



# PMEG3020EP-Q

30 V, 2 A low VF MEGA Schottky barrier rectifier

1 November 2021

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:  $V_R \leq 30$  V
- Low forward voltage
- High power capability due to clip-bond technology
- Small and flat lead SMD plastic package
- Suitable for both reflow and wave soldering
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 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; square wave; $T_{amb} \leq 110$ °C [1] | -   | -   | 2   | A    |
|             |                         | $\delta = 0.5$ ; $f = 20$ kHz; square wave; $T_{sp} \leq 140$ °C      | -   | -   | 2   | A    |
| $V_R$       | reverse voltage         | $T_j = 25$ °C   | -   | -   | 30  | V    |
| $V_F$       | forward voltage         | $I_F = 2$ A; $T_j = 25$ °C  | -   | 310 | 360 | mV   |
| $I_R$       | reverse current         | $V_R = 30$ V; $T_j = 25$ °C   | -   | 1   | 3   | mA   |

[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>CFP5 (SOD128) | <br>sym001 |
| 2   | A      | anode                  |  |   |

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

| Type number  | Package |  |         |
|--------------|---------|--|---------|
|              | Name    | Description  | Version |
| PMEG3020EP-Q | CFP5    | plastic, surface mounted package; 2 terminals; 4 mm pitch; 3.8 mm x 2.6 mm x 1 mm body | SOD128  |

## 7. Marking

Table 4. Marking codes

| Type number  | Marking code |
|--------------|--------------|
| PMEG3020EP-Q | A3           |

## 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                     | $T_j = 25\text{ °C}$   |     | -   | 30   | V    |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{amb} \leq 110\text{ °C}$ | [1] | -   | 2    | A    |
|             |                                     | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{sp} \leq 140\text{ °C}$  |     | -   | 2    | 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] | -   | 625  | mW   |
|             |                                     |  | [3] | -   | 1.05 | W    |
|             |                                     |  | [1] | -   | 2.1  | 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<sub>2</sub>O<sub>3</sub>, 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 cm<sup>2</sup>.

## 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  |
|                |  |             | [3] [2] | -   | -   | 120 | K/W  |
|                |  |             | [4] [2] | -   | -   | 60  | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [5]     | -   | -   | 12  | K/W  |

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

[2] 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.

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

[4] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

[5] Soldering point of cathode tab.

