
# BZT52-Q series

## Voltage regulator diodes

Rev. 2 — 3 June 2024 Product data sheet

## 1. General description

General-purpose Zener diodes in an SOD123 small and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Total power dissipation: ≤ 590 mW
- Two tolerance series: ±2 % and approximately ±5 %
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- Low differential resistance
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- General regulation functions

## 4. Quick reference data

**Table 1. Quick reference data**

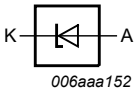
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_F$ | forward voltage | $I_F$ = 10 mA | [1] | - | - | 0.9 | V |
| $P_{tot}$ | total power dissipation | $T_{amb}$ ≤ 25 °C | [2] | - | - | 350 | mW |
| | | | [3] | - | - | 590 | mW |

[1] Pulse test: $t_p$ ≤ 300 µs; δ ≤ 0.02.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 $cm^2$.

nexperia

# 5. Pinning information

**Table 2. Pinning**

| Pin | Symbol | Description | | Simplified outline | Graphic symbol |
|---|---|---|---|---|---|
| 1 | K | cathode | [1] |  |  |
| 2 | A | anode | | | |



[1] The marking bar indicates the cathode.

# 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BZT52-B2V4-Q to BZT52-C75-Q [1] | - | plastic surface-mounted package; 2 leads | SOD123 |

[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 | Marking code | Type number | Marking code | Type number | Marking code | Type number | Marking code |
|---|---|---|---|---|---|---|---|
| BZT52-B2V4-Q | D7 | BZT52-B15-Q | DS | BZT52-C2V4-Q | C1 | BZT52-C15-Q | CL |
| BZT52-B2V7-Q | D8 | BZT52-B16-Q | DT | BZT52-C2V7-Q | C2 | BZT52-C16-Q | CM |
| BZT52-B3V0-Q | D9 | BZT52-B18-Q | DU | BZT52-C3V0-Q | C3 | BZT52-C18-Q | CN |
| BZT52-B3V3-Q | DA | BZT52-B20-Q | DV | BZT52-C3V3-Q | C4 | BZT52-C20-Q | CP |
| BZT52-B3V6-Q | DB | BZT52-B22-Q | DW | BZT52-C3V6-Q | C5 | BZT52-C22-Q | CQ |
| BZT52-B3V9-Q | DC | BZT52-B24-Q | DY | BZT52-C3V9-Q | C6 | BZT52-C24-Q | CR |
| BZT52-B4V3-Q | DD | BZT52-B27-Q | E1 | BZT52-C4V3-Q | C7 | BZT52-C27-Q | CS |
| BZT52-B4V7-Q | DE | BZT52-B30-Q | E2 | BZT52-C4V7-Q | C8 | BZT52-C30-Q | CT |
| BZT52-B5V1-Q | DF | BZT52-B33-Q | E3 | BZT52-C5V1-Q | C9 | BZT52-C33-Q | CU |
| BZT52-B5V6-Q | DG | BZT52-B36-Q | E4 | BZT52-C5V6-Q | CA | BZT52-C36-Q | CV |
| BZT52-B6V2-Q | DH | BZT52-B39-Q | E5 | BZT52-C6V2-Q | CB | BZT52-C39-Q | CW |
| BZT52-B6V8-Q | DJ | BZT52-B43-Q | E6 | BZT52-C6V8-Q | CC | BZT52-C43-Q | CY |
| BZT52-B7V5-Q | DK | BZT52-B47-Q | E7 | BZT52-C7V5-Q | CD | BZT52-C47-Q | D1 |
| BZT52-B8V2-Q | DL | BZT52-B51-Q | E8 | BZT52-C8V2-Q | CE | BZT52-C51-Q | D2 |
| BZT52-B9V1-Q | DM | BZT52-B56-Q | E9 | BZT52-C9V1-Q | CF | BZT52-C56-Q | D3 |
| BZT52-B10-Q | DN | BZT52-B62-Q | EA | BZT52-C10-Q | CG | BZT52-C62-Q | D4 |
| BZT52-B11-Q | DP | BZT52-B68-Q | EB | BZT52-C11-Q | CH | BZT52-C68-Q | D5 |
| BZT52-B12-Q | DQ | BZT52-B75-Q | EC | BZT52-C12-Q | CJ | BZT52-C75-Q | D6 |
| BZT52-B13-Q | DR | - | - | BZT52-C13-Q | CK | - | - |

