

### Features

- For surface mounted applications in order to optimize board space
- Low profile space
- Glass passivated chip
- Low inductance
- Excellent clamping capability
- Very fast response time
- Typical  $I_D$  less than  $1\mu A$  at  $V_{WM}$
- 400 W peak pulse power capability with a 10/1000  $\mu s$  waveform



**RoHS**  
COMPLIANT



SMA (DO-214AC)

### Mechanical Data

- **Case:** JEDEC DO-214AC molded plastic body over glass passivated chip
- **Terminals:** Solder plated, solderable per MIL-STD-750 Method 2026
- **Polarity:** For uni-directional types the band by laser denotes the cathode, which is positive with respect to the anode under normal TVS operation

### Major Ratings and Characteristics

|                    |              |
|--------------------|--------------|
| $P_{PPM}$          | 400 W        |
| $V_{RRM}$          | 5 V to 440 V |
| $I_{FSM}$          | 40 A         |
| $T_j \text{ max.}$ | 150 °C       |

### Devices for Bidirectional Applications

- For bi-directional devices, use suffix C or CA (e.g. SMAJ10C, SMAJ10CA). Electrical characteristics apply in both directions.

### Maximum Ratings & Thermal Characteristics

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

| Items                                                                       | Symbol          | Value          | UNIT   |
|-----------------------------------------------------------------------------|-----------------|----------------|--------|
| Peak pulse power dissipation with a 10/1000 $\mu s$ waveform (see fig. 1)   | $P_{PPM}$       | 400            | W      |
| Peak pulse current with a waveform (see fig. 3 , single pulse)              | $I_{PPM}$       | See Next Table | A      |
| Peak forward surge current 8.3ms single half sine-wave uni-directional only | $I_{FSM}$       | 40             | A      |
| Typical thermal resistance, junction to ambient <sup>(1)</sup>              | $R_{\theta JA}$ | 120            | °C / W |
| Typical thermal resistance, junction to lead <sup>(1)</sup>                 | $R_{\theta JL}$ | 30             | °C / W |
| Operating junction and storage temperature range                            | $T_J, T_{STG}$  | -55 to +150    | °C     |

Note 1: Mounted on P.C.B. with 0.2 x 0.2" (5.0 x 5.0mm) copper pad areas.

