



# PMEG4010EPK

40 V, 1 A low VF MEGA Schottky barrier rectifier

18 January 2018

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

## 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 1$  A
- Reverse voltage:  $V_R \leq 40$  V
- Low forward voltage  $V_F \leq 600$  mV
- Low reverse current
- AEC-Q101 qualified
- Solderable side pads
- Package height typ. 0.37 mm
- Ultra small and leadless SMD plastic package

## 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

## 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; $T_{amb} \leq 90$ °C; square wave	[1]	-	-	1	A
		$\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 135$ °C; square wave		-	-	1	A
$V_R$	reverse voltage	$T_j = 25$ °C		-	-	40	V
$V_F$	forward voltage	$I_F = 1$ A; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; pulsed; $T_j = 25$ °C		-	540	600	mV
$I_R$	reverse current	$V_R = 10$ V; $T_j = 25$ °C		-	0.6	4	$\mu$ A

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{rr}$	reverse recovery time	$I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	3	-	ns

[1] Device mounted on a ceramic Printed-Circuit Board (PCB),  $\text{Al}_2\text{O}_3$ , standard footprint.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 <p>Transparent top view <b>DFN1608D-2 (SOD1608)</b></p>	 $\text{K} \rightarrow \text{A}$ <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
PMEG4010EPK	DFN1608D-2	DFN1608D-2: leadless ultra small plastic package; 2 terminals	SOD1608

