

1. General Description

The EM74LVC1G97 is a configurable multiple function gate with Schmitt-trigger inputs. The device can be configured as any of the following logic functions MUX, AND, OR, NAND, NOR, inverter and buffer; using the 3-bit input. All inputs can be connected directly to V_{CC} or GND.

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.

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 ($V_{CC} = 3.0$ V)
- CMOS low power dissipation
- Latch-up performance exceeds 200 mA
- Direct interface with TTL levels
- I_{OFF} 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)
 - JESD8B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
 - HBM ANSI/ESDA/JEDEC JS-001 Class 3B exceeds 8000 V
 - CDM ANSI/ESDA/JEDEC JS-002 Class C3 exceeds 2000 V
- Multiple package options

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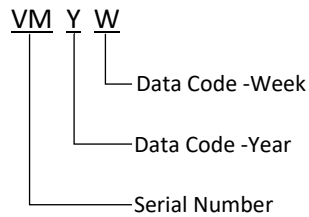
3. Ordering Information

Table 1. Ordering information

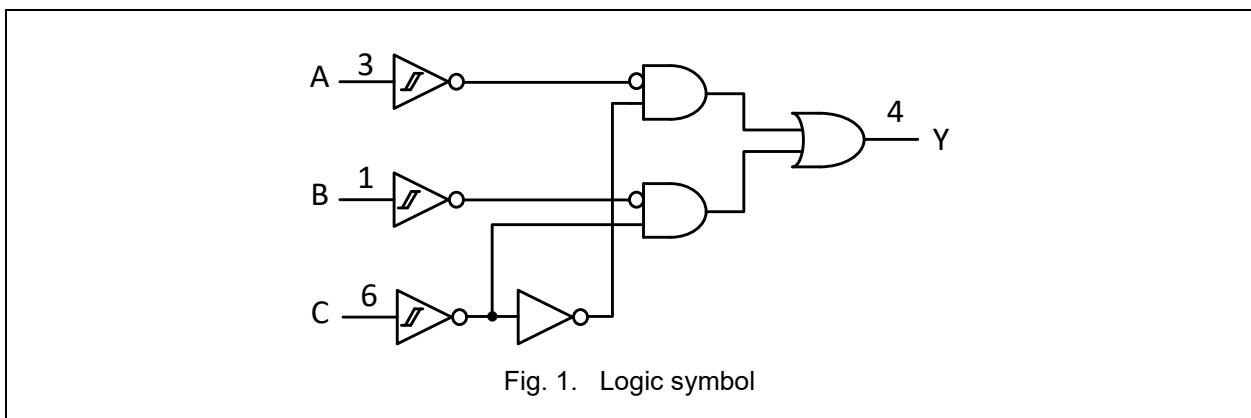
Type number	Topside marking	Package		
		Name	Description	Quantity
EM74LVC1G97GV	VMYW	SOT23-6L	SOT23 package, 6 pins 2.92 mm × 1.6 mm; 1.25 mm (Max) height	3000
EM74LVC1G97GW	VMYW	SOT363	SOT363 package, 6 pins 2.1 mm × 1.25 mm; 1.1 mm (Max) height	3000

MARKING INFORMATION

NOTE: YW = Data Code.

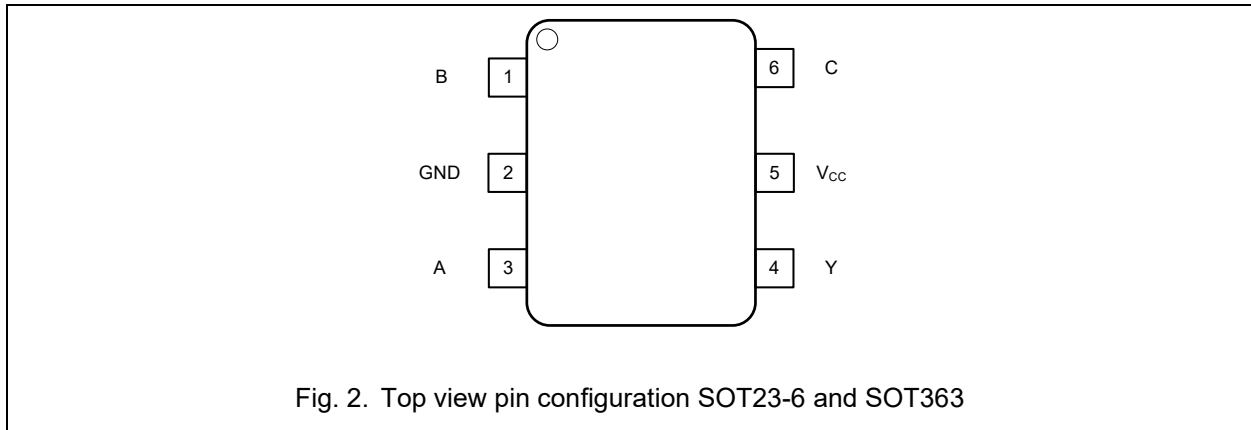


4. Function Diagram



5. Pinning Information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
B	1	Data input
GND	2	Ground (0V)
A	3	Data input
Y	4	Data output
V _{cc}	5	Supply voltage
C	6	Data input

