

# PMEGxx05EH/EJ series

0.5 A very low  $V_F$  MEGA Schottky barrier rectifiers

Rev. 01 — 12 April 2005

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 small SMD package.

Table 1: Product overview

| Type number | Package |       | Configuration |
|-------------|---------|-------|---------------|
|             | Philips | JEITA |               |
| PMEG2005EH  | SOD123F | -     | single diode  |
| PMEG3005EH  |         |       |               |
| PMEG4005EH  |         |       |               |
| PMEG2005EJ  | SOD323F | SC-90 | single diode  |
| PMEG3005EJ  |         |       |               |
| PMEG4005EJ  |         |       |               |

### 1.2 Features

- Forward current: 0.5 A
- Very low forward voltage
- Flat lead SMD package

### 1.3 Applications

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

# PHILIPS

## 1.4 Quick reference data

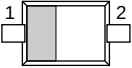
Table 2: Quick reference data

| Symbol | Parameter                 | Conditions                 | Min | Typ | Max | Unit |
|--------|---------------------------|----------------------------|-----|-----|-----|------|
| $I_F$  | forward current           | $T_{sp} \leq 55\text{ °C}$ | -   | -   | 0.5 | A    |
| $V_R$  | reverse voltage           |                            |     |     |     |      |
|        | PMEG2005EH,<br>PMEG2005EJ |                            | -   | -   | 20  | V    |
|        | PMEG3005EH,<br>PMEG3005EJ |                            | -   | -   | 30  | V    |
|        | PMEG4005EH,<br>PMEG4005EJ |                            | -   | -   | 40  | V    |
| $V_F$  | forward voltage           | $I_F = 500\text{ mA}$      | [1] |     |     |      |
|        | PMEG2005EH,<br>PMEG2005EJ |                            | -   | 355 | 390 | mV   |
|        | PMEG3005EH,<br>PMEG3005EJ |                            | -   | 380 | 430 | mV   |
|        | PMEG4005EH,<br>PMEG4005EJ |                            | -   | 420 | 470 | mV   |

[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

## 2. Pinning information

Table 3: Pinning

| Pin | Description | Simplified outline                                                                    | Symbol                                                                                          |
|-----|-------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1   | cathode     |  | <br>sym001 |
| 2   | anode       |                                                                                       |                                                                                                 |

[1] The marking bar indicates the cathode.

## 3. Ordering information

Table 4: Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| PMEG2005EH  | -       | plastic surface mounted package; 2 leads | SOD123F |
| PMEG3005EH  |         |                                          |         |
| PMEG4005EH  |         |                                          |         |
| PMEG2005EJ  | SC-90   | plastic surface mounted package; 2 leads | SOD323F |
| PMEG3005EJ  |         |                                          |         |
| PMEG4005EJ  |         |                                          |         |

## 4. Marking

Table 5: Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMEG2005EH  | A3           |
| PMEG3005EH  | A4           |
| PMEG4005EH  | A5           |
| PMEG2005EJ  | CC           |
| PMEG3005EJ  | CD           |
| PMEG4005EJ  | CE           |

