



# PMEG045V100EIQ

45 V, 10 A low  $V_F$  Schottky barrier rectifier

20 July 2022

Product data sheet

## 1. General description

Planar Low  $V_F$  Schottky barrier rectifier encapsulated in a CFP15B (SOT1289B) power and flat lead Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Very low forward voltage
- High power capability due to clip-bond technology
- Small and thin SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- High efficiency DC-to-DC conversion
- Low voltage rectification
- Switch mode power supply
- Freewheeling application
- Reverse polarity protection
- OR-ing

## 4. Quick reference data

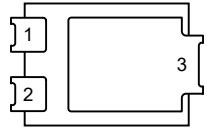
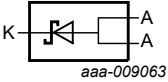
Table 1. Quick reference data

| Symbol      | Parameter               | Conditions  | Min | Typ | Max | Unit    |
|-------------|-------------------------|---|-----|-----|-----|---------|
| $I_{F(AV)}$ | average forward current | square-wave pulse; $\delta = 0.5$ ; $f = 20$ kHz;<br>$T_{sp} \leq 170$ °C | -   | -   | 10  | A       |
| $V_R$       | reverse voltage         | $T_j = 25$ °C   | -   | -   | 45  | V       |
| $V_F$       | forward voltage         | $I_F = 10$ A; pulsed; $T_j = 25$ °C                                       | [1] | 490 | 540 | mV      |
| $I_R$       | reverse current         | $V_R = 45$ V; pulsed; $T_j = 25$ °C                                       | [1] | 100 | 500 | $\mu$ A |

[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   | A      | anode       | <br>CFP15B (SOT1289B) | <br>aaa-009063 |
| 2   | A      | anode       |  |   |
| 3   | K      | cathode     |  |   |

## 6. Ordering information

Table 3. Ordering information

| Type number                       | Package |  |                          |
|-----------------------------------|---------|--|--------------------------|
|                                   | Name    | Description  | Version                  |
| <a href="#">PMEG045V100EIPE-Q</a> | CFP15B  | plastic, thermal enhanced ultra thin SMD package; 3 leads; 2.13 mm pitch; 5.8 x 4.3 x 0.95 mm body | <a href="#">SOT1289B</a> |

## 7. Marking

Table 4. Marking codes

| Type number       | Marking code |
|-------------------|--------------|
| PMEG045V100EIPE-Q | 045V<br>M10E |

## 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                     | $T_j = 25\text{ °C}$  |     | -   | 45   | V    |
| $I_F$       | forward current                     | $\delta = 1; T_{sp} \leq 168\text{ °C}$   |     | -   | 14   | A    |
| $I_{F(AV)}$ | average forward current             | square-wave pulse; $\delta = 0.5; f = 20\text{ kHz}; T_{sp} \leq 170\text{ °C}$ |     | -   | 10   | A    |
| $I_{FSM}$   | non-repetitive peak forward current | half sine-wave pulse; $t_p = 8.3\text{ ms}; T_{j(\text{init})} = 25\text{ °C}$  |     | -   | 210  | A    |
| $P_{tot}$   | total power dissipation             | $T_{amb} \leq 25\text{ °C}$   | [1] | -   | 1.66 | W    |
|             |                                     |   | [2] | -   | 2.15 | 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 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<sup>2</sup>.

## 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] | -   | -   | 90  | K/W  |
|                |  |             | [1] [3] | -   | -   | 70  | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [4]     | -   | -   | 3   | 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<sup>2</sup>.
- [4] Soldering point of cathode tab.

