



# 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

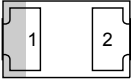
| Symbol      | Parameter               | Conditions                                                                         | Min | Typ | Max | Unit    |
|-------------|-------------------------|------------------------------------------------------------------------------------|-----|-----|-----|---------|
| $I_{F(AV)}$ | 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</p> <p>DFN1006D-2 (SOD882D)</p> |  <p>sym001</p> |
| 2   | A      | anode       |                                                                                                                                           |                                                                                                   |

[1] The marking bar indicates the cathode.

## 6. Ordering information

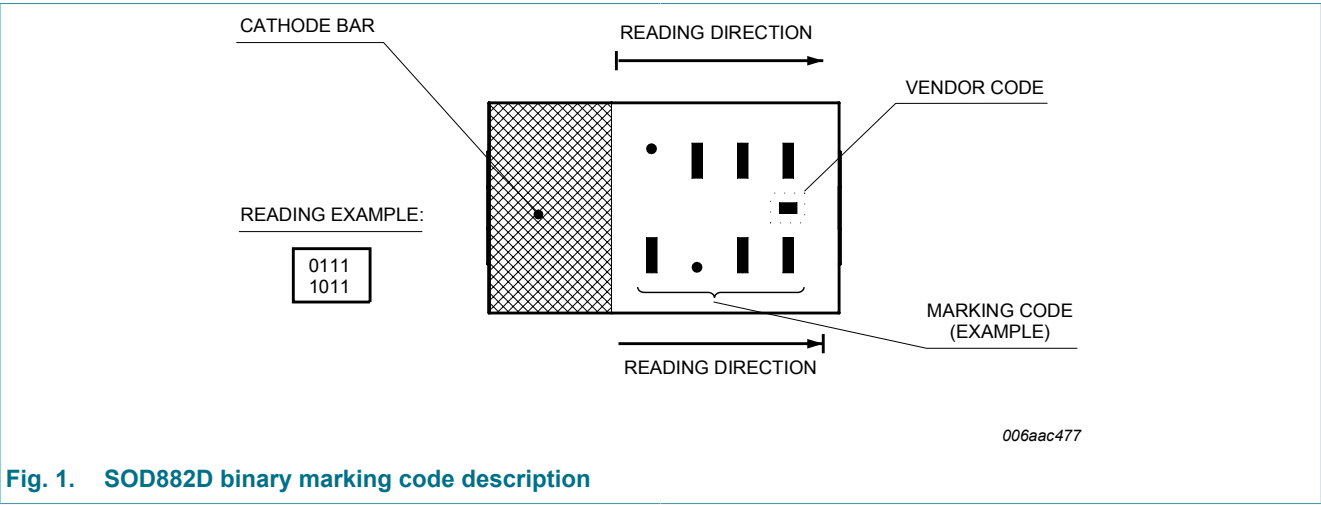
Table 3. Ordering information

| 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                     | $T_j = 25\text{ }^{\circ}\text{C}$                                                              |        | -   | 20   | V                  |
| $I_F$       | forward current                     | $T_{sp} \leq 140\text{ }^{\circ}\text{C}$                                                       |        | -   | 0.5  | A                  |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{sp} \leq 140\text{ }^{\circ}\text{C}$ ; square wave  |        | -   | 0.5  | A                  |
|             |                                     | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; $T_{amb} \leq 115\text{ }^{\circ}\text{C}$ ; 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 | $t_p = 8\text{ ms}$ ; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; square wave                  |        | -   | 6    | A                  |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ }^{\circ}\text{C}$                                                       | [2][3] | -   | 370  | mW                 |
|             |                                     |                                                                                                 | [1][3] | -   | 735  | mW                 |
|             |                                     |                                                                                                 | [4][3] | -   | 1135 | mW                 |
| $T_j$       | junction temperature                |                                                                                                 |        | -   | 150  | $^{\circ}\text{C}$ |
| $T_{amb}$   | ambient temperature                 |                                                                                                 |        | -55 | 150  | $^{\circ}\text{C}$ |
| $T_{stg}$   | storage temperature                 |                                                                                                 |        | -65 | 150  | $^{\circ}\text{C}$ |

[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 cm<sup>2</sup>.
- [5] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.
- [6] Soldering point of cathode tab.

