



# PMEG10010ELR

100 V, 1 A low leakage current 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:  $I_{F(AV)} \leq 1$  A
- Reverse voltage:  $V_R \leq 100$  V
- Low forward voltage:  $V_F = 710$  mV
- High power capability due to clip-bonding technology
- Extremely low leakage current  $I_R = 40$  nA
- 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

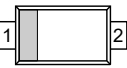
## 4. Quick reference data

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; $T_{sp} \leq 170$ °C          | -   | -   | 1   | A    |
| $V_R$       | reverse voltage         | $T_j = 25$ °C                                                             | -   | -   | 100 | V    |
| $V_F$       | forward voltage         | $I_F = 1$ A; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C   | -   | 710 | 770 | mV   |
| $I_R$       | reverse current         | $V_R = 100$ V; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C | -   | 40  | 150 | nA   |

## 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 |
| PMEG10010ELR | 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 |
|--------------|--------------|
| PMEG10010ELR | K7           |

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol             | Parameter                           | Conditions                                                            |     | Min | Max  | Unit |
|--------------------|-------------------------------------|-----------------------------------------------------------------------|-----|-----|------|------|
| V <sub>R</sub>     | reverse voltage                     | T <sub>j</sub> = 25 °C                                                |     | -   | 100  | V    |
| I <sub>F</sub>     | forward current                     | δ = 1; T <sub>sp</sub> = 165 °C                                       |     | -   | 1.4  | A    |
| I <sub>F(AV)</sub> | average forward current             | δ = 0.5; f = 20 kHz; square wave; T <sub>amb</sub> ≤ 135 °C           | [1] | -   | 1    | A    |
|                    |                                     | δ = 0.5; f = 20 kHz; square wave; T <sub>sp</sub> ≤ 170 °C            |     | -   | 1    | A    |
| I <sub>FSM</sub>   | non-repetitive peak forward current | t <sub>p</sub> = 8.3 ms; half sine wave; T <sub>j(init)</sub> = 25 °C |     | -   | 50   | A    |
| P <sub>tot</sub>   | total power dissipation             | T <sub>amb</sub> ≤ 25 °C                                              | [2] | -   | 680  | mW   |
|                    |                                     |                                                                       | [3] | -   | 1.15 | W    |
|                    |                                     |                                                                       | [1] | -   | 2.14 | W    |
| T <sub>j</sub>     | junction temperature                |                                                                       |     | -   | 175  | °C   |
| T <sub>amb</sub>   | ambient temperature                 |                                                                       |     | -55 | 175  | °C   |
| T <sub>stg</sub>   | storage temperature                 |                                                                       |     | -65 | 175  | °C   |

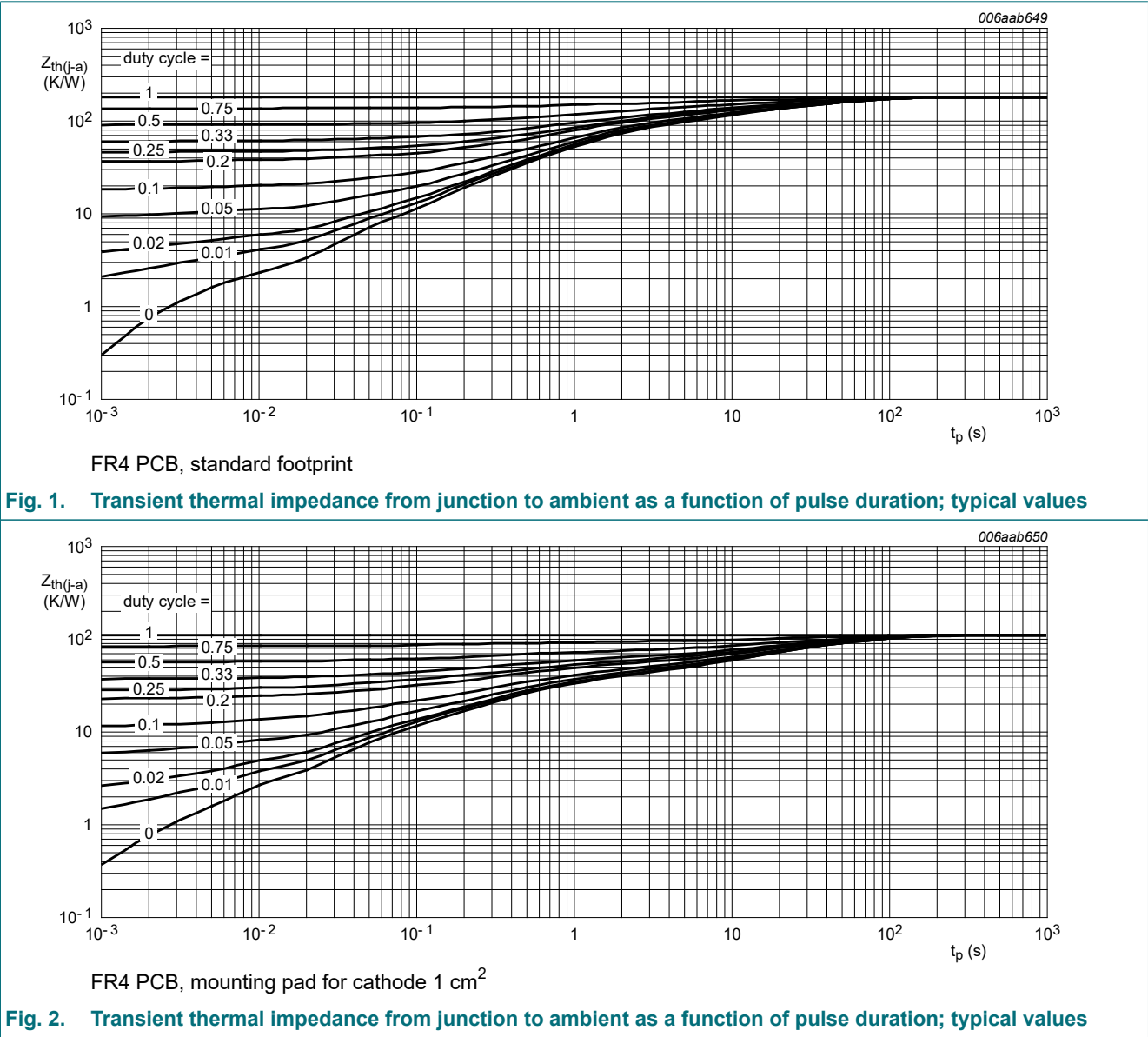
[1] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.  
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.  
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

