



# BZT52-Q series

## Voltage regulator diodes

Rev. 1 — 29 March 2023

Product data sheet

## 1. General description

General-purpose Zener diodes in an SOD123 small and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Total power dissipation:  $\leq 590$  mW
- Two tolerance series:  $\pm 2$  % and approximately  $\pm 5$  %
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- Low differential resistance
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 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	$I_F = 10$ mA	[1]	-	-	0.9	V
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	-	350	mW
			[3]	-	-	590	mW


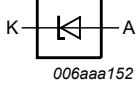
[1] Pulse test:  $t_p \leq 300$   $\mu$ s;  $\delta \leq 0.02$ .

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

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

## 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
BZT52-B2V4-Q to BZT52-C75-Q [1]	-	plastic surface-mounted package; 2 leads	SOD123

[1] The series consists of 74 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	Type number	Marking code	Type number	Marking code
BZT52-B2V4-Q	D7	BZT52-B15-Q	DS	BZT52-C2V4-Q	C1	BZT52-C15-Q	CL
BZT52-B2V7-Q	D8	BZT52-B16-Q	DT	BZT52-C2V7-Q	C2	BZT52-C16-Q	CM
BZT52-B3V0-Q	D9	BZT52-B18-Q	DU	BZT52-C3V0-Q	C3	BZT52-C18-Q	CN
BZT52-B3V3-Q	DA	BZT52-B20-Q	DV	BZT52-C3V3-Q	C4	BZT52-C20-Q	CP
BZT52-B3V6-Q	DB	BZT52-B22-Q	DW	BZT52-C3V6-Q	C5	BZT52-C22-Q	CQ
BZT52-B3V9-Q	DC	BZT52-B24-Q	DY	BZT52-C3V9-Q	C6	BZT52-C24-Q	CR
BZT52-B4V3-Q	DD	BZT52-B27-Q	E1	BZT52-C4V3-Q	C7	BZT52-C27-Q	CS
BZT52-B4V7-Q	DE	BZT52-B30-Q	E2	BZT52-C4V7-Q	C8	BZT52-C30-Q	CT
BZT52-B5V1-Q	DF	BZT52-B33-Q	E3	BZT52-C5V1-Q	C9	BZT52-C33-Q	CU
BZT52-B5V6-Q	DG	BZT52-B36-Q	E4	BZT52-C5V6-Q	CA	BZT52-C36-Q	CV
BZT52-B6V2-Q	DH	BZT52-B39-Q	E5	BZT52-C6V2-Q	CB	BZT52-C39-Q	CW
BZT52-B6V8-Q	DJ	BZT52-B43-Q	E6	BZT52-C6V8-Q	CC	BZT52-C43-Q	CY
BZT52-B7V5-Q	DK	BZT52-B47-Q	E7	BZT52-C7V5-Q	CD	BZT52-C47-Q	D1
BZT52-B8V2-Q	DL	BZT52-B51-Q	E8	BZT52-C8V2-Q	CE	BZT52-C51-Q	D2
BZT52-B9V1-Q	DN	BZT52-B56-Q	E9	BZT52-C9V1-Q	CF	BZT52-C56-Q	D3
BZT52-B10-Q	DM	BZT52-B62-Q	EA	BZT52-C10-Q	CG	BZT52-C62-Q	D4
BZT52-B11-Q	DP	BZT52-B68-Q	EB	BZT52-C11-Q	CH	BZT52-C68-Q	D5
BZT52-B12-Q	DQ	BZT52-B75-Q	EC	BZT52-C12-Q	CJ	BZT52-C75-Q	D6
BZT52-B13-Q	DR	-	-	BZT52-C13-Q	CK	-	-

## 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
$I_{ZSM}$	non-repetitive peak reverse current		-	see Tables 8, 9 and 10	
$P_{ZSM}$	non-repetitive peak reverse power dissipation		[1] -	40	W
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2] -	350	mW
			[3] -	590	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-55	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1]  $t_p = 100\ \mu\text{s}$ ; square wave;  $T_j = 25\text{ °C}$  prior to surge.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .

## 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] -	-	350	K/W
			[2] -	-	210	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3] -	-	55	K/W

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .

[3] Soldering point of cathode tab.

## 10. Characteristics

**Table 7. Characteristics**
 $T_j = 25\text{ °C}$  unless otherwise specified.

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

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

**Table 8. Characteristics per type; BZT52-B2V4-Q to BZT52-C24-Q**
 $T_j = 25\text{ °C}$  unless otherwise specified.

BZT52 -xxx-Q	Sel	Working voltage $V_Z$ (V); $I_Z = 5\text{ mA}$		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu\text{A}$ )		Temperature coefficient $S_Z$ (mV/K); $I_Z = 5\text{ mA}$		Diode capacitance $C_d$ (pF) [1]	Non-repetitive peak reverse current $I_{ZSM}$ (A) [2]
		Min	Max	$I_Z = 1\text{ mA}$	$I_Z = 5\text{ mA}$	Max	$V_R$ (V)	Min	Max	Max	Max
2V4	B	2.35	2.45	400	85	50	1	-3.5	0.0	450	6.0
	C	2.2	2.6								
2V7	B	2.65	2.75	500	83	20	1	-3.5	0.0	450	6.0
	C	2.5	2.9								
3V0	B	2.94	3.06	500	95	10	1	-3.5	0.0	450	6.0
	C	2.8	3.2								
3V3	B	3.23	3.37	500	95	5	1	-3.5	0.0	450	6.0
	C	3.1	3.5								
3V6	B	3.53	3.67	500	95	5	1	-3.5	0.0	450	6.0
	C	3.4	3.8								
3V9	B	3.82	3.98	500	95	3	1	-3.5	0.0	450	6.0
	C	3.7	4.1								
4V3	B	4.21	4.39	500	95	3	1	-3.5	0.0	450	6.0
	C	4.0	4.6								
4V7	B	4.61	4.79	500	78	3	2	-3.5	0.2	300	6.0
	C	4.4	5.0								
5V1	B	5.0	5.2	480	60	2	2	-2.7	1.2	300	6.0
	C	4.8	5.4								
5V6	B	5.49	5.71	400	40	1	2	-2.0	2.5	300	6.0
	C	5.2	6.0								
6V2	B	6.08	6.32	150	10	3	4	0.4	3.7	200	6.0
	C	5.8	6.6								
6V8	B	6.66	6.94	80	8	2	4	1.2	4.5	200	6.0
	C	6.4	7.2								
7V5	B	7.35	7.65	80	10	1	5	2.5	5.3	150	4.0
	C	7.0	7.9								
8V2	B	8.04	8.36	80	10	0.7	5	3.2	6.2	150	4.0
	C	7.7	8.7								
9V1	B	8.92	9.28	100	10	0.5	6	3.8	7.0	150	3.0
	C	8.5	9.6								

BZT52-xxx-Q	Sel	Working voltage $V_Z$ (V); $I_Z = 5$ mA		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K); $I_Z = 5$ mA		Diode capacitance $C_d$ (pF) [1]	Non-repetitive peak reverse current $I_{ZSM}$ (A) [2]
		Min	Max	$I_Z = 1$ mA	$I_Z = 5$ mA	Max	$V_R$ (V)	Min	Max	Max	Max
10	B	9.8	10.2	70	10	0.2	7	4.5	8.0	90	3.0
	C	9.4	10.6								
11	B	10.8	11.2	70	10	0.1	8	5.4	9.0	85	2.5
	C	10.4	11.6								
12	B	11.8	12.2	90	10	0.1	8	6.0	10.0	85	2.5
	C	11.4	12.7								
13	B	12.7	13.3	110	10	0.1	8	7.0	11.0	80	2.5
	C	12.4	14.1								
15	B	14.7	15.3	110	15	0.05	10.5	9.2	13.0	75	2.0
	C	13.8	15.6								
16	B	15.7	16.3	170	20	0.05	11.2	10.4	14.0	75	1.5
	C	15.3	17.1								
18	B	17.6	18.4	170	20	0.05	12.6	12.4	16.0	70	1.5
	C	16.8	19.1								
20	B	19.6	20.4	220	20	0.05	14	14.4	18.0	60	1.5
	C	18.8	21.2								
22	B	21.6	22.4	220	25	0.05	15.4	16.4	20.0	60	1.25
	C	20.8	23.3								
24	B	23.5	24.5	220	30	0.05	16.8	18.4	22.0	55	1.25
	C	22.8	25.6								

