



# PMEG2010BER

## 1 A low Vf MEGA Schottky barrier rectifier

22 August 2018

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 a SOD123W small and flat lead Surface-Mounted Device (SMD) plastic package.

### 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 1$  A
- Reverse voltage:  $V_R \leq 20$  V
- Low forward voltage
- High power capability due to clip-bond technology
- AEC-Q101 qualified
- Small and flat lead SMD plastic package
- Capable for reflow and wave soldering

### 3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications

### 4. Quick reference data

Table 1. Quick reference data

| Symbol      | Parameter               | Conditions                                                        |     | Min | Typ | Max | Unit    |
|-------------|-------------------------|-------------------------------------------------------------------|-----|-----|-----|-----|---------|
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$ ; $f = 20$ kHz; $T_{amb} \leq 125$ °C; square wave | [1] | -   | -   | 1   | A       |
|             |                         | $\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 140$ °C; square wave  |     | -   | -   | 1   | A       |
| $V_R$       | reverse voltage         | $T_j = 25$ °C                                                     |     | -   | -   | 20  | V       |
| $V_F$       | forward voltage         | $I_F = 1$ A; $T_j = 25$ °C                                        |     | -   | 395 | 450 | mV      |
| $I_R$       | reverse current         | $V_R = 20$ V; $T_j = 25$ °C                                       |     | -   | 8   | 50  | $\mu$ A |

[1] Device mounted on a ceramic PCB,  $Al_2O_3$ , standard footprint.

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description            | Simplified outline                                                                                  | Graphic symbol                                                                                       |
|-----|--------|------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 1   | K      | cathode <sup>[1]</sup> | <br>CFP3 (SOD123W) | <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 |
| PMEG2010BER | CFP3    | plastic, surface mounted package; 2 terminals; 2.6 mm x 1.7 mm x 1 mm body | SOD123W |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG2010BER | B6           |

## 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                     | $T_j = 25\text{ °C}$                                                              |     | -   | 20   | V    |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 125\text{ °C}$ ; square wave | [1] | -   | 1    | A    |
|             |                                     | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 140\text{ °C}$ ; square wave  |     | -   | 1    | A    |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 8\text{ ms}$ ; square wave; $T_{j(init)} = 25\text{ °C}$                   |     | -   | 50   | A    |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ °C}$                                                       | [2] | -   | 0.57 | W    |
|             |                                     |                                                                                   | [3] | -   | 0.95 | W    |
|             |                                     |                                                                                   | [1] | -   | 1.8  | W    |
| $T_j$       | junction temperature                |                                                                                   |     | -   | 150  | °C   |
| $T_{amb}$   | ambient temperature                 |                                                                                   |     | -55 | 150  | °C   |
| $T_{stg}$   | storage temperature                 |                                                                                   |     | -65 | 150  | °C   |

[1] Device mounted on a ceramic PCB,  $Al_2O_3$ , standard footprint.

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

## 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] | -   | -   | 220 | K/W  |
|                |                                                  |             | [1] [3] | -   | -   | 130 | K/W  |
|                |                                                  |             | [1] [4] | -   | -   | 70  | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [5]     | -   | -   | 18  | K/W  |

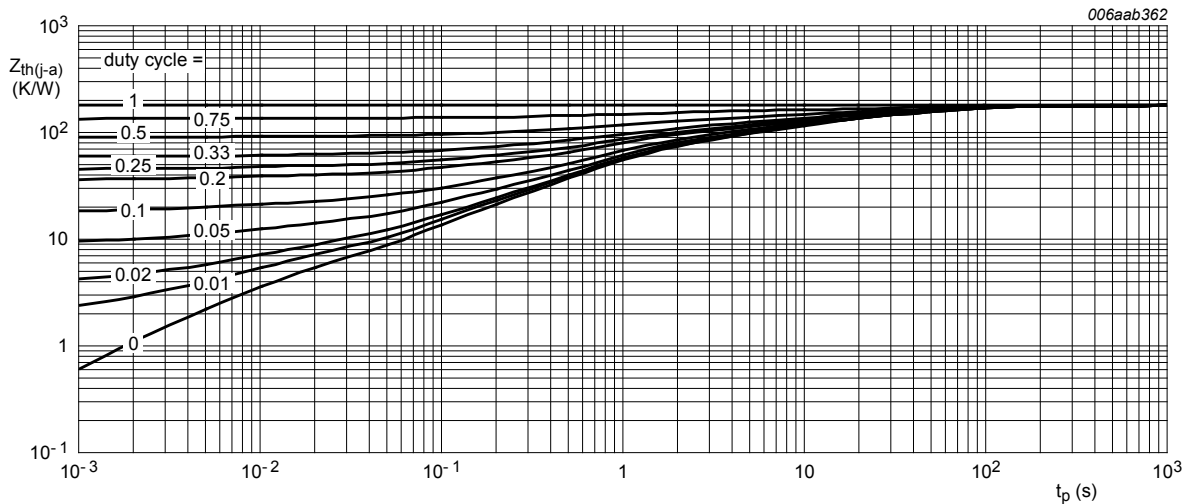
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses.

