



PMEG4050ETP

40 V, 5 A low VF MEGA Schottky barrier rectifier

Rev. 1 — 10 October 2011

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 SOD128 small and flat lead Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- Average forward current: $I_{F(AV)} \leq 5$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage
- High power capability due to clip-bonding technology
- Small and flat lead SMD plastic package
- AEC-Q101 qualified
- High temperature $T_j \leq 175$ °C

1.3 Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Reverse polarity protection
- Low power consumption applications
- High temperature applications

1.4 Quick reference data



Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|-------------------------|---|-----|-----|-----|---------|
| $I_{F(AV)}$ | average forward current | square wave; $\delta = 0.5$; $f = 20$ kHz; $T_{sp} \leq 155$ °C | - | - | 5 | A |
| V_R | reverse voltage | $T_j = 25$ °C | - | - | 40 | V |
| V_F | forward voltage | $I_F = 5$ A; $T_j = 25$ °C | - | 430 | 490 | mV |
| I_R | reverse current | $T_j = 25$ °C; $V_R = 40$ V | - | 60 | 300 | μ A |



2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|------------------------|---|---|
| 1 | K | cathode ^[1] |  <p>SOD128</p> |  <p>sym001</p> |
| 2 | A | anode | | |

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PMEG4050ETP | - | plastic surface-mounted package; 2 leads | SOD128 |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG4050ETP | C4 |

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; $\delta = 0.5$; $f = 20\text{ kHz}$; $T_{amb} \leq 15\text{ °C}$ | [1] | - | 5 | A |
| | | square wave; $\delta = 0.5$; $f = 20\text{ kHz}$; $T_{sp} \leq 155\text{ °C}$ | | - | 5 | A |
| I_{FSM} | non-repetitive peak forward current | square wave; $t_p = 8\text{ ms}$; $T_{j(init)} = 25\text{ °C}$ | - | 70 | A | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [2][3] | - | 750 | mW |
| | | | [4][3] | - | 1250 | mW |
| | | | [1][3] | - | 2500 | mW |
| T_j | junction temperature | | - | 175 | °C | |
| T_{amb} | ambient temperature | | -55 | 175 | °C | |
| T_{stg} | storage temperature | | -65 | 175 | °C | |

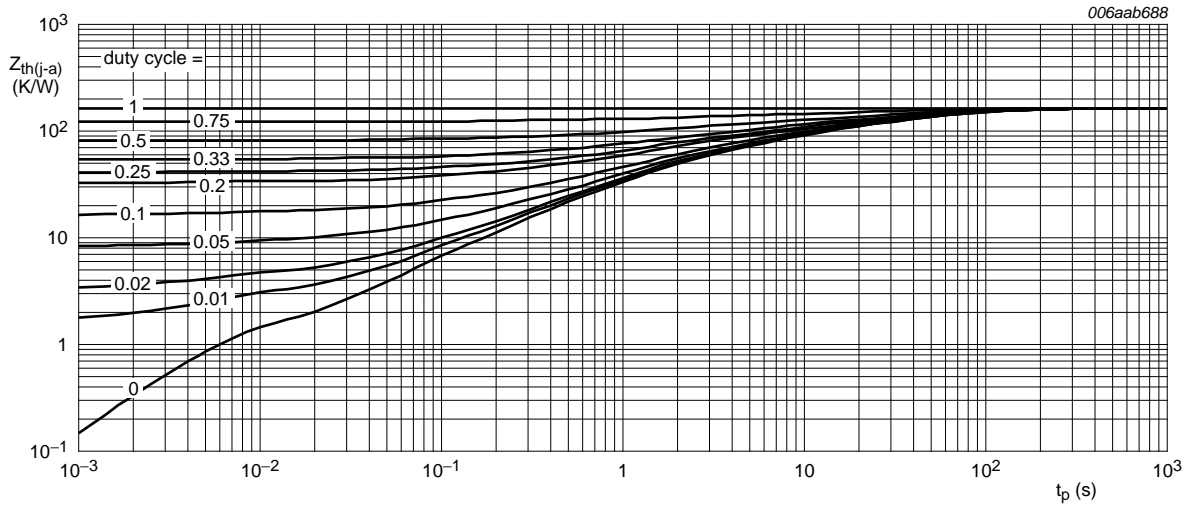
- [1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3 , standard footprint.
 [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
 [3] Reflow soldering is the only recommended soldering method.
 [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .

