

## 1500W, 6.8V - 200V Surface Mount Transient Voltage Suppressor

### FEATURES

- AEC-Q101 qualified
- Ideal for automated placement
- Glass passivated chip junction
- Excellent clamping capability
- Meets ISO 7637-2 (Pulse 1/2a/2b/3a/3b)
- Fast response time: Typically less than 1.0ps
- Typical  $I_R$  less than 1 $\mu$ A above 10V
- 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    |
| $V_{BR}$       | 6.8 - 200      | V    |
| $P_{PK}$       | 1500           | W    |
| $T_{JMAX}$     | 150            | °C   |
| Package        | DO-214AB (SMC) |      |
| Configuration  | Single die     |      |

### APPLICATIONS

- Immunization of sensitive devices in telecommunications, consumer electronics, and industrial equipment from electrostatic discharge (ESD) and transient voltages induced by load switching and lightning



DO-214AB (SMC)

### MECHANICAL DATA

- Case: DO-214AB (SMC)
- 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: 0.210g (approximately)

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)                                |           |             |      |
|--|-----------|-------------|------|
| PARAMETER  | SYMBOL    | VALUE       | UNIT |
| Peak power dissipation at $T_A = 25^\circ\text{C}$ , $t_p = 1\text{ms}^{(1)}$                              | $P_{PK}$  | 1500        | W    |
| Steady state power dissipation at $T_A = 25^\circ\text{C}$   | $P_D$     | 6.5         | W    |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load for Unidirectional only | $I_{FSM}$ | 200         | A    |
| Forward Voltage @ $I_F = 50\text{A}$ for Unidirectional only <sup>(2)</sup>                                | $V_F$     | 3.5 / 5.0   | V    |
| Junction temperature   | $T_J$     | -55 to +150 | °C   |
| Storage temperature  | $T_{STG}$ | -55 to +150 | °C   |

#### Notes:

1. Non-repetitive current pulse per Fig.5 and derated above  $T_A = 25^\circ\text{C}$  per Fig.2
2.  $V_F = 3.5\text{V}$  on 1.5SMC6.8H - 1.5SMC91H and  $V_F = 5.0\text{V}$  on 1.5SMC100H - 1.5SMC200H

#### Devices for Bipolar Applications

1. For bidirectional use CH or CAH suffix for types 1.5SMC6.8H - types 1.5SMC200AH
2. Electrical characteristics apply in both directions

| THERMAL PERFORMANCE                    |                 |     |               |
|--|-----------------|-----|---------------|
| PARAMETER                              | SYMBOL          | TYP | UNIT          |
| Junction-to-ambient thermal resistance | $R_{\theta JA}$ | 50  | $^{\circ}C/W$ |
| Junction-to-case thermal resistance    | $R_{\theta JC}$ | 15  | $^{\circ}C/W$ |

