

PMEG4010ER

1 A low V_F MEGA Schottky barrier rectifier

Rev. 01 — 9 December 2008

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.

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1.2 Features

- Average forward current: $I_{F(AV)} \leq 1$ 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					
		$T_{amb} \leq 115$ °C	[1]	-	-	1	A
		$T_{sp} \leq 140$ °C	-	-	-	1	A
V_R	reverse voltage		-	-	40	V	
V_F	forward voltage	$I_F = 1$ A	-	430	490	mV	
I_R	reverse current	$V_R = 40$ V	-	10	50	μ 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		sym001

[1] The marking bar indicates the cathode.

3. Ordering information

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Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4010ER	-	plastic surface-mounted package; 2 leads	SOD123W

4. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4010ER	BD

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; $\delta = 0.5$; $f = 20\text{ kHz}$			
		$T_{amb} \leq 115\text{ °C}$	[1] -	1	A
		$T_{sp} \leq 140\text{ °C}$	-	1	A
I_{FSM}	non-repetitive peak forward current	square wave; $t_p = 8\text{ ms}$	[2] -	25	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, Al₂O₃, 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 cm².

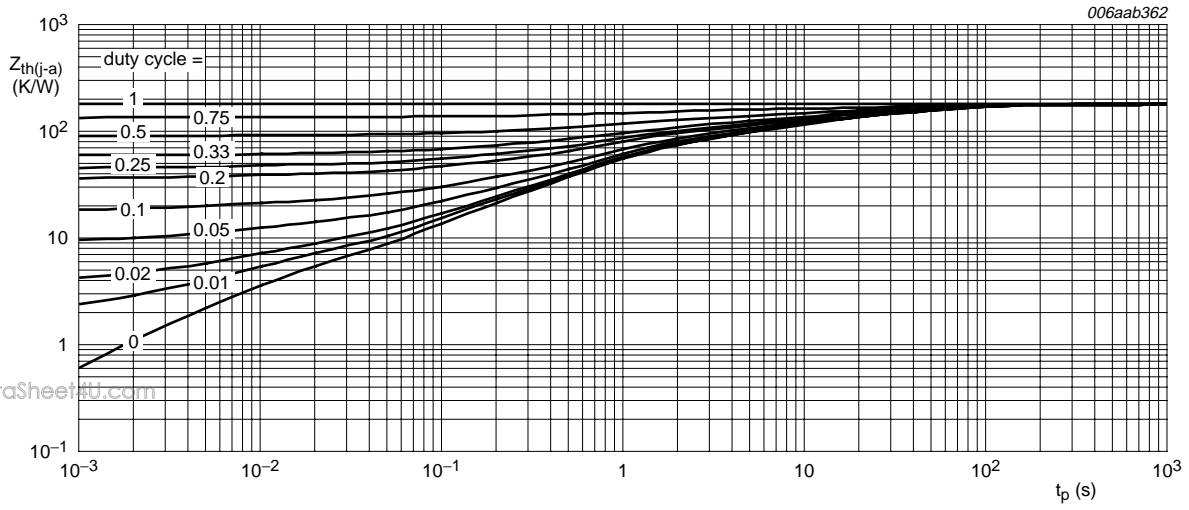
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6. Thermal characteristics