6. Thermal characteristics

Table 6. Thermal characteristics

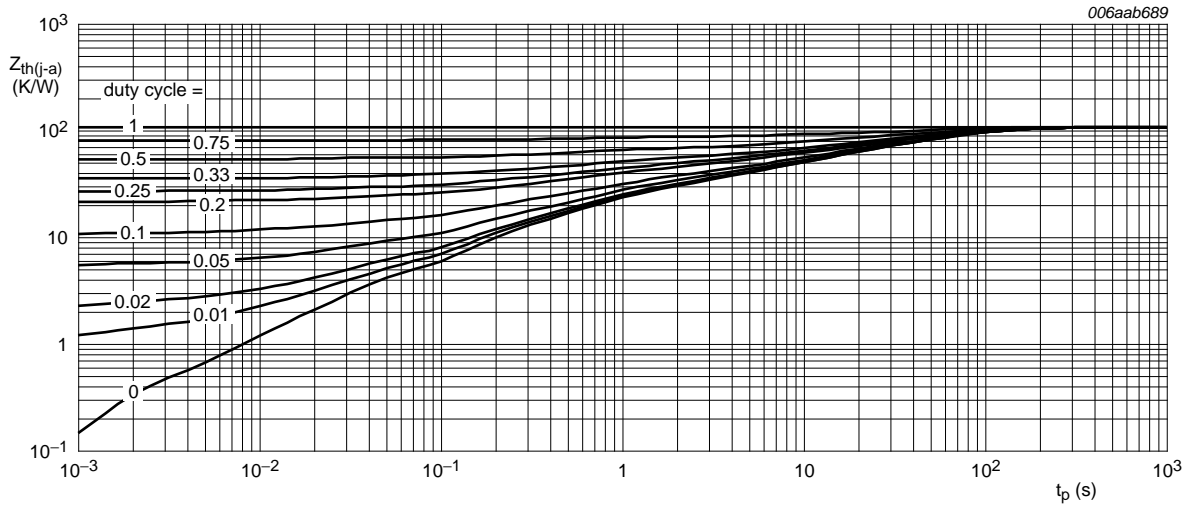
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|----------------|--|-------------|-----------|-----|-----|------|-----|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1][2][3] | - | - | 200 | K/W |
| | | | [1][4][3] | - | - | 120 | K/W |
| | | | [1][5][3] | - | - | 60 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [6] | - | - | 12 | 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] Reflow soldering is the only recommended soldering method.
 [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .
 [5] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.
 [6] Soldering point of cathode tab.



