



PMEG4020ETR

High temperature 40 V, 2 A low VF Schottky barrier rectifier

1 January 2023

Product data sheet

1. General description

Planar Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOD123W small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 2$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage
- High power capability due to clip-bonding technology
- Small and flat lead SMD plastic package
- High temperature $T_j \leq 175$ °C

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Reverse polarity protection
- Low power consumption applications
- High temperature 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; $T_{sp} \leq 165$ °C | - | - | 2 | A |
| V_R | reverse voltage | $T_j = 25$ °C | - | - | 40 | V |
| V_F | forward voltage | $I_F = 2$ A; $T_j = 25$ °C | - | 430 | 490 | mV |
| I_R | reverse current | $V_R = 40$ V; $T_j = 25$ °C | - | 25 | 100 | μ A |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--------------------|----------------|
| 1 | K | cathode[1] | CFP3 (SOD123W) | sym001 |
| 2 | A | anode | | |

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-----------------------------|---------|--|-------------------------|
| | Name | Description | Version |
| PMEG4020ETR | 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 |
|-------------|--------------|
| PMEG4020ETR | C1 |

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 | $T_j = 25\text{ °C}$ | | - | 40 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20\text{ kHz}$; square wave; $T_{amb} \leq 110\text{ °C}$ | [1] | - | 2 | A |
| | | $\delta = 0.5$; $f = 20\text{ kHz}$; square wave; $T_{sp} \leq 165\text{ °C}$ | | - | 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 | $T_{amb} \leq 25\text{ °C}$ | [2] | - | 680 | mW |
| | | | [3] | - | 1.15 | W |
| | | | [1] | - | 2.14 | 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 a ceramic Printed-Circuit Board (PCB), Al_2O_3 , standard footprint.

[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^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 |
| | | | [1] [4] | - | - | 70 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [5] | - | - | 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 cm².
- [4] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [5] Soldering point of cathode tab.

