



# PMEG2005EGW

20 V, 0.5 A low VF MEGA Schottky barrier rectifier

5 December 2016

Product data sheet

## 1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection encapsulated in small SOD123 Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Forward current:  $I_F \leq 0.5$  A
- Reverse voltage:  $V_R \leq 20$  V
- Low forward voltage typ.  $V_F = 355$  mV
- Low reverse current typ.  $I_R = 40$   $\mu$ A
- Small SMD plastic package
- AEC-Q101 qualified

## 3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Reverse polarity protection
- Low power consumption applications
- Automotive applications

## 4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter       | Conditions                                                                    |     | Min | Typ | Max | Unit    |
|--------|-----------------|-------------------------------------------------------------------------------|-----|-----|-----|-----|---------|
| $I_F$  | forward current | $T_{sp} \leq 55$ °C                                                           |     | -   | -   | 0.5 | A       |
| $V_R$  | reverse voltage | $T_j = 25$ °C                                                                 |     | -   | -   | 20  | V       |
| $V_F$  | forward voltage | $I_F = 500$ mA; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ;<br>$T_j = 25$ °C |     | -   | 355 | 390 | mV      |
| $I_R$  | reverse current | $V_R = 20$ V; pulsed; $T_j = 25$ °C                                           | [1] | -   | 40  | 200 | $\mu$ A |

[1] Very short test pulse to prevent junction self-heating.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description            | Simplified outline                                                                          | Graphic symbol                                                                                    |
|-----|--------|------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1   | K      | cathode <sup>[1]</sup> | <br>SOD123 | <br><br>sym001 |
| 2   | A      | anode                  |                                                                                             |                                                                                                   |

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| PMEG2005EGW | SOD123  | Plastic surface-mounted package; 2 leads | SOD123  |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG2005EGW | G1           |

## 8. Limiting values

**Table 5. Limiting values**

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

| Symbol      | Parameter                           | Conditions                                                                                      |     | Min | Max | Unit               |
|-------------|-------------------------------------|-------------------------------------------------------------------------------------------------|-----|-----|-----|--------------------|
| $V_R$       | reverse voltage                     | $T_j = 25\text{ }^{\circ}\text{C}$                                                              |     | -   | 20  | V                  |
| $I_F$       | forward current                     | $T_{sp} \leq 55\text{ }^{\circ}\text{C}$                                                        |     | -   | 0.5 | A                  |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 120\text{ }^{\circ}\text{C}$ ; square wave | [1] | -   | 0.5 | A                  |
|             |                                     | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 145\text{ }^{\circ}\text{C}$ ; square wave  |     | -   | 0.5 | A                  |
| $I_{FRM}$   | repetitive peak forward current     | $t_p \leq 1\text{ ms}$ ; $\delta \leq 0.25$                                                     |     | -   | 7   | A                  |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; square wave                  |     | -   | 10  | A                  |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ }^{\circ}\text{C}$                                                       | [2] | -   | 400 | mW                 |
|             |                                     |                                                                                                 | [1] | -   | 660 | mW                 |
| $T_j$       | junction temperature                |                                                                                                 |     | -   | 150 | $^{\circ}\text{C}$ |
| $T_{amb}$   | ambient temperature                 |                                                                                                 |     | -55 | 150 | $^{\circ}\text{C}$ |
| $T_{stg}$   | storage temperature                 |                                                                                                 |     | -65 | 150 | $^{\circ}\text{C}$ |

