EM74LVC1G17

Single Schmitt trigger buffer

1.General Description

The EM74LVC1G17 is a single buffer Schmitt-trigger. 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 (VCC = 3.0 V)
- CMOS low power dissipation
- Latch-up performance exceeds 100 mA
- Direct interface with TTL levels
- I_{OFF} circuitry provides partial Power-down mode operation
- Unlimited rise and fall times
- 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
  - MM JESD22-A115C Class C exceeds 550 V
  - CDM ANSI/ESDA/JEDEC JS-002 Class C3 exceeds 2000 V
- Multiple package options

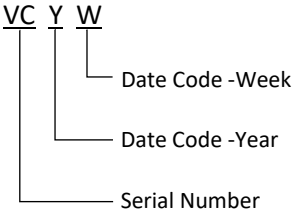
3.Ordering Information

Table 1. Ordering information

Type number	Topside marking	Package		
		Name	Description	Quantity
EM74LVC1G17GV	VCYW	SOT23-5L	SOT23 package, 5 pins 2.92 mm × 1.6 mm; 1.25 mm (Max) height	3000
EM74LVC1G17GW	VCYW	SOT353	SOT353 package, 5 pins 2.1 mm × 1.25 mm; 1.1 mm (Max) height	3000
EM74LVC1G17GS	VC	DFN1x1-6L	DFN1×1 package, 6 pins 1 mm × 1 mm; 0.42 mm (Max) height	3000
EM74LVC1G17GM	VCYW	DFN1x1.45-6L	DFN1.45×1 package, 6 pins 1.45 mm × 1 mm; 0.6 mm (Max) height	3000
EM74LVC1G17GX	VC	DFN0.8x0.8-4L	DFN0.8×0.8 package, 5pins 0.8 mm × 0.8 mm; 0.4 mm (Max) height	3000
EM74LVC1G17GX2	VC	DFN0.8x0.8-4L	DFN0.8×0.8 package, 5pins 0.8 mm × 0.8 mm; 0.4 mm (Max) height	3000
EM74LVC1G17YZV	VC	DFN-4L	DFN package, 4pins 0.888 mm × 0.888 mm; 0.4 mm (Max) height	3000

MARKING INFORMATION

NOTE: YW = Date Code.



