

# PMEG4030ER

3 A low  $V_F$  MEGA Schottky barrier rectifier

Rev. 01 — 11 August 2009

Product data sheet

## 1. Product profile

### 1.1 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.

### 1.2 Features

- Average forward current:  $I_{F(AV)} \leq 3 \text{ A}$
- Reverse voltage:  $V_R \leq 40 \text{ V}$
- Low forward voltage
- High power capability due to clip-bond technology
- AEC-Q101 qualified
- Small and flat lead SMD plastic package

### 1.3 Applications

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

### 1.4 Quick reference data

**Table 1. Quick reference data**  
 $T_j = 25^\circ\text{C}$  unless otherwise specified.

| Symbol      | Parameter               | Conditions                                               | Min   | Typ | Max | Unit          |
|-------------|-------------------------|----------------------------------------------------------|-------|-----|-----|---------------|
| $I_{F(AV)}$ | average forward current | square wave;<br>$\delta = 0.5$ ;<br>$f = 20 \text{ kHz}$ |       |     |     |               |
|             |                         | $T_{amb} \leq 40^\circ\text{C}$                          | [1] - | -   | 3   | A             |
|             |                         | $T_{sp} \leq 130^\circ\text{C}$                          | -     | -   | 3   | A             |
| $V_R$       | reverse voltage         |                                                          | -     | -   | 40  | V             |
| $V_F$       | forward voltage         | $I_F = 3 \text{ A}$                                      | -     | 460 | 540 | mV            |
| $I_R$       | reverse current         | $V_R = 40 \text{ V}$                                     | -     | 25  | 100 | $\mu\text{A}$ |

[1] Device mounted on a ceramic Printed-Circuit Board (PCB),  $\text{Al}_2\text{O}_3$ , standard footprint.

## 2. Pinning information

Table 2. Pinning

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

sym001

[1] The marking bar indicates the cathode.

## 3. Ordering information

Table 3. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| PMEG4030ER  | -       | plastic surface-mounted package; 2 leads | SOD123W |

## 4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG4030ER  | BF           |

## 5. 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    |
| $I_{F(AV)}$ | average forward current             | square wave;<br>$\delta = 0.5$ ;<br>$f = 20\text{ kHz}$ |                     |      |      |
|             |                                     | $T_{amb} \leq 40\text{ °C}$                             | <sup>[1]</sup> -    | 3    | A    |
|             |                                     | $T_{sp} \leq 130\text{ °C}$                             | -                   | 3    | A    |
| $I_{FSM}$   | non-repetitive peak forward current | square wave;<br>$t_p = 8\text{ ms}$                     | <sup>[2]</sup> -    | 50   | A    |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ °C}$                             | <sup>[3][4]</sup> - | 0.57 | W    |
|             |                                     |                                                         | <sup>[3][5]</sup> - | 0.95 | W    |
|             |                                     |                                                         | <sup>[3][1]</sup> - | 1.8  | W    |

**Table 5.** Limiting values ...continued

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

| Symbol    | Parameter            | Conditions | Min | Max  | Unit |
|-----------|----------------------|------------|-----|------|------|
| $T_j$     | 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]  $T_j = 25$  °C prior to surge.

[3] Reflow soldering is the only recommended soldering method.

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

[5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

## 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][2] |     |     |         |
|                |                                                  |             | [3]    | -   | -   | 220 K/W |
|                |                                                  |             | [4]    | -   | -   | 130 K/W |
|                |                                                  |             | [5]    | -   | -   | 70 K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [6]    | -   | -   | 18 K/W  |

