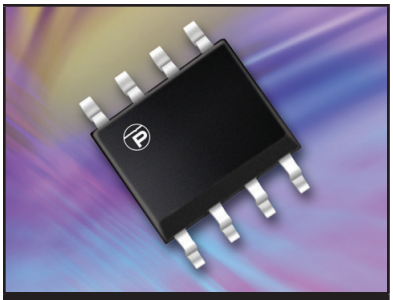
# 500 WATT ULTRA LOW CAPACITANCE TVS ARRAY



SO-8 PACKAGE

## DESCRIPTION

The PLC496 is an ultra low capacitance TVS array that provides two lines of protection. This device protects high-frequency applications such as voice and data related systems and is designed to minimize the effects of high overshoot voltage experienced during and ESD event.

The PLC496 has a peak pulse power rating of 500 Watts for an 8/20µs waveshape. This device meets the IEC 61000-4-2, IEC 61000-4-4 and IEC 61000-4-5 requirements.

## 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): 24A, 8/20µs - Level 2(Line-Gnd) & Level 3(Line-Line)
- 500 Watts Peak Pulse Power per Line (tp = 8/20µs)
- Bidirectional Configuration
- Low Clamping Voltage < 5 Volts
- Ultra Low Capacitance: 1.25pF
- RoHS Compliant
- REACH Compliant

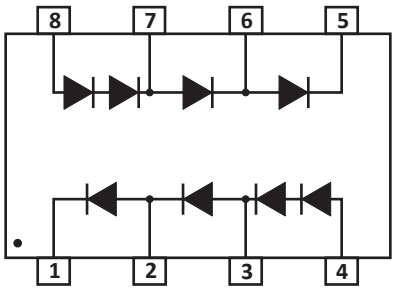
## APPLICATIONS

- Sensor & Control Circuits
- FireWire
- Ethernet - 10/100/1000 Base T
- Portable Electronics
- RF Applications

## MECHANICAL CHARACTERISTICS

- Molded JEDEC SO-8 Package
- Approximate Weight: 70 milligrams
- Lead-Free Pure-Tin Plating (Annealed)
- Solder Reflow Temperature:
  Pure-Tin - Sn, 100: 260-270°C
- 12mm Tape and Reel Per EIA Standard 481
- Flammability Rating UL 94V-0

## PIN CONFIGURATION



## TYPICAL DEVICE CHARACTERISTICS

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

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

| PART NUMBER | DEVICE MARKING | RATED STAND-OFF VOLTAGE $V_{WM}$ VOLTS | MINIMUM BREAKDOWN VOLTAGE (Note 1) @1mA $V_{(BR)}$ VOLTS | MAXIMUM REVERSE LEAKAGE CURRENT (Note 1) @$V_{WM}$ $I_D$ µA | MAXIMUM CLAMPING VOLTAGE (Note 1) (Fig. 2) @ 8/20µs $V_C$ @ $I_{PP}$ | WORKING INVERSE BLOCKING VOLTAGE (Note 2) @ $V_{WB}$ VOLTS | INVERSE BLOCKING LEAKAGE CURRENT (Note 2) @ $V_{WB}$ $I_R$ µA | MAXIMUM CAPACITANCE (Note 3) @0V, 1MHz C pF |
|---|---|---|---|---|---|---|---|---|
| PLC496 | VEC | 1.0 | 2.5 | 20 | 12.5V @ 30A | 75 | 1.0 | 1.25 |

**NOTE**
1. Apply positive voltage from pin 4 to 1 and pin 8 to 5.
2. Apply positive voltage from pin 1 to 4 and 5 to 8.
3. Capacitance from pin 1 to 4 < 1.25pF. Capacitance from pin 8 to 5 < 1.25pF.

