# THE DATASHEET OF

# SMB8J22C-E3/5B

# High Power Density Surface Mount TRANSZORB® Transient Voltage Suppressors

DO-214AA (SMB)

## FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in uni-directional and bi-directional
- 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
- AEC-Q101 qualified
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

## TYPICAL APPLICATIONS

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

## MECHANICAL DATA

**Case:** DO-214AA (SMBJ)
Molding compound meets UL 94 V-0 flammability rating
Base P/N-E3 - RoHS-compliant, commercial grade
Base P/NHE3 - RoHS-compliant, AEC-Q101 qualified

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102
E3 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

**Polarity:** For uni-directional types the color band denotes cathode end, no marking on bi-directional types

| PRIMARY CHARACTERISTICS | |
|---|---|
| $V_{BR}$ (uni-directional) | 6.4 V to 49.1 V |
| $V_{BR}$ (bi-directional) | 6.4 V to 49.1 V |
| $V_{WM}$ | 5.0 V to 40 V |
| $P_{PPM}$ (uni-directional) | 1000 W |
| $P_{PPM}$ (bi-directional) | 800 W |
| $P_D$ | 100 W |
| $I_{FSM}$ (uni-directional only) | 100 A |
| $T_J$ max. | 150 °C |
| Polarity | Uni-directional, bi-directional |
| Package | DO-214AA (SMBJ) |

| MAXIMUM RATINGS ($T_A$ = 25 °C unless otherwise noted) | | | | |
|---|---|---|---|---|
| PARAMETER | | SYMBOL | VALUE | UNIT |
| Peak pulse power dissipation with a 10/1000 µs waveform (1)(2) (fig. 1) | uni-directional | $P_{PPM}$ | 1000 | W |
| | bi-directional | | 800 | |
| Peak pulse current with a 10/1000 µs waveform (1) | | $I_{PPM}$ | See next table | A |
| Peak forward surge current 8.3 ms single half sine-wave uni-directional only (2) | | $P_D$ | 100 | W |
| 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 °C per fig. 2

(2) Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal



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## UNI-DIRECTIONAL

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25 °C unless otherwise noted)

| DEVICE TYPE | 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) | MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}$ (2) (A) | MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V) |
|---|---|---|---|---|---|---|---|---|
| | | MIN. | MAX. | | | | | |
| SMB10J5.0A | 1AE | 6.40 | 7.07 | 10 | 5.0 | 1000 | 108.7 | 9.2 |
| SMB10J6.0A | 1AG | 6.67 | 7.37 | 10 | 6.0 | 1000 | 97.1 | 10.3 |
| SMB10J6.5A | 1AK | 7.22 | 7.98 | 10 | 6.5 | 500 | 89.3 | 11.2 |
| SMB10J7.0A | 1AM | 7.78 | 8.60 | 10 | 7.0 | 200 | 83.3 | 12.0 |
| SMB10J7.5A | 1AP | 8.33 | 9.21 | 1.0 | 7.5 | 100 | 77.5 | 12.9 |
| SMB10J8.0A | 1AR | 8.89 | 9.83 | 1.0 | 8.0 | 50 | 73.5 | 13.6 |
| SMB10J8.5A | 1AT | 9.44 | 10.4 | 1.0 | 8.5 | 20 | 69.4 | 14.4 |
| SMB10J9.0A | 1AV | 10.0 | 11.1 | 1.0 | 9.0 | 10 | 64.9 | 15.4 |
| SMB10J10A | 1AX | 11.1 | 12.3 | 1.0 | 10 | 5.0 | 58.8 | 17.0 |
| SMB10J11A | 1AZ | 12.2 | 13.5 | 1.0 | 11 | 5.0 | 54.9 | 18.2 |
| SMB10J12A | 1BE | 13.3 | 14.7 | 1.0 | 12 | 5.0 | 50.3 | 19.9 |
| SMB10J13A | 1BG | 14.4 | 15.9 | 1.0 | 13 | 1.0 | 46.5 | 21.5 |
| SMB10J14A | 1BK | 15.6 | 17.2 | 1.0 | 14 | 1.0 | 43.1 | 23.2 |
| SMB10J15A | 1BM | 16.7 | 18.5 | 1.0 | 15 | 1.0 | 41.0 | 24.4 |
| SMB10J16A | 1BP | 17.8 | 19.7 | 1.0 | 16 | 1.0 | 38.5 | 26.0 |
| SMB10J17A | 1BR | 18.9 | 20.9 | 1.0 | 17 | 1.0 | 36.2 | 27.6 |
| SMB10J18A | 1BT | 20.0 | 22.1 | 1.0 | 18 | 1.0 | 34.2 | 29.2 |
| SMB10J20A | 1BV | 22.2 | 24.5 | 1.0 | 20 | 1.0 | 30.9 | 32.4 |
| SMB10J22A | 1BX | 24.4 | 26.9 | 1.0 | 22 | 1.0 | 28.2 | 35.5 |
| SMB10J24A | 1BZ | 26.7 | 29.5 | 1.0 | 24 | 1.0 | 25.7 | 38.9 |
| SMB10J26A | 1CE | 28.9 | 31.9 | 1.0 | 26 | 1.0 | 23.8 | 42.1 |
| SMB10J28A | 1CG | 31.1 | 34.4 | 1.0 | 28 | 1.0 | 22.0 | 45.4 |
| SMB10J30A | 1CK | 33.3 | 36.8 | 1.0 | 30 | 1.0 | 20.7 | 48.4 |
| SMB10J33A | 1CM | 36.7 | 40.6 | 1.0 | 33 | 1.0 | 18.8 | 53.3 |
| SMB10J36A | 1CP | 40.0 | 44.2 | 1.0 | 36 | 1.0 | 17.2 | 58.1 |
| SMB10J40A | 1CR | 44.4 | 49.1 | 1.0 | 40 | 1.0 | 15.5 | 64.5 |

