# PMEG3020BER

## 30 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: $V_R \leq 30$ V
- Low forward voltage
- High power capability due to clip-bond technology
- 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

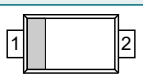
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{F(AV)}$ | average forward current | δ = 0.5; f = 20 kHz; square wave; $T_{sp} \leq$ 135 °C | | - | - | 2 | A |
| $V_R$ | reverse voltage | $T_j$ = 25 °C | | - | - | 30 | V |
| $V_F$ | forward voltage | $I_F$ = 2 A; $T_j$ = 25 °C | | - | 460 | 520 | mV |
| $I_R$ | reverse current | $V_R$ = 30 V; $T_j$ = 25 °C | | - | 15 | 50 | µA |

## 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.

nexperia

# 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PMEG3020BER | 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 |
|---|---|
| PMEG3020BER | BA |

# 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 °C | | - | 30 | V |
| $I_{F(AV)}$ | average forward current | δ = 0.5; f = 20 kHz; square wave; $T_{amb}$ ≤ 75 °C | [1] | - | 2 | A |
| | | δ = 0.5; f = 20 kHz; square wave; $T_{sp}$ ≤ 135 °C | | - | 2 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 8.3 ms; half sine wave; $T_{j(init)}$ = 25 °C | | - | 50 | A |
| $P_{tot}$ | total power dissipation | $T_{amb}$ ≤ 25 °C | [2] | - | 0.57 | W |
| | | | [3] | - | 0.95 | W |
| | | | [1] | - | 1.8 | W |
| $T_j$ | junction temperature | | | - | 150 | °C |
| $T_{amb}$ | ambient temperature | | | -55 | 150 | °C |
| $T_{stg}$ | storage temperature | | | -65 | 150 | °C |

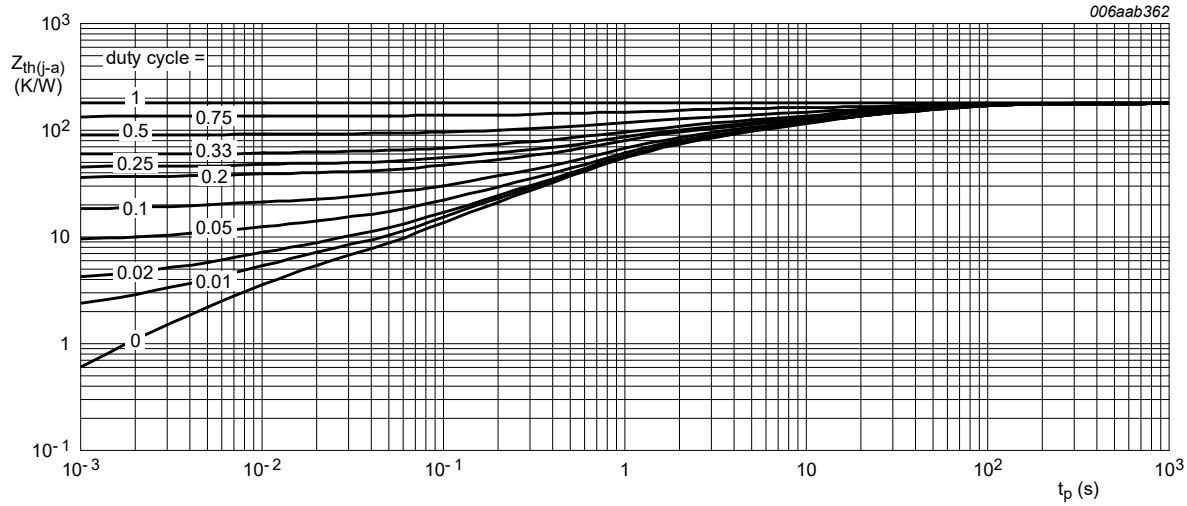
[1] Device mounted on a ceramic PCB, $Al_2O_3$, standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 $cm^2$.

