# SMAJ Series

RoHS Compliant

## Features:

- Low profile package
- Ideal for automated placement
- Glass passivated junction
- Built-in strain relief
- Excellent clamping capability
- Fast response time : Typically less than 1.0ps from 0 volt to BV min
- Typical IR less than 1μA above 10V
- 400 watts peak pulse power capability with a 10 / 1,000 μs waveform (300W above 78V)
- Moisture sensitivity level: level 1, per J-STD-020
- Halogen-free according to IEC 61249-2-21 definition

## Mechanical Data

Case : DO-214AC (SMA)
Molding compound
Base P/N with suffix “G” on packing code - Green compound (halogen-free)
Base P/N with prefix “H” on packing code - AEC-Q101 qualified
Terminals : Pure tin plated lead free
Polarity : Indicated by cathode band
Weight : 0.06 g (approximately)

## Max. Ratings and Electrical Characteristics

($T_A$ = 25°C unless otherwise noted)

| Type Number | Symbol | Value | Units |
|---|---|---|---|
| Peak Power Dissipation at $T_A$ = 25°C, $T_P$ = 1ms (Note 1) | $P_{PK}$ | 400 | Watts |
| Steady Power Dissipation | $P_D$ | 1 | |
| Peak forward surge current, 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$ | 40 | Amps |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only | $V_F$ | 3.5 | Volts |
| Operating and Storage Temperature Range | $T_j$, $T_{STG}$ | -55 to +150 | °C |

**Notes :** Note 1: Non-repetitive Current Pulse Per Fig. 3 and Derated above $T_A$ = 25°C Per Fig. 2

Devices for bipolar applications:

1. For bidirectional use C or CA suffix for types SMAJ5.0 through types SMAJ188.
2. Electrical characteristics apply in both directions.

## Ordering Information:

| Part No. | Aec-Q101 Qualified | Packing Code | Green Compound Code | Package | Packing |
|---|---|---|---|---|---|
| SMAJxxxx (Note 1) | Prefix "H" | R3 | Suffix "G" | SMA | 1,800 / 7" Plastic reel |
| | | R2 | | SMA | 7,500 / 13" Paper reel |
| | | M2 | | SMA | 7,500 / 13" Plastic reel |
| | | F3 | | Folded SMA | 1,800 / 7" Plastic reel |
| | | F2 | | Folded SMA | 7,500 / 13" Paper reel |
| | | F4 | | Folded SMA | 7,500 / 13" Plastic reel |
| | N/A | E3 | | Clip SMA | 1,800 / 7" Plastic reel |
| | | E2 | | Clip SMA | 7,500 / 13" Plastic reel |

Note 1: "xxxx" defines voltage from 5.0V (SMAJ5.0) to 188V (SMAJ188)

## Example:

| Preferred P/N | Part No. | AEC-Q101 Qualified | Packing Code | Green Compound Code | Description |
|---|---|---|---|---|---|
| SMAJ26A R3 | SMAJ26A | | R3 | | |
| SMAJ26A R3G | SMAJ26A | | R3 | G | Green compound |
| SMAJ26AHR3 | SMAJ26A | H | R3 | | AEC-Q101 qualified |