6. Functional Description

Table 3. Function table

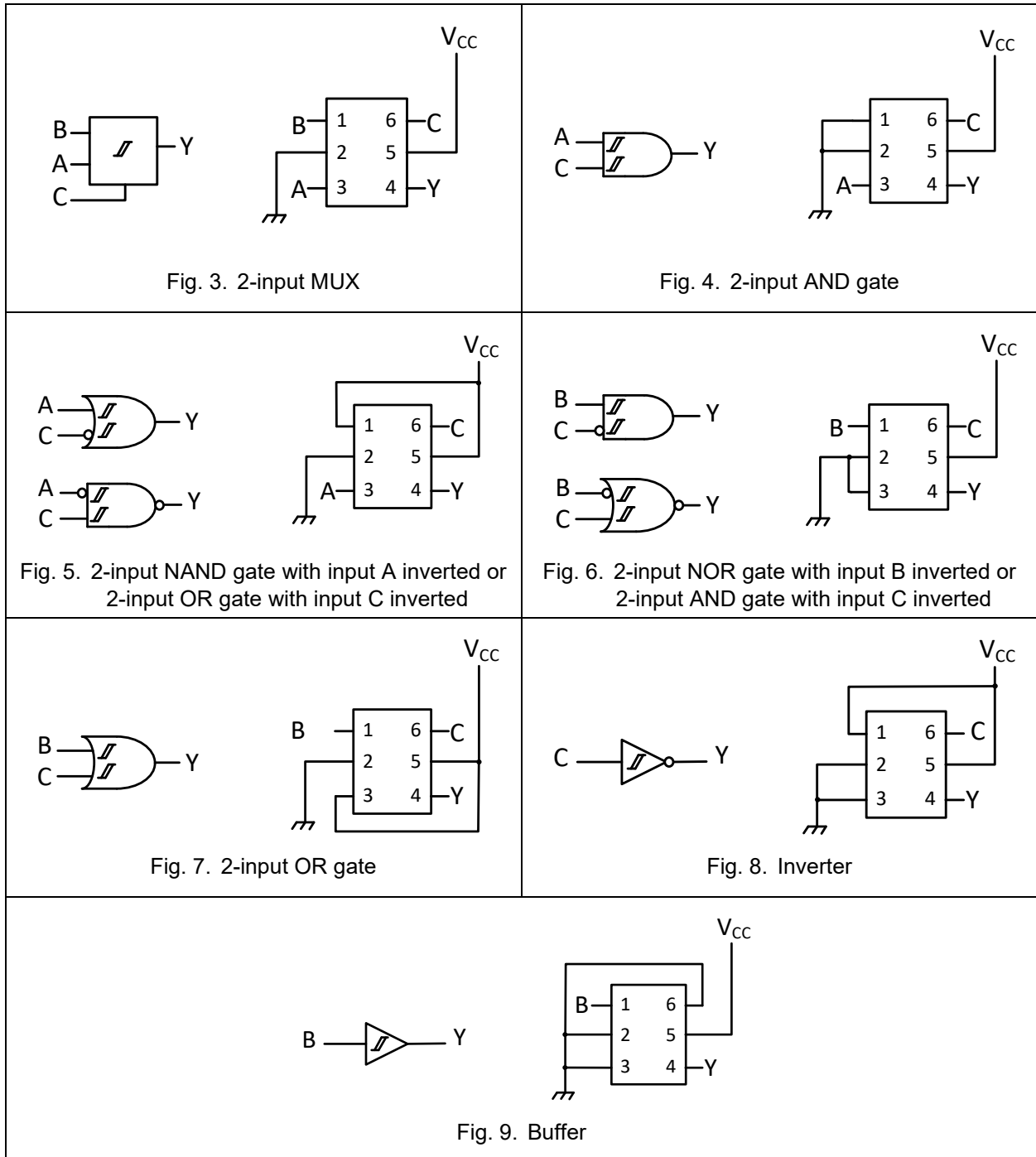
H = HIGH voltage level; L = LOW voltage level.

Input			Output
C	B	A	Y
L	L	L	L
L	L	H	L
L	H	L	H
L	H	H	H
H	L	L	L
H	L	H	H
H	H	L	L
H	H	H	H

6.1. Logic configurations

Table 4. Function selection table

Logic function	Figure
2-input MUX	see Fig. 3
2-input AND	see Fig. 4
2-input OR with one input inverted	see Fig. 5
2-input NAND with one input inverted	see Fig. 5
2-input AND with one input inverted	see Fig. 6
2-input NOR with one input inverted	see Fig. 6
2-input OR	see Fig. 7
Inverter	see Fig. 8
Buffer	see Fig. 9



7. Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Table 5. Absolute Maximum Ratings

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND.

