



# BZT52H-Q series

## Voltage regulator diodes

Rev. 1 — 4 October 2021

Product data sheet

## 1. General description

General-purpose Zener diodes in an SOD123F small and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Total power dissipation:  $\leq 830$  mW
- Three tolerance series:  $\pm 1\%$ ,  $\pm 2\%$  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
- 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]	-	-	375	mW
			[3]	-	-	830	mW


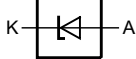
[1] Pulse test:  $t_p \leq 300$   $\mu$ s;  $\delta \leq 0.02$ .

[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
BZT52H-Q series[1]	-	plastic surface-mounted package; 2 leads	SOD123F

[1] The series consists of 111 types with 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V and  $\pm 1\%$ ,  $\pm 2\%$  and  $\pm 5\%$  tolerances.

## 7. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code	Type number	Marking code
BZT52H-A2V4-Q	FT	BZT52H-B2V4-Q	DC	BZT52H-C2V4-Q	B3
BZT52H-A2V7-Q	FU	BZT52H-B2V7-Q	DD	BZT52H-C2V7-Q	B4
BZT52H-A3V0-Q	FV	BZT52H-B3V0-Q	DE	BZT52H-C3V0-Q	B5
BZT52H-A3V3-Q	FW	BZT52H-B3V3-Q	DF	BZT52H-C3V3-Q	B6
BZT52H-A3V6-Q	FX	BZT52H-B3V6-Q	DG	BZT52H-C3V6-Q	B7
BZT52H-A3V9-Q	FY	BZT52H-B3V9-Q	DH	BZT52H-C3V9-Q	B8
BZT52H-A4V3-Q	FZ	BZT52H-B4V3-Q	DJ	BZT52H-C4V3-Q	B9
BZT52H-A4V7-Q	G1	BZT52H-B4V7-Q	DK	BZT52H-C4V7-Q	BA
BZT52H-A5V1-Q	G2	BZT52H-B5V1-Q	DL	BZT52H-C5V1-Q	BB
BZT52H-A5V6-Q	G3	BZT52H-B5V6-Q	DM	BZT52H-C5V6-Q	BC
BZT52H-A6V2-Q	G4	BZT52H-B6V2-Q	DN	BZT52H-C6V2-Q	BD
BZT52H-A6V8-Q	G5	BZT52H-B6V8-Q	DP	BZT52H-C6V8-Q	BE
BZT52H-A7V5-Q	G6	BZT52H-B7V5-Q	DQ	BZT52H-C7V5-Q	BF
BZT52H-A8V2-Q	G7	BZT52H-B8V2-Q	DR	BZT52H-C8V2-Q	BG
BZT52H-A9V1-Q	G8	BZT52H-B9V1-Q	DS	BZT52H-C9V1-Q	BH
BZT52H-A10-Q	G9	BZT52H-B10-Q	DT	BZT52H-C10-Q	BJ
BZT52H-A11-Q	GA	BZT52H-B11-Q	DU	BZT52H-C11-Q	BK
BZT52H-A12-Q	GB	BZT52H-B12-Q	DV	BZT52H-C12-Q	BL
BZT52H-A13-Q	GC	BZT52H-B13-Q	DW	BZT52H-C13-Q	BM
BZT52H-A15-Q	GD	BZT52H-B15-Q	DX	BZT52H-C15-Q	BN
BZT52H-A16-Q	GE	BZT52H-B16-Q	DY	BZT52H-C16-Q	BP
BZT52H-A18-Q	GF	BZT52H-B18-Q	DZ	BZT52H-C18-Q	BQ
BZT52H-A20-Q	GG	BZT52H-B20-Q	E1	BZT52H-C20-Q	BR
BZT52H-A22-Q	GH	BZT52H-B22-Q	E2	BZT52H-C22-Q	BS
BZT52H-A24-Q	GJ	BZT52H-B24-Q	E3	BZT52H-C24-Q	BT
BZT52H-A27-Q	GK	BZT52H-B27-Q	E4	BZT52H-C27-Q	BU
BZT52H-A30-Q	GL	BZT52H-B30-Q	E5	BZT52H-C30-Q	BV
BZT52H-A33-Q	GM	BZT52H-B33-Q	E6	BZT52H-C33-Q	BW
BZT52H-A36-Q	GN	BZT52H-B36-Q	E7	BZT52H-C36-Q	BX
BZT52H-A39-Q	GP	BZT52H-B39-Q	E8	BZT52H-C39-Q	BY
BZT52H-A43-Q	GY	BZT52H-B43-Q	E9	BZT52H-C43-Q	BZ
BZT52H-A47-Q	GR	BZT52H-B47-Q	EA	BZT52H-C47-Q	C1
BZT52H-A51-Q	GS	BZT52H-B51-Q	EB	BZT52H-C51-Q	C2
BZT52H-A56-Q	GT	BZT52H-B56-Q	EC	BZT52H-C56-Q	C3
BZT52H-A62-Q	GU	BZT52H-B62-Q	ED	BZT52H-C62-Q	C4
BZT52H-A68-Q	GV	BZT52H-B68-Q	EE	BZT52H-C68-Q	C5
BZT52H-A75-Q	GW	BZT52H-B75-Q	EF	BZT52H-C75-Q	C6

