



# PMEG2005BELD

20 V, 0.5 A low VF MEGA Schottky barrier rectifier

4 August 2015

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 SOD882D (DFN1006D-2) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

## 2. Features and benefits

- Average forward current:  $I_{F(AV)} \leq 0.5$  A
- Reverse voltage:  $V_R \leq 20$  V
- Low forward voltage  $V_F \leq 390$  mV
- AEC-Q101 qualified
- Ultra small and leadless SMD plastic package
- Solderable side pads
- Package height typ. 0.37 mm

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

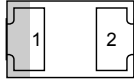

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20$ kHz; $T_{sp} \leq 140$ °C; square wave	-	-	0.5	A
		$\delta = 0.5$ ; $f = 20$ kHz; $T_{amb} \leq 115$ °C; square wave	[1]	-	0.5	A
$V_R$	reverse voltage	$T_j = 25$ °C	-	-	20	V
$V_F$	forward voltage	$I_F = 500$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C	-	353	390	mV
$I_R$	reverse current	$V_R = 10$ V; $T_j = 25$ °C	-	28	50	$\mu$ A



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

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 <p>Transparent top view DFN1006D-2 (SOD882D)</p>	 <i>sym001</i>
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

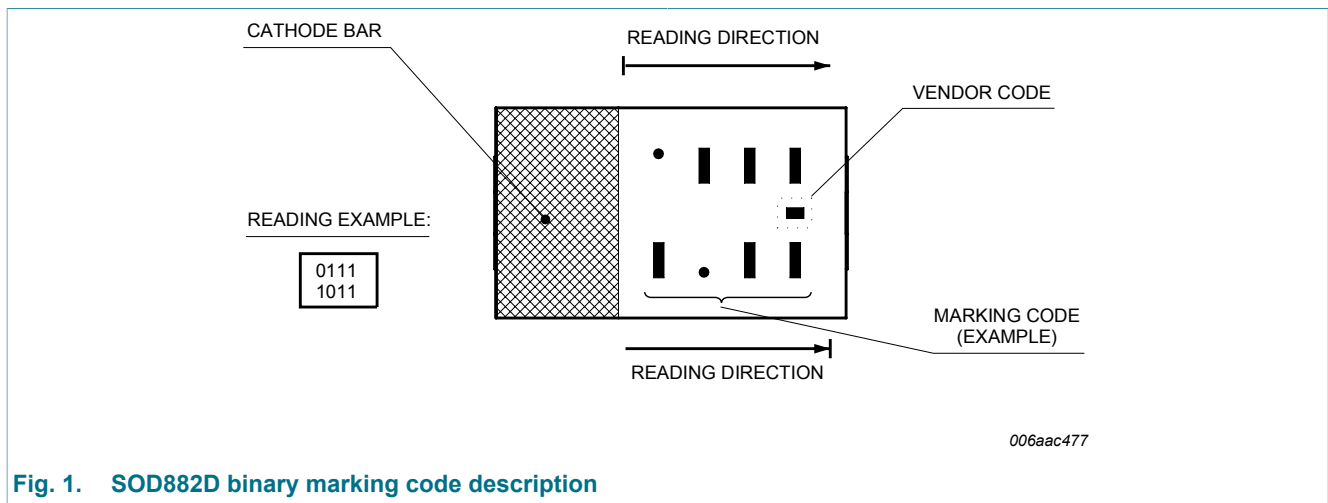
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG2005BELD	DFN1006D-2	DFN1006D-2: leadless ultra small plastic package; 2 terminals	SOD882D

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG2005BELD	0010 1000



## 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	$T_j = 25\text{ °C}$		-	20	V
$I_F$	forward current	$T_{sp} \leq 140\text{ °C}$		-	0.5	A
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 140\text{ °C}$ ; square wave		-	0.5	A
		$\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 115\text{ °C}$ ; square wave	[1]	-	0.5	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	$t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$ ; square wave		-	6	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2][3]	-	370	mW
			[1][3]	-	735	mW
			[4][3]	-	1135	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 Printed-Circuit Board (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.

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

[4] Device mounted on a ceramic PCB,  $\text{Al}_2\text{O}_3$ , 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][3]	-	-	340	K/W
			[1][4][3]	-	-	170	K/W
			[1][5][3]	-	-	110	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	-	25	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.

