



PMEG2020CER

20 V, 2 A Schottky barrier rectifier

24 August 2023

Product data sheet

1. General description

Planar Schottky barrier rectifier encapsulated in a CFP3 (SOD123W) power flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low forward voltage
- High power capability due to clip bond package
- Small and flat lead SMD plastic package

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications

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; $T_{sp} \leq 167$ °C | - | - | 2 | A |
| V_R | reverse voltage | $T_j = 25$ °C | - | - | 20 | V |
| V_F | forward voltage | $I_F = 2$ A; pulsed; $T_j = 25$ °C | [1] | 460 | 520 | mV |
| I_R | reverse current | $V_R = 20$ V; pulsed; $T_j = 25$ °C | [1] | 8 | 50 | μ A |
| | | $V_R = 20$ V; pulsed; $T_j = 125$ °C | [1] | 5 | 25 | 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] | CFP3 (SOD123W) | K A sym001 |
| 2 | A | anode | | |

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-----------------------------|---------|--|-------------------------|
| | Name | Description | Version |
| PMEG2020CER | 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 |
|-------------|--------------|
| PMEG2020CER | N3 |

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 | $T_j = 25\text{ °C}$ | | - | 20 | V |
| I_F | forward current | $\delta = 1; T_{sp} \leq 165\text{ °C}$ | | - | 2.8 | A |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5; f = 20\text{ kHz};$ square wave; $T_{sp} \leq 167\text{ °C}$ | | - | 2 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 8.3\text{ ms};$ half sine wave; $T_{j(init)} = 25\text{ °C}$ | | - | 50 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [1] | - | 0.68 | W |
| | | | [2] | - | 1.15 | W |
| T_j | junction temperature | | | - | 175 | °C |
| T_{amb} | ambient temperature | | | -55 | 175 | °C |
| T_{stg} | storage temperature | | | -65 | 175 | °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 cm².

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 |
| | | | [3] [2] | - | - | 130 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [4] | - | - | 18 | K/W |

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] 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.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
- [4] Soldering point of cathode tab.

