# uClamp0501T Low Profile µClamp™ 1-Line ESD protection

### PROTECTION PRODUCTS - MicroClamp™

#### Description

The  $\mu Clamp^{TM}$  series of TVS arrays are designed to protect sensitive electronics from damage or latch-up due to ESD. It is designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and other portable electronics. It features large cross-sectional area junctions for conducting high transient currents. They offer desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

The  $\mu\text{Clamp}^{\text{TM}}0501\text{T}$  is in a 2-pin, RoHS/WEEE compliant, SLP1006P2T 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. They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ( $\pm 15$ kV air,  $\pm 8$ kV contact discharge). The combination of small size and high ESD surge capability makes them ideal for use in portable applications such as cellular phones, digital cameras, and MP3 players.

#### **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
- Low clamping voltage
- Working voltage: 5V
- Low leakage current
- Solid-state silicon-avalanche technology

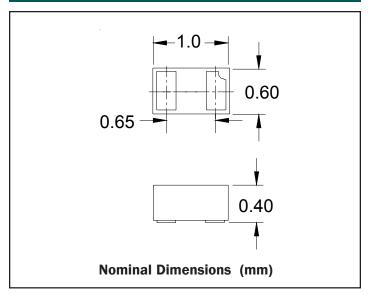
### Mechanical Characteristics

- ◆ SLP1006P2T package
- ◆ 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

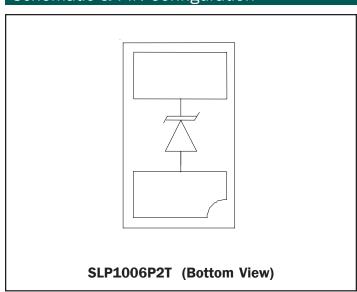
### Applications

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

#### **Dimensions**



### Schematic & PIN Configuration





# Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P <sub>pk</sub>	25	Watts
Maximum Peak Pulse Current (tp = 8/20μs)	I <sub>pp</sub>	2	Amps
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V <sub>ESD</sub>	+/- 20 +/- 15	kV
Operating Temperature	T <sub>J</sub>	-55 to +125	°C
Storage Temperature	T <sub>STG</sub>	-55 to +150	°C

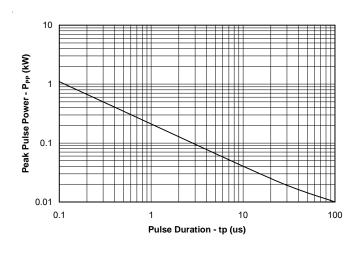
### Electrical Characteristics (T=25°C)

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V <sub>RWM</sub>				5	V
Reverse Breakdown Voltage	V <sub>BR</sub>	I <sub>t</sub> = 1mA	6			V
Reverse Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 5V, T=25°C			0.25	μΑ
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10mA		1	1.2	V
Clamping Voltage	V <sub>c</sub>	$I_{pp} = 2A, t_p = 8/20\mu s$			12.5	V
Junction Capacitance	C <sub>j</sub>	V <sub>R</sub> = OV, f = 1MHz			10	pF
Junction Capacitance	C <sub>j</sub>	V <sub>R</sub> = 3.3V, f = 1MHz		4.5		pF

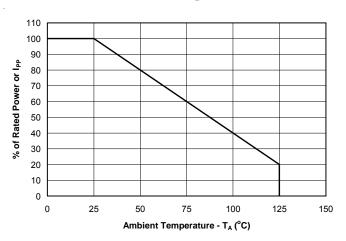


### **Typical Characteristics**

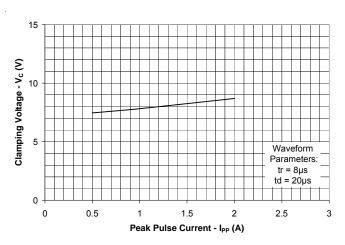
#### Non-Repetitive Peak Pulse Power vs. Pulse Time



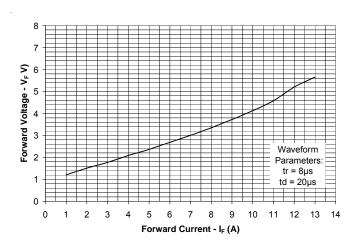
#### **Power Derating Curve**



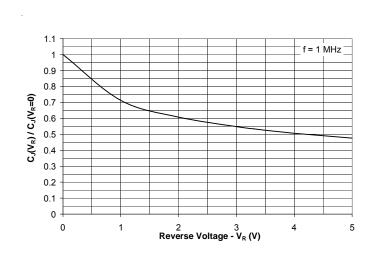
#### Clamping Voltage vs. Peak Pulse Current



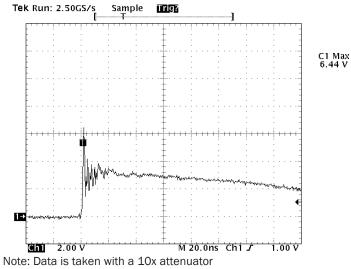
#### **Forward Voltage vs. Forward Current**



#### Junction Capacitance vs. Reverse Voltage



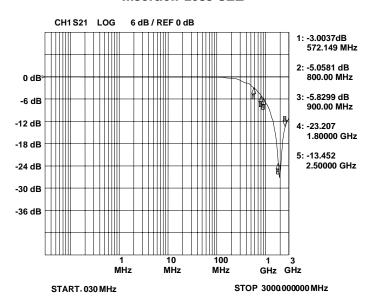
# ESD Clamping (8kV Contact per IEC 61000-4-2)





### Typical Characteristics

#### **Insertion Loss S21**





### **Applications Information**

#### **Device Connection Options**

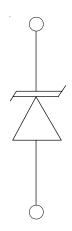
This device is designed to protect one data or power supply line. The device is unidirectional and may be used on lines where the signal polarity is above ground. The cathode band should be placed towards the line that is to be protected.

