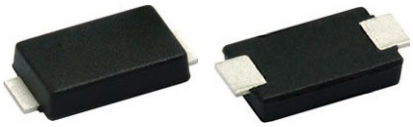
THE DATASHEET OF

SMA6F15A-M3/6A

Surface-Mount TRANSZORB® Transient Voltage Suppressors

eSMP® Series



Top View Bottom View

SlimSMA (DO-221AC)

Cathode ○—|◀|—○ Anode

DESIGN SUPPORT TOOLS AVAILABLE

3D Models

PRIMARY CHARACTERISTICS	
V_{BR}	6.4 V to 159 V
V_{WM}	5.0 V to 130 V
P_{PPM} (10 x 1000 µs)	600 W
P_{PPM} (8 x 20 µs)	4000 W
P_D at T_M = 55 °C	8 W
T_J max.	175 °C
Polarity	Uni-directional
Package	SlimSMA (DO-221AC)

FEATURES

- Very low profile - typical height of 0.95 mm
- Ideal for automated placement
- Uni-directional only
- Excellent clamping capability
- Peak pulse power:
  - 600 W (10/1000 µs)
  - 4 kW (8/20 µs)
- ESD capability: IEC 61000-4-2 level 4
  - 15 kV (air)
  - 8 kV (contact)
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see 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 lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, and telecommunication.

MECHANICAL DATA

Case: SlimSMA (DO-221AC)
Molding compound meets UL 94 V-0 flammability rating Base P/N-M3 - halogen-free, RoHS-compliant, and industrial grade

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD22-B102
M3 suffix meets JESD 201 class 2 whisker test

Polarity: color band denotes cathode end

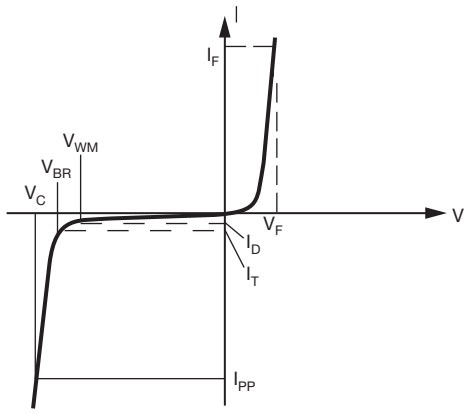
MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

PARAMETER		SYMBOL	VALUE	UNIT
Peak pulse power dissipation	with a 10/1000 µs waveform	P_{PPM} (1)	600	W
	with a 8/20 µs waveform		4000	
Peak pulse current	with a 10/1000 µs waveform	I_{PPM} (1)	See next table	A
	with a 8/20 µs waveform			
Power dissipation	T_M = 55 °C	P_D (2)	8	W
	T_A = 25 °C	P_D (3)	1.0	
Storage temperature range		T_{STG}	- 65 to + 175	°C
Operating junction temperature range		T_J	- 55 to + 175	

Notes

(1) Non-repetitive current pulse, per fig. 3 and derated above T_A = 25 °C per fig. 2.
(2) Power dissipation mounted on infinite heatsink
(3) Power dissipation mounted on FR4 PCB, 2 oz. standard footprint

INDEX OF SYMBOLS	
SYMBOL	**PARAMETER**
V_{WM}	Stand-off voltage
V_{BR}	Breakdown voltage
V_C	Clamping voltage
I_D	Leakage current at V_{WM}
I_{PP}	Peak pulse current
αT	Voltage temperature coefficient
V_F	Forward voltage drop
R_D	Dynamic resistance