# 9. Thermal characteristics

**Table 6. Thermal characteristics**

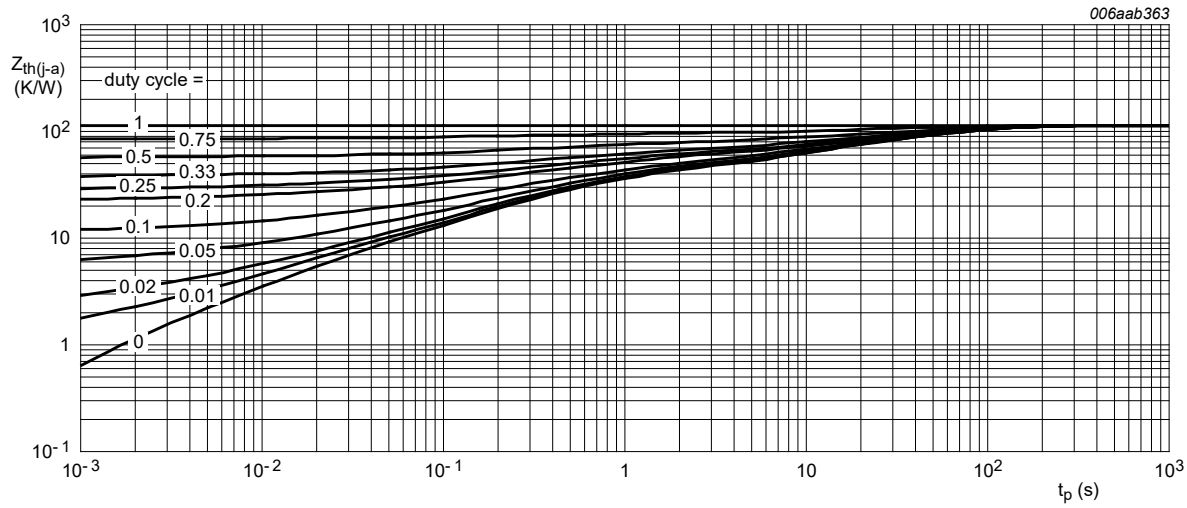
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] [2] | - | - | 220 | K/W |
| | | | [3] [2] | - | - | 130 | K/W |
| | | | [4] [2] | - | - | 70 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [5] | - | - | 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 $cm^2$.
[4] Device mounted on a ceramic PCB, $Al_2O_3$, standard footprint.
[5] Soldering point of cathode tab.



