



BZX84W series

Voltage regulator diodes

Rev. 1 — 29 May 2018

Product data sheet

1 Product profile

1.1 General description

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

1.2 Features and benefits

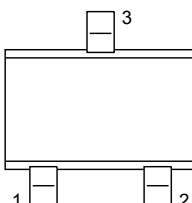
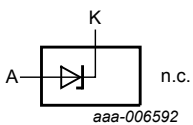
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Two tolerance series: $\pm 2\%$ and $\pm 5\%$
- AEC-Q101 qualified

1.3 Applications

- General regulation functions
- High-frequency applications

2 Pinning information

Table 1. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode		 aaa-006592
2	n.c.	not connected		
3	K	cathode		

3 Ordering information

Table 2. 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.

4 Marking

Table 3. Marking Codes

Type number	Marking Code	Type number	Marking Code	Type number	Marking Code	Type number	Marking Code
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%	-	-

% = placeholder for manufacturing site code

5 Limiting values

Table 4. 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	$t_p = 100 \mu s$; square wave; $T_{amb} = 25^\circ C$; prior to surge		-	40	W
P_{tot}	total power dissipation	$T_{amb} = 25^\circ C$	[1]	-	275	mW
T_j	junction temperature			-	150	$^\circ C$
T_{amb}	ambient temperature			-55	+150	$^\circ C$
T_{stg}	storage temperature			-65	+150	$^\circ C$

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

6 Thermal characteristics

Table 5. 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 an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7 Characteristics

Table 6. Electrical characteristics

$T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

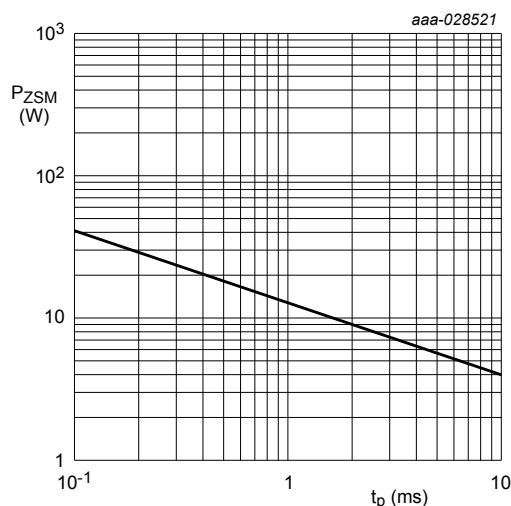
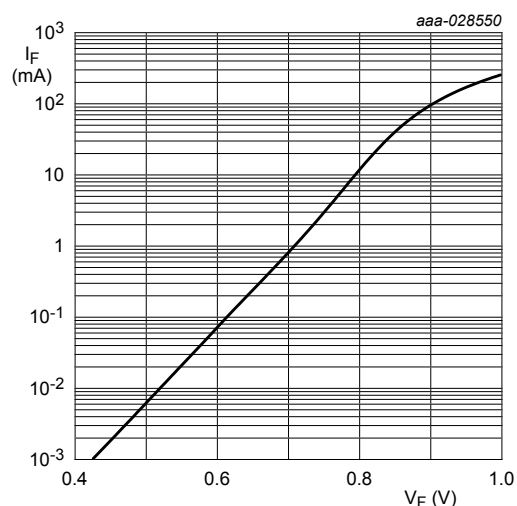
Symbol	Parameter	Conditions	Max	Unit
V_F	forward voltage	$I_F = 10\text{ mA}$	0.9	V
I_R	reverse current			
	BZX84W-B/C2V4	$V_R = 1\text{ V}$	50	μA
	BZX84W-B/C2V7	$V_R = 1\text{ V}$	20	μA
	BZX84W-B/C3V0	$V_R = 1\text{ V}$	10	μA
	BZX84W-B/C3V3	$V_R = 1\text{ V}$	5	μA
	BZX84W-B/C3V6	$V_R = 1\text{ V}$	5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

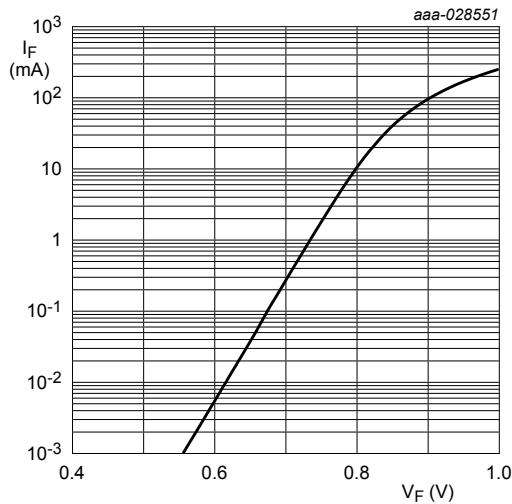
Table 7. Electrical characteristics per type

