

TRANSIENT VOLTAGE SUPPRESSORS

DESCRIPTION

The P4SMA series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

FEATURES

- For surface mounted applications in order to optimize board space.
- Low profile package.
- Built-in strain relief.
- Glass passivated junction.
- Excellent clamping capability. SMA/DO-214AC
- Repetition Rate (duty cycle):0.01%.
- Fast response time: typically less than 1.0ps from 0 Volts to VBR for unidirectional types.
- Typical IR less than 1 μ A above 10V.
- High Temperature soldering: 260°C/10 seconds at terminals.
- Plastic package has Underwriters Laboratory Flammability 94V-O.



DO-214AC PACKAGE

MECHANICAL DATE

- Case: JEDEC DO214AC. Molded plastic over glass passivated junction.
- Terminal: Solder plated, solderable per MIL-STD-750, Method 2026.
- Polarity: Color band denoted positive end (cathode) except Bidirectional.
- Standard Packaging: 12mm tape (EIA STD RS-481).
- Weight: 0.002 ounce, 0.061 grams.

MAXIMUM RATINGS AND CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified.

| RATING | SYMBOL | VALUE | UNITS |
|---|-----------------------------------|-------------|-------|
| Peak Pulse Power Dissipation on 10/1000us waveform (Note1,Note2, Fig.1). | P _{PPM} | Minimum 400 | Watts |
| Peak Pulse Current of on 10/1000us waveform.(Note1,Fig.3) | I _{PPM} | See Table | Amps |
| Steady State Power Dissipation at T _L =75°C,Lead lengths.375", (9.5mm) (Note2,Fig.5). | P _{M(AV)} | 3.3 | Watts |
| Peak Forward Surge Current,8.3ms Single Half Sine-Wave Superimposed on Rated Load, (JEDEC Method) (Note 3,Fig.6). | I _{FSM} | 40 | Amps |
| Operating junction and Storage Temperature Range. | T _J , T _{STG} | -65 to +150 | °C |

Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above °TA = 25 C per Fig. 2.
2. Mounted on 5.0mm x 5.0mm (0.03mm thick) Copper Pads to each terminal.
3. 8.3ms single half sine-wave, or equivalent square wave, Duty cycle=4 pulses per minutes maximum.

