

## PROTECTION PRODUCTS

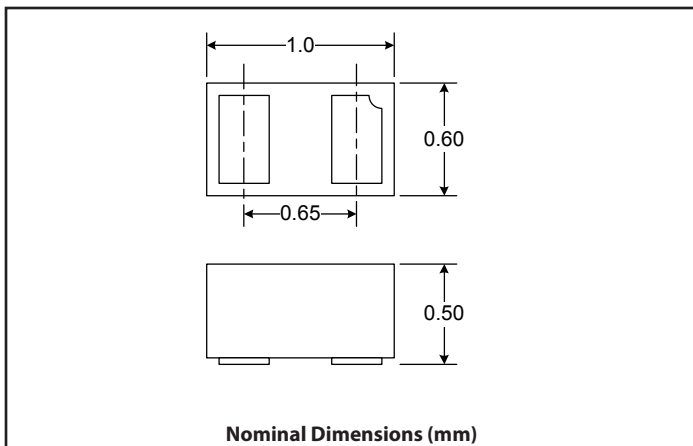
### Description

RailClamp® TVS arrays are ultra low capacitance ESD protection devices designed to protect high speed data interfaces. This series has been specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from overvoltage caused by ESD (electrostatic discharge), CDE (Cable Discharge Events), and EFT (electrical fast transients).

RClamp®0521PA has a maximum capacitance of only 0.5pF. This allows it to be used on circuits operating in excess of 10GHz without signal attenuation. They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ( $\pm 15\text{kV}$  air,  $\pm 12\text{kV}$  contact discharge).

RClamp0521PA is in a 2-pin SLP1006P2 package measuring 1.0 x 0.6 x 0.5mm. The leads are spaced at a pitch of 0.65mm and feature a lead-free finish. Each device will protect one high-speed 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, low capacitance, and high ESD surge capability makes them ideal for use in applications such as cellular phones and digital video interfaces.

### Package Dimension



### Features

- High ESD withstand Voltage:  $\pm 12\text{kV}$  (Contact) and  $\pm 15\text{kV}$  (Air) per IEC 61000-4-2
- Ultra-small package (1.0 x 0.6 x 0.5mm)
- Protects one data or I/O line
- Low ESD clamping voltage
- Working voltage:  $\pm 5.0\text{V}$
- Low capacitance: 0.5pF Max.
- Low leakage current
- Solid-state silicon-avalanche technology

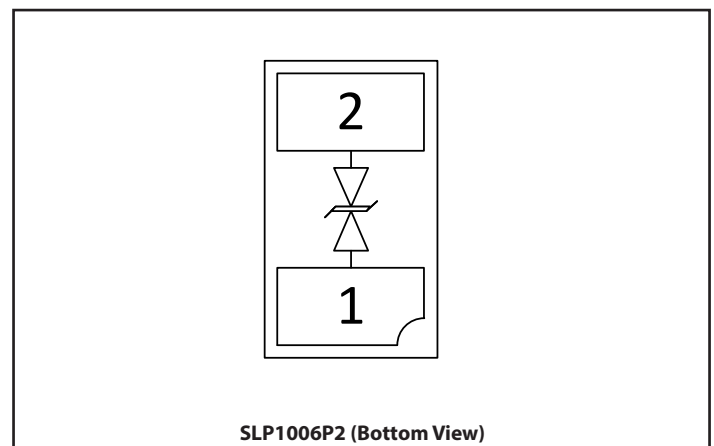
### Mechanical Characteristics

- SLP1006P2 package
- Molding compound flammability rating: UL 94V-0
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Lead Finish: NiPdAu
- Marking: Marking code
- Packaging: Tape and Reel

### Applications

- Cellular Handsets & Accessories
- Digital Visual Interface (DVI)
- Display Port
- MDDI Ports
- USB Ports
- PCI Express
- Serial ATA

### Schematic & Pin Configuration



## Absolute Maximum Rating

| Rating   | Symbol    | Value                | Units |
|--|-----------|----------------------|-------|
| Peak Pulse Power ( $t_p = 8/20\mu s$ )   | $P_{PK}$  | 100                  | W     |
| Peak Pulse Current ( $t_p = 8/20\mu s$ )   | $I_{PP}$  | 4                    | A     |
| ESD per IEC 61000-4-2 (Air) <sup>(1)</sup><br>ESD per IEC 61000-4-2 (Contact) <sup>(1)</sup> | $V_{ESD}$ | $\pm 15$<br>$\pm 12$ | kV    |
| Operating Temperature  | $T_J$     | -55 to +125          | °C    |
| Storage Temperature  | $T_{STG}$ | -55 to +150          | °C    |

