LL054BT6

List

LL054BT6

4-Channel Low Capacitance ESD Protection Diodes Array- 5.0V

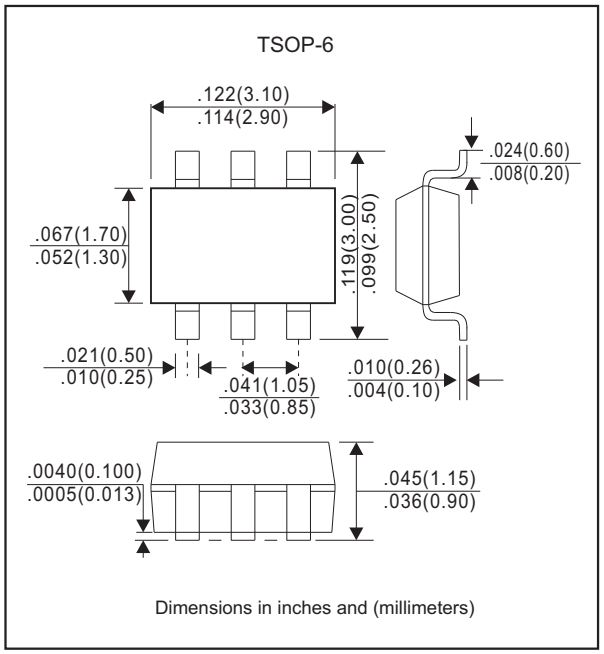
Features

- 4 channels of ESD protection
- Provide transient protection:
  IEC 61000-4-2 (ESD) level 4
  IEC 61000-4-4 (EFT) 80A (5/50ns)
  IEC 61000-4-5 (Surge) (8/20us)
- Channel I/O to GND capacitance: 0.9pF(Max)
- Channel I/O to I/O capacitance: 0.45pF(Max)
- Low clamping voltage
- Low operating voltage
- Improved zener structure
- Optimized package for easy high speed data lines PCB layout
- RoHS compliant
- Suffix "-H" indicates Halogen-free parts, ex. LL054BT6-H.

Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, TSOP-6
- Terminals :Plated terminals, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.013 gram

Package outline



Dimensions in inches and (millimeters)

Applications

- HDMI / DVI ports
- Display Port interface
- 10M / 100M / 1G Ethernet
- USB 2.0 interface
- VGA interface
- Set-top box
- Flat panel Monitors / TVs
- PC / Note book

Maximum ratings (at T_A=25°C unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Peak pulse power(8/20us)	P_{PP}	150	W
Peak pulse current IEC 61000-4-5(8/20us)	I_{PP}	5	A
ESD per IEC 61000-4-2(air) ESD per IEC 61000-4-2(contact)	V_{ESD}	±15 ±8	kV
Operating junction temperature range	T_{opr}	-55 to +125	°C
Storage temperature range	T_{stg}	-55 to +150	°C

Electrical characteristics (at T_A=25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Reverse working voltage	any I/O pin to GND	V_{RWM}			5.0	V
Reverse breakdown voltage	I_T = 1mA, any I/O pin to GND	V_{BR}	6.0			V
Reverse leakage current	V_{RWM}=5V,any I/O pin to GND	I_R			1.0	uA
Positive clamping voltage	I_{PP}=1A, tp=8/20us,positive pulse; any I/O pin to GND	V_{C1}		8.5	12.0	V
Negative clamping voltage	I_{PP}=1A, tp=8/20us,negative pulse; any I/O pin to GND	V_{C2}		1.8		V
Junction capacitance Between channel	V_R=0V, f=1MHz,between I/O pins	C_{J1}		0.35	0.45	pF
Junction capacitance Between I/O and GND	V_R=0V, f=1MHz,any I/O pin to GND	C_{J2}			0.9	pF

Rating and characteristic curves (LL054BT6)

