

# Transient Voltage Suppression Diodes: SMAF Series

## SMD Low Profile Type 400W



### ■ Features

1. Low profile and space saving
2. RoHS compliant and halogen-free
3. Reliable low cost construction utilizes molded plastic technique
4. Glass passivated chip junction
5. Both bi-directional and uni-directional devices are available
6. Typical IR less than 1 $\mu$ A above 11V
7. Fast response time
8. Excellent clamping capacity
9. 400W peak pulse power capability with a 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
10. High temperature soldering guaranteed: 265 $^{\circ}$ C/10 seconds



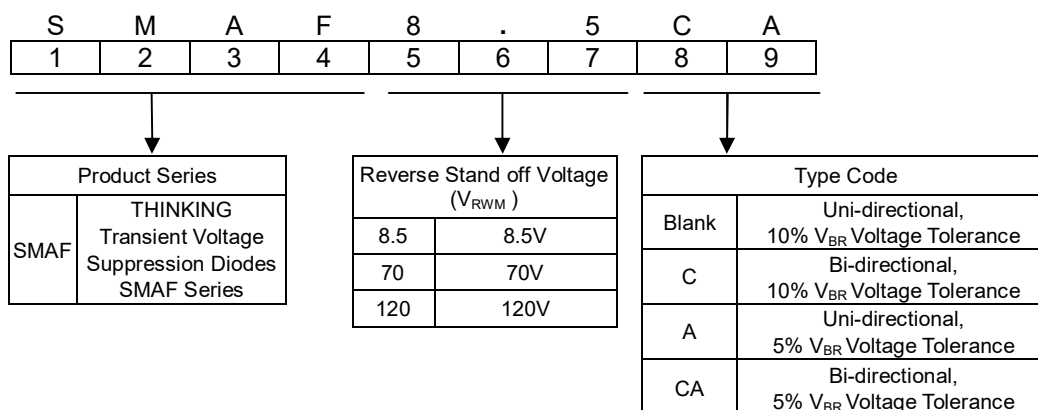
### ■ Recommended Applications

1. Telecommunication
2. Computer
3. Industrial device
4. Consumer electronic device

### ■ Mechanical Data

1. Case: SMA-FL, molded plastic meets UL flammability rating 94V-0
2. Terminal: Matte Tin-plated leads, solderable per MIL-STD-750, Method 2026.
3. Polarity: The band denotes cathode (Note: no polarity indicator for bi-directional devices)

### ■ Part Number Code



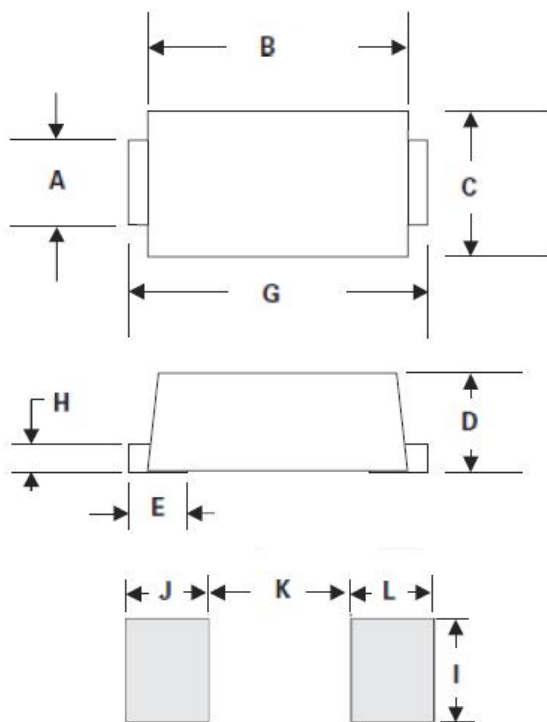
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### Structures and Dimensions

