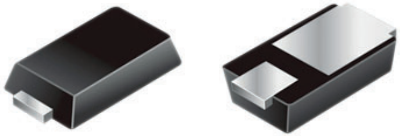
# Surface-Mount TRANSZORB® Transient Voltage Suppressors

**eSMP® Series**



Top View Bottom View

**MicroSMP (DO-219AD)**

Cathode ○—▶|—○ Anode

## LINKS TO ADDITIONAL RESOURCES

3D Models

| PRIMARY CHARACTERISTICS | |
|---|---|
| $V_{BR}$ | 6.67 V to 24.5 V |
| $V_{WM}$ | 6.0 V to 20 V |
| $P_{PPM}$ (10 x 1000 µs) | 150 W |
| $T_J$ max. | 150 °C |
| Polarity | Unidirectional |
| Package | MicroSMP (DO-219AD) |

## FEATURES

AUTOMOTIVE GRADE

RoHS COMPLIANT

HALOGEN FREE

- Very low profile - typical height of 0.65 mm
- Ideal for automated placement
- Oxide planar chip junction
- Unidirectional polarity only
- Peak pulse power: 150 W (10/1000 µs)
- ESD capability: **15 kV (air), 8 kV (contact)**
- Meets MSL level 1, per J-STD-020C, LF maximum peak of 260 °C
- AEC-Q101 qualified
  - Automotive ordering code: base P/NHM3 for MSMP6.0A to MSMP8.0A
- Material categorization: for definitions of compliance please see 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 protecting sensitive equipment against transient overvoltages.

## MECHANICAL DATA

**Case:** MicroSMP (DO-219AD)
Molding compound meets UL 94 V-0 flammability rating
Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade
Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified, only available for MSMP6.0A to MSMP8.0A types

**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

**Note**

- MSMP8.5A to MSMP20A for industrial grade only

**Polarity:** color band denotes the cathode end

| MAXIMUM RATINGS ($T_A$ = 25 °C unless otherwise noted) | | | | |
|---|---|---|---|---|
| **PARAMETER** | | **SYMBOL** | **VALUE** | **UNIT** |
| Peak power dissipation with a 10/1000 µs waveform (fig. 1) | | $P_{PPM}$ (1)(2) | 150 | W |
| Peak pulse current with a 10/1000 µs waveform | | $I_{PPM}$ (1) | See next table | A |
| Power dissipation | $T_M$ = 120 °C | $P_D$ (2) | 1.0 | W |
| Power dissipation | $T_A$ = 25 °C | $P_D$ (3) | 0.5 | |
| Operating junction and storage temperature range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

**Notes**

(1) Non-repetitive current pulse, per fig. 1
(2) Mounted on 6.0 mm x 6.0 mm copper pads to each terminal
(3) Mounted on minimum recommended pad layout



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## ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted)

