PMEG2005BELD

20 V, 0.5 A low VF MEGA Schottky barrier rectifier

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

1.2 Features and benefits

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

1.3 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

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
I _{F(AV)}	average forward current	δ = 0.5 ; f = 20 kHz; $T_{sp} \le$ 140 °C; square wave		-	-	0.5	Α
		δ = 0.5 ; f = 20 kHz; $T_{amb} \le$ 115 °C; square wave	[1]	-	-	0.5	Α
V _R	reverse voltage	T _j = 25 °C		-	-	20	V
V _F	forward voltage	I_F = 500 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_j = 25 °C		-	353	390	mV





Symb	ool	Parameter	Conditions	Min	Тур	Max	Unit
I _R		reverse current	V _R = 10 V; T _j = 25 °C	-	28	50	μΑ

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

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]		1 - 2
2	А	anode		sym001
			Transparent top view	
			DFN1006D-2 (SOD882D)	

[1] The marking bar indicates the cathode.

3. Ordering information

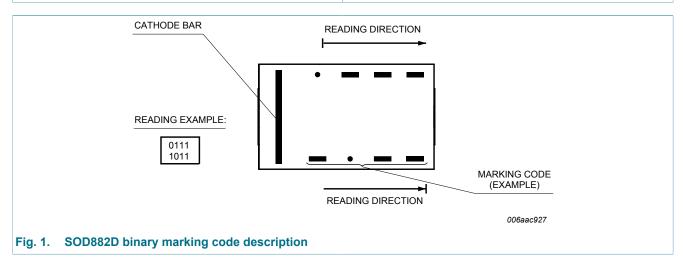
Table 3. Ordering information

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

4. Marking

Table 4. Marking codes

Type number	Marking code
PMEG2005BELD	0010 1000



PMEG2005BELD

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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 °C		-	20	V
I _F	forward current	T _{sp} ≤ 140 °C		-	0.5	Α
I _{F(AV)}	average forward current	δ = 0.5 ; f = 20 kHz; T _{sp} ≤ 140 °C; square wave		-	0.5	А
		δ = 0.5 ; f = 20 kHz; $T_{amb} \le$ 115 °C; square wave	[1]	-	0.5	А
I _{FRM}	repetitive peak forward current	$t_p \le 1 \text{ ms}; \ \delta \le 0.25$		-	3	Α
I _{FSM}	non-repetitive peak forward current	t_p = 8 ms; $T_{j(init)}$ = 25 °C; square wave		-	6	А
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[2][3]	-	370	mW
			[1][3]	-	735	mW
			[4][3]	-	1135	mW
Tj	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 cm².
- [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, Al₂O₃, standard footprint.

6. Thermal characteristics

Table 6. Thermal characteristics

PMEG2005BELD

Symbol	Parameter	Conditions		Min	Тур	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
	ambient		[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.

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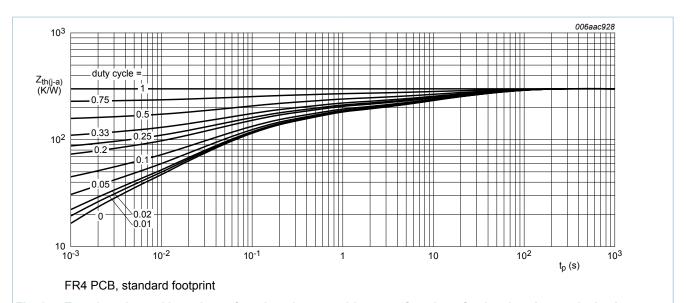
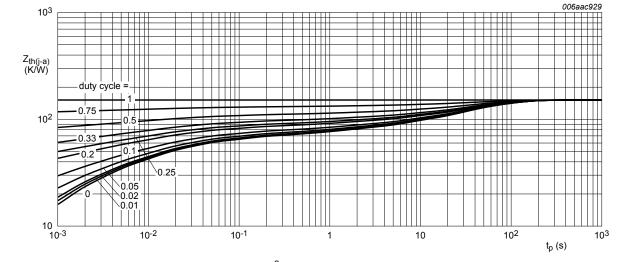
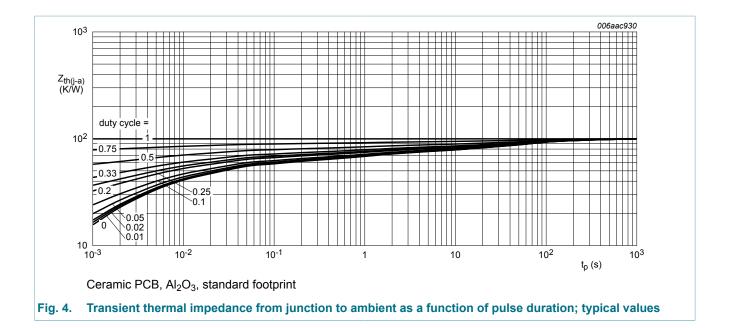


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, mounting pad for cathode 1 cm²

