



Features

- Transient protection for high-speed data lines
 - IEC 61000-4-2 (ESD) $\pm 25\text{kV}$ (Air)
 $\pm 17\text{kV}$ (Contact)
 - IEC 61000-4-4 (EFT) 40A (5/50 ns)
Cable Discharge Event (CDE)
- Small package (1.6mm $\times$ 1.0mm $\times$ 0.50mm)
- Protects two data lines
- Low capacitance: 0.25pF Typical (I/O-I/O)
- Low leakage current: 0.1 μA @ V_{RWM} (Typical)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for $\pm 8\text{kV}$ contact discharge

Description

TT0512TD is an ultra-low capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 0.25pF only, TT0512TD is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD), Level 4 ($\pm 15\text{kV}$ air, $\pm 8\text{kV}$ contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

TT0512TD uses small DFN1610-6L package. Each TT0512TD device can protect two high-speed data lines. The combined features of low capacitance, small size and high ESD robustness make TT0512TD ideal for high-speed data ports and high-frequency lines (e.g., USB2.0 & DVI) applications. The low clamping voltage of the TT0512TD guarantees a minimum stress on the protected IC.

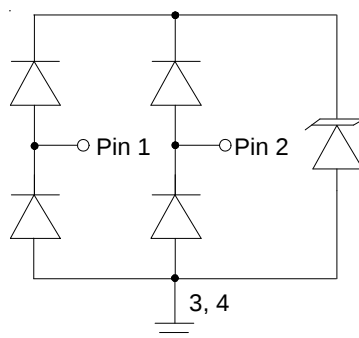
Applications

- Serial ATA
- PCI Express
- Desktops, Servers and Notebooks
- MDDI Ports
- USB2.0 Power and Data Line Protection
- Display Ports
- Digital Visual Interfaces (DVI)

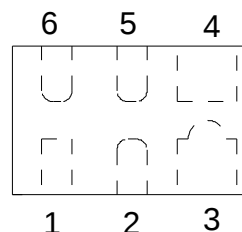
Mechanical Characteristics

- DFN1610-6L package
- Flammability Rating: UL 94V-0
- Marking: Part number
- Packaging: Tape and Reel

Circuit Diagram



Pin Configuration



Pin	Identification
1 - 2	Input Lines
5 - 6	Output Lines (No Internal Connection)
3 - 4	Ground

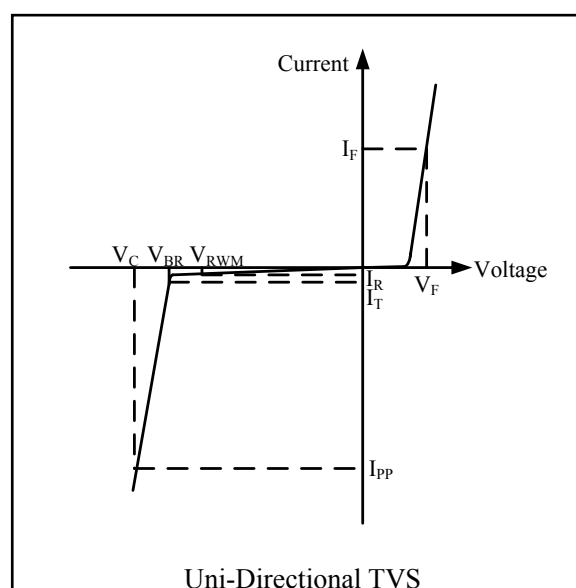


Absolute Maximum Rating

Symbol	Parameter	Value	Units
V_{ESD}	ESD per IEC 61000-4-2 (Air)	± 25	kV
	ESD per IEC 61000-4-2 (Contact)	± 17	
T_{OPT}	Operating Temperature	-55/+125	°C
T_{STG}	Storage Temperature	-55/+150	°C

Electrical Characteristics (T = 25°C)