Table 6. Thermal characteristics

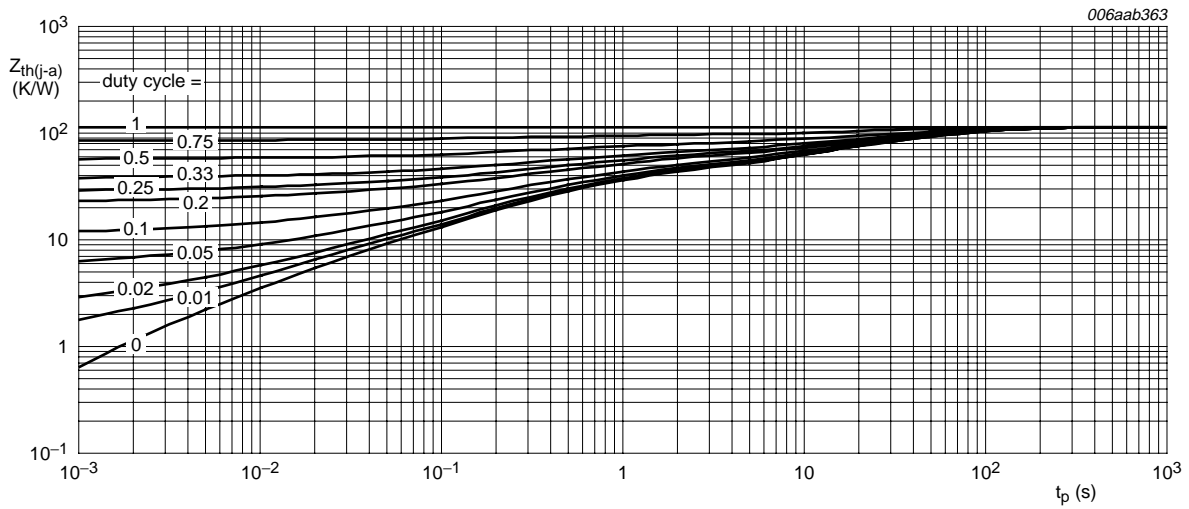
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]				
			[3]	-	-	220	K/W
			[4]	-	-	130	K/W
			[5]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	-	18	K/W

- [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 cm².
- [5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [6] Soldering point of cathode tab.



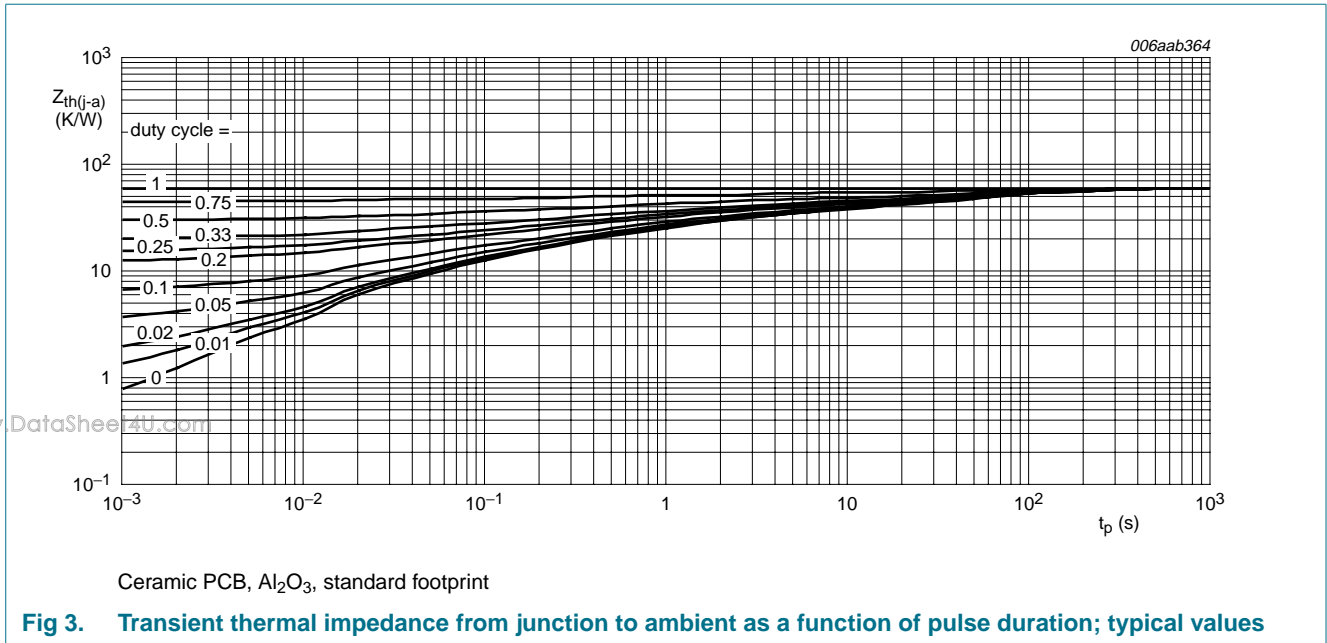
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

