



PMEG4005CEJ

40 V, 0.5 A low VF MEGA Schottky barrier rectifier

12 May 2016

Product data sheet

1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in an SOD323F (SC-90) very small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 0.5$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage typ. $V_F = 550$ mV
- Low reverse current typ. $I_R = 1.5$ μ A
- Very small and flat lead SMD plastic package
- AEC-Q101 qualified

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications
- Automotive applications

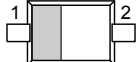

4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|-------------------------|--|-----|-----|-----|---------|
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20$ kHz; $T_{sp} \leq 135$ °C; square wave | - | - | 0.5 | A |
| V_R | reverse voltage | $T_j = 25$ °C | - | - | 40 | V |
| V_F | forward voltage | $I_F = 500$ mA; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_j = 25$ °C | - | 550 | 640 | mV |
| I_R | reverse current | $V_R = 40$ V; pulsed; $T_j = 25$ °C | - | 1.5 | 8 | μ A |
| | | $V_R = 40$ V; pulsed; $T_j = 125$ °C | - | 1 | 8 | mA |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|---|
| 1 | K | cathode |  SOD323F |  sym001 |
| 2 | A | anode | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PMEG4005CEJ | SOD323F | plastic surface-mounted package; 2 leads | SOD323F |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG4005CEJ | 2F |

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 | $T_{sp} \leq 130\text{ °C}; \delta = 1$ | | - | 0.7 | A |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $f = 20\text{ kHz}; T_{sp} \leq 135\text{ °C}$; square wave | | - | 0.5 | A |
| I_{FRM} | repetitive peak forward current | $t_p \leq 1\text{ ms}; \delta \leq 0.25$ | | - | 2 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 8\text{ ms}; T_{j(\text{init})} = 25\text{ °C}$; square wave | | - | 8 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [1] | - | 415 | mW |
| | | | [2] | - | 715 | 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 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^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] | - | - | 175 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [4] | - | - | 45 | 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] Soldering point of cathode tab.