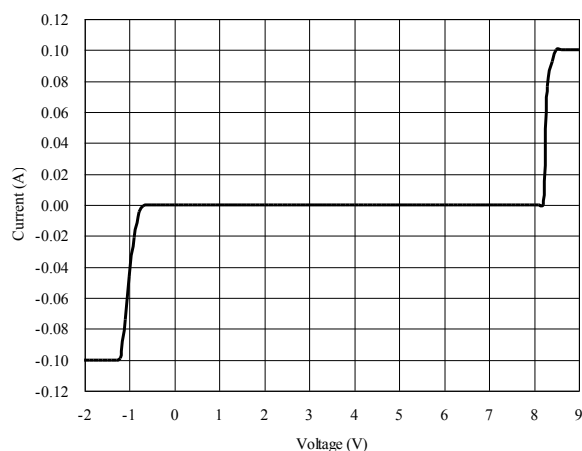
Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Reverse Breakdown Voltage @ I_T
I_T	Test Current for Reverse Breakdown
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Maximum Peak Pulse Current
C_{ESD}	Parasitic Capacitance
V_R	Reverse Voltage
f	Small Signal Frequency
I_F	Forward Current
V_F	Forward Voltage @ I_F



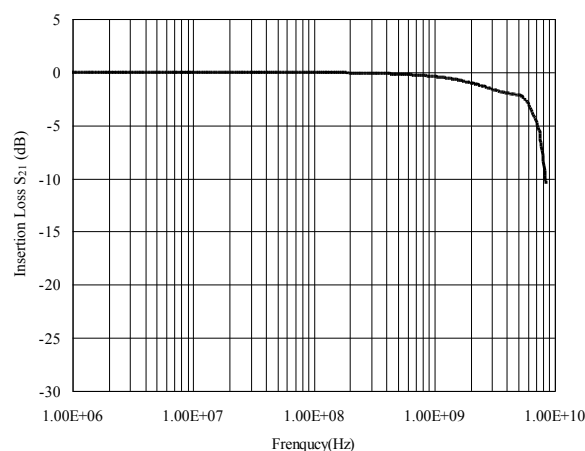
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				5.0	V
I_R	$V_{RWM} = 5V$, T = 25°C Between I/O and GND		0.1	1.0	μA
V_{BR}	$I_T = 1mA$ Between I/O and GND	6.0	8.0	10.0	V
V_C	$I_{PP} = 1A$, $t_p = 8/20\mu s$ Between I/O and GND			12	V
C_{ESD}	$V_R = 0V$, f = 1MHz Between I/O and GND		0.6	0.9	pF
C_{ESD}	$V_R = 0V$, f = 1MHz Between I/O and I/O		0.25	0.5	pF