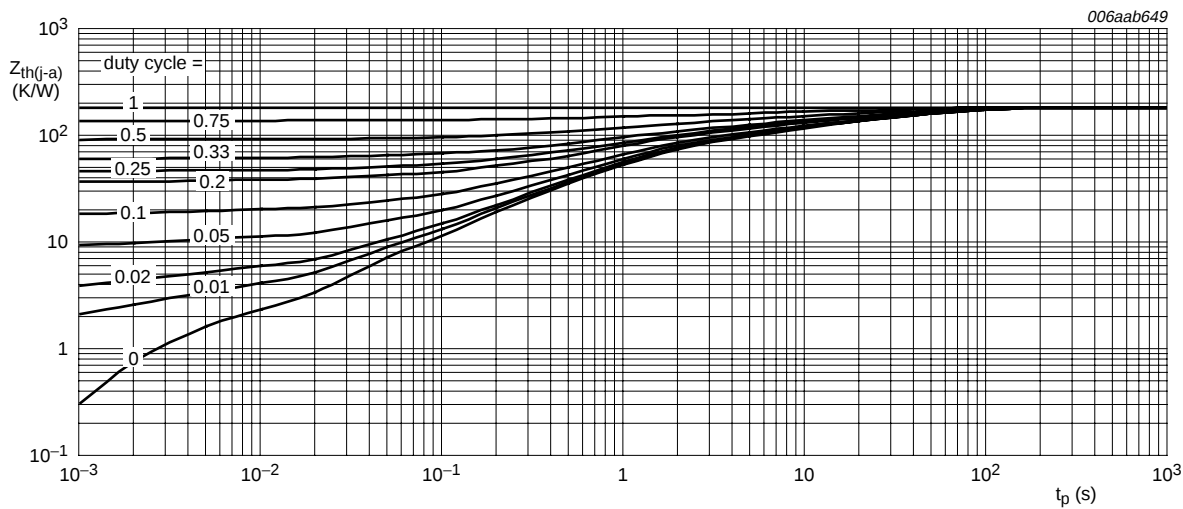
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses.

[2] Reflow soldering is the only recommended soldering method.

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

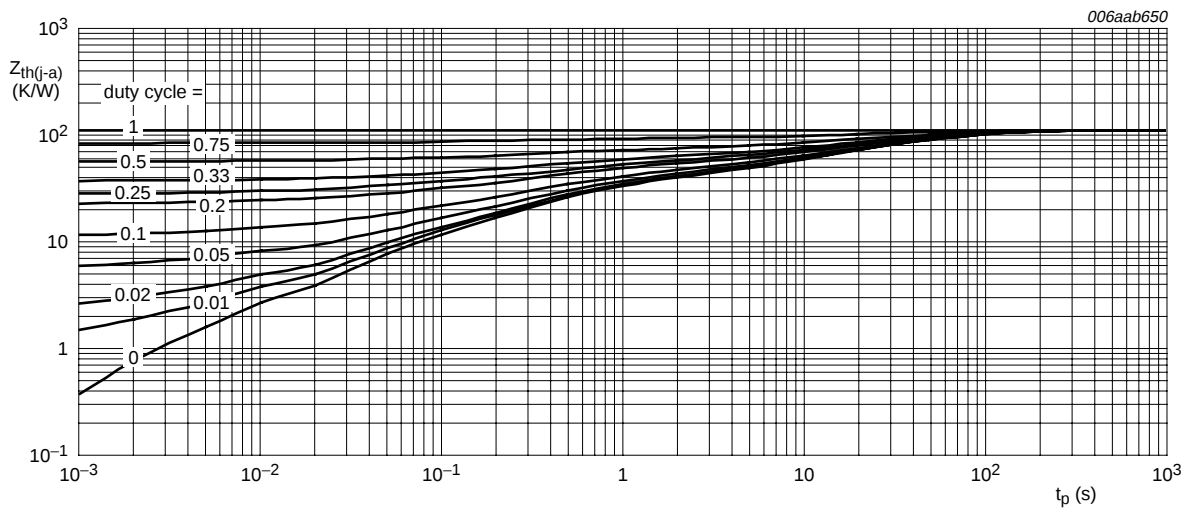
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.[5] Device mounted on a ceramic PCB,  $Al_2O_3$ , standard footprint.

[6] Soldering point of cathode tab.