## TYPICAL DEVICE CHARACTERISTICS

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

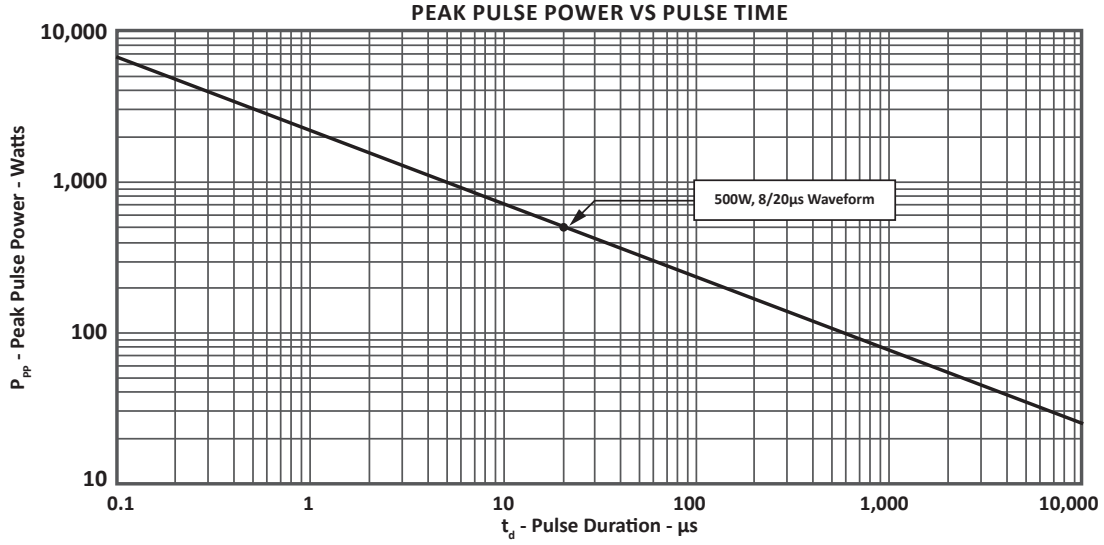
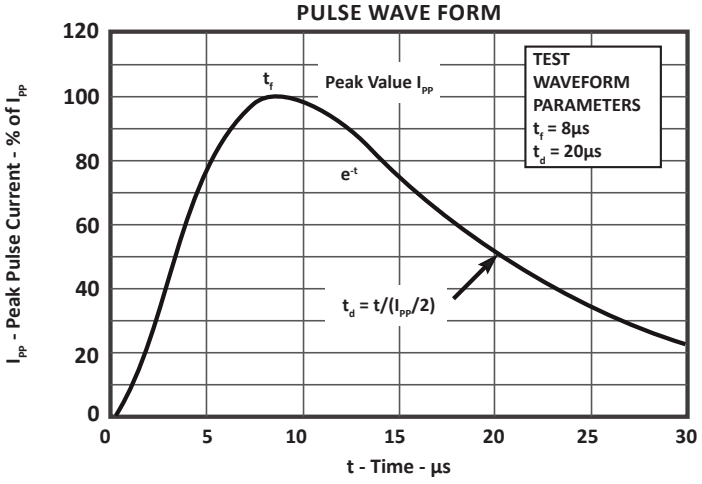



**FIGURE 2**
**PULSE WAVE FORM**



## TYPICAL DEVICE CHARACTERISTICS

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

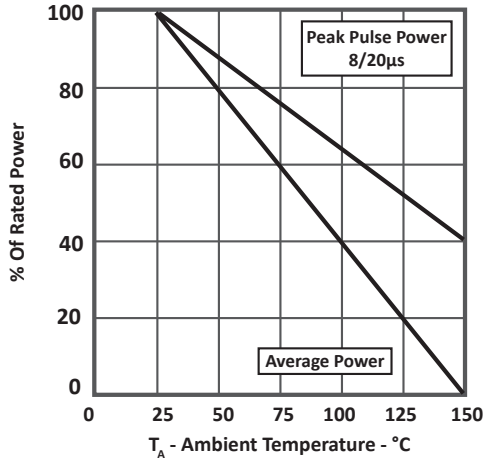
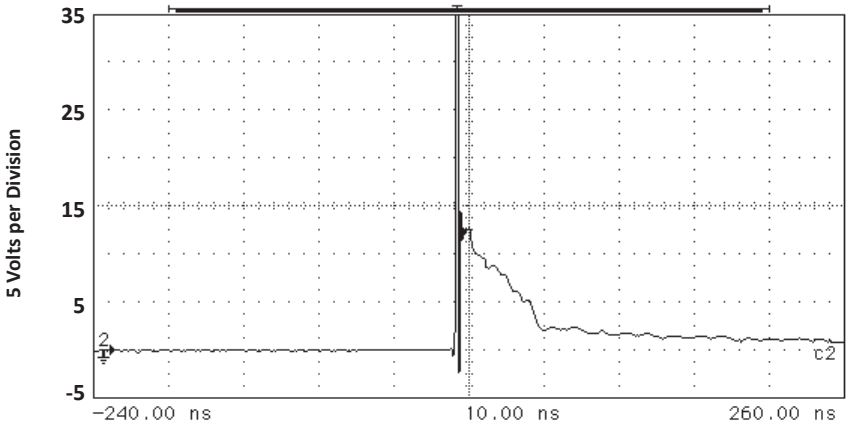


