



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 | $V_{CE} = -1\text{ V}; I_C = -10\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | 100 | - | 300 | |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|-------------------------|------------------|
| 1 | B | base | <p>TO-236AB (SOT23)</p> | <p>006aab259</p> |
| 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_{CBO} | collector-base voltage | open emitter | - | -40 | V |
| V_{CEO} | collector-emitter voltage | open base | - | -40 | V |
| V_{EBO} | emitter-base voltage | open collector | - | -5 | V |
| I_C | collector current | | - | -100 | mA |
| I_{CM} | peak collector current | | - | -200 | mA |
| I_{BM} | peak base current | | - | -200 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | - | 250 | mW |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -65 | 150 | °C |
| T_{stg} | storage temperature | | -65 | 150 | °C |

9. 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] | - | 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 |
| 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 |

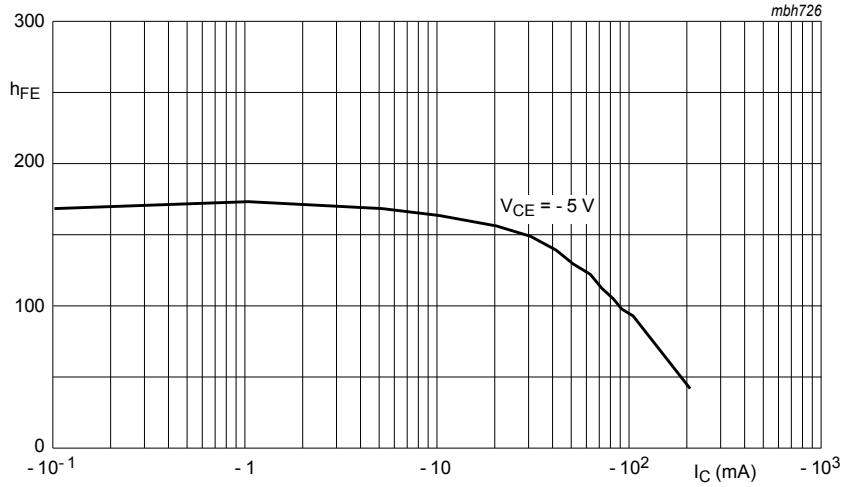
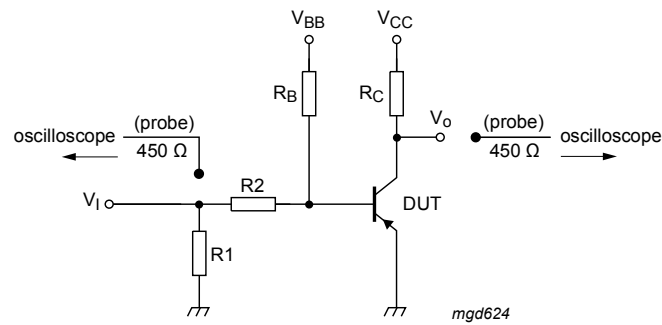


Fig. 1. DC current gain as a function of collector current; typical values

11. Test information



$V_1 = -5\text{ V}$; $T = 500\ \mu\text{s}$; $t_p = 10\ \mu\text{s}$; $t_r = t_f \leq 3\ \text{ns}$.
 $R_1 = 56\ \Omega$; $R_2 = 2.5\ \text{k}\Omega$; $R_B = 3.9\ \text{k}\Omega$; $R_C = 270\ \Omega$.
 $V_{BB} = 1.9\ \text{V}$; $V_{CC} = 3\ \text{V}$.
 Oscilloscope: input impedance $Z_i = 50\ \Omega$.