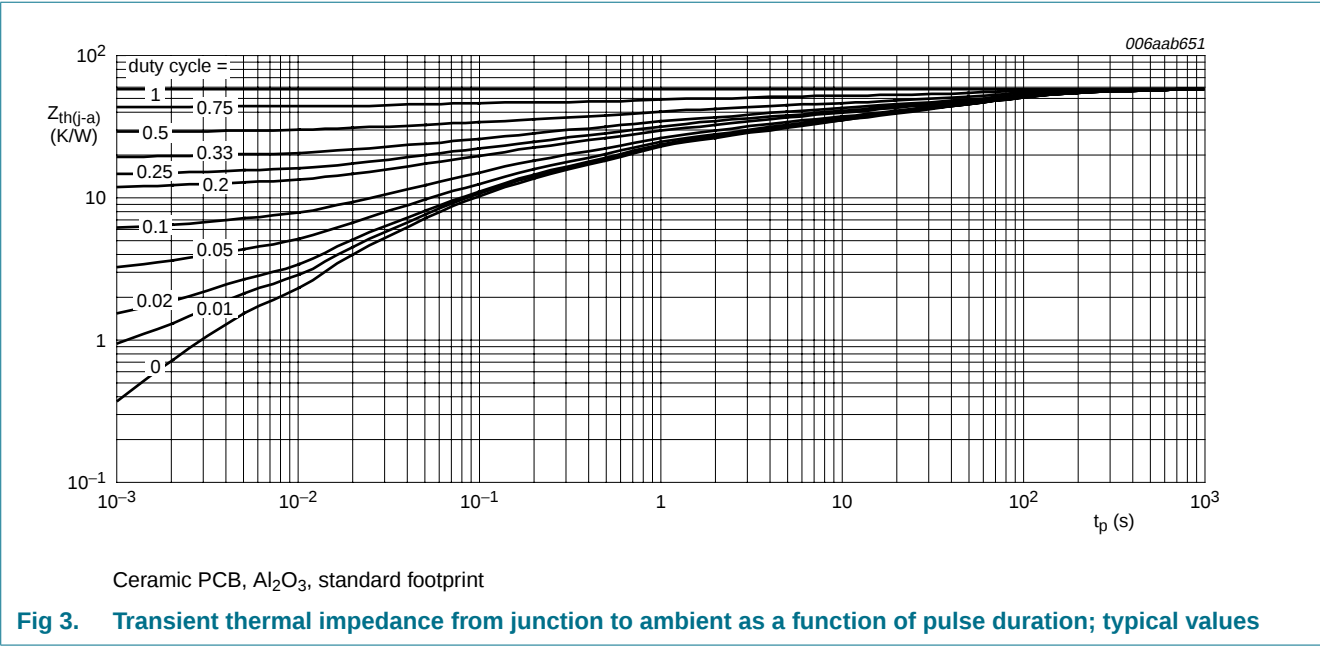
FR4 PCB, standard footprint

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>

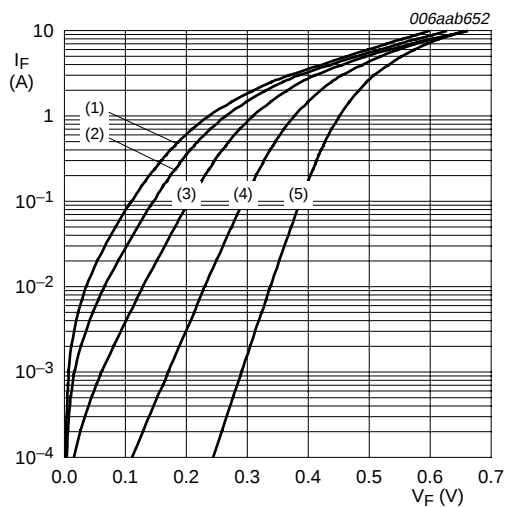
Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



7. Characteristics

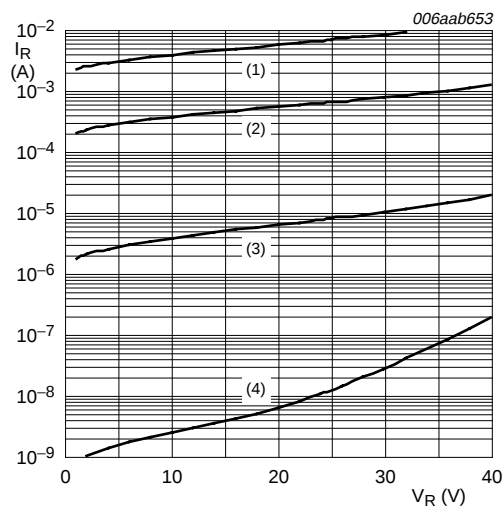
**Table 7. Characteristics**  
*T<sub>j</sub> = 25 °C unless otherwise specified.*

