

# PMEG4030ER

3 A low  $V_F$  MEGA Schottky barrier rectifier

Rev. 01 — 11 August 2009

Product data sheet

## 1. Product profile

### 1.1 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.

### 1.2 Features

- Average forward current:  $I_{F(AV)} \leq 3$  A
- Reverse voltage:  $V_R \leq 40$  V
- Low forward voltage
- High power capability due to clip-bond technology
- AEC-Q101 qualified
- Small and flat lead SMD plastic package

### 1.3 Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications

### 1.4 Quick reference data



**Table 1. Quick reference data**  
 $T_j = 25$  °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$ ; $f = 20$ kHz				
		$T_{amb} \leq 40$ °C	[1]	-	3	A
		$T_{sp} \leq 130$ °C	-	-	3	A
$V_R$	reverse voltage		-	-	40	V
$V_F$	forward voltage	$I_F = 3$ A	-	460	540	mV
$I_R$	reverse current	$V_R = 40$ V	-	25	100	$\mu$ A

[1] Device mounted on a ceramic Printed-Circuit Board (PCB),  $Al_2O_3$ , standard footprint.

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode	[1]	1  2
2	anode		<i>sym001</i>

[1] The marking bar indicates the cathode.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4030ER	-	plastic surface-mounted package; 2 leads	SOD123W

## 4. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4030ER	BF

## 5. 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
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$ ; $f = 20\text{ kHz}$			
		$T_{amb} \leq 40\text{ °C}$	[1] -	3	A
		$T_{sp} \leq 130\text{ °C}$	-	3	A
$I_{FSM}$	non-repetitive peak forward current	square wave; $t_p = 8\text{ ms}$	[2] -	50	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[3][4] -	0.57	W
			[3][5] -	0.95	W
			[3][1] -	1.8	W

**Table 5. Limiting values ...continued***In accordance with the Absolute Maximum Rating System (IEC 60134).*

Symbol	Parameter	Conditions	Min	Max	Unit
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-55	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1] Device mounted on a ceramic PCB,  $Al_2O_3$ , standard footprint.[2]  $T_j = 25$  °C prior to surge.

[3] Reflow soldering is the only recommended soldering method.

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

[5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

## 6. 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]				
			[3]	-	-	220	K/W
			[4]	-	-	130	K/W
			[5]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	-	18	K/W

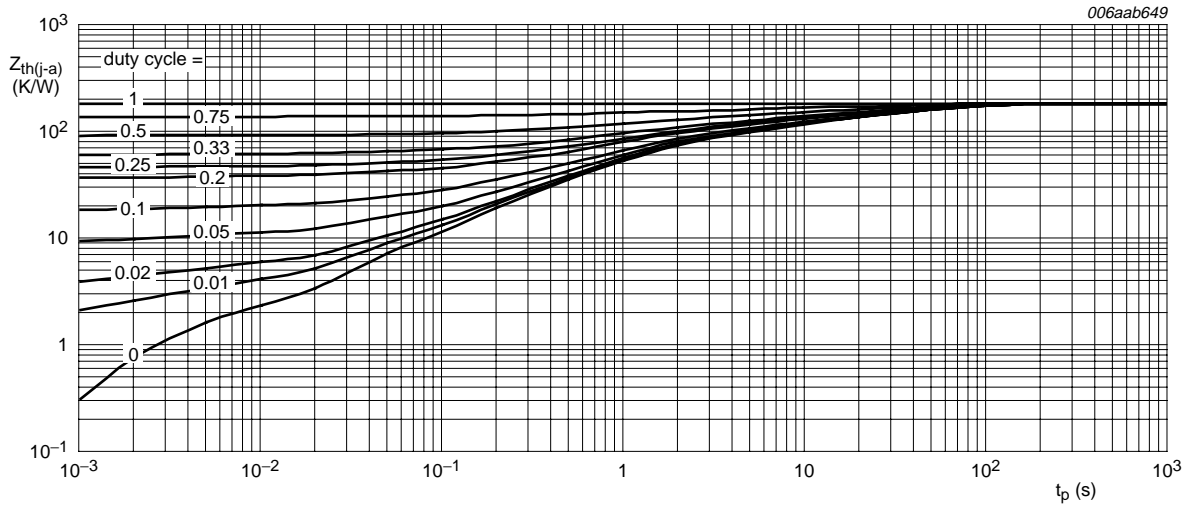
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses.

