



# PMEG10030ELP-Q

100 V, 3 A low leakage current 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

- Extremely low leakage current  $I_R = 110$  nA
- Reverse voltage:  $V_R \leq 100$  V
- Average forward current:  $I_{F(AV)} \leq 3$  A
- High power capability due to clip-bonding technology
- High temperature  $T_j \leq 175$  °C
- Small and flat lead SMD plastic package
- 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
- 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; $T_{sp} \leq 160$ °C	-	-	3	A
$V_R$	reverse voltage	$T_j = 25$ °C	-	-	100	V
$V_F$	forward voltage	$I_F = 3$ A; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C	-	710	770	mV
$I_R$	reverse current	$V_R = 100$ V; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C	-	110	450	nA

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 CFP5 (SOD128)	 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="#">PMEG10030ELP-Q</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
PMEG10030ELP-Q	DJ

## 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	$\delta = 1; T_{sp} = 155\text{ °C}$		-	4.2	A
$I_{F(AV)}$	average forward current	$\delta = 0.5; f = 20\text{ kHz};$ square wave; $T_{amb} \leq 55\text{ °C}$	[1]	-	3	A
		$\delta = 0.5; f = 20\text{ kHz};$ square wave; $T_{sp} \leq 160\text{ °C}$		-	3	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8.3\text{ ms};$ half-sine wave; $T_{j(init)} = 25\text{ °C}$		-	70	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 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
			[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 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.

