

## BIDIRECTIONAL 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
- ✓ xDSL Architecture Interface
- ✓ ISDN Architecture Interface

### IEC COMPATIBILITY (EN61000-4)

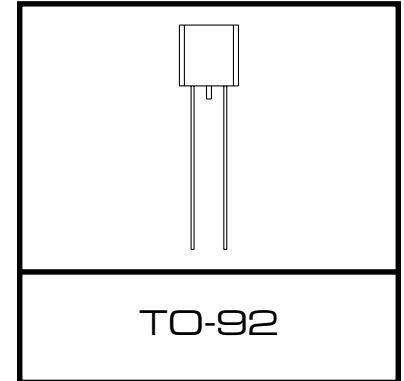
- ✓ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- ✓ 61000-4-4 (EFT): 40A - 5/50ns
- ✓ 61000-4-5 (Surge): 24A, 8/20 $\mu$ s - Level 2(Line-Gnd) & Level 3(Line-Line)

### FEATURES

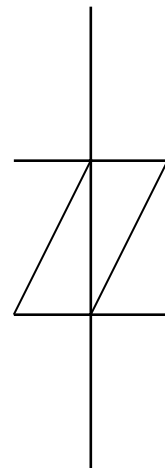
- ✓ *Complies with: FCC Part 68, UL 1459, Bellcore 1089, ITU-K.20 & K.21*
- ✓ Peak Off-State Voltage from 58 to 300 Volts
- ✓ Surge Current Capability(See Table 1)
- ✓ ESD Protection > 40 kilovolts
- ✓ Low Capacitance for T1/E1 Trunk & Line Card Applications

### MECHANICAL CHARACTERISTICS

- ✓ Molded TO-92 Package
- ✓ Weight 0.18 grams (Approximate)
- ✓ Flammability Rating UL 94V-0
- ✓ Device Marking: Logo & Marking Code



DEVICE SYMBOL  
(BIDIRECTIONAL)



SERIES	$I_{PP}$ 2 X 10 $\mu$ s AMPS	$I_{PP}$ 10 X 160 $\mu$ s AMPS	$I_{PP}$ 10 X 560 $\mu$ s AMPS	$I_{PP}$ 10 X 1000 $\mu$ s AMPS	$I_{TSM}$ 60 Hz AMPS	di/dt AMPS/ $\mu$ s (See Note 1)	dv/dt AMPS/ $\mu$ s (See Note 1)
EA	125	100	50	50	20	500	2000
EB	300	150	100	75	32	500	2000
EC	500	200	200	100	60	500	2000

Note 1: Critical Rate of Rise for On-State Current (di/dt) and Off-State Voltage (dv/dt).

# PP0640EA thru PP3500EC

## DEVICE CHARACTERISTICS

MAXIMUM RATINGS @ 25°C Unless Otherwise Specified			
PARAMETER	SYMBOL	VALUE	UNITS
Surge Current - 50/60 Hz	$I_{TSM}$	60	Amps
Junction Temperature	$T_J$	-40 to 150	°C
Storage Temperature	$T_{STG}$	-55 to 150	°C
Thermal Resistance(Junction) - EA & EB Series	$R_{\theta jc}$	28	°C/Watt
Thermal Resistance(Junction) - EC Series	$R_{\theta jc}$	26	°C/Watt
Thermal Resistance(Ambient) - EA & EB Series	$R_{\theta jc}$	90	°C/Watt
Thermal Resistance(Ambient) - EC Series	$R_{\theta jc}$	85	°C/Watt

