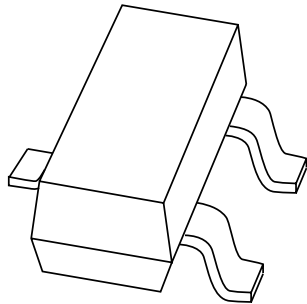


# DATA SHEET



## **PMBT4403** PNP switching transistor

Product data sheet  
Supersedes data of 1999 Apr 15

2004 Jan 21

## PNP switching transistor

## PMBT4403

## FEATURES

- High current (max. 600 mA)
- Low voltage (max. 40 V).

## APPLICATIONS

- Industrial and consumer switching applications.

## DESCRIPTION

PNP switching transistor in a SOT23 plastic package.  
NPN complement: PMBT4401.

## MARKING

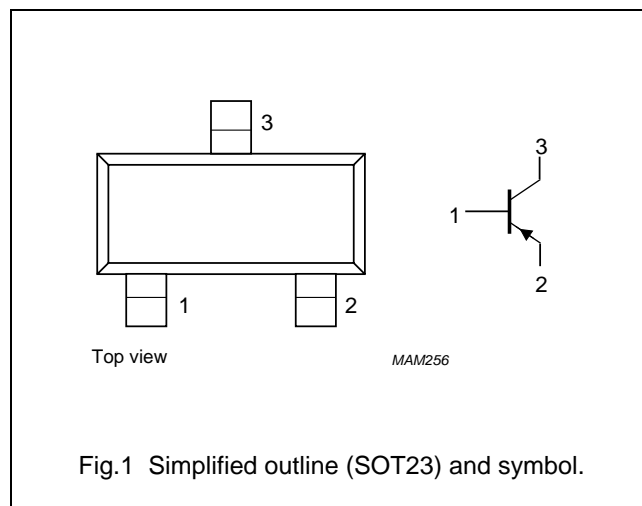
| TYPE NUMBER | MARKING CODE <sup>(1)</sup> |
|-------------|-----------------------------|
| PMBT4403    | *2T                         |

## Note

1. \* = p : Made in Hong Kong.  
 \* = t : Made in Malaysia.  
 \* = W : Made in China.

## PINNING

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | base        |
| 2   | emitter     |
| 3   | collector   |



## ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |  |         |
|-------------|---------|--|---------|
|             | NAME    | DESCRIPTION                              | VERSION |
| PMBT4403    | –       | plastic surface mounted package; 3 leads | SOT23   |

## 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 (DC)        |                                      | –    | –600 | mA   |
| $I_{CM}$  | peak collector current        |                                      | –    | –800 | mA   |
| $I_{BM}$  | peak base current             |                                      | –    | –200 | mA   |
| $P_{tot}$ | total power dissipation       | $T_{amb} \leq 25\text{ °C}$ ; note 1 | –    | 250  | mW   |
| $T_{stg}$ | storage temperature           |                                      | –65  | +150 | °C   |
| $T_j$     | junction temperature          |                                      | –    | 150  | °C   |
| $T_{amb}$ | operating ambient temperature |                                      | –65  | +150 | °C   |

## Note

1. Transistor mounted on an FR4 printed-circuit board.

## PNP switching transistor

## PMBT4403

## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | note 1     | 500   | K/W  |

