uClamp3301H
Low Voltage µClamp™ for ESD and CDE Protection

PROTECTION PRODUCTS - MicroClamp™

Description

The µClamp™ series of Transient Voltage Suppressors (TVS) are designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and PDAs. They offer superior electrical characteristics such as lower clamping voltage and no device degradation when compared to MLVs. They are designed to protect sensitive semiconductor components from damage or upset due to electrostatic discharge (ESD), lightning, electrical fast transients (EFT), and cable discharge events (CDE).

The µclamp™3301H is constructed using Semtech's proprietary EPD process technology. The EPD process provides low standoff voltages with significant reductions in leakage currents and capacitance over silicon-avalanche diode processes. They feature a true operating voltage of 3.3 volts for superior protection when compared to traditional pn junction devices.

The µclamp3301H is in a SOD-523 package and will protect one unidirectional line. They give the designer the flexibility to protect one line 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).

Features

- Transient protection for data lines to
  IEC 61000-4-2 (ESD) 20kV (air), 10kV (contact)
  IEC 61000-4-4 (EFT) 40A (tp = 5/50ns)
  Cable Discharge Event (CDE)
- Ultra-small SOD-523 package (1.7 x 0.9 x 0.7mm)
- Protects one I/O or power line
- Low clamping voltage
- Working voltage: 3.3V
- Low leakage current
- Solid-state silicon-avalanche technology

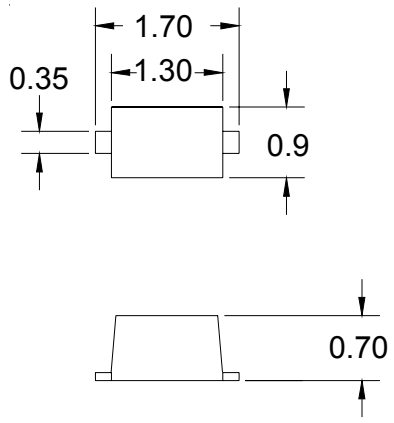
Mechanical Characteristics

- EIAJ SOD-523 package
- Molding compound flammability rating: UL 94V-0
- Marking : Marking code, cathode band
- Packaging : Tape and Reel per EIA 481
- Lead Finish: Matte tin

Applications

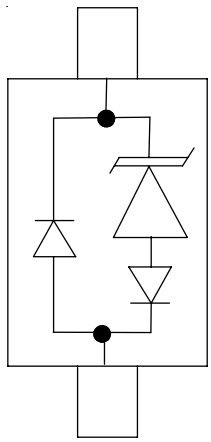
- Cellular Handsets & Accessories
- Cordless Phones
- Personal Digital Assistants (PDAs)
- Notebooks & Handhelds
- Portable Instrumentation
- Digital Cameras
- Peripherals
- MP3 Players

Dimensions



Maximum Dimensions (mm)

Schematic & PIN Configuration



SOD-523 (Top View)

Absolute Maximum Rating

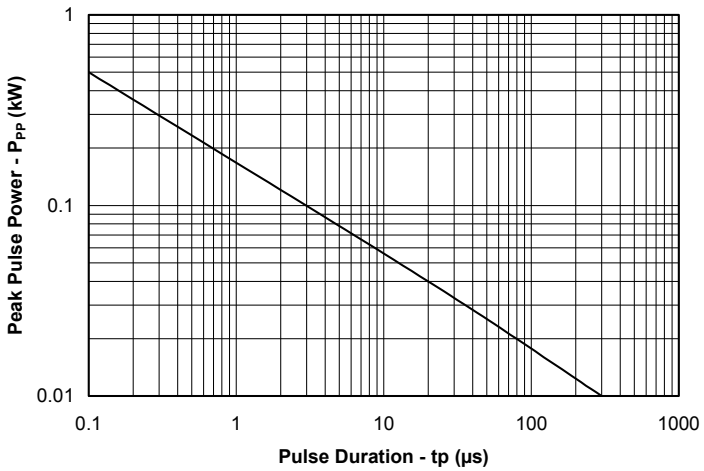
Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P_{pk}	40	Watts
Maximum Peak Pulse Current (tp = 8/20μs)	I_{pp}	5	Amps
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{PP}	+/- 20 +/- 15	kV
Lead Soldering Temperature	T_L	260 (10 sec.)	°C
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics (T=25°C)

