

#### PROTECTION PRODUCTS - MicroClamp<sup>®</sup>

#### Description

$\mu$ Clamp<sup>®</sup> TVS diodes are designed to protect sensitive electronics from damage or latch-up due to ESD. They are designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and other portable electronics. They feature large cross-sectional area junctions for conducting high transient currents. This device offers desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

The  $\mu$ Clamp<sup>®</sup>0554T is in a 4-pin SLP0808P4T package. It measures 0.8 x 0.8 mm with a nominal height of only 0.3mm. The leads are finished with lead-free NiPdAu. Each device will protect four lines operating at 5 volts. It gives the designer the flexibility to replace multiple single line devices in space constrained applications. They may be used to meet the ESD immunity requirements of IEC 61000-4-2. 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 tablet computers.

#### Features

- ◆ High ESD withstand Voltage: +/-**15kV** (Contact) per **IEC 61000-4-2**
- ◆ Very small PCB area: 0.8mm<sup>2</sup>
- ◆ Protects up to four data lines
- ◆ Low reverse current: <3nA typical (VR=5V)
- ◆ Working voltage: +/- 5V
- ◆ Low capacitance: <7pF (VR=0V)
- ◆ Low dynamic resistance: 0.70 Ohms (Typ)
- ◆ Solid-state silicon-avalanche technology

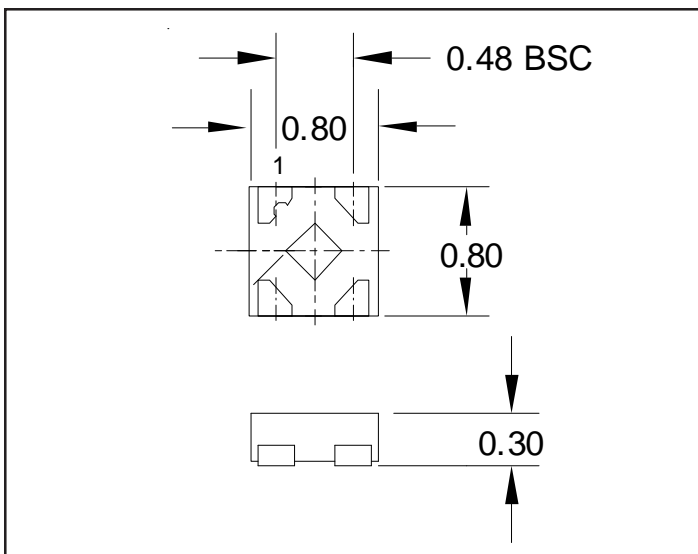
#### Mechanical Characteristics

- ◆ SLP0808P4T package
- ◆ Pb-Free, Halogen Free, RoHS/WEEE Compliant
- ◆ Nominal Dimensions: 0.8 x 0.8 x 0.30 mm
- ◆ Lead Pitch: 0.48mm
- ◆ Lead Finish: NiPdAu
- ◆ Molding compound flammability rating: UL 94V-0
- ◆ Marking : Marking code + dot matrix date code
- ◆ Packaging : Tape and Reel

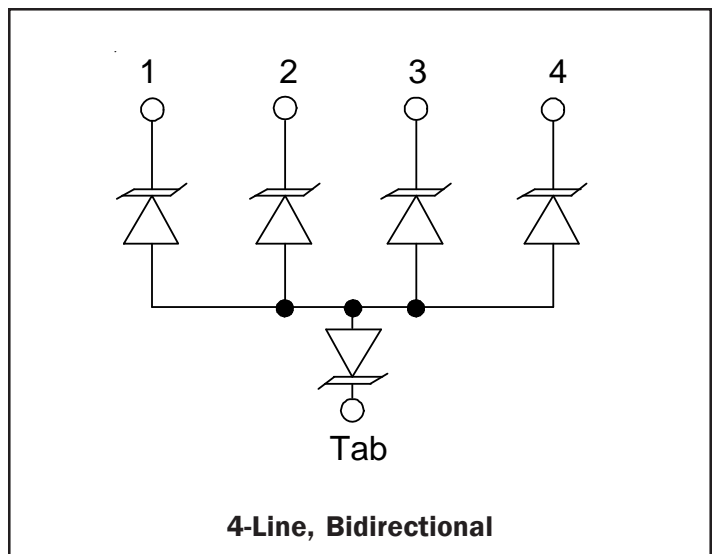
#### Applications

- ◆ Cellular Handsets & Accessories
- ◆ Keypads, Side Keys, Audio Ports
- ◆ SIM Ports
- ◆ Digital Lines
- ◆ Tablet PC

