$ V (Power-down mode), the output voltage can be 5.5 V in normal operation.

[3] For SC-88 and SC-74 packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K.

9. Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		1.65	-	5.5	V
V_I	input voltage		0	-	5.5	V
V_O	output voltage	Active mode	-	-	V_{CC}	V
		$V_{CC} = 0$ V; Power-down mode	-	-	5.5	V
T_{amb}	ambient temperature		-40	-	+125	°C
$\Delta t/\Delta V$	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 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	
V_{IH}	HIGH-level input voltage	$V_{CC} = 1.65$ V to 1.95 V	$0.65V_{CC}$	-	-	$0.65V_{CC}$	-	V
		$V_{CC} = 2.3$ 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 voltage	$V_{CC} = 1.65$ V to 1.95 V	-	-	$0.35V_{CC}$	-	$0.35V_{CC}$	V
		$V_{CC} = 2.3$ 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 voltage	$V_I = V_{IH}$ or V_{IL}						
		$I_O = -100$ μ A; $V_{CC} = 1.65$ 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 voltage	$V_I = V_{IH}$ or V_{IL}						
		$I_O = 100$ μ A; $V_{CC} = 1.65$ 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

Table 7. Static characteristics ...continued

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	
I _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 _{OFF}	power-off leakage current	V _{CC} = 0 V; V _I or V _O = 5.5 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
C _I	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.

11. Dynamic characteristics

Table 8. Dynamic characteristicsVoltages are referenced to GND (ground = 0 V); for load circuit see [Figure 7](#).

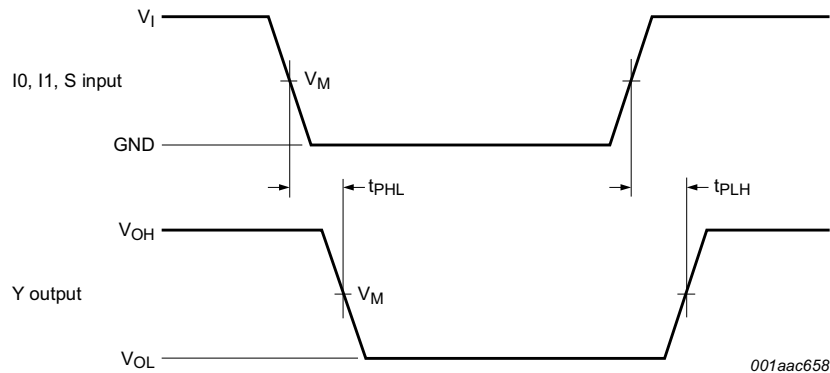
Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	
t _{pd}	propagation delay	I ₀ , I ₁ to Y; see Figure 6 ^[2]						
		V _{CC} = 1.65 V to 1.95 V	1.5	4.3	11.0	1.5	13.0	ns
		V _{CC} = 2.3 V to 2.7 V	1.0	2.9	6.1	1.0	7.6	ns
		V _{CC} = 2.7 V	1.0	3.1	5.6	1.0	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 Figure 6 ^[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 _I = GND to V _{CC} ; V _{CC} = 3.3 V ^[3]	-	18	-	-	-	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] C_{PD} is used to determine the dynamic power dissipation (P_D in µW).
$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$$
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;

Σ(C_L × V_{CC}² × f_o) = sum of the outputs.

12. Waveforms



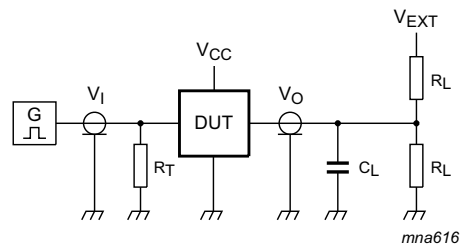
Measurement points are given in [Table 9](#).