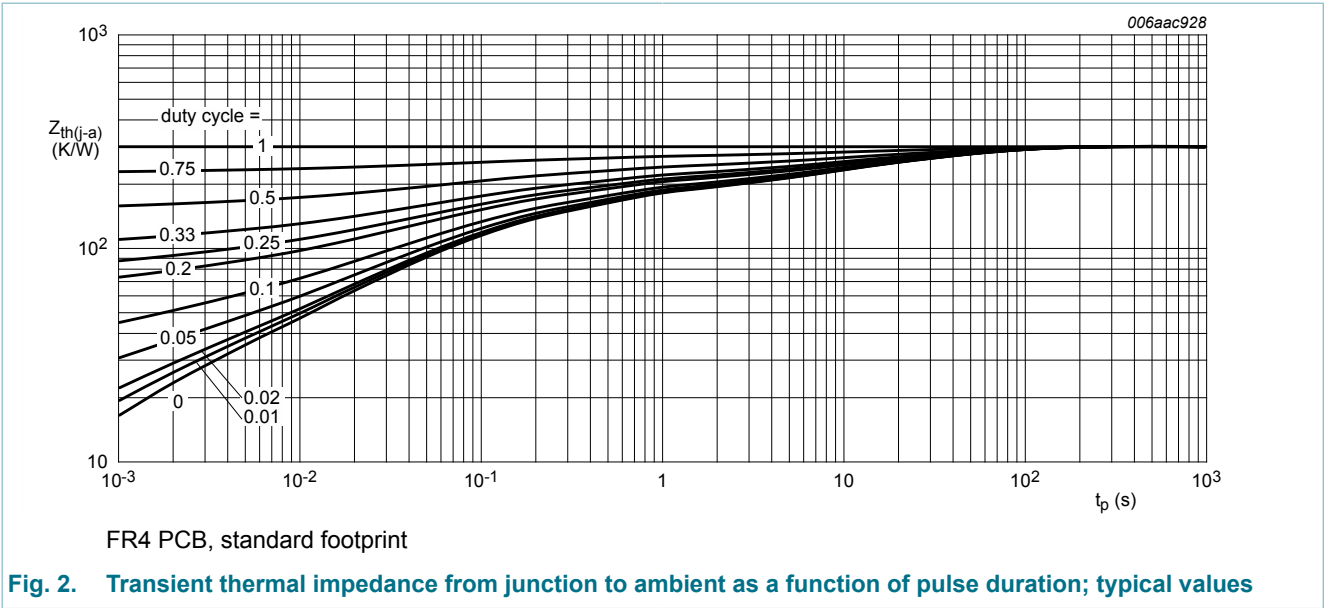
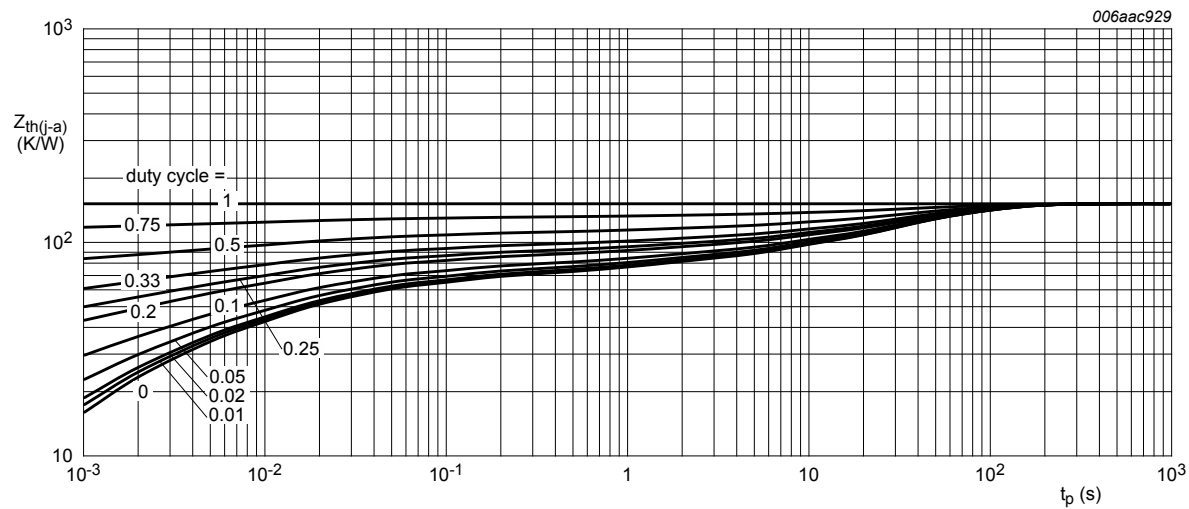
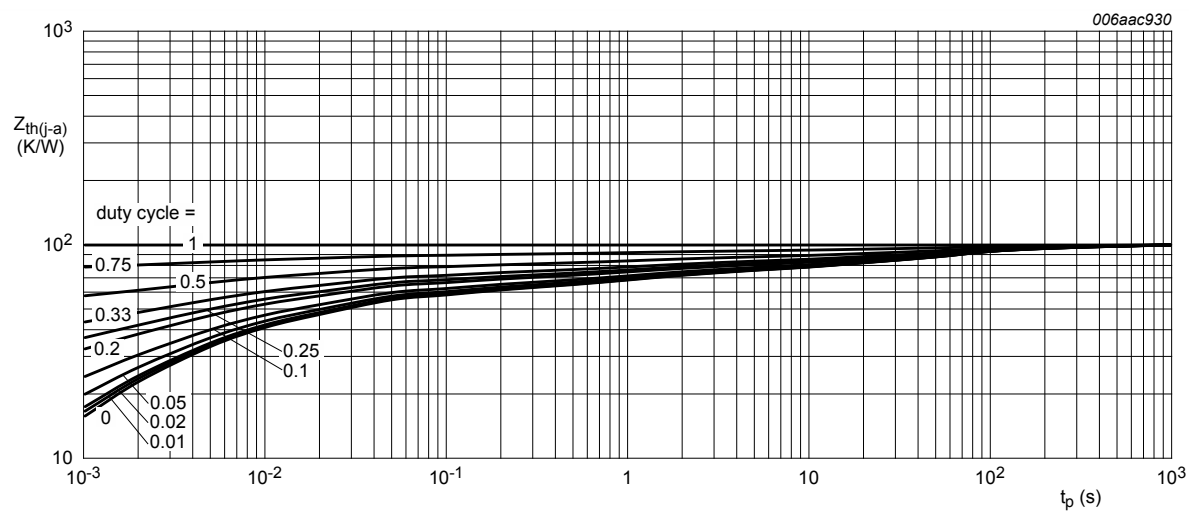