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

[2]  $t_p = 100$   $\mu$ s;  $T_{amb} = 25$  °C.

**Table 9. Characteristics per type; BZT52-B27-Q to BZT52-C51-Q**

$T_j = 25$  °C unless otherwise specified.

BZT52-xxx-Q	Sel	Working voltage $V_Z$ (V); $I_Z = 2$ mA		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K); $I_Z = 5$ mA		Diode capacitance $C_d$ (pF) [1]	Non-repetitive peak reverse current $I_{ZSM}$ (A) [2]
		Min	Max	$I_Z = 1$ mA	$I_Z = 5$ mA	Max	$V_R$ (V)	Min	Max	Max	Max
27	B	26.5	27.5	250	40	0.05	18.9	21.4	25.3	50	1.0
	C	25.1	28.9								
30	B	29.4	30.6	250	40	0.05	21	24.4	29.4	50	1.0
	C	28.0	32.0								
33	B	32.3	33.7	250	40	0.05	23.1	27.4	33.4	45	0.9
	C	31.0	35.0								
36	B	35.3	36.7	250	60	0.05	25.2	30.4	37.4	45	0.8
	C	34.0	38.0								
39	B	38.2	39.8	300	75	0.05	27.3	33.4	41.2	45	0.7
	C	37.0	41.0								
43	B	42.1	43.9	325	80	0.05	30.1	37.6	46.6	40	0.6
	C	40.0	46.0								

BZT52-xxx-Q	Sel	Working voltage $V_Z$ (V); $I_Z = 2$ mA		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K); $I_Z = 5$ mA		Diode capacitance $C_d$ (pF) [1]	Non-repetitive peak reverse current $I_{ZSM}$ (A) [2]
		Min	Max	$I_Z = 1$ mA	$I_Z = 5$ mA	Max	$V_R$ (V)	Min	Max	Max	Max
47	B	46.1	47.9	325	90	0.05	32.9	42.0	51.8	40	0.5
	C	44.0	50.0								
51	B	50.0	52.0	350	100	0.05	35.7	46.6	57.2	40	0.4
	C	48.0	54.0								

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

[2]  $t_p = 100$   $\mu$ s;  $T_{amb} = 25$   $^{\circ}$ C.