[2] Reflow soldering is the only recommended soldering method.

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

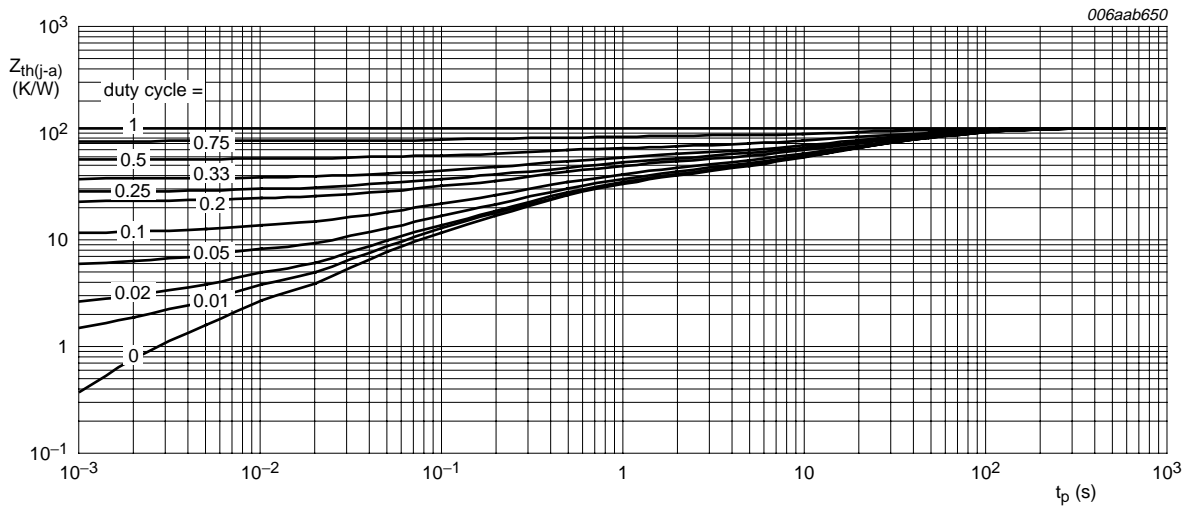
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.[5] Device mounted on a ceramic PCB,  $Al_2O_3$ , standard footprint.

[6] Soldering point of cathode tab.



