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Kind regards,

Team Nexperia



# PMEG6030ELP

60 V, 3 A low leakage current Schottky barrier rectifier

7 May 2015

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

- Extremely low leakage current  $I_R = 340 \text{ nA}$
- Average forward current:  $I_{F(AV)} \leq 3 \text{ A}$
- Reverse voltage:  $V_R \leq 60 \text{ V}$
- Low forward voltage  $V_F = 600 \text{ mV}$
- High power capability due to clip-bonding technology
- High temperature  $T_j \leq 175 \text{ °C}$
- Small and flat lead SMD plastic package
- AEC-Q101 qualified

## 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	$\delta = 0.5$ ; $f = 20 \text{ kHz}$ ; $T_{sp} \leq 155 \text{ °C}$ ; square wave	-	-	3	A
$V_R$	reverse voltage	$T_j = 25 \text{ °C}$	-	-	60	V
$V_F$	forward voltage	$I_F = 3 \text{ A}$ ; $t_p \leq 300 \text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ °C}$	-	600	670	mV
$I_R$	reverse current	$V_R = 60 \text{ V}$ ; $t_p \leq 300 \text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ °C}$	-	340	1000	nA



## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode <sup>[1]</sup>	 <p style="text-align: center;"><b>SOD128</b></p>	 <p style="text-align: center;"><i>sym001</i></p>
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG6030ELP	SOD128	plastic surface-mounted package; 2 leads	SOD128

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG6030ELP	DH

## 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	$T_{sp} = 150\text{ °C}; \delta = 1$		-	4.2	A
$I_{F(AV)}$	average forward current	$\delta = 0.5; f = 20\text{ kHz}; T_{amb} \leq 75\text{ °C};$ square wave	[1]	-	3	A
		$\delta = 0.5; f = 20\text{ kHz}; T_{sp} \leq 155\text{ °C};$ square wave		-	3	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8\text{ ms}; T_{j(init)} = 25\text{ °C};$ square wave		-	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  $1\text{ cm}^2$ .

## 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
			[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  $1\text{ cm}^2$ .

[4] Device mounted on a ceramic PCB,  $Al_2O_3$ , standard footprint.

[5] Soldering point of cathode tab.

