

## PROTECTION PRODUCTS - MicroClamp

### 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 PDA's. 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™0501H is in a ultra-small SOD-523 package ideal for use in portable electronics such as cell phones, PDA's, notebook computers, and digital cameras. It will protect one unidirectional line operating at 5 volts. It gives the designer the flexibility to protect one line in applications where arrays are not practical. Additionally, it may be "sprinkled" around the board in applications where board space is at a premium.

This device may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ( $\pm 15\text{kV}$  air,  $\pm 8\text{kV}$  contact discharge).

### Features

- ◆ Transient protection for data lines to  
**IEC 61000-4-2 (ESD)  $\pm 15\text{kV}$  (air),  $\pm 8\text{kV}$  (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: 5V
- ◆ Low leakage current
- ◆ Solid-state silicon-avalanche technology

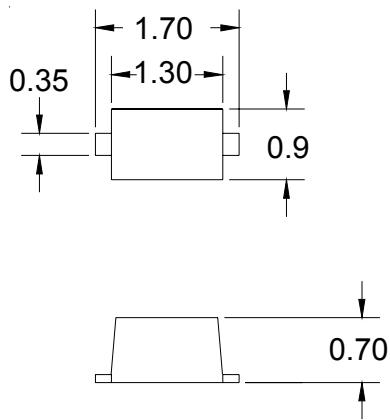
### Mechanical Characteristics

- ◆ 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

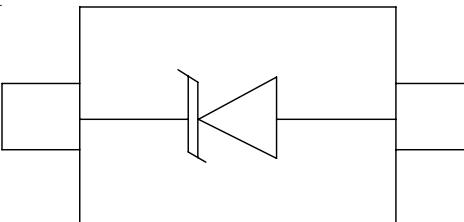
- ◆ Cellular Handsets & Accessories
- ◆ Cordless Phones
- ◆ Personal Digital Assistants (PDAs)
- ◆ Notebooks & Handhelds
- ◆ Portable Instrumentation
- ◆ Digital Cameras
- ◆ Peripherals
- ◆ MP3 Players

### Dimensions



**Maximum Dimensions (mm)**

### Schematic & PIN Configuration



**SOD-523 (Top View)**

## PROTECTION PRODUCTS

## Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power ( $t_p = 8/20\mu s$ )	$P_{pk}$	240	Watts
Maximum Peak Pulse Current ( $t_p = 8/20\mu s$ )	$I_{pp}$	16	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

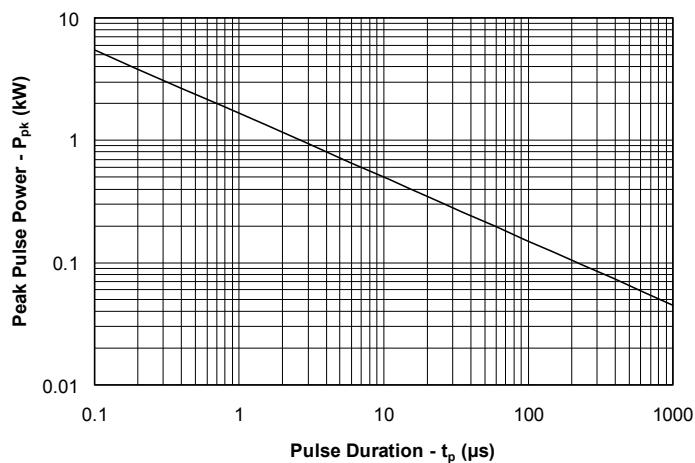
## Electrical Characteristics (T=25°C)

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	$V_{RWM}$				5	V
Reverse Breakdown Voltage	$V_{BR}$	$I_t = 1mA$	6			V
Reverse Leakage Current	$I_R$	$V_{RWM} = 5V, T=25^\circ C$			5	µA
Forward Voltage	$V_F$	$I_F = 10mA$		0.80		V
Clamping Voltage	$V_c$	$I_{pp} = 5A, t_p = 8/20\mu s$			9.8	V
Clamping Voltage	$V_c$	$I_{pp} = 16A, t_p = 8/20\mu s$			12.5	V
Junction Capacitance	$C_J$	$V_R = 0V, f = 1MHz$			160	pF