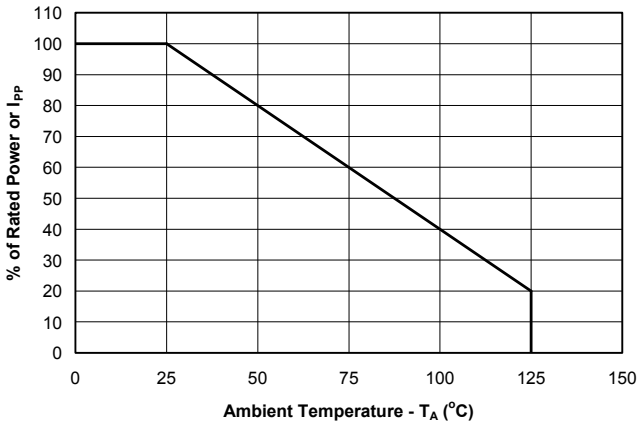
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				3.3	V
Punch-Through Voltage	V_{PT}	I_{PT} = 2μA	3.5			V
Snap-Back Voltage	V_{SB}	I_{SB} = 50mA	2.8			V
Reverse Leakage Current	I_R	V_{RWM} = 3.3V		0.05	0.5	μA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20μs			5.5	V
Clamping Voltage	V_C	I_{PP} = 5A, tp = 8/20μs			8.0	V
Reverse Clamping Voltage	V_{CR}	I_{PP} = 1A, tp = 8/20μs			2.4	V
Junction Capacitance	C_j	I/O pin to Gnd V_R = 0V, f = 1MHz		25	30	pF
		I/O pin to Gnd V_R = 3.3V, f = 1MHz		14		pF

Typical Characteristics

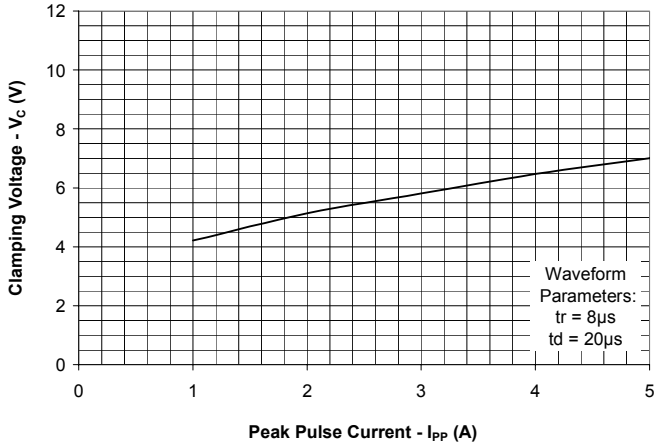
Non-Repetitive Peak Pulse Power vs. Pulse Time



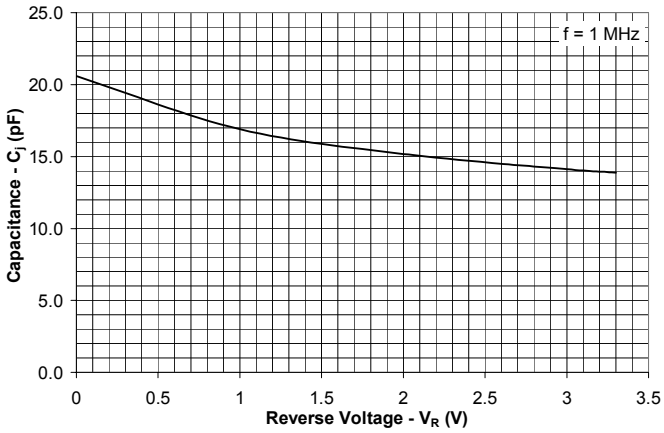
Power Derating Curve



Clamping Voltage vs. Peak Pulse Current



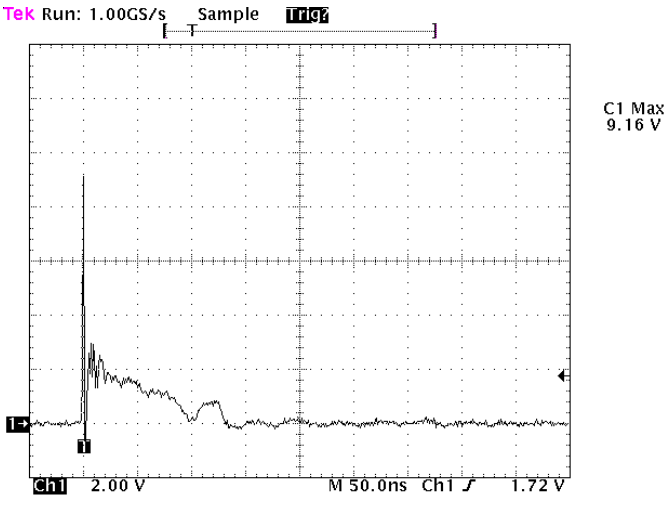
Junction Capacitance vs. Reverse Voltage



