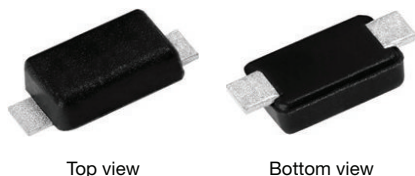


# Surface Mount TRANSZORB® Transient Voltage Suppressors

## eSMP® Series



Top view

Bottom view

### SMF (DO-219AB)



## PRIMARY CHARACTERISTICS

|                    |                 |
|--------------------|-----------------|
| $V_{WM}$           | 10 V to 85 V    |
| $V_{BR}$           | 11.1 V to 104 V |
| $P_{PPM}$          | 400 W, 350 W    |
| $P_D$              | 1.0 W           |
| $T_J \text{ max.}$ | 175 °C          |
| Polarity           | Bidirectional   |
| Package            | SMF (DO-219AB)  |

## FEATURES

- Low profile package
- Junction passivation optimized design passivated anisotropic rectifier technology
- Bidirectional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform (350 W above 48 V)
- Excellent clamping capability
- AEC-Q101 qualified
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Wave and reflow solderable
- Compatible to SOD-123W package case outline
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

AUTOMOTIVE  
GRADE  
Available



RoHS  
COMPLIANT  
HALOGEN  
FREE

## TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lightning on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, and telecommunication.

## MECHANICAL DATA

**Case:** SMF (DO-219AB)

Molding compound meets UL 94 V-0 flammability rating  
Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

Base P/N-M3 - halogen-free, RoHS-compliant, and industrial grade

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

M3 and HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** no cathode band for bidirectional types

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

| PARAMETER                                                         | SYMBOL          | VALUE          | UNIT |
|-------------------------------------------------------------------|-----------------|----------------|------|
| Peak power dissipation with a 10/1000 $\mu$ s waveform (fig. 3)   | $P_{PPM}^{(1)}$ | 400            | W    |
| Peak power pulse current with a 10/1000 $\mu$ s waveform (fig. 1) | $I_{PPM}^{(1)}$ | See next table | A    |
| Operating junction and storage temperature range                  | $T_J, T_{STG}$  | -65 to +175    | °C   |

