



PMEG2020EPAS-Q

20 V, 2 A low VF Schottky barrier rectifier

9 July 2024

Product data sheet

1. General description

Planar Schottky barrier rectifier 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 $V_R \leq 20$ V
- Low forward voltage $V_F \leq 420$ 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
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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

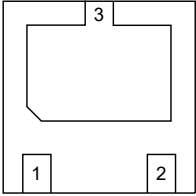
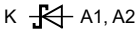
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|-------------------------|--|-----|-----|------|---------|
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20$ kHz; square wave; $T_{amb} \leq 80$ °C | - | - | 2 | A |
| | | $\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 140$ °C | - | - | 2 | A |
| V_R | reverse voltage | $T_j = 25$ °C | - | - | 20 | V |
| V_F | forward voltage | $I_F = 2$ A; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C; pulsed | - | 385 | 420 | mV |
| I_R | reverse current | $V_R = 20$ V; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C; pulsed | - | 335 | 1900 | μ A |

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3 , standard footprint.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|--|
| 1 | A1 | anode 1 |  <p>Transparent top view DFN2020D-3 (SOT1061D)</p> |  <p>006aab624</p> |
| 2 | A2 | anode 2 | | |
| 3 | K | cathode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|--------------------------------|------------|--|--------------------------|
| | Name | Description | Version |
| PMEG2020EPAS-Q | DFN2020D-3 | plastic, leadless thermal enhanced ultra thin small outline package with side-wettable flanks (SWF); no leads; 3 terminals; 1.3 mm pitch; 2 mm x 2 mm x 0.65 mm body | SOT1061D |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|----------------|--------------|
| PMEG2020EPAS-Q | CN |

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 | | - | 20 | V |
| I _F | forward current | δ = 1; T _{sp} ≤ 135 °C | | - | 2.8 | A |
| I _{F(AV)} | average forward current | δ = 0.5; f = 20 kHz; square wave; T _{amb} ≤ 80 °C | [1] | - | 2 | A |
| | | δ = 0.5; f = 20 kHz; square wave; T _{sp} ≤ 140 °C | | - | 2 | A |
| I _{FRM} | repetitive peak forward current | t _p ≤ 1 ms; δ ≤ 0.25 | [2] | - | 7 | A |
| I _{FSM} | non-repetitive peak forward current | t _p = 8 ms; square wave; T _{j(init)} = 25 °C | [2] | - | 17 | A |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | [3] | - | 500 | mW |
| | | | [4] | - | 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 |

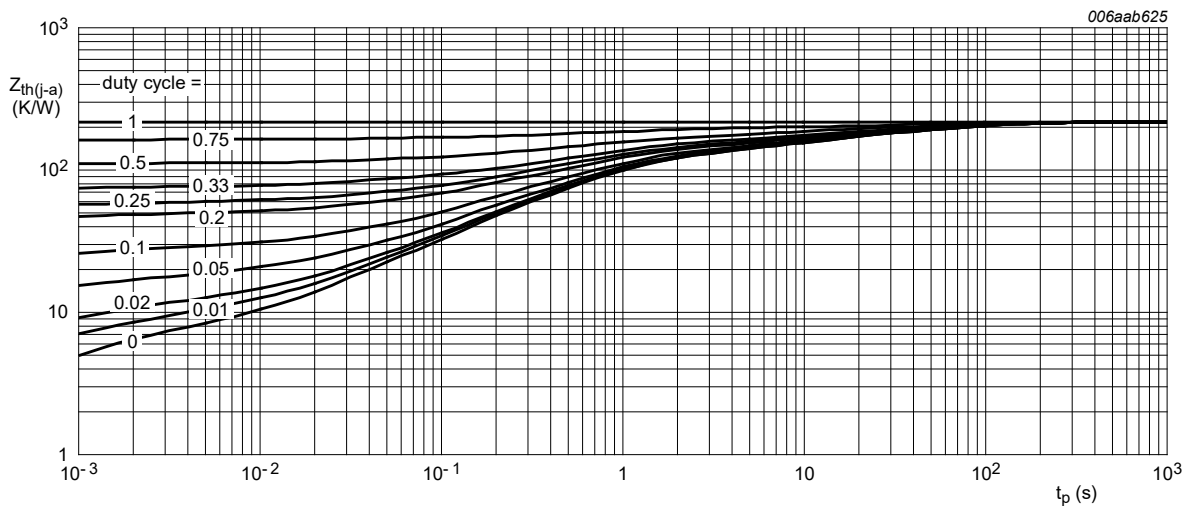
- [1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al₂O₃, standard footprint.
[2] Both anode pins connected.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

