

BZB84 series

Dual Zener diodes

Rev. 03 — 9 June 2009 Product data sheet

1. Product profile

1.1 General description

General-purpose Zener diodes in a SOT23 (TO-236AB) small Surface-Mounted Device (SMD) plastic package.

1.2 Features

- Non-repetitive peak reverse power dissipation: ≤ 40 W
- Total power dissipation: ≤ 300 mW
- Two tolerance series: B = ±2 % and C = ±5 %
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- Dual common anode configuration
- 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
Per diode							
V_F	forward voltage	I_F = 10 mA	[1]	-	-	0.9	V
P_{ZSM}	non-repetitive peak reverse power dissipation		[2]	-	-	40	W

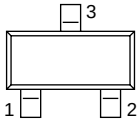
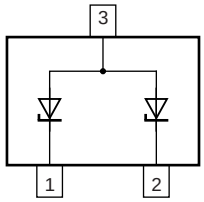
[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.

[2] t_p = 100 µs; square wave; T_j = 25 °C prior to surge

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2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode (diode 1)		
2	cathode (diode 2)		
3	common anode		

006aaa154

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZB84-B2V4 to BZB84-C75[1]	-	plastic surface-mounted package; 3 leads	SOT23

[1] The series consists of 74 types with nominal working voltages from 2.4 V to 75 V.

4. Marking

Table 4. Marking codes

Type number	Marking code[1]	Type number	Marking code[1]
BZB84-B2V4	V9*	BZB84-C2V4	U9*
BZB84-B2V7	VA*	BZB84-C2V7	UA*
BZB84-B3V0	VB*	BZB84-C3V0	UB*
BZB84-B3V3	VC*	BZB84-C3V3	UC*
BZB84-B3V6	VD*	BZB84-C3V6	UD*
BZB84-B3V9	VE*	BZB84-C3V9	UE*
BZB84-B4V3	VF*	BZB84-C4V3	UF*
BZB84-B4V7	VG*	BZB84-C4V7	UG*
BZB84-B5V1	VH*	BZB84-C5V1	UH*
BZB84-B5V6	VK*	BZB84-C5V6	UK*
BZB84-B6V2	VL*	BZB84-C6V2	UL*
BZB84-B6V8	VM*	BZB84-C6V8	UM*
BZB84-B7V5	VN*	BZB84-C7V5	UN*
BZB84-B8V2	VP*	BZB84-C8V2	UP*
BZB84-B9V1	VR*	BZB84-C9V1	UR*

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Table 4. Marking codes *…continued*

Type number	Marking code[1]	Type number	Marking code[1]
BZB84-B10	VS*	BZB84-C10	US*
BZB84-B11	VT*	BZB84-C11	UT*
BZB84-B12	VU*	BZB84-C12	UU*
BZB84-B13	VV*	BZB84-C13	UV*
BZB84-B15	VW*	BZB84-C15	UW*
BZB84-B16	PT*	BZB84-C16	PB*
BZB84-B18	PU*	BZB84-C18	PC*
BZB84-B20	RP*	BZB84-C20	RQ*
BZB84-B22	PV*	BZB84-C22	PD*
BZB84-B24	PW*	BZB84-C24	PE*
BZB84-B27	PX*	BZB84-C27	PF*
BZB84-B30	PY*	BZB84-C30	PG*
BZB84-B33	PZ*	BZB84-C33	PH*
BZB84-B36	RA*	BZB84-C36	PJ*
BZB84-B39	RB*	BZB84-C39	PK*
BZB84-B43	RC*	BZB84-C43	PL*
BZB84-B47	RD*	BZB84-C47	PM*
BZB84-B51	RE*	BZB84-C51	PN*
BZB84-B56	RF*	BZB84-C56	PP*
BZB84-B62	RG*	BZB84-C62	PQ*
BZB84-B68	RH*	BZB84-C68	PR*
BZB84-B75	RJ*	BZB84-C75	PS*

[1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
I_F	forward current		-	200	mA
I_{ZSM}	non-repetitive peak reverse current	[1]	-	see Table 8, 9, 10 and 11	
P_{ZSM}	non-repetitive peak reverse power dissipation	[1]	-	40	W

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Table 5. Limiting values *…continued*

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	300	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per device; single diode loaded							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	417	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[2]	-	-	100	K/W

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

[2] Soldering points at pins 1 and 2.