Voltage Sweeping of I/O to I/O

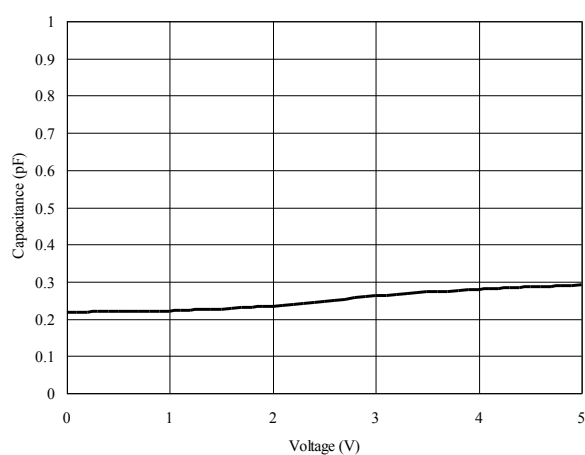


Insertion Loss S21 of I/O to I/O

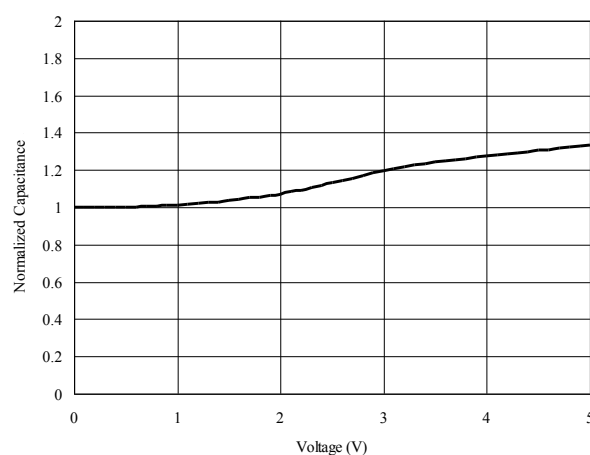


Capacitance vs. Voltage of I/O to I/O (f = 1MHz)

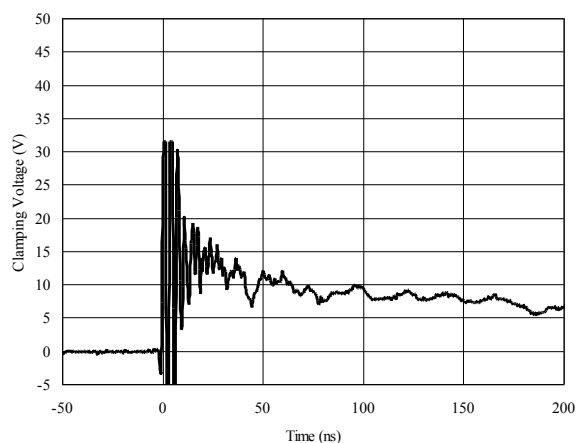
Capacitance vs. Reverse Voltage



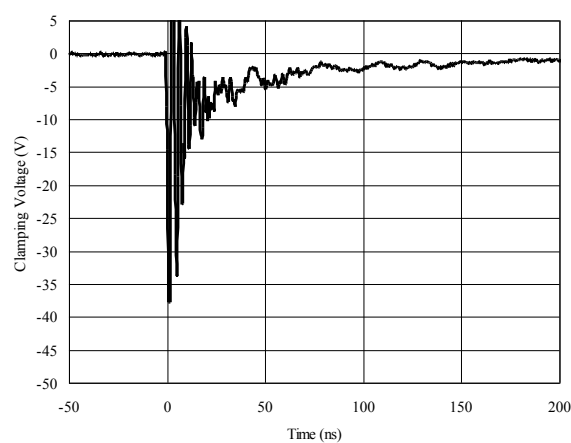
Normalized Capacitance vs. Reverse Voltage



