

## 400W, 6.8V - 200V Surface Mount Transient Voltage Suppressor

### FEATURES

- AEC-Q101 qualified
- Ideal for automated placement
- Glass passivated chip junction
- Excellent clamping capability
- Fast response time: Typically less than 1.0ps
- Typical  $I_R$  less than  $1\mu A$  above 10V
- Meets ISO 7637-2 (Pulse 1/2a/2b/3a/3b)
- Moisture sensitivity level: level 1, per J-STD-020
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

| KEY PARAMETERS                             |                |      |
|--|----------------|------|
| PARAMETER                                  | VALUE          | UNIT |
| $V_{WM}$                                   | 5.5 - 171      | V    |
| $V_{BR}$                                   | 6.12 - 210     | V    |
| $P_{PPM}$<br>$t_p = 10/1000\mu s$ waveform | 400            | W    |
| $T_{J MAX}$                                | 150            | °C   |
| Package                                    | DO-214AC (SMA) |      |
| Configuration                              | Single die     |      |



### APPLICATIONS

- Switching mode power supply (SMPS)
- Adapters
- Lighting application
- On-board DC/DC converter

### MECHANICAL DATA

- Case: DO-214AC (SMA)
- Molding compound meets UL 94V-0 flammability rating
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.060g (approximately)



DO-214AC (SMA)

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ unless otherwise noted)

| PARAMETER  | SYMBOL    | VALUE       | UNIT |
|--|-----------|-------------|------|
| Peak power dissipation at $T_A = 25^\circ C$ , $t_p = 1ms$ (Note 1)                | $P_{PK}$  | 400         | W    |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load | $I_{FSM}$ | 40          | A    |
| Maximum instantaneous forward voltage at 25A for unidirectional only               | $V_F$     | 3.5         | V    |
| Operating junction temperature range   | $T_J$     | -55 to +150 | °C   |
| Storage temperature range  | $T_{STG}$ | -55 to +150 | °C   |

#### Notes:

1. Non-repetitive current pulse per Fig.5 and derated above  $T_A = 25^\circ C$  per Fig.2

#### Devices for Bipolar Applications

1. For bidirectional use CH or CAH suffix for types P4SMA6.8H - types P4SMA200AH
2. Electrical characteristics apply in both directions

