



PMEG60T20ELXD-Q

60 V, 2 A Trench Schottky barrier rectifier

1 April 2022

Product data sheet

1. General description

Trench Schottky barrier rectifier encapsulated in a CFP2-HP (SOD323HP) power flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low forward voltage
- Low Q_{rr} and low I_{RM}
- Low leakage current
- High power capability due to clip-bonding technology
- Power flat lead plastic package with exposed heatsink for optimal thermal connection
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- High efficiency DC-to-DC conversion
- Automotive LED lighting
- Switch mode power supply
- Freewheeling applications
- Reverse polarity protection
- OR-ing

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; $T_{sp} \leq 166$ °C | - | - | 2 | A |
| V_R | reverse voltage | $T_j = 25$ °C | - | - | 60 | V |
| V_F | forward voltage | $I_F = 2$ A; pulsed; $T_j = 25$ °C | [1] | 635 | 700 | mV |
| I_R | reverse current | $V_R = 60$ V; pulsed; $T_j = 25$ °C | [1] | 0.1 | 0.47 | μ A |
| | | $V_R = 60$ V; pulsed; $T_j = 125$ °C | [1] | 0.15 | 0.55 | mA |

[1] Very short pulse, in order to maintain a stable junction temperature.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|---|
| 1 | K | cathode |  <p>Transparent top view CFP2-HP (SOD323HP)</p> |  <p>sym001</p> |
| 2 | A | anode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------------------------|---------|---|--------------------------|
| | Name | Description | Version |
| PMEG60T20ELXD-Q | CFP2-HP | SOD323HP: plastic surface-mounted package with solderable lead ends; 2.2 mm x 1.3 mm x 0.68 mm body | SOD323HP |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-----------------|--------------|
| PMEG60T20ELXD-Q | 2M |

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC60134).

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|-------------|-------------------------------------|--|-----|-----|------|------|
| V_R | reverse voltage | $T_j = 25\text{ °C}$ | | - | 60 | V |
| I_F | forward current | $\delta = 1; T_{sp} \leq 164\text{ °C}$ | | - | 2.8 | A |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5; f = 20\text{ kHz}$; square wave; $T_{sp} \leq 166\text{ °C}$ | | - | 2 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 8.3\text{ ms}$; half sine wave; $T_{j(\text{init})} = 25\text{ °C}$ | | - | 35 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [1] | - | 0.65 | W |
| | | | [2] | - | 1.2 | W |
| T_j | junction temperature | | | - | 175 | °C |
| T_{amb} | ambient temperature | | | -55 | 175 | °C |
| T_{stg} | storage temperature | | | -65 | 175 | °C |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] 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] | - | - | 230 | K/W |
| | | | [1] [3] | - | - | 125 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [4] | - | - | 6 | 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] Soldering point of cathode tab.

