

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_{WM} | 3.3 V to 5.0 V |
| V_{BR} | 4.1 V to 7.07 V |
| P_{PPM} | 150 W |
| $T_J \text{ max.}$ | 150 °C |
| Polarity | Unidirectional |
| Package | MicroSMP (DO-219AD) |

FEATURES

- 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 μ s/1000 μ s)
- 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
- Not recommended for PCB bottom side wave mounting
- Material categorization: for definitions of compliance please see 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 lighting on ICs, MOSFET, industrial, and 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 industrial grade

Base P/NHM3 - halogen-free, RoHS-compliant, and automotive grade

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

M3 suffix meets JESD 201 class 2 whisker test, HM3 suffix meets JESD 201 class 2 whisker test

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 μ s waveform (fig. 1) | | $P_{PPM}^{(1)(2)}$ | 150 | W |
| Peak pulse current with a 10/1000 μ s 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 | W |
| 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



| ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ 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} | | |
| | | MIN. | MAX. | | | | 10/1000 μs | | | | 8/20 μs | | |
| | | | | | | | V_C (V) | I_{PPM} (A) | R_D (Ω) | | V_C (V) | I_{PPM} (A) | R_D (Ω) |
| MSP3V3 | KC | 4.10 | 5.10 | 1.0 | 3.3 | 200 | 7.6 | 19.7 | 0.127 | 11.5 | 87 | 0.074 | |
| MSP5.0A | AE | 6.40 | 7.07 | 10 | 5.0 | 100 | 9.2 | 16.3 | 0.131 | 13.4 | 75 | 0.085 | |

Notes

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

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

| THERMAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | |
|---|--------------------------------|-------|--------------------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Typical thermal resistance | $R_{\theta JA}$ ⁽¹⁾ | 250 | $^\circ\text{C/W}$ |
| | $R_{\theta JM}$ ⁽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 | | | | | |
|---|--|--|--------|-------|---------|
| $(T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | |
| STANDARD | TEST TYPE | TEST CONDITIONS | SYMBOL | CLASS | VALUE |
| AEC-Q101-001 | Human body model (contact mode) | $C = 100\ \text{pF}$, $R = 1.5\ \text{k}\Omega$ | V_C | H3B | > 8 kV |
| IEC 61000-4-2 ⁽²⁾ | Human body model (air discharge mode) ⁽¹⁾ | $C = 150\ \text{pF}$, $R = 330\ \Omega$ | | 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 |
| MSP3V3-M3/89A | 0.006 | 89A | 4500 | 7" diameter plastic tape and reel |
| MSP3V3HM3/89A ⁽¹⁾ | 0.006 | 89A | 4500 | 7" diameter plastic tape and reel |
| MSP5.0A-M3/89A | 0.006 | 89A | 4500 | 7" diameter plastic tape and reel |
| MSP5.0AHM3/89A ⁽¹⁾ | 0.006 | 89A | 4500 | 7" diameter plastic tape and reel |

