uClamp0512Z
Ultra Small µClamp®
2-Line ESD Protection

PROTECTION PRODUCTS - Z-Pak™

Description

µClamp® 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. These devices offers desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

µClamp®0512Z features extremely good ESD protection characteristics highlighted by low typical dynamic resistance, low peak ESD clamping voltage, and high ESD withstand voltage (+/-15kV contact per IEC 61000-4-2). Low typical capacitance (5pF at VR=0V) minimizes loading on sensitive cirucuits. Each device will protect two data lines operating at 5 Volts.

µClamp®0512Z is in a 3-pin SLP0603P3X3A package measuring 0.6 x 0.3 mm with a nominal height of only 0.25mm. The leads partially extend up the side of the package for ease of soldering and are finished with lead-free NiAu. 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 tablets.

Features

- High ESD withstand Voltage: **+/-15kV** (Contact), **+/-17kV** (Air) per **IEC 61000-4-2**
- Able to withstand over 1000 ESD strikes per IEC 61000-4-2 Level 4
- Ultra-small **0201 package**
- Protects two data lines
- Low reverse current: <3nA typical (VR=5V)
- Working voltage: +/- 5V
- Low capacitance: 5pF typical
- Extremely low dynamic resistance: 0.63 Ohms (Typ)
- Solid-state silicon-avalanche technology

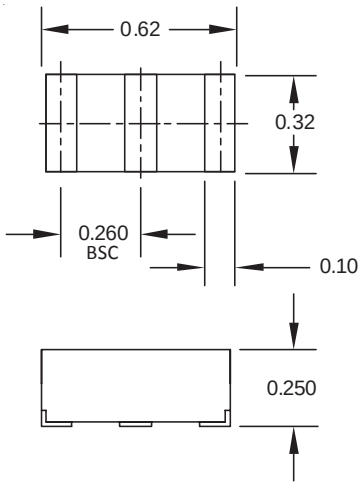
Mechanical Characteristics

- SLP0603P3X3A package
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Nominal Dimensions: 0.6 x 0.3 x 0.25 mm
- Lead Finish: NiAu
- Molding compound flammability rating: UL 94V-0
- Marking : Marking code + dot matrix date code
- Packaging : Tape and Reel

Applications

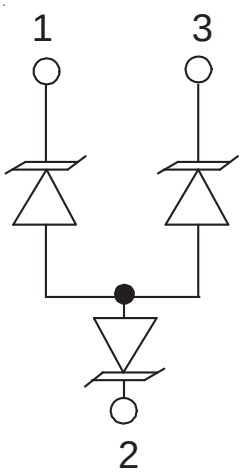
- Cellular Handsets & Accessories
- Keypads, Side Keys, Audio Ports
- Portable Instrumentation
- Digital Lines
- Tablet PC

Nominal Dimensions



Nominal Dimensions (in mm)

Schematic



Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{pk}	30	Watts
Maximum Peak Pulse Current (tp = 8/20µs)	I_{pp}	2	Amps
ESD per IEC 61000-4-2 (Air)[1] ESD per IEC 61000-4-2 (Contact)[1]	V_{ESD}	+/- 17 +/- 15	kV
Operating Temperature	T_J	-40 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

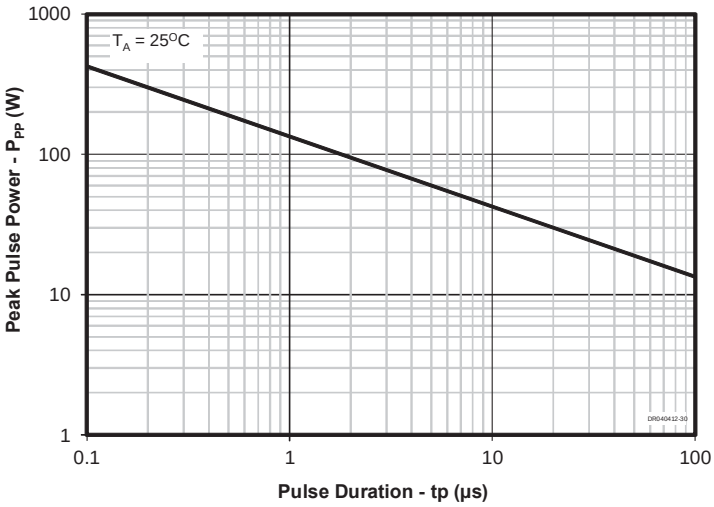
Electrical Characteristics (T=25°C)