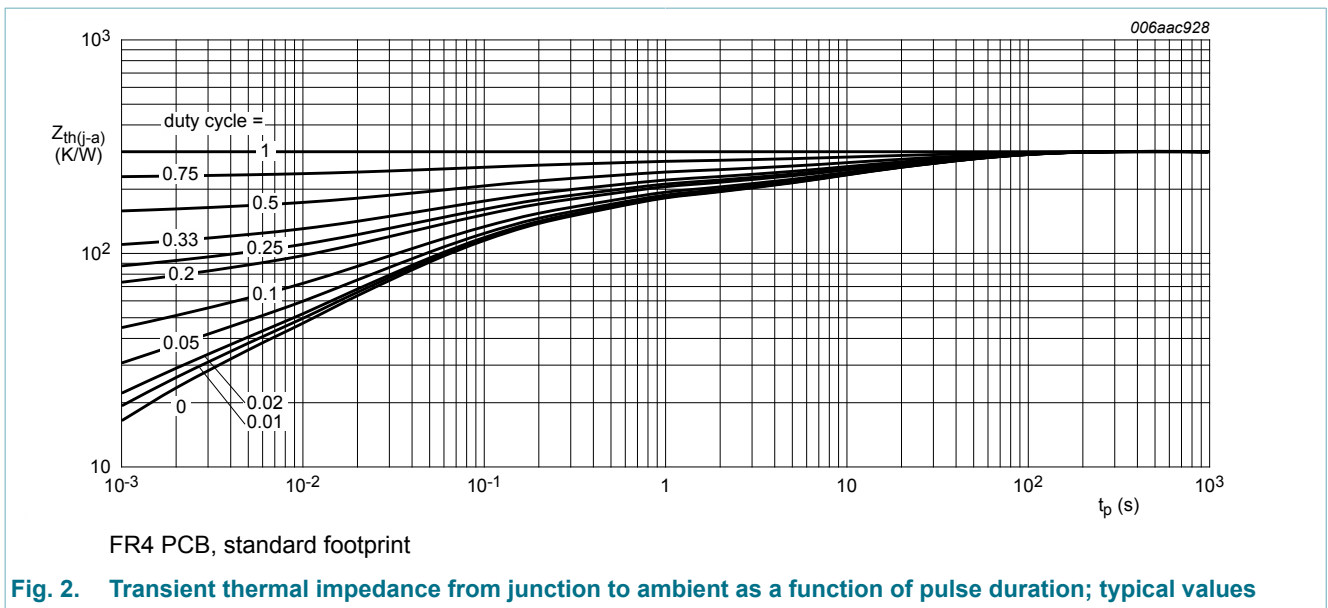
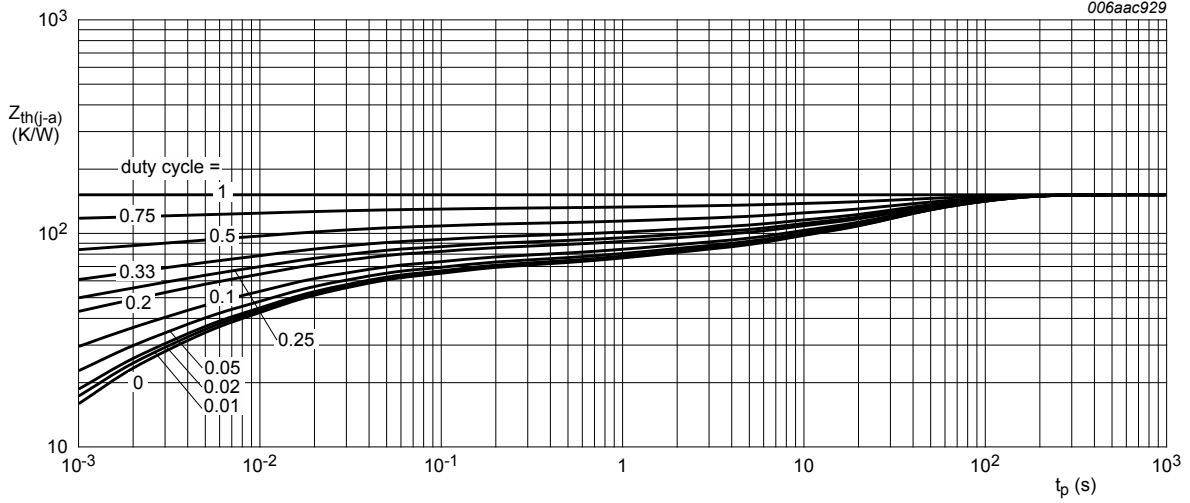
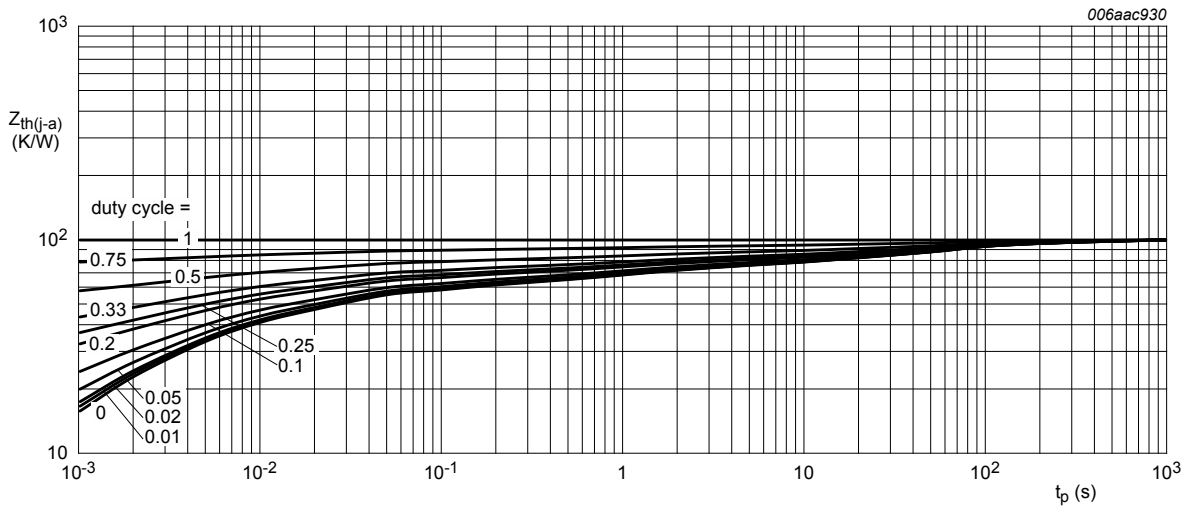


