



# PMEG100T10ELR

100 V, 1 A low leakage current Trench MEGA Schottky barrier rectifier

19 May 2021

Product data sheet

## 1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier encapsulated in a CFP3 (SOD123W) 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; $T_{sp} \leq 166$ °C |     | -   | -    | 1   | A       |
| $V_R$       | reverse voltage         | $T_j = 25$ °C                                                    |     | -   | -    | 100 | V       |
| $V_F$       | forward voltage         | $I_F = 1$ A; pulsed; $T_j = 25$ °C                               | [1] | -   | 670  | 750 | mV      |
| $I_R$       | reverse current         | $V_R = 100$ V; pulsed; $T_j = 25$ °C                             | [1] | -   | 0.1  | 0.9 | $\mu$ A |
|             |                         | $V_R = 100$ V; pulsed; $T_j = 125$ °C                            | [1] | -   | 0.18 | 1   | 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>CFP3 (SOD123W) | <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 |
| PMEG100T10ELR | CFP3    | plastic, surface mounted package; 2 terminals; 2.6 mm x 1.7 mm x 1 mm body | SOD123W |

## 7. Marking

Table 4. Marking codes

| Type number   | Marking code |
|---------------|--------------|
| PMEG100T10ELR | LA           |

## 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                     | $\delta = 1$ ; $T_{sp} \leq 163\text{ }^{\circ}\text{C}$                                      |     | -   | 1.4  | A                  |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $f = 20\text{ kHz}$ ; square wave; $T_{sp} \leq 166\text{ }^{\circ}\text{C}$ |     | -   | 1    | A                  |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 8.3\text{ ms}$ ; half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$            |     | -   | 40   | A                  |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ }^{\circ}\text{C}$                                                     | [1] | -   | 0.68 | W                  |
|             |                                     |                                                                                               | [2] | -   | 1.15 | 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] | -   | -   | 220 | K/W  |
|                |                                                  |             | [1] [3] | -   | -   | 130 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [4]     | -   | -   | 18  | 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.