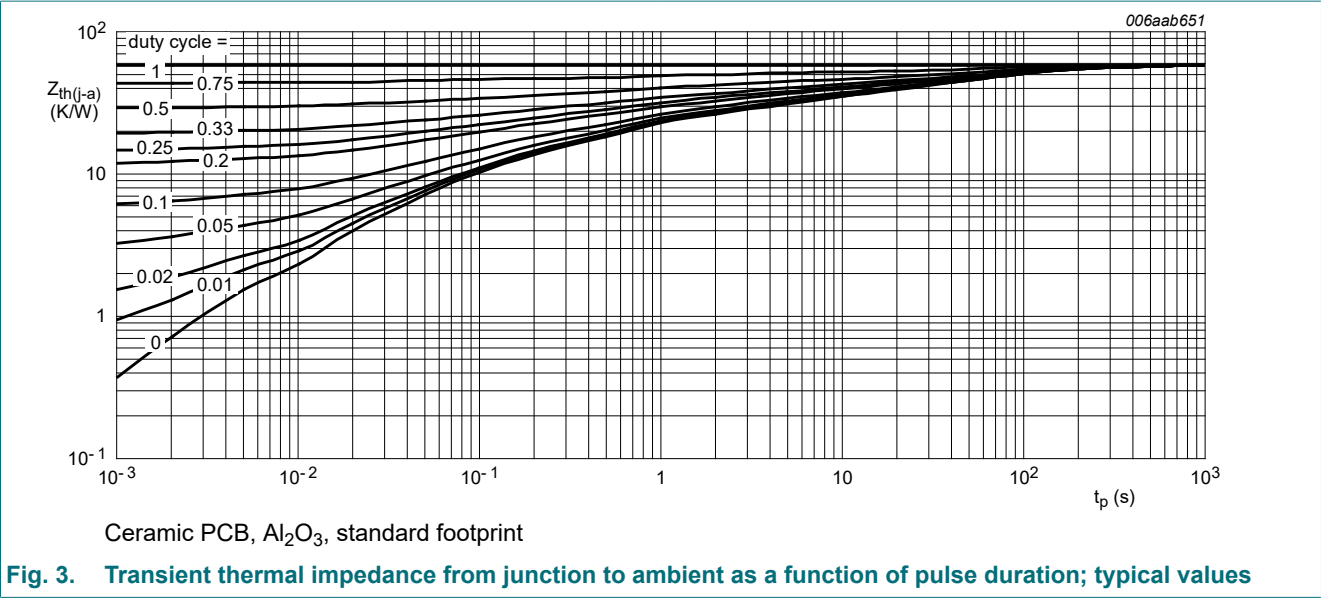
9. Thermal characteristics

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





10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                     | Conditions                                                                                                          | Min | Typ | Max | Unit          |
|-------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage     | $I_R = 1\text{ mA}$ ; $t_p = 300\text{ }\mu\text{s}$ ; $\delta = 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$           | 100 | -   | -   | V             |
| $V_F$       | forward voltage               | $I_F = 0.1\text{ A}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$    | -   | 505 | 565 | mV            |
|             |                               | $I_F = 0.5\text{ A}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$    | -   | 640 | 710 | mV            |
|             |                               | $I_F = 0.7\text{ A}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$    | -   | 675 | 740 | mV            |
|             |                               | $I_F = 1\text{ A}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$      | -   | 710 | 770 | mV            |
|             |                               | $I_F = 1\text{ A}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 125\text{ }^\circ\text{C}$     | -   | 575 | 680 | mV            |
| $I_R$       | reverse current               | $V_R = 10\text{ V}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$     | -   | 4   | -   | nA            |
|             |                               | $V_R = 60\text{ V}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$     | -   | 12  | -   | nA            |
|             |                               | $V_R = 100\text{ V}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 25\text{ }^\circ\text{C}$    | -   | 40  | 150 | nA            |
|             |                               | $V_R = 100\text{ V}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_j = 125\text{ }^\circ\text{C}$   | -   | 70  | 500 | $\mu\text{A}$ |
| $C_d$       | diode capacitance             | $V_R = 1\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_j = 25\text{ }^\circ\text{C}$                                          | -   | 70  | -   | pF            |
|             |                               | $V_R = 4\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_j = 25\text{ }^\circ\text{C}$                                          | -   | 42  | -   | pF            |
|             |                               | $V_R = 10\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_j = 25\text{ }^\circ\text{C}$                                         | -   | 28  | -   | pF            |
| $t_{rr}$    | reverse recovery time         | $I_F = 0.5\text{ A}$ ; $I_R = 1\text{ A}$ ; $I_{R(\text{meas})} = 0.25\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ | -   | 3.7 | -   | ns            |
| $V_{FRM}$   | peak forward recovery voltage | $I_F = 0.5\text{ A}$ ; $dI_F/dt = 20\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ }^\circ\text{C}$                       | -   | 690 | -   | mV            |