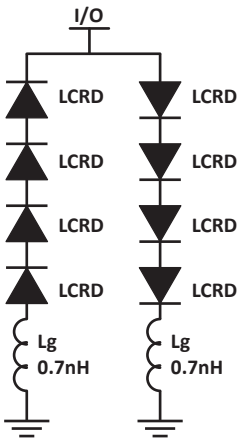

**FIGURE 4**
**OVERSHOOT & CLAMPING VOLTAGE**




**ESD Test Pulse - 25 kilovolt, 1/30ns (Waveshape)**

## SPICE MODEL

**FIGURE 1**
**SPICE MODEL**



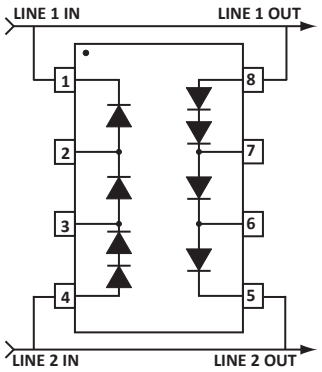

LCRD: Low Capacitance Rectifier Diode
Lg - Lead Inductance

**TABLE 1 - SPICE PARAMETERS**

| PARAMETER | UNIT | LCRD |
|---|---|---|
| BV | V | 200 |
| IBV | µA | 0.01 |
| $C_{jo}$ | pF | 5 |
| $I_s$ | A | 1E-13 |
| Vj | V | 0.6 |
| M | - | 0.33 |
| N | - | 1 |
| $R_s$ | Ohms | 0.31 |
| TT | s | 1E-9 |
| EG | eV | 1.11 |

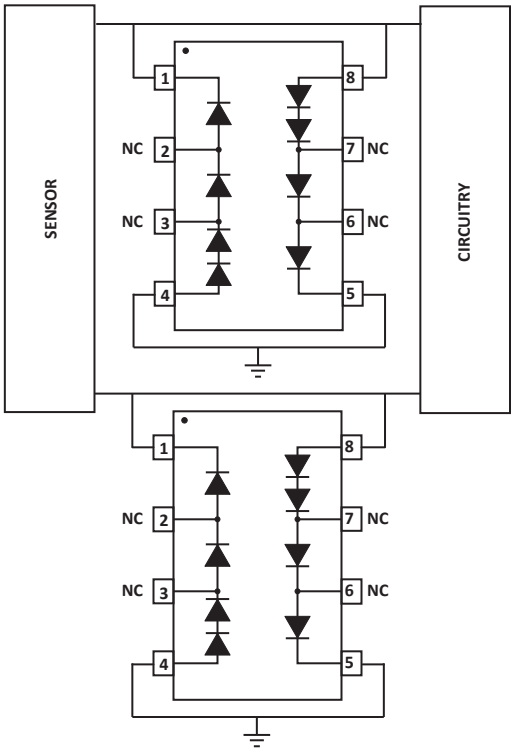
## APPLICATION INFORMATION

### FIGURE 1 - DIFFERENTIAL MODE I/O PORT PROTECTION




Circuit connectivity is as follows:
- Pins 1, 4, 5 and 8 are connected to the data lines.
- Pins 2, 3, 6 and 7 are not connected.

### FIGURE 2 - COMMON MODE SENSOR PROTECTION




Circuit connectivity is as follows:
- Pins 1 and 8 connected to the dataline.
- Pins 4 and 5 connected to ground.
- Pins 2, 3, 6 and 7 are not connected.

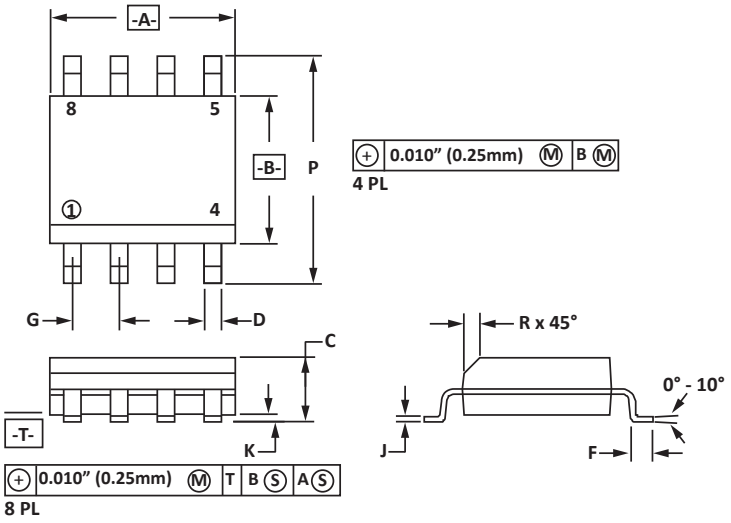
### CIRCUIT BOARD RECOMMENDATIONS

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.

