BZX84W series

Voltage regulator diodes

Rev. 2 — 1 January 2023 Product data sheet

1. General description

General-purpose Zener diodes in a SOT323 (SC-70) leadless very small Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Two tolerance series: ± 2 % and ± 5 %

3. Applications

- General regulation functions
- High-frequency applications

4. Quick reference data

Table 1. Quick reference data

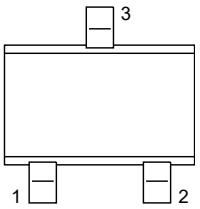
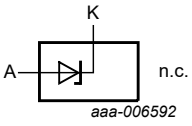
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 10 mA	[1]	-	-	0.9	V
P_{tot}	total power dissipation		[2]	-	-	275	mW

[1] Pulse test: tp ≤ 100 µs; δ ≤ 0.02
[2] Device mounted on a FR4 PCB, single-sided copper, tin-plated and standard footprint.

5. Pinning information

Table 2. Pinning

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

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6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZX84W-B2V4 to BZX84W-C75 [1]	SC-70	Plastic surface-mounted package; 3 leads	SOT323

[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	Mark. Code[1]	Type number	Mark. Code[1]	Type number	Mark. Code[1]	Type number	Mark. Code[1]
BZX84W-B2V4	D3%	BZX84W-B15	J5%	BZX84W-C2V4	M3%	BZX84W-C15	R8%
BZX84W-B2V7	D4%	BZX84W-B16	J6%	BZX84W-C2V7	M4%	BZX84W-C16	R9%
BZX84W-B3V0	D5%	BZX84W-B18	J7%	BZX84W-C3V0	M5%	BZX84W-C18	S2%
BZX84W-B3V3	D6%	BZX84W-B20	J8%	BZX84W-C3V3	M6%	BZX84W-C20	S3%
BZX84W-B3V6	D7%	BZX84W-B22	J9%	BZX84W-C3V6	M7%	BZX84W-C22	S4%
BZX84W-B3V9	D8%	BZX84W-B24	K5%	BZX84W-C3V9	M9%	BZX84W-C24	S5%
BZX84W-B4V3	D9%	BZX84W-B27	K6%	BZX84W-C4V3	N3%	BZX84W-C27	S6%
BZX84W-B4V7	E4%	BZX84W-B30	K7%	BZX84W-C4V7	P3%	BZX84W-C30	S7%
BZX84W-B5V1	E5%	BZX84W-B33	K8%	BZX84W-C5V1	P4%	BZX84W-C33	S8%
BZX84W-B5V6	E6%	BZX84W-B36	K9%	BZX84W-C5V6	P5%	BZX84W-C36	S9%
BZX84W-B6V2	E7%	BZX84W-B39	L2%	BZX84W-C6V2	P6%	BZX84W-C39	U2%
BZX84W-B6V8	E8%	BZX84W-B43	L3%	BZX84W-C6V8	P7%	BZX84W-C43	U3%
BZX84W-B7V5	E9%	BZX84W-B47	L5%	BZX84W-C7V5	P8%	BZX84W-C47	U4%
BZX84W-B8V2	F5%	BZX84W-B51	L6%	BZX84W-C8V2	P9%	BZX84W-C51	U5%
BZX84W-B9V1	F7%	BZX84W-B56	L7%	BZX84W-C9V1	R3%	BZX84W-C56	U6%
BZX84W-B10	F9%	BZX84W-B62	L8%	BZX84W-C10	R4%	BZX84W-C62	U7%
BZX84W-B11	J2%	BZX84W-B68	L9%	BZX84W-C11	R5%	BZX84W-C68	U8%
BZX84W-B12	J3%	BZX84W-B75	M2%	BZX84W-C12	R6%	BZX84W-C75	U9%
BZX84W-B13	J4%	-	-	BZX84W-C13	R7%	-	-

[1] % = placeholder for manufacturing site code

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	t_p = 100 µs; square wave; T_{amb} = 25 °C; prior to surge	-	40	W
P_{tot}	total power dissipation	T_{amb} = 25 °C [1]	-	275	mW
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		−55	+150	°C
T_{stg}	storage temperature		−65	+150	°C