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG4010EPK	1010 0000

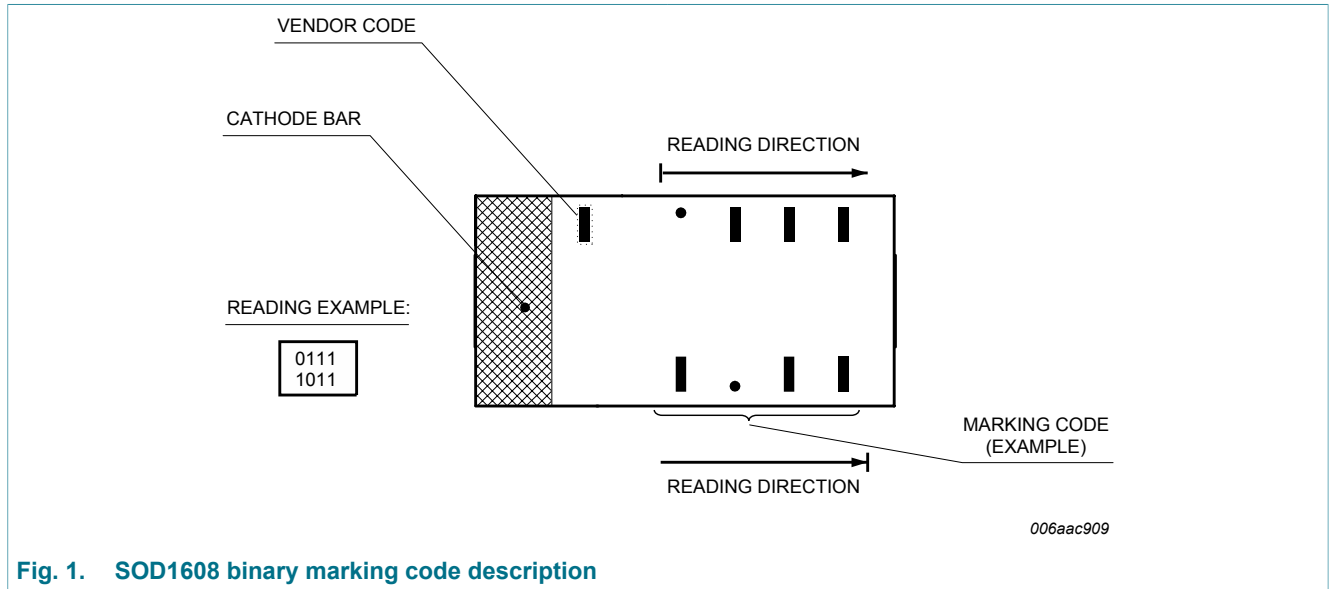


Fig. 1. SOD1608 binary marking code description

## 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	$T_{sp} \leq 130\text{ °C}$		-	1.4	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 90\text{ °C}$ ; square wave	[1]	-	1	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 135\text{ °C}$ ; square wave		-	1	A
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\text{ ms}$ ; $\delta \leq 0.25$		-	3	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8\text{ ms}$ ; square wave; $T_{j(init)} = 25\text{ °C}$		-	5	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2] [3]	-	410	mW
			[4] [3]	-	860	mW
			[1] [3]	-	1565	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),  $Al_2O_3$ , 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  $1\text{ cm}^2$ .

## 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] [3]	-	-	305	K/W
			[1] [4] [3]	-	-	145	K/W
			[1] [5] [3]	-	-	80	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,  $Al_2O_3$ , standard footprint.

[6] Soldering point of cathode tab.

