



# PMEG6010ELR

60 V, 1 A low leakage current Schottky barrier rectifier

25 April 2018

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 SOD123W 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:  $V_R \leq 60$  V
- Extremely low leakage current
- 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
- Capable for reflow and wave soldering

## 3. Applications

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



## 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; $T_{sp} \leq 170$ °C; square wave	-	-	1	A
$V_R$	reverse voltage	$T_j = 25$ °C	-	-	60	V
$V_F$	forward voltage	$I_F = 1$ A; $T_j = 25$ °C	-	605	660	mV
$I_R$	reverse current	$V_R = 60$ V; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C; pulsed	-	90	300	nA

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 CFP3 (SOD123W)	 sym001
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG6010ELR	CFP3	plastic, surface mounted package; 2 terminals; 2.6 mm x 1.7 mm x 1 mm body	SOD123W

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG6010ELR	K1

## 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	$\delta = 1$ ; $T_{sp} = 165\text{ }^{\circ}\text{C}$		-	1.41	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 170\text{ }^{\circ}\text{C}$ ; square wave		-	1	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 140\text{ }^{\circ}\text{C}$ ; square wave	[1]	-	1	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8\text{ ms}$ ; square wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$		-	50	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	[2]	-	680	mW
			[3]	-	1.15	W
			[1]	-	2.14	W
$T_j$	junction temperature			-	175	$^{\circ}\text{C}$
$T_{amb}$	ambient temperature			-55	175	$^{\circ}\text{C}$

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

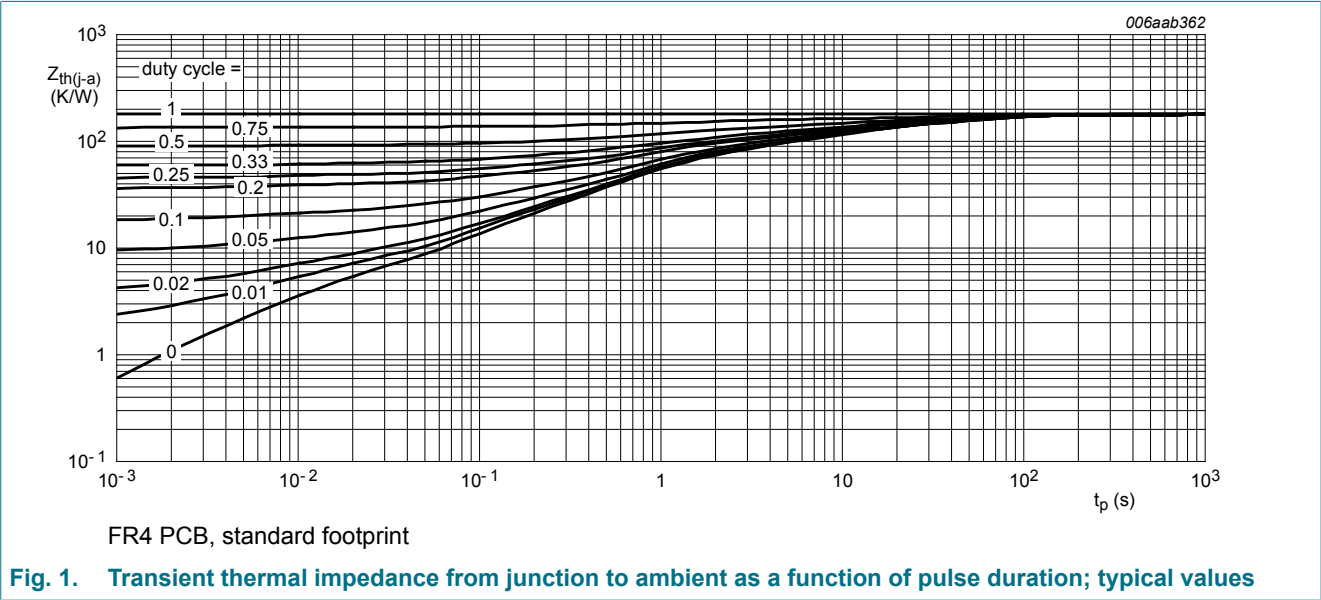
- [1] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.  
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.  
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

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]	-	-	220	K/W
			[1] [3]	-	-	130	K/W
			[1] [4]	-	-	70	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point		[5]	-	-	18	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.



