



## Surface Mount TRANSZORB® Transient Voltage Suppressors

### eSMP® Series



Top View

Bottom View

### MicroSMP (DO-219AD)



### FEATURES

- Very low profile - typical height of 0.65 mm
- Ideal for automated placement
- Oxide planar chip junction
- Uni-directional polarity only
- Peak pulse power: 150 W (10/1000  $\mu$ s)
- ESD capability: **15 kV (air), 8 kV (contact)**
- Meets MSL level 1, per J-STD-020C, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### DESIGN SUPPORT TOOLS

[click logo to get started](#)



### 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

**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 the cathode end

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

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	
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 <sub>A</sub> = 25 °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>		
		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)
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<sub>p</sub> ≤ 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<sub>CL max.</sub> = R<sub>D</sub> × I<sub>PP</sub> + V<sub>BR max.</sub>

THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance	R <sub>θJA</sub> <sup>(1)</sup>	250	°C/W
	R <sub>θJM</sub> <sup>(2)</sup>	30	

Notes

- (1) Free air, mounted on recommended PCB 1 oz. pad area; thermal resistance R<sub>θJA</sub> - junction to ambient
- (2) Units mounted on PCB with 6.0 mm x 6.0 mm copper pad areas; R<sub>θJM</sub> - junction to mount

IMMUNITY TO STATIC ELECTRICAL DISCHARGE TO THE FOLLOWING STANDARDS (T <sub>A</sub> = 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 <sub>C</sub>	H3B	> 8 kV
IEC 61000-4-2 <sup>(2)</sup>	Human body model (air discharge mode) <sup>(1)</sup>	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	0.006	89A	4500	7" diameter plastic tape and reel



