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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

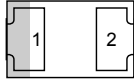

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20$ kHz; $T_{sp} \leq 140$ °C; square wave	-	-	0.5	A
		$\delta = 0.5$; $f = 20$ kHz; $T_{amb} \leq 115$ °C; square wave	[1]	-	0.5	A
V_R	reverse voltage	$T_j = 25$ °C	-	-	20	V
V_F	forward voltage	$I_F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



[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode 1 cm².

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>	 <p>sym001</p>
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

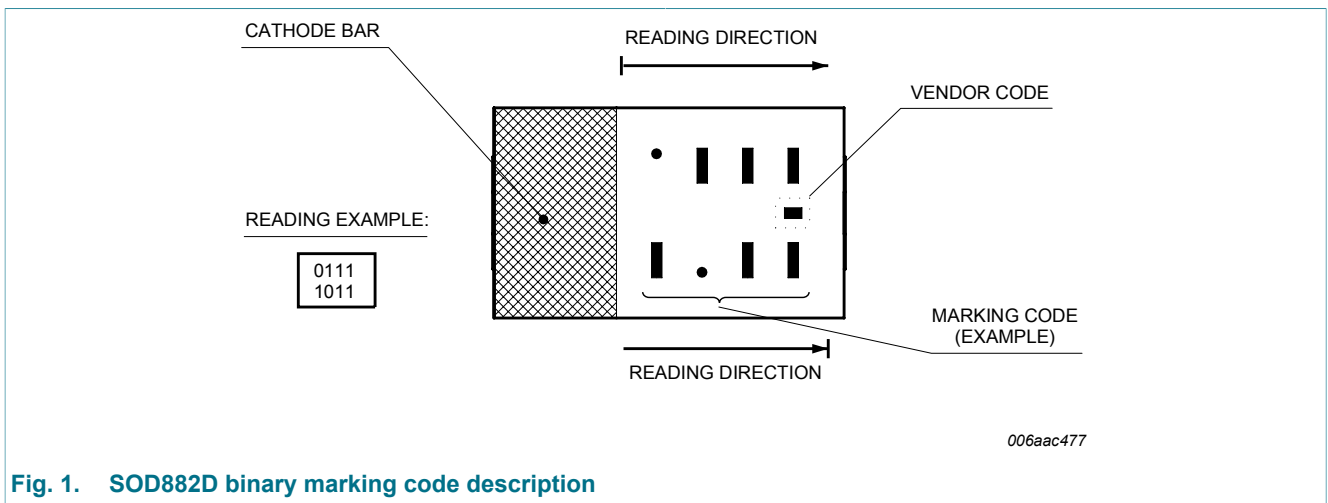
Table 3. Ordering information

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 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, Al_2O_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 cm².
- [5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [6] Soldering point of cathode tab.

