THYRISTOR SURGE SUPPRESSOR



DO-214AA PACKAGE

DESCRIPTION

The PP-SM Series are 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 and other telecommunication equiment/systems. The bidirectional configuration provides protection for both positive and negative transients and the discrete surface mount package allows for individual placement of the device on line cards or other locations where multiple component devices do not offer the versatile in board trace layout.

This series can be used to provide protection in accordance with industry standards such as FCC Part 68, ANSI C62.41, UL 1459, GR-1089-CORE, IEC 61000-2, IEC 61000-4 and IEC 61000-4-5 requirements.

FEATURES

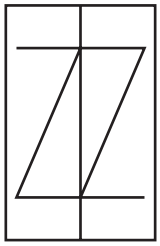
- Compatible with IEC 61000-4-2 (ESD): Air 15kV, Contact 8kV
- Compatible with IEC 61000-4-4 (EFT): 40A, 5/50ns
- Compatible with IEC 61000-4-5 (Surge): 95A, 8/20µs - L4(Line-Ground), 48A - L4(Line-Line) & 83A - L2(Power)
- FCC Part 68, UL 1459, Bellcore 1089 & ITU-K.20/K.21 Compliant
- UL File Recognition #E208219
- Peak Off-State Voltage from 25 to 300 Volts
- Surge Current Capability (See Table 1)
- ESD Protection > 25 kilovolts
- Low Capacitance for T1/E1 Trunk & Line Card Applications
- Bidirectional Configuration
- RoHS Compliant
- REACH Compliant

MECHANICAL CHARACTERISTICS

- Molded Plastic DO-214AA Package
- Approximate Weight: 2.5 grams
- Lead-Free Pure-Tin Plating (Annealed)
- Solder Reflow Temperature:
  Pure-Tin - Sn, 100: 260-270°C
- Flammability Rating UL 94V-0
- 12mm Tape and Reel per EIA Standard 481

APPLICATIONS

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



DEVICE SYMBOL
BIDIRECTIONAL

TABLE 1 - SURGE RATINGS

SERIES	I_{PP} 2/10µs AMPS	I_{PP} 8/20µs AMPS	I_{PP} 10/160µs AMPS	I_{PP} 10/560µs AMPS	I_{PP} 10/1000µs AMPS	I_{TSM} 60Hz AMPS	di/dt A/µs (Note 1)	dv/dt V/µs (Note 1)
SA	150	150	100	50	50	20	500	2000
SB	300	300	150	100	80	32	500	2000
SC	500	400	200	200	100	60	500	2000

NOTES
1. Critical rate of rise for On-State Current (di/dt) and Off-State Voltage (dv/dt).

TYPICAL DEVICE CHARACTERISTICS

MAXIMUM RATINGS @ 25°C Unless Otherwise Specified			
PARAMETER	**SYMBOL**	**VALUE**	**UNITS**
Surge Current - 50/60Hz (SC Series)	I_{TSM}	60	Amps
Junction Temperature	T_A	-40 to 150	°C
Storage Temperature	T_{STG}	-55 to 150	°C
Thermal Resistance (Junction) - SA & SB Series	R_{QJC}	28	°C/Watt
Thermal Resistance (Junction) - SC Series	R_{QJC}	26	°C/Watt
Thermal Resistance (Ambient) - SA & SB Series	R_{QJA}	90	°C/Watt
Thermal Resistance (Ambient) - SC Series	R_{QJA}	85	°C/Watt