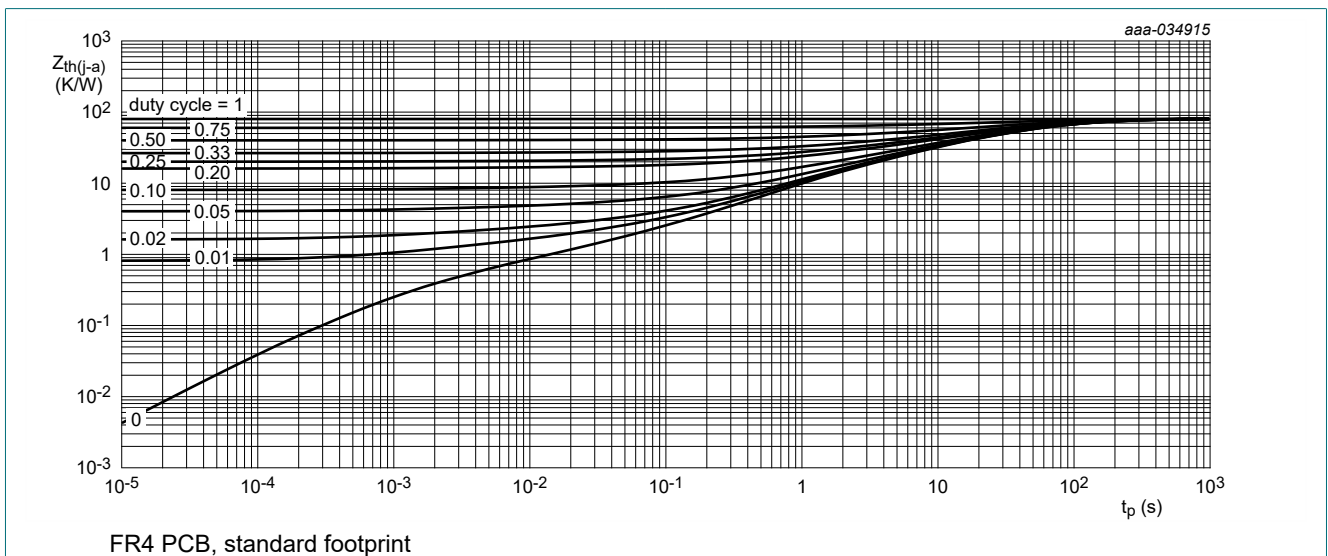


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

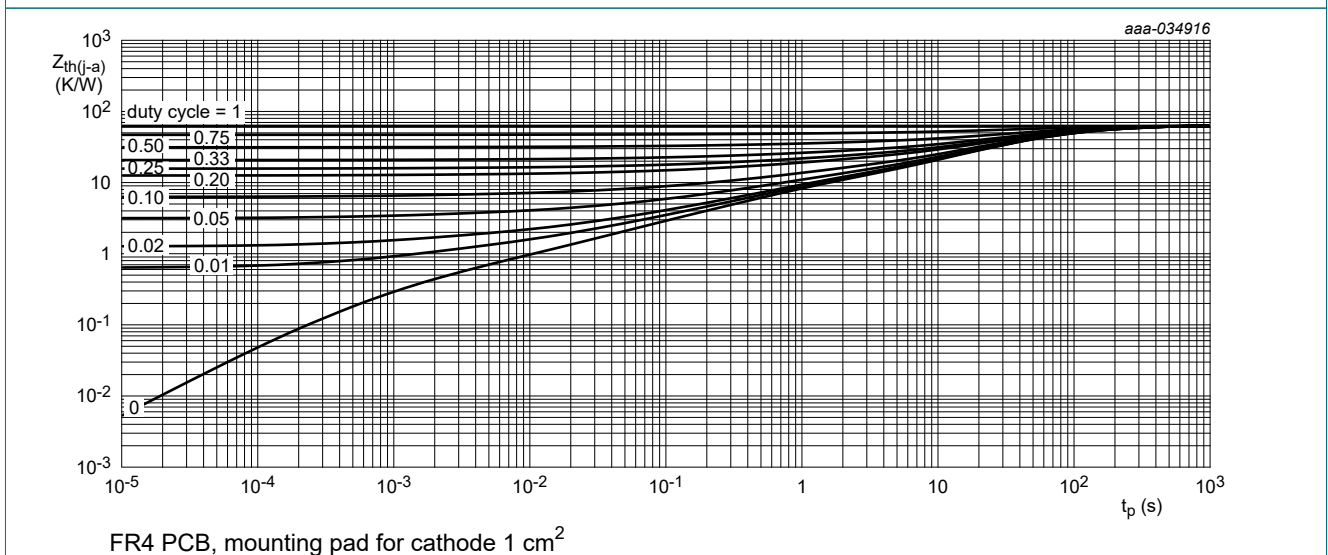


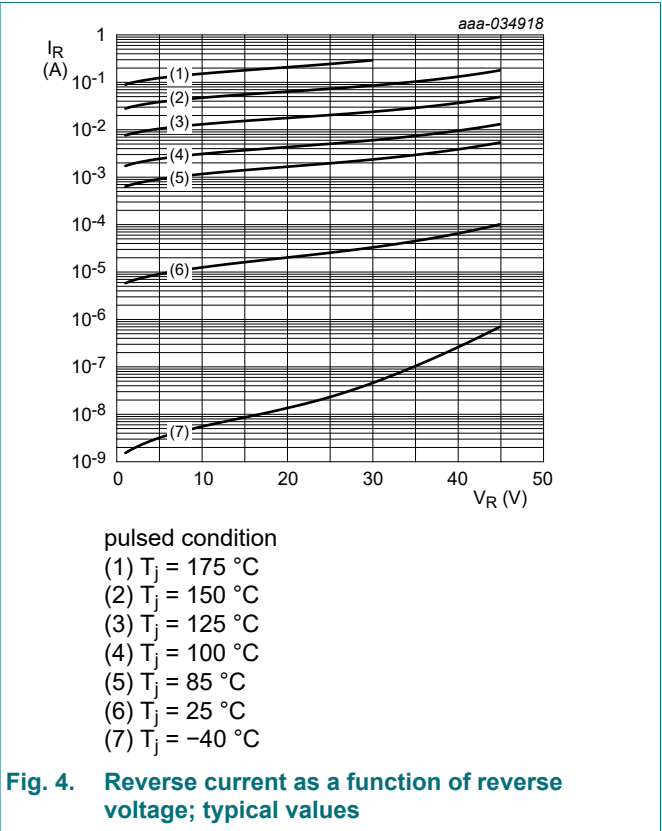
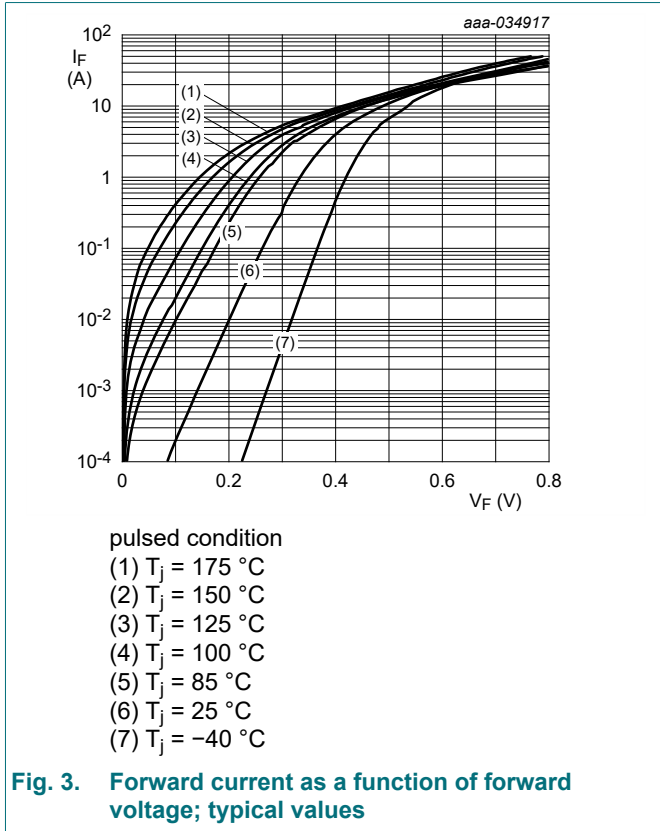
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

### 10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                           | Conditions   | Min | Typ | Max | Unit |               |
|-------------|-------------------------------------|--|-----|-----|-----|------|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage           | $I_R = 5 \text{ mA}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$   | [1] | 45  | -   | V    |               |
| $V_F$       | forward voltage                     | $I_F = 1 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$  | [1] | -   | 330 | 380  | mV            |
|             |                                     | $I_F = 5 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$  | [1] | -   | 410 | 470  | mV            |
|             |                                     | $I_F = 10 \text{ A}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$   | [1] | -   | 490 | 540  | mV            |
|             |                                     | $I_F = 10 \text{ A}$ ; pulsed; $T_j = -40 \text{ }^\circ\text{C}$  | [1] | -   | 530 | 600  | mV            |
