



# PMEG100T30ELP

100 V, 3 A low leakage current Trench MEGA Schottky barrier rectifier

7 July 2021

Product data sheet

## 1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier encapsulated in a CFP5 (SOD128) small and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Low forward voltage
- Low  $Q_{rr}$  and low  $I_{RM}$
- Low leakage current
- High power capability due to clip-bonding technology
- Small and flat lead SMD power plastic package

## 3. Applications

- High efficiency DC-to-DC conversion
- LED lighting
- Switch mode power supply
- Freewheeling applications
- Reverse polarity protection
- OR-ing

## 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; square wave; $T_{sp} \leq 160$ °C |     | -   | -    | 3    | A       |
| $V_R$       | reverse voltage         | $T_j = 25$ °C                                                    |     | -   | -    | 100  | V       |
| $V_F$       | forward voltage         | $I_F = 3$ A; pulsed; $T_j = 25$ °C                               | [1] | -   | 705  | 800  | mV      |
| $I_R$       | reverse current         | $V_R = 100$ V; pulsed; $T_j = 25$ °C                             | [1] | -   | 0.25 | 1.75 | $\mu$ A |
|             |                         | $V_R = 100$ V; pulsed; $T_j = 125$ °C                            | [1] | -   | 0.42 | 2.2  | mA      |

[1] Very short pulse, in order to maintain a stable junction temperature.

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline                                                                                 | Graphic symbol                                                                                |
|-----|--------|-------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 1   | K      | cathode[1]  | <br>CFP5 (SOD128) | <br>sym001 |
| 2   | A      | anode       |                                                                                                    |                                                                                               |

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

| Type number   | Package |                                                                                           |         |
|---------------|---------|-------------------------------------------------------------------------------------------|---------|
|               | Name    | Description                                                                               | Version |
| PMEG100T30ELP | CFP5    | plastic, surface mounted package; 2 terminals; 4 mm pitch;<br>3.8 mm x 2.6 mm x 1 mm body | SOD128  |

## 7. Marking

Table 4. Marking codes

| Type number   | Marking code |
|---------------|--------------|
| PMEG100T30ELP | E5           |

## 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                     | $T_j = 25\text{ }^{\circ}\text{C}$                                                            |     | -   | 100  | V                  |
| $I_F$       | forward current                     | $\delta = 1$ ; $T_{sp} \leq 156\text{ }^{\circ}\text{C}$                                      |     | -   | 4.2  | A                  |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{sp} \leq 160\text{ }^{\circ}\text{C}$ |     | -   | 3    | A                  |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 8.3\text{ ms}$ ; half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$            |     | -   | 90   | A                  |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ }^{\circ}\text{C}$                                                     | [1] | -   | 0.75 | W                  |
|             |                                     |                                                                                               | [2] | -   | 1.2  | W                  |
| $T_j$       | junction temperature                |                                                                                               |     | -   | 175  | $^{\circ}\text{C}$ |
| $T_{amb}$   | ambient temperature                 |                                                                                               |     | -55 | 175  | $^{\circ}\text{C}$ |
| $T_{stg}$   | storage temperature                 |                                                                                               |     | -65 | 175  | $^{\circ}\text{C}$ |

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .

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] | -   | -   | 200 | K/W  |
|                |                                                  |             | [1] [3] | -   | -   | 120 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [4]     | -   | -   | 12  | 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 cm<sup>2</sup>.
- [4] Soldering point of cathode tab.

