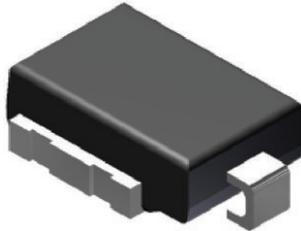


Surface Mount PAR[®] Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DO-218 Compatible

Anode  Cathode



FEATURES

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 175\text{ }^\circ\text{C}$ 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 $245\text{ }^\circ\text{C}$
- AEC-Q101 qualified available
- Automotive ordering code: base P/NHE3
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting, especially for automotive load dump protection application.

MECHANICAL DATA

Case: DO-218AC

Molding compound meets UL 94 V-0 flammability rating
Base P/NHE3 - RoHS-compliant, AEC-Q101 qualified

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

| PRIMARY CHARACTERISTICS | |
|--|-----------------------------|
| V_{WM} | 10 V to 43 V |
| V_{BR} | 11.1 V to 52.8 V |
| P_{PPM} (10 x 1000 μs) | 3600 W |
| P_{PPM} (10 x 10 000 μs) | 2800 W |
| P_D | 5 W |
| I_{FSM} | 500 A |
| T_J max. | $175\text{ }^\circ\text{C}$ |
| Polarity | Unidirectional |
| Package | DO-218AC |

| MAXIMUM RATINGS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | |
|---|-----------------|---------------------------------------|------------------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Peak pulse power dissipation | P_{PPM} | with 10/1000 μs waveform | 3600 |
| | | with 10/10 000 μs waveform | 2800 |
| Power dissipation on infinite heatsink at $T_C = 25\text{ }^\circ\text{C}$ (fig. 1) | P_D | 5.0 | W |
| Peak pulse current with 10/1000 μs waveform | $I_{PPM}^{(1)}$ | See next table | A |
| Peak forward surge current 8.3 ms single half sine-wave | I_{FSM} | 500 | A |
| Operating junction and storage temperature range | T_J, T_{STG} | -55 to +175 | $^\circ\text{C}$ |

Note

⁽¹⁾ Non-repetitive current pulse at $T_A = 25\text{ }^\circ\text{C}$

**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} α_T ($\%/^\circ\text{C}$) |
|-------------|--------------------------------|------|------|-------------------------|--------------------------------|---|---|---|---|--|
| | MIN. | NOM. | MAX. | | | | | | | |
| SM5S10AT | 11.1 | 11.7 | 12.3 | 5.0 | 10.0 | 15 | 250 | 212 | 17.0 | 0.069 |
| SM5S11AT | 12.2 | 12.9 | 13.5 | 5.0 | 11.0 | 10 | 150 | 198 | 18.2 | 0.072 |
| SM5S12AT | 13.3 | 14.0 | 14.7 | 5.0 | 12.0 | 10 | 150 | 181 | 19.9 | 0.074 |
| SM5S13AT | 14.4 | 15.2 | 15.9 | 5.0 | 13.0 | 10 | 150 | 167 | 21.5 | 0.076 |
| SM5S14AT | 15.6 | 16.4 | 17.2 | 5.0 | 14.0 | 10 | 150 | 155 | 23.2 | 0.078 |
| SM5S15AT | 16.7 | 17.6 | 18.5 | 5.0 | 15.0 | 10 | 150 | 148 | 24.4 | 0.080 |
| SM5S16AT | 17.8 | 18.8 | 19.7 | 5.0 | 16.0 | 10 | 150 | 138 | 26.0 | 0.081 |
| SM5S17AT | 18.9 | 19.9 | 20.9 | 5.0 | 17.0 | 10 | 150 | 130 | 27.6 | 0.082 |
| SM5S18AT | 20.0 | 21.1 | 22.1 | 5.0 | 18.0 | 10 | 150 | 123 | 29.2 | 0.083 |
| SM5S20AT | 22.2 | 23.4 | 24.5 | 5.0 | 20.0 | 10 | 150 | 111 | 32.4 | 0.085 |
| SM5S22AT | 24.4 | 25.7 | 26.9 | 5.0 | 22.0 | 10 | 150 | 101 | 35.5 | 0.086 |
| SM5S24AT | 26.7 | 28.1 | 29.5 | 5.0 | 24.0 | 10 | 150 | 93 | 38.9 | 0.087 |
| SM5S26AT | 28.9 | 30.4 | 31.9 | 5.0 | 26.0 | 10 | 150 | 86 | 42.1 | 0.088 |
| SM5S28AT | 31.1 | 32.8 | 34.4 | 5.0 | 28.0 | 10 | 150 | 79 | 45.4 | 0.089 |
| SM5S30AT | 33.3 | 35.1 | 36.8 | 5.0 | 30.0 | 10 | 150 | 74 | 48.4 | 0.090 |
| SM5S33AT | 36.7 | 38.7 | 40.6 | 5.0 | 33.0 | 10 | 150 | 68 | 53.3 | 0.091 |
| SM5S36AT | 40.0 | 42.1 | 44.2 | 5.0 | 36.0 | 10 | 150 | 62 | 58.1 | 0.091 |
| SM5S40AT | 44.4 | 46.8 | 49.1 | 5.0 | 40.0 | 10 | 150 | 56 | 64.5 | 0.092 |
| SM5S43AT | 47.8 | 50.3 | 52.8 | 5.0 | 43.0 | 10 | 150 | 52 | 69.4 | 0.093 |

