



# PDZ-GW series

Single Zener diodes in a SOD123 package

Rev. 1 — 4 September 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

- Non-repetitive peak reverse power dissipation:  $P_{ZSM} \leq 40 \text{ W}$
- Total power dissipation:  $P_{tot} \leq 365 \text{ mW}$
- Tolerance series:  
B2: approximately  $\pm 2 \%$
- Wide working voltage range: nominal 2.4 V to 36 V (E24 range)
- Low reverse current  $I_R$  range
- Small plastic package suitable for surface-mounted design
- 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         | $I_F = 10 \text{ mA}$ [1]        | -   | -   | 0.9 | V    |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25 \text{ °C}$ [2] | -   | -   | 365 | mW   |
|           |                         | [3]                              | -   | -   | 625 | mW   |

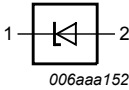
[1] Pulse test:  $t_p \leq 300 \text{ } \mu\text{s}$ ;  $\delta \leq 0.02$ .

[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  $1 \text{ cm}^2$ .

## 2 Pinning information

Table 2. Pinning

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

[1] The marking bar indicates the cathode.

## 3 Ordering information

Table 3. Ordering information

| Type number                          | Package |                                          |         |
|--------------------------------------|---------|------------------------------------------|---------|
|                                      | Name    | Description                              | Version |
| PDZ2.4BGW to PDZ36BGW <sup>[1]</sup> | -       | plastic surface-mounted package; 2 leads | SOD123  |

[1] The series consists of 29 types with nominal working voltages from 2.4 V to 36 V.

## 4 Marking

Table 4. Marking Codes

| Type number | Marking Code | Type number | Marking Code | Type number | Marking Code |
|-------------|--------------|-------------|--------------|-------------|--------------|
| PDZ2.4BGW   | B1           | PDZ6.2BGW   | BB           | PDZ16BGW    | BM           |
| PDZ2.7BGW   | B2           | PDZ6.8BGW   | BC           | PDZ18BGW    | BN           |
| PDZ3.0BGW   | B3           | PDZ7.5BGW   | BD           | PDZ20BGW    | BP           |
| PDZ3.3BGW   | B4           | PDZ8.2BGW   | BE           | PDZ22BGW    | BQ           |
| PDZ3.6BGW   | B5           | PDZ9.1BGW   | BF           | PDZ24BGW    | BR           |
| PDZ3.9BGW   | B6           | PDZ10BGW    | BG           | PDZ27BGW    | BS           |
| PDZ4.3BGW   | B7           | PDZ11BGW    | BH           | PDZ30BGW    | BT           |
| PDZ4.7BGW   | B8           | PDZ12BGW    | BJ           | PDZ33BGW    | BU           |
| PDZ5.1BGW   | B9           | PDZ13BGW    | BK           | PDZ36BGW    | BV           |
| PDZ5.6BGW   | BA           | PDZ15BGW    | BL           |             |              |

## 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                       |                             |     | -   | 200                       | mA   |
| $I_{ZSM}$ | non-repetitive peak reverse current   |                             |     | -   | see characteristics table |      |
| $P_{ZSM}$ | non-repetitive peak power dissipation |                             | [1] | -   | 40                        | W    |
| $P_{tot}$ | total power dissipation               | $T_{amb} \leq 25\text{ °C}$ | [2] | -   | 365                       | mW   |
|           |                                       |                             | [3] | -   | 625                       | mW   |
| $T_j$     | junction temperature                  |                             |     | -   | 150                       |      |
| $T_{amb}$ | ambient temperature                   |                             |     | -55 | +150                      | °C   |
| $T_{stg}$ | storage temperature                   |                             |     | -65 | +150                      | °C   |

[1]  $t_p = 100\text{ }\mu\text{s}$ ; 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  $1\text{ cm}^2$ .

## 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] | -   | -   | 340 | K/W  |
|                |                                                  |             | [2] | -   | -   | 200 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [3] | -   | -   | 50  | 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  $1\text{ cm}^2$ .