## Ratings and Characteristics Curves ($T_A$ = 25 unless otherwise noted)

FIG. 1 PEAK PULSE POWER RATING CURVE

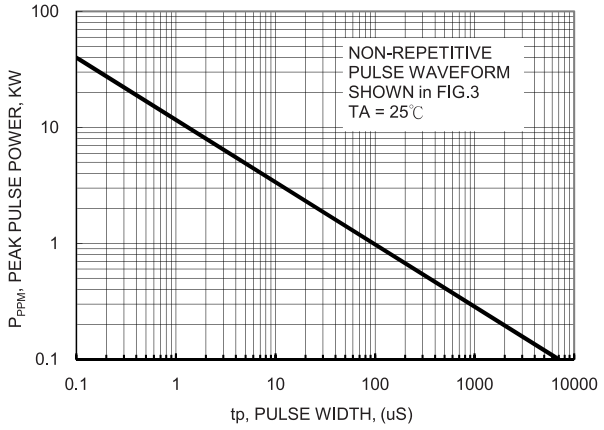



FIG.2 PULSE DERATING CURVE

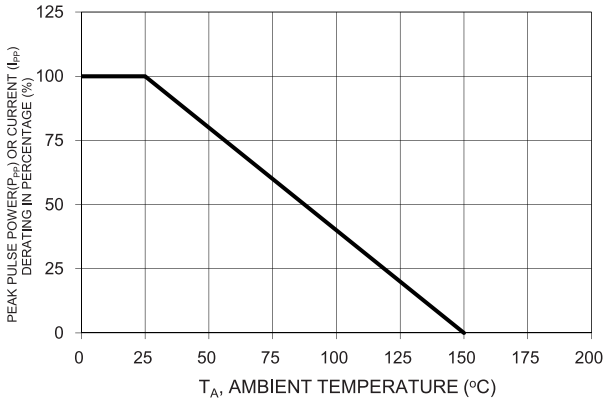


FIG. 3 CLAMPING POWER PULSE WAVEFORM

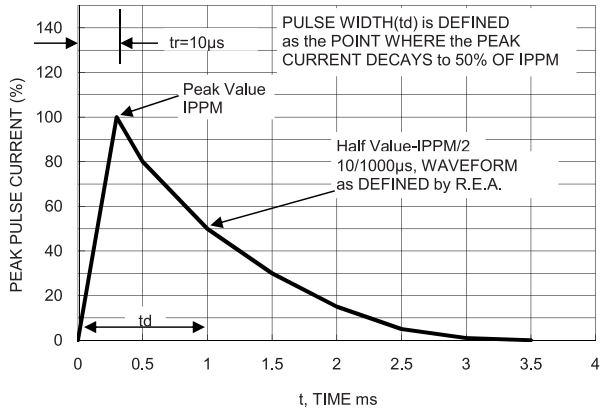



FIG. 4 MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT UNIDIRECTIONAL ONLY

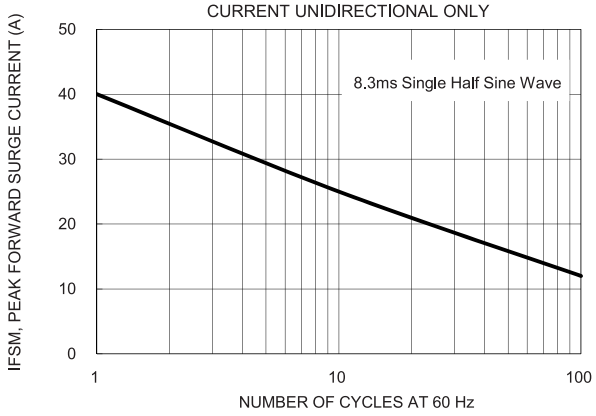
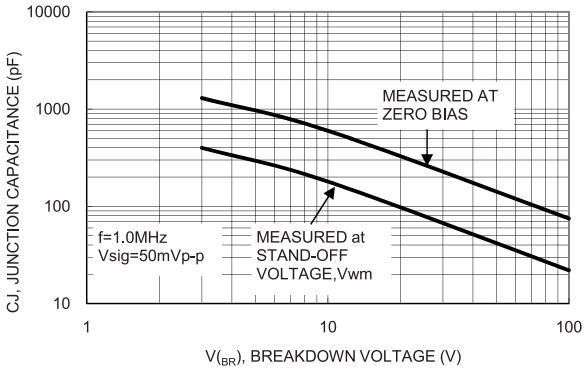