| Symbol | Parameter         | Conditions           | Min | Typ | Max | Unit          |
|--------|-------------------|----------------------|-----|-----|-----|---------------|
| $V_F$  | forward voltage   | $I_F = 0.1\text{ A}$ | -   | 295 | 330 | mV            |
|        |                   | $I_F = 1\text{ A}$   | -   | 380 | 440 | mV            |
|        |                   | $I_F = 3\text{ A}$   | -   | 460 | 540 | mV            |
| $I_R$  | reverse current   | $V_R = 10\text{ V}$  | -   | 5   | -   | $\mu\text{A}$ |
|        |                   | $V_R = 40\text{ V}$  | -   | 25  | 100 | $\mu\text{A}$ |
| $C_d$  | diode capacitance | $f = 1\text{ MHz}$   |     |     |     |               |
|        |                   | $V_R = 1\text{ V}$   | -   | 250 | -   | pF            |
|        |                   | $V_R = 10\text{ V}$  | -   | 95  | -   | pF            |



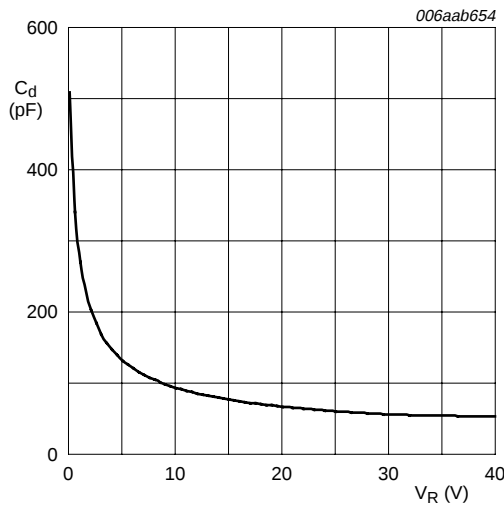
- (1)  $T_j = 150\text{ }^{\circ}\text{C}$
- (2)  $T_j = 125\text{ }^{\circ}\text{C}$
- (3)  $T_j = 85\text{ }^{\circ}\text{C}$
- (4)  $T_j = 25\text{ }^{\circ}\text{C}$
- (5)  $T_j = -40\text{ }^{\circ}\text{C}$

Fig 4. Forward current as a function of forward voltage; typical values



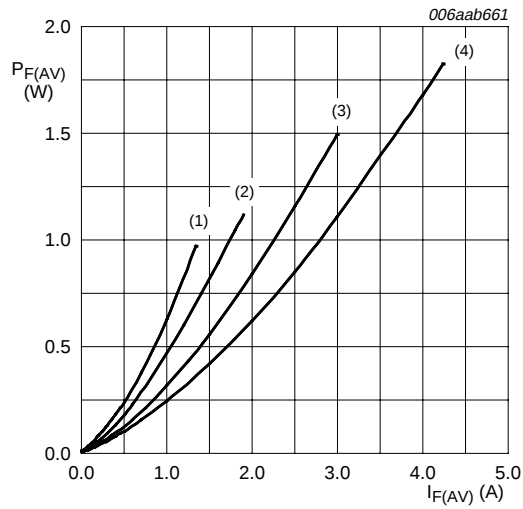
- (1)  $T_j = 125\text{ }^{\circ}\text{C}$
- (2)  $T_j = 85\text{ }^{\circ}\text{C}$
- (3)  $T_j = 25\text{ }^{\circ}\text{C}$
- (4)  $T_j = -40\text{ }^{\circ}\text{C}$