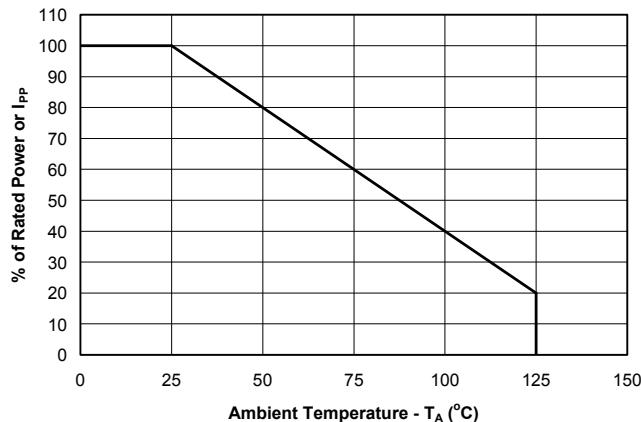
## PROTECTION PRODUCTS

### Typical Characteristics

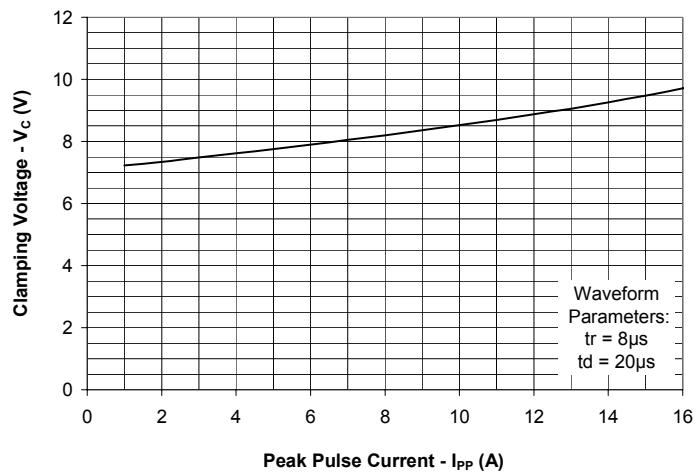
#### Non-Repetitive Peak Pulse Power vs. Pulse Time



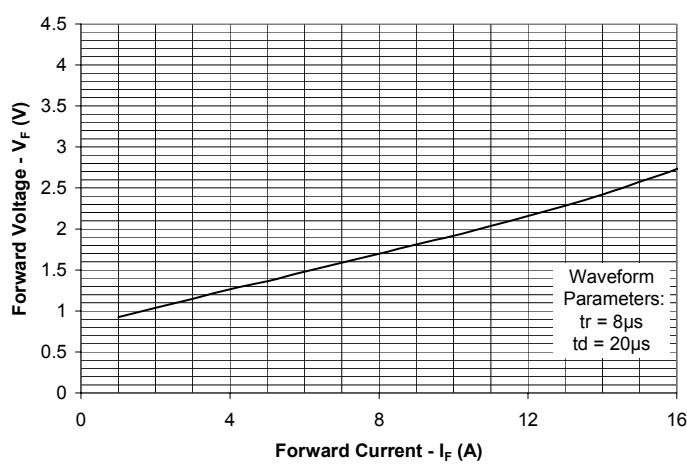
#### Power Derating Curve



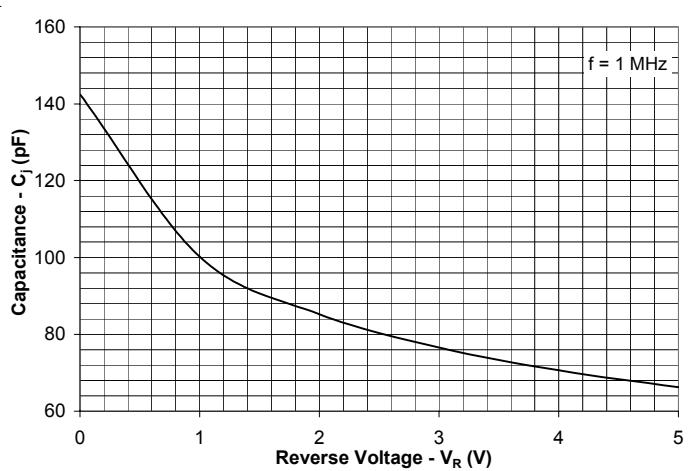
#### Clamping Voltage vs. Peak Pulse Current