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



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



Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint

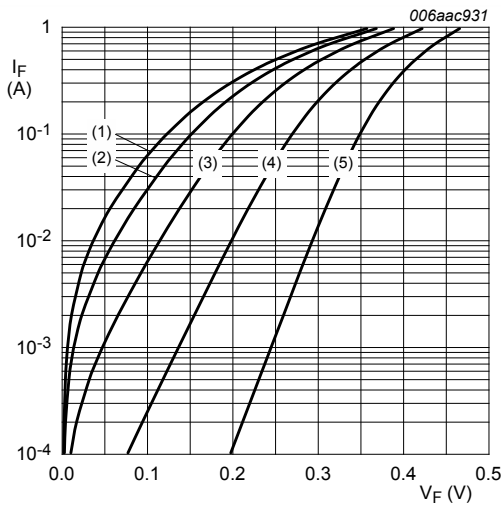
Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

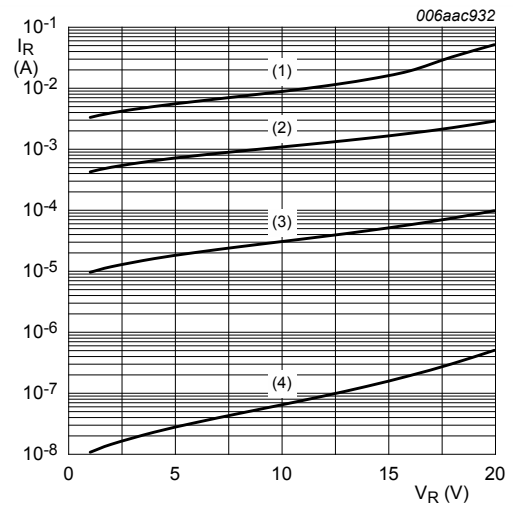
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 0.1 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>j</sub> = 25 °C	-	79	105	mV
		I <sub>F</sub> = 1 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>j</sub> = 25 °C	-	137	170	mV
		I <sub>F</sub> = 10 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>j</sub> = 25 °C	-	197	235	mV

