



# PMEG4010EP

40 V, 1 A low VF Schottky barrier rectifier

20 February 2023

Product data sheet

## 1. General description

Planar 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:  $I_{F(AV)} \leq 1$  A
- Reverse voltage:  $V_R \leq 40$  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

## 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; $T_{amb} \leq 145$ °C	-	-	1	A
$V_R$	reverse voltage	$T_j = 25$ °C	-	-	40	V
$V_F$	forward voltage	$I_F = 1$ A; $T_j = 25$ °C	-	430	490	mV
$I_R$	reverse current	$V_R = 40$ V; $T_j = 25$ °C	-	10	50	$\mu$ A

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 CFP5 (SOD128)	 K $\rightarrow$ A sym001
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PMEG4010EP</a>	CFP5	plastic, surface mounted package; 2 terminals; 4 mm pitch; 3.8 mm x 2.6 mm x 1 mm body	<a href="#">SOD128</a>

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4010EP	AC

## 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	$T_j = 25\text{ °C}$		-	40	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{amb} \leq 120\text{ °C}$	[1]	-	1	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{amb} \leq 145\text{ °C}$		-	1	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$ ; half sine 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,  $Al_2O_3$ , 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
			[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.

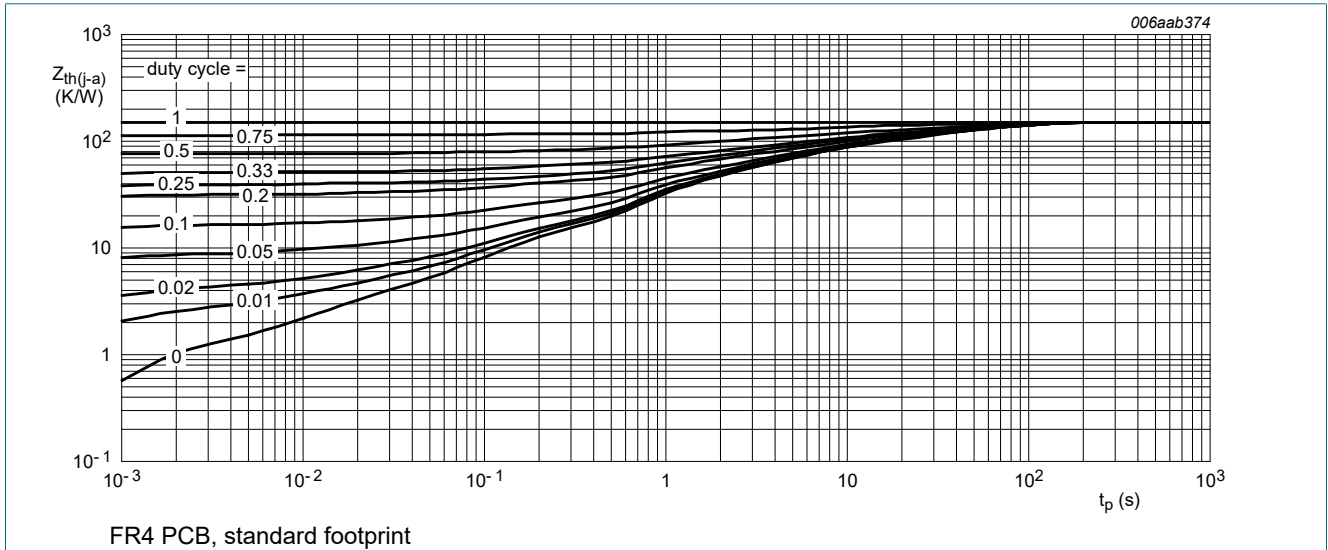


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

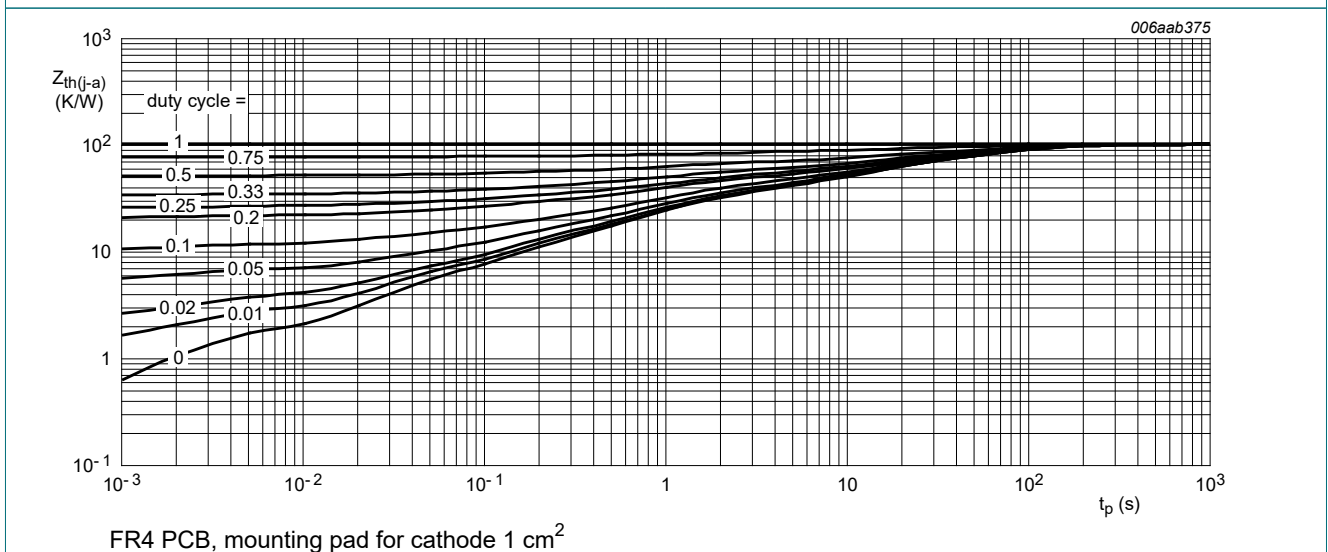
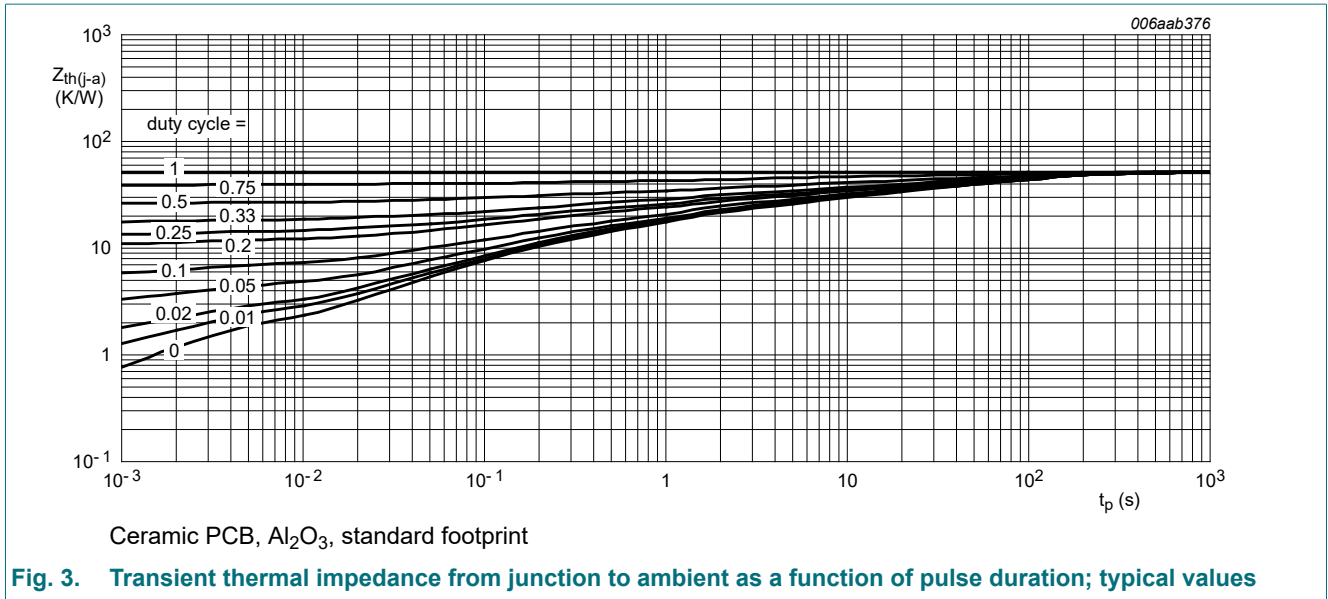


