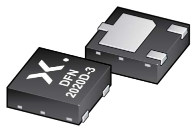


# PMEG3020CPAS

## 30 V, 2 A low VF dual MEGA Schottky barrier rectifier

20 January 2015 — Product data sheet

## 1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier in common cathode configuration with an integrated guard ring for stress protection, encapsulated in an ultra thin DFN2020D-3 (SOT1061D) leadless small Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

## 2. Features and benefits

- Average forward current $I_{F(AV)} \leq 2$ A
- Reverse voltage $V_R \leq 30$ V
- Low forward voltage $V_F \leq 440$ mV
- Low reverse current
- Reduced Printed-Circuit-Board (PCB) area requirements
- Exposed heat sink (cathode pad) for excellent thermal and electrical conductivity
- Leadless small SMD plastic package with visible and solderable side pads
- Suitable for Automatic Optical Inspection (AOI) of solder joints
- AEC-Q101 qualified

## 3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Free-wheeling application
- Reverse polarity protection
- Low power consumption application
- Battery chargers for mobile equipment
- LED backlight for mobile application

## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Per diode** | | | | | | | |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; f = 20 kHz; $T_{amb} \leq 75$ °C; square wave | [1] | - | - | 2 | A |
| | | $\delta = 0.5$; f = 20 kHz; $T_{sp} \leq 135$ °C; square wave | | - | - | 2 | A |

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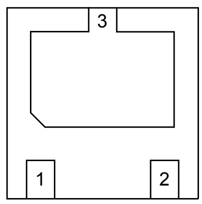
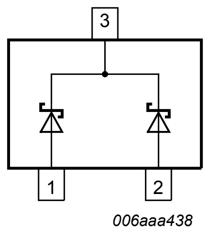
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_R$ | reverse voltage | $T_j$ = 25 °C | | - | - | 30 | V |
| **Per diode** | | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 2 A; $t_p$ ≤ 300 μs; δ ≤ 0.02; $T_j$ = 25 °C; pulsed | | - | 410 | 440 | mV |
| $I_R$ | reverse current | $V_R$ = 30 V; $t_p$ ≤ 300 μs; δ ≤ 0.02; $T_j$ = 25 °C; pulsed | | - | 485 | 2000 | μA |

[1] Device mounted on a ceramic PCB, $Al_2O_3$, standard footprint.

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | anode diode 1 | A1 |  Transparent top view **DFN2020D-3 (SOT1061D)** |  |
| 2 | anode diode 2 | A2 | | |
| 3 | common cathode | K | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PMEG3020CPAS | DFN2020D-3 | DFN2020D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 2 x 2 x 0.65 mm | SOT1061D |

## 7. Marking

**Table 4. Marking codes**

| Type number | Marking code |
|---|---|
| PMEG3020CPAS | CT |

## 8. Limiting values

**Table 5. Limiting values**

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| **Per diode** | | | | | | |
| $V_R$ | reverse voltage | $T_j$ = 25 °C | | - | 30 | V |
| $I_F$ | forward current | $T_{sp}$ ≤ 130 °C; δ = 1 | | - | 2.8 | A |
| $I_{F(AV)}$ | average forward current | δ = 0.5; f = 20 kHz; $T_{amb}$ ≤ 75 °C; square wave | [1] | - | 2 | A |
| | | δ = 0.5; f = 20 kHz; $T_{sp}$ ≤ 135 °C; square wave | | - | 2 | A |
| $I_{FRM}$ | repetitive peak forward current | $t_p$ ≤ 1 ms; δ ≤ 0.25 | | - | 7 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 8 ms; $T_{j(init)}$ = 25 °C; square wave | | - | 9 | A |
| **Per device; one diode loaded** | | | | | | |
| $P_{tot}$ | total power dissipation | $T_{amb}$ ≤ 25 °C | [2] | - | 500 | mW |
| | | | [3] | - | 960 | mW |
| | | | [1] | - | 1800 | mW |
| $T_j$ | junction temperature | | | - | 150 | °C |
| $T_{amb}$ | ambient temperature | | | -55 | 150 | °C |
| $T_{stg}$ | storage temperature | | | -65 | 150 | °C |