FIGURE 1
PULSE WAVEFORM

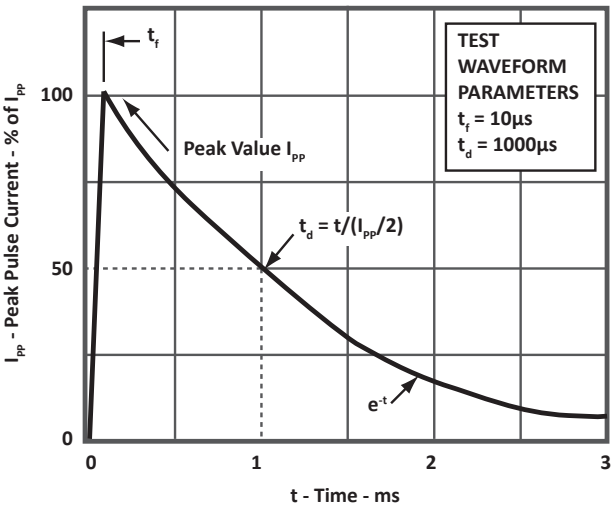


FIGURE 2
VI CHARACTERISITC CURVE

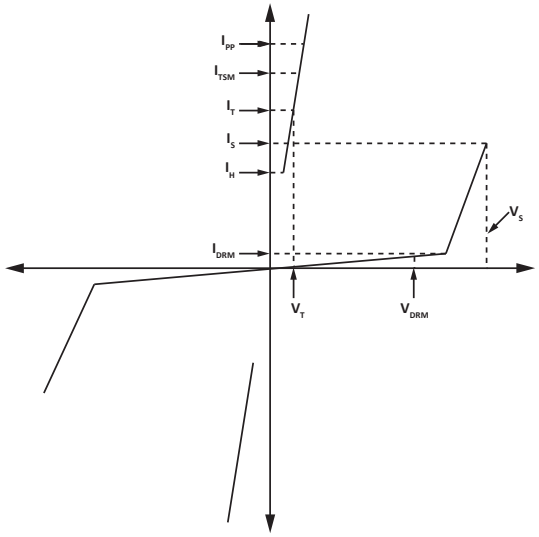
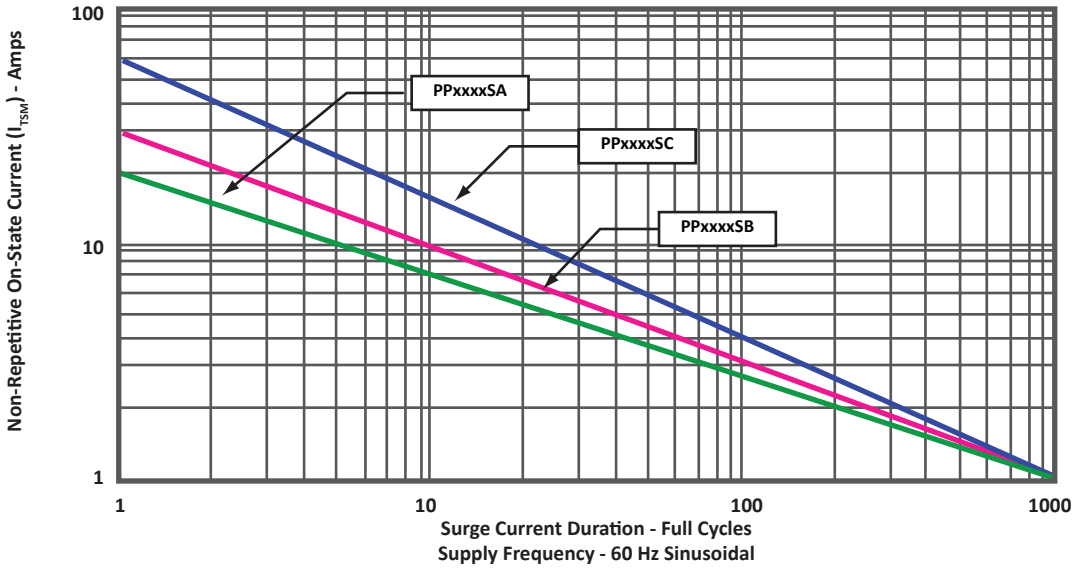


