



# PMEG4005EPK

40 V, 0.5 A low VF MEGA Schottky barrier rectifier

Rev. 2 — 6 March 2012

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 leadless ultra small SOD1608 (DFN1608D-2) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

### 1.2 Features and benefits

- Average forward current:  $I_{F(AV)} \leq 0.5$  A
- Reverse voltage:  $V_R \leq 40$  V
- Low forward voltage  $V_F \leq 590$  mV
- Low reverse current
- AEC-Q101 qualified
- Solderable side pads
- Package height typ. 0.37 mm
- Ultra small and leadless SMD plastic package

### 1.3 Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- LED backlight for mobile application
- Low power consumption applications
- Ultra high-speed switching
- Reverse polarity protection

### 1.4 Quick reference data

Table 1. Quick reference data

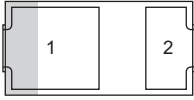

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20$ kHz; $T_{amb} \leq 115$ °C; square wave	-	-	0.5	A
		$\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 140$ °C; square wave	-	-	0.5	A
$V_R$	reverse voltage	$T_j = 25$ °C	-4		0	V
$V_F$	forward voltage	$I_F = 500$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C	-	530	590	mV
$I_R$	reverse current	$V_R = 1$ 0V; $T_j = 25$ °C	-	0.4	2	$\mu$ A
$t_{rr}$	reverse recovery time	$I_R = 0.5$ A; $I_F = 0.5$ A; $I_{R(meas)} = 0.1$ A; $T_j = 25$ °C	-2		-n	s

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al<sub>2</sub>O<sub>3</sub>, standard footprint.



## 2. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode <sup>[1]</sup>	 <p>Transparent top view</p> <p><b>SOD1608 (DFN1608D-2)</b></p>	 <p><i>sym001</i></p>
2	A	anode		

[1] The marking bar indicates the cathode.

## 3. Ordering information

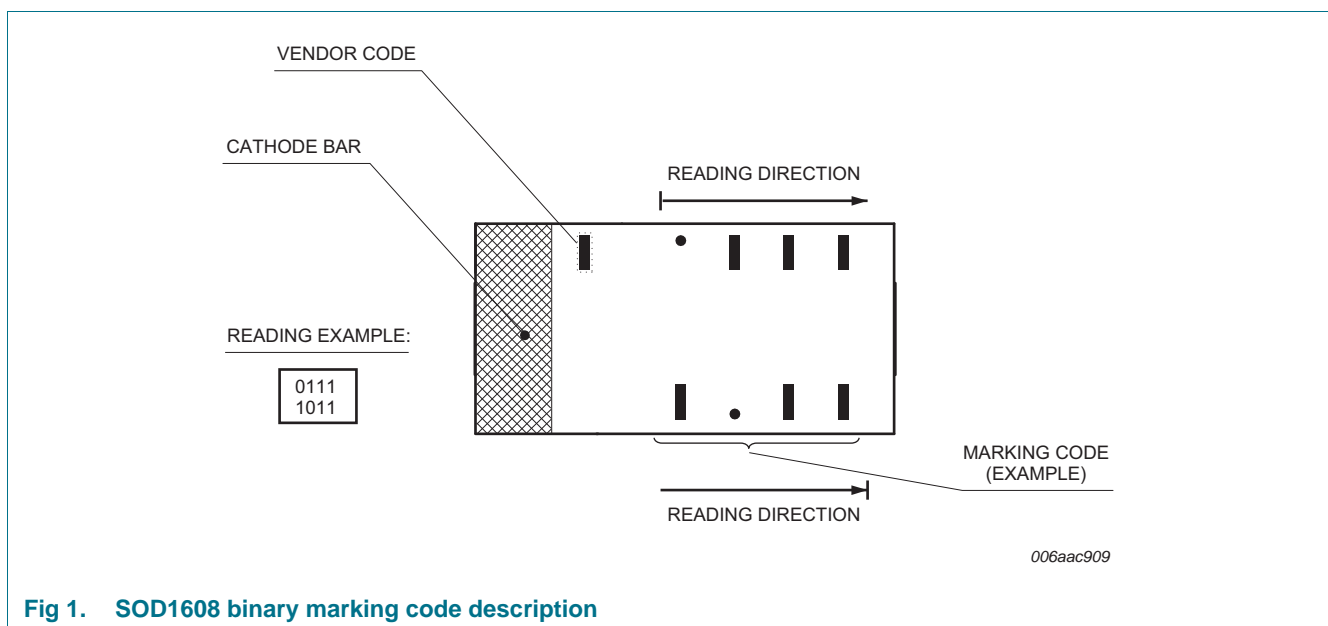
**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
PMEG4005EPK	DFN1608D-2	Leadless ultra small plastic package; 2 terminals	SOD1608

