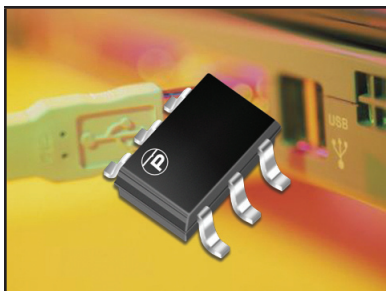


## MULTI-LINE TVS ARRAY



**SOT-23-6 PACKAGE**

### DESCRIPTION

The SMSxx and SMSxxC series are subminiature monolithic TVS suppressor arrays designed for the protection of sensitive IC components from the damaging effects of Electrostatic Discharge (ESD). This series is ideally suited for use in portable electronics such as SMART phones, laptops, and other wireless devices.

The SMSxx and SMSxxC series is usable on I/O ports where the signal voltage is positive. These devices will also provide protection in accordance with IEC 61000-4-2 and IEC 61000-4-4 requirements. This series is available in a SOT-23-6 package configuration and is rated at 350 Watts peak pulse power (8/20 $\mu$ s) per line.

### FEATURES

- Compatible with IEC 61000-4-2 (ESD): Air 15kV, Contact 8kV
- Compatible with IEC 61000-4-4 (EFT): 40A, 5/50ns
- Compatible with IEC 61000-4-5 (Surge): 12A, 8/20 $\mu$ s - Level 1(Line-Gnd) & Level 2(Line-Line)
- 350 Watts Peak Pulse Power per Line(tp = 8/20 $\mu$ s)
- Monolithic Design
- Protects 4 Lines
- Unidirectional & Bidirectional Configurations
- ESD Protection > 25 kilovolts
- Low Clamping Voltage
- Low Leakage Current
- Available in Multiple Voltages
- RoHS Compliant
- REACH Compliant

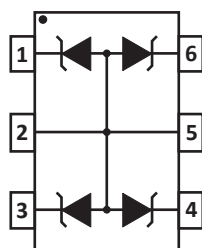
### APPLICATIONS

- SMART Phones
- Portable Electronics
- FireWire, Ethernet and USB Interfaces

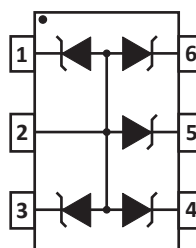
### MECHANICAL CHARACTERISTICS

- Molded JEDEC SOT-23-6 Package
- Approximate Weight: 16 milligrams
- 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

### PIN CONFIGURATIONS



**UNIDIRECTIONAL**



**BIDIRECTIONAL**

**TYPICAL DEVICE CHARACTERISTICS**
**MAXIMUM RATINGS @ 25°C Unless Otherwise Specified**

| PARAMETER                                     | SYMBOL    | VALUE      | UNITS |
|---|-----------|------------|-------|
| Peak Pulse Power (tp = 8/20μs) - 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>(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 (Fig. 2)<br><br>@ $I_p = 1A$<br>$V_c$<br>VOLTS | MAXIMUM LEAKAGE CURRENT<br><br>@ $V_{WM}$<br>$I_D$<br>μA | TYPICAL CAPACITANCE (Note 4)<br><br>@ 0V, 1MHz<br>$C_j$<br>pF |
|----------------------------|----------------|--|---|---|--|---|
| SMS05                      | PRH            | 5.0  | 6.0   | 9.8   | 20   | 150   |
| SMS05C                     | PRL            | 5.0  | 6.0   | 9.8   | 20   | 150   |
| SMS12                      | PRI            | 12.0   | 13.3  | 19.0  | 1  | 80  |
| SMS12C                     | PRM            | 12.0   | 13.3  | 19.0  | 1  | 80  |
| SMS15                      | PRJ            | 15.0   | 16.7  | 24.0  | 1  | 50  |
| SMS15C                     | PRN            | 15.0   | 16.7  | 24.0  | 1  | 50  |
| SMS24                      | PRK            | 24.0   | 26.7  | 40.0  | 1  | 40  |
| SMS24C                     | PRO            | 24.0   | 26.7  | 40.0  | 1  | 40  |

**NOTES**

- Part numbers with an additional "C" suffix are bidirectional, i.e., SMS05C.
- Unidirectional Only: For SMSxx, test between pin 1 to 2 or 5, 4 to 2 or 5, 6 to 2 or 5, 3 to 2 or 5. For SMSxxC, test between 2 to 1, 3, 4, 5, or 6.
- Bidirectional Only: For SMSxxC, test between pin 5 to 1 or 3 or 4 or 6. Electrical characteristics apply in both directions.
- Unidirectional Only: For SMSxx, capacitance measured between pins 1, 3, 4, 6 to 2. For SMSxxC, capacitance measured between pins 2 to 1, 3, 4, 5, or 6.

