

## STEERING DIODE/ TVS ARRAY COMBO

## APPLICATIONS

- ✓ Ethernet - 10/100 Base T
- ✓ FireWire
- ✓ Wireless Communications
- ✓ USB Interface

## IEC COMPATIBILITY (EN61000-4)

- ✓ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- ✓ 61000-4-4 (EFT): 40A - 5/50ns
- ✓ 61000-4-5 (Surge): 24A, 8/20 $\mu$ s - Level 2(Line-Gnd) & Level 3(Line-Line)

## FEATURES

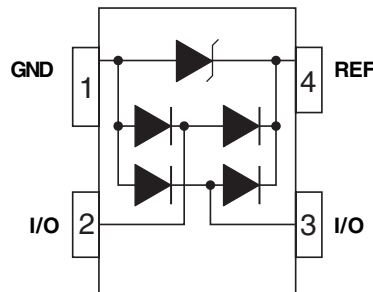
- ✓ ESD Protection > 25 kilovolts
- ✓ 500 Watts Peak Power per Line (tp = 8/20 $\mu$ s)
- ✓ Low Clamping Voltage
- ✓ Unidirectional Configuration
- ✓ Protects 2 I/O Ports and Power Supply
- ✓ Low Capacitance: 10pF
- ✓ RoHS Compliant

## MECHANICAL CHARACTERISTICS

- ✓ Molded JEDEC SOT-143
- ✓ Weight 9 milligrams (Approximate)
- ✓ Available Lead-Free Pure-Tin Plating(Annealed)
- ✓ Solder Reflow Temperature:  
Pure-Tin - Sn, 100: 260-270°C
- ✓ Flammability Rating UL 94V-0
- ✓ 8mm Tape and Reel Per EIA Standard 481
- ✓ Marking: Marking Code



## PIN CONFIGURATION



## DEVICE CHARACTERISTICS

### MAXIMUM RATINGS @ 25°C Unless Otherwise Specified

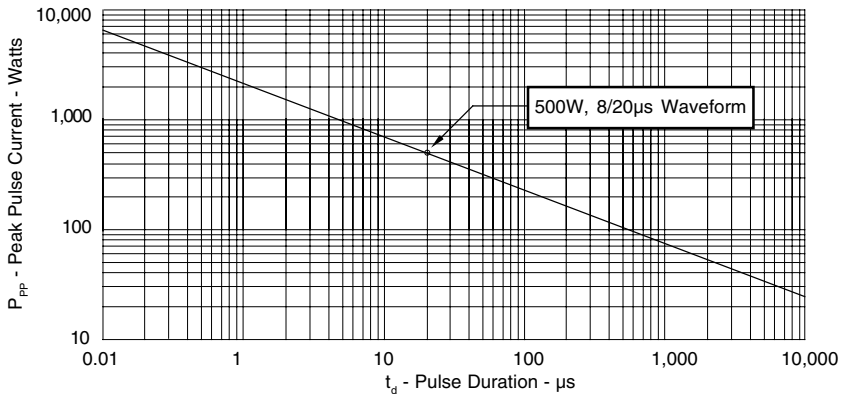
PARAMETER	SYMBOL	VALUE	UNITS
Peak Pulse Power (tp = 8/20µs) - See Figure 1	P <sub>PP</sub>	500	Watts
Operating Temperature	T <sub>J</sub>	-55°C to 150°C	°C
Storage Temperature	T <sub>STG</sub>	-55°C to 150°C	°C
Peak Forward Voltage - I <sub>F</sub> = 1A, 8/20µs	V <sub>F</sub>	1.5	Volts

### ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

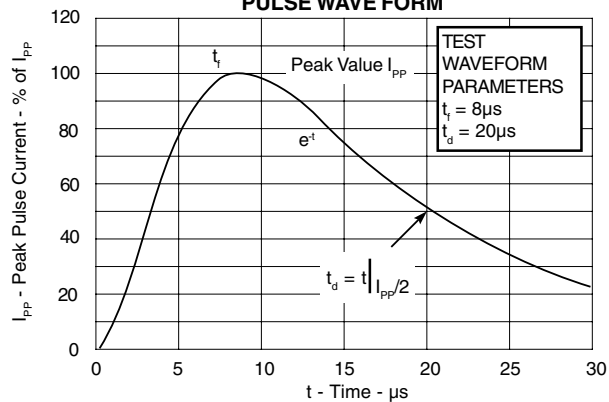
PART NUMBER	DEVICE MARKING	RATED STAND-OFF VOLTAGE  V <sub>WM</sub> VOLTS	MINIMUM BREAKDOWN VOLTAGE  @ 1mA V <sub>(BR)</sub> VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2)  @ I <sub>p</sub> = 1A V <sub>C</sub> VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2)  8/20µs V <sub>C</sub> @ I <sub>PP</sub> VOLTS	MAXIMUM LEAKAGE CURRENT  @ V <sub>WM</sub> I <sub>b</sub> µA	MAXIMUM CAPACITANCE (See Note 1) (See Fig. 5) (Per Data Line) @ 0V, 1 MHz C <sub>J(SD)</sub> pF
SR12	12A	12.0	13.3	19.0	30.0V @ 16.0A	1.0	10

**Note 1:** As shown in Figure 5, REF 1 is connected to ground, REF 2 is connected to +V<sub>CC</sub> and input applies to V<sub>CC</sub> = 12V, V<sub>sign</sub> = 30mV, F = 1MHz.