Zener Voltage Regulator

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

DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE V_{BR} AT I_T (1)			STAND-OFF VOLTAGE V_{WM}	MAXIMUM REVERSE LEAKAGE I_D AT V_{WM} (3)			V_C AT I_{PP}	R_D (2)		V_C AT I_{PP}	R_D (2)		αT (3)
									10/1000 µs			8/20 µs			
		MIN.	MAX.	mA	V	25 °C	85 °C	V	MAX.	A	Ω	MAX.	A	Ω	MAX.
		V				µA			V			V			10^{-4}/°C
SMA6F5.0A	6AE	6.40	7.07	10	5	150	375	5.0	9.2	68.0	0.031	13.4	298	0.021	5.7
SMA6F6.0A	6AG	6.70	7.41	10	6	600	1500	6.0	9.5	63.2	0.033	13.7	290	0.022	5.9
SMA6F6.5A	6AK	7.20	7.96	10	6.5	100	250	6.5	10.2	58.8	0.038	14.5	276	0.024	6.1
SMA6F7.5A	6AP	8.33	9.21	1.0	7.5	50	125	7.5	11.8	50.8	0.051	17.0	235	0.033	6.5
SMA6F8.0A	6AR	8.89	9.83	1.0	8.0	20	50	8.0	12.8	46.9	0.063	18.2	220	0.038	7.0
SMA6F8.5A	6AT	9.4	10.4	1.0	8.5	20	50	8.5	13.3	45.1	0.064	18.7	205	0.040	7.3
SMA6F10A	6AX	11.1	12.3	1.0	10	1.0	5.0	10	15.7	38.2	0.089	19.6	184	0.040	7.8
SMA6F11A	6AZ	12.2	13.5	1.0	11	1.0	5.0	11	17.2	34.8	0.107	21.5	172	0.047	8.1
SMA6F12A	6BE	13.3	14.7	1.0	12	0.2	1.0	12	18.8	31.9	0.128	23.5	157	0.056	8.3
SMA6F12AHD	6BF	13.2	14.3	1.0	12	0.2	1.0	12	18.5	32.4	0.130	22.9	157	0.055	8.4
SMA6F13A	6BG	14.4	15.9	1.0	13	0.2	1.0	13	20.4	29.4	0.153	23.9	147	0.064	8.4
SMA6F15A	6BM	16.7	18.5	1.0	15	0.2	1.0	15	23.6	25.4	0.201	27.7	123	0.075	8.8
SMA6F16A	6BP	17.8	19.7	1.0	16	0.2	1.0	16	25.2	23.8	0.229	29.5	119	0.082	8.8
SMA6F17A	6BR	18.9	20.9	1.0	17	0.2	1.0	17	26.7	22.5	0.259	31.4	111	0.095	9.0
SMA6F18A	6BT	20.0	22.1	1.0	18	0.2	1.0	18	28.3	21.2	0.292	33.2	102	0.109	9.2
SMA6F20A	6BV	22.2	24.5	1.0	20	0.2	1.0	20	31.4	19.1	0.361	36.8	93	0.132	9.4
SMA6F22A	6BX	24.4	26.9	1.0	22	0.2	1.0	22	35.5	16.9	0.509	48.2	83.0	0.257	9.6
SMA6F24A	6BZ	26.7	29.5	1.0	24	0.2	1.0	24	39.0	15.4	0.617	50.0	80.0	0.256	9.6
SMA6F26A	6CE	28.9	31.9	1.0	26	0.2	1.0	26	42.0	14.3	0.706	53.3	75.0	0.285	9.7
SMA6F28A	6CG	31.1	34.4	1.0	28	0.2	1.0	28	45.5	13.2	0.841	58.8	68.0	0.359	9.8
SMA6F30A	6CK	33.3	36.8	1.0	30	0.2	1.0	30	48.4	12.4	0.935	64.5	62.0	0.447	9.9
SMA6F33A	6CM	36.7	40.6	1.0	33	0.2	1.0	33	53.1	11.3	1.11	70.2	57.0	0.519	10.0
SMA6F36A	6CP	40.0	44.2	1.0	36	0.2	1.0	36	58.3	10.3	1.37	76.9	52.0	0.629	10.0
SMA6F40A	6CR	44.4	49.1	1.0	40	0.2	1.0	40	64.5	9.3	1.66	83.3	48.0	0.713	10.1
SMA6F43A	6CT	47.8	52.8	1.0	43	0.2	1.0	43	69.8	8.6	1.98	89.9	44.5	0.834	10.1
SMA6F45A	6CV	50.0	55.3	1.0	45	0.2	1.0	45	72.3	8.3	2.05	93.9	42.6	0.906	10.2
SMA6F48A	6CX	53.3	58.9	1.0	48	0.2	1.0	48	76.9	7.8	2.31	100	40.0	1.03	10.3
SMA6F51A	6CZ	56.7	62.7	1.0	51	0.2	1.0	51	82.2	7.3	2.67	107	37.5	1.18	10.3
SMA6F54A	6RE	60.0	66.3	1.0	54	0.2	1.0	54	87.0	6.9	3.00	113	35.5	1.32	10.4
SMA6F58A	6RG	64.4	71.2	1.0	58	0.2	1.0	58	93.8	6.4	3.53	121	33.0	1.51	10.4

