

PROTECTION PRODUCTS - Z-Pak™
Description

μ Clamp[®] TVS diodes are designed to protect sensitive electronics from damage or latch-up due to ESD. It is designed to replace 0201 size multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and other portable electronics. It features 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.

μ Clamp[®]0541Z is in a 2-pin SLP0603P2X3 package. It measures 0.6 x 0.3 mm with a nominal height of only 0.25mm. Leads are finished with lead-free NiAu. Each device will protect one line operating at 5 volts. It gives the designer the flexibility to protect single lines in applications where arrays are not practical. 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

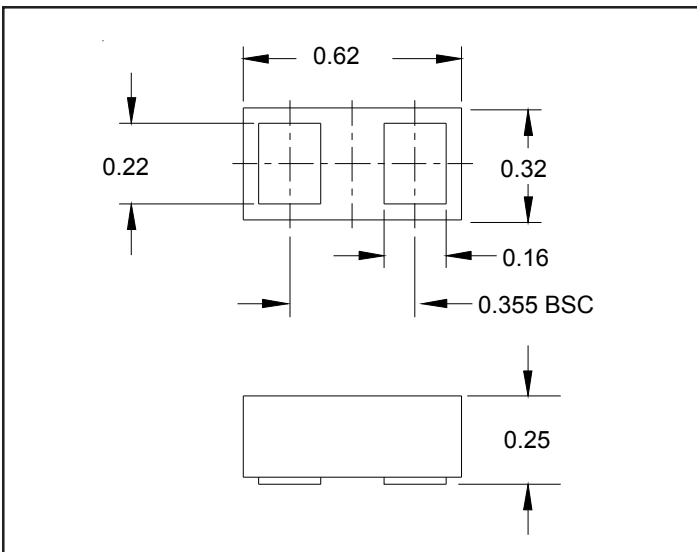
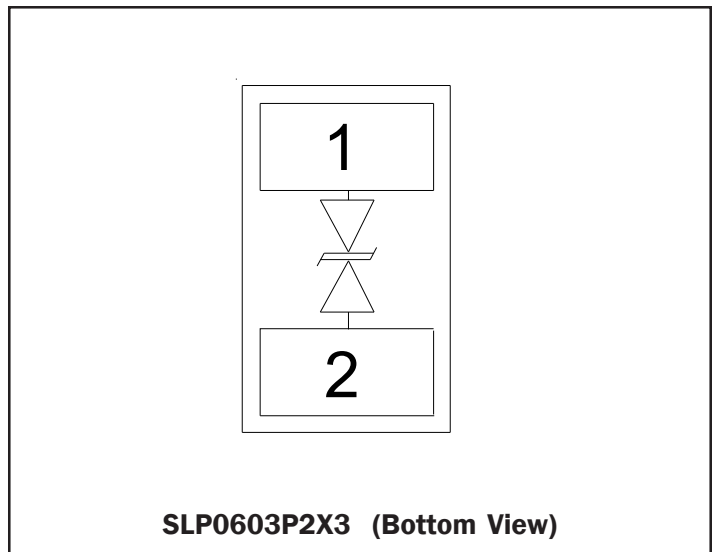
- ◆ High ESD withstand Voltage: **+/-17kV** (Contact/Air) per **IEC 61000-4-2**
- ◆ Able to withstand over 1000 ESD strikes per IEC 61000-4-2 Level 4
- ◆ Ultra-small **0201 package**
- ◆ Protects one data or power line
- ◆ Low reverse current: <10nA typical (VR=5V)
- ◆ Working voltage: +/- 5V
- ◆ Low capacitance: 6.5pF typical
- ◆ Solid-state silicon-avalanche technology

Mechanical Characteristics

- ◆ SLP0603P2X3 package
- ◆ Pb-Free, Halogen Free, RoHS/WEEE Compliant
- ◆ Nominal Dimensions: 0.6 x 0.3 x 0.25 mm
- ◆ Lead Finish: NiAu
- ◆ 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

