

Surface Mount PAR[®] Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DO-218AB

Cathode  Anode

LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS | |
|---------------------------------|------------------|
| V_{WM} | 10 V to 43 V |
| V_{BR} | 11.1 V to 52.8 V |
| P_{PPM} (10 x 1000 μ s) | 6600 W |
| P_{PPM} (10 x 10 000 μ s) | 5200 W |
| P_D | 8 W |
| I_{FSM} | 700 A |
| T_J max. | 175 °C |
| Polarity | Unidirectional |
| Package | DO-218AB |

FEATURES

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 175$ °C capability suitable for high reliability and automotive requirement
- Available in unidirectional polarity only
- Low leakage current
- Low forward voltage drop
- High surge capability
- Meets ISO7637-2 surge specification (varied by test condition)
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °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 lightning, especially for automotive load dump protection application.

MECHANICAL DATA

Case: DO-218AB

Molding compound meets UL 94 V-0 flammability rating

Base P/NHE3_X - 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

HE3 suffix meets JESD 201 class 2 whisker test

Polarity: heatsink is anode

| MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted) | | | |
|--------------------------------------------------------------------------------------------------------------|-----------------|----------------|------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Peak pulse power dissipation with 10/1000 μs waveform | P_{PPM} | 6600 | W |
| with 10/10 000 μs waveform | | 5200 | |
| Power dissipation on infinite heatsink at $T_A = 25$ °C (fig. 1) | P_D | 8.0 | W |
| Peak pulse current with 10/1000 μ s waveform | $I_{PPM}^{(1)}$ | See next table | A |
| Peak forward surge current 8.3 ms single half sine-wave | I_{FSM} | 700 | A |
| Operating junction and storage temperature range | T_J, T_{STG} | -55 to +175 | °C |

Note

(1) Non-repetitive current pulse at $T_A = 25$ °C

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

| DEVICE TYPE | BREAKDOWN VOLTAGE V_{BR} (V) | | | TEST CURRENT I_T (mA) | STAND-OFF VOLTAGE V_{WM} (V) | MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (μA) | MAXIMUM REVERSE LEAKAGE AT V_{WM} $T_J = 175\text{ }^{\circ}\text{C}$ I_D (μA) | MAX. PEAK PULSE CURRENT AT 10/1000 μs WAVEFORM (A) | MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V) | TYPICAL TEMP. COEFFICIENT OF V_{BR} αT ($\%/^{\circ}\text{C}$) |
|-------------|--------------------------------|------|------|-------------------------|--------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------|
| | MIN. | NOM. | MAX. | | | | | | | |
| SM8S10A | 11.1 | 11.7 | 12.3 | 5.0 | 10.0 | 15 | 250 | 388 | 17.0 | 0.069 |
| SM8S11A | 12.2 | 12.9 | 13.5 | 5.0 | 11.0 | 10 | 150 | 363 | 18.2 | 0.072 |
| SM8S12A | 13.3 | 14.0 | 14.7 | 5.0 | 12.0 | 10 | 150 | 332 | 19.9 | 0.074 |
| SM8S13A | 14.4 | 15.2 | 15.9 | 5.0 | 13.0 | 10 | 150 | 307 | 21.5 | 0.076 |
| SM8S14A | 15.6 | 16.4 | 17.2 | 5.0 | 14.0 | 10 | 150 | 284 | 23.2 | 0.078 |
| SM8S15A | 16.7 | 17.6 | 18.5 | 5.0 | 15.0 | 10 | 150 | 270 | 24.4 | 0.080 |
| SM8S16A | 17.8 | 18.8 | 19.7 | 5.0 | 16.0 | 10 | 150 | 254 | 26.0 | 0.081 |
| SM8S17A | 18.9 | 19.9 | 20.9 | 5.0 | 17.0 | 10 | 150 | 239 | 27.6 | 0.082 |
| SM8S18A | 20.0 | 21.1 | 22.1 | 5.0 | 18.0 | 10 | 150 | 226 | 29.2 | 0.083 |
| SM8S20A | 22.2 | 23.4 | 24.5 | 5.0 | 20.0 | 10 | 150 | 204 | 32.4 | 0.085 |
| SM8S22A | 24.4 | 25.7 | 26.9 | 5.0 | 22.0 | 10 | 150 | 186 | 35.5 | 0.086 |
| SM8S24A | 26.7 | 28.1 | 29.5 | 5.0 | 24.0 | 10 | 150 | 170 | 38.9 | 0.087 |
| SM8S26A | 28.9 | 30.4 | 31.9 | 5.0 | 26.0 | 10 | 150 | 157 | 42.1 | 0.088 |
| SM8S28A | 31.1 | 32.8 | 34.4 | 5.0 | 28.0 | 10 | 150 | 145 | 45.4 | 0.089 |
| SM8S30A | 33.3 | 35.1 | 36.8 | 5.0 | 30.0 | 10 | 150 | 136 | 48.4 | 0.090 |
| SM8S33A | 36.7 | 38.7 | 40.6 | 5.0 | 33.0 | 10 | 150 | 124 | 53.3 | 0.091 |
| SM8S36A | 40.0 | 42.1 | 44.2 | 5.0 | 36.0 | 10 | 150 | 114 | 58.1 | 0.091 |
| SM8S40A | 44.4 | 46.8 | 49.1 | 5.0 | 40.0 | 10 | 150 | 102 | 64.5 | 0.092 |
| SM8S43A | 47.8 | 50.3 | 52.8 | 5.0 | 43.0 | 10 | 150 | 95.1 | 69.4 | 0.093 |