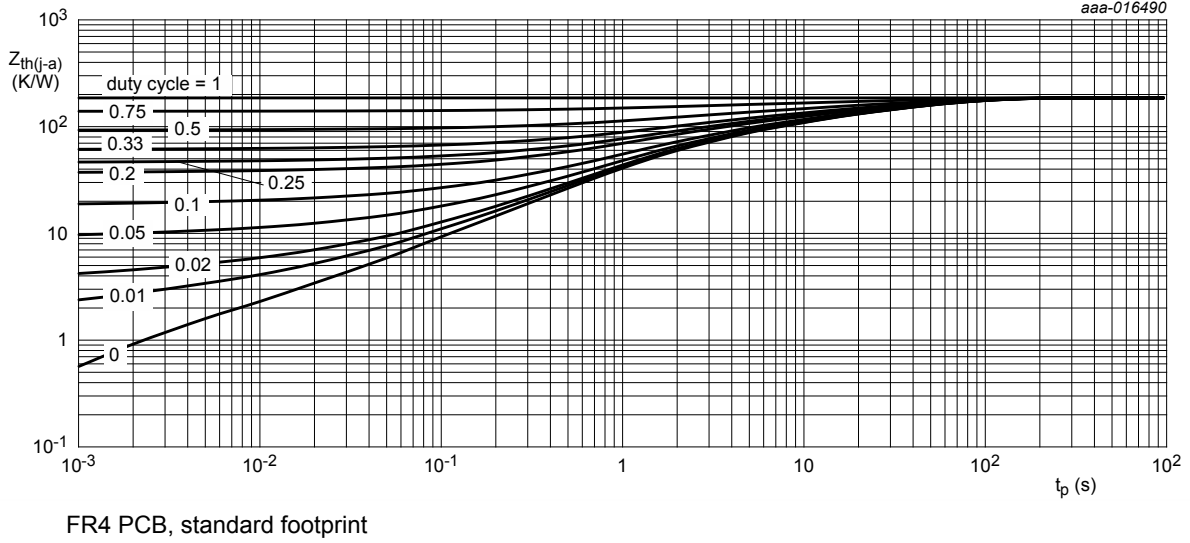


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

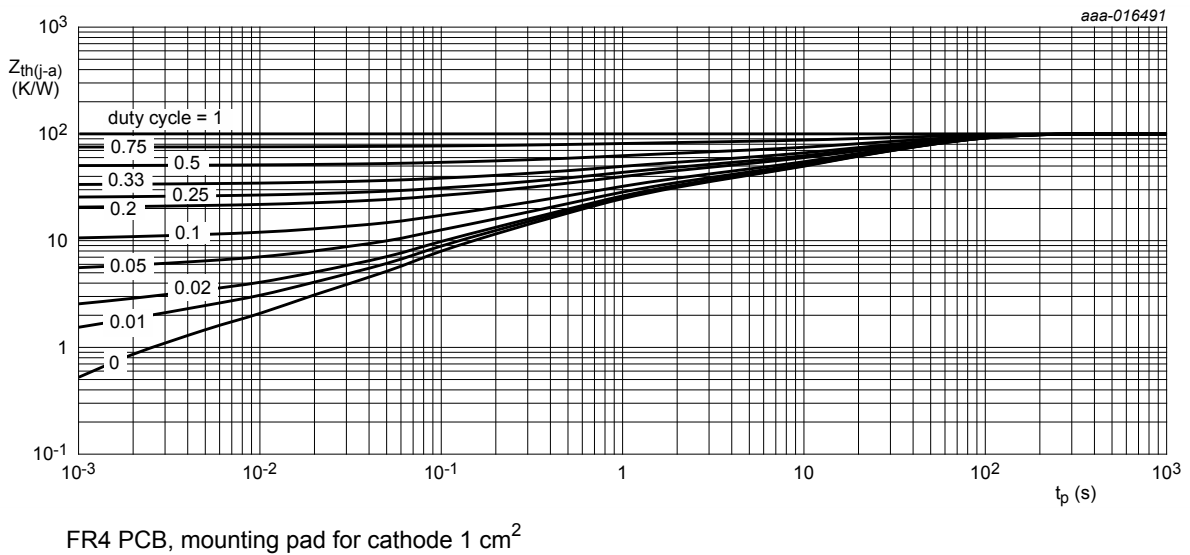
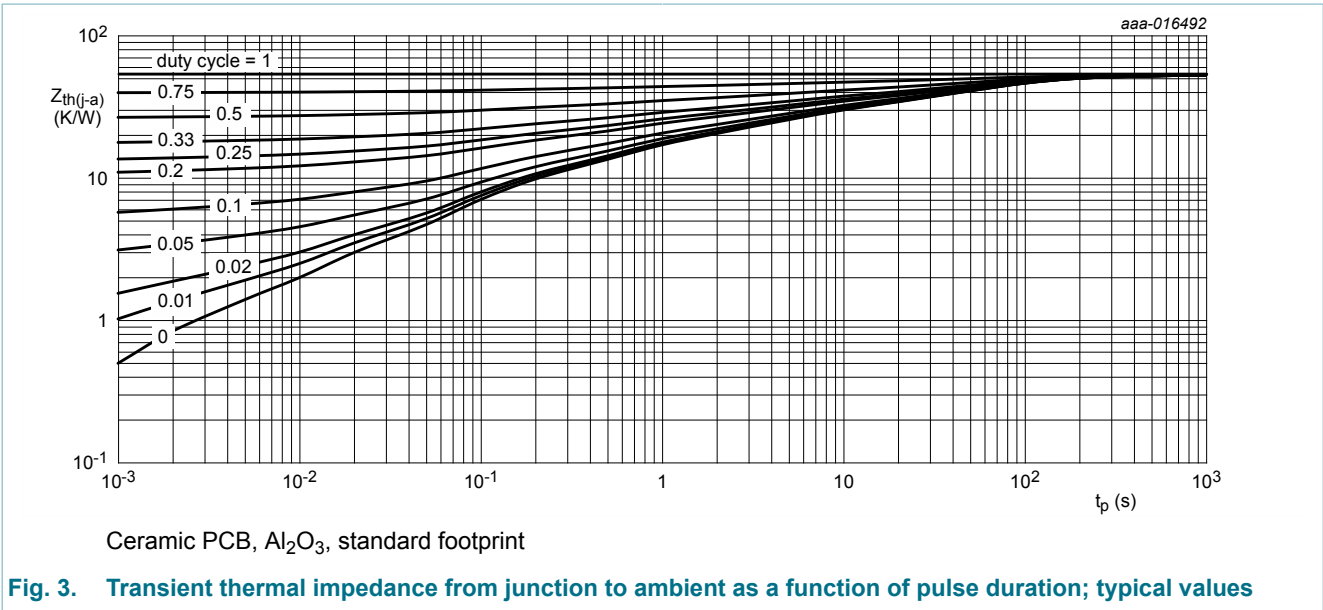


