BZT52H series

Voltage regulator diodes

Rev. 6 — 7 February 2022 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: ≤ 830 mW
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- AEC-Q101 qualified

3. Applications

- General regulation functions

4. Quick reference data

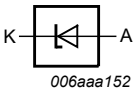
Table 1. Quick reference data

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]	-	-	375	mW
			[3]	-	-	830	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	Description		Simplified outline	Graphic symbol
1	cathode	[1]		
2	anode			

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZT52H-B2V4 to BZT52H-C75 [1]	-	plastic surface-mounted package; 2 leads	SOD123F

[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
BZT52H-B2V4	DC	BZT52H-B15	DX	BZT52H-C2V4	B3	BZT52H-C15	BN
BZT52H-B2V7	DD	BZT52H-B16	DY	BZT52H-C2V7	B4	BZT52H-C16	BP
BZT52H-B3V0	DE	BZT52H-B18	DZ	BZT52H-C3V0	B5	BZT52H-C18	BQ
BZT52H-B3V3	DF	BZT52H-B20	E1	BZT52H-C3V3	B6	BZT52H-C20	BR
BZT52H-B3V6	DG	BZT52H-B22	E2	BZT52H-C3V6	B7	BZT52H-C22	BS
BZT52H-B3V9	DH	BZT52H-B24	E3	BZT52H-C3V9	B8	BZT52H-C24	BT
BZT52H-B4V3	DJ	BZT52H-B27	E4	BZT52H-C4V3	B9	BZT52H-C27	BU
BZT52H-B4V7	DK	BZT52H-B30	E5	BZT52H-C4V7	BA	BZT52H-C30	BV
BZT52H-B5V1	DL	BZT52H-B33	E6	BZT52H-C5V1	BB	BZT52H-C33	BW
BZT52H-B5V6	DM	BZT52H-B36	E7	BZT52H-C5V6	BC	BZT52H-C36	BX
BZT52H-B6V2	DN	BZT52H-B39	E8	BZT52H-C6V2	BD	BZT52H-C39	BY
BZT52H-B6V8	DP	BZT52H-B43	E9	BZT52H-C6V8	BE	BZT52H-C43	BZ
BZT52H-B7V5	DQ	BZT52H-B47	EA	BZT52H-C7V5	BF	BZT52H-C47	C1
BZT52H-B8V2	DR	BZT52H-B51	EB	BZT52H-C8V2	BG	BZT52H-C51	C2
BZT52H-B9V1	DS	BZT52H-B56	EC	BZT52H-C9V1	BH	BZT52H-C56	C3
BZT52H-B10	DT	BZT52H-B62	ED	BZT52H-C10	BJ	BZT52H-C62	C4
BZT52H-B11	DU	BZT52H-B68	EE	BZT52H-C11	BK	BZT52H-C68	C5
BZT52H-B12	DV	BZT52H-B75	EF	BZT52H-C12	BL	BZT52H-C75	C6
BZT52H-B13	DW	-	-	BZT52H-C13	BM	-	-

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 Table 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]	-	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 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]	-	-	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 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; BZT52H-B2V4 to BZT52H-C24

T_j = 25 °C unless otherwise specified.

BZT52H -xxx	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								

BZT52H -xxx	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; BZT52H-B27 to BZT52H-C51

T_j = 25 °C unless otherwise specified.

BZT52H -xxx	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 = 2 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								

BZT52H -xxx	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 = 2 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								

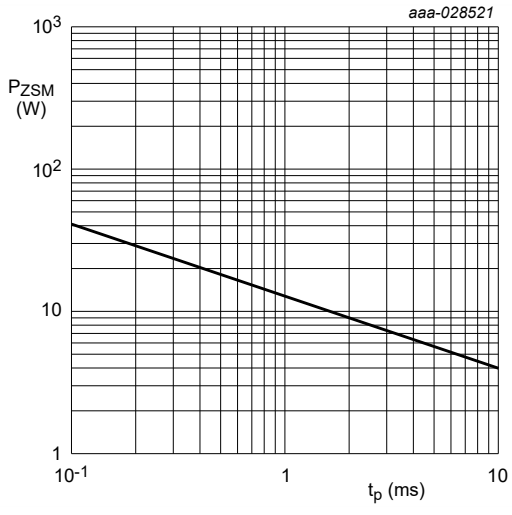
[1] f = 1 MHz; V_R = 0 V.
[2] t_p = 100 μs; T_{amb} = 25 °C.

