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# DATA SHEET

**BFT93**

PNP 5 GHz wideband transistor

Product specification

November 1992



# PNP 5 GHz wideband transistor

# BFT93

### DESCRIPTION

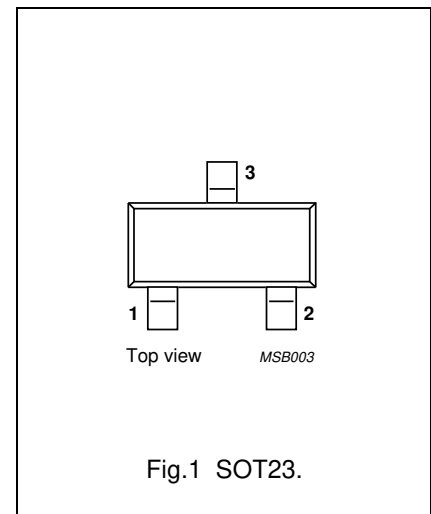
PNP transistor in a plastic SOT23 envelope.

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 BFR93 and BFR93A.

### PINNING

PIN	DESCRIPTION
Code: X1p	
1	base
2	emitter
3	collector



### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–15	V
$V_{CEO}$	collector-emitter voltage	open base	–	–12	V
$I_C$	DC collector current		–	–35	mA
$P_{tot}$	total power dissipation	up to $T_s = 95\text{ °C}$ ; note 1	–	300	mW
$f_T$	transition frequency	$I_C = -30\text{ mA}$ ; $V_{CE} = -5\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_j = 25\text{ °C}$	5	–	GHz
$C_{re}$	feedback capacitance	$I_C = -2\text{ mA}$ ; $V_{CE} = -5\text{ V}$ ; $f = 1\text{ MHz}$	1	–	pF
$G_{UM}$	maximum unilateral power gain	$I_C = -30\text{ mA}$ ; $V_{CE} = -5\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	16.5	–	dB
F	noise figure	$I_C = -10\text{ mA}$ ; $V_{CE} = -5\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	2.4	–	dB
$V_o$	output voltage	$d_{im} = -60\text{ dB}$ ; $I_C = -30\text{ mA}$ ; $V_{CE} = -5\text{ V}$ ; $R_L = 75\text{ }\Omega$ ; $f_{(p+q-r)} = 493.25\text{ MHz}$	300	–	mV

### Note

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

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**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter	–	–15	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	–12	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	–2	V
I <sub>C</sub>	DC collector current		–	–35	mA
I <sub>CM</sub>	peak collector current	f > 1 MHz	–	–50	mA
P <sub>tot</sub>	total power dissipation	up to T <sub>s</sub> = 95 °C; note 1	–	300	mW
T <sub>stg</sub>	storage temperature		–65	150	°C
T <sub>j</sub>	junction temperature		–	175	°C

**THERMAL RESISTANCE**

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
R <sub>th j-s</sub>	thermal resistance from junction to soldering point	up to T <sub>s</sub> = 70 °C; (note 1)	260 K/W

**Note**

1. T<sub>s</sub> is the temperature at the soldering point of the collector tab.

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = -5\text{ V}$	–	–	–50	nA
$h_{FE}$	DC current gain	$I_C = -30\text{ mA}; V_{CE} = -5\text{ V}$	20	50	–	
$f_T$	transition frequency	$I_C = -30\text{ mA}; V_{CE} = -5\text{ V};$ $f = 500\text{ MHz}$	–	5	–	GHz
$C_c$	collector capacitance	$I_E = i_e = 0; V_{CB} = -10\text{ V}; f = 1\text{ MHz}$	–	0.95	–	pF
$C_e$	emitter capacitance	$I_C = i_c = 0; V_{EB} = -0.5\text{ V}; f = 1\text{ MHz}$	–	1.8	–	pF
$C_{re}$	feedback capacitance	$I_C = -2\text{ mA}; V_{CE} = -5\text{ V}; f = 1\text{ MHz}$	–	1	–	pF
$G_{UM}$	maximum unilateral power gain (note 1)	$I_C = -30\text{ mA}; V_{CE} = -5\text{ V};$ $f = 500\text{ MHz}; T_{amb} = 25\text{ °C}$	–	16.5	–	dB
F	noise figure	$I_C = -10\text{ mA}; V_{CE} = -5\text{ V};$ $f = 500\text{ MHz}; T_{amb} = 25\text{ °C}$	–	2.4	–	dB
$V_o$	output voltage	see Fig.2 and note 2	–	300	–	mV