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}	Between any two pins			5	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA Between any two pins	6	8.2	9.5	V
Reverse Leakage Current	I_R	V_{RWM} = 5V, T=25°C Between any two pins		3	50	nA
Clamping Voltage	V_C	I_{PP} = 2A, tp = 8/20µs Between any two pins			15	V
ESD Clamping Voltage[2]	V_C	IPP = 4A, tIp = 0.2/100ns Pin 1 to 2 or 3 to 2		12.5		V
ESD Clamping Voltage[2]	V_C	IPP = 16A, tIp = 0.2/100ns Pin 1 to 2 or 3 to 2		20		V
Dynamic Resistance[2, 3]	R_D	tp = 100ns Pin 1 to 2 or 3 to 2		0.63		Ohms
Junction Capacitance	C_j	V_R = 0V f = 1MHz Between any two pins		5	7	pF

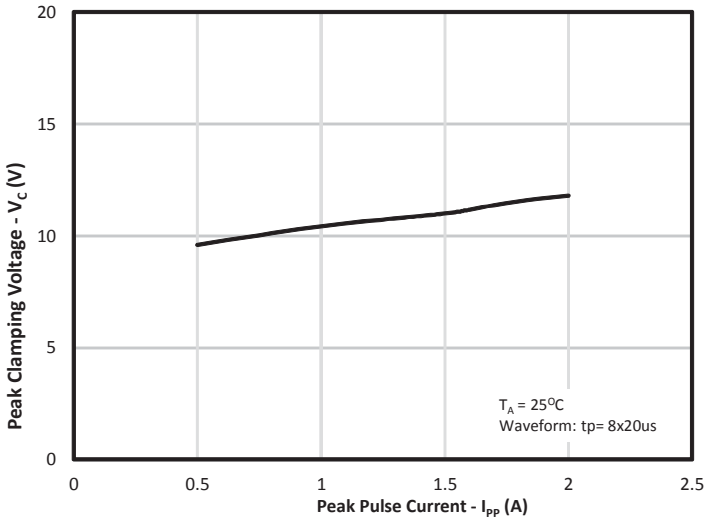
Notes
1)ESD gun return path connected to ESD ground reference plane.
2)Transmission Line Pulse Test (TLP) Settings: t_p = 100ns, t_r = 0.2ns, I_{TLP} and V_{TLP} averaging window: t_1 = 70ns to t_2 = 90ns.
3) Dynamic resistance calculated from I_{TLP} = 4A to I_{TLP} = 16A

Typical Characteristics

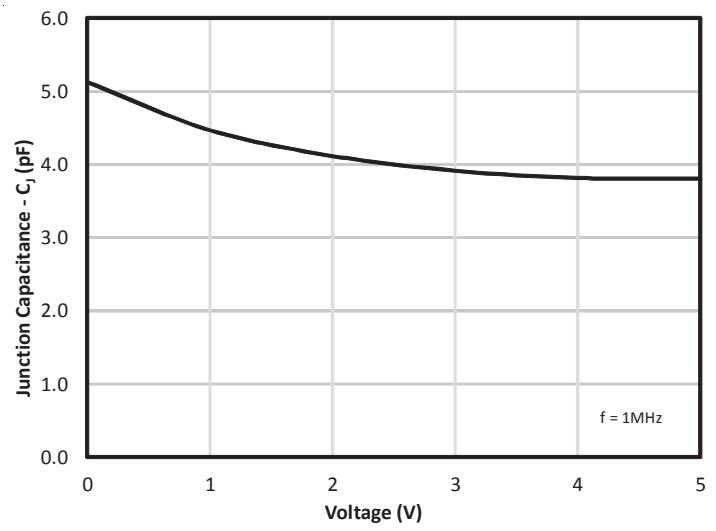
Non-Repetitive Peak Pulse Power vs. Pulse Time