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



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 |
|--------|-----------------|---------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| $V_F$  | forward voltage | $I_F = 0.1 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ }\mu\text{s}$ ;<br>$\delta \leq 0.02$ ; $T_J = 25 \text{ }^\circ\text{C}$ | -   | 79  | 105 | mV   |
|        |                 | $I_F = 1 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ }\mu\text{s}$ ;<br>$\delta \leq 0.02$ ; $T_J = 25 \text{ }^\circ\text{C}$   | -   | 137 | 170 | mV   |
|        |                 | $I_F = 10 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ }\mu\text{s}$ ;<br>$\delta \leq 0.02$ ; $T_J = 25 \text{ }^\circ\text{C}$  | -   | 197 | 235 | mV   |

| Symbol    | Parameter                     | Conditions                                                                                                                   | Min | Typ | Max | Unit          |
|-----------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|
|           |                               | $I_F = 100\text{ mA}$ ; pulsed; $t_p \leq 300\text{ }\mu\text{s}$ ;<br>$\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$ | -   | 266 | 310 | mV            |
|           |                               | $I_F = 500\text{ mA}$ ; pulsed; $t_p \leq 300\text{ }\mu\text{s}$ ;<br>$\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$ | -   | 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         | $I_F = 0.5\text{ A}$ ; $I_R = 0.5\text{ A}$ ; $I_{R(\text{meas})} = 0.1\text{ A}$ ;<br>$T_j = 25\text{ }^\circ\text{C}$      | -   | 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            |

