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: ≤ 590 mW
- Two tolerance series: ±2 % and approximately ±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

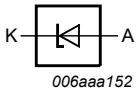
Table 1. Quick reference data

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} ≤ 25 °C	[2]	-	-	350	mW
			[3]	-	-	590	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.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

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.

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	$T_{amb} \leq 25$ °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 µs; square wave; T_j = 25 °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 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 cm^2.
[3] Soldering point of cathode tab.

10. Characteristics

Table 7. Characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	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. Characteristics per type; BZT52-B2V4-Q to BZT52-C24-Q

T_j = 25 °C unless otherwise specified.

BZT52 -xxx-Q	Sel	Working voltage V_Z (V); I_Z = 5 mA		Maximum differential resistance r_{dif} (Ω)		Reverse current I_R (µA)		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
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} (Ω)		Reverse current I_R (µA)		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 µs; 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} (Ω)		Reverse current I_R (µA)		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} (Ω)		Reverse current I_R (µA)		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								

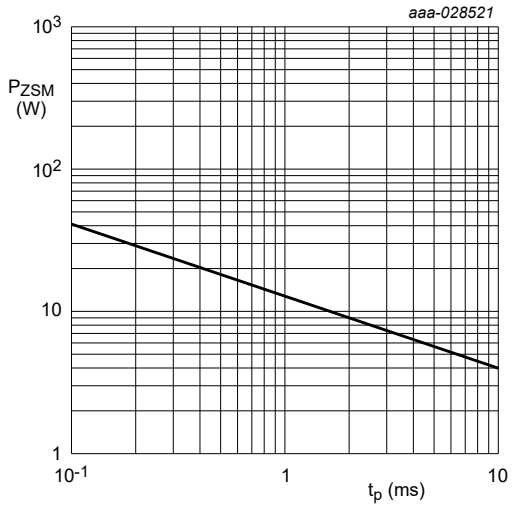
[1] f = 1 MHz; V_R = 0 V.
[2] t_p = 100 µs; T_{amb} = 25 °C.

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

T_j = 25 °C unless otherwise specified.

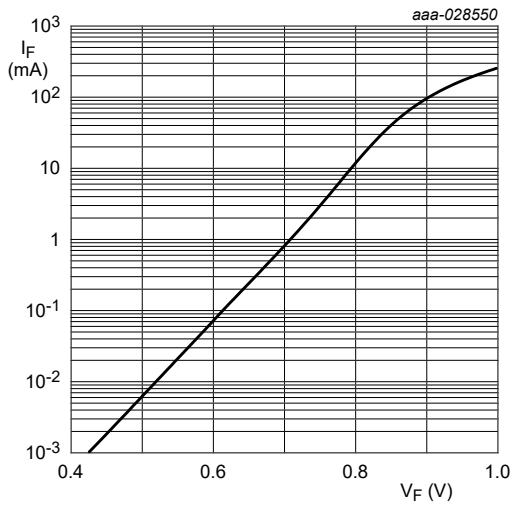
BZT52 -xxx-Q	Sel	Working voltage V_Z (V); I_Z = 2 mA		Maximum differential resistance r_{dif} (Ω)		Reverse current I_R (µA)		Temperature coefficient S_Z (mV/K); I_Z = 5 mA		Diode capacitance C_d (pF) [1]	Non-repetitive peak reverse current I_{ZSM} (A) [2]
		Min	Max	I_Z = 0.5 mA	I_Z = 2 mA	Max	V_R (V)	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 µs; T_{amb} = 25 °C.



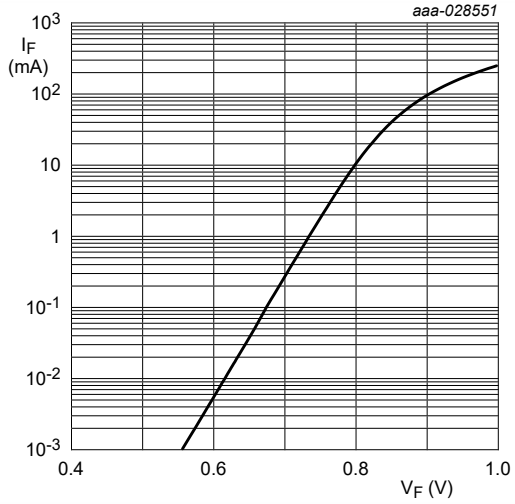
(1) T_j = 25 °C (before surge)