Schematic


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) ¹ ESD per IEC 61000-4-2 (Contact) ¹ | V_{ESD} | +/- 17 +/- 17 | 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} | Pin 1 to 2 or 2 to 1 | | | 5 | V |
| Reverse Breakdown Voltage | V_{BR} | $I_t = 1mA$ Pin 1 to 2 or 2 to 1 | 6 | 8.2 | 9.5 | V |
| Reverse Leakage Current | I_R | $V_{RWM} = 5V, T=25°C$ Pin 1 to 2 or 2 to 1 | | 3 | 50 | nA |
| Clamping Voltage | V_C | $I_{pp} = 1A, tp = 8/20μs$ Pin 1 to 2 or 2 to 1 | | | 12 | V |
| Clamping Voltage | V_C | $I_{pp} = 2A, tp = 8/20μs$ Pin 1 to 2 or 2 to 1 | | | 15 | V |
| Dynamic Resistance ^{2, 3} | R_{DYN} | tlp = 0.2 / 100ns | | 0.78 | | Ohms |
| Junction Capacitance | C_J | $V_R = 0V, f = 1MHz$ | | 6.5 | 9 | pF |

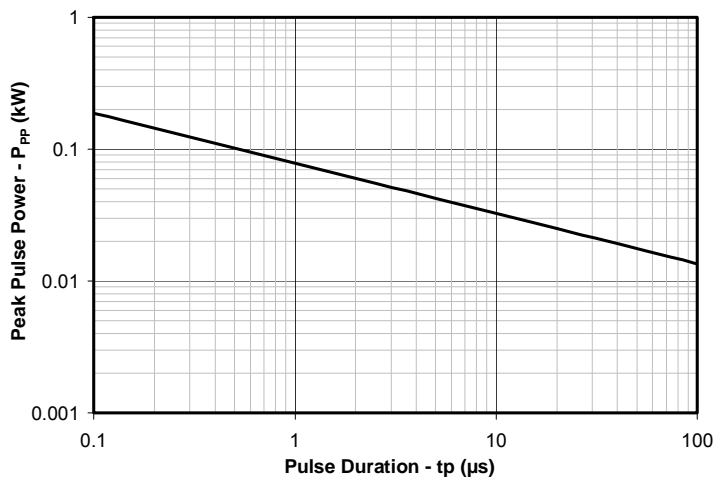
Notes

- 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 $I_{TLP} = 16A$

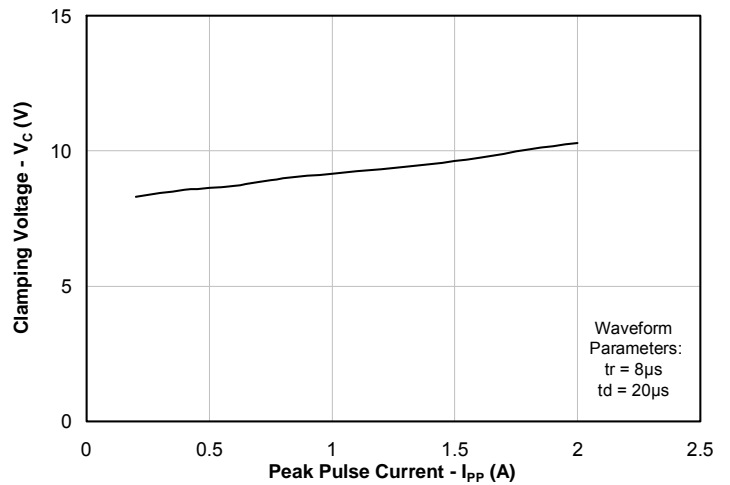
PROTECTION PRODUCTS

Typical Characteristics

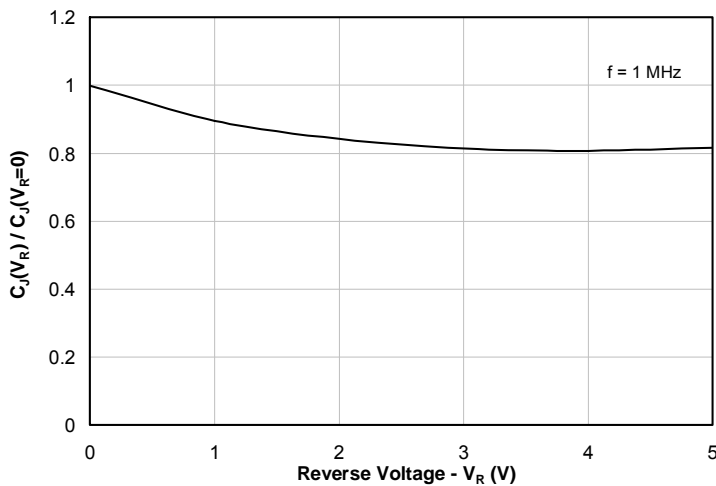
Non-Repetitive Peak Pulse Power vs. Pulse Time



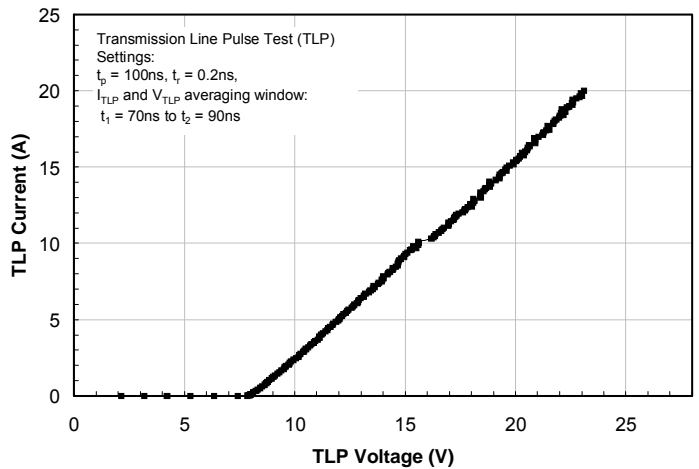
Clamping Voltage vs. Peak Pulse Current (t_p=8/20μs)



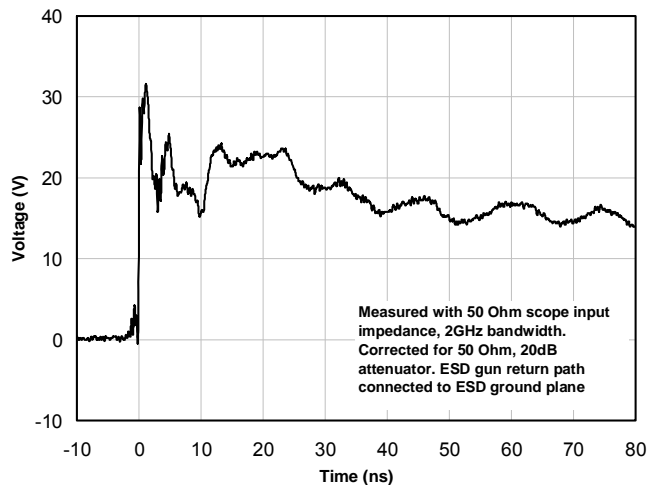
Junction Capacitance vs. Reverse Voltage



