

PMEG4010ER

1 A low V_F MEGA Schottky barrier rectifier

Rev. 02 — 15 April 2010

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 and benefits

- Average forward current: $I_{F(AV)} \leq 1$ A
- Reverse voltage: $V_R \leq 40$ 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
 $T_j = 25$ °C unless otherwise specified.



| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-------------|-------------------------|--|-----|-----|-----|---------|---|
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$; $f = 20$ kHz | | | | | |
| | | $T_{amb} \leq 115$ °C | [1] | - | - | 1 | A |
| | | $T_{sp} \leq 140$ °C | - | - | - | 1 | A |
| V_R | reverse voltage | | - | - | 40 | V | |
| V_F | forward voltage | $I_F = 1$ A | - | 430 | 490 | mV | |
| I_R | reverse current | $V_R = 40$ V | - | 10 | 50 | μ A | |

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3 , standard footprint.



2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|---|---|
| 1 | cathode | [1] |  sym001 |
| 2 | anode |  | |

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PMEG4010ER | - | plastic surface-mounted package; 2 leads | SOD123W |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG4010ER | BD |

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; $\delta = 0.5$; $f = 20\text{ kHz}$ | | | | |
| | | $T_{amb} \leq 115\text{ °C}$ | [1] | - | 1 | A |
| | | $T_{sp} \leq 140\text{ °C}$ | - | - | 1 | A |
| I_{FSM} | non-repetitive peak forward current | square wave; $t_p = 8\text{ ms}$ | [2] | - | 50 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [3][4] | - | 0.57 | W |
| | | | [3][5] | - | 0.95 | W |
| | | | [3][1] | - | 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 |

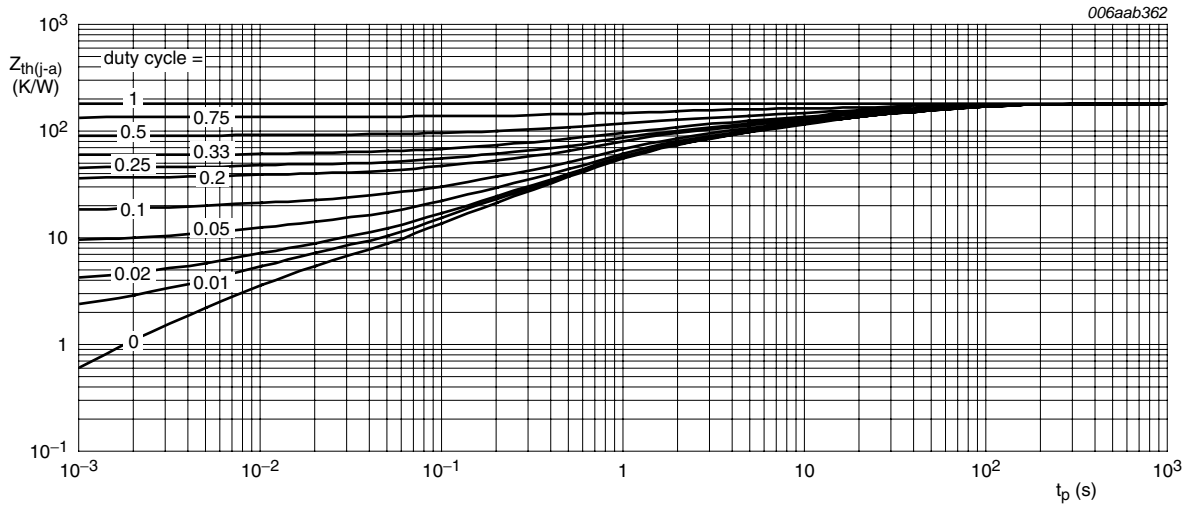
- [1] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.
 [2] $T_j = 25$ °C prior to surge.
 [3] Reflow soldering is the only recommended soldering method.
 [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
 [5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

