1SMA59xxBT3 Series, SZ1SMA59xxBT3G Series

1.5 Watt Plastic Surface Mount Zener Voltage Regulators

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
- Pb−Free Packages are Available

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

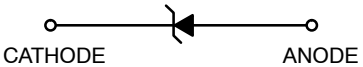
Rating	Symbol	Value	Unit
DC Power Dissipation @ T_L = 75°C, Measured Zero Lead Length (Note 1)	P_D	1.5	W
Derate above 75°C		20	mW/°C
Thermal Resistance, Junction−to−Lead	$R_{\theta JL}$	50	°C/W
DC Power Dissipation @ T_A = 25°C (Note 2)	P_D	0.5	W
Derate above 25°C		4.0	mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	250	°C/W
Operating and Storage Temperature Range	T_J, T_{stg}	−65 to +150	°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. 1 in square copper pad, FR−4 board.
2. FR−4 Board, using ON Semiconductor minimum recommended footprint.

ON Semiconductor®

http://onsemi.com



SMA
CASE 403D
PLASTIC

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†
1SMA59xxBT3	SMA	5000 / Tape & Reel
1SMA59xxBT3G	SMA (Pb−Free)	5000 / Tape & Reel
SZ1SMA59xxBT3G	SMA (Pb−Free)	5000 / Tape & Reel

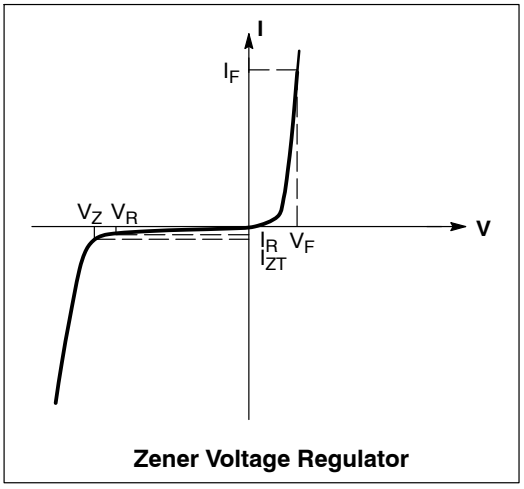
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

DEVICE MARKING INFORMATION

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

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 1.5 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 = 1.5 V Max. @ I_F = 200 mA for all types)