| DEVICE TYPE | DEVICE MARKING CODE | BREAKDOWN VOLTAGE $V_{BR}$ AT $I_T$ (1) (V) | | TEST CURRENT $I_T$ (mA) | STAND-OFF VOLTAGE $V_{WM}$ (V) | MAXIMUM REVERSE LEAKAGE CURRENT $I_R$ AT $V_{WM}$ (µA) | MAXIMUM $V_C$ AT $I_{PPM}$ | | $R_D$ | MAXIMUM $V_C$ AT $I_{PPM}$ | | $R_D$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 10/1000 µs | | | 8/20 µs | | |
| | | MIN. | MAX. | | | | $V_C$ (V) | $I_{PPM}$ (A) | $R_D$ (Ω) | $V_C$ (V) | $I_{PPM}$ (A) | $R_D$ (Ω) |
| MSMP6.0A | AG | 6.67 | 7.37 | 10 | 6.0 | 200 | 10.3 | 14.6 | 0.201 | 13.7 | 73.0 | 0.087 |
| MSMP6.5A | AK | 7.22 | 7.98 | 10 | 6.5 | 100 | 11.2 | 13.4 | 0.240 | 14.5 | 69.0 | 0.095 |
| MSMP7.0A | AM | 7.78 | 8.60 | 10 | 7.0 | 50 | 12.0 | 12.5 | 0.272 | 15.7 | 63.7 | 0.111 |
| MSMP7.5A | AP | 8.33 | 9.21 | 1.0 | 7.5 | 50 | 12.9 | 11.6 | 0.317 | 17.0 | 58.8 | 0.132 |
| MSMP8.0A | AR | 8.89 | 9.83 | 1.0 | 8.0 | 20 | 13.6 | 11.0 | 0.342 | 18.2 | 54.9 | 0.152 |
| MSMP8.5A | AT | 9.44 | 10.4 | 1.0 | 8.5 | 2.0 | 14.4 | 10.4 | 0.384 | 19.5 | 51.3 | 0.177 |
| MSMP9.0A | AV | 10.0 | 11.1 | 1.0 | 9.0 | 2.0 | 15.4 | 9.7 | 0.441 | 20.6 | 48.6 | 0.195 |
| MSMP10A | AX | 11.1 | 12.3 | 1.0 | 10 | 1.0 | 17.0 | 8.8 | 0.533 | 21.7 | 46.1 | 0.204 |
| MSMP11A | AZ | 12.2 | 13.5 | 1.0 | 11 | 1.0 | 18.2 | 8.2 | 0.570 | 24.4 | 41.0 | 0.266 |
| MSMP12A | BE | 13.3 | 14.7 | 1.0 | 12 | 1.0 | 19.9 | 7.5 | 0.690 | 25.3 | 39.5 | 0.268 |
| MSMP13A | BG | 14.4 | 15.9 | 1.0 | 13 | 1.0 | 21.5 | 7.0 | 0.803 | 27.2 | 36.8 | 0.307 |
| MSMP14A | BK | 15.6 | 17.2 | 1.0 | 14 | 1.0 | 23.2 | 6.5 | 0.928 | 29.5 | 33.9 | 0.364 |
| MSMP15A | BM | 16.7 | 18.5 | 1.0 | 15 | 1.0 | 24.4 | 6.2 | 0.960 | 32.5 | 30.8 | 0.455 |
| MSMP16A | BP | 17.8 | 19.7 | 1.0 | 16 | 1.0 | 26.0 | 5.8 | 1.092 | 34.7 | 28.8 | 0.520 |
| MSMP17A | BR | 18.9 | 20.9 | 1.0 | 17 | 1.0 | 27.6 | 5.4 | 1.233 | 36.8 | 27.2 | 0.586 |
| MSMP18A | BT | 20.0 | 22.1 | 1.0 | 18 | 1.0 | 29.2 | 5.1 | 1.382 | 39.3 | 25.4 | 0.676 |
| MSMP20A | BV | 22.2 | 24.5 | 1.0 | 20 | 1.0 | 32.4 | 4.6 | 1.706 | 42.8 | 23.4 | 0.783 |

**Notes**

(1) Pulse test: $t_p \leq 50$ ms

(2) Surge current waveform per Fig. 1 and derate per Fig. 3

(3) To calculate maximum clamping voltage at surge current uses the following formula: $V_{CL\ max.} = R_D \times I_{PP} + V_{BR\ max.}$

## THERMAL CHARACTERISTICS ($T_A$ = 25 °C unless otherwise noted)

| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---|---|---|
| Typical thermal resistance | $R_{\theta JA}$ (1) | 250 | °C/W |
| | $R_{\theta JM}$ (2) | 30 | |

**Notes**

(1) Free air, mounted on recommended PCB 1 oz. pad area; thermal resistance $R_{\theta JA}$ - junction to ambient

(2) Units mounted on PCB with 6.0 mm x 6.0 mm copper pad areas; $R_{\theta JM}$ - junction to mount

## IMMUNITY TO STATIC ELECTRICAL DISCHARGE TO THE FOLLOWING STANDARDS ($T_A$ = 25 °C unless otherwise noted)

| STANDARD | TEST TYPE | TEST CONDITIONS | SYMBOL | CLASS | VALUE |
|---|---|---|---|---|---|
| AEC-Q101-001 | Human body model (contact mode) | C = 100 pF, R = 1.5 kΩ | $V_C$ | H3B | > 8 kV |
| IEC 61000-4-2 (2) | Human body model (air discharge mode) (1) | C = 150 pF, R = 330 Ω | | 4 | > 15 kV |