## 5. Limiting values

Table 6: Limiting values

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

| Symbol    | Parameter                           | Conditions                                  | Min   | Max  | Unit |
|-----------|-------------------------------------|---------------------------------------------|-------|------|------|
| $V_R$     | reverse voltage                     |                                             |       |      |      |
|           | PMEG2005EH,<br>PMEG2005EJ           |                                             | -     | 20   | V    |
|           | PMEG3005EH,<br>PMEG3005EJ           |                                             | -     | 30   | V    |
|           | PMEG4005EH,<br>PMEG4005EJ           |                                             | -     | 40   | V    |
| $I_F$     | forward current                     | $T_{sp} \leq 55\text{ °C}$                  | -     | 0.5  | A    |
| $I_{FRM}$ | repetitive peak forward current     | $t_p \leq 1\text{ ms}$ ; $\delta \leq 0.25$ | -     | 7    | A    |
| $I_{FSM}$ | non-repetitive peak forward current | $t = 8\text{ ms}$ square wave               | -     | 10   | A    |
| $P_{tot}$ | total power dissipation             | $T_{amb} \leq 25\text{ °C}$                 |       |      |      |
|           | SOD123F                             |                                             | [1] - | 375  | mW   |
|           |                                     |                                             | [2] - | 830  | mW   |
|           | SOD323F                             |                                             | [1] - | 360  | mW   |
|           |                                     |                                             | [2] - | 830  | mW   |
| $T_j$     | junction temperature                |                                             | -     | 150  | °C   |
| $T_{amb}$ | ambient temperature                 |                                             | -65   | +150 | °C   |
| $T_{stg}$ | storage temperature                 |                                             | -65   | +150 | °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<sup>2</sup>.

## 6. Thermal characteristics

**Table 7: Thermal characteristics**

| Symbol         | Parameter                                        | Conditions                                          | Min | Typ | Max | Unit |
|----------------|--------------------------------------------------|-----------------------------------------------------|-----|-----|-----|------|
| $R_{th(j-a)}$  | thermal resistance from junction to ambient      | in free air <a href="#">[1]</a> <a href="#">[2]</a> |     |     |     |      |
|                | SOD123F                                          |                                                     | -   | -   | 330 | K/W  |
|                | SOD323F                                          |                                                     | -   | -   | 350 | K/W  |
|                |                                                  | <a href="#">[1]</a> <a href="#">[3]</a>             | -   | -   | 150 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |                                                     |     |     |     |      |
|                | SOD123F                                          |                                                     | -   | -   | 60  | K/W  |
|                | SOD323F                                          |                                                     | -   | -   | 55  | K/W  |

[1] Schottky barrier diodes thermal run-away has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses. Nomograms for determining the reverse power losses  $P_R$  and  $I_{F(AV)}$  rating will be available on request.

[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>.

