BZX38450 series

Low-current voltage regulator diodes

Rev. 4 — 16 July 2024 Product data sheet

1. General description

Low-current voltage regulator diodes in a small SOD323 (SC-76) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Total power dissipation: ≤ 300 mW
- Two tolerance series: ± 2 % and approximately ± 5 %
- Working voltage range: nominal 1.8 V to 51 V
- Specified at a low test current (50 µA), ideal for low bias and portable battery-powered applications
- BZX38450-B11 to -C51: Intentional minor rise of leakage current for optimized fast switching and noise reduction [AN90031]

3. Applications

- Low-current general regulation functions

4. Quick reference data

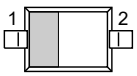
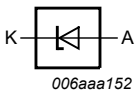
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 10 mA	[1]	-	-	0.9	V
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2]	-	-	300	mW

[1] Pulse test: t_p ≤ 300 µs; δ ≤ 0.02
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

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
BZX38450 series	SC-76	plastic, surface-mounted package; 2 leads; 1.3 mm pitch; 1.7 mm x 1.25 mm x 0.95 mm body	SOD323

7. Marking

Table 4. Marking Codes

Type number	Marking code	Type number	Marking code	Type number	Marking code	Type number	Marking code
BZX38450-B1V8	8S	BZX38450-B10	9E	BZX38450-C1V8	6R	BZX38450-C10	7K
BZX38450-B2V0	8T	BZX38450-B11	9F	BZX38450-C2V0	6S	BZX38450-C11	7M
BZX38450-B2V2	8U	BZX38450-B12	9G	BZX38450-C2V2	6T	BZX38450-C12	7N
BZX38450-B2V4	8V	BZX38450-B13	9H	BZX38450-C2V4	6U	BZX38450-C13	7P
BZX38450-B2V7	8W	BZX38450-B15	9J	BZX38450-C2V7	6V	BZX38450-C15	7Q
BZX38450-B3V0	8X	BZX38450-B16	9K	BZX38450-C3V0	6W	BZX38450-C16	7R
BZX38450-B3V3	8Y	BZX38450-B18	9L	BZX38450-C3V3	6X	BZX38450-C18	7S
BZX38450-B3V6	8Z	BZX38450-B20	9M	BZX38450-C3V6	6Y	BZX38450-C20	7T
BZX38450-B3V9	82	BZX38450-B22	9N	BZX38450-C3V9	6Z	BZX38450-C22	7U
BZX38450-B4V3	83	BZX38450-B24	9P	BZX38450-C4V3	7A	BZX38450-C24	7V
BZX38450-B4V7	84	BZX38450-B27	9R	BZX38450-C4V7	7B	BZX38450-C27	7W
BZX38450-B5V1	85	BZX38450-B30	9S	BZX38450-C5V1	7C	BZX38450-C30	7X
BZX38450-B5V6	86	BZX38450-B33	9T	BZX38450-C5V6	7D	BZX38450-C33	7Y
BZX38450-B6V2	87	BZX38450-B36	9U	BZX38450-C6V2	7E	BZX38450-C36	7Z
BZX38450-B6V8	89	BZX38450-B39	9V	BZX38450-C6V8	7F	BZX38450-C39	8A
BZX38450-B7V5	9B	BZX38450-B43	9W	BZX38450-C7V5	7G	BZX38450-C43	8B
BZX38450-B8V2	9C	BZX38450-B47	9X	BZX38450-C8V2	7H	BZX38450-C47	8C
BZX38450-B9V1	9D	BZX38450-B51	9Y	BZX38450-C9V1	7J	BZX38450-C51	8D

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			-	250	mA
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; square wave; T_j = 25 °C; prior to surge		-	40	W
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °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

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

Table 8. Electrical characteristics per type: BZX38450-B1V8 to BZX38450-C36

T_j = 25 °C unless otherwise specified.

