

## APPLICATIONS

- ✓ Ethernet - 10 Base T
- ✓ Cellular Phones
- ✓ Handheld Electronics
- ✓ FireWire & USB Interfaces

## IEC COMPATIBILITY (EN61000-4)

- ✓ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- ✓ 61000-4-4 (EFT): 40A - 5/50ns
- ✓ 61000-4-5 (Surge): 12A, 8/20 $\mu$ s - Level 1(Line-Gnd) & Level 2(Line-Line)

## FEATURES

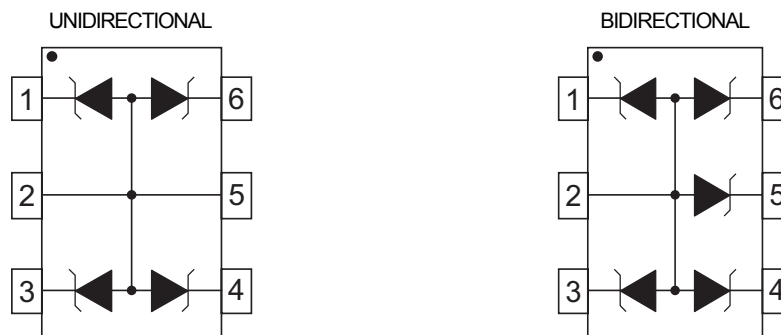
- ✓ 350 Watts Peak Pulse Power per Line (tp=8/20 $\mu$ s)
- ✓ Monolithic Design
- ✓ Available in Multiple Voltage Types Ranging From 5V to 24V
- ✓ Protects 4 Lines
- ✓ ESD Protection > 25 kilovolts
- ✓ Low Clamping Voltage
- ✓ Unidirectional & Bidirectional Configurations
- ✓ Low Leakage Current
- ✓ RoHS Compliant

## MECHANICAL CHARACTERISTICS

- ✓ Molded JEDEC SOT-23-6 Package
- ✓ Weight 16 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 One Defined By DOT on Package



## PIN CONFIGURATIONS



# PSMS05 thru PSMS24C

## DEVICE CHARACTERISTICS

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

| PARAMETER   | SYMBOL    | VALUE      | UNITS |
|---|-----------|------------|-------|
| Peak Pulse Power ( $t_p = 8/20\mu s$ ) - See Figure 1 | $P_{PP}$  | 350        | Watts |
| Operating Temperature                                 | $T_L$     | -55 to 150 | °C    |
| Storage Temperature                                   | $T_{STG}$ | -55 to 150 | °C    |

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

| PART NUMBER<br>(See Notes 1-3) | DEVICE MARKING | RATED STAND-OFF VOLTAGE<br><br>$V_{WM}$<br>VOLTS | MINIMUM BREAKDOWN VOLTAGE<br><br>@ 1mA<br>$V_{(BR)}$<br>VOLTS | MAXIMUM CLAMPING VOLTAGE<br>(See Fig. 2)<br><br>@ $I_p = 1A$<br>$V_C$<br>VOLTS | MAXIMUM CLAMPING VOLTAGE<br>(See Fig. 2)<br><br>@8/20 $\mu s$<br>$V_C @ I_{PP}$ | MAXIMUM LEAKAGE CURRENT<br><br>@ $V_{WM}$<br>$I_b$<br>$\mu A$ | TYPICAL CAPACITANCE<br>(See Note 4)<br><br>0V @ 1 MHz<br>$C_j$<br>pF |
|--------------------------------|----------------|--|---|--|---|---|--|
| PSMS05                         | PRH            | 5.0  | 6.0   | 9.8  | 21.0V @ 17.0A   | 20  | 150  |
| PSMS05C                        | PRL            | 5.0  | 6.0   | 9.8  | 21.0V @ 17.0A   | 20  | 150  |
| PSMS12                         | PRI            | 12.0   | 13.3  | 19   | 29.2V @ 12.0A   | 1   | 80   |
| PSMS12C                        | PRM            | 12.0   | 13.3  | 19   | 29.2V @ 12.0A   | 1   | 80   |
| PSMS15                         | PRJ            | 15.0   | 16.7  | 24   | 34.6V @ 10.0A   | 1   | 50   |
| PSMS15C                        | PRN            | 15.0   | 16.7  | 24   | 34.6V @ 10.0A   | 1   | 50   |
| PSMS24                         | PRK            | 24.0   | 26.7  | 43   | 58.3V @ 6.0A  | 1   | 40   |
| PSMS24C                        | PRO            | 24.0   | 26.7  | 43   | 58.3V @ 6.0A  | 1   | 40   |