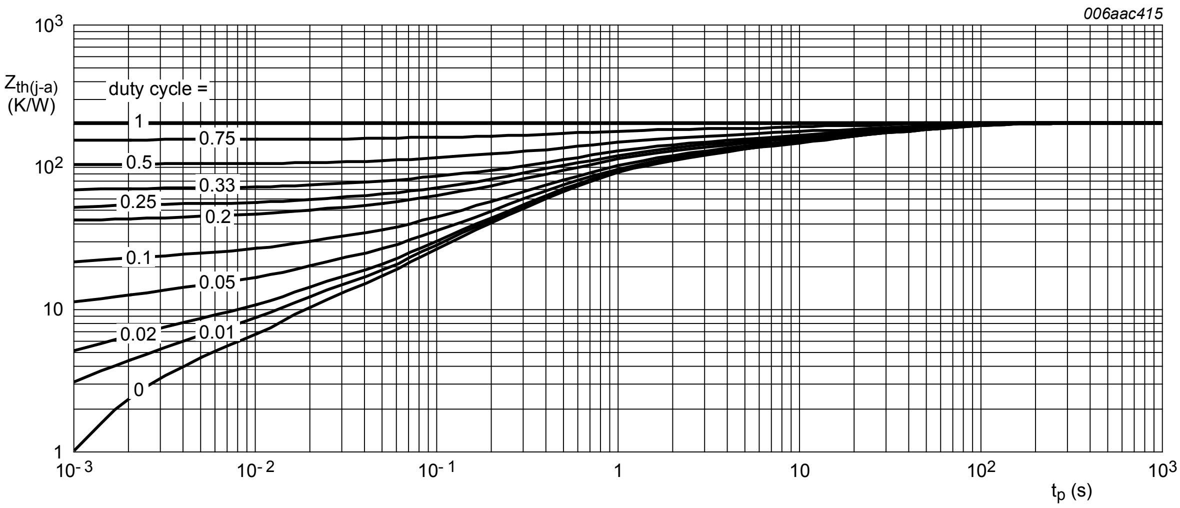
[1] Device mounted on a ceramic PCB, $Al_2O_3$, standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 $cm^2$.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

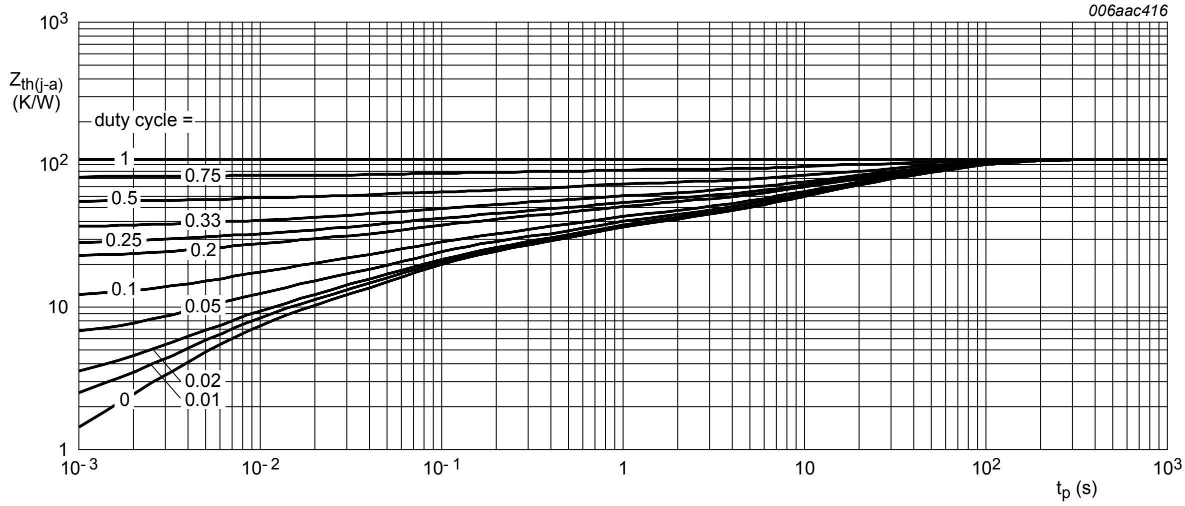
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Per device; one diode loaded** | | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1][2] | - | - | 250 | K/W |
| | | | [1][3] | - | - | 130 | K/W |
| | | | [1][4] | - | - | 70 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [5] | - | - | 12 | 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 $cm^2$.
[4] Device mounted on a ceramic PCB, $Al_2O_3$, standard footprint.
[5] Soldering point of cathode tab.