### Notes

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25$  °C per fig. 2

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

| DEVICE TYPE | DEVICE MARKING CODE | BREAKDOWN VOLTAGE $V_{BR}^{(1)}$ AT $I_T$ (V) |      | TEST CURRENT $I_T$ (mA) | STAND-OFF VOLTAGE $V_{WM}$ (V) | MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ ( $\mu\text{A}$ ) | $T_J = 150\text{ }^{\circ}\text{C}$ MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ ( $\mu\text{A}$ ) | MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}^{(2)}$ (A) | MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V) | TYPICAL TEMP. COEFFICIENT OF $V_{BR}^{(3)}$ $\alpha_T$ ( $\%/^{\circ}\text{C}$ ) |
|-------------|---------------------|-----------------------------------------------|------|-------------------------|--------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------|
|             | UNI                 | MIN.                                          | MAX. |                         |                                |                                                             |                                                                                                 |                                                      |                                                 |                                                                                  |
| 4SMF10CA    | 4AX                 | 11.1                                          | 12.3 | 1.0                     | 10                             | 1.0                                                         | 5.0                                                                                             | 25.5                                                 | 15.7                                            | 0.070                                                                            |
| 4SMF11CA    | 4AZ                 | 12.2                                          | 13.5 | 1.0                     | 11                             | 1.0                                                         | 5.0                                                                                             | 23.3                                                 | 17.2                                            | 0.072                                                                            |
| 4SMF12CA    | 4BE                 | 13.3                                          | 14.7 | 1.0                     | 12                             | 1.0                                                         | 5.0                                                                                             | 21.3                                                 | 18.8                                            | 0.076                                                                            |
| 4SMF13CA    | 4BG                 | 14.4                                          | 15.9 | 1.0                     | 13                             | 1.0                                                         | 5.0                                                                                             | 19.6                                                 | 20.4                                            | 0.076                                                                            |
| 4SMF14CA    | 4BK                 | 15.6                                          | 17.2 | 1.0                     | 14                             | 1.0                                                         | 5.0                                                                                             | 18.2                                                 | 22.0                                            | 0.078                                                                            |
| 4SMF15CA    | 4BM                 | 16.7                                          | 18.5 | 1.0                     | 15                             | 1.0                                                         | 5.0                                                                                             | 16.9                                                 | 23.6                                            | 0.080                                                                            |
| 4SMF16CA    | 4BP                 | 17.8                                          | 19.7 | 1.0                     | 16                             | 1.0                                                         | 5.0                                                                                             | 15.9                                                 | 25.2                                            | 0.082                                                                            |
| 4SMF17CA    | 4BR                 | 18.9                                          | 20.9 | 1.0                     | 17                             | 1.0                                                         | 5.0                                                                                             | 15.0                                                 | 26.7                                            | 0.082                                                                            |
| 4SMF18CA    | 4BT                 | 20.0                                          | 22.1 | 1.0                     | 18                             | 1.0                                                         | 5.0                                                                                             | 14.1                                                 | 28.3                                            | 0.084                                                                            |
| 4SMF20CA    | 4BV                 | 22.2                                          | 24.5 | 1.0                     | 20                             | 1.0                                                         | 5.0                                                                                             | 12.7                                                 | 31.4                                            | 0.085                                                                            |
| 4SMF22CA    | 4BX                 | 24.4                                          | 26.9 | 1.0                     | 22                             | 1.0                                                         | 5.0                                                                                             | 11.3                                                 | 35.5                                            | 0.087                                                                            |
| 4SMF24CA    | 4BZ                 | 26.7                                          | 29.5 | 1.0                     | 24                             | 1.0                                                         | 5.0                                                                                             | 10.3                                                 | 39.0                                            | 0.087                                                                            |
| 4SMF26CA    | 4CE                 | 28.9                                          | 31.9 | 1.0                     | 26                             | 1.0                                                         | 5.0                                                                                             | 9.5                                                  | 42.0                                            | 0.088                                                                            |
| 4SMF28CA    | 4CG                 | 31.1                                          | 34.4 | 1.0                     | 28                             | 1.0                                                         | 5.0                                                                                             | 8.8                                                  | 45.5                                            | 0.089                                                                            |
| 4SMF30CA    | 4CK                 | 33.3                                          | 36.8 | 1.0                     | 30                             | 1.0                                                         | 5.0                                                                                             | 8.3                                                  | 48.4                                            | 0.090                                                                            |
| 4SMF33CA    | 4CM                 | 36.7                                          | 40.6 | 1.0                     | 33                             | 1.0                                                         | 5.0                                                                                             | 7.5                                                  | 53.1                                            | 0.091                                                                            |
| 4SMF36CA    | 4CP                 | 40.0                                          | 44.2 | 1.0                     | 36                             | 1.0                                                         | 5.0                                                                                             | 6.9                                                  | 58.3                                            | 0.092                                                                            |
| 4SMF40CA    | 4CR                 | 44.4                                          | 49.1 | 1.0                     | 40                             | 1.0                                                         | 5.0                                                                                             | 6.2                                                  | 64.5                                            | 0.092                                                                            |
| 4SMF43CA    | 4CT                 | 47.8                                          | 52.8 | 1.0                     | 43                             | 1.0                                                         | 5.0                                                                                             | 5.7                                                  | 69.8                                            | 0.093                                                                            |
| 4SMF45CA    | 4CV                 | 50.0                                          | 55.3 | 1.0                     | 45                             | 1.0                                                         | 5.0                                                                                             | 5.5                                                  | 72.3                                            | 0.093                                                                            |
| 4SMF48CA    | 4CX                 | 53.3                                          | 58.9 | 1.0                     | 48                             | 1.0                                                         | 5.0                                                                                             | 4.6                                                  | 76.9                                            | 0.093                                                                            |
| 4SMF51CA    | 4CZ                 | 56.7                                          | 62.7 | 1.0                     | 51                             | 1.0                                                         | 5.0                                                                                             | 4.3                                                  | 82.2                                            | 0.094                                                                            |
| 4SMF54CA    | 4RE                 | 60.0                                          | 66.3 | 1.0                     | 54                             | 1.0                                                         | 5.0                                                                                             | 4.0                                                  | 87.0                                            | 0.094                                                                            |
| 4SMF58CA    | 4RG                 | 64.4                                          | 71.2 | 1.0                     | 58                             | 1.0                                                         | 5.0                                                                                             | 3.7                                                  | 93.8                                            | 0.095                                                                            |
| 4SMF60CA    | 4RK                 | 66.7                                          | 73.7 | 1.0                     | 60                             | 1.0                                                         | 5.0                                                                                             | 3.6                                                  | 96.8                                            | 0.095                                                                            |
| 4SMF64CA    | 4RM                 | 71.1                                          | 78.6 | 1.0                     | 64                             | 1.0                                                         | 5.0                                                                                             | 3.4                                                  | 103                                             | 0.095                                                                            |
| 4SMF70CA    | 4RP                 | 77.8                                          | 86.0 | 1.0                     | 70                             | 1.0                                                         | 5.0                                                                                             | 3.1                                                  | 113                                             | 0.095                                                                            |
| 4SMF75CA    | 4RR                 | 83.3                                          | 92.1 | 1.0                     | 75                             | 1.0                                                         | 5.0                                                                                             | 2.9                                                  | 120                                             | 0.096                                                                            |
| 4SMF78CA    | 4RT                 | 86.7                                          | 95.8 | 1.0                     | 78                             | 1.0                                                         | 5.0                                                                                             | 2.8                                                  | 125                                             | 0.096                                                                            |
| 4SMF85CA    | 4RV                 | 94.4                                          | 104  | 1.0                     | 85                             | 1.0                                                         | 5.0                                                                                             | 2.6                                                  | 136                                             | 0.096                                                                            |