Notes

- For all types maximum $V_F = 1.8\text{ V}$ at $I_F = 100\text{ A}$ measured on $300\text{ }\mu\text{s}$ square pulse width

(1) To calculate V_{BR} vs. junction temperature, use the following formula: V_{BR} at $T_J = V_{BR}$ at $25\text{ }^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$

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

| PARAMETER | SYMBOL | VALUE | UNIT |
|----------------------------|---------------------|-------|----------------------|
| Typical thermal resistance | $R_{\theta JA}$ (1) | 55 | $^{\circ}\text{C/W}$ |
| | $R_{\theta JM}$ (2) | 0.35 | $^{\circ}\text{C/W}$ |

Notes

(1) Thermal resistance junction-to-ambient to follow JEDEC®51-2A, device mounted on FR4 PCB, 2 oz. standard footprint

(2) Thermal resistance junction-to-mount to follow JEDEC®51-14 using Transient Dual Interface Test Method (TDIM)



ORDERING INFORMATION TABLE

| Device code | SM | x | S | xx | A | H | E3 |
|-------------|----|---|---------------------------------------------------------------------------------------------------------|----|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | 1 | - | Surface mount | | | | |
| | 2 | - | Power dissipation P_D (5 = 5 W, 6 = 6 W, 8 = 8 W) | | | | |
| | 3 | - | Standard V_F type | | | | |
| | 4 | - | Stand-off voltage | | | | |
| | 5 | - | Breakdown voltage tolerance and polarity (A \pm 5 %, unidirectional) | | | | |
| | 6 | - | Quality grade (H = AEC-Q101 qualified, otherwise = industry grade) | | | | |
| | 7 | - | Material / Environment category (E3 = non halogen-free, RoHS-compliant, and termination lead (Pb)-free) | | | | |

| ORDERING INFORMATION (Example) | | | | |
|--------------------------------|-----------------|------------------------|---------------|---------------------------------------------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| SM8S10AHE3_A/I ⁽¹⁾ | 2.605 | I | 750 | 13" diameter plastic tape and reel, anode towards the sprocket hole |

