

## Surface Mount Automotive Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions

Patented\*

\* Patent #'s:  
4,980,315  
5,166,769  
5,278,095


**DO-218AB**
**FEATURES**

- Patented PAR<sup>®</sup> construction
- Available in uni-directional polarity only
- Low leakage current
- Low forward voltage drop
- High surge capability
- Meets ISO7637-2 surge spec (varied by test condition)
- Meets MSL level 1, per J-STD-020C, LF max peak of 245 °C
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC


**TYPICAL APPLICATIONS**

Used 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

Epoxy meets UL 94V-0 flammability rating

**Terminals:** Matte tin plated leads, solderable per J-STD-002B and JESD22-B102D

HE3 suffix for high reliability grade (AEC Q101 qualified)

**Polarity:** Heatsink is anode

| PRIMARY CHARACTERISTICS        |              |
|--------------------------------|--------------|
| $V_{WM}$                       | 10 V to 36 V |
| $P_{PPM}$ (10 x 1000 $\mu$ s)  | 4600 W       |
| $P_{PPM}$ (10 x 10000 $\mu$ s) | 3600 W       |
| $P_D$                          | 6 W          |
| $I_{FSM}$                      | 600 A        |
| $T_J$ max.                     | 175 °C       |

| MAXIMUM RATINGS ( $T_C = 25$ °C unless otherwise noted)          |   |                |                |      |
|--|---|----------------|----------------|------|
| PARAMETER  |   | SYMBOL         | VALUE          | UNIT |
| Peak pulse power dissipation                                     | with 10/1000 $\mu$ s waveform<br>with 10/10000 $\mu$ s waveform | $P_{PPM}$      | 4600<br>3600   | W    |
| Power dissipation on infinite heatsink at $T_C = 25$ °C (Fig. 1) |   | $P_D$          | 6.0            | W    |
| Peak pulse current with 10/1000 $\mu$ s waveform <sup>(1)</sup>  |   | $I_{PPM}$      | See next table | A    |
| Peak forward surge current 8.3 ms single half sine-wave          |   | $I_{FSM}$      | 600            | 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 <sub>C</sub> = 25 °C unless otherwise noted) |   |      |                                  |                                       |  |  |  |   |
|--|---|------|----------------------------------|---------------------------------------|--|--|--|---|
| DEVICE TYPE  | BREAKDOWN VOLTAGE V <sub>(BR)</sub> (V) |      | TEST CURRENT I <sub>T</sub> (mA) | STAND-OFF VOLTAGE V <sub>WM</sub> (V) | MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> I <sub>D</sub> (μA) | MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> T <sub>J</sub> = 175 °C I <sub>D</sub> (μA) | MAX. PEAK PULSE CURRENT AT 10/1000 μs WAVEFORM (A) | MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V) |
|  | MIN                                     | MAX  |                                  |                                       |  |  |  |   |
| SM6S10   | 11.1                                    | 13.6 | 5.0                              | 10.0                                  | 15   | 250  | 245  | 18.8  |
| SM6S10A  | 11.1                                    | 12.3 | 5.0                              | 10.0                                  | 15   | 250  | 271  | 17.0  |
| SM6S11   | 12.2                                    | 14.9 | 5.0                              | 11.0                                  | 10   | 150  | 229  | 20.1  |
| SM6S11A  | 12.2                                    | 13.5 | 5.0                              | 11.0                                  | 10   | 150  | 253  | 18.2  |
| SM6S12   | 13.3                                    | 16.3 | 5.0                              | 12.0                                  | 10   | 150  | 209  | 22.0  |
| SM6S12A  | 13.3                                    | 14.7 | 5.0                              | 12.0                                  | 10   | 150  | 231  | 19.9  |
| SM6S13   | 14.4                                    | 17.6 | 5.0                              | 13.0                                  | 10   | 150  | 193  | 23.8  |
| SM6S13A  | 14.4                                    | 15.9 | 5.0                              | 13.0                                  | 10   | 150  | 214  | 21.5  |