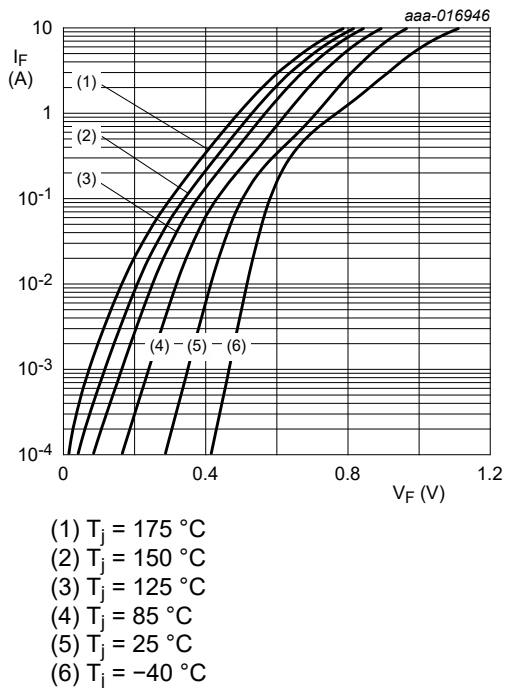


Fig. 4. Forward current as a function of forward voltage; typical values

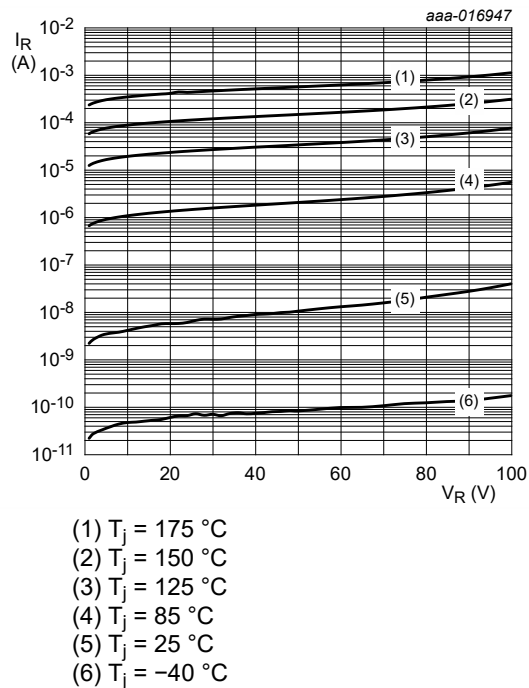


Fig. 5. Reverse current as a function of reverse voltage; typical values

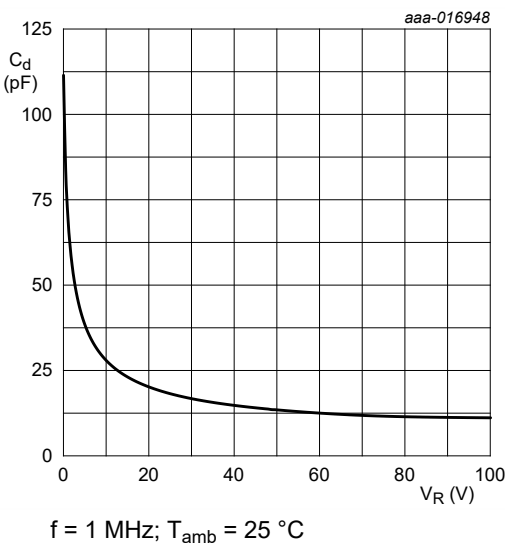