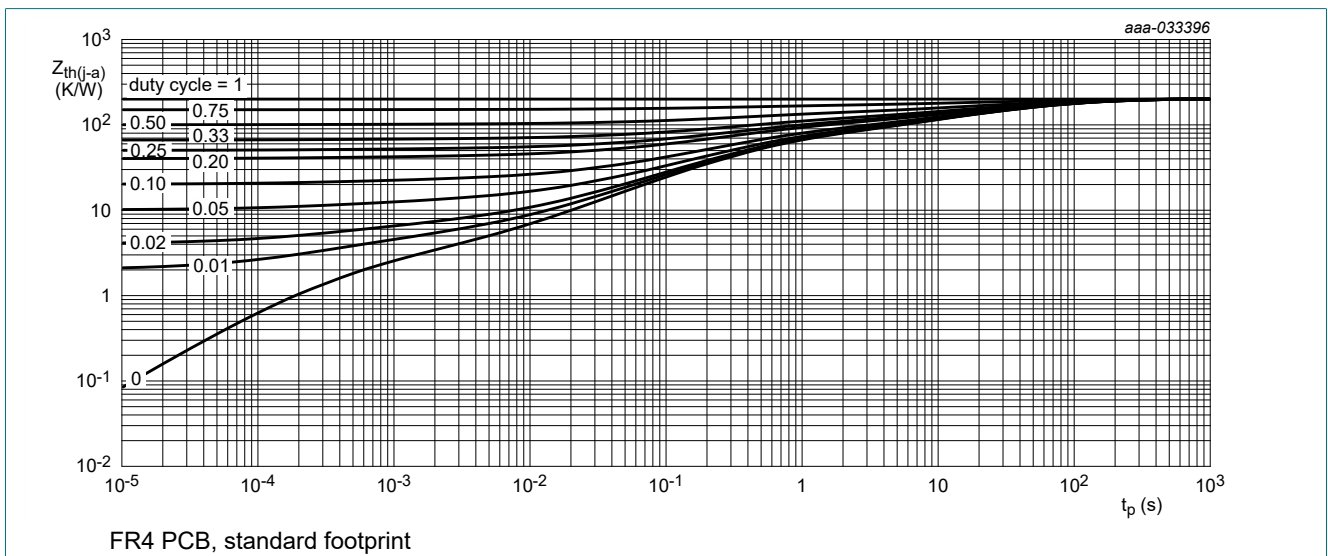


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

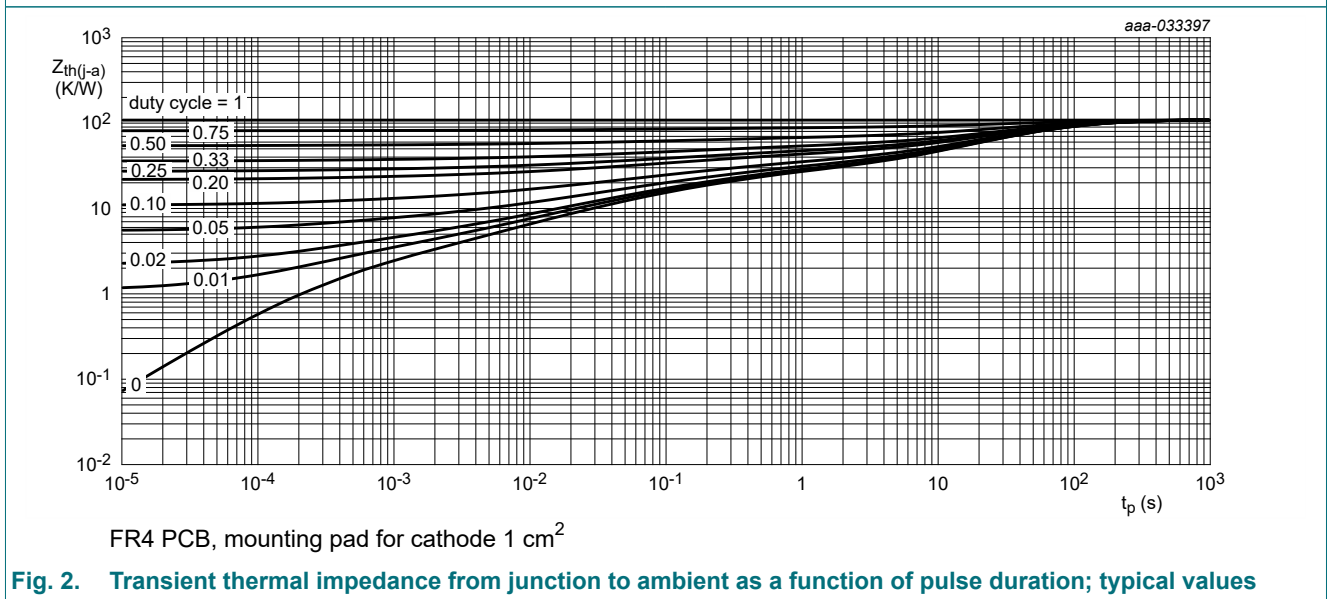


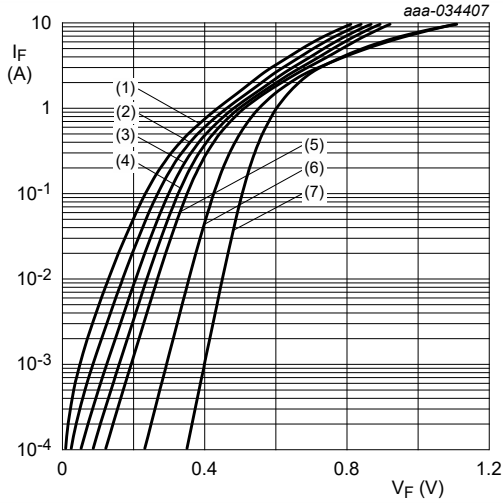
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