| ELECTRICAL SPECIFICATIONS ( $T_A = 25^{\circ}C$ unless otherwise noted) |              |  |       |                            |   |  |  |   |  |
|---|--------------|--|-------|----------------------------|---|--|--|---|--|
| Part number   | Marking code | Breakdown voltage (Note 1)<br>$V_{BR}@I_T$ (V) |       | Test current<br>$I_T$ (mA) | Working stand-off voltage<br>$V_{WM}$ (V) | Maximum blocking leakage current<br>$I_R@V_{WM}$ ( $\mu A$ ) | Maximum peak impulse current (Note 2)<br>$I_{PPM}$ (A) | Maximum clamping voltage<br>$V_C@I_{PPM}$ (V) | Maximum Temperature Coefficient of $V_{BR}$ ( $\%/^{\circ}C$ ) |
|   |              | Min  | Max   |                            |   |  |  |   |  |
| 1.5SMC6.8H  | DDJ          | 6.12   | 7.48  | 10                         | 5.50                                      | 1000   | 145  | 10.8  | 0.057  |
| 1.5SMC6.8AH   | DEJ          | 6.46   | 7.14  | 10                         | 5.80                                      | 1000   | 150  | 10.5  | 0.057  |
| 1.5SMC7.5H  | DFJ          | 6.75   | 8.25  | 10                         | 6.05                                      | 500  | 134  | 11.7  | 0.061  |
| 1.5SMC7.5AH   | DGJ          | 7.13   | 7.88  | 10                         | 6.40                                      | 500  | 139  | 11.3  | 0.061  |
| 1.5SMC8.2H  | DHJ          | 7.38   | 9.02  | 10                         | 6.63                                      | 200  | 126  | 12.5  | 0.065  |
| 1.5SMC8.2AH   | DKJ          | 7.79   | 8.61  | 10                         | 7.02                                      | 200  | 130  | 12.1  | 0.065  |
| 1.5SMC9.1H  | DLJ          | 8.19   | 10.00 | 1.0                        | 7.37                                      | 50   | 114  | 13.8  | 0.068  |
| 1.5SMC9.1AH   | DMJ          | 8.65   | 9.55  | 1.0                        | 7.78                                      | 50   | 117  | 13.4  | 0.068  |
| 1.5SMC10H   | DNJ          | 9.00   | 11.00 | 1.0                        | 8.10                                      | 10   | 105  | 15.0  | 0.073  |
| 1.5SMC10AH  | DPJ          | 9.50   | 10.5  | 1.0                        | 8.55                                      | 10   | 108  | 14.5  | 0.073  |
| 1.5SMC11H   | DQJ          | 9.90   | 12.1  | 1.0                        | 8.92                                      | 1  | 97   | 16.2  | 0.075  |
| 1.5SMC11AH  | DRJ          | 10.5   | 11.6  | 1.0                        | 9.40                                      | 1  | 100  | 15.6  | 0.075  |
| 1.5SMC12H   | DSJ          | 10.8   | 13.2  | 1.0                        | 9.72                                      | 1  | 91   | 17.3  | 0.078  |
| 1.5SMC12AH  | DTJ          | 11.4   | 12.6  | 1.0                        | 10.2                                      | 1  | 94   | 16.7  | 0.078  |
| 1.5SMC13H   | DUJ          | 11.7   | 14.3  | 1.0                        | 10.5                                      | 1  | 82   | 19.0  | 0.081  |
| 1.5SMC13AH  | DVJ          | 12.4   | 13.7  | 1.0                        | 11.1                                      | 1  | 86   | 18.2  | 0.081  |
| 1.5SMC15H   | DWJ          | 13.5   | 16.5  | 1.0                        | 12.1                                      | 1  | 71   | 22.0  | 0.084  |
| 1.5SMC15AH  | DXJ          | 14.3   | 15.8  | 1.0                        | 12.8                                      | 1  | 74   | 21.2  | 0.084  |
| 1.5SMC16H   | DYJ          | 14.4   | 17.6  | 1.0                        | 12.9                                      | 1  | 67   | 23.5  | 0.086  |
| 1.5SMC16AH  | DZJ          | 15.2   | 16.8  | 1.0                        | 13.6                                      | 1  | 70   | 22.5  | 0.086  |
| 1.5SMC18H   | EDJ          | 16.2   | 19.8  | 1.0                        | 14.5                                      | 1  | 59   | 26.5  | 0.088  |
| 1.5SMC18AH  | EEJ          | 17.1   | 18.9  | 1.0                        | 15.3                                      | 1  | 60   | 25.5  | 0.088  |
| 1.5SMC20H   | EFJ          | 18.0   | 22.0  | 1.0                        | 16.2                                      | 1  | 54   | 29.1  | 0.090  |
| 1.5SMC20AH  | EGJ          | 19.0   | 21.0  | 1.0                        | 17.1                                      | 1  | 56   | 27.7  | 0.090  |
| 1.5SMC22H   | EHJ          | 19.8   | 24.2  | 1.0                        | 17.8                                      | 1  | 49   | 31.9  | 0.092  |
| 1.5SMC22AH  | EKJ          | 20.9   | 23.1  | 1.0                        | 18.8                                      | 1  | 51   | 30.6  | 0.092  |
| 1.5SMC24H   | ELJ          | 21.6   | 26.4  | 1.0                        | 19.4                                      | 1  | 45   | 34.7  | 0.094  |
| 1.5SMC24AH  | EMJ          | 22.8   | 25.2  | 1.0                        | 20.5                                      | 1  | 47   | 33.2  | 0.094  |
| 1.5SMC27H   | ENJ          | 24.3   | 29.7  | 1.0                        | 21.8                                      | 1  | 40   | 39.1  | 0.096  |
| 1.5SMC27AH  | EPJ          | 25.7   | 28.4  | 1.0                        | 23.1                                      | 1  | 42   | 37.5  | 0.096  |
| 1.5SMC30H   | EQJ          | 27.0   | 33.0  | 1.0                        | 24.3                                      | 1  | 36   | 43.5  | 0.097  |
| 1.5SMC30AH  | ERJ          | 28.5   | 31.5  | 1.0                        | 25.6                                      | 1  | 38   | 41.4  | 0.097  |
| 1.5SMC33H   | ESJ          | 29.7   | 36.3  | 1.0                        | 26.8                                      | 1  | 33   | 47.7  | 0.098  |
| 1.5SMC33AH  | ETJ          | 31.4   | 34.7  | 1.0                        | 28.2                                      | 1  | 34   | 45.7  | 0.098  |
| 1.5SMC36H   | EUJ          | 32.4   | 39.6  | 1.0                        | 29.1                                      | 1  | 30   | 52.0  | 0.099  |
| 1.5SMC36AH  | EVJ          | 34.2   | 37.8  | 1.0                        | 30.8                                      | 1  | 31   | 49.9  | 0.099  |
| 1.5SMC39H   | EWJ          | 35.1   | 42.9  | 1.0                        | 31.6                                      | 1  | 27   | 56.4  | 0.100  |
| 1.5SMC39AH  | EXJ          | 37.1   | 41.0  | 1.0                        | 33.3                                      | 1  | 29   | 53.9  | 0.100  |
| 1.5SMC43H   | EYJ          | 38.7   | 47.3  | 1.0                        | 34.8                                      | 1  | 25   | 61.9  | 0.101  |
| 1.5SMC43AH  | EZJ          | 40.9   | 45.2  | 1.0                        | 36.8                                      | 1  | 26   | 59.3  | 0.101  |
| 1.5SMC47H   | FDJ          | 42.3   | 51.7  | 1.0                        | 38.1                                      | 1  | 23   | 67.8  | 0.101  |
| 1.5SMC47AH  | FEJ          | 44.7   | 49.4  | 1.0                        | 40.2                                      | 1  | 24   | 64.8  | 0.101  |
| 1.5SMC51H   | FFJ          | 45.9   | 56.1  | 1.0                        | 41.3                                      | 1  | 21   | 73.5  | 0.102  |

