

PROTECTION PRODUCTS

Description

PowerClamp TVS diodes are designed for use in harsh transient environments to protect sensitive electronics from damage or latch-up due to EOS, lightning, CDE, and ESD. They feature large cross-sectional area junctions for conducting high transient currents. These devices offer desirable characteristics for board level protection including fast response time, low operating and clamping voltage, and no device degradation.

They feature extremely good protection characteristics highlighted by high surge current capability (80A, $t_p = 8/20\mu s$), low peak ESD clamping voltage, and high ESD withstand voltage (+/- 30kV per IEC 61000-4-2). Each device will protect one data or power line operating at 12V.

P Clamp1221P is in a 2-pin DFN1610N2 package measuring 1.6 x 1.0 mm with a nominal height of 0.50mm. The leads are finished with lead-free NiPdAu. High surge current capability and low clamping voltage making them ideal for protecting VBus, battery, and other power lines in portable electronics, industrial, and consumer electronics applications.

Features

- Transient Protection to
 - ♦ IEC 61000-4-2 (ESD) 30kV (Air), 30kV (Contact)
 - ♦ IEC 61000-4-4 (EFT) 4kV (5/50ns)
 - ♦ IEC 61000-4-5 (Lightning) 80A (8/20 μs)
- Protects one data or power line
- Working Voltage: 12V
- Low leakage current
- Solid-state silicon-avalanche technology

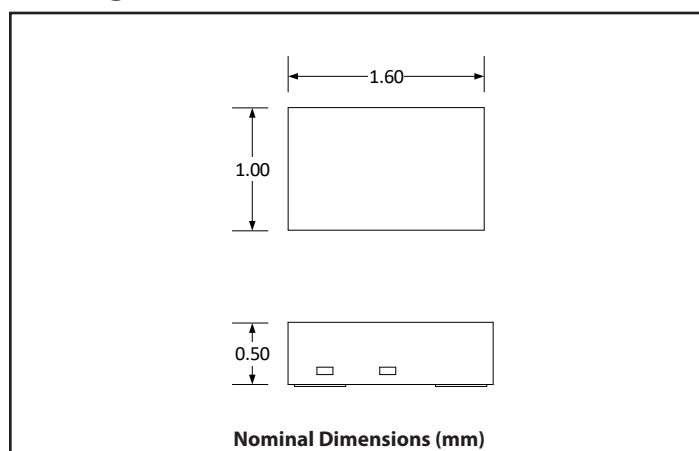
Mechanical Characteristics

- DFN1610N2 package
- Pb-Free, Halogen Free, RoHS/WEEE compliant
- Nominal Dimensions: 1.6 x 1.0 x 0.50 mm
- Lead Finish: NiPdAu
- Marking: Marking code
- Packaging: Tape and Reel

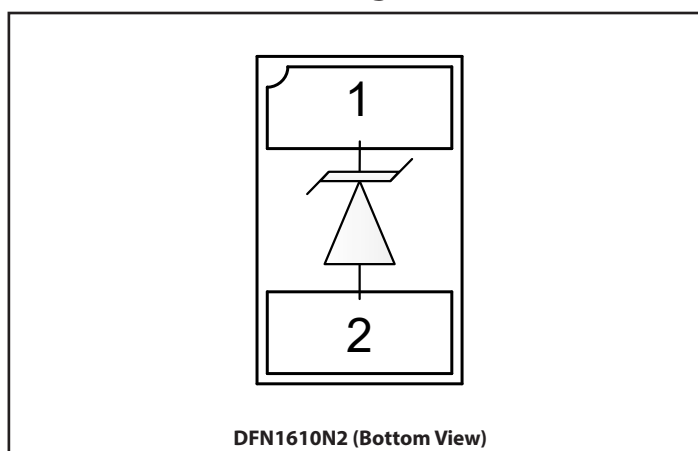
Applications

- Cellular Handsets & Accessories
- Voltage Supply Lines
- Battery protection
- USB VBus
- VBAT

Package Dimension



Schematic & Pin Configuration



Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{PK}	2000	W
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{PP}	80	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
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}	-40°C to 125°C, Pin 1 to Pin 2			12	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$, Pin 1 to Pin 2	13	14	15	V
Reverse Leakage Current	I_R	$V_{RWM} = 12V$, Pin 1 to Pin 2		<10	100	nA
Clamping Voltage	V_C	$I_{PP} = 40A$, $t_p = 8/20\mu s$, Pin 1 to Pin 2		18	20	V
		$I_{PP} = 80A$, $t_p = 8/20\mu s$, Pin 1 to Pin 2		22.5	25	
Clamping Voltage ⁽²⁾	V_C	$I_{PP} = 4A$, $t_p = 0.2/100ns$, Pin 1 to Pin 2		14.4		V
		$I_{PP} = 16A$, $t_p = 0.2/100ns$, Pin 1 to Pin 2		15		
Dynamic Resistance ^{(2), (3)}	R_{DYN}	$t_p = 0.2/100ns$ (TLP)		0.03		Ohms
Junction Capacitance	C_J	$V_R = 0V$, $f = 1MHz$		408	430	pF

