



# BZB984 series

## Voltage regulator double diodes

Rev. 3 — 27 December 2022

Product data sheet

## 1. General description

Low-power voltage regulator diodes in a SOT663 ultra small plastic SMD package.

## 2. Features and benefits

- Total power dissipation:  $\leq 425$  mW
- Approximately 5%  $V_Z$  tolerance
- Ultra small flat plastic SMD package
- Working voltage range nominal 2.4 to 15 V (E24 range)

## 3. Applications

- General regulation functions
- ESD and surge protection

## 4. Quick reference data

Table 1. Quick reference data

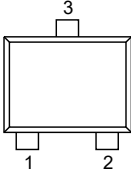
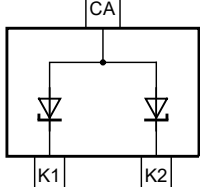
| Symbol    | Parameter               | Conditions                            |     | Min | Typ | Max | Unit |
|-----------|-------------------------|---------------------------------------|-----|-----|-----|-----|------|
| $V_F$     | forward voltage         | $I_F = 10$ mA                         | [1] | -   | -   | 0.9 | V    |
| $P_{tot}$ | total power dissipation | 2 diodes loaded; $T_{amb} \leq 25$ °C | [2] | -   | -   | 425 | mW   |
|           |                         | 1 diode loaded; $T_{amb} \leq 25$ °C  | [2] | -   | -   | 265 | mW   |

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

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

5. Pinning information

Table 2. Pinning

| Pin | Symbol | Description  | Simplified outline                                                                 | Graphic symbol                                                                                    |
|-----|--------|--------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1   | K1     | cathode 1    |  | <br>aaa-033766 |
| 2   | K2     | cathode 2    |                                                                                    |                                                                                                   |
| 3   | CA     | common anode |                                                                                    |                                                                                                   |

6. Ordering information

Table 3. Ordering information

| Type number                   | Package |                                          |         |
|-------------------------------|---------|------------------------------------------|---------|
|                               | Name    | Description                              | Version |
| BZB984-C2V4 to BZB984-C15 [1] | -       | plastic surface-mounted package; 3 leads | SOT663  |

[1] The series consists of 20 types with nominal working voltages from 2.4 V to 15 V.

7. Marking

Table 4. Marking codes

| Type number | Marking code | Type number | Marking code | Type number | Marking code | Type number | Marking code |
|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|
| BZB984-C2V4 | 91           | BZB984-C3V9 | 96           | BZB984-C6V2 | 9B           | BZB984-C10  | 9G           |
| BZB984-C2V7 | 92           | BZB984-C4V3 | 97           | BZB984-C6V8 | 9C           | BZB984-C11  | 9H           |
| BZB984-C3V0 | 93           | BZB984-C4V7 | 98           | BZB984-C7V5 | 9D           | BZB984-C12  | 9J           |
| BZB984-C3V3 | 94           | BZB984-C5V1 | 99           | BZB984-C8V2 | 9E           | BZB984-C13  | 9K           |
| BZB984-C3V6 | 95           | BZB984-C5V6 | 9A           | BZB984-C9V1 | 9F           | BZB984-C15  | 9L           |

## 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         |
| $I_{ZSM}$ | non-repetitive peak reverse current           | $t_p = 100 \mu s$ ; square wave;<br>$T_{amb} = 25^\circ C$ |     | see Table 1 |      |            |
| $P_{ZSM}$ | non-repetitive peak reverse power dissipation | $t_p = 100 \mu s$ ; square wave;<br>$T_{amb} = 25^\circ C$ |     | -           | 40   | W          |
| $P_{tot}$ | total power dissipation                       | $T_{amb} \leq 25^\circ C$<br>2 diodes loaded               | [1] | -           | 425  | mW         |
|           |                                               | $T_{amb} \leq 25^\circ C$<br>1 diode loaded                | [1] | -           | 265  | 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 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; 2 diodes loaded | [1] | -   | -   | 294 | K/W  |
|                |                                                  | in free air; 1 diode loaded  | [1] | -   | -   | 472 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | 2 diodes loaded              | [2] | -   | -   | 125 | K/W  |
|                |                                                  | 1 diode loaded               | [2] | -   | -   | 230 | K/W  |

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

[2] Soldering point of cathode tab.