## Electrical Characteristics (T=25°C unless otherwise specified)

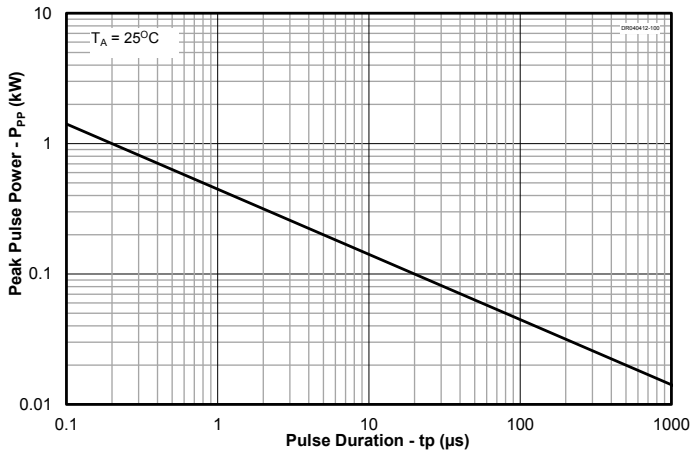
| Parameter                         | Symbol    | Conditions                              | Min. | Typ.  | Max. | Units   |
|-----------------------------------|-----------|---|------|-------|------|---------|
| Reverse Stand-Off Voltage         | $V_{RWM}$ | Pin 1 to 2 or 2 to 1                    |      |       | 5    | V       |
| Reverse Breakdown Voltage         | $V_{BR}$  | $I_t = 1mA$ , Pin 1 to 2 or 2 to 1      | 6    | 9.3   | 11   | V       |
| Reverse Leakage Current           | $I_R$     | $V_{RWM} = 5V$ , Pin 1 to 2 or 2 to 1   |      | 0.025 | 1    | $\mu A$ |
| Clamping Voltage                  | $V_C$     | $I_{PP} = 1A$ , $t_p = 8/20\mu s$       |      |       | 15   | V       |
|                                   |           | $I_{PP} = 4A$ , $t_p = 8/20\mu s$       |      |       | 25   |         |
| ESD Clamping Voltage <sup>2</sup> | $V_C$     | $I_{PP} = 4A$ , $tp = 0.2/100ns$ (TLP)  |      | 16.4  |      | V       |
|                                   |           | $I_{PP} = 16A$ , $tp = 0.2/100ns$ (TLP) |      | 30.7  |      |         |
| Dynamic Resistance <sup>2,3</sup> |           | $tp = 0.2/100ns$ (TLP)                  |      | 1.2   |      | Ohms    |
| Junction Capacitance              | $C_J$     | $V_R = 0V$ , $f = 1MHz$                 |      | 0.30  | 0.50 | pF      |

Notes:

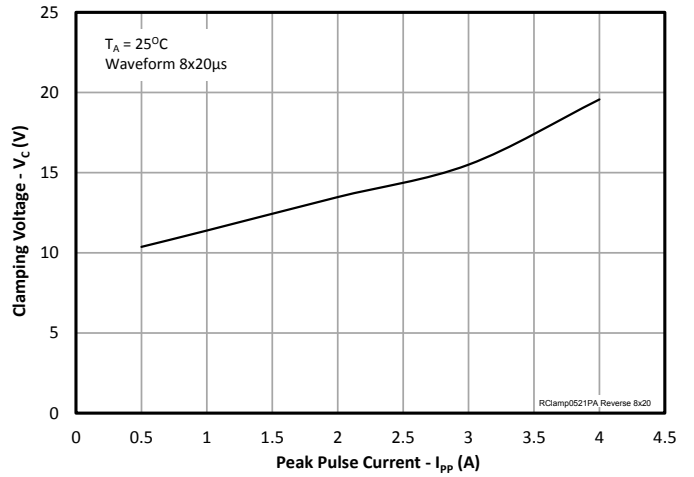
- 1) ESD gun return path connected to ESD ground plane
- 2) Transmission Line Pulse Test (TLP) Settings:  $t_p = 100ns$ ,  $t_r = 0.2ns$ ,  $I_{TLP}$  and  $V_{TLP}$  averaging window:  $t_1 = 70ns$  to  $t_2 = 90ns$ .
- 3) Dynamic resistance calculated from  $I_{TLP} = 4A$  to  $I_{TLP} = 16A$