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

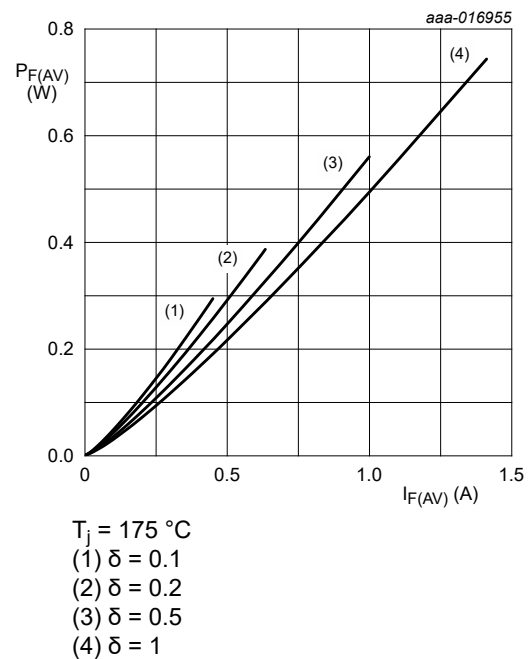
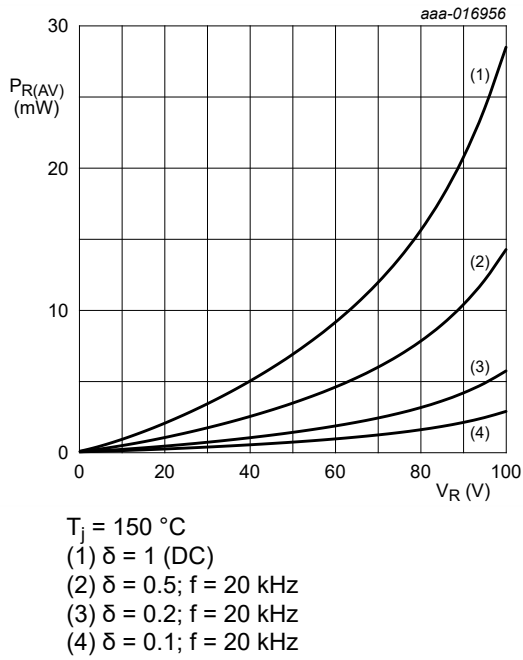
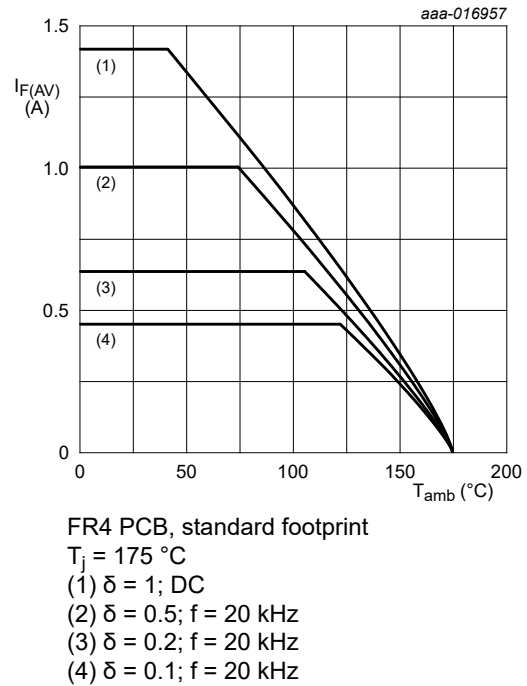


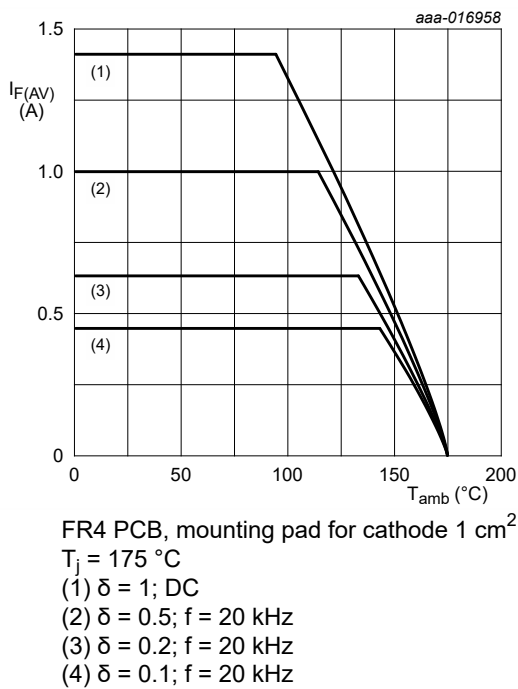
Fig. 7. Average forward power dissipation as a function of average forward current; typical values



