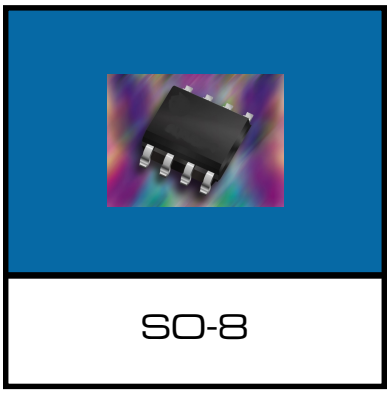
PROTEK DEVICES
. . . engineered solutions for the transient environment™

PLCDA03 thru PLCDA24

BIDIRECTIONAL LOW CAPACITANCE TVS ARRAYS

APPLICATIONS

✔ Ethernet - 10/100 Base T
✔ FireWire, SCSI & USB
✔ Audio/Video Inputs
✔ xDSL Interfaces
✔ Cellular Phone Terminals



SO-8

IEC COMPATIBILITY (EN61000-4)

✔ 61000-4-2 (ESD): Air - 15kv, Contact - 8kv
✔ 61000-4-4 (EFT): 40A - 5/50ns
✔ 61000-4-5 (Surge): 24A, 8/20µs - Level 2(Line-Gnd) & Level 3(Line-Line)

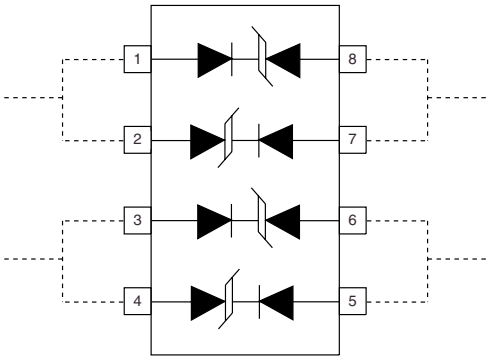
FEATURES

✔ 500 Watts Peak Pulse Power Dissipation(t_p = 8/20µs)
✔ Bidirectional Configuration
✔ Available in 6 Voltage Types: 3.3V to 24V
✔ Protects Up to Two (2) Lines
✔ ESD Protection > 40 kilovolts
✔ ***LOW CAPACITANCE -5pF***

MECHANICAL CHARACTERISTICS

✔ Molded JEDEC SO-8
✔ Weight 15 milligrams (Approximate)
✔ Flammability Rating UL 94V-0
✔ 12mm Tape and Reel Per EIA Standard 481-1-A
✔ Device Marking Code & Logo
✔ Pin 1 Indicated By Dot on Package

CIRCUIT DIAGRAM



Note 1: For bidirectional applications, connect external pins 1 &2, 3 & 4, 5 & 6 and 7 & 8 as shown in the circuit diagram.
Note 2: Do not surge from pins 8 to 1, 2 to 7, 6 to 3, and 4 to 5. PIV typically greater than 100V for each rectifier die.

DEVICE CHARACTERISTICS

MAXIMUM RATINGS @ 25°C Unless Otherwise Specified			
PARAMETER	SYMBOL	VALUE	UNITS
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 (See Note 1) (See Note 2)	DEVICE MARKING	RATED STAND-OFF VOLTAGE V_{WM} VOLTS	MINIMUM BREAKDOWN VOLTAGE @ 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	MAXIMUM CAPACITANCE (See Note 3) 0V @ 1 MHz C pF
PLCDA03	SGA	3.3	4.5	7.0	10.9V @ 43.0A	125	5
PLCDA05	SGB	5.0	6.0	9.8	13.5V @ 42.0A	20	5
PLCDA08	SGF	8.0	8.5	13.4	16.0V @ 34.0A	10	5
PLCDA12	SGC	12.0	13.3	19.0	25.9V @ 21.0A	1	5
PLCDA15	SGD	15.0	16.7	24.0	30.0V @ 17.0A	1	5
PLCDA24	SGE	24.0	26.7	43.0	49.0V @ 12.0A	1	5

Note 1: Spice model and parameters for this series are available on the ProTek Devices web site: www.protekdevices.com.
Note 2: Devices are designed to be used in parallel (See Circuit Diagram). For other applications, contact the factory. Do not apply surge in the "forward" direction of the TVS.
Note 3: Do not surge from pins 8 to 1, 2 to 7, 6 to 3 and 4 to 5. PIV typically greater than 100V for each rectifier die. Electrical characteristics apply to pins 1 to 8, 7 to 2, 3 to 6 and 5 to 4.

