Absolute Maximum Rating

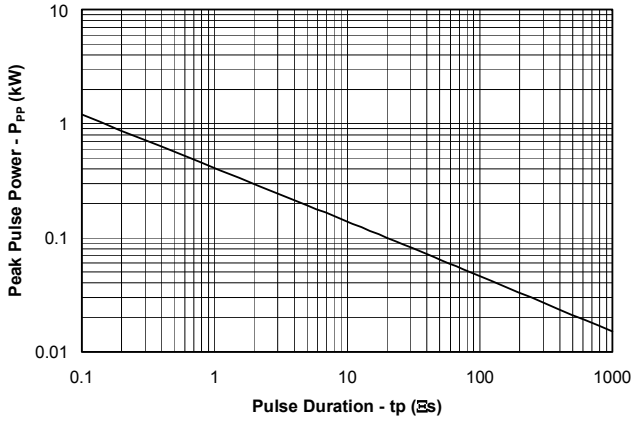
Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20µs)	P_{pk}	100	Watts
Peak Pulse Current (tp = 8/20µs)	I_{PP}	10	A
ESD Voltage (HBM Waveform per IEC 61000-4-2)	V_{PP}	30	kV
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics

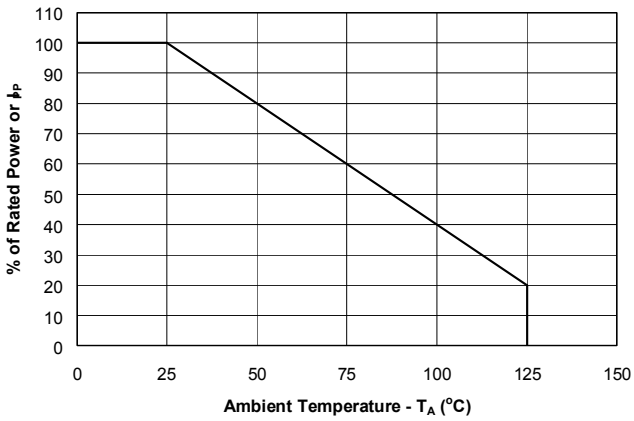
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				3.3	V
Punch-Through Voltage	V_{PT}	I_{PT} = 2µA	3.5			V
Snap-Back Voltage	V_{SB}	I_{SB} = 50mA	2.8			V
Reverse Leakage Current	I_R	V_{RWM} = 3.3V, T=25°C			0.5	µA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20µs Pin 1 to 2			4.5	V
Clamping Voltage	V_C	I_{PP} = 5A, tp = 8/20µs Pin 1 to 2			5.5	V
Clamping Voltage	V_C	I_{PP} = 10A, tp = 8/20µs Pin 1 to 2			9.5	V
Steering Diode Forward Voltage (Reverse Clamping Voltage)	V_F	I_{PP} = 1A, tp = 8/20µs Pin 2 to 1			1.8	V
Junction Capacitance	C_j	V_R = 0V, f = 1MHz			50	pF

Typical Characteristics

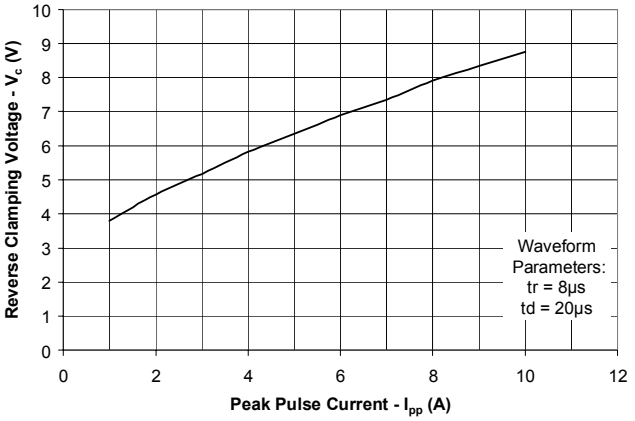
Non-Repetitive Peak Pulse Power vs. Pulse Time



