



# PMEG4010EGW

40 V, 1 A low VF MEGA Schottky barrier rectifier

7 December 2016

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 small SOD123 Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Forward current:  $I_F \leq 1 \text{ A}$
- Reverse voltage:  $V_R \leq 40 \text{ V}$
- Low forward voltage typ.  $V_F = 540 \text{ mV}$
- Low reverse current typ.  $I_R = 30 \mu\text{A}$
- Small 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
- Automotive applications

## 4. Quick reference data



Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_F$	forward current	$T_{sp} \leq 55 \text{ }^\circ\text{C}$		-	-	1	A
$V_R$	reverse voltage	$T_J = 25 \text{ }^\circ\text{C}$		-	-	40	V
$V_F$	forward voltage	$I_F = 1 \text{ A}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02$ ; $T_J = 25 \text{ }^\circ\text{C}$		-	540	640	mV
$I_R$	reverse current	$V_R = 40 \text{ V}$ ; pulsed; $T_J = 25 \text{ }^\circ\text{C}$	[1]	-	30	100	$\mu\text{A}$

[1] Very short test pulse to prevent junction self-heating.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode <sup>[1]</sup>	 SOD123	  sym001
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4010EGW	SOD123	Plastic surface-mounted package; 2 leads	SOD123

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4010EGW	G5

## 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	$T_j = 25\text{ }^{\circ}\text{C}$		-	40	V
$I_F$	forward current	$T_{sp} \leq 55\text{ }^{\circ}\text{C}$		-	1	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 60\text{ }^{\circ}\text{C}$ ; square wave	[1]	-	1	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 130\text{ }^{\circ}\text{C}$ ; square wave		-	1	A
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\text{ ms}$ ; $\delta \leq 0.25$		-	7	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; square wave		-	9	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	[2]	-	400	mW
			[1]	-	660	mW
$T_j$	junction temperature			-	150	$^{\circ}\text{C}$
$T_{amb}$	ambient temperature			-55	150	$^{\circ}\text{C}$
$T_{stg}$	storage temperature			-65	150	$^{\circ}\text{C}$

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

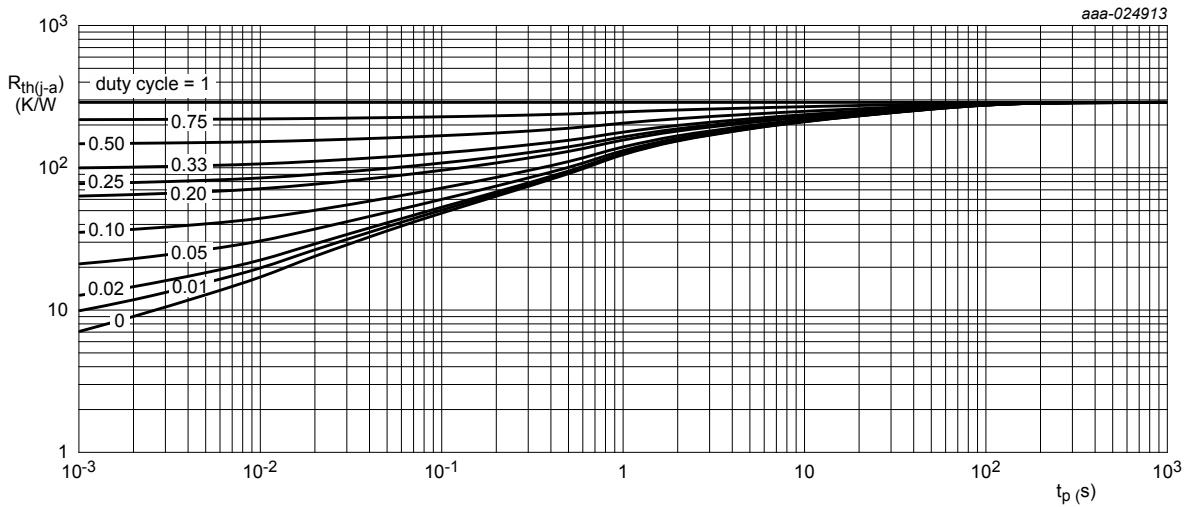
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	310	K/W
			[1] [3]	-	-	190	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	29	K/W

[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.