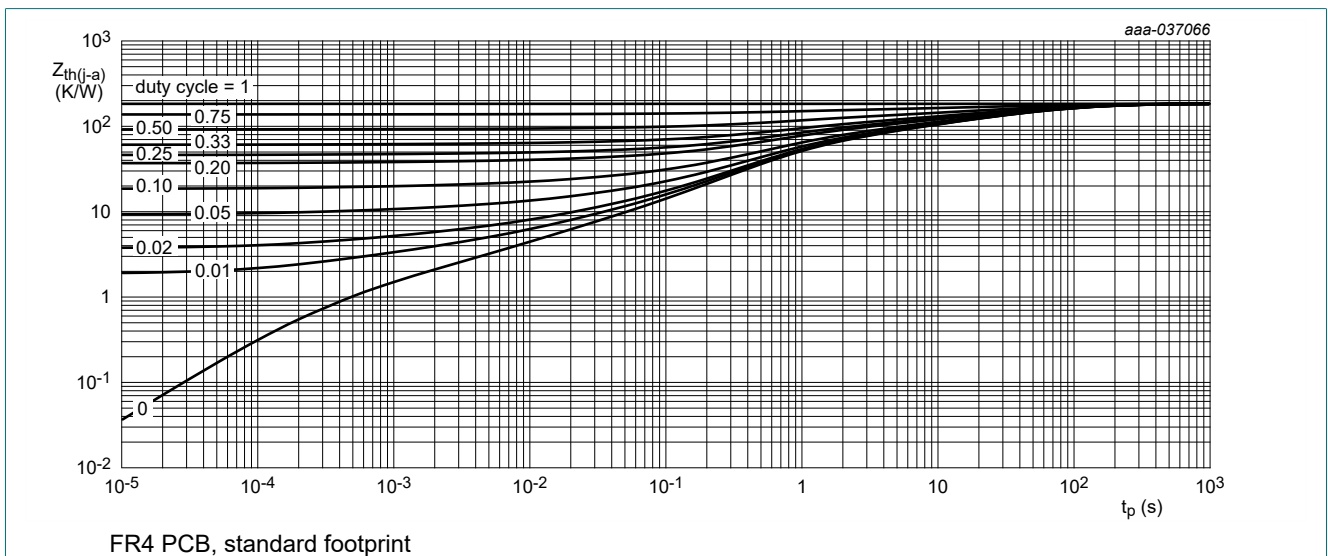


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

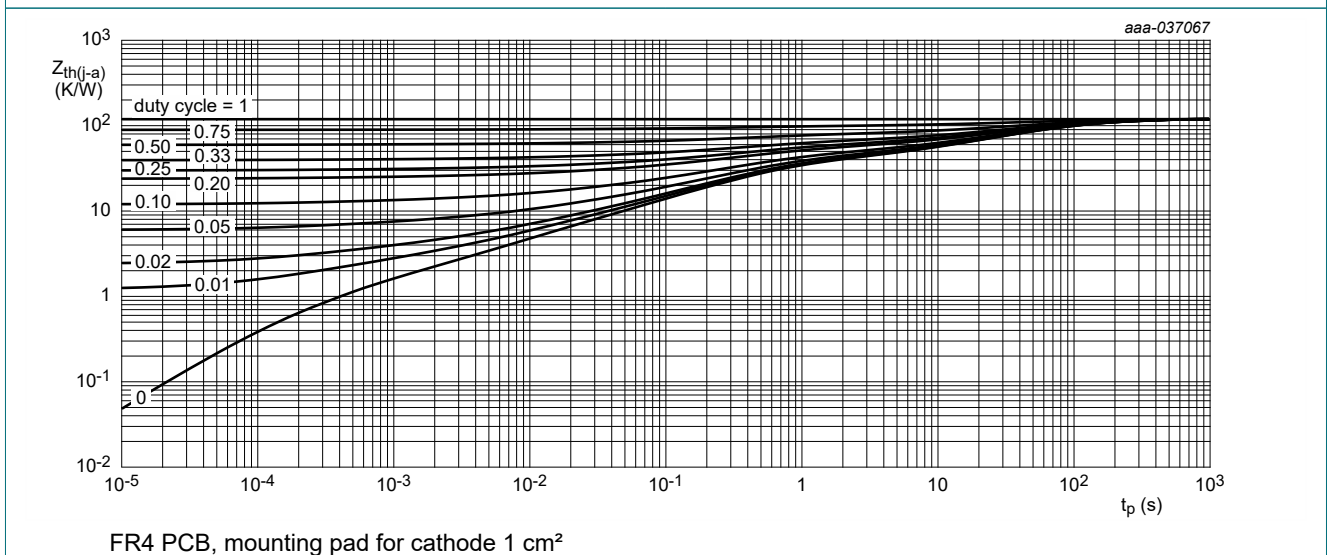


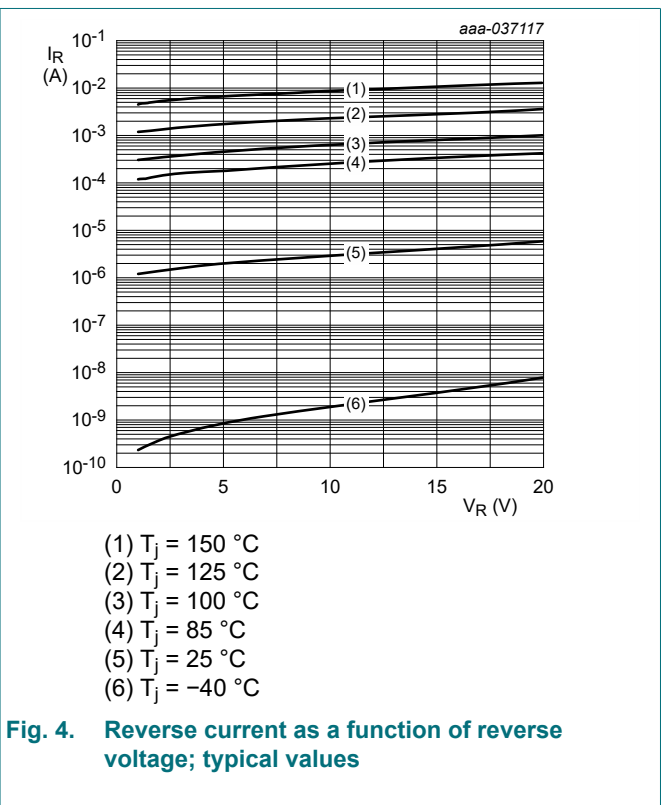
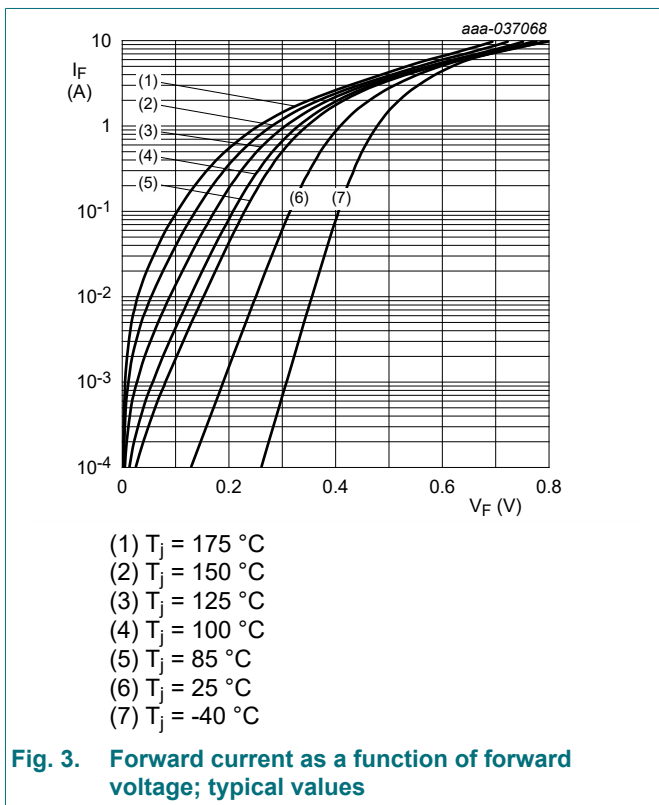
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

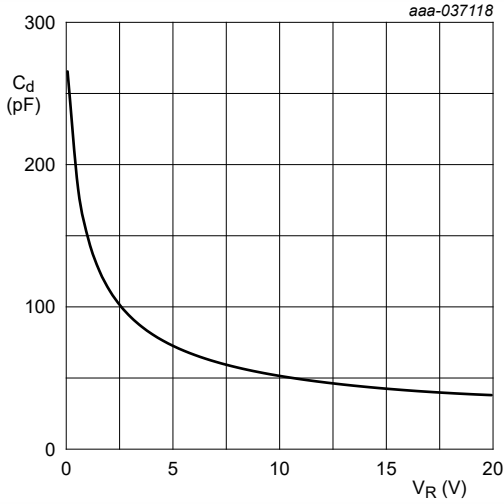
10. Characteristics

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] | 20 | - | V | |
| V_F | forward voltage | $I_F = 1 \text{ A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 405 | 450 | mV |
| | | $I_F = 2 \text{ A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 460 | 520 | mV |
| | | $I_F = 2 \text{ A}$; pulsed; $T_j = -40 \text{ }^\circ\text{C}$ | [1] | - | 520 | 590 | mV |
| | | $I_F = 2 \text{ A}$; pulsed; $T_j = 125 \text{ }^\circ\text{C}$ | [1] | - | 380 | 470 | mV |
| I_R | reverse current | $V_R = 20 \text{ V}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 8 | 50 | μA |
| | | $V_R = 20 \text{ V}$; pulsed; $T_j = 125 \text{ }^\circ\text{C}$ | [1] | - | 5 | 25 | mA |
| C_d | diode capacitance | $V_R = 1 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 145 | - | pF |
| | | $V_R = 10 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 51 | - | pF |
| t_{rr} | reverse recovery time step recovery | $I_F = 0.5 \text{ A}$; $I_R = 0.5 \text{ A}$; $I_{R(\text{meas})} = 0.1 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 5.5 | - | ns |
| | reverse recovery time ramp recovery | $dI_F/dt = 200 \text{ A}/\mu\text{s}$; $I_F = 6 \text{ A}$; $V_R = 26 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 5.5 | - | ns |
| I_{RM} | peak reverse recovery current | | | - | 0.6 | - | A |
| Q_{rr} | reverse recovery charge | | | - | 2.1 | - | nC |
| V_{FRM} | peak forward recovery voltage | $I_F = 0.5 \text{ A}$; $dI_F/dt = 20 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 390 | - | mV |

