BZX84 series

Voltage regulator diodes

Rev. 6 — 6 March 2014 Product data sheet

1. Product profile

1.1 General description

Low-power voltage regulator diodes in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

The diodes are available in the normalized E24 ±1 % (BZX84-A), ±2 % (BZX84-B) and approximately ±5 % (BZX84-C) tolerance range. The series includes 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V.

1.2 Features and benefits

- Total power dissipation: ≤ 250 mW
- Three tolerance series: ±1 %, ±2 % and approximately ±5 %
- AEC-Q101 qualified
- Working voltage range: nominal 2.4 V to 75 V (E24 range)
- Non-repetitive peak reverse power dissipation: ≤ 40 W

1.3 Applications

- General regulation functions

1.4 Quick reference data

Table 1. Quick reference data

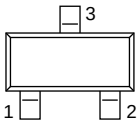
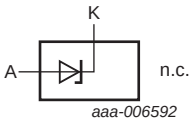
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 10 mA	[1]	-	-	0.9	V
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2]	-	-	250	mW

[1] Pulse test: $t_p \leq 100\ \mu s$; $\delta \leq 0.02$

[2] Device mounted on a FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

2. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode		
2	n.c.	not connected		
3	K	cathode		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZX84 series[1]	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

[1] The series includes 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V and ±1 %, ±2 % and ±5 % tolerances.

4. Marking

Table 4. Marking codes

Type number	Marking code[1]	Type number	Marking code[1]
BZX84-A2V4	*50	BZX84-A18	KF*
BZX84-A2V7	*51	BZX84-A20	*C2
BZX84-A3V0	*52	BZX84-A22	KG*
BZX84-A3V3	*53	BZX84-A24	KH*
BZX84-A3V6	*C1	BZX84-A27	*75
BZX84-A3V9	*55	BZX84-A30	KJ*
BZX84-A4V3	*56	BZX84-A33	KK*
BZX84-A4V7	*57	BZX84-A36	*C3
BZX84-A5V1	*58	BZX84-A39	*C4
BZX84-A5V6	*59	BZX84-A43	*C5
BZX84-A6V2	*60	BZX84-A51	*C6
BZX84-A6V8	*61	BZX84-A75	*86
BZX84-A7V5	*62	BZX84-B2V4	*Z0
BZX84-A8V2	*63	BZX84-B2V7	*Z1
BZX84-A9V1	*64	BZX84-B3V0	*S1
BZX84-A10	*65	BZX84-B3V3	*S2
BZX84-A11	*04	BZX84-B3V6	*S3
BZX84-A12	*67	BZX84-B3V9	*S4
BZX84-A13	*C0	BZX84-B4V3	*S7
BZX84-A15	*69	BZX84-B4V7	*S8
BZX84-A16	KE*	BZX84-B5V1	*R1

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Table 4. Marking codes *...continued*

Type number	Marking code[1]	Type number	Marking code[1]
BZX84-B5V6	*R2	BZX84-C3V9	*B3
BZX84-B6V2	*R5	BZX84-C4V3	*B6
BZX84-B6V8	*R6	BZX84-C4V7	Z1*
BZX84-B7V5	*R8	BZX84-C5V1	Z2*
BZX84-B8V2	*R9	BZX84-C5V6	Z3*
BZX84-B9V1	*T1	BZX84-C6V2	Z4*
BZX84-B10	*66	BZX84-C6V8	Z5*
BZX84-B11	*Z6	BZX84-C7V5	Z6*
BZX84-B12	*Z7	BZX84-C8V2	Z7*
BZX84-B13	*Z8	BZX84-C9V1	Z8*
BZX84-B15	*Z9	BZX84-C10	Z9*
BZX84-B16	*70	BZX84-C11	Y1*
BZX84-B18	*71	BZX84-C12	Y2*
BZX84-B20	*72	BZX84-C13	Y3*
BZX84-B22	*73	BZX84-C15	Y4*
BZX84-B24	*74	BZX84-C16	Y5*
BZX84-B27	*Z5	BZX84-C18	Y6*
BZX84-B30	*Z4	BZX84-C20	Y7*
BZX84-B33	*Y1	BZX84-C22	Y8*
BZX84-B36	*Y2	BZX84-C24	Y9*
BZX84-B39	*S0	BZX84-C27	*T2
BZX84-B43	*S5	BZX84-C30	*T5
BZX84-B47	*S6	BZX84-C33	*T6
BZX84-B51	*S9	BZX84-C36	*T7
BZX84-B56	*R0	BZX84-C39	*T8
BZX84-B62	*R3	BZX84-C43	*B4
BZX84-B68	*R4	BZX84-C47	*B5
BZX84-B75	*R7	BZX84-C51	*B7
BZX84-C2V4	*T3	BZX84-C56	*B8
BZX84-C2V7	*T4	BZX84-C62	*B9
BZX84-C3V0	*T9	BZX84-C68	*B0
BZX84-C3V3	*B1	BZX84-C75	*A1
BZX84-C3V6	*B2	-	-