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

| Part number | Marking code | Breakdown voltage (Note 1)<br>V <sub>BR</sub> @I <sub>T</sub><br>(V) |      | Test current<br>I <sub>T</sub><br>(mA) | Working stand-off voltage<br>V <sub>WM</sub><br>(V) | Maximum blocking leakage current<br>I <sub>R</sub> @V <sub>WM</sub><br>(μA) | Maximum peak impulse current (Note 2)<br>I <sub>PPM</sub><br>(A) | Maximum clamping voltage<br>V <sub>C</sub> @I <sub>PPM</sub><br>(V) | Maximum Temperature Coefficient of V <sub>BR</sub><br>(%/°C) |
|-------------|--------------|--|------|--|---|---|--|---|--|
|             |              | Min  | Max  |  |   |   |  |   |  |
| 1.5SMC51AH  | FGJ          | 48.5   | 53.6 | 1.0                                    | 43.6  | 1   | 22   | 70.1  | 0.102  |
| 1.5SMC56H   | FHJ          | 50.4   | 61.6 | 1.0                                    | 45.4  | 1   | 19   | 80.5  | 0.103  |
| 1.5SMC56AH  | FKJ          | 53.2   | 58.8 | 1.0                                    | 47.8  | 1   | 20   | 77.0  | 0.103  |
| 1.5SMC62H   | FLJ          | 55.8   | 68.2 | 1.0                                    | 50.2  | 1   | 17   | 89.0  | 0.104  |
| 1.5SMC62AH  | FMJ          | 58.9   | 65.1 | 1.0                                    | 53.0  | 1   | 18   | 85.0  | 0.104  |
| 1.5SMC68H   | FNJ          | 61.2   | 74.8 | 1.0                                    | 55.1  | 1   | 16   | 98.0  | 0.104  |
| 1.5SMC68AH  | FPJ          | 64.6   | 71.4 | 1.0                                    | 58.1  | 1   | 17   | 92.0  | 0.104  |
| 1.5SMC75H   | FQJ          | 67.5   | 82.5 | 1.0                                    | 60.7  | 1   | 14   | 108   | 0.105  |
| 1.5SMC75AH  | FRJ          | 71.3   | 78.8 | 1.0                                    | 64.1  | 1   | 15   | 103   | 0.105  |
| 1.5SMC82H   | FSJ          | 73.8   | 90.2 | 1.0                                    | 66.4  | 1   | 13   | 118   | 0.105  |
| 1.5SMC82AH  | FTJ          | 77.9   | 86.1 | 1.0                                    | 70.1  | 1   | 13.9   | 113   | 0.105  |
| 1.5SMC91H   | FUJ          | 81.9   | 100  | 1.0                                    | 73.7  | 1   | 12   | 131   | 0.106  |
| 1.5SMC91AH  | FVJ          | 86.5   | 95.5 | 1.0                                    | 77.8  | 1   | 12.6   | 125   | 0.106  |
| 1.5SMC100H  | FWJ          | 90   | 110  | 1.0                                    | 81.0  | 1   | 10.9   | 144   | 0.106  |
| 1.5SMC100AH | FXJ          | 95   | 105  | 1.0                                    | 85.5  | 1   | 11.4   | 137   | 0.106  |
| 1.5SMC110H  | FYJ          | 99   | 121  | 1.0                                    | 89.2  | 1   | 9.9  | 158   | 0.107  |
| 1.5SMC110AH | FZJ          | 105  | 116  | 1.0                                    | 94.0  | 1   | 10.3   | 152   | 0.107  |
| 1.5SMC120H  | GDJ          | 108  | 132  | 1.0                                    | 97.2  | 1   | 9.1  | 173   | 0.107  |
| 1.5SMC120AH | GEJ          | 114  | 126  | 1.0                                    | 102.0   | 1   | 9.5  | 165   | 0.107  |
| 1.5SMC130H  | GFJ          | 117  | 143  | 1.0                                    | 105.0   | 1   | 8.4  | 187   | 0.107  |
| 1.5SMC130AH | GGJ          | 124  | 137  | 1.0                                    | 111.0   | 1   | 8.7  | 179   | 0.107  |
| 1.5SMC150H  | GHJ          | 135  | 165  | 1.0                                    | 121.0   | 1   | 7.3  | 215   | 0.108  |
| 1.5SMC150AH | GKJ          | 143  | 158  | 1.0                                    | 128.0   | 1   | 7.6  | 207   | 0.108  |
| 1.5SMC160H  | GLJ          | 144  | 176  | 1.0                                    | 130.0   | 1   | 6.8  | 230   | 0.108  |
| 1.5SMC160AH | GMJ          | 152  | 168  | 1.0                                    | 136.0   | 1   | 7.1  | 219   | 0.108  |
| 1.5SMC170H  | GNJ          | 153  | 187  | 1.0                                    | 138.0   | 1   | 6.4  | 244   | 0.108  |
| 1.5SMC170AH | GPJ          | 162  | 179  | 1.0                                    | 145.0   | 1   | 6.7  | 234   | 0.108  |
| 1.5SMC180H  | GQJ          | 162  | 198  | 1.0                                    | 146.0   | 1   | 6.1  | 258   | 0.108  |
| 1.5SMC180AH | GRJ          | 171  | 189  | 1.0                                    | 154.0   | 1   | 6.4  | 246   | 0.108  |
| 1.5SMC200H  | GSJ          | 180  | 220  | 1.0                                    | 162.0   | 1   | 5.4  | 287   | 0.108  |
| 1.5SMC200AH | GTJ          | 190  | 210  | 1.0                                    | 171.0   | 1   | 5.7  | 274   | 0.108  |

