
# 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**

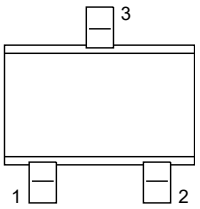
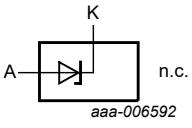
*$T_{amb}$ = 25 °C unless otherwise specified.*

| 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 | | | | | |

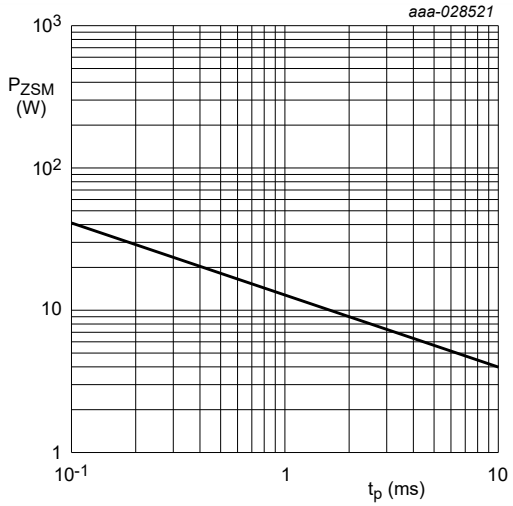
[1] f = 1 MHz; $V_R$ = 0 V

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

*$T_j$ = 25 °C unless otherwise specified.*

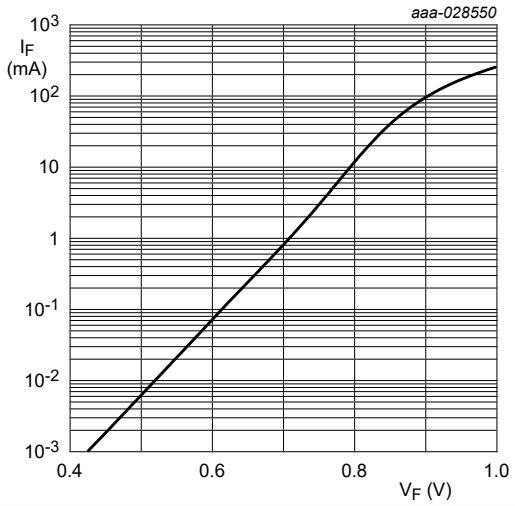
| BZX84W- | Sel | Working voltage $V_Z$ (V) | | Differential resistance $r_{dif}$ (Ω) | | Temperature coefficient $S_Z$ (mV/K) | Diode capacitance $C_d$ (pF) [1] | Non-repetitive peak reverse current |
|---|---|---|---|---|---|---|---|---|
| | | $I_Z$ = 2 mA Tol. ± 2% (B) Tol. ± 5% (C) | | $I_Z$ = 0.5 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



