

Description

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

RClamp®04041PW features extremely good ESD protection characteristics, highlighted by a low typical dynamic resistance of 0.1 Ohms, a low peak ESD clamping voltage, and a high ESD withstand voltage (+/-30kV contact per IEC 61000-4-2). Low maximum capacitance (0.65pF at VR=0V) minimises loading on sensitive circuits. Each device will protect one high-speed data line operating at 4 Volts.

RClamp04041PW is in a 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 their small size and high ESD surge capability makes them ideal for use in portable applications.

Features

- ESD protection for high speed lines to
 - ♦ IEC 61000-4-2 (ESD): +/-30kV (Contact & Air)
 - ♦ IEC 61000-4-5 (Lightning): 20A (tp = 8/20µs)
- Ultra-small package
- Low ESD clamping voltage
- Working voltage: 4.0V
- Low capacitance: 0.65pF maximum
- Low leakage current
- Low dynamic resistance: 0.1Ω (typ)
- Solid-state silicon-avalanche technology

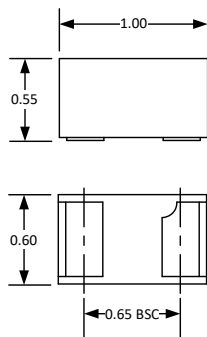
Mechanical Characteristics

- 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

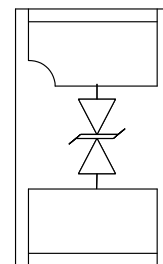
- USB 2.0
- MIPI/MDDI
- MHL
- Wearables

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 Power ($t_p = 8/20\mu s$)	P_{PK}	160	W
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{PP}	20	A
ESD per IEC 61000-4-2 (Contact) ⁽¹⁾ ESD per IEC 61000-4-2 (Air) ⁽¹⁾	V_{ESD}	± 30 ± 30	kV
Operating Temperature	T_{OP}	-40 to +125	°C
Junction Temperature & Storage Temperature	T_J & T_{STG}	-55 to +150	°C

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

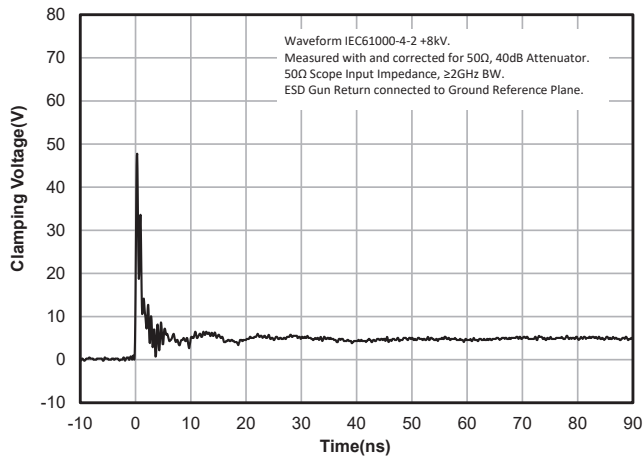
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Stand-Off Voltage	V_{RWM}				4	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$	6	7.6	10	V
Reverse Leakage Current	I_R	$V_{RWM} = 4V$		<10	50	nA
Clamping Voltage ⁽²⁾	V_C	$I_{PP} = 20A$, $t_p = 1.2/50\mu s$ (Voltage), $8/20\mu s$ (Current) Combination Waveform, $R_s = 2\Omega$		5.2	8	V
ESD Clamping Voltage ⁽³⁾	V_C	$t_p = 0.2/100ns$		2.9		V
		$I_{TLP} = 4A$ $I_{TLP} = 16A$		4.0		
Dynamic Resistance ^{(3),(4)}	R_{DYN}	$t_p = 0.2/100ns$		0.1		Ω
Junction Capacitance	C_J	$V_R = 0V$, $f = 1MHz$		0.49	0.65	pF

Notes:

