EClamp0501T
Low Profile EClamp®
1-Line ESD protection

PROTECTION PRODUCTS - EMIClamp®

Description

The EClamp® 0501T TVS diode is designed to protect sensitive electronics from damage or latch-up due to ESD. This state-of-the-art device utilizes solid-state silicon-avalanche technology for superior clamping performance and DC electrical characteristics. It has been optimized for **protection of digital lines** in cellular phones and other portable electronics.

The device replaces two discrete components in a small footprint. It consists of a TVS diode and a series 1K Ohm resistor. The TVS diode presents a maximum loading capacitance of 15pF for maximum signal integrity. The TVS diodes provide effective suppression of ESD voltages in excess of ±15kV (air discharge) and ±8kV (contact discharge) per IEC 61000-4-2, level 4.

The EClamp0501T is in a 3-pin, SLP1006P3T package. It measures 1.0 x 0.6 mm with a nominal height of only 0.4mm. The leads are spaced at a pitch of 0.65mm and are finished with lead-free NiPdAu. Each device will protect one line operating at 5 volts. It gives the designer the flexibility to protect single lines in applications where arrays are not practical. The small package makes it ideal for use in portable electronics such as cell phones, digital still cameras, and PDAs.

Features

- Transient protection for data lines to
  IEC 61000-4-2 (ESD) ±15kV (air), ±8kV (contact)
  IEC 61000-4-4 (EFT) 40A (tp = 5/50ns)
  Cable Discharge Event (CDE)
- Ultra-small package (1.0 x 0.6 x 0.4mm)
- Protects one data line
- TVS working voltage: 5V
- Series Resistor: 1K Ohm
- Capacitance: 15pF (Maximum at VR = 0V)
- Low leakage current
- Solid-state silicon-avalanche technology

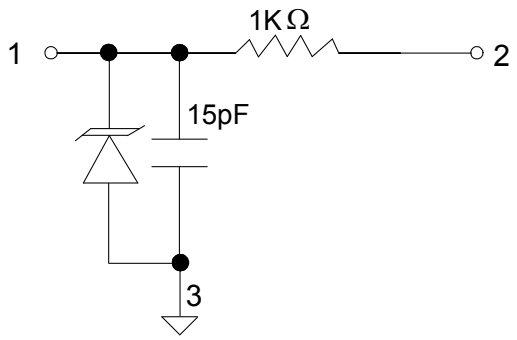
Mechanical Characteristics

- SLP1006P3T package
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Nominal Dimensions: 1.0 x 0.6 x 0.4 mm
- Lead Finish: NiPdAu
- Molding compound flammability rating: UL 94V-0
- Marking : Marking code, cathode band
- Packaging : Tape and Reel

Applications

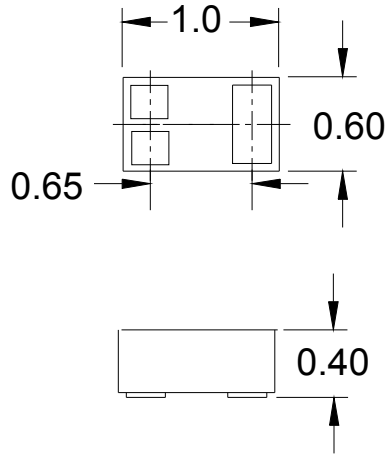
- Cellular Handsets & Accessories
- Personal Digital Assistants (PDAs)
- Notebooks & Handhelds
- Portable Instrumentation
- Peripherals
- MP3 Players

Schematic



Pin Identification and Configuration
(Top Side View)

Package Configuration



3 Pin SLP package (Bottom Side View)
Nominal Dimensions in mm

Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{pk}	25	Watts
Maximum Peak Pulse Current (tp = 8/20µs)	I_{pp}	2	Amps
ESD per IEC 61000-4-2 (Air) [1] ESD per IEC 61000-4-2 (Contact) [1]	V_{ESD}	+/- 17 +/- 12	kV
Operating Temperature	T_J	-40 to +85	°C
Storage Temperature	T_{STG}	-55 to +150	°C

