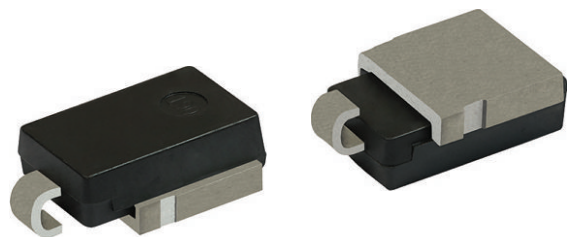


# Surface-Mount PAR<sup>®</sup> Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DO-218AB



## LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS         |                         |
|---------------------------------|-------------------------|
| $V_{BR}$                        | 11.1 V to 104 V         |
| $V_{WM}$                        | 10 V to 85 V            |
| $P_{PPM}$ (10 x 1000 $\mu$ s)   | 3600 W                  |
| $P_{PPM}$ (10 x 10 000 $\mu$ s) | 2200 W for 12CA to 20CA |
|                                 | 2400 W for 22CA to 85CA |
| $P_D$                           | 5 W                     |
| $T_J$ max.                      | 175 °C                  |
| Polarity                        | Bidirectional           |
| Package                         | DO-218AB                |

## FEATURES

- RoHS compliant junction passivation
- $T_J = 175$  °C capability suitable for high reliability and automotive requirement
- Bidirectional
- Low leakage current
- High surge capability
- Meets ISO 7637-2 and ISO 16750-2 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

## 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/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

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

HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** bidirectional, no cathode band

| MAXIMUM RATINGS (T <sub>C</sub> = 25 °C unless otherwise noted)           |                                     |                                     |                |      |      |
|---------------------------------------------------------------------------|-------------------------------------|-------------------------------------|----------------|------|------|
| PARAMETER                                                                 |                                     | SYMBOL                              | VALUE          |      | UNIT |
| Peak pulse power dissipation                                              | with 10/1000 μs waveform (fig. 4)   | P <sub>PPM</sub> <sup>(1)/(2)</sup> | 3600           |      | W    |
|                                                                           | with 10/10 000 μs waveform (fig. 5) |                                     | 12CA to 20CA   | 2200 |      |
|                                                                           |                                     |                                     | 22CA to 85CA   | 2400 |      |
| Power dissipation on infinite heatsink at T <sub>C</sub> = 25 °C (fig. 2) |                                     | P <sub>D</sub>                      | 5              |      | W    |
| Peak pulse current with 10/1000 μs waveform (fig. 4 )                     |                                     | I <sub>PPM</sub> <sup>(1)</sup>     | See next table |      | A    |
| Operating junction and storage temperature range                          |                                     | T <sub>J</sub> , T <sub>STG</sub>   | -55 to +175    |      | °C   |

## Notes

(1) Non-repetitive current pulse derated above  $T_A = 25$  °C, per fig. 3

(2) Power calculation is based on  $I_{PPM}$  times defined maximum clamping voltage by pulse width