### Electrical Characteristics

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

| Device Type | Marking Code |    | Breakdown Voltage at $I_T^{(2)}$<br>$V_{(BR)}$ (V) |      | Test Current<br>$I_T$ (mA) | Stand-off Voltage<br>$V_{WM}$ (V) | Maximum Reverse Leakage at $V_{WM}^{(4)}$<br>$I_D$ ( $\mu\text{A}$ ) | Maximum Peak Pulse Surge Current <sup>(3)</sup><br>$I_{PPM}$ (A) | Maximum Clamping Voltage at $I_{PPM}$<br>$V_C$ (V) |
|-------------|--------------|----|----------------------------------------------------|------|----------------------------|-----------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------|
|             |              |    | Min                                                | Max  |                            |                                   |                                                                      |                                                                  |                                                    |
| SMAJ5.0A/CA | AE           | WE | 6.4                                                | 7    | 10                         | 5                                 | 800                                                                  | 43.5                                                             | 9.2                                                |
| SMAJ6.0A/CA | AG           | WG | 6.67                                               | 7.37 | 10                         | 6                                 | 800                                                                  | 38.8                                                             | 10.3                                               |
| SMAJ6.5A/CA | AK           | WK | 7.22                                               | 7.98 | 10                         | 6.5                               | 500                                                                  | 35.7                                                             | 11.2                                               |
| SMAJ7.0A/CA | AM           | WM | 7.78                                               | 8.6  | 10                         | 7                                 | 200                                                                  | 33.3                                                             | 12                                                 |
| SMAJ7.5A/CA | AP           | WP | 8.33                                               | 9.21 | 1                          | 7.5                               | 100                                                                  | 31                                                               | 12.9                                               |
| SMAJ8.0A/CA | AR           | WR | 8.89                                               | 9.83 | 1                          | 8                                 | 50                                                                   | 29.4                                                             | 13.6                                               |
| SMAJ8.5A/CA | AT           | WT | 9.44                                               | 10.4 | 1                          | 8.5                               | 20                                                                   | 27.8                                                             | 14.4                                               |
| SMAJ9.0A/CA | AV           | WV | 10                                                 | 11.1 | 1                          | 9                                 | 10                                                                   | 26.0                                                             | 15.4                                               |
| SMAJ10A/CA  | AX           | WX | 11.1                                               | 12.3 | 1                          | 10                                | 5                                                                    | 23.5                                                             | 17                                                 |
| SMAJ11A/CA  | AZ           | WZ | 12.2                                               | 13.5 | 1                          | 11                                | 1                                                                    | 22                                                               | 18.2                                               |
| SMAJ12A/CA  | BE           | XE | 13.3                                               | 14.7 | 1                          | 12                                | 1                                                                    | 20.1                                                             | 19.9                                               |
| SMAJ13A/CA  | BG           | XG | 14.4                                               | 15.9 | 1                          | 13                                | 1                                                                    | 18.6                                                             | 21.5                                               |
| SMAJ14A/CA  | BK           | XK | 15.6                                               | 17.2 | 1                          | 14                                | 1                                                                    | 17.2                                                             | 23.2                                               |
| SMAJ15A/CA  | BM           | XM | 16.7                                               | 18.5 | 1                          | 15                                | 1                                                                    | 16.4                                                             | 24.4                                               |
| SMAJ16A/CA  | BP           | XP | 17.8                                               | 19.7 | 1                          | 16                                | 1                                                                    | 15.4                                                             | 26                                                 |
| SMAJ17A/CA  | BR           | XR | 18.9                                               | 20.9 | 1                          | 17                                | 1                                                                    | 14.5                                                             | 27.6                                               |
| SMAJ18A/CA  | BT           | XT | 20                                                 | 22.1 | 1                          | 18                                | 1                                                                    | 13.7                                                             | 29.2                                               |
| SMAJ20A/CA  | BV           | XV | 22.2                                               | 24.5 | 1                          | 20                                | 1                                                                    | 12.3                                                             | 32.4                                               |
| SMAJ22A/CA  | BX           | XX | 24.4                                               | 26.9 | 1                          | 22                                | 1                                                                    | 11.3                                                             | 35.5                                               |
| SMAJ24A/CA  | BZ           | XZ | 26.7                                               | 29.5 | 1                          | 24                                | 1                                                                    | 10.3                                                             | 38.9                                               |
| SMAJ26A/CA  | CE           | YE | 28.9                                               | 31.9 | 1                          | 26                                | 1                                                                    | 9.5                                                              | 42.1                                               |
| SMAJ28A/CA  | CG           | YG | 31.1                                               | 34.4 | 1                          | 28                                | 1                                                                    | 8.8                                                              | 45.4                                               |
| SMAJ30A/CA  | CK           | YK | 33.3                                               | 36.8 | 1                          | 30                                | 1                                                                    | 8.3                                                              | 48.4                                               |
| SMAJ33A/CA  | CM           | YM | 36.7                                               | 40.6 | 1                          | 33                                | 1                                                                    | 7.5                                                              | 53.3                                               |
| SMAJ36A/CA  | CP           | YP | 40                                                 | 44.2 | 1                          | 36                                | 1                                                                    | 6.9                                                              | 58.1                                               |
| SMAJ40A/CA  | CR           | YR | 44.4                                               | 49.1 | 1                          | 40                                | 1                                                                    | 6.2                                                              | 64.5                                               |
| SMAJ43A/CA  | CT           | YT | 47.8                                               | 52.8 | 1                          | 43                                | 1                                                                    | 5.8                                                              | 69.4                                               |
| SMAJ45A/CA  | CV           | YV | 50.0                                               | 55.3 | 1                          | 45                                | 1                                                                    | 5.5                                                              | 72.7                                               |
| SMAJ48A/CA  | CX           | YX | 53.3                                               | 58.9 | 1                          | 48                                | 1                                                                    | 5.2                                                              | 77.4                                               |
| SMAJ51A/CA  | CZ           | YZ | 56.7                                               | 62.7 | 1                          | 51                                | 1                                                                    | 4.9                                                              | 82.4                                               |
| SMAJ54A/CA  | RE           | ZE | 60                                                 | 66.3 | 1                          | 54                                | 1                                                                    | 4.6                                                              | 87.1                                               |
| SMAJ58A/CA  | RG           | ZG | 64.4                                               | 71.2 | 1                          | 58                                | 1                                                                    | 4.3                                                              | 93.6                                               |
| SMAJ60A/CA  | RK           | ZK | 66.7                                               | 73.7 | 1                          | 60                                | 1                                                                    | 4.1                                                              | 96.8                                               |
| SMAJ64A/CA  | RM           | ZM | 71.1                                               | 78.6 | 1                          | 64                                | 1                                                                    | 3.9                                                              | 103                                                |
| SMAJ70A/CA  | RP           | ZP | 77.8                                               | 86.0 | 1                          | 70                                | 1                                                                    | 3.5                                                              | 113                                                |
| SMAJ75A/CA  | RR           | ZR | 83.3                                               | 92.1 | 1                          | 75                                | 1                                                                    | 3.3                                                              | 121                                                |
| SMAJ78A/CA  | RT           | ZT | 86.7                                               | 95.8 | 1                          | 78                                | 1                                                                    | 3.2                                                              | 126                                                |
| SMAJ85A/CA  | RV           | ZV | 94.4                                               | 104  | 1                          | 85                                | 1                                                                    | 2.9                                                              | 137                                                |
| SMAJ90A/CA  | RX           | ZX | 100                                                | 111  | 1                          | 90                                | 1                                                                    | 2.7                                                              | 146                                                |