| SM6S14   | 15.6                                    | 19.1 | 5.0                              | 14.0                                  | 10   | 150  | 178  | 25.8  |
| SM6S14A  | 15.6                                    | 17.2 | 5.0                              | 14.0                                  | 10   | 150  | 198  | 23.2  |
| SM6S15   | 16.7                                    | 20.4 | 5.0                              | 15.0                                  | 10   | 150  | 171  | 26.9  |
| SM6S15A  | 16.7                                    | 18.5 | 5.0                              | 15.0                                  | 10   | 150  | 189  | 24.4  |
| SM6S16   | 17.8                                    | 21.8 | 5.0                              | 16.0                                  | 10   | 150  | 160  | 28.8  |
| SM6S16A  | 17.8                                    | 19.7 | 5.0                              | 16.0                                  | 10   | 150  | 177  | 26.0  |
| SM6S17   | 18.9                                    | 23.1 | 5.0                              | 17.0                                  | 10   | 150  | 151  | 30.5  |
| SM6S17A  | 18.9                                    | 20.9 | 5.0                              | 17.0                                  | 10   | 150  | 167  | 27.6  |
| SM6S18   | 20.0                                    | 24.4 | 5.0                              | 18.0                                  | 10   | 150  | 143  | 32.2  |
| SM6S18A  | 20.0                                    | 22.1 | 5.0                              | 18.0                                  | 10   | 150  | 158  | 29.2  |
| SM6S20   | 22.2                                    | 27.1 | 5.0                              | 20.0                                  | 10   | 150  | 128  | 35.8  |
| SM6S20A  | 22.2                                    | 24.5 | 5.0                              | 20.0                                  | 10   | 150  | 142  | 32.4  |
| SM6S22   | 24.4                                    | 29.8 | 5.0                              | 22.0                                  | 10   | 150  | 117  | 39.4  |
| SM6S22A  | 24.4                                    | 26.9 | 5.0                              | 22.0                                  | 10   | 150  | 130  | 35.5  |
| SM6S24   | 26.7                                    | 32.6 | 5.0                              | 24.0                                  | 10   | 150  | 107  | 43.0  |
| SM6S24A  | 26.7                                    | 29.5 | 5.0                              | 24.0                                  | 10   | 150  | 118  | 38.9  |
| SM6S26   | 28.9                                    | 35.3 | 5.0                              | 26.0                                  | 10   | 150  | 99   | 46.6  |
| SM6S26A  | 28.9                                    | 31.9 | 5.0                              | 26.0                                  | 10   | 150  | 109  | 42.1  |
| SM6S28   | 31.1                                    | 38.0 | 5.0                              | 28.0                                  | 10   | 150  | 92   | 50.1  |
| SM6S28A  | 31.1                                    | 34.4 | 5.0                              | 28.0                                  | 10   | 150  | 101  | 45.4  |
| SM6S30   | 33.3                                    | 40.7 | 5.0                              | 30.0                                  | 10   | 150  | 86   | 53.5  |
| SM6S30A  | 33.3                                    | 36.8 | 5.0                              | 30.0                                  | 10   | 150  | 95   | 48.4  |
| SM6S33   | 36.7                                    | 44.9 | 5.0                              | 33.0                                  | 10   | 150  | 78   | 59.0  |
| SM6S33A  | 36.7                                    | 40.6 | 5.0                              | 33.0                                  | 10   | 150  | 86   | 53.3  |
| SM6S36   | 40.0                                    | 48.9 | 5.0                              | 36.0                                  | 10   | 150  | 72   | 64.3  |
| SM6S36A  | 40.0                                    | 44.2 | 5.0                              | 36.0                                  | 10   | 150  | 79   | 58.1  |

