

THYRISTOR SURGE SUPPRESSOR

**APPLICATIONS**

- T1/E1 Trunk & Line Card
- SLIC Line Card
- DBX Branch Exchange Switches
- FCC Part 68 Customer Premise Equipment
- Line Interface Modem
- ADSL Architecture Interface
- ISDN Architecture Interface

**FEATURES**

- Meets IEC 1000-4-4 & -5 Industry Requirements
- Provides Protection in Accordance with FCC Part 68, UL 1459, Bellcore 1089, ITU-TK.20 & K.21
- Peak Off-State Voltage from 58 to 300 Volts
- Surge Current Capability (See Surge Ratings Table)
- ESD Protection > 40 kilovolts
- Low Capacitance for T1/E1 Trunk & Line Card Applications
- UL 94V-0 Flammability Classification

**MAXIMUM RATINGS**

- Surge Current: 60A Max. (50/60 Hz) ( $I_{TSM}$ )
- Storage Temperatures: -55° to + 150°C
- Junction Temperatures:  $T_j = -40°$  to 150°C
- Thermal Resistance for PPxxxxSA in a DO-214AA Package is  $R_{\Theta JC} = 28^\circ\text{C}/\text{Watt}$  &  $R_{\Theta JC} = 90^\circ\text{C}/\text{Watt}$
- Thermal Resistance for PPxxxxSB or SC in a DO-214AA Package is  $R_{\Theta JC} = 26^\circ\text{C}/\text{Watt}$  &  $R_{\Theta JC} = 85^\circ\text{C}/\text{Watt}$
- Critical Rate of Rise of Maximum On-State Current:  $di/dt = 500\text{A}/\mu\text{s}$
- Critical Rate of Rise of Maximum Off-State Voltage:  $dv/dt > 2\text{kV}/\mu\text{s}$

**MECHANICAL CHARACTERISTICS**

- Package: Molded DO-214AA (JEDEC)
- Approximate Weight: 2.5 grams
- Body Marked with Logo and Marking Code

SURGE RATINGS						
SERIES	$I_{PP}$ 2 X 10 $\mu\text{s}$ AMPS	$I_{PP}$ 10 X 160 $\mu\text{s}$ AMPS	$I_{PP}$ 10 X 560 $\mu\text{s}$ AMPS	$I_{PP}$ 10 X 1000 $\mu\text{s}$ AMPS	$I_{TSM}$ 60 Hz AMPS	$di/dt$ AMPS/ $\mu\text{s}$
SA	N/A	100	50	N/A	20	500
SB	N/A	150	100	N/A	30	500
SC	500	200	N/A	100	60	500

**IEC 1000-4 COMPATIBLE**



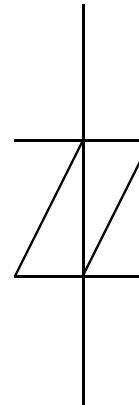
**DO-214AA PACKAGE**

**DESCRIPTION**

The PPxxxxSA, SB and SC families are a series of Thyristor surge suppression (TSS) devices designed to protect telecommunication equipment against lightning and transients induced by AC power lines. These devices can be used on central office equipment, PBX, DSU, OCU, digital telephones, fax machines, modems and radio controlled equipment. The bidirectional configuration provides protection for both positive and negative transients and the discrete surface mount package allows individual placement of the device on line cards or other locations where multiple component devices do not offer the versatile in board trace layout.

The ProTek TSS device can be used to provide protection in accordance with industry standard requirements, such as FCC Part 68, ANSI C62.41, UL 1459 and GR-1089-CORE. Their low capacitance is ideal for T1/E1 trunk or line card applications.