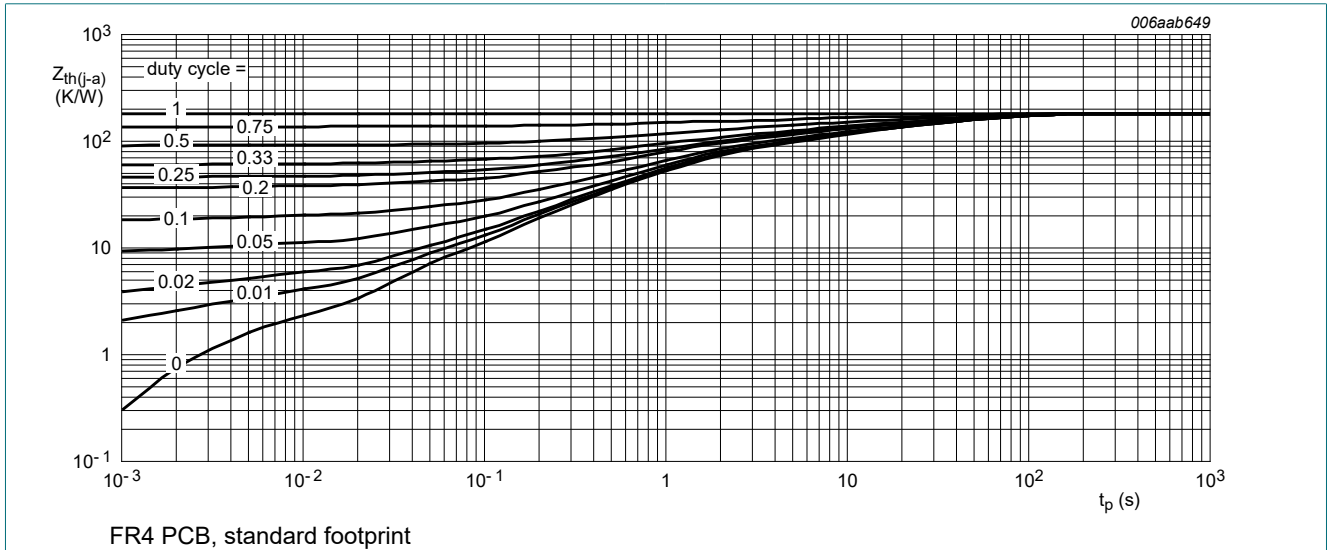


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