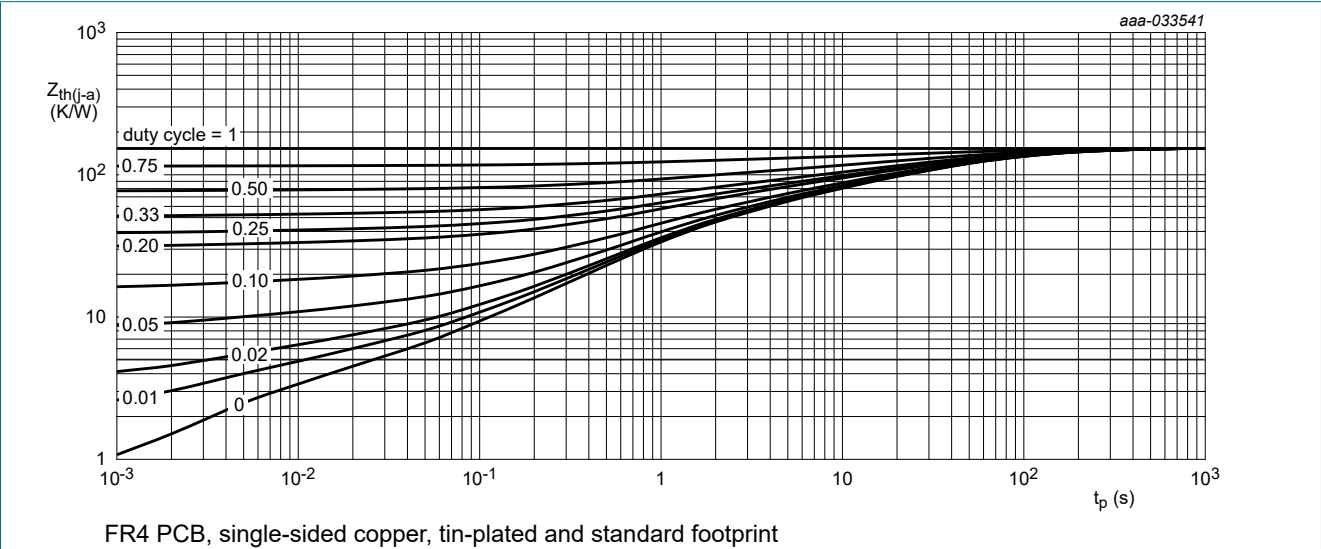


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

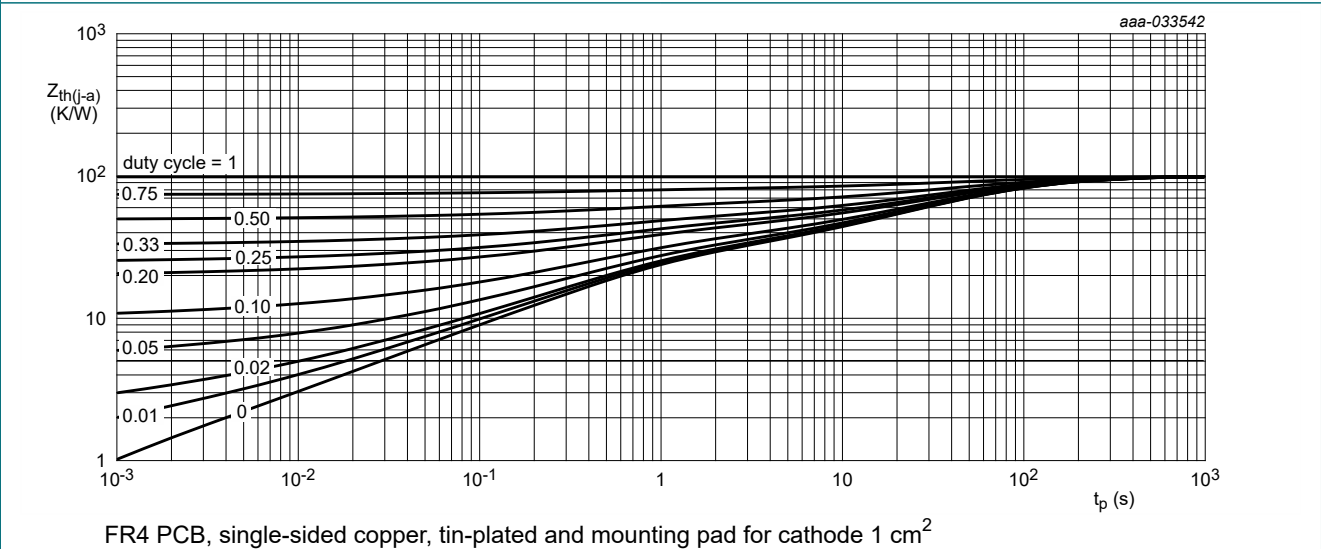


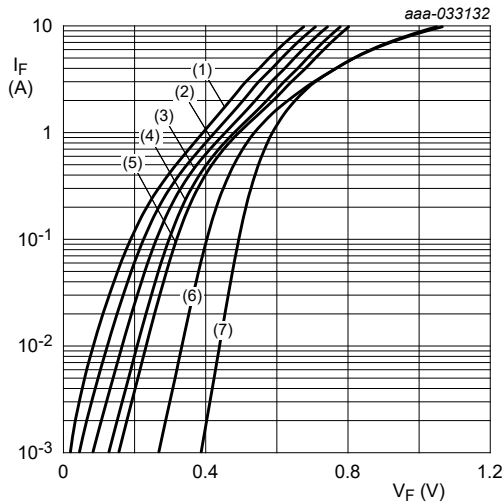
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                           | Conditions                                                                                                                 |     | Min | Typ  | Max  | Unit          |
|-------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----|-----|------|------|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage           | $I_R = 1 \text{ mA}$ ; pulsed; $T_j = 25 \text{ }^{\circ}\text{C}$                                                         | [1] | 100 | -    | -    | V             |
| $V_F$       | forward voltage                     | $I_F = 0.5 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^{\circ}\text{C}$                                                        | [1] | -   | 480  | 550  | mV            |
|             |                                     | $I_F = 1 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^{\circ}\text{C}$                                                          | [1] | -   | 540  | 610  | mV            |
|             |                                     | $I_F = 2 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^{\circ}\text{C}$                                                          | [1] | -   | 630  | 710  | mV            |
|             |                                     | $I_F = 3 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^{\circ}\text{C}$                                                          | [1] | -   | 705  | 800  | mV            |
|             |                                     | $I_F = 3 \text{ A}$ ; pulsed; $T_j = -40 \text{ }^{\circ}\text{C}$                                                         | [1] | -   | 705  | 800  | mV            |
|             |                                     | $I_F = 3 \text{ A}$ ; pulsed; $T_j = 125 \text{ }^{\circ}\text{C}$                                                         | [1] | -   | 580  | 650  | mV            |
|             |                                     | $I_F = 3 \text{ A}$ ; pulsed; $T_j = 150 \text{ }^{\circ}\text{C}$                                                         | [1] | -   | 545  | 620  | mV            |
| $I_R$       | reverse current                     | $V_R = 60 \text{ V}$ ; pulsed; $T_j = 25 \text{ }^{\circ}\text{C}$                                                         | [1] | -   | 0.1  | 0.8  | $\mu\text{A}$ |
