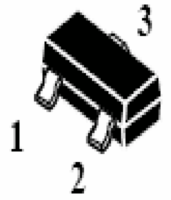
SLVU2.8 Utralow Capacitance Transient Voltage Suppressors

Features

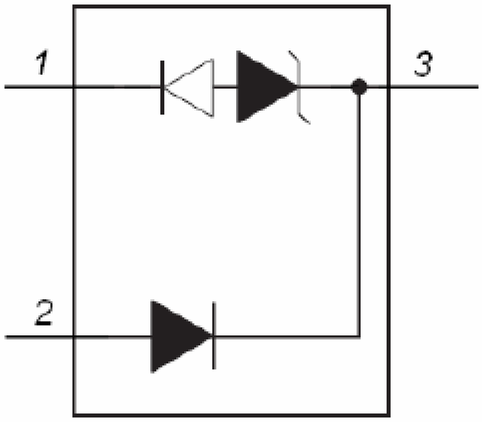


SOT-23

- 400 W Peak Pulse Power per Line (tp=8/20 s)
- One Device Protects one Unidirectional Line.
- Low Capacitance.
- Low Leakage Current.
- Low Operating and Clamping Voltages.
- Transient Protection for High Speed Data Lines to
  IEC61000-4-2(ESD)±15kV(air),±8kV(Contact)
  IEC61000-4-4(EFT) 40A(5/50ns)
  IEC61000-4-5(lightning) 24A(8/20us)

General Description

The Utralow Capacitance Transient Voltage Suppressors are designed to low votage, integrated circuits from transients caused by electrostatic discharge (ESD), electrical fast transients (EFT), tertiary lightning and other induced voltages.



Applications

- Ethernet – 10/100/1000 Base T
- WAN/LAN Equipment
- Desktops,Servers,Notebooks & Handhelds
  Laser Diode Protection

Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Peak Pulse Power (t_p = 8/20μs) - See Fig1.	P_{PK}	400	W
Peak Pulse Current (t_p = 8/20μs)	I_{PP}	24	A
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C

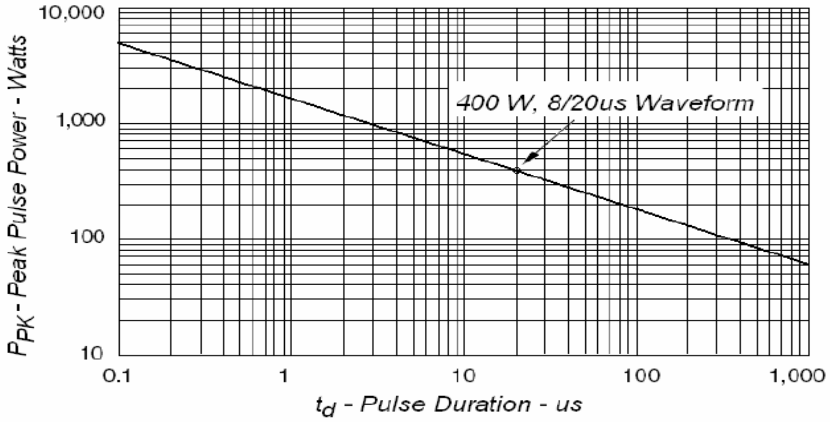


Fig1. Peak Pulse Power VS Pulse Time

Electrical Parameter

Symbol	Parameter
I_{PP}	Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Reverse Stand-Off Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{SB}	Snap-Back Voltage @ I_{SB}
I_{SB}	Snap-Back Current
V_{PT}	Punch-Through Voltage
I_{PT}	Punch-Through Current
V_{BRR}	Reverse Breakdown Voltage @ I_{BRR}
I_{BRR}	Reverse Breakdown Current