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

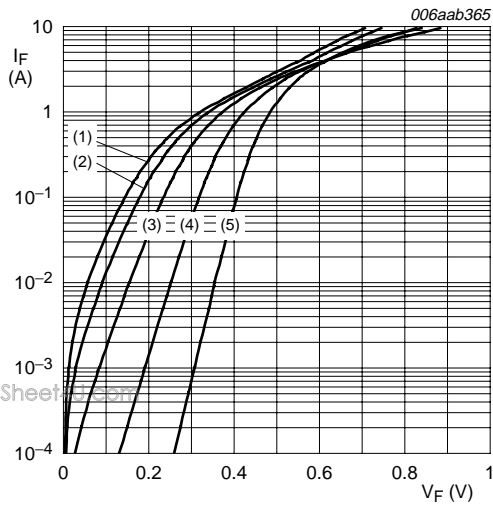


7. Characteristics

Table 7. Characteristics

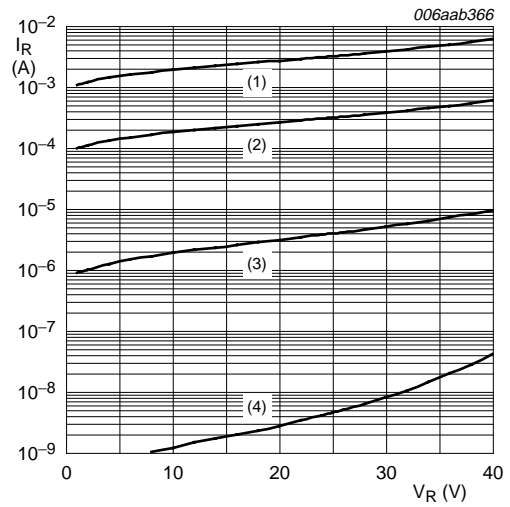
$T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	$I_F = 0.1\text{ A}$	-	310	360	mV
		$I_F = 1\text{ A}$	-	430	490	mV
I_R	reverse current	$V_R = 10\text{ V}$	-	3	13	μA
		$V_R = 40\text{ V}$	-	10	50	μA
C_d	diode capacitance	$f = 1\text{ MHz}$				
		$V_R = 1\text{ V}$	-	130	-	pF
		$V_R = 10\text{ V}$	-	50	-	pF



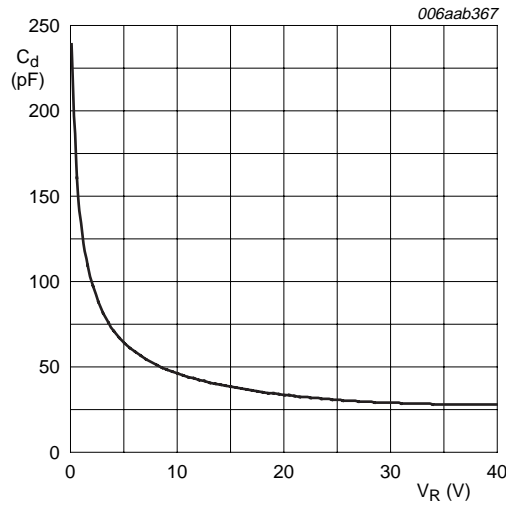
- (1) $T_j = 150\text{ °C}$
- (2) $T_j = 125\text{ °C}$
- (3) $T_j = 85\text{ °C}$
- (4) $T_j = 25\text{ °C}$
- (5) $T_j = -40\text{ °C}$