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

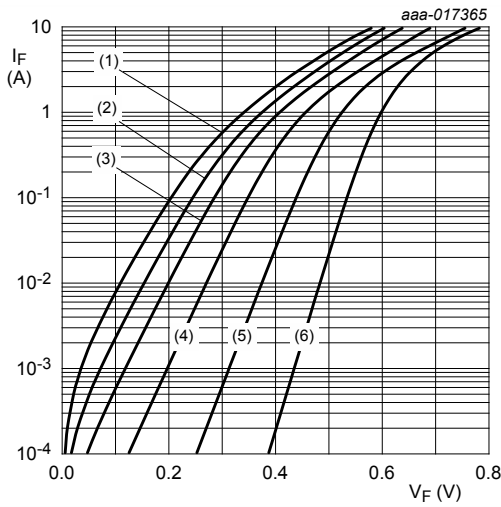


## 10. Characteristics

Table 7. Characteristics

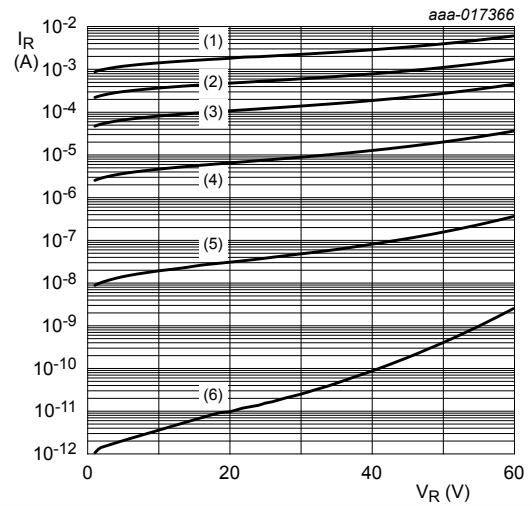
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 1 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; $t_p = 300 \text{ } \mu\text{s}$ ; $\delta = 0.02$	60	-	-	V
$V_F$	forward voltage	$I_F = 0.1 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	440	500	mV
		$I_F = 0.5 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	495	555	mV
		$I_F = 0.7 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	505	565	mV
		$I_F = 1 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	525	585	mV
		$I_F = 1.6 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	550	620	mV
		$I_F = 2 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	570	640	mV
		$I_F = 3 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	600	670	mV
		$I_F = 3 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 125 \text{ }^\circ\text{C}$	-	510	630	mV
$I_R$	reverse current	$V_R = 10 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	20	-	nA
		$V_R = 40 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	80	-	nA
		$V_R = 60 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	340	1000	nA
		$V_R = 60 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 125 \text{ }^\circ\text{C}$	-	440	2100	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	315	-	pF
		$V_R = 4 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	190	-	pF
		$V_R = 10 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	125	-	pF
$t_{rr}$	reverse recovery time	$I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	12	-	ns
$V_{FRM}$	peak forward recovery voltage	$I_F = 0.5 \text{ A}$ ; $dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	560	-	mV

60 V, 3 A low leakage current Schottky barrier rectifier



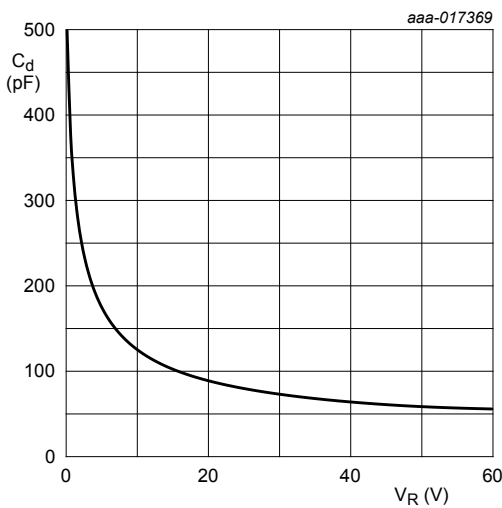
- (1)  $T_j = 175\text{ }^\circ\text{C}$
- (2)  $T_j = 150\text{ }^\circ\text{C}$
- (3)  $T_j = 125\text{ }^\circ\text{C}$
- (4)  $T_j = 85\text{ }^\circ\text{C}$
- (5)  $T_j = 25\text{ }^\circ\text{C}$
- (6)  $T_j = -40\text{ }^\circ\text{C}$

