



# PMBS3906

40 V, 100 mA PNP general-purpose transistor

5 June 2018

Product data sheet

## 1. General description

PNP general-purpose transistor in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PMBS3904

## 2. Features and benefits

- 100 mA collector current capability

## 3. Applications

- General-purpose switching and amplification

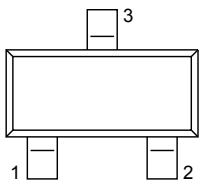
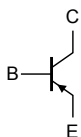
## 4. Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter                 | Conditions                                                                | Min | Typ | Max  | Unit |
|-----------|---------------------------|---------------------------------------------------------------------------|-----|-----|------|------|
| $V_{CEO}$ | collector-emitter voltage | open base                                                                 | -   | -   | -40  | V    |
| $I_C$     | collector current         |                                                                           | -   | -   | -100 | mA   |
| $h_{FE}$  | DC current gain           | $V_{CE} = -1\text{ V}$ ; $I_C = -10\text{ mA}$ ; $T_{amb} = 25\text{ °C}$ | 100 | -   | 300  |      |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline                                                                                      | Graphic symbol                                                                                     |
|-----|--------|-------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1   | B      | base        | <br>TO-236AB (SOT23) | <br>006aab259 |
| 2   | E      | emitter     |                                                                                                         |                                                                                                    |
| 3   | C      | collector   |                                                                                                         |                                                                                                    |

6. Ordering information

Table 3. Ordering information

| Type number | Package  |                                          |         |
|-------------|----------|------------------------------------------|---------|
|             | Name     | Description                              | Version |
| PMBS3906    | TO-236AB | plastic surface-mounted package; 3 leads | SOT23   |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| PMBS3906    | %O6             |

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values

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

| Symbol           | Parameter                 | Conditions               |  | Min | Max  | Unit |
|------------------|---------------------------|--------------------------|--|-----|------|------|
| V <sub>CBO</sub> | collector-base voltage    | open emitter             |  | -   | -40  | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                |  | -   | -40  | V    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector           |  | -   | -5   | V    |
| I <sub>C</sub>   | collector current         |                          |  | -   | -100 | mA   |
| I <sub>CM</sub>  | peak collector current    |                          |  | -   | -200 | mA   |
| I <sub>BM</sub>  | peak base current         |                          |  | -   | -200 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C |  | -   | 250  | mW   |
| T <sub>j</sub>   | junction temperature      |                          |  | -   | 150  | °C   |
| T <sub>amb</sub> | ambient temperature       |                          |  | -65 | 150  | °C   |
| T <sub>stg</sub> | storage temperature       |                          |  | -65 | 150  | °C   |

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol               | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|----------------------|---------------------------------------------|-------------|-----|-----|-----|-----|------|
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 500 | K/W  |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB).