## 4. Marking

**Table 4. Marking codes**

Type number	Marking code
PMEG4005EPK	0010 0000



## 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
$I_F$	forward current	$T_{sp} \leq 135\text{ °C}$	-	0.7	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{amb} \leq 115\text{ °C}$	[1]	0.5	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{sp} \leq 140\text{ °C}$	-0	.5	A
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\text{ ms}$ ; $\delta \leq 0.25$	-	2	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; square wave	-	3	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2][3]	390	mW
			[4][3]	830	mW
			[1][3]	1470	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 a ceramic Printed-Circuit Board (PCB),  $\text{Al}_2\text{O}_3$ , standard footprint.

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

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

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

## 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]	-	320	K/W
			[1][4][3]	-	150	K/W
			[1][5][3]	-	85	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	20	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.

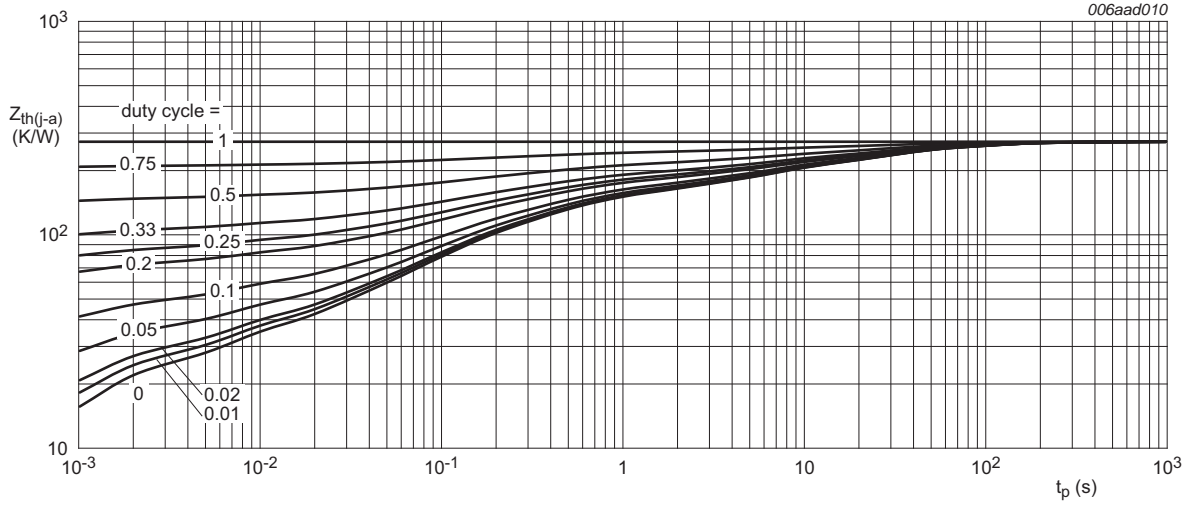
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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

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

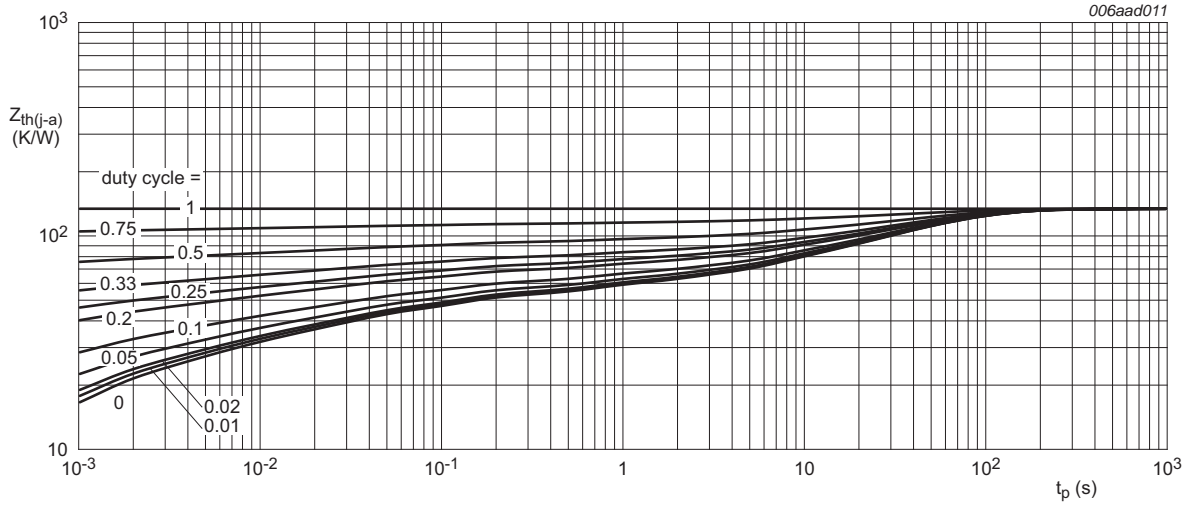
[5] Device mounted on a ceramic PCB,  $\text{Al}_2\text{O}_3$ , standard footprint.