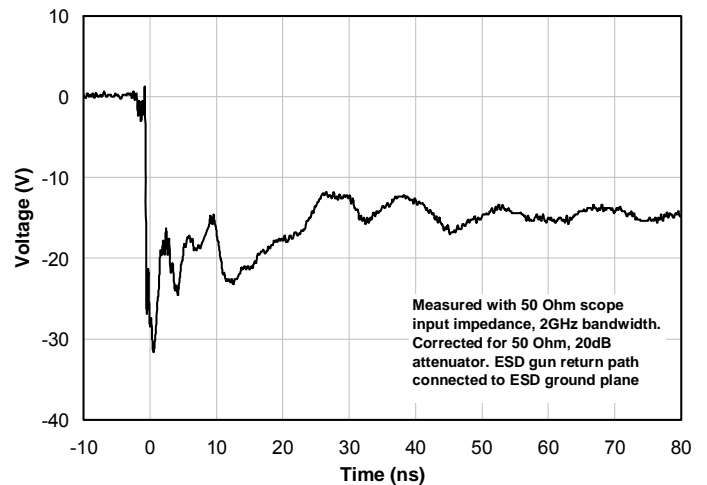
TLP Characteristic



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



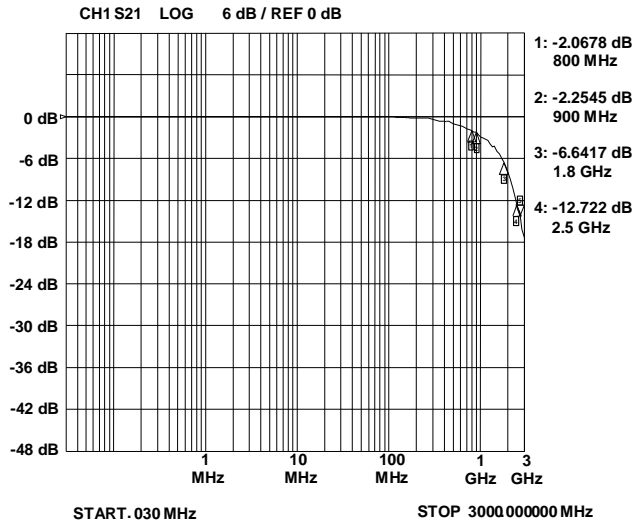
ESD Clamping (-8kV Contact per IEC 61000-4-2)



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Typical Characteristics

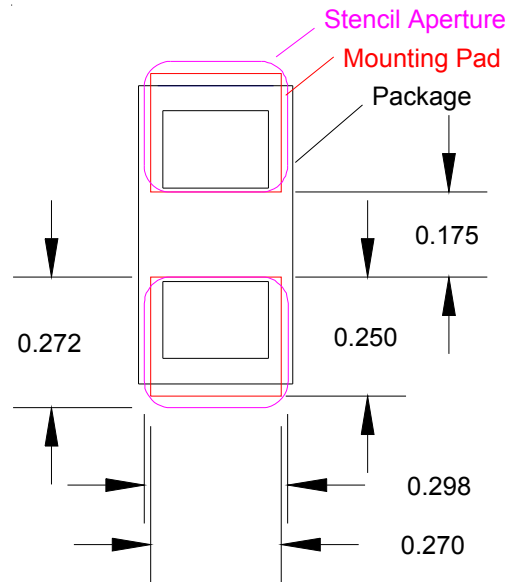
Typical Insertion Loss S21



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 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.