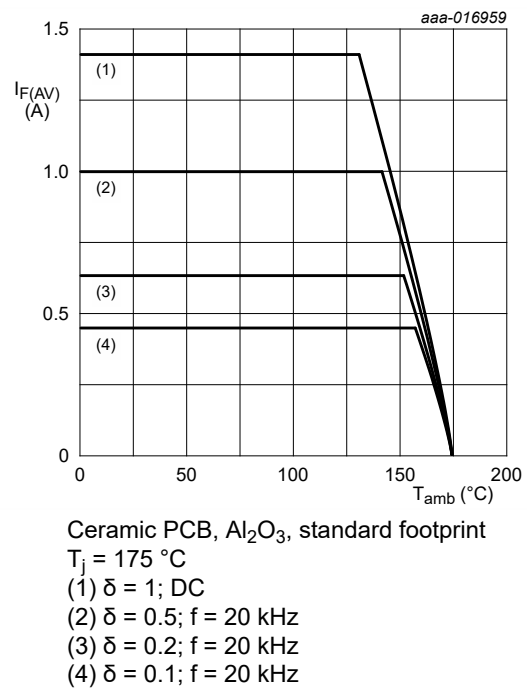
**Fig. 8.** Average reverse power dissipation as a function of reverse voltage; typical values



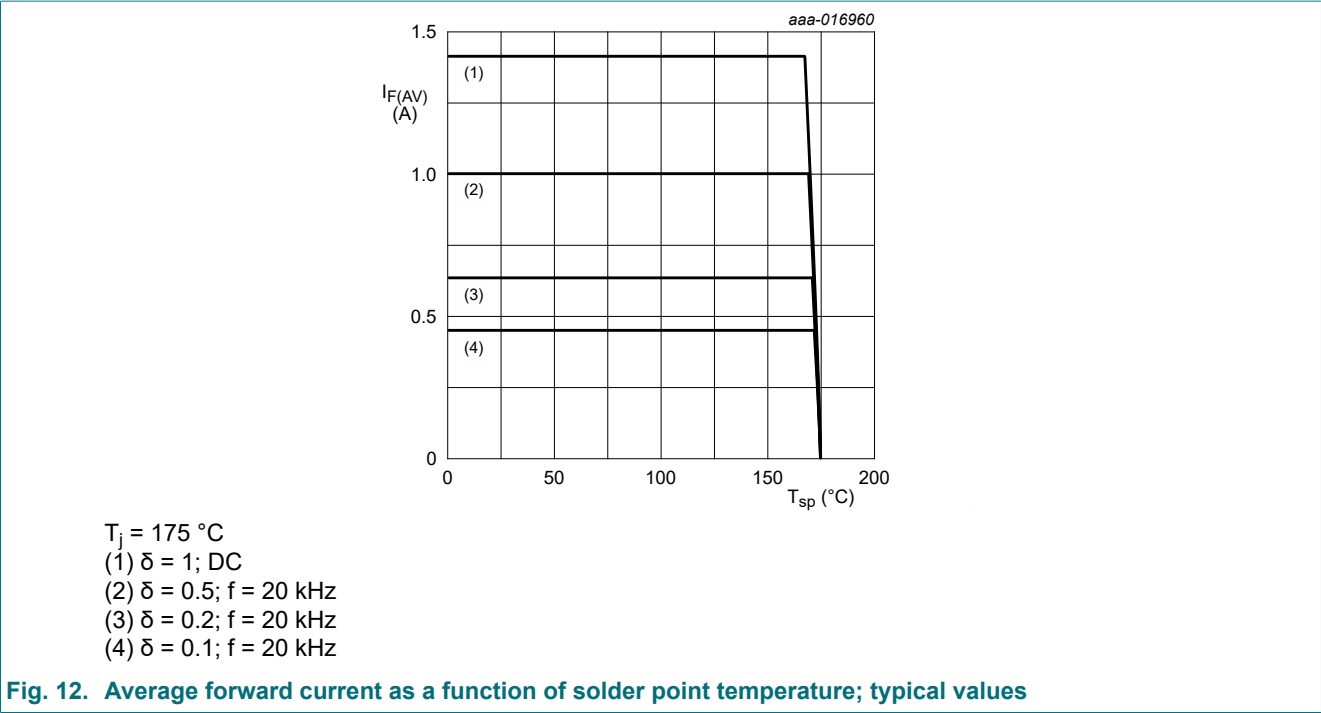
**Fig. 9.** Average forward current as a function of ambient temperature; typical values