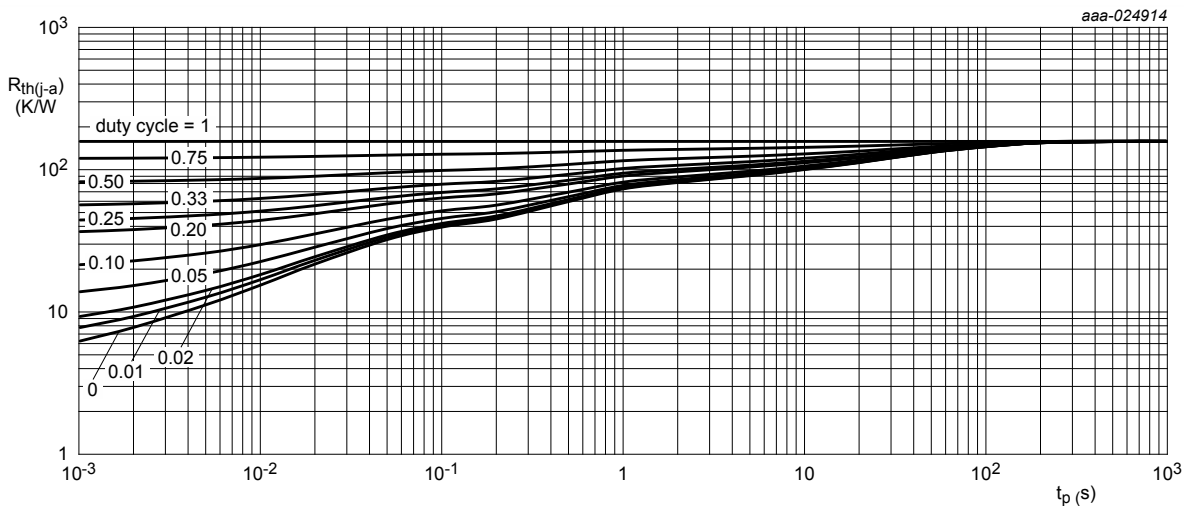
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .

[4] Soldering point of cathode tab.



FR4 PCB, standard footprint

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



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

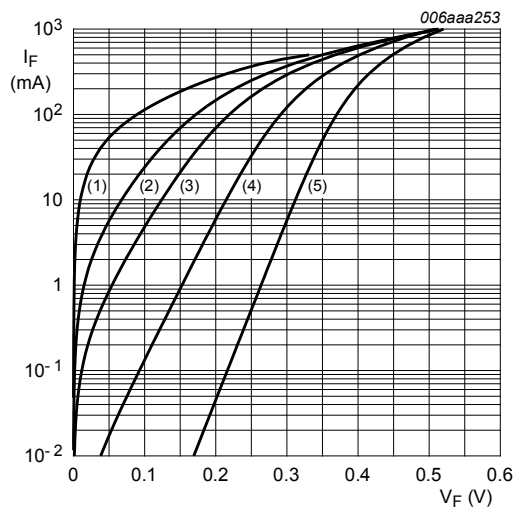
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	$I_R = 1 \text{ mA}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_J = 25 \text{ } ^\circ\text{C}$	40	-	-	V
$V_F$	forward voltage	$I_F = 0.1 \text{ mA}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_J = 25 \text{ } ^\circ\text{C}$	-	95	130	mV
		$I_F = 1 \text{ mA}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_J = 25 \text{ } ^\circ\text{C}$	-	155	210	mV
		$I_F = 10 \text{ mA}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_J = 25 \text{ } ^\circ\text{C}$	-	220	270	mV
		$I_F = 100 \text{ mA}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_J = 25 \text{ } ^\circ\text{C}$	-	295	350	mV
		$I_F = 500 \text{ mA}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_J = 25 \text{ } ^\circ\text{C}$	-	420	470	mV
		$I_F = 1 \text{ A}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_J = 25 \text{ } ^\circ\text{C}$	-	540	640	mV
$I_R$	reverse current	$V_R = 10 \text{ V}$ ; pulsed; $T_J = 25 \text{ } ^\circ\text{C}$	[1]	7	20	$\mu\text{A}$
		$V_R = 40 \text{ V}$ ; pulsed; $T_J = 25 \text{ } ^\circ\text{C}$	[1]	30	100	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_J = 25 \text{ } ^\circ\text{C}$	-	43	50	pF

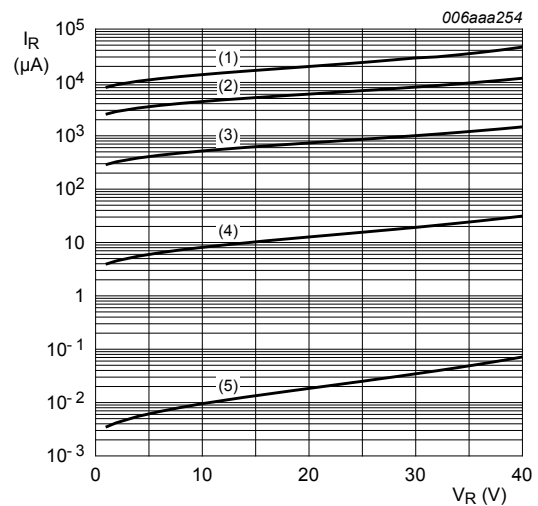
[1] Very short test pulse to prevent junction self-heating.



