



# PMEG10020AELP

100 V, 2 A low leakage current Schottky barrier rectifier

7 May 2015

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 SOD128 small and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 2$  A
- Reverse voltage:  $V_R \leq 100$  V
- Low forward voltage:  $V_F = 710$  mV
- High power capability due to clip-bonding technology
- Extremely low leakage current
- High temperature  $T_j \leq 175$  °C
- Small and flat lead 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

## 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; $T_{sp} \leq 165$ °C;<br>square wave          | -   | -   | 2   | A    |
| $V_R$       | reverse voltage         | $T_j = 25$ °C  | -   | -   | 100 | V    |
| $V_F$       | forward voltage         | $I_F = 2$ A; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ;<br>$T_j = 25$ °C   | -   | 710 | 770 | mV   |
| $I_R$       | reverse current         | $V_R = 100$ V; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ;<br>$T_j = 25$ °C | -   | 70  | 300 | nA   |



## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description            | Simplified outline   | Graphic symbol   |
|-----|--------|------------------------|--|--|
| 1   | K      | cathode <sup>[1]</sup> |  <p style="text-align: center;"><b>SOD128</b></p> |  <p style="text-align: center;"><i>sym001</i></p> |
| 2   | A      | anode                  |  |  |

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

| Type number   | Package |  |         |
|---------------|---------|--|---------|
|               | Name    | Description                              | Version |
| PMEG10020AELP | SOD128  | plastic surface-mounted package; 2 leads | SOD128  |

## 7. Marking

Table 4. Marking codes

| Type number   | Marking code |
|---------------|--------------|
| PMEG10020AELP | DM           |

## 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                     | $T_j = 25\text{ °C}$  |     | -   | 100  | V    |
| $I_F$       | forward current                     | $T_{sp} = 160\text{ °C}; \delta = 1$  |     | -   | 2.83 | A    |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5; f = 20\text{ kHz}; T_{amb} \leq 100\text{ °C};$<br>square wave | [1] | -   | 2    | A    |
|             |                                     | $\delta = 0.5; f = 20\text{ kHz}; T_{sp} \leq 165\text{ °C};$<br>square wave  |     | -   | 2    | A    |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 8\text{ ms}; T_{j(init)} = 25\text{ °C};$ square wave                  |     | -   | 50   | A    |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ °C}$   | [2] | -   | 750  | mW   |
|             |                                     |   | [3] | -   | 1250 | mW   |
|             |                                     |   | [1] | -   | 2500 | mW   |
| $T_j$       | junction temperature                |   |     | -   | 175  | °C   |
| $T_{amb}$   | ambient temperature                 |   |     | -55 | 175  | °C   |
| $T_{stg}$   | storage temperature                 |   |     | -65 | 175  | °C   |

[1] Device mounted on a ceramic Printed-Circuit Board (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] | -   | -   | 200 | K/W  |
|                |  |             | [1][3] | -   | -   | 120 | K/W  |
|                |  |             | [1][4] | -   | -   | 60  | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [5]    | -   | -   | 12  | 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.