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

Fig 6. 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 7. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load		V_{EXT}
V_{CC}	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}, t_{PHL}
1.65 V to 1.95 V	V_{CC}	≤ 2.0 ns	30 pF	1 k Ω	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

13. Package outline

Plastic surface-mounted package; 6 leads

SOT363

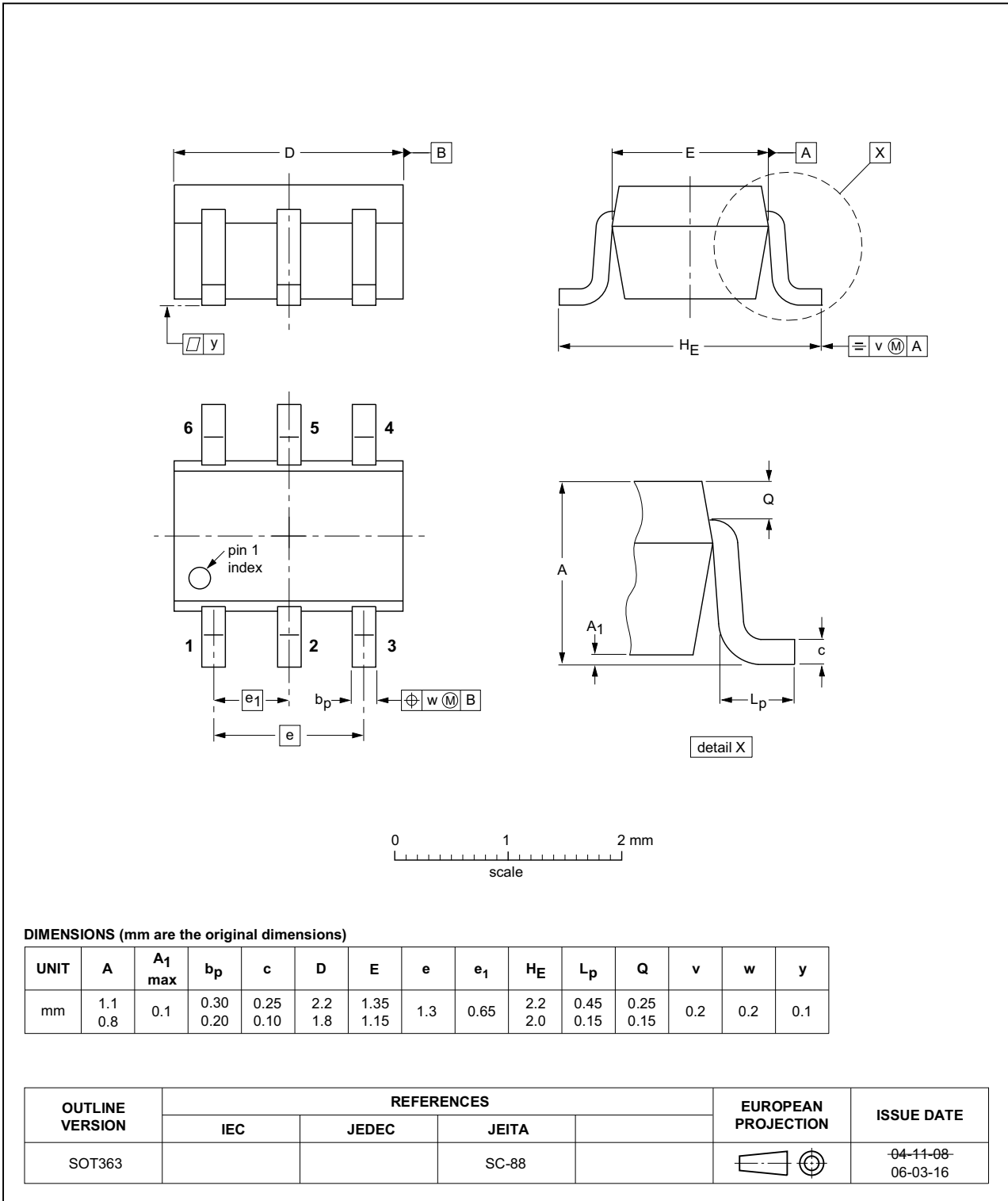


Fig 8. Package outline SOT363 (SC-88)

