SZMM3Z series

Voltage regulator diodes

Rev. 3 — 20 February 2023 Product data sheet

1. General description

General-purpose Zener diodes in a very small SOD323 (SC-76) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Non-repetitive peak reverse power disspation: ≤ 40 W
- Total power dissipation: ≤ 300 mW
- Tolerance series: Approximately ± 5 %
- Wide working voltage range: nominal 2.4 V to 75 V
- Low differential resistance
- AEC-Q101 qualified

3. Applications

- General regulation functions

4. Quick reference data

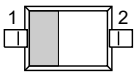
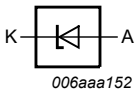
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 100 mA	[1]	-	-	1.1	V
P_{ZSM}	non-repetitive peak reverse power dissipation		[2]	-	-	40	W

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$
[2] t_p = 100 µs; square wave; T_j = 25 °C before surge

5. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]		
2	A	anode		

[1] The marking bar indicates the cathode.

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6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
SZMM3Z2V4T1G to SZMM3Z75VT1G[1]	SC-76	plastic surface-mounted package; 2 leads	SOD323

[1] The series consists of 37 types with nominal working voltages from 2.4 V to 75 V.

7. Marking

Table 4. Marking Codes

Type number	Marking Code	Type number	Marking Code
SZMM3Z2V4T1G	X8	SZMM3Z15VT1G	VV
SZMM3Z2V7T1G	X9	SZMM3Z16VT1G	VZ
SZMM3Z3V0T1G	XT	SZMM3Z18VT1G	X4
SZMM3Z3V3T1G	XW	SZMM3Z20VT1G	XC
SZMM3Z3V6T1G	XZ	SZMM3Z22VT1G	XG
SZMM3Z3V9T1G	ME	SZMM3Z24VT1G	XM
SZMM3Z4V3T1G	MM	SZMM3Z27VT1G	DK
SZMM3Z4V7T1G	MS	SZMM3Z30VT1G	DL
SZMM3Z5V1T1G	MW	SZMM3Z33VT1G	DM
SZMM3Z5V6T1G	LF	SZMM3Z36VT1G	DN
SZMM3Z6V2T1G	LL	SZMM3Z39VT1G	DP
SZMM3Z6V8T1G	LR	SZMM3Z43VT1G	DR
SZMM3Z7V5T1G	LV	SZMM3Z47VT1G	DS
SZMM3Z8V2T1G	LZ	SZMM3Z51VT1G	DT
SZMM3Z9V1T1G	CU	SZMM3Z56VT1G	DU
SZMM3Z10VT1G	VA	SZMM3Z62VT1G	DV
SZMM3Z11VT1G	VE	SZMM3Z68VT1G	DW
SZMM3Z12VT1G	VK	SZMM3Z75VT1G	DX
SZMM3Z13VT1G	VP	-	-

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
I_F	forward current			-	200	mA
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; square wave; T_{amb} = 25 °C; prior to surge	-	-	40	W
P_{tot}	total power dissipation	T_{amb} = 25 °C	[1]	-	300	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			−55	+150	°C
T_{stg}	storage temperature			−65	+150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB) , single-sided copper, tin-plated and standard footprint.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	415	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[2]	-	-	110	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB) , single-sided copper, tin-plated and standard footprint.
[2] Soldering point of cathode tab

10. Characteristics

Table 7. Electrical characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Max	Unit
V_F	forward voltage	I_F = 10 mA	[1]	0.9	V
		I_F = 100 mA	[1]	1.1	V

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$

Table 8. Electrical characteristics per type: SZMM3Z2V4T1G to SZMM3Z24VT1G

T_j = 25 °C unless otherwise specified.