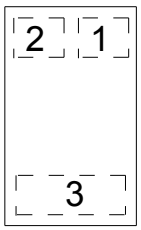
Notes:
1) ESD rating between pin 1 and ground. Pin 2 not rated for IEC level ESD discharges

Electrical Characteristics (T=25°C)

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
TVS Reverse Stand-Off Voltage	V_{RWM}				5	V
TVS Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	6	8	10	V
TVS Reverse Leakage Current	I_R	V_{RWM} = 5.0V			0.5	µA
Total Series Resistance	R	Each Line	850	1000	1150	Ohms
Total Capacitance	C_{in}	Input to Gnd, Each Line V_R = 0V, f = 1MHz	10	12	15	pF

Pin Identification and Configuration

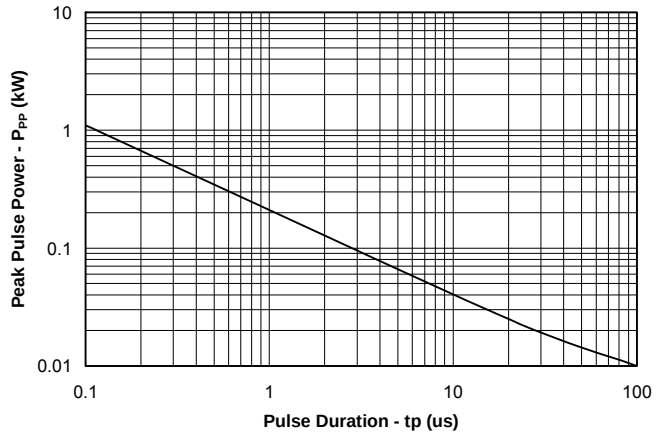
Pin	Symbol	Identification
1	I/O In	Data Input (Connector Side)
2	I/O Out	Data Output (To Protected IC)
3	GND	Ground



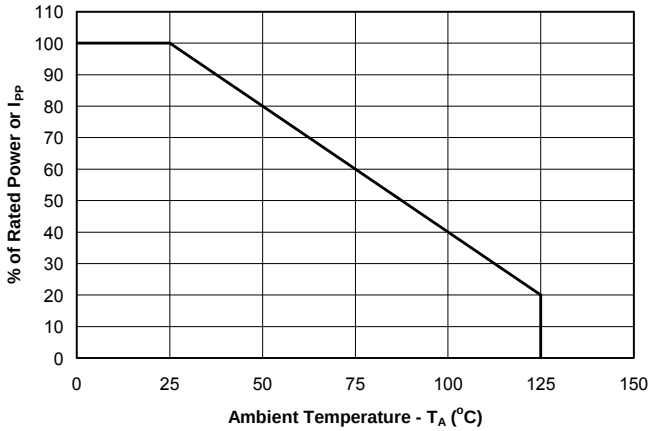
Pin Configuration (Top View)

Typical Characteristics

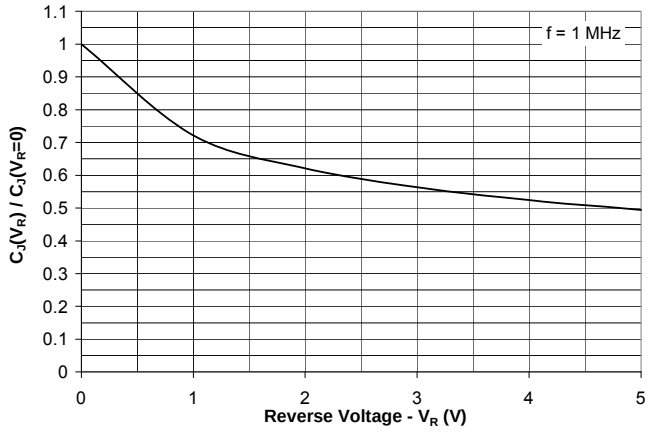
Non-Repetitive Peak Pulse Power vs. Pulse Time