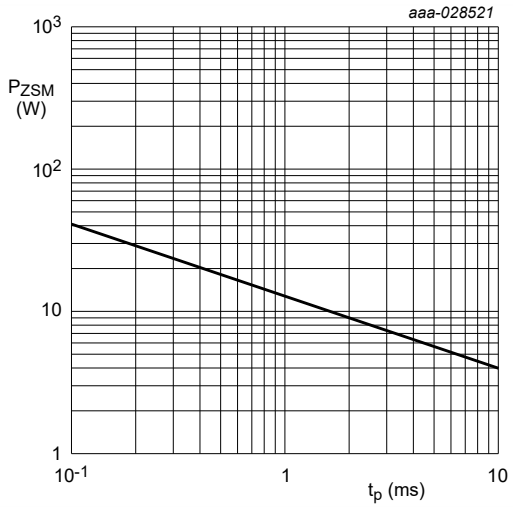
BZX38450-xxx	Sel.	Working voltage V_Z (V)		Differential resistance r_{diff} (Ω)		Reverse current I_R (µA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 50 µA		I_Z = 1 mA	I_Z = 5 mA			I_Z = 5 mA		f = 1 MHz V_R = 0 V
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max
1V8	B	1.76	1.84	600	100	7.5	1.0	-3.5	0	220
	C	1.71	1.89							
2V0	B	1.96	2.04	600	100	7	1.0	-3.5	0	220
	C	1.88	2.12							
2V2	B	2.15	2.25	600	100	4	1.0	-3.5	0	210
	C	2.09	2.31							
2V4	B	2.35	2.45	600	100	2	1.0	-3.5	0	200
	C	2.28	2.52							
2V7	B	2.65	2.75	600	100	1	1.0	-3.5	0	190
	C	2.565	2.835							
3V0	B	2.94	3.06	600	100	0.8	1.0	-3.5	0.2	170
	C	2.85	3.15							
3V3	B	3.23	3.37	600	100	7.5	1.5	-3.5	1.2	160
	C	3.13	3.47							
3V6	B	3.53	3.67	600	95	7.5	2.0	-3.5	1.2	160
	C	3.42	3.78							
3V9	B	3.82	3.98	600	95	5.0	2.0	-2.7	2.5	150
	C	3.70	4.10							
4V3	B	4.21	4.39	600	95	4.0	2.0	-2.7	2.5	150
	C	4.09	4.52							
4V7	B	4.61	4.79	600	80	5.0	3.0	-2.7	2.5	140
	C	4.47	4.94							
5V1	B	5.00	5.20	500	60	5.0	3.0	-2.0	3.7	130
	C	4.85	5.36							
5V6	B	5.49	5.71	400	40	2.0	4.0	-2.0	3.7	120
	C	5.32	5.88							
6V2	B	6.08	6.32	160	10	1.0	5.0	0.4	4.5	110
	C	5.89	6.51							
6V8	B	6.66	6.94	80	15	0.1	5.1	1.2	4.5	100
	C	6.46	7.14							
7V5	B	7.35	7.65	80	15	0.1	5.7	2.5	5.3	150
	C	7.13	7.88							
8V2	B	8.04	8.36	80	15	0.1	6.2	3.2	6.2	150
	C	7.79	8.61							
9V1	B	8.92	9.28	100	15	0.1	6.9	3.8	7.0	150
	C	8.65	9.56							
10	B	9.80	10.20	150	20	0.1	7.6	4.5	8.0	90
	C	9.50	10.50							

BZX38450-xxx	Sel.	Working voltage V_Z (V)		Differential resistance r_{diff} (Ω)		Reverse current I_R (µA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 50 µA		I_Z = 1 mA	I_Z = 5 mA			I_Z = 5 mA		f = 1 MHz V_R = 0 V
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max
11	B	10.80	11.20	150	20	0.05	8.4	5.4	9.0	85
	C	10.45	11.55							
12	B	11.80	12.20	150	25	0.05	9.1	6.0	10	85
	C	11.40	12.60							
13	B	12.70	13.30	170	30	0.05	9.8	7.0	11	80
	C	12.35	13.65							
15	B	14.70	15.30	200	30	0.05	11.4	9.2	13	75
	C	14.25	15.75							
16	B	15.70	16.30	200	40	0.05	12.1	10.4	14	75
	C	15.20	16.80							
18	B	17.60	18.40	225	45	0.05	13.6	12.4	16	70
	C	17.10	18.90							
20	B	19.60	20.40	225	55	0.05	15.2	14.4	18	60
	C	19.00	21.00							
22	B	21.60	22.40	250	55	0.05	16.7	16.4	20	60
	C	20.90	23.10							
24	B	23.50	24.50	250	70	0.05	18.2	18.4	22	55
	C	22.80	25.20							
27	B	26.50	27.50	300	80	0.05	20.4	21.4	25.3	50
	C	25.65	28.35							
30	B	29.40	30.60	300	80	0.05	22.8	24.4	29.4	50
	C	28.50	31.50							
33	B	32.30	33.70	325	80	0.05	25.0	27.4	33.4	45
	C	31.35	34.65							
36	B	35.30	36.70	350	90	0.05	27.3	30.4	37.4	45
	C	34.20	37.80							