## 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		[1] -	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] -	375	mW
			[3] -	830	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-65	+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] -	-	330	K/W
			[2] -	-	150	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3] -	-	70	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:  $t_p \leq 300\ \mu\text{s}$ ;  $\delta \leq 0.02$ .

Table 8. Characteristics per type; BZT52H-A2V4-Q to BZT52H-C24-Q

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

BZT52H -xxx	Sel	Working voltage $V_Z$ (V) $I_Z = 5\text{ mA}$		Maximum differential resistance $r_{\text{dif}}$ ( $\Omega$ )		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-Q	A	2.37	2.43	400	85	50	1	-3.5	0.0	450	6.0
	B	2.35	2.45								
	C	2.20	2.60								
2V7-Q	A	2.67	2.73	500	83	20	1	-3.5	0.0	450	6.0
	B	2.65	2.75								
	C	2.50	2.90								
3V0-Q	A	2.97	3.03	500	95	10	1	-3.5	0.0	450	6.0
	B	2.94	3.06								
	C	2.80	3.20								
3V3-Q	A	3.26	3.34	500	95	5	1	-3.5	0.0	450	6.0
	B	3.23	3.37								
	C	3.10	3.50								
3V6-Q	A	3.56	3.64	500	95	5	1	-3.5	0.0	450	6.0
	B	3.53	3.67								
	C	3.40	3.80								
3V9-Q	A	3.86	3.94	500	95	3	1	-3.5	0.0	450	6.0
	B	3.82	3.98								
	C	3.70	4.10								
4V3-Q	A	4.25	4.35	500	95	3	1	-3.5	0.0	450	6.0
	B	4.21	4.39								
	C	4.00	4.60								
4V7-Q	A	4.65	4.75	500	78	3	2	-3.5	0.2	300	6.0
	B	4.61	4.79								
	C	4.40	5.00								
5V1-Q	A	5.04	5.16	480	60	2	2	-2.7	1.2	300	6.0
	B	5.00	5.20								
	C	4.80	5.40								
5V6-Q	A	5.54	5.66	400	40	1	2	-2.0	2.5	300	6.0
	B	5.49	5.71								
	C	5.20	6.00								
6V2-Q	A	6.13	6.27	150	10	3	4	0.4	3.7	200	6.0
	B	6.08	6.32								
	C	5.80	6.60								
6V8-Q	A	6.73	6.87	80	8	2	4	1.2	4.5	200	6.0
	B	6.66	6.94								
	C	6.40	7.20								
7V5-Q	A	7.42	7.58	80	10	1	5	2.5	5.3	150	4.0
	B	7.35	7.65								
	C	7.00	7.90								

