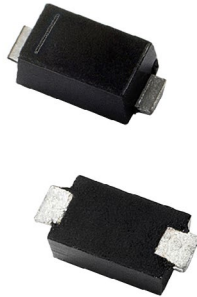


# SZSMF Series

## Surface Mount > 200W



Uni-Directional



### Web Resources



Download ECAD models, order samples, and find technical resources at [www.littelfuse.com](http://www.littelfuse.com)

### Agency Approvals

Agency	Agency file number
	E128662

### Maximum Ratings and Thermal Characteristics

Rating	Symbol	Value	Unit
Maximum Ppk Dissipation (PW=10/1000 $\mu$ s) (Note 1)	$P_{PK}$	200	W
Maximum $P_{PK}$ Dissipation @ $T_A = 25^\circ\text{C}$ , (PW=8/20 $\mu$ s) (Note 2)	$P_{PK}$	1000	W
DC Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 3)	$P_D$	1.0	W
Derate Above $25^\circ\text{C}$		6.6	mW/ $^\circ\text{C}$
Thermal Resistance from Junction-to-Ambient (Note 3)	$R_{\theta JA}$	150	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Lead (Note3)	$R_{\theta JL}$	26	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to +175	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the component. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect component reliability.

1. Non-repetitive current pulse at  $T_A = 25^\circ\text{C}$ , per waveform of Figure 2.
2. Non-repetitive current pulse at  $T_A = 25^\circ\text{C}$ , per waveform of Figure 3.
3. Mounted with recommended minimum pad size, DC board FR-4.
4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

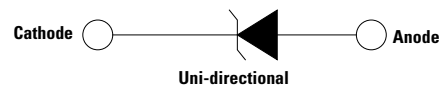
### Description

The SZSMF series is designed to protect sensitive systems or components from high voltage, high energy transients. It offers a fast response time, low Zener impedance, high surge and excellent clamping capabilities. Because of its small size, it is ideal for use in cellular phones, portable devices, business machines, power supplies and other industrial and consumer applications.

### Features & Benefits

- Zener Transient Overvoltage Suppressors per IEC 61000-4-4
- Stand-off Voltage: 5 – 58 Volts
- Peak Power: 200 Watts @ 1 ms
- Low Leakage
- Response Time is Typically < 1 ns
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha T$ : Temperature Coefficient)
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- ESD protection of data lines in accordance with IEC 61000-4-2 30kV(Air), 30kV (Contact)
- EFT (Electrical Fast Transients) Rating of 40 A
- Low Profile: Maximum Height of 1.0 mm
- Small Footprint: Footprint Area of 8.45 mm<sup>2</sup>
- Supplied in 8 mm Tape and Reel – 3,000 Units per Reel
- Cathode Indicated by Polarity Band
- Lead Orientation in Tape: Cathode Lead to Sprocket Holes
- These components are Pb-Free and are RoHS Compliant
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable

### Functional Diagram



# SZSMF Series

## Surface Mount > 200W

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

Device	Device Marking	$V_{RWM}$	$V_{BR} @ I_T$ (V) (Note 6)			@ $I_T$	$I_R @ V_{RWM}$	$V_C(\text{Max})$	$I_{PP}(\text{Max})$ (A)
			V	Min	Nom				
SZSMF5.0AT1G	KE	5	6.40	6.70	7.00	10	400	9.2	21.7
SZSMF6.0AT1G	KG	6	6.67	7.02	7.37	10	400	10.3	19.4
SZSMF6.5AT1G	KK	6.5	7.22	7.60	7.98	10	250	11.2	17.9
SZSMF7.0AT1G	KM	7	7.78	8.19	8.60	10	100	12	16.7
SZSMF7.5AT1G	KP	7.5	8.33	8.77	9.21	1	50	12.9	15.5
SZSMF8.0AT1G	KR	8	8.89	9.36	9.83	1	25	13.6	14.7
SZSMF9.0AT1G	KV	9	10.00	10.55	11.10	1	5	15.4	13.0
SZSMF10AT1G	KX	10	11.10	11.70	12.30	1	2.5	17	11.8
SZSMF11AT1G	KZ	11	12.20	12.85	13.50	1	2.5	18.2	11.0
SZSMF12AT1G	LE	12	13.30	14.00	14.70	1	2.5	19.9	10.1
SZSMF13AT1G	LG	13	14.40	15.15	15.90	1	1	21.5	9.3
SZSMF14AT1G	LK	14	15.60	16.40	17.20	1	1	23.2	8.6
SZSMF15AT1G	LM	15	16.70	17.60	18.50	1	1	24.4	8.2
SZSMF18AT1G	LT	18	20.00	21.00	22.10	1	1	29.2	6.8
SZSMF20AT1G	LV	20	22.20	23.35	24.50	1	1	32.4	6.2
SZSMF22AT1G	LX	22	24.40	25.60	26.90	1	1	35.5	5.6
SZSMF24AT1G	LZ	24	26.70	28.10	29.50	1	1	38.9	5.1
SZSMF26AT1G	ME	26	28.90	30.40	31.90	1	1	42.1	4.8
SZSMF28AT1G	MG	28	31.10	32.80	34.40	1	1	45.4	4.4
SZSMF30AT1G	MK	30	33.30	35.10	36.80	1	1	48.4	4.1
SZSMF33AT1G	MM	33	36.70	38.70	40.60	1	1	53.3	3.8
SZSMF36AT1G	MP	36	40.00	42.10	44.20	1	1	58.1	3.4
SZSMF48AT1G	MX	48	53.30	56.10	58.90	1	1	77.4	2.6
SZSMF58AT1G	NG	58	64.40	67.80	71.20	1	1	93.6	2.1

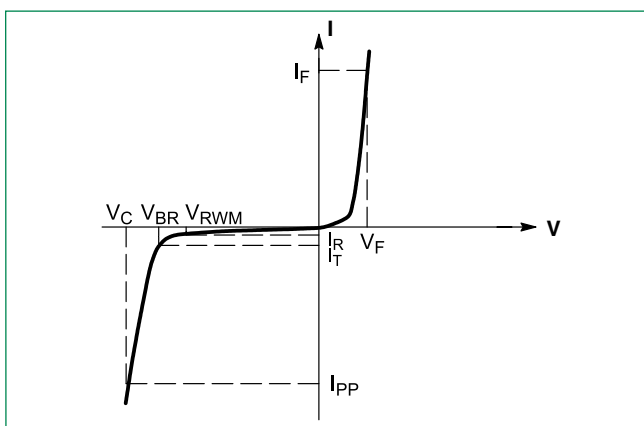
#### Notes:

5. A transient suppressor is normally selected according to the Working Peak Reverse Voltage ( $V_{RWM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.

6.  $V_{BR}$  measured at pulse test current  $I_T$  at ambient temperature of  $25^\circ\text{C}$ .

7. Surge current waveform per Figure 2 and derate per Figure 3.

### I-V Curve Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 3.5\text{ V Max. @ } I_F$ (Note 4) = 12 A)



Symbol	Parameter
$I_{PP}$	Maximum Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$V_{RWM}$	Working Peak Reverse Voltage
$I_R$	Maximum Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$

# SZSMF Series

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## Ratings and Characteristic Curves

