

PMEG4002ELD

40 V, 0.2 A low V_F MEGA Schottky barrier rectifier

Rev. 1 — 20 April 2011

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 SOD882D leadless ultra small Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

1.2 Features and benefits

- Forward current: $I_F \leq 0.2$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage: $V_F \leq 600$ mV
- Ultra small and leadless SMD plastic package
- AEC-Q101 qualified
- 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 (SMPS)
- Reverse polarity protection
- Low power consumption applications
- Ultra high-speed switching

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; $\delta = 0.5$; $f = 20$ kHz				
		$T_{amb} \leq 120$ °C	[1]	-	0.2	A
		$T_{sp} \leq 140$ °C	-	-	0.2	A
I_R	reverse current	$V_R = 25$ V	-	0.3	0.5	μ A
V_R	reverse voltage		-	-	40	V
V_F	forward voltage	$I_F = 200$ mA	[2]	540	600	mV

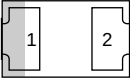
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode 1 cm².

[2] Pulse test: $t_p \leq 300$ μ s; $\delta \leq 0.02$.



2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode	 <p>Transparent top view</p>	 <p>sym001</p>
2	anode		

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG4002ELD	-	leadless ultra small plastic package; 2 terminals; body 1 × 0.6 × 0.4 mm	SOD882D

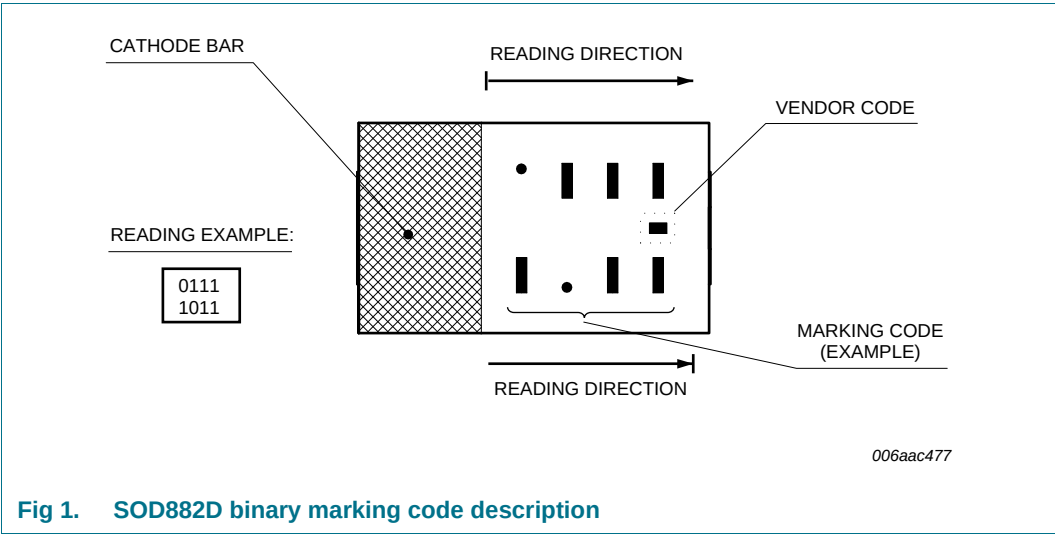
4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PMEG4002ELD	1011 0000

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

4.1 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		-	40	V
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$; $f = 20$ kHz			
		$T_{amb} \leq 120$ °C	[1] -	0.2	A
		$T_{sp} \leq 140$ °C	-	0.2	A
I_{FRM}	repetitive peak forward current	$t_p \leq 1$ ms; $\delta \leq 0.25$	-	1	A
I_{FSM}	non-repetitive peak forward current	square wave; $t_p = 8$ ms	[2] -	3	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[3] -	340	mW
			[1] -	660	mW
			[4] -	1000	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 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

[2] $T_j = 25$ °C prior to surge.