### Electrical Characteristics

T<sub>A</sub> = 25°C unless otherwise noted

| Device Type | Marking Code |    | Breakdown Voltage at I <sub>T</sub> <sup>(2)</sup><br>V <sub>(BR)</sub> (V) |     | Test Current<br>I <sub>T</sub> (mA) | Stand-off Voltage<br>V <sub>WM</sub> (V) | Maximum Reverse Leakage at V <sub>WM</sub> <sup>(4)</sup><br>I <sub>D</sub> (μA) | Maximum Peak Pulse Surge Current <sup>(3)</sup><br>I <sub>PPM</sub> (A) | Maximum Clamping Voltage at I <sub>PPM</sub><br>V <sub>C</sub> (V) |
|-------------|--------------|----|-----------------------------------------------------------------------------|-----|-------------------------------------|------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|
|             |              |    | Min                                                                         | Max |                                     |                                          |                                                                                  |                                                                         |                                                                    |
| UNI         | UNI          | BI |                                                                             |     |                                     |                                          |                                                                                  |                                                                         |                                                                    |
| SMAJ100A/CA | RZ           | ZZ | 111                                                                         | 123 | 1                                   | 100                                      | 1                                                                                | 2.5                                                                     | 162                                                                |
| SMAJ110A/CA | SE           | VE | 122                                                                         | 135 | 1                                   | 110                                      | 1                                                                                | 2.3                                                                     | 177                                                                |
| SMAJ120A/CA | SG           | VG | 133                                                                         | 147 | 1                                   | 120                                      | 1                                                                                | 2.1                                                                     | 193                                                                |
| SMAJ130A/CA | SK           | VK | 144                                                                         | 159 | 1                                   | 130                                      | 1                                                                                | 1.9                                                                     | 209                                                                |
| SMAJ150A/CA | SM           | VM | 167                                                                         | 185 | 1                                   | 150                                      | 1                                                                                | 1.6                                                                     | 243                                                                |
| SMAJ160A/CA | SP           | VP | 178                                                                         | 197 | 1                                   | 160                                      | 1                                                                                | 1.5                                                                     | 259                                                                |
| SMAJ170A/CA | SR           | VR | 189                                                                         | 209 | 1                                   | 170                                      | 1                                                                                | 1.5                                                                     | 275                                                                |
| SMAJ180A/CA | ST           | VT | 201                                                                         | 222 | 1                                   | 180                                      | 1                                                                                | 1.4                                                                     | 292                                                                |
| SMAJ200A/CA | SV           | VV | 224                                                                         | 247 | 1                                   | 200                                      | 1                                                                                | 1.2                                                                     | 324                                                                |
| SMAJ220A/CA | SX           | VX | 246                                                                         | 272 | 1                                   | 220                                      | 1                                                                                | 1.1                                                                     | 356                                                                |
| SMAJ250A/CA | SZ           | VZ | 279                                                                         | 309 | 1                                   | 250                                      | 1                                                                                | 1.0                                                                     | 405                                                                |
| SMAJ300A/CA | TE           | UE | 335                                                                         | 371 | 1                                   | 300                                      | 1                                                                                | 0.8                                                                     | 486                                                                |
| SMAJ350A/CA | TG           | UG | 391                                                                         | 432 | 1                                   | 350                                      | 1                                                                                | 0.7                                                                     | 567                                                                |
| SMAJ400A/CA | TK           | UK | 447                                                                         | 494 | 1                                   | 400                                      | 1                                                                                | 0.6                                                                     | 648                                                                |
| SMAJ440A/CA | TM           | UM | 492                                                                         | 543 | 1                                   | 440                                      | 1                                                                                | 0.6                                                                     | 713                                                                |

