

PROTECTION PRODUCTS - MicroClamp[®]

Description

μ Clamp[®] 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 μ Clamp[®]0545T is in a 6-pin SLP1007N6T package. It measures 1.0 x 0.7 mm with a nominal height of only 0.4mm. The leads are finished with lead-free NiPdAu. Each device will protect five lines 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. 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

- ◆ High ESD withstand Voltage: +/-**12kV** (Contact) per **IEC 61000-4-2**
- ◆ Very small PCB area: 0.7mm²
- ◆ Protects up to five data lines
- ◆ Low reverse current: <10nA typical (VR=5V)
- ◆ Working voltage: +/- 5V
- ◆ Low capacitance: 4pF typical
- ◆ Low dynamic resistance: 0.70 Ohms (Typ)
- ◆ Solid-state silicon-avalanche technology

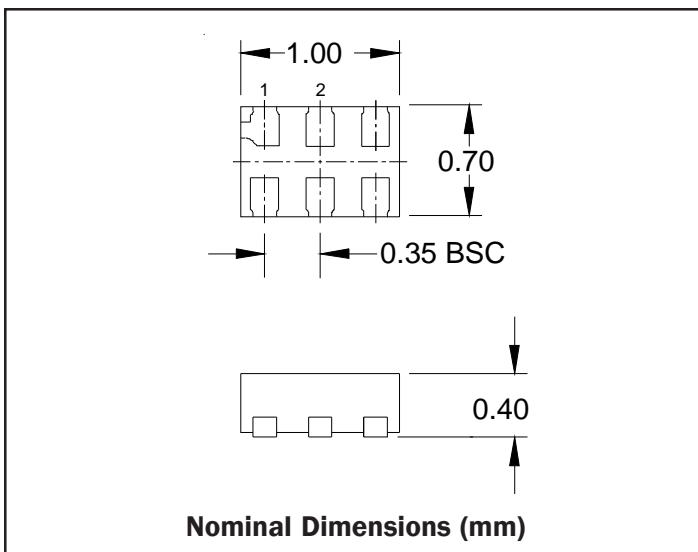
Mechanical Characteristics

- ◆ SLP1007N6T package
- ◆ Pb-Free, Halogen Free, RoHS/WEEE Compliant
- ◆ Nominal Dimensions: 1.0 x 0.7 x 0.40 mm
- ◆ Lead Pitch: 0.35mm
- ◆ Lead Finish: NiPdAu
- ◆ Molding compound flammability rating: UL 94V-0
- ◆ Marking : Marking code + dot matrix date code
- ◆ Packaging : Tape and Reel

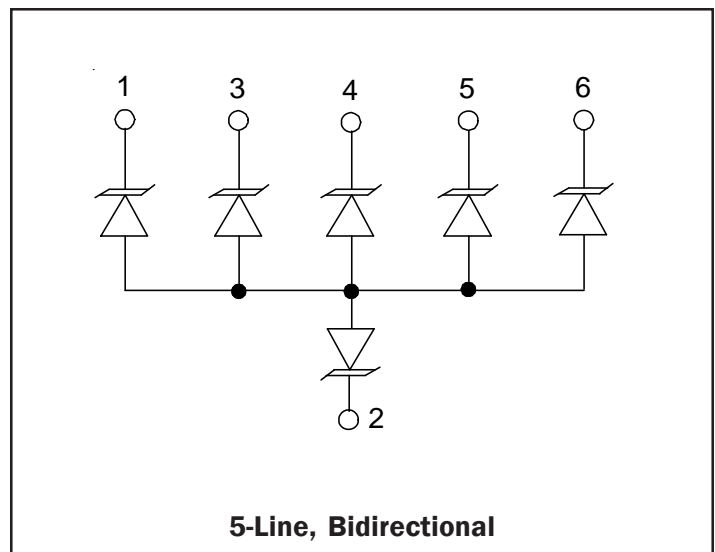
Applications

- ◆ Cellular Handsets & Accessories
- ◆ Keypads, Side Keys, Audio Ports
- ◆ LCD Connectors
- ◆ Digital Lines
- ◆ Analog Video