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	[1]	-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 [1]	-0.5	6.5	V
		Power-down mode; V _{CC} = 0 V [1]	-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.

8. Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. EnergyMath does not recommend exceeding them or designing to Absolute Maximum Ratings.

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} = 0V	0		5.5	V
T _{amb}	ambient temperature		-40		125	°C

9. 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 _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-}						
		I _O = -100µA; 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			0.95		V
		I _O = -8 mA; V _{CC} = 2.3 V	1.9			1.7		V
		I _O = -12 mA; V _{CC} = 2.7 V	2.2			1.9		V
		I _O = -24 mA; V _{CC} = 3.0 V	2.3			2.0		V
		I _O = -32 mA; V _{CC} = 4.5 V	3.8			3.4		V
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-}						
		I _O = 100µA; V _{CC} = 1.65 V to 5.5 V			0.10		0.10	V
		I _O = 4 mA; V _{CC} = 1.65 V			0.45		0.70	V
		I _O = 8 mA; V _{CC} = 2.3 V			0.30		0.45	V
		I _O = 12 mA; V _{CC} = 2.7 V			0.40		0.60	V
		I _O = 24 mA; V _{CC} = 3.0 V			0.55		0.80	V
		I _O = 32 mA; V _{CC} = 4.5 V			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	µA
I _{OFF}	power-off leakage current	V _{CC} = 0V ; V _I or V _O = 5.5 V		±0.1	±2		±2	µA
I _{CC}	supply current	V _I = 5.5V or GND ; I _O = 0A ; V _{CC} = 5.5V		0.1	4		4	µA
ΔI _{CC}	additional supply current	per pin ; V _{CC} = 2.3V to 5.5V ; V _I = V _{CC} - 0.6V ; I _O = 0A		5	500		500	µA
C _I	input capacitance	V _{CC} = 3.3V ; V _I = GND to V _{CC}		5				pF

 [1]All typical values are measured at T_{amb} = 25°C.

10. Dynamic Characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 11.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
t_{pd}	propagation delay	A, B, C to Y; see Fig. 10 [2]						
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	4.0	15.7	26	4.0	26.5	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	2.5	9.5	14	2.5	14.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.0	7.1	9	2.0	9.5	ns
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	1.5	2.9	5	1.5	5.5	ns
C_{PD}	power dissipation capacitance	$C_L = 15 \text{ pF}; f = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$ [3]		25				pF

 [1] Typical values are measured at nominal V_{CC} and at $T_{amb} = 25 \text{ °C}$.

 [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).

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

 N = number of inputs switching;

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

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10.1. Waveforms and test circuit

