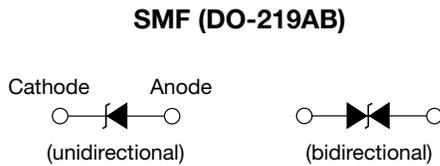
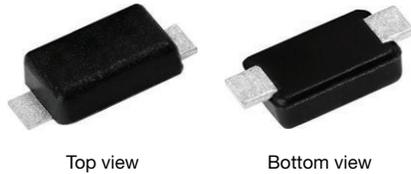


# Surface Mount PAR<sup>®</sup> Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions

## eSMP<sup>®</sup> Series



PRIMARY CHARACTERISTICS	
$V_{WM}$ unidirectional	8.55 V to 43.6 V
$V_{WM}$ bidirectional	10.2 V to 85.5 V
$V_{BR}$ unidirectional	10 V to 51 V
$V_{BR}$ bidirectional	12 V to 100 V
$P_{PPM}$	400 W, 350 W
$P_D$	1.0 W
$T_J$ max.	185 °C
Polarity	Unidirectional, bidirectional
Package	SMF (DO-219AB)

## FEATURES

- Low profile package
- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 185$  °C capability suitable for high reliability and automotive requirement
- Available in unidirectional and bidirectional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform (350 W above 56 V)
- Excellent clamping capability
- AEC-Q101 qualified
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Wave and reflow solderable
- Compatible to SOD-123W package case outline
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

## TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lightning on ICs, MOSFET, signal lines of sensor units for automotive.

## MECHANICAL DATA

**Case:** SMF (DO-219AB)

Molding compound meets UL 94 V-0 flammability rating Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

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

HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** for unidirectional types the band denotes cathode end, no marking on bidirectional types

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Peak power dissipation with a 10/1000 $\mu$ s waveform (fig. 3)	$P_{PPM}$ <sup>(1)</sup>	400	W
Peak power pulse current with a 10/1000 $\mu$ s waveform (fig. 1)	$I_{PPM}$ <sup>(1)</sup>	See next table	A
Operating junction and storage temperature range	$T_J, T_{STG}$	-65 to +185	°C

### Notes

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



ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)												
DEVICE TYPE	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V <sub>BR</sub> <sup>(1)</sup> AT I <sub>T</sub> (V)			TEST CURRENT I <sub>T</sub> (mA)	STAND-OFF VOLTAGE V <sub>WM</sub> (V)	MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> I <sub>D</sub> (μA)	T <sub>J</sub> = 150 °C MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> I <sub>D</sub> (μA)	MAXIMUM PEAK PULSE SURGE CURRENT I <sub>PPM</sub> <sup>(2)</sup> (A)	MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V)	TYPICAL TEMP. COEFFICIENT OF V <sub>BR</sub> <sup>(3)</sup> α <sub>T</sub> (%/°C)
	UNI	BI	MIN.	NOM.	MAX.							
T4F10A	APP	-	9.5	10.0	10.5	1.0	8.55	5.0	20	27.6	14.5	0.064
T4F11A	ARP	-	10.5	11.0	11.6	1.0	9.40	1.0	5.0	25.6	15.6	0.067
T4F12A	ATP	ATP	11.4	12.0	12.6	1.0	10.2	1.0	5.0	24.0	16.7	0.070
T4F13A	AVP	AVP	12.4	13.0	13.7	1.0	11.1	1.0	5.0	22.0	18.2	0.072
T4F15A	AXP	AXP	14.3	15.0	15.8	1.0	12.8	1.0	5.0	18.9	21.2	0.076
T4F16A	AZP	AZP	15.2	16.0	16.8	1.0	13.6	1.0	5.0	17.8	22.0	0.078
T4F18A	BEP	BEP	17.1	18.0	18.9	1.0	15.3	1.0	5.0	15.9	25.5	0.080
T4F20A	BGP	BGP	19.0	20.0	21.0	1.0	17.1	1.0	5.0	14.4	27.7	0.082
T4F22A	BKP	BKP	20.9	22.0	23.1	1.0	18.8	1.0	5.0	13.1	30.6	0.084
T4F24A	BMP	BMP	22.8	24.0	25.2	1.0	20.5	1.0	5.0	12.0	33.2	0.085
T4F27A	BPP	BPP	25.7	27.0	28.4	1.0	23.1	1.0	5.0	10.7	37.5	0.087
T4F30A	BRP	BRP	28.5	30.0	31.5	1.0	25.6	1.0	5.0	9.7	41.4	0.088
T4F33A	BTP	BTP	31.4	33.0	34.7	1.0	28.2	1.0	5.0	8.8	45.7	0.089
T4F36A	BVP	BVP	34.2	36.0	37.8	1.0	30.8	1.0	5.0	8.0	49.9	0.090
T4F39A	BXP	BXP	37.1	39.0	41.0	1.0	33.3	1.0	5.0	7.4	53.9	0.091
T4F43A	BZP	BZP	40.9	43.0	45.2	1.0	36.8	1.0	5.0	6.7	59.3	0.092
T4F47A	CEP	CEP	44.7	47.0	49.4	1.0	40.2	1.0	5.0	6.2	64.8	0.092
T4F51A	CGP	CGP	48.5	51.0	53.6	1.0	43.6	1.0	5.0	5.7	70.1	0.093
T4F56A	-	CKP	53.2	56.0	58.8	1.0	47.8	1.0	5.0	4.5	77.0	0.093
T4F62A	-	CMP	58.9	62.0	65.1	1.0	53.0	1.0	5.0	4.1	85.0	0.094
T4F68A	-	CPP	64.6	68.0	71.4	1.0	58.1	1.0	5.0	3.8	92.0	0.095
T4F75A	-	CRP	71.3	75.0	78.8	1.0	64.1	1.0	5.0	3.4	104	0.095
T4F82A	-	CTP	77.9	82.0	86.1	1.0	70.1	1.0	5.0	3.1	113	0.095
T4F91A	-	CVP	86.5	91.0	95.5	1.0	77.8	1.0	5.0	2.8	125	0.096
T4F100A	-	CXP	95.0	100	105	1.0	85.5	1.0	5.0	2.6	137	0.096