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

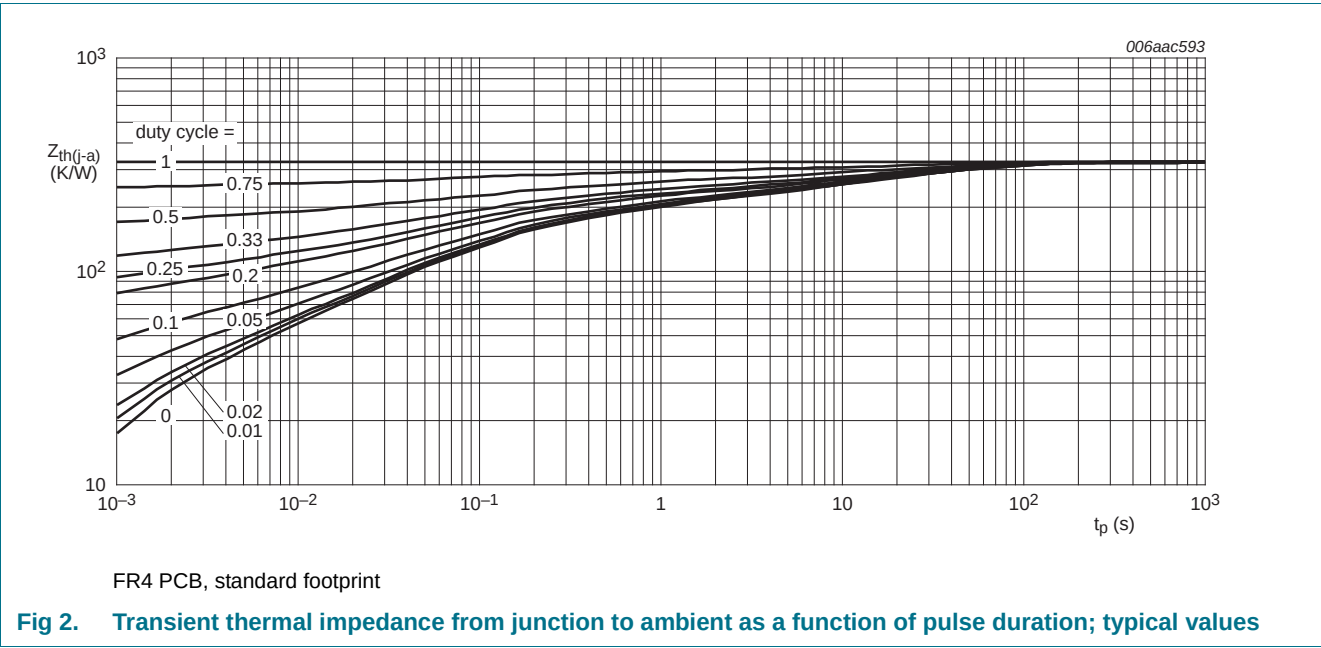
[4] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.