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



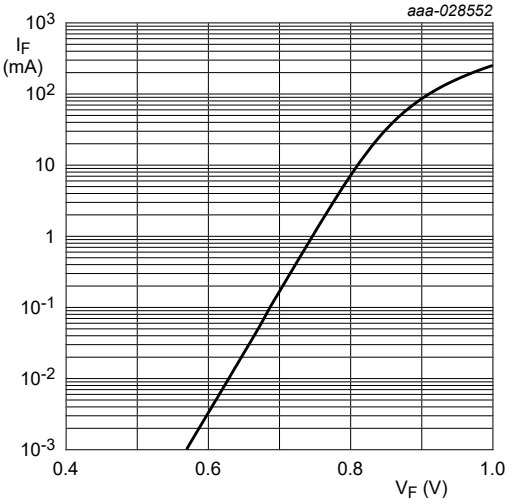
T_j = 25 °C

Fig. 2. Forward current as a function of forward voltage; typical values (BZT52-B/C2V4-Q)



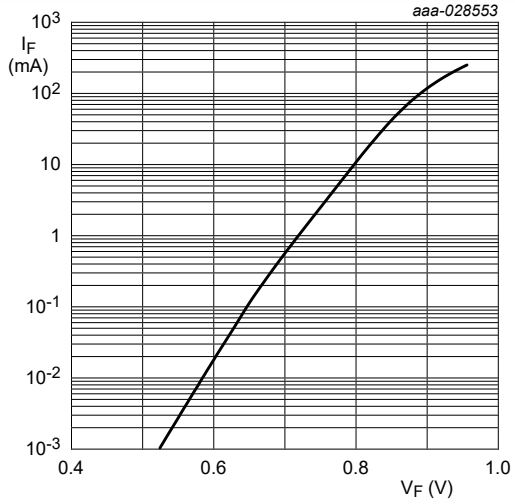
T_j = 25 °C

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



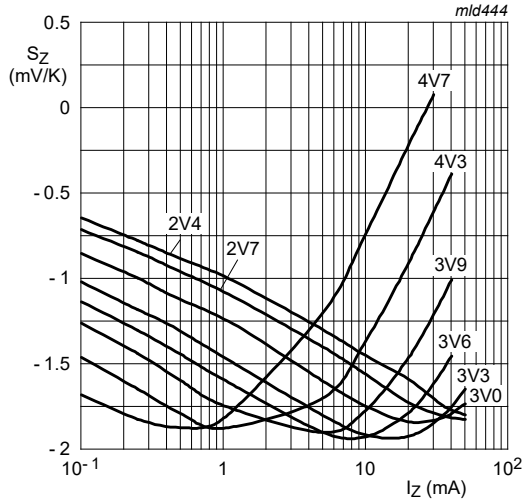
T_j = 25 °C

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



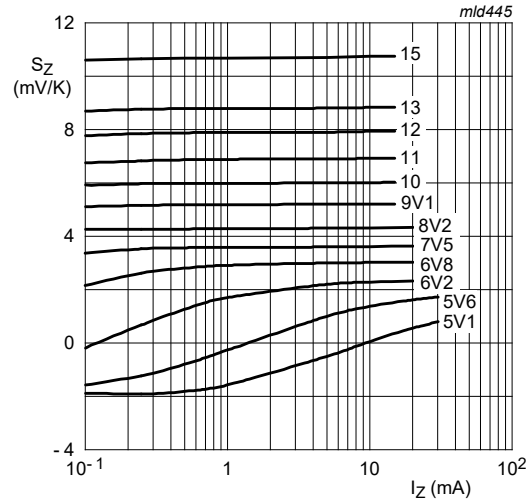
T_j = 25 °C

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



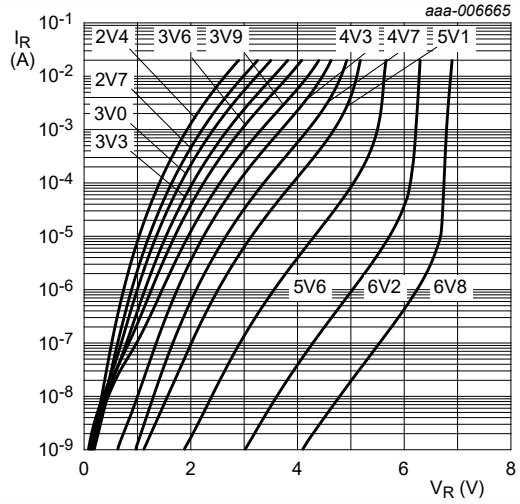
T_j = 25 °C to 150 °C

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