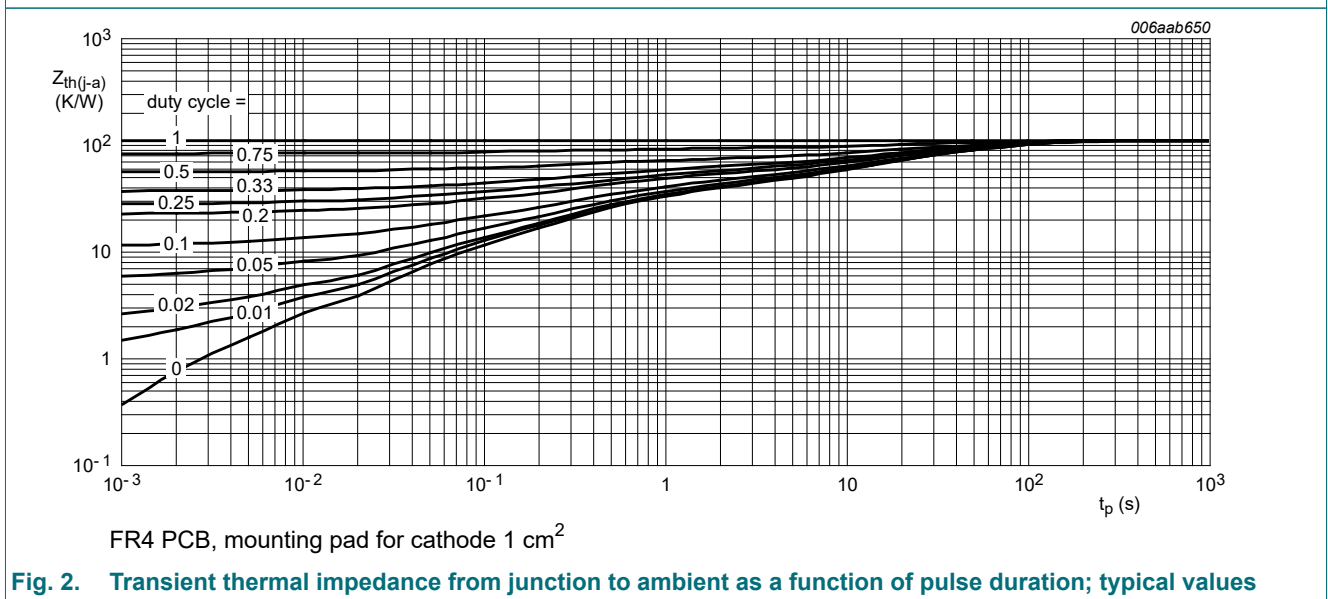
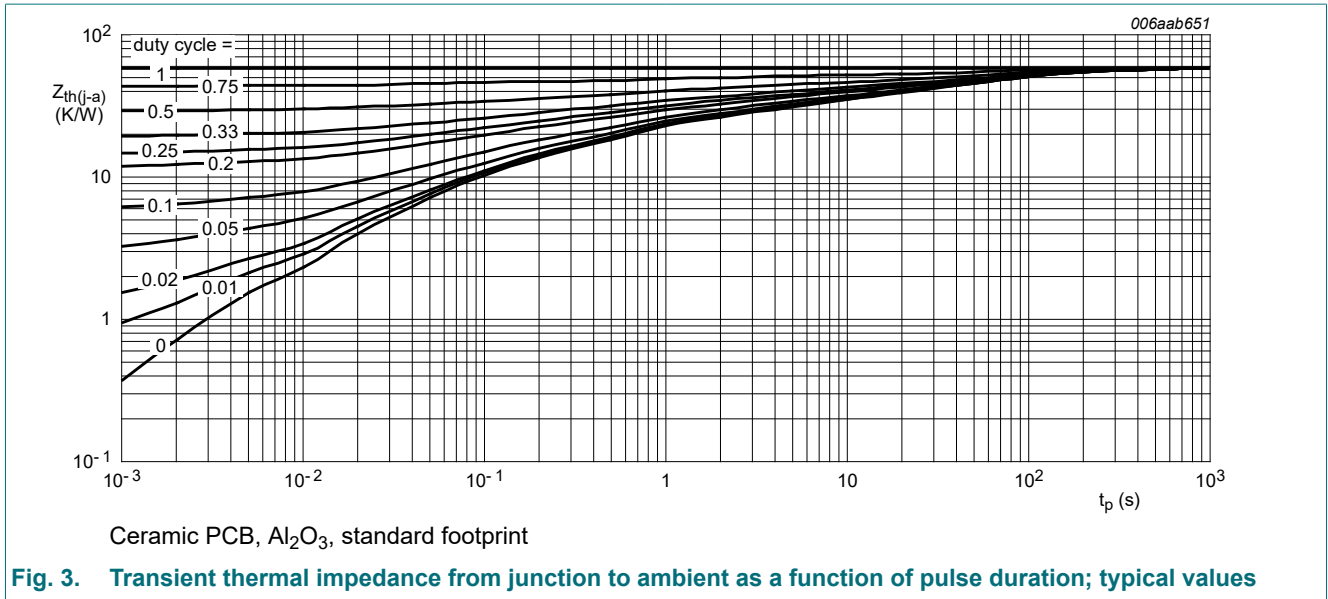


