



PMBT2907

40V, 600 mA, PNP switching transistor

6 March 2015

Product data sheet

1. General description

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

NPN complement: PMBT2222

60V variant: PMBT2907A

2. Features and benefits

- Single general-purpose switching transistor
- AEC-Q101 qualified

3. Applications

- Switching and linear amplification

4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------|--|-----|-----|------|------|
| V_{CE0} | collector-emitter voltage | open base | - | - | -40 | V |
| I_C | collector current | | - | - | -600 | mA |
| h_{FE} | DC current gain | $V_{CE} = -10\text{ V}$; $I_C = -150\text{ mA}$; $T_{amb} = 25\text{ °C}$ | 100 | - | 300 | |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|-------------------------|----------------|
| 1 | B | base | <p>TO-236AB (SOT23)</p> | <p>sym132</p> |
| 2 | E | emitter | | |
| 3 | C | collector | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|----------|--|---------|
| | Name | Description | Version |
| PMBT2907 | TO-236AB | plastic surface-mounted package; 3 leads | SOT23 |

7. Marking

Table 4. Marking codes

| Type number | Marking code [1] |
|-------------|---------------------|
| PMBT2907 | %2B |

[1] % = placeholder for manufacturing site code

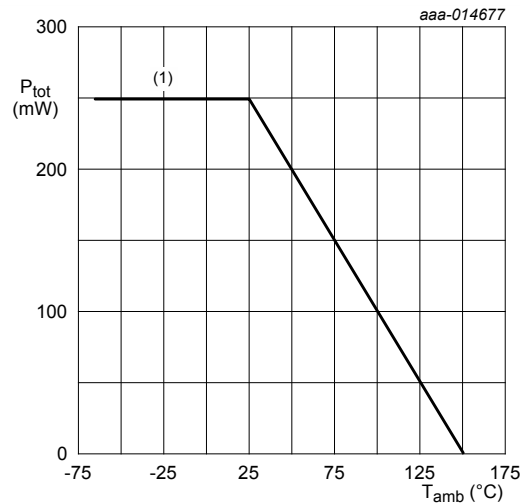
8. Limiting values

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 | | - | -60 | V |
| V_{CEO} | collector-emitter voltage | open base | | - | -40 | V |
| V_{EBO} | emitter-base voltage | open collector | | - | -5 | V |
| I_C | collector current | | | - | -600 | mA |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | | - | -800 | mA |
| I_{BM} | peak base current | | | - | -200 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 250 | mW |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -65 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |