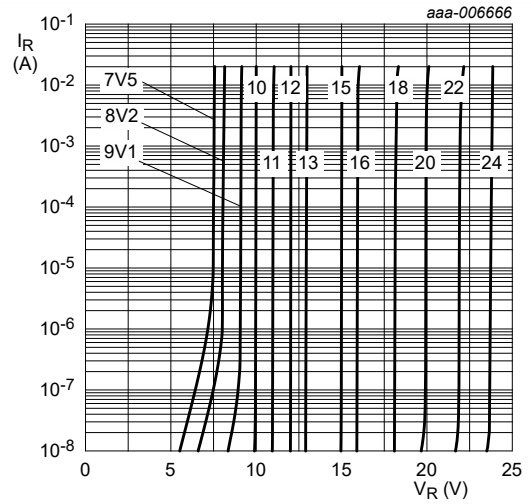
T_j = 25 °C to 150 °C

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



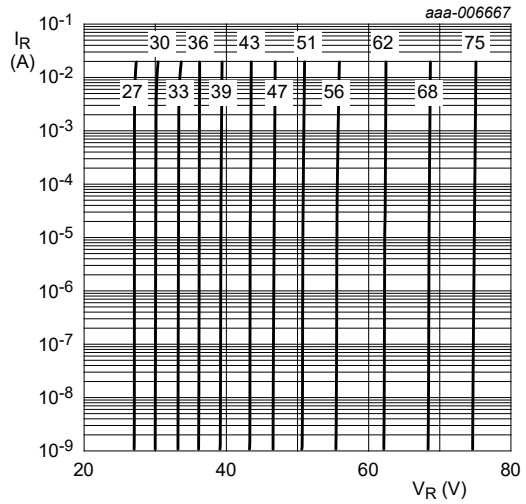
T_j = 25 °C

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



T_j = 25 °C

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



T_j = 25 °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

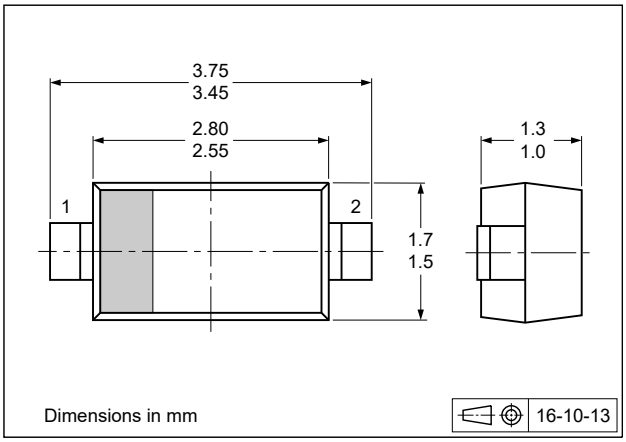
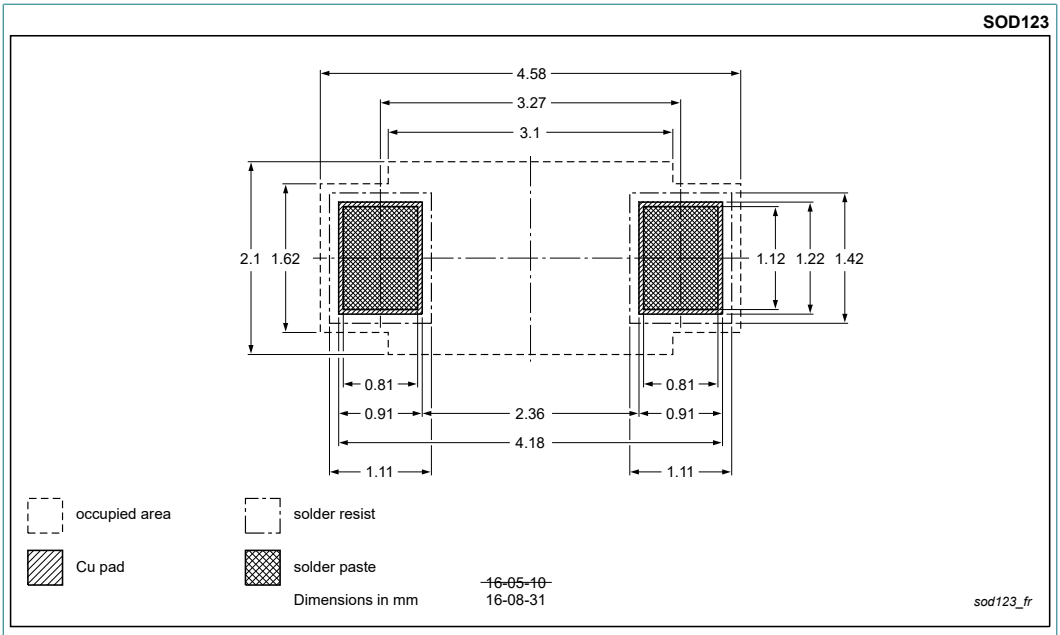


Fig. 11. Package outline SOD123

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".
[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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