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|-------------------|--|-----|-----|-----|------|
| V _F | forward voltage | I _F = 0.1 A; T _j = 25 °C | - | 295 | 330 | mV |
| | | I _F = 1 A; T _j = 25 °C | - | 380 | 440 | mV |
| | | I _F = 2 A; T _j = 25 °C | - | 430 | 490 | mV |
| | | I _F = 2 A; T _j = 125 °C | - | 330 | 380 | mV |
| I _R | reverse current | V _R = 10 V; T _j = 25 °C | - | 5 | - | μA |
| | | V _R = 40 V; T _j = 25 °C | - | 25 | 100 | μA |
| | | V _R = 10 V; T _j = 125 °C | - | 4 | - | mA |
| | | V _R = 40 V; T _j = 125 °C | - | 15 | - | mA |
| C _d | diode capacitance | V _R = 1 V; f = 1 MHz; T _j = 25 °C | - | 250 | - | pF |
| | | V _R = 10 V; f = 1 MHz; T _j = 25 °C | - | 95 | - | pF |

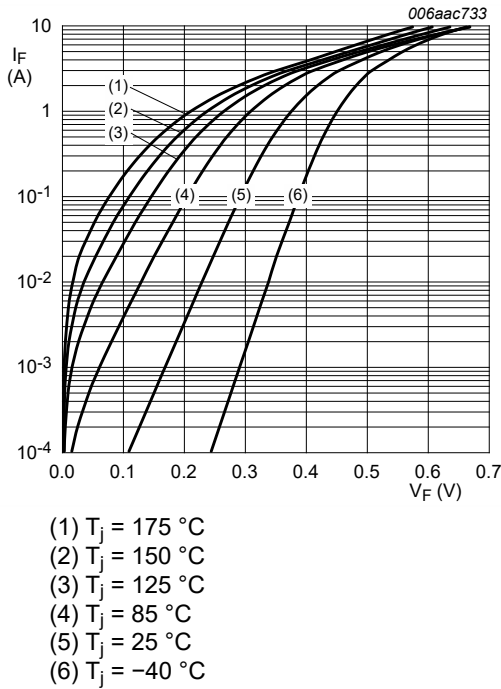


Fig. 4. Forward current as a function of forward voltage; typical values

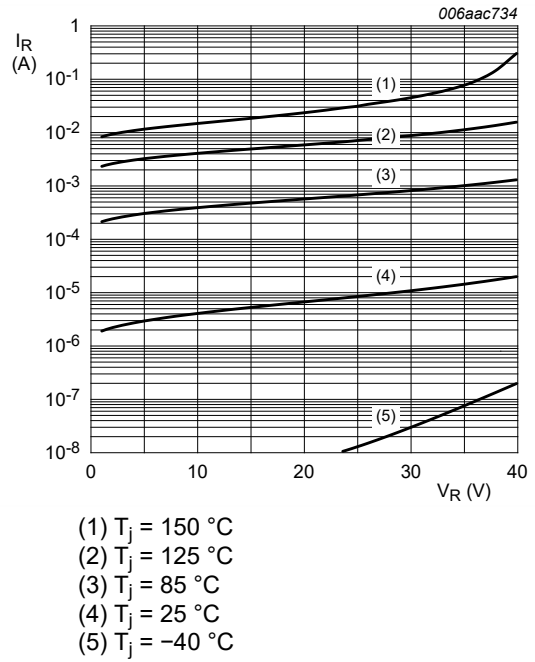


Fig. 5. Reverse current as a function of reverse voltage; typical values

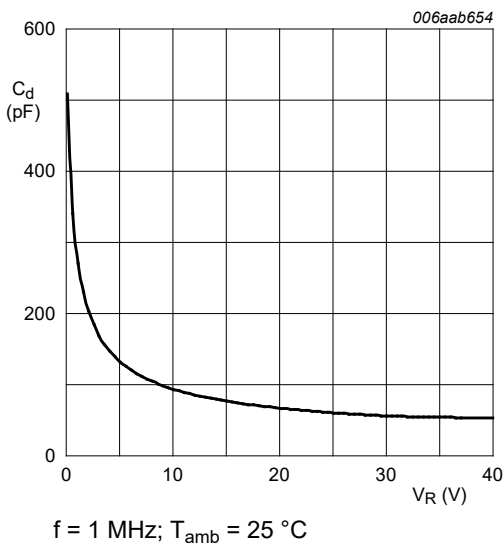


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

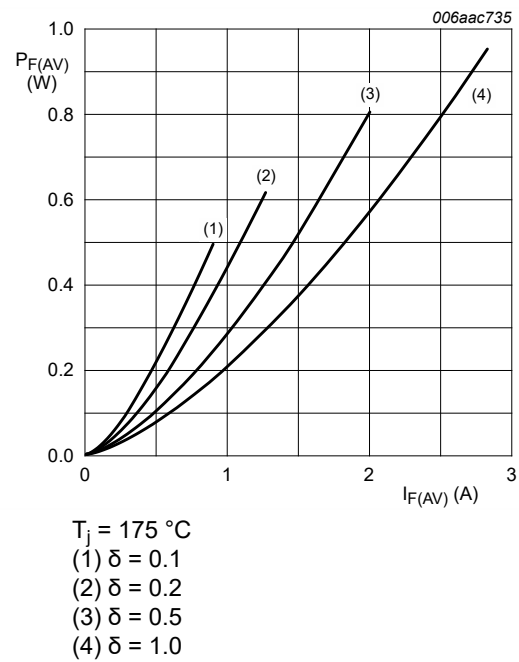
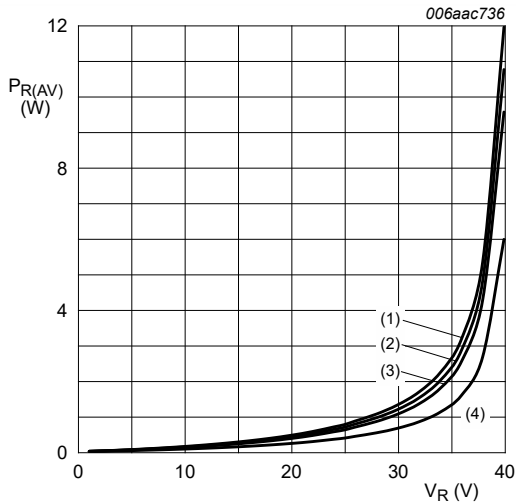
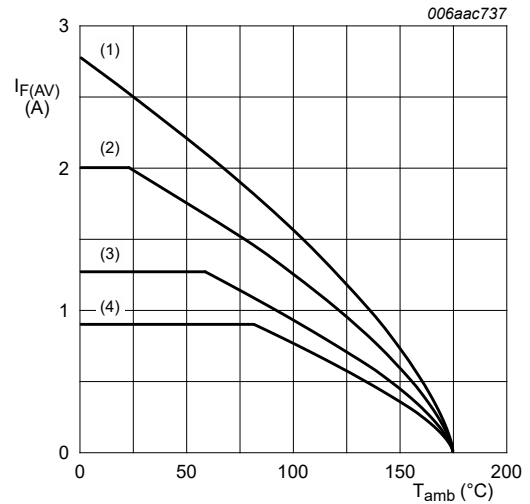


Fig. 7. Average forward power dissipation as a function of average forward current; typical values