6. Thermal characteristics

Table 6. Thermal characteristics

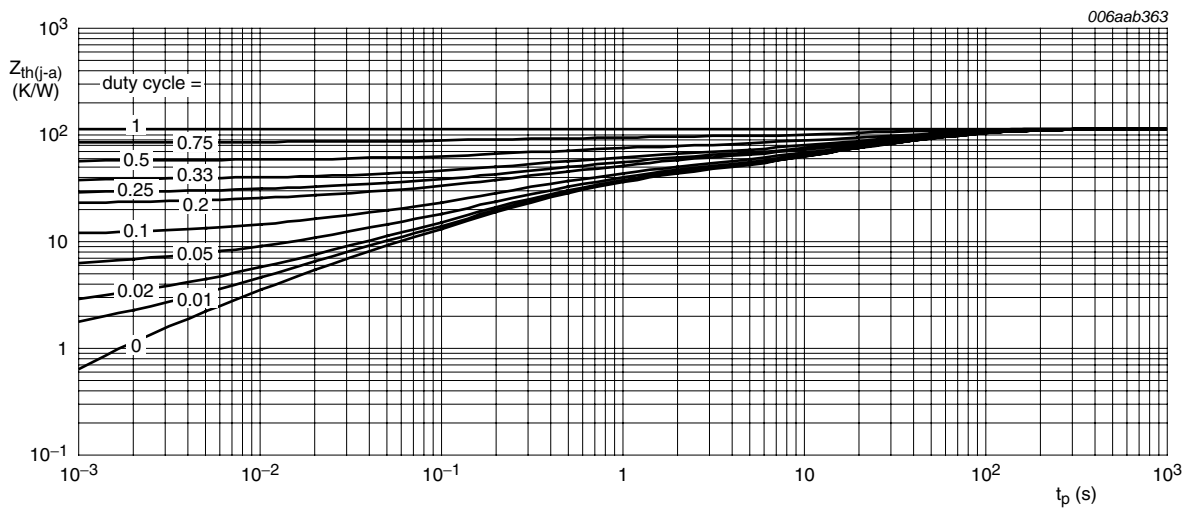
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|----------------|--|-------------|--------|-----|-----|------|-----|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1][2] | | | | |
| | | | [3] | - | - | 220 | K/W |
| | | | [4] | - | - | 130 | K/W |
| | | | [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 cm².
 [5] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.
 [6] Soldering point of cathode tab.



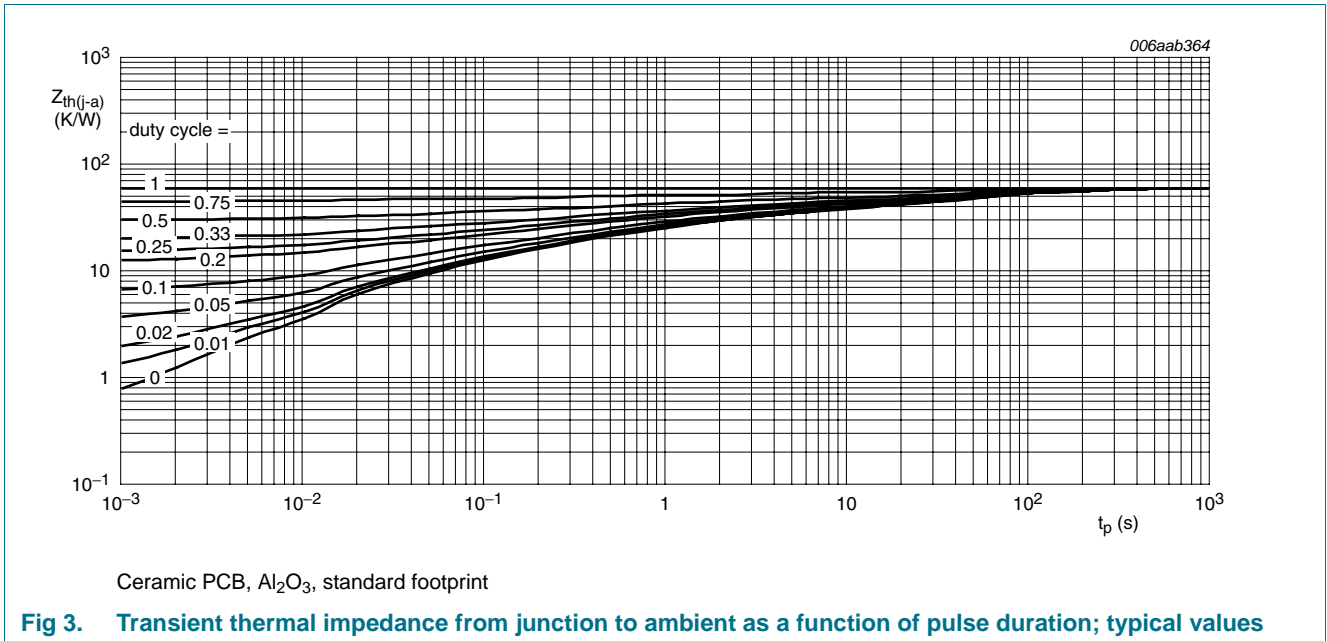
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