BZT52H -xxx	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
8V2-Q	A	8.11	8.29	80	10	0.7	5	3.2	6.2	150	4.0
	B	8.04	8.36								
	C	7.70	8.70								
9V1-Q	A	9.00	9.20	100	10	0.5	6	3.8	7.0	150	3.0
	B	8.92	9.28								
	C	8.50	9.60								
10-Q	A	9.90	10.10	70	10	0.2	7	4.5	8.0	90	3.0
	B	9.80	10.20								
	C	9.40	10.60								
11-Q	A	10.89	11.11	70	10	0.1	8	5.4	9.0	85	2.5
	B	10.80	11.20								
	C	10.40	11.60								
12-Q	A	11.88	12.12	90	10	0.1	8	6.0	10.0	85	2.5
	B	11.80	12.20								
	C	11.40	12.70								
13-Q	A	12.87	13.13	110	10	0.1	8	7.0	11.0	80	2.5
	B	12.70	13.30								
	C	12.40	14.10								
15-Q	A	14.85	15.15	110	15	0.05	10.5	9.2	13.0	75	2.0
	B	14.70	15.30								
	C	13.80	15.60								
16-Q	A	15.84	16.16	170	20	0.05	11.2	10.4	14.0	75	1.5
	B	15.70	16.30								
	C	15.30	17.10								
18-Q	A	17.82	18.18	170	20	0.05	12.6	12.4	16.0	70	1.5
	B	17.60	18.40								
	C	16.80	19.10								
20-Q	A	19.80	20.20	220	20	0.05	14	14.4	18.0	60	1.5
	B	19.60	20.40								
	C	18.80	21.20								
22-Q	A	21.78	22.22	220	25	0.05	15.4	16.4	20.0	60	1.25
	B	21.60	22.40								
	C	20.80	23.30								
24-Q	A	23.76	24.24	220	30	0.05	16.8	18.4	22.0	55	1.25
	B	23.50	24.50								
	C	22.80	25.60								

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

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

Table 9. Characteristics per type; BZT52H-A27-Q to BZT52H-C51-Q

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

BZT52H-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) $I_Z = 2\text{ mA}$		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
27-Q	A	26.73	27.27	250	40	0.05	18.9	21.4	25.3	50	1.0
	B	26.50	27.50								
	C	25.10	28.90								
30-Q	A	29.70	30.30	250	40	0.05	21	24.4	29.4	50	1.0
	B	29.40	30.60								
	C	28.00	32.00								
33-Q	A	32.67	33.33	250	40	0.05	23.1	27.4	33.4	45	0.9
	B	32.30	33.70								
	C	31.00	35.00								
36-Q	A	35.64	36.36	250	60	0.05	25.2	30.4	37.4	45	0.8
	B	35.30	36.70								
	C	34.00	38.00								
39-Q	A	38.61	39.39	300	75	0.05	27.3	33.4	41.2	45	0.7
	B	38.20	39.80								
	C	37.00	41.00								
43-Q	A	42.57	43.43	325	80	0.05	30.1	37.6	46.6	40	0.6
	B	42.10	43.90								
	C	40.00	46.00								
47-Q	A	46.53	47.47	325	90	0.05	32.9	42.0	51.8	40	0.5
	B	46.10	47.90								
	C	44.00	50.00								
51-Q	A	50.49	51.51	350	100	0.05	35.7	46.6	57.2	40	0.4
	B	50.00	52.00								
	C	48.00	54.00								

