LL054BT2510

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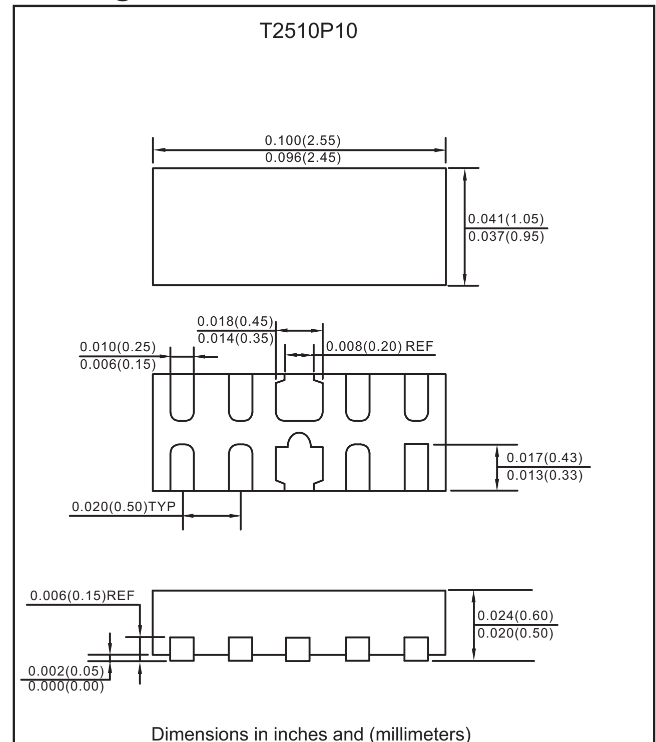
LL054BT2510

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

Features

- Transient protection for high-speed data lines
  IEC 61000-4-2(ESD) ±25kV(Air)±17kV(Contact)
  IEC 61000-4-4(EFT)40A(5/50ns)
  Cable discharge event(CDE)
- Package optimized for high-speed lines
- Ultra-small package(2.5mm*1.0mm*0.55mm)
- Protects four data lines
- Low capacitance:0.6pF for each channel
- Low leakage current:0.1μA @V_{RWM} (Typical)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±8KV contact discharge
- RoHS compliant
- Suffix "-H" indicates Halogen-free parts, ex. LL054BT2510-H

Package outline



Applications

- Serial ATA
- PCI express
- Desktops, servers and notebooks
- MDDI ports
- USB 2.0/3.0 power and data line protection
- Display Ports
- High definition multi-media interface (HDMI)
- Digital visual interface (DVI)

Mechanical data

- Flammability Rating: UL 94V-0
- Terminal: Matte tin plated
- Case : Molded plastic, T2510P10
- Mounting Position : Any
- Weight : 3.3 Millgrams (Approximate)

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

Parameter	Symbol	Value	Unit
Peak pulse power (8/20μs)	P_{PP}	30	Watt
ESD per IEC 61000-4-2(Air)	V_{ESD}	±25	kV
ESD per IEC 61000-4-2(Contact)	V_{ESD}	±17	kV
Operating junction temperature range	T_J	-55 to +125	°C
Storage temperature range	T_{STG}	-55 to +150	°C

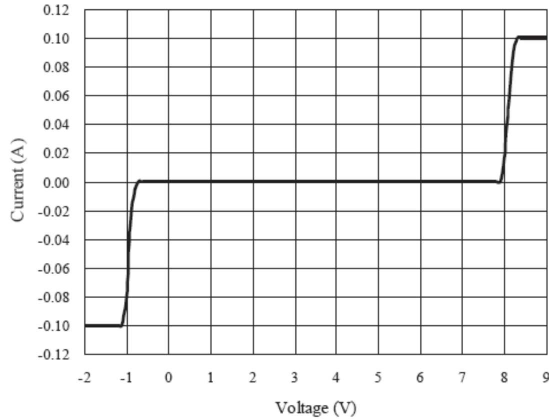
Electrical characteristics (at T_A=25°C unless otherwise noted)