**Notes**

- (1)  $V_{BR}$  measured after  $I_T$  applied for 300 $\mu\text{s}$ ,  $I_T$  = square wave pulse or equivalent  
(2) Surge current waveform per fig. 3 and derated per fig. 2  
(3) To calculate  $V_{BR}$  vs. junction temperature, use the following formula:  $T_J = V_{BR}$  at  $25\text{ }^{\circ}\text{C} \times (1 + \alpha_T \times (T_J - 25))$   
(4) All terms and symbols are consistent with ANSI/IEEE C62.35

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

| PARAMETER          | SYMBOL           | TYP. | MAX. | UNIT                 |
|--------------------|------------------|------|------|----------------------|
| Thermal resistance | $R_{thJA}^{(1)}$ | 135  | 160  | $^{\circ}\text{C/W}$ |
|                    | $R_{thJM}^{(2)}$ | 15   | 18   | $^{\circ}\text{C/W}$ |

**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** (Example)

| PREFERRED P/N                | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|------------------------------|-----------------|------------------------|---------------|------------------------------------|
| 4SMF10CA-M3/H                | 0.015           | H                      | 3000          | 7" diameter plastic tape and reel  |
| 4SMF10CA-M3/I                | 0.015           | I                      | 10 000        | 13" diameter plastic tape and reel |
| 4SMF10CAHM3/H <sup>(1)</sup> | 0.015           | H                      | 3000          | 7" diameter plastic tape and reel  |
| 4SMF10CAHM3/I <sup>(1)</sup> | 0.015           | I                      | 10 000        | 13" diameter plastic tape and reel |