4.Function Diagram

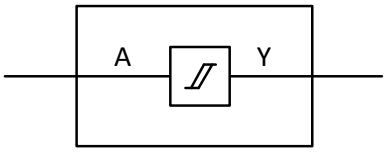


Fig 1. Logic symbol

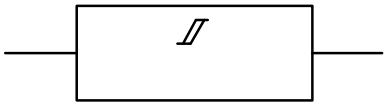


Fig 2. IEC logic symbol

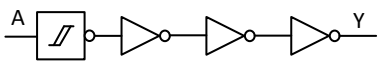


Fig 3. Logic diagram

5.Pinning Information

5.1. Pin map

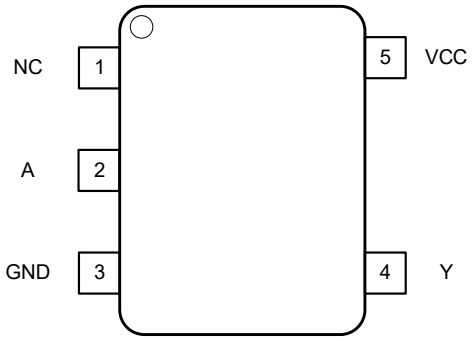


Fig 4. Top view pin configuration SOT23-5 and SOT353

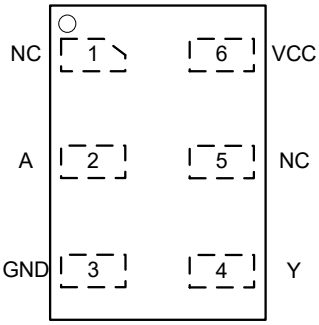


Fig 5. Top view pin configuration DFN6L

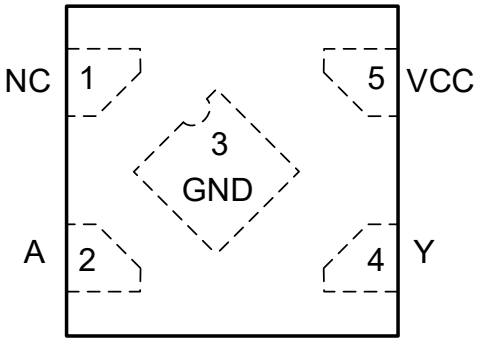


Fig 6. Top view pin configuration DFN0.8x0.8-4L

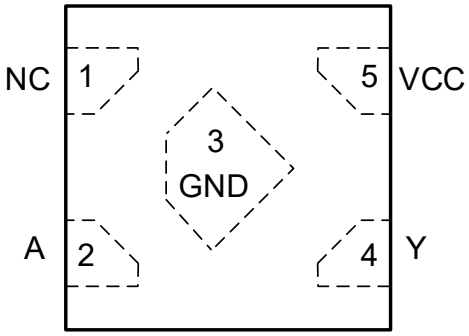


Fig 7. Top view pin configuration DFN0.8x0.8-4L

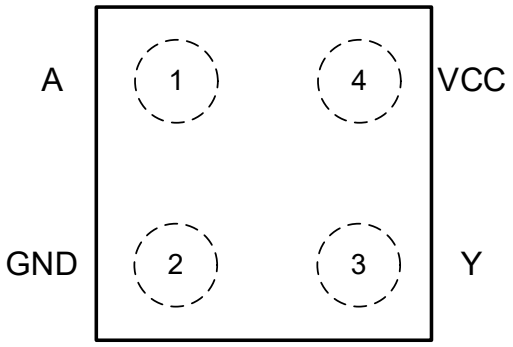


Fig 8.Top view pin configuration DFN-4L

5.2. Pin description

Table 2. Pin description

Symbol	Pin			Description
	SOT23-5, SOT353 and DFN0.8x0.8-4L	DFN-6L	DFN-4L	
NC	1	1, 5	-	Not connected
A	2	2	1	Data input
GND	3	3	2	Ground (0V)
Y	4	4	3	Data output
VCC	5	6	4	Supply voltage

6.Functional Description

Table 3. Function table

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

Input	Output
A	**Y**
L	L
H	H

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 4. 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	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 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 5. 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

9.Static Characteristics

Table 6. 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} = 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 V_{CC} = 3.3V and T_{amb} = 25℃.

10. Dynamic Characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 10.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
t_{pd}	propagation delay	nA to nY; see Fig. 9 [2]						
		V_{CC} = 1.65 V to 1.95 V	4.0	10.6	19.5	4.0	19.8	ns
		V_{CC} = 2.3 V to 2.7 V	2.5	5.9	10.6	2.5	10.9	ns
		V_{CC} = 3.0 V to 3.6 V	2.0	4.3	7	2.0	7.5	ns
		V_{CC} = 4.5 V to 5.5 V	1.5	2.9	4.8	1.5	5.0	ns
C_{PD}	power dissipation capacitance	per buffer ; V_I = GND to V_{CC} ; V_{CC} = 3.3V [3]		24				pF

[1] Typical values are measured at T_{amb} = 25 °C and V_{CC} = 1.8 V, 2.5 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).

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

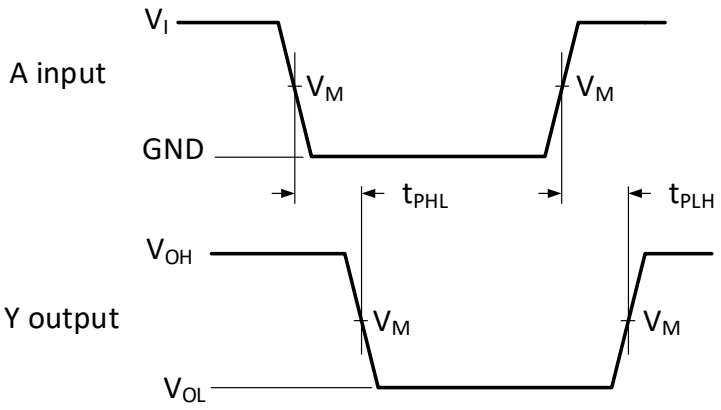
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

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

10.1. Waveforms and test circuit

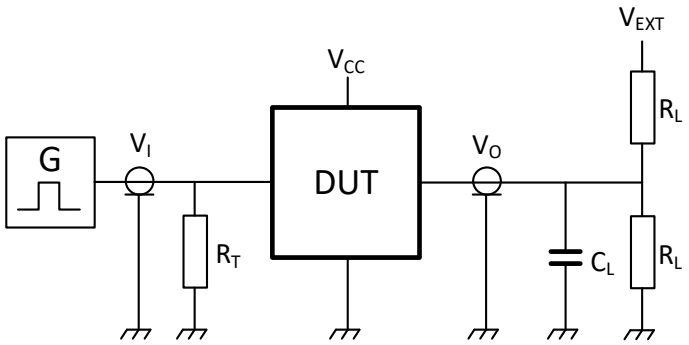


Measurement points are given in Table 8.
V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig 9. The input nA to output nY propagation delays

Table 8. 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	$0.5V_{CC}$	$0.5V_{CC}$



Test data is given in Table 9.
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 10. Test circuit for measuring switching times