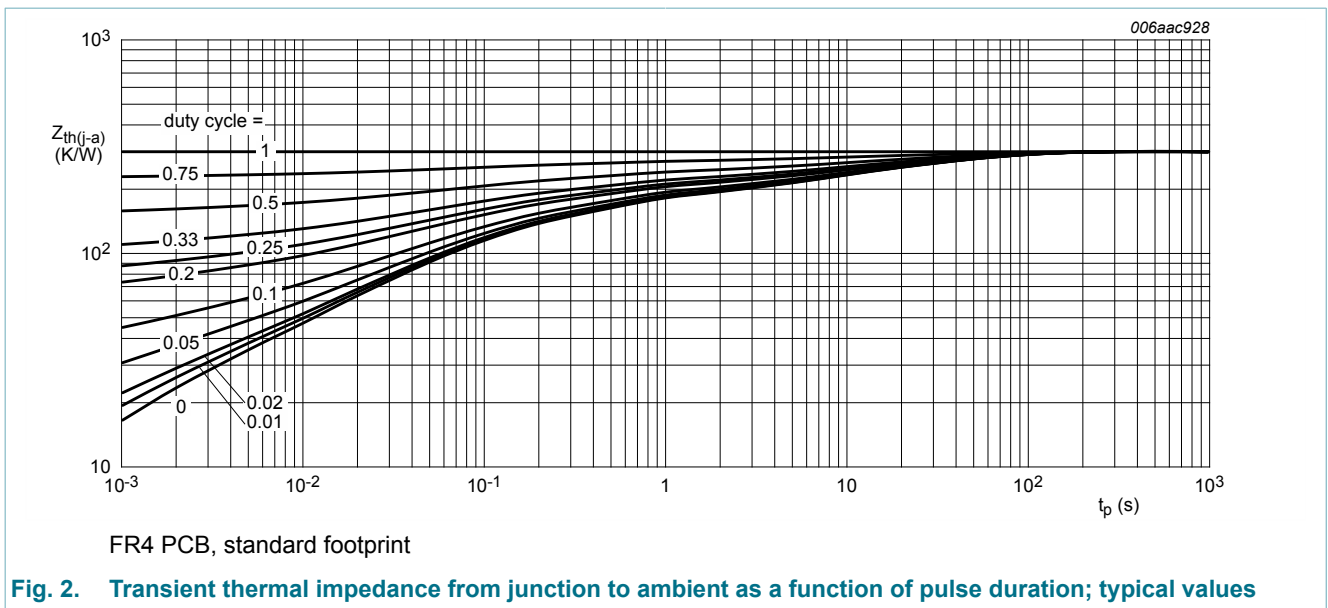
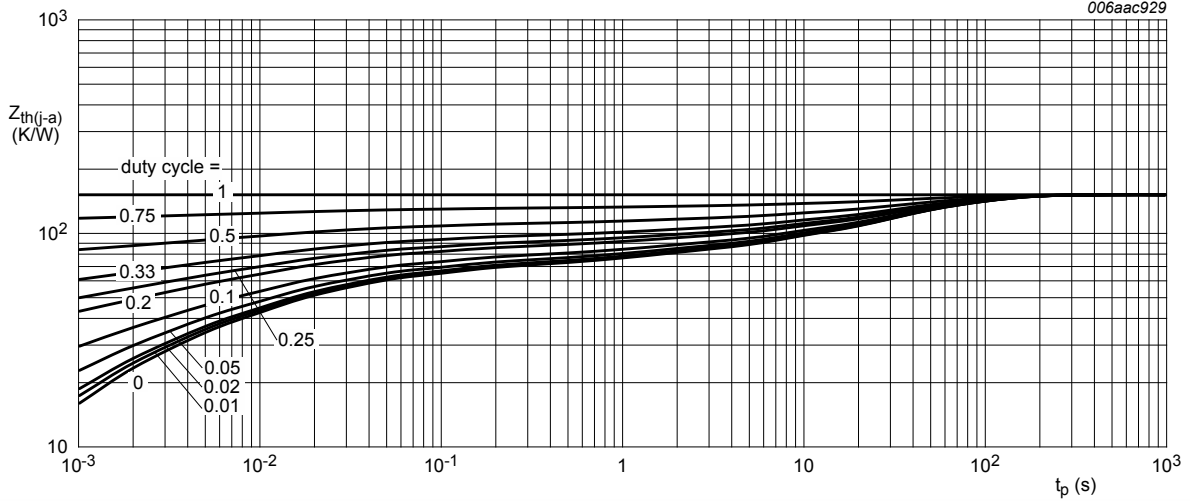
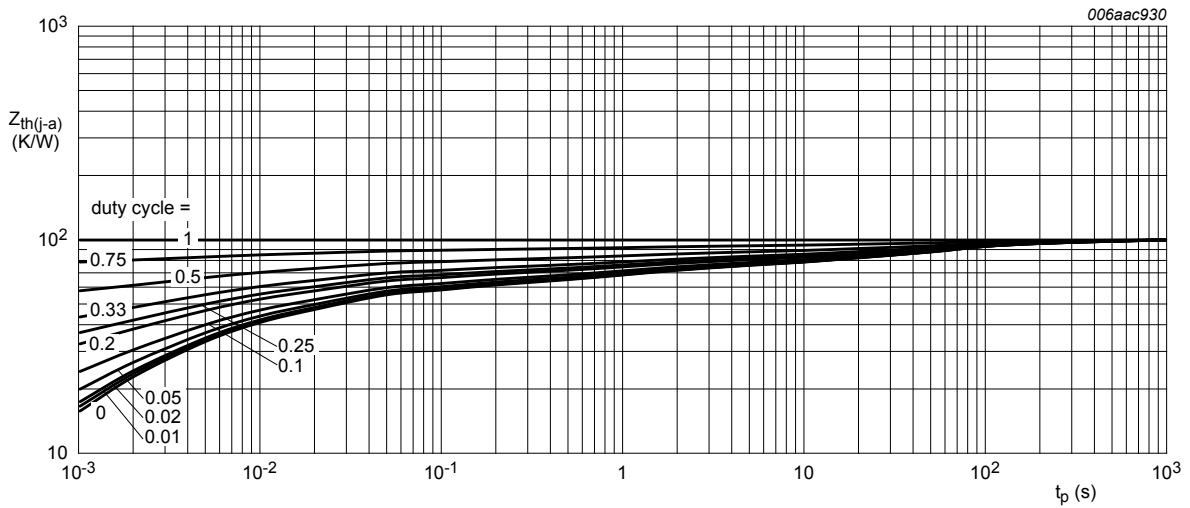


