

## Surface Mount TRANSZORB® Transient Voltage Suppressors

### eSMP® Series


**SMP (DO-220AA)**

Anode Cathode


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Available in unidirectional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### TYPICAL APPLICATIONS

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

### MECHANICAL DATA

**Case:** SMP (DO-220AA)

Molding compound meets UL 94 V-0 flammability rating 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 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end

### LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS  |                  |
|--------------------------|------------------|
| $V_{BR}$ uni-directional | 4.10 V to 44.2 V |
| $V_{WM}$                 | 3.3 V to 36 V    |
| $P_{PPM}$                | 400 W            |
| $I_{FSM}$                | 40 A             |
| $T_J$ max.               | 150 °C           |
| Polarity                 | Unidirectional   |
| Package                  | SMP (DO-220AA)   |

| MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)                                 |                |                     |      |
|-----------------------------------------------------------------------------------------|----------------|---------------------|------|
| PARAMETER                                                                               | SYMBOL         | VALUE               | UNIT |
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform (fig. 1) <sup>(1)(2)</sup> | $P_{PPM}$      | 400                 | W    |
| Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup>                       | $I_{PPM}$      | See table next page | A    |
| Peak forward surge current 10 ms single half sine-wave <sup>(2)</sup>                   | $I_{FSM}$      | 40                  | A    |
| Maximum instantaneous forward voltage at 25 A <sup>(3)</sup>                            | $V_F$          | 2.5                 | V    |
| Operating junction and storage temperature range                                        | $T_J, T_{STG}$ | -55 to +150         | °C   |

### Notes

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

<sup>(2)</sup> Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal

<sup>(3)</sup> Pulse test: 300  $\mu$ s pulse width, 1 % duty cycle



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                     |                                                        |      |                         |                                 |                                                                             |                                                               |                                                 |
|----------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------|------|-------------------------|---------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------|
| DEVICE TYPE                                                                                  | DEVICE MARKING CODE | BREAKDOWN VOLTAGE $V_{BR}$ AT $I_T$ <sup>(1)</sup> (V) |      | TEST CURRENT $I_T$ (mA) | STAND-OFF VOLTAGE $V_{WMM}$ (V) | MAXIMUM REVERSE LEAKAGE AT $V_{WMM}$ $I_D$ ( $\mu\text{A}$ ) <sup>(3)</sup> | MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}$ (A) <sup>(2)</sup> | MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V) |
|                                                                                              |                     | MIN.                                                   | MAX. |                         |                                 |                                                                             |                                                               |                                                 |
| SMP3V3                                                                                       | AC                  | 4.10                                                   | 5.10 | 1.0                     | 3.3                             | 200                                                                         | 54.8                                                          | 7.3                                             |
| SMP5.0A                                                                                      | AE                  | 6.40                                                   | 7.07 | 10                      | 5.0                             | 150                                                                         | 43.5                                                          | 9.2                                             |
| SMP6.0A                                                                                      | AG                  | 6.67                                                   | 7.37 | 10                      | 6.0                             | 600                                                                         | 38.8                                                          | 10.3                                            |
| SMP6.5A                                                                                      | AK                  | 7.22                                                   | 7.98 | 10                      | 6.5                             | 100                                                                         | 35.7                                                          | 11.2                                            |
| SMP7.0A                                                                                      | AM                  | 7.78                                                   | 8.60 | 10                      | 7.0                             | 50                                                                          | 33.3                                                          | 12.0                                            |
| SMP7.5A                                                                                      | AN                  | 8.33                                                   | 9.21 | 1.0                     | 7.5                             | 50                                                                          | 31.0                                                          | 12.9                                            |
| SMP8.0A                                                                                      | AR                  | 8.89                                                   | 9.83 | 1.0                     | 8.0                             | 20                                                                          | 29.4                                                          | 13.6                                            |
| SMP11A                                                                                       | AZ                  | 12.2                                                   | 13.5 | 1.0                     | 11                              | 1.0                                                                         | 22.0                                                          | 18.2                                            |
| SMP12A                                                                                       | BE                  | 13.3                                                   | 14.7 | 1.0                     | 12                              | 1.0                                                                         | 20.1                                                          | 19.9                                            |
| SMP13A                                                                                       | BG                  | 14.4                                                   | 15.9 | 1.0                     | 13                              | 1.0                                                                         | 18.6                                                          | 21.5                                            |
| SMP14A                                                                                       | BK                  | 15.6                                                   | 17.2 | 1.0                     | 14                              | 1.0                                                                         | 17.2                                                          | 23.2                                            |
| SMP15A                                                                                       | BM                  | 16.7                                                   | 18.5 | 1.0                     | 15                              | 1.0                                                                         | 16.4                                                          | 24.4                                            |
| SMP16A                                                                                       | BP                  | 17.8                                                   | 19.7 | 1.0                     | 16                              | 1.0                                                                         | 15.4                                                          | 26.0                                            |
| SMP17A                                                                                       | BR                  | 18.9                                                   | 20.9 | 1.0                     | 17                              | 1.0                                                                         | 14.5                                                          | 27.6                                            |
| SMP18A                                                                                       | BT                  | 20.0                                                   | 22.1 | 1.0                     | 18                              | 1.0                                                                         | 13.7                                                          | 29.2                                            |
| SMP20A                                                                                       | BV                  | 22.2                                                   | 24.5 | 1.0                     | 20                              | 1.0                                                                         | 12.3                                                          | 32.4                                            |
| SMP22A                                                                                       | BX                  | 24.4                                                   | 26.9 | 1.0                     | 22                              | 1.0                                                                         | 11.3                                                          | 35.5                                            |
| SMP24A                                                                                       | BZ                  | 26.7                                                   | 29.5 | 1.0                     | 24                              | 1.0                                                                         | 10.3                                                          | 38.9                                            |
| SMP26A                                                                                       | CE                  | 28.9                                                   | 31.9 | 1.0                     | 26                              | 1.0                                                                         | 9.5                                                           | 42.1                                            |
| SMP28A                                                                                       | CG                  | 31.1                                                   | 34.4 | 1.0                     | 28                              | 1.0                                                                         | 8.8                                                           | 45.4                                            |
| SMP30A                                                                                       | CK                  | 33.3                                                   | 36.8 | 1.0                     | 30                              | 1.0                                                                         | 8.3                                                           | 48.4                                            |
| SMP33A                                                                                       | CM                  | 36.7                                                   | 40.6 | 1.0                     | 33                              | 1.0                                                                         | 7.5                                                           | 53.3                                            |
| SMP36A                                                                                       | CP                  | 40.0                                                   | 44.2 | 1.0                     | 36                              | 1.0                                                                         | 6.9                                                           | 58.1                                            |