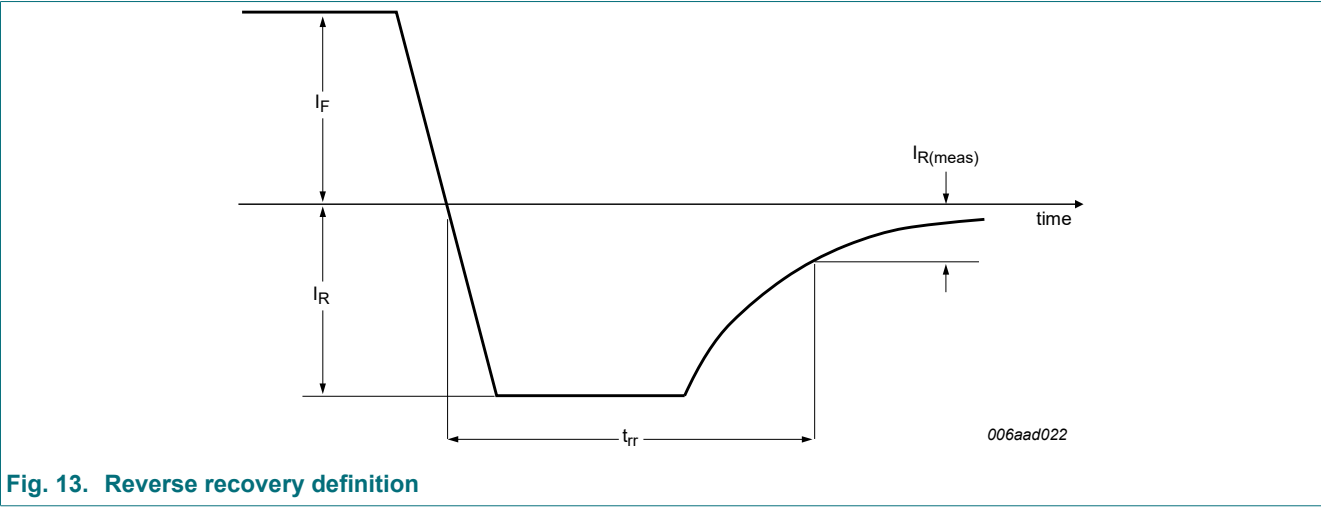
**Fig. 10.** Average forward current as a function of ambient temperature; typical values



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



11. Test information



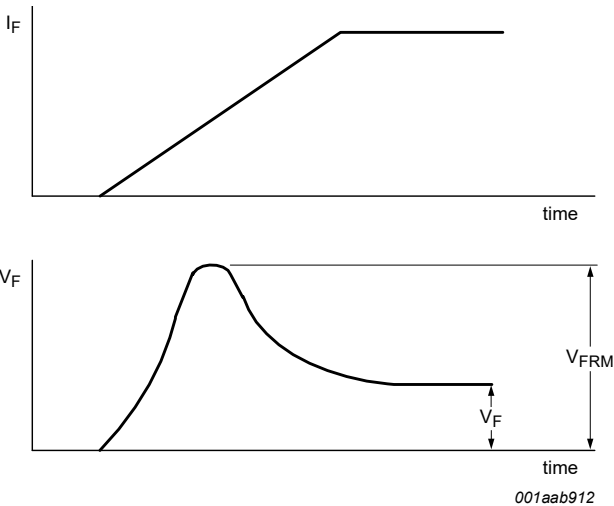


Fig. 14. Forward recovery definition

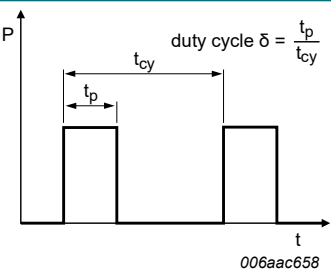


Fig. 15. Duty cycle definition

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,

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

## 12. Package outline

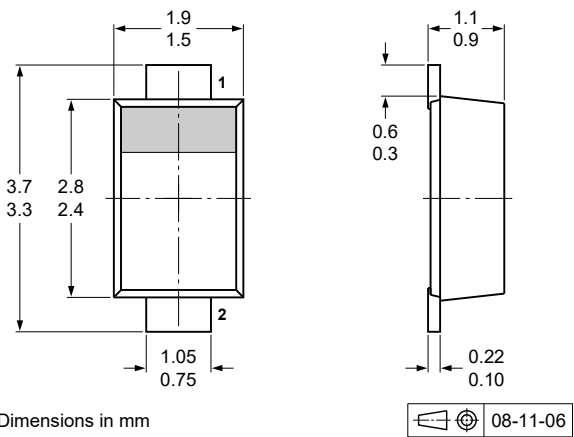


Fig. 16. Package outline CFP3 (SOD123W)