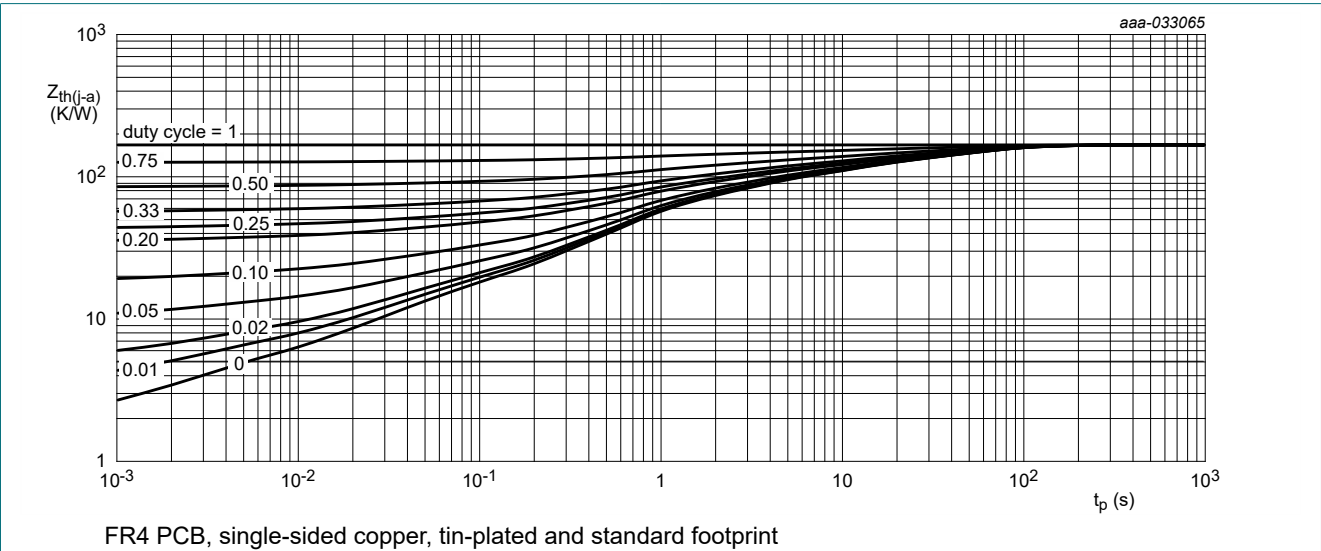


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

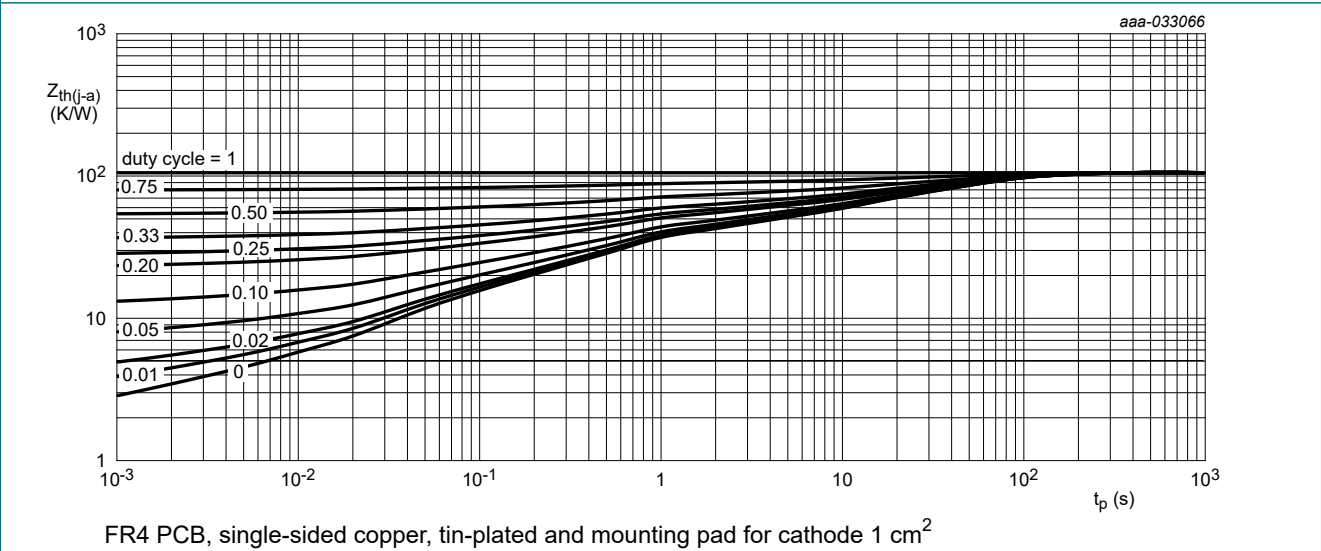


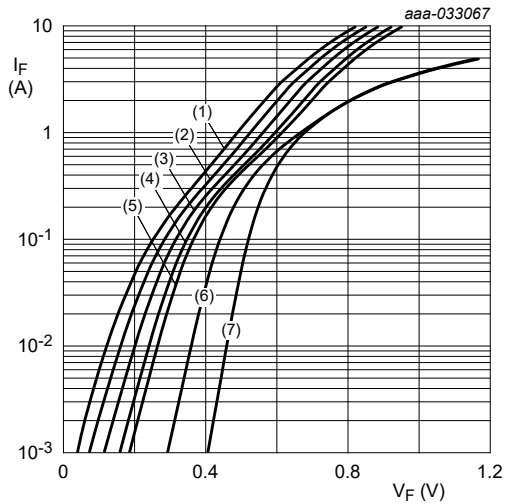
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                           | Conditions                                                                                                               |     | Min | Typ  | Max | Unit          |
|-------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----|-----|------|-----|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage           | $I_R = 1 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$                                                                 | [1] | 100 | -    | -   | V             |
| $V_F$       | forward voltage                     | $I_F = 0.1 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$                                                        | [1] | -   | 440  | 510 | mV            |
|             |                                     | $I_F = 0.5 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$                                                        | [1] | -   | 560  | 630 | mV            |
|             |                                     | $I_F = 1 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$                                                          | [1] | -   | 670  | 750 | mV            |
|             |                                     | $I_F = 1 \text{ A}$ ; pulsed; $T_j = -40 \text{ }^\circ\text{C}$                                                         | [1] | -   | 680  | 750 | mV            |
|             |                                     | $I_F = 1 \text{ A}$ ; pulsed; $T_j = 125 \text{ }^\circ\text{C}$                                                         | [1] | -   | 565  | 630 | mV            |
|             |                                     | $I_F = 1 \text{ A}$ ; pulsed; $T_j = 150 \text{ }^\circ\text{C}$                                                         | [1] | -   | 525  | 600 | mV            |
| $I_R$       | reverse current                     | $V_R = 60 \text{ V}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$                                                         | [1] | -   | 0.04 | 0.3 | $\mu\text{A}$ |
