Description

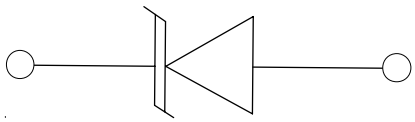
The Clamp™ series of Transient Voltage Suppressors (TVS) are designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and PDAs. They offer superior electrical characteristics such as lower clamping voltage and no device degradation when compared to MLVs. They are are designed to protect sensitive semiconductor components from damage or upset due to electrostatic discharge (ESD), lightning, electrical fast transients (EFT), and cable discharge events (CDE).

The UClamp3301D is constructed using proprietary EPD process technology.

The EPD process provides low standoff voltages with significant reduc-tions in leakage currents and capacitance over silicon-avalanche diode processes. They feature a true operating voltage of 3.3 volts for superior protection when compared to traditional pn junction devices.

The UClamp3301D is in a SOD-323 package and will protect one unidirectional line. They give the designer the flexibility to protect one line in applications where arrays are not practical.

They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 (±15kV air, ±8kV contact discharge).



Features

100 Watts peak pulse power (tp = 8/20μs)
Transient protection for data lines to
IEC 61000-4-2 (ESD) ±15kV (air), ±8kV (contact)
IEC 61000-4-4 (EFT) 40A (tp = 5/50ns)
IEC 61000-4-5 (Lightning) 10A (tp = 8/20μs)
Small package for use in portable electronics
Suitable replacement for MLVs in ESD protection applications
Protects one line
Low clamping voltage
Working voltages: 3.3V
Low leakage current
Solid-state silicon-avalanche technology

Mechanical Characteristics

EIAJ SOD-323 package
Molding compound flammability rating: UL 94V-0
Lead Finish: Matte tin
RoHS/WEEE Compliant

Applications

Cell Phone Handsets and Accessories
Laser Diode Protection
Notebooks, Desktops, & Servers
Portable Instrumentation
Analog Inputs

Absolute Maximum Rating

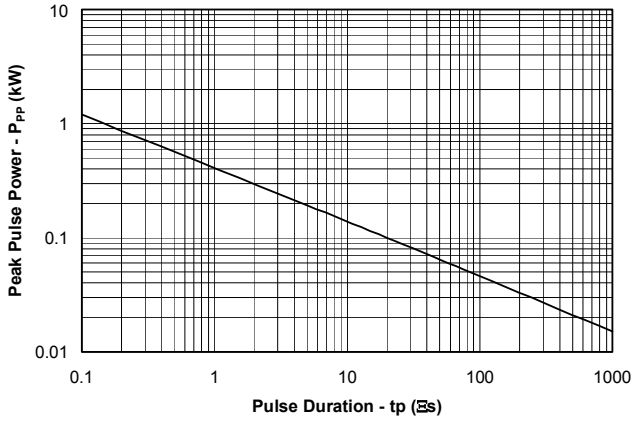
Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P_{pk}	100	Watts
Peak Pulse Current (tp = 8/20μs)	I_{PP}	10	A
ESD Voltage (HBM Waveform per IEC 61000-4-2)	V_{PP}	30	kV
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics

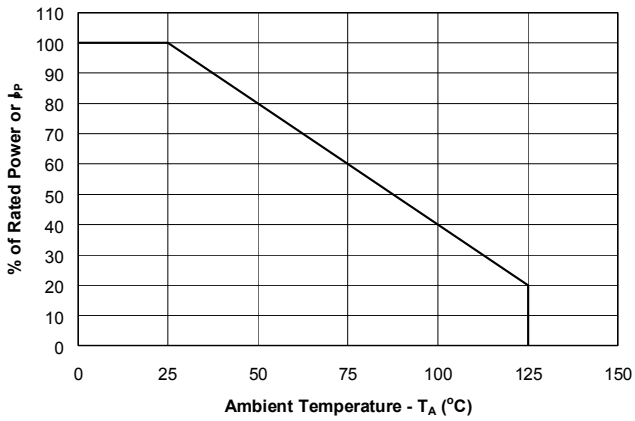
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				3.3	V
Punch-Through Voltage	V_{PT}	I_{PT} = 2μA	3.5			V
Snap-Back Voltage	V_{SB}	I_{SB} = 50mA	2.8			V
Reverse Leakage Current	I_R	V_{RWM} = 3.3V, T=25°C			0.5	μA
Clamping Voltage	V_C	I_{PP} = 1A, tp = 8/20μs 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

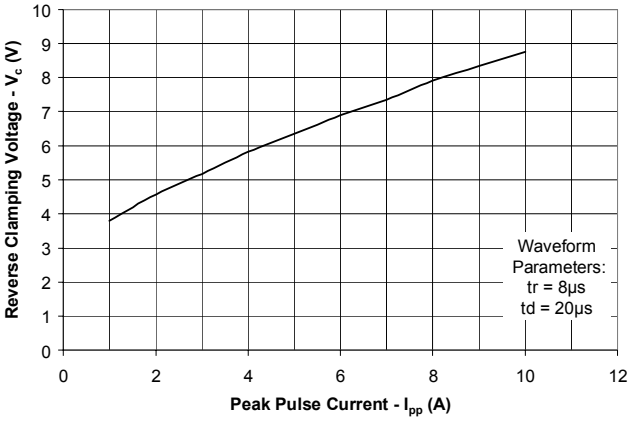
Non-Repetitive Peak Pulse Power vs. Pulse Time



