RClamp0821P
Ultra-Low Capacitance 1-Line ESD protection

PROTECTION PRODUCTS - RailClamp®

Description

The RailClamp family is a series of ultra low capacitance Transient Voltage Suppressors (TVS) 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).

The RClamp™0821P has a maximum capacitance of only 0.50pF. This allows it to be used on circuits operating in excess of 3GHz without signal attenuation. They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 (±15kV air, ±8kV contact discharge).

The RClamp0821P is in a 2-pin, RoHS/WEEE compliant, 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 8 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.

Features

- Transient protection for data lines to
  IEC 61000-4-2 (ESD) ±15kV (air), ±8kV (contact)
  IEC 61000-4-4 (EFT) 40A (tp = 5/50ns)
  Cable Discharge Event (CDE)
- Ultra-small package (1.0 x 0.6 x 0.5mm)
- Protects one data or I/O line
- Low capacitance: **0.3pF** typical
- Low clamping voltage
- Low operating voltage: 8.0V
- Solid-state silicon-avalanche technology

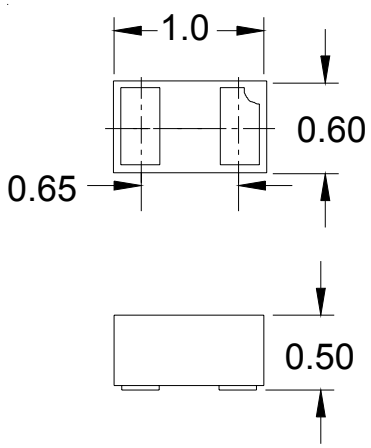
Mechanical Characteristics

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

Applications

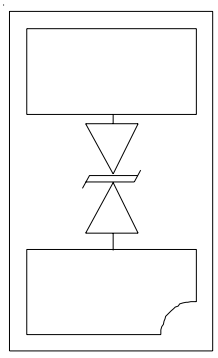
- Cellular Handsets & Accessories
- Digital Visual Interface (DVI)
- Display Port
- MDDI Ports
- USB Ports
- PCI Express
- Serial ATA

Dimensions



Maximum Dimensions (mm)

Schematic & PIN Configuration



SLP1006P2 (Bottom View)

Absolute Maximum Rating

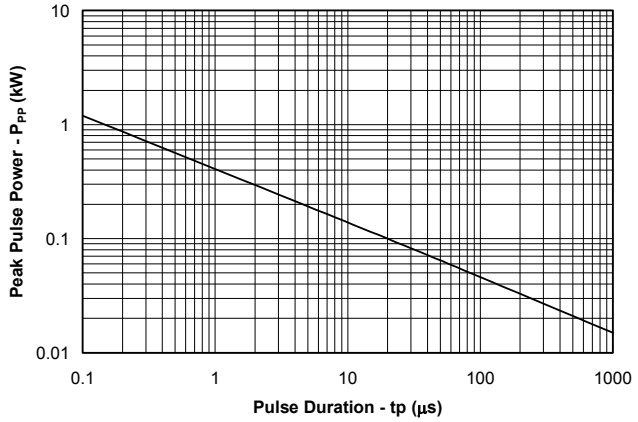
Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{pk}	100	Watts
Peak Pulse Current (tp = 8/20µs)	I_{PP}	4	A
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	+/- 15 +/- 8	kV
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics (T=25°C)

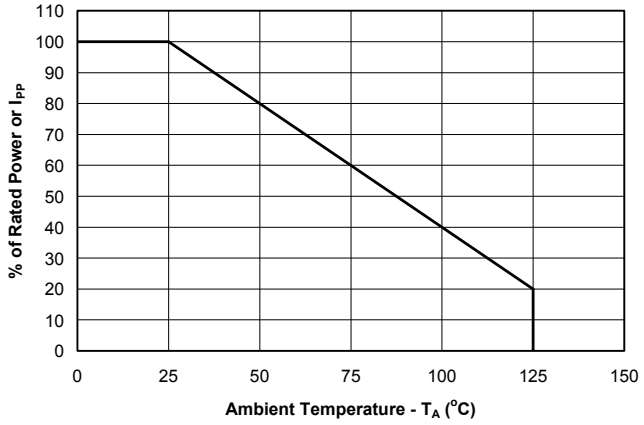
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				8	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	10			V
Reverse Leakage Current	I_R	V_{RWM} = 8V, T=25°C			1	µA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20µs			20	V
Clamping Voltage	V_C	I_{PP} = 4A, tp = 8/20µs			25	V
Junction Capacitance	C_j	V_R = 0V, f = 1MHz		0.30	0.50	pF