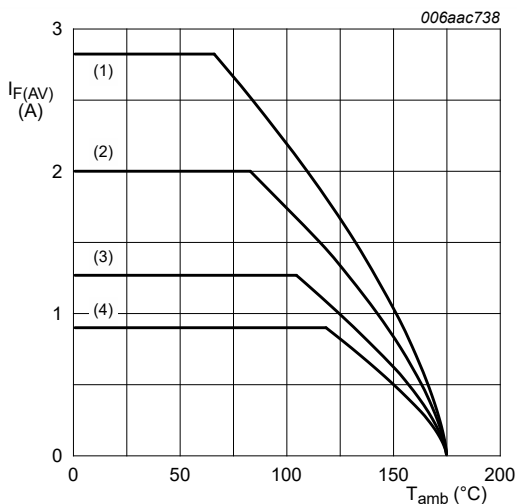
$T_j = 150\text{ }^\circ\text{C}$
 (1) $\delta = 1.0$
 (2) $\delta = 0.9$
 (3) $\delta = 0.8$
 (4) $\delta = 0.5$

Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values



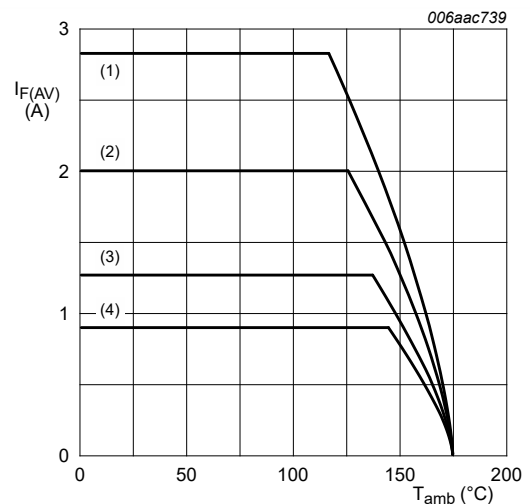
FR4 PCB, standard footprint
 $T_j = 175\text{ }^\circ\text{C}$
 (1) $\delta = 1.0$ (DC)
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



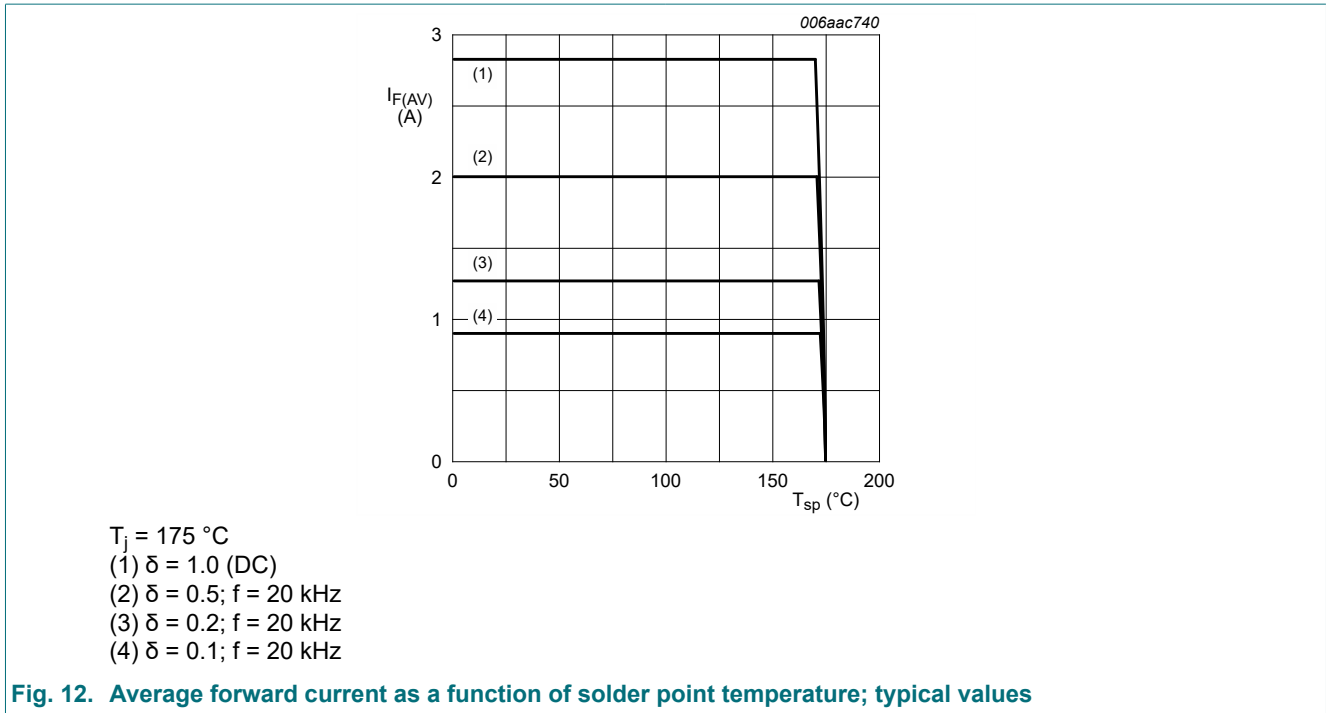
FR4 PCB, mounting pad for cathode 1 cm^2
 $T_j = 175\text{ }^\circ\text{C}$
 (1) $\delta = 1.0$ (DC)
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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

