



# PMEG6030EVP

High-temperature 60 V, 3 A Schottky barrier rectifier

4 March 2013

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:  $I_{F(AV)} \leq 3$  A
- Reverse voltage:  $V_R \leq 60$  V
- Low forward voltage
- High power capability due to clip-bonding technology
- Small and flat lead SMD plastic package
- AEC-Q101 qualified
- High temperature  $T_J \leq 175$  °C

## 3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- 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; $T_{sp} \leq 165$ °C; square wave	-	-	3	A
$V_R$	reverse voltage	$T_J = 25$ °C	-	-	60	V
$V_F$	forward voltage	$I_F = 3$ A; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_J = 25$ °C; pulsed	-	420	475	mV
$I_R$	reverse current	$T_J = 25$ °C; $V_R = 60$ V; pulsed	-	115	400	$\mu$ A





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## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 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
PMEG6030EVP	SOD128	plastic surface-mounted package; 2 leads	SOD128

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG6030EVP	DB

## 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	$T_j = 25\text{ }^{\circ}\text{C}$		-	60	V
$I_F$	forward current	$T_{sp} = 160\text{ }^{\circ}\text{C}$		-	4.2	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 95\text{ }^{\circ}\text{C}$ ; square wave	[1]	-	3	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 165\text{ }^{\circ}\text{C}$ ; square wave		-	3	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; square wave		-	70	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	[2]	-	750	mW
			[3]	-	1250	mW
			[1]	-	2500	mW
$T_j$	junction temperature			-	175	$^{\circ}\text{C}$

Symbol	Parameter	Conditions		Min	Max	Unit
T <sub>amb</sub>	ambient temperature			-55	175	°C
T <sub>stg</sub>	storage temperature			-65	175	°C

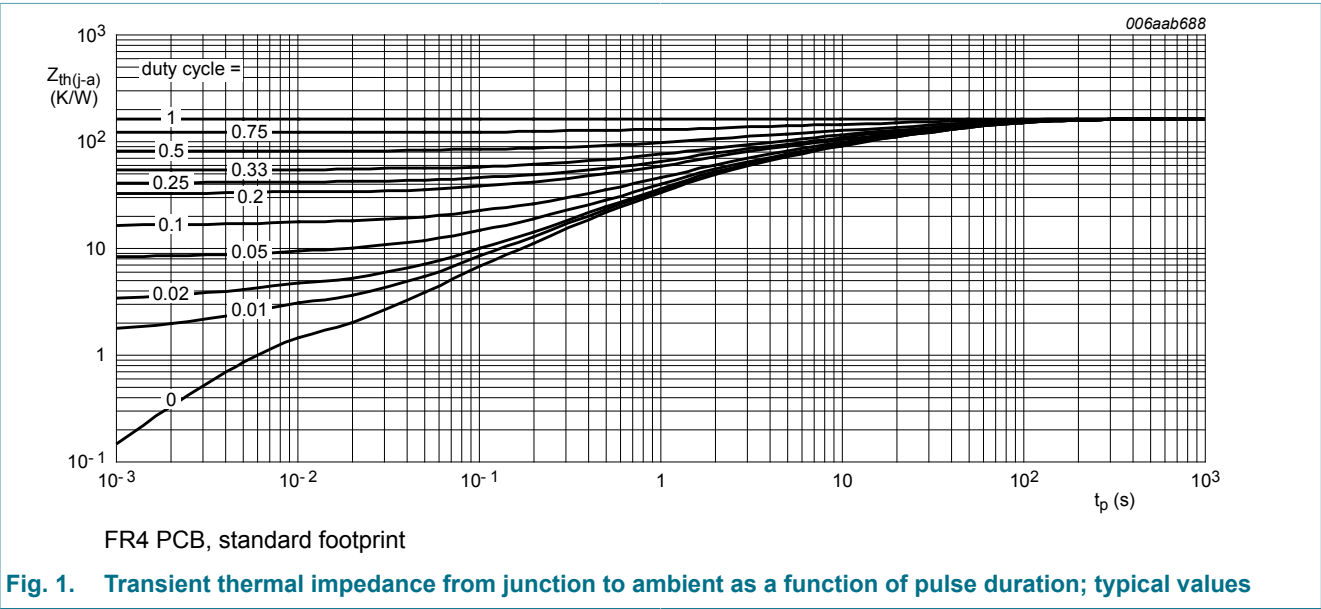
- [1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al<sub>2</sub>O<sub>3</sub>, standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