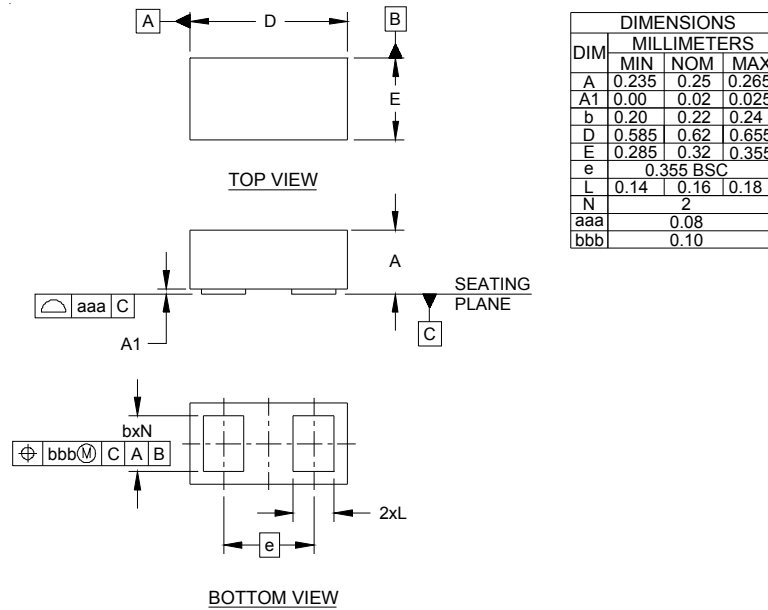


Recommended Mounting Pattern

| 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 |

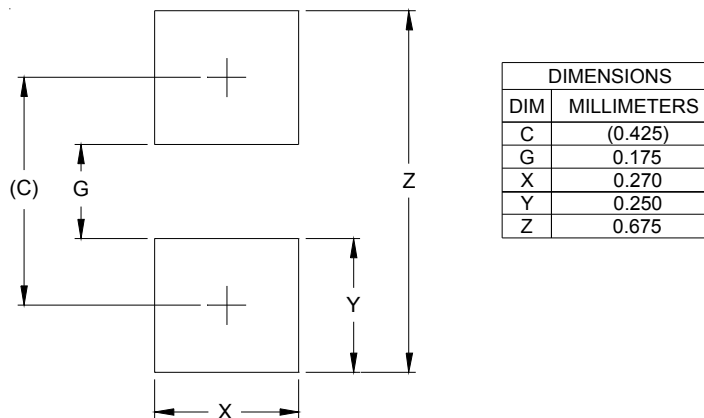
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Outline Drawing - SLP0603P2X3



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

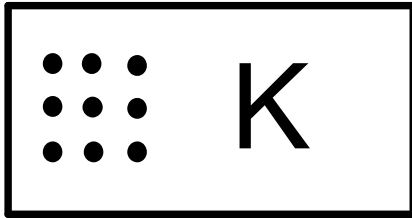
Land Pattern - SLP0603P2X3



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.

PROTECTION PRODUCTS

Marking Code



Notes:

1) Dots represent matrix date code

Ordering Information

| Ordering Number | Qty per Reel | Carrier Tape | Reel Size | Comments |
|-----------------|--------------|--------------|-----------|---------------------------------|
| uClamp0541Z.TNT | 10,000 | Plastic | 7 Inch | Not Recommended for New Designs |
| uClamp0541Z.TFT | 15,000 | Paper | 7 Inch | |
| uClamp0541Z.TVT | 50,000 | Paper | 13 Inch | |

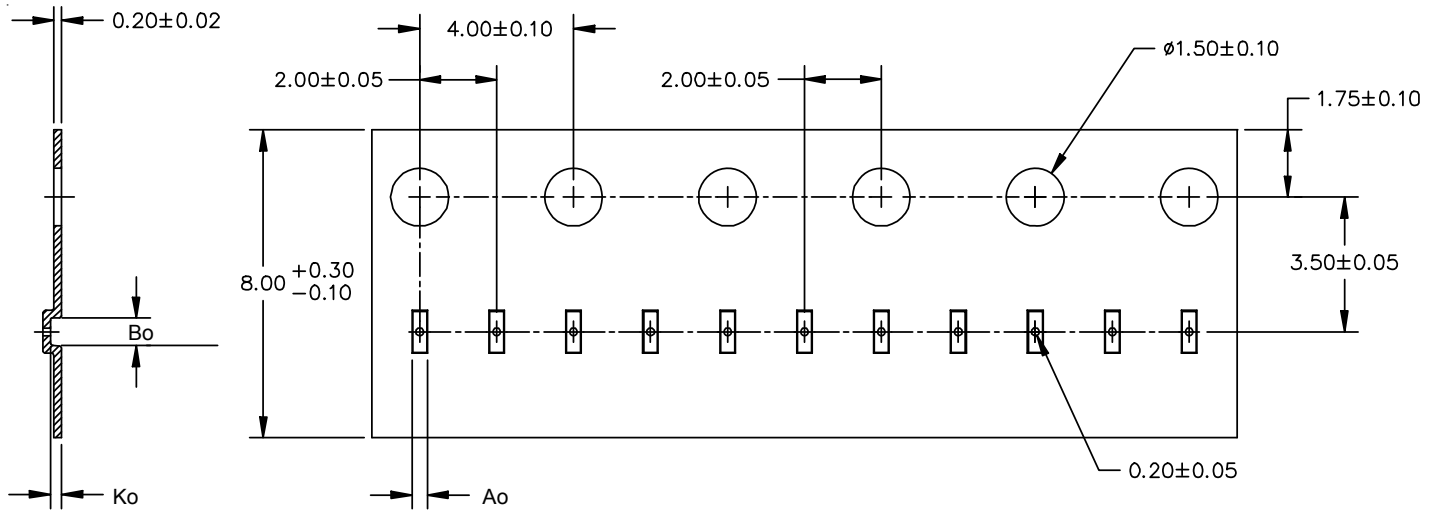
Notes:

1) MicroClamp, uClamp and μ Clamp are trademarks of Semtech Corporation

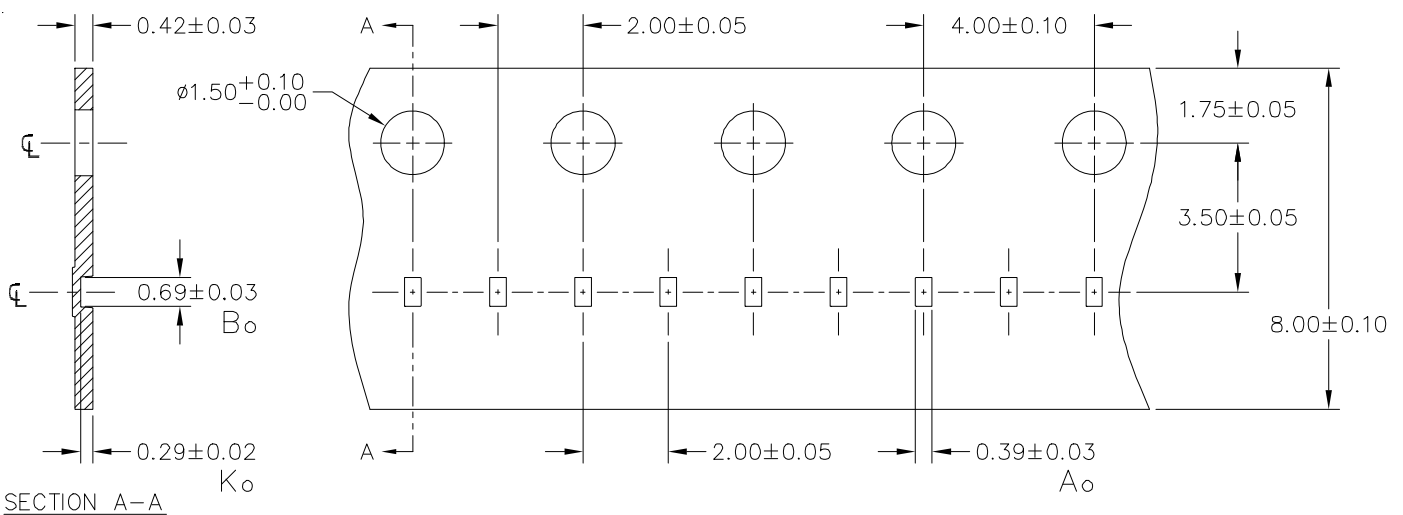
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Carrier Tape Specification

Plastic Tape

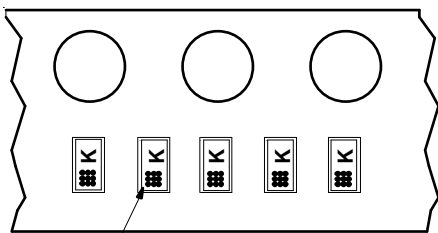


Paper Tape



Note: All dimensions in mm unless otherwise specified

Device Orientation in Tape



Date Code Location
(Away from Sprocket Holes)

Contact Information

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

Looking for pricing, stock, or lifecycle information?

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- ⊖ [Semtech Corporation](#) Information

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