Table 9. 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 kΩ	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 10. 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. 10 and Fig. 11						
		V_{CC} = 1.8 V	0.82	1.0	1.14	0.79	1.14	V
		V_{CC} = 2.3 V	1.03	1.2	1.40	1.00	1.40	V
		V_{CC} = 3.0 V	1.29	1.5	1.71	1.26	1.71	V
		V_{CC} = 4.5 V	1.84	2.2	2.36	1.81	2.36	V
		V_{CC} = 5.5 V	2.19	2.6	2.79	2.16	2.79	V
V_{T-}	negative-going threshold voltage	see Fig. 10 and Fig. 11						
		V_{CC} = 1.8 V	0.46	0.6	0.75	0.46	0.78	V
		V_{CC} = 2.3 V	0.65	0.7	0.96	0.65	0.99	V
		V_{CC} = 3.0 V	0.88	1.0	1.24	0.88	1.27	V
		V_{CC} = 4.5 V	1.32	1.6	1.84	1.32	1.87	V
		V_{CC} = 5.5 V	1.58	1.9	2.24	1.58	2.27	V
V_H	hysteresis voltage	see Fig. 10 and Fig. 11						
		V_{CC} = 1.8 V	0.26	0.5	0.62	0.19	0.62	V
		V_{CC} = 2.3 V	0.28	0.5	0.65	0.22	0.65	V
		V_{CC} = 3.0 V	0.31	0.6	0.7	0.25	0.7	V
		V_{CC} = 4.5 V	0.40	0.6	0.77	0.34	0.77	V
		V_{CC} = 5.5 V	0.47	0.6	0.88	0.41	0.88	V

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

11.1. Waveforms transfer characteristics

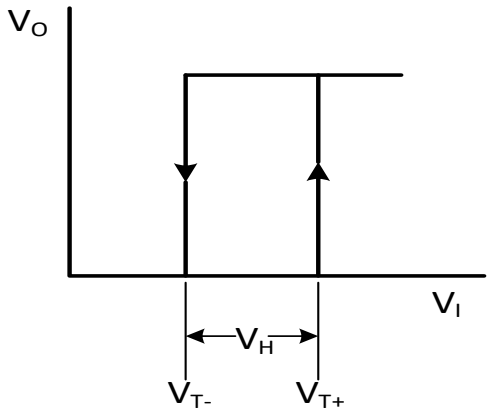
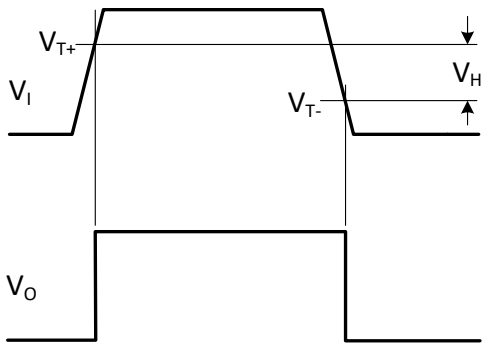


Fig 11. Transfer characteristic

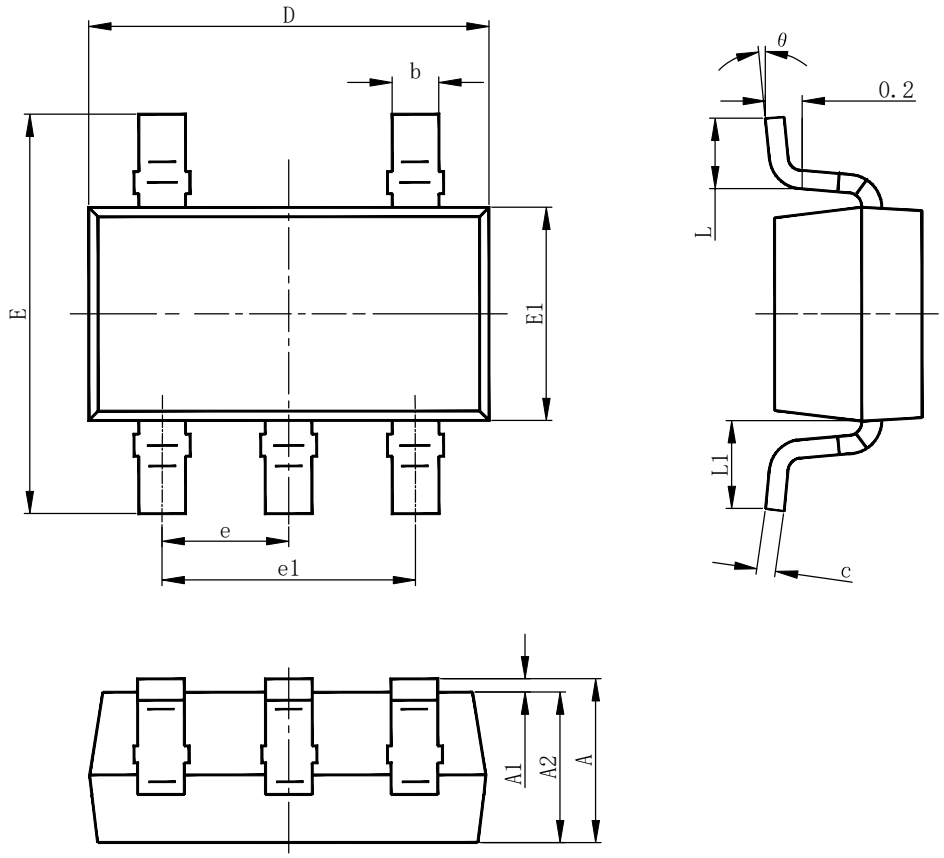


V_{T+} and V_{T-} limits at 70% and 20%.

