



PMEG4020EPK-Q

40 V, 2 A low VF Schottky barrier rectifier

16 November 2023

Product data sheet

1. General description

Planar Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a leadless ultra small SOD1608 (DFN1608D-2) 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: $V_R \leq 40$ V
- Low forward voltage $V_F \leq 660$ mV
- Low reverse current
- Solderable side pads
- Package height typ. 0.37 mm
- Ultra small and leadless SMD plastic package
- 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
- LED backlight for mobile application
- Low power consumption applications
- Ultra high-speed switching
- Reverse polarity protection

4. Quick reference data

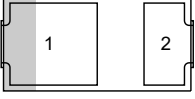

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|-------------------------|---|-----|-----|-----|---------|
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 130$ °C | - | - | 2 | A |
| | | $\delta = 0.5$; $f = 20$ kHz; square wave; $T_{amb} \leq 25$ °C [1] | - | - | 2 | A |
| V_R | reverse voltage | $T_j = 25$ °C | - | - | 40 | V |
| V_F | forward voltage | $I_F = 2$ A; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C | - | 585 | 660 | mV |
| I_R | reverse current | $V_R = 10$ V; $T_j = 25$ °C | - | 1 | 5 | μ A |
| t_{rr} | reverse recovery time | $I_F = 0.5$ A; $I_R = 0.5$ A; $I_{R(meas)} = 0.1$ A; $T_j = 25$ °C | - | 4 | - | ns |

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al₂O₃, standard footprint.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|--|
| 1 | K | cathode[1] |  <p>Transparent top view DFN1608D-2 (SOD1608)</p> |  <p><i>sym001</i></p> |
| 2 | A | anode | | |

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------------------------|------------|---|-------------------------|
| | Name | Description | Version |
| PMEG4020EPK-Q | DFN1608D-2 | plastic, leadless ultra small plastic package with side-wettable flanks (SWF); 2 terminals; 0.94 mm pitch; 1.6 mm x 0.8 mm x 0.37 mm body | SOD1608 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|---------------|--------------|
| PMEG4020EPK-Q | 0001 0000 |

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 | forward current | $T_{sp} \leq 125\text{ °C}$ | | - | 2.83 | A |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20\text{ kHz}$; square wave; $T_{sp} \leq 130\text{ °C}$ | | - | 2 | A |
| | | $\delta = 0.5$; $f = 20\text{ kHz}$; square wave; $T_{amb} \leq 25\text{ °C}$ | [1] | - | 2 | A |
| I_{FRM} | repetitive peak forward current | $t_p \leq 1\text{ ms}$; $\delta \leq 0.25$ | | - | 4 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 8\text{ ms}$; square wave; $T_{j(init)} = 25\text{ °C}$ | | - | 5 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [2] | - | 415 | mW |
| | | | [3] | - | 895 | mW |
| | | | [1] | - | 1565 | 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), 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] | - | - | 300 | K/W |
| | | | [1] [3] | - | - | 140 | K/W |
| | | | [1] [4] | - | - | 80 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [5] | - | - | 20 | 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.

