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# PMEG60T20ELP

60 V, 2 A low leakage current Trench MEGA Schottky barrier rectifier

24 May 2018

Product data sheet

## 1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier encapsulated in a CFP5 (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:  $V_R \leq 60$  V
- Low forward voltage
- Low leakage current due to Trench MEGA Schottky technology
- High power capability due to clip-bonding technology
- Small and flat lead SMD power plastic package
- Capable for reflow and wave soldering
- AEC-Q101 qualified

## 3. Applications

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

## 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; $T_{sp} \leq 159$ °C; square wave		-	-	2	A
$V_R$	reverse voltage	$T_j = 25$ °C		-	-	60	V
$V_F$	forward voltage	$I_F = 2$ A; pulsed; $T_j = 25$ °C	[1]	-	550	620	mV
$I_R$	reverse current	$V_R = 10$ V; pulsed; $T_j = 25$ °C	[1]	-	0.08	0.6	$\mu$ A
		$V_R = 60$ V; pulsed; $T_j = 25$ °C	[1]	-	0.2	1.2	$\mu$ A

[1] Very short pulse, in order to maintain a stable junction temperature.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 CFP5 (SOD128)	 sym001
2	A	anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG60T20ELP	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
PMEG60T20ELP	E1

## 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	$T_j = 25\text{ °C}$		-	60	V
$I_F$	forward current	$\delta = 1; T_{sp} \leq 154\text{ °C}$		-	2.8	A
$I_{F(AV)}$	average forward current	$\delta = 0.5; f = 20\text{ kHz}; T_{sp} \leq 159\text{ °C};$ square wave		-	2	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8\text{ ms};$ square wave; $T_{j(\text{init})} = 25\text{ °C}$		-	40	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	0.75	W
			[2]	-	1.2	W
$T_j$	junction temperature			-	175	°C
$T_{amb}$	ambient temperature			-55	175	°C
$T_{stg}$	storage temperature			-65	175	°C

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

[2] 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
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	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] Soldering point of cathode tab.