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

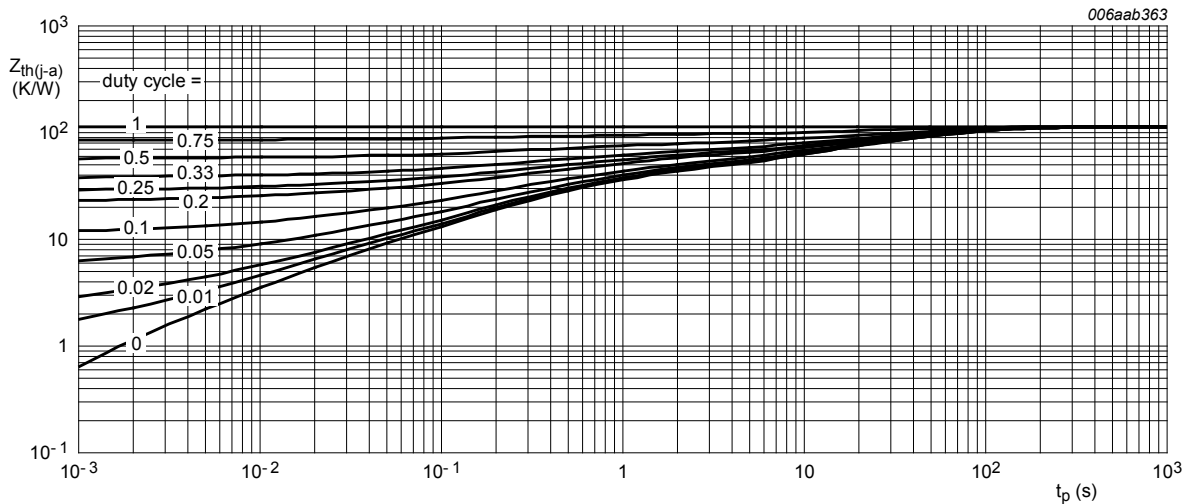
[4] Device mounted on a ceramic PCB,  $Al_2O_3$ , standard footprint.

[5] Soldering point of cathode tab.