7. Characteristics

Table 7. Characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
V_F	forward voltage	I_F = 10 mA	[1]	-	-	0.9	V

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

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Table 8. Characteristics per type; BZB84-B2V4 to BZB84-B24

T_j = 25 °C unless otherwise specified.

BZB84-Bxxx	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]	Non-repetitive peak reverse current I_{ZSM} (A)[2]
	I_Z = 5 mA		I_Z = 1 mA	I_Z = 5 mA			I_Z = 5 mA			
	Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
2V4	2.35	2.45	600	100	50	1	–3.5	0	450	6.0
2V7	2.65	2.75	600	100	20	1	–3.5	0	450	6.0
3V0	2.94	3.06	600	95	10	1	–3.5	0	450	6.0
3V3	3.23	3.37	600	95	5	1	–3.5	0	450	6.0
3V6	3.53	3.67	600	90	5	1	–3.5	0	450	6.0
3V9	3.82	3.98	600	90	3	1	–3.5	0	450	6.0
4V3	4.21	4.39	600	90	3	1	–3.5	0	450	6.0
4V7	4.61	4.79	500	80	3	2	–3.5	0.2	300	6.0
5V1	5.00	5.20	480	60	2	2	–2.7	1.2	300	6.0
5V6	5.49	5.71	400	40	1	2	–2.0	2.5	300	6.0
6V2	6.08	6.32	150	10	3	4	0.4	3.7	200	6.0
6V8	6.66	6.94	80	15	2	4	1.2	4.5	200	6.0
7V5	7.35	7.65	80	15	1	5	2.5	5.3	150	4.0
8V2	8.04	8.36	80	15	0.70	5	3.2	6.2	150	4.0
9V1	8.92	9.28	100	15	0.50	6	3.8	7.0	150	3.0
10	9.80	10.20	150	20	0.20	7	4.5	8.0	90	3.0
11	10.80	11.20	150	20	0.10	8	5.4	9.0	85	2.5
12	11.80	12.20	150	25	0.10	8	6.0	10.0	85	2.5
13	12.70	13.30	170	30	0.10	8	7.0	11.0	80	2.5
15	14.70	15.30	200	30	0.05	10.5	9.2	13.0	75	2.0
16	15.70	16.30	200	40	0.05	11.2	10.4	14.0	75	1.5
18	17.60	18.40	225	45	0.05	12.6	12.4	16.0	70	1.5
20	19.6	20.4	225	55	0.05	14.0	14.4	18.0	60	1.5
22	21.6	22.4	250	55	0.05	15.4	16.4	20.0	60	1.25
24	23.5	24.5	250	70	0.05	16.8	18.4	22.0	55	1.25

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

[2] t_p = 100 μs; square wave; T_j = 25 °C prior to surge

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Table 9. Characteristics per type; BZB84-B27 to BZB84-B75

T_j = 25 °C unless otherwise specified.

BZB84-Bxxx	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]	Non-repetitive peak reverse current I_{ZSM} (A)[2]
	I_Z = 2 mA		I_Z = 0.5 mA	I_Z = 2 mA			I_Z = 2 mA			
	Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
27	26.5	27.5	300	80	0.05	18.9	21.4	25.3	50	1.00
30	29.4	30.6	300	80	0.05	21.0	24.4	29.4	50	1.00
33	32.3	33.7	325	80	0.05	23.1	27.4	33.4	45	0.90
36	35.3	36.7	350	90	0.05	25.2	30.4	37.4	45	0.80
39	38.2	39.8	350	130	0.05	27.3	33.4	41.2	45	0.70
43	42.1	43.9	375	150	0.05	30.1	37.6	46.6	40	0.60
47	46.1	47.9	375	170	0.05	32.9	42.0	51.8	40	0.50
51	50.0	52.0	400	180	0.05	35.7	46.6	57.2	40	0.40
56	54.9	57.1	425	200	0.05	39.2	52.2	63.8	40	0.30
62	60.8	63.2	450	215	0.05	43.4	58.8	71.6	35	0.30
68	66.6	69.4	475	240	0.05	47.6	65.6	79.8	35	0.25
75	73.5	76.5	500	255	0.05	52.5	73.4	88.6	35	0.20

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

[2] t_p = 100 μs; square wave; T_j = 25 °C prior to surge

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Table 10. Characteristics per type; BZB84-C2V4 to BZB84-C24

T_j = 25 °C unless otherwise specified.

