BZX84 series

Voltage regulator diodes

Rev. 7 — 1 January 2023 Product data sheet

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.

2. Features and benefits

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

3. Applications

- General regulation functions

4. Quick reference data

Table 1. Quick reference data

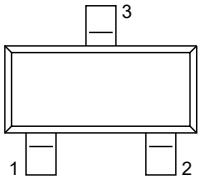
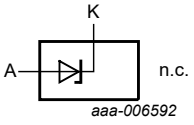
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 10 mA	[1]	-	-	0.9	V
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2]	-	-	250	mW

[1] Pulse test: t_p ≤ 100 µs; δ ≤ 0.02.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

nexperia

5. Pinning information

Table 2. Pinning

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

6. 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 consists of 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V and ±1 %, ±2 % and ±5 % tolerances.

7. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code	Type number	Marking code
BZX84-A2V4	%50	BZX84-B2V4	%Z0	BZX84-C2V4	%T3
BZX84-A2V7	%51	BZX84-B2V7	%Z1	BZX84-C2V7	%T4
BZX84-A3V0	%52	BZX84-B3V0	%S1	BZX84-C3V0	%T9
BZX84-A3V3	%53	BZX84-B3V3	%S2	BZX84-C3V3	%B1
BZX84-A3V6	%C1	BZX84-B3V6	%S3	BZX84-C3V6	%B2
BZX84-A3V9	%55	BZX84-B3V9	%S4	BZX84-C3V9	%B3
BZX84-A4V3	%56	BZX84-B4V3	%S7	BZX84-C4V3	%B6
BZX84-A4V7	%57	BZX84-B4V7	%S8	BZX84-C4V7	Z1%
BZX84-A5V1	%58	BZX84-B5V1	%R1	BZX84-C5V1	Z2%
BZX84-A5V6	%59	BZX84-B5V6	%R2	BZX84-C5V6	Z3%
BZX84-A6V2	%60	BZX84-B6V2	%R5	BZX84-C6V2	Z4%
BZX84-A6V8	%61	BZX84-B6V8	%R6	BZX84-C6V8	Z5%
BZX84-A7V5	%62	BZX84-B7V5	%R8	BZX84-C7V5	Z6%
BZX84-A8V2	%63	BZX84-B8V2	%R9	BZX84-C8V2	Z7%
BZX84-A9V1	%64	BZX84-B9V1	%T1	BZX84-C9V1	Z8%
BZX84-A10	%65	BZX84-B10	%66	BZX84-C10	Z9%
BZX84-A11	%04	BZX84-B11	%Z6	BZX84-C11	Y1%
BZX84-A12	%67	BZX84-B12	%Z7	BZX84-C12	Y2%
BZX84-A13	%C0	BZX84-B13	%Z8	BZX84-C13	Y3%
BZX84-A15	%69	BZX84-B15	%Z9	BZX84-C15	Y4%
BZX84-A16	KE%	BZX84-B16	%70	BZX84-C16	Y5%
BZX84-A18	KF%	BZX84-B18	%71	BZX84-C18	Y6%
BZX84-A20	%C2	BZX84-B20	%72	BZX84-C20	Y7%
BZX84-A22	KG%	BZX84-B22	%73	BZX84-C22	Y8%
BZX84-A24	KH%	BZX84-B24	%74	BZX84-C24	Y9%
BZX84-A27	%75	BZX84-B27	%Z5	BZX84-C27	%T2
BZX84-A30	KJ%	BZX84-B30	%Z4	BZX84-C30	%T5
BZX84-A33	KK%	BZX84-B33	%Y1	BZX84-C33	%T6
BZX84-A36	%C3	BZX84-B36	%Y2	BZX84-C36	%T7
BZX84-A39	%C4	BZX84-B39	%S0	BZX84-C39	%T8
BZX84-A43	%C5	BZX84-B43	%S5	BZX84-C43	%B4
BZX84-A51	%C6	BZX84-B47	%S6	BZX84-C47	%B5
BZX84-A75	%86	BZX84-B51	%S9	BZX84-C51	%B7
-	-	BZX84-B56	%R0	BZX84-C56	%B8
-	-	BZX84-B62	%R3	BZX84-C62	%B9
-	-	BZX84-B68	%R4	BZX84-C68	%B0
-	-	BZX84-B75	%R7	BZX84-C75	%A1

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			-	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_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 70 µm copper, tin-plated and standard footprint.