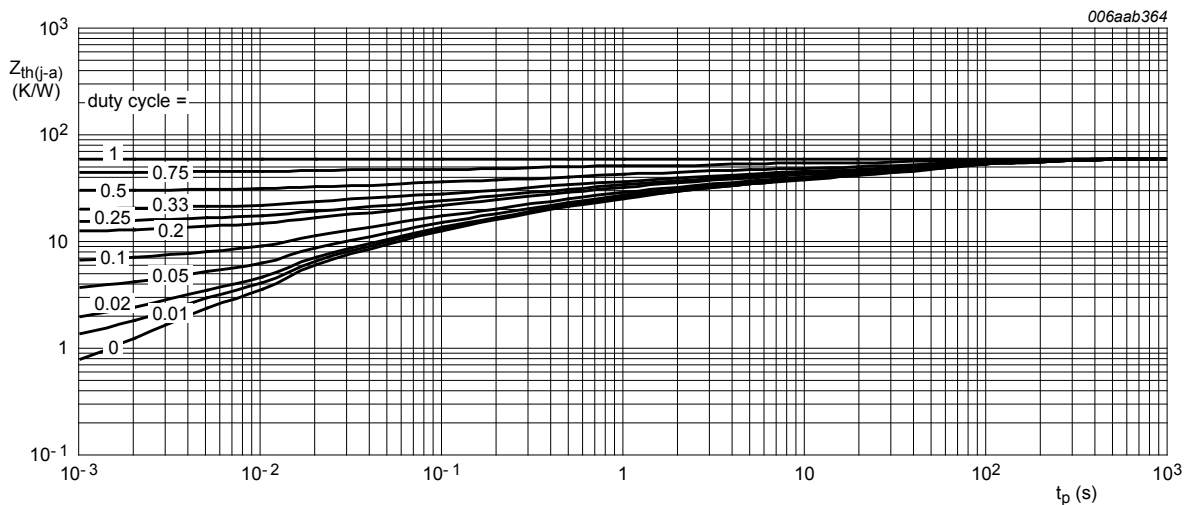
FR4 PCB, standard footprint

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



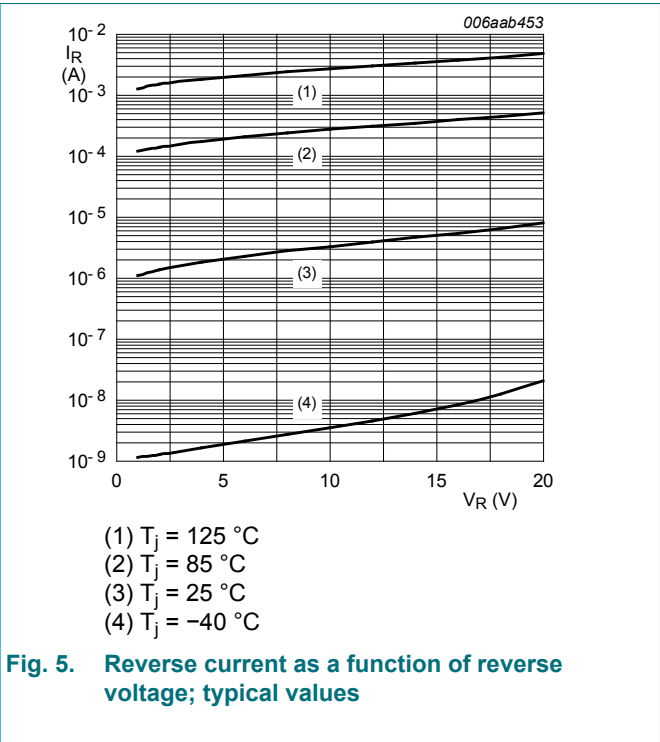
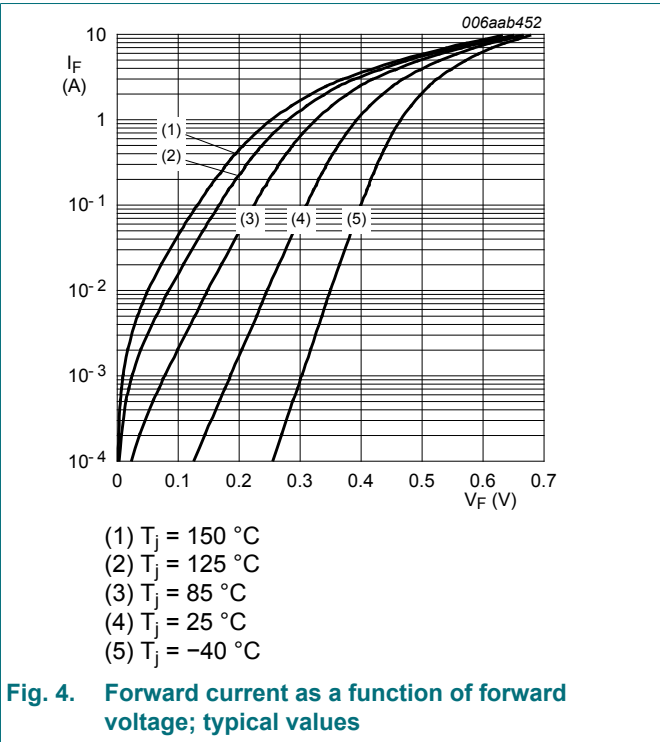
Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint

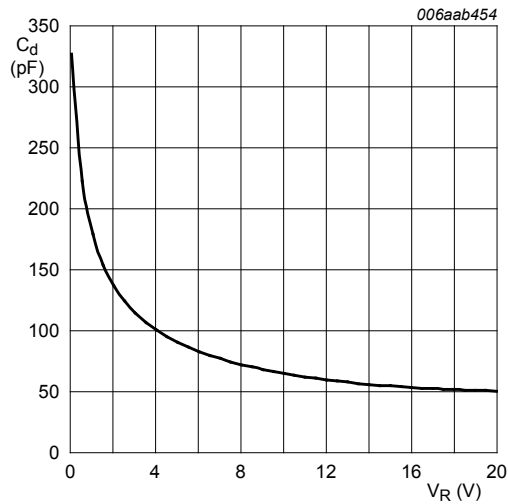
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

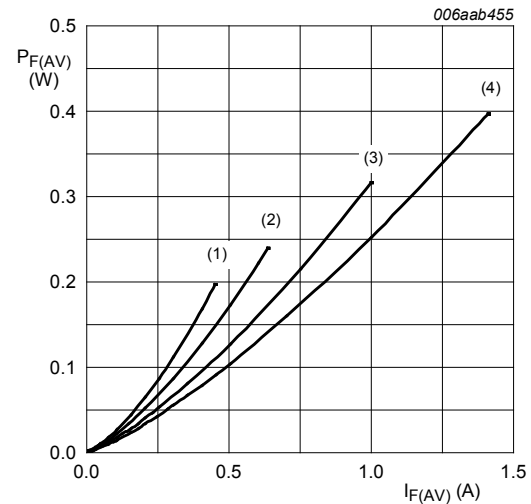
| Symbol | Parameter         | Conditions                                                              | Min | Typ | Max | Unit          |
|--------|-------------------|-------------------------------------------------------------------------|-----|-----|-----|---------------|
| $V_F$  | forward voltage   | $I_F = 0.1\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$                  | -   | 310 | 340 | mV            |
|        |                   | $I_F = 0.7\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$                  | -   | 380 | 430 | mV            |
|        |                   | $I_F = 1\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$                    | -   | 395 | 450 | mV            |
| $I_R$  | reverse current   | $V_R = 5\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$                    | -   | 2   | -   | $\mu\text{A}$ |
|        |                   | $V_R = 10\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$                   | -   | 3   | -   | $\mu\text{A}$ |
|        |                   | $V_R = 20\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$                   | -   | 8   | 50  | $\mu\text{A}$ |
| $C_d$  | diode capacitance | $V_R = 1\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^{\circ}\text{C}$  | -   | 185 | -   | pF            |
|        |                   | $V_R = 10\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^{\circ}\text{C}$ | -   | 65  | -   | pF            |





$f = 1 \text{ MHz}$ ;  $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$

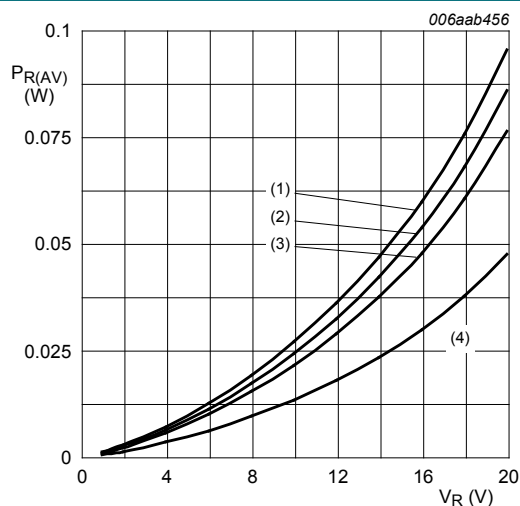
**Fig. 6.** Diode capacitance as a function of reverse voltage; typical values



