

## 350 WATT LOW CAPACITANCE TVS ARRAY



### DESCRIPTION

The PSLC and PSLCxxC Series of devices are low capacitance TVS arrays available in a SOT-143 package. These devices are designed to protect Ethernet data I/O ports against the damaging effects of ESD and EFT transient threats.

The PSLC series are unidirectional devices used for common mode protection from line to ground. The PSLCxxC series are bidirectional devices typically used for differential mode or common mode protection on balanced lines.

Voltages range from 3.3 to 24 volts for both configurations. Each series provides ESD protection to > 25 kilovolts with a peak pulse power rating of 350 Watts for an 8/20 $\mu$ s waveshape. The PSLC and PSLCxxC series are designed to meet and exceed 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): 12A, 8/20 $\mu$ s - Level 1(Line-Gnd) & Level 2(Line-Line)
- 350 Watts Peak Pulse Power per Line (tp = 8/20 $\mu$ s)
- Unidirectional and Bidirectional Configurations
- Protects 1 Line
- Low Clamping Voltage
- Low Capacitance: 3pF Typical
- RoHS Compliant
- REACH Compliant

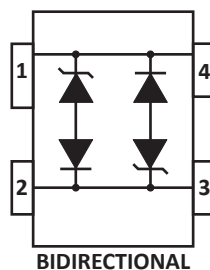
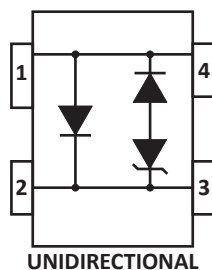
### APPLICATIONS

- Ethernet - 10/100/1000 Base T
- Cellular Phones
- Audio/Video Inputs
- FireWire, SCSI & USB Interfaces

### MECHANICAL CHARACTERISTICS

- Molded JEDEC SOT-143 Package
- Approximate Weight: 9 milligrams
- Lead-Free Pure-Tin Plating (Annealed)
- Solder Reflow Temperature:  
Pure-Tin - Sn, 100: 260-270°C
- 8mm Tape and Reel Per EIA Standard 481
- Flammability Rating UL 94V-0

### PIN CONFIGURATIONS



**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 ( $t_p = 8/20\mu s$ ) - See Figure 1	$P_{PP}$	350	Watts

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

PART NUMBER (Notes 1 - 2)	DEVICE MARKING	RATED STAND-OFF VOLTAGE  $V_{WM}$ VOLTS	MINIMUM BREAKDOWN VOLTAGE  @ 1mA $V_{(BR)}$ VOLTS	MAXIMUM CLAMPING VOLTAGE (Fig. 2)  @ $I_p = 5A$ $V_C$ VOLTS	MAXIMUM CLAMPING VOLTAGE (Fig. 2)  @ 8/20 $\mu s$ $V_C @ I_{PP}$ VOLTS	MAXIMUM LEAKAGE CURRENT  @ $V_{WM}$ $I_D$ $\mu A$	TYPICAL CAPACITANCE  @ 0V, 1MHz C pF
PSLC03	3U	3.3	4.0	9.0	19.0V @ 20.0A	125	3
PSLC03C	3B	3.3	4.0	9.0	19.0V @ 20.0A	125	3
PSLC05	5U	5.0	6.0	11.0	18.3V @ 17.0A	20	3
PSLC05C	5B	5.0	6.0	11.0	18.3V @ 17.0A	20	3
PSLC08	8U	8.0	8.5	16.6	18.5V @ 17.0A	10	3
PSLC08C	8B	8.0	8.5	16.6	18.5V @ 17.0A	10	3
PSLC12	12U	12.0	13.3	24.0	28.6V @ 11.0A	1	3
PSLC12C	12B	12.0	13.3	24.0	28.6V @ 11.0A	1	3
PSLC15	15U	15.0	16.6	30.0	31.8V @ 10.0A	1	3
PSLC15C	15B	15.0	16.6	30.0	31.8V @ 10.0A	1	3
PSLC24	24U	24.0	26.7	N/A	56.0V @ 6.0A	1	3
PSLC24C	24B	24.0	26.7	N/A	56.0V @ 6.0A	1	3

**NOTES**

1. Part numbers with an additional "C" suffix are bidirectional devices, i.e., PSLC05C.
2. *Unidirectional Only*: Positive potential is applied from pin 2 to 1 or pin 3 to 4.

