

Surface Mount TRANSZORB® Transient Voltage Suppressors


DO-214AA (SMBJ-Bend)

FEATURES

- Low profile package
- Ideal for automated placement
- $\pm 3.5\%$, very tight V_{BR} tolerance
- Available in uni-directional
- 600 W peak pulse power capability with a 10/1000 μ s waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFETs, signal lines of sensor units for consumer, computer, industrial, and telecommunication.

MECHANICAL DATA

Case: DO-214AA (SMBJ)

Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and industrial grade

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 suffix meets JESD 201 class 2 whisker test

Polarity: for uni-directional types the band denotes cathode end

| PRIMARY CHARACTERISTICS | |
|-------------------------------|-----------------|
| V_{BR} (uni-directional) | 6.5 V to 228 V |
| V_{WM} | 5.0 V to 188 V |
| P_{PPM} | 600 W |
| P_D at $T_M = 50\text{ °C}$ | 5.0 W |
| P_D at $T_A = 25\text{ °C}$ | 1.0 W |
| T_J max. | 150 °C |
| Polarity | Uni-directional |
| Package | DO-214AA (SMBJ) |

| MAXIMUM RATINGS ($T_A = 25\text{ °C}$ unless otherwise noted) | | | | |
|--|---------------------------------|-----------------|----------------|------|
| PARAMETER | | SYMBOL | VALUE | UNIT |
| Peak pulse power dissipation | with a 10/1000 μ s waveform | $P_{PPM}^{(1)}$ | 600 | W |
| Peak pulse current | with a 10/1000 μ s waveform | $I_{PPM}^{(1)}$ | See next table | A |
| Power dissipation | $T_M = 50\text{ °C}$ | $P_D^{(2)}$ | 5.0 | W |
| | $T_A = 25\text{ °C}$ | $P_D^{(3)}$ | 1.0 | |
| Operating junction and storage temperature range | | T_J, T_{STG} | -55 to +150 | °C |

Notes

- (1) Non-repetitive current pulse, per fig. 3 and derated above $T_A = 25\text{ °C}$ per fig. 2
- (2) Power dissipation mounted on infinite heatsink
- (3) Power dissipation mounted on minimum recommended pad layout