**DEVICE SYMBOL**

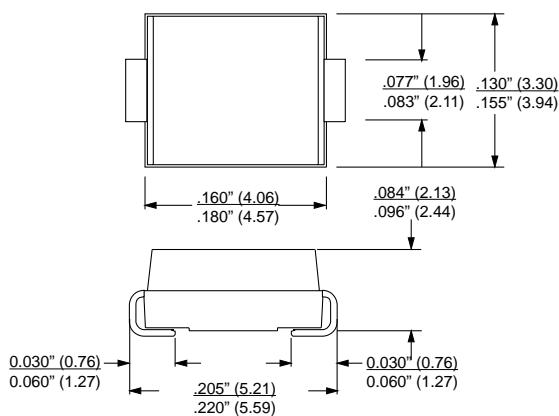


# ELECTRICAL CHARACTERISTICS @ 25°C Ambient Temperature

PROTEK PART NUMBER	DEVICE MARKING CODE	REPETITIVE PEAK OFF-STATE VOLTAGE	SWITCHING VOLTAGE	MINIMUM HOLDING CURRENT (Figure 4)	SWITCHING CURRENT	MAXIMUM OFF-STATE CURRENT (Figure 2)	MAXIMUM ON-STATE VOLTAGE (Figure 3)	ON-STATE CURRENT	TYPICAL CAPACITANCE
									(See Note 1)
						$I_{DRM}$ $\mu$ A	$V_T$ VOLTS	$I_T$ A	@ 2V, 1 MHZ
									C pF
PP0640SA	GC	58	77	150	800	5	5	1.0	60
PP0720SA	GD	65	88	150	800	5	5	1.0	60
PP0800SA	GE	75	98	150	800	5	5	1.0	60
PP1100SA	GF	90	130	150	800	5	5	1.0	60
PP1300SA	GG	120	160	150	800	5	5	1.0	40
PP1500SA	GH	140	180	150	800	5	5	1.0	40
PP1800SA	GI	160	220	150	800	5	5	1.0	40
PP2300SA	GJ	190	260	150	800	5	5	1.0	30
PP2600SA	GK	220	300	150	800	5	5	1.0	30
PP3100SA	GL	275	350	150	800	5	5	1.0	30
PP3500SA	GM	300	400	150	800	5	5	1.0	30
PP0640SB	GP	58	77	150	800	5	5	1.0	60
PP0720SB	GQ	65	88	150	800	5	5	1.0	60
PP0800SB	GR	75	98	150	800	5	5	1.0	60
PP1100SB	GS	90	130	150	800	5	5	1.0	60
PP1300SB	GT	120	160	150	800	5	5	1.0	40
PP1500SB	GU	140	180	150	800	5	5	1.0	40
PP1800SB	GV	160	220	150	800	5	5	1.0	40
PP2300SB	GW	190	260	150	800	5	5	1.0	30
PP2600SB	GX	220	300	150	800	5	5	1.0	30
PP3100SB	GY	275	350	150	800	5	5	1.0	30
PP3500SB	GZ	300	400	150	800	5	5	1.0	30
PP0640SC	HC	58	77	150	800	5	5	1.0	120
PP0720SC	HD	65	88	150	800	5	5	1.0	120
PP0800SC	HE	75	98	150	800	5	5	1.0	120
PP1100SC	HF	90	130	150	800	5	5	1.0	120
PP1300SC	HG	120	160	150	800	5	5	1.0	80
PP1500SC	HH	140	180	150	800	5	5	1.0	80
PP1800SC	HI	160	220	150	800	5	5	1.0	80
PP2300SC	HJ	190	260	150	800	5	5	1.0	60
PP2600SC	HK	220	300	150	800	5	5	1.0	60
PP3100SC	HL	275	350	150	800	5	5	1.0	60
PP3500SC	HM	300	400	150	800	5	5	1.0	60

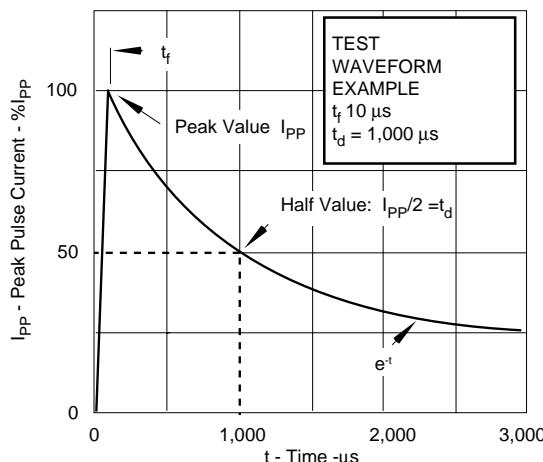
Note 1: Capacitance imbalance between positive and negative polarities is typically < 15pF.