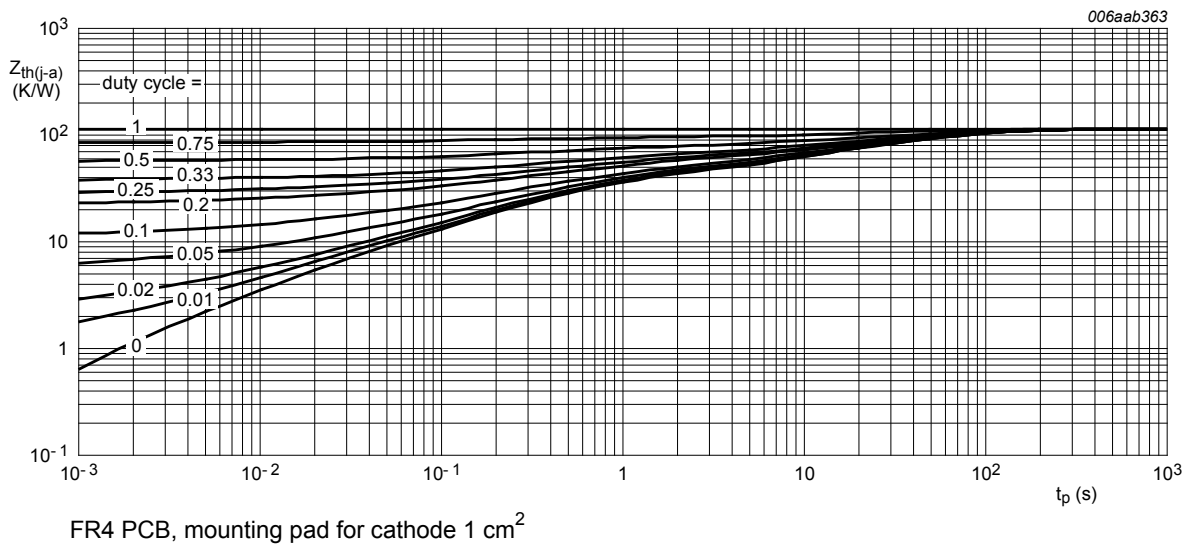


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

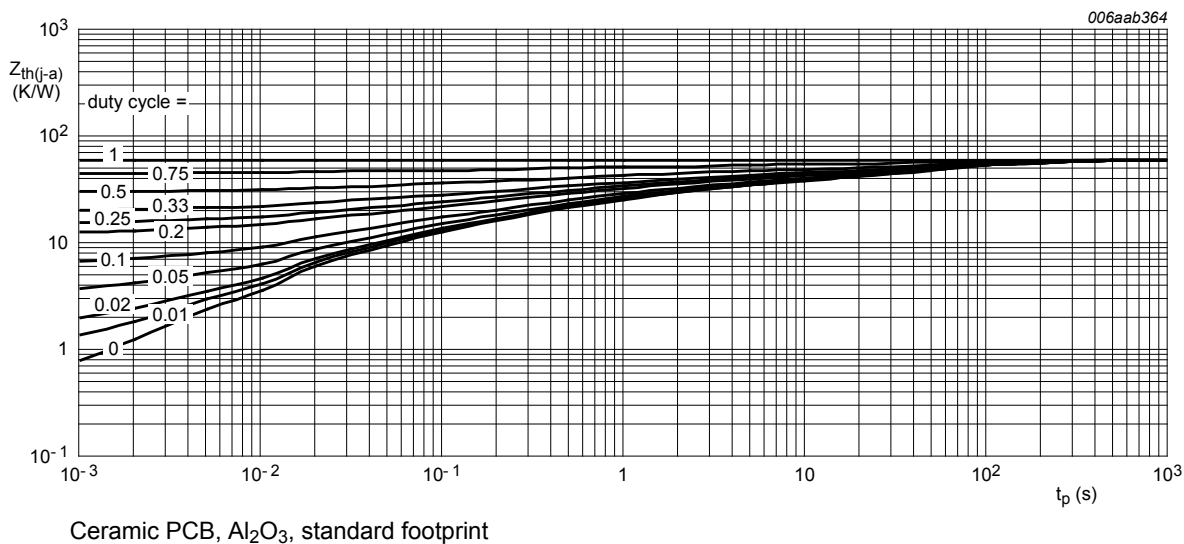


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 1 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$	60	-	-	V
$V_F$	forward voltage	$I_F = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	475	540	mV
		$I_F = 0.5 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	550	605	mV
		$I_F = 0.7 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	575	625	mV
		$I_F = 1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	605	660	mV
$I_R$	reverse current	$V_R = 5 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	5	-	nA
		$V_R = 10 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	6	-	nA
		$V_R = 40 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	25	50	nA
		$V_R = 60 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; pulsed	-	90	300	nA
		$V_R = 10 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 125 \text{ }^\circ\text{C}$ ; pulsed	-	25	-	$\mu\text{A}$
		$V_R = 60 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 125 \text{ }^\circ\text{C}$ ; pulsed	-	120	-	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	110	-	pF
		$V_R = 4 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	65	-	pF
		$V_R = 10 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	45	-	pF
$t_{rr}$	reverse recovery time	$I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	4.5	-	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