SZMM3ZxxxT1G	Working voltage V_Z (V)		Reverse current I_R (µA)		Differential resistance r_{diff} (Ω)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]
	I_Z = 5 mA				I_Z = 0.5 mA	I_Z = 5 mA	I_Z = 5 mA		
	Min	Max	Max	V_R (V)	Max	Max	Min	Max	Max
2V4	2.30	2.60	50.0	1.0	1000	100	-3.5	0	450
2V7	2.50	2.90	20.0	1.0	1000	100	-3.5	0	440
3V0	2.80	3.20	10.0	1.0	1000	95	-3.5	0	425
3V3	3.10	3.50	5.0	1.0	1000	95	-3.5	0	410
3V6	3.40	3.80	5.0	1.0	1000	90	-3.5	0	390
3V9	3.70	4.10	3.0	1.0	1000	90	-3.5	0	370
4V3	4.01	4.48	3.0	1.0	1000	90	-3.5	0	350
4V7	4.42	4.90	2.0	1.0	800	80	-3.5	0.2	325
5V1	4.84	5.37	2.0	1.5	250	60	-2.7	1.2	300
5V6	5.31	5.92	1.0	2.5	100	40	-2.0	2.5	275
6V2	5.86	6.53	0.5	3.0	80	30	0.4	3.7	250
6V8	6.47	7.14	0.5	3.5	60	20	1.2	4.5	215
7V5	7.06	7.84	0.5	4.0	60	10	2.5	5.3	170
8V2	7.76	8.64	0.5	5.0	60	10	3.2	6.2	150
9V1	8.56	9.55	0.5	6.0	60	10	3.8	7.0	120
10V	9.45	10.55	0.1	7.0	60	10	4.5	8.0	110
11V	10.44	11.56	0.1	8.0	60	10	5.4	9.0	108
12V	11.42	12.60	0.1	9.0	80	10	6.0	10.0	105
13V	12.47	13.96	0.1	10.0	80	10	7.0	11.0	103
15V	13.84	15.52	0.05	11.0	80	15	9.2	13.0	99
16V	15.37	17.09	0.05	12.0	80	20	10.4	14.0	97
18V	16.94	19.03	0.05	13.0	80	20	12.4	16.0	93
20V	18.86	21.08	0.05	15.0	100	20	14.4	18.0	88
22V	20.88	23.17	0.05	17.0	100	25	16.4	20.0	84
24V	22.93	25.57	0.05	19.0	120	30	18.4	22.0	80

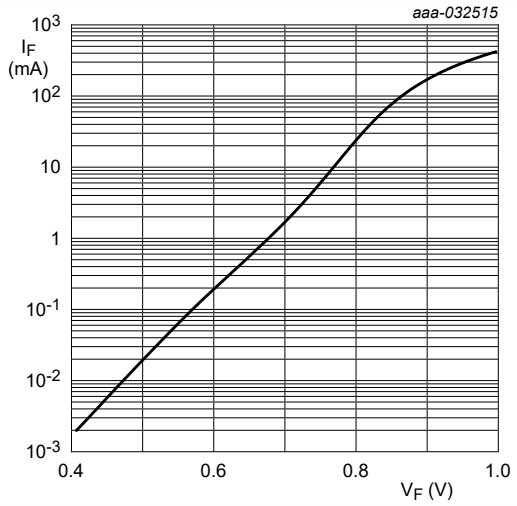
[1] f = 1 MHz; V_R = 0 V

Table 9. Electrical characteristics per type: SZMM3Z27VT1G to SZMM3Z75VT1G

T_j = 25 °C unless otherwise specified.

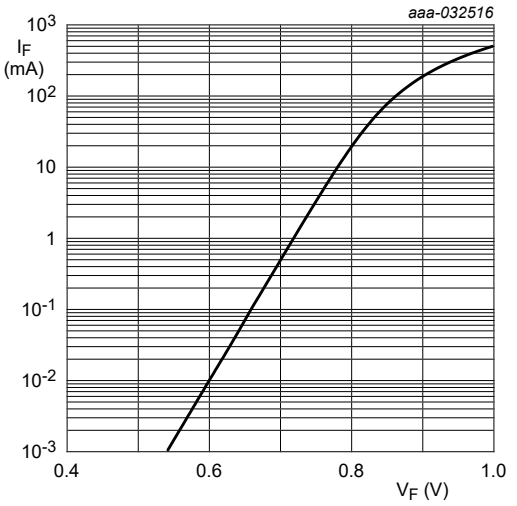
SZMM3ZxxxT1G	Working voltage V_Z (V)		Reverse current I_R (µA)		Differential resistance r_{diff} (Ω)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]
	I_Z = 2 mA				I_Z = 0.5 mA	I_Z = 2 mA	I_Z = 2 mA		
	Min	Max	Max	V_R (V)	Max	Max	Min	Max	Max
27V	25.10	28.90	0.05	18.9	300	80	21.4	25.3	50
30V	28.00	32.00	0.05	21.0	300	80	24.4	29.4	50
33V	31.00	35.00	0.05	23.1	325	80	27.4	33.4	45
36V	34.00	38.00	0.05	25.2	350	90	30.4	37.4	45
39V	37.00	41.00	0.05	27.3	350	130	33.4	41.2	45
43V	40.00	46.00	0.05	30.1	375	150	37.6	46.6	40
47V	44.00	50.00	0.05	32.9	375	170	42.0	51.8	40
51V	48.00	54.00	0.05	35.7	400	180	46.6	57.2	40
56V	52.00	60.00	0.05	39.2	425	200	52.2	63.8	40
62V	58.00	66.00	0.05	43.4	450	215	58.8	71.6	35
68V	64.00	72.00	0.05	47.6	475	240	65.6	79.8	35
75V	70.00	79.00	0.05	52.5	500	255	73.4	88.6	35