Table 10. Characteristics per type; BZT52H-B56 to BZT52H-C75

T_j = 25 °C unless otherwise specified.

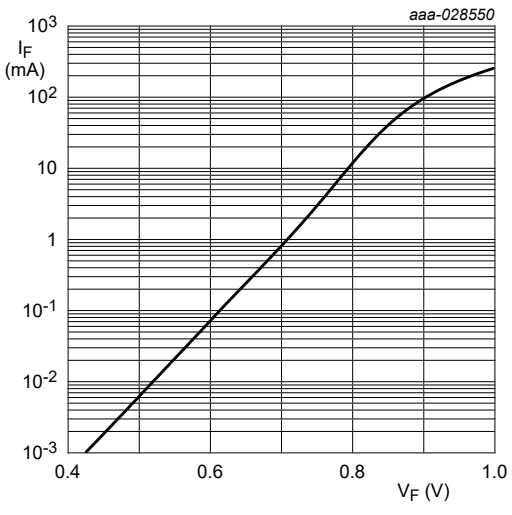
BZT52H -xxx	Sel	Working voltage V_Z (V); I_Z = 2 mA		Maximum differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K); I_Z = 2 mA		Diode capacitance C_d (pF) [1]	Non-repetitive peak reverse current I_{ZSM} (A) [2]
		Min	Max	I_Z = 0.5 mA	I_Z = 2 mA	Max	V_R (V)	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.



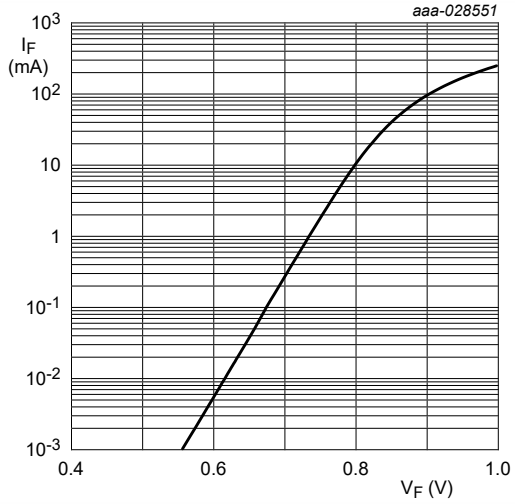
(1) T_j = 25 °C (before surge)

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



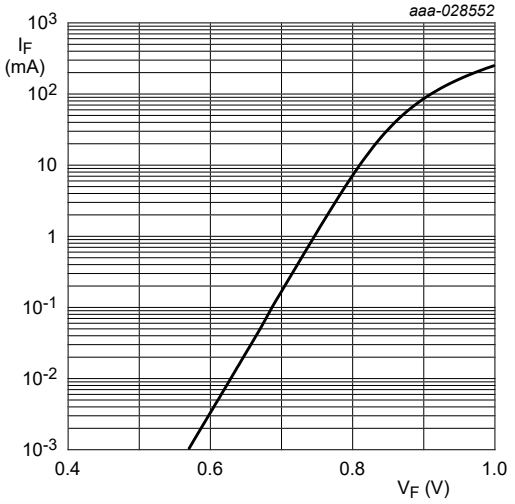
T_j = 25 °C

Fig. 2. Forward current as a function of forward voltage; typical values (BZT52H-B/C2V4)



