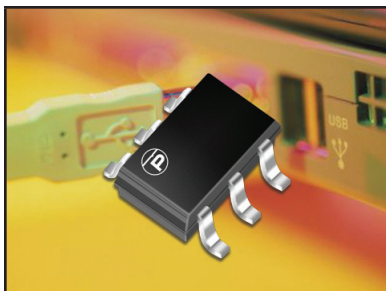


## MULTI-LINE TVS ARRAY



**SOT-23-6 PACKAGE**

### DESCRIPTION

The CPxx and CPxxC 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 CPxx and CPxxC 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 200 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)
- 200 Watts Peak Pulse Power per Line(tp = 8/20 $\mu$ s)
- Monolithic Design
- Protects 4 Bidirectional Lines & 5 Unidirectional Lines
- Unidirectional & Bidirectional Configurations
- ESD Protection > 25 kilovolts
- Available in Multiple Voltages
- Low Clamping Voltage
- Low Leakage Current
- RoHS Compliant
- REACH Compliant

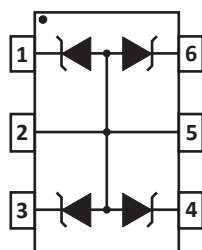
### APPLICATIONS

- SMART Phones
- Portable Electronics
- Multiple I/O Ports and Power Supplies
- FireWire, Ethernet and USB Interfaces

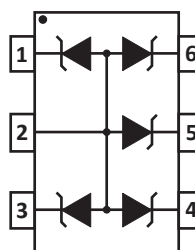
### MECHANICAL CHARACTERISTICS

- 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 | $P_{PP}$  | 200        | 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<br>(Fig. 2)<br>@ $I_p = 1A$<br>$V_c$<br>VOLTS | MAXIMUM LEAKAGE CURRENT<br><br>@ $V_{WM}$<br>$I_D$<br>μA | TYPICAL CAPACITANCE<br><br>@ 0V, 1MHz<br>$C_j$<br>pF |
|----------------------------|----------------|--|---|--|--|--|
| CP05                       | QRH            | 5.0  | 6.0   | 9.8  | 20   | 70   |
| CP05C                      | QRL            | 5.0  | 6.0   | 9.8  | 20   | 70   |
| CP12                       | QRI            | 12.0   | 13.3  | 19.0   | 1  | 50   |
| CP12C                      | QRM            | 12.0   | 13.3  | 19.0   | 1  | 50   |
| CP15                       | QRJ            | 15.0   | 16.7  | 24.0   | 1  | 30   |
| CP15C                      | QRN            | 15.0   | 16.7  | 24.0   | 1  | 30   |
| CP24                       | QRK            | 24.0   | 26.7  | 43.0   | 1  | 25   |
| CP24C                      | QRO            | 24.0   | 26.7  | 43.0   | 1  | 25   |

**NOTES**

1. Part numbers with an additional "C" suffix are bidirectional, i.e., CP05C.
2. Unidirectional Only: For CPxx, test between pin 1 to 2 or 5, 4 to 2 or 5, 6 to 2 or 5, 3 to 2 or 5. For CPxxC, test between 2 to 1, 3, 4, 5, or 6.
3. Bidirectional Only: For CPxxC, test between pin 5 to 1 or 3 or 4 or 6. Electrical characteristics apply in both directions.
4. Unidirectional Only: For CPxx, capacitance measured between pins 1, 3, 4, 6 to 2. For CPxxC, capacitance measured between pins 2 to 1, 3, 4, 5, or 6.