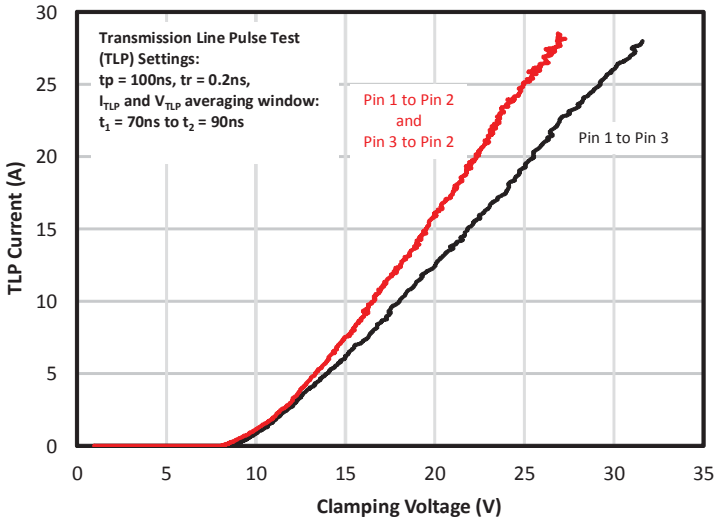
Clamping Voltage vs. Peak Pulse Current (tp=8/20us)



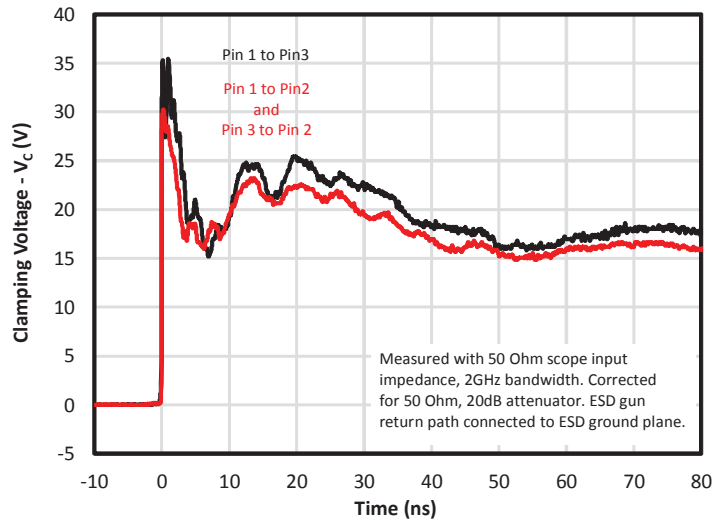
Junction Capacitance vs. Reverse Voltage