## ELECTRICAL SPECIFICATIONS (T<sub>A</sub> = 25°C unless otherwise noted)

| Part number | Marking code | Breakdown voltage<br>V <sub>BR</sub> @I <sub>T</sub> <sup>(1)</sup><br>(V) |       | Test current<br>I <sub>T</sub><br>(mA) | Working stand-off voltage<br>V <sub>WM</sub><br>(V) | Maximum reverse leakage current<br>I <sub>R</sub> @V <sub>WM</sub> <sup>(1)</sup><br>(μA) | Maximum peak impulse current<br>I <sub>PPM</sub> (A)<br>t <sub>p</sub> = 10/1000 μs | Maximum clamping voltage<br>V <sub>C</sub> @I <sub>PPM</sub> (V)<br>t <sub>p</sub> = 10/1000 μs | Maximum Temperature Coefficient<br>of V <sub>BR</sub><br>(%/°C) |
|-------------|--------------|--|-------|--|---|---|---|---|---|
|             |              | Min  | Max   |  |   |   |   |   |   |
| P4SMA6.8H   | ADJ          | 6.12   | 7.48  | 10                                     | 5.50  | 1000  | 38.0  | 10.8  | 0.057   |
| P4SMA6.8AH  | AEJ          | 6.46   | 7.14  | 10                                     | 5.80  | 1000  | 40.0  | 10.5  | 0.057   |
| P4SMA7.5H   | AFJ          | 6.75   | 8.25  | 10                                     | 6.05  | 500   | 35.0  | 11.7  | 0.061   |
| P4SMA7.5AH  | AGJ          | 7.13   | 7.88  | 10                                     | 6.40  | 500   | 37.0  | 11.3  | 0.061   |
| P4SMA8.2H   | AHJ          | 7.38   | 9.02  | 10                                     | 6.63  | 200   | 33.0  | 12.5  | 0.065   |
| P4SMA8.2AH  | AKJ          | 7.79   | 8.61  | 10                                     | 7.02  | 200   | 34.0  | 12.1  | 0.065   |
| P4SMA9.1H   | ALJ          | 8.19   | 10.00 | 1.0                                    | 7.37  | 50  | 30.0  | 13.8  | 0.068   |
| P4SMA9.1AH  | AMJ          | 8.65   | 9.55  | 1.0                                    | 7.78  | 50  | 31.0  | 13.4  | 0.068   |
| P4SMA10H    | ANJ          | 9.00   | 11.00 | 1.0                                    | 8.10  | 10  | 28.0  | 15.0  | 0.073   |
| P4SMA10AH   | APJ          | 9.50   | 10.50 | 1.0                                    | 8.55  | 10  | 29.0  | 14.5  | 0.073   |
| P4SMA11H    | AQJ          | 9.90   | 12.10 | 1.0                                    | 8.92  | 1   | 26.0  | 16.2  | 0.075   |
| P4SMA11AH   | ARJ          | 10.50  | 11.60 | 1.0                                    | 9.40  | 1   | 27.0  | 15.6  | 0.075   |
| P4SMA12H    | ASJ          | 10.80  | 13.20 | 1.0                                    | 9.72  | 1   | 24.0  | 17.3  | 0.078   |
| P4SMA12AH   | ATJ          | 11.40  | 12.60 | 1.0                                    | 10.2  | 1   | 25.0  | 16.7  | 0.078   |
| P4SMA13H    | AUJ          | 11.70  | 14.30 | 1.0                                    | 10.5  | 1   | 22.0  | 19.0  | 0.081   |
| P4SMA13AH   | AVJ          | 12.40  | 13.70 | 1.0                                    | 11.1  | 1   | 23.0  | 18.2  | 0.081   |
| P4SMA15H    | AWJ          | 13.50  | 16.50 | 1.0                                    | 12.1  | 1   | 19.0  | 22.0  | 0.084   |
| P4SMA15AH   | AXJ          | 14.30  | 15.80 | 1.0                                    | 12.8  | 1   | 20.0  | 21.2  | 0.084   |
| P4SMA16H    | AYJ          | 14.40  | 17.60 | 1.0                                    | 12.9  | 1   | 17.8  | 23.5  | 0.086   |
| P4SMA16AH   | AZJ          | 15.20  | 16.80 | 1.0                                    | 13.6  | 1   | 18.6  | 22.5  | 0.086   |
| P4SMA18H    | BDJ          | 16.20  | 19.80 | 1.0                                    | 14.5  | 1   | 16.0  | 26.5  | 0.088   |