#### Nominal Dimensions (mm)



#### Schematic & PIN Configuration



**PROTECTION PRODUCTS**
**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) <sup>1</sup> ESD per IEC 61000-4-2 (Contact) <sup>1</sup>	$V_{ESD}$	+/- 17 +/- 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	$V_{RWM}$	Any I/O Pin to GND			5	V
Reverse Breakdown Voltage	$V_{BR}$	$I_t = 1mA$ Any I/O Pin to GND	6	8.2	9.5	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 5V, T=25°C$ Any I/O Pin to GND		3	50	nA
Clamping Voltage	$V_C$	$I_{pp} = 2A, tp = 8/20μs$ Any I/O Pin to GND			12.5	V
ESD Clamping Voltage <sup>2</sup>	$V_C$	IPP = 4A, tIp = 0.2/100ns		12		V
ESD Clamping Voltage <sup>2</sup>	$V_C$	IPP = 16A, tIp = 0.2/100ns		20.5		V
Dynamic Resistance <sup>2,3</sup>	$R_{Dyn}$	tp = 100ns		0.70		Ohms
Junction Capacitance	$C_j$	$V_R = 0V, f = 1MHz$ Any I/O Pin to GND		4.5	7	pF

**Notes**

1)ESD gun return path connected to ESD ground plane.

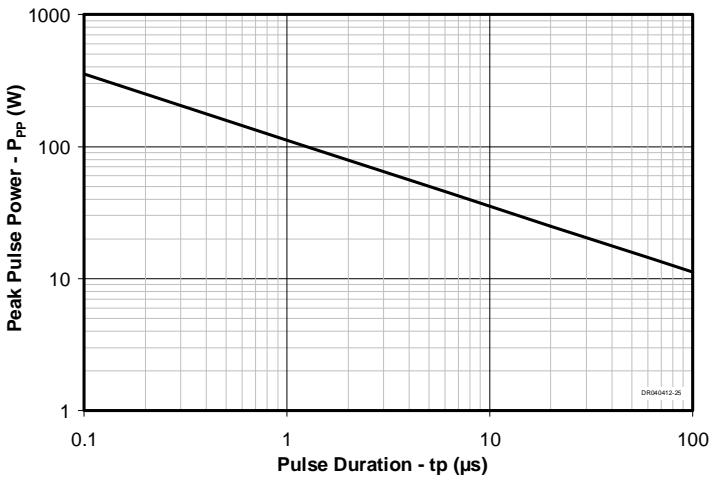
2)Transmission Line Pulse Test (TLP) Settings:  $t_p = 100ns$ ,  $t_r = 0.2ns$ ,  $I_{TLP}$  and  $V_{TLP}$  averaging window:  $t_1 = 70ns$  to  $t_2 = 90ns$ .

