



# PMST3904

NPN switching transistor

30 September 2025

Product data sheet

## 1. General description

NPN switching transistor in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

PNP complement: PMST3906

## 2. Features and benefits

- Collector current capability  $I_C = 200 \text{ mA}$
- Collector-emitter voltage  $V_{CEO} = 40 \text{ V}$
- AEC-Q101 qualified

## 3. Applications

- General amplification and switching

## 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         |  | -   | -   | 200 | mA   |
| $h_{FE}$  | DC current gain           | $V_{CE} = 1 \text{ V}$ ; $I_C = 10 \text{ mA}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$ | 100 | -   | 300 |      |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--------------------|----------------|
| 1   | B      | base        | <br>SC-70 (SOT323) | <br>sym123     |
| 2   | E      | emitter     |                    |                |
| 3   | C      | collector   |                    |                |

6. Ordering information

Table 3. Ordering information

| Type number | Package |  |         |
|-------------|---------|--|---------|
|             | Name    | Description  | Version |
| PMST3904    | SC-70   | plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body | SOT323  |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| PMST3904    | %1A             |

[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 <sub>CBO</sub> | collector-base voltage    | open emitter             |     | -   | 60  | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                |     | -   | 40  | V    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector           |     | -   | 6   | V    |
| I <sub>C</sub>   | collector current         |                          |     | -   | 200 | mA   |
| I <sub>CM</sub>  | peak collector current    |                          |     | -   | 200 | mA   |
| I <sub>BM</sub>  | peak base current         |                          |     | -   | 100 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C | [1] | -   | 200 | mW   |
| T <sub>j</sub>   | junction temperature      |                          |     | -   | 150 | °C   |
| T <sub>amb</sub> | ambient temperature       |                          |     | -65 | 150 | °C   |
| T <sub>stg</sub> | storage temperature       |                          |     | -65 | 150 | °C   |

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

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol               | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|----------------------|---|-------------|-----|-----|-----|-----|------|
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 625 | K/W  |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

| Symbol                                       | Parameter                            | Conditions   |  | Min | Typ | Max | Unit |
|--|--------------------------------------|--|--|-----|-----|-----|------|
| I <sub>CBO</sub>                             | collector-base cut-off current       | V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C   |  | -   | -   | 50  | nA   |
| I <sub>EBO</sub>                             | emitter-base cut-off current         | V <sub>EB</sub> = 6 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C  |  | -   | -   | 50  | nA   |
| h <sub>FE</sub>                              | DC current gain                      | V <sub>CE</sub> = 1 V; I <sub>C</sub> = 0.1 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C    |  | 60  | -   | -   |      |
|  |                                      | V <sub>CE</sub> = 1 V; I <sub>C</sub> = 1 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C      |  | 80  | -   | -   |      |
|  |                                      | V <sub>CE</sub> = 1 V; I <sub>C</sub> = 10 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C     |  | 100 | -   | 300 |      |
|  |                                      | V <sub>CE</sub> = 1 V; I <sub>C</sub> = 50 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C     |  | 60  | -   | -   |      |
|  |                                      | V <sub>CE</sub> = 1 V; I <sub>C</sub> = 100 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C    |  | 30  | -   | -   |      |
| V <sub>CEsat</sub>                           | collector-emitter saturation voltage | I <sub>C</sub> = 10 mA; I <sub>B</sub> = 1 mA; T <sub>amb</sub> = 25 °C  |  | -   | -   | 200 | mV   |
|  |                                      | I <sub>C</sub> = 50 mA; I <sub>B</sub> = 5 mA; T <sub>amb</sub> = 25 °C  |  | -   | -   | 300 | mV   |
| V <sub>BEsat</sub>                           | base-emitter saturation voltage      | I <sub>C</sub> = 10 mA; I <sub>B</sub> = 1 mA; T <sub>amb</sub> = 25 °C  |  | 650 | -   | 850 | mV   |
|  |                                      | I <sub>C</sub> = 50 mA; I <sub>B</sub> = 5 mA; T <sub>amb</sub> = 25 °C  |  | -   | -   | 950 | mV   |
| C <sub>c</sub>                               | collector capacitance                | V <sub>CB</sub> = 5 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C                 |  | -   | -   | 4   | pF   |
| C <sub>e</sub>                               | emitter capacitance                  | V <sub>EB</sub> = 0.5 V; I <sub>C</sub> = 0 A; i <sub>c</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C               |  | -   | -   | 8   | pF   |
| f <sub>T</sub>                               | transition frequency                 | V <sub>CE</sub> = 10 V; I <sub>C</sub> = 20 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C                                  |  | 300 | -   | -   | MHz  |
| NF   | noise figure                         | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 100 μA; R <sub>S</sub> = 1 kΩ; f = 10 Hz to 15.7 kHz; T <sub>amb</sub> = 25 °C |  | -   | -   | 5   | dB   |
| Switching times (between 10% and 90% levels) |                                      |  |  |     |     |     |      |
| t <sub>d</sub>                               | delay time                           | I <sub>C</sub> = 10 mA; I <sub>Bon</sub> = 1 mA; I <sub>Boff</sub> = -1 mA; T <sub>amb</sub> = 25 °C                   |  | -   | -   | 35  | ns   |
| t <sub>r</sub>                               | rise time                            |  |  | -   | -   | 35  | ns   |
| t <sub>s</sub>                               | storage time                         |  |  | -   | -   | 200 | ns   |
| t <sub>f</sub>                               | fall time                            |  |  | -   | -   | 50  | ns   |

