



# PMEG4005EGW

40 V, 0.5 A low VF MEGA Schottky barrier rectifier

5 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:  $I_F \leq 0.5$  A
- Reverse voltage:  $V_R \leq 40$  V
- Low forward voltage typ.  $V_F = 420$  mV
- Low reverse current typ.  $I_R = 30$   $\mu$ 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	$T_{sp} \leq 55$ °C	-	-	0.5	A
$V_R$	reverse voltage	$T_j = 25$ °C	-	-	40	V
$V_F$	forward voltage	$I_F = 500$ mA; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C	-	420	470	mV
$I_R$	reverse current	$V_R = 40$ V; pulsed; $T_j = 25$ °C	[1]	30	100	$\mu$ 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	 <i>sym001</i>
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4005EGW	SOD123	Plastic surface-mounted package; 2 leads	SOD123

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4005EGW	G4

## 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	$T_j = 25\text{ °C}$		-	40	V
$I_F$	forward current	$T_{sp} \leq 55\text{ °C}$		-	0.5	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 120\text{ °C}$ ; square wave	[1]	-	0.5	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 145\text{ °C}$ ; square wave		-	0.5	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	$t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$ ; square wave		-	10	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2]	-	400	mW
			[1]	-	660	mW
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-65	150	°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.

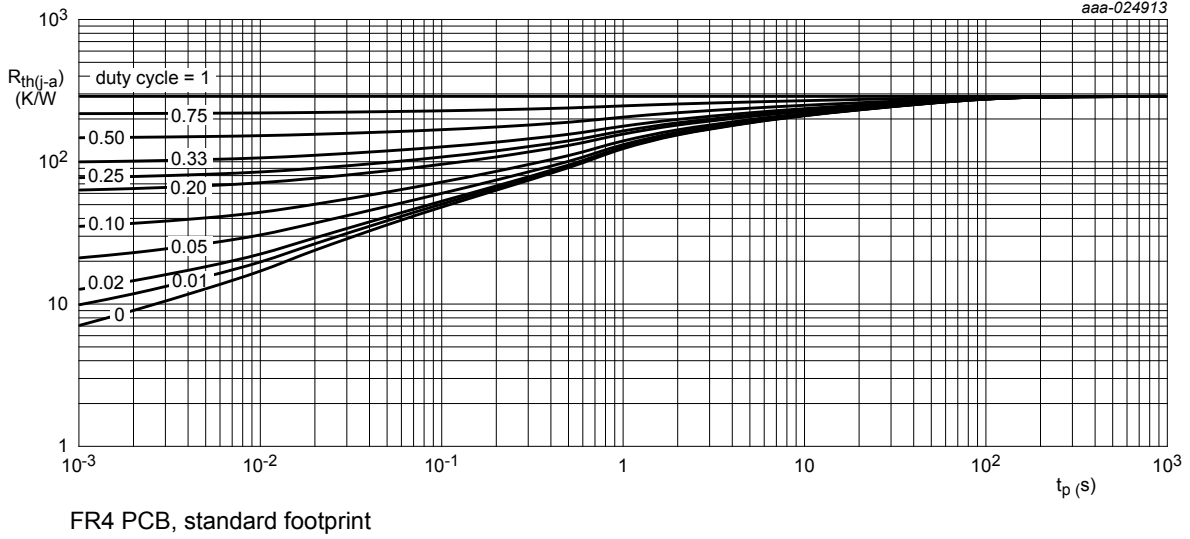


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

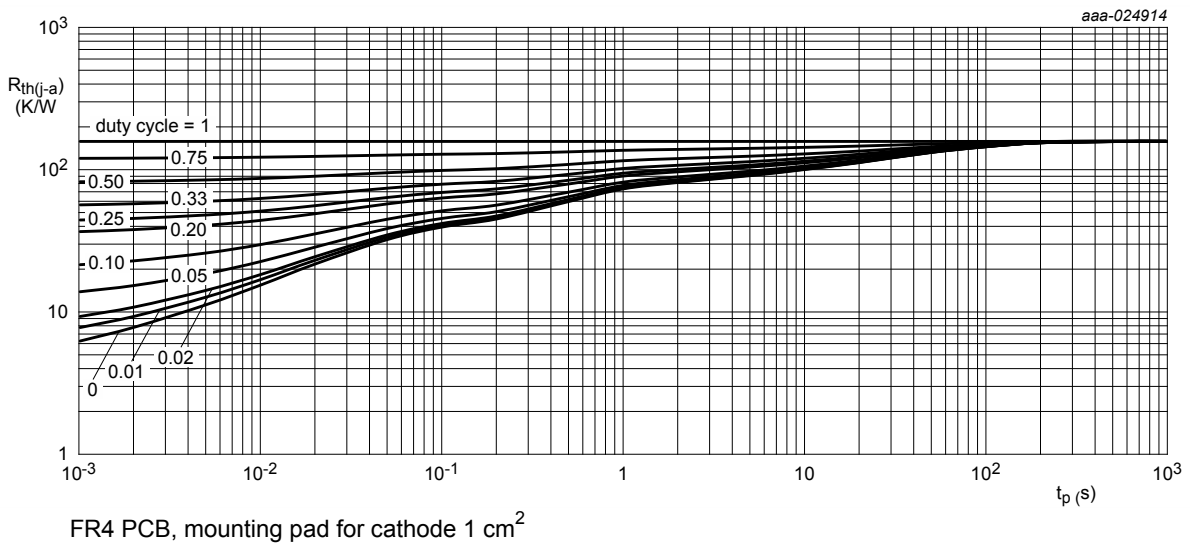


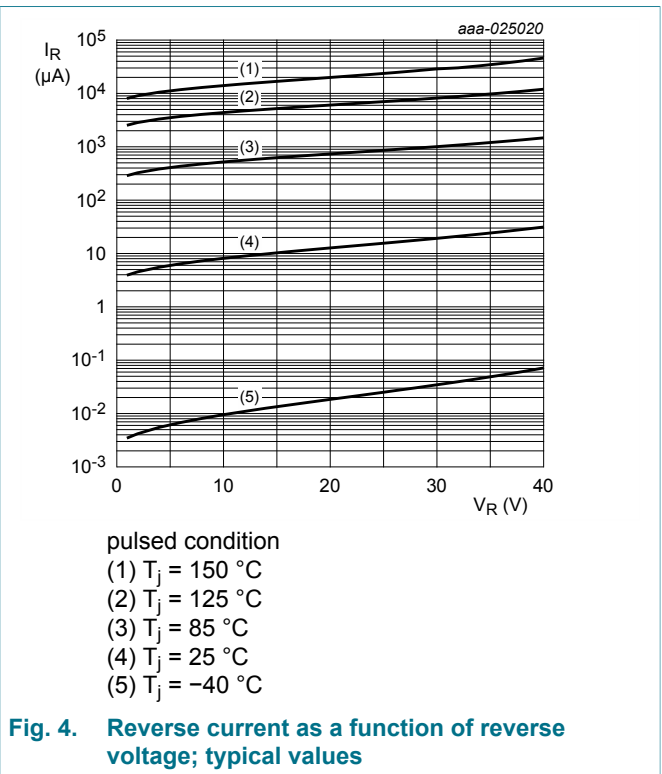
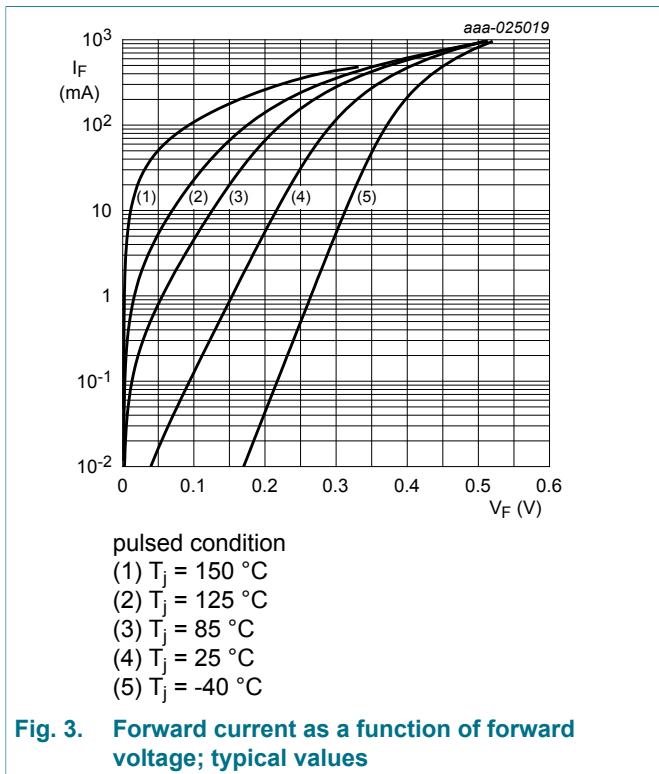
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