Figure 1. Pulse Rating Curve



Figure 2. 10/1000 µs Pulse Waveform

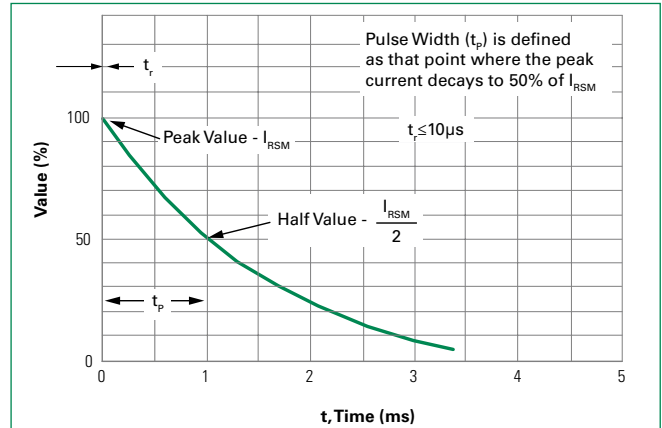


Figure 3. 8/20 µs Pulse Waveform

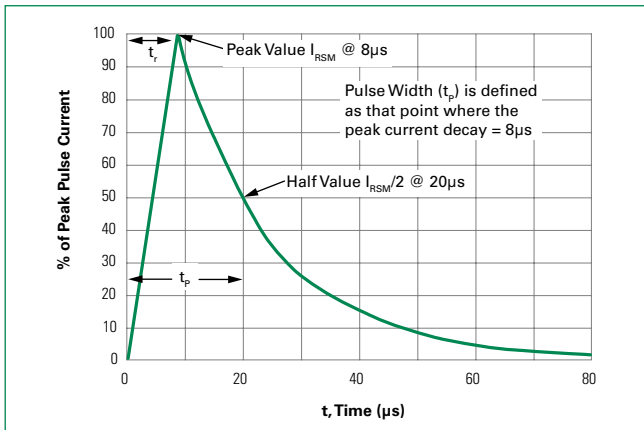


Figure 4. Surge Derating Curve

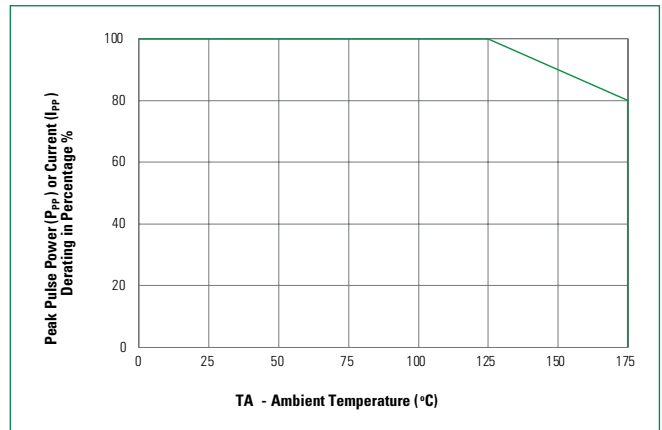


Figure 5. Typical Derating Factor for Duty Cycle

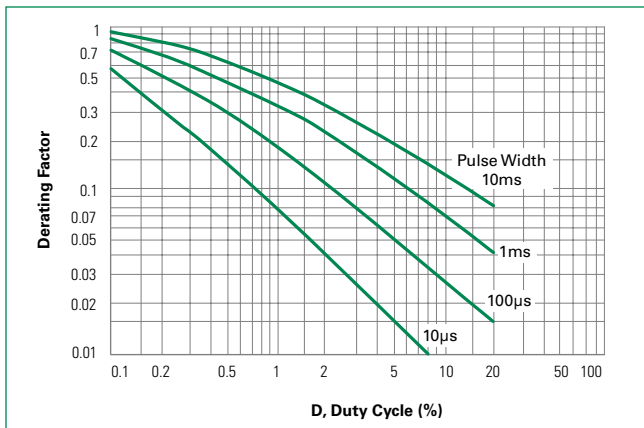
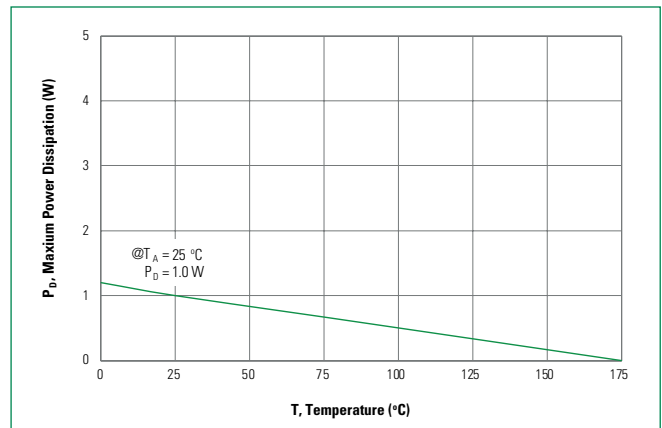