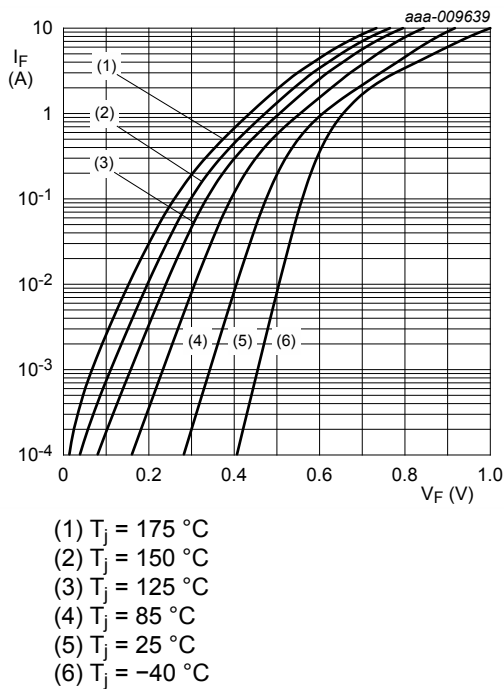


Fig. 4. Forward current as a function of forward voltage; typical values

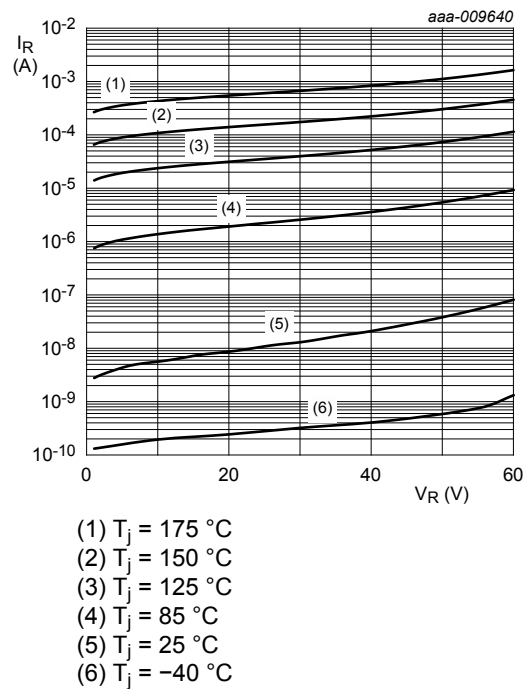


Fig. 5. Reverse current as a function of reverse voltage; typical values