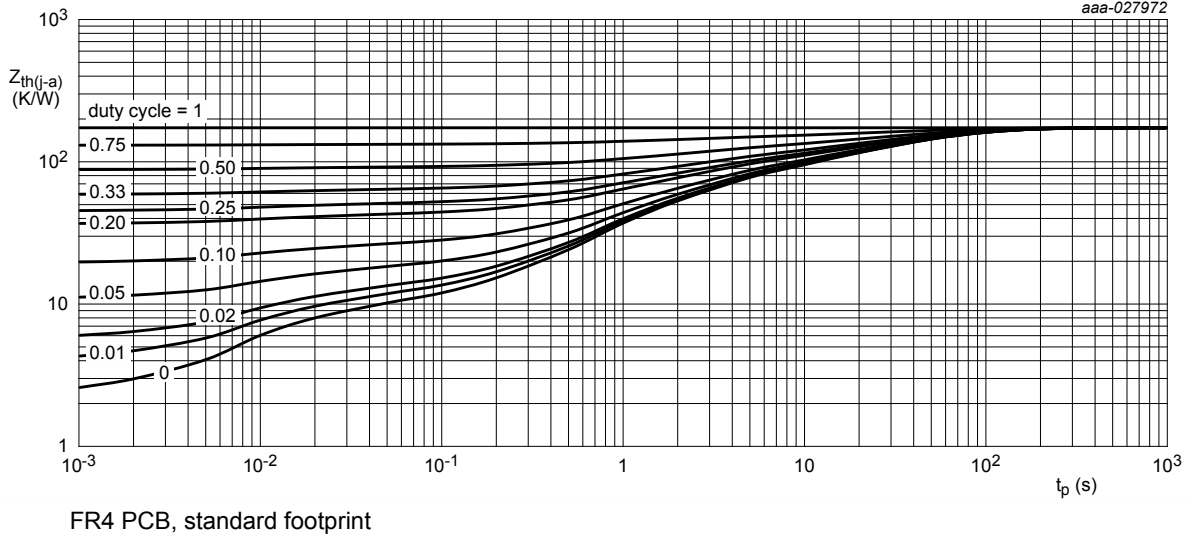


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

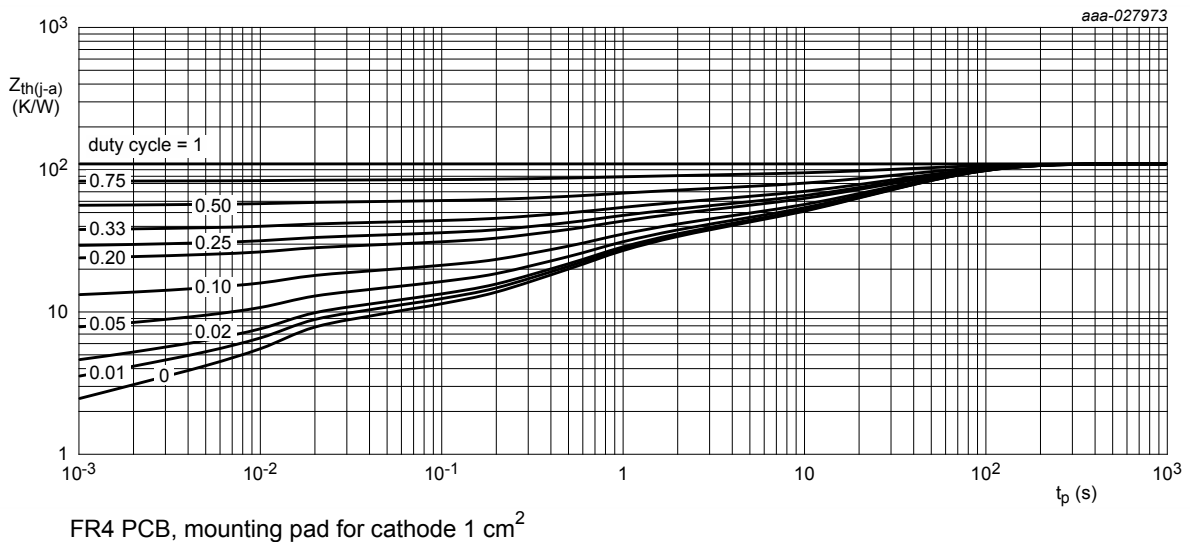


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

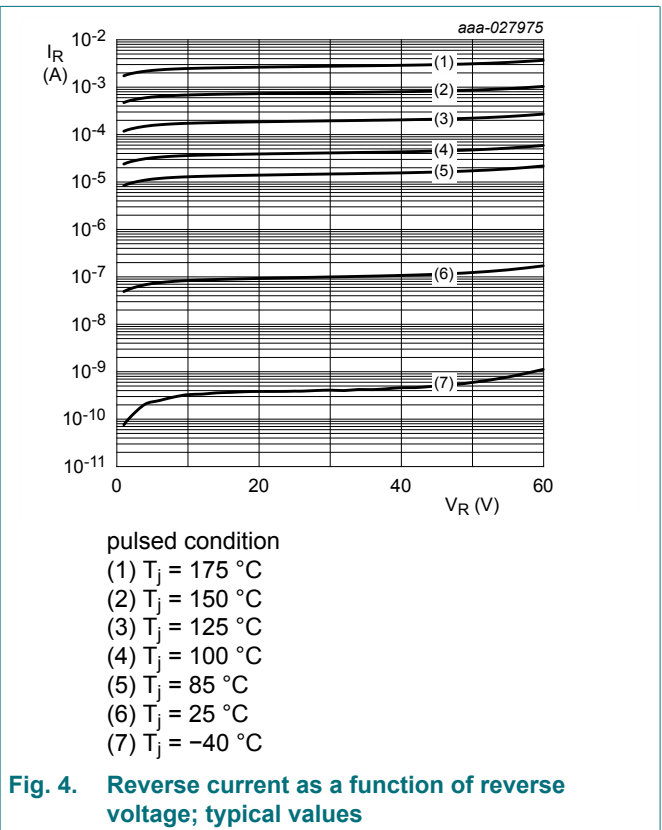
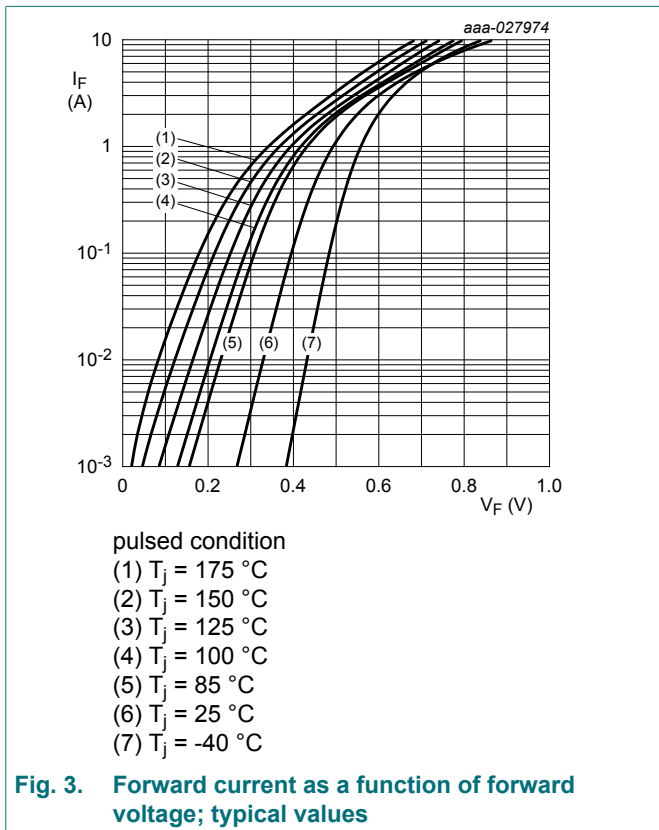
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 1 \text{ mA}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	[1]	60	-	-	V

