
# PMBTA06-Q

## NPN general purpose transistor

**18 June 2021** **Product data sheet**

## 1. General description

NPN general-purpose transistor encapsulated in a small SOT23 Surface-Mounted Device (SMD) plastic package.

PNP complement: PMBTA56-Q

## 2. Features and benefits

- High current (max. 500 mA)
- Low voltage (max. 80 V)
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- General purpose switching and amplification in e.g. telephony and professional communication equipment.

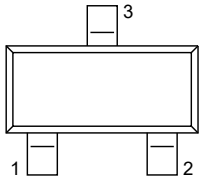
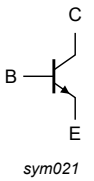
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | open base | | - | - | 80 | V |
| $I_C$ | collector current | | | - | - | 500 | mA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 1 V; $I_C$ = 10 mA; $T_{amb}$ = 25 °C | | 100 | - | - | |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | B | base |  SOT23 |  sym021 |
| 2 | E | emitter | | |
| 3 | C | collector | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PMBTA06-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] |
|---|---|
| PMBTA06-Q | %1G |

[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 | | - | 80 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | | - | 80 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | | - | 4 | V |
| $I_C$ | collector current | | | - | 500 | mA |
| $I_{CM}$ | peak collector current | single pulse; $t_p \leq 1$ ms | | - | 1 | A |
| $I_{BM}$ | 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] Device mounted on an FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint.

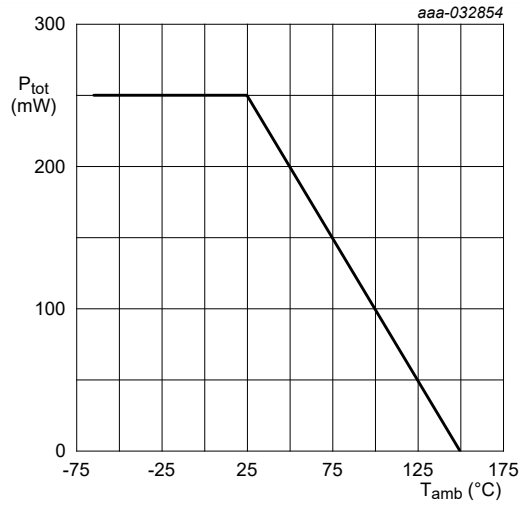


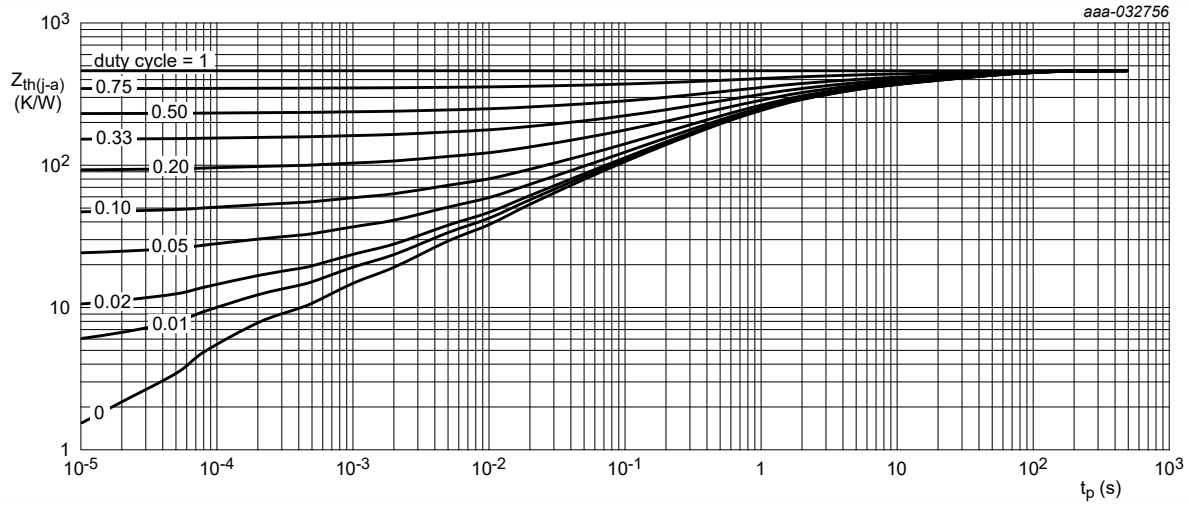

**Fig. 1. Power derating curve**

# 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] Device mounted on an FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint.




FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint

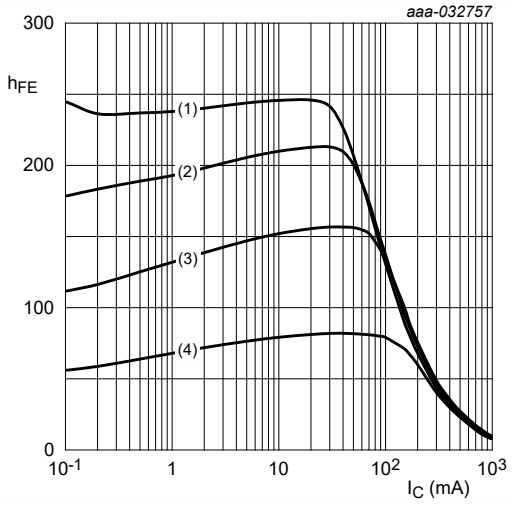
**Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

# 10. Characteristics

**Table 7. Characteristics**

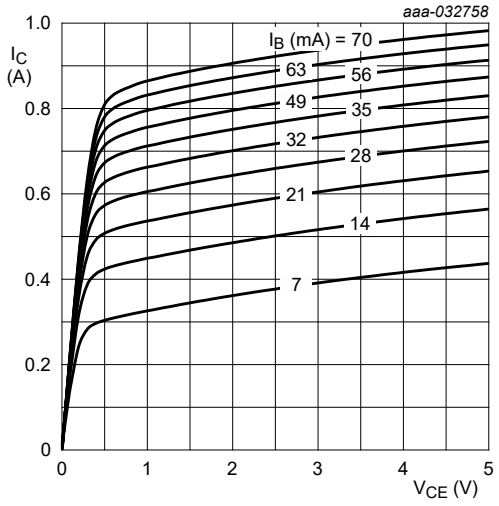
*$T_{amb}$ = 25 °C unless otherwise specified*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | $I_C$ = 100 µA; $I_E$ = 0 A; $T_{amb}$ = 25 °C | | 80 | - | - | V |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage | $I_C$ = 2 mA; $I_B$ = 0 A; $T_{amb}$ = 25 °C | | 80 | - | - | V |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage (collector open) | $I_E$ = 0 A; $I_C$ = 100 µA; $T_{amb}$ = 25 °C | | 4 | - | - | V |
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 80 V; $I_E$ = 0 A; $T_{amb}$ = 25 °C | | - | - | 50 | nA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = 5 V; $I_C$ = 0 A; $T_{amb}$ = 25 °C | | - | - | 50 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 1 V; $I_C$ = 10 mA; $T_{amb}$ = 25 °C | | 100 | - | - | |
| | | $V_{CE}$ = 1 V; $I_C$ = 100 mA; $T_{amb}$ = 25 °C | | 100 | - | - | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 100 mA; $I_B$ = 10 mA; $T_{amb}$ = 25 °C | | - | - | 0.25 | V |
| $V_{BE}$ | base-emitter voltage | $V_{CE}$ = 1 V; $I_C$ = 100 mA; $T_{amb}$ = 25 °C | | - | - | 1.2 | V |
| $f_T$ | transition frequency | $V_{CE}$ = 2 V; $I_C$ = 10 mA; f = 100 MHz; $T_{amb}$ = 25 °C | | 100 | - | - | MHz |