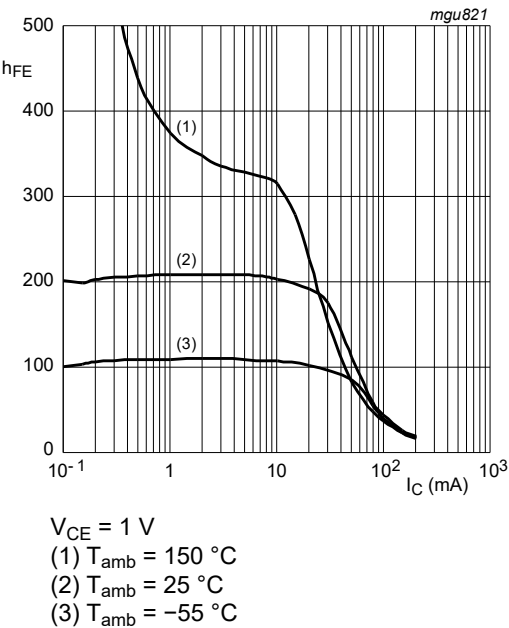


Fig. 1. DC current gain as a function of collector current; typical values

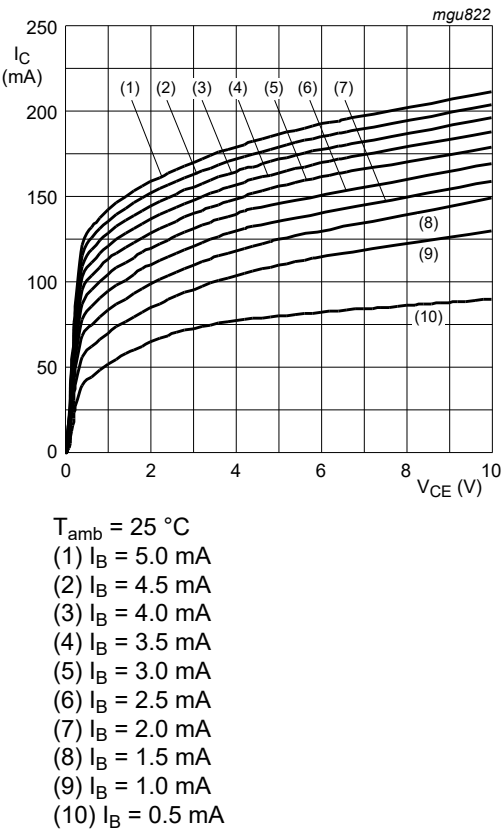


Fig. 2. Collector current as a function of collector-emitter voltage; typical values