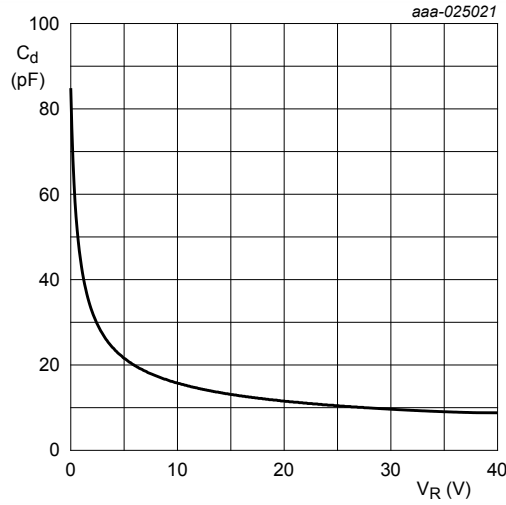
### 10. Characteristics

Table 7. Characteristics

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





f = 1 MHz; T<sub>amb</sub> = 25 °C

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

## 11. Test information

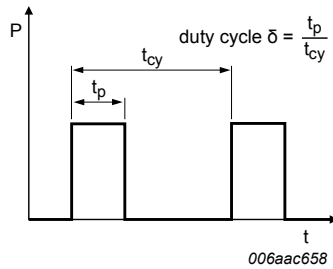


Fig. 6. Duty cycle definition