**Notes**

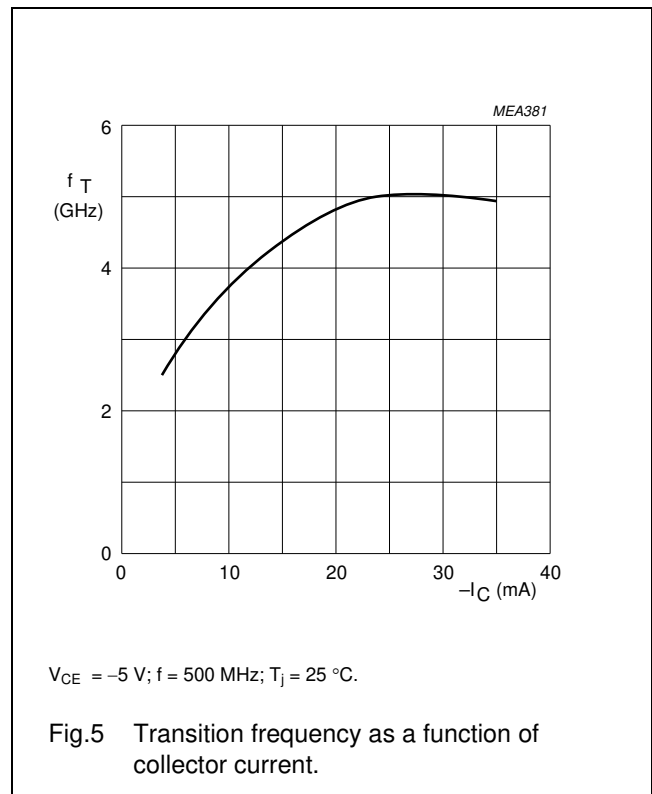
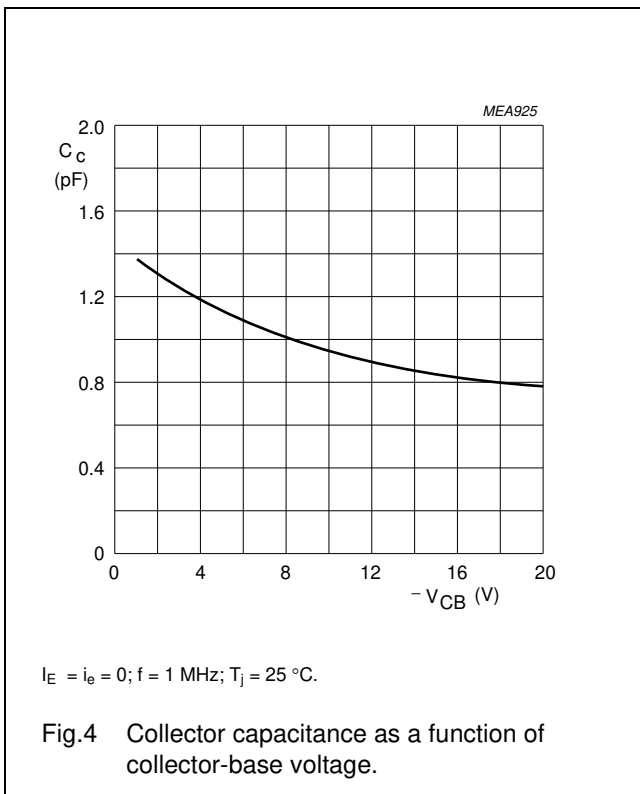
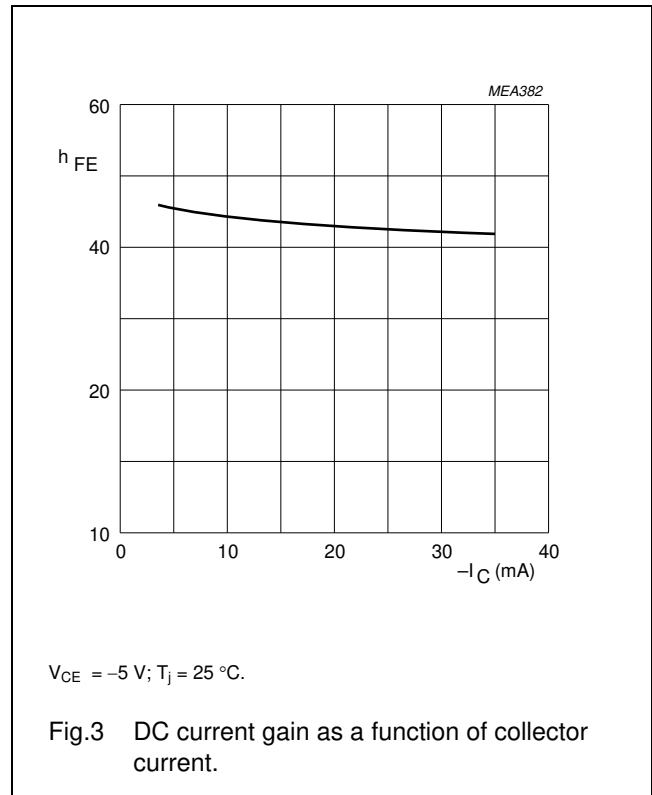
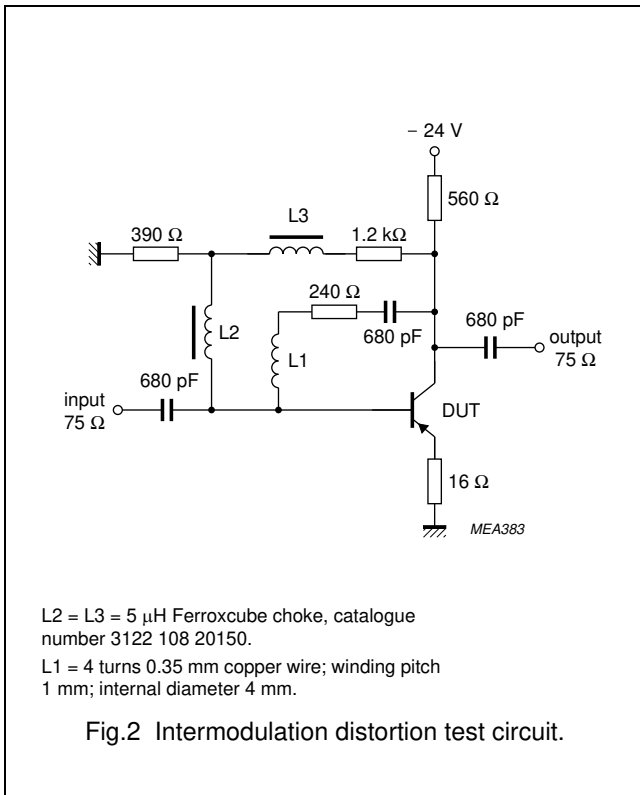
1.  $G_{UM}$  is the maximum unilateral power gain, assuming  $S_{12}$  is zero and