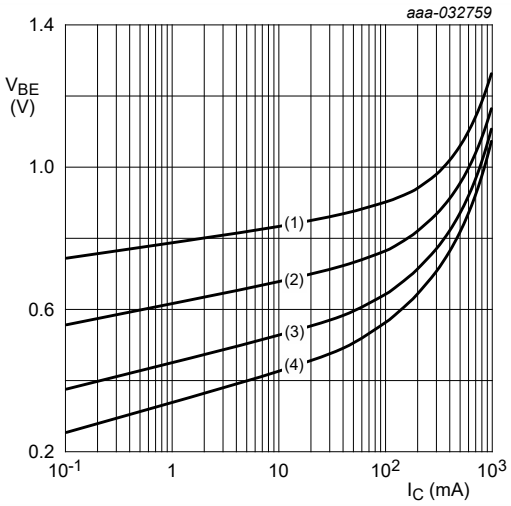

$V_{CE}$ = 1 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 100 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = −55 °C

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



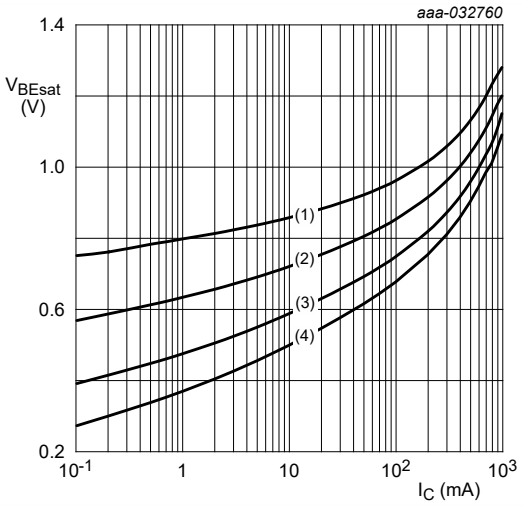

$T_{amb}$ = 25 °C

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



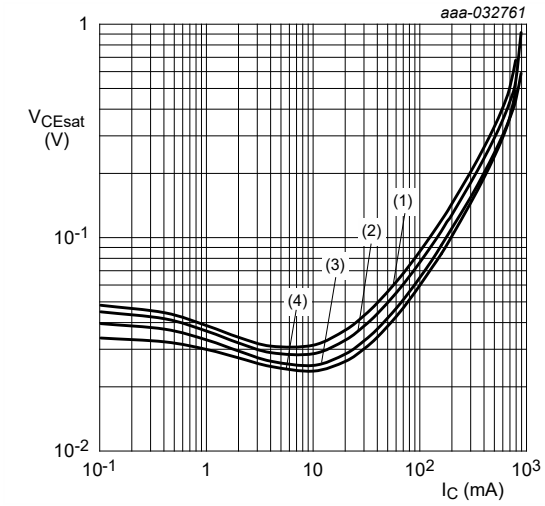

$V_{CE}$ = 1 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 100 °C
(4) $T_{amb}$ = 150 °C

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




$I_C/I_B$ = 10
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 100 °C
(4) $T_{amb}$ = 150 °C

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




$I_C/I_B$ = 10
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 100 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = -55 °C

