# BFT92

## PNP 5 GHz wideband transistor

Rev. 3 — 22 January 2016 Product data sheet

## 1. Product profile

### 1.1 General description

PNP transistor in a plastic SOT23 envelope. It is primarily intended for use in RF wideband amplifiers, such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analyzers, etc. The transistor features 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. NPN complements are BFR92 and BFR92A.

### 1.2 Features and benefits

- High power gain
- Low intermodulation distortion

### 1.3 Applications

- Oscilloscopes and spectrum analyzers
- Radar systems
- RF wideband amplifiers

### 1.4 Quick reference data

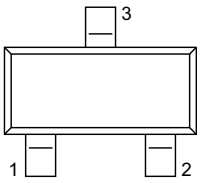
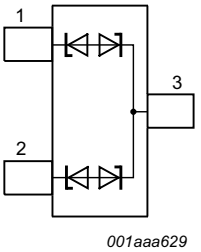
**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CBO}$ | collector-base voltage | open emitter | - | - | –20 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | - | - | –15 | V |
| $I_C$ | DC collector current | | - | - | –25 | mA |
| $P_{tot}$ | total power dissipation | up to $T_s$ = 95 °C [1] | - | - | 300 | mW |
| $f_T$ | transition frequency | $I_C$ = –14 mA; $V_{CE}$ = –10 V; f = 500 MHz | - | 5 | - | GHz |
| $C_{re}$ | feedback capacitance | $I_C$ = –2 mA; $V_{CE}$ = –10 V; f = 1 MHz | - | 0.7 | - | pF |
| $G_{UM}$ | maximum unilateral power gain | $I_C$ = –14 mA; $V_{CE}$ = –10 V; f = 500 MHz<br>$T_{amb}$ = 25 °C; | - | 18 | - | dB |
| NF | noise figure | $I_C$ = –5 mA; $V_{CE}$ = –10 V; f = 500 MHz;<br>$T_{amb}$ = 25 °C | - | 2.5 | - | dB |
| $d_{im}$ | intermodulation distortion | $I_C$ = –14 mA; $V_{CE}$ = –10 V; $R_L$ = 75 Ω;<br>$V_o$ = 150 mV; $T_{amb}$ = 25 °C;<br>$f_{(p + q-r)}$ = 493.25 MHz | - | –60 | - | dB |

[1] $T_s$ is the temperature at the soldering point of the collector tab.

## 2. Pinning information

**Table 2. Pinning**

| Pin | Description | Simplified outline | Graphic symbol |
|---|---|---|---|
| 1 | base |  |  |
| 2 | emitter | | |
| 3 | collector | | |



## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BFT92 | TO-236AB | Plastic surface mounted package; 3 leads | SOT23 |

## 4. Marking

**Table 4. Marking codes**

| Type number | Marking code |
|---|---|
| BFT92 | W1% |

## 5. Limiting values

**Table 5. 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 | - | −20 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | - | −15 | V |
| $V_{EBO}$ | emitter-base voltage | open collector | - | −2 | V |
| $I_C$ | DC collector current | | - | −25 | mA |
| $I_{CM}$ | peak collector current | f > 1 MHz | - | −35 | mA |
| $P_{tot}$ | total power dissipation | up to $T_s$ = 95 °C [1] | - | 300 | mW |
| $T_{stg}$ | storage temperature | | −65 | 150 | °C |
| $T_j$ | junction temperature | | - | 175 | °C |

[1] $T_s$ is the temperature at the soldering point of the collector tab.

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol | Parameter | Conditions | Typ | Unit |
|---|---|---|---|---|
| $R_{th\ j\text{-}s}$ | thermal resistance from junction to soldering point | up to $T_s$ = 95 °C [1] | 260 | K/W |

[1] $T_s$ is the temperature at the soldering point of the collector tab.

