



# BAS21GW

## High-voltage switching diode

15 June 2017

Product data sheet

### 1. General description

High-voltage switching diode, encapsulated in an SOD123 small Surface-Mounted Device (SMD) plastic package.

### 2. Features and benefits

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current:  $I_R \leq 100$  nA
- High reverse voltage  $V_R \leq 200$  V
- Low capacitance:  $C_d \leq 2$  pF
- Small SMD plastic package
- AEC-Q101 qualified

### 3. Applications

- High-speed switching
- General-purpose switching



### 4. Quick reference data

Table 1. Quick reference data

| Symbol   | Parameter             | Conditions  | Min | Typ | Max  | Unit |
|----------|-----------------------|---|-----|-----|------|------|
| $I_F$    | forward current       | $T_j = 25$ °C   | -   | -   | 225  | mA   |
| $V_R$    | reverse voltage       |   | -   | -   | 200  | V    |
| $V_F$    | forward voltage       | $I_F = 200$ mA; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ;<br>$T_j = 25$ °C               | -   | -   | 1.25 | V    |
| $I_R$    | reverse current       | $V_R = 200$ V; pulsed; $T_j = 25$ °C  | -   | -   | 100  | nA   |
| $t_{rr}$ | reverse recovery time | $I_F = 10$ mA; $I_R = 10$ mA; $R_L = 100$ $\Omega$ ;<br>$I_{R(meas)} = 1$ mA; $T_j = 25$ °C | -   | -   | 50   | ns   |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline  | Graphic symbol  |
|-----|--------|-------------|---|---|
| 1   | K      | Cathode     | <br>SOD123 | <br>sym001 |
| 2   | A      | Anode       |   |   |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package |  |         |
|-------------|---------|--|---------|
|             | Name    | Description                              | Version |
| BAS21GW     | SOD123  | Plastic surface-mounted package; 2 leads | SOD123  |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BAS21GW     | GC           |

## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol           | Parameter                           | Conditions  |     | Min | Max | Unit |
|------------------|-------------------------------------|---|-----|-----|-----|------|
| $V_{RRM}$        | repetitive peak reverse voltage     | $T_j = 25\text{ °C}$  |     | -   | 250 | V    |
| $V_R$            | reverse voltage                     |   |     | -   | 200 | V    |
| $I_F$            | forward current                     |   |     | -   | 225 | mA   |
| $I_{FSM}$        | non-repetitive peak forward current | $t_p = 1\text{ }\mu\text{s}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$   |     | -   | 9   | A    |
|                  |                                     | $t_p = 100\text{ }\mu\text{s}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$ |     | -   | 3   | A    |
|                  |                                     | $t_p = 10\text{ ms}; T_{j(\text{init})} = 25\text{ °C}; \text{square wave}$           |     | -   | 1.7 | A    |
| $I_{FRM}$        | repetitive peak forward current     | $t_p = 1\text{ ms}; \delta = 0.25$  |     | -   | 625 | mA   |
| $P_{\text{tot}}$ | total power dissipation             | $T_{\text{amb}} \leq 25\text{ °C}$  | [1] | -   | 380 | mW   |
|                  |                                     |   | [2] | -   | 660 | mW   |
| $T_j$            | junction temperature                |   |     | -   | 150 | °C   |
| $T_{\text{amb}}$ | ambient temperature                 |   |     | -55 | 150 | °C   |
| $T_{\text{stg}}$ | storage temperature                 |   |     | -65 | 150 | °C   |

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

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated mounting pad for cathode  $1\text{ cm}^2$ .

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol                | Parameter  | Conditions  |     | Min | Typ | Max | Unit |
|-----------------------|--|-------------|-----|-----|-----|-----|------|
| $R_{\text{th}(j-a)}$  | thermal resistance from junction to ambient      | In free air | [1] | -   | -   | 330 | K/W  |
|                       |  |             | [2] | -   | -   | 190 | K/W  |
| $R_{\text{th}(j-sp)}$ | thermal resistance from junction to solder point |             | [3] | -   | -   | 44  | 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  $1\text{ cm}^2$ .

[3] Soldering point of cathode tab.