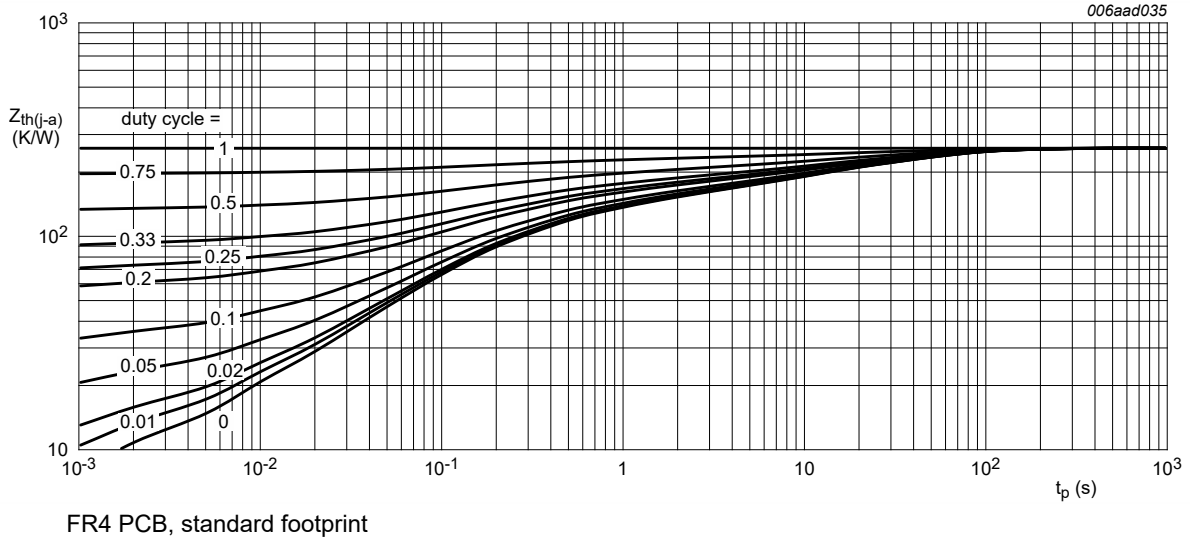


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

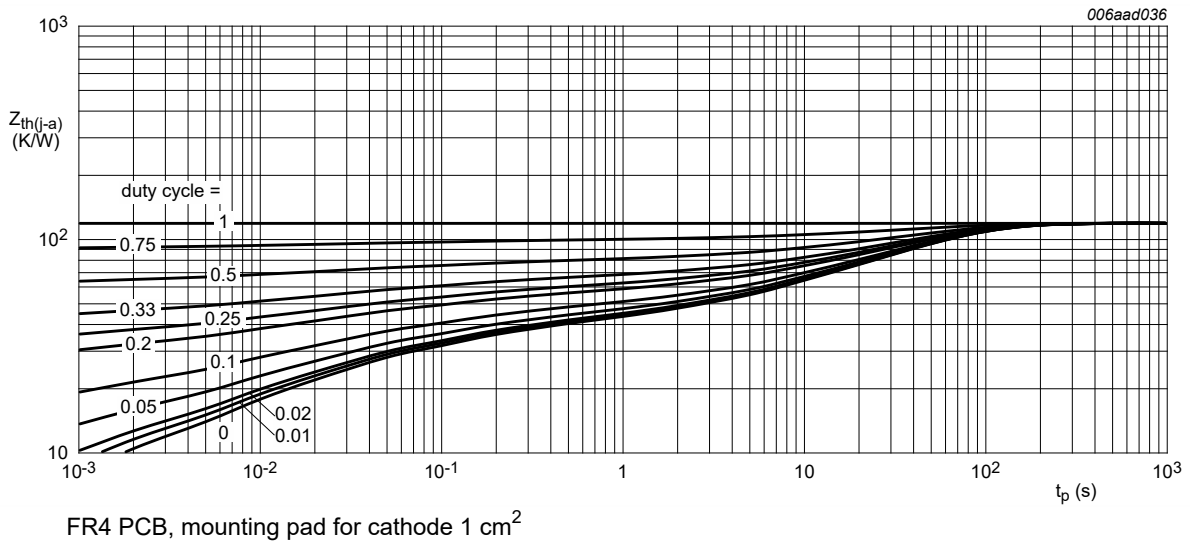