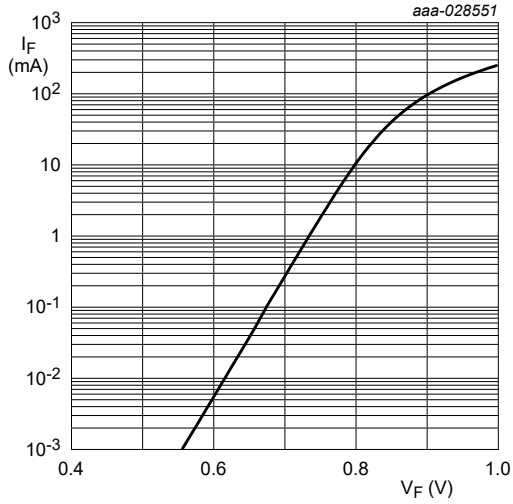

$T_j$ = 25 °C

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



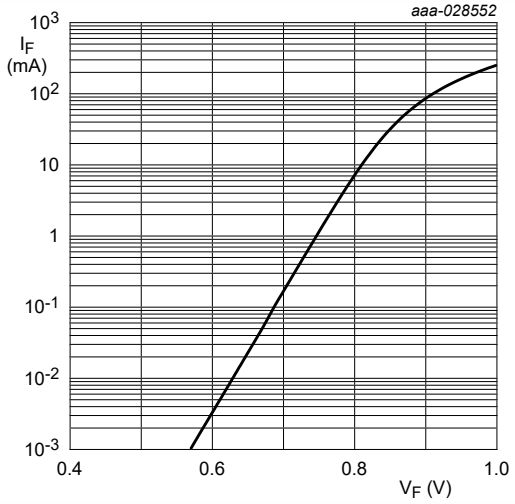

$T_j$ = 25 °C

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



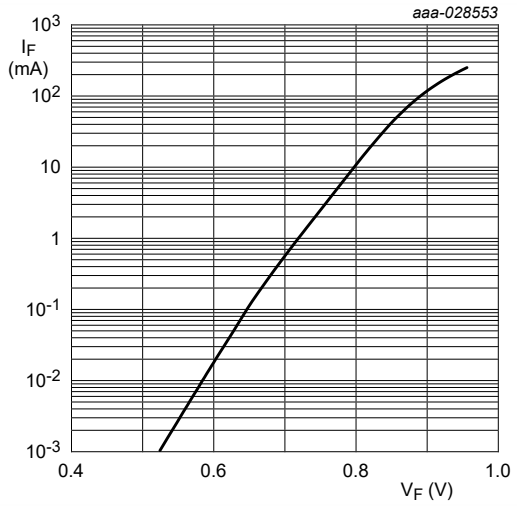

$T_j$ = 25 °C

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



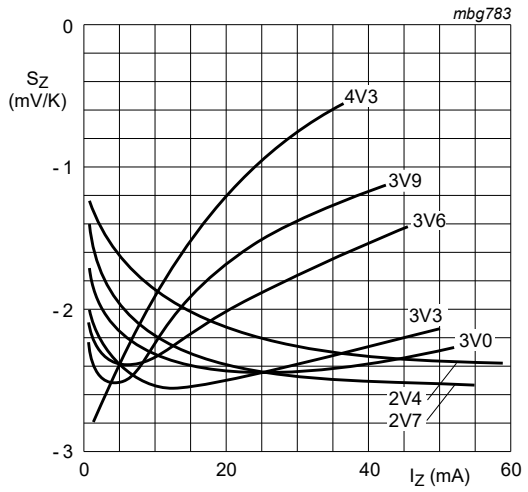

$T_j$ = 25 °C

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



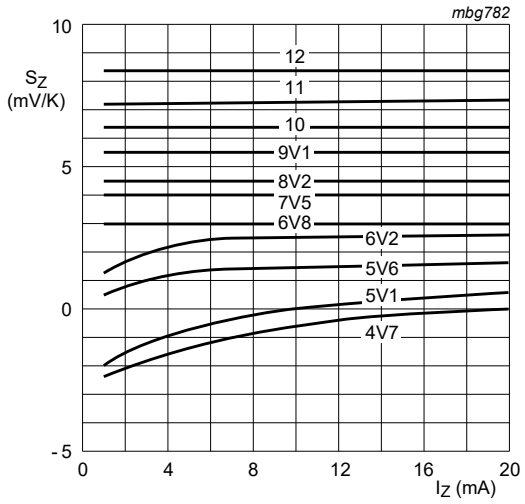

$T_j$ = 25 °C

**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)**

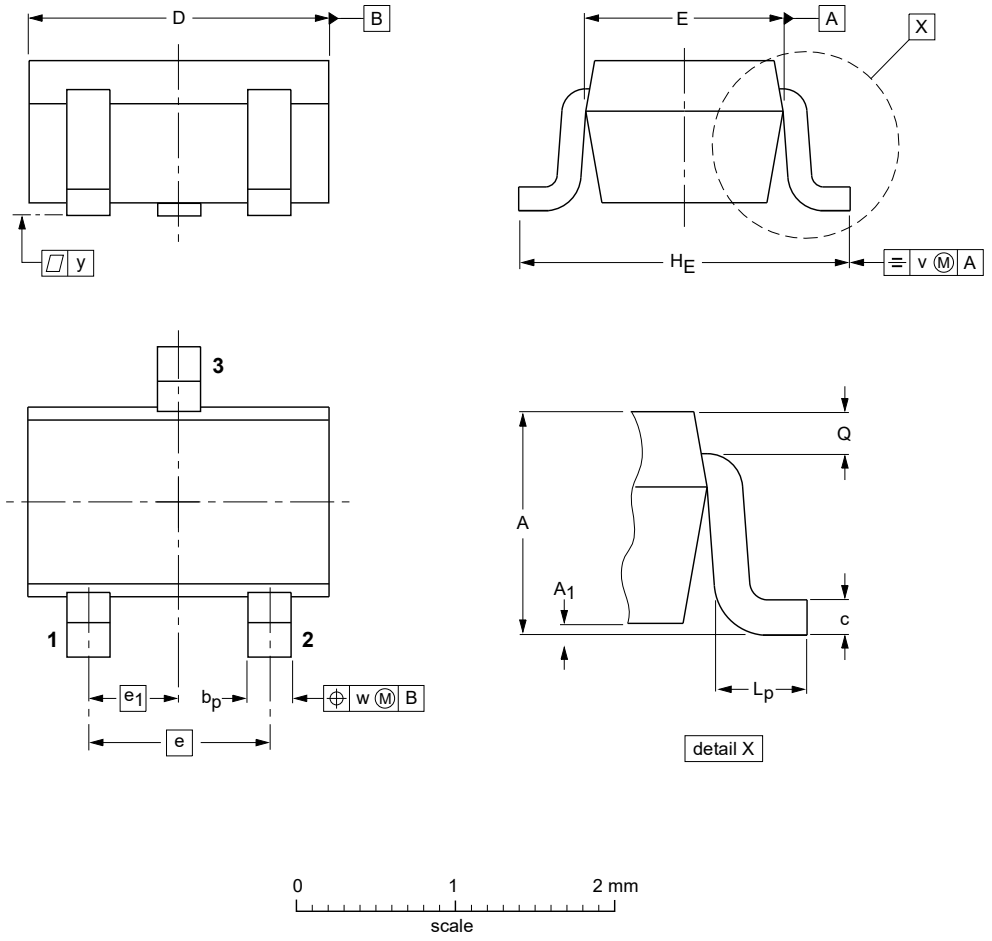