|             |                                     | $V_R = 100 \text{ V}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$                                                        | [1] | -   | 0.1  | 0.9 | $\mu\text{A}$ |
|             |                                     | $V_R = 100 \text{ V}$ ; pulsed; $T_j = 125 \text{ }^\circ\text{C}$                                                       | [1] | -   | 0.18 | 1   | mA            |
|             |                                     | $V_R = 100 \text{ V}$ ; pulsed; $T_j = 150 \text{ }^\circ\text{C}$                                                       | [1] | -   | 0.7  | 3.5 | mA            |
| $C_d$       | diode capacitance                   | $V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$                                            |     | -   | 125  | -   | pF            |
|             |                                     | $V_R = 10 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$                                           |     | -   | 36   | -   | pF            |
| $t_{rr}$    | reverse recovery time step recovery | $I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$ |     | -   | 4    | -   | ns            |
|             | reverse recovery time ramp recovery | $dI_F/dt = 200 \text{ A}/\mu\text{s}$ ; $I_F = 6 \text{ A}$ ; $V_R = 26 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$   |     | -   | 11.5 | -   | ns            |
| $I_{RM}$    | peak reverse recovery current       | $dI_F/dt = 200 \text{ A}/\text{s}$ ; $I_F = 6 \text{ A}$ ; $V_R = 26 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$      |     | -   | 1.2  | -   | A             |
| $Q_{rr}$    | reverse recovery charge             |                                                                                                                          |     | -   | 8    | -   | nC            |
| $V_{FRM}$   | peak forward recovery voltage       | $I_F = 0.5 \text{ A}$ ; $dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$                         |     | -   | 560  | -   | mV            |

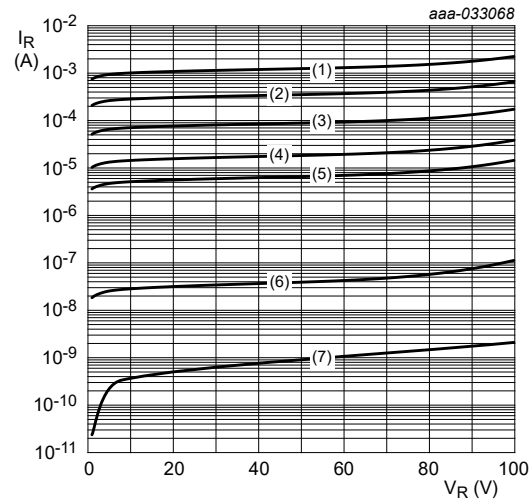
[1] Very short pulse, in order to maintain a stable junction temperature.