## 7. Characteristics

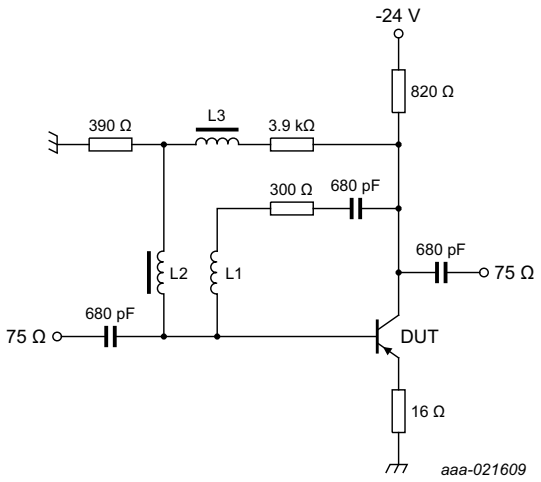
**Table 7. Characteristics**

*$T_j$ = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector cut-off current | $I_E$ = 0; $V_{CB}$ = –10 V | - | - | –50 | nA |
| $h_{FE}$ | DC current gain | $I_C$ = –14 mA; $V_{CE}$ = –10 V | 20 | 50 | - | |
| $f_T$ | transition frequency | $I_C$ = –14 mA; $V_{CE}$ = –10 V; f = 500 MHz | - | 5 | - | GHz |
| $C_c$ | collector capacitance | $I_E = i_e$ = 0; $V_{CB}$ = –10 V; f = 1 MHz | - | 0.75 | - | pF |
| $C_e$ | emitter capacitance | $I_C = i_c$ = 0; $V_{EB}$ = –0.5 V; f = 1 MHz | - | 0.8 | - | pF |
| $C_{re}$ | feedback capacitance | $I_C$ = –2 mA; $V_{CE}$ = –10 V; f = 1 MHz | - | 0.7 | - | pF |
| $G_{UM}$ | maximum unilateral power gain | $I_C$ = –14 mA; $V_{CE}$ = –10 V; f = 500 MHz; $T_{amb}$ = 25 °C [1] | - | 18 | - | dB |
| NF | noise figure | $I_C$ = –5 mA; $V_{CE}$ = –10 V; f = 500 MHz; $T_{amb}$ = 25 °C | - | 2.5 | - | dB |
| $V_o$ | output voltage | $d_{im}$ = –60 dB (DIN 45004B); $I_C$ = –14 mA; $V_{CE}$ = –10 V; $R_L$ = 75 Ω; $V_p = V_o$ at $d_{im}$ = –60 dB; $f_p$ = 495.25 MHz; $V_q = V_o$ –6 dB; $f_q$ = 503.25 MHz; $V_r = V_o$ –6 dB; $f_r$ = 505.25 MHz; measured at $f_{(p+q-r)}$ = 493.25 MHz. | - | 150 | - | mV |

[1] $G_{UM}$ is the maximum unilateral power gain, assuming S12 is zero and $G_{UM} = 10\ log\frac{|S_{21}|^2}{(1-|S_{11}|^2)(1-|S_{22}|^2)}dB$

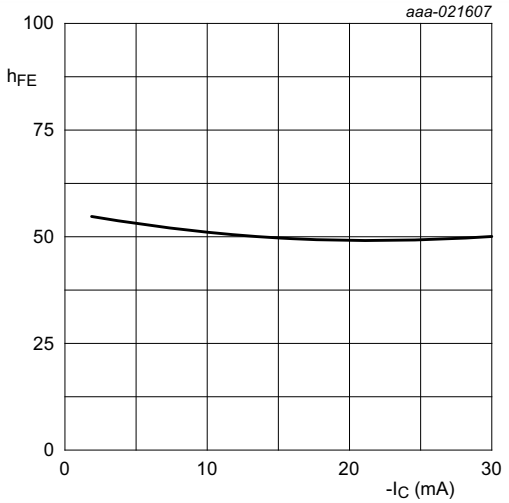
## 8. Graphs




L2 = L3 = 5 uH Ferroxcube choke, cataloque number 3122 108 20150

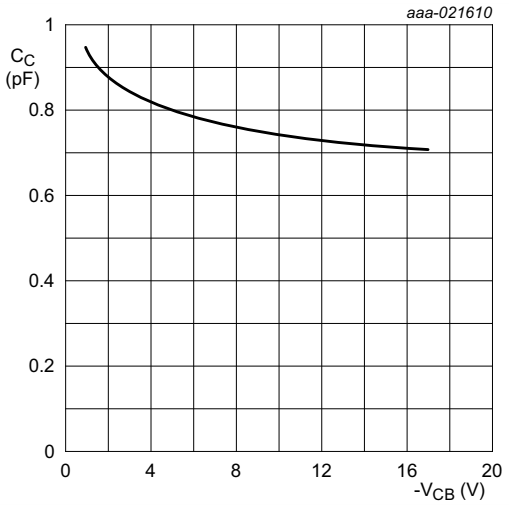
L1 = 4 turns 0.35 mm copper wire; winding pitch 1 mm; internal diameter 4 mm