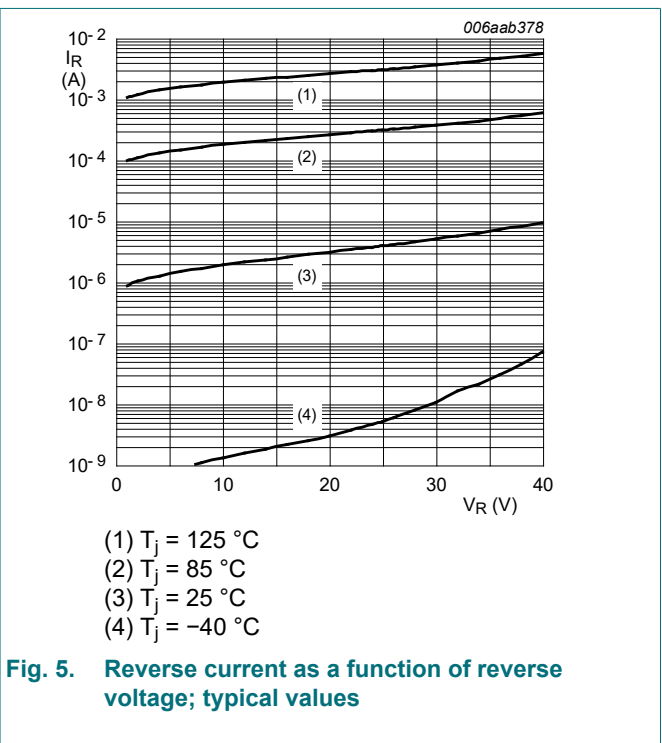
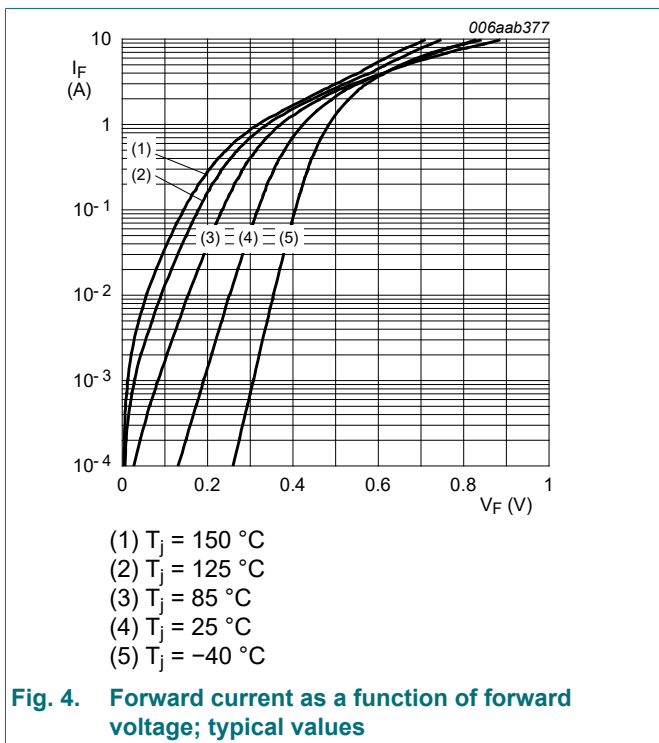
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

