


Agency Approvals

| AGENCY | AGENCY FILE NUMBER |
|---|--------------------|
|  | E128662/E230531 |

Maximum Ratings and Thermal Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|----------------|------------|--------------------|
| Peak Pulse Power Dissipation at $T_A=25^\circ\text{C}$ by 10x1000 μs waveform (Fig.1)(Note 1), (Note 2) | P_{PPM} | 600 | W |
| Power Dissipation on infinite heat sink at $T_A=50^\circ\text{C}$ | $P_{M(AV)}$ | 5.0 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3) | I_{FSM} | 100 | A |
| Maximum Instantaneous Forward Voltage at 50A for Unidirectional only (Note 4) | V_F | 3.5V/5.0 | V |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -65 to 150 | $^\circ\text{C}$ |
| Typical Thermal Resistance Junction to Lead | R_{wJL} | 20 | $^\circ\text{C/W}$ |
| Typical Thermal Resistance Junction to Ambient | R_{wJA} | 100 | $^\circ\text{C/W}$ |

Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above $T_A = 25^\circ\text{C}$ per Fig. 2.
2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.
4. $V_F < 3.5\text{V}$ for $V_{BR} \leq 200\text{V}$ and $V_F < 5.0\text{V}$ for $V_{BR} \geq 201\text{V}$.

Description

The SMBJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.


Features

- Halogen-Free
- RoHS compliant
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- Typical maximum temperature coefficient $\Delta V_{BR} = 0.1\% \times V_{BR}@25^\circ\text{C} \times \Delta T$
- Glass passivated chip junction
- 600W peak pulse power capability at 10x1000 μs waveform, repetition rate (duty cycles):0.01 %
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical I_R less than 1 μA above 12V
- High Temperature soldering guaranteed: 260 $^\circ\text{C}$ /40 seconds at terminals
- Plastic package has Underwriters Laboratory Flammability 94V-0
- Matte Tin Lead-free Plated

Applications

TVS devices are ideal for the protection of I/O Interfaces, V_{CC} bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

