uClamp1201P
µClamp™
1-Line ESD protection

Description

The µClamp™ 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 PDAs. It features large cross-sectional area junctions for conducting high transient currents. It offers superior electrical characteristics such as lower clamping voltage and no device degradation when compared to MLVs. They offer desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

The µClamp™1201P is in a 2-pin, RoHS/WEEE compliant, SLP1006P2 package. It measures 1.0 x 0.6 x 0.50mm. 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 12 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 (±15kV air, ±8kV 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 0.5mm)
- Protects one I/O or power line
- Low clamping voltage
- Working voltage: 12V
- Low leakage current
- Solid-state silicon-avalanche technology

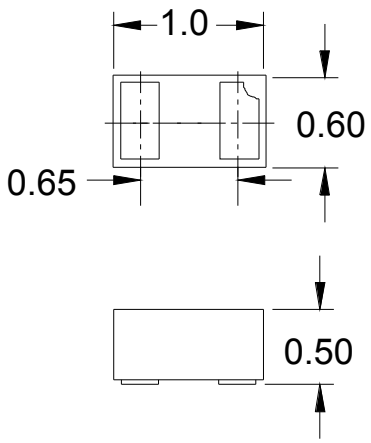
Mechanical Characteristics

- SLP1006P2 package
- RoHS/WEEE Compliant
- Nominal Dimensions: 1.0 x 0.6 x 0.50 mm
- Lead Finish: NiPdAu
- Molding compound flammability rating: UL 94V-0
- Marking: Marking code, cathode band
- Packaging: Tape and Reel

Applications

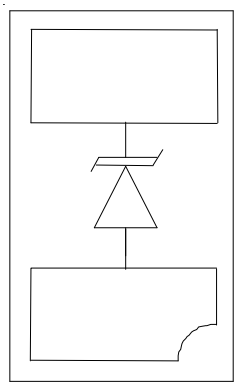
- Cellular Handsets & Accessories
- Personal Digital Assistants (PDAs)
- Notebooks & Handhelds
- Portable Instrumentation
- Digital Cameras
- Peripherals
- MP3 Players

Dimensions



Nominal Dimensions (mm)

Schematic & PIN Configuration



SLP1006P2 (Bottom View)

Absolute Maximum Rating

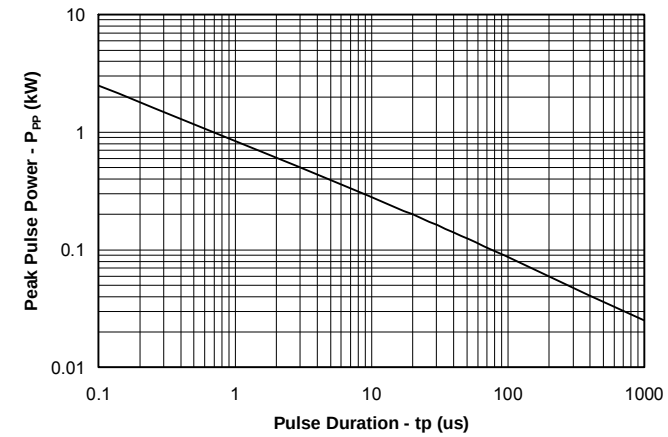
Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{pk}	200	Watts
Maximum Peak Pulse Current (tp = 8/20µs)	I_{pp}	8	Amps
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{PP}	+/- 20 +/- 15	kV
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics (T=25°C)