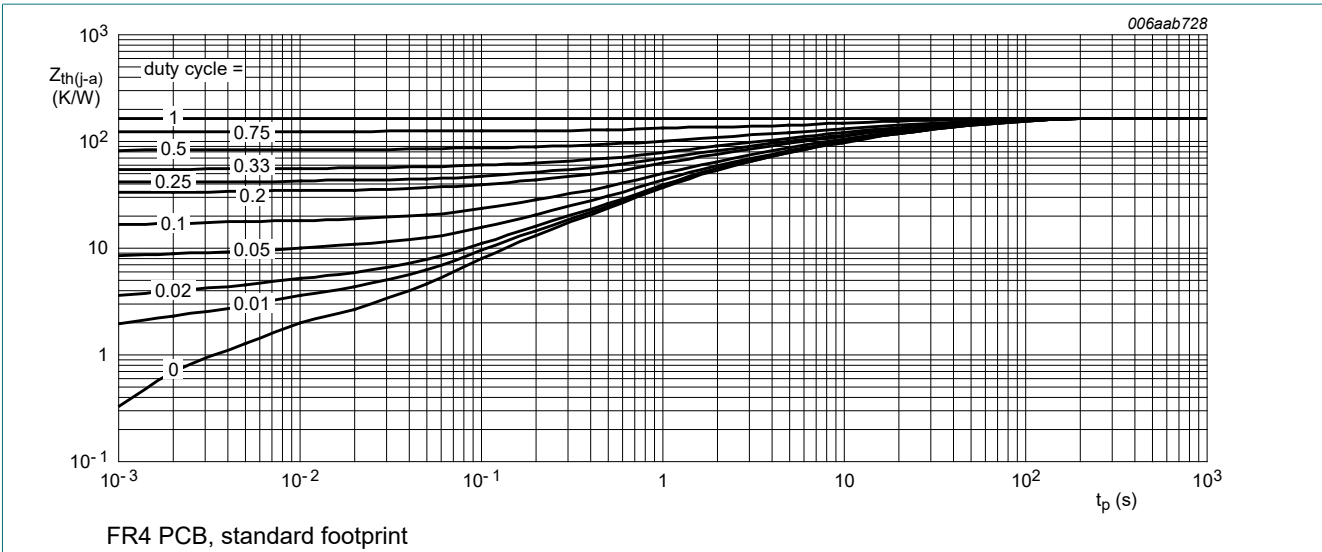


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

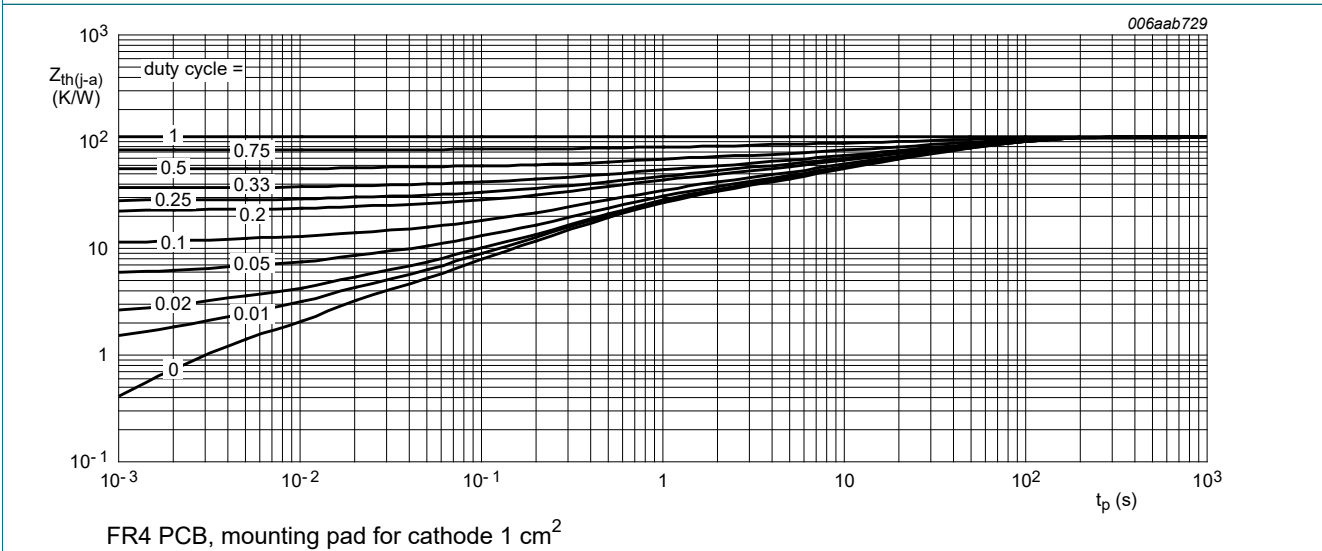