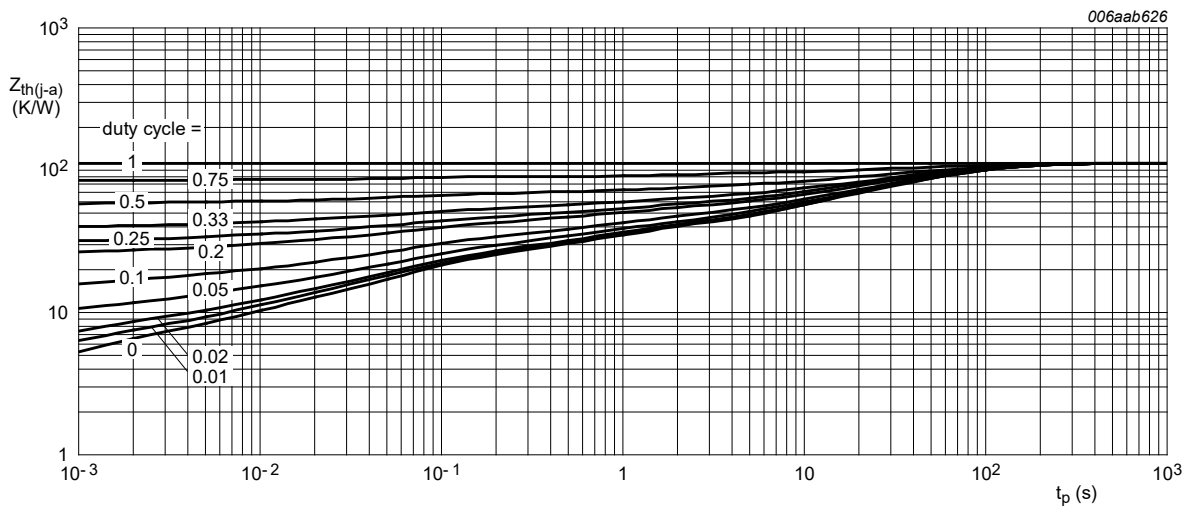
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-----------------------|--|-------------|---------|-----|-----|-----|------|
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | [1] [2] | - | - | 250 | K/W |
| | | | [1] [3] | - | - | 130 | K/W |
| | | | [1] [4] | - | - | 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 cm².
[4] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
[5] Soldering point of cathode tab.