[1] * = placeholder for manufacturing site code

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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		-	200	mA
P_{ZSM}	non-repetitive peak reverse power dissipation	[1]	-	40	W
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C [2]	-	250	mW
T_{amb}	ambient temperature		-	150	°C
T_{stg}	storage temperature		−55	+150	°C
T_j	junction temperature		−65	+150	°C

[1] $t_p = 100$ μs; square wave; $T_j = 25$ °C before surge

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

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]	-	-	500	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point	[2]	-	-	330	K/W

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

[2] Soldering point of cathode tab.

7. 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: $t_p \leq 100$ μs; $\delta \leq 0.02$

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Table 8. Characteristics per type; BZX84-A2V4 to BZX84-C24

T_j = 25 °C unless otherwise specified.

BZX84-xxx	Sel	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	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
2V4	A	2.37	2.43	275	600	70	100	50	1	−3.5	−1.6	0	450	6.0
	B	2.35	2.45											
	C	2.2	2.6											
2V7	A	2.67	2.73	300	600	75	100	20	1	−3.5	−2.0	0	450	6.0
	B	2.65	2.75											
	C	2.5	2.9											
3V0	A	2.97	3.03	325	600	80	95	10	1	−3.5	−2.1	0	450	6.0
	B	2.94	3.06											
	C	2.8	3.2											
3V3	A	3.26	3.34	350	600	85	95	5	1	−3.5	−2.4	0	450	6.0
	B	3.23	3.37											
	C	3.1	3.5											
3V6	A	3.56	3.64	375	600	85	90	5	1	−3.5	−2.4	0	450	6.0
	B	3.53	3.67											
	C	3.4	3.8											
3V9	A	3.86	3.94	400	600	85	90	3	1	−3.5	−2.5	0	450	6.0
	B	3.82	3.98											
	C	3.7	4.1											
4V3	A	4.25	4.35	410	600	80	90	3	1	−3.5	−2.5	0	450	6.0
	B	4.21	4.39											
	C	4.0	4.6											
4V7	A	4.65	4.75	425	500	50	80	3	2	−3.5	−1.4	0.2	300	6.0
	B	4.61	4.79											
	C	4.4	5.0											
5V1	A	5.04	5.16	400	480	40	60	2	2	−2.7	−0.8	1.2	300	6.0
	B	5.0	5.2											
	C	4.8	5.4											
5V6	A	5.54	5.66	80	400	15	40	1	2	−2.0	1.2	2.5	300	6.0
	B	5.49	5.71											
	C	5.2	6.0											
6V2	A	6.13	6.27	40	150	6	10	3	4	0.4	2.3	3.7	200	6.0
	B	6.08	6.32											
	C	5.8	6.6											
6V8	A	6.73	6.87	30	80	6	15	2	4	1.2	3.0	4.5	200	6.0
	B	6.66	6.94											
	C	6.4	7.2											

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Table 8. Characteristics per type; BZX84-A2V4 to BZX84-C24 *…continued*

T_j = 25 °C unless otherwise specified.

