

## Description

RailClamp® TVS diodes are designed to protect sensitive electronics from damage or latch-up due to ESD & EOS. These devices offer desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

The RClamp®1221PW features extremely good ESD protection characteristics highlighted by low typical dynamic resistance, low peak ESD clamping voltage, and high ESD withstand voltage ( $\pm 10\text{kV}$  contact per IEC 61000-4-2). Low maximum capacitance (0.45pF at  $V_R = 0\text{V}$ ) minimizes loading on sensitive circuits. Each device will protect one high-speed data line operating at 12 Volts.

This device is in a 2-pin DFN 1.0 x 0.6 x 0.55mm 2-Lead package. The small package 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.

## Features

- High ESD withstand Voltage:  $\pm 10\text{kV}$  (Contact) per IEC 61000-4-2 and  $\pm 12\text{kV}$  (air) per IEC 61000-4-2
- Protects one line
- Low ESD clamping voltage
- Working voltage: 12V
- Low capacitance: 0.45pF maximum
- Low leakage current
- Low dynamic resistance
- Solid-state silicon-avalanche technology

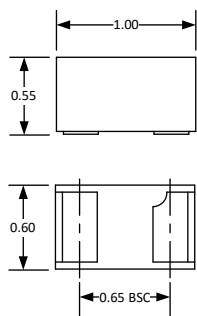
## Mechanical Characteristics

- Package: DFN 1.0 x 0.6 x 0.55mm 2-Lead
- Pb-Free, Halogen Free, RoHS/WEEE compliant
- Lead Finish: Pb-Free
- Marking: Marking code
- Packaging: Tape and Reel

## Applications

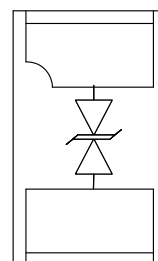
- Touchscreen Controllers
- USB 3.0 / USB Type-C
- MIPI/MDDI
- MHL
- FM antenna
- Wearables

## Package Dimension



Nominal Dimensions (mm)

## Schematic & Pin Configuration



DFN 1.0 x 0.6 x 0.55mm 2-Lead (Bottom View)

## Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Current (tp = 8/20μs)	I <sub>PP</sub>	4	A
ESD per IEC 61000-4-2 (Contact) <sup>(1)</sup> ESD per IEC 61000-4-2 (Air) <sup>(1)</sup>	V <sub>ESD</sub>	±10 ±12	kV
Operating Temperature	T <sub>OP</sub>	-40 to +85	°C
Storage Temperature	T <sub>STG</sub>	-55 to +150	°C

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

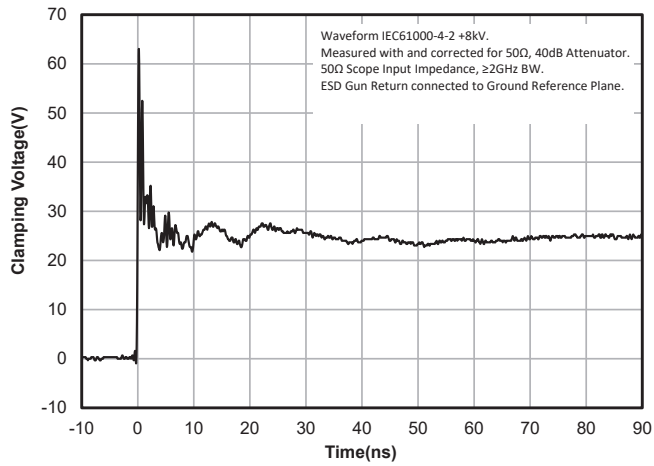
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Stand-Off Voltage	V <sub>RWM</sub>				12	V
Reverse Breakdown Voltage	V <sub>BR</sub>	I <sub>t</sub> = 1mA	13.5	15.6	17.5	V
Reverse Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 12V		<5	100	nA
Clamping Voltage	V <sub>C</sub>	tp = 8/20μs	I <sub>PP</sub> = 1A	16.9	21	V
			I <sub>PP</sub> = 4A	19.7	24	V
ESD Clamping Voltage <sup>(2)</sup>	V <sub>C</sub>	tp = 0.2/100ns	I <sub>TLP</sub> = 4A	18.1		V
			I <sub>TLP</sub> = 16A	25.8		
Dynamic Resistance <sup>(2),(3)</sup>	R <sub>DYN</sub>	tp = 0.2/100ns		0.64		Ω
Junction Capacitance	C <sub>J</sub>	V <sub>R</sub> = 0V, f = 1MHz		0.32	0.45	pF