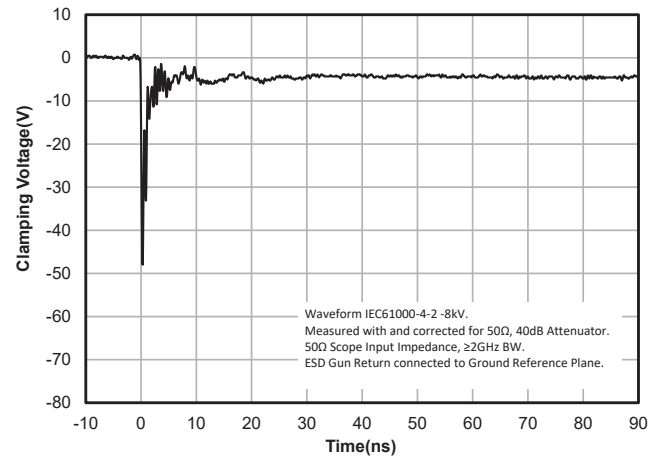
- 1) ESD gun return path connected to ESD ground plane.
- 2) Measured using a 1.2/50 μs voltage, 8/20 μs current combination waveform, $R_s = 2\Omega$. Clamping is defined as the clamping voltage after the device snaps back to a conducting state.
- 3) Transmission Line Pulse Test (TLP) Settings: $t_p = 100ns$, $t_r = 0.2ns$, I_{TLP} and V_{TLP} averaging window: $t_1 = 70ns$ to $t_2 = 90ns$.
- 4) Dynamic resistance calculated from $I_{TLP} = 4A$ to $I_{TLP} = 16A$

Typical Characteristics

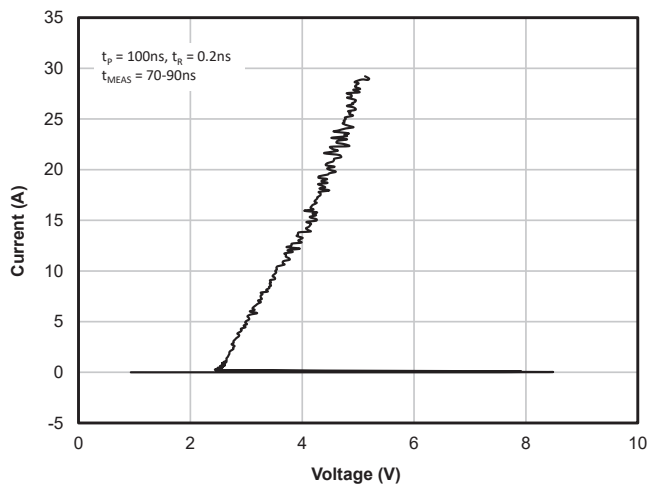
ESD Clamping (8kV Contact per IEC 61000-4-2)



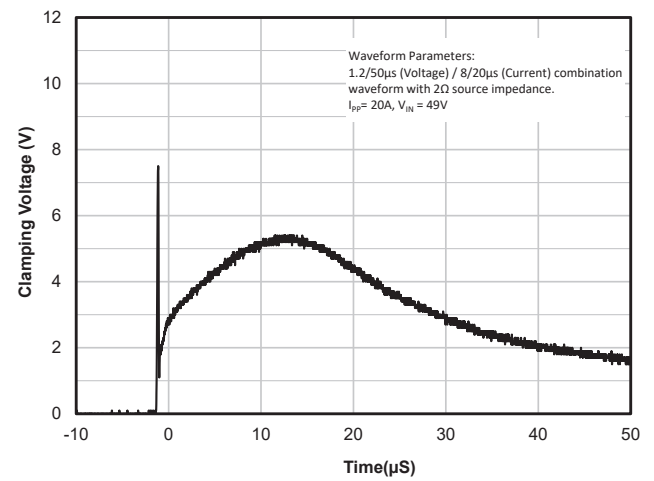
ESD Clamping (-8kV Contact per IEC 61000-4-2)