TYPICAL DEVICE CHARACTERISTICS

FIGURE 1  
PEAK PULSE POWER VS PULSE TIME

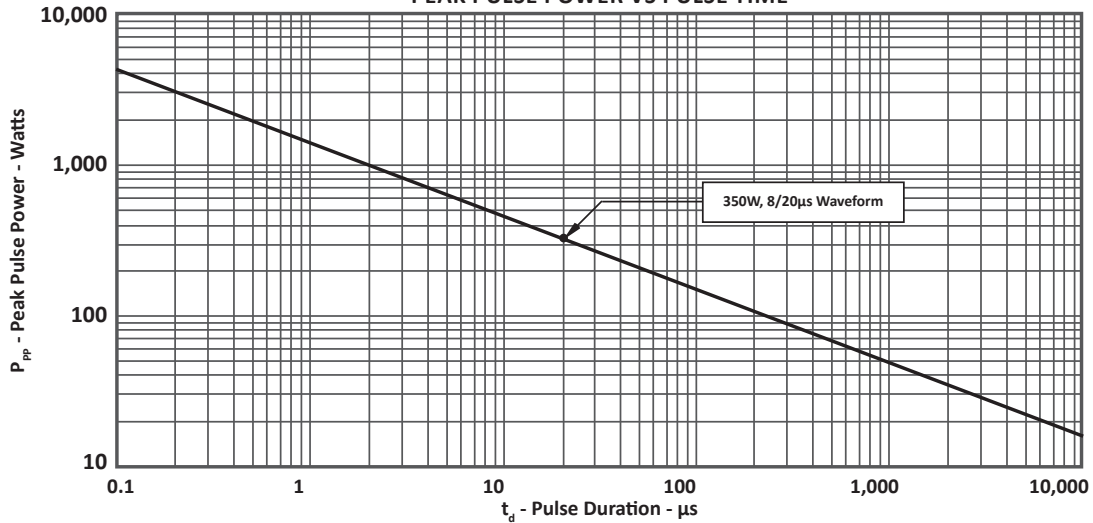


FIGURE 2  
PULSE WAVE FORM

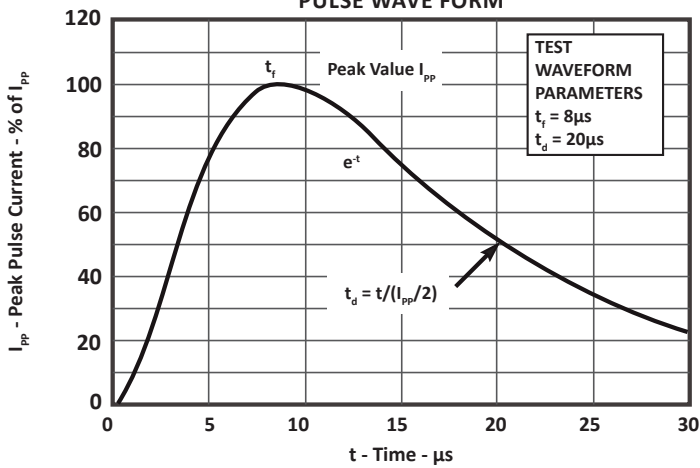
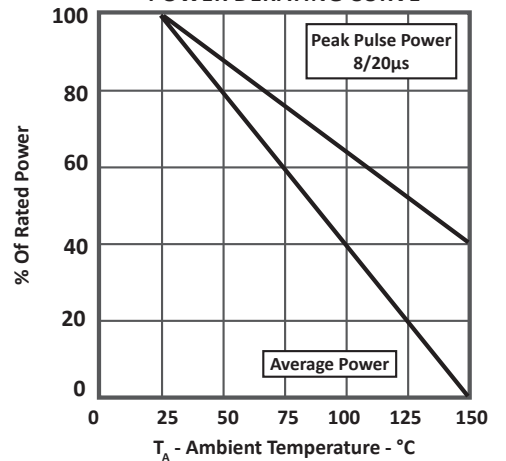