Fig 5. Reverse current as a function of reverse voltage; typical values

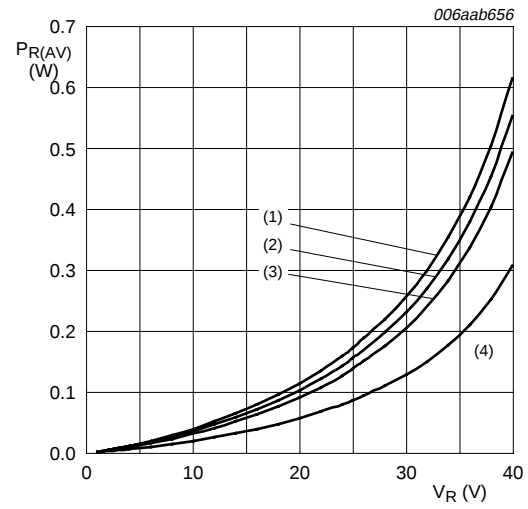


$f = 1\text{ MHz}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$

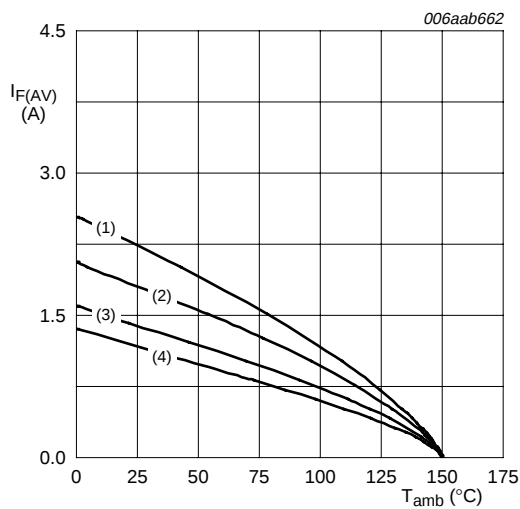
Fig 6. Diode capacitance as a function of reverse voltage; typical values



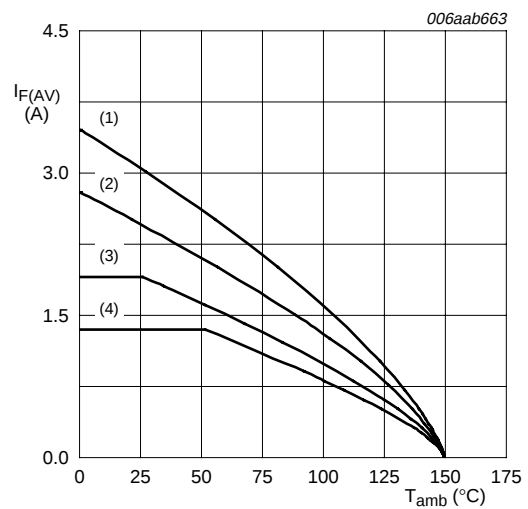
**Fig 7.** Average forward power dissipation as a function of average forward current; typical values



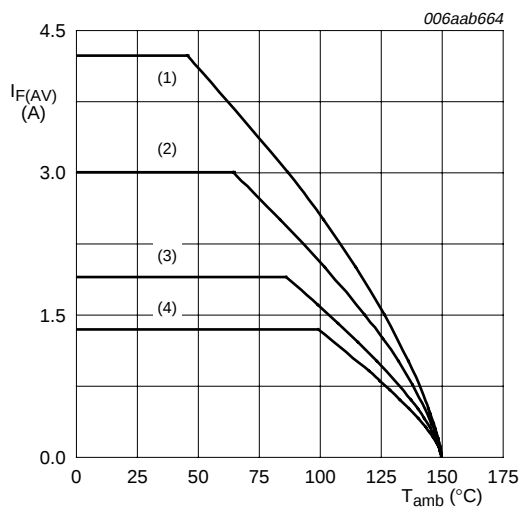
**Fig 8.** Average reverse power dissipation as a function of reverse voltage; typical values



