

BFQ19

NPN 5 GHz wideband transistor

Rev. 03 — 28 September 2007

Product data sheet

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NXP Semiconductors

NPN 5 GHz wideband transistor

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DESCRIPTION

NPN transistor in a SOT89 plastic envelope intended for application in thick and thin-film circuits. It is primarily intended for use in UHF and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features very low intermodulation distortion and high power gain. Due to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

PINNING

| PIN | DESCRIPTION |
|----------|-------------|
| Code: FB | |
| 1 | emitter |
| 2 | collector |
| 3 | base |

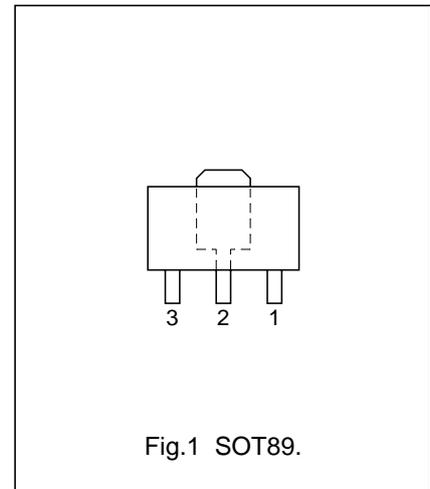


Fig.1 SOT89.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | TYP. | MAX. | UNIT |
|-----------|---------------------------|---|------|------|------|
| V_{CEO} | collector-emitter voltage | open base | – | 15 | V |
| I_C | DC collector current | | – | 100 | mA |
| P_{tot} | total power dissipation | up to $T_s = 145\text{ °C}$ (note 1) | – | 1 | W |
| f_T | transition frequency | $I_C = 50\text{ mA}$; $V_{CE} = 10\text{ V}$; $f = 500\text{ MHz}$; $T_j = 25\text{ °C}$ | 5.5 | – | GHz |
| C_{re} | feedback capacitance | $I_C = 10\text{ mA}$; $V_{CE} = 10\text{ V}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ °C}$ | 1.3 | – | pF |
| F | noise figure | $I_C = 50\text{ mA}$; $V_{CE} = 10\text{ V}$; $Z_s = \text{opt.}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ °C}$ | 3.3 | – | dB |

LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------|---------------------------|--------------------------------------|------|------|------|
| V_{CBO} | collector-base voltage | open emitter | – | 20 | V |
| V_{CEO} | collector-emitter voltage | open base | – | 15 | V |
| V_{EBO} | emitter-base voltage | open collector | – | 3.3 | V |
| I_C | DC collector current | | – | 100 | mA |
| I_{CM} | peak collector current | $f > 1\text{ MHz}$ | – | 150 | mA |
| P_{tot} | total power dissipation | up to $T_s = 145\text{ °C}$ (note 1) | – | 1 | W |
| T_{stg} | storage temperature | | –65 | 150 | °C |
| T_j | junction temperature | | – | 175 | °C |

Note

- T_s is the temperature at the soldering point of the collector tab.

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THERMAL RESISTANCE

| SYMBOL | PARAMETER | CONDITIONS | THERMAL RESISTANCE |
|---------------|---|--------------------------------------|--------------------|
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point | up to $T_s = 145\text{ °C}$ (note 1) | 30 K/W |

Note

- T_s is the temperature at the soldering point of the collector tab.

CHARACTERISTICS

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------|--|---|------|------|------|------|
| I_{CBO} | collector cut-off current | $I_E = 0; V_{CB} = 10\text{ V}$ | – | – | 100 | nA |
| h_{FE} | DC current gain | $I_C = 70\text{ mA}; V_{CE} = 10\text{ V}$ | 25 | 80 | – | |
| C_c | collector capacitance | $I_E = i_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$ | – | 1.6 | – | pF |
| C_e | emitter capacitance | $I_C = i_c = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$ | – | 5 | – | pF |
| C_{re} | feedback capacitance | $I_C = 10\text{ mA}; V_{CE} = 10\text{ V}; f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$ | – | 1.3 | – | pF |
| f_T | transition frequency | $I_C = 70\text{ mA}; V_{CE} = 10\text{ V}; f = 500\text{ MHz}$ | 4.4 | 5.5 | – | GHz |
| G_{UM} | maximum unilateral power gain (note 1) | $I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 500\text{ MHz}; T_{amb} = 25\text{ °C}$ | – | 11.5 | – | dB |
| | | $I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 800\text{ MHz}; T_{amb} = 25\text{ °C}$ | – | 7.5 | – | dB |
| F | noise figure | $I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; Z_s = \text{opt.}; f = 500\text{ MHz}; T_{amb} = 25\text{ °C}$ | – | 3.3 | – | dB |

