

# Transient Voltage Suppressors

**PxxxxSX Series  
DO-214AA/SMB**

## Thyristor Surge Suppressors -PxxxxSX Series

### Description

DO-214AA/SMB Series are low capacitance devices designed to protect broadband equipment such as VOIP, DSL modems and DSLAMs from damaging overvoltage transients.

The series provides a surface mount solution that enables equipment to comply with global regulatory standards while limiting the impact to broadband signals.

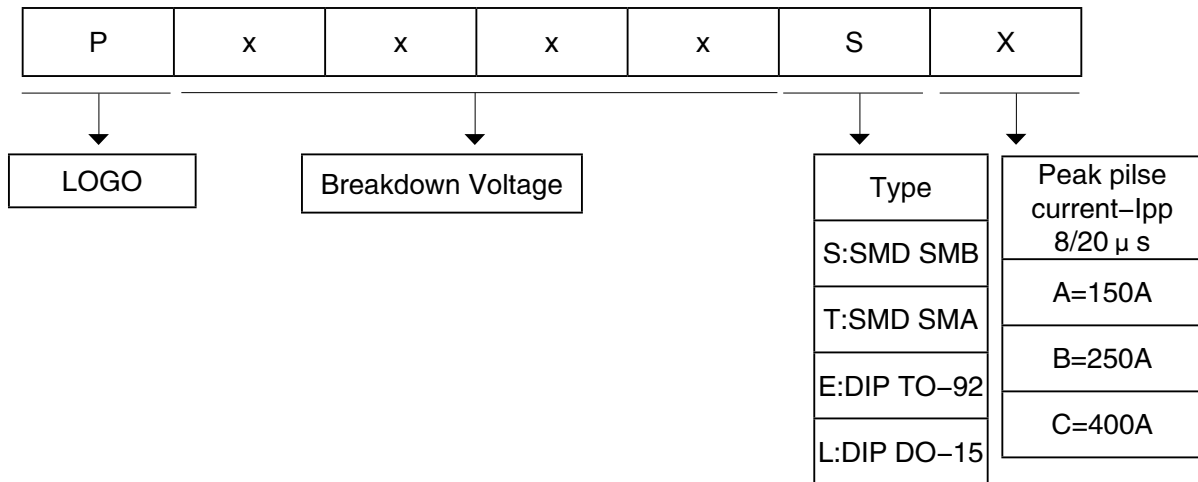


### Features

Compared to surge suppression using other technologies, P Series devices offer absolute surge protection regardless of the surge current available and the rate of applied voltage (dv/dt). P Series devices:

- Cannot be damaged by voltage
- Eliminate hysteresis and heat dissipation typically found with clamping devices
- Eliminate voltage overshoot caused by fast-rising transients
- Are non-degenerative
- Will not fatigue
- Have low capacitance, making them ideal for high-speed transmission equipment