10. Characteristics

Table 7. Characteristics

T<sub>j</sub> = 25 °C unless otherwise specified.

| Symbol         | Parameter       | Conditions             | Min   | Typ | Max | Unit |
|----------------|-----------------|------------------------|-------|-----|-----|------|
| V <sub>F</sub> | forward voltage | I <sub>F</sub> = 10 mA | [1] - | -   | 0.9 | V    |

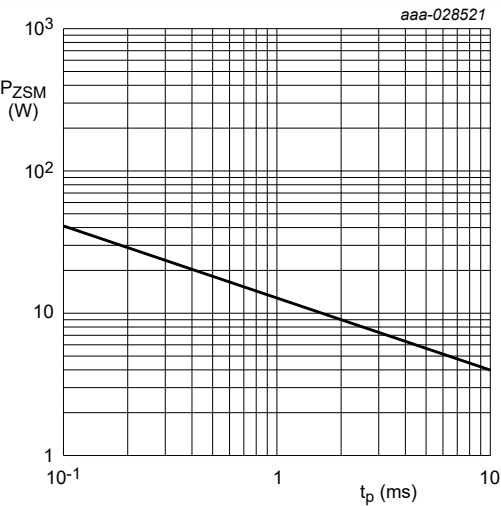
[1] Pulse test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02.

Table 8. Characteristics per type; BZB984-C2V4 to BZB984-C15

T<sub>j</sub> = 25 °C unless otherwise specified.