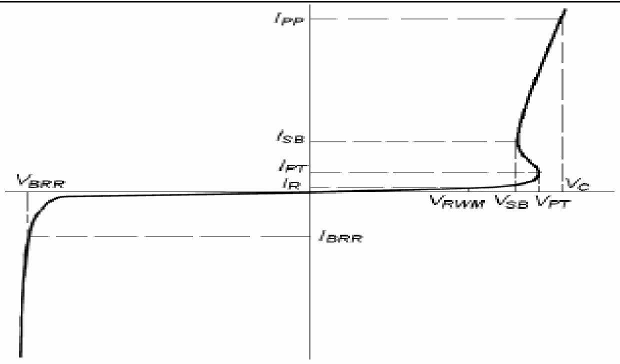


Fig2. SLVU2.8 IV Characteristic Curve

Electrical Characteristics

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}	Pin 3 to 1 or Pin 2 to 1			2.8	V
Punch-Through Voltage	V_{PT}	I_{PT} = 2uA, Pin 3 to 1	2.8			V
Snap-Back Voltage	V_{SB}	I_{SB} = 50mA, Pin 3 to 1	2.8			V
Reverse Leakage Current	I_R	V_{RWM} =2.8V, T=25℃ Pin 3 to 1 or Pin 2 to 1			1	uA
Clamping Voltage	V_C	I_{PP} =2A, t_P=8/20us Pin 3 to 1			3.9	V
Clamping Voltage	V_C	I_{PP} =5A, t_P=8/20us Pin 3 to 1			7	V
Clamping Voltage	V_C	I_{PP} =24A, t_P=8/20us Pin 3 to 1			12.5	V
Clamping Voltage	V_C	I_{PP} =5A, t_P=8/20us Pin 2 to 1			8.5	V
Clamping Voltage	V_C	I_{PP} =24A, t_P=8/20us Pin 2 to 1			15	V
Junction Capacitance	C_j	Pin 3 to 1 and 2 (Pin 1 and 2 tied together) VR =0V, f =1MHz		70	100	pF
Junction Capacitance	C_j	Pin 2 to 1 (Pin 3 N.C.) VR =0V, f =1MHz		3.5	5	pF

Steering Diode Characteristics						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Breakdown Voltage	V_{BRR}	I_T =10uA, Pin 3 to 2	40			V
Reverse Leakage Current	I_{BRR}	V_{RWM} =2.8V, T =25℃ Pin 3 to 2			1	UA
Forward Voltage	V_F	I_F =1A, Pin 2 to 3			2	V