# 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 | | | - | 250 | mA |
| $I_{ZSM}$ | non-repetitive peak reverse current | | | - | see Tables 8, 9 and 10 | |
| $P_{ZSM}$ | non-repetitive peak reverse power dissipation | | [1] | - | 40 | W |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C | [2] | - | 350 | mW |
| | | | [3] | - | 590 | 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 copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 $cm^2$.

# 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] | - | - | 350 | K/W |
| | | | [2] | - | - | 210 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [3] | - | - | 55 | K/W |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 $cm^2$.
[3] 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: $t_p \leq 300$ µs; $\delta \leq 0.02$.

**Table 8. Characteristics per type; BZT52-B2V4-Q to BZT52-C24-Q**

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

| BZT52 -xxx-Q | 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 | B | 2.35 | 2.45 | 400 | 85 | 50 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 2.2 | 2.6 | | | | | | | | |
| 2V7 | B | 2.65 | 2.75 | 500 | 83 | 20 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 2.5 | 2.9 | | | | | | | | |
| 3V0 | B | 2.94 | 3.06 | 500 | 95 | 10 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 2.8 | 3.2 | | | | | | | | |
| 3V3 | B | 3.23 | 3.37 | 500 | 95 | 5 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 3.1 | 3.5 | | | | | | | | |
| 3V6 | B | 3.53 | 3.67 | 500 | 95 | 5 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 3.4 | 3.8 | | | | | | | | |
| 3V9 | B | 3.82 | 3.98 | 500 | 95 | 3 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 3.7 | 4.1 | | | | | | | | |
| 4V3 | B | 4.21 | 4.39 | 500 | 95 | 3 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 4.0 | 4.6 | | | | | | | | |
| 4V7 | B | 4.61 | 4.79 | 500 | 78 | 3 | 2 | -3.5 | 0.2 | 300 | 6.0 |
| | C | 4.4 | 5.0 | | | | | | | | |
| 5V1 | B | 5.0 | 5.2 | 480 | 60 | 2 | 2 | -2.7 | 1.2 | 300 | 6.0 |
| | C | 4.8 | 5.4 | | | | | | | | |
| 5V6 | B | 5.49 | 5.71 | 400 | 40 | 1 | 2 | -2.0 | 2.5 | 300 | 6.0 |
| | C | 5.2 | 6.0 | | | | | | | | |
| 6V2 | B | 6.08 | 6.32 | 150 | 10 | 3 | 4 | 0.4 | 3.7 | 200 | 6.0 |
| | C | 5.8 | 6.6 | | | | | | | | |
| 6V8 | B | 6.66 | 6.94 | 80 | 8 | 2 | 4 | 1.2 | 4.5 | 200 | 6.0 |
| | C | 6.4 | 7.2 | | | | | | | | |
| 7V5 | B | 7.35 | 7.65 | 80 | 10 | 1 | 5 | 2.5 | 5.3 | 150 | 4.0 |
| | C | 7.0 | 7.9 | | | | | | | | |
| 8V2 | B | 8.04 | 8.36 | 80 | 10 | 0.7 | 5 | 3.2 | 6.2 | 150 | 4.0 |
| | C | 7.7 | 8.7 | | | | | | | | |
| 9V1 | B | 8.92 | 9.28 | 100 | 10 | 0.5 | 6 | 3.8 | 7.0 | 150 | 3.0 |
| | C | 8.5 | 9.6 | | | | | | | | |