Notes:

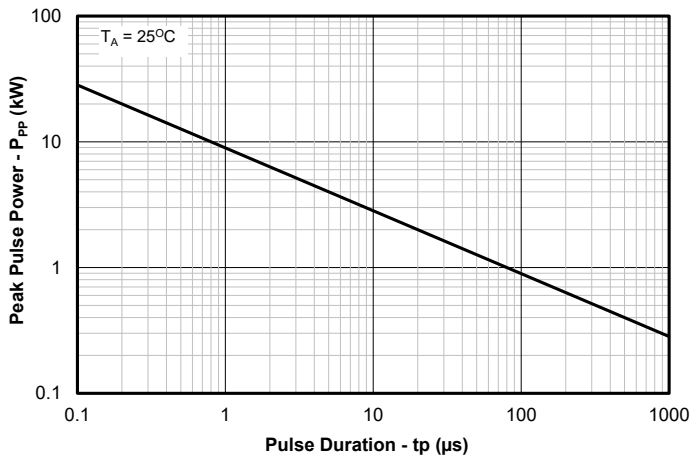
(1): ESD Gun return path to Ground Reference Plane (GRP)

(2): Transmission Line Pulse Test (TLP) Settings: $t_p = 100ns$, $t_r = 0.2ns$, I_{TLP} and V_{TLP} averaging window: $t_1 = 70ns$ to $t_2 = 90ns$

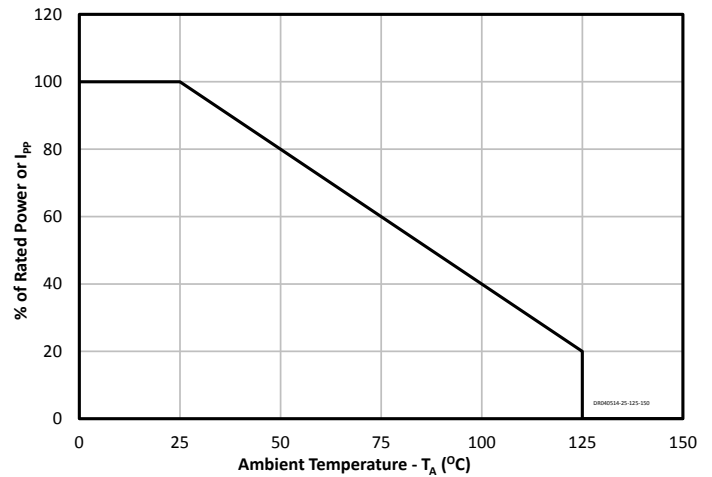
(3): Dynamic resistance calculated from $I_{TLP} = 4A$ to $I_{TLP} = 16A$

Typical Characteristics

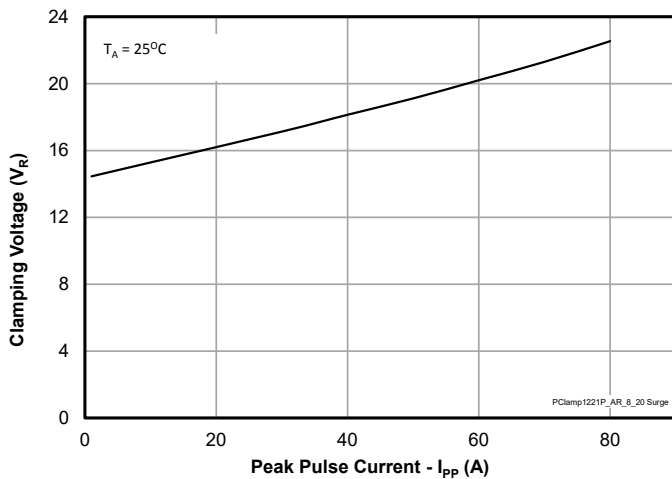
Non-Repetitive Peak Pulse Power vs. Pulse Time