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

[1] Device mounted on an FR4 PCB, single-sided 70 µm copper, tin-plated and standard footprint.
[2] 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: $t_p \leq 100$ µs; $\delta \leq 0.02$

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) 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	A	2.37	2.43	600	100	50	1	-3.5	0.0	450	6.0
	B	2.35	2.45								
	C	2.20	2.60								
2V7	A	2.67	2.73	600	100	20	1	-3.5	0.0	450	6.0
	B	2.65	2.75								
	C	2.50	2.90								
3V0	A	2.97	3.03	600	95	10	1	-3.5	0.0	450	6.0
	B	2.94	3.06								
	C	2.80	3.20								
3V3	A	3.26	3.34	600	95	5	1	-3.5	0.0	450	6.0
	B	3.23	3.37								
	C	3.10	3.50								
3V6	A	3.56	3.64	600	90	5	1	-3.5	0.0	450	6.0
	B	3.53	3.67								
	C	3.40	3.80								
3V9	A	3.86	3.94	600	90	3	1	-3.5	0.0	450	6.0
	B	3.82	3.98								
	C	3.70	4.10								
4V3	A	4.25	4.35	600	90	3	1	-3.5	0.0	450	6.0
	B	4.21	4.39								
	C	4.00	4.60								
4V7	A	4.65	4.75	500	80	3	2	-3.5	0.2	300	6.0
	B	4.61	4.79								
	C	4.40	5.00								
5V1	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	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	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	A	6.73	6.87	80	15	2	4	1.2	4.5	200	6.0
	B	6.66	6.94								
	C	6.40	7.20								
7V5	A	7.42	7.58	80	15	1	5	2.5	5.3	150	4.0
	B	7.35	7.65								
	C	7.00	7.90								

BZX84 -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
8V2	A	8.11	8.29	80	15	0.7	5	3.2	6.2	150	4.0
	B	8.04	8.36								
	C	7.70	8.70								
9V1	A	9.00	9.20	100	15	0.5	6	3.8	7.0	150	3.0
	B	8.92	9.28								
	C	8.50	9.60								
10	A	9.90	10.10	150	20	0.2	7	4.5	8.0	90	3.0
	B	9.80	10.20								
	C	9.40	10.60								
11	A	10.89	11.11	150	20	0.1	8	5.4	9.0	85	2.5
	B	10.80	11.20								
	C	10.40	11.60								
12	A	11.88	12.12	150	25	0.1	8	6.0	10.0	85	2.5
	B	11.80	12.20								
	C	11.40	12.70								
13	A	12.87	13.13	170	30	0.1	8	7.0	11.0	80	2.5
	B	12.70	13.30								
	C	12.40	14.10								
15	A	14.85	15.15	200	30	0.05	10.5	9.2	13.0	75	2.0
	B	14.70	15.30								
	C	13.80	15.60								
16	A	15.84	16.16	200	40	0.05	11.2	10.4	14.0	75	1.5
	B	15.70	16.30								
	C	15.30	17.10								
18	A	17.82	18.18	225	45	0.05	12.6	12.4	16.0	70	1.5
	B	17.60	18.40								
	C	16.80	19.10								
20	A	19.80	20.20	225	55	0.05	14	14.4	18.0	60	1.5
	B	19.60	20.40								
	C	18.80	21.20								
22	A	21.78	22.22	250	55	0.05	15.4	16.4	20.0	60	1.25
	B	21.60	22.40								
	C	20.80	23.30								
24	A	23.76	24.24	250	70	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 μs; square wave; T_j = 25 °C

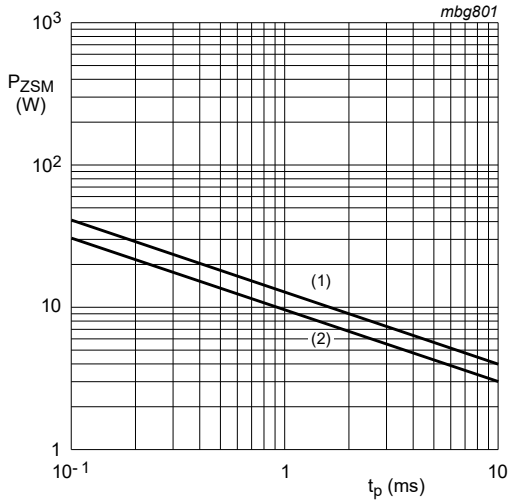
Table 9. Characteristics per type; BZX84-A27 to BZX84-C75

T_j = 25 °C unless otherwise specified.