| BZT52 -xxx-Q | 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 |
| 10 | B | 9.8 | 10.2 | 70 | 10 | 0.2 | 7 | 4.5 | 8.0 | 90 | 3.0 |
| | C | 9.4 | 10.6 | | | | | | | | |
| 11 | B | 10.8 | 11.2 | 70 | 10 | 0.1 | 8 | 5.4 | 9.0 | 85 | 2.5 |
| | C | 10.4 | 11.6 | | | | | | | | |
| 12 | B | 11.8 | 12.2 | 90 | 10 | 0.1 | 8 | 6.0 | 10.0 | 85 | 2.5 |
| | C | 11.4 | 12.7 | | | | | | | | |
| 13 | B | 12.7 | 13.3 | 110 | 10 | 0.1 | 8 | 7.0 | 11.0 | 80 | 2.5 |
| | C | 12.4 | 14.1 | | | | | | | | |
| 15 | B | 14.7 | 15.3 | 110 | 15 | 0.05 | 10.5 | 9.2 | 13.0 | 75 | 2.0 |
| | C | 13.8 | 15.6 | | | | | | | | |
| 16 | B | 15.7 | 16.3 | 170 | 20 | 0.05 | 11.2 | 10.4 | 14.0 | 75 | 1.5 |
| | C | 15.3 | 17.1 | | | | | | | | |
| 18 | B | 17.6 | 18.4 | 170 | 20 | 0.05 | 12.6 | 12.4 | 16.0 | 70 | 1.5 |
| | C | 16.8 | 19.1 | | | | | | | | |
| 20 | B | 19.6 | 20.4 | 220 | 20 | 0.05 | 14 | 14.4 | 18.0 | 60 | 1.5 |
| | C | 18.8 | 21.2 | | | | | | | | |
| 22 | B | 21.6 | 22.4 | 220 | 25 | 0.05 | 15.4 | 16.4 | 20.0 | 60 | 1.25 |
| | C | 20.8 | 23.3 | | | | | | | | |
| 24 | B | 23.5 | 24.5 | 220 | 30 | 0.05 | 16.8 | 18.4 | 22.0 | 55 | 1.25 |
| | C | 22.8 | 25.6 | | | | | | | | |

[1] f = 1 MHz; $V_R$ = 0 V.
[2] $t_p$ = 100 µs; $T_{amb}$ = 25 °C.

### Table 9. Characteristics per type; BZT52-B27-Q to BZT52-C51-Q

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

| BZT52 -xxx-Q | 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); $I_Z$ = 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 |
| 27 | B | 26.5 | 27.5 | 250 | 40 | 0.05 | 18.9 | 21.4 | 25.3 | 50 | 1.0 |
| | C | 25.1 | 28.9 | | | | | | | | |
| 30 | B | 29.4 | 30.6 | 250 | 40 | 0.05 | 21 | 24.4 | 29.4 | 50 | 1.0 |
| | C | 28.0 | 32.0 | | | | | | | | |
| 33 | B | 32.3 | 33.7 | 250 | 40 | 0.05 | 23.1 | 27.4 | 33.4 | 45 | 0.9 |
| | C | 31.0 | 35.0 | | | | | | | | |
| 36 | B | 35.3 | 36.7 | 250 | 60 | 0.05 | 25.2 | 30.4 | 37.4 | 45 | 0.8 |
| | C | 34.0 | 38.0 | | | | | | | | |
| 39 | B | 38.2 | 39.8 | 300 | 75 | 0.05 | 27.3 | 33.4 | 41.2 | 45 | 0.7 |
| | C | 37.0 | 41.0 | | | | | | | | |
| 43 | B | 42.1 | 43.9 | 325 | 80 | 0.05 | 30.1 | 37.6 | 46.6 | 40 | 0.6 |
| | C | 40.0 | 46.0 | | | | | | | | |

| BZT52 -xxx-Q | 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); $I_Z$ = 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 |
| 47 | B | 46.1 | 47.9 | 325 | 90 | 0.05 | 32.9 | 42.0 | 51.8 | 40 | 0.5 |
| | C | 44.0 | 50.0 | | | | | | | | |
| 51 | B | 50.0 | 52.0 | 350 | 100 | 0.05 | 35.7 | 46.6 | 57.2 | 40 | 0.4 |
| | C | 48.0 | 54.0 | | | | | | | | |

