uClamp5581P

µClamp ®

5.5V ESD & Surge Protection

Description

µClamp® series of TVS diodes are designed 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.

uClamp5581P is in a DFN 1.0x0.6x0.50mm 2-Lead package. Each device may be used to meet the ESD immunity requirements of IEC 61000-4-2 (±20kV air, ±20kV contact discharge). uClamp5581P also provides high surge current capability (20A, tp=8/20µs). The combination of small size and high ESD and surge capability makes them ideal for use in applications such as portables, wearables and various industrial equipment.

Features

- Transient protection for VBus and data lines to
  - IEC 61000-4-2 (ESD): 20kV (contact), 20kV (air)
  - IEC 61000-4-5 (Lightning): 20A (8/20µs)
- Protects one line
- Low ESD clamping voltage
- Working voltage: 5.5V
- Low reverse leakage current
- Solid-state silicon-avalanche technology

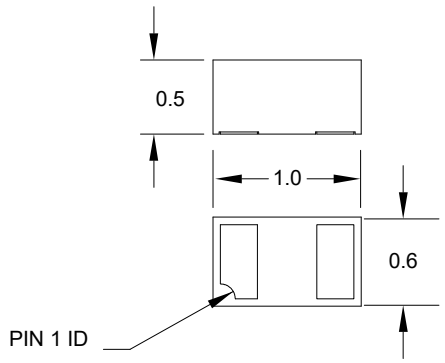
Applications

- 5.5V VBus Protection
- Tablets
- Personal Computers
- Instrumentation
- CCTV Cameras

Mechanical Characteristics

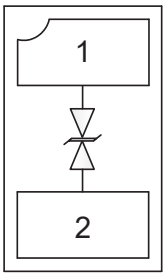
- Package: DFN 1.0x0.6x0.50mm 2-Lead
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Molding compound flammability rating: UL 94V-0
- Lead Finish: NiPdAu
- Marking: Marking code
- Packaging: Tape and Reel

Nominal Dimensions



Nominal Dimensions in mm

Schematic and Pin Configuration



DFN 1.00 x 0.60 x0.50mm 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}	20	A
ESD per IEC 61000-4-2 (Contact)(1)	V_{ESD}	±20	kV
ESD per IEC 61000-4-2 (Air)(1)		±20	
Operating Temperature	T_J	-40 to +85	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics

T=25°C unless otherwise specified

All data taken from Pin 1 to 2 unless otherwise specified

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse Stand-Off Voltage	V_{RWM}				5.5	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	6.0	8.5	10	V
Reverse Leakage Current	I_R	V_{RWM} = 5.5V			800	nA
Clamping Voltage	V_C	t_p = 8/20us, I_{PP} = 20A			11.5	V
ESD Clamping Voltage(2)	V_C	I_{TLP}=16A, t_p=0.2/100ns (TLP)		9.0		V
Junction Capacitance	C_J	V_R = 0V, f = 1MHz			40	pF

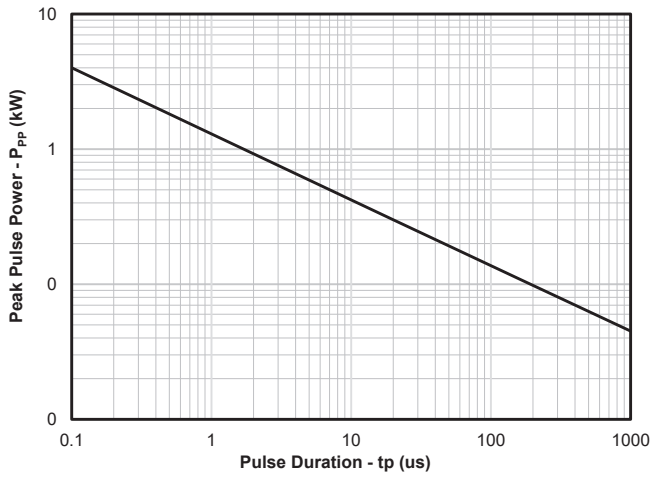
Notes:

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

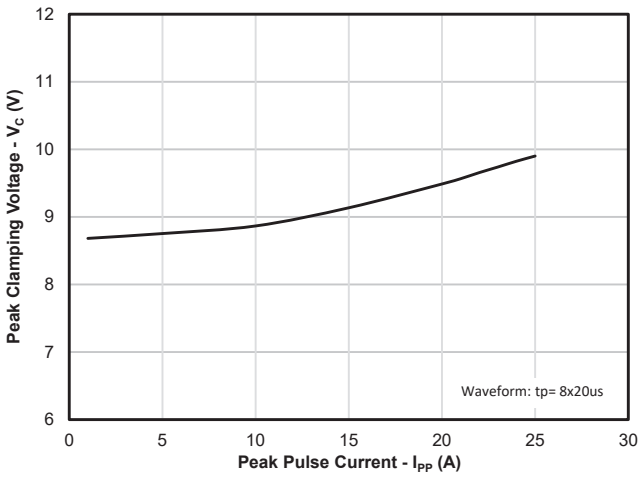
(2): Transmission Line Pulse Test (TLP) Settings: tp = 100ns, tr = 0.2ns, I_{TLP} and V_{TLP} averaging window: t_1 = 70ns to t_2 = 90ns

Typical Characteristics

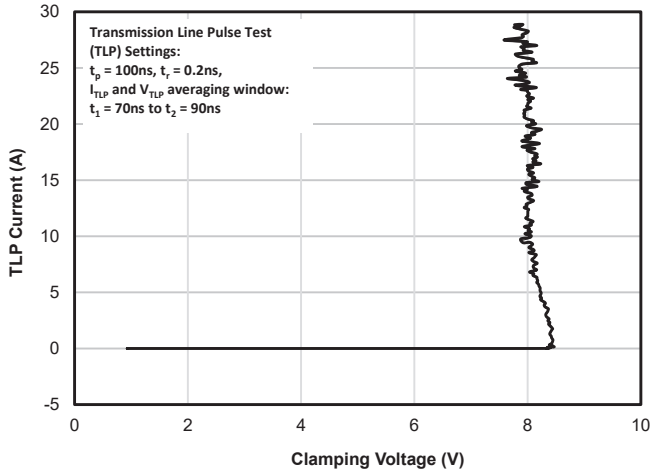
Non-Repetitive Peak Pulse Power vs. Pulse Time



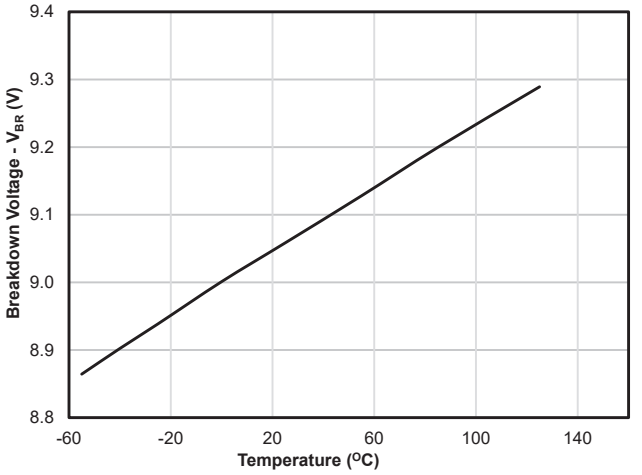
Clamping Voltage vs. Peak Pulse Current (tp=8/20µs)