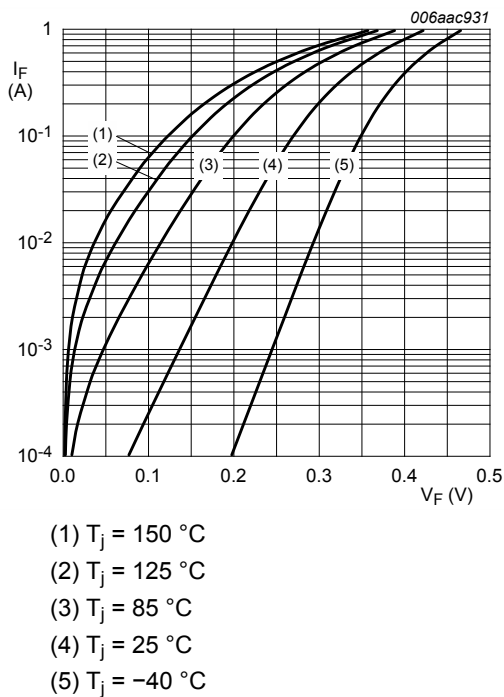


Fig. 5. Forward current as a function of forward voltage; typical values

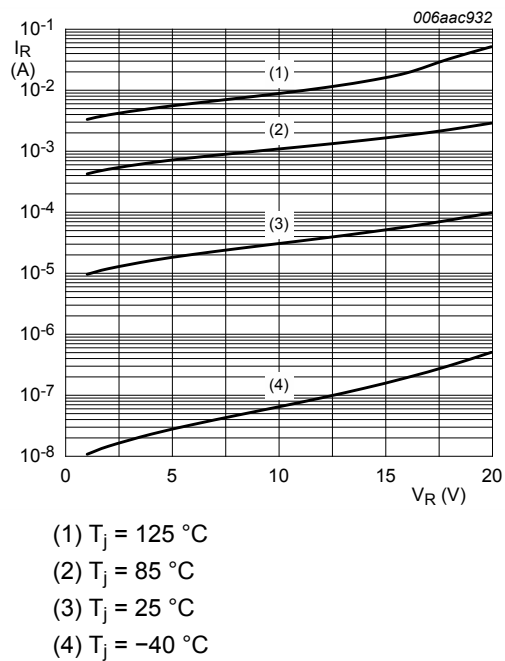


Fig. 6. Reverse current as a function of reverse voltage; typical values

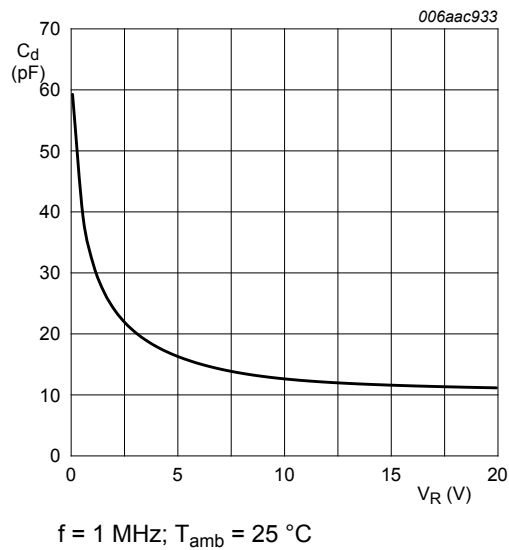


Fig. 7. Diode capacitance as a function of reverse voltage; typical values

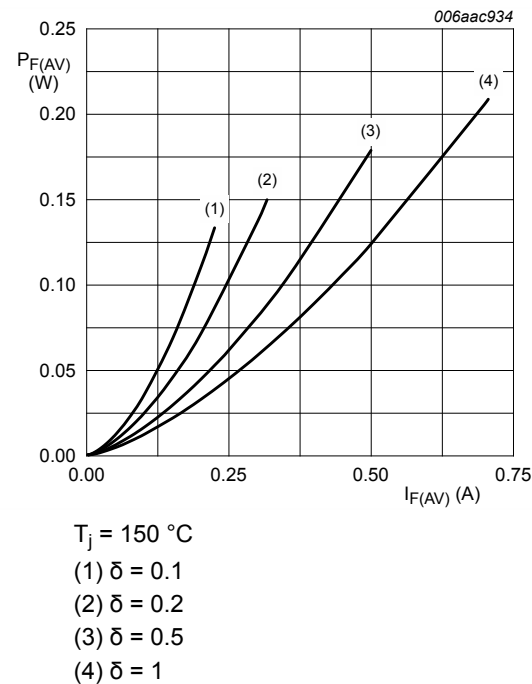


Fig. 8. Average forward power dissipation as a function of average forward current; typical values