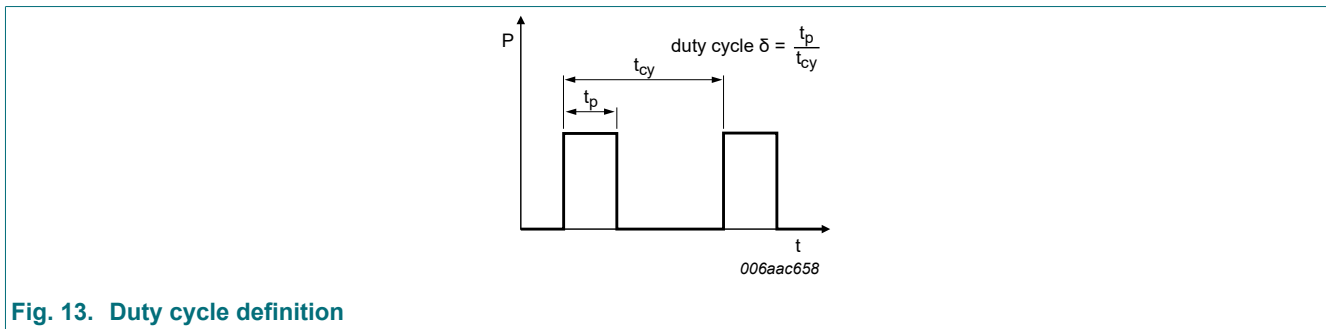


Ceramic PCB, Al_2O_3 , standard footprint
 $T_j = 175\text{ }^\circ\text{C}$
 (1) $\delta = 1.0$ (DC)
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



11. Test information



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

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

$$I_{RMS} = I_{F(AV)} \text{ at DC}$$

$$I_{RMS} = I_M \times \sqrt{\delta} \text{ with } I_{RMS} \text{ defined as RMS current}$$

12. Package outline

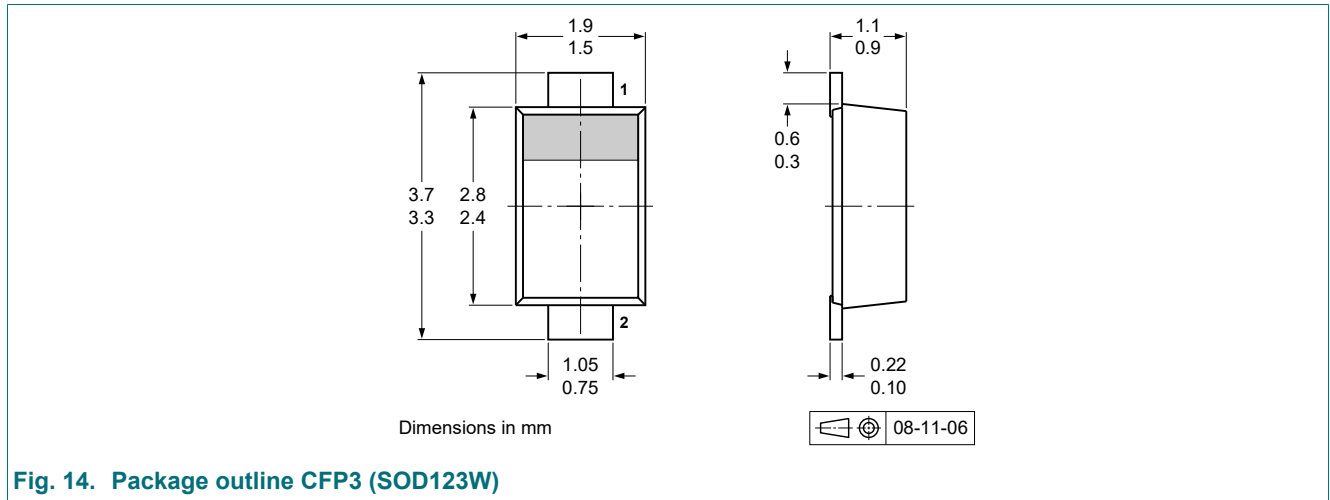


Fig. 14. Package outline CFP3 (SOD123W)