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, mounting pad for cathode 1 cm²

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



Ceramic PCB, Al₂O₃, 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 _F	forward voltage	I _F = 0.1 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02 ; T _j = 25 °C	-	79	105	mV
		I _F = 1 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02 ; T _j = 25 °C	-	137	170	mV
		I _F = 10 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02 ; T _j = 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	μA
		$V_R = 20 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	87	200	μA
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

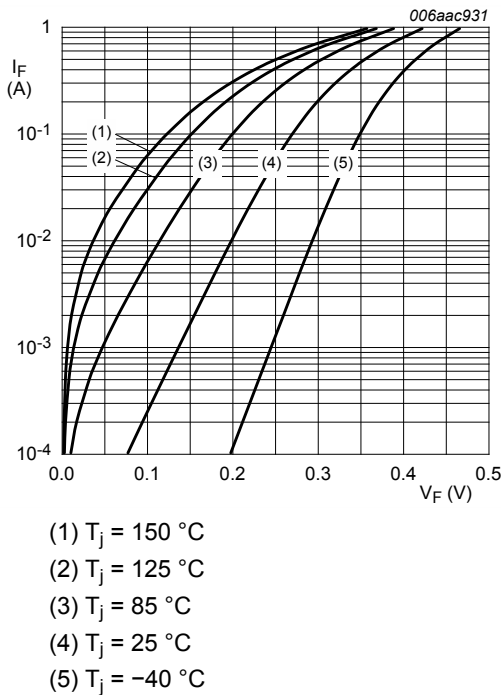


Fig. 5. Forward current as a function of forward voltage; typical values

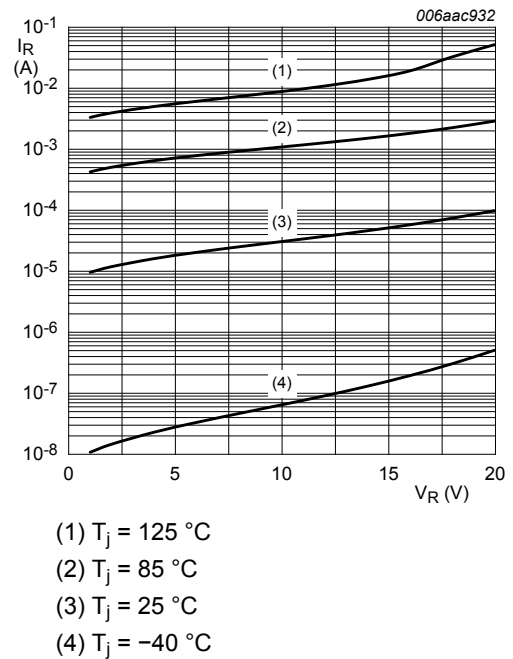
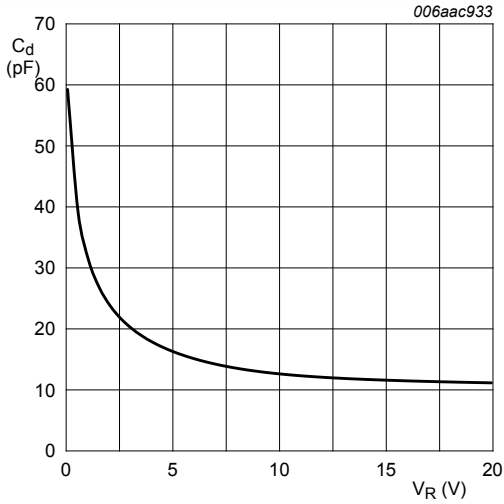
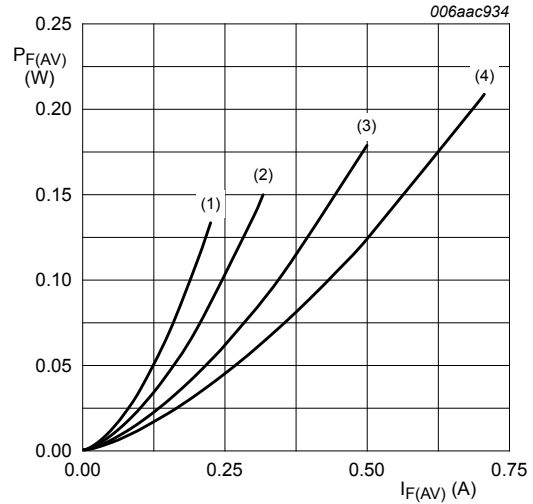