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



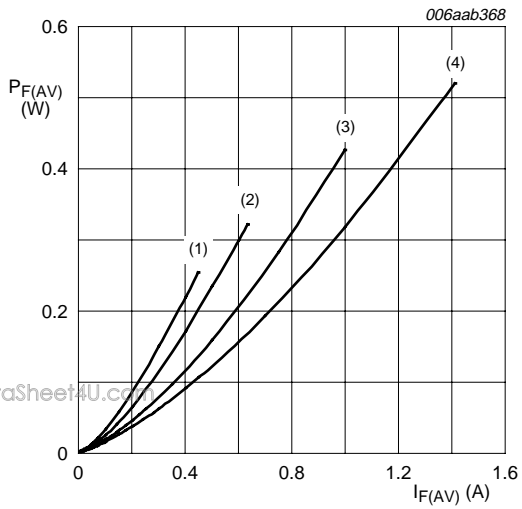
- (1) $T_j = 125\text{ °C}$
- (2) $T_j = 85\text{ °C}$
- (3) $T_j = 25\text{ °C}$
- (4) $T_j = -40\text{ °C}$

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



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

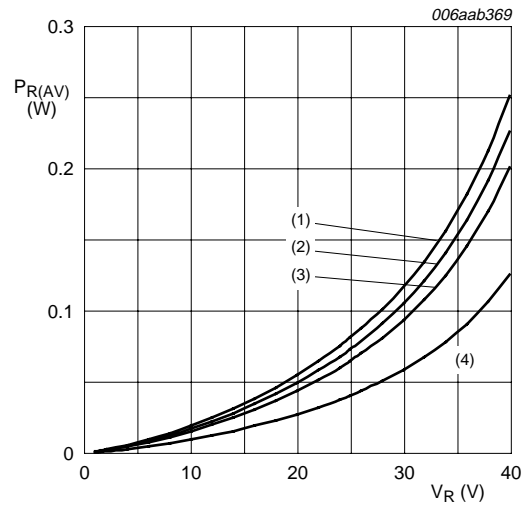
Fig 6. Diode capacitance as a function of reverse voltage; typical values



$T_j = 150\text{ °C}$

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

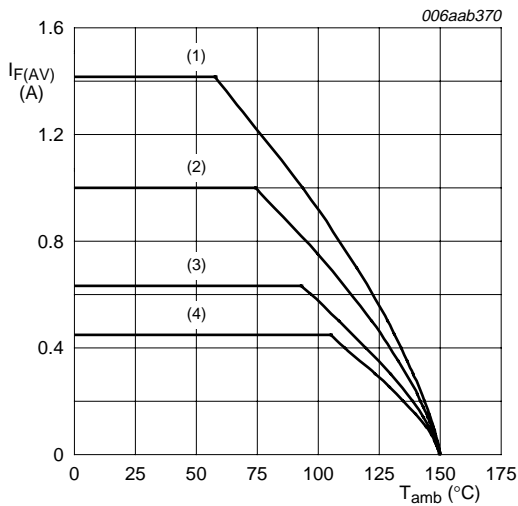
Fig 7. Average forward power dissipation as a function of average forward current; typical values



