RClamp2261ZA
RailClamp®
1 Line, 22V EOS Protection

Description

RailClamp® low capacitance Transient Voltage Suppressors (TVS) are designed to protect sensitive electronics from damage or latch-up due to EOS, voltage surges, and ESD. This device offers desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

RClamp®2261ZA features extremely good EOS protection characteristics highlighted by high surge current capability (18A, tp = 8/20µs), low ESD clamping voltage, and high ESD withstand voltage (+/-25kV Contact per IEC 61000-4-2). Low capacitance (0.35pF at V_R=0V) minimizes loading on sensitive circuits. Each device will protect one high-speed data line operating up to 22V.

RClamp2261ZA is in a DFN 0.60 x 0.30 x 0.25 mm 2-Lead package. The combination of small size and high ESD surge capability makes them ideal for use in portable applications.

Features

- ESD withstand Voltage: +/-25kV (Contact) per and +/-30kV (Air) per IEC 61000-4-2
- Surge Current: 18A (tp = 8/20µs) per IEC 61000-4-5
- Ultra-small package
- Protects one data line
- Low ESD clamping voltage
- Working voltage: ±22V
- Low capacitance: 0.35pF (typ.)
- Low dynamic resistance: 0.22Ω (typ.)
- Solid-state silicon-avalanche technology

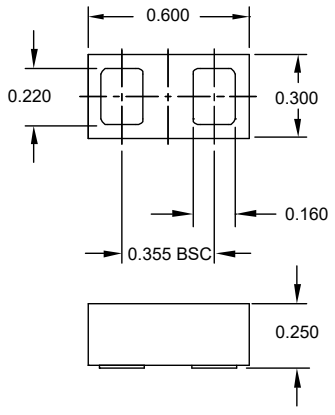
Mechanical Characteristics

- Package: DFN 0.60 x 0.30 x 0.25 mm 2-Lead
- Pb-free, Halogen Free, RoHS/WEEE compliant
- Lead Finish: Pb-free
- Marking: Marking Code
- Packaging: Tape and Reel

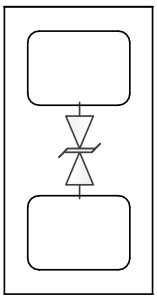
Applications

- USB Type-C
- Near Field Communication (NFC) lines
- RF Antenna
- FM Antenna
- IoT Devices

Package Dimension (mm)



Schematic & Pin Configuration



DFN 0.60 x 0.30 x 0.25mm 2-Lead (Bottom View)

Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{PK}	270	W
Peak Pulse Current (tp = 8/20µs)	I_{PP}	18	A
ESD per IEC 61000-4-2 (Air)(1) ESD per IEC 61000-4-2 (Contact)(1)	V_{ESD}	±30 ±25	kV
Operating Temperature	T_{OP}	-40 to +85	°C
Junction and Storage Temperature	T_J and 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}					22	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA		24	28	32	V
Reverse Leakage Current	I_R	V_{RWM} = 22V				100	nA
Clamping Voltage[2]	V_C	tp = 1.2/50µs (Voltage), 8/20µs (Current) Combination Waveform, R_S = 2 Ω	I_{PP} = 10A		7.5	12	V
			I_{PP} = 18A		10.5	15	
ESD Clamping Voltage[3]	V_C	tp = 0.2/100ns	I_{PP} = 4A		6		V
			I_{PP} = 16A		8.6		
Dynamic Resistance[3,4]	R_{DYN}	tp = 0.2/100ns			0.22		Ω
Junction Capacitance	C_J	V_R = 0V, f = 1MHz			0.35	0.5	pF

Notes:

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

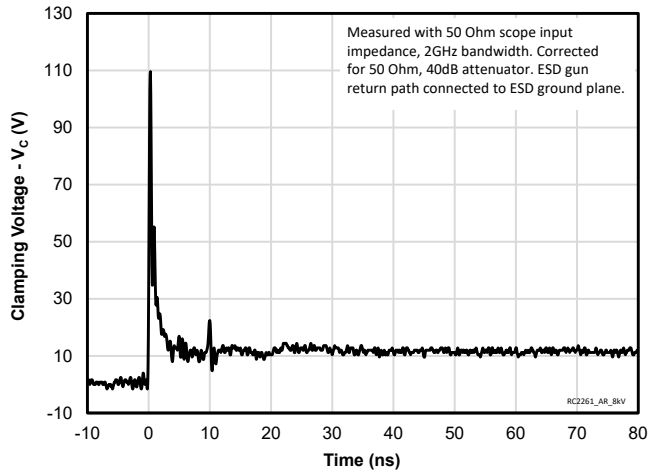
2) Measured using a 1.2/50µs(voltage), 8/20µs(current) combination waveform, R_S = 2Ω. Clamping is defined as the peak voltage across the device after the device snaps back to a conducting state.