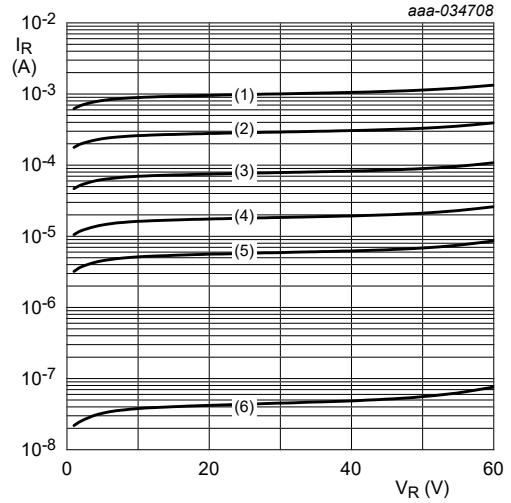
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-------------|-------------------------------------|---|-----|-----|------|------|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R = 1 \text{ mA}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | 60 | - | - | V |
| V_F | forward voltage | $I_F = 0.5 \text{ A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 495 | 560 | mV |
| | | $I_F = 1 \text{ A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 545 | 605 | mV |
| | | $I_F = 2 \text{ A}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 635 | 700 | mV |
| | | $I_F = 2 \text{ A}$; pulsed; $T_j = -40 \text{ }^\circ\text{C}$ | [1] | - | 660 | 730 | mV |
| | | $I_F = 2 \text{ A}$; pulsed; $T_j = 125 \text{ }^\circ\text{C}$ | [1] | - | 580 | 650 | mV |
| I_R | reverse current | $V_R = 60 \text{ V}$; pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | [1] | - | 0.1 | 0.47 | μA |
| | | $V_R = 60 \text{ V}$; pulsed; $T_j = 125 \text{ }^\circ\text{C}$ | [1] | - | 0.15 | 0.55 | mA |
| | | $V_R = 60 \text{ V}$; pulsed; $T_j = 150 \text{ }^\circ\text{C}$ | [1] | - | 0.6 | 2.6 | mA |
| C_d | diode capacitance | $V_R = 1 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 210 | - | pF |
| | | $V_R = 10 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 65 | - | pF |
| t_{rr} | reverse recovery time step recovery | $I_F = 0.5 \text{ A}$; $I_R = 1 \text{ A}$; $I_{R(\text{meas})} = 0.25 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 4.5 | - | ns |
| | reverse recovery time ramp recovery | $dI_F/dt = 100 \text{ A}/\mu\text{s}$; $I_F = 1 \text{ A}$; $V_R = 30 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 8 | - | ns |
| I_{RM} | peak reverse recovery current | | | - | 0.35 | - | A |
| Q_{rr} | reverse recovery charge | | | - | 1.5 | - | nC |
| V_{FRM} | peak forward recovery voltage | $I_F = 0.5 \text{ A}$; $dI_F/dt = 20 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$ | | - | 495 | - | mV |

[1] Very short pulse, in order to maintain a stable junction temperature.



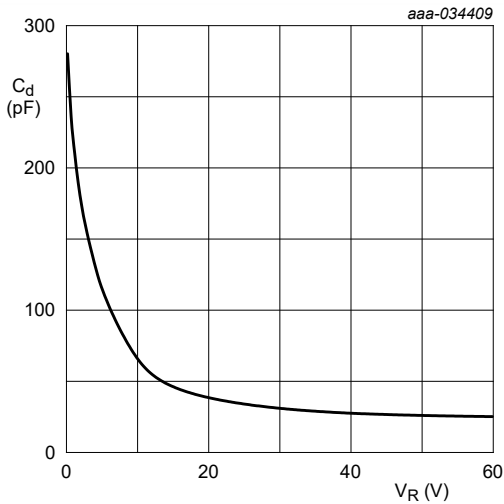
pulsed condition
 (1) $T_j = 175\text{ °C}$
 (2) $T_j = 150\text{ °C}$
 (3) $T_j = 125\text{ °C}$
 (4) $T_j = 100\text{ °C}$
 (5) $T_j = 85\text{ °C}$
 (6) $T_j = 25\text{ °C}$
 (7) $T_j = -40\text{ °C}$