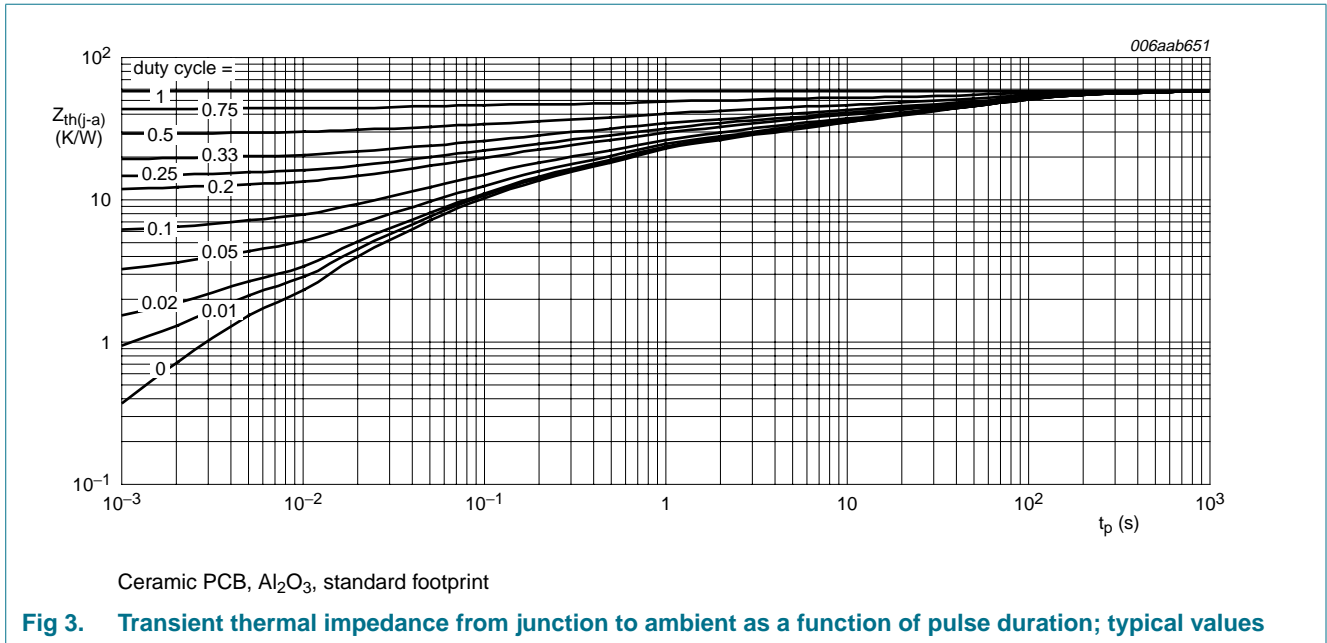
FR4 PCB, standard footprint

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>

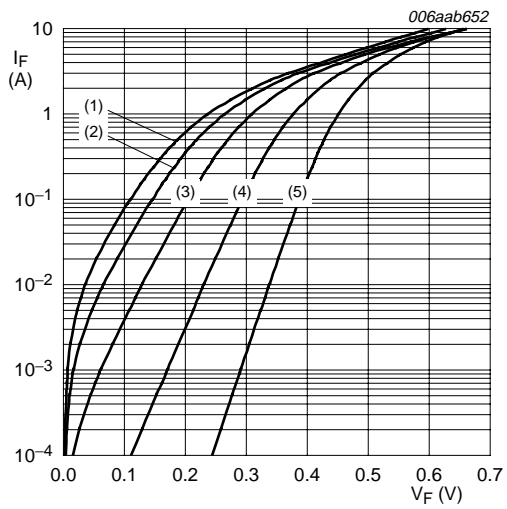
Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



## 7. Characteristics

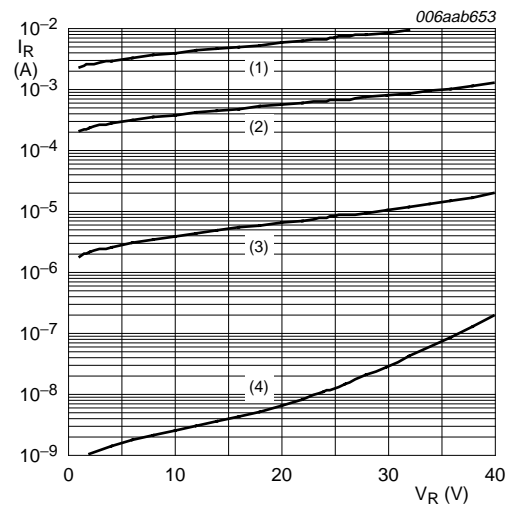
**Table 7. Characteristics**  
*T<sub>j</sub> = 25 °C unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 0.1 A	-	295	330	mV
		I <sub>F</sub> = 1 A	-	380	440	mV
		I <sub>F</sub> = 3 A	-	460	540	mV
I <sub>R</sub>	reverse current	V <sub>R</sub> = 10 V	-	5	-	μA
		V <sub>R</sub> = 40 V	-	25	100	μA
C <sub>d</sub>	diode capacitance	f = 1 MHz				
		V <sub>R</sub> = 1 V	-	250	-	pF
		V <sub>R</sub> = 10 V	-	95	-	pF