Fig. 6. Reverse current as a function of reverse voltage; typical values



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

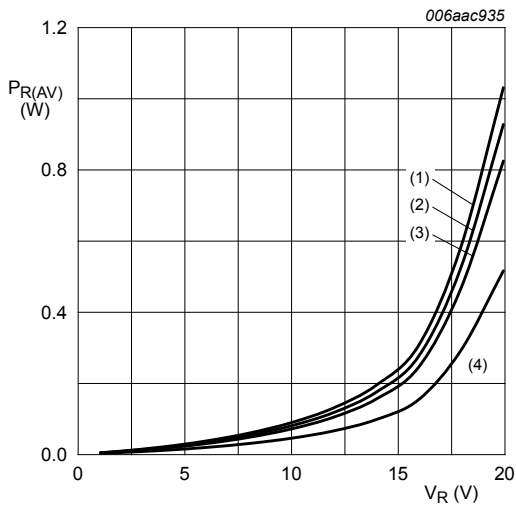
Fig. 7. Diode capacitance as a function of reverse voltage; typical values



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

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

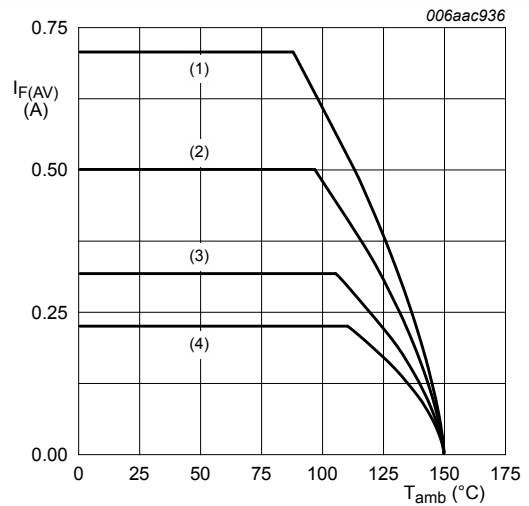
Fig. 8. Average forward power dissipation as a function of average forward current; typical values



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

- (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

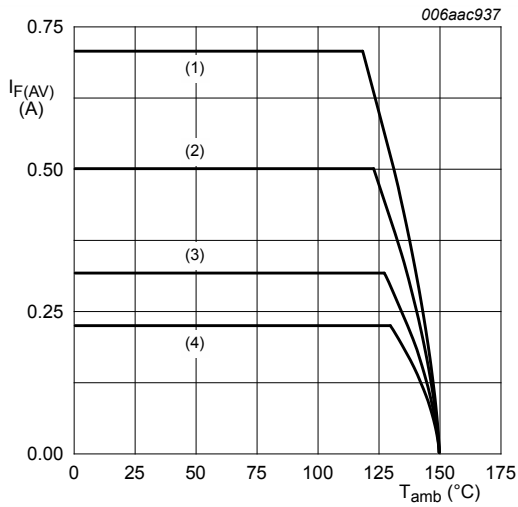


FR4 PCB, standard footprint

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

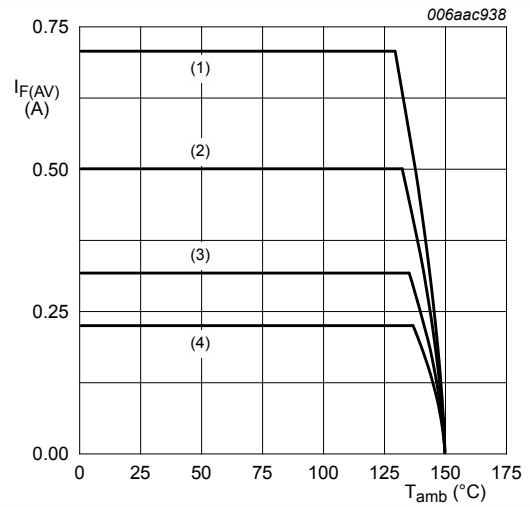
- (1) $\delta = 1$
- (2) $\delta = 0.5$
- (3) $\delta = 0.2$
- (4) $\delta = 0.1$

