

# 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

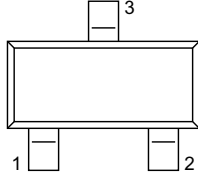
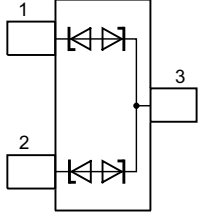
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	-	-20	V
$V_{CEO}$	collector-emitter voltage	open base	-	-	-15	V
$I_C$	DC collector current		-	-	-25	mA
$P_{tot}$	total power dissipation	up to $T_s = 95\text{ °C}$ <a href="#">[1]</a>	-	-	300	mW
$f_T$	transition frequency	$I_C = -14\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ; $f = 500\text{ MHz}$	-	5	-	GHz
$C_{re}$	feedback capacitance	$I_C = -2\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ; $f = 1\text{ MHz}$	-	0.7	-	pF
$G_{UM}$	maximum unilateral power gain	$I_C = -14\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ; $f = 500\text{ MHz}$ $T_{amb} = 25\text{ °C}$ ;	-	18	-	dB
NF	noise figure	$I_C = -5\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	-	2.5	-	dB
$d_{im}$	intermodulation distortion	$I_C = -14\text{ mA}$ ; $V_{CE} = -10\text{ V}$ ; $R_L = 75\text{ }\Omega$ ; $V_o = 150\text{ mV}$ ; $T_{amb} = 25\text{ °C}$ ; $f_{(p+q-r)} = 493.25\text{ MHz}$	-	-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		 001aaa629
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
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 95\text{ °C}$	[1] 260	K/W

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

## 7. Characteristics

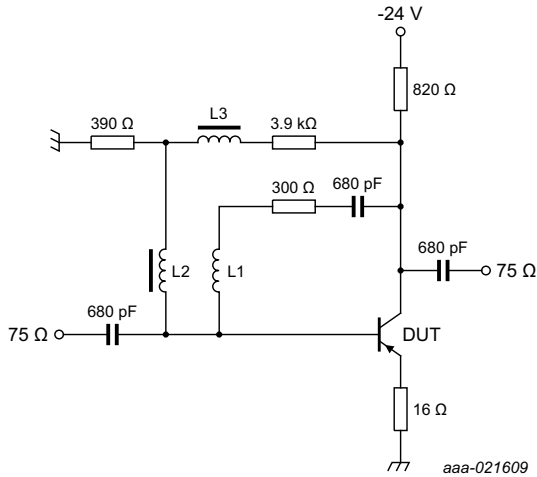
**Table 7. Characteristics**

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

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

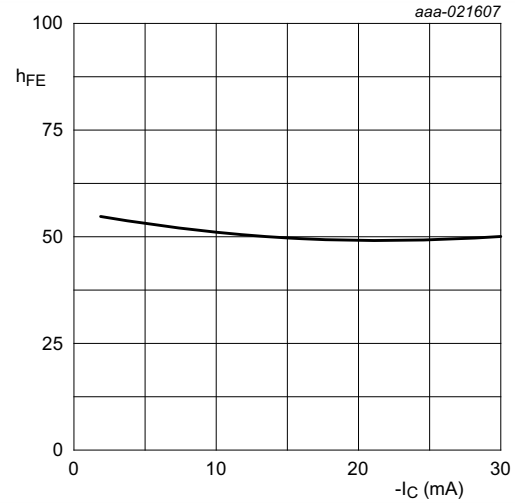
[1]  $G_{UM}$  is the maximum unilateral power gain, assuming  $S_{12}$  is zero and  $G_{UM} = 10 \log \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)} \text{ dB}$