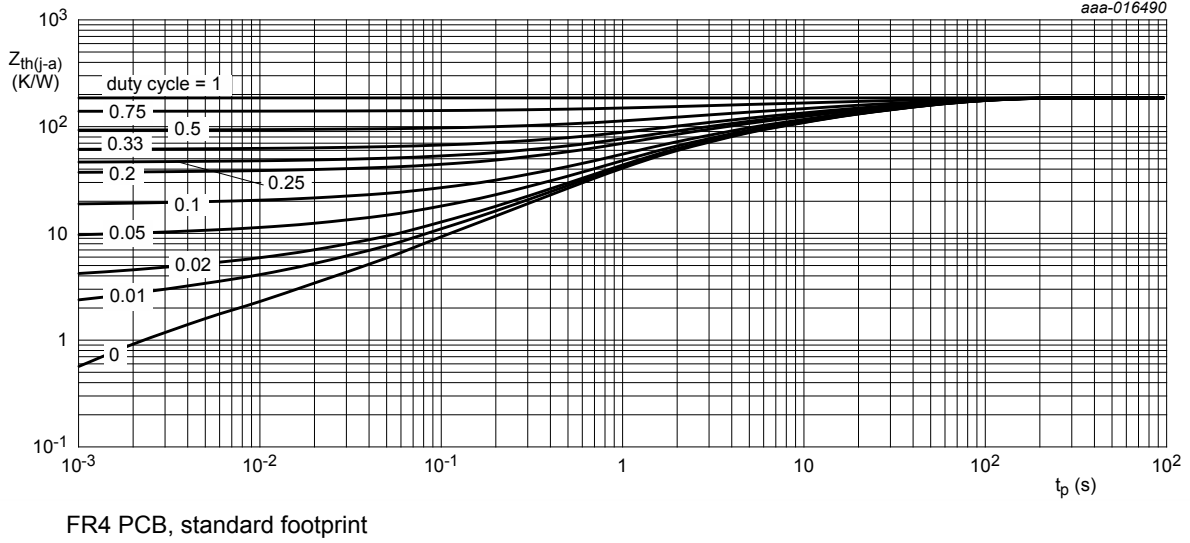


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