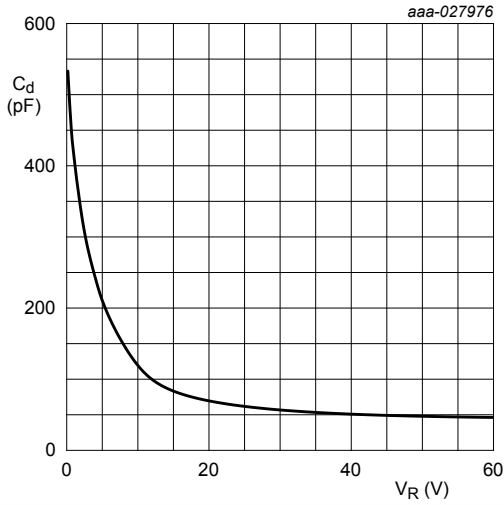
60 V, 2 A low leakage current Trench MEGA Schottky barrier rectifier

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 0.1 A; pulsed; T <sub>j</sub> = 25 °C	[1]	-	400	460	mV
		I <sub>F</sub> = 0.5 A; pulsed; T <sub>j</sub> = 25 °C	[1]	-	460	520	mV
		I <sub>F</sub> = 1 A; pulsed; T <sub>j</sub> = 25 °C	[1]	-	495	560	mV
		I <sub>F</sub> = 2 A; pulsed; T <sub>j</sub> = 25 °C	[1]	-	550	620	mV
		I <sub>F</sub> = 2 A; pulsed; T <sub>j</sub> = -40 °C	[1]	-	605	-	mV
		I <sub>F</sub> = 2 A; pulsed; T <sub>j</sub> = 125 °C	[1]	-	475	-	mV
I <sub>R</sub>	reverse current	V <sub>R</sub> = 10 V; pulsed; T <sub>j</sub> = 25 °C	[1]	-	0.08	0.6	μA
		V <sub>R</sub> = 40 V; pulsed; T <sub>j</sub> = 25 °C	[1]	-	0.12	-	μA
		V <sub>R</sub> = 60 V; pulsed; T <sub>j</sub> = 25 °C	[1]	-	0.2	1.2	μA
		V <sub>R</sub> = 60 V; pulsed; T <sub>j</sub> = 125 °C	[1]	-	0.3	-	mA
C <sub>d</sub>	diode capacitance	V <sub>R</sub> = 1 V; f = 1 MHz; T <sub>j</sub> = 25 °C		-	400	-	pF
		V <sub>R</sub> = 10 V; f = 1 MHz; T <sub>j</sub> = 25 °C		-	120	-	pF
t <sub>rr</sub>	reverse recovery time step recovery	I <sub>F</sub> = 0.5 A; I <sub>R</sub> = 0.5 A; I <sub>R(meas)</sub> = 0.1 A; T <sub>j</sub> = 25 °C		-	11	-	ns
	reverse recovery time ramp recovery	dI <sub>F</sub> /dt = 200 A/μs; I <sub>F</sub> = 6 A; V <sub>R</sub> = 26 V; T <sub>j</sub> = 25 °C		-	14	-	ns
V <sub>FRM</sub>	peak forward recovery voltage	I <sub>F</sub> = 0.5 A; dI <sub>F</sub> /dt = 20 A/μs; T <sub>j</sub> = 25 °C		-	500	-	mV

[1] Very short pulse, in order to maintain a stable junction temperature.