Fig 12. Definition of V_{T+}, V_{T-} and V_H

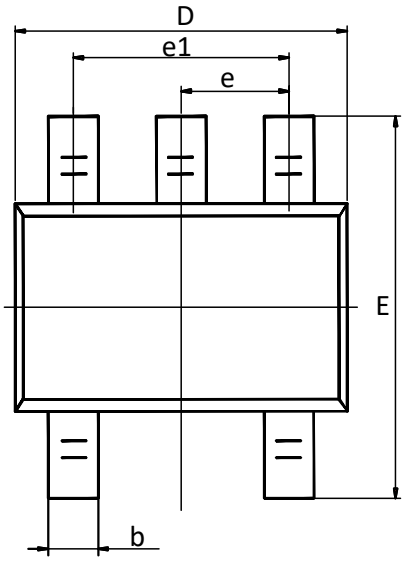
12. Package Outline

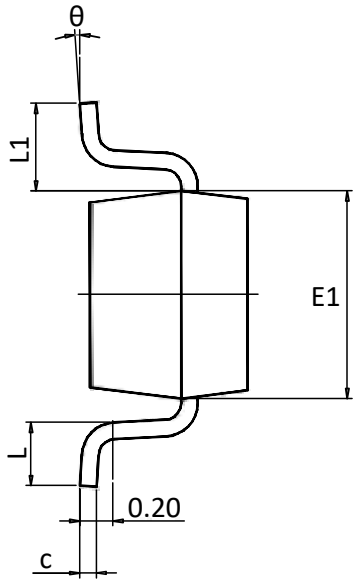
SOT23-5L

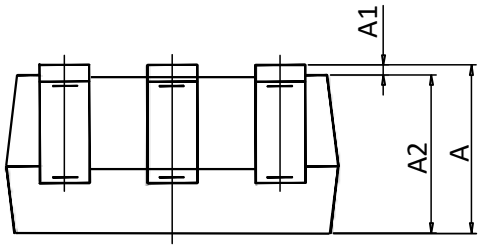


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
L1	0.600REF.		0.024REF.	
θ	0°	8°	0°	8°

