PROTEK DEVICES
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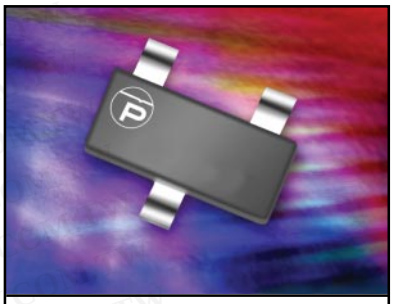
# PSOT03LC thru PSOT36LC

## ULTRA LOW CAPACITANCE TVS ARRAY

## APPLICATIONS



SOT-23

- ✔ Ethernet - 10/100 Base T
- ✔ Cellular Phones
- ✔ FireWire
- ✔ Audio/Video Inputs
- ✔ Portable Electronics

## IEC COMPATIBILITY (EN61000-4)

- ✔ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- ✔ 61000-4-4 (EFT): 40A - 5/50ns
- ✔ 61000-4-5 (Surge): 12A, 8/20µs - Level 1(Line-Ground) & Level 2(Line-Line)



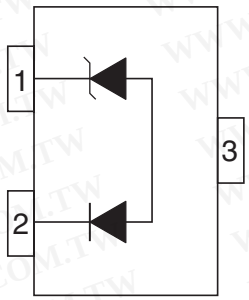
## FEATURES

- ✔ ESD Protection > 40 kilovolts
- ✔ 500 Watts Peak Pulse Power per Line (tp = 8/20µs)
- ✔ Low Clamping Voltage
- ✔ Available in Multiple Voltage Types Ranging from 3V to 36V
- ✔ ***ULTRA LOW CAPACITANCE: 5pF***
- ✔ RoHS Compliant in Lead-Free Versions

## MECHANICAL CHARACTERISTICS

- ✔ Molded JEDEC SOT-23
- ✔ Weight 8 milligrams (Approximate)
- ✔ Available in Tin-Lead or Lead-Free Pure-Tin Plating(Annealed)
- ✔ Solder Reflow Temperature:
  - Tin-Lead - Sn/Pb, 85/15: 240-245°C
  - Pure-Tin - Sn, 100: 260-270°C
- ✔ Flammability rating UL 94V-0
- ✔ 8mm Tape and Reel Per EIA Standard 481
- ✔ Device Marking: Marking Code

## PIN CONFIGURATION



# DEVICE CHARACTERISTICS

| MAXIMUM RATINGS @ 25°C Unless Otherwise Specified | | | |
|---|---|---|---|
| PARAMETER | SYMBOL | VALUE | UNITS |
| Peak Pulse Power - $t_p$ = 8/20µs (See Figure 1) | $P_{PP}$ | 500 | W |
| Operating Temperature | $T_J$ | -55°C to 150°C | °C |
| Storage Temperature | $T_{STG}$ | -55°C to 150°C | °C |

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

| PART NUMBER (Note 1) | DEVICE MARKING | RATED STAND-OFF VOLTAGE $V_{WM}$ VOLTS | MINIMUM BREAKDOWN VOLTAGE (See Note 2) @ 1mA $V_{(BR)}$ VOLTS | MAXIMUM CLAMPING VOLTAGE (See Fig. 2) @ $I_P$ = 1A $V_C$ VOLTS | MAXIMUM CLAMPING VOLTAGE (See Fig. 2) @8/20µs $V_C$ @ $I_{PP}$ | MAXIMUM LEAKAGE CURRENT @$V_{WM}$ $I_D$ µA | TYPICAL CAPACITANCE @0V, 1 MHz C pF |
|---|---|---|---|---|---|---|---|
| PSOT03LC | 03L | 3.3 | 4.0 | 7.0 | 10.9V @ 43.0A | 125 | 5 |
| PSOT05LC | 05L | 5.0 | 6.0 | 9.8 | 13.5V @ 42.0A | 20 | 5 |
| PSOT08LC | 08L | 8.0 | 8.5 | 13.4 | 16.9V @ 34.0A | 10 | 5 |
| PSOT12LC | 12L | 12.0 | 13.3 | 19.0 | 25.9V @ 21.0A | 1 | 5 |
| PSOT15LC | 15L | 15.0 | 16.7 | 24.0 | 30.0V @ 17.0A | 1 | 5 |
| PSOT24LC | 24L | 24.0 | 26.7 | 43.0 | 49.0V @ 12.0A | 1 | 5 |
| PSOT36LC | 36L | 36.0 | 40.0 | 51.0 | 76.8V @ 9.0A | 1 | 5 |

**Note 1:** Positive potential is applied from pin 1 to 2; pin 2 is ground.
**Note 2:** Do not test or surge from pin 2 to 1. PIV typically greater than 100V for the rectifier diode.