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

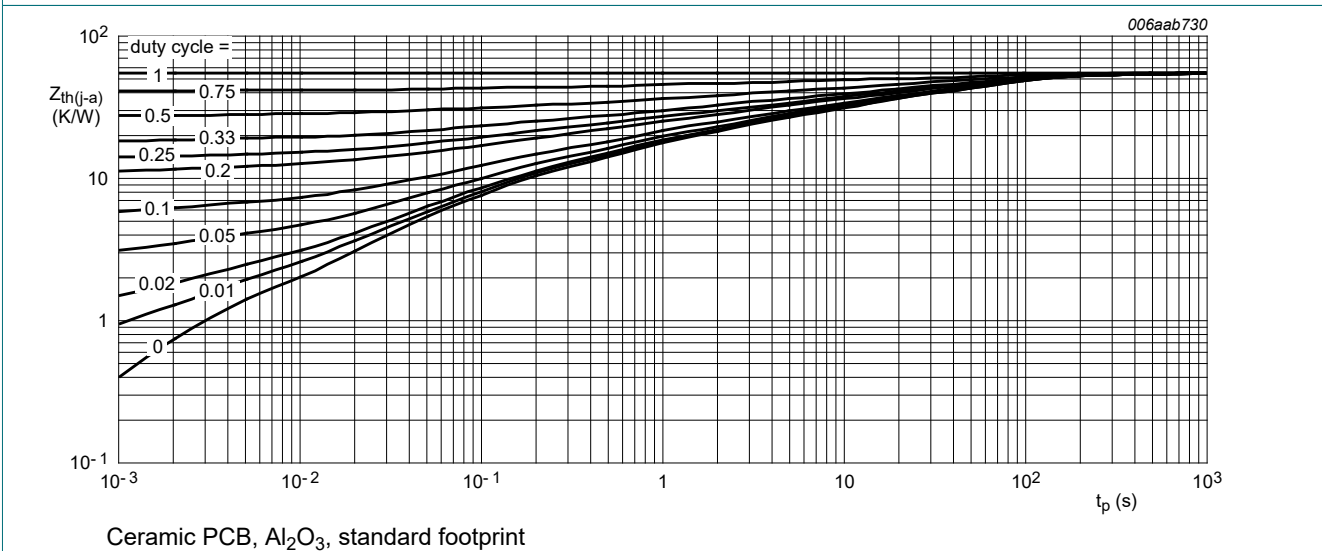
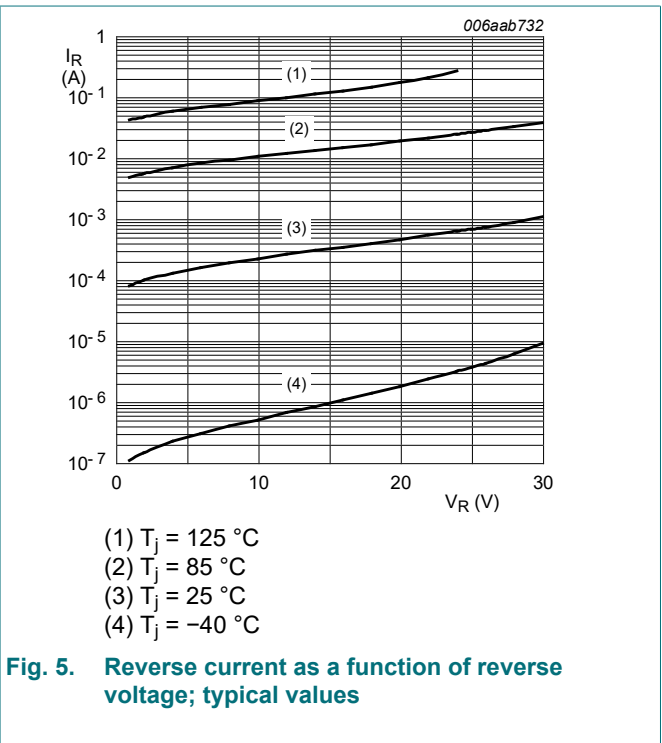
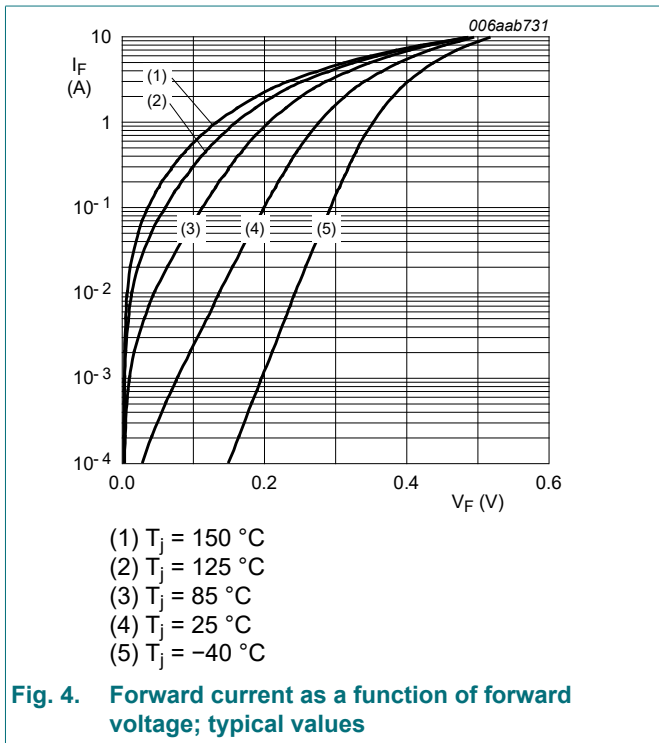