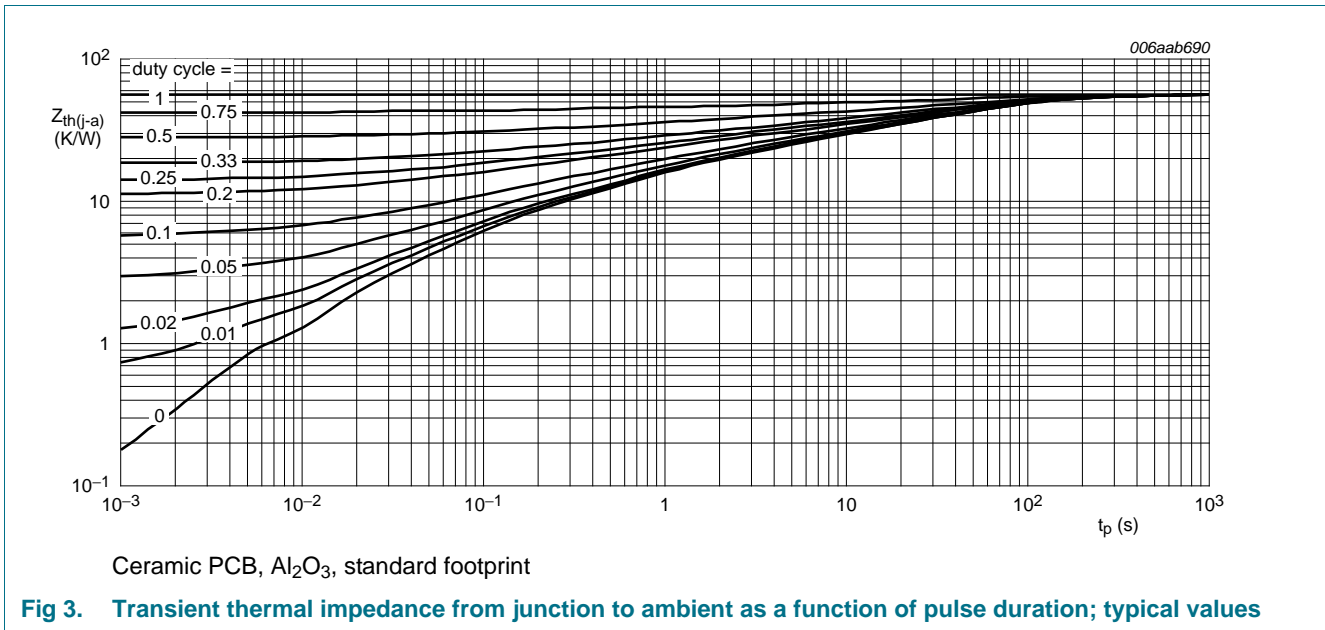
FR4 PCB, standard footprint

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

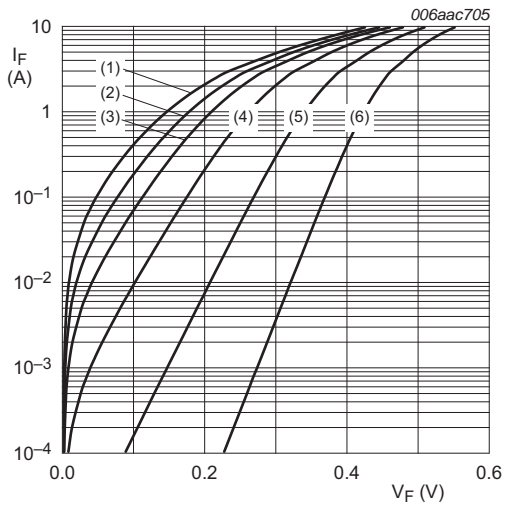
Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



7. Characteristics

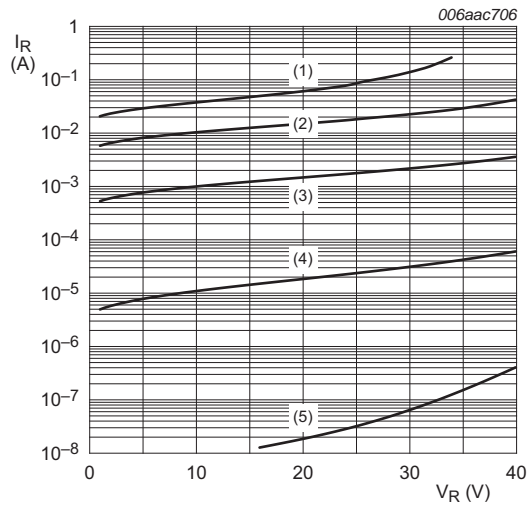
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|-------------------|--|-----|-----|-----|------|
| V _F | forward voltage | I _F = 0.1 A; T _j = 25 °C | - | 270 | 310 | mV |
| | | I _F = 1 A; T _j = 25 °C | - | 340 | 390 | mV |
| | | I _F = 5 A; T _j = 25 °C | - | 430 | 490 | mV |
| | | I _F = 5 A; T _j = 125 °C | - | 340 | 390 | mV |
| I _R | reverse current | V _R = 10 V; T _j = 25 °C | - | 10 | - | µA |
| | | V _R = 40 V; T _j = 25 °C | - | 60 | 300 | µA |
| | | V _R = 10 V; T _j = 125 °C | - | 10 | - | mA |
| | | V _R = 40 V; T _j = 125 °C | - | 42 | - | mA |
| C _d | diode capacitance | V _R = 1 V; f = 1 MHz; T _j = 25 °C | - | 600 | - | pF |
| | | V _R = 10 V; f = 1 MHz; T _j = 25 °C | - | 220 | - | pF |



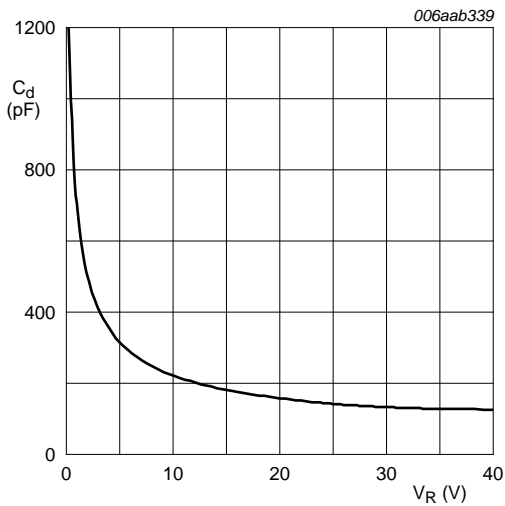
- (1) $T_j = 175\text{ °C}$
- (2) $T_j = 150\text{ °C}$
- (3) $T_j = 125\text{ °C}$
- (4) $T_j = 85\text{ °C}$
- (5) $T_j = 25\text{ °C}$
- (6) $T_j = -40\text{ °C}$