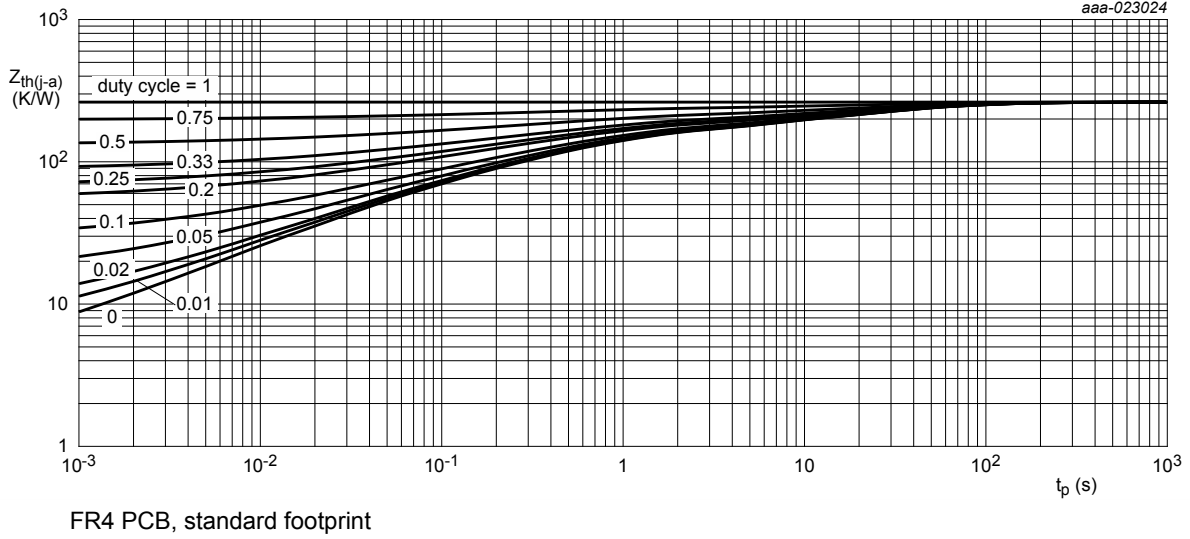


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

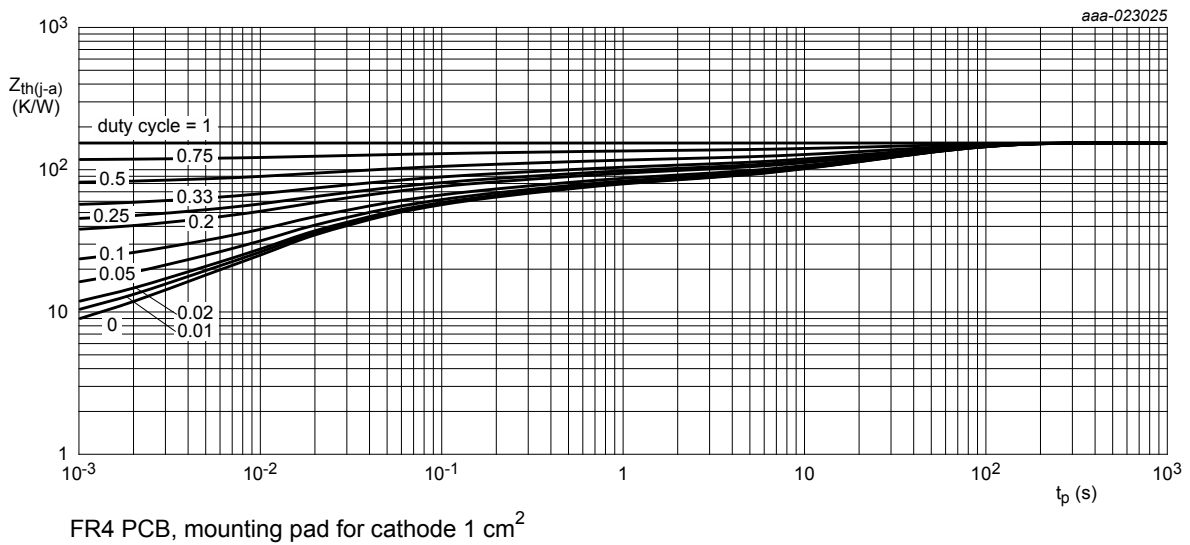
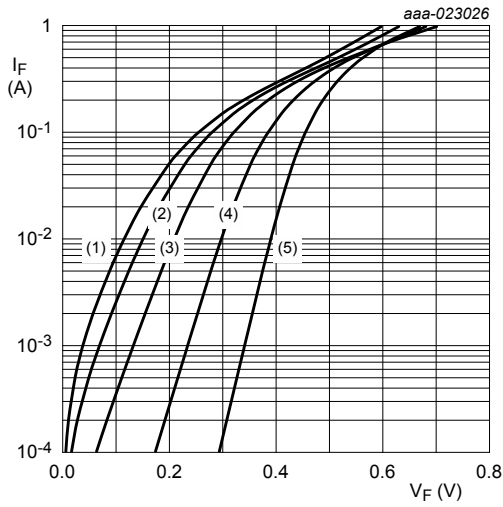


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

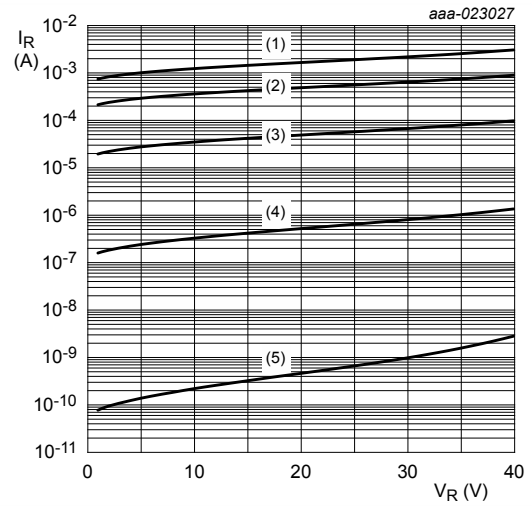
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|---------------------------|--|-----|------|-----|---------------|
| $V_{(BR)R}$ | reverse breakdown voltage | $I_R = 1 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ } ^\circ\text{C}$ | 40 | - | - | V |
| V_F | forward voltage | $I_F = 10 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 300 | 380 | mV |
| | | $I_F = 100 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 390 | 470 | mV |
| | | $I_F = 200 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 435 | 510 | mV |
| | | $I_F = 300 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 475 | 560 | mV |
| | | $I_F = 400 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 515 | 600 | mV |
| | | $I_F = 500 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 550 | 640 | mV |
| | | $I_F = 500 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = -40 \text{ } ^\circ\text{C}$ | - | 570 | 670 | mV |
| | | $I_F = 500 \text{ mA}$; $t_p \leq 300 \text{ } \mu\text{s}$; $\delta \leq 0.02$; $T_j = 125 \text{ } ^\circ\text{C}$ | - | 520 | 610 | mV |
| I_R | reverse current | $V_R = 30 \text{ V}$; pulsed; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 1 | 5 | μA |
| | | $V_R = 40 \text{ V}$; pulsed; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 1.5 | 8 | μA |
| | | $V_R = 40 \text{ V}$; pulsed; $T_j = 125 \text{ } ^\circ\text{C}$ | - | 1 | 8 | mA |
| C_d | diode capacitance | $V_R = 1 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 24 | - | pF |
| | | $V_R = 4 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 13.5 | - | pF |
| | | $V_R = 10 \text{ V}$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 9 | - | pF |
| t_{rr} | reverse recovery time | $I_F = 0.5 \text{ A}$; $I_R = 0.5 \text{ A}$; $I_{R(\text{meas})} = 0.1 \text{ A}$; $T_j = 25 \text{ } ^\circ\text{C}$ | - | 1.8 | - | ns |