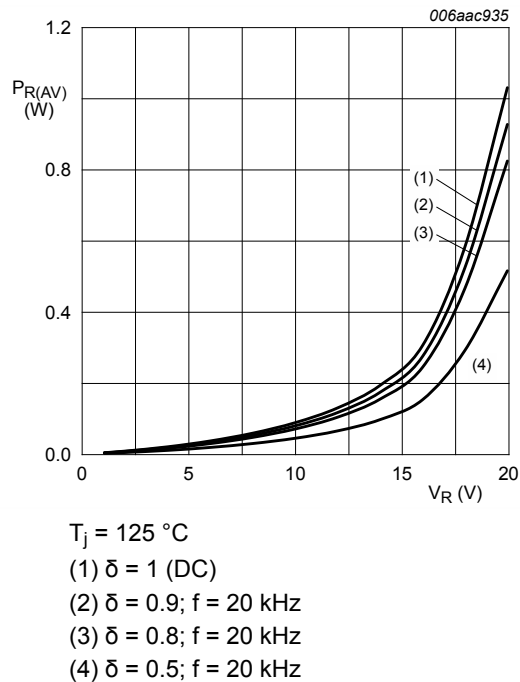


Fig. 9. Average reverse power dissipation as a function of reverse voltage; typical values

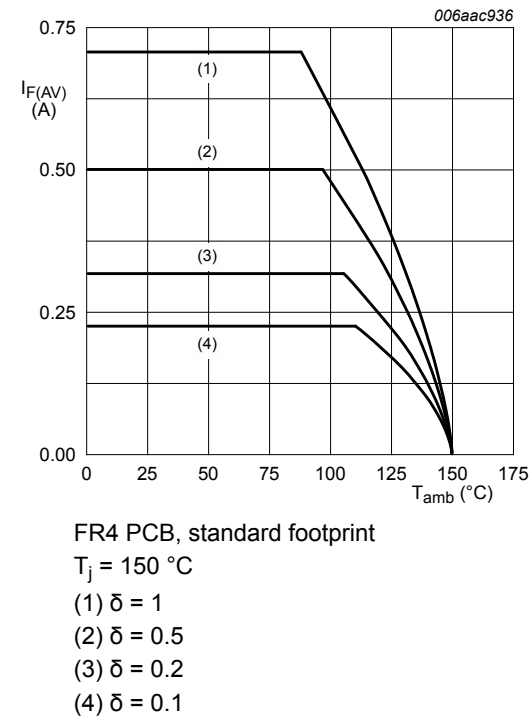
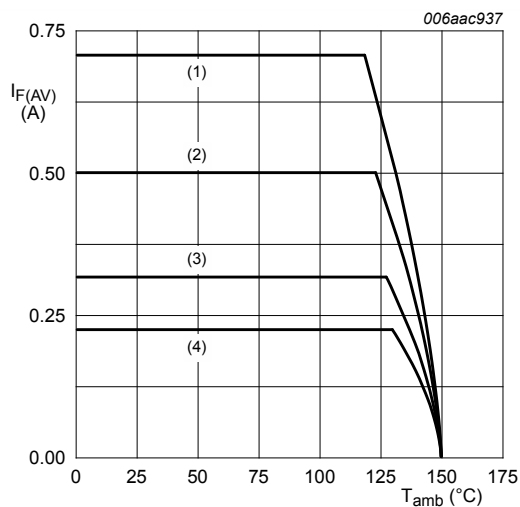
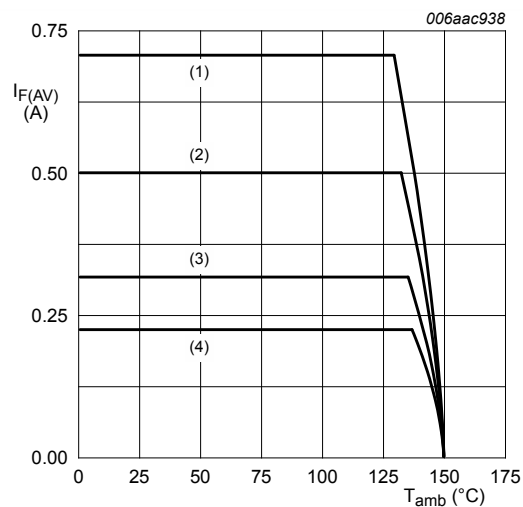


Fig. 10. Average forward current as a function of ambient temperature; typical values