8. Graphs



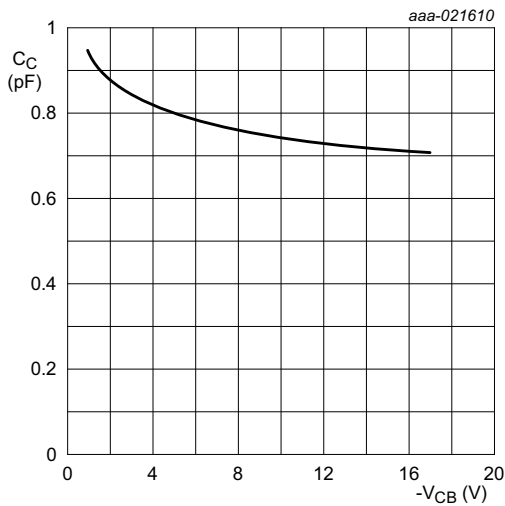
L2 = L3 = 5 uH Ferroxcube choke, catalogue number 3122 108 20150  
 L1 = 4 turns 0.35 mm copper wire; winding pitch 1 mm; internal diameter 4 mm

**Fig 1. Intermodulation distortion test circuit**



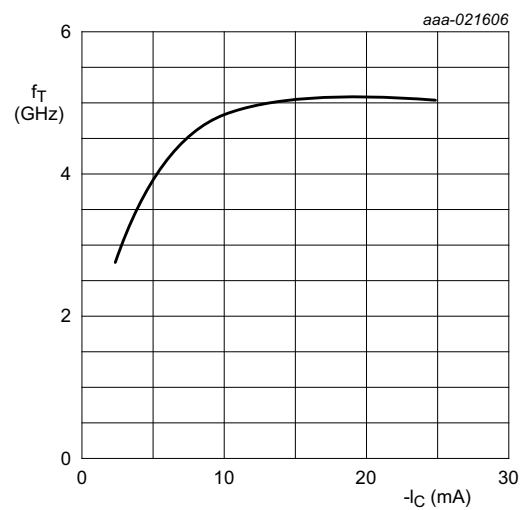
V<sub>CE</sub> = -10 V; T<sub>j</sub> = 25 °C

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



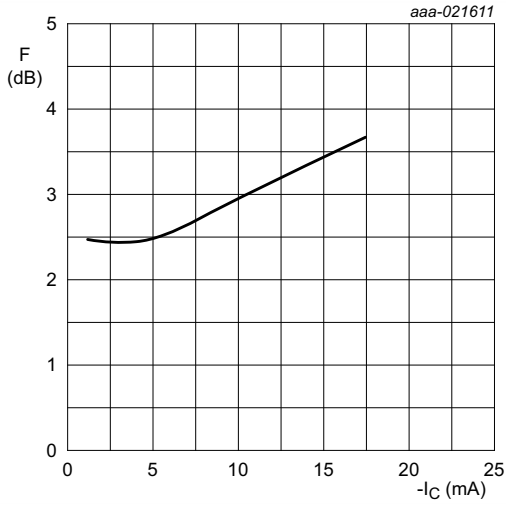
I<sub>E</sub> = i<sub>e</sub> = 0; f = 1 MHz; T<sub>j</sub> = 25 °C

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



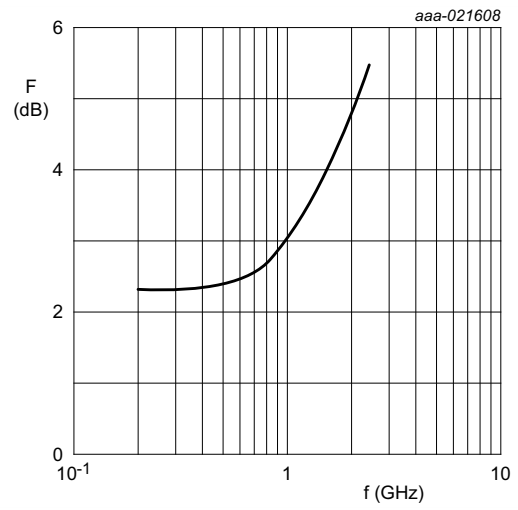
V<sub>CE</sub> = -10 V; f = 500 MHz; T<sub>j</sub> = 25 °C

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



V<sub>CE</sub> = -10 V; Z<sub>s</sub> = opt; f = 500 MHz; T<sub>amb</sub> = 25 °C

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



I<sub>C</sub> = -2 mA; V<sub>CE</sub> = -10 V; Z<sub>s</sub> = opt; T<sub>amb</sub> = 25 °C