Note 2: Pulse test : T<sub>p</sub> ≤ 50ms.

Note 3: Surge current waveform Per Fig. 3 and derate Per Fig. 2.

Note 4: For bi-directional types with V<sub>WM</sub> of 10 V and less, the I<sub>D</sub> limit is doubled

Note 5: V<sub>F</sub> = 3.5 V at I<sub>F</sub> = 25 A (uni-directional only)

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

Fig. 1-- Peak Pulse Power Rating Curve

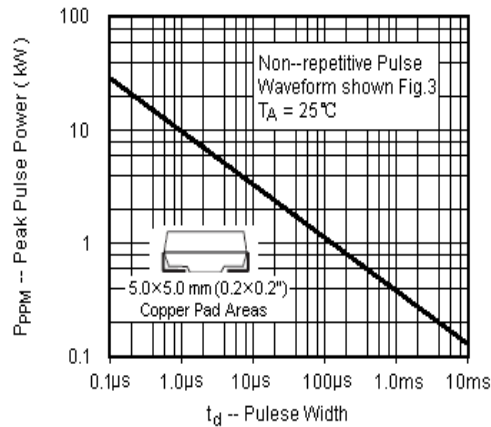


Fig. 2-- Pulse Derating Curve

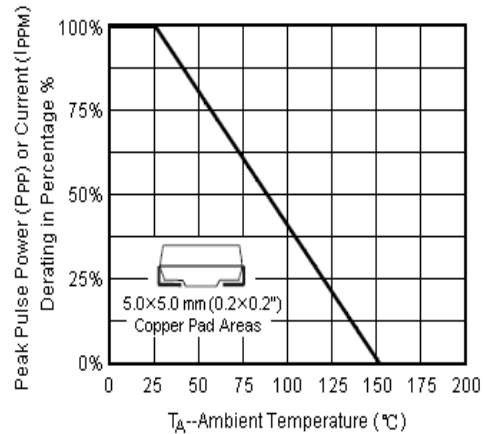