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



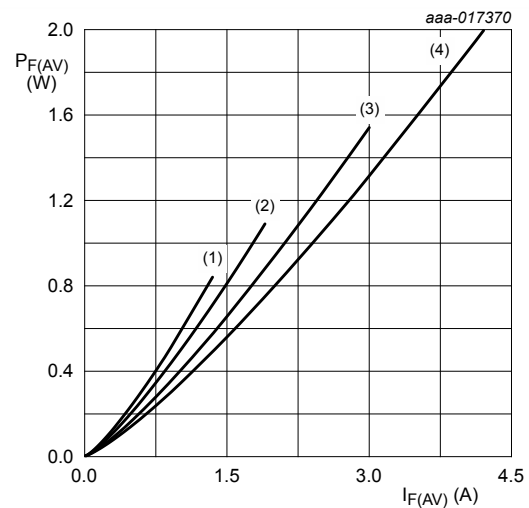
- (1)  $T_j = 175\text{ }^\circ\text{C}$
- (2)  $T_j = 150\text{ }^\circ\text{C}$
- (3)  $T_j = 125\text{ }^\circ\text{C}$
- (4)  $T_j = 85\text{ }^\circ\text{C}$
- (5)  $T_j = 25\text{ }^\circ\text{C}$
- (6)  $T_j = -40\text{ }^\circ\text{C}$

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



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

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

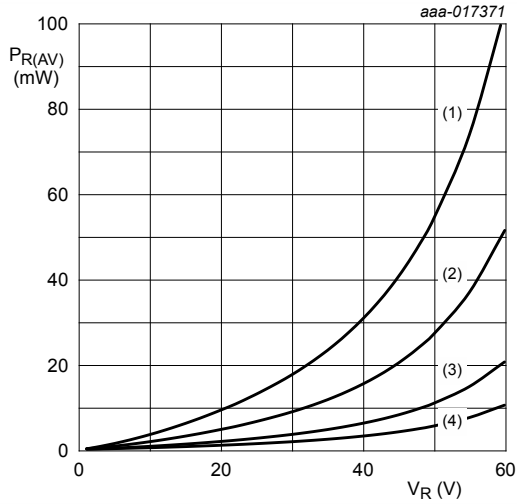


- $T_j = 175\text{ }^\circ\text{C}$
- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$

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

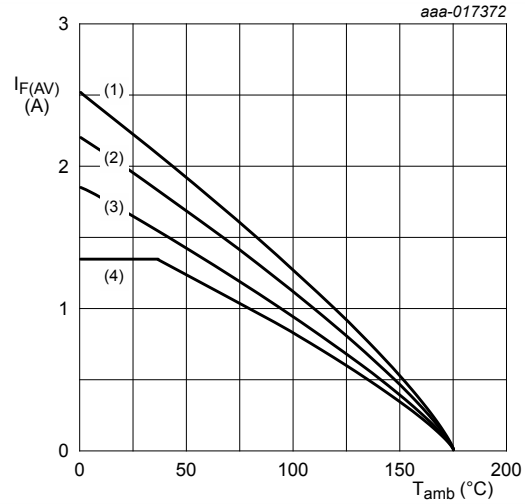


60 V, 3 A low leakage current Schottky barrier rectifier



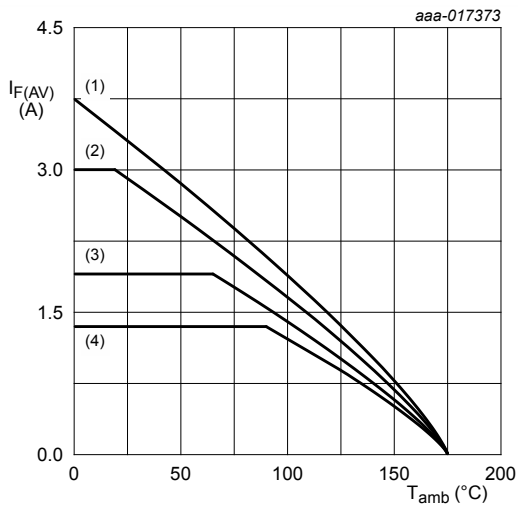
$T_j = 150\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$  (DC)  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