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

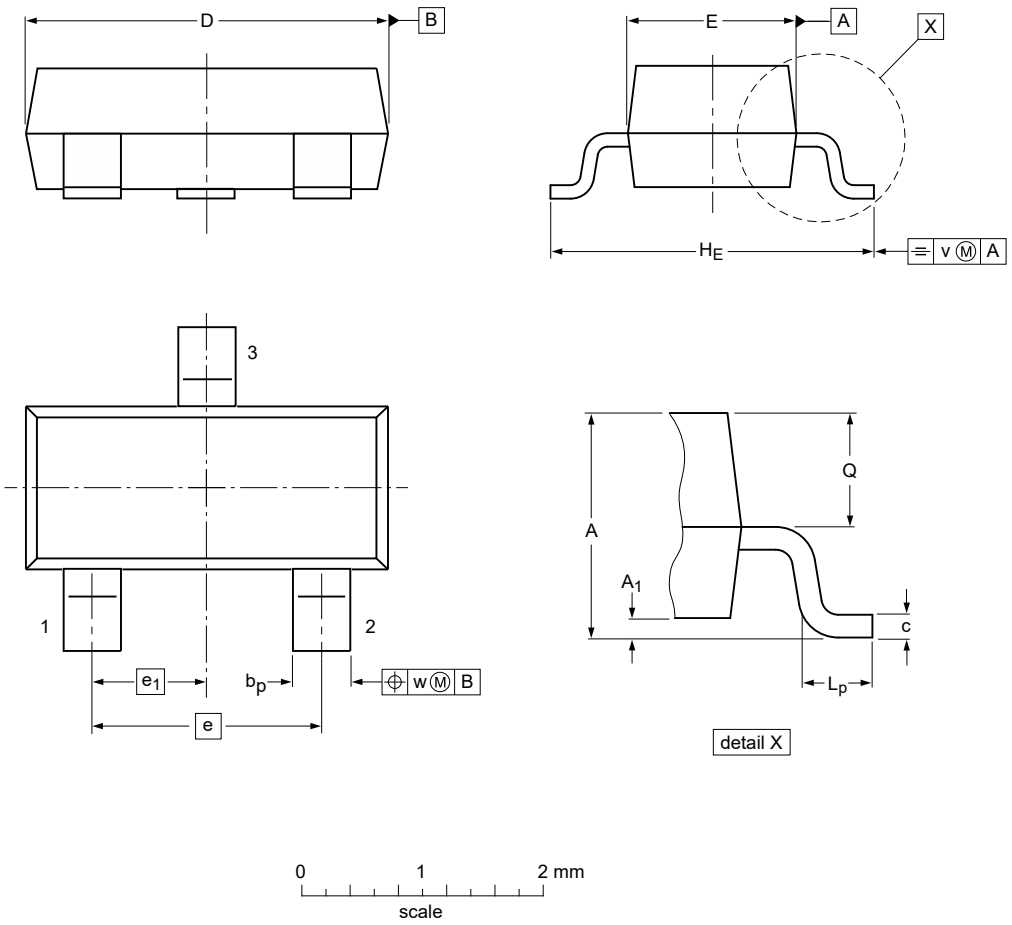
# 11. Test information

## 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

**Plastic surface-mounted package; 3 leads** **SOT23**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.1 | 0.1 | 0.48 | 0.15 | 3.0 | 1.4 | | | 2.5 | 0.45 | 0.55 | | |
| | nom | | | | | | | 1.9 | 0.95 | | | | 0.2 | 0.1 |
| | min | 0.9 | | 0.38 | 0.09 | 2.8 | 1.2 | | | 2.1 | 0.15 | 0.45 | | |

*sot023_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT23 | | TO-236AB | | | | ~~14-06-19~~ 14-09-22 |