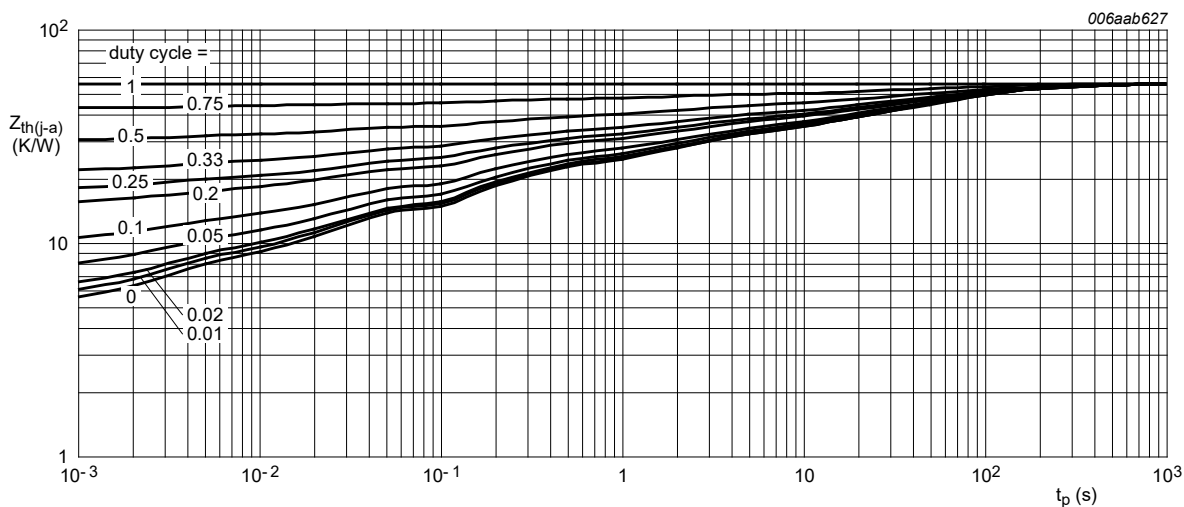
FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

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



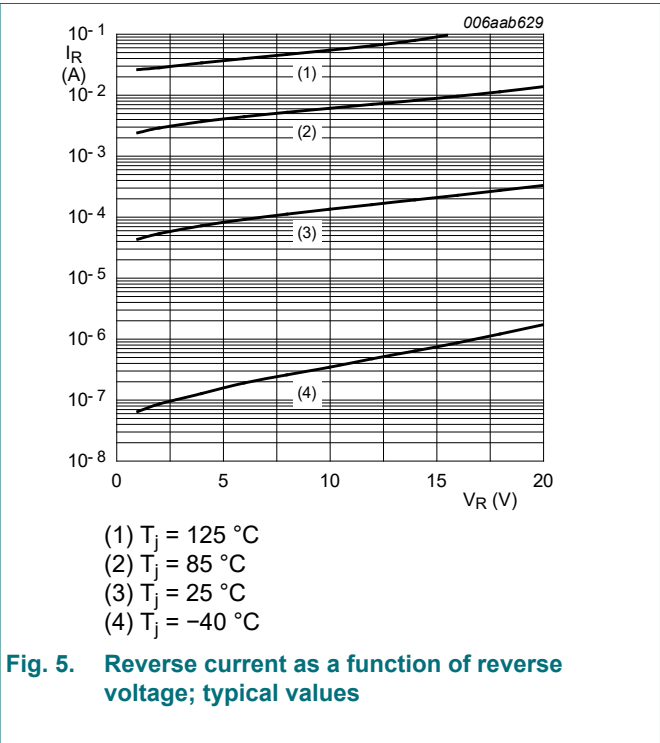
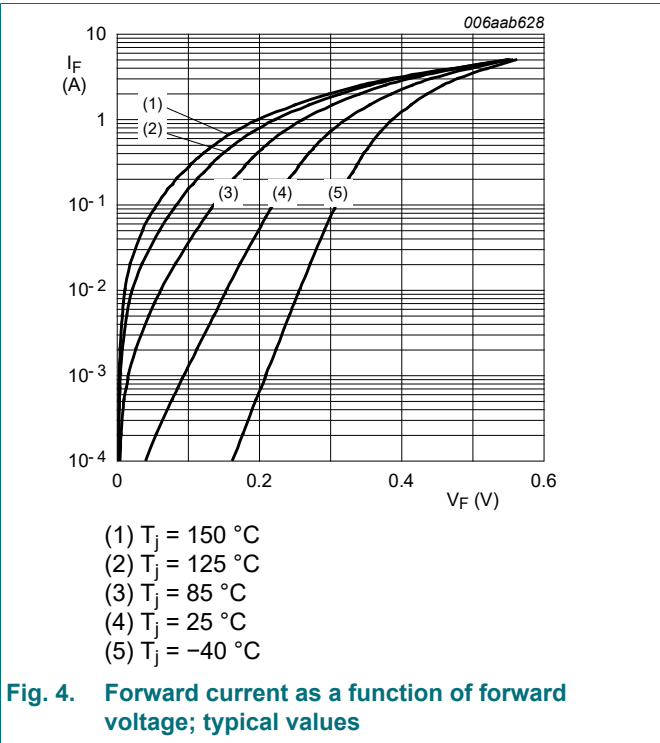
Ceramic PCB, Al₂O₃, standard footprint