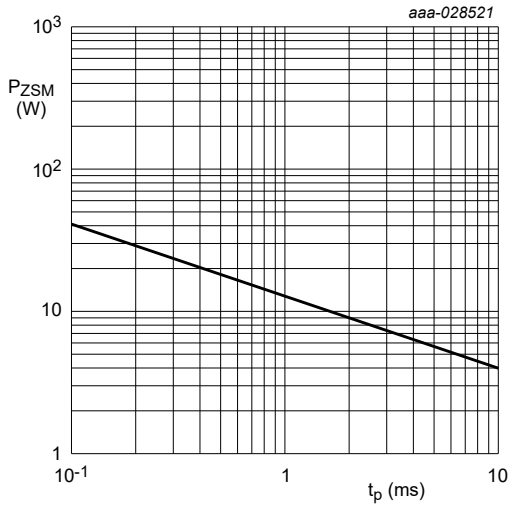
[1] f = 1 MHz; $V_R$ = 0 V.
[2] $t_p$ = 100 µs; $T_{amb}$ = 25 °C.

**Table 10. Characteristics per type; BZT52-B56-Q to BZT52-C75-Q**

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

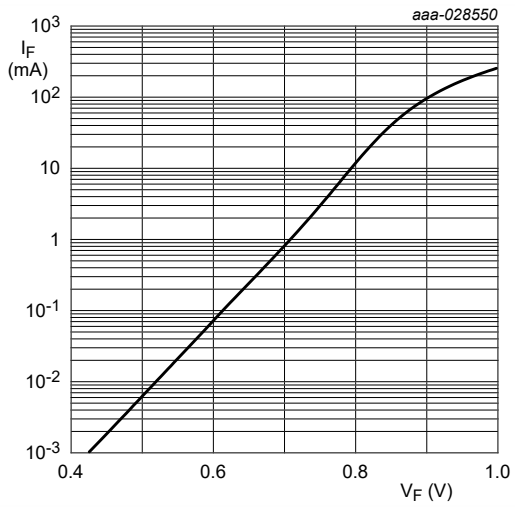
| BZT52 -xxx-Q | Sel | Working voltage $V_Z$ (V); $I_Z$ = 2 mA | | Maximum differential resistance $r_{dif}$ (Ω) | | Reverse current $I_R$ (µA) | | Temperature coefficient $S_Z$ (mV/K); $I_Z$ = 5 mA | | Diode capacitance $C_d$ (pF) [1] | Non-repetitive peak reverse current $I_{ZSM}$ (A) [2] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | $I_Z$ = 0.5 mA | $I_Z$ = 2 mA | Max | $V_R$ (V) | Min | Max | Max | Max |
| 56 | B | 54.9 | 57.1 | 375 | 120 | 0.05 | 39.2 | 52.2 | 63.8 | 40 | 0.3 |
| | C | 52.0 | 60.0 | | | | | | | | |
| 62 | B | 60.8 | 63.2 | 400 | 140 | 0.05 | 43.4 | 58.8 | 71.6 | 35 | 0.3 |
| | C | 58.0 | 66.0 | | | | | | | | |
| 68 | B | 66.6 | 69.4 | 400 | 160 | 0.05 | 47.6 | 65.6 | 79.8 | 35 | 0.25 |
| | C | 64.0 | 72.0 | | | | | | | | |
| 75 | B | 73.5 | 76.5 | 400 | 175 | 0.05 | 52.5 | 73.4 | 88.6 | 35 | 0.20 |
| | C | 70.0 | 79.0 | | | | | | | | |

[1] f = 1 MHz; $V_R$ = 0 V.
[2] $t_p$ = 100 µs; $T_{amb}$ = 25 °C.