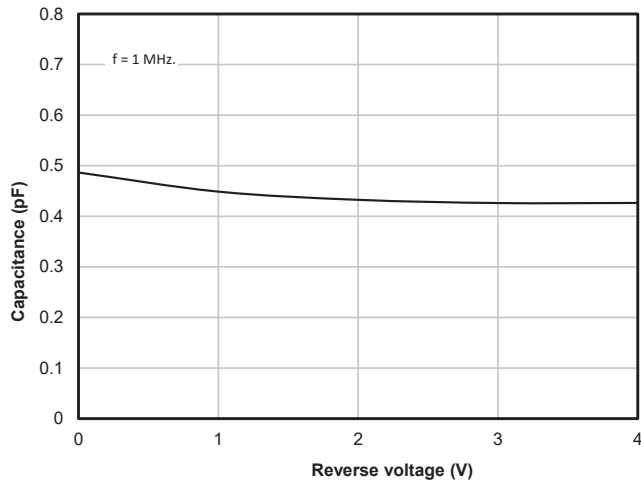
TLP Characteristic (Positive Pulse)



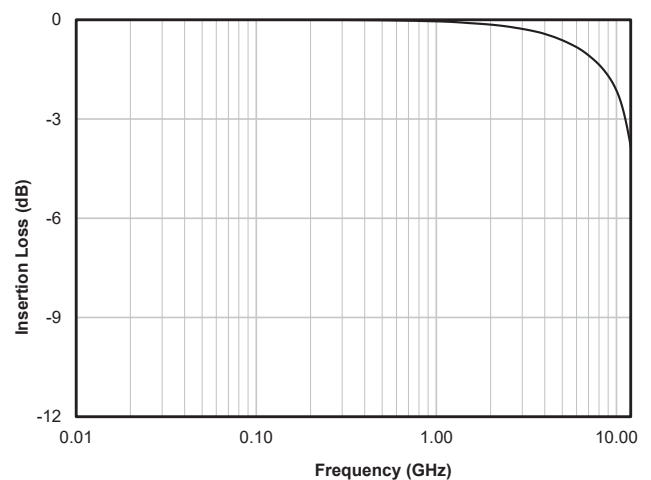
Clamping Voltage Waveform ($t_p=1.2/50\mu\text{s}$)