Plastic surface-mounted package (TSOP6); 6 leads

SOT457

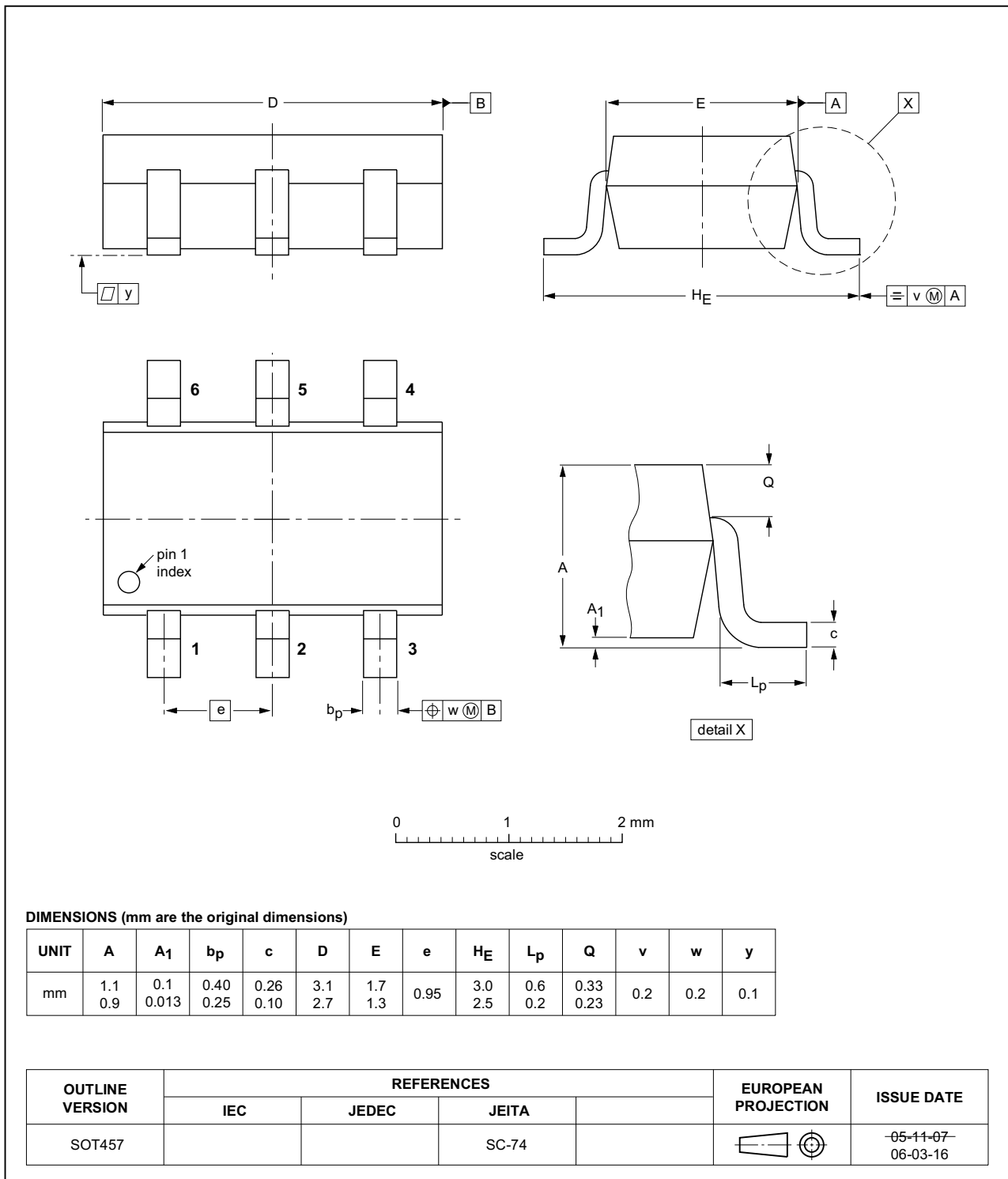


Fig 9. Package outline SOT457 (SC-74)

14. 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
MIL	Military
TTL	Transistor-Transistor Logic

15. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G157_Q100 v.2	20161208	Product data sheet	-	74LVC1G157_Q100 v.1
Modifications:	• Table 7 : The maximum limits for leakage current and supply current have changed.			
74LVC1G157_Q100 v.1	20130121	Product data sheet	-	-

16. Legal information

16.1 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.

[1] 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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