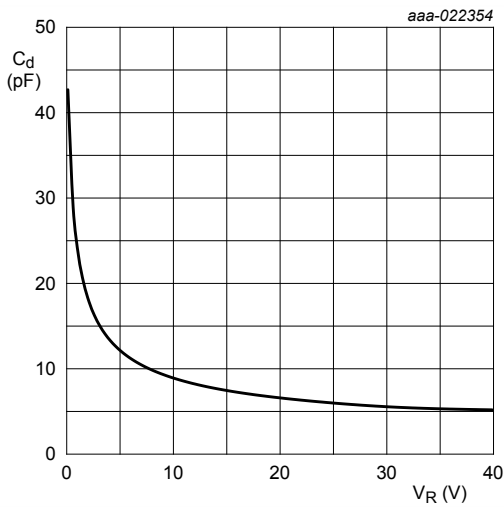
pulsed condition
 (1) $T_j = 150\text{ }^\circ\text{C}$
 (2) $T_j = 125\text{ }^\circ\text{C}$
 (3) $T_j = 85\text{ }^\circ\text{C}$
 (4) $T_j = 25\text{ }^\circ\text{C}$
 (5) $T_j = -40\text{ }^\circ\text{C}$

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



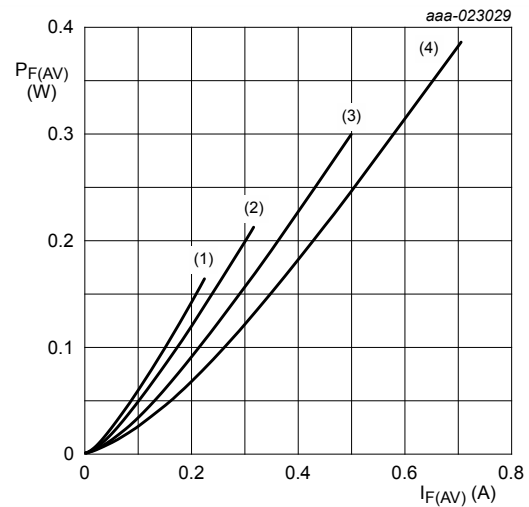
pulsed condition
 (1) $T_j = 150\text{ }^\circ\text{C}$
 (2) $T_j = 125\text{ }^\circ\text{C}$
 (3) $T_j = 85\text{ }^\circ\text{C}$
 (4) $T_j = 25\text{ }^\circ\text{C}$
 (5) $T_j = -40\text{ }^\circ\text{C}$

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



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

Fig. 5. 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) $\delta = 1\text{ (DC)}$