Device* (Note 3)	Device Marking	Zener Voltage (Note 4) V_Z (Volts) Min	Nom	Max	@ I_{ZT} mA	Zener Impedance Z_{ZT} @ I_{ZT} Ω	Z_{ZK} @ I_{ZK} Ω	mA	Leakage Current I_R @ V_R μA	Volts	I_{ZM} mA(dc)
SZ/1SMA5913BT3, G	813B	3.13	3.3	3.47	113.6	10	500	1.0	50	1.0	455
1SMA5914BT3, G	814B	3.42	3.6	3.78	104.2	9.0	500	1.0	35.5	1.0	417
SZ/1SMA5915BT3, G	815B	3.70	3.9	4.10	96.1	7.5	500	1.0	12.5	1.0	385
SZ/1SMA5916BT3, G	816B	4.08	4.3	4.52	87.2	6.0	500	1.0	2.5	1.0	349
SZ/1SMA5917BT3, G	817B	4.46	4.7	4.94	79.8	5.0	500	1.0	2.5	1.5	319
SZ/1SMA5918BT3, G	818B	4.84	5.1	5.36	73.5	4.0	350	1.0	2.5	2.0	294
SZ/1SMA5919BT3, G	819B	5.32	5.6	5.88	66.9	2.0	250	1.0	2.5	3.0	268
SZ/1SMA5920BT3, G	820B	5.89	6.2	6.51	60.5	2.0	200	1.0	2.5	4.0	242
SZ/1SMA5921BT3, G	821B	6.46	6.8	7.14	55.1	2.5	200	1.0	2.5	5.2	221
SZ/1SMA5922BT3, G	822B	7.12	7.5	7.88	50	3.0	400	0.5	2.5	6.0	200
SZ/1SMA5923BT3, G	823B	7.79	8.2	8.61	45.7	3.5	400	0.5	2.5	6.5	183
SZ/1SMA5924BT3, G	824B	8.64	9.1	9.56	41.2	4.0	500	0.5	2.5	7.0	165
SZ/1SMA5925BT3, G	825B	9.5	10	10.5	37.5	4.5	500	0.25	2.5	8.0	150
1SMA5926BT3, G	826B	10.45	11	11.55	34.1	5.5	550	0.25	0.5	8.4	136
SZ/1SMA5927BT3, G	827B	11.4	12	12.6	31.2	6.5	550	0.25	0.5	9.1	125
SZ/1SMA5928BT3, G	828B	12.35	13	13.65	28.8	7.0	550	0.25	0.5	9.9	115
SZ/1SMA5929BT3, G	829B	14.25	15	15.75	25	9.0	600	0.25	0.5	11.4	100
SZ/1SMA5930BT3, G	830B	15.2	16	16.8	23.4	10	600	0.25	0.5	12.2	94
SZ/1SMA5931BT3, G	831B	17.1	18	18.9	20.8	12	650	0.25	0.5	13.7	83
SZ/1SMA5932BT3, G	832B	19	20	21	18.7	14	650	0.25	0.5	15.2	75
SZ/1SMA5933BT3, G	833B	20.9	22	23.1	17	17.5	650	0.25	0.5	16.7	68
SZ/1SMA5934BT3, G	834B	22.8	24	25.2	15.6	19	700	0.25	0.5	18.2	63
SZ/1SMA5935BT3, G	835B	25.65	27	28.35	13.9	23	700	0.25	0.5	20.6	56
SZ/1SMA5936BT3, G	836B	28.5	30	31.5	12.5	26	750	0.25	0.5	22.8	50
SZ/1SMA5937BT3, G	837B	31.35	33	34.65	11.4	33	800	0.25	0.5	25.1	45
SZ/1SMA5938BT3, G	838B	34.2	36	37.8	10.4	38	850	0.25	0.5	27.4	42
SZ/1SMA5939BT3, G	839B	37.05	39	40.95	9.6	45	900	0.25	0.5	29.7	38
SZ/1SMA5940BT3, G	840B	40.85	43	45.15	8.7	53	950	0.25	0.5	32.7	35
SZ/1SMA5941BT3, G	841B	44.65	47	49.35	8.0	67	1000	0.25	0.5	35.8	32
SZ/1SMA5942BT3, G	842B	48.45	51	53.55	7.3	70	1100	0.25	0.5	38.8	29
SZ/1SMA5943BT3, G	843B	53.2	56	58.8	6.7	86	1300	0.25	0.5	42.6	27
1SMA5944BT3, G	844B	58.9	62	65.1	6.0	100	1500	0.25	0.5	47.1	24
SZ/1SMA5945BT3, G	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.