Electrical Characteristics

| Part Number (Uni) | Part Number (Bi) | Marking | | Reverse Stand off Voltage V_R (Volts) | Breakdown Voltage V_{BR} (Volts) @ I_T | | Test Current I_T (mA) | Maximum Clamping Voltage V_C @ I_{PP} (V) | Maximum Peak Pulse Current I_{PP} (A) | Maximum Reverse Leakage I_R @ V_R (μ A) | Agency Approval  |
|-------------------|------------------|---------|----|---|--|--------|-------------------------|---|---|--|---|
| | | UNI | BI | | MIN | MAX | | | | | |
| SMBJ5.0A | SMBJ5.0CA | KE | AE | 5.0 | 6.40 | 7.00 | 10 | 9.2 | 65.3 | 800 | X |
| SMBJ6.0A | SMBJ6.0CA | KG | AG | 6.0 | 6.67 | 7.37 | 10 | 10.3 | 58.3 | 800 | X |
| SMBJ6.5A | SMBJ6.5CA | KK | AK | 6.5 | 7.22 | 7.98 | 10 | 11.2 | 53.6 | 500 | X |
| SMBJ7.0A | SMBJ7.0CA | KM | AM | 7.0 | 7.78 | 8.60 | 10 | 12.0 | 50.0 | 200 | X |
| SMBJ7.5A | SMBJ7.5CA | KP | AP | 7.5 | 8.33 | 9.21 | 1 | 12.9 | 46.6 | 100 | X |
| SMBJ8.0A | SMBJ8.0CA | KR | AR | 8.0 | 8.89 | 9.83 | 1 | 13.6 | 44.2 | 50 | X |
| SMBJ8.5A | SMBJ8.5CA | KT | AT | 8.5 | 9.44 | 10.40 | 1 | 14.4 | 41.7 | 20 | X |
| SMBJ9.0A | SMBJ9.0CA | KV | AV | 9.0 | 10.00 | 11.10 | 1 | 15.4 | 39.0 | 10 | X |
| SMBJ10A | SMBJ10CA | KX | AX | 10.0 | 11.10 | 12.30 | 1 | 17.0 | 35.3 | 5 | X |
| SMBJ11A | SMBJ11CA | KZ | AZ | 11.0 | 12.20 | 13.50 | 1 | 18.2 | 33.0 | 1 | X |
| SMBJ12A | SMBJ12CA | LE | BE | 12.0 | 13.30 | 14.70 | 1 | 19.9 | 30.2 | 1 | X |
| SMBJ13A | SMBJ13CA | LG | BG | 13.0 | 14.40 | 15.90 | 1 | 21.5 | 28.0 | 1 | X |
| SMBJ14A | SMBJ14CA | LK | BK | 14.0 | 15.60 | 17.20 | 1 | 23.2 | 25.9 | 1 | X |
| SMBJ15A | SMBJ15CA | LM | BM | 15.0 | 16.70 | 18.50 | 1 | 24.4 | 24.6 | 1 | X |
| SMBJ16A | SMBJ16CA | LP | BP | 16.0 | 17.80 | 19.70 | 1 | 26.0 | 23.1 | 1 | X |
| SMBJ17A | SMBJ17CA | LR | BR | 17.0 | 18.90 | 20.90 | 1 | 27.6 | 21.8 | 1 | X |
| SMBJ18A | SMBJ18CA | LT | BT | 18.0 | 20.00 | 22.10 | 1 | 29.2 | 20.6 | 1 | X |
| SMBJ20A | SMBJ20CA | LV | BV | 20.0 | 22.20 | 24.50 | 1 | 32.4 | 18.6 | 1 | X |
| SMBJ22A | SMBJ22CA | LX | BX | 22.0 | 24.40 | 26.90 | 1 | 35.5 | 16.9 | 1 | X |
| SMBJ24A | SMBJ24CA | LZ | BZ | 24.0 | 26.70 | 29.50 | 1 | 38.9 | 15.5 | 1 | X |
| SMBJ26A | SMBJ26CA | ME | CE | 26.0 | 28.90 | 31.90 | 1 | 42.1 | 14.3 | 1 | X |
| SMBJ28A | SMBJ28CA | MG | CG | 28.0 | 31.10 | 34.40 | 1 | 45.4 | 13.3 | 1 | X |
| SMBJ30A | SMBJ30CA | MK | CK | 30.0 | 33.30 | 36.80 | 1 | 48.4 | 12.4 | 1 | X |
| SMBJ33A | SMBJ33CA | MM | CM | 33.0 | 36.70 | 40.60 | 1 | 53.3 | 11.3 | 1 | X |