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

40 V, 0.5 A low VF MEGA Schottky barrier rectifier

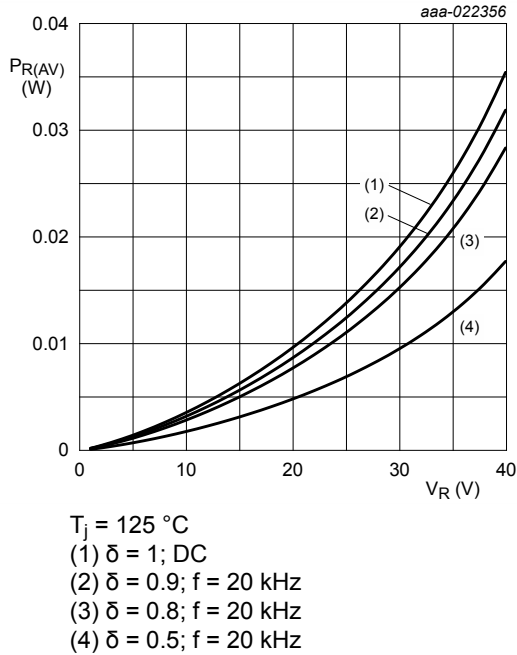


Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values

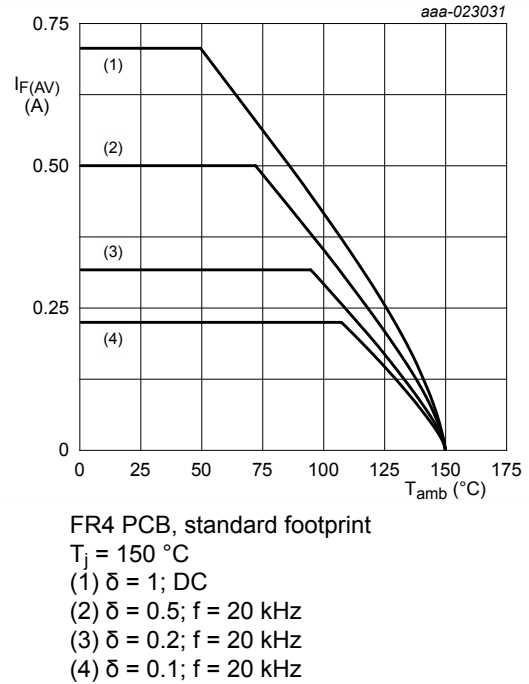


Fig. 8. Average forward current as a function of ambient temperature; typical values

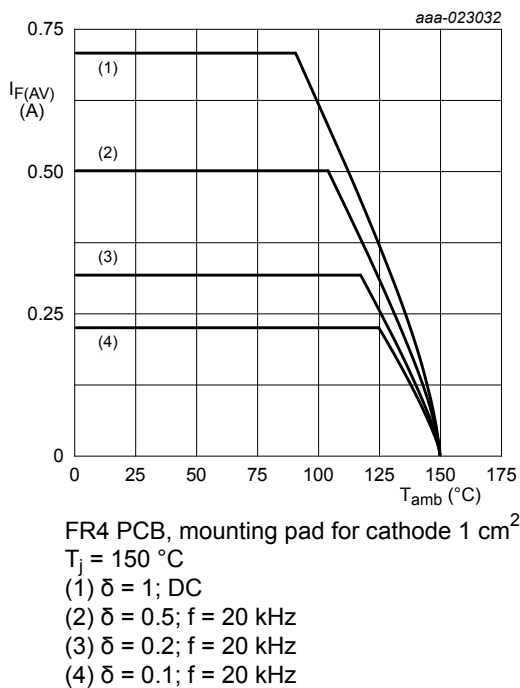


Fig. 9. Average forward current as a function of ambient temperature; typical values

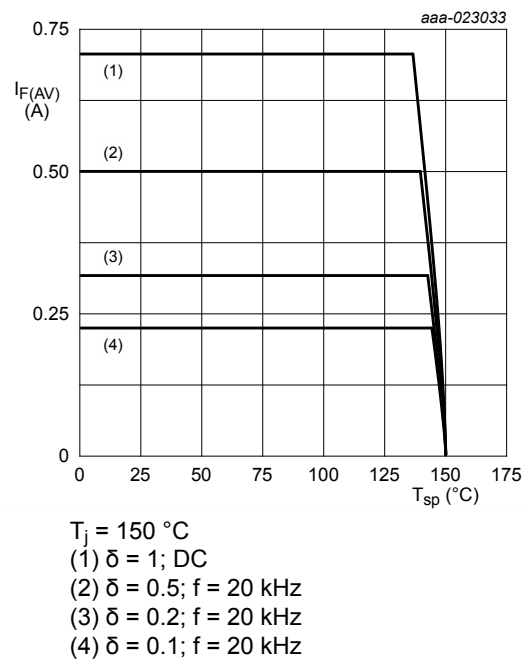


Fig. 10. Average forward current as a function of solder point temperature; typical values

