

## Important notice

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Kind regards,

Team Nexperia

# PMEGxx05EH/EJ series

0.5 A very low  $V_F$  MEGA Schottky barrier rectifiers

Rev. 02 — 13 January 2010

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 |
|-------------|---------|-------|---------------|
|             | NXP     | 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

## 1.4 Quick reference data

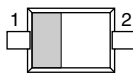
Table 2. Quick reference data

| 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

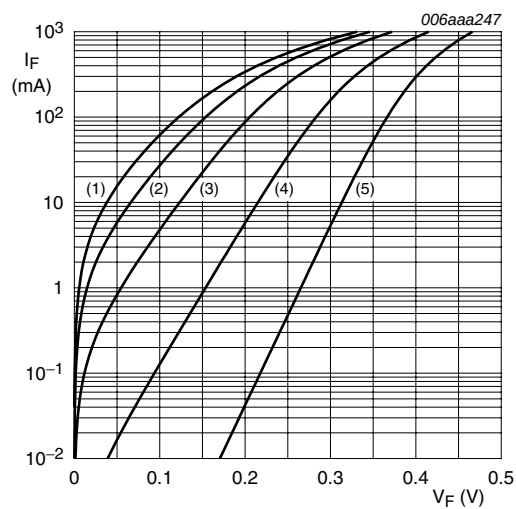
**Table 8. Characteristics**

$T_{amb} = 25\text{ }^{\circ}\text{C}$  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            |

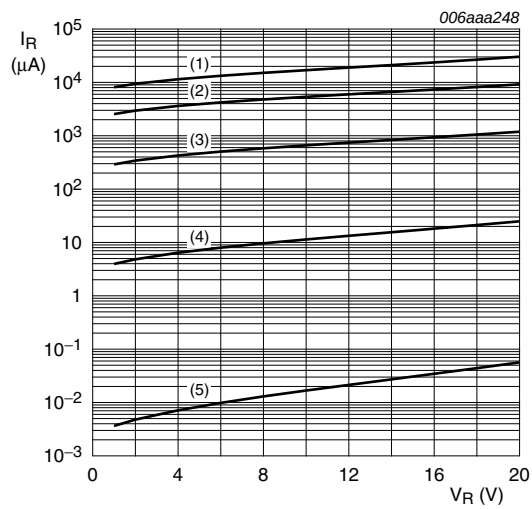
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

[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.



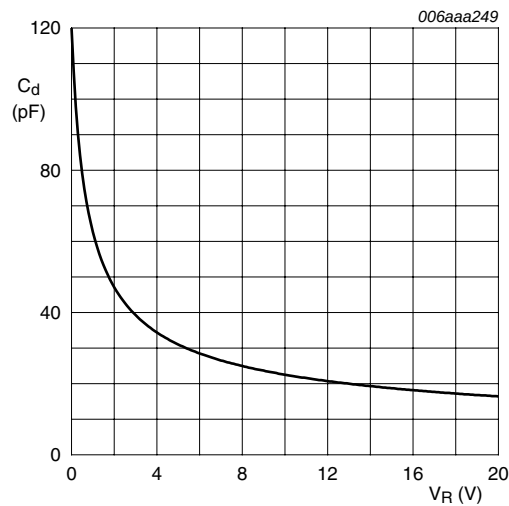
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



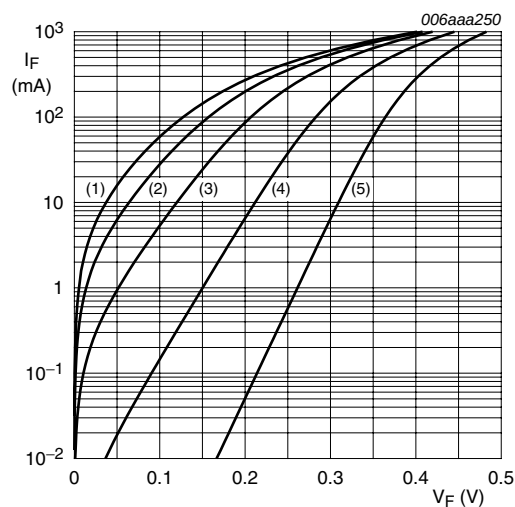
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