### Notes

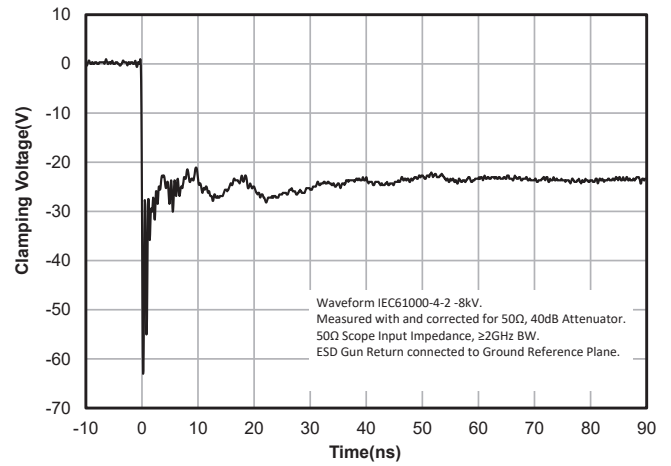
- 1) Measured with a 40dB attenuator, 50 Ohm scope input impedance, 2GHz bandwidth. ESD gun return path connected to ESD ground plane.
- 2) Transmission Line Pulse Test (TLP) Settings: tp = 100ns, tr = 0.2ns, I<sub>TLP</sub> and V<sub>TLP</sub> averaging window: t1 = 70ns to t2 = 90ns.
- 3) Dynamic resistance calculated from I<sub>TLP</sub> = 4A to I<sub>TLP</sub> = 16A

# Typical Characteristics

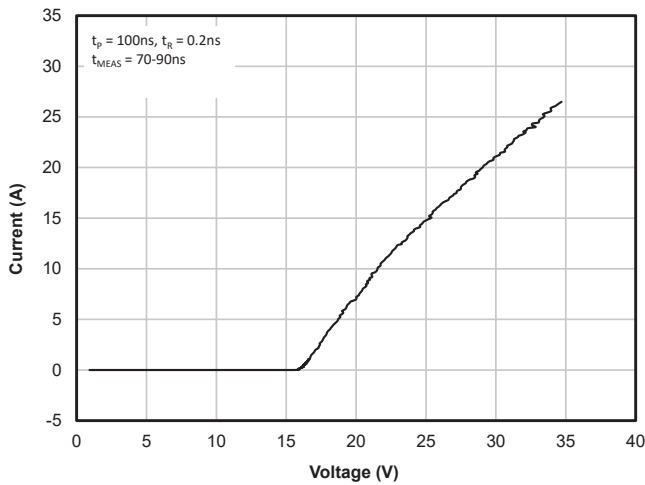
## ESD Clamping (8kV Contact per IEC 61000-4-2)



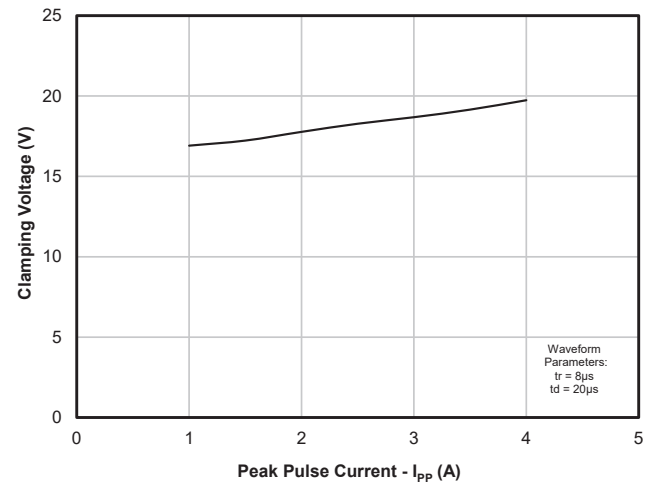
## ESD Clamping (-8kV Contact per IEC 61000-4-2)