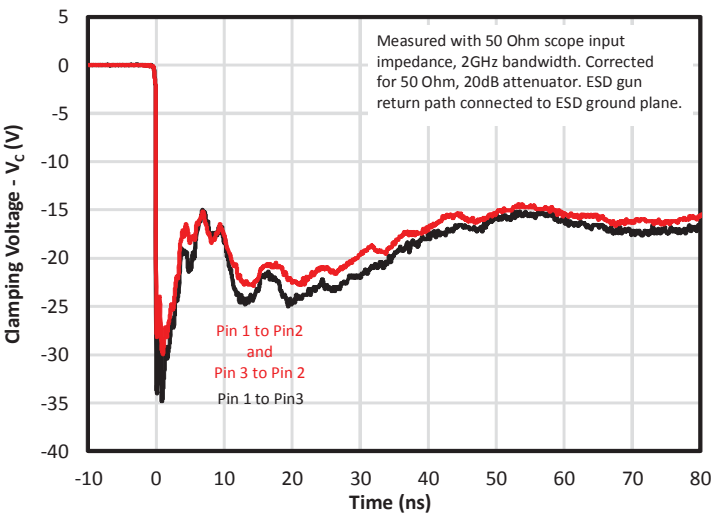
TLP Characteristic



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

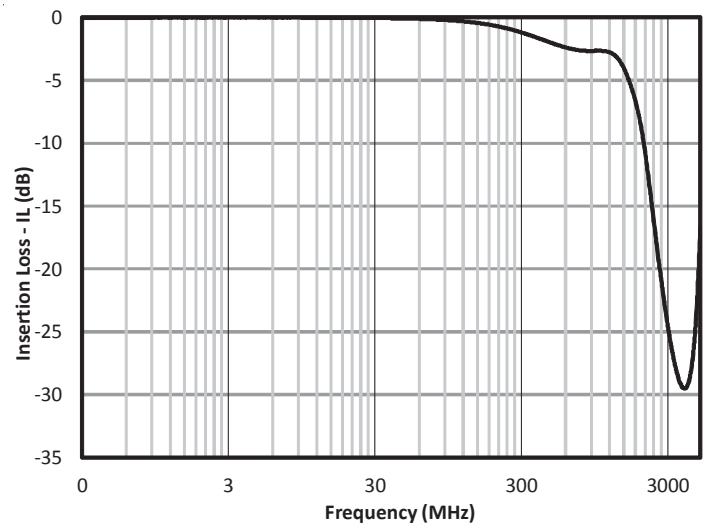


ESD Clamping (-8kV Contact per IEC 61000-4-2)