BZX84-xxx	Sel	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	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
7V5	A	7.42	7.58	30	80	6	15	1	5	2.5	4.0	5.3	150	4.0
	B	7.35	7.65											
	C	7.0	7.9											
8V2	A	8.11	8.29	40	80	6	15	0.7	5	3.2	4.6	6.2	150	4.0
	B	8.04	8.36											
	C	7.7	8.7											
9V1	A	9	9.2	40	100	6	15	0.5	6	3.8	5.5	7.0	150	3.0
	B	8.92	9.28											
	C	8.5	9.6											
10	A	9.9	10.1	50	150	8	20	0.2	7	4.5	6.4	8.0	90	3.0
	B	9.8	10.2											
	C	9.4	10.6											
11	A	10.8	11.11	50	150	10	20	0.1	8	5.4	7.4	9.0	85	2.5
	B	10.8	11.2											
	C	10.4	11.6											
12	A	11.88	12.12	50	150	10	25	0.1	8	6.0	8.4	10.0	85	2.5
	B	11.8	12.2											
	C	11.4	12.7											
13	A	12.87	13.13	50	170	10	30	0.1	8	7.0	9.4	11.0	80	2.5
	B	12.7	13.3											
	C	12.4	14.1											
15	A	14.85	15.15	50	200	10	30	0.05	10.5	9.2	11.4	13.0	75	2.0
	B	14.7	15.3											
	C	13.8	15.6											
16	A	15.84	16.16	50	200	10	40	0.05	11.2	10.4	12.4	14.0	75	1.5
	B	15.7	16.3											
	C	15.3	17.1											
18	A	17.82	18.18	50	225	10	45	0.05	12.6	12.4	14.4	16.0	70	1.5
	B	17.6	18.4											
	C	16.8	19.1											
20	A	19.8	20.2	60	225	15	55	0.05	14	14.4	16.4	18.0	60	1.5
	B	19.6	20.4											
	C	18.8	21.2											
22	A	21.78	22.22	60	250	20	55	0.05	15.4	16.4	18.4	20.0	60	1.25
	B	21.6	22.4											
	C	20.8	23.3											

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Table 8. Characteristics per type; BZX84-A2V4 to BZX84-C24 *…continued*

T_j = 25 °C unless otherwise specified.

BZX84-xxx	Sel	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	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
24	A	23.76	24.24	60	250	25	70	0.05	16.8	18.4	20.4	22.0	55	1.25
	B	23.5	24.5											
	C	22.8	25.6											

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

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

Table 9. Characteristics per type; BZX84-A27 to BZX84-C75

T_j = 25 °C unless otherwise specified.

BZX84-xxx	Sel	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	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
27	A	26.73	27.27	65	300	25	80	0.05	18.9	21.4	23.4	25.3	50	1.0
	B	26.5	27.5											
	C	25.1	28.9											
30	A	29.7	30.30	70	300	30	80	0.05	21	24.4	26.6	29.4	50	1.0
	B	29.4	30.6											
	C	28.0	32.0											
33	A	32.67	33.33	75	325	35	80	0.05	23.1	27.4	29.7	33.4	45	0.9
	B	32.3	33.7											
	C	31.0	35.0											
36	A	35.64	36.36	80	350	35	90	0.05	25.2	30.4	33.0	37.4	45	0.8
	B	35.3	36.7											
	C	34.0	38.0											
39	A	38.61	39.39	80	350	40	130	0.05	27.3	33.4	36.4	41.2	45	0.7
	B	38.2	39.8											
	C	37.0	41.0											
43	A	42.57	43.43	85	375	45	150	0.05	30.1	37.6	41.2	46.6	40	0.6
	B	42.1	43.9											
	C	40.0	46.0											
47	B	46.1	47.9	85	375	50	170	0.05	32.9	42.0	46.1	51.8	40	0.5
	C	44.0	50.0											
51	A	50.49	51.51	90	400	60	180	0.05	35.7	46.6	51.0	57.2	40	0.4
	B	50.0	52.0											
	C	48.0	54.0											

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Table 9. Characteristics per type; BZX84-A27 to BZX84-C75 *…continued*

T_j = 25 °C unless otherwise specified.

BZX84-xxx	Sel	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	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
56	B	54.9	57.1	100	425	70	200	0.05	39.2	52.2	57.0	63.8	40	0.3
	C	52.0	60.0											
62	B	60.8	63.2	120	450	80	215	0.05	43.4	58.8	64.4	71.6	35	0.3
	C	58.0	66.0											
68	B	66.6	69.4	150	475	90	240	0.05	47.6	65.6	71.7	79.8	35	0.25
	C	64.0	72.0											
75	A	74.25	75.75	170	500	95	255	0.05	52.5	73.4	80.2	88.6	35	0.20
	B	73.5	76.5											
	C	70.0	79.0											

