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1.5 Watt Plastic Surface Mount Zener Voltage Regulators

1SMA59xxBT3G Series, SZ1SMA59xxBT3G Series

This complete new line of 1.5 Watt Zener Diodes offers the following advantages.

Features

- Standard Zener Breakdown Voltage Range – 3.3 V to 68 V
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Flat Handling Surface for Accurate Placement
- Package Design for Top Slide or Bottom Circuit Board Mounting
- Low Profile Package
- Ideal Replacement for MELF Packages
- AEC−Q101 Qualified and PPAP Capable – SZ1SMA59xxBT3G
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These are Pb−Free Devices*

Mechanical Characteristics:
CASE: Void-free, transfer-molded plastic
FINISH: All external surfaces are corrosion resistant with readily solderable leads
MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES: 260°C for 10 seconds
POLARITY: Cathode indicated by molded polarity notch or cathode band
FLAMMABILITY RATING: UL 94 V−0 @ 0.125 in

MAXIMUM RATINGS

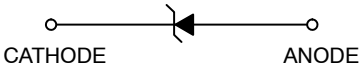
Rating	Symbol	Value	Unit
DC Power Dissipation @ T_L = 75°C, Measured Zero Lead Length (Note 1) Derate above 75°C Thermal Resistance, Junction−to−Lead	P_D $R_{\theta JL}$	 1.5 20 50	 W mW/°C °C/W
DC Power Dissipation @ T_A = 25°C (Note 2) Derate above 25°C Thermal Resistance, Junction−to−Ambient	P_D $R_{\theta JA}$	0.5 4.0 250	W mW/°C °C/W
Operating and Storage Temperature Range	T_J, T_{stg}	−65 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
1. 1 in square copper pad, FR−4 board.
2. FR−4 Board, using **onsemi** minimum recommended footprint.

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



SMA
CASE 403D
STYLE 1



MARKING DIAGRAM



8xxB = Device Code (Refer to page 2)
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping†
1SMA59xxBT3G	SMA (Pb−Free)	5,000 / Tape & Reel
SZ1SMA59xxBT3G	SMA (Pb−Free)	5,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

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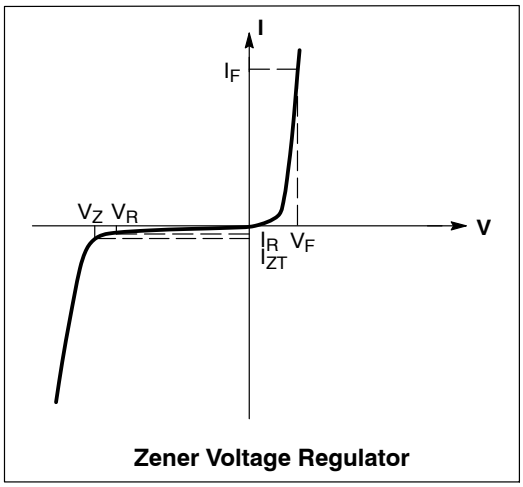
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 1.2 V Max. @ I_F = 200 mA for all types)

Symbol	Parameter
V_Z	Reverse Zener Voltage @ I_{ZT}
I_{ZT}	Reverse Current
Z_{ZT}	Maximum Zener Impedance @ I_{ZT}
I_{ZK}	Reverse Current
Z_{ZK}	Maximum Zener Impedance @ I_{ZK}
I_R	Reverse Leakage Current @ V_R
V_R	Reverse Voltage
I_F	Forward Current
V_F	Forward Voltage @ I_F
I_{ZM}	Maximum DC Zener Current



Zener Voltage Regulator

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 1.2 V Max. @ I_F = 200 mA for all types)