TYPICAL DEVICE CHARACTERISTICS

FIGURE 1  
PEAK PULSE POWER VS PULSE TIME

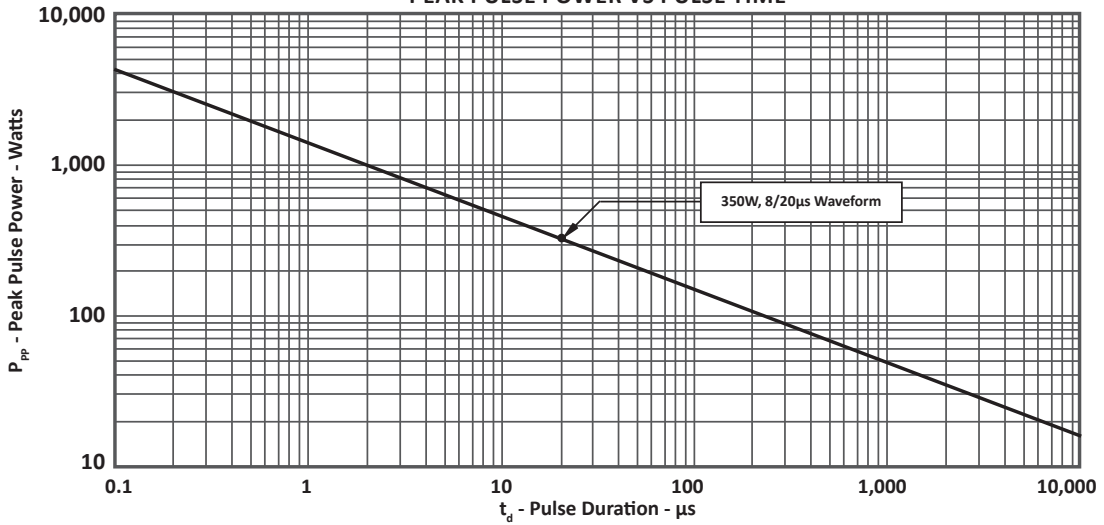


FIGURE 2  
PULSE WAVE FORM

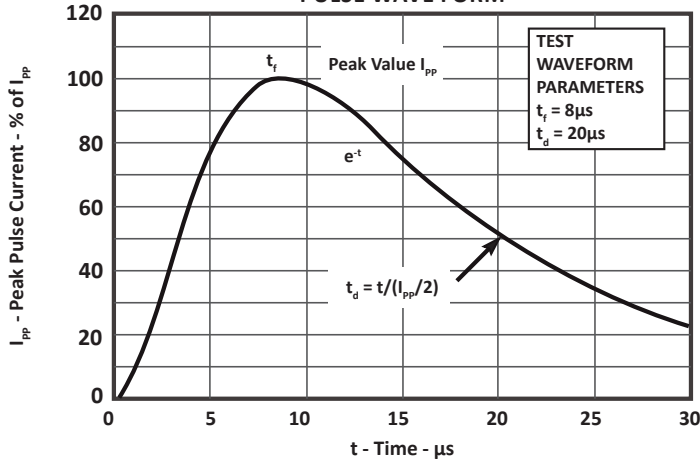
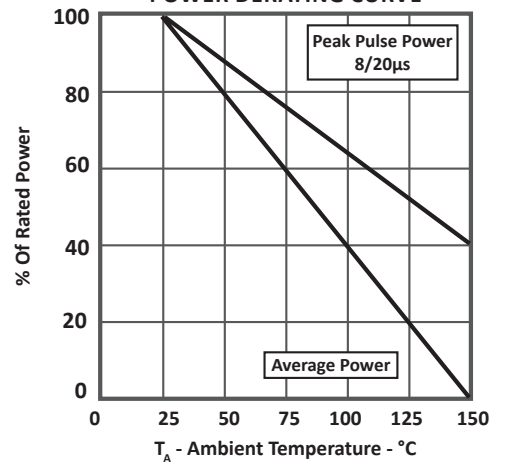
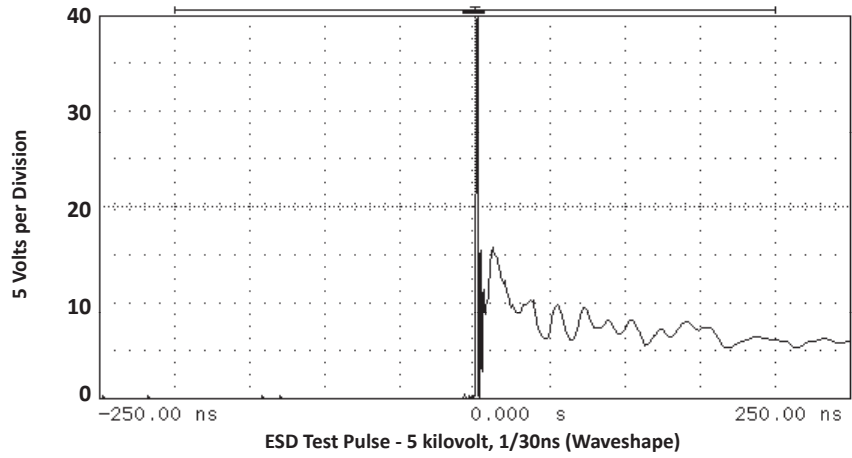