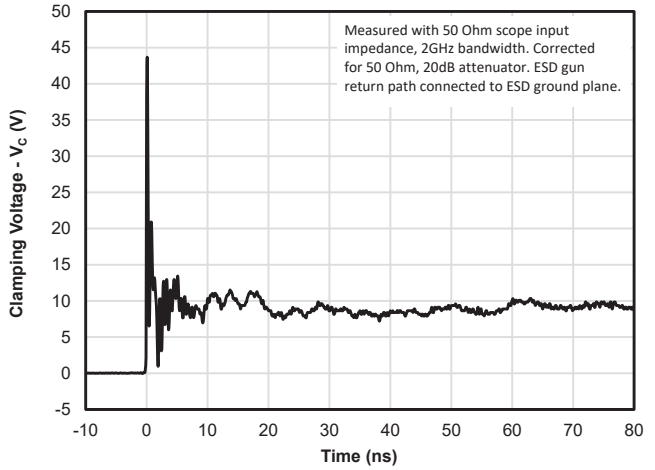
TLP Charateristic



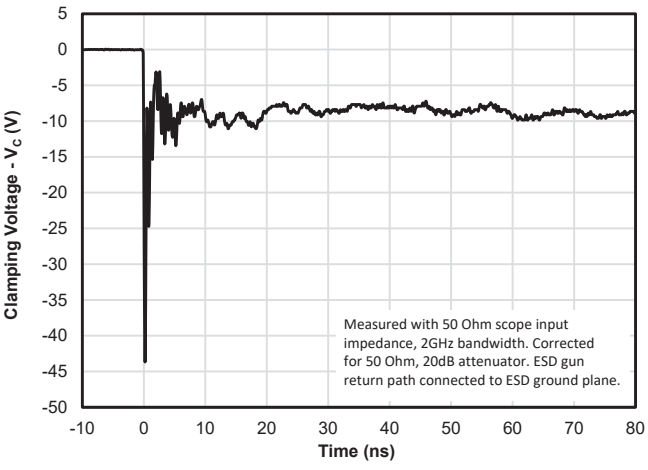
Typical Breakdown Voltage vs. Temperature



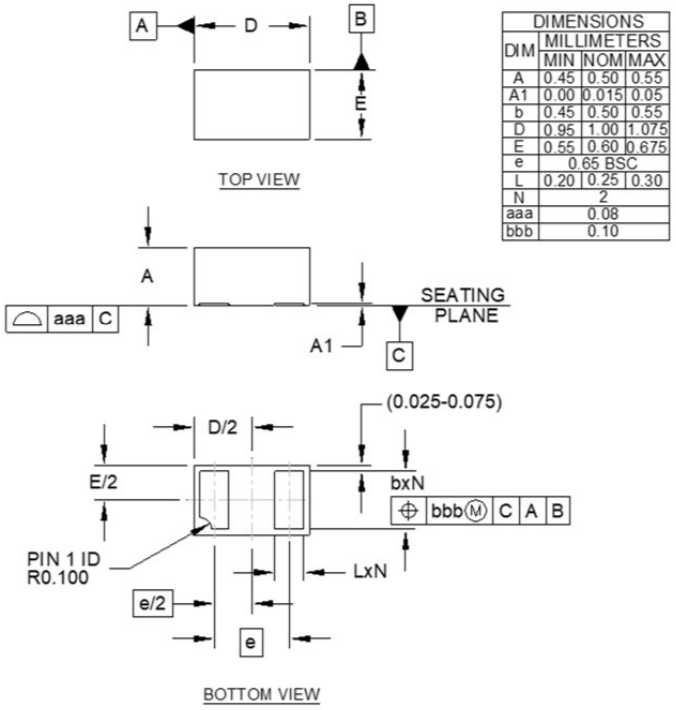
ESD Clamping (+8kV Contact per IEC 61000-4-2)



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



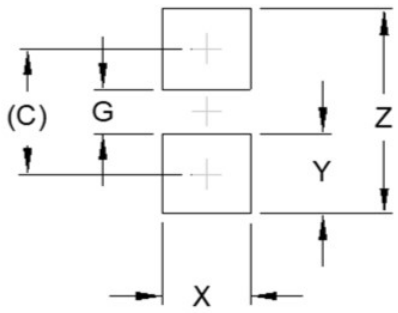
Outline Drawing - DFN 1.00 x 0.60 x 0.50mm 2-Lead



DIMENSIONS			
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.45	0.50	0.55
A1	0.00	0.015	0.05
b	0.45	0.50	0.55
D	0.95	1.00	1.075
E	0.55	0.60	0.675
e	0.65 BSC		
L	0.20	0.25	0.30
N	2		
aaa	0.08		
bbb	0.10		

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

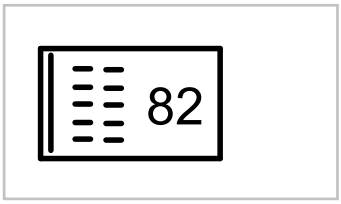
Landing Pattern - DFN 1.00 x 0.60 x 0.50mm 2-Lead



