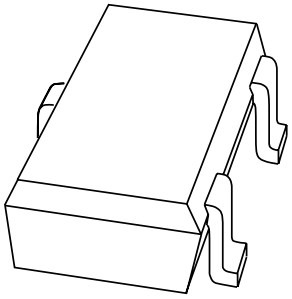
# DATA SHEET



# BFS20W
## NPN medium frequency transistor

Product data sheet

1999 Apr 21

NXP founded by Philips

# NPN medium frequency transistor BFS20W

## FEATURES

- Low current (max. 25 mA)
- Low voltage (max. 20 V).
- Very low feedback capacitance (typ. 350 fF).

## APPLICATIONS

- IF and VHF applications in thick and thin-film circuits.

## DESCRIPTION

NPN medium frequency transistor in a SOT323 (SC-70) plastic package.

## MARKING

| TYPE NUMBER | MARKING CODE(1) |
|---|---|
| BFS20W | N1∗ |

**Note**

1. ∗ = -: Made in Hong Kong.
   ∗ = t: Made in Malaysia.

## PINNING

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

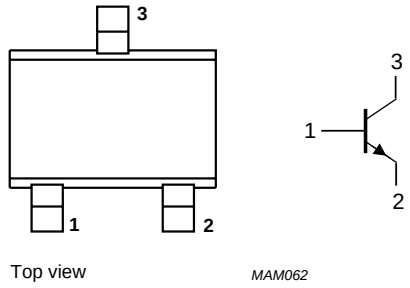



Fig.1 Simplified outline (SOT323; SC-70) and symbol.

## LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{CBO}$ | collector-base voltage | open emitter | – | 30 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | – | 20 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | – | 4 | V |
| $I_C$ | collector current (DC) | | – | 25 | mA |
| $I_{CM}$ | peak collector current | | – | 25 | mA |
| $I_{BM}$ | peak base current | | – | 200 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ °C; note 1 | – | 200 | mW |
| $T_{stg}$ | storage temperature | | −65 | +150 | °C |
| $T_j$ | junction temperature | | – | 150 | °C |
| $T_{amb}$ | operating ambient temperature | | −65 | +150 | °C |

**Note**

1. Refer to SOT323 (SC-70) standard mounting conditions.

## THERMAL CHARACTERISTICS

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

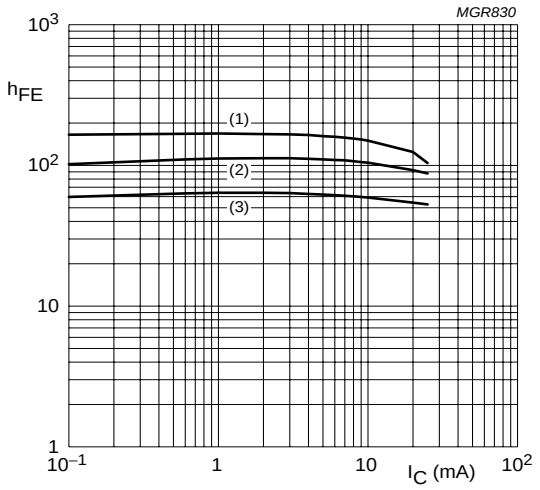
**Note**

1. Refer to SOT323 (SC-70) standard mounting conditions.

## CHARACTERISTICS

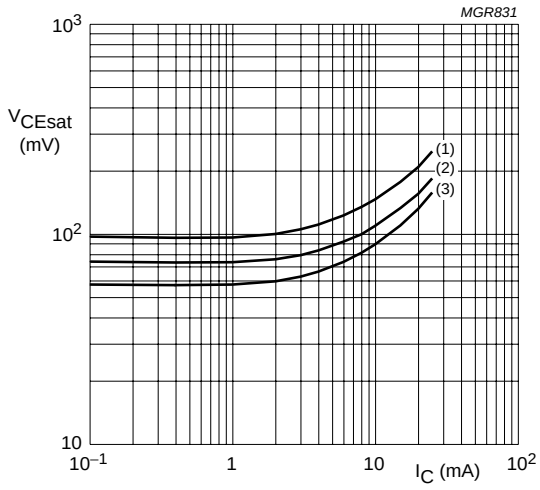
$T_{amb}$ = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector cut-off current | $I_E$ = 0; $V_{CB}$ = 20 V | – | – | 100 | nA |
| | | $I_E$ = 0; $V_{CB}$ = 20 V; $T_j$ = 100 °C | – | – | 10 | μA |
| $I_{EBO}$ | emitter cut-off current | $I_C$ = 0; $V_{EB}$ = 4 V | – | – | 100 | nA |
| $h_{FE}$ | DC current gain | $I_C$ = 7 mA; $V_{CE}$ = 10 V | 40 | 85 | – | |
| $V_{BE}$ | base-emitter voltage | $I_C$ = 7 mA; $V_{CE}$ = 10 V | – | 740 | 900 | mV |
| $C_c$ | collector capacitance | $I_E = i_e$ = 0; $V_{CB}$ = 10 V; f = 1 MHz | – | 1 | – | pF |
| $C_{re}$ | feedback capacitance | $I_C$ = 0; $V_{CE}$ = 10 V; f = 1 MHz | – | 350 | – | fF |
| $f_T$ | transition frequency | $I_C$ = 5 mA; $V_{CE}$ = 10 V; f = 100 MHz | 360 | 470 | – | MHz |



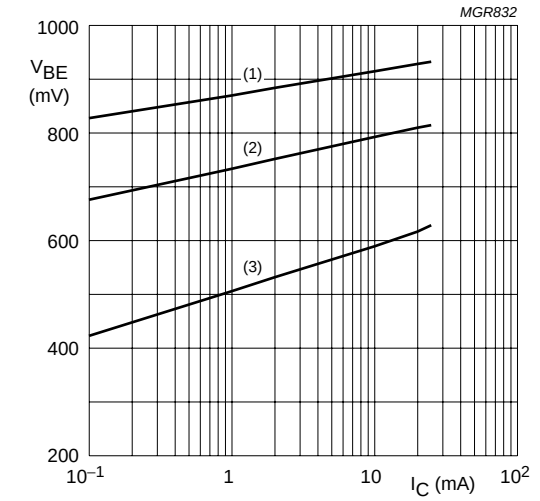

$V_{CE}$ = 10 V.
(1) $T_{amb}$ = 150 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = –55 °C.

