

## 1500W, 5V - 170V Surface Mount Transient Voltage Suppressor

### FEATURES

- AEC-Q101 qualified
- Ideal for automated placement
- Glass passivated junction
- Excellent clamping capability
- Meets ISO 7637-2 (Pulse 1/2a/2b/3a/3b)
- Fast response time: Typically less than 1.0ps from 0 V to BV min
- 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 - 170        | V    |
| $V_{BR}$       | 6.4 - 231      | 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.

### 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)



DO-214AB (SMC)

| 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 $T_A = 25^\circ\text{C}$                         | $P_D$     | 5           | W    |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load | $I_{FSM}$ | 200         | A    |
| Forward Voltage @ $I_F = 100\text{A}$ 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 SMCJ5.0H - SMCJ90H devices and  $V_F = 5.0\text{V}$  on SMCJ100H - SMCJ170H devices

Devices for bipolar applications

1. For bidirectional use CH or CAH suffix for types SMCJ5.0H - types SMCJ170H
2. Electrical characteristics apply in both directions

| <b>THERMAL PERFORMANCE</b>             |                 |            |             |
|--|-----------------|------------|-------------|
| <b>PARAMETER</b>                       | <b>SYMBOL</b>   | <b>TYP</b> | <b>UNIT</b> |
| Junction-to-ambient thermal resistance | $R_{\theta JA}$ | 55         | °C/W        |
| Junction-to-case thermal resistance    | $R_{\theta JC}$ | 10         | °C/W        |