Fig. 2. Test circuit or switching times

12. Package outline

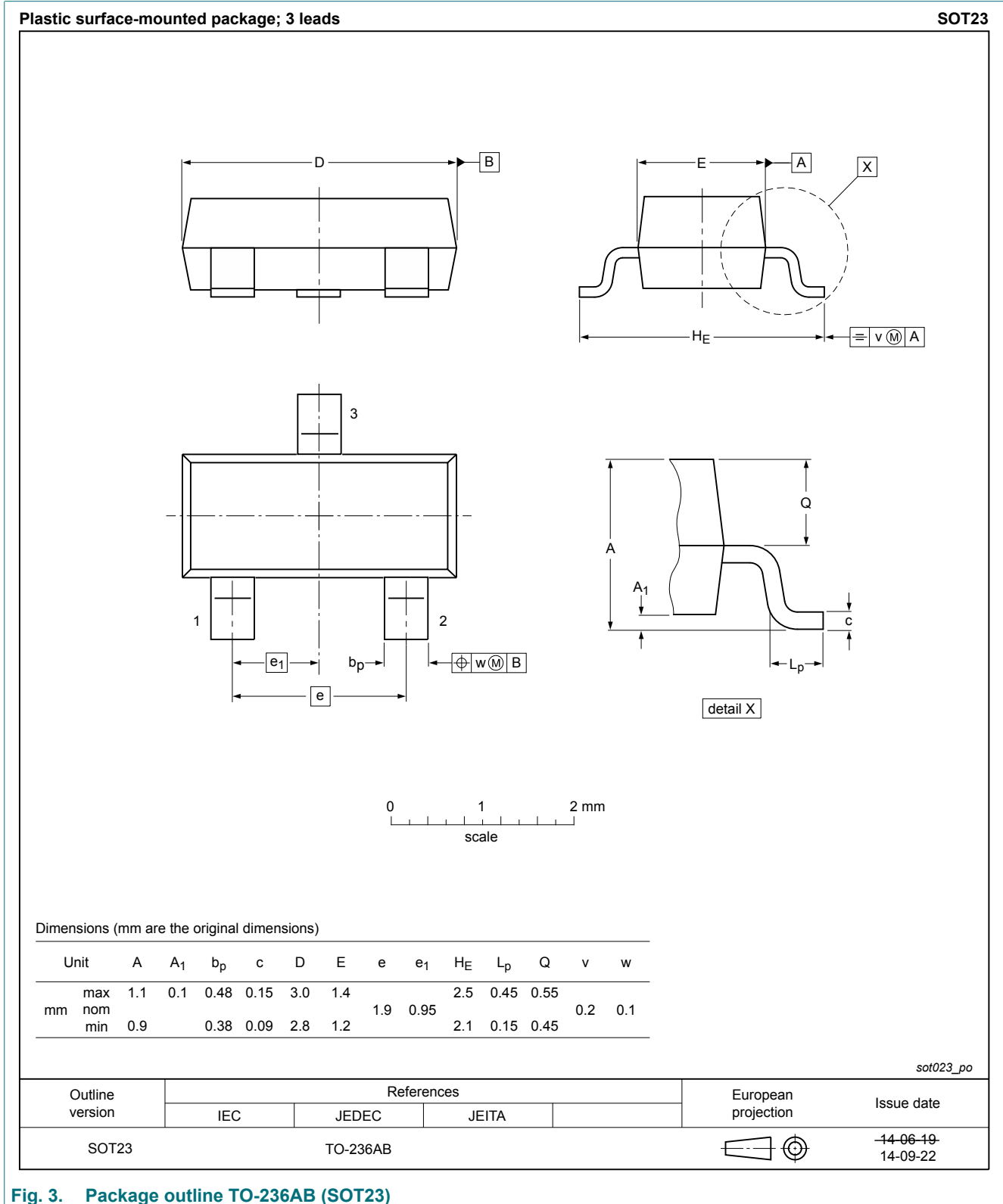


Fig. 3. Package outline TO-236AB (SOT23)