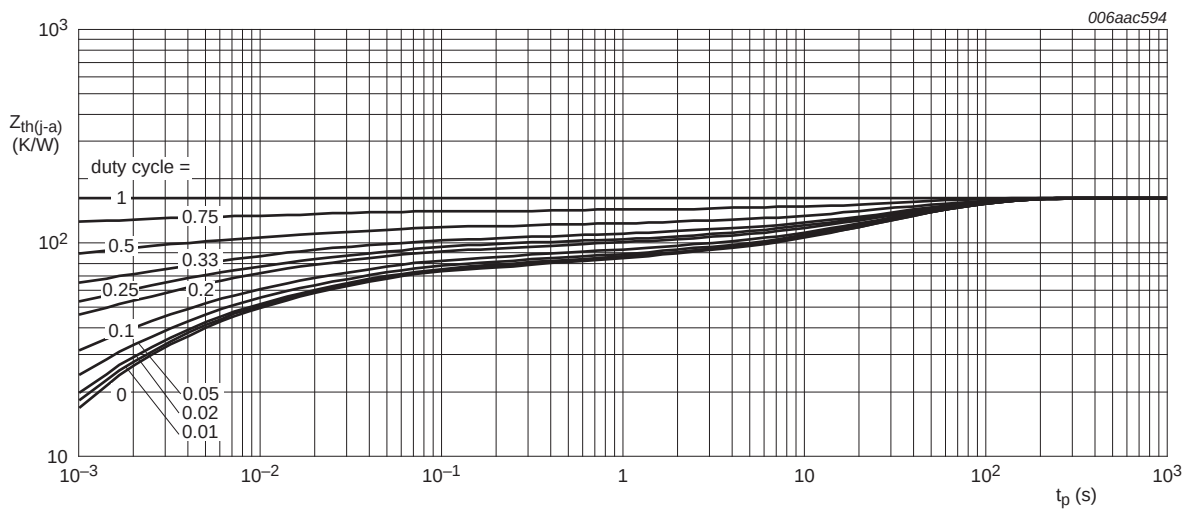
6. Thermal characteristics

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]	-	370	K/W
			[1][3]	-	190	K/W
			[1][4]	-	125	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[5]	-	50	K/W

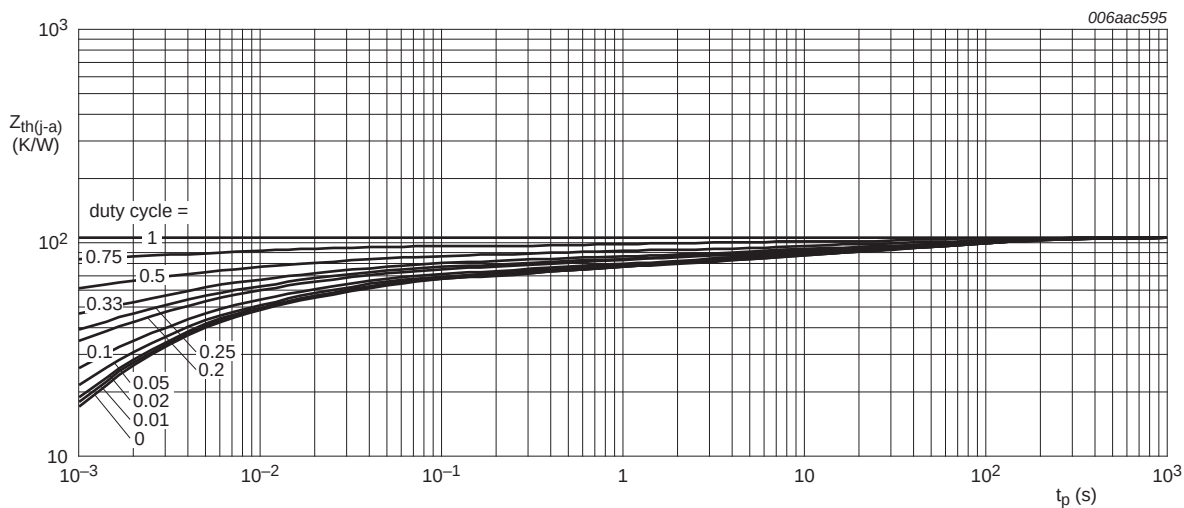
- [1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
- [4] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [5] Soldering point of cathode tab.





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

7. Characteristics

Table 7. Characteristics
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _F	forward voltage		[1]			
		I _F = 0.1 mA	-	190	220	mV
		I _F = 1 mA	-	250	290	mV
		I _F = 10 mA	-	320	360	mV
		I _F = 100 mA	-	450	500	mV
		I _F = 200 mA	-	540	600	mV
I _R	reverse current	V _R = 25 V	-	0.3	0.5	μA
		V _R = 40 V	-	0.6	10	μA
C _d	diode capacitance	V _R = 1 V; f = 1 MHz	-	14	20	pF
t _{rr}	reverse recovery time		[2]	4	-	ns

[1] Pulse test: t_p ≤ 300 μs; δ ≤ 0.02.
[2] When switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA.