Fig.1 - Non-Repetitive Peak Pulse Power

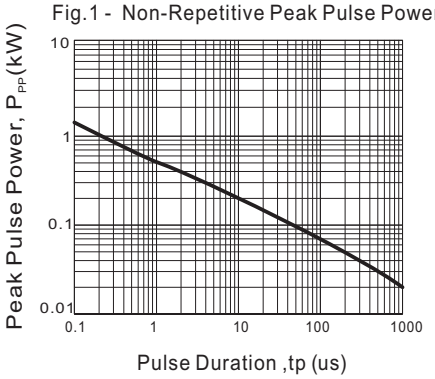


Fig. 2 - Power Derating Curve

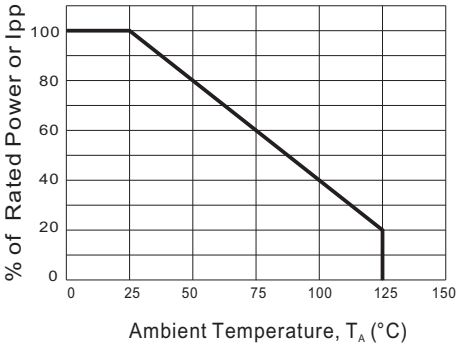


Fig. 3 - Pulse Waveform

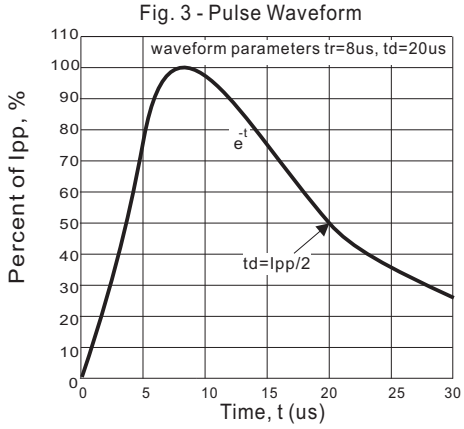


Fig. 4 - I/O-GND Clamping Voltage vs. Peak Pulse Current

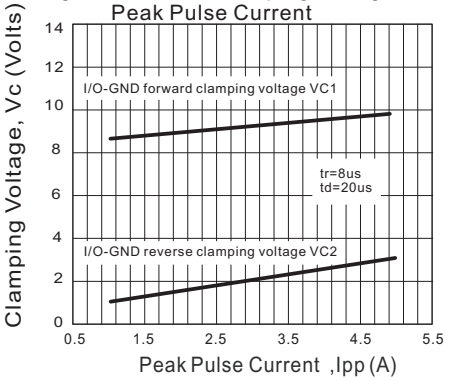


Fig. 5 - Normalized Capacitance vs. Reverse Voltage

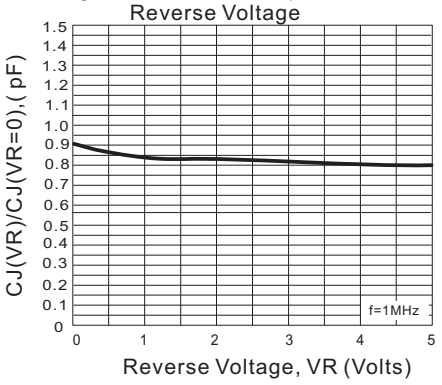


Fig. 6 - I/O-GND Insertion Loss vs. Frequency

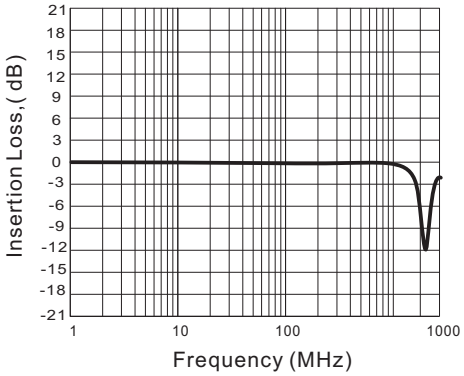
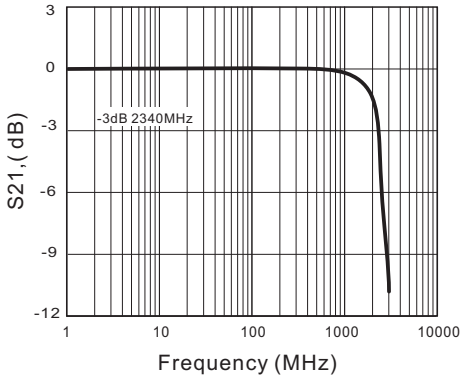
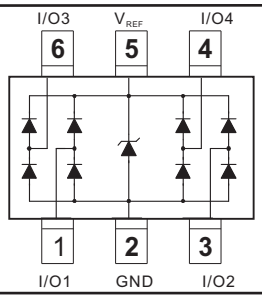
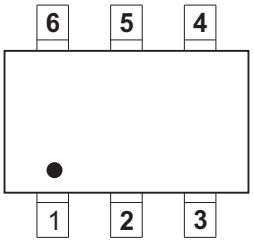
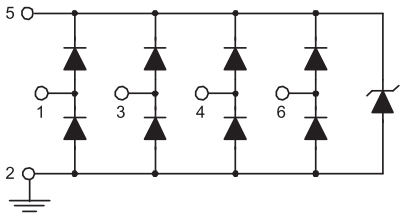