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

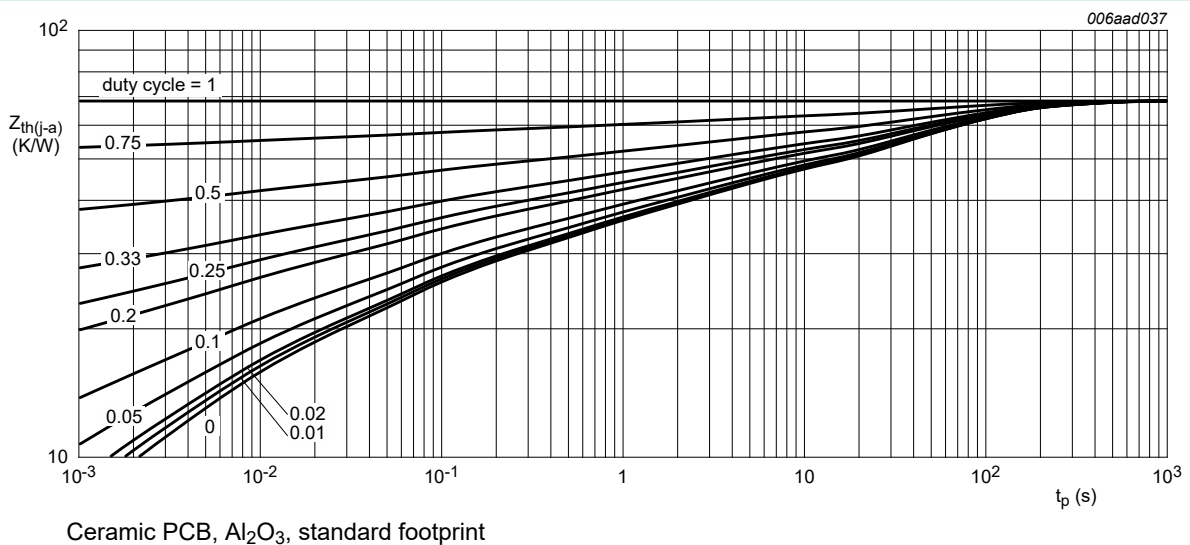
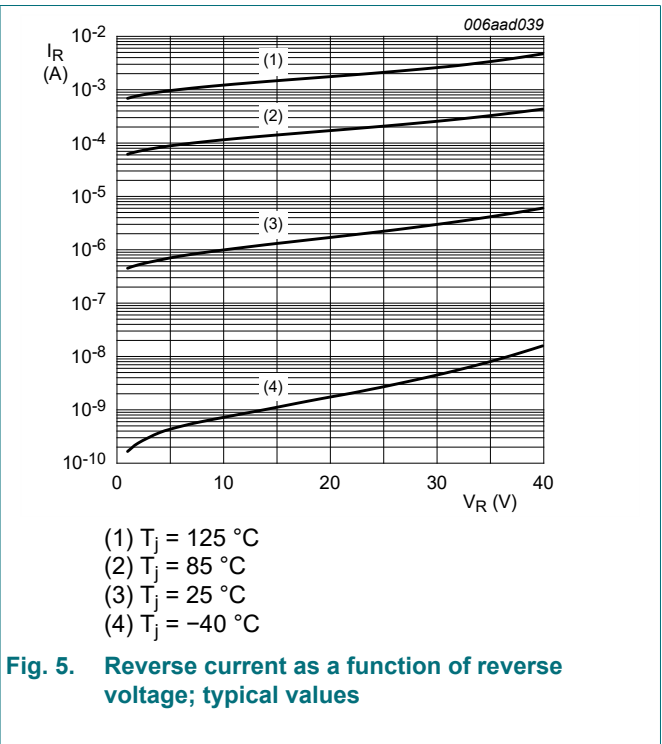
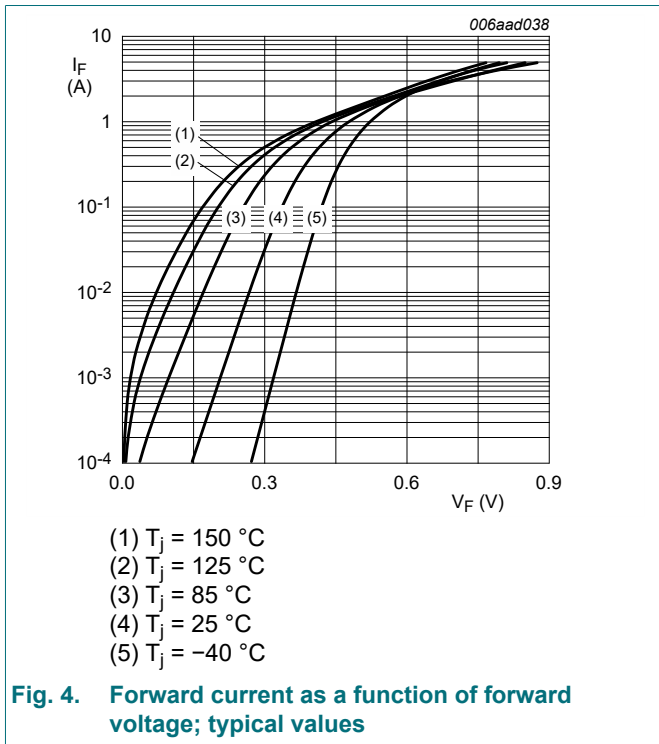