[6] Soldering point of cathode tab.



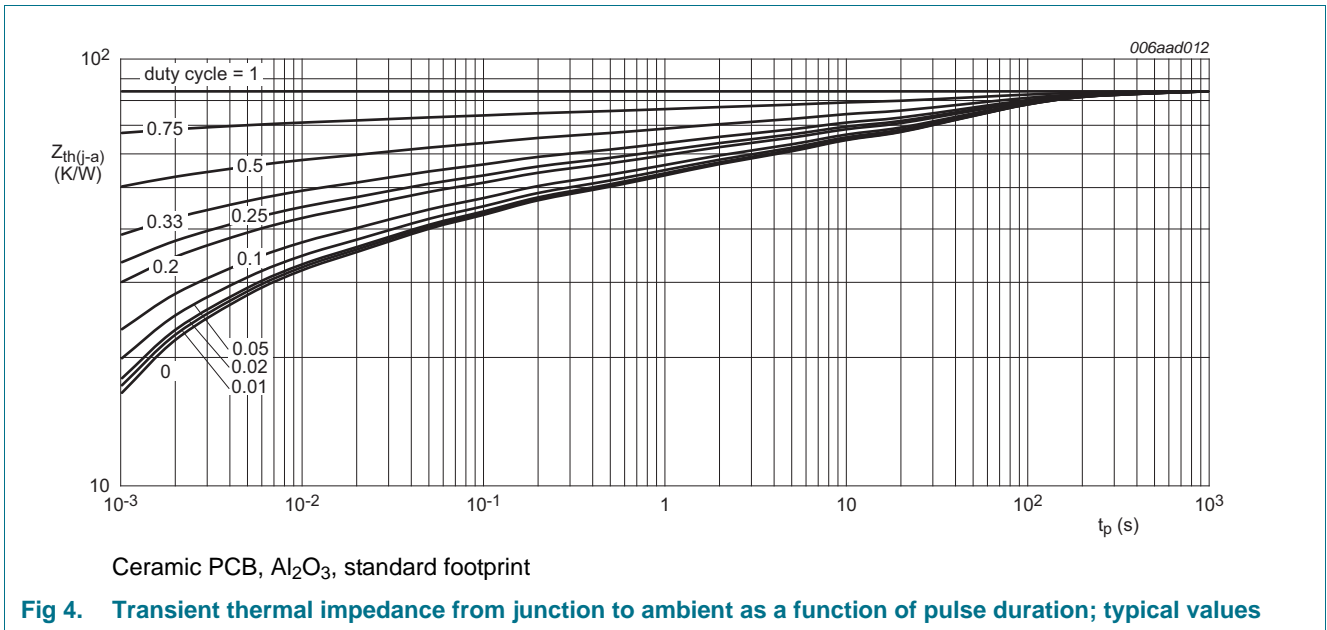
FR4 PCB, standard footprint

Fig 2. 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>

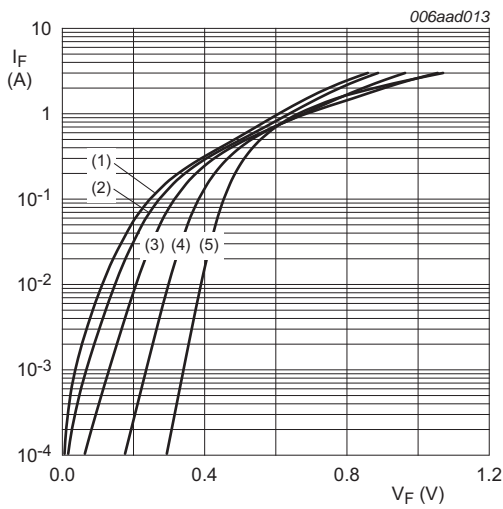
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