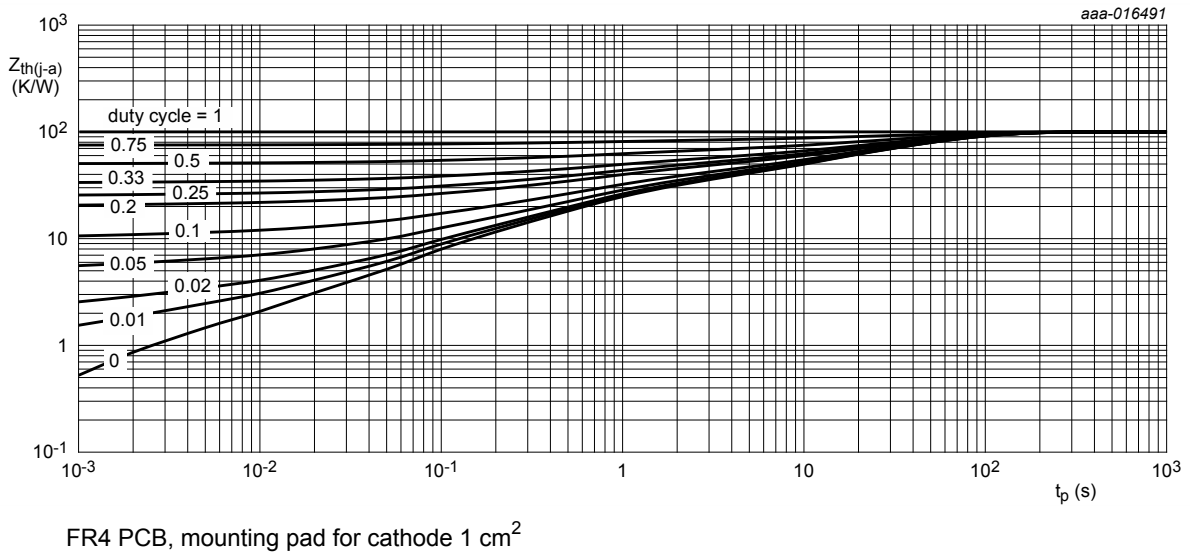
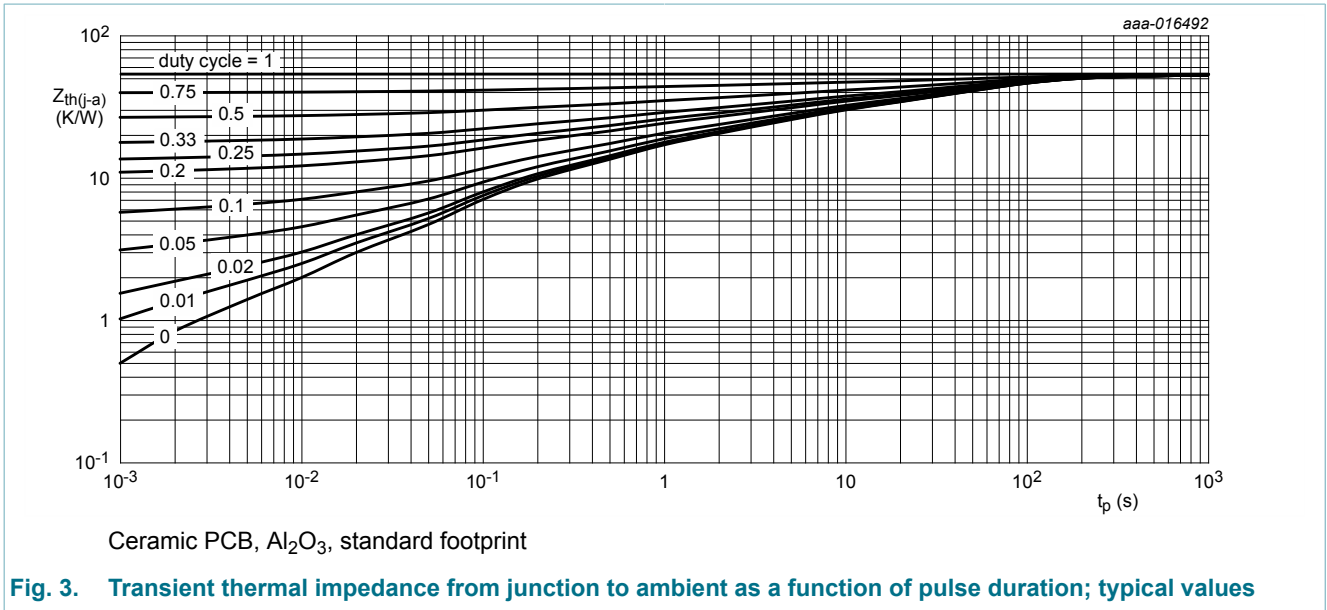


