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Kind regards,

Team Nexperia



# PMEG4020ETP

40 V, 2 A low VF MEGA Schottky barrier rectifier

Rev. 1 — 5 October 2011

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

### 1.2 Features and benefits

- Average forward current:  $I_{F(AV)} \leq 2$  A
- Reverse voltage:  $V_R \leq 40$  V
- Low forward voltage
- High power capability due to clip-bonding technology
- Small and flat lead SMD plastic package
- AEC-Q101 qualified
- High temperature  $T_j \leq 175$  °C

### 1.3 Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Reverse polarity protection
- Low power consumption applications
- High temperature applications

### 1.4 Quick reference data

Table 1. Quick reference data

| Symbol      | Parameter               | Conditions                                                        | Min | Typ | Max | Unit |
|-------------|-------------------------|-------------------------------------------------------------------|-----|-----|-----|------|
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$ ; $f = 20$ kHz; $T_{amb} \leq 110$ °C | -   | -   | 2   | A    |
|             |                         | square wave; $\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 165$ °C  | -   | -   | 2   | A    |
| $V_R$       | reverse voltage         | $T_j = 25$ °C                                                     | -   | -   | 40  | V    |
| $V_F$       | forward voltage         | $I_F = 2$ A; $T_j = 25$ °C                                        | -   | 430 | 490 | mV   |
| $I_R$       | reverse current         | $T_j = 25$ °C; $V_R = 40$ V                                       | -   | 25  | 100 | μA   |

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



## 2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description            | Simplified outline                                                                          | Graphic symbol                                                                                |
|-----|--------|------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 1   | K      | cathode <sup>[1]</sup> | <br>SOD128 | <br>sym001 |
| 2   | A      | anode                  |                                                                                             |                                                                                               |

[1] The marking bar indicates the cathode.

## 3. Ordering information

Table 3. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| PMEG4020ETP | -       | plastic surface-mounted package; 2 leads | SOD128  |

## 4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG4020ETP | C2           |

## 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; $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 110\text{ °C}$ <a href="#">[1]</a> | -   | 2    | A    |
|             |                                     | square wave; $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 165\text{ °C}$                      | -   | 2    | A    |
| $I_{FSM}$   | non-repetitive peak forward current | square wave; $t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$                                      | -   | 50   | A    |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ °C}$ <a href="#">[2][3]</a>                                                   | -   | 750  | mW   |
|             |                                     | <a href="#">[4][3]</a>                                                                               | -   | 1250 | mW   |
|             |                                     | <a href="#">[1][3]</a>                                                                               | -   | 2500 | mW   |
| $T_j$       | junction temperature                |                                                                                                      | -   | 175  | °C   |
| $T_{amb}$   | ambient temperature                 |                                                                                                      | -55 | 175  | °C   |
| $T_{stg}$   | storage temperature                 |                                                                                                      | -65 | 175  | °C   |

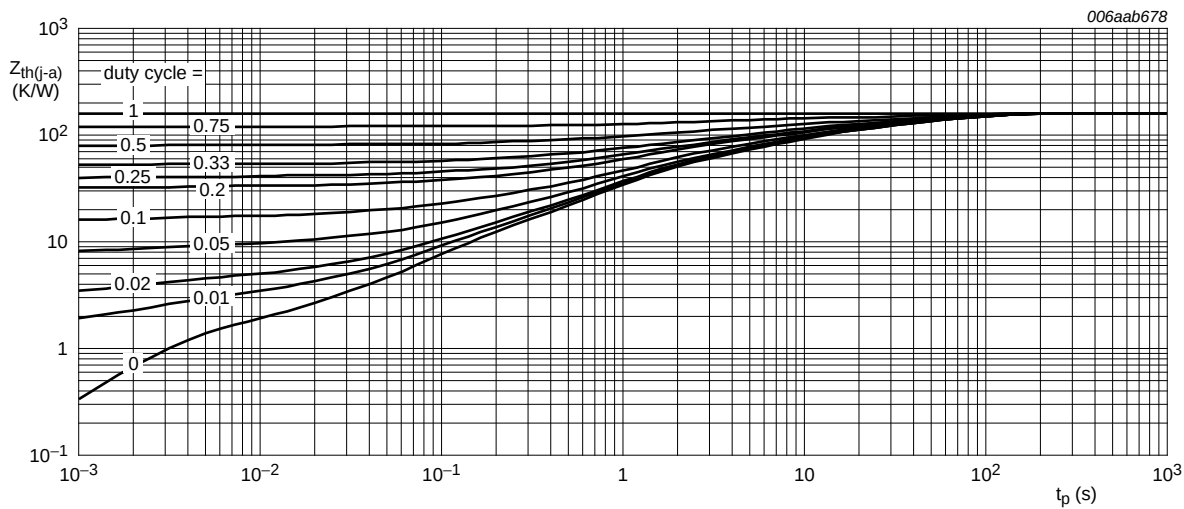
- [1] Device mounted on a ceramic Printed-Circuit Board (PCB),  $Al_2O_3$ , standard footprint.  
 [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.  
 [3] Reflow soldering is the only recommended soldering method.  
 [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