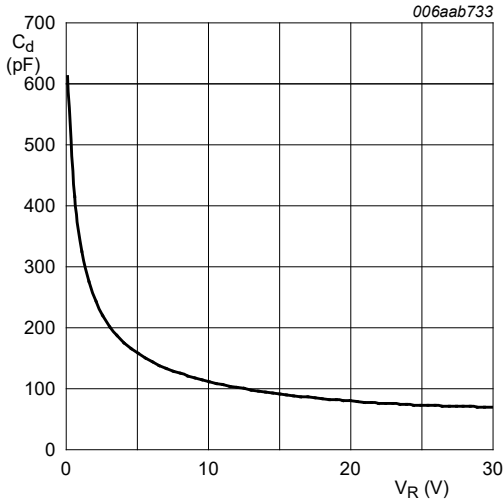
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

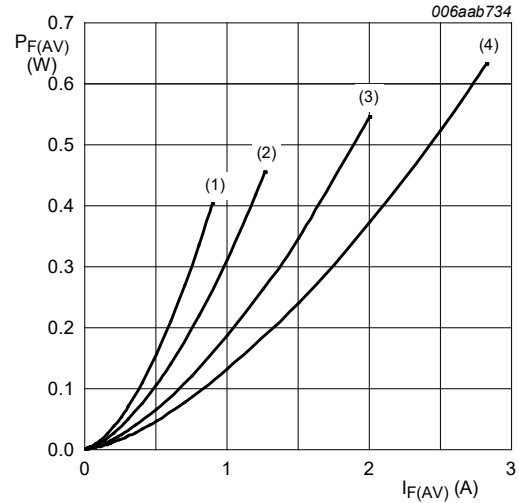
| Symbol | Parameter         | Conditions   | Min | Typ | Max | Unit          |
|--------|-------------------|--|-----|-----|-----|---------------|
| $V_F$  | forward voltage   | $I_F = 0.5 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$                   | -   | 250 | 280 | mV            |
|        |                   | $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$                     | -   | 275 | 310 | mV            |
|        |                   | $I_F = 2 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$                     | -   | 310 | 360 | mV            |
| $I_R$  | reverse current   | $V_R = 5 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$                     | -   | 130 | -   | $\mu\text{A}$ |
|        |                   | $V_R = 30 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$                    | -   | 1   | 3   | mA            |
| $C_d$  | diode capacitance | $V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$  | -   | 325 | -   | pF            |
|        |                   | $V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$ | -   | 110 | -   | pF            |





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

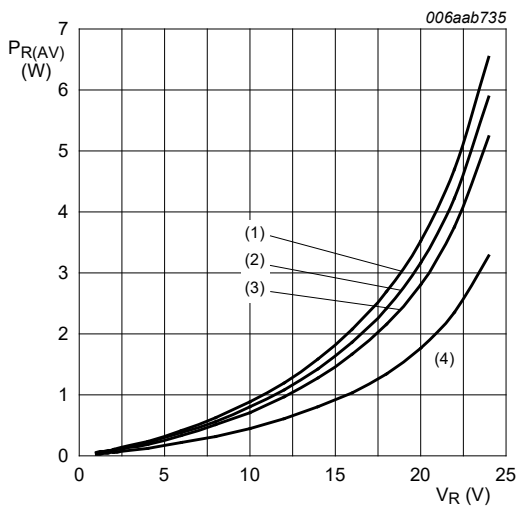
**Fig. 6. Diode capacitance as a function of reverse voltage; typical values**