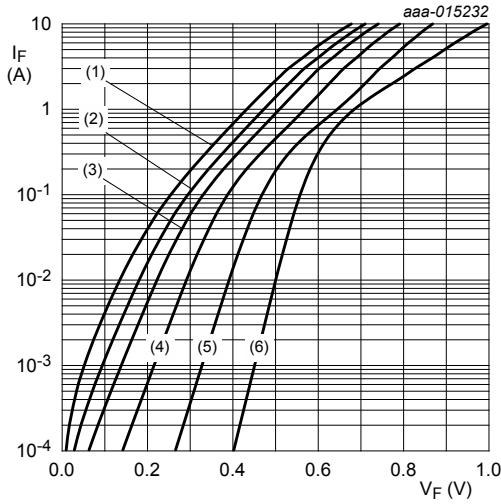
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



## 10. Characteristics

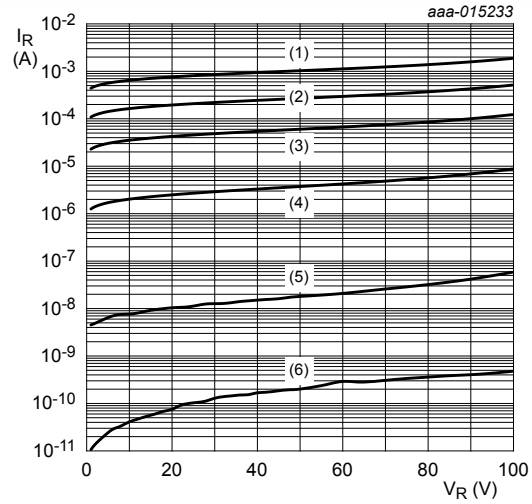
Table 7. Characteristics

| Symbol      | Parameter                     | Conditions  | Min | Typ | Max  | Unit          |
|-------------|-------------------------------|---|-----|-----|------|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage     | $I_R = 1 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; $t_p = 300 \text{ } \mu\text{s}$ ;<br>$\delta = 0.02$            | 100 | -   | -    | V             |
| $V_F$       | forward voltage               | $I_F = 0.1 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$     | -   | 470 | 520  | mV            |
|             |                               | $I_F = 0.5 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$     | -   | 580 | 630  | mV            |
|             |                               | $I_F = 0.7 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$     | -   | 610 | 670  | mV            |
|             |                               | $I_F = 1 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$       | -   | 650 | 710  | mV            |
|             |                               | $I_F = 1.6 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$     | -   | 690 | 750  | mV            |
|             |                               | $I_F = 2 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$       | -   | 710 | 770  | mV            |
|             |                               | $I_F = 2 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 125 \text{ }^\circ\text{C}$      | -   | 575 | 650  | mV            |
| $I_R$       | reverse current               | $V_R = 10 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$      | -   | 10  | -    | nA            |
|             |                               | $V_R = 60 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$      | -   | 25  | -    | nA            |
|             |                               | $V_R = 100 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$     | -   | 70  | 300  | nA            |
|             |                               | $V_R = 100 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ;<br>$T_j = 125 \text{ }^\circ\text{C}$    | -   | 120 | 1000 | $\mu\text{A}$ |
| $C_d$       | diode capacitance             | $V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$   | -   | 135 | -    | pF            |
|             |                               | $V_R = 4 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$   | -   | 80  | -    | pF            |
|             |                               | $V_R = 10 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$  | -   | 50  | -    | pF            |
| $t_{rr}$    | reverse recovery time         | $I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ;<br>$T_j = 25 \text{ }^\circ\text{C}$ | -   | 5   | -    | ns            |
| $V_{FRM}$   | peak forward recovery voltage | $I_F = 0.5 \text{ A}$ ; $dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$                            | -   | 610 | -    | mV            |



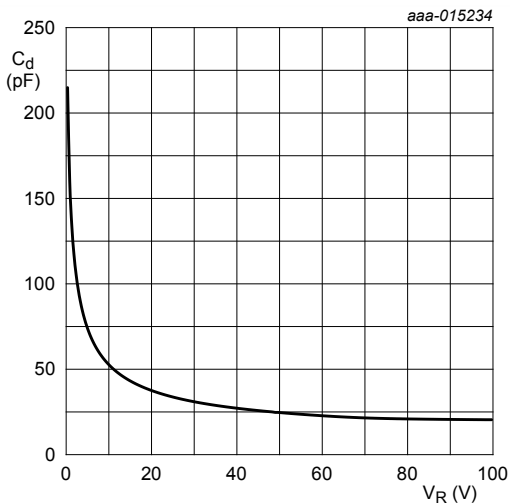
- (1)  $T_j = 175\text{ }^\circ\text{C}$
- (2)  $T_j = 150\text{ }^\circ\text{C}$
- (3)  $T_j = 125\text{ }^\circ\text{C}$
- (4)  $T_j = 85\text{ }^\circ\text{C}$
- (5)  $T_j = 25\text{ }^\circ\text{C}$
- (6)  $T_j = -40\text{ }^\circ\text{C}$

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



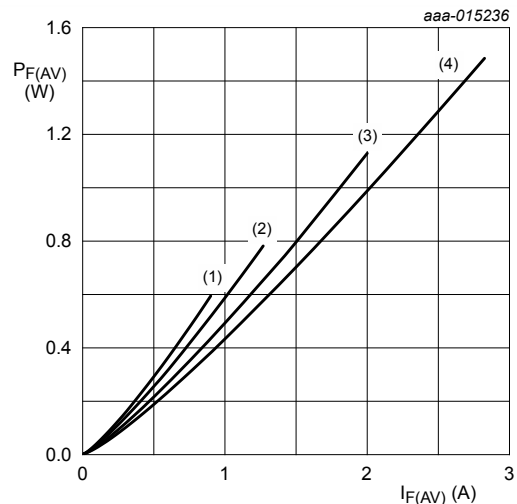
- (1)  $T_j = 175\text{ }^\circ\text{C}$
- (2)  $T_j = 150\text{ }^\circ\text{C}$
- (3)  $T_j = 125\text{ }^\circ\text{C}$
- (4)  $T_j = 85\text{ }^\circ\text{C}$
- (5)  $T_j = 25\text{ }^\circ\text{C}$
- (6)  $T_j = -40\text{ }^\circ\text{C}$