[1] Transistor mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



(1) FR4 PCB; standard footprint

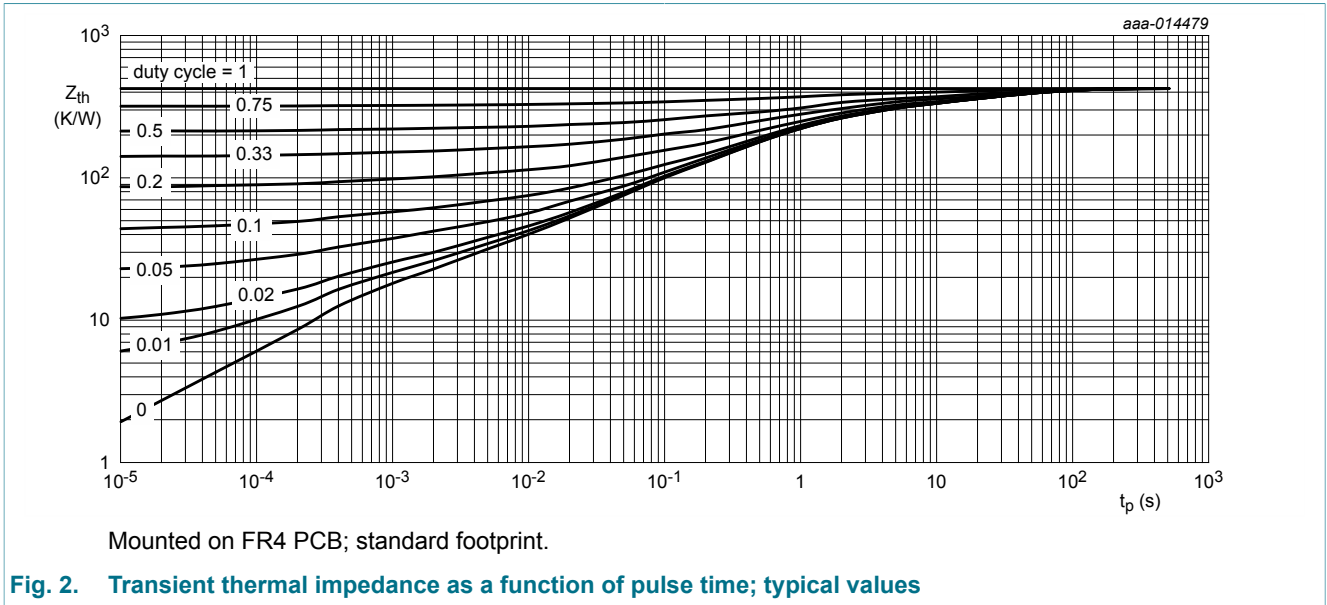
Fig. 1. Power derating curve

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] Transistor mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint.



10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|--------------------------------------|--|---|-----|------|---------------|
| I_{CBO} | collector-base cut-off current | $V_{CB} = -50\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | -20 | nA |
| | | $V_{CB} = -50\text{ V}; I_E = 0\text{ A}; T_j = 125\text{ }^\circ\text{C}$ | - | - | -20 | μA |
| 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 | $V_{CE} = -10\text{ V}; I_C = -0.1\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | 35 | - | - | |
| | | $V_{CE} = -10\text{ V}; I_C = -1\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | 50 | - | - | |
| | | $V_{CE} = -10\text{ V}; I_C = -10\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | 75 | - | - | |
| | | $V_{CE} = -10\text{ V}; I_C = -150\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | 100 | - | 300 | |
| | | $V_{CE} = -10\text{ V}; I_C = -500\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | 30 | - | - | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = -150\text{ mA}; I_B = -15\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | -400 | mV |
| | | $I_C = -500\text{ mA}; I_B = -50\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | -1.6 | V |
| V_{BEsat} | base-emitter saturation voltage | $I_C = -150\text{ mA}; I_B = -15\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | -1.3 | V |
| | | $I_C = -500\text{ mA}; I_B = -50\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | -2.6 | V |
| t_d | delay time | $I_C = -150\text{ mA}; I_{Bon} = -15\text{ mA}; I_{Boff} = 15\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 12 | ns |
| t_r | rise time | | - | - | 30 | ns |
| t_{on} | turn-on time | | - | - | 40 | ns |
| t_s | storage time | | - | - | 300 | ns |
| t_f | fall time | | - | - | 65 | ns |
| t_{off} | turn-off time | | - | - | 365 | ns |
| C_C | collector capacitance | | $V_{CB} = -10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 8 |
| C_E | emitter capacitance | $V_{EB} = -2\text{ V}; I_C = 0\text{ A}; i_c = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 30 | pF |
| f_T | transition frequency | $V_{CE} = -20\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$ | 200 | - | - | MHz |