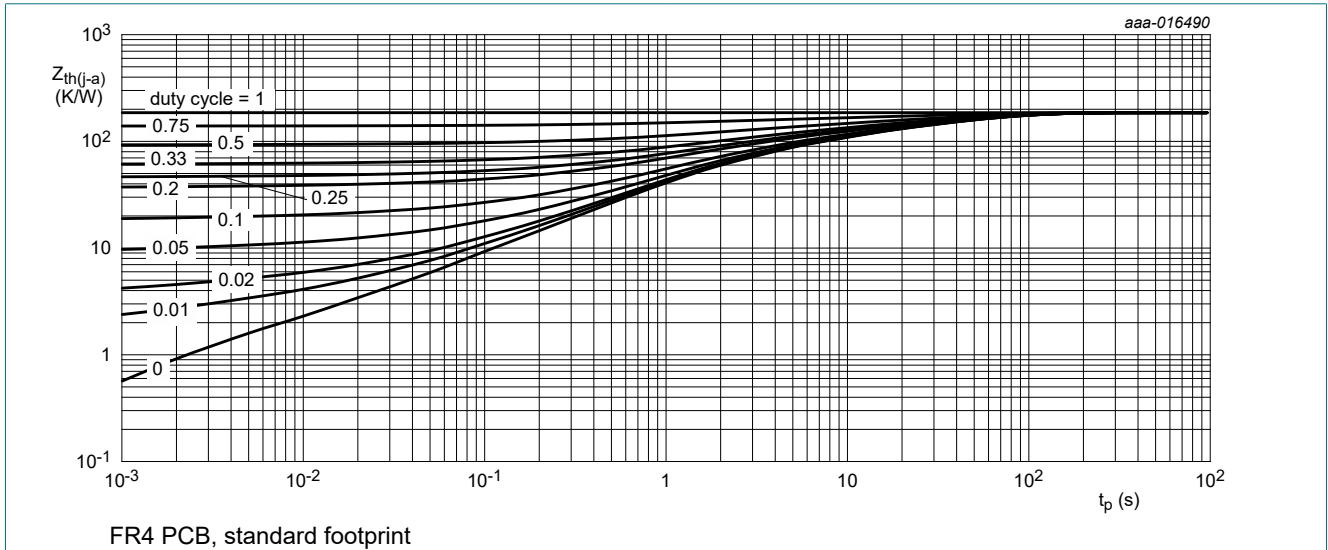


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