Typical Characteristics

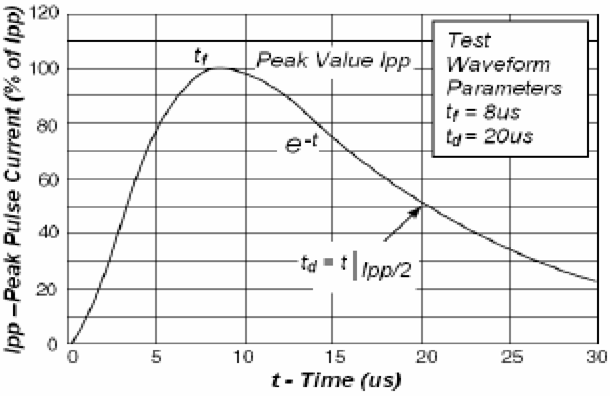


Fig3. Pulse Waveform

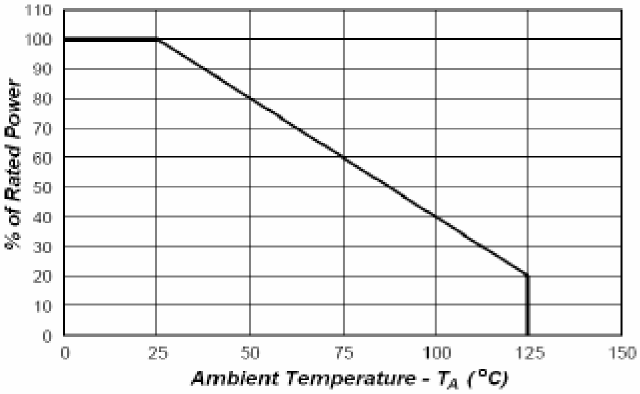


Fig4. Power Derating Curve

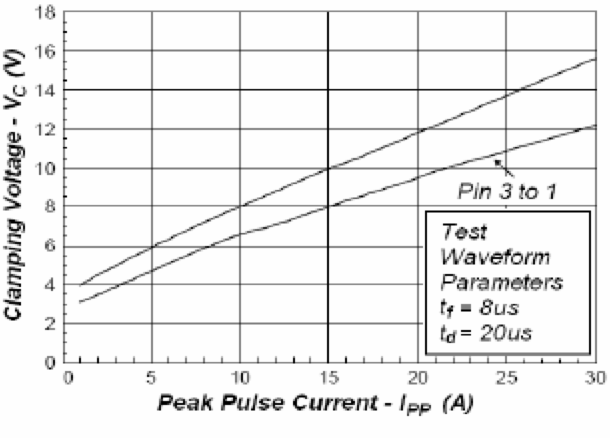


Fig5. Clamping Voltage vs. Peak Pulse Current

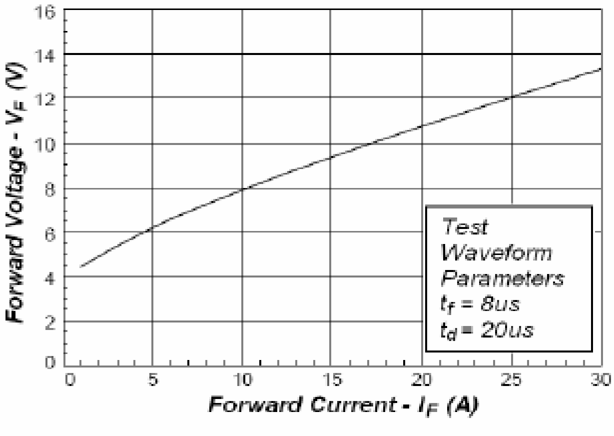


Fig6. Forward Voltage vs. Forward Current

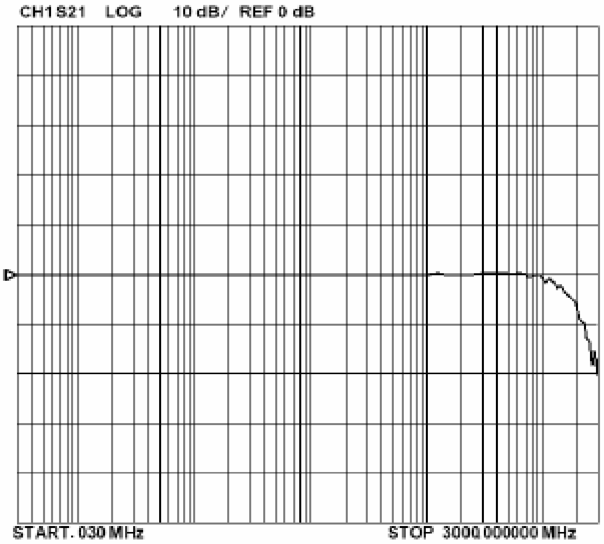


Fig7. Insertion Loss S21

Application Note

The SLVU2.8 is ideal for providing protection for electronic equipment that is susceptible to damage caused by Electrostatic Discharge (ESD), Electrical Fast Transients (EFT) and tertiary lightning effects. This product is offered in a unidirectional configuration and provides both commonmode or differential-mode protection.

Unidirectional Common-Mode Protection (Figure 9)

The SLVU2.8 provides one line of unidirectional protection in a common-mode configuration as depicted in figure 9.

Circuit connectivity is as follows:

- Line 1 is connected to Pin 3
- Pins 1 and 2 are connected to ground

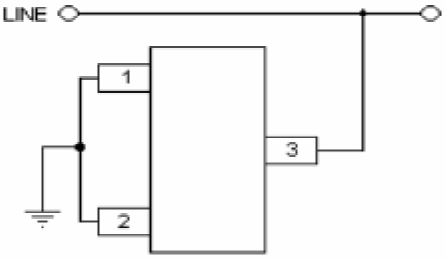


Fig9.