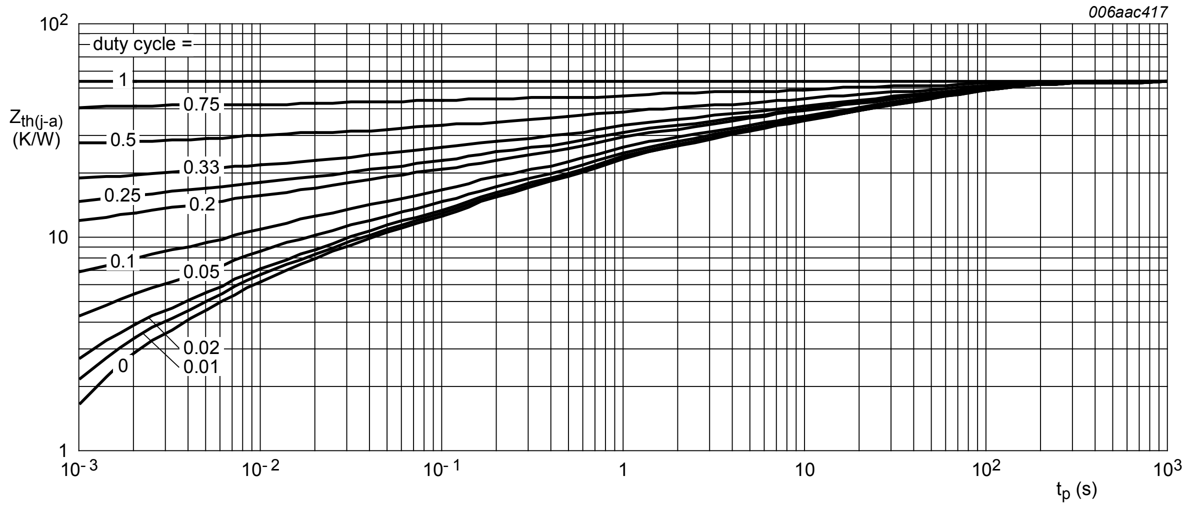

FR4 PCB, standard footprint

**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**



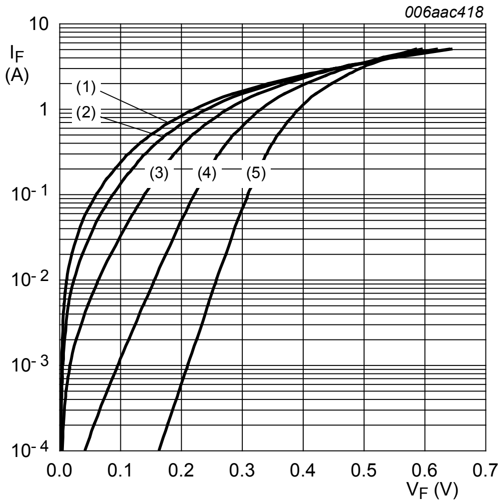

Ceramic PCB, $Al_2O_3$, standard footprint

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

## 10. Characteristics

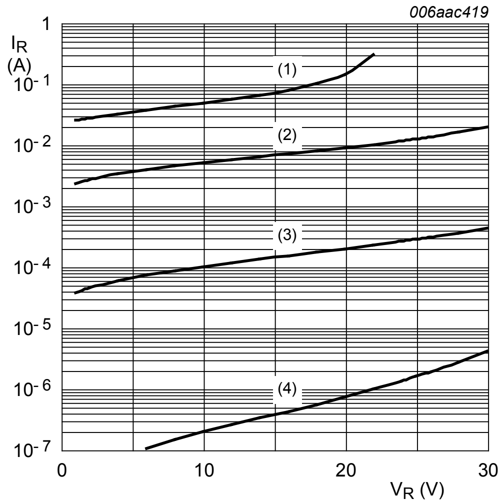
**Table 7. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Per diode** | | | | | | | |
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R$ = 5 mA; $T_j$ = 25 °C; $t_p$ = 300 μs; δ = 0.02; pulsed | | 30 | - | - | V |
| $V_F$ | forward voltage | $I_F$ = 100 mA; $t_p$ ≤ 300 μs; δ ≤ 0.02; $T_j$ = 25 °C; pulsed | | - | 220 | - | mV |
