



**THE DATASHEET OF
SMAJ15CAQ-13-F**



Product Summary (@T_A = +25°C)

| P _{PK} | I _{FSM} | V _{RWM} | PM _(AV) |
|-----------------|------------------|------------------|--------------------|
| 400W | 40A | 5V to 200V | 5W |

Features and Benefits

- 400W Peak Pulse Power Dissipation
- 5V to 200V Standoff Voltages
- Glass Passivated Die Construction
- Unidirectional and Bidirectional Versions Available
- Excellent Clamping Capability
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**
- **The SMAJ5.0(C)AQ – SMAJ200(C)AQ are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Description and Applications

Suitable to protect sensitive automotive circuits against surges defined in ISO7637-2 and against electrostatic discharges according to ISO10605.

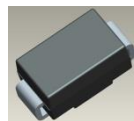
Compliance with following standards:

- ISO10605, C = 150pF, R = 330Ω:
30kV (Air Discharge)
30kV (Contact Discharge)
- ISO7637-2 (Note 5)
Pulse 1: V_S = -100V
Pulse 2a: V_S = +50V
Pulse 3a: V_S = -150V
Pulse 3b: V_S = +100V

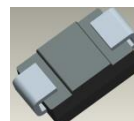
Mechanical Data

- Package: SMA
- Package Material: Molded Plastic
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Lead-Free Plating (Matte Tin Finish). Solderable per MIL-STD-202, Method 208 (③)
- Polarity Indicator: Cathode Band (Bidirectional Devices Do Not Have a Polarity Indicator)
- Weight: 0.064 grams (Approximate)

SMA



Top View



Bottom View

Ordering Information (Note 4)

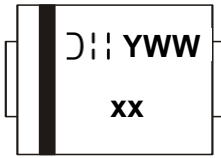
| Part Number | Package | Packing | |
|-------------------|---------|---------|-------------|
| | | Qty. | Carrier |
| SMAJX.X(C)AQ-13-F | SMA | 5000 | Tape & Reel |
| SMAJXX(C)AQ-13-F | SMA | 5000 | Tape & Reel |
| SMAJXXX(C)AQ-13-F | SMA | 5000 | Tape & Reel |

*X = Device Voltage, Example: SMAJ14AQ-13-F

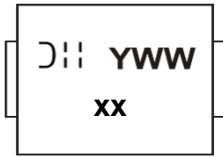
- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.
 5. Not applicable to parts with standoff voltage lower than the average battery voltage (13.5V).

Marking Information

Cathode Band for Uni-Directional Device



Bi-Directional Device



xx = Product Type Marking Code
 (See *Electrical Characteristics Table*)
 Dii = Manufacturers' Marking
 YWW = Date Code Marking
 Y = Last Digit of Year (ex: 3 for 2023)
 WW = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|--------------------|-------|------|
| Peak Pulse Power Dissipation (Non-Repetitive Current Pulse Derated Above T _A = +25°C) (Note 6) | P _{PK} | 400 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Superimposed on Rated Load (Notes 6, 7, 8) | I _{FSM} | 40 | A |
| Steady-State Power Dissipation @ T _L = +75°C | PM _(AV) | 1.0 | W |
| Instantaneous Forward Voltage @ I _{PP} = 35A (Notes 6, 7, 8) | V _F | 3.5 | V |

Notes: 6. Valid provided that terminals are kept at ambient temperature.
 7. Measured with 8.3ms single half sine wave. Duty cycle = 4 pulses per minute maximum.
 8. Unidirectional units only.