Figure 6. Steady State Power Derating



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Figure 7. Forward Voltage

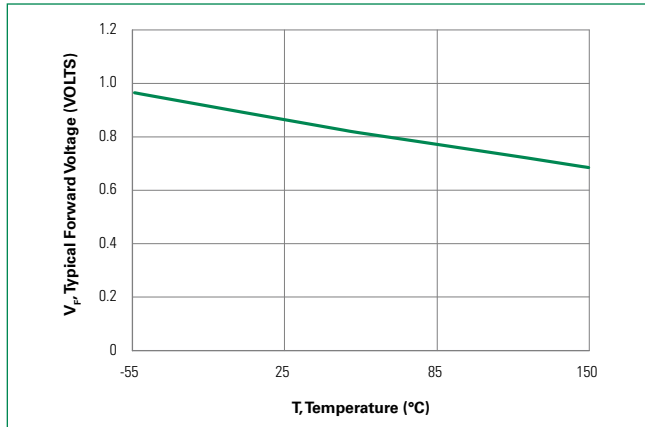
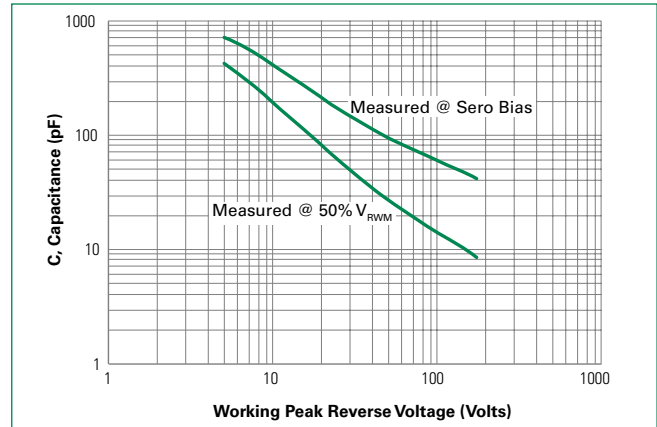
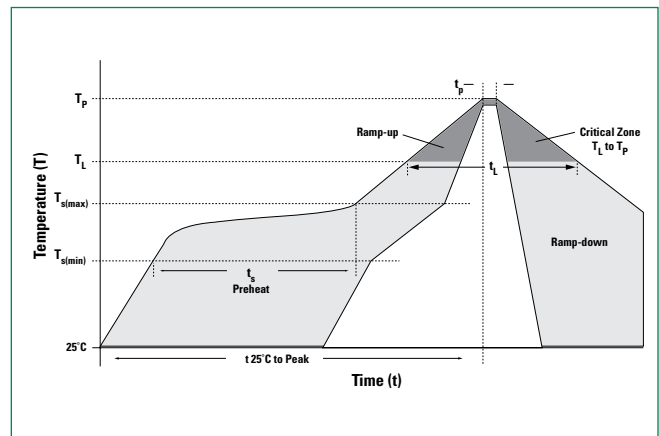


Figure 8. Capacitance vs. Working Peak Reverse Voltage



### Soldering Parameters

<b>Reflow Condition</b>	Lead-free assembly	
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 120 secs
<b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak)</b>	3°C/second max	
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>	3°C/second max	
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Time (min to max) ( $t_L$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>	260 <sup>+0/-5</sup> °C	
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>	30 seconds max	
<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	



### Physical Specifications

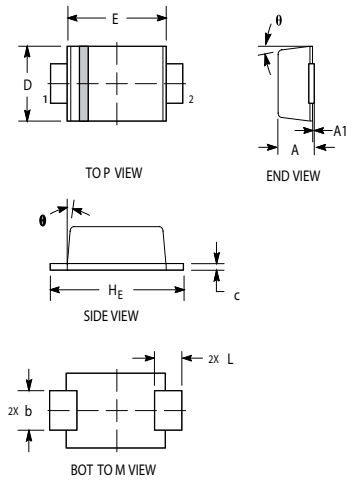
<b>Weight</b>	0.004 ounce ,0.0116 grams
<b>Case</b>	JEDEC SOD-123FL. Void-free, transfer-molded, thermosetting plastic epoxy meets UL 94V-0
<b>Polarity</b>	Color band denotes positive end (cathode) except Bidirectional.
<b>Terminal</b>	Matte Tin-plated leads, Solderable per JESD22-B102