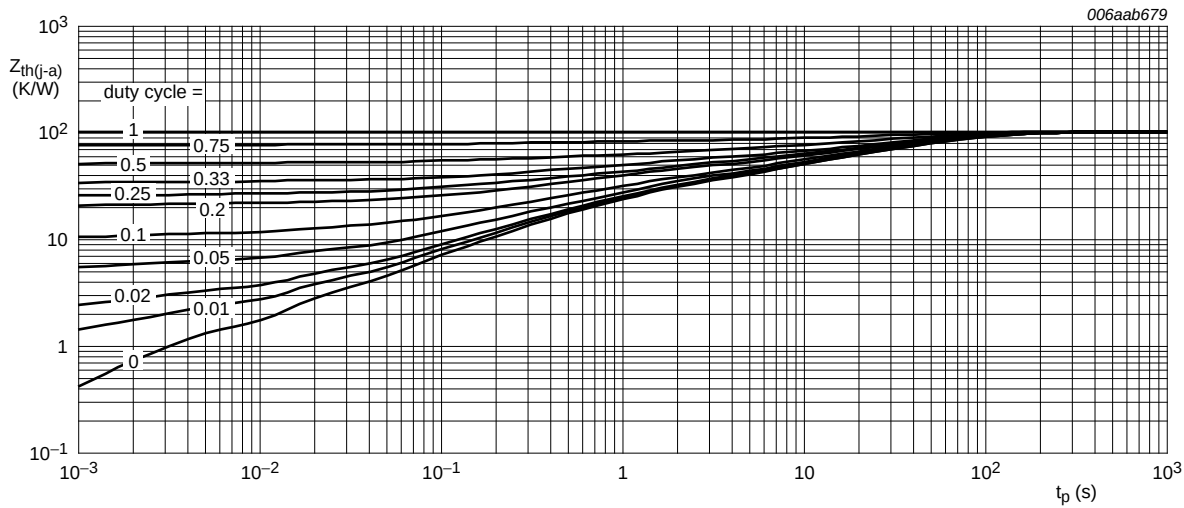
| Symbol         | Parameter                                        | Conditions  | Min                       | Typ | Max | Unit |
|----------------|--------------------------------------------------|-------------|---------------------------|-----|-----|------|
| $R_{th(j-a)}$  | thermal resistance from junction to ambient      | in free air | <a href="#">[1][2][3]</a> | -   | 200 | K/W  |
|                |                                                  |             | <a href="#">[1][4][3]</a> | -   | 120 | K/W  |
|                |                                                  |             | <a href="#">[1][5][3]</a> | -   | 60  | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | <a href="#">[6]</a>       | -   | 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] Reflow soldering is the only recommended soldering method.  
 [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .  
 [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