| P4SMA18AH   | BEJ          | 17.10  | 18.90 | 1.0                                    | 15.3  | 1   | 16.5  | 25.5  | 0.088   |
| P4SMA20H    | BFJ          | 18.00  | 22.00 | 1.0                                    | 16.2  | 1   | 14.0  | 29.1  | 0.090   |
| P4SMA20AH   | BGJ          | 19.00  | 21.00 | 1.0                                    | 17.1  | 1   | 15.0  | 27.7  | 0.090   |
| P4SMA22H    | BHJ          | 19.80  | 24.20 | 1.0                                    | 17.8  | 1   | 13.0  | 31.9  | 0.092   |
| P4SMA22AH   | BKJ          | 20.90  | 23.10 | 1.0                                    | 18.8  | 1   | 13.7  | 30.6  | 0.092   |
| P4SMA24H    | BLJ          | 21.60  | 26.40 | 1.0                                    | 19.4  | 1   | 12.0  | 34.7  | 0.094   |
| P4SMA24AH   | BMJ          | 22.80  | 25.20 | 1.0                                    | 20.5  | 1   | 12.6  | 33.2  | 0.094   |
| P4SMA27H    | BNJ          | 24.30  | 29.70 | 1.0                                    | 21.8  | 1   | 10.7  | 39.1  | 0.096   |
| P4SMA27AH   | BPJ          | 25.70  | 28.40 | 1.0                                    | 23.1  | 1   | 11.0  | 37.5  | 0.096   |
| P4SMA30H    | BQJ          | 27.00  | 33.00 | 1.0                                    | 24.3  | 1   | 9.6   | 43.5  | 0.097   |
| P4SMA30AH   | BRJ          | 28.50  | 31.50 | 1.0                                    | 25.6  | 1   | 10.0  | 41.4  | 0.097   |
| P4SMA33H    | BSJ          | 29.70  | 36.30 | 1.0                                    | 26.8  | 1   | 8.8   | 47.7  | 0.098   |
| P4SMA33AH   | BTJ          | 31.40  | 34.70 | 1.0                                    | 28.2  | 1   | 9.0   | 45.7  | 0.098   |
| P4SMA36H    | BUJ          | 32.40  | 39.60 | 1.0                                    | 29.1  | 1   | 8.0   | 52.0  | 0.099   |
| P4SMA36AH   | BVJ          | 34.20  | 37.80 | 1.0                                    | 30.8  | 1   | 8.4   | 49.9  | 0.099   |
| P4SMA39H    | BWJ          | 35.10  | 42.90 | 1.0                                    | 31.6  | 1   | 7.4   | 56.4  | 0.100   |
| P4SMA39AH   | BXJ          | 37.10  | 41.00 | 1.0                                    | 33.3  | 1   | 7.7   | 53.9  | 0.100   |
| P4SMA43H    | BYJ          | 38.70  | 47.30 | 1.0                                    | 34.8  | 1   | 6.7   | 61.9  | 0.101   |
| P4SMA43AH   | BZJ          | 40.90  | 45.20 | 1.0                                    | 36.8  | 1   | 7.0   | 59.3  | 0.101   |
| P4SMA47H    | CDJ          | 42.30  | 51.70 | 1.0                                    | 38.1  | 1   | 6.2   | 67.8  | 0.101   |
| P4SMA47AH   | CEJ          | 44.70  | 49.40 | 1.0                                    | 40.2  | 1   | 6.4   | 64.8  | 0.101   |
| P4SMA51H    | CFJ          | 45.90  | 56.10 | 1.0                                    | 41.3  | 1   | 5.7   | 73.5  | 0.102   |
| P4SMA51AH   | CGJ          | 48.50  | 53.60 | 1.0                                    | 43.6  | 1   | 6.0   | 70.1  | 0.102   |
| P4SMA56H    | CHJ          | 50.40  | 61.60 | 1.0                                    | 45.4  | 1   | 5.2   | 80.5  | 0.103   |
| P4SMA56AH   | CKJ          | 53.20  | 58.80 | 1.0                                    | 47.8  | 1   | 5.4   | 77.0  | 0.103   |
| P4SMA62H    | CLJ          | 55.8   | 68.2  | 1.0                                    | 50.2  | 1   | 4.7   | 89.0  | 0.104   |
| P4SMA62AH   | CMJ          | 58.9   | 65.1  | 1.0                                    | 53.0  | 1   | 5.0   | 85.0  | 0.104   |