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

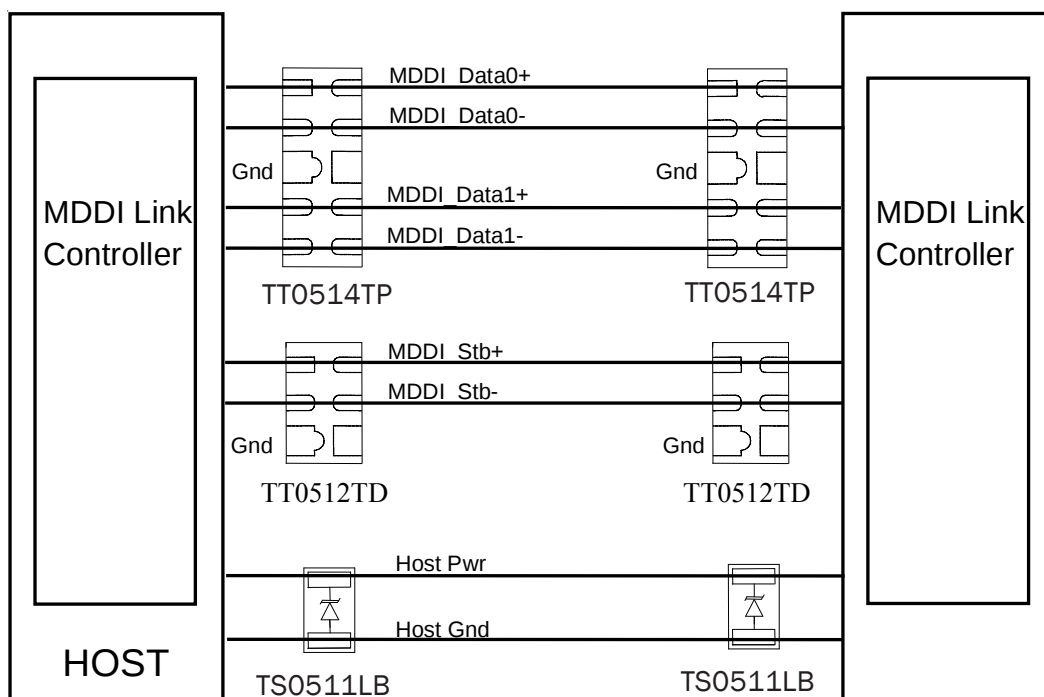


ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)





Application Information



MDDI Port Protection

Universal Serial Bus ESD Protection

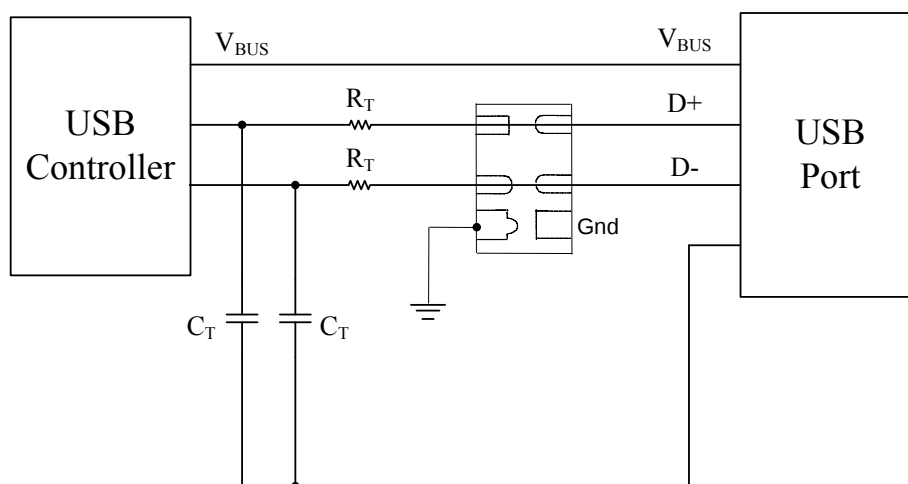
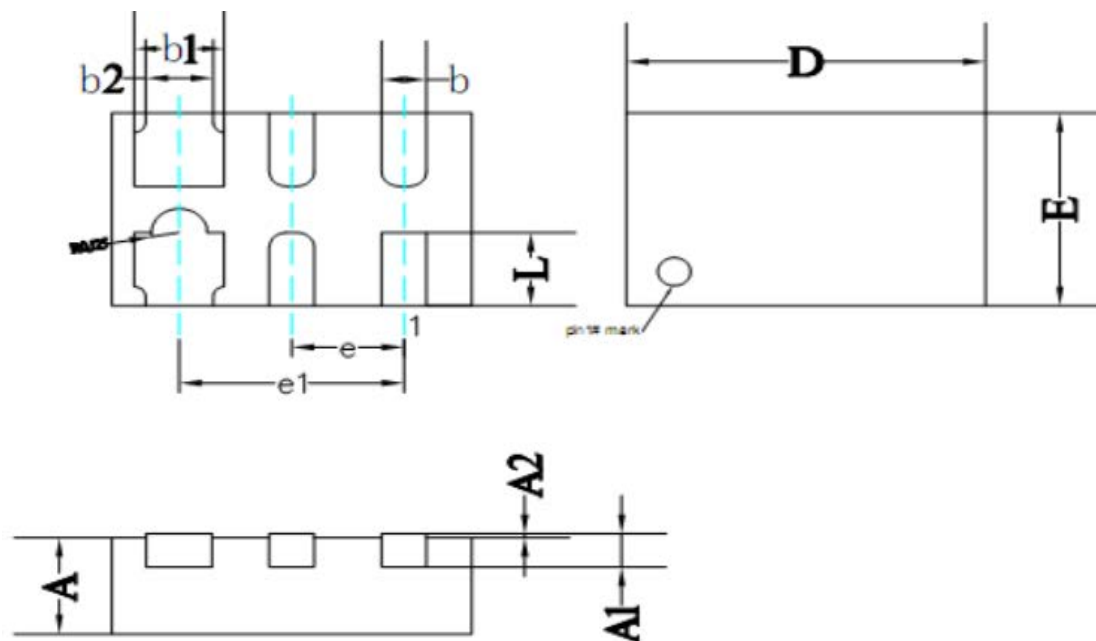