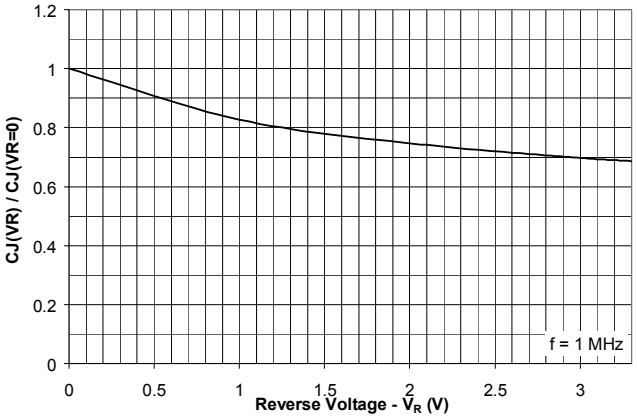
Power Derating Curve



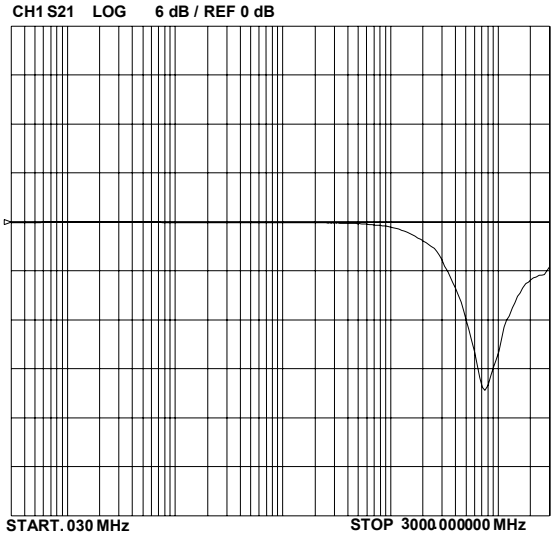
Clamping Voltage vs. Peak Pulse Current



Normalized Capacitance vs. Reverse Voltage



Insertion Loss S21



Applications Information

Device Connection Options

The ULCAMP3301D 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 snapback votlage (V_{SB}) as the device can latch on as described below.

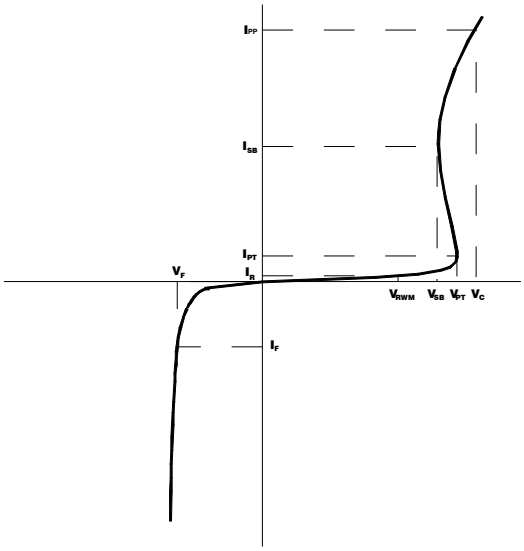
EPD TVS Characteristics

The ULCAMP3301D is constructed using 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 ava-lanche technology impractical for most applications. However, by utilizing the EPD technology, the ULCAMP3301D can effectively operate at 3.3V while maintaining excellent electrical characteristics.

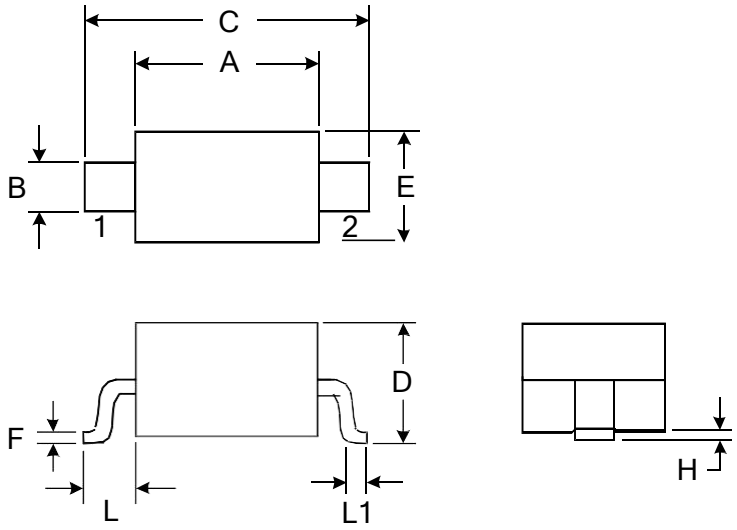
The EPD TVS employs a complex nppn structure in contrast to the pn structure normally found in traditional silicon-avalanche TVS diodes. Since the EPD TVS devices use a 4-layer structure, they exhibit a slightly different IV characteristic curve when compared to conventional devices. During normal operation, 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.

EPD TVS IV Characteristic Curve



Outline Drawing - SOD-323



DIMENSIONS				
SYMBOL	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	1.600	1.800	0.063	0.071
B	0.250	0.350	0.010	0.014
C	2.500	2.700	0.098	0.106
D		1.000		0.039
E	1.200	1.400	0.047	0.055
F	0.080	0.150	0.003	0.006
L	0.475 REF		0.019REF	
L1	0.250	0.400	0.010	0.016
H	0.000	0.100	0.000	0.004

Marking

Ordering information

Order code	Package	Baseqty	Delivery mode
UCLAMP3301D	SOD-323	3000	Tape and reel