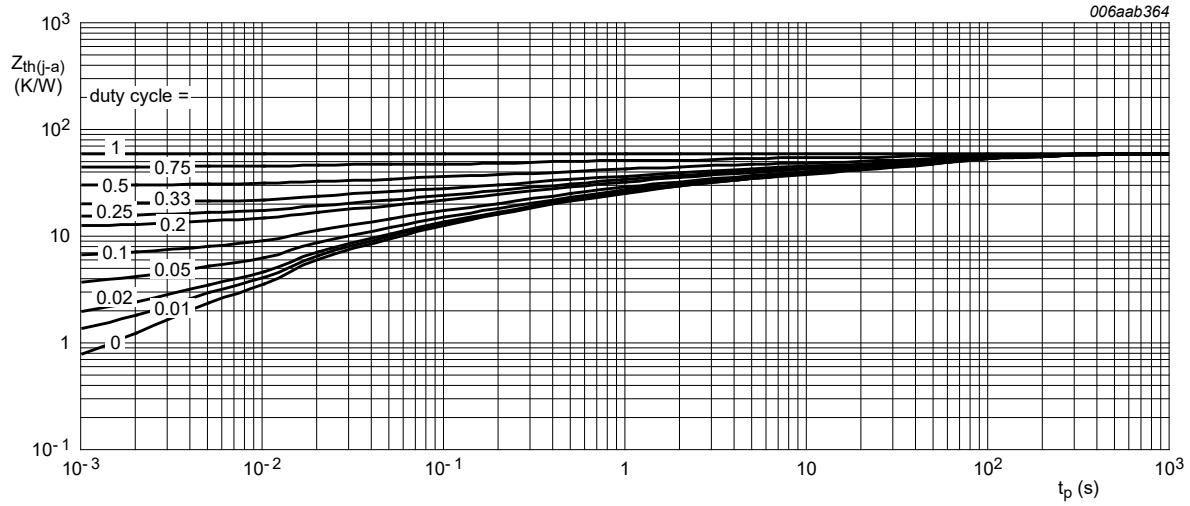

FR4 PCB, standard footprint

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




FR4 PCB, mounting pad for cathode 1 $cm^2$

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



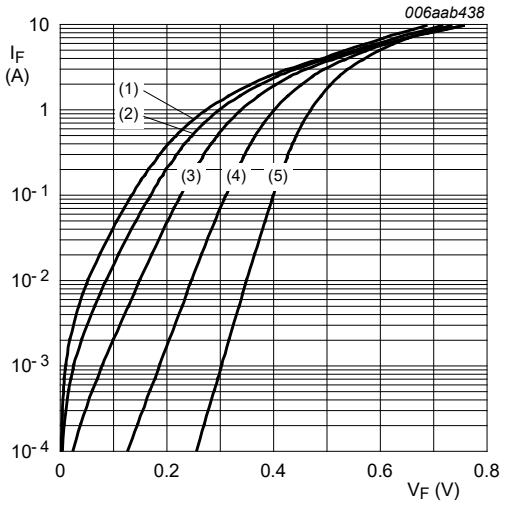

Ceramic PCB, $Al_2O_3$, standard footprint

**Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

## 10. Characteristics

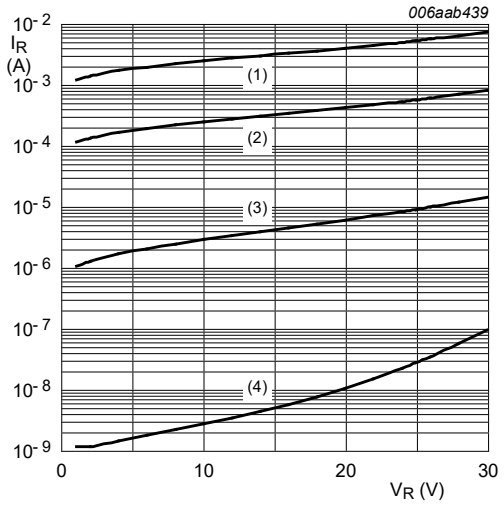
**Table 7. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_F$ | forward voltage | $I_F$ = 0.1 A; $T_j$ = 25 °C | | - | 315 | 360 | mV |
| | | $I_F$ = 0.7 A; $T_j$ = 25 °C | | - | 390 | 430 | mV |
| | | $I_F$ = 1 A; $T_j$ = 25 °C | | - | 405 | 450 | mV |
| | | $I_F$ = 1.5 A; $T_j$ = 25 °C | | - | 430 | 480 | mV |
| | | $I_F$ = 2 A; $T_j$ = 25 °C | | - | 460 | 520 | mV |
| $I_R$ | reverse current | $V_R$ = 5 V; $T_j$ = 25 °C | | - | 2 | - | µA |
| | | $V_R$ = 10 V; $T_j$ = 25 °C | | - | 3 | - | µA |
| | | $V_R$ = 30 V; $T_j$ = 25 °C | | - | 15 | 50 | µA |
| $C_d$ | diode capacitance | $V_R$ = 1 V; f = 1 MHz; $T_j$ = 25 °C | | - | 170 | - | pF |
| | | $V_R$ = 10 V; f = 1 MHz; $T_j$ = 25 °C | | - | 60 | - | pF |



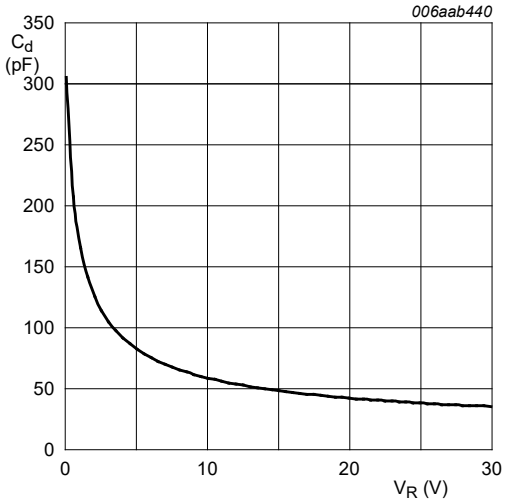

(1) $T_j$ = 150 °C
(2) $T_j$ = 125 °C
(3) $T_j$ = 85 °C
(4) $T_j$ = 25 °C
(5) $T_j$ = -40 °C