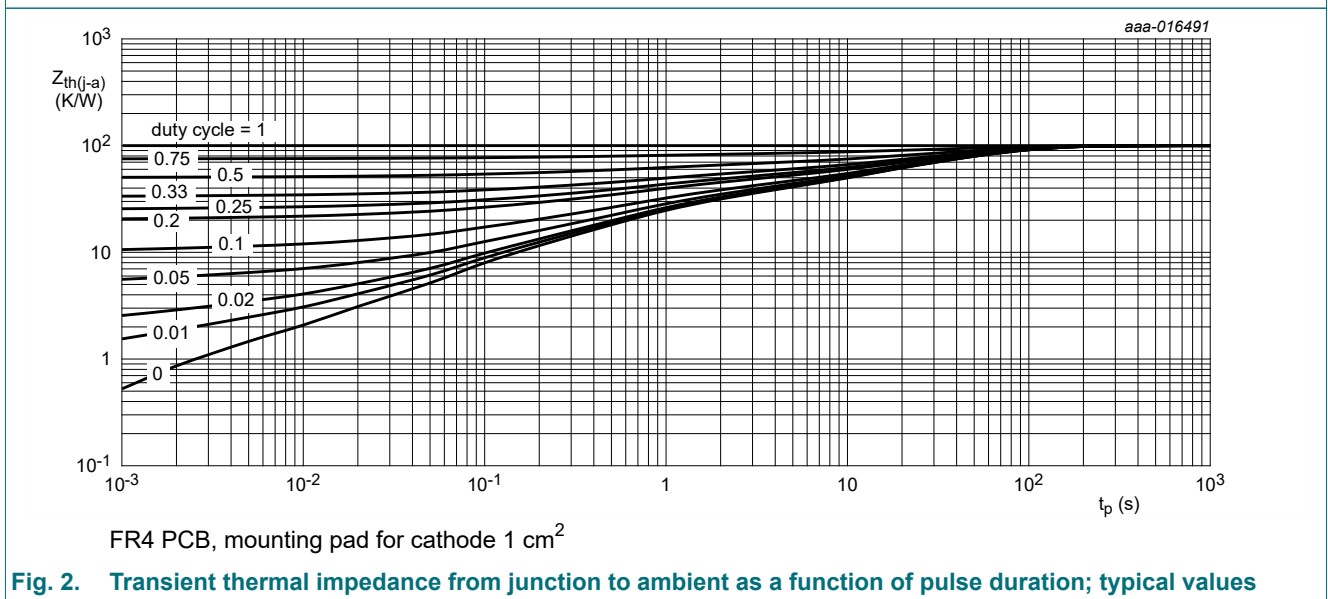
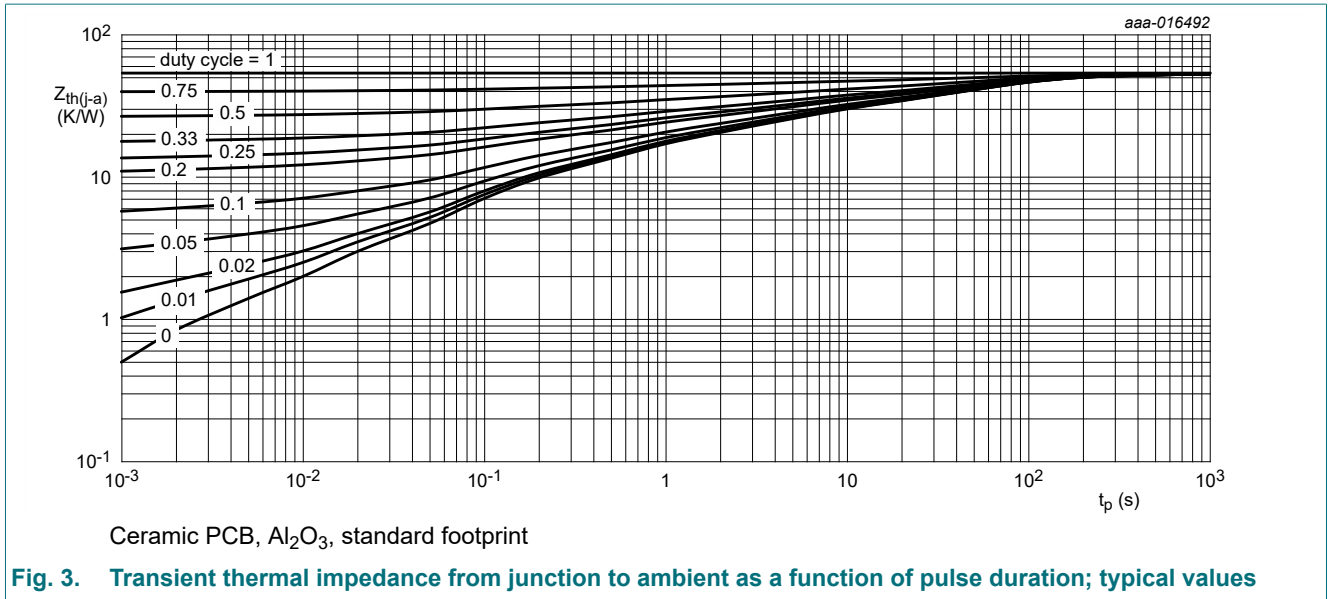