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

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

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

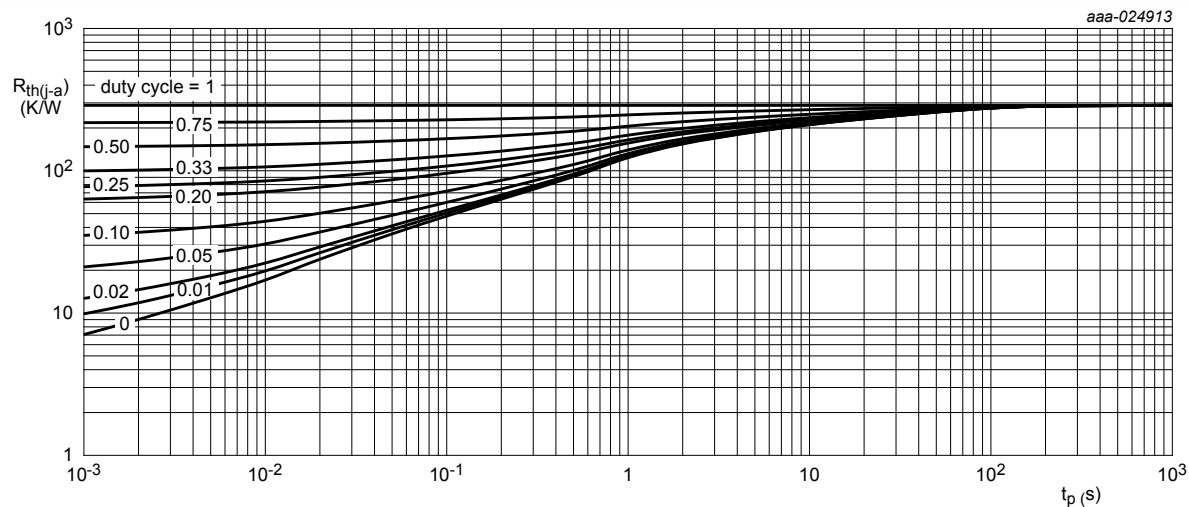
| Symbol         | Parameter                                        | Conditions  |         | Min | Typ | Max | Unit |
|----------------|--------------------------------------------------|-------------|---------|-----|-----|-----|------|
| $R_{th(j-a)}$  | thermal resistance from junction to ambient      | in free air | [1] [2] | -   | -   | 310 | K/W  |
|                |                                                  |             | [1] [3] | -   | -   | 190 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [4]     | -   | -   | 29  | K/W  |

[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses.

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

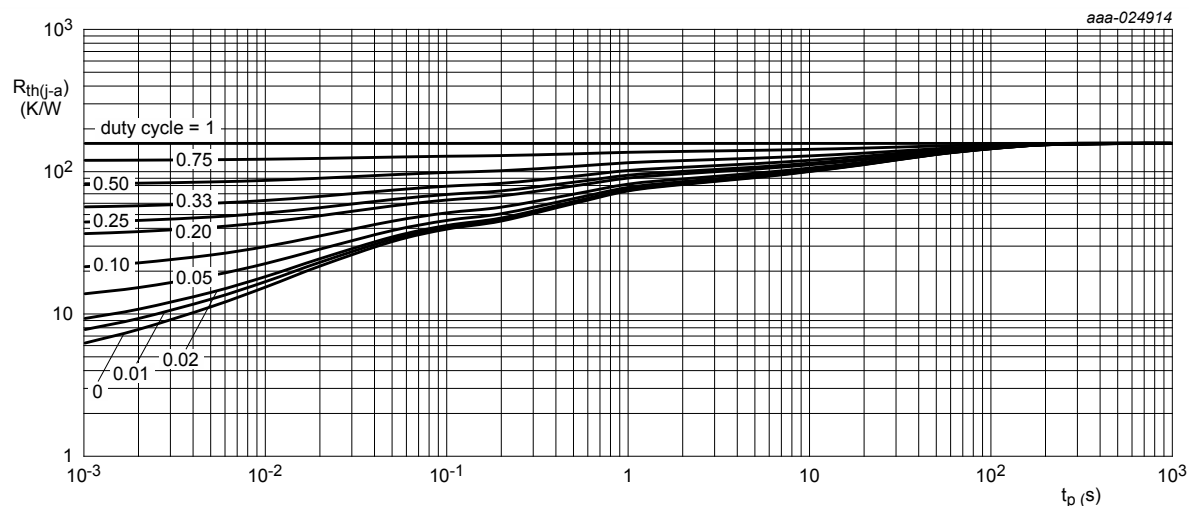
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .

[4] Soldering point of cathode tab.



FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>

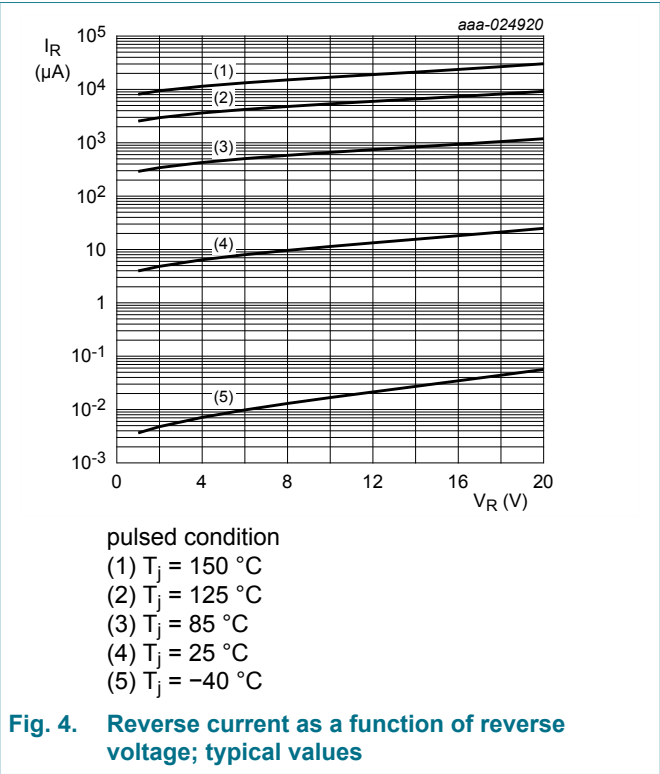
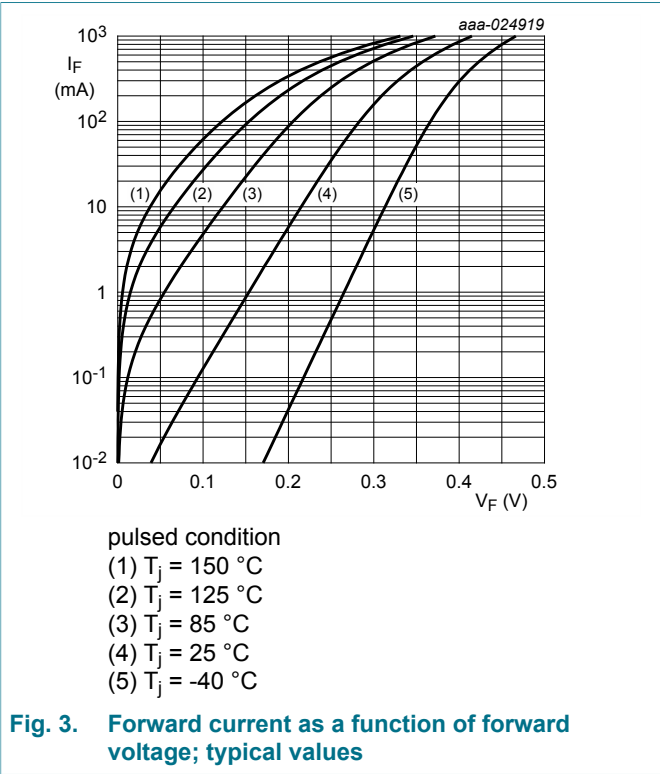
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

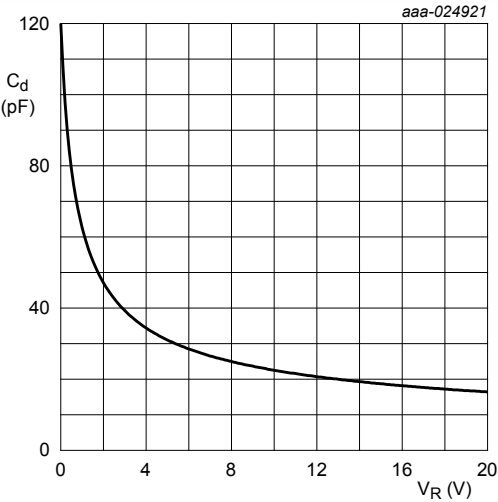
10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                 | Conditions                                                                                                           |     | Min | Typ | Max | Unit          |
|-------------|---------------------------|----------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R = 1\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25\text{ }^\circ\text{C}$   |     | 20  | -   | -   | V             |
| $V_F$       | forward voltage           | $I_F = 0.1\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25\text{ }^\circ\text{C}$ |     | -   | 90  | 130 | mV            |
|             |                           | $I_F = 1\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25\text{ }^\circ\text{C}$   |     | -   | 150 | 190 | mV            |
|             |                           | $I_F = 10\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25\text{ }^\circ\text{C}$  |     | -   | 210 | 240 | mV            |
|             |                           | $I_F = 100\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25\text{ }^\circ\text{C}$ |     | -   | 280 | 330 | mV            |
|             |                           | $I_F = 500\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25\text{ }^\circ\text{C}$ |     | -   | 355 | 390 | mV            |
| $I_R$       | reverse current           | $V_R = 10\text{ V}$ ; pulsed; $T_j = 25\text{ }^\circ\text{C}$                                                       | [1] | -   | 15  | 40  | $\mu\text{A}$ |
|             |                           | $V_R = 20\text{ V}$ ; pulsed; $T_j = 25\text{ }^\circ\text{C}$                                                       | [1] | -   | 40  | 200 | $\mu\text{A}$ |
| $C_d$       | diode capacitance         | $V_R = 1\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_j = 25\text{ }^\circ\text{C}$                                           |     | -   | 66  | 80  | pF            |

[1] Very short test pulse to prevent junction self-heating.





f = 1 MHz; T<sub>amb</sub> = 25 °C

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

11. Test information

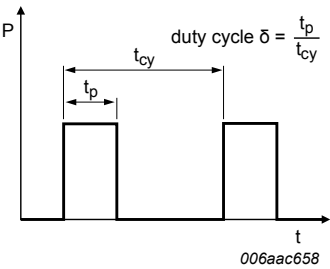


Fig. 6. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:  
 $I_{F(AV)} = I_M \times \delta$  with  $I_M$  defined as peak current,  $I_{RMS} = I_{F(AV)}$  at DC, and  $I_{RMS} = I_M \times \sqrt{\delta}$  with  $I_{RMS}$  defined as RMS current.