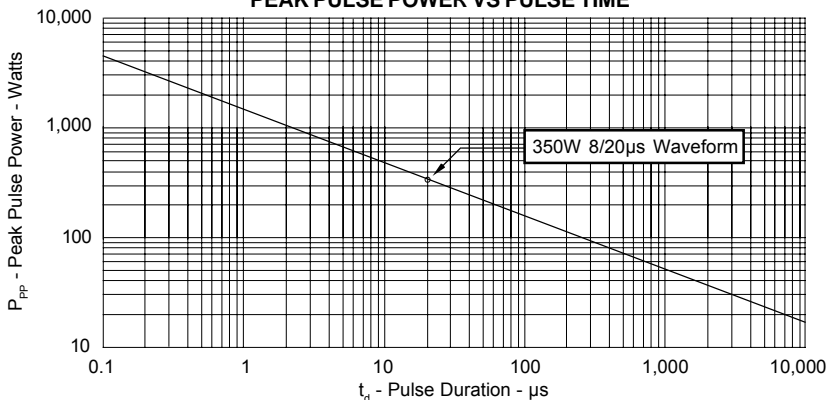
**Note 1:** Part numbers with an additional "C" suffix are bidirectional devices, i.e., PSMS05C.

**Note 2:** *Unidirectional Only:* Test between pin 1 to 2 or 5, 4 to 2 or 5, 6 to 2 or 5, 3 to 2 or 5.

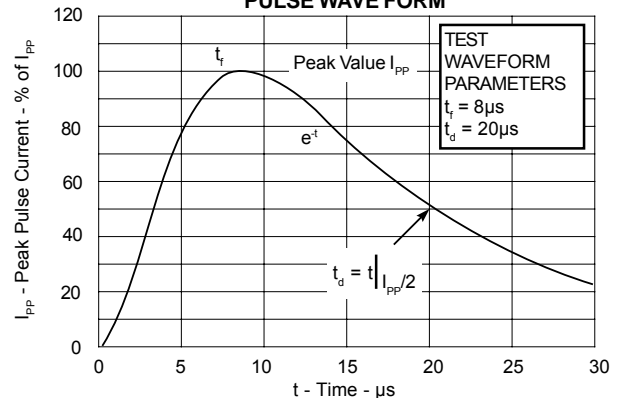
**Note 3:** *Bidirectional Only:* Test between pin 5 to 1 or 3 or 4 or 6. Electrical characteristics apply in both directions.

