



**THE DATASHEET OF  
BZT52-C33J**





# BZT52 series

Single Zener diodes in a SOD123 package

Rev. 1 — 16 March 2017

Product data sheet

## 1 Product profile

### 1.1 General description

General-purpose Zener diodes in a SOD123 small Surface-Mounted Device (SMD) plastic package.

### 1.2 Features and benefits

- Total power dissipation:  $\leq 590$  mW
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- Low differential resistance
- AEC-Q101 qualified

### 1.3 Applications

- General regulation functions

### 1.4 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


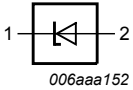
[1] Pulse test:  $t_p \leq 300$   $\mu$ s;  $\delta \leq 0.02$ .

[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>.

## 2 Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode <sup>[1]</sup>		
2	A	anode		

[1] The marking bar indicates the cathode.

## 3 Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZT52-C2V4 to BZT52-C75 <sup>[1]</sup>	-	plastic surface-mounted package; 2 leads	SOD123

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

## 4 Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code	Type number	Marking code	Type number	Marking code
BZT52-C2V4	C1	BZT52-C6V2	CB	BZT52-C16	CM	BZT52-C43	CY
BZT52-C2V7	C2	BZT52-C6V8	CC	BZT52-C18	CN	BZT52-C47	D1
BZT52-C3V0	C3	BZT52-C7V5	CD	BZT52-C20	CP	BZT52-C51	D2
BZT52-C3V3	C4	BZT52-C8V2	CE	BZT52-C22	CQ	BZT52-C56	D3
BZT52-C3V6	C5	BZT52-C9V1	CF	BZT52-C24	CR	BZT52-C62	D4
BZT52-C3V9	C6	BZT52-C10	CG	BZT52-C27	CS	BZT52-C68	D5
BZT52-C4V3	C7	BZT52-C11	CH	BZT52-C30	CT	BZT52-C75	D6
BZT52-C4V7	C8	BZT52-C12	CJ	BZT52-C33	CU	-	-
BZT52-C5V1	C9	BZT52-C13	CK	BZT52-C36	CV	-	-
BZT52-C5V6	CA	BZT52-C15	CL	BZT52-C39	CW	-	-

## 5 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 Table 8, 9 and 10	
$P_{ZSM}$	non-repetitive peak 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	
$T_{amb}$	ambient temperature		-55	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1]  $t_p = 100\text{ }\mu\text{s}$ ; 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  $1\text{ cm}^2$ .

## 6 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 Printed-Circuit Board (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.

## 7 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-C2V4 to BZT52-C24

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

BZT52-xxx	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) <sup>[1]</sup>	Non-repetitive peak reverse current $I_{ZSM}$ (A) <sup>[2]</sup>
		Min	Max	$I_Z = 1\text{ mA}$	$I_Z = 5\text{ mA}$	Max	$V_R$ (V)	Min	Max	Max	Max
2V4	C	2.2	2.6	400	85	50	1	-3.5	0.0	450	6.0
2V7	C	2.5	2.9	500	83	20	1	-3.5	0.0	450	6.0
3V0	C	2.8	3.2	500	95	10	1	-3.5	0.0	450	6.0
3V3	C	3.1	3.5	500	95	5	1	-3.5	0.0	450	6.0
3V6	C	3.4	3.8	500	95	5	1	-3.5	0.0	450	6.0
3V9	C	3.7	4.1	500	95	3	1	-3.5	0.0	450	6.0
4V3	C	4.0	4.6	500	95	3	1	-3.5	0.0	450	6.0
4V7	C	4.4	5.0	500	78	3	2	-3.5	0.2	300	6.0
5V1	C	4.8	5.4	480	60	2	2	-2.7	1.2	300	6.0
5V6	C	5.2	6.0	400	40	1	2	-2.0	2.5	300	6.0
6V2	C	5.8	6.6	150	10	3	4	0.4	3.7	200	6.0
6V8	C	6.4	7.2	80	8	2	4	1.2	4.5	200	6.0
7V5	C	7.0	7.9	80	10	1	5	2.5	5.3	150	4.0
8V2	C	7.7	8.7	80	10	0.7	5	3.2	6.2	150	4.0
9V1	C	8.5	9.6	100	10	0.5	6	3.8	7	150	3.0
10	C	9.4	10.6	70	10	0.2	7	4.5	8	90	3.0
11	C	10.4	11.6	70	10	0.1	8	5.4	9.0	85	2.5
12	C	11.4	12.7	90	10	0.1	8	6.0	10.0	85	2.5
13	C	12.4	14.1	110	10	0.1	8	7.0	11.0	80	2.5
15	C	13.8	15.6	110	15	0.05	10.5	9.2	13.0	75	2.0
16	C	15.3	17.1	170	20	0.05	11.2	10.4	14.0	75	1.5
18	C	16.8	19.1	170	20	0.05	12.6	12.4	16.0	70	1.5
20	C	18.8	21.2	220	20	0.05	14	14.4	18.0	60	1.5
22	C	20.8	23.3	220	25	0.05	15.4	16.4	20.0	60	1.25
24	C	22.8	25.6	220	30	0.05	16.8	18.4	22.0	55	1.25