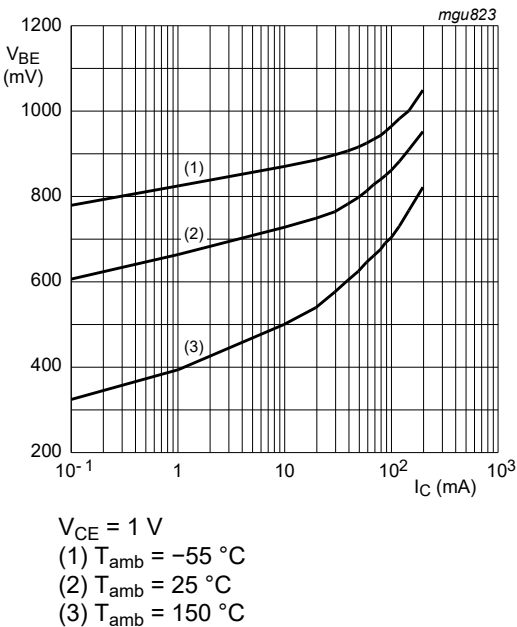


Fig. 3. Base-emitter voltage as a function of collector current; typical values

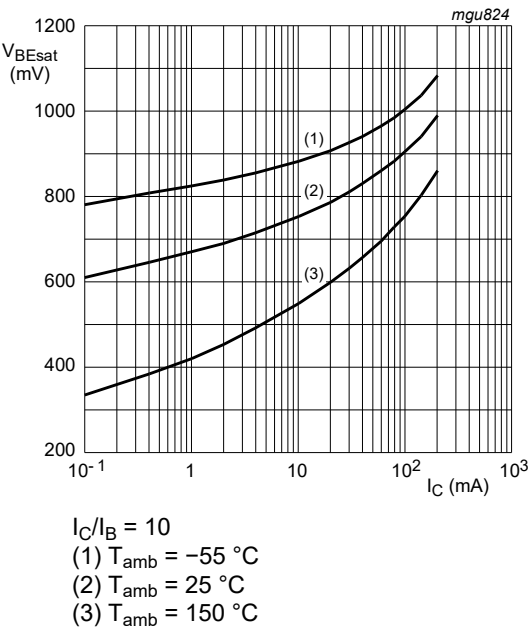
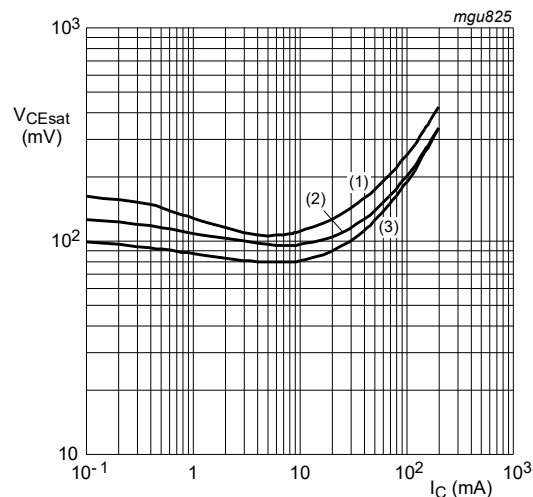


Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values



$$I_C/I_B = 10$$

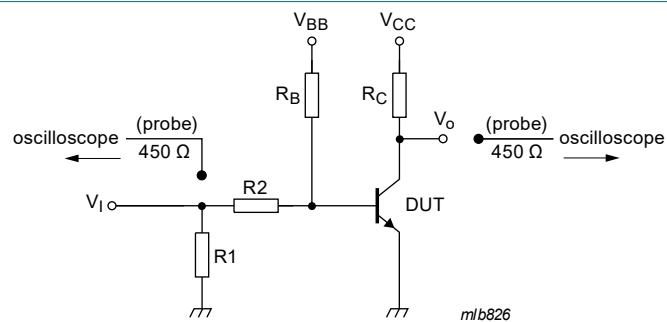
(1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