|             |                                     | $V_R = 100 \text{ V}$ ; pulsed; $T_j = 25 \text{ }^{\circ}\text{C}$                                                        | [1] | -   | 0.25 | 1.75 | $\mu\text{A}$ |
|             |                                     | $V_R = 100 \text{ V}$ ; pulsed; $T_j = 125 \text{ }^{\circ}\text{C}$                                                       | [1] | -   | 0.42 | 2.2  | mA            |
|             |                                     | $V_R = 100 \text{ V}$ ; pulsed; $T_j = 150 \text{ }^{\circ}\text{C}$                                                       | [1] | -   | 1.65 | 8    | mA            |
| $C_d$       | diode capacitance                   | $V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^{\circ}\text{C}$                                            |     | -   | 300  | -    | pF            |
|             |                                     | $V_R = 10 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^{\circ}\text{C}$                                           |     | -   | 85   | -    | pF            |
| $t_{rr}$    | reverse recovery time step recovery | $I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^{\circ}\text{C}$ |     | -   | 9    | -    | ns            |
|             | reverse recovery time ramp recovery | $dI_F/dt = 200 \text{ A}/\mu\text{s}$ ; $I_F = 6 \text{ A}$ ; $V_R = 26 \text{ V}$ ; $T_j = 25 \text{ }^{\circ}\text{C}$   |     | -   | 12.5 | -    | ns            |
| $I_{RM}$    | peak reverse recovery current       | $dI_F/dt = 200 \text{ A}/\text{s}$ ; $I_F = 6 \text{ A}$ ; $V_R = 26 \text{ V}$ ; $T_j = 25 \text{ }^{\circ}\text{C}$      |     | -   | 1.3  | -    | A             |
| $Q_{rr}$    | reverse recovery charge             |                                                                                                                            |     | -   | 10   | -    | nC            |
| $V_{FRM}$   | peak forward recovery voltage       | $I_F = 0.5 \text{ A}$ ; $dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^{\circ}\text{C}$                         |     | -   | 480  | -    | mV            |

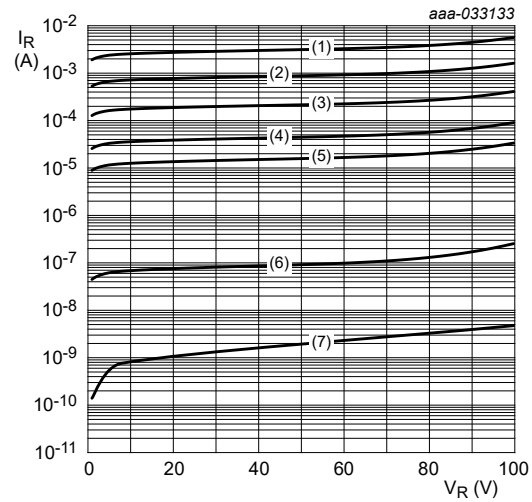
[1] Very short pulse, in order to maintain a stable junction temperature.



pulsed condition

- (1)  $T_j = 175\text{ }^{\circ}\text{C}$
- (2)  $T_j = 150\text{ }^{\circ}\text{C}$
- (3)  $T_j = 125\text{ }^{\circ}\text{C}$
- (4)  $T_j = 100\text{ }^{\circ}\text{C}$
- (5)  $T_j = 85\text{ }^{\circ}\text{C}$
- (6)  $T_j = 25\text{ }^{\circ}\text{C}$
- (7)  $T_j = -40\text{ }^{\circ}\text{C}$

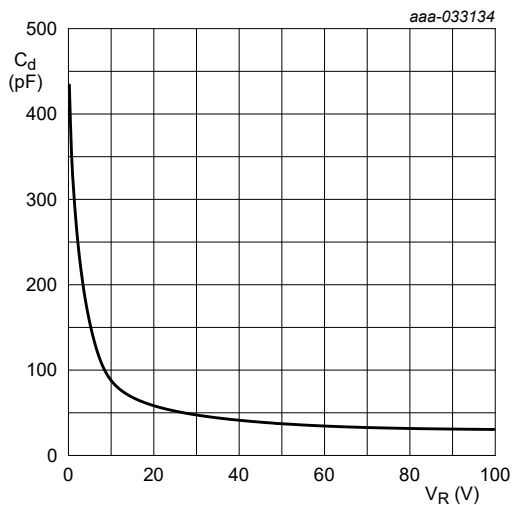
**Fig. 3. Forward current as a function of forward voltage; typical values**