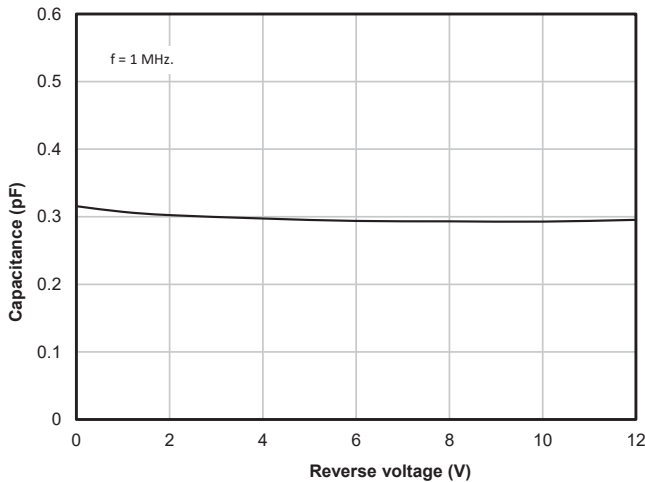
## TLP Characteristic (Positive Pulse)



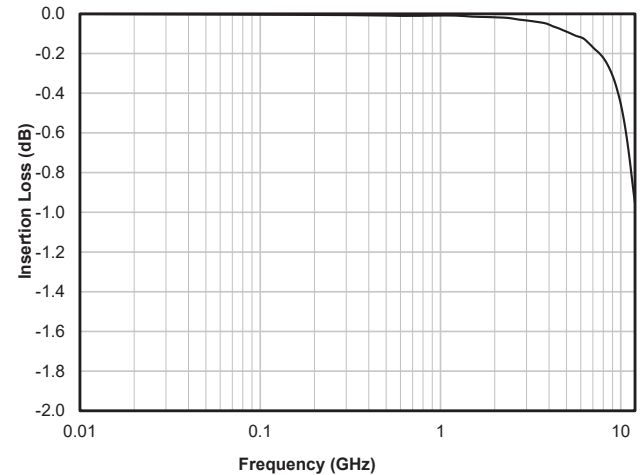
## Clamping Voltage ( $t_p=8/20\mu\text{s}$ )



