Features

- Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD) ±30kV (Air)
  - ±30kV (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - Cable Discharge Event (CDE)
- Package optimized for high-speed lines
- Small package (2.9mm x 2.8mm x 1.4mm)
- Protects four data lines
- Low capacitance: 3.5pF Typical @ 0V
- Low leakage current: 0.1uA @ V_{RWM}(Typical)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

Description

S0514PL is a low-capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 3.5pF only, S0514PL is desighed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It compies with IEC 61000-4-2 (ESD), Level 4 (±15kV air,±8kV 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.

S0514PL uses small SOT23-6L package. Each S0514PL device can protect four high-speed data lines. The combined features of low capacitance,small size and high ESD robustness make S0514PL ideal for high-speed data ports and high-frequency lines (e.g., USB2.0) applications. The low clamping voltage of the S0514PL guarantees a minimum stress on the protected IC.

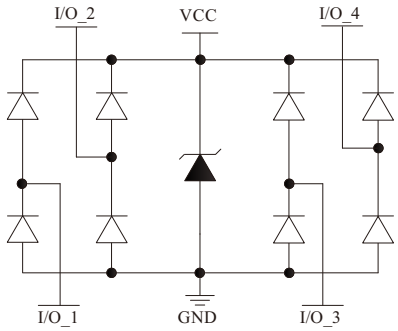
Applications

- USB2.0 Power and Data Line Protection
- Digital Visual Interfaces (DVI)
- 10/100/1000M Ethernet Interfaces
- Desktops, Servers and Notebooks
- SIM Ports
- Monitors and Flat Panel Displays
- Video Graphics Cards

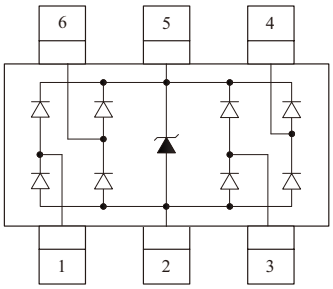
Mechanical Characteristics

- SOT23-6L package
- Flammability Rating: UL 94V-0
- Packaging: Tape and Reel

Circuit Diagram



Pin Configuration



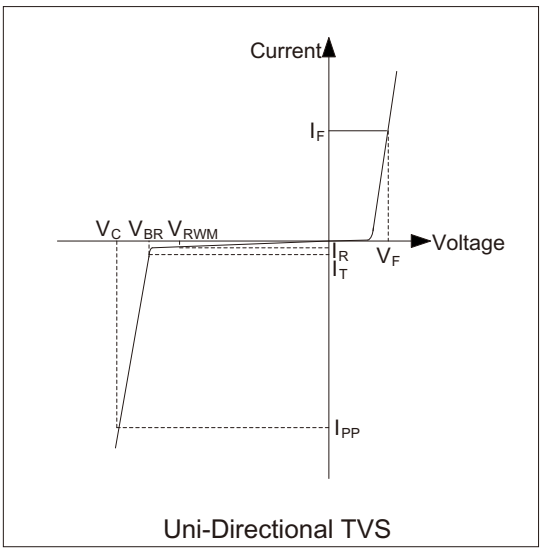
SOT23-6L
(Top View)

Absolute Maximum Rating

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current (8/20us)	18	A
P_{PK}	Peak Pulse Power (8/20us)	350	Watts
V_{ESD}	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	±30 ±30	kV
T_{OPT}	Operating Temperature	-55/+125	˚C
T_{STG}	Storage Temperature	-55/+150	˚C

Electrical Characteristics (T=25˚C)

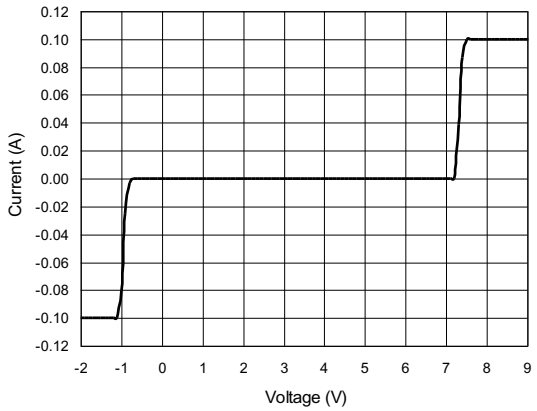
Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Reverse Breakdown Voltage @ I_T
I_T	Test Current for Reverse Breakdown
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Maximum Peak Pulse Current
C_{ESD}	Parasitic Capacitance
V_R	Reverse
f	Small Signal Frequency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