**Notes**

(1) Pulse test: $t_p \leq 50$ 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

(4) $V_F$ = 3.5 V at $I_F$ = 50 A (uni-directional only)



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## BI-DIRECTIONAL

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25 °C unless otherwise noted)

| DEVICE TYPE | 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 $V_{WM}$ (3) $I_D$ (µA) | MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}$ (2) (A) | MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V) |
|---|---|---|---|---|---|---|---|---|
| | | MIN. | MAX. | | | | | |
| SMB8J5.0CA | 1AE | 6.40 | 7.25 | 10 | 5.0 | 2000 | 87.0 | 9.2 |
| SMB8J6.0CA | 1AG | 6.67 | 7.37 | 10 | 6.0 | 2000 | 77.7 | 10.3 |
| SMB8J6.5CA | 1AK | 7.22 | 7.98 | 10 | 6.5 | 1000 | 71.4 | 11.2 |
| SMB8J7.0CA | 1AM | 7.78 | 8.60 | 10 | 7.0 | 400 | 66.7 | 12.0 |
| SMB8J7.5CA | 1AP | 8.33 | 9.21 | 1.0 | 7.5 | 200 | 62.0 | 12.9 |
| SMB8J8.0CA | 1AR | 8.89 | 9.83 | 1.0 | 8.0 | 100 | 58.8 | 13.6 |
| SMB8J8.5CA | 1AT | 9.44 | 10.4 | 1.0 | 8.5 | 40 | 55.6 | 14.4 |
| SMB8J9.0CA | 1AV | 10.0 | 11.1 | 1.0 | 9.0 | 20 | 51.9 | 15.4 |
| SMB8J10CA | 1AX | 11.1 | 12.3 | 1.0 | 10 | 10 | 47.1 | 17.0 |
| SMB8J11CA | 1AZ | 12.2 | 13.5 | 1.0 | 11 | 5.0 | 44.0 | 18.2 |
| SMB8J12CA | 1BE | 13.3 | 14.7 | 1.0 | 12 | 5.0 | 40.2 | 19.9 |
| SMB8J13CA | 1BG | 14.4 | 15.9 | 1.0 | 13 | 1.0 | 37.2 | 21.5 |
| SMB8J14CA | 1BK | 15.6 | 17.2 | 1.0 | 14 | 1.0 | 34.5 | 23.2 |
| SMB8J15CA | 1BM | 16.7 | 18.5 | 1.0 | 15 | 1.0 | 32.8 | 24.4 |
| SMB8J16CA | 1BP | 17.8 | 19.7 | 1.0 | 16 | 1.0 | 30.8 | 26.0 |
| SMB8J17CA | 1BR | 18.9 | 20.9 | 1.0 | 17 | 1.0 | 29.0 | 27.6 |
| SMB8J18CA | 1BT | 20.0 | 22.1 | 1.0 | 18 | 1.0 | 27.4 | 29.2 |
| SMB8J20CA | 1BV | 22.2 | 24.5 | 1.0 | 20 | 1.0 | 24.7 | 32.4 |
| SMB8J22CA | 1BX | 24.4 | 26.9 | 1.0 | 22 | 1.0 | 22.5 | 35.5 |
| SMB8J24CA | 1BZ | 26.7 | 29.5 | 1.0 | 24 | 1.0 | 20.6 | 38.9 |
| SMB8J26CA | 1CE | 28.9 | 31.9 | 1.0 | 26 | 1.0 | 19.0 | 42.1 |
| SMB8J28CA | 1CG | 31.1 | 34.4 | 1.0 | 28 | 1.0 | 17.6 | 45.4 |
| SMB8J30CA | 1CK | 33.3 | 36.8 | 1.0 | 30 | 1.0 | 16.5 | 48.4 |
| SMB8J33CA | 1CM | 36.7 | 40.6 | 1.0 | 33 | 1.0 | 15.0 | 53.3 |
| SMB8J36CA | 1CP | 40.0 | 44.2 | 1.0 | 36 | 1.0 | 13.8 | 58.1 |
| SMB8J40CA | 1CR | 44.4 | 49.1 | 1.0 | 40 | 1.0 | 12.4 | 64.5 |

