

# Thyristor Surge Suppressors (TSS)

PXXX0SA Series

DO-214AA(SMB)

@10/700 $\mu$ S, 2KV

## Description

PXXX0SA Series are designed to protect broadband equipment such as modems, line card, CPE and DSL from damaging over-voltage transients.

The series provides a surface mount solution that enables equipment to comply with global regulatory standards.

## Features and Benefits

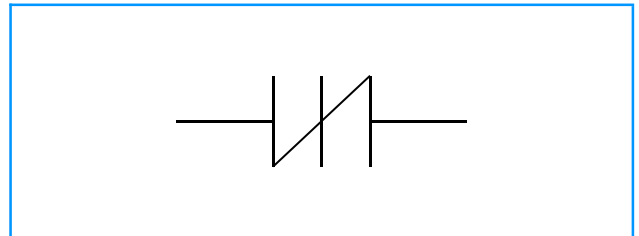
- ◆ Low voltage overshoot
- ◆ Low on-state voltage
- ◆ Does not degrade surge capability after multiple surge events within limit
- ◆ Fails short circuit when surged in excess of ratings
- ◆ Low Capacitance

## Applicable Global Standards

- ◆ TIA-968-A
- ◆ ITU K.20/21 Enhanced level
- ◆ ITU K.20/21 Basic Level
- ◆ GR 1089 Inter building
- ◆ GR 1089 Inter building
- ◆ IEC 6100-4-5
- ◆ YD/T 1082
- ◆ YD/T 993
- ◆ YD/T 950



## Schematic Symbol



## Electrical Parameters

Parameter	Definition
$I_S$	<b>Switching Current</b> - maximum current required to switch to on state
$I_{DRM}$	<b>Leakage Current</b> - maximum peak off-state current measured at $V_{DRM}$
$I_H$	<b>Holding Current</b> - minimum current required to maintain on state
$I_T$	<b>On-state Current</b> - maximum rated continuous on-state current
$V_S$	<b>Switching Voltage</b> - maximum voltage prior to switching to on state
$V_{DRM}$	<b>Peak Off-state Voltage</b> - maximum voltage that can be applied while maintaining off state
$V_T$	<b>On-state Voltage</b> - maximum voltage measured at rated on-state current
$C_0$	<b>Off-state Capacitance</b> - typical capacitance measured in off state

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## Electrical Characteristics (T<sub>A</sub>=25°C)

Part Number	Marking	V <sub>DRM</sub> @I <sub>DRM</sub> =5 $\mu$ A	V <sub>S</sub> ① @100V/ $\mu$ S	V <sub>T</sub> @I <sub>T</sub> =2.2A	I <sub>S</sub>	I <sub>T</sub>	I <sub>H</sub>	C <sub>0</sub> ② @1MHz, 2V bias
		V min	V max	V max	mA max	A max	mA min	pF typ
P0080SA	P008A	6	25	4	800	2.2	50	50
P0300SA	P03A	25	40	4	800	2.2	50	70
P0640SA	P06A	58	77	4	800	2.2	150	50
P0720SA	P07A	65	88	4	800	2.2	150	50
P0900SA	P09A	75	98	4	800	2.2	150	45
P1100SA	P11A	90	130	4	800	2.2	150	45
P1300SA	P13A	120	160	4	800	2.2	150	45
P1500SA	P15A	140	180	4	800	2.2	150	40
P1800SA	P18A	170	220	4	800	2.2	150	40
P2300SA	P23A	190	260	4	800	2.2	150	35
P2600SA	P26A	220	300	4	800	2.2	150	35
P3100SA	P31A	275	350	4	800	2.2	150	30
P3500SA	P35A	320	400	4	800	2.2	150	30

**Notes:**

- ① V<sub>s</sub> is measured at 100KV/s.
- ② Off-state capacitance is measured in V<sub>DC</sub>=2V, V<sub>RMS</sub>=1V, f=1MHz.