[1] f = 1 MHz; V_R = 0 V



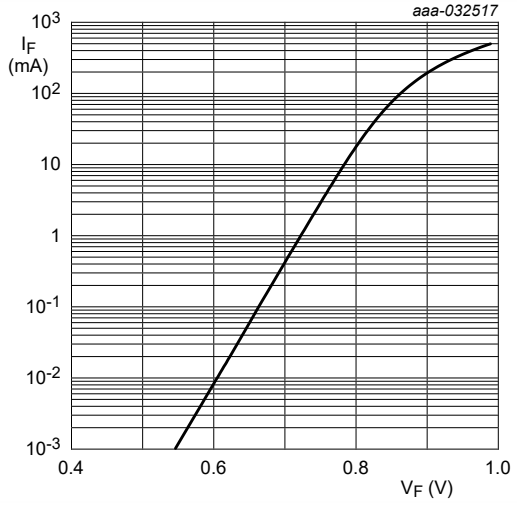
T_j = 25 ° C

Fig. 1. Forward current as a function of forward voltage; typical values (SZMM3Z2V4T1G)



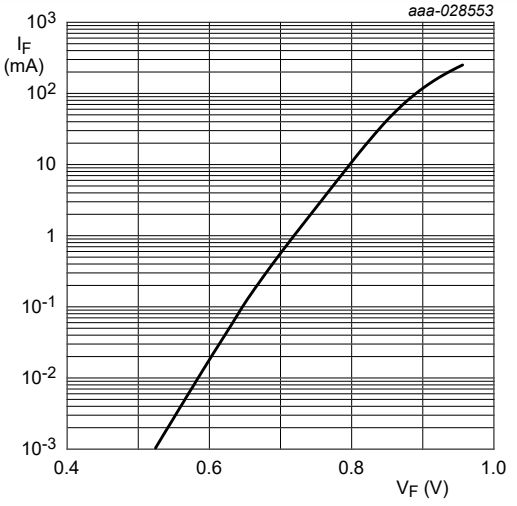
T_j = 25 ° C

Fig. 2. Forward current as a function of forward voltage; typical values (SZMM3Z6V8T1G)



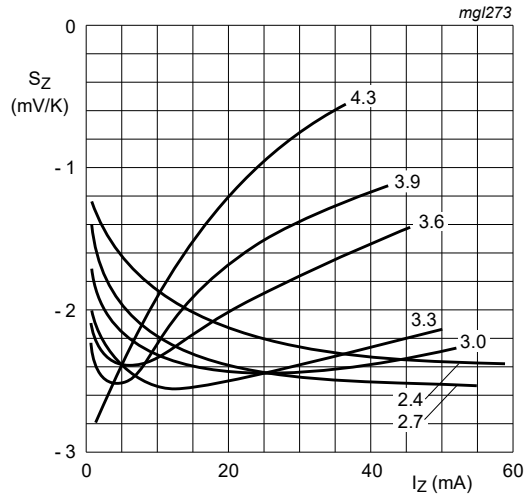
T_j = 25 ° C

Fig. 3. Forward current as a function of forward voltage; typical values (SZMM3Z7V5T1G)



T_j = 25 ° C

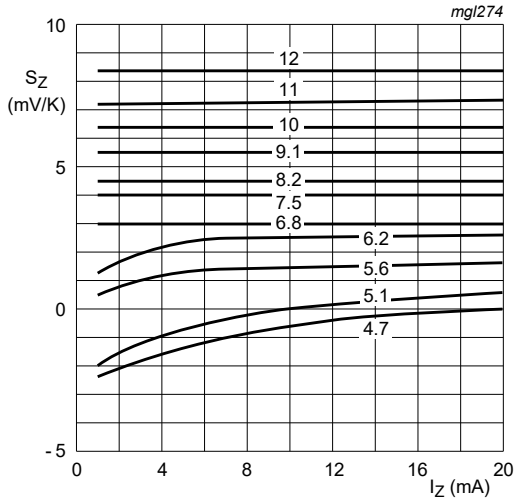
Fig. 4. Forward current as a function of forward voltage; typical values (SZMM3Z75VT1G)