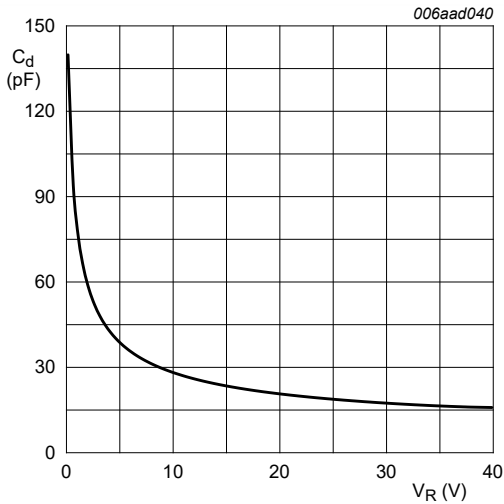
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

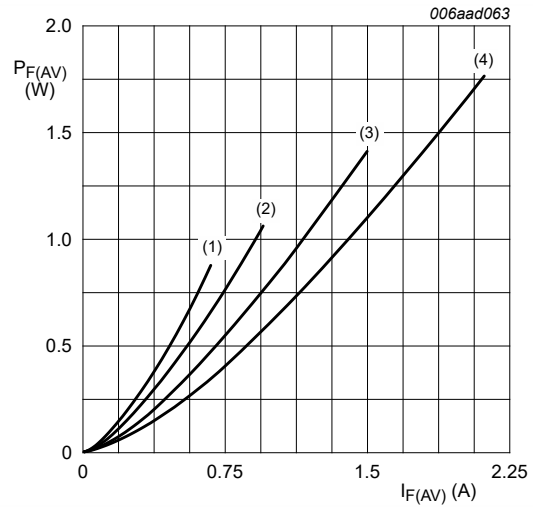
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------------------|--|-----|-----|-----|------|
| V _F | forward voltage | I _F = 100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C | - | 330 | 380 | mV |
| | | I _F = 500 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C | - | 415 | 480 | mV |
| | | I _F = 1 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C | - | 490 | 550 | mV |
| | | I _F = 2 A; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _j = 25 °C | - | 585 | 660 | mV |
| I _R | reverse current | V _R = 10 V; T _j = 25 °C | - | 1 | 5 | μA |
| | | V _R = 40 V; T _j = 25 °C | - | 8 | 30 | μA |
| C _d | diode capacitance | V _R = 1 V; f = 1 MHz; T _j = 25 °C | - | 75 | 90 | pF |
| | | V _R = 10 V; f = 1 MHz; T _j = 25 °C | - | 30 | 40 | pF |
| t _{rr} | reverse recovery time | I _F = 0.5 A; I _R = 0.5 A; I _{R(meas)} = 0.1 A; T _j = 25 °C | - | 4 | - | ns |
| V _{FRM} | peak forward recovery voltage | I _F = 0.5 A; dI _F /dt = 20 A/μs; T _j = 25 °C | - | 440 | - | mV |





$f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$

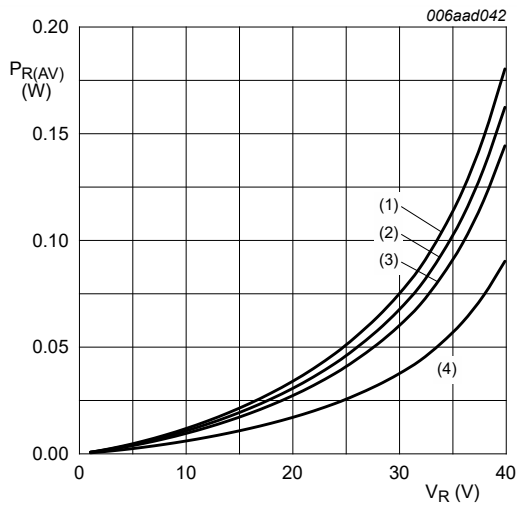
Fig. 6. Diode capacitance as a function of reverse voltage; typical values