| <b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted) |              |  |       |                               |  |   |  |  |
|---|--------------|--|-------|-------------------------------|--|---|--|--|
| Part number   | Marking code | Breakdown voltage<br>$V_{BR}@I_T$<br>(V) |       | Test current<br>$I_T$<br>(mA) | Working stand-off voltage<br>$V_{WM}$<br>(V) | Maximum Reverse Leakage<br>(Note 3)<br>$I_R@V_{WM}$ ( $\mu\text{A}$ ) | Maximum peak impulse current<br>(Note 2)<br>$I_{PPM}$<br>(A) | Maximum clamping voltage<br>(Note 2)<br>$V_C@I_{PPM}$<br>(V) |
|   |              | Min                                      | Max   |                               |  |   |  |  |
| SMCJ5.0H  | GDD          | 6.4                                      | 7.3   | 10                            | 5  | 1000  | 164  | 9.6  |
| SMCJ5.0AH   | GDE          | 6.4                                      | 7     | 10                            | 5  | 1000  | 171  | 9.2  |
| SMCJ6.0H  | GDF          | 6.67                                     | 8.15  | 10                            | 6  | 1000  | 138  | 11.4   |
| SMCJ6.0AH   | GDG          | 6.67                                     | 7.37  | 10                            | 6  | 1000  | 152  | 10.3   |
| SMCJ6.5H  | GDH          | 7.22                                     | 8.82  | 10                            | 6.5  | 500   | 128  | 12.3   |
| SMCJ6.5AH   | GDK          | 7.22                                     | 7.98  | 10                            | 6.5  | 500   | 140  | 11.2   |
| SMCJ7.0H  | GDL          | 7.78                                     | 9.51  | 10                            | 7  | 200   | 118  | 13.3   |
| SMCJ7.0AH   | GDM          | 7.78                                     | 8.6   | 10                            | 7  | 200   | 131  | 12.0   |
| SMCJ7.5H  | GDN          | 8.33                                     | 10.30 | 1                             | 7.5  | 100   | 110  | 14.3   |
| SMCJ7.5AH   | GDP          | 8.33                                     | 9.21  | 1                             | 7.5  | 100   | 122  | 12.9   |
| SMCJ8.0H  | GDQ          | 8.89                                     | 10.9  | 1                             | 8  | 50  | 105  | 15.0   |
| SMCJ8.0AH   | GDR          | 8.89                                     | 9.83  | 1                             | 8  | 50  | 115  | 13.6   |
| SMCJ8.5H  | GDS          | 9.44                                     | 11.5  | 1                             | 8.5  | 20  | 99   | 15.9   |
| SMCJ8.5AH   | GDT          | 9.44                                     | 10.4  | 1                             | 8.5  | 20  | 109  | 14.4   |
| SMCJ9.0H  | GDU          | 10                                       | 12.2  | 1                             | 9  | 10  | 93   | 16.9   |
| SMCJ9.0AH   | GDV          | 10                                       | 11.1  | 1                             | 9  | 10  | 102  | 15.4   |
| SMCJ10H   | GDW          | 11.1                                     | 13.6  | 1                             | 10   | 5   | 83   | 18.8   |
| SMCJ10AH  | GDX          | 11.1                                     | 12.3  | 1                             | 10   | 5   | 92   | 17.0   |
| SMCJ11H   | GDY          | 12.2                                     | 14.9  | 1                             | 11   | 1   | 78   | 20.1   |
| SMCJ11AH  | GDZ          | 12.2                                     | 13.5  | 1                             | 11   | 1   | 86   | 18.2   |
| SMCJ12H   | GED          | 13.3                                     | 16.3  | 1                             | 12   | 1   | 71   | 22.0   |
| SMCJ12AH  | GEE          | 13.3                                     | 14.7  | 1                             | 12   | 1   | 79   | 19.9   |
| SMCJ13H   | GEF          | 14.4                                     | 17.6  | 1                             | 13   | 1   | 66   | 23.8   |
| SMCJ13AH  | GEG          | 14.4                                     | 15.9  | 1                             | 13   | 1   | 73   | 21.5   |
| SMCJ14H   | GEH          | 15.6                                     | 19.1  | 1                             | 14   | 1   | 61   | 25.8   |
| SMCJ14AH  | GEK          | 15.6                                     | 17.2  | 1                             | 14   | 1   | 67   | 23.2   |
| SMCJ15H   | GEL          | 16.7                                     | 20.4  | 1                             | 15   | 1   | 58   | 26.9   |
| SMCJ15AH  | GEM          | 16.7                                     | 18.5  | 1                             | 15   | 1   | 64   | 24.4   |
| SMCJ16H   | GEN          | 17.8                                     | 21.8  | 1                             | 16   | 1   | 54   | 28.8   |
| SMCJ16AH  | GEP          | 17.8                                     | 19.7  | 1                             | 16   | 1   | 60   | 26.0   |
| SMCJ17H   | GEQ          | 18.9                                     | 23.1  | 1                             | 17   | 1   | 51   | 30.5   |
| SMCJ17AH  | GER          | 18.9                                     | 20.9  | 1                             | 17   | 1   | 57   | 27.6   |
| SMCJ18H   | GES          | 20                                       | 24.4  | 1                             | 18   | 1   | 48   | 32.2   |
| SMCJ18AH  | GET          | 20                                       | 22.1  | 1                             | 18   | 1   | 53   | 29.2   |
| SMCJ20H   | GEU          | 22.2                                     | 27.1  | 1                             | 20   | 1   | 43   | 35.8   |
| SMCJ20AH  | GEV          | 22.2                                     | 24.5  | 1                             | 20   | 1   | 48   | 32.4   |
| SMCJ22H   | GEW          | 24.4                                     | 29.8  | 1                             | 22   | 1   | 39   | 39.4   |
| SMCJ22AH  | GEX          | 24.4                                     | 26.9  | 1                             | 22   | 1   | 44   | 35.5   |
| SMCJ24H   | GEY          | 26.7                                     | 32.6  | 1                             | 24   | 1   | 36   | 43.0   |
| SMCJ24AH  | GEZ          | 26.7                                     | 29.5  | 1                             | 24   | 1   | 40   | 38.9   |
| SMCJ26H   | GFD          | 28.9                                     | 35.3  | 1                             | 26   | 1   | 33   | 46.6   |
| SMCJ26AH  | GFE          | 28.9                                     | 31.9  | 1                             | 26   | 1   | 37   | 42.1   |
| SMCJ28H   | GFF          | 31.1                                     | 38    | 1                             | 28   | 1   | 31   | 50.0   |