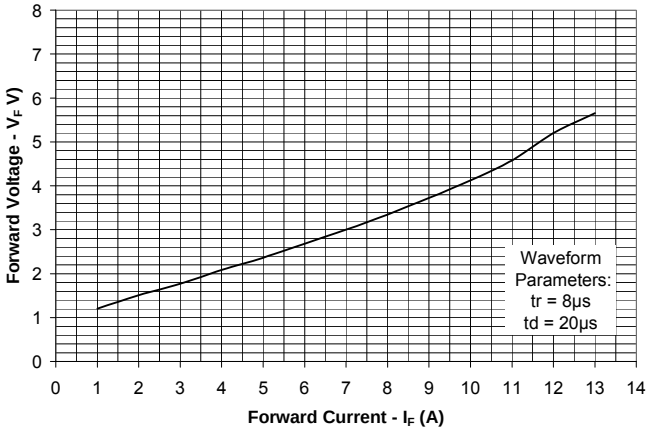
Power Derating Curve



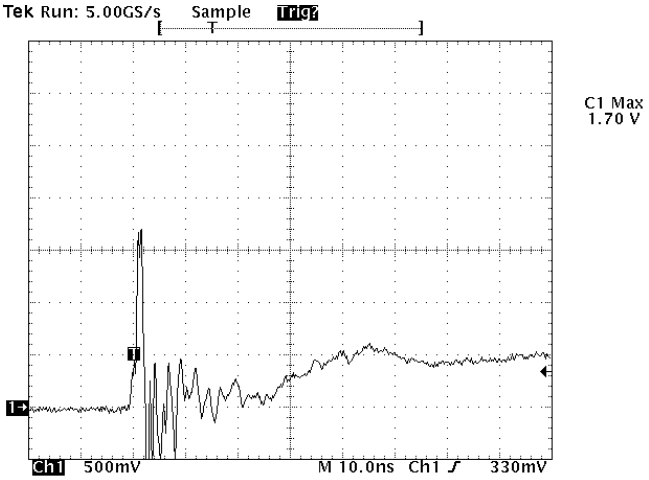
Normalized Junction Capacitance vs. Reverse Voltage



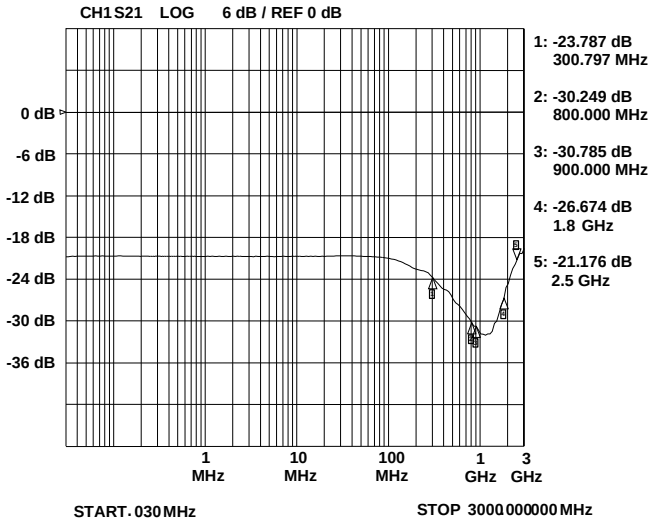
Forward Voltage vs. Forward Current



ESD Clamping (Measured between Pin2 and Gnd) (8kV Contact per IEC 61000-4-2)



Insertion Loss S21



Note: Data is taken with a 10x attenuator

Applications Information

Device Connection Options

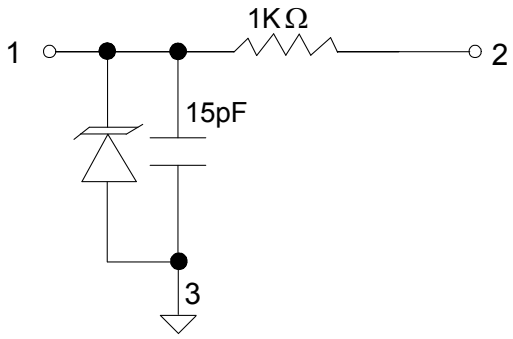
This device is designed to protect one data line. The device is unidirectional and may be used on lines where the signal polarity is above ground. The cathode band should be placed towards the line that is to be protected.