11. Test information

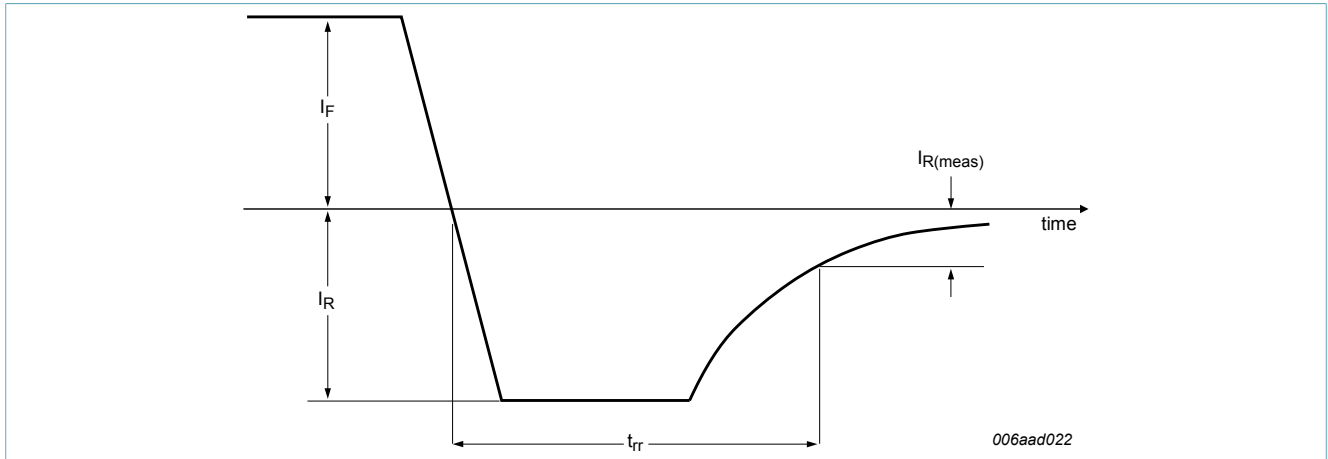


Fig. 11. Reverse recovery definition

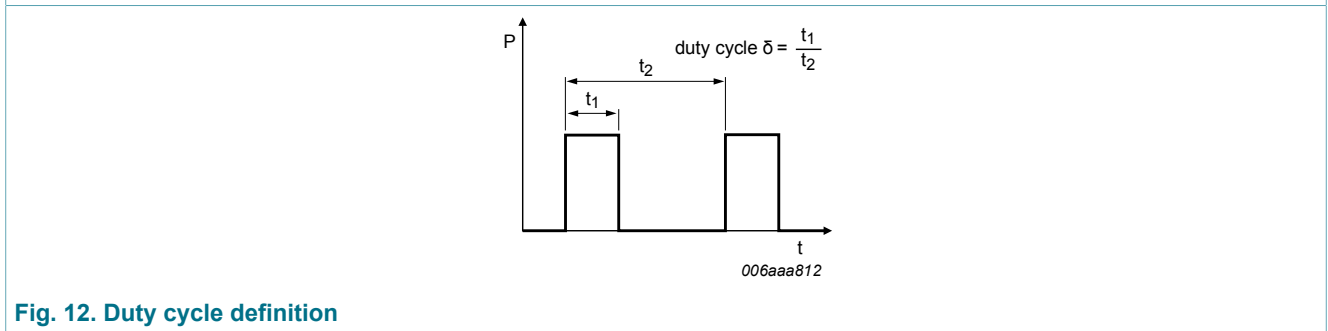


Fig. 12. Duty cycle definition

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

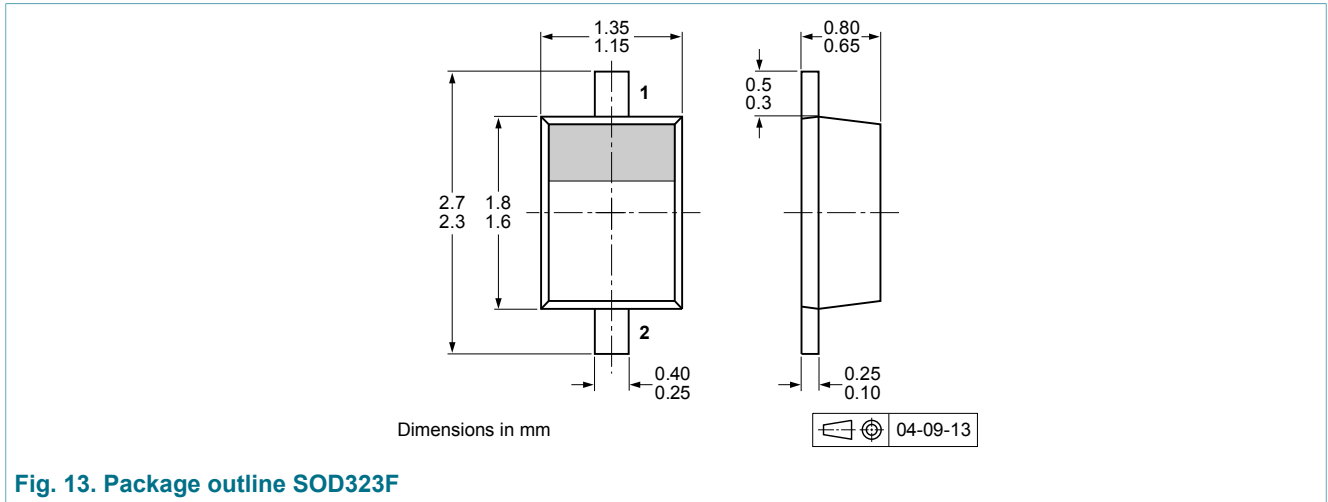


Fig. 13. Package outline SOD323F

13. Soldering

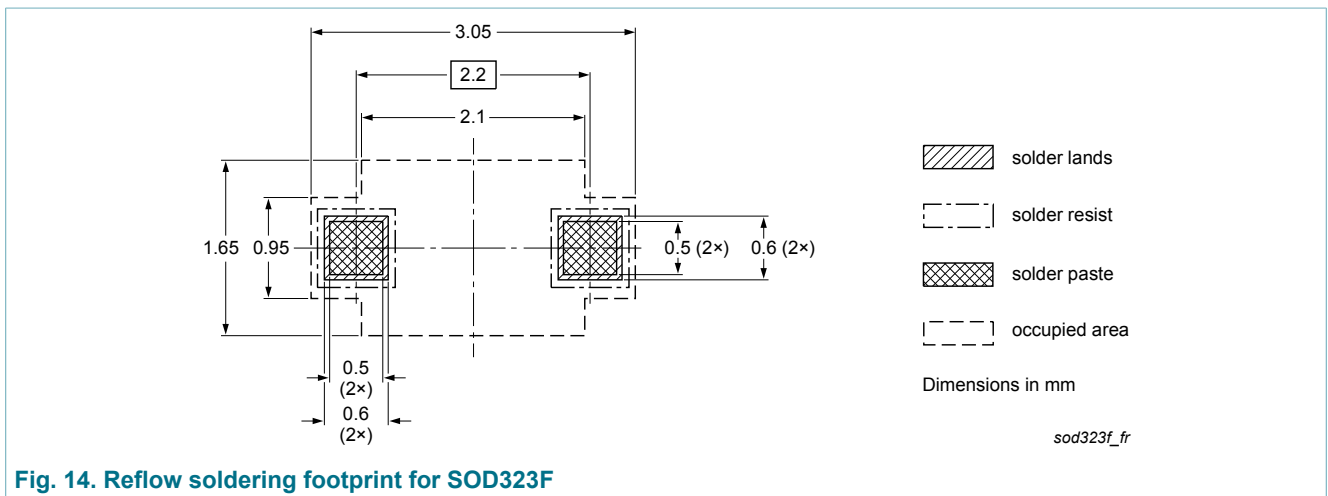


Fig. 14. Reflow soldering footprint for SOD323F

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PMEG4005CEJ v.1 | 20160512 | 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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16. Contents

| | |
|---------------------------------|----|
| 1. General description..... | 1 |
| 2. Features and benefits..... | 1 |
| 3. Applications..... | 1 |
| 4. Quick reference data..... | 1 |
| 5. Pinning information..... | 2 |
| 6. Ordering information..... | 2 |
| 7. Marking..... | 2 |
| 8. Limiting values..... | 3 |
| 9. Thermal characteristics..... | 3 |
| 10. Characteristics..... | 5 |
| 11. Test information..... | 8 |
| 12. Package outline..... | 9 |
| 13. Soldering..... | 9 |
| 14. Revision history..... | 10 |
| 15. Legal information..... | 11 |

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