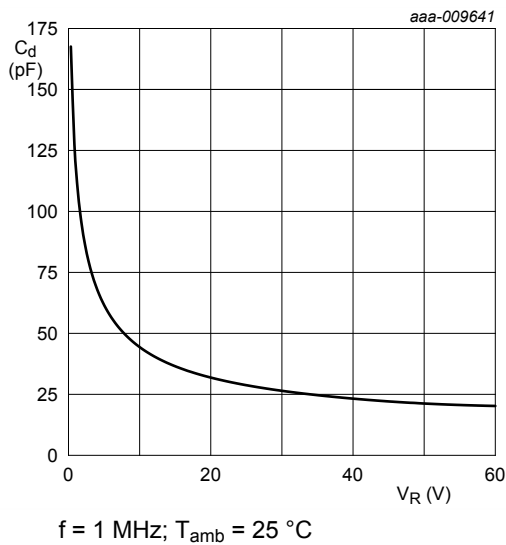


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

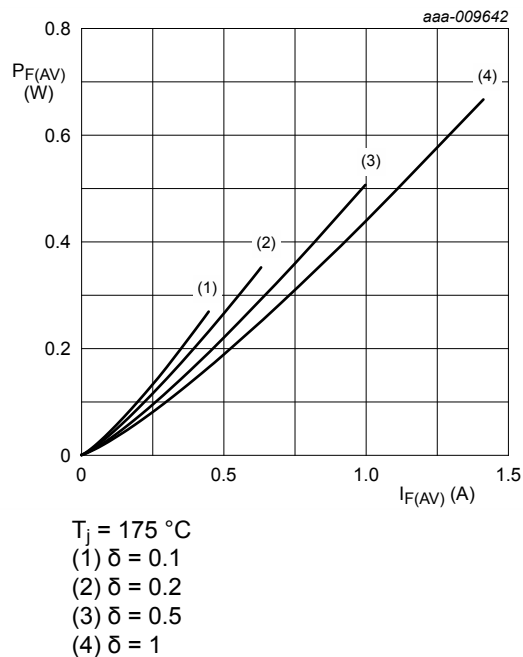
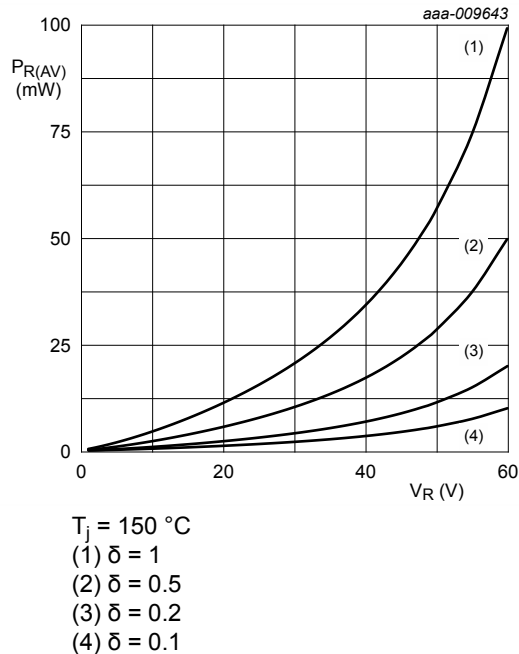
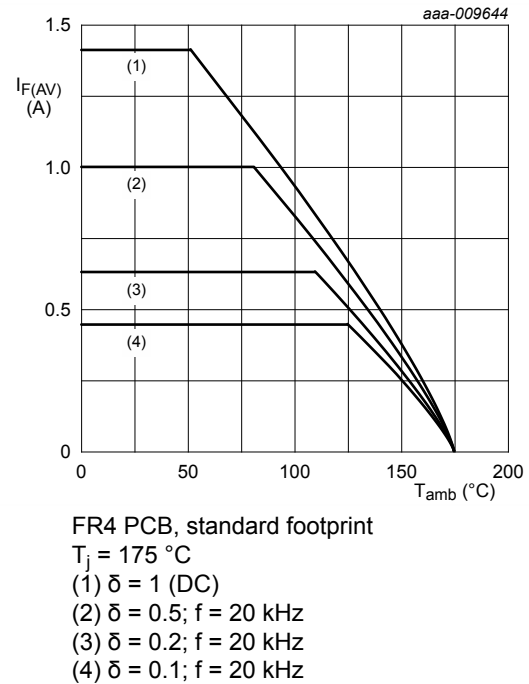