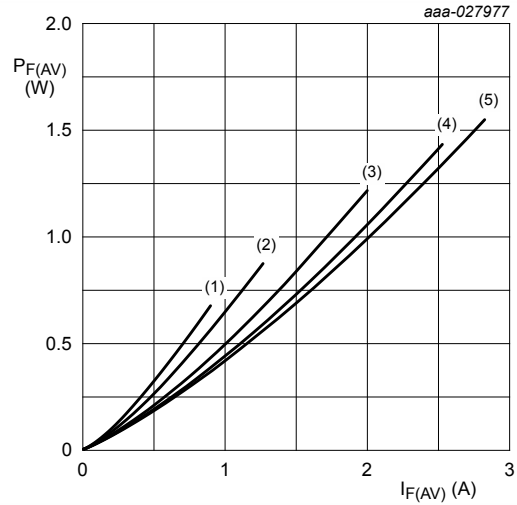


60 V, 2 A low leakage current Trench MEGA Schottky barrier rectifier



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

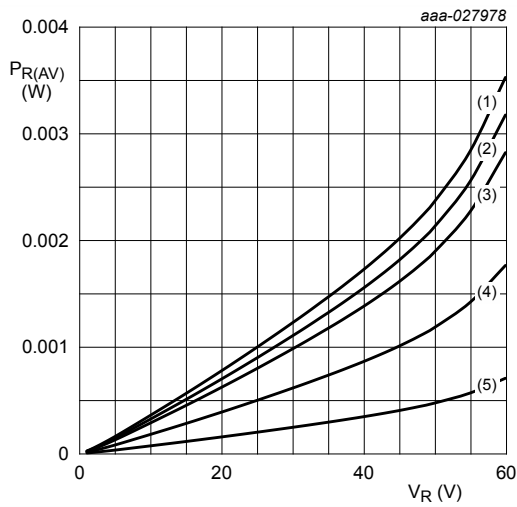
**Fig. 5. Diode capacitance as a function of reverse voltage; typical values**



$T_j = 100 \text{ }^\circ\text{C}$

- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 0.8$
- (5)  $\delta = 1$ ; DC

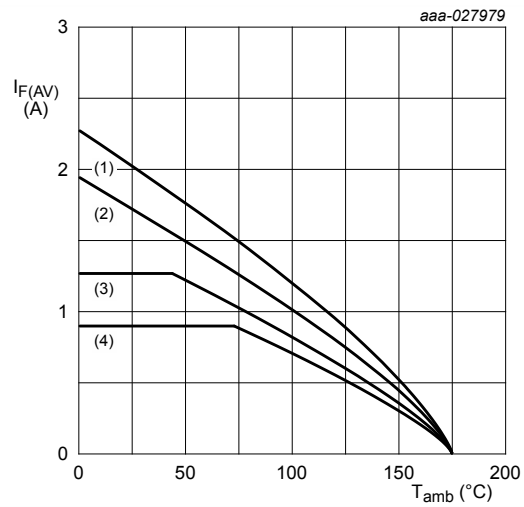
**Fig. 6. Average forward power dissipation as a function of average forward current; typical values**



$T_j = 100 \text{ }^\circ\text{C}$

- (1)  $\delta = 1$ ; DC
- (2)  $\delta = 0.9$
- (3)  $\delta = 0.8$
- (4)  $\delta = 0.5$
- (5)  $\delta = 0.2$

**Fig. 7. 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. 8. Average forward current as a function of ambient temperature; typical values**

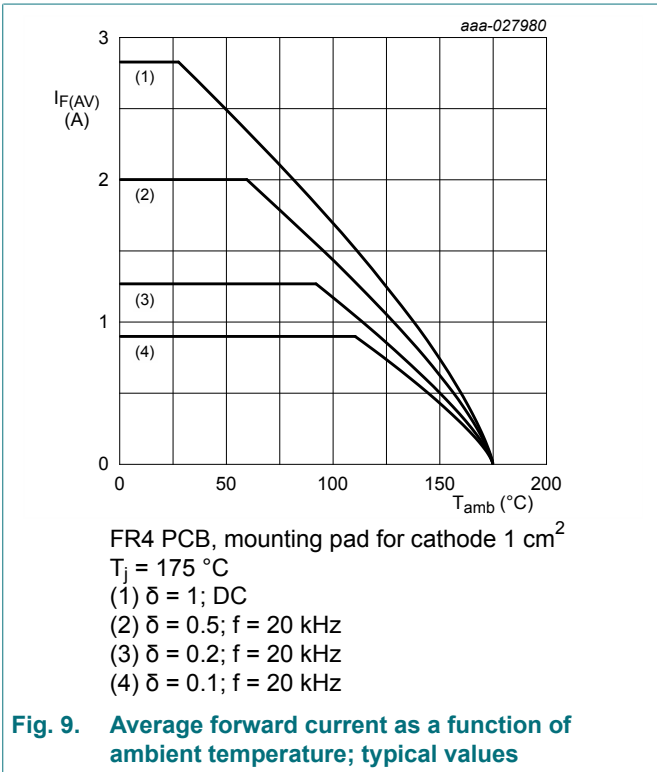


Fig. 9. Average forward current as a function of ambient temperature; typical values