FIGURE 1
PEAK PULSE POWER VS PULSE TIME

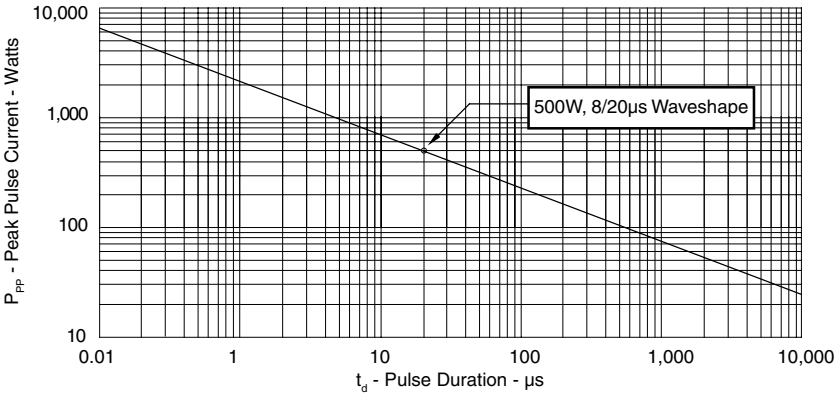
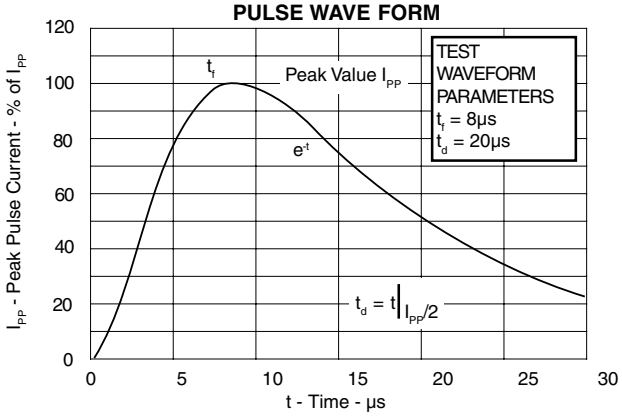


FIGURE 2
PULSE WAVE FORM



GRAPHS

FIGURE 3
POWER DERATING CURVE

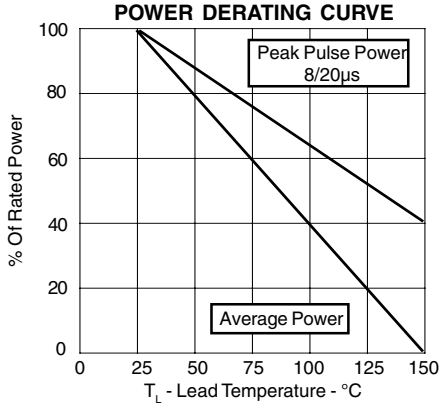
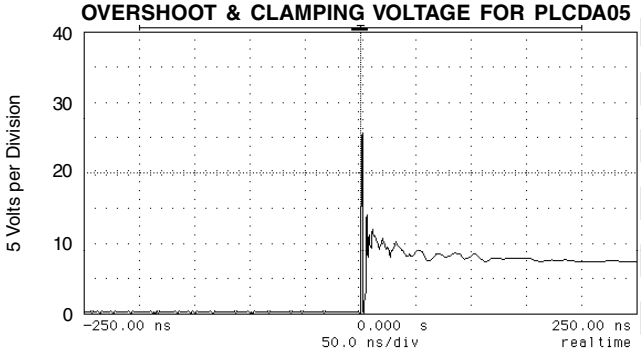


FIGURE 4
OVERSHOOT & CLAMPING VOLTAGE FOR PLCDA05



ESD Test Pulse: 25 kilovolt, 1/30ns (waveshape)