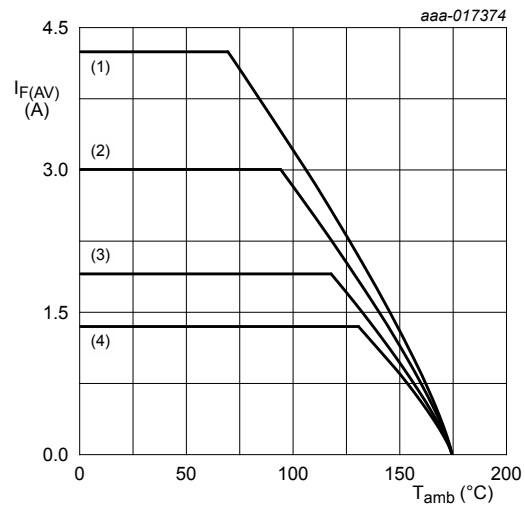
FR4 PCB, standard footprint  
 $T_j = 175\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



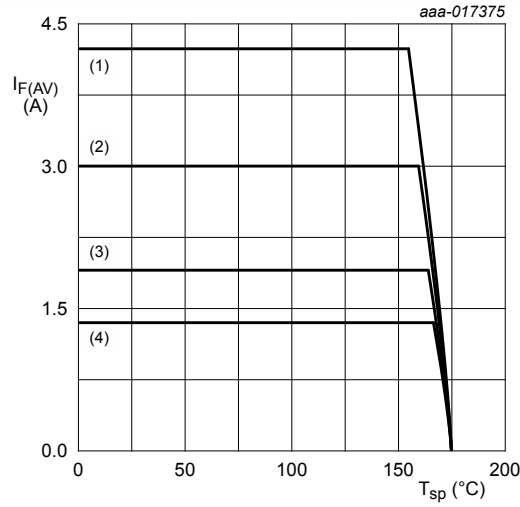
FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$   
 $T_j = 175\text{ }^\circ\text{C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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