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



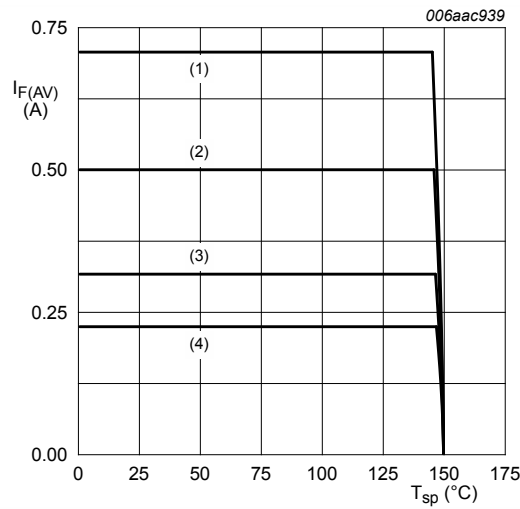
FR4 PCB, mounting pad for cathode 1 cm²
 T_j = 150 °C
 (1) δ = 1
 (2) δ = 0.5
 (3) δ = 0.2
 (4) δ = 0.1

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



Ceramic PCB, Al₂O₃, standard footprint
 T_j = 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_j = 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

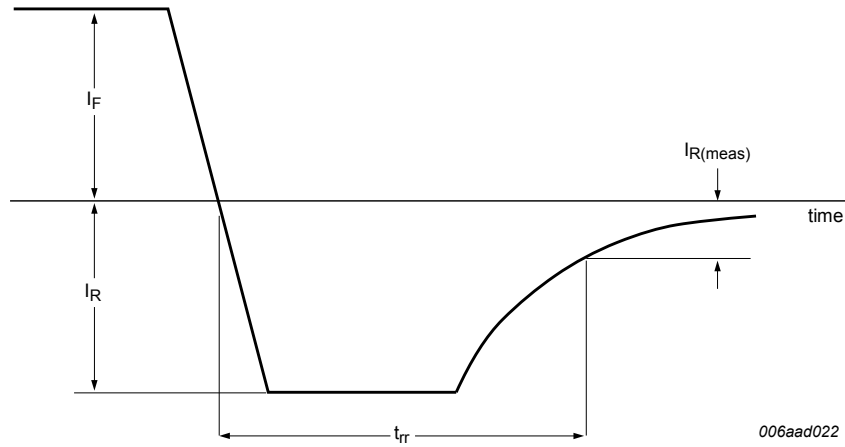


Fig. 14. Reverse recovery definition

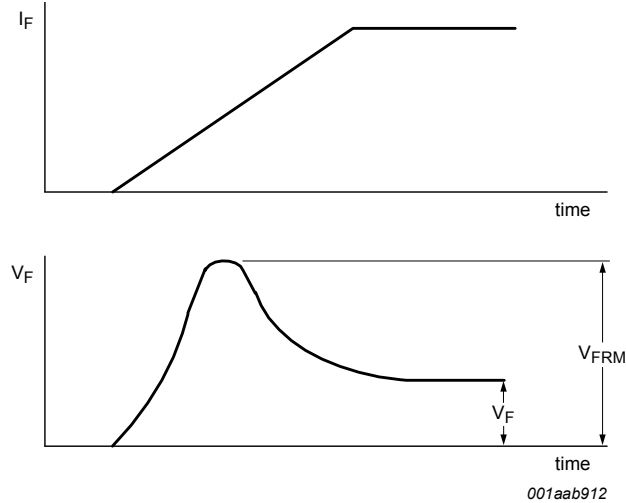


Fig. 15. Forward recovery definition