**Notes**

(1) Pulse test: $t_p \leq 50$ 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 °C unless otherwise noted)

| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---|---|---|
| Typical thermal resistance, junction to ambient (1) | $R_{\theta JA}$ | 72 | °C/ W |
| Typical thermal resistance, junction to lead | $R_{\theta JL}$ | 20 | |

**Note**

(1) Mounted on minimum recommended pad layout

**ORDERING INFORMATION** (Example)

| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
|---|---|---|---|---|
| SMB10J5.0A-E3/52 | 0.106 | 52 | 750 | 7" diameter plastic tape and reel |
| SMB10J5.0A-E3/5B | 0.106 | 5B | 3200 | 13" diameter plastic tape and reel |
| SMB10J5.0AHE3/52 (1) | 0.106 | 52 | 750 | 7" diameter plastic tape and reel |
| SMB10J5.0AHE3/5B (1) | 0.106 | 5B | 3200 | 13" diameter plastic tape and reel |

**Note**

(1) AEC-Q101 qualified



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## RATINGS AND CHARACTERISTICS CURVES ($T_A$ = 25 °C unless otherwise noted)

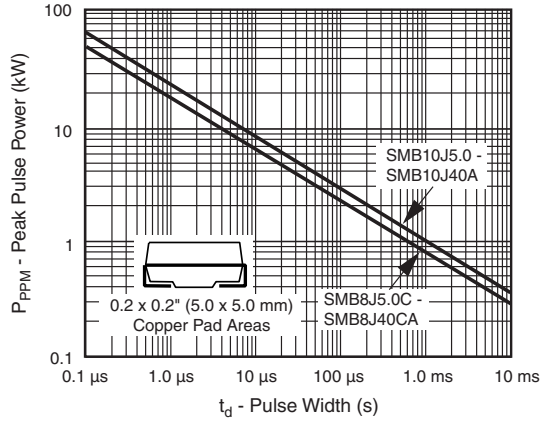


Fig. 1 - Peak Pulse Power Rating Curve

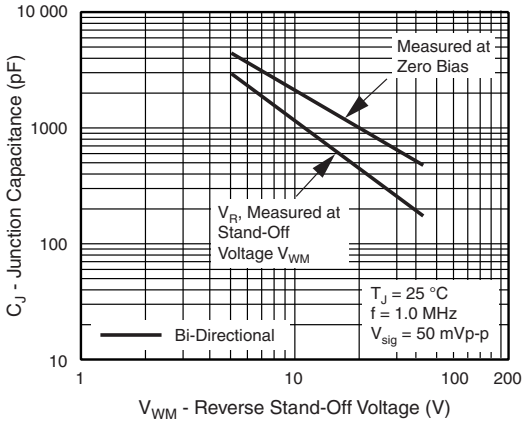


Fig. 4 - Typical Junction Capacitance

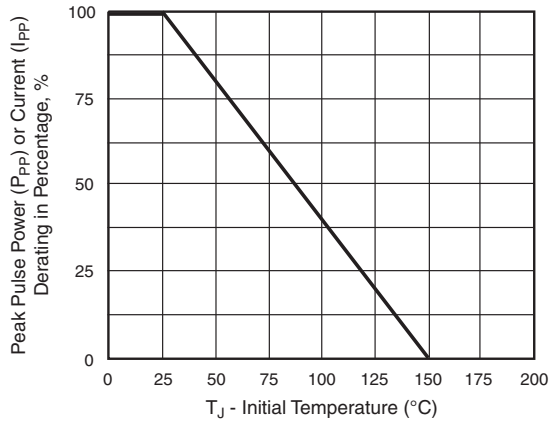


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

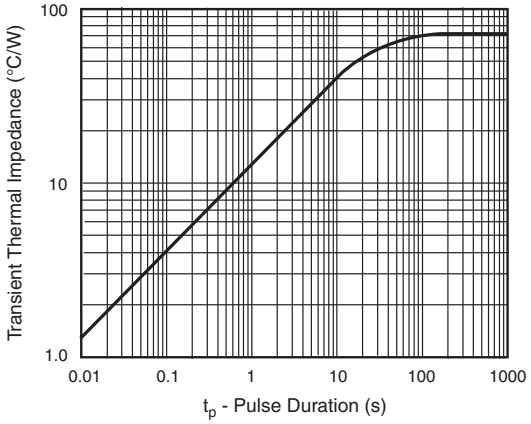


Fig. 5 - Typical Transient Thermal Impedance

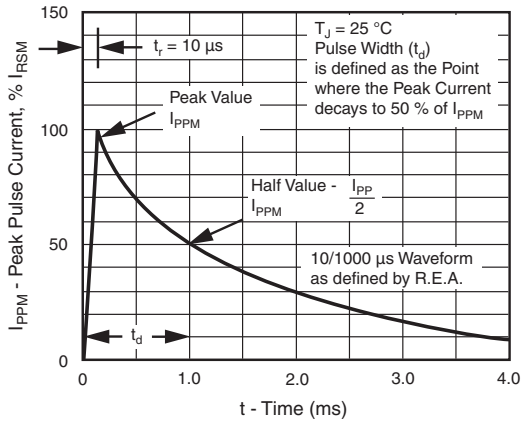


Fig. 3 - Pulse Waveform

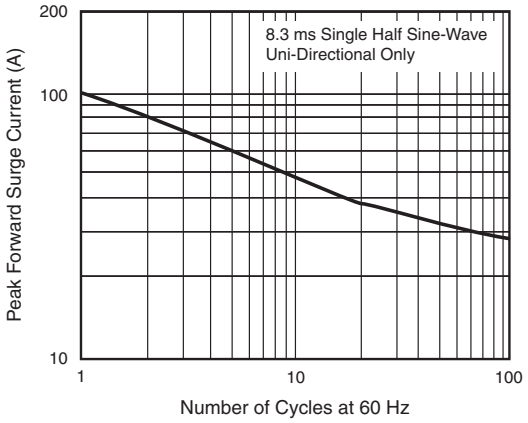


Fig. 6 - Maximum Non-Repetitive Forward Surge Current



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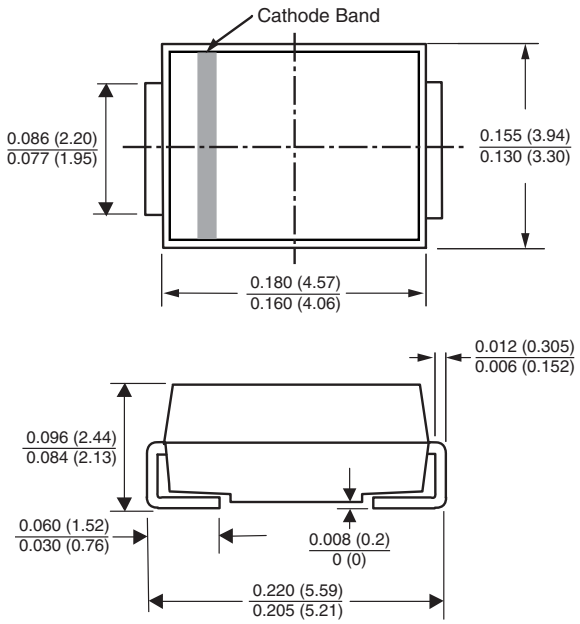
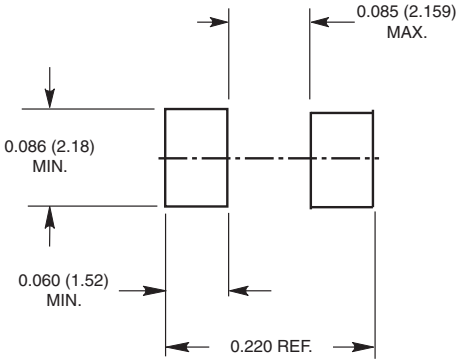
**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**DO-214AA (SMB)**




**Mounting Pad Layout**



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