Fig. 3. Forward current as a function of forward voltage; typical values



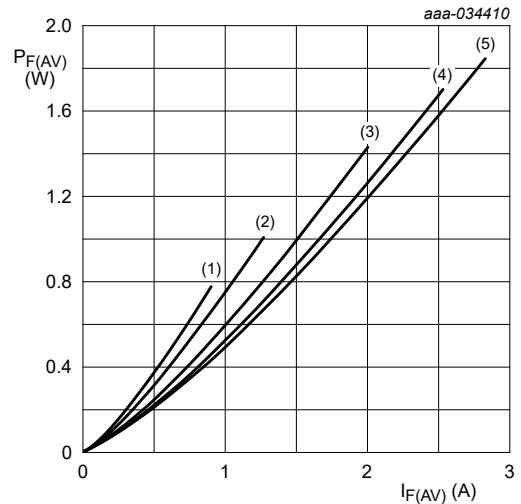
pulsed condition
 (1) $T_j = 175\text{ °C}$
 (2) $T_j = 150\text{ °C}$
 (3) $T_j = 125\text{ °C}$
 (4) $T_j = 100\text{ °C}$
 (5) $T_j = 85\text{ °C}$
 (6) $T_j = 25\text{ °C}$

Fig. 4. Reverse current as a function of reverse voltage; typical values



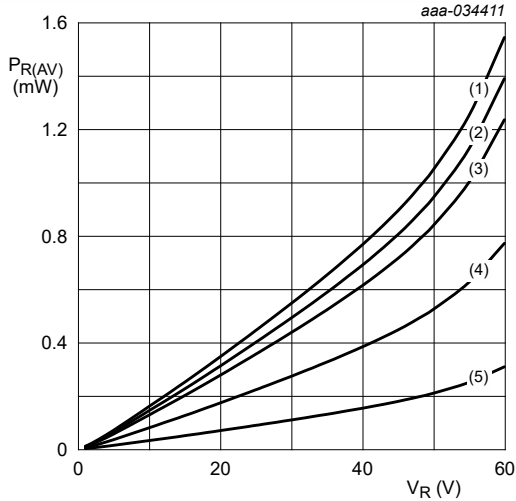
$f = 1\text{ MHz}$; $T_{amb} = 25\text{ °C}$

Fig. 5. Diode capacitance as a function of reverse voltage; typical values



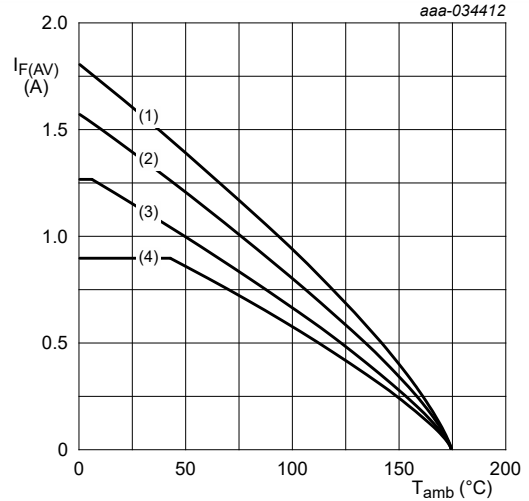
$T_j = 100\text{ °C}$
 (1) $\delta = 0.1$
 (2) $\delta = 0.2$
 (3) $\delta = 0.5$
 (4) $\delta = 0.8$
 (5) $\delta = 1$; DC

Fig. 6. Average forward power dissipation as a function of average forward current; typical values



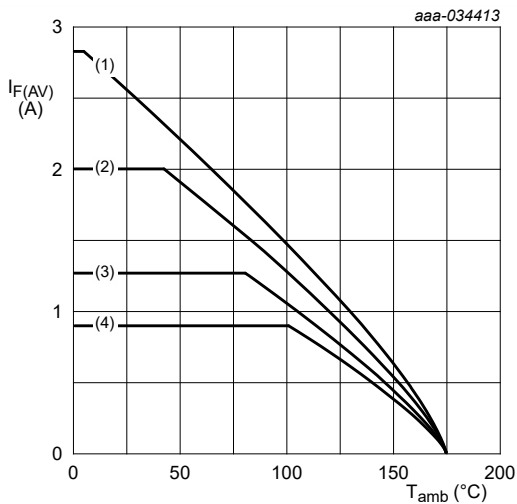
$T_j = 100\text{ °C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.9$
 (3) $\delta = 0.8$
 (4) $\delta = 0.5$
 (5) $\delta = 0.2$

Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values



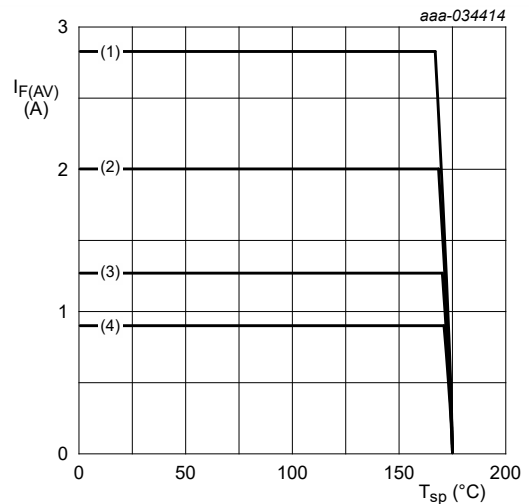
FR4 PCB, standard footprint
 $T_j = 175\text{ °C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

Fig. 8. Average forward current as a function of ambient temperature; typical values



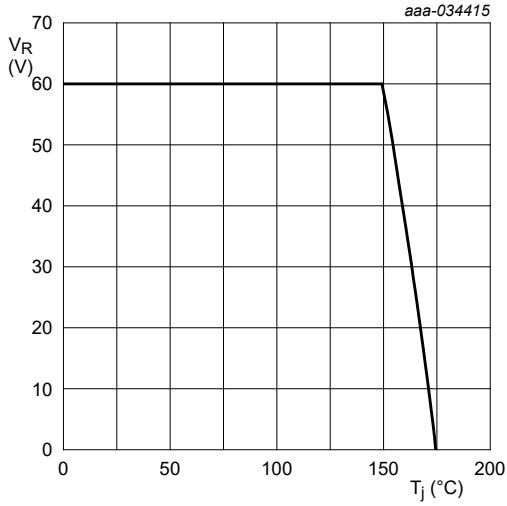
FR4 PCB, mounting pad for cathode 1 cm^2
 $T_j = 175\text{ °C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



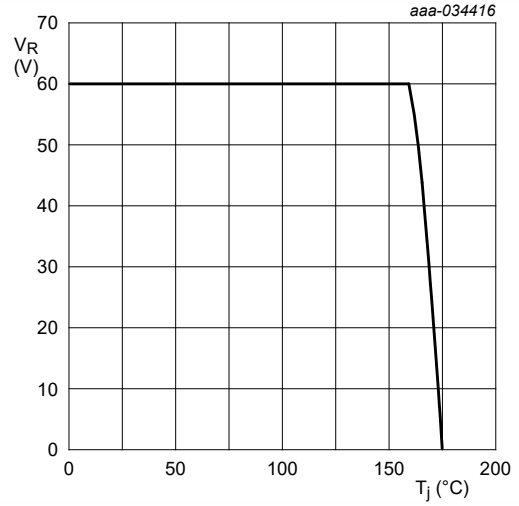
$T_j = 175\text{ °C}$
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



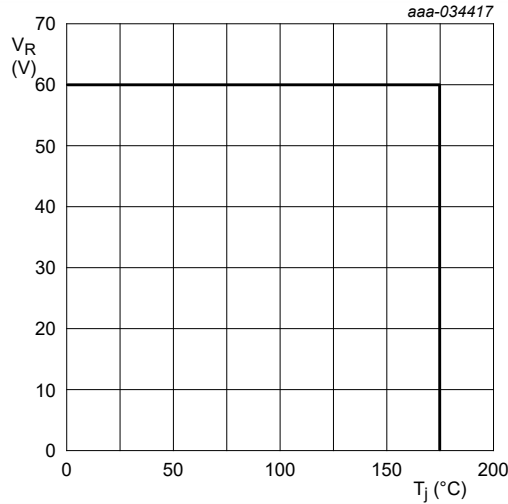
FR4 PCB, standard footprint
R_{th} = 230 K/W