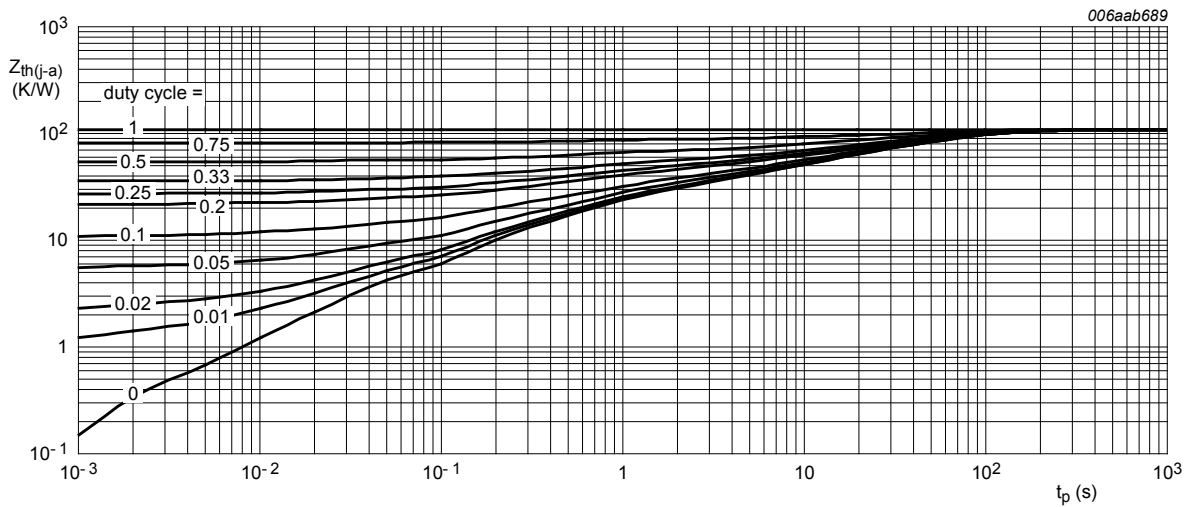
9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	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 <sub>th(j-sp)</sub>	thermal resistance from junction to solder point		[5]	-	-	12	K/W

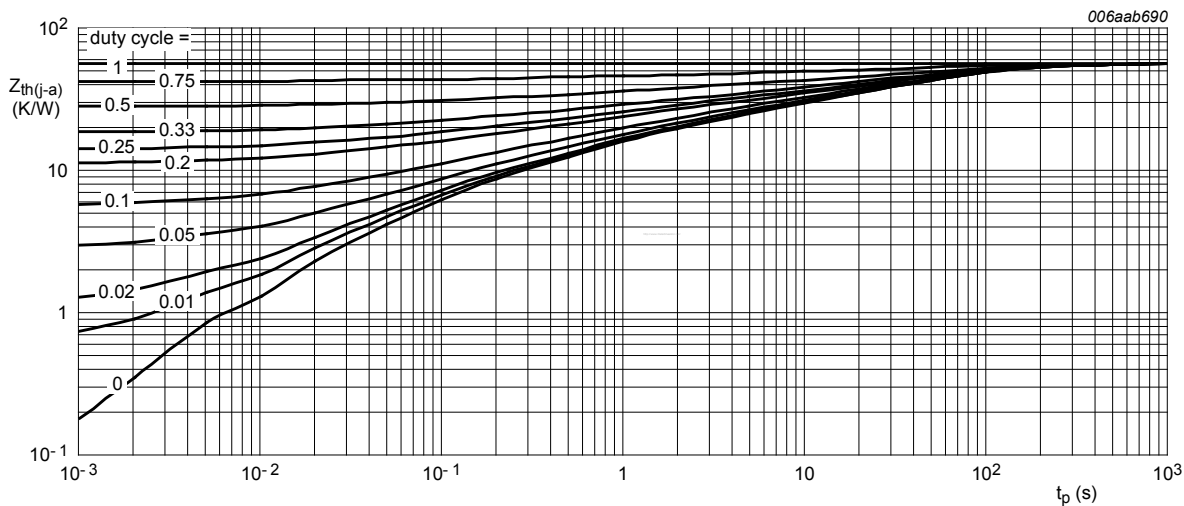
- [1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P<sub>R</sub> are a significant part of the total power losses.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on 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.





FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>

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



Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint

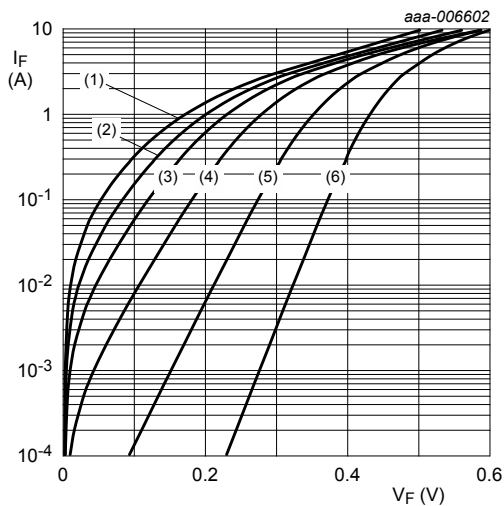
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

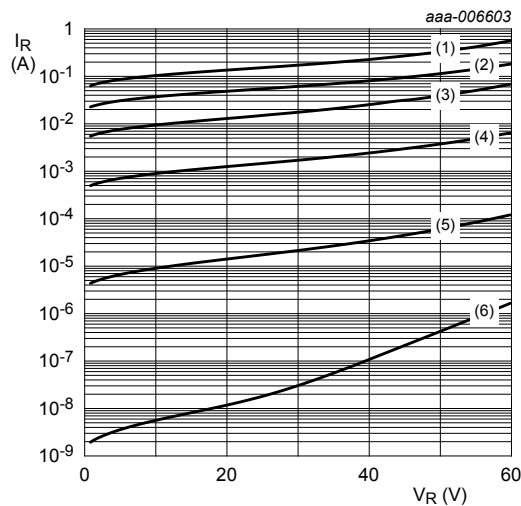
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 0.1 A; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>j</sub> = 25 °C; pulsed	-	275	310	mV
		I <sub>F</sub> = 0.5 A; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>j</sub> = 25 °C; pulsed	-	325	-	mV
		I <sub>F</sub> = 1 A; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>j</sub> = 25 °C; pulsed	-	355	400	mV

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$I_F = 1.5\text{ A}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$ ; pulsed	-	375	-	mV
		$I_F = 2\text{ A}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$ ; pulsed	-	390	440	mV
		$I_F = 3\text{ A}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$ ; pulsed	-	420	475	mV
$I_R$	reverse current	$V_R = 5\text{ V}; T_j = 25\text{ }^\circ\text{C}$ ; pulsed	-	7	20	$\mu\text{A}$
		$V_R = 10\text{ V}; T_j = 25\text{ }^\circ\text{C}$ ; pulsed	-	9	40	$\mu\text{A}$
		$V_R = 30\text{ V}; T_j = 25\text{ }^\circ\text{C}$ ; pulsed	-	20	80	$\mu\text{A}$
		$V_R = 60\text{ V}; T_j = 25\text{ }^\circ\text{C}$ ; pulsed	-	115	400	$\mu\text{A}$
		$V_R = 10\text{ V}; T_j = 125\text{ }^\circ\text{C}$ ; pulsed	-	9	-	mA
		$V_R = 60\text{ V}; T_j = 125\text{ }^\circ\text{C}$ ; pulsed	-	70	300	mA
$C_d$	diode capacitance	$V_R = 1\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^\circ\text{C}$	-	575	-	pF
		$V_R = 10\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^\circ\text{C}$	-	200	-	pF
$t_{rr}$	reverse recovery time	$I_F = 0.5\text{ A}; I_R = 0.5\text{ A}; I_{R(\text{meas})} = 0.1\text{ A};$ $T_j = 25\text{ }^\circ\text{C}$	-	20	-	ns
$V_{FRM}$	peak forward recovery voltage	$I_F = 1\text{ A}; dI_F/dt = 40\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}$	-	385	-	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