Notes

- For all types maximum $V_F = 2.0\text{ V}$ at $I_F = 100\text{ A}$ measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum
- (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, junction to case | $R_{\theta JC}$ | 1.0 | $^\circ\text{C/W}$ |

ORDERING INFORMATION (Example)

| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
|-------------------|-----------------|------------------------|---------------|---|
| SM5S10ATHE3/I (1) | 2.505 | I | 750 | 13" diameter plastic tape and reel, anode towards the sprocket hole |

Note

- (1) AEC-Q101 qualified



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

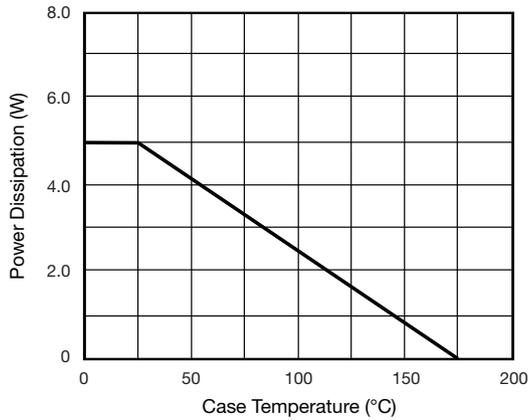


Fig. 1 - Power Derating Curve

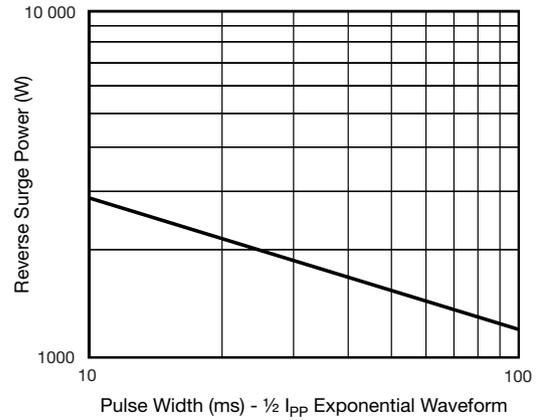


Fig. 4 - Reverse Power Capability

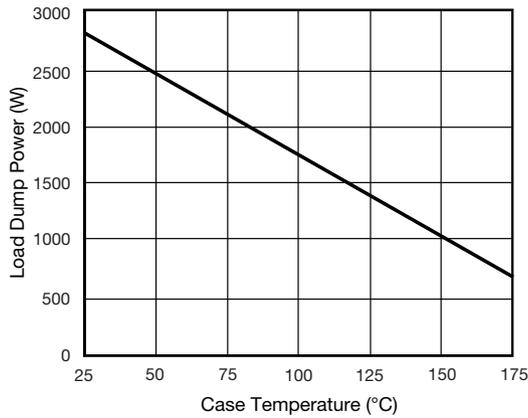


Fig. 2 - Load Dump Power Characteristics (10 ms Exponential Waveform)