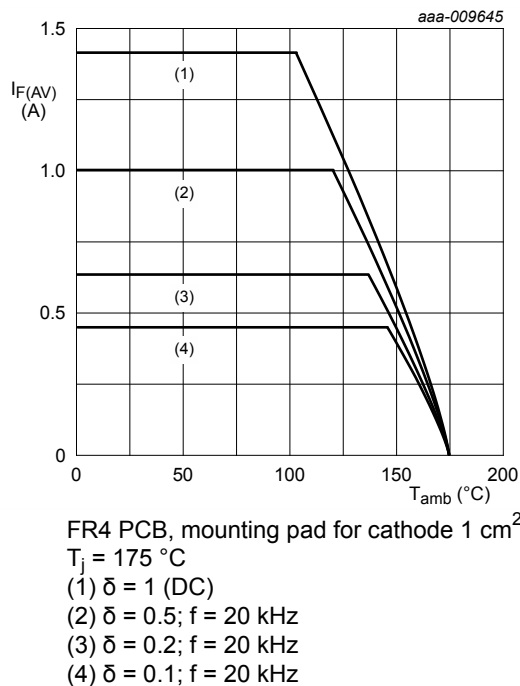
Fig. 7. Average forward power dissipation as a function of average forward current; typical values



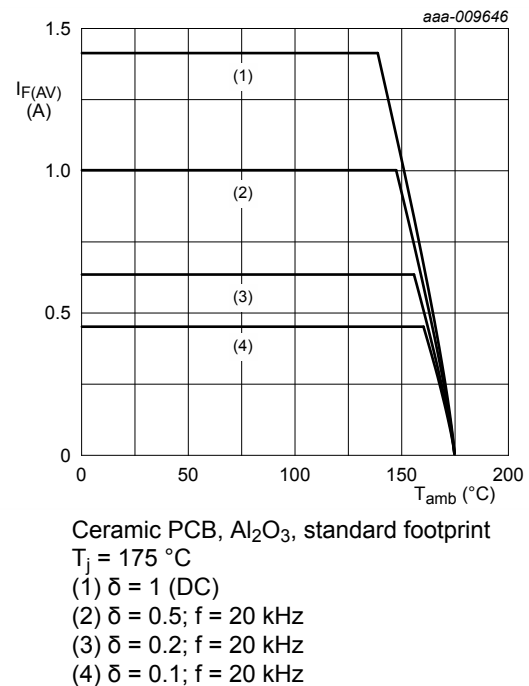
**Fig. 8.** Average reverse power dissipation as a function of reverse voltage; typical values



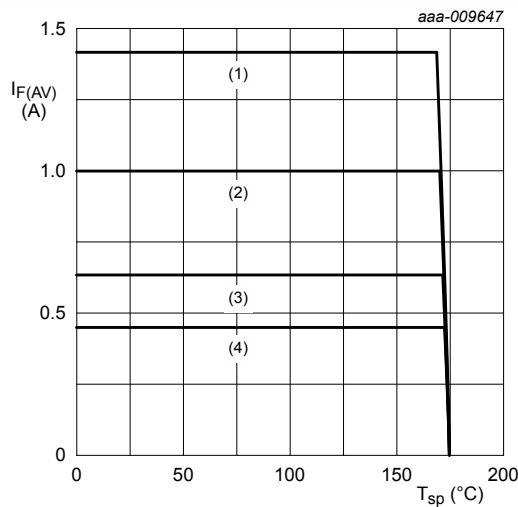
**Fig. 9.** Average forward current as a function of ambient temperature; typical values