[1] Device mounted on a FR4 PCB, single-sided 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]	-	-	455	K/W

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

10. Characteristics

Table 7. Characteristics per type; BZX84W-B2V4 to BZX84W-C75

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Max	Unit
V_F	forward voltage	I_F = 10 mA	[1]	0.9	V
I_R	reverse current				
	BZX84W-B/C2V4	V_R = 1 V		50	µA
	BZX84W-B/C2V7	V_R = 1 V		20	µA
	BZX84W-B/C3V0	V_R = 1 V		10	µA
	BZX84W-B/C3V3	V_R = 1 V		5	µA
	BZX84W-B/C3V6	V_R = 1 V		5	µA
	BZX84W-B/C3V9	V_R = 1 V		3	µA
	BZX84W-B/C4V3	V_R = 1 V		3	µA
	BZX84W-B/C4V7	V_R = 2 V		3	µA
	BZX84W-B/C5V1	V_R = 2 V		2	µA
	BZX84W-B/C5V6	V_R = 2 V		1	µA
	BZX84W-B/C6V2	V_R = 4 V		3	µA
	BZX84W-B/C6V8	V_R = 4 V		2	µA
	BZX84W-B/C7V5	V_R = 5 V		1	µA
	BZX84W-B/C8V2	V_R = 5 V		700	nA
	BZX84W-B/C9V1	V_R = 6 V		500	nA
	BZX84W-B/C10	V_R = 7 V		200	nA
	BZX84W-B/C11	V_R = 8 V		100	nA
	BZX84W-B/C12	V_R = 8 V		100	nA
	BZX84W-B/C13	V_R = 8 V		100	nA
	BZX84W-B/C15 to 75	V_R = 0.7 V_{Znom}		50	nA

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

Table 8. Characteristics per type; BZX84W-B2V4 to BZX84W-C24

T_j = 25 °C unless otherwise specified.

BZX84W-	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Temperature coefficient S_Z (mV/K)	Diode capacit. C_d (pF) [1]	Non-repetitive peak reverse current I_{ZSM} (A)
		I_Z = 5 mA Tol. ± 2% (B) Tol. ± 5% (C)		I_Z = 1 mA	I_Z = 5 mA	I_Z = 5 mA		t_p = 100 µs; T_{amb} = 25 °C
		Min	Max	Max	Max	Typ	Max	Max
2V4	B	2.35	2.45	600	100	-1.6	450	6
	C	2.20	2.60					
2V7	B	2.65	2.75	600	100	-2.0	450	6
	C	2.50	2.90					
3V0	B	2.94	3.06	600	95	-2.1	450	6
	C	2.80	3.20					
3V3	B	3.23	3.37	600	95	-2.4	450	6
	C	3.10	3.50					
3V6	B	3.53	3.67	600	90	-2.4	450	6
	C	3.40	3.80					
3V9	B	3.82	3.98	600	90	-2.5	450	6
	C	3.70	4.10					
4V3	B	4.21	4.39	600	90	-2.5	450	6
	C	4.00	4.60					
4V7	B	4.61	4.79	500	80	-1.4	300	6
	C	4.40	5.00					
5V1	B	5.00	5.20	480	60	-0.8	300	6
	C	4.80	5.40					
5V6	B	5.49	5.71	400	40	1.2	300	6
	C	5.20	6.00					
6V2	B	6.08	6.32	150	10	2.3	200	6
	C	5.80	6.60					
6V8	B	6.66	6.94	80	15	3.0	200	6
	C	6.40	7.20					
7V5	B	7.35	7.65	80	15	4.0	150	4
	C	7.00	7.90					
8V2	B	8.04	8.36	80	15	4.6	150	4
	C	7.70	8.70					
9V1	B	8.92	9.28	100	15	5.5	150	3
	C	8.50	9.60					
10	B	9.80	10.20	150	20	6.4	90	3
	C	9.40	10.60					
11	B	10.80	11.20	150	20	7.4	85	2.5
	C	10.40	11.60					
12	B	11.80	12.20	150	25	8.4	85	2.5
	C	11.40	12.70					

