

# SZ1SMCxxA Series

## Surface Mount > 1500W



### Additional Information



Resources



Accessories



Samples

### Maximum Ratings and Thermal Characteristics

Parameter	Symbol	Value	Unit
Peak Power Dissipation (Note 1) @ $T_L = 25^\circ\text{C}$ , Pulse Width = 1 ms	$P_{PK}$	1500	W
DC Power Dissipation @ $T_L = 75^\circ\text{C}$ Measured Zero Lead Length (Note 2) Derate Above $75^\circ\text{C}$	$P_D$	5.4	W
Thermal Resistance from Junction-to-Lead	$R_{\theta JL}$	54.6	$\text{mW}/^\circ\text{C}$
		18.3	$^\circ\text{C}/\text{W}$
DC Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	2.0	W
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	13.3	$\text{mW}/^\circ\text{C}$
		75	$^\circ\text{C}/\text{W}$
Forward Surge Current (Note 4) @ $T_A = 25^\circ\text{C}$	$I_{FSM}$	200	A
Operating and Storage Temperature Range	$T_J$ $T_{stg}$	-65 to +175	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. 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 device reliability.

- 10 x 1000  $\mu\text{s}$ , non-repetitive.
- 1 in square copper pad, FR-4 board.
- FR-4 board, using Littelfuse minimum recommended footprint
- 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

### Description

The SZ1SMC series is designed to protect voltage sensitive components from high voltage, high energy transients. They have excellent clamping capability, high surge capability, low zener impedance and fast response time. The SZ1SMC series is supplied in cost-effective, highly reliable DO-214AB package and is ideally suited for use in communication systems, automotive, numerical controls, process controls, medical equipment, business machines, power supplies and many other industrial/consumer applications.

### Features & Benefits

- Zener Transient Overvoltage Suppressors
- Working Peak Reverse Voltage Range – 5.0 V to 170 V
- Standard Zener Breakdown Voltage Range – 6.4 V to 209 V
- Peak Power – 1500 W@1 ms
- ESD protection of data lines in accordance with IEC 61000-4-2 30kV(Air), 30kV (Contact)
- ESD Rating of Class 3 (> 16 KV) per Human Body Model
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage < 5  $\mu\text{A}$  Above 10 V
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha T$ : Temperature Coefficient)
- UL Recognized to UL 497B as an Isolated Loop Circuit Protector.
- Maximum Temperature Coefficient Specified
- Response Time is Typically < 1 ns
- Pb-Free Packages are Available
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable

### Agency Approvals

Agency	Agency File Number
	E128662

### Functional Diagram



# SZ1SMCxxA Series

## Surface Mount > 1500W

### Electrical Characteristics

(TA = 25°C unless otherwise noted)

