

## ULTRA LOW CAPACITANCE STEERING DIODE/TVS ARRAY



### DESCRIPTION

The PLC497 is an ultra low capacitance steering diode/TVS array. Designed for protection against Electrostatic Discharge (ESD), Electrical Fast Transients (EFT) and secondary lightning threats, this device is ideal for use in high-speed signal interface applications.

The PLC497 is available in the small SOT-23 package, which reduces internal lead inductance for low overshoot voltage during fast front time transient events like ESD. This device meets the IEC 61000-4-2 and IEC 61000-4-4 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): 20A, 8/20 $\mu$ s - Level 2(Line-Ground) & Level 3(Line-Line)
- ESD Protection > 25 kilovolts
- 200 Watts Peak Pulse Power per Line( $t_p = 8/20\mu$ s)
- Low Clamping Voltage < 5 Volts
- Ultra Low Capacitance: 2.5pF
- RoHS Compliant
- REACH Compliant

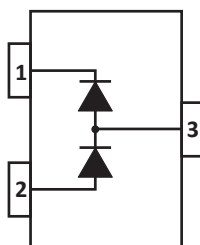
### APPLICATIONS

- Low Voltage Wireless Equipment
- Sensor & Control Circuits
- Ethernet 10/100/1000 Base T
- FireWire Interfaces/Connections

### MECHANICAL CHARACTERISTICS

- Molded JEDEC SOT-23 Package
- Approximate Weight: 8 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 CONFIGURATION



**TYPICAL DEVICE CHARACTERISTICS**
**MAXIMUM RATINGS @ 25°C Unless Otherwise Specified**

PARAMETER	SYMBOL	VALUE	UNITS
Peak Pulse Power (tp = 8/20μs) - See Figure 1	$P_{PP}$	200	Watts
Peak Pulse Current - $I_{PP}$ Max (tp = 8/20μs)	$I_{PP}$	20	Amps
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	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 $V_C$ @ $I_{PP}$	MAXIMUM WORKING INVERSE BLOCKING VOLTAGE (Note 2)  $V_{WIB}$ VOLTS	INVERSE BLOCKING LEAKAGE CURRENT (Note 2)  @ $V_{WIB}$ $I_R$ μA	MAXIMUM CAPACITANCE (Note 3)  @ 0V, 1MHz C pF
PLC497	LC	1.0	1.3	20	5.0V @ 5.0A	75	1.0	2.5

**NOTES**

1. Apply positive voltage from pin 2 to pin 1.
2. Apply positive voltage from pin 1 to pin 2.
3. Capacitance from pin 1 to pin 2 < 2.5pF.