DIMENSIONS	
DIM	MILLIMETERS
(C)	0.85
G	0.30
X	0.60
Y	0.55
Z	1.40

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



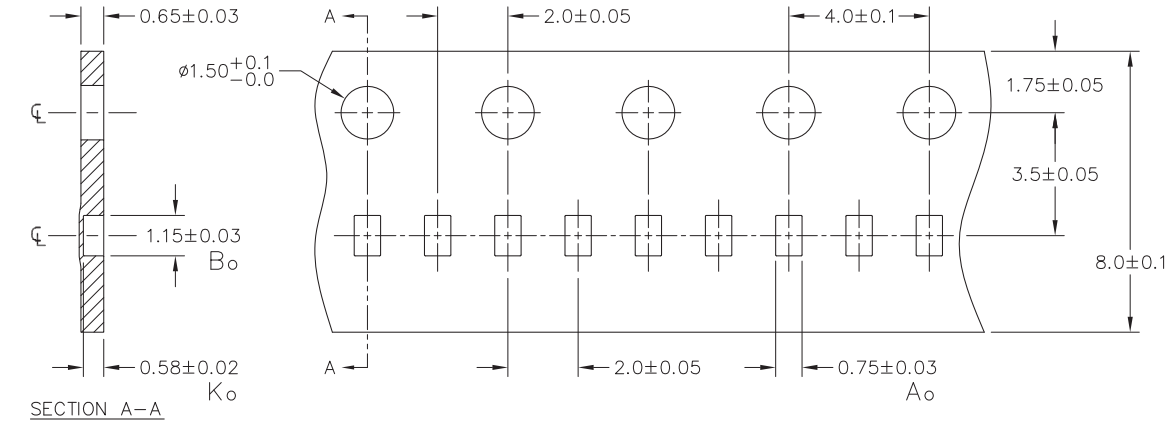
Notes:

(1) Device is electrically symmetrical.

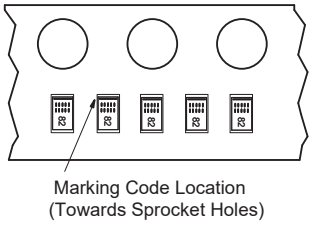
(2) Marking will also include line matrix date code.

(3) Bar indicates Pin 1 location.

Tape and Reel Specification



NOTES: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.



Order Information

PART NUMBER	QTY PER REEL	REEL SIZE
uClamp5581P.F	15,000	7"

MicroClamp, uClamp and µClamp are registered trademarks of Semtech Corporation.

Important Notice

Information relating to this product and the application or design described herein is believed to be reliable, however such information is provided as a guide only and Semtech assumes no liability for any errors in this document, or for the application or design described herein. Semtech reserves the right to make changes to the product or this document at any time without notice. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. Semtech warrants performance of its products to the specifications applicable at the time of sale, and all sales are made in accordance with Semtech's standard terms and conditions of sale.

Product features listed in this datasheet may be suitable for "non-safety" applications in Automotive use cases. Information in this datasheet for such applications is provided as a guide only. No safety claim is made in respect of the product described in this datasheet when used in Automotive safety systems or security devices, including systems for controlling vehicles and other transportation equipment; responsibility for achieving safety goals belongs solely to the buyer and/or integrators. Semtech is under no obligation to provide any data regarding safety integration to the buyer or any integrator.

SEMTECH PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN AUTOMOTIVE SAFETY OR SECURITY DEVICES, INCLUDING SYSTEMS FOR CONTROLLING VEHICLES AND OTHER TRANSPORTATION EQUIPMENT, LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS, OR IN NUCLEAR APPLICATIONS IN WHICH THE FAILURE COULD BE REASONABLY EXPECTED TO RESULT IN PERSONAL INJURY, LOSS OF LIFE OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. INCLUSION OF SEMTECH PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE UNDERTAKEN SOLELY AT THE CUSTOMER'S OWN RISK. Should a customer purchase or use Semtech products for any such unauthorized application, the customer shall indemnify and hold Semtech and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs damages and attorney fees which could arise.

The Semtech name and logo are registered trademarks of the Semtech Corporation. All other trademarks and trade names mentioned may be marks and names of Semtech or their respective companies. Semtech reserves the right to make changes to, or discontinue any products described in this document without further notice. Semtech makes no warranty, representation or guarantee, express or implied, regarding the suitability of its products for any particular purpose. All rights reserved.

© Semtech 2024