

Thyristor Surge Suppressors (TSS) Data Sheet

Description

DO-214AA Thyristor solid state protection thyristor protect telecommunications equipment such as modems, line cards, fax machines, and other CPE.

P Series devices are used to enable equipment to meet various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968 (formerly known as FCC Part 68).



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
- Meets MSL level 1, per J-STD-020

Electrical Parameters

| Parameter | Definition |
|-----------|---|
| V_{DRM} | Peak Off-state Voltage – maximum voltage that can be applied while maintaining off state |
| V_S | Switching Voltage – maximum voltage prior to switching to on state |
| V_T | On-state Voltage – maximum voltage measured at rated on-state current |
| I_{DRM} | Leakage Current – maximum peak off-state current measured at V_{DRM} |
| I_S | Switching Current – maximum current required to switch to on state |
| I_T | On-state Current – maximum rated continuous on-state current |
| I_H | Holding Current – typical current required to maintain on state |
| C_O | Off-state Capacitance – typical capacitance measured in off state |
| I_{PP} | Peak Pulse Current – maximum rated peak impulse current |

Electrical Characteristics

| Part Number | V_{DRM} (V) | V_S (V) | V_T (V) | I_{DRM} (μ A) | I_S (mA) | I_T (A) | I_H (mA) | C_O (pF) | Marking |
|-------------|---------------|-----------|-----------|----------------------|------------|-----------|------------|------------|---------|
| P0080SA | 6 | 25 | 4 | 5 | 800 | 2.2 | 50 | 50 | P008A |
| P0080SB | 6 | 25 | 4 | 5 | 800 | 2.2 | 50 | 70 | P008B |
| P0080SC | 6 | 25 | 4 | 5 | 800 | 2.2 | 50 | 100 | P008C |
| P0300SA | 25 | 40 | 4 | 5 | 800 | 2.2 | 50 | 70 | P03A |
| P0300SB | 25 | 40 | 4 | 5 | 800 | 2.2 | 50 | 70 | P03B |
| P0300SC | 25 | 40 | 4 | 5 | 800 | 2.2 | 50 | 100 | P03C |
| P0640SA | 58 | 77 | 4 | 5 | 800 | 2.2 | 150 | 50 | P06A |
| P0640SB | 58 | 77 | 4 | 5 | 800 | 2.2 | 150 | 60 | P06B |
| P0640SC | 58 | 77 | 4 | 5 | 800 | 2.2 | 150 | 100 | P06C |
| P0720SA | 65 | 88 | 4 | 5 | 800 | 2.2 | 150 | 50 | P07A |
| P0720SB | 65 | 88 | 4 | 5 | 800 | 2.2 | 150 | 60 | P07B |
| P0720SC | 65 | 88 | 4 | 5 | 800 | 2.2 | 150 | 100 | P07C |
| P0900SA | 75 | 98 | 4 | 5 | 800 | 2.2 | 150 | 45 | P09A |
| P0900SB | 75 | 98 | 4 | 5 | 800 | 2.2 | 150 | 55 | P09B |
| P0900SC | 75 | 98 | 4 | 5 | 800 | 2.2 | 150 | 90 | P09C |
| P1100SA | 90 | 130 | 4 | 5 | 800 | 2.2 | 150 | 45 | P11A |
| P1100SB | 90 | 130 | 4 | 5 | 800 | 2.2 | 150 | 55 | P11B |
| P1100SC | 90 | 130 | 4 | 5 | 800 | 2.2 | 150 | 90 | P11C |
| P1300SA | 120 | 160 | 4 | 5 | 800 | 2.2 | 150 | 45 | P13A |
| P1300SB | 120 | 160 | 4 | 5 | 800 | 2.2 | 150 | 55 | P13B |
| P1300SC | 120 | 160 | 4 | 5 | 800 | 2.2 | 150 | 90 | P13C |
| P1500SA | 140 | 180 | 4 | 5 | 800 | 2.2 | 150 | 40 | P15A |
| P1500SB | 140 | 180 | 4 | 5 | 800 | 2.2 | 150 | 60 | P15B |
| P1500SC | 140 | 180 | 4 | 5 | 800 | 2.2 | 150 | 85 | P15C |
| P1800SA | 170 | 220 | 4 | 5 | 800 | 2.2 | 150 | 40 | P18A |
| P1800SB | 170 | 220 | 4 | 5 | 800 | 2.2 | 150 | 60 | P18B |
| P1800SC | 170 | 220 | 4 | 5 | 800 | 2.2 | 150 | 85 | P18C |
| P2300SA | 190 | 260 | 4 | 5 | 800 | 2.2 | 150 | 35 | P23A |