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



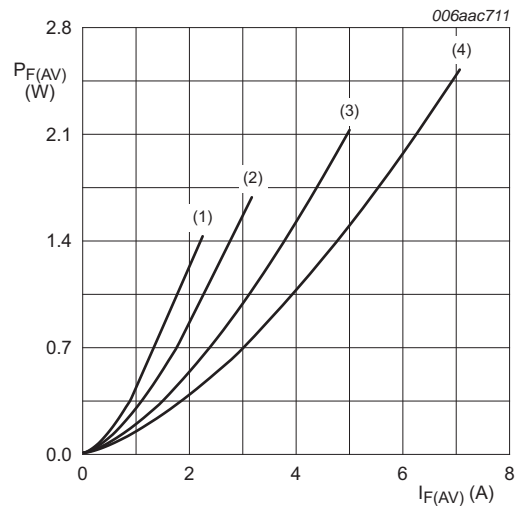
- (1) $T_j = 150\text{ °C}$
- (2) $T_j = 125\text{ °C}$
- (3) $T_j = 85\text{ °C}$
- (4) $T_j = 25\text{ °C}$
- (5) $T_j = -40\text{ °C}$

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



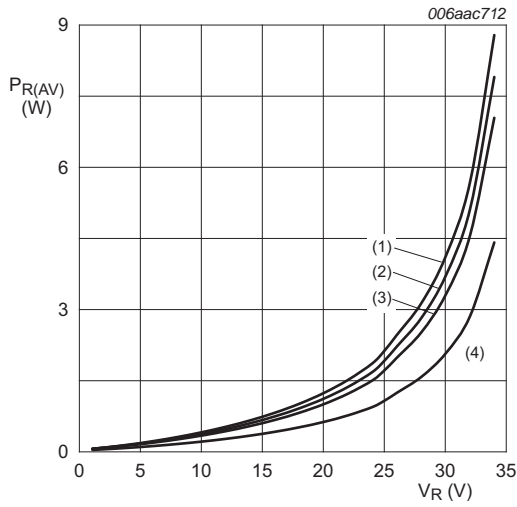
$f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$

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



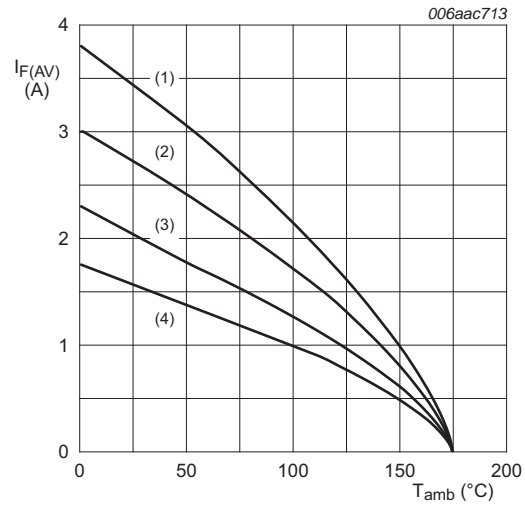
- $T_j = 175\text{ °C}$
- (1) $\delta = 0.1$
- (2) $\delta = 0.2$
- (3) $\delta = 0.5$
- (4) $\delta = 1.0$

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



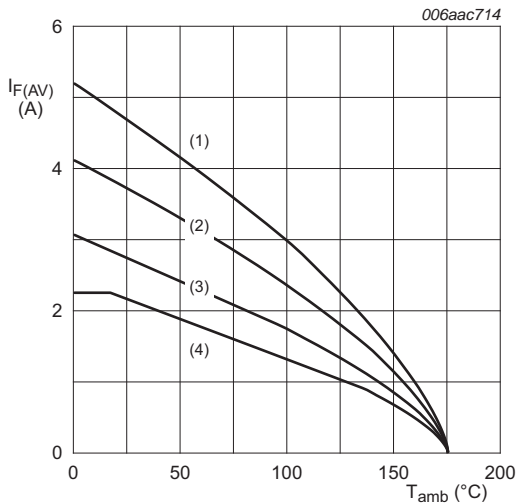
$T_j = 150\text{ °C}$
 (1) $\delta = 1.0$
 (2) $\delta = 0.9$
 (3) $\delta = 0.8$
 (4) $\delta = 0.5$

