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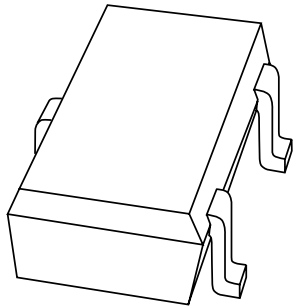
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Kind regards,

Team Nexperia

# DATA SHEET



## **PMST2222; PMST2222A** NPN switching transistors

Product data sheet  
Supersedes data of 1997 Jul 14

1999 Apr 22

# NPN switching transistors

# PMST2222; PMST2222A

### FEATURES

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

### APPLICATIONS

- High-speed switching and linear amplification.

### DESCRIPTION

NPN switching transistor in a SOT323 plastic package.  
PNP complement: PMST2907A.

### MARKING

| TYPE NUMBER | MARKING CODE <sup>(1)</sup> |
|-------------|-----------------------------|
| PMST2222    | *1B                         |
| PMST2222A   | *1P                         |

### Note

- \* = - : Made in Hong Kong.  
\* = t : Made in Malaysia.

### PINNING

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

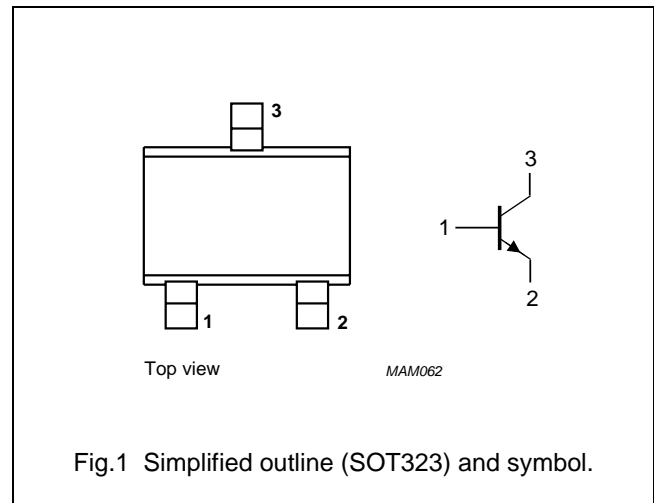


Fig.1 Simplified outline (SOT323) and symbol.

### LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL           | PARAMETER                     | CONDITIONS                       | MIN. | MAX. | UNIT |
|------------------|-------------------------------|----------------------------------|------|------|------|
| V <sub>CBO</sub> | collector-base voltage        | open emitter                     |      |      |      |
|                  | PMST2222                      |                                  | –    | 60   | V    |
|                  | PMST2222A                     |                                  | –    | 75   | V    |
| V <sub>CEO</sub> | collector-emitter voltage     | open base                        |      |      |      |
|                  | PMST2222                      |                                  | –    | 30   | V    |
|                  | PMST2222A                     |                                  | –    | 40   | V    |
| V <sub>EBO</sub> | emitter-base voltage          | open collector                   |      |      |      |
|                  | PMST2222                      |                                  | –    | 5    | V    |
|                  | PMST2222A                     |                                  | –    | 6    | V    |
| I <sub>C</sub>   | collector current (DC)        |                                  | –    | 600  | mA   |
| I <sub>CM</sub>  | peak collector current        |                                  | –    | 800  | mA   |
| I <sub>BM</sub>  | peak base current             |                                  | –    | 200  | mA   |
| P <sub>tot</sub> | total power dissipation       | T <sub>amb</sub> ≤ 25 °C; note 1 | –    | 200  | mW   |
| T <sub>stg</sub> | storage temperature           |                                  | –65  | +150 | °C   |
| T <sub>j</sub>   | junction temperature          |                                  | –    | 150  | °C   |
| T <sub>amb</sub> | operating ambient temperature |                                  | –65  | +150 | °C   |

### Note

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

## NPN switching transistors

## PMST2222; PMST2222A

## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | note 1     | 625   | K/W  |