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

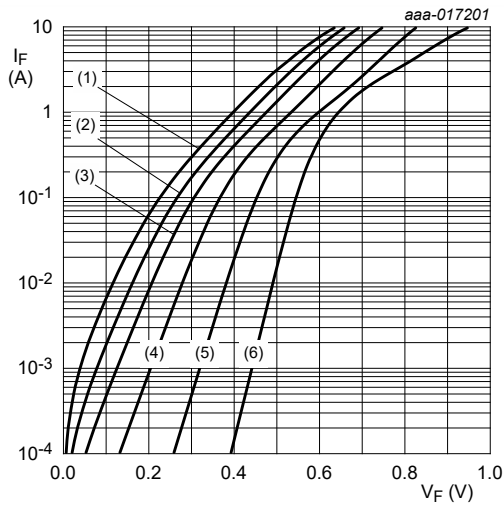


## 10. Characteristics

Table 7. Characteristics

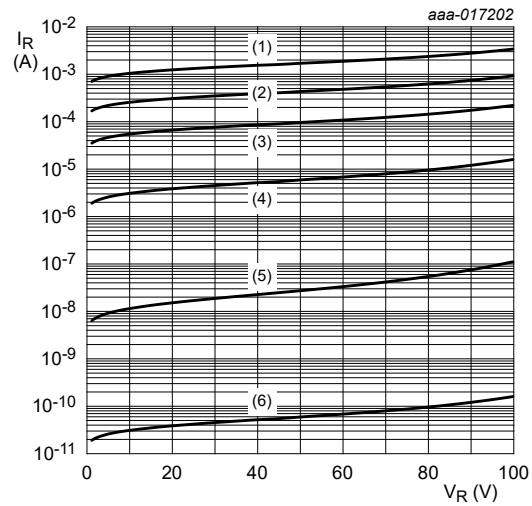
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 1 \text{ mA}; t_p = 300 \text{ }\mu\text{s}; \delta = 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	100	-	-	V
$V_F$	forward voltage	$I_F = 0.1 \text{ A}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	455	510	mV
		$I_F = 0.5 \text{ A}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	535	605	mV
		$I_F = 0.7 \text{ A}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	565	640	mV
		$I_F = 1 \text{ A}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	600	670	mV
		$I_F = 1.6 \text{ A}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	645	720	mV
		$I_F = 2 \text{ A}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	670	740	mV
		$I_F = 3 \text{ A}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	710	770	mV
		$I_F = 3 \text{ A}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 125 \text{ }^\circ\text{C}$	-	575	680	mV
$I_R$	reverse current	$V_R = 10 \text{ V}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	15	-	nA
		$V_R = 60 \text{ V}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	35	-	nA
		$V_R = 100 \text{ V}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	110	450	nA
		$V_R = 100 \text{ V}; t_p \leq 300 \text{ }\mu\text{s}; \delta \leq 0.02;$ $T_j = 125 \text{ }^\circ\text{C}$	-	220	1500	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	200	-	pF
		$V_R = 4 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	120	-	pF
		$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	78	-	pF

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{rr}$	reverse recovery time	$I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	8	-	ns
$V_{FRM}$	peak forward recovery voltage	$I_F = 0.5 \text{ A}$ ; $dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	580	-	mV