Fig. 3-- Pulse Waveform

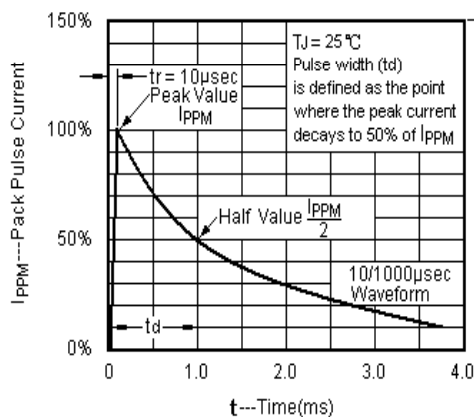


Fig. 4 -- Typical Junction Capacitance

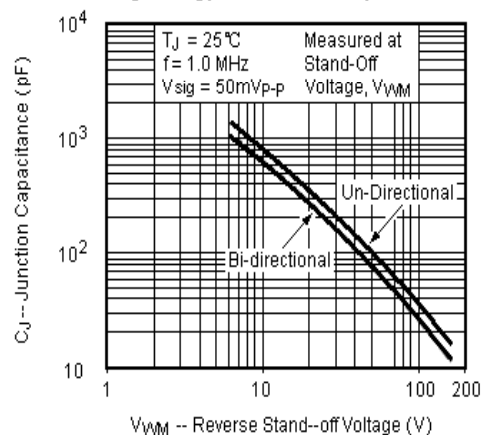


Fig. 5 -- Typical Transient Thermal Impedance

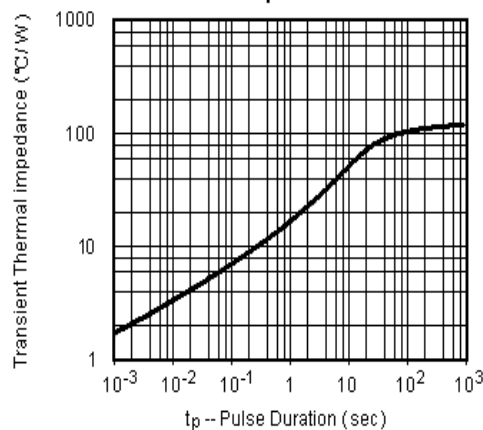
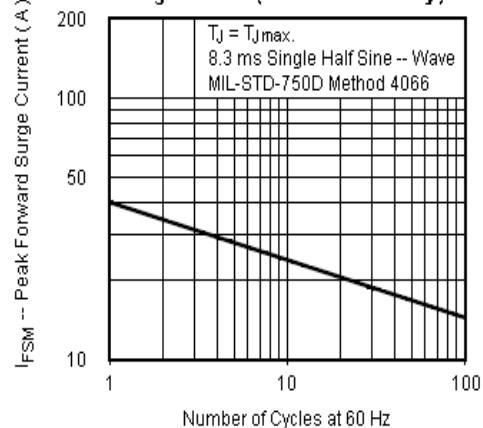
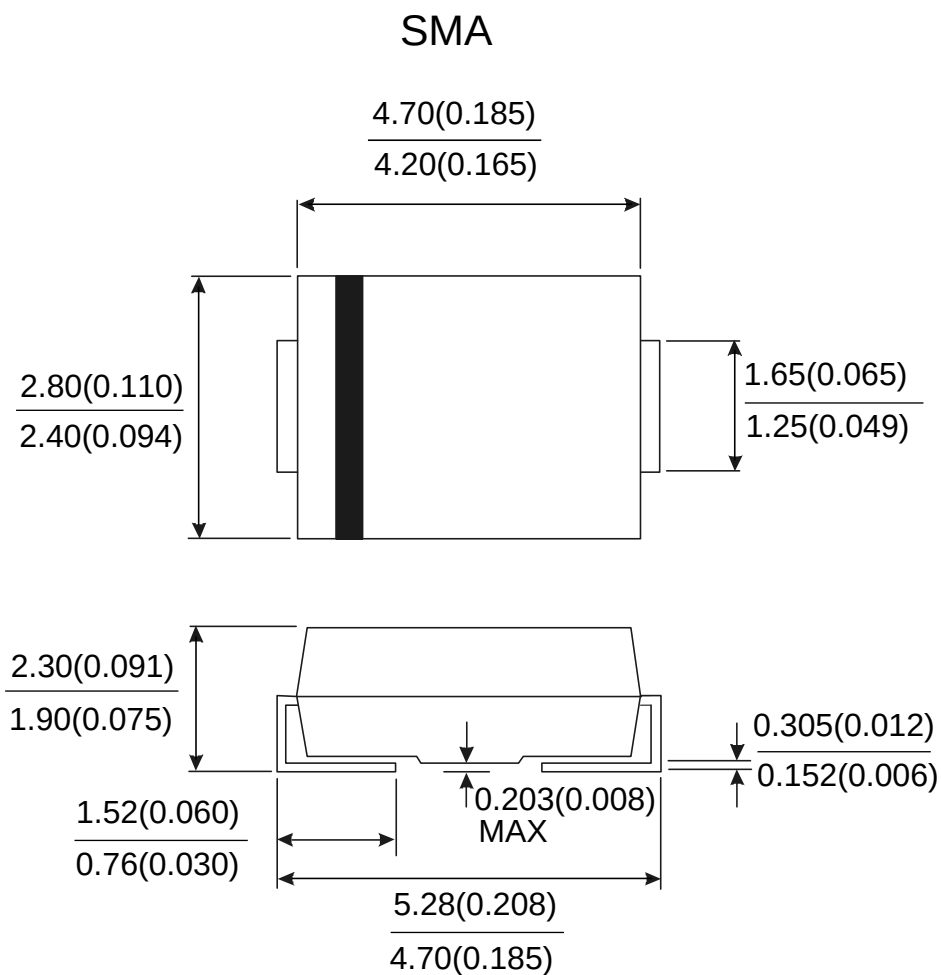


Fig. 6 -- Maximum Non-Repetitive Forward Surge Current (Uni-Directional Only)



### Package Outline



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