BZB84-Cxxx	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]	Non-repetitive peak reverse current I_{ZSM} (A)[2]
	I_Z = 5 mA		I_Z = 1 mA	I_Z = 5 mA			I_Z = 5 mA			
	Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
2V4	2.2	2.6	600	100	50	1	–3.5	0	450	6.0
2V7	2.5	2.9	600	100	20	1	–3.5	0	450	6.0
3V0	2.8	3.2	600	95	10	1	–3.5	0	450	6.0
3V3	3.1	3.5	600	95	5	1	–3.5	0	450	6.0
3V6	3.4	3.8	600	90	5	1	–3.5	0	450	6.0
3V9	3.7	4.1	600	90	3	1	–3.5	0	450	6.0
4V3	4.0	4.6	600	90	3	1	–3.5	0	450	6.0
4V7	4.4	5.0	500	80	3	2	–3.5	0.2	300	6.0
5V1	4.8	5.4	480	60	2	2	–2.7	1.2	300	6.0
5V6	5.2	6.0	400	40	1	2	–2.0	2.5	300	6.0
6V2	5.8	6.6	150	10	3	4	0.4	3.7	200	6.0
6V8	6.4	7.2	80	15	2	4	1.2	4.5	200	6.0
7V5	7.0	7.9	80	15	1	5	2.5	5.3	150	4.0
8V2	7.7	8.7	80	15	0.70	5	3.2	6.2	150	4.0
9V1	8.5	9.6	100	15	0.50	6	3.8	7.0	150	3.0
10	9.4	10.6	150	20	0.20	7	4.5	8.0	90	3.0
11	10.4	11.6	150	20	0.10	8	5.4	9.0	85	2.5
12	11.4	12.7	150	25	0.10	8	6.0	10.0	85	2.5
13	12.4	14.1	170	30	0.10	8	7.0	11.0	80	2.5
15	13.8	15.6	200	30	0.05	10.5	9.2	13.0	75	2.0
16	15.3	17.1	200	40	0.05	11.2	10.4	14.0	75	1.5
18	16.8	19.1	225	45	0.05	12.6	12.4	16.0	70	1.5
20	18.8	21.2	225	55	0.05	14.0	14.4	18.0	60	1.5
22	20.8	23.3	250	55	0.05	15.4	16.4	20.0	60	1.25
24	22.8	25.6	250	70	0.05	16.8	18.4	22.0	55	1.25

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

[2] t_p = 100 μs; square wave; T_j = 25 °C prior to surge

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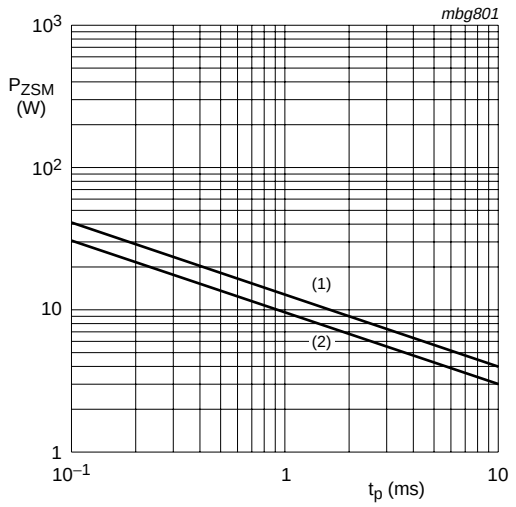
Table 11. Characteristics per type; BZB84-C27 to BZB84-C75

T_j = 25 °C unless otherwise specified.