| 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><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<br>(Note 3)<br>I <sub>R</sub> @V <sub>WM</sub> (μA) | Maximum peak impulse current<br>(Note 2)<br>I <sub>PPM</sub><br>(A) | Maximum clamping voltage<br>(Note 2)<br>V <sub>C</sub> @I <sub>PPM</sub><br>(V) |
|  |              | Min   | Max  |  |   |   |   |   |
| SMCJ28AH   | GFG          | 31.1  | 34.4 | 1                                      | 28  | 1   | 34  | 45.4  |
| SMCJ30H  | GFH          | 33.3  | 40.7 | 1                                      | 30  | 1   | 29  | 53.5  |
| SMCJ30AH   | GFK          | 33.3  | 36.8 | 1                                      | 30  | 1   | 32  | 48.4  |
| SMCJ33H  | GFL          | 36.7  | 44.9 | 1                                      | 33  | 1   | 26  | 59.0  |
| SMCJ33AH   | GFM          | 36.7  | 40.6 | 1                                      | 33  | 1   | 29  | 53.3  |
| SMCJ36H  | GFN          | 40  | 48.9 | 1                                      | 36  | 1   | 24  | 64.3  |
| SMCJ36AH   | GFP          | 40  | 44.2 | 1                                      | 36  | 1   | 27  | 58.1  |
| SMCJ40H  | GFQ          | 44.4  | 54.3 | 1                                      | 40  | 1   | 22  | 71.4  |
| SMCJ40AH   | GFR          | 44.4  | 49.1 | 1                                      | 40  | 1   | 24  | 64.5  |
| SMCJ43H  | GFS          | 47.8  | 58.4 | 1                                      | 43  | 1   | 20  | 76.7  |
| SMCJ43AH   | GFT          | 47.8  | 52.8 | 1                                      | 43  | 1   | 22  | 69.4  |
| SMCJ45H  | GFU          | 50  | 61.1 | 1                                      | 45  | 1   | 19  | 80.3  |
| SMCJ45AH   | GFV          | 50  | 55.3 | 1                                      | 45  | 1   | 21  | 72.7  |
| SMCJ48H  | GFW          | 53.3  | 65.1 | 1                                      | 48  | 1   | 18  | 85.5  |
| SMCJ48AH   | GFX          | 53.3  | 58.9 | 1                                      | 48  | 1   | 20  | 77.4  |
| SMCJ51H  | GFY          | 56.7  | 69.3 | 1                                      | 51  | 1   | 17  | 91.1  |
| SMCJ51AH   | GFZ          | 56.7  | 62.7 | 1                                      | 51  | 1   | 19  | 82.4  |
| SMCJ54H  | GGD          | 60  | 73.3 | 1                                      | 54  | 1   | 16  | 96.3  |
| SMCJ54AH   | GGE          | 60  | 66.3 | 1                                      | 54  | 1   | 18  | 87.1  |
| SMCJ58H  | GGF          | 64.4  | 78.7 | 1                                      | 58  | 1   | 15  | 103   |
| SMCJ58AH   | GGG          | 64.4  | 71.2 | 1                                      | 58  | 1   | 16  | 93.6  |
| SMCJ60H  | GGH          | 66.7  | 81.5 | 1                                      | 60  | 1   | 14  | 107   |
| SMCJ60AH   | GGK          | 66.7  | 73.7 | 1                                      | 60  | 1   | 16  | 96.8  |
| SMCJ64H  | GGL          | 71.1  | 86.9 | 1                                      | 64  | 1   | 13.8  | 114   |
| SMCJ64AH   | GGM          | 71.1  | 78.6 | 1                                      | 64  | 1   | 15  | 103   |
| SMCJ70H  | GGN          | 77.8  | 95.1 | 1                                      | 70  | 1   | 12.6  | 125   |
| SMCJ70AH   | GGP          | 77.8  | 86   | 1                                      | 70  | 1   | 13.9  | 113   |
| SMCJ75H  | GGQ          | 83.3  | 102  | 1                                      | 75  | 1   | 11.7  | 134   |
| SMCJ75AH   | GGR          | 83.3  | 92.1 | 1                                      | 75  | 1   | 13  | 121   |
| SMCJ78H  | GGS          | 86.7  | 106  | 1                                      | 78  | 1   | 11.3  | 139   |
| SMCJ78AH   | GGT          | 86.7  | 95.8 | 1                                      | 78  | 1   | 12.5  | 126   |
| SMCJ85H  | GGU          | 94.4  | 115  | 1                                      | 85  | 1   | 10.4  | 151   |
| SMCJ85AH   | GGV          | 94.4  | 104  | 1                                      | 85  | 1   | 11.5  | 137   |
| SMCJ90H  | GGW          | 100   | 122  | 1                                      | 90  | 1   | 9.8   | 160   |
| SMCJ90AH   | GGX          | 100   | 111  | 1                                      | 90  | 1   | 10.7  | 146   |
| SMCJ100H   | GGY          | 111   | 136  | 1                                      | 100   | 1   | 8.8   | 179   |
| SMCJ100AH  | GGZ          | 111   | 123  | 1                                      | 100   | 1   | 9.7   | 162   |
| SMCJ110H   | GHD          | 122   | 149  | 1                                      | 110   | 1   | 8   | 196   |
| SMCJ110AH  | GHE          | 122   | 135  | 1                                      | 110   | 1   | 8.9   | 177   |
| SMCJ120H   | GHF          | 133   | 163  | 1                                      | 120   | 1   | 7.3   | 214   |
| SMCJ120AH  | GHG          | 133   | 147  | 1                                      | 120   | 1   | 8.1   | 193   |
| SMCJ130H   | GHH          | 144   | 176  | 1                                      | 130   | 1   | 6.8   | 231   |
| SMCJ130AH  | GHK          | 144   | 159  | 1                                      | 130   | 1   | 7.5   | 209   |
| SMCJ150H   | GHL          | 167   | 204  | 1                                      | 150   | 1   | 5.8   | 266   |
| SMCJ150AH  | GHM          | 167   | 185  | 1                                      | 150   | 1   | 6.4   | 243   |
| SMCJ160H   | GHN          | 178   | 218  | 1                                      | 160   | 1   | 5.4   | 287   |
| SMCJ160AH  | GHP          | 178   | 197  | 1                                      | 160   | 1   | 6   | 259   |
| SMCJ170H   | GHQ          | 189   | 231  | 1                                      | 170   | 1   | 5.1   | 304   |
| SMCJ170AH  | GHR          | 189   | 209  | 1                                      | 170   | 1   | 5.7   | 275   |