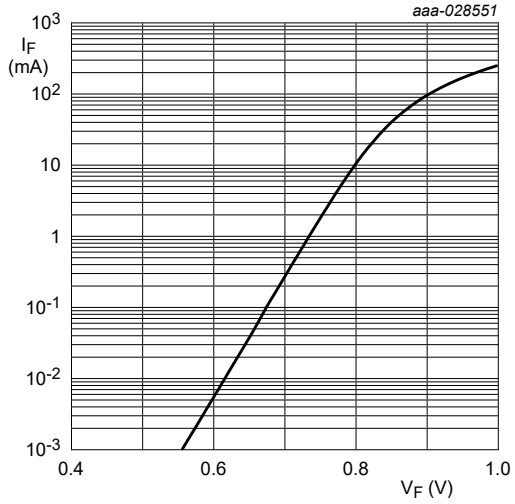

(1) $T_j$ = 25 °C (before surge)

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



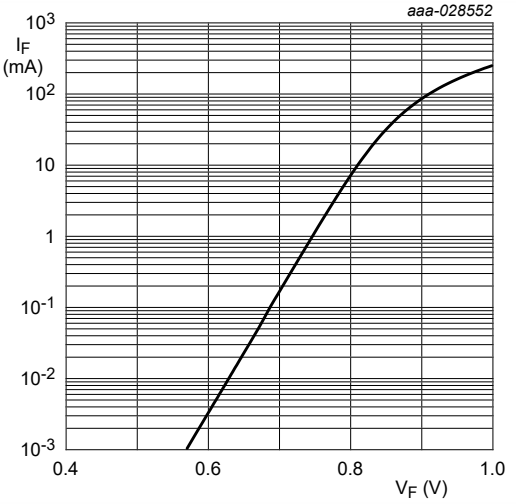

$T_j$ = 25 °C

**Fig. 2. Forward current as a function of forward voltage; typical values (BZT52-B/C2V4-Q)**



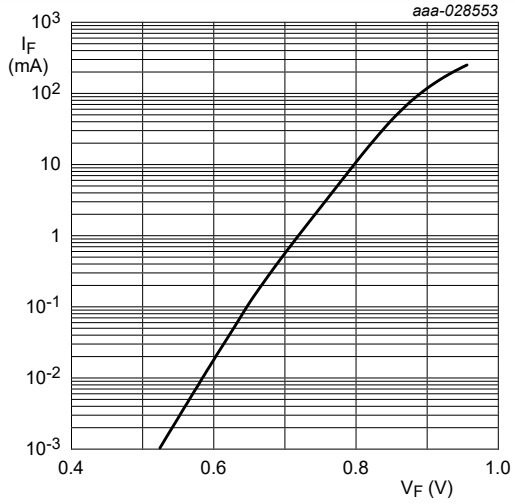

$T_j$ = 25 °C

**Fig. 3. Forward current as a function of forward voltage; typical values (BZT52-B/C6V8-Q)**



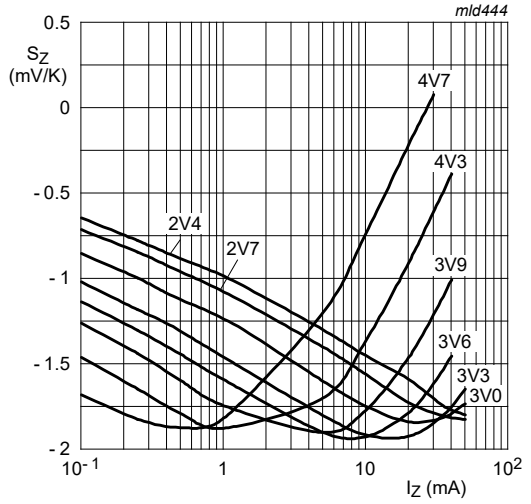

$T_j$ = 25 °C

**Fig. 4. Forward current as a function of forward voltage; typical values (BZT52-B/C7V5-Q)**



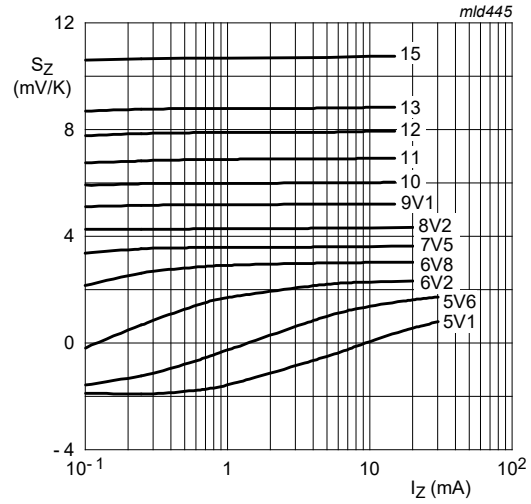

$T_j$ = 25 °C

**Fig. 5. Forward current as a function of forward voltage; typical values (BZT52-B/C75-Q)**



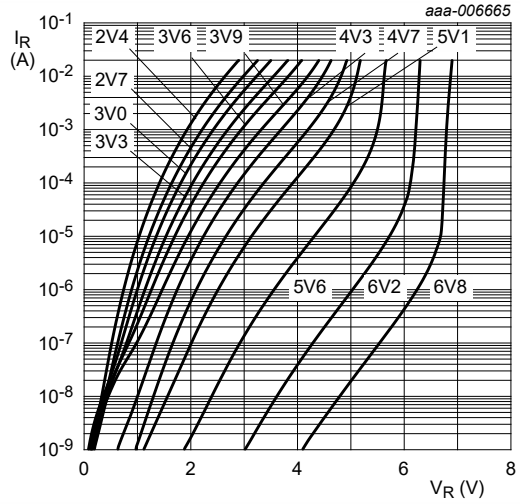