Bidirectional Common-Mode Protection (Figure 10)

Two SLVU2.8 devices provide one line of bidirectional protection in a common-mode configuration as depicted in figure 10.

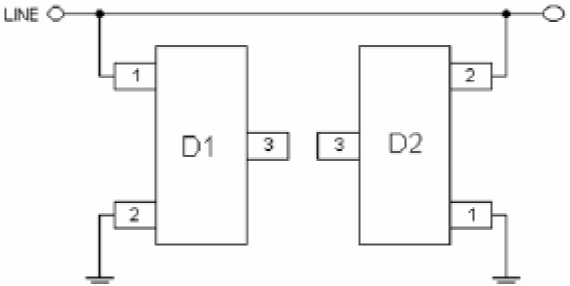


Fig10.

Circuit connectivity is as follows:

- Line 1 is connected to Pin1 of Device 1 & Pin 2 of Device 2
- Pin 2 of Device 1 and Pin 1 of Device 2 are connected to ground
- Pin 3 of both devices is not connected

Bidirectional Differential-Mode Protection (Figure 11)

Two SLVU2.8 devices provide up to two lines of bidrectional protection in a differenitalmode configuration as depicted in figure 11.

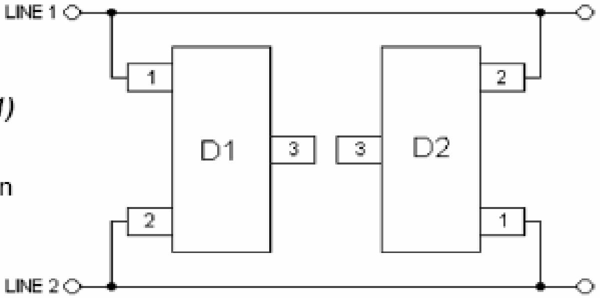


Fig11.

Circuit connectivity is as follows:

- Line 1 is connected to Pin1 of Device 1 & Pin 2 of Device 2
- Line 2 is connected to Pin 2 of Device 1 & Pin 1 of Device 2

Circuit Board Layout Protection

Circuit board layout is critical for Electromagnetic Compatibility (EMC) protection. The following guidelines are recommended:

- The protection device should be placed near the input terminals or connectors, the device will divert the transient current immediately before it can be coupled into the nearby traces.
- The path length between the TVS device and the protected line should be minimized.
- All conductive loops including power and ground loops should be minimized.
- The transient current return path to ground should be kept as short as possible to reduce parasitic inductance.
- Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