pulsed condition

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

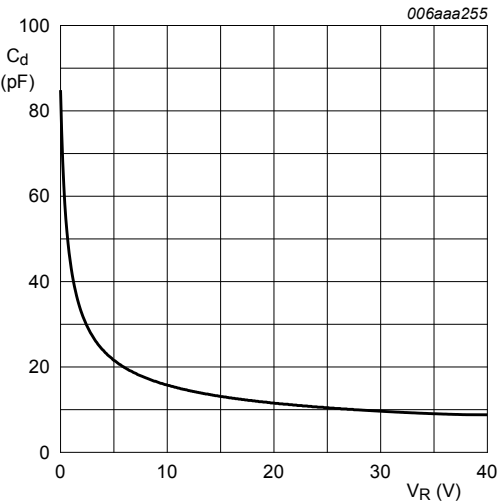
**Fig. 3. Forward current as a function of forward voltage; typical values**



pulsed condition

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

**Fig. 4. Reverse current as a function of reverse voltage; typical values**



f = 1 MHz; T<sub>amb</sub> = 25 °C

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

11. Test information

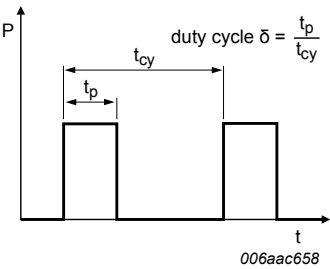


Fig. 6. Duty cycle definition

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

