

SMAFxxxXX Series transient voltage suppressors are excellent overvoltage protective devices.

The Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.



SMAF (SOD-128)

Features

- Excellent clamping capability
- Low leakage current
- Low capacitance
- High surge capability
- Glass passivated chip
- Epoxy resin package
- Built-in strain relief
- Will not fatigue
- RoHS Compliant
- Fast response time:
typically less than 1.0ps from 0 Volts to V_{BR} min

Mechanical Characteristics

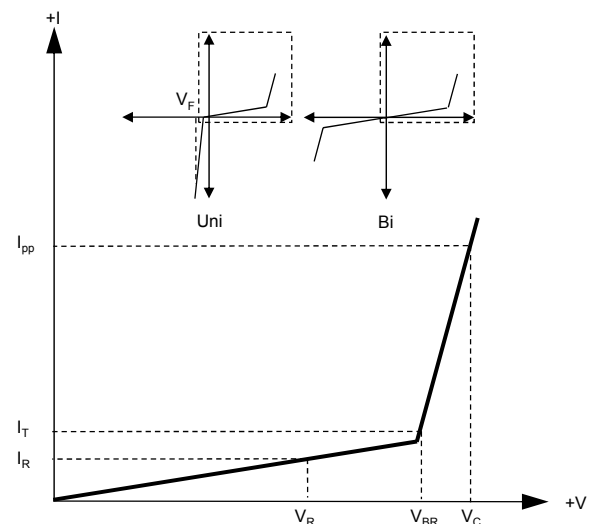
- Package: SMAF plastic package.
- Lead Finish: Matte Tin
- Case Material: Epoxy Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020

Applications

- Cellular phones
- Portable devices
- Business machines
- Power supplies
- Consumer applications

Electrical Parameters

Parameter	Definition
C_J	Junction Capacitance - typical capacitance measured with 0V or V_R bias
I_{PP}	Peak Pulse Current - maximum rated peak impulse current
V_C	Clamping Voltage - Peak voltage measured across the suppressor at a specified I_{ppm} (peak impulse current)
V_{BR}	Breakdown Voltage - Maximum voltage that flows through the TVS at a specified test current (I_T)
I_R	Leakage Current - maximum peak off-state current measured at V_R
V_R	Peak Off-state Voltage - maximum voltage that can be applied while maintaining off state



Summary of Packing Options

Package	Packing Description	Packing Quantity	Industry Standard
SMAF	Tape/Reel, 11" reel	5000	EIA-481-1
	Tape/Reel, 7" reel	3000	EIA-481-1

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Units	Remarks
Peak Pulse Power Dissipation	P_{PPM}	400	W	(Note1)(Note2)
Steady State Power Dissipation	P_D	3.3	W	(Note3)
Peak Forward Surge Current	I_{FSM}	40	A	(Note4)
Maximum Instantaneous Forward Voltage at 20A	V_{FM}	3.5	V	(Note5)
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	25	$^\circ\text{C/W}$	
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	110	$^\circ\text{C/W}$	
Operating Temperature Range	T_J	-55 to 150	$^\circ\text{C}$	
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ\text{C}$	

Notes1: Non-repetitive current pulse , 10/1000us Waveform.

Notes2: Mounted on copper pad area of 5×5mm to each terminal.

Notes3: Infinite HeatSink at $T_A=50^\circ\text{C}$

Notes4: Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 perminute maximum.