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

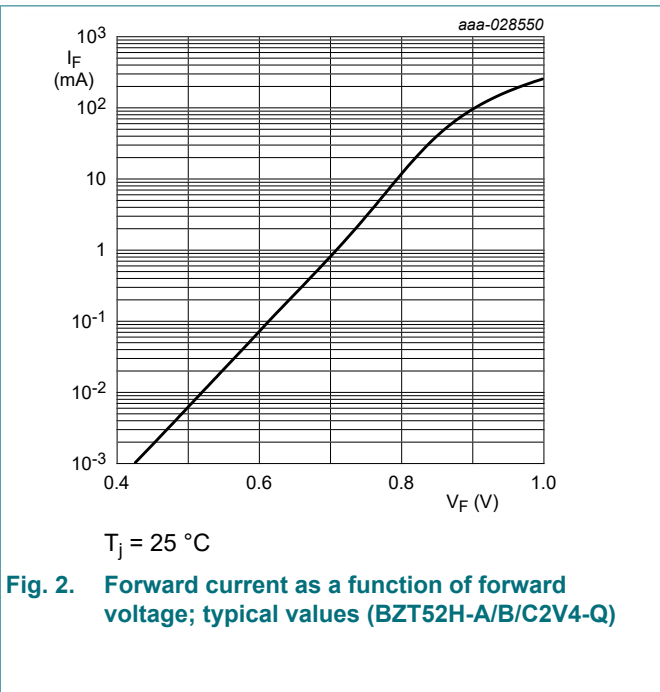
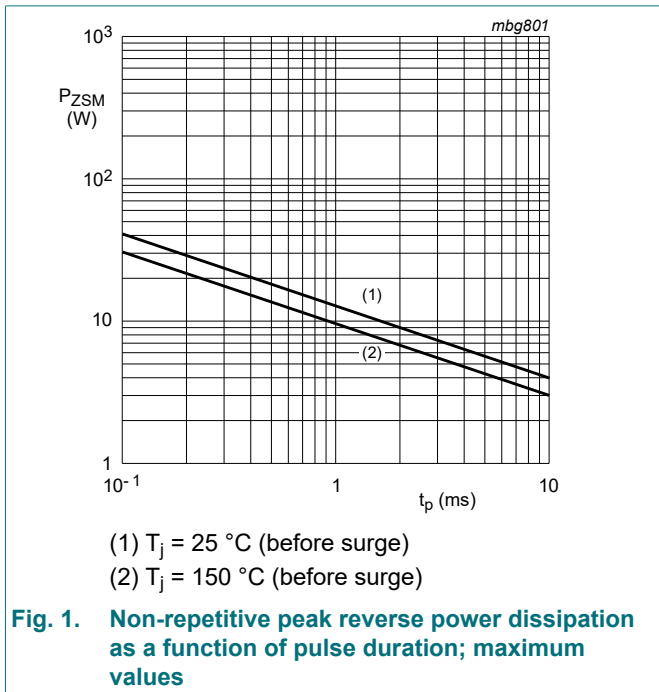
Table 10. Characteristics per type; BZT52H-A56-Q to BZT52H-C75-Q

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

BZT52H-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) $I_Z = 2\text{ mA}$		Diode capacitance $C_d$ (pF) [1]	Non-repetitive peak reverse current $I_{ZSM}$ (A) [2]
		Min	Max	$I_Z = 0.5\text{ mA}$	$I_Z = 2\text{ mA}$	Max	$V_R$ (V)	Min	Max	Max	Max
56-Q	A	55.44	56.56	375	120	0.05	39.2	52.2	63.8	40	0.3
	B	54.90	57.10								
	C	52.00	60.00								
62-Q	A	61.38	62.62	400	140	0.05	43.4	58.8	71.6	35	0.3
	B	60.80	63.20								
	C	58.00	66.00								
68-Q	A	67.32	68.68	400	160	0.05	47.6	65.6	79.8	35	0.25
	B	66.60	69.40								
	C	64.00	72.00								
75-Q	A	74.25	75.75	400	175	0.05	52.5	73.4	88.6	35	0.20
	B	73.50	76.50								
	C	70.00	79.00								

[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$

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





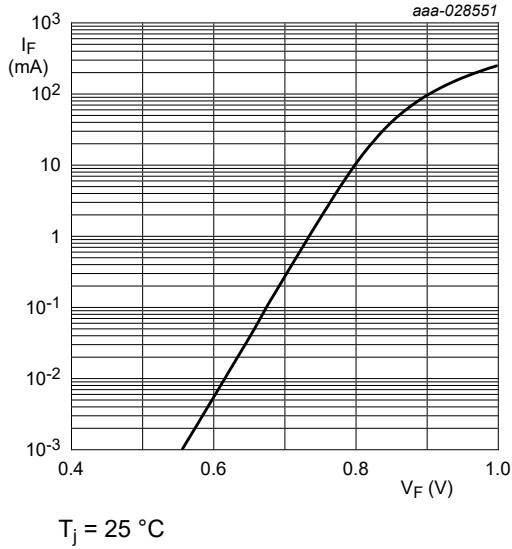


Fig. 3. Forward current as a function of forward voltage; typical values (BZT52H-A/B/C6V8-Q)