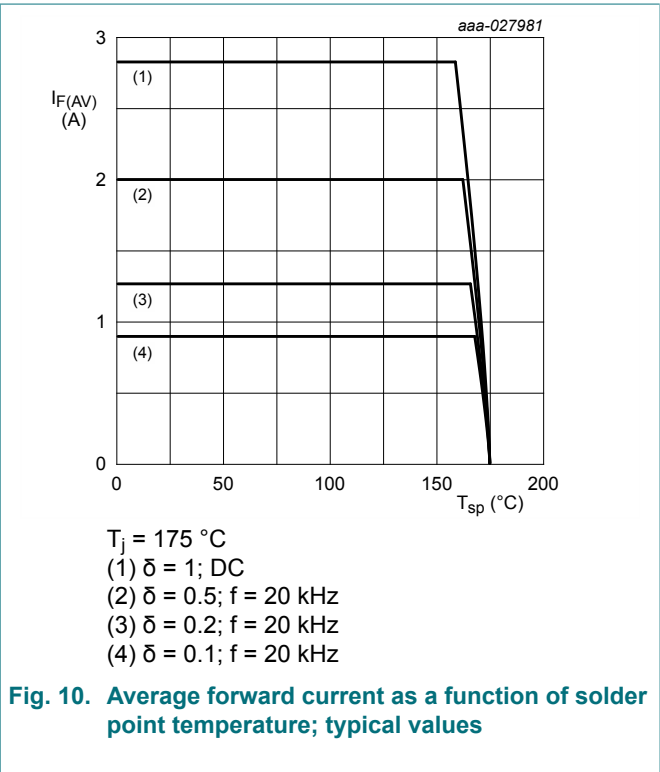


Fig. 10. Average forward current as a function of solder point temperature; typical values