BZX84W-	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Temperature coefficient S_Z (mV/K)	Diode capacit. C_d (pF) [1]	Non-repetitive peak reverse current I_{ZSM} (A)
		I_Z = 5 mA Tol. ± 2% (B) Tol. ± 5% (C)		I_Z = 1 mA	I_Z = 5 mA	I_Z = 5 mA		t_p = 100 µs; T_{amb} = 25 °C
		Min	Max	Max	Max	Typ	Max	Max
13	B	12.70	13.30	170	30	9.4	80	2.5
	C	12.40	14.10					
15	B	14.70	15.30	200	30	11.4	75	2.0
	C	13.80	15.60					
16	B	15.70	16.30	200	40	12.4	75	1.5
	C	15.30	17.10					
18	B	17.60	18.40	225	45	14.4	70	1.5
	C	16.80	19.10					
20	B	19.60	20.40	225	55	16.4	60	1.5
	C	18.80	21.20					
22	B	21.60	22.40	250	55	18.4	60	1.25
	C	20.80	23.30					
24	B	23.50	24.50	250	70	20.4	55	1.25
	C	22.80	25.60					

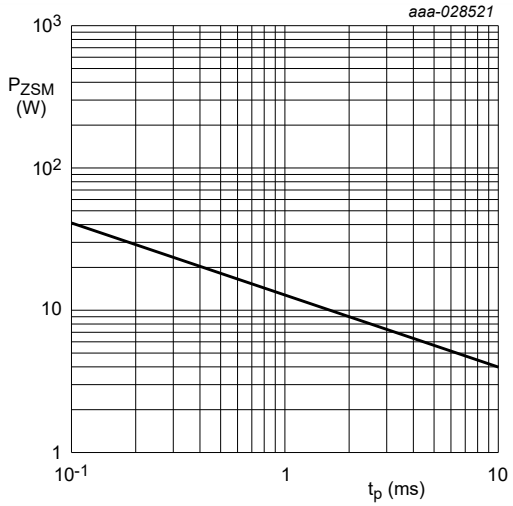
[1] f = 1 MHz; V_R = 0 V

Table 9. Characteristics per type; BZX84W-B27 to BZX84W-C75

T_j = 25 °C unless otherwise specified.

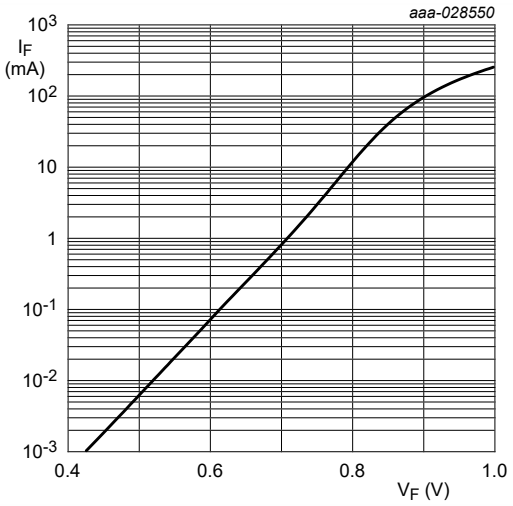
BZX84W-	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Temperature coefficient S_Z (mV/K)	Diode capacitance C_d (pF) [1]	Non-repetitive peak reverse current
		I_Z = 2 mA Tol. ± 2% (B) Tol. ± 5% (C)		I_Z = 0.5 mA	I_Z = 2 mA	I_Z = 2 mA		I_{ZSM} (A) at t_p = 100 µs; T_{amb} = 25 °C
		Min	Max	Max	Max	Typ	Max	Max
27	B	26.50	27.50	300	80	23.4	50	1.0
	C	25.10	28.90					
30	B	29.40	30.60	300	80	26.6	50	1.0
	C	28.50	32.00					
33	B	32.30	33.70	325	80	29.7	45	0.9
	C	31.00	35.00					
36	B	35.30	36.70	350	90	33.0	45	0.8
	C	34.00	38.00					
39	B	38.20	39.80	350	130	36.4	45	0.7
	C	37.00	41.00					
43	B	42.10	43.90	375	150	41.2	40	0.6
	C	40.00	46.00					
47	B	46.10	47.90	375	170	46.1	40	0.5
	C	44.00	50.00					
51	B	50.00	52.00	400	180	51.0	40	0.4
	C	48.00	54.00					
56	B	54.90	57.10	425	200	57.0	40	0.3
	C	52.00	60.00					
62	B	60.80	63.20	450	215	64.4	35	0.3
	C	58.00	66.00					
68	B	66.60	69.40	475	240	71.7	35	0.25
	C	64.00	72.00					
75	B	73.50	76.50	500	255	80.2	35	0.2
	C	70.00	79.00					

