PMEG2005BELD

20 V, 0.5 A low VF MEGA Schottky barrier rectifier

Rev. 1 — 11 January 2012 **Preliminary 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 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: $V_R \leq 20$ 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

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

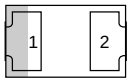
Table 1. Quick reference data

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

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

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 Transparent top view **SOD882D**	
2	A	anode		

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

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

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMEG2005BELD	0010 1000

[1] For SOD882D binary marking code description, see Figure 1.

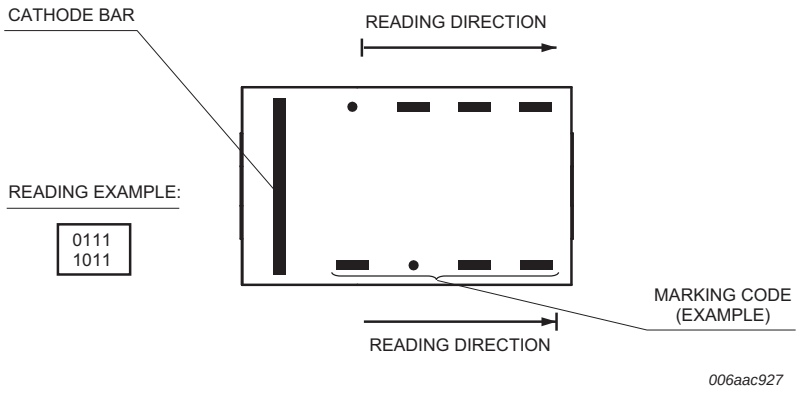


Fig 1. SOD882D binary marking code description

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	$T_{sp} \leq 140$ °C		-	0.5	A
$I_{F(AV)}$	average forward current	square wave; δ = 0.5; f = 20 kHz; $T_{amb} \leq 115$ °C	[1]	-	0.5	A
		square wave; δ = 0.5; f = 20 kHz; $T_{sp} \leq 140$ °C		-	0.5	A
I_{FRM}	repetitive peak forward current	$t_p \leq 1$ ms; δ ≤ 0.25		-	3	A
I_{FSM}	non-repetitive peak forward current	square wave; t_p = 8 ms; $T_{j(init)}$ = 25 °C		-	6	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °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.

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]	-	-	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.

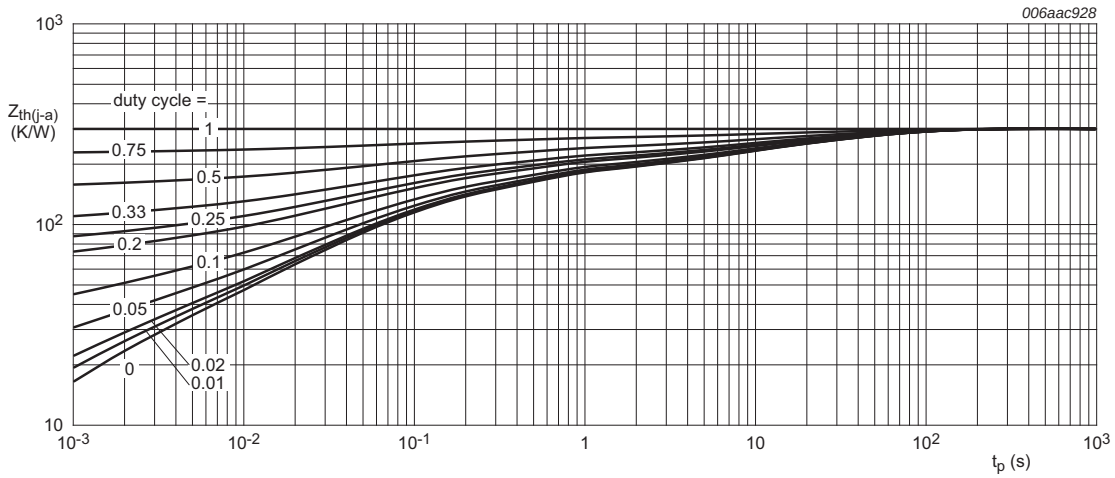
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[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 cm^2.