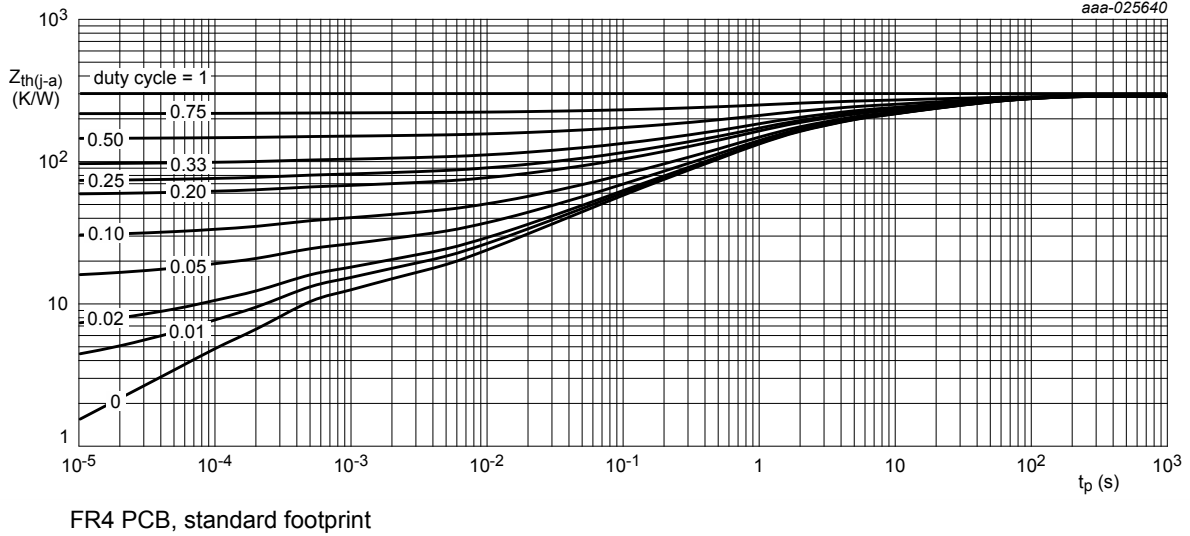


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

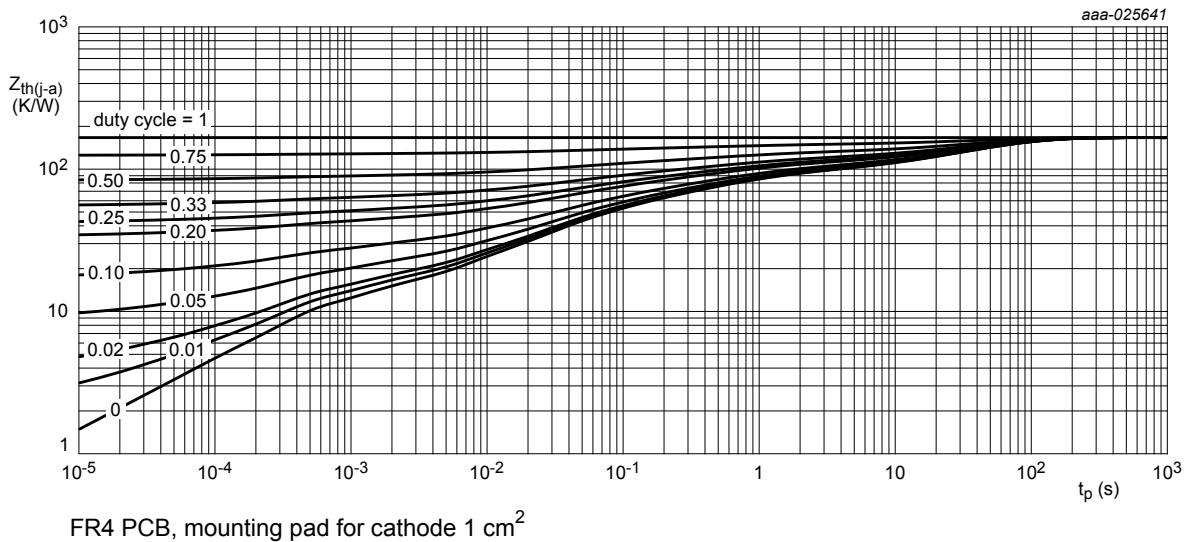