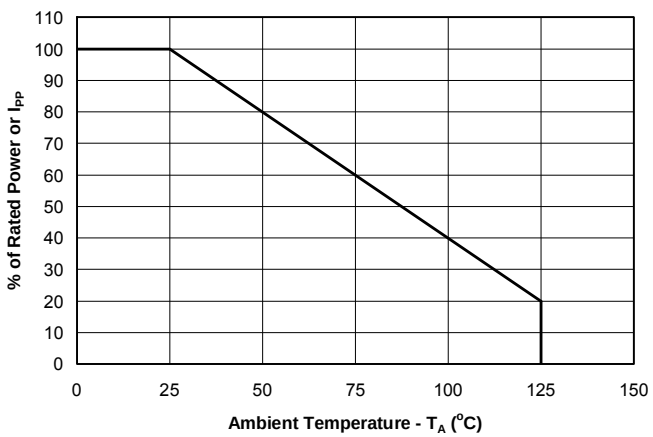
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	13.3	15.5	17.5	V
Reverse Leakage Current	I_R	V_{RWM} = 12V, T=25°C		0.100	1	µA
Forward Voltage	V_F	I_F = 10mA		0.8		V
Clamping Voltage	V_C	I_{PP} = 1A, t_p = 8/20µs			19	V
Clamping Voltage	V_C	I_{PP} = 8A, t_p = 8/20µs			25	V
Junction Capacitance	C_j	V_R = 0V, f = 1MHz			60	pF

Typical Characteristics

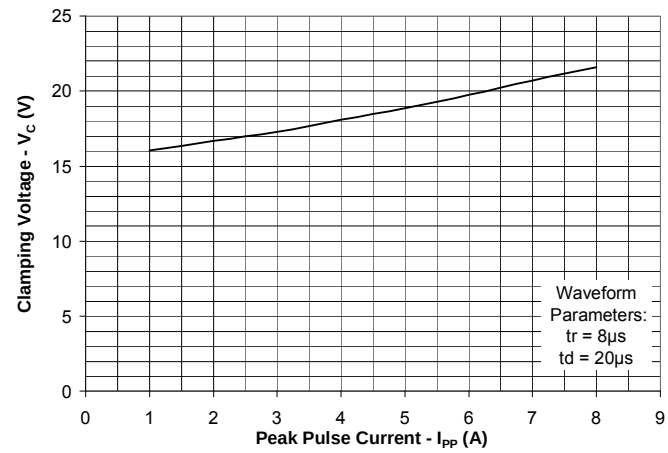
Non-Repetitive Peak Pulse Power vs. Pulse Time