TYPICAL DEVICE CHARACTERISTICS

FIGURE 1  
PEAK PULSE POWER VS PULSE TIME

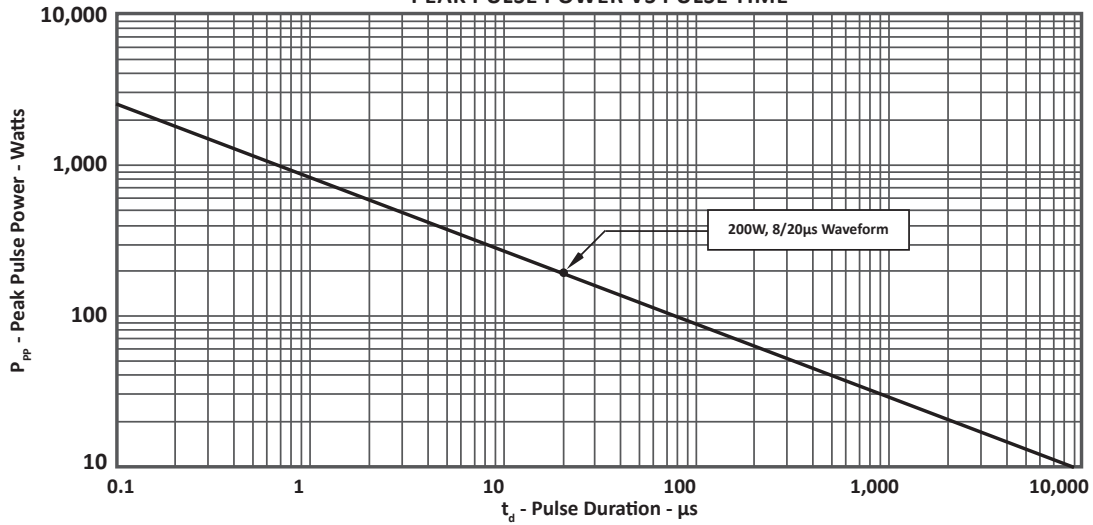


FIGURE 2  
PULSE WAVE FORM

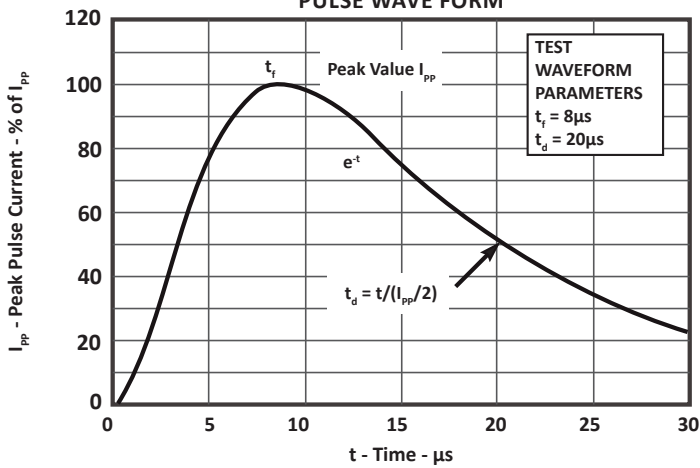
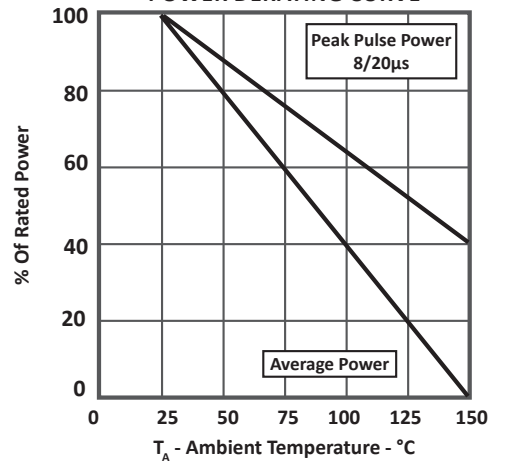


