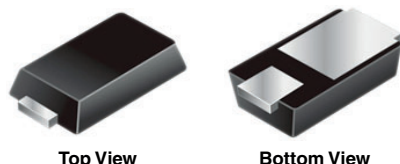


# Surface-Mount TRANSZORB® Transient Voltage Suppressors

## 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  $\mu$ s/1000  $\mu$ 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](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 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 $\mu$ s waveform (fig. 1)	$P_{PPM}^{(1)(2)}$	150	W
Peak pulse current with a 10/1000 $\mu$ 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 <sub>BR</sub> AT I <sub>T</sub> <sup>(1)</sup> (V)		TEST CURRENT I <sub>T</sub> (mA)	STAND-OFF VOLTAGE V <sub>WM</sub> (V)	MAXIMUM REVERSE LEAKAGE CURRENT I <sub>R</sub> AT V <sub>WM</sub> (μA)	MAXIMUM V <sub>C</sub> AT I <sub>PPM</sub>		R <sub>D</sub>	MAXIMUM V <sub>C</sub> AT I <sub>PPM</sub>		R <sub>D</sub>
		MIN.	MAX.				10/1000 μs			8/20 μs		
							V <sub>C</sub> (V)	I <sub>PPM</sub> (A)	R <sub>D</sub> (Ω)	V <sub>C</sub> (V)	I <sub>PPM</sub> (A)	R <sub>D</sub> (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:  $V_{CL\text{ max.}} = R_D \times I_{PP} + V_{BR\text{ max.}}$

(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	$> 8\text{ kV}$
IEC 61000-4-2 <sup>(2)</sup>	Human body model (air discharge mode) <sup>(1)</sup>	$C = 150\text{ pF}$ , $R = 330\text{ }\Omega$		4	$> 15\text{ kV}$

**Notes**

- (1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance  $> 30\text{ kV}$
- (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 <sup>(1)</sup>	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 <sup>(1)</sup>	0.006	89A	4500	7" diameter plastic tape and reel

**Note**

- (1) Automotive grade

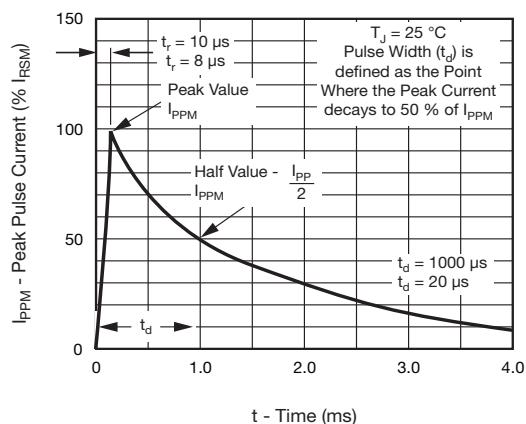
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Pulse Waveform

