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

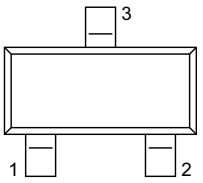
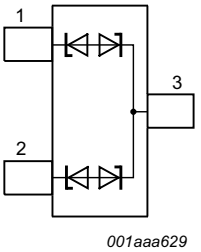
Table 1. Quick reference data

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 T_{amb} = 25 °C;	-	18	-	dB
NF	noise figure	I_C = –5 mA; V_{CE} = –10 V; f = 500 MHz; T_{amb} = 25 °C	-	2.5	-	dB
d_{im}	intermodulation distortion	I_C = –14 mA; V_{CE} = –10 V; R_L = 75 Ω; V_o = 150 mV; T_{amb} = 25 °C; $f_{(p + q-r)}$ = 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

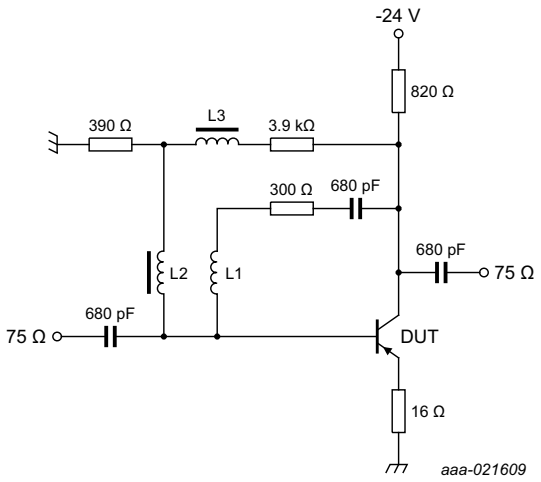
Table 7. Characteristics

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

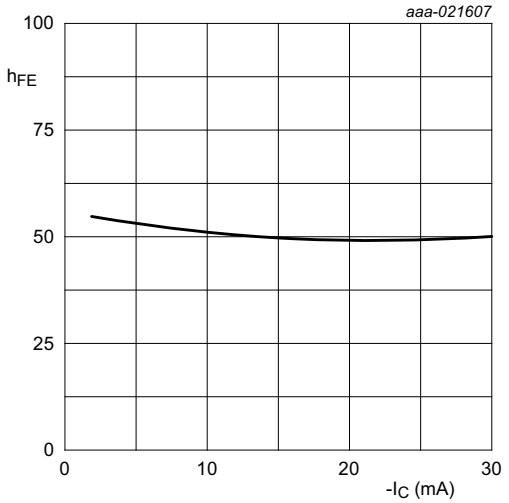
8. Graphs



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

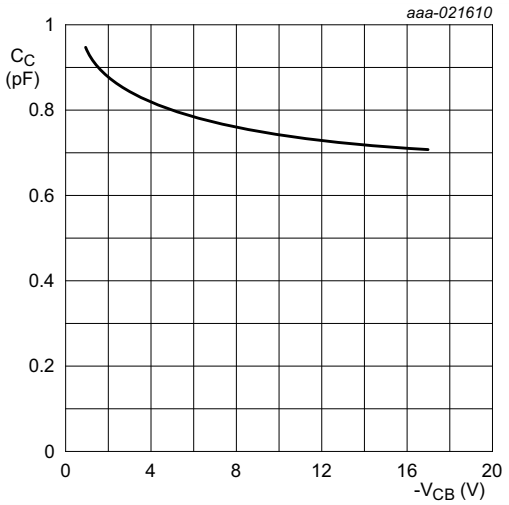
L1 = 4 turns 0.35 mm copper wire; winding pitch 1 mm; internal diameter 4 mm