|             |                                     | $I_F = 10 \text{ A}$ ; pulsed; $T_j = 125 \text{ }^\circ\text{C}$  | [1] | -   | 440 | 500  | mV            |
| $I_R$       | reverse current                     | $V_R = 45 \text{ V}$ ; pulsed; $T_j = 25 \text{ }^\circ\text{C}$   | [1] | -   | 100 | 500  | $\mu\text{A}$ |
| $C_d$       | diode capacitance                   | $V_R = 1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$  |     | -   | 700 | -    | pF            |
|             |                                     | $V_R = 10 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_j = 25 \text{ }^\circ\text{C}$   |     | -   | 240 | -    | pF            |
| $t_{rr}$    | reverse recovery time step recovery | $I_F = 0.5 \text{ A}$ ; $I_R = 0.5 \text{ A}$ ; $I_{R(\text{meas})} = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$ |     | -   | 22  | -    | ns            |
|             | reverse recovery time ramp recovery | $dI_F/dt = 100 \text{ A}/\mu\text{s}$ ; $I_F = 3 \text{ A}$ ; $V_R = 30 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$   |     | -   | 15  | -    | ns            |
| $V_{FRM}$   | peak forward recovery voltage       | $I_F = 0.5 \text{ A}$ ; $dI_F/dt = 20 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$                         |     | -   | 310 | -    | mV            |