$T_j = 150 \text{ }^{\circ}\text{C}$

- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$

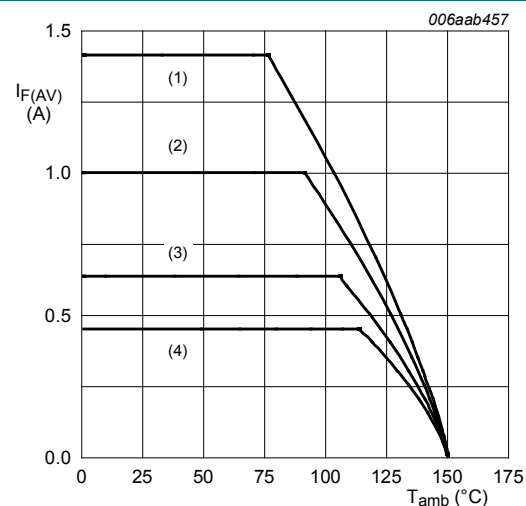
**Fig. 7.** Average forward power dissipation as a function of average forward current; typical values



$T_j = 125 \text{ }^{\circ}\text{C}$

- (1)  $\delta = 1$
- (2)  $\delta = 0.9$
- (3)  $\delta = 0.8$
- (4)  $\delta = 0.5$

**Fig. 8.** Average reverse power dissipation as a function of reverse voltage; typical values

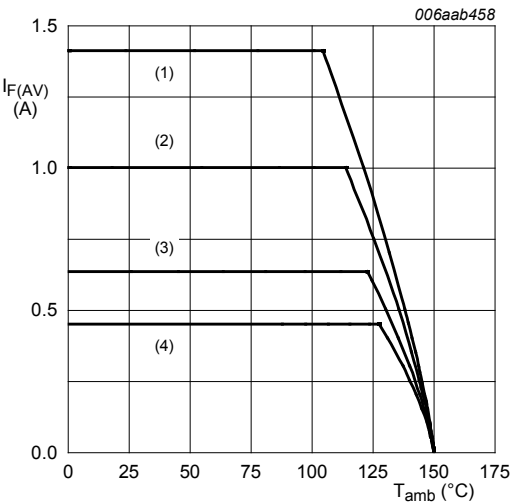


FR4 PCB, standard footprint

$T_j = 150 \text{ }^{\circ}\text{C}$

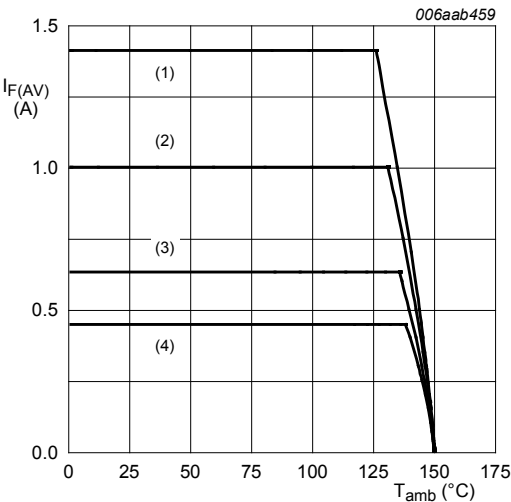
- (1)  $\delta = 1$ ; DC
- (2)  $\delta = 0.5$ ;  $f = 20 \text{ kHz}$
- (3)  $\delta = 0.2$ ;  $f = 20 \text{ kHz}$
- (4)  $\delta = 0.1$ ;  $f = 20 \text{ kHz}$

**Fig. 9.** Average forward current as a function of ambient temperature; typical values



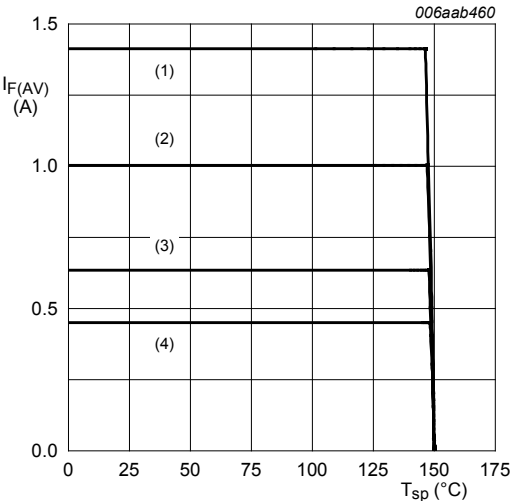
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 $T_j = 150$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

Fig. 10. Average forward current as a function of ambient temperature; typical values



Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint  
 $T_j = 150$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