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

(3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

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

## 11. Test information



$V_I = 5\text{ V}$ ;  $t = 600\text{ }\mu\text{s}$ ;  $t_p = 10\text{ }\mu\text{s}$ ;  $t_r = t_f \leq 3\text{ ns}$

$R_1 = 56\text{ }\Omega$ ;  $R_2 = 2.5\text{ k}\Omega$ ;  $R_B = 3.9\text{ k}\Omega$ ;  $R_C = 270\text{ }\Omega$

$V_{BB} = -1.9\text{ V}$ ;  $V_{CC} = 3\text{ V}$

Oscilloscope: input impedance  $Z_i = 50\text{ }\Omega$

Fig. 6. Test circuit for switching times

12. Package outline

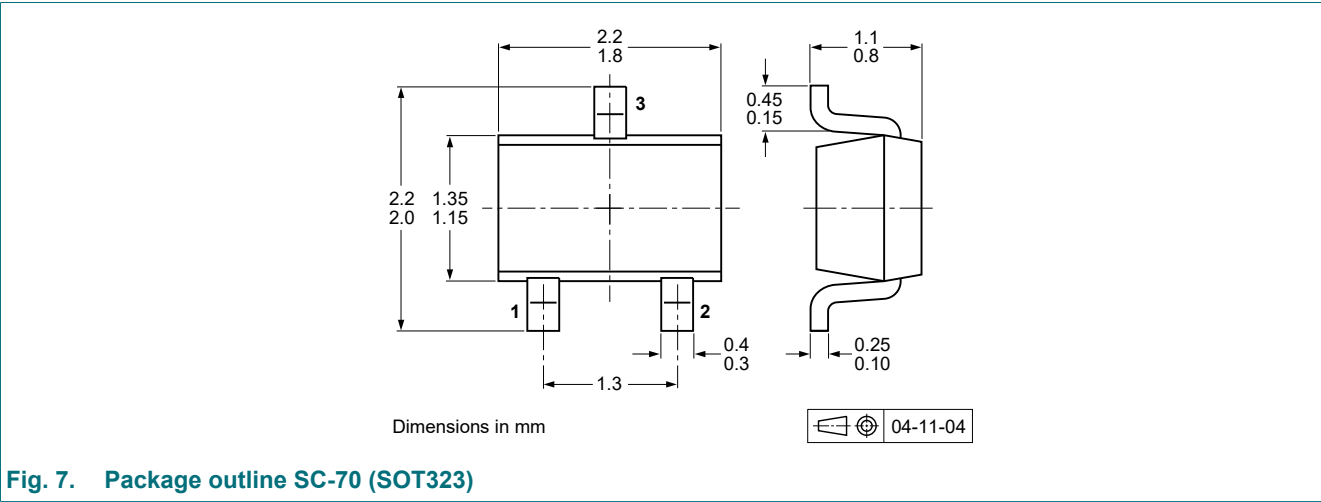


Fig. 7. Package outline SC-70 (SOT323)