**ELECTRICAL CHARACTERISTICS** ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

| DEVICE TYPE MODIFIED "J" BEND LEAD | DEVICE MARKING CODE | BREAKDOWN VOLTAGE V_{BR} AT I_T ⁽¹⁾ (V) | | TEST CURRENT I_T (mA) | STAND-OFF VOLTAGE V_{WM} (V) | MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (μA) ⁽³⁾ | MAXIMUM PEAK PULSE SURGE CURRENT I_{PPM} (A) ⁽²⁾ | MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V) |
|--|---------------------------|---|------|----------------------------------|--------------------------------------|--|---|---|
| | | MIN. | MAX. | | | | | |
| SMBJ5.0D | 6AA | 6.50 | 6.97 | 10 | 5.0 | 800 | 65.9 | 9.1 |
| SMBJ6.0D | 6AB | 6.77 | 7.27 | 10 | 6.0 | 800 | 58.9 | 10.2 |
| SMBJ6.5D | 6AC | 7.33 | 7.87 | 10 | 6.5 | 500 | 54.5 | 11.0 |
| SMBJ7.0D | 6AD | 7.90 | 8.48 | 10 | 7.0 | 200 | 50.8 | 11.8 |
| SMBJ7.5D | 6AE | 8.46 | 9.08 | 1.0 | 7.5 | 100 | 47.2 | 12.7 |
| SMBJ8.0D | 6AF | 9.03 | 9.69 | 1.0 | 8.0 | 50 | 44.8 | 13.4 |
| SMBJ8.5D | 6AG | 9.57 | 10.3 | 1.0 | 8.5 | 20 | 42.2 | 14.3 |
| SMBJ9.0D | 6AH | 10.2 | 10.9 | 1.0 | 9.0 | 10 | 39.7 | 15.1 |
| SMBJ10D | 6AK | 11.3 | 12.1 | 1.0 | 10 | 5.0 | 35.9 | 16.7 |
| SMBJ11D | 6AL | 12.4 | 13.3 | 1.0 | 11 | 5.0 | 33.5 | 17.9 |
| SMBJ12D | 6AM | 13.5 | 14.5 | 1.0 | 12 | 5.0 | 30.6 | 19.6 |
| SMBJ13D | 6AN | 14.6 | 15.7 | 1.0 | 13 | 1.0 | 28.3 | 21.2 |
| SMBJ14D | 6AP | 15.8 | 17.0 | 1.0 | 14 | 1.0 | 26.2 | 22.9 |
| SMBJ15D | 6AQ | 17.0 | 18.2 | 1.0 | 15 | 1.0 | 25.0 | 24.0 |
| SMBJ16D | 6AR | 18.1 | 19.4 | 1.0 | 16 | 1.0 | 23.4 | 25.6 |
| SMBJ17D | 6AS | 19.2 | 20.6 | 1.0 | 17 | 1.0 | 22.1 | 27.2 |
| SMBJ18D | 6AT | 20.3 | 21.8 | 1.0 | 18 | 1.0 | 20.8 | 28.8 |
| SMBJ20D | 6AU | 22.5 | 24.2 | 1.0 | 20 | 1.0 | 18.8 | 32.0 |
| SMBJ22D | 6AV | 24.8 | 26.6 | 1.0 | 22 | 1.0 | 17.1 | 35.1 |
| SMBJ24D | 6AW | 27.1 | 29.1 | 1.0 | 24 | 1.0 | 15.6 | 38.4 |
| SMBJ26D | 6AX | 29.3 | 31.5 | 1.0 | 26 | 1.0 | 14.5 | 41.6 |
| SMBJ28D | 6AY | 31.6 | 33.9 | 1.0 | 28 | 1.0 | 13.4 | 44.7 |
| SMBJ30D | 6AZ | 33.8 | 36.3 | 1.0 | 30 | 1.0 | 12.6 | 47.7 |
| SMBJ33D | 6BA | 37.3 | 40.0 | 1.0 | 33 | 1.0 | 11.5 | 52.5 |
| SMBJ36D | 6BB | 40.6 | 43.6 | 1.0 | 36 | 1.0 | 10.5 | 57.3 |
| SMBJ40D | 6BC | 45.1 | 48.4 | 1.0 | 40 | 1.0 | 9.43 | 63.6 |
| SMBJ43D | 6BD | 48.5 | 52.1 | 1.0 | 43 | 1.0 | 8.76 | 68.5 |
| SMBJ45D | 6BE | 50.8 | 54.5 | 1.0 | 45 | 1.0 | 8.40 | 71.6 |
| SMBJ48D | 6BF | 54.1 | 58.1 | 1.0 | 48 | 1.0 | 7.90 | 76.3 |
| SMBJ51D | 6BG | 57.6 | 61.8 | 1.0 | 51 | 1.0 | 7.40 | 81.2 |
| SMBJ54D | 6BH | 60.9 | 65.4 | 1.0 | 54 | 1.0 | 7.00 | 85.9 |
| SMBJ58D | 6BK | 65.4 | 70.2 | 1.0 | 58 | 1.0 | 6.50 | 92.3 |
| SMBJ60D | 6BL | 67.7 | 72.7 | 1.0 | 60 | 1.0 | 6.28 | 95.5 |
| SMBJ64D | 6BM | 72.2 | 77.5 | 1.0 | 64 | 1.0 | 5.88 | 102 |
| SMBJ70D | 6BN | 79.0 | 84.8 | 1.0 | 70 | 1.0 | 5.40 | 111 |
| SMBJ75D | 6BP | 84.6 | 90.8 | 1.0 | 75 | 1.0 | 5.06 | 119 |
| SMBJ78D | 6BQ | 88.1 | 94.4 | 1.0 | 78 | 1.0 | 4.86 | 124 |
| SMBJ85D | 6BR | 95.7 | 103 | 1.0 | 85 | 1.0 | 4.46 | 135 |
| SMBJ90D | 6BS | 102 | 109 | 1.0 | 90 | 1.0 | 4.17 | 144 |
| SMBJ100D | 6BT | 113 | 121 | 1.0 | 100 | 1.0 | 3.77 | 159 |
| SMBJ110D | 6BU | 124 | 133 | 1.0 | 110 | 1.0 | 3.45 | 174 |
| SMBJ120D | 6BV | 135 | 145 | 1.0 | 120 | 1.0 | 3.15 | 190 |
| SMBJ130D | 6BW | 146 | 157 | 1.0 | 130 | 1.0 | 2.94 | 206 |
| SMBJ150D | 6BX | 170 | 182 | 1.0 | 150 | 1.0 | 2.53 | 239 |
| SMBJ160D | 6BY | 181 | 194 | 1.0 | 160 | 1.0 | 2.34 | 256 |
| SMBJ170D | 6BZ | 192 | 206 | 1.0 | 170 | 1.0 | 2.23 | 270 |
| SMBJ188D | 6CA | 212 | 228 | 1.0 | 188 | 1.0 | 2.03 | 301 |