[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    |
| $V_F$  | forward voltage | $I_F = 100\text{ mA}$ | [1] | -   | -   | 1.1 | V    |

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

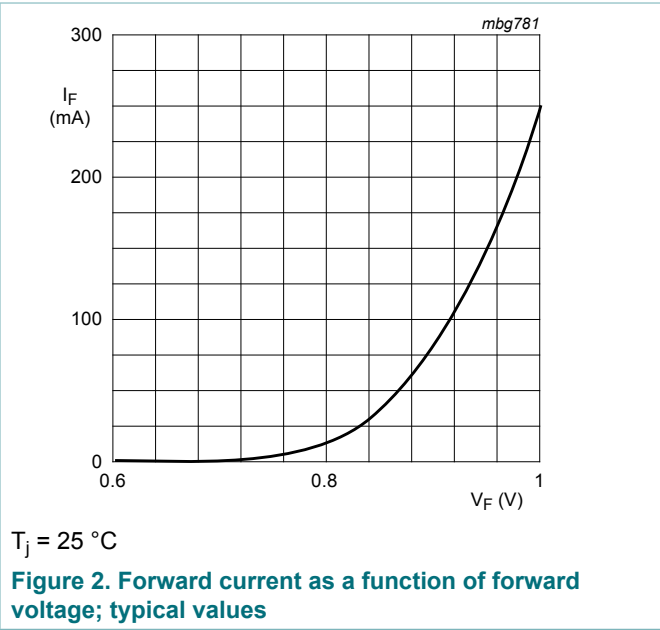
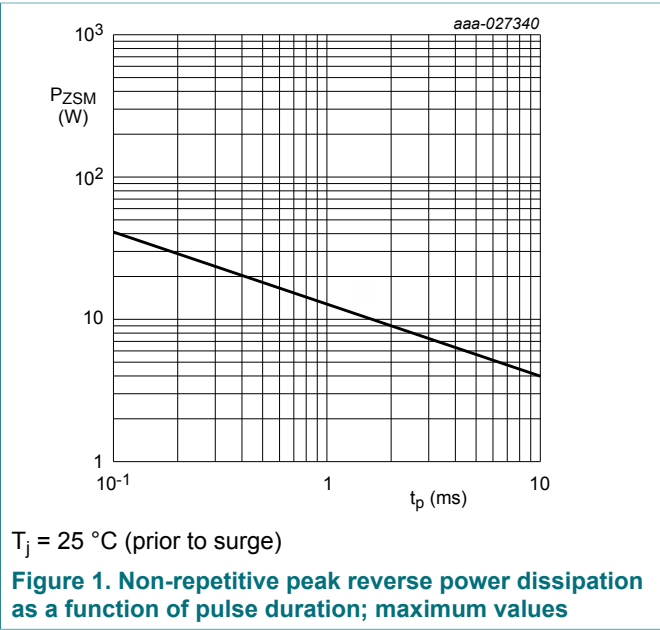
Table 8. Characteristics per type; PDZ2.4BGW to PDZ36BGW

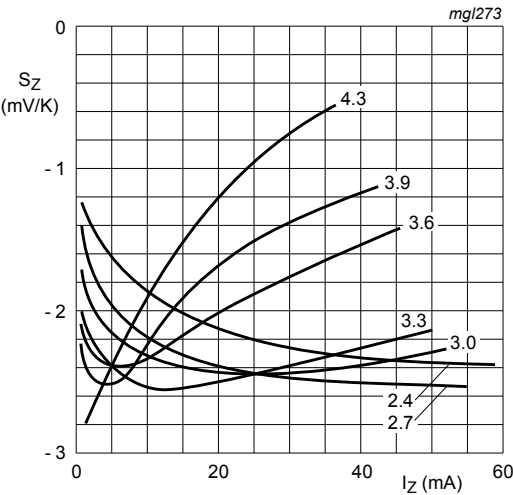
 $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