Fig. 11. Derated maximum reverse voltage as a function of junction temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm²
R_{th} = 125 K/W

Fig. 12. Derated maximum reverse voltage as a function of junction temperature; typical values



Soldering point of cathode tab
R_{th} = 6 K/W

Fig. 13. Derated maximum reverse voltage as a function of junction temperature; typical values

11. Test information



Fig. 14. Reverse recovery definition; step recovery



Fig. 15. Reverse recovery definition; ramp recovery



Fig. 16. Forward recovery definition

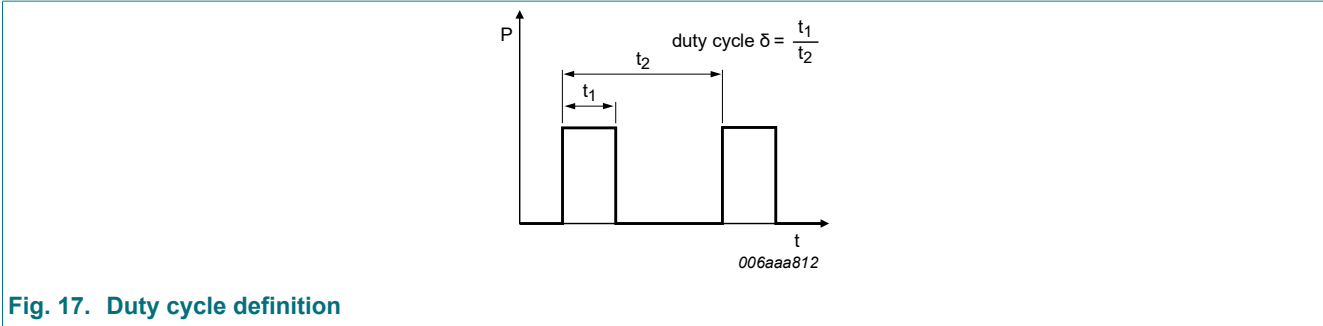


Fig. 17. Duty cycle definition

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

$$I_{RMS} = I_{F(AV)} \text{ at DC, and } I_{RMS} = I_M \times \sqrt{\delta}$$

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

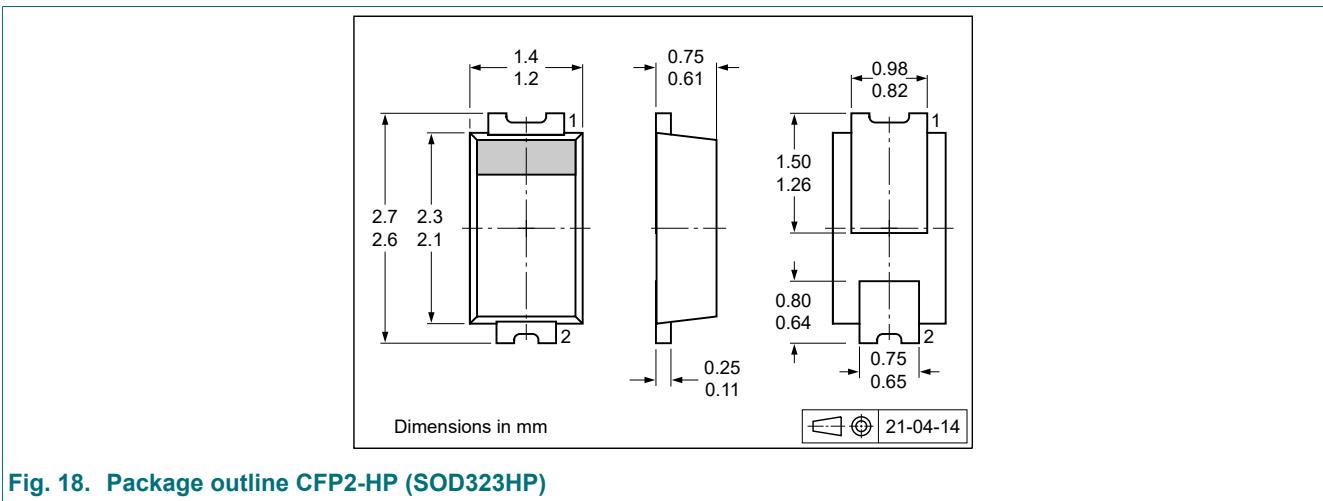


Fig. 18. Package outline CFP2-HP (SOD323HP)

