



PMBT4403-Q

40 V, 600 mA PNP switching transistor

16 June 2023

Product data sheet

1. General description

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

2. Features and benefits

- High current (max. 600 mA)
- Collector-emitter voltage $V_{CEO} = 40$ V
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Switching and linear amplification

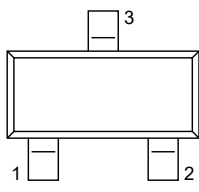
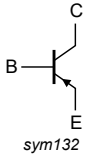
4. Quick reference data

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 | | - | - | -600 | mA |
| h_{FE} | DC current gain | $V_{CE} = -2$ V; $I_C = -150$ mA; $T_{amb} = 25$ °C | 100 | - | 300 | |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|---|
| 1 | B | base |  SOT23 |  sym132 |
| 2 | E | emitter | | |
| 3 | C | collector | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|----------------------------|---------|--|-----------------------|
| | Name | Description | Version |
| PMBT4403-Q | SOT23 | plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body | SOT23 |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| PMBT4403-Q | %2T |

[1] % = placeholder for manufacturing site code

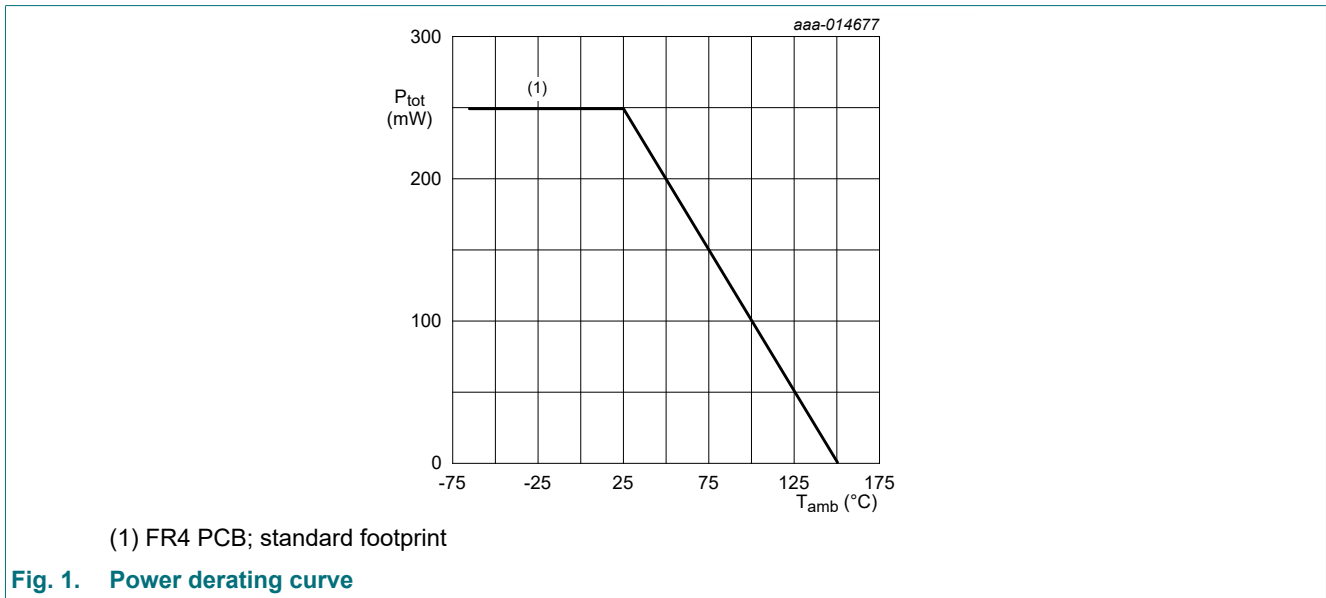
8. Limiting values

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 | | - | -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, single-sided copper, tin-plated and standard footprint.