FIG. 5 TYPICAL JUNCTION CAPACITANCE




## Electrical Characteristics (TA = 25°C unless otherwise noted)

| Device | Device Marking Code (Note 9) | Working Peak Reverse Voltage VWM (Volts) | Breakdown Voltage V(BR) (Volts) at IT | | Test Current at IT (mA) | Maximum Clamping Voltage at IPPM VC (Volts) (Note 5) | Maximum Peak Pulse Surge Current IPPM (Note 5) (Amps) | Maximum Reverse Leakage at VWM ID (µA) |
|---|---|---|---|---|---|---|---|---|
| | | | Minimum | Maximum | | | | |
| SMAJ5.0A | AE | 5 | 6.4 | 7 | 10 | 9.2 | 43.5 | 800 |
| SMAJ6.0A | AG | 6 | 6.67 | 7.37 | 10 | 10.3 | 38.8 | 800 |
| SMAJ6.5A | AK | 6.5 | 7.22 | 7.98 | 10 | 11.2 | 35.7 | 500 |
| SMAJ7.0A | AM | 7 | 7.78 | 8.6 | 10 | 12.0 | 33.3 | 200 |
| SMAJ7.5A | AP | 7.5 | 8.33 | 9.21 | 1 | 12.9 | 31.0 | 100 |
| SMAJ8.0A | AR | 8 | 8.89 | 9.83 | 1 | 13.6 | 29.4 | 50 |
| SMAJ8.5A | AT | 8.5 | 9.44 | 10.4 | 1 | 14.4 | 27.8 | 10 |

| Device | Device Marking Code (Note 9) | Working Peak Reverse Voltage $V_{WM}$ (Volts) | Breakdown Voltage $V_{(BR)}$ (Volts) at $I_T$ | | Test Current at IT (mA) | Maximum Clamping Voltage at $I_{PPM}$ $V_C$ (Volts) (Note 5) | Maximum Peak Pulse Surge Current $I_{PPM}$ (Note 5) (Amps) | Maximum Reverse Leakage at $V_{WM}$ ID (µA) |
|---|---|---|---|---|---|---|---|---|
| | | | Minimum | Maximum | | | | |
| SMAJ9.0A | AV | 9 | 10 | 11.1 | 1 | 15.4 | 26.0 | 5 |
| SMAJ10A | AX | 10 | 11.1 | 12.3 | 1 | 17.0 | 23.5 | 5 |
| SMAJ11A | AZ | 11 | 12.2 | 13.5 | 1 | 18.2 | 22.0 | 1 |
| SMAJ12A | BE | 12 | 13.3 | 14.7 | 1 | 19.9 | 20.1 | 1 |
| SMAJ13A | BG | 13 | 14.4 | 15.9 | 1 | 21.5 | 18.6 | 1 |
| SMAJ14A | BK | 14 | 15.6 | 17.2 | 1 | 23.2 | 17.2 | 1 |
| SMAJ15A | BM | 15 | 16.7 | 18.5 | 1 | 24.4 | 16.4 | 1 |
| SMAJ16A | BP | 16 | 17.8 | 19.7 | 1 | 26.0 | 15.4 | 1 |
| SMAJ17A | BR | 17 | 18.9 | 20.9 | 1 | 27.6 | 14.5 | 1 |
| SMAJ18A | BT | 18 | 20 | 22.1 | 1 | 29.2 | 13.7 | 1 |
| SMAJ20A | BV | 20 | 22.2 | 24.5 | 1 | 32.4 | 12.3 | 1 |
| SMAJ22A | BX | 22 | 24.4 | 26.9 | 1 | 35.5 | 11.3 | 1 |
| SMAJ24A | BZ | 24 | 26.7 | 29.5 | 1 | 38.9 | 10.3 | 1 |
| SMAJ26A | CE | 26 | 28.9 | 31.9 | 1 | 42.1 | 9.5 | 1 |
| SMAJ28A | CG | 28 | 31.1 | 34.4 | 1 | 45.4 | 8.8 | 1 |
| SMAJ30A | CK | 30 | 33.3 | 36.8 | 1 | 48.4 | 8.3 | 1 |
| SMAJ33A | CM | 33 | 36.7 | 40.6 | 1 | 53.3 | 7.5 | 1 |
| SMAJ36A | CP | 36 | 40 | 44.2 | 1 | 58.1 | 6.9 | 1 |
| SMAJ40A | CR | 40 | 44.4 | 49.1 | 1 | 64.5 | 6.2 | 1 |
| SMAJ43A | CT | 43 | 47.8 | 52.8 | 1 | 69.4 | 5.8 | 1 |
| SMAJ45A | CV | 45 | 50 | 55.3 | 1 | 72.7 | 5.5 | 1 |
| SMAJ48A | CX | 48 | 53.3 | 58.9 | 1 | 77.4 | 5.2 | 1 |
| SMAJ51A | CZ | 51 | 56.7 | 62.7 | 1 | 82.4 | 4.9 | 1 |
| SMAJ54A | RE | 54 | 60 | 66.3 | 1 | 87.1 | 4.6 | 1 |
| SMAJ58A | RG | 58 | 64.4 | 71.2 | 1 | 93.6 | 4.3 | 1 |
| SMAJ60A | RK | 60 | 66.7 | 73.7 | 1 | 96.8 | 4.1 | 1 |
| SMAJ64A | RM | 64 | 71.1 | 78.6 | 1 | 103 | 3.9 | 1 |
| SMAJ70A | RP | 70 | 77.8 | 86 | 1 | 113 | 3.5 | 1 |
| SMAJ75A | RR | 75 | 83.3 | 92.1 | 1 | 121 | 3.3 | 1 |
| SMAJ78A | RT | 78 | 86.7 | 95.8 | 1 | 126 | 3.2 | 1 |
| SMAJ85A | RV | 85 | 94.4 | 104 | 1 | 137 | 2.2 | 1 |
| SMAJ90A | RX | 90 | 100 | 111 | 1 | 146 | 2.1 | 1 |
| SMAJ100A | RZ | 100 | 111 | 123 | 1 | 162 | 1.9 | 1 |