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



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

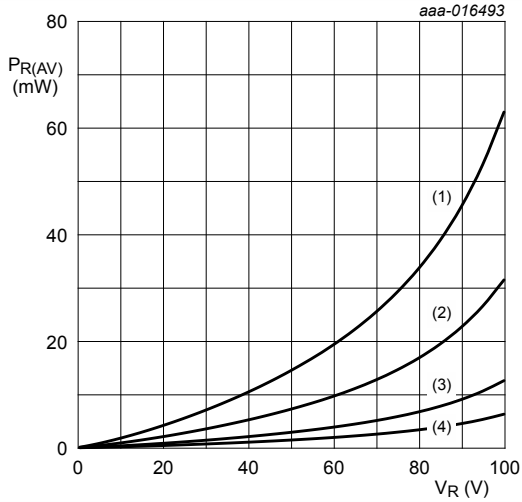
Fig. 6. Diode capacitance as a function of reverse voltage; typical values



- $T_j = 175\text{ }^\circ\text{C}$
- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$

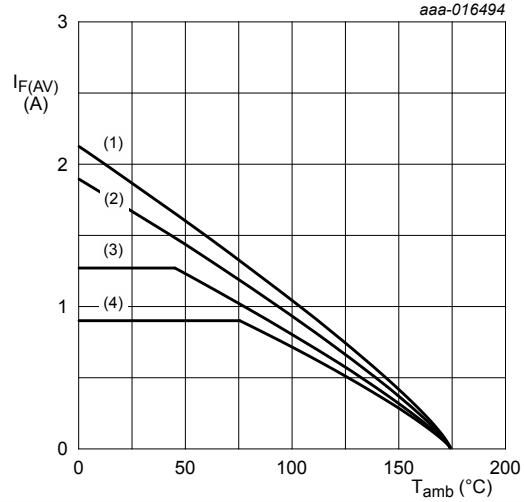
Fig. 7. Average forward power dissipation as a function of average forward current; typical values

100 V, 2 A low leakage current Schottky barrier rectifier



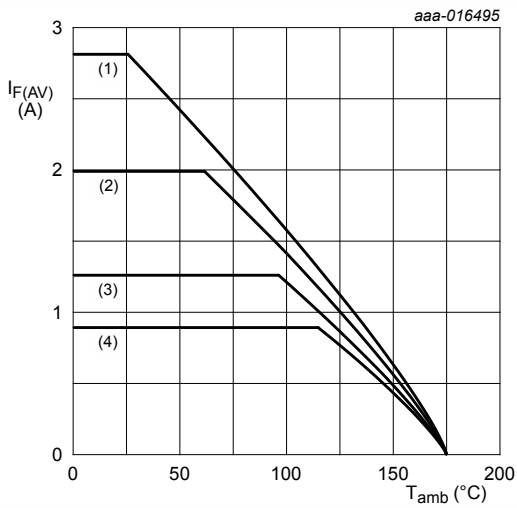
$T_j = 150\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$  (DC)  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



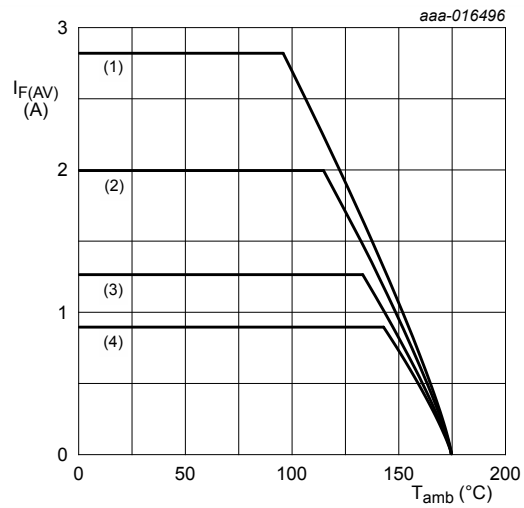
FR4 PCB, standard footprint  
 $T_j = 175\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$   
 $T_j = 175\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