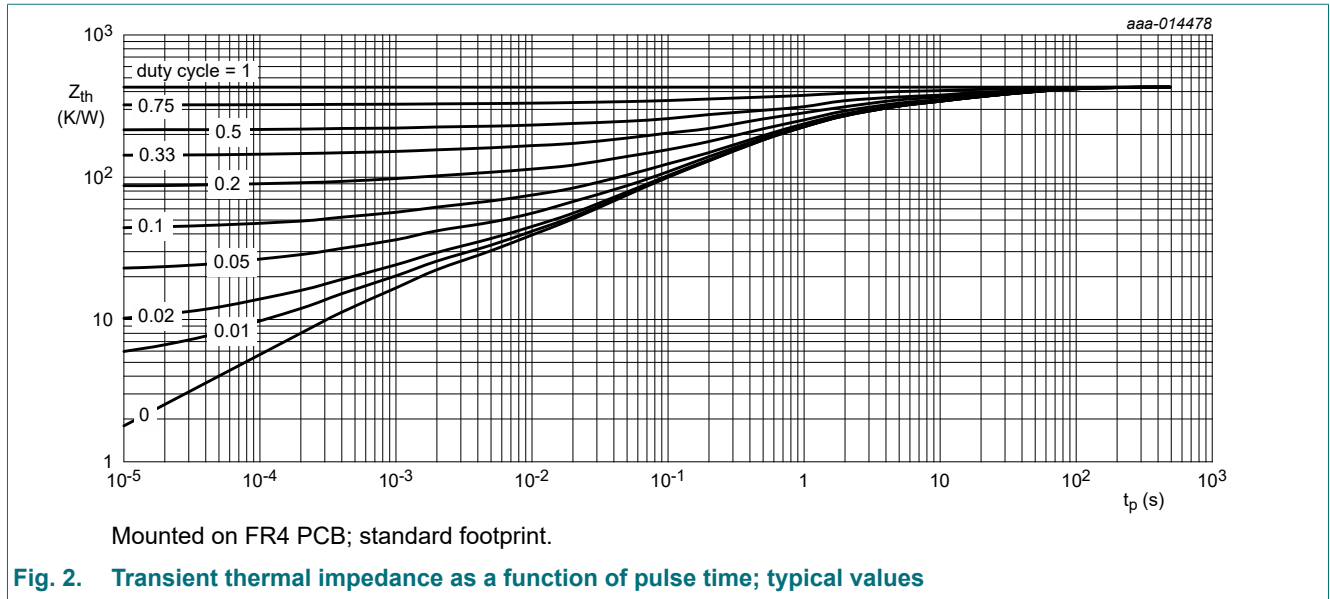


9. Thermal characteristics

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 |

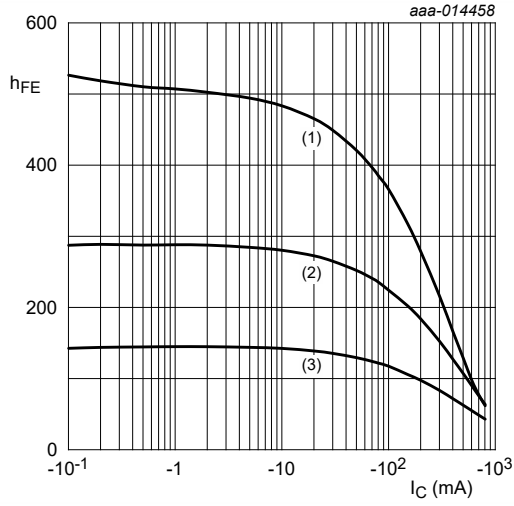
[1] Transistor mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint.