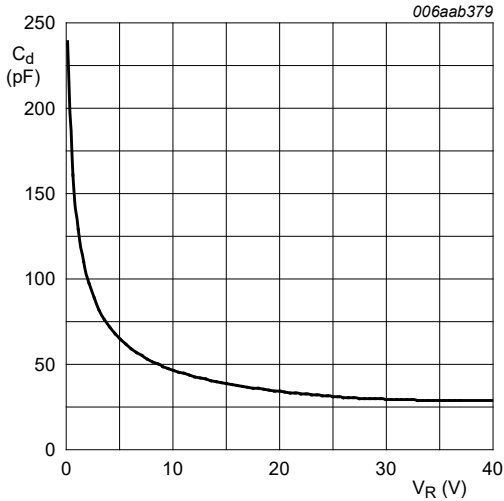


## 10. Characteristics

Table 7. Characteristics

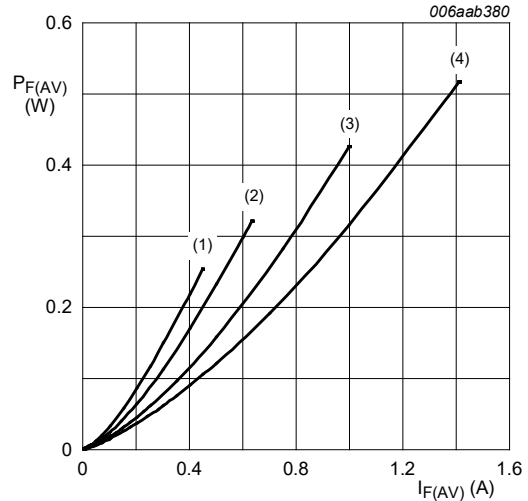
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 0.1$ A; $T_j = 25$ °C	-	310	360	mV
		$I_F = 1$ A; $T_j = 25$ °C	-	430	490	mV
$I_R$	reverse current	$V_R = 10$ V; $T_j = 25$ °C	-	3	13	μA
		$V_R = 40$ V; $T_j = 25$ °C	-	10	50	μA
$C_d$	diode capacitance	$V_R = 1$ V; $f = 1$ MHz; $T_j = 25$ °C	-	130	-	pF
		$V_R = 10$ V; $f = 1$ MHz; $T_j = 25$ °C	-	50	-	pF





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

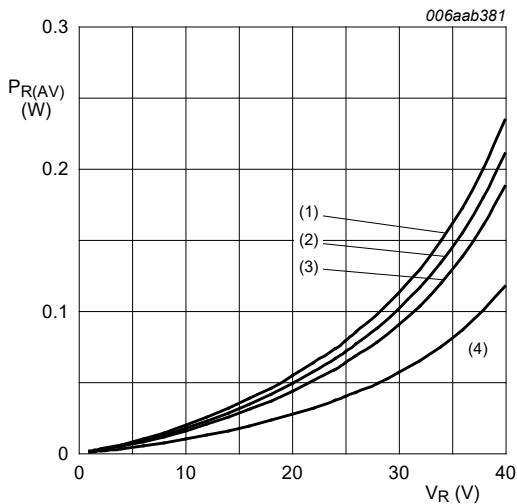
**Fig. 6. Diode capacitance as a function of reverse voltage; typical values**



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

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

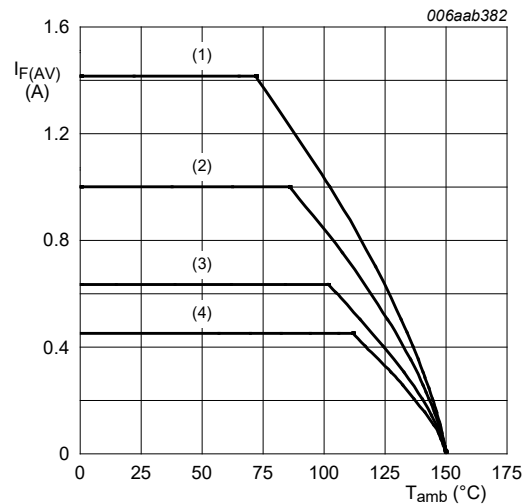
**Fig. 7. Average forward power dissipation as a function of average forward current; typical values**