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

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

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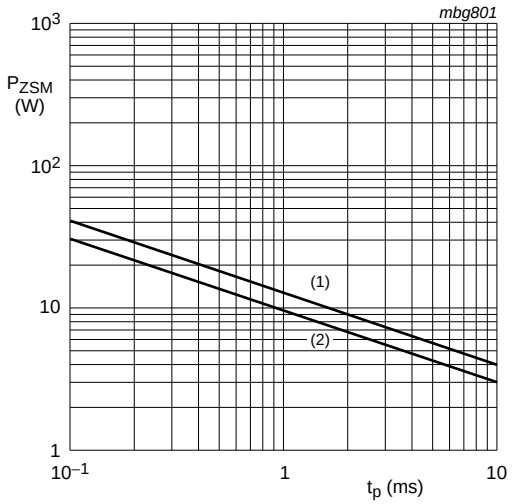
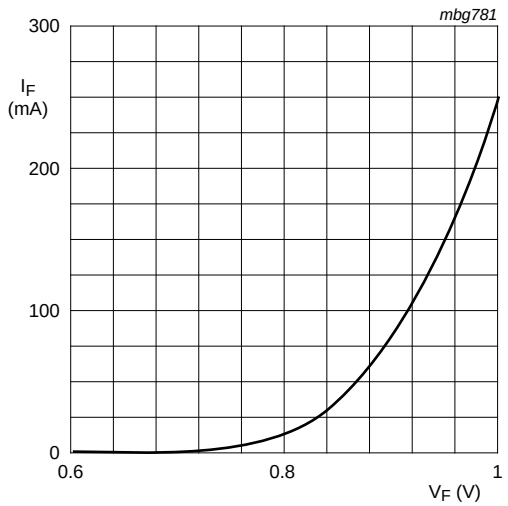


(1) T_j = 25 °C (before surge)

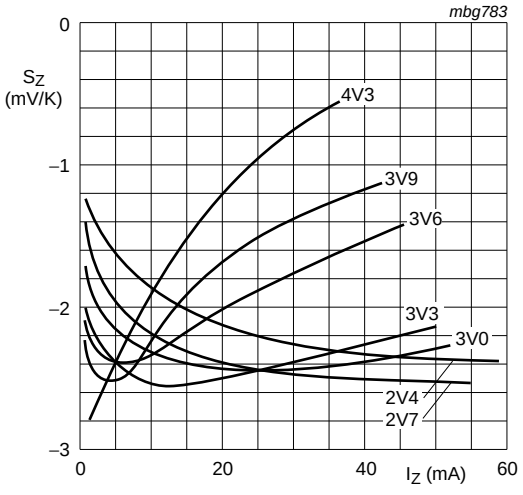
(2) T_j = 150 °C (before surge)

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



T_j = 25 °C

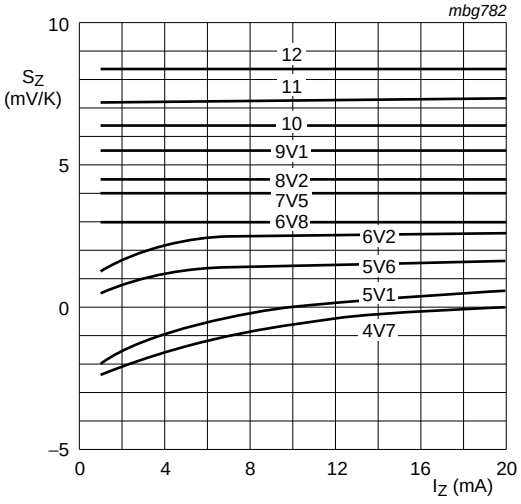
Fig 2. Forward current as a function of forward voltage; typical values