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



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

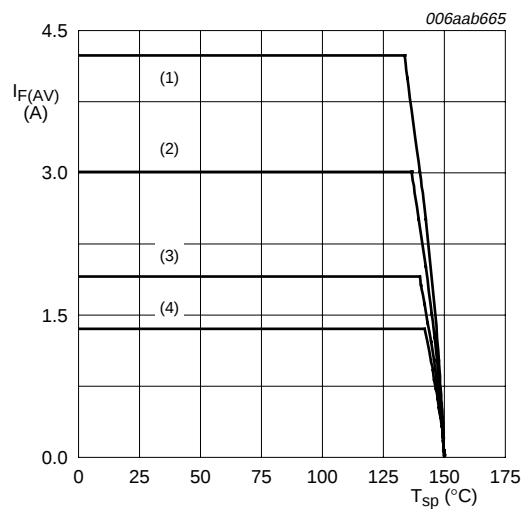


Ceramic PCB,  $Al_2O_3$ , standard footprint

$T_j = 150$  °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

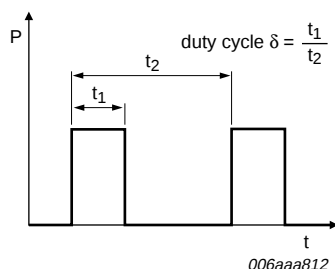


$T_j = 150$  °C

- (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

## 8. Test information



**Fig 13. Duty cycle definition**

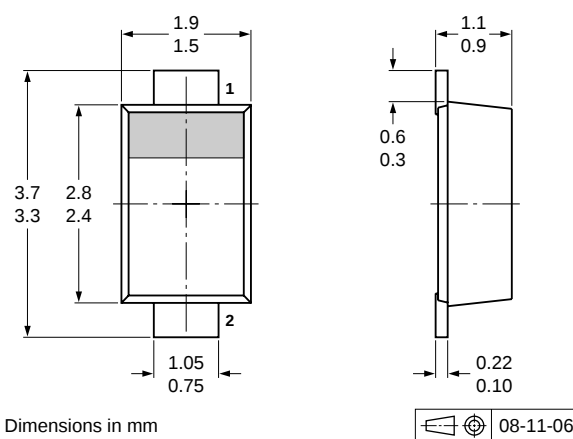
The current ratings for the typical waveforms as shown in [Figure 9](#), [10](#), [11](#) and [12](#) are calculated according to the equations:  $I_{F(AV)} = I_M \times \delta$  with  $I_M$  defined as peak current,

$I_{RMS} = I_{F(AV)}$  at DC, and  $I_{RMS} = I_M \times \sqrt{\delta}$  with  $I_{RMS}$  defined as RMS current.

### 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



**Fig 14. Package outline SOD123W**

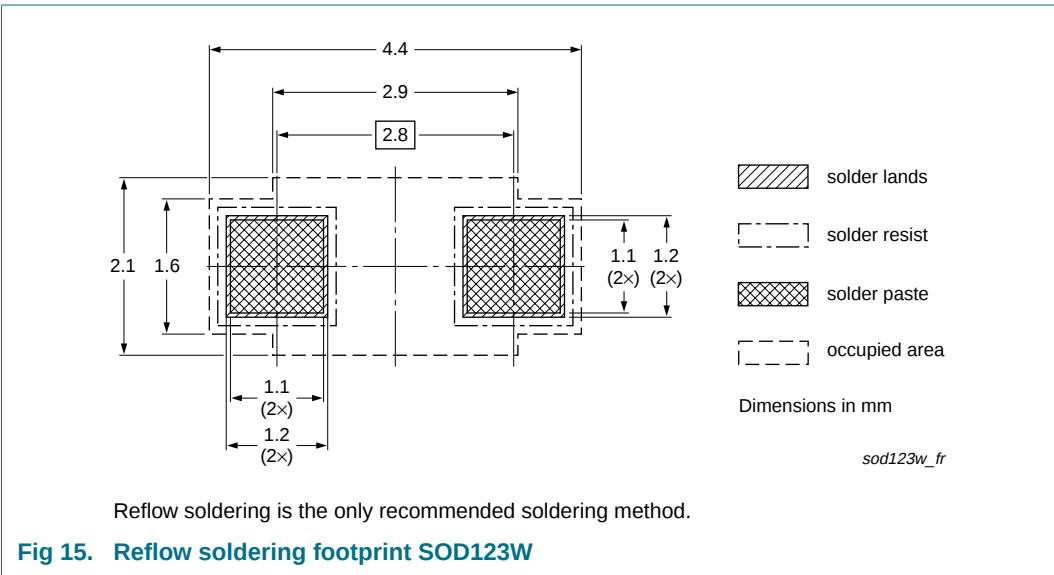
10. Packing information

Table 8. Packing methods  
The indicated -xxx are the last three digits of the 12NC ordering code.[\[1\]](#)

| Type number | Package | Description                    | Packing quantity |
|-------------|---------|--------------------------------|------------------|
|             |         |                                | 3000             |
| PMEG4030ER  | SOD123W | 4 mm pitch, 8 mm tape and reel | -115             |

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering



12. Revision history

Table 9. Revision history

| Document ID  | Release date | Data sheet status  | Change notice | Supersedes |
|--------------|--------------|--------------------|---------------|------------|
| PMEG4030ER_1 | 20090811     | Product data sheet | -             | -          |

## 13. Legal information

### 13.1 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.                       |
| 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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