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

DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE V_{BR} AT I_T (1)			STAND-OFF VOLTAGE V_{WM}	MAXIMUM REVERSE LEAKAGE I_D AT V_{WM} (3)			V_C AT I_{PP} 10/1000 µs		R_D (2)	V_C AT I_{PP} 8/20 µs		R_D (2)	αT (3)
		MIN.	MAX.	mA	V	25 °C	85 °C	V	MAX.	A	Ω	MAX.	A	Ω	MAX.
		V				µA			V			V			10^{-4}/°C
SMA6F60A	6RK	66.7	73.7	1.0	60	0.2	1.0	60	96.8	6.2	3.73	125	31.9	1.61	10.5
SMA6F64A	6RM	71.1	78.6	1.0	64	0.2	1.0	64	103	5.8	4.21	134	29.9	1.85	10.5
SMA6F70A	6RP	77.8	86.0	1.0	70	0.2	1.0	70	113	5.3	5.09	148	27.0	2.30	10.5
SMA6F75A	6RR	83.3	92.1	1.0	75	0.2	1.0	75	120	5.0	5.58	156	25.6	2.50	10.6
SMA6F78A	6RT	86.7	95.8	1.0	78	0.2	1.0	78	125	4.8	6.08	163	24.6	2.73	10.6
SMA6F85A	6RV	94.4	104	1.0	85	0.2	1.0	85	136	4.4	7.27	178	22.5	3.29	10.6
SMA6F90A	6RX	100	111	1.0	90	0.2	1.0	90	146	4.1	8.54	189	21.2	3.68	10.7
SMA6F100A	6RZ	111	123	1.0	100	0.2	1.0	100	162	3.7	10.5	211	19.0	4.63	10.7
SMA6F110A	6SE	122	135	1.0	110	0.2	1.0	110	177	3.4	12.4	230	17.4	5.46	10.7
SMA6F120A	6VG	133	147	1.0	120	0.2	1.0	120	194	3.1	15.2	250	16.0	6.44	10.7
SMA6F130A	6VK	144	159	1.0	130	0.2	1.0	130	207	2.9	16.6	267	15.0	7.20	10.8

Notes

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

(2) To calculate maximum clamping voltage at other surge currents, use following formula: V_{CL} max. = R_D x I_{PP} + V_{BR} max.

(3) To calculate V_{BR} vs. junction temperature, use following formula: V_{BR} at T_J = V_{BR} at 25 °C x (1 + αT x (T_J - 25))

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

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Typical thermal resistance	$R_{\theta JA}$ (1)	120	150	°C/W
	$R_{\theta JM}$ (2)	12	15	

Notes

(4) Thermal resistance junction-to-ambient to follow JEDEC® 51-2A, device mounted on FR4 PCB, 2 oz. standard footprint

(5) Thermal resistance junction-to-mount to follow JEDEC® 51-14, using TDIM (transient dual interface test method)

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

STANDARD	TEST TYPE	TEST CONDITIONS	SYMBOL	CLASS	VALUE
IEC 61000-4-2	Human body model (contact mode)	C = 150 pF, R = 330 Ω	V_C	4	> 8 kV
	Human body model (air discharge mode)				> 15 kV

