



**THE DATASHEET OF  
SMBJ28AQ-13-F**



## Product Summary (@T<sub>A</sub> = +25°C)

| P <sub>PK</sub> | I <sub>FSM</sub> | V <sub>RWM</sub> | PM <sub>(AV)</sub> |
|-----------------|------------------|------------------|--------------------|
| 600W            | 100A             | 5V to 200V       | 5W                 |

## Description and Applications

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

Compliance with the following standards:

- ISO10605, C = 150pF, R = 330Ω:
  - 30kV (Air Discharge)
  - 30kV (Contact Discharge)
- ISO7637-2 (Note 5)
  - Pulse 1: V<sub>S</sub> = -150V
  - Pulse 2a: V<sub>S</sub> = +112V
  - Pulse 3a: V<sub>S</sub> = -220V
  - Pulse 3b: V<sub>S</sub> = +150V

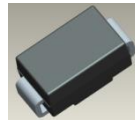
## Features and Benefits

- 600W 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 SMBJ5.0(C)AQ – SMBJ200(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/>

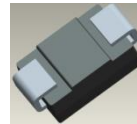
## Mechanical Data

- Package: SMB
- 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 (E3)
- Weight: 0.1 grams (Approximate)

SMB



Top View



Bottom View

## Ordering Information (Note 4)

| Part Number       | Package | Packing |             |
|-------------------|---------|---------|-------------|
|                   |         | Qty.    | Carrier     |
| SMBJX.X(C)AQ-13-F | SMB     | 3000    | Tape & Reel |
| SMBJXX(C)AQ-13-F  | SMB     | 3000    | Tape & Reel |
| SMBJXXX(C)AQ-13-F | SMB     | 3000    | Tape & Reel |

\*X = Device Voltage, e.g., SMBJ14AQ-13-F.

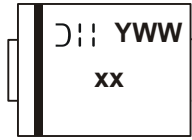
- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  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

Bi-directional Device



Cathode Band for Uni-directional Device



xx = Product Type Marking Code (See Page 3)

⌋|| = Manufacturer's Marking

YWW = Date Code Marking

Y = Last Digit of Year (ex: 3 for 2023)

WW = Week Code (01 to 53)

## Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic   | Symbol             | Value | Unit |
|--|--------------------|-------|------|
| Peak Pulse Power Dissipation<br>(Non-Repetitive Current Pulse Derated Above T <sub>A</sub> = +25°C) (Note 6) | P <sub>PK</sub>    | 600   | W    |
| Peak Power Derating Above +25°C  | P <sub>DER</sub>   | 4.8   | W/°C |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave<br>Superimposed on Rated Load (Notes 6, 7, 8)        | I <sub>FSM</sub>   | 100   | A    |
| Steady-State Power Dissipation @ T <sub>L</sub> = +75°C  | PM <sub>(AV)</sub> | 5.0   | W    |
| Instantaneous Forward Voltage @ I <sub>PP</sub> = 35A (Notes 6, 7, 8)  | V <sub>F</sub>     | 3.5   | V    |

## Thermal Characteristics

| Characteristic              | Symbol           | Value       | Unit |
|-----------------------------|------------------|-------------|------|
| Operating Temperature Range | T <sub>J</sub>   | -55 to +150 | °C   |
| Storage Temperature Range   | T <sub>STG</sub> | -55 to +175 | °C   |

- 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.