[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$ .[2]  $t_p = 100\text{ }\mu\text{s}$ ;  $T_{amb} = 25\text{ °C}$ .

Table 9. Characteristics per type; BZT52-C27 to BZT52-C51

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

BZT52 -xxx	Sel	Working voltage $V_Z$ (V); $I_Z = 2\text{ mA}$		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) <sup>[1]</sup>	Non-repetitive peak reverse current $I_{ZSM}$ (A) <sup>[2]</sup>
		Min	Max	$I_Z = 1\text{ mA}$	$I_Z = 5\text{ mA}$	Max	$V_R$ (V)	Min	Max	Max	Max
27	C	25.1	28.9	250	40	0.05	18.9	21.4	25.3	50	1.0
30	C	28.0	32.0	250	40	0.05	21	24.4	29.4	50	1.0
33	C	31.0	35.0	250	40	0.05	23.1	27.4	33.4	45	0.9
36	C	34.0	38.0	250	60	0.05	25.2	30.4	37.4	45	0.8
39	C	37.0	41.0	300	75	0.05	27.3	33.4	41.2	45	0.7
43	C	40.0	46.0	325	80	0.05	30.1	37.6	46.6	40	0.6
47	C	44.0	50.0	325	90	0.05	32.9	42.0	51.8	40	0.5
51	C	48.0	54.0	350	100	0.05	35.7	46.6	57.2	40	0.4

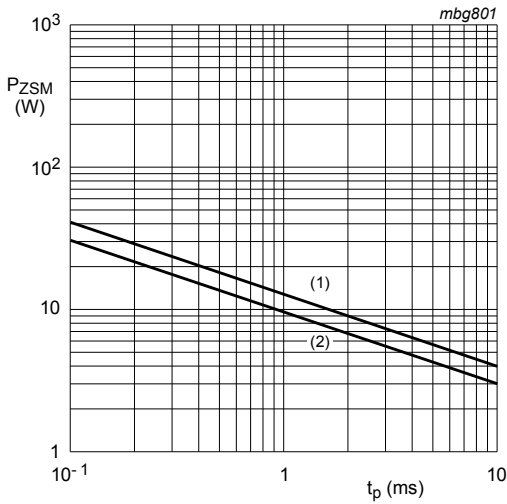
[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$ .[2]  $t_p = 100\text{ }\mu\text{s}$ ;  $T_{amb} = 25\text{ °C}$ .

Table 10. Characteristics per type; BZT52-C56 to BZT52-C75

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

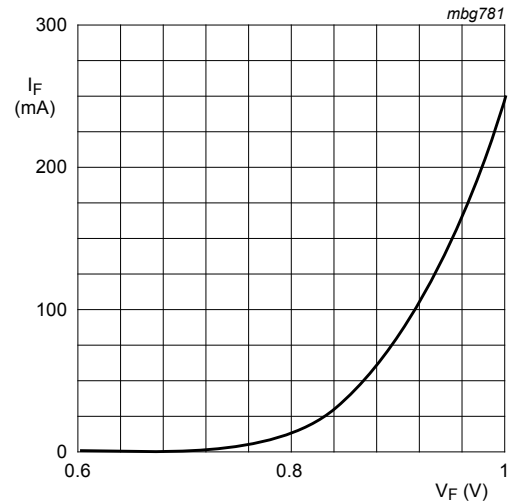
BZT52 -xxx	Sel	Working voltage $V_Z$ (V); $I_Z = 2\text{ mA}$		Maximum differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu\text{A}$ )		Temperature coefficient $S_Z$ (mV/K); $I_Z = 5\text{ mA}$		Diode capacitance $C_d$ (pF) <sup>[1]</sup>	Non-repetitive peak reverse current $I_{ZSM}$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