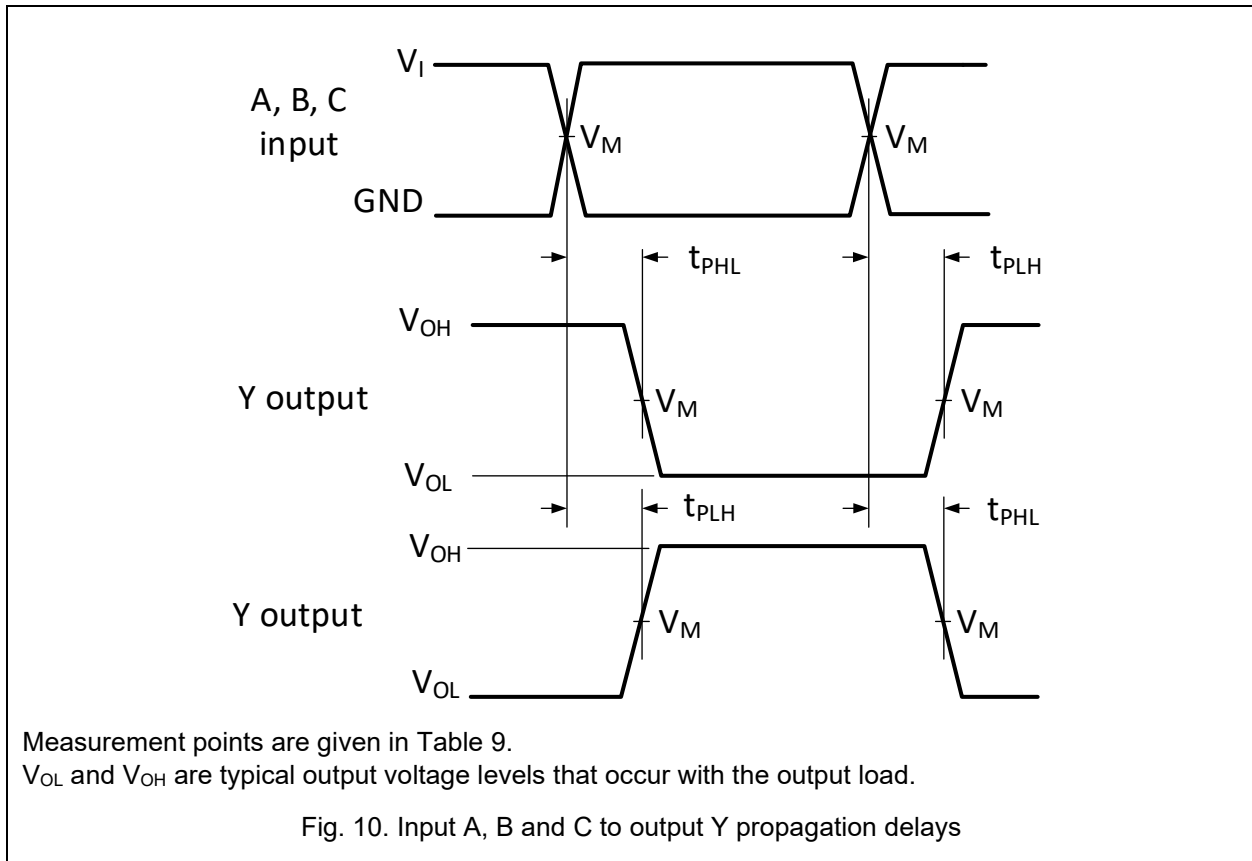


Table 9. Measurement points

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	$0.5V_{CC}$	$0.5V_{CC}$
3.0 V to 3.6 V	1.5 V	1.5 V
4.5 V to 5.5 V	$0.5V_{CC}$	$0.5V_{CC}$

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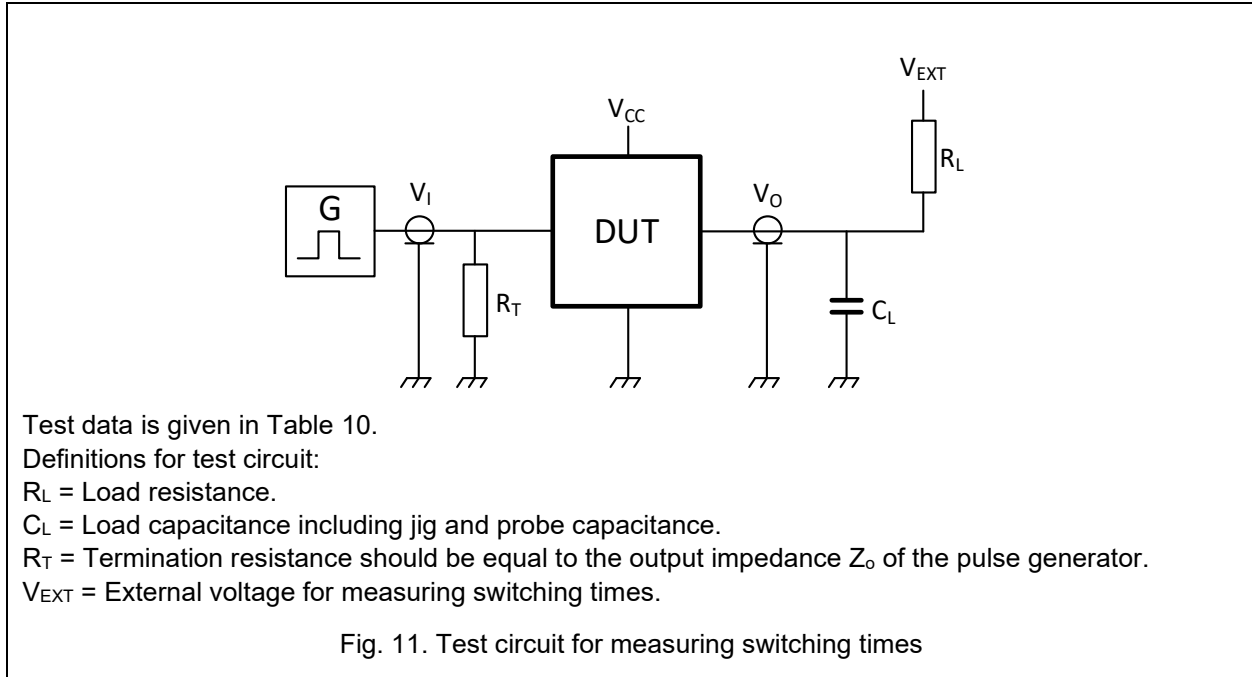


Table 10. Test data

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
3.0 V to 3.6 V	3 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