BZX84W- B or C	Working voltage V _Z (V); at I _Z = 5 mA				Differential resistance r _{diff} (Ω);				Temperature coefficient S _Z (mV/K); I _{Ztest} = 5 mA	Diode capacit. C _d (pF) ^[1]	Non- repetitive peak reverse current I _{ZSM} (A) at t _p = 100 μs; T _{amb} = 25°C
	Tol. ± 2% (B)		Tol. ± 5% (C)		at I _{Ztest} = 1 mA		at I _{Ztest} = 5 mA				
	Min	Max	Min	Max	Typ	Max	Typ	Max			
2V4	2.35	2.45	2.2	2.6	275	600	70	100	-1.6	450	6
2V7	2.65	2.75	2.5	2.9	300	600	75	100	-2.0	450	6
3V0	2.94	3.06	2.8	3.2	325	600	80	95	-2.1	450	6
3V3	3.23	3.37	3.1	3.5	350	600	85	95	-2.4	450	6
3V6	3.53	3.67	3.4	3.8	375	600	85	90	-2.4	450	6
3V9	3.82	3.98	3.7	4.1	400	600	85	90	-2.5	450	6
4V3	4.21	4.39	4.0	4.6	410	600	80	90	-2.5	450	6
4V7	4.61	4.79	4.4	5.0	425	500	50	80	-1.4	300	6
5V1	5.00	5.20	4.8	5.4	400	480	40	60	-0.8	300	6
5V6	5.49	5.71	5.2	6.0	80	400	15	40	1.2	300	6
6V2	6.08	6.32	5.8	6.6	40	150	6	10	2.3	200	6
6V8	6.66	6.94	6.4	7.2	30	80	6	15	3.0	200	6
7V5	7.35	7.65	7.0	7.9	30	80	6	15	4.0	150	4
8V2	8.04	8.36	7.7	8.7	40	80	6	15	4.6	150	4
9V1	8.92	9.28	8.5	9.6	40	100	6	15	5.5	150	3
10	9.80	10.20	9.4	10.6	50	150	8	20	6.4	90	3
11	10.8	11.2	10.4	11.6	50	150	10	20	7.4	85	2.5
12	11.8	12.2	11.4	12.7	50	150	10	25	8.4	85	2.5
13	12.7	13.3	12.4	14.1	50	170	10	30	9.4	80	2.5
15	14.7	15.3	13.8	15.6	50	200	10	30	11.4	75	2.0
16	15.7	16.3	15.3	17.1	50	200	10	40	12.4	75	1.5
18	17.6	18.4	16.8	19.1	50	225	10	45	14.4	70	1.5
20	19.6	20.4	18.8	21.2	60	225	15	55	16.4	60	1.5
22	21.6	22.4	20.8	23.3	60	250	20	55	18.4	60	1.25
24	23.5	24.5	22.8	25.6	60	250	25	70	20.4	55	1.25

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

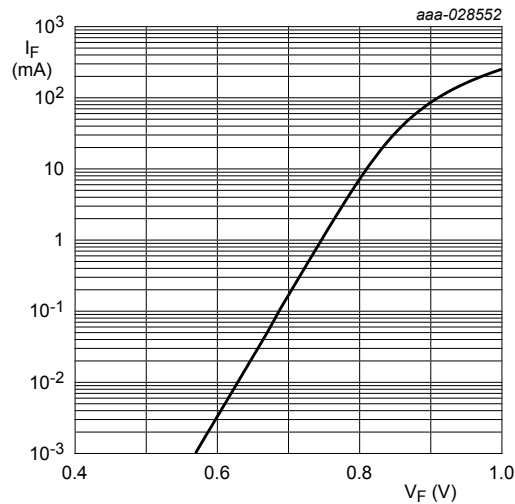
BZX84W-B or C	Working voltage V _Z (V); at I _Z = 2 mA				Differential resistance r _{diff} (Ω);				Temperature coefficient S _Z (mV/K); I _{Ztest} = 2 mA	Diode capacit. C _d (pF) ^[1]	Non-repetitive peak reverse current I _{ZSM} (A) at t _p = 100 μs; T _{amb} = 25°C
	Tol. ± 2% (B)		Tol. ± 5% (C)		at I _{Ztest} = 0.5 mA		at I _{Ztest} = 2 mA				
	Min	Max	Min	Max	Typ	Max	Typ	Max			
27	26.5	27.5	25.1	28.9	65	300	25	80	23.4	50	1.0
30	29.4	30.6	28.5	32.0	70	300	30	80	26.6	50	1.0
33	32.3	33.7	31.0	35.0	75	325	35	80	29.7	45	0.9
36	35.3	36.7	34.0	38.0	80	350	35	90	33.0	45	0.8
39	38.2	39.8	37.0	41.0	80	350	40	130	36.4	45	0.7
43	42.1	43.9	40.0	46.0	85	375	45	150	41.2	40	0.6
47	46.1	47.9	44.0	50.0	85	375	50	170	46.1	40	0.5
51	50.0	52.0	48.0	54.0	90	400	60	180	51.0	40	0.4
56	54.9	57.1	52.0	60.0	100	425	70	200	57.0	40	0.3
62	60.8	63.2	58.0	66.0	120	450	80	215	64.4	35	0.3
68	66.6	69.4	64.0	72.0	150	475	90	240	71.7	35	0.25
75	73.5	76.5	70.0	79.0	170	500	95	255	80.2	35	0.2