# Typical Characteristics

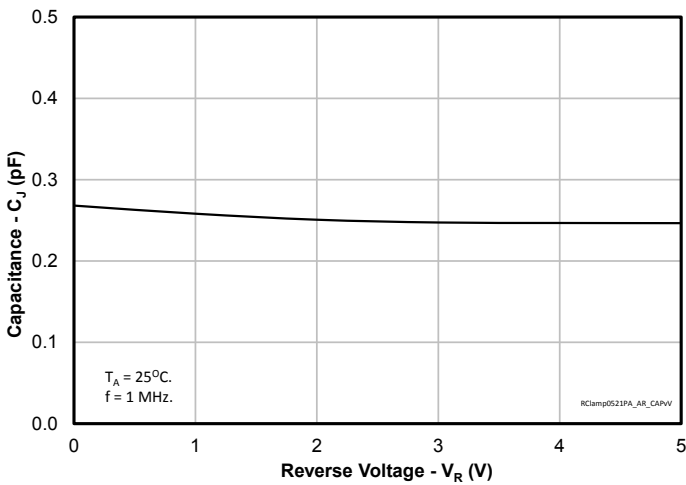
**Non-Repetitive Peak Pulse Power vs. Pulse Time**



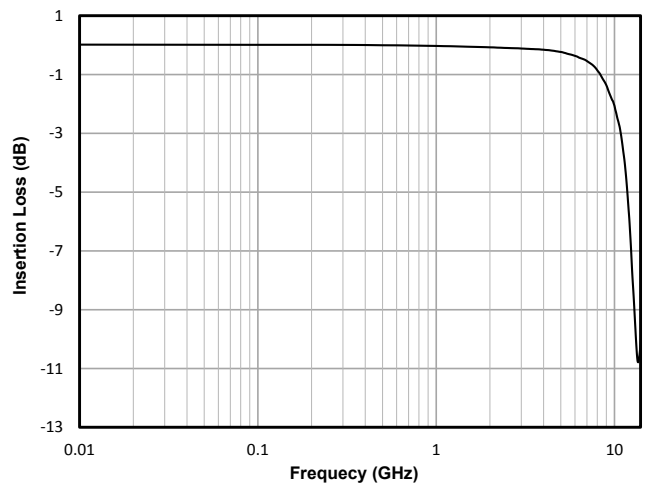
**Clamping Voltage vs. Peak Pulse Current ( $t_p = 8/20\mu\text{s}$ )**