$T_j = 150 \text{ }^\circ\text{C}$

- (1) $\delta = 0.1$
- (2) $\delta = 0.2$
- (3) $\delta = 0.5$
- (4) $\delta = 1$

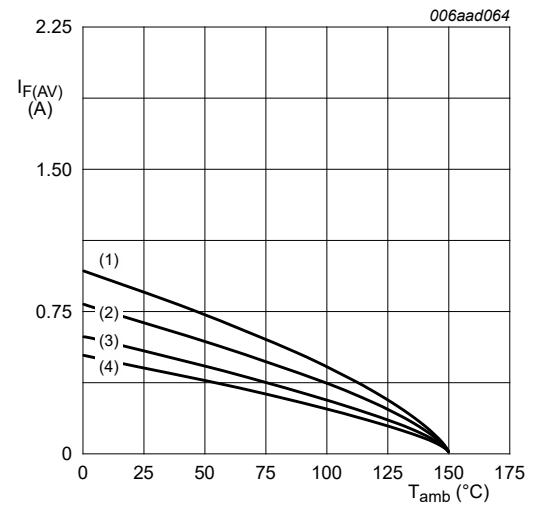
Fig. 7. Average forward power dissipation as a function of average forward current; typical values



$T_j = 125 \text{ }^\circ\text{C}$

- (1) $\delta = 1$
- (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

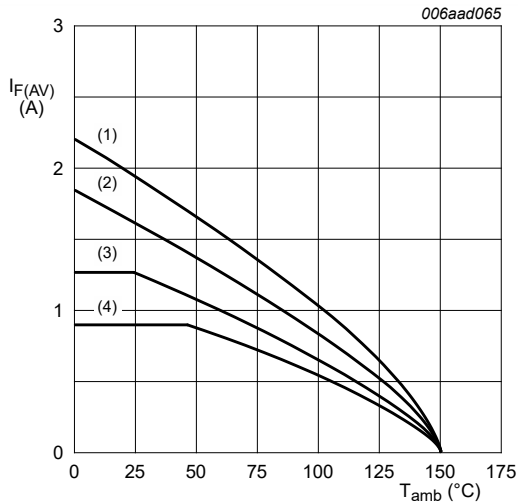


FR4 PCB, standard footprint

$T_j = 150 \text{ }^\circ\text{C}$

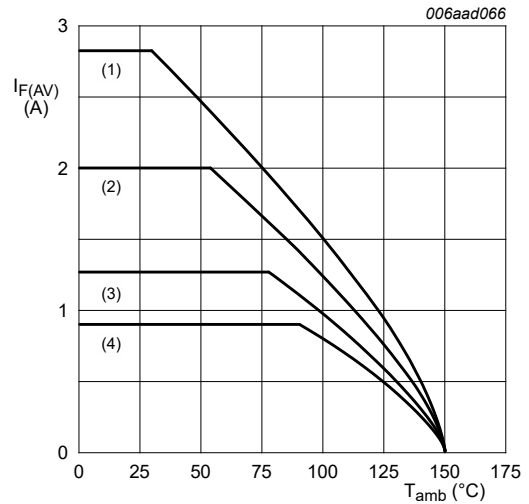
- (1) $\delta = 1$ (DC)
- (2) $\delta = 0.5; f = 20 \text{ kHz}$
- (3) $\delta = 0.2; f = 20 \text{ kHz}$
- (4) $\delta = 0.1; f = 20 \text{ kHz}$

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



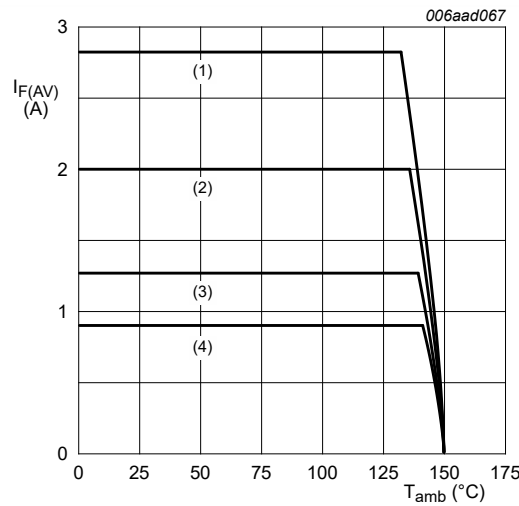
FR4 PCB, mounting pad for cathode 1 cm²
 $T_j = 150\text{ °C}$
 (1) $\delta = 1$ (DC)
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