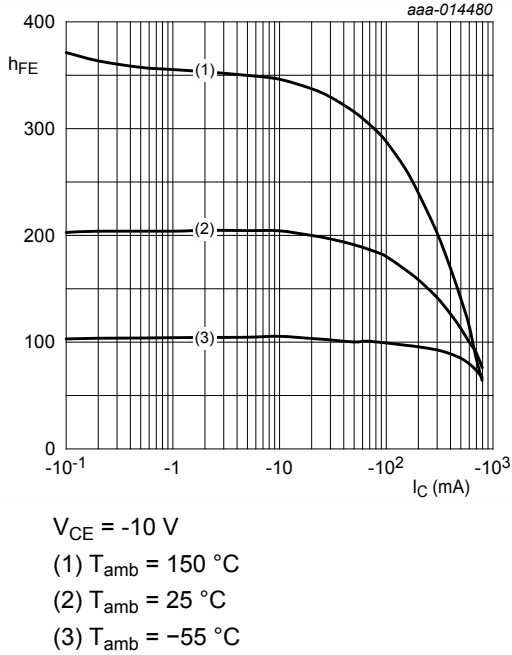


Fig. 3. DC current gain as a function of collector current; typical values

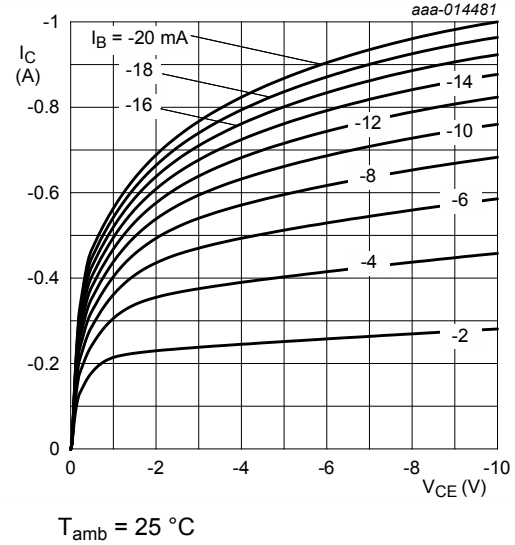


Fig. 4. Collector current as a function of collector-emitter voltage; typical values

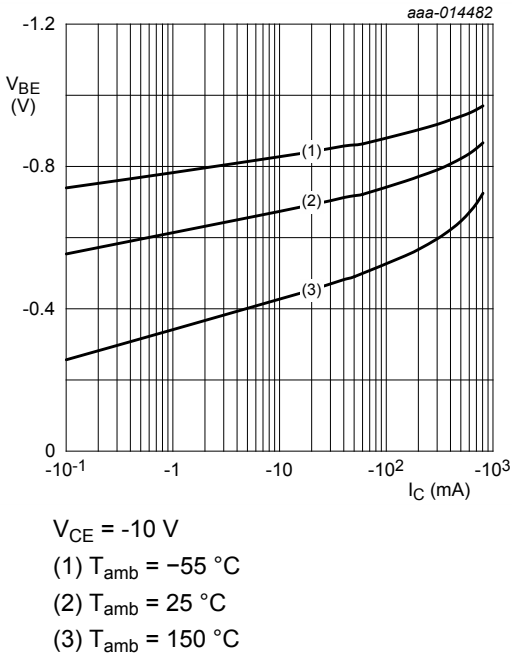


Fig. 5. Base-emitter voltage as a function of collector current; typical values

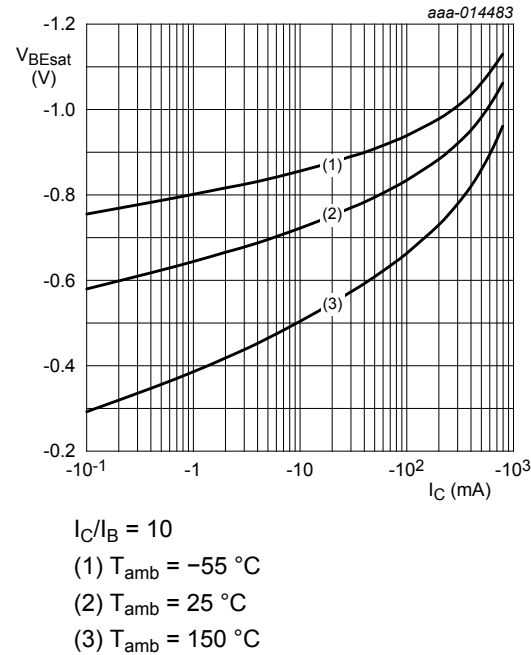
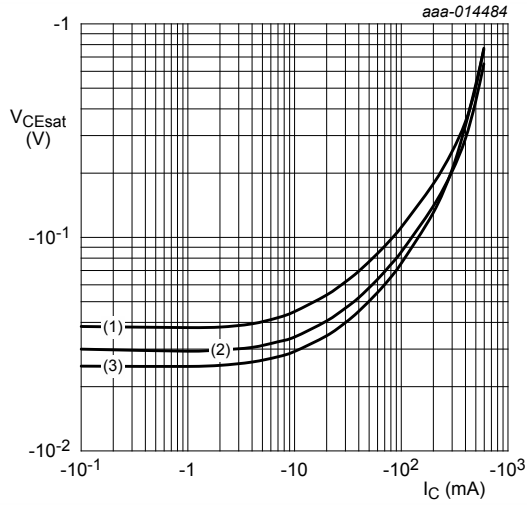
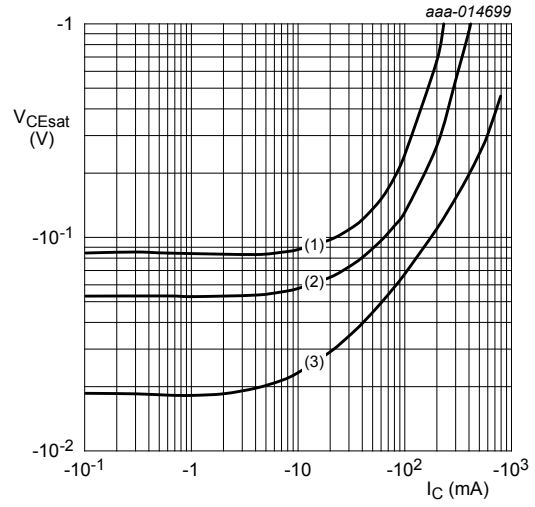


Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values



$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 100$
 (2) $I_C/I_B = 50$
 (3) $I_C/I_B = 10$

Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

11. Test information

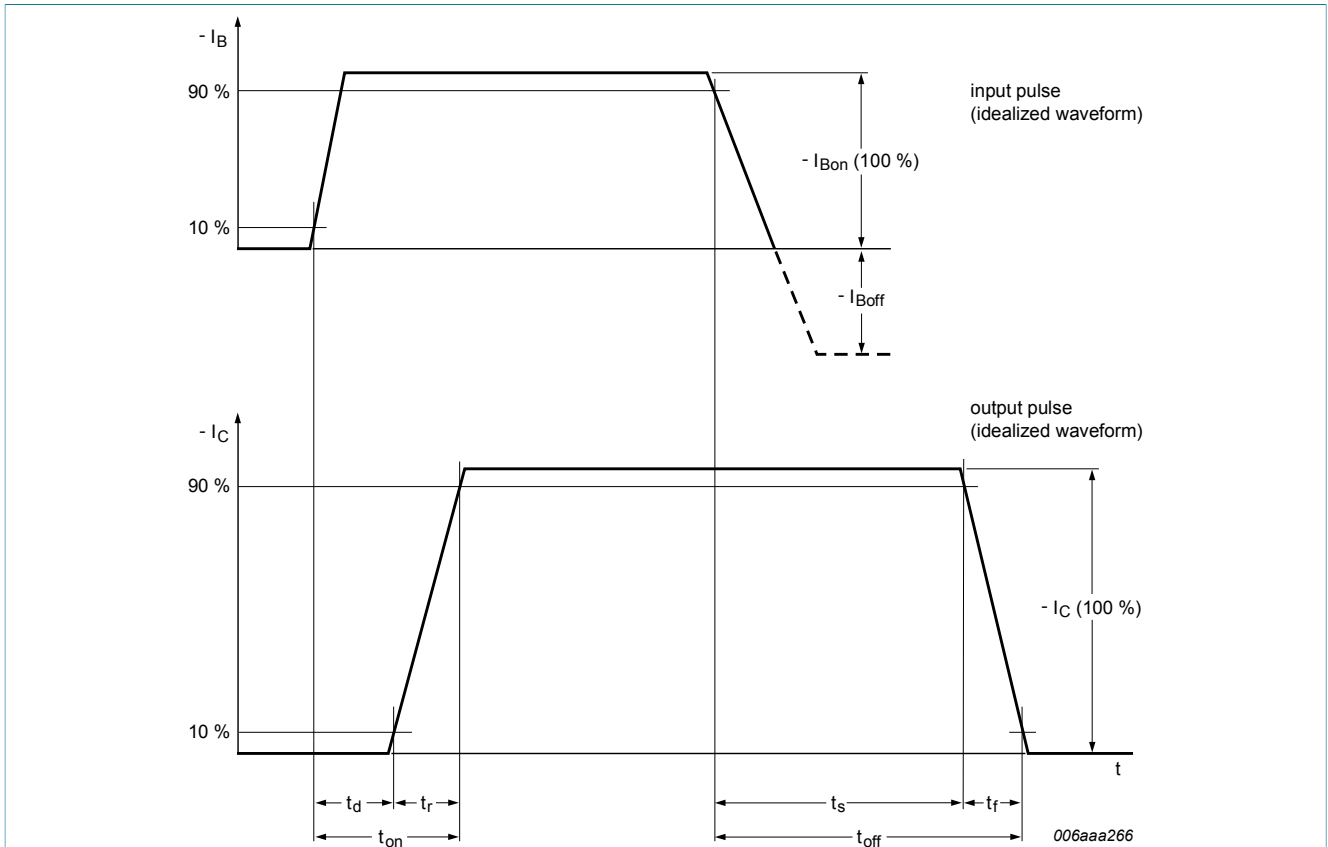


Fig. 9. BISS transistor switching time definition

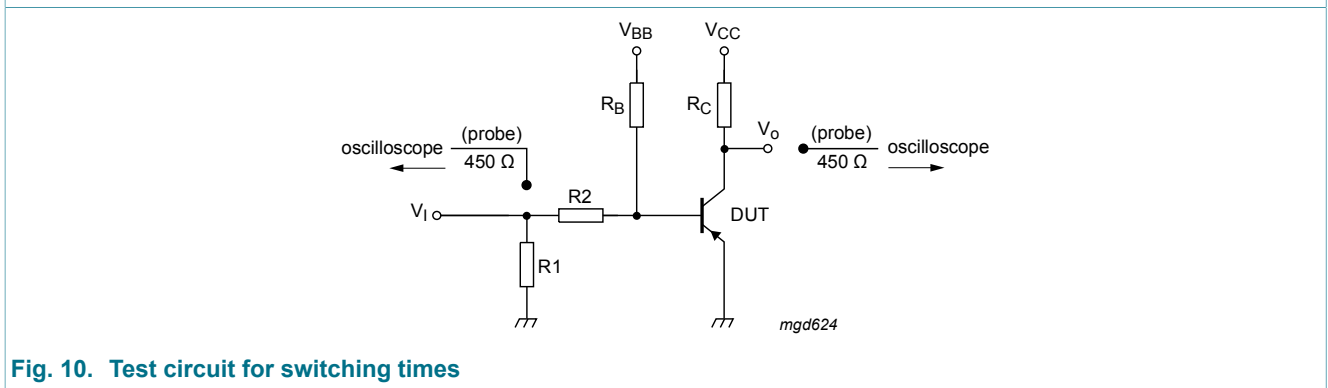


Fig. 10. Test circuit for switching times

11.1 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.