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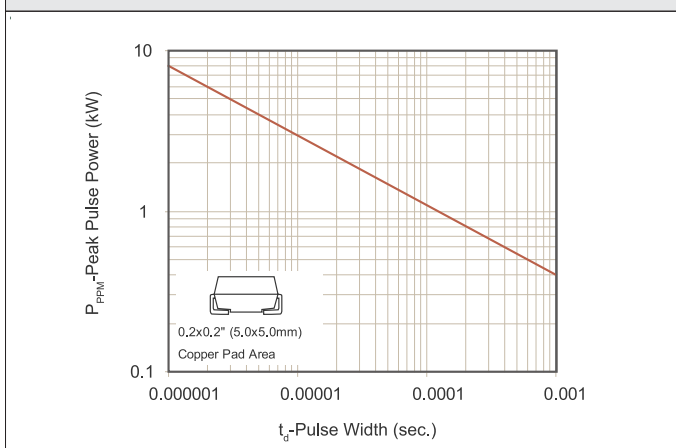
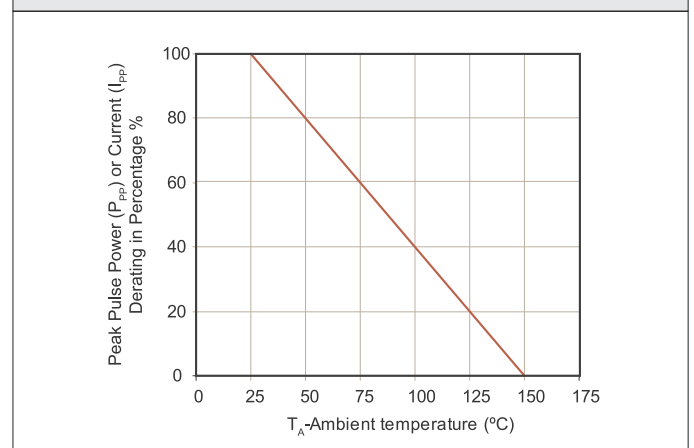
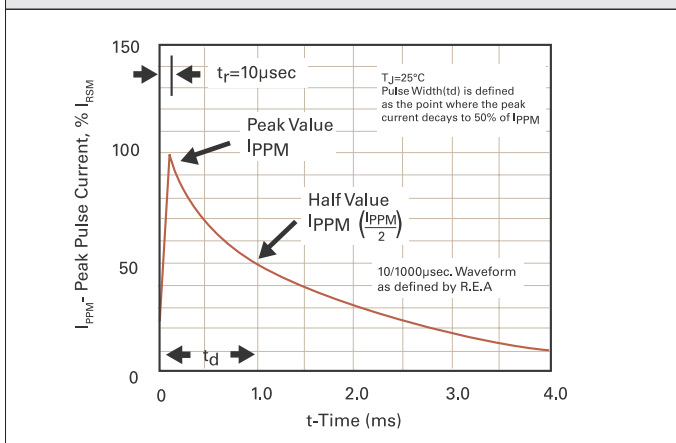
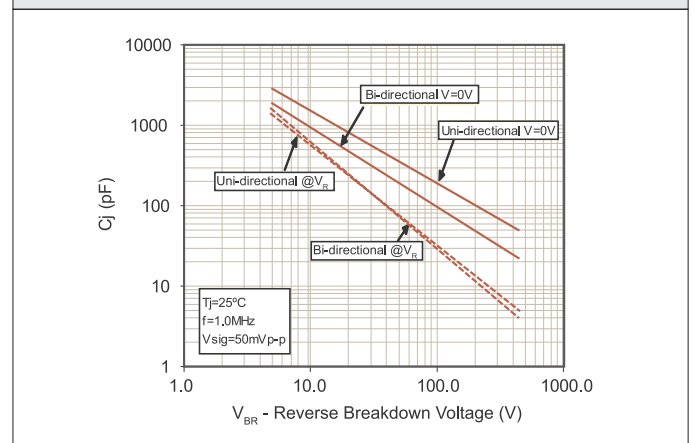
ELECTRICAL CHARACTERISTICS

| Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @I _T | Breakdown Voltage @I _r | Test Current | Maximum Clamping Voltage @I _{PP} | Peak Pulse Current |
|-------------|------------|---------------------|------|---------------------------|-----------------------------------|-----------------------------------|---------------------|---|---------------------|
| UNI-POLAR | BI-POLAR | UNI | BI | V _{RWM} (V) | V _{BR MIN.} (V) | V _{BR MAX.} (V) | I _T (mA) | V _C (V) | I _{PP} (A) |
| P4SMA6.8A | P4SMA6.8CA | 6V8A | 6V8C | 5.80 | 6.45 | 7.14 | 10 | 10.5 | 39.0 |
| P4SMA7.5A | P4SMA7.5CA | 7V5A | 7V5C | 6.40 | 7.13 | 7.88 | 10 | 11.3 | 36.3 |
| P4SMA8.2A | P4SMA8.2CA | 8V2A | 8V2C | 7.02 | 7.79 | 8.61 | 10 | 12.1 | 33.9 |
| P4SMA9.1A | P4SMA9.1CA | 9V1A | 9V1C | 7.78 | 8.65 | 9.55 | 1 | 13.4 | 30.6 |
| P4SMA10A | P4SMA10CA | 10A | 10C | 8.55 | 9.50 | 10.50 | 1 | 14.5 | 28.3 |
| P4SMA11A | P4SMA11CA | 11A | 11C | 9.40 | 10.50 | 11.60 | 1 | 15.6 | 26.3 |
| P4SMA12A | P4SMA12CA | 12A | 12C | 10.20 | 11.40 | 12.60 | 1 | 16.7 | 24.6 |
| P4SMA13A | P4SMA13CA | 13A | 13C | 11.10 | 12.40 | 13.70 | 1 | 18.2 | 22.5 |
| P4SMA15A | P4SMA15CA | 15A | 15C | 12.80 | 14.30 | 15.80 | 1 | 21.2 | 19.3 |
| P4SMA16A | P4SMA16CA | 16A | 16C | 13.60 | 15.20 | 16.80 | 1 | 22.5 | 18.2 |
| P4SMA18A | P4SMA18CA | 18A | 18C | 15.30 | 17.10 | 18.90 | 1 | 25.5 | 16.1 |
| P4SMA20A | P4SMA20CA | 20A | 20C | 17.10 | 19.00 | 21.00 | 1 | 27.7 | 14.8 |
| P4SMA22A | P4SMA22CA | 22A | 22C | 18.80 | 20.90 | 23.10 | 1 | 30.6 | 13.4 |
| P4SMA24A | P4SMA24CA | 24A | 24C | 20.50 | 22.80 | 25.20 | 1 | 33.2 | 12.3 |
| P4SMA27A | P4SMA27CA | 27A | 27C | 23.10 | 25.70 | 28.40 | 1 | 37.5 | 10.9 |
| P4SMA30A | P4SMA30CA | 30A | 30C | 25.60 | 28.50 | 31.50 | 1 | 41.4 | 9.9 |
| P4SMA33A | P4SMA33CA | 33A | 33C | 28.20 | 31.40 | 34.70 | 1 | 45.7 | 9.0 |
| P4SMA36A | P4SMA36CA | 36A | 36C | 30.80 | 34.20 | 37.80 | 1 | 49.9 | 8.2 |
| P4SMA39A | P4SMA39CA | 39A | 39C | 33.30 | 37.10 | 41.00 | 1 | 53.9 | 7.6 |
| P4SMA43A | P4SMA43CA | 43A | 43C | 36.80 | 40.90 | 45.20 | 1 | 59.3 | 6.9 |
| P4SMA47A | P4SMA47CA | 47A | 47C | 40.20 | 44.70 | 49.40 | 1 | 64.8 | 6.3 |
| P4SMA51A | P4SMA51CA | 51A | 51C | 43.60 | 48.50 | 53.60 | 1 | 70.1 | 5.8 |
| P4SMA56A | P4SMA56CA | 56A | 56C | 47.80 | 53.20 | 58.80 | 1 | 77.0 | 5.3 |
| P4SMA62A | P4SMA62CA | 62A | 62C | 53.00 | 58.90 | 65.10 | 1 | 85.0 | 4.8 |
| P4SMA68A | P4SMA68CA | 68A | 68C | 58.10 | 64.60 | 71.40 | 1 | 92.0 | 4.5 |
| P4SMA75A | P4SMA75CA | 75A | 75C | 64.10 | 71.30 | 78.80 | 1 | 103.0 | 4.0 |
| P4SMA82A | P4SMA82CA | 82A | 82C | 70.10 | 77.90 | 86.10 | 1 | 113.0 | 3.6 |
| P4SMA91A | P4SMA91CA | 91A | 91C | 77.80 | 86.50 | 95.50 | 1 | 125.0 | 3.3 |
| P4SMA100A | P4SMA100CA | 100A | 100C | 85.50 | 95.00 | 105.00 | 1 | 137.0 | 3.0 |
| P4SMA110A | P4SMA110CA | 110A | 110C | 94.00 | 105.00 | 116.00 | 1 | 152.0 | 2.7 |
| P4SMA120A | P4SMA120CA | 120A | 120C | 102.00 | 114.00 | 126.00 | 1 | 165.0 | 2.5 |
| P4SMA130A | P4SMA130CA | 130A | 130C | 111.00 | 124.00 | 137.00 | 1 | 179.0 | 2.3 |
| P4SMA150A | P4SMA150CA | 150A | 150C | 128.00 | 143.00 | 158.00 | 1 | 207.0 | 2.0 |
| P4SMA160A | P4SMA160CA | 160A | 160C | 136.00 | 152.00 | 168.00 | 1 | 219.0 | 1.9 |
| P4SMA170A | P4SMA170CA | 170A | 170C | 145.00 | 162.00 | 179.00 | 1 | 234.0 | 1.8 |
| P4SMA180A | P4SMA180CA | 180A | 180C | 154.00 | 171.00 | 189.00 | 1 | 246.0 | 1.7 |
| P4SMA200A | P4SMA200CA | 200A | 200C | 171.00 | 190.00 | 210.00 | 1 | 274.0 | 1.5 |
| P4SMA220A | P4SMA220CA | 220A | 220C | 185.00 | 209.00 | 231.00 | 1 | 328.0 | 1.3 |
| P4SMA250A | P4SMA250CA | 250A | 250C | 214.00 | 237.00 | 263.00 | 1 | 344.0 | 1.2 |
| P4SMA300A | P4SMA300CA | 300A | 300C | 256.00 | 285.00 | 315.00 | 1 | 414.0 | 1.0 |

