



BZT52 series

Single Zener diodes in a SOD123 package

Rev. 1 — 16 March 2017

Product data sheet

1 Product profile

1.1 General description

General-purpose Zener diodes in a SOD123 small Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- Total power dissipation: ≤ 590 mW
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- Low differential resistance
- AEC-Q101 qualified

1.3 Applications

- General regulation functions

1.4 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 | $T_{amb} \leq 25$ °C [2] | - | - | 350 | mW |
| | | [3] | - | - | 590 | mW |


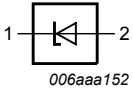
[1] Pulse test: $t_p \leq 300$ μ s; $\delta \leq 0.02$.

[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 cm².

2 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.

3 Ordering information

Table 3. Ordering information

| Type number | Package | | |
|--|---------|--|---------|
| | Name | Description | Version |
| BZT52-C2V4 to BZT52-C75 ^[1] | - | plastic surface-mounted package; 2 leads | SOD123 |

[1] The series consists of 37 types with nominal working voltages from 2.4 V to 75 V.

4 Marking

Table 4. Marking codes

| Type number | Marking code | Type number | Marking code | Type number | Marking code | Type number | Marking code |
|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|
| BZT52-C2V4 | C1 | BZT52-C6V2 | CB | BZT52-C16 | CM | BZT52-C43 | CY |
| BZT52-C2V7 | C2 | BZT52-C6V8 | CC | BZT52-C18 | CN | BZT52-C47 | D1 |
| BZT52-C3V0 | C3 | BZT52-C7V5 | CD | BZT52-C20 | CP | BZT52-C51 | D2 |
| BZT52-C3V3 | C4 | BZT52-C8V2 | CE | BZT52-C22 | CQ | BZT52-C56 | D3 |
| BZT52-C3V6 | C5 | BZT52-C9V1 | CF | BZT52-C24 | CR | BZT52-C62 | D4 |
| BZT52-C3V9 | C6 | BZT52-C10 | CG | BZT52-C27 | CS | BZT52-C68 | D5 |
| BZT52-C4V3 | C7 | BZT52-C11 | CH | BZT52-C30 | CT | BZT52-C75 | D6 |
| BZT52-C4V7 | C8 | BZT52-C12 | CJ | BZT52-C33 | CU | - | - |
| BZT52-C5V1 | C9 | BZT52-C13 | CK | BZT52-C36 | CV | - | - |
| BZT52-C5V6 | CA | BZT52-C15 | CL | BZT52-C39 | CW | - | - |

5 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 Table 8, 9 and 10 | |
| P_{ZSM} | non-repetitive peak power dissipation | | [1] - | 40 | W |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [2] - | 350 | mW |
| | | | [3] - | 590 | mW |
| T_j | junction temperature | | - | 150 | |
| T_{amb} | ambient temperature | | -55 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] $t_p = 100\ \mu\text{s}$; square wave; $T_j = 25\text{ °C}$ 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 .

6 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 Printed-Circuit Board (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.

7 Characteristics

Table 7. Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-----------------|----------------------|-------|-----|-----|------|
| V_F | forward voltage | $I_F = 10\text{ mA}$ | [1] - | - | 0.9 | V |

[1] Pulse test: $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$.