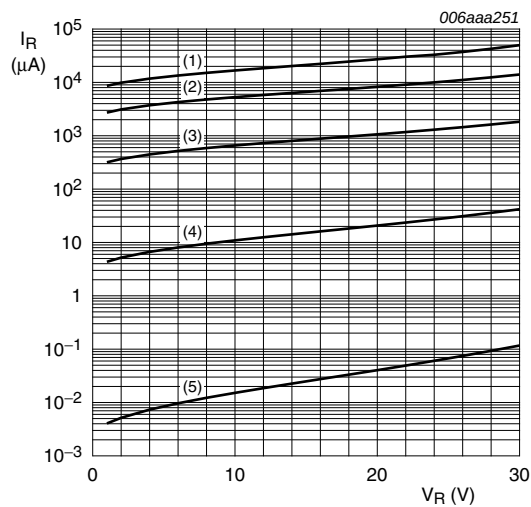
$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $f = 1\text{ MHz}$

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



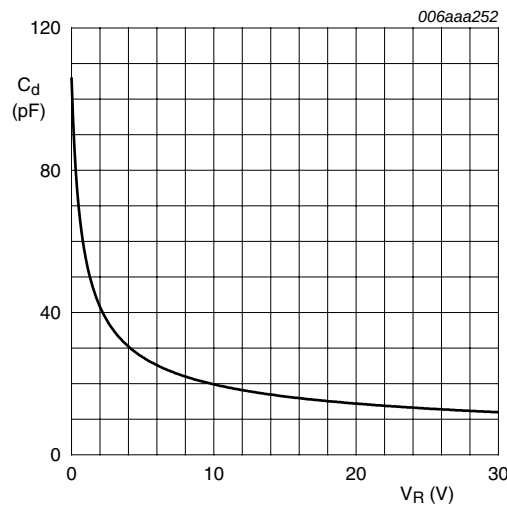
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 4. PMEG3005EH, PMEG3005EJ: 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)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

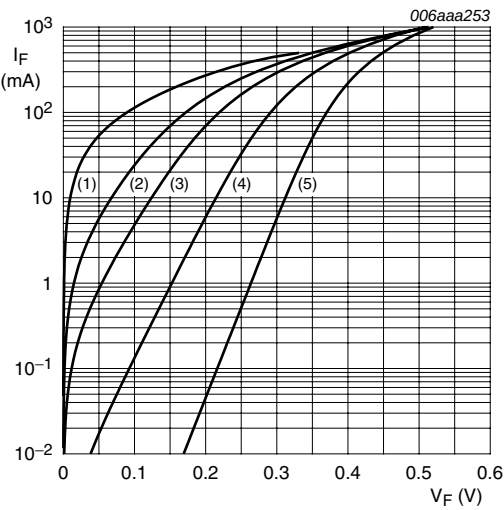
Fig 5. PMEG3005EH, PMEG3005EJ: Reverse current as a function of reverse voltage; typical values



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

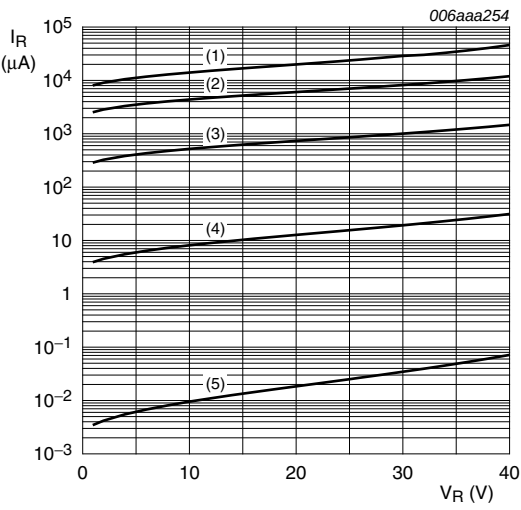
Fig 6. PMEG3005EH, PMEG3005EJ: Diode capacitance as a function of reverse voltage; typical values





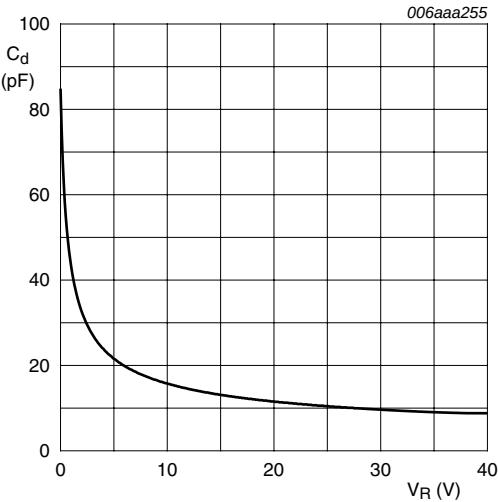
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