### Notes:

1. V<sub>BR</sub> measure after I<sub>T</sub> applied for 30ms, I<sub>T</sub>=square wave pulse or equivalent
2. Surge current waveform per Fig.5 and derate per Fig.2
3. For bipolar types having V<sub>WM</sub> of 10V and under, the I<sub>R</sub> limit is doubled
4. For bidirectional use CH or CAH suffix for types 1.5SMC6.8H - 1.5SMC200AH
5. All terms and symbols are consistent with ANSI/IEEE C62.35

## ORDERING INFORMATION

| ORDERING CODE <sup>(1)</sup> | PACKAGE        | PACKING             |
|------------------------------|----------------|---------------------|
| 1.5SMCxH                     | DO-214AB (SMC) | 3,000 / Tape & Reel |

### Notes:

1. "x" defines voltage from 6.8V(1.5SMC6.8H) to 200V(1.5SMC200H)

**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-214AB (SMC)



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min.      | Max. | Min.        | Max.  |
| A    | 2.00      | 2.62 | 0.079       | 0.103 |
| A1   | 0.10      | 0.20 | 0.004       | 0.008 |
| b    | 2.90      | 3.20 | 0.114       | 0.126 |
| c    | 0.15      | 0.31 | 0.006       | 0.012 |
| D    | 5.59      | 6.22 | 0.220       | 0.245 |
| E    | 7.75      | 8.13 | 0.305       | 0.320 |
| E1   | 6.60      | 7.11 | 0.260       | 0.280 |
| L    | 1.00      | 1.60 | 0.039       | 0.063 |

**SUGGESTED PAD LAYOUT**



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A      | 3.30      | 0.130       |
| B      | 2.50      | 0.098       |
| C      | 6.90      | 0.272       |
| D      | 4.40      | 0.173       |
| E      | 9.40      | 0.370       |

**MARKING DIAGRAM**



Cathode band for uni-directional products only

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