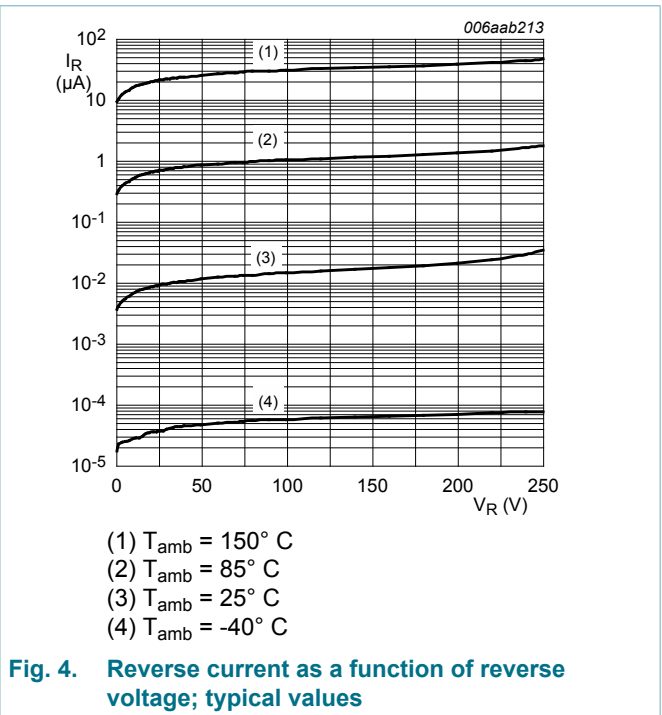
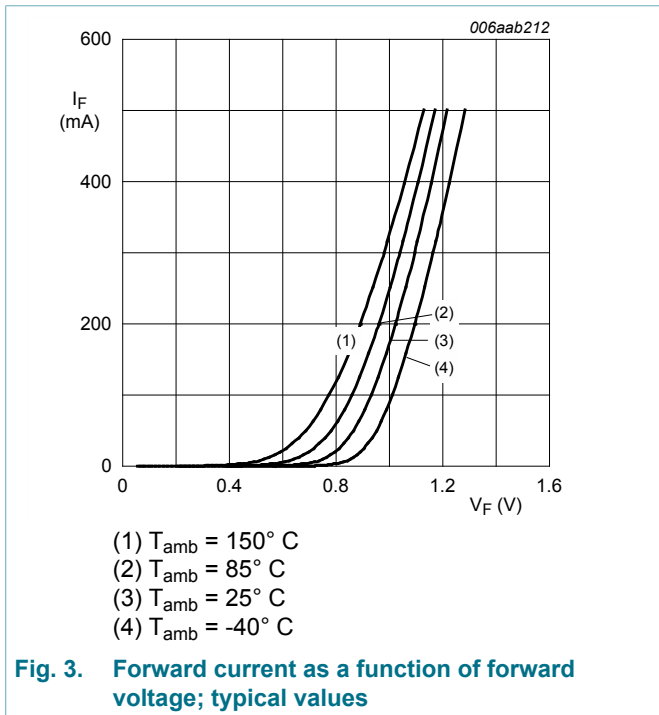


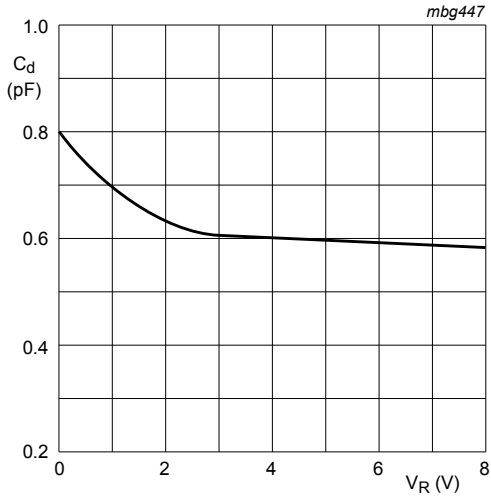
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