Device* (Note 3)	Device Marking	Zener Voltage (Note 4)				Zener Impedance			Leakage Current		I_{ZM}
		V_Z (Volts)			@ I_{ZT}	Z_{ZT} @ I_{ZT}	Z_{ZK} @ I_{ZK}		I_R @ V_R		
		Min	Nom	Max	mA	Ω	Ω	mA	μA	Volts	mA(dc)
1SMA5913BT3G	813B	3.13	3.3	3.47	113.6	10	500	1.0	50	1.0	455
1SMA5914BT3G	814B	3.42	3.6	3.78	104.2	9.0	500	1.0	35.5	1.0	417
1SMA5915BT3G	815B	3.70	3.9	4.10	96.1	7.5	500	1.0	12.5	1.0	385
1SMA5916BT3G	816B	4.08	4.3	4.52	87.2	6.0	500	1.0	2.5	1.0	349
1SMA5917BT3G	817B	4.46	4.7	4.94	79.8	5.0	500	1.0	2.5	1.5	319
1SMA5918BT3G	818B	4.84	5.1	5.36	73.5	4.0	350	1.0	2.5	2.0	294
1SMA5919BT3G	819B	5.32	5.6	5.88	66.9	2.0	250	1.0	2.5	3.0	268
1SMA5920BT3G	820B	5.89	6.2	6.51	60.5	2.0	200	1.0	2.5	4.0	242
1SMA5921BT3G	821B	6.46	6.8	7.14	55.1	2.5	200	1.0	2.5	5.2	221
1SMA5922BT3G	822B	7.12	7.5	7.88	50	3.0	400	0.5	2.5	6.0	200
1SMA5923BT3G	823B	7.79	8.2	8.61	45.7	3.5	400	0.5	2.5	6.5	183
1SMA5924BT3G	824B	8.64	9.1	9.56	41.2	4.0	500	0.5	2.5	7.0	165
1SMA5925BT3G	825B	9.5	10	10.5	37.5	4.5	500	0.25	2.5	8.0	150
1SMA5926BT3G	826B	10.45	11	11.55	34.1	5.5	550	0.25	0.5	8.4	136
1SMA5927BT3G	827B	11.4	12	12.6	31.2	6.5	550	0.25	0.5	9.1	125
1SMA5928BT3G	828B	12.35	13	13.65	28.8	7.0	550	0.25	0.5	9.9	115
1SMA5929BT3G	829B	14.25	15	15.75	25	9.0	600	0.25	0.5	11.4	100
1SMA5930BT3G	830B	15.2	16	16.8	23.4	10	600	0.25	0.5	12.2	94
1SMA5931BT3G	831B	17.1	18	18.9	20.8	12	650	0.25	0.5	13.7	83
1SMA5932BT3G	832B	19	20	21	18.7	14	650	0.25	0.5	15.2	75
1SMA5933BT3G	833B	20.9	22	23.1	17	17.5	650	0.25	0.5	16.7	68
1SMA5934BT3G	834B	22.8	24	25.2	15.6	19	700	0.25	0.5	18.2	63
1SMA5935BT3G	835B	25.65	27	28.35	13.9	23	700	0.25	0.5	20.6	56
1SMA5936BT3G	836B	28.5	30	31.5	12.5	26	750	0.25	0.5	22.8	50
1SMA5937BT3G	837B	31.35	33	34.65	11.4	33	800	0.25	0.5	25.1	45
1SMA5938BT3G	838B	34.2	36	37.8	10.4	38	850	0.25	0.5	27.4	42
1SMA5939BT3G	839B	37.05	39	40.95	9.6	45	900	0.25	0.5	29.7	38
1SMA5940BT3G	840B	40.85	43	45.15	8.7	53	950	0.25	0.5	32.7	35
1SMA5941BT3G	841B	44.65	47	49.35	8.0	67	1000	0.25	0.5	35.8	32
1SMA5942BT3G	842B	48.45	51	53.55	7.3	70	1100	0.25	0.5	38.8	29
1SMA5943BT3G	843B	53.2	56	58.8	6.7	86	1300	0.25	0.5	42.6	27
1SMA5945BT3G	845B	64.6	68	71.4	5.5	120	1700	0.25	0.5	51.7	22

3. Tolerance and Voltage Regulation Designation – The type number listed indicates a tolerance of ±5%.
4. V_Z limits are to be guaranteed at thermal equilibrium.

* Include SZ-prefix devices where applicable.

RATING AND TYPICAL CHARACTERISTIC CURVES (T_A = 25°C)