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

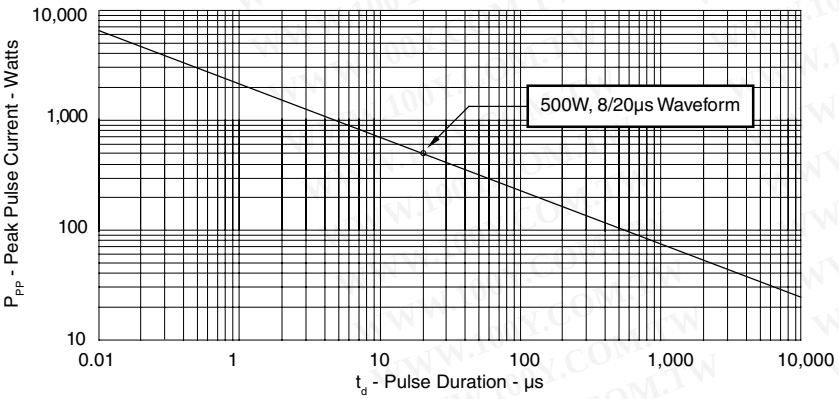
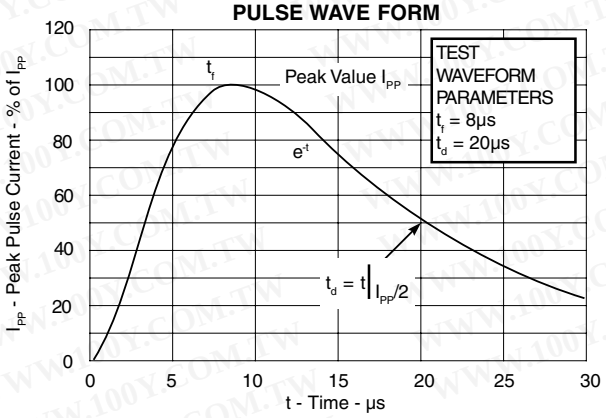



**FIGURE 2**
**PULSE WAVE FORM**



## GRAPHS



**FIGURE 3**
**POWER DERATING CURVE**

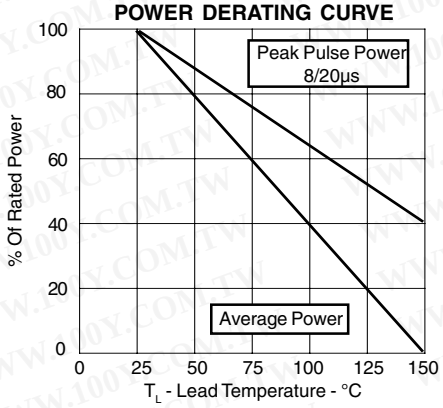
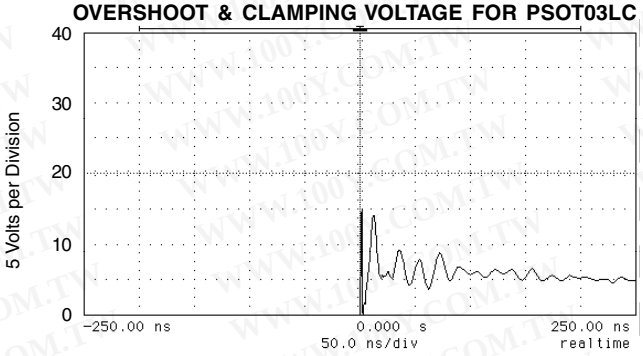
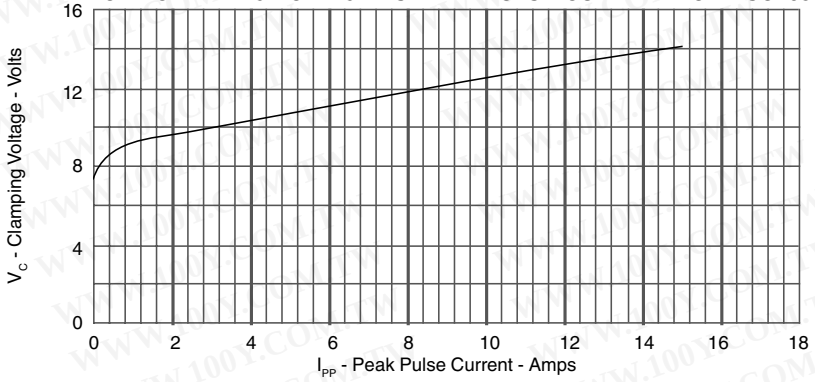