Table 8. Characteristics per type; BZT52-C2V4 to BZT52-C24

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

| BZT52-xxx | Sel | Working voltage V_Z (V); $I_Z = 5\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μA) | | Temperature coefficient S_Z (mV/K); $I_Z = 5\text{ mA}$ | | Diode capacitance C_d (pF) ^[1] | Non-repetitive peak reverse current I_{ZSM} (A) ^[2] |
|-----------|-----|--|------|---|---------------------|--|-----------|---|------|--|---|
| | | Min | Max | $I_Z = 1\text{ mA}$ | $I_Z = 5\text{ mA}$ | Max | V_R (V) | Min | Max | Max | Max |
| 2V4 | C | 2.2 | 2.6 | 400 | 85 | 50 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| 2V7 | C | 2.5 | 2.9 | 500 | 83 | 20 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| 3V0 | C | 2.8 | 3.2 | 500 | 95 | 10 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| 3V3 | C | 3.1 | 3.5 | 500 | 95 | 5 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| 3V6 | C | 3.4 | 3.8 | 500 | 95 | 5 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| 3V9 | C | 3.7 | 4.1 | 500 | 95 | 3 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| 4V3 | C | 4.0 | 4.6 | 500 | 95 | 3 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| 4V7 | C | 4.4 | 5.0 | 500 | 78 | 3 | 2 | -3.5 | 0.2 | 300 | 6.0 |
| 5V1 | C | 4.8 | 5.4 | 480 | 60 | 2 | 2 | -2.7 | 1.2 | 300 | 6.0 |
| 5V6 | C | 5.2 | 6.0 | 400 | 40 | 1 | 2 | -2.0 | 2.5 | 300 | 6.0 |
| 6V2 | C | 5.8 | 6.6 | 150 | 10 | 3 | 4 | 0.4 | 3.7 | 200 | 6.0 |
| 6V8 | C | 6.4 | 7.2 | 80 | 8 | 2 | 4 | 1.2 | 4.5 | 200 | 6.0 |
| 7V5 | C | 7.0 | 7.9 | 80 | 10 | 1 | 5 | 2.5 | 5.3 | 150 | 4.0 |
| 8V2 | C | 7.7 | 8.7 | 80 | 10 | 0.7 | 5 | 3.2 | 6.2 | 150 | 4.0 |
| 9V1 | C | 8.5 | 9.6 | 100 | 10 | 0.5 | 6 | 3.8 | 7 | 150 | 3.0 |
| 10 | C | 9.4 | 10.6 | 70 | 10 | 0.2 | 7 | 4.5 | 8 | 90 | 3.0 |
| 11 | C | 10.4 | 11.6 | 70 | 10 | 0.1 | 8 | 5.4 | 9.0 | 85 | 2.5 |
| 12 | C | 11.4 | 12.7 | 90 | 10 | 0.1 | 8 | 6.0 | 10.0 | 85 | 2.5 |
| 13 | C | 12.4 | 14.1 | 110 | 10 | 0.1 | 8 | 7.0 | 11.0 | 80 | 2.5 |
| 15 | C | 13.8 | 15.6 | 110 | 15 | 0.05 | 10.5 | 9.2 | 13.0 | 75 | 2.0 |
| 16 | C | 15.3 | 17.1 | 170 | 20 | 0.05 | 11.2 | 10.4 | 14.0 | 75 | 1.5 |
| 18 | C | 16.8 | 19.1 | 170 | 20 | 0.05 | 12.6 | 12.4 | 16.0 | 70 | 1.5 |
| 20 | C | 18.8 | 21.2 | 220 | 20 | 0.05 | 14 | 14.4 | 18.0 | 60 | 1.5 |
| 22 | C | 20.8 | 23.3 | 220 | 25 | 0.05 | 15.4 | 16.4 | 20.0 | 60 | 1.25 |
| 24 | C | 22.8 | 25.6 | 220 | 30 | 0.05 | 16.8 | 18.4 | 22.0 | 55 | 1.25 |

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

Table 9. Characteristics per type; BZT52-C27 to BZT52-C51

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

| BZT52 -xxx | Sel | Working voltage V_Z (V); $I_Z = 2\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μA) | | Temperature coefficient S_Z (mV/K); $I_Z = 5\text{ mA}$ | | Diode capacitance C_d (pF) ^[1] | Non-repetitive peak reverse current I_{ZSM} (A) ^[2] |
|---------------|-----|--|------|---|---------------------|--|-----------|---|------|--|---|
| | | Min | Max | $I_Z = 1\text{ mA}$ | $I_Z = 5\text{ mA}$ | Max | V_R (V) | Min | Max | Max | Max |
| 27 | C | 25.1 | 28.9 | 250 | 40 | 0.05 | 18.9 | 21.4 | 25.3 | 50 | 1.0 |
| 30 | C | 28.0 | 32.0 | 250 | 40 | 0.05 | 21 | 24.4 | 29.4 | 50 | 1.0 |
| 33 | C | 31.0 | 35.0 | 250 | 40 | 0.05 | 23.1 | 27.4 | 33.4 | 45 | 0.9 |
| 36 | C | 34.0 | 38.0 | 250 | 60 | 0.05 | 25.2 | 30.4 | 37.4 | 45 | 0.8 |
| 39 | C | 37.0 | 41.0 | 300 | 75 | 0.05 | 27.3 | 33.4 | 41.2 | 45 | 0.7 |
| 43 | C | 40.0 | 46.0 | 325 | 80 | 0.05 | 30.1 | 37.6 | 46.6 | 40 | 0.6 |
| 47 | C | 44.0 | 50.0 | 325 | 90 | 0.05 | 32.9 | 42.0 | 51.8 | 40 | 0.5 |
| 51 | C | 48.0 | 54.0 | 350 | 100 | 0.05 | 35.7 | 46.6 | 57.2 | 40 | 0.4 |