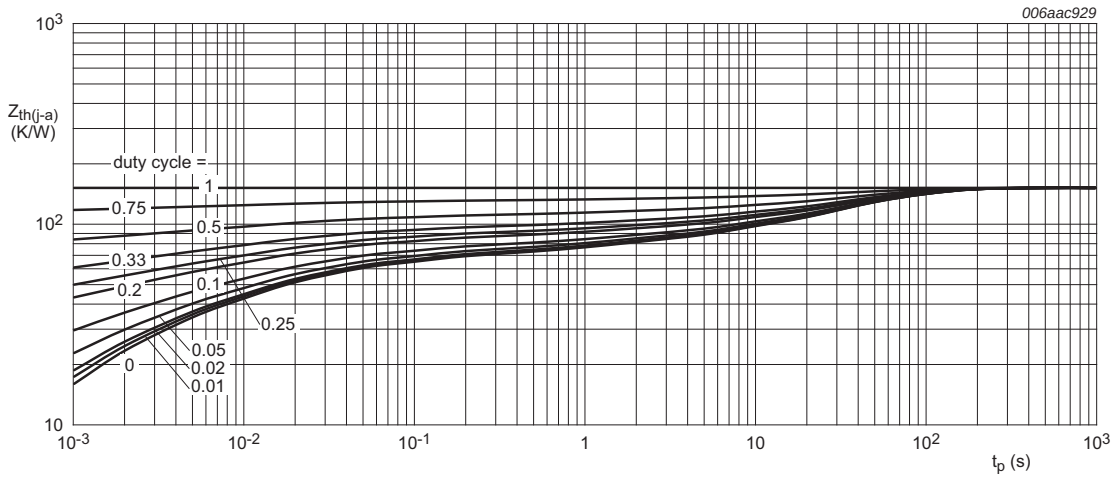
[5] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

[6] Soldering point of cathode tab.