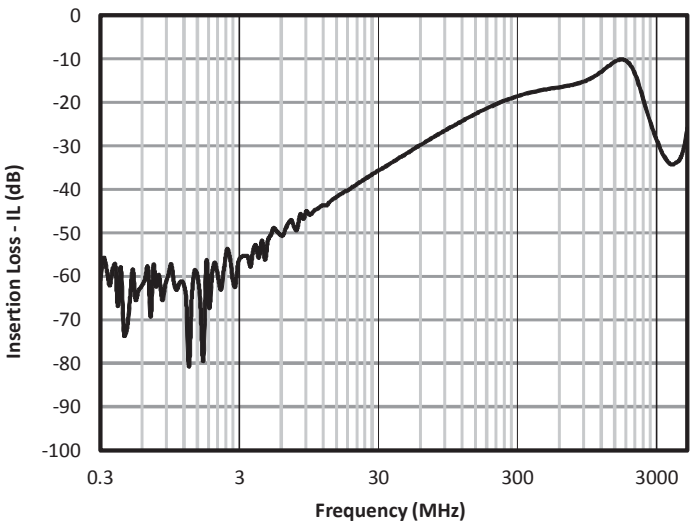


Typical Characteristics

Typical Insertion Loss S21



Analog Cross Talk

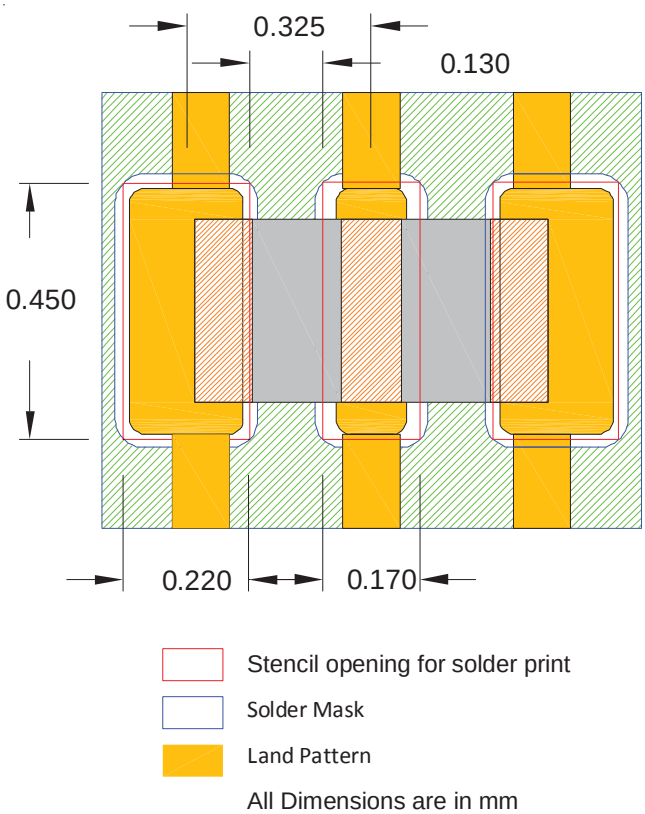


Applications Information

Assembly Guidelines

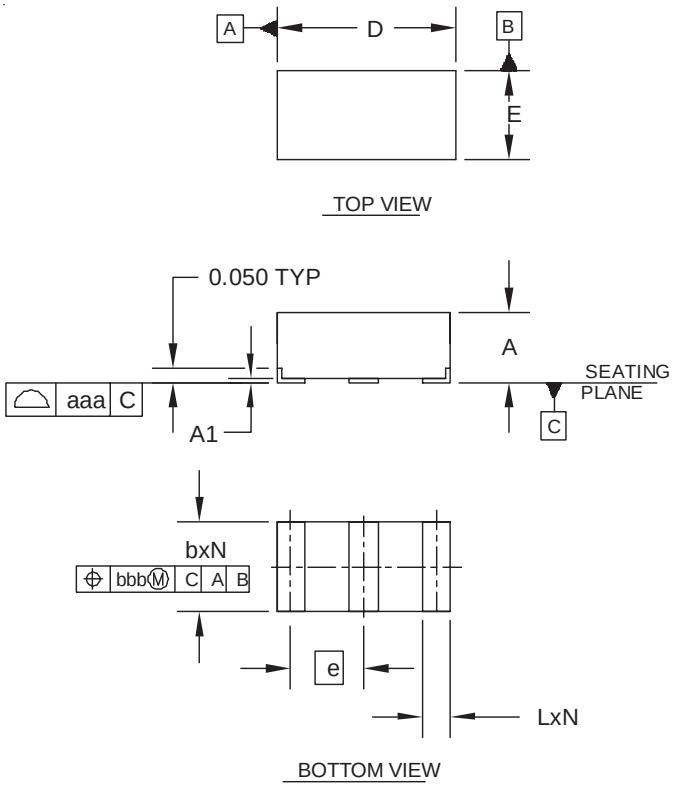
The small size of this device means that some care must be taken during the mounting process to insure reliable solder joints. The figure at the right details Semtech's recommended aperture based on the assembly guidelines detailed in the table below. Note that these are only recommendations and should serve only as a starting point for design since there are many factors that affect the assembly process. 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 with rounded corners
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
(All dimensions are in mm)

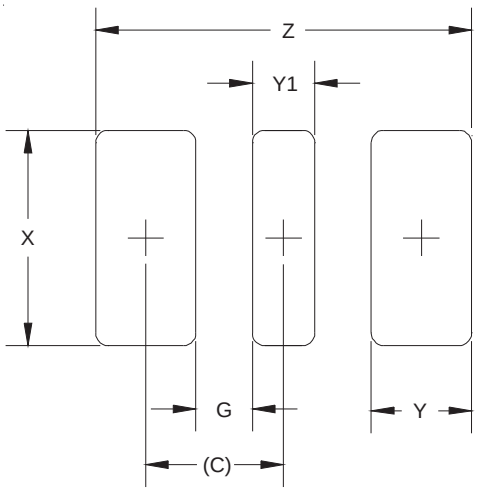
Outline Drawing - SLP0603P3X3A



DIM	DIMENSIONS MILLIMETERS MIN	NOM	MAX
A	0.235	0.250	0.265
A1	0.005	0.015	0.050
b	0.290	0.32	0.350
D	0.590	0.62	0.650
E	0.290	0.32	0.350
e	0.260 BSC		
L	0.090	0.10	0.120
N	3		
aaa	0.08		
bbb	0.10		

