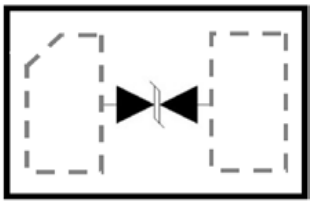
Description

The RCLAMP3321P provides ESD protection for USB3.0, HDMI1.3/1.4, and other high-speed ports. It may be used to meet the ESD immunity requirements of IEC 61000-4-2. The RCLAMP3321P is designed to minimize both the ESD peak clamping and the TLP clamping. The dynamic resistance is minimized (0.47 Ohms typical) for optimum protection of sensitive circuits. Maximum ca-pacitance is only 0.35pF. This allows the RClamp3321P to be used in applications operating in excess of 5GHz without signal attenuation. These devices are manufac-tured using Semtech's proprietary low voltage technol-ogy for superior characteritics at operating voltages up to 3.3 volts.

The RClamp3321P is in a 2-pin SLP1006P2 package. It measures 1.0 x 0.6 x 0.5mm. The leads are spaced at a pitch of 0.65mm and are fi nished with lead-free NiPdAu. Each device will protect one line operating at 3.3 volts. The combination of low peak ESD clamping, low dynamic resistance, and low capacitance makes this device suit-able for applications such as USB 3.0, HDMI and V-By-One interfaces in portable devices.



Applications

- USB 3.0
- HDMI 1.3/1.4
- V-By-One
- Display Port
- MHL / MDDI
- LVDS Interfaces
- eSATA Interfaces

Features

- Transient protection for data lines to
  IEC 61000-4-2 (ESD) ±17kV (air), ±12kV (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: 0.35pF
- Dynamic Resistance: 0.47 Ohms Typical
- Low ESD clamping voltage
- Operating voltage: 3.3V
- Solid-state silicon-avalanche technology

Mechanical Characteristics

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

Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P_{PK}	25	W
Maximum Peak Pulse Current (tp = 8/20μs)	I_{PP}	3	A
ESD per IEC 61000-4-2 (Air)[1] ESD per IEC 61000-4-2 (Contact)[1]	V_{ESD}	+/- 17 +/- 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}				3.3	V
Breakdown Voltage	V_{BR}	I_{BR} = 1mA	5.5	7	8.5	V
Reverse Leakage Current	I_R	V_{RWM} = 3.3V		10	50	nA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20µs		9.5	10	V
Clamping Voltage	V_C	I_{PP} = 4A, tp = 8/20µs		10.5	13	V
ESD Clamping Voltage [2]	V_C	I_{PP} = 4A, tlp =		8.8		V
ESD Clamping Voltage [2]	V_C	I_{PP} = 16A, tlp = 0.2/100ns		14.5		V
Trigger Voltage [2]	V_{TRIG}	tlp = 0.2/100ns		8		V
Dynamic Resistance [2, 3]	R_{DYN}	tlp = 0.2 / 100ns		0.47		Ω
Junction Capacitance	C_j	V_R = 0V, f = 1MHz		0.22	0.35	pF

Notes

1)ESD gun return path connected to ESD ground reference plane.

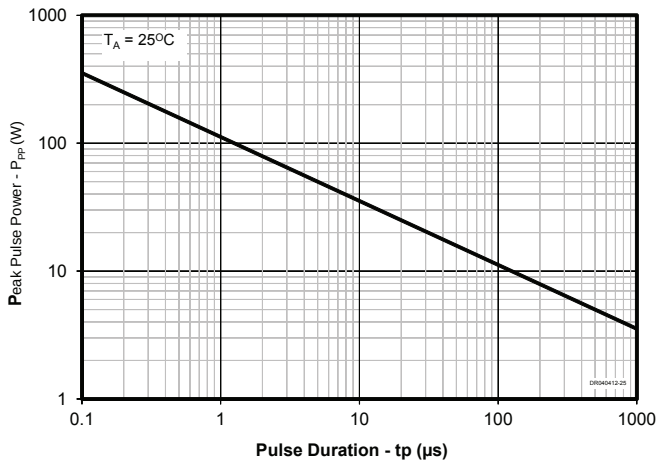
2)TLP Settings: t_p = 100ns, t_r = 0.2ns, I_{TLP} and V_{TLP} sample window: t_1 = 70ns to t_2 = 90ns.