13. Soldering

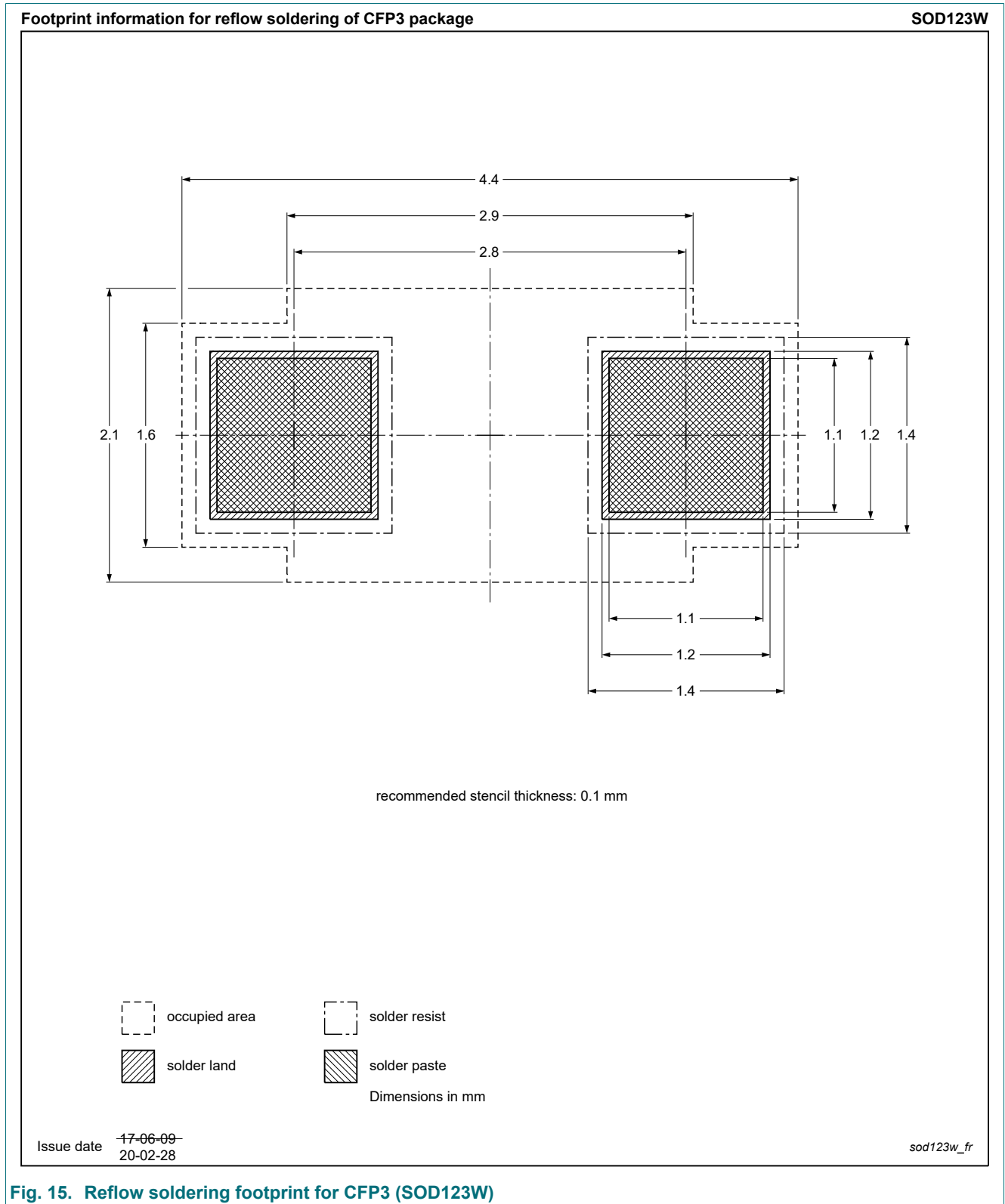


Fig. 15. Reflow soldering footprint for CFP3 (SOD123W)

