



# PMEG4010EGW

40 V, 1 A low VF MEGA Schottky barrier rectifier

7 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:  $I_F \leq 1$  A
- Reverse voltage:  $V_R \leq 40$  V
- Low forward voltage typ.  $V_F = 540$  mV
- Low reverse current typ.  $I_R = 30$   $\mu$ 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  | -   | -   | 1   | A       |
| $V_R$  | reverse voltage | $T_j = 25$ °C  | -   | -   | 40  | V       |
| $V_F$  | forward voltage | $I_F = 1$ A; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ;<br>$T_j = 25$ °C | -   | 540 | 640 | mV      |
| $I_R$  | reverse current | $V_R = 40$ V; pulsed; $T_j = 25$ °C  | [1] | 30  | 100 | $\mu$ 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><i>sym001</i> |
| 2   | A      | anode                  |   |  |

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

| Type number | Package |  |         |
|-------------|---------|--|---------|
|             | Name    | Description                              | Version |
| PMEG4010EGW | SOD123  | Plastic surface-mounted package; 2 leads | SOD123  |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG4010EGW | G5           |

## 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                     | $T_j = 25\text{ °C}$   |     | -   | 40  | V    |
| $I_F$       | forward current                     | $T_{sp} \leq 55\text{ °C}$   |     | -   | 1   | A    |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 60\text{ °C}$ ; square wave | [1] | -   | 1   | A    |
|             |                                     | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 130\text{ °C}$ ; square wave |     | -   | 1   | 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 | $t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$ ; square wave                 |     | -   | 9   | A    |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ °C}$  | [2] | -   | 400 | mW   |
|             |                                     |  | [1] | -   | 660 | mW   |
| $T_j$       | junction temperature                |  |     | -   | 150 | °C   |
| $T_{amb}$   | ambient temperature                 |  |     | -55 | 150 | °C   |
| $T_{stg}$   | storage temperature                 |  |     | -65 | 150 | °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.