Typical Characteristics

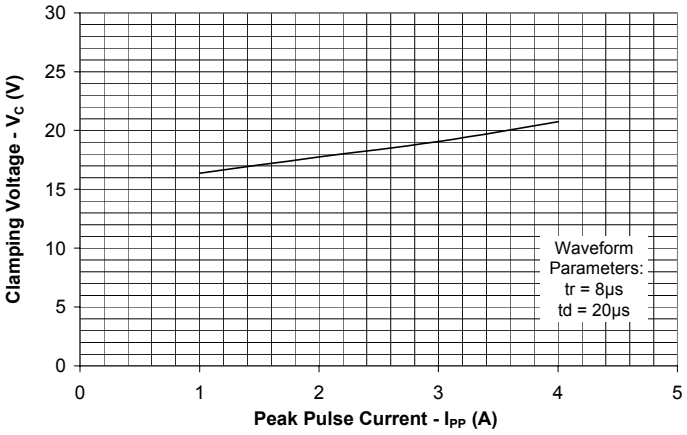
Non-Repetitive Peak Pulse Power vs. Pulse Time



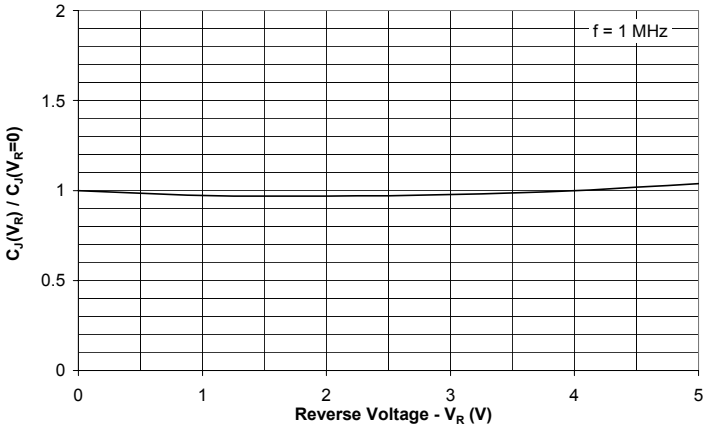
Power Derating Curve



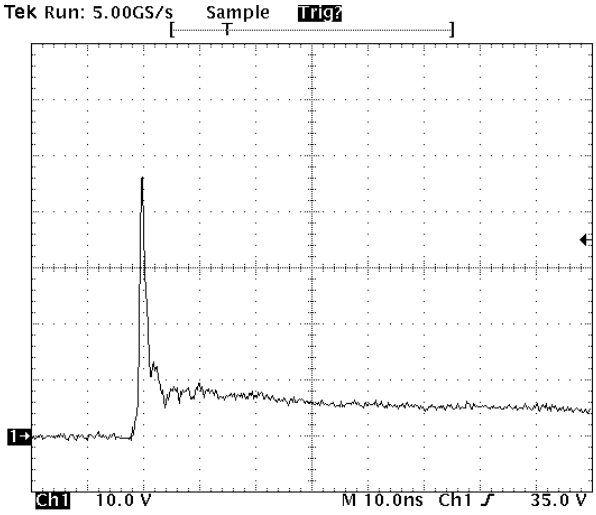
Clamping Voltage vs. Peak Pulse Current



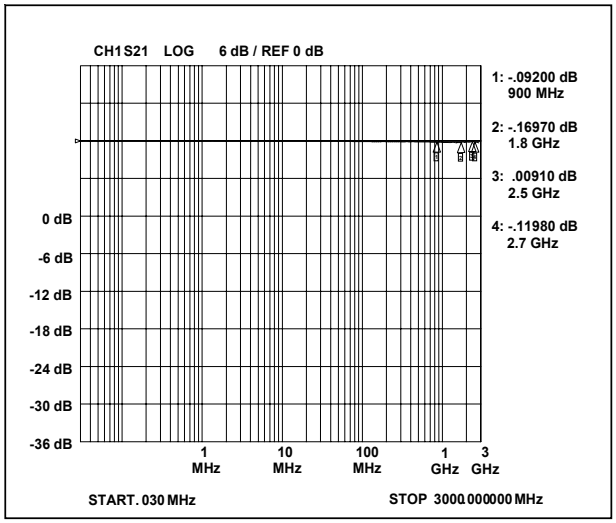
Normalized Capacitance vs. Reverse Voltage