**Note 4:** *Unidirectional Only:* Capacitance measured between pins 1, 3, 4, 6, to 2.

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

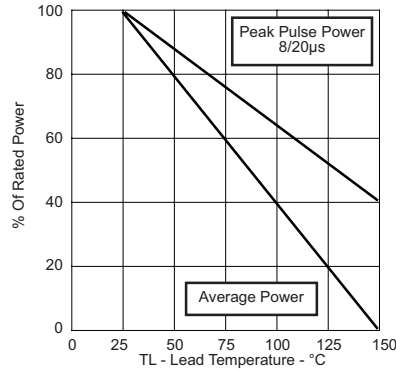


**FIGURE 2**  
PULSE WAVE FORM

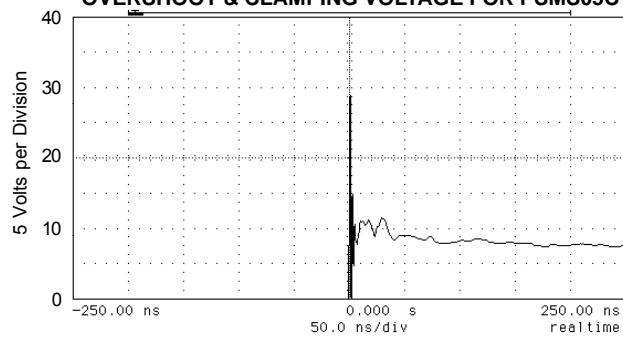


GRAPHS

**FIGURE 3  
POWER DERATING CURVE**

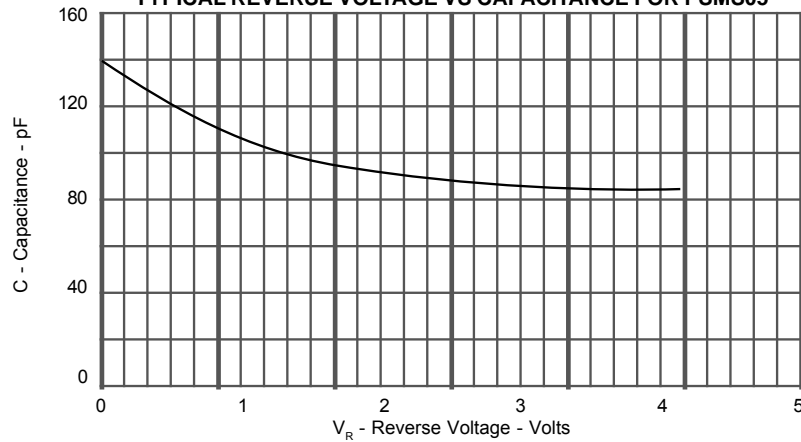


**FIGURE 4  
OVERSHOOT & CLAMPING VOLTAGE FOR PSMS05C**



ESD Test Pulse: 25 kilovolt, 1/30ns (waveform)

**FIGURE 5  
TYPICAL REVERSE VOLTAGE VS CAPACITANCE FOR PSMS05**



## APPLICATION NOTE

The PSMS Series are TVS arrays designed to protect I/O or data lines from the damaging effects of ESD or EFT. This product series provides both unidirectional and bidirectional protection, with a surge capability of 350 Watts  $P_{PP}$  per line for an 8/20 $\mu$ s waveform and ESD protection > 25 kilovolts.

### UNIDIRECTIONAL COMMON-MODE CONFIGURATION (Figure 1)

The PSMS Series provides up to four (4) lines of protection in a common-mode configuration as depicted in Figure 1.

Circuit connectivity is as follows:

- ✓ Line 1 is connected to Pin 1.
- ✓ Line 2 is connected to Pin 3.
- ✓ Line 3 is connected to Pin 4.
- ✓ Line 4 is connected to Pin 6.
- ✓ Pin 5 is connected to ground.
- ✓ Pin 2 is not connected.

### BIDIRECTIONAL COMMON-MODE CONFIGURATION (Figure 2)

The PSMSxxC Series provides up to four (4) lines of protection in a common-mode configuration as depicted in Figure 2.

Circuit connectivity is as follows:

- ✓ Line 1 is connected to Pin 1.
- ✓ Line 2 is connected to Pin 3.
- ✓ Line 3 is connected to Pin 4.
- ✓ Line 4 is connected to Pin 5.
- ✓ Pin 6 is connected to ground.
- ✓ Pin 2 is not connected.

### 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 - Unidirectional Configuration  
Common-Mode I/O Port Protection

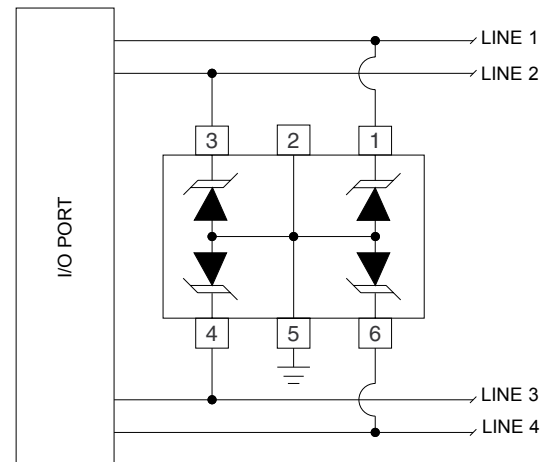
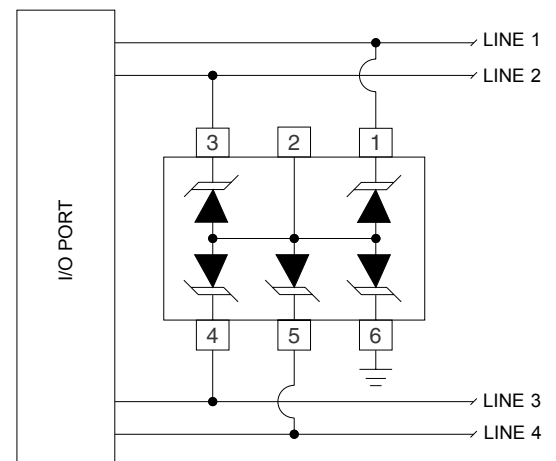