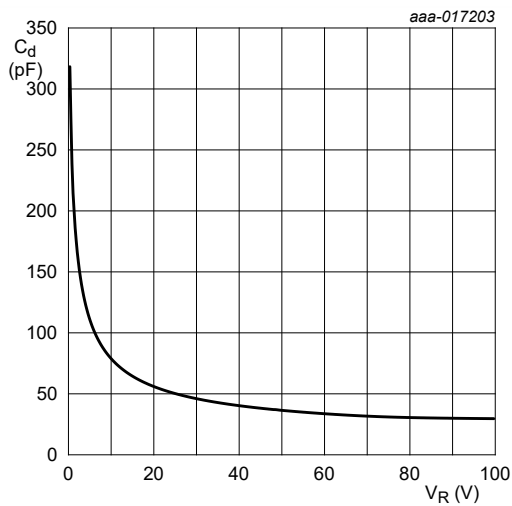
- (1)  $T_j = 175 \text{ }^\circ\text{C}$
- (2)  $T_j = 150 \text{ }^\circ\text{C}$
- (3)  $T_j = 125 \text{ }^\circ\text{C}$
- (4)  $T_j = 85 \text{ }^\circ\text{C}$
- (5)  $T_j = 25 \text{ }^\circ\text{C}$
- (6)  $T_j = -40 \text{ }^\circ\text{C}$

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



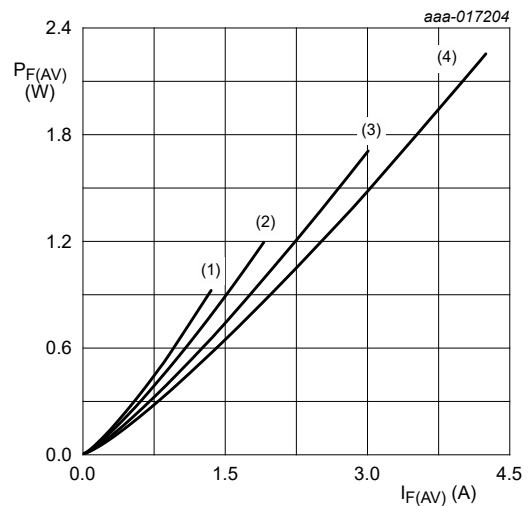
- (1)  $T_j = 175 \text{ }^\circ\text{C}$
- (2)  $T_j = 150 \text{ }^\circ\text{C}$
- (3)  $T_j = 125 \text{ }^\circ\text{C}$
- (4)  $T_j = 85 \text{ }^\circ\text{C}$
- (5)  $T_j = 25 \text{ }^\circ\text{C}$
- (6)  $T_j = -40 \text{ }^\circ\text{C}$

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



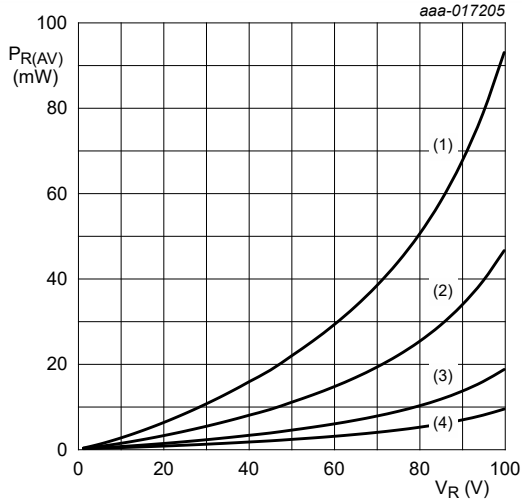
$f = 1 \text{ MHz}$ ;  $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$

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



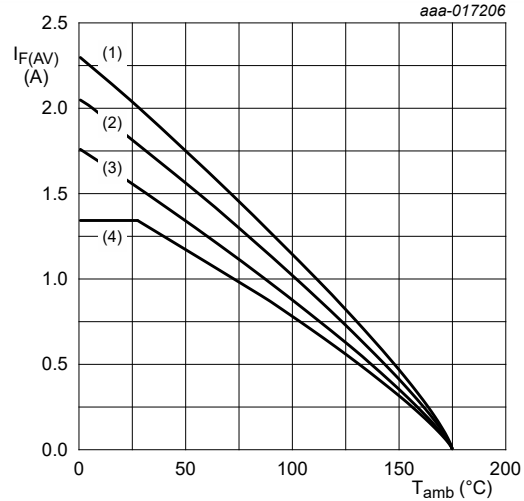
- $T_j = 175 \text{ }^\circ\text{C}$
- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$