**Fig. 10.** Average forward current as a function of ambient temperature; typical values



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



$T_j = 175$  °C  
(1)  $\delta = 1$  (DC)  
(2)  $\delta = 0.5$ ;  $f = 20$  kHz  
(3)  $\delta = 0.2$ ;  $f = 20$  kHz  
(4)  $\delta = 0.1$ ;  $f = 20$  kHz

Fig. 12. Average forward current as a function of solder point temperature; typical values

11. Test information

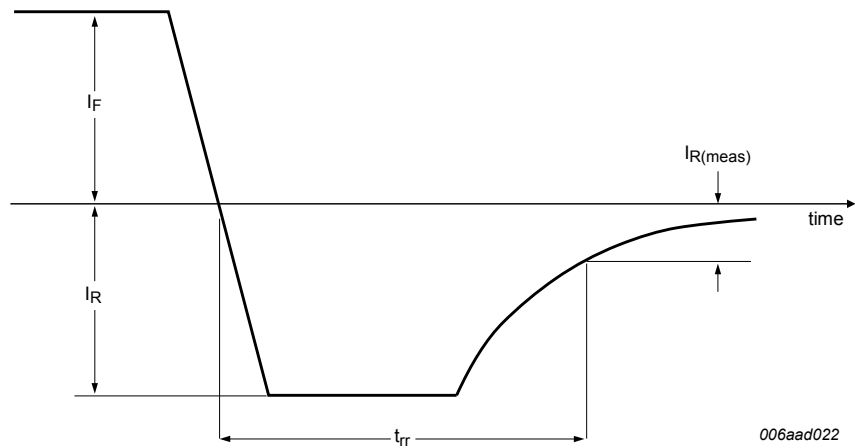


Fig. 13. Reverse recovery definition



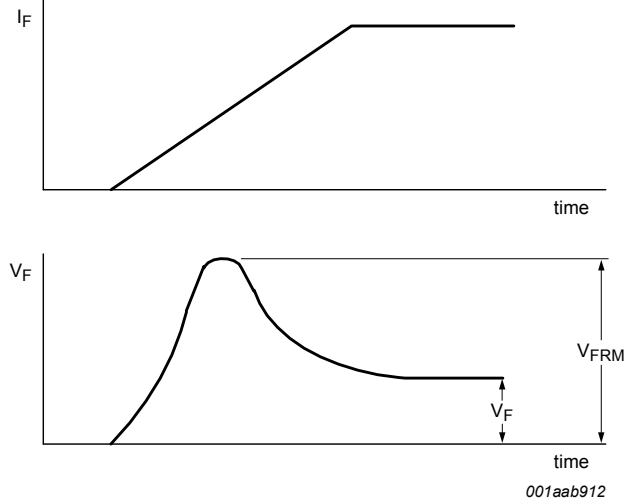


Fig. 14. Forward recovery definition

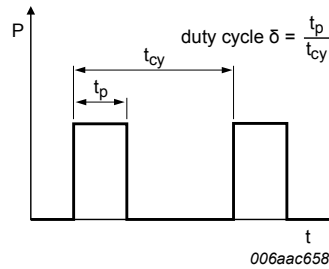


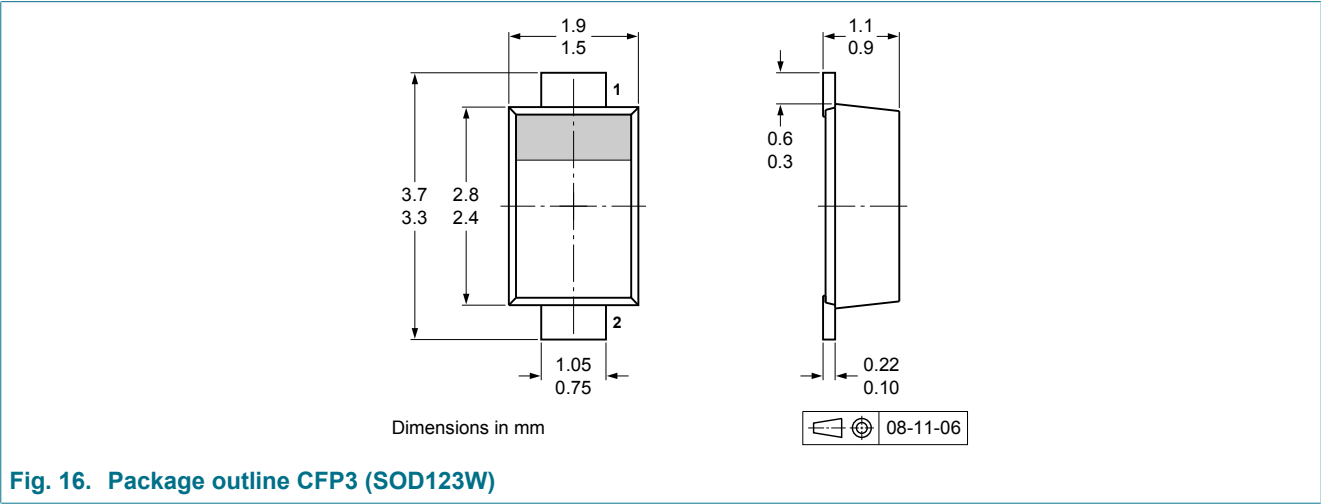
Fig. 15. Duty cycle definition

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.