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	8.0	10.0	V
Reverse leakage current	V_{RWM}=5V, any I/O pin to GND	I_R		0.1	1.0	μA
Clamping voltage	I_{PP}=1A, any I/O pin to GND (8/20μs)	V_C			12.0	V
Junction capacitance	V_R=0V, f=1MHz ,between I/O pins	C_J		0.2	0.4	pF
Junction capacitance	V_R=0V, f=1MHz ,any I/O pin to GND	C_J		0.6	0.8	pF

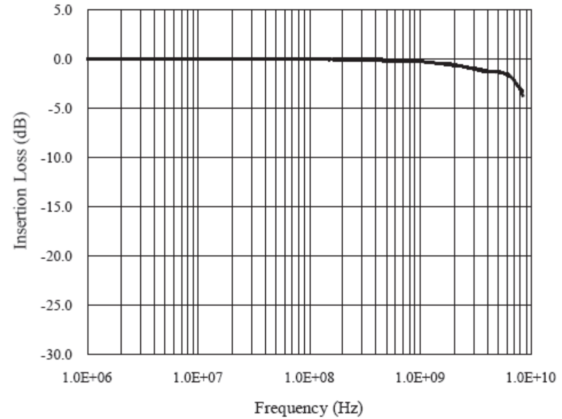
Note: I/O pins are pin 1,2,4,5.

Rating and characteristic curves

Voltage Sweeping of I/O to GND

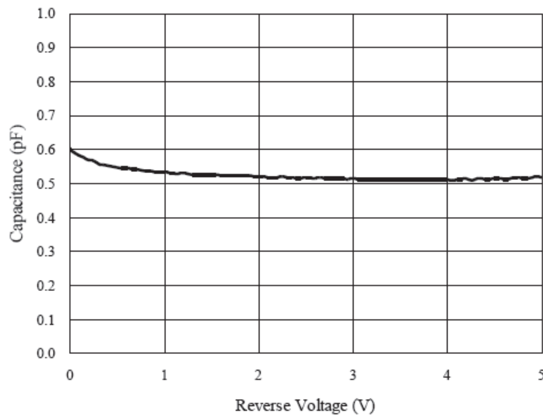


Insertion Loss S21 of I/O to GND

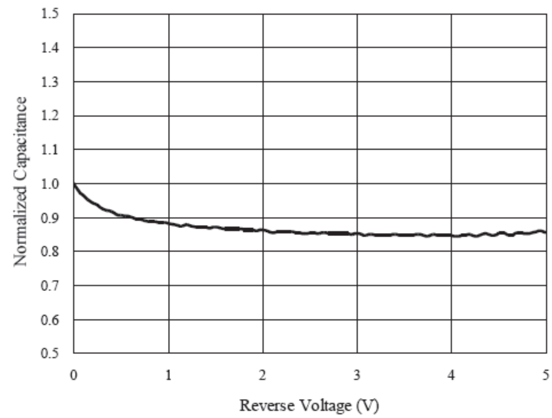


Capacitance *vs.* Voltage of I/O to GND (f = 1MHz)

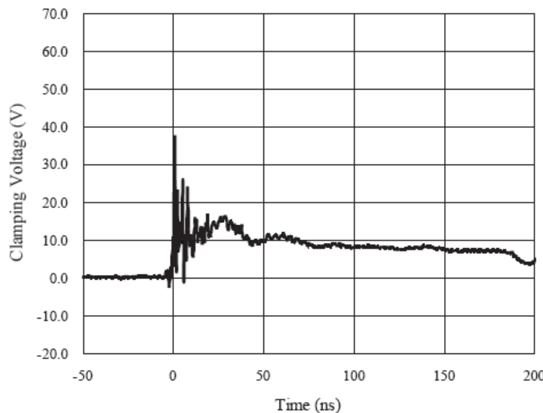
Capacitance *vs.* Reverse Voltage



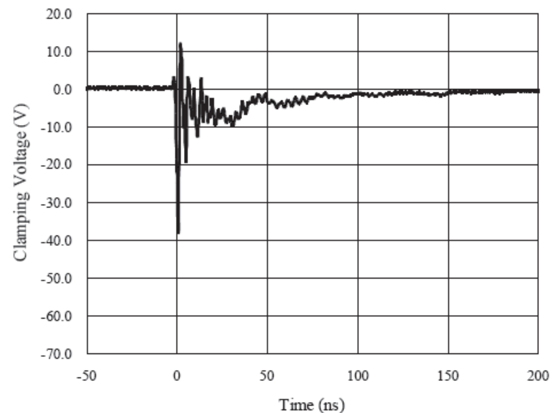
Normalized Capacitance *vs.* Reverse Voltage