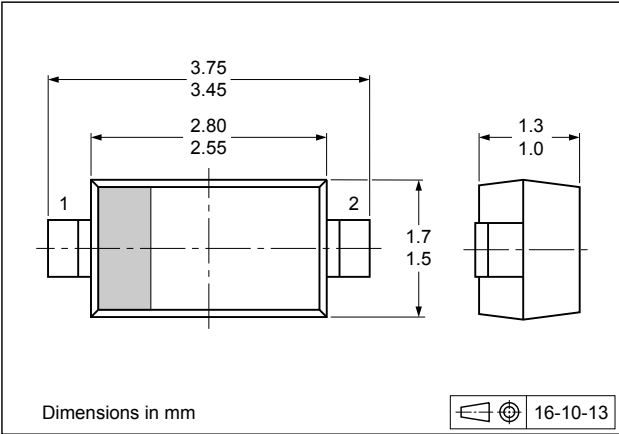


Fig. 7. Package outline SOD123

13. Soldering

SOD123

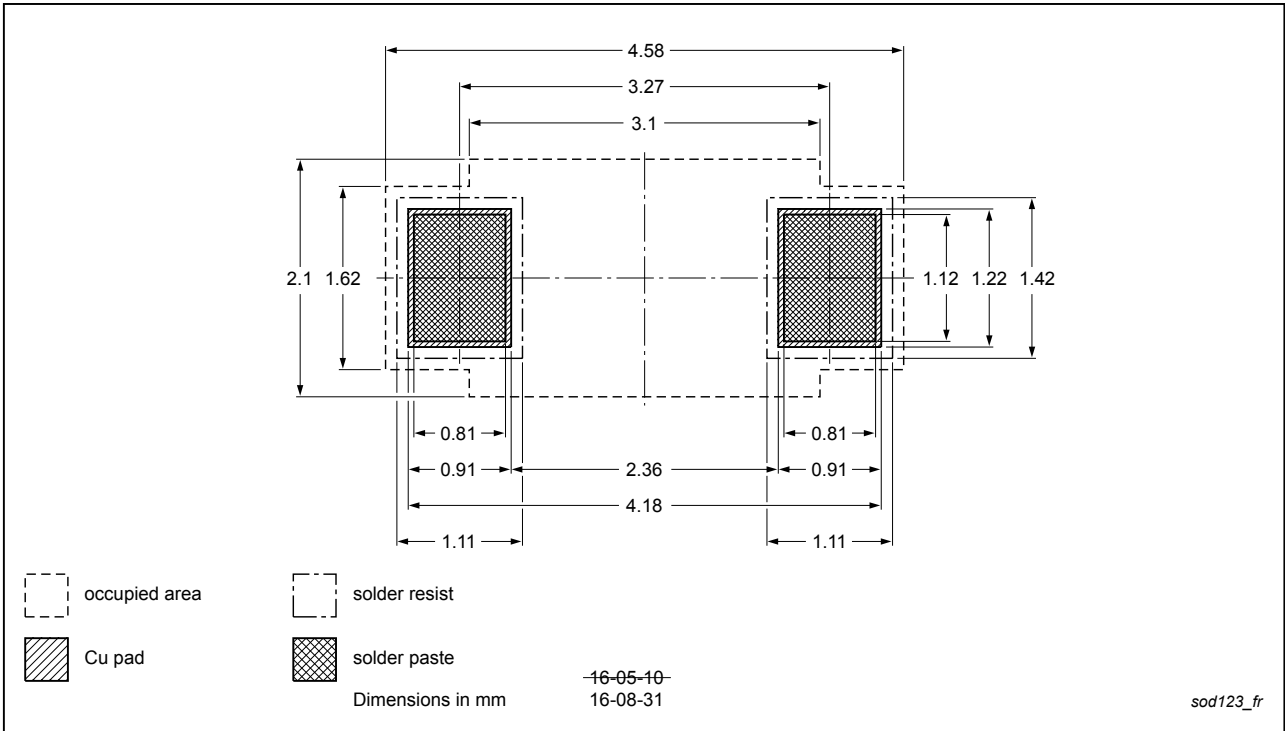


Fig. 8. Reflow soldering footprint for SOD123

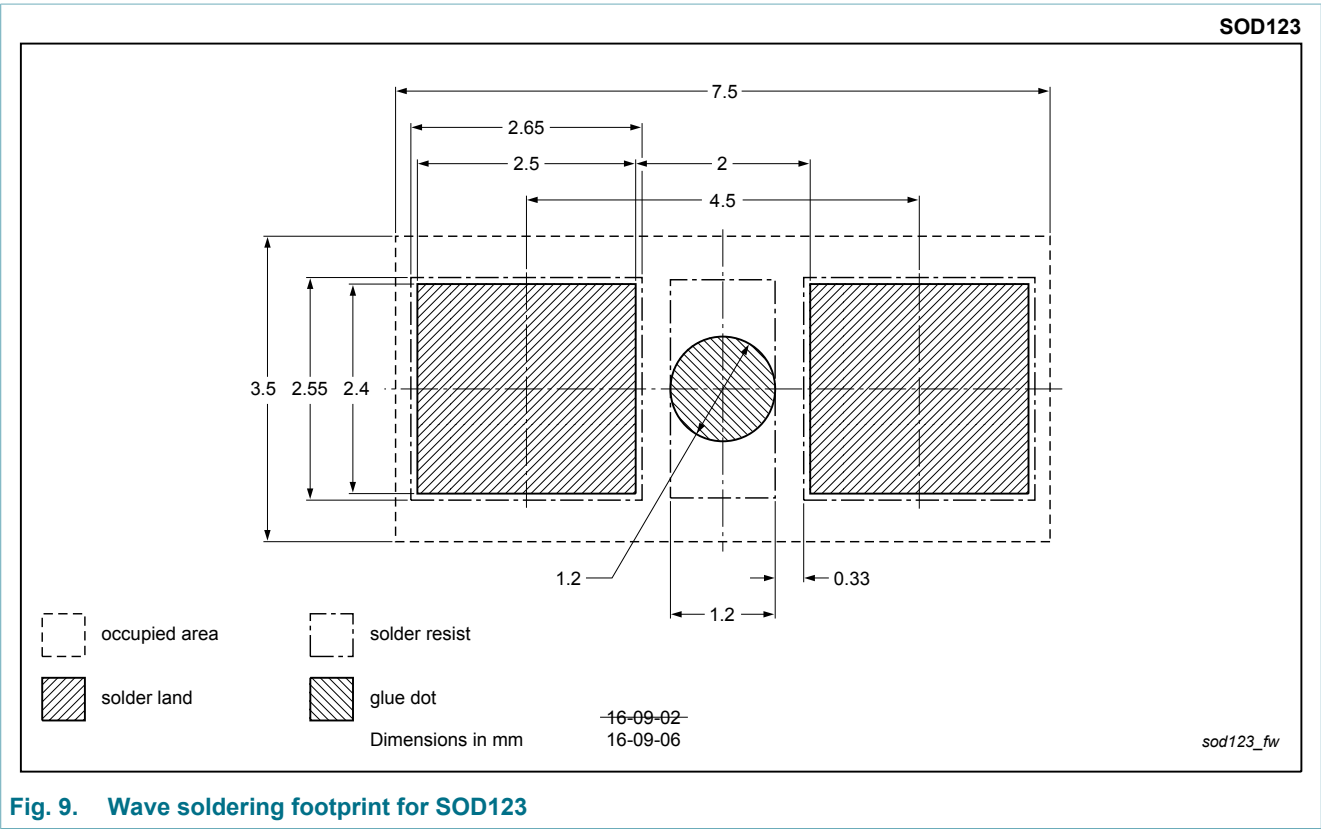


Fig. 9. Wave soldering footprint for SOD123



14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4010EGW v.1	20161207	Product data sheet	-	-

## 15. Legal information

### Data sheet status

Document status <sup>[1] [2]</sup>	Product status <sup>[3]</sup>	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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