## 11. Test information

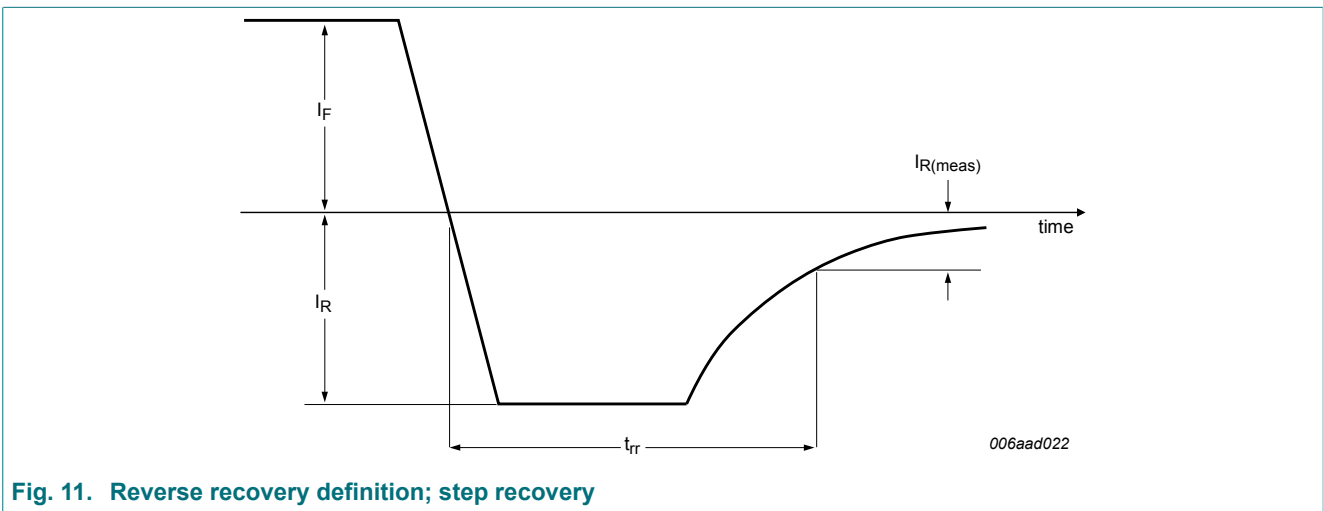


Fig. 11. Reverse recovery definition; step recovery



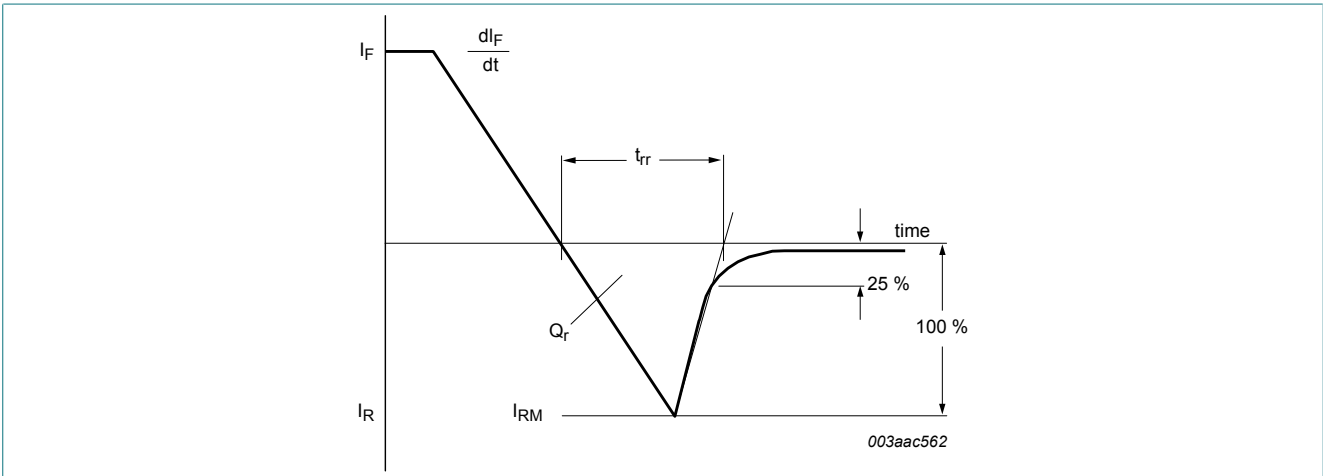


Fig. 12. Reverse recovery definition; ramp recovery

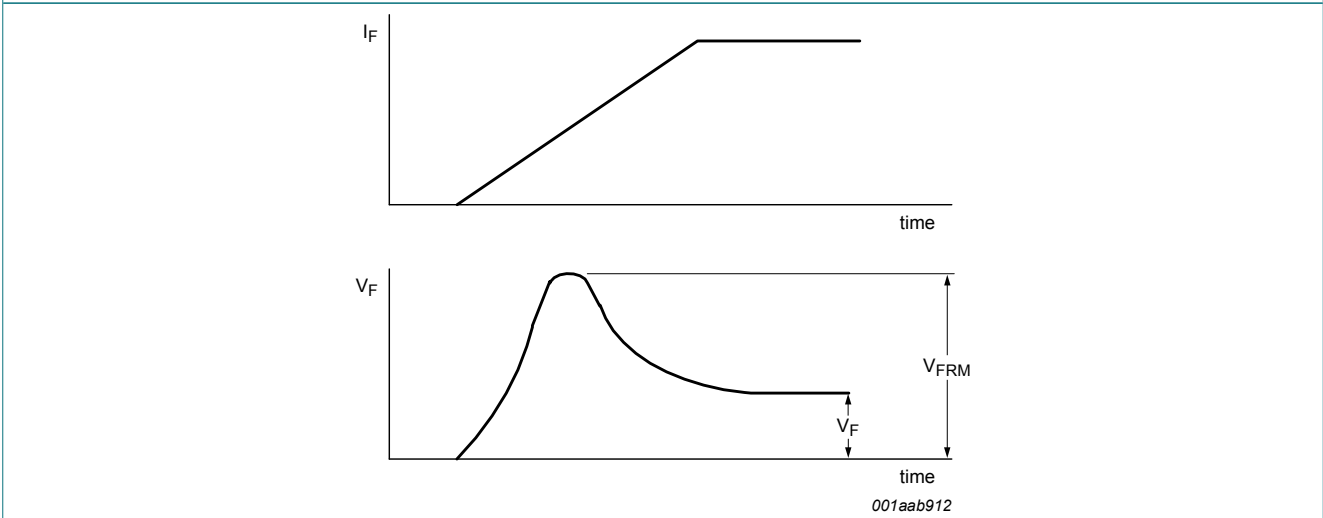


Fig. 13. Forward recovery definition

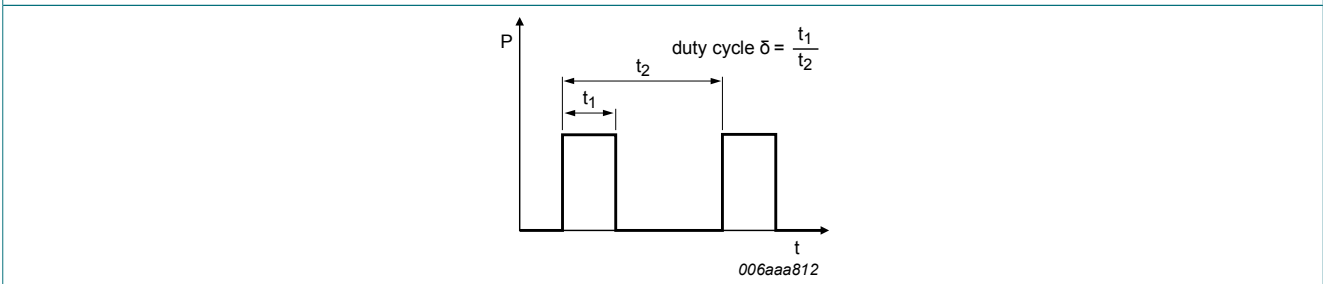