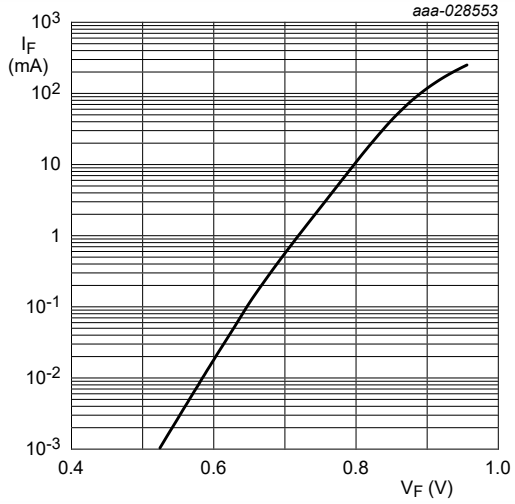
T_j = 25 °C

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



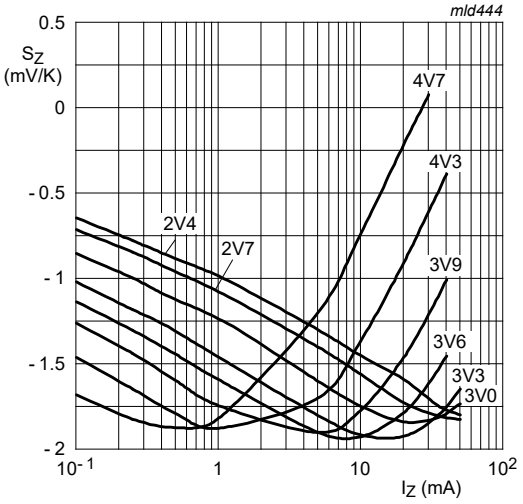
T_j = 25 °C

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



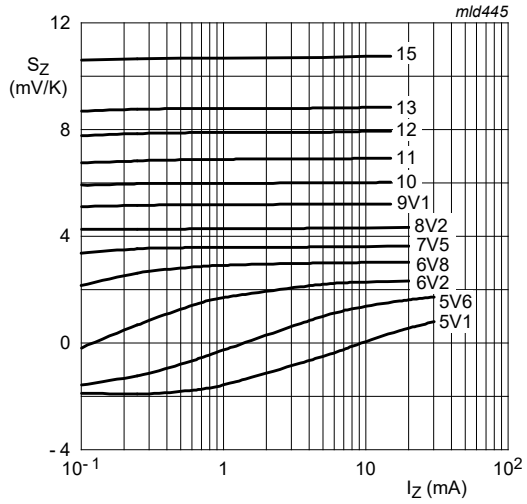
T_j = 25 °C

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



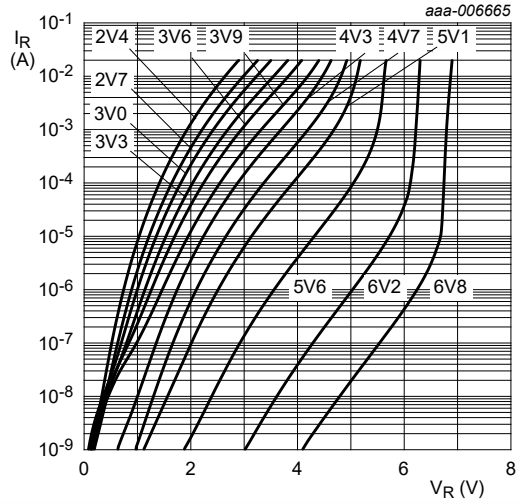
T_j = 25 °C to 150 °C

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



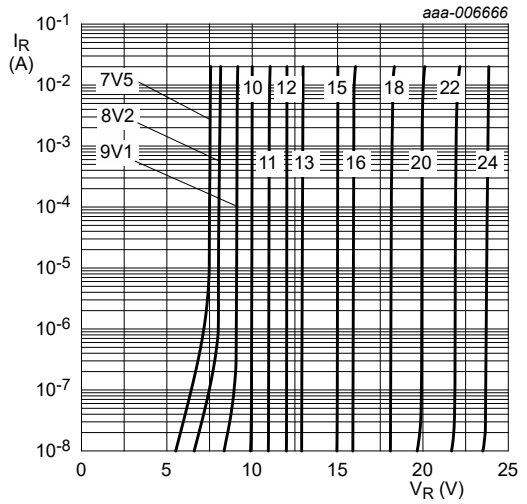
T_j = 25 °C to 150 °C

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



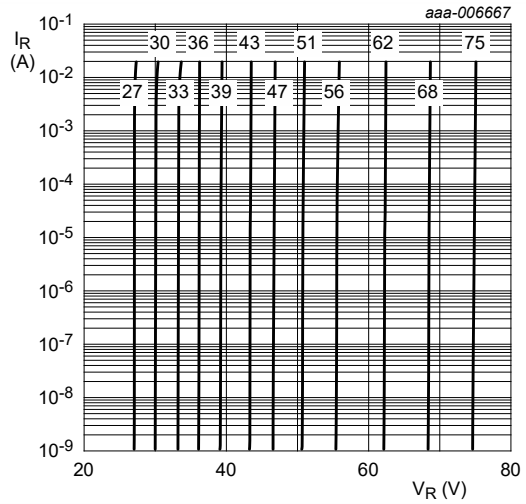
T_j = 25 °C

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



T_j = 25 °C

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



T_j = 25 °C

Fig. 10. Reverse current as a function of reverse voltage; typical values (BZT52H-B/C27 to BZT52H-B/C75)

11. Test information

11.1. 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.

