



# BZX38450-Q 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:  $\leq 300$  mW
- Two tolerance series:  $\pm 2\%$  and approximately  $\pm 5\%$
- Working voltage range: nominal 1.8 V to 51 V
- Specified at a low test current (50  $\mu$ A), ideal for low bias and portable battery-powered applications
- BZX38450-B11-Q to -C51-Q: Intentional minor rise of leakage current for optimized fast switching and noise reduction [[AN90031](#)]
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- Low-current general regulation functions

## 4. Quick reference data

Table 1. Quick reference data

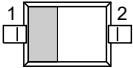
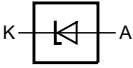
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 10$ mA [1]	-	-	0.9	V
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C [2]	-	-	300	mW

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

[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]		 006aaa152
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZX38450-Q 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-Q	8S	BZX38450-B10-Q	9E	BZX38450-C1V8-Q	6R	BZX38450-C10-Q	7K
BZX38450-B2V0-Q	8T	BZX38450-B11-Q	9F	BZX38450-C2V0-Q	6S	BZX38450-C11-Q	7M
BZX38450-B2V2-Q	8U	BZX38450-B12-Q	9G	BZX38450-C2V2-Q	6T	BZX38450-C12-Q	7N
BZX38450-B2V4-Q	8V	BZX38450-B13-Q	9H	BZX38450-C2V4-Q	6U	BZX38450-C13-Q	7P
BZX38450-B2V7-Q	8W	BZX38450-B15-Q	9J	BZX38450-C2V7-Q	6V	BZX38450-C15-Q	7Q
BZX38450-B3V0-Q	8X	BZX38450-B16-Q	9K	BZX38450-C3V0-Q	6W	BZX38450-C16-Q	7R
BZX38450-B3V3-Q	8Y	BZX38450-B18-Q	9L	BZX38450-C3V3-Q	6X	BZX38450-C18-Q	7S
BZX38450-B3V6-Q	8Z	BZX38450-B20-Q	9M	BZX38450-C3V6-Q	6Y	BZX38450-C20-Q	7T
BZX38450-B3V9-Q	82	BZX38450-B22-Q	9N	BZX38450-C3V9-Q	6Z	BZX38450-C22-Q	7U
BZX38450-B4V3-Q	83	BZX38450-B24-Q	9P	BZX38450-C4V3-Q	7A	BZX38450-C24-Q	7V
BZX38450-B4V7-Q	84	BZX38450-B27-Q	9R	BZX38450-C4V7-Q	7B	BZX38450-C27-Q	7W
BZX38450-B5V1-Q	85	BZX38450-B30-Q	9S	BZX38450-C5V1-Q	7C	BZX38450-C30-Q	7X
BZX38450-B5V6-Q	86	BZX38450-B33-Q	9T	BZX38450-C5V6-Q	7D	BZX38450-C33-Q	7Y
BZX38450-B6V2-Q	87	BZX38450-B36-Q	9U	BZX38450-C6V2-Q	7E	BZX38450-C36-Q	7Z
BZX38450-B6V8-Q	89	BZX38450-B39-Q	9V	BZX38450-C6V8-Q	7F	BZX38450-C39-Q	8A
BZX38450-B7V5-Q	9B	BZX38450-B43-Q	9W	BZX38450-C7V5-Q	7G	BZX38450-C43-Q	8B
BZX38450-B8V2-Q	9C	BZX38450-B47-Q	9X	BZX38450-C8V2-Q	7H	BZX38450-C47-Q	8C
BZX38450-B9V1-Q	9D	BZX38450-B51-Q	9Y	BZX38450-C9V1-Q	7J	BZX38450-C51-Q	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	$t_p = 100 \mu\text{s}$ ; square wave; $T_j = 25 \text{ }^\circ\text{C}$ ; prior to surge	-	40	W
$P_{tot}$	total power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[1]	300	mW
$T_j$	junction temperature		-	150	$^\circ\text{C}$
$T_{amb}$	ambient temperature		-55	+150	$^\circ\text{C}$
$T_{stg}$	storage temperature		-65	+150	$^\circ\text{C}$

[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**

$T_j = 25 \text{ }^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Max	Unit	
$V_F$	forward voltage	$I_F = 10 \text{ mA}$	[1]	0.9	V

[1] Pulse test:  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$

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

 $T_j = 25\text{ °C}$  unless otherwise specified.