# 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:

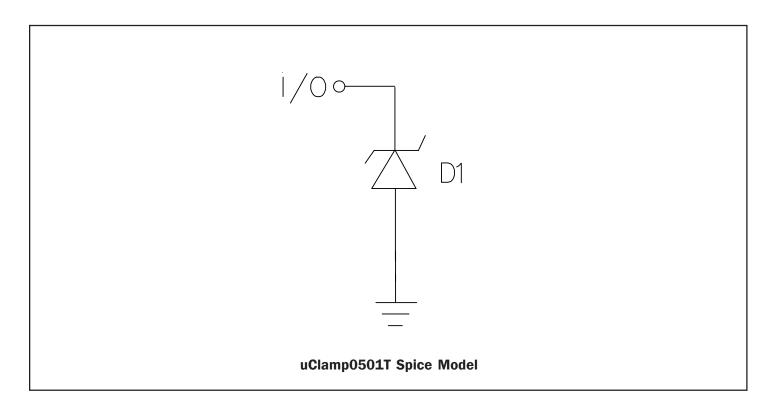
- Place the TVS near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the TVS and the protected line.
- Minimize all conductive loops including power and ground loops.
- The ESD transient return path to ground should be kept as short as possible.
-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

#### **Circuit Diagram**





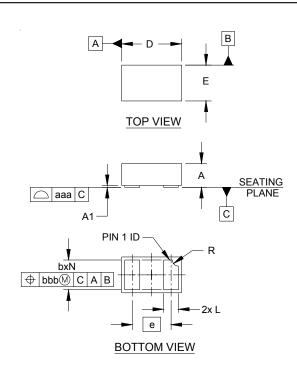
# Applications Information - Spice Model



uClamp0501T Spice Parameters							
Parameter	Unit	D1 (TVS)					
IS	Amp	2.05e-15					
BV	Volt	7.0					
VJ	Volt	0.80					
RS	Ohm	0.75					
IBV	Amp	1.0E-3					
C10	Farad	9e-12					
TT	sec	2.541E-9					
М		0.25					
N		1.1					
EG	eV	1.11					



# Outline Drawing - SLP1006P2T

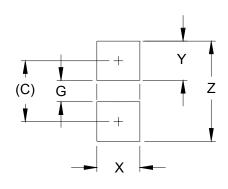


DIMENSIONS								
DIM	11	NCHE	S	MILLIMETERS				
	MIN	NOM	MAX	MIN	NOM	MAX		
Α	.015	.016	.017	0.37	0.40	0.43		
A1	.000	.001	.002	0.00	0.03	0.05		
b	.018	.020	.022	0.45	0.50	0.55		
D	.035	.039	.043	0.90	1.00	1.10		
E	.020	.024	.028	0.50	0.60	0.70		
е	.(	26 BS	SC	0.65 BSC				
L	.008	.010	.012	0.20	0.25	0.30		
R	.002	.004	.006	0.05	0.10	0.15		
N		2		2				
aaa		.003		0.08				
bbb		.004			0.10			

#### NOTES:

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

### Land Pattern - SLP1006P2T



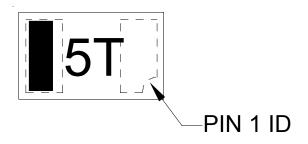
	DIMENSIONS							
DIM	INCHES	MILLIMETERS						
С	(.033)	(0.85)						
G	.012	0.30						
Χ	.024	0.60						
Υ	.022	0.55						
Ζ	.055	1.40						

#### 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



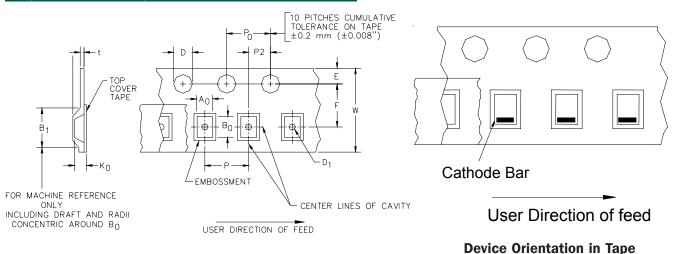
### Ordering Information

Part Number	Working	Qty per	Reel	
	Voltage	Reel	Size	
uClamp0501T.TCT	5V	3,000	7 Inch	

#### Notes:

1) This is a lead-free, RoHS/WEEE compliant product MicroClamp, uClamp and  $\mu\text{Clamp}$  are marks of Semtech Corporation

## Tape and Reel Specification



A0	во	ко		
0.69 +/-0.10 mm	1.19 +/-0.10 mm	0.66 +/-0.10 mm		

Tape Width	B, (Max)	D	D1	E	F	Р	PO	P2	Т	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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