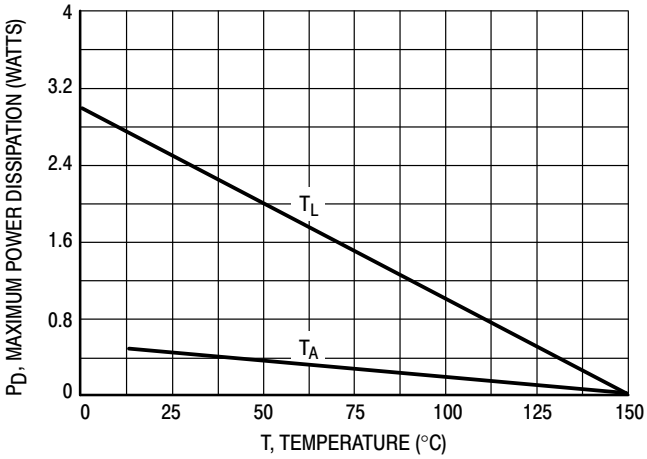


Figure 1. Steady State Power Derating

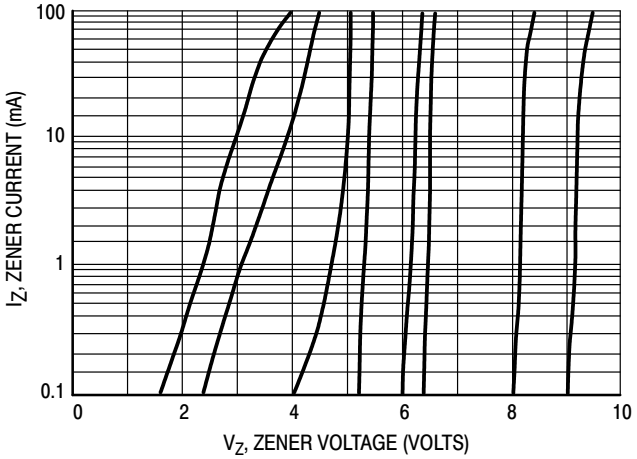


Figure 2. V_Z – 3.3 thru 10 Volts

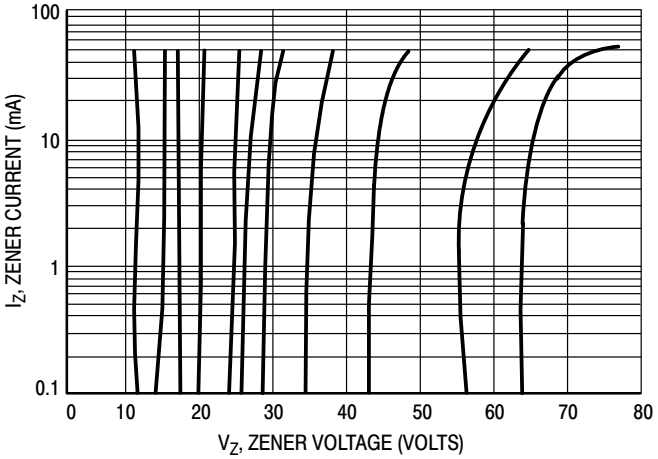


Figure 3. V_Z = 12 thru 68 Volts

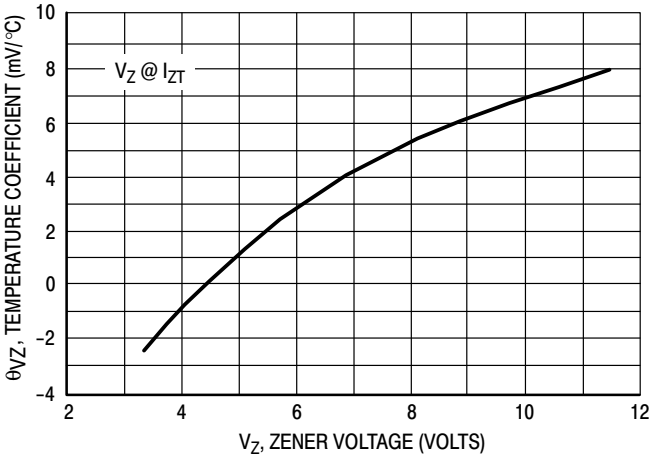


Figure 4. Zener Voltage – 3.3 to 12 Volts

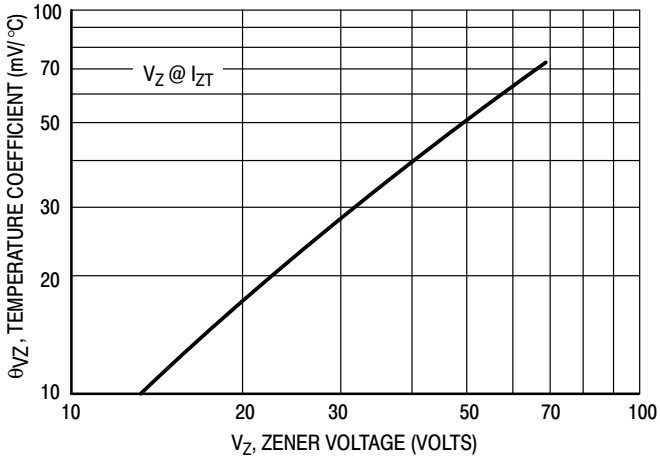


Figure 5. Zener Voltage – 12 to 68 Volts

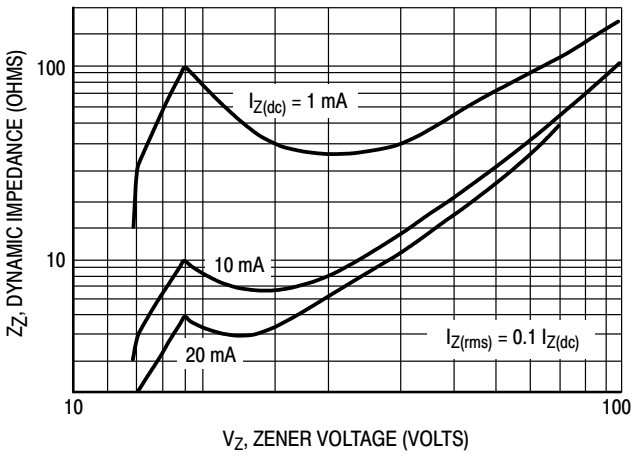


Figure 6. Effect of Zener Voltage

RATING AND TYPICAL CHARACTERISTIC CURVES (T_A = 25°C)