**Fig 1. Intermodulation distortion test circuit**



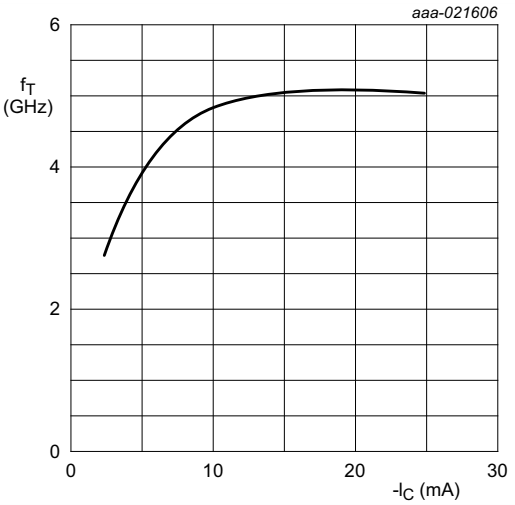

$V_{CE}$ = −10 V; $T_j$ =25 °C

**Fig 2. DC current gain as a function of collector current**



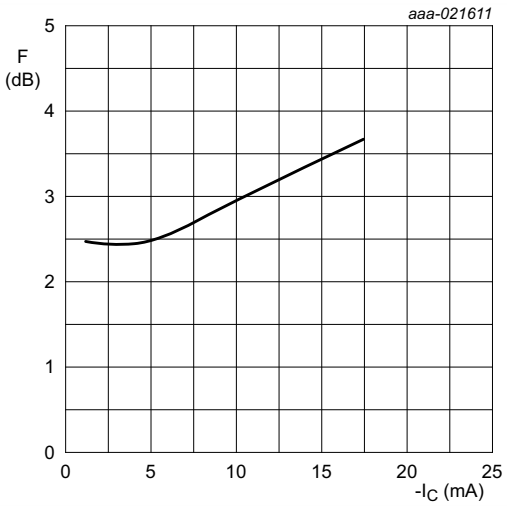

$I_E = i_e$ = 0; f = 1 MHz; $T_j$ =25 °C

**Fig 3. Collector capacitance as a function of collector-base voltage**



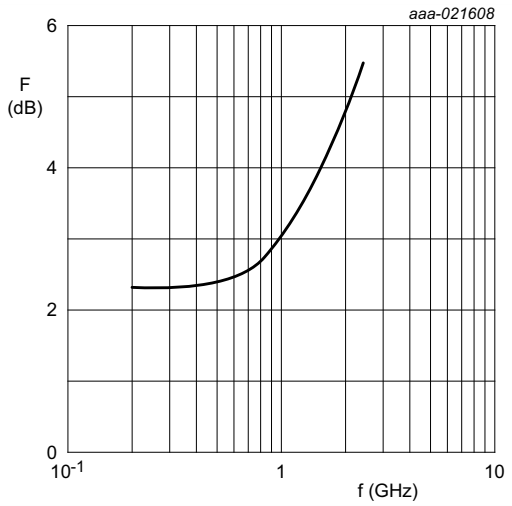

$V_{CE}$ = −10 V; f = 500 MHz; $T_j$ =25 °C

**Fig 4. Transistion frequency as a function of collector current**




$V_{CE}$ = −10 V; $Z_s$ = opt; f = 500 MHz; $T_{amb}$ = 25 °C

**Fig 5. Minimum noise figure as a function of collector current.**

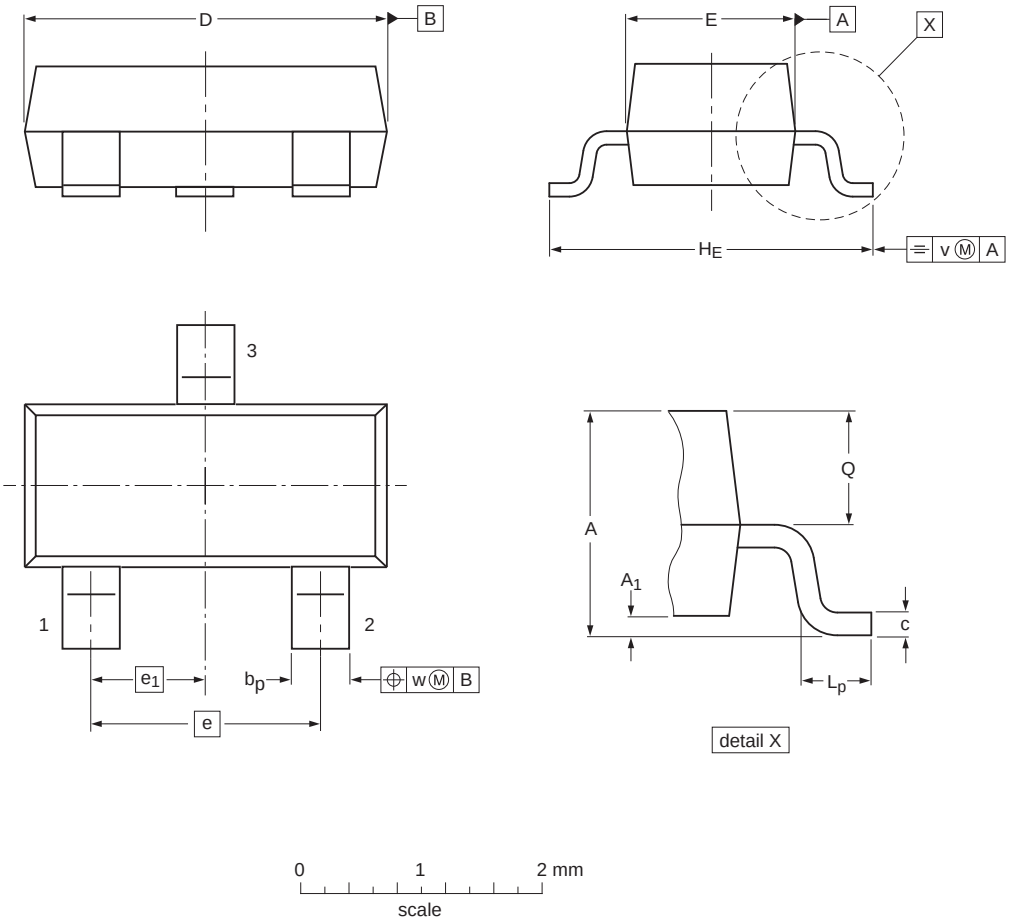



$I_C$ = −2 mA; $V_{CE}$ = −10 V; $Z_s$ = opt; $T_{amb}$ = 25 °C

**Fig 6. Minimum noise figure as a function of frequency.**

# 9. Package outline

**Plastic surface-mounted package; 3 leads** **SOT23**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.1 | 0.1 | 0.48 | 0.15 | 3.0 | 1.4 | | | 2.5 | 0.45 | 0.55 | | |
| | nom | | | | | | | 1.9 | 0.95 | | | | 0.2 | 0.1 |
| | min | 0.9 | | 0.38 | 0.09 | 2.8 | 1.2 | | | 2.1 | 0.15 | 0.45 | | |

*sot023_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT23 | | TO-236AB | | | | ~~14-06-19~~ 14-09-22 |

**Fig 7. Package outline SOT23 (TO-236AB)**

## 10. Revision history

**Table 8. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BFT92 v.3 | 20160122 | Product data sheet | - | BFT92 v.2 |
| Modifications: | • The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.<br>• Legal texts have been adapted to the new company name where appropriate. | | | |
| BFT92 v.2 | 19921101 | Product specification | - | - |

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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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| Product [short] data sheet | Production | This document contains the product specification. |

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[2] The term 'short data sheet' is explained in section "Definitions".

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