

# 74LVC1G19-Q100

## 1-of-2 decoder/demultiplexer

Rev. 2 — 9 December 2016

Product data sheet

## 1. General description

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The 74LVC1G19-Q100 is a 1-of-2 decoder/demultiplexer with a common output enable. This device buffers the data on input A and passes it to the outputs 1Y (true) and 2Y (complement) when the enable ( $\bar{E}$ ) input signal is LOW.

Inputs can be driven from either 3.3 V or 5 V devices. These features allow the use of these devices in a mixed 3.3 V and 5 V environment.

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.

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

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- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - ◆ Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$
- Wide supply voltage range from 1.65 V to 5.5 V
- 5 V tolerant inputs for interfacing with 5 V logic
- 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)
- ESD protection:
  - ◆ MIL-STD-883, method 3015 exceeds 2000 V
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V ( $C = 200\text{ pF}$ ,  $R = 0\text{ }\Omega$ )
- $\pm 24\text{ mA}$  output drive ( $V_{CC} = 3.0\text{ V}$ )
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 5 V

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74LVC1G19GW-Q100	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363

### 4. Marking

Table 2. Marking

Type number	Marking code <sup>[1]</sup>
74LVC1G19GW-Q100	VY

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

### 5. Functional diagram

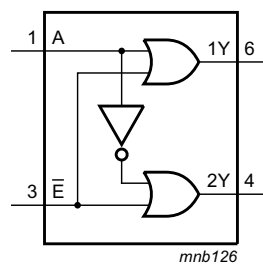


Fig 1. Logic symbol

### 6. Pinning information

#### 6.1 Pinning

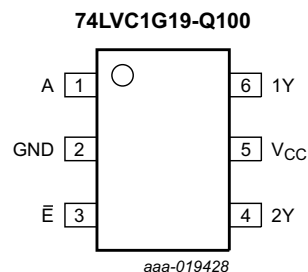


Fig 2. Pin configuration SOT363

## 6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
A	1	data input
GND	2	ground (0 V)
$\overline{E}$	3	enable input (active LOW)
2Y	4	data output
V <sub>CC</sub>	5	supply voltage
1Y	6	data output

## 7. Functional description

Table 4. Function table<sup>[1]</sup>

Input		Output	
$\overline{E}$	A	1Y	2Y
L	L	L	H
L	H	H	L
H	X	H	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 <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
V <sub>I</sub>	input voltage		-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
V <sub>O</sub>	output voltage	Active mode	-0.5	V <sub>CC</sub> + 0.5	V
		Power-down mode	-0.5	+6.5	V
I <sub>O</sub>	output current	V <sub>O</sub> = 0 V to V <sub>CC</sub>	-	±50	mA
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	-	250	mW
T <sub>stg</sub>	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<sub>CC</sub> = 0 V (Power-down mode), the output voltage can be 5.5 V in normal operation.

[3] For SC-88 package: above 87.5 °C the value of P<sub>tot</sub> 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	0	-	$V_{CC}$	V
		Power-down mode; $V_{CC} = 0$ V	0	-	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	Min	Typ <sup>[1]</sup>	Max	Unit
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °C</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 1.65$ V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3$ V to 2.7 V	1.7	-	-	V
		$V_{CC} = 2.7$ V to 3.6 V	2.0	-	-	V
		$V_{CC} = 4.5$ V to 5.5 V	$0.7 \times V_{CC}$	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 1.65$ V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3$ V to 2.7 V	-	-	0.7	V
		$V_{CC} = 2.7$ V to 3.6 V	-	-	0.8	V
		$V_{CC} = 4.5$ V to 5.5 V	-	-	$0.3 \times V_{CC}$	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -100$ $\mu$ A; $V_{CC} = 1.65$ V to 5.5 V	$V_{CC} - 0.1$	-	-	V
		$I_O = -4$ mA; $V_{CC} = 1.65$ V	1.2	1.54	-	V
		$I_O = -8$ mA; $V_{CC} = 2.3$ V	1.9	2.15	-	V
		$I_O = -12$ mA; $V_{CC} = 2.7$ V	2.2	2.50	-	V
		$I_O = -24$ mA; $V_{CC} = 3.0$ V	2.3	2.62	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 100$ $\mu$ A; $V_{CC} = 1.65$ V to 5.5 V	-	-	0.10	V
		$I_O = 4$ mA; $V_{CC} = 1.65$ V	-	0.07	0.45	V
		$I_O = 8$ mA; $V_{CC} = 2.3$ V	-	0.12	0.30	V
		$I_O = 12$ mA; $V_{CC} = 2.7$ V	-	0.17	0.40	V
		$I_O = 24$ mA; $V_{CC} = 3.0$ V	-	0.33	0.55	V
		$I_O = 32$ mA; $V_{CC} = 4.5$ V	-	0.39	0.55	V