ORDERING INFORMATION (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SMA6F5.0A-M3/6A (1)	0.032	6A	3500	7" diameter plastic tape and reel
SMA6F5.0A-M3/6B (1)	0.032	6B	14 000	13" diameter plastic tape and reel
SMA6F22A-M3/H (2)	0.032	H	3500	7" diameter plastic tape and reel
SMA6F22A-M3/I (2)	0.032	I	14 000	13" diameter plastic tape and reel

Notes

(1) Package code “6A and 6B” apply for SMA6F5.0A thru SMA6F20A

(2) Package code “H and I” apply for SMA6F22A thru SMA6F130A

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

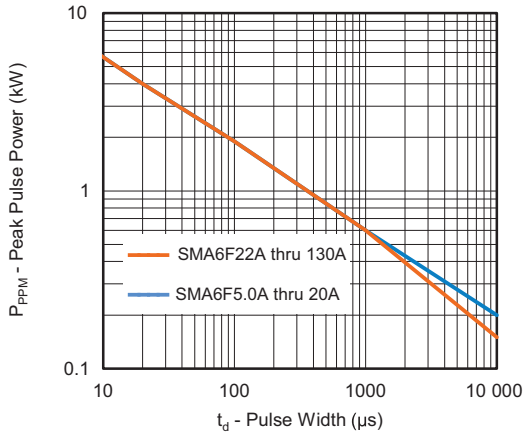


Fig. 1 - Peak Pulse Power Rating Curve

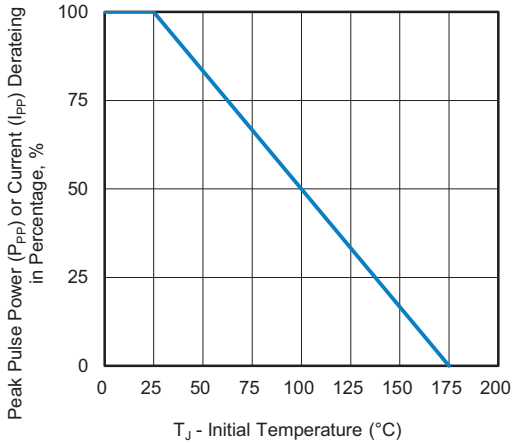


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