Device	Device Marking	V <sub>RWM</sub> (Note 6)	I <sub>R</sub> @ V <sub>RWM</sub>	Breakdown Voltage				V <sub>C</sub> @ I <sub>PP</sub> (Note 8)		Agency Approval
				V <sub>BR</sub> @ I <sub>T</sub> (V) (Note 7)			@ I <sub>T</sub>	V <sub>C</sub>	I <sub>PP</sub>	
				Volts	μA	Min	Nom	Max	mA	
SZ1SMC5.0AT3G	GDE	5.0	1000	6.40	6.70	7.00	10	9.2	163.0	x
SZ1SMC6.0AT3G	GDG	6.0	1000	6.67	7.02	7.37	10	10.3	145.6	x
SZ1SMC6.5AT3G	GDK	6.5	500	7.22	7.60	7.98	10	11.2	133.9	x
SZ1SMC7.5AT3G	GDP	7.5	100	8.33	8.77	9.21	1	12.9	116.3	x
SZ1SMC8.0AT3G	GDR	8.0	50	8.89	9.36	9.83	1	13.6	110.3	x
SZ1SMC9.0AT3G	GDV	9.0	10	10.00	10.55	11.10	1	15.4	97.4	x
SZ1SMC10AT3G	GDX	10	5	11.10	11.70	12.30	1	17.0	88.2	x
SZ1SMC12AT3G	GEE	12	5	13.30	14.00	14.70	1	19.9	75.3	x
SZ1SMC13AT3G	GEG	13	5	14.40	15.15	15.90	1	21.5	69.7	x
SZ1SMC14AT3G	GEK	14	5	15.60	16.40	17.20	1	23.2	64.7	x
SZ1SMC15AT3G	GEM	15	5	16.70	17.60	18.50	1	24.4	61.5	x
SZ1SMC16AT3G	GEP	16	5	17.80	18.75	19.70	1	26.0	57.7	x
SZ1SMC17AT3G	GER	17	5	18.90	19.90	20.90	1	27.6	53.3	x
SZ1SMC18AT3G	GET	18	5	20.00	21.05	22.10	1	29.2	51.4	x
SZ1SMC20AT3G	GEV	20	5	22.20	23.35	24.50	1	32.4	46.3	x
SZ1SMC22AT3G	GEX	22	5	24.40	25.65	26.90	1	35.5	42.2	x
SZ1SMC24AT3G	GEZ	24	5	26.70	28.10	29.50	1	38.9	38.6	x
SZ1SMC26AT3G	GFE	26	5	28.90	30.40	31.90	1	42.1	35.6	x
SZ1SMC28AT3G	GFG	28	5	31.10	32.75	34.40	1	45.4	33.0	x
SZ1SMC30AT3G	GFK	30	5	33.30	35.05	36.80	1	48.4	31.0	x
SZ1SMC33AT3G	GFM	33	5	36.70	38.65	40.60	1	53.3	28.1	x
SZ1SMC36AT3G	GFP	36	5	40.00	42.10	44.20	1	58.1	25.8	x
SZ1SMC40AT3G	GFR	40	5	44.40	46.75	49.10	1	64.5	32.2	x
SZ1SMC43AT3G	GFT	43	5	47.80	50.30	52.80	1	69.4	21.6	x
SZ1SMC48AT3G	GFX	48	5	53.30	56.10	58.90	1	77.4	19.4	x
SZ1SMC51AT3G	GFZ	51	5	56.70	59.70	62.70	1	82.4	18.2	x
SZ1SMC54AT3G	GGE	54	5	60.00	63.15	66.30	1	87.1	17.2	x
SZ1SMC58AT3G	GGG	58	5	64.40	67.80	71.20	1	93.6	16.0	x
SZ1SMC60AT3G	GGK	60	5	66.70	70.20	73.70	1	96.8	15.5	x
SZ1SMC64AT3G	GGM	64	5	71.10	74.85	78.60	1	103.0	14.6	x
SZ1SMC70AT3G	GGP	70	5	77.80	81.90	86.00	1	113.0	13.3	x
SZ1SMC75AT3G	GGR	75	5	83.30	87.70	92.10	1	121.0	12.4	x
SZ1SMC78AT3G	GGT	78	5	86.70	91.25	95.80	1	126.0	11.4	x
SZ1SMC85AT3G	GGV	85	5	94.40	99.20	104.0	1	137.0	10.9	-
SZ1SMC90AT3G	GGX	90	5	100.0	105.5	111.0	1	146.0	10.3	-
SZ1SMC100AT3G	GGZ	100	5	111.0	117.0	123.0	1	162.0	9.3	-
SZ1SMC110AT3G	GHE	110	5	122.0	128.5	135.0	1	177.0	8.5	-
SZ1SMC120AT3G	GHG	120	5	133.0	140.0	147.0	1	193.0	7.8	-
SZ1SMC130AT3G	GHK	130	5	144.0	151.5	159.0	1	209.0	7.2	-
SZ1SMC150AT3G	GHM	150	5	167.0	176.0	185.0	1	243.0	6.2	-
SZ1SMC160AT3G	GHP	160	5	178.0	187.5	197.0	1	259.0	5.8	-
SZ1SMC170AT3G	GHR	170	5	189.0	199.0	209.0	1	275.0	5.5	-

**Notes:**

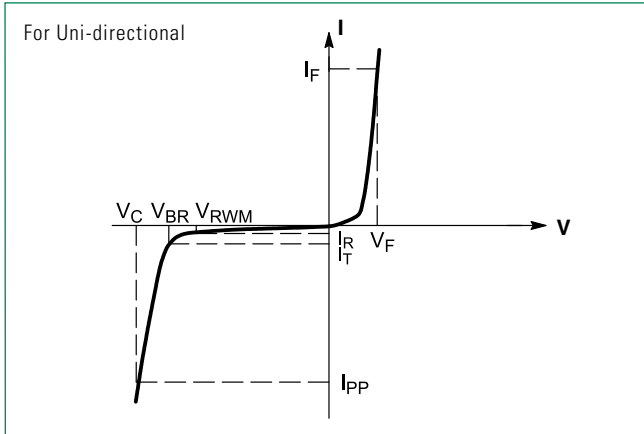
6. A transient suppressor is normally selected according to the maximum working peak reverse voltage (V<sub>RWM</sub>), which should be equal to or greater than the DC or continuous peak operating voltage level.  
7. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C.  
8. Surge current waveform per Figure 2 and derate per Figure 3 of the General Data – 1500 Watt at the beginning of this group.