FIGURE 3
ON-STATE CURRENT VS SURGE CURRENT DURATION



TYPICAL DEVICE CHARACTERISTICS

ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

PART NUMBER	DEVICE MARKING	REPETITIVE PEAK OFF-STATE VOLTAGE V_{DRM} VOLTS	SWITCHING VOLTAGE @100V/µs V_S VOLTS	MINIMUM HOLDING CURRENT (Fig. 7) di/dt = 1A/ms I_H mA	SWITCHING CURRENT IS mA	MAXIMUM OFF-STATE CURRENT (Fig. 4) @V_{DRM} I_{DRM} µA	MAXIMUM ON-STATE VOLTAGE (Fig. 5) @I_T V_T VOLTS	ON-STATE CURRENT I_T AMPS	TYPICAL CAPACITANCE (Note 1) @2V, 1MHz C pF
PP0640SA	GC	58	77	150	800	5	4	2.2	60
PP0720SA	GD	65	88	150	800	5	4	2.2	60
PP0800SA	GE	75	98	150	800	5	4	2.2	60
PP1100SA	GF	90	130	150	800	5	4	2.2	60
PP1300SA	GG	120	160	150	800	5	4	2.2	40
PP1500SA	GH	140	180	150	800	5	4	2.2	40
PP1800SA	GI	160	220	150	800	5	4	2.2	40
PP2300SA	GJ	190	260	150	800	5	4	2.2	30
PP2600SA	GK	220	300	150	800	5	4	2.2	30
PP3100SA	GL	275	350	150	800	5	4	2.2	30
PP3500SA	GM	300	400	150	800	5	4	2.2	30
PP0300SB	GN	25	40	50	800	5	4	2.2	110
PP0640SB	GP	58	77	150	800	5	4	2.2	60
PP0720SB	GQ	65	88	150	800	5	4	2.2	60
PP0800SB	GR	75	98	150	800	5	4	2.2	60
PP1100SB	GS	90	130	150	800	5	4	2.2	60
PP1300SB	GT	120	160	150	800	5	4	2.2	40
PP1500SB	GU	140	180	150	800	5	4	2.2	40
PP1800SB	GV	160	220	150	800	5	4	2.2	40
PP2300SB	GW	190	260	150	800	5	4	2.2	30
PP2600SB	GX	220	300	150	800	5	4	2.2	30
PP3100SB	GY	275	350	150	800	5	4	2.2	30
PP3500SB	GZ	300	400	150	800	5	4	2.2	30
PP0640SC	HC	58	77	150	800	5	4	2.2	120
PP0720SC	HD	65	88	150	800	5	4	2.2	120
PP0800SC	HE	75	98	150	800	5	4	2.2	120
PP1100SC	HF	90	130	150	800	5	4	2.2	120
PP1300SC	HG	120	160	150	800	5	4	2.2	80
PP1500SC	HH	140	180	150	800	5	4	2.2	80
PP1800SC	HI	160	220	150	800	5	4	2.2	80
PP2300SC	HJ	190	260	150	800	5	4	2.2	60
PP2600SC	HK	220	300	150	800	5	4	2.2	60
PP3100SC	HL	275	350	150	800	5	4	2.2	60
PP3500SC	HM	300	400	150	800	5	4	2.2	60

NOTES
1. Capacitance imblance between positive and negative polarities is typically < 15pF.