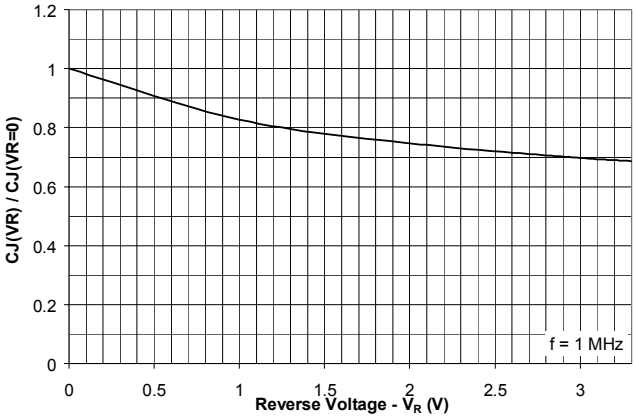
Power Derating Curve



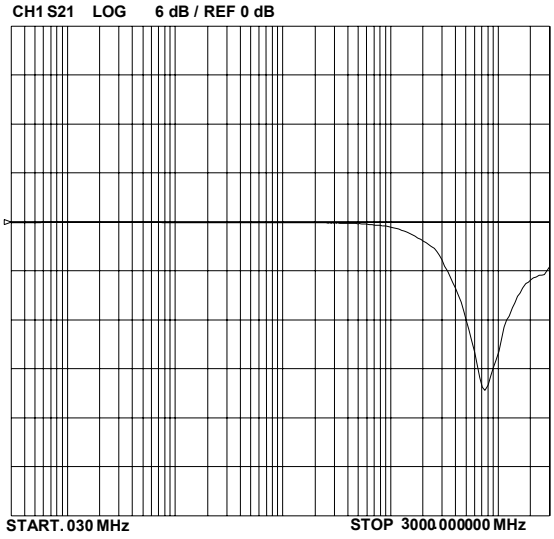
Clamping Voltage vs. Peak Pulse Current



Normalized Capacitance vs. Reverse Voltage



Insertion Loss S21



Applications Information

Device Connection Options

The µClamp3301D is designed to protect one I/O, or power supply line. It will present a high impedance to the protected line up to 3.3 volts. It will "turn on" when the line voltage exceeds 3.5 volts. The device is unidirectional and may be used on lines where the signal polarity is above ground. The cathode band should be placed towards the line that is to be protected.

Due to the "snap-back" characteristics of the low voltage TVS, it is not recommended that the I/O line be directly connected to a DC source greater than snap-back votlage (V_{SB}) as the device can latch on as described below.

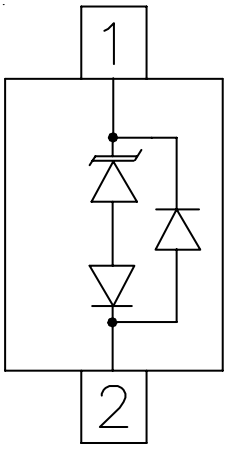
EPD TVS Characteristics

The µClamp3301D is constructed using Semtech's proprietary EPD technology. The structure of the EPD TVS is vastly different from the traditional pn-junction devices. At voltages below 5V, high leakage current and junction capacitance render conventional avalanche technology impractical for most applications. However, by utilizing the EPD technology, the µClamp3301D can effectively operate at 3.3V while maintaining excellent electrical characteristics.

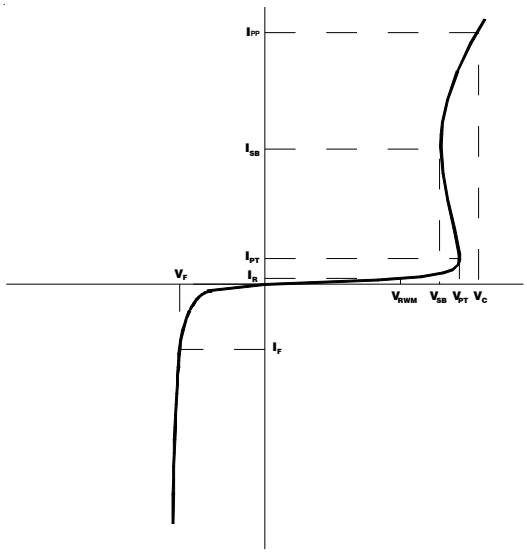
The EPD TVS employs a complex nppn structure in contrast to the pn structure normally found in traditional silicon-avalanche TVS diodes. Since the EPD TVS devices use a 4-layer structure, they exhibit a slightly different IV characteristic curve when compared to conventional devices. During normal operation, the device represents a high-impedance to the circuit up to the device working voltage (V_{RWM}). During an ESD event, the device will begin to conduct and will enter a low impedance state when the punch through voltage (V_{PT}) is exceeded. Unlike a conventional device, the low voltage TVS will exhibit a slight negative resistance characteristic as it conducts current. This characteristic aids in lowering the clamping voltage of the device, but must be considered in applications where DC voltages are present.