Circuit Board Layout Recommendations for Suppression of ESD.

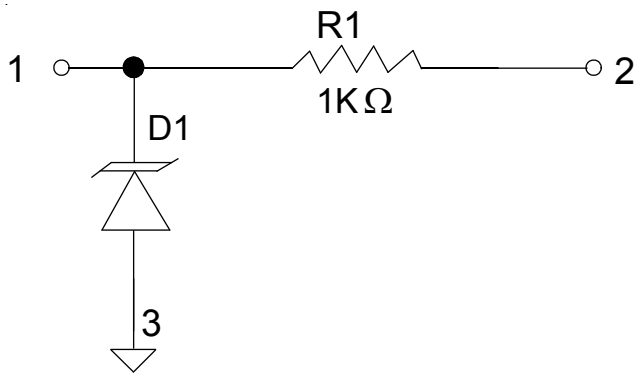
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- Place the TVS near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the TVS and the protected line.
- Minimize all conductive loops including power and ground loops.
- The ESD transient return path to ground should be kept as short as possible.
- Never run critical signals near board edges.
- Use ground planes whenever possible.

Circuit Diagram



Applications Information - Spice Model

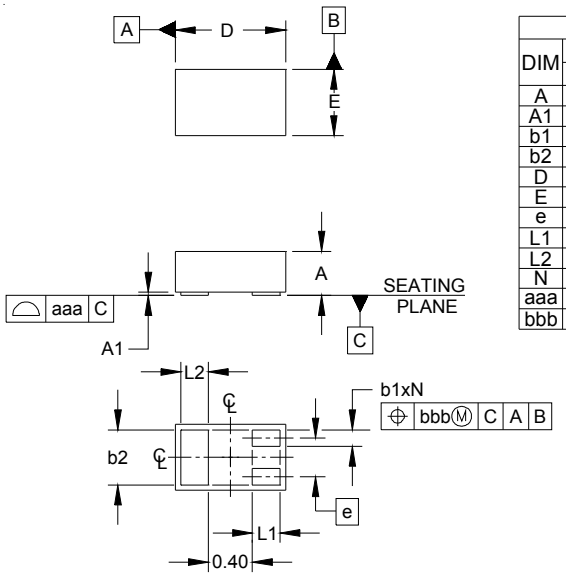


EClamp0501T Spice Model

Table 1 - EClamp0501T Spice Parameters

Parameter	Unit	D1 (TVS)
IS	Amp	2E-15
BV	Volt	7.56
VJ	Volt	0.776
RS	Ohm	0.912
IBV	Amp	1.0E-3
CJO	Farad	11.5E-12
TT	sec	2.541E-9
M	--	0.23
N	--	1.1
EG	eV	1.11

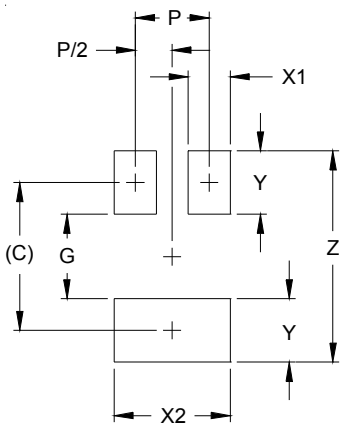
Outline Drawing - SLP1006P3T



DIM	DIMENSIONS					
	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.015	.016	.017	0.37	0.40	0.43
A1	.000	.001	.002	0.00	0.03	0.05
b1	.004	.006	.008	0.10	0.15	0.20
b2	.018	.020	.022	0.45	0.50	0.55
D	.035	.039	.043	0.90	1.00	1.10
E	.020	.024	.028	0.50	0.60	0.70
e	.014 BSC			0.35 BSC		
L1	.008	.010	.012	0.20	0.25	0.30
L2	.008	.010	.012	0.20	0.25	0.30
N	3			3		
aaa	.003			0.08		
bbb	.004			0.10		

NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).

