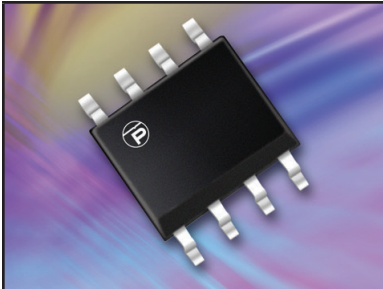


500 WATT LOW CAPACITANCE STEERING DIODE/TVS ARRAY



SO-8 PACKAGE

DESCRIPTION

The PSRDAXx-4 Series are low capacitance multi-line steering diode/transient voltage suppressor arrays that provides board level protection for standard TTL and CMOS bus line applications against the damaging effects of ESD, tertiary lightning and switching transients.

The PSRDAXx-4 Series has a peak pulse power rating of 500 Watts for an 8/20 μ s waveshape. This device series 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, 8/20 μ s - Level 2(Line-Gnd) & Level 3(Line-Line)
- 500 Watts Peak Pulse Power per Line (tp = 8/20 μ s)
- Unidirectional Configuration
- Available in 3.3V, 5V, 12V & 15V
- Protects Up to Four I/O Ports
- Low Capacitance: 5pF per Diode
- RoHS Compliant
- REACH Compliant

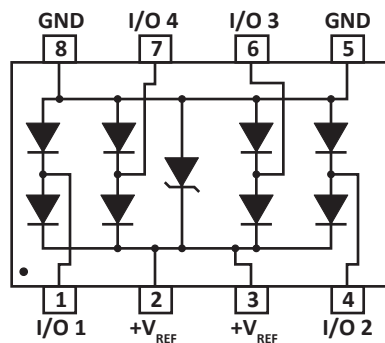
APPLICATIONS

- Computer Interface Protection
- Ethernet - 10/100/1000 Base T
- Set-Top Box Protection
- Video Card

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 |
|---|-----------|------------|-------|
| Peak Pulse Power (tp = 8/20μs) - See Figure 1 | P_{PP} | 500 | Watts |
| Operating Temperature | T_L | -55 to 150 | °C |
| Storage Temperature | T_{STG} | -55 to 150 | °C |
| Continuous Power Dissipation | P_{PC} | 1000 | mW |
| Maximum Forward Voltage @ 10mA (Note 1) | V_F | 1.1 | Volts |

NOTES

1. Measured between pins 8 or 5 to 1, 2, 3, 4, 6 and 7.

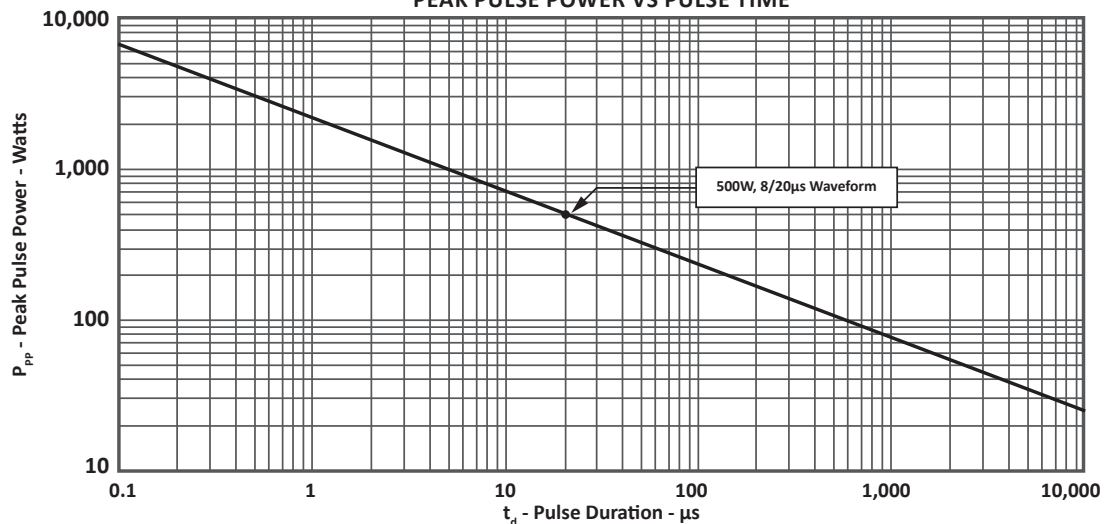
ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

