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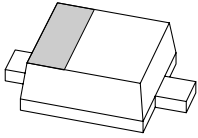
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Kind regards,

Team Nexperia



PMEG4002EJ

200 mA low V_F MEGA Schottky barrier rectifier

Rev. 01 — 15 May 2009

Product data sheet

1. Product profile

1.1 General description

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

1.2 Features

- Average forward current: $I_{F(AV)} \leq 0.2$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage
- AEC-Q101 qualified
- Small and flat lead SMD plastic package

1.3 Applications

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

1.4 Quick reference data

Table 1. Quick reference data



$T_j = 25$ °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|-------------------------|--|-----|-----|-----|---------|
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$; $f = 20$ kHz | | | | |
| | | $T_{amb} \leq 130$ °C | [1] | - | 0.2 | A |
| | | $T_{sp} \leq 145$ °C | - | - | 0.2 | A |
| V_R | reverse voltage | | - | - | 40 | V |
| V_F | forward voltage | $I_F = 0.2$ A | - | 520 | 600 | mV |
| I_R | reverse current | $V_R = 40$ V | - | 0.7 | 10 | μ A |

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

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-----------------------------|---|---|
| 1 | cathode [1] |  |  sym001 |
| 2 | anode | | |

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PMEG4002EJ | SC-90 | plastic surface-mounted package; 2 leads | SOD323F |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG4002EJ | 1N |

5. 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 |
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$; $f = 20\text{ kHz}$ | | | |
| | | $T_{amb} \leq 130\text{ °C}$ | [1] - | 0.2 | A |
| | | $T_{sp} \leq 145\text{ °C}$ | - | 0.2 | A |
| I_{FRM} | repetitive peak forward current | $t_p \leq 1\text{ ms}$; $\delta \leq 0.25$ | - | 2.6 | A |
| I_{FSM} | non-repetitive peak forward current | square wave; $t_p = 8\text{ ms}$ | [2] - | 2.75 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [3][4] - | 385 | mW |
| | | | [3][5] - | 695 | mW |
| | | | [3][1] - | 1045 | mW |

Table 5. Limiting values ...continued

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|----------------------|------------|-----|------|------|
| 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 PCB, Al_2O_3 , standard footprint.

[2] $T_j = 25$ °C prior to surge.

[3] Reflow soldering is the only recommended soldering method.

[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

6. 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] | | | | |
| | | | [3] | - | - | 325 | K/W |
| | | | [4] | - | - | 180 | K/W |
| | | | [5] | - | - | 120 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [6] | - | - | 25 | 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.

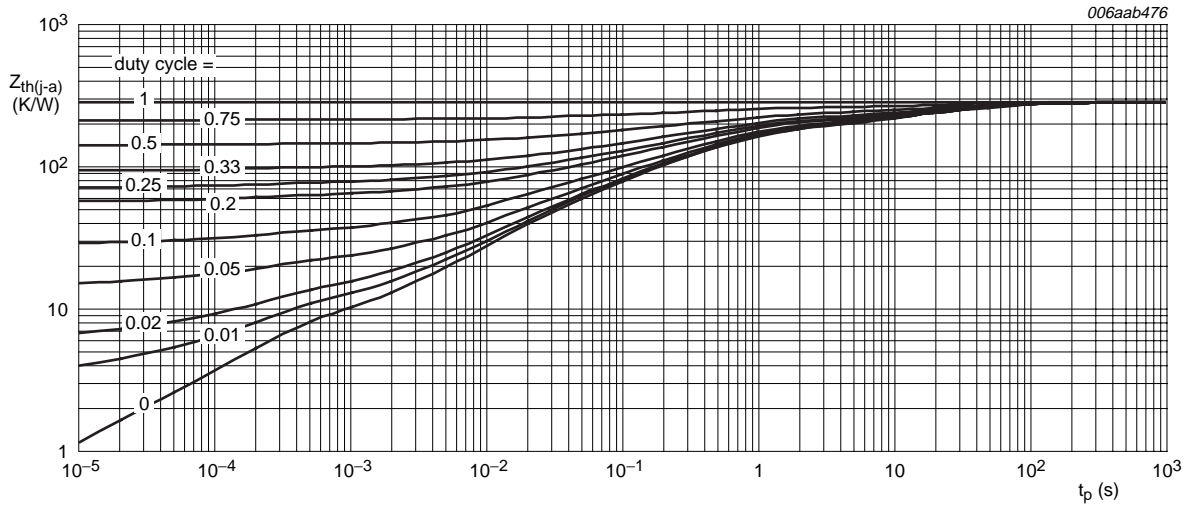
[2] Reflow soldering is the only recommended soldering method.