## Note

1. Transistor mounted on an FR4 printed-circuit board.

## CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

| SYMBOL   | PARAMETER                            | CONDITIONS  | MIN.      | MAX.     | UNIT |
|--|--------------------------------------|---|-----------|----------|------|
| $I_{CBO}$  | collector-base cut-off current       | $I_E = 0$ ; $V_{CB} = -40\text{ V}$   | –         | –50      | nA   |
| $I_{EBO}$  | emitter-base cut-off current         | $I_C = 0$ ; $V_{EB} = -5\text{ V}$  | –         | –50      | nA   |
| $h_{FE}$   | DC current gain                      | $V_{CE} = -1\text{ V}$ ; (see Fig.2)<br>$I_C = -0.1\text{ mA}$                        | 30        | –        |      |
|  |                                      | $I_C = -1\text{ mA}$  | 60        | –        |      |
|  |                                      | $I_C = -10\text{ mA}$   | 100       | –        |      |
|  |                                      | $V_{CE} = -2\text{ V}$<br>$I_C = -150\text{ mA}$<br>$I_C = -500\text{ mA}$            | 100<br>20 | 300<br>– |      |
| $V_{CEsat}$  | collector-emitter saturation voltage | $I_C = -150\text{ mA}$ ; $I_B = -15\text{ mA}$  | –         | –400     | mV   |
|  |                                      | $I_C = -500\text{ mA}$ ; $I_B = -50\text{ mA}$  | –         | –750     | mV   |
| $V_{BEsat}$  | base-emitter saturation voltage      | $I_C = -150\text{ mA}$ ; $I_B = -15\text{ mA}$  | –         | –950     | mV   |
|  |                                      | $I_C = -500\text{ mA}$ ; $I_B = -50\text{ mA}$  | –         | –1.3     | V    |
| $C_c$  | collector capacitance                | $I_E = I_c = 0$ ; $V_{CB} = -10\text{ V}$ ; $f = 1\text{ MHz}$                        | –         | 8.5      | pF   |
| $C_e$  | emitter capacitance                  | $I_C = I_c = 0$ ; $V_{EB} = -500\text{ mV}$ ; $f = 1\text{ MHz}$                      | –         | 35       | pF   |
| $f_T$  | transition frequency                 | $I_C = -20\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ; $f = 100\text{ MHz}$                | 200       | –        | MHz  |
| <b>Switching times (between 10% and 90% levels); (see Fig.3)</b> |                                      |   |           |          |      |
| $t_{on}$   | turn-on time                         | $I_{Con} = -150\text{ mA}$ ; $I_{Bon} = -15\text{ mA}$ ;<br>$I_{Boff} = 15\text{ mA}$ | –         | 40       | ns   |
| $t_d$  | delay time                           |   | –         | 15       | ns   |
| $t_r$  | rise time                            |   | –         | 30       | ns   |
| $t_{off}$  | turn-off time                        |   | –         | 350      | ns   |
| $t_s$  | storage time                         |   | –         | 300      | ns   |
| $t_f$  | fall time                            |   | –         | 50       | ns   |

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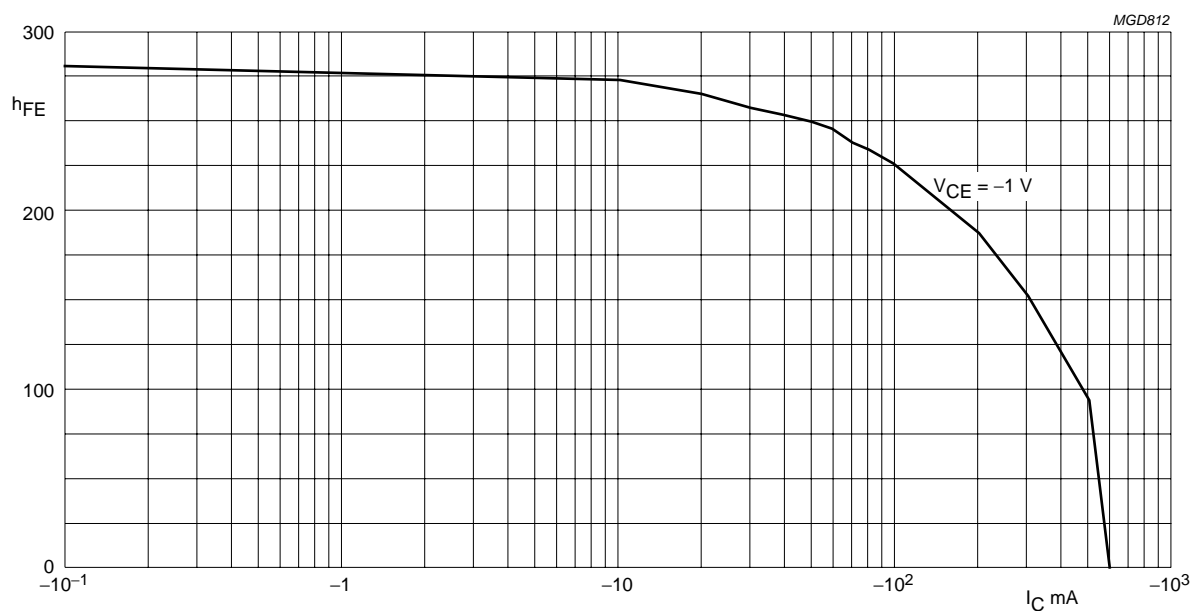
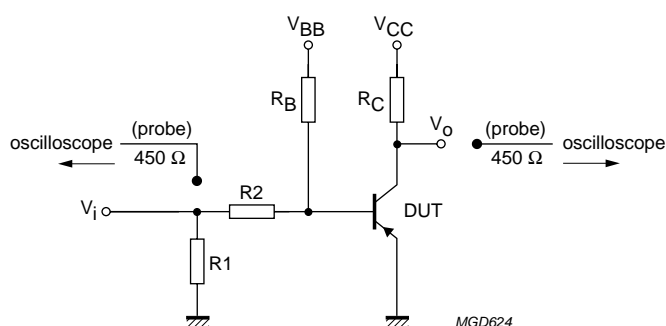


Fig.2 DC current gain; typical values.