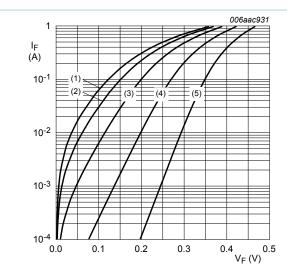
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Тур	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; $t_p \le 300$ μs; $δ \le 0.02$; T_j = 25 °C	-	137	170	mV
		I_F = 10 mA; pulsed; $t_p \le 300$ μs; $δ \le 0.02$; T_j = 25 °C	-	197	235	mV
		I_F = 100 mA; pulsed; t_p ≤ 300 μs; $δ$ ≤ 0.02 ; T_j = 25 °C	-	266	310	mV
		I_F = 500 mA; pulsed; $t_p \le$ 300 µs; $\delta \le$ 0.02 ; T_j = 25 °C	-	353	390	mV
I_R	reverse current	V _R = 10 V; T _j = 25 °C	-	28	50	μΑ
		V _R = 20 V; T _j = 25 °C	-	87	200	μΑ
C _d	diode capacitance	V _R = 1 V; f = 1 MHz; T _j = 25 °C	-	31	40	pF
t _{rr}	reverse recovery time	$I_F = 0.5 \text{ A}$; $I_R = 0.5 \text{ A}$; $I_{R(meas)} = 0.1 \text{ A}$; $I_{j} = 25 \text{ °C}$	-	1.6	-	ns
V_{FRM}	peak forward recovery voltage	$I_F = 0.5 \text{ A}$; $dI_F/dt = 20 \text{ A/}\mu\text{s}$; $T_j = 25 \text{ °C}$	-	565	-	mV



(1)
$$T_i = 150 \, ^{\circ}C$$

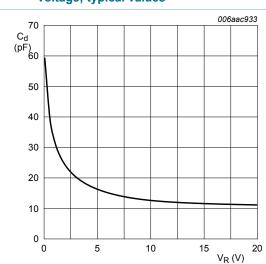
(2)
$$T_j = 125 \, ^{\circ}C$$

(3)
$$T_i = 85 \, ^{\circ}C$$

(4)
$$T_i = 25 \,^{\circ}C$$

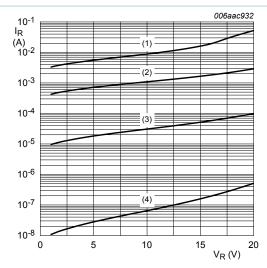
(5)
$$T_j = -40 \, ^{\circ}\text{C}$$

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



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

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



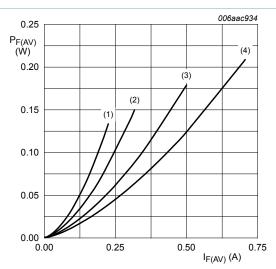
(1)
$$T_i = 125 \, ^{\circ}C$$

(2)
$$T_i = 85 \,^{\circ}C$$

(3)
$$T_i = 25 \, ^{\circ}C$$

(4)
$$T_i = -40 \, ^{\circ}C$$

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



T_i = 150 °C

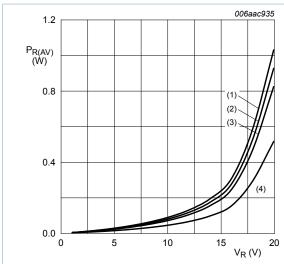
$$(1) \delta = 0.1$$

$$(2) \delta = 0.2$$

$$(3) \delta = 0.5$$

$$(4) \delta = 1$$

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



T_i = 125 °C

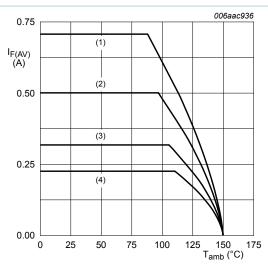
(1) $\delta = 1$ (DC)