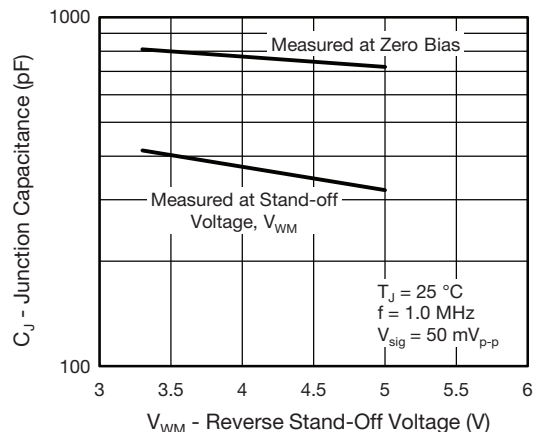


Fig. 4 - Typical Junction Capacitance

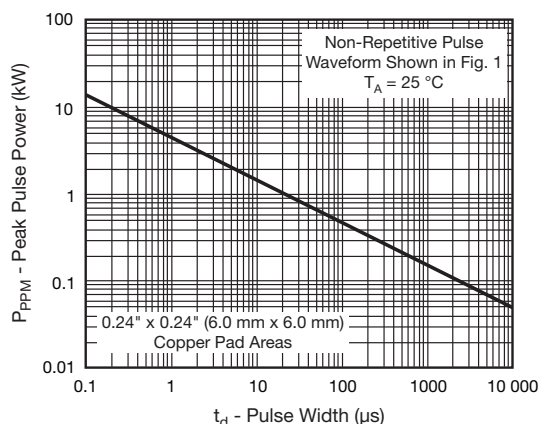


Fig. 2 - Peak Pulse Power Rating Curve

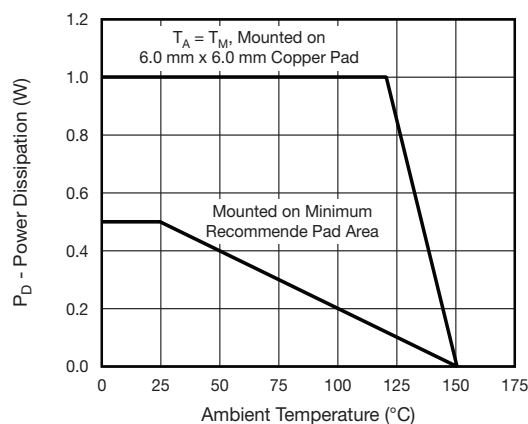


Fig. 5 - Power Dissipation Derating Curve

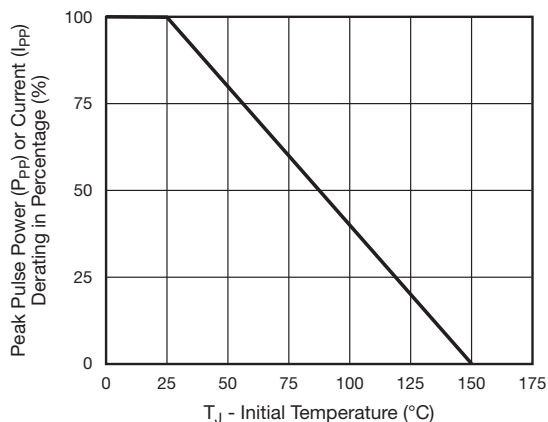


Fig. 3 - Pulse Power or Current vs. Initial Junction Temperature

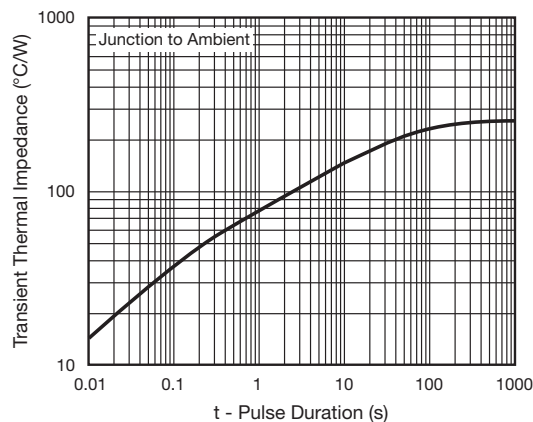
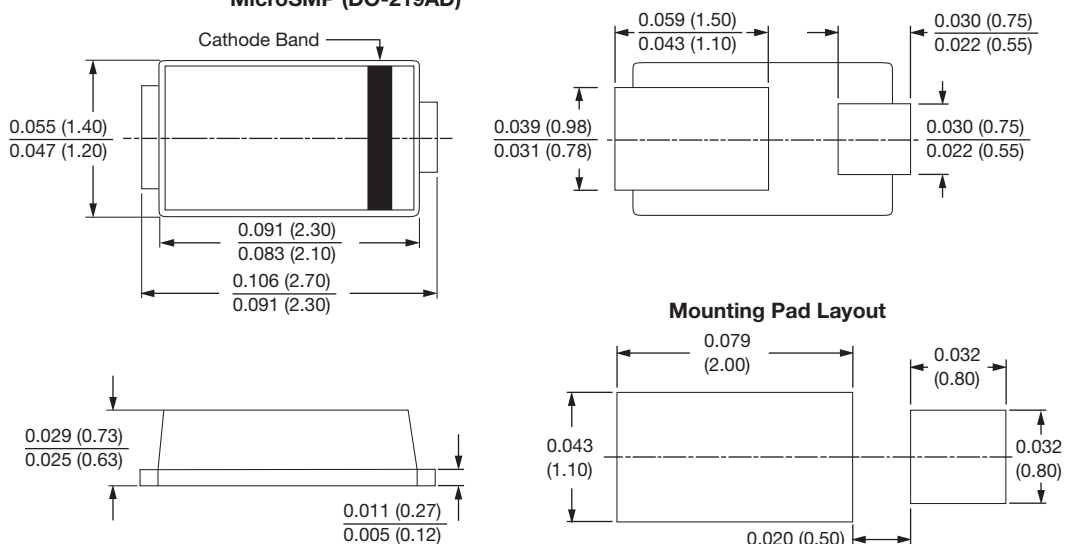


Fig. 6 - Typical Transient Thermal Impedance



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

**MicroSMP (DO-219AD)**





## 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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

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.