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

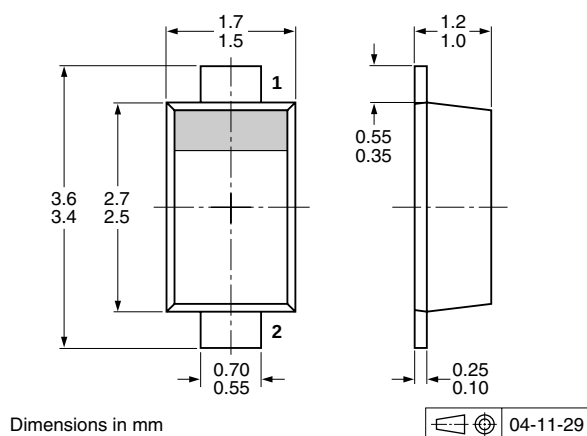


Fig 10. Package outline SOD123F

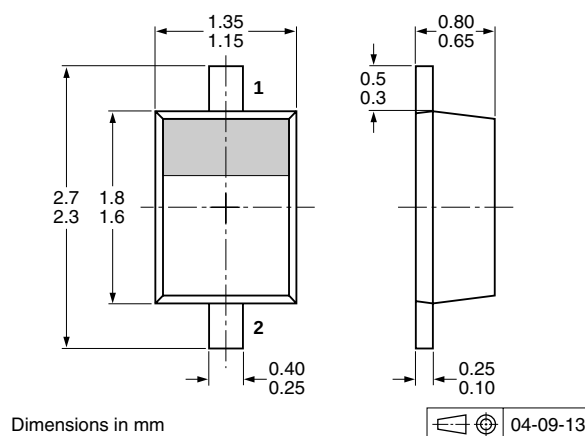


Fig 11. Package outline SOD323F (SC-90)

## 9. Packing information

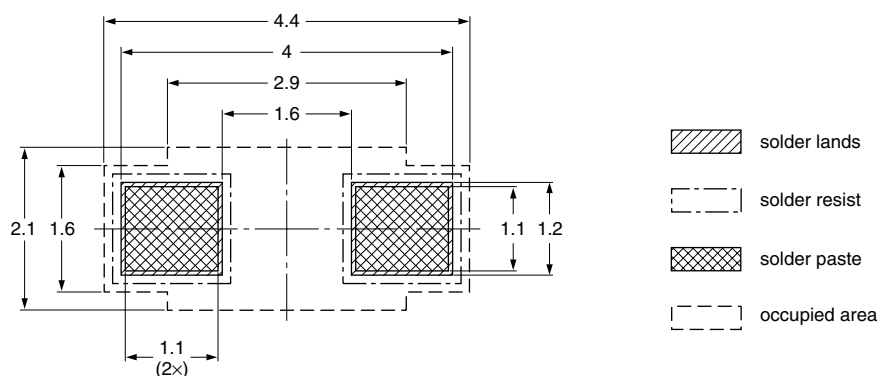
**Table 9. Packing methods**

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

| 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 13](#).

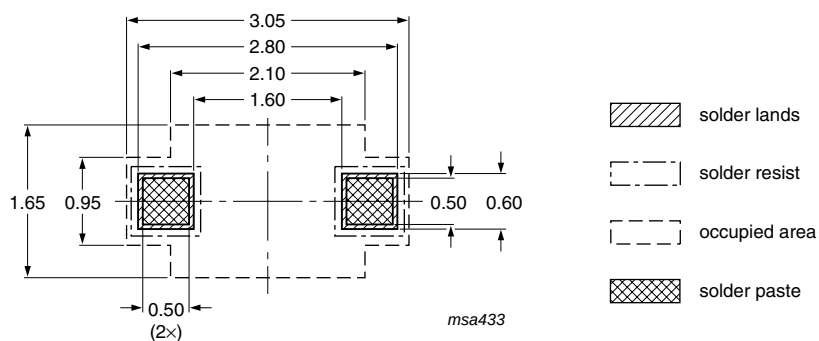
## 10. Soldering



Reflow soldering is the only recommended soldering method.

Dimensions in mm

**Fig 12. Reflow soldering footprint SOD123F**



Reflow soldering is the only recommended soldering method.

Dimensions in mm

**Fig 13. Reflow soldering footprint SOD323F (SC-90)**

## 11. Revision history

Table 10. Revision history

| Document ID                                                                                                                                                                                                                     | Release date | Data sheet status  | Change notice | Supersedes          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------|---------------|---------------------|
| PMEGXX05EH_EJ_SER_2                                                                                                                                                                                                             | 20100113     | Product data sheet | -             | PMEGXX05EH_EJ_SER_1 |
| Modifications:                                                                                                                                                                                                                  |              |                    |               |                     |
| <ul style="list-style-type: none"><li>This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content.</li></ul> |              |                    |               |                     |
| PMEGXX05EH_EJ_SER_1                                                                                                                                                                                                             | 20050412     | Product data sheet | -             | -                   |

## 12. Legal information

### 12.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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.

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

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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