Note

⁽¹⁾ Automotive grade

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

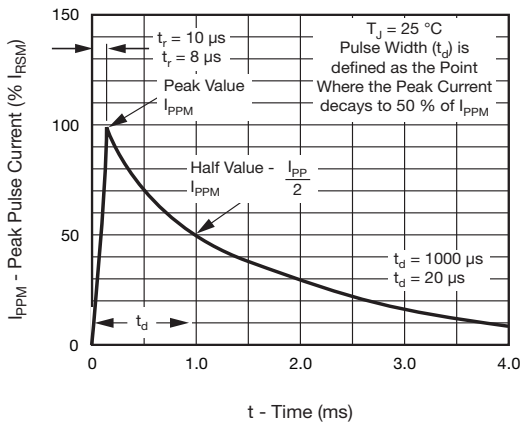


Fig. 1 - Pulse Waveform

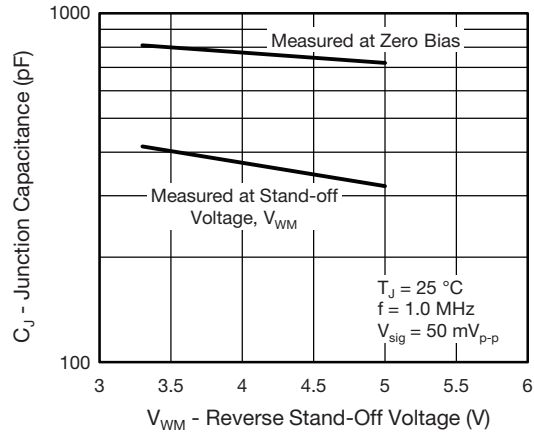


Fig. 4 - Typical Junction Capacitance

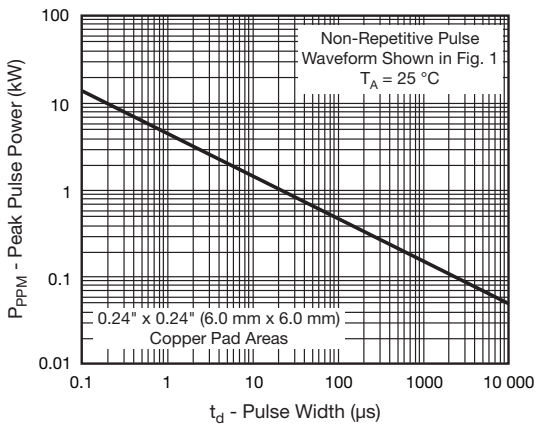


Fig. 2 - Peak Pulse Power Rating Curve

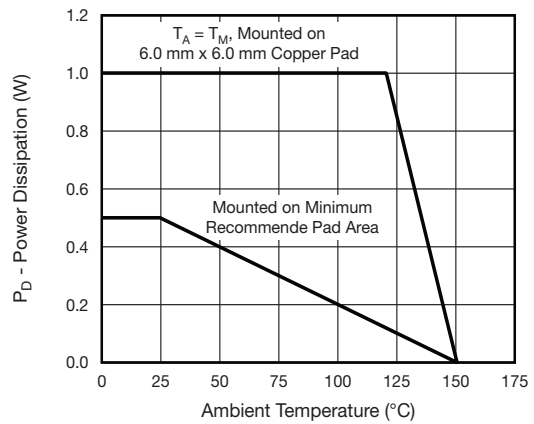


Fig. 5 - Power Dissipation Derating Curve

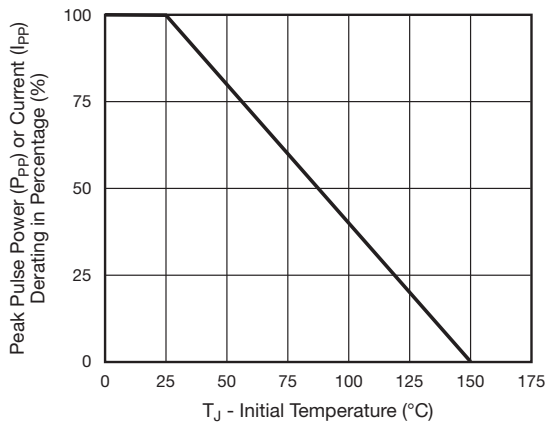


Fig. 3 - Pulse Power or Current vs. Initial Junction Temperature

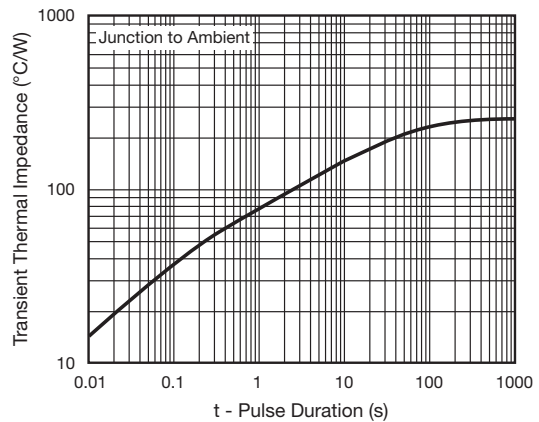
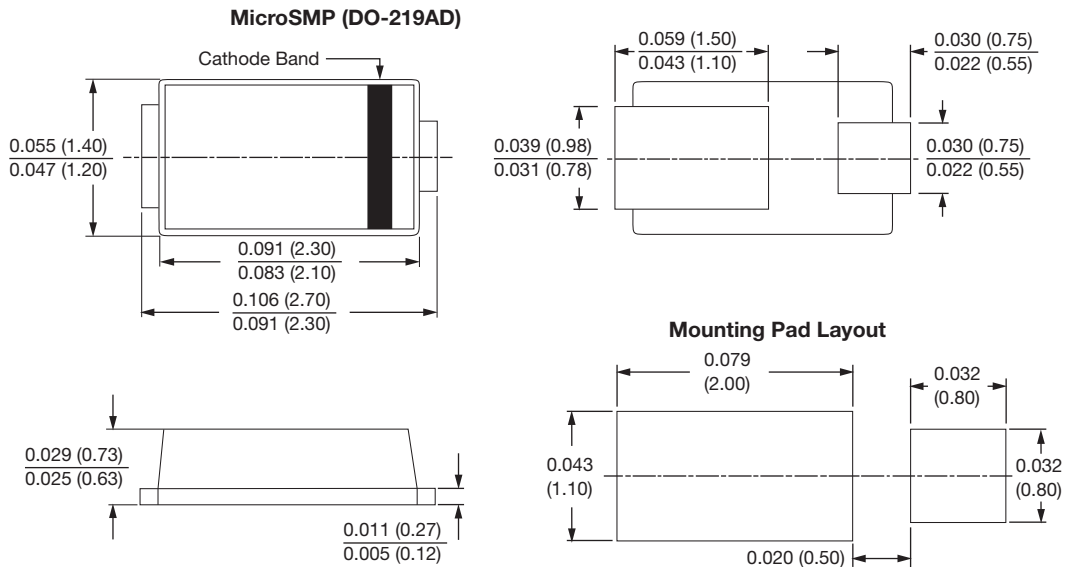


Fig. 6 - Typical Transient Thermal Impedance



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.