Fig. 7 - Insertion Loss vs. Frequency



LL054BT6

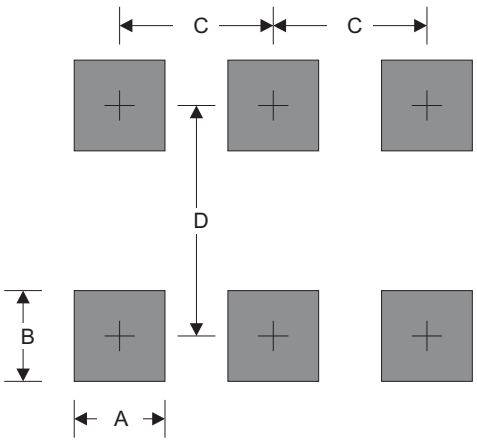
Pinning information

Pin Configuration	Simplified outline	Circuit Diagram
		

Marking

Type number	Marking code
LL054BT6	C96

Suggested solder pad layout

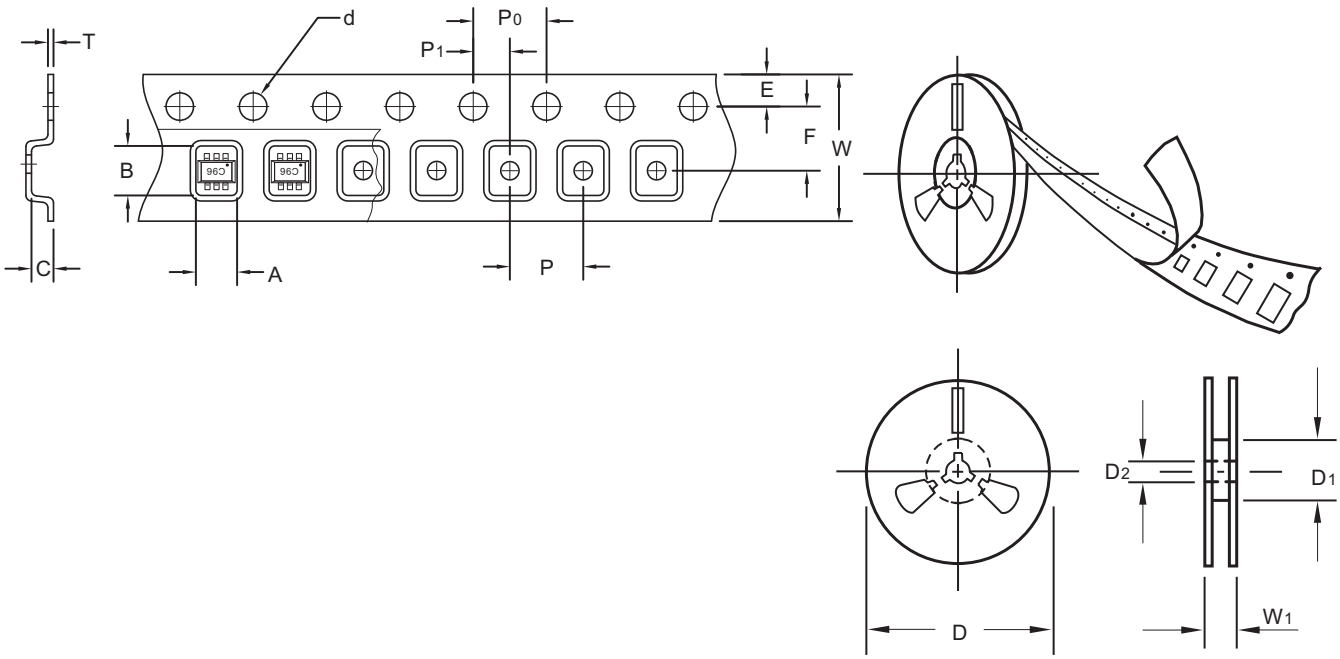


Dimensions in inches and (millimeters)