$T_j = 125\text{ °C}$

- (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

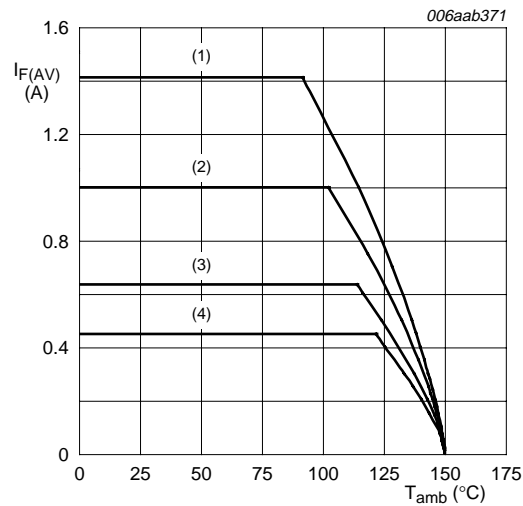


FR4 PCB, standard footprint

$T_j = 150\text{ °C}$

- (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

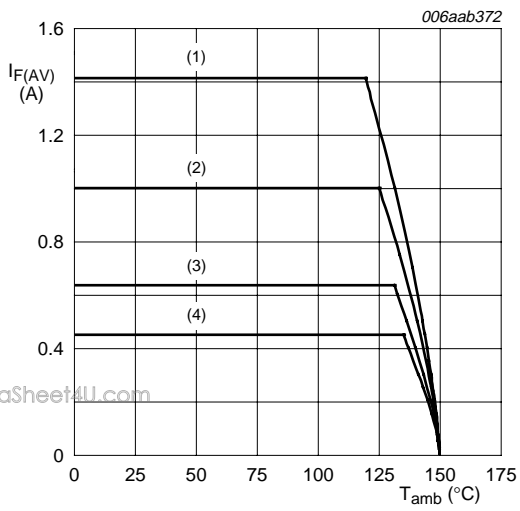


FR4 PCB, mounting pad for cathode 1 cm^2

$T_j = 150\text{ °C}$

- (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

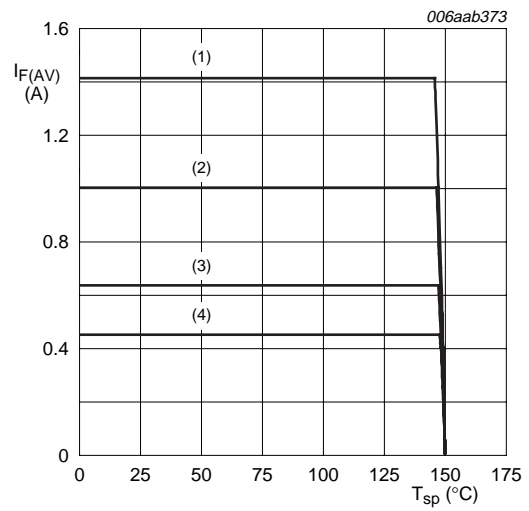


Ceramic PCB, Al_2O_3 , standard footprint

$T_j = 150$ °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

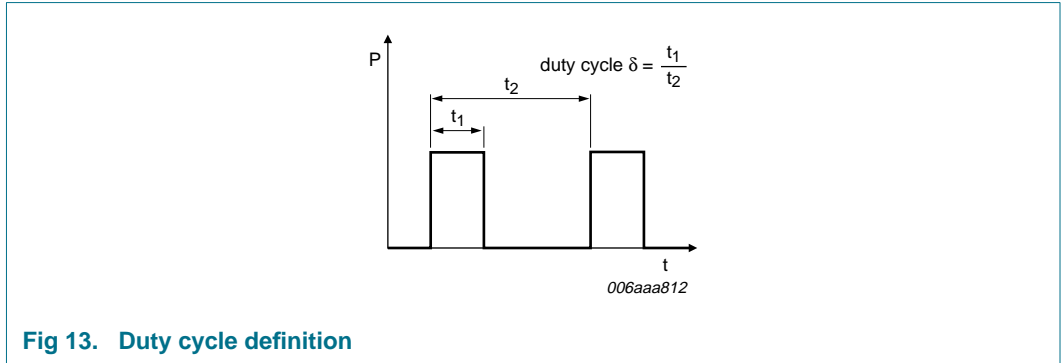


$T_j = 150$ °C

- (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



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Fig 13. Duty cycle definition