BZX84 -xxx	Sel	Working voltage V_Z (V) 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
27	A	26.73	27.27	300	80	0.05	18.9	21.4	25.3	50	1.0
	B	26.50	27.50								
	C	25.10	28.90								
30	A	29.70	30.30	300	80	0.05	21	24.4	29.4	50	1.0
	B	29.40	30.60								
	C	28.00	32.00								
33	A	32.67	33.33	325	80	0.05	23.1	27.4	33.4	45	0.9
	B	32.30	33.70								
	C	31.00	35.00								
36	A	35.64	36.36	350	90	0.05	25.2	30.4	37.4	45	0.8
	B	35.30	36.70								
	C	34.00	38.00								
39	A	38.61	39.39	350	130	0.05	27.3	33.4	41.2	45	0.7
	B	38.20	39.80								
	C	37.00	41.00								
43	A	42.57	43.43	375	150	0.05	30.1	37.6	46.6	40	0.6
	B	42.10	43.90								
	C	40.00	46.00								
47	B	46.10	47.90	375	170	0.05	32.9	42.0	51.8	40	0.5
	C	44.00	50.00								
51	A	50.49	51.51	400	180	0.05	35.7	46.6	57.2	40	0.4
	B	50.00	52.00								
	C	48.00	54.00								
56	B	54.90	57.10	425	200	0.05	39.2	52.2	63.8	40	0.3
	C	52.00	60.00								
62	B	60.80	63.20	450	215	0.05	43.4	58.8	71.6	35	0.3
	C	58.00	66.00								
68	B	66.60	69.40	475	240	0.05	47.6	65.6	79.8	35	0.25
	C	64.00	72.00								
75	A	74.25	75.75	500	255	0.05	52.5	73.4	88.6	35	0.20
	B	73.50	76.50								
	C	70.00	79.00								

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

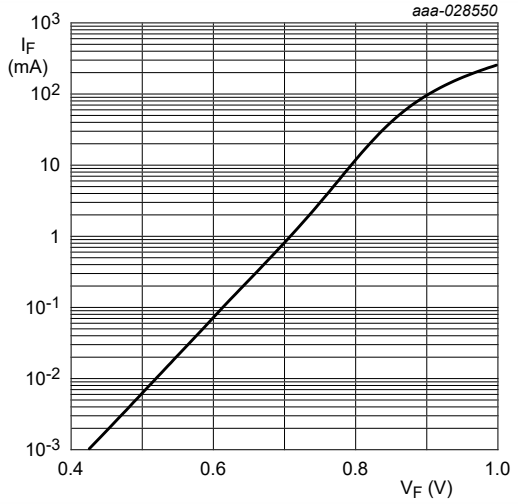
[2] t_p = 100 μs; square wave; T_j = 25 °C



(1) T_j = 25 °C (before surge)

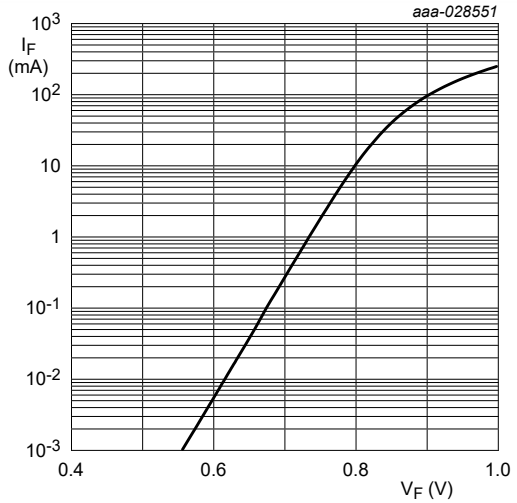
(2) T_j = 150 °C (before surge)

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



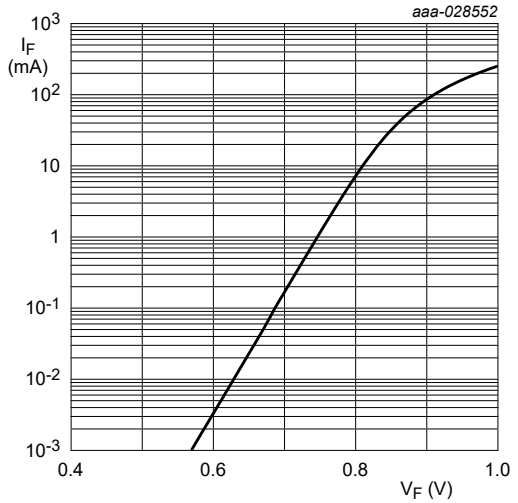
T_j = 25 °C

Fig. 2. Forward current as a function of forward voltage; typical values (BZX84-A/B/C2V4)