**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. All terms and symbols are consistent with ANSI/IEEE C62.35

**ORDERING INFORMATION**

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

**Notes:**

1. "x" defines voltage from 5V(SMCJ5.0H) to 170V(SMCJ170H)

**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**

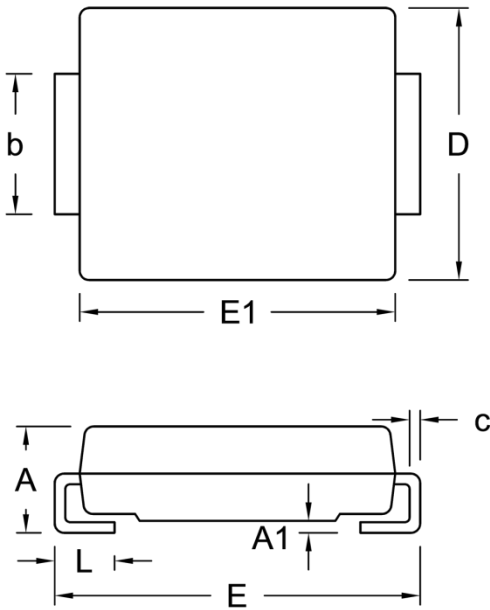
( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Fig.5 Clamping Power Pulse Waveform**



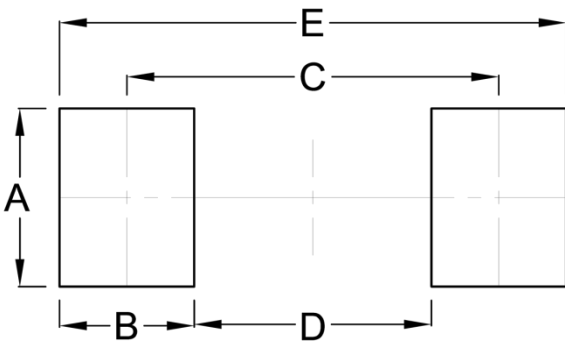
**PACKAGE OUTLINE DIMENSIONS**

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**



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

Cathode band for uni-directional products only