**Table 7. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
$I_I$	input leakage current	$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 0 \text{ V}$ to $5.5 \text{ V}$	-	$\pm 0.1$	$\pm 1$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_{CC} = 0 \text{ V}$ ; $V_I$ or $V_O = 5.5 \text{ V}$	-	$\pm 0.1$	$\pm 2$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 1.65 \text{ V}$ to $5.5 \text{ V}$ ; $I_O = 0 \text{ A}$	-	0.1	4	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per pin; $V_{CC} = 2.3 \text{ V}$ to $5.5 \text{ V}$ ; $V_I = V_{CC} - 0.6 \text{ V}$ ; $I_O = 0 \text{ A}$	-	5	500	$\mu\text{A}$
$C_I$	input capacitance	$V_{CC} = 3.3 \text{ V}$ ; $V_I = \text{GND}$ to $V_{CC}$	-	2.5	-	pF
<b><math>T_{amb} = -40 \text{ }^\circ\text{C}</math> to <math>+125 \text{ }^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 1.65 \text{ V}$ to $1.95 \text{ V}$	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$	1.7	-	-	V
		$V_{CC} = 2.7 \text{ V}$ to $3.6 \text{ V}$	2.0	-	-	V
		$V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	$0.7 \times V_{CC}$	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 1.65 \text{ V}$ to $1.95 \text{ V}$	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$	-	-	0.7	V
		$V_{CC} = 2.7 \text{ V}$ to $3.6 \text{ V}$	-	-	0.8	V
		$V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	-	$0.3 \times V_{CC}$	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -100 \mu\text{A}$ ; $V_{CC} = 1.65 \text{ V}$ to $5.5 \text{ V}$	$V_{CC} - 0.1$	-	-	V
		$I_O = -4 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$	0.95	-	-	V
		$I_O = -8 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$	1.7	-	-	V
		$I_O = -12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$	1.9	-	-	V
		$I_O = -24 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$	2.0	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 100 \mu\text{A}$ ; $V_{CC} = 1.65 \text{ V}$ to $5.5 \text{ V}$	-	-	0.10	V
		$I_O = 4 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$	-	-	0.70	V
		$I_O = 8 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$	-	-	0.45	V
		$I_O = 12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$	-	-	0.60	V
		$I_O = 24 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$	-	-	0.80	V
$I_I$	input leakage current	$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 0 \text{ V}$ to $5.5 \text{ V}$	-	-	$\pm 1$	$\mu\text{A}$
		$V_{CC} = 0 \text{ V}$ ; $V_I$ or $V_O = 5.5 \text{ V}$	-	-	$\pm 2$	$\mu\text{A}$
		$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 1.65 \text{ V}$ to $5.5 \text{ V}$ ; $I_O = 0 \text{ A}$	-	-	4	$\mu\text{A}$
		per pin; $V_{CC} = 2.3 \text{ V}$ to $5.5 \text{ V}$ ; $V_I = V_{CC} - 0.6 \text{ V}$ ; $I_O = 0 \text{ A}$	-	-	500	$\mu\text{A}$
		$V_I = 5.5 \text{ V}$ or GND; $V_{CC} = 0 \text{ V}$ to $5.5 \text{ V}$	-	-	$\pm 1$	$\mu\text{A}$
		$V_{CC} = 0 \text{ V}$ ; $V_I$ or $V_O = 5.5 \text{ V}$	-	-	$\pm 2$	$\mu\text{A}$