**Fig. 8. Package outline SOT23**

## 13. Soldering

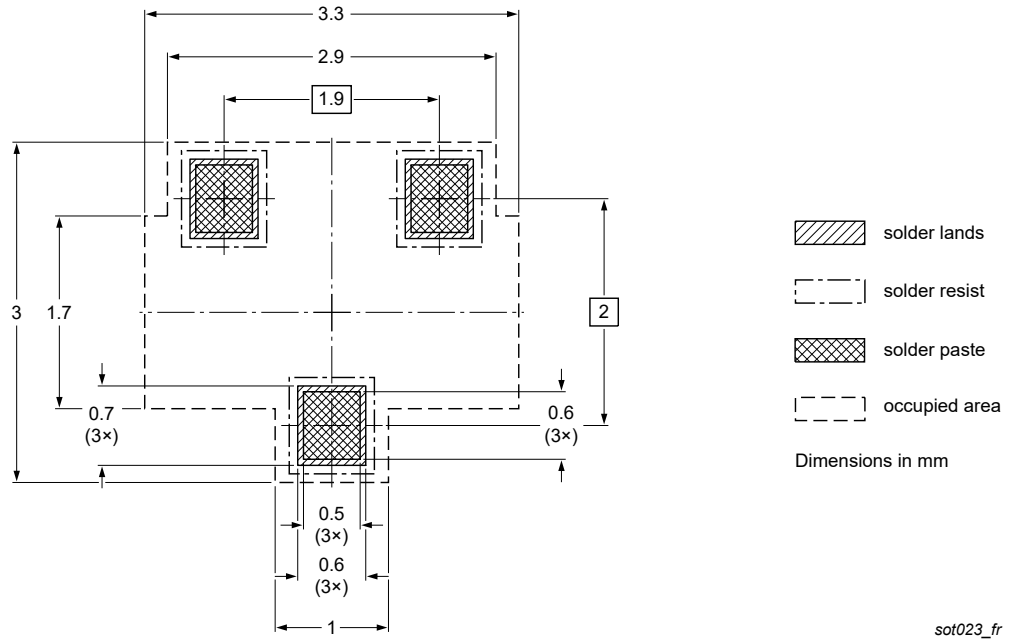



**Fig. 9. Reflow soldering footprint for SOT23**

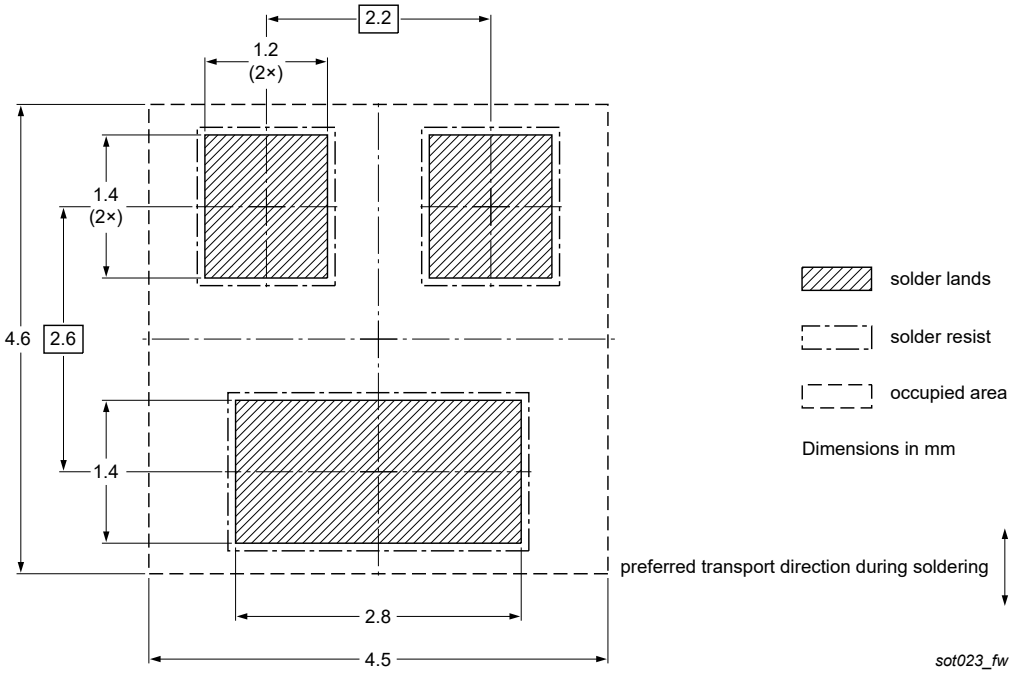



**Fig. 10. Wave soldering footprint for SOT23**

# 14. Revision history

**Table 8. Revision history**

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PMBTA06-Q v.1 | 20210618 | 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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