Typical Applications

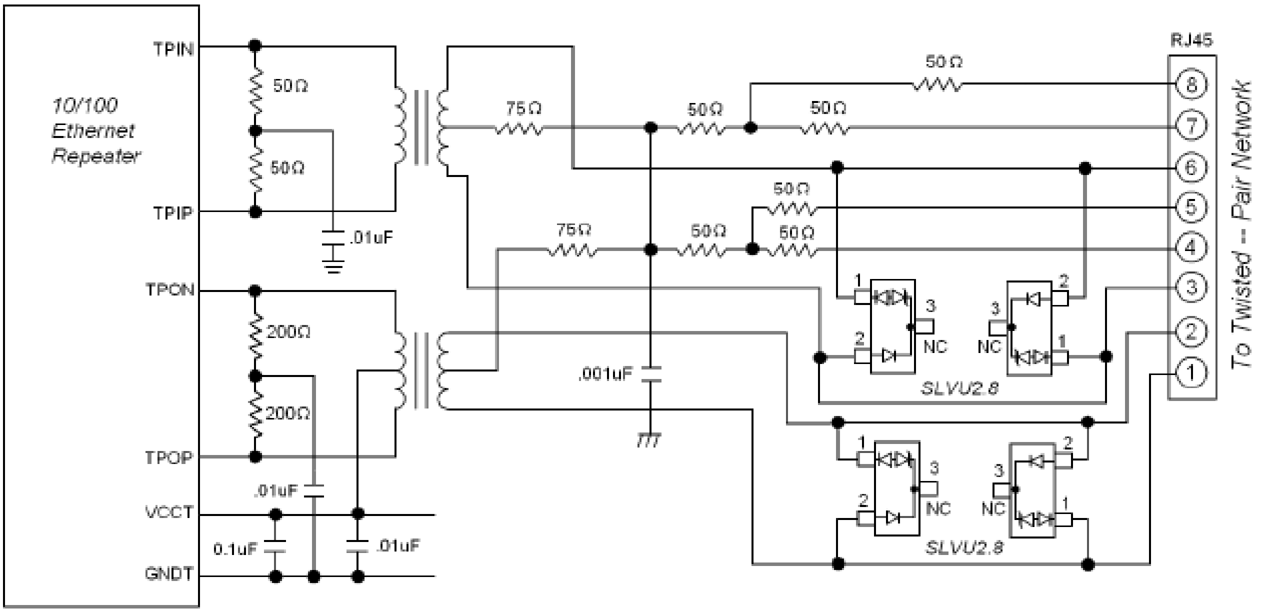


Fig12. 10/100 Ethernet Protection Circuit

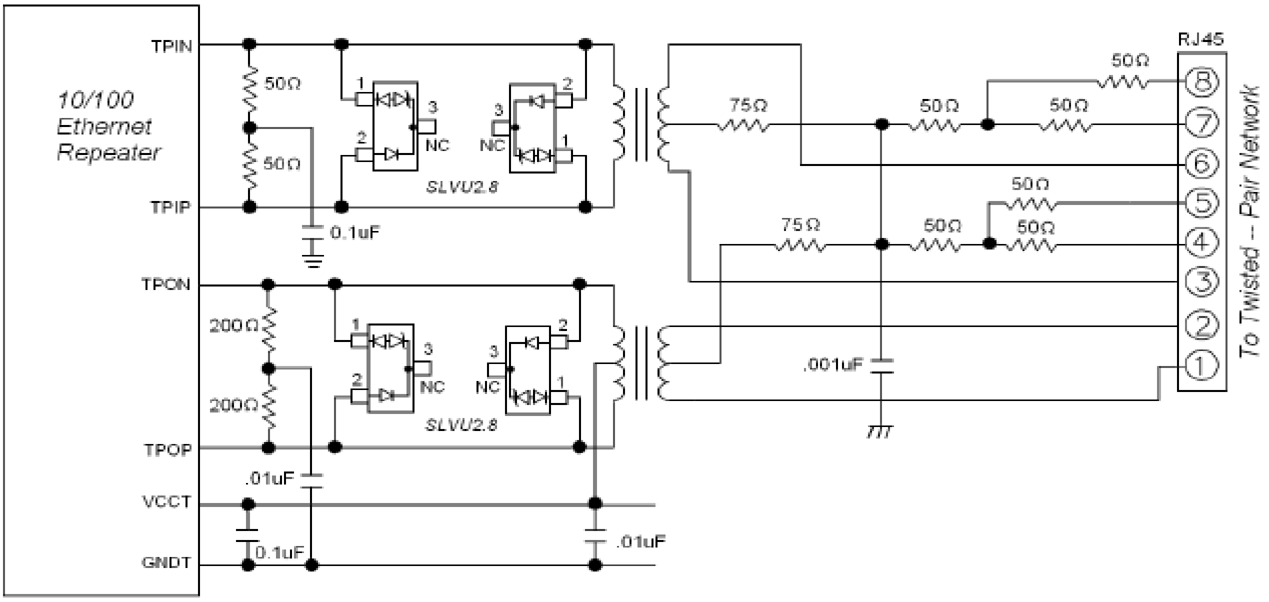


Fig13. 10/100 Ethernet “Enhanced” Lightning Protection Circuit

SOT-23 MECHANICAL DATA

Dim	Millimeters		
	Min	TYP	Max
A	1.00		1.40
A1	0		0.10
A2	1.00		1.30
b	0.35		0.50
c	0.10		0.20
D	2.70	2.90	3.10
E	2.40		2.80
E1	1.40		1.60
e	0.85		1.15
e1		1.90	
L1	0.40	.	
q	0°		10°
S	0.45		0.55