**FIGURE 4**
**OVERSHOOT & CLAMPING VOLTAGE FOR PSOT03LC**




ESD Test Pulse: 7 kilovolt, 1/30ns (waveform)

**FIGURE 5**
**TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT FOR PSOT05LC**



# APPLICATION NOTE

The PSOTxxLC Series are low capacitance TVS arrays designed to protect I/O or data lines from the damaging effects of ESD or EFT. This product series provides unidirectional & bidirectional protection, with a surge capability of 500 Watts $P_{PP}$ per line for an 8/20µs waveform and ESD protection > 40 kilovolts.

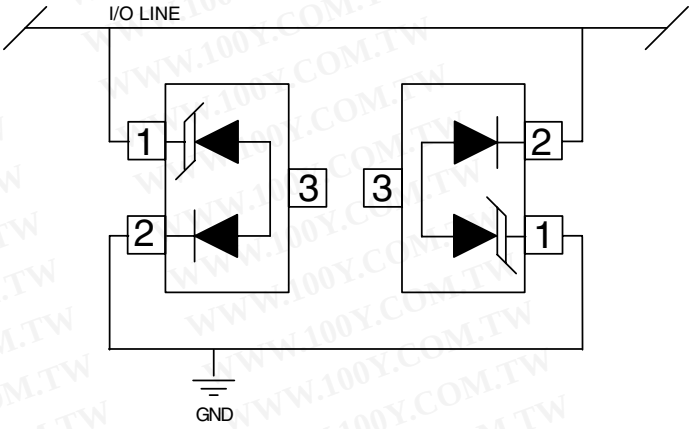
**BIDIRECTIONAL COMMON-MODE CONFIGRUATION (Figure 1)**

Two PSOTxxLC devices, when used in paralell, provide protection in a common-mode configuration as depicted in Figure 1.

Circuit connectivity is as follows:

- ✔ I/O Line is connected to Device 1, Pin 1.
- ✔ I/O Line is connect to Device 2, Pin 2.
- ✔ Device 1, Pin 2 is connected to ground.
- ✔ Device 2, Pin 1 is connected to ground.
- ✔ Device 1 & 2, Pin 3 is not connected.

Figure 1 - Common-Mode I/O Port Protection



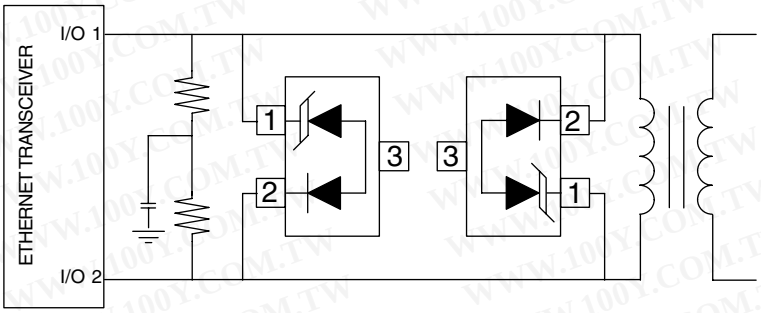

**BIDIRECTIONAL DIFFERENTIAL-MODE CONFIGRUATION (Figure 1)**

In addition, two PSOTxxLC devices, when used in paralell, provide protection in a differential-mode configuration for Ethernet applications as depicted in Figure 2.