## 10. Characteristics

Table 7. Characteristics

| Symbol      | Parameter                            | Conditions                                                                                                                                                                 | Min | Typ | Max  | Unit |
|-------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|------|
| $I_{CBO}$   | collector-base cut-off current       | $V_{CB} = -30 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                   | -   | -   | -50  | nA   |
| $I_{EBO}$   | emitter-base cut-off current         | $V_{EB} = -5 \text{ V}$ ; $I_C = 0 \text{ A}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                    | -   | -   | -50  | nA   |
| $h_{FE}$    | DC current gain                      | $V_{CE} = -1 \text{ V}$ ; $I_C = -0.1 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                | 60  | -   | -    |      |
|             |                                      | $V_{CE} = -1 \text{ V}$ ; $I_C = -1 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                  | 80  | -   | -    |      |
|             |                                      | $V_{CE} = -1 \text{ V}$ ; $I_C = -10 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                 | 100 | -   | 300  |      |
|             |                                      | $V_{CE} = -1 \text{ V}$ ; $I_C = -50 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$              | 60  | -   | -    |      |
|             |                                      | $V_{CE} = -1 \text{ V}$ ; $I_C = -100 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$             | 30  | -   | -    |      |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = -10 \text{ mA}$ ; $I_B = -1 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                   | -   | -   | -250 | mV   |
|             |                                      | $I_C = -50 \text{ mA}$ ; $I_B = -5 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                | -   | -   | -400 | mV   |
| $V_{BEsat}$ | base-emitter saturation voltage      | $I_C = -10 \text{ mA}$ ; $I_B = -1 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                   | -   | -   | -850 | mV   |
|             |                                      | $I_C = -50 \text{ mA}$ ; $I_B = -5 \text{ mA}$ ; pulsed; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                | -   | -   | -950 | mV   |
| $t_d$       | delay time                           | $I_C = -10 \text{ mA}$ ; $I_{Bon} = -1 \text{ mA}$ ; $I_{Boff} = 1 \text{ mA}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                   | -   | -   | 50   | ns   |
| $t_r$       | rise time                            |                                                                                                                                                                            | -   | -   | 50   | ns   |
| $t_{on}$    | turn-on time                         |                                                                                                                                                                            | -   | -   | 100  | ns   |
| $t_s$       | storage time                         |                                                                                                                                                                            | -   | -   | 600  | ns   |
| $t_f$       | fall time                            |                                                                                                                                                                            | -   | -   | 100  | ns   |
| $t_{off}$   | turn-off time                        |                                                                                                                                                                            | -   | -   | 700  | ns   |
| $C_c$       | collector capacitance                | $V_{CB} = -5 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $i_e = 0 \text{ A}$ ; $f = 100 \text{ MHz}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                      | -   | -   | 4.5  | pF   |
| $C_e$       | emitter capacitance                  | $V_{EB} = -0.5 \text{ V}$ ; $I_C = 0 \text{ A}$ ; $i_c = 0 \text{ A}$ ; $f = 100 \text{ MHz}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                    | -   | -   | 12   | pF   |
| $f_T$       | transition frequency                 | $V_{CE} = -20 \text{ V}$ ; $I_C = -10 \text{ mA}$ ; $f = 100 \text{ MHz}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                        | 150 | -   | -    | MHz  |
| NF          | noise figure                         | $V_{CE} = -5 \text{ V}$ ; $I_C = -100 \text{ } \mu\text{A}$ ; $R_S = 1 \text{ k}\Omega$ ; $10 \text{ Hz} < f < 15700 \text{ Hz}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$ | -   | -   | 4    | dB   |