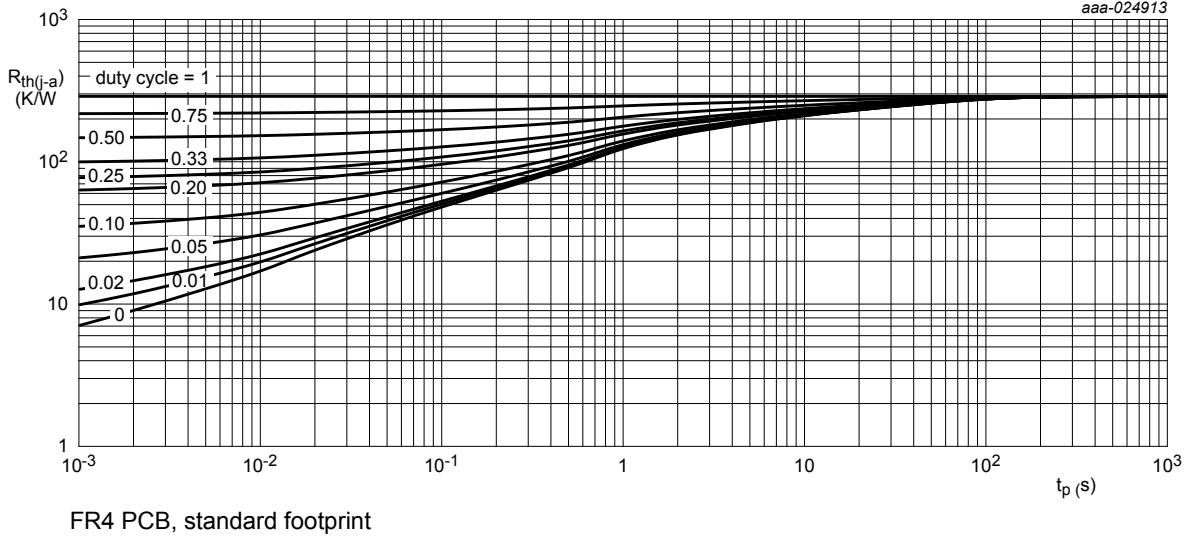


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

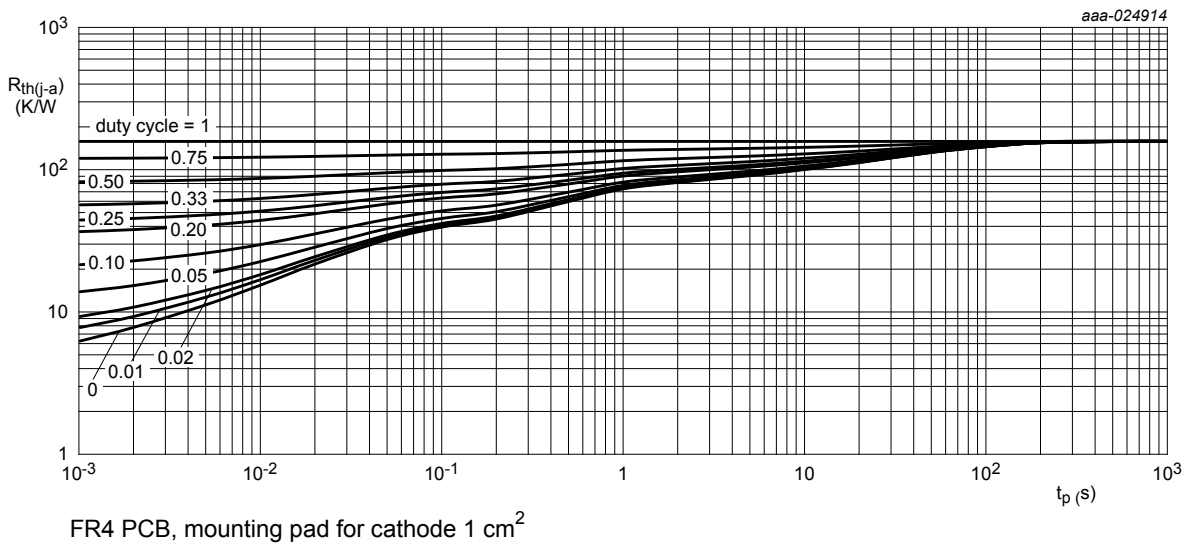


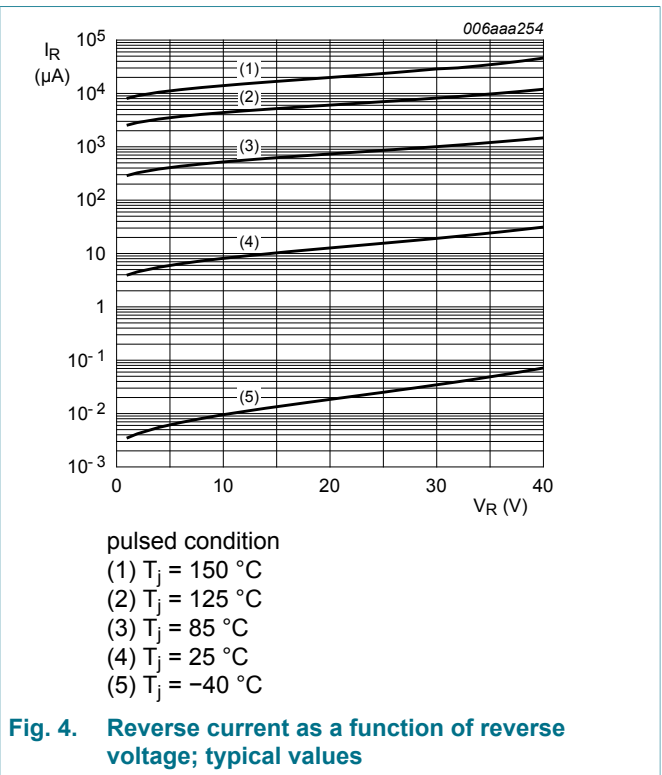
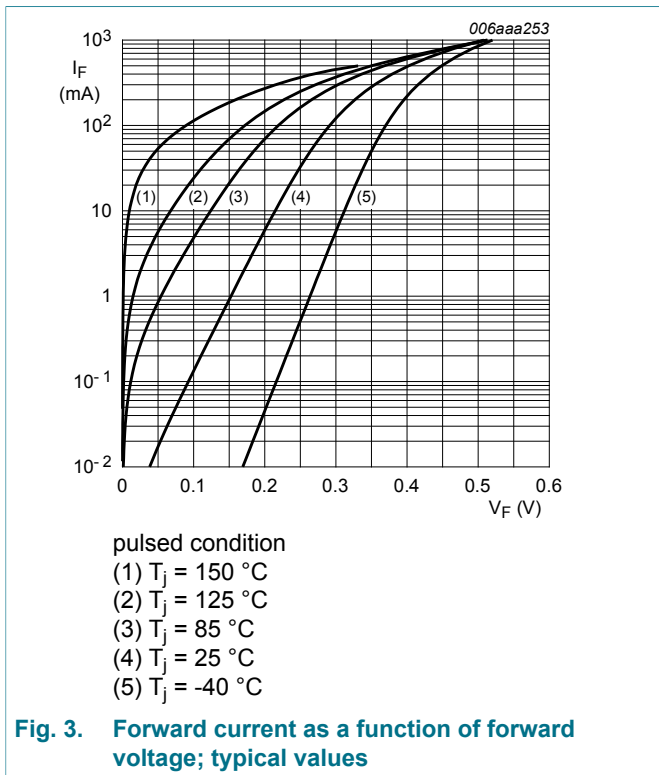
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