[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.

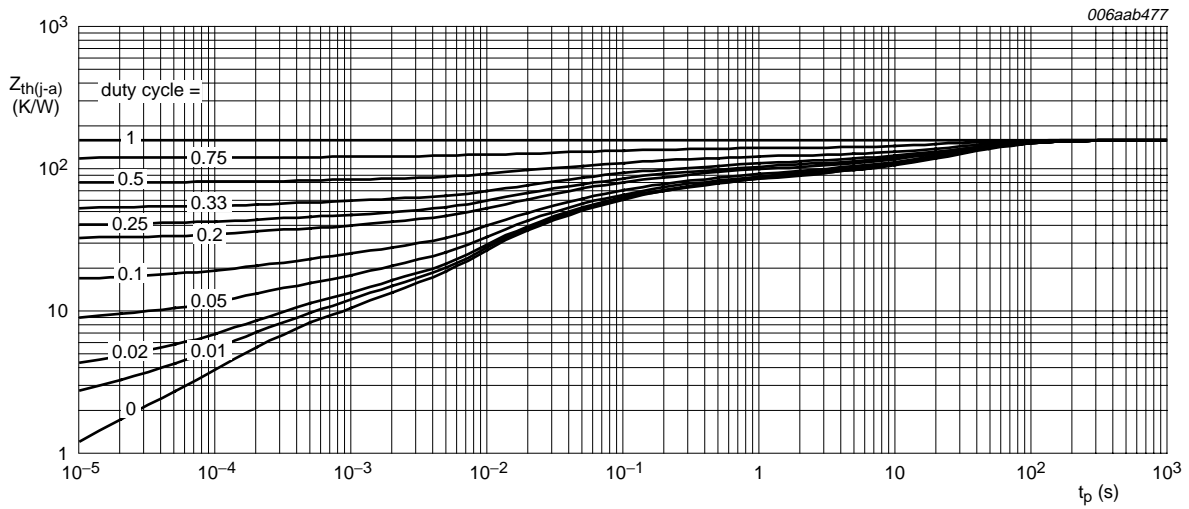
[5] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.

[6] Soldering point of cathode tab.