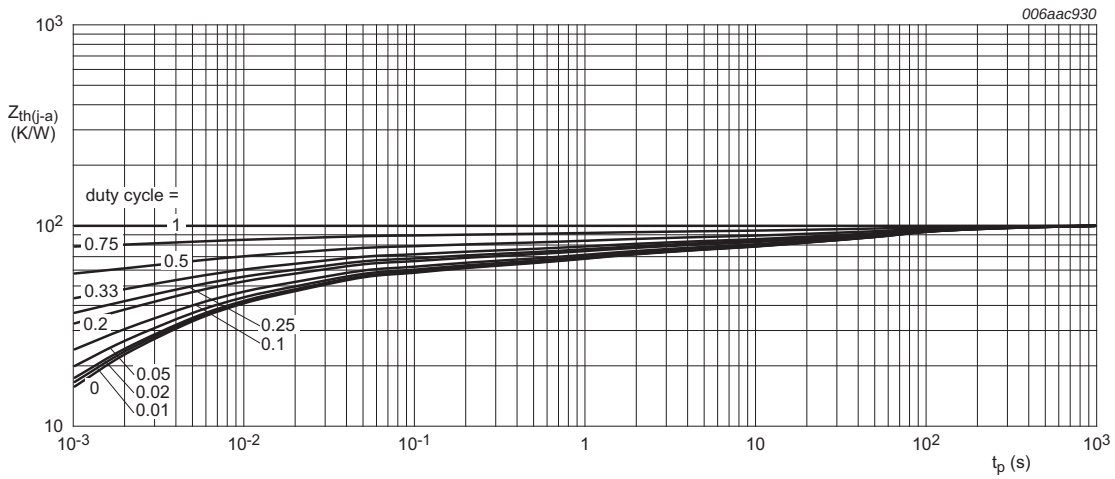
FR4 PCB, standard footprint

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^2

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



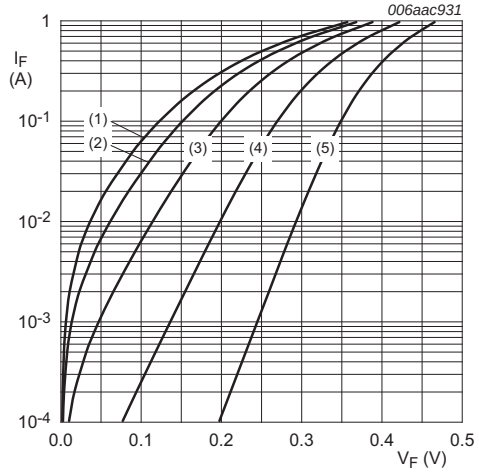
Ceramic PCB, Al_2O_3, standard footprint

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

7. Characteristics

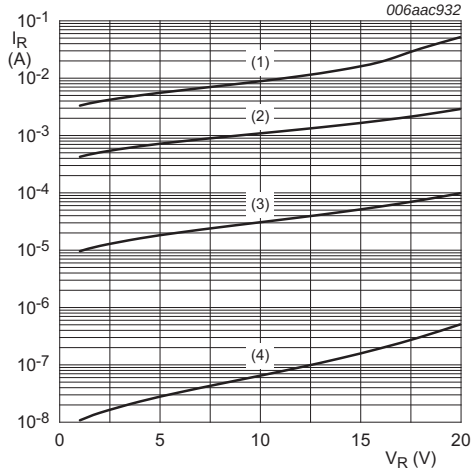
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	I_F = 0.1 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_j = 25 °C	-	79	105	mV
		I_F = 1 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_j = 25 °C	-	137	170	mV
		I_F = 10 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_j = 25 °C	-	197	235	mV
		I_F = 100 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_j = 25 °C	-	266	310	mV
		I_F = 500 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_j = 25 °C	-	353	390	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C	-	28	50	µA
		V_R = 20 V; T_j = 25 °C	-	87	200	µA
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 = 10 mA; I_R = 10 mA; R_L = 100 Ω; $I_{R(meas)}$ = 1 mA; T_j = 25 °C	-	11	-	ns



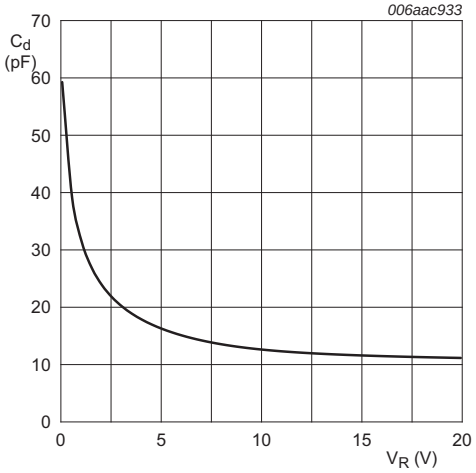
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

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



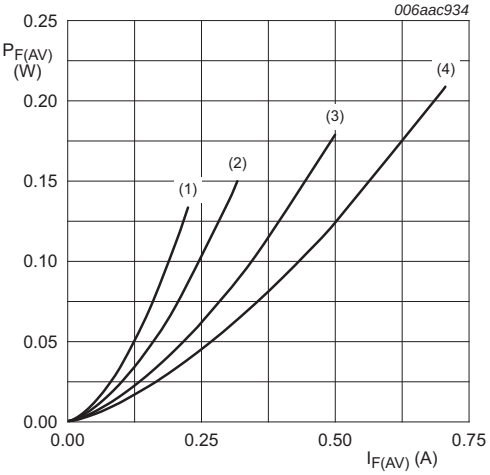
(1) T_j = 125 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