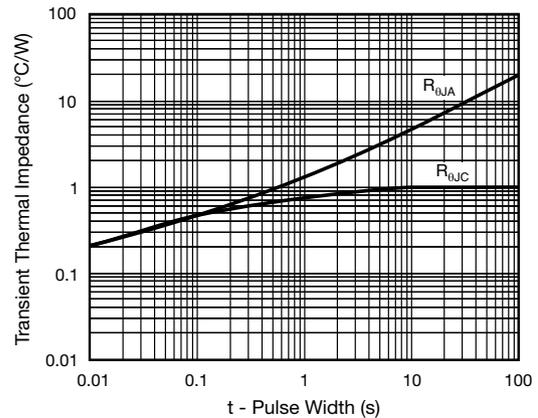


Fig. 5 - Typical Transient Thermal Impedance

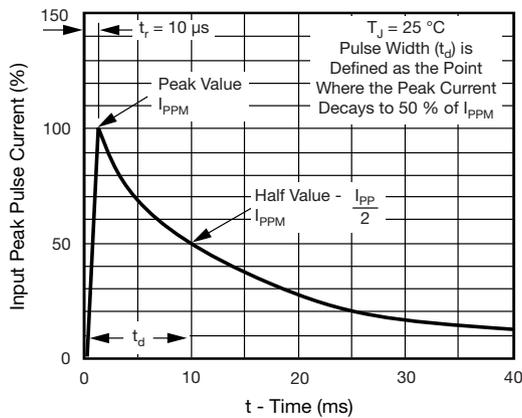
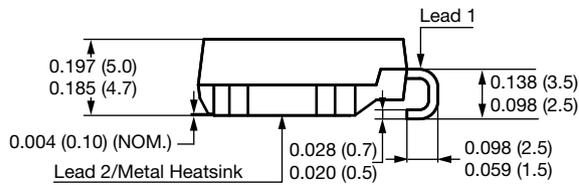
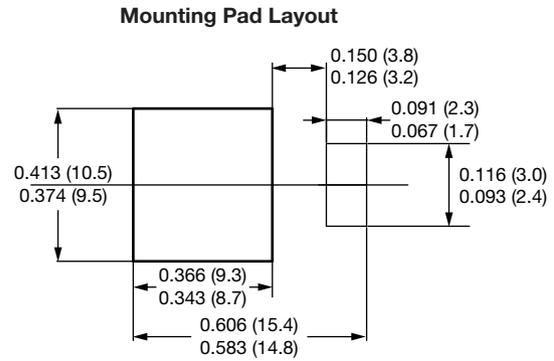
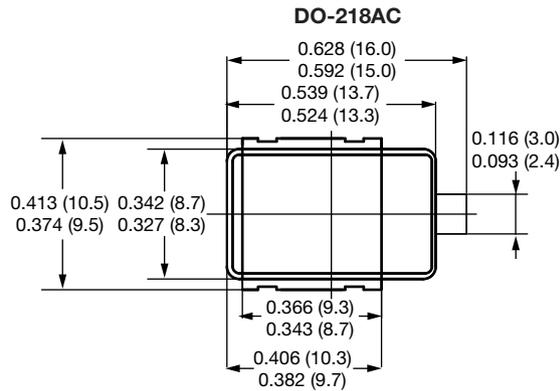


Fig. 3 - Pulse Waveform



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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