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SM5S10 thru SM5S36A

Vishay General Semiconductor

Surface Mount PAR[®] Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DO-218AB

PRIMARY CHARACTERISTICS

| | |
|---------------------------------|------------------|
| V_{WM} | 10 V to 36 V |
| V_{BR} | 11.1 V to 44.2 V |
| P_{PPM} (10 x 1000 μ s) | 3600 W |
| P_{PPM} (10 x 10 000 μ s) | 2800 W |
| P_D | 5 W |
| I_{FSM} | 500 A |
| T_J max. | 175 °C |
| Polarity | Uni-directional |
| 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 uni-directional 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 lighting, especially for automotive load dump protection application.

MECHANICAL DATA

Case: DO-218AB

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

MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted)

| PARAMETER | SYMBOL | VALUE | UNIT |
|--|-----------------|----------------|------|
| Peak pulse power dissipation with 10/1000 μ s waveform | P_{PPM} | 3600 | W |
| with 10/10 000 μ s waveform | | 2800 | |
| Power dissipation on infinite heatsink at $T_C = 25$ °C (fig. 1) | P_D | 5.0 | 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} | 500 | 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


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| 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} 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) |
| | MIN. | MAX. | | | | | | |
| SM5S10 | 11.1 | 13.6 | 5.0 | 10.0 | 15 | 250 | 191 | 18.8 |
| SM5S10A | 11.1 | 12.3 | 5.0 | 10.0 | 15 | 250 | 212 | 17.0 |
| SM5S11 | 12.2 | 14.9 | 5.0 | 11.0 | 10 | 150 | 179 | 20.1 |
| SM5S11A | 12.2 | 13.5 | 5.0 | 11.0 | 10 | 150 | 198 | 18.2 |
| SM5S12 | 13.3 | 16.3 | 5.0 | 12.0 | 10 | 150 | 164 | 22.0 |
| SM5S12A | 13.3 | 14.7 | 5.0 | 12.0 | 10 | 150 | 181 | 19.9 |
| SM5S13 | 14.4 | 17.6 | 5.0 | 13.0 | 10 | 150 | 151 | 23.8 |
| SM5S13A | 14.4 | 15.9 | 5.0 | 13.0 | 10 | 150 | 167 | 21.5 |
| SM5S14 | 15.6 | 19.1 | 5.0 | 14.0 | 10 | 150 | 140 | 25.8 |
| SM5S14A | 15.6 | 17.2 | 5.0 | 14.0 | 10 | 150 | 155 | 23.2 |
| SM5S15 | 16.7 | 20.4 | 5.0 | 15.0 | 10 | 150 | 134 | 26.9 |
| SM5S15A | 16.7 | 18.5 | 5.0 | 15.0 | 10 | 150 | 148 | 24.4 |
| SM5S16 | 17.8 | 21.8 | 5.0 | 16.0 | 10 | 150 | 125 | 28.8 |
| SM5S16A | 17.8 | 19.7 | 5.0 | 16.0 | 10 | 150 | 138 | 26.0 |
| SM5S17 | 18.9 | 23.1 | 5.0 | 17.0 | 10 | 150 | 118 | 30.5 |
| SM5S17A | 18.9 | 20.9 | 5.0 | 17.0 | 10 | 150 | 130 | 27.6 |
| SM5S18 | 20.0 | 24.4 | 5.0 | 18.0 | 10 | 150 | 112 | 32.2 |
| SM5S18A | 20.0 | 22.1 | 5.0 | 18.0 | 10 | 150 | 123 | 29.2 |
| SM5S20 | 22.2 | 27.1 | 5.0 | 20.0 | 10 | 150 | 101 | 35.8 |
| SM5S20A | 22.2 | 24.5 | 5.0 | 20.0 | 10 | 150 | 111 | 32.4 |
| SM5S22 | 24.4 | 29.8 | 5.0 | 22.0 | 10 | 150 | 91 | 39.4 |
| SM5S22A | 24.4 | 26.9 | 5.0 | 22.0 | 10 | 150 | 101 | 35.5 |
| SM5S24 | 26.7 | 32.6 | 5.0 | 24.0 | 10 | 150 | 84 | 43.0 |
| SM5S24A | 26.7 | 29.5 | 5.0 | 24.0 | 10 | 150 | 93 | 38.9 |
| SM5S26 | 28.9 | 35.3 | 5.0 | 26.0 | 10 | 150 | 77 | 46.6 |
| SM5S26A | 28.9 | 31.9 | 5.0 | 26.0 | 10 | 150 | 86 | 42.1 |
| SM5S28 | 31.1 | 38.0 | 5.0 | 28.0 | 10 | 150 | 72 | 50.1 |
| SM5S28A | 31.1 | 34.4 | 5.0 | 28.0 | 10 | 150 | 79 | 45.4 |
| SM5S30 | 33.3 | 40.7 | 5.0 | 30.0 | 10 | 150 | 67 | 53.5 |
| SM5S30A | 33.3 | 36.8 | 5.0 | 30.0 | 10 | 150 | 74 | 48.4 |
| SM5S33 | 36.7 | 44.9 | 5.0 | 33.0 | 10 | 150 | 61 | 59.0 |
| SM5S33A | 36.7 | 40.6 | 5.0 | 33.0 | 10 | 150 | 68 | 53.3 |
| SM5S36 | 40.0 | 48.9 | 5.0 | 36.0 | 10 | 150 | 56 | 64.3 |
| SM5S36A | 40.0 | 44.2 | 5.0 | 36.0 | 10 | 150 | 62 | 58.1 |