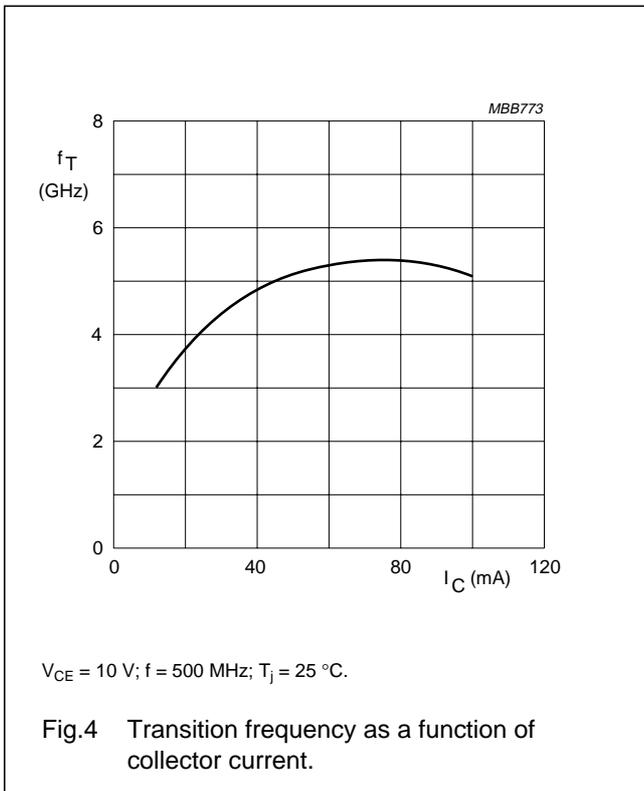
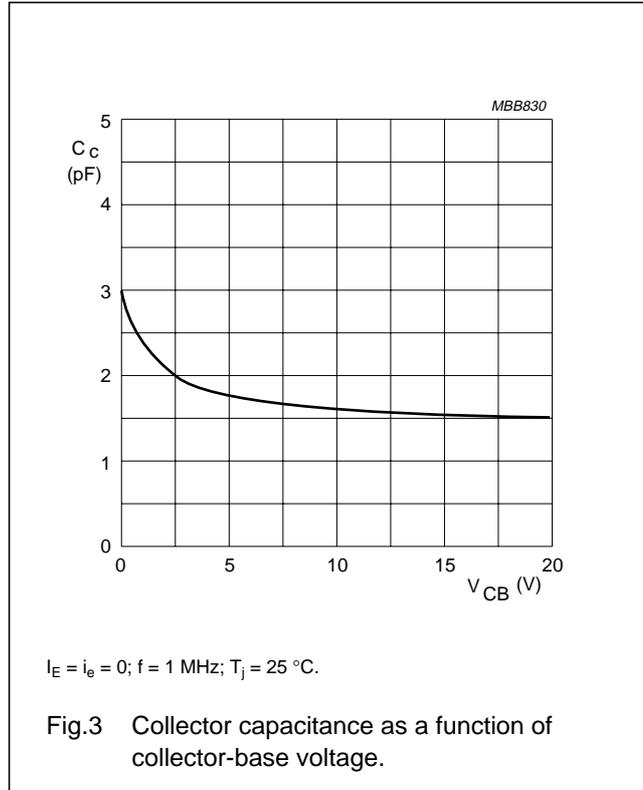
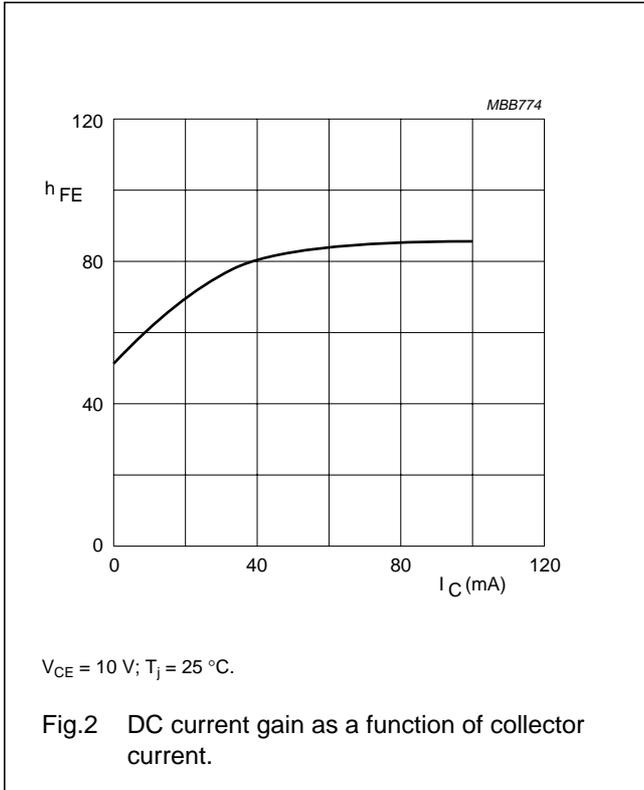
Note