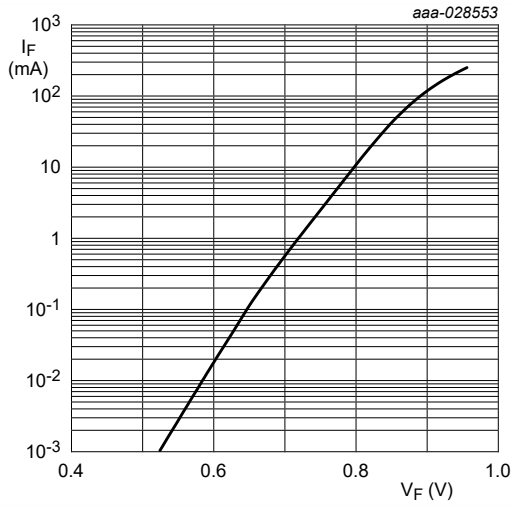
T_j = 25 °C

Fig. 3. Forward current as a function of forward voltage; typical values (BZX84-A/B/C6V8)



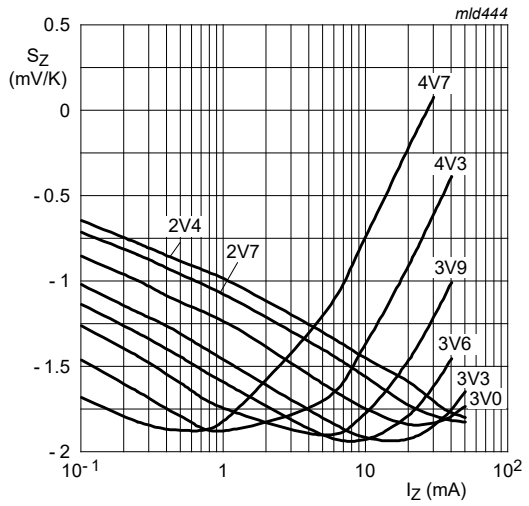
T_j = 25 °C

Fig. 4. Forward current as a function of forward voltage; typical values (BZX84-A/B/C7V5)



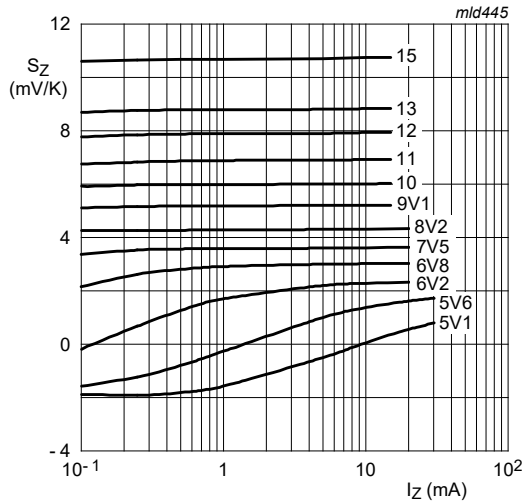
T_j = 25 °C

Fig. 5. Forward current as a function of forward voltage; typical values (BZX84-A/B/C75)



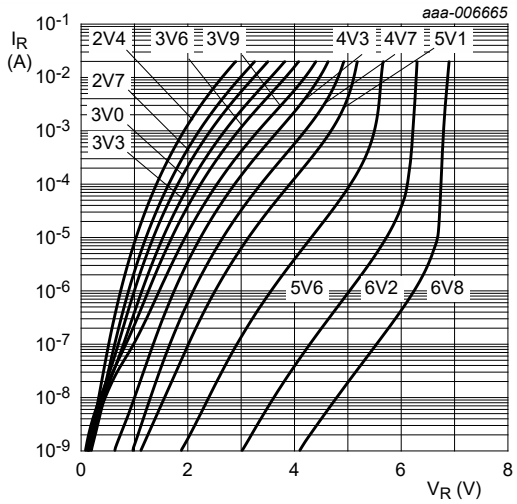
T_j = 25 °C to 150 °C

Fig. 6. Temperature coefficient as a function of working current; typical values (BZX84-A/B/C2V4 to BZX84-A/B/C4V7)