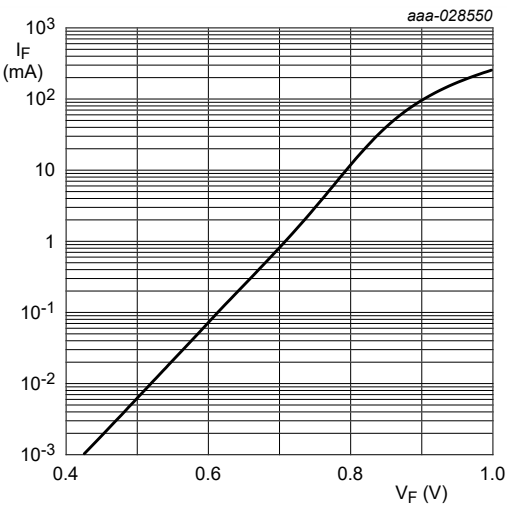
| BZB984<br>-xxx | Sel | Working<br>voltage<br>V <sub>Z</sub> (V); |      | Maximum differential<br>resistance r <sub>dif</sub> (Ω) |     |                       |     | Reverse<br>current I <sub>R</sub><br>(μA) |                    | Temperature<br>coefficient<br>S <sub>Z</sub> (mV/K); |  | Diode<br>capacitance<br>C <sub>d</sub> (pF) [1] | Non-<br>repetitive<br>peak reverse<br>current<br>I <sub>ZSM</sub> (A) [2] |
|----------------|-----|-------------------------------------------|------|---------------------------------------------------------|-----|-----------------------|-----|-------------------------------------------|--------------------|------------------------------------------------------|--|-------------------------------------------------|---------------------------------------------------------------------------|
|                |     | I <sub>Z</sub> = 5 mA<br>Tol. 5 %         |      | I <sub>Z</sub> = 1 mA                                   |     | I <sub>Z</sub> = 5 mA |     | I <sub>F</sub> = 10 mA                    |                    | I <sub>Ztest</sub> = 5 mA                            |  |                                                 |                                                                           |
|                |     | Min                                       | Max  | Typ                                                     | Max | Typ                   | Max | Max                                       | V <sub>R</sub> (V) | Typ                                                  |  | Max                                             | Max                                                                       |
| 2V4            | C   | 2.2                                       | 2.6  | 275                                                     | 600 | 70                    | 100 | 50                                        | 1                  | -1.3                                                 |  | 450                                             | 6.0                                                                       |
| 2V7            | C   | 2.5                                       | 2.9  | 300                                                     | 600 | 75                    | 100 | 20                                        | 1                  | -1.4                                                 |  | 450                                             | 6.0                                                                       |
| 3V0            | C   | 2.8                                       | 3.2  | 325                                                     | 600 | 80                    | 95  | 10                                        | 1                  | -1.6                                                 |  | 450                                             | 6.0                                                                       |
| 3V3            | C   | 3.1                                       | 3.5  | 350                                                     | 600 | 85                    | 95  | 5                                         | 1                  | -1.8                                                 |  | 450                                             | 6.0                                                                       |
| 3V6            | C   | 3.4                                       | 3.8  | 375                                                     | 600 | 85                    | 90  | 5                                         | 1                  | -1.9                                                 |  | 450                                             | 6.0                                                                       |
| 3V9            | C   | 3.7                                       | 4.1  | 400                                                     | 600 | 85                    | 90  | 3                                         | 1                  | -1.9                                                 |  | 450                                             | 6.0                                                                       |
| 4V3            | C   | 4.0                                       | 4.6  | 410                                                     | 600 | 80                    | 90  | 3                                         | 1                  | -1.7                                                 |  | 450                                             | 6.0                                                                       |
| 4V7            | C   | 4.4                                       | 5.0  | 425                                                     | 500 | 50                    | 80  | 3                                         | 2                  | -1.2                                                 |  | 300                                             | 6.0                                                                       |
| 5V1            | C   | 4.8                                       | 5.4  | 400                                                     | 480 | 40                    | 60  | 2                                         | 2                  | -0.5                                                 |  | 300                                             | 6.0                                                                       |
| 5V6            | C   | 5.2                                       | 6.0  | 80                                                      | 400 | 15                    | 40  | 1                                         | 2                  | 1.0                                                  |  | 300                                             | 6.0                                                                       |
| 6V2            | C   | 5.8                                       | 6.6  | 40                                                      | 150 | 6                     | 10  | 3                                         | 4                  | 2.2                                                  |  | 200                                             | 6.0                                                                       |
| 6V8            | C   | 6.4                                       | 7.2  | 30                                                      | 80  | 6                     | 15  | 2                                         | 4                  | 3.0                                                  |  | 200                                             | 6.0                                                                       |
| 7V5            | C   | 7.0                                       | 7.9  | 30                                                      | 80  | 6                     | 15  | 1                                         | 5                  | 3.6                                                  |  | 150                                             | 4.0                                                                       |
| 8V2            | C   | 7.7                                       | 8.7  | 40                                                      | 80  | 6                     | 15  | 0.7                                       | 5                  | 4.3                                                  |  | 150                                             | 4.0                                                                       |
| 9V1            | C   | 8.5                                       | 9.6  | 40                                                      | 100 | 6                     | 15  | 0.5                                       | 6                  | 5.2                                                  |  | 150                                             | 3.0                                                                       |
| 10             | C   | 9.4                                       | 10.6 | 50                                                      | 150 | 8                     | 20  | 0.2                                       | 7                  | 6.0                                                  |  | 90                                              | 3.0                                                                       |
| 11             | C   | 10.4                                      | 11.6 | 50                                                      | 150 | 10                    | 20  | 0.1                                       | 8                  | 6.9                                                  |  | 90                                              | 2.5                                                                       |
| 12             | C   | 11.4                                      | 12.7 | 50                                                      | 150 | 10                    | 25  | 0.1                                       | 8                  | 7.9                                                  |  | 85                                              | 2.5                                                                       |
| 13             | C   | 12.4                                      | 14.1 | 50                                                      | 170 | 10                    | 30  | 0.1                                       | 8                  | 8.8                                                  |  | 80                                              | 2.5                                                                       |
| 15             | C   | 13.8                                      | 15.6 | 50                                                      | 200 | 10                    | 30  | 0.05                                      | 10.5               | 10.7                                                 |  | 75                                              | 2.0                                                                       |