### 10. Characteristics

Table 7. Characteristics

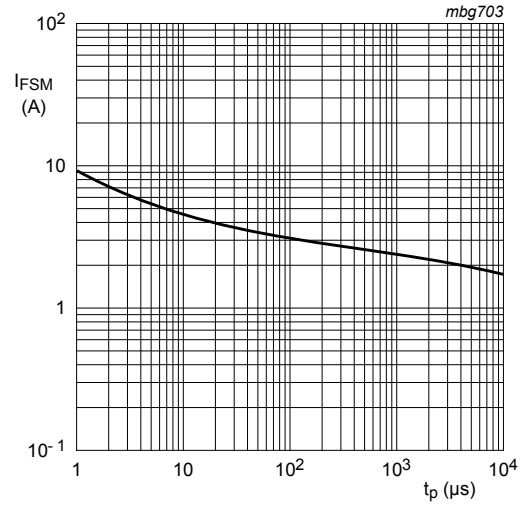
| Symbol          | Parameter             | Conditions   | Min | Typ | Max  | Unit |
|-----------------|-----------------------|--|-----|-----|------|------|
| V <sub>F</sub>  | forward voltage       | I <sub>F</sub> = 100 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ;<br>T <sub>j</sub> = 25 °C   | -   | -   | 1    | V    |
|                 |                       | I <sub>F</sub> = 200 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ;<br>T <sub>j</sub> = 25 °C   | -   | -   | 1.25 | V    |
| I <sub>R</sub>  | reverse current       | V <sub>R</sub> = 200 V; pulsed; T <sub>j</sub> = 25 °C   | -   | -   | 100  | nA   |
|                 |                       | V <sub>R</sub> = 200 V; pulsed; T <sub>j</sub> = 150 °C  | -   | -   | 100  | μA   |
| C <sub>d</sub>  | diode capacitance     | V <sub>R</sub> = 0 V; f = 1 MHz; T <sub>j</sub> = 25 °C  | -   | -   | 2    | pF   |
| t <sub>rr</sub> | reverse recovery time | I <sub>F</sub> = 10 mA; I <sub>R</sub> = 10 mA; R <sub>L</sub> = 100 Ω;<br>I <sub>R(meas)</sub> = 1 mA; T <sub>j</sub> = 25 °C | -   | -   | 50   | ns   |





$f = 1 \text{ MHz}$   
 $T_j = 25 \text{ }^\circ\text{C}$ .

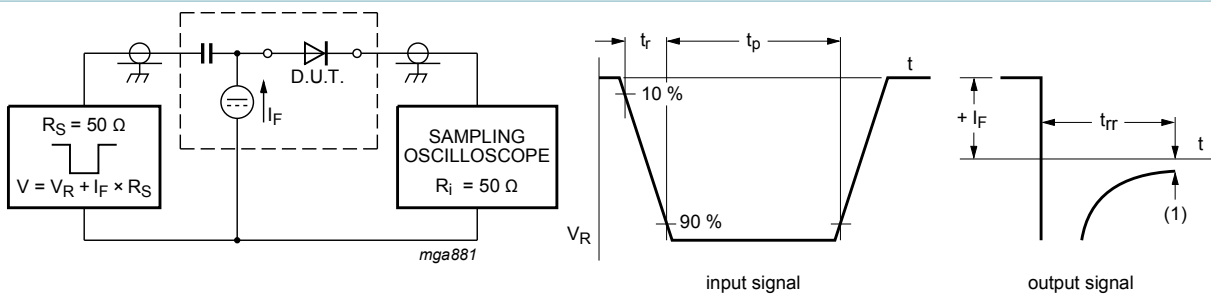
**Fig. 5.** Diode capacitance as a function of reverse voltage; typical values.



Based on square wave currents.  
 $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$