3) Dynamic resistance calculated from  $I_{pp} = 4A$  to  $I_{pp} = 16A$

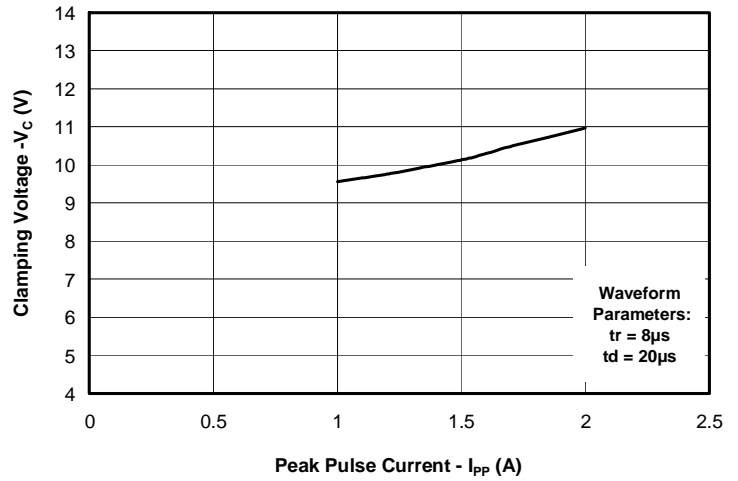
## PROTECTION PRODUCTS

### Typical Characteristics

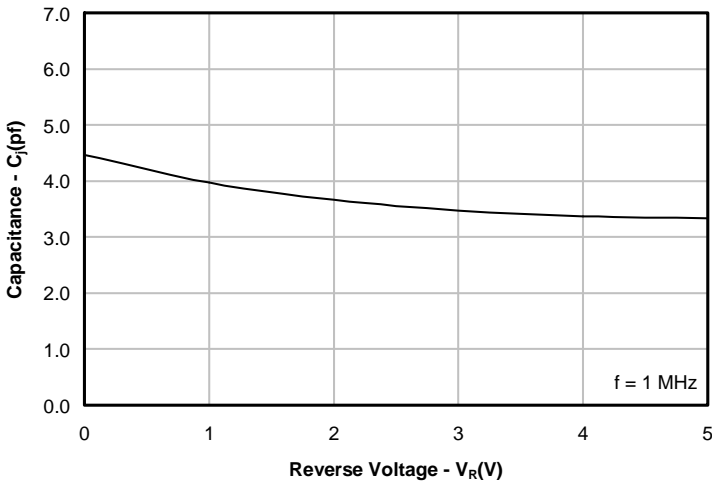
**Non-Repetitive Peak Pulse Power vs. Pulse Time**



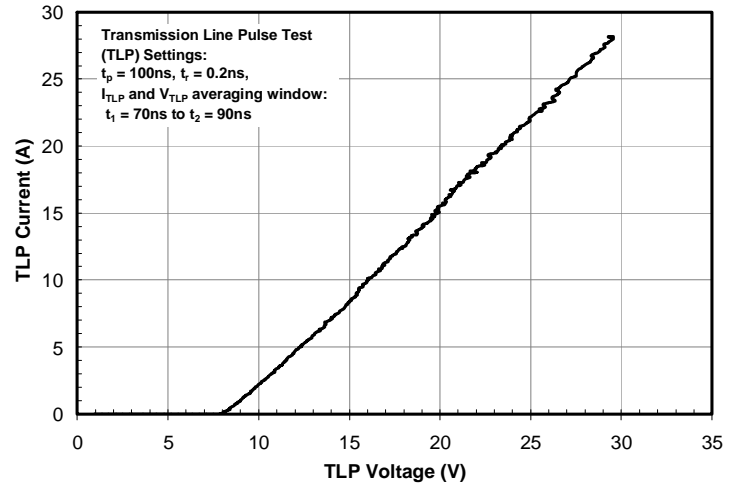
**Clamping Voltage vs. Peak Pulse Current ( $t_p=8/20\mu$ s)**



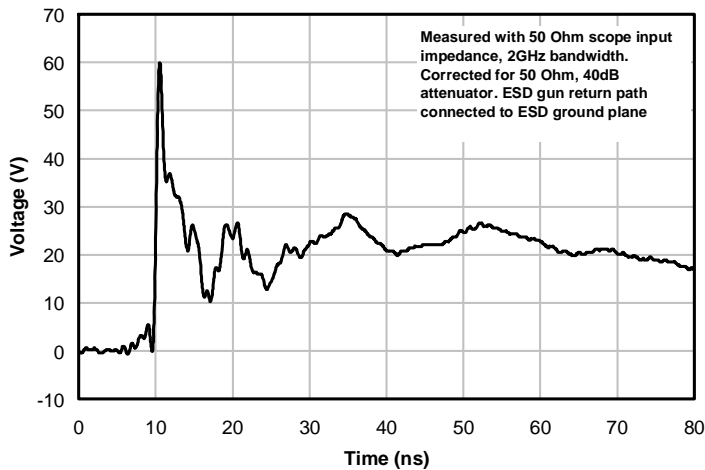
**Junction Capacitance vs. Reverse Voltage**