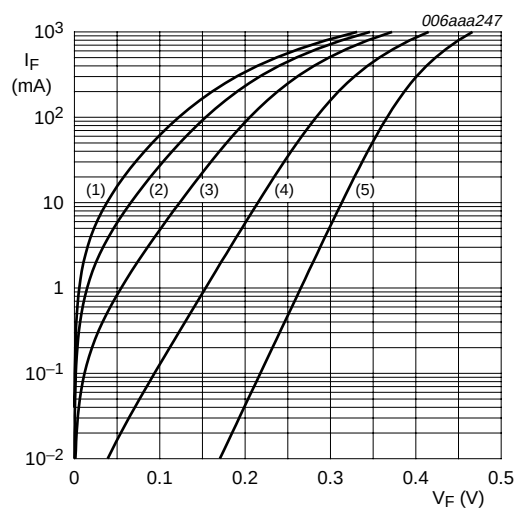
## 7. Characteristics

**Table 8: Characteristics**
 $T_{amb} = 25^\circ\text{C}$  unless otherwise specified.

| Symbol | Parameter                 | Conditions            | Min                                  | Typ | Max | Unit          |
|--------|---------------------------|-----------------------|--------------------------------------|-----|-----|---------------|
| $V_F$  | forward voltage           |                       | [1]                                  |     |     |               |
|        | PMEG2005EH,<br>PMEG2005EJ | $I_F = 0.1\text{ mA}$ | -                                    | 90  | 130 | mV            |
|        |                           | $I_F = 1\text{ mA}$   | -                                    | 150 | 190 | mV            |
|        |                           | $I_F = 10\text{ mA}$  | -                                    | 210 | 240 | mV            |
|        |                           | $I_F = 100\text{ mA}$ | -                                    | 280 | 330 | mV            |
|        |                           | $I_F = 500\text{ mA}$ | -                                    | 355 | 390 | mV            |
|        | PMEG3005EH,<br>PMEG3005EJ | $I_F = 0.1\text{ mA}$ | -                                    | 90  | 130 | mV            |
|        |                           | $I_F = 1\text{ mA}$   | -                                    | 150 | 200 | mV            |
|        |                           | $I_F = 10\text{ mA}$  | -                                    | 215 | 250 | mV            |
|        |                           | $I_F = 100\text{ mA}$ | -                                    | 285 | 340 | mV            |
|        |                           | $I_F = 500\text{ mA}$ | -                                    | 380 | 430 | mV            |
|        | PMEG4005EH,<br>PMEG4005EJ | $I_F = 0.1\text{ mA}$ | -                                    | 95  | 130 | mV            |
|        |                           | $I_F = 1\text{ mA}$   | -                                    | 155 | 210 | mV            |
|        |                           | $I_F = 10\text{ mA}$  | -                                    | 220 | 270 | mV            |
|        |                           | $I_F = 100\text{ mA}$ | -                                    | 295 | 350 | mV            |
|        |                           | $I_F = 500\text{ mA}$ | -                                    | 420 | 470 | mV            |
| $I_R$  | reverse current           |                       | [1] [2]                              |     |     |               |
|        | PMEG2005EH,<br>PMEG2005EJ | $V_R = 10\text{ V}$   | -                                    | 15  | 40  | $\mu\text{A}$ |
|        |                           | $V_R = 20\text{ V}$   | -                                    | 40  | 200 | $\mu\text{A}$ |
|        | PMEG3005EH,<br>PMEG3005EJ | $V_R = 10\text{ V}$   | -                                    | 12  | 30  | $\mu\text{A}$ |
|        |                           | $V_R = 30\text{ V}$   | -                                    | 40  | 150 | $\mu\text{A}$ |
|        | PMEG4005EH,<br>PMEG4005EJ | $V_R = 10\text{ V}$   | -                                    | 7   | 20  | $\mu\text{A}$ |
|        |                           | $V_R = 40\text{ V}$   | -                                    | 30  | 100 | $\mu\text{A}$ |
| $C_d$  | diode capacitance         |                       | $V_R = 1\text{ V}; f = 1\text{ MHz}$ |     |     |               |
|        | PMEG2005EH,<br>PMEG2005EJ |                       | -                                    | 66  | 80  | pF            |
|        | PMEG3005EH,<br>PMEG3005EJ |                       | -                                    | 55  | 70  | pF            |
|        | PMEG4005EH,<br>PMEG4005EJ |                       | -                                    | 43  | 50  | pF            |

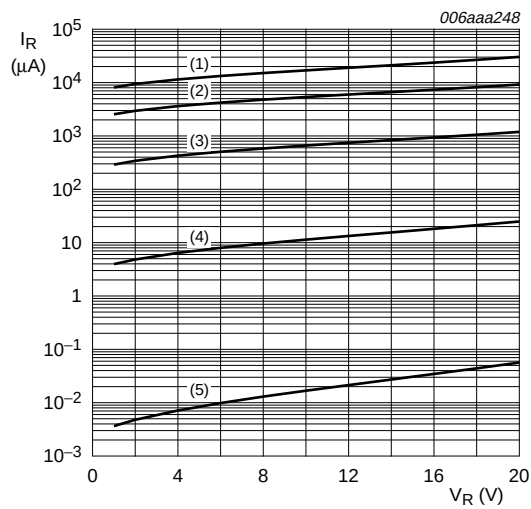
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

[2] Schottky barrier rectifier thermal run-away has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses. Nomograms for determining the reverse power losses  $P_R$  and  $I_{F(AV)}$  rating will be available on request.