[1] $f = 1$ MHz; $V_R = 0$ V $T_j = 25^\circ\text{C}$ (before surge)**Figure 1. Non-repetitive peak reverse power dissipation as a function of pulse duration; maximum values** $T_j = 25^\circ\text{C}$ **Figure 2. Forward current as a function of forward voltage; typical values (BZX84W-B/C2V4)**



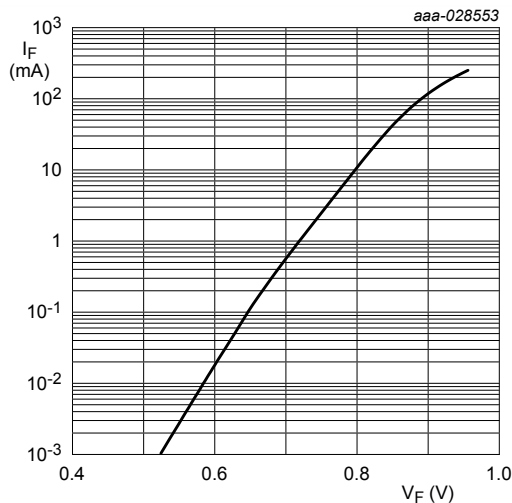
$T_j = 25\text{ }^{\circ}\text{C}$

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



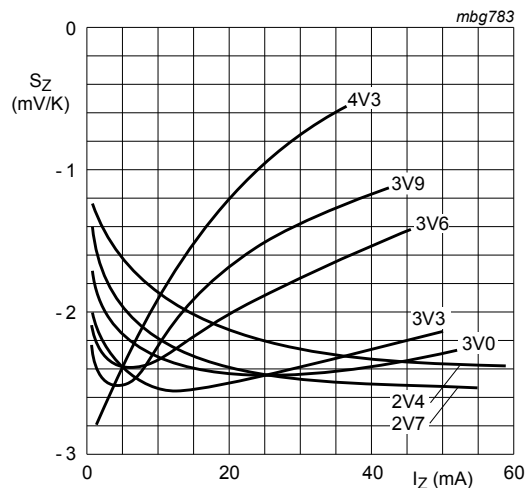
$T_j = 25\text{ }^{\circ}\text{C}$

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



$T_j = 25\text{ }^{\circ}\text{C}$

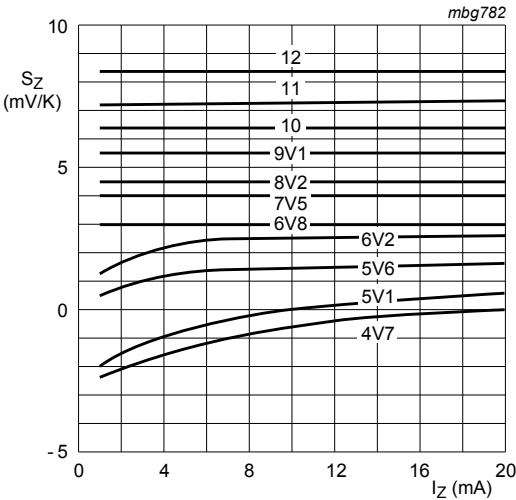
Figure 5. Forward current as a function of forward voltage; typical values (BZX84W-B/C75)