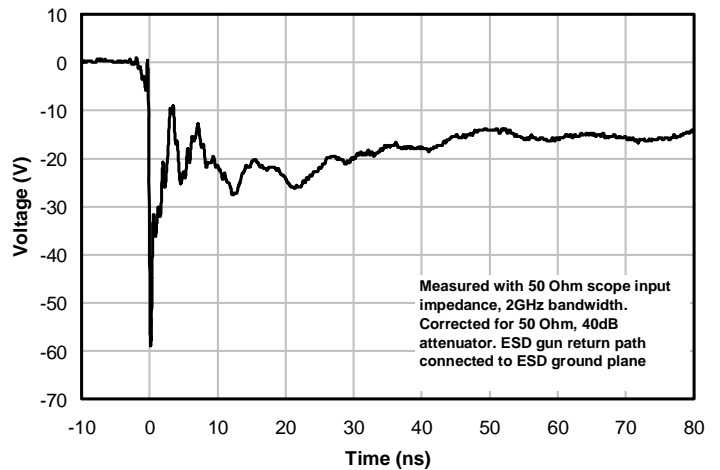
**TLP Characteristic**

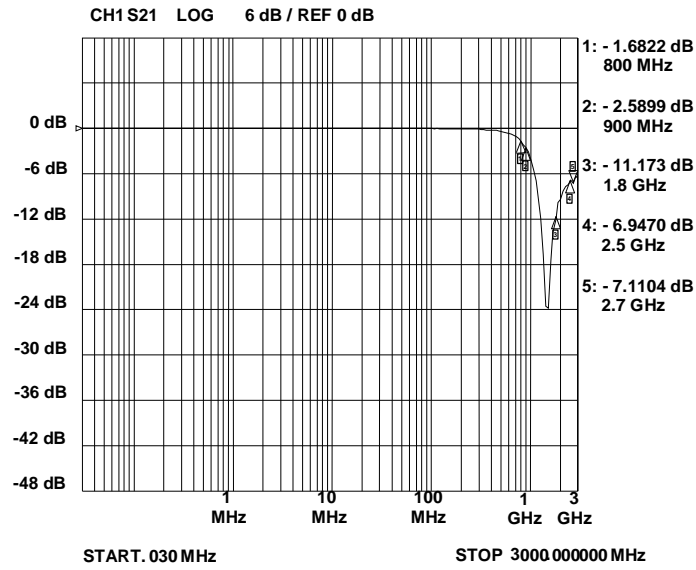
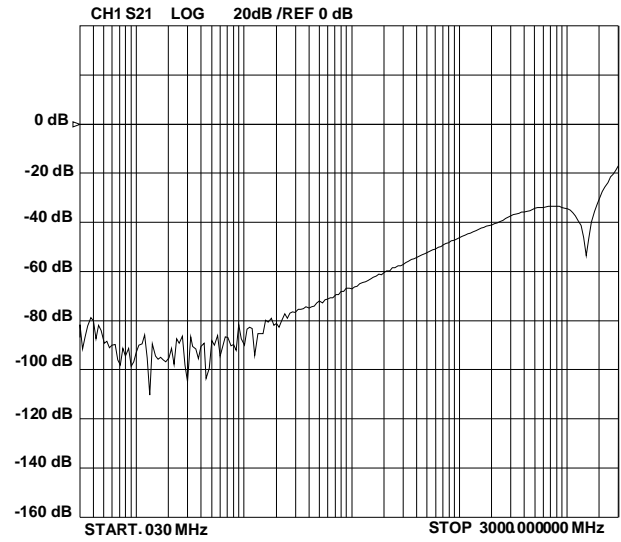