BZB84-Cxxx	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]	Non-repetitive peak reverse current I_{ZSM} (A)[2]
	I_Z = 2 mA		I_Z = 0.5 mA	I_Z = 2 mA			I_Z = 2 mA			
	Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
27	25.1	28.9	300	80	0.05	18.9	21.4	25.3	50	1.00
30	28.0	32.0	300	80	0.05	21.0	24.4	29.4	50	1.00
33	31.0	35.0	325	80	0.05	23.1	27.4	33.4	45	0.90
36	34.0	38.0	350	90	0.05	25.2	30.4	37.4	45	0.80
39	37.0	41.0	350	130	0.05	27.3	33.4	41.2	45	0.70
43	40.0	46.0	375	150	0.05	30.1	37.6	46.6	40	0.60
47	44.0	50.0	375	170	0.05	32.9	42.0	51.8	40	0.50
51	48.0	54.0	400	180	0.05	35.7	46.6	57.2	40	0.40
56	52.0	60.0	425	200	0.05	39.2	52.2	63.8	40	0.30
62	58.0	66.0	450	215	0.05	43.4	58.8	71.6	35	0.30
68	64.0	72.0	475	240	0.05	47.6	65.6	79.8	35	0.25
75	70.0	79.0	500	255	0.05	52.5	73.4	88.6	35	0.20

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

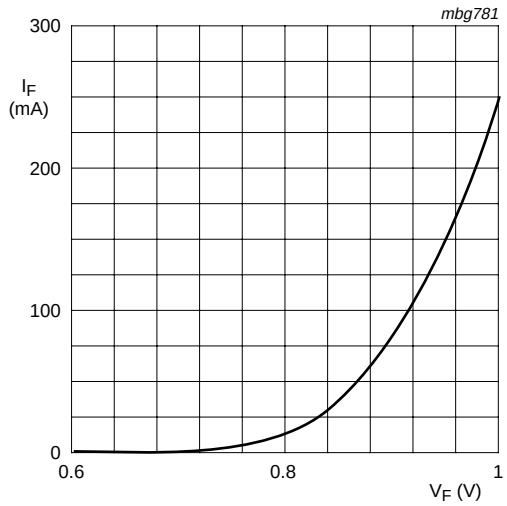
[2] t_p = 100 μs; square wave; T_j = 25 °C prior to surge



(1) T_j = 25 °C (prior to surge)

(2) T_j = 150 °C (prior to surge)

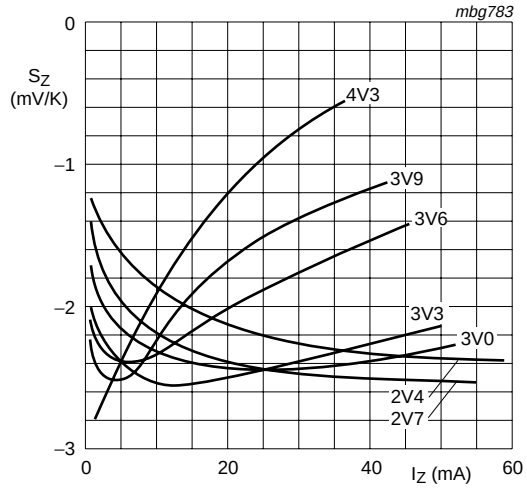
Fig 1. Per diode: Non-repetitive peak reverse power dissipation as a function of pulse duration; maximum values



T_j = 25 °C

Fig 2. Per diode: Forward current as a function of forward voltage; typical values

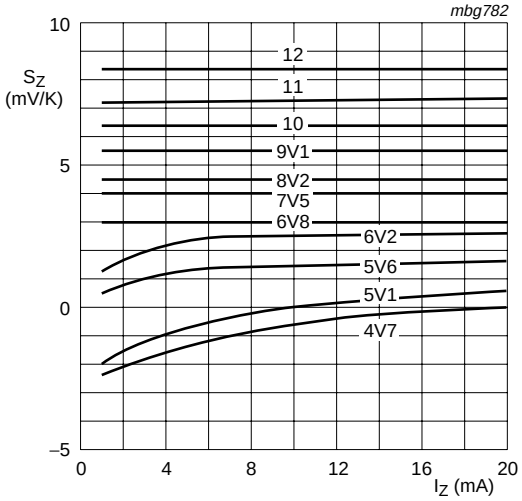
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T_j = 25 °C to 150 °C