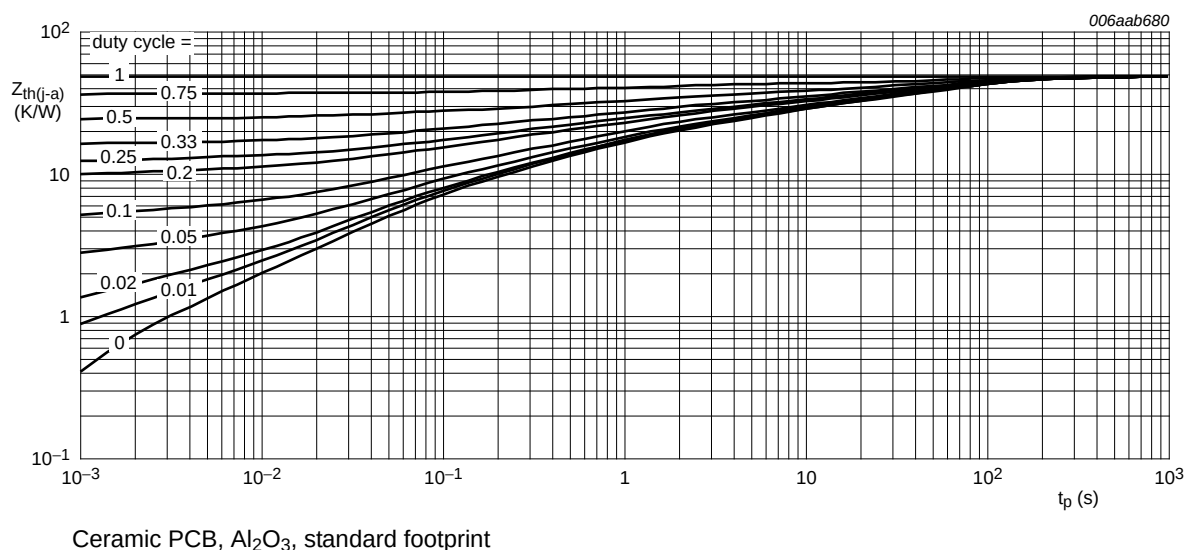


Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 7. Characteristics

Table 7. Characteristics

| Symbol | Parameter         | Conditions                                                               | Min | Typ | Max | Unit          |
|--------|-------------------|--------------------------------------------------------------------------|-----|-----|-----|---------------|
| $V_F$  | forward voltage   | $I_F = 0.1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$                   | -   | 295 | 330 | mV            |
|        |                   | $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$                     | -   | 380 | 440 | mV            |
|        |                   | $I_F = 2 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$                     | -   | 430 | 490 | mV            |
|        |                   | $I_F = 2 \text{ A}; T_j = 125 \text{ }^\circ\text{C}$                    | -   | 330 | 380 | mV            |
| $I_R$  | reverse current   | $V_R = 10 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$                    | -   | 5   | -   | $\mu\text{A}$ |
|        |                   | $V_R = 40 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$                    | -   | 25  | 100 | $\mu\text{A}$ |
|        |                   | $V_R = 10 \text{ V}; T_j = 125 \text{ }^\circ\text{C}$                   | -   | 4   | -   | mA            |
|        |                   | $V_R = 40 \text{ V}; T_j = 125 \text{ }^\circ\text{C}$                   | -   | 15  | -   | mA            |
| $C_d$  | diode capacitance | $V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$  | -   | 250 | -   | pF            |
|        |                   | $V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$ | -   | 95  | -   | pF            |