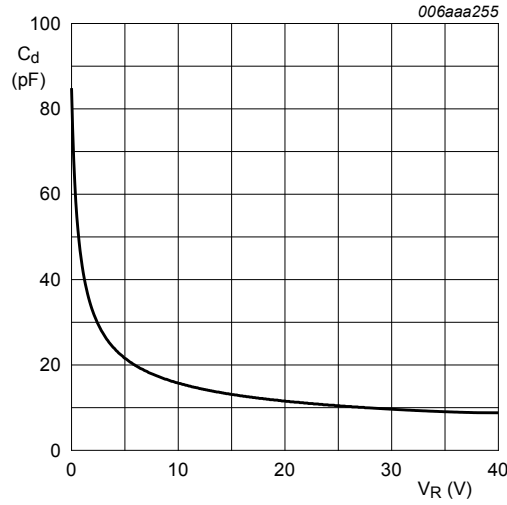
### 10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                 | Conditions   | Min | Typ | Max | Unit          |
|-------------|---------------------------|--|-----|-----|-----|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R = 1 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02 ; T_j = 25 \text{ }^\circ\text{C}$   | 40  | -   | -   | V             |
| $V_F$       | forward voltage           | $I_F = 0.1 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02 ; T_j = 25 \text{ }^\circ\text{C}$ | -   | 95  | 130 | mV            |
|             |                           | $I_F = 1 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02 ; T_j = 25 \text{ }^\circ\text{C}$   | -   | 155 | 210 | mV            |
|             |                           | $I_F = 10 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02 ; T_j = 25 \text{ }^\circ\text{C}$  | -   | 220 | 270 | mV            |
|             |                           | $I_F = 100 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02 ; T_j = 25 \text{ }^\circ\text{C}$ | -   | 295 | 350 | mV            |
|             |                           | $I_F = 500 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02 ; T_j = 25 \text{ }^\circ\text{C}$ | -   | 420 | 470 | mV            |
|             |                           | $I_F = 1 \text{ A}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02 ; T_j = 25 \text{ }^\circ\text{C}$    | -   | 540 | 640 | mV            |
| $I_R$       | reverse current           | $V_R = 10 \text{ V}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$                                 | [1] | 7   | 20  | $\mu\text{A}$ |
|             |                           | $V_R = 40 \text{ V}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$                                 | [1] | 30  | 100 | $\mu\text{A}$ |
| $C_d$       | diode capacitance         | $V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$                              | -   | 43  | 50  | 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