$T_j$ = 25 °C to 150 °C

**Fig. 6. Temperature coefficient as a function of working current; typical values (BZT52-B/C2V4-Q to B/C4V7-Q)**



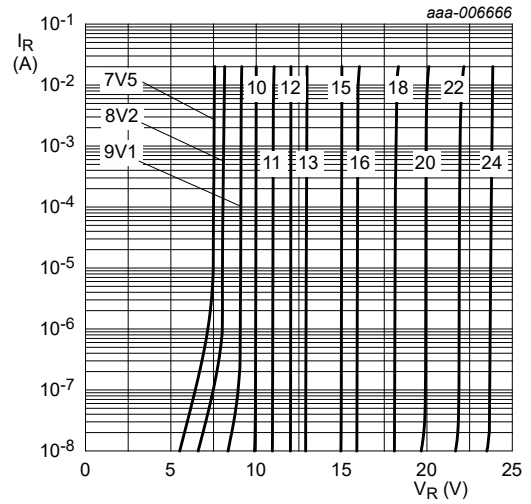

$T_j$ = 25 °C to 150 °C

**Fig. 7. Temperature coefficient as a function of working current; typical values (BZT52-B/C5V1-Q to B/C15-Q)**



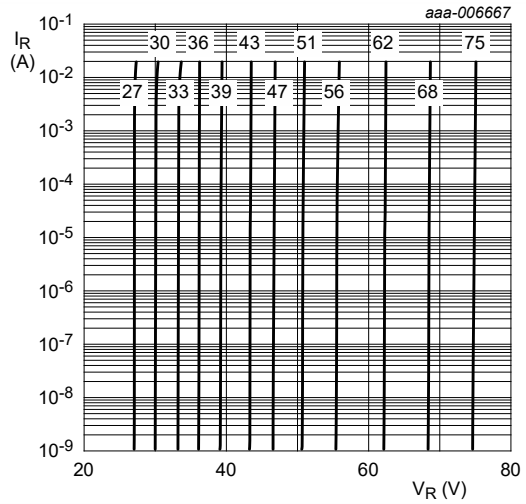

$T_j$ = 25 °C

**Fig. 8. Reverse current as a function of reverse voltage; typical values (BZT52-B/C2V4-Q to -B/C6V8-Q)**




$T_j$ = 25 °C

**Fig. 9. Reverse current as a function of reverse voltage; typical values (BZT52-B/C7V5-Q to B/C24-Q)**




$T_j$ = 25 °C

**Fig. 10. Reverse current as a function of reverse voltage; typical values (BZT52-B/C27-Q to -B/C75-Q)**

# 11. Test information

## 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.