**Fig. 6.** Non-repetitive peak forward current as a function of pulse duration; maximum values

## 11. Test information



(1)  $I_R = 1 \text{ mA}$

**Fig. 7.** Reverse recovery time test circuit and waveforms

### 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

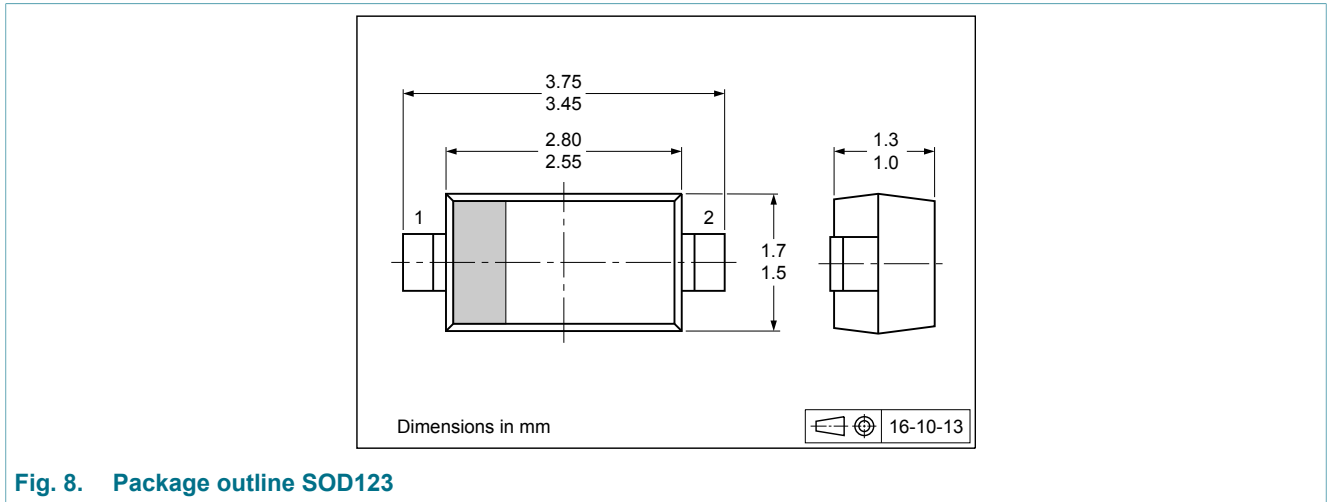


Fig. 8. Package outline SOD123

## 13. Soldering

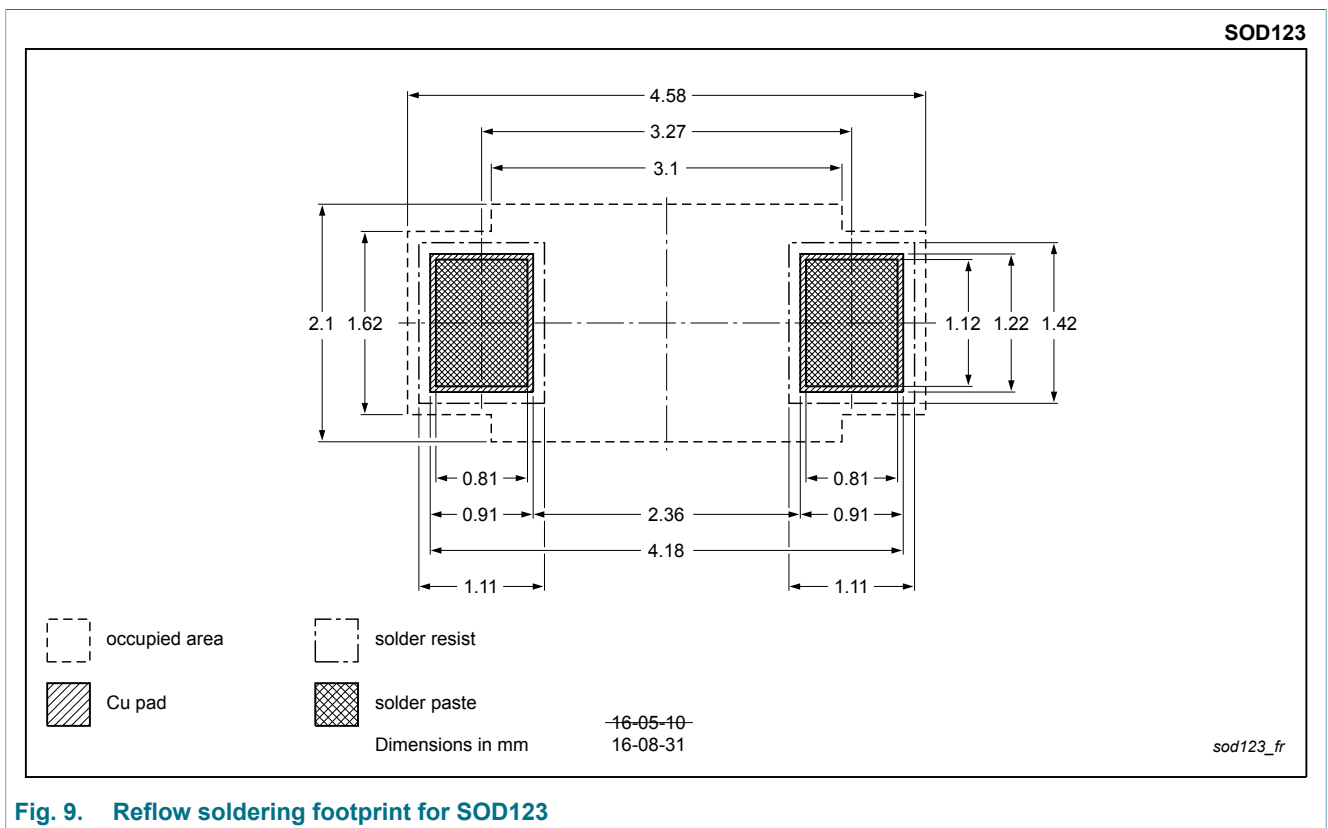


Fig. 9. Reflow soldering footprint for SOD123

SOD123

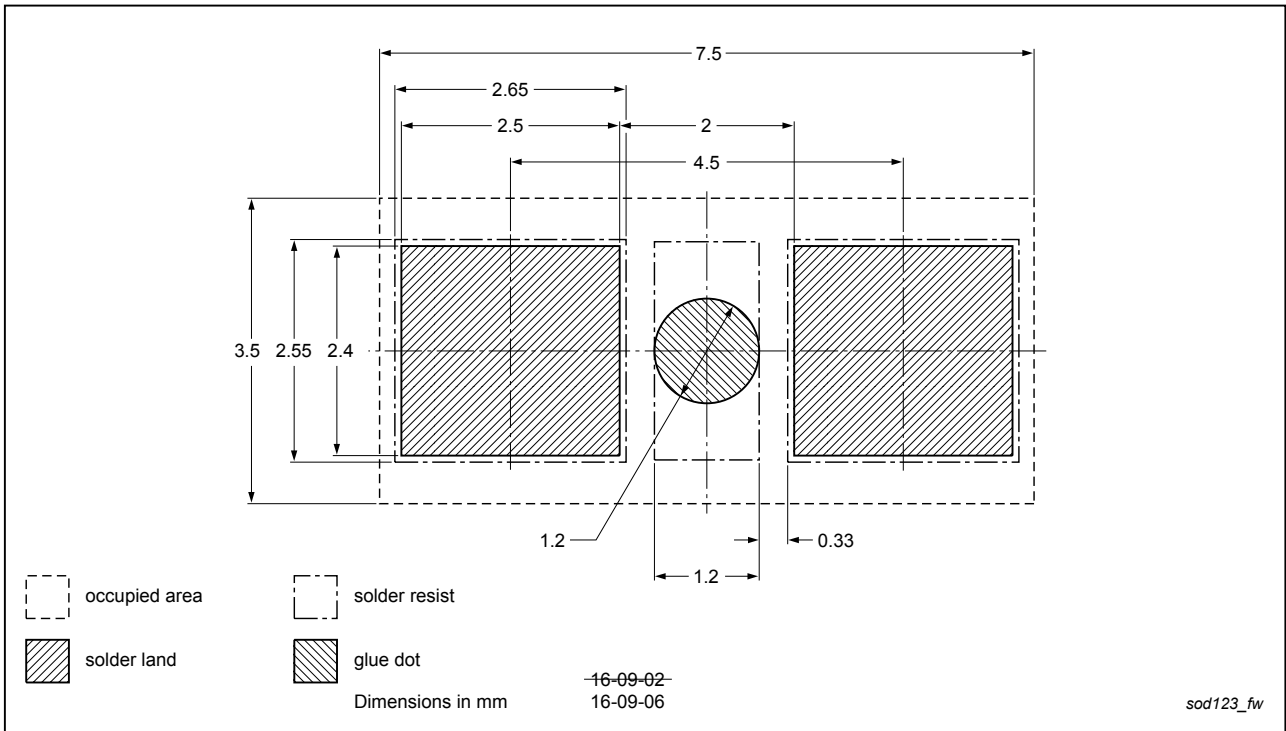


Fig. 10. Wave soldering footprint for SOD123



## 14. Revision history

Table 8. Revision history

| Data sheet ID  | Release date   | Data sheet status  | Change notice | Supersedes |
|----------------|--|--------------------|---------------|------------|
| BAS21GW v.2    | 20170615   | Product data sheet | -             | -          |
| Modifications: | <ul style="list-style-type: none"><li>• Value of maximum reverse voltage revised</li><li>• Parameter for repetitive peak reverse voltage inserted</li><li>• Figure 4: unit at y-axis corrected</li></ul> |                    |               |            |
| BAS21GW v.1    | 20161124   | 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".
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