| PART NUMBER | DEVICE MARKING | RATED STAND-OFF VOLTAGE V_{WM} VOLTS | MINIMUM BREAKDOWN VOLTAGE @1mA $V_{(BR)}$ VOLTS | MAXIMUM CLAMPING VOLTAGE (Fig. 2) @ $I_P = 1A$ V_C VOLTS | MAXIMUM LEAKAGE CURRENT @ V_{WM} I_D μA | MAXIMUM CAPACITANCE (Note 1) (Fig. 6) @0V, 1MHz $C_{J(SD)}$ pF |
|-------------|----------------|--|--|---|--|---|
| PSRDA3.3-4 | PRA | 3.3 | 4.0 | 6.5 | 125 | 5 |
| PSRDA05-4 | PRB | 5.0 | 6.0 | 9.8 | 20 | 5 |
| PSRDA12-4 | PRD | 12.0 | 13.3 | 19.0 | 1 | 5 |
| PSRDA15-4 | PRE | 15.0 | 16.7 | 24.0 | 1 | 5 |

NOTES

1. Capacitance measured at $V_{WM} = V_{CC}$ connected between I/O pins to pin 8 and 5 (Gnd). $V_R = V_{WM}$ @ 1MHz. As shown in Figure 6, REF1 is connected to ground, REF2 is connected to + V_{CC} and input applies to $V_{CC} = 5V$, $V_{SIGN} = 30mV$, $F = 1MHz$

FIGURE 1
PEAK PULSE POWER VS PULSE TIME



TYPICAL DEVICE CHARACTERISTICS

FIGURE 2
PULSE WAVE FORM

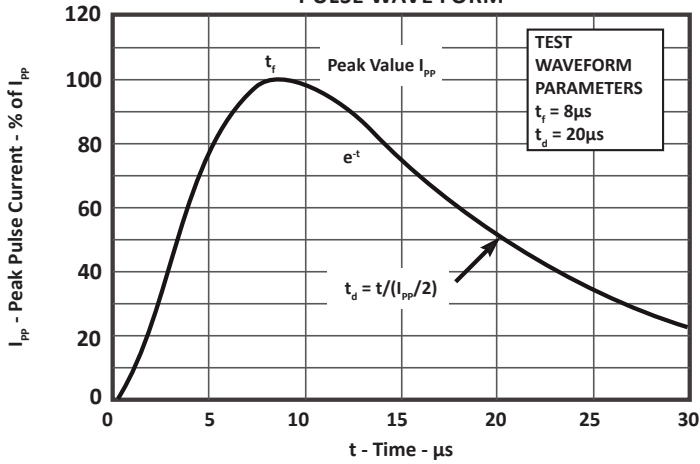


FIGURE 3
POWER DERATING CURVE

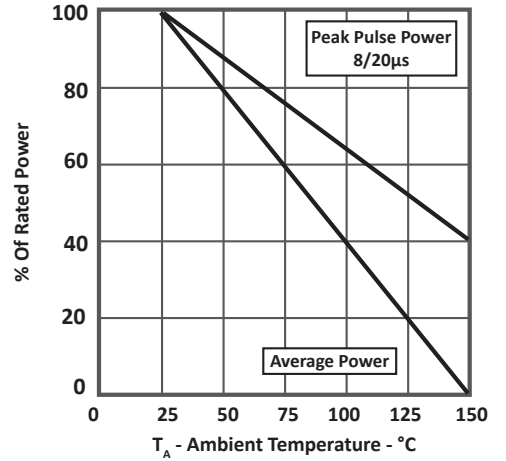
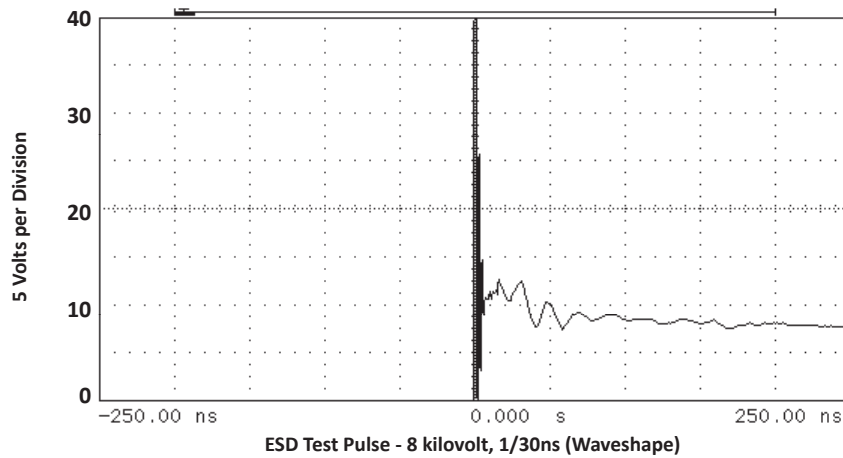