| SMBJ36A | SMBJ36CA | MP | CP | 36.0 | 40.00 | 44.20 | 1 | 58.1 | 10.4 | 1 | X |
| SMBJ40A | SMBJ40CA | MR | CR | 40.0 | 44.40 | 49.10 | 1 | 64.5 | 9.3 | 1 | X |
| SMBJ43A | SMBJ43CA | MT | CT | 43.0 | 47.80 | 52.80 | 1 | 69.4 | 8.7 | 1 | X |
| SMBJ45A | SMBJ45CA | MV | CV | 45.0 | 50.00 | 55.30 | 1 | 72.7 | 8.3 | 1 | X |
| SMBJ48A | SMBJ48CA | MX | CX | 48.0 | 53.30 | 58.90 | 1 | 77.4 | 7.8 | 1 | X |
| SMBJ51A | SMBJ51CA | MZ | CZ | 51.0 | 56.70 | 62.70 | 1 | 82.4 | 7.3 | 1 | X |
| SMBJ54A | SMBJ54CA | NE | DE | 54.0 | 60.00 | 66.30 | 1 | 87.1 | 6.9 | 1 | X |
| SMBJ58A | SMBJ58CA | NG | DG | 58.0 | 64.40 | 71.20 | 1 | 93.6 | 6.5 | 1 | X |
| SMBJ60A | SMBJ60CA | NK | DK | 60.0 | 66.70 | 73.70 | 1 | 96.8 | 6.2 | 1 | X |
| SMBJ64A | SMBJ64CA | NM | DM | 64.0 | 71.10 | 78.60 | 1 | 103.0 | 5.9 | 1 | X |
| SMBJ70A | SMBJ70CA | NP | DP | 70.0 | 77.80 | 86.00 | 1 | 113.0 | 5.3 | 1 | X |
| SMBJ75A | SMBJ75CA | NR | DR | 75.0 | 83.30 | 92.10 | 1 | 121.0 | 5.0 | 1 | X |
| SMBJ78A | SMBJ78CA | NT | DT | 78.0 | 86.70 | 95.80 | 1 | 126.0 | 4.8 | 1 | X |
| SMBJ85A | SMBJ85CA | NV | DV | 85.0 | 94.40 | 104.00 | 1 | 137.0 | 4.4 | 1 | X |
| SMBJ90A | SMBJ90CA | NX | DX | 90.0 | 100.00 | 111.00 | 1 | 146.0 | 4.1 | 1 | X |
| SMBJ100A | SMBJ100CA | NZ | DZ | 100.0 | 111.00 | 123.00 | 1 | 162.0 | 3.7 | 1 | X |
| SMBJ110A | SMBJ110CA | PE | EE | 110.0 | 122.00 | 135.00 | 1 | 177.0 | 3.4 | 1 | X |
| SMBJ120A | SMBJ120CA | PG | EG | 120.0 | 133.00 | 147.00 | 1 | 193.0 | 3.1 | 1 | X |
| SMBJ130A | SMBJ130CA | PK | EK | 130.0 | 144.00 | 159.00 | 1 | 209.0 | 2.9 | 1 | X |
| SMBJ150A | SMBJ150CA | PM | EM | 150.0 | 167.00 | 185.00 | 1 | 243.0 | 2.5 | 1 | X |
| SMBJ160A | SMBJ160CA | PP | EP | 160.0 | 178.00 | 197.00 | 1 | 259.0 | 2.3 | 1 | X |
| SMBJ170A | SMBJ170CA | PR | ER | 170.0 | 189.00 | 209.00 | 1 | 275.0 | 2.2 | 1 | X |
| SMBJ180A | SMBJ180CA | PT | ET | 180.0 | 201.00 | 222.00 | 1 | 292.0 | 2.1 | 1 | X |
| SMBJ200A | SMBJ200CA | PV | EV | 200.0 | 224.00 | 247.00 | 1 | 324.0 | 1.9 | 1 | X |
| SMBJ220A | SMBJ220CA | PX | EX | 220.0 | 246.00 | 272.00 | 1 | 356.0 | 1.7 | 1 | X |
| SMBJ250A | SMBJ250CA | PZ | EZ | 250.0 | 279.00 | 309.00 | 1 | 405.0 | 1.5 | 1 | X |
| SMBJ300A | SMBJ300CA | QE | FE | 300.0 | 335.00 | 371.00 | 1 | 486.0 | 1.3 | 1 | X |
| SMBJ350A | SMBJ350CA | QG | FG | 350.0 | 391.00 | 432.00 | 1 | 567.0 | 1.1 | 1 | X |
| SMBJ400A | SMBJ400CA | QK | FK | 400.0 | 447.00 | 494.00 | 1 | 648.0 | 0.9 | 1 | X |
| SMBJ440A | SMBJ440CA | QM | FM | 440.0 | 492.00 | 543.00 | 1 | 713.0 | 0.9 | 1 | X |