| Part Number | V_{DRM} (V) | V_S (V) | V_T (V) | I_{DRM} (μ A) | I_S (mA) | I_T (A) | I_H (mA) | C_O (pF) | Marking |
|-------------|---------------|-----------|-----------|----------------------|------------|-----------|------------|------------|---------|
| P2300SB | 190 | 260 | 4 | 5 | 800 | 2.2 | 150 | 55 | P23B |
| P2300SC | 190 | 260 | 4 | 5 | 800 | 2.2 | 150 | 80 | P23C |
| P2600SA | 220 | 300 | 4 | 5 | 800 | 2.2 | 150 | 35 | P26A |
| P2600SB | 220 | 300 | 4 | 5 | 800 | 2.2 | 150 | 50 | P26B |
| P2600SC | 220 | 300 | 4 | 5 | 800 | 2.2 | 150 | 80 | P26C |
| P3100SA | 275 | 350 | 4 | 5 | 800 | 2.2 | 150 | 30 | P31A |
| P3100SB | 275 | 350 | 4 | 5 | 800 | 2.2 | 150 | 45 | P31B |
| P3100SC | 275 | 350 | 4 | 5 | 800 | 2.2 | 150 | 65 | P31C |
| P3500SA | 320 | 400 | 4 | 5 | 800 | 2.2 | 150 | 30 | P35A |
| P3500SB | 320 | 400 | 4 | 5 | 800 | 2.2 | 150 | 40 | P35B |
| P3500SC | 320 | 400 | 4 | 5 | 800 | 2.2 | 150 | 65 | P35C |


Notes:

- All measurements are made at an ambient temperature of 25°C. I_{PP} applies to -40°C through +85°C temperature range.
- Off-state capacitance(C_O) is measured at 1 MHz with a 2V bias and is typical value.
- For surge ratings, see table below.