TYPICAL DEVICE CHARACTERISTICS

FIGURE 1  
PEAK PULSE POWER VS PULSE TIME

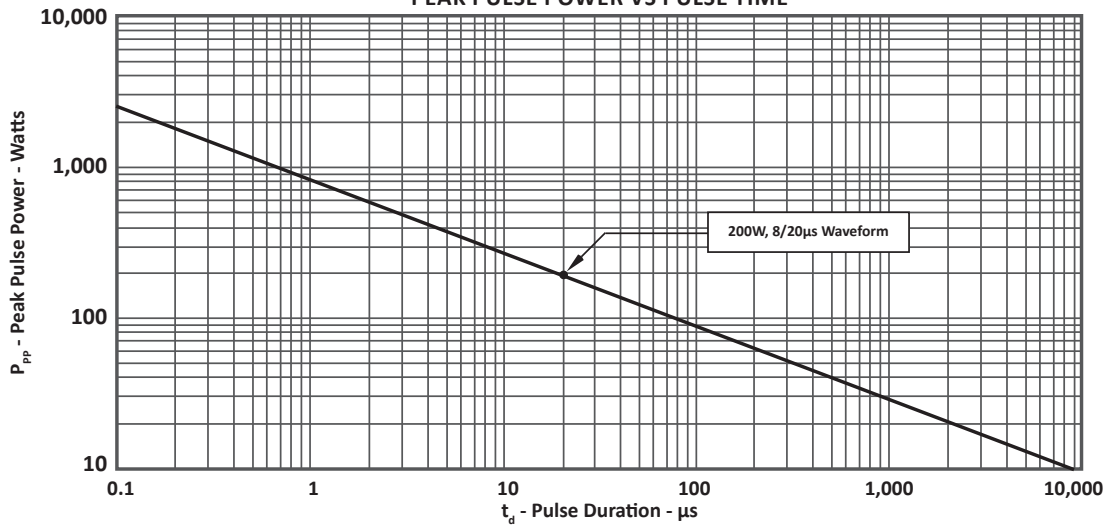


FIGURE 2  
PULSE WAVE FORM

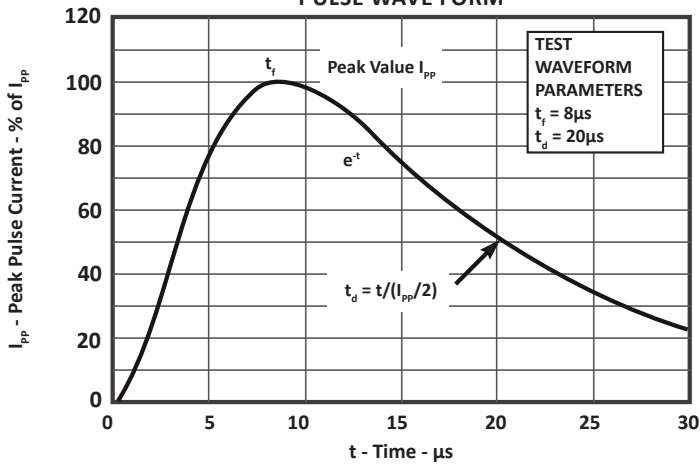
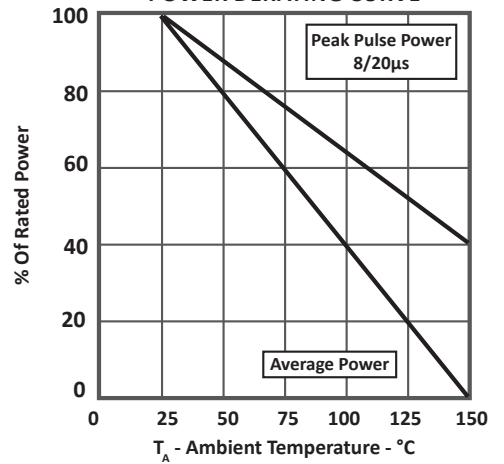
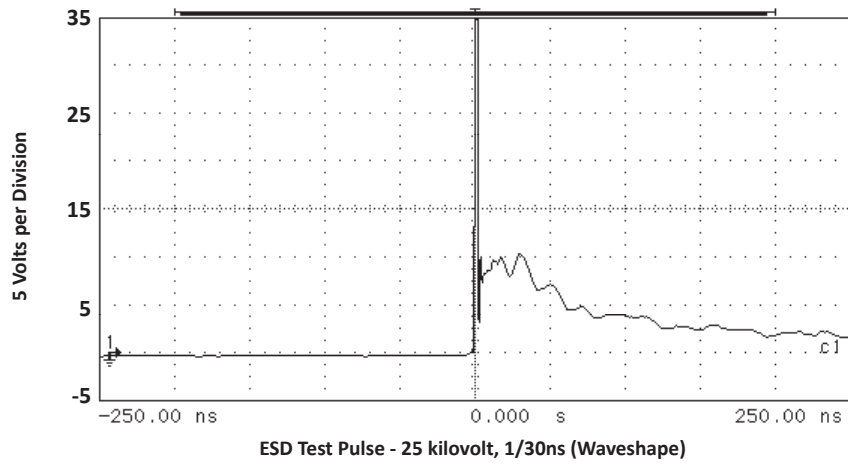