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 |
|-------------|---------------------------|--|-----|-----|------|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R = 10\text{ mA}$; $t_p = 300\text{ }\mu\text{s}$; pulsed; $\delta = 0.02$; $T_j = 25\text{ }^\circ\text{C}$ | 20 | - | - | V |
| V_F | forward voltage | $I_F = 0.5\text{ A}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_j = 25\text{ }^\circ\text{C}$; pulsed | - | 280 | - | mV |
| | | $I_F = 2\text{ A}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_j = 25\text{ }^\circ\text{C}$; pulsed | - | 385 | 420 | mV |
| I_R | reverse current | $V_R = 10\text{ V}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_j = 25\text{ }^\circ\text{C}$; pulsed | - | 135 | - | μA |
| | | $V_R = 20\text{ V}$; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$; $T_j = 25\text{ }^\circ\text{C}$; pulsed | - | 335 | 1900 | μA |
| C_d | diode capacitance | $V_R = 1\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^\circ\text{C}$ | - | 175 | - | pF |
| | | $V_R = 10\text{ V}$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^\circ\text{C}$ | - | 65 | - | pF |
| t_{rr} | reverse recovery time | $I_F = 10\text{ mA}$; $I_R = 10\text{ mA}$; $I_{R(\text{meas})} = 1\text{ mA}$; $R_L = 100\text{ }\Omega$; $T_j = 25\text{ }^\circ\text{C}$ | - | 50 | - | ns |



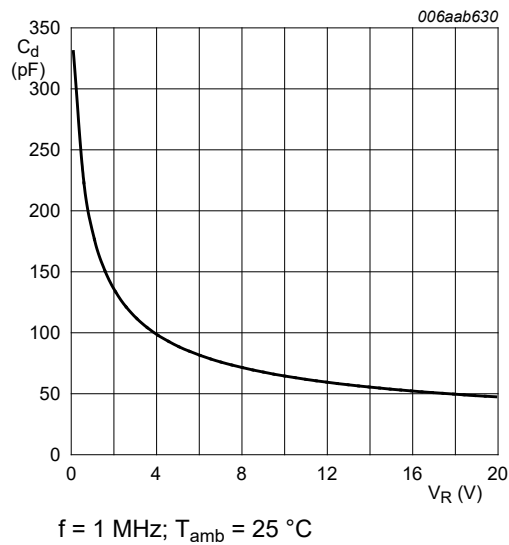


Fig. 6. Diode capacitance as a function of reverse voltage; typical values

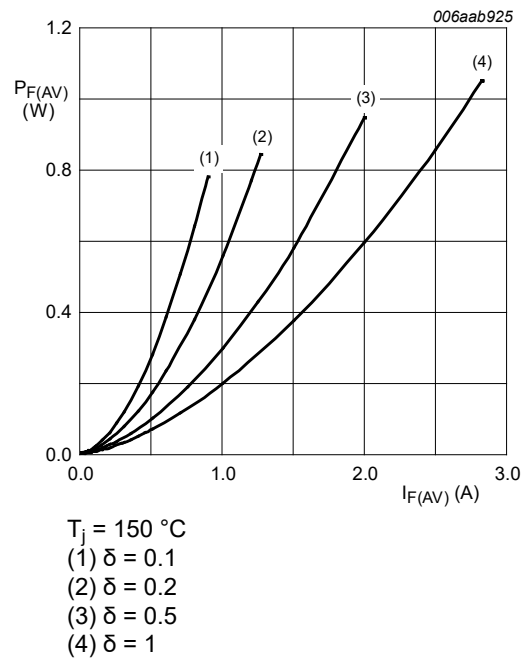


Fig. 7. Average forward power dissipation as a function of average forward current; typical values