| PDZx<br>BGW | Sel | Working<br>voltage<br>$V_Z$ (V);<br>$I_Z = 5\text{ mA}$ |       | Maximum<br>differential<br>resistance<br>$r_{\text{dif}}$ ( $\Omega$ ) |                     | Reverse<br>current<br>$I_R$ ( $\mu\text{A}$ ) |           | Temperature<br>coefficient<br>$S_Z$ (mV/K);<br>$I_Z = 5\text{ mA}$ | Diode<br>capacitance<br>$C_d$ (pF) <sup>[1]</sup> | Non-<br>repetitive<br>peak<br>reverse<br>current<br>$I_{ZSM}$ (A) <sup>[2]</sup> |
|-------------|-----|---------------------------------------------------------|-------|------------------------------------------------------------------------|---------------------|-----------------------------------------------|-----------|--------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------|
|             |     | Min                                                     | Max   | $I_Z = 0.5\text{ mA}$                                                  | $I_Z = 5\text{ mA}$ | Max                                           | $V_R$ (V) | Typ                                                                | Max                                               | Max                                                                              |
| 2.4         | B   | 2.43                                                    | 2.63  | 1000                                                                   | 100                 | 50                                            | 1.0       | -1.6                                                               | 450                                               | 8.0                                                                              |
| 2.7         | B   | 2.69                                                    | 2.91  | 1000                                                                   | 100                 | 20                                            | 1.0       | -2.0                                                               | 440                                               | 8.0                                                                              |
| 3.0         | B   | 2.85                                                    | 3.07  | 1000                                                                   | 95                  | 10                                            | 1.0       | -2.1                                                               | 425                                               | 8.0                                                                              |
| 3.3         | B   | 3.32                                                    | 3.53  | 1000                                                                   | 95                  | 5                                             | 1.0       | -2.4                                                               | 410                                               | 8.0                                                                              |
| 3.6         | B   | 3.60                                                    | 3.85  | 500 @ 1<br>mA                                                          | 90                  | 5                                             | 1.0       | -2.4                                                               | 390                                               | 8.0                                                                              |
| 3.9         | B   | 3.89                                                    | 4.16  | 500 @ 1<br>mA                                                          | 90                  | 3                                             | 1.0       | -2.5                                                               | 370                                               | 8.0                                                                              |
| 4.3         | B   | 4.17                                                    | 4.48  | 600 @ 1<br>mA                                                          | 90                  | 3                                             | 1.0       | -2.5                                                               | 350                                               | 8.0                                                                              |
| 4.7         | B   | 4.55                                                    | 4.75  | 600 @ 1<br>mA                                                          | 90                  | 2                                             | 1.0       | -1.4                                                               | 325                                               | 8.0                                                                              |
| 5.1         | B   | 4.96                                                    | 5.20  | 250                                                                    | 60                  | 2                                             | 1.5       | 0.3                                                                | 300                                               | 5.5                                                                              |
| 5.6         | B   | 5.48                                                    | 5.73  | 100                                                                    | 50                  | 1                                             | 2.5       | 1.9                                                                | 275                                               | 5.5                                                                              |
| 6.2         | B   | 6.06                                                    | 6.33  | 80                                                                     | 50                  | 0.5                                           | 3.0       | 2.7                                                                | 250                                               | 5.5                                                                              |
| 6.8         | B   | 6.65                                                    | 6.93  | 60                                                                     | 40                  | 0.5                                           | 3.5       | 3.4                                                                | 215                                               | 5.5                                                                              |
| 7.5         | B   | 7.28                                                    | 7.60  | 60                                                                     | 10                  | 0.5                                           | 4.0       | 4.0                                                                | 170                                               | 3.5                                                                              |
| 8.2         | B   | 8.02                                                    | 8.36  | 60                                                                     | 10                  | 0.5                                           | 5.0       | 4.6                                                                | 150                                               | 3.5                                                                              |
| 9.1         | B   | 8.85                                                    | 9.23  | 60                                                                     | 10                  | 0.5                                           | 6.0       | 5.5                                                                | 120                                               | 3.5                                                                              |
| 10          | B   | 9.77                                                    | 10.21 | 60                                                                     | 10                  | 0.1                                           | 7.0       | 6.4                                                                | 110                                               | 3.5                                                                              |
| 11          | B   | 10.78                                                   | 11.22 | 60                                                                     | 10                  | 0.1                                           | 8.0       | 7.4                                                                | 108                                               | 3.0                                                                              |
| 12          | B   | 11.74                                                   | 12.24 | 80                                                                     | 10                  | 0.1                                           | 9.0       | 8.4                                                                | 105                                               | 3.0                                                                              |
| 13          | B   | 12.91                                                   | 13.49 | 80                                                                     | 10                  | 0.1                                           | 10.0      | 9.4                                                                | 103                                               | 2.5                                                                              |
| 15          | B   | 14.34                                                   | 14.98 | 80                                                                     | 15                  | 0.05                                          | 11.0      | 11.4                                                               | 99                                                | 2.0                                                                              |
| 16          | B   | 15.85                                                   | 16.51 | 80                                                                     | 20                  | 0.05                                          | 12.0      | 12.4                                                               | 97                                                | 1.5                                                                              |
| 18          | B   | 17.56                                                   | 18.35 | 80                                                                     | 20                  | 0.05                                          | 13.0      | 14.4                                                               | 93                                                | 1.5                                                                              |
| 20          | B   | 19.52                                                   | 20.39 | 100                                                                    | 20                  | 0.05                                          | 15.0      | 16.4                                                               | 88                                                | 1.5                                                                              |
| 22          | B   | 21.54                                                   | 22.47 | 100                                                                    | 25                  | 0.05                                          | 17.0      | 18.4                                                               | 84                                                | 1.3                                                                              |
| 24          | B   | 23.72                                                   | 24.78 | 120                                                                    | 30                  | 0.05                                          | 19.0      | 20.4                                                               | 80                                                | 1.3                                                                              |