#### SMA-FL



Item	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.25	1.65	0.049	0.065
B	3.2	4.6	0.126	0.181
C	2.25	2.95	0.088	0.116
D	0.9	1.45	0.035	0.057
E	0.6	1.5	0.024	0.059
G	4.35	5.28	0.171	0.208
H	0.1	0.4	0.003	0.016
I	1.9	-	0.075	-
J/L	1.6	-	0.063	-
K	-	2.7	-	0.106

### Maximum Rating (TA=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak pulse power dissipation at TA=25 °C by 10/1000µs waveform (Note1, Fig.1)	P <sub>PPM</sub>	400	W
Peak pulse current of on 10/1000us waveform.(Note1, Fig.3)	I <sub>PPM</sub>	See Table	A
Peak forward surge current, 8.3ms single half sine wave on rated load (Fig.6)	I <sub>FSM</sub>	40	A
Steady state power dissipation at TL =75°C	P <sub>D</sub>	1.0	W
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>STG</sub>	-55~+150	°C

Notes: 1. Please refer to Fig. 3 for non-repetitive current pulse, and Fig. 2 for derated above T<sub>A</sub> = 25°C  
 2. 8.3ms single half sine-wave, or square wave that has a maximum of 4 pulses per minute.

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### ■ Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Part No. (Uni)	Part No. (Bi)	Reverse Stand off Voltage	Breakage Voltage VBR @ IT		Test Current	Maximum Clamping Voltage VC @ Ipp	Maximum Peak Pulse Current	Maximum Reverse Leakage IR @VRWM	Marking Code	
			VRWM ( V )	Min( V )					Max( V )	IT( mA )
SMAF8.5A	SMAF8.5CA	8.5	9.44	10.4	1	14.4	27.78	10	AT.	WT.
SMAF9.0A	SMAF9.0CA	9.0	10.0	11.1	1	15.4	25.97	5	AV.	WV.
SMAF10A	SMAF10CA	10	11.1	12.3	1	17.0	23.53	5	AX.	WX.
SMAF11A	SMAF11CA	11	12.2	13.5	1	18.2	21.98	1	AZ.	WZ.
SMAF12A	SMAF12CA	12	13.3	14.7	1	19.9	20.10	1	BE.	XE.
SMAF13A	SMAF13CA	13	14.4	15.9	1	21.5	18.60	1	BG.	XG.
SMAF14A	SMAF14CA	14	15.6	17.2	1	23.2	17.24	1	BK.	XK.
SMAF15A	SMAF15CA	15	16.7	18.5	1	24.4	16.39	1	BM.	XM.
SMAF16A	SMAF16CA	16	17.8	19.7	1	26.0	15.38	1	BP.	XP.
SMAF17A	SMAF17CA	17	18.9	20.9	1	27.6	14.49	1	BR.	XR.
SMAF18A	SMAF18CA	18	20.0	22.1	1	29.2	13.70	1	BT.	XT.
SMAF20A	SMAF20CA	20	22.2	24.5	1	32.4	12.35	1	BV.	XV.
SMAF22A	SMAF22CA	22	24.4	26.9	1	35.5	11.27	1	BX.	XX.
SMAF24A	SMAF24CA	24	26.7	29.5	1	38.9	10.28	1	BZ.	XZ.
SMAF26A	SMAF26CA	26	28.9	31.9	1	42.1	9.50	1	CE.	YE.
SMAF28A	SMAF28CA	28	31.1	34.4	1	45.4	8.81	1	CG.	YG.
SMAF30A	SMAF30CA	30	33.3	36.8	1	48.4	8.26	1	CK.	YK.
SMAF33A	SMAF33CA	33	36.7	40.6	1	53.3	7.50	1	CM.	YM.
SMAF36A	SMAF36CA	36	40.0	44.2	1	58.1	6.88	1	CP.	YP.
SMAF40A	SMAF40CA	40	44.4	49.1	1	64.5	6.20	1	CR.	YR.
SMAF43A	SMAF43CA	43	47.8	52.8	1	69.4	5.76	1	CT.	YT.
SMAF45A	SMAF45CA	45	50.0	55.3	1	72.7	5.50	1	CV.	YV.
SMAF48A	SMAF48CA	48	53.3	58.9	1	77.4	5.17	1	CX.	YX.
SMAF51A	SMAF51CA	51	56.7	62.7	1	82.4	4.85	1	CZ.	YZ.
SMAF54A	SMAF54CA	54	60.0	66.3	1	87.1	4.59	1	RE.	ZE.
SMAF58A	SMAF58CA	58	64.4	71.2	1	93.6	4.27	1	RG.	ZG.
SMAF60A	SMAF60CA	60	66.7	73.7	1	96.8	4.13	1	RK.	ZK.
SMAF64A	SMAF64CA	64	71.1	78.6	1	103	3.88	1	RM.	ZM.
SMAF70A	SMAF70CA	70	77.8	86.0	1	113	3.54	1	RP.	ZP.

