

## LOW CAPACITANCE STEERING DIODE & TVS ARRAYS

### APPLICATIONS

- ✓ Ethernet - 10/100 Base T
- ✓ Computer I/O Ports- SCSI, FireWire & USB
- ✓ Set Top Box Protection

### IEC COMPATIBILITY (EN61000-4)

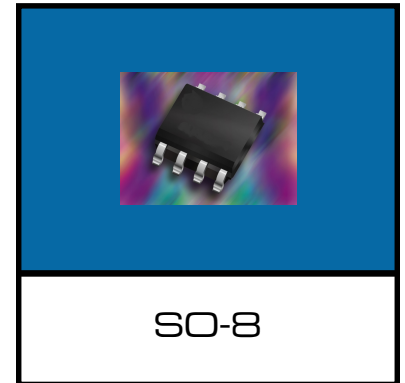
- ✓ 61000-4-2 (ESD): Air - 15kv, Contact - 8kv
- ✓ 61000-4-4 (EFT): 40A - 5/50ns
- ✓ 61000-4-5 (Surge): 24A, 8/20 $\mu$ s - Level 2(Line-Gnd) & Level 3(Line-Line)

### FEATURES

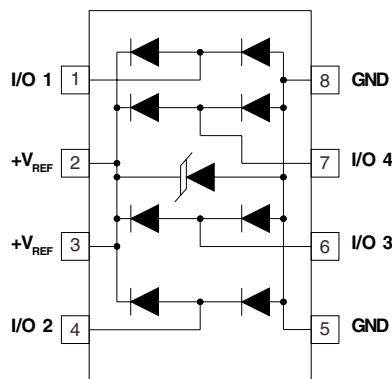
- ✓ 500 Watts Peak Pulse Power Dissipation( $t_p = 8/20\mu$ s)
- ✓ Unidirectional Configuration
- ✓ Available in 4 Voltage Types: 3.3V to 15V
- ✓ Protects Up to Four (4) I/O Ports
- ✓ ESD Protection > 40 kilovolts
- ✓ **LOW CAPACITANCE -15pF**

### MECHANICAL CHARACTERISTICS

- ✓ Molded JEDEC SO-8
- ✓ Weight 15 milligrams (Approximate)
- ✓ Flammability Rating UL 94V-0
- ✓ 12mm Tape and Reel Per EIA Standard 481-1-A
- ✓ Device Marking Code & Logo
- ✓ Pin 1 Indicated By Dot on Package



### CIRCUIT DIAGRAM





## DEVICE CHARACTERISTICS

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

PARAMETER	SYMBOL	VALUE	UNITS
Operating Temperature	$T_J$	-55°C to 150°C	°C
Storage Temperature	$T_{STG}$	-55°C to 150°C	°C
Maximum Forward Voltage @ 100 mA (See Note 1)	$V_F$	1.1	Volts

**Note 1:** Measured between pins 8 or 5 to 1, 2, 3, 4, 6 and 7.

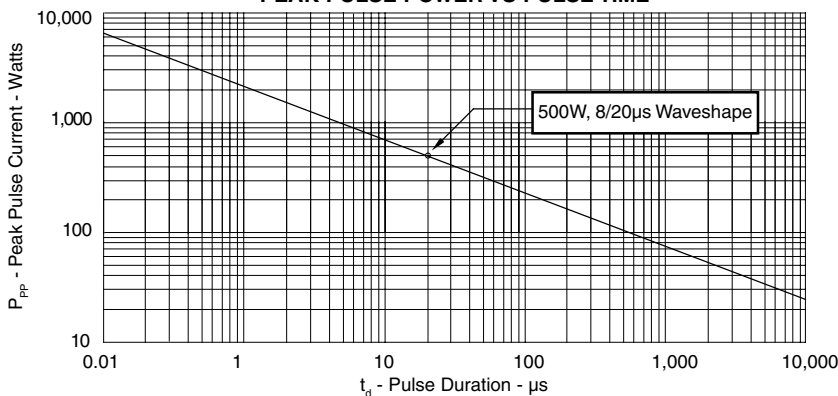
### ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