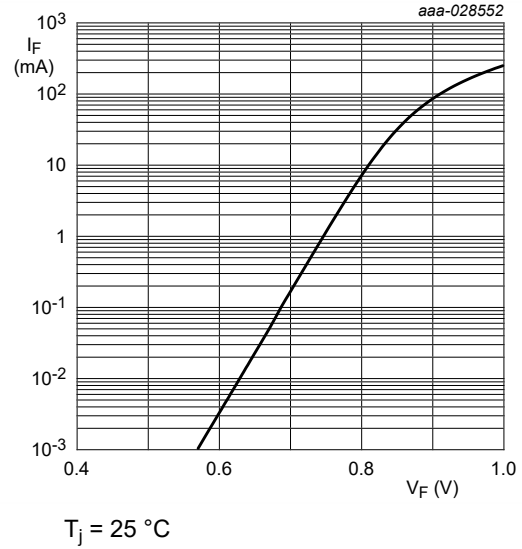


Fig. 4. Forward current as a function of forward voltage; typical values (BZT52H-A/B/C7V5-Q)

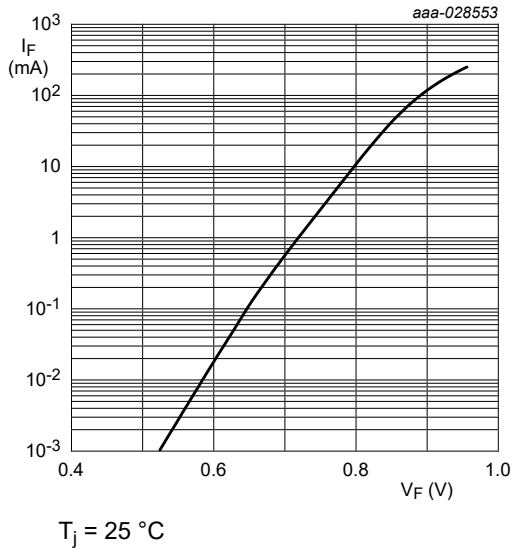


Fig. 5. Forward current as a function of forward voltage; typical values (BZT52H-A/B/C75-Q)

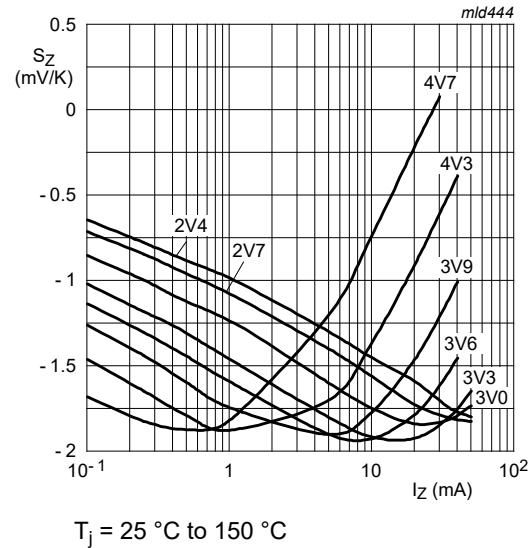
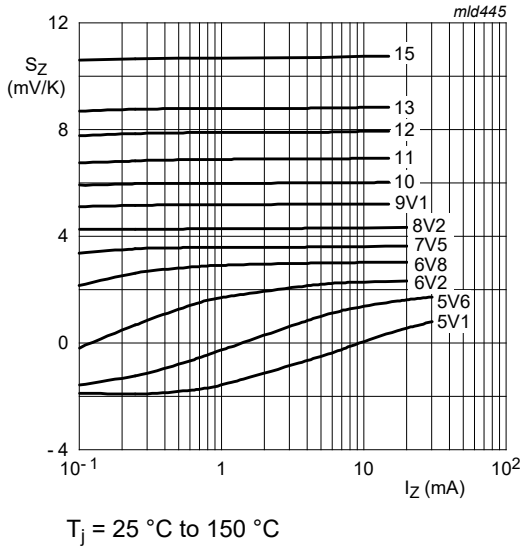
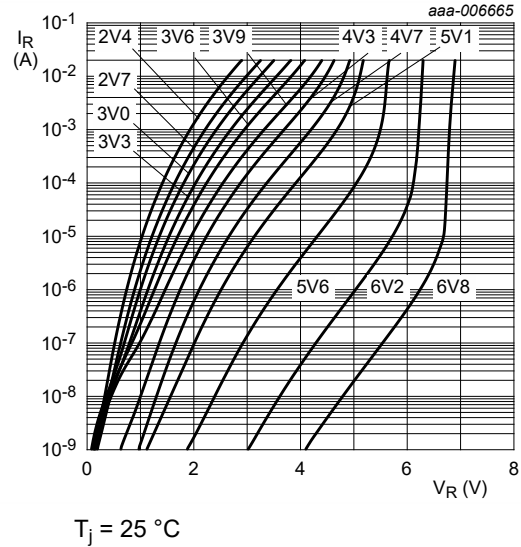