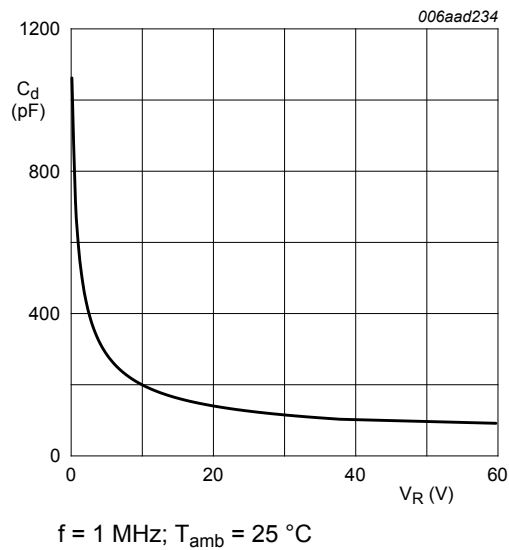


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

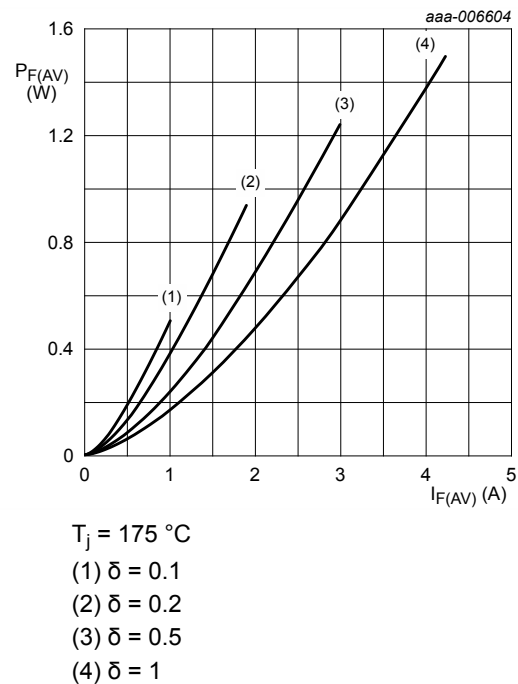


Fig. 7. Average forward power dissipation as a function of average forward current; typical values

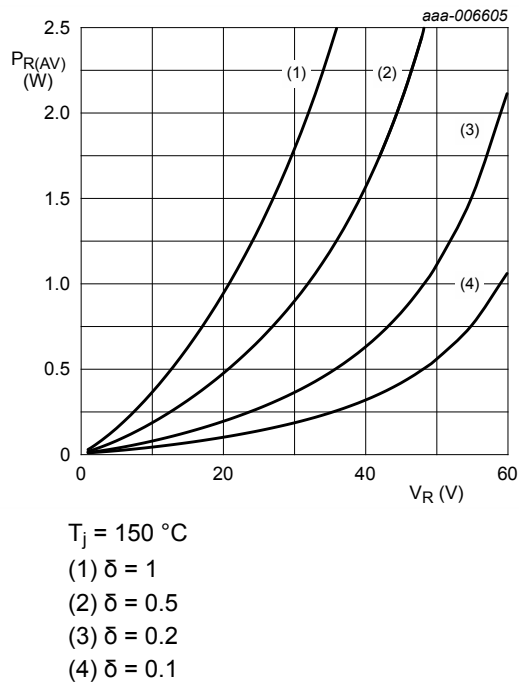


Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values

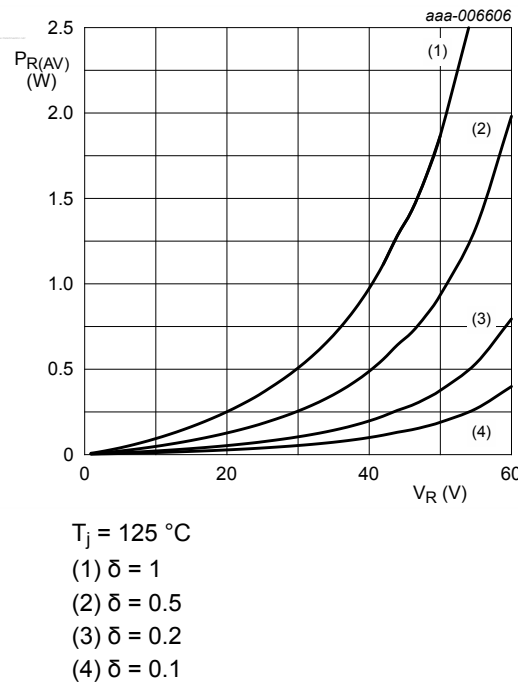
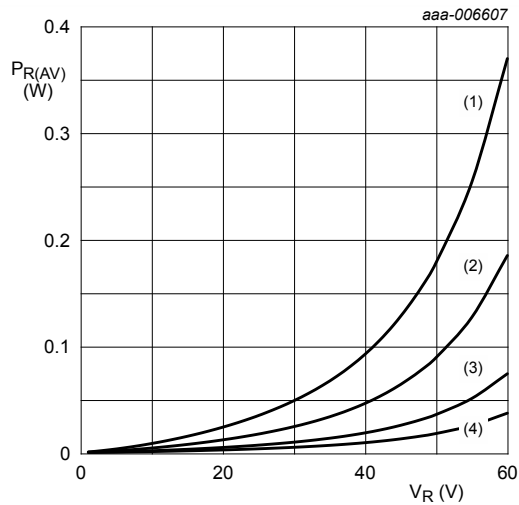