Figure 3 Schematic and Diagram for USB 2.0 Protection using TT0512TD



Package Outline

□ DFN1610-6L package

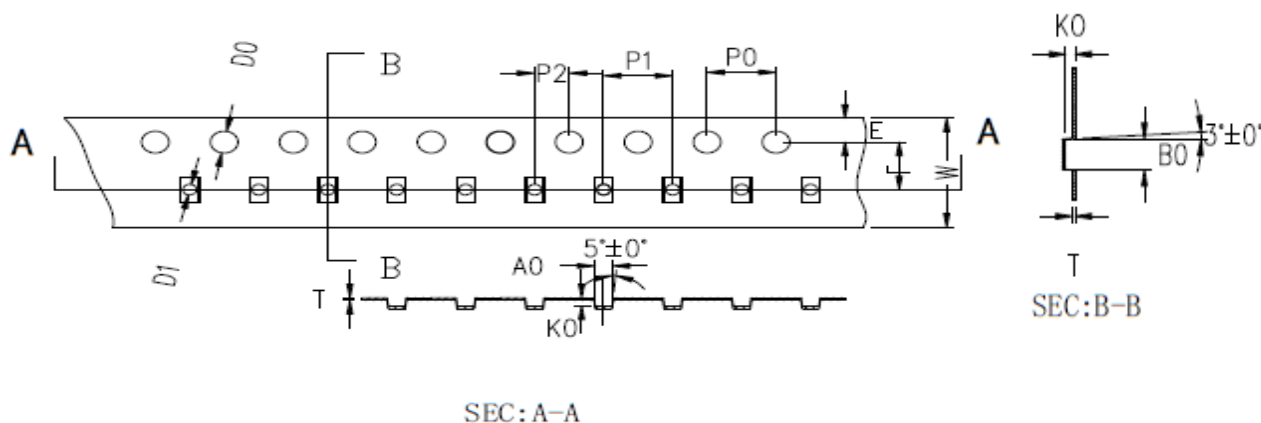


ALL DIMENSIONS IN MM

	MIN	NOM	MAX
D	1.55	1.60	1.65
E	0.95	1.00	1.05
L	0.33	0.38	0.43
b	0.15	0.20	0.25
b1	0.35	0.40	0.45
b2	0.25	0.30	0.35
e	0.50BSC		
e1	1.00BSC		
A	0.45	0.5	0.55
A1			
A2	0.00	-	0.05



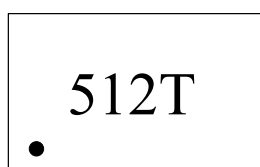
Tape and Reel Specification



ITEM	SPECIFICATION	TOL.(±)
W	8.00	±0.20
E	1.75	±0.1
F	3.50	±0.1
D0	1.55	±0.05
D1	0.8	±0.1
P0	4.00	±0.1
P1	4.00	±0.1
P2	2.00	±0.05
P0*10	40.00	±0.20

ITEM	SPECIFICATION	TOL.(±)
T	0.20	±0.05
A0	1.15	±0.1
B0	1.85	±0.1
K0	0.85	±0.1

Marking Codes



Note:

(1) "512T" is part number, fixed.

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0512TD	5V	3,000	7 Inch