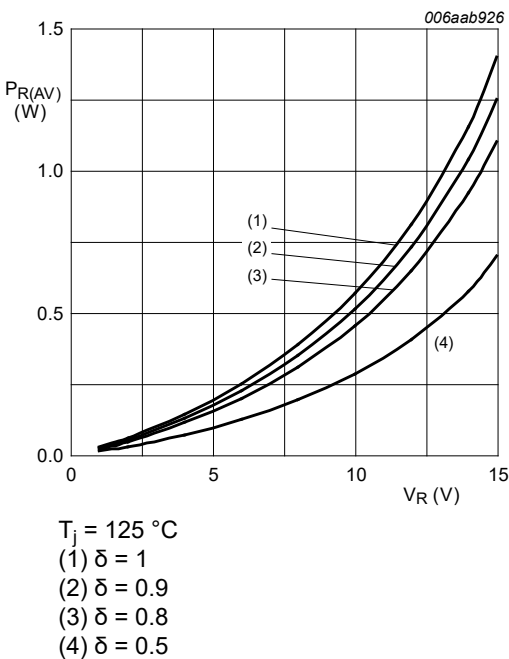


Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values

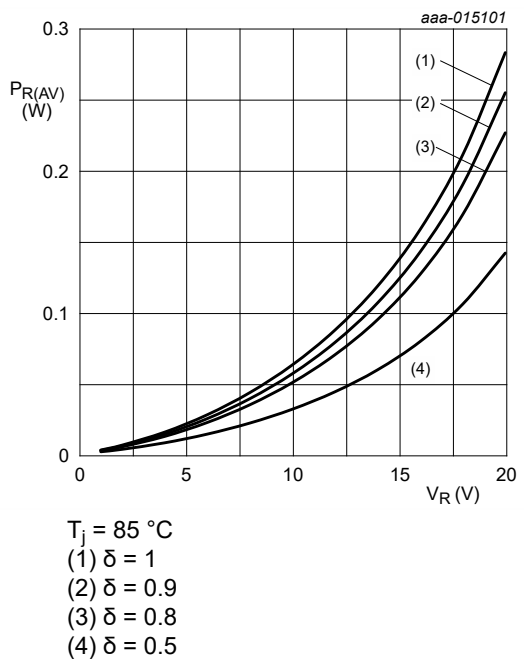
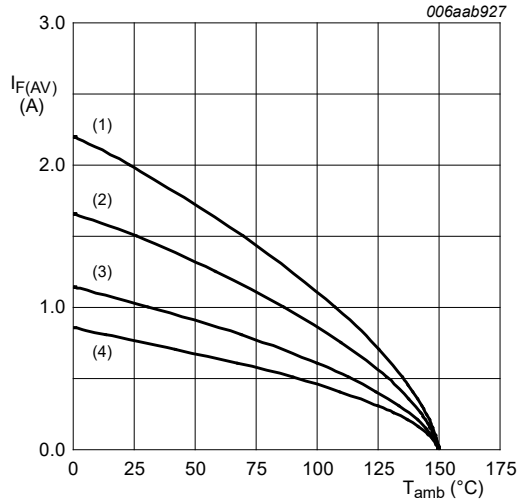


Fig. 9. Average reverse power dissipation as a function of reverse voltage; typical values