## 12. Package outline

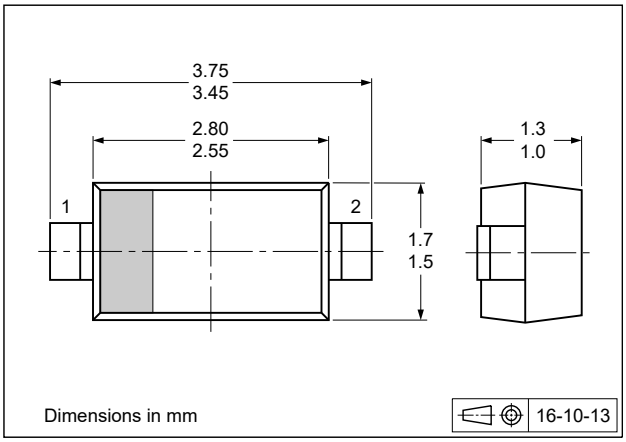
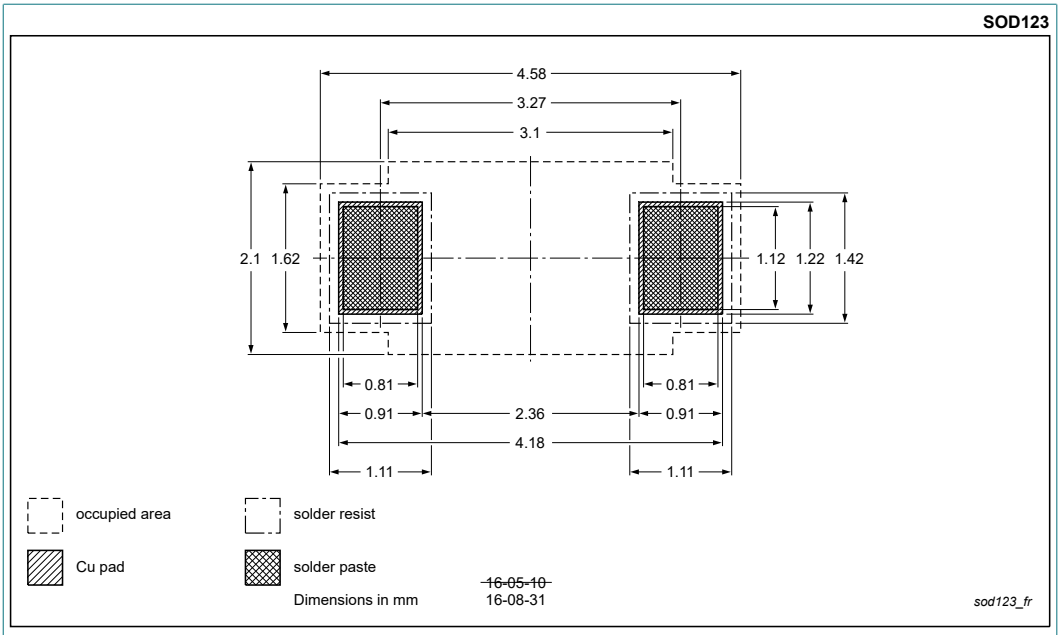



**Fig. 11. Package outline SOD123**

## 13. Soldering




Reflow soldering is the only recommended soldering method.

**Fig. 12. Reflow soldering footprint SOD123**

## 14. Revision history

**Table 11. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BZT52-Q_SER v.2 | 20240603 | Product data sheet | - | BZT52-Q_SER v.1 |
| Modifications: | • Marking: BZT52-B9V1-Q and BZT52-B10-Q marking codes corrected | | | |
| BZT52-Q_SER v.1 | 20230329 | Product data sheet | - | - |

# 15. 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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