| | | $I_F$ = 1 A; $t_p$ ≤ 300 μs; δ ≤ 0.02; $T_j$ = 25 °C; pulsed | | - | 335 | 370 | mV |
| | | $I_F$ = 2 A; $t_p$ ≤ 300 μs; δ ≤ 0.02; $T_j$ = 25 °C; pulsed | | - | 410 | 440 | mV |
| $I_R$ | reverse current | $V_R$ = 10 V; $t_p$ ≤ 300 μs; δ ≤ 0.02; $T_j$ = 25 °C; pulsed | | - | 120 | - | μA |
| | | $V_R$ = 30 V; $t_p$ ≤ 300 μs; δ ≤ 0.02; $T_j$ = 25 °C; pulsed | | - | 485 | 2000 | 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 |
| $t_{rr}$ | reverse recovery time | $I_F$ = 0.5 A; $I_R$ = 1 A; $I_{R(meas)}$ = 0.25 A; $T_j$ = 25 °C | | - | 4 | - | ns |



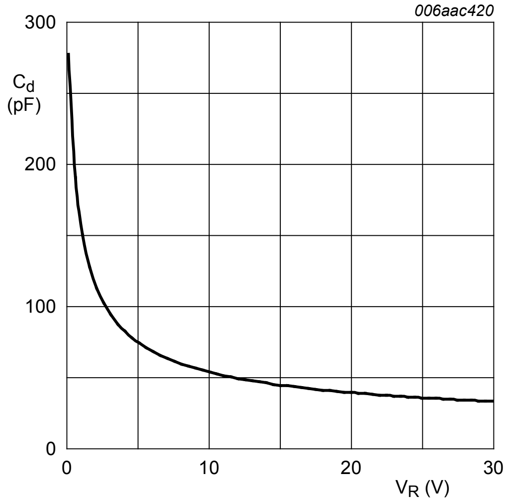

(1) $T_j$ = 150 °C
(2) $T_j$ = 125 °C
(3) $T_j$ = 85 °C
(4) $T_j$ = 25 °C
(5) $T_j$ = −40 °C