$V_i = -9.5\text{ V}$ ;  $T = 500\text{ }\mu\text{s}$ ;  $t_p = 10\text{ }\mu\text{s}$ ;  $t_r = t_f \leq 3\text{ ns}$ .  
 $R_1 = 68\text{ }\Omega$ ;  $R_2 = 325\text{ }\Omega$ ;  $R_B = 325\text{ }\Omega$ ;  $R_C = 160\text{ }\Omega$ .  
 $V_{BB} = 3.5\text{ V}$ ;  $V_{CC} = -29.5\text{ V}$ .  
 Oscilloscope: input impedance  $Z_i = 50\text{ }\Omega$ .

Fig.3 Test circuit for switching times.

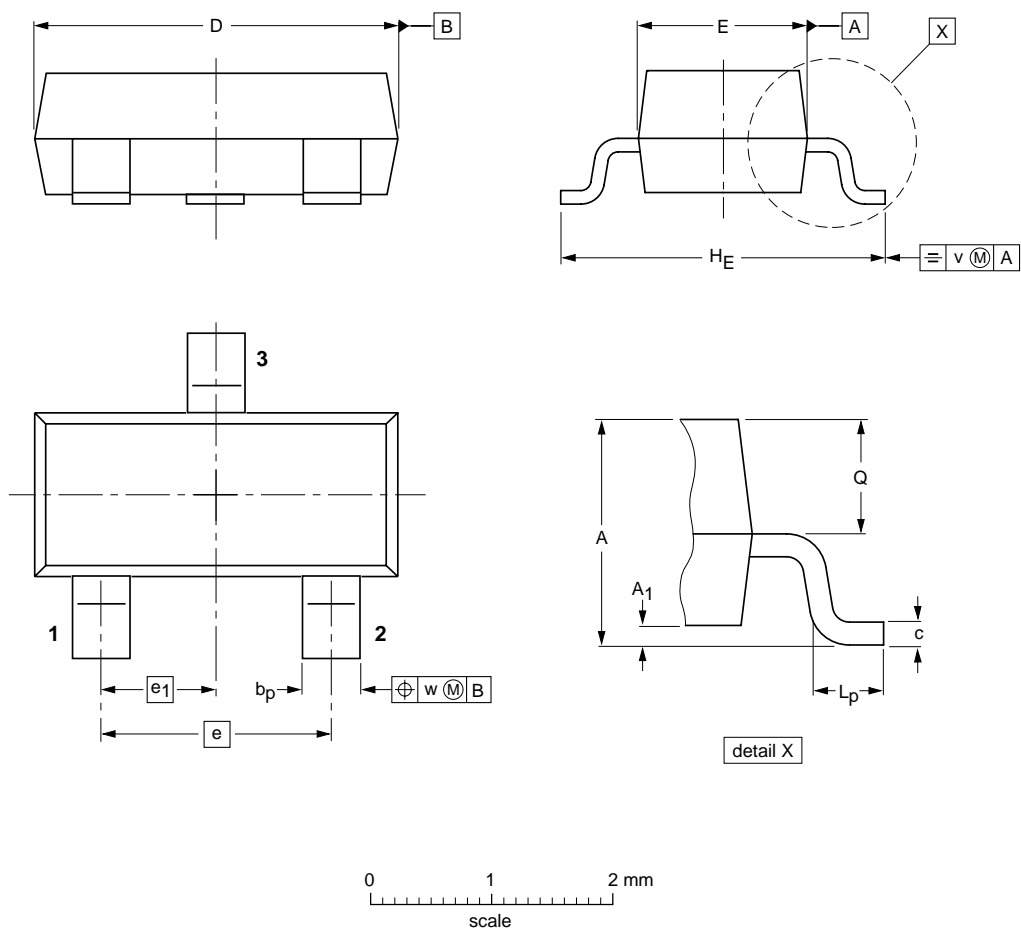
PNP switching transistor

PMBT4403

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub><br>max. | b <sub>p</sub> | c            | D          | E          | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   |
|------|------------|------------------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|
| mm   | 1.1<br>0.9 | 0.1                    | 0.48<br>0.38   | 0.15<br>0.09 | 3.0<br>2.8 | 1.4<br>1.2 | 1.9 | 0.95           | 2.5<br>2.1     | 0.45<br>0.15   | 0.55<br>0.45 | 0.2 | 0.1 |

| OUTLINE<br>VERSION | REFERENCES |          |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|----------|-------|--|------------------------|----------------------|
|                    | IEC        | JEDEC    | JEITA |  |                        |                      |
| SOT23              |            | TO-236AB |       |  |                        | 04-11-04<br>06-03-16 |

## PNP switching transistor

PMBT4403

## DATA SHEET STATUS

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | DEFINITION  |
|--------------------------------|-------------------------------|---|
| Objective data sheet           | Development                   | This document contains data from the objective specification for product development. |
| Preliminary data sheet         | Qualification                 | This document contains data from the preliminary specification.                       |
| Product data sheet             | Production                    | This document contains the product specification.                                     |

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