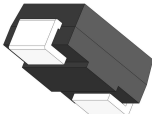
## Surge Ratings

Series	2/10 $\mu$ S <sup>1</sup>	8/20 $\mu$ S <sup>1</sup>	10/160 $\mu$ S <sup>1</sup>	10/560 $\mu$ S <sup>1</sup>	10/1000 $\mu$ S <sup>1</sup>	5/310 $\mu$ S <sup>1</sup>	I <sub>TSM</sub> 50/60 Hz	di/dt
	2/10 $\mu$ S <sup>2</sup>	1.2/50 $\mu$ S <sup>2</sup>	10/160 $\mu$ S <sup>2</sup>	10/560 $\mu$ S <sup>2</sup>	10/1000 $\mu$ S <sup>2</sup>	10/700 $\mu$ S <sup>2</sup>		
	A min	A min	A min	A min	A min	A min	A min	Amps/ $\mu$ s max
A	150	150	90	50	45	50	20	500

**Notes:**

1. Current waveform in  $\mu$ s
  2. Voltage waveform in  $\mu$ s
- Peak pulse current rating (I<sub>PP</sub>) is repetitive and guaranteed for the life of the product.
  - I<sub>PP</sub> ratings applicable over temperature range of -40°C to +85°C
  - The device must initially be in thermal equilibrium with -40°C < T<sub>J</sub> < +150°C

## Thermal Considerations

Package	Symbol	Parameter	Value	Unit
DO-214AA 	T <sub>J</sub>	Operating Junction Temperature Range	- 40 to + 150	°C
	T <sub>S</sub>	Storage Temperature Range	- 40 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	90	°C/W