***** The "G" suffix indicates Pb−Free package available.

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

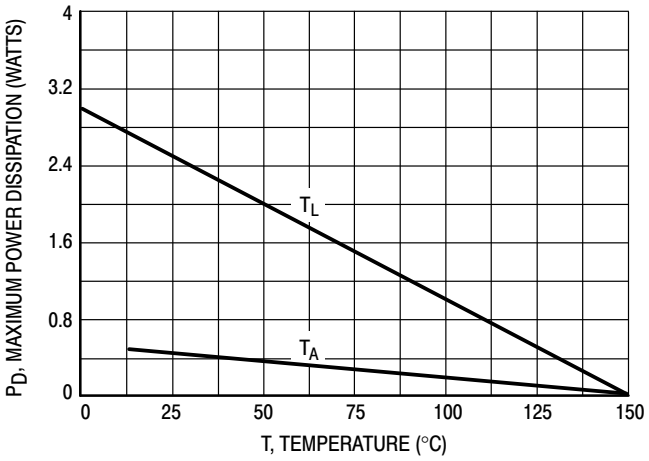


Figure 1. Steady State Power Derating

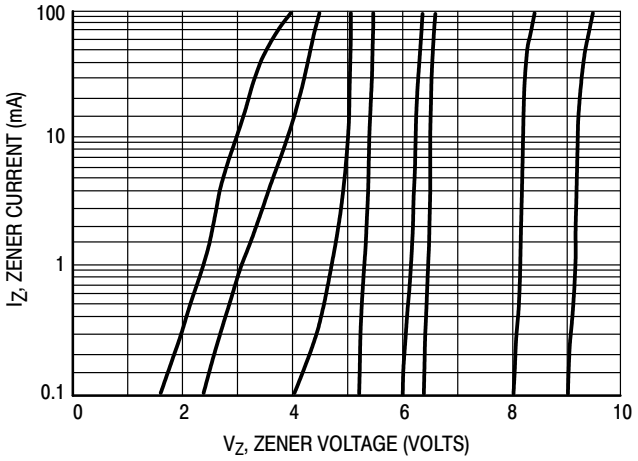


Figure 2. V_Z – 3.3 thru 10 Volts

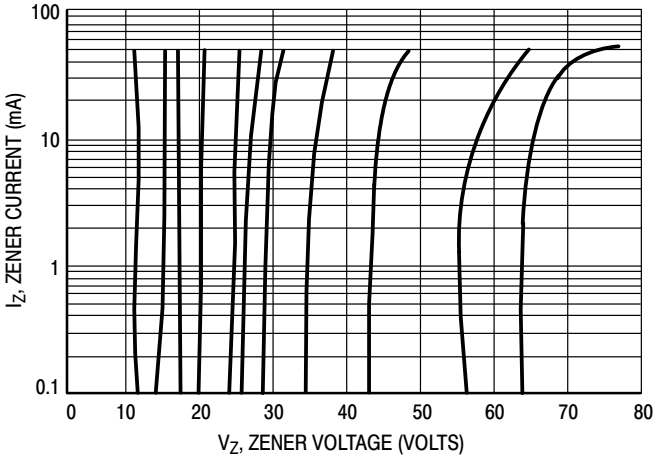


Figure 3. V_Z = 12 thru 68 Volts

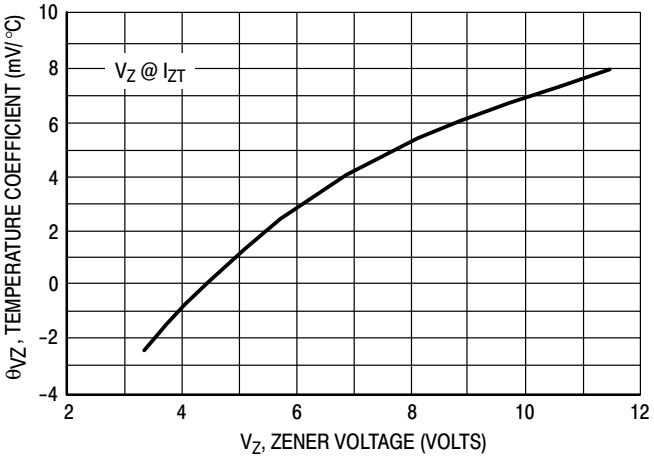


Figure 4. Zener Voltage – 3.3 to 12 Volts

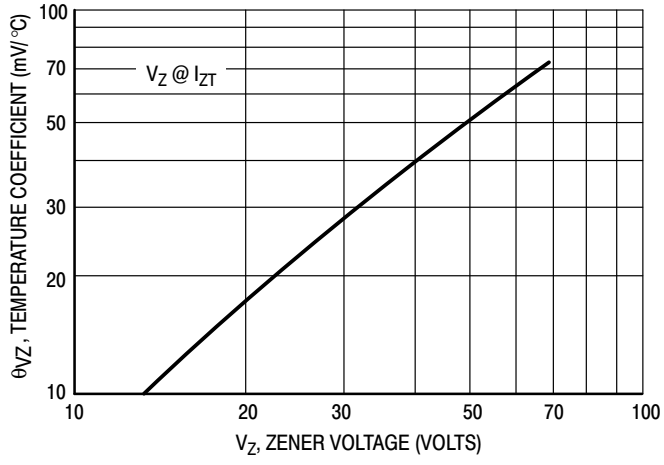


Figure 5. Zener Voltage – 12 to 68 Volts