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

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

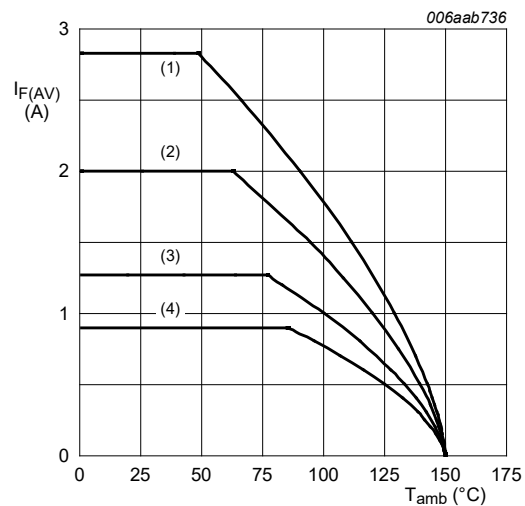
**Fig. 7. Average forward power dissipation as a function of average forward current; typical values**



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

- (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**

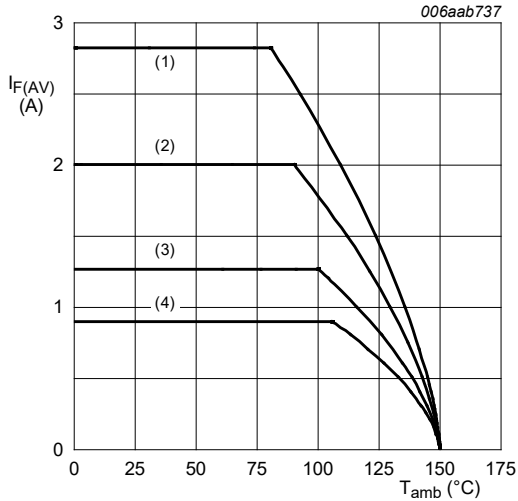


FR4 PCB, standard footprint

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

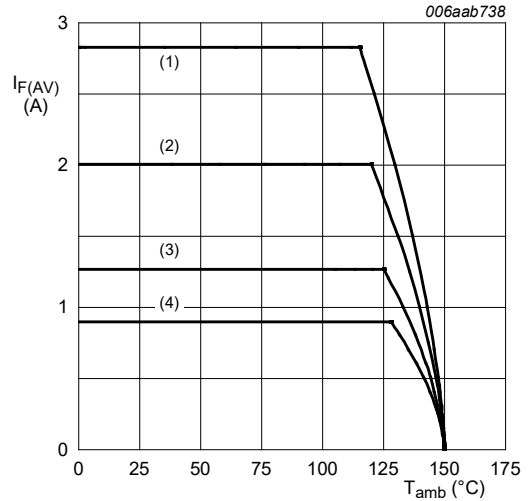
- (1)  $\delta = 1; \text{DC}$
- (2)  $\delta = 0.5; f = 20 \text{ kHz}$
- (3)  $\delta = 0.2; f = 20 \text{ kHz}$
- (4)  $\delta = 0.1; f = 20 \text{ kHz}$

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



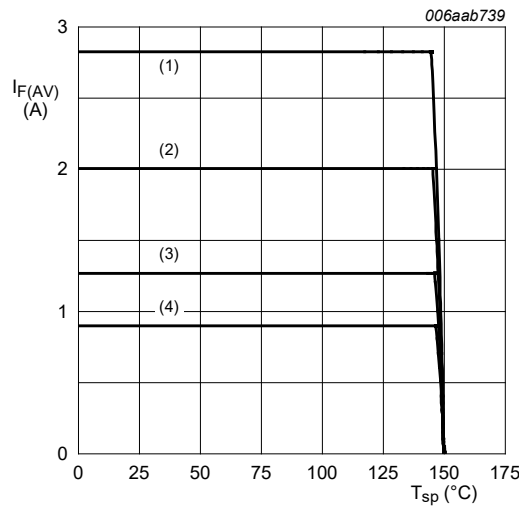
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 $T_j = 150\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, 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. 11. Average forward current as a function of ambient temperature; typical values**



$T_j = 150\text{ °C}$   
 (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. 12. Average forward current as a function of solder point temperature; typical values**