**Electrical Characteristics** (@ T<sub>A</sub> = +25°C, unless otherwise specified.)

| Part Number<br>Add C for<br>Bidirectional<br>(Note 9) | Reverse<br>Standoff<br>Voltage<br>V <sub>RWM</sub> (V) | Breakdown<br>Voltage<br>V <sub>BR</sub> @ I <sub>T</sub> (Note 10) |         | Test<br>Current<br>I <sub>T</sub> (mA) | Max Reverse<br>Leakage @ V <sub>RWM</sub><br>(Note 11)<br>I <sub>R</sub> (µA) | Max Clamping<br>Voltage @ I <sub>PP</sub><br>(Note 12)<br>V <sub>C</sub> (V) | Max Peak Pulse<br>Current<br>I <sub>PP</sub> (A) | Marking Code |      |
|---|--|--|---------|--|---|--|--|--------------|------|
|   |  | Min (V)  | Max (V) |  |   |  |  | BI-          | UNI- |
| SMBJ5.0(C)AQ  | 5.0  | 6.40   | 7.23    | 10                                     | 800   | 9.2  | 65.2   | AE           | KE   |
| SMBJ6.0(C)AQ  | 6.0  | 6.67   | 7.67    | 10                                     | 800   | 10.3   | 58.3   | AG           | KG   |
| SMBJ6.5(C)AQ  | 6.5  | 7.22   | 8.30    | 10                                     | 500   | 11.2   | 53.6   | AK           | KK   |
| SMBJ7.0(C)AQ  | 7.0  | 7.78   | 8.95    | 10                                     | 200   | 12.0   | 50.0   | AM           | KM   |
| SMBJ7.5(C)AQ  | 7.5  | 8.33   | 9.58    | 1.0                                    | 50  | 13.6   | 46.5   | AP           | KP   |
| SMBJ8.0(C)AQ  | 8.0  | 8.89   | 10.23   | 1.0                                    | 50  | 13.6   | 44.1   | AR           | KR   |
| SMBJ10(C)AQ   | 10.0   | 11.10  | 12.80   | 1.0                                    | 5.0   | 17.0   | 35.3   | AX           | KX   |
| SMBJ11(C)AQ   | 11.0   | 12.20  | 14.40   | 1.0                                    | 5.0   | 18.2   | 33.0   | AZ           | KZ   |
| SMBJ12(C)AQ   | 12.0   | 13.30  | 15.30   | 1.0                                    | 5.0   | 19.9   | 30.2   | BE           | LE   |
| SMBJ14(C)AQ   | 14.0   | 15.60  | 17.90   | 1.0                                    | 5.0   | 23.2   | 25.8   | BK           | LK   |
| SMBJ15(C)AQ   | 15.0   | 16.70  | 19.20   | 1.0                                    | 5.0   | 24.4   | 24.0   | BM           | LM   |
| SMBJ16(C)AQ   | 16.0   | 17.80  | 20.50   | 1.0                                    | 5.0   | 26.0   | 23.1   | BP           | LP   |
| SMBJ17(C)AQ   | 17.0   | 18.90  | 21.70   | 1.0                                    | 5.0   | 27.6   | 21.7   | BR           | LR   |
| SMBJ18(C)AQ   | 18.0   | 20.00  | 23.30   | 1.0                                    | 5.0   | 29.2   | 20.5   | BT           | LT   |
| SMBJ20(C)AQ   | 20.0   | 22.20  | 25.50   | 1.0                                    | 5.0   | 32.4   | 18.5   | BV           | LV   |
| SMBJ22(C)AQ   | 22.0   | 24.40  | 28.00   | 1.0                                    | 5.0   | 35.5   | 16.9   | BX           | LX   |
| SMBJ24(C)AQ   | 24.0   | 26.70  | 30.70   | 1.0                                    | 5.0   | 38.9   | 15.4   | BZ           | LZ   |