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

- (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**

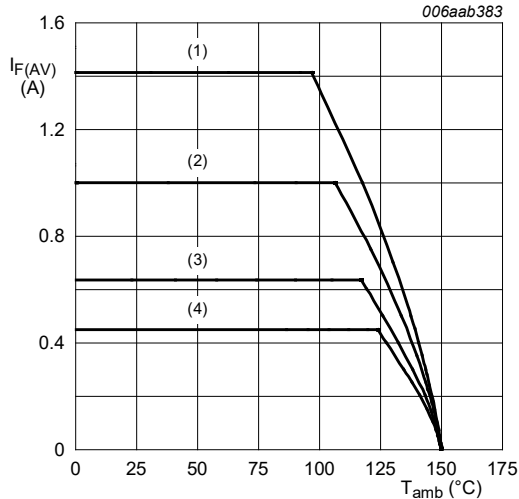


FR4 PCB, standard footprint

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

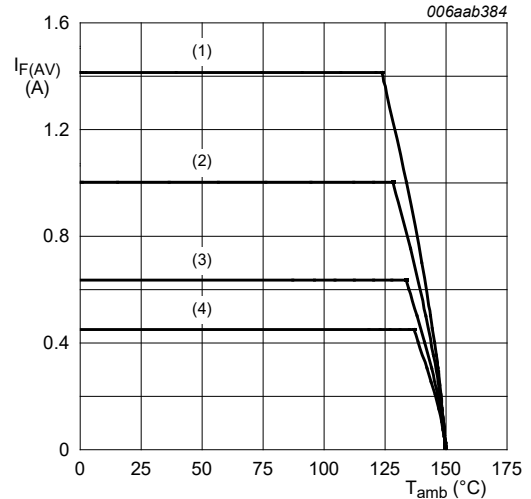
- (1)  $\delta = 1; \text{DC}$
- (2)  $\delta = 0.5; f = 20\text{kHz}$
- (3)  $\delta = 0.2; f = 20\text{kHz}$
- (4)  $\delta = 0.1; f = 20\text{kHz}$

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



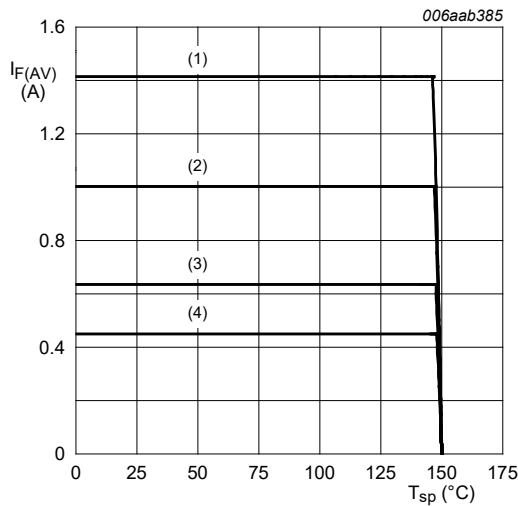
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 $T_j = 150\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{kHz}$

**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

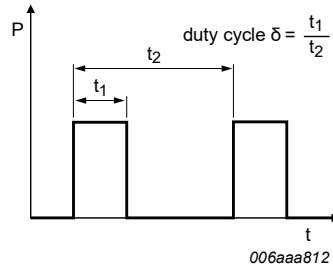


Fig. 13. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

$$I_{F(AV)} = I_M \times \delta \text{ with } I_M \text{ defined as peak current}$$

$$I_{RMS} = I_{F(AV)} \text{ at DC}$$

$$I_{RMS} = I_M \times \sqrt{\delta} \text{ with } I_{RMS} \text{ defined as RMS current}$$