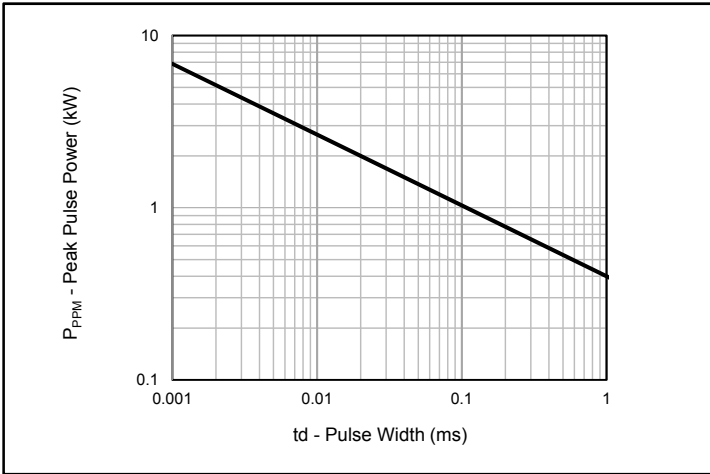
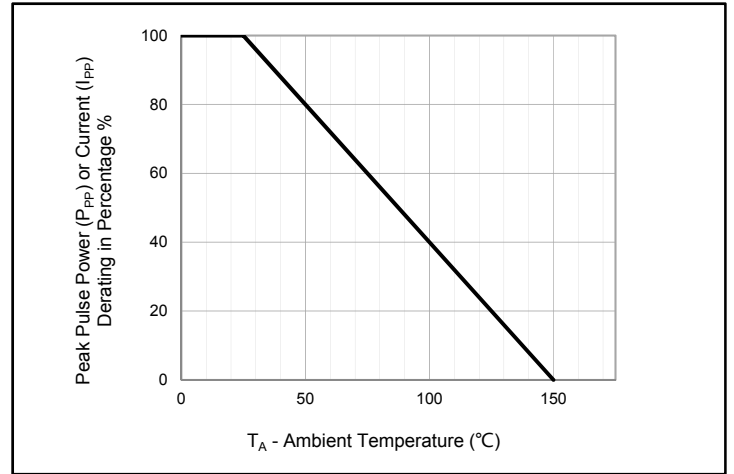
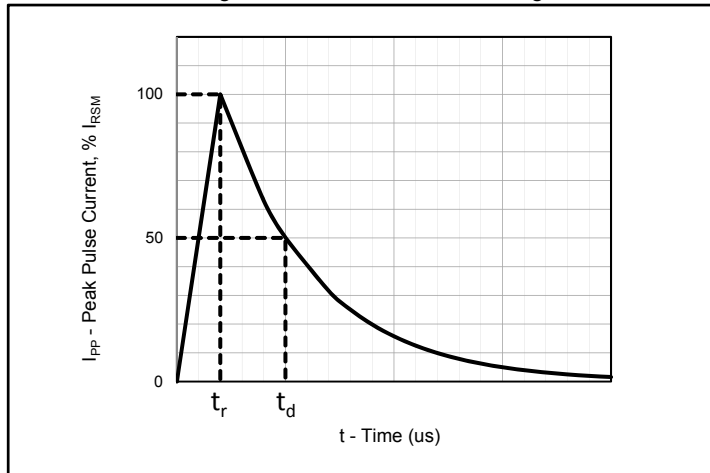
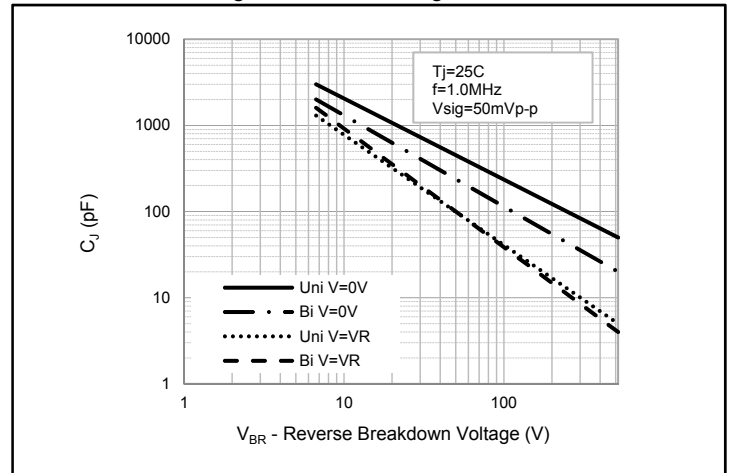
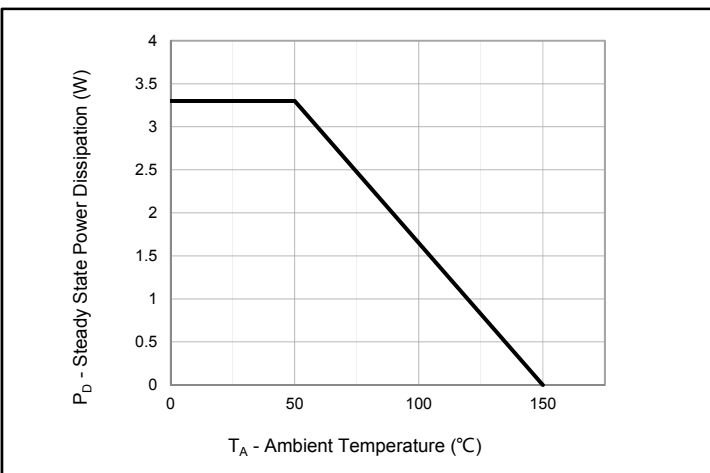
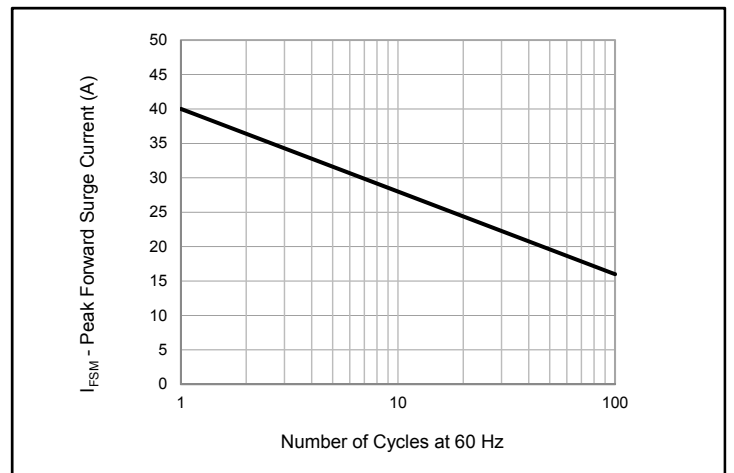
Notes5: For UnidirectionalOnly.