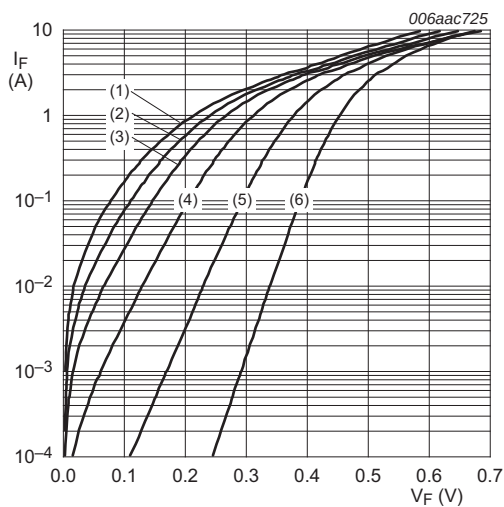


Fig 4. Forward current as a function of forward voltage; typical values

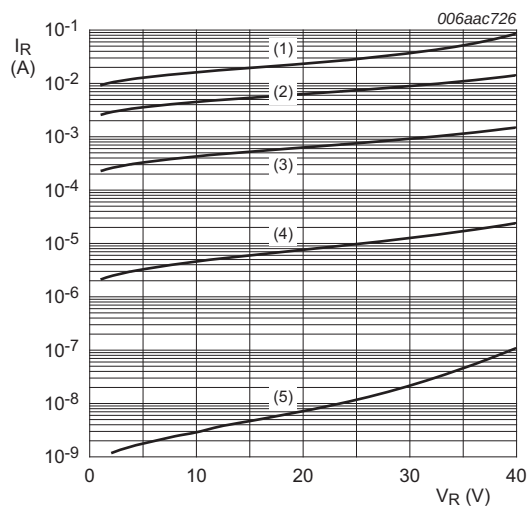


Fig 5. Reverse current as a function of reverse voltage; typical values

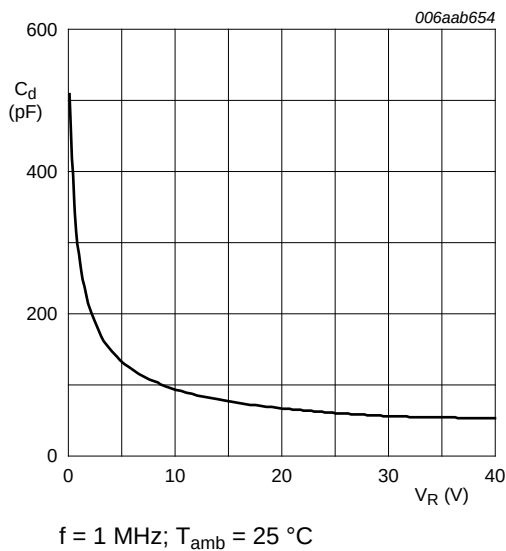


Fig 6. Diode capacitance as a function of reverse voltage; typical values

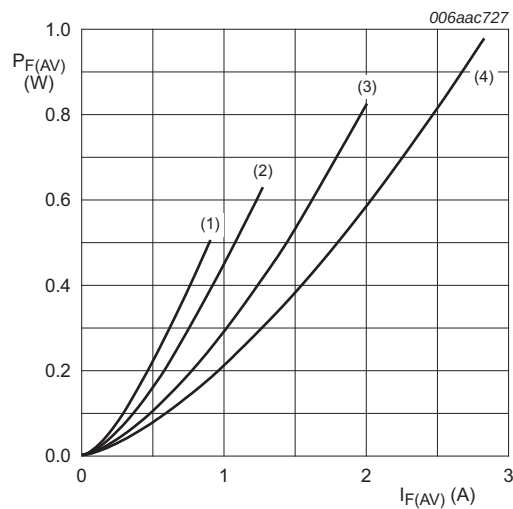
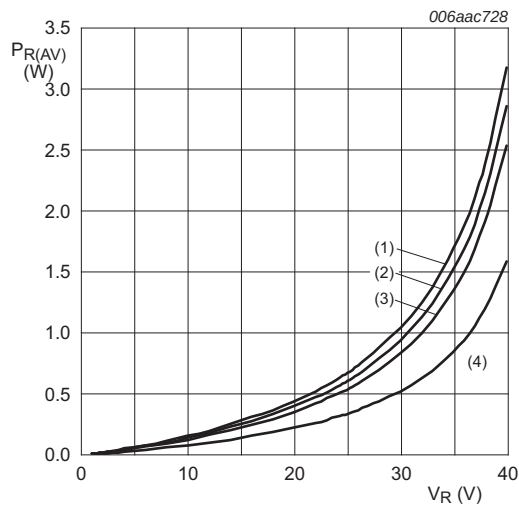
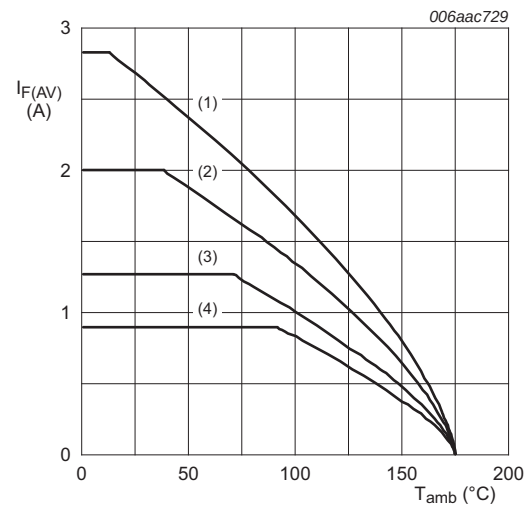