Ceramic PCB, Al₂O₃, 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. 11. 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. 12. Average forward current as a function of solder point temperature; typical values

11. Test information

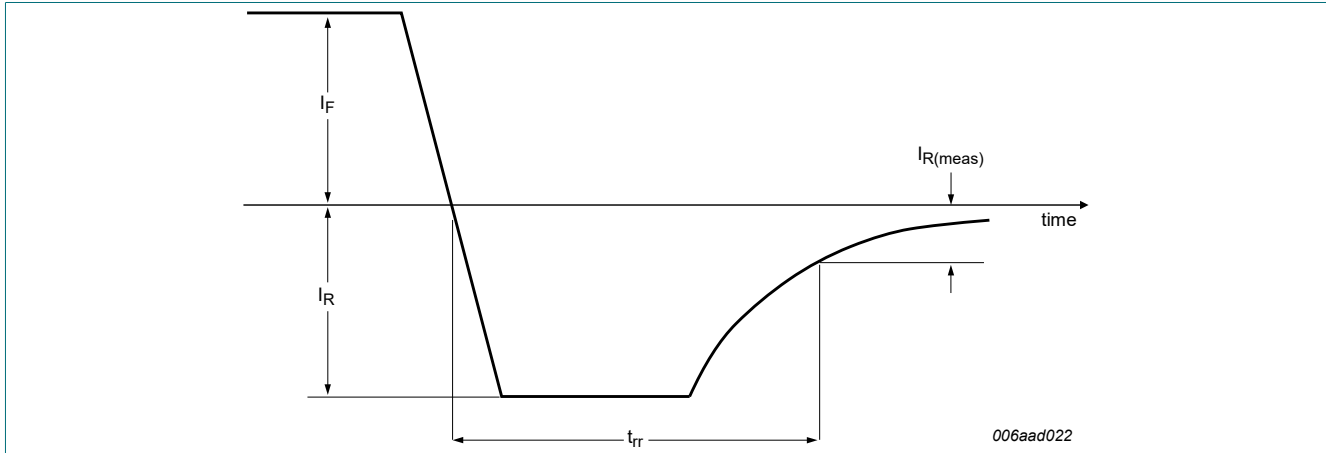


Fig. 13. Reverse recovery definition

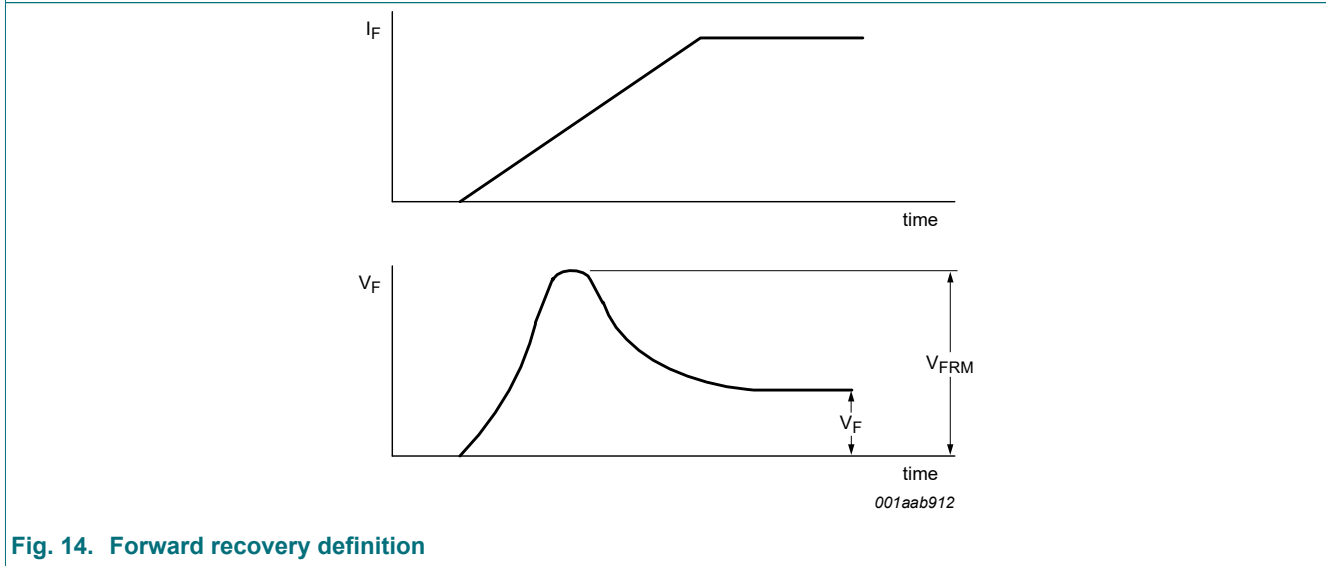


Fig. 14. Forward recovery definition