Fig. 11. Average forward current as a function of ambient temperature; typical values



$T_j = 150$  °C  
(1)  $\delta = 1$ ; DC  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

Fig. 12. Average forward current as a function of solder point temperature; typical values

11. Test information

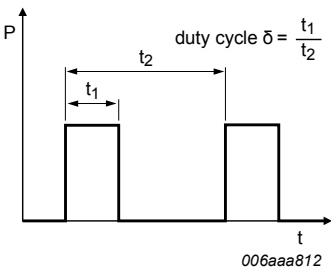


Fig. 13. Duty cycle definition

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

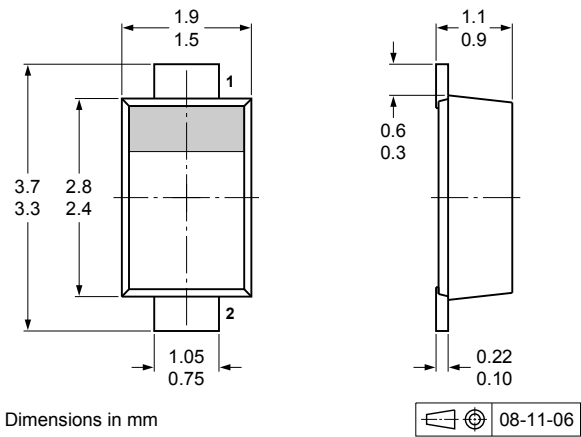
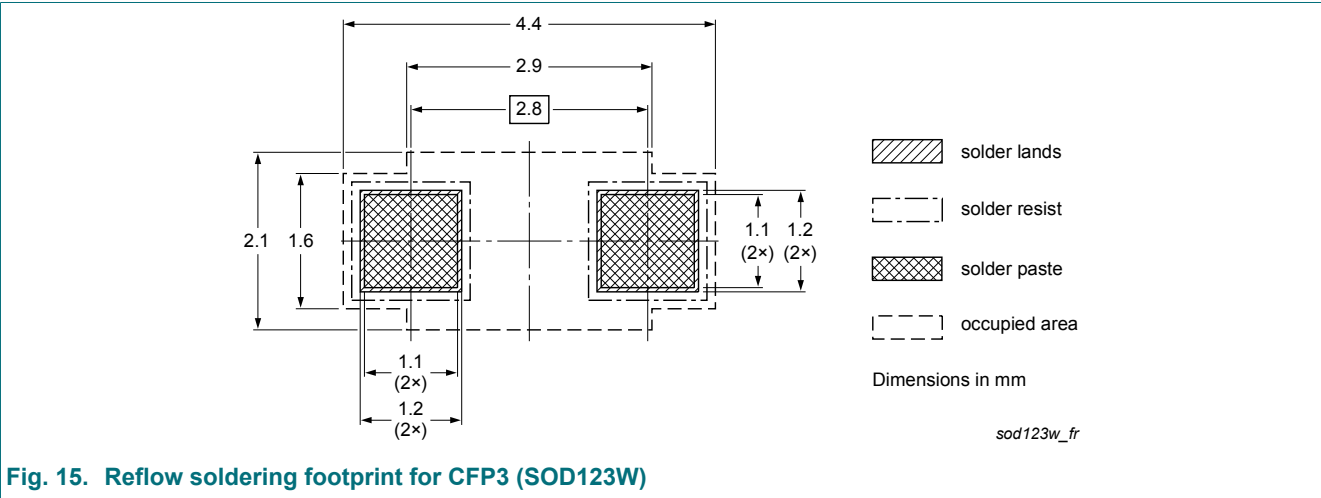


Fig. 14. Package outline CFP3 (SOD123W)