[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$ .[2]  $t_p = 100\text{ }\mu\text{s}$ ;  $T_{amb} = 25\text{ °C}$ .



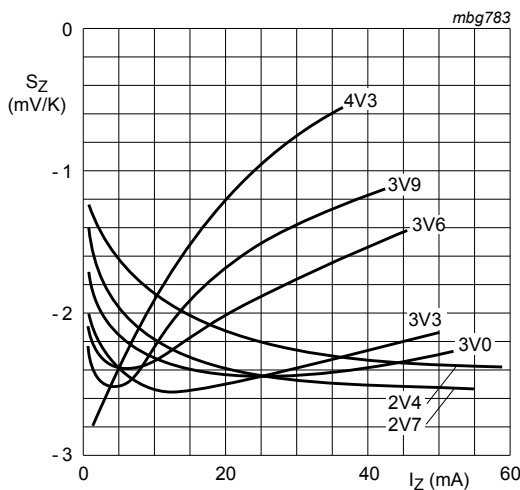
(1)  $T_j = 25\text{ °C}$  (prior to surge)  
 (2)  $T_j = 150\text{ °C}$  (prior to surge)

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



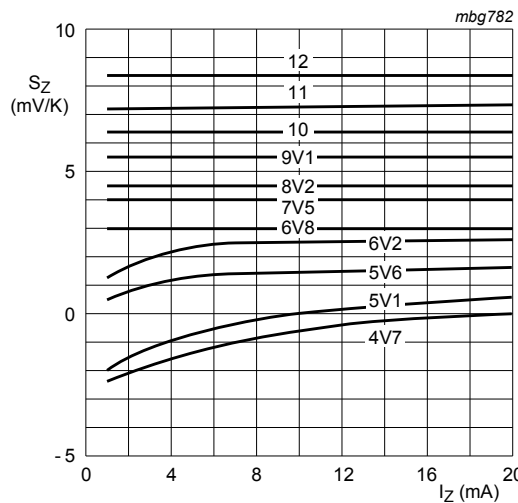
$T_j = 25\text{ °C}$

**Figure 2. Forward current as a function of forward voltage; typical values**



BZT52-C2V4 to BZT52-C4V3  
 $T_j = 25\text{ °C}$  to  $150\text{ °C}$

**Figure 3. Temperature coefficient as a function of working current; typical values**



BZT52-C4V7 to BZT52-C12  
 $T_j = 25\text{ °C}$  to  $150\text{ °C}$

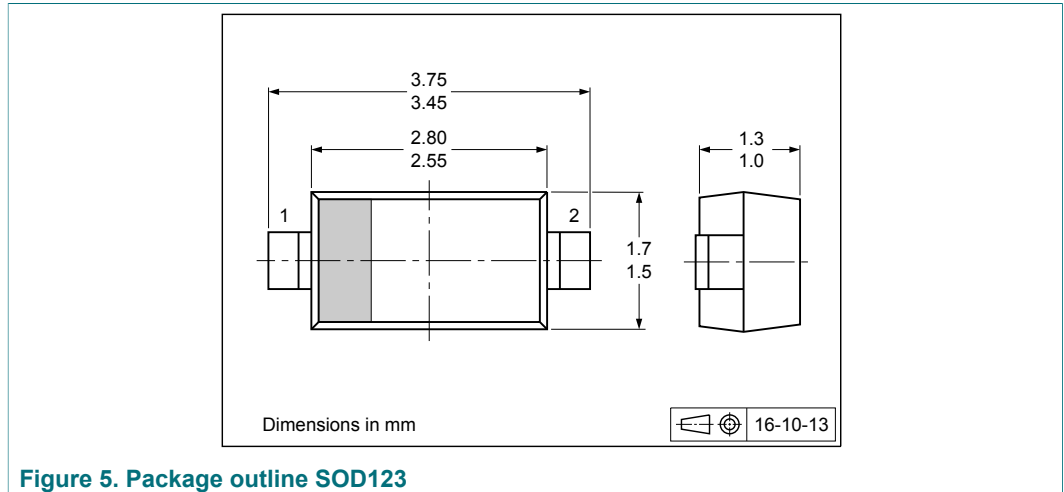
**Figure 4. Temperature coefficient as a function of working current; typical values**

