



**THE DATASHEET OF  
SMBJ20AQ-13-F**



**Product Summary** (@ $T_A = +25^\circ\text{C}$ )

PPK	IFSM	VRWM	PM(AV)
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:  $V_S = -150\text{V}$
  - Pulse 2a:  $V_S = +112\text{V}$
  - Pulse 3a:  $V_S = -220\text{V}$
  - Pulse 3b:  $V_S = +150\text{V}$

**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/>

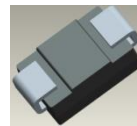
**Mechanical Data**

- 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)

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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.

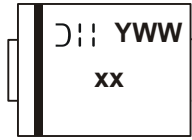
- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  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 (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 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 Add C for Bidirectional (Note 9)	Reverse Standoff Voltage V <sub>RWM</sub> (V)	Breakdown Voltage V <sub>BR</sub> @ I <sub>T</sub> (Note 10)		Test Current I <sub>T</sub> (mA)	Max Reverse Leakage @ V <sub>RWM</sub> (Note 11) I <sub>R</sub> (µA)	Max Clamping Voltage @ I <sub>PP</sub> (Note 12) V <sub>C</sub> (V)	Max Peak Pulse Current 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.

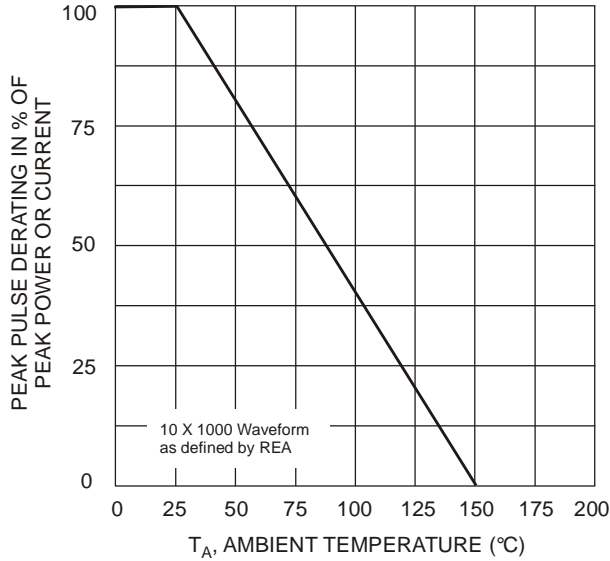


Figure 1. Pulse Derating Curve

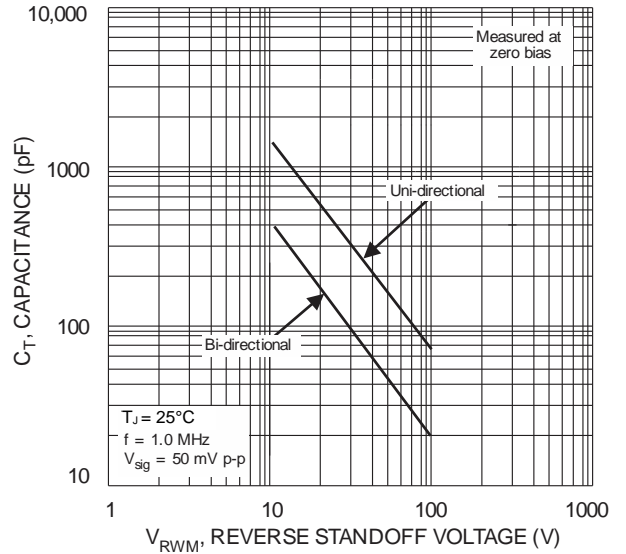


Figure 2. Typical Total Capacitance

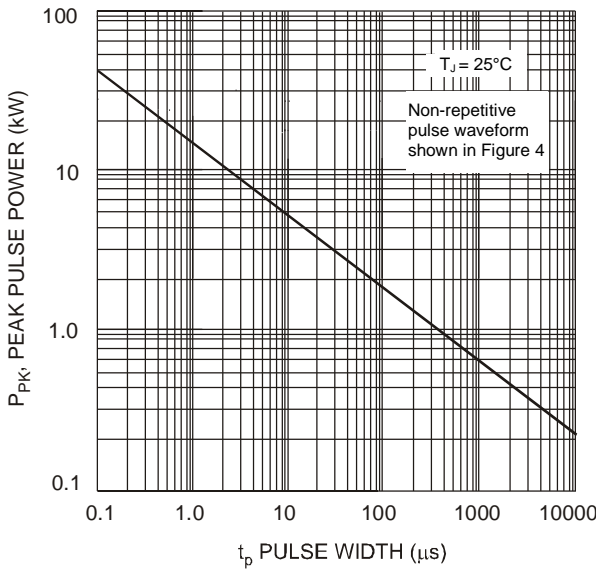


Figure 3. Pulse Rating Curve

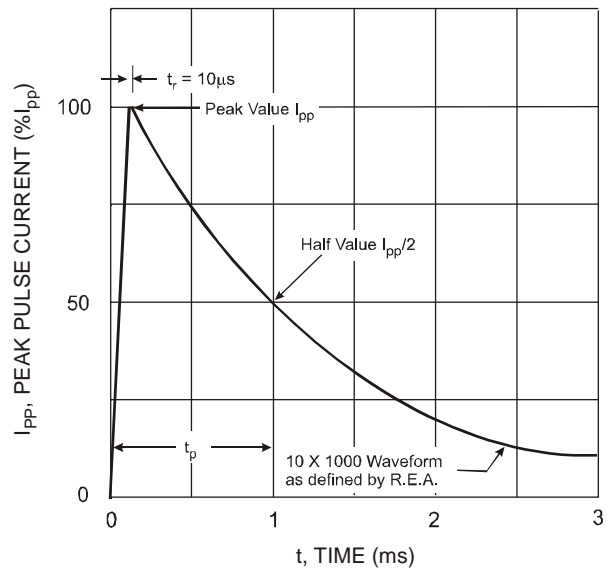


Figure 4. Pulse Waveform

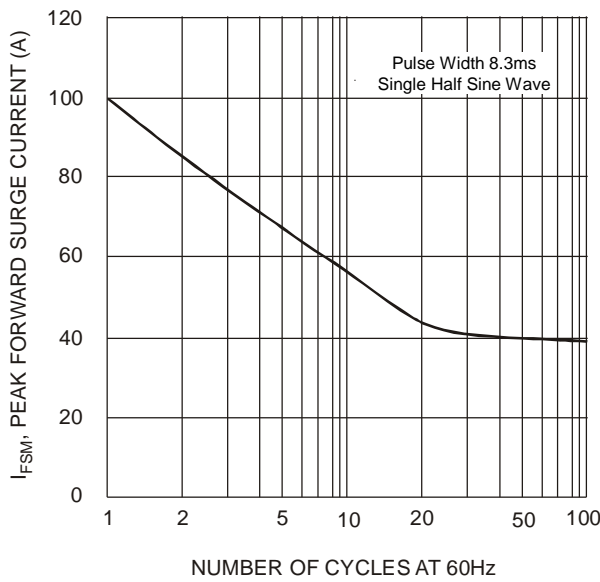


Figure 5. Maximum Non-Repetitive Surge Current

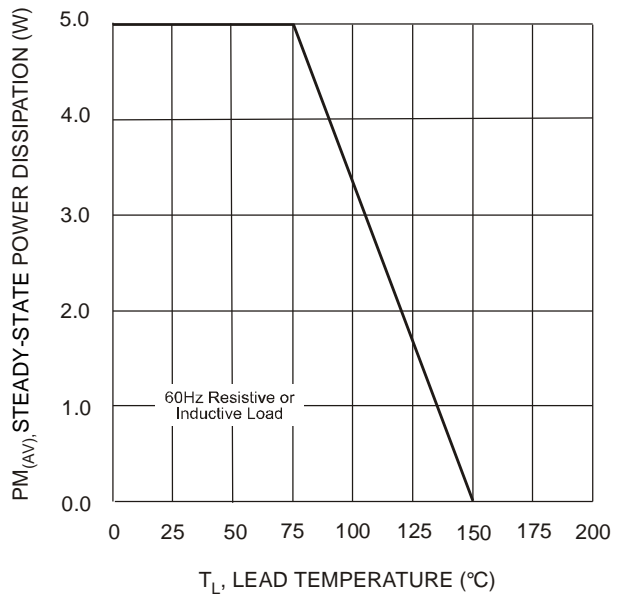
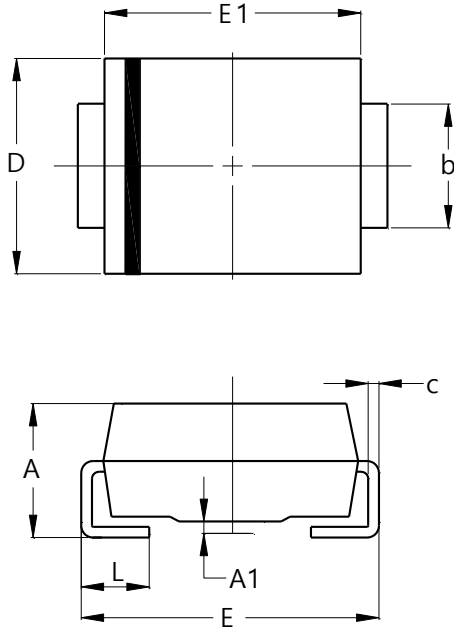


Figure 6. Steady-State Power Derating Curve

**Package Outline Dimensions** (Note 13)

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

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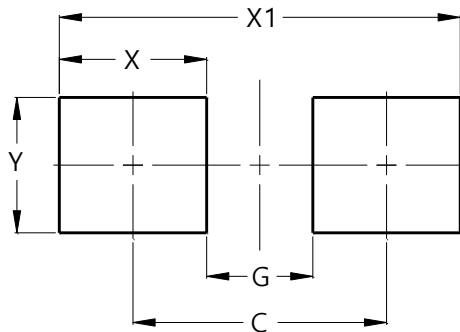
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Dim	Min	Max
A	2.00	2.50
A1	0.05	0.20
b	1.96	2.21
c	0.15	0.31
D	3.30	3.94
E	5.00	5.59
E1	4.06	4.57
L	0.76	1.52
All Dimensions in mm		

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.

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

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