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ELECTRICAL CHARACTERISTICS

| Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @I _T | Breakdown Voltage @I _T | Test Current | Maximum Clamping Voltage @I _{PP} |
|-------------|------------|---------------------|------|---------------------------|-----------------------------------|-----------------------------------|---------------------|---|
| UNI-POLAR | BI-POLAR | UNI | BI | V _{RWM} (V) | V _{BR} MIN.(V) | V _{BR} MAX.(V) | I _T (mA) | V _C (V) |
| P4SMA350A | P4SMA350CA | 350A | 350C | 300 | 332.0 | 368.0 | 1 | 482 |
| P4SMA400A | P4SMA400CA | 400A | 400C | 342 | 380.0 | 420.0 | 1 | 548 |
| P4SMA440A | P4SMA440CA | 440A | 440C | 376 | 418.0 | 462.0 | 1 | 602 |
| P4SMA480A | P4SMA480CA | 480A | 480C | 408 | 456.0 | 504.0 | 1 | 658 |
| P4SMA510A | P4SMA510CA | 510A | 510C | 434 | 485.0 | 535.0 | 1 | 698 |
| P4SMA530A | P4SMA530CA | 530A | 530C | 477 | 503.5 | 556.5 | 1 | 725 |
| P4SMA540A | P4SMA540CA | 540A | 540C | 486 | 513.0 | 567.0 | 1 | 740 |

Notes: For bidirectional type having V_{RWM} of 10 volts and less, the I_R limit is double.

RATINGS AND CHARACTERISTIC CURVES (T_A=25°C unless otherwise noted)
Figure 1 - Peak Pulse Power Rating Curve

Figure 2 - Pulse Derating Curve

Figure 3 - Pulse Waveform

Figure 4 - Typical Junction Capacitance


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Figure 5 - Steady State Power Dissipation Derating Curve

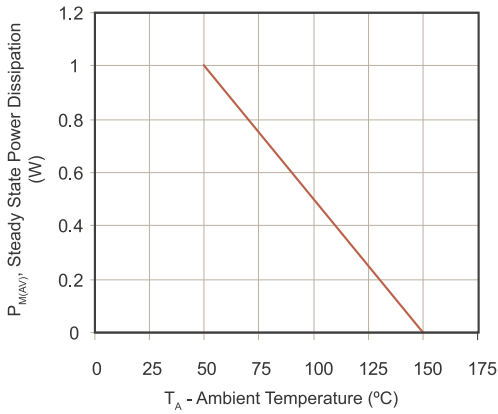
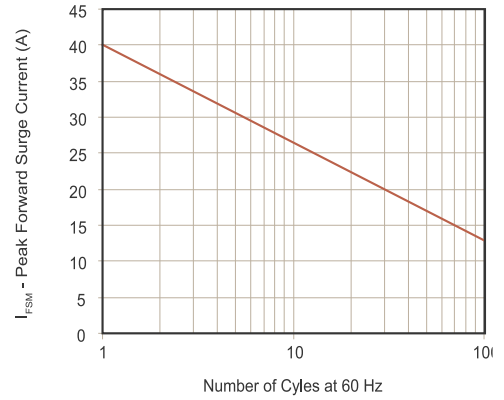
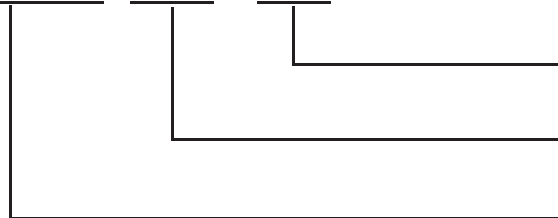