- G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and

$$G_{UM} = 10 \log \left(\frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)} \right) \text{ dB.}$$

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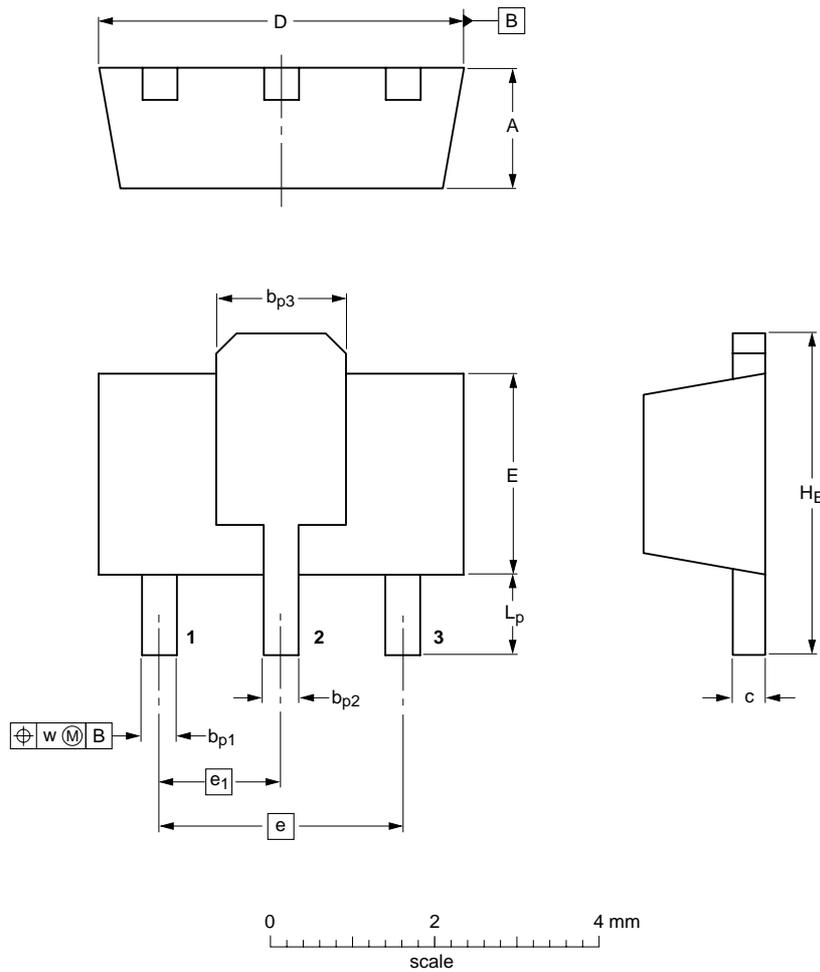
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PACKAGE OUTLINE

Plastic surface-mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

| UNIT | A | b _{p1} | b _{p2} | b _{p3} | c | D | E | e | e ₁ | H _E | L _p | w |
|------|-----|-----------------|-----------------|-----------------|------|-----|-----|-----|----------------|----------------|----------------|------|
| mm | 1.6 | 0.48 | 0.53 | 1.8 | 0.44 | 4.6 | 2.6 | 3.0 | 1.5 | 4.25 | 1.2 | 0.13 |
| | 1.4 | 0.35 | 0.40 | 1.4 | 0.23 | 4.4 | 2.4 | | | | | |

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT89 | | TO-243 | SC-62 | | 06-03-16 06-08-29 |

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| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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Revision history

Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------------------------------|-----------------------|---------------|-------------|
| BFQ19_N_3 | 20070928 | Product data sheet | - | BFQ19_CNV_2 |
| Modifications: | • Fig. 1 and package outline updated | | | |
| BFQ19_CNV_2 | 19950901 | Product specification | - | - |

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