FR4 PCB, standard footprint

$T_j = 150\text{ °C}$

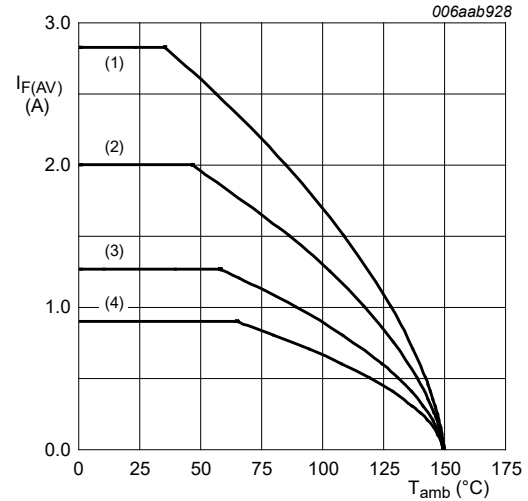
(1) $\delta = 1$; DC

(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



FR4 PCB, mounting pad for cathode 1 cm^2

$T_j = 150\text{ °C}$

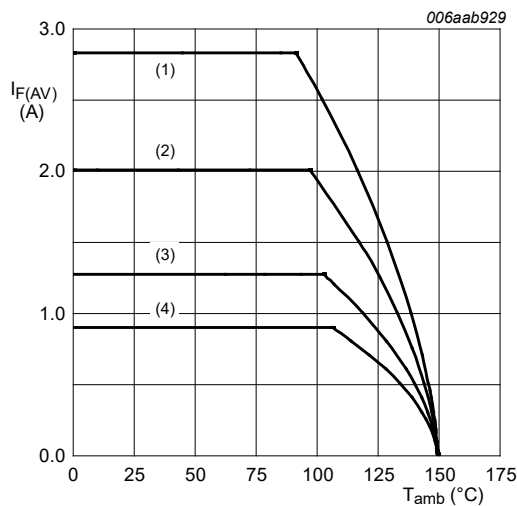
(1) $\delta = 1$; DC

(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



Ceramic PCB, Al_2O_3 , standard footprint

$T_j = 150\text{ °C}$

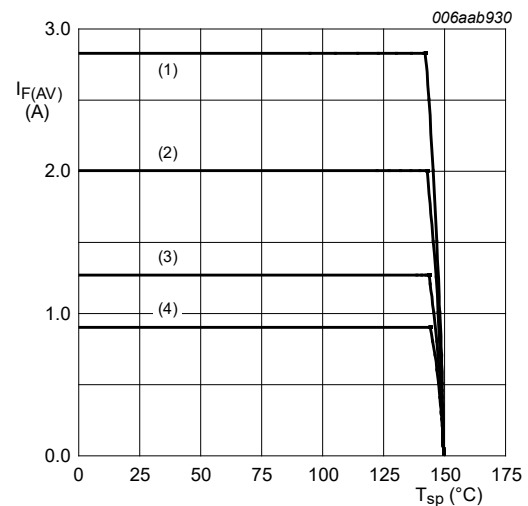
(1) $\delta = 1$; DC

(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. 12. Average forward current as a function of ambient temperature; typical values



$T_j = 150\text{ °C}$

(1) $\delta = 1$; 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. 13. Average forward current as a function of solder point temperature; typical values