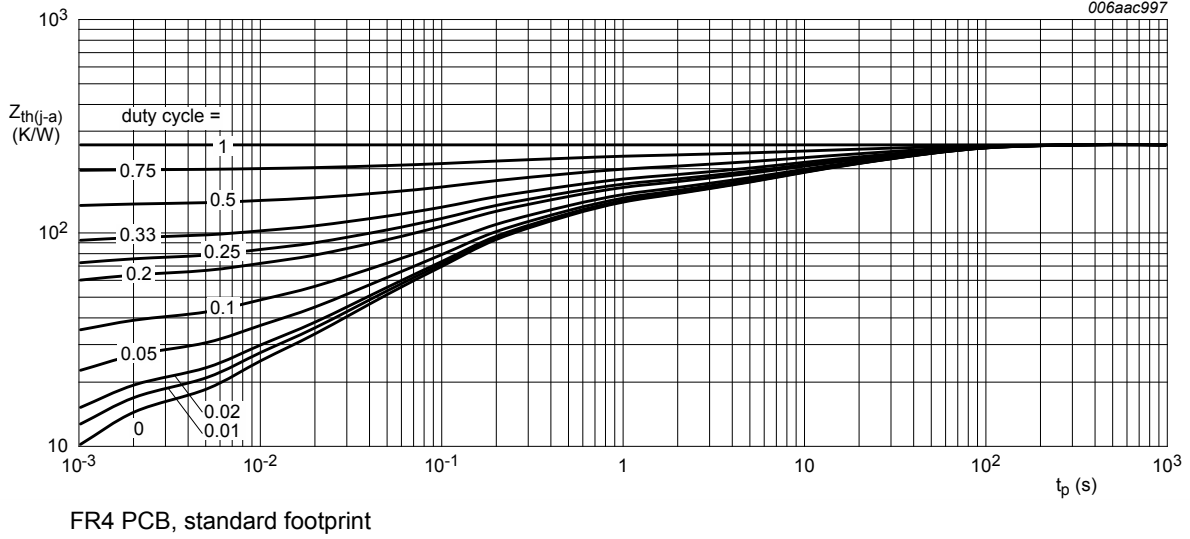


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

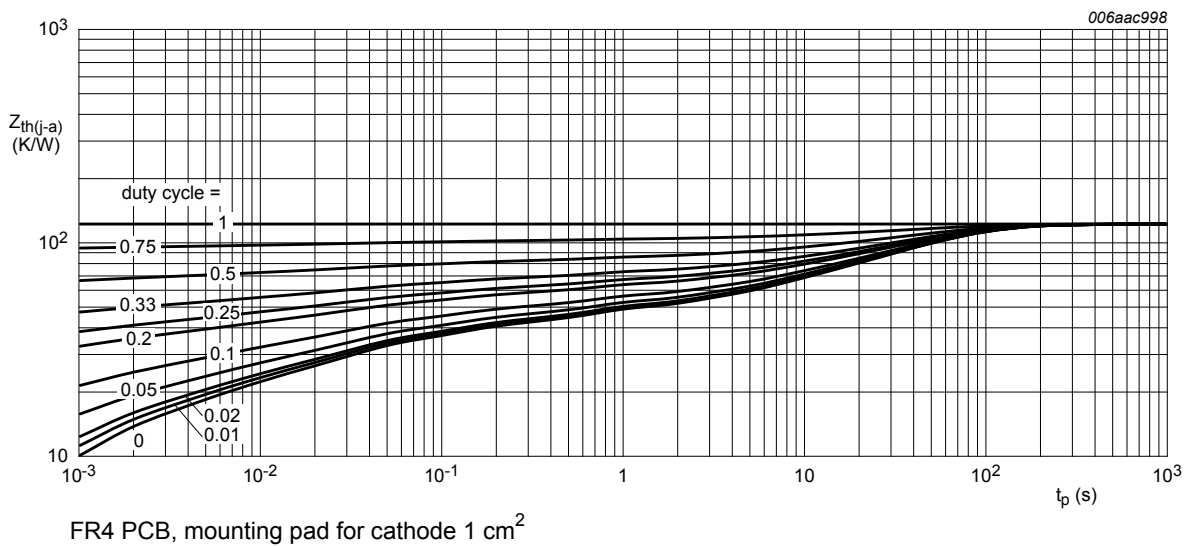
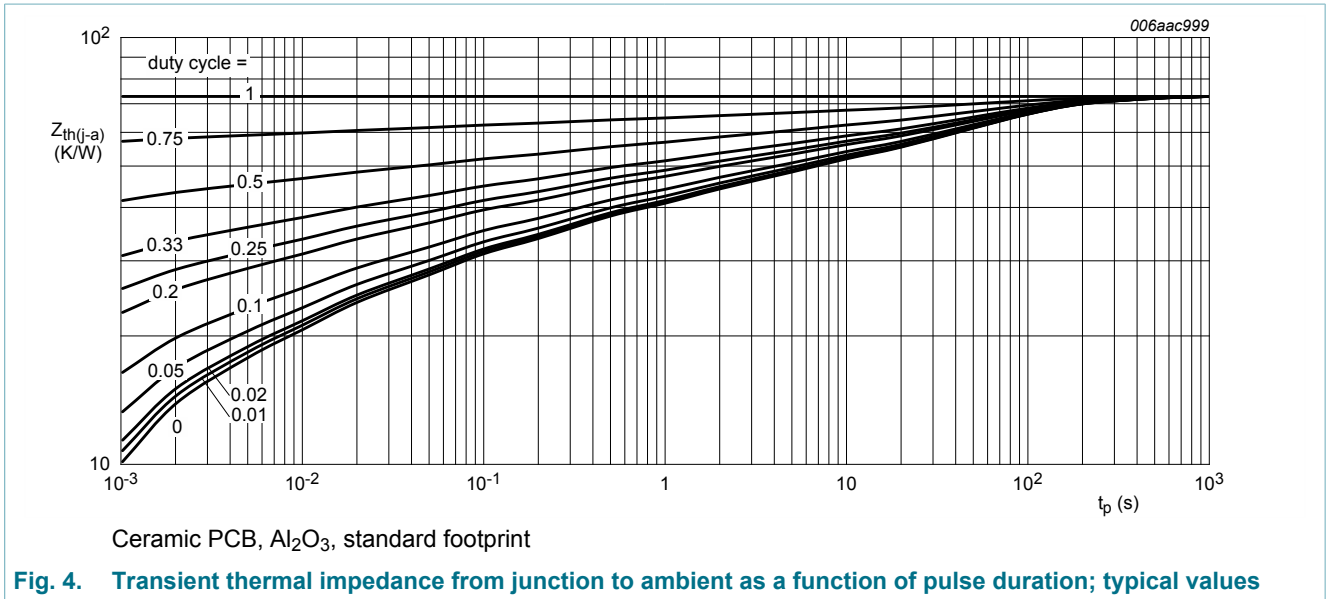