## 7. Characteristics

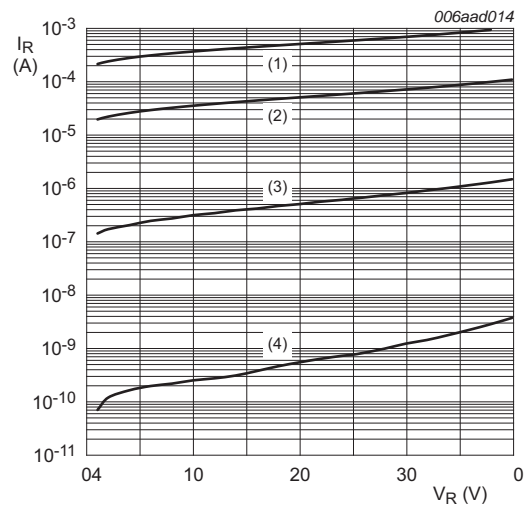
**Table 7. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 100 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>j</sub> = 25 °C	-	380	420	mV
		I <sub>F</sub> = 500 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>j</sub> = 25 °C	-	530	590	mV
I <sub>R</sub>	reverse current	V <sub>R</sub> = 1.0 V; T <sub>j</sub> = 25 °C	-	0.4	2	μA
		V <sub>R</sub> = 4.0 V; T <sub>j</sub> = 25 °C	-	2	10	μA
C <sub>d</sub>	diode capacitance	V <sub>R</sub> = 1 V; f = 1 MHz; T <sub>j</sub> = 25 °C	-	30	35	pF
		V <sub>R</sub> = 1.0 V; f = 1 MHz; T <sub>j</sub> = 25 °C	-	10	15	pF
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 0.5 A; I <sub>R</sub> = 0.5 A; I <sub>R(meas)</sub> = 0.1 A; T <sub>j</sub> = 25 °C	-2	-	-n	s
V <sub>FRM</sub>	peak forward recovery voltage	I <sub>F</sub> = 0.5 A; dI <sub>F</sub> /dt = 20 A/μs; T <sub>j</sub> = 25 °C	-	545	-	mV



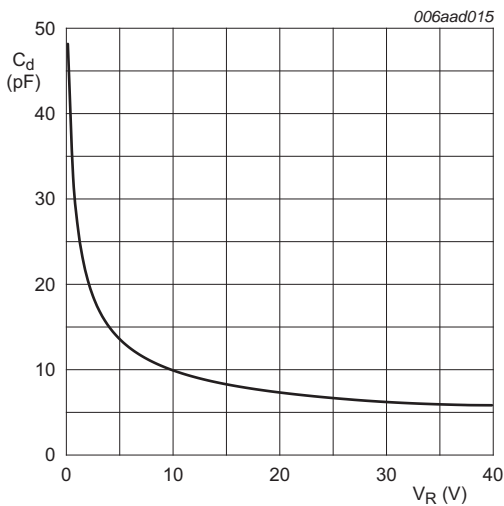
- (1)  $T_j = 150\text{ °C}$
- (2)  $T_j = 125\text{ °C}$
- (3)  $T_j = 85\text{ °C}$
- (4)  $T_j = 25\text{ °C}$
- (5)  $T_j = -40\text{ °C}$

**Fig 5. Forward current as a function of forward voltage; typical values**



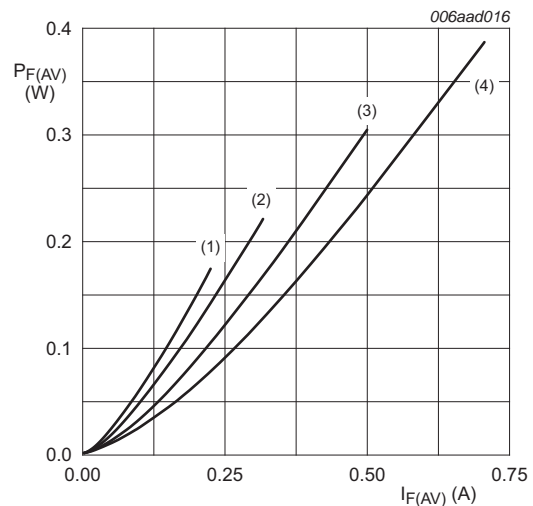
- (1)  $T_j = 125\text{ °C}$
- (2)  $T_j = 85\text{ °C}$
- (3)  $T_j = 25\text{ °C}$
- (4)  $T_j = -40\text{ °C}$