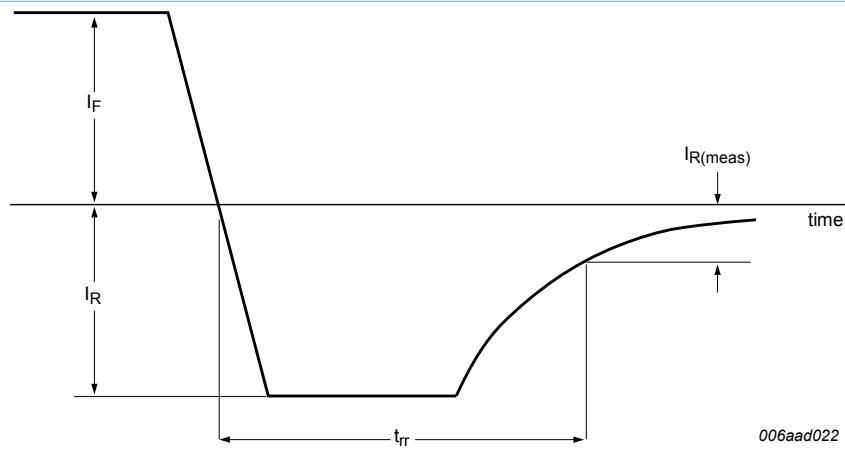


Fig. 13. Reverse recovery definition

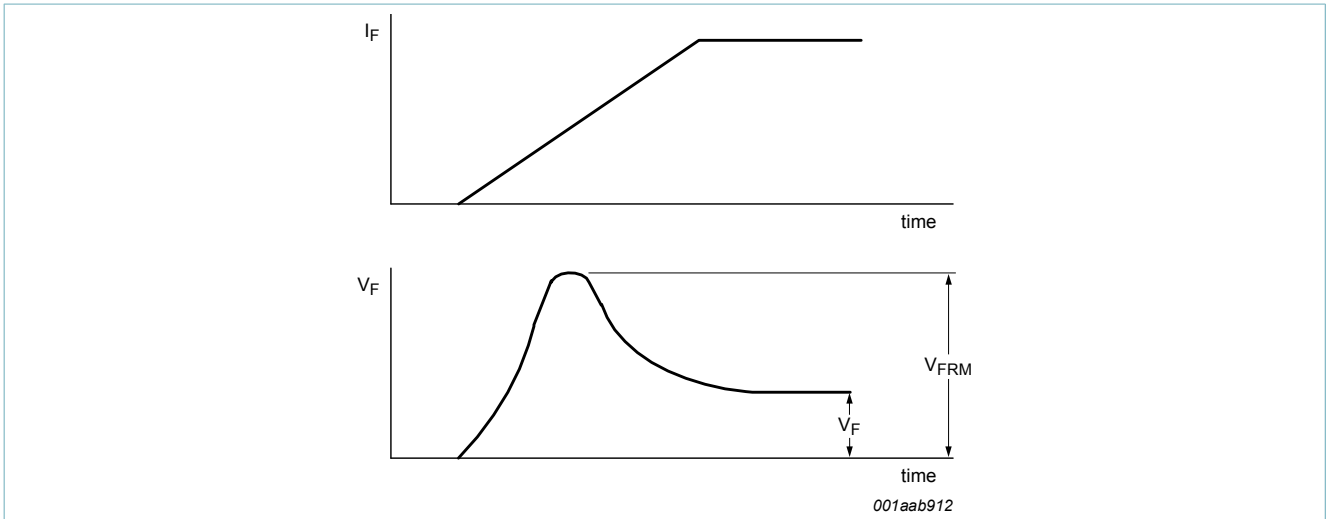


Fig. 14. Forward recovery definition

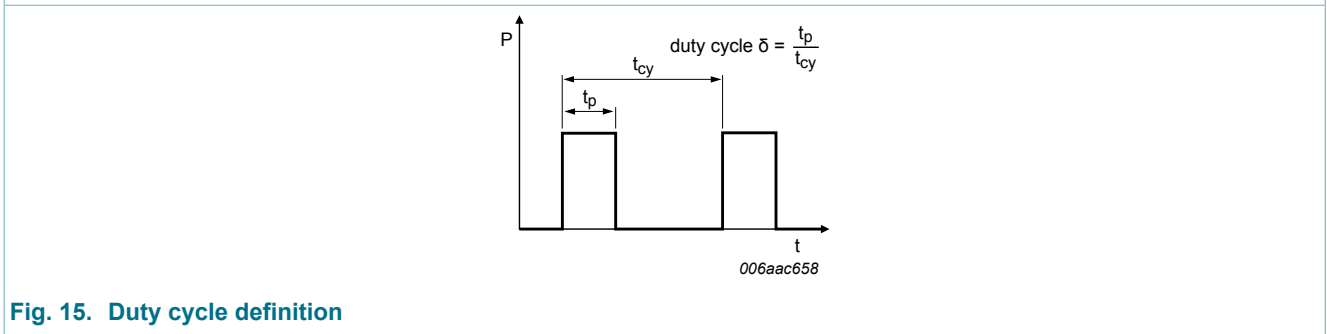


Fig. 15. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:  $I_{F(AV)} = I_M \times \delta$  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.