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



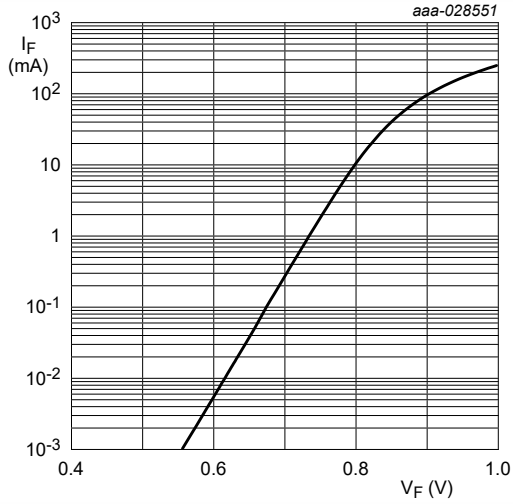
T_j = 25 °C

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



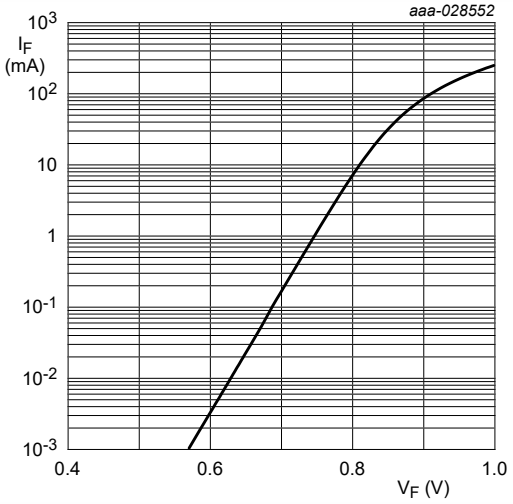
T_j = 25 °C

Fig. 2. Forward current as a function of forward voltage; typical values (BZX84W-B/C2V4)



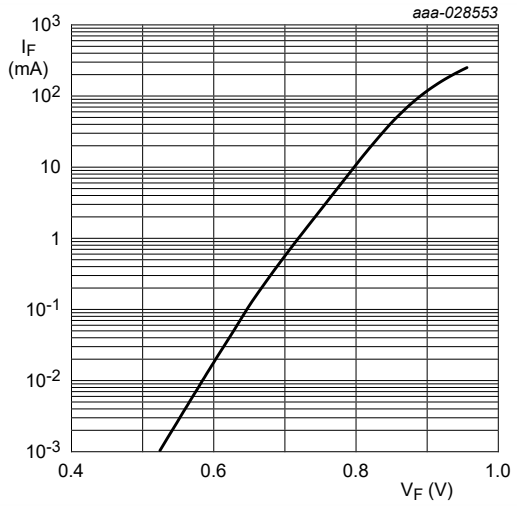
T_j = 25 °C

Fig. 3. Forward current as a function of forward voltage; typical values (BZX84W-B/C6V8)



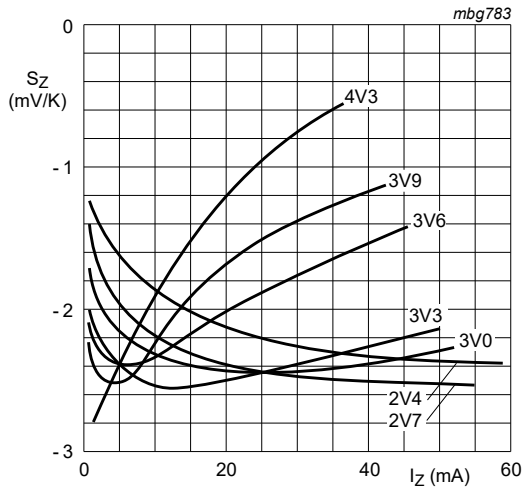
T_j = 25 °C

Fig. 4. Forward current as a function of forward voltage; typical values (BZX84W-B/C7V5)