13. Soldering

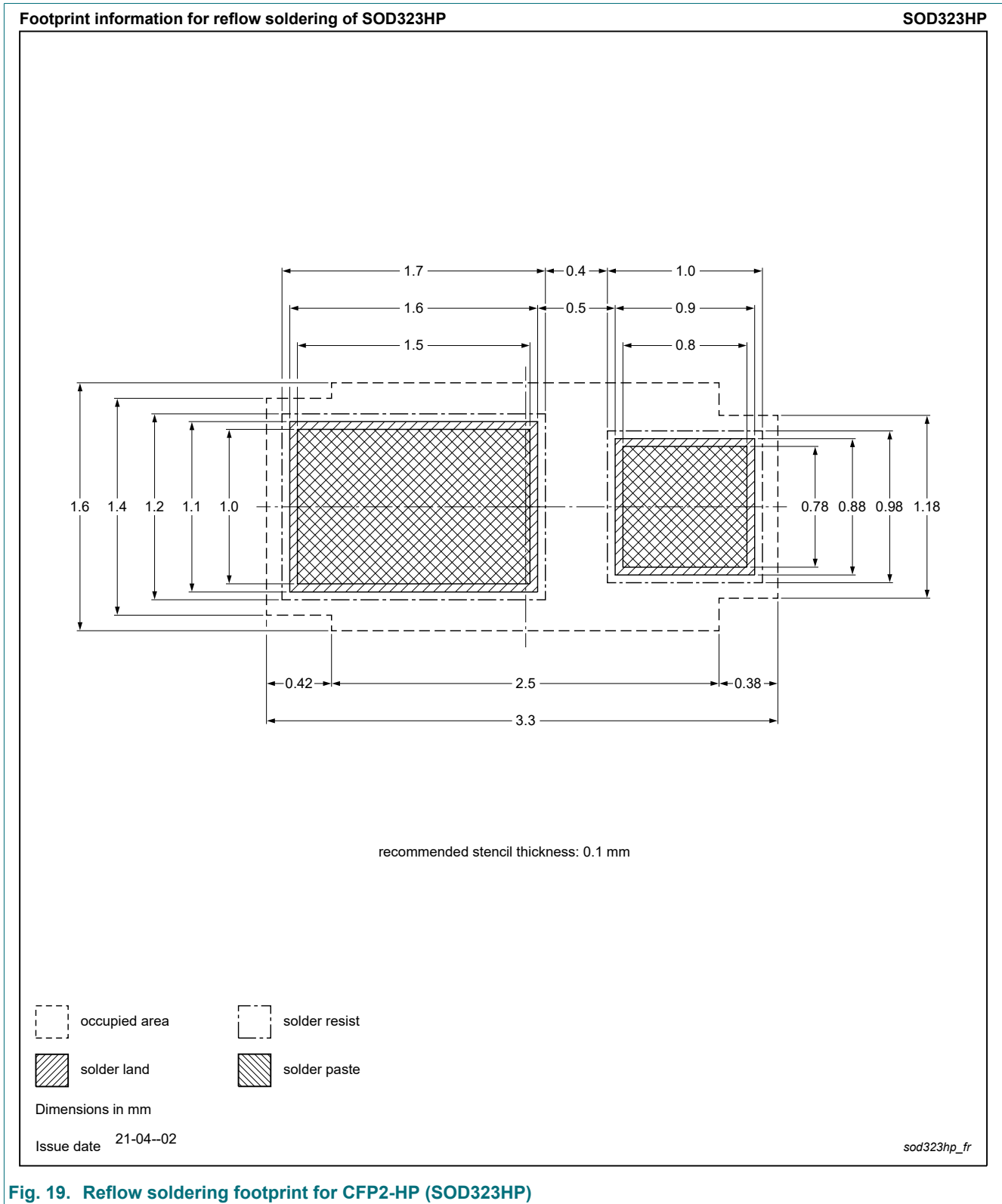


Fig. 19. Reflow soldering footprint for CFP2-HP (SOD323HP)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------------|--------------|--------------------|---------------|------------|
| PMEG60T20ELXD-Q v.1 | 20220401 | 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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