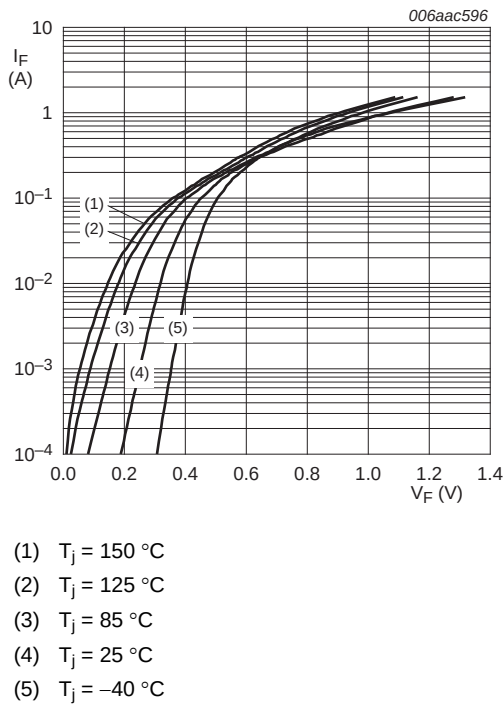


Fig 5. Forward current as a function of forward voltage; typical values

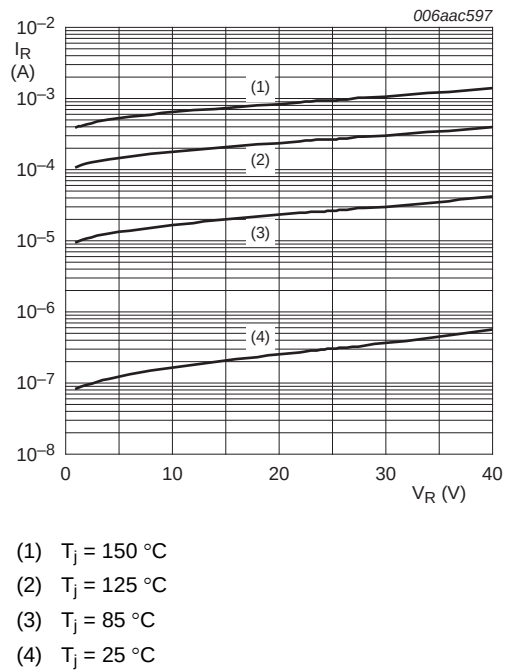
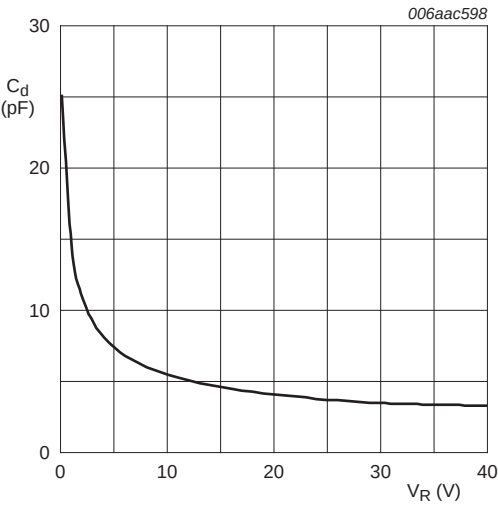
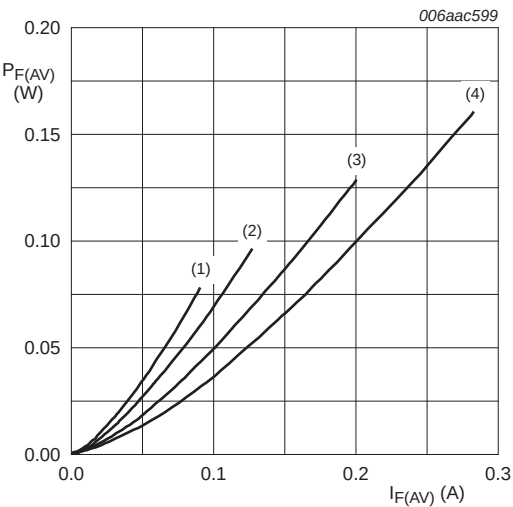