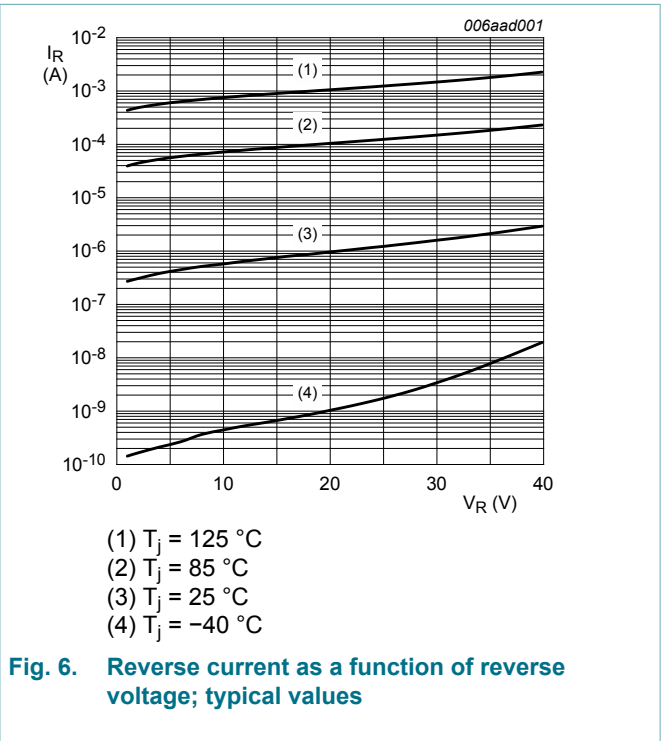
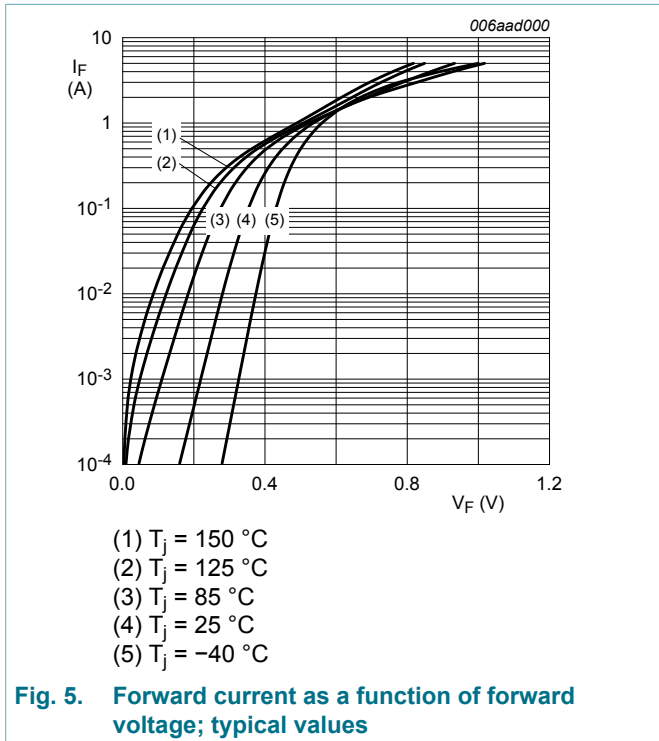
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