10. Characteristics

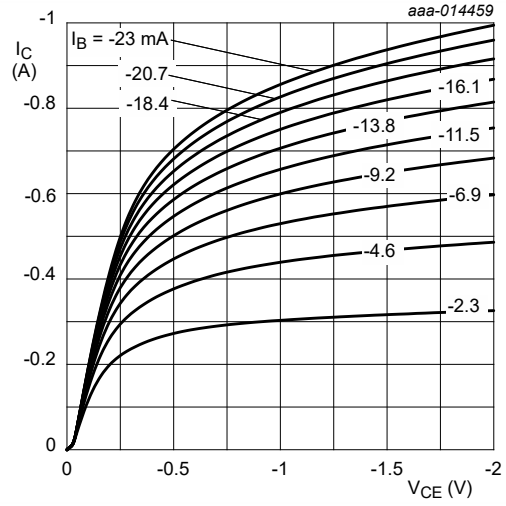
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-------------|--------------------------------------|--|--|-----|------|------|----|
| I_{CBO} | collector-base cut-off current | $V_{CB} = -40\text{ V}$; $I_E = 0\text{ A}$; $T_{amb} = 25\text{ °C}$ | - | - | -50 | nA | |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = -5\text{ V}$; $I_C = 0\text{ A}$; $T_{amb} = 25\text{ °C}$ | - | - | -50 | nA | |
| h_{FE} | DC current gain | $V_{CE} = -1\text{ V}$; $I_C = -0.1\text{ mA}$; $T_{amb} = 25\text{ °C}$ | 30 | - | - | | |
| | | $V_{CE} = -1\text{ V}$; $I_C = -1\text{ mA}$; $T_{amb} = 25\text{ °C}$ | 60 | - | - | | |
| | | $V_{CE} = -1\text{ V}$; $I_C = -10\text{ mA}$; $T_{amb} = 25\text{ °C}$ | 100 | - | - | | |
| | | $V_{CE} = -2\text{ V}$; $I_C = -150\text{ mA}$; $T_{amb} = 25\text{ °C}$ | 100 | - | 300 | | |
| | | $V_{CE} = -2\text{ V}$; $I_C = -500\text{ mA}$; $T_{amb} = 25\text{ °C}$ | 20 | - | - | | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = -150\text{ mA}$; $I_B = -15\text{ mA}$; $T_{amb} = 25\text{ °C}$ | - | - | -400 | mV | |
| | | $I_C = -500\text{ mA}$; $I_B = -50\text{ mA}$; $T_{amb} = 25\text{ °C}$ | - | - | -750 | mV | |
| V_{BEsat} | base-emitter saturation voltage | $I_C = -150\text{ mA}$; $I_B = -15\text{ mA}$; $T_{amb} = 25\text{ °C}$ | - | - | -950 | mV | |
| | | $I_C = -500\text{ mA}$; $I_B = -50\text{ mA}$; $T_{amb} = 25\text{ °C}$ | - | - | -1.3 | V | |
| t_d | delay time | $I_C = -150\text{ mA}$; $I_{B(on)} = -15\text{ mA}$; $I_{B(off)} = 15\text{ mA}$; $T_{amb} = 25\text{ °C}$ | - | - | 15 | ns | |
| t_r | rise time | | - | - | 30 | ns | |
| t_{on} | turn-on time | | - | - | 40 | ns | |
| t_s | storage time | | - | - | 300 | ns | |
| t_f | fall time | | - | - | 50 | ns | |
| t_{off} | turn-off time | | - | - | 350 | ns | |
| C_c | collector capacitance | | $V_{CB} = -10\text{ V}$; $I_E = 0\text{ A}$; $i_e = 0\text{ A}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ °C}$ | - | - | 8.5 | pF |
| C_e | emitter capacitance | | $V_{EB} = -500\text{ mV}$; $I_C = 0\text{ A}$; $i_c = 0\text{ A}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ °C}$ | - | - | 35 | pF |
| f_T | transition frequency | $V_{CE} = -10\text{ V}$; $I_C = -20\text{ mA}$; $f = 100\text{ MHz}$; $T_{amb} = 25\text{ °C}$ | 200 | - | - | MHz | |



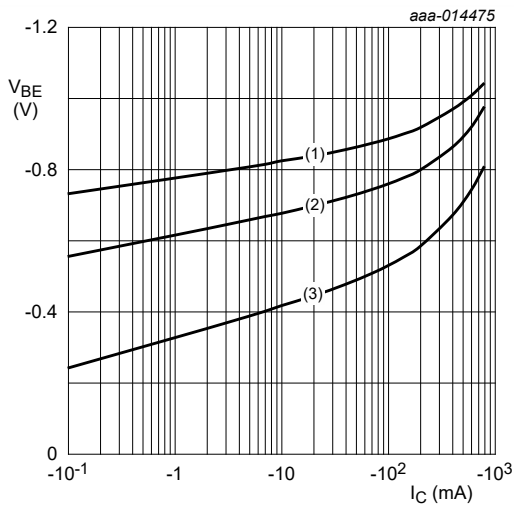
$V_{CE} = -2\text{ V}$
 (1) $T_{amb} = 150^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = -55^\circ\text{C}$