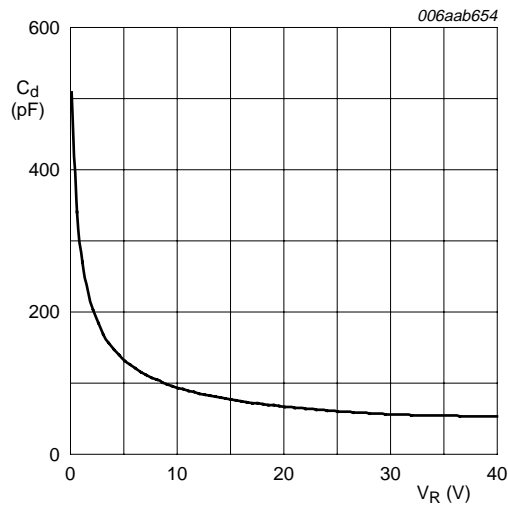
- (1)  $T_j = 150\text{ }^\circ\text{C}$
- (2)  $T_j = 125\text{ }^\circ\text{C}$
- (3)  $T_j = 85\text{ }^\circ\text{C}$
- (4)  $T_j = 25\text{ }^\circ\text{C}$
- (5)  $T_j = -40\text{ }^\circ\text{C}$

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



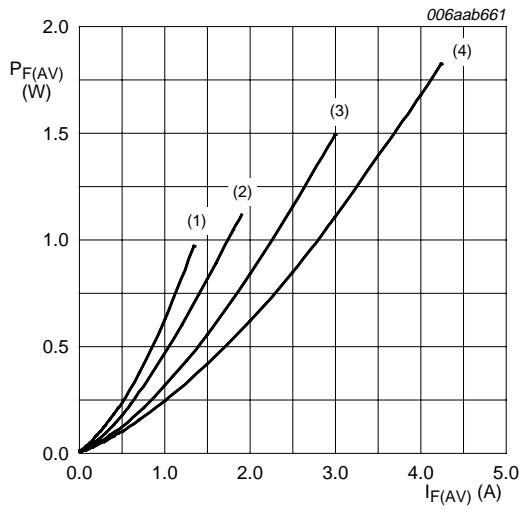
- (1)  $T_j = 125\text{ }^\circ\text{C}$
- (2)  $T_j = 85\text{ }^\circ\text{C}$
- (3)  $T_j = 25\text{ }^\circ\text{C}$
- (4)  $T_j = -40\text{ }^\circ\text{C}$

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



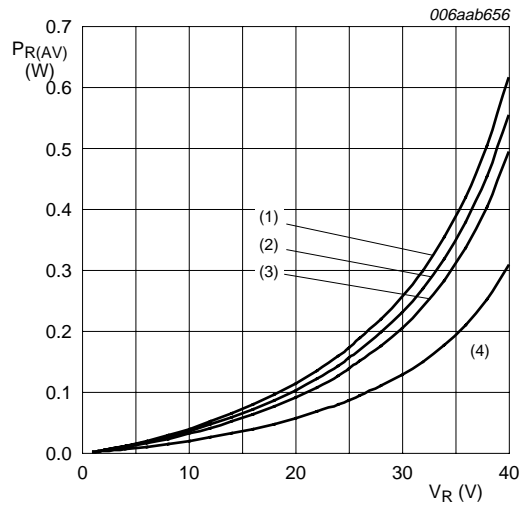
$f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