PART NUMBER (See Note 1)	DEVICE MARKING	RATED STAND-OFF VOLTAGE  $V_{WM}$ VOLTS	MINIMUM BREAKDOWN VOLTAGE  @ 1mA $V_{(BR)}$ VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2)  @ $I_p = 1A$ $V_C$ VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2)  @ 8/20 $\mu s$ $V_C$ @ $I_{PP}$	MAXIMUM LEAKAGE CURRENT  @ $V_{WM}$ $I_D$ $\mu A$	MAXIMUM CAPACITANCE (See Note 2) (See Figure 5)  0V @ 1 MHz C pF
PSRDA3.3-4	PRA	3.3	4.0	6.5	10.9V @ 43.0A	125	15
PSRDA05-4	PRB	5.0	6.0	9.8	13.5V @ 42.0A	20	15
PSRDA12-4	PRD	12.0	13.3	19.0	25.9V @ 21.0A	1	15
PSRDA15-4	PRE	15.0	16.7	24.0	30.0V @ 17.0A	1	15

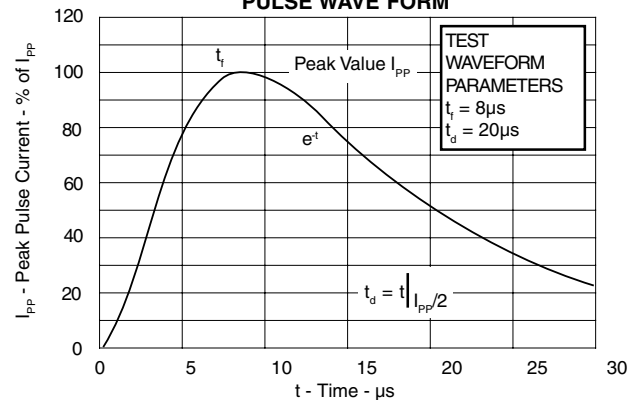
**Note 1:** Spice model and parameters for this series are available on the ProTek Devices web site: [www.protekdevices.com](http://www.protekdevices.com).

**Note 2:** Capacitance measured at  $V_{WM} = V_{CC}$  connected between I/O pins to pin 8 and 5 (Gnd).  $V_R = V_{WM}$  @ 1MHz. As shown in Figure 5, REF1 is connected to ground, REF2 is connected to  $+V_{CC}$ , and input applies to  $V_{CC} = 5V$ ,  $V_{sign} = mV$ ,  $F = 1$  MHz.

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

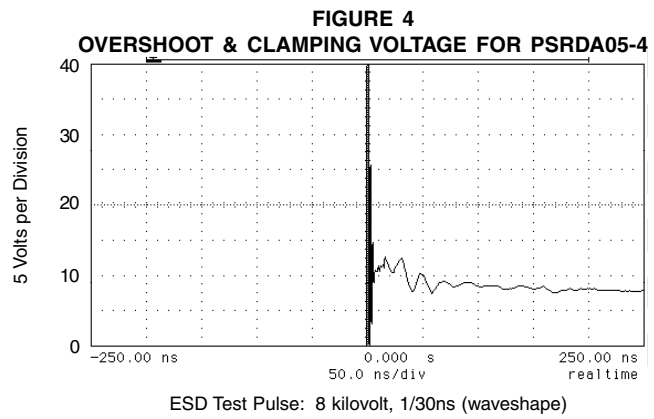
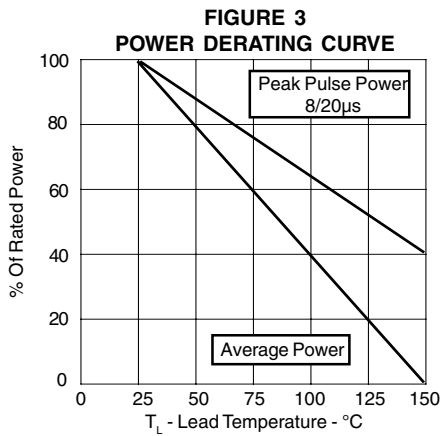