Table 9. Electrical characteristics per type: BZX38450-B39 to BZX38450-C51

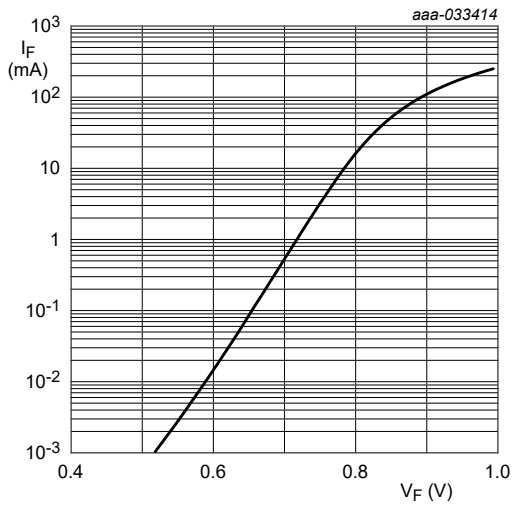
T_j = 25 °C unless otherwise specified.

BZX38450-xxx	Sel.	Working voltage V_Z (V)		Differential resistance r_{diff} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)
		I_Z = 50 μA		I_Z = 0.5 mA	I_Z = 2 mA			I_Z = 2 mA		f = 1 MHz V_R = 0 V
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max
39	B	38.20	39.80	350	130	0.05	29.6	33.4	41.2	45
	C	37.05	40.95							
43	B	42.10	43.90	375	150	0.05	32.6	37.6	46.6	40
	C	40.85	45.15							
47	B	46.10	47.90	375	170	0.05	32.9	42.0	51.8	40
	C	44.00	50.00							
51	B	50.00	52.00	400	180	0.05	35.7	46.6	57.2	40
	C	48.00	54.00							



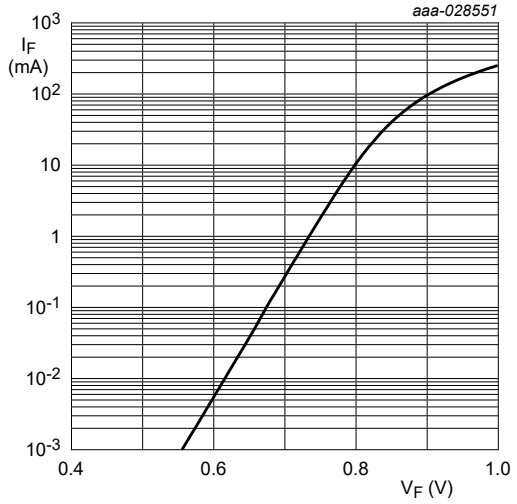
T_j = 25 °C (before surge)

Fig. 1. Non-repetitive peak reverse power dissipation as a function of pulse duration; maximum values



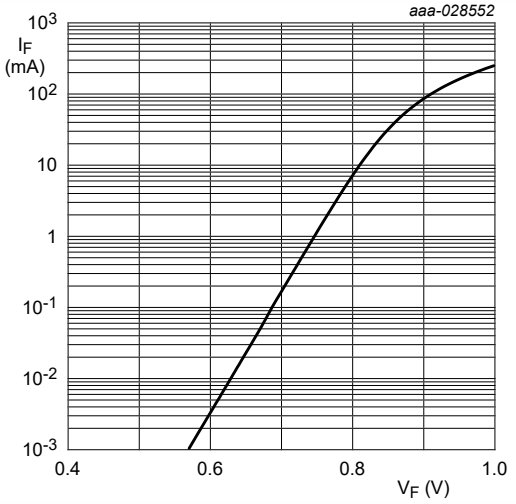
T_j = 25 °C

Fig. 2. Forward current as a function of forward voltage; typical values (BZX38450-B/C1V8)