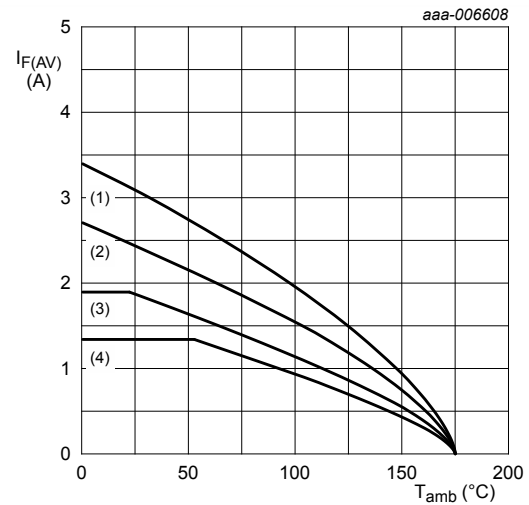
Fig. 9. Average reverse power dissipation as a function of reverse voltage; typical values



$T_j = 85\text{ }^{\circ}\text{C}$

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

**Fig. 10. Average reverse power dissipation as a function of reverse voltage; typical values**

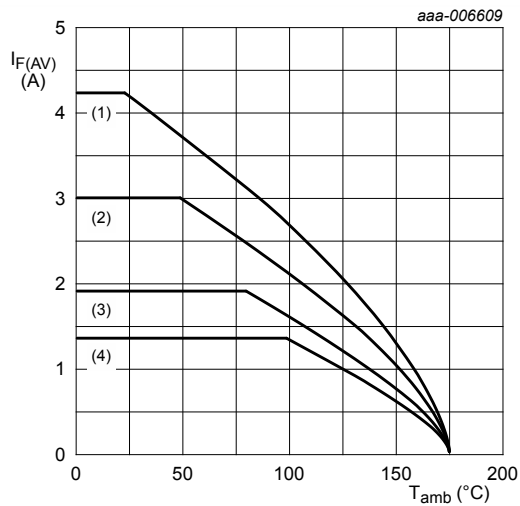


FR4 PCB, standard footprint

$T_j = 175\text{ }^{\circ}\text{C}$

- (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. 11. Average forward current as a function of ambient temperature; typical values**

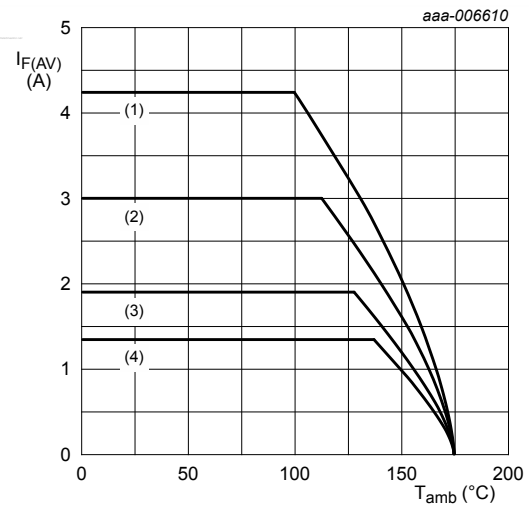


FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$

$T_j = 175\text{ }^{\circ}\text{C}$

- (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. 12. Average forward current as a function of ambient temperature; typical values**