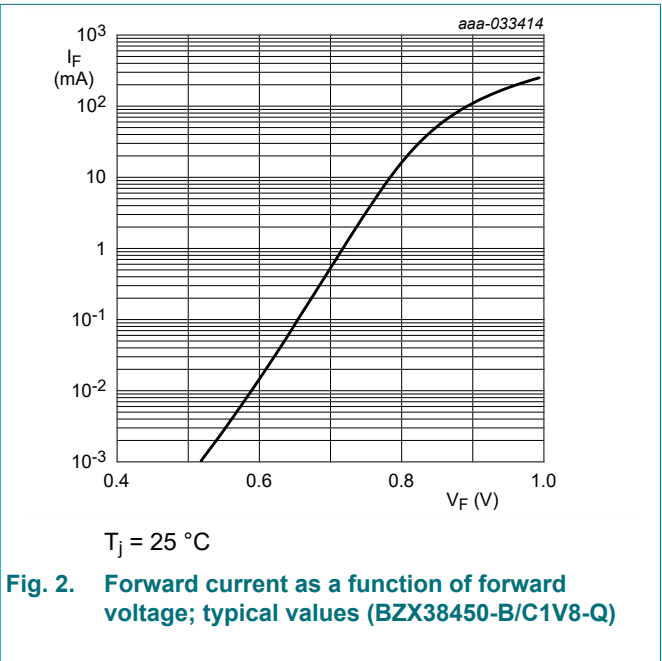
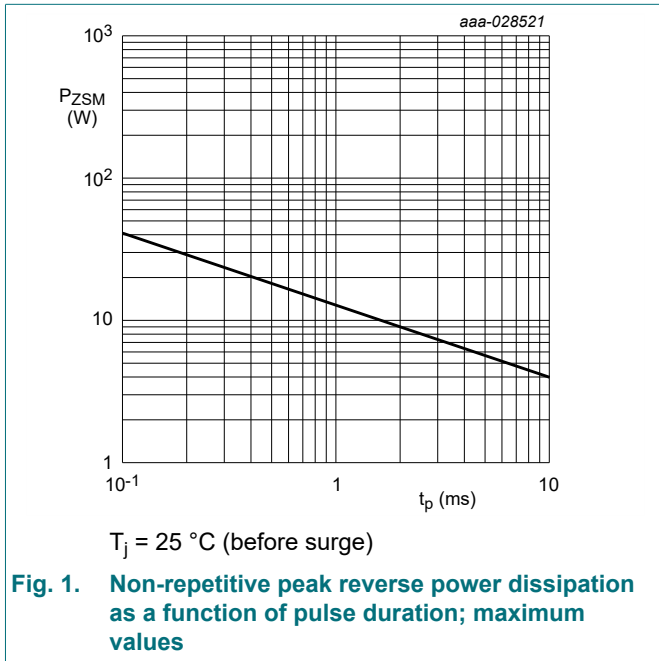
BZX38450- xxx-Q	Sel.	Working voltage $V_Z$ (V)		Differential resistance $r_{diff}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K)		Diode capacitance $C_d$ (pF)
		$I_Z = 50\ \mu$ A		$I_Z = 1$ mA	$I_Z = 5$ mA	Max	$V_R$ (V)	$I_Z = 5$ mA		$f = 1$ MHz $V_R = 0$ V
		Min	Max	Max	Max			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							