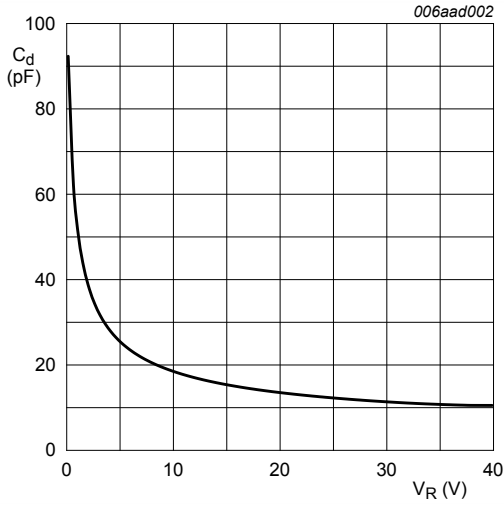


## 10. Characteristics

Table 7. Characteristics

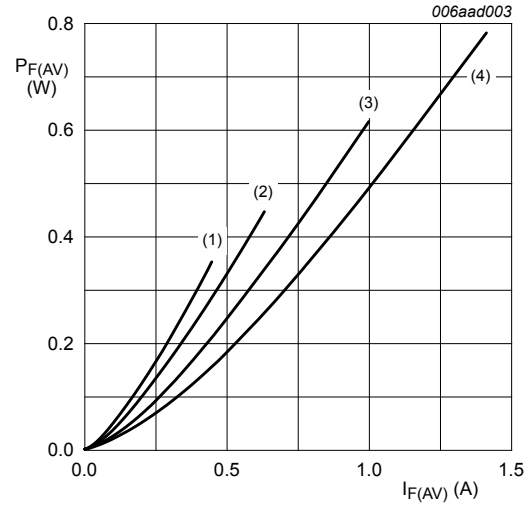
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 100 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	-	345	390	mV
		$I_F = 500 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	-	440	500	mV
		$I_F = 700 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	-	480	550	mV
		$I_F = 1 \text{ A}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$	-	540	600	mV
$I_R$	reverse current	$V_R = 10 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	0.6	4	$\mu\text{A}$
		$V_R = 40 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	3	20	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	50	60	pF
		$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	20	25	pF
$t_{rr}$	reverse recovery time	$I_F = 0.5 \text{ A}; I_R = 0.5 \text{ A}; I_{R(\text{meas})} = 0.1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	3	-	ns
$V_{FRM}$	peak forward recovery voltage	$I_F = 0.5 \text{ A}; dI_F/dt = 20 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$	-	460	-	mV





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

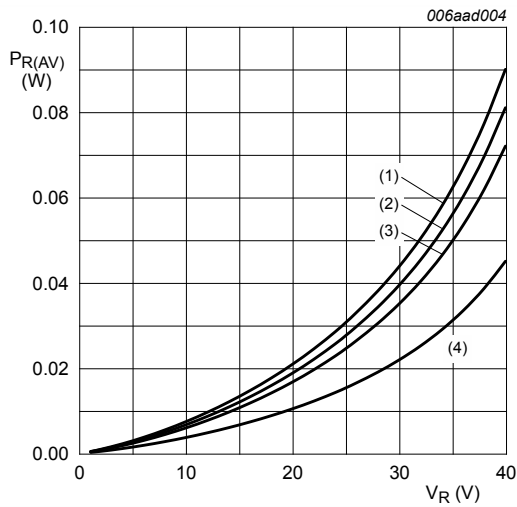
**Fig. 7. Diode capacitance as a function of reverse voltage; typical values**



$T_j = 150 \text{ }^\circ\text{C}$

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

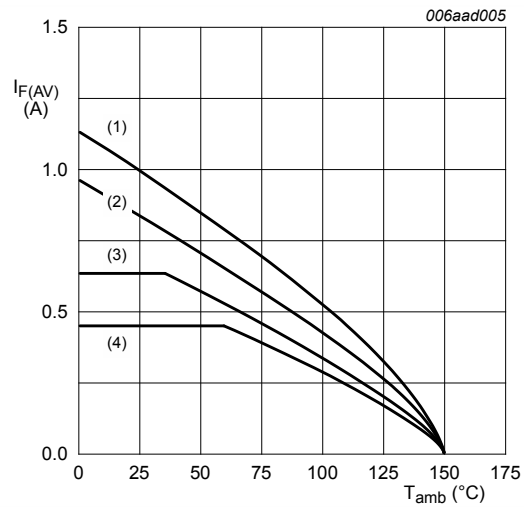
**Fig. 8. Average forward power dissipation as a function of average forward current; typical values**