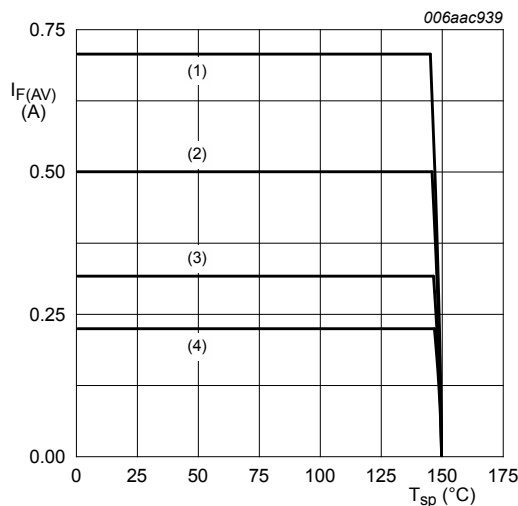
FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
 $T_j = 150$  °C  
 (1)  $\delta = 1$   
 (2)  $\delta = 0.5$   
 (3)  $\delta = 0.2$   
 (4)  $\delta = 0.1$

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



Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint  
 $T_j = 150$  °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



$T_j = 150$  °C  
 (1)  $\delta = 1$   
 (2)  $\delta = 0.5$   
 (3)  $\delta = 0.2$   
 (4)  $\delta = 0.1$