FIGURE 3  
POWER DERATING CURVE

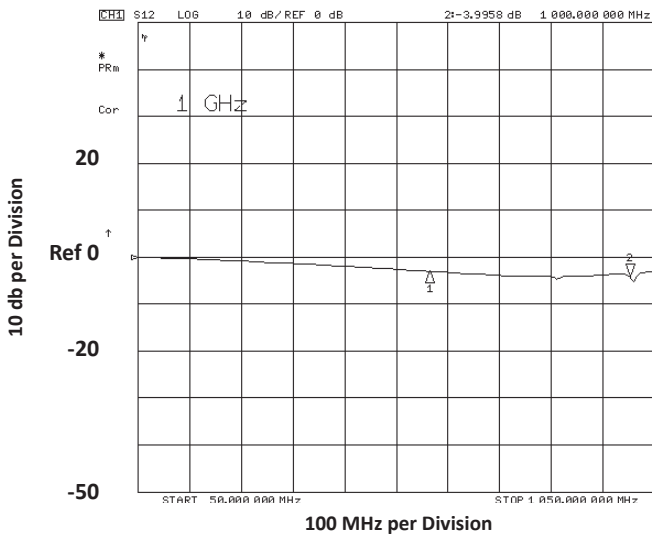


TYPICAL DEVICE CHARACTERISTICS

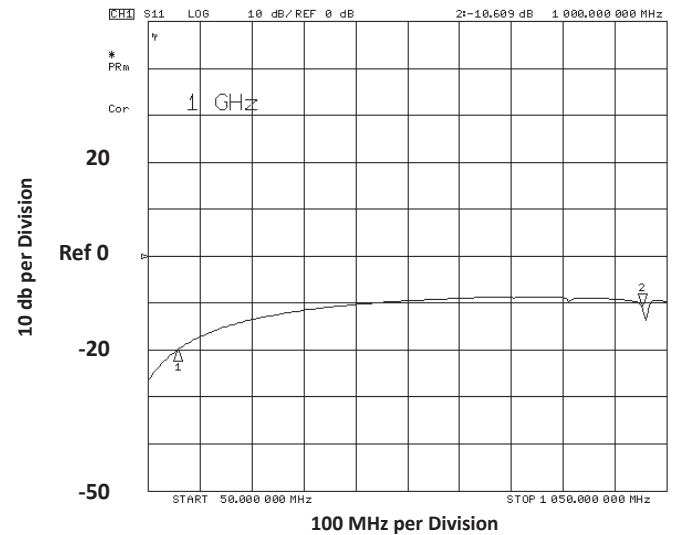
**FIGURE 4**  
**OVERSHOOT & CLAMPING VOLTAGE FOR PSLC03**



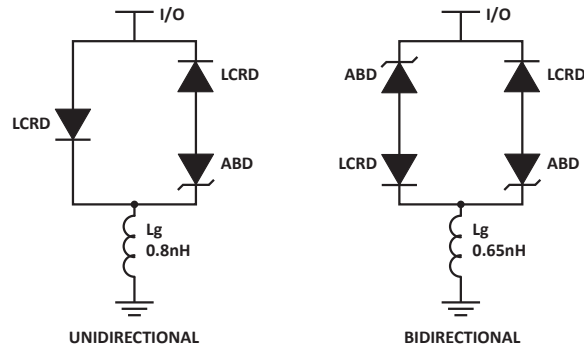
**FIGURE 5**  
**INSERTION LOSS - PSLC05**