Fig 6. Reverse current as a function of reverse voltage; typical values



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

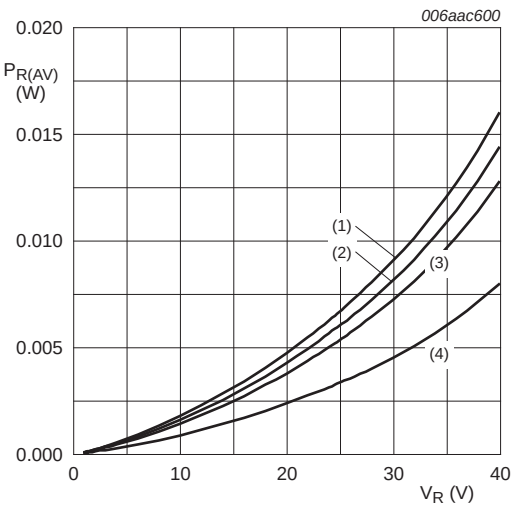
Fig 7. Diode capacitance as a function of reverse voltage; typical values



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

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

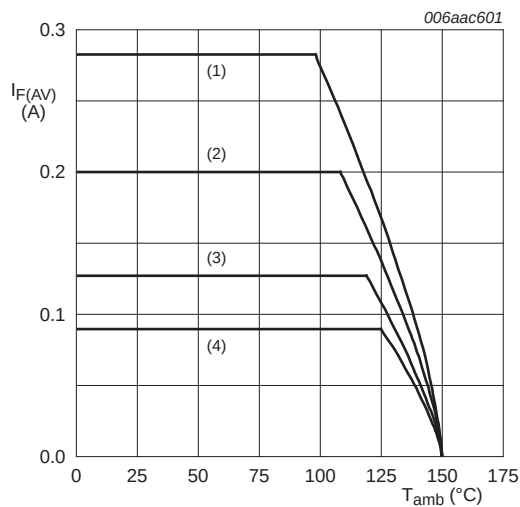
Fig 8. Average forward power dissipation as a function of average forward current; typical values