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$I_F = 100 \text{ mA}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	266	310	mV
		$I_F = 500 \text{ mA}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	353	390	mV
$I_R$	reverse current	$V_R = 10 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	28	50	$\mu\text{A}$
		$V_R = 20 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	87	200	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	31	40	pF
$t_{rr}$	reverse recovery time	$I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	1.6	-	ns
$V_{FRM}$	peak forward recovery voltage	$I_F = 0.5 \text{ A}$ ; $dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	565	-	mV



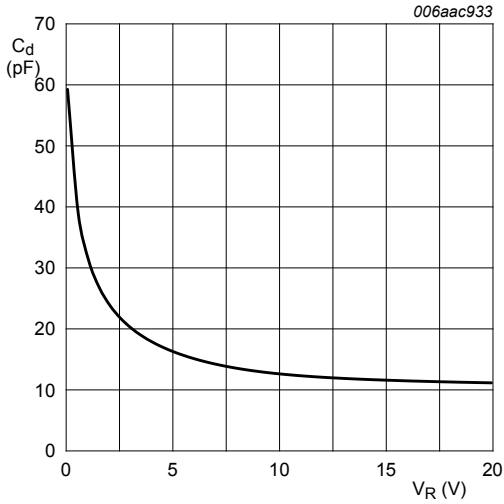
- (1)  $T_j = 150 \text{ }^\circ\text{C}$
- (2)  $T_j = 125 \text{ }^\circ\text{C}$
- (3)  $T_j = 85 \text{ }^\circ\text{C}$
- (4)  $T_j = 25 \text{ }^\circ\text{C}$
- (5)  $T_j = -40 \text{ }^\circ\text{C}$

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



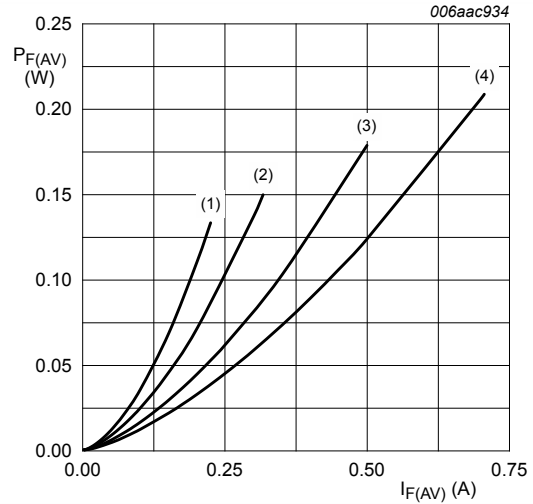
- (1)  $T_j = 125 \text{ }^\circ\text{C}$
- (2)  $T_j = 85 \text{ }^\circ\text{C}$
- (3)  $T_j = 25 \text{ }^\circ\text{C}$
- (4)  $T_j = -40 \text{ }^\circ\text{C}$

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



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

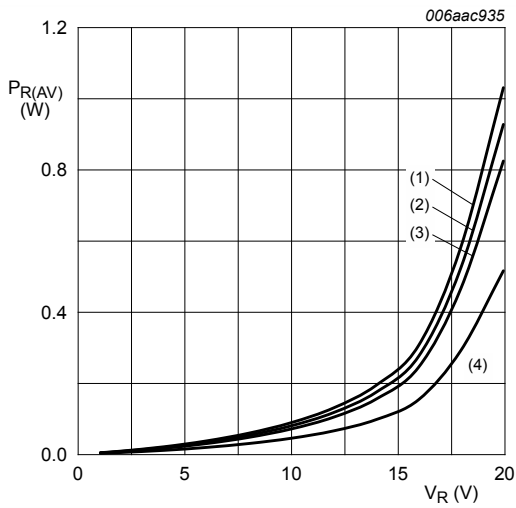
**Fig. 7. Diode capacitance as a function of reverse voltage; typical values**