**FIGURE 5**  
**RETURN LOSS - PSLC05**



## SPICE MODEL

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


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

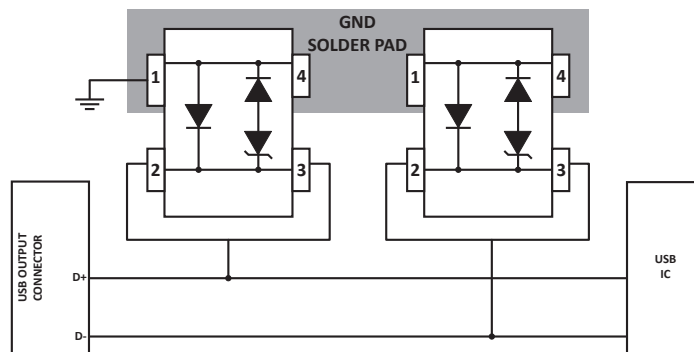
**TABLE 1 - SPICE PARAMETERS**

PARAMETER	UNIT	ABD(TVS)	LCRD
BV	V	See Table 2	200
IBV	$\mu\text{A}$	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)
PSLC03	4.5	200	1E-11	0.22
PSLC05	6.0	140	1E-11	0.18
PSLC08	8.5	67	1E-11	0.12
PSLC12	13.3	55	1E-13	1.10
PSLC15	16.7	47	1E-13	1.43
PSLC24	26.7	28	1E-13	4.24
PSLC03C	4.5	200	1E-11	0.22
PSLC05C	6.0	140	1E-11	0.18
PSLC08C	8.5	67	1E-11	0.12
PSLC12C	13.3	55	1E-13	1.10
PSLC15C	16.7	47	1E-13	1.43
PSLC24C	26.7	28	1E-13	4.24

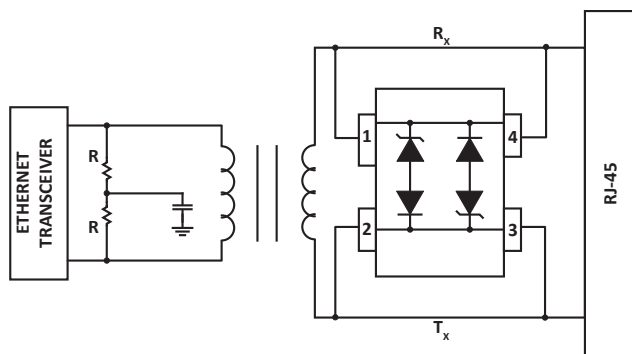
## APPLICATION INFORMATION



**FIGURE 1 - USB PROTECTION**

Two PSLCxx (Unidirectional) in a Common-Mode configuration. Circuit connectivity is as follows:

- Device 1: Line 1(D+) is connected to pins 2 and 3.
- Device 2: Line 2(D-) is connected to pins 2 and 3.
- Device 1 and 2: Pins 1 and 4 connected to ground



**FIGURE 2 - ETHERNET PROTECTION**

One PSLCxxC (Bidirectional) in a Differential-Mode configuration. Circuit connectivity is as follow:

- Line 1 ( $R_x$ ) is connected to pins 1 and 4.
- Line 2 ( $T_x$ ) is connected to pins 2 and 3.