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

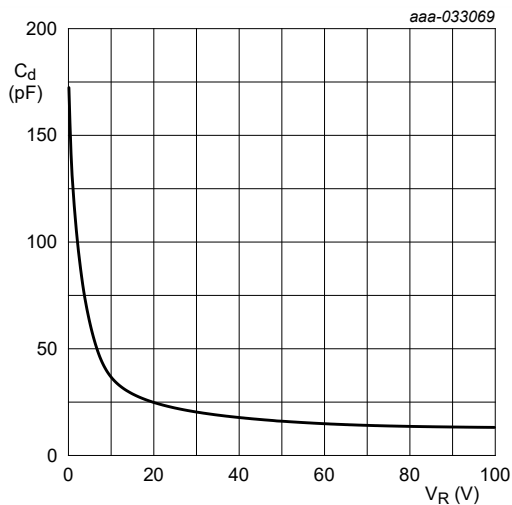
**Fig. 3. Forward current as a function of forward voltage; typical values**



pulsed condition

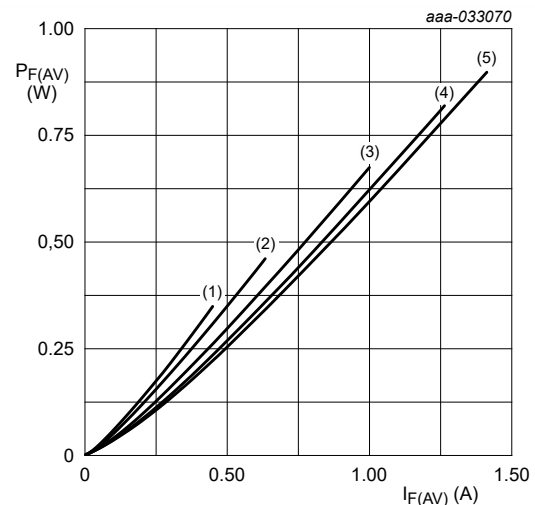
- (1)  $T_j = 175\text{ }^{\circ}\text{C}$
- (2)  $T_j = 150\text{ }^{\circ}\text{C}$
- (3)  $T_j = 125\text{ }^{\circ}\text{C}$
- (4)  $T_j = 100\text{ }^{\circ}\text{C}$
- (5)  $T_j = 85\text{ }^{\circ}\text{C}$
- (6)  $T_j = 25\text{ }^{\circ}\text{C}$
- (7)  $T_j = -40\text{ }^{\circ}\text{C}$

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



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

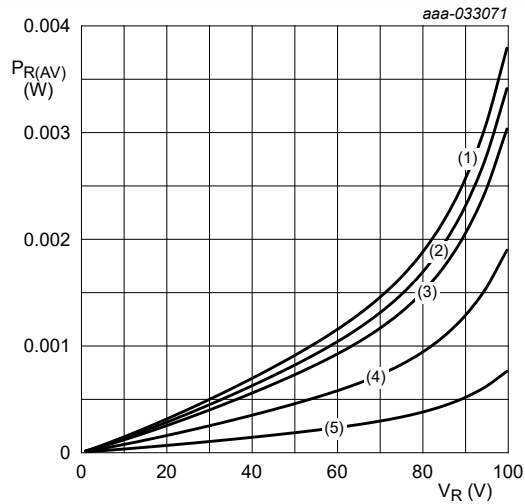
**Fig. 5. Diode capacitance as a function of reverse voltage; typical values**



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

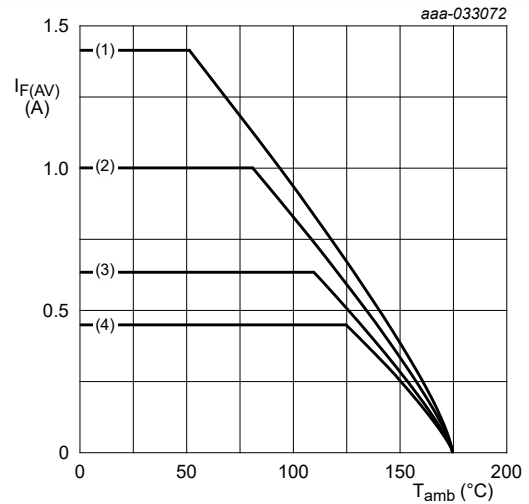
- (1)  $\delta = 0.1$
- (2)  $\delta = 0.2$
- (3)  $\delta = 0.5$
- (4)  $\delta = 1$ ; DC
- (5)  $\delta = 1$ ; DC