Note

- 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

| 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 |
| SM5S10AHE3/2D ⁽¹⁾ | 2.505 | 2D | 750 | 13" diameter plastic tape and reel, anode towards the sprocket hole |

Note

- ⁽¹⁾ AEC-Q101 qualified



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

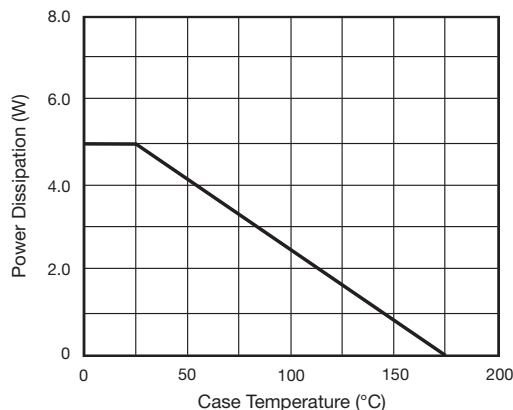


Fig. 1 - Power Derating Curve

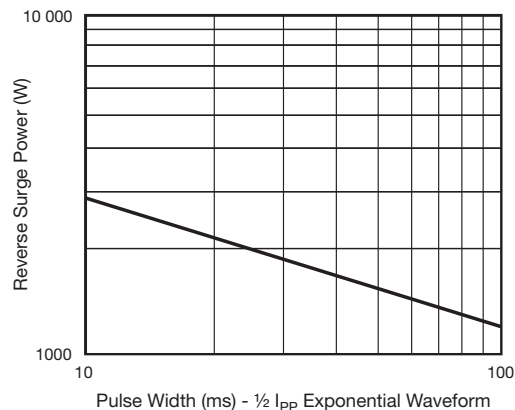


Fig. 4 - Reverse Power Capability

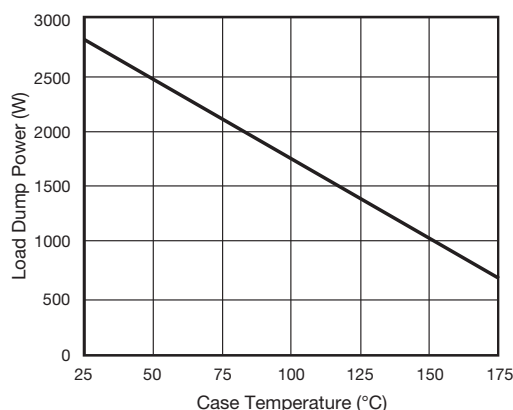


Fig. 2 - Load Dump Power Characteristics (10 ms Exponential Waveform)