Note: For bidirectional type with V<sub>RWM</sub> of 10 volts and under, the I<sub>R</sub> limit is doubled.

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

Part No. (Uni)	Part No. (Bi)	Reverse Stand off Voltage	Breakage Voltage $V_{BR}$ @ IT		Test Current	Maximum Clamping Voltage VC @ Ipp	Maximum Peak Pulse Current	Maximum Reverse Leakage IR @ $V_{RWM}$	Marking Code	
		$V_{RWM}$ ( V )	Min( V )	Max( V )	IT( mA )	VC( V )	Ipp(A)	IR( $\mu$ A)	UNI	BI
SMAF75A	SMAF75CA	75	83.3	92.1	1	121	3.31	1	RR.	ZR.
SMAF78A	SMAF78CA	78	86.7	95.8	1	126	3.17	1	RT.	ZT.
SMAF85A	SMAF85CA	85	94.4	104	1	137	2.92	1	RV.	ZV.
SMAF90A	SMAF90CA	90	100	111	1	146	2.74	1	RX.	ZX.
SMAF100A	SMAF100CA	100	111	123	1	162	2.47	1	RZ.	ZZ.
SMAF110A	SMAF110CA	110	122	135	1	177	2.26	1	SE.	VE.
SMAF120A	SMAF120CA	120	133	147	1	193	2.07	1	SG.	VG.
SMAF130A	SMAF130CA	130	144	159	1	209	1.91	1	SK.	VK.
SMAF150A	SMAF150CA	150	167	185	1	243	1.65	1	SM.	VM.
SMAF160A	SMAF160CA	160	178	197	1	259	1.54	1	SP.	VP.
SMAF170A	SMAF170CA	170	189	209	1	275	1.45	1	SR.	VR.

Note: For bidirectional type with  $V_{RWM}$  of 10 volts and under, the  $I_R$  limit is double.

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### Rate and Characteristic Curve ( $T_A=25^\circ\text{C}$ unless otherwise noted)