Notes

- (1) V<sub>BR</sub> measured after I<sub>T</sub> applied for 300μs, I<sub>T</sub> = square wave pulse or equivalent
- (2) Surge current waveform per fig. 3 and derated per fig. 2
- (3) To calculate V<sub>BR</sub> vs. junction temperature, use the following formula: T<sub>J</sub> = V<sub>BR</sub> at 25 °C x (1+α<sub>T</sub> x (T<sub>J</sub> - 25))
- (4) All terms and symbols are consistent with ANSI/IEEE C62.35

THERMAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Thermal resistance	R <sub>thJA</sub> <sup>(1)</sup>	135	160	°C/W
	R <sub>thJM</sub> <sup>(2)</sup>	15	18	°C/W

Notes

- (1) Thermal resistance junction-to-ambient to follow JEDEC® 51-2A, device mounted on FR4 PCB, 2 oz. standard footprint
- (2) Thermal resistance junction-to-mount to follow JEDEC® 51-14 using Transient Dual Interface Test Method (TDIM)

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
T4F10AHM3/H <sup>(1)</sup>	0.015	H	3000	7" diameter plastic tape and reel
T4F10AHM3/I <sup>(1)</sup>	0.015	I	10 000	13" diameter plastic tape and reel
T4F12CAHM3/H <sup>(1)</sup>	0.015	H	3000	7" diameter plastic tape and reel
T4F12CAHM3/I <sup>(1)</sup>	0.015	I	10 000	13" diameter plastic tape and reel