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|-----------------------------|------------------|-------------|------|
| Operating Temperature Range | T _J | -55 to +150 | °C |
| Storage Temperature Range | T _{STG} | -55 to +175 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Part Number Add C For Bidirectional (Note 9) | Reverse Standoff Voltage | Breakdown Voltage V _{BR} @ I _T (Note 10) | | Test Current I _T (mA) | Max Reverse Leakage @ V _{RWM} (Note 12) | Max Clamping Voltage @ I _{PP} (Note 11) | Max Peak Pulse Current | Marking Code | |
|---|--------------------------------|---|---------|--|--|--|---------------------------|--------------|-----|
| | | V _{RWM} (V) | Min (V) | | | | | Max (V) | BI- |
| SMAJ5.0(C)AQ | 5.0 | 6.40 | 7.25 | 10 | 800 | 9.2 | 43.5 | TE | HE |
| SMAJ6.0(C)AQ | 6.0 | 6.67 | 7.37 | 10 | 800 | 10.3 | 38.8 | TG | HG |
| SMAJ7.5(C)AQ | 7.5 | 8.33 | 9.21 | 1.0 | 100 | 12.9 | 31.0 | TP | HP |
| SMAJ8.5(C)AQ | 8.5 | 9.44 | 10.4 | 1.0 | 10 | 14.4 | 27.7 | TT | HT |
| SMAJ9.0(C)AQ | 9.0 | 10.0 | 11.1 | 1.0 | 5.0 | 15.4 | 26.0 | TV | HV |
| SMAJ10(C)AQ | 10 | 11.1 | 12.3 | 1.0 | 5.0 | 17.0 | 23.5 | TX | HX |
| SMAJ11(C)AQ | 11 | 12.2 | 13.5 | 1.0 | 5.0 | 18.2 | 22.0 | TZ | HZ |
| SMAJ12(C)AQ | 12 | 13.3 | 14.7 | 1.0 | 5.0 | 19.9 | 20.1 | UE | IE |
| SMAJ13(C)AQ | 13 | 14.4 | 15.9 | 1.0 | 5.0 | 21.5 | 18.6 | UG | IG |
| SMAJ14(C)AQ | 14 | 15.6 | 17.2 | 1.0 | 5.0 | 23.2 | 17.2 | UK | IK |
| SMAJ15(C)AQ | 15 | 16.7 | 18.5 | 1.0 | 5.0 | 24.4 | 16.4 | UM | IM |
| SMAJ16(C)AQ | 16 | 17.8 | 19.7 | 1.0 | 5.0 | 26.0 | 15.3 | UP | IP |
| SMAJ17(C)AQ | 17 | 18.9 | 20.9 | 1.0 | 5.0 | 27.6 | 14.5 | UR | IR |
| SMAJ18(C)AQ | 18 | 20.0 | 22.1 | 1.0 | 5.0 | 29.2 | 13.7 | UT | IT |
| SMAJ20(C)AQ | 20 | 22.2 | 24.5 | 1.0 | 5.0 | 32.4 | 12.3 | UV | IV |
| SMAJ22(C)AQ | 22 | 24.4 | 26.9 | 1.0 | 5.0 | 35.5 | 11.2 | UX | IX |
| SMAJ24(C)AQ | 24 | 26.7 | 29.5 | 1.0 | 5.0 | 38.9 | 10.3 | UZ | IZ |
| SMAJ26(C)AQ | 26 | 28.9 | 31.9 | 1.0 | 5.0 | 42.1 | 9.5 | VE | JE |
| SMAJ28(C)AQ | 28 | 31.1 | 34.4 | 1.0 | 5.0 | 45.4 | 8.8 | VG | JG |
| SMAJ30(C)AQ | 30 | 33.3 | 36.8 | 1.0 | 5.0 | 48.4 | 8.3 | VK | JK |
| SMAJ33(C)AQ | 33 | 36.7 | 40.6 | 1.0 | 5.0 | 53.3 | 7.5 | VM | JM |
| SMAJ36(C)AQ | 36 | 40.0 | 44.2 | 1.0 | 5.0 | 58.1 | 6.9 | VP | JP |
| SMAJ40(C)AQ | 40 | 44.4 | 49.1 | 1.0 | 5.0 | 64.5 | 6.2 | VR | JR |
| SMAJ43(C)AQ | 43 | 47.8 | 52.8 | 1.0 | 5.0 | 69.4 | 5.7 | VT | JT |
| SMAJ48(C)AQ | 48 | 53.3 | 58.9 | 1.0 | 5.0 | 77.4 | 5.2 | VX | JX |
| SMAJ51(C)AQ | 51 | 56.7 | 62.7 | 1.0 | 5.0 | 82.4 | 4.9 | VZ | JZ |
| SMAJ54(C)AQ | 54 | 60.0 | 66.3 | 1.0 | 5.0 | 87.1 | 4.6 | WE | RE |
| SMAJ58(C)AQ | 58 | 64.4 | 71.2 | 1.0 | 5.0 | 93.6 | 4.3 | WG | RG |
| SMAJ60(C)AQ | 60 | 66.7 | 73.7 | 1.0 | 5.0 | 96.8 | 4.1 | WK | RK |
| SMAJ64(C)AQ | 64 | 71.1 | 78.6 | 1.0 | 5.0 | 103 | 3.9 | WM | RM |
| SMAJ70(C)AQ | 70 | 77.8 | 86.0 | 1.0 | 5.0 | 113 | 3.5 | WP | RP |
| SMAJ75(C)AQ | 75 | 83.3 | 92.1 | 1.0 | 5.0 | 121 | 3.3 | WR | RR |
| SMAJ78(C)AQ | 78 | 86.7 | 95.8 | 1.0 | 5.0 | 126 | 3.2 | WT | RT |
| SMAJ85(C)AQ | 85 | 94.4 | 104 | 1.0 | 5.0 | 137 | 2.9 | WV | RV |
| SMAJ90(C)AQ | 90 | 100 | 111 | 1.0 | 5.0 | 146 | 2.7 | WX | RX |
| SMAJ100(C)AQ | 100 | 111 | 123 | 1.0 | 5.0 | 162 | 2.5 | WZ | RZ |
| SMAJ110(C)AQ | 110 | 122 | 135 | 1.0 | 5.0 | 177 | 2.3 | XE | SE |
| SMAJ120(C)AQ | 120 | 133 | 147 | 1.0 | 5.0 | 193 | 2.0 | XG | SG |
| SMAJ130(C)AQ | 130 | 144 | 159 | 1.0 | 5.0 | 209 | 1.9 | XK | SK |
| SMAJ150(C)AQ | 150 | 167 | 185 | 1.0 | 5.0 | 243 | 1.6 | XM | SM |
| SMAJ160(C)AQ | 160 | 178 | 197 | 1.0 | 5.0 | 259 | 1.5 | XP | SP |
| SMAJ170(C)AQ | 170 | 189 | 209 | 1.0 | 5.0 | 275 | 1.4 | XR | SR |
| SMAJ200(C)AQ | 200 | 224 | 248 | 1.0 | 1.0 | 324 | 1.2 | YT | ST |