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

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V). For test circuit see [Figure 4](#).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
t <sub>pd</sub>	propagation delay	A, $\bar{E}$ to nY; see <a href="#">Figure 3</a> <sup>[2]</sup>						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	4.0	10.5	1.0	13.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.5	2.5	6.2	0.5	7.7	ns
		V <sub>CC</sub> = 2.7 V	1.0	2.8	6.5	1.0	8.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.5	2.5	5.2	0.5	6.0	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.5	1.8	3.9	0.5	5.0	ns
C <sub>PD</sub>	power dissipation capacitance	V <sub>I</sub> = GND to V <sub>CC</sub> ; V <sub>CC</sub> = 3.3 V <sup>[3]</sup>	-	18.9	-	-	-	pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

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

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

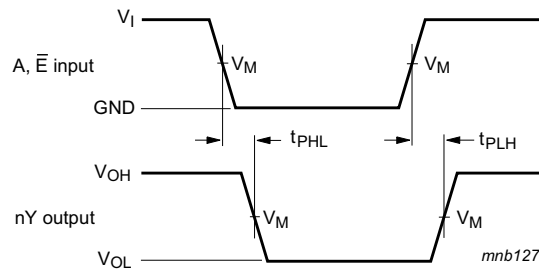
C<sub>L</sub> = output load capacitance in pF;

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

N = number of inputs switching;

∑(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of outputs.

## 12. AC waveforms



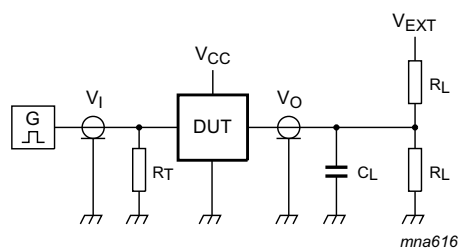
Measurement points are given in [Table 9](#).

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

**Fig 3. The input A,  $\bar{E}$  to output nY propagation delays**

Table 9. Measurement points

Supply voltage	Input	Output
$V_{CC}$	$V_M$	$V_M$
1.65 V to 1.95 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.3 V to 2.7 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
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	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$



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 4. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load		$V_{EXT}$
	$V_I$	$t_r = t_f$	$C_L$	$R_L$	$t_{PLH}, t_{PHL}$
1.65 V to 1.95 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	1 k $\Omega$	open
2.3 V to 2.7 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	500 $\Omega$	open
2.7 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open
3.0 V to 3.6 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open
4.5 V to 5.5 V	$V_{CC}$	$\leq 2.5$ ns	50 pF	500 $\Omega$	open