Note

- (1) AEC-Q101 qualified



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

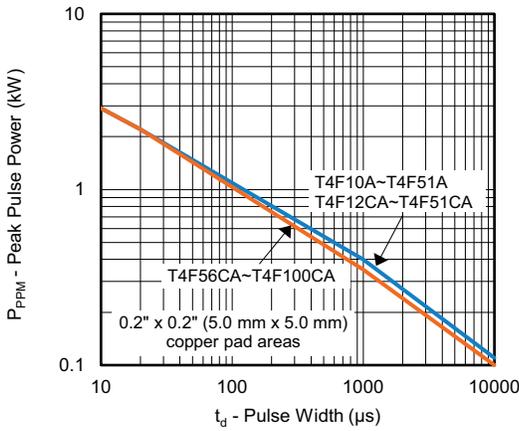


Fig. 1 - Peak Pulse Power Rating Curve

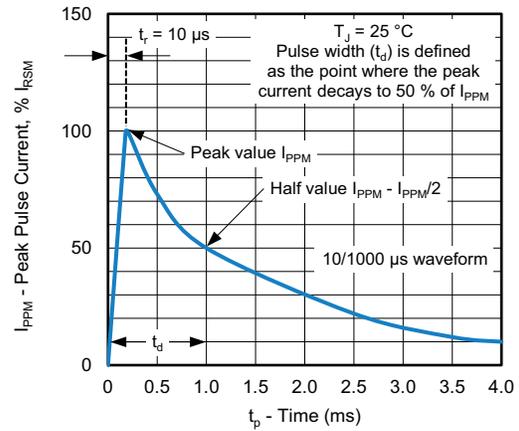


Fig. 3 - Pulse Waveform

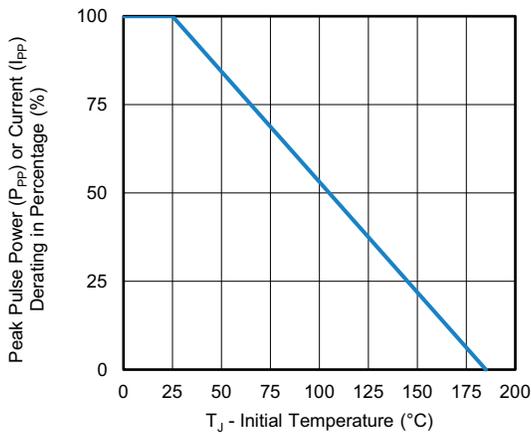


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

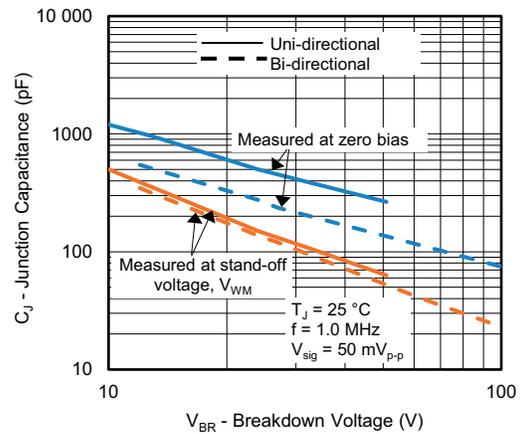


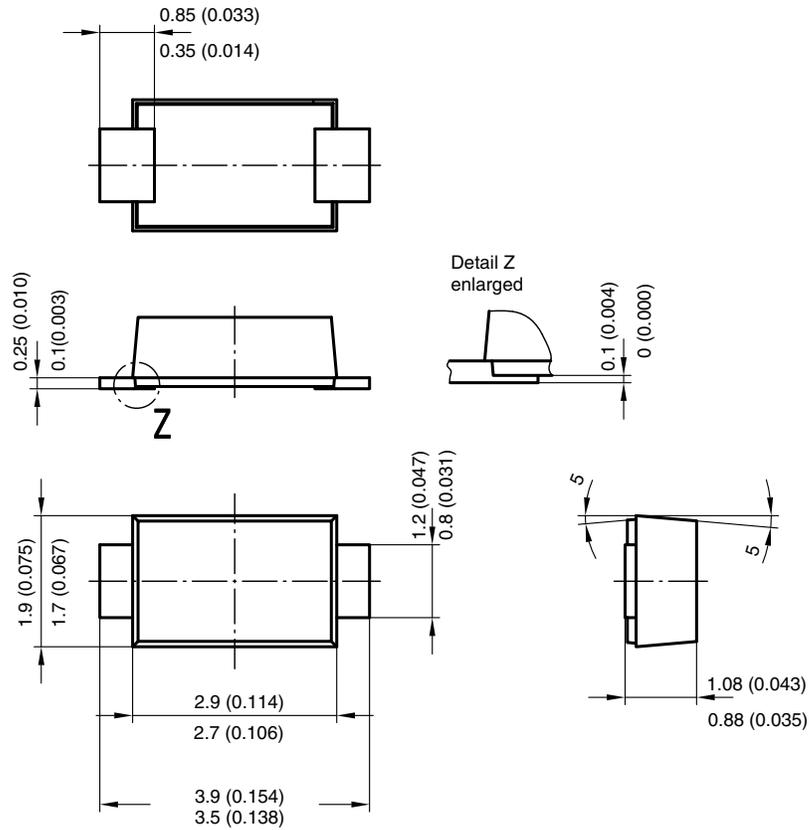
Fig. 4 - Typical Junction Capacitance

### Note

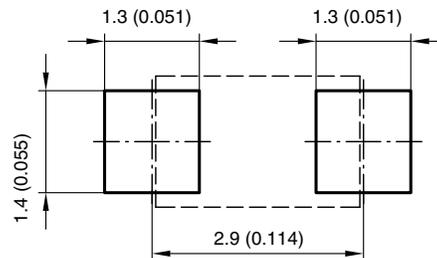
- Fig.1 power calculation is based on  $I_{PPM}$  times defined maximum clamping voltage by pulse width