ESD Clamping of I/O to GND (+8kV Contact per IEC 61000-4-2)



ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



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Pinning information

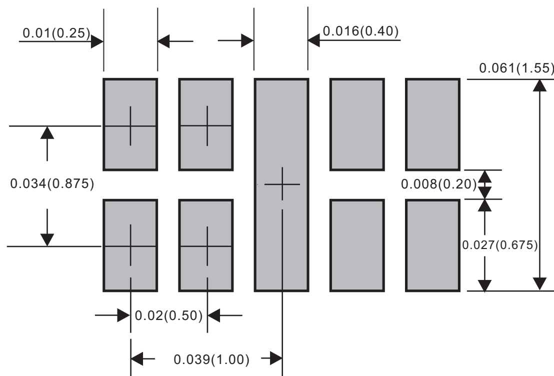
Pin Configuration	Simplified outline	Circuit Diagram
NC NC GND NC NC 10 9 8 7 6 1 2 3 4 5 I/O I/O GND I/O I/O	Pin1 dot by marking 1	1 2 4 5 3,8

Marking

Type number	Marking code
LL054BT2510	0524P

Suggested solder pad layout

T2510P10



Dimensions in inches and (millimeters)

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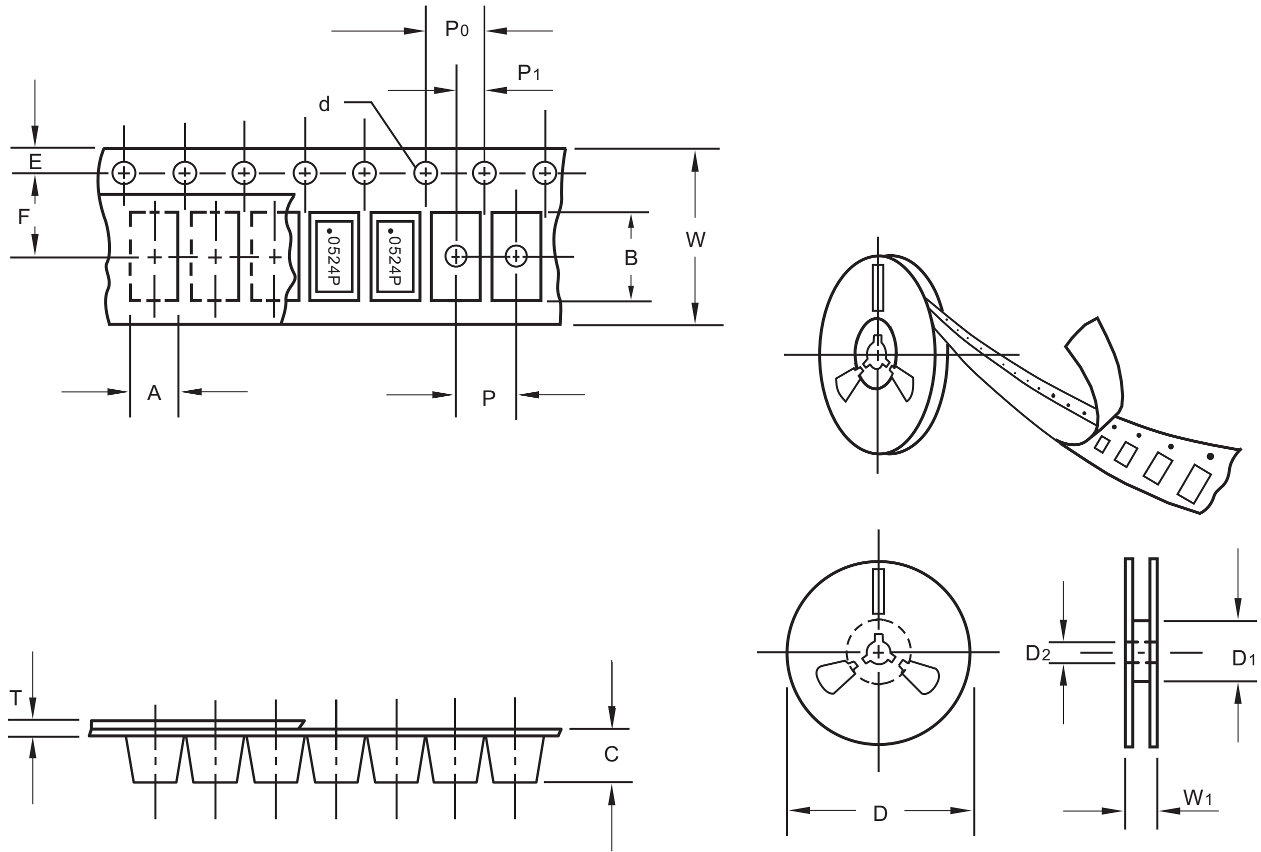
Packing information