Land Pattern - SLP1006P3T

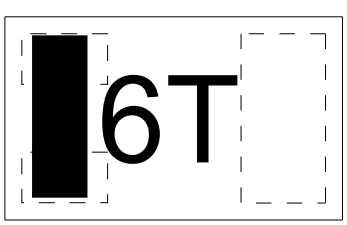


DIM	DIMENSIONS	
	INCHES	MILLIMETERS
C	(.028)	(0.70)
G	.016	0.40
P	.014	0.35
X1	.008	0.20
X2	.022	0.55
Y	.012	0.30
Z	.039	1.00

NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY.
   CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR
   COMPANY'S MANUFACTURING GUIDELINES ARE MET.

Marking Code

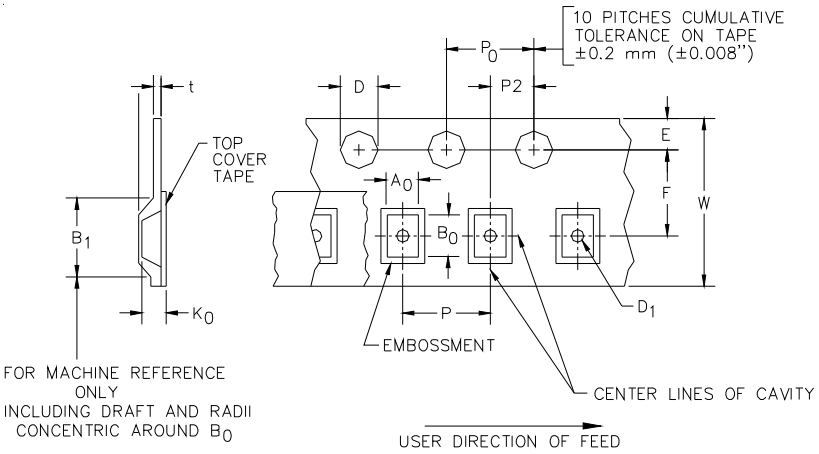


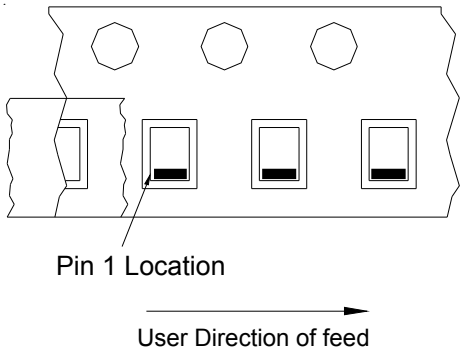
Ordering Information

Part Number	Working Voltage	Qty per Reel	Reel Size
EClamp0501T.TCT	5V	3,000	7 Inch

Notes:
1) This is a lead-free, RoHS/WEEE compliant product
EMIClamp and EClamp are marks of Semtech Corporation

Tape and Reel Specification





Device Orientation in Tape

A0	B0	K0
0.69 +/-0.10 mm	1.19 +/-0.10 mm	0.66 +/-0.10 mm

Tape Width	B, (Max)	D	D1	E	F	P	P0	P2	T	W
8 mm	4.2 mm (.165)	1.5 + 0.1 mm - 0.0 mm (0.59 +.005 - .000)	0.4 mm ±0.25 (.031)	1.750±.10 mm (.069±.004)	3.5±0.05 mm (.138±.002)	4.0±0.10 mm (.157±.00-4)	4.0±0.1 mm (.157±.00-4)	2.0±0.05 mm (.079±.002)	0.254±0.02 mm (.016)	8.0 mm + 0.3 mm - 0.1 mm (.312±.012)

Contact Information

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