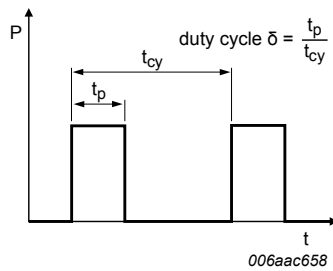


Fig. 6. Duty cycle definition

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

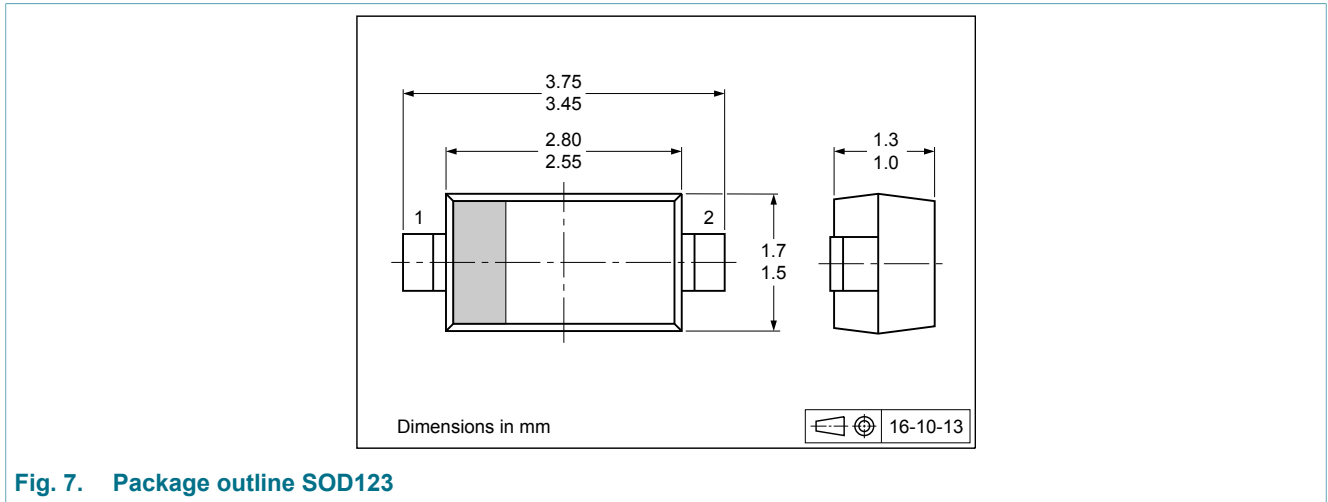


Fig. 7. Package outline SOD123

## 13. Soldering

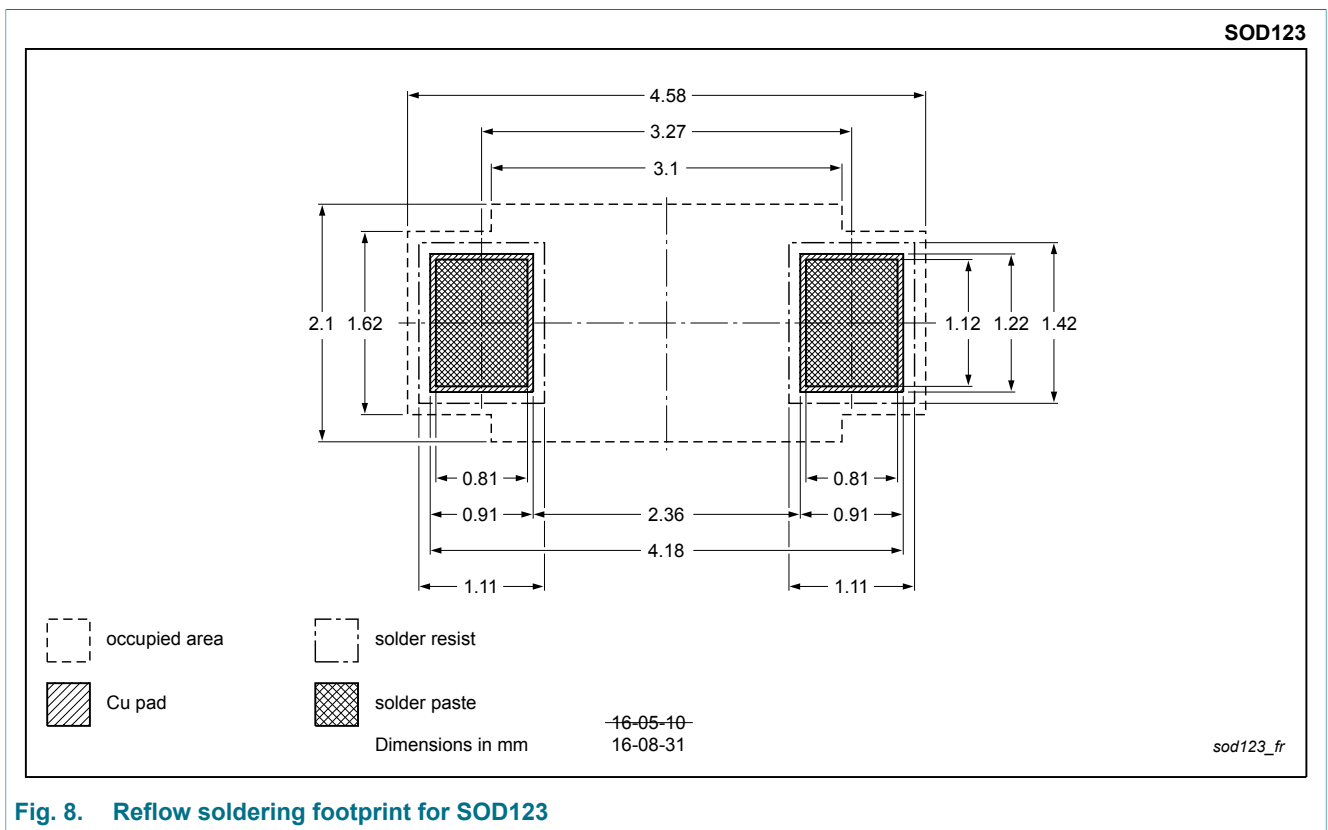


Fig. 8. Reflow soldering footprint for SOD123

SOD123