FIGURE 3  
POWER DERATING CURVE



## TYPICAL DEVICE CHARACTERISTICS

FIGURE 4  
 OVERTHOOT & CLAMPING VOLTAGE FOR CP05C

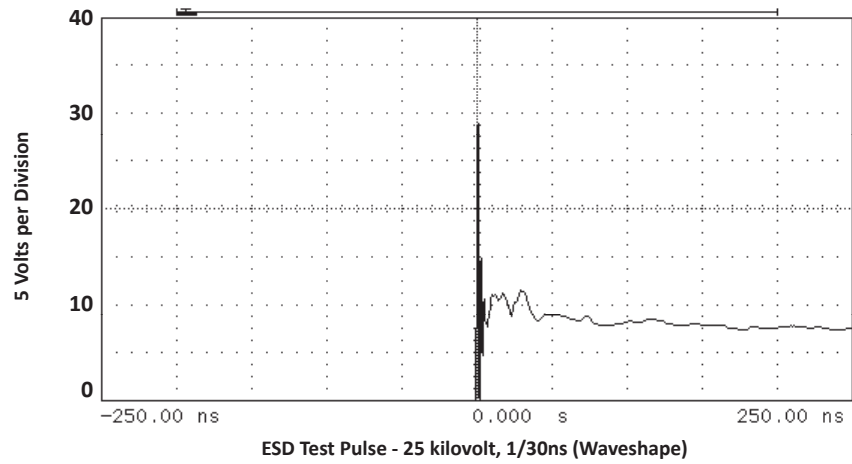
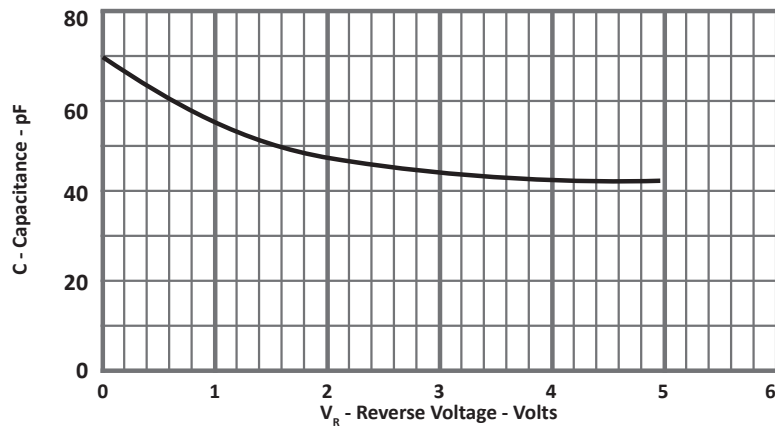
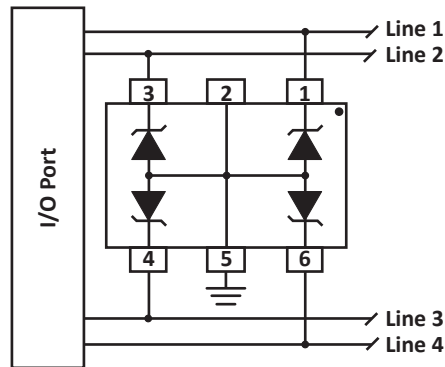