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



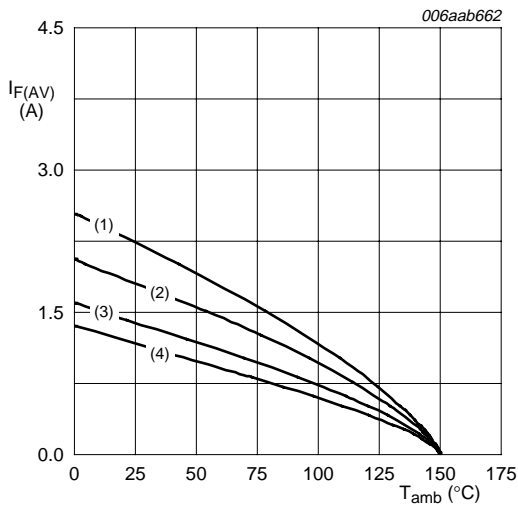
- $T_j = 150\text{ °C}$
- (1)  $\delta = 0.1$
  - (2)  $\delta = 0.2$
  - (3)  $\delta = 0.5$
  - (4)  $\delta = 1$

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



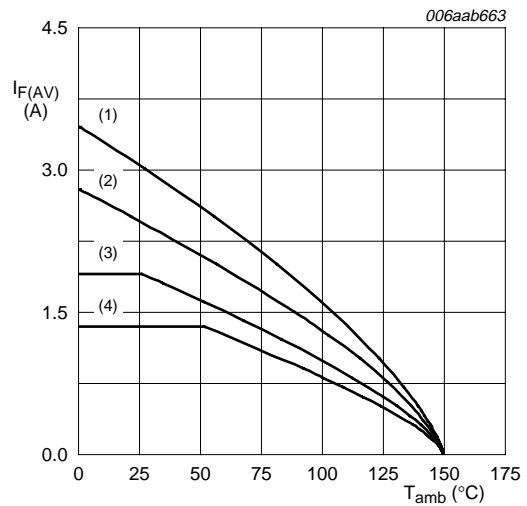
- $T_j = 125\text{ °C}$
- (1)  $\delta = 1$
  - (2)  $\delta = 0.9$
  - (3)  $\delta = 0.8$
  - (4)  $\delta = 0.5$

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



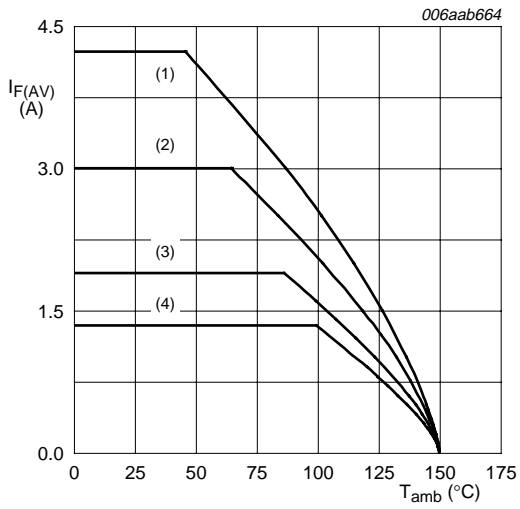
- FR4 PCB, standard footprint  
 $T_j = 150\text{ °C}$
- (1)  $\delta = 1$ ; DC
  - (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$
  - (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$
  - (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



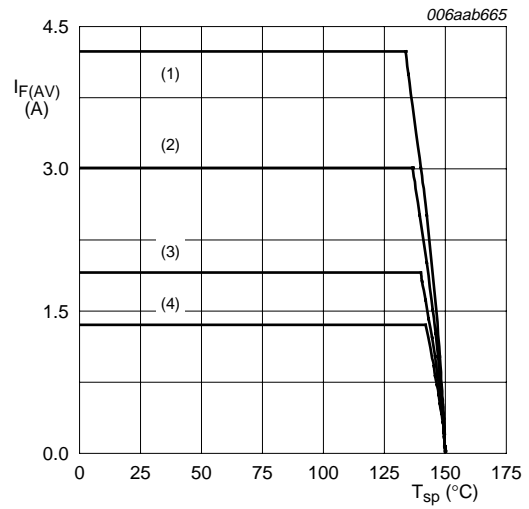
- FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$   
 $T_j = 150\text{ °C}$
- (1)  $\delta = 1$ ; DC
  - (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$
  - (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$
  - (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