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



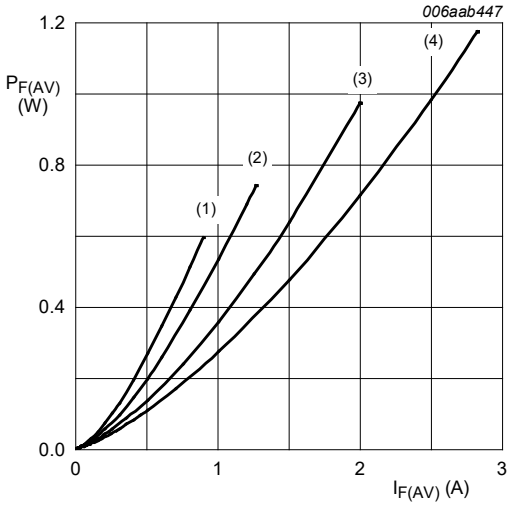

(1) $T_j$ = 125 °C
(2) $T_j$ = 85 °C
(3) $T_j$ = 25 °C
(4) $T_j$ = −40 °C

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



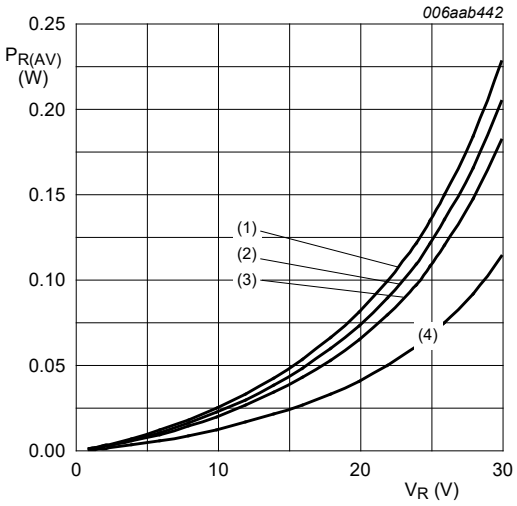

f = 1 MHz; $T_{amb}$ = 25 °C

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



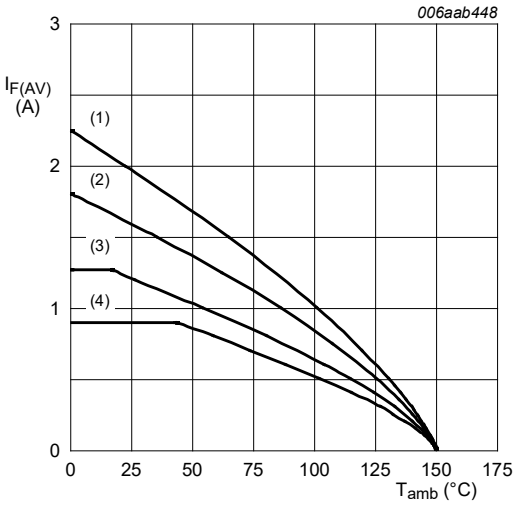

$T_j$ = 150 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 1

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



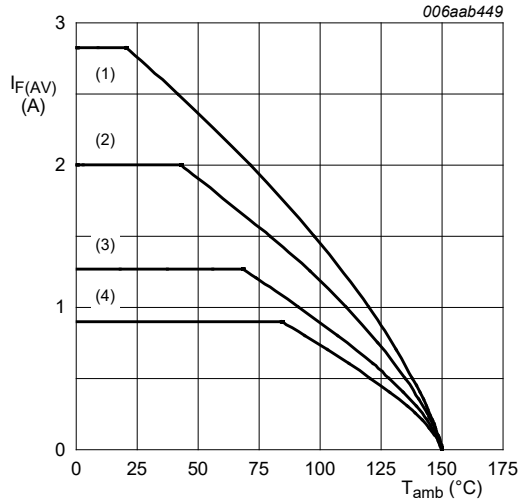

$T_j$ = 125 °C
(1) δ = 1
(2) δ = 0.9
(3) δ = 0.8
(4) δ = 0.5

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



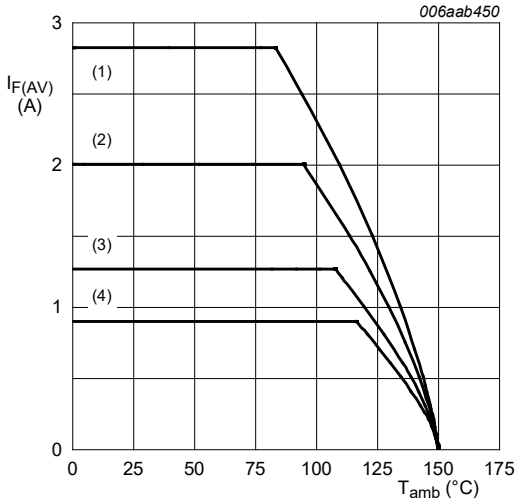

FR4 PCB, standard footprint
$T_j$ = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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