Fig.2 DC current gain as a function of collector current; typical values.



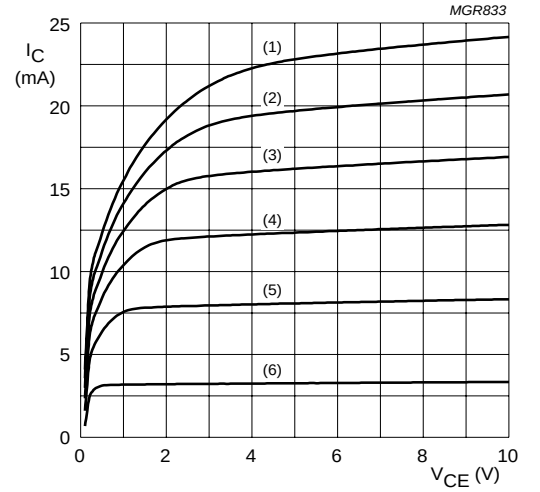

$I_C/I_B$ = 10.
(1) $T_{amb}$ = 100 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = –55 °C.

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




$V_{CE}$ = 10 V.
(1) $T_{amb}$ = –100 °C.
(2) $T_{amb}$ = 25 °C.
(3) $T_{amb}$ = 150 °C.

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

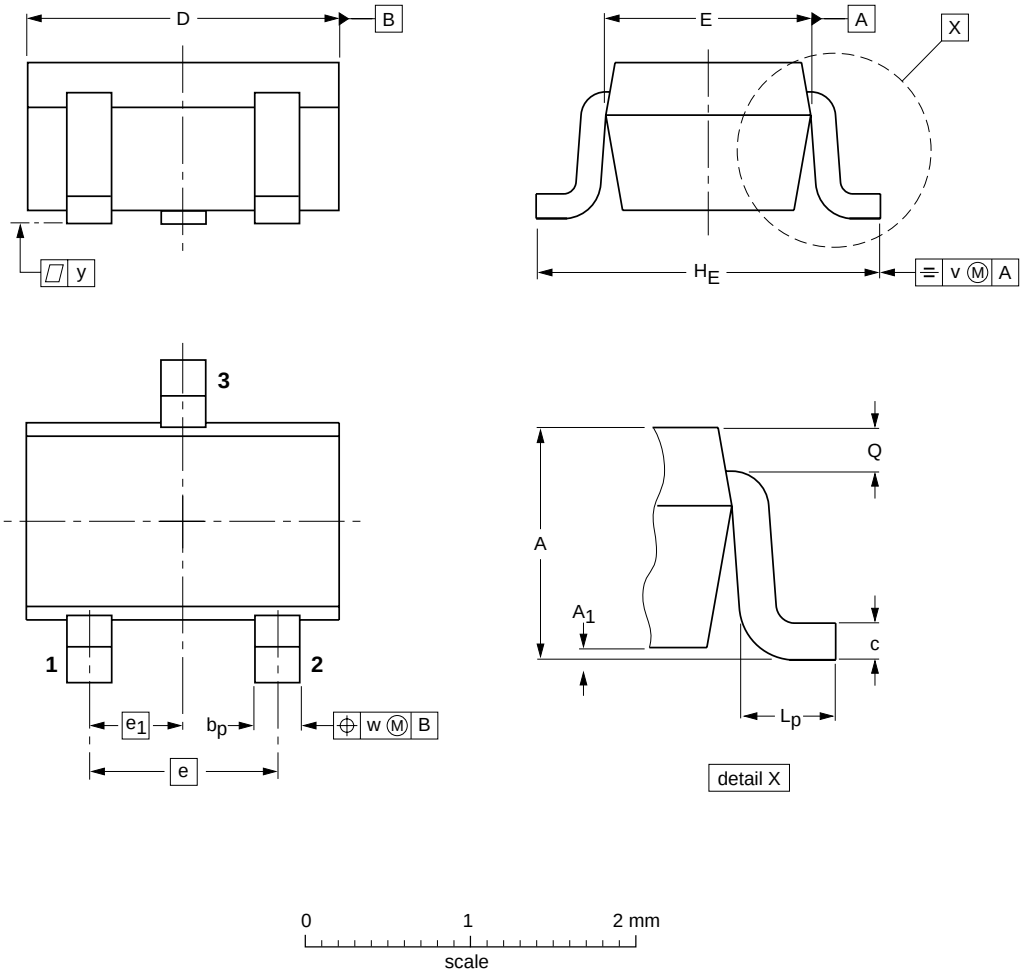



$T_{amb}$ = 25 °C.
(1) $I_B$ = 280 μA.
(2) $I_B$ = 230 μA.
(3) $I_B$ = 180 μA.
(4) $I_B$ = 130 μA.
(5) $I_B$ = 80 μA.
(6) $I_B$ = 30 μA.

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

## PACKAGE OUTLINE

**Plastic surface mounted package; 3 leads** **SOT323**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | 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 |

## DATA SHEET STATUS

| DOCUMENT STATUS[1] | PRODUCT STATUS[2] | 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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