Fig 8. Average reverse power dissipation as a function of reverse voltage; typical values



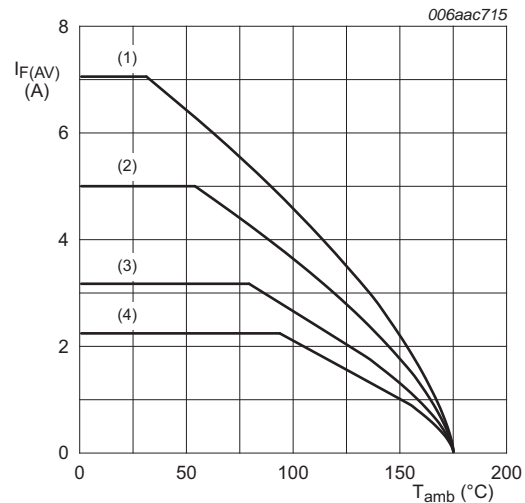
FR4 PCB, standard footprint
 $T_j = 175\text{ °C}$
 (1) $\delta = 1.0$ (DC)
 (2) $\delta = 0.5$; $f = 20\text{ kHz}$
 (3) $\delta = 0.2$; $f = 20\text{ kHz}$
 (4) $\delta = 0.1$; $f = 20\text{ kHz}$

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



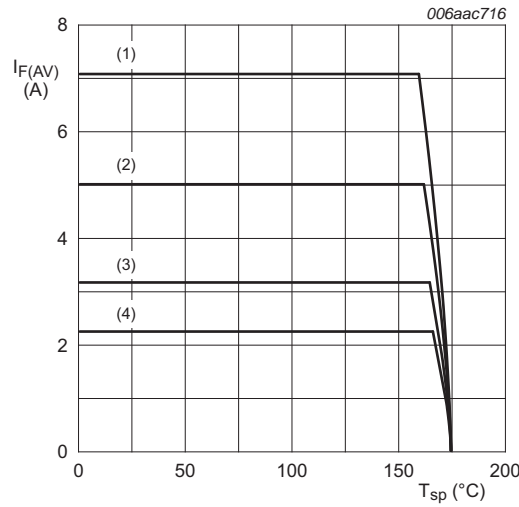
FR4 PCB, mounting pad for cathode 1 cm^2
 $T_j = 175\text{ °C}$
 (1) $\delta = 1.0$
 (2) $\delta = 0.9$
 (3) $\delta = 0.8$
 (4) $\delta = 0.5$

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



Ceramic PCB, Al_2O_3 , standard footprint
 $T_j = 175\text{ °C}$
 (1) $\delta = 1.0$ (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



- $T_j = 175\text{ °C}$
- (1) $\delta = 1.0$
- (2) $\delta = 0.9$
- (3) $\delta = 0.8$
- (4) $\delta = 0.5$

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

8. Test information

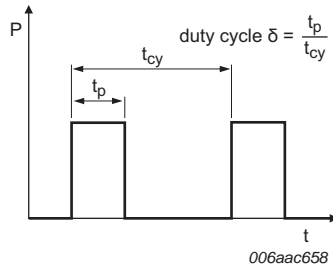


Fig 13. Duty cycle definition

The current ratings for the typical waveforms as shown in figures 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