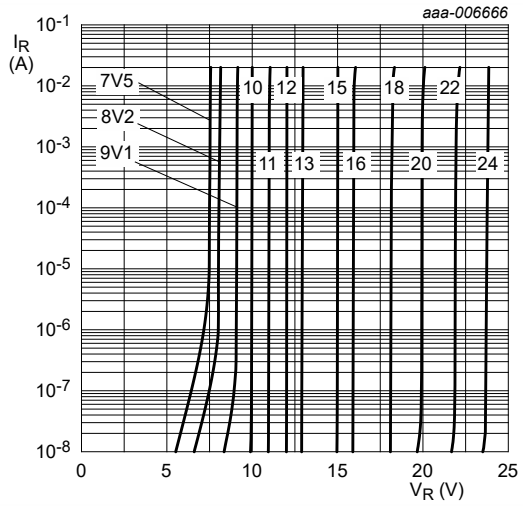
T_j = 25 °C to 150 °C

Fig. 7. Temperature coefficient as a function of working current; typical values (BZX84-A/B/C5V1 to BZX84-A/B/C15)



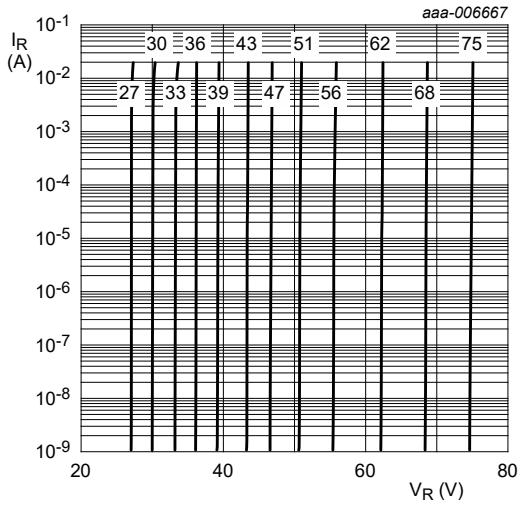
T_j = 25 °C

Fig. 8. Reverse current as a function of reverse voltage; typical values (BZX84-A/B/C2V4 to BZX84-A/B/C6V8)



T_j = 25 °C

Fig. 9. Reverse current as a function of reverse voltage; typical values (BZX84-A/B/C7V5 to BZX84-A/B/C24)



T_j = 25 °C

Fig. 10. Reverse current as a function of reverse voltage; typical values (BZX84-A/B/C27 to BZX84-A/B/C75)

11. Package outline

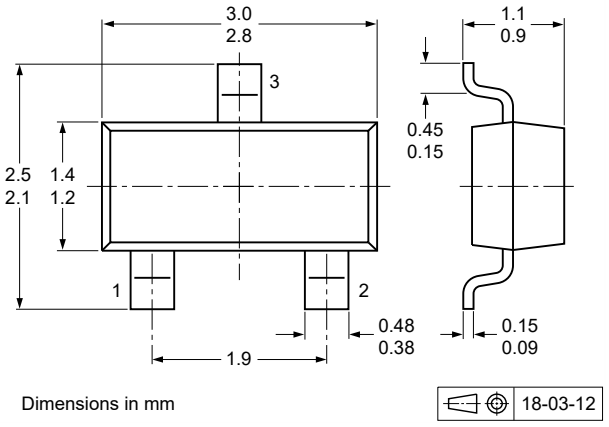


Fig. 11. Package outline SOT23 (TO-236AB)