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



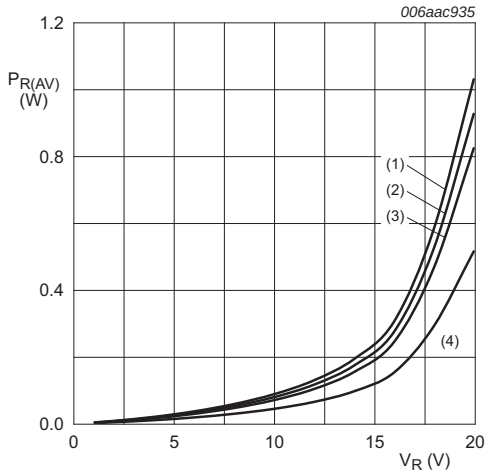
f = 1 MHz; T_{amb} = 25 °C

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



T_j = 150 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 1

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



T_j = 125 °C

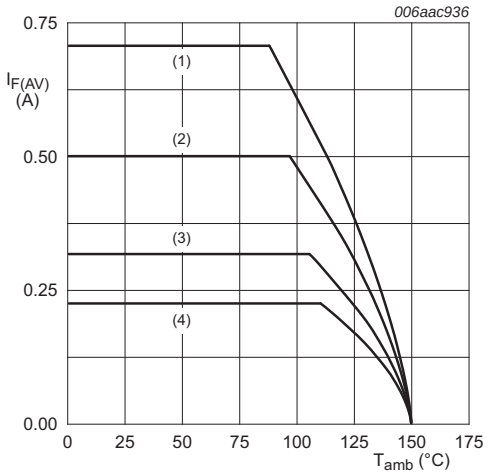
(1) δ = 1 (DC)

(2) δ = 0.9; f = 20 kHz

(3) δ = 0.8; f = 20 kHz

(4) δ = 0.5; f = 20 kHz

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



FR4 PCB, standard footprint

T_j = 150 °C

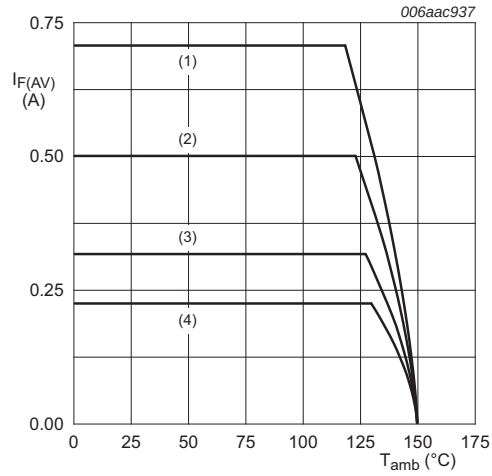
(1) δ = 1

(2) δ = 0.5

(3) δ = 0.2

(4) δ = 0.1

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



FR4 PCB, mounting pad for cathode 1 cm^2

T_j = 150 °C

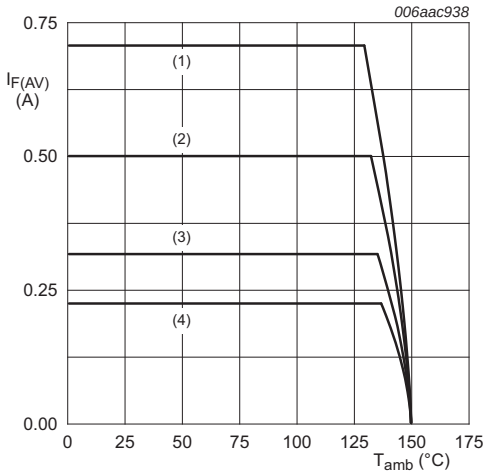
(1) δ = 1

(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, Al_2O_3, standard footprint