Note

⁽¹⁾ AEC-Q101 qualified



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

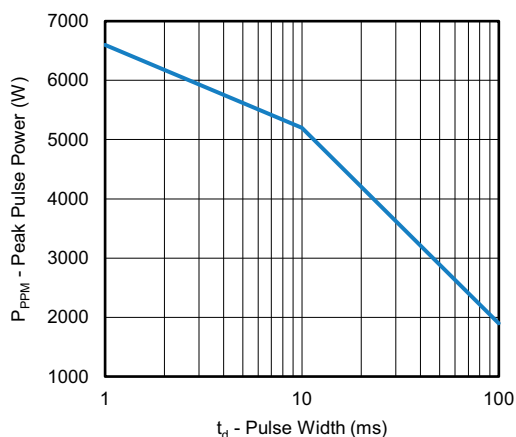


Fig. 1 - Peak Pulse Power Derating Curve

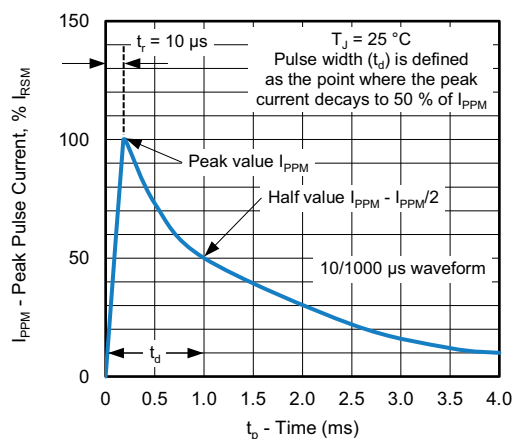


Fig. 4 - Pulse waveform

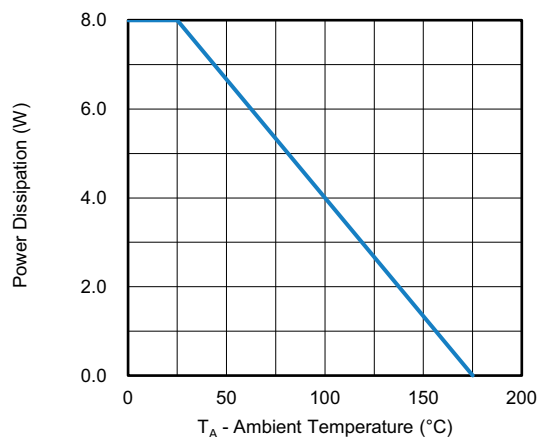


Fig. 2 - Power Derating Curve

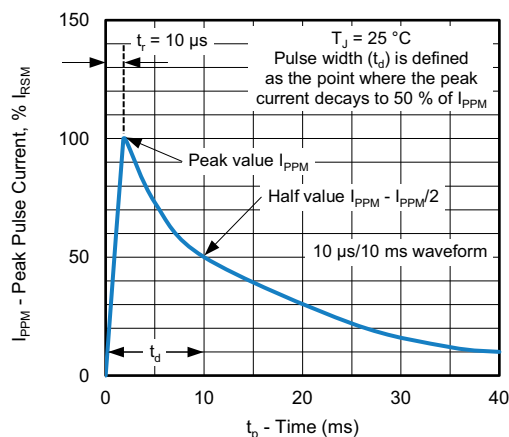


Fig. 5 - Pulse Waveform

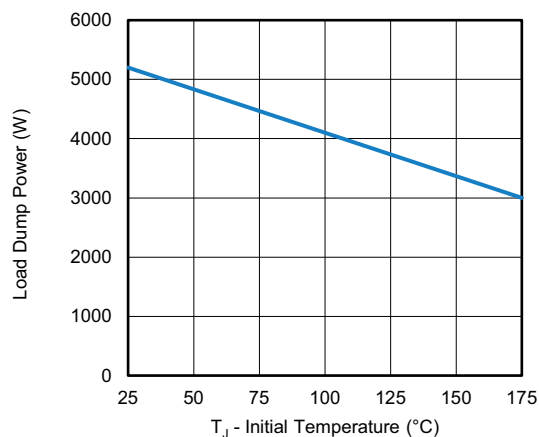


Fig. 3 - Load Dump Power Characteristics (10 ms Exponential Waveform)