pulsed condition

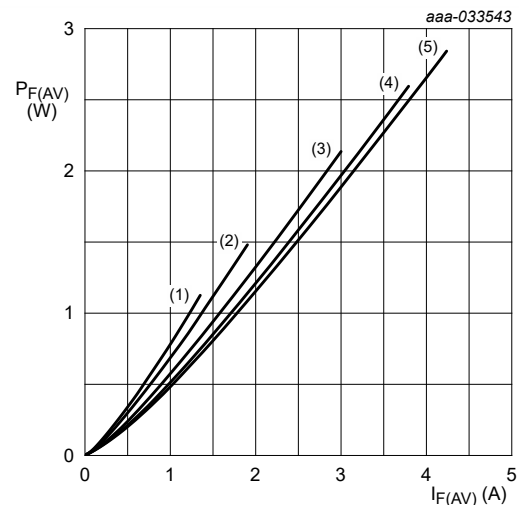
- (1)  $T_j = 175\text{ }^{\circ}\text{C}$
- (2)  $T_j = 150\text{ }^{\circ}\text{C}$
- (3)  $T_j = 125\text{ }^{\circ}\text{C}$
- (4)  $T_j = 100\text{ }^{\circ}\text{C}$
- (5)  $T_j = 85\text{ }^{\circ}\text{C}$
- (6)  $T_j = 25\text{ }^{\circ}\text{C}$
- (7)  $T_j = -40\text{ }^{\circ}\text{C}$

**Fig. 4. Reverse current as a function of reverse voltage; typical values**



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

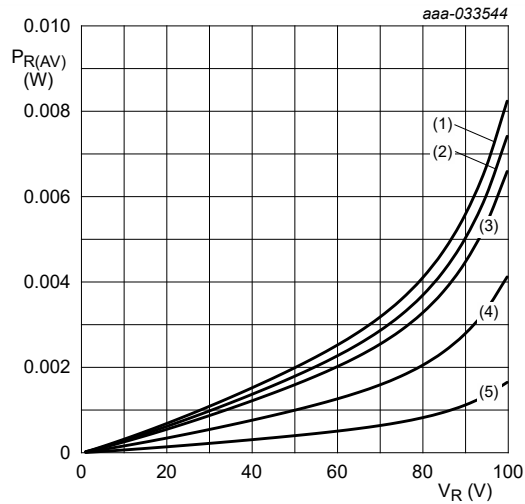
**Fig. 5. Diode capacitance as a function of reverse voltage; typical values**



$T_j = 100\text{ }^{\circ}\text{C}$

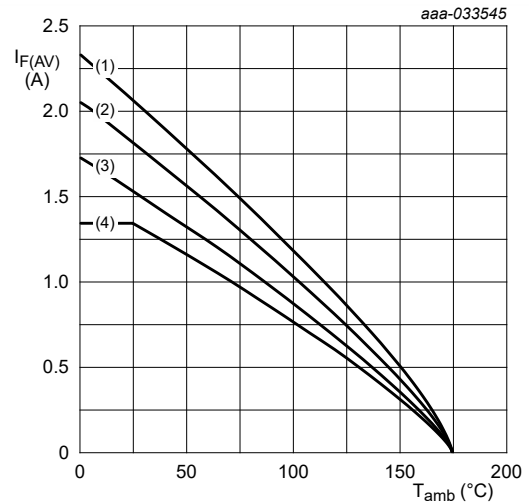
- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 0.8$
- (5)  $\delta = 1$ ; DC

**Fig. 6. Average forward power dissipation as a function of average forward current; typical values**



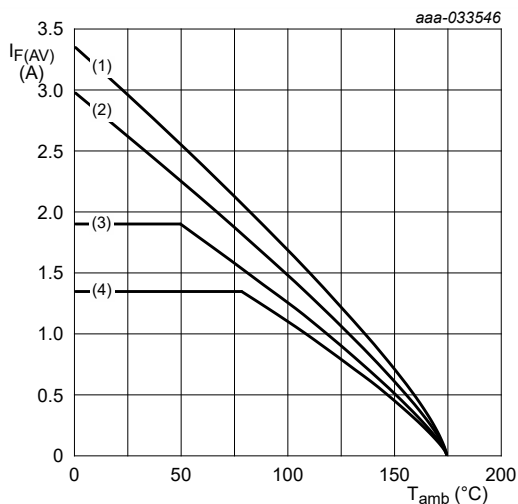
$T_j = 100\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.9$   
 (3)  $\delta = 0.8$   
 (4)  $\delta = 0.5$   
 (5)  $\delta = 0.2$