11. Transfer Characteristics

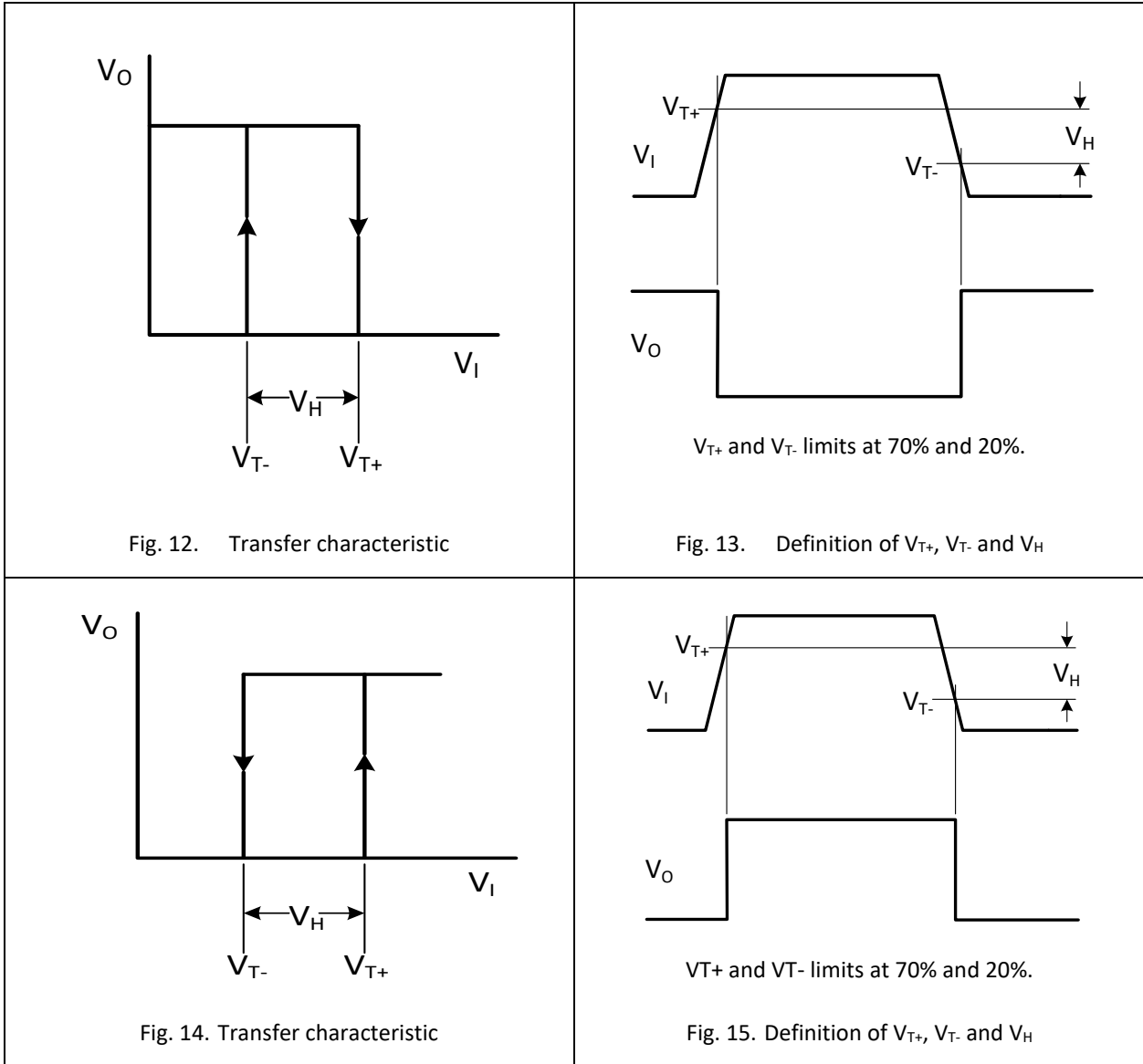
Table 11. Transfer characteristics

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 _{T+}	positive-going threshold voltage	see Fig. 12, Fig. 13, Fig. 14 and Fig. 15						
		V _{CC} = 1.8 V	0.70	1.09	1.20	0.67	1.20	V
		V _{CC} = 2.3 V	1.11	1.36	1.60	1.08	1.60	V
		V _{CC} = 3.0 V	1.50	1.69	2.00	1.47	2.00	V
		V _{CC} = 4.5 V	2.16	2.39	2.74	2.13	2.74	V
		V _{CC} = 5.5 V	2.61	2.86	3.33	2.58	3.33	V
V _{T-}	negative-going threshold voltage	see Fig. 12, Fig. 13, Fig. 14 and Fig. 15						
		V _{CC} = 1.8 V	0.30	0.6	0.72	0.30	0.75	V
		V _{CC} = 2.3 V	0.58	0.77	1.00	0.58	1.03	V
		V _{CC} = 3.0 V	0.80	1.09	1.30	0.80	1.33	V
		V _{CC} = 4.5 V	1.21	1.62	1.90	1.21	1.93	V
		V _{CC} = 5.5 V	1.45	1.99	2.29	1.45	2.32	V
V _H	hysteresis voltage	see Fig. 12, Fig. 13, Fig. 14 and Fig. 15						
		V _{CC} = 1.8 V	0.30	0.49	0.62	0.23	0.62	V
		V _{CC} = 2.3 V	0.40	0.58	0.80	0.34	0.80	V
		V _{CC} = 3.0 V	0.50	0.6	1.00	0.44	1.00	V
		V _{CC} = 4.5 V	0.71	0.76	1.20	0.65	1.20	V
		V _{CC} = 5.5 V	0.71	0.86	1.40	0.65	1.40	V