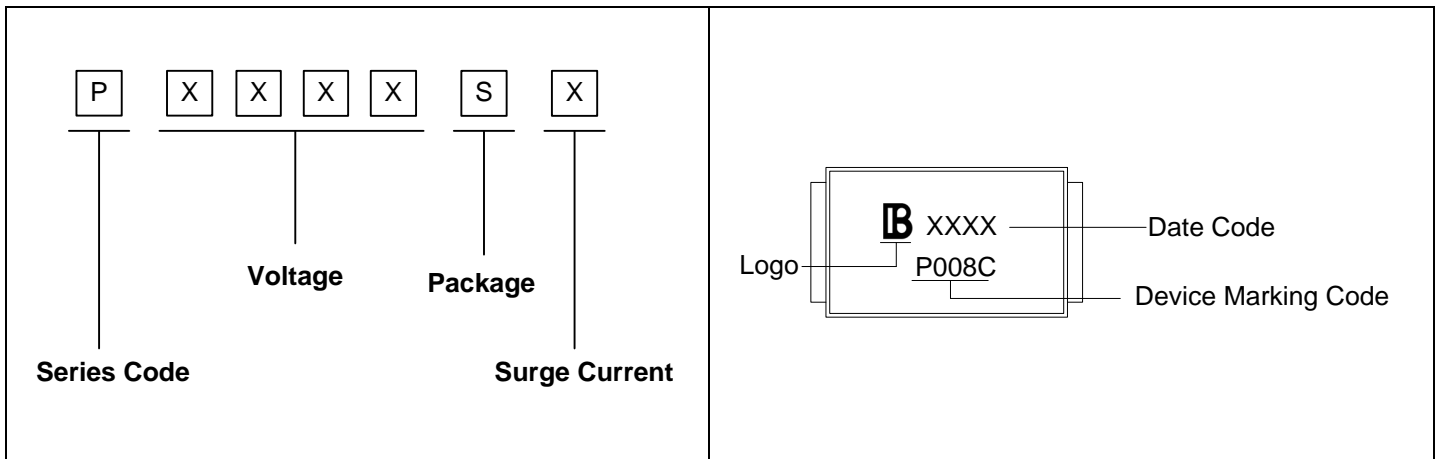
Surge Ratings

| Series | I_{PP} 2×10 μ s (A) | I_{PP} 8×20 μ s (A) | I_{PP} 10×160 μ s (A) | I_{PP} 10×560 μ s (A) | I_{PP} 10×1000 μ s (A) | V_{PP} 10×1000 μ s (V) | I_{TSM} 60Hz (A) | di/dt (A/ μ s) |
|--------|---------------------------------|---------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|--------------------------|-----------------------|
| A | 150 | 150 | 90 | 50 | 45 | 2000 | 20 | 500 |
| B | 250 | 250 | 150 | 100 | 80 | 4000 | 30 | 500 |
| C | 500 | 400 | 200 | 150 | 100 | 6000 | 50 | 500 |

Thermal Considerations

| Package DO-214AA/SMB | Symbol | Parameter | Value | Unit |
|---|-----------------|--|-------------|------|
|  | T_J | Operating Junction Temperature | -40 to +125 | °C |
| | T_S | Storage Temperature Range | -40 to +150 | °C |
| | $R_{\theta JA}$ | Junction to Ambient on printed circuit | 90 | °C/W |