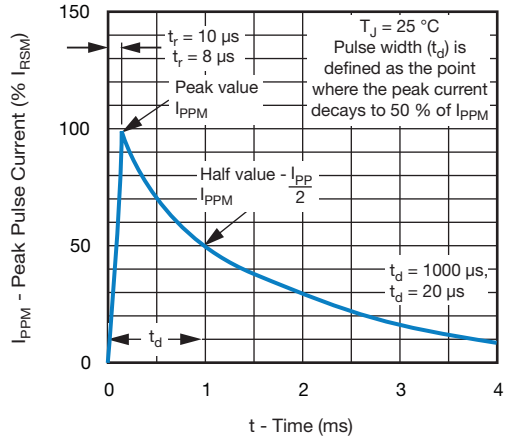


Fig. 3 - Pulse Waveform

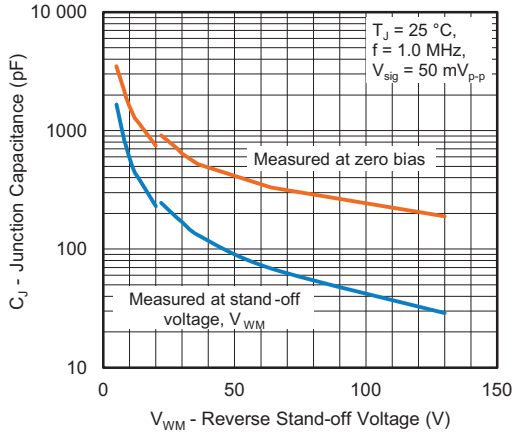


Fig. 4 - Typical Junction Capacitance

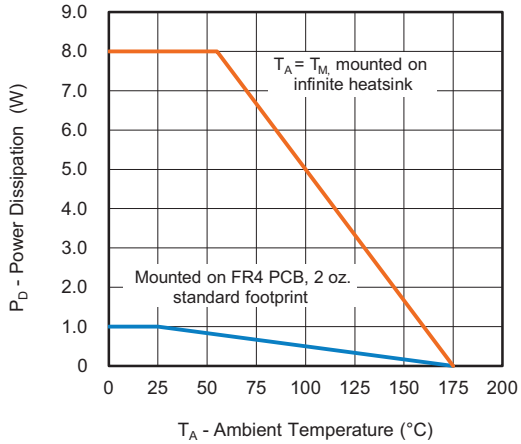


Fig. 5 - Power Dissipation Derating Curve

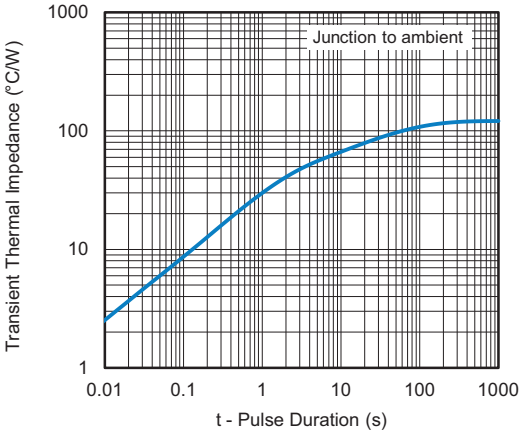


Fig. 6 - Typical Transient Thermal Impedance

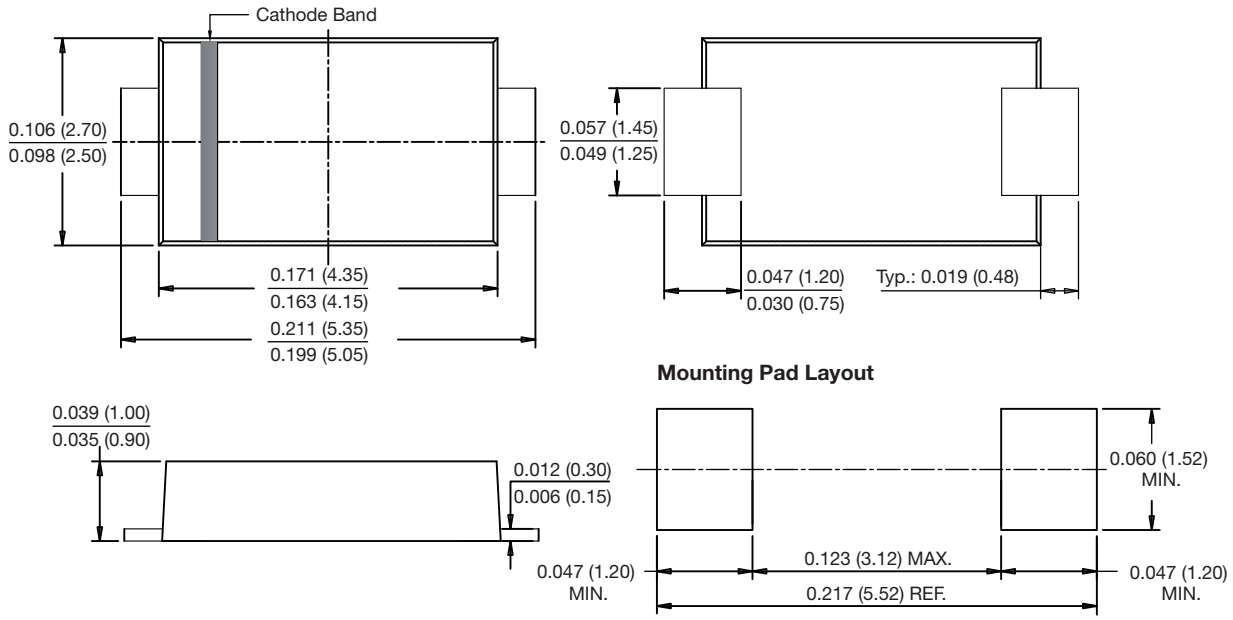
Notes

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

- Fig.1 - 10 000 µs P_{PPM} is actual test for $V_{WM} \leq 60$ V types, over 60 V types 10 000 µs P_{PPM} is curve extensional value

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SlimSMA (DO-221AC)



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