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



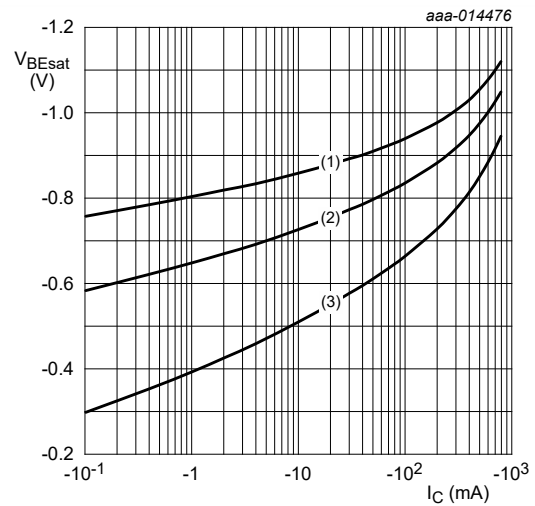
$T_{amb} = 25^\circ\text{C}$

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



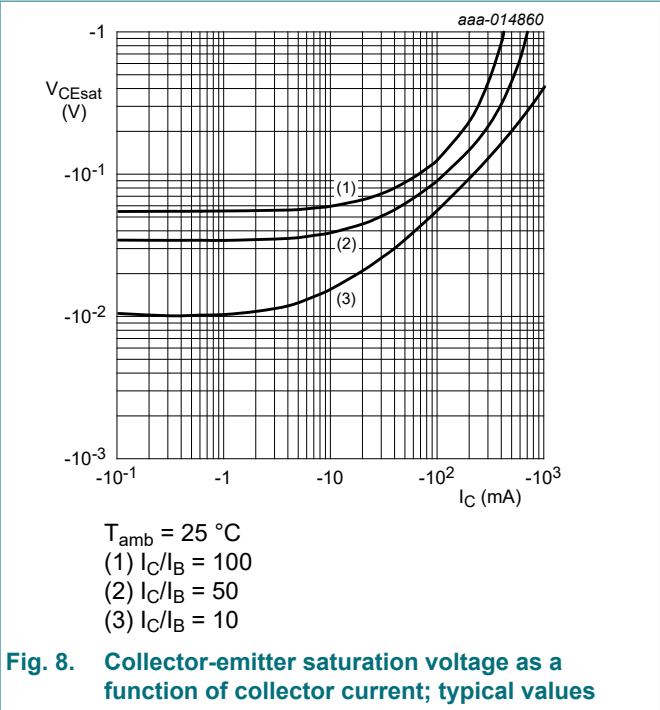
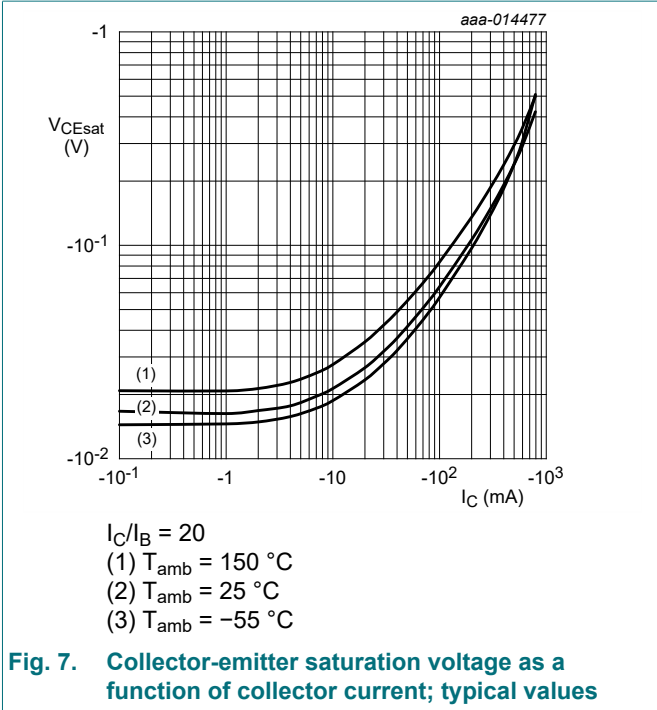
$V_{CE} = -2\text{ V}$
 (1) $T_{amb} = -55^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = 150^\circ\text{C}$