#### Forward Voltage vs. Forward Current

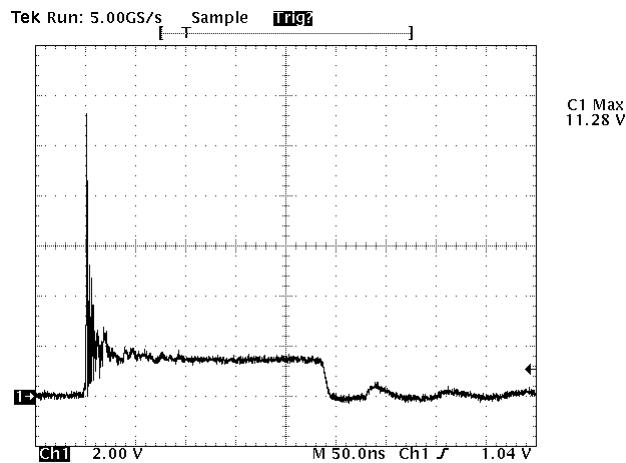


#### Junction Capacitance vs. Reverse Voltage



#### ESD Clamping

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



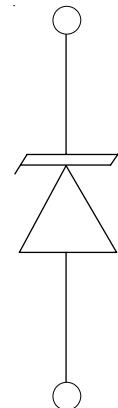
## PROTECTION PRODUCTS

### 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 Diagram



#### Circuit Board Layout Recommendations for Suppression of ESD.

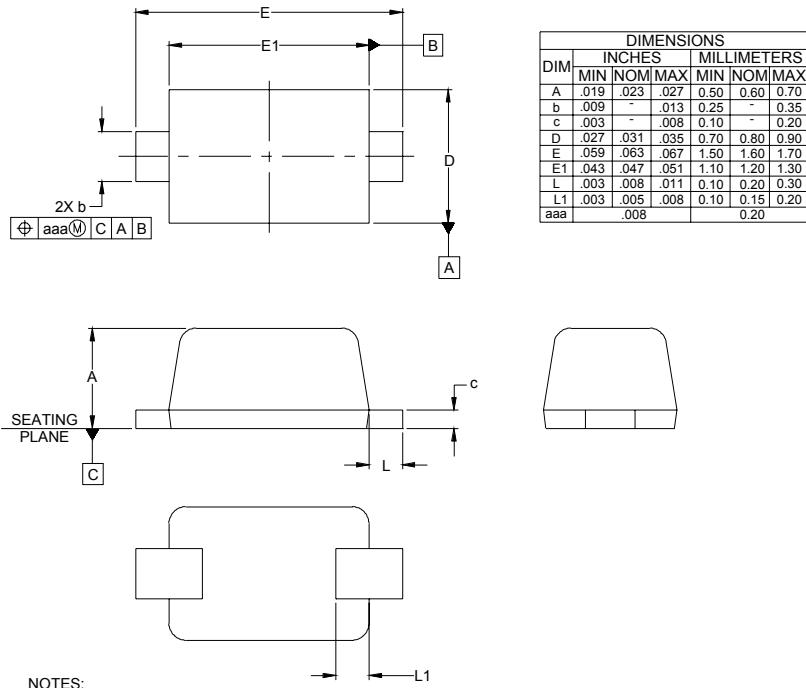
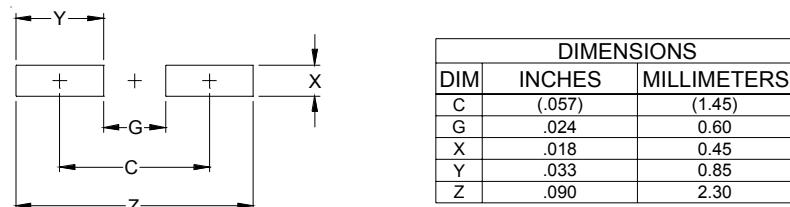
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- 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.