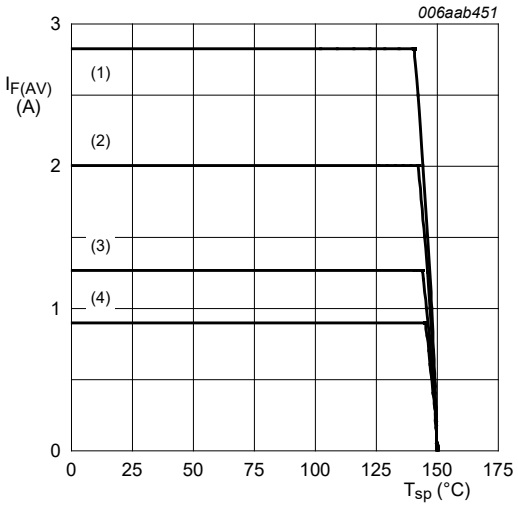

FR4 PCB, mounting pad for cathode 1 $cm^2$
$T_j$ = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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




Ceramic PCB, $Al_2O_3$, standard footprint
$T_j$ = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

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




$T_j$ = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

**Fig. 12. Average forward current as a function of solder point temperature; typical values**

## 11. Test information

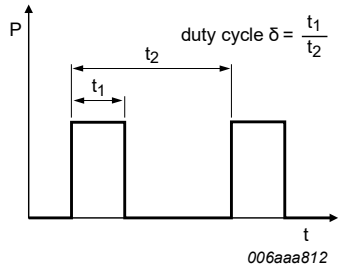



**Fig. 13. Duty cycle definition**

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

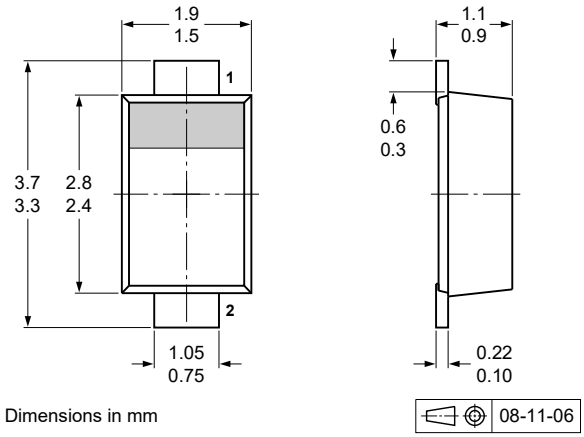
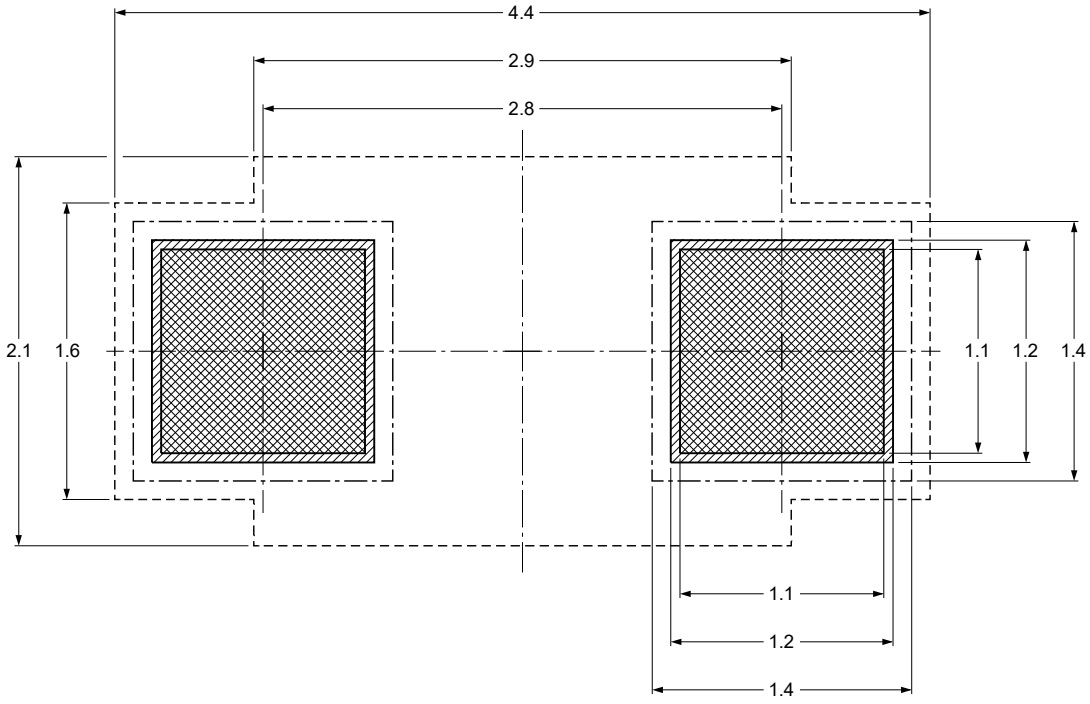