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



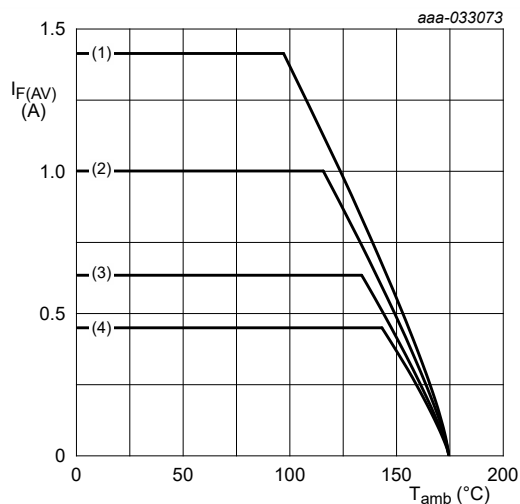
$T_j = 100\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.9$   
 (3)  $\delta = 0.8$   
 (4)  $\delta = 0.5$   
 (5)  $\delta = 0.2$

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



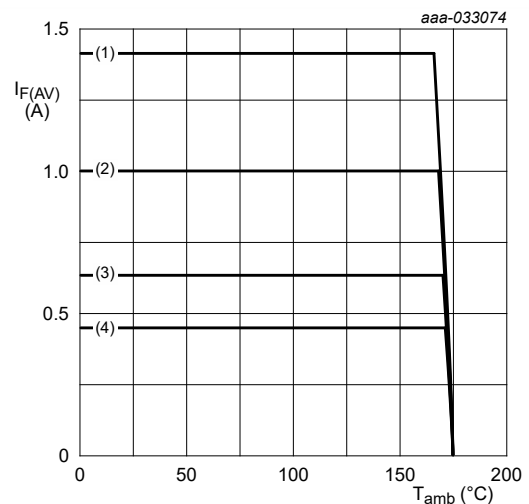
FR4 PCB, standard footprint  
 $T_j = 175\text{ °C}$   
 (1)  $\delta = 1$ ; DC  
 (2)  $\delta = 0.5$ ;  $f = 20\text{ kHz}$   
 (3)  $\delta = 0.2$ ;  $f = 20\text{ kHz}$   
 (4)  $\delta = 0.1$ ;  $f = 20\text{ kHz}$

**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

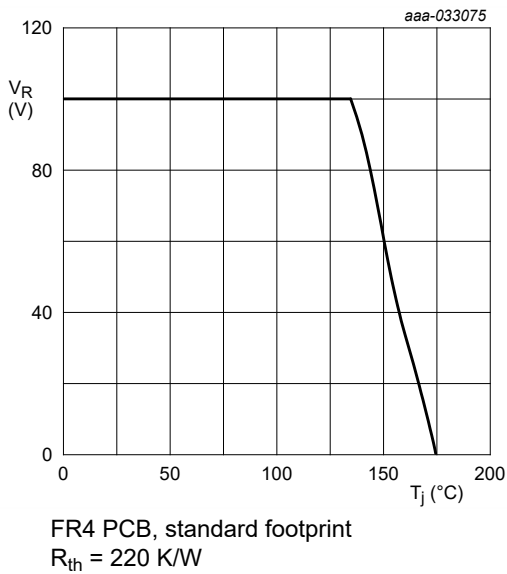


Fig. 11. Derated maximum reverse voltage as a function of junction temperature; typical values