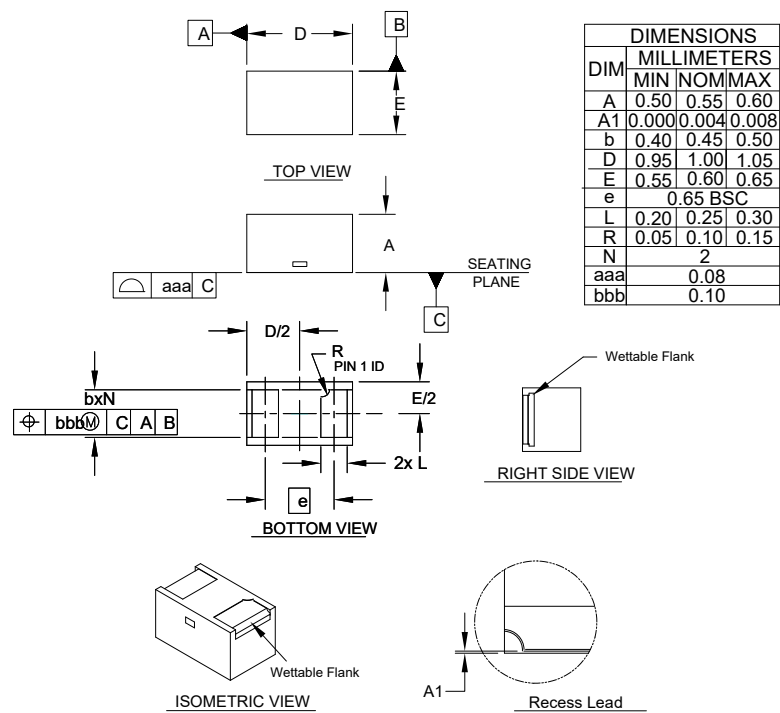
Capacitance vs. Reverse Voltage



Insertion Loss - S21



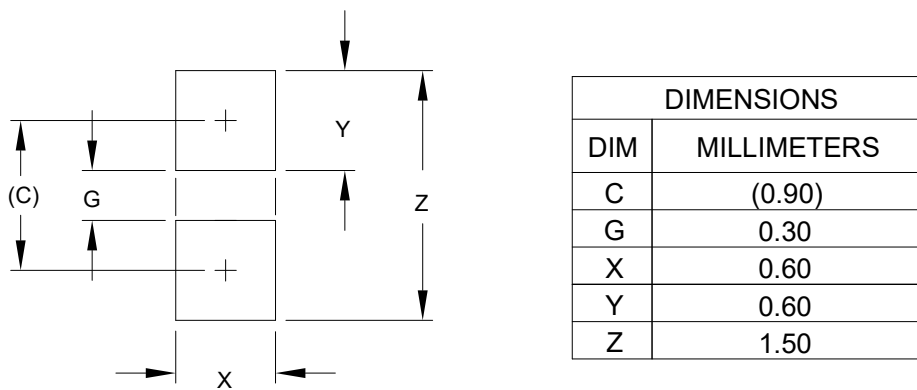
Outline Drawing - DFN 1.0 x 0.6 x 0.55mm 2-Lead



NOTES:

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

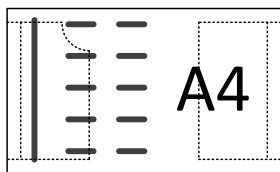
Land Pattern - DFN 1.0 x 0.6 x 0.55mm 2-Lead



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.

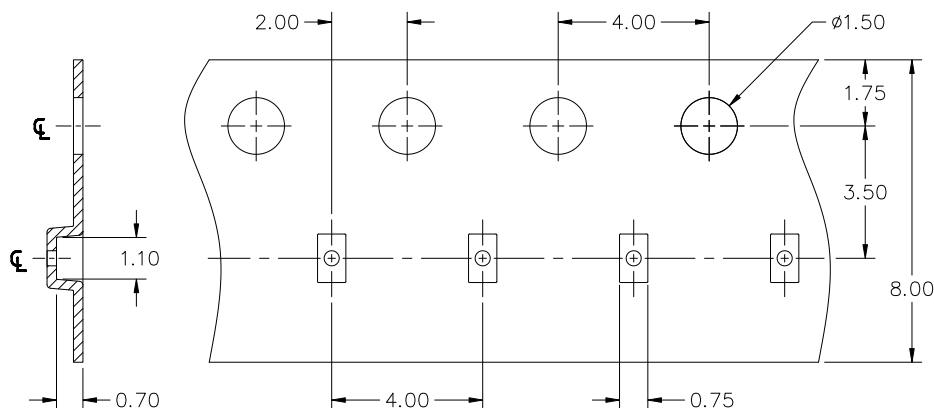
Marking Code



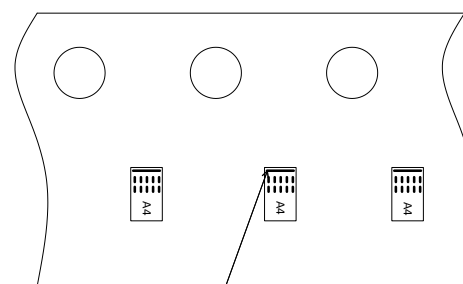
Notes:

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.



Pin1 Location
(Bar Toward Sprocket Holes)

Ordering Information

Part Number	Qty per Reel	Reel Size
RClamp04041PW.C	3,000	7"
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