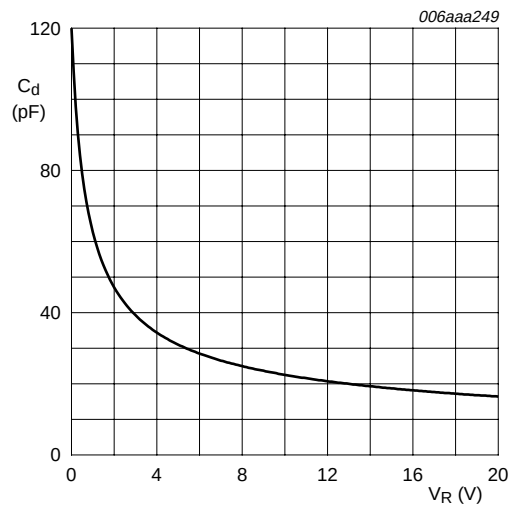
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 1. PMEG2005EH, PMEG2005EJ: Forward current as a function of forward voltage; typical values



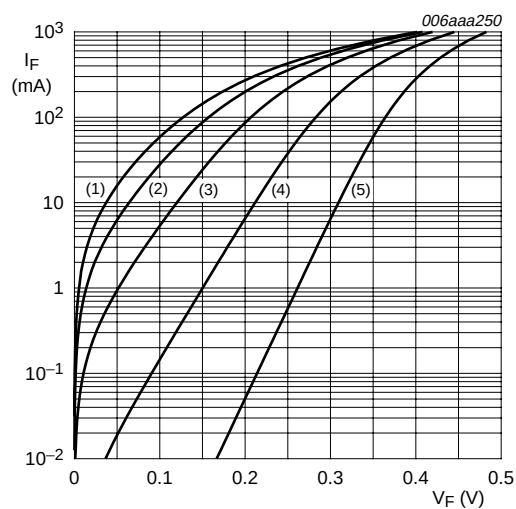
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 2. PMEG2005EH, PMEG2005EJ: Reverse current as a function of reverse voltage; typical values



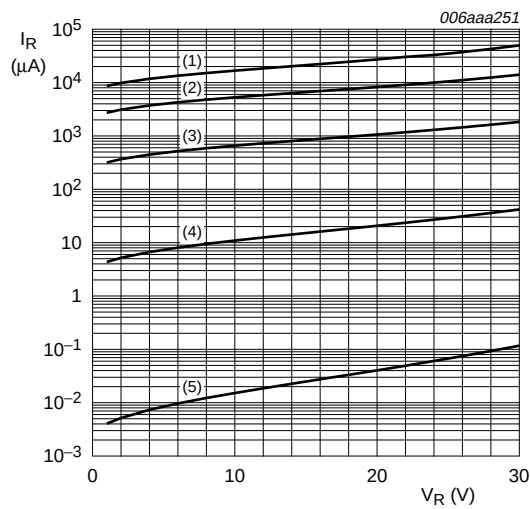
$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $f = 1\text{ MHz}$

Fig 3. PMEG2005EH, PMEG2005EJ: Diode capacitance as a function of reverse voltage; typical values



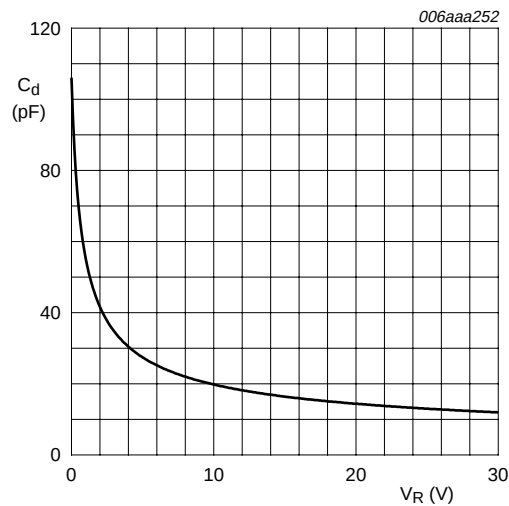
- (1)  $T_{amb} = 150\text{ °C}$
- (2)  $T_{amb} = 125\text{ °C}$
- (3)  $T_{amb} = 85\text{ °C}$
- (4)  $T_{amb} = 25\text{ °C}$
- (5)  $T_{amb} = -40\text{ °C}$