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

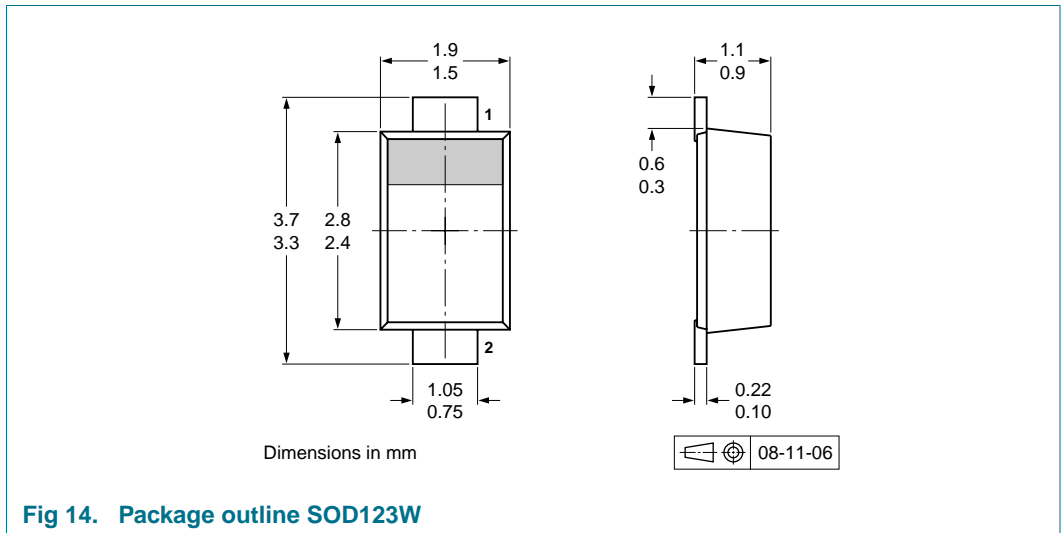


Fig 14. Package outline SOD123W

10. Packing information

Table 8. Packing methods

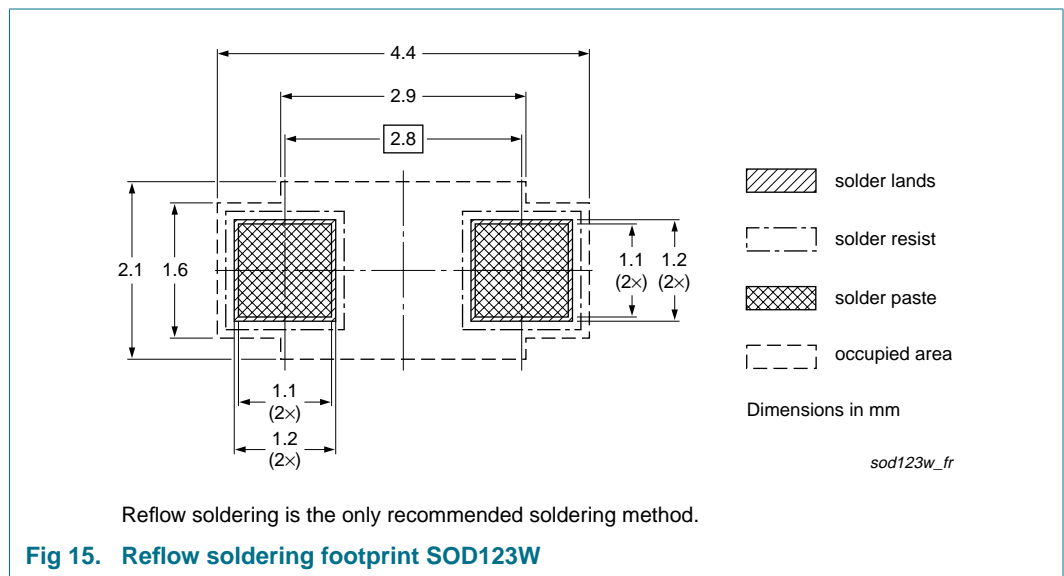
The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity
			3000
PMEG4010ER	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

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12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4010ER_1	20081209	Product data sheet	-	-

13. Legal information

13.1 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.

[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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