## DO-214AA PACKAGE DIMENSIONS

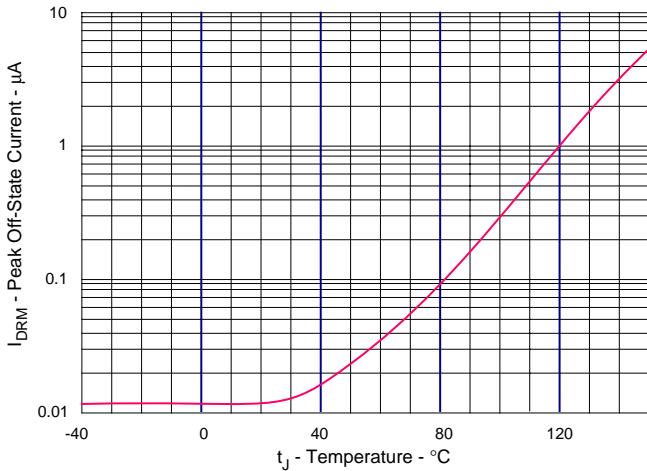


Measurements are in inches, (mm) denotes millimeters

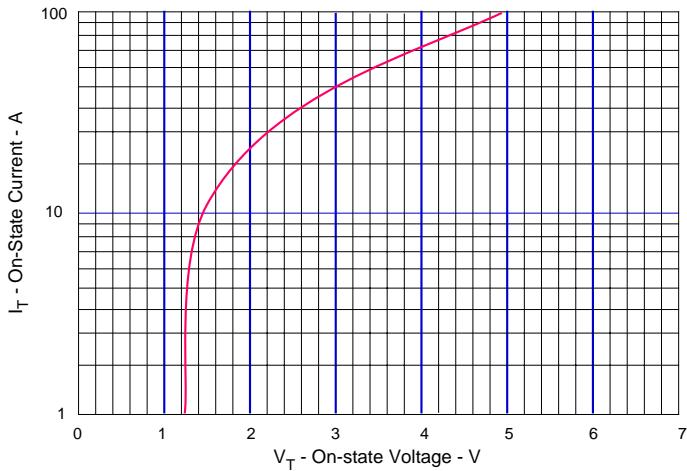
FIGURE 1  
PULSE WAVE FORM EXAMPLE



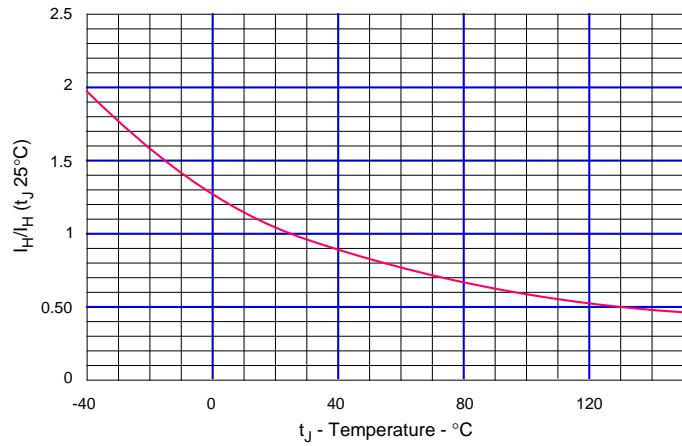
**FIGURE 2**  
TYPICAL PEAK OFF-STATE CURRENT VS JUNCTION TEMPERATURE



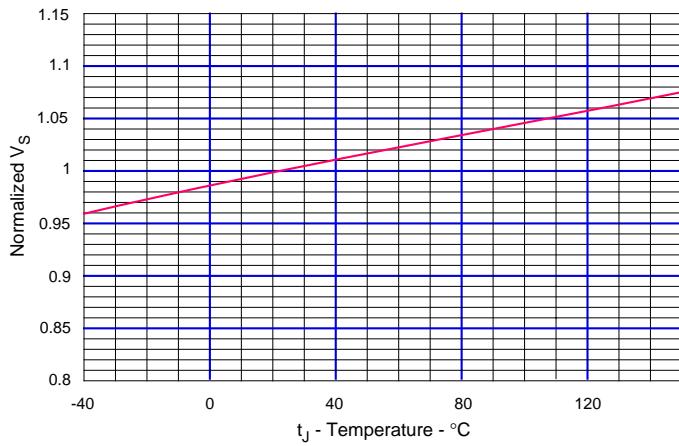
**FIGURE 3**  
TYPICAL ON-STATE CURRENT VS ON-STATE VOLTAGE