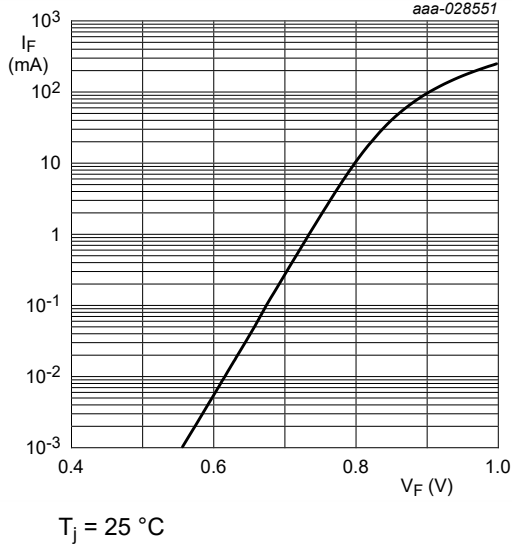
BZX38450- xxx-Q	Sel.	Working voltage $V_Z$ (V)		Differential resistance $r_{diff}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K)		Diode capacitance $C_d$ (pF)
		$I_Z = 50 \mu$ A		$I_Z = 1$ mA	$I_Z = 5$ mA	Max	$V_R$ (V)	$I_Z = 5$ mA		$f = 1$ MHz $V_R = 0$ V
		Min	Max	Max	Max			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-Q to BZX38450-C51-Q

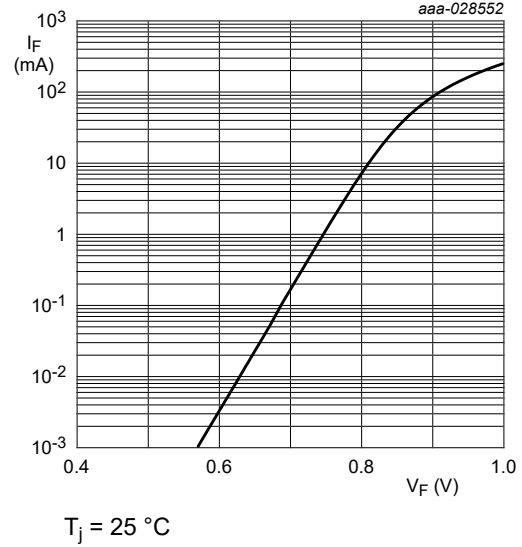
$T_j = 25\text{ °C}$  unless otherwise specified.

BZX38450-xxx-Q	Sel.	Working voltage $V_Z$ (V)		Differential resistance $r_{diff}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu\text{A}$ )		Temperature coefficient $S_Z$ (mV/K)		Diode capacitance $C_d$ (pF)
		$I_Z = 50\ \mu\text{A}$		$I_Z = 0.5\ \text{mA}$	$I_Z = 2\ \text{mA}$	Max	$V_R$ (V)	Min	Max	$f = 1\ \text{MHz}$ $V_R = 0\ \text{V}$
		Min	Max	Max	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							