13. Soldering



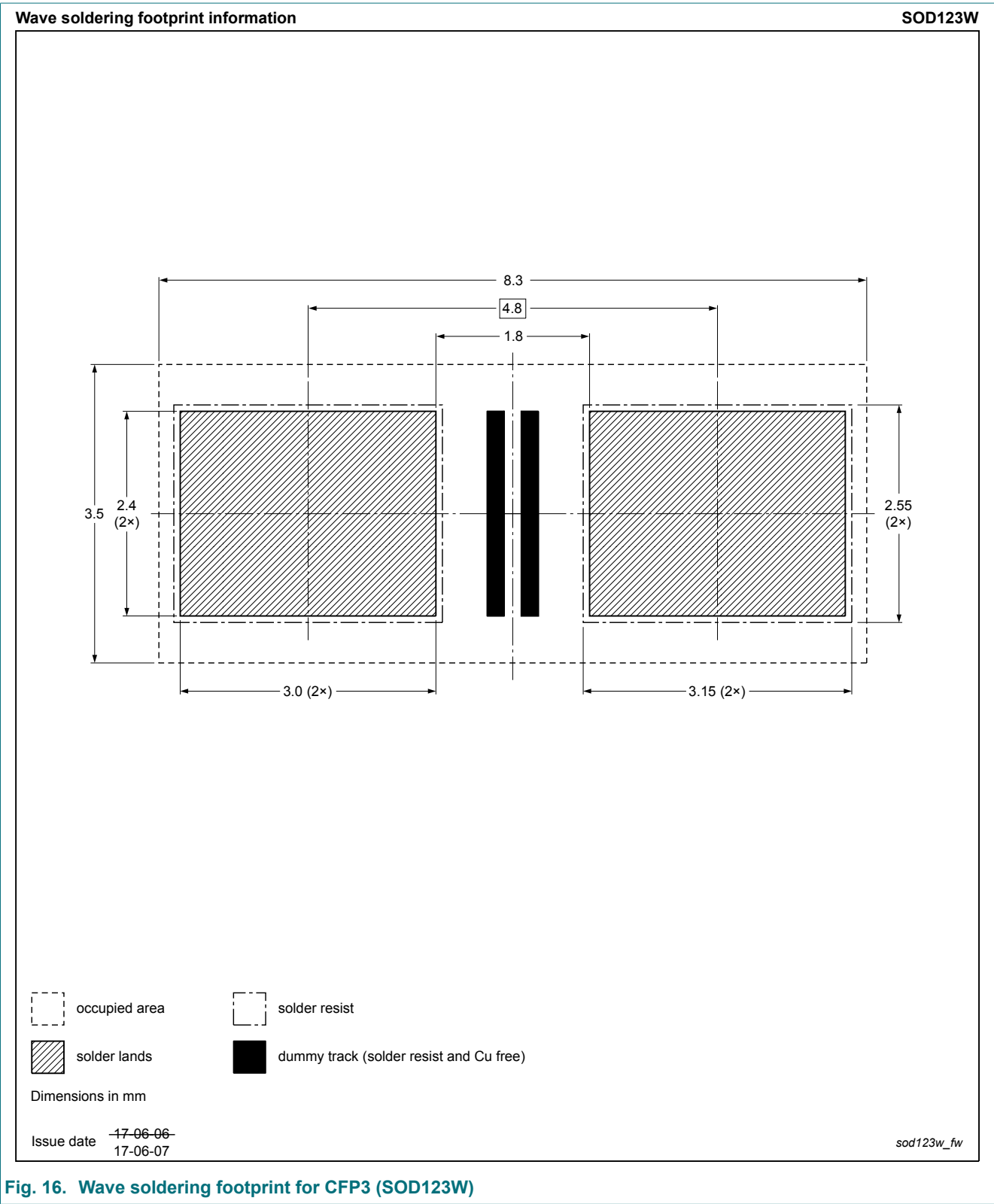


Fig. 16. Wave soldering footprint for CFP3 (SOD123W)

## 14. Revision history

**Table 8. Revision history**

| Data sheet ID   | Release date                                                                                                                                                               | Data sheet status  | Change notice | Supersedes    |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|---------------|
| PMEG2010BER v.2 | 20180822                                                                                                                                                                   | Product data sheet | -             | PMEG2010BER_1 |
| Modifications   | <ul style="list-style-type: none"><li>• Features and benefits: Capable for reflow and wave soldering added.</li><li>• Soldering: Wave soldering footprint added.</li></ul> |                    |               |               |
| PMEG2010BER_1   | 20090416                                                                                                                                                                   | Product data sheet | -             | -             |

## 15. Legal information

### Data sheet status

| 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. |
| 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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Date of release: 22 August 2018

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