Circuit connectivity is as follows:

- ✔ I/O Line 1 is connected to Device 1, Pin 1.
- ✔ I/O Line 1 is connect to Device 2, Pin 2.
- ✔ I/O Line 2 is connected to Device 1, Pin 1.
- ✔ I/O Line 2 is connect to Device 2, Pin 2.
- ✔ Device 1 & 2, Pin 3 is not connected.

Figure 2 - Differential-Mode Ethernet Protection



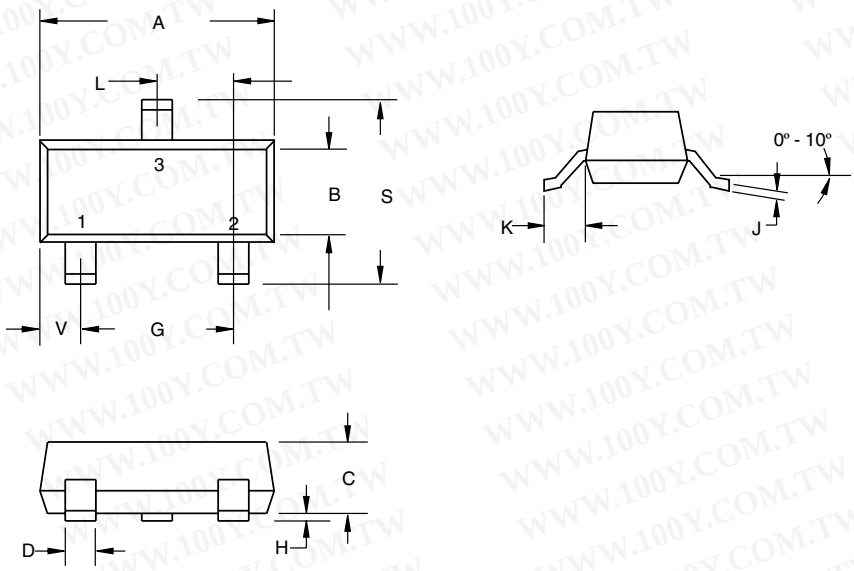

**CIRCUIT BOARD LAYOUT RECOMMENDATIONS**

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.

# PACKAGE OUTLINE & DIMENSIONS

## PACKAGE OUTLINE

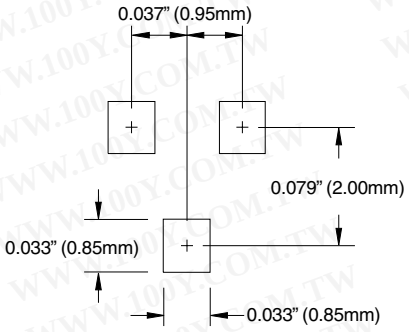



## SOT-23

## PACKAGE DIMENSIONS

| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 2.80 | 3.04 | 0.1102 | 0.1197 |
| B | 1.20 | 1.40 | 0.0472 | 0.0551 |
| C | 0.89 | 1.11 | 0.0350 | 0.0440 |
| D | 0.37 | 0.50 | 0.0150 | 0.0200 |
| G | 1.78 | 2.04 | 0.0701 | 0.0807 |
| H | 0.013 | 0.100 | 0.0005 | 0.0040 |
| J | 0.085 | 0.177 | 0.0034 | 0.0070 |
| K | 0.45 | 0.60 | 0.0180 | 0.0236 |
| L | 0.89 | 1.02 | 0.0350 | 0.0401 |
| S | 2.10 | 2.50 | 0.0830 | 0.0984 |
| V | 0.45 | 0.60 | 0.0177 | 0.0236 |

## MOUNTING PAD




**NOTES**

1. Dimensioning and tolerances per ANSI Y14.5M, 1985.
2. Controlling Dimension: Inches
3. Pin 3 is the cathode (Unidirectional Only).
4. Dimensions are exclusive of mold flash and metal burrs.

**TAPE & REEL 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., *PSOT05LC-T7*.
3. Suffix -T13 = 13 Inch Reel - 10,000 pieces per 8mm tape, i.e., *PSOT05LC-T13*.
4. Suffix - LF = Lead-Free, Pure-Tin Plating, i.e., *PSOT05LC-LF-T7*.

**Outline & Dimensions: Rev 1 - 11/01, 06012**



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