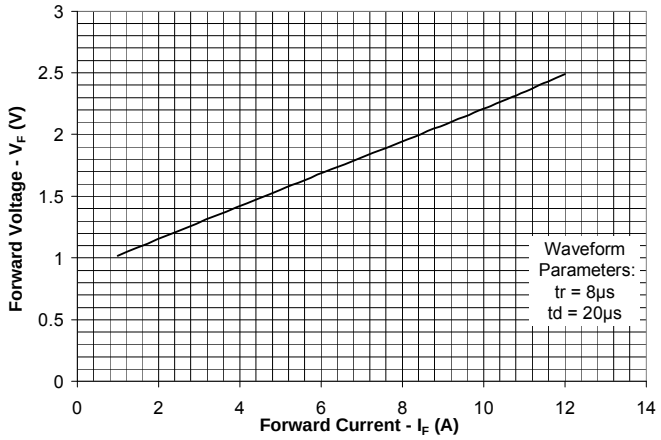
Power Derating Curve



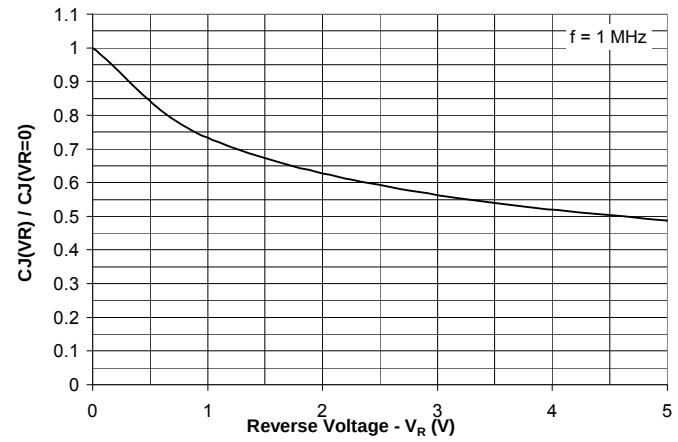
Clamping Voltage vs. Peak Pulse Current



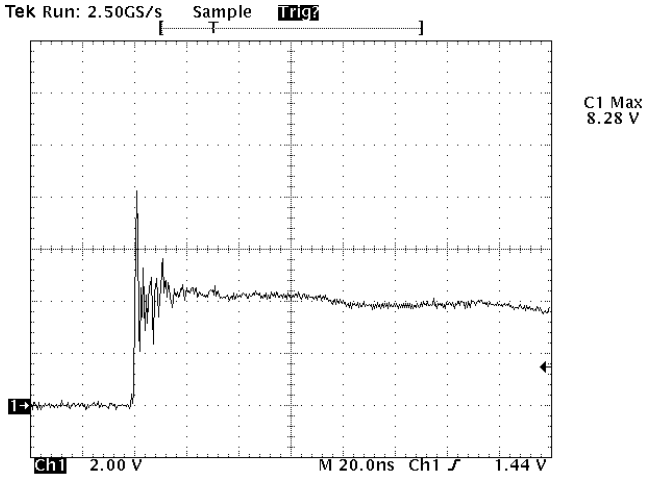
Forward Voltage vs. Forward Current



Normalized Junction Capacitance vs. Reverse Voltage



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



Note: Data is taken with a 10x attenuator

Applications Information

Device Connection Options

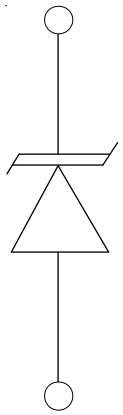
These TVS diodes are designed to protect one data, I/O, or power supply line. The device is unidirectional and may be used on lines where the signal polarity is above ground. The cathode band should be placed towards the line that is to be protected.

Circuit Board Layout Recommendations for Suppression of ESD.

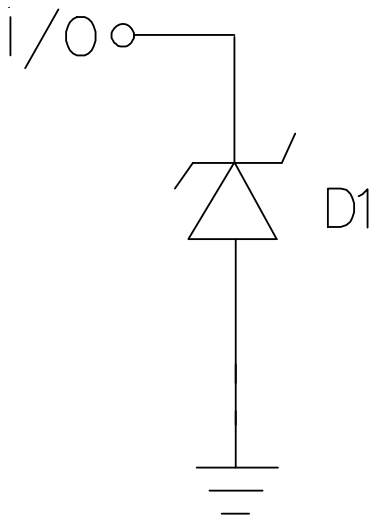
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- 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



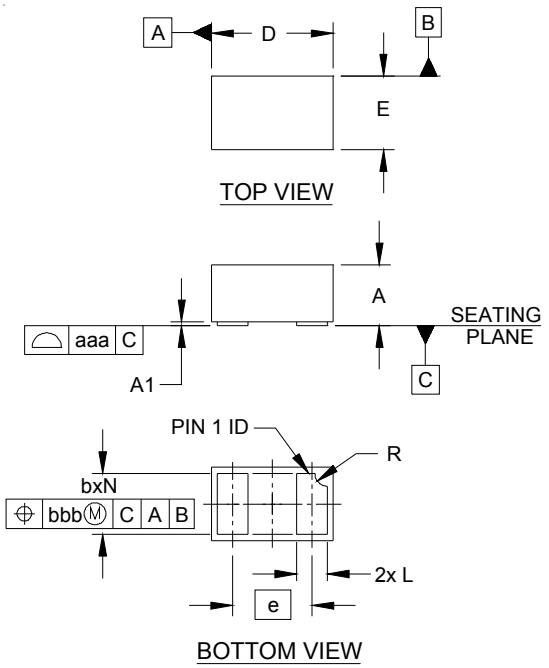
Applications Information - Spice Model



uClamp1201P Spice Model

uClamp1201P Spice Parameters		
Parameter	**Unit**	**D1 (TVS)**
IS	Amp	1.48E-14
BV	Volt	15.33
VJ	Volt	0.723
RS	Ohm	0.772
IBV	Amp	1.0E-3
CJO	Farad	52E-12
TT	sec	2.541E-9
M	--	0.268
N	--	1.1
EG	eV	1.11

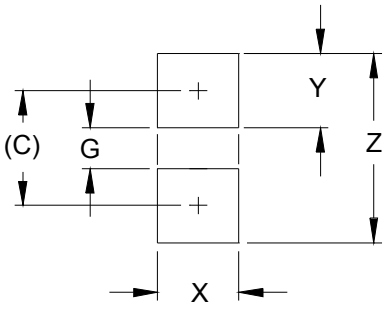
Outline Drawing - SLP1006P2



DIMENSIONS						
DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.016	.020	.022	0.40	0.50	0.55
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
e	.026 BSC			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).