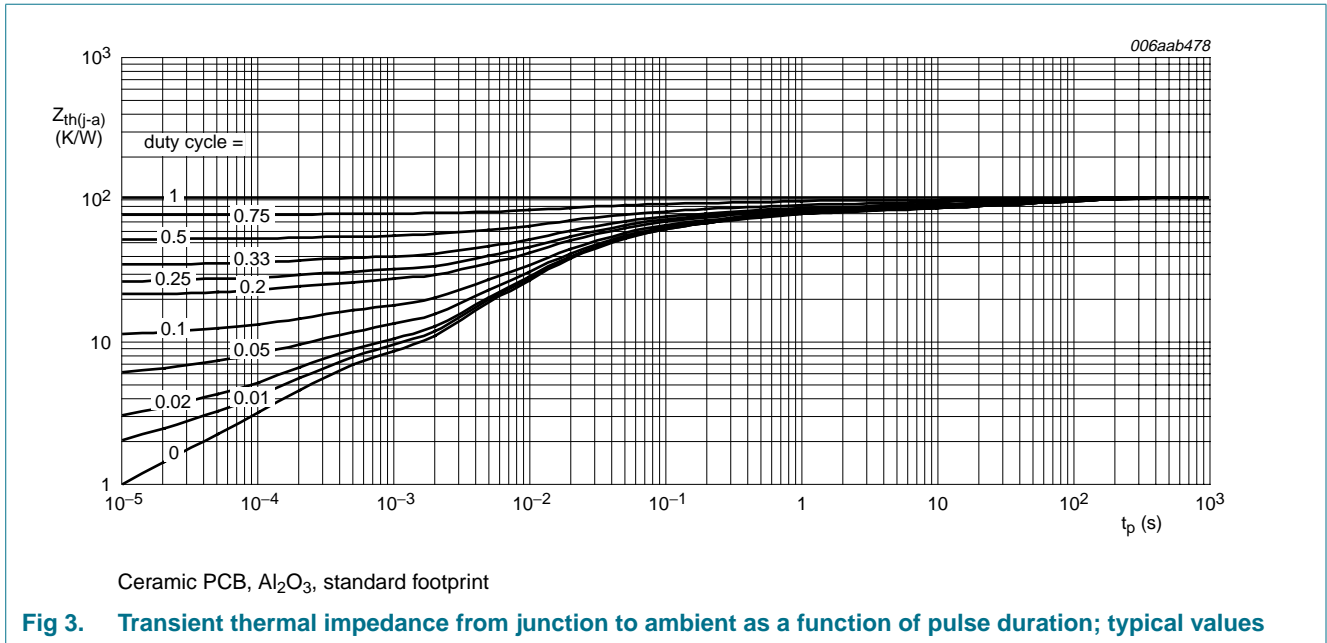
FR4 PCB, standard footprint

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



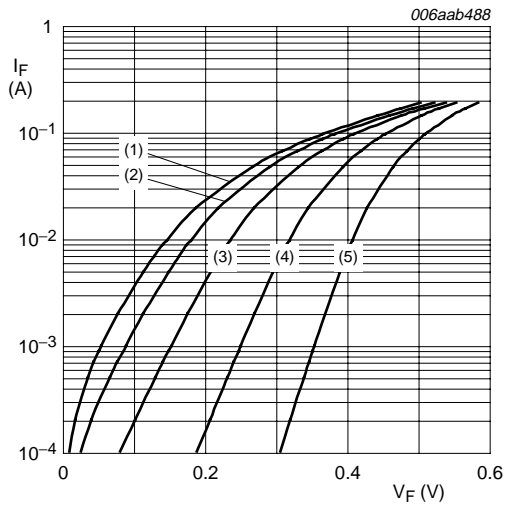
7. Characteristics

Table 7. Characteristics

$T_j = 25^\circ\text{C}$ unless otherwise specified.

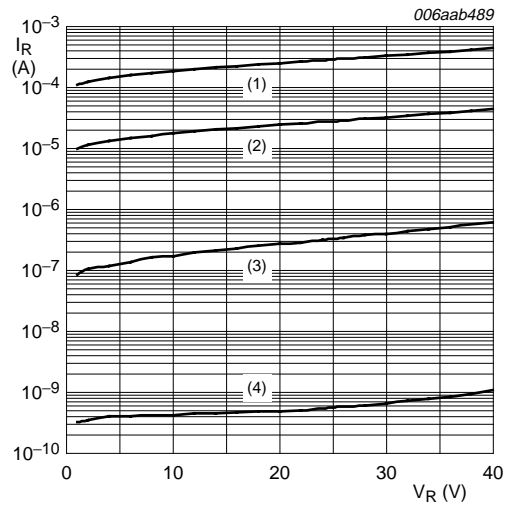
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------|-----------------------|-----------------------|-----|-----|-----|---------------|
| V_F | forward voltage | $I_F = 0.1\text{ mA}$ | - | 190 | 220 | mV |
| | | $I_F = 1\text{ mA}$ | - | 250 | 290 | mV |
| | | $I_F = 10\text{ mA}$ | - | 320 | 360 | mV |
| | | $I_F = 100\text{ mA}$ | - | 440 | 500 | mV |
| | | $I_F = 200\text{ mA}$ | - | 520 | 600 | mV |
| I_R | reverse current | $V_R = 10\text{ V}$ | - | 0.2 | 0.3 | μA |
| | | $V_R = 25\text{ V}$ | - | 0.3 | 0.5 | μA |
| | | $V_R = 40\text{ V}$ | - | 0.7 | 10 | μA |
| C_d | diode capacitance | $f = 1\text{ MHz}$ | | | | |
| | | $V_R = 1\text{ V}$ | - | 14 | - | pF |
| | | $V_R = 10\text{ V}$ | - | 6 | - | pF |
| t_{rr} | reverse recovery time | | [1] | 5 | - | ns |

[1] When switched from $I_F = 10\text{ mA}$ to $I_R = 10\text{ mA}$; $R_L = 100\ \Omega$; measured at $I_R = 1\text{ mA}$.