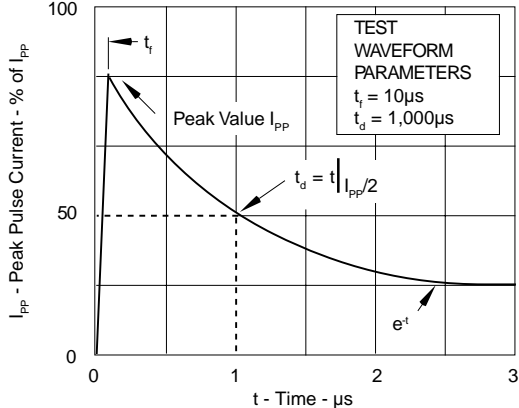
ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified									
PART NUMBER (See Note 1)	DEVICE MARKING CODE	REPETITIVE PEAK OFF-STATE VOLTAGE $V_{DRM}$ VOLTS	SWITCHING VOLTAGE @100V/ $\mu$ s $V_s$ VOLTS	MINIMUM HOLDING CURRENT (See Fig. 4) di/dt = 1A/ms $I_H$ mA	SWITCHING CURRENT $I_S$ mA	MAXIMUM OFF-STATE VOLTAGE (See Fig. 3) @ $V_{DRM}$ $I_{DRM}$ $\mu$ A	MAXIMUM ON-STATE VOLTAGE (See Fig. 3) @ $I_T$ $V_T$ VOLTS	ON-STATE CURRENT $I_T$ AMPS	TYPICAL CAPACITANCE (See Note 2) @2V, 1 MHz C pF
PP0640EA	GC	58	77	150	800	5	5	1.0	60
PP0720EA	GD	65	88	150	800	5	5	1.0	60
PP0800EA	GE	75	98	150	800	5	5	1.0	60
PP1100EA	GF	90	130	150	800	5	5	1.0	60
PP1300EA*	GG	120	160	150	800	5	5	1.0	40
PP1500EA	GH	140	180	150	800	5	5	1.0	40
PP1800EA	GI	160	220	150	800	5	5	1.0	40
PP2300EA*	GJ	190	260	150	800	5	5	1.0	30
PP2600EA*	GK	220	300	150	800	5	5	1.0	30
PP3100EA	GL	275	350	150	800	5	5	1.0	30
PP3500EA	GM	300	400	150	800	5	5	1.0	30
PP0640EB*	GP	58	77	150	800	5	5	1.0	60
PP0720EB	GQ	65	88	150	800	5	5	1.0	60
PP0800EB	GR	75	98	150	800	5	5	1.0	60
PP1100EB	GS	90	130	150	800	5	5	1.0	60
PP1300EB	GT	120	160	150	800	5	5	1.0	40
PP1500EB*	GU	140	180	150	800	5	5	1.0	40
PP1800EB	GV	160	220	150	800	5	5	1.0	40
PP2300EB	GW	190	260	150	800	5	5	1.0	30
PP2600EB	GX	220	300	150	800	5	5	1.0	30
PP3100EB*	GY	275	350	150	800	5	5	1.0	30
PP3500EB*	GZ	300	400	150	800	5	5	1.0	30
PP0640EC*	HC	58	77	150	800	5	5	1.0	120
PP0720EC	HD	65	88	150	800	5	5	1.0	120
PP0800EC	HE	75	98	150	800	5	5	1.0	120
PP1100EC	HF	90	130	150	800	5	5	1.0	120
PP1300EC*	HG	120	160	150	800	5	5	1.0	80
PP1500EC*	HH	140	180	150	800	5	5	1.0	80
PP1800EC	HI	160	220	150	800	5	5	1.0	80
PP2300EC*	HJ	190	260	150	800	5	5	1.0	60
PP2600EC	HK	220	300	150	800	5	5	1.0	60
PP3100EC*	HL	275	350	150	800	5	5	1.0	60
PP3500EC*	HM	300	400	150	800	5	5	1.0	60

Note 1: \* Indicates preferred a part number.

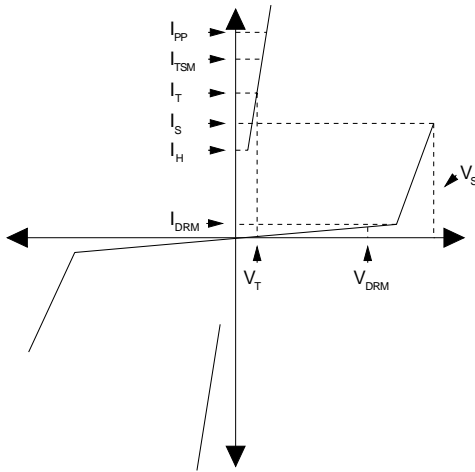
Note 2: Capacitance imbalance between positive and negative polarities is typically < 15pF.