Fig 4. PMEG3005EH, PMEG3005EJ: Forward current as a function of forward voltage; typical values



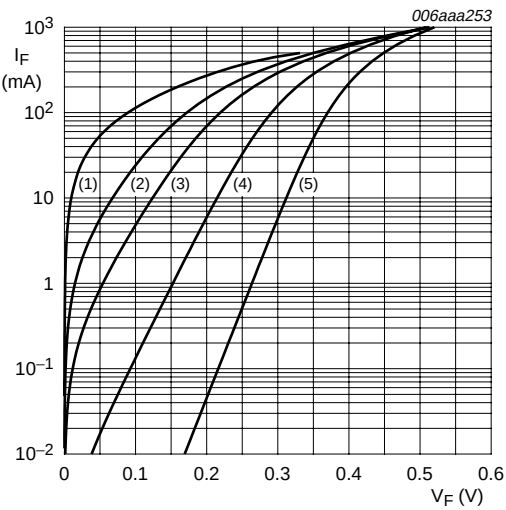
- (1)  $T_{amb} = 150\text{ °C}$
- (2)  $T_{amb} = 125\text{ °C}$
- (3)  $T_{amb} = 85\text{ °C}$
- (4)  $T_{amb} = 25\text{ °C}$
- (5)  $T_{amb} = -40\text{ °C}$

Fig 5. PMEG3005EH, PMEG3005EJ: Reverse current as a function of reverse voltage; typical values



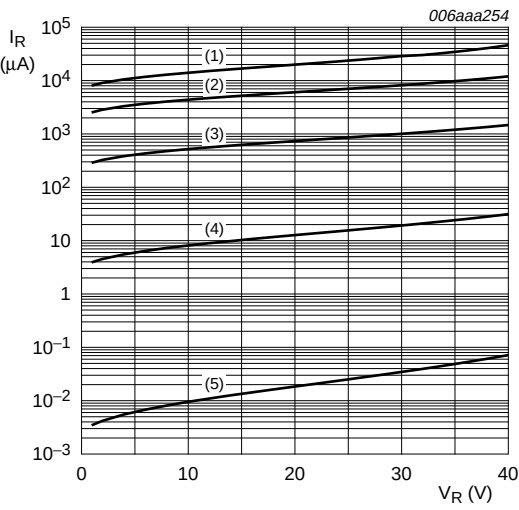
$T_{amb} = 25\text{ °C}$ ;  $f = 1\text{ MHz}$

Fig 6. PMEG3005EH, PMEG3005EJ: Diode capacitance as a function of reverse voltage; typical values



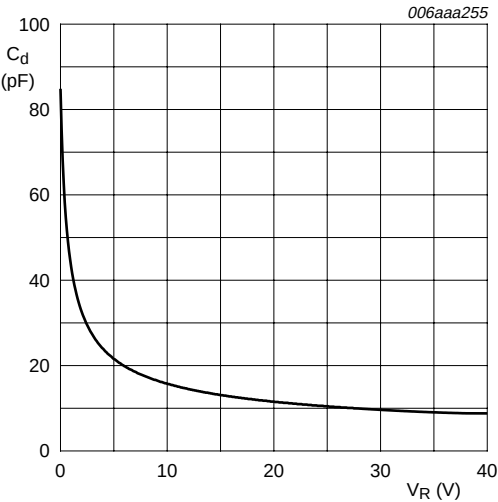
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 7. PMEG4005EH, PMEG4005EJ: Forward current as a function of forward voltage; typical values



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

Fig 8. PMEG4005EH, PMEG4005EJ: Reverse current as a function of reverse voltage; typical values