Figure 2 - Bidirectional Configuration  
Common-Mode I/O Port Protection



# PSMS05 thru PSMS24C

## SOT-23-6 PACKAGE OUTLINE & DIMENSIONS

| PACKAGE OUTLINE    |             | SOT-23-6 |        |       |  |
|--------------------|-------------|----------|--------|-------|--|
|                    |             |          |        |       |  |
| PACKAGE DIMENSIONS |             |          |        |       |  |
| DIM                | MILLIMETERS |          | INCHES |       |  |
|                    | MIN         | MAX      | MIN    | MAX   |  |
| A                  | 2.80        | 3.05     | 0.110  | 0.120 |  |
| B                  | 1.50        | 1.75     | 0.059  | 0.070 |  |
| C                  | 0.90        | 1.30     | 0.036  | 0.051 |  |
| D                  | 0.30        | 0.40     | 0.012  | 0.016 |  |
| E                  | 0.85        | 1.05     | 0.033  | 0.040 |  |
| G                  | 0.90        | 1.45     | 0.036  | 0.057 |  |
| J                  | 0.09        | 0.20     | 0.003  | 0.008 |  |
| K                  | 2.60        | 3.00     | 0.102  | 0.118 |  |
| L                  | 0.0         | 0.15     | 0.0    | 0.006 |  |
| M                  | 0.30        | 0.60     | 0.012  | 0.024 |  |

| MOUNTING PAD |             |        |
|--------------|-------------|--------|
| TYPICAL      |             |        |
| DIM          | Millimeters | Inches |
| 1            | 0.70        | 0.028  |
| 2            | 1.90        | 0.074  |
| 3            | 0.95        | 0.037  |
| 4            | 2.40        | 0.094  |
| 5            | 1.00        | 0.039  |

**NOTES**

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

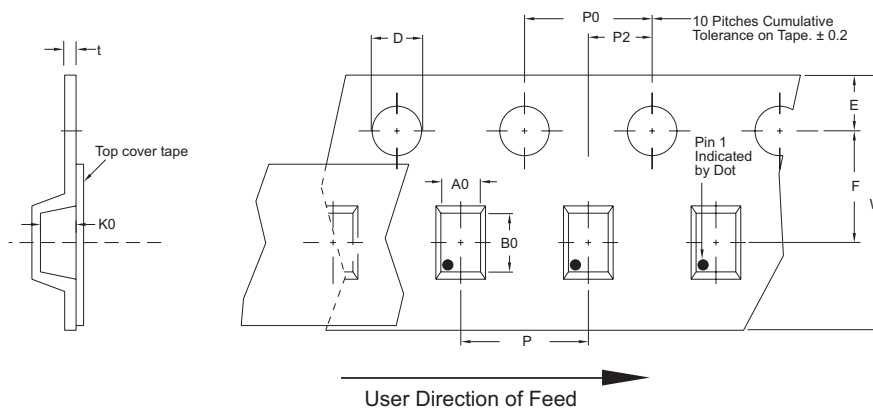
**TAPE & REEL/BULK ORDERING NOMENCLATURE**

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., *PSMS-T7*
3. Suffix - LF = Lead-Free, Pure-Tin Plating, i.e., *PSMS-LF-T7*.

**Outline & Dimensions: Rev 3 - 3/08, 06013**

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

| Reel Dia.  | Tape Width | A0          | B0          | K0          | D           | E           | F           | W           | P0          | P2          | P           | tmax |
|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------|
| 178mm (7") | 8mm        | 3.20 ± 0.10 | 3.20 ± 0.10 | 1.65 ± 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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