FIGURE 4
OVERSHOOT & CLAMPING VOLTAGE FOR PSRDA05-4



TYPICAL DEVICE CHARACTERISTICS

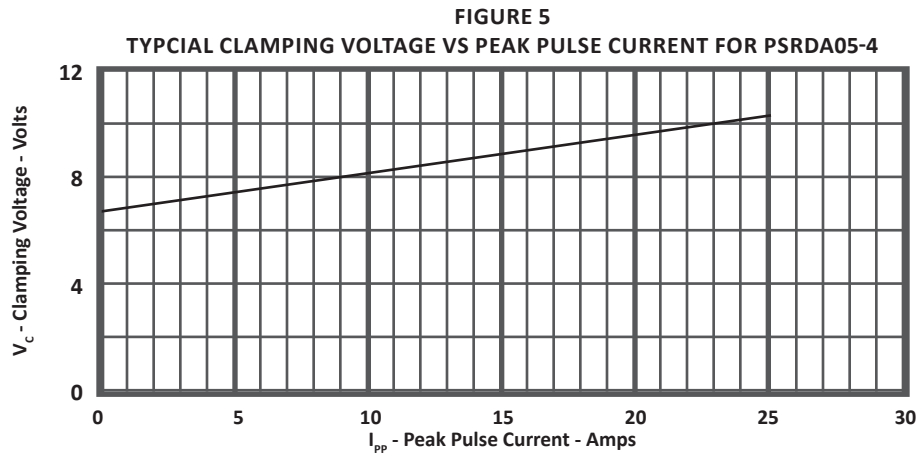
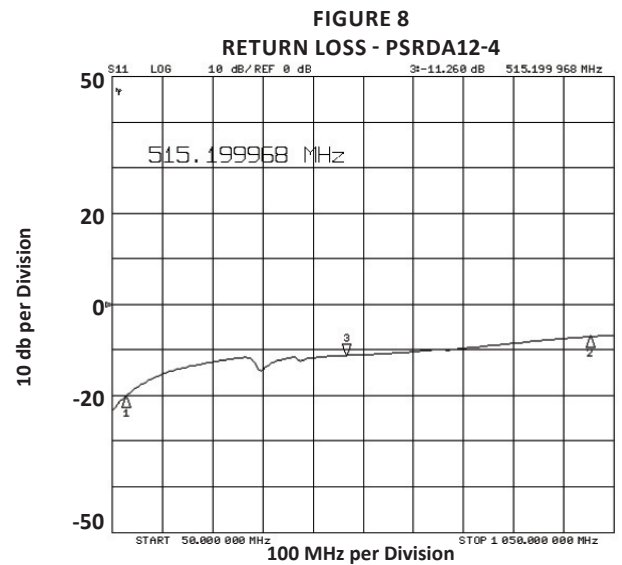
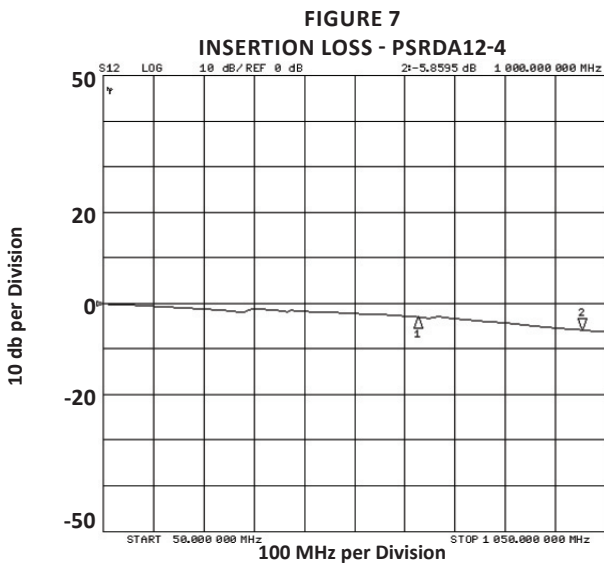
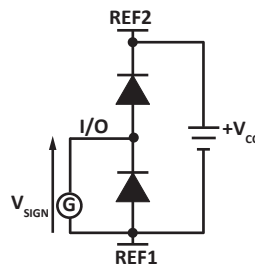
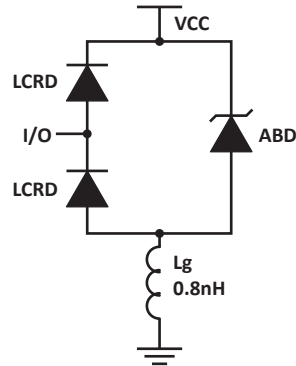