## 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.

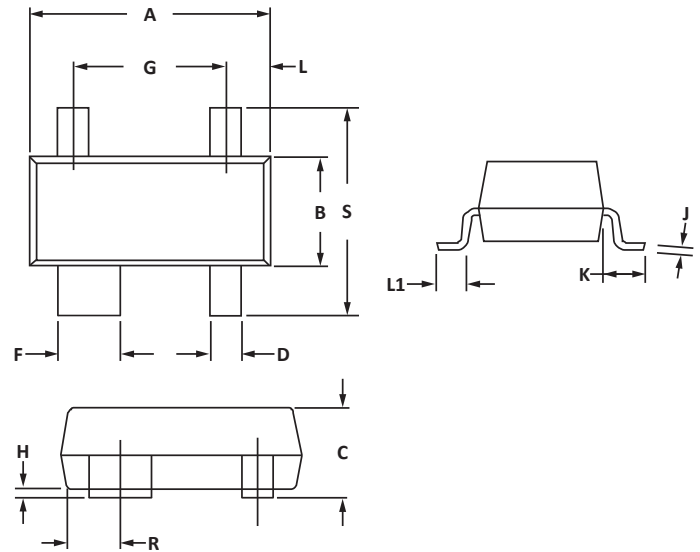
## SOT-143 PACKAGE INFORMATION

## OUTLINE DIMENSIONS

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	3.04	0.110	0.120
B	1.20	1.39	0.047	0.055
C	0.84	1.14	0.033	0.045
D	0.39	0.50	0.015	0.020
F	0.79	0.93	0.031	0.037
G	1.78	2.03	0.070	0.080
J	0.08	0.15	0.003	0.006
K	0.46	0.60	0.018	0.024
L	0.445	0.60	0.0175	0.024
L1	0.40	0.60	0.016	0.024
R	0.72	0.83	0.028	0.033
S	2.11	2.48	0.083	0.098

## NOTES

1. Dimensioning and tolerances per ANSI Y14.M, 1985.
2. Controlling dimension: inches.
3. Dimensions are exclusive of mold flash and metal burrs.

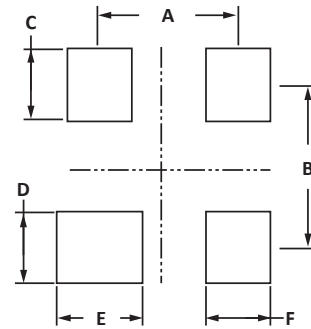


## PAD LAYOUT DIMENSIONS

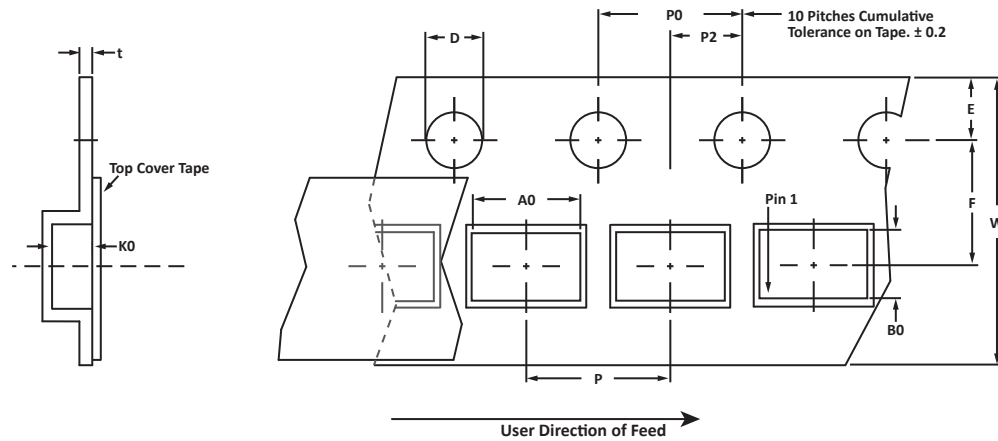
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.88	2.13	0.074	0.084
B	1.80	2.06	0.071	0.081
C	0.71	0.97	0.028	0.038
D	0.76	1.02	0.030	0.040
E	1.07	1.32	0.042	0.052
F	0.71	0.97	0.028	0.038

## 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	3.10 ± 0.10	2.70 ± 0.10	1.35 ± 0.10	1.50 ± 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	0.25

## NOTES

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

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

## ORDERING INFORMATION

BASE PART NUMBER (xx = Voltage)	LEADFREE SUFFIX	TAPE SUFFIX	QTY/REEL	REEL SIZE	TUBE QTY
PSLCxx/PSLCxxC	-LF	-T7	3,000	7"	n/a
PSLCxx/PSLCxxC	-LF	-T13	10,000	13"	n/a

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



## COMPANY INFORMATION

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### COMPANY PROFILE

In business more than 20 years, ProTek Devices™ is a privately-held company located in Tempe, Arizona, that offers a product line of transient voltage suppressors (TVS); avalanche breakdown diodes; steering diode TVS arrays and other surge suppressor component products. These TVS devices protect electronic systems from the effects of lightning, electrostatic discharge (ESD), nuclear electromagnetic pulses (NEMP), inductive switching and EMI / RFI. ProTek Devices also offers high performance interface and linear products that include analog switches; multiplexers; LED drivers; audio control ICs; RF and related high frequency products. The analog devices work in a host of consumer; industrial; automotive and other applications.

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