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

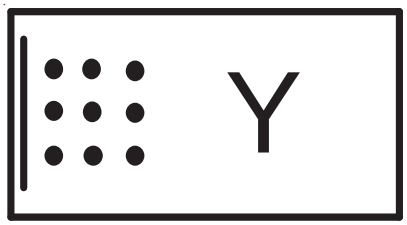
Land Pattern - SLP0603P3X3A



DIM	DIMENSIONS MILLIMETERS
C	(0.275)
G	0.113
X	0.430
Y	0.200
Y1	0.125
Z	0.750

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



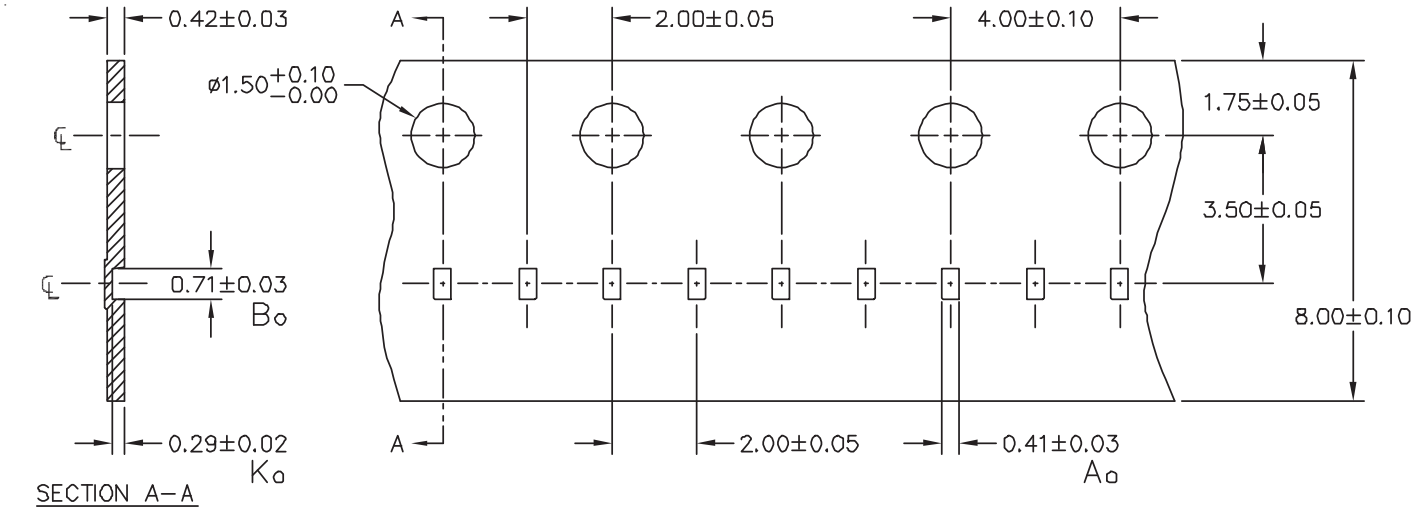
Note:
Device is electrically symmetrical

Ordering Information

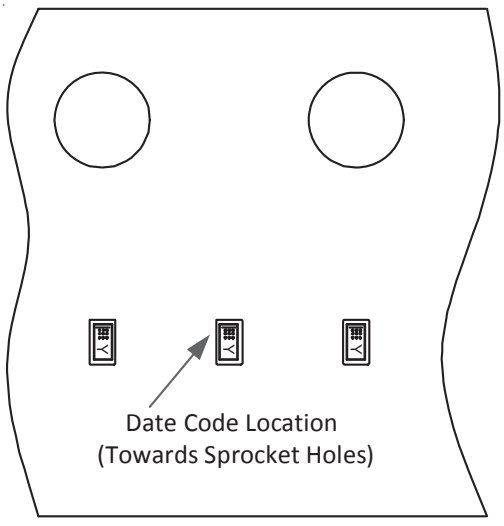
Part Number	Qty per Reel	Pocket Pitch	Reel Size
uClamp0512Z.TFT	15,000	2mm	7 Inch

Note:
MicroClamp, uClamp and µClamp are trademarks of Semtech Corporation

Carrier Tape Specification



NOTES: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.



Device Orientation in Tape

Contact Information

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