[1] f = 1 MHz; V<sub>R</sub> = 0 V  
[2] t<sub>p</sub> = 100 μs; T<sub>amb</sub> = 25 °C



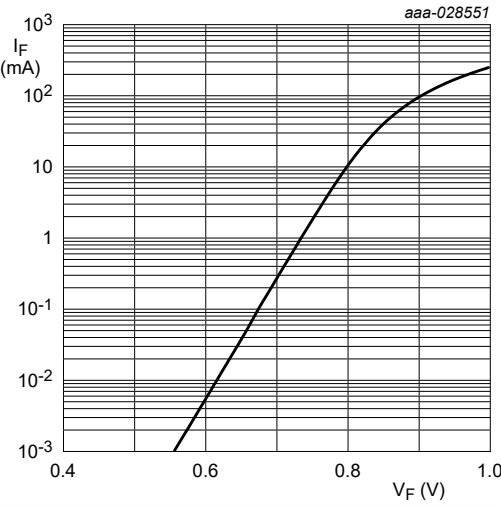
(1)  $T_j = 25\text{ }^{\circ}\text{C}$  (before surge)

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



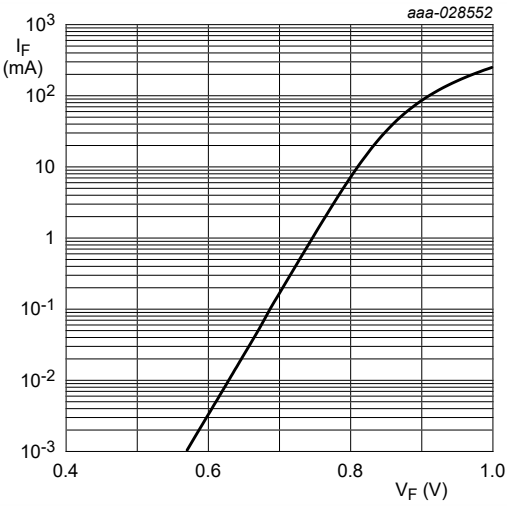
$T_j = 25\text{ }^{\circ}\text{C}$

Fig. 2. Forward current as a function of forward voltage; typical values (BZB984-C2V4)



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

Fig. 3. Forward current as a function of forward voltage; typical values (BZB984-C6V8)



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

Fig. 4. Forward current as a function of forward voltage; typical values (BZB984-C7V5)

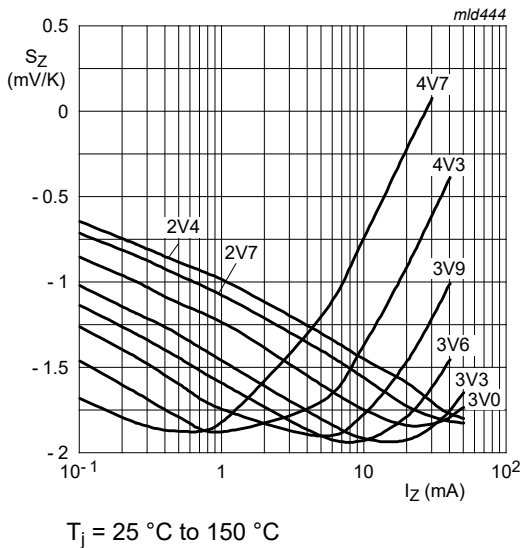


Fig. 5. Temperature coefficient as a function of working current; typical values (BZB984-C2V4 to C4V7)