TYPICAL DEVICE CHARACTERISTICS

FIGURE 4
TYPICAL PEAK OFF-STATE CURRENT
VS JUNCTION TEMPERATURE

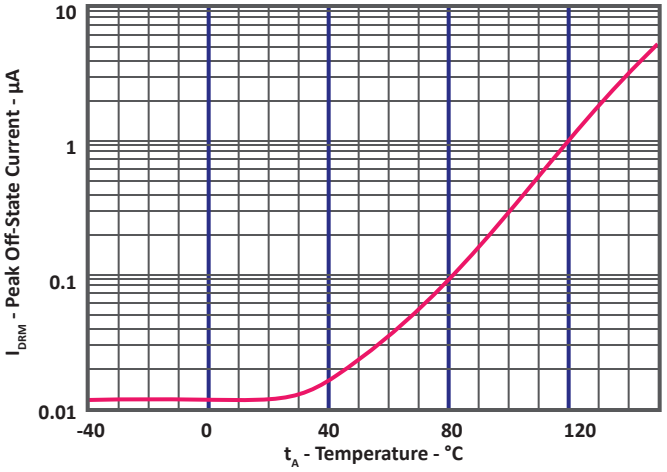


FIGURE 5
TYPICAL PEAK ON-STATE CURRENT
VS ON-STATE VOLTAGE

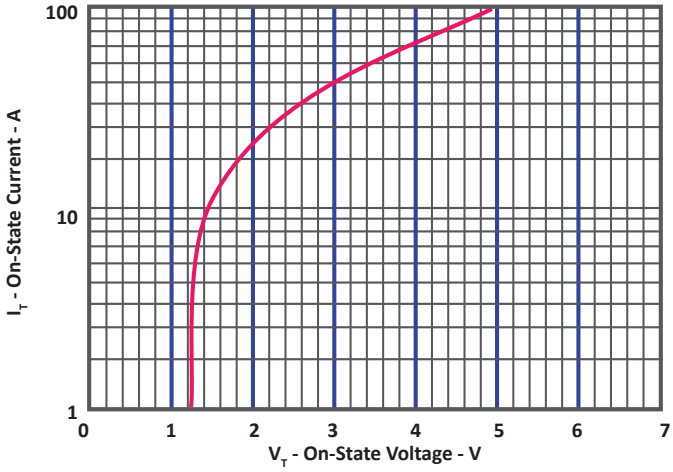


FIGURE 6
TYPICAL NORMALIZED SWITCHING VOLTAGE
VS JUNCTION TEMPERATURE

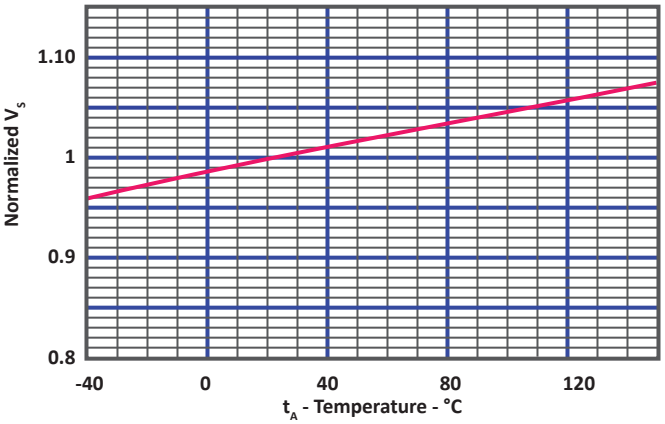
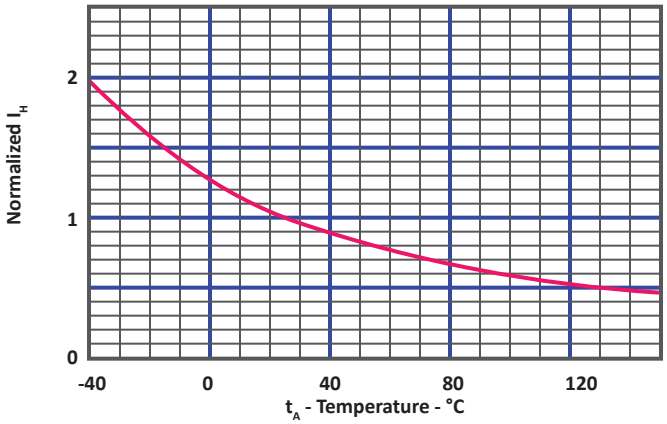


FIGURE 7
TYPICAL NORMALIZED HOLDING CURRENT
VS JUNCTION TEMPERATURE



APPLICATION INFORMATION

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. RTIP and RRING 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 PPxxxx-SA or SB/SC 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.