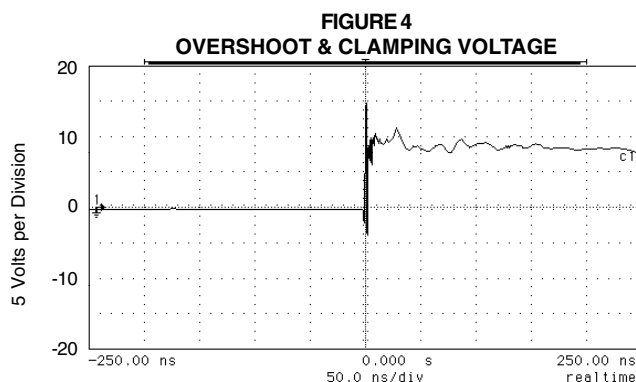
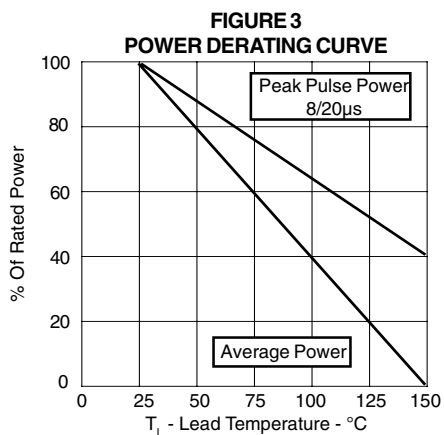
**FIGURE 1**  
PEAK PULSE POWER VS PULSE TIME



**FIGURE 2**  
PULSE WAVE FORM

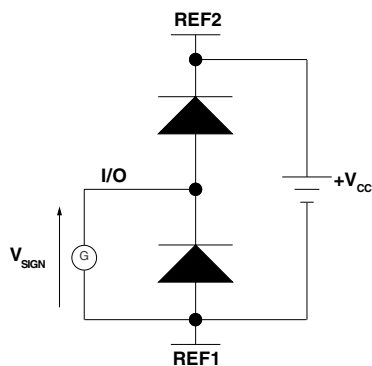


GRAPHS

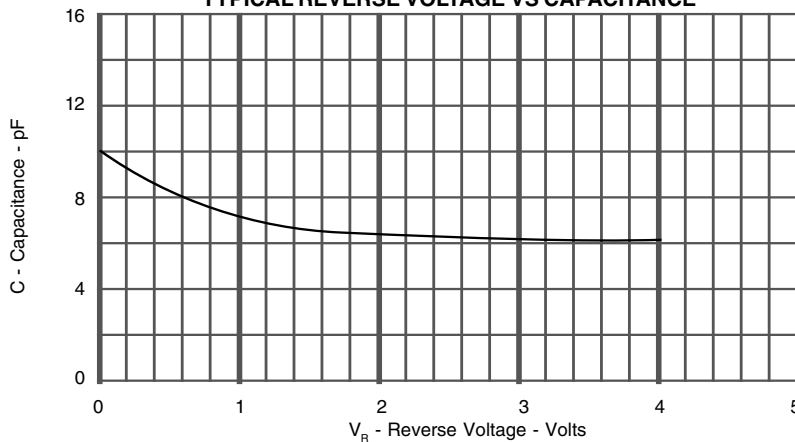


ESD Test Pulse: 5 kilovolt, 1/30ns (waveform)

**FIGURE 5  
INPUT CAPACITANCE CIRCUIT**



**FIGURE 6  
TYPICAL REVERSE VOLTAGE VS CAPACITANCE**



## APPLICATION NOTE

The SR12 is a low capacitance, unidirectional TVS array that is designed to protect I/O or high speed data lines from the damaging effects of ESD or EFT. This product series has a surge capability of 500 Watts  $P_{PP}$  per line for an 8/20 $\mu$ s waveform and offers ESD protection > 25kV.

### COMMON-MODE CONFIGURATION (Figure 1)

Ideal for use in USB applications, two SR12 devices provides up to two(2) lines of protection(per device) in a common-mode configuration as depicted in Figure 1.