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



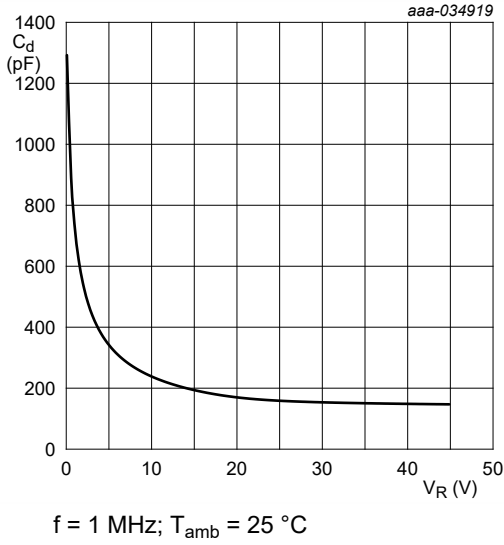


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

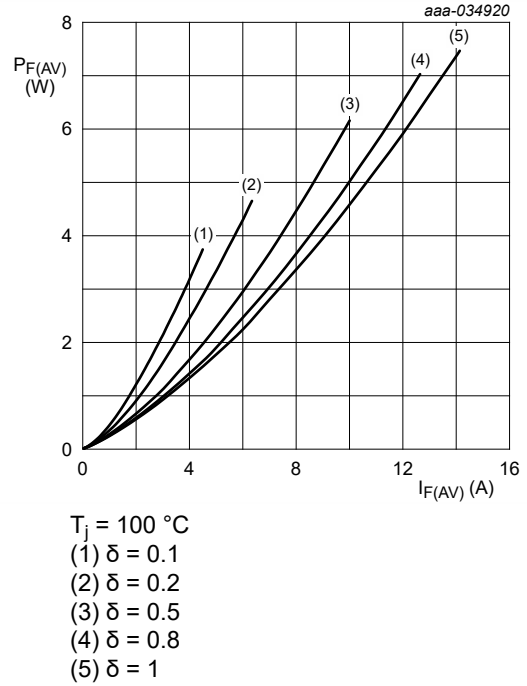


Fig. 6. Average forward power dissipation as a function of average forward current; typical values