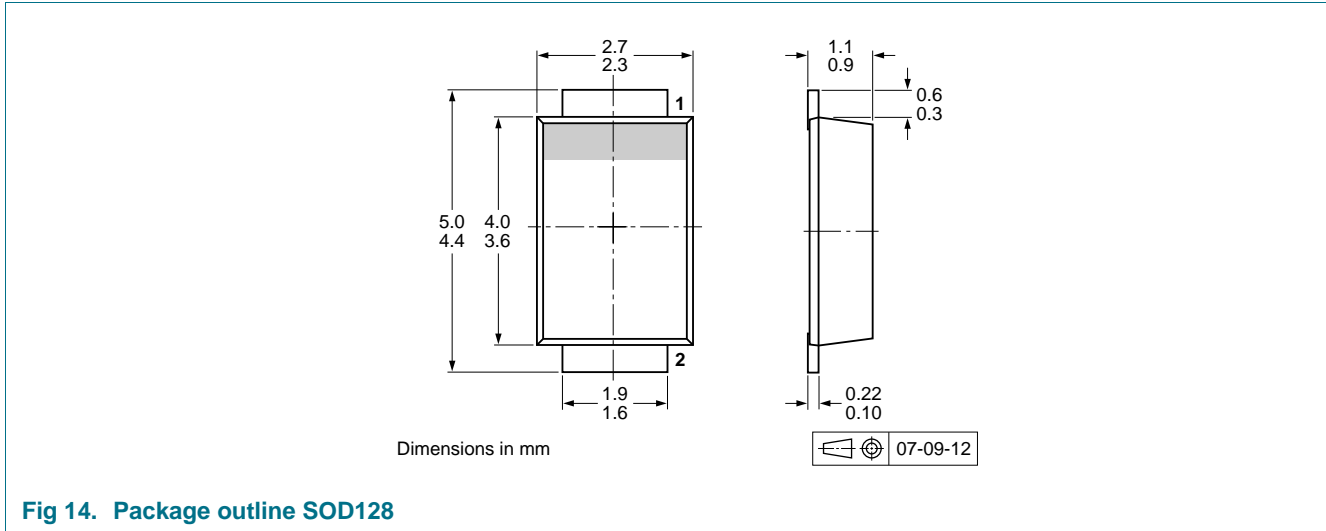


Fig 14. Package outline SOD128

10. Packing information

Table 8. Ordering information

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

| Type number | Package | Description | Packing quantity |
|-------------|---------|---------------------------------|------------------|
| PMEG4050ETP | SOD128 | 4 mm pitch, 12 mm tape and reel | 3000 |
| | | | -115 |

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

11. Soldering

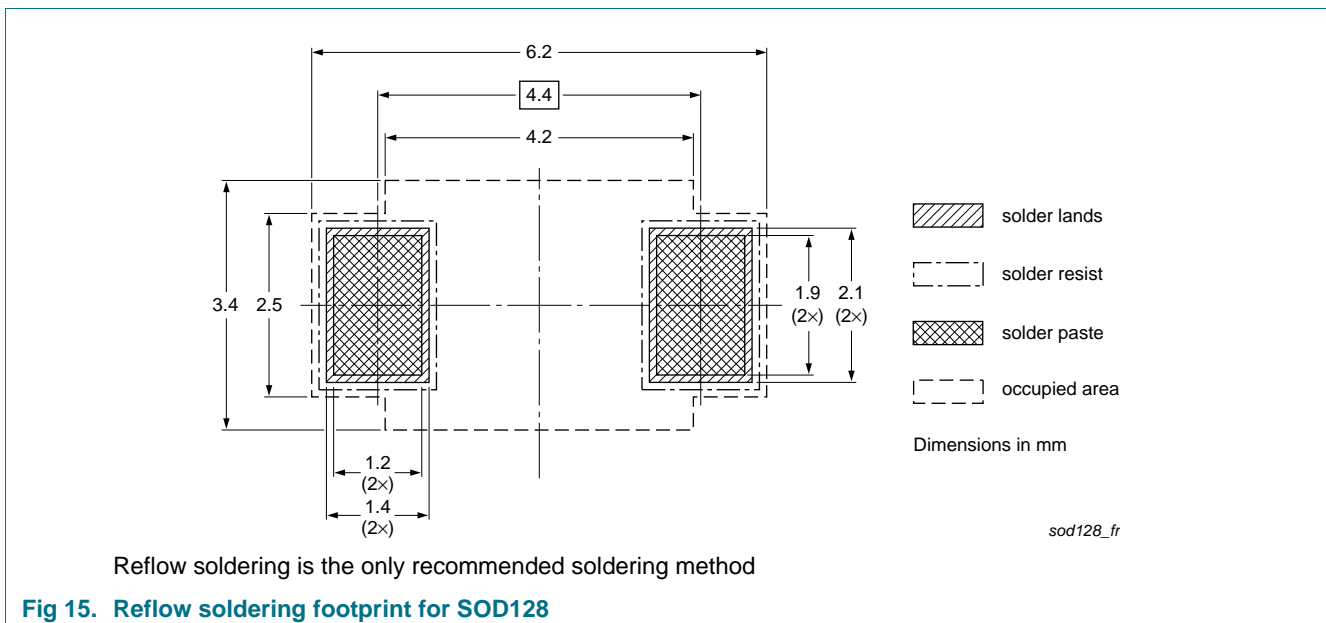


Fig 15. Reflow soldering footprint for SOD128

12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PMEG4050ETP v.1 | 20111010 | 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. |
| Product [short] data sheet | Production | This document contains the product specification. |

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

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