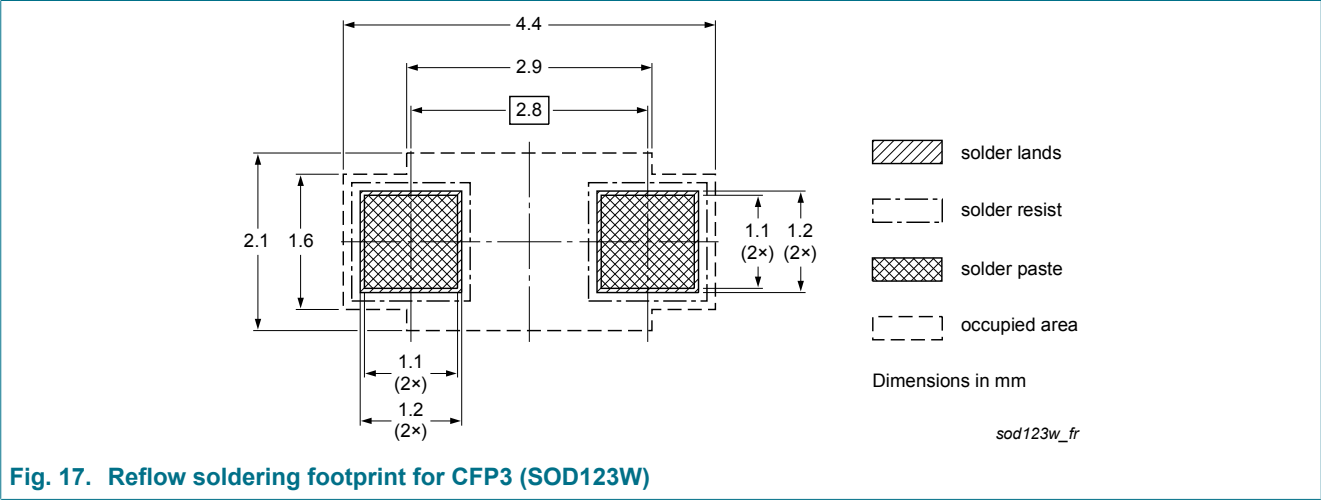
### Quality information

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



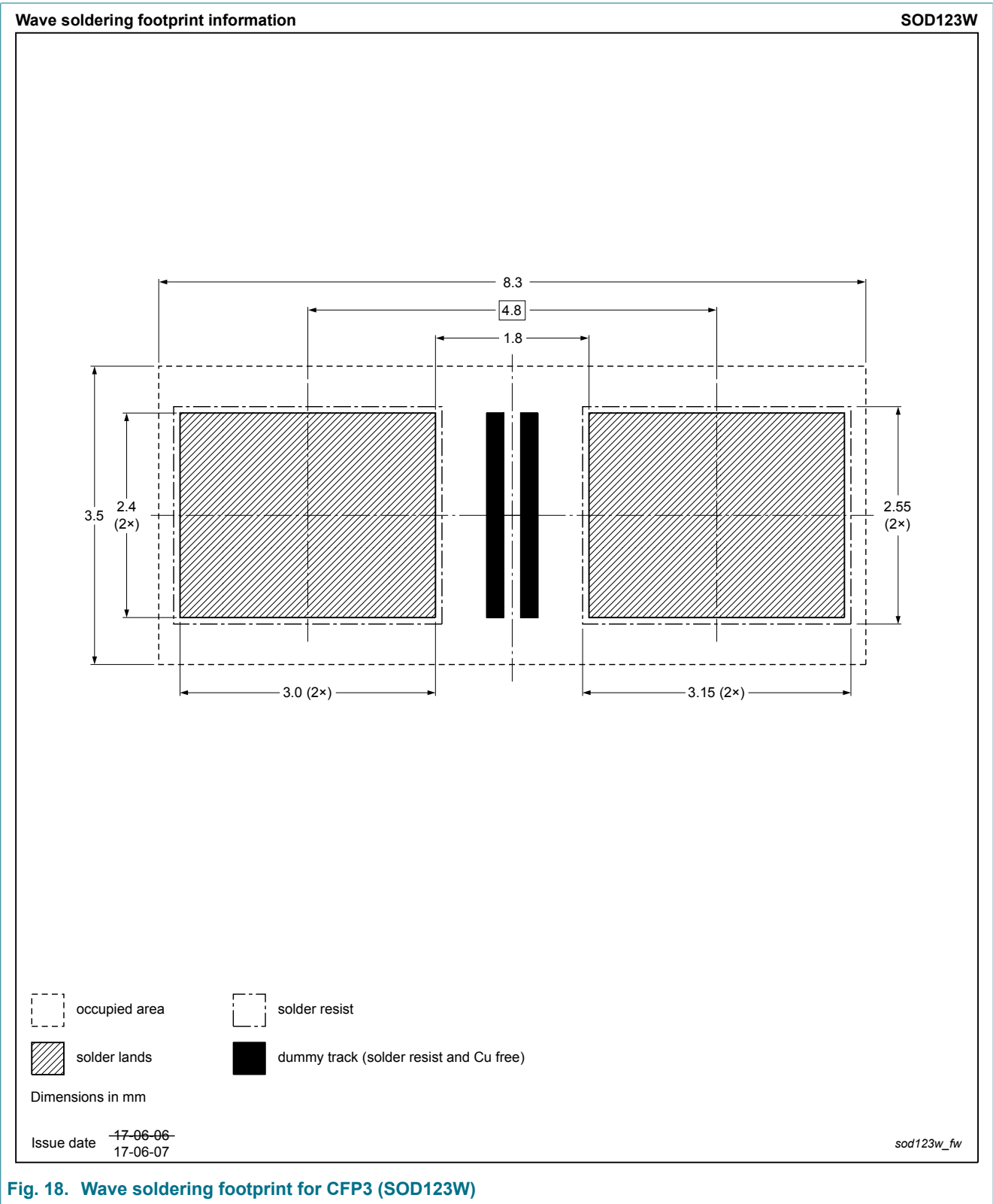


Fig. 18. Wave soldering footprint for CFP3 (SOD123W)

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG6010ELR v.4	20180425	Product data sheet	-	PMEG6010ELR v.3
Modifications:	<ul style="list-style-type: none"><li>• Features and benefits: Capable for reflow and wave soldering added</li><li>• Soldering: Wave soldering footprint added</li></ul>			
PMEG6010ELR v.3	20160908	Product data sheet	-	PMEG6010ELR v.2
PMEG6010ELR v.2	20140603	Product data sheet	-	PMEG6010ELR v.1
PMEG6010ELR v.1	20131108	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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