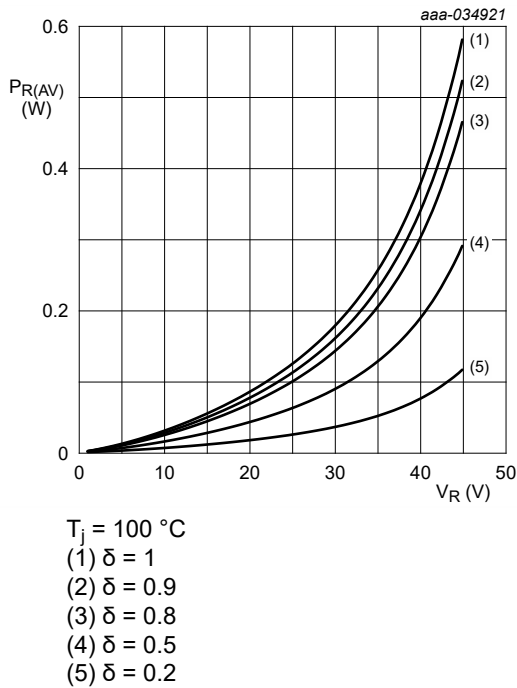


Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values

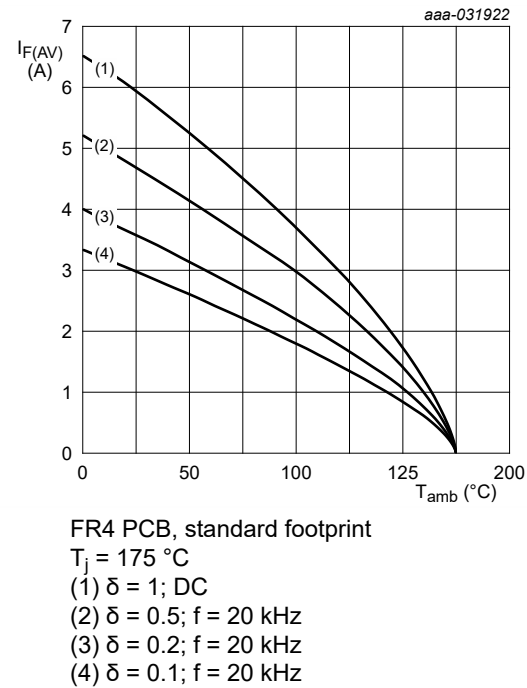
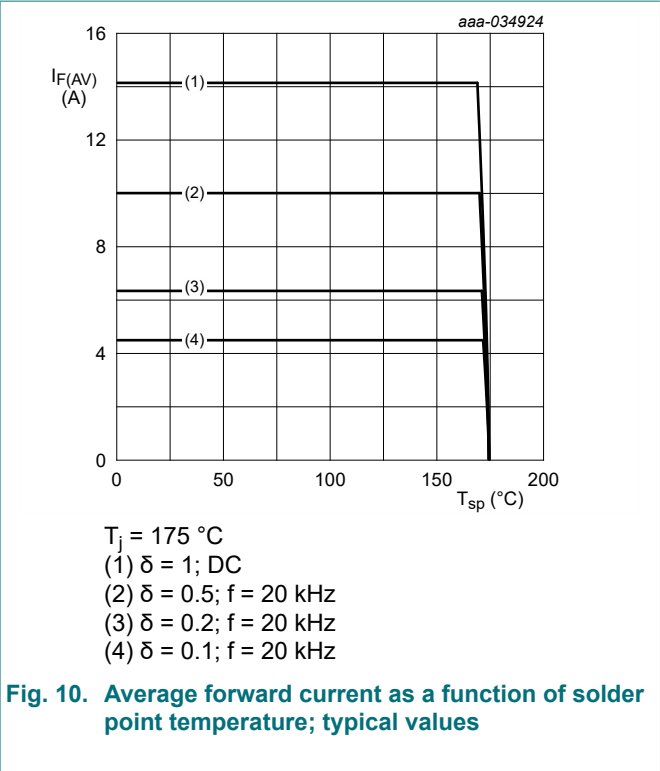
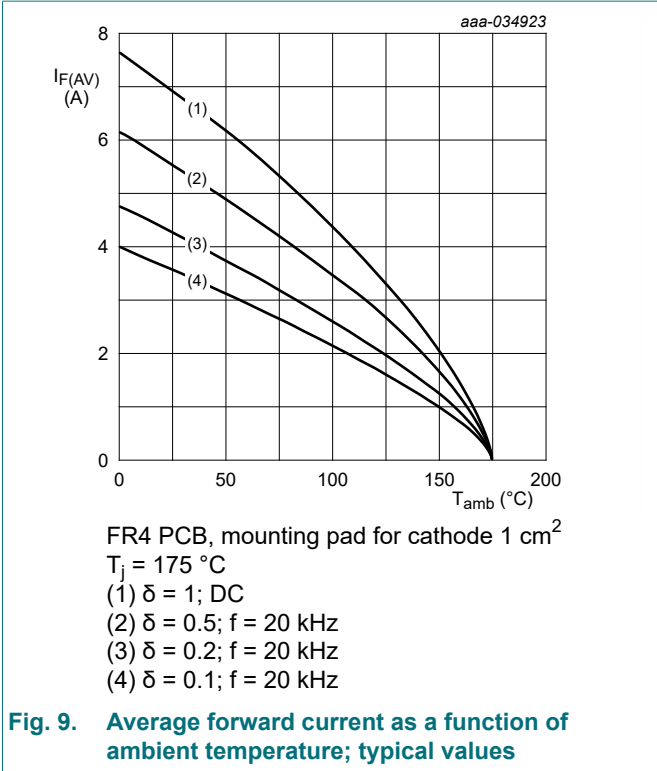