**Fig 6. Reverse current as a function of reverse voltage; typical values**



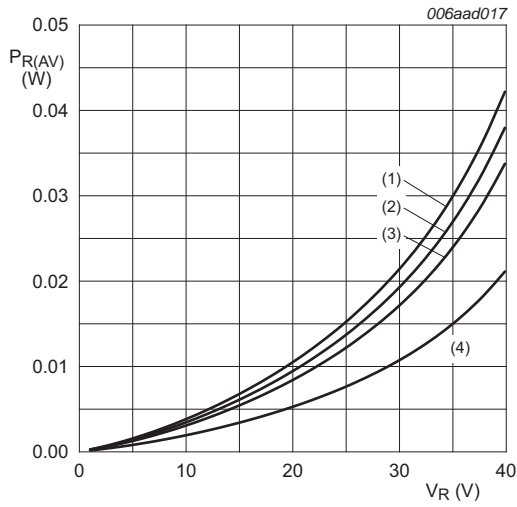
$f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$

**Fig 7. Diode capacitance as a function of reverse voltage; typical values**



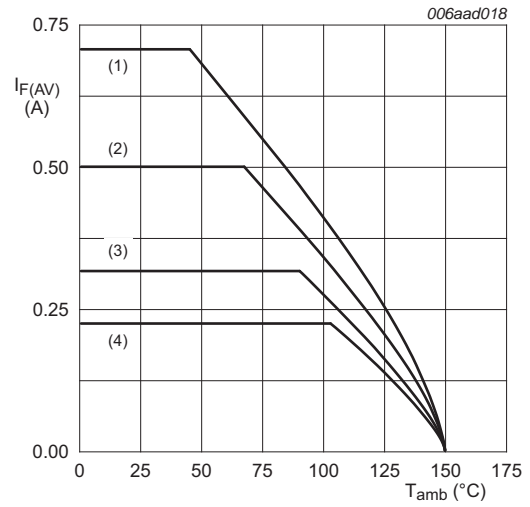
- $T_j = 150\text{ °C}$
- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$

**Fig 8. Average forward power dissipation as a function of average forward current; typical values**



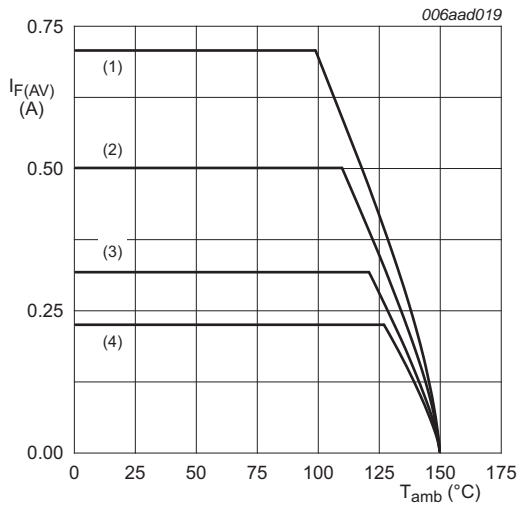
$T_j = 125\text{ °C}$   
 (1)  $\delta = 1$   
 (2)  $\delta = 0.9$   
 (3)  $\delta = 0.8$   
 (4)  $\delta = 0.5$

**Fig 9. Average reverse power dissipation as a function of reverse voltage; typical values**



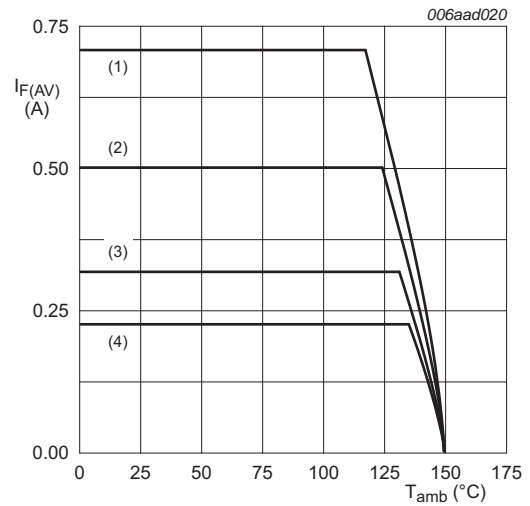
FR4 PCB, standard footprint  
 $T_j = 150\text{ °C}$   
 (1)  $\delta = 1$  (DC)  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