BZB84-B/C2V4 to BZB84-B/C4V3

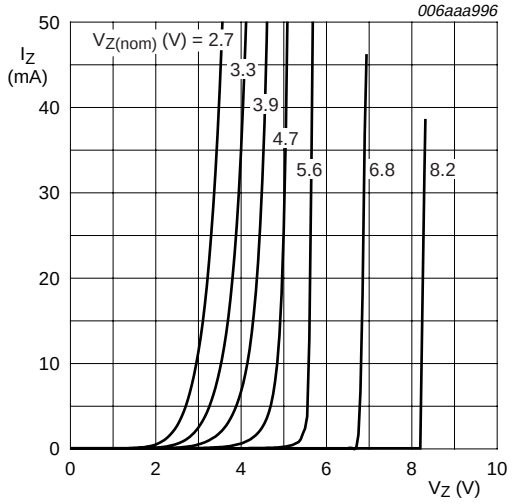
Fig 3. Per diode: Temperature coefficient as a function of working current; typical values



T_j = 25 °C to 150 °C

BZB84-B/C4V7 to BZB84-B/C12

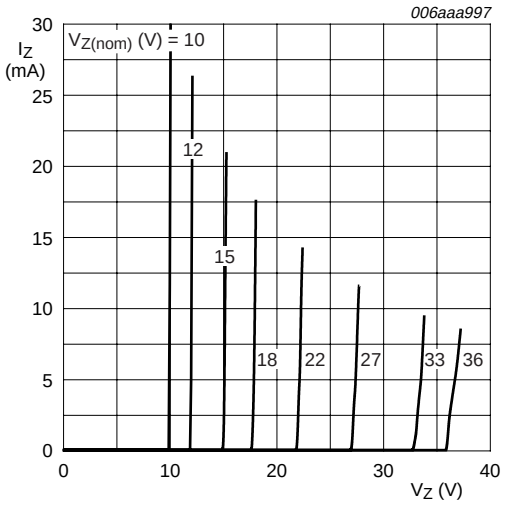
Fig 4. Per diode: Temperature coefficient as a function of working current; typical values



T_j = 25 °C

BZB84-B/C2V7 to BZB84-B/C8V2

Fig 5. Per diode: Working current as a function of working voltage; typical values



T_j = 25 °C

BZB84-B/C10 to BZB84-B/C36

Fig 6. Per diode: Working current as a function of working voltage; typical values

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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

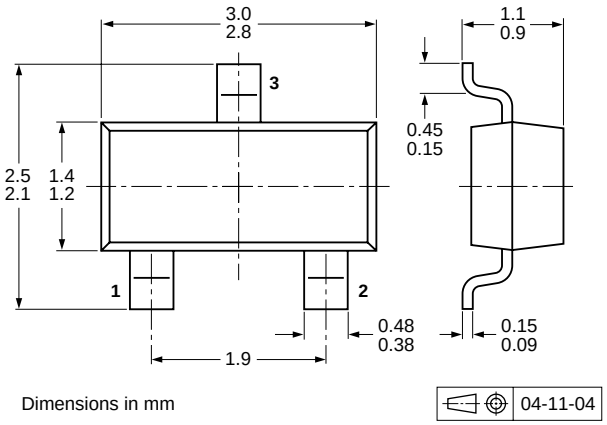


Fig 7. Package outline SOT23 (TO-236AB)

10. Packing information

Table 12. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity	
			3000	10000
BZB84-B2V4 to BZB84-C75[2]	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

[1] For further information and the availability of packing methods, see Section 14.

[2] The series consists of 74 types with nominal working voltages from 2.4 V to 75 V.