**Fig. 7.** Average reverse power dissipation as a function of reverse voltage; typical values



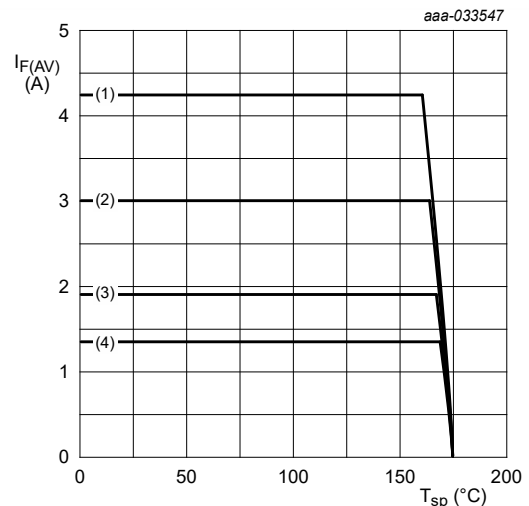
FR4 PCB, standard footprint  
 $T_j = 175\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

**Fig. 8.** Average forward current as a function of ambient temperature; typical values



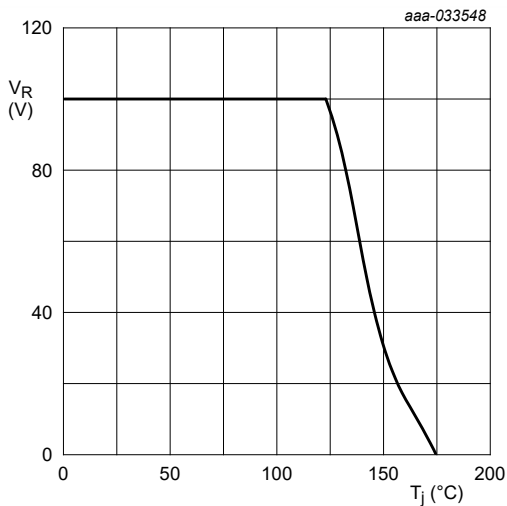
FR4 PCB, mounting pad for cathode  $1\text{ cm}^2$   
 $T_j = 175\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

**Fig. 9.** Average forward current as a function of ambient temperature; typical values



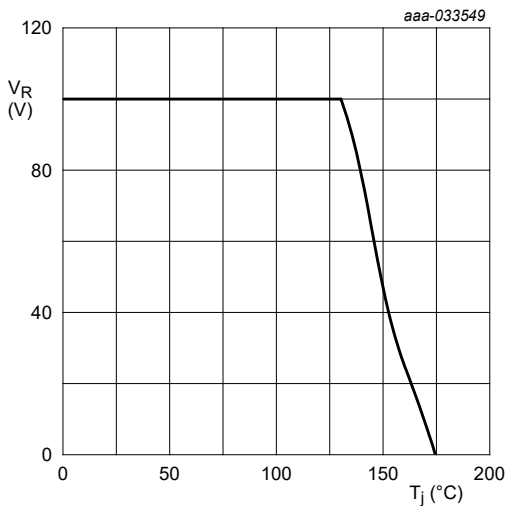
$T_j = 175\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

**Fig. 10.** Average forward current as a function of solder point temperature; typical values



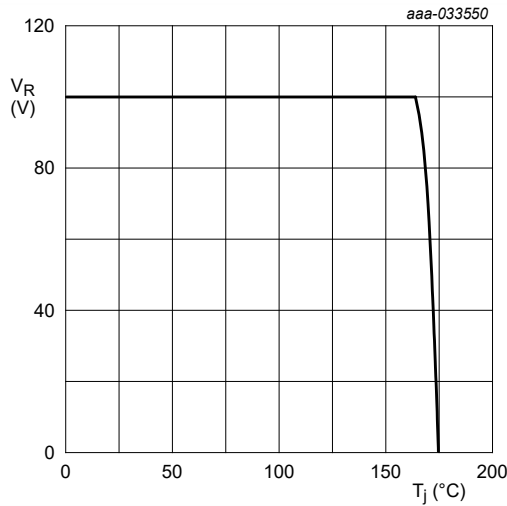
FR4 PCB, standard footprint  
R<sub>th</sub> = 200 K/W

Fig. 11. Derated maximum reverse voltage as a function of junction temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm<sup>2</sup>  
R<sub>th</sub> = 120 K/W

Fig. 12. Derated maximum reverse voltage as a function of junction temperature; typical values



Soldering point of cathode tab  
R<sub>th</sub> = 12 K/W

Fig. 13. Derated maximum reverse voltage as a function of junction temperature; typical values