13. Soldering

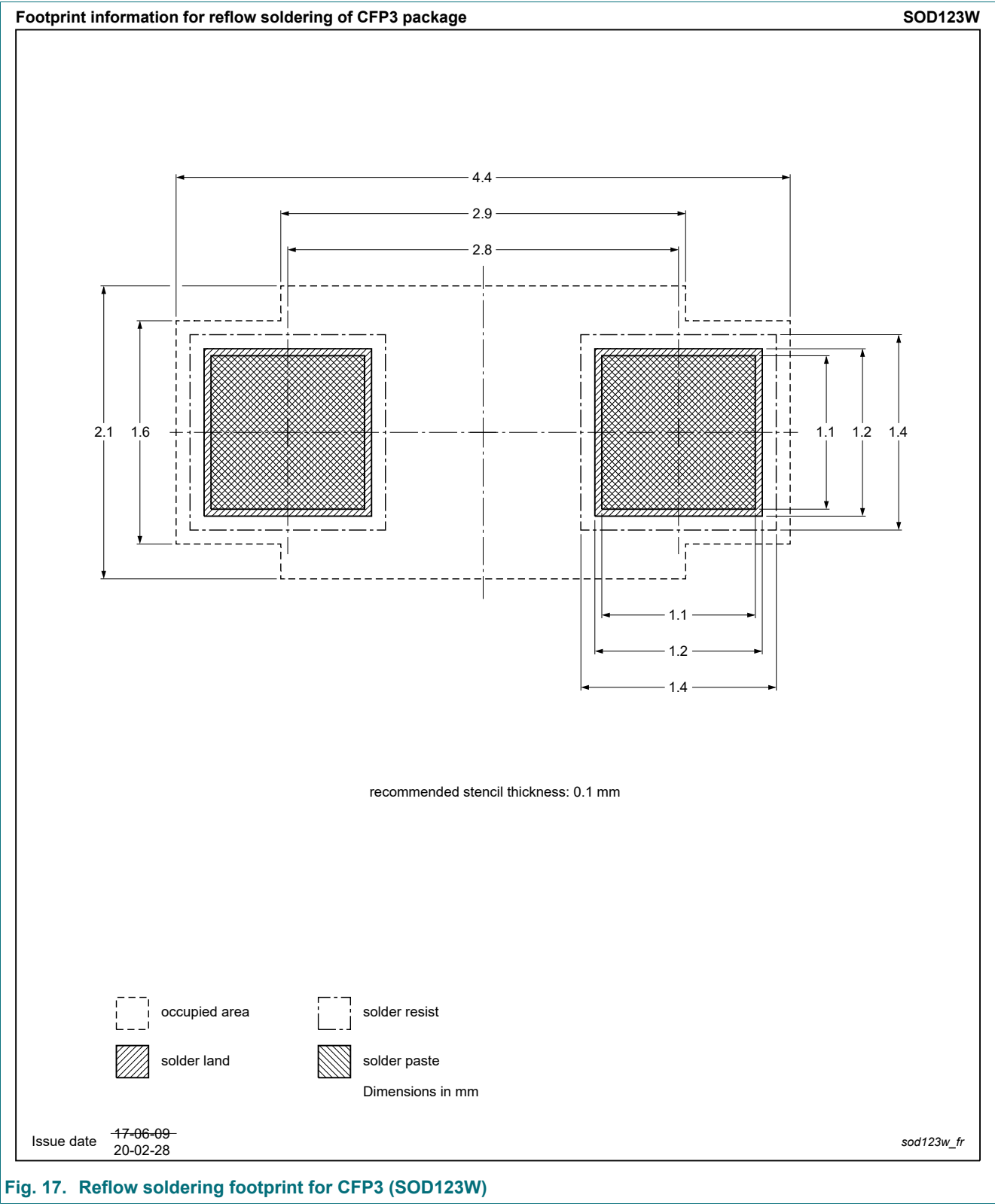


Fig. 17. Reflow soldering footprint for CFP3 (SOD123W)