FIG.1 - PULSE RATING CURVE

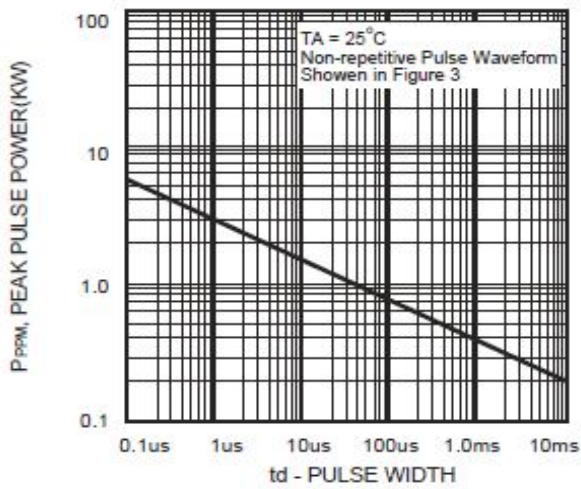


FIG.2 - PULSE DERATING CURVE

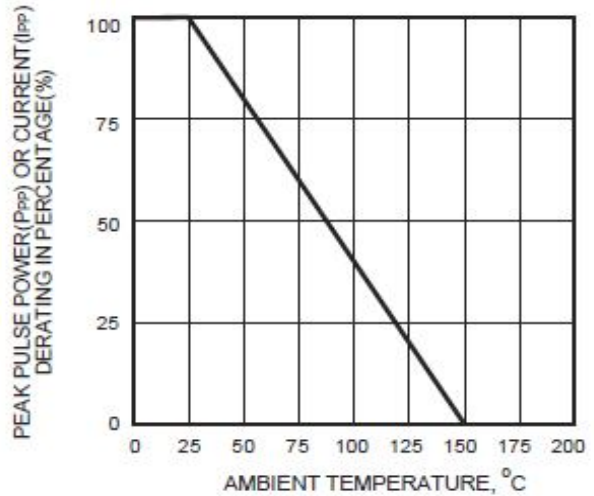


FIG.3 - PULSE WAVEFORM

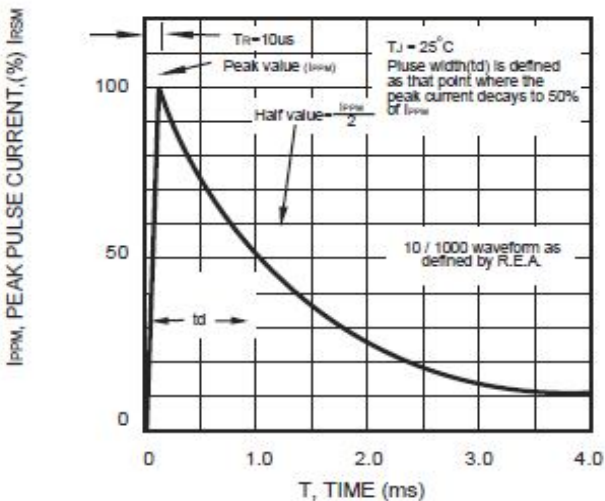


FIG.4 - TYPICAL JUNCTION CAPACITANCE

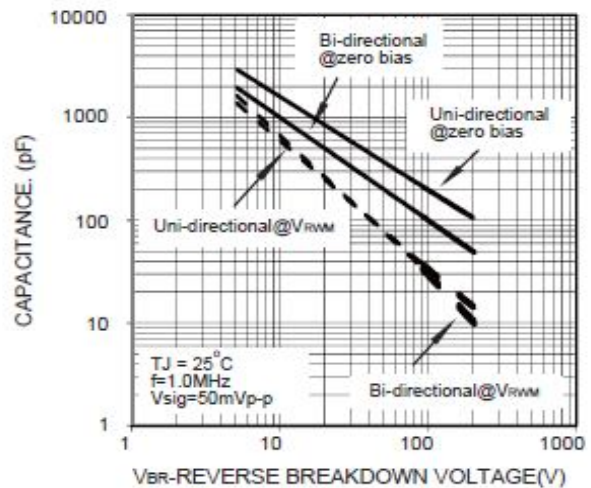


FIG.5 - STEADY STATE POWER DERATING CURVE

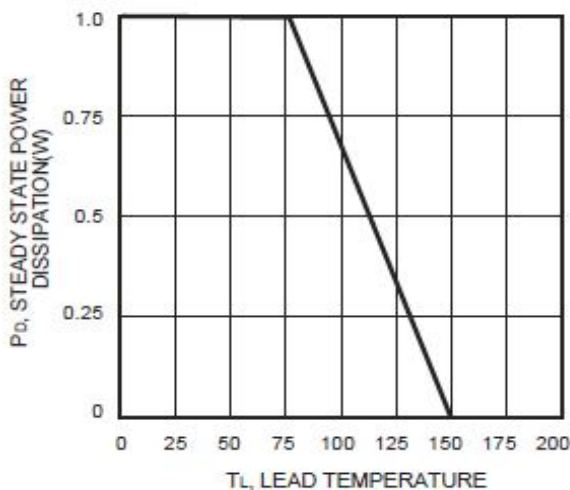
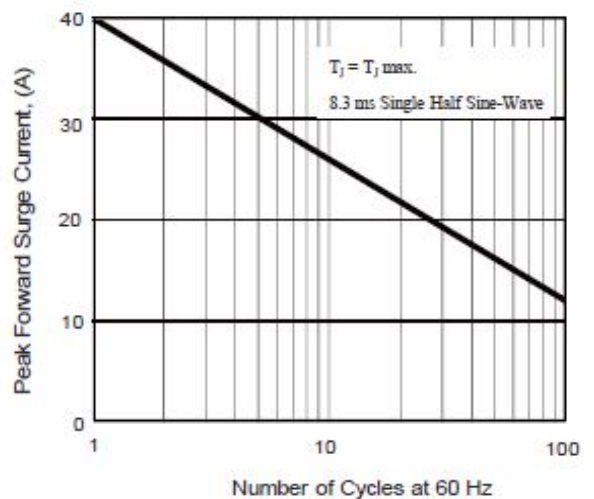