## Note

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

## CHARACTERISTICS

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

| SYMBOL      | PARAMETER   | CONDITIONS  | MIN.     | MAX.   | UNIT          |
|-------------|---|---|----------|--------|---------------|
| $I_{CBO}$   | collector cut-off current<br>PMST2222             | $I_E = 0; V_{CB} = 50\text{ V}$                                     | –        | 10     | nA            |
|             |   | $I_E = 0; V_{CB} = 50\text{ V}; T_j = 125\text{ °C}$                | –        | 10     | $\mu\text{A}$ |
|             | collector cut-off current<br>PMST2222A            | $I_E = 0; V_{CB} = 60\text{ V}$                                     | –        | 10     | nA            |
|             |   | $I_E = 0; V_{CB} = 60\text{ V}; T_j = 125\text{ °C}$                | –        | 10     | $\mu\text{A}$ |
| $I_{EBO}$   | collector cut-off current                         | $I_C = 0; V_{EB} = 3\text{ V}$                                      | –        | 10     | nA            |
| $h_{FE}$    | DC current gain                                   | $I_C = 0.1\text{ mA}; V_{CE} = 10\text{ V}$                         | 35       | –      |               |
|             |   | $I_C = 1\text{ mA}; V_{CE} = 10\text{ V}$                           | 50       | –      |               |
|             |   | $I_C = 10\text{ mA}; V_{CE} = 10\text{ V}$                          | 75       | –      |               |
|             |   | $I_C = 10\text{ mA}; V_{CE} = 10\text{ V}; T_{amb} = -55\text{ °C}$ | 35       | –      |               |
|             |   | $I_C = 150\text{ mA}; V_{CE} = 1\text{ V}; \text{note 1}$           | 50       | –      |               |
|             |   | $I_C = 150\text{ mA}; V_{CE} = 10\text{ V}; \text{note 1}$          | 100      | 300    |               |
|             | DC current gain<br>PMST2222<br>PMST2222A          | $I_C = 500\text{ mA}; V_{CE} = 10\text{ V}; \text{note 1}$          | 30<br>40 | –<br>– |               |
| $V_{CEsat}$ | collector-emitter saturation voltage<br>PMST2222  | $I_C = 150\text{ mA}; I_B = 15\text{ mA}; \text{note 1}$            | –        | 400    | mV            |
|             |   | $I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{note 1}$            | –        | 1.6    | V             |
|             | collector-emitter saturation voltage<br>PMST2222A | $I_C = 150\text{ mA}; I_B = 15\text{ mA}; \text{note 1}$            | –        | 300    | mV            |
|             |   | $I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{note 1}$            | –        | 1      | V             |
| $V_{BEsat}$ | base-emitter saturation voltage<br>PMST2222       | $I_C = 150\text{ mA}; I_B = 15\text{ mA}; \text{note 1}$            | –        | 1.3    | V             |
|             |   | $I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{note 1}$            | –        | 2.6    | V             |
|             | base-emitter saturation voltage<br>PMST2222A      | $I_C = 150\text{ mA}; I_B = 15\text{ mA}; \text{note 1}$            | 0.6      | 1.2    | V             |
|             |   | $I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{note 1}$            | –        | 2      | V             |
| $C_c$       | collector capacitance                             | $I_E = i_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$             | –        | 8      | pF            |
| $C_e$       | emitter capacitance<br>PMST2222                   | $I_C = i_c = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$            | –        | 30     | pF            |
|             | PMST2222A   |   | –        | 25     | pF            |
| $f_T$       | transition frequency<br>PMST2222                  | $I_C = 20\text{ mA}; V_{CE} = 20\text{ V}; f = 100\text{ MHz}$      | 250      | –      | MHz           |
|             | PMST2222A   |   | 300      | –      | MHz           |