**GRAPHS**

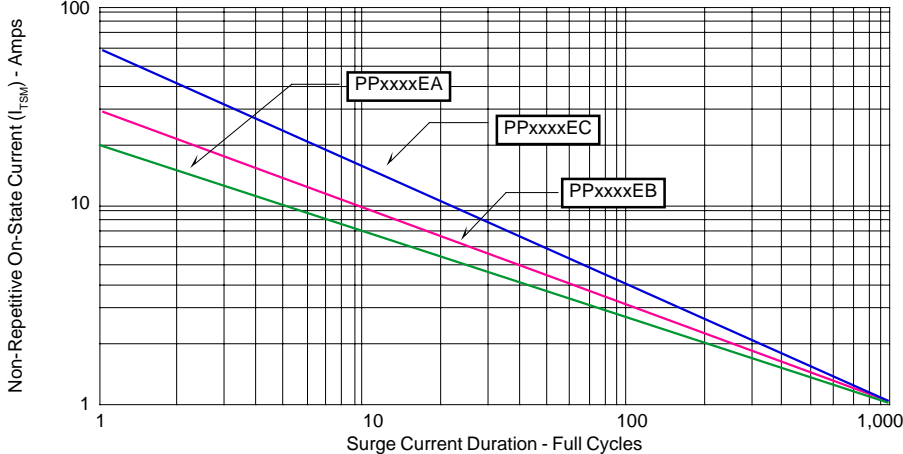
**FIGURE 1  
PULSE WAVE FORM**



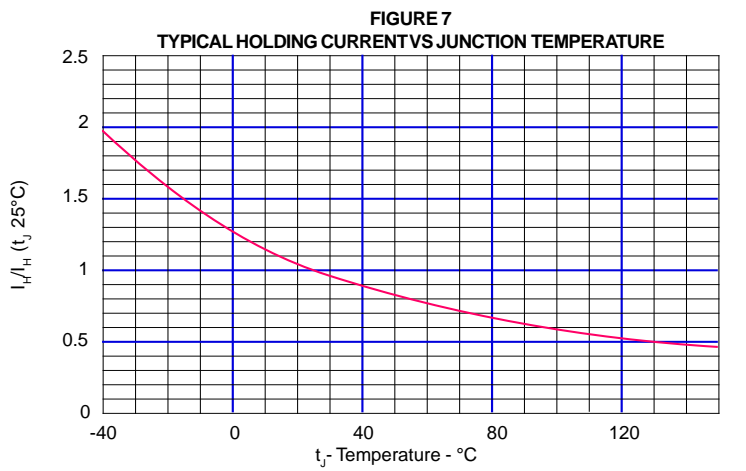
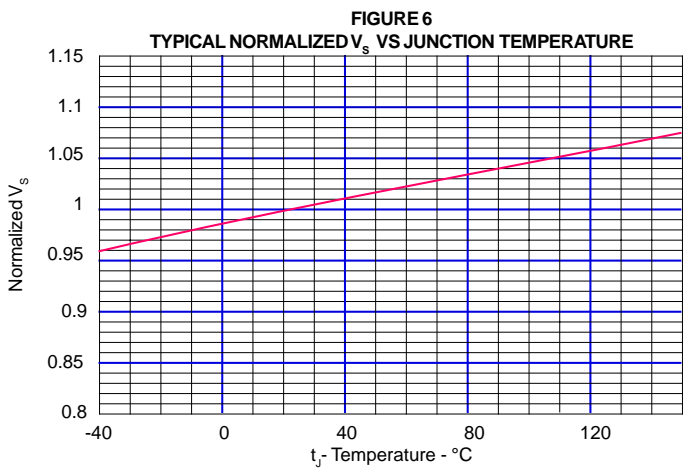
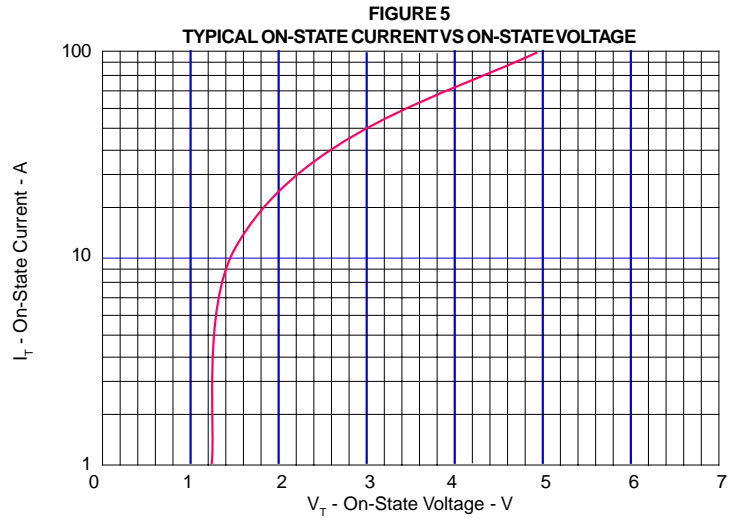
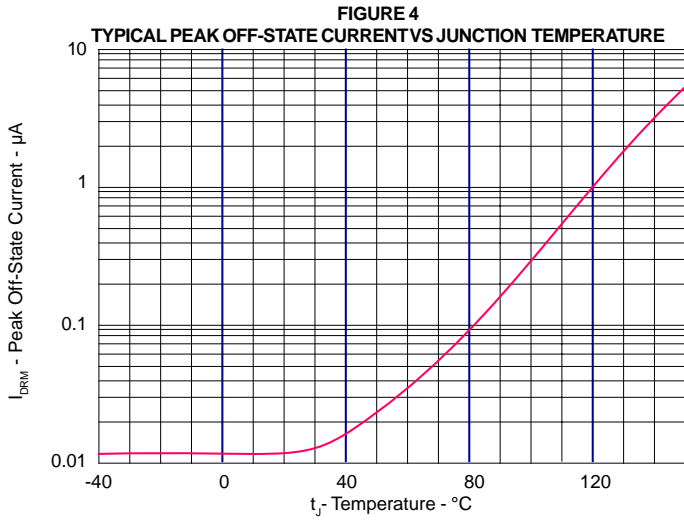
**FIGURE 2  
V-I CHARACTERISTIC CURVE**