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

2.  $d_{im} = -60\text{ dB}$  (DIN 45004B);  $I_C = -30\text{ mA}; V_{CE} = -5\text{ V}; R_L = 75\ \Omega$ ;  
 $V_p = V_o$  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  $f_{(p+q-r)} = 493.25\text{ MHz}$ .

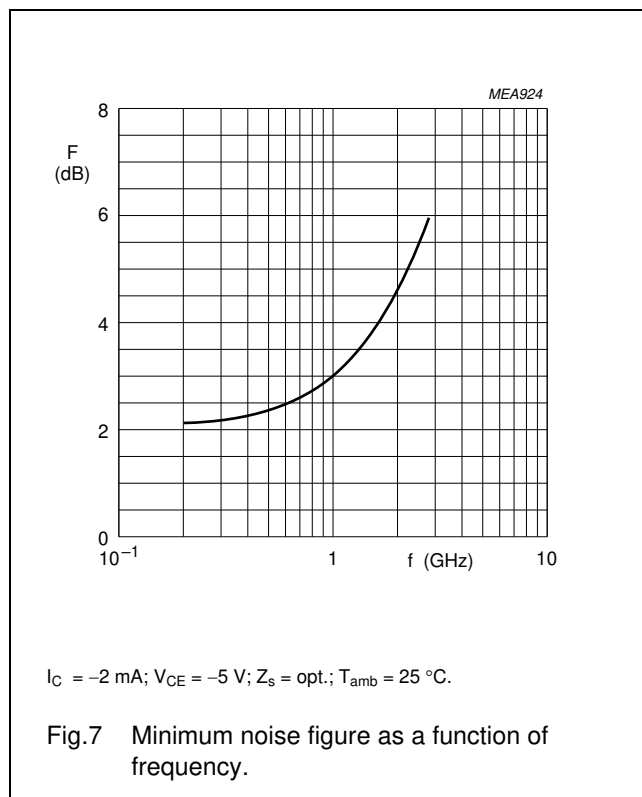
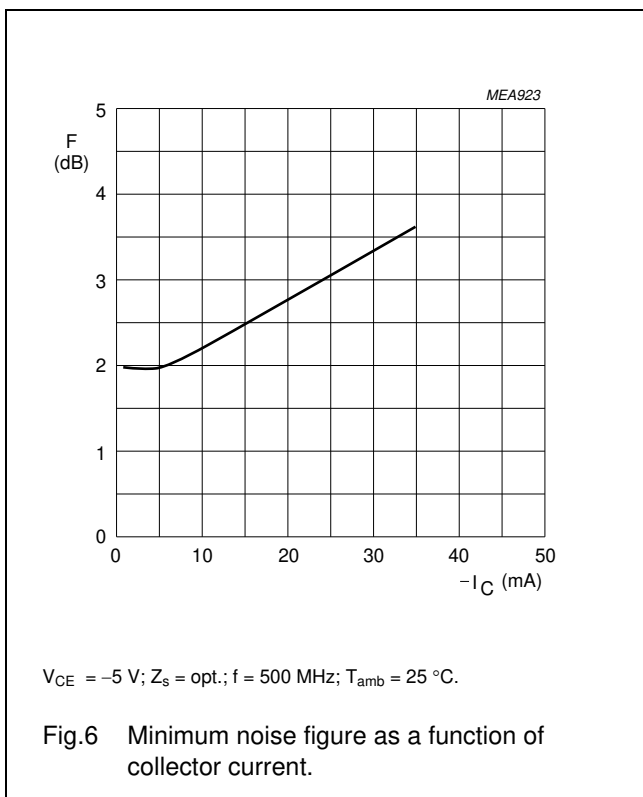