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

- (1) $\delta = 1$
- (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

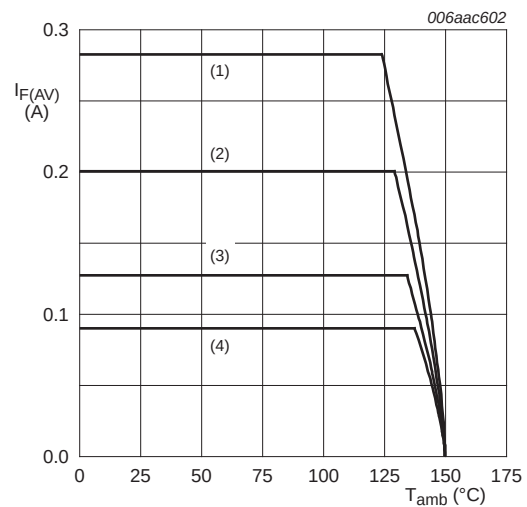


FR4 PCB, standard footprint

$T_j = 150\text{ °C}$

- (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

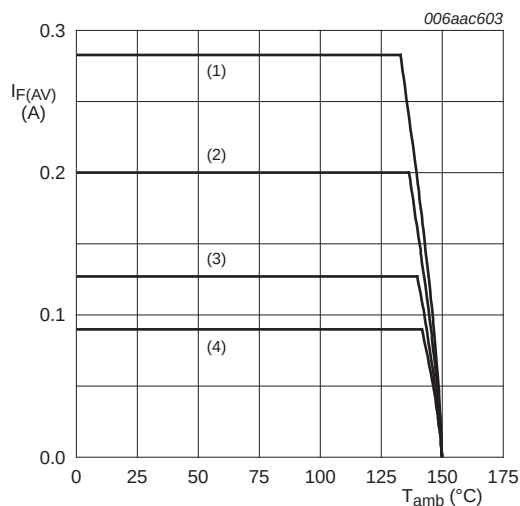


FR4 PCB, mounting pad for cathode 1 cm^2

$T_j = 150\text{ °C}$

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

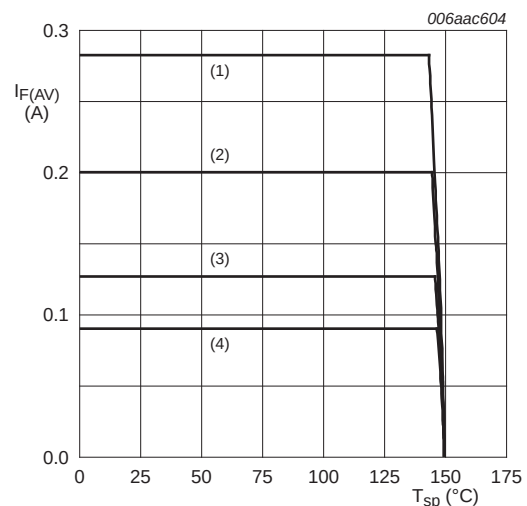


Ceramic PCB, Al_2O_3 , standard footprint

$T_j = 150\text{ °C}$

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



$T_j = 150\text{ °C}$

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

8. Test information

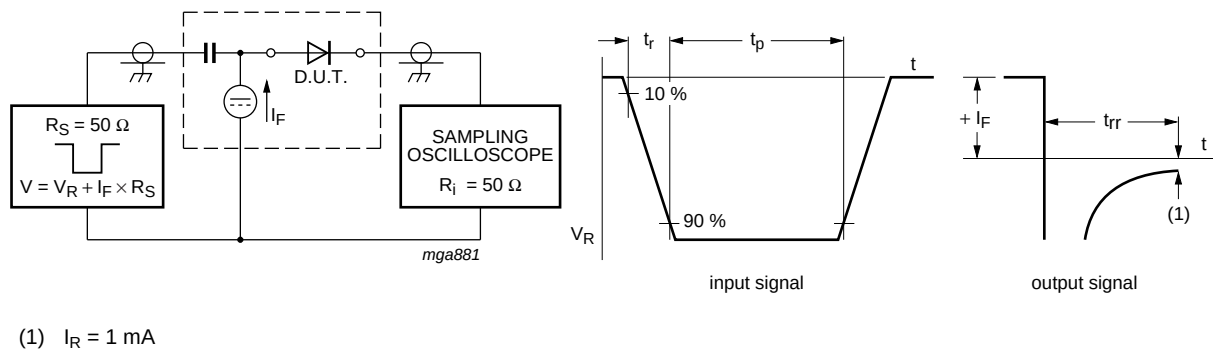


Fig 14. Reverse recovery time test circuit and waveforms