**FIGURE 2**  
**PULSE WAVE FORM**

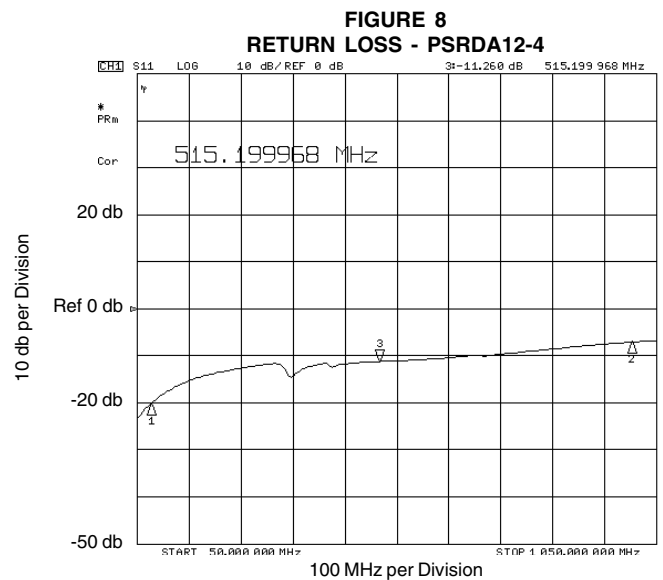
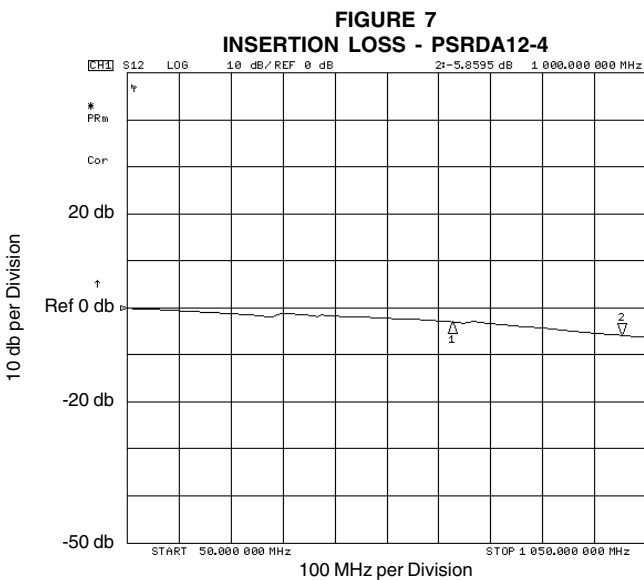
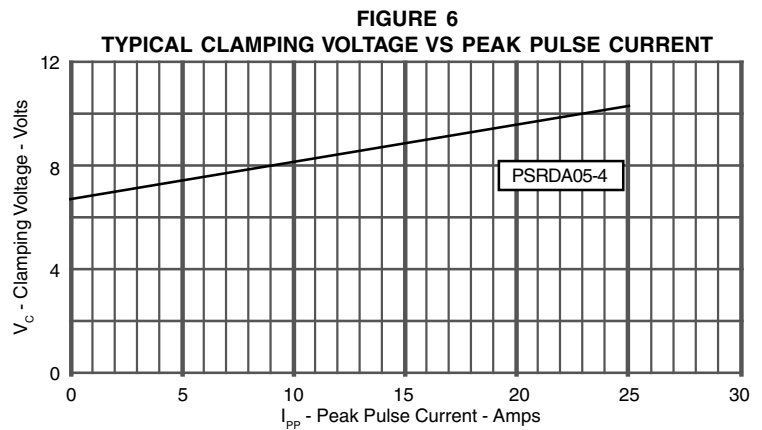
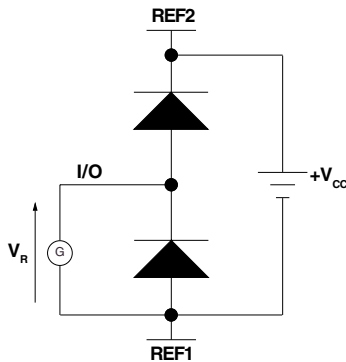




## GRAPHS



**FIGURE 5**  
**INPUT CAPACITANCE CIRCUIT**





## APPLICATION NOTE

The PSRDAxx-4 Series are low capacitance, unidirectional TVS arrays that are 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 waveshape and offers ESD protection > 40kv.