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

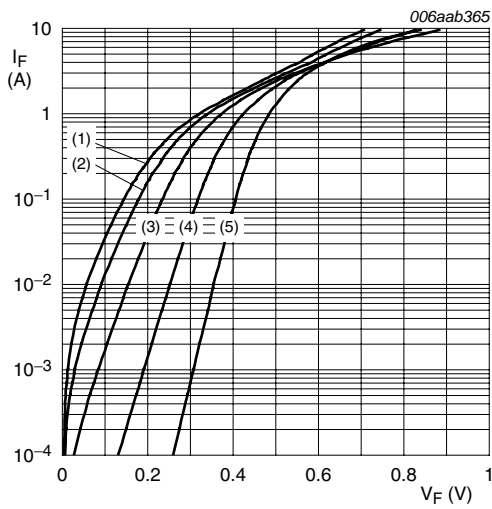


7. Characteristics

Table 7. Characteristics

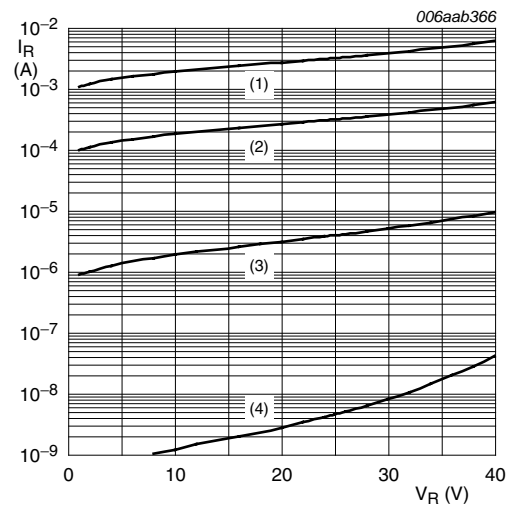
$T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-------------------|----------------------|-----|-----|-----|---------------|
| V_F | forward voltage | $I_F = 0.1\text{ A}$ | - | 310 | 360 | mV |
| | | $I_F = 1\text{ A}$ | - | 430 | 490 | mV |
| I_R | reverse current | $V_R = 10\text{ V}$ | - | 3 | 13 | μA |
| | | $V_R = 40\text{ V}$ | - | 10 | 50 | μA |
| C_d | diode capacitance | $f = 1\text{ MHz}$ | | | | |
| | | $V_R = 1\text{ V}$ | - | 130 | - | pF |
| | | $V_R = 10\text{ V}$ | - | 50 | - | pF |



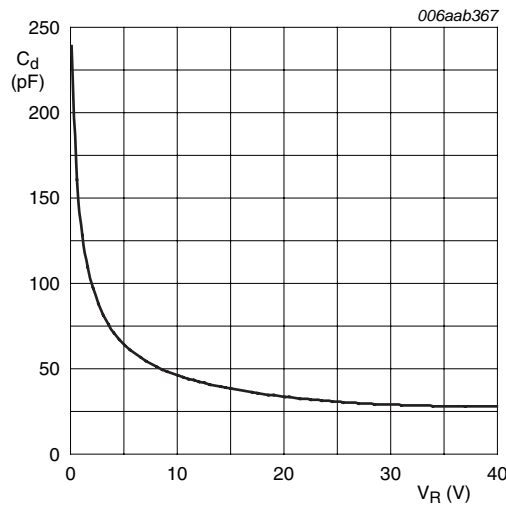
- (1) $T_j = 150\text{ }^\circ\text{C}$
- (2) $T_j = 125\text{ }^\circ\text{C}$
- (3) $T_j = 85\text{ }^\circ\text{C}$
- (4) $T_j = 25\text{ }^\circ\text{C}$
- (5) $T_j = -40\text{ }^\circ\text{C}$