**Note**

- (1) AEC-Q101 qualified



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

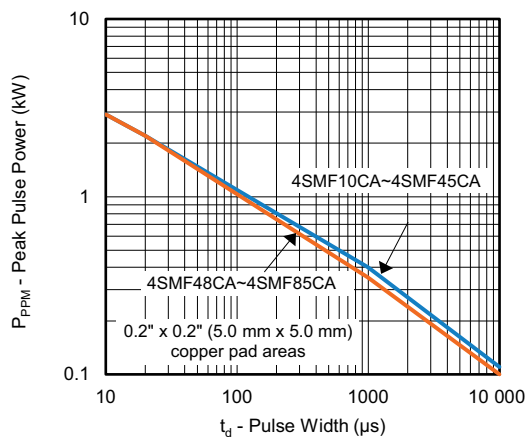


Fig. 1 - Peak Pulse Power Rating Curve

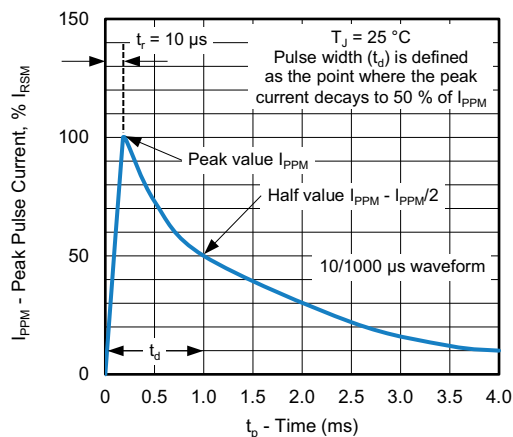


Fig. 3 - Pulse Waveform

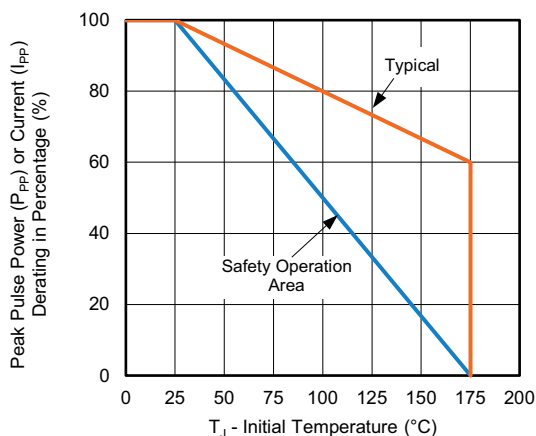


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

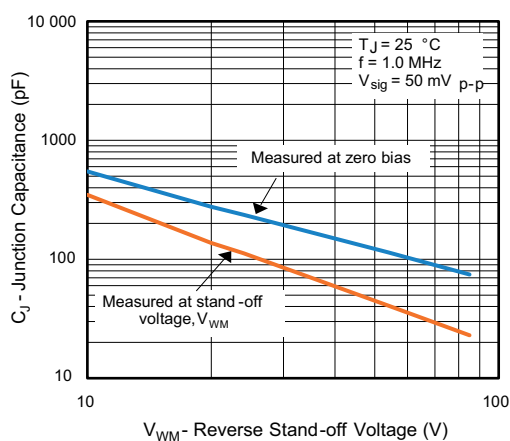


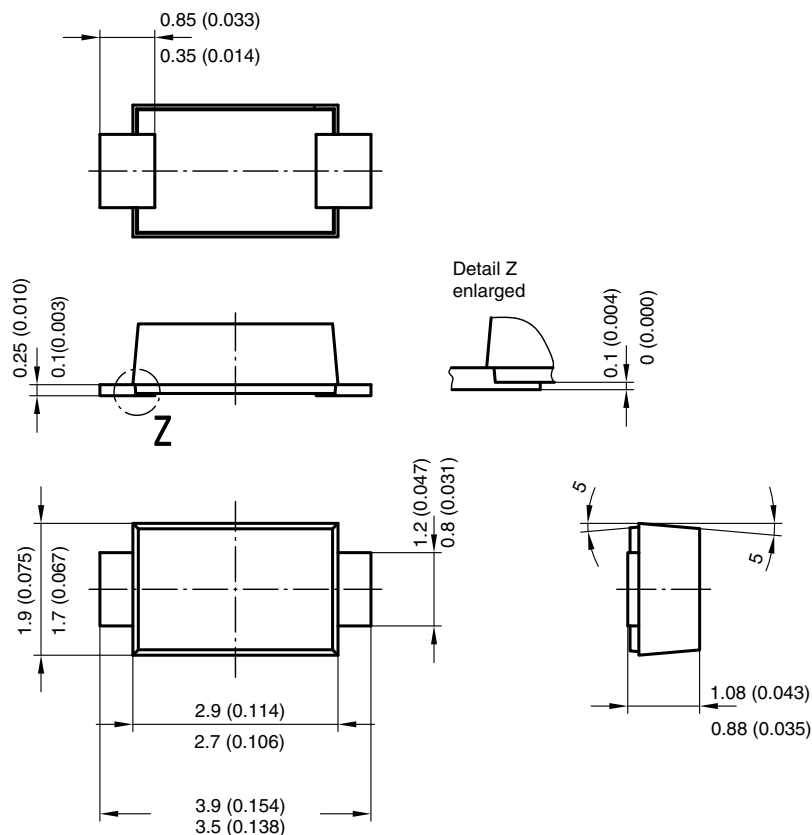
Fig. 4 - Typical Junction Capacitance

### Note

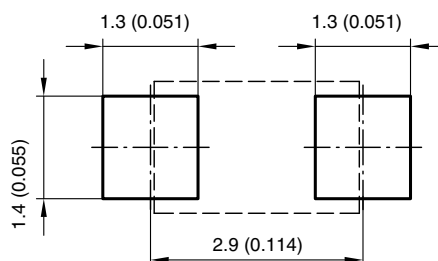
- Fig.1 power calculation is based on  $I_{PPM}$  times defined maximum clamping voltage by pulse width