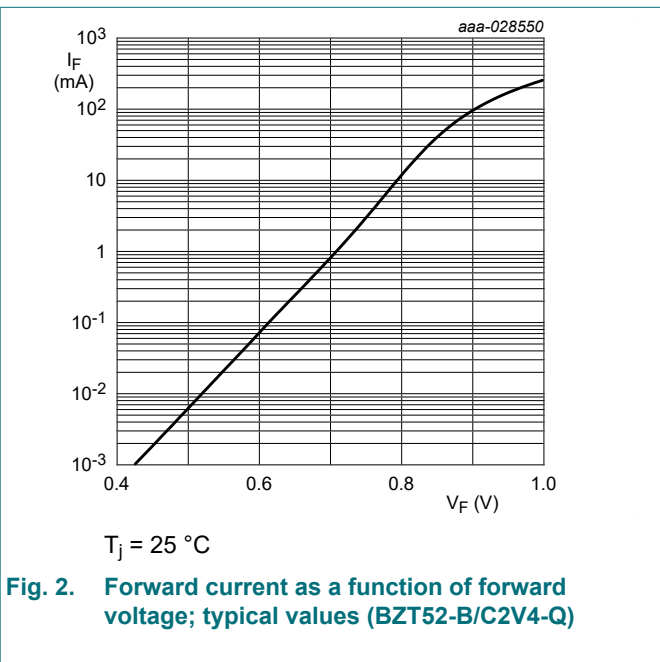
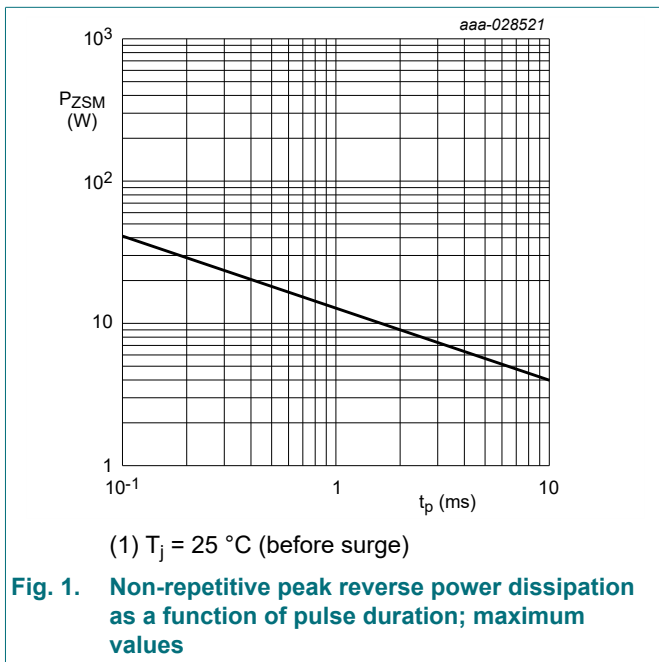
Table 10. Characteristics per type; BZT52-B56-Q to BZT52-C75-Q

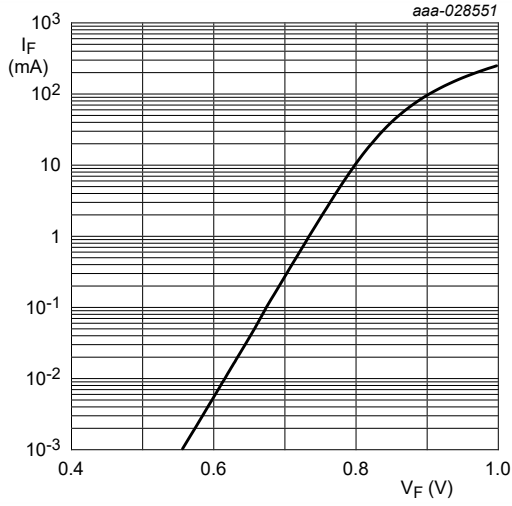
$T_j = 25$   $^{\circ}$ C unless otherwise specified.

BZT52-xxx-Q	Sel	Working voltage $V_Z$ (V); $I_Z = 2$ mA		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K); $I_Z = 5$ mA		Diode capacitance $C_d$ (pF) [1]	Non-repetitive peak reverse current $I_{ZSM}$ (A) [2]
		Min	Max	$I_Z = 0.5$ mA	$I_Z = 2$ mA	Max	$V_R$ (V)	Min	Max	Max	Max
56	B	54.9	57.1	375	120	0.05	39.2	52.2	63.8	40	0.3
	C	52.0	60.0								
62	B	60.8	63.2	400	140	0.05	43.4	58.8	71.6	35	0.3
	C	58.0	66.0								
68	B	66.6	69.4	400	160	0.05	47.6	65.6	79.8	35	0.25
	C	64.0	72.0								
75	B	73.5	76.5	400	175	0.05	52.5	73.4	88.6	35	0.20
	C	70.0	79.0								