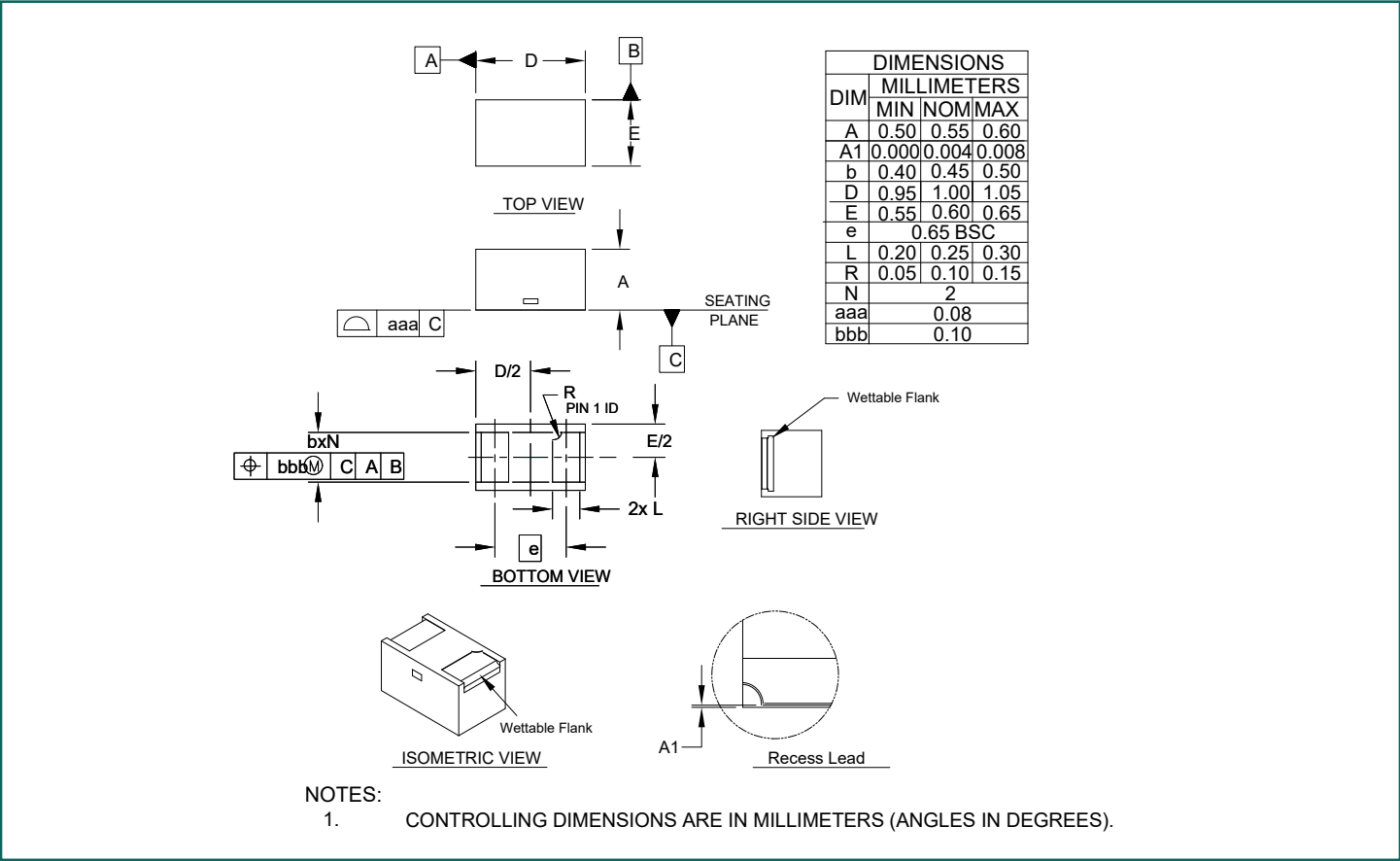
## Capacitance vs. Reverse Voltage



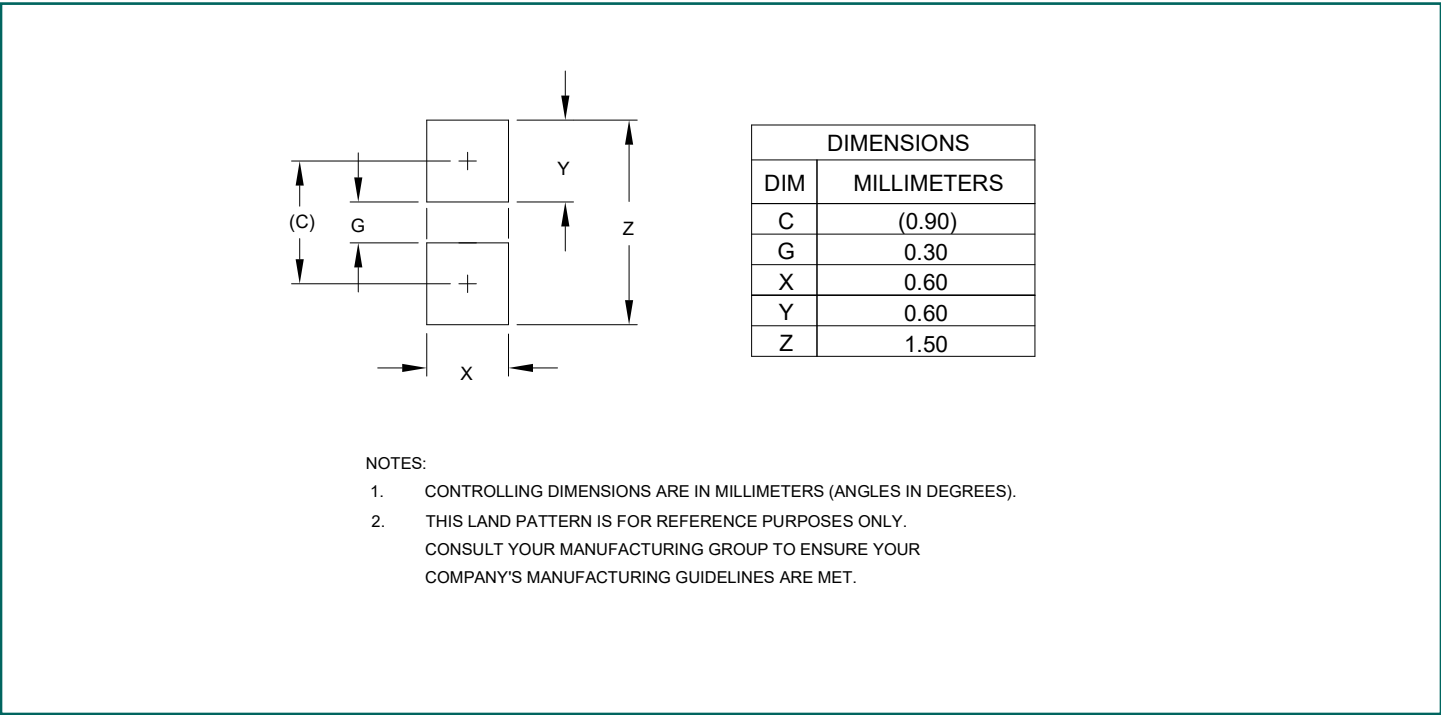
## Insertion Loss - S21



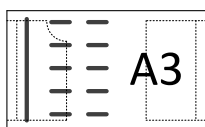
# Outline Drawing - DFN 1.0 x 0.6 x 0.55mm 2-Lead



# Land Pattern - DFN 1.0 x 0.6 x 0.55mm 2-Lead



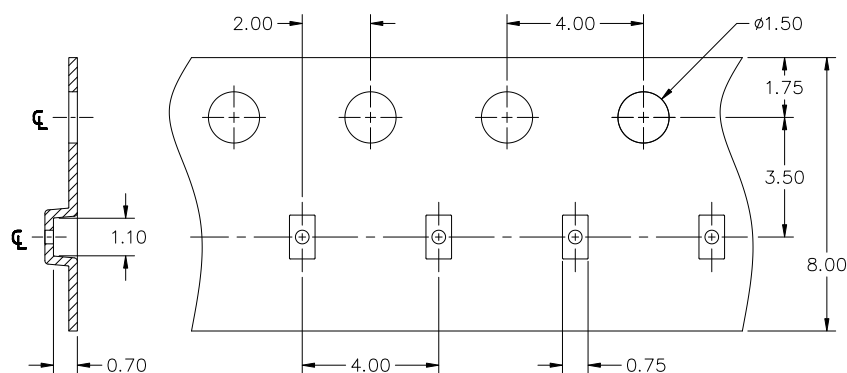
## Marking Codes



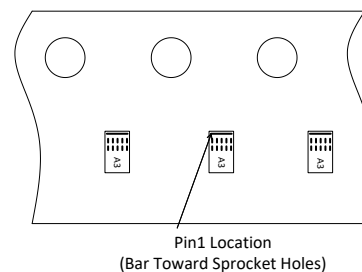
### Notes:

1. Device is electrically symmetrical
2. Marking will also include line matrix date code
3. Bar indicates Pin 1 location

## Tape and Reel Specification



Note: All dimensions are nominal dimensions in mm.



## Ordering Information

Part Number	Qty per Reel	Reel Size
RClamp1221PW.C	3,000	7"
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