# SZ1SMCxxA Series

## Surface Mount > 1500W

### I-V Curve Characteristics

(TA = 25°C unless otherwise noted, VF = 3.5 V Max @ IF = 100 A) (Note 5)



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 @ $I_F$

**Note 5:** 1/2 sine wave or equivalent, PW= 8.3 ms non-repetitive duty cycle

### Ratings and Characteristic Curves

Figure 1. Pulse Rating Curve

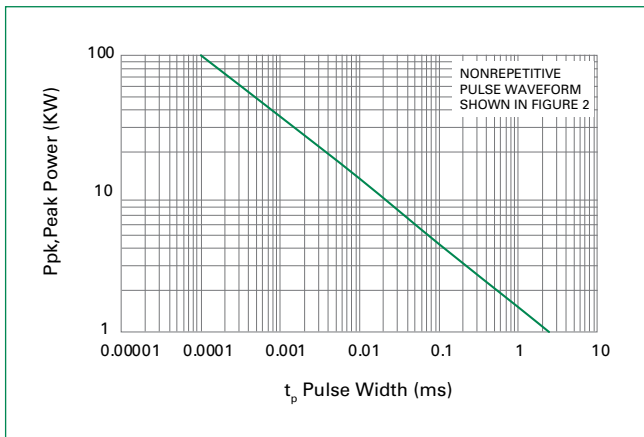


Figure 2. Pulse Waveform

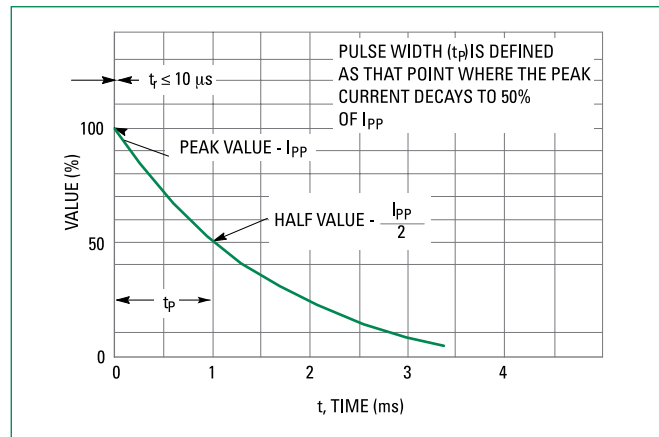


Figure 3. Surge Derating Curve

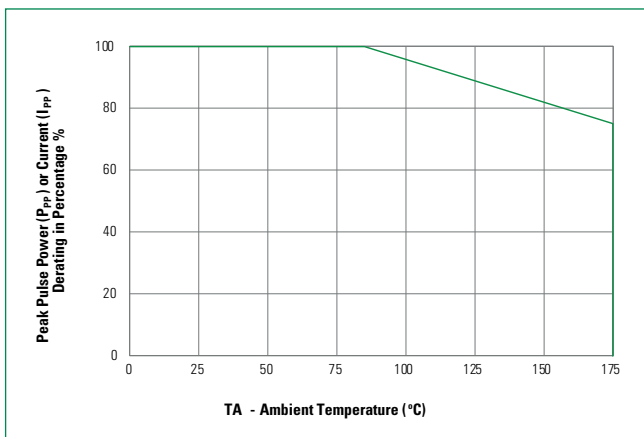
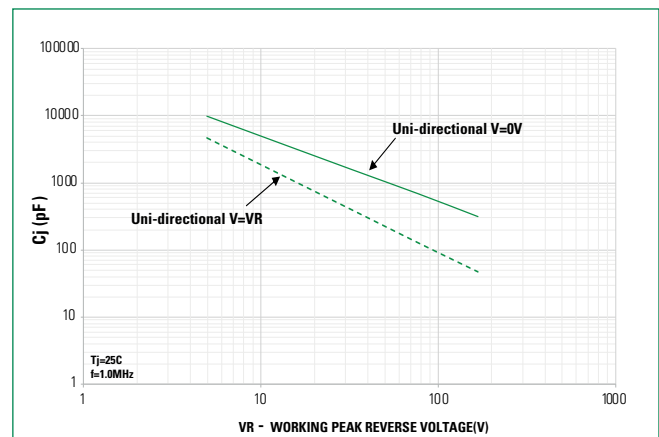


