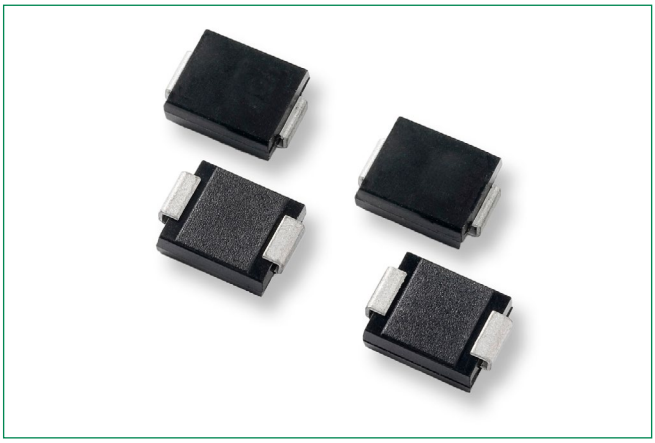
SZ1SMCxxA Series

Surface Mount > 1500W

AUTOMOTIVE GRADE HF RoHS



Additional Information

Resources | Accessories | Samples

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 μA Above 10 V
- V_{BR} @T_J = V_{BR}@25°C x (1+αT x (T_J - 25)) (αT: 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

Maximum Ratings and Thermal Characteristics

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

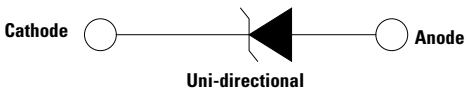
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. 10 x 1000 μs, non–repetitive.
2. 1 in square copper pad, FR–4 board.
3. FR–4 board, using Littelfuse minimum recommended footprint
4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

Agency Approvals

Agency	Agency File Number
	E128662

Functional Diagram



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Electrical Characteristics
(TA = 25°C unless otherwise noted)

Device	Device Marking	V_{RWM} (Note 6)	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 8)		Agency Approval
				V_{BR} @ I_T (V) (Note 7)			@ I_T	V_C	I_{PP}	
		Volts	µA	Min	Nom	Max	mA	Volts	Amps	
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_{RWM}), which should be equal to or greater than the DC or continuous peak operating voltage level.
7. V_{BR} measured at pulse test current I_T 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.

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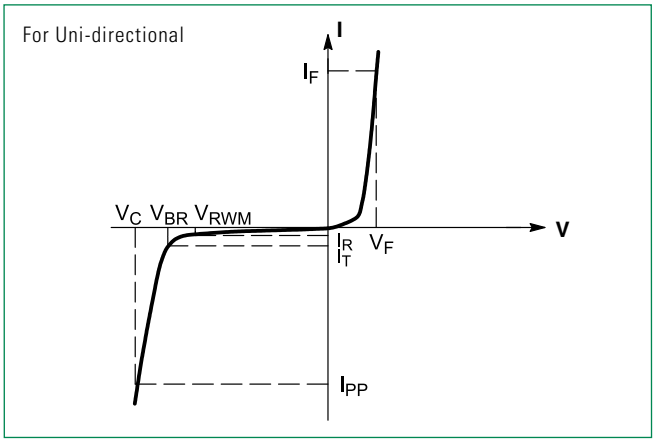
I-V Curve Characteristics
(TA = 25°C unless otherwise noted, VF = 3.5 V Max @ IF = 100 A) (Note 5)