Notes

- (1) Pulse test: $t_p \leq 50\text{ ms}$
(2) Surge current waveform per fig. 3 and derate per fig. 2
(3) All terms and symbols are consistent with ANSI/IEEE C62.35

**THERMAL CHARACTERISTICS** ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

| PARAMETER | SYMBOL | VALUE | UNIT |
|---|-----------------------|-------|----------------------|
| Typical thermal resistance, junction to ambient | $R_{\theta JA}^{(1)}$ | 125 | $^{\circ}\text{C/W}$ |
| | $R_{\theta JA}^{(2)}$ | 100 | |
| Typical thermal resistance, junction to mount | $R_{\theta JM}$ | 20 | |

Notes

(1) Mounted on minimum recommended pad layout

(2) Mounted on 5.0 mm x 5.0 mm copper pad area

ORDERING INFORMATION (Example)

| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
|---------------|-----------------|------------------------|---------------|------------------------------------|
| SMBJ5.0D-M3/H | 0.096 | H | 750 | 7" diameter plastic tape and reel |
| SMBJ5.0D-M3/I | 0.096 | I | 3200 | 13" diameter plastic tape and reel |

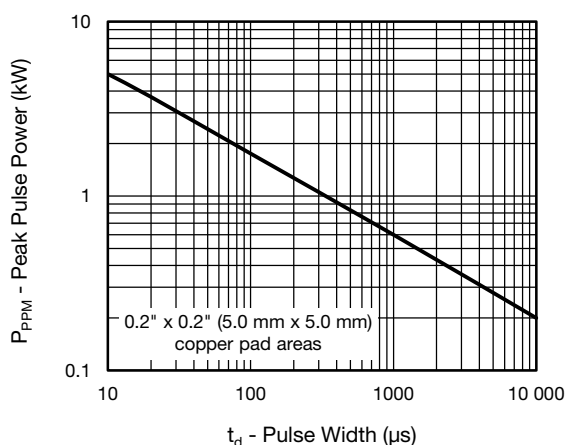
RATINGS AND CHARACTERISTICS CURVES ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