**Note:**

For all types maximum V<sub>F</sub> = 1.9 V at I<sub>F</sub> = 100 A measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum

| THERMAL CHARACTERISTICS (T <sub>C</sub> = 25 °C unless otherwise noted) |                  |       |      |
|---|------------------|-------|------|
| PARAMETER   | SYMBOL           | VALUE | UNIT |
| Typical thermal resistance, junction to case                            | R <sub>θJC</sub> | 0.95  | °C/W |



| ORDERING INFORMATION (Example) |                 |                        |               |   |
|--------------------------------|-----------------|------------------------|---------------|---|
| PREFERRED P/N                  | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE   |
| SM6S10AHE3/2D <sup>(1)</sup>   | 2.550           | 2D                     | 750           | 13" diameter paper tape and reel, anode towards the sprocket hole |

**Note:**

(1) Automotive grade AEC Q101 qualified

### RATINGS AND CHARACTERISTICS CURVES

(T<sub>A</sub> = 25 °C unless otherwise noted)

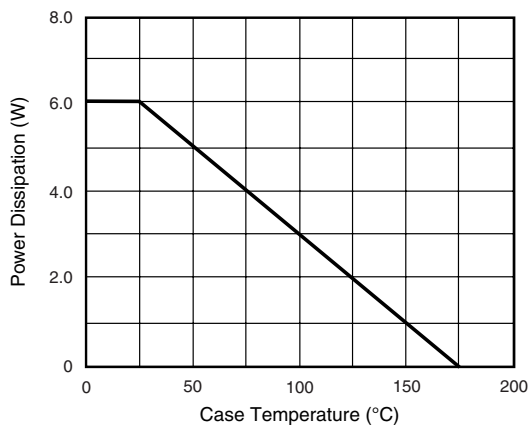


Figure 1. Power Derating Curve

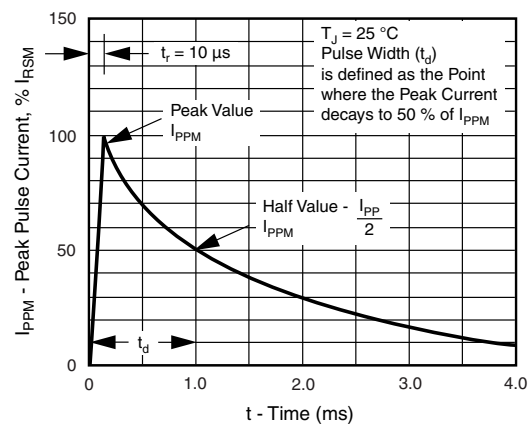


Figure 3. Pulse Waveform

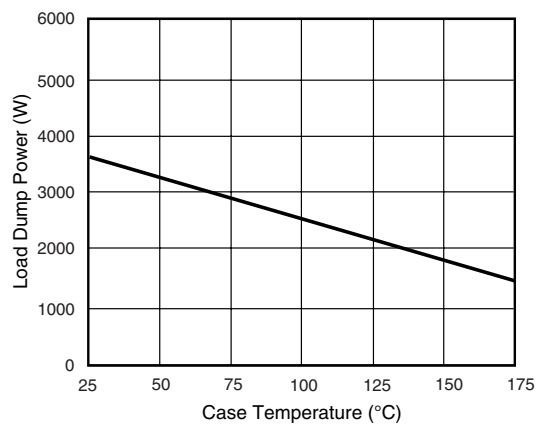


Figure 2. Load Dump Power Characteristics (10 ms Exponential Waveform)

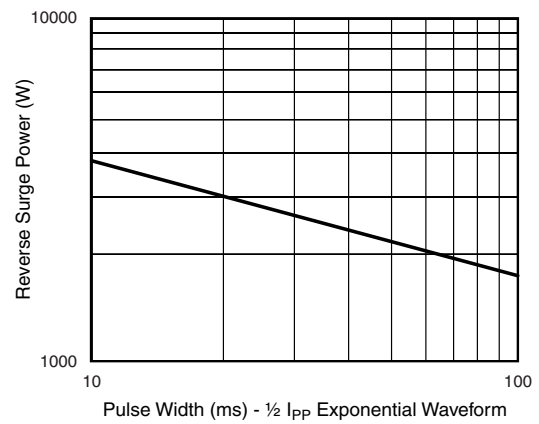


Figure 4. Reverse Power Capability

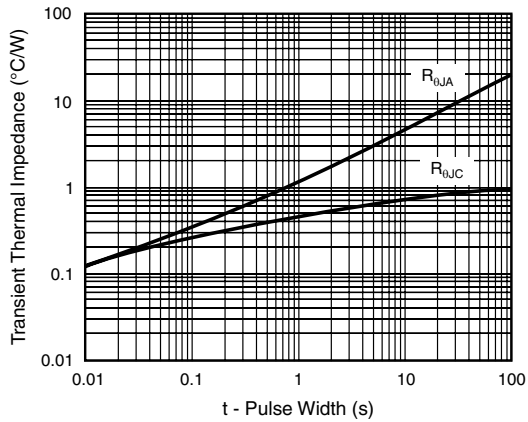
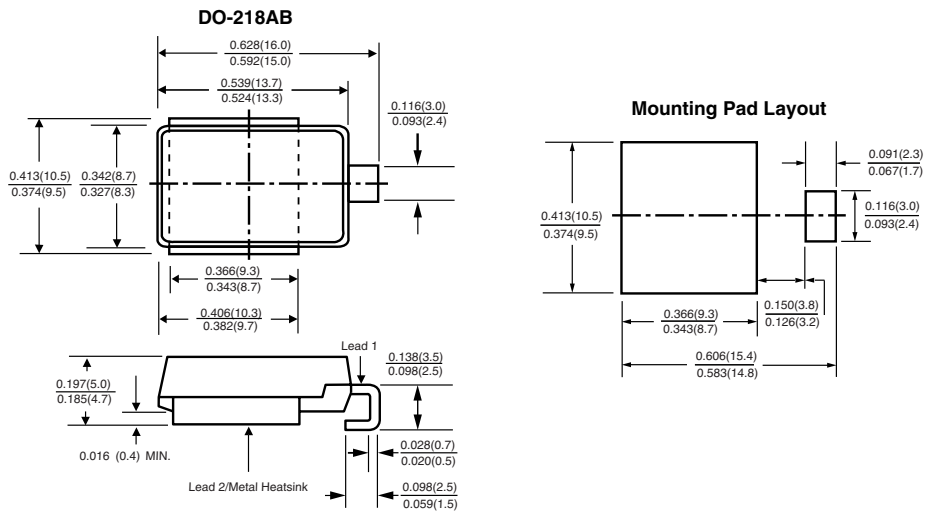


Figure 5. Typical Transient Thermal Impedance

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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