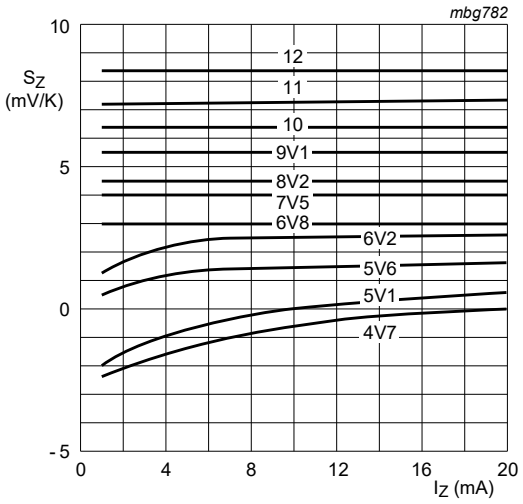
T_j = 25 °C

Fig. 5. Forward current as a function of forward voltage; typical values (BZX84W-B/C75)



T_j = 25 °C to 150 °C

Fig. 6. Temperature coefficient as a function of working current; typical values (BZX84W-B/C2V4 to B/C4V3)

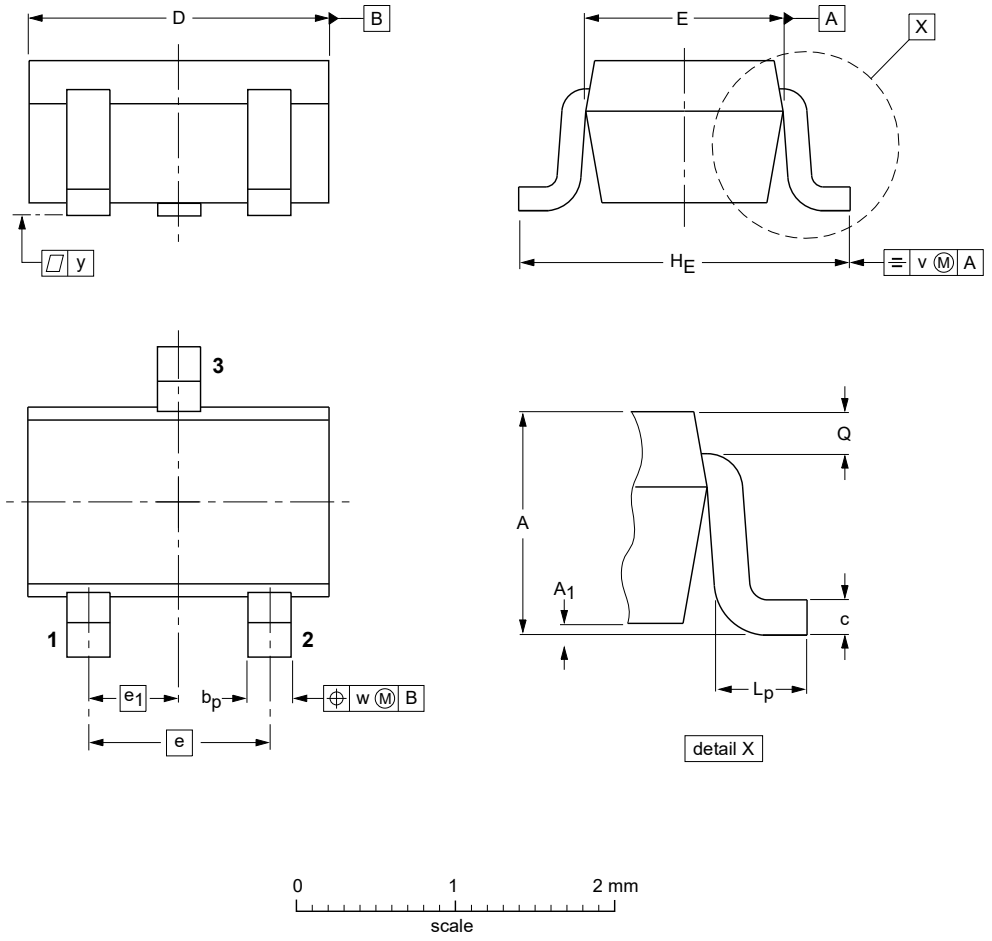


T_j = 25 °C to 150 °C

Fig. 7. Temperature coefficient as a function of working current; typical values (BZX84W-B/C4V7 to B/C12)