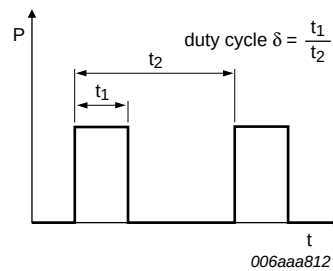


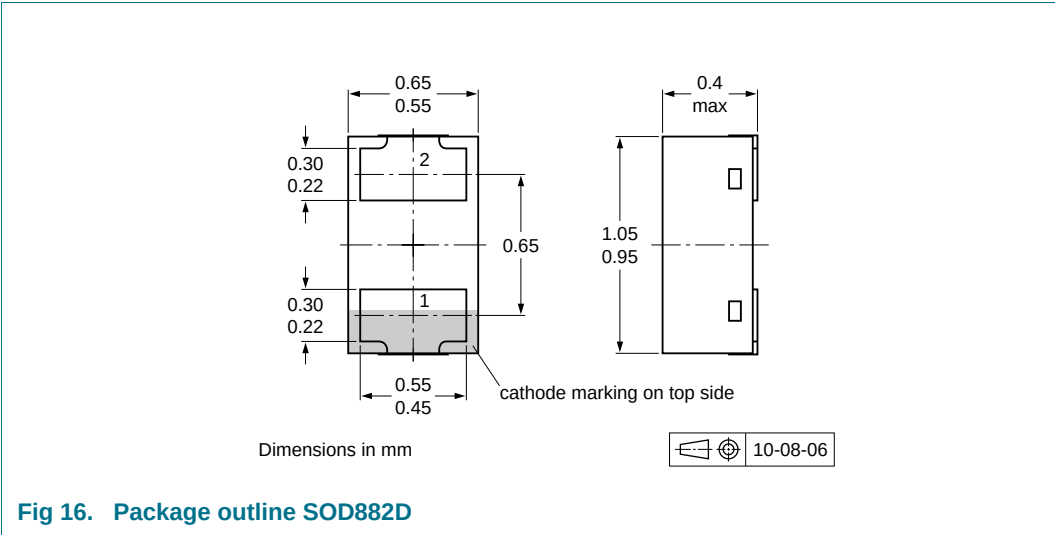
Fig 15. Duty cycle definition

The current ratings for the typical waveforms as shown in [Figure 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



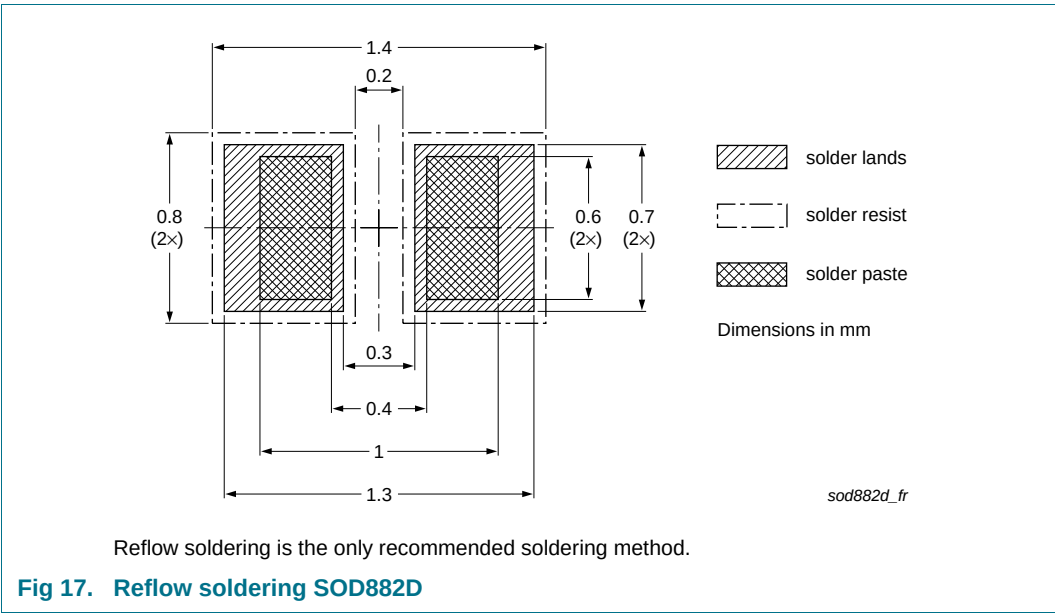
10. Packing information

Table 8. Packing methods
The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity
			10000
PMEG4002ELD	SOD882D	2 mm pitch, 8 mm tape and reel	-315

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering



12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEG4002ELD v.1	20110420	Product data sheet	-	-

13. Legal information

13.1 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.

[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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