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



Insertion Loss S21



Applications Information

Device Connection Options

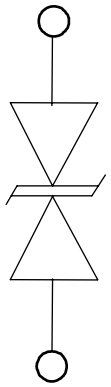
These low capacitance TVS diodes are designed to provide common mode protection for one high-speed line or differential protection for one line pair. The device is bidirectional and may be used on lines where the signal polarity is positive and negative.

Circuit Board Layout Recommendations for Suppression of ESD.

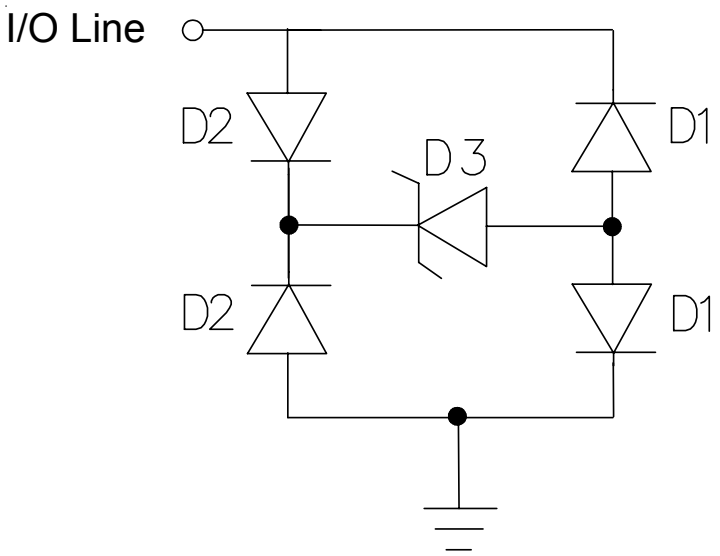
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- Place the TVS near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the TVS and the protected line.
- Minimize all conductive loops including power and ground loops.
- The ESD transient return path to ground should be kept as short as possible.
- Never run critical signals near board edges.
- Use ground planes whenever possible.

Equivalent Circuit Diagram



Applications Information - Spice Model

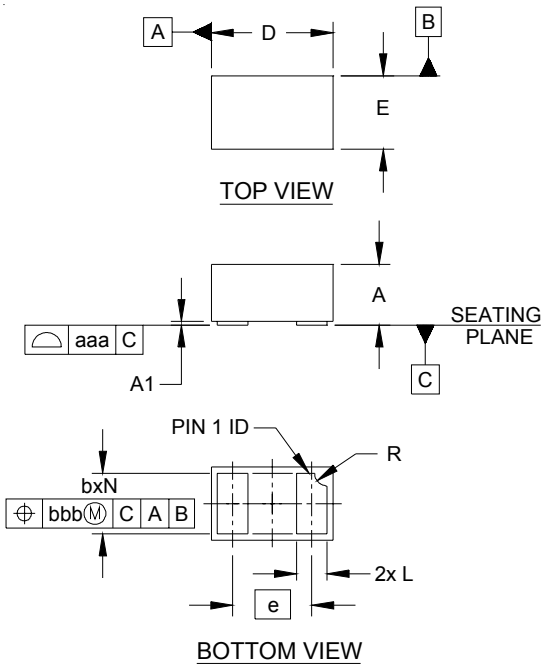


RClamp0821P Spice Model

Table 1 - RClamp0821P Spice Parameters

Parameter	Unit	D1 (LCRD)	D2 (LCRD)	D3 (TVS)
IS	Amp	1.0E-20	1.0E-20	2.0E-12
BV	Volt	100	100	13.7
VJ	Volt	0.7	0.7	0.6
RS	Ohm	0.458	0.89	0.8
IBV	Amp	1E-3	1E-3	1E-3
CJO	Farad	0.4E-12	0.4E-12	56E-12
TT	sec	2.541E-9	2.541E-9	2.541E-9
M	--	0.01	0.01	0.23
N	--	1.1	1.1	1.1
EG	eV	1.11	1.11	1.11