SOT353

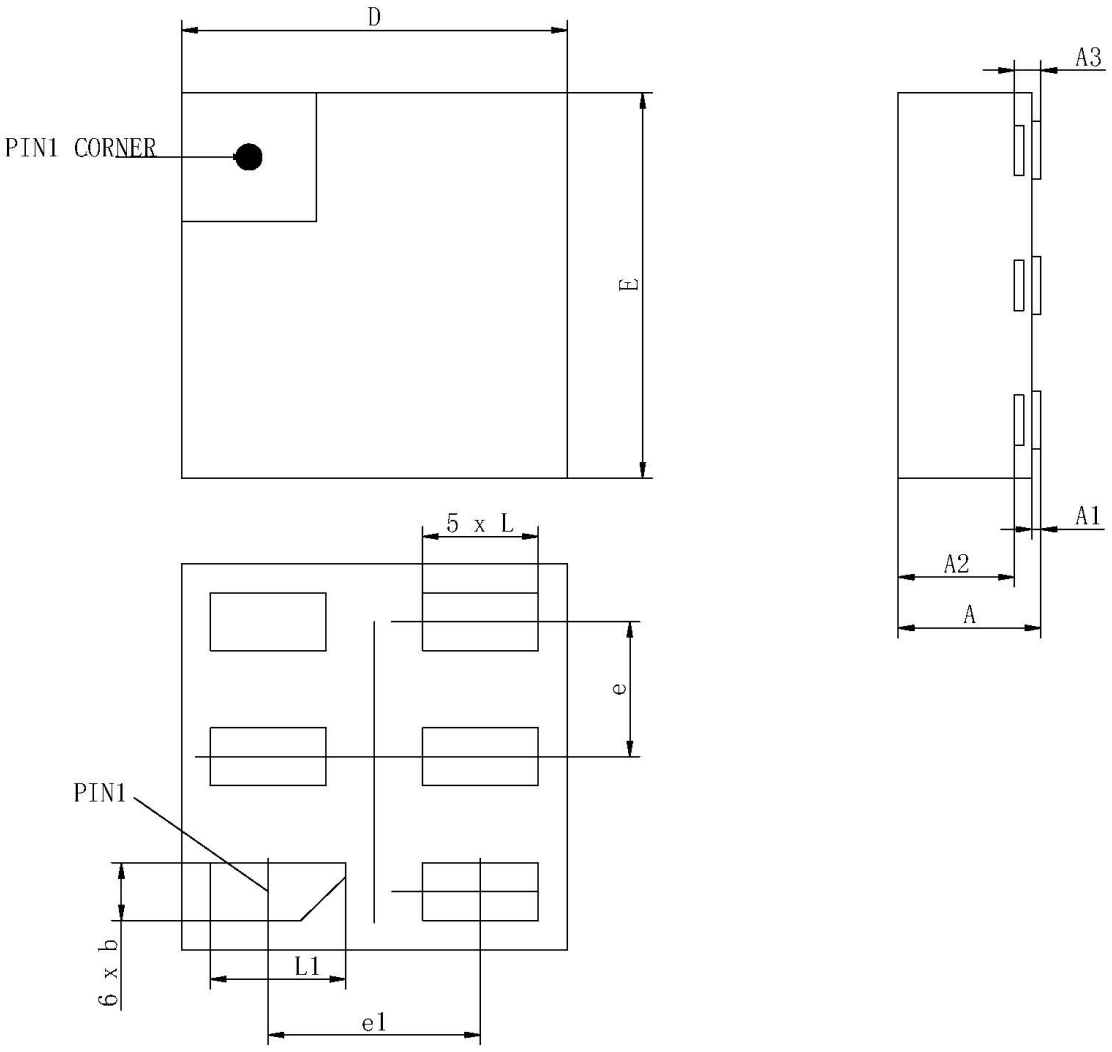






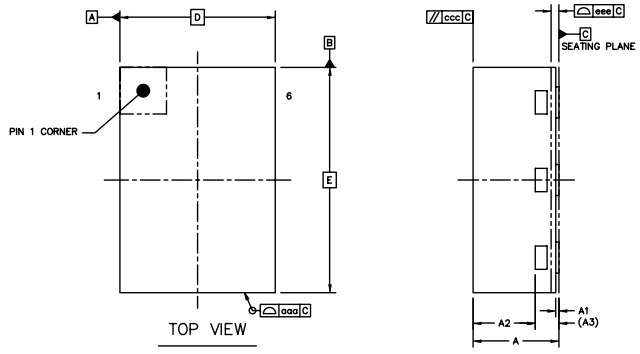
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.110	0.175	0.004	0.007
D	2.000	2.200	0.079	0.087
E	2.150	2.450	0.085	0.096
E1	1.150	1.350	0.045	0.053
e	0.650 TYP.		0.026 TYP.	
e1	1.200	1.400	0.047	0.055
L	0.260	0.460	0.010	0.018
L1	0.525 REF.		0.021 REF.	
θ	0°	8°	0°	8°

DFN1x1-6L



		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.32	0.37	0.42
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.27	---
L/F THICKNESS		A3		0.102 REF	
BODY SIZE	X	D		1.00 BSC	
	Y	E		1.00 BSC	
LEAD WIDTH		b	0.10	0.15	0.20
LEAD PITCH		e		0.35 BSC	
		e1		0.55 BSC	
LEAD LENGTH		L	0.25	0.30	0.35
		L1	0.30	0.35	0.40