| PDZx<br>BGW | Sel | Working<br>voltage<br>V <sub>Z</sub> (V);<br>I <sub>Z</sub> = 5 mA |       | Maximum<br>differential<br>resistance<br>r <sub>dif</sub> (Ω) |                       | Reverse<br>current<br>I <sub>R</sub> (μA) |                    | Temperature<br>coefficient<br>S <sub>Z</sub> (mV/K);<br>I <sub>Z</sub> = 5 mA | Diode<br>capacitance<br>C <sub>d</sub> (pF) <sup>[1]</sup> | Non-<br>repetitive<br>peak<br>reverse<br>current<br>I <sub>ZSM</sub> (A) <sup>[2]</sup> |
|-------------|-----|--------------------------------------------------------------------|-------|---------------------------------------------------------------|-----------------------|-------------------------------------------|--------------------|-------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------|
|             |     | Min                                                                | Max   | I <sub>Z</sub> = 0.5<br>mA                                    | I <sub>Z</sub> = 5 mA | Max                                       | V <sub>R</sub> (V) | Typ                                                                           | Max                                                        | Max                                                                                     |
| 27          | B   | 26.19                                                              | 27.53 | 150                                                           | 40                    | 0.05                                      | 21.0               | 23.4                                                                          | 73                                                         | 1.0                                                                                     |
| 30          | B   | 29.19                                                              | 30.69 | 200                                                           | 40                    | 0.05                                      | 23.0               | 26.6                                                                          | 66                                                         | 1.0                                                                                     |
| 33          | B   | 32.15                                                              | 33.79 | 250                                                           | 40                    | 0.05                                      | 25.0               | 29.7                                                                          | 60                                                         | 0.9                                                                                     |
| 36          | B   | 35.07                                                              | 36.87 | 300                                                           | 60                    | 0.05                                      | 27.0               | 33.0                                                                          | 59                                                         | 0.8                                                                                     |

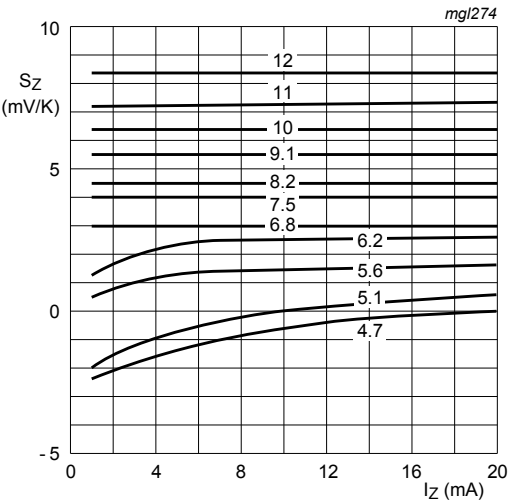
[1] f = 1 MHz; V<sub>R</sub> = 0 V.  
[2] t<sub>p</sub> = 100 μs; T<sub>amb</sub> = 25 °C.