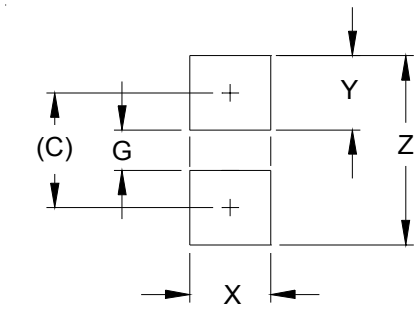
Outline Drawing - SLP1006P2



DIMENSIONS						
DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.016	.020	.022	0.40	0.50	0.55
A1	.000	.001	.002	0.00	0.03	0.05
b	.018	.020	.022	0.45	0.50	0.55
D	.035	.039	.043	0.90	1.00	1.10
E	.020	.024	.028	0.50	0.60	0.70
e	.026 BSC			0.65 BSC		
L	.008	.010	.012	0.20	0.25	0.30
R	.002	.004	.006	0.05	0.10	0.15
N	2			2		
aaa	.003			0.08		
bbb	.004			0.10		

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

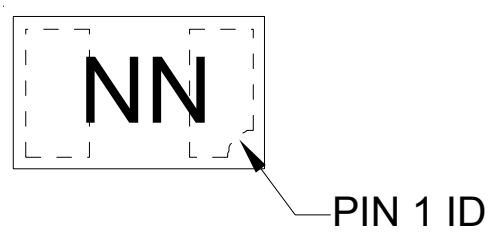
Land Pattern - SLP1006P2



DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	(.033)	(0.85)
G	.012	0.30
X	.024	0.60
Y	.022	0.55
Z	.055	1.40

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



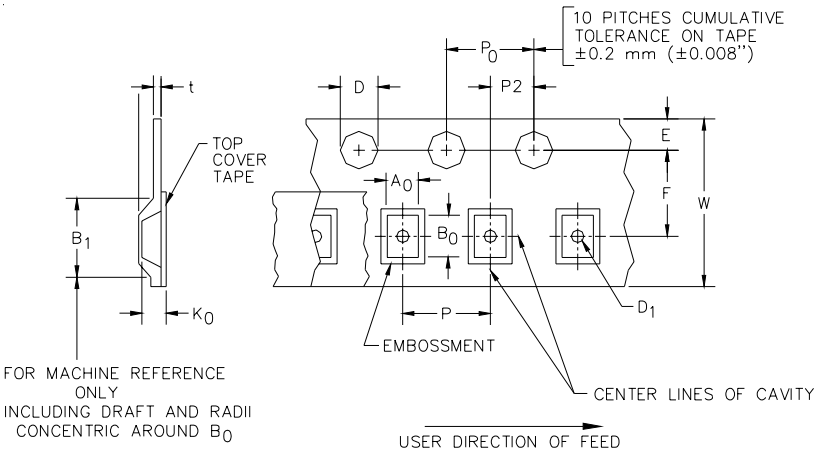
Ordering Information

Part Number	Qty per Reel	Reel Size
RClamp0821P.TCT	3,000	7 Inch

Note: Lead finish is lead-free NiPdAu.

RailClamp and RClamp are marks of Semtech Corporation.

Tape and Reel Specification



A0	B0	K0
0.69 +/-0.10 mm	1.19 +/-0.10 mm	0.66 +/-0.10 mm

Tape Width	B, (Max)	D	D1	E	F	K (Max)	P	P0	P2	T (Max)	W
8 mm	4.2 mm (.165)	1.5 + 0.1 mm - 0.0 mm (0.59 +.005 - .000)	0.8 mm ±0.25 (.031)	1.750±0.1 mm (.069±.004)	3.5±0.05 mm (.138±.002)	2.4 mm (.094)	4.0±0.10 mm (.157±.004)	4.0±0.1 mm (.157±.004)	2.0±0.05 mm (.079±.002)	0.4mm (.016)	8.0 mm + 0.3 mm - 0.1 mm (.312±.012)

Contact Information

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