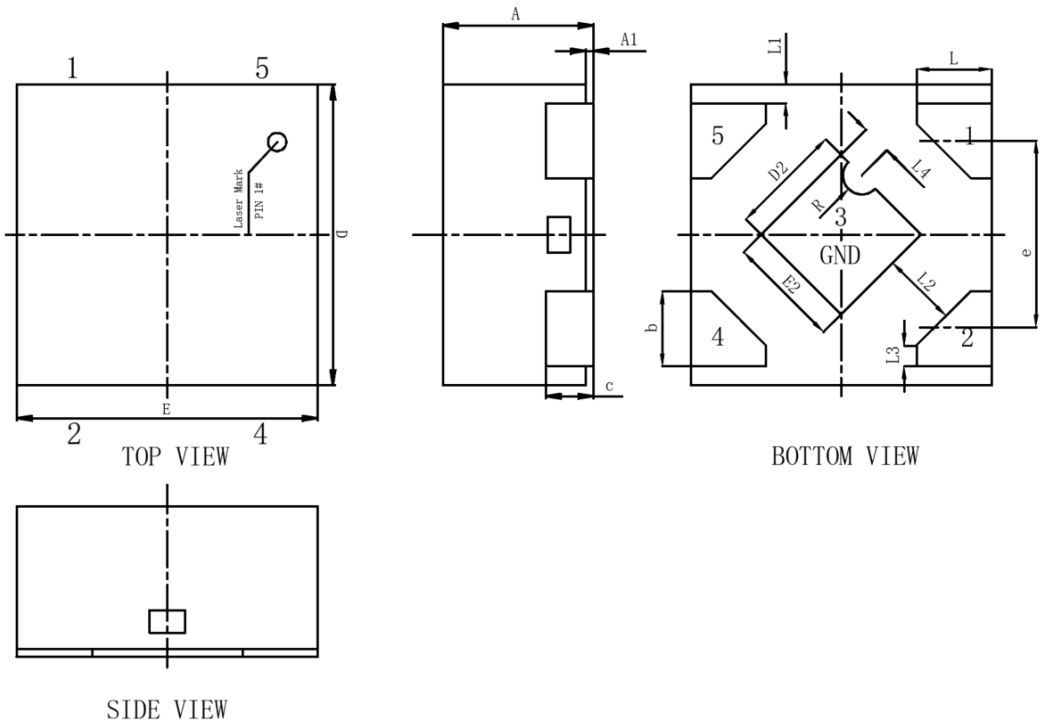
DFN1x1.45-6L



		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.5	0.55	0.6
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.4	---
L/F THICKNESS		A3		0.152 REF	
LEAD WIDTH		b	0.15	0.2	0.25
BODY SIZE	X	D		1 BSC	
	Y	E		1.45 BSC	
LEAD PITCH		e		0.5 BSC	
LEAD LENGTH		L	0.25	0.3	0.35
		L1		0.05 REF	
PACKAGE EDGE TOLERANCE		aaa		0.1	
MOLD FLATNESS		ccc		0.1	
COPLANARITY		eee		0.05	
LEAD OFFSET		bbb		0.1	

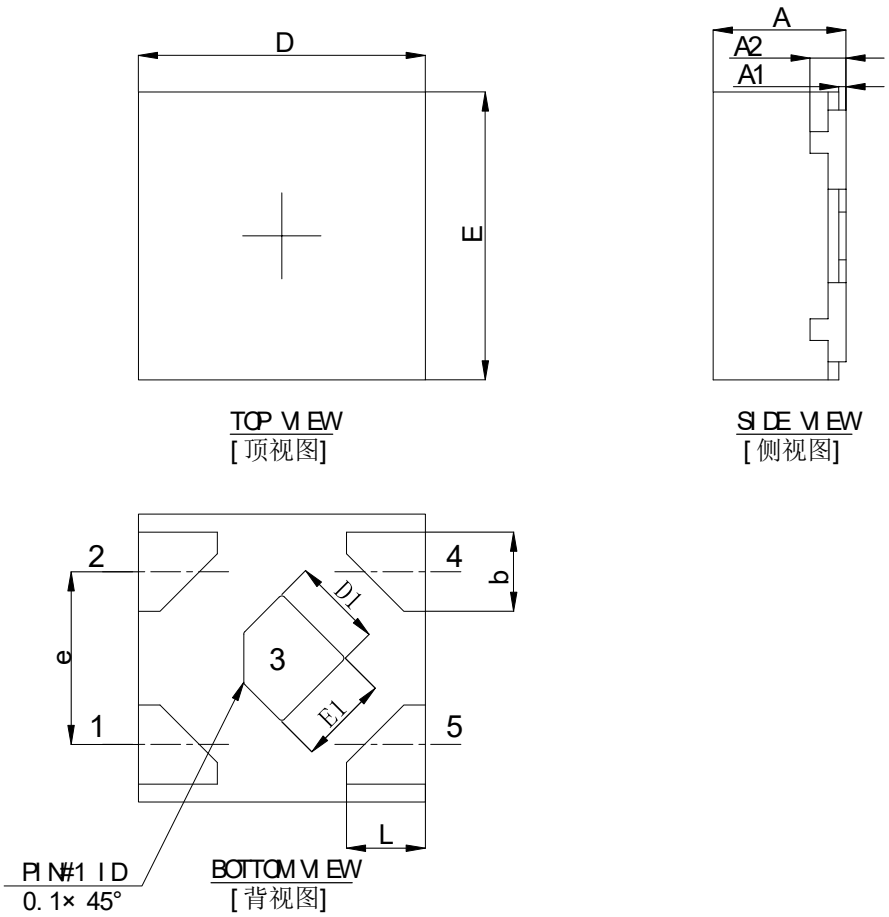
NOTES
1.REFER TO JEDEC MO-220;
2.COPLANARITY APPLIES TO LEADS, CORNER LEADS AND DIE ATTACH PAD;
3.BAN TO USE THE LEVEL 1 ENVIRONMENT-RELATED SUBSTANCES OF JCET PRESCRIBING;
4.FINISH: Cu/EP •Sn8~20s