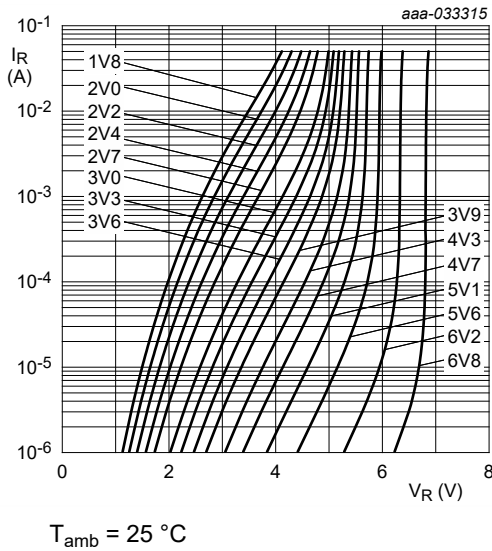




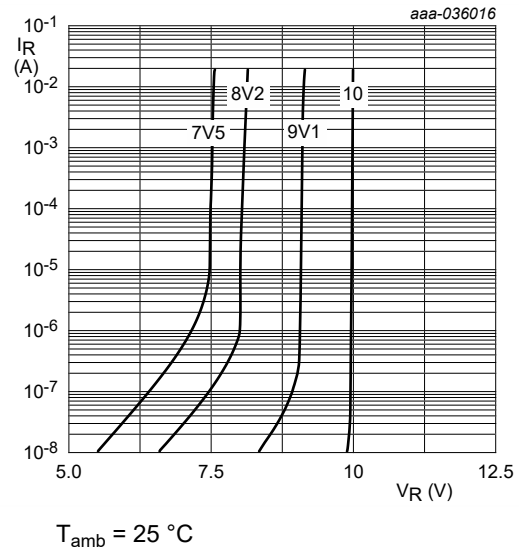
**Fig. 3.** Forward current as a function of forward voltage; typical values (BZX38450-B/C6V8-Q)



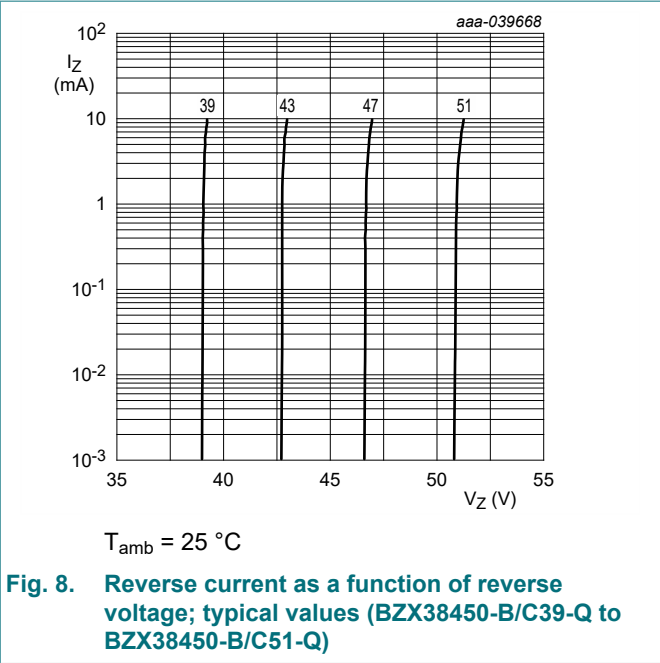
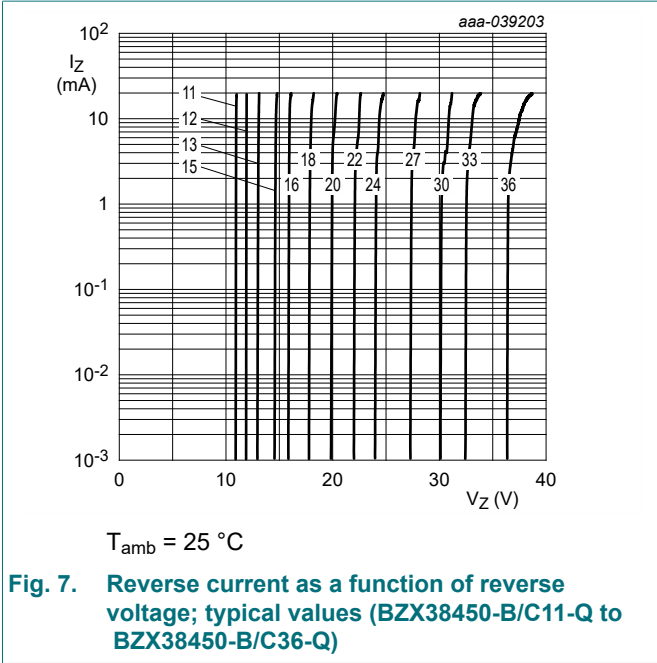
**Fig. 4.** Forward current as a function of forward voltage; typical values (BZX38450-B/C7V5-Q)