**ELECTRICAL CHARACTERISTICS** ( $T_C = 25\text{ }^{\circ}\text{C}$  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 $V_{WM}$ $I_D$ ( $\mu\text{A}$ ) | MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $T_J = 175\text{ }^{\circ}\text{C}$ $I_D$ ( $\mu\text{A}$ ) | MAX. PEAK PULSE CURRENT AT 10/1000 $\mu\text{s}$ WAVEFORM $I_{PPM}$ (A) | MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V) |
|-------------|--------------------------------|------|------|-------------------------|--------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------|
|             | MIN.                           | NOM. | MAX. |                         |                                |                                                             |                                                                                                 |                                                                         |                                                 |
| SM5S10CA    | 11.1                           | 11.7 | 12.3 | 5.0                     | 10.0                           | 15                                                          | 250                                                                                             | 212                                                                     | 17.0                                            |
| SM5S11CA    | 12.2                           | 12.9 | 13.5 | 5.0                     | 11.0                           | 10                                                          | 150                                                                                             | 198                                                                     | 18.2                                            |
| SM5S12CA    | 13.3                           | 14.0 | 14.7 | 5.0                     | 12.0                           | 10                                                          | 150                                                                                             | 181                                                                     | 19.9                                            |
| SM5S13CA    | 14.4                           | 15.2 | 15.9 | 5.0                     | 13.0                           | 10                                                          | 150                                                                                             | 167                                                                     | 21.5                                            |
| SM5S14CA    | 15.6                           | 16.4 | 17.2 | 5.0                     | 14.0                           | 10                                                          | 150                                                                                             | 155                                                                     | 23.2                                            |
| SM5S15CA    | 16.7                           | 17.6 | 18.5 | 5.0                     | 15.0                           | 10                                                          | 150                                                                                             | 148                                                                     | 24.4                                            |
| SM5S16CA    | 17.8                           | 18.8 | 19.7 | 5.0                     | 16.0                           | 10                                                          | 150                                                                                             | 138                                                                     | 26.0                                            |
| SM5S17CA    | 18.9                           | 19.9 | 20.9 | 5.0                     | 17.0                           | 10                                                          | 150                                                                                             | 130                                                                     | 27.6                                            |
| SM5S18CA    | 20.0                           | 21.1 | 22.1 | 5.0                     | 18.0                           | 10                                                          | 150                                                                                             | 123                                                                     | 29.2                                            |
| SM5S20CA    | 22.2                           | 23.4 | 24.5 | 5.0                     | 20.0                           | 10                                                          | 150                                                                                             | 111                                                                     | 32.4                                            |
| SM5S22CA    | 24.4                           | 25.7 | 26.9 | 5.0                     | 22.0                           | 10                                                          | 150                                                                                             | 101                                                                     | 35.5                                            |
| SM5S24CA    | 26.7                           | 28.1 | 29.5 | 5.0                     | 24.0                           | 10                                                          | 150                                                                                             | 92.5                                                                    | 38.9                                            |
| SM5S26CA    | 28.9                           | 30.4 | 31.9 | 5.0                     | 26.0                           | 10                                                          | 150                                                                                             | 85.5                                                                    | 42.1                                            |
| SM5S28CA    | 31.1                           | 32.8 | 34.4 | 5.0                     | 28.0                           | 10                                                          | 150                                                                                             | 79.3                                                                    | 45.4                                            |
| SM5S30CA    | 33.3                           | 35.1 | 36.8 | 5.0                     | 30.0                           | 10                                                          | 150                                                                                             | 74.4                                                                    | 48.4                                            |
| SM5S33CA    | 36.7                           | 38.7 | 40.6 | 5.0                     | 33.0                           | 10                                                          | 150                                                                                             | 67.5                                                                    | 53.3                                            |
| SM5S36CA    | 40.0                           | 42.1 | 44.2 | 5.0                     | 36.0                           | 10                                                          | 150                                                                                             | 62.0                                                                    | 58.1                                            |
| SM5S40CA    | 44.4                           | 46.8 | 49.1 | 5.0                     | 40.0                           | 10                                                          | 150                                                                                             | 55.8                                                                    | 64.5                                            |
| SM5S43CA    | 47.8                           | 50.3 | 52.8 | 5.0                     | 43.0                           | 10                                                          | 150                                                                                             | 51.9                                                                    | 69.4                                            |
| SM5S45CA    | 50.0                           | 52.7 | 55.3 | 5.0                     | 45.0                           | 10                                                          | 150                                                                                             | 49.5                                                                    | 72.7                                            |
| SM5S48CA    | 53.3                           | 56.1 | 58.9 | 5.0                     | 48.0                           | 10                                                          | 150                                                                                             | 46.5                                                                    | 77.4                                            |
| SM5S51CA    | 56.7                           | 59.7 | 62.7 | 5.0                     | 51.0                           | 10                                                          | 150                                                                                             | 43.7                                                                    | 82.4                                            |
| SM5S54CA    | 60.0                           | 63.2 | 66.3 | 5.0                     | 54.0                           | 10                                                          | 150                                                                                             | 41.3                                                                    | 87.1                                            |
| SM5S58CA    | 64.4                           | 67.8 | 71.2 | 5.0                     | 58.0                           | 10                                                          | 150                                                                                             | 38.5                                                                    | 93.6                                            |
| SM5S60CA    | 66.7                           | 70.2 | 73.7 | 5.0                     | 60.0                           | 10                                                          | 150                                                                                             | 37.2                                                                    | 96.8                                            |
| SM5S64CA    | 71.1                           | 74.9 | 78.6 | 5.0                     | 64.0                           | 10                                                          | 150                                                                                             | 35.0                                                                    | 103                                             |
| SM5S70CA    | 77.8                           | 81.9 | 86.0 | 5.0                     | 70.0                           | 10                                                          | 150                                                                                             | 31.9                                                                    | 113                                             |
| SM5S75CA    | 83.3                           | 87.7 | 92.1 | 5.0                     | 75.0                           | 10                                                          | 150                                                                                             | 29.8                                                                    | 121                                             |
| SM5S78CA    | 86.7                           | 91.3 | 95.8 | 5.0                     | 78.0                           | 10                                                          | 150                                                                                             | 28.6                                                                    | 126                                             |
| SM5S85CA    | 94.4                           | 99.2 | 104  | 5.0                     | 85.0                           | 10                                                          | 150                                                                                             | 26.3                                                                    | 137                                             |