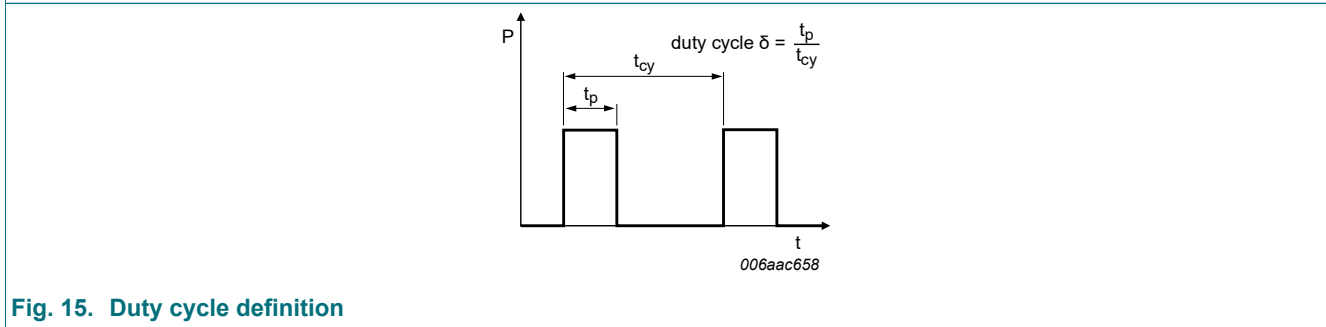


Fig. 15. Duty cycle definition

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

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

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

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

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

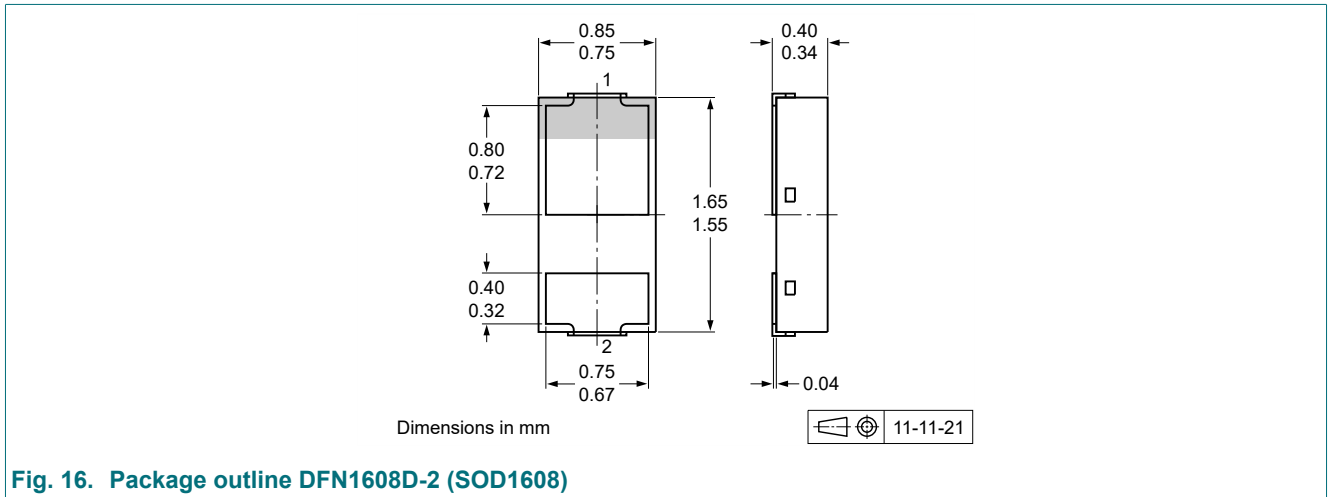


Fig. 16. Package outline DFN1608D-2 (SOD1608)