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



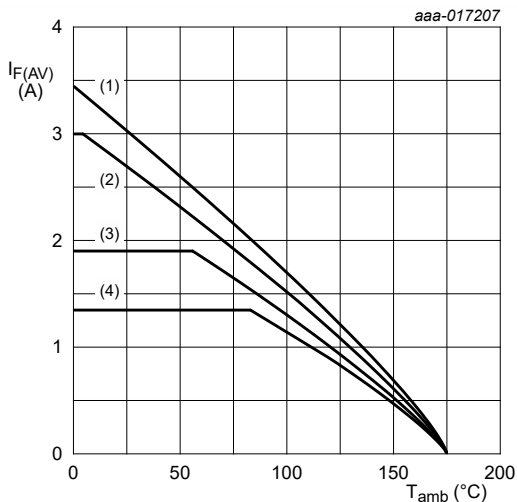
$T_j = 150\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$  (DC)  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



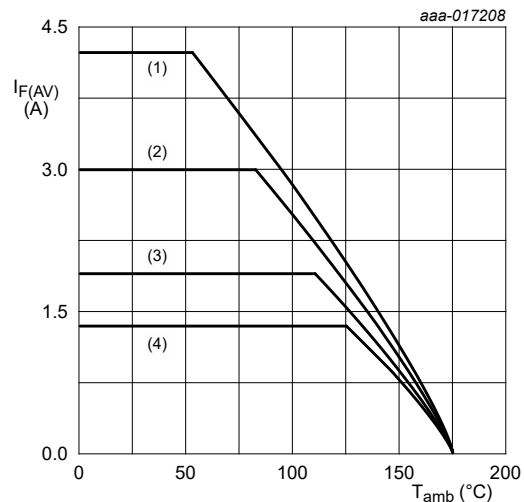
FR4 PCB, standard footprint  
 $T_j = 175\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



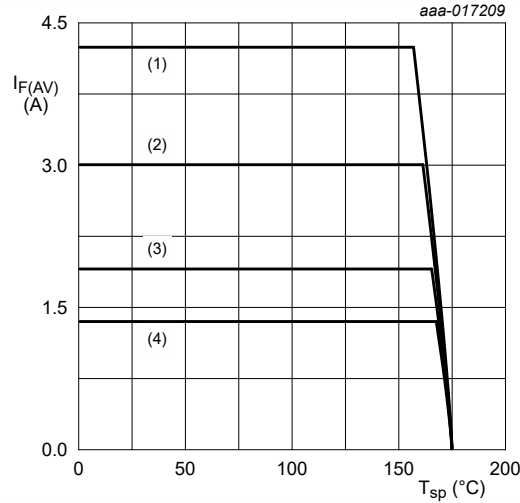
FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$   
 $T_j = 175\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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