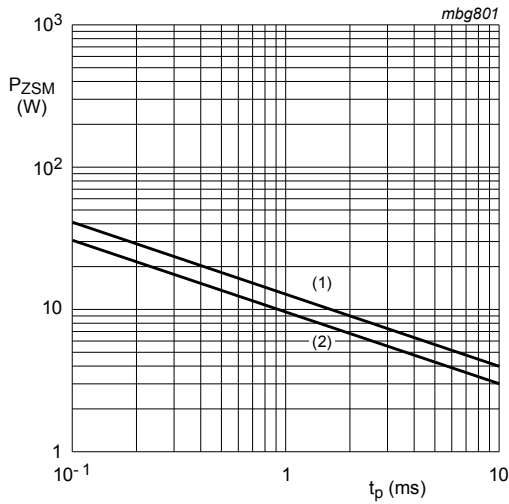
[1] $f = 1\text{ MHz}$; $V_R = 0\text{ V}$.[2] $t_p = 100\text{ }\mu\text{s}$; $T_{amb} = 25\text{ °C}$.

Table 10. Characteristics per type; BZT52-C56 to BZT52-C75

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

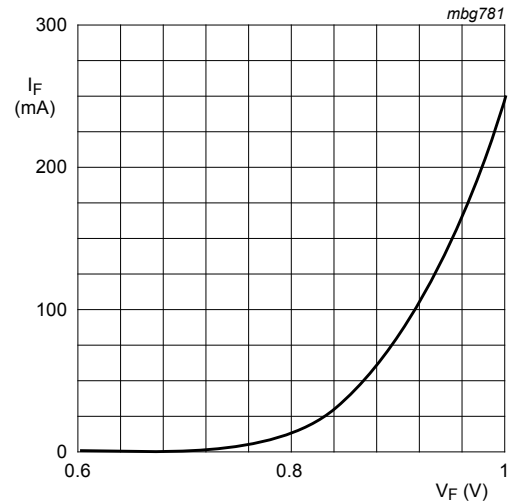
| BZT52 -xxx | Sel | Working voltage V_Z (V); $I_Z = 2\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μA) | | Temperature coefficient S_Z (mV/K); $I_Z = 5\text{ mA}$ | | Diode capacitance C_d (pF) ^[1] | Non-repetitive peak reverse current I_{ZSM} (A) ^[2] |
|---------------|-----|--|------|---|---------------------|--|------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

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



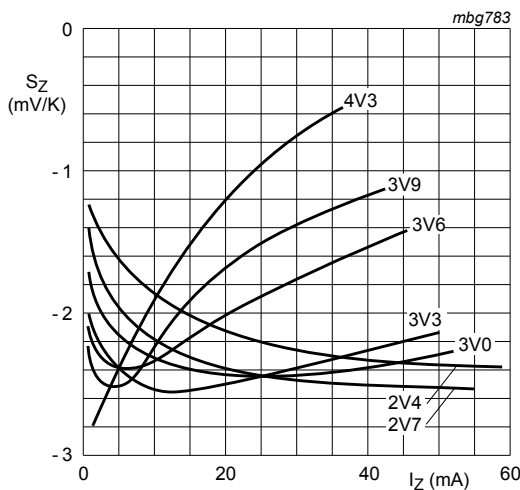
(1) $T_j = 25\text{ °C}$ (prior to surge)
 (2) $T_j = 150\text{ °C}$ (prior to surge)