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

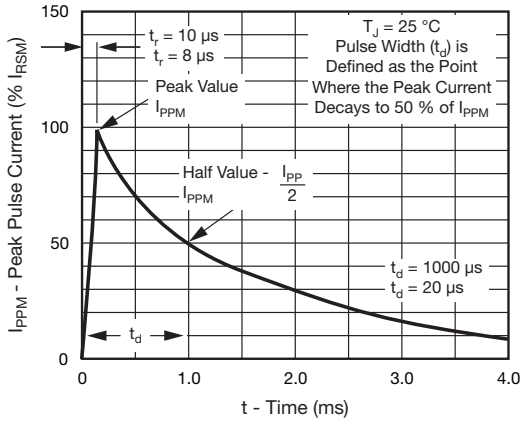


Fig. 1 - Pulse Waveform

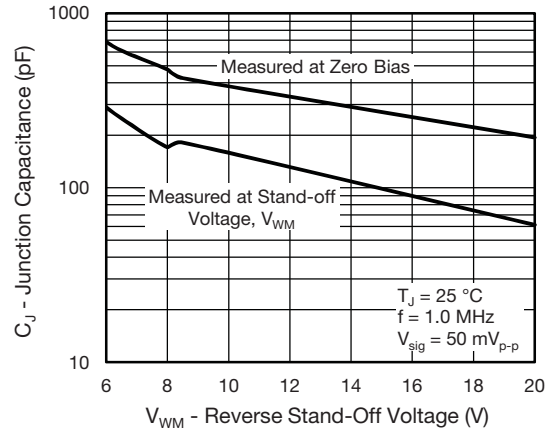


Fig. 4 - Typical Junction Capacitance

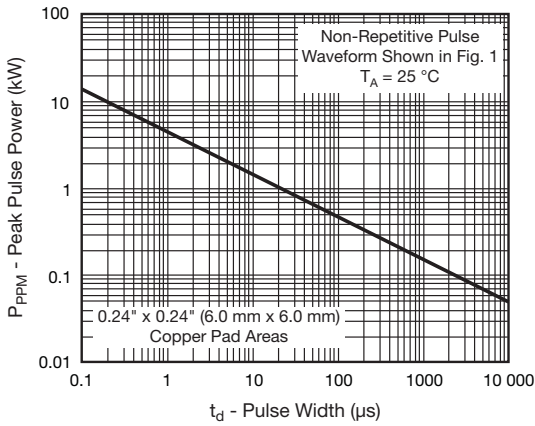


Fig. 2 - Peak Pulse Power Rating Curve

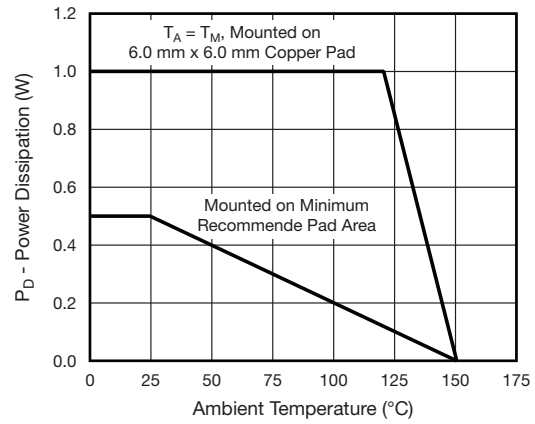


Fig. 5 - Power Dissipation Derating Curve

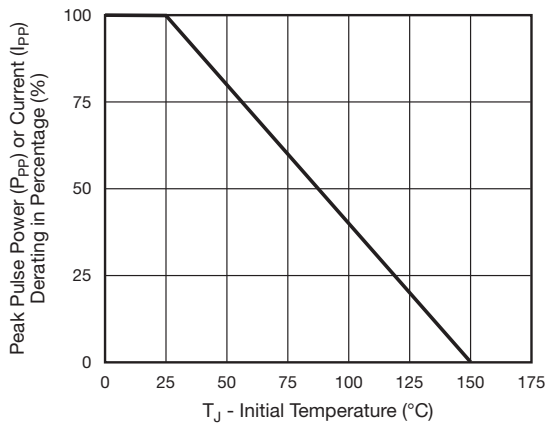


Fig. 3 - Pulse Power or Current vs. Initial Junction Temperature

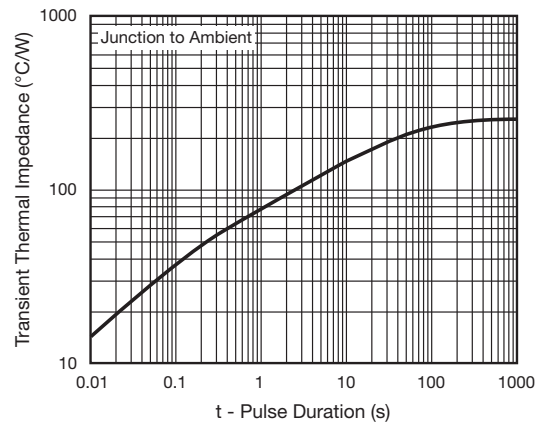
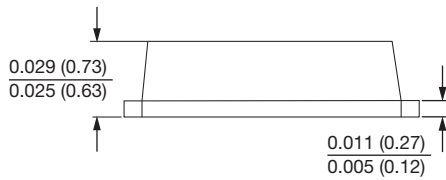
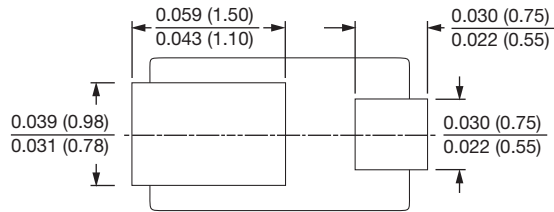
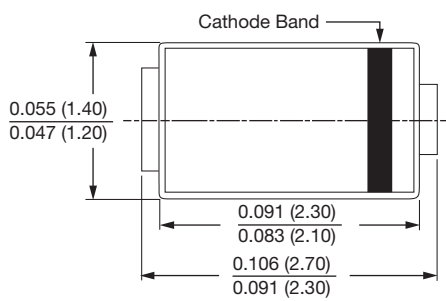


Fig. 6 - Typical Transient Thermal Impedance

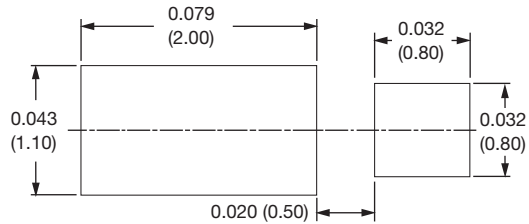


## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### MicroSMP (DO-219AD)



### Mounting Pad Layout





## **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.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Vishay:](#)

[MSMP20A-M3/89A](#) [MSMP6.5A-M3/89A](#) [MSMP17A-M3/89A](#) [MSMP14A-M3/89A](#) [MSMP7.0A-M3/89A](#) [MSMP9.0A-M3/89A](#) [MSMP11A-M3/89A](#) [MSMP10A-M3/89A](#) [MSMP18A-M3/89A](#) [MSMP7.5A-M3/89A](#) [MSMP15A-M3/89A](#) [MSMP6.0A-M3/89A](#) [MSMP8.0A-M3/89A](#) [MSMP8.5A-M3/89A](#) [MSMP16A-M3/89A](#) [MSMP12A-M3/89A](#) [MSMP13A-M3/89A](#)