BZX84W_B/C2V4 to B/C4V3

$T_j = 25\text{ }^{\circ}\text{C}$ to $150\text{ }^{\circ}\text{C}$

Figure 6. Temperature coefficient as a function of working current; typical values



BZX84W_B/C4V7 to B/C12

$T_j = 25\text{ °C to }150\text{ °C}$

Figure 7. Temperature coefficient as a function of working current; typical values

8 Package outline

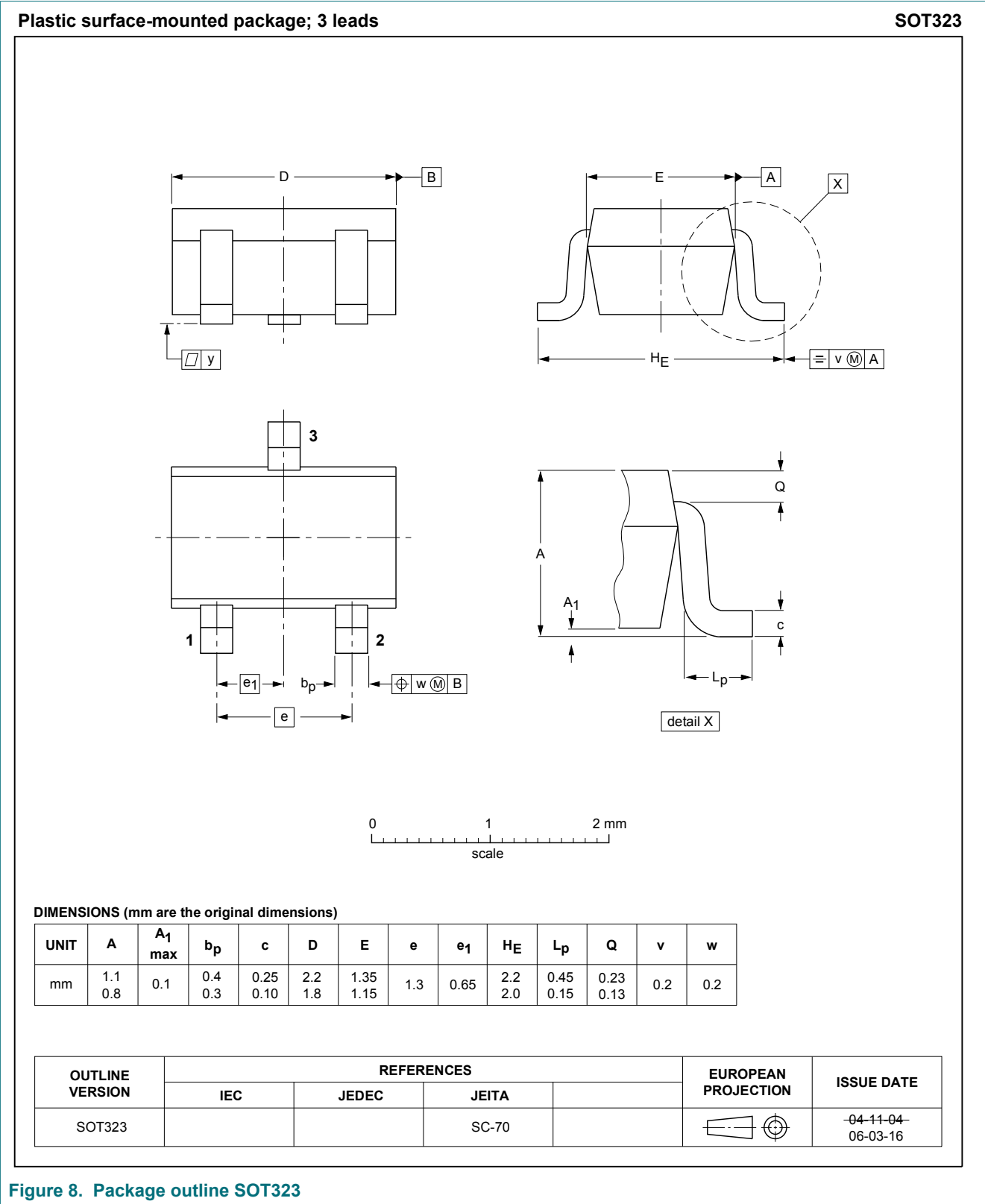
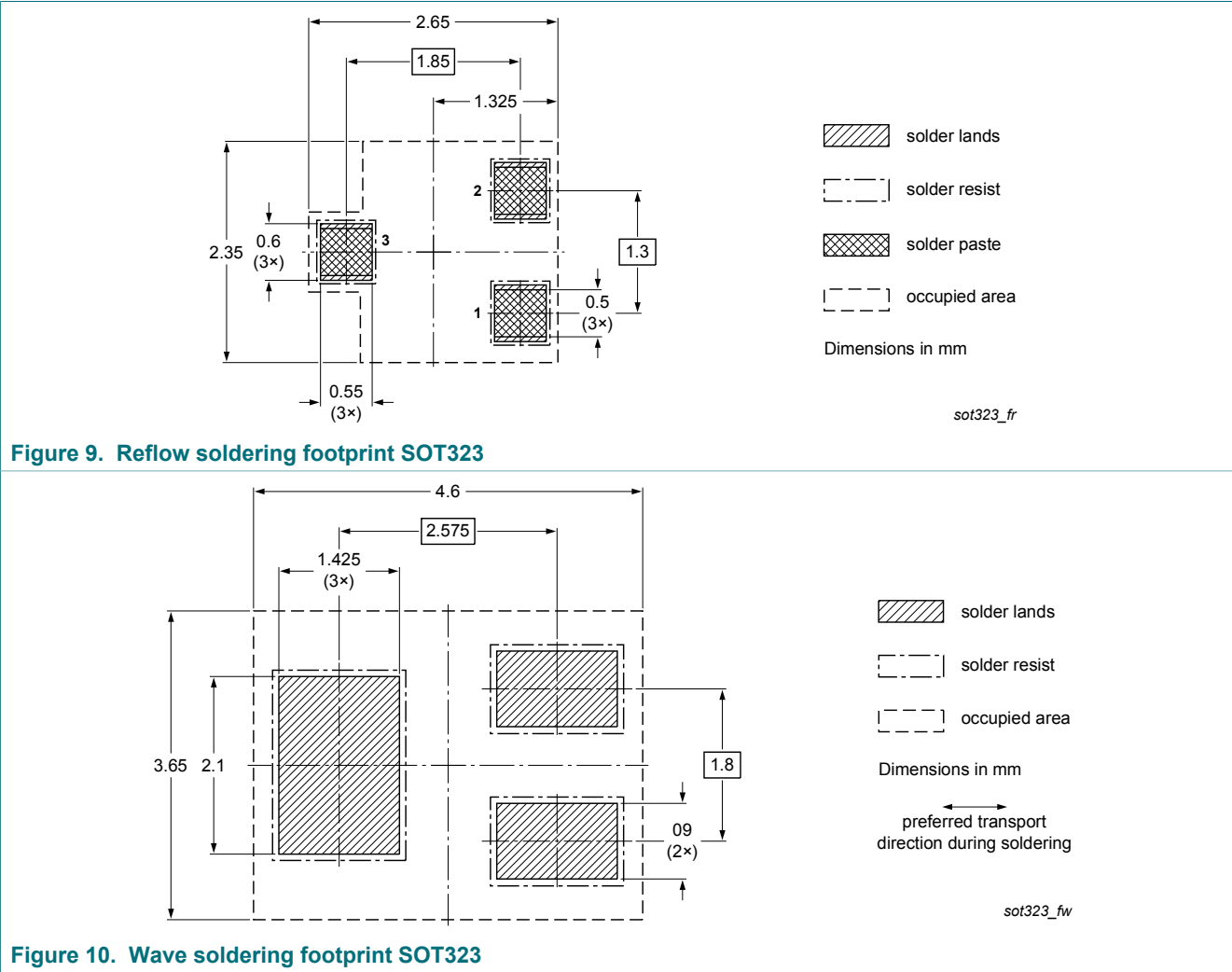


Figure 8. Package outline SOT323

9 Soldering



10 Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX84W_SER v.1	20180529	Product data sheet	-	-

11 Legal information

11.1 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.nexperia.com>.

11.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

11.3 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia. In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of Nexperia.

Right to make changes — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation

or warranty that such applications will be suitable for the specified use without further testing or modification. Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products. Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nexperia.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Suitability for use in automotive applications — This Nexperia product has been qualified for use in automotive applications. Unless otherwise agreed in writing, the product is not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

11.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

Contents

1 Product profile 1

1.1 General description 1

1.2 Features and benefits 1

1.3 Applications 1

2 Pinning information 1

3 Ordering information 1

4 Marking 2

5 Limiting values 3

6 Thermal characteristics 3

7 Characteristics 4

8 Package outline 9

9 Soldering 10

10 Revision history 11

11 Legal information 12

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.