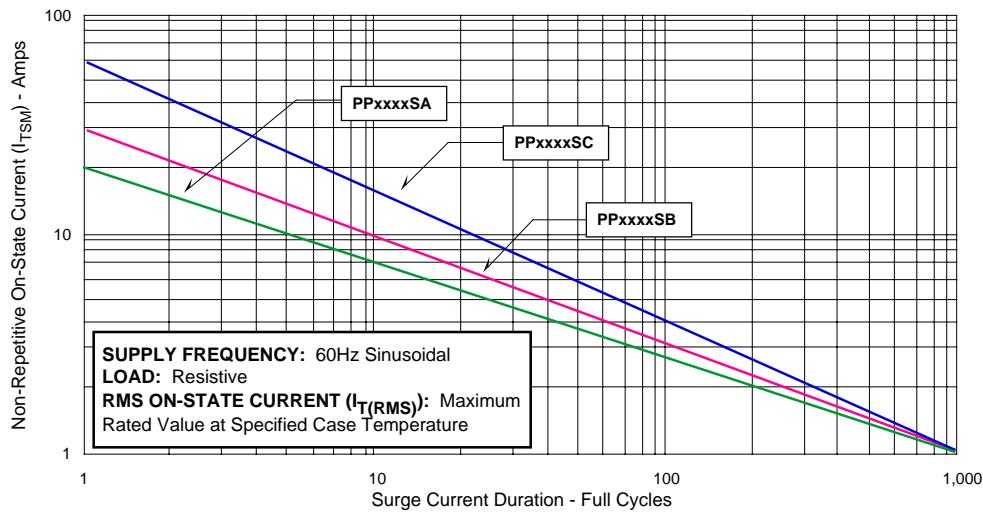
**FIGURE 4**  
TYPICAL HOLDING CURRENT VS JUNCTION TEMPERATURE



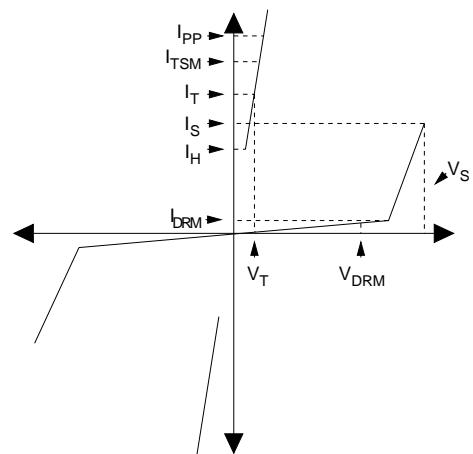
**FIGURE 5**  
TYPICAL NORMALIZED  $V_S$  VS JUNCTION TEMPERATURE



**FIGURE 6**  
ON-STATE CURRENT VS SURGE CURRENT DURATION

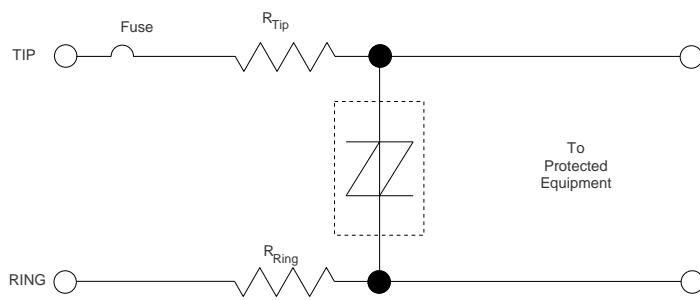


**FIGURE 7**  
V-I CHARACTERISTICS CURVE



# Application Notes for Thyristor Surge Suppressors used in Telecommunication Circuits

FIGURE 8 - UL 1459 & FCC Part 68 Metallic Protection



The TSS device is located across the tip-to-ring line after a limiting resistor and fuse combination.  $R_{TIP}$  and  $R_{RING}$  resistors are optional depending upon the TSS device selection. Without the resistors, the PP3100SB/SC is recommended. However, with a resistance value of 7.5 ohms for tip and ring, the PP3100SA is recommended. Digital signals may use a lower TSS device depending upon the total tip to ring voltage range. Selection of the TSS device, either PPxxxxSA or SB/SC is based upon the value of the tip and ring resistors. For the National Electronic Code (NEC) article 800, it is recommended that at least one fuse be used in the tip or ring line for metallic surges. Fuses may be replaced with a suitable Positive Temperature Coefficient (PTC) automatic resettable current limiting device.