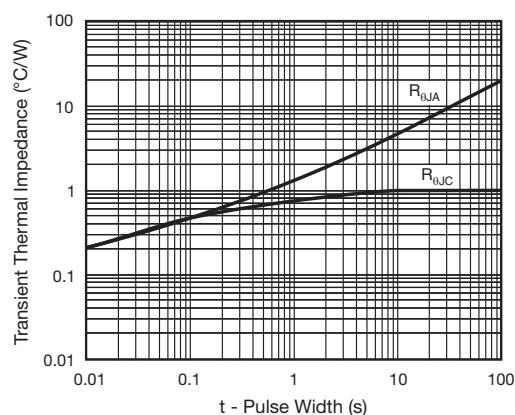


Fig. 5 - Typical Transient Thermal Impedance

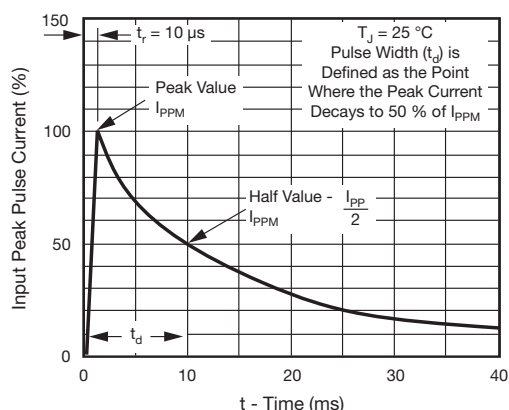


Fig. 3 - Pulse Waveform

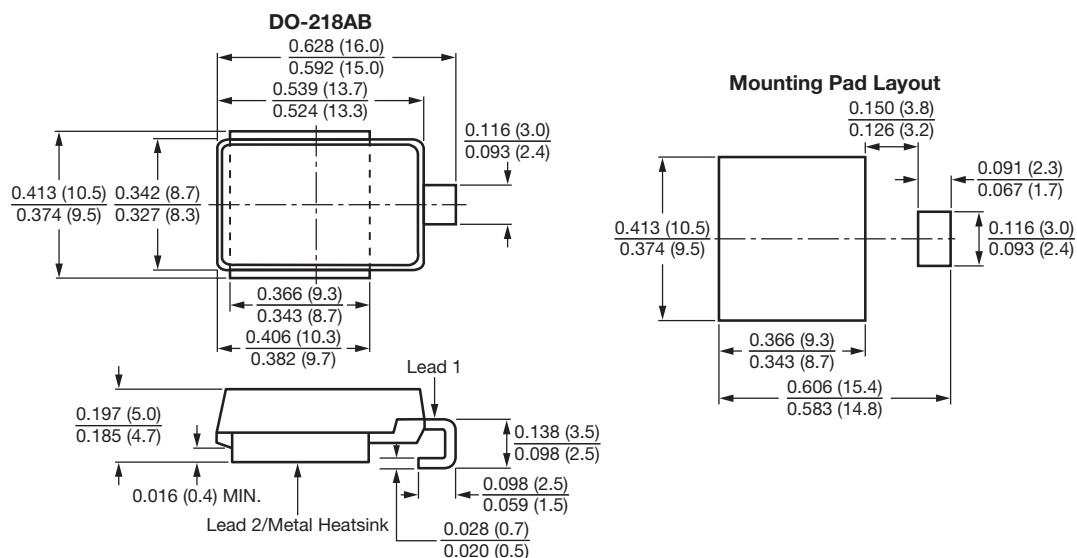


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PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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