| Device | Device Marking Code (Note 9) | Working Peak Reverse Voltage $V_{WM}$ (Volts) | Breakdown Voltage $V_{(BR)}$ (Volts) at $I_T$ | | Test Current at IT (mA) | Maximum Clamping Voltage at $I_{PPM}$ $V_C$ (Volts) (Note 5) | Maximum Peak Pulse Surge Current $I_{PPM}$ (Note 5) (Amps) | Maximum Reverse Leakage at $V_{WM}$ ID (µA) |
|---|---|---|---|---|---|---|---|---|
| | | | Minimum | Maximum | | | | |
| SMAJ110A | SE | 110 | 122 | 135 | 1 | 177 | 1.7 | 1 |
| SMAJ120A | SG | 120 | 133 | 147 | 1 | 193 | 1.6 | 1 |
| SMAJ130A | SK | 130 | 144 | 159 | 1 | 209 | 1.5 | 1 |
| SMAJ150A | SM | 150 | 167 | 185 | 1 | 243 | 1.3 | 1 |
| SMAJ160A | SP | 160 | 178 | 197 | 1 | 259 | 1.2 | 1 |
| SMAJ170A | SR | 170 | 189 | 209 | 1 | 275 | 1.1 | 1 |
| SMAJ188A | SS | 188 | 209 | 231 | 1 | 328 | 0.91 | 1 |
| SMAJ5.0CA | AE | 5 | 6.4 | 7 | 10 | 9.2 | 43.5 | 800 |
| SMAJ6.0CA | AG | 6 | 6.67 | 7.37 | 10 | 10.3 | 38.8 | 800 |
| SMAJ6.5CA | AK | 6.5 | 7.22 | 7.98 | 10 | 11.2 | 35.7 | 500 |
| SMAJ7.0CA | AM | 7 | 7.78 | 8.6 | 10 | 12.0 | 33.3 | 200 |
| SMAJ7.5CA | AP | 7.5 | 8.33 | 9.21 | 1 | 12.9 | 31.0 | 100 |
| SMAJ8.0CA | AR | 8 | 8.89 | 9.83 | 1 | 13.6 | 29.4 | 50 |
| SMAJ8.5CA | AT | 8.5 | 9.44 | 10.4 | 1 | 14.4 | 27.8 | 10 |
| SMAJ9.0CA | AV | 9 | 10 | 11.1 | 1 | 15.4 | 26.0 | 5 |
| SMAJ10CA | AX | 10 | 11.1 | 12.3 | 1 | 17.0 | 23.5 | 5 |
| SMAJ11CA | AZ | 11 | 12.2 | 13.5 | 1 | 18.2 | 22.0 | 1 |
| SMAJ12CA | BE | 12 | 13.3 | 14.7 | 1 | 19.9 | 20.1 | 1 |
| SMAJ13CA | BG | 13 | 14.4 | 15.9 | 1 | 21.5 | 18.6 | 1 |
| SMAJ14CA | BK | 14 | 15.6 | 17.2 | 1 | 23.2 | 17.2 | 1 |
| SMAJ15CA | BM | 15 | 16.7 | 18.5 | 1 | 24.4 | 16.4 | 1 |
| SMAJ16CA | BP | 16 | 17.8 | 19.7 | 1 | 26.0 | 15.4 | 1 |
| SMAJ17CA | BR | 17 | 18.9 | 20.9 | 1 | 27.6 | 14.5 | 1 |
| SMAJ18CA | BT | 18 | 20 | 22.1 | 1 | 29.2 | 13.7 | 1 |
| SMAJ20CA | BV | 20 | 22.2 | 24.5 | 1 | 32.4 | 12.3 | 1 |
| SMAJ22CA | BX | 22 | 24.4 | 26.9 | 1 | 35.5 | 11.3 | 1 |
| SMAJ24CA | BZ | 24 | 26.7 | 29.5 | 1 | 38.9 | 10.3 | 1 |
| SMAJ26CA | CE | 26 | 28.9 | 31.9 | 1 | 42.1 | 9.5 | 1 |
| SMAJ28CA | CG | 28 | 31.1 | 34.4 | 1 | 45.4 | 8.8 | 1 |
| SMAJ30CA | CK | 30 | 33.3 | 36.8 | 1 | 48.4 | 8.3 | 1 |
| SMAJ33CA | CM | 33 | 36.7 | 40.6 | 1 | 53.3 | 7.5 | 1 |
| SMAJ36CA | CP | 36 | 40 | 44.2 | 1 | 58.1 | 6.9 | 1 |
| SMAJ40CA | CR | 40 | 44.4 | 49.1 | 1 | 64.5 | 6.2 | 1 |