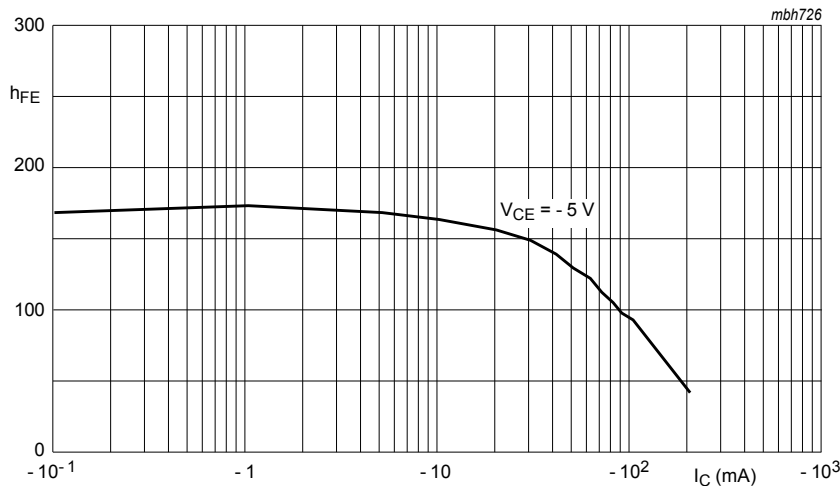


Fig. 1. DC current gain as a function of collector current; typical values

11. Test information

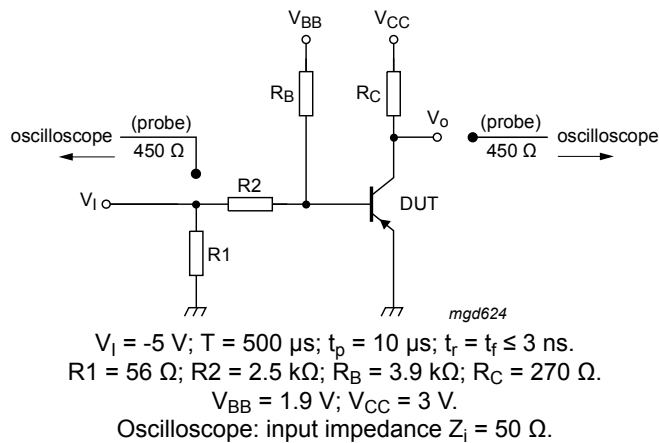


Fig. 2. Test circuit or switching times

