

## 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

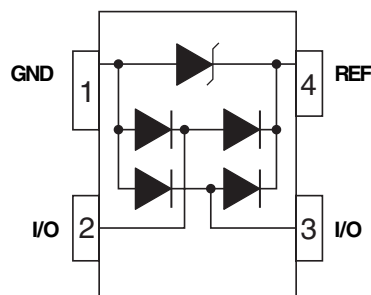
- ✓ 500 Watts Peak Power per Line (tp = 8/20 $\mu$ s)
- ✓ ESD Protection > 25 kilovolts
- ✓ Low Clamping Voltage
- ✓ Unidirectional Configuration
- ✓ Protects 2 I/O Ports & Power Supply
- ✓ Low Capacitance: 10pF
- ✓ RoHS Compliant in Lead-Free Versions

## MECHANICAL CHARACTERISTICS

- ✓ Molded JEDEC SOT-143
- ✓ Weight 9 milligrams (Approximate)
- ✓ Available in Lead-Free Pure-Tin Plating(Annealed)
- ✓ Solder Reflow Temperature:  
Pure-Tin - Sn, 100: 260-270°C
- ✓ Consult Factory for Leaded Device Availability
- ✓ 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

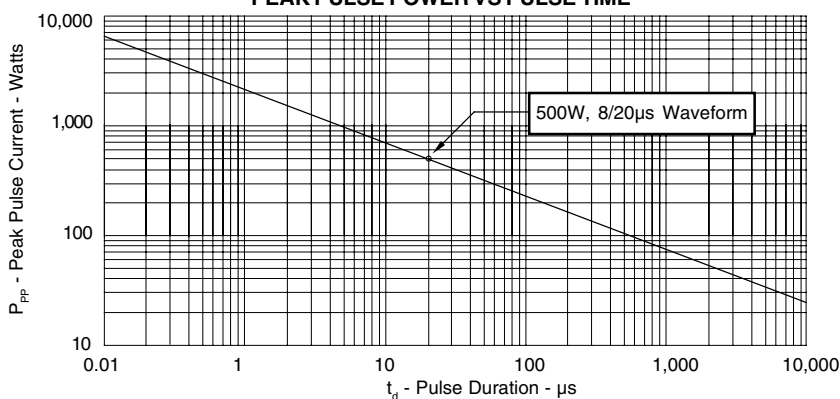
| PARAMETER  | SYMBOL           | VALUE      | UNITS |
|--|------------------|------------|-------|
| Peak Pulse Power (tp = 8/20µs) - See Figure 1      | P <sub>PP</sub>  | 500        | Watts |
| Operating Temperature                              | T <sub>L</sub>   | -55 to 150 | °C    |
| Storage Temperature                                | T <sub>STG</sub> | -55 to 150 | °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

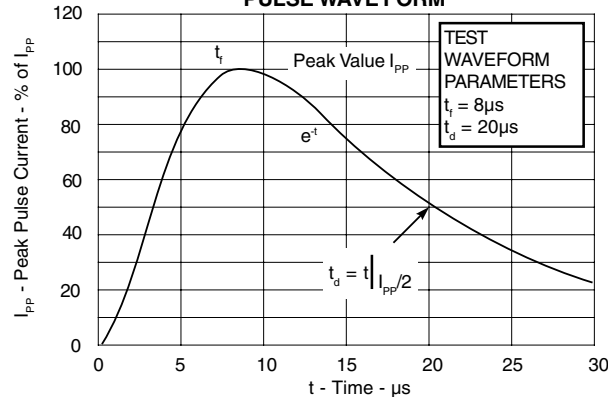
| PART NUMBER | DEVICE MARKING | RATED STAND-OFF VOLTAGE<br><br>V <sub>WM</sub><br>VOLTS | MINIMUM BREAKDOWN VOLTAGE<br><br>@ 1mA<br>V <sub>(BR)</sub><br>VOLTS | MAXIMUM CLAMPING VOLTAGE (See Fig. 2)<br><br>@ I <sub>F</sub> = 1A<br>V <sub>C</sub><br>VOLTS | MAXIMUM CLAMPING VOLTAGE (See Fig. 2)<br><br>8/20µs<br>V <sub>C</sub> @ I <sub>PP</sub><br>VOLTS | MAXIMUM LEAKAGE CURRENT<br><br>@ V <sub>WM</sub><br>I <sub>b</sub><br>µA | MAXIMUM CAPACITANCE (See Note 1) (See Fig. 5) (Per Data Line) @ 0V, 1 MHz<br>C <sub>J(SD)</sub><br>pF |
|-------------|----------------|---|--|---|--|--|---|
| PSR05       | 5A             | 5.0   | 6.0  | 9.8   | 20.0V @ 28.0A  | 5.0  | 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> = 5V, V<sub>sign</sub> = 30mV, F = 1MHz.