**ESD Clamping (+8kV Contact per IEC 61000-4-2)**



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



**PROTECTION PRODUCTS**
**Typical Characteristics**
**Typical Insertion Loss S21**

**Analog Crosstalk**


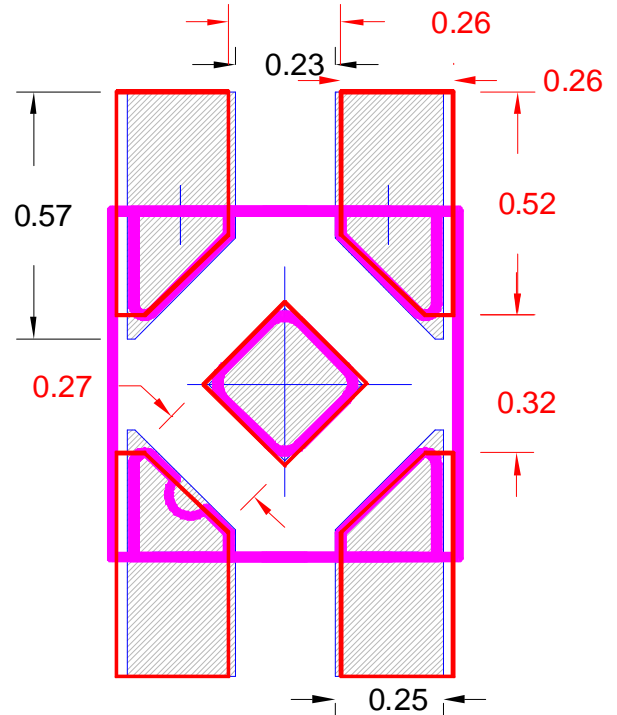
**PROTECTION PRODUCTS**

**Recommended Assembly Parameters**

**Assembly Guidelines**

The small size of this device means that some care must be taken during the mounting process to insure reliable solder joint. The table below provides Semtech's recommended assembly guidelines for mounting this device. The figure at the right details Semtech's recommended aperture based on the below recommendations. Note that these are only recommendations and should serve only as a starting point for design since there are many factors that affect the assembly process. The exact manufacturing parameters will require some experimentation to get the desired solder application.

Assembly Parameter	Recommendation
Solder Stencil Design	Laser cut, Electro-polished
Aperture shape	Rectangular
Solder Stencil Thickness	0.100 mm (0.004")
Solder Paste Type	Type 4 size sphere or smaller
Solder Reflow Profile	Per JEDEC J-STD-020
PCB Solder Pad Design	Non-Solder mask defined
PCB Pad Finish	OSP OR NiAu

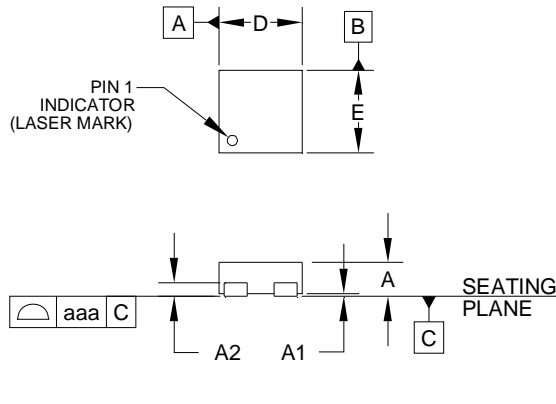


All Dimensions are in mm  
 Land Pad. Stencil opening Component

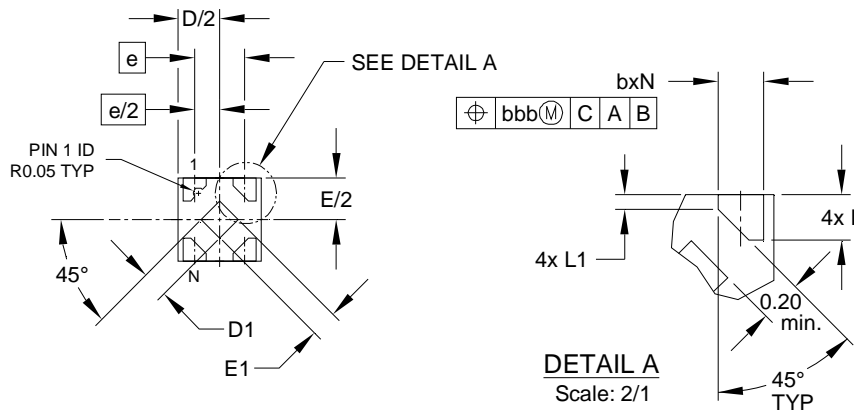
**Recommended Mounting Pattern**

PROTECTION PRODUCTS

Outline Drawing - SLP0808P4T



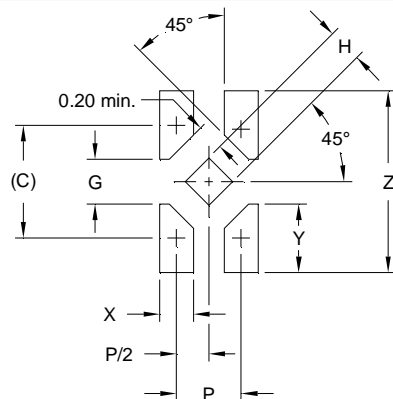
DIMENSIONS			
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.25	0.30	0.35
A1	0.00	-	0.04
A2	(0.13)		
b	0.17	0.22	0.27
D	0.75	0.80	0.85
D1	0.15	0.25	0.35
E	0.75	0.80	0.85
E1	0.15	0.25	0.35
e	0.48 BSC		
L	0.17	0.22	0.27
L1	0.02	0.07	0.12
N	4		
aaa	0.08		
bbb	0.10		



NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

Land Pattern - SLP0808P4T



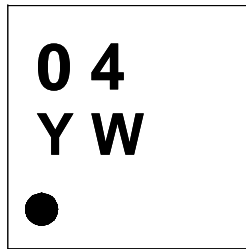
DIMENSIONS	
DIM	MILLIMETERS
C	(0.84)
G	0.33
H	0.25
P	0.48
X	0.25
Y	0.51
Z	1.35

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.
3. THERMAL VIAS IN THE LAND PATTERN OF THE EXPOSED PAD SHALL BE CONNECTED TO A SYSTEM GROUND PLANE. FAILURE TO DO SO MAY COMPROMISE THE THERMAL AND/OR FUNCTIONAL PERFORMANCE OF THE DEVICE.

## PROTECTION PRODUCTS

### Marking Code



YW = Date Code

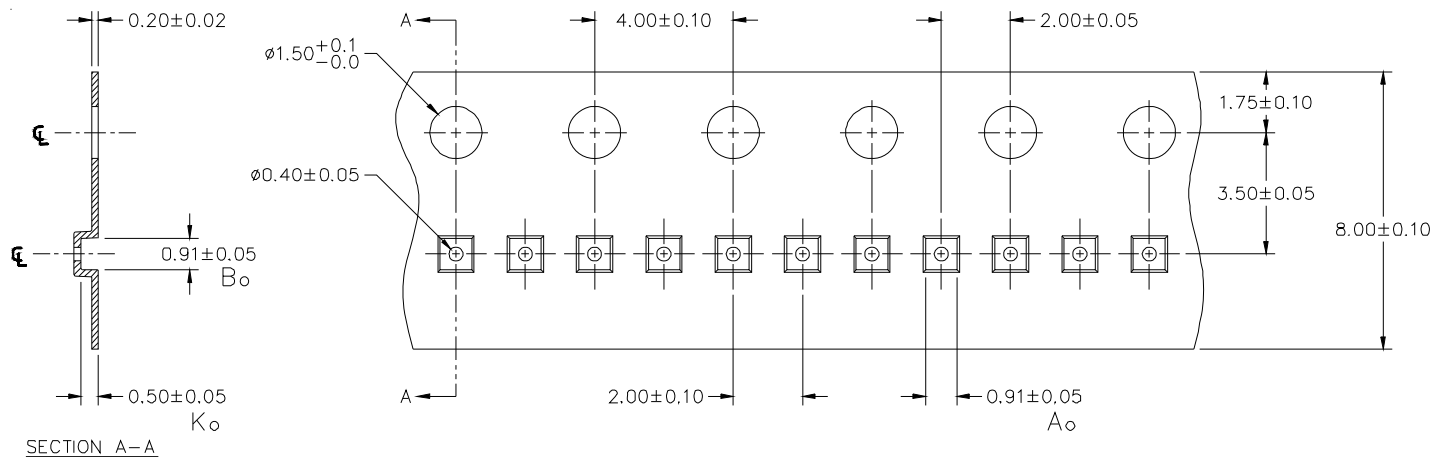
### Ordering Information

Part Number	Qty per Reel	Reel Size
uClamp0554T.TNT	10,000	7 Inch

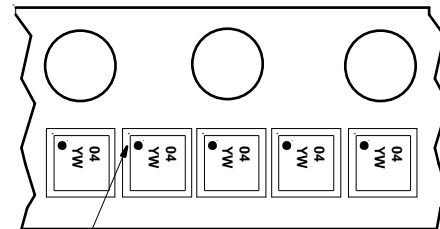
**Notes:**

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

### Carrier Tape Specification



### Device Orientation in Tape



Pin 1 Location  
(Towards Sprocket Holes)

ESTIMATED MAX. LENGTH: 500 METER/13x6.

CUMULATIVE TOLERANCE OF 10 SPROCKET HOLES IS  $\pm 0.20$ mm.

NOTES: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

### Contact Information

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

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