T_j = 25 °C to 150 °C

V_Z = 2.4 V to 4.3 V

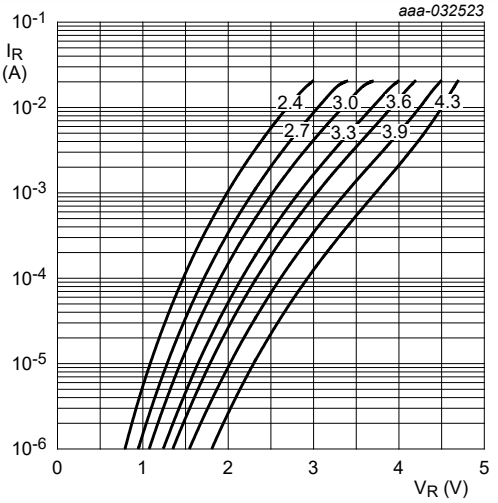
Fig. 5. Temperature coefficient as a function of working current; typical values (SZMM3Z2V4T1G to 4V3T1G)



T_j = 25 °C to 150 °C

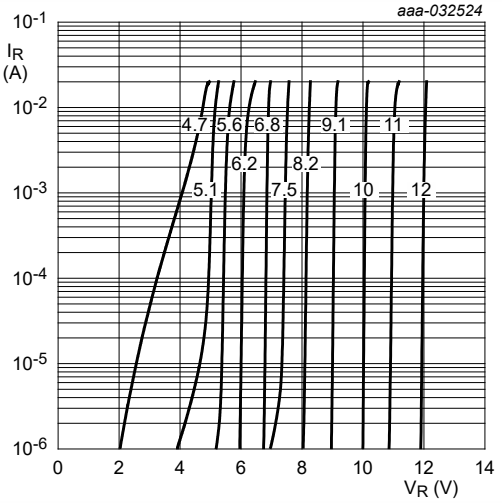
V_Z = 4.7 V to 12 V

Fig. 6. Temperature coefficient as a function of working current; typical values (SZMM3Z4V7T1G to 12VT1G)



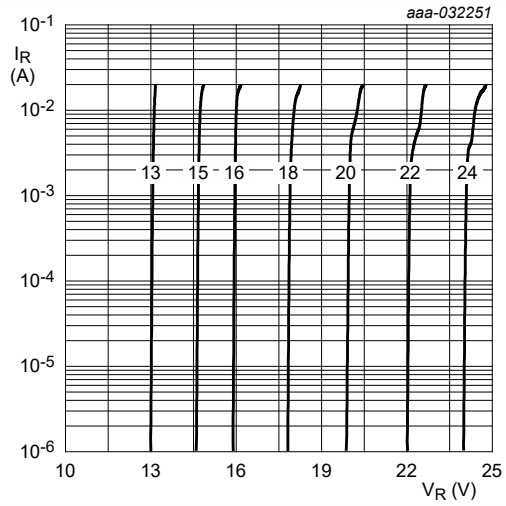
T_j = 25 °C

Fig. 7. Reverse current as a function of reverse voltage; typical values (SZMM3Z2V4T1G to 4V3T1G)



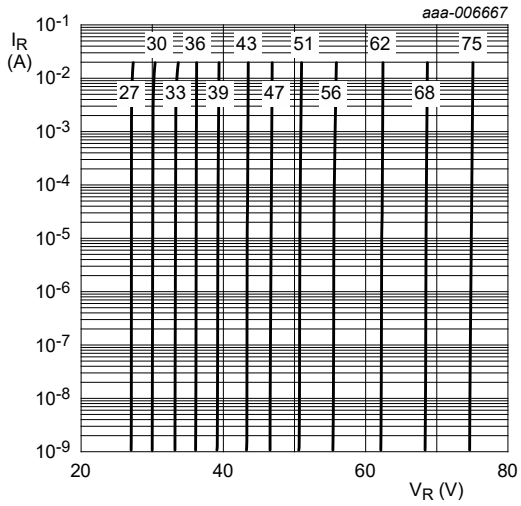
T_j = 25 °C

Fig. 8. Reverse current as a function of reverse voltage; typical values (SZMM3Z4V7T1G to 12VT1G)



T_j = 25 °C

Fig. 9. Reverse current as a function of reverse voltage; typical values (SZMM3Z13VT1G to 24VT1G)