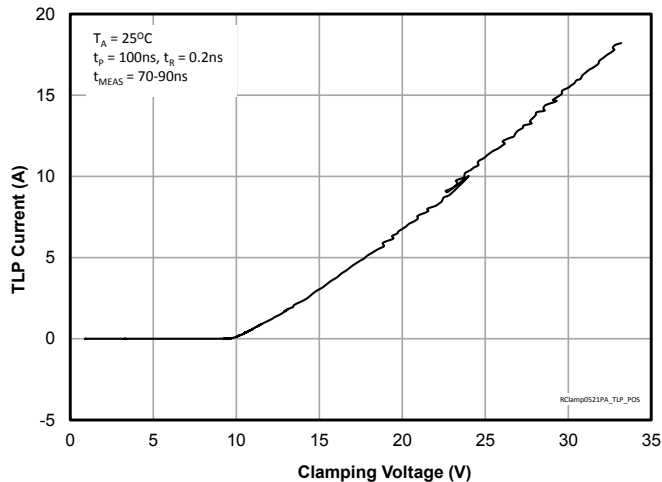
**Capacitance vs. Reverse Voltage**



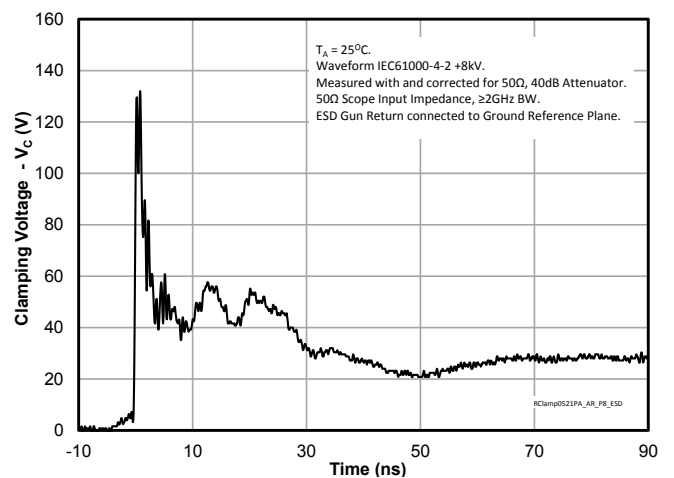
**Insertion Loss**



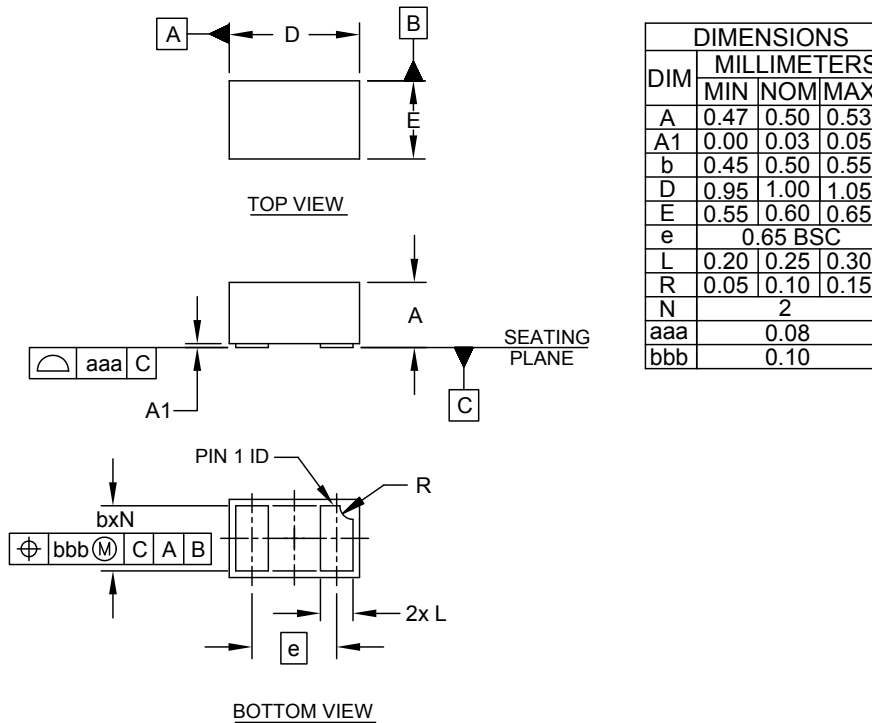
**TLP Characteristic (Pin 1 to 2 or 2 to 1)**