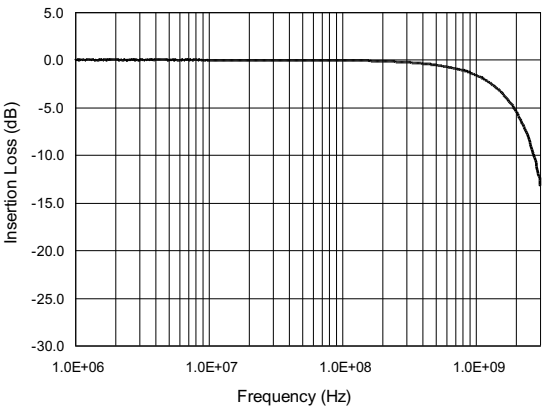
Uni-Directional TVS

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	7.0	9.0	V
V_F	I_F = 15mA			1.2	V
V_C	I_{PP} = 1A, t_p = 8/20μs Between I/O and GND			12	V
V_C	I_{PP} = 5A, t_p = 8/20μs Between I/O and GND			17	V
C_{ESD}	V_R = 0V, f = 1MHz Between I/O and GND		3.5	5.0	pF
C_{ESD}	V_R = 0V, f = 1MHz Between I/O and I/O		1.5	2.5	pF

Voltage Sweeping of I/O to GND

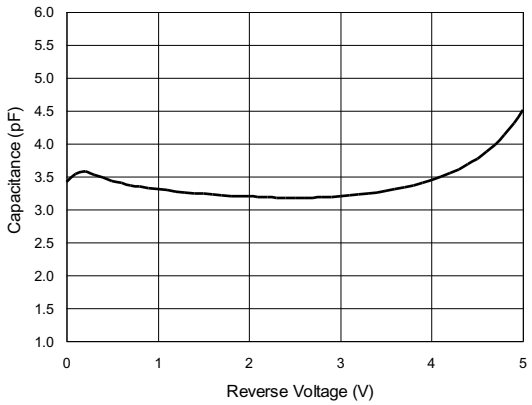


Insertion Loss S21 of I/O to GND

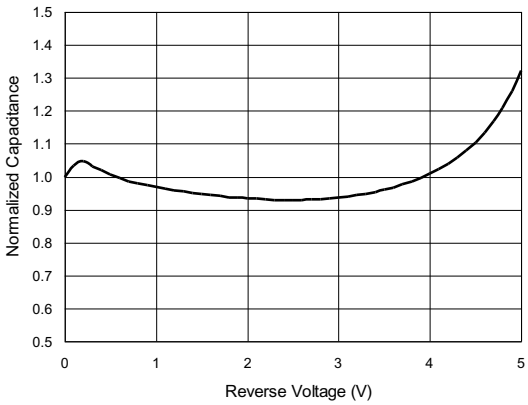


Capacitance vs. Voltage of I/O to GND (f = 1MHz)

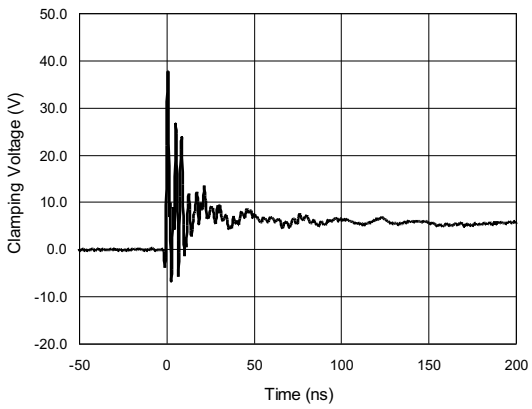
Capacitance vs. Reverse Voltage



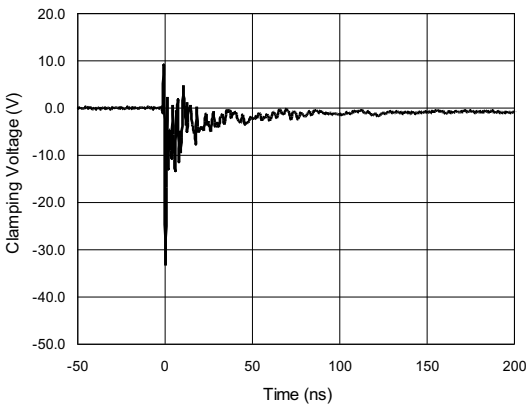
Normalized Capacitance vs. Reverse Voltage