12. Soldering

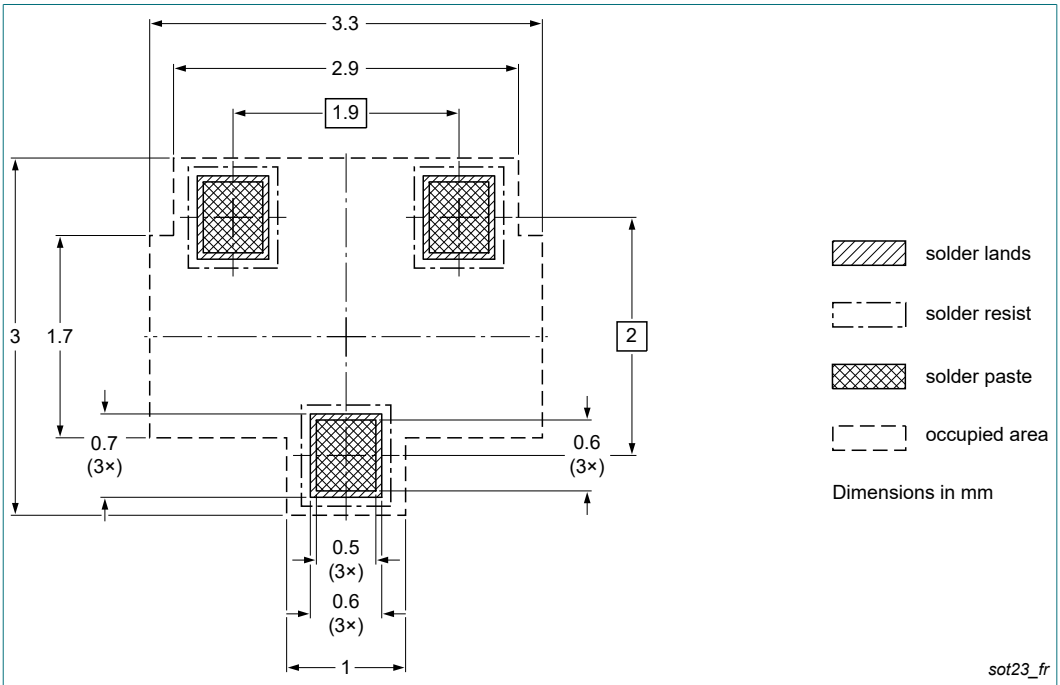


Fig. 12. Reflow soldering footprint for SOT23 (TO-236AB)

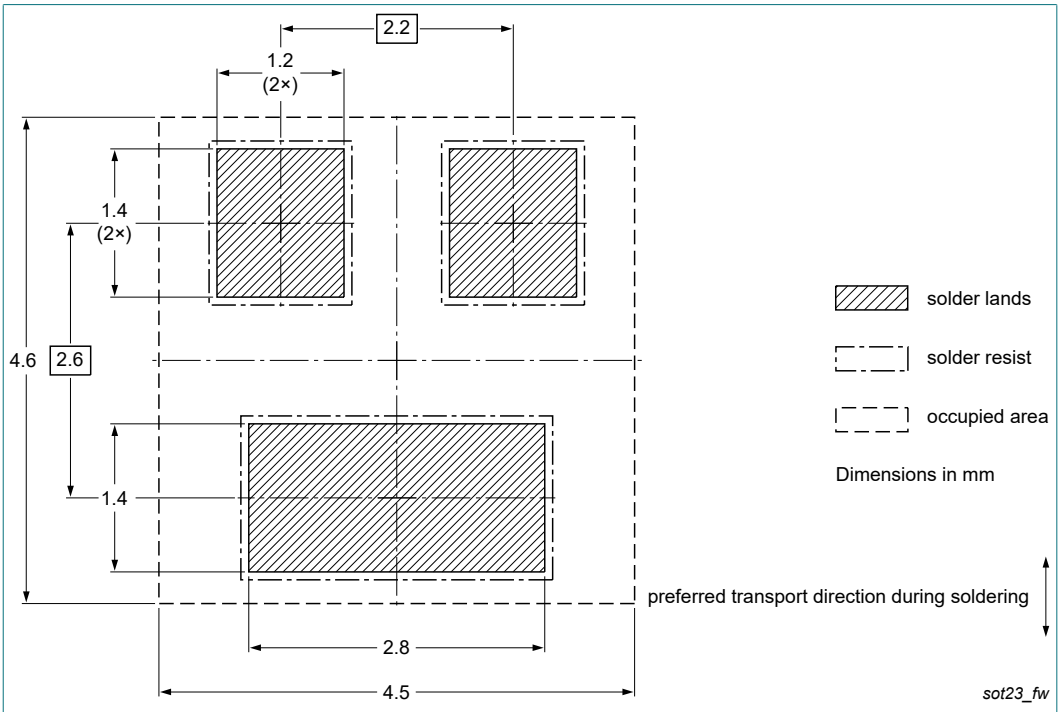


Fig. 13. Wave soldering footprint for SOT23 (TO-236AB)

13. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX84_SER v.7	20230101	Product data sheet	-	BZX84_SER v.6
Modifications:	• Section "Packing information" removed • Limiting values: Temperature specifications adjusted • Products changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternatives.			
BZX84_SER v.6	20140306	Product data sheet		BZX84_SER v.5
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	-	-

14. 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.

Definitions

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