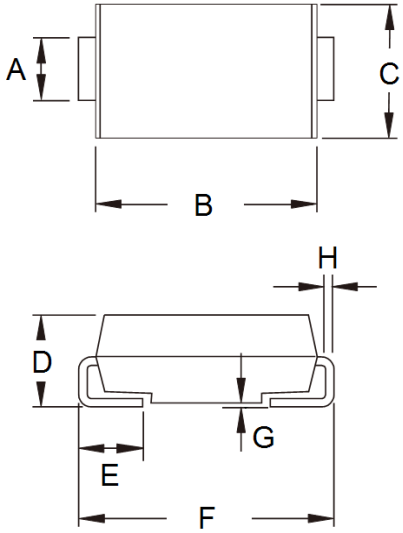
| Device | Device Marking Code (Note 9) | Working Peak Reverse Voltage $V_{WM}$ (Volts) | Breakdown Voltage $V_{(BR)}$ (Volts) at $I_T$ | | Test Current at IT (mA) | Maximum Clamping Voltage at $I_{PPM}$ $V_C$ (Volts) (Note 5) | Maximum Peak Pulse Surge Current $I_{PPM}$ (Note 5) (Amps) | Maximum Reverse Leakage at $V_{WM}$ ID (µA) |
|---|---|---|---|---|---|---|---|---|
| | | | Minimum | Maximum | | | | |
| SMAJ43CA | CT | 43 | 47.8 | 52.8 | 1 | 69.4 | 5.8 | 1 |
| SMAJ45CA | CV | 45 | 50 | 55.3 | 1 | 72.7 | 5.5 | 1 |
| SMAJ48CA | CX | 48 | 53.3 | 58.9 | 1 | 77.4 | 5.2 | 1 |
| SMAJ51CA | CZ | 51 | 56.7 | 62.7 | 1 | 82.4 | 4.9 | 1 |
| SMAJ54CA | RE | 54 | 60 | 66.3 | 1 | 87.1 | 4.6 | 1 |
| SMAJ58CA | RG | 58 | 64.4 | 71.2 | 1 | 93.6 | 4.3 | 1 |
| SMAJ60CA | RK | 60 | 66.7 | 73.7 | 1 | 96.8 | 4.1 | 1 |
| SMAJ64CA | RM | 64 | 71.1 | 78.6 | 1 | 103 | 3.9 | 1 |
| SMAJ70CA | RP | 70 | 77.8 | 86 | 1 | 113 | 3.5 | 1 |
| SMAJ75CA | RR | 75 | 83.3 | 92.1 | 1 | 121 | 3.3 | 1 |
| SMAJ78CA | RT | 78 | 86.7 | 95.8 | 1 | 126 | 3.2 | 1 |
| SMAJ85CA | RV | 85 | 94.4 | 104 | 1 | 137 | 2.2 | 1 |
| SMAJ90CA | RX | 90 | 100 | 111 | 1 | 146 | 2.1 | 1 |
| SMAJ100CA | RZ | 100 | 111 | 123 | 1 | 162 | 1.9 | 1 |
| SMAJ110CA | SE | 110 | 122 | 135 | 1 | 177 | 1.7 | 1 |
| SMAJ120CA | SG | 120 | 133 | 147 | 1 | 193 | 1.6 | 1 |
| SMAJ130CA | SK | 130 | 144 | 159 | 1 | 209 | 1.5 | 1 |
| SMAJ150CA | SM | 150 | 167 | 185 | 1 | 243 | 1.3 | 1 |
| SMAJ160CA | SP | 160 | 178 | 197 | 1 | 259 | 1.2 | 1 |
| SMAJ170CA | SR | 170 | 189 | 209 | 1 | 275 | 1.1 | 1 |
| SMAJ188CA | SS | 188 | 209 | 231 | 1 | 328 | 0.91 | 1 |