Part Number Code and Marking



Characteristics Curves

Figure 1. V-I Characteristics

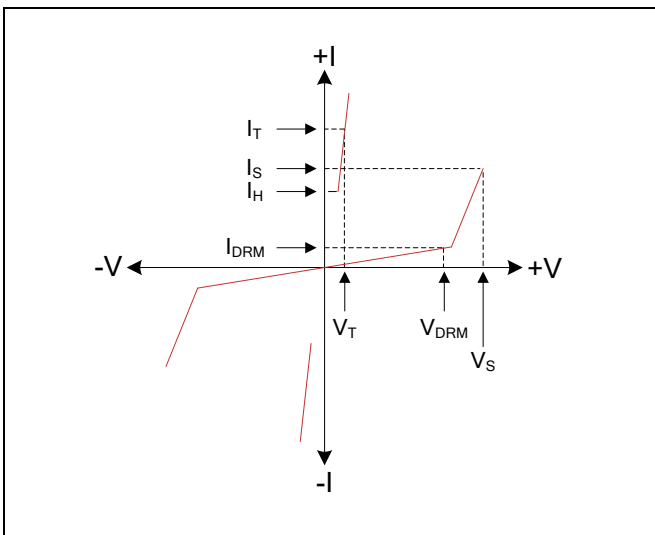


Figure 2. $t_r \times t_d$ Pulse Wave-form

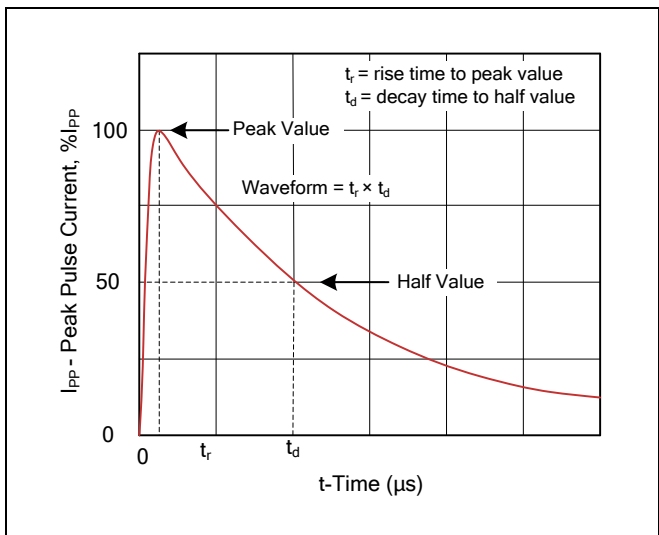


Figure 3. Normalized V_S Change versus Junction Temperature

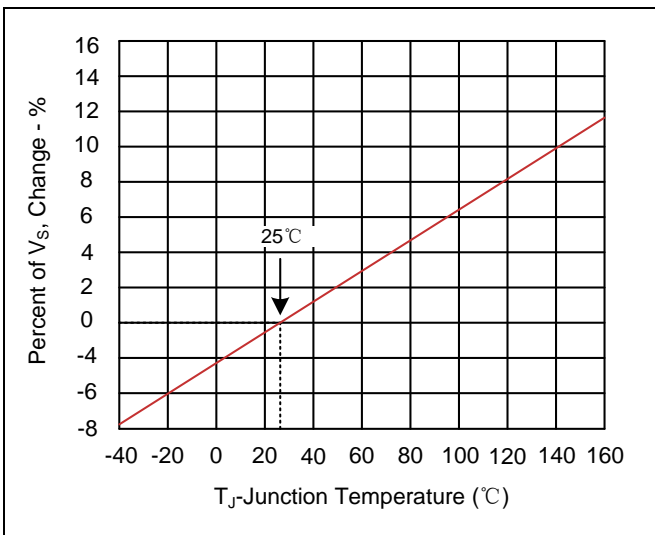
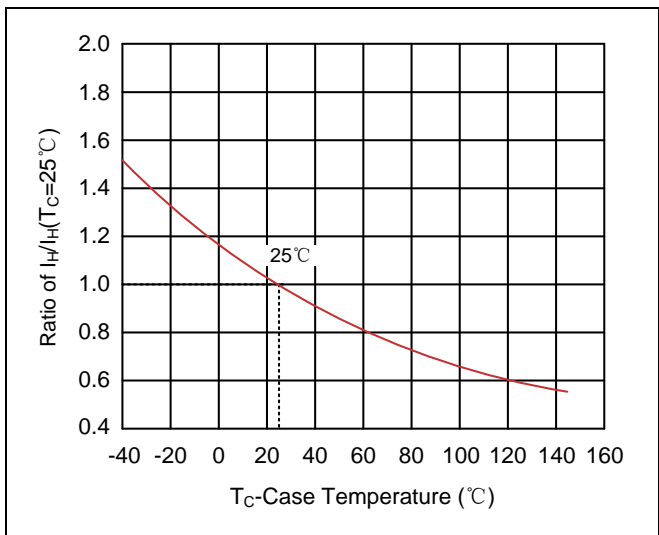
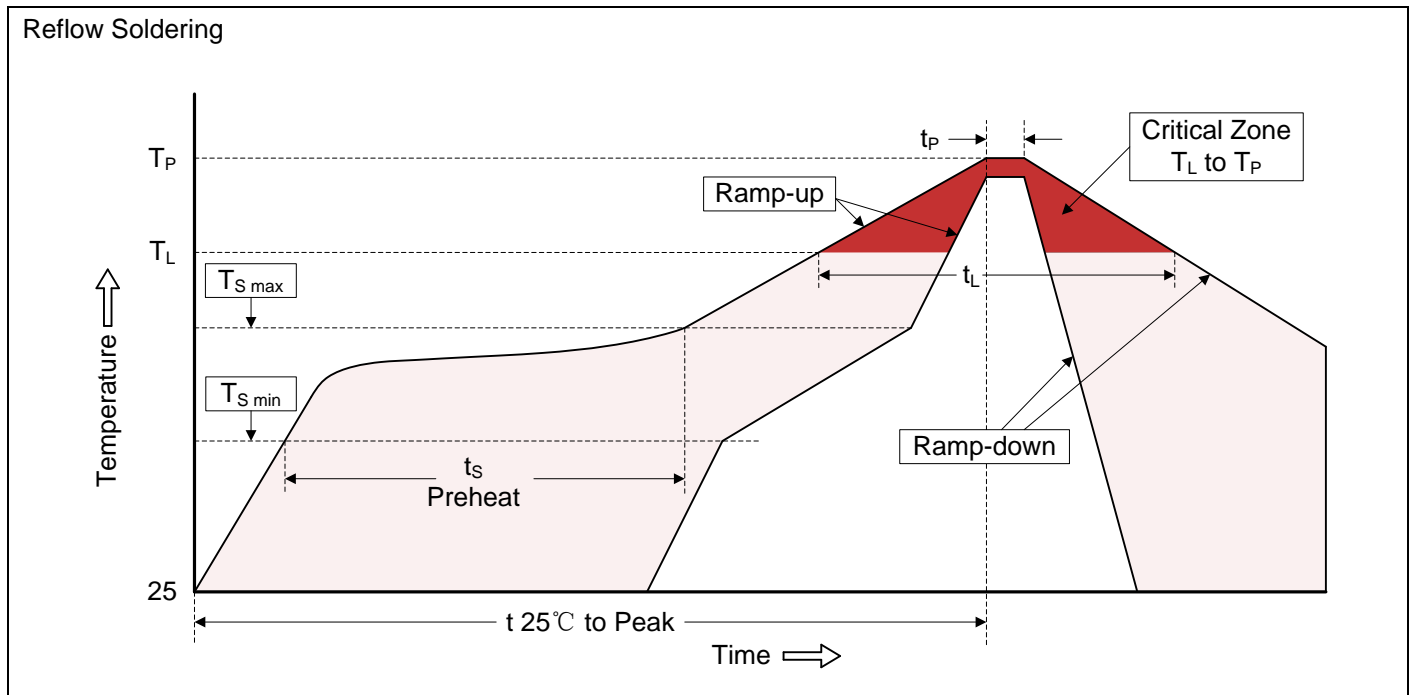