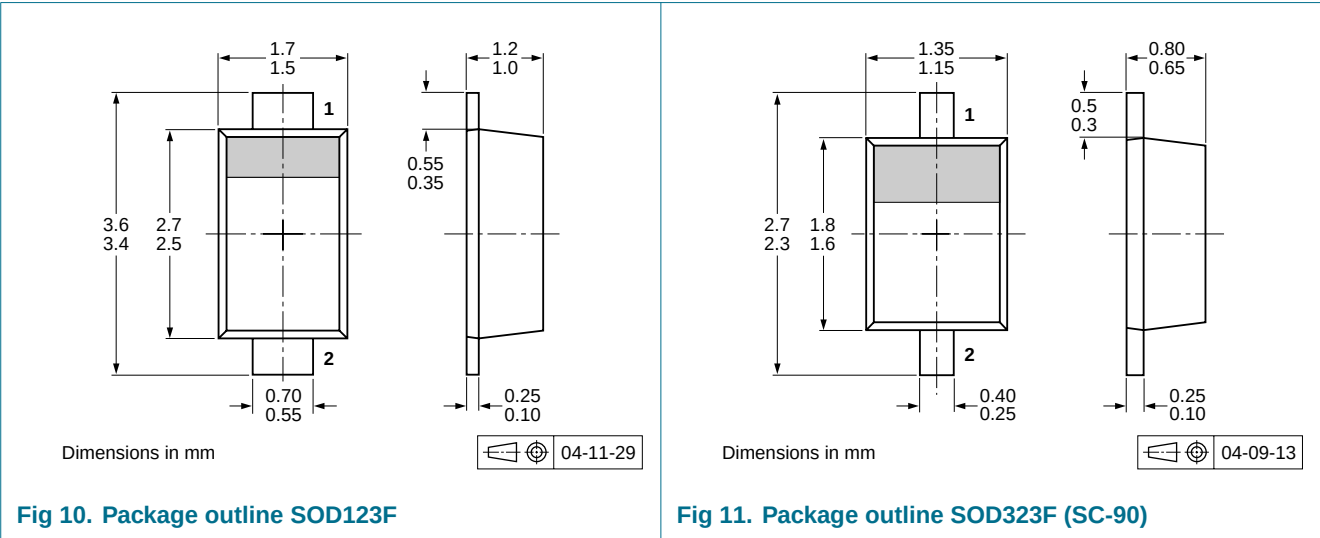


$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $f = 1\text{ MHz}$

Fig 9. PMEG4005EH, PMEG4005EJ: Diode capacitance as a function of reverse voltage; typical values