FIGURE 6
INPUT CAPACITANCE CIRCUIT



SPICE MODEL

FIGURE 1
SPICE MODEL



ABD - Avalanche Breakdown Diode (TVS)
 LCRD: Low Capacitance Rectifier Diode
 Lg - Lead Inductance

TABLE 1 - SPICE PARAMETERS

| PARAMETER | UNIT | ABD(TVS) | LCRD |
|-----------|---------------|-------------|-------|
| BV | V | See Table 2 | 200 |
| IBV | μA | 1 | 0.01 |
| C_{jo} | pF | See Table 2 | 5 |
| I_s | A | See Table 2 | 1E-13 |
| Vj | V | 0.6 | 0.6 |
| M | - | 0.33 | 0.33 |
| N | - | 1 | 1 |
| R_s | Ohms | See Table 2 | 0.31 |
| TT | s | 1E-8 | 1E-9 |
| EG | eV | 1.11 | 1.11 |

TABLE 2 - ABD SPECIFIC SPICE PARAMETERS

| PART NUMBER | B_v (VOLTS) | C_{jo} (pF) | I_s (AMPS) | R_s (OHMS) |
|-------------|---------------|---------------|--------------|--------------|
| PSRDA3.3-4 | 4.0 | 438 | 1E-11 | 0.21 |
| PSRDA05-4 | 6.0 | 284 | 1E-11 | 0.14 |
| PSRDA12-4 | 13.3 | 123 | 1E-11 | 0.4 |
| PSRDA15-4 | 16.7 | 102 | 1E-11 | 0.52 |

APPLICATION INFORMATION

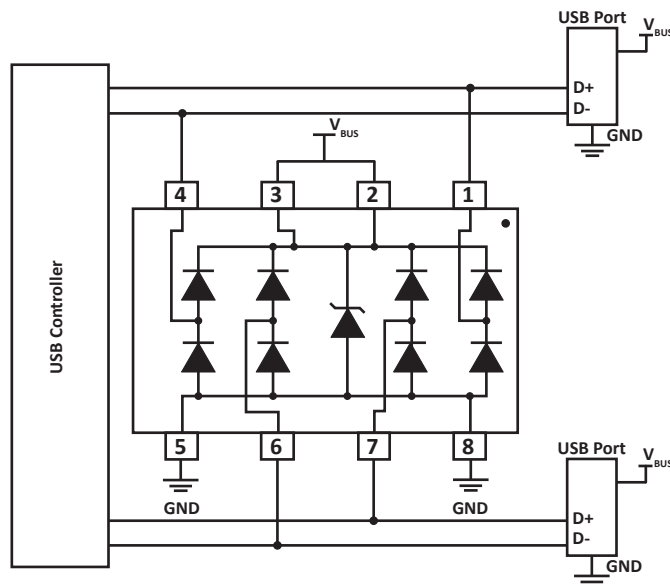


FIGURE 1 - DIFFERENTIAL MODE USB PROTECTION

Circuit connectivity is as follows:

- Pins 1, 2, 4, 6 and 7 connected to the datalines.
- Pin 5 and 8 connected to ground.
- Pins 2 and 3 connected to the databus.

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.