unit:mm

Item	Symbol	Tolerance	T2510P10
Carrier width	A	0.05	1.23
Carrier length	B	0.05	2.70
Carrier depth	C	0.05	0.65
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	62.00
Feed hole diameter	D_2	0.2	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	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	11.40

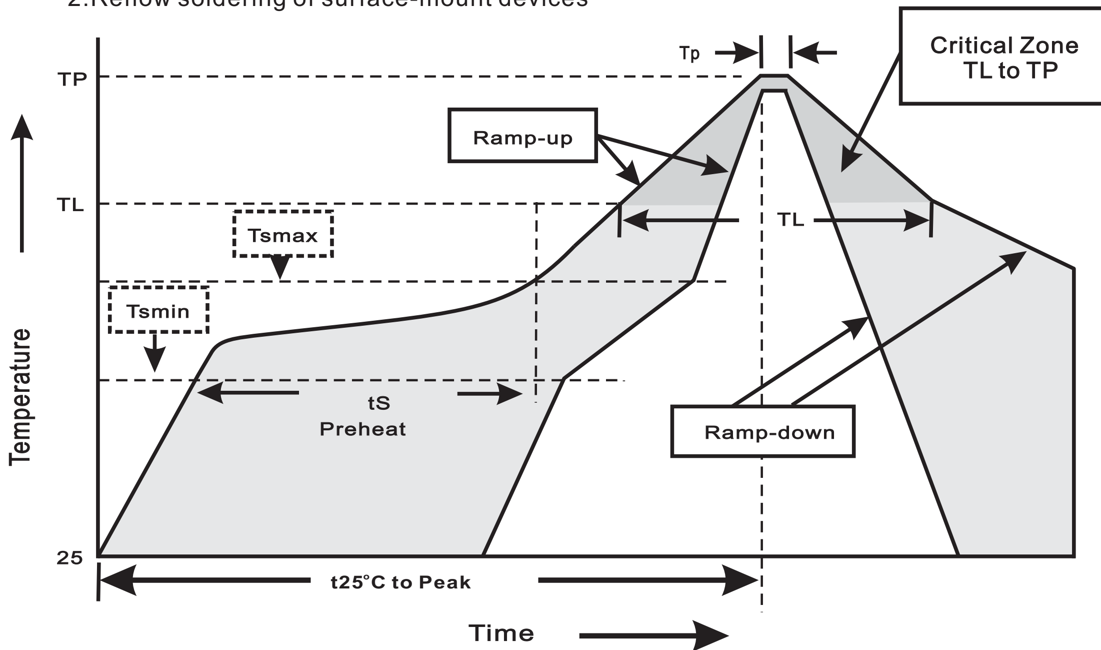
Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

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)
T2510P10	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	7.5

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

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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	$V_{BR}=V_{BR\,NOM}$*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