**Notes:**

1. Suffix A = Unidirectional
2. Suffix CA = Bidirectional
3. Non-repetitive current pulse and derated above $T_A$ = 25°C.
4. Mounted on 5mm$^2$ copper pads to each terminal.
5. Lead temperature at $T_L$ = 75°C.
6. Measured on 8.3ms single half sine-wave duty cycle = 4 pulses per minutes max.
7. Peak pulse power waveform is 10/1000 us.
8. For bi-directional devices having $V_R$ of 10 volts and under, the IR limit is double.
9. Cathode band marking on device for Uni-Directional parts , blank for Bi-Directional

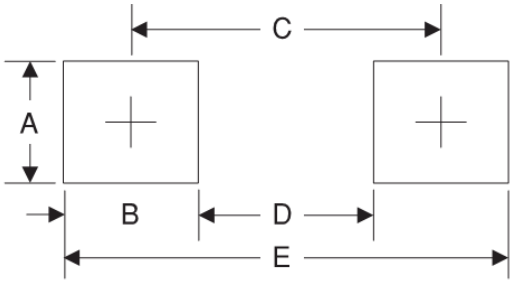
## Dimensions

DO-214AC (SMA)




| DIM. | Unit (mm) | | Unit (inch) | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 1.27 | 1.58 | 0.05 | 0.062 |
| B | 4.06 | 4.6 | 0.16 | 0.181 |
| C | 2.29 | 2.83 | 0.09 | 0.111 |
| D | 1.99 | 2.5 | 0.078 | 0.098 |
| E | 0.9 | 1.41 | 0.035 | 0.056 |
| F | 4.95 | 5.33 | 0.195 | 0.21 |
| G | 0.1 | 0.2 | 0.004 | 0.008 |
| H | 0.15 | 0.31 | 0.006 | 0.012 |

## Suggested Pad Layout




| Symbol | Unit (mm) | Unit (inch) |
|---|---|---|
| A | 1.68 | 0.066 |
| B | 1.52 | 0.06 |
| C | 3.93 | 0.155 |
| D | 2.41 | 0.095 |
| E | 5.45 | 0.215 |

## Marking Diagram:


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