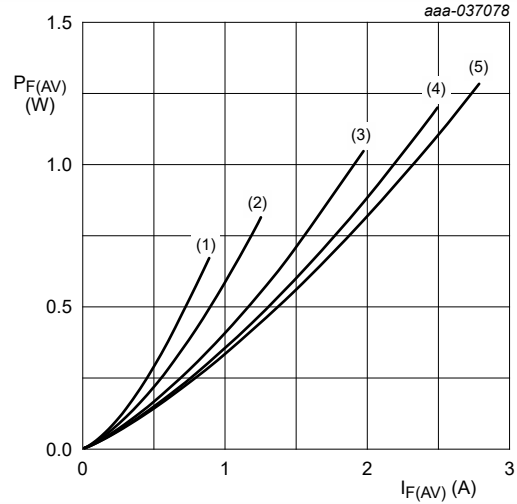
[1] Very short pulse, in order to maintain a stable junction temperature.





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

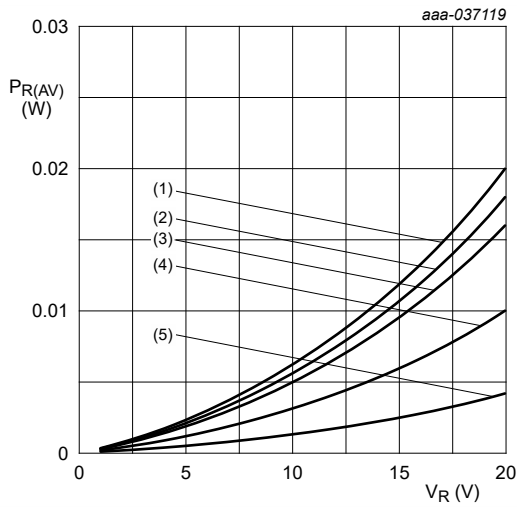
Fig. 5. Diode capacitance as a function of reverse voltage; typical values



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

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

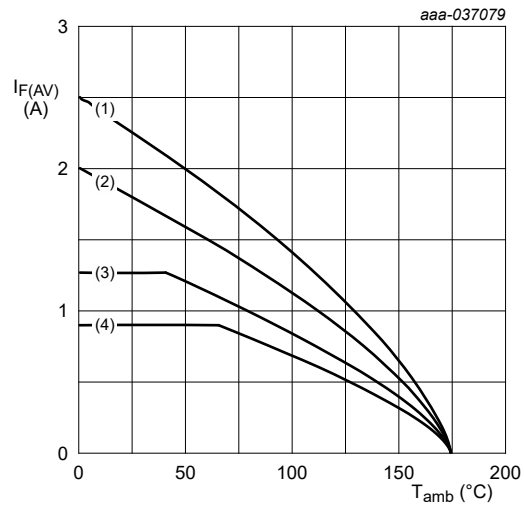
Fig. 6. Average forward power dissipation as a function of average forward current; typical values