11. Package outline

Plastic surface-mounted package; 3 leads **SOT323**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.8	0.1	0.4 0.3	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT323			SC-70			~~04-11-04~~ 06-03-16

Fig. 8. Package outline SOT323

12. Soldering

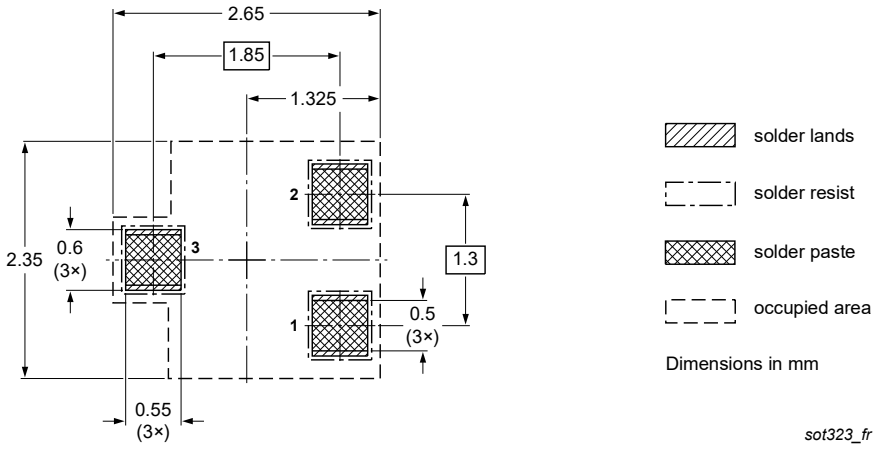


Fig. 9. Reflow soldering footprint SOT323

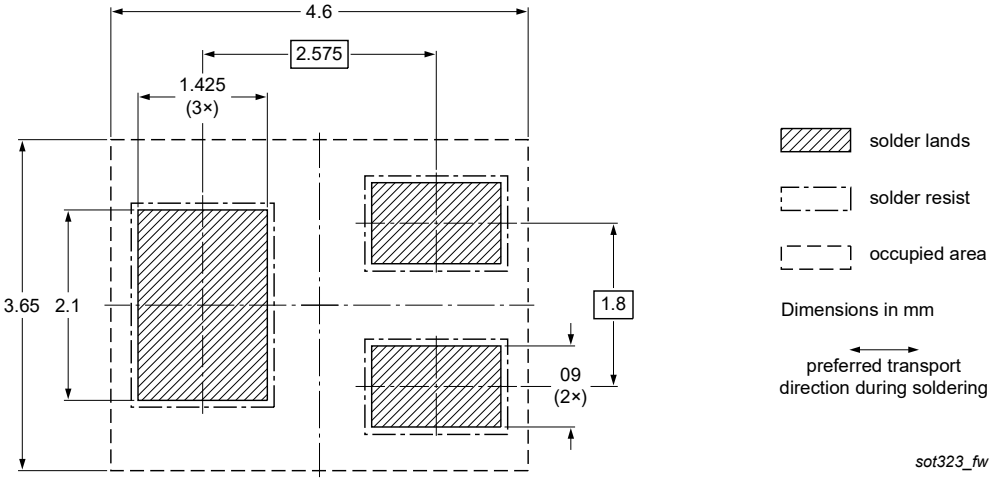


Fig. 10. Wave soldering footprint SOT323

13. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX84W_SER v.2	20230101	Product data sheet	-	BZX84W_SER v.1
Modifications:	• Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
BZX84W_SER v.1	20180529	Product data sheet	-	-

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.

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