For bidirectional type having V_R of 10 volts and less, the I_R limit is double.

For parts without A, the V_{BR} is $\pm 10\%$ and V_C is 5% higher than with A parts.

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

Figure 1 - Peak Pulse Power Rating

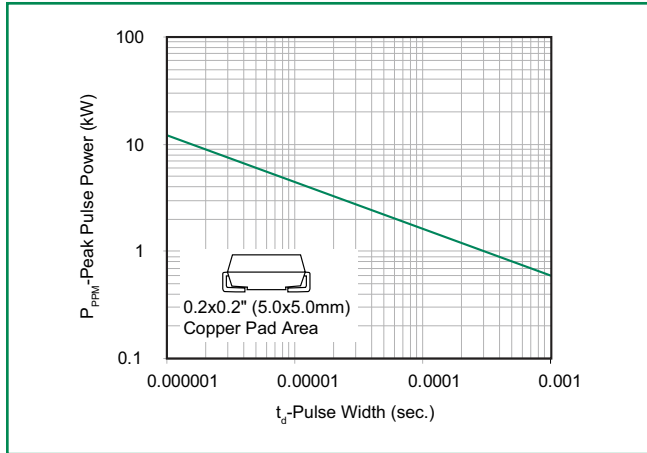


Figure 2 - Pulse Derating Curve

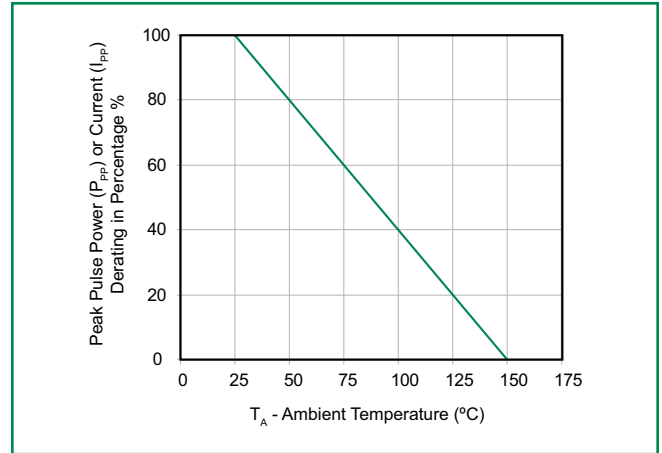


Figure 3 - Pulse Waveform

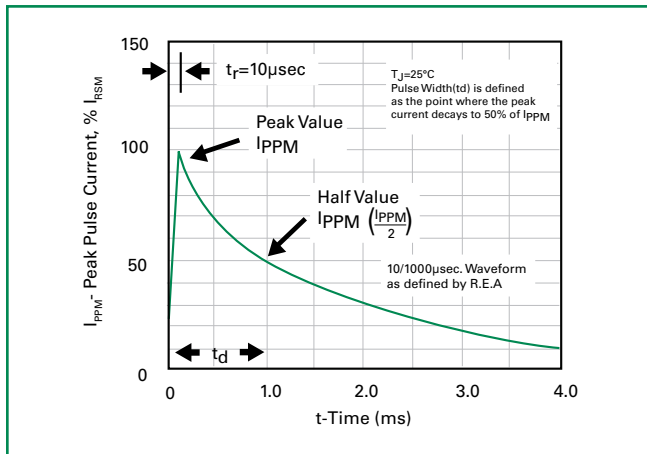


Figure 4 - Typical Junction Capacitance

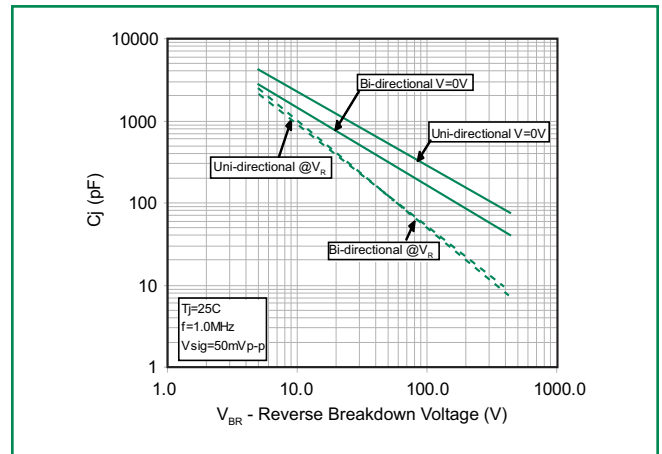


Figure 5 - Steady State Power Dissipation Derating Curve

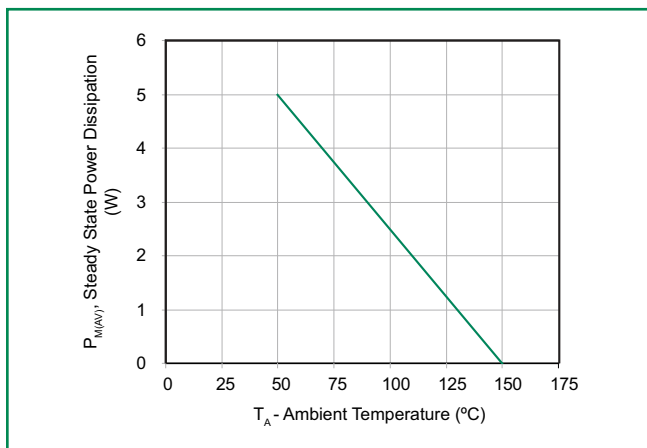
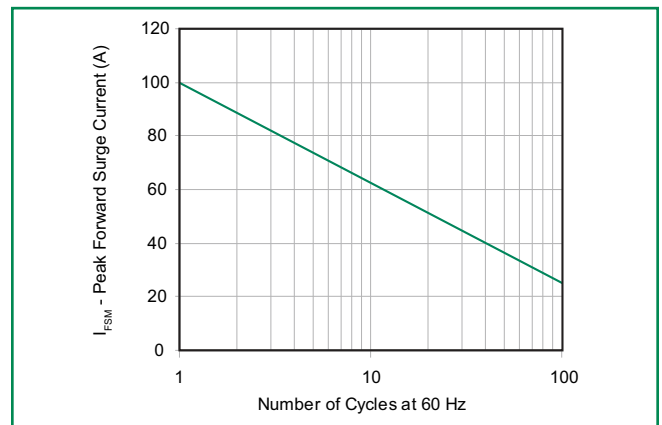
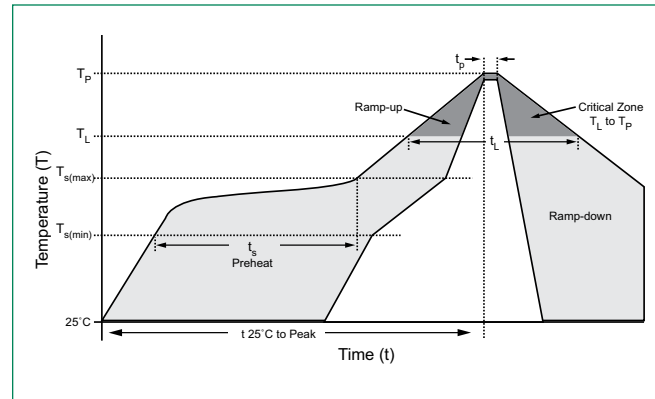


Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



Soldering Parameters

| | | |
|--|------------------------------------|-------------------------|
| Reflow Condition | | Lead-free assembly |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (min to max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus Temp (T_L) to peak) | | 3°C/second max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/second max |
| Reflow | - Temperature (T_L) (Liquidus) | 217°C |
| | - Time (min to max) (t_s) | 60 – 150 seconds |
| Peak Temperature (T_p) | | 260 ^{+0/-5} °C |
| Time within 5°C of actual peak Temperature (t_p) | | 20 – 40 seconds |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature (T_p) | | 8 minutes Max. |
| Do not exceed | | 280°C |



Physical Specifications

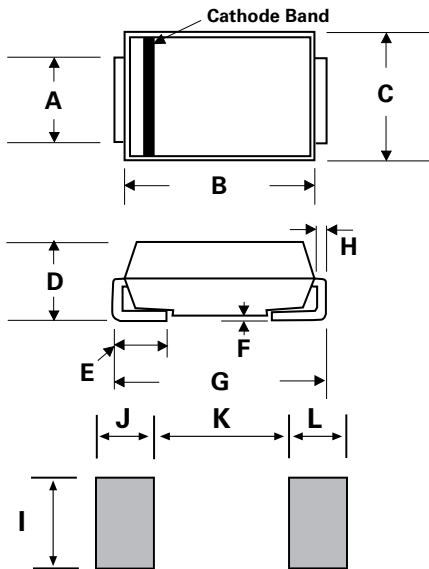
| | |
|-----------------|---|
| Weight | 0.003 ounce, 0.093 grams |
| Case | JEDEC DO214AA. Molded plastic body over glass passivated junction |
| Polarity | Color band denotes cathode except Bidirectional |
| Terminal | Matte Tin-plated leads, Solderable per JESD22-B102D |

Environmental Specifications

| | |
|---------------------------|--------------|
| Temperature Cycle | JESD22-A104 |
| Pressure Cooker | JESD 22-A102 |
| High Temp. Storage | JESD22-A103 |
| HTRB | JESD22-A108 |
| Thermal Shock | JESD22-A106 |

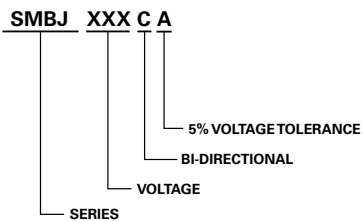
Dimensions

DO-214AA (SMB J-Bend)

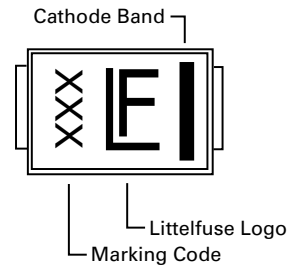


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.077 | 0.086 | 1.950 | 2.200 |
| B | 0.160 | 0.180 | 4.060 | 4.570 |
| C | 0.130 | 0.155 | 3.300 | 3.940 |
| D | 0.084 | 0.096 | 2.130 | 2.440 |
| E | 0.030 | 0.060 | 0.760 | 1.520 |
| F | - | 0.008 | - | 0.203 |
| G | 0.205 | 0.220 | 5.210 | 5.590 |
| H | 0.006 | 0.012 | 0.152 | 0.305 |
| I | 0.089 | - | 2.260 | - |
| J | 0.085 | - | 2.160 | - |
| K | - | 0.107 | - | 2.740 |
| L | 0.085 | - | 2.160 | - |

Part Numbering System



Part Marking System



Packaging

| Part number | Component Package | Quantity | Packaging Option | Packaging Specification |
|-------------|-------------------|----------|-----------------------------|-------------------------|
| SMBJxxxXX | DO-214AA | 3000 | Tape & Reel – 12mm/13" tape | EIA STD RS-481 |

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