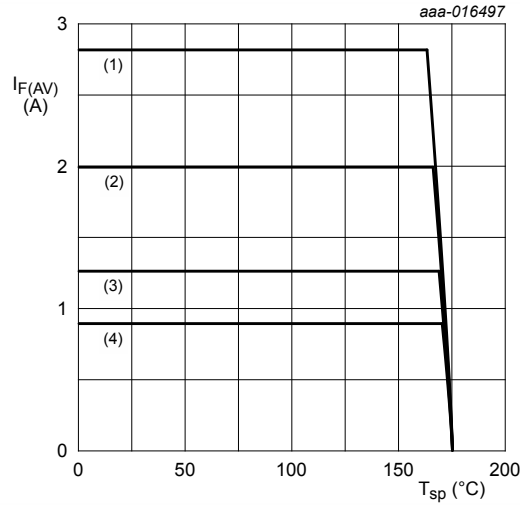
**Fig. 10. Average forward current as a function of ambient temperature; typical values**



Ceramic PCB,  $\text{Al}_2\text{O}_3$ , standard footprint  
 $T_j = 175\text{ }^\circ\text{C}$   
 (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. 11. Average forward current as a function of ambient temperature; typical values**





$T_j = 175\text{ °C}$

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

## 11. Test information

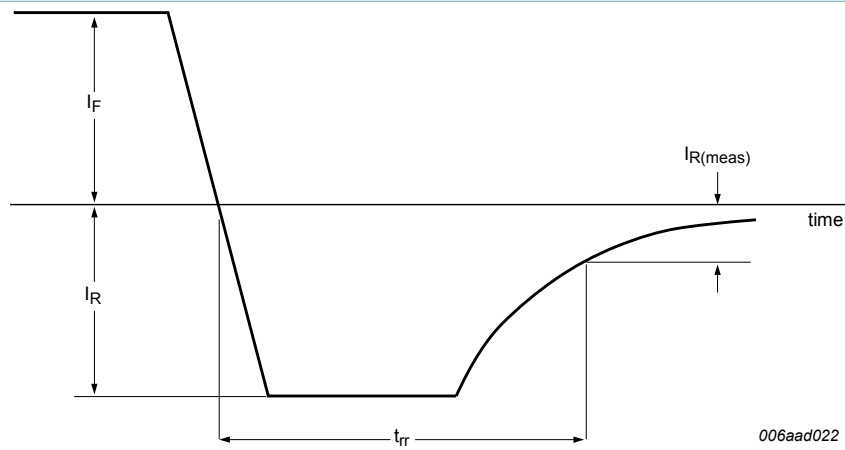


Fig. 13. Reverse recovery definition

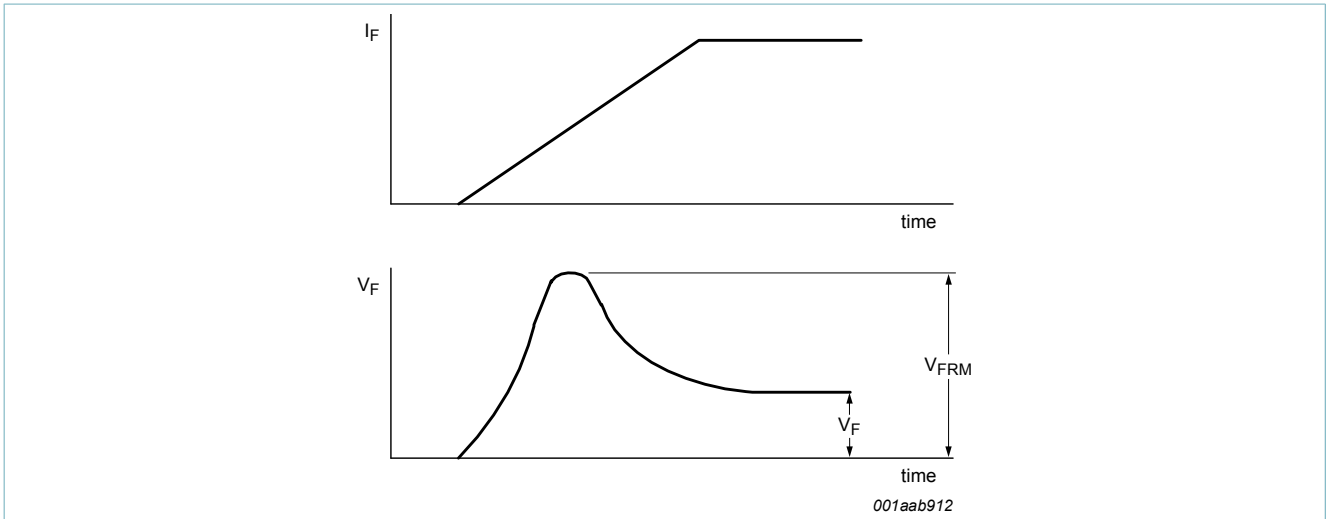


Fig. 14. Forward recovery definition

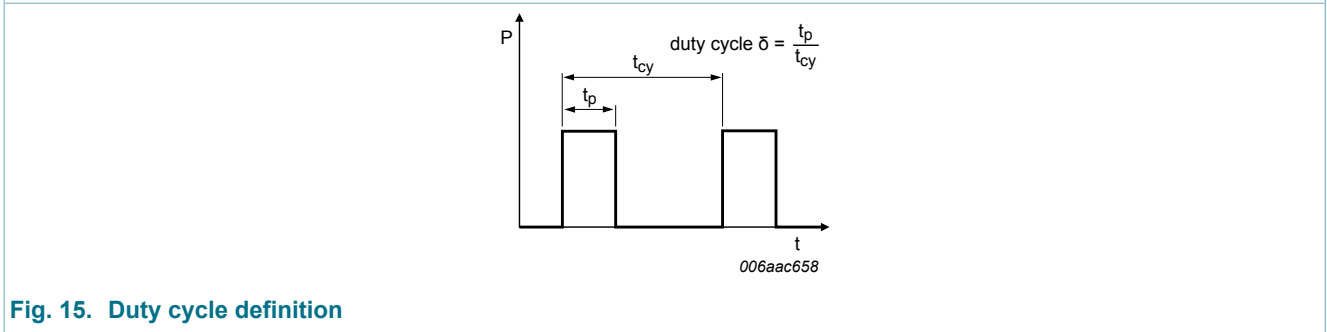


Fig. 15. Duty cycle definition

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.