## SO-8 PACKAGE INFORMATION

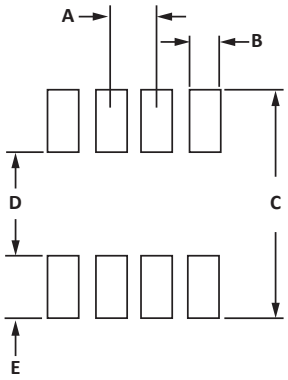
| OUTLINE DIMENSIONS | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.196 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.05 BSC | |
| J | 0.18 | 0.25 | 0.007 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.008 |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |

**NOTES**
1. -T- = Seating plane and datum surface.
2. Dimensions "A" and "B" are datum.
3. Dimensions "A" and "B" do not include mold protrusion.
4. Maximum mold protrusion is 0.015" (0.380mm) per side.
5. Dimensioning and tolerances per ANSI Y14.5M, 1982.
6. Dimensions are exclusive of mold flash and metal burrs.

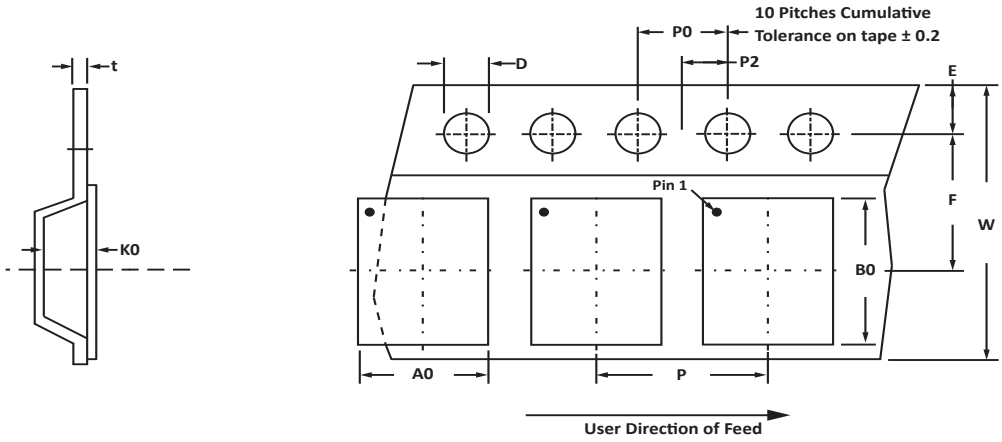



| PAD LAYOUT DIMENSIONS | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 1.14 | 1.40 | 0.045 | 0.055 |
| B | 0.64 | 0.89 | 0.025 | 0.035 |
| C | 6.22 | - | 0.245 | - |
| D | 3.94 | 4.17 | 0.155 | 0.165 |
| E | 1.02 | 1.27 | 0.040 | 0.050 |

**NOTES**
1. Controlling dimension: inches.



## TAPE AND REEL




| SPECIFICATIONS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REEL DIA. | TAPE WIDTH | A0 | B0 | K0 | D | E | F | W | P0 | P2 | P | tmax |
| 178mm (7") | 12mm | 6.50 ± 0.10 | 5.40 ± 0.10 | 2.00 ± 0.10 | 1.50 ± 0.10 | 1.75 ± 0.10 | 5.50 ± 0.05 | 12.00 ± 0.30 | 4.00 ± 0.12 | 2.00 ± 0.10 | 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 - 1,000 pieces per 12mm tape.
4. Suffix - T13 = 13" Reel - 2,500 pieces per 12mm tape.
5. Bulk product shipped in tubes of 98 pieces per tube.
6. Marking on Part - marking code (see page 2), date code, logo and pin one defined by dot on top of package.

Package outline, pad layout and tape specifications per document number 06011.R4 8/10.

| ORDERING INFORMATION | | | | | |
|---|---|---|---|---|---|
| BASE PART NUMBER | LEADFREE SUFFIX | TAPE SUFFIX | QTY/REEL | REEL SIZE | TUBE QTY |
| PLC496 | -LF | -T7 | 1,000 | 7" | 98 |
| PLC496 | -LF | -T13 | 2,500 | 13" | 98 |

## COMPANY INFORMATION

**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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