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11. Soldering

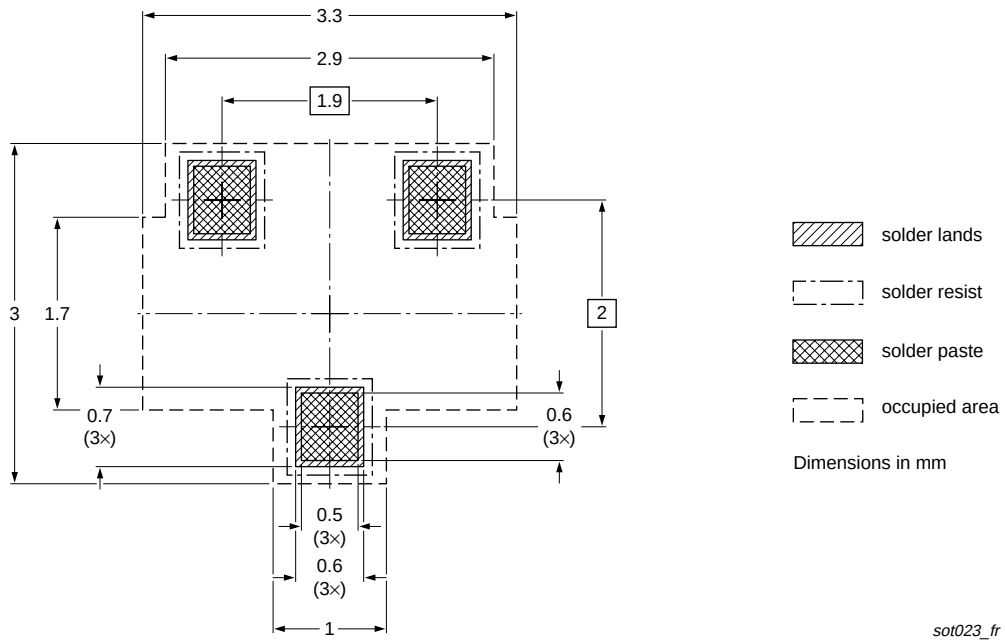


Fig 8. Reflow soldering footprint SOT23 (TO-236AB)

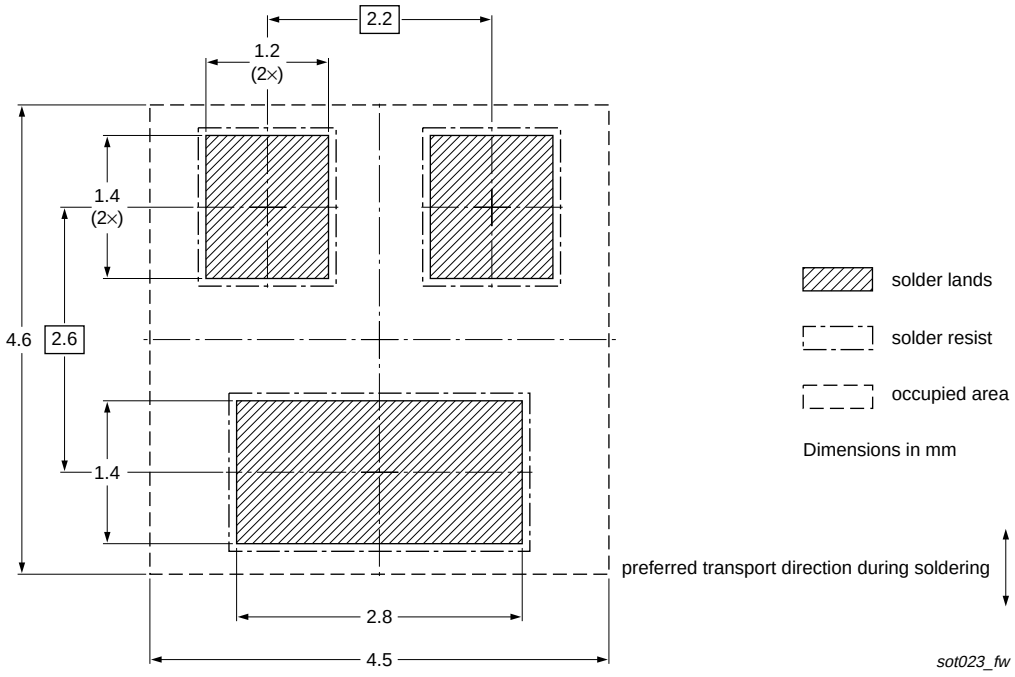


Fig 9. Wave soldering footprint SOT23 (TO-236AB)

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12. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZB84_SER_3	20090609	Product data sheet	-	BZB84_SER_2
Modifications:	• Table 5 “Limiting values”: P_{tot} maximum value amended • Table 6: R_{th} maximum values amended • Section 13 “Legal information”: updated			
BZB84_SER_2	20090223	Product data sheet	-	BZB84_SER_1
BZB84_SER_1	20080514	Product data sheet	-	-

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13. Legal information

13.1 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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