11. Test information

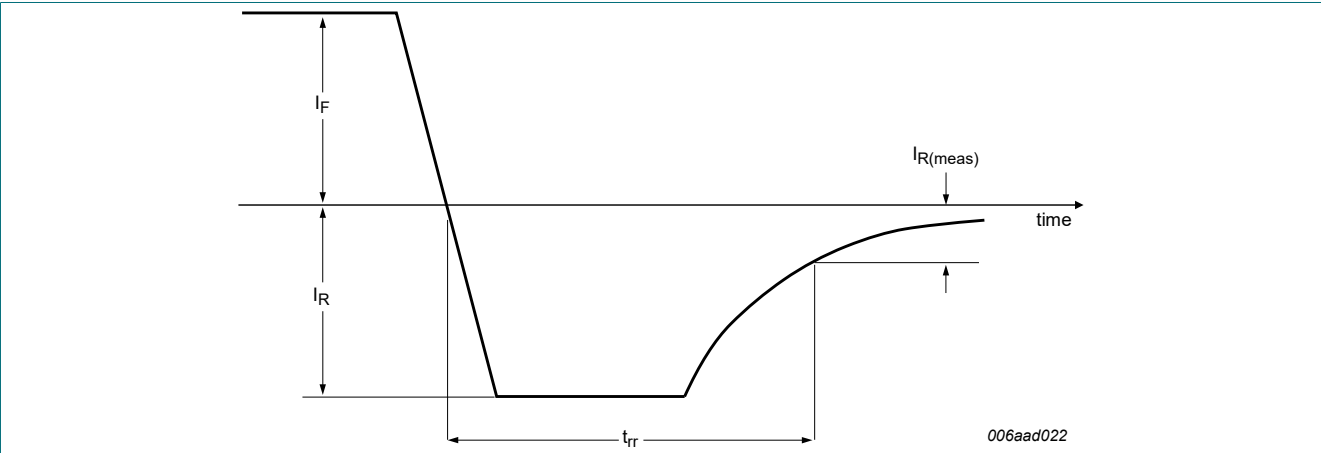


Fig. 14. Reverse recovery definition; step recovery

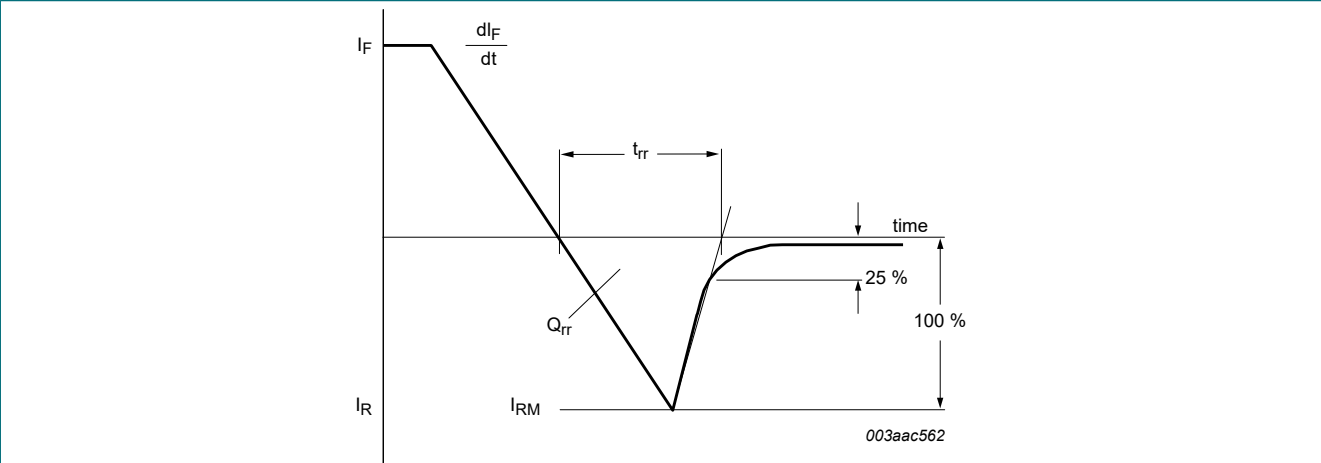


Fig. 15. Reverse recovery definition; ramp recovery