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

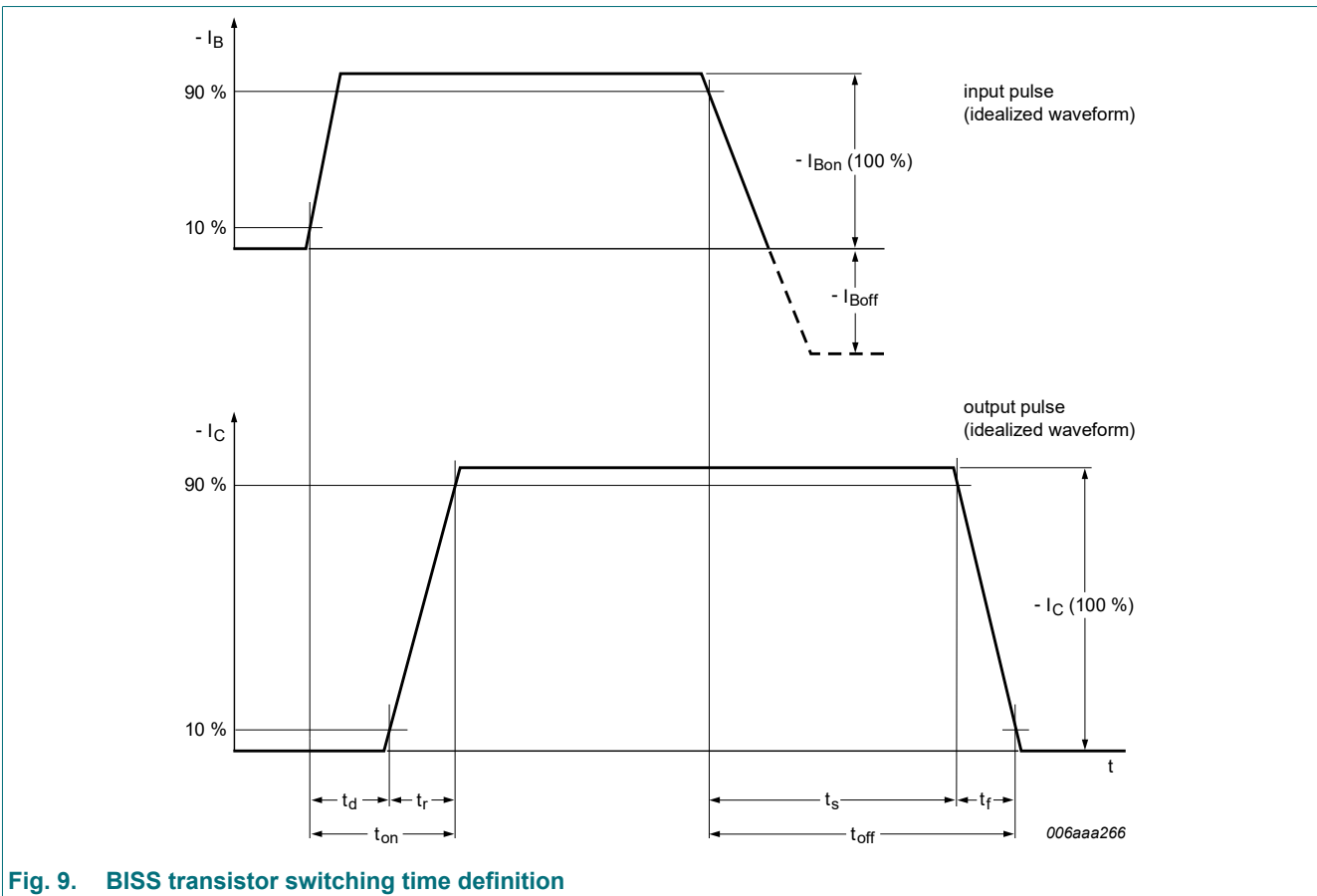


$I_C/I_B = 10$
 (1) $T_{amb} = -55^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = 150^\circ\text{C}$

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



11. Test information



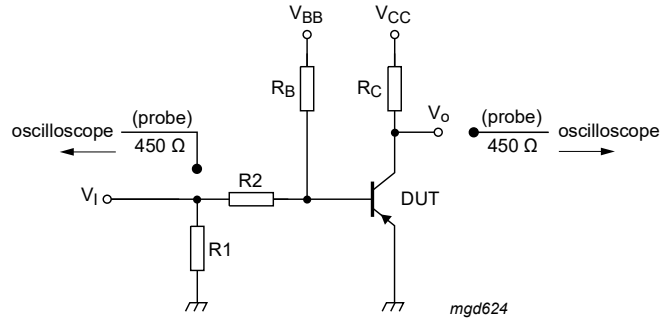


Fig. 10. Test circuit for switching times

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

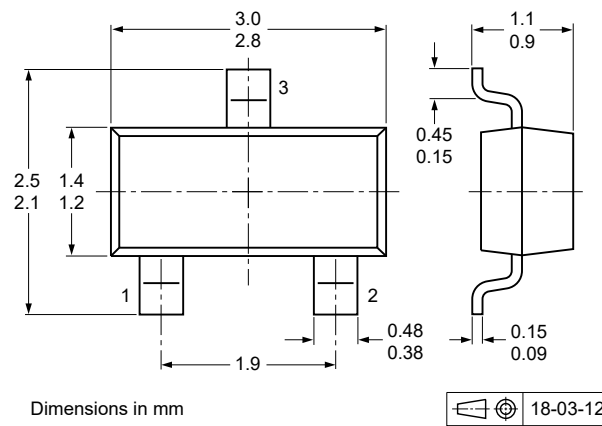


Fig. 11. Package outline SOT23

13. Soldering



Fig. 12. Reflow soldering footprint for SOT23



Fig. 13. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PMBT4403-Q v.1 | 20230616 | 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. |

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