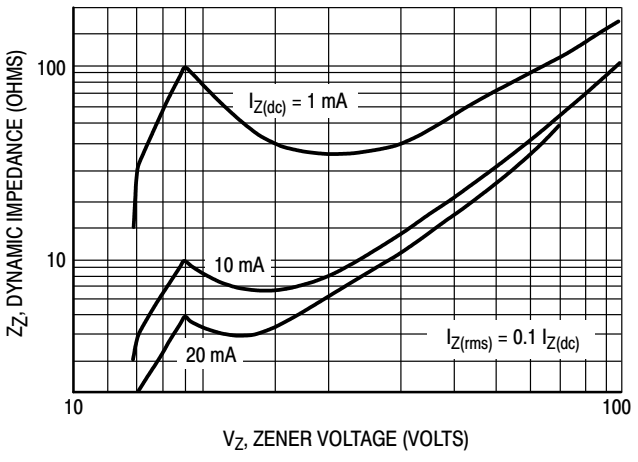


Figure 6. Effect of Zener Voltage

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

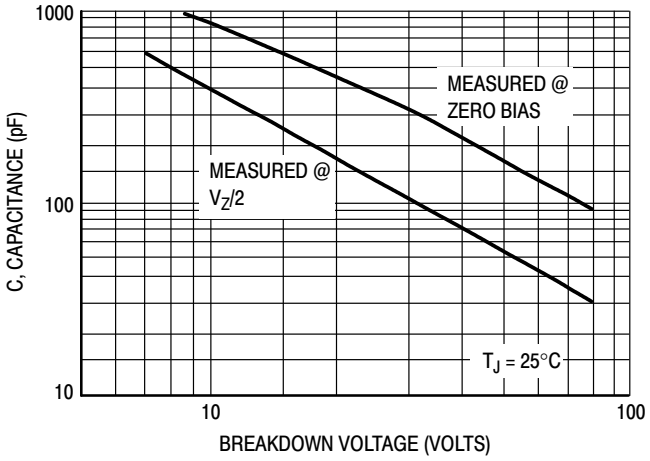


Figure 7. Capacitance Curve

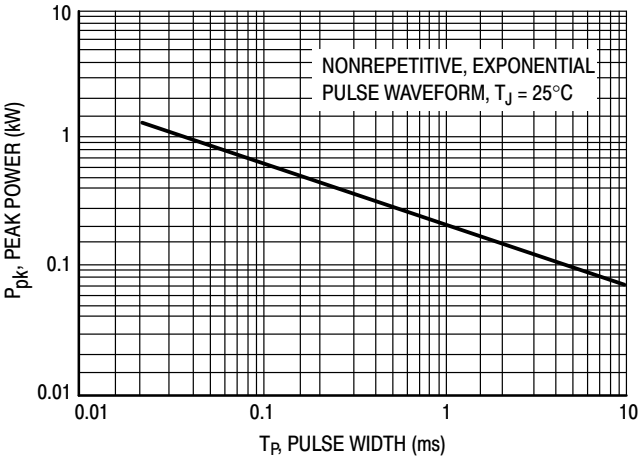


Figure 8. Typical Pulse Rating Curve

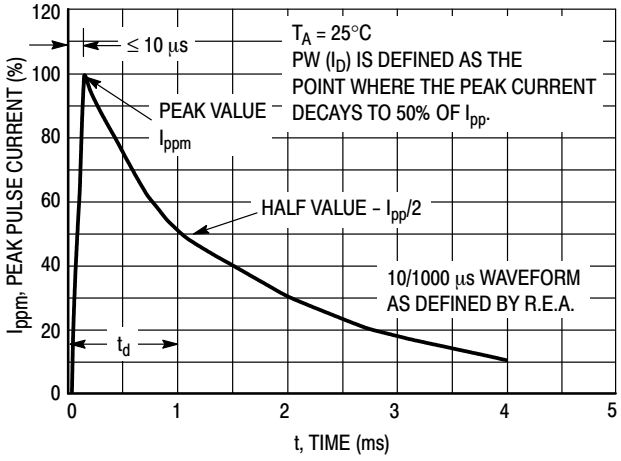


Figure 9. Pulse Waveform

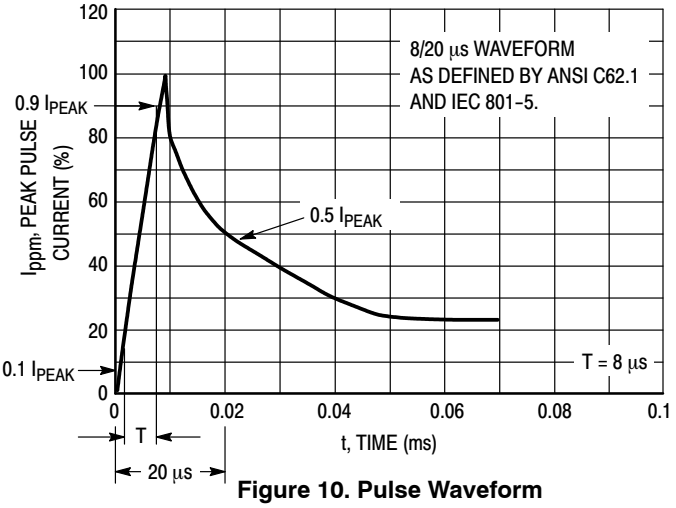
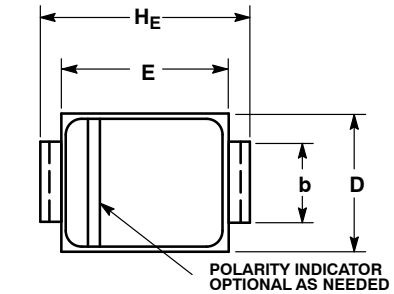
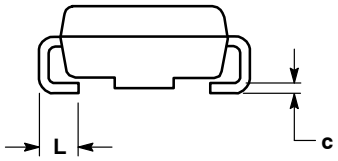


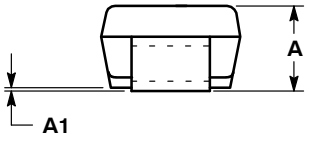
Figure 10. Pulse Waveform

PACKAGE DIMENSIONS

SMA
CASE 403D−02
ISSUE F





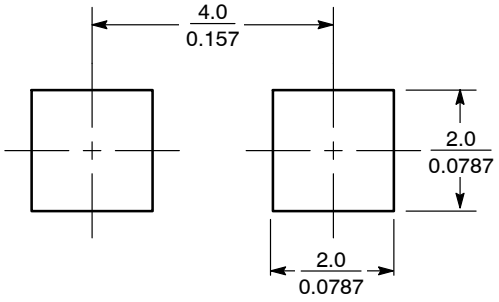


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 403D−01 OBSOLETE, NEW STANDARD IS 403D−02.

	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	0.15	0.002	0.004	0.006
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

SOLDERING FOOTPRINT*



SCALE 8:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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For additional information, please contact your local Sales Representative

1SMA5913BT3/D