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

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

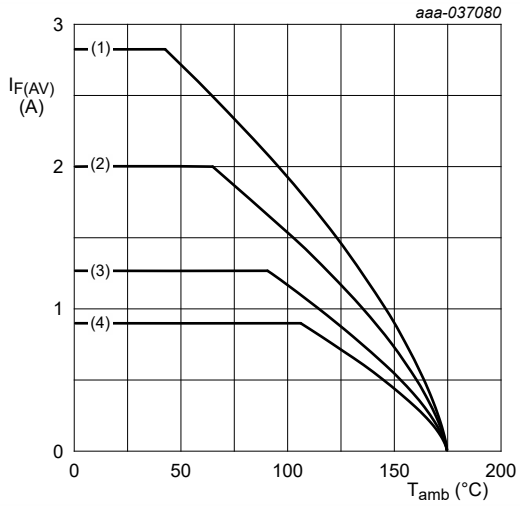


FR4 PCB, standard footprint

$T_j = 175 \text{ }^\circ\text{C}$

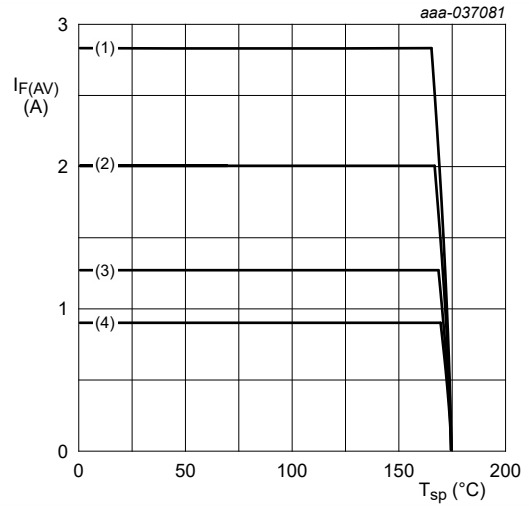
- (1) $\delta = 1; \text{DC}$
- (2) $\delta = 0.5; f = 20 \text{ kHz}$
- (3) $\delta = 0.2; f = 20 \text{ kHz}$
- (4) $\delta = 0.1; f = 20 \text{ kHz}$

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



FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 175$ °C
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20$ kHz
 (3) $\delta = 0.2$; $f = 20$ kHz
 (4) $\delta = 0.1$; $f = 20$ kHz