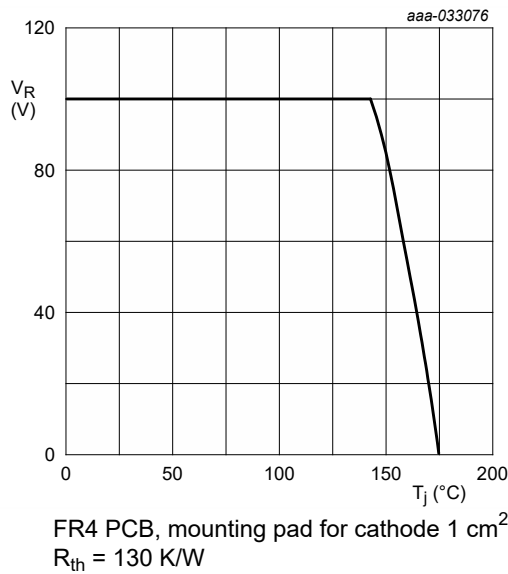


Fig. 12. Derated maximum reverse voltage as a function of junction temperature; typical values

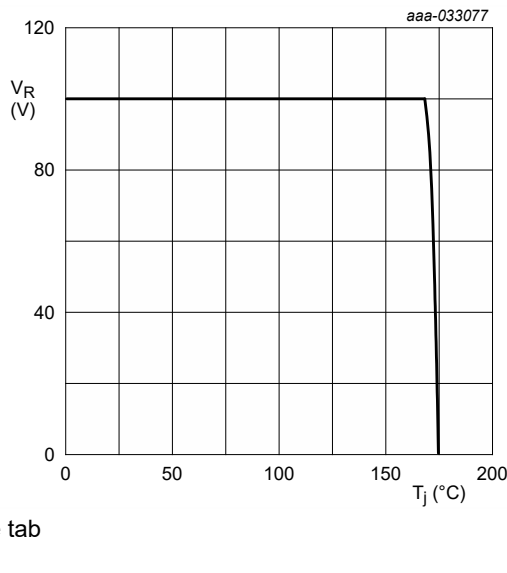


Fig. 13. Derated maximum reverse voltage as a function of junction temperature; typical values

11. Test information



Fig. 14. Reverse recovery definition; step recovery



Fig. 15. Reverse recovery definition; ramp recovery



Fig. 16. Forward recovery definition

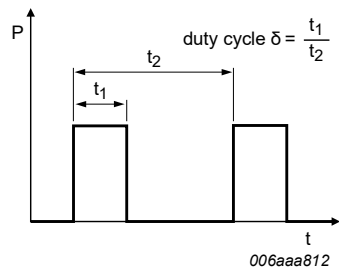


Fig. 17. Duty cycle definition

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

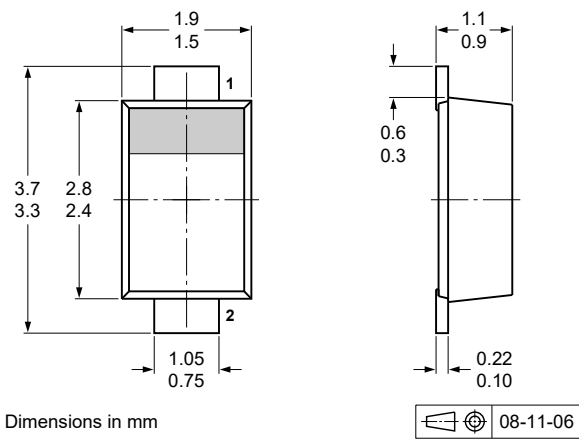


Fig. 18. Package outline CFP3 (SOD123W)