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

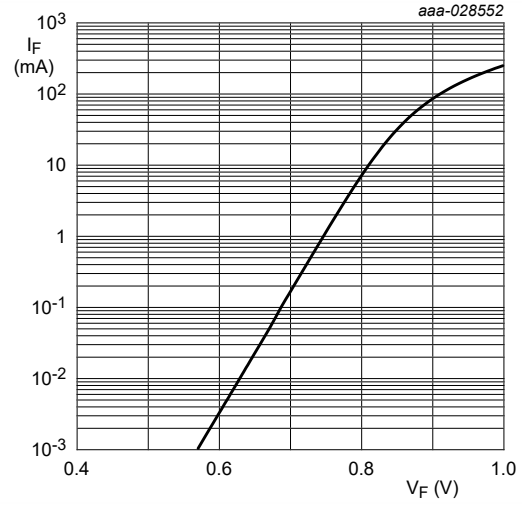
[2]  $t_p = 100$   $\mu$ s;  $T_{amb} = 25$   $^{\circ}$ C.





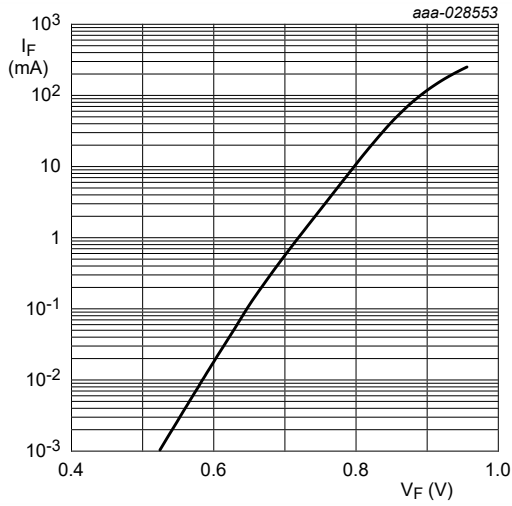
$T_j = 25\text{ }^\circ\text{C}$

**Fig. 3.** Forward current as a function of forward voltage; typical values (BZT52-B/C6V8-Q)



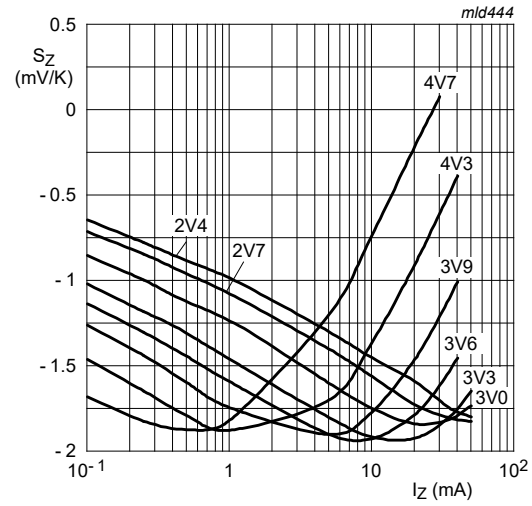
$T_j = 25\text{ }^\circ\text{C}$

**Fig. 4.** Forward current as a function of forward voltage; typical values (BZT52-B/C7V5-Q)



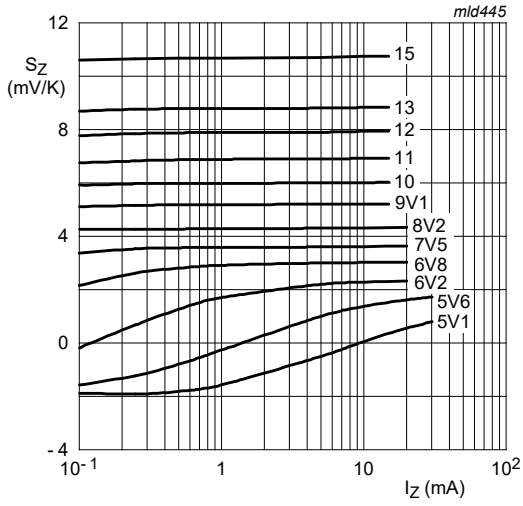
$T_j = 25\text{ }^\circ\text{C}$

**Fig. 5.** Forward current as a function of forward voltage; typical values (BZT52-B/C75-Q)



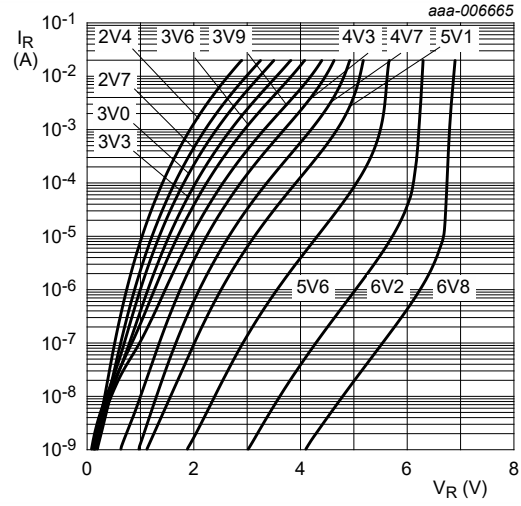
$T_j = 25\text{ }^\circ\text{C to } 150\text{ }^\circ\text{C}$