Dimensions



Schematic & PIN Configuration



PROTECTION PRODUCTS
Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P_{pk}	12	Watts
Maximum Peak Pulse Current (tp = 8/20μs)	I_{pp}	1	Amps
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	+/- 15 +/- 12	kV
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

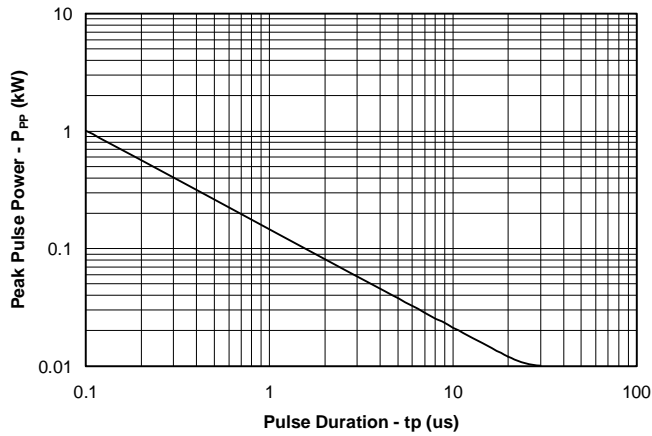
Electrical Characteristics (T=25°C)

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	$I_{pp} = 1A, tp = 8/20μs$ Any I/O Pin to GND			12	V
ESD Clamping Voltage	V_C	$IPP = 16A,$ $t1p = 0.2/100ns$		19		V
Dynamic Resistance	R_{dyn}	$tp = 100ns$		0.70		Ohms
Junction Capacitance	C_j	$V_R = 0V, f = 1MHz$ Any I/O Pin to GND		4.5	9	pF

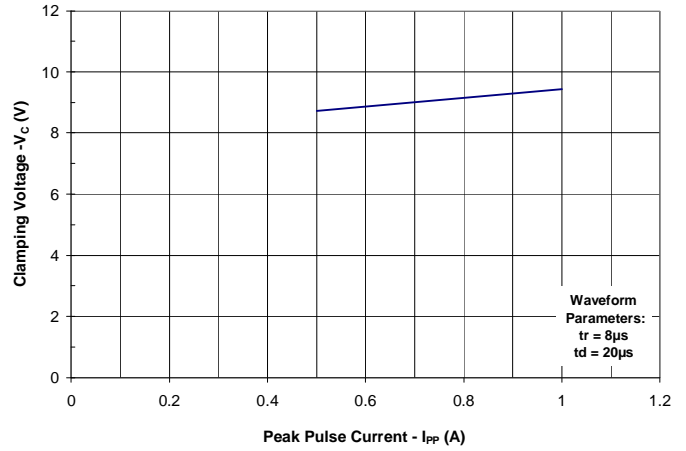
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Typical Characteristics

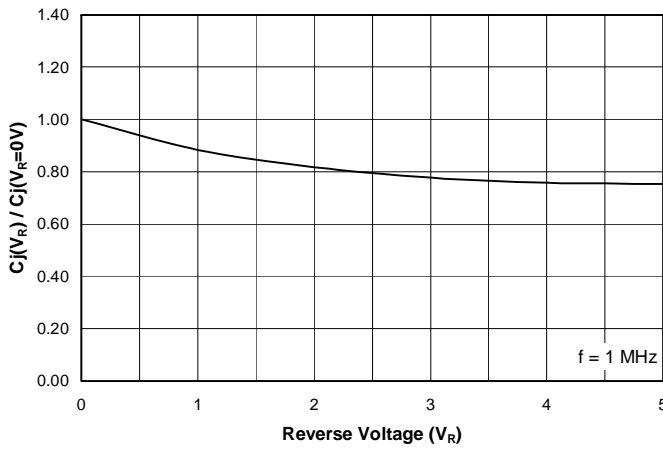
Non-Repetitive Peak Pulse Power vs. Pulse Time