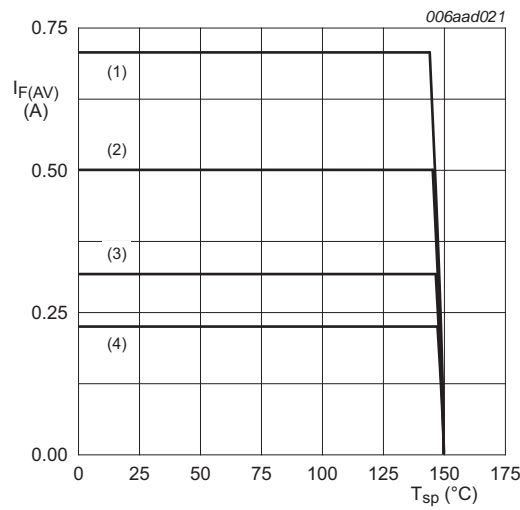
FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$   
 $T_j = 150\text{ °C}$   
 (1)  $\delta = 1$  (DC)  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

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



Ceramic PCB,  $\text{Al}_2\text{O}_3$ , 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 12. Average forward current as a function of ambient temperature; typical values**



$T_j = 150\text{ °C}$

(1)  $\delta = 1$  (DC)

(2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$

(3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$

(4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

Fig 13. Average forward current as a function of solder point temperature; typical values

## 8. Test information

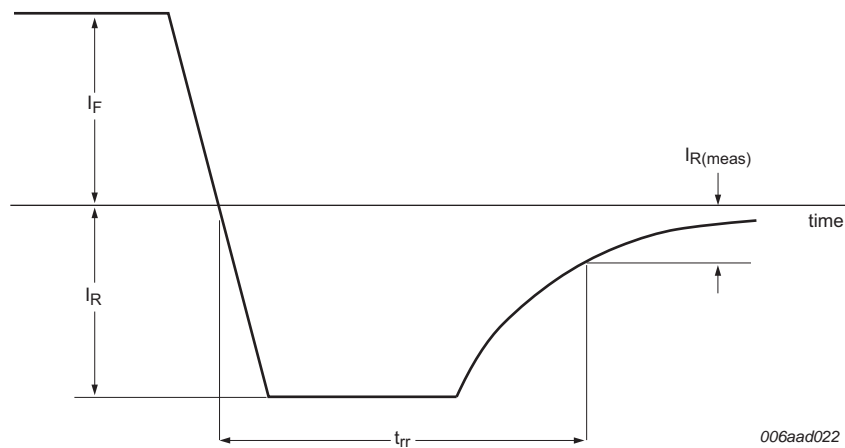
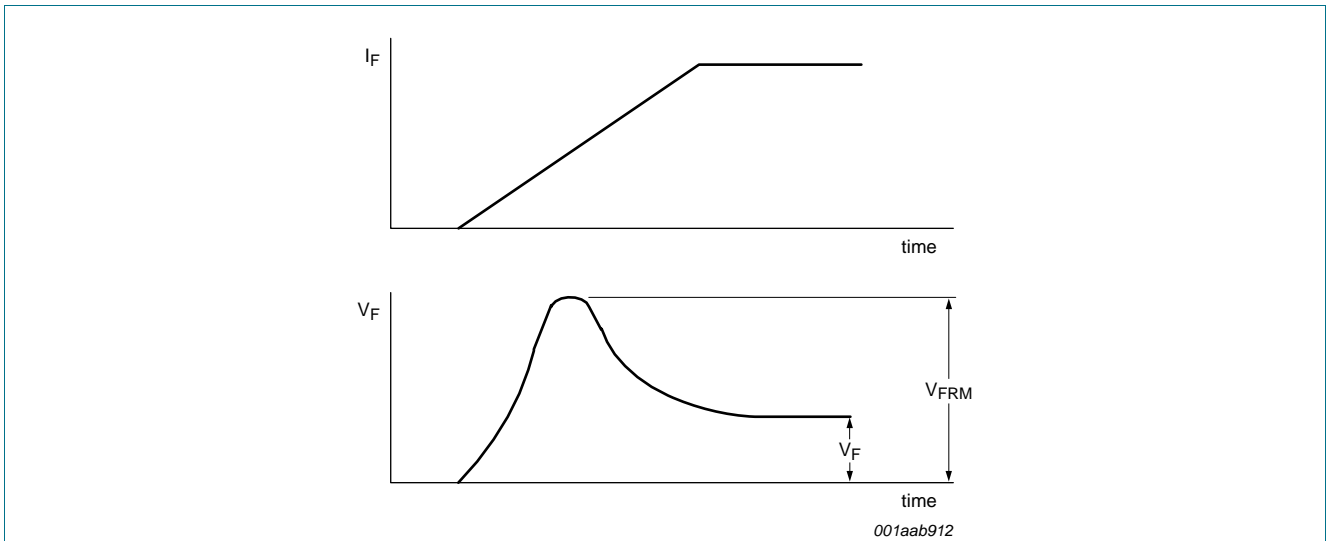
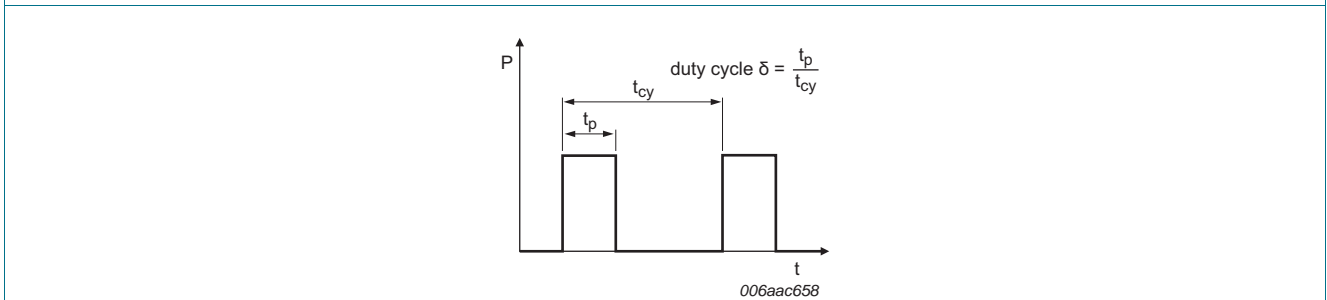