Ceramic PCB,  $Al_2O_3$ , standard footprint  
 $T_j = 150\text{ °C}$   
 (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 11. Average forward current as a function of ambient temperature; typical values**

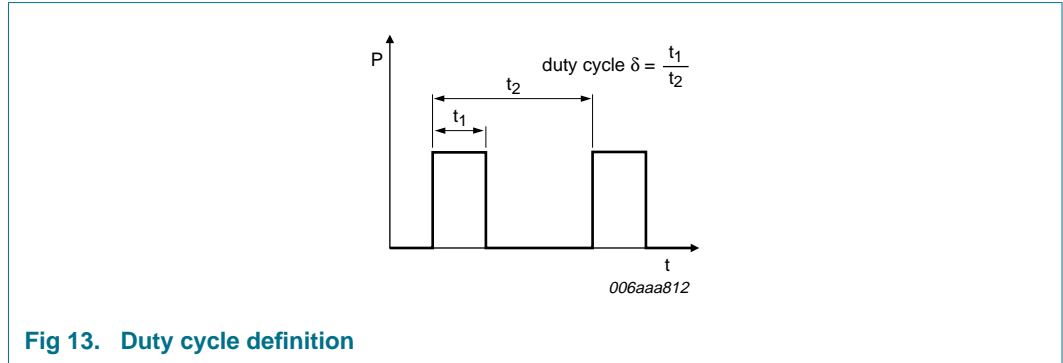


$T_j = 150\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ; f = 20 kHz  
 (3)  $\delta = 0.2$ ; f = 20 kHz  
 (4)  $\delta = 0.1$ ; f = 20 kHz

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



## 8. Test information

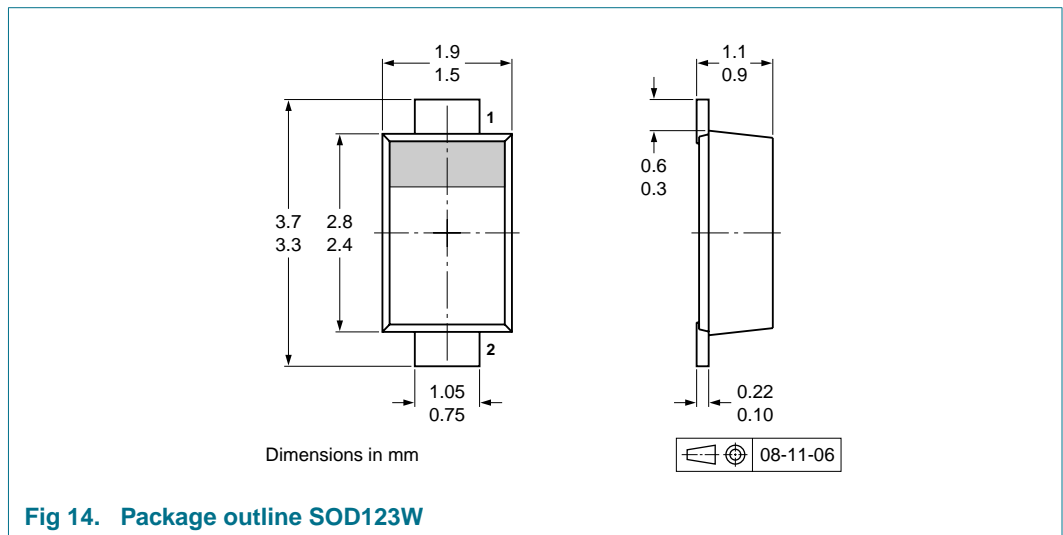


The current ratings for the typical waveforms as shown in [Figure 9](#), [10](#), [11](#) and [12](#) are calculated according to the equations:  $I_{F(AV)} = I_M \times \delta$  with  $I_M$  defined as peak current,  $I_{RMS} = I_{F(AV)}$  at DC, and  $I_{RMS} = I_M \times \sqrt{\delta}$  with  $I_{RMS}$  defined as RMS current.