3) Dynamic resistance calculated from I_{pp} = 4A to I_{pp} = 16A using “Best Fit”

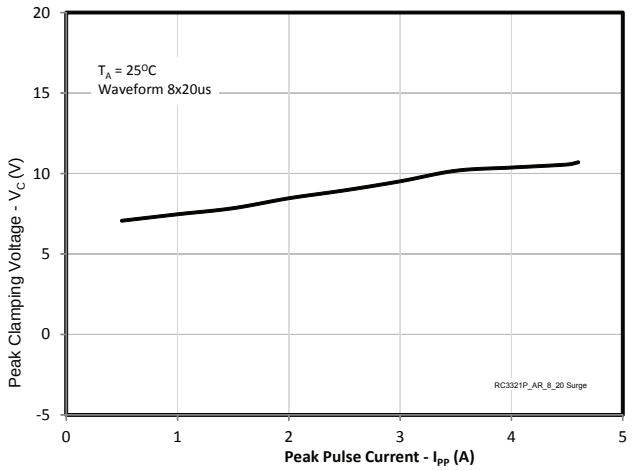
4) Device is electrically symmetrical

Typical Characteristics

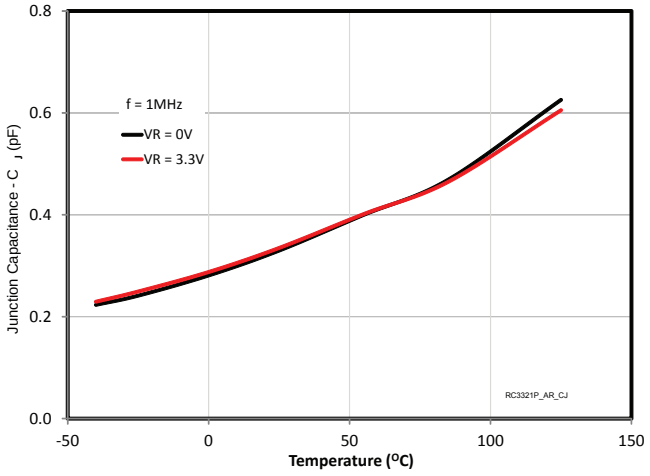
Non-Repetitive Peak Pulse Power vs. Pulse Time



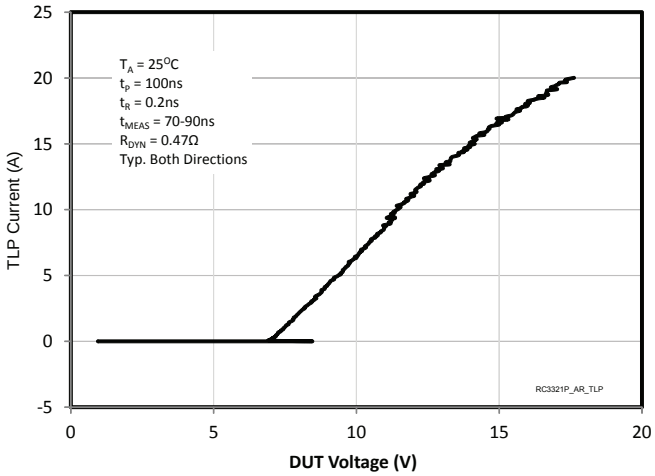
8x20us Peak Clamping Voltage vs Peak Current



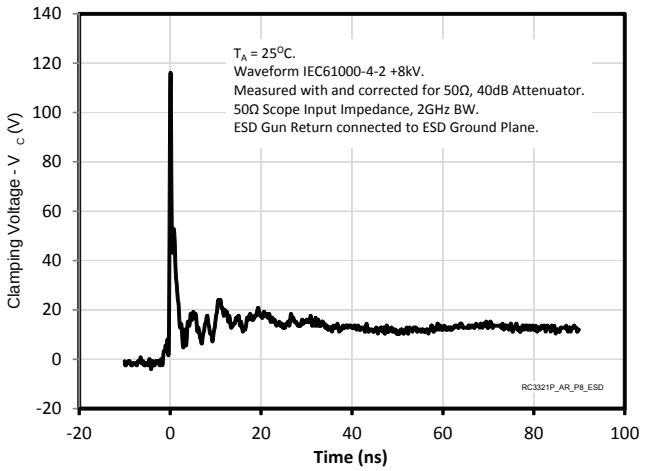
Capacitance vs. Temperature vs. Bias Voltage