13. Soldering

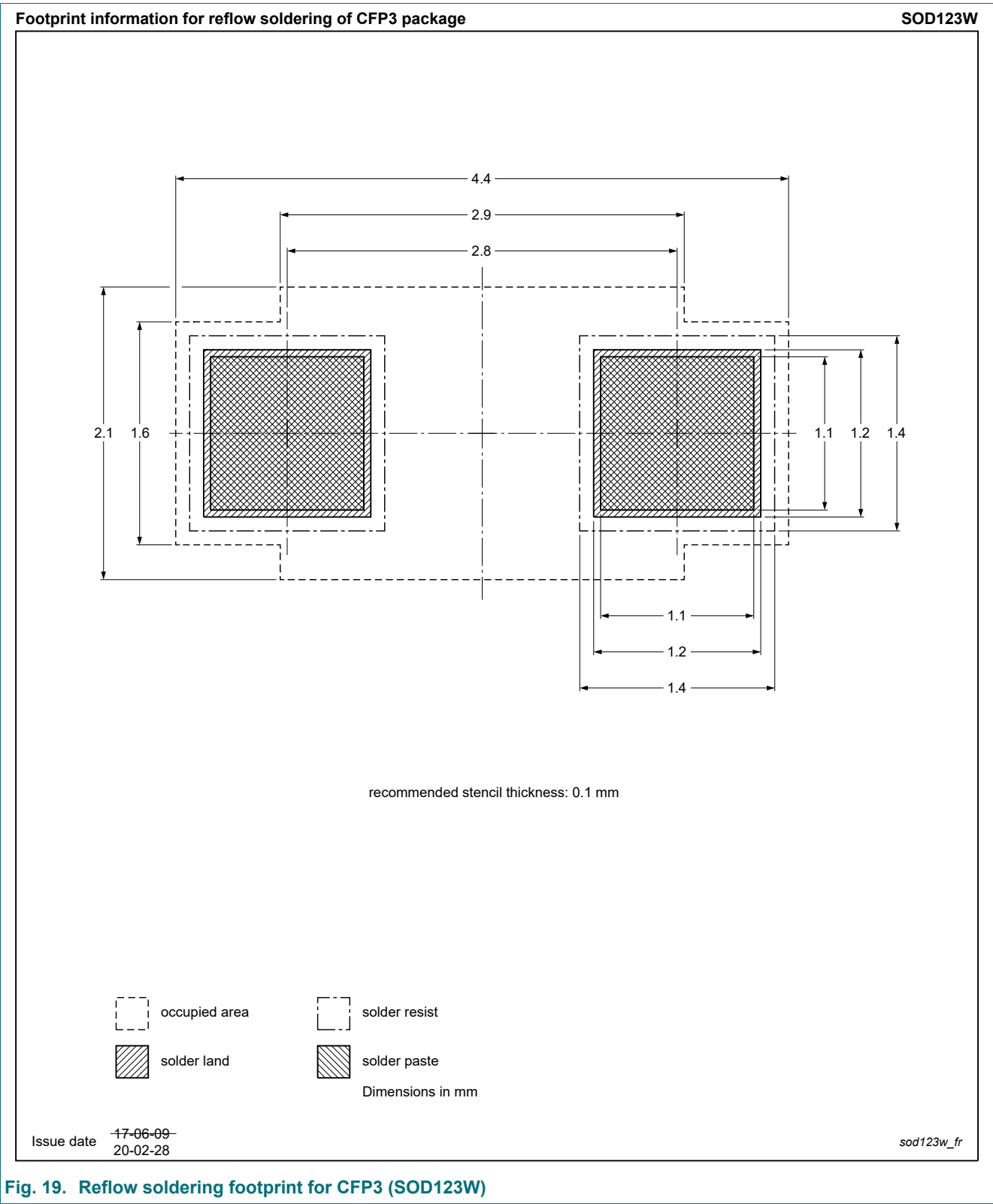


Fig. 19. Reflow soldering footprint for CFP3 (SOD123W)