$T_j = 125 \text{ }^\circ\text{C}$

- (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**

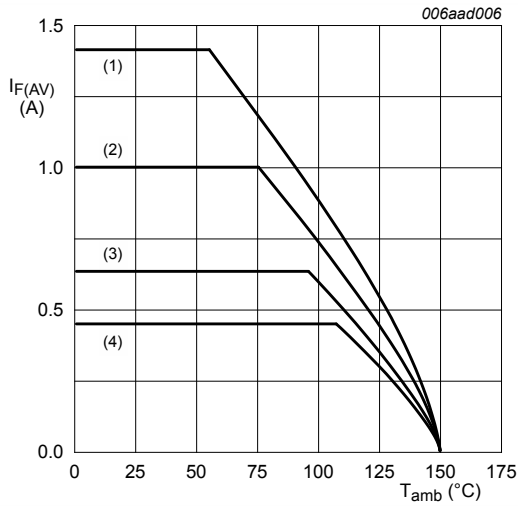


FR4 PCB, standard footprint

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

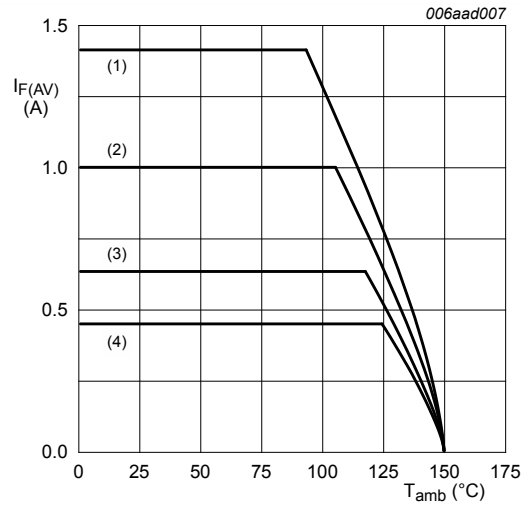
**Fig. 10. Average forward current as a function of ambient temperature; typical values**





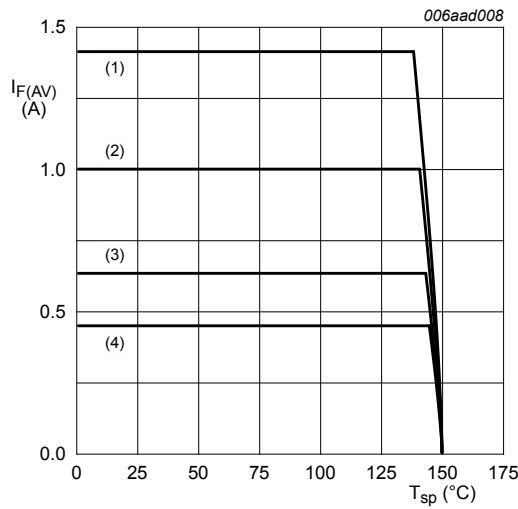
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 T<sub>j</sub> = 150 °C  
 (1) δ = 1 (DC)  
 (2) δ = 0.5; f = 20 kHz  
 (3) δ = 0.2; f = 20 kHz  
 (4) δ = 0.1; f = 20 kHz

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



Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint  
 T<sub>j</sub> = 150 °C  
 (1) δ = 1 (DC)  
 (2) δ = 0.5; f = 20 kHz  
 (3) δ = 0.2; f = 20 kHz  
 (4) δ = 0.1; f = 20 kHz

Fig. 12. Average forward current as a function of ambient temperature; typical values



T<sub>j</sub> = 150 °C  
 (1) δ = 1 (DC)  
 (2) δ = 0.5; f = 20 kHz  
 (3) δ = 0.2; f = 20 kHz  
 (4) δ = 0.1; f = 20 kHz