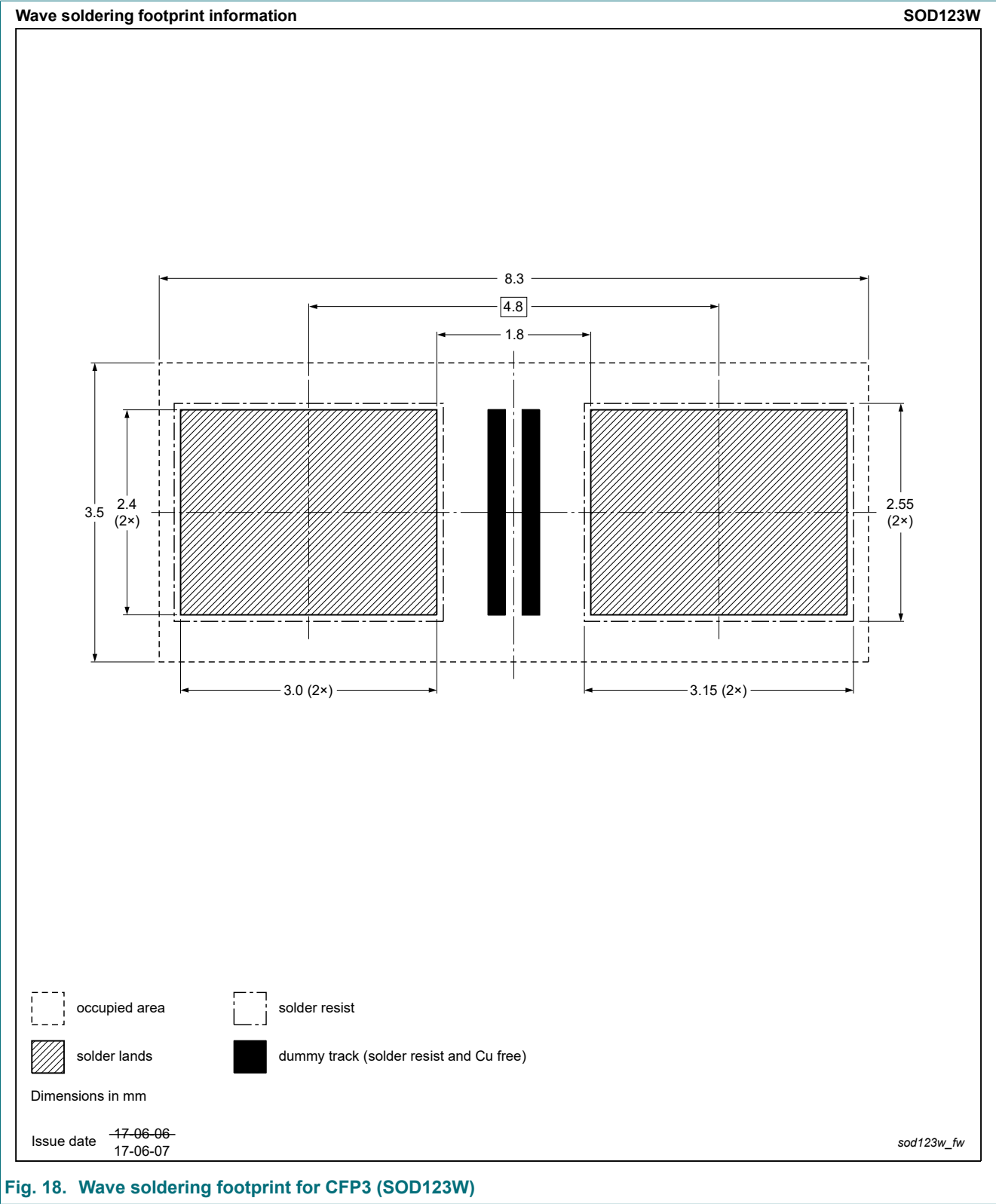


Fig. 18. Wave soldering footprint for CFP3 (SOD123W)

## 14. Revision history

**Table 8. Revision history**

| Data sheet ID    | Release date                                                                                                                                                                                                                                                                                                                          | Data sheet status      | Change notice | Supersedes       |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|------------------|
| PMEG10010ELR v.5 | 20230101                                                                                                                                                                                                                                                                                                                              | Product data sheet     | -             | PMEG10010ELR v.4 |
| Modifications:   | <ul style="list-style-type: none"><li>Limiting values: Measurement conditions for <math>I_{FSM}</math> changed from square wave to half-sine wave.</li><li>Product changed to non-automotive qualification. Please refer to <a href="https://www.nexperia.com">nexperia.com</a> for automotive (-Q) product alternative(s).</li></ul> |                        |               |                  |
| PMEG10010ELR v.4 | 20180326                                                                                                                                                                                                                                                                                                                              | Product data sheet     | -             | PMEG10010ELR v.3 |
| PMEG10010ELR v.3 | 20160908                                                                                                                                                                                                                                                                                                                              | Product data sheet     | -             | PMEG10010ELR v.2 |
| PMEG10010ELR v.2 | 20150507                                                                                                                                                                                                                                                                                                                              | Product data sheet     | -             | PMEG10010ELR v.1 |
| PMEG10010ELR v.1 | 20150220                                                                                                                                                                                                                                                                                                                              | Preliminary 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.
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