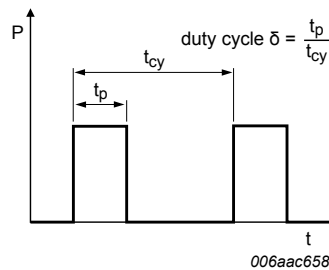


Fig. 16. Duty cycle definition

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

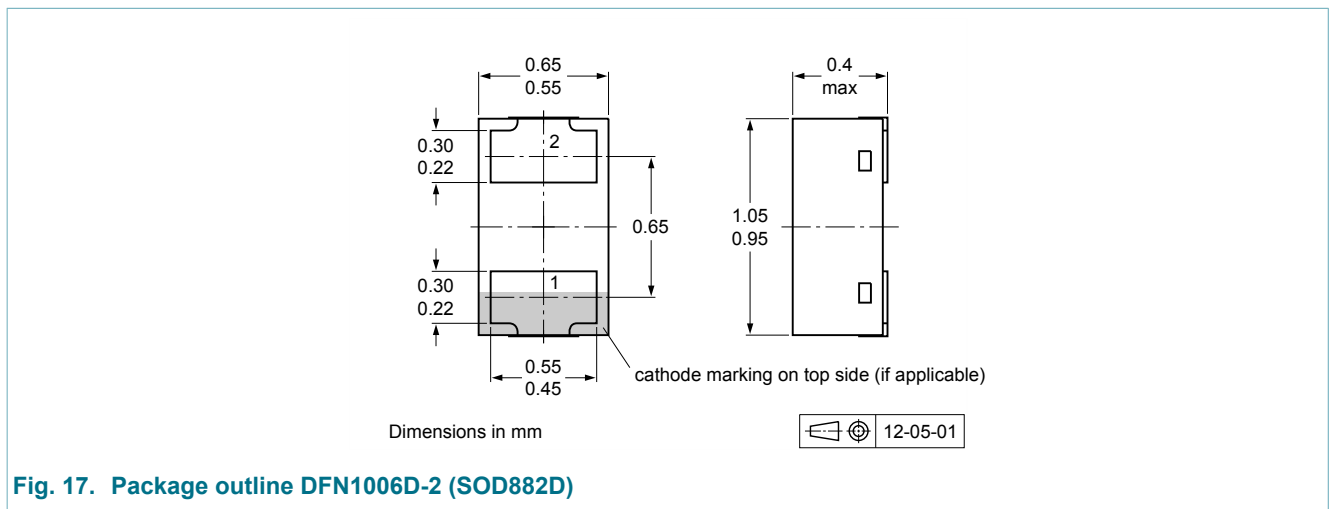


Fig. 17. Package outline DFN1006D-2 (SOD882D)

13. Soldering

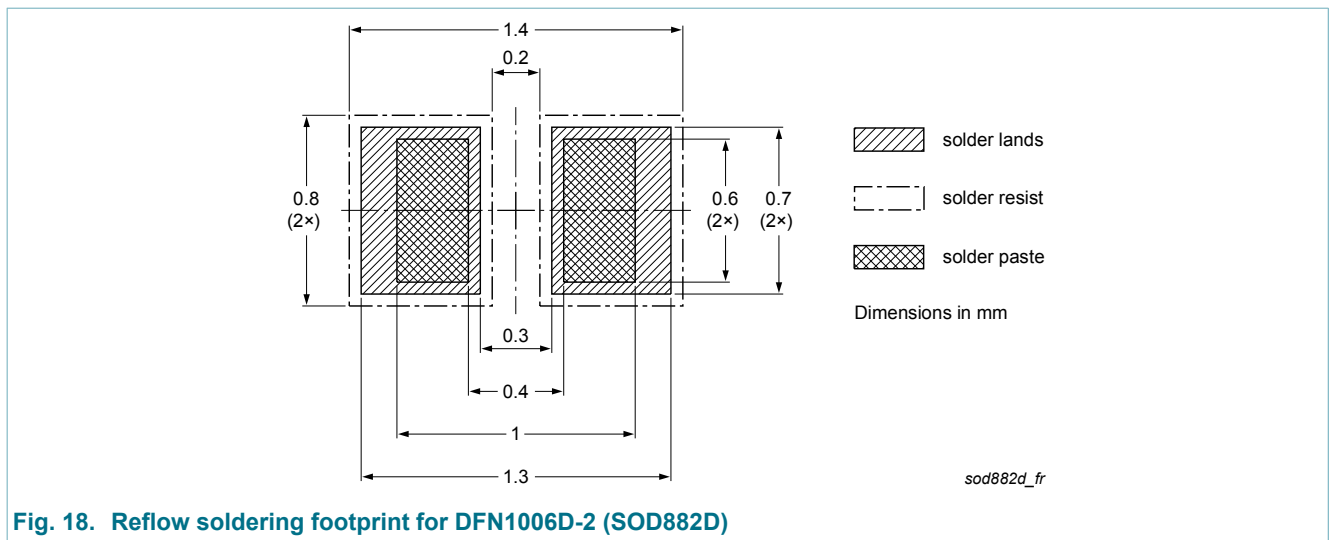


Fig. 18. Reflow soldering footprint for DFN1006D-2 (SOD882D)

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">Section "Marking": updated Figure 1.			
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	-	-

15. Legal information

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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