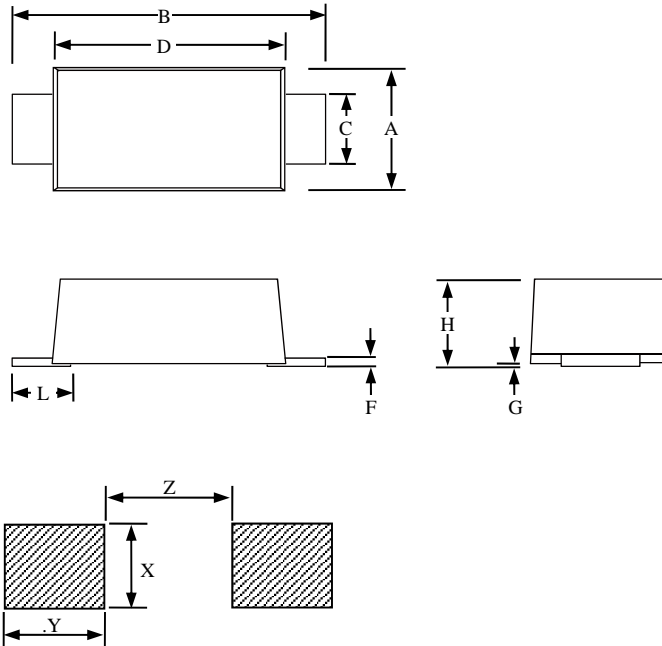
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Marking Code		Reverse Stand off Voltage V_R (V)	Breakdown Voltage $V_{BR} @ I_T$ (V)		Test Current I_T (mA)	Maximum Clamping Voltage $V_C @ I_{PP}$ (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximun Reverse Leakage $I_R @ V_R$ (μA)
		Uni	Bi		Min	Max				
SMAF5.0A	SMAF5.0CA	KE	AE	5	6.4	7	10	9.2	43.5	800
SMAF6.0A	SMAF6.0CA	KG	AG	6	6.67	7.37	10	10.3	38.8	800
SMAF6.5A	SMAF6.5CA	KK	AK	6.5	7.22	7.98	10	11.2	35.7	500
SMAF7.0A	SMAF7.0CA	KM	AM	7	7.78	8.6	10	12	33.3	200
SMAF7.5A	SMAF7.5CA	KP	AP	7.5	8.33	9.21	1	12.9	31	100
SMAF8.0A	SMAF8.0CA	KR	AR	8	8.89	9.83	1	13.6	29.4	50
SMAF8.5A	SMAF8.5CA	KT	AT	8.5	9.44	10.4	1	14.4	27.8	20
SMAF9.0A	SMAF9.0CA	KV	AV	9	10	11.1	1	15.4	26	10
SMAF10A	SMAF10CA	KX	AX	10	11.1	12.3	1	17	23.5	5
SMAF11A	SMAF11CA	KZ	AZ	11	12.2	13.5	1	18.2	22	1
SMAF12A	SMAF12CA	LE	BE	12	13.3	14.7	1	19.9	20.1	1
SMAF13A	SMAF13CA	LG	BG	13	14.4	15.9	1	21.5	18.6	1
SMAF14A	SMAF14CA	LK	BK	14	15.6	17.2	1	23.2	17.2	1
SMAF15A	SMAF15CA	LM	BM	15	16.7	18.5	1	24.4	16.4	1
SMAF16A	SMAF16CA	LP	BP	16	17.8	19.7	1	26	15.4	1
SMAF17A	SMAF17CA	LR	BR	17	18.9	20.9	1	27.6	14.5	1
SMAF18A	SMAF18CA	LT	BT	18	20	22.1	1	29.2	13.7	1
SMAF20A	SMAF20CA	LV	BV	20	22.2	24.5	1	32.4	12.3	1