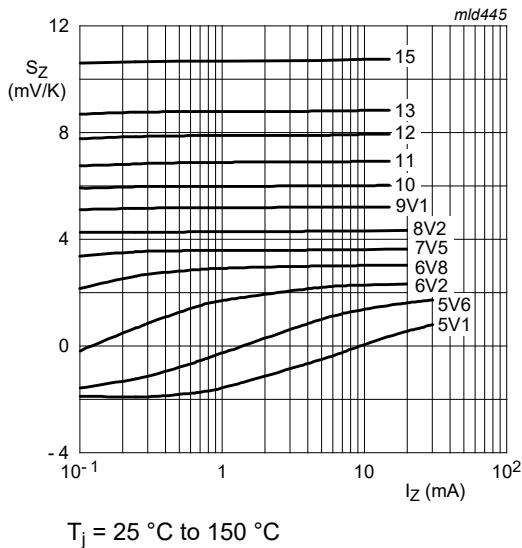


Fig. 6. Temperature coefficient as a function of working current; typical values (BZB984-C5V1 to C15)

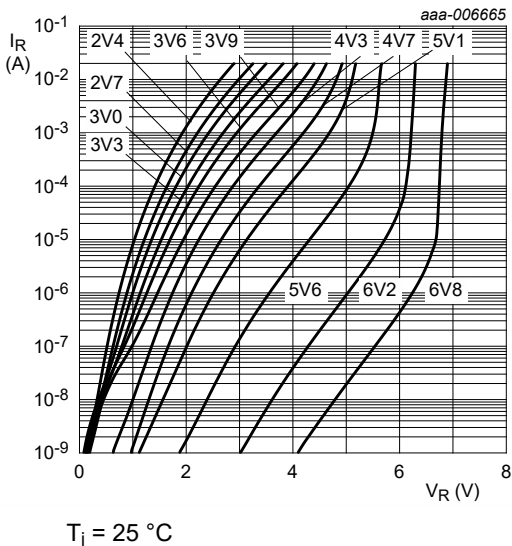


Fig. 7. Reverse current as a function of reverse voltage; typical values (BZB984-C2V4 to BZB984-C6V8)