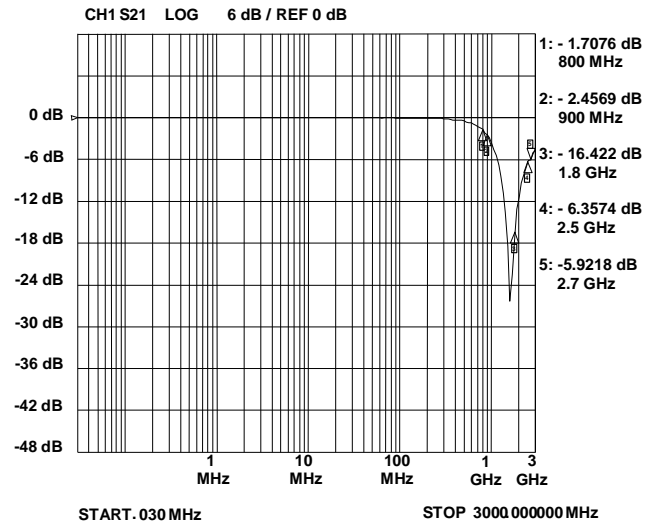
Clamping Voltage vs. Peak Pulse Current (t_p=8/20μs)

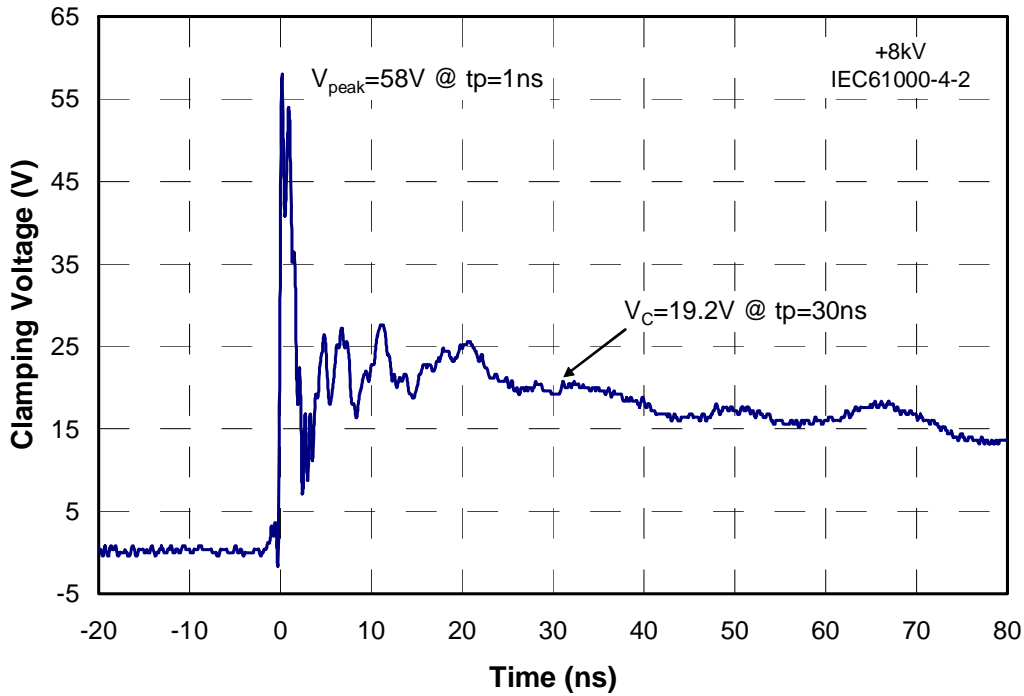
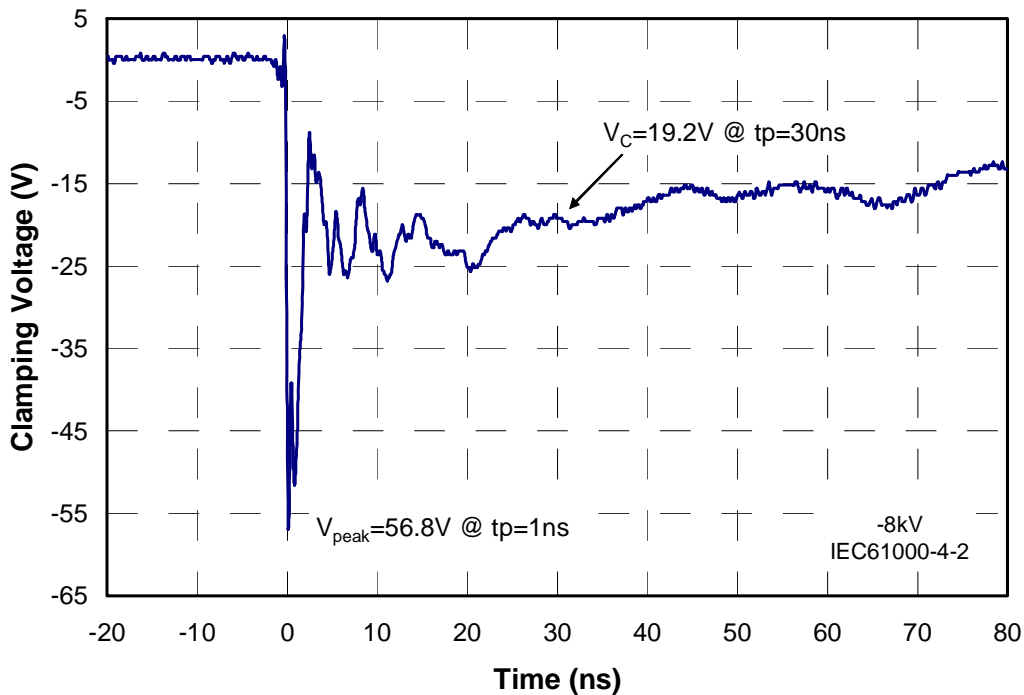