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

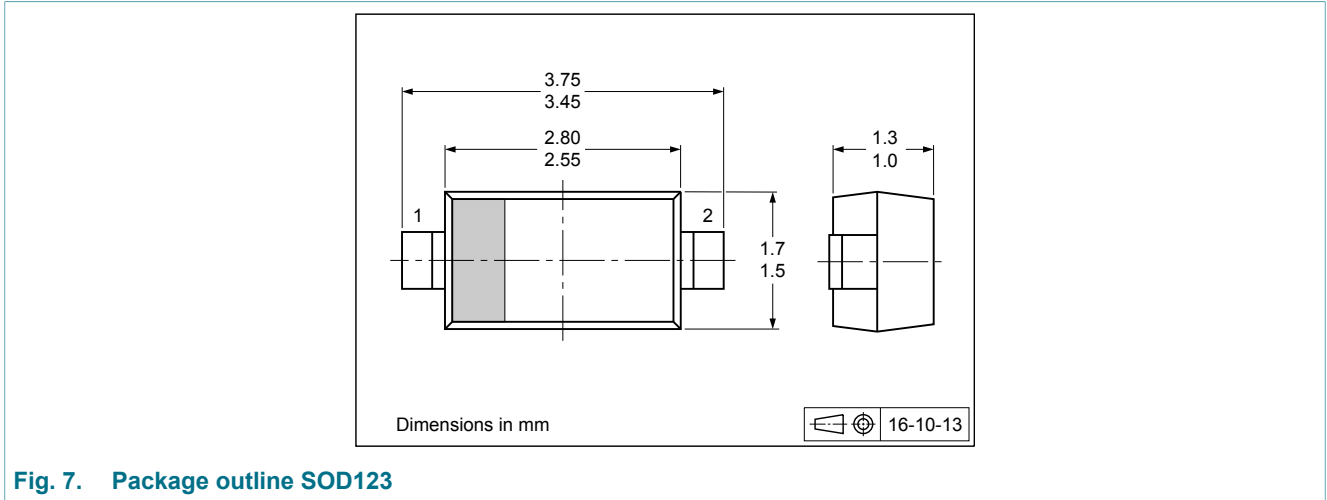


Fig. 7. Package outline SOD123

## 13. Soldering

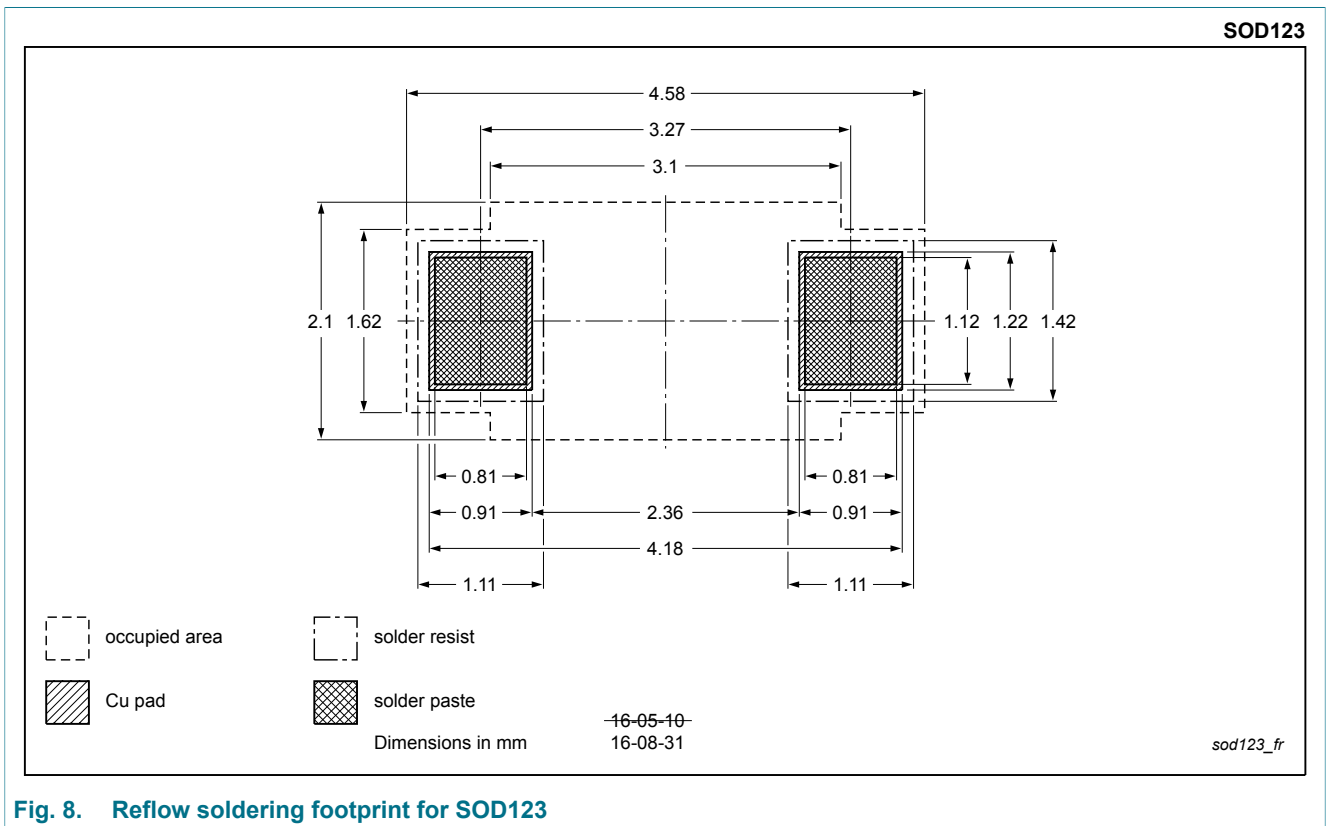


Fig. 8. Reflow soldering footprint for SOD123

SOD123

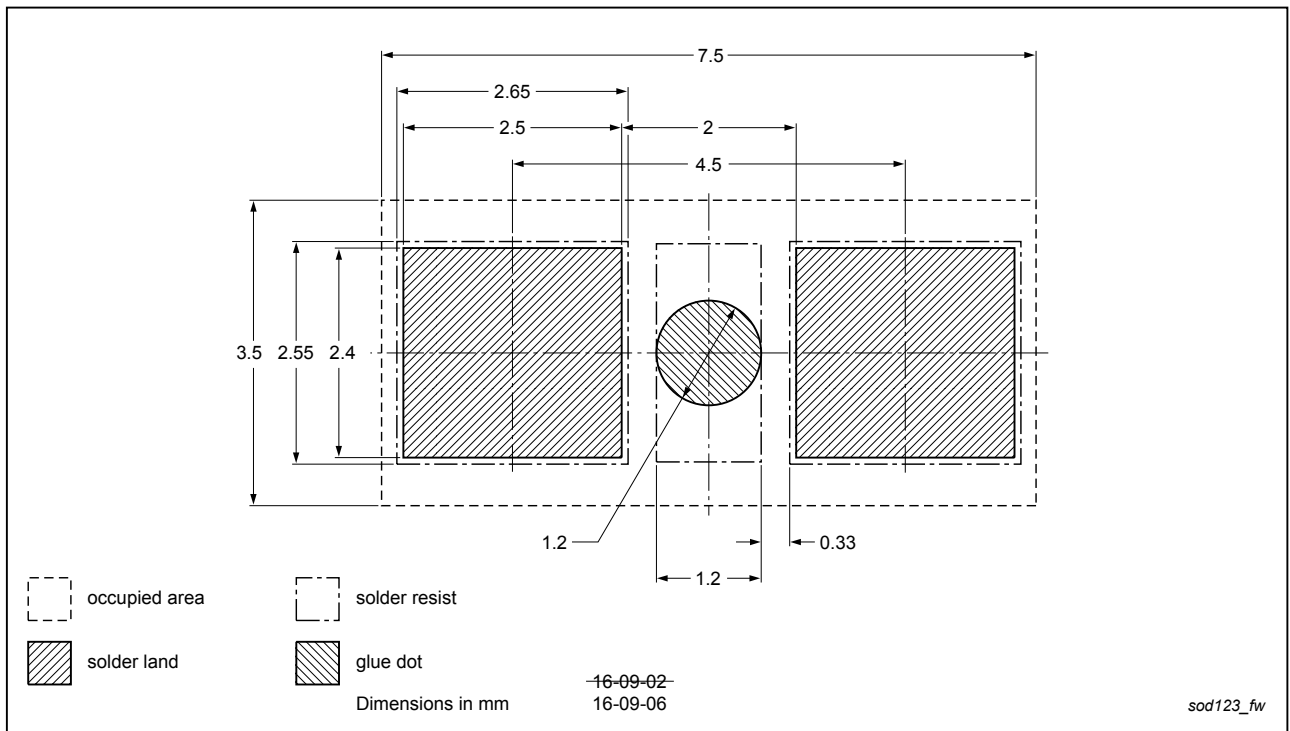


Fig. 9. Wave soldering footprint for SOD123



## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4005EGW v.2	20161205	Product data sheet	-	PMEG4005EGW v.1
Modifications:	<ul style="list-style-type: none"><li>Product status changed</li></ul>			
PMEG4005EGW v.1	20161123	Preliminary 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 05 December 2016

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