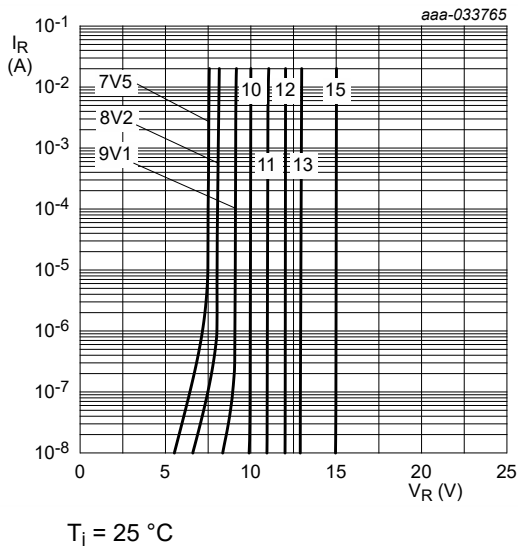
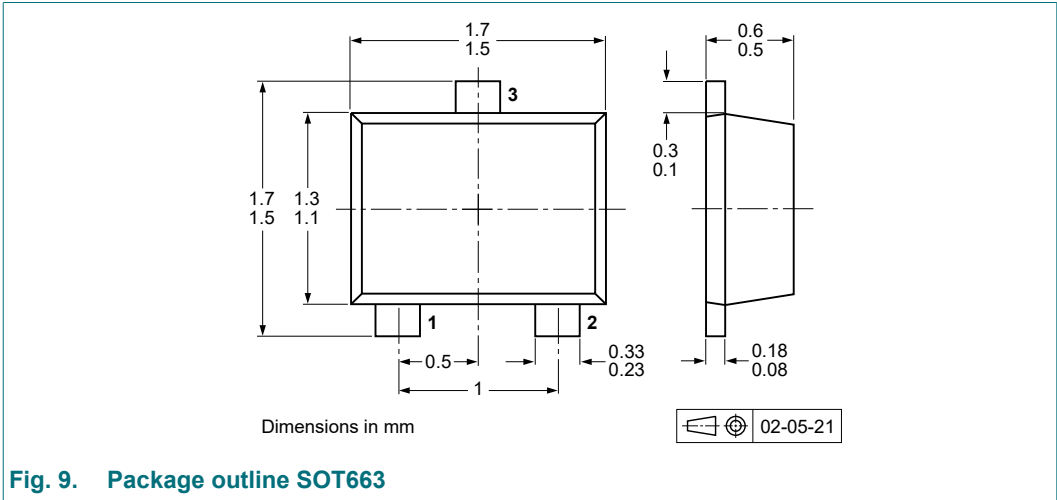
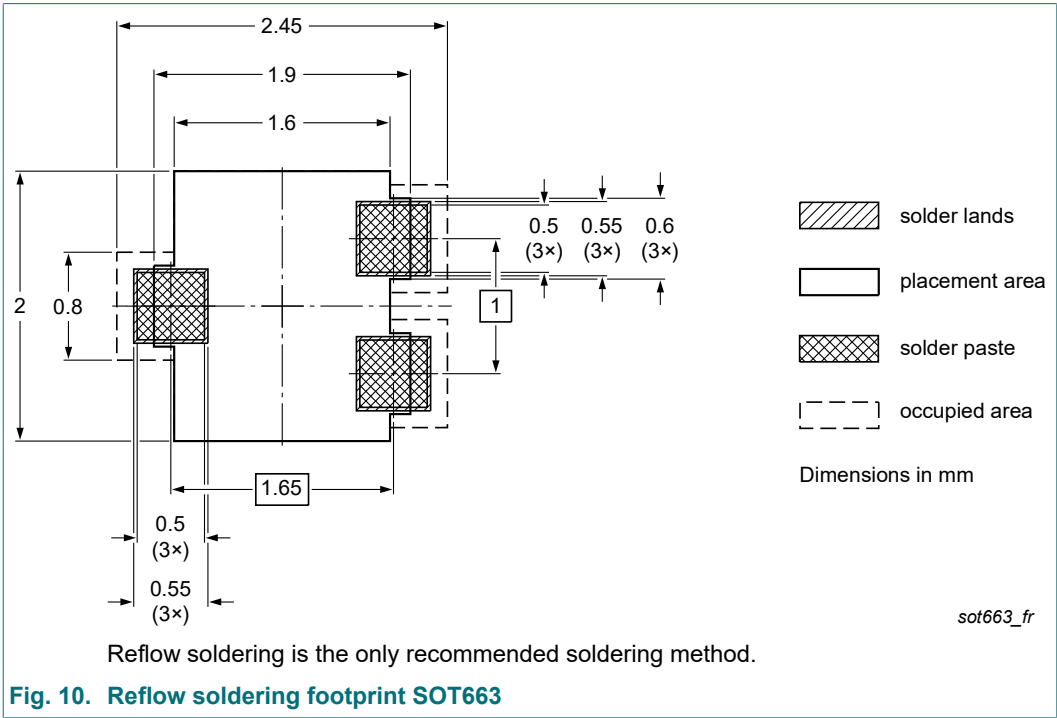


Fig. 8. Reverse current as a function of reverse voltage; typical values (BZB984-C7V5 to BZB984-C15)

11. Package outline



12. Soldering



13. Revision history

Table 9. Revision history

| Document ID    | Release date                                                                                                                                                                                                                                                                                    | Data sheet status  | Change notice | Supersedes     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|----------------|
| BZB984_SER v.3 | 20221227                                                                                                                                                                                                                                                                                        | Product data sheet | -             | BZB984_SER v.2 |
| Modifications: | <ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li><li>Product changed to non-automotive qualification.</li></ul> |                    |               |                |
| BZB984_SER v.2 | 2002062                                                                                                                                                                                                                                                                                         | Product data sheet | -             | BZB984_SER v.1 |
| BZB984_SER v.1 | 20011128                                                                                                                                                                                                                                                                                        | Product data sheet | -             | -              |

## 14. Legal information

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| Document status<br>[1][2]      | Product status [3] | Definition                                                                            |
|--------------------------------|--------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet   | Development        | This document contains data from the objective specification for product development. |
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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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Date of release: 27 December 2022

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