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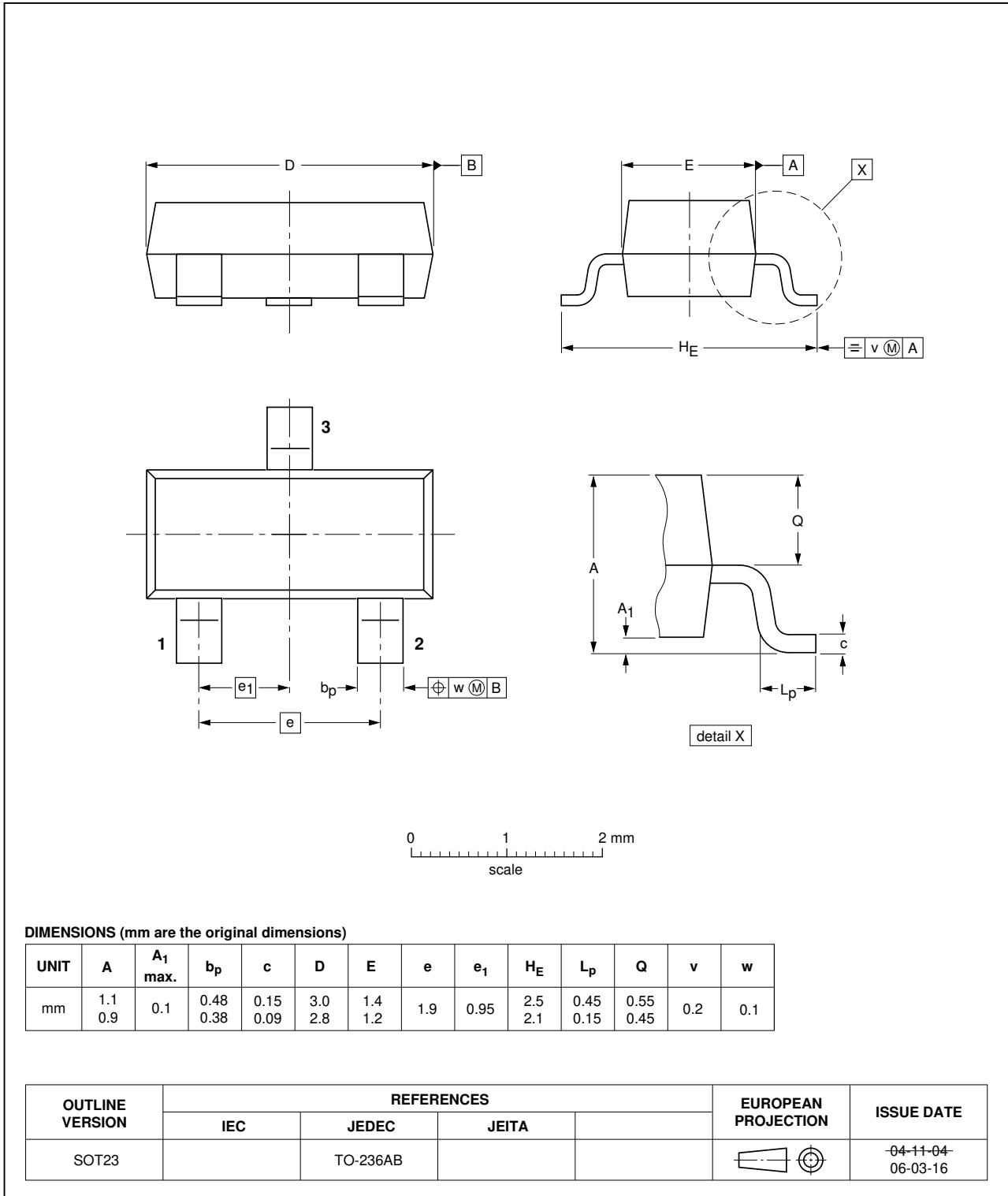
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23





## PNP 5 GHz wideband transistor

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## DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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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