13. Soldering

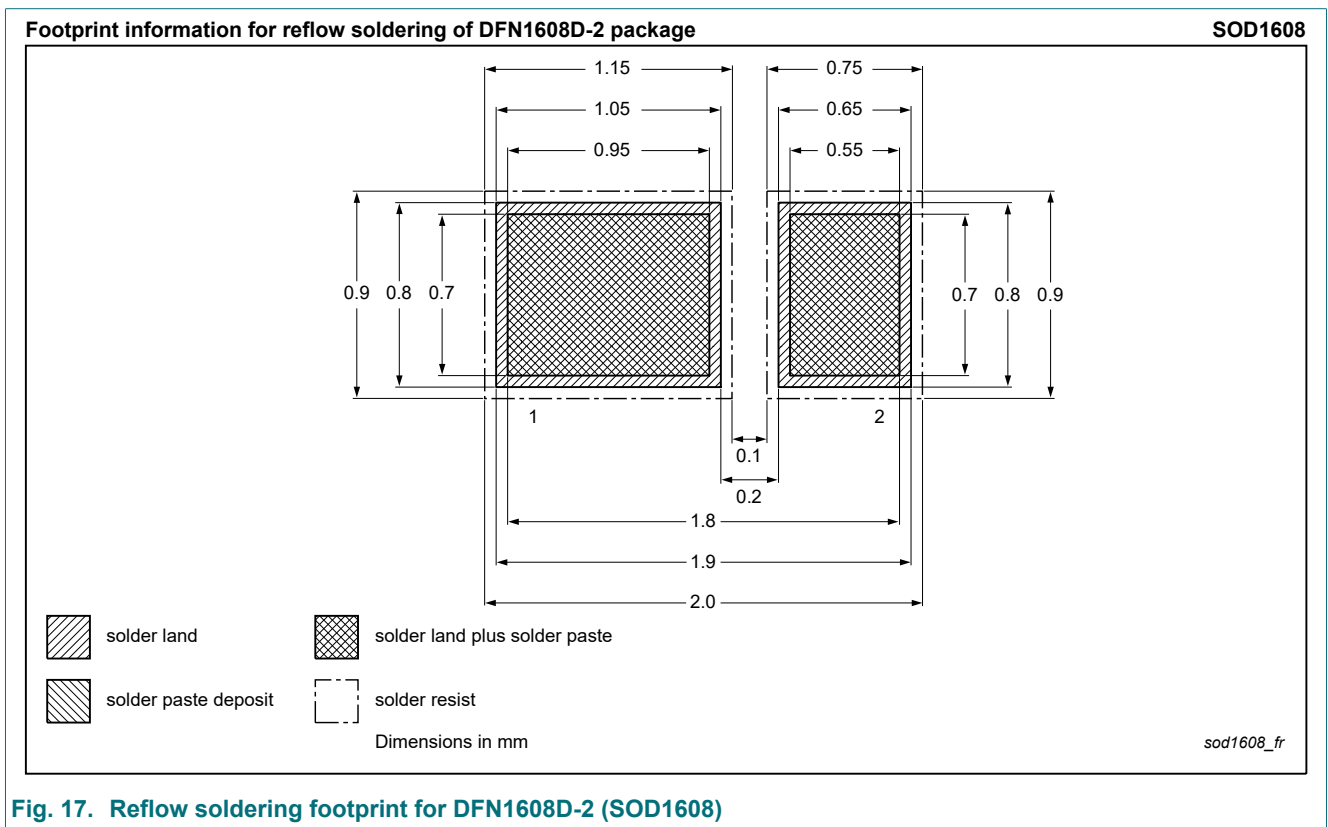


Fig. 17. Reflow soldering footprint for DFN1608D-2 (SOD1608)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PMEG4020EPK-Q v.1 | 20231116 | 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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