T_j = 150 °C

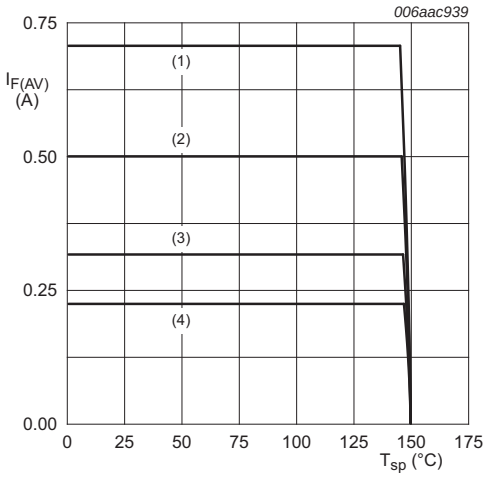
(1) δ = 1

(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

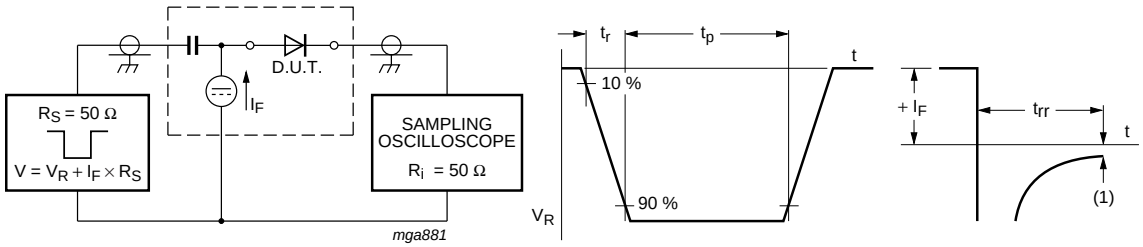
(2) δ = 0.5

(3) δ = 0.2

(4) δ = 0.1

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

8. Test information



(1) I_R = 1 mA

Fig 14. Reverse recovery time test circuit and waveforms

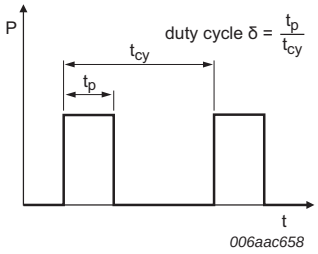


Fig 15. Duty cycle definition

The current ratings for the typical waveforms as shown in figures 10, 11, 12 and 13 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

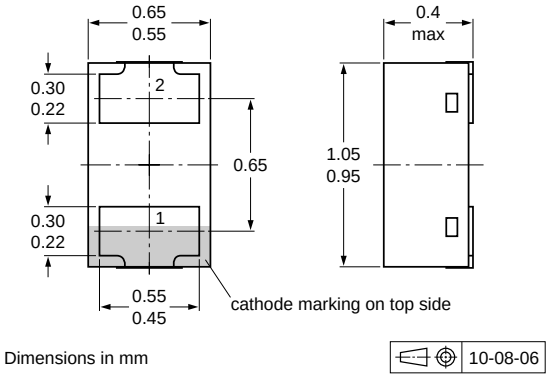
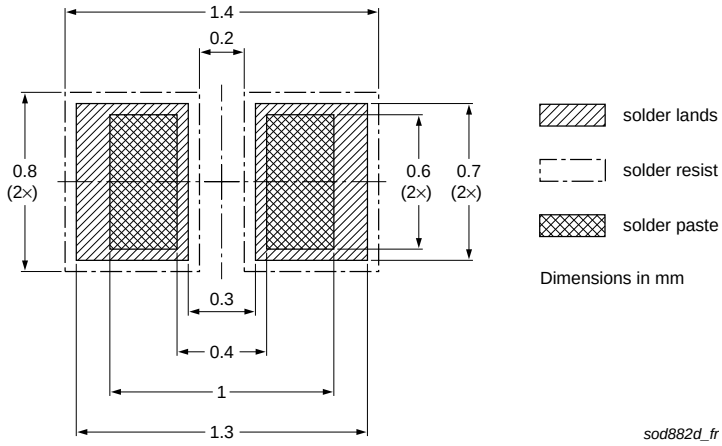


Fig 16. Package outline SOD882D

10. Soldering



Reflow soldering is the only recommended soldering method.

Fig 17. Reflow soldering footprint for SOD882D

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG2005BELD v.1	20120111	Preliminary data sheet	-	-

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.
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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[2] The term 'short data sheet' is explained in section "Definitions".

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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 9
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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