8. Package outline



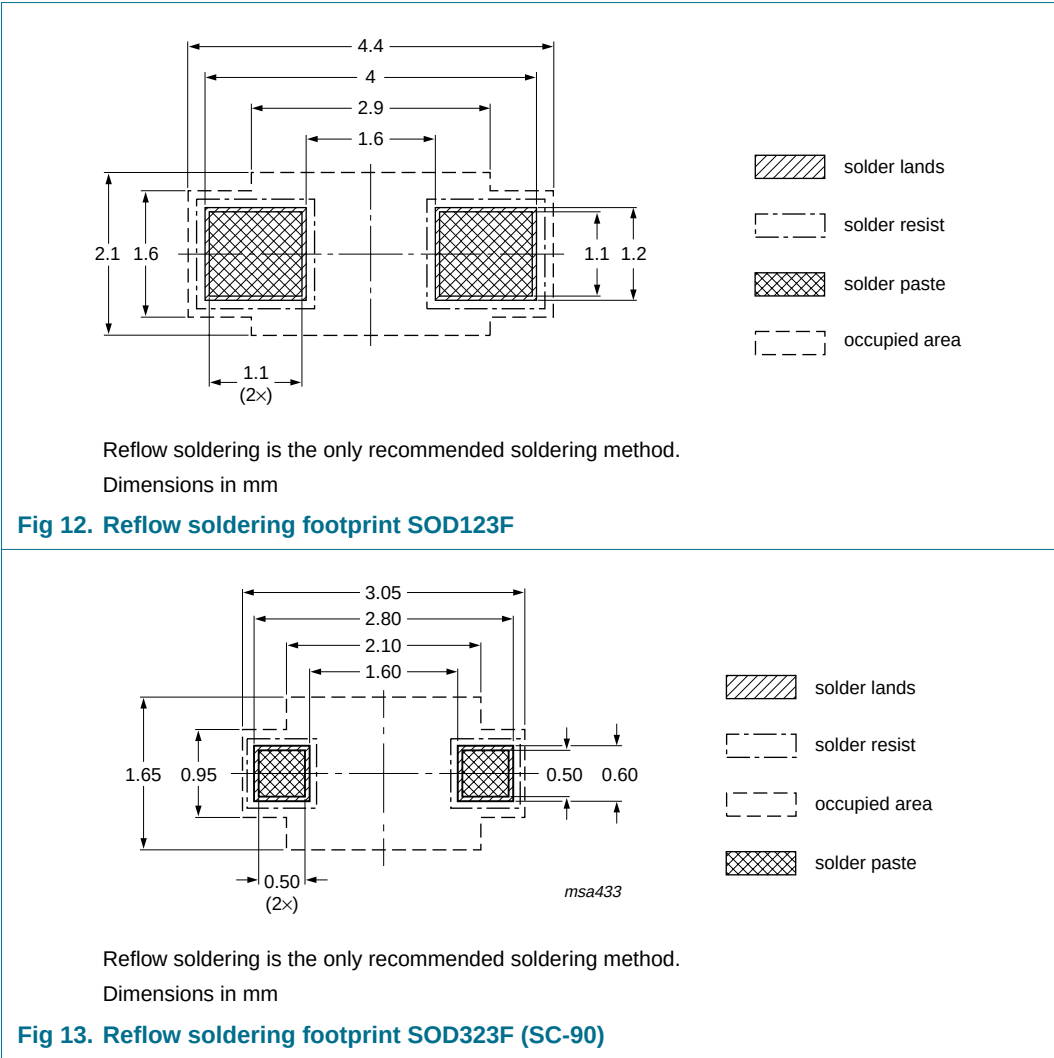
9. Packing information

**Table 9: Packing methods**  
The indicated -xxx are the last three digits of the 12NC ordering code. [\[1\]](#)

| Type number | Package | Description                    | Packing quantity |       |
|-------------|---------|--------------------------------|------------------|-------|
|             |         |                                | 3000             | 10000 |
| PMEG2005EH  | SOD123F | 4 mm pitch, 8 mm tape and reel | -115             | -135  |
| PMEG3005EH  |         |                                |                  |       |
| PMEG4005EH  |         |                                |                  |       |
| PMEG2005EJ  | SOD323F | 4 mm pitch, 8 mm tape and reel | -115             | -135  |
| PMEG3005EJ  |         |                                |                  |       |
| PMEG4005EJ  |         |                                |                  |       |

[1] For further information and the availability of packing methods, see [Section 15](#).

10. Soldering





11. Revision history

Table 10: Revision history

| Document ID         | Release date | Data sheet status  | Change notice | Doc. number    | Supersedes |
|---------------------|--------------|--------------------|---------------|----------------|------------|
| PMEGXX05EH_EJ_SER_1 | 20050412     | Product data sheet | -             | 9397 750 14515 | -          |

## 12. Data sheet status

| Level | Data sheet status <sup>[1]</sup> | Product status <sup>[2] [3]</sup> | Definition                                                                                                                                                                                                                                                                                     |
|-------|----------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I     | Objective data                   | Development                       | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.                                                                                                    |
| II    | Preliminary data                 | Qualification                     | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.             |
| III   | Product data                     | Production                        | This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). |

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

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## 13. Definitions

**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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For sales office addresses, send an email to: [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com)



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