#### 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.

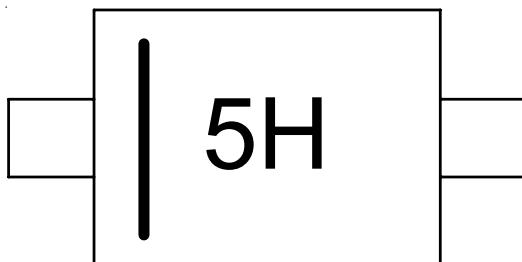
Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

**PROTECTION PRODUCTS**
**Outline Drawing - SOD-523**

**Land Pattern - SOD-523**

**NOTES:**

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY  
CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR  
COMPANY'S MANUFACTURING GUIDELINES ARE MET

## PROTECTION PRODUCTS

### Marking Code

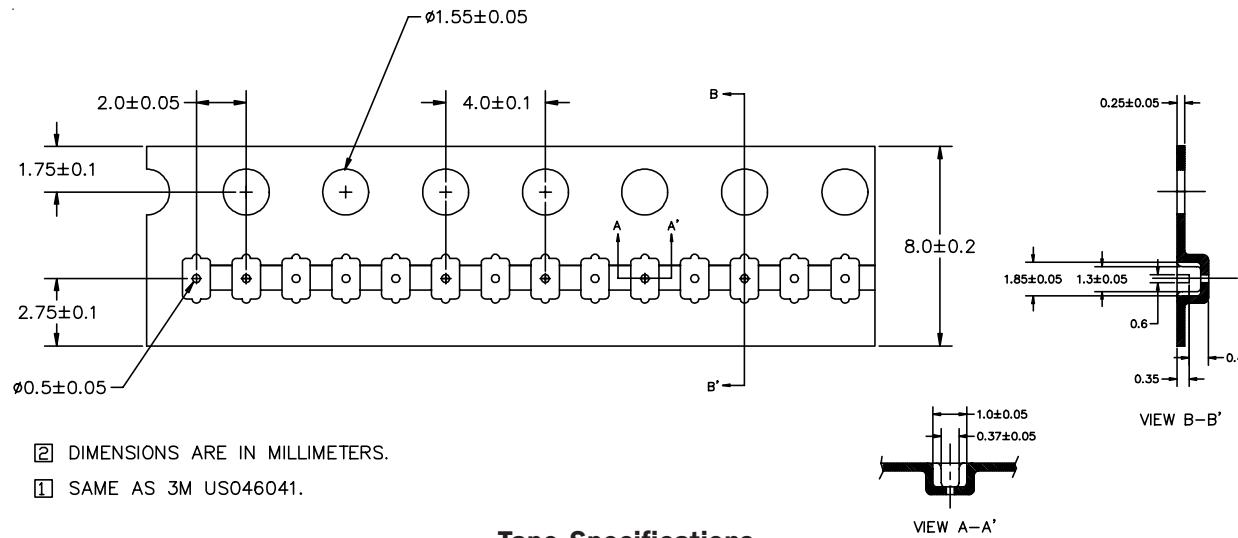


### Ordering Information

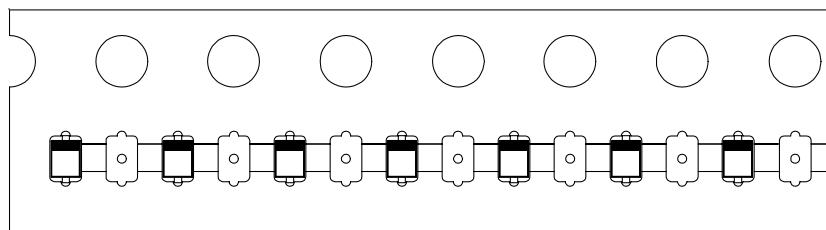
Part Number	Working Voltage	Device Marking	Qty per Reel	Reel Size
uClamp0501H.TCT	5V	5H	3,000	7 Inch

MicroClamp, uClamp and  $\mu$ Clamp are trademarks of Semtech Corporation

### Tape and Reel Specification



**Tape Specifications**



**Device Orientation in Tape**

### Contact Information

Semtech Corporation  
 Protection Products Division  
 200 Flynn Rd., Camarillo, CA 93012  
 Phone: (805)498-2111 FAX (805)498-3804

# AMEYA360

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