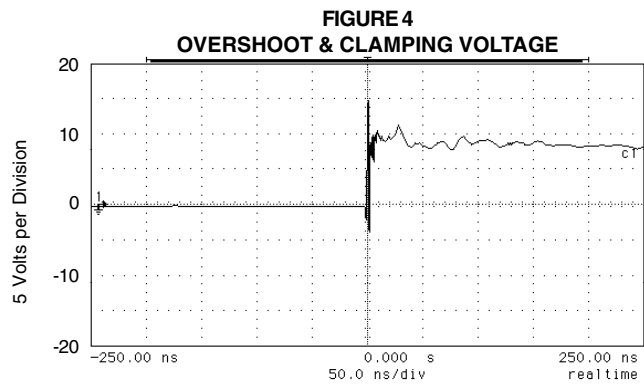
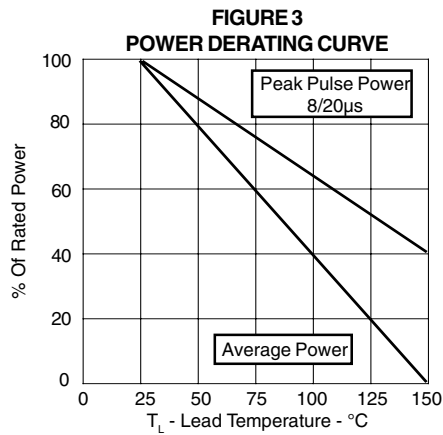
**FIGURE 1**  
PEAK PULSE POWER VS PULSE TIME



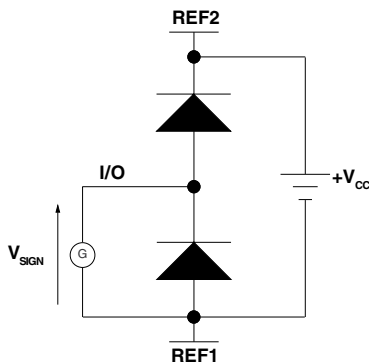
**FIGURE 2**  
PULSE WAVE FORM



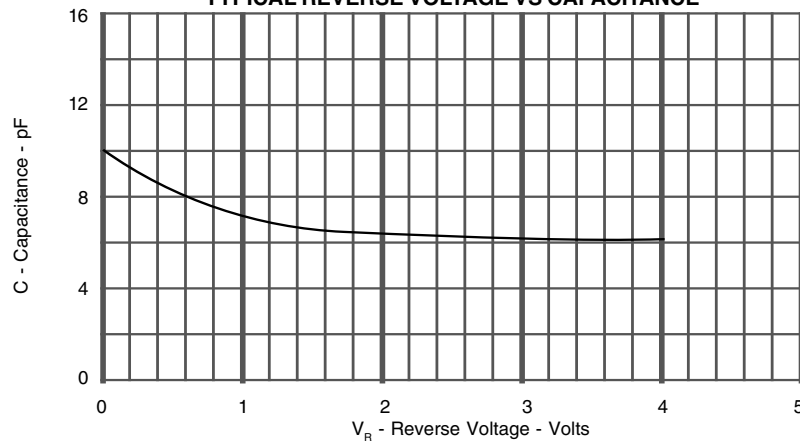
## GRAPHS



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



**FIGURE 6**  
**TYPICAL REVERSE VOLTAGE VS CAPACITANCE**



## APPLICATION NOTE

The PSR05 is a low capacitance, bidirectional 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 PSR05 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:

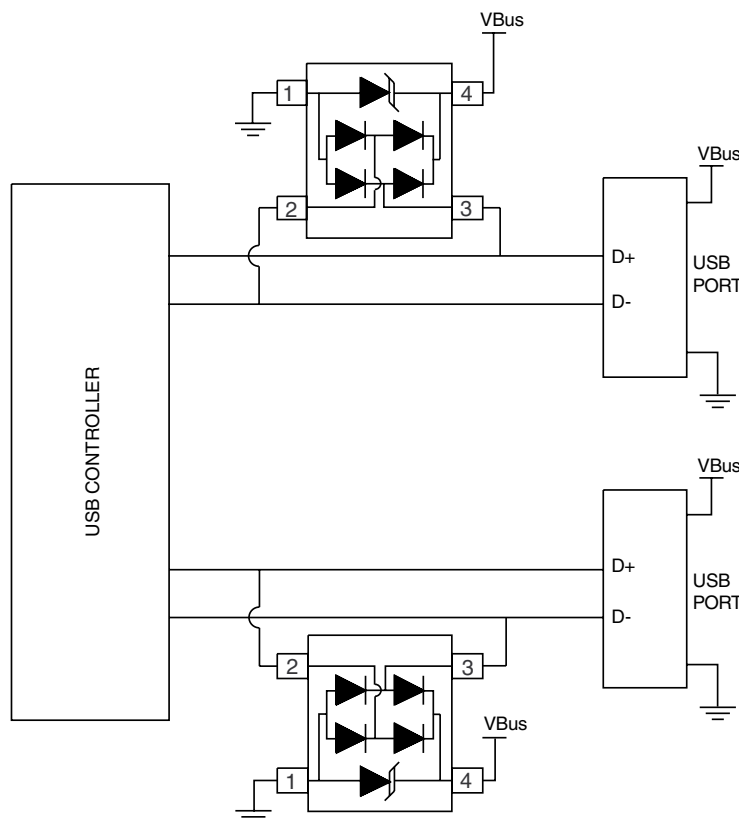
- ✓ Pins 2 and 3 are connected to the datalines.
- ✓ Pin 1 is connected to ground.
- ✓ Pin 4 is connected to the databus.

### 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

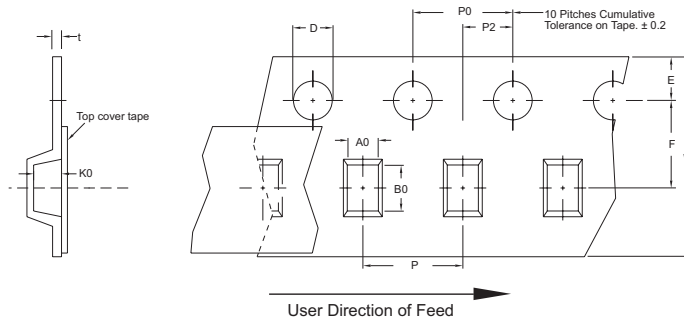
| PACKAGE OUTLINE    |             | SOT-143 |        |       |  |
|--------------------|-------------|---------|--------|-------|--|
|                    |             |         |        |       |  |
| PACKAGE DIMENSIONS |             |         |        |       |  |
| DIM                | MILLIMETERS |         | 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  |             |        | NOTES   |  |  |     |             |        |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |    |      |       |    |      |       |   |
|---|-------------|--------|---------|--|--|-----|-------------|--------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|---|------|-------|----|------|-------|----|------|-------|---|
| <table border="1" style="margin: auto;"> <thead> <tr> <th colspan="3">TYPICAL</th> </tr> <tr> <th>DIM</th> <th>Millimeters</th> <th>Inches</th> </tr> </thead> <tbody> <tr><td>1</td><td>2.85</td><td>0.112</td></tr> <tr><td>2</td><td>2.00</td><td>0.079</td></tr> <tr><td>3</td><td>1.80</td><td>0.071</td></tr> <tr><td>4</td><td>1.90</td><td>0.075</td></tr> <tr><td>5</td><td>1.05</td><td>0.041</td></tr> <tr><td>6</td><td>2.75</td><td>0.108</td></tr> <tr><td>7</td><td>1.20</td><td>0.047</td></tr> <tr><td>8</td><td>0.80</td><td>0.031</td></tr> <tr><td>9</td><td>0.85</td><td>0.033</td></tr> <tr><td>10</td><td>0.85</td><td>0.033</td></tr> <tr><td>11</td><td>0.85</td><td>0.033</td></tr> </tbody> </table> |             |        | 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 | <p>1. Dimensioning and tolerances per ANSI Y14.5M, 1985.<br/>                 2. Controlling Dimension: Inches<br/>                 3. Dimensions are exclusive of mold flash and metal burrs.</p> <p><b>TAPE &amp; REEL ORDERING NOMENCLATURE</b></p> <p>1. Surface mount product is taped and reeled in accordance with EIA-481.<br/>                 2. Suffix-T7 = 7 Inch Reel - 3,000 pieces per 8mm tape, i.e., <i>PSR05-T7</i>.<br/>                 3. Suffix-T13 = 13 Inch Reel - 10,000 pieces per 8mm tape, i.e., <i>PSR05-T13</i>.<br/>                 4. Suffix -LF = Lead-Free, Pure-Tin Plating, i.e., <i>PSR05-LF-T7</i>.</p> <p style="text-align: right;"><b>Outline &amp; Dimensions: Rev 2 - 6/06, 06011</b></p> |
| 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  |         |  |  |     |             |        |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |    |      |       |    |      |       |   |
|   |             |        |         |  |  |     |             |        |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |   |      |       |    |      |       |    |      |       |   |

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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