## 8 Test information

### 8.1 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.

## 9 Package outline



## 10 Packing information

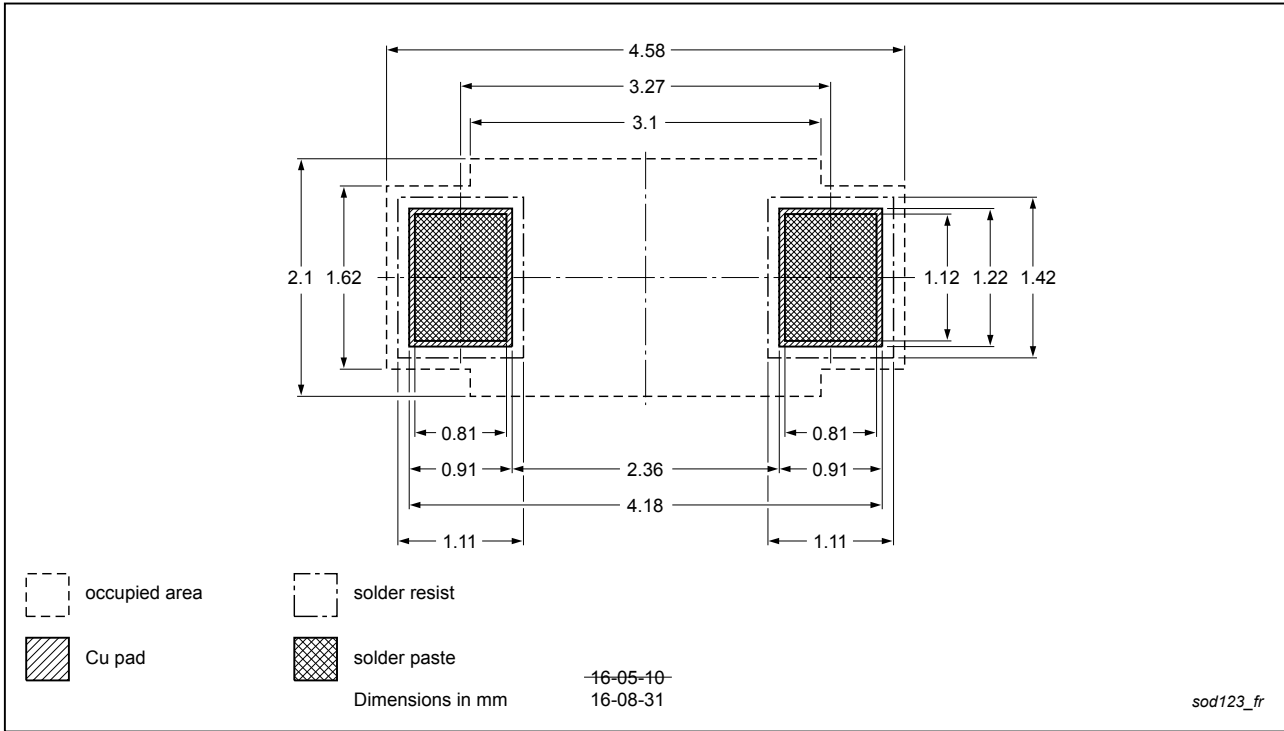
**Table 11. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.

Type number	Package	Description	Packing quantity	
			3000	10000
BZT52-C2V4 to BZT52-C75	SOD123	4 mm pitch, 8 mm tape and reel	-115	-118

**11 Soldering**

SOD123



Reflow soldering is the only recommended soldering method.  
 Dimensions in mm.

**Figure 6. Reflow soldering footprint SOD123**

## 12 Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZT52_SER v.1	20170316	Product data sheet	-	-

## 13 Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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