### DIFFERENTIAL MODE CONFIGURATION (Figure 1)

Ideal for use in USB applications, the PSRDAxx-4 Series provides up to four (4) lines of protection in a differential mode configuration as depicted in Figure 1.

Circuit connectivity is as follows:

- ✓ Pins 1, 4, 6 and 7 are connected to the data lines.
- ✓ Pins 5 and 8 are connected to ground.
- ✓ Pins 2 and 3 are connected to the databus.

### DIFFERENTIAL MODE CONFIGURATION (Figure 2)

The PSRDAxx-4 Series also provides up to four (4) lines of protection in a differential mode configuration as depicted in Figure 2 for T1/E1 applications.

Circuit connectivity is as follows:

- ✓ Pins 1, 4, 6 and 7 are connected to the data lines.
- ✓ Pins 5 and 8 are connected to ground.
- ✓ Pins 2 and 3 are 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.

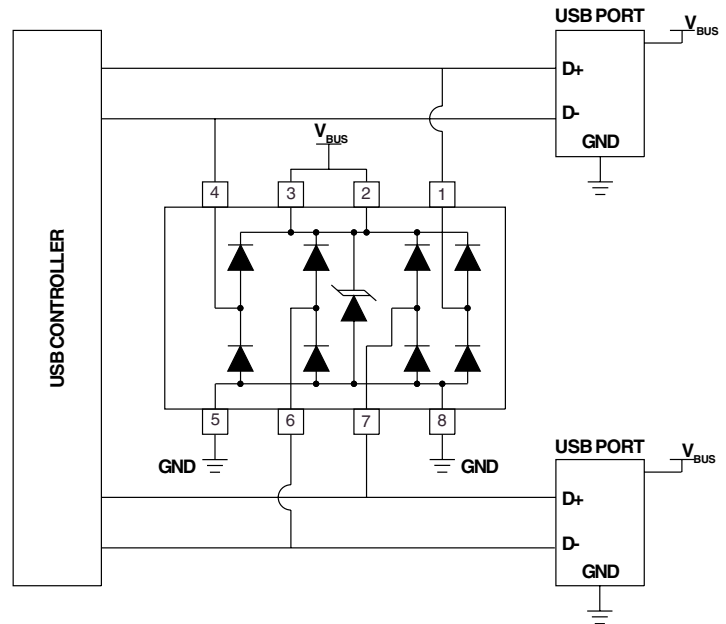


Figure 1. Typical Differential-Mode USB Protection

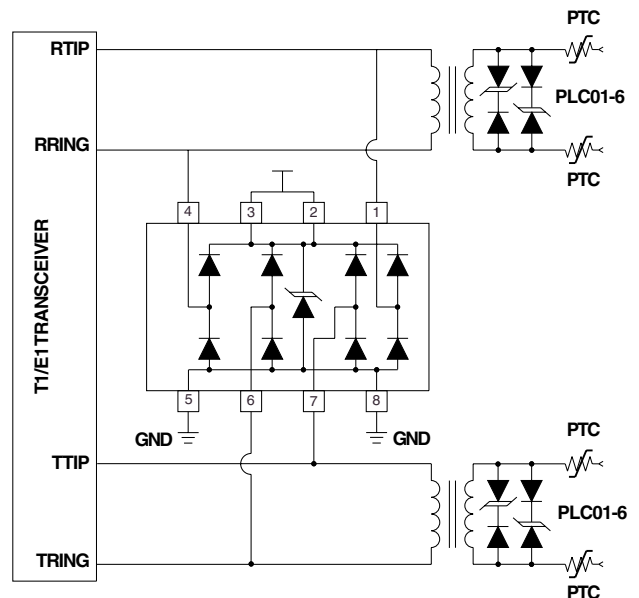
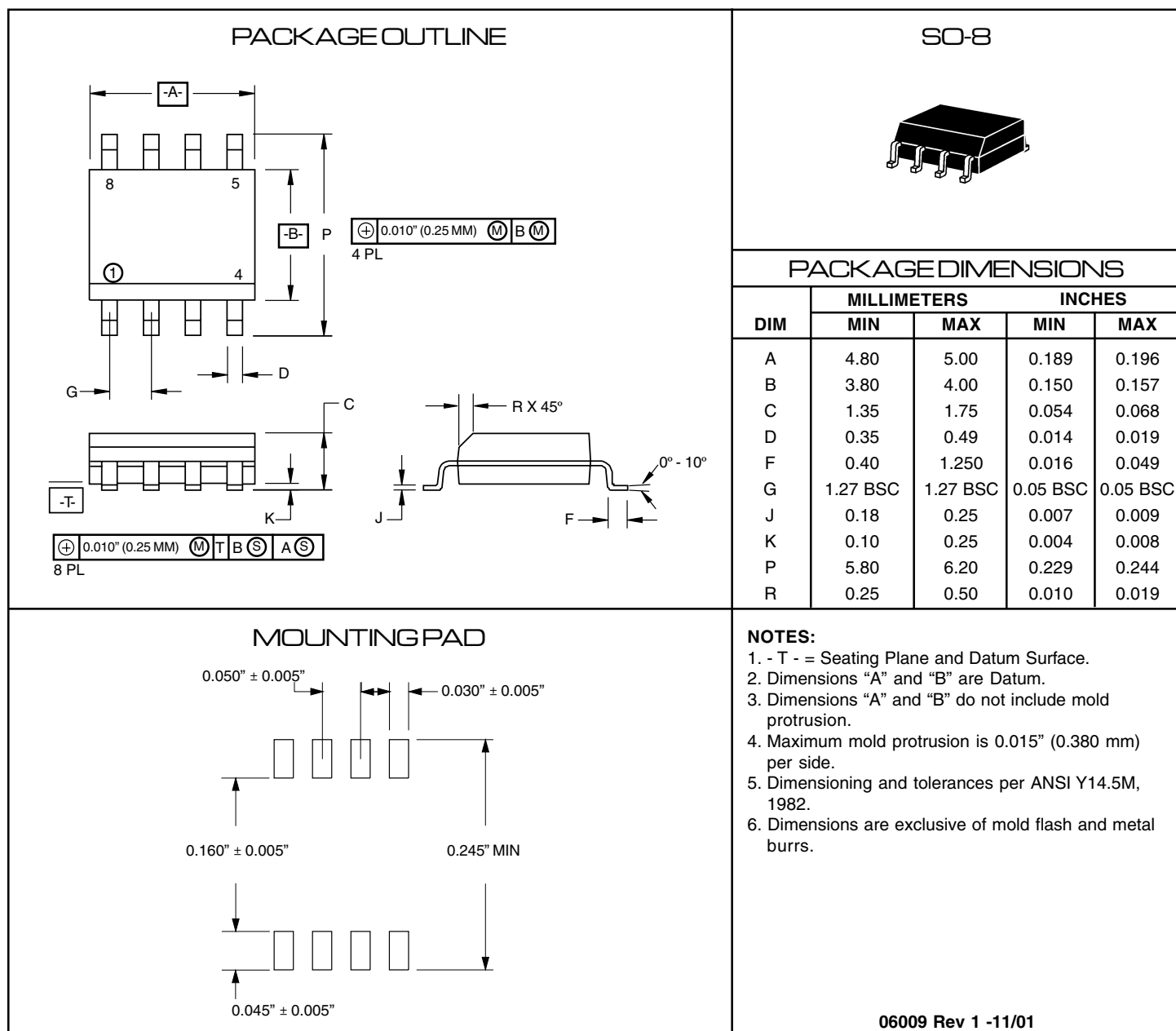


Figure 2. Typical Differential-Mode T1/E1 Protection



## PACKAGE OUTLINE & DIMENSIONS



### TAPE & REEL PACKAGING:

Surface mount product is taped and reeled in accordance with EIA-481, reel quantities and sizes are as follows:

7 Inch Reel - 1,000 pieces per reel; 13 Inch Reel - 2,500 pieces per reel

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