FIGURE 9 - UL 1459 & FCC Part 68 - Longitudinal Protection

There are two TSS devices, one located from tip-to-ground and one ring-to-ground. For standard analog signals, the PP3100SA is recommended with a typical resistor value for tip and ring of 15 ohms. The PP3100SB/SC is recommended for resistor values of 7.5 ohms each. The National Electric Code (NEC) article 800 requires two fuse elements when connecting to ground. Fuses or a suitable Positive Temperature Coefficient (PTC) automatic resettable current limiting device may be used. The purpose of this circuit is to limit AC power current from getting on the ground line causing any safety hazard.

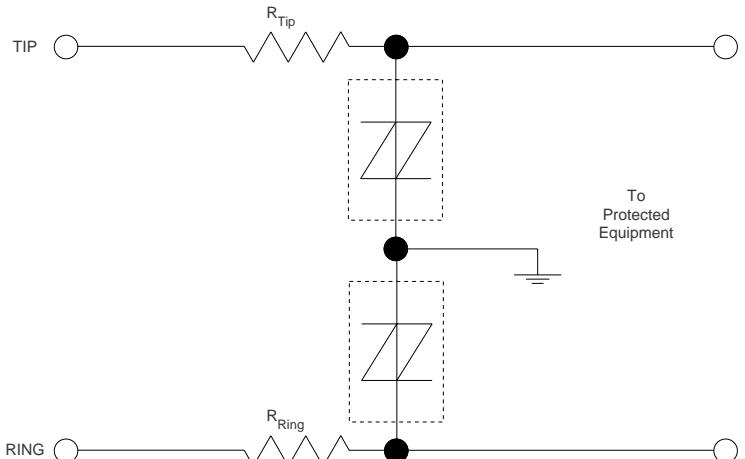
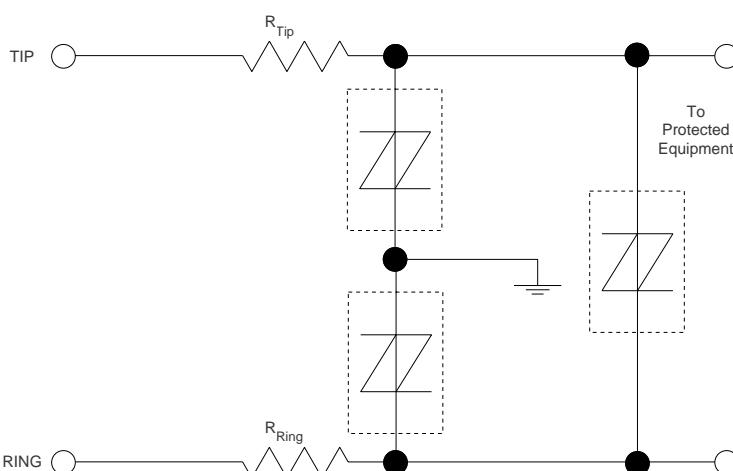


FIGURE 10 - UL 1459 & FCC Part 68 - Metallic and Longitudinal Protection



Three equal TSS devices are used in this application for metallic (tip-to-ring) and longitudinal (tip-to-ground and ring-to-ground) protection. For analog signals, the PP3100SB/SC is recommended. With a resistance value of 15 ohms for the tip and ring resistors, the PP3100SA may be used. The National Electric Code (NEC) article 800 requires two fuse elements when connecting to ground. Fuses or a suitable Positive Temperature Coefficient (PTC) automatic resettable current limiting device may be used. This circuit is recommended for protection against the Bellcore requirement: First Level Lightning Surge Tests (Telecommunications Port), document #GR-1089-CORE.