**Fig. 6.** Temperature coefficient as a function of working current; typical values (BZT52-B/C2V4-Q to B/C4V7-Q)



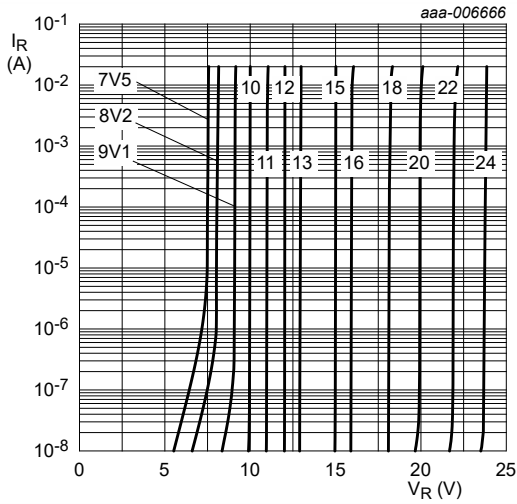
$T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$

**Fig. 7. Temperature coefficient as a function of working current; typical values (BZT52-B/C5V1-Q to B/C15-Q)**



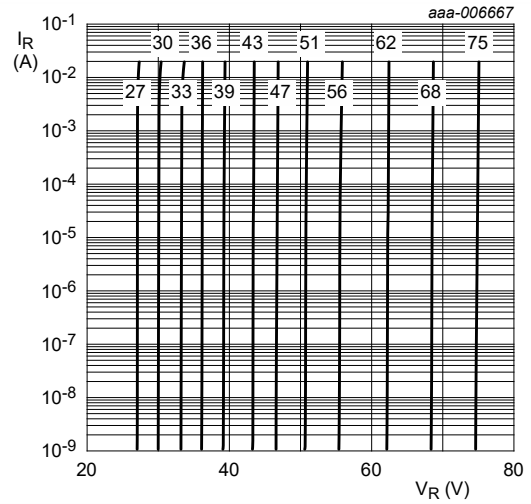
$T_j = 25\text{ }^\circ\text{C}$

**Fig. 8. Reverse current as a function of reverse voltage; typical values (BZT52-B/C2V4-Q to -B/C6V8-Q)**



$T_j = 25\text{ }^\circ\text{C}$

**Fig. 9. Reverse current as a function of reverse voltage; typical values (BZT52-B/C7V5-Q to B/C24-Q)**



$T_j = 25\text{ }^\circ\text{C}$

**Fig. 10. Reverse current as a function of reverse voltage; typical values (BZT52-B/C27-Q to -B/C75-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