Insertion Loss S21



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



Applications Information

Device Connection Options

The µclamp3301H is designed to protect one I/O, or power supply line. It will present a high impedance to the protected line up to 3.3 volts. It will "turn on" when the line voltage exceeds 3.5 volts. 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.

EPD TVS Characteristics

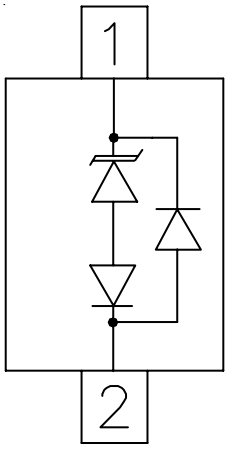
These devices are constructed using Semtech's proprietary EPD technology. The structure of the EPD TVS is vastly different from the traditional pn-junction devices. At voltages below 5V, high leakage current and junction capacitance render conventional avalanche technology impractical for most applications. However, by utilizing the EPD technology, these devices can effectively operate at 3.3V while maintaining excellent electrical characteristics.

The EPD TVS employs a complex nppn structure in contrast to the pn structure normally found in traditional silicon-avalanche TVS diodes. The EPD mechanism is achieved by engineering the center region of the device such that the reverse biased junction does not avalanche, but will "punch-through" to a conducting state. This structure results in a device with superior DC electrical parameters at low voltages while maintaining the capability to absorb high transient currents.

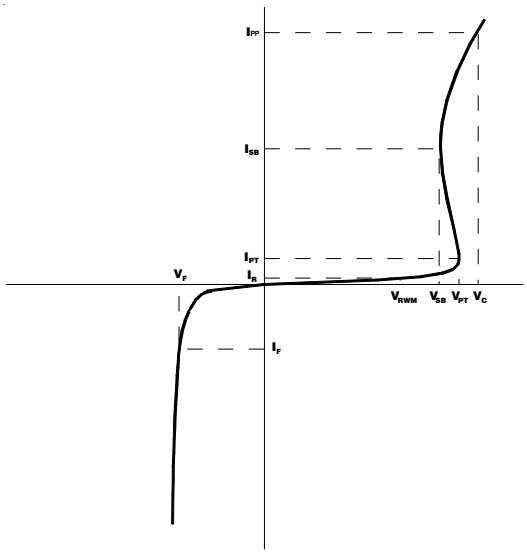
Matte Tin Lead Finish

Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

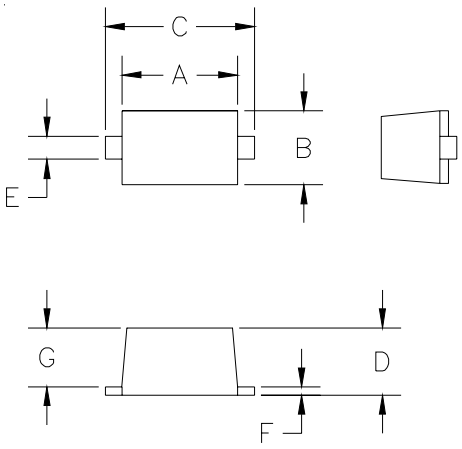
Device Schematic & Pin Configuration



EPD TVS IV Characteristic Curve



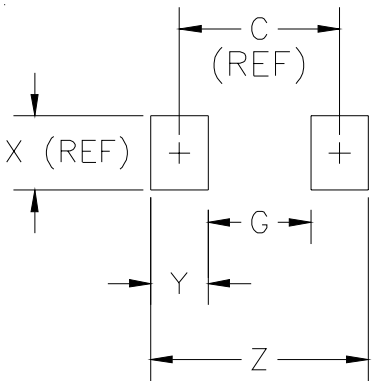
Outline Drawing



DIMENSIONS					
DIM	INCHES		MM [1]		NOTE
	MIN	MAX	MIN	MAX	
A	.043	.051	1.10	1.30	–
B	.028	.035	0.70	0.90	–
C	.059	.067	1.50	1.70	–
D	.020	.028	0.50	0.70	–
E	.010	.014	0.25	0.35	–
F	.004	.008	0.10	0.20	–
G	.020	.028	0.50	0.70	–