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



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

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

11. Test information

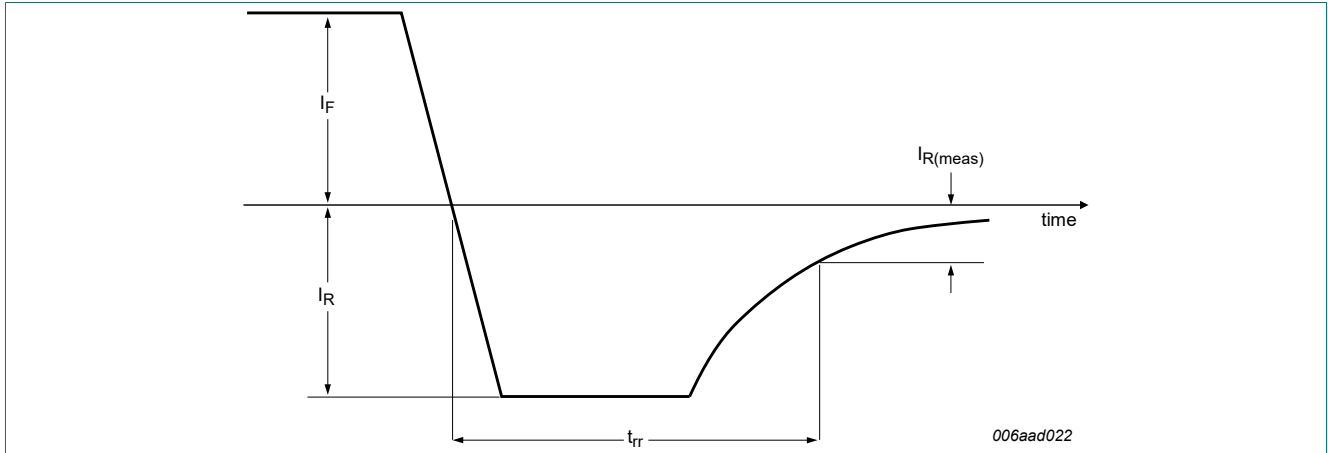


Fig. 11. Reverse recovery definition; step recovery

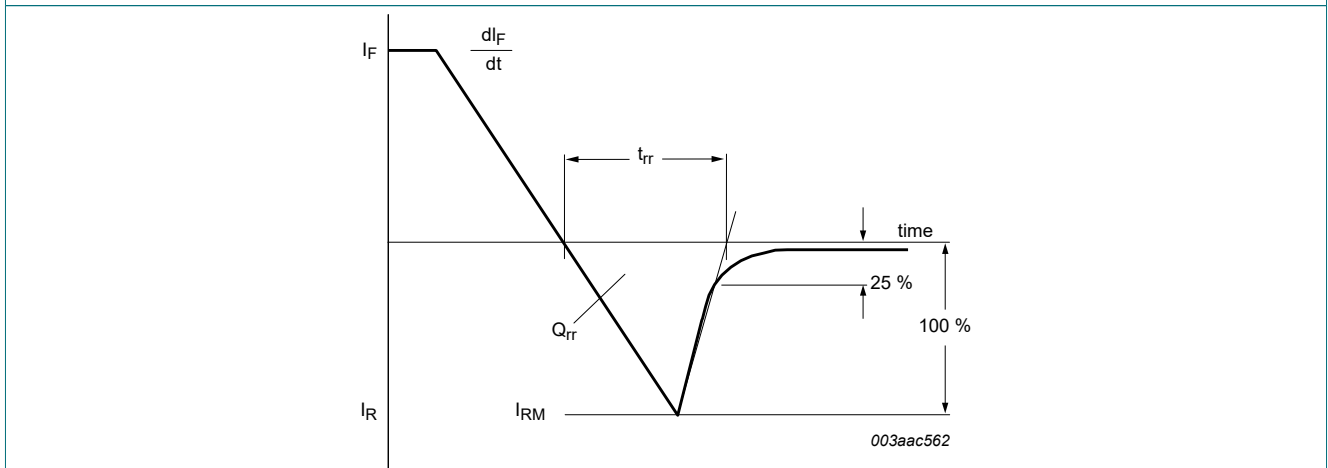


Fig. 12. Reverse recovery definition; ramp recovery

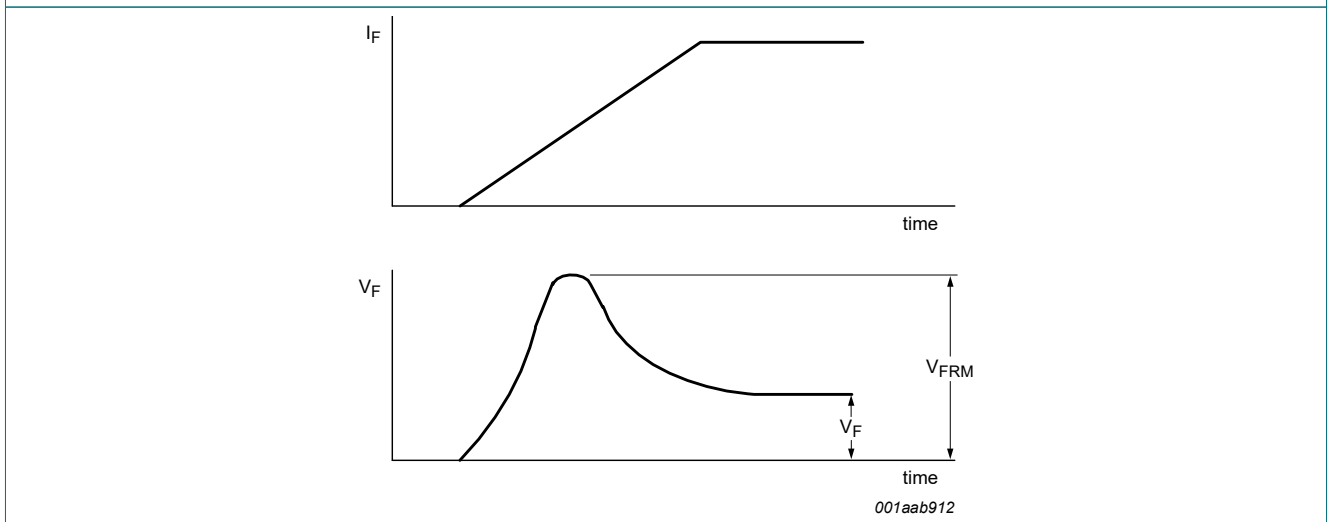


Fig. 13. Forward recovery definition

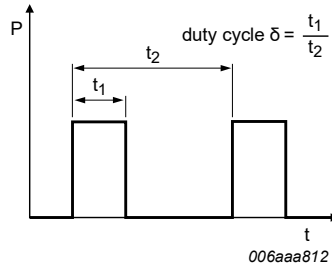


Fig. 14. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

$$I_{F(AV)} = I_M \times \delta \text{ with } I_M \text{ defined as peak current}$$

$$I_{RMS} = I_{F(AV)} \text{ at DC, and } I_{RMS} = I_M \times \sqrt{\delta}$$

with I_{RMS} defined as RMS current.