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

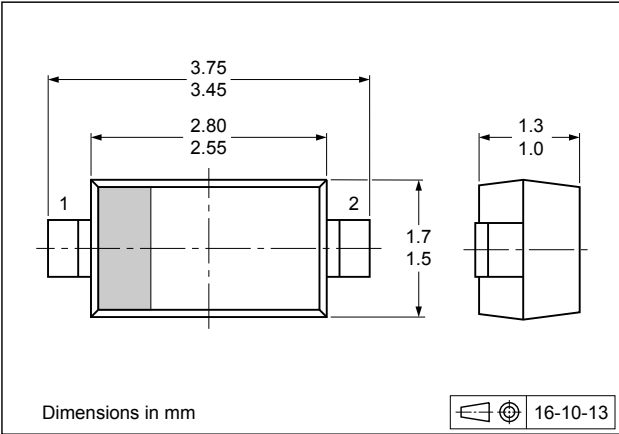


Fig. 7. Package outline SOD123

13. Soldering

SOD123

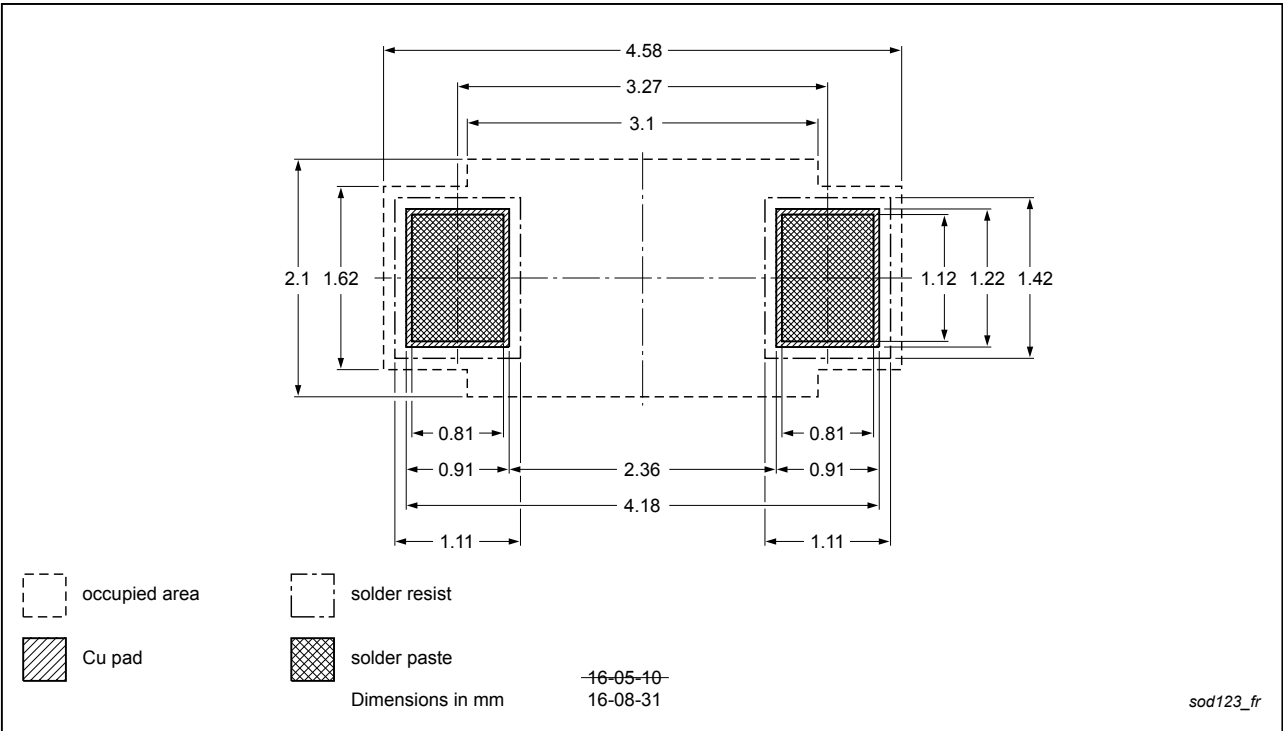


Fig. 8. Reflow soldering footprint for SOD123

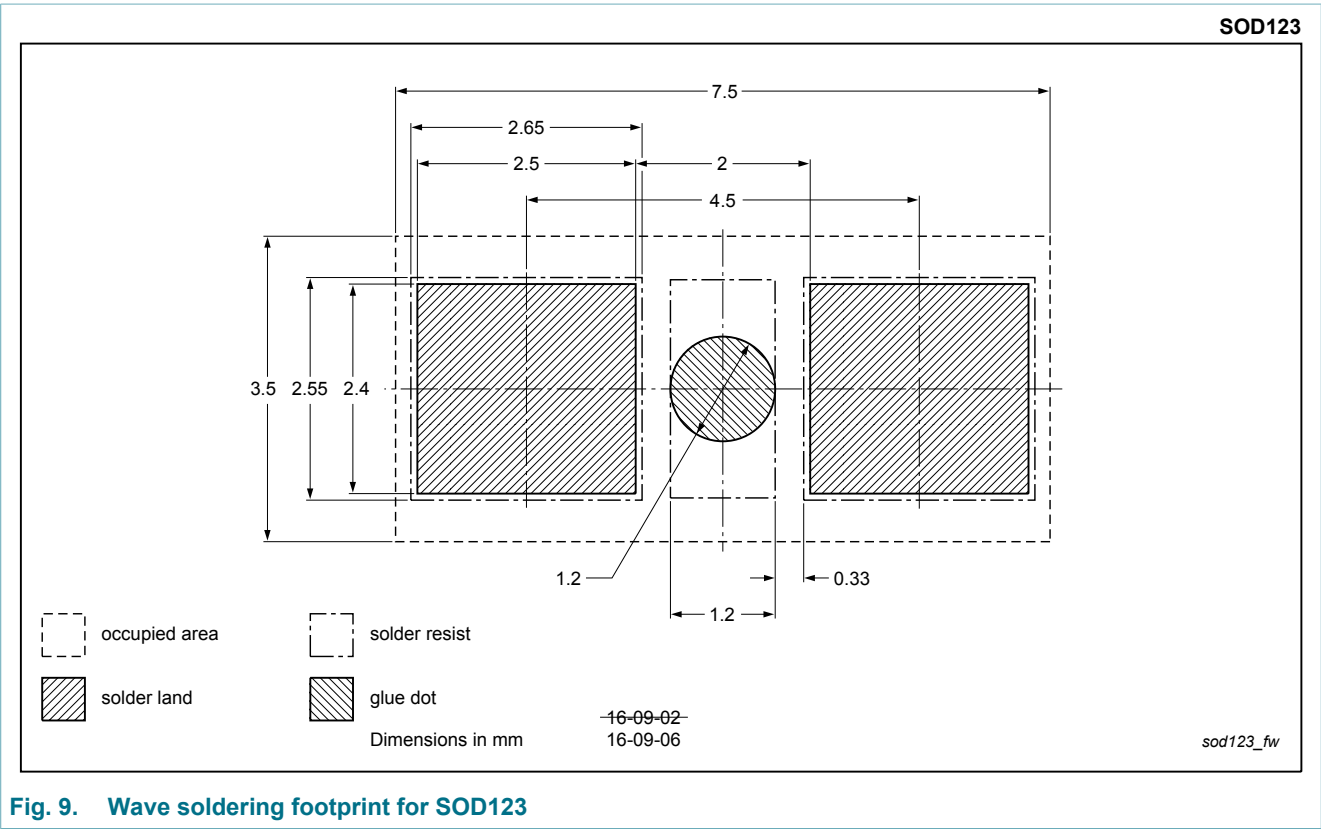


Fig. 9. Wave soldering footprint for SOD123

## 14. Revision history

Table 8. Revision history

| Data sheet ID   | Release date                                                           | Data sheet status      | Change notice | Supersedes      |
|-----------------|------------------------------------------------------------------------|------------------------|---------------|-----------------|
| PMEG2005EGW v.2 | 20161205                                                               | Product data sheet     | -             | PMEG2005EGW v.1 |
| Modifications:  | <ul style="list-style-type: none"><li>Product status changed</li></ul> |                        |               |                 |
| PMEG2005EGW v.1 | 20161122                                                               | Preliminary data sheet | -             | -               |

## 15. Legal information

### 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.                       |
| Product [short] data sheet         | Production                    | This document contains the product specification.                                     |

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