Figure 4. Normalized DC Holding Current versus Case Temperature



Recommended Soldering Conditions



Recommended Conditions

| Profile Feature | Pb-Free Assembly |
|--|------------------|
| Average ramp-up rate (T_L to T_P) | 3°C/second max. |
| Preheat | |
| -Temperature Min ($T_{S\ min}$) | 150°C |
| -Temperature Max ($T_{S\ max}$) | 200°C |
| -Time (min to max) (t_s) | 60-180 seconds |
| $T_{S\ max}$ to T_L | |
| -Ramp-up Rate | 3°C/second max. |
| Time maintained above: | |
| -Temperature (T_L) | 217°C |
| -Time (t_L) | 60-150 seconds |
| Peak Temperature (T_P) | 260°C |
| Time within 5°C of actual Peak Temperature (t_p) | 20-40 seconds |
| Ramp-down Rate | 6°C/second max. |
| Time 25°C to Peak Temperature | 8 minutes max. |

Dimensions (SMB/DO-214AA)

| | Symbol | Millimeters | | Inches | |
|---|--------|-------------|-------|--------|-------|
| | | Min. | Max. | Min. | Max. |
| | L | 4.06 | 4.70 | 0.160 | 0.185 |
| | D | 3.30 | 3.94 | 0.130 | 0.155 |
| | D1 | 1.90 | 2.20 | 0.075 | 0.086 |
| | T | 5.21 | 5.59 | 0.205 | 0.220 |
| | T1 | 0.76 | 1.52 | 0.030 | 0.060 |
| | d | - | 0.203 | - | 0.008 |
| H | 1.95 | 2.65 | 0.077 | 0.104 | |

Packaging

| <p>Tape</p> | Symbol | Dimension (mm) |
|------------------|---------------------------------------|----------------|
| | W | 12.00±0.30 |
| | P0 | 4.00±0.10 |
| | P1 | 8.00±0.10 |
| | P2 | 2.00±0.10 |
| | D0 | Φ1.55±0.05 |
| | D1 | Φ1.55±0.05 |
| | E | 1.75±0.10 |
| | F | 5.50±0.10 |
| | A0 | 3.76±0.10 |
| <p>13 " Reel</p> | B0 | 5.69±0.10 |
| | K0 | 2.70±0.10 |
| | T | 0.25±0.10 |
| | D2 | Φ330.0±2.0 |
| | D3 | Φ13.5±0.5 |
| | H | 2.5±0.5 |
| | W1 | 16.0±1.0 |
| | Quantity: 2500PCS P0080SB: 3000PCS | |

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