Figure 6 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



PART NUMBERING SYSTEM

P4SMA 6.8 CA



Suffix

A = 5 % Tolerance Unidirectional Device
 CA = 5 % Tolerance Bidirectional Device

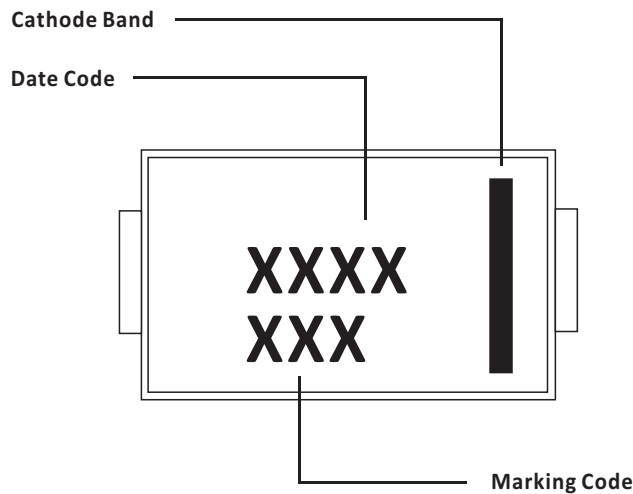
Working Peak Reverse Voltage

6.8 = 6.8 VRWM (Volts)

Package

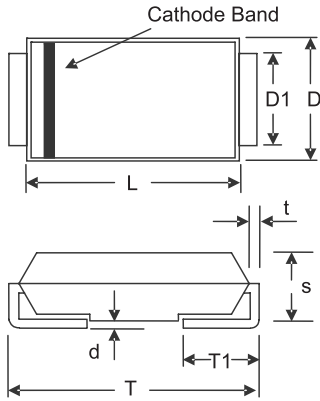
P4SMA = SMA/DO-214AC

PART MARKING SYSTEM



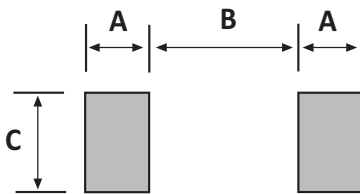
TRANSIENT VOLTAGE SUPPRESSORS

DIMENSIONS



SMA/DO-214AC

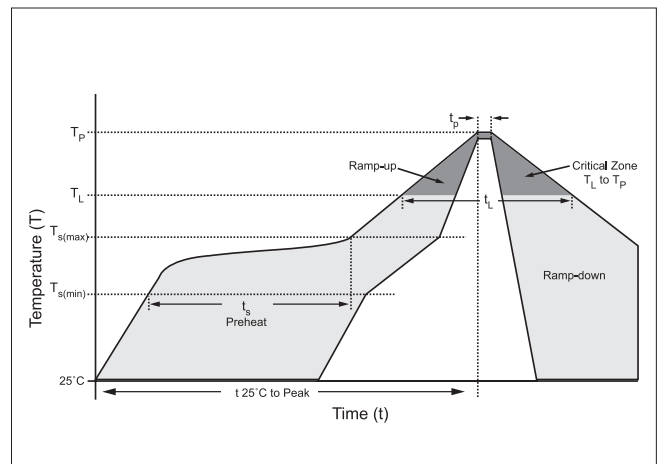
| Item | Millimeters | | Inches | |
|------|-------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| L | 3.99 | 4.5 | 0.157 | 0.177 |
| D | 2.54 | 2.79 | 0.1 | 0.11 |
| D1 | 1.25 | 1.65 | 0.049 | 0.065 |
| T | 4.93 | 5.28 | 0.194 | 0.208 |
| T1 | 0.78 | 1.52 | 0.03 | 0.06 |
| d | - | 0.203 | - | 0.008 |
| s | 1.98 | 2.29 | 0.078 | 0.09 |
| t | 0.152 | 0.305 | 0.006 | 0.012 |