T_j = 25 °C

Fig. 10. Reverse current as a function of reverse voltage; typical values (SZMM3Z27VT1G to 75VT1G)

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

12. Package outline

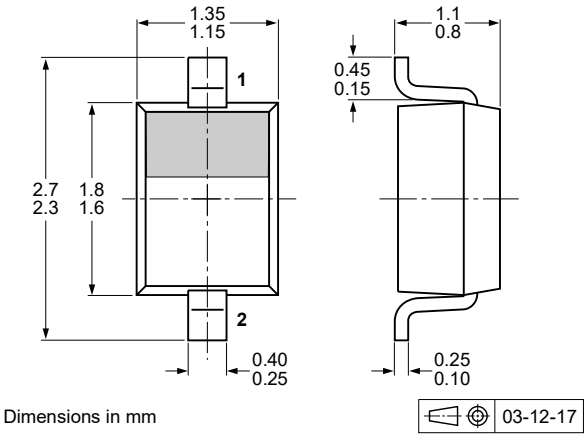


Fig. 11. Package outline SOD323 (SC-76)

13. Soldering

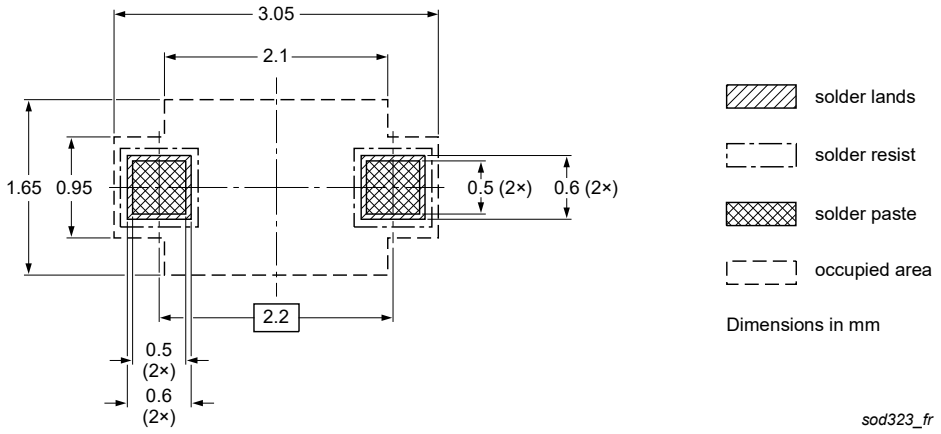


Fig. 12. Reflow soldering footprint SOD323 (SC-76)

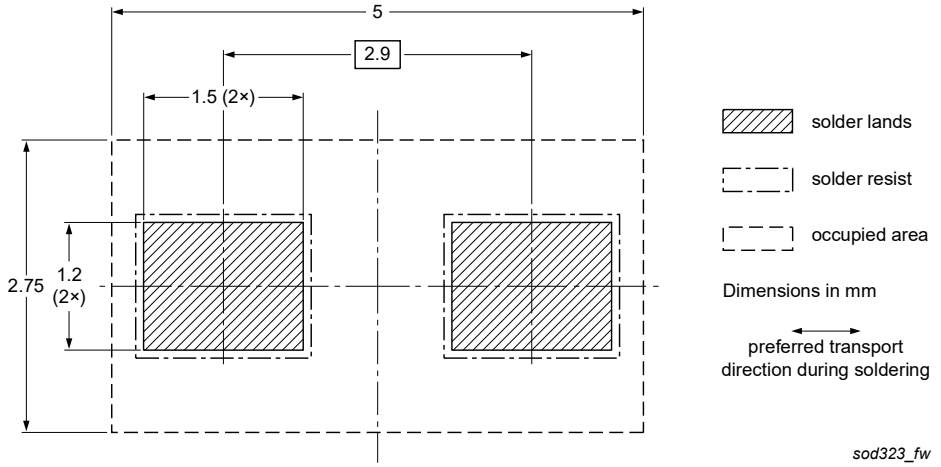


Fig. 13. Wave soldering footprint SOD323 (SC-76)

14. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
SZMM3Z_SER v.3	20230220	Product data sheet	-	SZMM3Z_SER v.1
Modifications:	• Limiting values: Tolerance changed			
SZMM3Z_SER v.2	20210330	Product data sheet	-	SZMM3Z_SER v.1
SZMM3Z_SER v.1	20201210	Product data sheet	-	-

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
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