BZX84-A/B/C2V4 to BZX84-A/B/C4V3

T_j = 25 °C to 150 °C

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



BZX84-A/B/C4V7 to BZX84-A/B/C12

T_j = 25 °C to 150 °C

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

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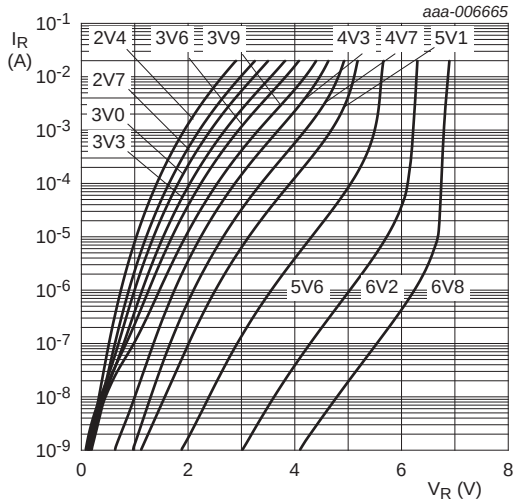
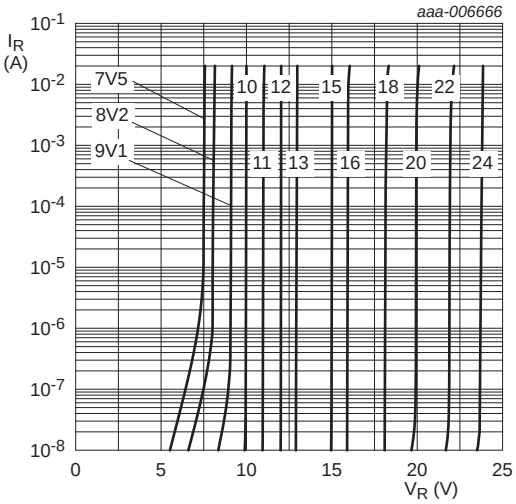


BZX84-A/B/C2V4 to BZX84-A/B/C6V8

T_{amb} = 25 °C

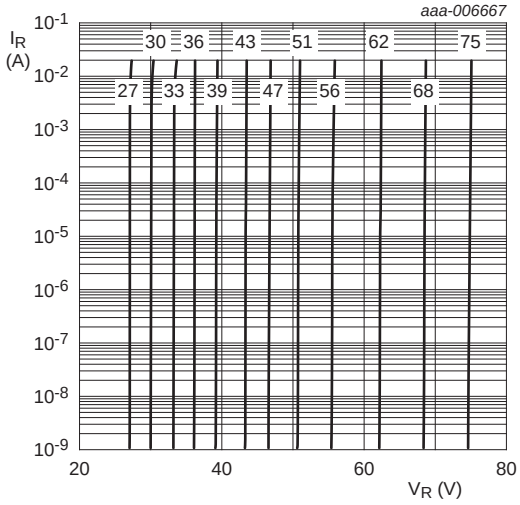
Fig 5. Reverse current as a function of reverse voltage; typical values



BZX84-A/B/C7V5 to BZX84-A/B/C24

T_{amb} = 25 °C

Fig 6. Reverse current as a function of reverse voltage; typical values



BZX84-A/B/C27 to BZX84-A/B/C75

T_{amb} = 25 °C

Fig 7. Reverse current as a function of reverse voltage; 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.

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9. Package outline

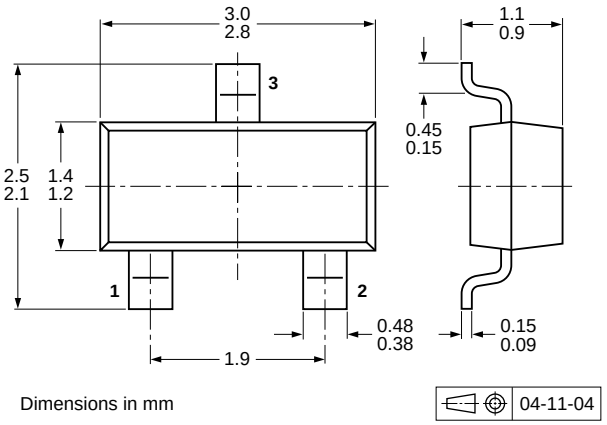

Fig 8. Package outline SOT23 (TO-236AB)

10. Packing information

Table 10. Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
BZX84 series[2]	SOT23 (TO-236AB)	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 includes 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V and ±1 %, ±2 % and ±5 % tolerances.