### Environmental Specifications

<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Temperature Cycling</b>	JESD22-A104
<b>MSL</b>	JEDEC-J-STD-020, Level 1
<b>H3TRB</b>	JESD22-A101
<b>RSH</b>	JESD22-A111

# SZSMF Series

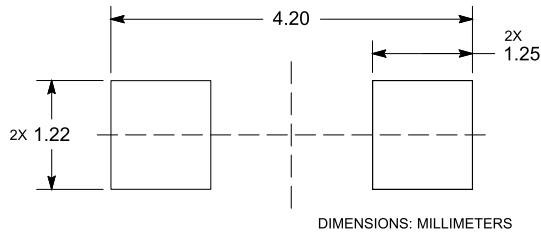
## Surface Mount > 200W



### Dimensions

Dim	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.90	0.95	0.98	0.035	0.037	0.039
A1	0.00	0.05	0.10	0.000	0.002	0.004
b	0.70	0.90	1.10	0.028	0.035	0.043
c	0.10	0.15	0.20	0.004	0.006	0.008
D	1.50	1.65	1.80	0.059	0.065	0.071
E	2.50	2.70	2.90	0.098	0.106	0.114
L	0.55	0.75	0.95	0.022	0.030	0.037
HE	3.40	3.60	3.80	0.134	0.142	0.150
θ	0°	–	8°	0°	–	8°

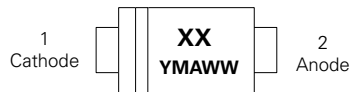
### Soldering Footprint



### Ordering Information

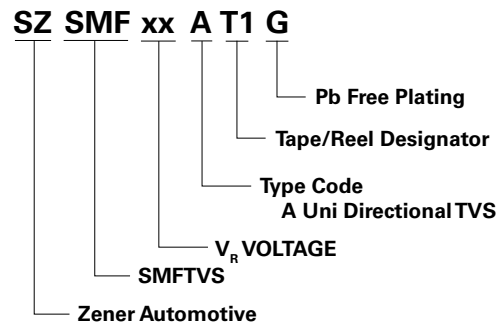
Device	Package	Shipping
SZSMFxxxAT1G	SOD-123FL (Pb-Free)	3,000 / Tape & Reel

### Part Marking System



- XX** =Device Code
- Y** =Year
- M** =Month
- A** =Assembly Location
- WW** =Lot Code

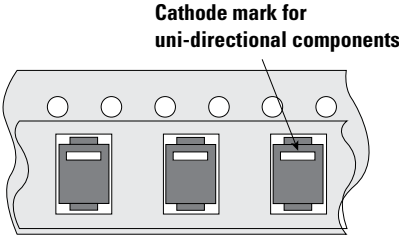
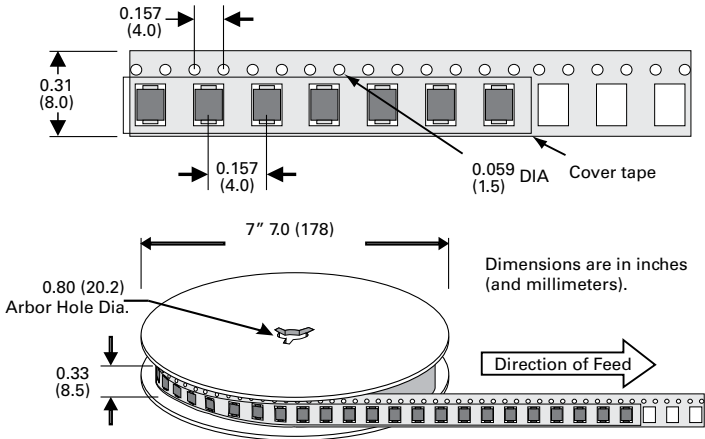
### Part Numbering System



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### Tape and Reel Specification



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