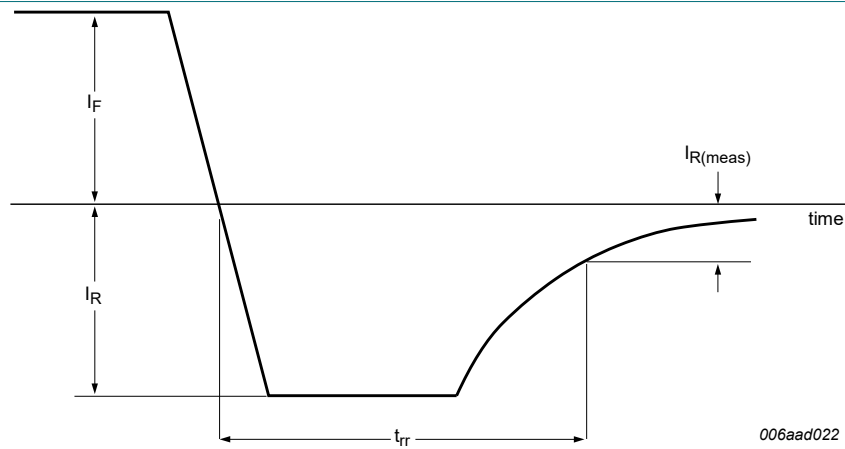


Fig. 13. Reverse recovery definition

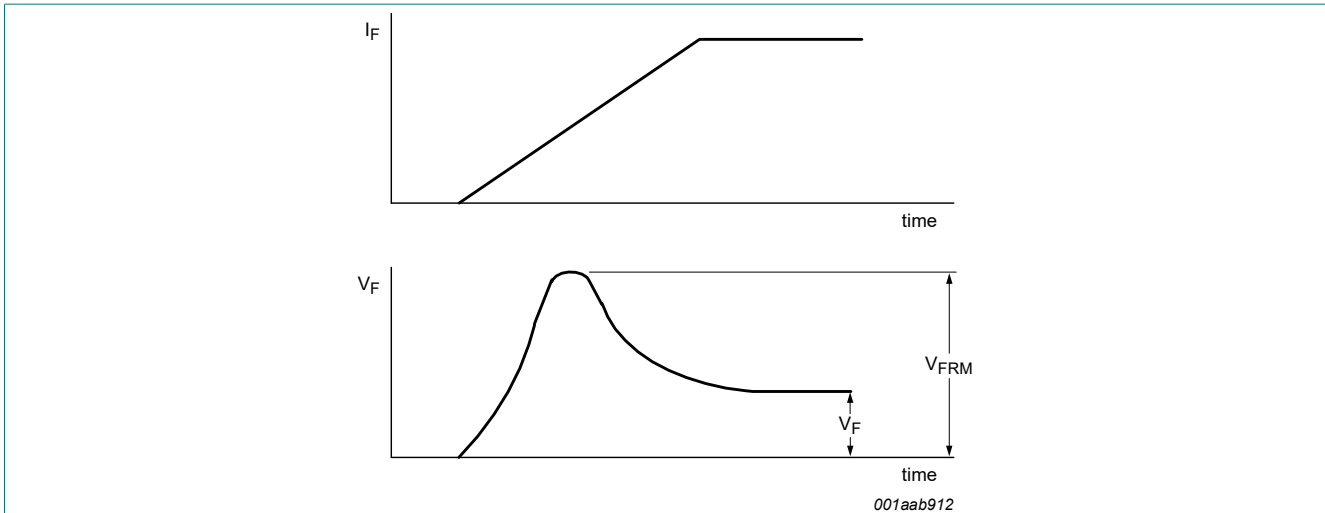


Fig. 14. Forward recovery definition

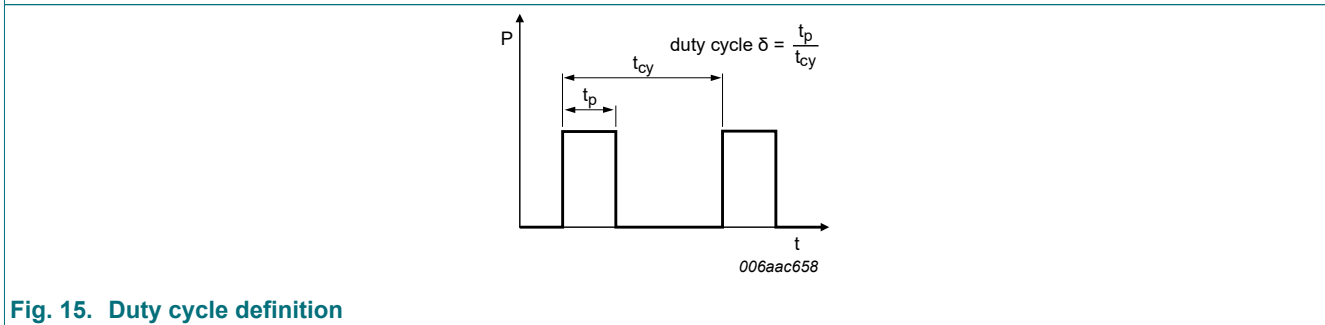


Fig. 15. Duty cycle definition

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

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

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

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

### 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

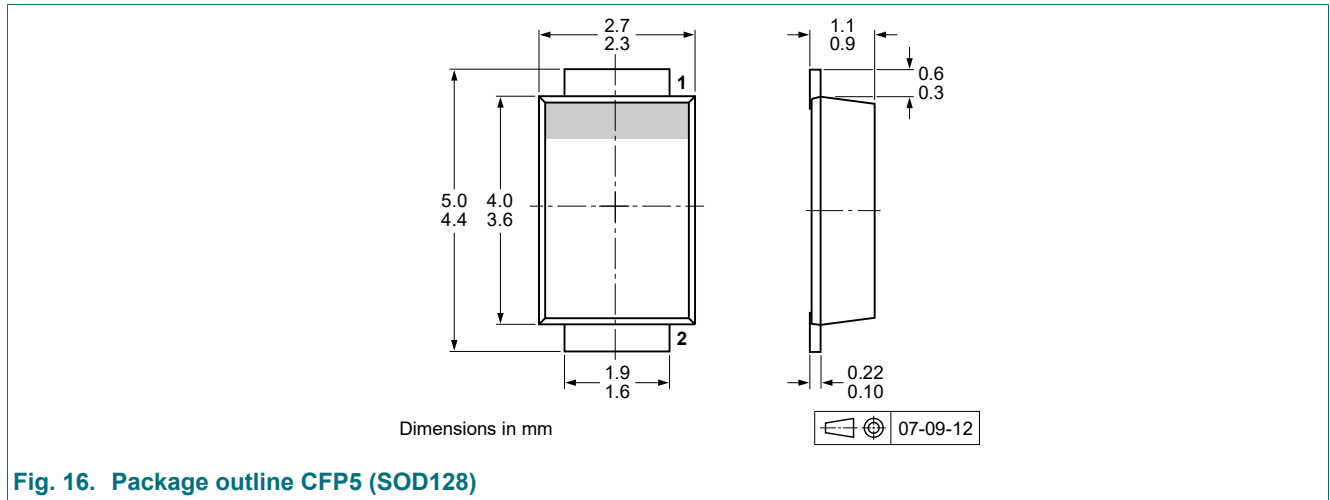


Fig. 16. Package outline CFP5 (SOD128)