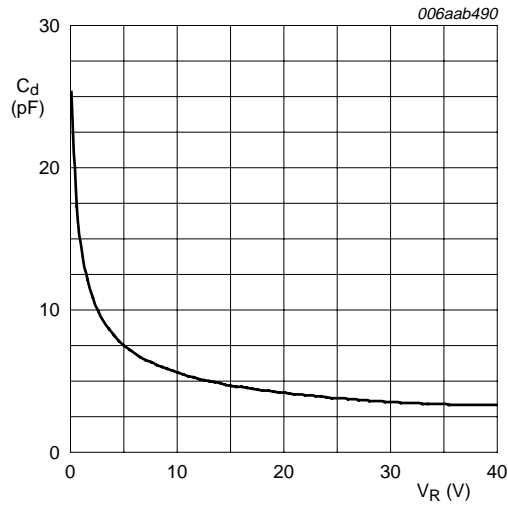
- (1) $T_j = 150\text{ }^\circ\text{C}$
- (2) $T_j = 125\text{ }^\circ\text{C}$
- (3) $T_j = 85\text{ }^\circ\text{C}$
- (4) $T_j = 25\text{ }^\circ\text{C}$
- (5) $T_j = -40\text{ }^\circ\text{C}$

Fig 4. Forward current as a function of forward voltage; typical values



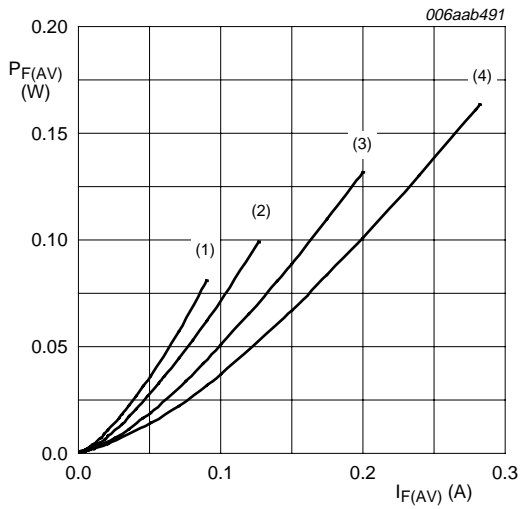
- (1) $T_j = 125\text{ }^\circ\text{C}$
- (2) $T_j = 85\text{ }^\circ\text{C}$
- (3) $T_j = 25\text{ }^\circ\text{C}$
- (4) $T_j = -40\text{ }^\circ\text{C}$

Fig 5. Reverse current as a function of reverse voltage; typical values



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

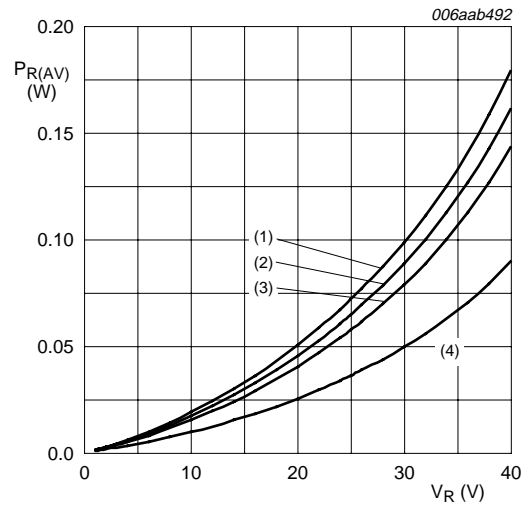
Fig 6. Diode capacitance as a function of reverse voltage; typical values