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



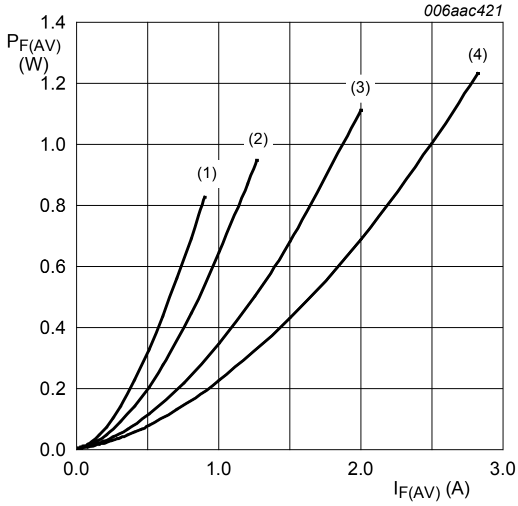

(1) $T_j$ = 125 °C
(2) $T_j$ = 85 °C
(3) $T_j$ = 25 °C
(4) $T_j$ = −40 °C

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



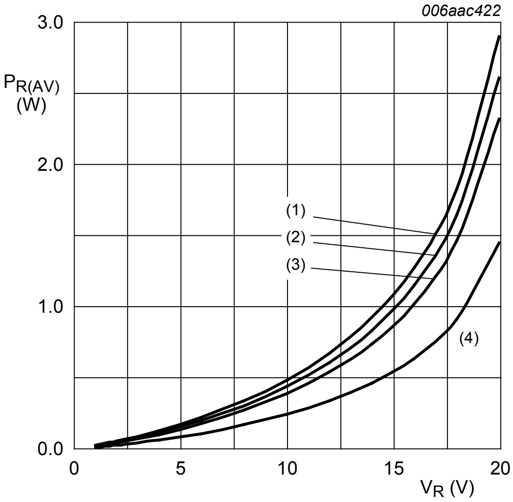

f = 1 MHz; $T_{amb}$ = 25 °C

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



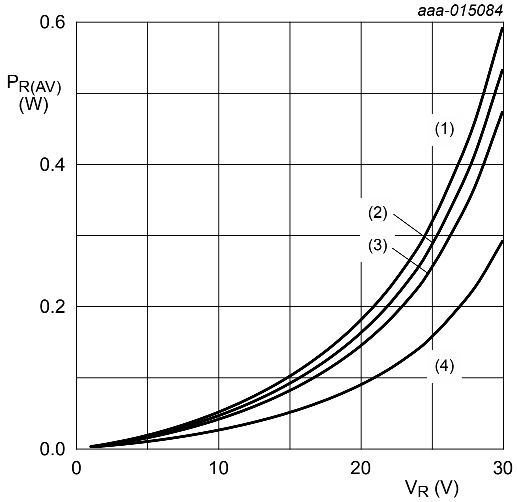

$T_j$ = 150 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 1

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



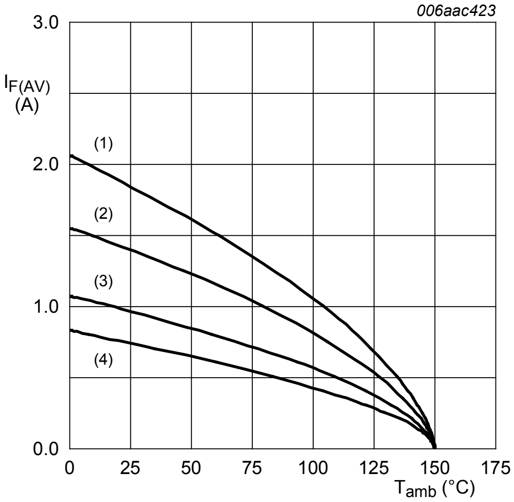

$T_j$ = 125 °C
(1) δ = 1
(2) δ = 0.9
(3) δ = 0.8
(4) δ = 0.5

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




$T_j$ = 85 °C
(1) δ = 1
(2) δ = 0.9
(3) δ = 0.8
(4) δ = 0.5

**Fig. 9.** **Average reverse power dissipation as a function of reverse voltage; typical values**




FR4 PCB, standard footprint

$T_j$ = 150 °C

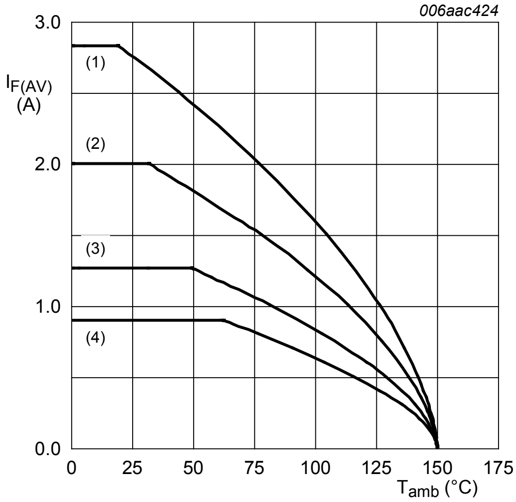
(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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




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

$T_j$ = 150 °C

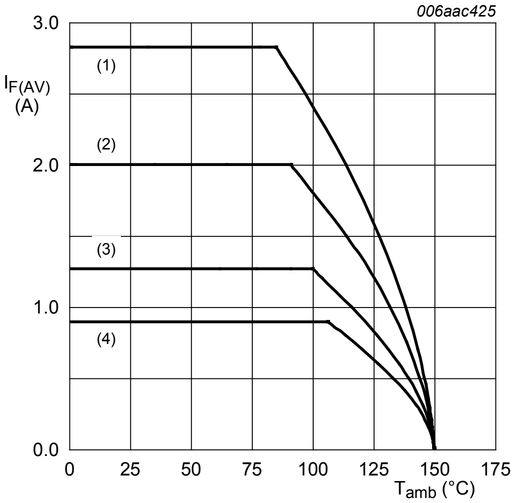
(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