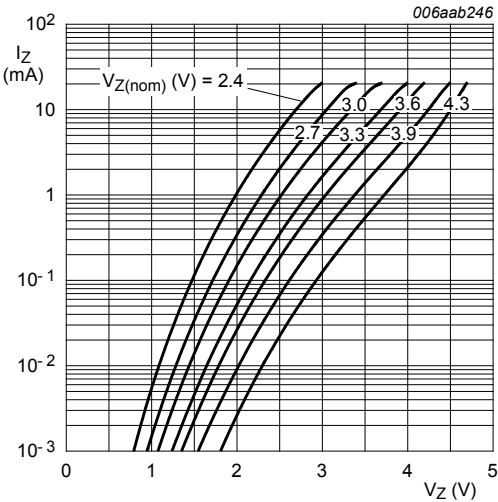
PDZ2.4BGW to PDZ4.3BGW  
 $T_j = 25\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$

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



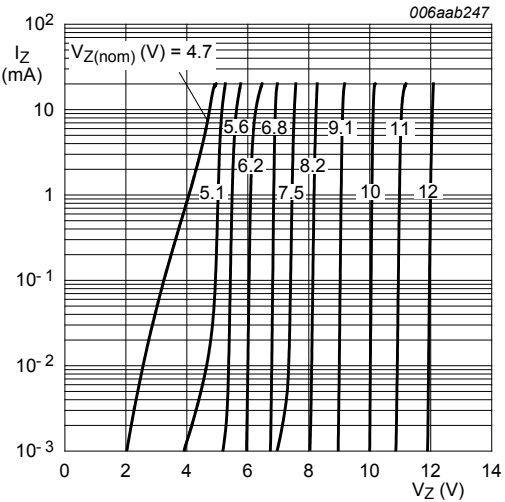
PDZ4.7BGW to PDZ12BGW  
 $T_j = 25\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$

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



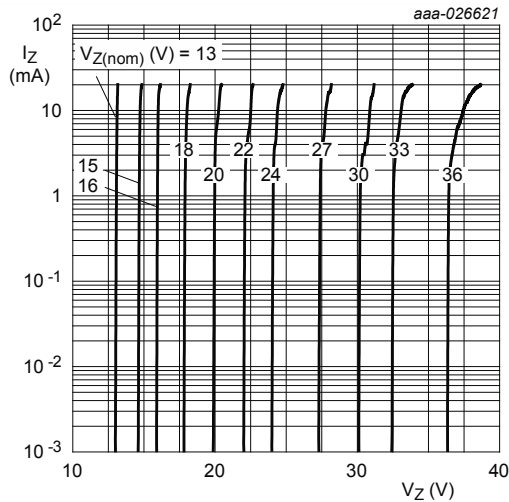
PDZ2.4BGW to PDZ4.3BGW  
 $T_j = 25\text{ }^{\circ}\text{C}$

Figure 5. Working current as a function of working voltage; typical values



PDZ4.7BGW to PDZ12BGW  
 $T_j = 25\text{ }^{\circ}\text{C}$

Figure 6. Working current as a function of working voltage; typical values



PDZ13BGW to PDZ36BGW

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

Figure 7. Working current as a function of working voltage; 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