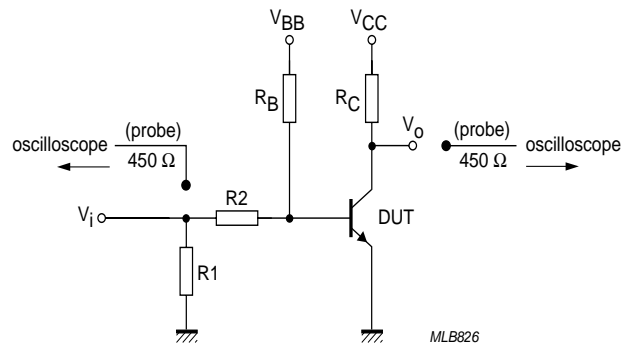
NPN switching transistors

PMST2222; PMST2222A

| SYMBOL   | PARAMETER     | CONDITIONS   | MIN. | MAX. | UNIT |
|--|---------------|--|------|------|------|
| F  | noise figure  | $I_C = 200 \mu A$ ; $V_{CE} = 5 V$ ; $R_S = 2 k\Omega$ ;<br>$f = 1 kHz$ ; $B = 200 Hz$ | -    | 4    | dB   |
| <b>Switching times (between 10% and 90% levels); (see Fig.2)</b> |               |  |      |      |      |
| $t_{on}$   | turn-on time  | $I_{Con} = 150 mA$ ; $I_{Bon} = 15 mA$ ;<br>$I_{Boff} = -15 mA$                        | -    | 35   | ns   |
| $t_d$  | delay time    |  | -    | 15   | ns   |
| $t_r$  | rise time     |  | -    | 20   | ns   |
| $t_{off}$  | turn-off time |  | -    | 250  | ns   |
| $t_s$  | storage time  |  | -    | 200  | ns   |
| $t_f$  | fall time     |  | -    | 60   | ns   |

Note

1. Pulse test:  $t_p \leq 300 \mu s$ ;  $\delta \leq 0.02$ .



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

Fig.2 Test circuit for switching times.

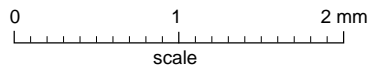
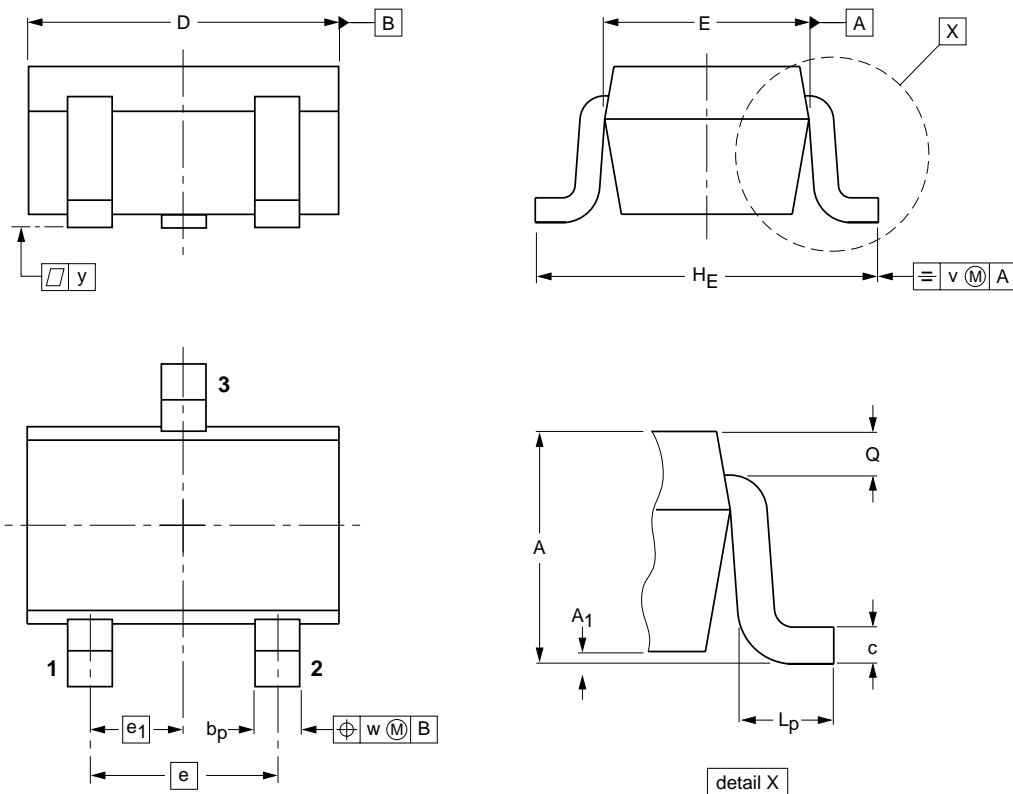
NPN switching transistors

PMST2222; PMST2222A

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT323



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>0.8 | 0.1                   | 0.4<br>0.3     | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65           | 2.2<br>2.0     | 0.45<br>0.15   | 0.23<br>0.13 | 0.2 | 0.2 |

| OUTLINE VERSION | REFERENCES |       |       | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|---------------------|------------|
|                 | IEC        | JEDEC | EIAJ  |                     |            |
| SOT323          |            |       | SC-70 |                     | 97-02-28   |

## NPN switching transistors

PMST2222;  
PMST2222A

## 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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# ***NXP Semiconductors***

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