FIGURE 5
TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT

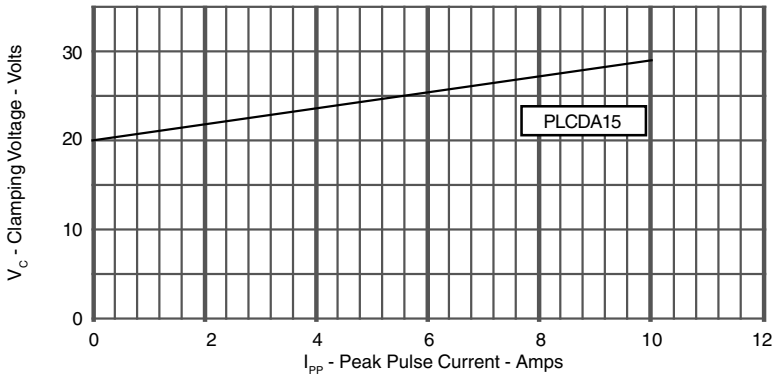


FIGURE 6
INSERTION LOSS - PLCDA05

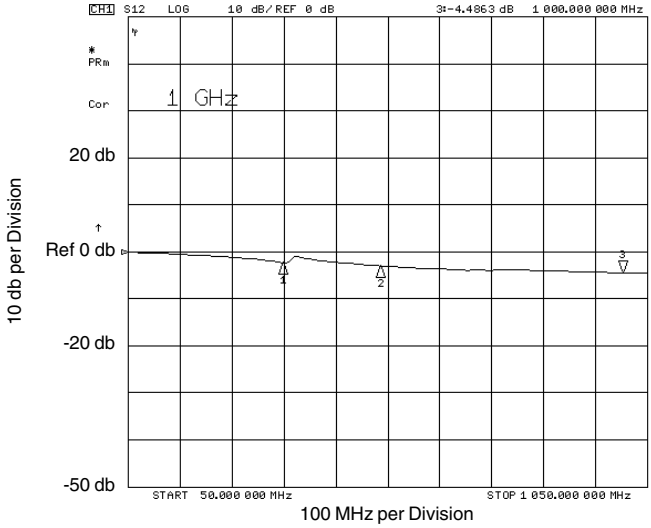
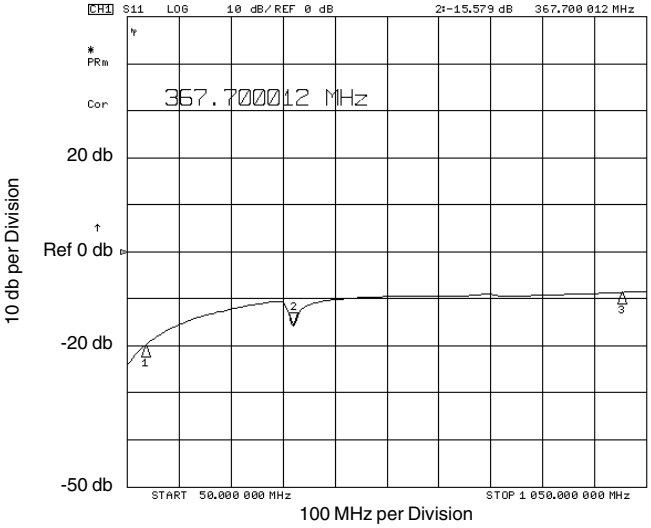


FIGURE 7
RETURN LOSS - PLCDA05



APPLICATION NOTE

The PLCDA Series are low capacitance, bidirectional TVS arrays that are designed to protect I/O or high speed data lines from the damaging effects of ESD or EFT. This product series has a surge capability of 500 Watts P_{PP} per line for an 8/20µs waveshape and offers ESD protection > 40kv.

BIDIRECTIONAL COMMON MODE CONFIGURATION (Figure 1)
Ideal for use in USB applications, the PLCDA Series provides up to two (2) lines of protection in a common mode configuration as depicted in Figure 1.

Circuit connectivity is as follows:
- ✔ Pins 1 & 2 and 3 & 4 are connected to Ground.
- ✔ Pins 5 and 6 are connected to I/O Line D+.
- ✔ Pins 7 and 8 are connected to I/O Line D-.

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.