### 11.1 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.

### 12. Package outline

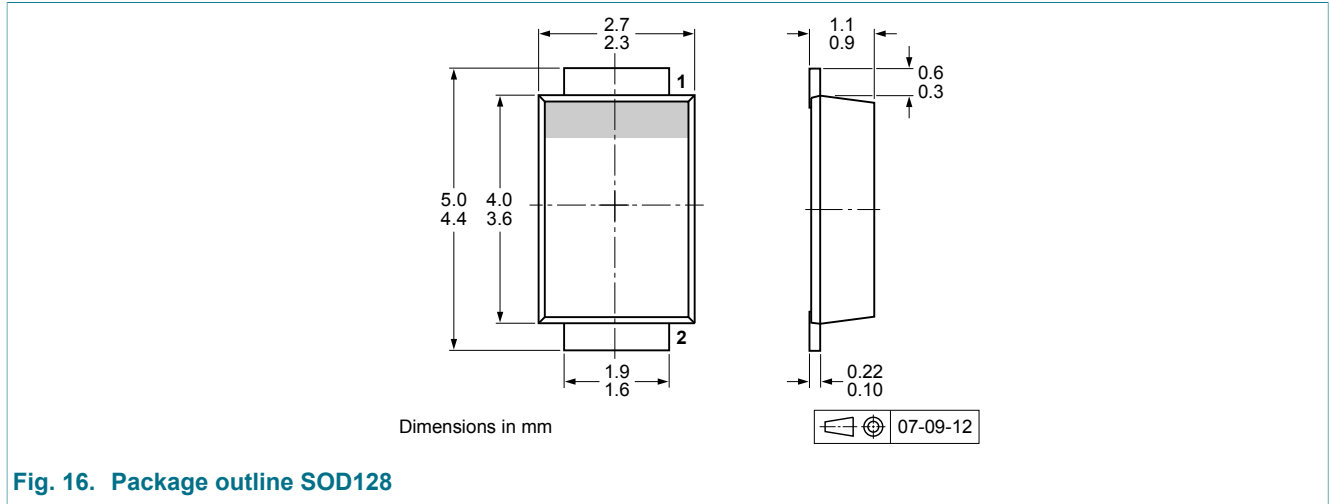


Fig. 16. Package outline SOD128

### 13. Soldering

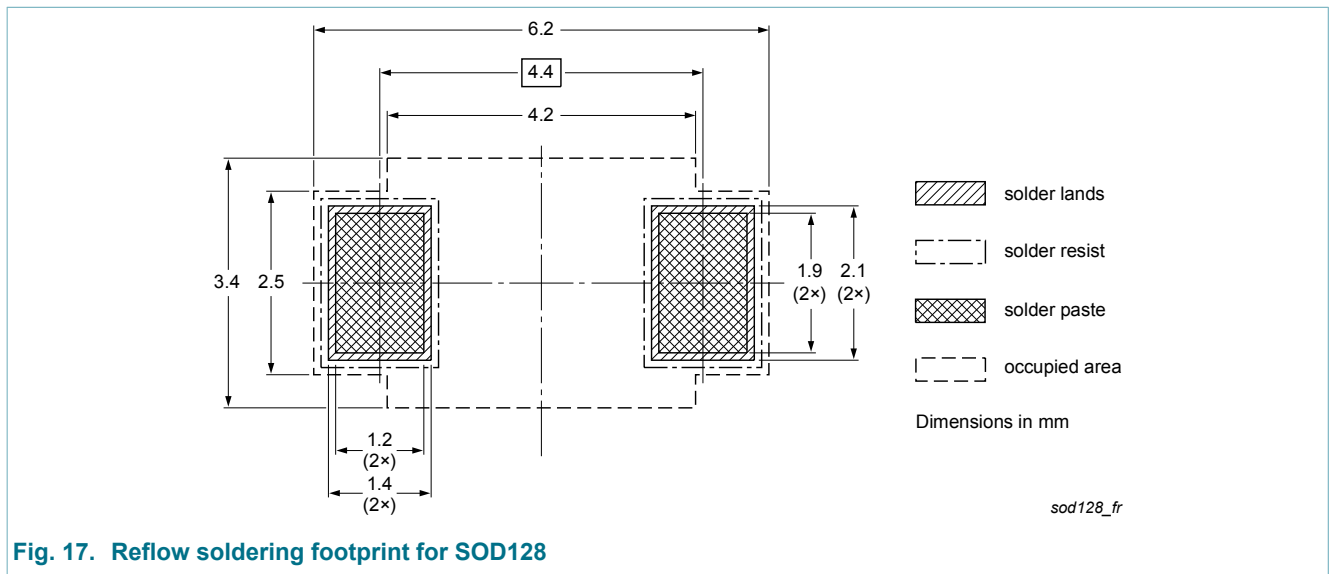


Fig. 17. Reflow soldering footprint for SOD128

## 14. Revision history

Table 8. Revision history

| Data sheet ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PMEG10020AELP v.1 | 20150507     | Product data sheet | -             | -          |

## 15. Legal information

### 15.1 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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## 16. Contents

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