**Notes**

(1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance > 30 kV

(2) System ESD standard

## ORDERING INFORMATION (Example)

| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
|---|---|---|---|---|
| MSMP6.0A-M3/89A (1) | 0.006 | 89A | 4500 | 7" diameter plastic tape and reel |
| MSMP6.0AHM3/H (2) | 0.006 | H | 4500 | 7" diameter plastic tape and reel |

**Note**

(1) Available for MSMP6.0A to MSMP20A

(2) AEC-Q101 qualified, is available for MSMP6.0A to MSMP8.0A only


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## RATINGS AND CHARACTERISTICS CURVES ($T_A$ = 25 °C unless otherwise noted)

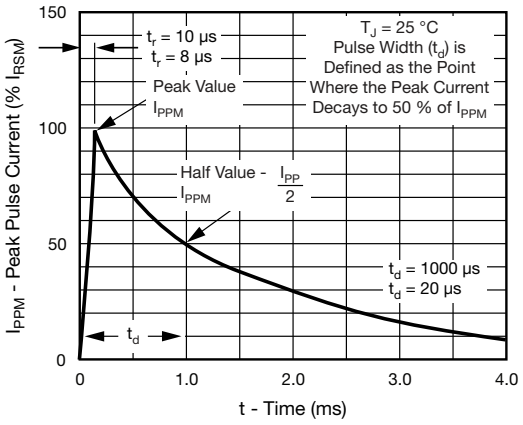



Fig. 1 - Pulse Waveform