[1] CONTROLLING DIMENSION: MILLIMETERS

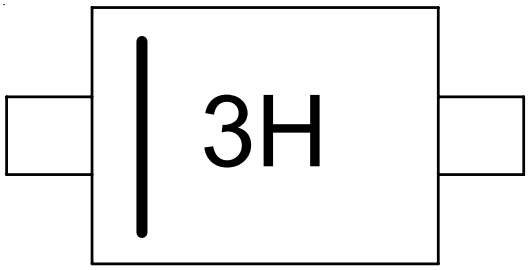
Land Pattern



DIMENSIONS					
DIM	INCHES		MM [1]		NOTE
	MIN	MAX	MIN	MAX	
C	–	.067	–	1.70	REF
G	–	.043	–	1.10	–
X	–	.031	–	0.80	REF
Y	–	.024	–	0.60	–
Z	–	.091	–	2.30	–

[1] CONTROLLING DIMENSION: MILLIMETERS

Marking Code

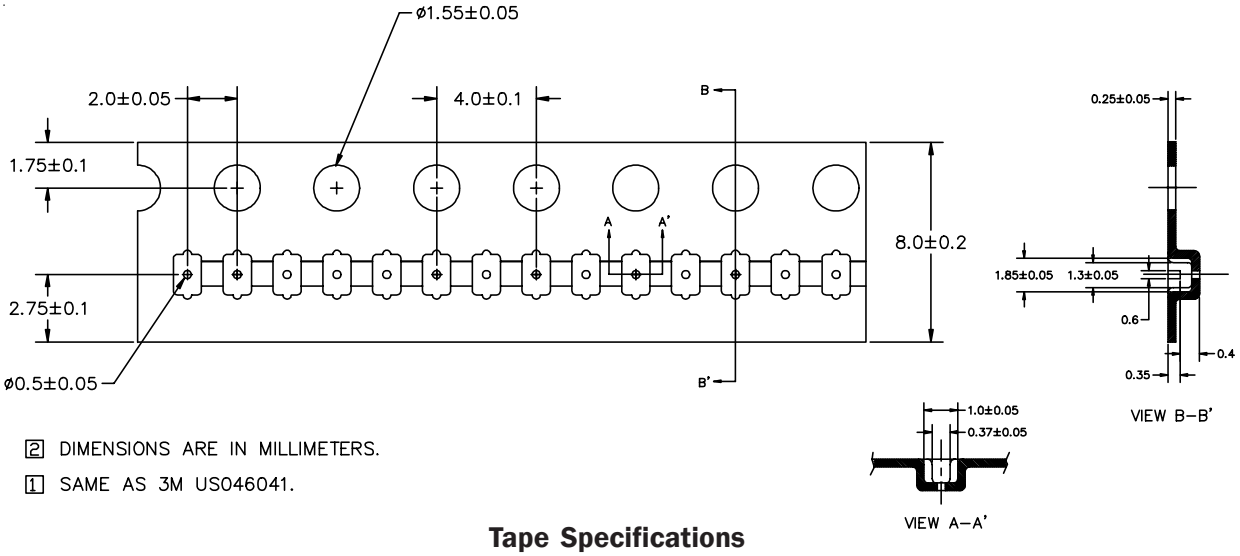


Ordering Information

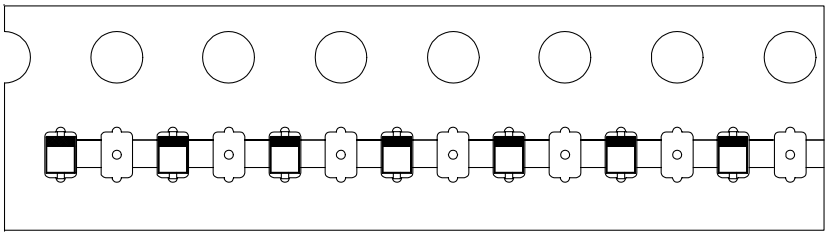
Part Number	Working Voltage	Device Marking	Qty per Reel	Reel Size
uClamp3301H.TCT	5V	3H	3,000	7 Inch

MicroClamp, uClamp and µClamp are trademarks of Semtech Corporation

Tape and Reel Specification



Tape Specifications



Device Orientation in Tape

Contact Information

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