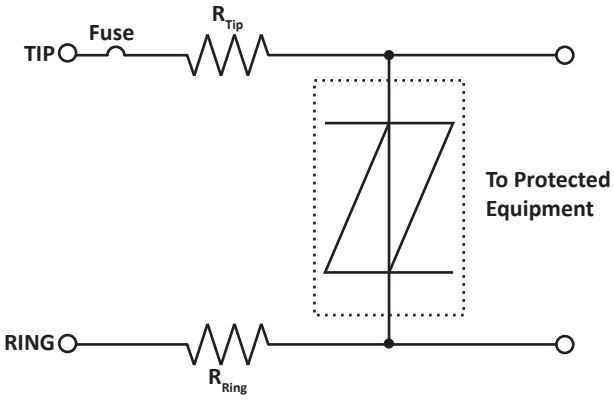
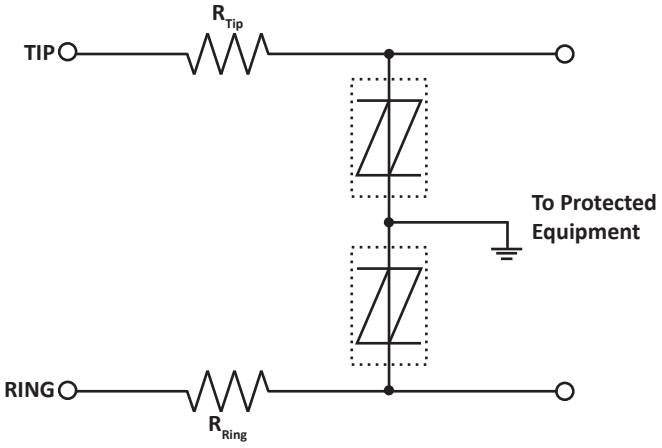


FIGURE 2 - UL 1459 & FCC PART 68 LONGITUDINAL PROTECTION

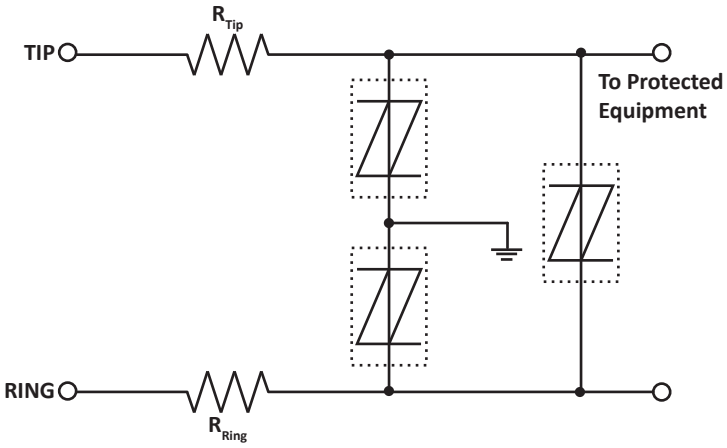
There are two TSS devices, one located from tip-to-ground and one ring-to-ground. For standard analog signals, the PP3100SA is recommended with a typical resistor value for tip and ring of 15 Ohms. The PP3100SB/SC is recommended for resistor values of 7.5 Ohms each. The National Electric Code (NEC) article 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.



APPLICATION INFORMATION

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 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.



CIRCUIT BOARD RECOMMENDATIONS

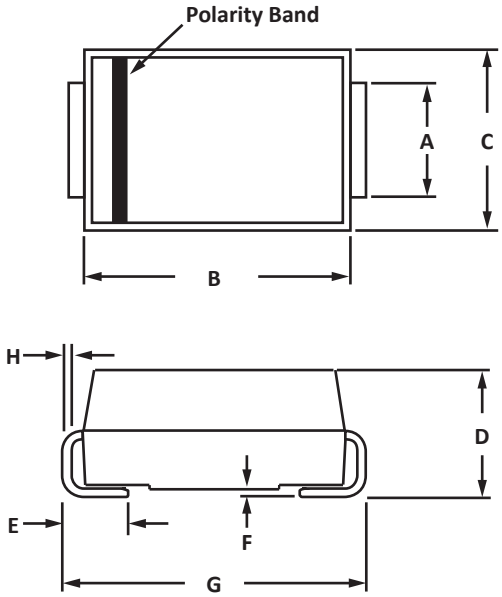
Circuit board layout is critical for electromagnetic compatibility protection. The following guidelines are recommended:

- 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.