When the TVS is conducting current, it will exhibit a slight "snap-back" or negative resistance characteristics due to its structures. This point is defined on the curve by the snap-back voltage (V_{SB}) and snap-back current (I_{SB}). To return to a non-conducting state, the current through the device must fall below the I_{SB} (approximately <50mA) and the voltage must fall below the V_{SB} (normally 2.8 volts for a 3.3V device). If a 3.3V TVS is connected to 3.3V DC source, it will never fall below the snap-back voltage of 2.8V and will therefore stay in a conducting state.

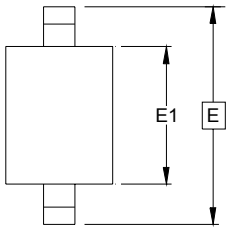
Device Schematic & Pin Configuration



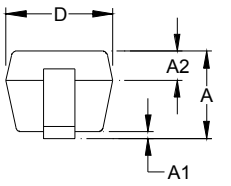
EPD TVS IV Characteristic Curve

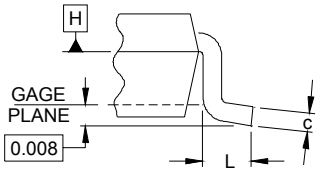


Outline Drawing - SOD-323

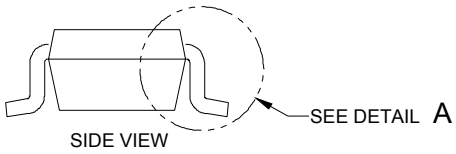


DIM	DIMENSIONS					
	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.36	-	.046	0.91	-	1.17
A1	.000	-	.004	0.00	-	0.10
A2	.012	-	.016	0.30	-	0.40
b	.013	-	.017	0.33	-	0.43
c	.005	-	.008	0.13	-	0.20
D	.044	.050	.054	1.18	1.28	1.37
E1	.060	.065	.070	1.50	1.64	1.78
E	.097	.102	.107	2.46	2.59	2.72
L	.010	.014	.018	0.25	0.35	0.45
N	2			2		





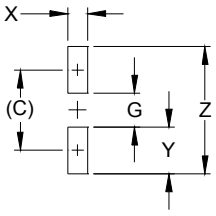
DETAIL A



NOTES:

1. CONTROLLING DIMENSIONS ARE IN INCHES (ANGLES IN DEGREES).
2. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

Land Pattern - SOD-323

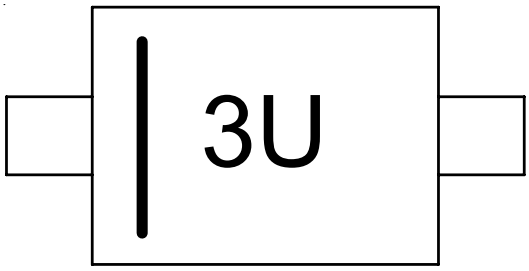


DIM	DIMENSIONS	
	INCHES	MILLIMETERS
C	(.085)	(2.15)
G	.035	0.90
X	.021	0.53
Y	.049	1.25
Z	.134	3.40

NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

Marking Code



Ordering Information

Part Number	Working Voltage	Qty per Reel	Reel Size
uClamp3301D.TCT	3.3V	3,000	7”

Contact Information for Semtech International AG

Taiwan Branch Tel: 886-2-2748-3380 Fax: 886-2-2748-3390

Korea Branch Tel: 82-2-527-4377 Fax: 82-2-527-4376

Shanghai Office Tel: 86-21-6391-0830 Fax: 86-21-6391-0831

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Semtech Switzerland GmbH Japan Branch Tel: 81-3-6408-0950 Fax: 81-3-6408-0951

Semtech Limited (U.K.) Tel: 44-1794-527-600 Fax: 44-1794-527-601

Semtech France SARL Tel: 33-(0)169-28-22-00 Fax: 33-(0)169-28-12-98

Semtech Germany GmbH Tel: 49-(0)8161-140-123 Fax: 49-(0)8161-140-124