## 11. Test information

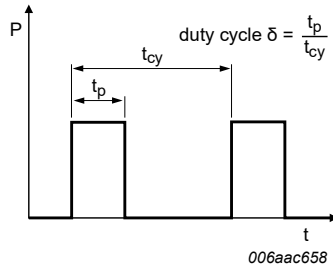


Fig. 13. Duty cycle definition

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

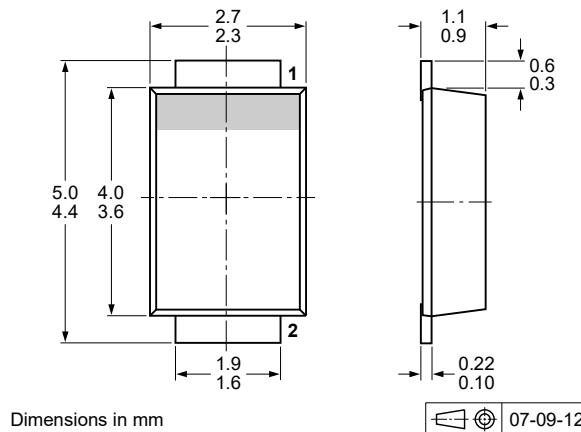


Fig. 14. Package outline CFP5 (SOD128)



### 13. Soldering

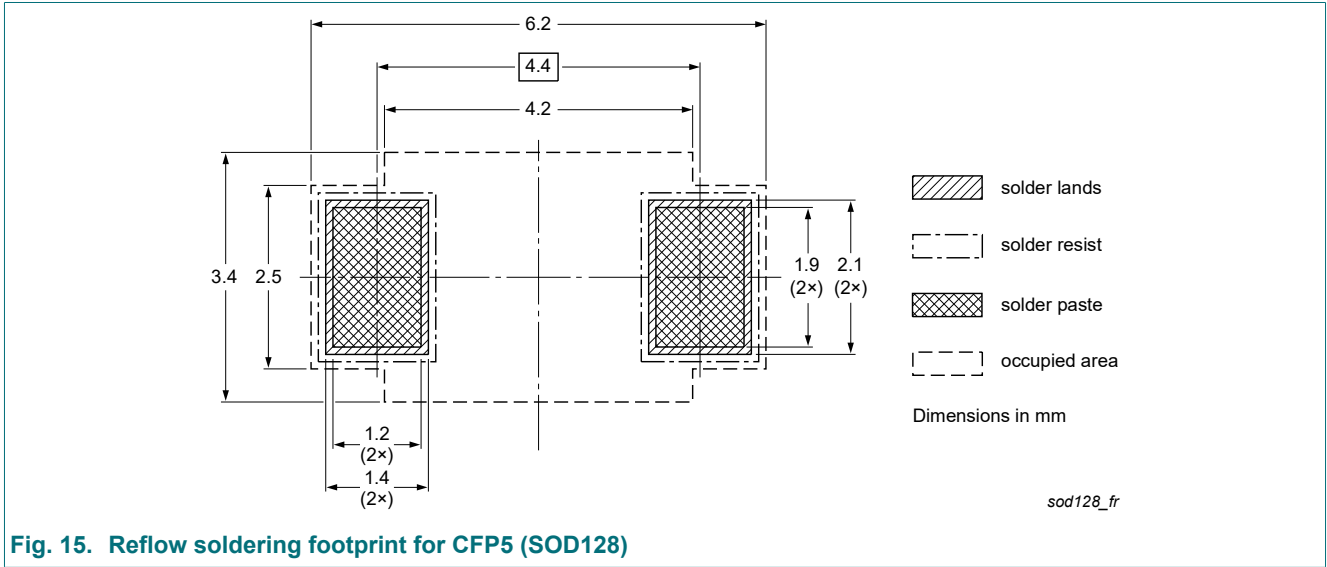
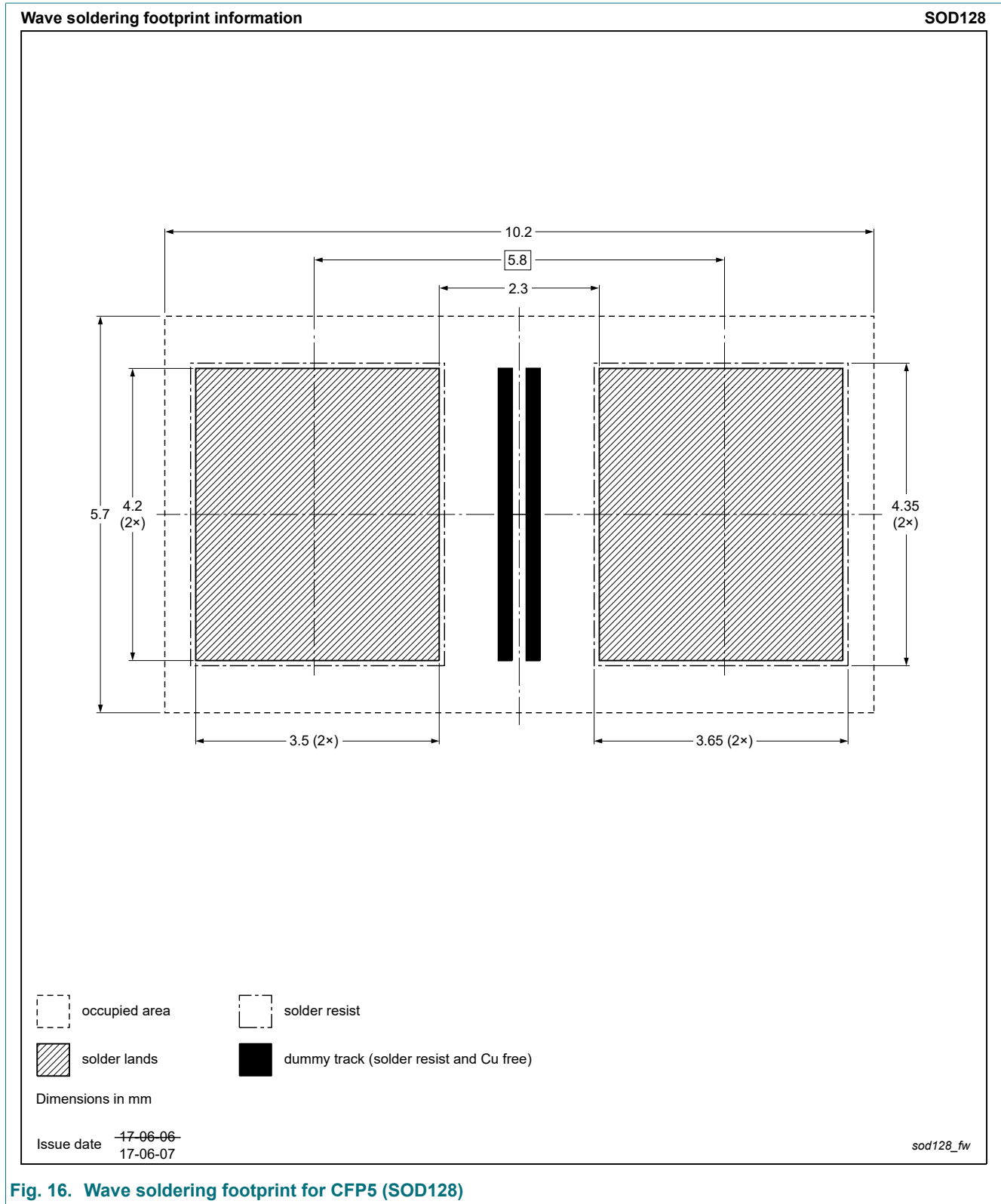


Fig. 15. Reflow soldering footprint for CFP5 (SOD128)



**Fig. 16. Wave soldering footprint for CFP5 (SOD128)**

## 14. Revision history

Table 8. Revision history

| Data sheet ID    | Release date | Data sheet status  | Change notice | Supersedes |
|------------------|--------------|--------------------|---------------|------------|
| PMEG3020EP-Q v.1 | 20211101     | Product data sheet | -             | -          |

## 15. Legal information

### 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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