3) Transmission Line Pulse Test (TLP) Settings: tp = 100ns, tr = 0.2ns, I_{TLP} and V_{TLP} averaging window: t_1 = 70ns to t_2 = 90ns

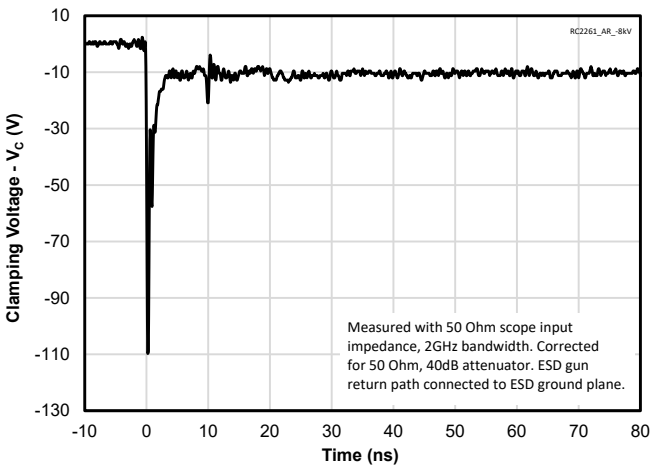
4) Dynamic resistance calculated from I_{TLP} = 4A to I_{TLP} = 16A

Typical Characteristics

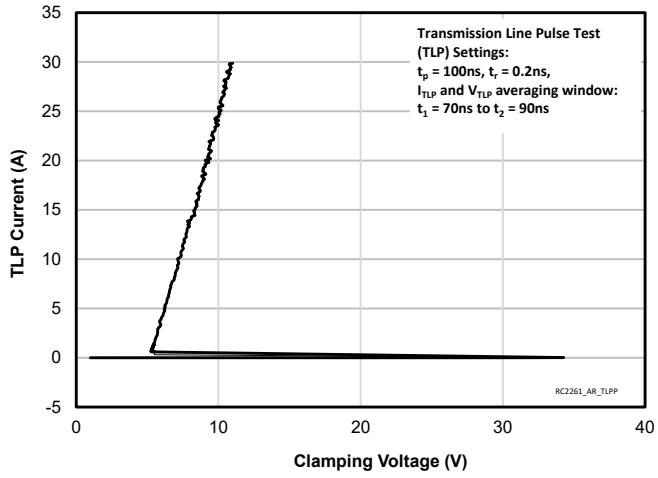
ESD Clamping (8kV Contact per IEC 61000-4-2)



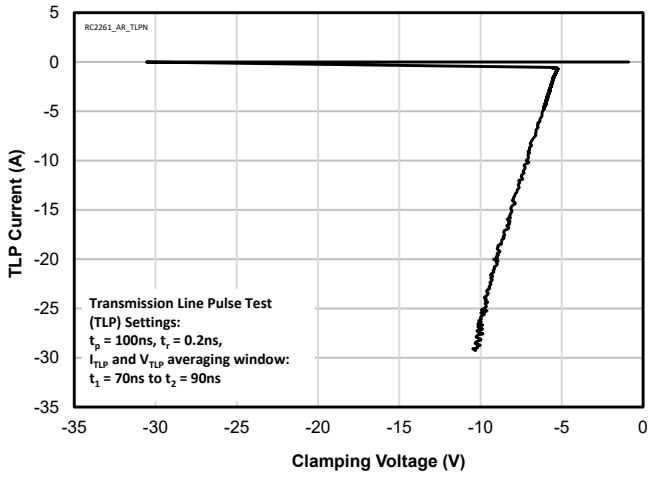
ESD Clamping (-8kV Contact per IEC 61000-4-2)



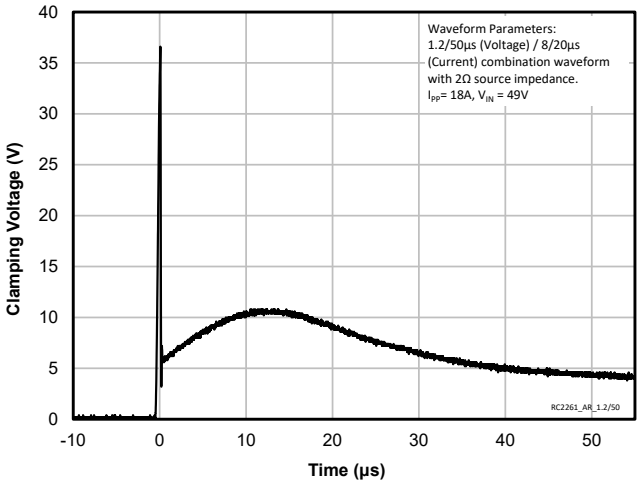
TLP Characteristic (Positive Pulse)