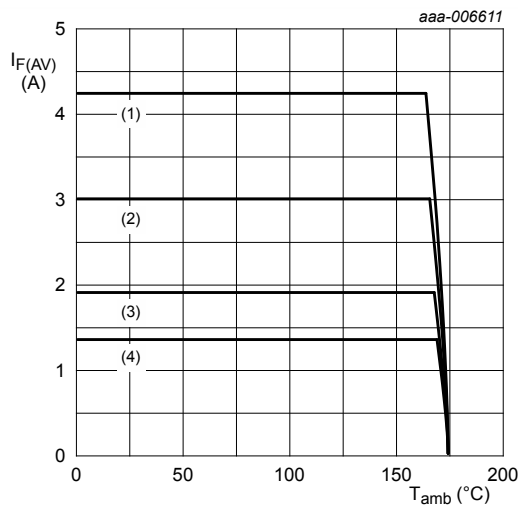


Ceramic PCB,  $\text{Al}_2\text{O}_3$ , standard footprint

$T_j = 175\text{ }^{\circ}\text{C}$

- (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. 13. Average forward current as a function of ambient temperature; typical values**



$T_J = 175\text{ }^{\circ}\text{C}$   
(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. 14. Average forward current as a function of solder point temperature; typical values

11. Test information

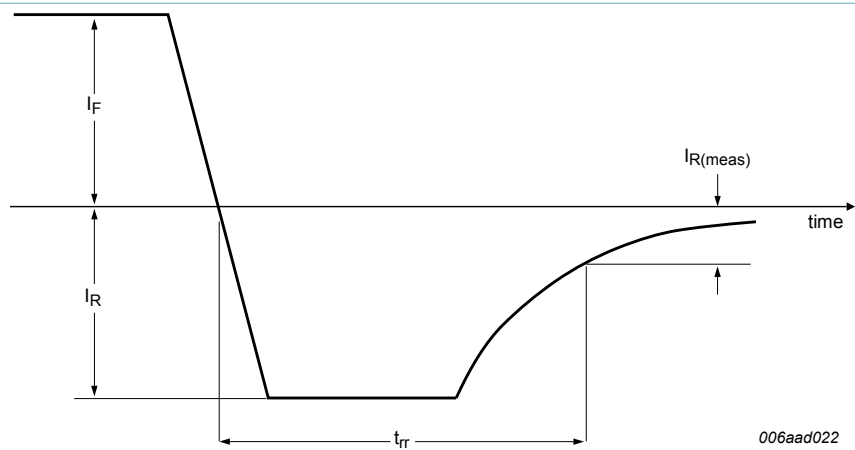


Fig. 15. Reverse recovery definition



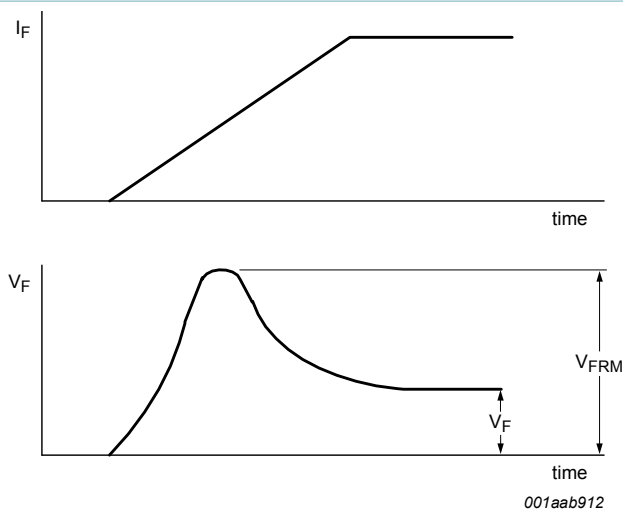