13. Soldering

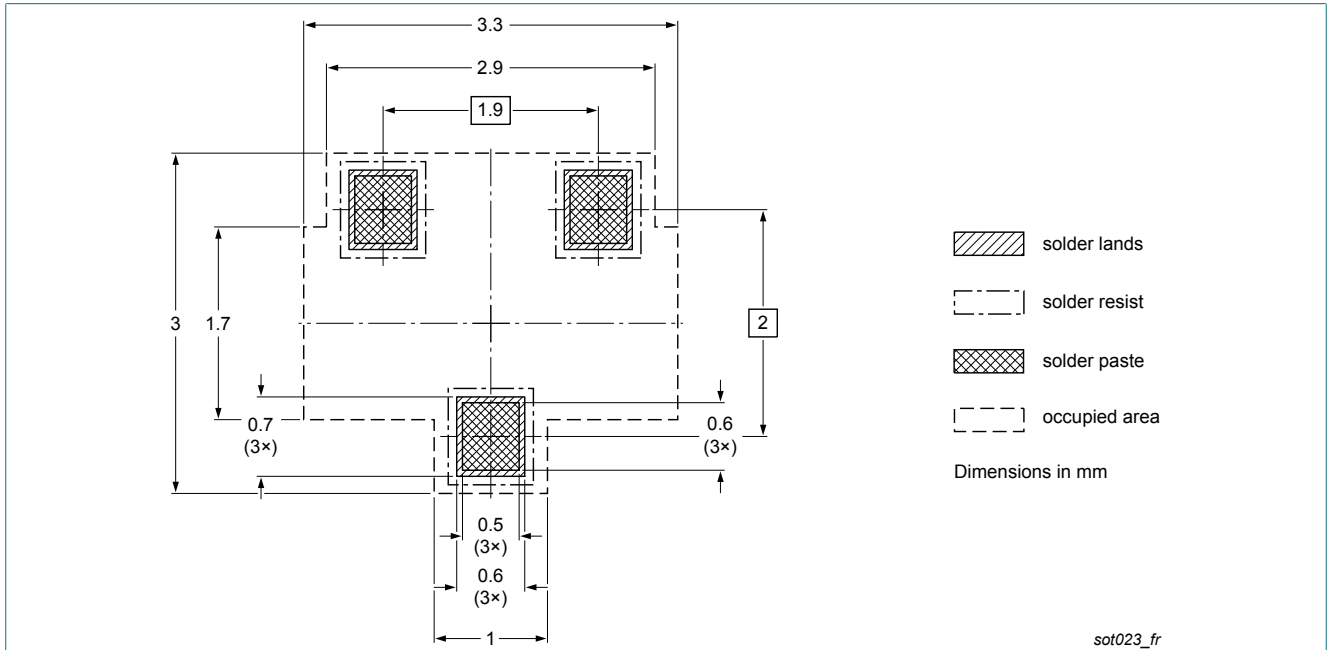


Fig. 4. Reflow soldering footprint for TO-236AB (SOT23)

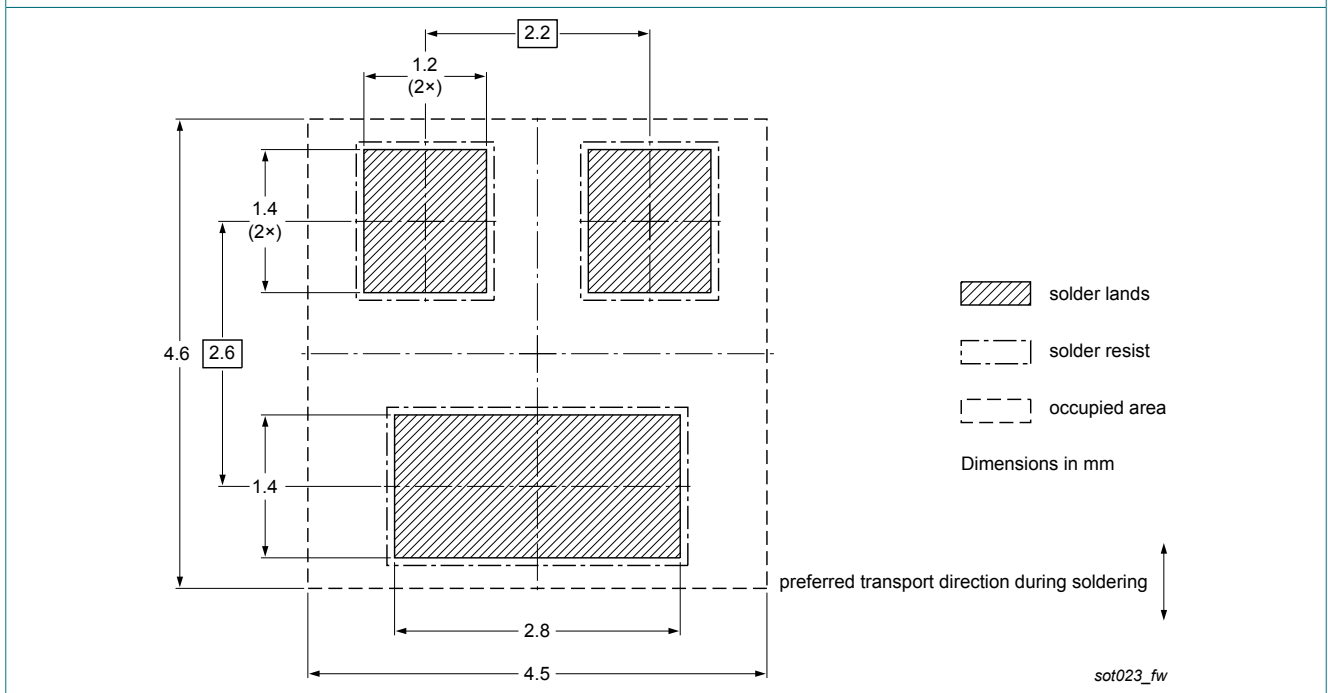


Fig. 5. Wave soldering footprint for TO-236AB (SOT23)

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">The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.Legal texts have been adapted to the new company name where appropriate. | | | |
| 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 [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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