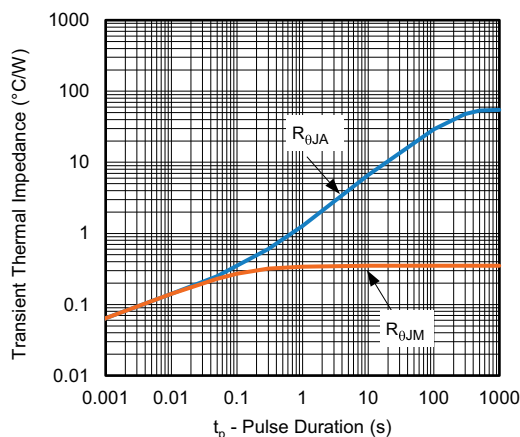


Fig. 6 - Typical Transient Thermal Impedance

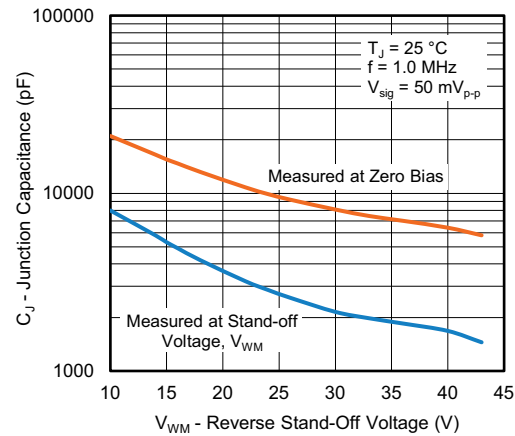
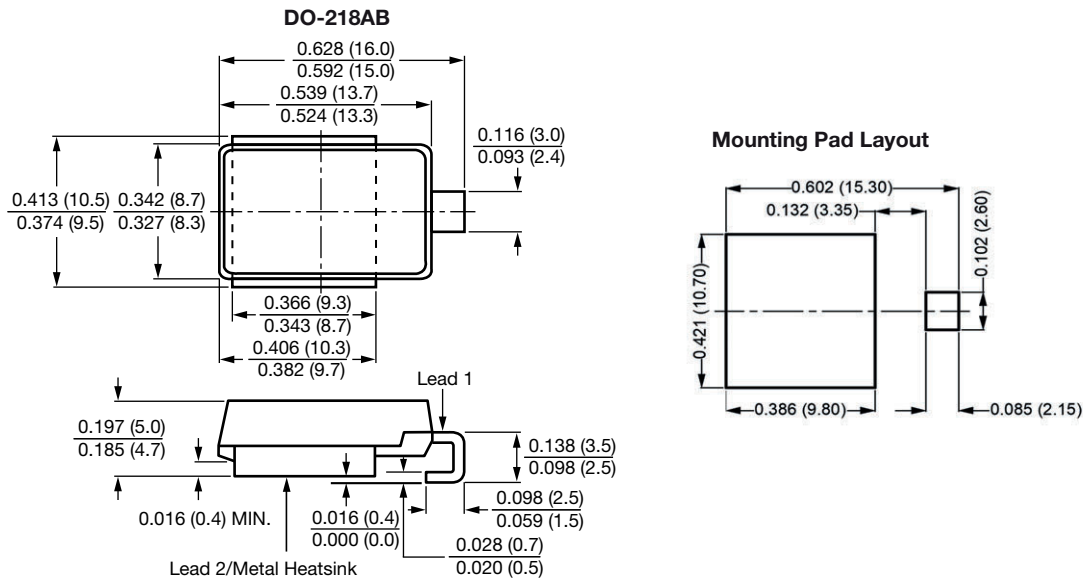


Fig. 7 - Junction Capacitance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

Note

- Footprint in accordance with IPC 7351 standard



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