FIGURE 3  
POWER DERATING CURVE

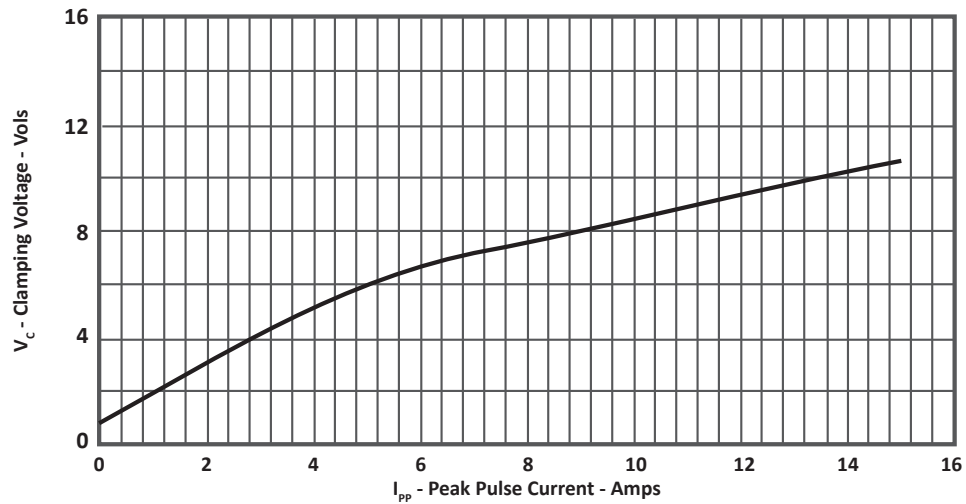


**TYPICAL DEVICE CHARACTERISTICS**

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



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



## SPICE MODEL

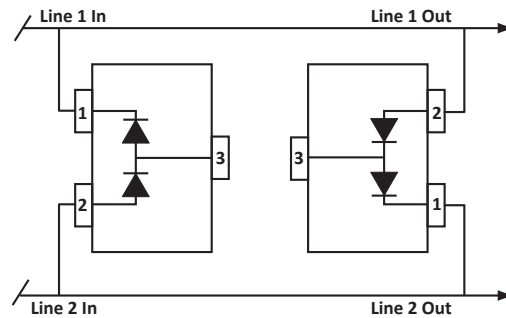
FIGURE 1  
SPICE MODEL



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

TABLE 1 - SPICE PARAMETERS		
PARAMETER	UNIT	LCRD
BV	V	200
IBV	$\mu\text{A}$	0.01
$C_{jo}$	pF	5
$I_s$	A	1E-14
Vj	V	0.6
M	-	0.33
N	-	1
$R_s$	Ohms	0.31
TT	s	1E-9
EG	eV	1.11

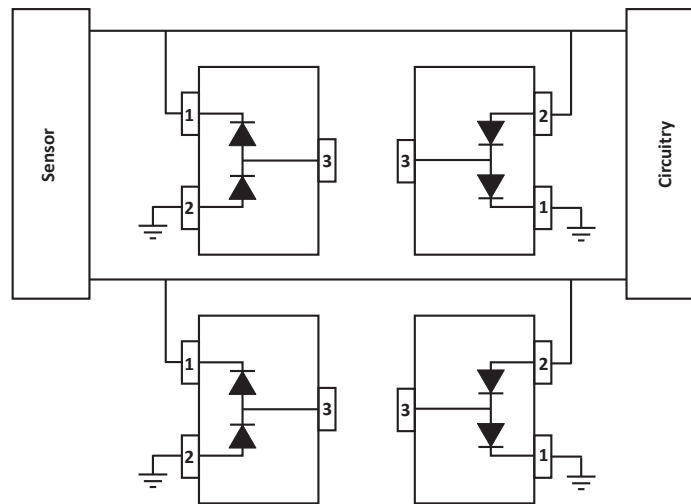
## APPLICATION INFORMATION



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

Two PLC497 devices used in parallel. Circuit connectivity is as follows:

- Pins 1 and 2 of each device connected to data lines.
- Pin 3 not connected.



**FIGURE 2 - COMMON MODE SENSOR CIRCUIT PROTECTION**

Two PLC497 devices used in parallel. Circuit connectivity is as follows:

- Pin 1 on each device connected to data lines.
- Pin 2 on each device connected to ground.
- Pin 3 not connected.

## CIRCUIT BOARD RECOMMENDATIONS

Circuit board layout is critical for electromagnetic compatibility protection. The following guidelines are recommended:

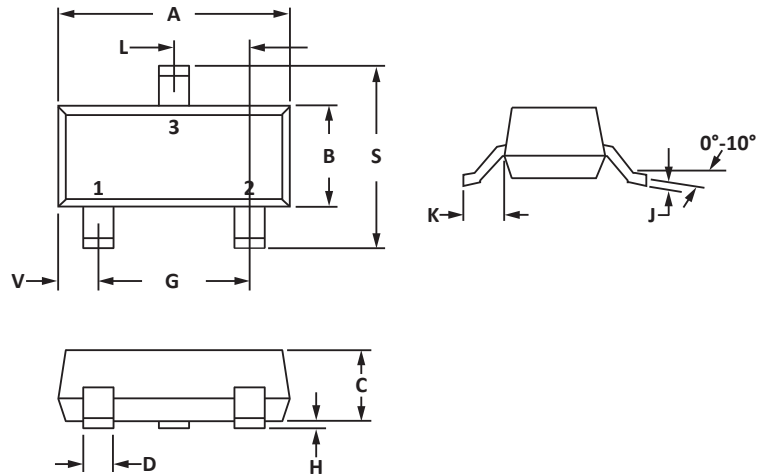
- The protection device should be placed near the input terminals or connectors, the device will divert the transient current immediately before it can be coupled into the nearby traces.
- The path length between the TVS device and the protected line should be minimized.
- All conductive loops including 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 PACKAGE INFORMATION**
**OUTLINE DIMENSIONS**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	3.04	0.110	0.120
B	1.20	1.40	0.047	0.055
C	0.89	1.11	0.035	0.044
D	0.37	0.50	0.015	0.020
G	1.78	2.04	0.070	0.081
H	0.013	0.100	0.001	0.004
J	0.085	0.177	0.003	0.007
K	0.45	0.60	0.018	0.024
L	0.89	1.02	0.035	0.040
S	2.10	2.50	0.083	0.098
V	0.45	0.60	0.018	0.024

**NOTES**

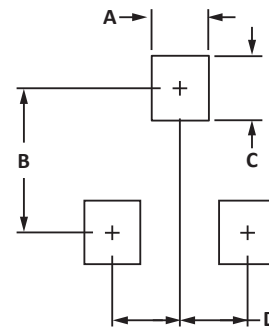
1. Controlling dimension: inches.
2. Dimensioning and tolerances per ANSI Y14.5M, 1985.
3. Pin 3 is the cathode (Unidirectional Only)
4. Dimensions are exclusive of mold flash and metal burrs.


**PAD LAYOUT DIMENSIONS**

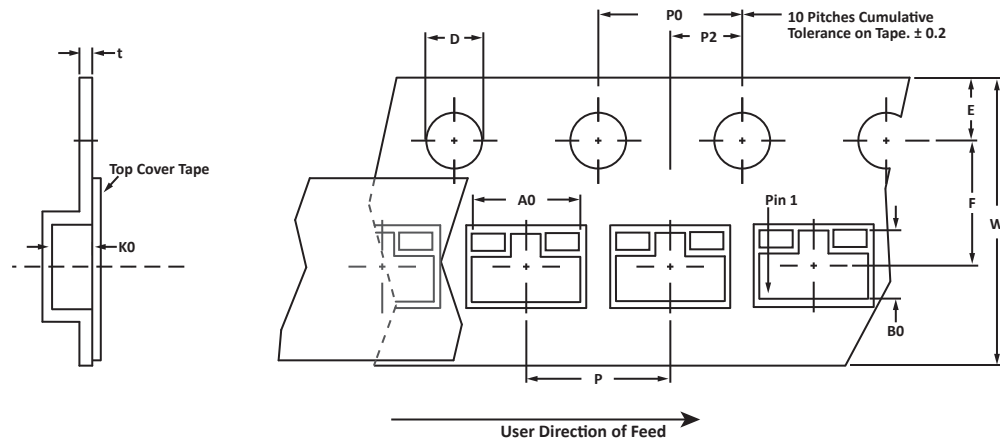
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.71	0.97	0.028	0.038
B	1.88	2.13	0.074	0.084
C	0.71	0.97	0.028	0.038
D	0.81	1.07	0.032	0.042

**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")	8mm	3.15 ± 0.10	2.77 ± 0.10	1.30 ± 0.10	1.55 ± 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	0.228

## NOTES

1. Dimensions are in millimeters.
2. Surface mount product is taped and reeled in accordance with EIA-481.
3. Suffix - T7 = 7" Reel - 3,000 pieces per 8mm tape.
4. Suffix - T13 = 13" Reel - 10,000 pieces per 8mm tape.
5. Marking on Part - marking code (see page 2) and date code.

Package outline, pad layout and tape specifications per document number 06012.R2 8/10.

## ORDERING INFORMATION

BASE PART NUMBER	LEADFREE SUFFIX	TAPE SUFFIX	QTY/REEL	REEL SIZE	TUBE QTY
PLC497	-LF	-T7	3000	7"	n/a
PLC497	-LF	-T13	10,000	13"	n/a



## COMPANY INFORMATION

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### 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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