| SMBJ26(C)AQ   | 26.0   | 28.90  | 33.20   | 1.0                                    | 5.0   | 42.1   | 14.2   | CE           | ME   |
| SMBJ28(C)AQ   | 28.0   | 31.10  | 35.80   | 1.0                                    | 5.0   | 45.4   | 13.2   | CG           | MG   |
| SMBJ30(C)AQ   | 30.0   | 33.30  | 38.30   | 1.0                                    | 5.0   | 48.4   | 12.4   | CK           | MK   |
| SMBJ33(C)AQ   | 33.0   | 36.70  | 42.20   | 1.0                                    | 5.0   | 53.3   | 11.3   | CM           | MM   |
| SMBJ36(C)AQ   | 36.0   | 40.00  | 46.00   | 1.0                                    | 5.0   | 58.1   | 10.3   | CP           | MP   |
| SMBJ40(C)AQ   | 40.0   | 44.40  | 51.10   | 1.0                                    | 5.0   | 64.5   | 9.3  | CR           | MR   |
| SMBJ43(C)AQ   | 43.0   | 47.80  | 54.90   | 1.0                                    | 5.0   | 69.4   | 8.6  | CT           | MT   |
| SMBJ45(C)AQ   | 45.0   | 50.00  | 57.50   | 1.0                                    | 5.0   | 72.7   | 8.3  | CV           | MV   |
| SMBJ48(C)AQ   | 48.0   | 53.30  | 61.30   | 1.0                                    | 5.0   | 77.4   | 7.7  | CX           | MX   |
| SMBJ51(C)AQ   | 51.0   | 56.70  | 65.20   | 1.0                                    | 5.0   | 82.4   | 7.3  | CZ           | MZ   |
| SMBJ58(C)AQ   | 58.0   | 64.40  | 74.60   | 1.0                                    | 5.0   | 93.6   | 6.4  | DG           | NG   |
| SMBJ60(C)AQ   | 60.0   | 66.70  | 76.70   | 1.0                                    | 5.0   | 96.8   | 6.2  | DK           | NK   |
| SMBJ64(C)AQ   | 64.0   | 71.10  | 81.80   | 1.0                                    | 5.0   | 103.0  | 5.8  | DM           | NM   |
| SMBJ70(C)AQ   | 70.0   | 77.80  | 89.50   | 1.0                                    | 5.0   | 113.0  | 5.3  | DP           | NP   |
| SMBJ75(C)AQ   | 75.0   | 83.30  | 95.80   | 1.0                                    | 5.0   | 121.0  | 4.9  | DR           | NR   |
| SMBJ85(C)AQ   | 85.0   | 94.40  | 108.20  | 1.0                                    | 5.0   | 137.0  | 4.4  | DV           | NV   |
| SMBJ100(C)AQ  | 100.0  | 111.0  | 128.00  | 1.0                                    | 5.0   | 162.0  | 3.7  | DZ           | NZ   |
| SMBJ110(C)AQ  | 110.0  | 122.0  | 140.00  | 1.0                                    | 5.0   | 177.0  | 3.4  | EE           | PE   |
| SMBJ130(C)AQ  | 130.0  | 144.0  | 165.50  | 1.0                                    | 5.0   | 209.0  | 2.9  | EK           | PK   |
| SMBJ170(C)AQ  | 170.0  | 189.0  | 217.50  | 1.0                                    | 5.0   | 275.0  | 2.2  | ER           | PR   |
| SMBJ180(C)AQ  | 180.0  | 200.00   | 220.00  | 1.0                                    | 1.0   | 291.6  | 2.06   | ET           | PT   |
| SMBJ200(C)AQ  | 200.0  | 224.00   | 247.00  | 1.0                                    | 1.0   | 324.0  | 1.9  | EV           | PV   |