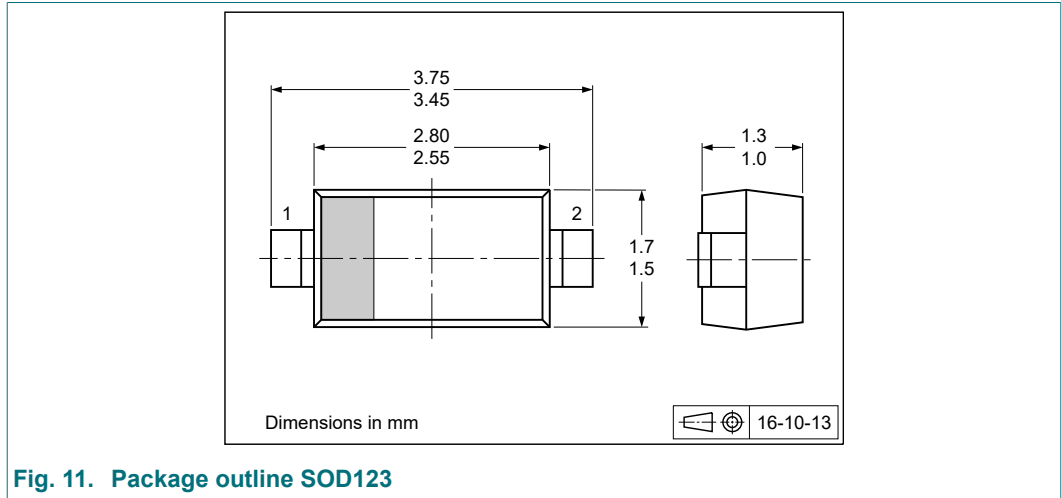
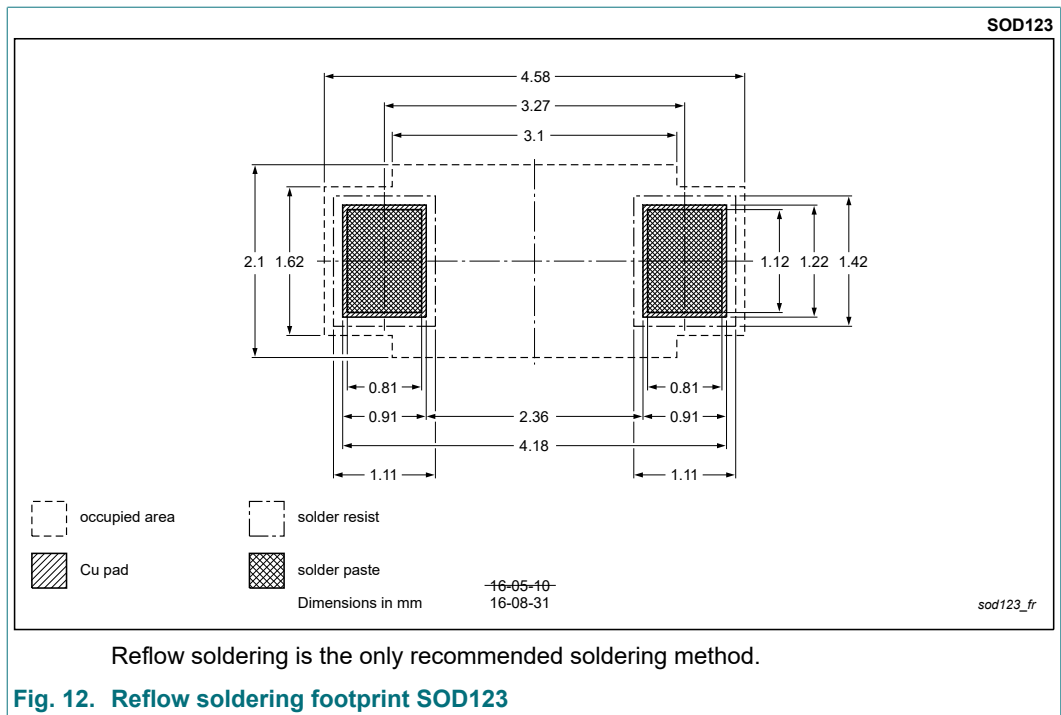


Fig. 11. Package outline SOD123

## 13. Soldering



Reflow soldering is the only recommended soldering method.

Fig. 12. Reflow soldering footprint SOD123

## 14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZT52-Q_SER v.1	2023mmdd	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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