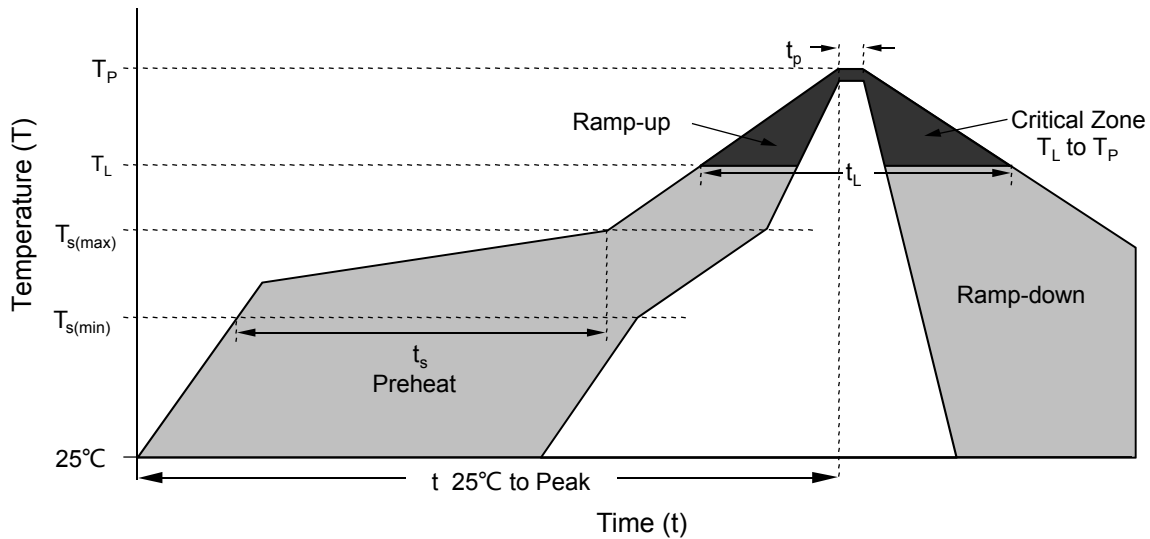
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Marking Code		Reverse Stand off Voltage V_R (V)	Breakdown Voltage $V_{BR} @ I_T$ (V)		Test Current I_T (mA)	Maximum Clamping Voltage $V_C @ I_{PP}$ (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage $I_R @ V_R$ (μA)
		Uni	Bi		Min	Max				
SMAF22A	SMAF22CA	LX	BX	22	24.4	26.9	1	35.5	11.3	1
SMAF24A	SMAF24CA	LZ	BZ	24	26.7	29.5	1	38.9	10.3	1
SMAF26A	SMAF26CA	ME	CE	26	28.9	31.9	1	42.1	9.5	1
SMAF28A	SMAF28CA	MG	CG	28	31.1	34.4	1	45.4	8.8	1
SMAF30A	SMAF30CA	MK	CK	30	33.3	36.8	1	48.4	8.3	1
SMAF33A	SMAF33CA	MM	CM	33	36.7	40.6	1	53.3	7.5	1
SMAF36A	SMAF36CA	MP	CP	36	40	44.2	1	58.1	6.9	1
SMAF40A	SMAF40CA	MR	CR	40	44.4	49.1	1	64.5	6.2	1
SMAF43A	SMAF43CA	MT	CT	43	47.8	52.8	1	69.4	5.8	1
SMAF45A	SMAF45CA	MV	CV	45	50	55.3	1	72.7	5.5	1
SMAF48A	SMAF48CA	MX	CX	48	53.3	58.9	1	77.4	5.2	1
SMAF51A	SMAF51CA	MZ	CZ	51	56.7	62.7	1	82.4	4.9	1
SMAF54A	SMAF54CA	NE	DE	54	60	66.3	1	87.1	4.6	1
SMAF58A	SMAF58CA	NG	DG	58	64.4	71.2	1	93.6	4.3	1
SMAF60A	SMAF60CA	NK	DK	60	66.7	73.7	1	96.8	4.1	1
SMAF64A	SMAF64CA	NM	DM	64	71.1	78.6	1	103	3.9	1
SMAF70A	SMAF70CA	NP	DP	70	77.8	86	1	113	3.5	1
SMAF75A	SMAF75CA	NR	DR	75	83.3	92.1	1	121	3.3	1
SMAF78A	SMAF78CA	NT	DT	78	86.7	95.8	1	126	3.2	1
SMAF85A	SMAF85CA	NV	DV	85	94.4	104	1	137	2.9	1
SMAF90A	SMAF90CA	NX	DX	90	100	111	1	146	2.7	1
SMAF100A	SMAF100CA	NZ	DZ	100	111	123	1	162	2.5	1
SMAF110A	SMAF110CA	PE	EE	110	122	135	1	177	2.3	1
SMAF120A	SMAF120CA	PG	EG	120	133	147	1	193	2.1	1
SMAF130A	SMAF130CA	PK	EK	130	144	159	1	209	1.9	1
SMAF150A	SMAF150CA	PM	EM	150	167	185	1	243	1.6	1
SMAF160A	SMAF160CA	PP	EP	160	178	197	1	259	1.5	1
SMAF170A	SMAF170CA	PR	ER	170	189	209	1	275	1.5	1