12. Package outline

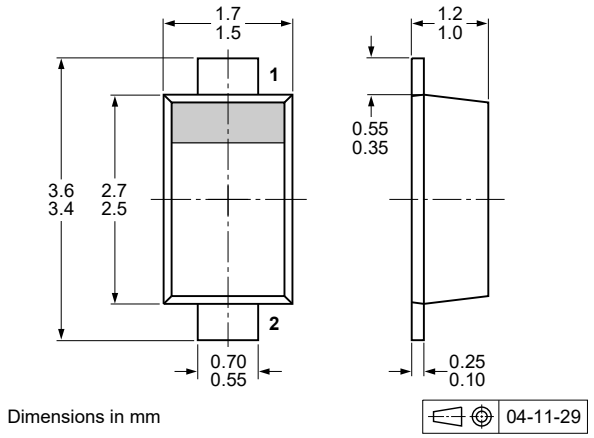
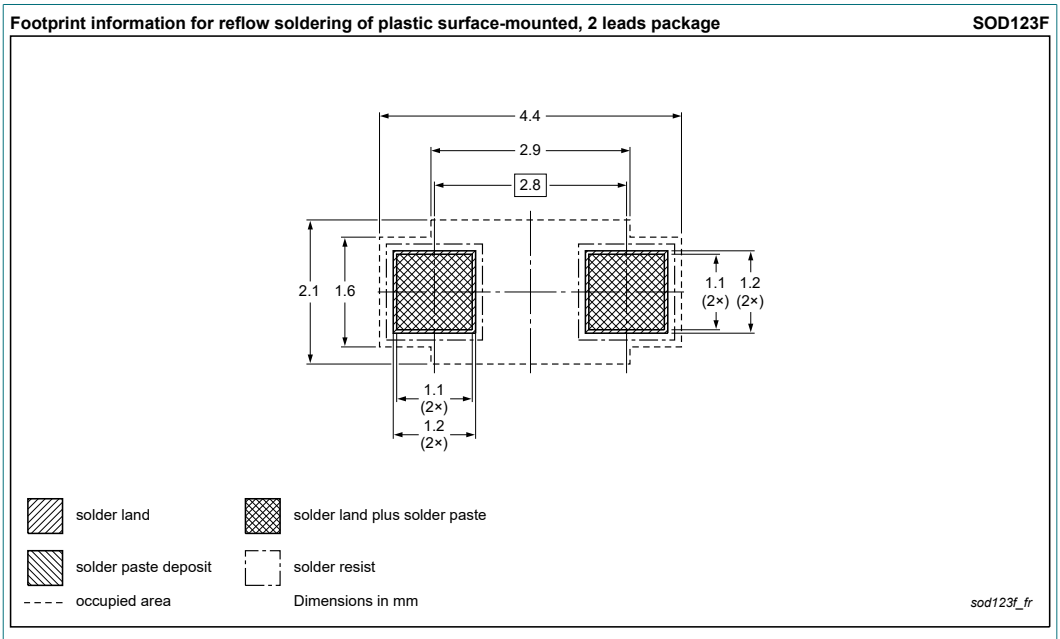


Fig. 11. Package outline SOD123F

13. Soldering



Reflow soldering is the only recommended soldering method.

Fig. 12. Reflow soldering footprint SOD123F

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZT52H_SER v.6	20220207	Product data sheet	-	BZT52H_SER v.5
Modifications:	• Tables 9 and 10: Conditions at "Temperature coefficient" corrected to I_Z = 2 mA			
BZT52H_SER v.5	20201130	Product data sheet	-	BZT52H_SER v.4
BZT52H_SER v.4	20190121	Product data sheet		BZT52H_SER v.3
BZT52H_SER v.3	20091115	Product data sheet	-	BZT52H_SER v.2
BZT52H_SER v.2	20091115	Product data sheet	-	BZT52H_SER v.1
BZT52H_SER v.1	20051222	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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