12. Package outline

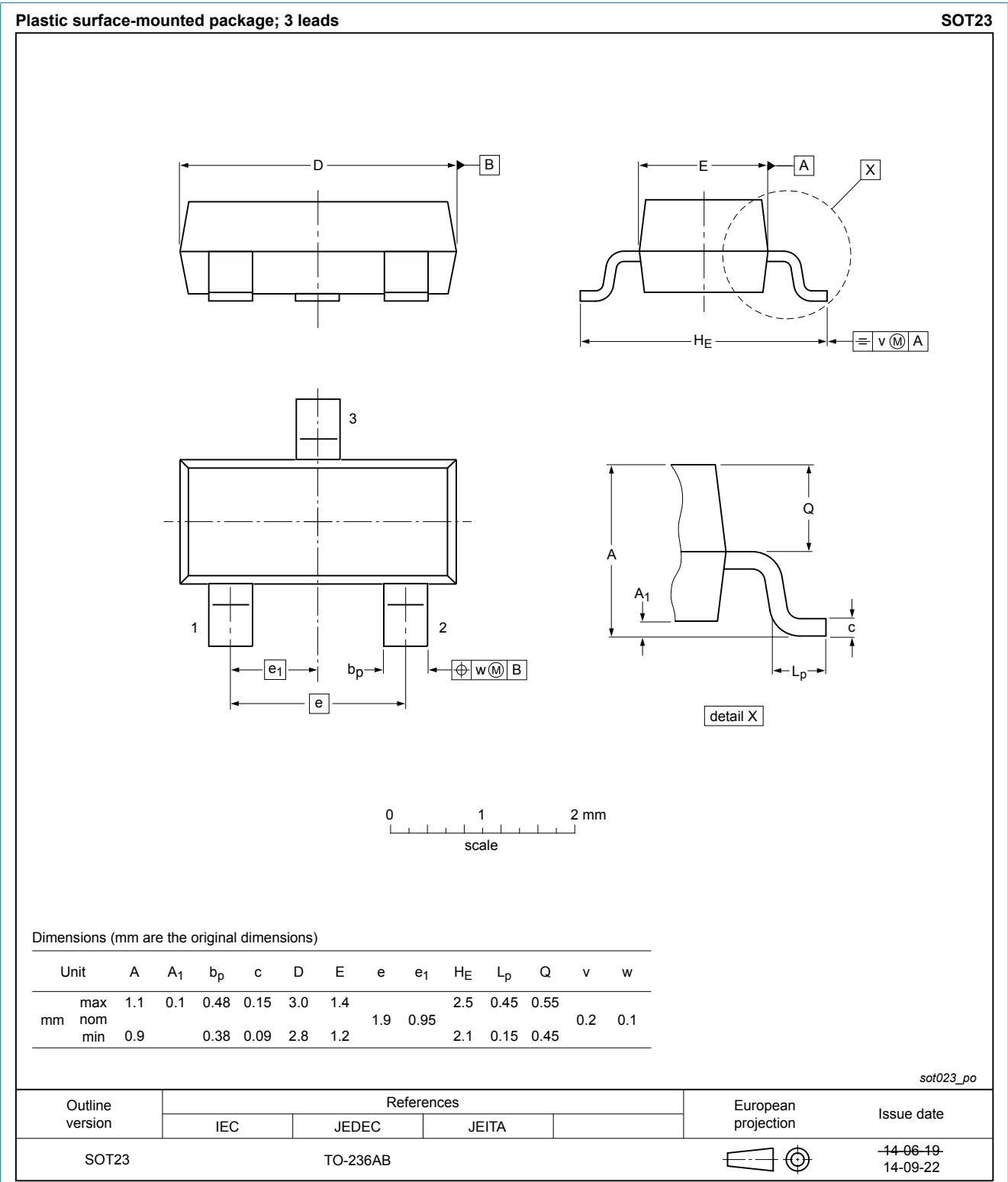


Fig. 3. Package outline TO-236AB (SOT23)

13. Soldering

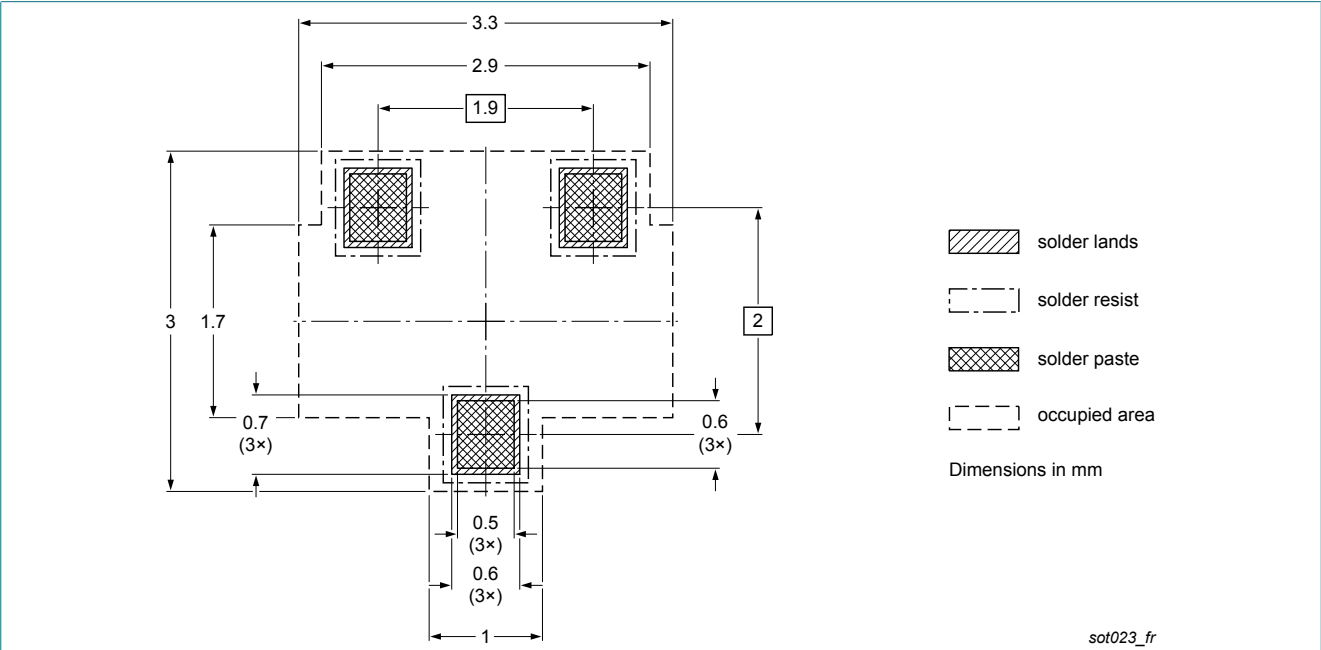


Fig. 4. Reflow soldering footprint for TO-236AB (SOT23)