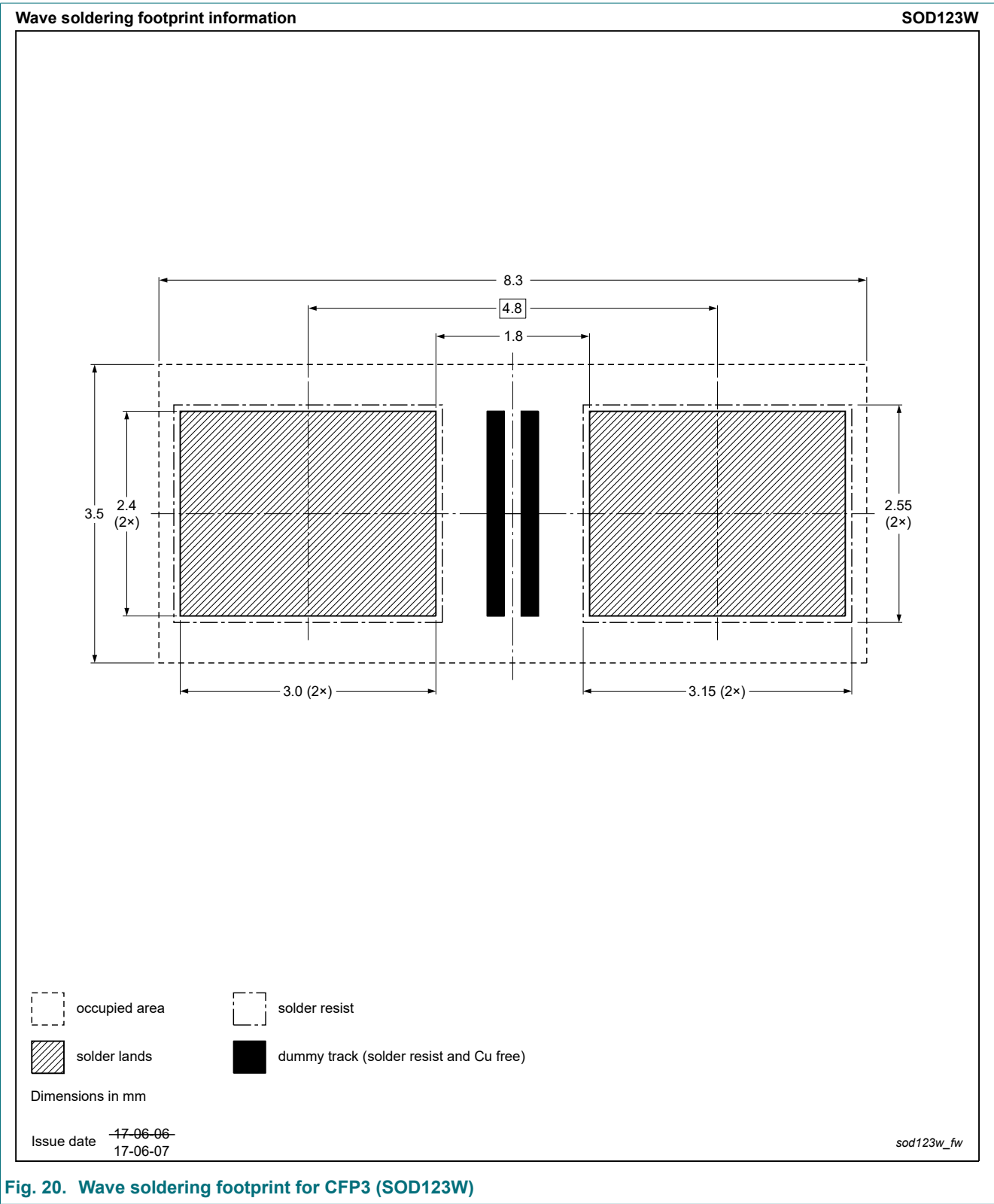


Fig. 20. Wave soldering footprint for CFP3 (SOD123W)

14. Revision history

Table 8. Revision history

| Data sheet ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PMEG100T10ELR v.1 | 20210519     | 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.                       |
| 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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