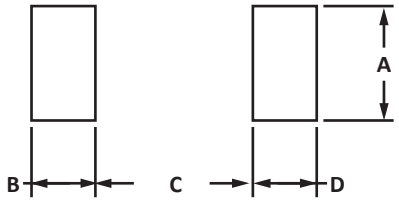
DO-214AA PACKAGE INFORMATION

OUTLINE DIMENSIONS				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.96	2.21	0.077	0.087
B	4.06	4.57	0.160	0.180
C	3.30	3.94	0.130	0.155
D	2.00	2.50	0.079	0.098
E	0.76	1.52	0.030	0.060
F	0.10	0.20	0.004	0.008
G	5.08	5.59	0.200	0.220
H	0.15	031	0.006	0.012

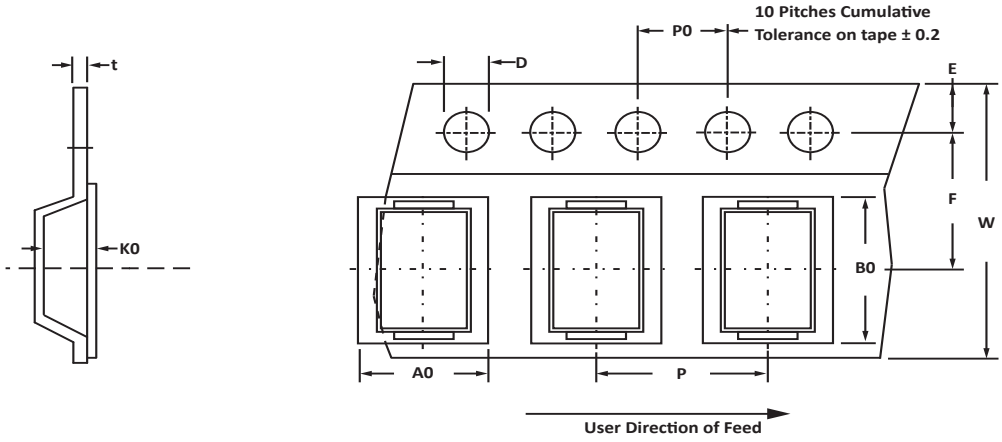
NOTES
1. Dimensions are exclusive of mold flash and metal burrs.



PAD LAYOUT DIMENSIONS				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.10	-	0.083	-
B	1.27	-	0.050	-
C	-	2.69	-	0.106
D	1.27	-	0.083	-



TAPE AND REEL



SPECIFICATIONS											
REEL DIA.	TAPE WIDTH	A0	B0	K0	D	E	F	W	P0	P	tmax
330mm (13")	12mm	3.79 ± 0.15	5.72 ± 0.15	2.46 ± 0.30	1.55 ± 0.05	1.75 ± 0.10	5.5 ± 0.05	12.00 ± 0.30	4.00 ± 0.10	8.00 ± 0.10	0.25 ± 0.10

NOTES
1. Dimensions are in millimeters.
2. Surface mount product is taped and reeled in accordance with EIA-481.
3. Suffix - T = 13" Reel - 3,000 pieces per 12mm tape.
4. Marking on Part - marking code (see page 2) and logo.

Package outline, pad layout and tape specifications per document number 06013.R5 2/11

ORDERING INFORMATION					
BASE PART NUMBER	LEADFREE SUFFIX	TAPE SUFFIX	QTY/REEL	REEL SIZE	TUBE QTY
PPxxxxSA/SB/SC	-LF	-T	3,000	13"	n/a

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

COMPANY INFORMATION

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.

CONTACT US

Corporate Headquarters
2929 South Fair Lane
Tempe, Arizona 85282
USA

By Telephone
General: 602-431-8101
Sales: & Marketing: 602-414-5109
Customer Service: 602-414-5114
Product Technical Support: 602-414-5107

By Fax
General: 602-431-2288

By E-mail:
Sales: sales@protekdevices.com
Customer Service: service@protekdevices.com
Technical Support: support@protekdevices.com

ProTek Devices (Asia Pacific) Pte. Ltd.
8 Ubi Road 2, #06-19
Zervex
Singapore - 408538
Tel: +65-67488312
Fax: +65-67488313

Web
www.protekdevices.com

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