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




Ceramic PCB, $Al_2O_3$, standard footprint

$T_j$ = 150 °C

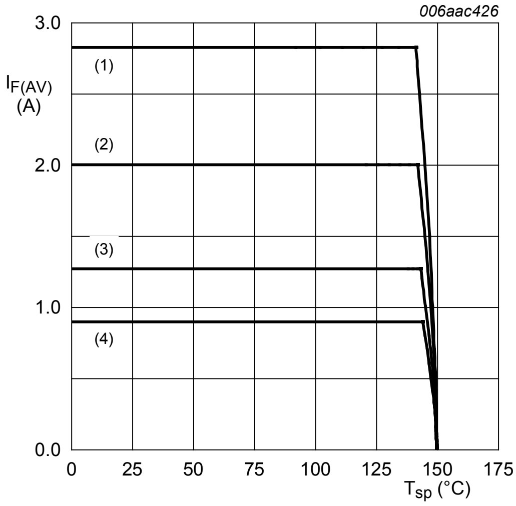
(1) δ = 1; DC

(2) δ = 0.5; f = 20 kHz

(3) δ = 0.2; f = 20 kHz

(4) δ = 0.1; f = 20 kHz

**Fig. 12. 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. 13. Average forward current as a function of solder point temperature; typical values**

# 11. Test information

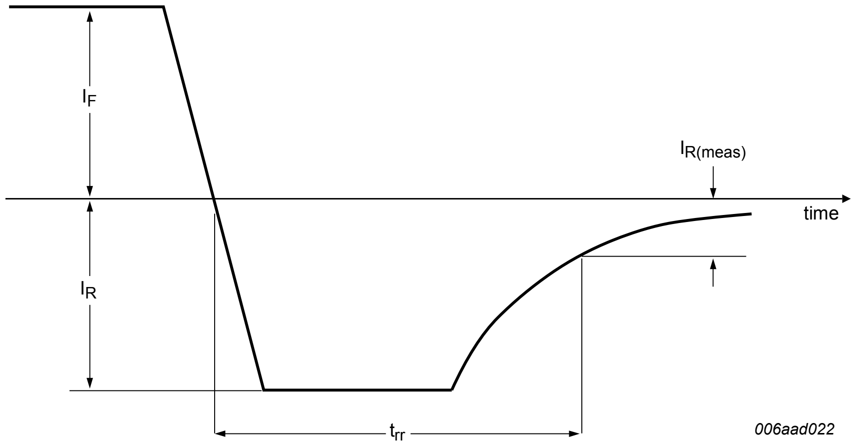



**Fig. 14. Reverse recovery definition**

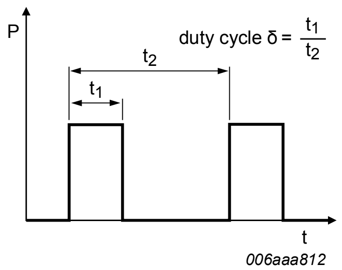



**Fig. 15. Duty cycle definition**

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

## 11.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

## 12. Package outline

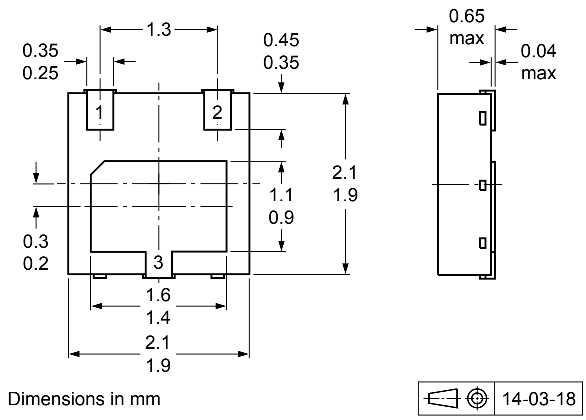