Fig. 8. Average forward current as a function of ambient temperature; typical values



## 11. Test information

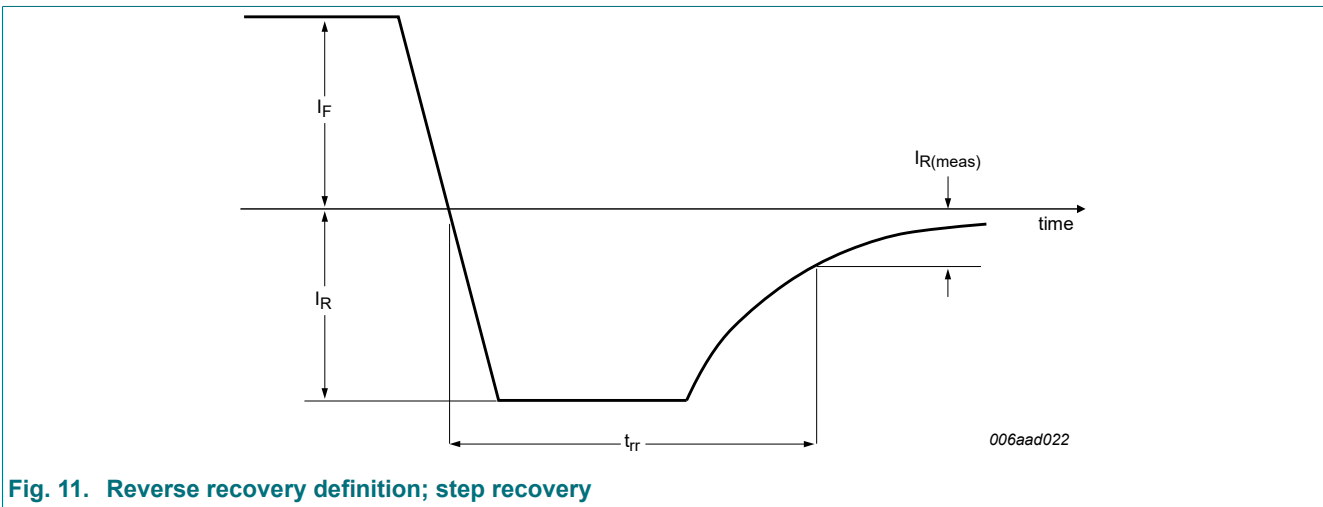




Fig. 12. Reverse recovery definition; ramp recovery



Fig. 13. Forward recovery definition



Fig. 14. Duty cycle definition

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

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

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

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

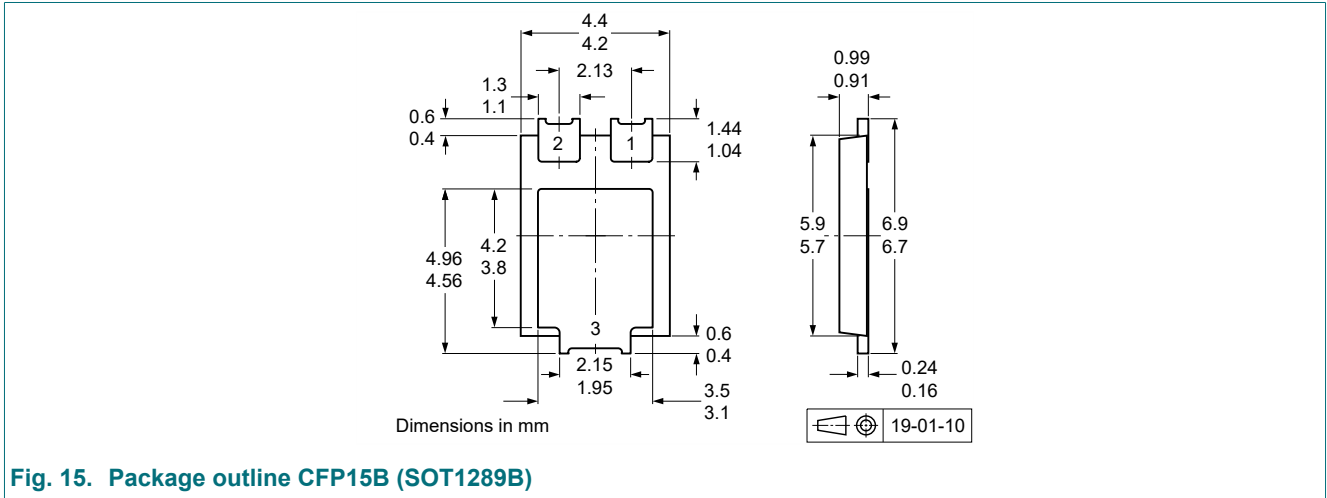