**FIGURE 3  
ON-STATE CURRENT VS SURGE CURRENT DURATION**



## GRAPHS



## APPLICATION NOTES

### FIGURE 1: UL 1459 & FCC Part 68 - Metallic Protection

The TSS (Thyristor Surge Suppressor) device is located across the tip-to-ring 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 PP3100EB/EC is recommended. However, with a resistance value of 7.5 Ohms for tip and ring, the PP3100EA 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 PPxxxxEA or EB/EC is based upon the value of the tip and ring resistors. For the National Electric 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.

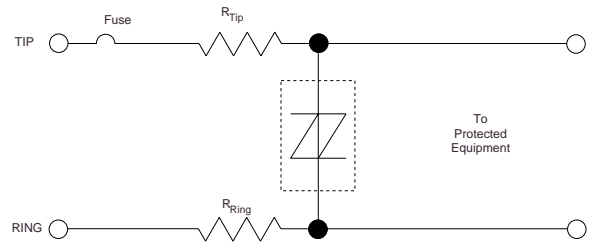


FIGURE 1 - Metallic Protection

### FIGURE 2 - 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 PP3100EA is recommended with a typical resistor value for tip and ring of 15 Ohms. The PP3100EB/EC 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.

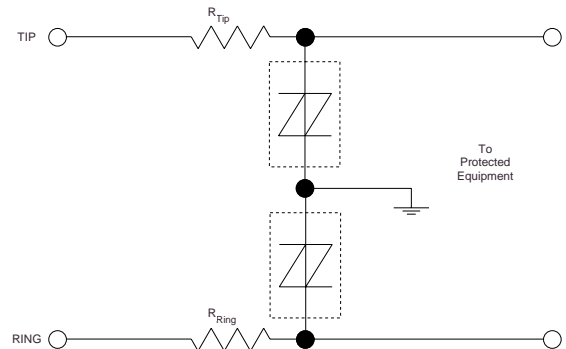


FIGURE 2 - Longitudinal Protection

### FIGURE 3 - UL 1459 & FCC Part 68 - Metallic & 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 PP3100EB/EC is recommended. With a resistance value of 15 Ohms for the tip and ring resistors, the PP3100EA 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.