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



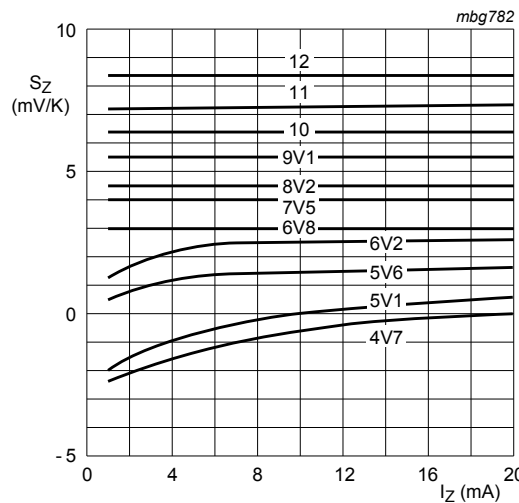
$T_j = 25\text{ °C}$

Figure 2. Forward current as a function of forward voltage; typical values



BZT52-C2V4 to BZT52-C4V3
 $T_j = 25\text{ °C}$ to 150 °C

Figure 3. Temperature coefficient as a function of working current; typical values



BZT52-C4V7 to BZT52-C12
 $T_j = 25\text{ °C}$ to 150 °C

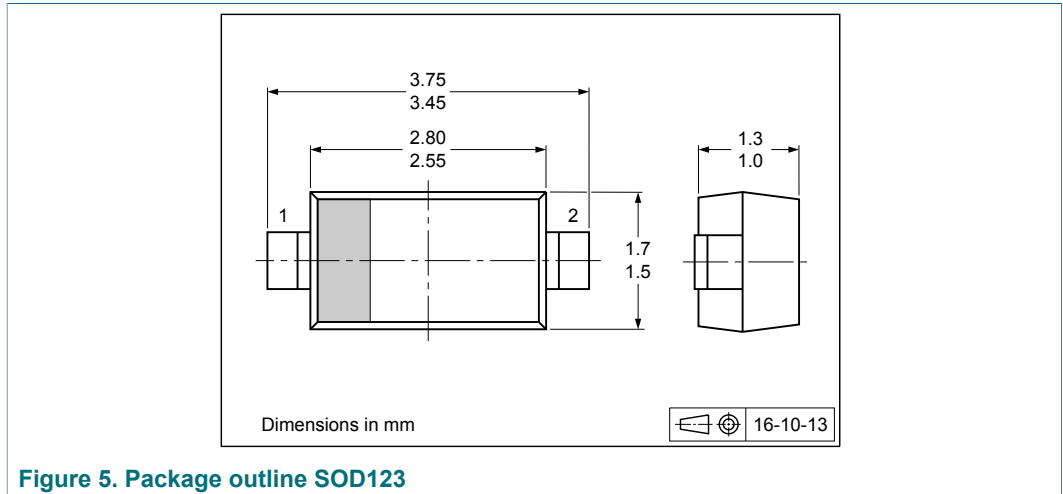
Figure 4. Temperature coefficient as a function of working current; typical values

8 Test information

8.1 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.

9 Package outline



10 Packing information

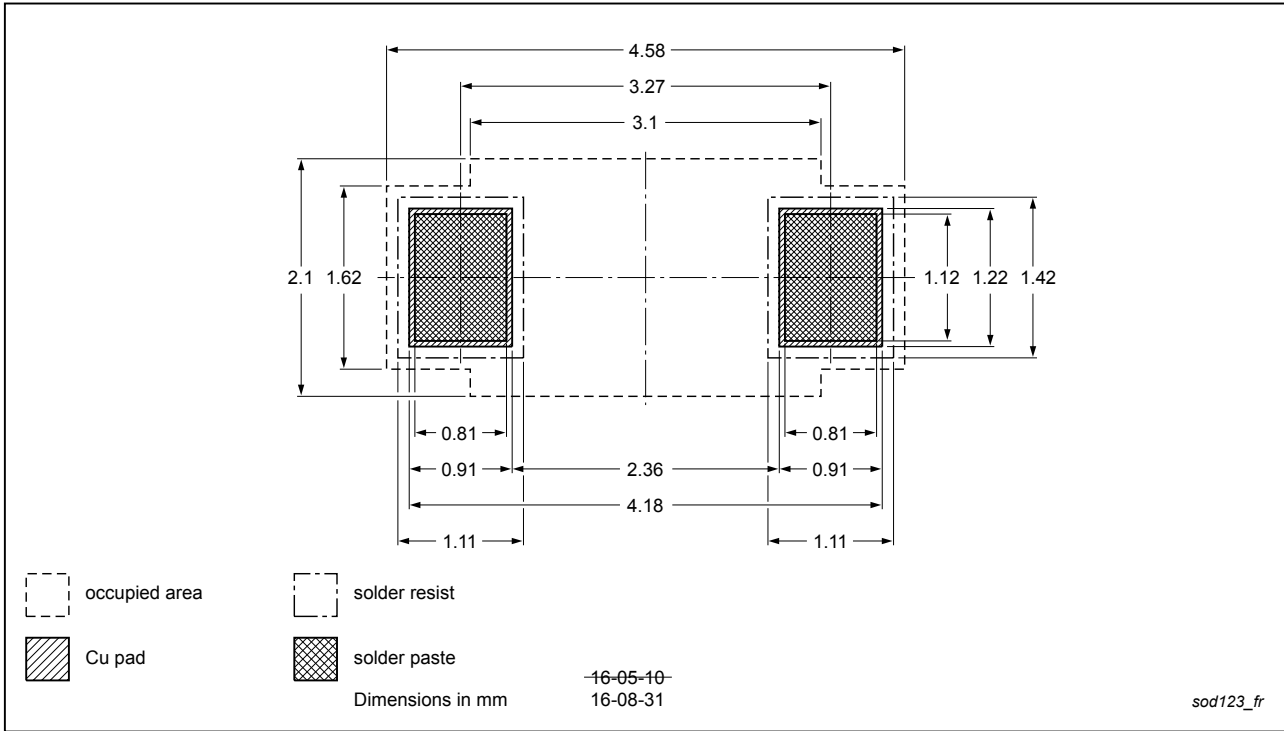
Table 11. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.