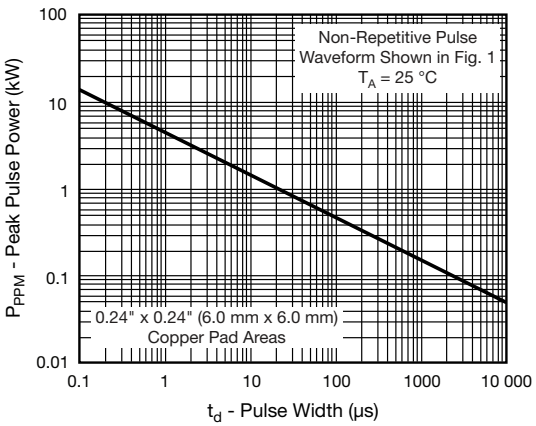



Fig. 2 - Peak Pulse Power Rating Curve

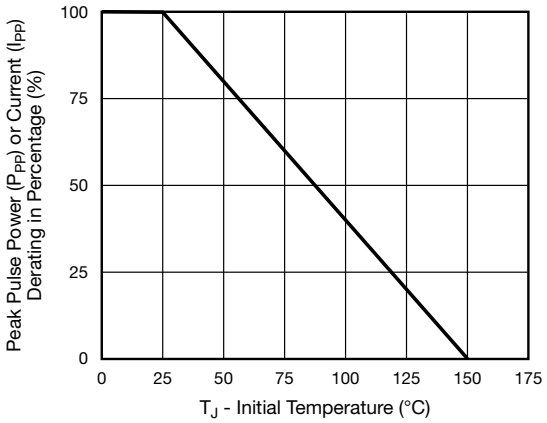



Fig. 3 - Pulse Power or Current vs. Initial Junction Temperature

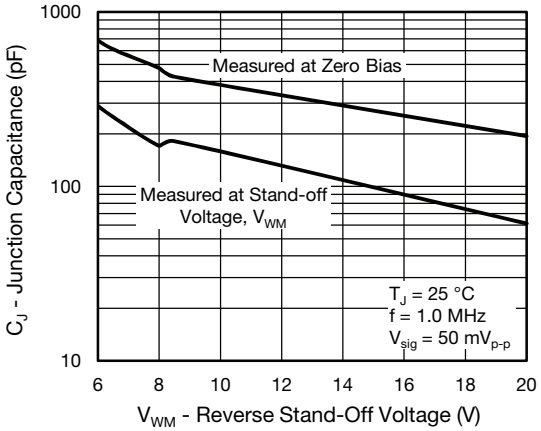



Fig. 4 - Typical Junction Capacitance

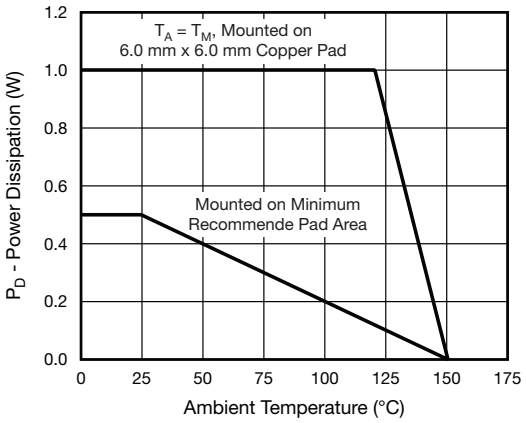



Fig. 5 - Power Dissipation Derating Curve

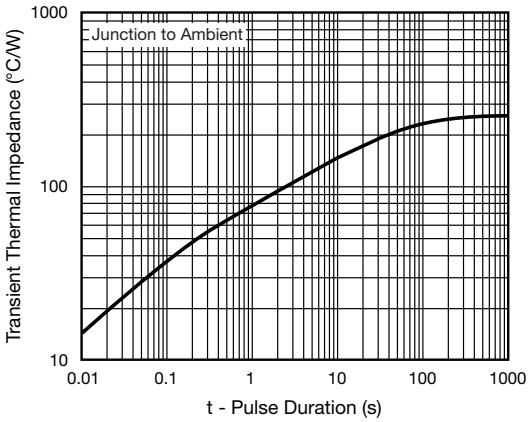
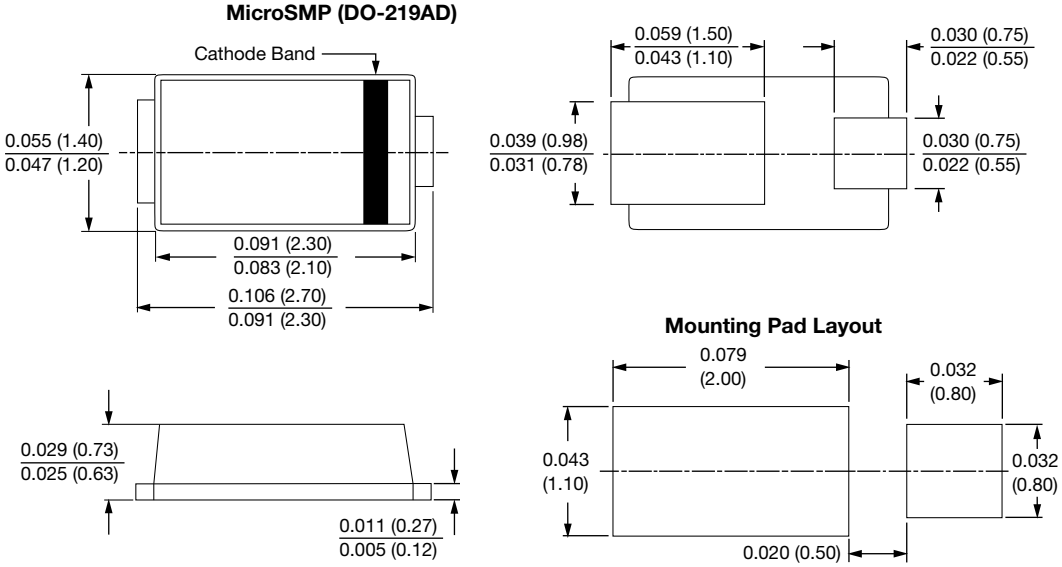



Fig. 6 - Typical Transient Thermal Impedance


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## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

**MicroSMP (DO-219AD)**




**Mounting Pad Layout**





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