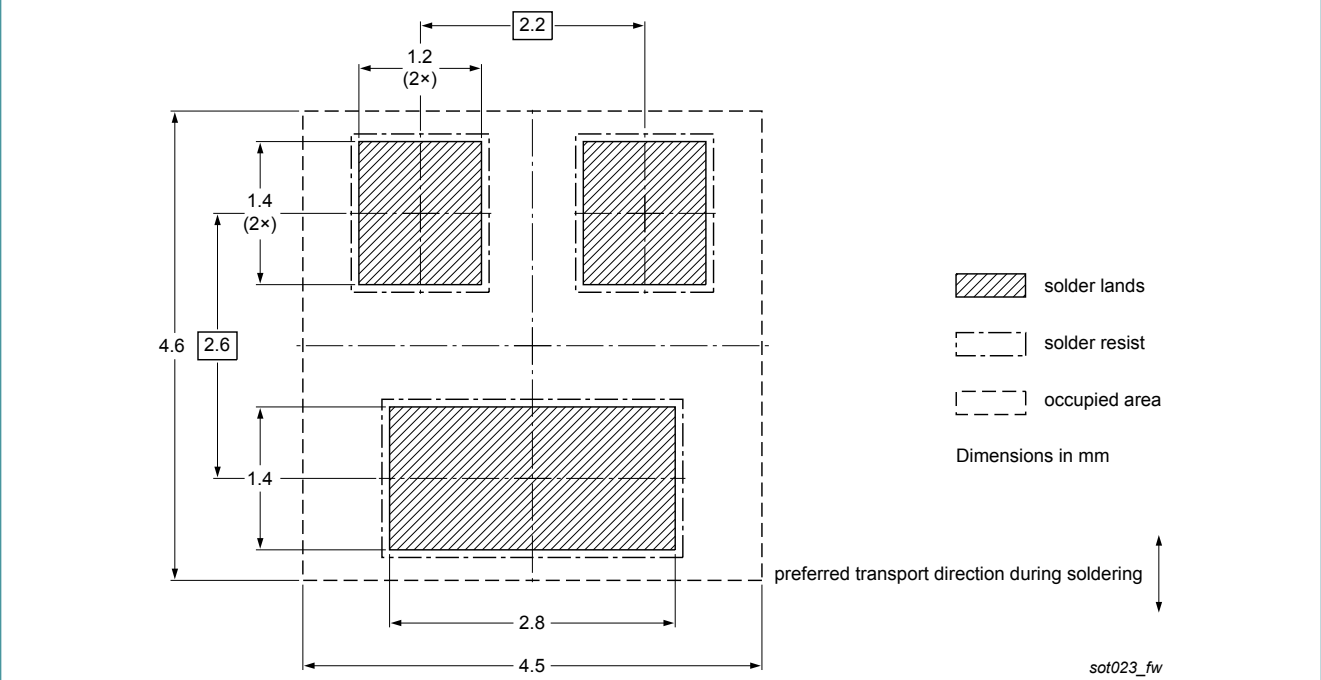


Fig. 5. Wave soldering footprint for TO-236AB (SOT23)

## 14. Revision history

**Table 8. Revision history**

| Data sheet ID  | Release date                                                                                                                                                                                                                           | Data sheet status  | Change notice | Supersedes   |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|--------------|
| PMBS3906 v.3   | 20180605                                                                                                                                                                                                                               | Product data sheet | -             | PMBS3906 v.2 |
| Modifications: | <ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li></ul> |                    |               |              |
| PMBS3906 v.2   | 20040202                                                                                                                                                                                                                               | Product data sheet | -             | PMBS3906 v.1 |
| PMBS3906 v.1   | 19990422                                                                                                                                                                                                                               | Product data sheet | -             | -            |

## 15. Legal information

### Data sheet status

| Document status<br>[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.
- [2] The term 'short data sheet' is explained in section "Definitions".
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