FIGURE 5  
 TYPICAL REVERSE VOLTAGE VS CAPACITANCE FOR CP05C



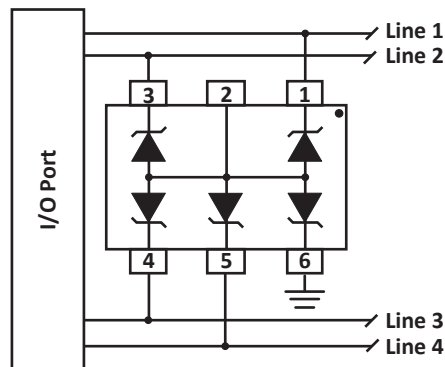
## APPLICATION INFORMATION



**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.

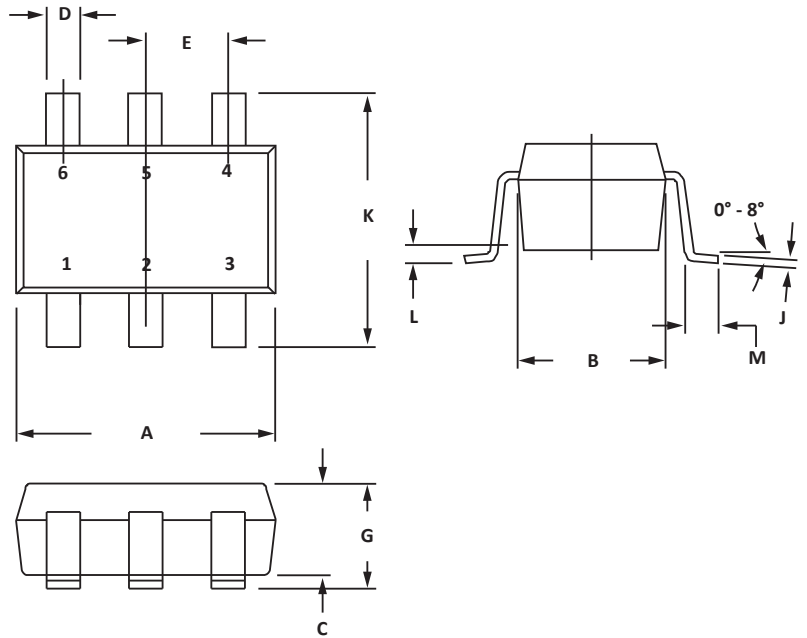
## SOT-23-6 PACKAGE INFORMATION

## 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.

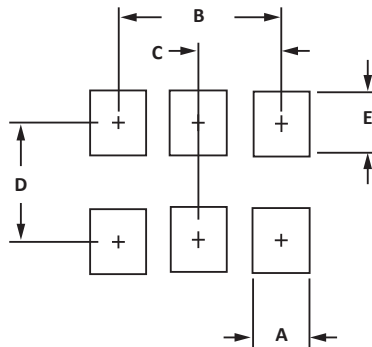


## PAD LAYOUT DIMENSIONS

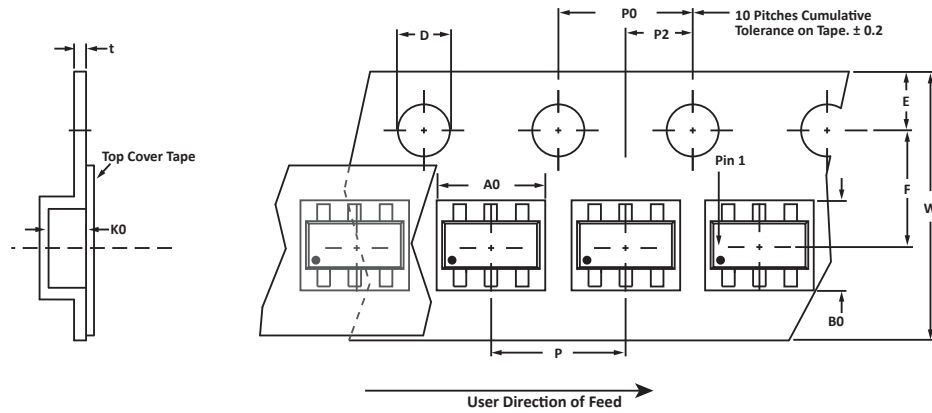
| DIM | MILLIMETERS | INCHES  |
|-----|-------------|---------|
|     | NOMINAL     | NOMINAL |
| A   | 0.70        | 0.028   |
| B   | 1.90        | 0.074   |
| C   | 0.95        | 0.037   |
| D   | 2.40        | 0.094   |
| E   | 1.00        | 0.039   |

## 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

- Dimensions are in millimeters.
- Surface mount product is taped and reeled in accordance with EIA-481.
- Suffix - T7 = 7" Reel - 3,000 pieces per 8mm tape.
- 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 |
|------------------------------------|-----------------|-------------|----------|-----------|----------|
| CPxx/CPxxC                         | -LF             | -T7         | 3,000    | 7"        | n/a      |

This device is only available in a Lead-Free configuration.

## COMPANY INFORMATION

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### COMPANY PROFILE

In business more than 20 years, ProTek Devices™ is a privately-held company located in Tempe, Arizona, that offers a product line of transient voltage suppressors (TVS); avalanche breakdown diodes; steering diode TVS arrays and other surge suppressor component products. These TVS devices protect electronic systems from the effects of lightning, electrostatic discharge (ESD), nuclear electromagnetic pulses (NEMP), inductive switching and EMI / RFI. ProTek Devices also offers high performance interface and linear products that include analog switches; multiplexers; LED drivers; audio control ICs; RF and related high frequency products. The analog devices work in a host of consumer; industrial; automotive and other applications.

### CONTACT US

#### Corporate Headquarters

2929 South Fair Lane  
Tempe, Arizona 85282  
USA

#### By Telephone

General: 602-431-8101  
Sales: & Marketing: 602-414-5109  
Customer Service: 602-414-5114  
Product Technical Support: 602-414-5107

#### By Fax

General: 602-431-2288

#### By E-mail:

Sales: [sales@protekdevices.com](mailto:sales@protekdevices.com)  
Customer Service: [service@protekdevices.com](mailto:service@protekdevices.com)  
Technical Support: [support@protekdevices.com](mailto:support@protekdevices.com)

#### ProTek Devices (Asia Pacific) Pte. Ltd.

8 Ubi Road 2, #06-19  
Zervex  
Singapore - 408538  
Tel: +65-67488312  
Fax: +65-67488313

#### Web

[www.protekdevices.com](http://www.protekdevices.com)

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