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

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

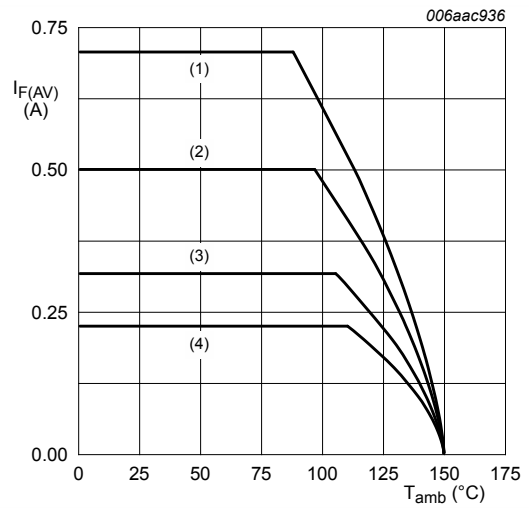
**Fig. 8. Average forward power dissipation as a function of average forward current; typical values**



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

- (1)  $\delta = 1 \text{ (DC)}$
- (2)  $\delta = 0.9; f = 20 \text{ kHz}$
- (3)  $\delta = 0.8; f = 20 \text{ kHz}$
- (4)  $\delta = 0.5; f = 20 \text{ kHz}$

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

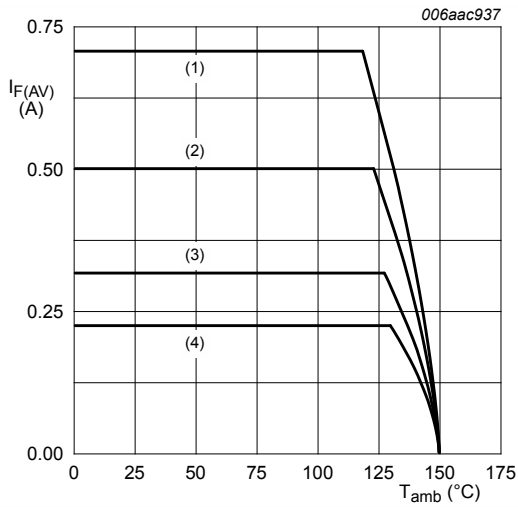


FR4 PCB, standard footprint

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

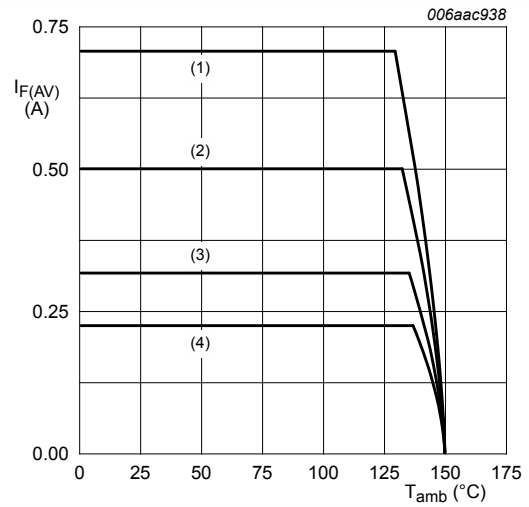
- (1)  $\delta = 1$
- (2)  $\delta = 0.5$
- (3)  $\delta = 0.2$
- (4)  $\delta = 0.1$

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



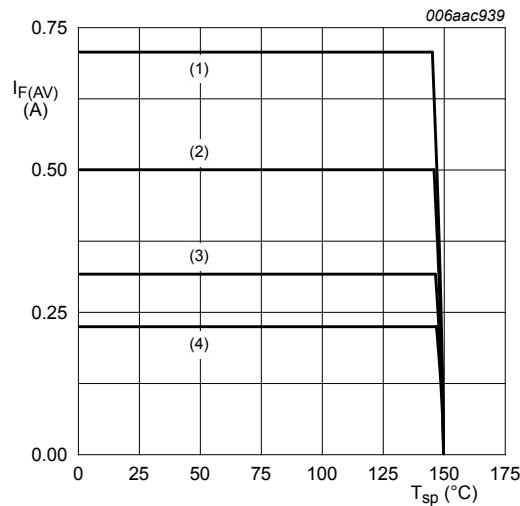
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 T<sub>j</sub> = 150 °C  
 (1) δ = 1  
 (2) δ = 0.5  
 (3) δ = 0.2  
 (4) δ = 0.1