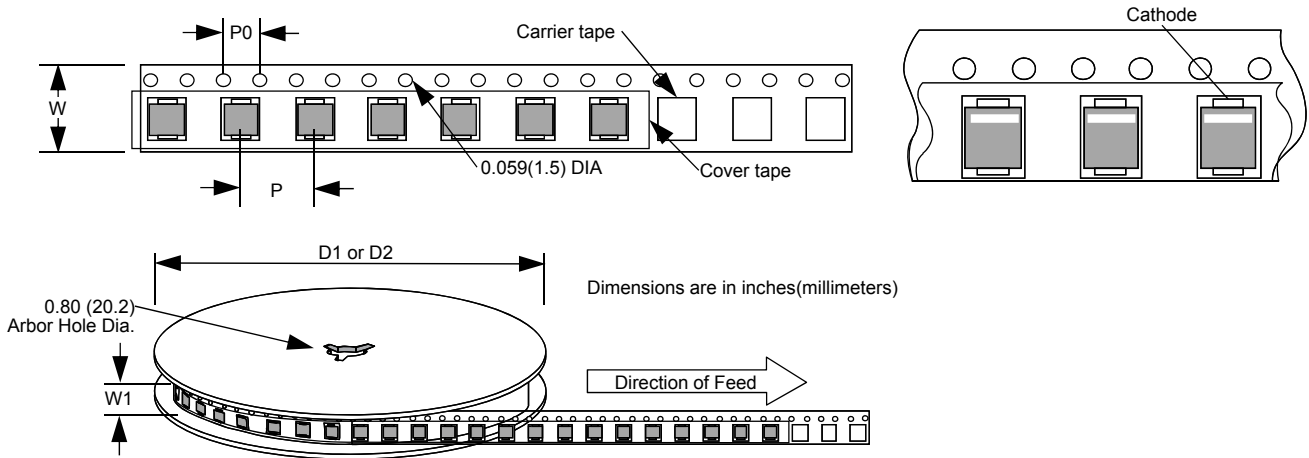

Fig.1 - Peak Pulse Power Rating

Fig.2 - Pulse Derating Curve

Fig.3 - Pulse Waveform

Fig.4 - Typical Junction Capacitance

Fig.5 - Steady State Power Dissipation Derating Curve

**Fig.6 - Maximum Non-Repetitive Peak Forward Surge Current
Uni-Directional Only**



SMAF						
Dimension	Inches			Millimeters		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.094		0.11	2.4		2.8
B	0.173		0.189	4.4		4.8
C	0.051		0.059	1.3		1.5
D	0.128		0.144	3.25		3.65
F	0.006		0.012	0.15		0.3
G	-		0.004	-		0.1
H	0.043		0.055	1.1		1.4
L	0.028		0.047	0.7		1.2
X		0.067			1.7	
Y		0.098			2.5	
Z		0.059			1.5	



Reflow Condition		Lead-free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus Temp (T_L) to peak)		3°C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Time (t_L)	60 – 150 secs
Peak Temperature (T_P)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 secs
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (t)		8 minutes Max.
Do not exceed		260°C



Dimension	Inches			Millimeters		
	MIN	NOM	MAX	MIN	NOM	MAX
P		0.157			4	
P0		0.157			4	
W		0.472			12	
W1		0.492			12.5	
D1		7			177.8	
D2		11			279.4	

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