Fig. 14. Duty cycle definition

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

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

$$I_{RMS} = I_{F(AV)} \text{ at DC, and } I_{RMS} = I_M \times \sqrt{\delta}$$

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**

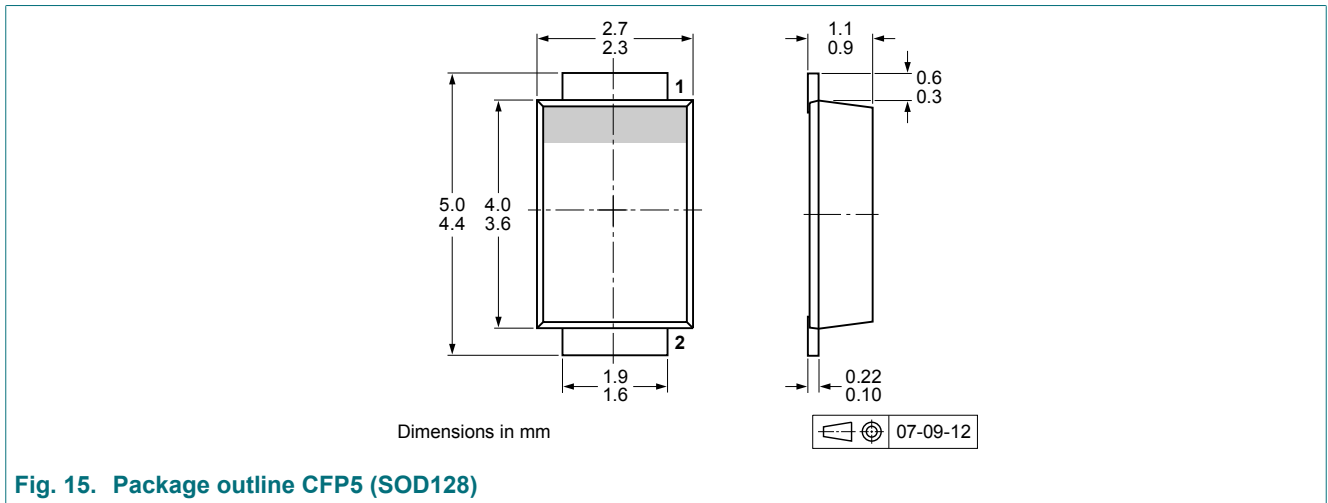


Fig. 15. Package outline CFP5 (SOD128)