| Type number | Package | Description | Packing quantity | |
|-------------------------|---------|--------------------------------|------------------|-------|
| | | | 3000 | 10000 |
| BZT52-C2V4 to BZT52-C75 | SOD123 | 4 mm pitch, 8 mm tape and reel | -115 | -118 |

11 Soldering

SOD123



Reflow soldering is the only recommended soldering method.
 Dimensions in mm.

Figure 6. Reflow soldering footprint SOD123

12 Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BZT52_SER v.1 | 20170316 | Product data sheet | - | - |

13 Legal information

13.1 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. |
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[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".

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[BZT52-C8V2J](#) [BZT52-C33J](#) [BZT52-C39J](#) [BZT52-C3V3X](#) [BZT52-C3V9X](#) [BZT52-C4V7J](#) [BZT52-C5V1J](#) [BZT52-](#)
[C11J](#) [BZT52-C22X](#) [BZT52-C24J](#) [BZT52-C7V5J](#) [BZT52-C2V7J](#) [BZT52-C30J](#) [BZT52-C39X](#) [BZT52-C36J](#) [BZT52-](#)
[C6V8X](#) [BZT52-C15J](#) [BZT52-C51X](#) [BZT52-C10X](#) [BZT52-C56X](#) [BZT52-C13J](#) [BZT52-C51J](#) [BZT52-C20J](#) [BZT52-](#)
[C2V7X](#) [BZT52-C27J](#) [BZT52-C4V3X](#) [BZT52-C56J](#) [BZT52-C62J](#) [BZT52-C33X](#) [BZT52-C12J](#) [BZT52-C3V3J](#) [BZT52-](#)
[C3V9J](#) [BZT52-C68J](#) [BZT52-C75J](#) [BZT52-C43J](#) [BZT52-C3V6J](#) [BZT52-C24X](#) [BZT52-C3V6X](#) [BZT52-C62X](#) [BZT52-](#)
[C9V1X](#) [BZT52-C47J](#) [BZT52-C30X](#) [BZT52-C11X](#) [BZT52-C68X](#) [BZT52-C36X](#) [BZT52-C47X](#) [BZT52-C27X](#) [BZT52-](#)
[C2V4J](#) [BZT52-C5V1X](#) [BZT52-C13X](#) [BZT52-C22J](#) [BZT52-C9V1J](#) [BZT52-C4V3J](#) [BZT52-C6V8J](#) [BZT52-C18J](#)
[BZT52-C16J](#) [BZT52-C3V0X](#) [BZT52-C75X](#) [BZT52-C43X](#) [BZT52-C2V4X](#) [BZT52-C4V7X](#) [BZT52-C20X](#) [BZT52-C8V2X](#)
[BZT52-C3V0J](#) [BZT52-C6V2J](#) [BZT52-C5V6X](#)