Normalized Junction Capacitance vs. Reverse Voltage



**Typical Insertion Loss (S₂₁)
30KHz to 3GHz**

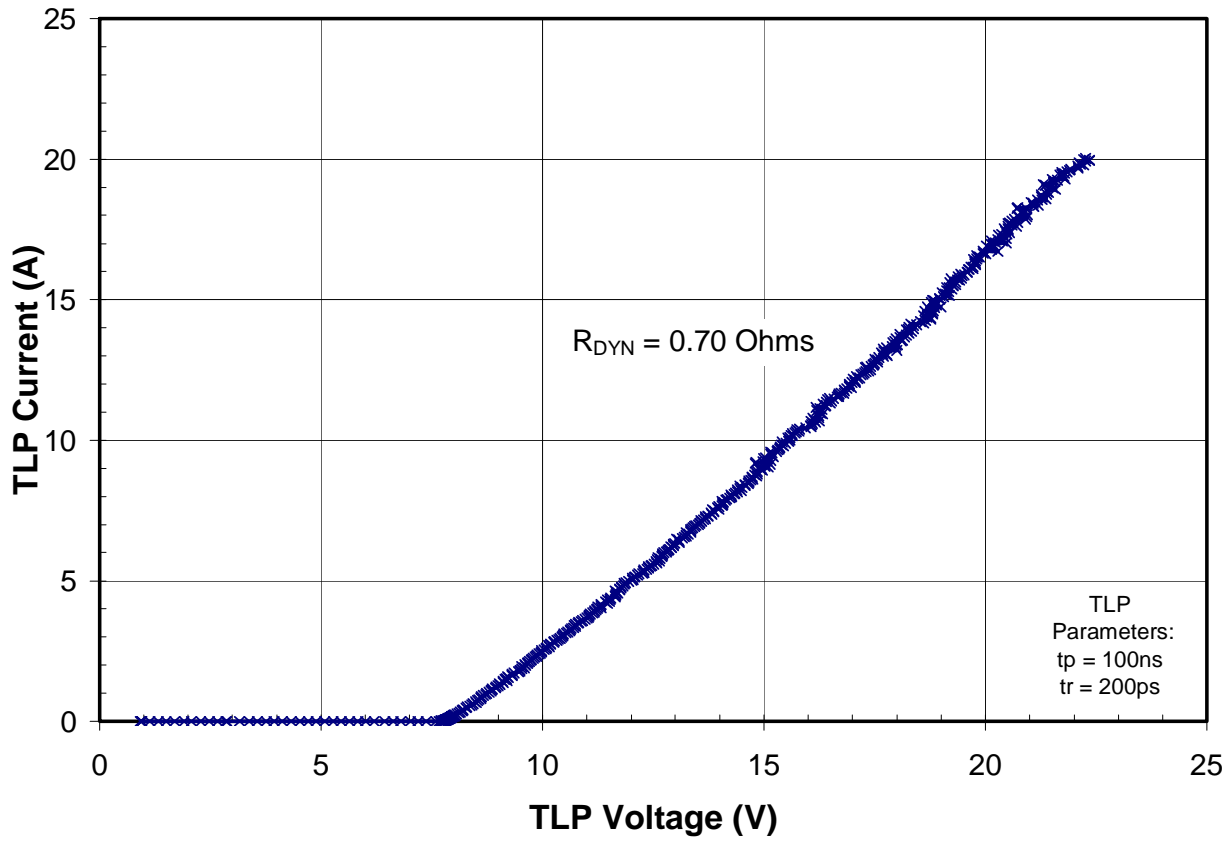


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Typical Characteristics (Con't)
ESD Clamping (+8kV Contact per IEC 61000-4-2)

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


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Typical Characteristics (Con't)

TLP Characteristic



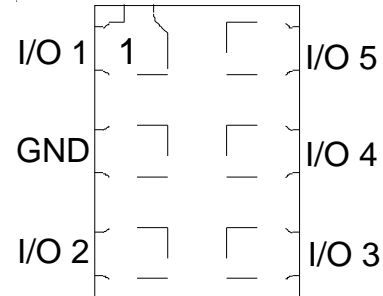
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Applications Information

Device Connection Options

The μ Clamp0545T is designed to protect five data lines operating up to 5 volts. The device is bidirectional and may be used on lines where the signal polarity is above and below