Fig 14. Reverse recovery definition





**Fig 15. Forward recovery definition**



**Fig 16. 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.

### 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

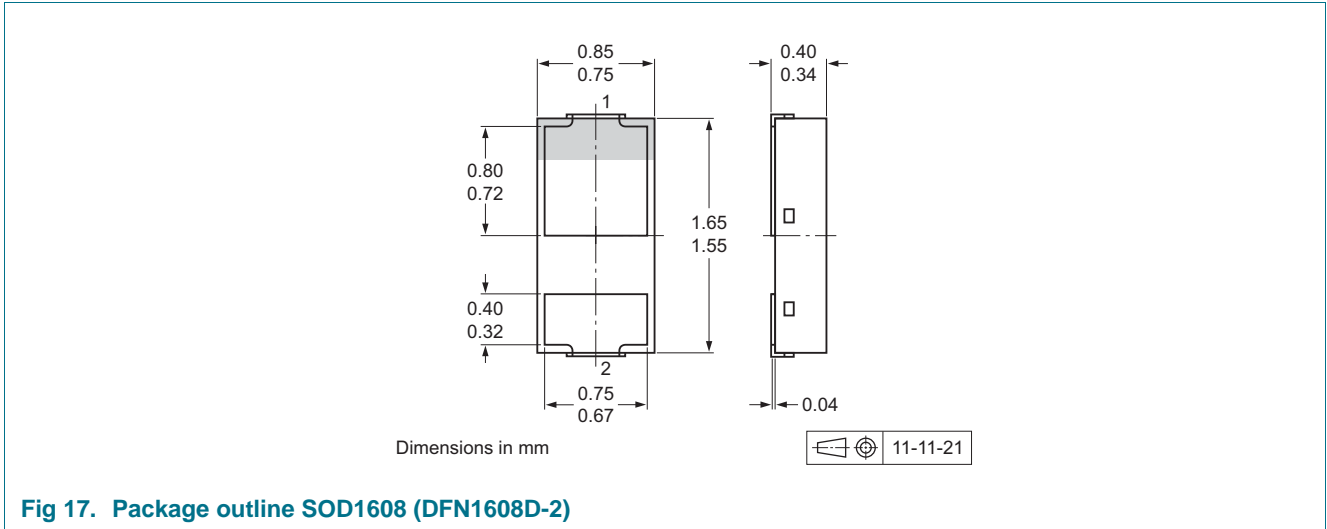


Fig 17. Package outline SOD1608 (DFN1608D-2)