Fig. 15. Package outline CFP15B (SOT1289B)

## 13. Soldering

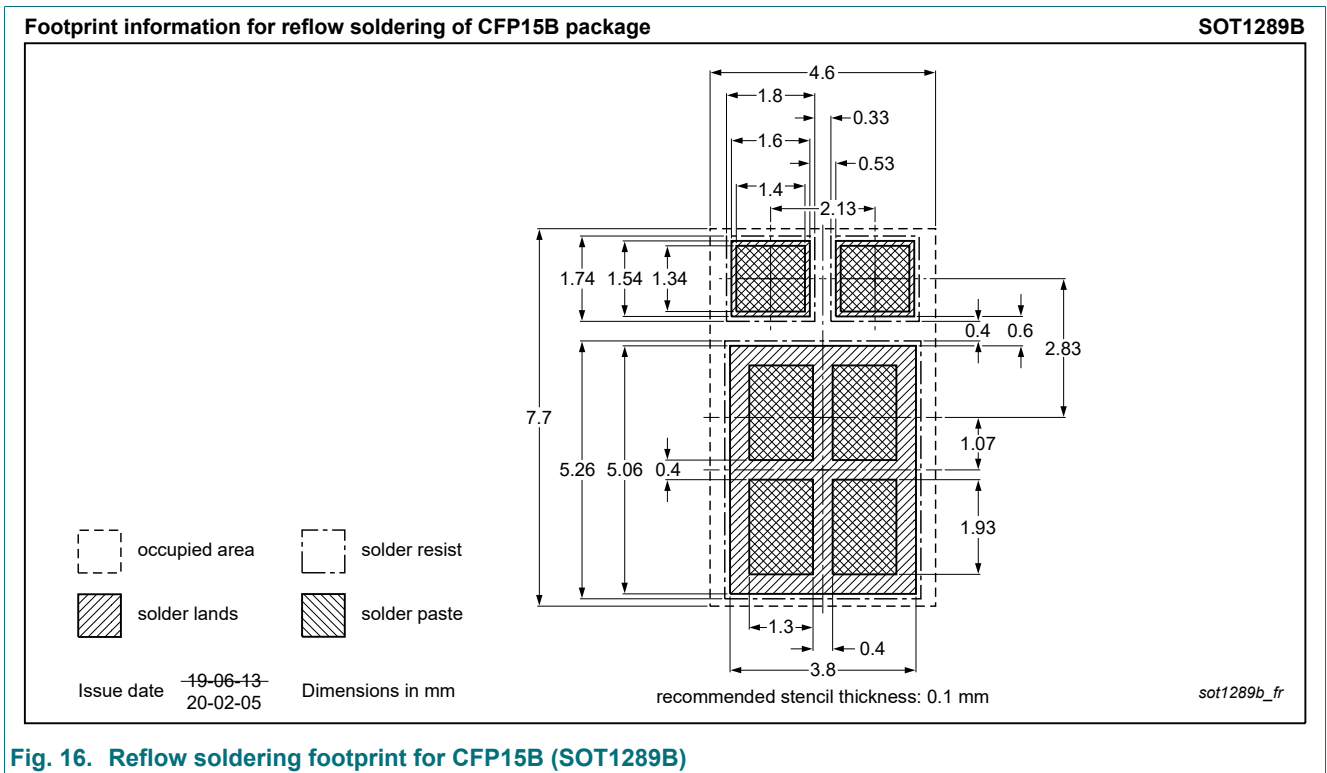


Fig. 16. Reflow soldering footprint for CFP15B (SOT1289B)



## 14. Revision history

Table 8. Revision history

| Data sheet ID         | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------------|--------------|--------------------|---------------|------------|
| PMEG045V100EIPE-Q v.1 | 20220720     | 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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