## 13. Soldering

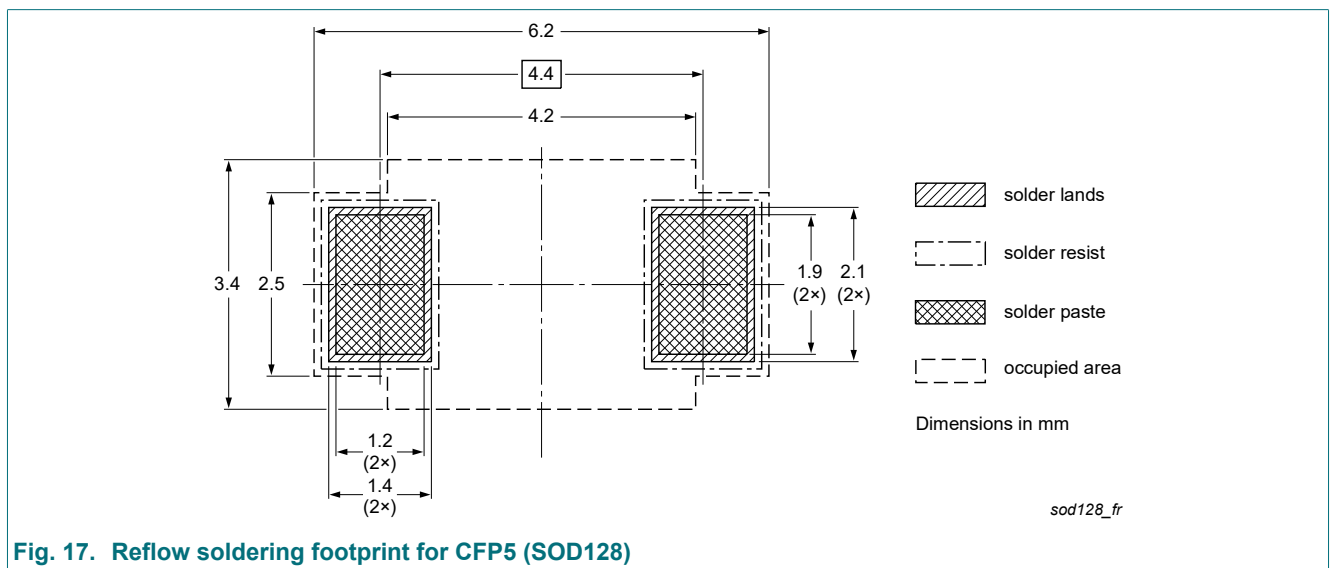
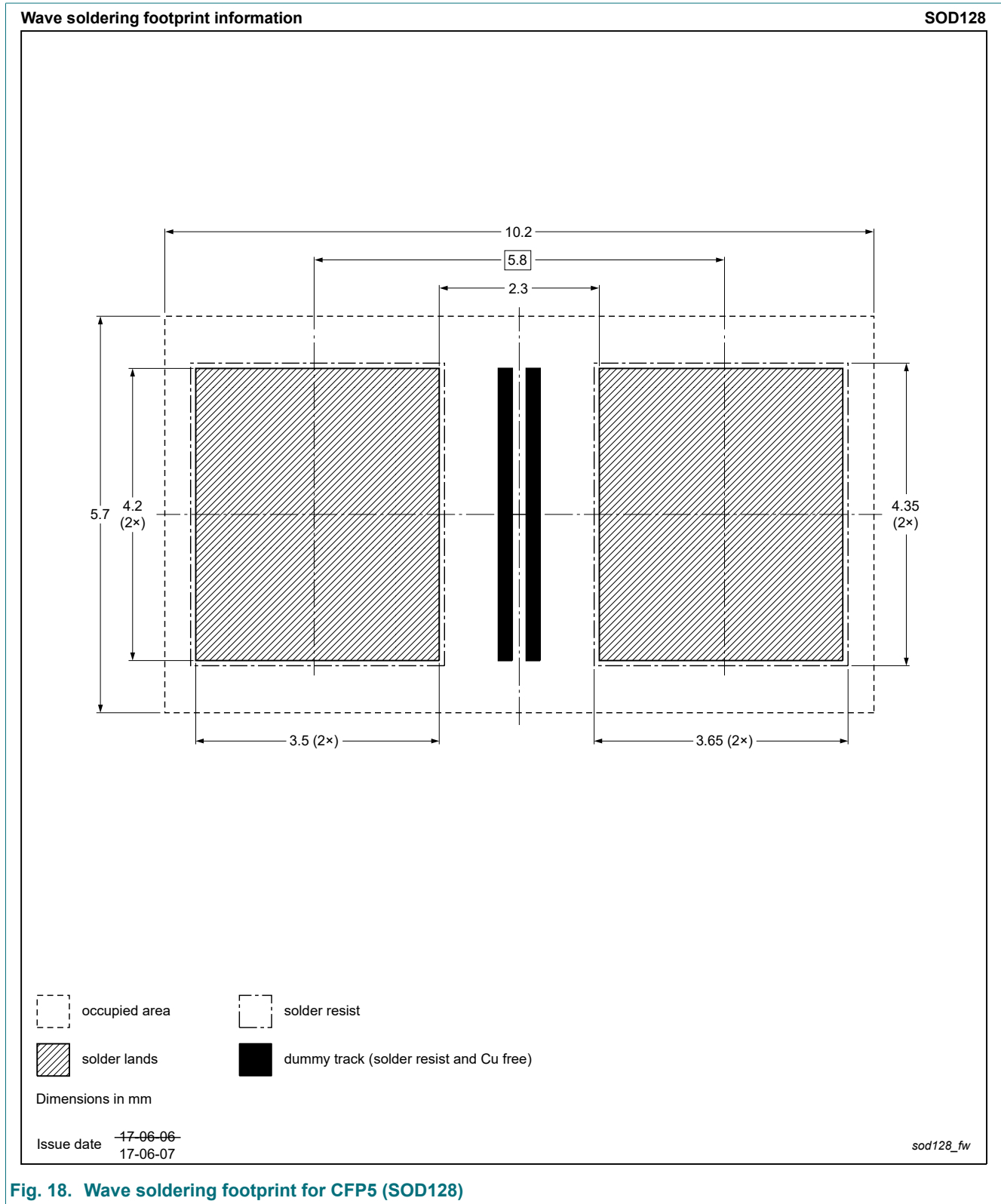


Fig. 17. Reflow soldering footprint for CFP5 (SOD128)



**Fig. 18. Wave soldering footprint for CFP5 (SOD128)**

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG10030ELP-Q v.2	20230220	Product data sheet	-	PMEG10030ELP-Q v.1
Modifications:	<ul style="list-style-type: none"><li>Limiting values: Measurement conditions for <math>I_{FSM}</math> changed from square wave to half-sine wave.</li></ul>			
PMEG10030ELP-Q v.1	20210722	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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## Contents

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1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	2
9. Thermal characteristics.....	3
10. Characteristics.....	4
11. Test information.....	7
12. Package outline.....	9
13. Soldering.....	9
14. Revision history.....	11
15. Legal information.....	12

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