Fig 7. Average forward power dissipation as a function of average forward current; typical values



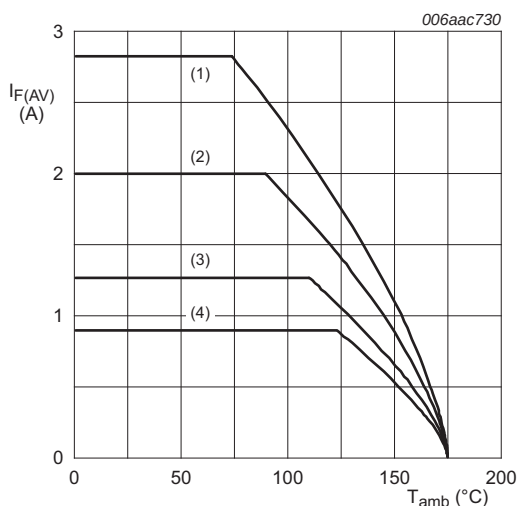
$T_j = 150\text{ °C}$   
 (1)  $\delta = 1.0$   
 (2)  $\delta = 0.9$   
 (3)  $\delta = 0.8$   
 (4)  $\delta = 0.5$

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



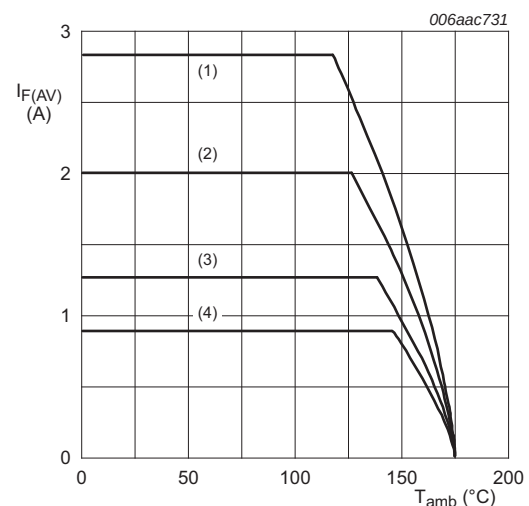
FR4 PCB, standard footprint  
 $T_j = 175\text{ °C}$   
 (1)  $\delta = 1.0$  (DC)  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$   
 $T_j = 175\text{ °C}$   
 (1)  $\delta = 1.0$   
 (2)  $\delta = 0.9$   
 (3)  $\delta = 0.8$   
 (4)  $\delta = 0.5$

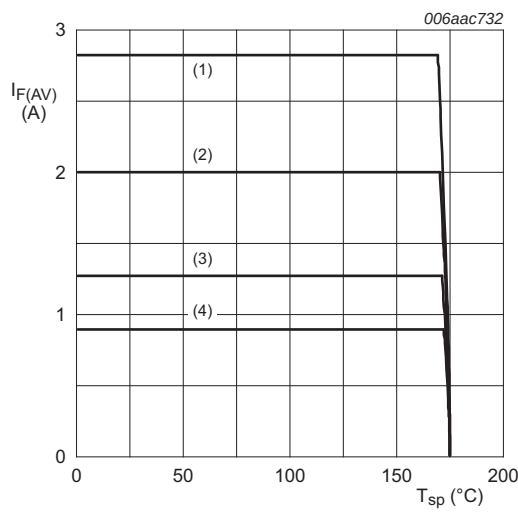
**Fig 10.** Average forward current as a function of ambient temperature; typical values



Ceramic PCB,  $\text{Al}_2\text{O}_3$ , standard footprint  
 $T_j = 175\text{ °C}$   
 (1)  $\delta = 1.0$  (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





$T_j = 175\text{ }^{\circ}\text{C}$   
(1)  $\delta = 1.0$   
(2)  $\delta = 0.9$   
(3)  $\delta = 0.8$   
(4)  $\delta = 0.5$

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

## 8. Test information

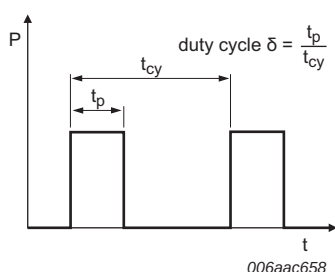


Fig 13. Duty cycle definition

The current ratings for the typical waveforms as shown in figures 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