FIGURE 3  
POWER DERATING CURVE



## TYPICAL DEVICE CHARACTERISTICS

FIGURE 4  
 OVERSHOOT & CLAMPING VOLTAGE FOR SMS05C

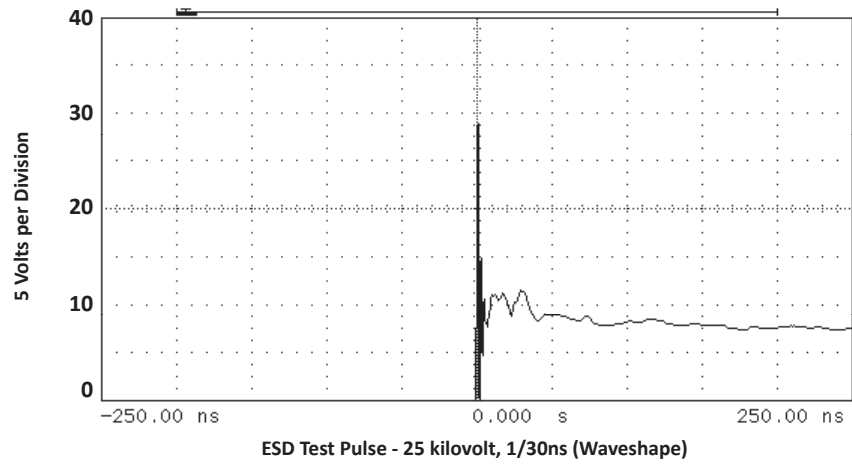
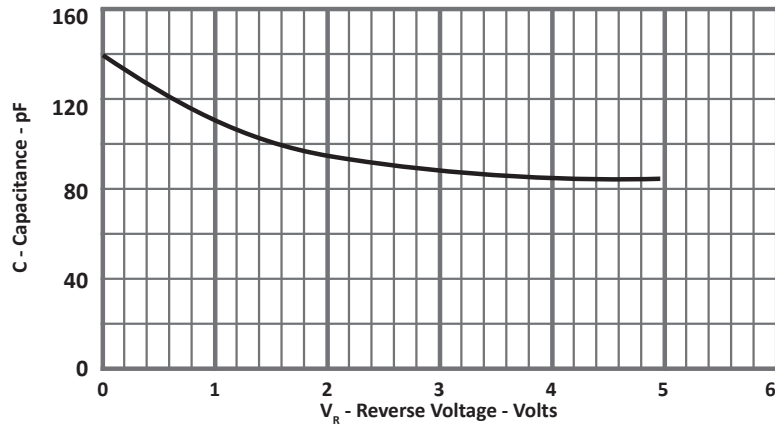
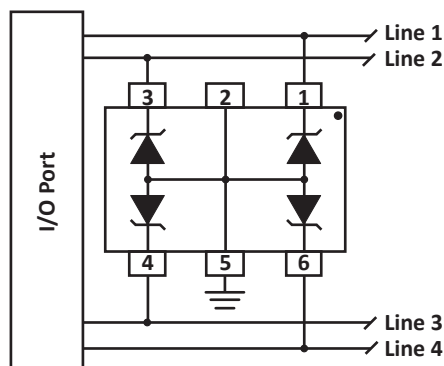


FIGURE 5  
 TYPICAL REVERSE VOLTAGE VS CAPACITANCE FOR SMS05



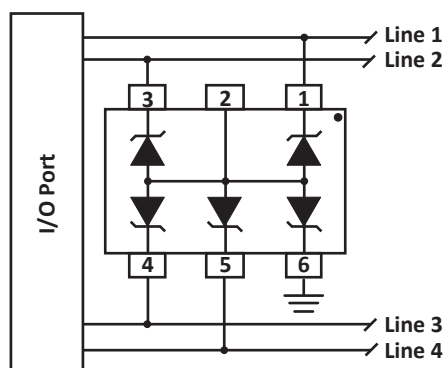
## APPLICATION INFORMATION



**FIGURE 1 - COMMON-MODE I/O PORT PROTECTION (UNIDIRECTIONAL)**

Circuit connectivity is as follows:

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



**FIGURE 1 - COMMON-MODE I/O PORT PROTECTION (BIDIRECTIONAL)**

Circuit connectivity is as follows:

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

## CIRCUIT BOARD RECOMMENDATIONS

Circuit board layout is critical for electromagnetic compatibility 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.