**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  
 (2) δ = 0.5  
 (3) δ = 0.2  
 (4) δ = 0.1

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



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

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



11. Test information

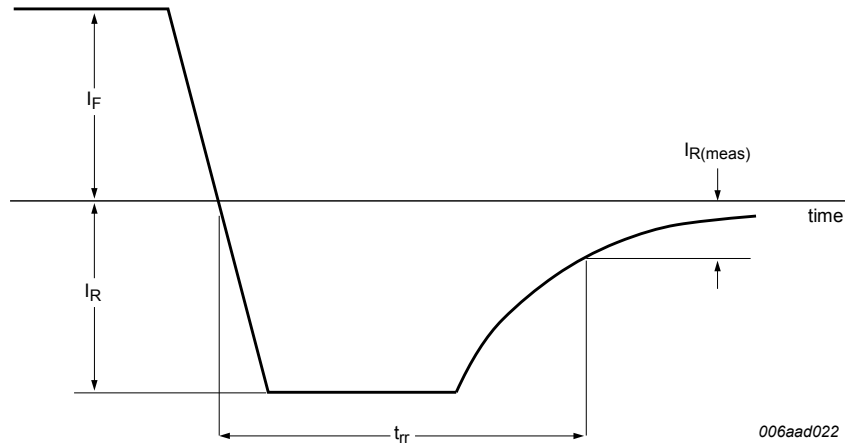


Fig. 14. Reverse recovery definition

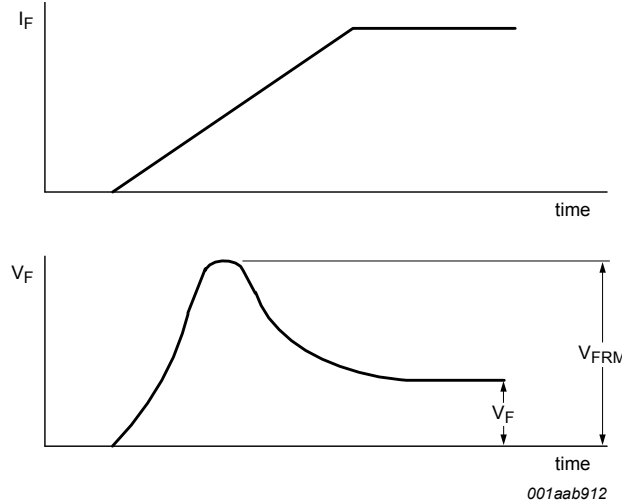


Fig. 15. Forward recovery definition

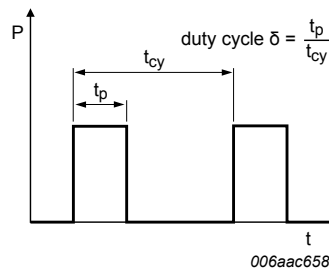


Fig. 16. Duty cycle definition

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.