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

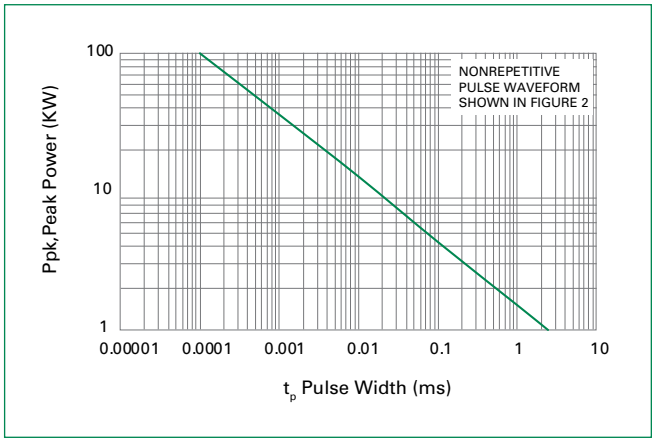


Figure 2. Pulse Waveform

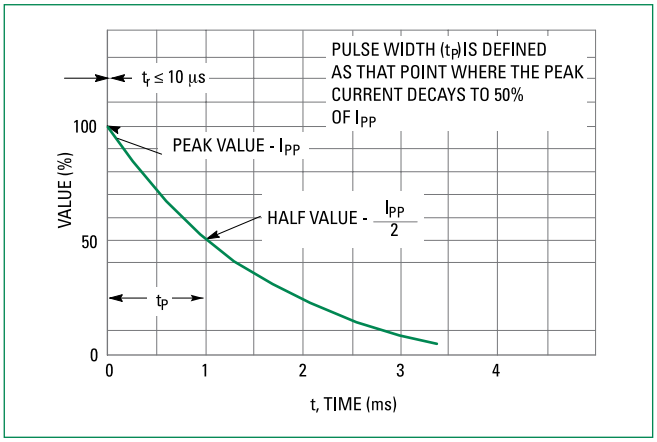


Figure 3. Surge Derating Curve

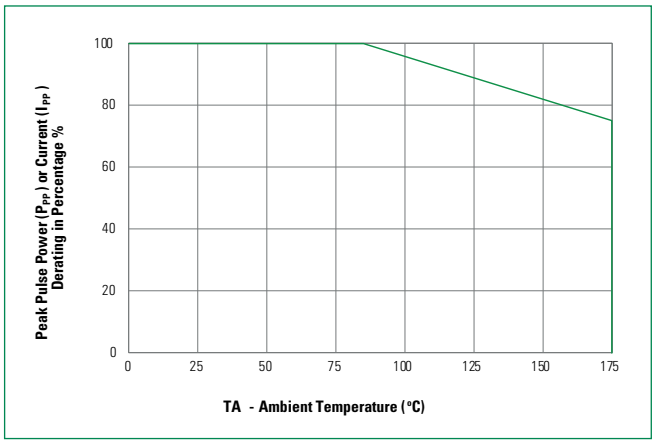
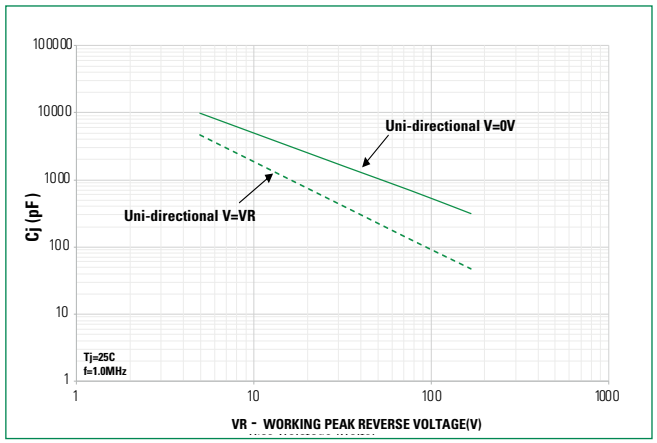


Figure 4. Typical Junction Capacitance



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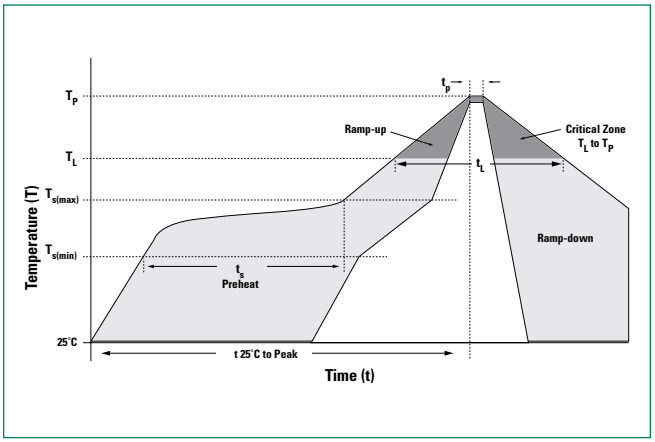
Soldering Parameters

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 – 120 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 (min to max) (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		30 seconds max
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C



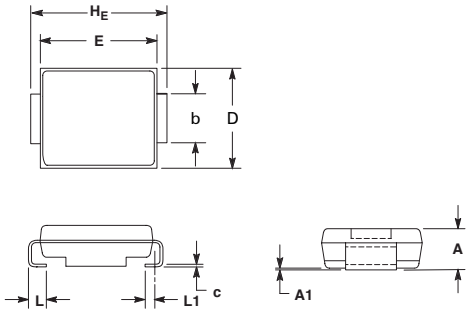
Physical Specifications

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

Environmental Specifications

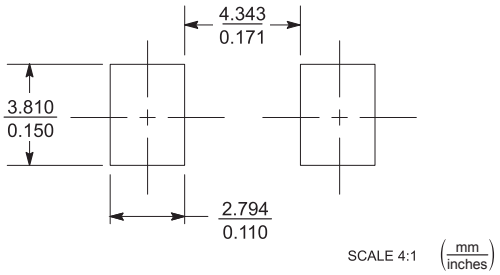
High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
MSL	JEDEC-J-STD-020, Level 1
H3TRB	JESD22-A101
RSH	JESD22-A111

Dimensions



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_E	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		

Soldering Footprint



Ordering Information

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

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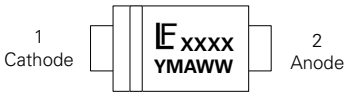
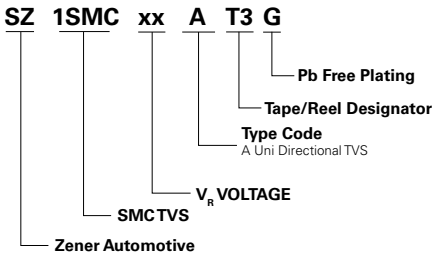
Part Marking System

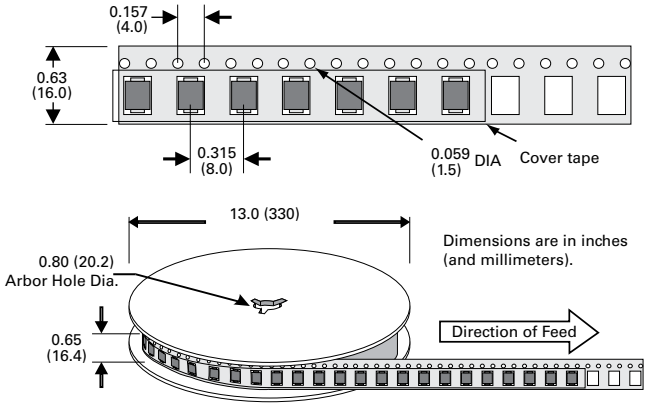


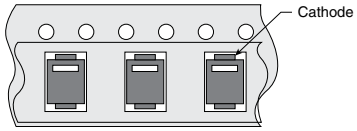
XXXX =Device Code
Y =Year
M =Month
A =Assembly Location
WW =Lot Code

Part Numbering System



Tape and Reel Specification





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