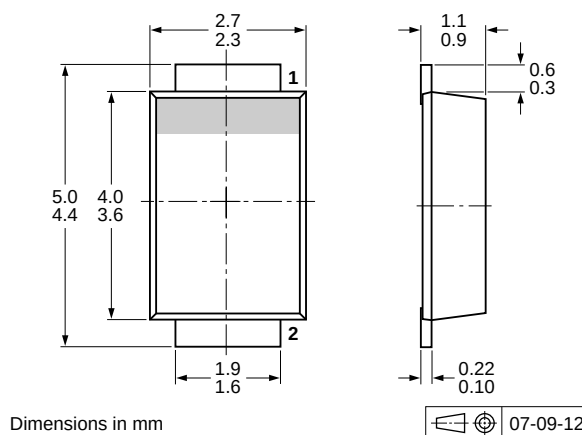


Fig 14. Package outline SOD128

10. Packing information

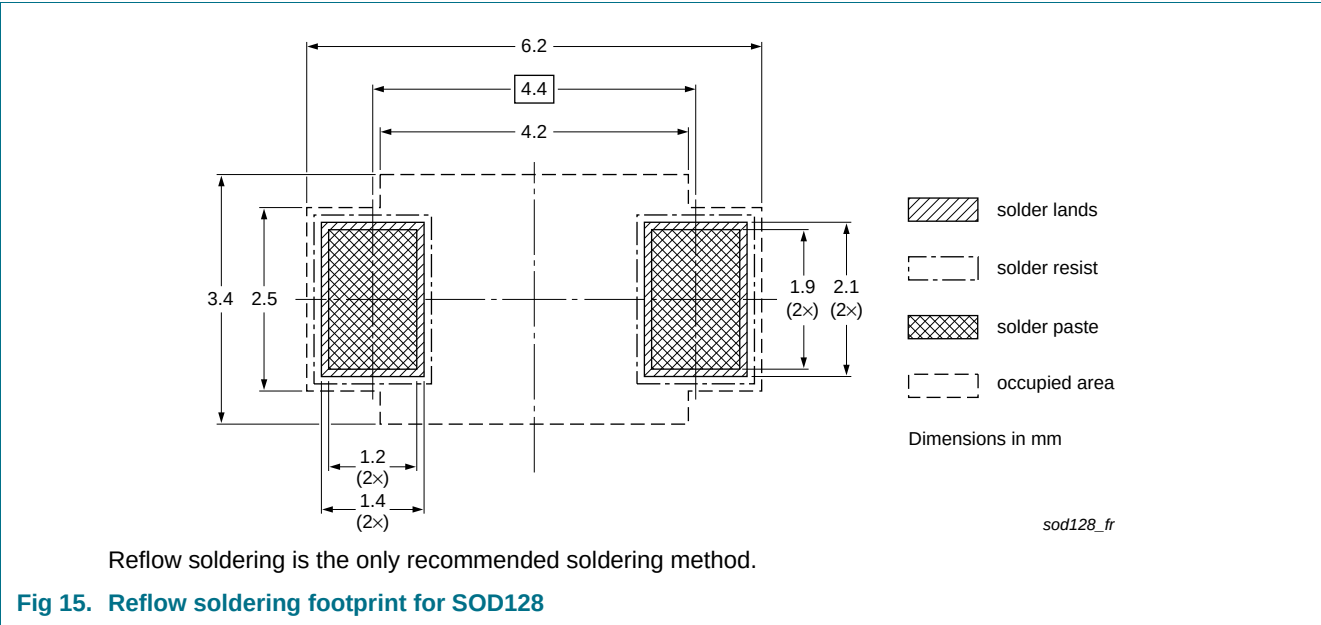
Table 8. Ordering information

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

| Type number | Package | Description                     | Packing quantity |
|-------------|---------|---------------------------------|------------------|
|             |         |                                 | 3000             |
| PMEG4020ETP | SOD128  | 4 mm pitch, 12 mm tape and reel | -115             |

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

11. Soldering



## 12. Revision history

Table 9. Revision history

| Document ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PMEG4020ETP v.1 | 20111005     | 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.                                     |

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Date of release: 5 October 2011

Document identifier: PMEG4020ETP