### 11.1 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.

## 12. Package outline

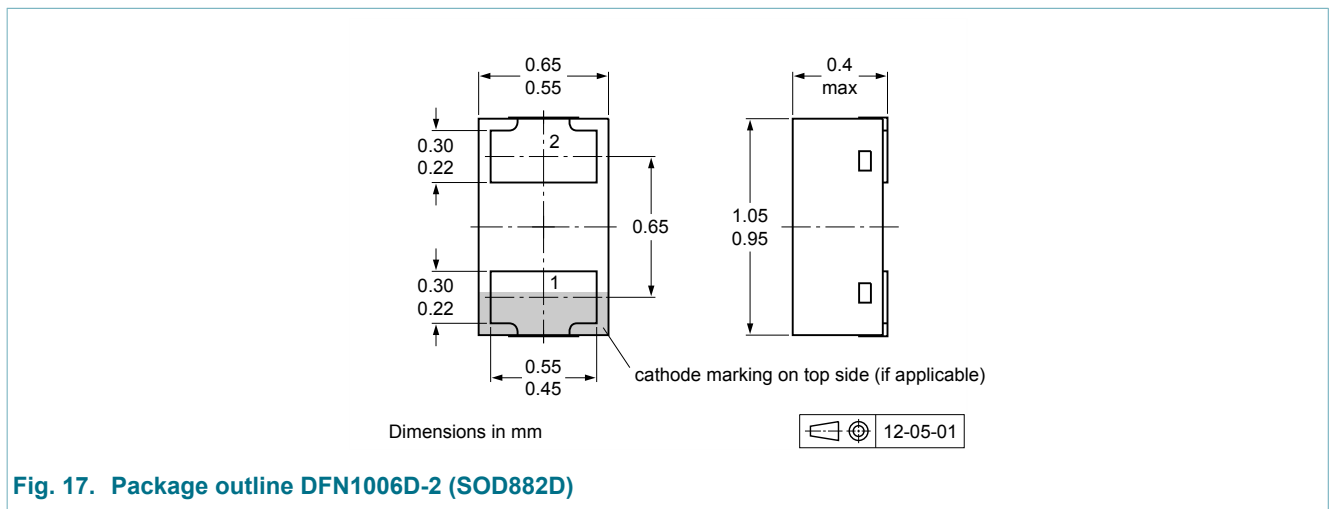


Fig. 17. Package outline DFN1006D-2 (SOD882D)

## 13. Soldering

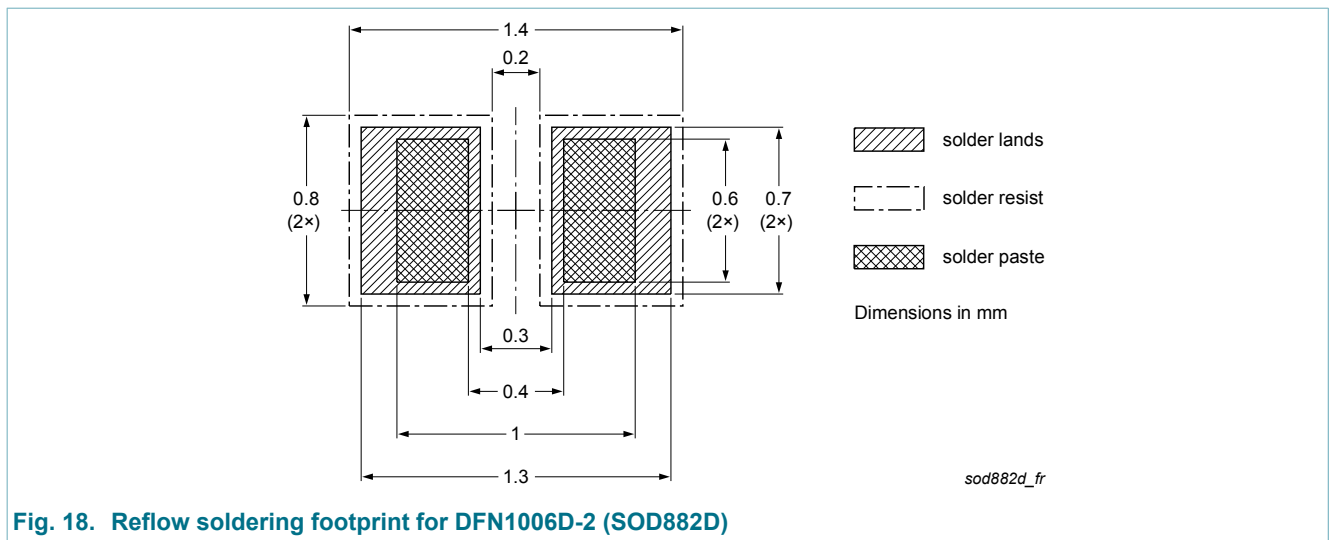


Fig. 18. Reflow soldering footprint for DFN1006D-2 (SOD882D)

## 14. Revision history

Table 8. Revision history

Document ID	Release date	Document status	Change notice	Supersedes
PMEG2005BELD v.4	20150804	Product data sheet	-	PMEG2005BELD v.3
Modifications:	<ul style="list-style-type: none"><li>Section "Marking": updated Figure 1.</li></ul>			
PMEG2005BELD v.3	20120704	Product data sheet	-	PMEG2005BELD v.2
PMEG2005BELD v.2	20120312	Product data sheet	-	PMEG2005BELD v.1
PMEG2005BELD v.1	20120111	Preliminary data sheet	-	-

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### 15.1 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.

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