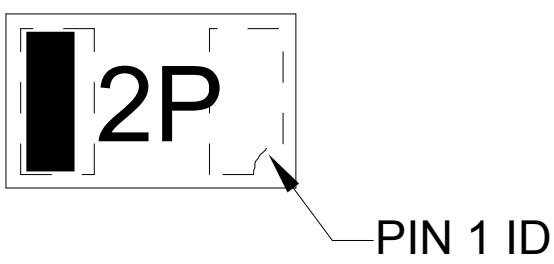
Land Pattern - SLP1006P2



DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	(.033)	(0.85)
G	.012	0.30
X	.024	0.60
Y	.022	0.55
Z	.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

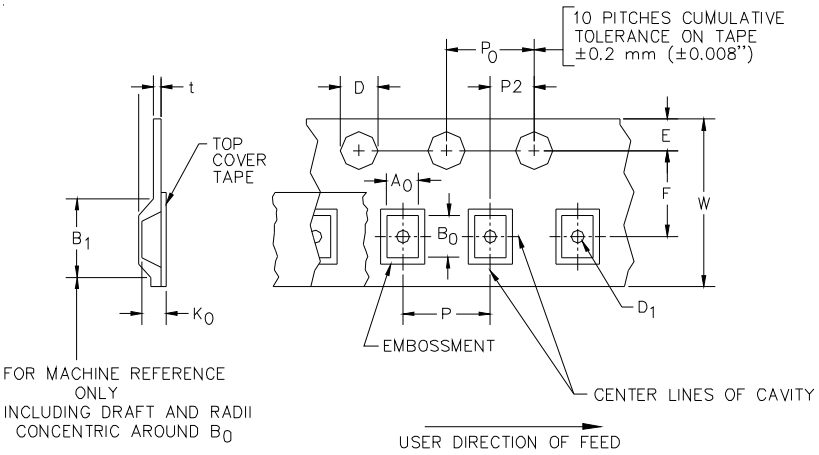


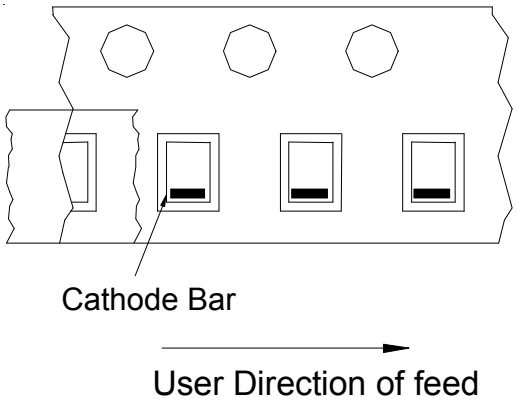
Ordering Information

Part Number	Working Voltage	Qty per Reel	Reel Size
uClamp1201P.TCT	12V	3,000	7 Inch

Notes:
1) This is a lead-free, RoHS/WEEE compliant product
MicroClamp, uClamp and µClamp 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 for Semtech International AG

Taiwan Branch Tel: 886-2-2748-3380 Fax: 886-2-2748-3390

Korea Branch Tel: 82-2-527-4377 Fax: 82-2-527-4376

Shanghai Office Tel: 86-21-6391-0830 Fax: 86-21-6391-0831

Semtech International AG is a wholly-owned subsidiary of Semtech Corporation, which has its headquarters in the U.S.A.

Semtech Switzerland GmbH Japan Branch Tel: 81-3-6408-0950 Fax: 81-3-6408-0951

Semtech Limited (U.K.) Tel: 44-1794-527-600 Fax: 44-1794-527-601

Semtech France SARL Tel: 33-(0)169-28-22-00 Fax: 33-(0)169-28-12-98

Semtech Germany GmbH Tel: 49-(0)8161-140-123 Fax: 49-(0)8161-140-124