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

### 11. Test information

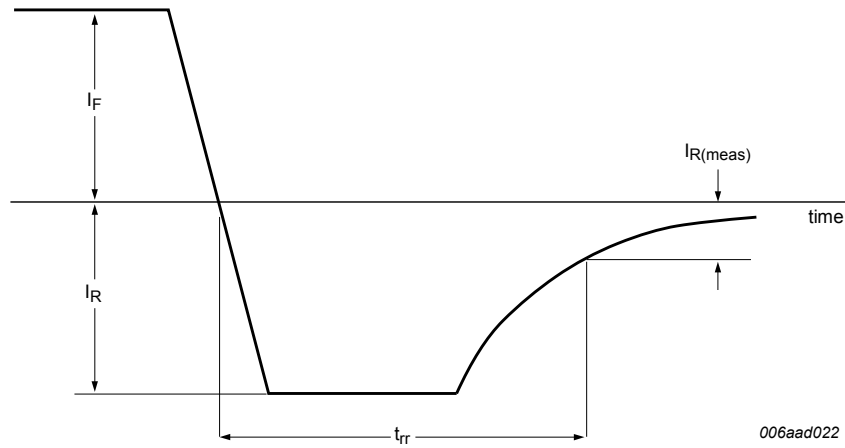


Fig. 14. Reverse recovery definition

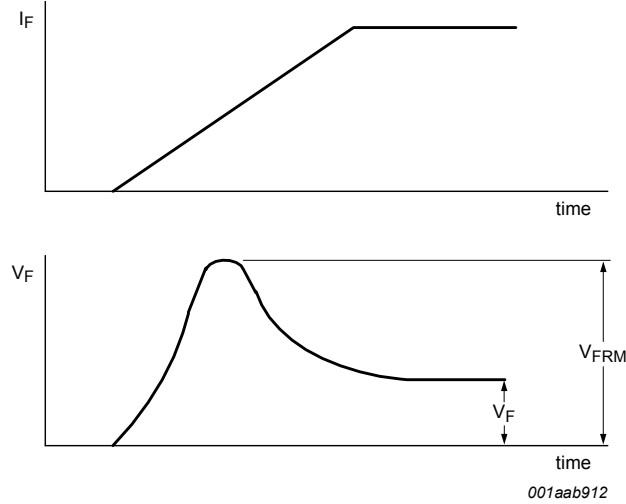


Fig. 15. Forward recovery definition

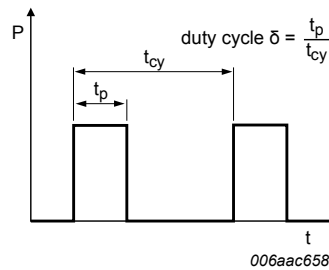


Fig. 16. Duty cycle definition

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.

**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**

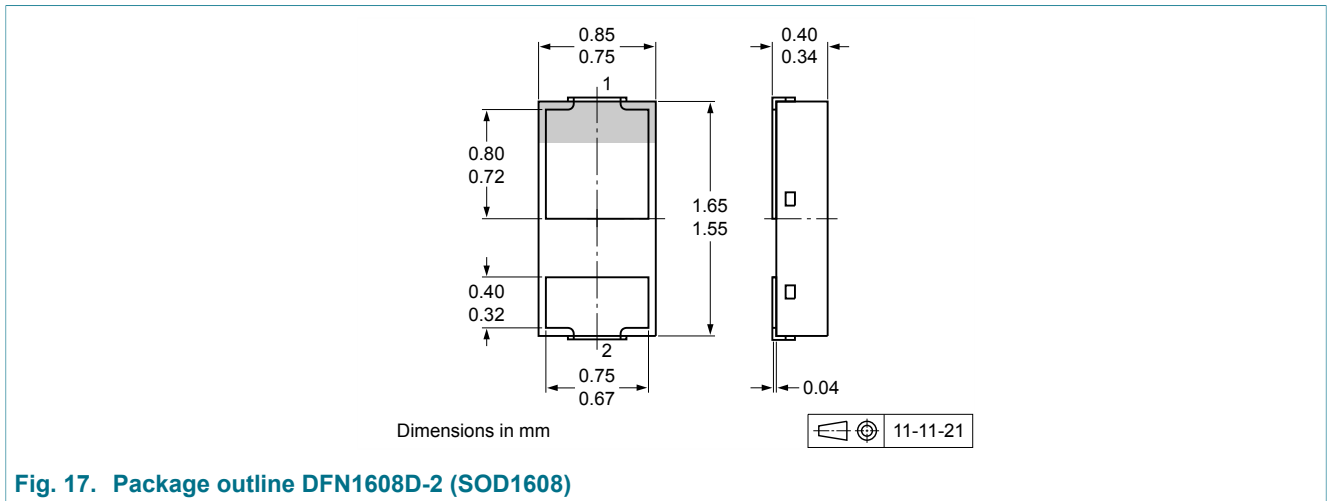


Fig. 17. Package outline DFN1608D-2 (SOD1608)