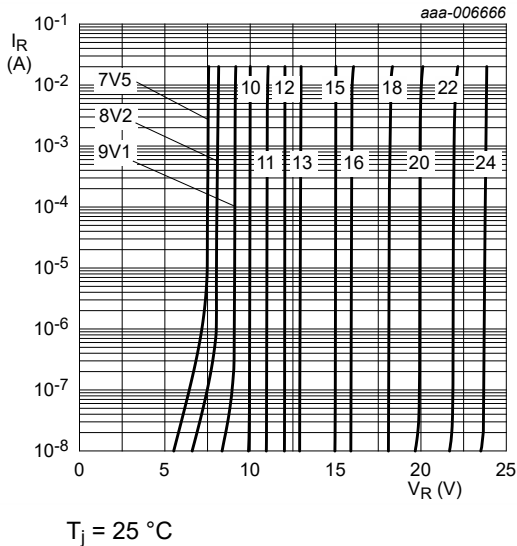
Fig. 6. Temperature coefficient as a function of working current; typical values (BZT52H-A/B/C2V4-Q to BZT52H-A/B/C4V7-Q)



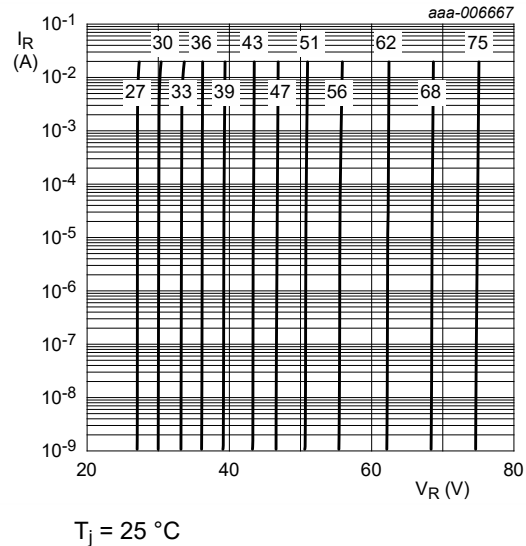
**Fig. 7. Temperature coefficient as a function of working current; typical values (BZT52H-A/B/C5V1-Q to BZT52H-A/B/C15-Q)**



**Fig. 8. Reverse current as a function of reverse voltage; typical values (BZT52H-A/B/C2V4-Q to BZT52H-A/B/C6V8-Q)**



**Fig. 9. Reverse current as a function of reverse voltage; typical values (BZT52H-A/B/C7V5-Q to BZT52H-A/B/C24-Q)**



**Fig. 10. Reverse current as a function of reverse voltage; typical values (BZT52H-A/B/C27-Q to BZT52H-A/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