$T_j = 150\text{ °C}$

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

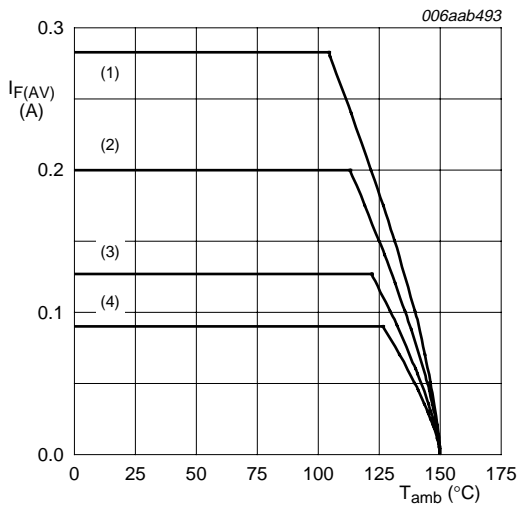
Fig 7. Average forward power dissipation as a function of average forward current; typical values



$T_j = 125\text{ °C}$

- (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

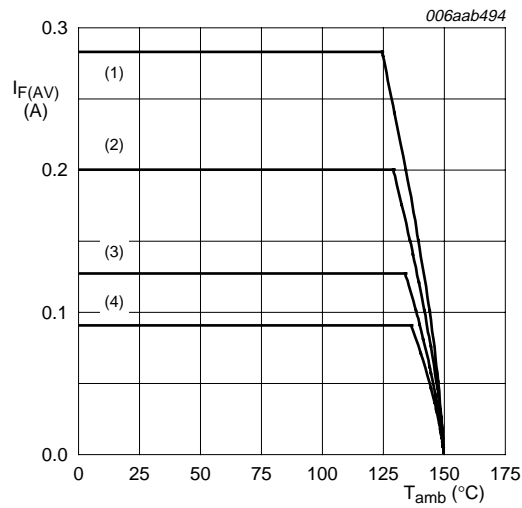


FR4 PCB, standard footprint

$T_j = 150\text{ °C}$

- (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

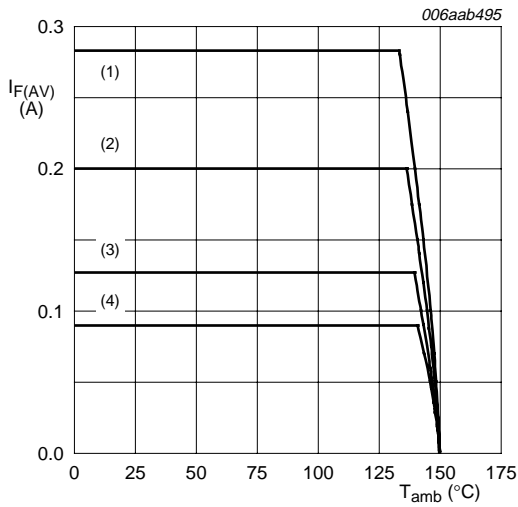


FR4 PCB, mounting pad for cathode 1 cm²

$T_j = 150\text{ °C}$

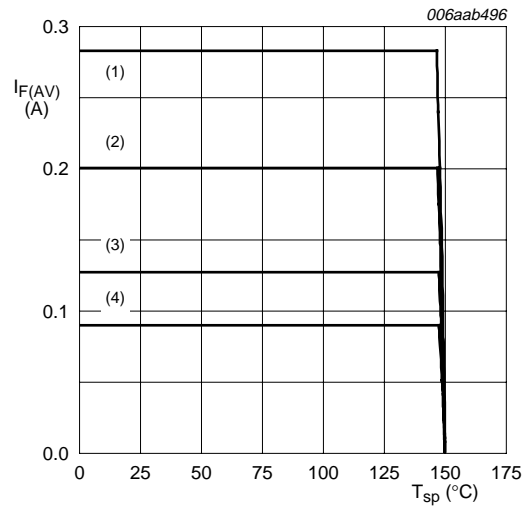
- (1) $\delta = 1$; DC
- (2) $\delta = 0.5$; $f = 20\text{ kHz}$
- (3) $\delta = 0.2$; $f = 20\text{ kHz}$
- (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