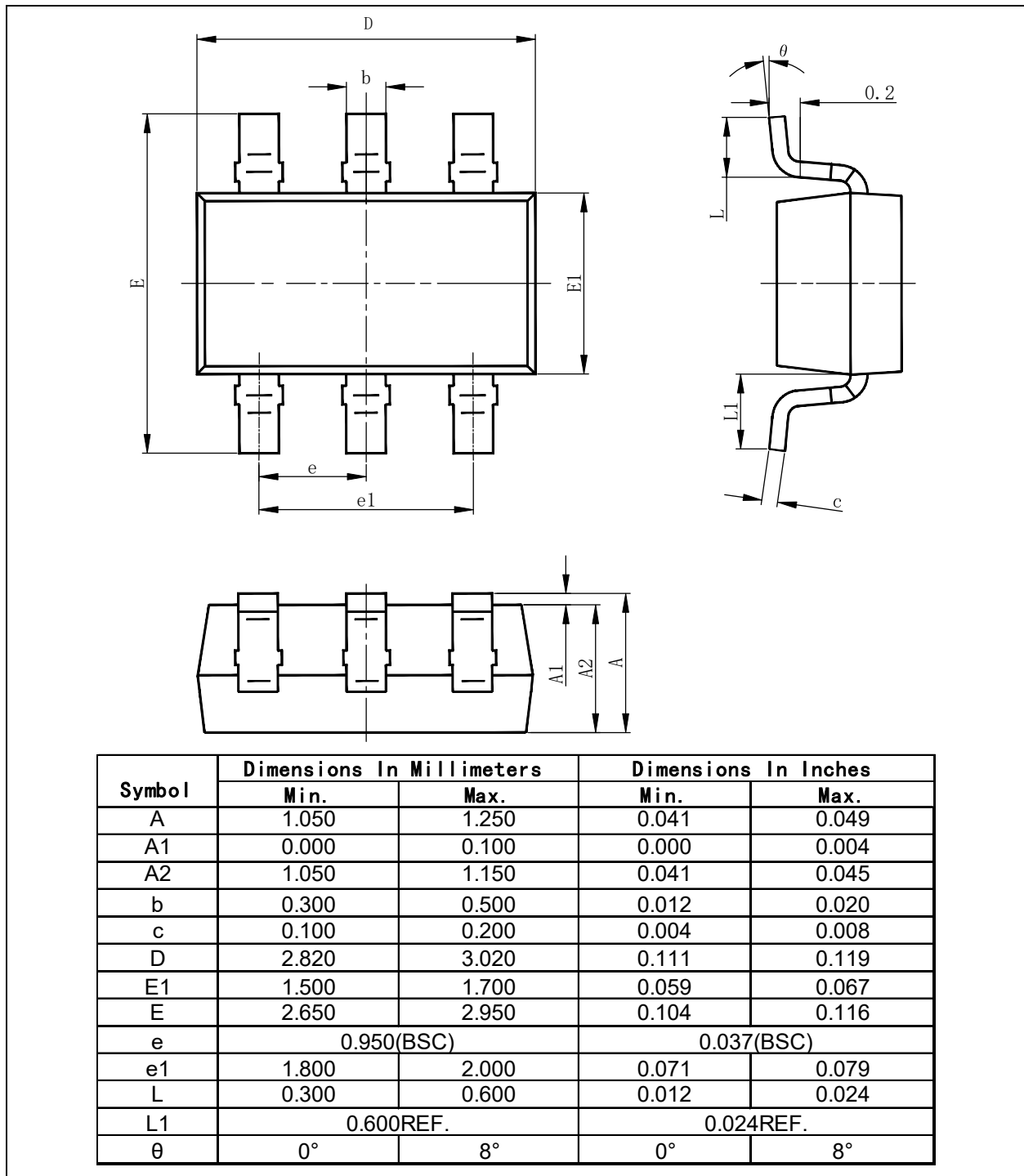
 [1]All typical values are measured at T_{amb} = 25°C.