ground. The diagram at the right shows an example pin configuration with pin 2 connected to ground. However, due to the device symmetry, any pin may be connected to ground with the remaining pins connected to the protected lines.

Example Pin Configuration

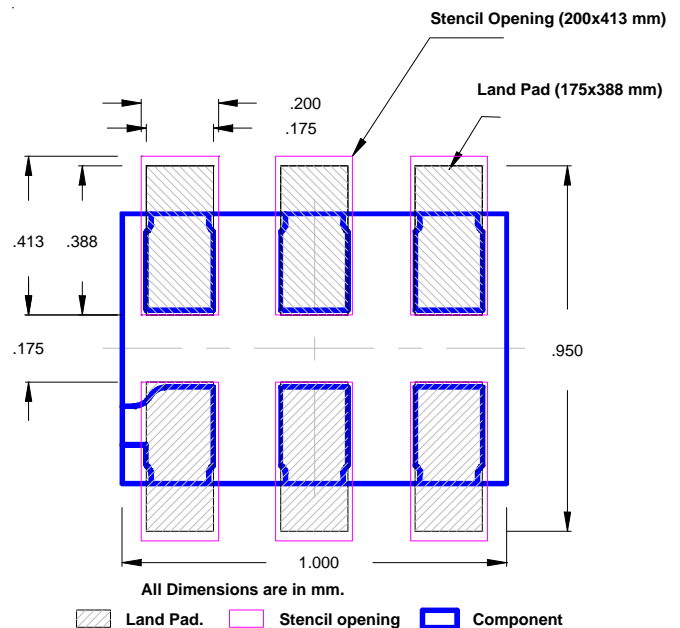


Assembly Guidelines

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.

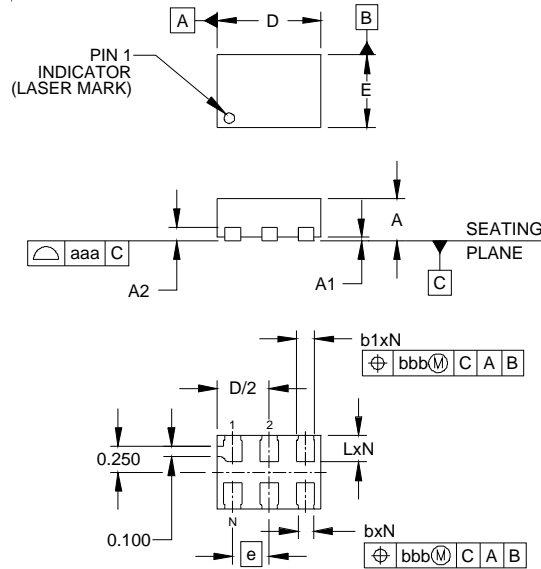
Assembly Parameter	Recommendation
Solder Stencil Design	Laser cut, Electro-polished
Aperture shape	Rectangular
Solder Stencil Thickness	0.100 mm (0.004")
Solder Paste Type	Type 4 size sphere or smaller
Solder Reflow Profile	Per JEDEC J-STD-020
PCB Solder Pad Design	Non-Solder mask defined
PCB Pad Finish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