## PACKAGE OUTLINE DIMENSIONS in millimeters (inches)



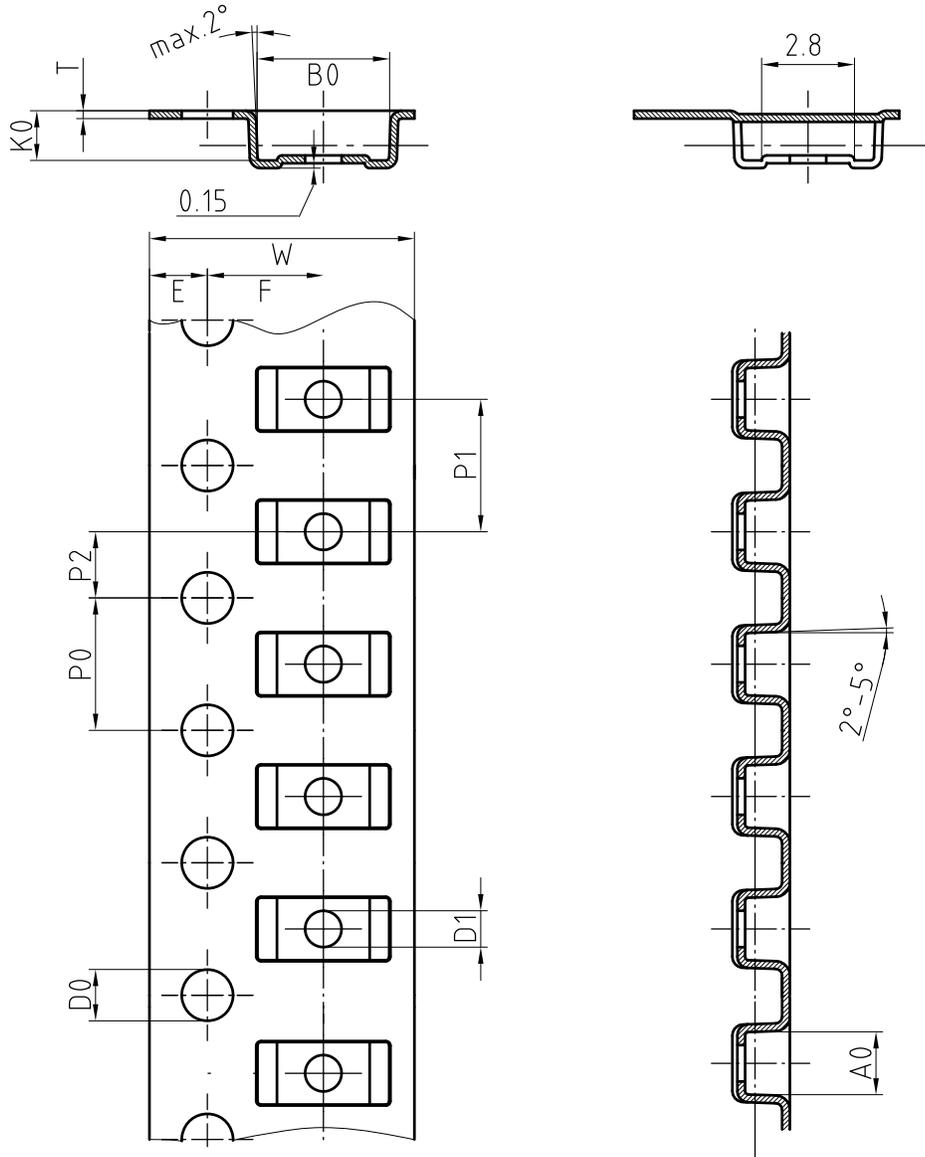
Foot print recommendation:



Created - Date: 15. February 2005  
 Rev. 3 - Date: 13. March 2007  
 Document no.: S8-V-3915.01-001 (4)  
 17247



**BLISTERTAPE DIMENSIONS** in millimeters: **SMF (DO-219AB)**



Mat:	A0	B0	K0	W	T	P0	P2	P1	D0	D1	E	F
PS	1.9	4.0	1.5	8.0	0.235	4.0	2.0	4.0	1.5	1	1.75	3.5

Document-No.: S8-V-3717.02-001 (3)  
18513



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