Fig. 1 - Peak Pulse Power Rating Curve

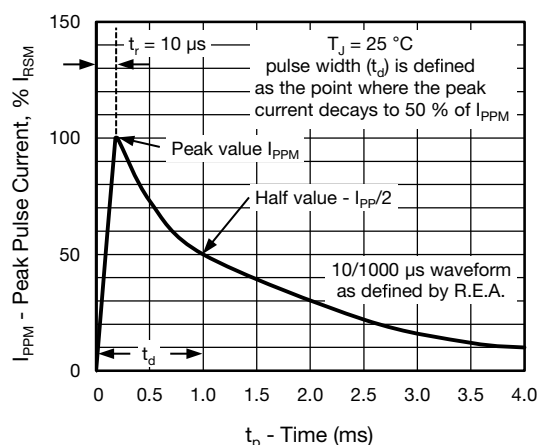


Fig. 3 - Pulse Waveform

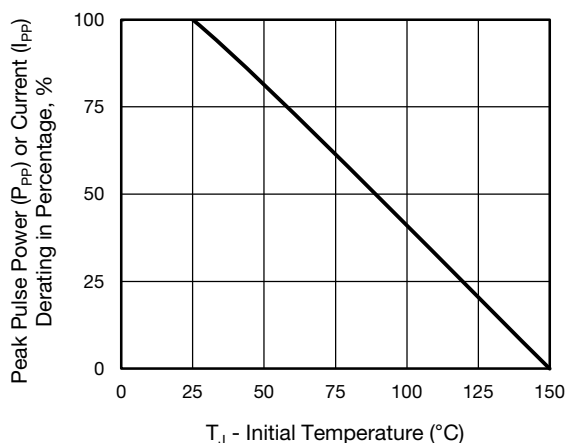


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

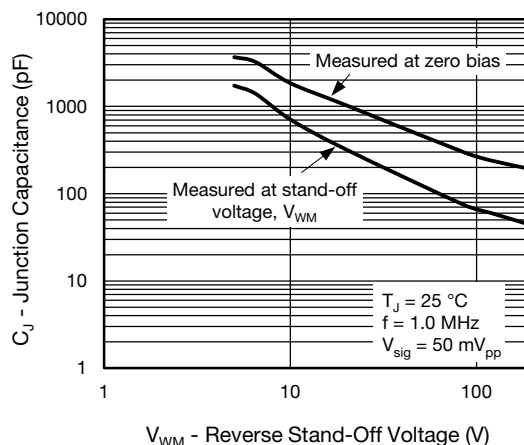


Fig. 4 - Typical Junction Capacitance

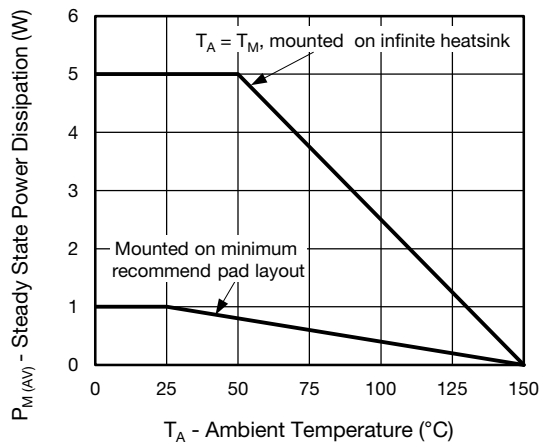


Fig. 5 - Power Dissipation Derating Curve

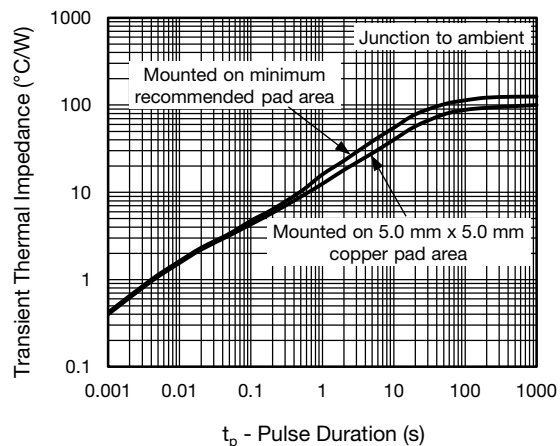
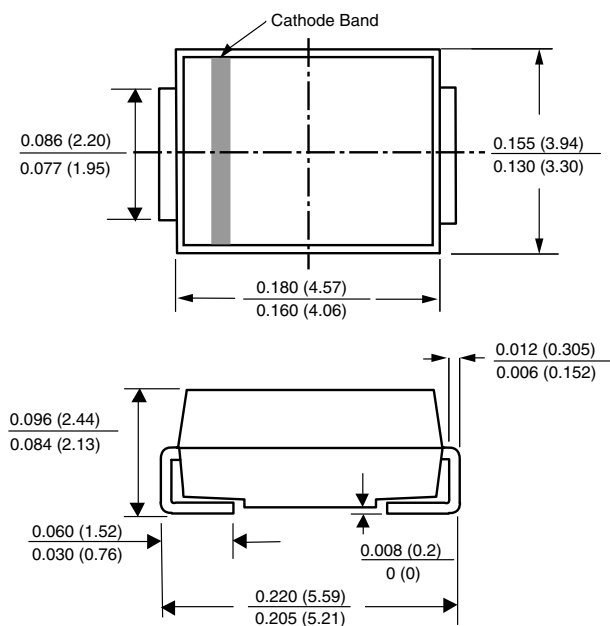
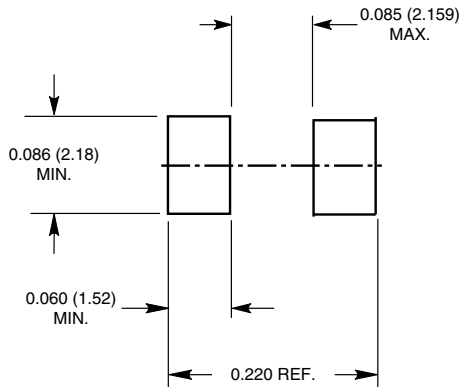


Fig. 6 - Typical Transient Thermal Impedance

Note

(1) Fig.1, 10 000 μ s P_{ppm} is actual test for $V_{WM} \leq 60$ V types, over 60 V types 10 000 μ s P_{ppm} is curve extensional value as reference only

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-214AA (SMB-J-Bend)

Mounting Pad Layout




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