- Notes:
9. Suffix C denotes bidirectional devices.
 10. V_{BR} measured with I_T current pulse = 10ms to 15ms.
 11. Per 10 × 1000μs waveform. See Figure 4.
 12. For bidirectional devices having V_{RWM} of 10V and under, the I_R is doubled.



Figure 1. Pulse Derating Curve

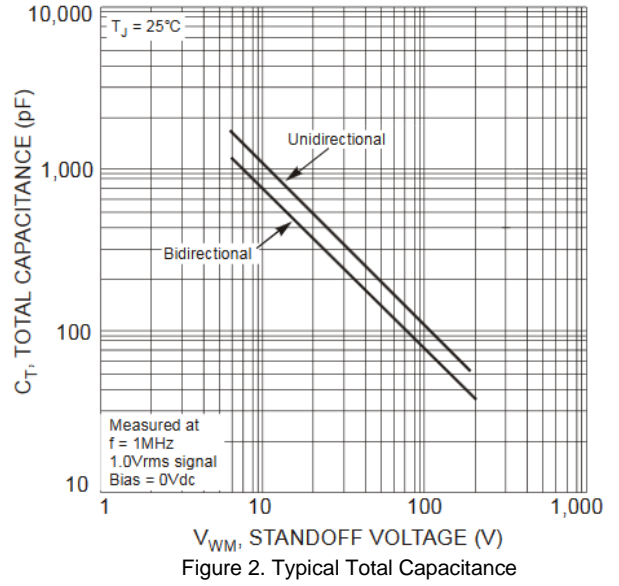


Figure 2. Typical Total Capacitance



Figure 3. Pulse Rating Curve



Figure 4. Pulse Waveform



Figure 5. Maximum Non-Repetitive Surge Current



Figure 6. Steady-State Power Derating Curve

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SMA



| SMA | | |
|----------------------|------|------|
| Dim | Min | Max |
| A | 2.29 | 2.92 |
| B | 4.00 | 4.60 |
| C | 1.27 | 1.63 |
| D | 0.15 | 0.31 |
| E | 4.80 | 5.59 |
| G | 0.05 | 0.20 |
| H | 0.76 | 1.52 |
| J | 1.96 | 2.40 |
| All Dimensions in mm | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SMA



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 4.00 |
| G | 1.50 |
| X | 2.50 |
| X1 | 6.50 |
| Y | 1.70 |

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