PACKAGE	A	B	C	D
TSOP-6	0.028 (0.70)	0.039 (1.00)	0.037(0.95)	0.094(2.40)

LL054BT6

Packing information



unit:mm

Item	Symbol	Tolerance	TSOP-6
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	54.4.00
Feed hole diameter	D_2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.05	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P_0	0.1	4.00
Embossment center	P_1	0.05	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	max	14.40

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

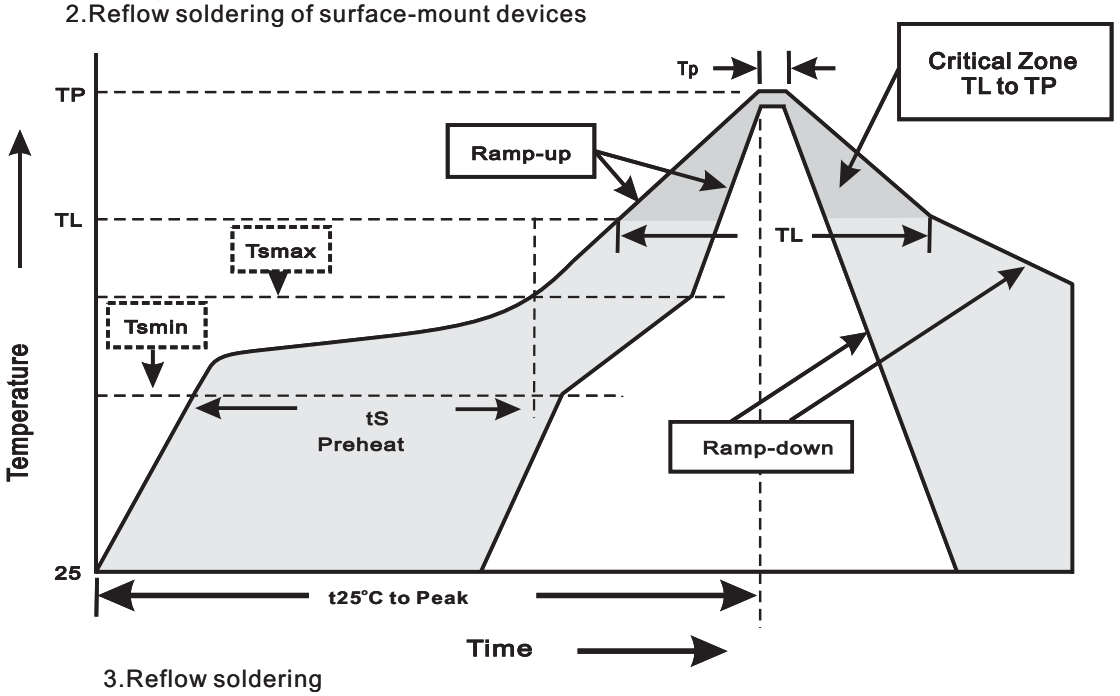
LL054BT6

Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
TSOP-6	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	9.50

Suggested thermal profiles for soldering processes

1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	<3°C/sec
Preheat -Temperature Min(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax to T_L -Ramp-upRate	 <3°C/sec
Time maintained above: -Temperature(T_L) -Time(t_L)	 217°C 60~260sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

LL054BT6

High reliability test capabilities

Item Test	Conditions	Reference
1. Solder Resistance	at 260±5°C for 10±2sec.	MIL-STD-750D METHOD-2031
2. Solderability	at 245±5°C for 5 sec.	MIL-STD-202F METHOD-208
3. High Temperature Reverse Bias	V_{BR}= V_{BR} Min * 80% at T_J=125°C for 168 hrs.	MIL-STD-750D METHOD-1038
4. Pressure Cooker	15P_{SIG} at T_A=121°C for 4 hrs.	JESD22-A102
5. Temperature Cycling	-55°C to +125°C dwelled for 30 min. and transferred for 5min. total 10 cycles.	MIL-STD-750D METHOD-1051
6. Humidity	at T_A=85°C, RH=85% for 1000hrs.	MIL-STD-750D METHOD-1021
7. High Temperature Storage Life	at 175°C for 1000 hrs.	MIL-STD-750D METHOD-1031