**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 derate per fig. 2
- (3) All terms and symbols are consistent with ANSI/IEEE C62.35

| <b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |                 |       |                    |
|-------------------------------------------------------------------------------------------|-----------------|-------|--------------------|
| PARAMETER                                                                                 | SYMBOL          | LIMIT | UNIT               |
| Typical thermal resistance, junction to lead <sup>(1)</sup>                               | $R_{\theta JL}$ | 50    | $^\circ\text{C/W}$ |
| Typical thermal resistance, junction to ambient <sup>(2)</sup>                            | $R_{\theta JA}$ | 250   | $^\circ\text{C/W}$ |

**Notes**

- (1) Mounted on PCB with 5.0 mm x 5.0 mm copper pad areas attached to each terminal
- (2) Mounted on minimum recommended pad layout

| <b>ORDERING INFORMATION</b> (Example) |                 |                        |               |                                    |
|---------------------------------------|-----------------|------------------------|---------------|------------------------------------|
| PREFERRED P/N                         | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
| SMP3V3-M3/84A                         | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| SMP3V3-M3/85A                         | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |
| SMP11A-M3/84A                         | 0.024           | 84A                    | 3000          | 7" diameter plastic tape and reel  |
| SMP11A-M3/85A                         | 0.024           | 85A                    | 10 000        | 13" diameter plastic tape and reel |