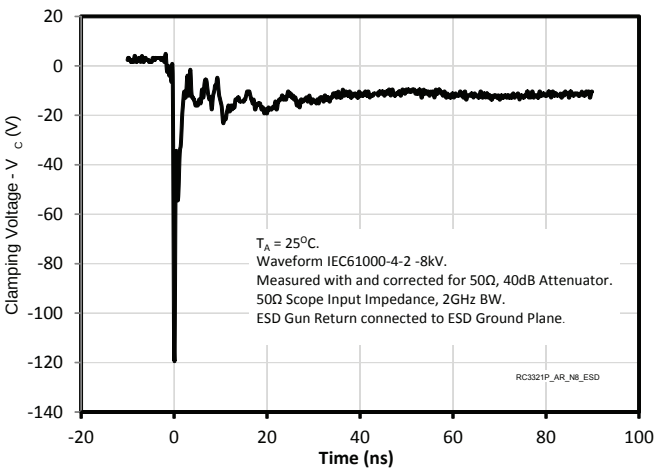
TLP Characteristic



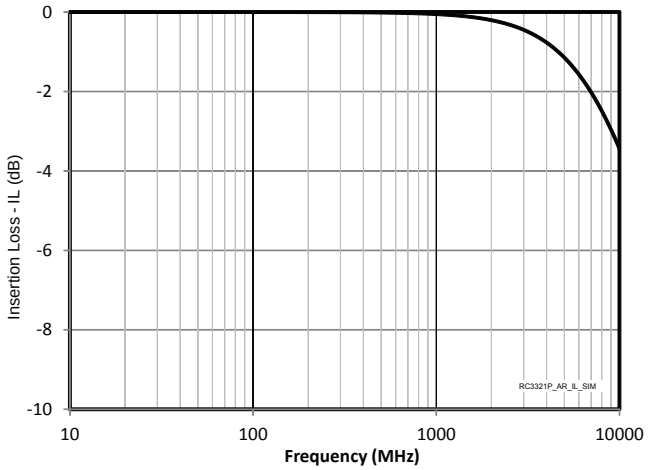
ESD Clamping (+8kV Contact per IEC 61000-4-2)



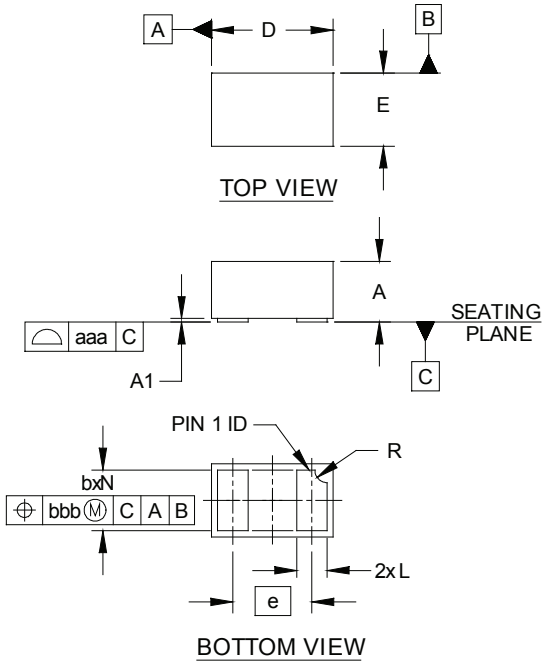
ESD Clamping (-8kV Contact per IEC 61000-4-2)



Typical Insertion Loss (S21)



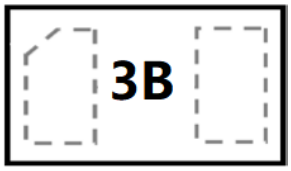
SLP1006P2 PACKAGE OUTLINE DIMENSIONS



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).

Marking



Ordering information

Order Code	Package	Baseqty	Deliverymode
UMW RCLAMP3321P	SLP1006P2	10000	Tape and reel