



Part Number: **SMBJ5.0A**

Technology: **TVS Diodes**

Series: **SMBJ**

SMBJ Series - 600W Surface Mount TVS Diode

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

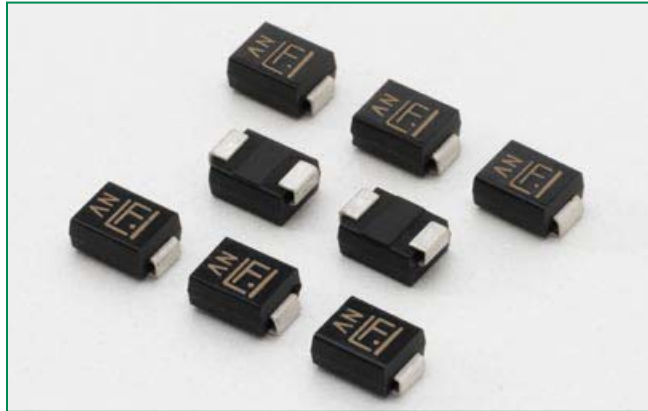
TVS devices are ideal for the protection of I/O Interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

Features:

- Halogen-Free and RoHS complaint
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- Typical maximum temperature coefficient $\Delta VBR = 0.1\% \times VBR@25^{\circ}C \times \Delta T$
- Glass passivated chip junction
- 600W peak pulse power capability at $10 \times 1000\mu s$ 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 IR less than $1\mu A$ above 12V
- High Temperature soldering guaranteed: $260^{\circ}C/40$ seconds at terminals
- Plastic package has Underwriters Laboratory Flammability 94V-O

Electrical Characteristics

| Property | Value |
|--------------------------|----------|
| I_R | 800 |
| Max Temp (°C) | 150 |
| Polarity | Unipolar |
| Tolerance | 5 |
| V_{SO} | 5 |
| Watts | 600 |
| V_R (V) | 5 |
| V_{BR} MIN (V) | 6.4 |
| V_{BR} MAX (V) | 7 |
| I_T (mA) | 10 |
| V_{CL} @ I_{PP} (μA) | 9.2 |
| I_{PP} 10x1000(A) | 65.3 |
| I_{PP} (A) | 65.3 |
| P_{PP} 10x1000μs (W) | 600 |



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 | $R_{\theta JL}$ | 20 | $^\circ\text{C/W}$ |
| Typical Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | 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

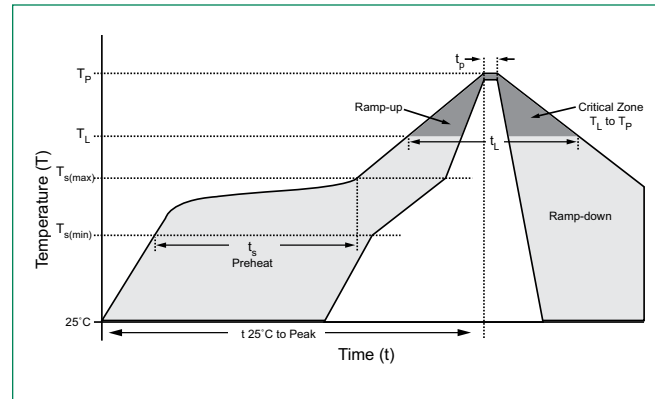
| Part Number (Uni) | Part Number (Bi) | Marking | | Reverse Stand off Voltage V_R (Volts) | Breakdown Voltage V_{BR} (Volts) @ I_T | | Test Current I_T (mA) | Maximum Clamping Voltage V_C @ I_{PP} (V) | Maximum Peak Pulse Current I_{PP} (A) | Maximum Reverse Leakage I_R @ V_R (μ A) | Agency Approval  |
|-------------------|------------------|---------|----|---|--|--------|-------------------------|---|---|--|---|
| | | 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.

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

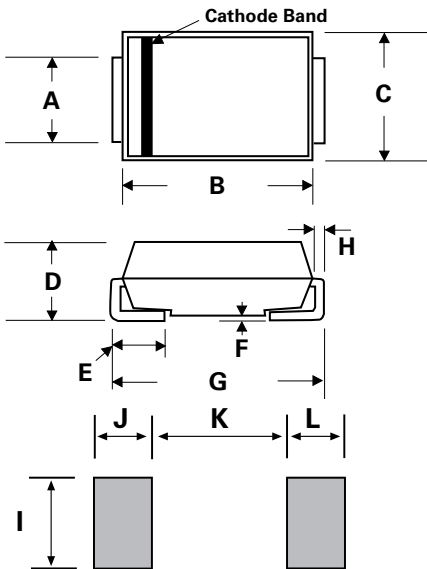
| | |
|-----------------|---|
| Weight | 0.003 ounce, 0.093 grams |
| Case | JEDEC DO214AA. Molded plastic body over glass passivated junction |
| Polarity | Color band denotes cathode except Bidirectional |
| Terminal | Matte Tin-plated leads, Solderable per JESD22-B102D |

Environmental Specifications

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

Dimensions

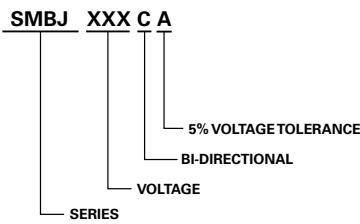
DO-214AA (SMB J-Bend)



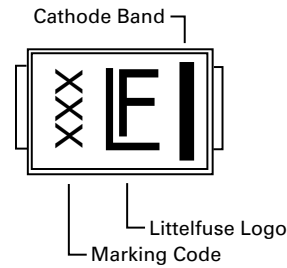
| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.077 | 0.086 | 1.950 | 2.200 |
| B | 0.160 | 0.180 | 4.060 | 4.570 |
| C | 0.130 | 0.155 | 3.300 | 3.940 |
| D | 0.084 | 0.096 | 2.130 | 2.440 |
| E | 0.030 | 0.060 | 0.760 | 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 | - |

SMBJ Series

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 |