12. Package outline

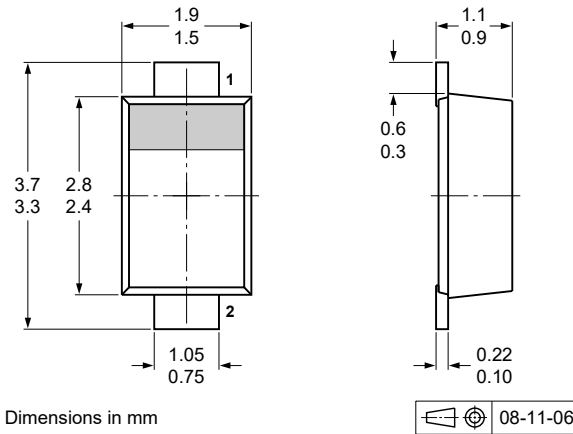


Fig. 15. Package outline CFP3 (SOD123W)

13. Soldering

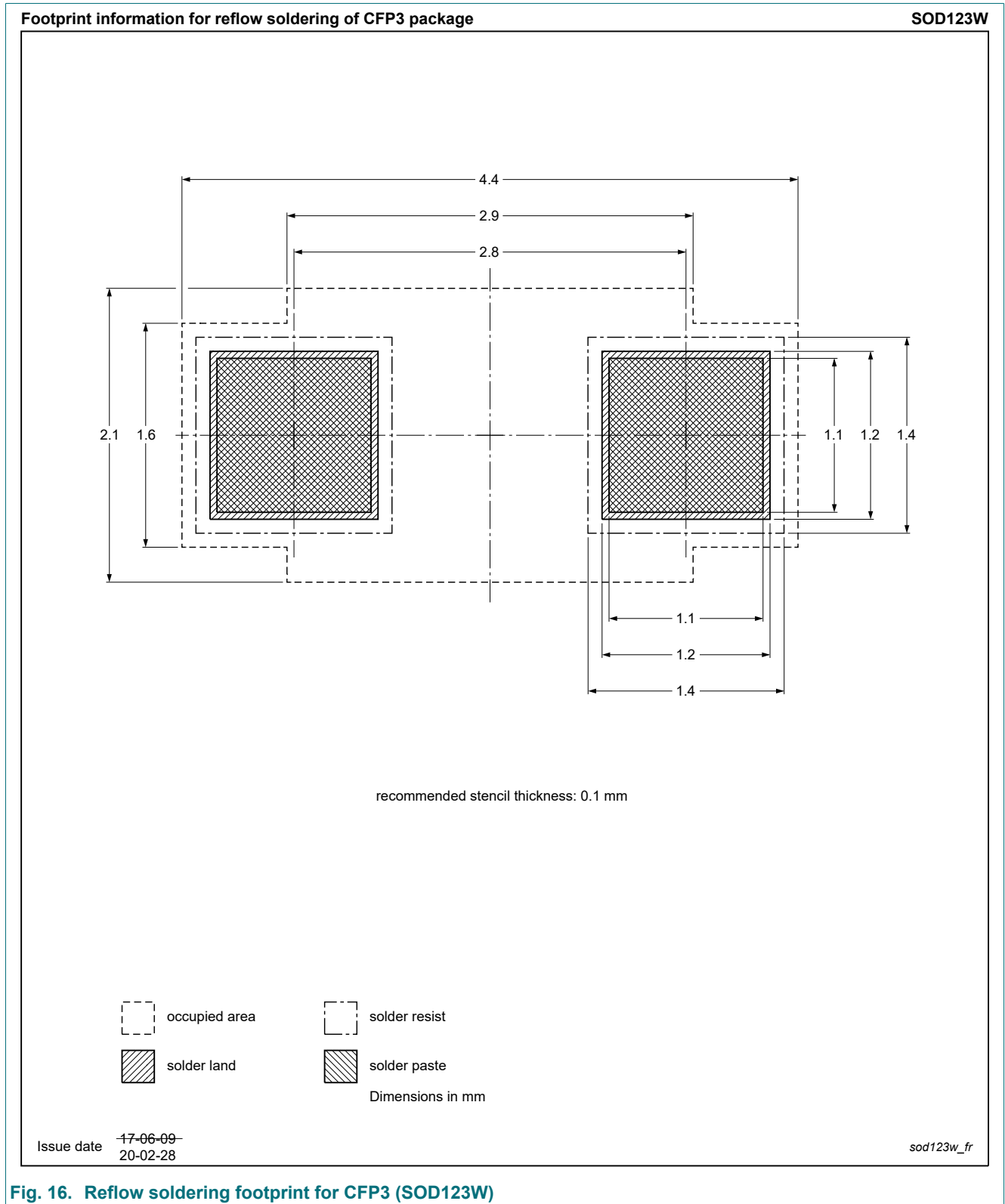


Fig. 16. Reflow soldering footprint for CFP3 (SOD123W)