Fig. 6 - Maximum Non-Repetitive Surge Current

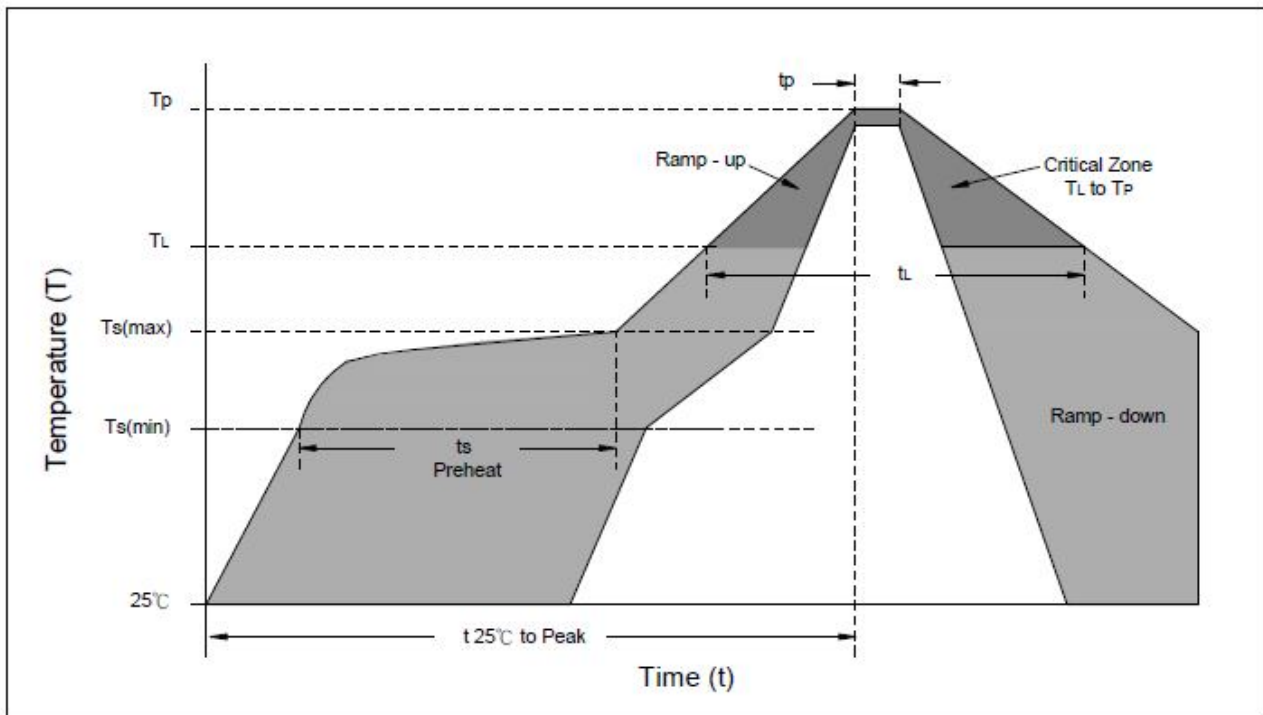


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### ■ Soldering Recommendation