### 11.1 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.

## 12. Package outline

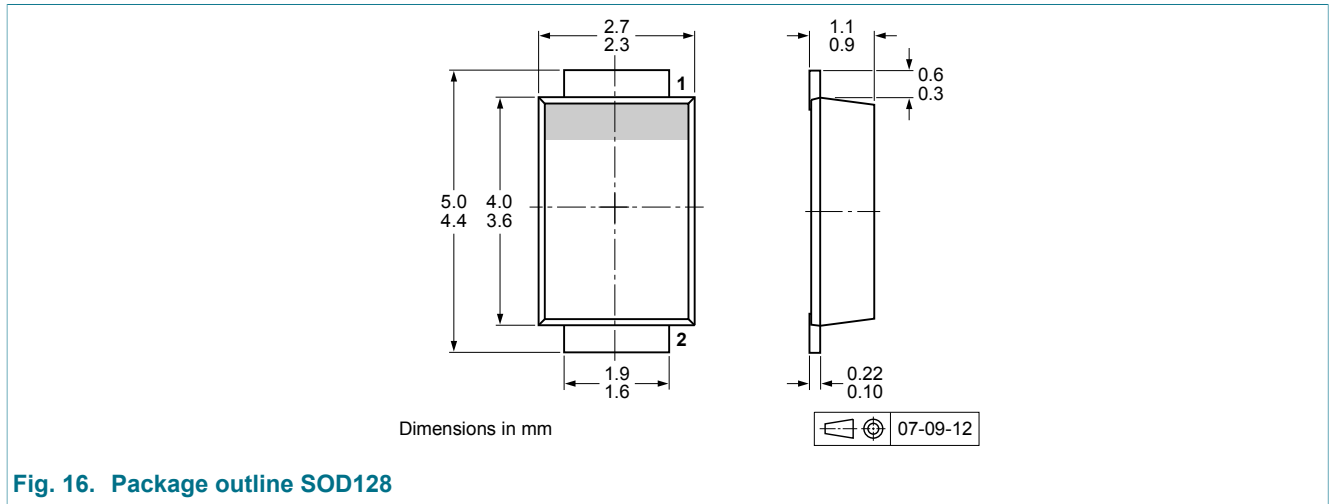


Fig. 16. Package outline SOD128

## 13. Soldering

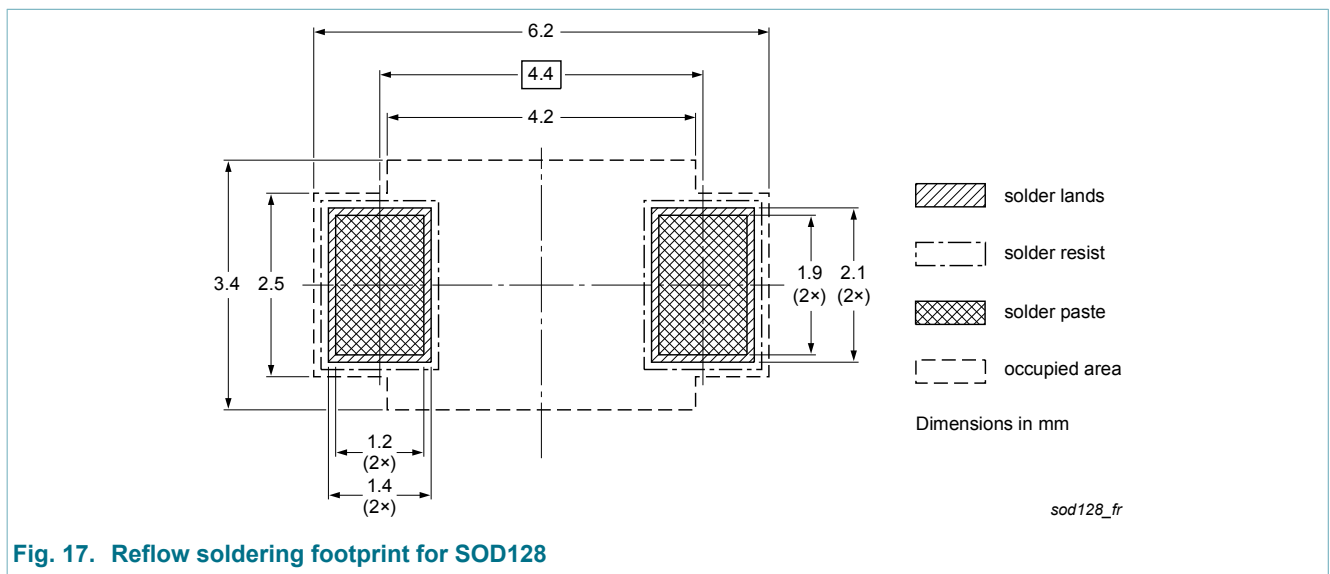


Fig. 17. Reflow soldering footprint for SOD128

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG6030ELP v.2	20150507	Product data sheet	-	PMEG6030ELP v.1
Modifications:	<ul style="list-style-type: none"><li>Product status changed</li></ul>			
PMEG6030ELP v.1	20150320	Preliminary data sheet	-	-

## 15. Legal information

### 15.1 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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## 16. Contents

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 .....	3
9	Thermal characteristics .....	3
10	Characteristics .....	6
11	Test information .....	9
11.1	Quality information .....	10
12	Package outline .....	11
13	Soldering .....	11
14	Revision history .....	12
15	Legal information .....	13
15.1	Data sheet status .....	13
15.2	Definitions .....	13
15.3	Disclaimers .....	13
15.4	Trademarks .....	14

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Date of release: 7 May 2015