12. Package outline

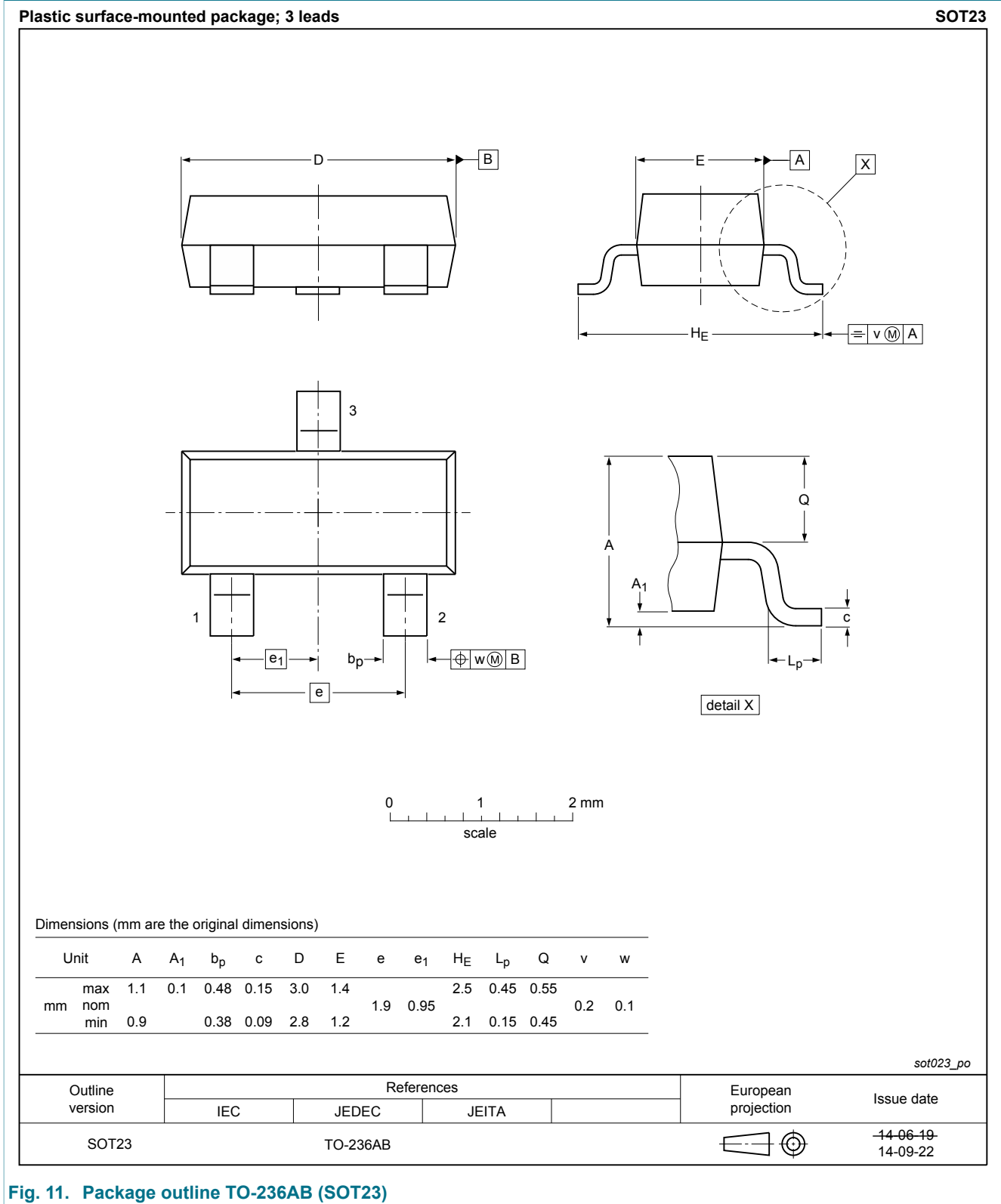


Fig. 11. Package outline TO-236AB (SOT23)