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

## 11. Test information

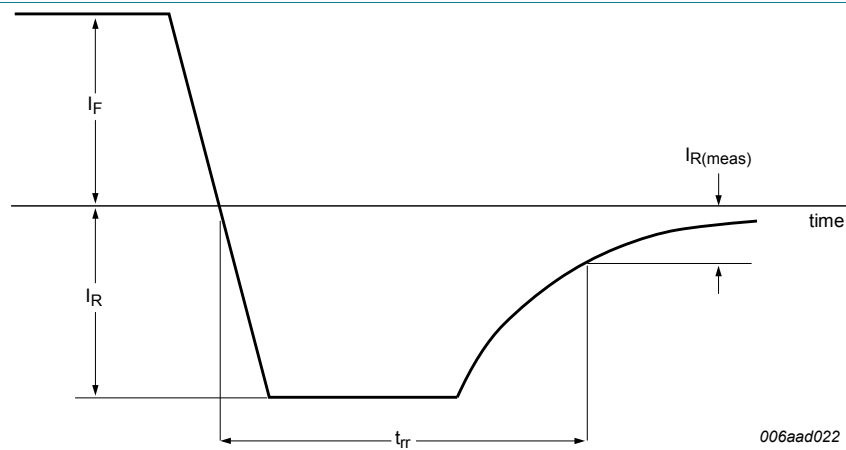


Fig. 14. Reverse recovery definition

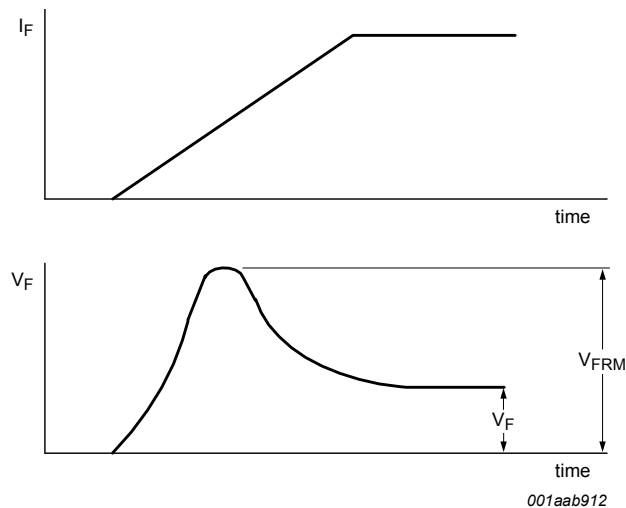


Fig. 15. Forward recovery definition

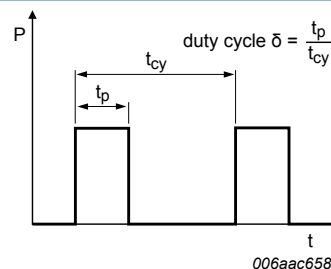


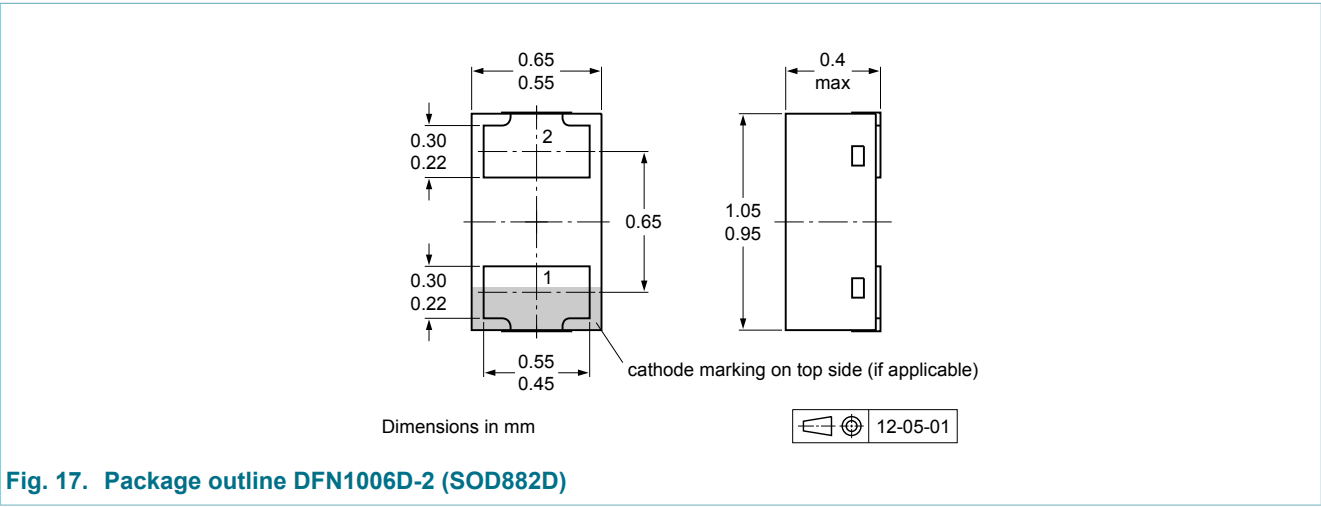
Fig. 16. Duty cycle definition

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.

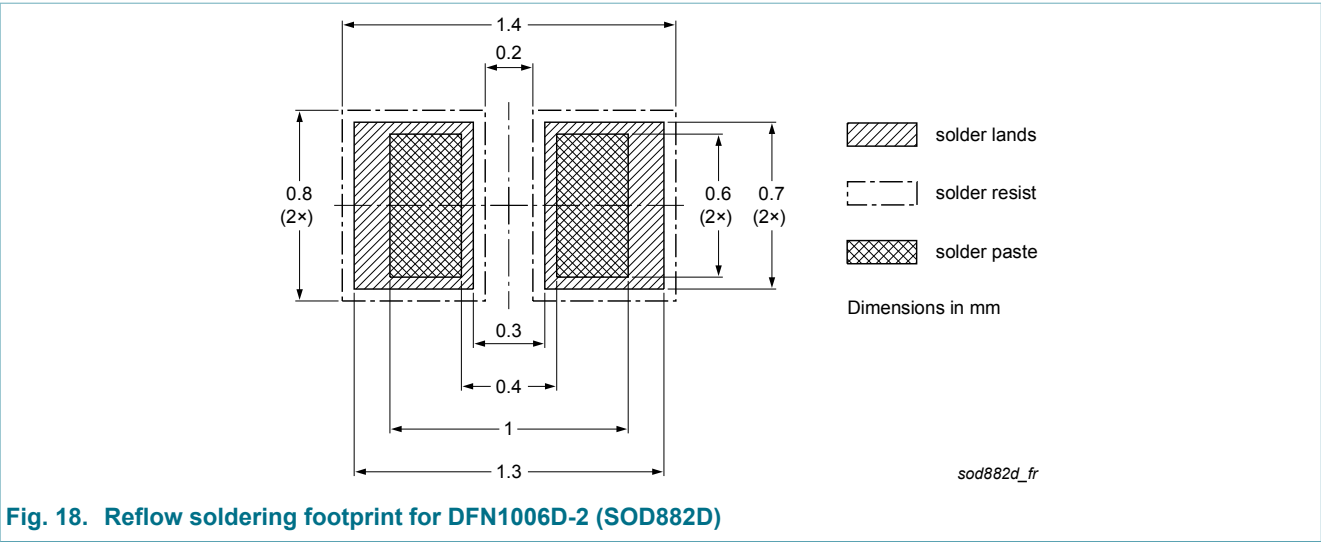
11.1 Quality information

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



13. Soldering



## 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 | -             | -                |

## 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.                                     |

- [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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