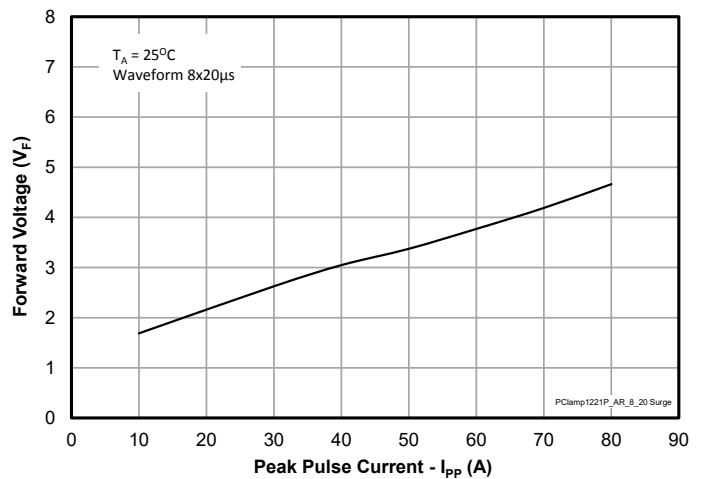
Power Derating vs. Temperature



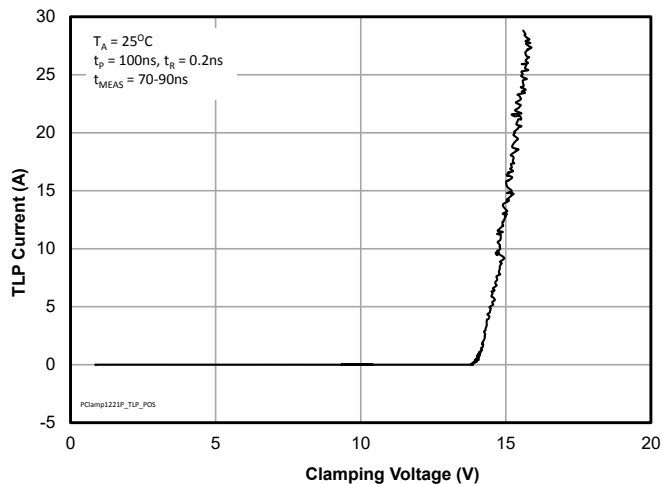
Clamping Voltage vs. Peak Pulse Current ($t_p=8/20\mu$ s)



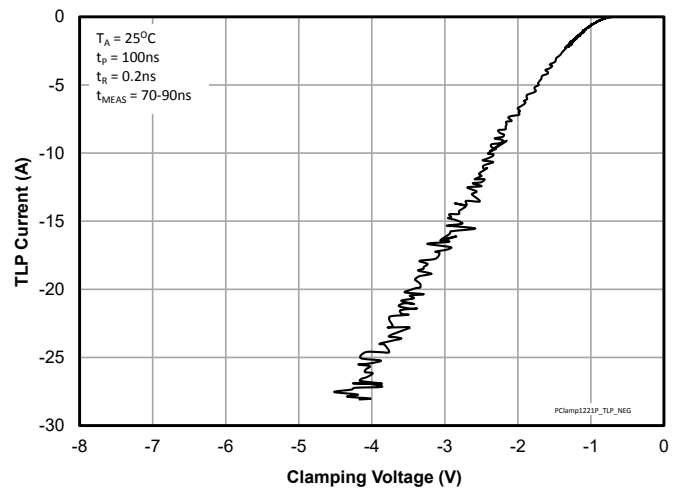
Forward Voltage vs. Peak Pulse Current ($t_p=8/20\mu$ s)



TLP Characteristic (Positive)

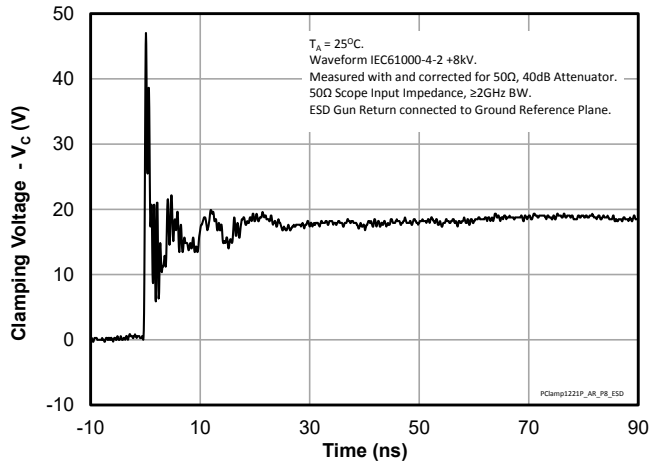


TLP Characteristic (Negative)