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



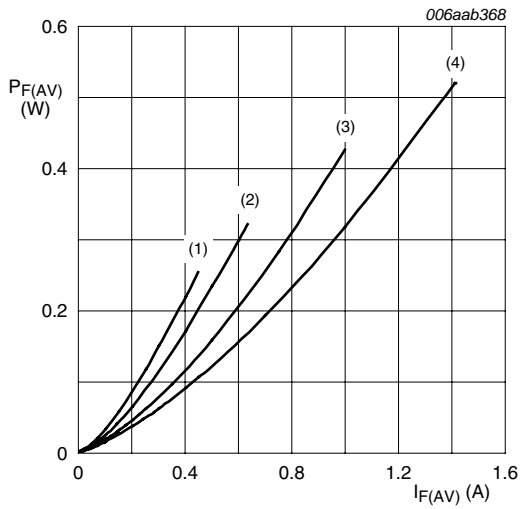
- (1) $T_j = 125\text{ }^\circ\text{C}$
- (2) $T_j = 85\text{ }^\circ\text{C}$
- (3) $T_j = 25\text{ }^\circ\text{C}$
- (4) $T_j = -40\text{ }^\circ\text{C}$

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



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

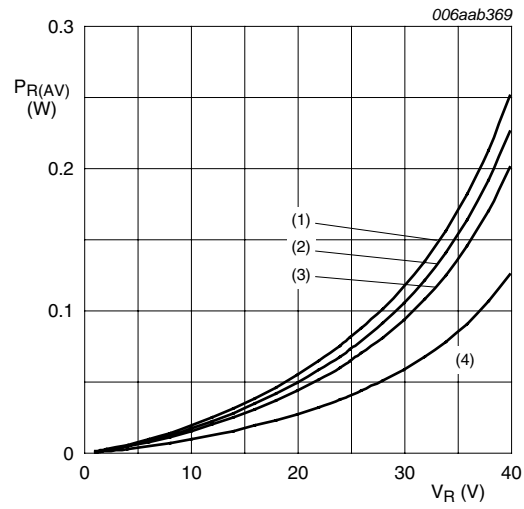
Fig 6. Diode capacitance as a function of reverse voltage; typical values



$T_j = 150\text{ °C}$

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

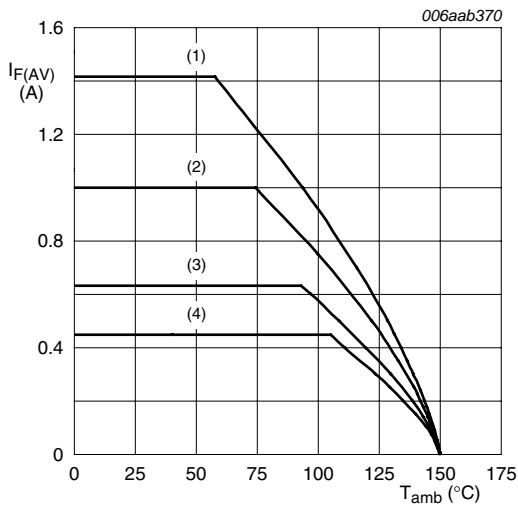
Fig 7. Average forward power dissipation as a function of average forward current; typical values