| Item | Millimeters | | Inchs | |
|------|-------------|-------|-------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.082 | - | 2.100 | - |
| B | - | 0.090 | - | 2.300 |
| C | 0.070 | - | 1.800 | - |

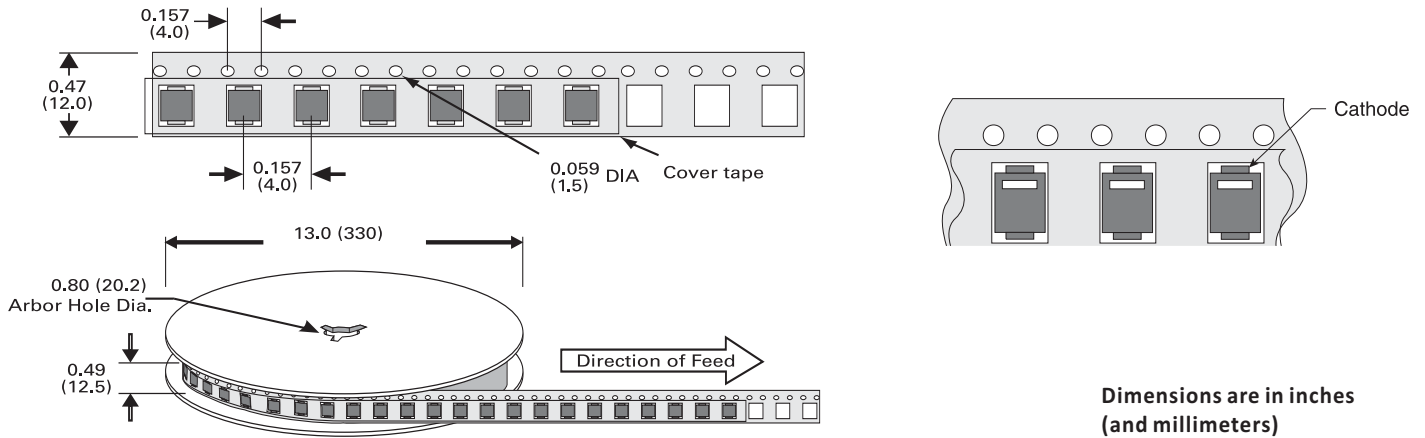
SOLDERING PARAMETERS

| Reflow Condition | | Lead-free assembly |
|--|----------------------------------|-------------------------|
| 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/second max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/second max |
| Reflow | Temperature (T_L) (Liquidus) | 217°C |
| | Time (min to max) (t_s) | 60 – 150 seconds |
| Peak Temperature (T_p) | | 260 ^{+0/-5} °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 (T_p) | | 8 minutes Max. |
| Do not exceed | | 280°C |



TRANSIENT VOLTAGE SUPPRESSORS

TAPE AND REEL SPECIFICATION



ORDERING INFORMATION

| PART NUMBER | COMPONENT PACKAGE | QTY/REEL | REEL SIZE |
|------------------|-------------------|----------|-----------|
| P4SMAxxxA/CA-T13 | DO-214AC | 5000 | 13" |
| P4SMAxxxA/CA-T7 | DO-214AC | 2000 | 7" |

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