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

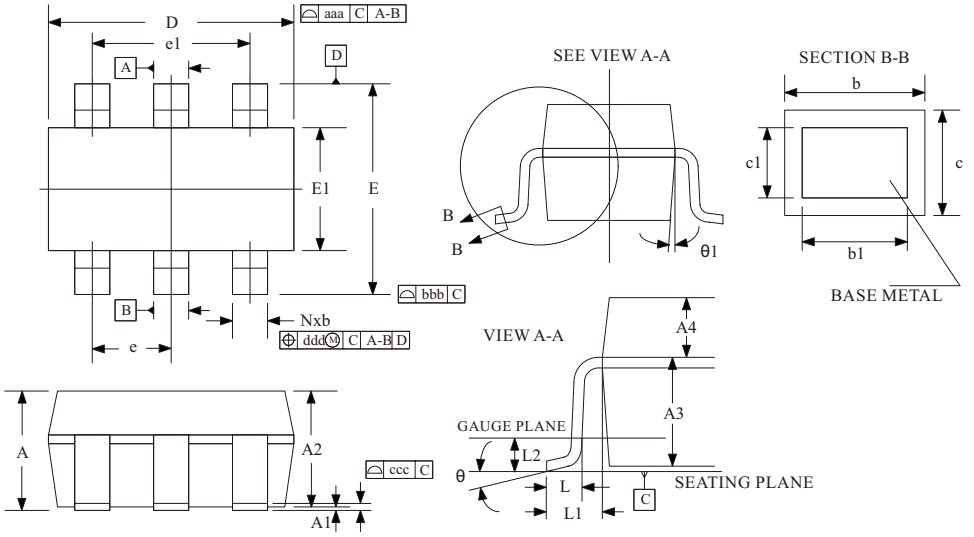


ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



Package Outline

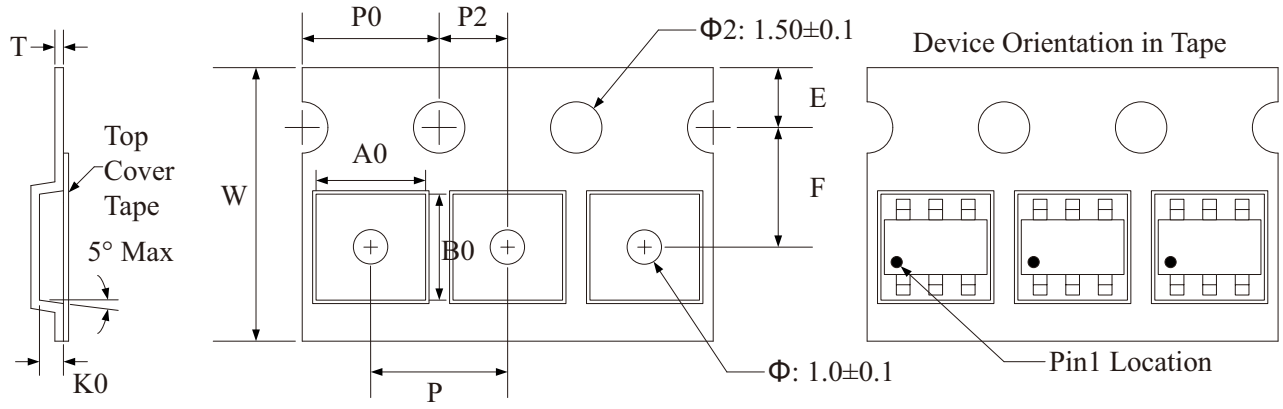
SOT23-6L package



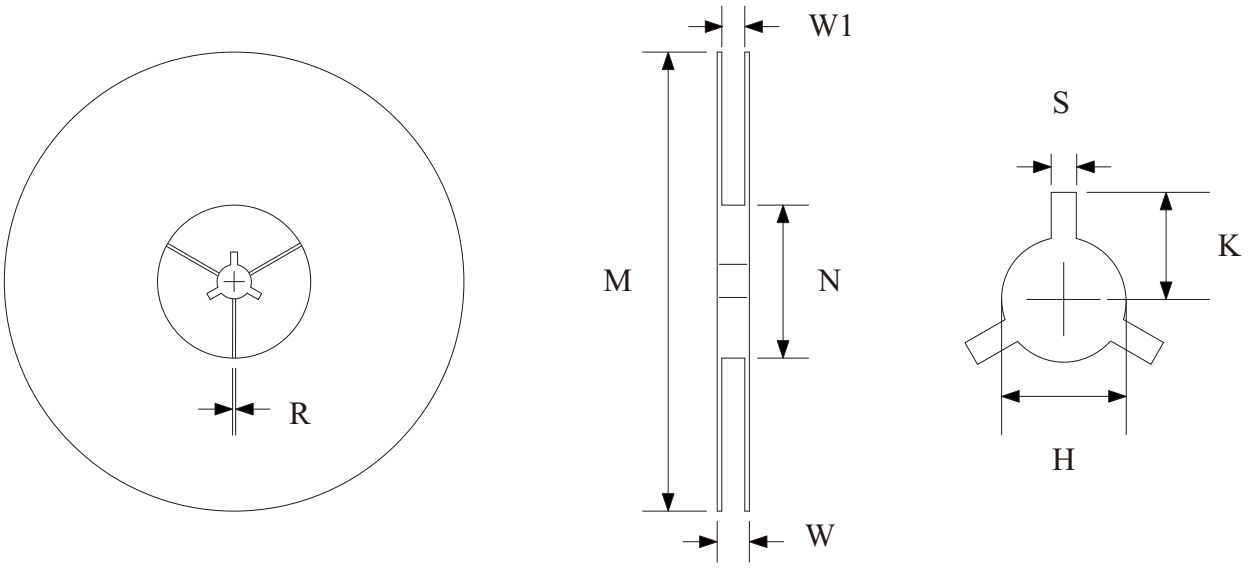
Package Dimensions (Controlling dimensions are in millimeters)

Symbol	Dimensions (mm)			Dimensions (Inches)		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
A	—	—	1.450	---	---	0.057
A1	0.000	---	0.150	0.000	---	0.006
A2	0.900	1.200	1.300	0.035	0.047	0.012
A3	0.637	0.787	0.837	0.025	0.031	0.033
A4	0.263	0.413	0.463	0.010	0.016	0.018
b	0.300	---	0.500	0.012	---	0.020
b1	0.300	0.400	0.450	0.012	0.016	0.018
c	0.080	---	0.220	0.003	---	0.009
c1	0.080	0.130	0.200	0.003	0.005	0.008
D	2.90 BSC			0.114 BSC		
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
E	2.80 BSC			0.110 BSC		
E1	1.60 BSC			0.063 BSC		
L	0.300	0.450	0.600	0.012	0.018	0.024