### Part Number Code



## Electrical Characteristics

| Type Number | VDRM | IDRM | VBO | IH  | IS  | IT  | VT | CJ    |       |
|-------------|------|------|-----|-----|-----|-----|----|-------|-------|
|             | V    | μA   | V   | MA  | MA  | A   | V  | pFMin | pFMax |
| P0080SA     | 6    | 5    | 25  | 50  | 800 | 2.2 | 4  | 25    | 150   |
| P0080SB     | 6    | 5    | 25  | 50  | 800 | 2.2 | 4  | 25    | 150   |
| P0080SC     | 6    | 5    | 25  | 50  | 800 | 2.2 | 4  | 35    | 260   |
| P0300SA     | 25   | 5    | 40  | 50  | 800 | 2.2 | 4  | 15    | 140   |
| P0300SB     | 25   | 5    | 40  | 50  | 800 | 2.2 | 4  | 15    | 140   |
| P0300SC     | 25   | 5    | 40  | 50  | 800 | 2.2 | 4  | 25    | 250   |
| P0640SA     | 58   | 5    | 77  | 150 | 800 | 2.2 | 4  | 40    | 60    |
| P0640SB     | 58   | 5    | 77  | 150 | 800 | 2.2 | 4  | 40    | 60    |
| P0640SC     | 58   | 5    | 77  | 150 | 800 | 2.2 | 4  | 28    | 80    |
| P0720SA     | 65   | 5    | 88  | 150 | 800 | 2.2 | 4  | 35    | 60    |
| P0720SB     | 65   | 5    | 88  | 150 | 800 | 2.2 | 4  | 35    | 75    |
| P0720SC     | 65   | 5    | 88  | 150 | 800 | 2.2 | 4  | 50    | 150   |
| P0900SA     | 75   | 5    | 98  | 150 | 800 | 2.2 | 4  | 35    | 55    |
| P0900SB     | 75   | 5    | 98  | 150 | 800 | 2.2 | 4  | 35    | 70    |
| P0900SC     | 75   | 5    | 98  | 150 | 800 | 2.2 | 4  | 45    | 140   |
| P1100SA     | 90   | 5    | 130 | 150 | 800 | 2.2 | 4  | 30    | 50    |
| P1100SB     | 90   | 5    | 130 | 150 | 800 | 2.2 | 4  | 30    | 70    |
| P1100SC     | 90   | 5    | 130 | 150 | 800 | 2.2 | 4  | 45    | 115   |
| P1300SA     | 120  | 5    | 160 | 150 | 800 | 2.2 | 4  | 25    | 45    |
| P1300SB     | 120  | 5    | 160 | 150 | 800 | 2.2 | 4  | 25    | 60    |
| P1300SC     | 120  | 5    | 160 | 150 | 800 | 2.2 | 4  | 40    | 105   |
| P1500SA     | 140  | 5    | 180 | 150 | 800 | 2.2 | 4  | 25    | 40    |
| P1500SB     | 140  | 5    | 180 | 150 | 800 | 2.2 | 4  | 25    | 55    |
| P1500SC     | 140  | 5    | 180 | 150 | 800 | 2.2 | 4  | 35    | 95    |
| P1800SA     | 170  | 5    | 220 | 150 | 800 | 2.2 | 4  | 25    | 35    |
| P1800SB     | 170  | 5    | 220 | 150 | 800 | 2.2 | 4  | 25    | 50    |
| P1800SC     | 170  | 5    | 220 | 150 | 800 | 2.2 | 4  | 35    | 90    |
| P2300SA     | 190  | 5    | 260 | 150 | 800 | 2.2 | 4  | 25    | 35    |
| P2300SB     | 190  | 5    | 260 | 150 | 800 | 2.2 | 4  | 25    | 50    |
| P2300SC     | 190  | 5    | 260 | 150 | 800 | 2.2 | 4  | 30    | 80    |
| P2600SA     | 220  | 5    | 300 | 150 | 800 | 2.2 | 4  | 20    | 35    |
| P2600SB     | 220  | 5    | 300 | 150 | 800 | 2.2 | 4  | 20    | 45    |
| P2600SC     | 220  | 5    | 300 | 150 | 800 | 2.2 | 4  | 30    | 80    |
| P3100SA     | 275  | 5    | 350 | 150 | 800 | 2.2 | 4  | 20    | 35    |
| P3100SB     | 275  | 5    | 350 | 150 | 800 | 2.2 | 4  | 20    | 45    |
| P3100SC     | 275  | 5    | 350 | 150 | 800 | 2.2 | 4  | 30    | 70    |
| P3500SA     | 320  | 5    | 400 | 150 | 800 | 2.2 | 4  | 20    | 35    |
| P3500SB     | 320  | 5    | 400 | 150 | 800 | 2.2 | 4  | 20    | 40    |
| P3500SC     | 320  | 5    | 400 | 150 | 800 | 2.2 | 4  | 25    | 65    |

**Notes:**

- Is: Switching Current – maximum current required to switch to on state
- IDRM: Leakage Current – maximum peak off-state current measured at VDRM
- IH: Holding Current – minimum current required to maintain on state
- IPP: Peak Pulse Current – maximum rated peak impulse current
- IT: On-state Current – maximum rated continuous on-state current
- VDRM: Peak Off-state Voltage – maximum voltage that can be applied while maintaining off state
- VT: On-state Voltage – maximum voltage measured at rated on-state current

## Surge Ratings

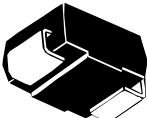
| Series | I <sub>pp</sub> |         |           |           |            | ITSM<br>50/60 Hz | di/dt    |
|--------|-----------------|---------|-----------|-----------|------------|------------------|----------|
|        | 2x10 μs         | 8x20 μs | 10x160 μs | 10x560 μs | 10x1000 μs |                  |          |
|        | A min           | A min   | A min     | A min     | A min      | A min            | A/μs max |
| A      | 150             | 150     | 90        | 50        | 45         | 20               | 500      |
| B      | 250             | 250     | 150       | 100       | 80         | 30               | 500      |
| C      | 500             | 400     | 200       | 150       | 100        | 50               | 500      |

Notes:

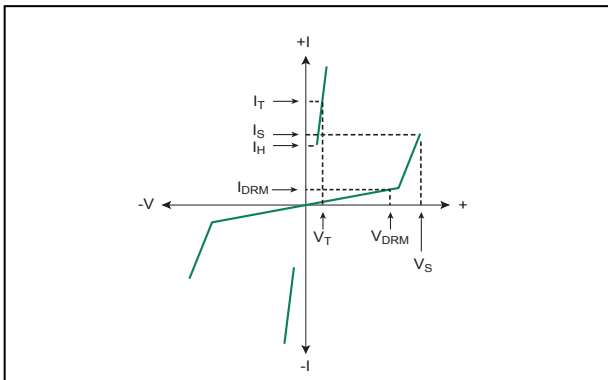
- Peak pulse current rating (I<sub>pp</sub>) is repetitive and guaranteed for the life of the product.
- I<sub>pp</sub> ratings applicable over temperature range of -40°C to +85°C
- The device must initially be in thermal equilibrium with -40°C ≤ T<sub>j</sub> ≤ +150°C

1 Current waveform in μs  
2 Voltage waveform in μs

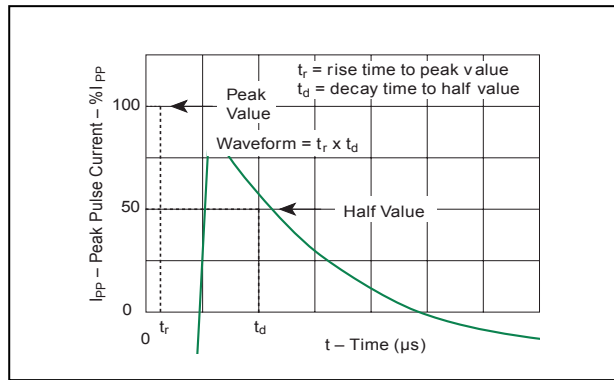
## Thermal Considerations

| 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               | -65 to +150 | °C   |
|                                                                                            | R <sub>θJA</sub> | Thermal Resistance: Junction to Ambient | 90          | °C/W |

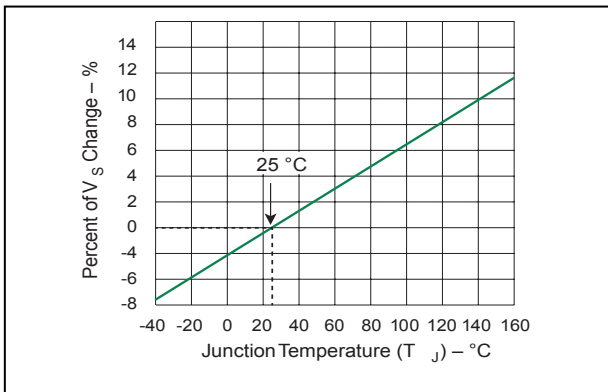
### V-I Characteristics



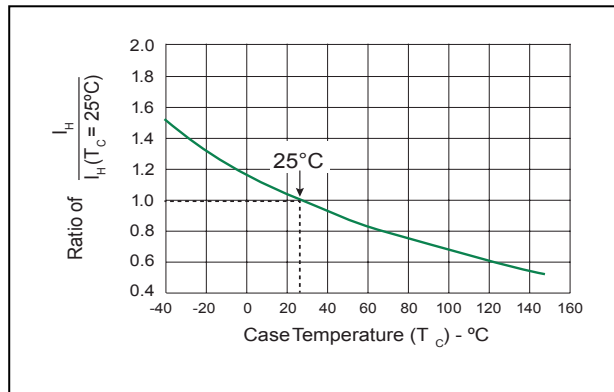
### t<sub>r</sub> x t<sub>d</sub> Pulse Waveform



### Normalized V<sub>S</sub> Change vs. Junction Temperature



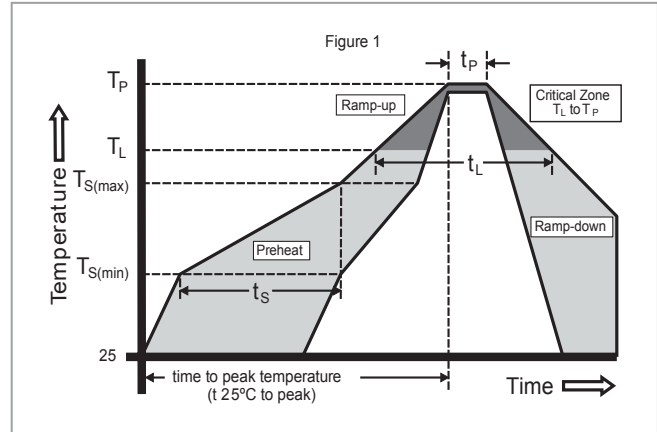
### Normalized DC Holding Current vs. Case Temperature