Ceramic PCB, Al_2O_3 , standard footprint
 $T_j = 150$ °C
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20$ kHz
 (3) $\delta = 0.2$; $f = 20$ kHz
 (4) $\delta = 0.1$; $f = 20$ kHz

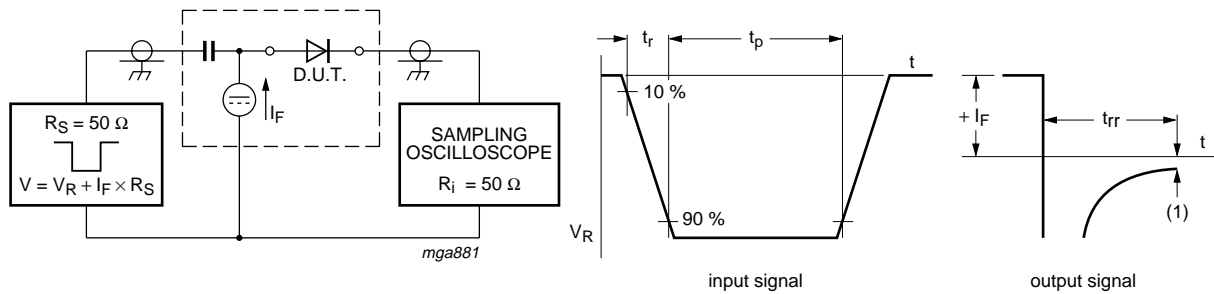
Fig 11. Average forward current as a function of ambient temperature; typical values



$T_j = 150$ °C
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20$ kHz
 (3) $\delta = 0.2$; $f = 20$ kHz
 (4) $\delta = 0.1$; $f = 20$ kHz

Fig 12. Average forward current as a function of solder point temperature; typical values

8. Test information



(1) $I_R = 1$ mA
 Input signal: reverse pulse rise time $t_r = 0.6$ ns; reverse voltage pulse duration $t_p = 100$ ns; duty cycle $\delta = 0.05$
 Oscilloscope: rise time $t_r = 0.35$ ns

Fig 13. Reverse recovery time test circuit and waveforms

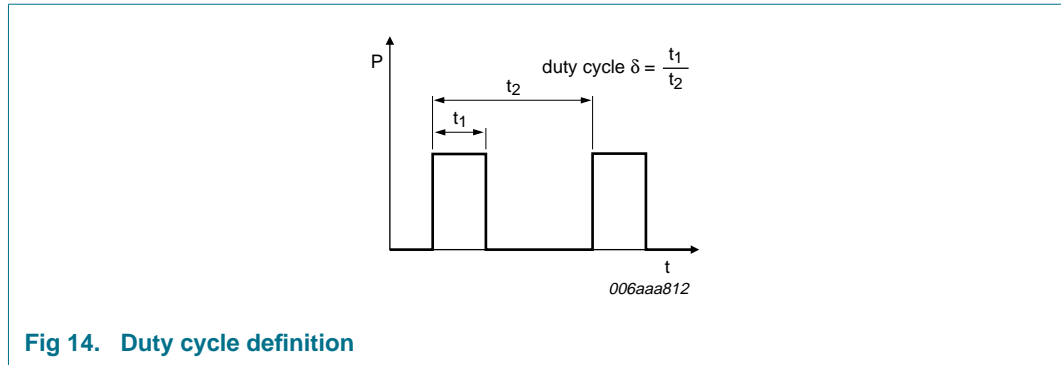


Fig 14. Duty cycle definition

The current ratings for the typical waveforms as shown in [Figure 9](#), [10](#), [11](#) and [12](#) 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.

8.1 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.