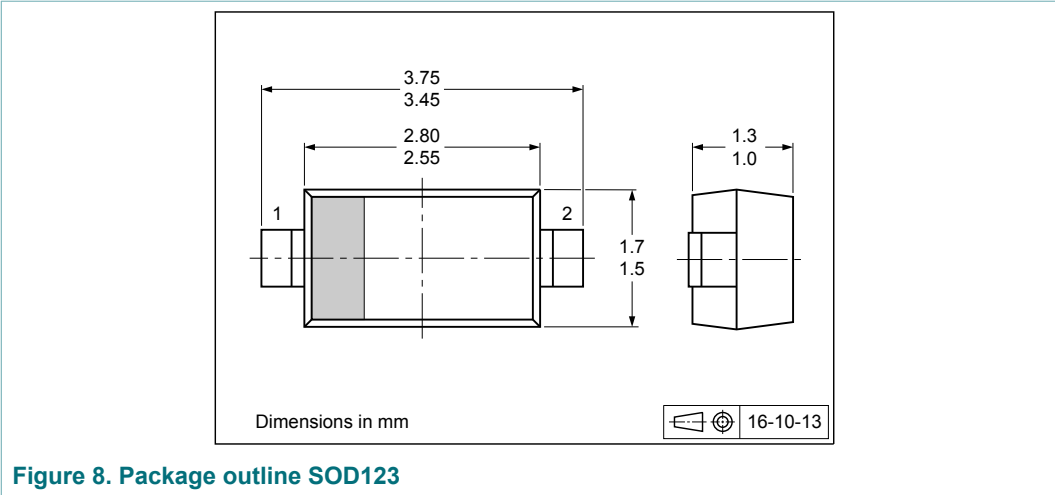
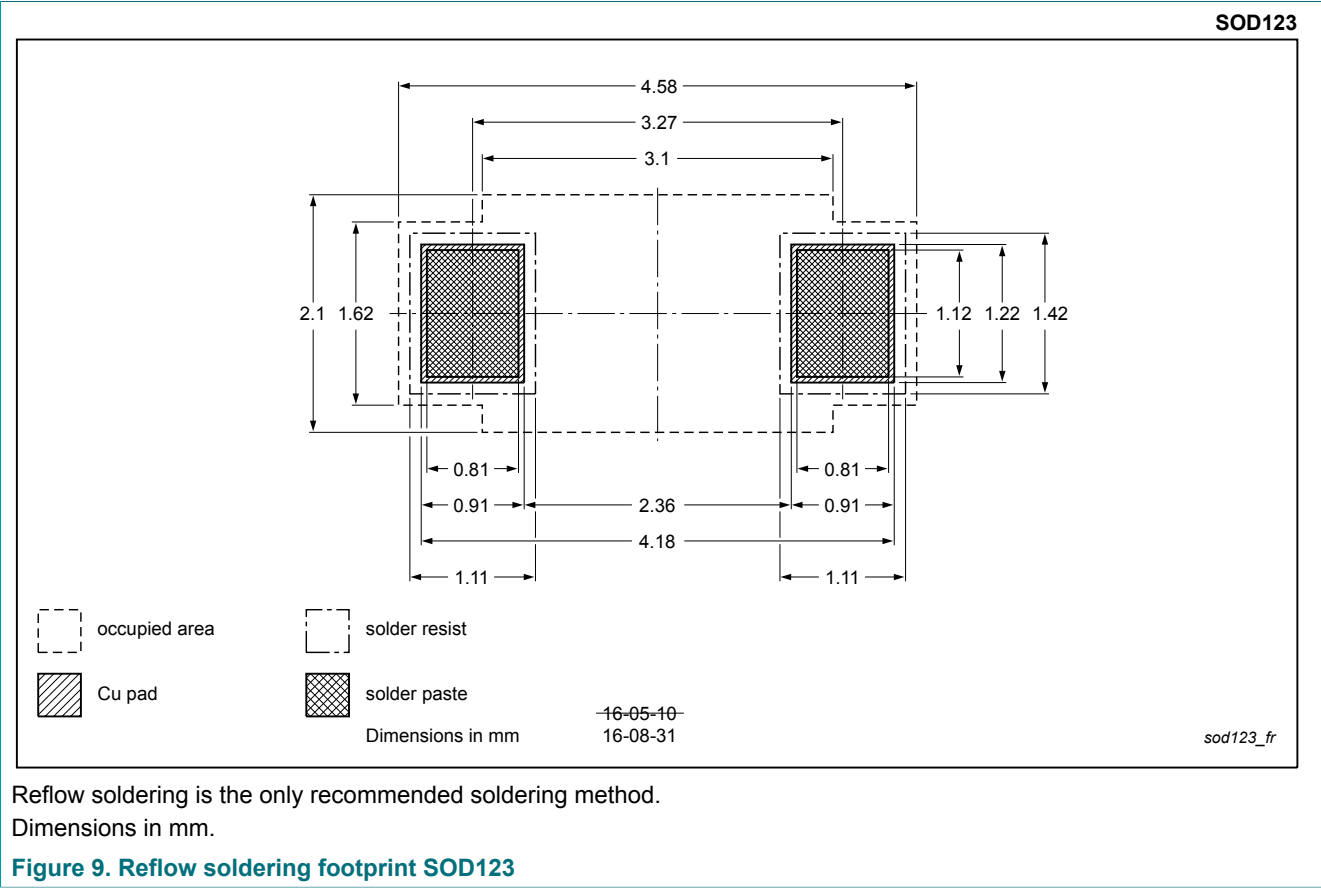


Figure 8. Package outline SOD123

10 Soldering





## 11 Revision history

Table 9. Revision history

| Document ID    | Release date | Data sheet status  | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PDZ-GW_SER v.1 | 20170904     | Product data sheet | -             | -          |

## 12 Legal information

### 12.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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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Document identifier: PDZ-GW\_SER