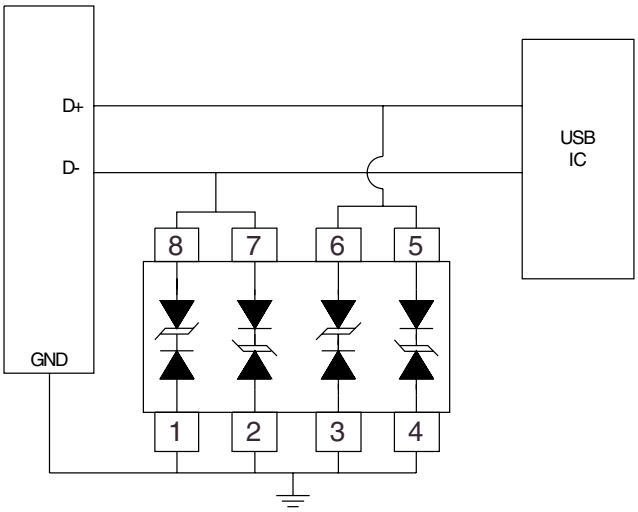
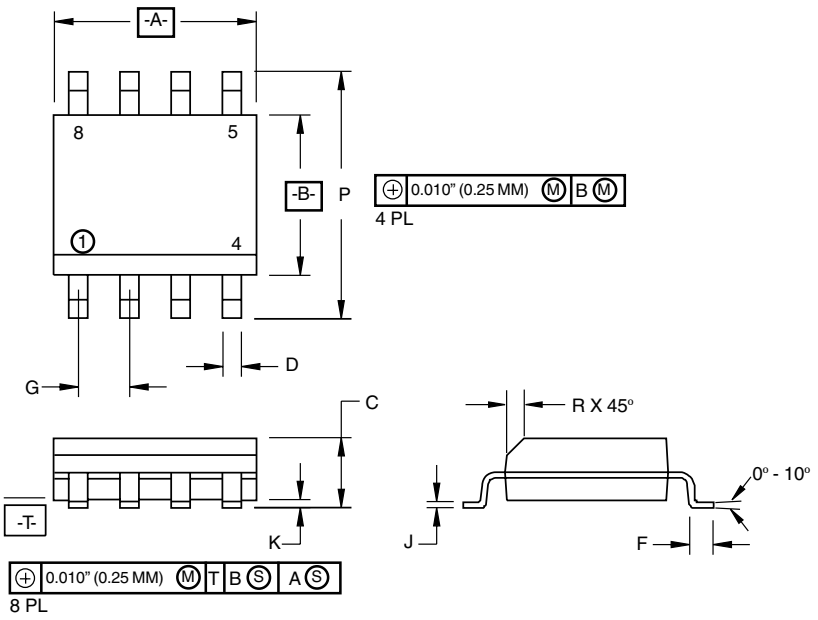


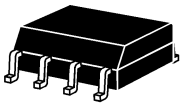
Figure 1. Typical Common-Mode USB Protection Circuit

PACKAGE OUTLINE & DIMENSIONS

PACKAGE OUTLINE



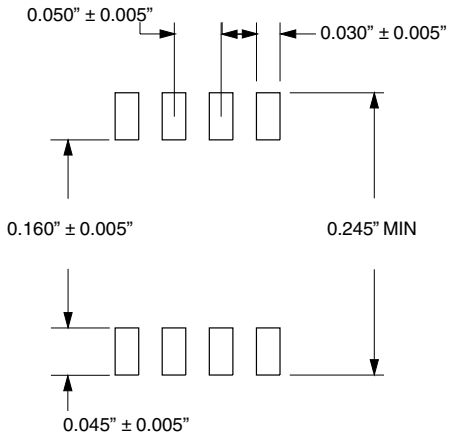
SO-8



PACKAGE DIMENSIONS

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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	1.250	0.016	0.049
G	1.27 BSC	1.27 BSC	0.05 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

MOUNTING PAD



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" (0.380 mm) per side.
5. Dimensioning and tolerances per ANSI Y14.5M, 1982.
6. Dimensions are exclusive of mold flash and metal burrs.

06009 Rev 1 -11/01

TAPE & REEL PACKAGING:
Surface mount product is taped and reeled in accordance with EIA-481, reel quantites and sizes are as follows:
7 Inch Reel - 1,000 pieces per reel; 13 Inch Reel - 2,500 pieces per reel

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