**Fig. 16. Package outline DFN2020D-3 (SOT1061D)**

# 13. Soldering

**Footprint information for reflow soldering of DFN2020D-3 package** **SOT1061D**

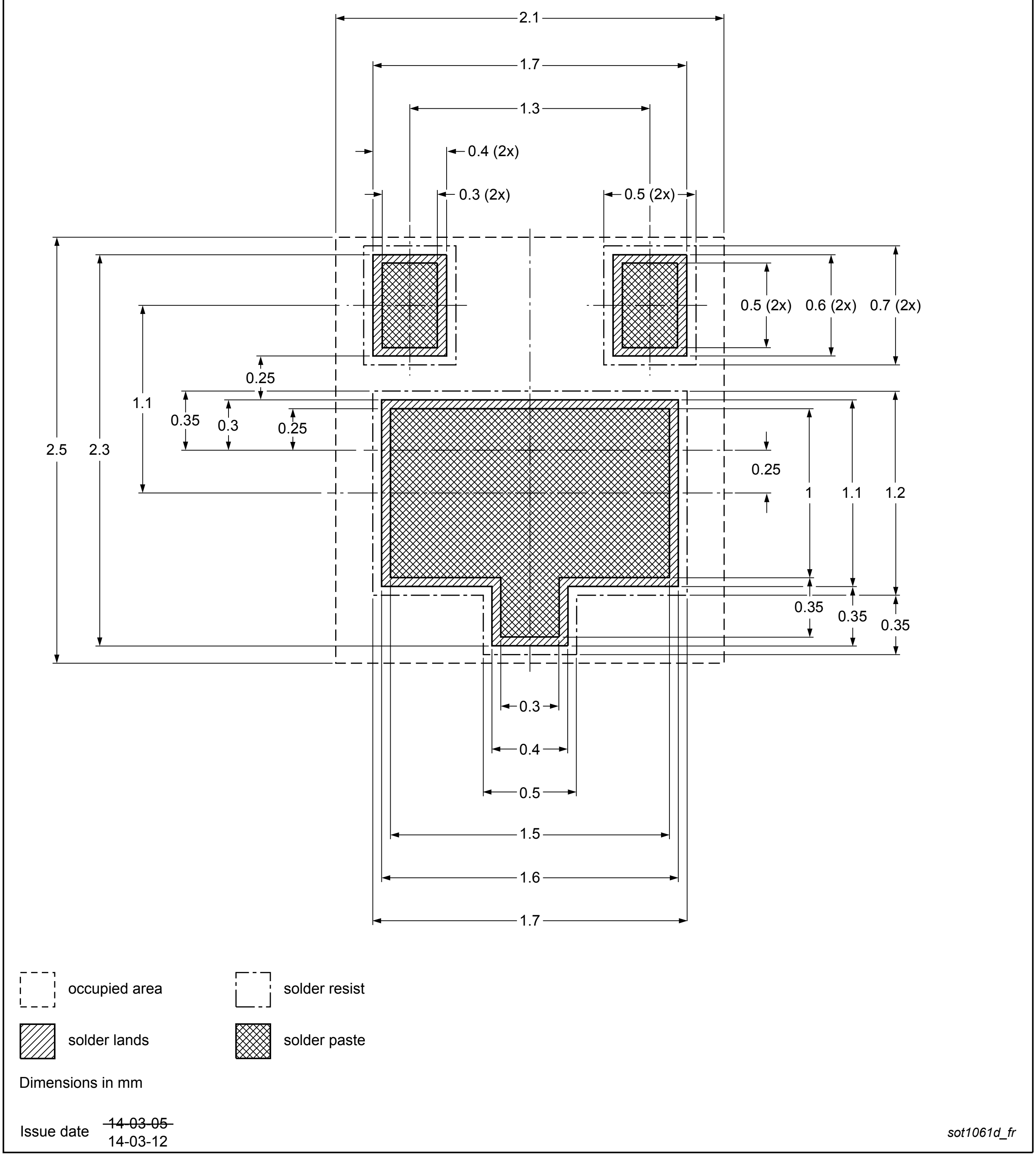



Fig. 17. Reflow soldering footprint for DFN2020D-3 (SOT1061D)

## 14. Revision history

**Table 8. Revision history**

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PMEG3020CPAS v.2 | 20150120 | Product data sheet | - | PMEG3020CPAS v.1 |
| Modifications: | • Changed data sheet status | | | |
| PMEG3020CPAS v.1 | 20141210 | Preliminary data sheet | - | - |

# 15. Legal information

## 15.1 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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nexperia.com.

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## 16. Contents