$T_j$ = 25 °C to 150 °C

**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<br>0.8 | 0.1 | 0.4<br>0.3 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.23<br>0.13 | 0.2 | 0.2 |

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

**Fig. 8. Package outline SOT323**

## 12. Soldering

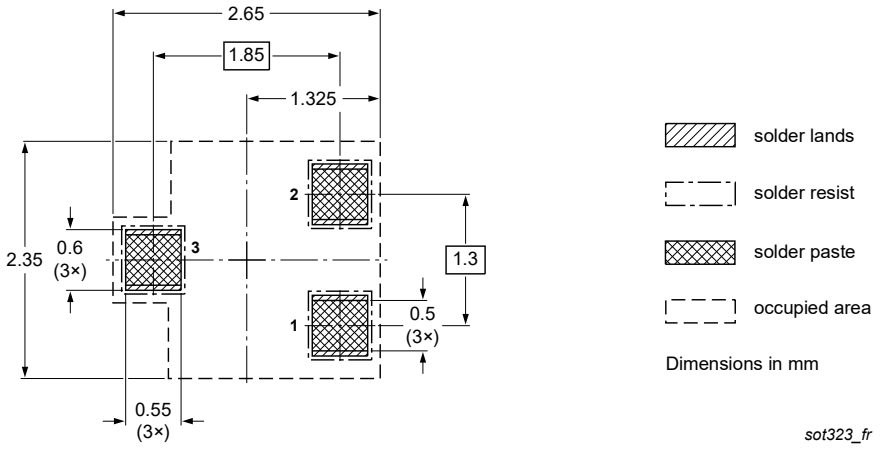



**Fig. 9. Reflow soldering footprint SOT323**

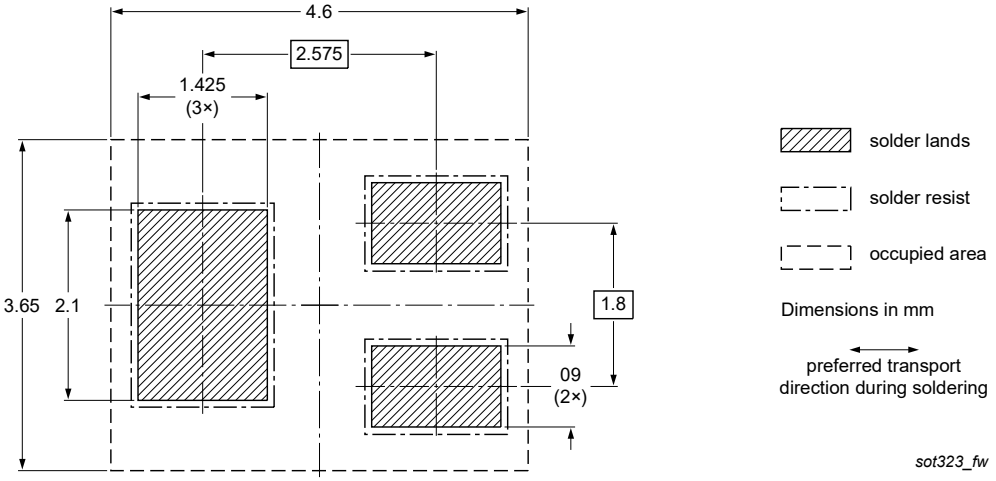



**Fig. 10. Wave soldering footprint SOT323**

# 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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