

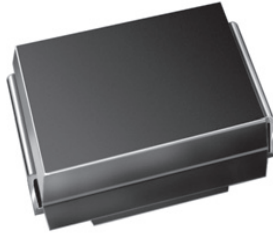


**THE DATASHEET OF
SMB10J13AHE3/52**





High Power Density Surface-Mount TRANSZORB® Transient Voltage Suppressors



SMB (DO-214AA)

LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS | |
|---|-------------------------------|
| V _{BR} (unidirectional) | 6.4 V to 49.1 V |
| V _{BR} (bidirectional) | 6.4 V to 49.1 V |
| V _{WM} | 5.0 V to 40 V |
| P _{PPM} (unidirectional) | 1000 W |
| P _{PPM} (bidirectional) | 800 W |
| I _{FSM} (uni-directional only) | 100 A |
| T _J max. | 150 °C |
| Polarity | Unidirectional, bidirectional |
| Package | SMB (DO-214AA) |

FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated pellet chip junction
- Available in unidirectional and bidirectional
- 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 available - Automotive ordering code: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS COMPLIANT
HALOGEN FREE Available

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: SMB (DO-214AA)
Molding compound meets UL 94 V-0 flammability rating
Base P/N-E3 - RoHS-compliant, commercial grade
Base P/N-M3 - halogen-free, RoHS-compliant, commercial grade
Base P/NHE3_X - RoHS-compliant and AEC-Q101 qualified
Base P/NHM3_X - halogen-free, RoHS-compliant, and AEC-Q101 qualified
(“_X” denotes revision code e.g. A, B, ...)

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

E3, M3, HE3, and HM3 suffix meets JESD 201 class 2 whisker test

Polarity: for unidirectional types the color band denotes cathode end, no marking on bidirectional types

| MAXIMUM RATINGS (T _A = 25 °C unless otherwise noted) | | | |
|--|-----------------------------------|----------------|------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Peak pulse power dissipation with a 10/1000 μs waveform (fig. 1) | unidirectional | 1000 | W |
| | bidirectional | 800 | |
| Peak pulse current with a 10/1000 μs waveform | I _{PPM} ⁽¹⁾ | See next table | A |
| Peak forward surge current 8.3 ms single half sine-wave uni-directional only | I _{FSM} ⁽²⁾ | 100 | A |
| 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



UNIDIRECTIONAL

| 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 ≤ 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)

**BIDIRECTIONAL**

| ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ 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. | | | | | |
| 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: $t_p \leq 50\text{ ms}$
(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 ⁽¹⁾ | $R_{\theta JA}$ | 72 | $^\circ\text{C}/\text{W}$ |
| 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-M3/52 | | | | |
| SMB10J5.0A-E3/5B | 0.106 | 5B | 3200 | 13" diameter plastic tape and reel |
| SMB10J5.0A-M3/5B | | | | |
| SMB10J5.0AHE3_B/H ⁽¹⁾ | 0.106 | H | 750 | 7" diameter plastic tape and reel |
| SMB10J5.0AHM3_B/H ⁽¹⁾ | | | | |
| SMB10J5.0AHE3_B/I ⁽¹⁾ | 0.106 | I | 3200 | 13" diameter plastic tape and reel |
| SMB10J5.0AHM3_B/I ⁽¹⁾ | | | | |

Note

- (1) AEC-Q101 qualified

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



Fig. 1 - Peak Pulse Power Rating Curve

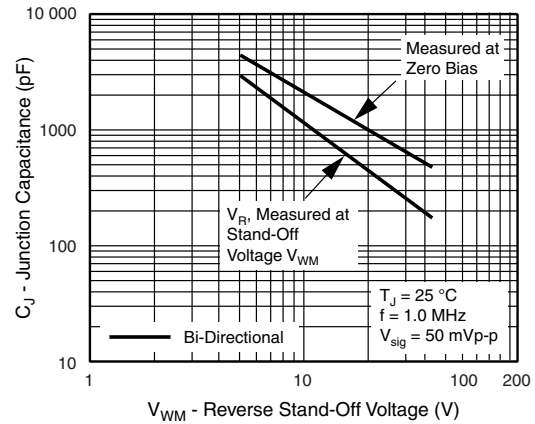


Fig. 4 - Typical Junction Capacitance

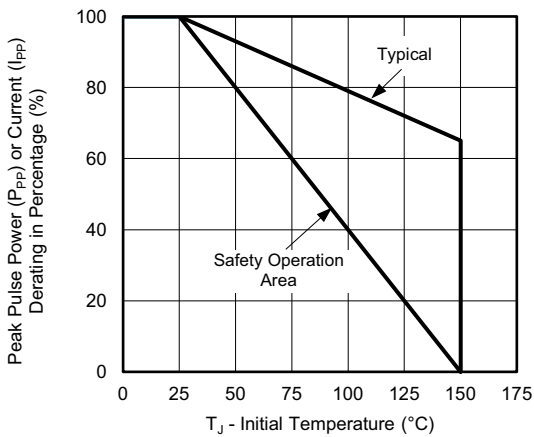


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature



Fig. 5 - Typical Transient Thermal Impedance



Fig. 3 - Pulse Waveform



Fig. 6 - Maximum Non-Repetitive Forward Surge Current



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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