## ELECTRICAL SPECIFICATIONS (T<sub>A</sub> = 25°C unless otherwise noted)

| Part number | Marking code | Breakdown voltage<br>V <sub>BR</sub> @I <sub>T</sub> <sup>(1)</sup><br>(V) |      | Test current<br>I <sub>T</sub><br>(mA) | Working stand-off voltage<br>V <sub>WM</sub><br>(V) | Maximum reverse leakage current<br>I <sub>R</sub> @V <sub>WM</sub> <sup>(1)</sup><br>(μA) | Maximum peak impulse current<br>I <sub>PPM</sub> (A)<br>t <sub>p</sub> = 10/1000 μs | Maximum clamping voltage<br>V <sub>C</sub> @I <sub>PPM</sub> (V)<br>t <sub>p</sub> = 10/1000 μs | Maximum Temperature Coefficient<br>of V <sub>BR</sub><br>(%/°C) |
|-------------|--------------|--|------|--|---|---|---|---|---|
|             |              | Min  | Max  |  |   |   |   |   |   |
| P4SMA68H    | CNJ          | 61.2   | 74.8 | 1.0                                    | 55.1  | 1   | 4.2   | 98.0  | 0.104   |
| P4SMA68AH   | CPJ          | 64.6   | 71.4 | 1.0                                    | 58.1  | 1   | 4.5   | 92.0  | 0.104   |
| P4SMA75H    | CQJ          | 67.5   | 82.5 | 1.0                                    | 60.7  | 1   | 3.8   | 108   | 0.105   |
| P4SMA75AH   | CRJ          | 71.3   | 78.8 | 1.0                                    | 64.1  | 1   | 4.0   | 103   | 0.105   |
| P4SMA82H    | CSJ          | 73.8   | 90.2 | 1.0                                    | 66.4  | 1   | 3.5   | 118   | 0.105   |
| P4SMA82AH   | CTJ          | 77.9   | 86.1 | 1.0                                    | 70.1  | 1   | 3.7   | 113   | 0.105   |
| P4SMA91H    | CUJ          | 81.9   | 100  | 1.0                                    | 73.7  | 1   | 3.2   | 131   | 0.106   |
| P4SMA91AH   | CVJ          | 86.5   | 95.5 | 1.0                                    | 77.8  | 1   | 3.3   | 125   | 0.106   |
| P4SMA100H   | CWJ          | 90   | 110  | 1.0                                    | 81.0  | 1   | 2.9   | 144   | 0.106   |
| P4SMA100AH  | CXJ          | 95   | 105  | 1.0                                    | 85.5  | 1   | 3.0   | 137   | 0.106   |
| P4SMA110H   | CYJ          | 99   | 121  | 1.0                                    | 89.2  | 1   | 2.6   | 158   | 0.107   |
| P4SMA110AH  | CZJ          | 105  | 116  | 1.0                                    | 94.0  | 1   | 2.7   | 152   | 0.107   |
| P4SMA120H   | RDJ          | 108  | 132  | 1.0                                    | 97.2  | 1   | 2.4   | 173   | 0.107   |
| P4SMA120AH  | REJ          | 114  | 126  | 1.0                                    | 102   | 1   | 2.5   | 165   | 0.107   |
| P4SMA130H   | RFJ          | 117  | 143  | 1.0                                    | 105   | 1   | 2.2   | 187   | 0.107   |
| P4SMA130AH  | RGJ          | 124  | 137  | 1.0                                    | 111   | 1   | 2.3   | 179   | 0.107   |
| P4SMA150H   | RHJ          | 135  | 165  | 1.0                                    | 121   | 1   | 1.9   | 215   | 0.108   |
| P4SMA150AH  | RKJ          | 143  | 158  | 1.0                                    | 128   | 1   | 2.0   | 207   | 0.108   |
| P4SMA160H   | RLJ          | 144  | 176  | 1.0                                    | 130   | 1   | 1.8   | 230   | 0.108   |
| P4SMA160AH  | RMJ          | 152  | 168  | 1.0                                    | 136   | 1   | 1.9   | 219   | 0.108   |
| P4SMA170H   | RNJ          | 153  | 187  | 1.0                                    | 138   | 1   | 1.7   | 244   | 0.108   |
| P4SMA170AH  | RPJ          | 162  | 179  | 1.0                                    | 145   | 1   | 1.8   | 234   | 0.108   |
| P4SMA180H   | RQJ          | 162  | 198  | 1.0                                    | 146   | 1   | 1.6   | 258   | 0.108   |
| P4SMA180AH  | RRJ          | 171  | 189  | 1.0                                    | 154   | 1   | 1.7   | 246   | 0.108   |
| P4SMA200H   | RSJ          | 180  | 220  | 1.0                                    | 162   | 1   | 1.4   | 287   | 0.108   |
| P4SMA200AH  | RTJ          | 190  | 210  | 1.0                                    | 171   | 1   | 1.51  | 274   | 0.108   |

### Notes:

1. V<sub>BR</sub> measure after I<sub>T</sub> applied for 300μs, I<sub>T</sub> = square wave pulse or equivalent.
2. Surge current waveform per Figure.5 and derate per Figure.2.
3. For bipolar types having V<sub>WM</sub> of 10 volts and under, the I<sub>D</sub> limit is doubled.
4. For bidirectional use CH or CAH suffix for types PS4MA6.8H through P4SMA200AH.
5. All terms and symbols are consistent with ANSI/IEEE C62.35.