## PACKAGE OUTLINE DIMENSIONS in millimeters (inches)



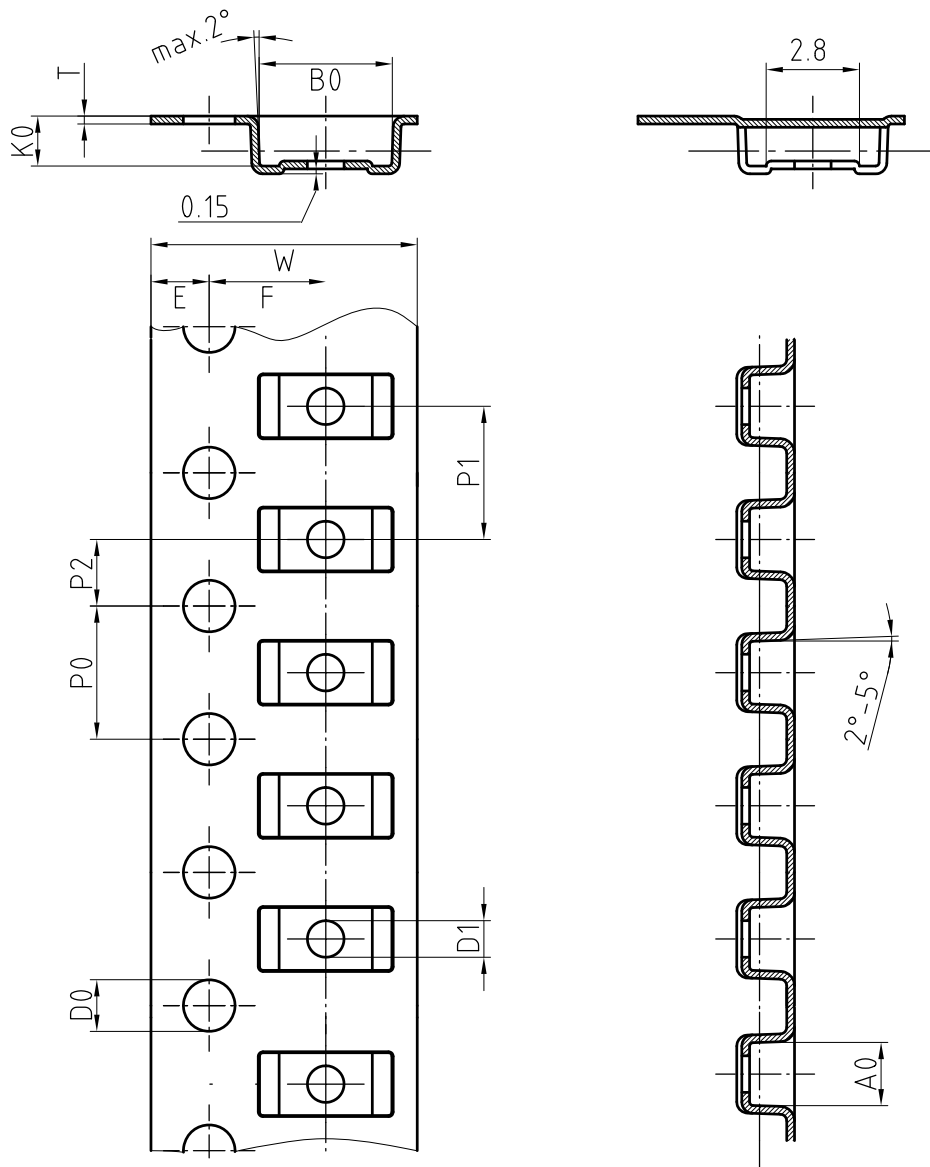
Foot print recommendation:



Created - Date: 15. February 2005  
Rev. 3 - Date: 13. March 2007  
Document no.: S8-V-3915.01-001 (4)  
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**BLISTERTAPE DIMENSIONS** in millimeters: **SMF (DO-219AB)**



| Mat: | A0  | B0  | K0  | W   | T     | P0  | P2  | P1  | D0  | D1 | E    | F   |
|------|-----|-----|-----|-----|-------|-----|-----|-----|-----|----|------|-----|
| PS   | 1.9 | 4.0 | 1.5 | 8.0 | 0.235 | 4.0 | 2.0 | 4.0 | 1.5 | 1  | 1.75 | 3.5 |

Document-No.: S8-V-3717.02-001 (3)

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