Recommended Mounting Pattern



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Outline Drawing - SLP1007N6T

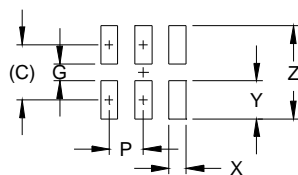


DIMENSIONS			
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.37	0.40	0.43
A1	0.00	0.02	0.05
A2	(0.13)		
b	0.125	0.15	0.175
b1	0.15	0.175	0.20
D	0.90	1.00	1.10
E	0.60	0.70	0.80
e	0.35 BSC		
L	0.225	0.25	0.275
N	6		
aaa	0.08		
bbb	0.10		

NOTES:

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

Land Pattern - SLP1007N6T



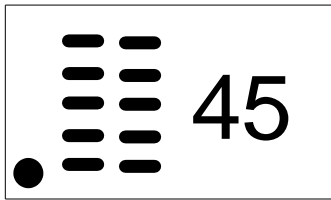
DIMENSIONS	
DIM	MILLIMETERS
C	(0.563)
G	0.175
P	0.35
X	0.175
Y	0.388
Z	0.95

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.

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Marking Code



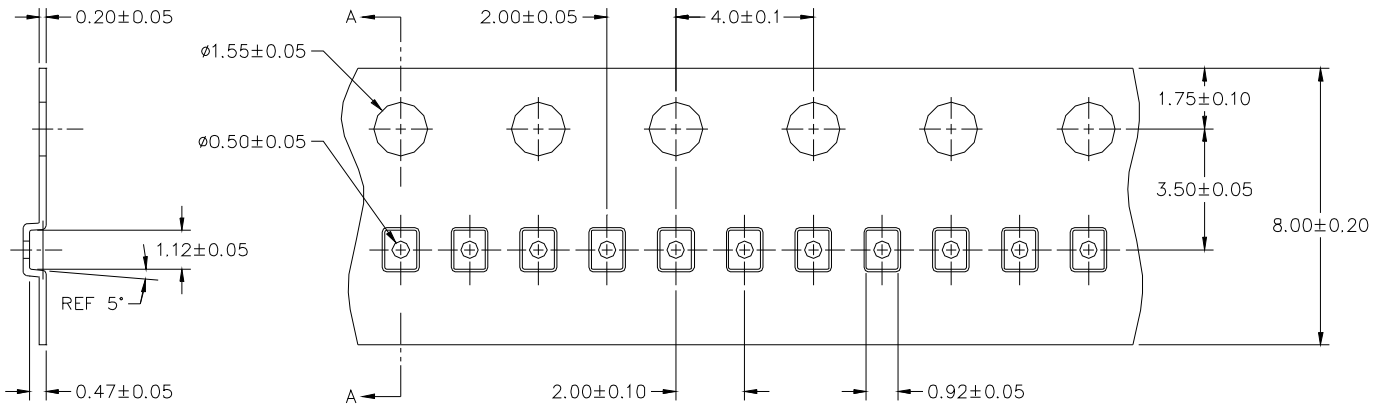
Notes:
Marking will also include line matrix date code

Ordering Information

Part Number	Qty per Reel	Reel Size
uClamp0545T.TNT	10,000	7 Inch

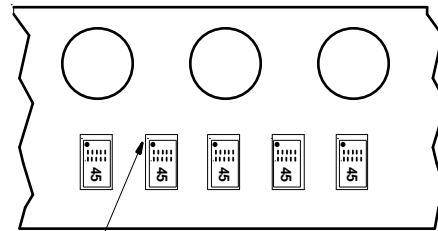
Notes:
MicroClamp, uClamp and μ Clamp are trademarks of Semtech Corporation

Carrier Tape Specification



SECTION A-A

Device Orientation in Tape



Pin 1 Location
(Towards Sprocket Holes)

Contact Information

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