9. Package outline

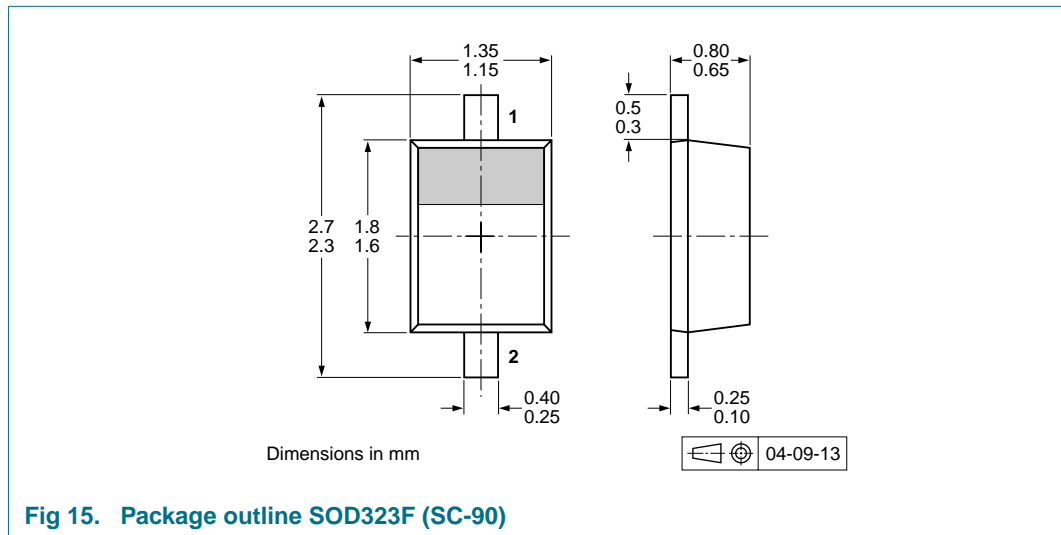


Fig 15. Package outline SOD323F (SC-90)

10. Packing information

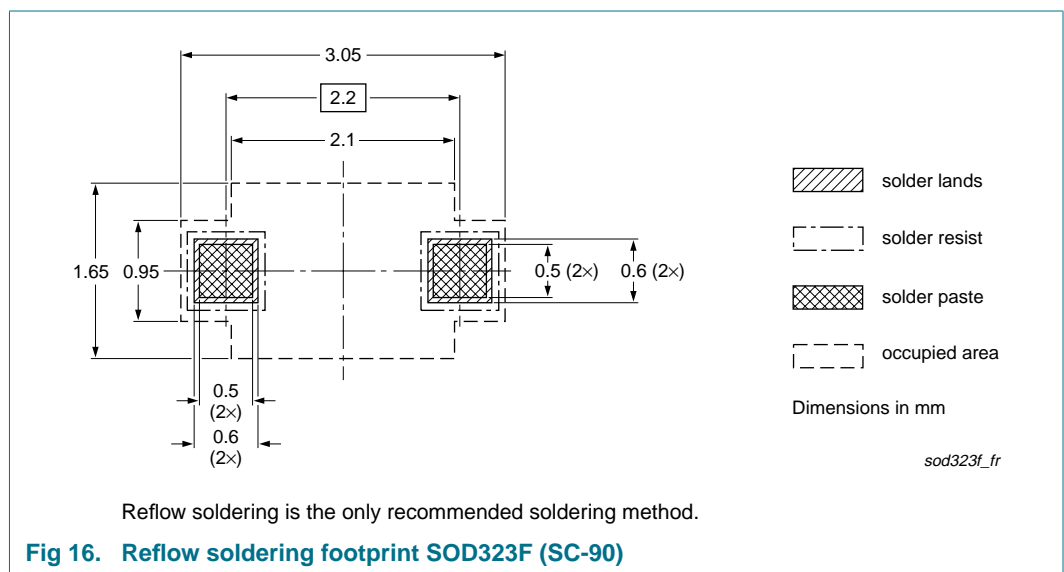
Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity | |
|-------------|---------|--------------------------------|------------------|-------|
| | | | 3000 | 10000 |
| PMEG4002EJ | SOD323F | 4 mm pitch, 8 mm tape and reel | -115 | -135 |

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering



12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|--------------|--------------|--------------------|---------------|------------|
| PMEG4002EJ_1 | 20090515 | Product data sheet | - | - |

13. Legal information

13.1 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. |
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[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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