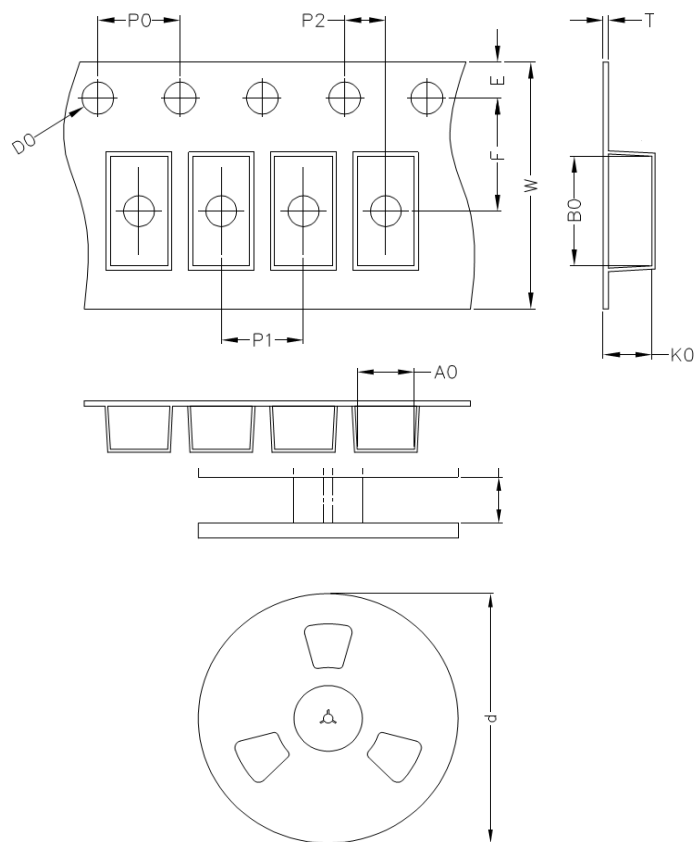
Reflow Condition	Lead-free assembly
<b>Preheat</b> -Temperature Min( $T_s$ min) -Temperature Min( $T_s$ max) -Time (min to max) ( $t_s$ )	150°C 200°C 60 – 180 seconds
<b>Average ramp up rate</b> -Temperature Liquidus ( $T_L$ ) to peak	3°C/second max
<b><math>T_s(max)</math> to <math>T_L</math></b> -Ramp-up Rate	3°C/second max.
<b>Reflow</b> -Temperature Liquidus ( $T_L$ ) -Time ( $t_L$ )	217°C 60 – 150 seconds
<b>Peak Temperature (<math>T_P</math>)</b>	260°C
<b>Time within 5°C of actual peak Temperature(<math>t_P</math>)</b>	20 – 40 seconds
<b>Ramp-down Rate</b>	6°C/second max.
<b>Time 25°C to peak Temperature(<math>T_P</math>)</b>	8 minutes max.
<b>Do not exceed</b>	260°C

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### ■ Packaging



Item	Symbol	SMA-FL Unit: mm
Carrier width	A0	2.90
Carrier length	B0	5.50
Carrier depth	K0	2.10
Sprocket hole	D0	1.55
Sprocket hole position	E	1.75
Punch hole position	F	5.50
Sprocket hole pitch	P0	4.00
Carrier pitch	P1	4.00
Embossment center	P2	2.00
Tape thickness	T	0.23
Tape width	W	12.00
Reel outside diameter	d (7")	330.00
Reel inner diameter	d1	50.00
Feed hole diameter	d0	13.00
Reel inner width	w1	12.40

Note: The tolerance of carrier tape and top cover is  $\pm 0.1\text{mm}$ , and the tolerance of reel is  $\pm 2\text{mm}$ .

### ■ Quantity

Package Type	Reel Size	Reel
	inch	Kpcs
SMA-FL	13	5

### ■ Warehouse Storage Conditions of Product

- Storage Condition:
  - Storage Temperature:  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
  - Relative Humidity:  $\leq 75\% \text{RH}$
  - Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year.