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## Characteristic Curves

Figure 1 - V-I Characteristics

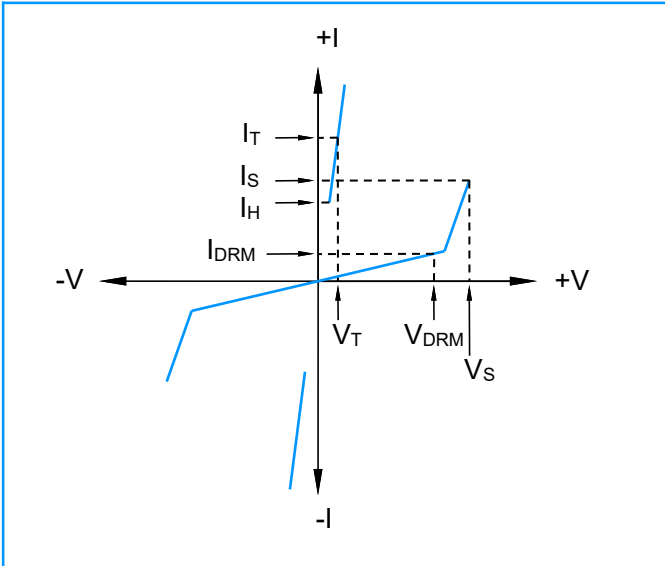


Figure 2 -  $t_r \times t_d$  Pulse Waveform

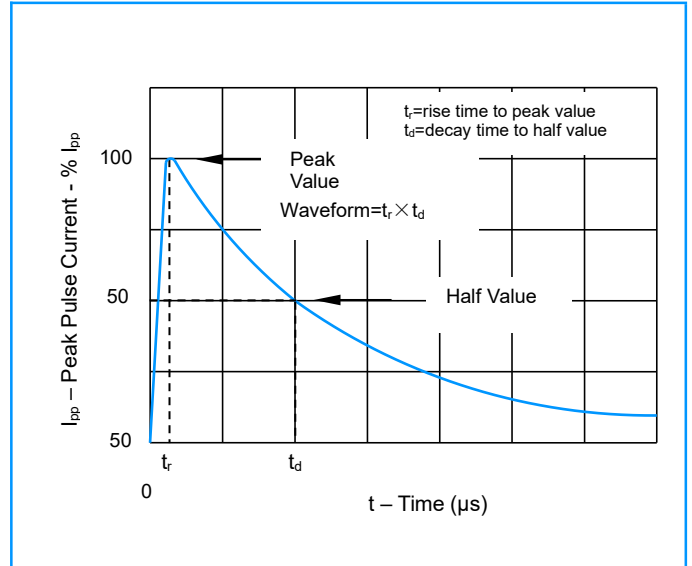


Figure 3 - Normalized  $V_S$  Change Versus Junction Temperature

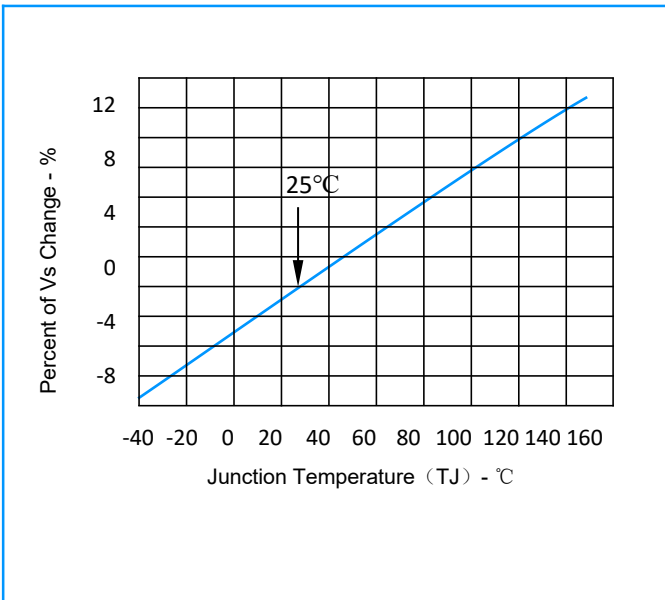
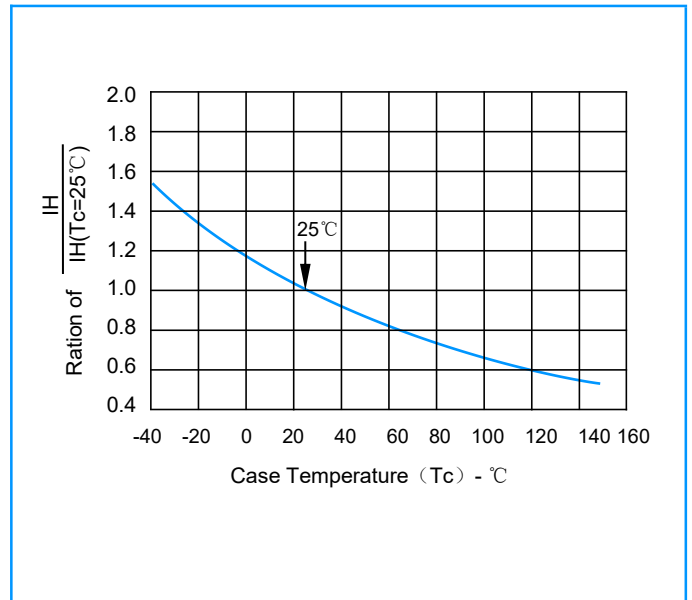


Figure 4 - Normalized DC Holding Current Versus Case Temperature



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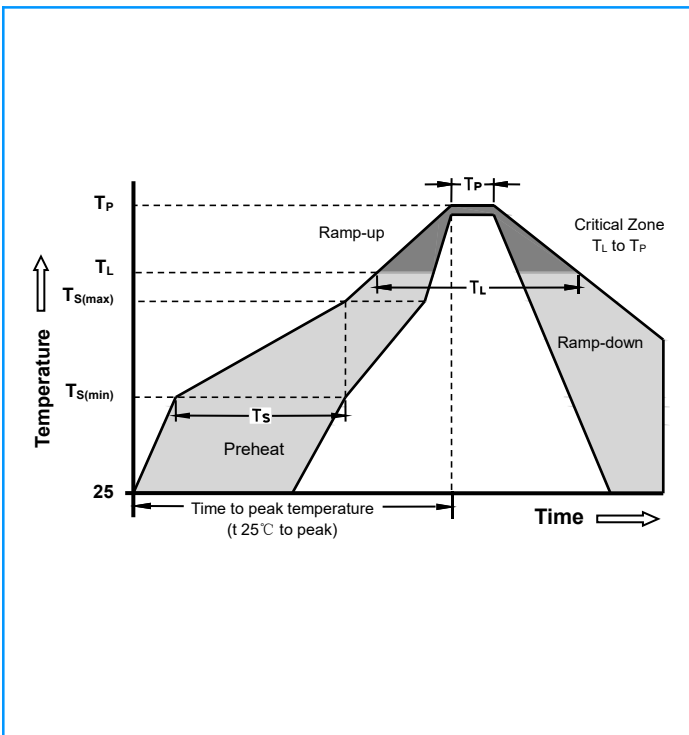
## Environmental Specifications

<b>High Temp Voltage Blocking</b>	80% Rated VDRM (VAC Peak ) +125°C or +150°C, Lead Material Copper Alloy High Temp Voltage Blocking 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101
<b>Temp Cycling</b>	-65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104
<b>Biased Temp &amp; Humidity</b>	52 VDC (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101
<b>High Temp Storage</b>	+150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101
<b>Low Temp Storage</b>	-65°C, 1008 hrs.
<b>Thermal Shock</b>	0°C to +100°C, 5 min. dwell, 10 sec. transfer, Thermal Shock 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106
<b>Autoclave (Pressure Cooker Test)</b>	+121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/Cooker Test) JEDEC, JESD22-A-102
<b>Resistance to Solder Heat</b>	+260°C, 30 secs. MIL-STD-750 (Method 2031
<b>Moisture Sensitivity Level</b>	85%RH, +85°C, 168 hrs., 3 reflow cycles Level (+260°C Peak). JEDEC-J-STD-020, Level 1