Figure 4. Typical Junction Capacitance

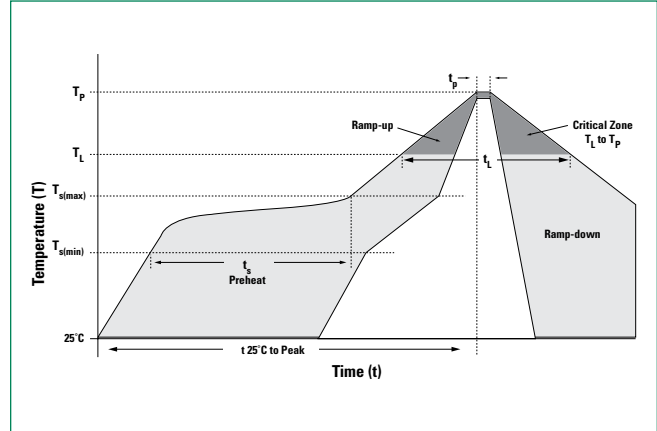


# SZ1SMCxxA Series

## Surface Mount > 1500W

### 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



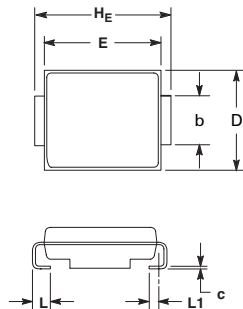
### Physical Specifications

<b>Weight</b>	0.00733 ounce, 0.228 grams
<b>Case</b>	JEDEC DO-214AB. Void-Free, Transfer-Molded, Thermosetting Plastic Epoxy Meets UL 94V-0 Color band denotes cathode for unidirectional components.
<b>Polarity</b>	Matte Tin-plated leads, Solderable per JESD22-B102
<b>Terminal</b>	

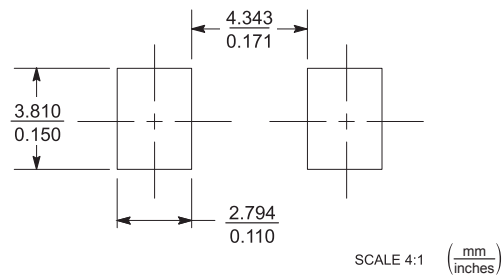
### Environmental Specifications

<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

### Dimensions



### Soldering Footprint



Dim	Inches			Millimeters		
	Min	Nom	Max	Min	Nom	Max
A	0.079	0.087	0.095	2.00	2.22	2.41
A1	0.002	0.004	0.008	0.05	0.10	0.20
b	0.115	0.118	0.125	2.92	3.00	3.18
c	0.006	0.009	0.012	0.15	0.23	0.30
D	0.220	0.230	0.240	5.59	5.84	6.10
E	0.260	0.270	0.280	6.60	6.86	7.11
H <sub>E</sub>	0.305	0.313	0.320	7.75	7.94	8.13
L	0.030	0.040	0.050	0.76	1.02	1.27
L1	0.020 REF			0.51 REF		

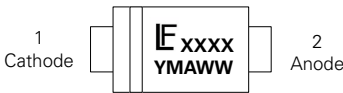
### Ordering Information

Device	Package	Shipping
SZ1SMCxxAT3G	SMC (Pb-Free)	2,500 / Tape & Reel

# SZ1SMCxxA Series

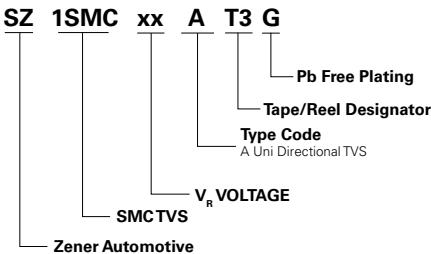
## Surface Mount > 1500W

### Part Marking System

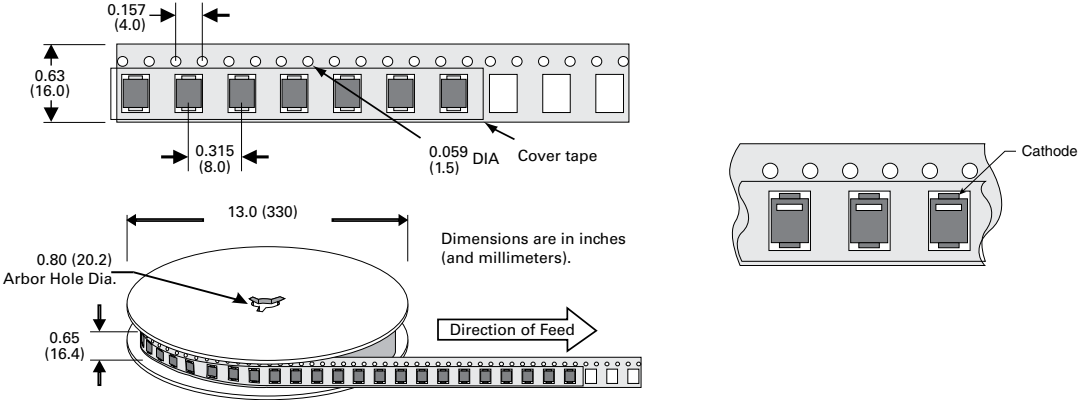


**XXXX** = Device Code  
**Y** = Year  
**M** = Month  
**A** = Assembly Location  
**WW** = Lot Code

### Part Numbering System



### Tape and Reel Specification



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