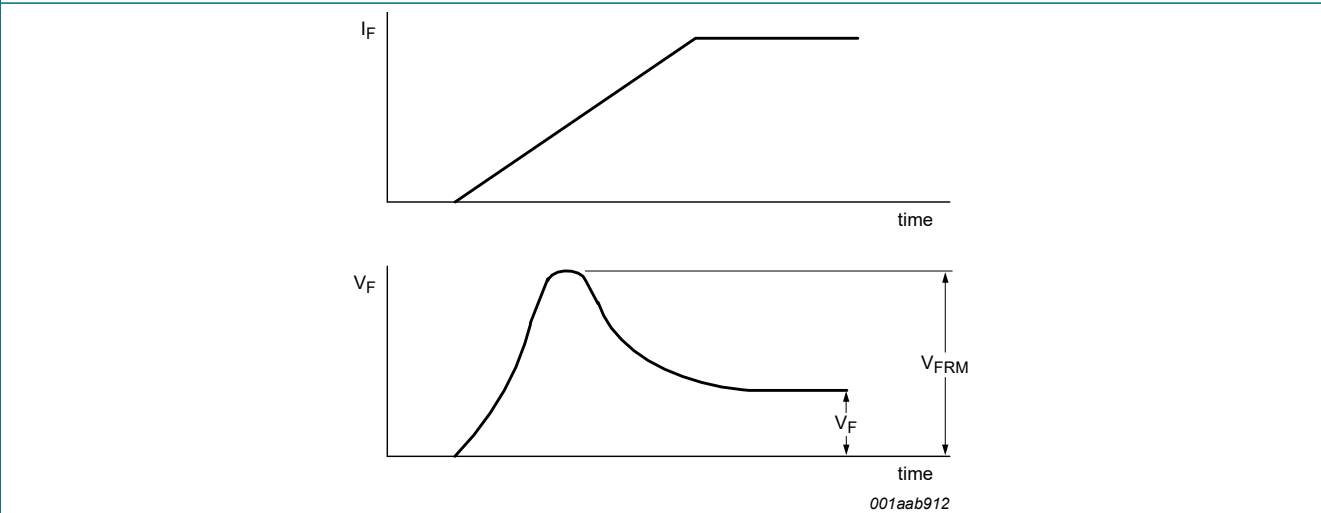


Fig. 16. Forward recovery definition

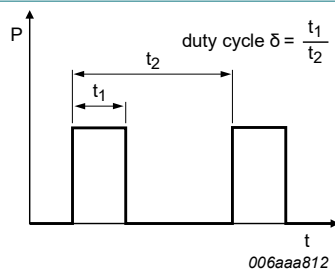
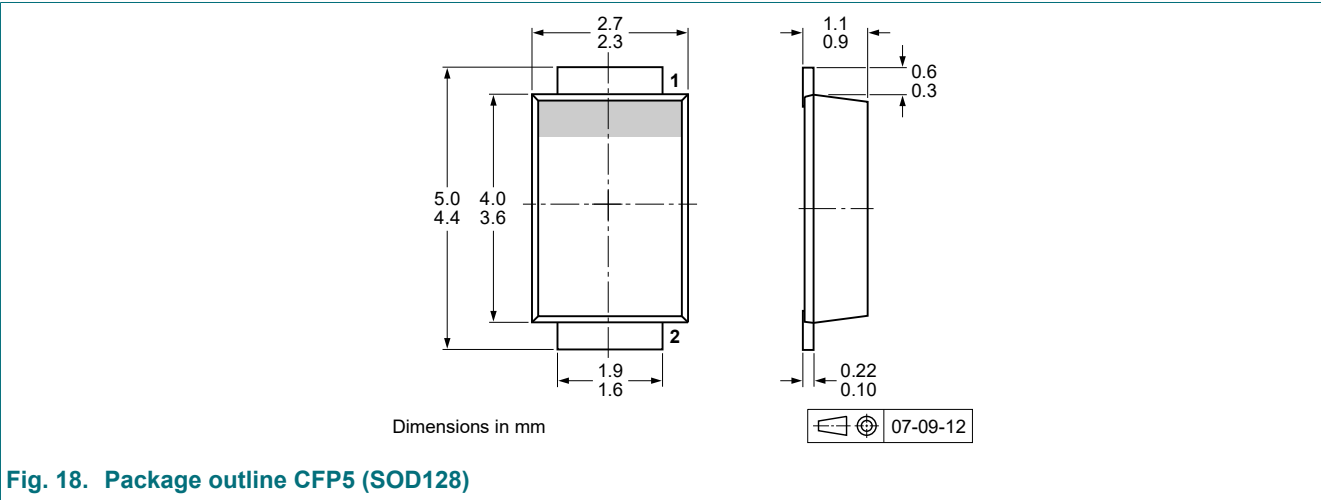