**13. Soldering**

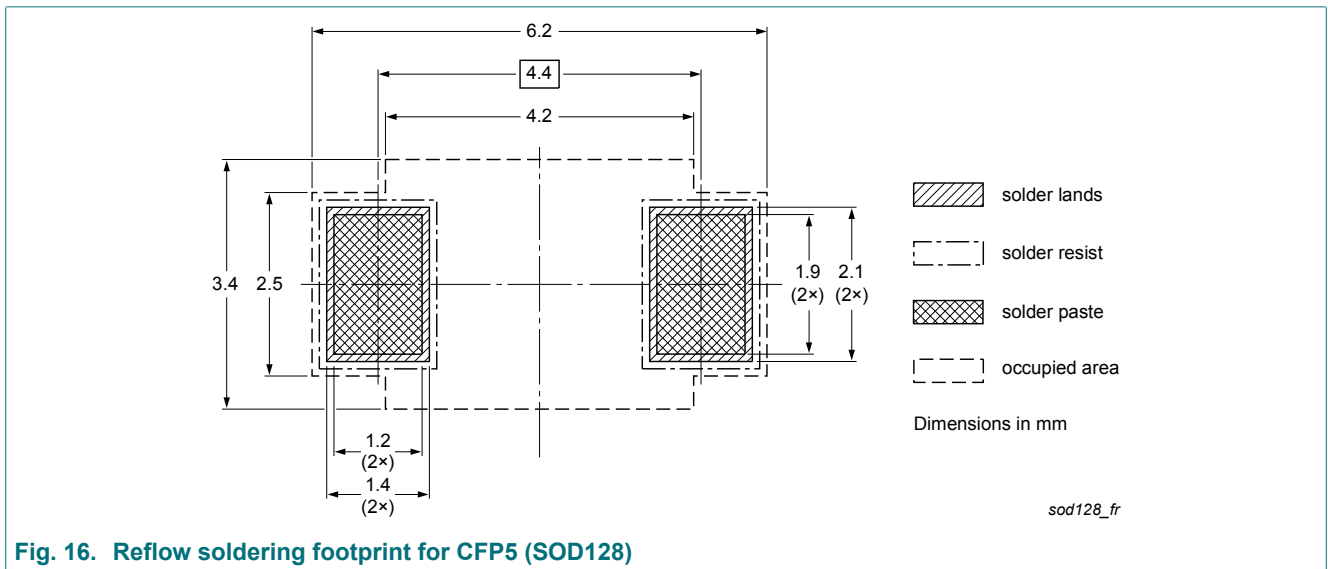
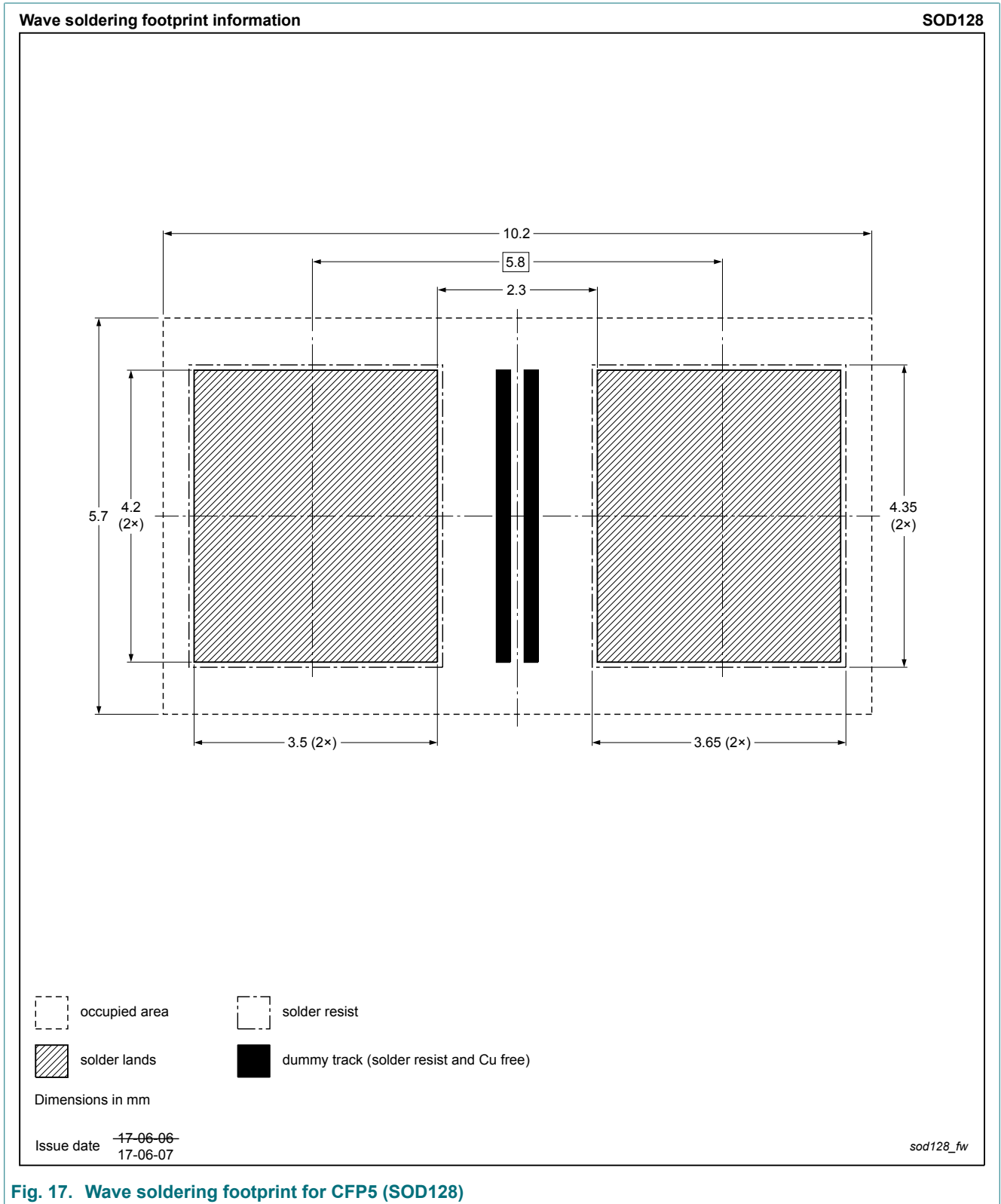


Fig. 16. Reflow soldering footprint for CFP5 (SOD128)



**Fig. 17. Wave soldering footprint for CFP5 (SOD128)**

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG60T20ELP v.2	20180524	Product data sheet	-	PMEG60T20ELP v.1
Modifications:	<ul style="list-style-type: none"><li>Product status changed</li></ul>			
PMEG60T20ELP v.1	20180227	Preliminary 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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