Fig 1. Intermodulation distortion test circuit



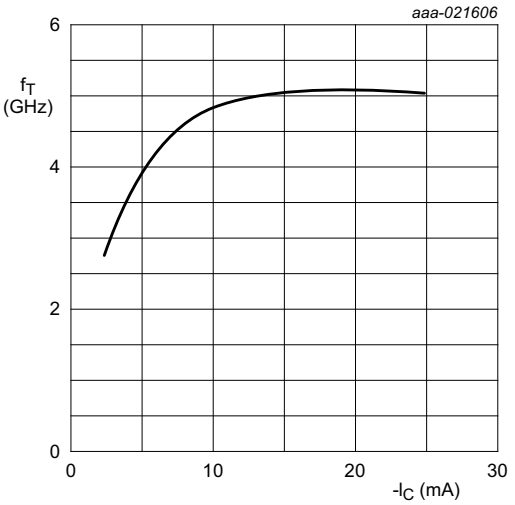
V_{CE} = −10 V; T_j =25 °C

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



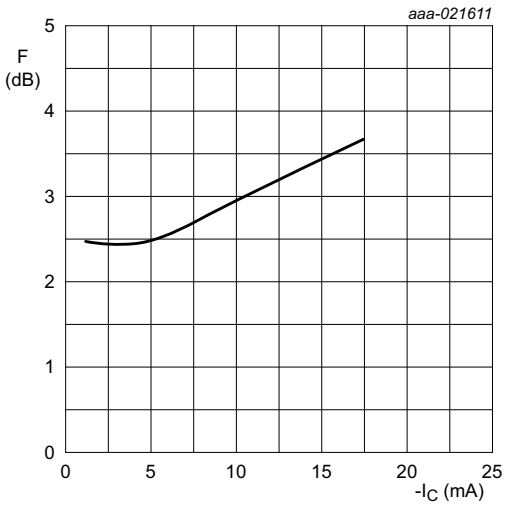
$I_E = i_e$ = 0; f = 1 MHz; T_j =25 °C

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



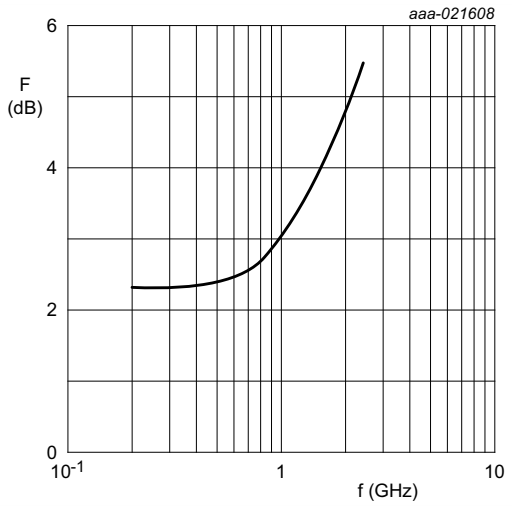
V_{CE} = −10 V; f = 500 MHz; T_j =25 °C

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.

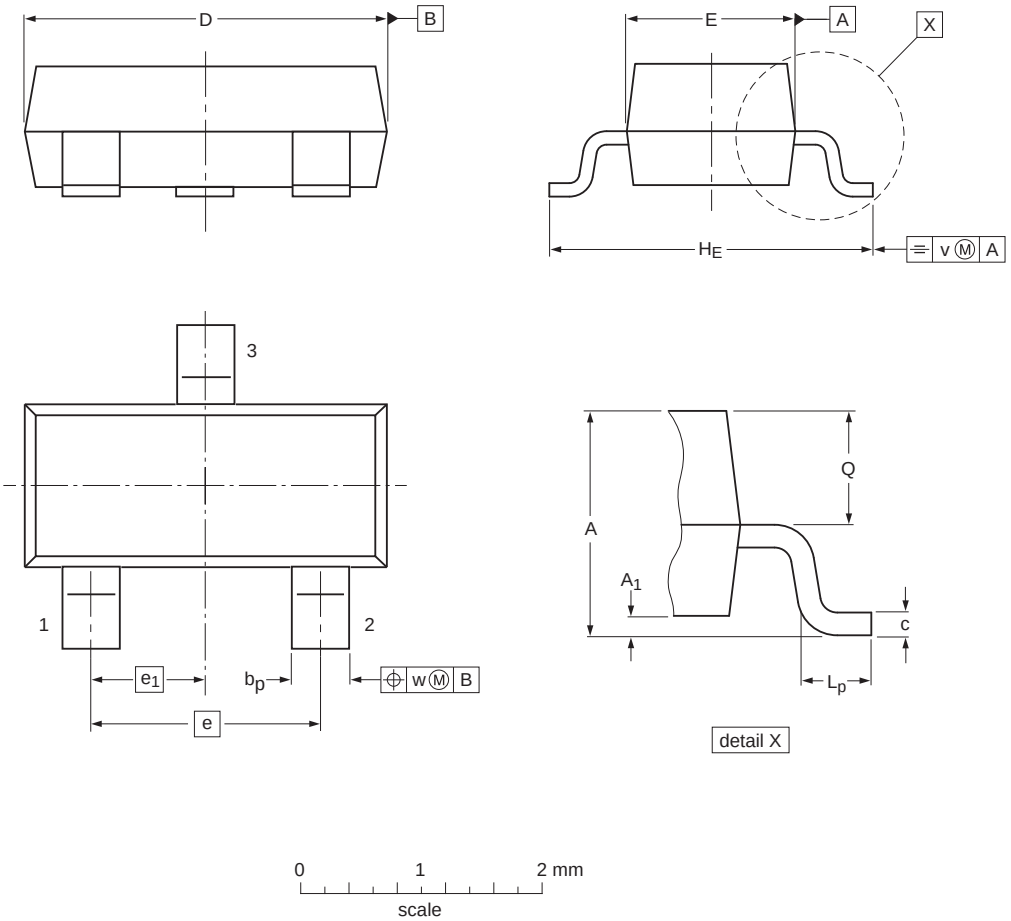


I_C = −2 mA; V_{CE} = −10 V; Z_s = opt; T_{amb} = 25 °C

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)