(2) δ = 0.9; f = 20 kHz

(3) δ = 0.8; f = 20 kHz

(4) $\delta = 0.5$; f = 20 kHz

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



FR4 PCB, standard footprint

T_i = 150 °C

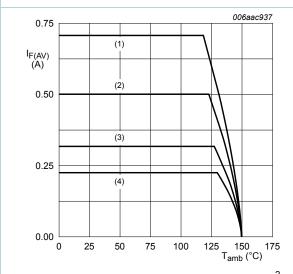
 $(1) \delta = 1$

 $(2) \delta = 0.5$

 $(3) \delta = 0.2$

 $(4) \delta = 0.1$

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



FR4 PCB, mounting pad for cathode 1 cm²

T_i = 150 °C

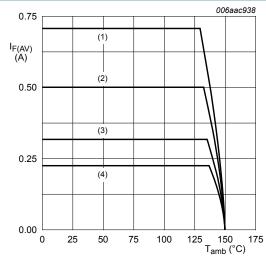
 $(1) \delta = 1$

 $(2) \delta = 0.5$

 $(3) \delta = 0.2$

 $(4) \delta = 0.1$

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



Ceramic PCB, Al₂O₃, standard footprint

T_i = 150 °C

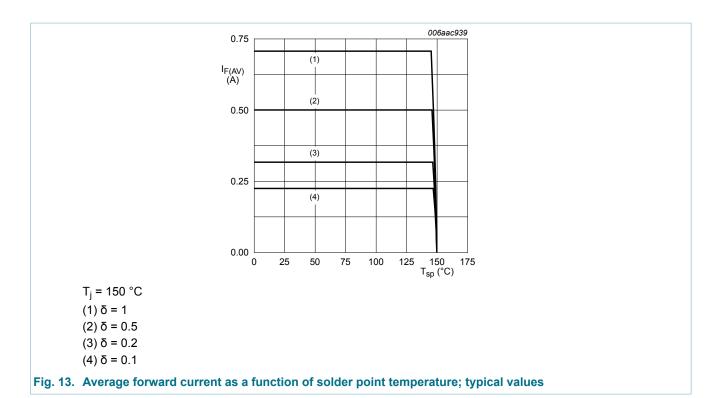
 $(1) \delta = 1$

 $(2) \delta = 0.5$

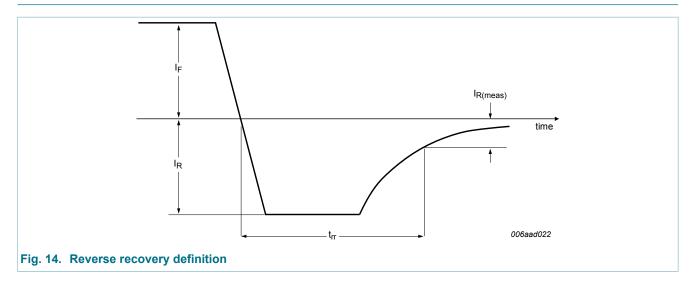
 $(3) \delta = 0.2$

 $(4) \delta = 0.1$

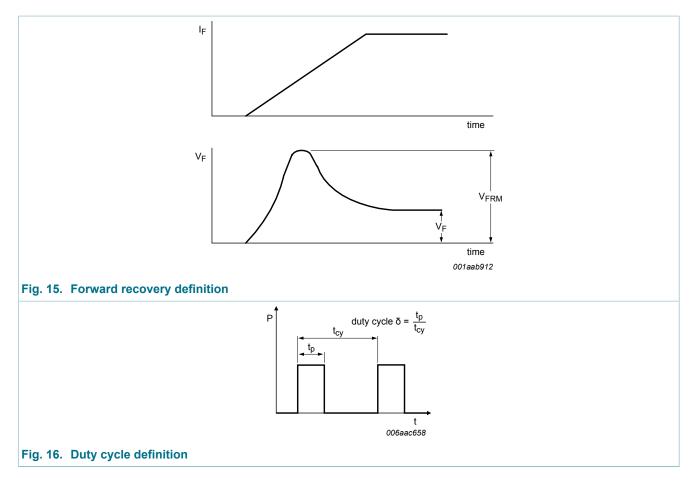
Fig. 12. Average forward current as a function of ambient temperature; typical values



8. Test information



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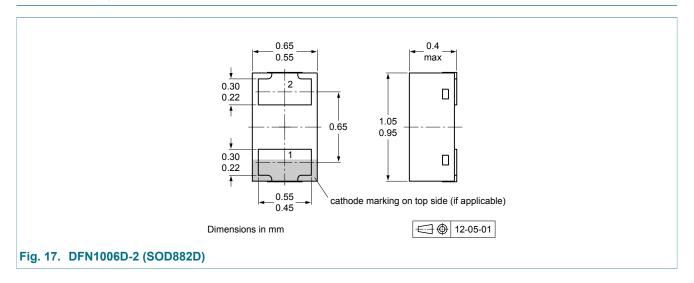


The current ratings for the typical waveforms are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current, $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current.

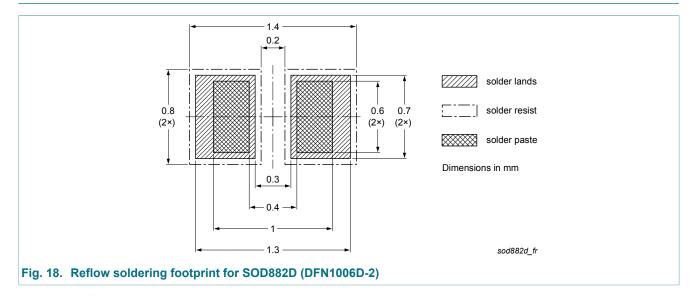
8.1 Quality information

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



10. Soldering



11. Revision history

Table 8. Revision history

Document ID	Release date	Document status	Change notice	Supersedes			
PMEG2005BELD v.3	20120704	Product document	-	PMEG2005BELD v.2			
Modifications:	Characteristics: V _{FF}	 Characteristics: V_{FRM} added; changed conditions of t_{rr}. 					
PMEG2005BELD v.2	20120312	Product document	-	PMEG2005BELD v.1			
PMEG2005BELD v.1	20120111	Preliminary document	-	-			

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12. Legal information

12.1 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.
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