11. Test information

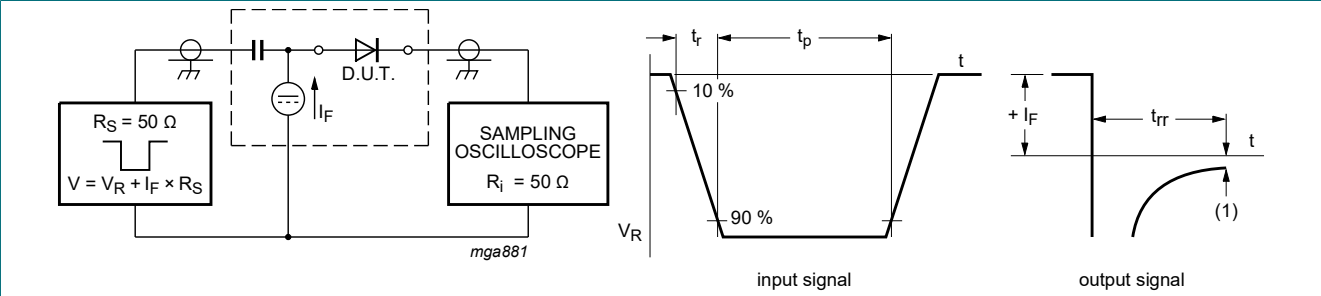


Fig. 14. Reverse recovery time: test circuit and waveforms

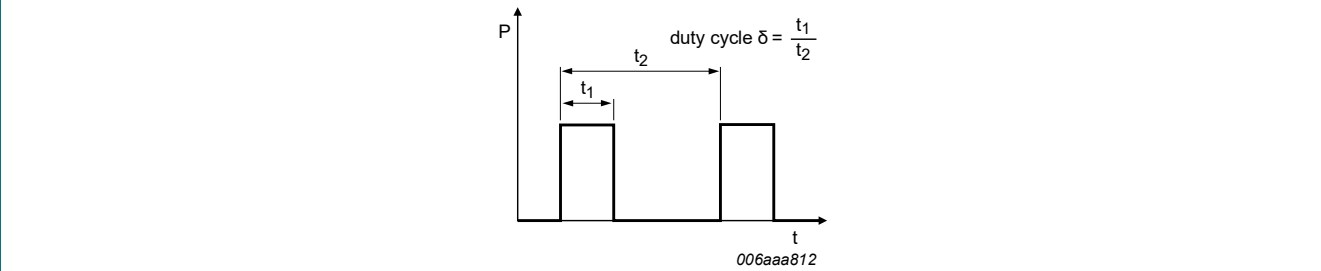


Fig. 15. Duty cycle definition

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.

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

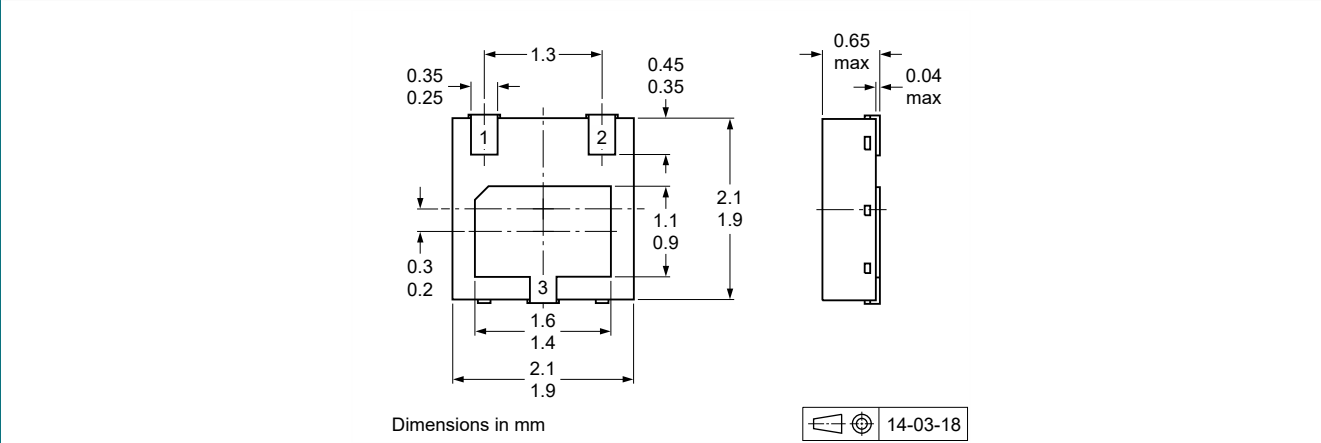


Fig. 16. Package outline DFN2020D-3 (SOT1061D)