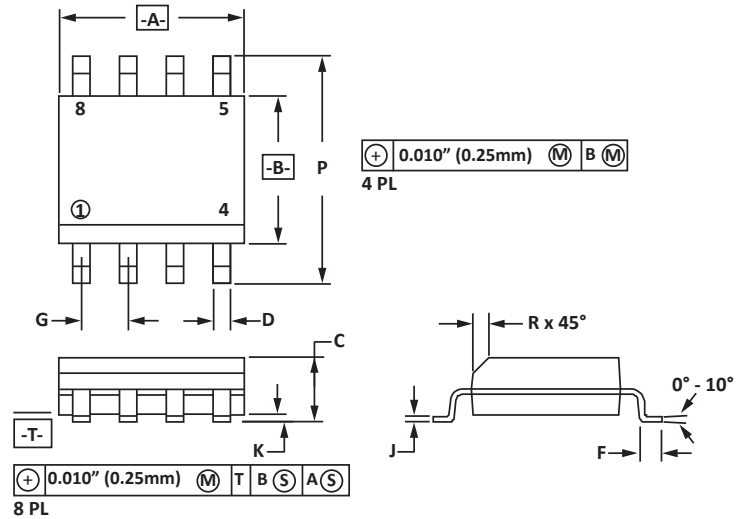
SO-8 PACKAGE INFORMATION

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

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

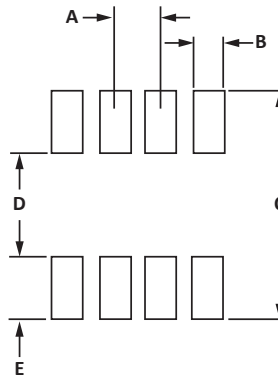


PAD LAYOUT DIMENSIONS

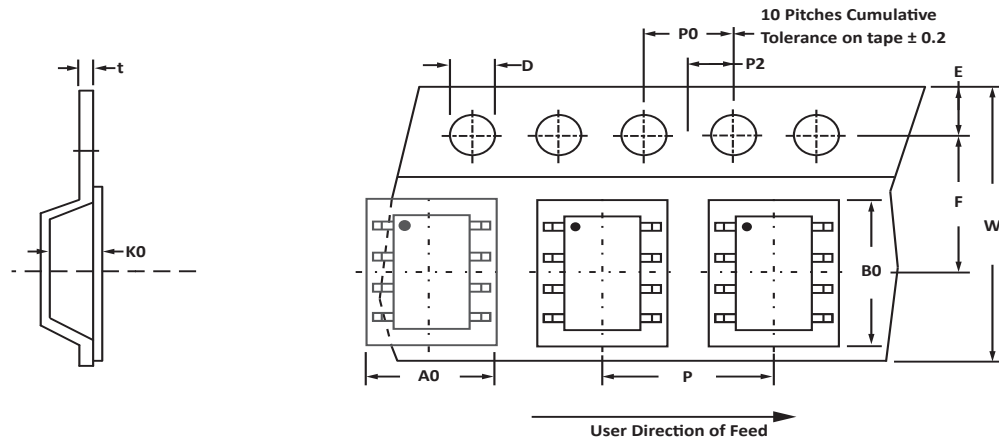
| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.14 | 1.40 | 0.045 | 0.055 |
| B | 0.64 | 0.89 | 0.025 | 0.035 |
| C | 6.22 | - | 0.245 | - |
| D | 3.94 | 4.17 | 0.155 | 0.165 |
| E | 1.02 | 1.27 | 0.040 | 0.050 |

NOTES

- 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 | 8.00 ± 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 - 1,000 pieces per 12mm tape.
- Suffix - T13 = 13" Reel - 2,500 pieces per 12mm tape.
- Bulk product shipped in tubes of 98 pieces per tube.
- Marking on Part - marking code (see page 2), date code, logo and pin one defined by dot on top of package.

ORDERING INFORMATION

| BASE PART NUMBER (xx = Voltage) | LEADFREE SUFFIX | TAPE SUFFIX | QTY/REEL | REEL SIZE | TUBE QTY |
|------------------------------------|-----------------|-------------|----------|-----------|----------|
| PSRDAxx-4 | -LF | -T7 | 1,000 | 7" | 98 |
| PSRDAxx-4 | -LF | -T13 | 2,500 | 13" | 98 |

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

COMPANY INFORMATION

COMPANY PROFILE

In business more than 25 years, ProTek Devices™ is a privately held semiconductor company. The company offers a product line of overvoltage protection and overcurrent protection components. These include transient voltage suppressor array (TVS arrays) avalanche breakdown diode, steering diode TVS array and electronics SMD chip fuses. These components deliver circuit protection in electronic systems from numerous overvoltage and overcurrent events. They include lightning; electrostatic discharge (ESD); nuclear electromagnetic pulses (NEMP); inductive switching; and electromagnetic interference (EMI) / radio frequency interference (RFI). ProTek Devices also offers LED wafer die for ESD protection and related high frequency products. ProTek Devices is ISO 9001:2015 certified.

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:

Asia Sales: asiasales@protekdevices.com
Europe Sales: europesales@protekdevices.com
U.S. Sales: ussales@protekdevices.com
Distributor Sales: distysales@protekdevices.com
Customer Service: service@protekdevices.com
Technical Support: 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

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