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

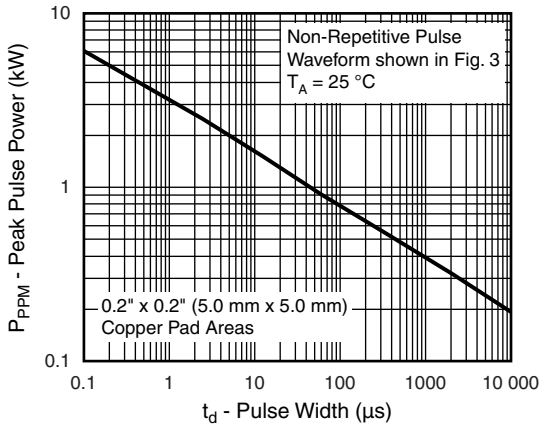


Fig. 1 - Peak Pulse Power Rating Curve

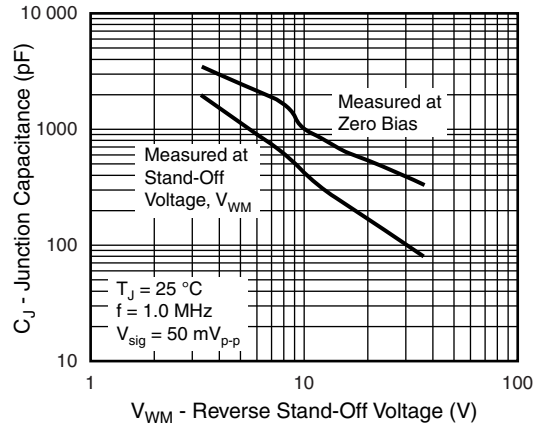


Fig. 4 - Typical Junction Capacitance

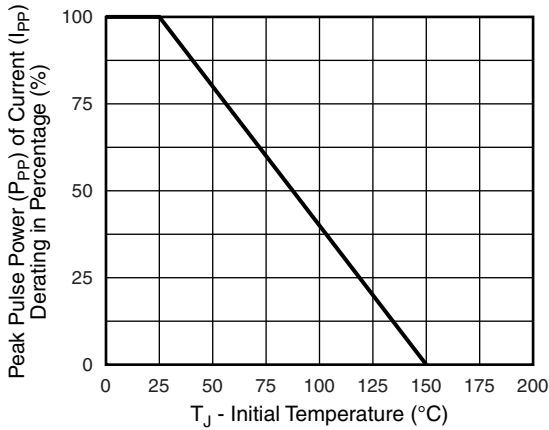


Fig. 2 - Pulse Derating Curve

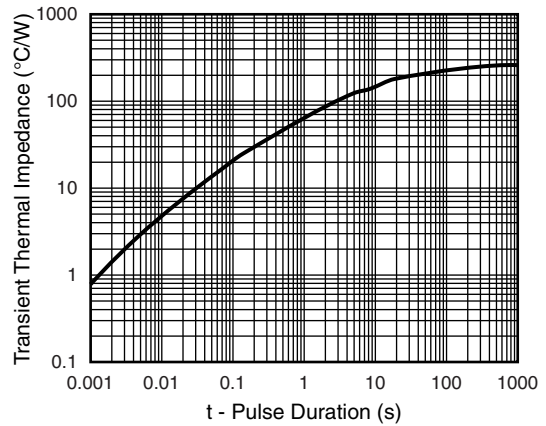


Fig. 5 - Typical Transient Thermal Impedance

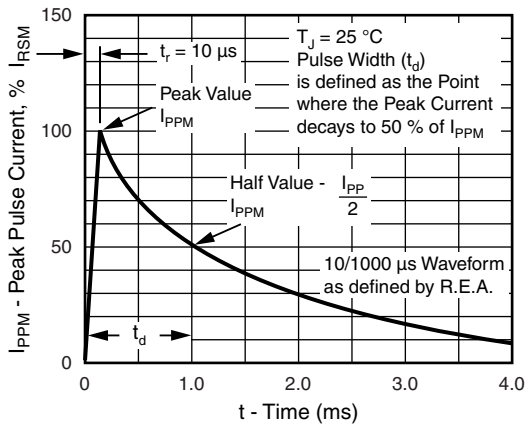
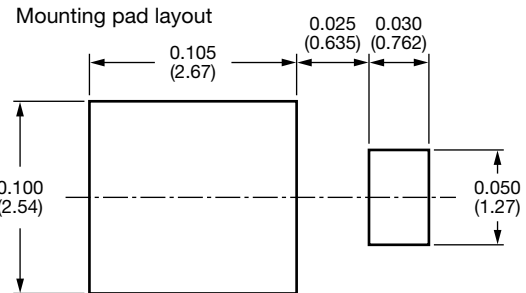
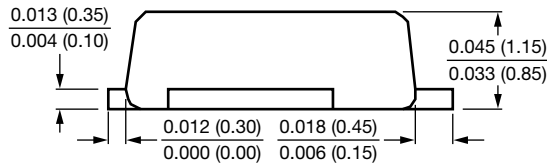
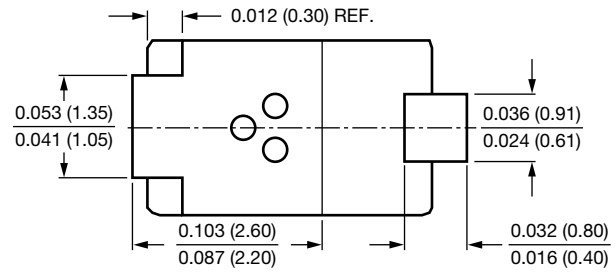
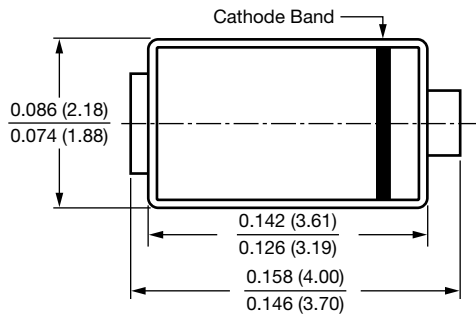


Fig. 3 - Pulse Waveform



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### SMP (DO-220AA)





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