13. Package outline

Plastic surface-mounted package; 6 leads

SOT363

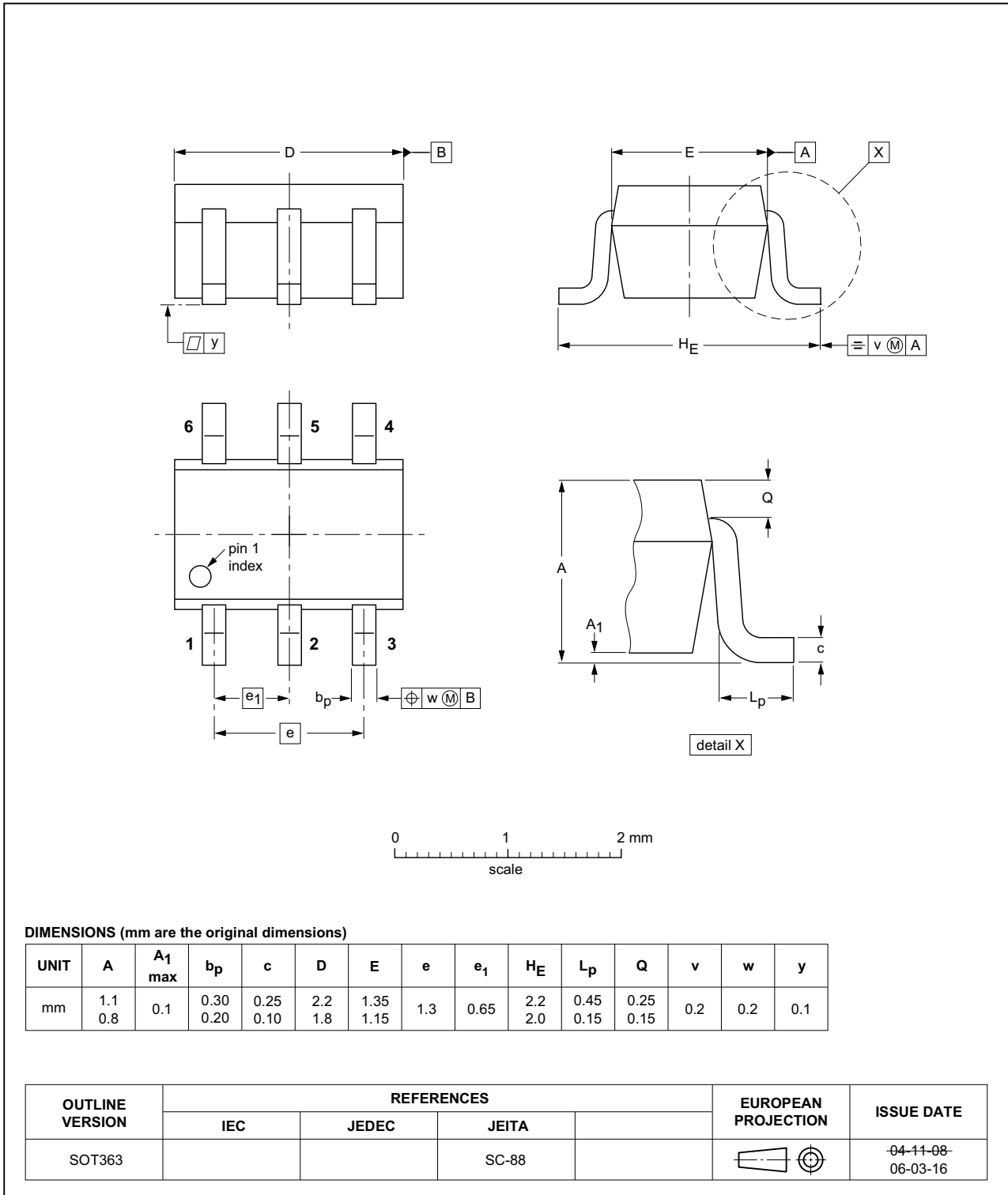


Fig 5. Package outline SOT363 (SC-88)



## 14. 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

## 15. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G19_Q100 v.2	20161209	Product data sheet	-	74LVC1G19_Q100 v.1
Modifications:	• <a href="#">Table 7</a> : The maximum limits for leakage current and supply current have changed.			
74LVC1G19_Q100 v.1	20150924	Product data sheet	-	-

## 16. Legal information

### 16.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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## 18. Contents

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<b>1</b>	<b>General description</b> .....	<b>1</b>
<b>2</b>	<b>Features and benefits</b> .....	<b>1</b>
<b>3</b>	<b>Ordering information</b> .....	<b>2</b>
<b>4</b>	<b>Marking</b> .....	<b>2</b>
<b>5</b>	<b>Functional diagram</b> .....	<b>2</b>
<b>6</b>	<b>Pinning information</b> .....	<b>2</b>
6.1	Pinning .....	2
6.2	Pin description .....	3
<b>7</b>	<b>Functional description</b> .....	<b>3</b>
<b>8</b>	<b>Limiting values</b> .....	<b>3</b>
<b>9</b>	<b>Recommended operating conditions</b> .....	<b>4</b>
<b>10</b>	<b>Static characteristics</b> .....	<b>4</b>
<b>11</b>	<b>Dynamic characteristics</b> .....	<b>6</b>
<b>12</b>	<b>AC waveforms</b> .....	<b>6</b>
<b>13</b>	<b>Package outline</b> .....	<b>8</b>
<b>14</b>	<b>Abbreviations</b> .....	<b>9</b>
<b>15</b>	<b>Revision history</b> .....	<b>9</b>
<b>16</b>	<b>Legal information</b> .....	<b>10</b>
16.1	Data sheet status .....	10
16.2	Definitions .....	10
16.3	Disclaimers .....	10
16.4	Trademarks .....	11
<b>17</b>	<b>Contact information</b> .....	<b>11</b>
<b>18</b>	<b>Contents</b> .....	<b>12</b>