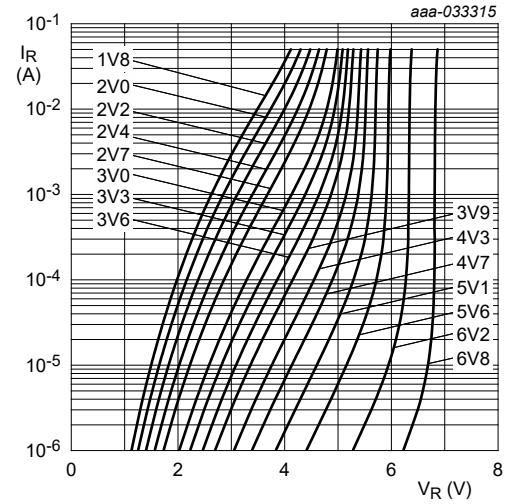
T_j = 25 °C

Fig. 3. Forward current as a function of forward voltage; typical values (BZX38450-B/C6V8)



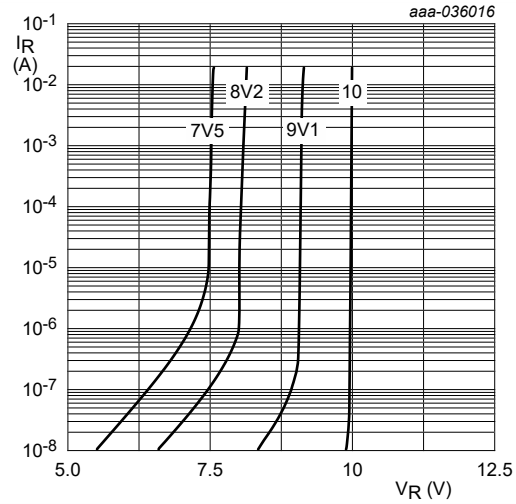
T_j = 25 °C

Fig. 4. Forward current as a function of forward voltage; typical values (BZX38450-B/C7V5)



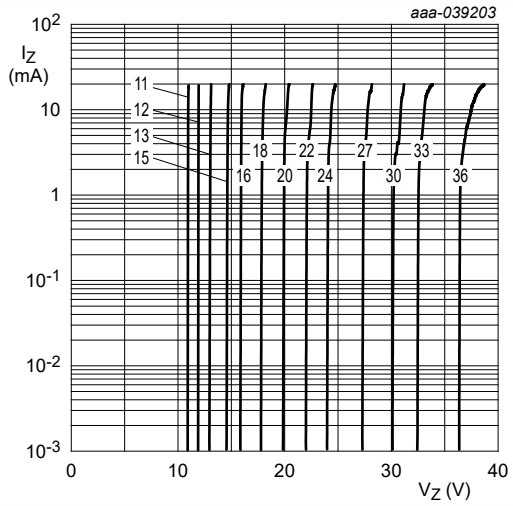
T_{amb} = 25 °C

Fig. 5. Reverse current as a function of reverse voltage; typical values (BZX38450-B/C1V8 to BZX38450-B/C6V8)



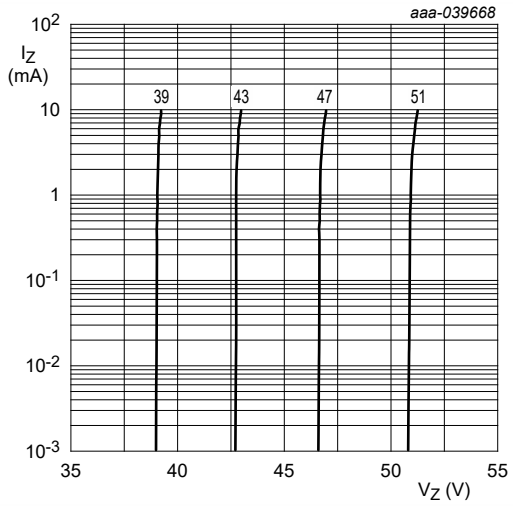
T_{amb} = 25 °C

Fig. 6. Reverse current as a function of reverse voltage; typical values (BZX38450-B/C7V5 to BZX38450-B/C10)



T_{amb} = 25 °C

Fig. 7. Reverse current as a function of reverse voltage; typical values (BZX38450-B/C11 to BZX38450-B/C36)



T_{amb} = 25 °C

Fig. 8. Reverse current as a function of reverse voltage; typical values (BZX38450-B/C39 to BZX38450-B/C51)