### 8.1 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.

## 9. Package outline



## 10. Packing information

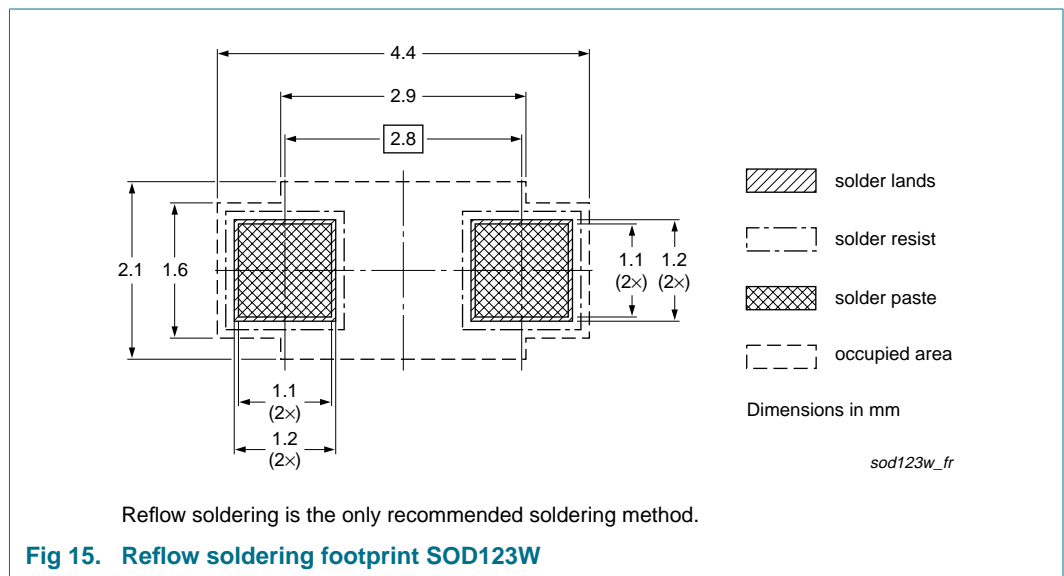
**Table 8. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity
			<b>3000</b>
PMEG4030ER	SOD123W	4 mm pitch, 8 mm tape and reel	-115

[1] For further information and the availability of packing methods, see [Section 14](#).

## 11. Soldering



## 12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4030ER_1	20090811	Product data sheet	-	-

## 13. Legal information

### 13.1 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.

[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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**15. Contents**

**1 Product profile . . . . . 1**

1.1 General description . . . . . 1

1.2 Features . . . . . 1

1.3 Applications . . . . . 1

1.4 Quick reference data . . . . . 1

**2 Pinning information . . . . . 2**

**3 Ordering information . . . . . 2**

**4 Marking . . . . . 2**

**5 Limiting values . . . . . 2**

**6 Thermal characteristics . . . . . 3**

**7 Characteristics . . . . . 5**

**8 Test information . . . . . 9**

8.1 Quality information . . . . . 9

**9 Package outline . . . . . 9**

**10 Packing information . . . . . 10**

**11 Soldering . . . . . 10**

**12 Revision history . . . . . 11**

**13 Legal information . . . . . 12**

13.1 Data sheet status . . . . . 12

13.2 Definitions . . . . . 12

13.3 Disclaimers . . . . . 12

13.4 Trademarks . . . . . 12

**14 Contact information . . . . . 12**

**15 Contents . . . . . 13**

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