13. Soldering

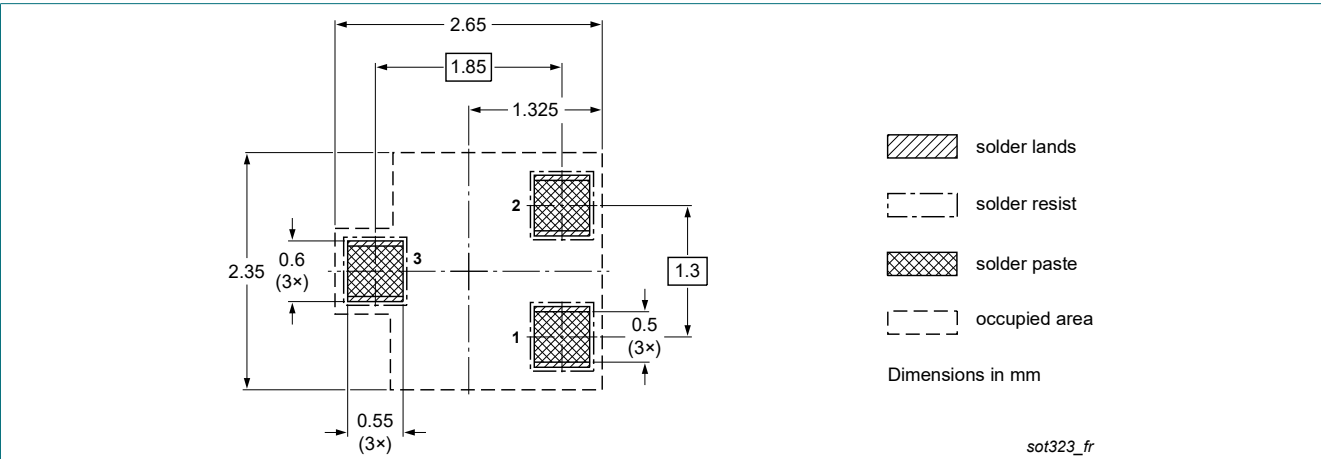


Fig. 8. Reflow soldering footprint for SC-70 (SOT323)

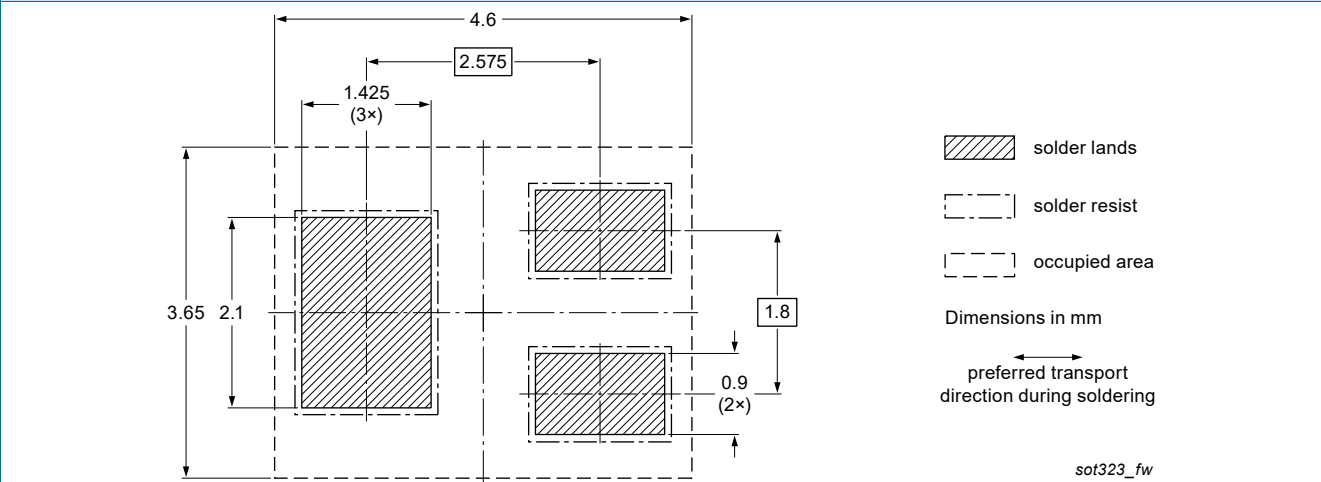


Fig. 9. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 8. Revision history

| Data sheet ID  | Release date   | Data sheet status  | Change notice | Supersedes   |
|----------------|--|--------------------|---------------|--------------|
| PMST3904 v.4   | 20250930   | Product data sheet | -             | PMST3904 v.3 |
| Modifications: | <ul style="list-style-type: none"><li>Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li></ul> |                    |               |              |
| PMST3904 v.3   | 20240228   | Product data sheet | -             | PMST3904 v.2 |
| PMST3904 v.2   | 20040421   | Product data sheet | -             | PMST3904 v.1 |
| PMST3904 v.1   | 19990422   | Product data sheet | -             | -            |

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### 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.                       |
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