DFN0.8x0.8-4L



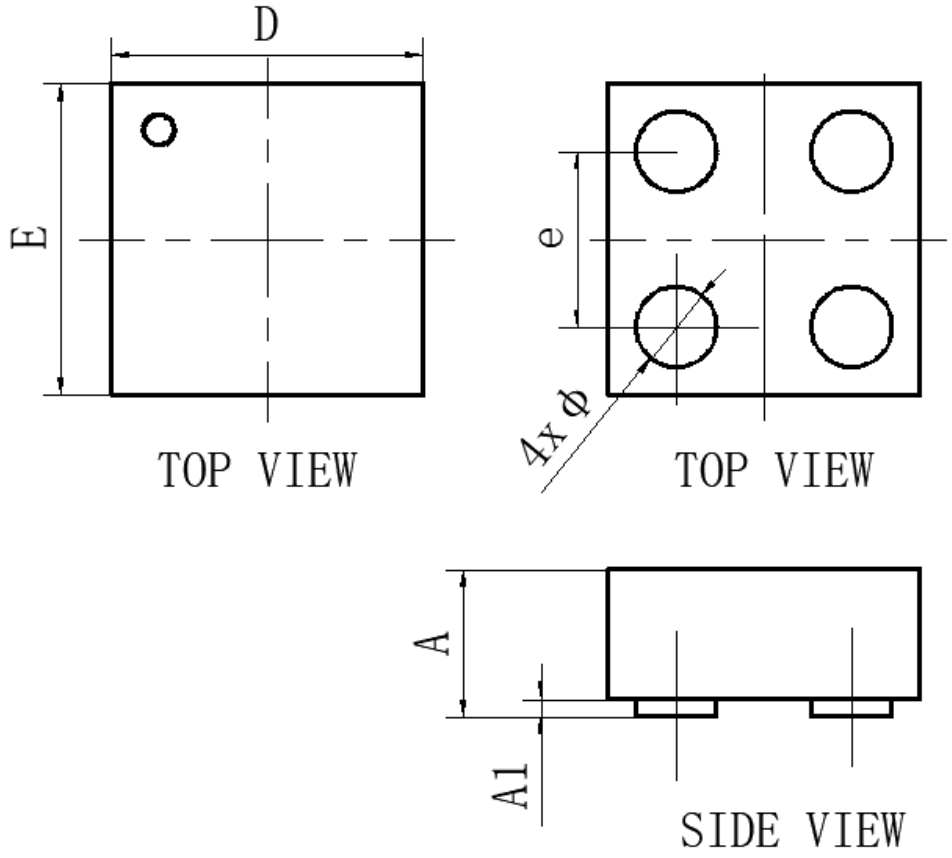
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.35	—	0.40
A1	0.00	0.02	0.05
b	0.15	0.20	0.25
c	0.127REF		
D	0.75	0.80	0.85
D2	0.20	0.30	0.40
e	0.50BSC		
E	0.75	0.80	0.85
E2	0.20	0.30	0.40
L	0.15	0.20	0.25
L1	0.05REF		
L2	0.20REF		
L3	0.055REF		
L4	0.10REF		
R	0.05REF		

DFN0.8x0.8-4L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nor.	Max.	Min.	Nor.	Max.
A	0.340	0.370	0.400	0.013	0.015	0.016
A1	0.000	-	0.050	0.000	-	0.002
A2	0.100REF.			0.004REF.		
b	0.170	0.220	0.270	0.007	0.009	0.011
D	0.750	0.800	0.850	0.030	0.031	0.033
E	0.750	0.800	0.850	0.030	0.031	0.033
D1	0.200	0.250	0.300	0.008	0.010	0.012
E1	0.200	0.250	0.300	0.008	0.010	0.012
e	0.480BSC.			0.019BSC.		
L	0.170	0.220	0.270	0.007	0.009	0.011

DFN-4L



Symbol	Dimensions in Millimeters	
	Min.	Max.
A	0.34	0.4
A1	0	0.05
D	0.858	0.918
E	0.858	0.918
e	0.5TYP	
ϕ	0.21	0.25