11.1. Waveforms transfer characteristics



12. Package Outline

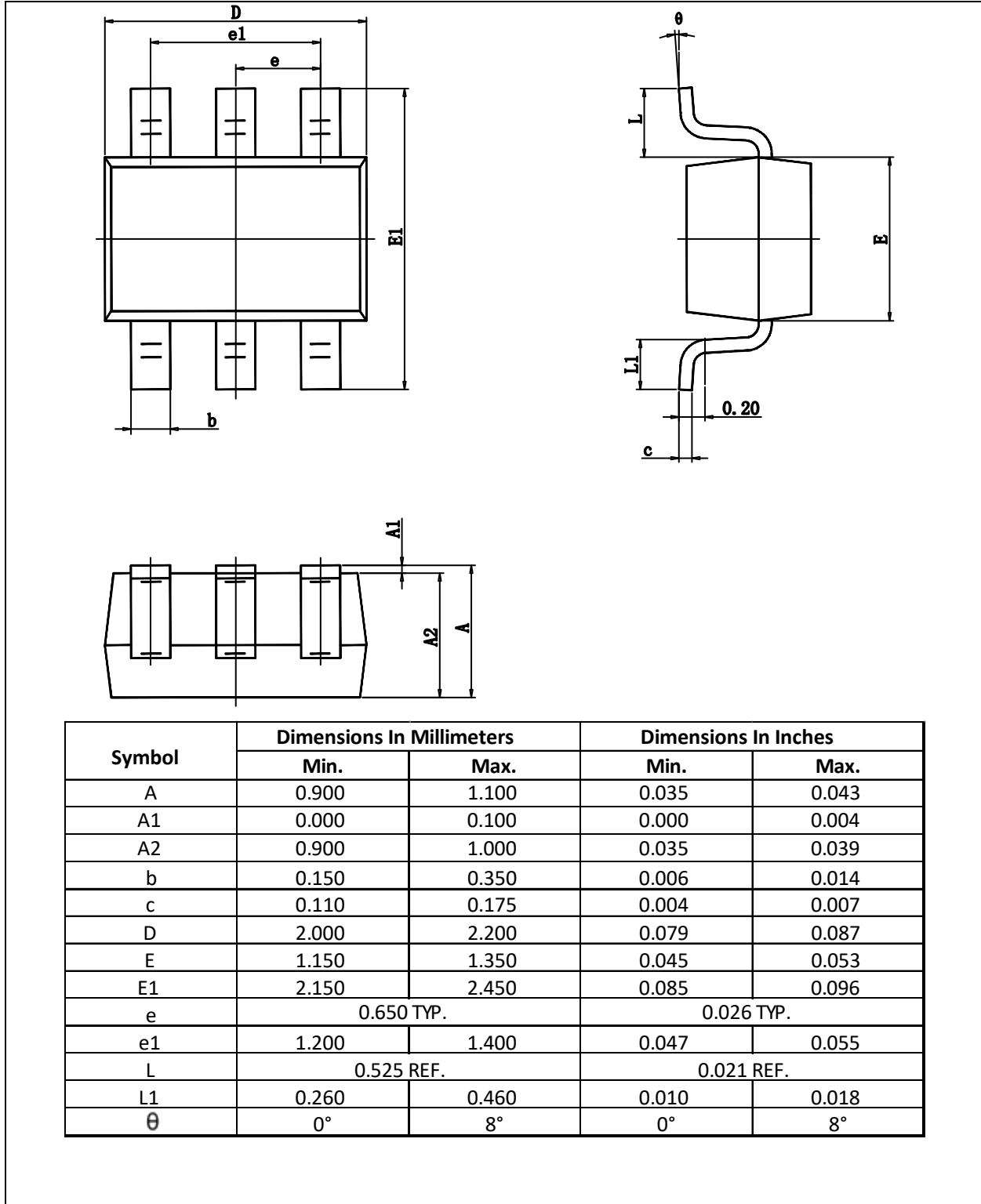
SOT23-6L



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SOT363



13. Tape and Reel Information

13.1. Carrier tape dimensions

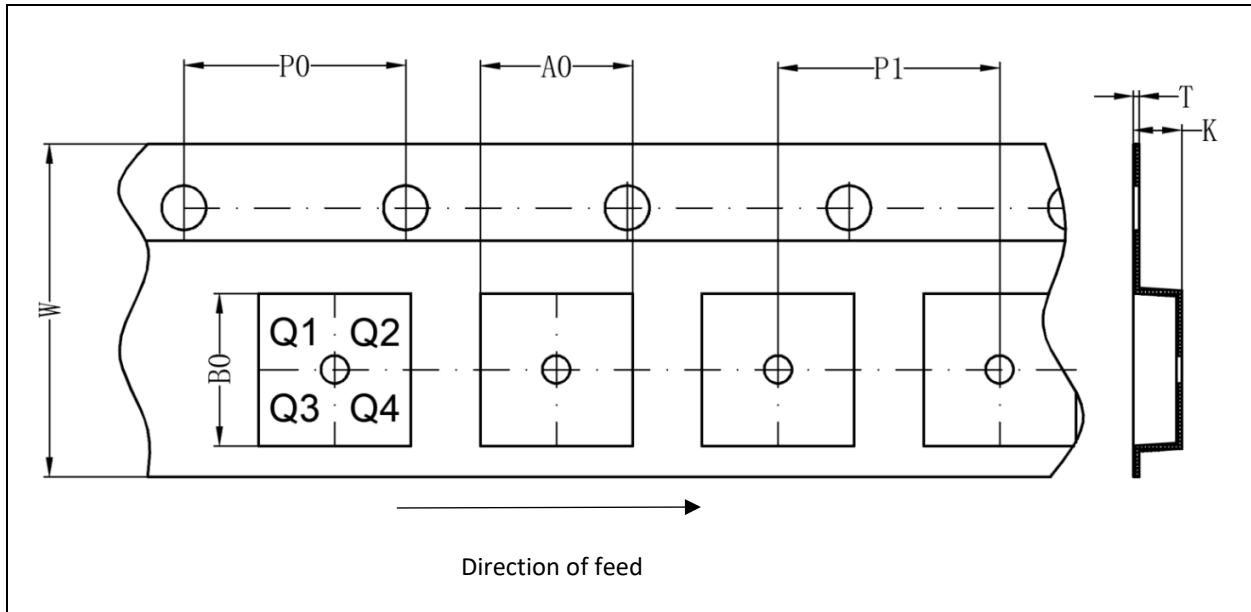
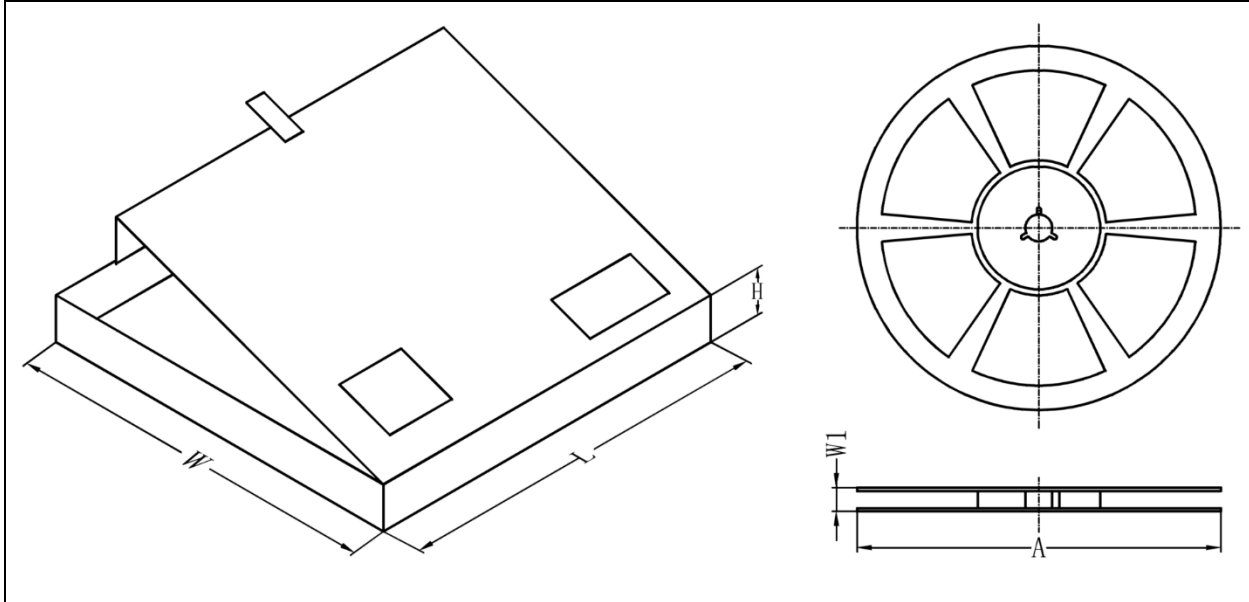


Table 12. Carrier tape dimensions

Package version	A0(mm)	B0(mm)	K0(mm)	T(mm)	P1(mm)	W(mm)	P0(mm)	PIN 1
SOT363	2.55	2.55	1.2	0.2	4	8	4	Q3
SOT23-6L	3.23	3.17	1.37	0.25	4	8	4	Q3

13.2. Reel and box dimensions


Table 13. Dimensions and quantities

Package version	Type NO. ending	Reel Dimension A (mm)	Reel Width W1 (mm)	SPQ (pcs)[1]	Reels per box	Outer box dimensions L×W×H(mm)[2]
SOT363	GW	180	12.2	3000	1	210x200x40
SOT23-6L	GV	180	12.2	3000	1	210x200x40

[1] Packing quantity dependent on specific product type. Please contact your local Energymath representative for ordering.

[2] Dimensions for reference only.

14. Abbreviations

Table 14. Abbreviations

Acronym	Description
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
CDM	Charged Device Model
TTL	Transistor-Transistor Logic

15. Revision History

Table 15. Revision history

Document ID	Release Date	Data sheet status	Change notice	Supersedes
EM74LVC1G97 Rev. 1.1	Jun 20, 2025	Product datasheet		EM74LVC1G97 Rev. 1.0
Modifications:	<ul style="list-style-type: none"> Section 13: Added tape and reel information. 			
EM74LVC1G97 Rev. 1.0	Jun 30, 2024	Product datasheet		