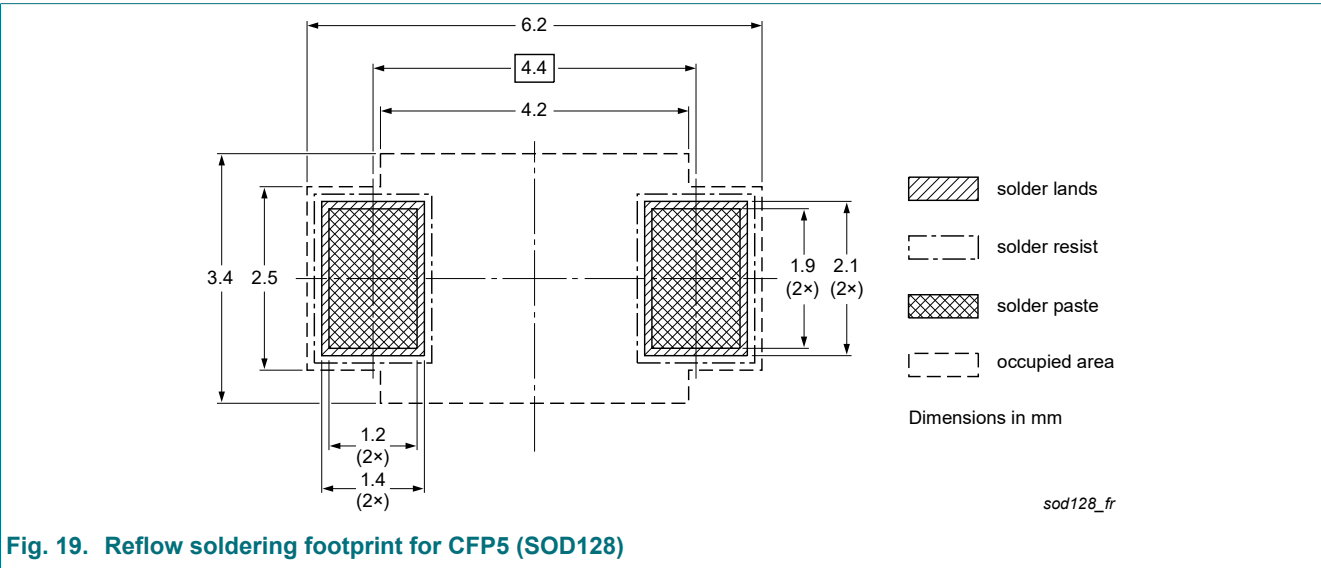
Fig. 17. Duty cycle definition

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.

12. Package outline



13. Soldering



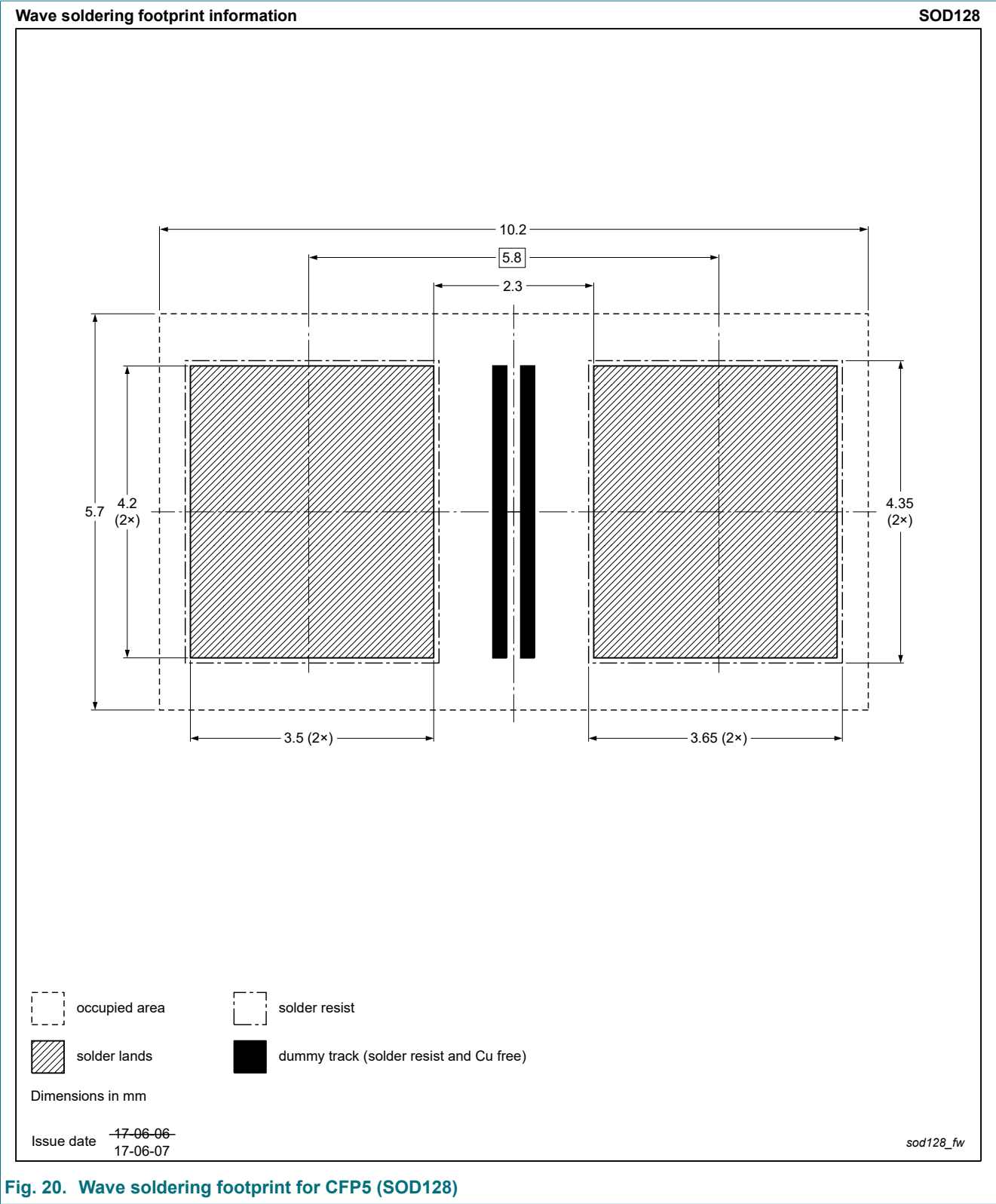


Fig. 20. Wave soldering footprint for CFP5 (SOD128)

14. Revision history

Table 8. Revision history

| Data sheet ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PMEG100T30ELP v.1 | 20210707     | Product data sheet | -             | -          |

## 15. Legal information

### 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.                       |
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- [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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