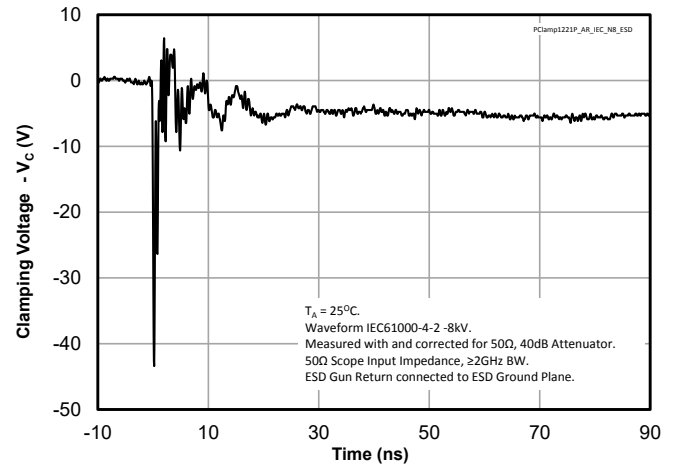


Typical Characteristics

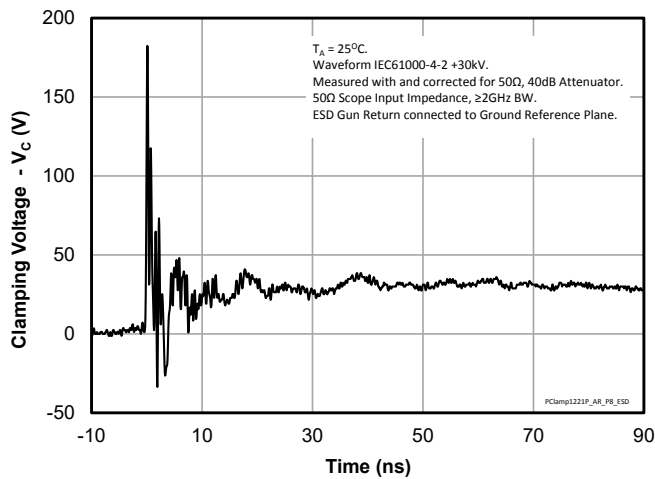
ESD Clamping (8kV Contact per IEC 61000-4-2)



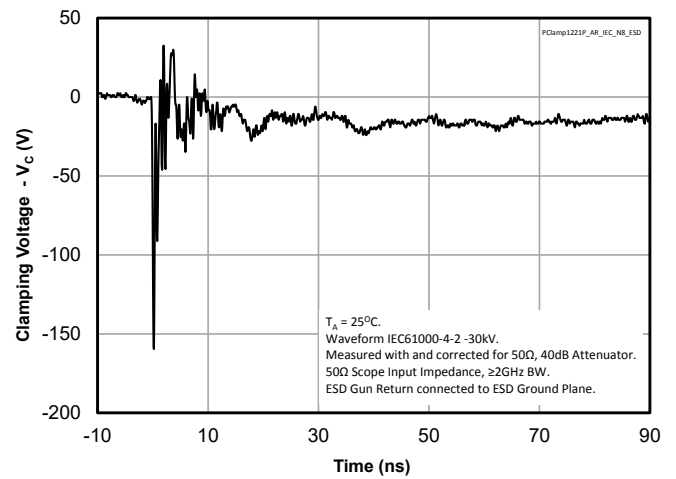
ESD Clamping (-8kV Contact per IEC 61000-4-2)



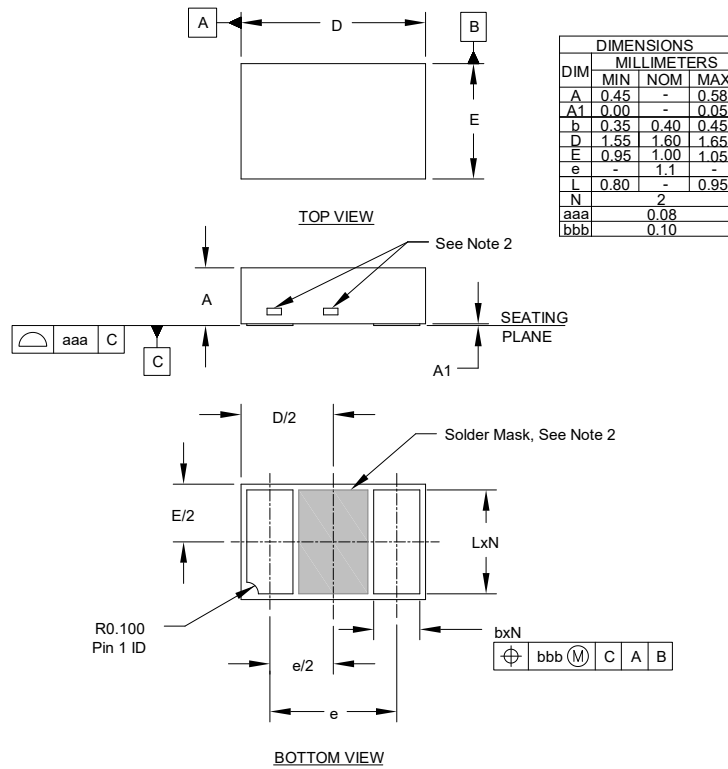
ESD Clamping (30kV Contact per IEC 61000-4-2)