11. Package outline

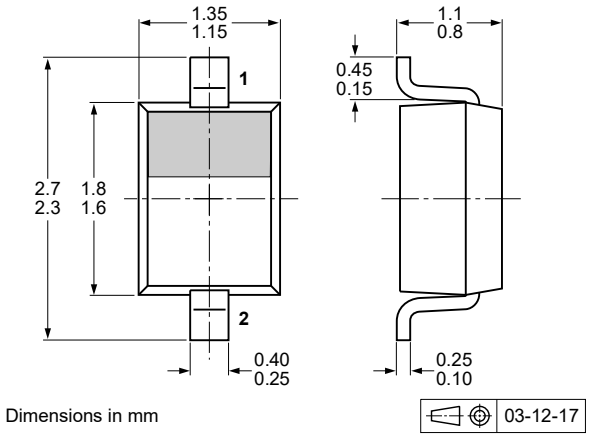


Fig. 9. Package outline SOD323 (SC-76)

12. Soldering

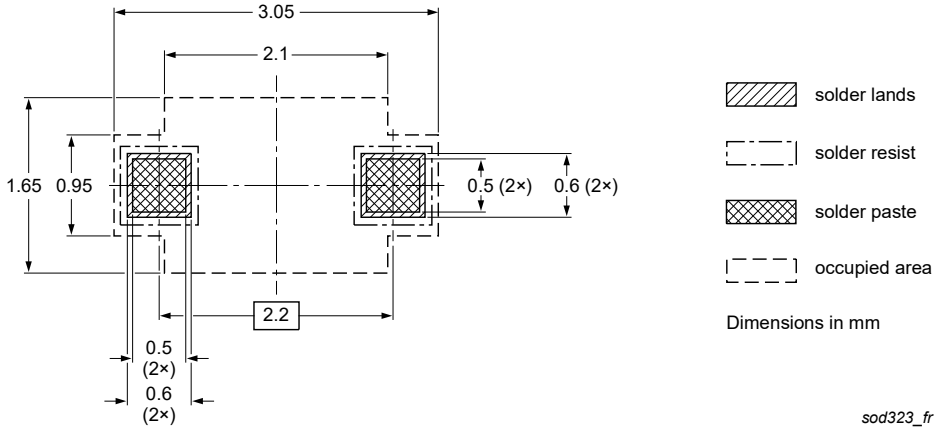


Fig. 10. Reflow soldering footprint for SOD323 (SC-76)

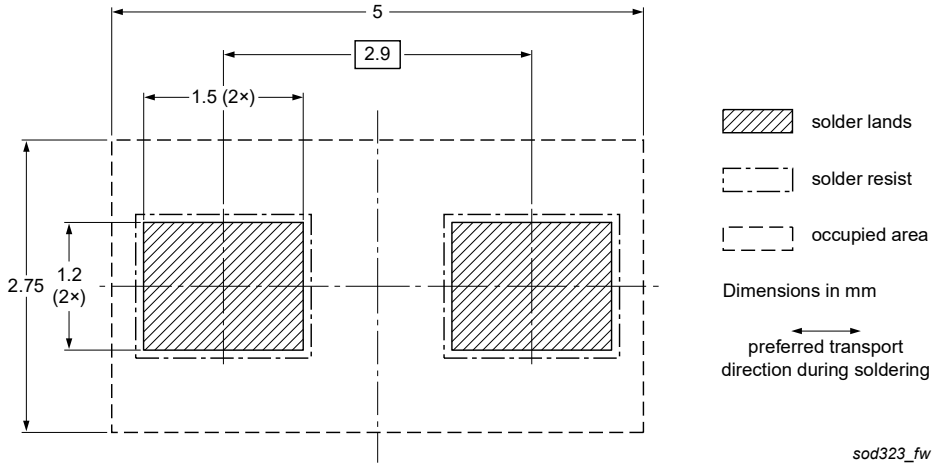


Fig. 11. Wave soldering footprint for SOD323 (SC-76)

13. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX38450_SER v.4	20240716	Product data sheet	-	BZX38450_SER v.3
Modifications:	• B and C selections 11 V up to 51 V added			
BZX38450_SER v.3	20230118	Product data sheet	-	BZX38450_SER v.2
BZX38450_SER v.2	20210825	Product data sheet	-	BZX38450_SER v.1
BZX38450_SER v.1	20210427	Objective data sheet	-	-

14. 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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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