- Notes:
9. Suffix C denotes bidirectional devices.
  10. V<sub>BR</sub> measured with I<sub>T</sub> current pulse = 10ms to 15ms.
  11. For bidirectional devices having V<sub>RWM</sub> of 10V and under, the I<sub>R</sub> is doubled.
  12. Per 10 × 1000µs waveform. See Figure 4.

**SMBJ5.0(C)AQ – SMBJ200(C)AQ**

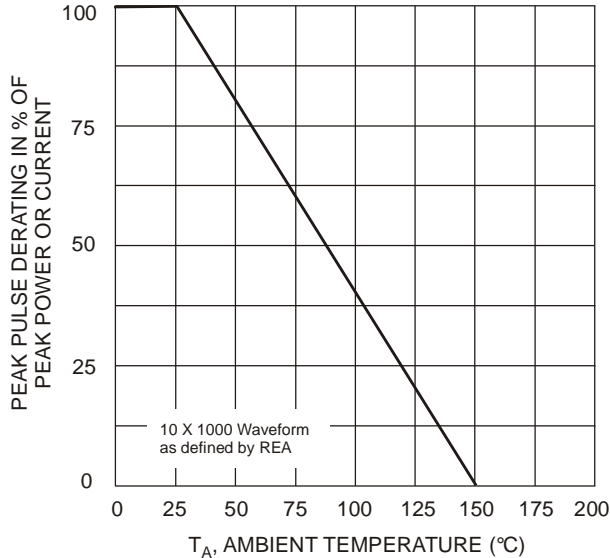


Figure 1. Pulse Derating Curve

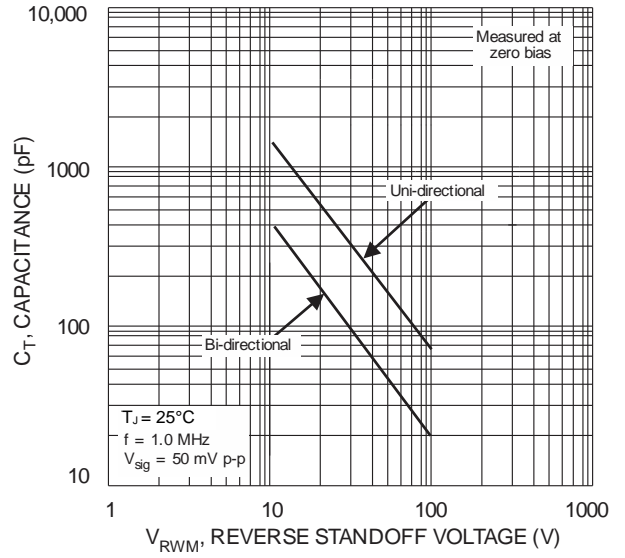


Figure 2. Typical Total Capacitance

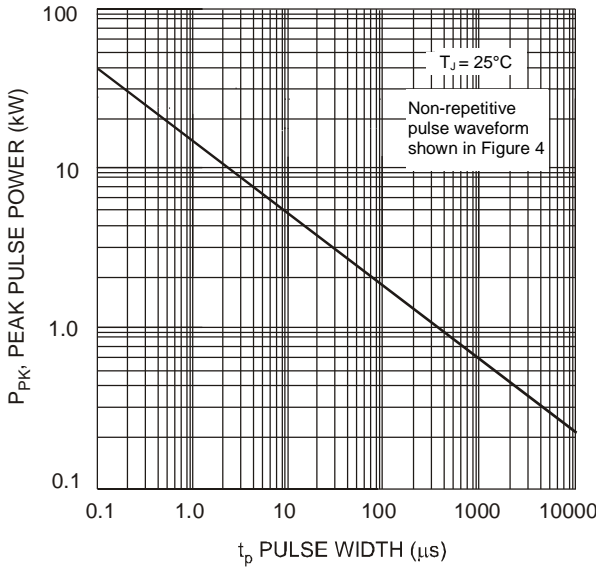


Figure 3. Pulse Rating Curve

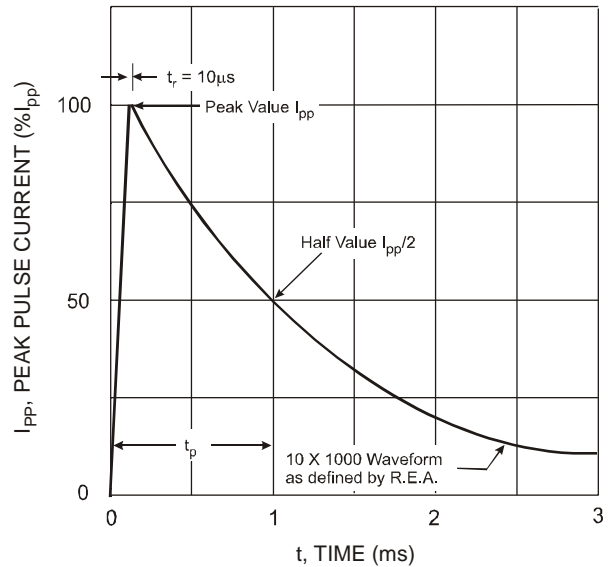


Figure 4. Pulse Waveform

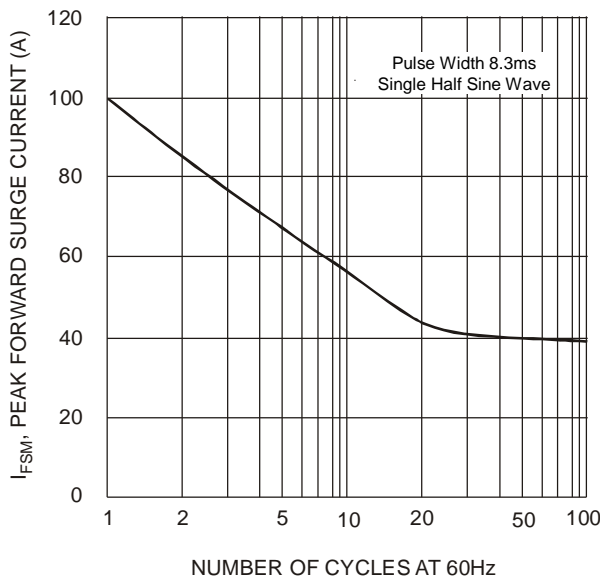


Figure 5. Maximum Non-Repetitive Surge Current

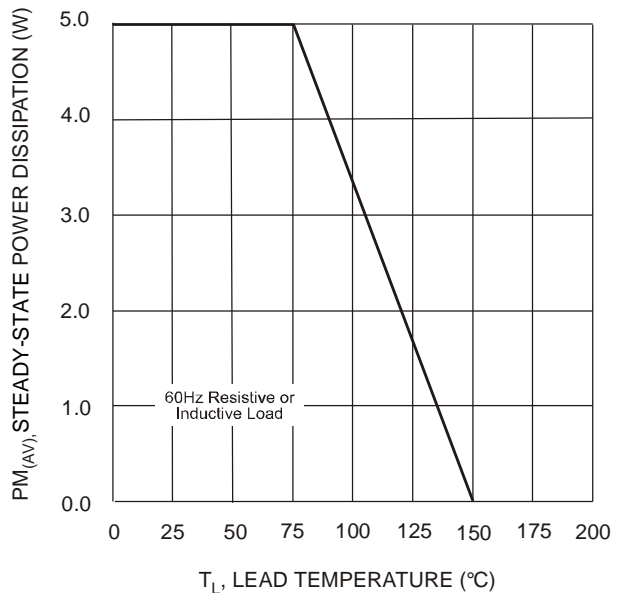
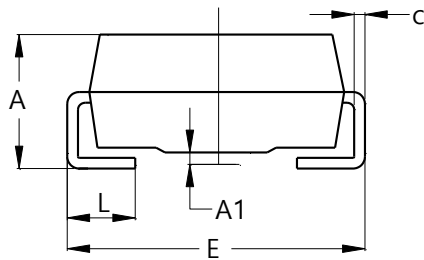
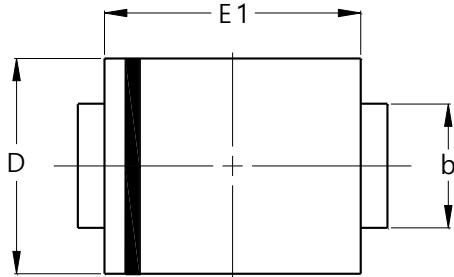


Figure 6. Steady-State Power Derating Curve

**Package Outline Dimensions** (Note 13)

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

**SMB**



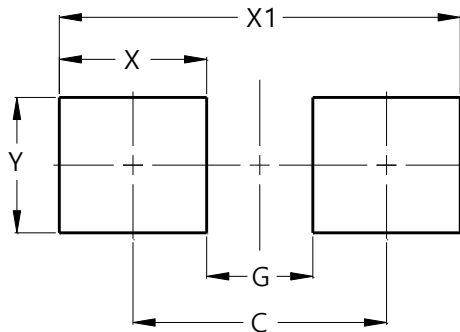
| SMB                  |      |      |
|----------------------|------|------|
| Dim                  | Min  | Max  |
| A                    | 2.00 | 2.50 |
| A1                   | 0.05 | 0.20 |
| b                    | 1.96 | 2.21 |
| c                    | 0.15 | 0.31 |
| D                    | 3.30 | 3.94 |
| E                    | 5.00 | 5.59 |
| E1                   | 4.06 | 4.57 |
| L                    | 0.76 | 1.52 |
| All Dimensions in mm |      |      |

Note: 13. The bar in the upper drawing is polarity indicator for Cathode Band. It is for unidirectional devices only. Bidirectional devices have no polarity indicator.

**Suggested Pad Layout**

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

**SMB**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 4.30          |
| G          | 1.80          |
| X          | 2.50          |
| X1         | 6.80          |
| Y          | 2.30          |

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