## 12. Package outline

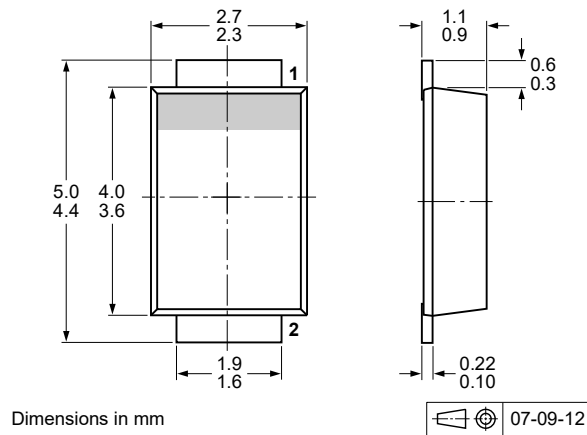


Fig. 14. Package outline CFP5 (SOD128)

### 13. Soldering

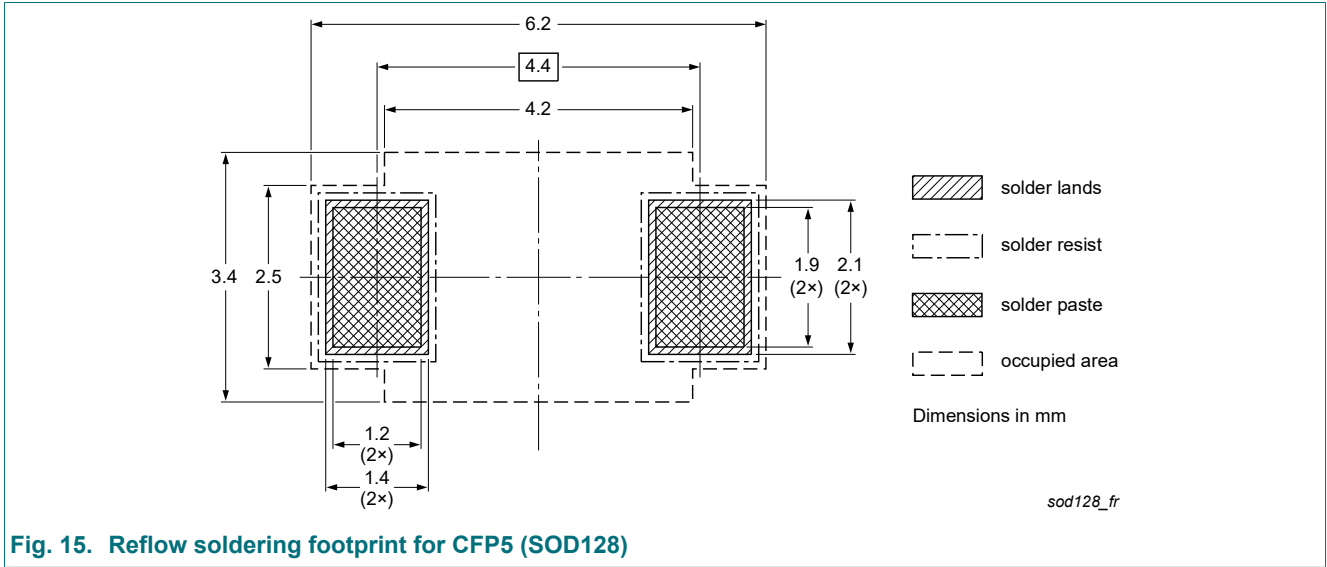
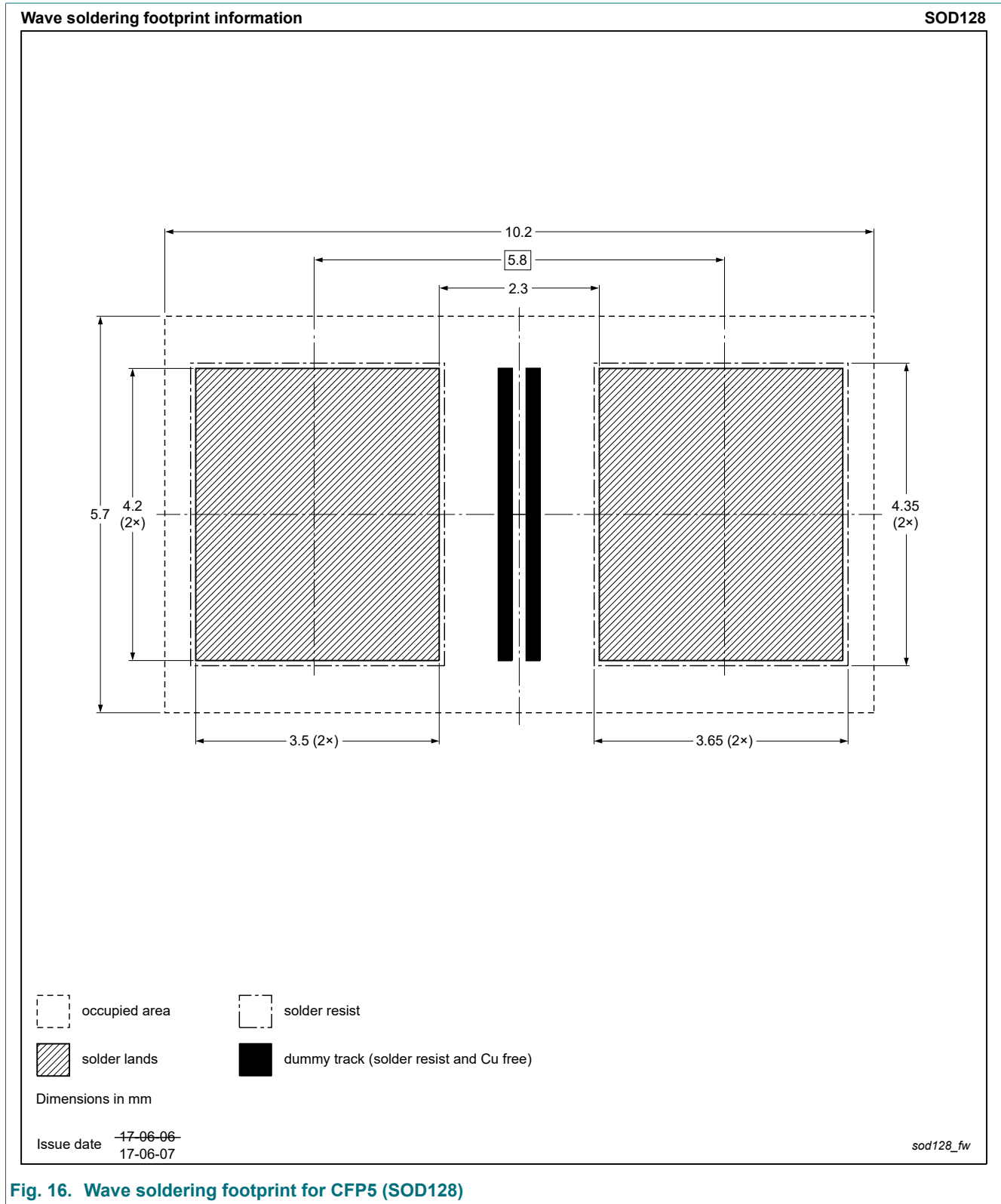


Fig. 15. Reflow soldering footprint for CFP5 (SOD128)





**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
PMEG4010EP v.5	20230220	Product data sheet	-	PMEG4010EP v.4
Modifications:	• Limiting values: Measurement conditions for $I_{FSM}$ changed from square wave to half-sine wave.			
PMEG4010EP v.4	20230101	Product data sheet	-	PMEG4010EP v.3
PMEG4010EP v.3	20190228	Product data sheet	-	PMEG4010EP_2
PMEG4010EP_2	20100415	Product data sheet	-	PMEG4010EP_1
PMEG4010EP_1	20081209	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 20 February 2023

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