Fig. 16. Forward recovery definition

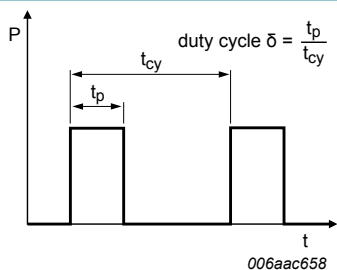


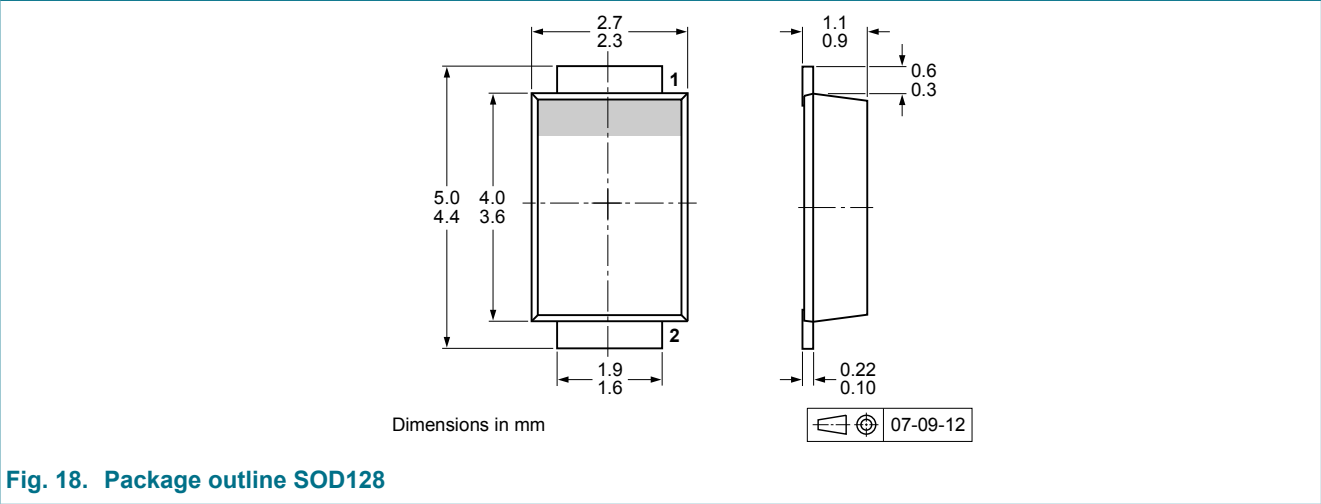
Fig. 17. Duty cycle definition

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.

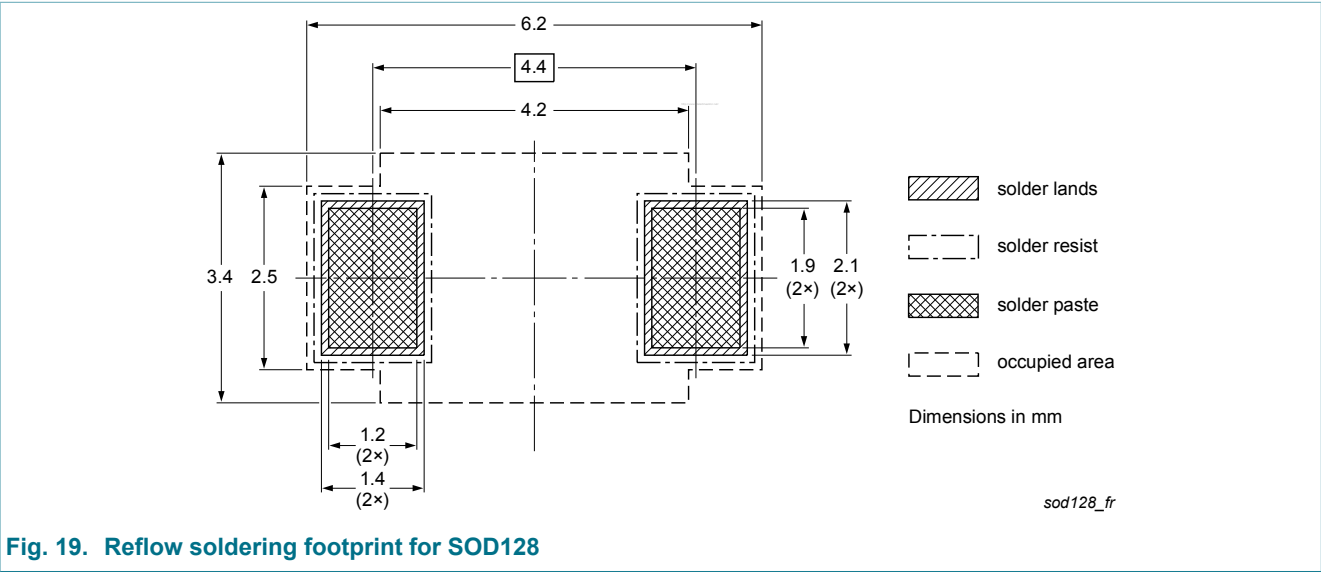
## 11.1 Quality information

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



13. Soldering



14. Revision history

Table 8. Revision history				
Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG6030EVP v.1	20130304	Product 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 4 March 2013

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