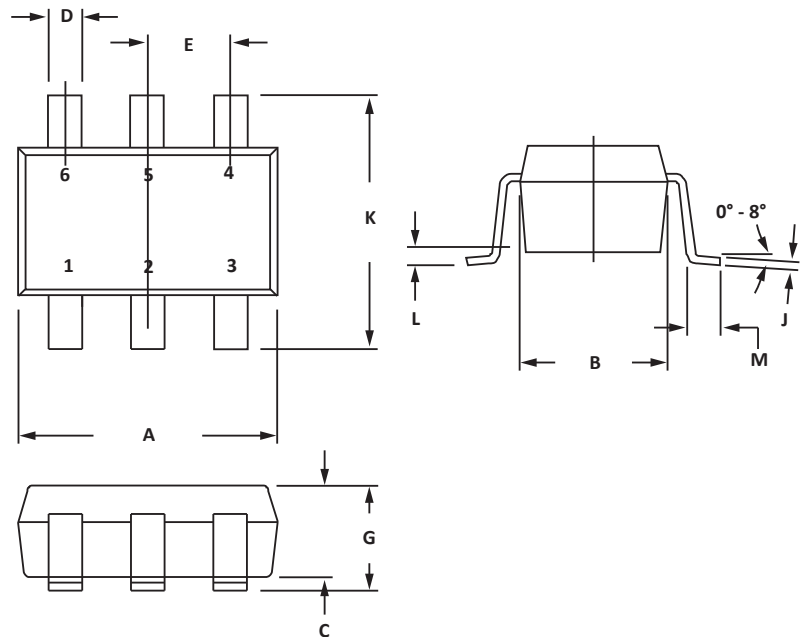
## SOT-23-6 PACKAGE INFORMATION

## OUTLINE 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 |

## NOTES

- Controlling dimension: inches.
- Dimensioning and tolerances per ANSI Y14.5M, 1985.
- Dimensions are exclusive of mold flash and metal burrs.

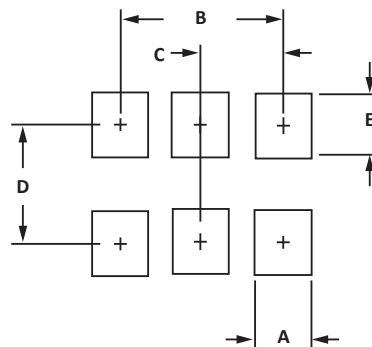


## PAD LAYOUT DIMENSIONS

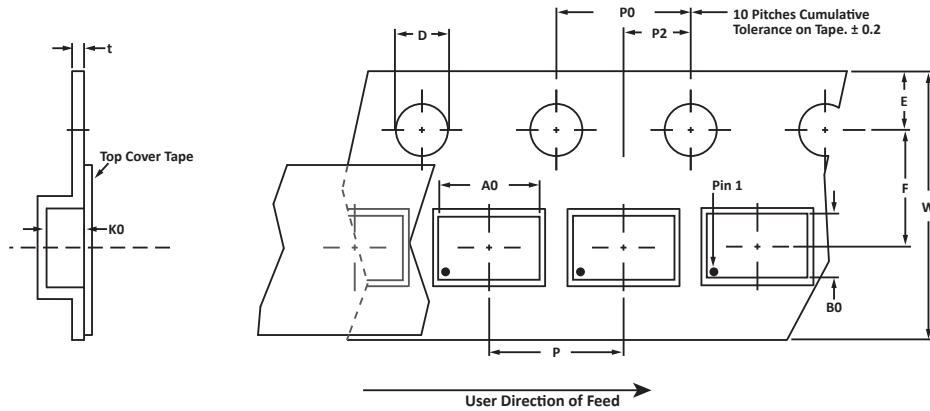
| DIM | MILLIMETERS | INCHES  |
|-----|-------------|---------|
|     | NOMINAL     | NOMINAL |
| A   | 0.70        | 0.028   |
| B   | 1.90        | 0.074   |
| C   | 0.95        | 0.037   |
| D   | 2.40        | 0.094   |
| E   | 1.00        | 0.039   |

## NOTES

- Controlling dimension: inches.



## TAPE AND REEL



## SPECIFICATIONS

| 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 |

## NOTES

1. Dimensions are in millimeters.
2. Surface mount product is taped and reeled in accordance with EIA-481.
3. Suffix - T7 = 7" Reel - 3,000 pieces per 8mm tape.
4. Marking on Part - marking code (see page 2) and pin one defined by dot on package.

Package outline, pad layout and tape specifications per document number 06013.R5 2/11

## ORDERING INFORMATION

| BASE PART NUMBER<br>(xx = Voltage) | LEADFREE SUFFIX | TAPE SUFFIX | QTY/REEL | REEL SIZE | TUBE QTY |
|------------------------------------|-----------------|-------------|----------|-----------|----------|
| SMSxx/SMSxxC                       | -LF             | -T7         | 3,000    | 7"        | n/a      |

## COMPANY INFORMATION

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### COMPANY PROFILE

ProTek Devices, based in Tempe, Arizona USA, is a manufacturer of Transient Voltage Suppression (TVS) products designed specifically for the protection of electronic systems from the effects of lightning, Electrostatic Discharge (ESD), Nuclear Electromagnetic Pulse (NEMP), inductive switching and EMI/RFI. With over 25 years of engineering and manufacturing experience, ProTek designs TVS devices that provide application specific protection solutions for all electronic equipment/systems.

ProTek Devices Analog Products Division, also manufactures analog interface, control, RF and power management products.

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