## Physical Specifications

<b>Lead Material</b>	Copper Alloy
<b>Terminal Finish</b>	100% Matte-Tin Plated
<b>Body Material</b>	UL recognized epoxy meeting flammability classification 94V-0

## Soldering Parameters



<b>Reflow Condition</b>		Lead-free assembly
<b>Pre Heat</b>	-Temperature Min ( $T_{s(\min)}$ )	+150°C
	-Temperature Max ( $T_{s(\max)}$ )	+200°C
	-Time (min to max) ( $T_s$ )	60 -180 Seconds
<b>Average ramp up rate ( Liquidus Temp <math>T_L</math> to peak)</b>		3°C/Second Max
<b><math>T_{s(\max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3°C/Second Max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	+217°C
	- Time (min to max) ( $T_L$ )	60 -150 Seconds
<b>Peak Temperature (<math>T_P</math>)</b>		260 +0/-5°C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		30 Seconds Max
<b>Ramp-down Rate</b>		6°C/Second Max
<b>Time 25°C to peak Temperature (<math>T_P</math>)</b>		8 minutes Max
<b>Do not exceed</b>		+260°C

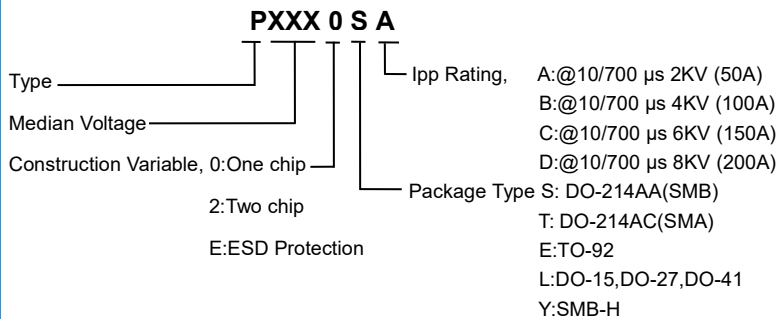
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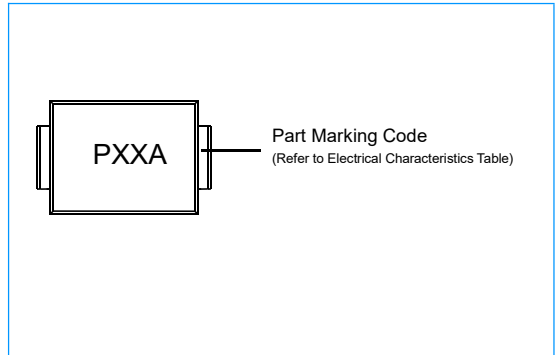
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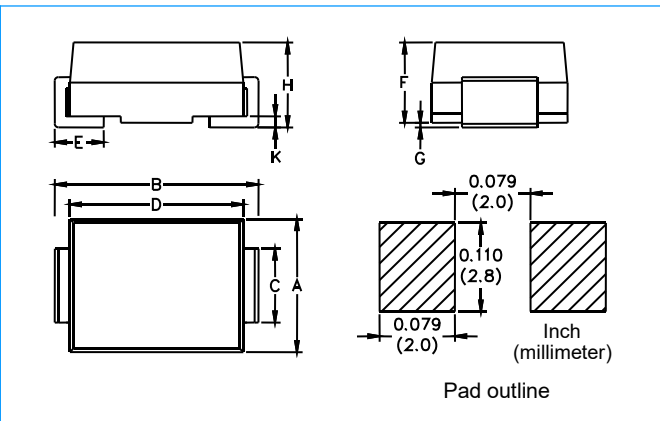
## Part Numbering



## Part Marking



## Dimensions DO-214AA



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.130	0.156	3.30	3.95
B	0.201	0.220	5.10	5.60
C	0.077	0.087	1.95	2.20
D	0.159	0.181	4.05	4.60
E	0.030	0.063	0.76	1.60
F	0.076	0.096	1.90	2.45
G	0.002	0.008	0.05	0.20
H	0.077	0.104	1.95	2.65
K	0.006	0.016	0.15	0.41

## Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
Pxxx0SA	DO-214AA	2500	Tape & Reel -12mm/13"tape	EIA -481 - D

## Tape and Reel Specifications