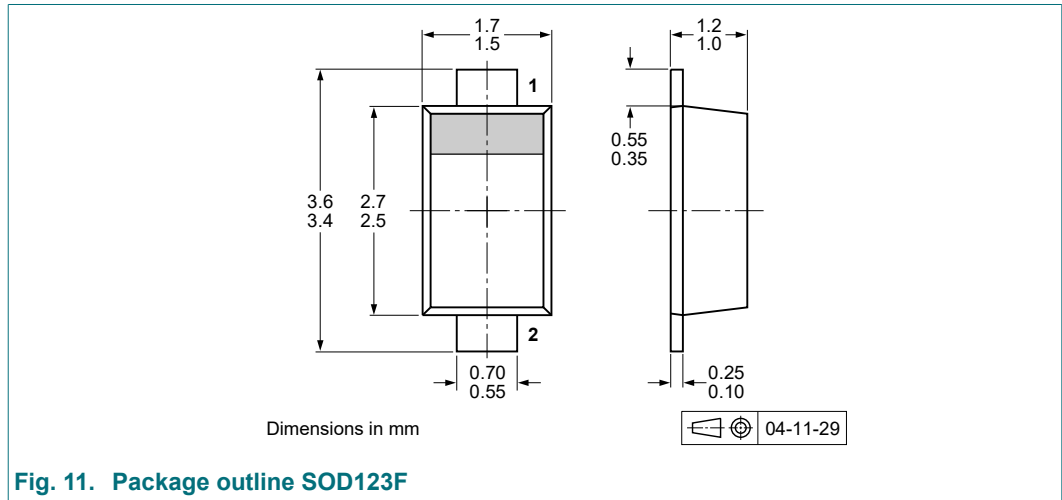


Fig. 11. Package outline SOD123F

## 13. Soldering

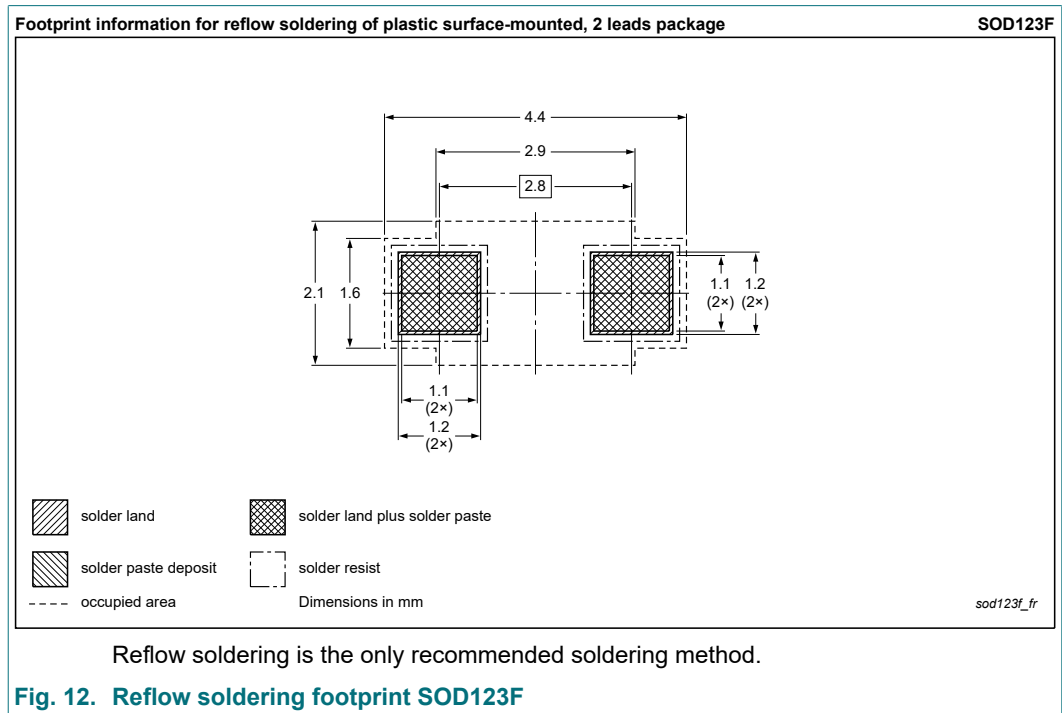


Fig. 12. Reflow soldering footprint SOD123F

## 14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZT52H-Q_SER v.1	20211004	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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