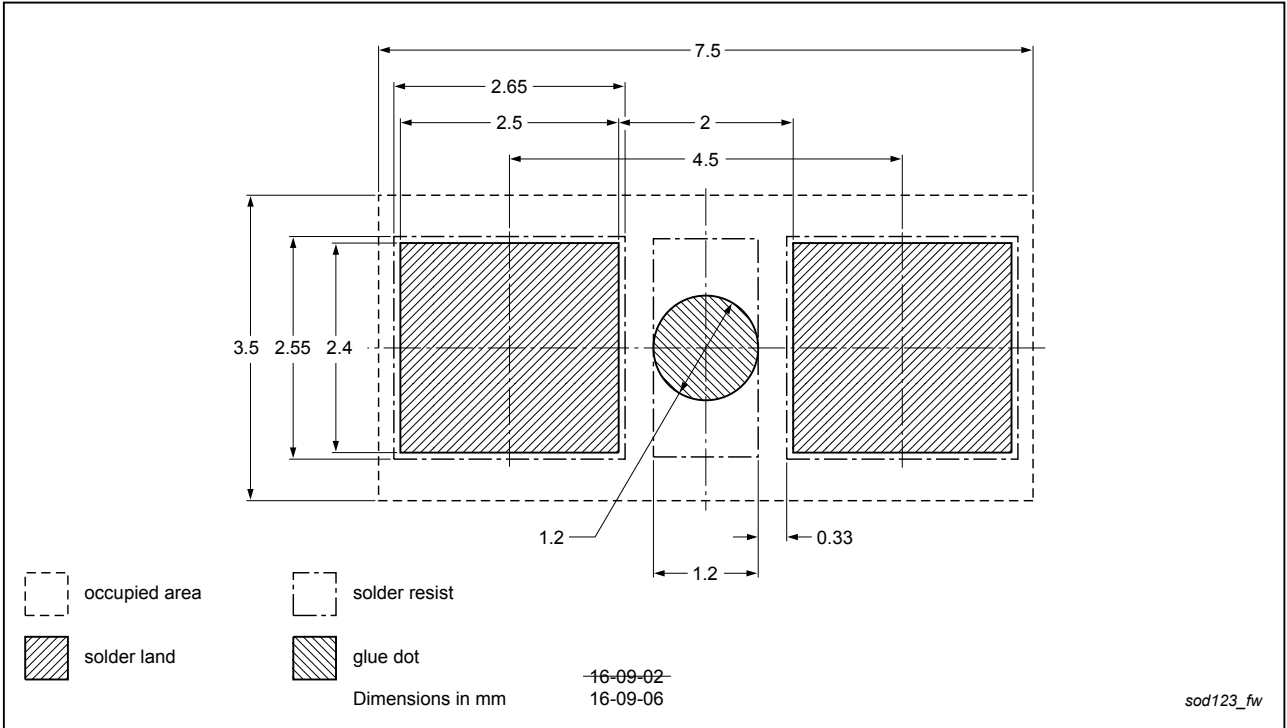


Fig. 9. Wave soldering footprint for SOD123



## 14. Revision history

Table 8. Revision history

| Data sheet ID   | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PMEG4010EGW v.1 | 20161207     | Product 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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