13. Soldering

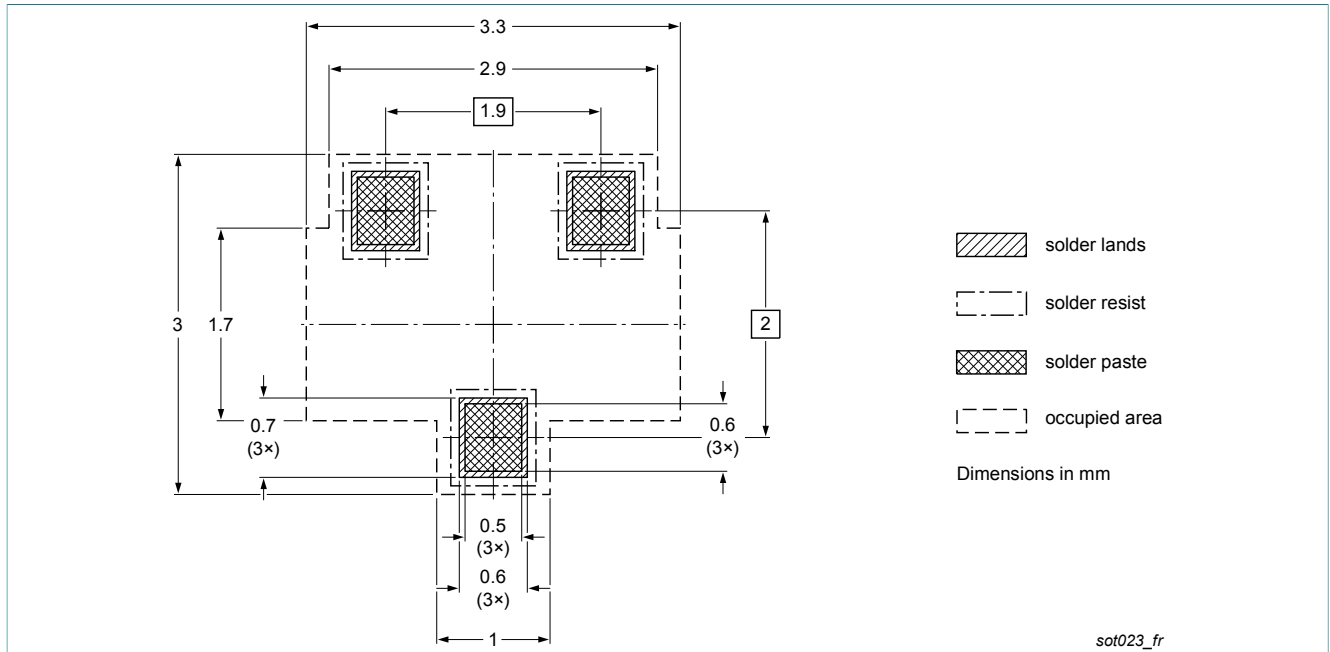


Fig. 12. Reflow soldering footprint for TO-236AB (SOT23)