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

## 9. Package outline

Plastic surface-mounted package; 3 leads

SOT23

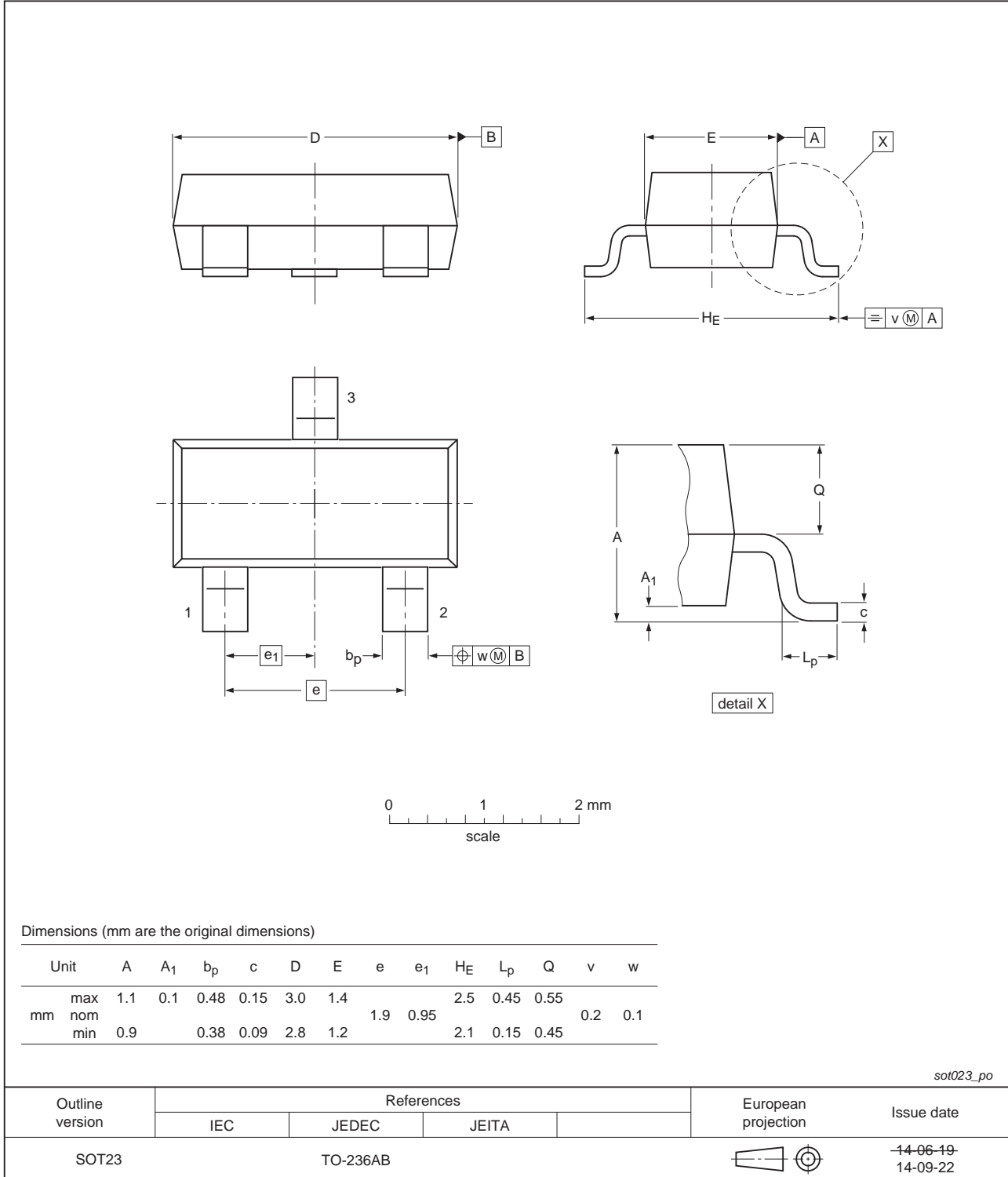


Fig 7. Package outline SOT23 (TO-236AB)

## 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:	<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li></ul>			
BFT92 v.2	19921101	Product specification	-	-

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### 11.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.
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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