ESD Clamping (-30kV Contact per IEC 61000-4-2)

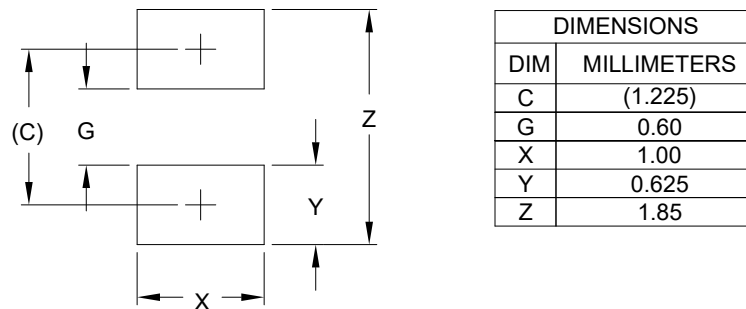


Outline Drawing - DFN1610N2



- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
 2. ASSEMBLY SITE DEPENDENT FEATURES

Land Pattern - DFN1610N2



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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.

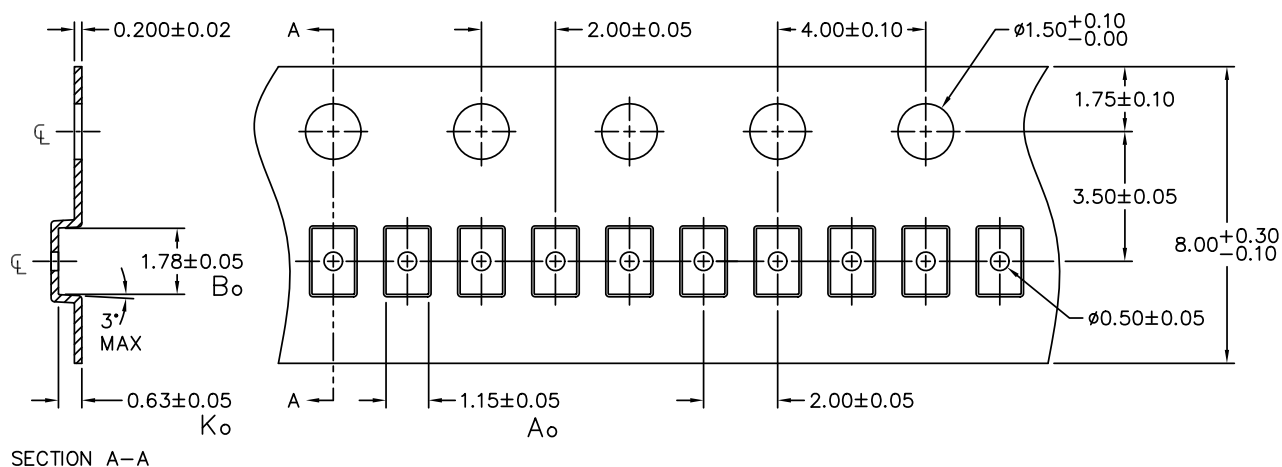
Marking Example



Notes:

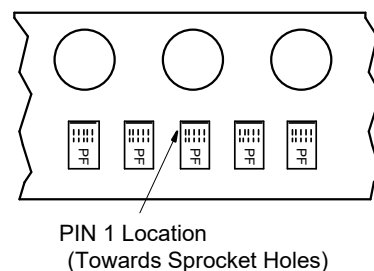
- 1) Bar indicates Pin 1 location
- 2) Marking includes line matrix date code

Tape and Reel Specification



SECTION A-A

NOTES: 1.) ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.



Ordering Information

Part Number	Qty per Reel	Reel Size
P Clamp1221P.TNT	10,000	7"



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