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11. Soldering

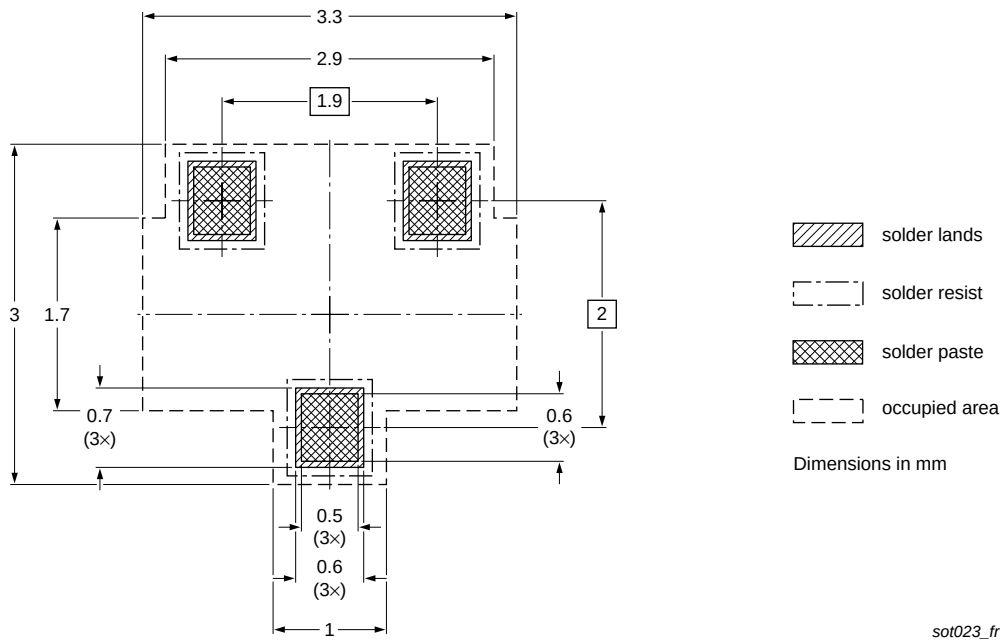

Fig 9. Reflow soldering footprint SOT23 (TO-236AB)

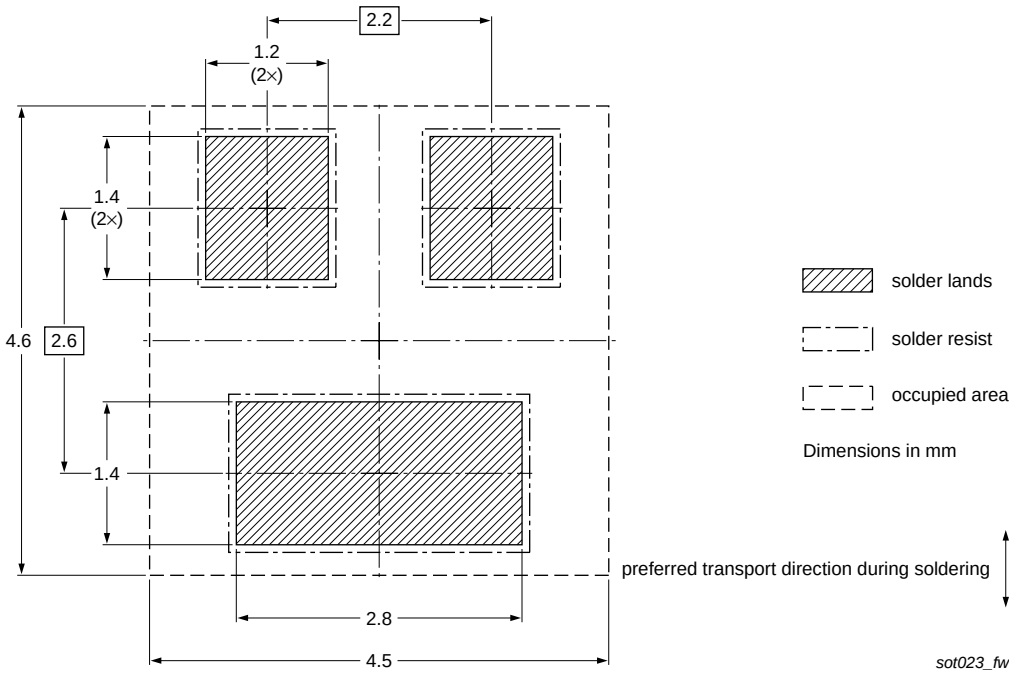

Fig 10. Wave soldering footprint SOT23 (TO-236AB)

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12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX84_SER v.6	20140306	Product data sheet	-	BZX84_SER v.5
Modifications:	• Descriptive title of the document corrected			
BZX84_SER v.5	20130918	Product data sheet	-	BZX84_SER v.4
BZX84_SER v.4	20130322	Product data sheet	-	BZX84_SERIES v.3
BZX84_SERIES v.3	20030410	Product data sheet	-	BZX84 v.2
BZX84 v.2	19990518	Product specification	-	BZX84 v.1
BZX84 v.1	19960426	Product specification	-	-

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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".

[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 URL http://www.nxp.com.

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