$T_j = 125\text{ °C}$

- (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

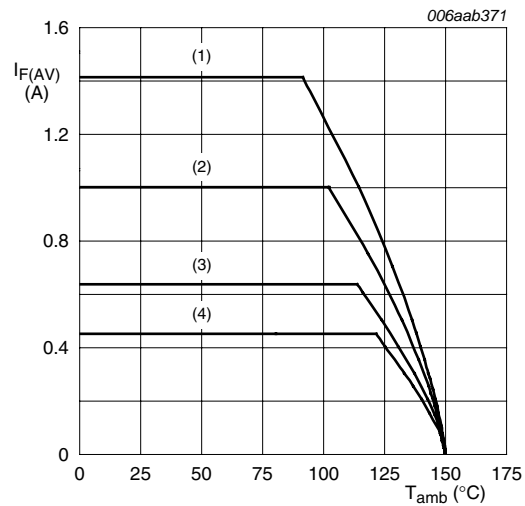


FR4 PCB, standard footprint

$T_j = 150\text{ °C}$

- (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

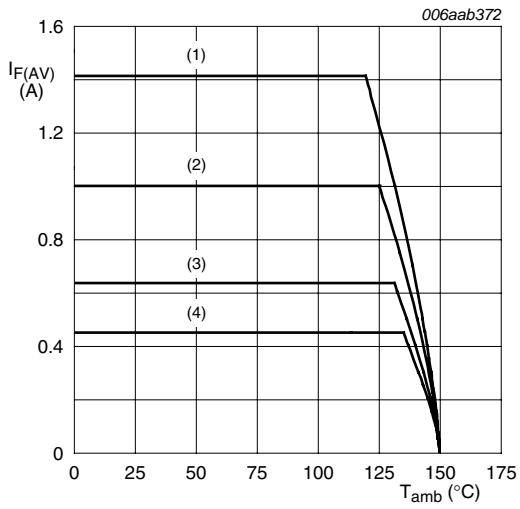


FR4 PCB, mounting pad for cathode 1 cm^2

$T_j = 150\text{ °C}$

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

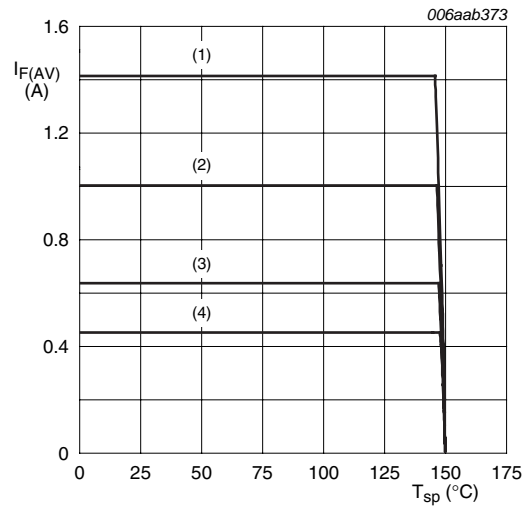


Ceramic PCB, Al_2O_3 , standard footprint

$T_j = 150$ °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

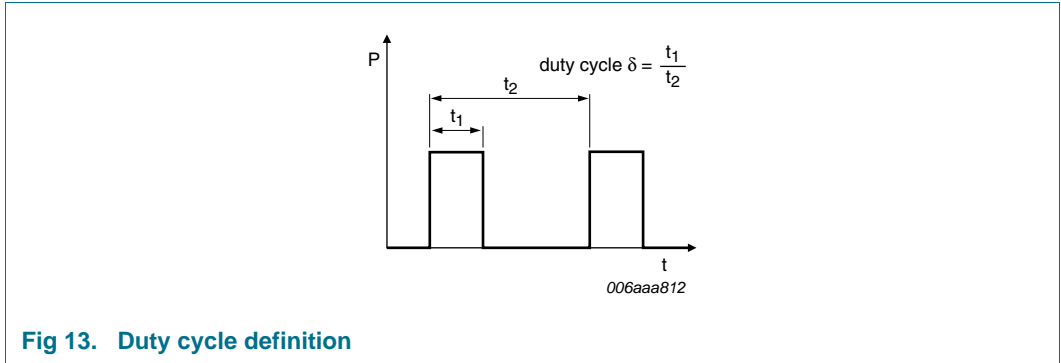


$T_j = 150$ °C

- (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

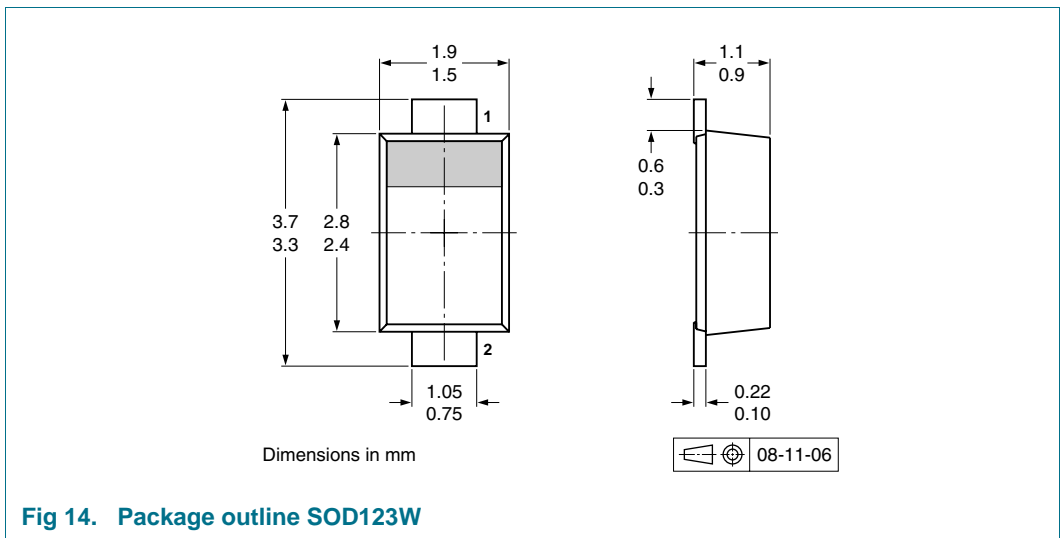


The current ratings for the typical waveforms as shown in [Figure 9](#), [10](#), [11](#) and [12](#) are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current, $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined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