## 10. Soldering

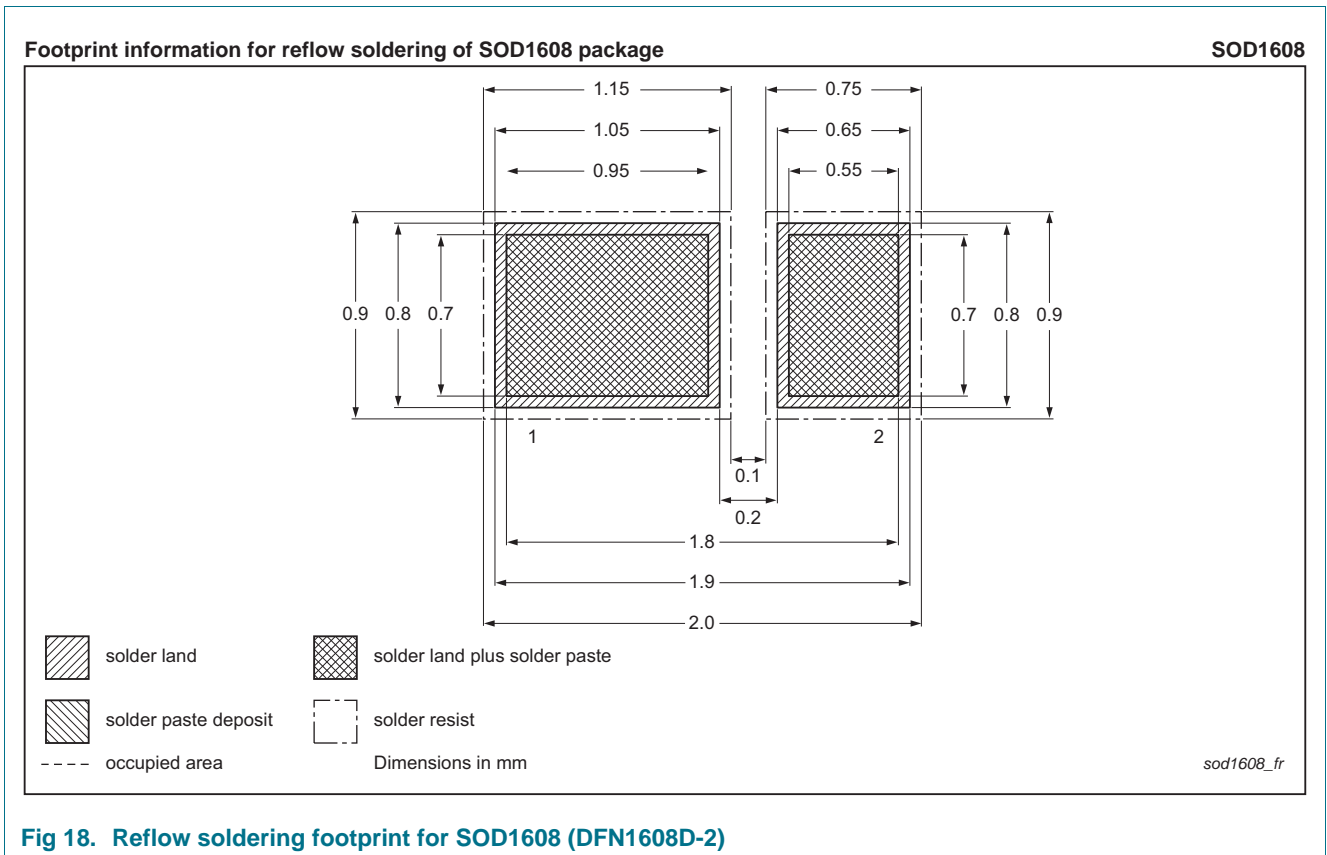


Fig 18. Reflow soldering footprint for SOD1608 (DFN1608D-2)

## 11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4005EPK v.2	20120306	Product data sheet	-	PMEG4005EPK v.1
Modifications:	• <a href="#">Fig 14.</a> and <a href="#">15</a> : corrected title			
PMEG4005EPK v.1	20120306	Product data sheet	-	-

## 12. Legal information

### 12.1 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.

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**14. Contents**

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

1.1 General description . . . . .1

1.2 Features and benefits . . . . .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 . . . . .3**

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

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

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

8.1 Quality information . . . . .9

**9 Package outline . . . . .10**

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

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

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

12.1 Data sheet status . . . . .12

12.2 Definitions . . . . .12

12.3 Disclaimers . . . . .12

12.4 Trademarks . . . . .13

**13 Contact information . . . . .13**

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Date of release: 6 March 2012

Document identifier: PMEG4005EPK