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



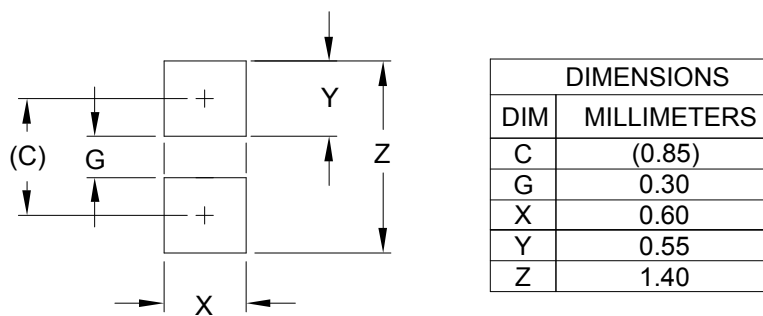
## Outline Drawing - SLP1006P2



### NOTES:

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

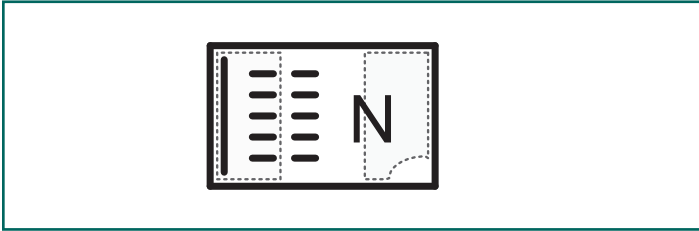
## Land Pattern - SLP1006P2



### NOTES:

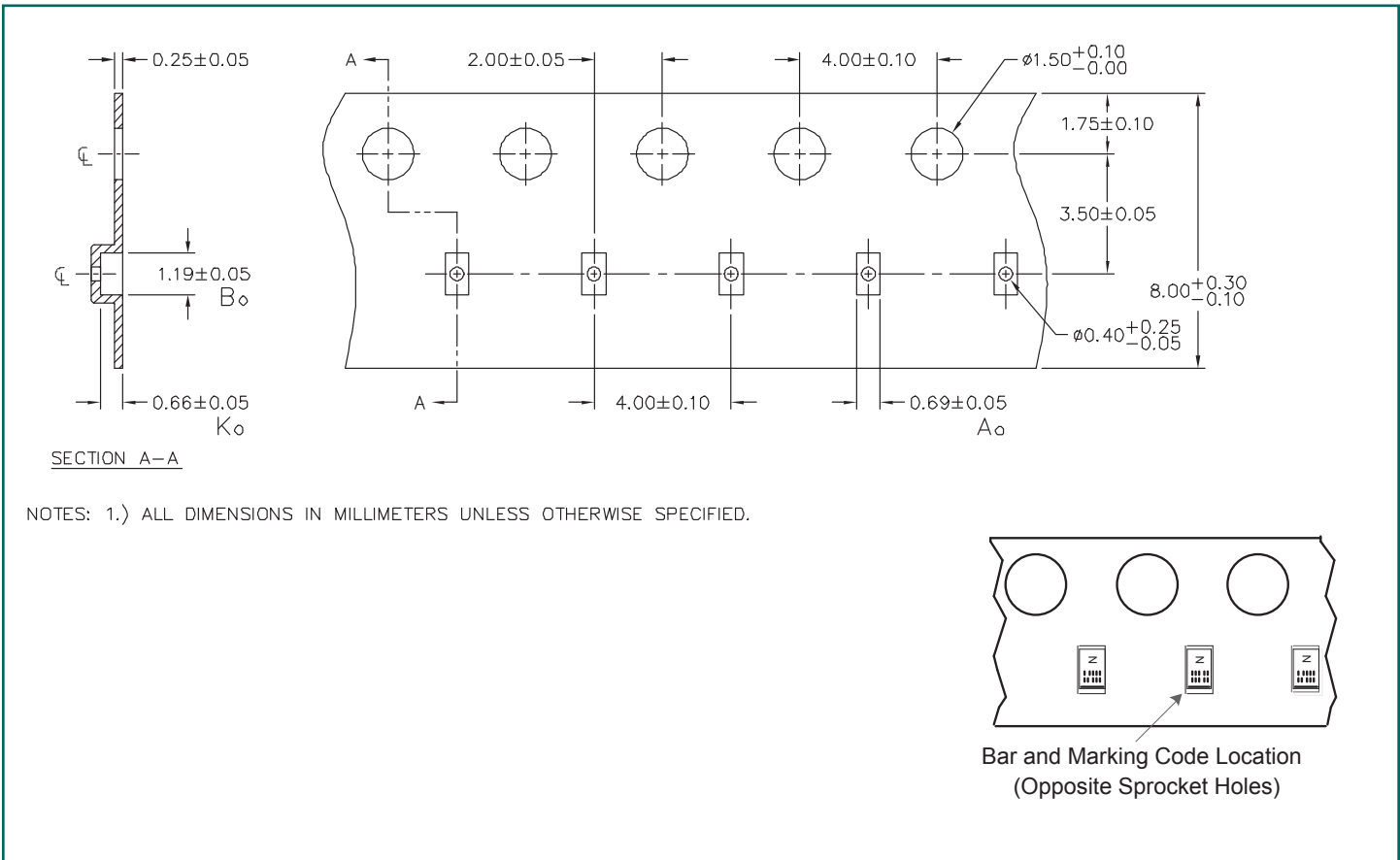
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2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

# Marking Code



- Note:
1. Marking will also include line matrix date code.
  2. Device is electrically symmetrical.

# Tape and Reel Specification



# Ordering Information

| Part Number  | Qty per Reel | Reel Size |
|--|--------------|-----------|
| RClamp0521PATCT  | 3,000        | 7 Inch    |
| RailClamp and RClamp are registered trademarks of Semtech Corporation. |              |           |



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