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



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

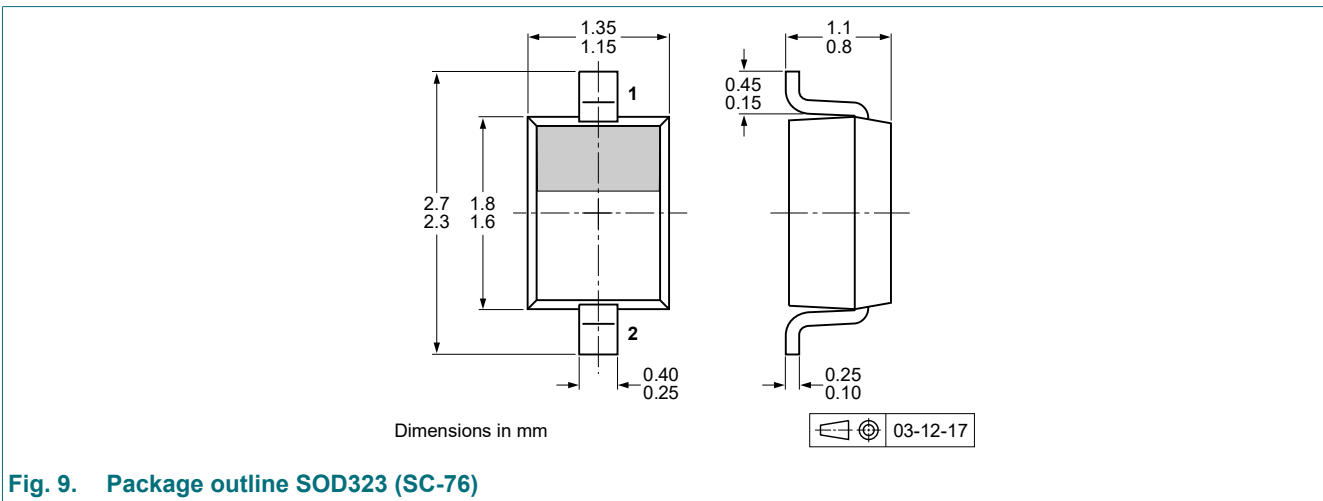


## 11. Test information

### 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



### 13. Soldering

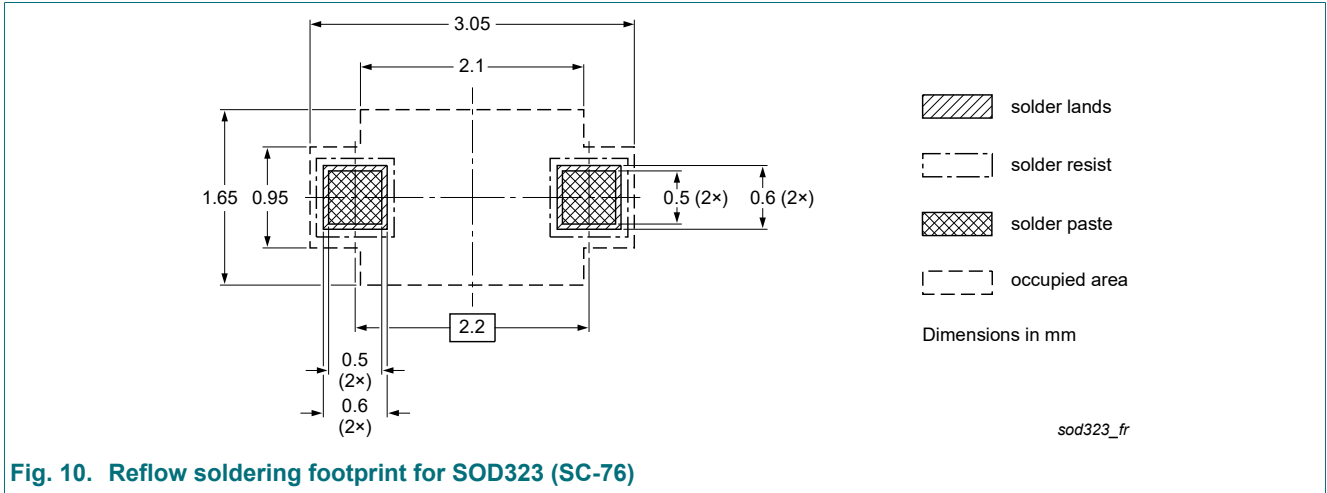


Fig. 10. Reflow soldering footprint for SOD323 (SC-76)

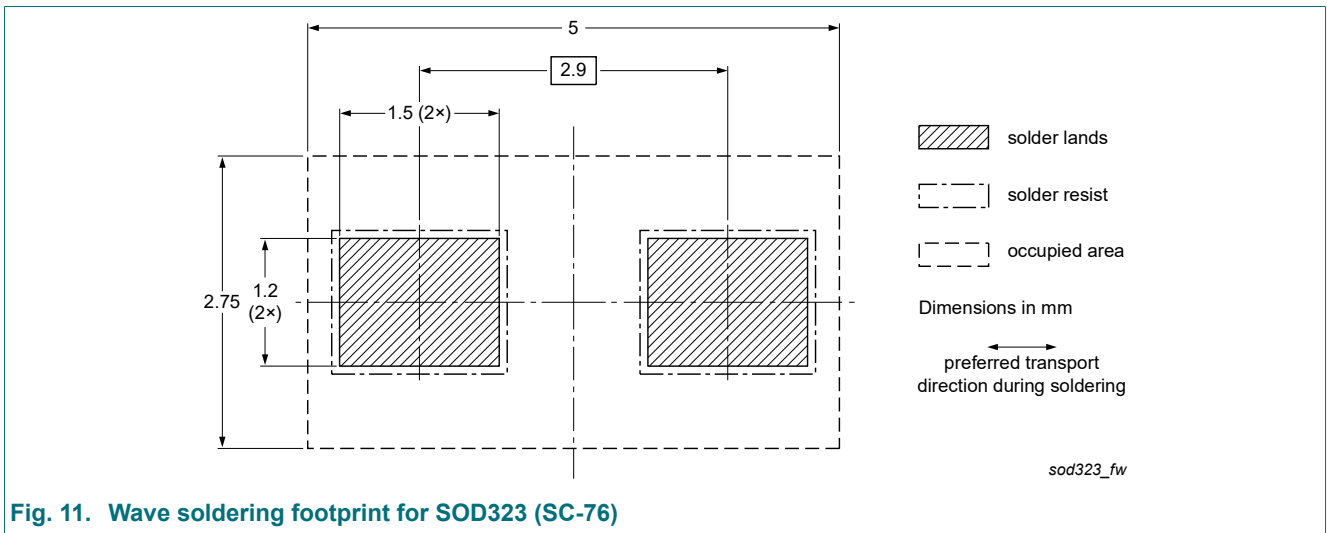


Fig. 11. Wave soldering footprint for SOD323 (SC-76)

## 14. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX38450-Q_SER v.4	20240716	Product data sheet	-	BZX38450-Q_SER v.3
Modifications:	• B and C selections up to 51 V added			
BZX38450-Q_SER v.3	20230118	Product data sheet	-	BZX38450-Q_SER v.2
BZX38450-Q_SER v.2	20210825	Product data sheet	-	BZX38450-Q_SER v.1
BZX38450-Q_SER v.1	20210427	Objective 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 16 July 2024

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