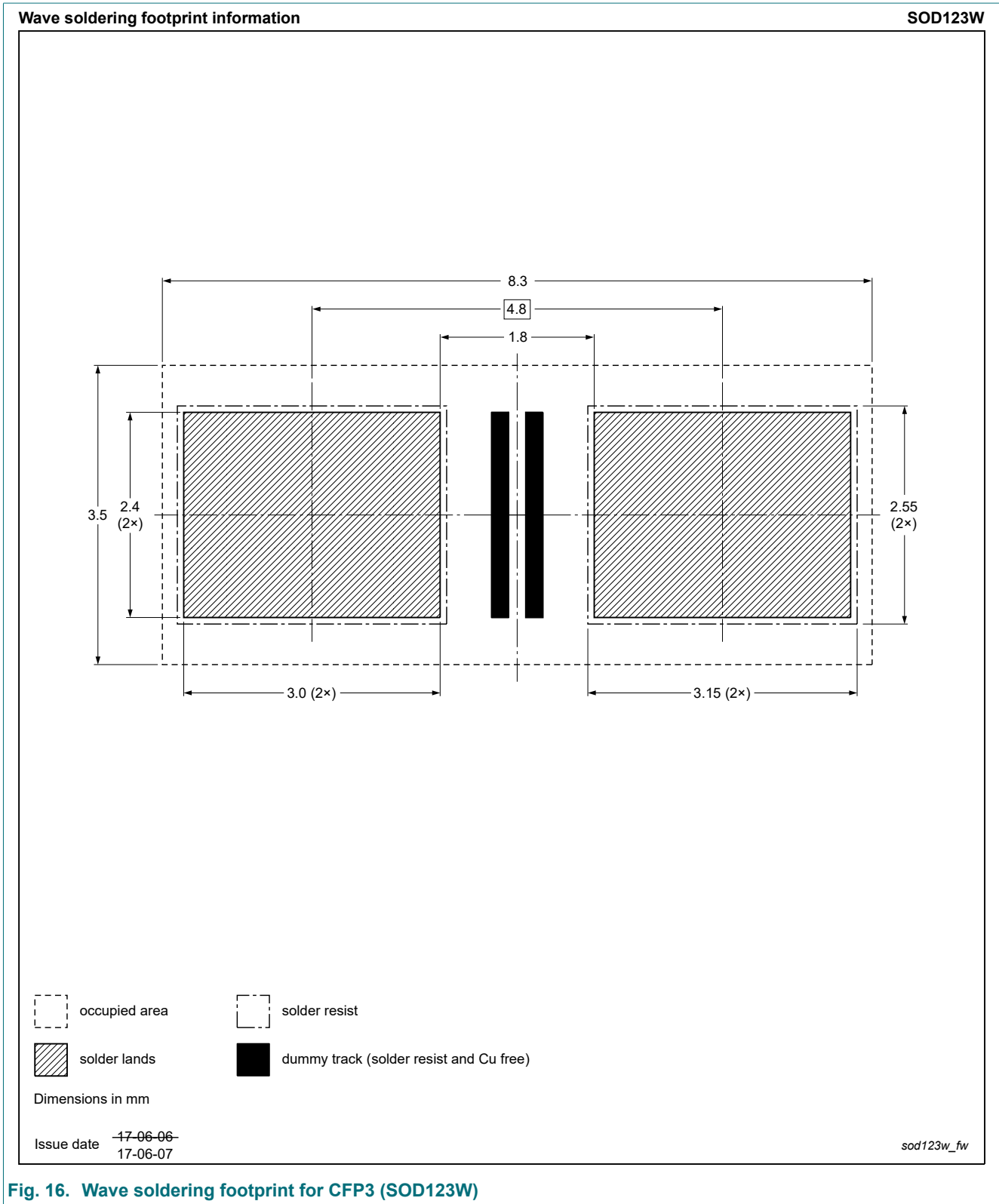


Fig. 16. Wave soldering footprint for CFP3 (SOD123W)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|---|--------------------|---------------|-----------------|
| PMEG4020ETR v.4 | 20230101 | Product data sheet | - | PMEG4020ETR v.3 |
| Modifications: | <ul style="list-style-type: none"> Limiting values: Measurement conditions for I_{FSM} changed from square wave to half-sine wave. Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). | | | |
| PMEG4020ETR v.3 | 20171113 | Product data sheet | - | PMEG4020ETR v.2 |
| PMEG4020ETR v.2 | 20171109 | Product data sheet | - | PMEG4020ETR v.1 |

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. |

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