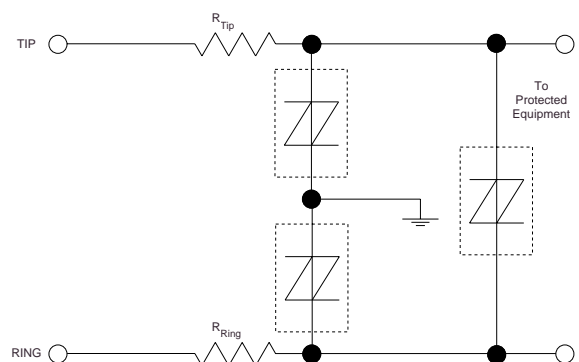
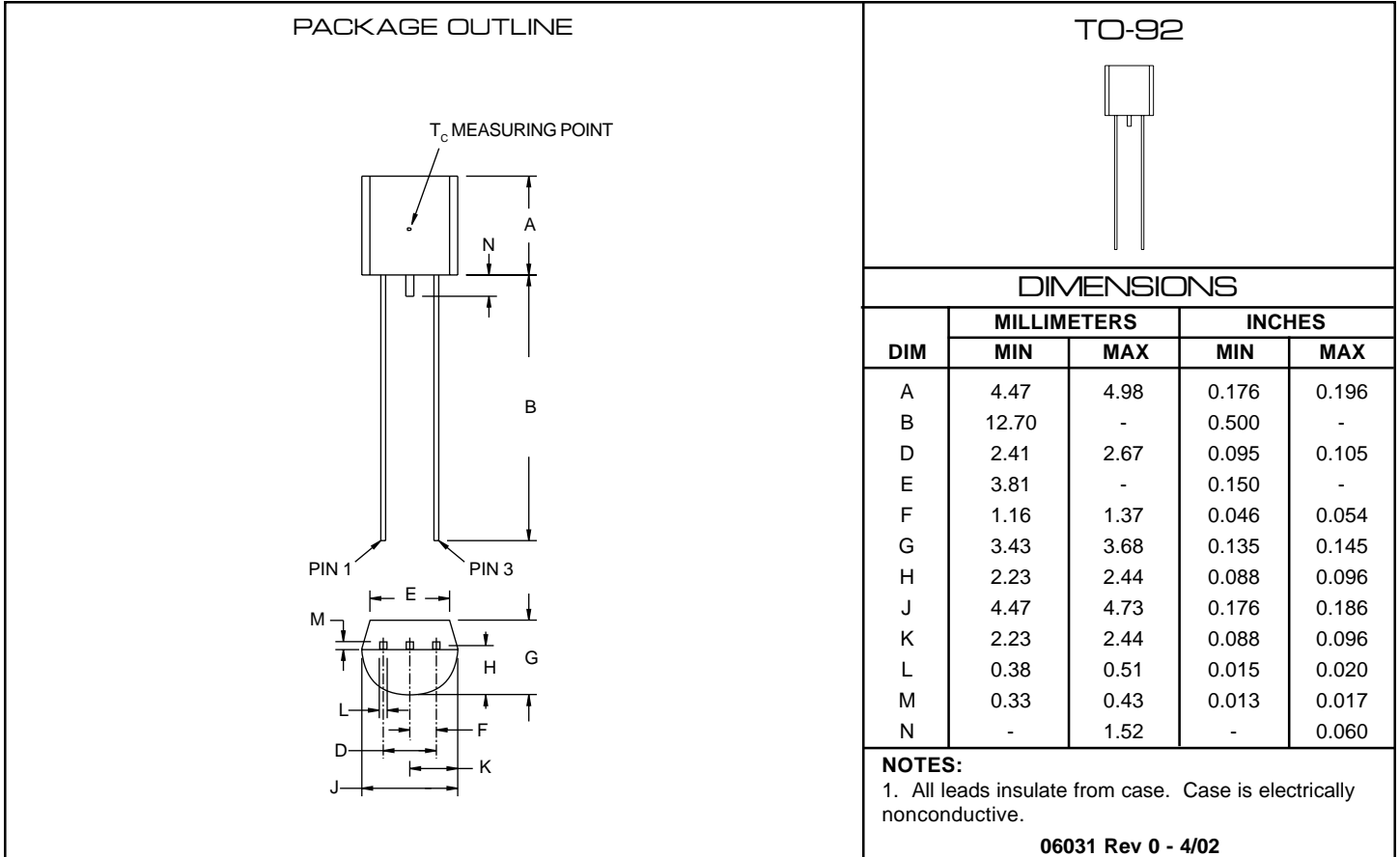


FIGURE 3 - Metallic & Longitudinal Protection

# PP0640EA thru PP3500EC

## PACKAGE OUTLINE & DIMENSIONS



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