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

| PARAMETER                  | SYMBOL                         | TYP. | UNIT                 |
|----------------------------|--------------------------------|------|----------------------|
| Typical thermal resistance | $R_{\theta JA}$ <sup>(1)</sup> | 65   | $^{\circ}\text{C/W}$ |
|                            | $R_{\theta JM}$ <sup>(2)</sup> | 0.45 | $^{\circ}\text{C/W}$ |

**Note**

- (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** (Example)

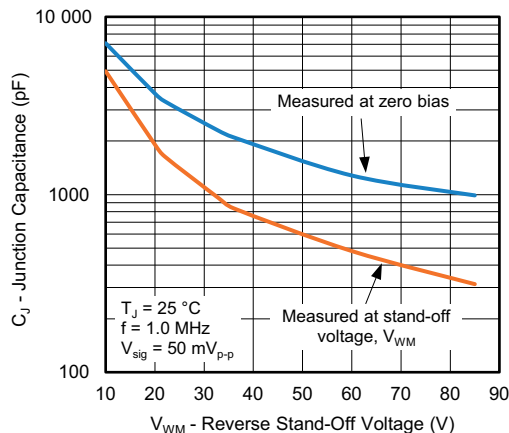
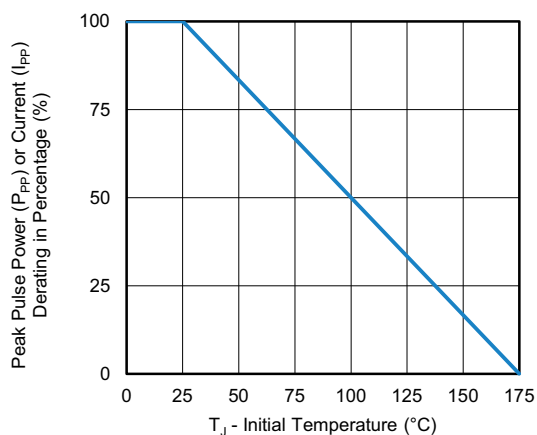
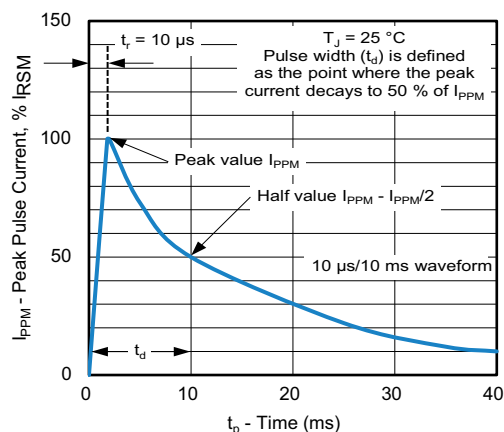
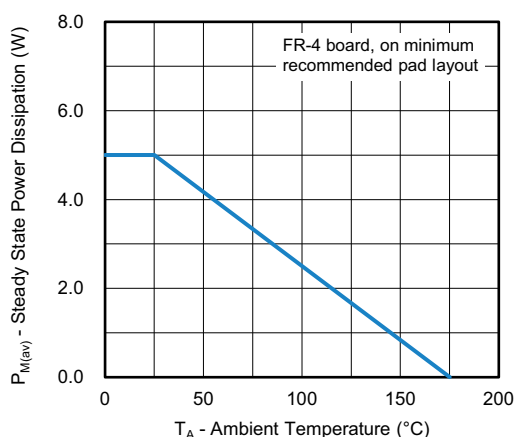
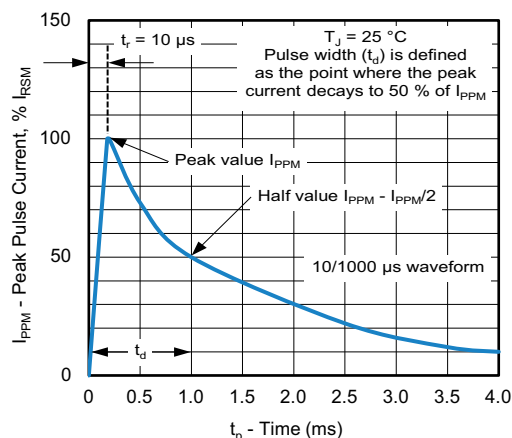
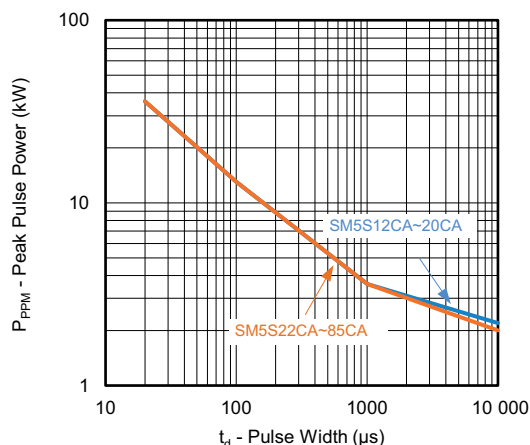
| PREFERRED P/N                | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                                                       |
|------------------------------|-----------------|------------------------|---------------|---------------------------------------------------------------------|
| SM5S10CAHM3/I <sup>(1)</sup> | 2.505           | I                      | 750           | 13" diameter plastic tape and reel, anode towards the sprocket hole |