13. Tape and Reel Information

13.1. Carrier tape dimensions

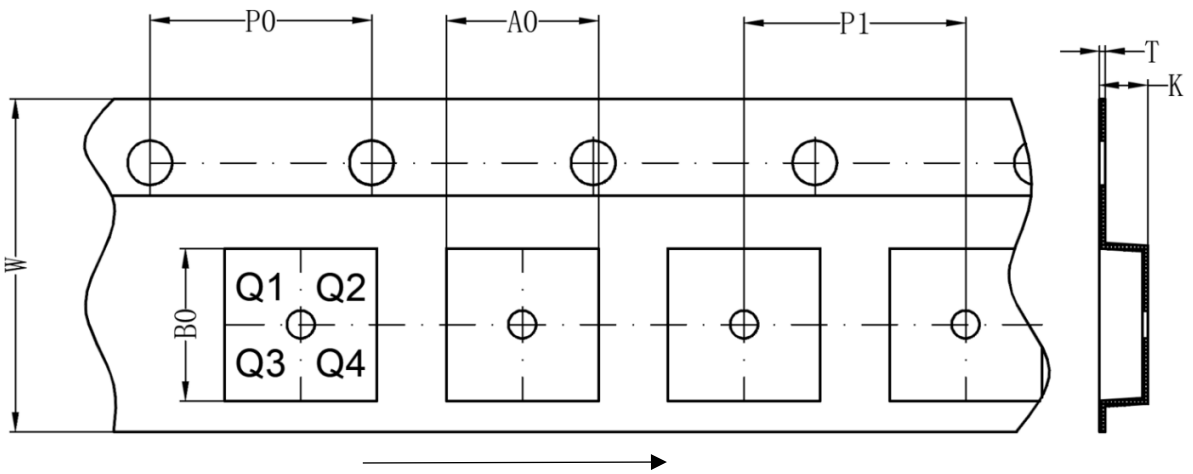


Table 11. Carrier tape dimensions

Package version	A0(mm)	B0(mm)	K0(mm)	T(mm)	P1(mm)	W(mm)	P0(mm)	PIN 1
DFN1x1.45-6L	1.15	1.6	0.75	0.2	4	8	4	Q1
DFN1x1-6L	1.16	1.16	0.5	0.23	4	8	4	Q1
DFN0.8x0.8-4L	0.91	0.91	0.5	0.2	2	8	4	Q1
SOT353	2.55	2.55	1.2	0.2	4	8	4	Q3
SOT363	2.55	2.55	1.2	0.2	4	8	4	Q3
SOT23-5L/6L	3.23	3.17	1.37	0.25	4	8	4	Q3

13.2. Reel and box dimensions

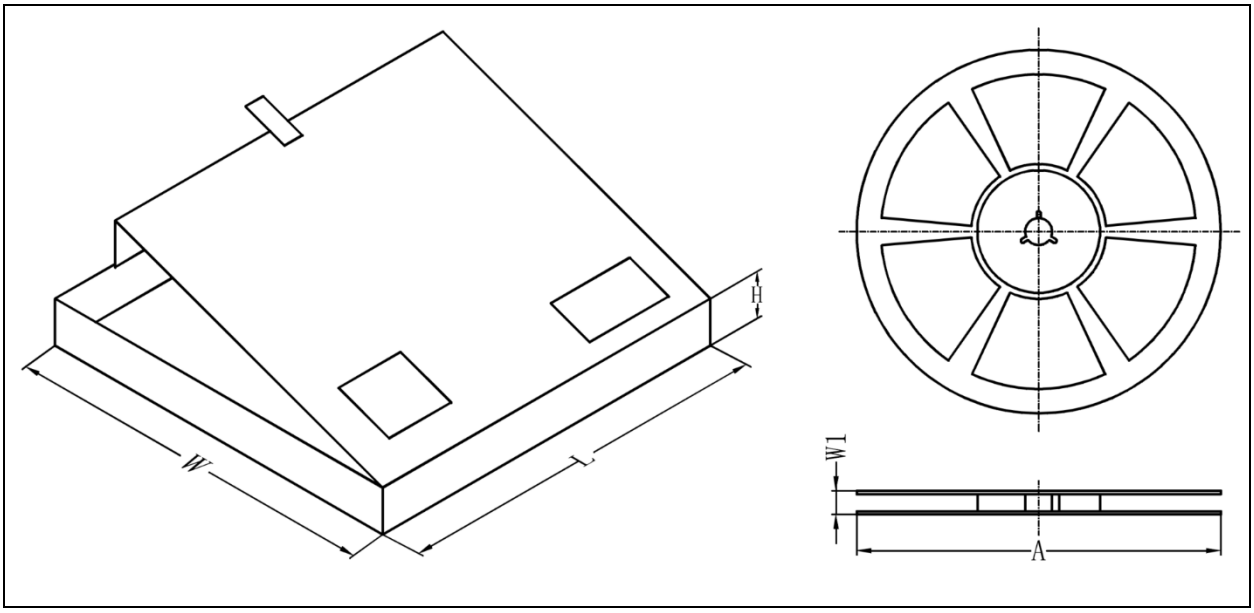


Table 12. Dimensions and quantities

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]
DFN1x1.45-6L	1R	180	12.2	3000	1	210x200x40
DFN1x1-6L	1R	180	12.2	3000	1	210x200x40
DFN0.8x0.8-4L	1R	180	12.2	3000	1	210x200x40
SOT353	1R	180	12.2	3000	1	210x200x40
SOT363	1R	180	12.2	3000	1	210x200x40
SOT23-5L/6L	1R	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 13. Abbreviations

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

15. Revision History

Table 14. Revision history

Document ID	Release Date	Data sheet status	Change notice	Supersedes
EM74LVC1G17 Rev1.3	Aug 30, 2025	Product datasheet		EM74LVC1G17 Rev1.2
Modifications:	• Added type number EM74LVC1G17GX2 and package information.			
EM74LVC1G17 Rev1.2	Jul 14, 2025	Product datasheet		EM74LVC1G17 Rev1.1
Modifications:	• Added tape and reel information.			
EM74LVC1G17 Rev1.1	Feb 20, 2025	Product datasheet		EM74LVC1G17 Rev1.0
Modifications:	• Added DFN-4L package.			
EM74LVC1G17 Rev1.0	Oct 30, 2023	Product datasheet		