TLP Characteristic (Negative Pulse)

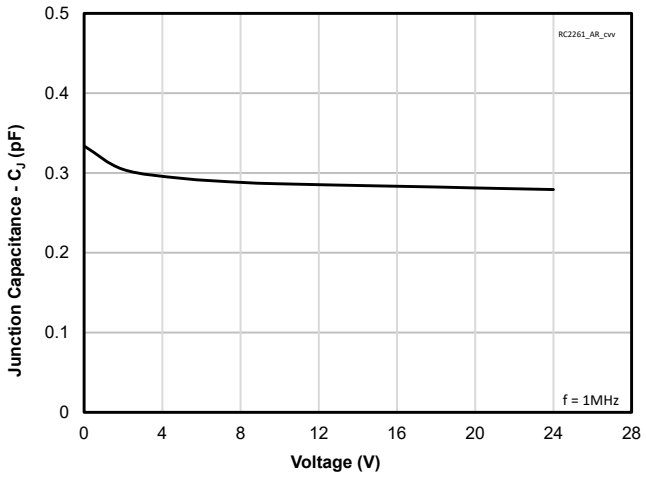


Clamping Voltage Waveform (I_{PP} = 18A)

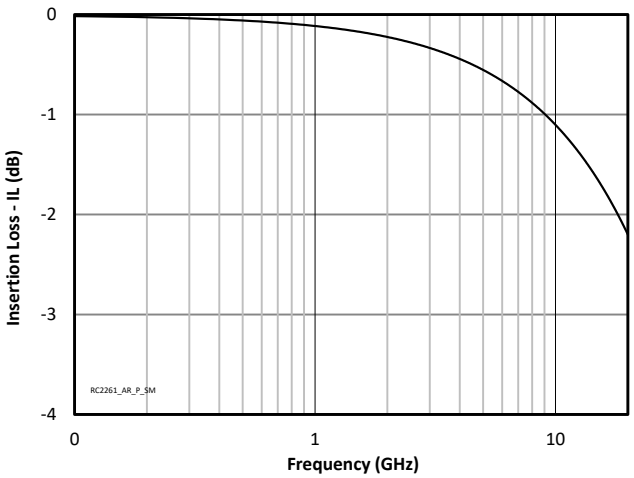


Typical Characteristics

Capacitance vs. Reverse Voltage



Insertion Loss - S21



Application Information

Assembly Guidelines

The figure at the right details Semtech's recommended mounting pattern. Recommended assembly guidelines are shown in Table 1. 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.

Solder Stencil

Stencil design is one of the key factors which will determine the volume of solder paste which is deposited onto the land pad. The area ratio of the stencil aperture will determine how well the stencil will print. The area ratio takes into account the aperture shape, aperture size, and stencil thickness. A minimum area ratio of 0.66 is preferred for the subject package. The area ratio of a rectangular aperture is given as:

Area Ratio = (L * W)/ (2 * (L + W) * T)

Where:
L = Aperture Length
W = Aperture Width
T = Stencil Thickness

Semtech recommends a stencil with square aperture and rounded corners for consistent solder release. The stencil should be laser cut with electro-polished finish. A stencil thickness of 0.075mm (0.003") is recommended. A 0.100mm (0.004") stencil may be used, however the stencil opening may need to be increased slightly to achieve the desired area ratio to ensure proper solder coverage on the pad.

Recommended Mounting Pattern

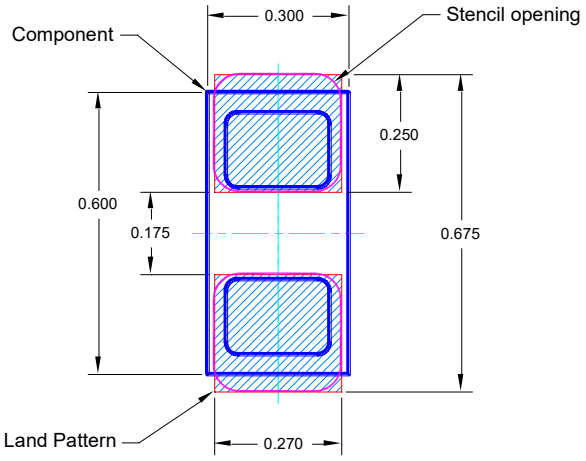
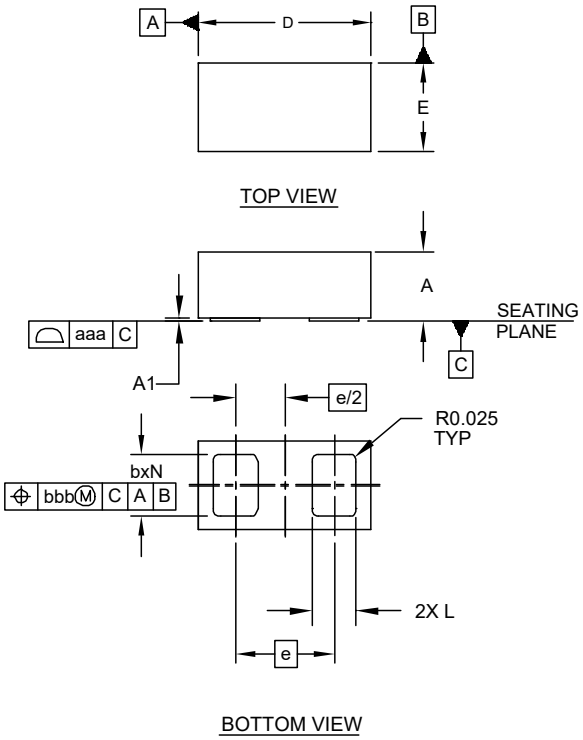