**Fig. 14. Package outline CFP3 (SOD123W)**

## 13. Soldering

**Footprint information for reflow soldering of CFP3 package** **SOD123W**




recommended stencil thickness: 0.1 mm

occupied area

solder resist

solder land

solder paste

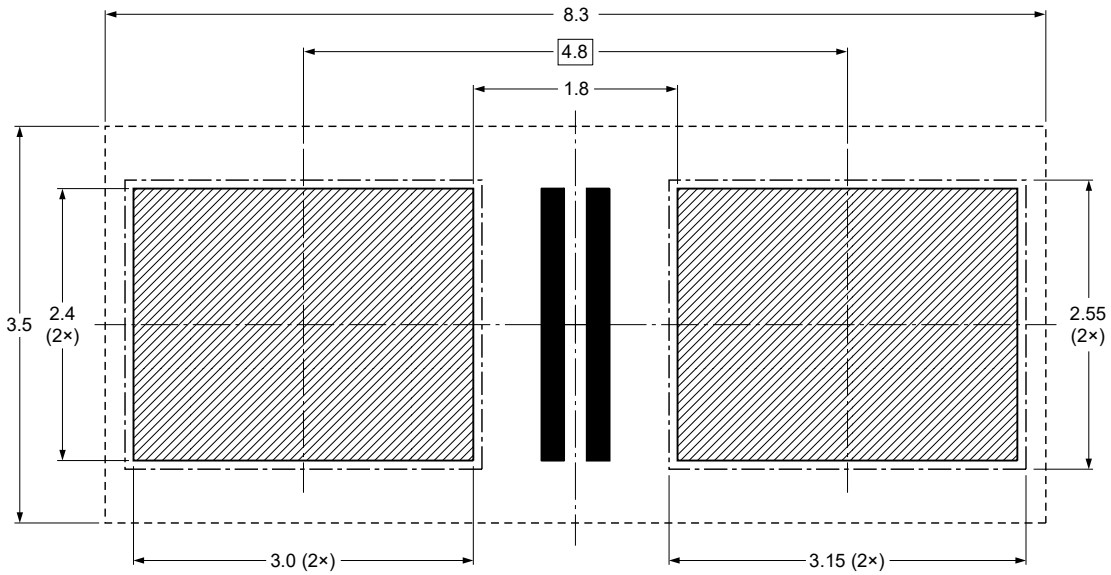
Dimensions in mm

Issue date ~~17-06-09~~ 20-02-28

*sod123w_fr*

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

**Wave soldering footprint information** **SOD123W**




occupied area

solder resist

solder lands

dummy track (solder resist and Cu free)

Dimensions in mm

Issue date ~~17-06-06~~ 17-06-07

*sod123w_fw*

**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 |
|---|---|---|---|---|
| PMEG3020BER v.3 | 20230101 | Product data sheet | - | PMEG3020BER v.2 |
| Modifications: | • Limiting values: Measurement conditions for $I_{FSM}$ changed from square wave to half-sine wave.<br>• Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). | | | |
| PMEG3020BER v.2 | 20180209 | Product data sheet | - | PMEG3020BER v.1 |
| PMEG3020BER v.1 | 20090416 | 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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**Date of release: 1 January 2023**

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