10. Packing information

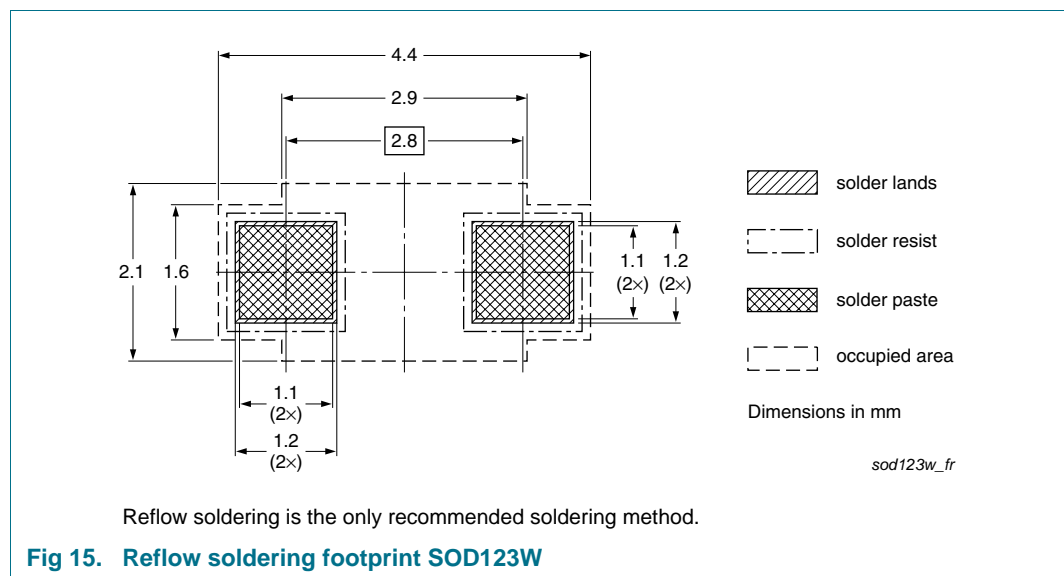
Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity |
|-------------|---------|--------------------------------|------------------|
| | | | 3000 |
| PMEG4010ER | 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 |
|----------------|--------------|---|---------------|--------------|
| PMEG4010ER_2 | 20100415 | Product data sheet | - | PMEG4010ER_1 |
| Modifications: | | <ul style="list-style-type: none">• Table 5 “Limiting values”: I_{FSM} maximum value amended• Section 13 “Legal information”: updated | | |
| PMEG4010ER_1 | 20081209 | Product data sheet | - | - |

13. Legal information

13.1 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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