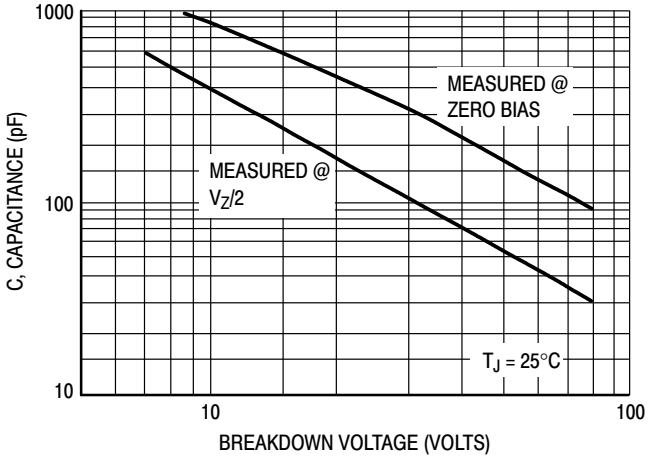


Figure 7. Capacitance Curve

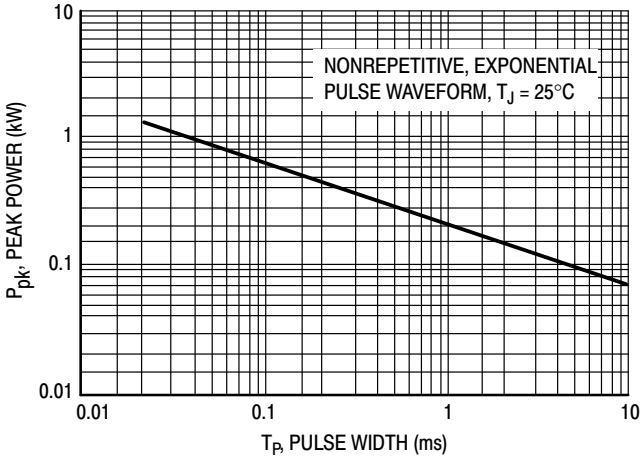


Figure 8. Typical Pulse Rating Curve

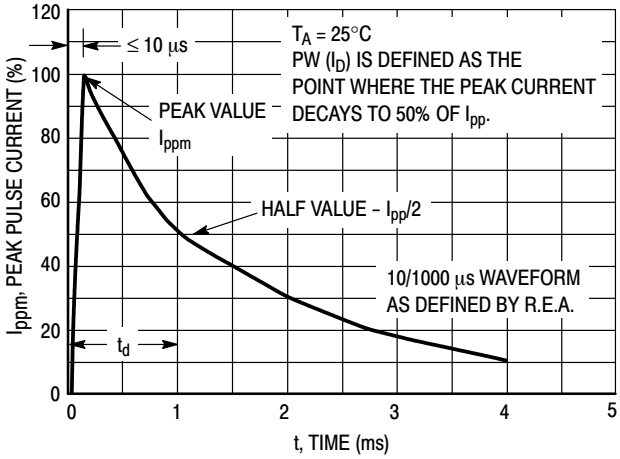


Figure 9. Pulse Waveform

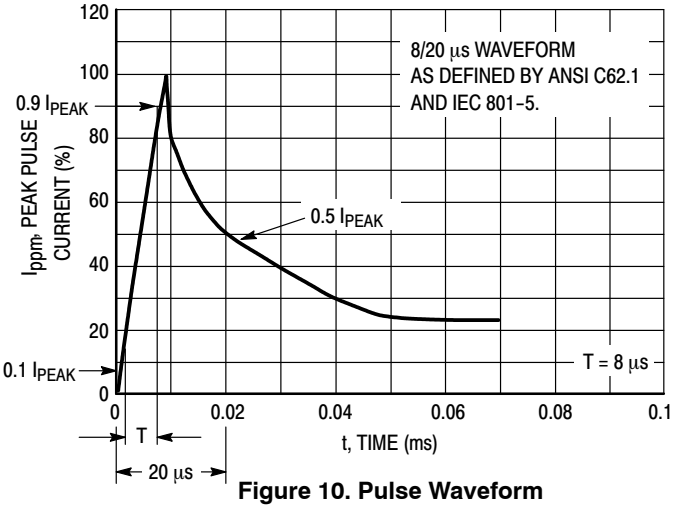


Figure 10. Pulse Waveform

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

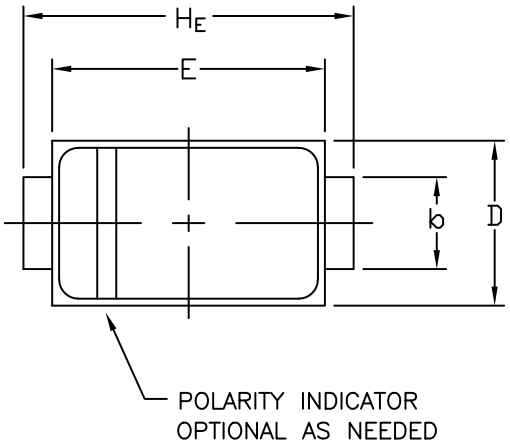
SMA
CASE 403D
ISSUE J

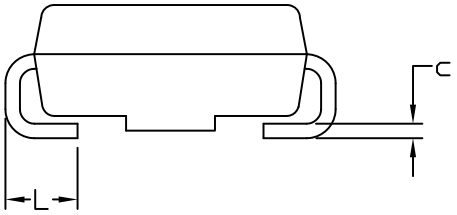
DATE 22 OCT 2021

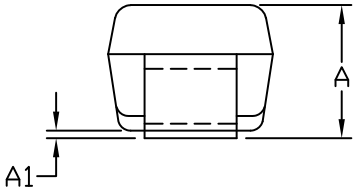


STYLE 1 STYLE 2

SCALE 1:1







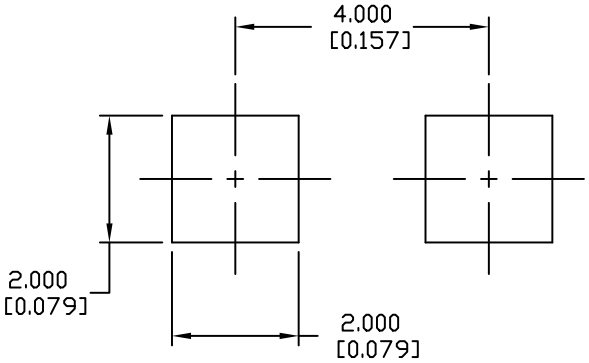
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION b SHALL BE MEASURED WITHIN DIMENSION L.

	MILLIMETERS			INCHES		
DIM	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.97	2.10	2.20	0.078	0.083	0.087
A1	0.05	0.10	0.20	0.002	0.004	0.008
b	1.27	1.45	1.63	0.050	0.057	0.064
c	0.15	0.28	0.41	0.006	0.011	0.016
D	2.29	2.60	2.92	0.090	0.103	0.115
E	4.06	4.32	4.57	0.160	0.170	0.180
H_E	4.83	5.21	5.59	0.190	0.205	0.220
L	0.76	1.14	1.52	0.030	0.045	0.060

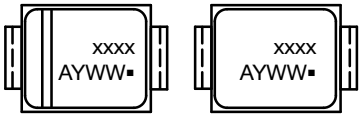
STYLE 1:
PIN 1. CATHODE (POLARITY BAND)
2. ANODE

STYLE 2:
NO POLARITY



RECOMMENDED
MOUNTING FOOTPRINT

GENERIC
MARKING DIAGRAM*



STYLE 1 STYLE 2

xxxx = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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