**13. Soldering**

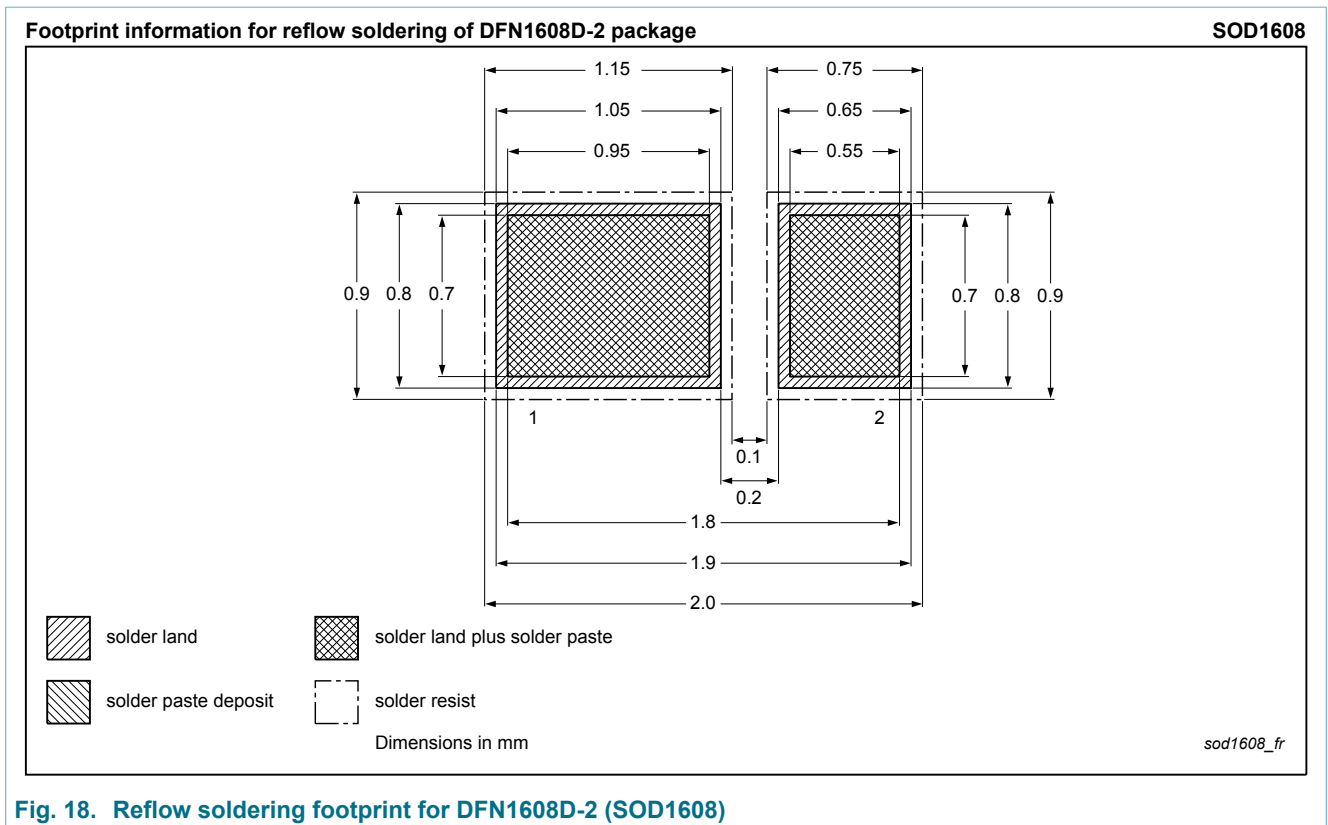


Fig. 18. Reflow soldering footprint for DFN1608D-2 (SOD1608)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4010EPK v.3	20180118	Product data sheet	-	PMEG4010EPK_2
Modifications:	<ul style="list-style-type: none"><li>The format of this datasheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li></ul>			
PMEG4010EPK_2	20120306	Product data sheet	-	PMEG4010EPK_1
PMEG4010EPK_1	20120302	Product data sheet	-	-

## 15. Legal information

### 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".
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