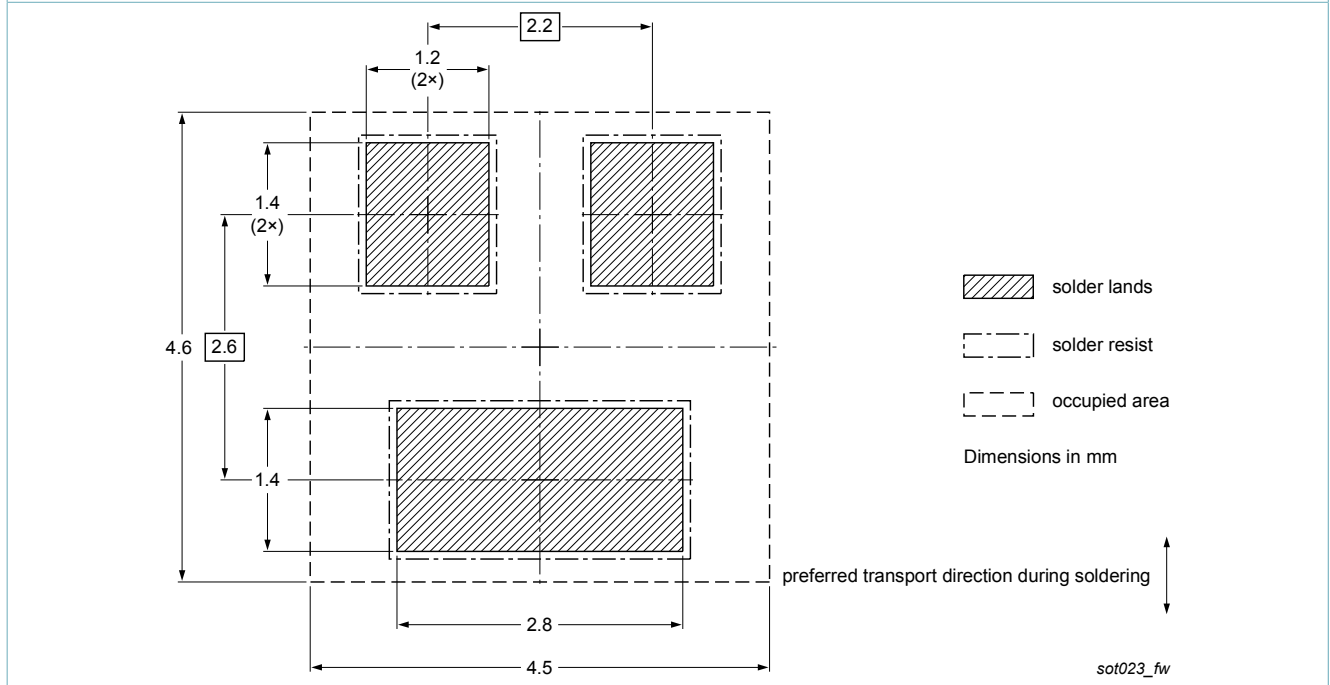


Fig. 13. Wave soldering footprint for TO-236AB (SOT23)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------------------|---|-----------------------|---------------|----------------------------|
| PMBT2907 v.5 | 20150306 | Product data sheet | - | PMBT2907_ PMBT2907A v.4 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors Legal texts have been adapted to the new company name where appropriate Data sheet PMBT29007_PMBT2907A split into two separate data sheets | | | |
| PMBT2907_ PMBT2907A v.4 | 20040116 | Product data sheet | - | PMBT2907_ PMBT2907A v.3 |
| PMBT2907_ PMBT2907A v.3 | 19990427 | Product specification | - | PMBT2907_ PMBT2907A v.2 |
| PMBT2907_ PMBT2907A v.2 | 19970904 | Product specification | - | PMBT2907_ PMBT2907A v.1 |
| PMBT2907_ PMBT2907A v.1 | 19970507 | Product specification | - | - |

15. Legal information

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| 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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