# Thyristor Surge Suppressors -PxxxxSX Series

## Soldering Parameters

|                                                        |                                    |                               |
|--------------------------------------------------------|------------------------------------|-------------------------------|
| Reflow Condition                                       |                                    | Pb-Free assembly (see Fig. 1) |
| Pre Heat                                               | - Temperature Min ( $T_{s(min)}$ ) | +150°C                        |
|                                                        | - Temperature Max ( $T_{s(max)}$ ) | +200°C                        |
|                                                        | - Time (Min to Max) ( $t_s$ )      | 60-180 secs.                  |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 3°C/sec. Max.                 |
| $T_{S(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 3°C/sec. Max.                 |
| Reflow                                                 | - Temperature ( $T_L$ ) (Liquidus) | +217°C                        |
|                                                        | - Temperature ( $t_L$ )            | 60-150 secs.                  |
| Peak Temp ( $T_p$ )                                    |                                    | +260(+0/-5)°C                 |
| Time within 5°C of actual Peak Temp ( $t_p$ )          |                                    | 30 secs. Max.                 |
| Ramp-down Rate                                         |                                    | 6°C/sec. Max.                 |
| Time 2.5°C to Peak Temp ( $T_p$ )                      |                                    | 8 min. Max.                   |
| Do not exceed                                          |                                    | +260°C                        |



## Physical Specifications

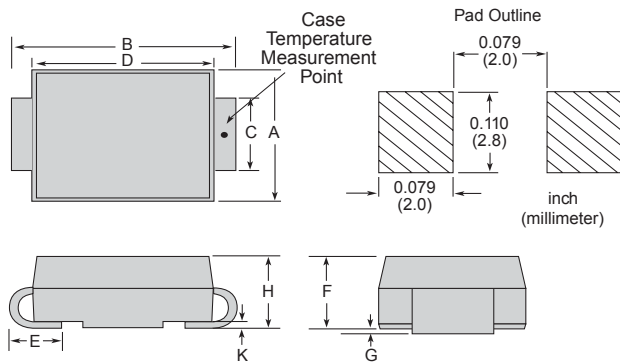
|                 |                                                               |
|-----------------|---------------------------------------------------------------|
| Lead Material   | Copper Alloy                                                  |
| Terminal Finish | 100% Matte-Tin Plated       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

## Environmental Specifications

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

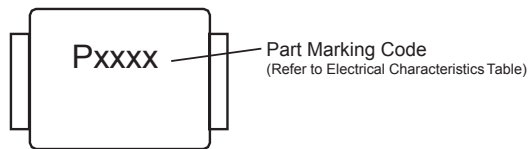
# Thyristor Surge Suppressors -PxxxxSX Series

## 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 | 0.75        | 1.60 |
| F          | 0.075  | 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 |

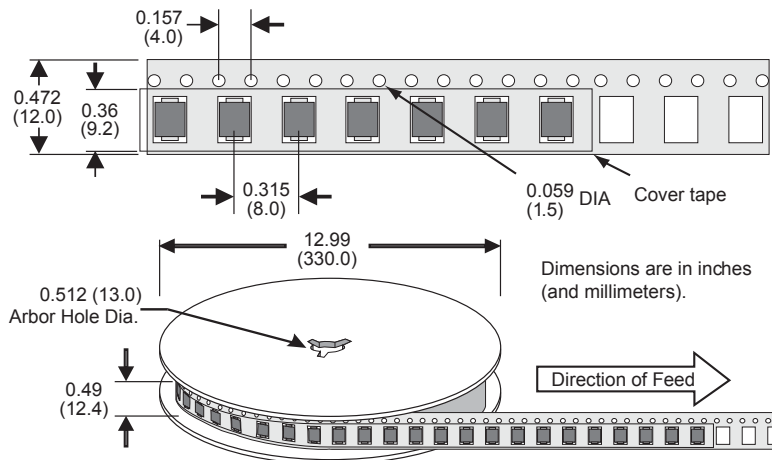
## Part Marking



## Packing Options

| Package Type | Description               | Quantity | Added Suffix | Industry Standard |
|--------------|---------------------------|----------|--------------|-------------------|
| S            | DO-214AA Tape & Reel Pack | 2500     | N/A          | EIA-481-D         |

## Tape and Reel Specification — DO-214AA



## RuiLongYuan Electronics Co., Ltd.

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