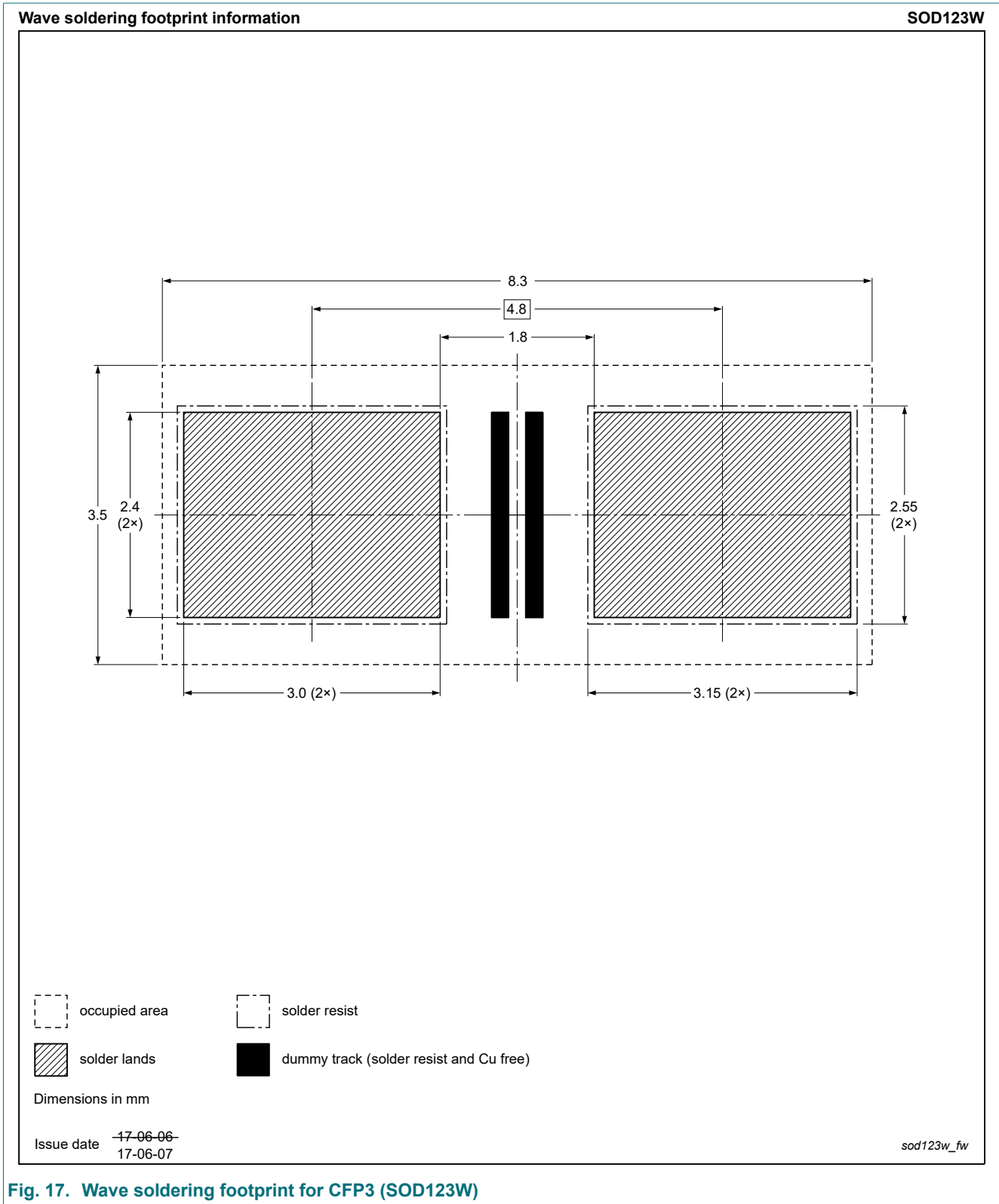


Fig. 17. Wave soldering footprint for CFP3 (SOD123W)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PMEG2020CER v.1 | 20230824 | 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. |
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| Product [short] data sheet | Production | This document contains the product specification. |

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