L1	0.600 REF			0.024 REF		
L2	0.250 BSC			0.010 BSC		
θ	0°	4°	8°	0°	4°	8°
θ1	5°	10°	15°	5°	10°	15°
aaa	0.150			0.006		
bbb	0.200			0.008		
ccc	0.100			0.004		
ddd	0.100			0.004		

Tape and Reel Specification

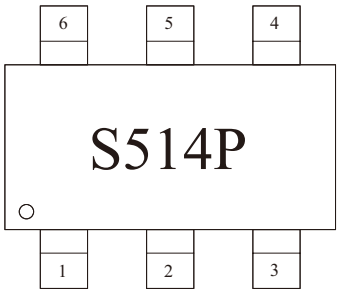


Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00+0.3 -0.1	3.23±0.05	3.17±0.05	1.37±0.05	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	0.25±0.02



Symbol	Reel Size	M	N	W	W1	H	S	K	R
Dimensions (mm)	Φ178	178.0±1.0	60.0±1.0	11.5±0.5	9.0±0.5	13.0±0.5	2.0±0.1	11.0±0.2	1.0±0.05

Marking Codes



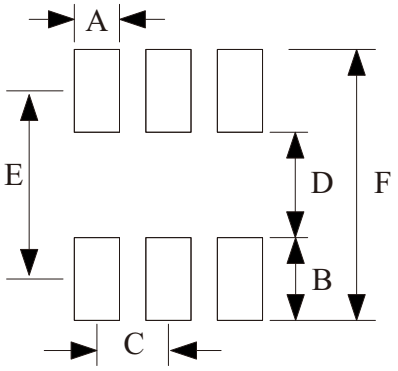
Note:

(1) "S514P" is part number, fixed.

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
S0514PL	5V	3,000	7 Inch

Footprint: SOT23-6L



Symbol	Dimensions	
	Millimeters	Inches
A	0.60	0.024
B	1.10	0.043
C	0.95	0.037
D	1.40	0.055
E	2.50	0.098
F	3.60	0.141

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