13. Soldering

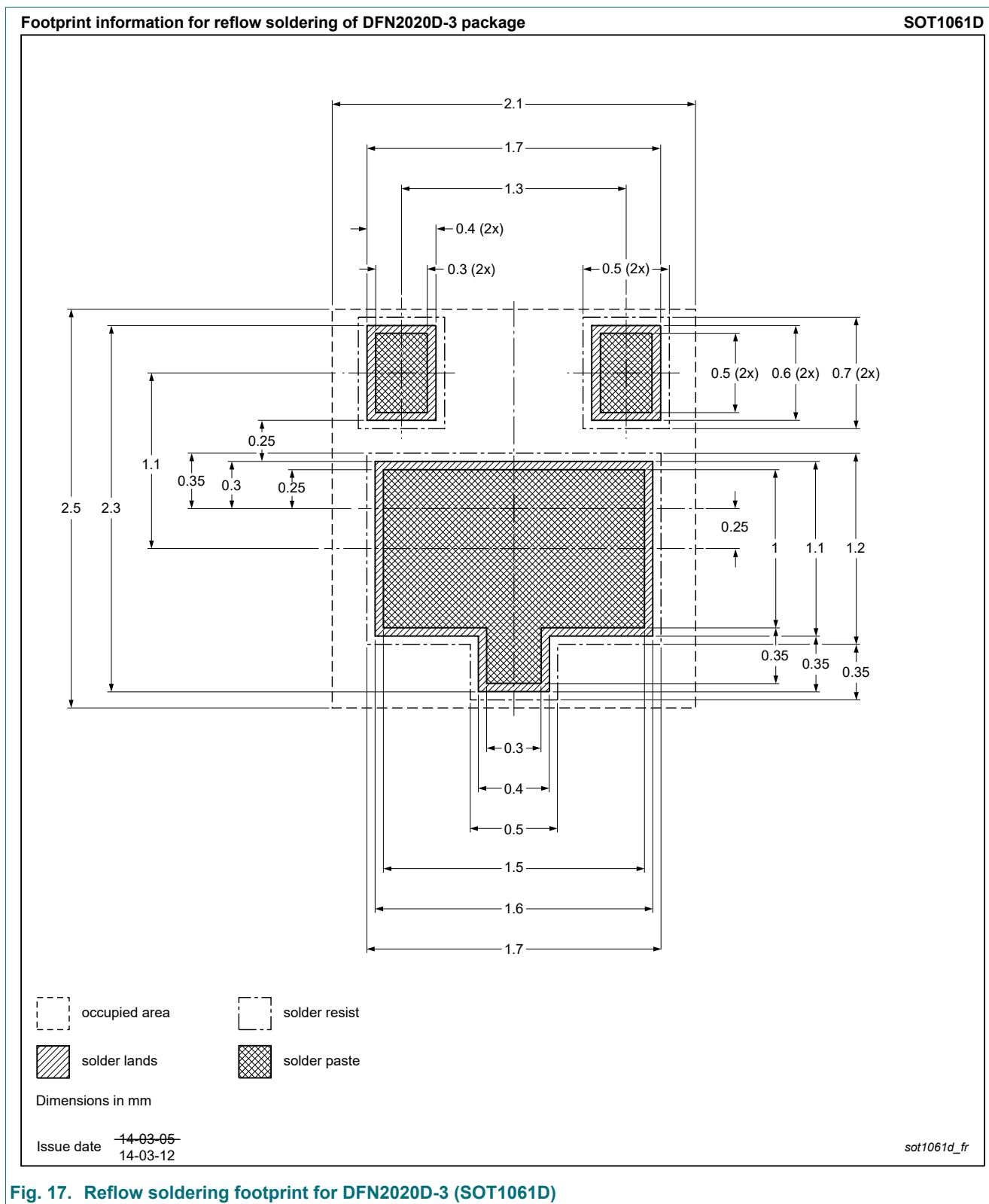


Fig. 17. Reflow soldering footprint for DFN2020D-3 (SOT1061D)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|--------------------|--------------|--------------------|---------------|------------|
| PMEG2020EPAS-Q v.1 | 20240709 | 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. |

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