Circuit connectivity is as follows:

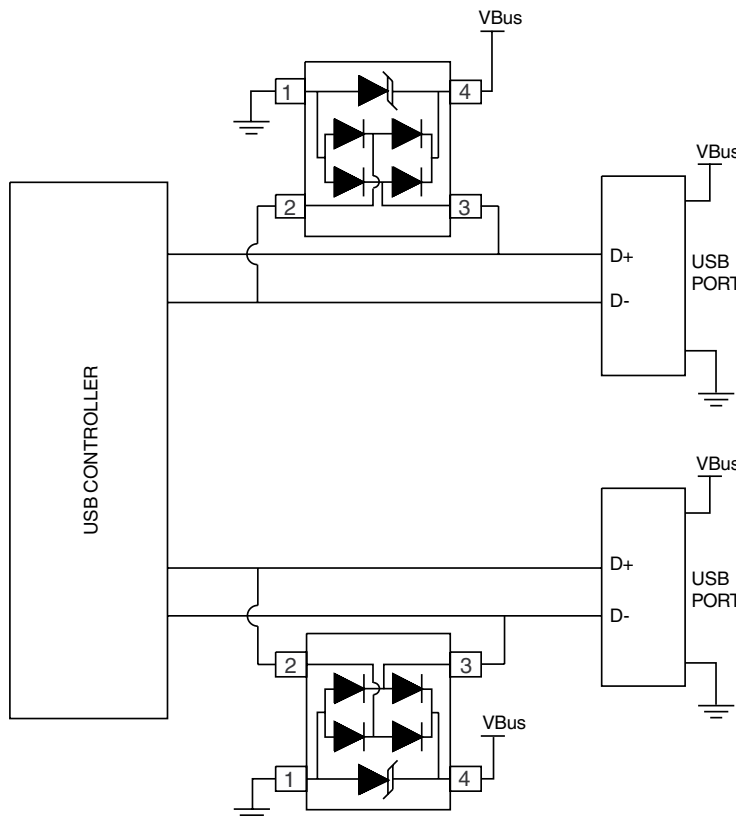
- ✓ Pins 2 and 3 are connected to the datalines.
- ✓ Pin 1 is connected to ground.
- ✓ Pin 4 is connected to the databus.

### CIRCUIT BOARD LAYOUT RECOMMENDATIONS

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.

Figure 1. Typical Common-Mode USB Protection



## SOT-143 PACKAGE OUTLINE & DIMENSIONS

### PACKAGE OUTLINE

### SOT-143

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	3.04	0.110	0.120
B	1.20	1.39	0.047	0.055
C	0.84	1.14	0.033	0.045
D	0.39	0.50	0.015	0.020
F	0.79	0.93	0.031	0.037
G	1.78	2.03	0.070	0.080
H	0.013	0.10	0.0005	0.004
J	0.08	0.15	0.003	0.006
K	0.46	0.60	0.018	0.024
L	0.445	0.60	0.0175	0.024
R	0.72	0.83	0.028	0.033
S	2.11	2.48	0.083	0.098

### MOUNTING PAD

TYPICAL		
DIM	Millimeters	Inches
1	2.85	0.112
2	2.00	0.079
3	1.80	0.071
4	1.90	0.075
5	1.05	0.041
6	2.75	0.108
7	1.20	0.047
8	0.80	0.031
9	0.85	0.033
10	0.85	0.033
11	0.85	0.033

### NOTES

1. Dimensioning and tolerances per ANSI Y14.5M, 1985.
2. Controlling Dimension: Inches
3. Dimensions are exclusive of mold flash and metal burrs.

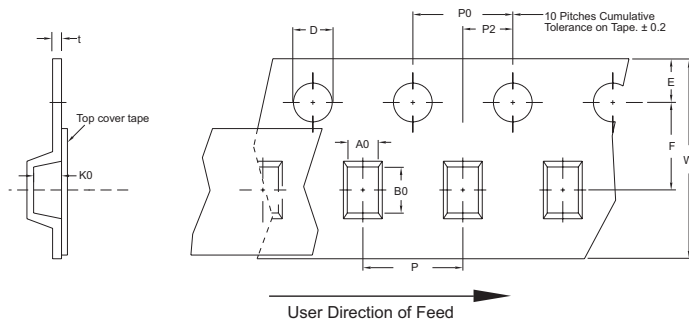
### TAPE & REEL ORDERING NOMENCLATURE

1. Surface mount product is taped and reeled in accordance with EIA-481.
2. Suffix-T7 = 7 Inch Reel - 3,000 pieces per 8mm tape, i.e., SR12-LF-T7.
3. Suffix-T13 = 13 Inch Reel - 10,000 pieces per 8mm tape, i.e., SR12-LF-T13.
4. Suffix -LF = Lead-Free, Pure-Tin Plating, i.e., SR12-LF-T7.

**Outline & Dimensions: Rev 2 - 6/06, 06011**

### Tape & Reel Specifications (Dimensions in millimeters)

Reel Dia.	Tape Width	A0	B0	K0	D	E	F	W	P0	P2	P	tmax
178mm (7")	8mm	3.10 ± 0.10	2.70 ± 0.10	1.35 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	3.50 ± 0.05	8.00 ± 0.30	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	0.25



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**ProTek Devices**  
 2929 South Fair Lane, Tempe, AZ 85282  
 Tel: 602-431-8101 Fax: 602-431-2288  
 E-Mail: [sales@protekdevices.com](mailto:sales@protekdevices.com)  
 Web Site: [www.protekdevices.com](http://www.protekdevices.com)