## ORDERING INFORMATION

| ORDERING CODE <sup>(1)</sup> | PACKAGE        | PACKING             |
|------------------------------|----------------|---------------------|
| P4SMAxH                      | DO-214AC (SMA) | 7,500 / Tape & Reel |

### Notes:

1. "x" defines voltage from 6.8V(P4SMA6.8H) to 200V(P4SMA200AH)

**CHARACTERISTICS CURVES**

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Fig.1 Peak Pulse Power Rating Curve**



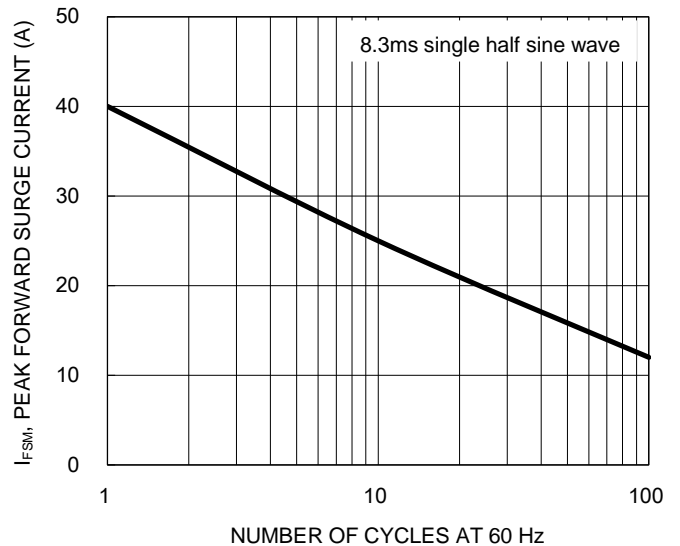
**Fig.2 Pulse Derating Curve**



**Fig.3 Typical Junction Capacitance**



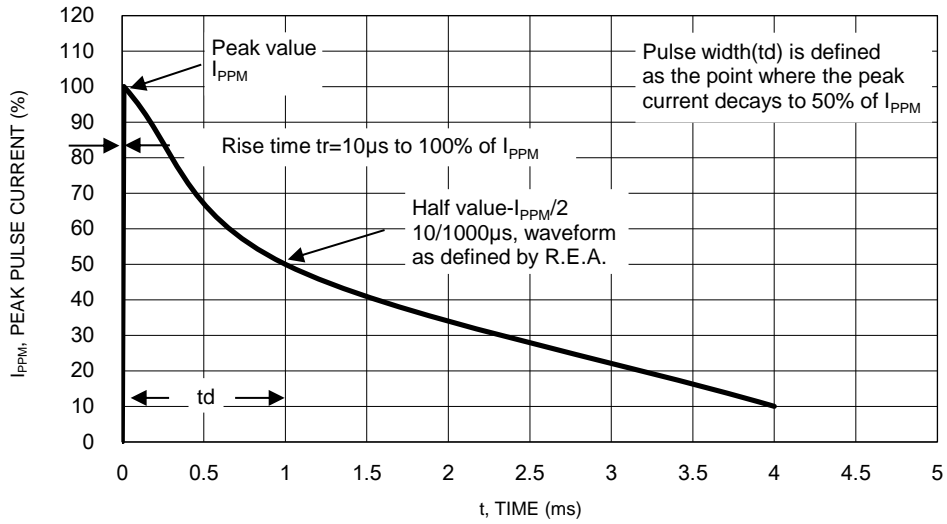
**Fig.4 Maximum Non-repetitive Forward Surge Current**



**CHARACTERISTICS CURVES**

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Fig.5 Clamping Power Pulse Waveform**



**PACKAGE OUTLINE DIMENSIONS**

DO-214AC (SMA)



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min.      | Max. | Min.        | Max.  |
| A    | 1.99      | 2.50 | 0.078       | 0.098 |
| A1   | 0.10      | 0.20 | 0.004       | 0.008 |
| b    | 1.27      | 1.58 | 0.050       | 0.062 |
| c    | 0.15      | 0.31 | 0.006       | 0.012 |
| D    | 2.29      | 2.83 | 0.090       | 0.111 |
| E    | 4.95      | 5.33 | 0.195       | 0.210 |
| E1   | 4.06      | 4.60 | 0.160       | 0.181 |
| L    | 0.90      | 1.41 | 0.035       | 0.056 |

**SUGGESTED PAD LAYOUT**



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A      | 1.68      | 0.066       |
| B      | 1.52      | 0.060       |
| C      | 3.93      | 0.155       |
| D      | 2.41      | 0.095       |
| E      | 5.45      | 0.215       |

**MARKING DIAGRAM**



Cathode band for uni-directional products only

- P/N = Marking Code
- G = Green Compound
- YW = Date Code
- F = Factory Code