Table 1 - Assembly Guidelines

Assembly Parameter	Recommendation
Solder Stencil Design	Laser Cut, Electro-Polished
Aperture Shape	Rectangular with Rounded Corners
Solder Stencil Thickness	0.075mm (0.003") or 0.100mm (0.004")
Solder Paste Type	Type 4 Size Sphere or Smaller
Solder Reflow Profile	Per JEDEC J-STD-020
PCB Solder Pad Design	Solder Mask Defined or Non Solder Mask Defined
PCB Pad Finish	OSP or NiAu

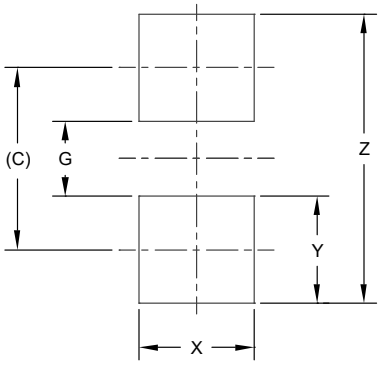
Outline Drawing - DFN 0.60 x 0.30 x 0.25mm 2-Lead



DIMENSIONS			
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.235	0.250	0.265
A1	0.000	0.010	0.050
b	0.200	0.220	0.240
D	0.580	0.600	0.620
E	0.280	0.300	0.320
e	0.355 BSC		
L	0.140	0.160	0.180
N	2		
aaa	0.08		
bbb	0.10		

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

Land Pattern - DFN 0.60 x 0.30 x 0.25mm 2-Lead



DIMENSIONS	
DIM	MILLIMETERS
(C)	(0.425)
G	0.175
X	0.270
Y	0.250
Z	0.675

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

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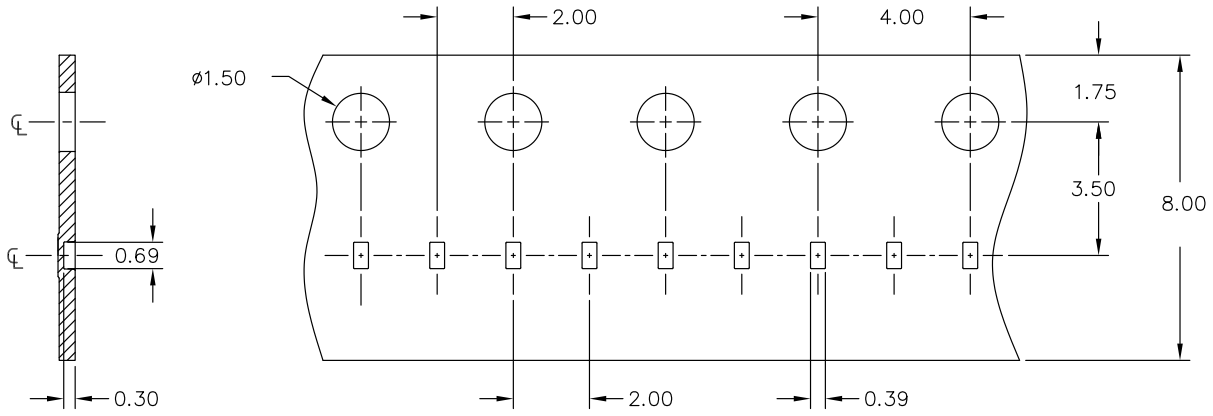
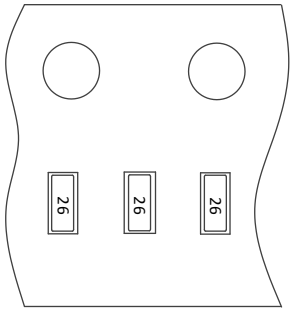
Tape and Reel Specification



Note: All dimensions are nominal dimensions in mm.



Ordering Information

Part Number	Qty per Reel	Reel Size
RClamp2261ZA.F	15,000	7”

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