**Note**

- (1) AEC-Q101 qualified



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



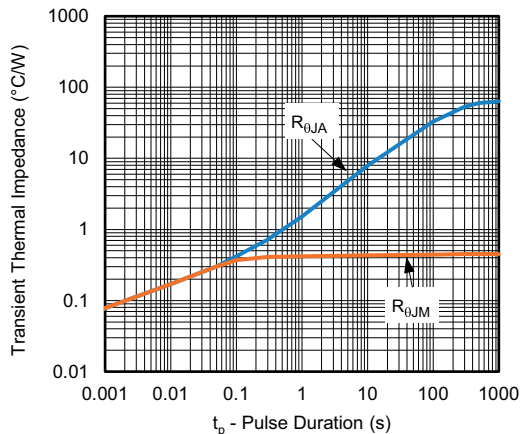
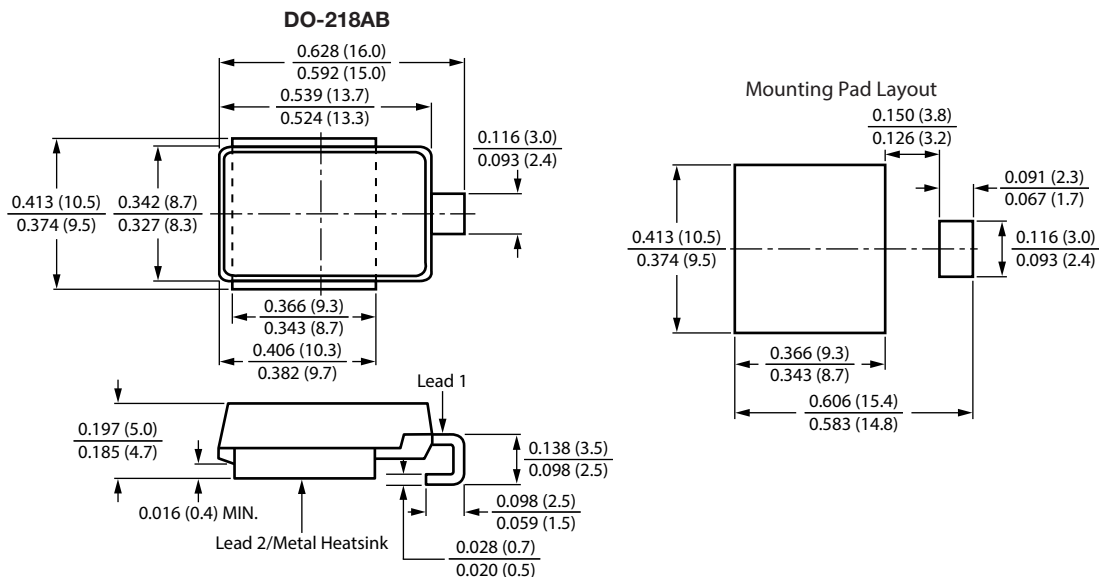


Fig. 7 - Typical Transient Thermal Impedance

**Note**

- Fig.1 - Power calculation is based on  $I_{PPM}$  times defined maximum clamping voltage by pulse width

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)




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