DISCRETE SEMICONDUCTORS

DATA SHEET

BFT93PNP 5 GHz wideband transistor

Product specification
File under Discrete Semiconductors, SC14

November 1992





BFT93

DESCRIPTION

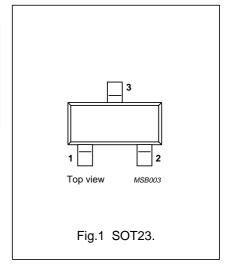
PNP transistor in a plastic SOT23 envelope.

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	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 °C; note 1	_	300	mW
f _T	transition frequency	$I_C = -30 \text{ mA}; V_{CE} = -5 \text{ V}; f = 500 \text{ MHz};$ $T_j = 25 ^{\circ}\text{C}$	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
Vo	output voltage	$d_{im} = -60 \text{ dB}; I_C = -30 \text{ mA};$ $V_{CE} = -5 \text{ V}; R_L = 75 \Omega;$ $f_{(p+q-r)} = 493.25 \text{ MHz}$	300	-	mV

Note

1. 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 _{CBO}	collector-base voltage	open emitter	_	–15	V
V_{CEO}	collector-emitter voltage	open base	_	-12	V
V _{EBO}	emitter-base voltage	open collector	_	-2	V
I _C	DC collector current		_	-35	mA
I _{CM}	peak collector current	f > 1 MHz	_	-50	mA
P _{tot}	total power dissipation	up to T _s = 95 °C; note 1	_	300	mW
T _{stg}	storage temperature		-65	150	°C
Tj	junction temperature		_	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
R _{th j-s}	thermal resistance from junction to soldering point	up to $T_s = 70 ^{\circ}\text{C}$; (note 1)	260 K/W

Note

1. $\,\,T_s$ is the temperature at the soldering point of the collector tab.

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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} = -5 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 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 MHz; $T_{amb} = 25 \text{ °C}$	_	16.5	_	dB
F	noise figure	$I_{C} = -10 \text{ mA}; V_{CE} = -5 \text{ V};$ $f = 500 \text{ MHz}; T_{amb} = 25 ^{\circ}\text{C}$	_	2.4	_	dB
Vo	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

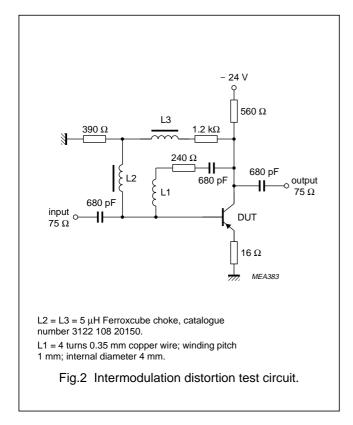
$$G_{UM} = 10 \log \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)} dB.$$

2. d_{im} = -60 dB (DIN 45004B); I_C = -30 mA; V_{CE} = -5 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;

 $V_r = V_o -6 \text{ dB}$; $f_r = 505.25 \text{ MHz}$;

measured at $f_{(p+q-r)} = 493.25$ MHz.

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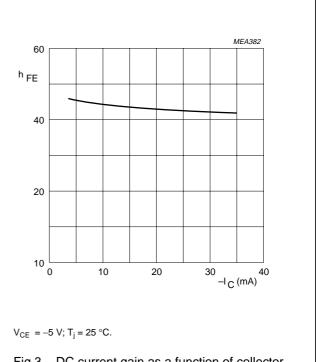
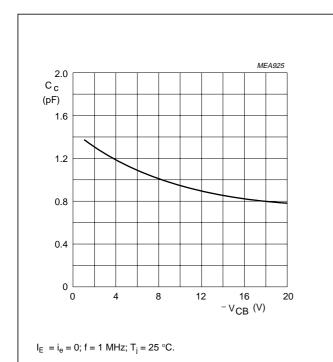


Fig.3 DC current gain as a function of collector current.

MEA381



 f_{T} (GHz) f_{T} (MA) f_{T} (MA) f_{T} (MA)

collector current.

iig.4 Collector capacitance as a function of collector-base voltage.

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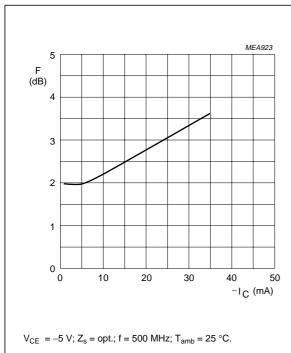


Fig.6 Minimum noise figure as a function of

collector current.

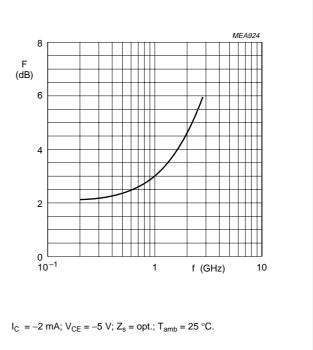


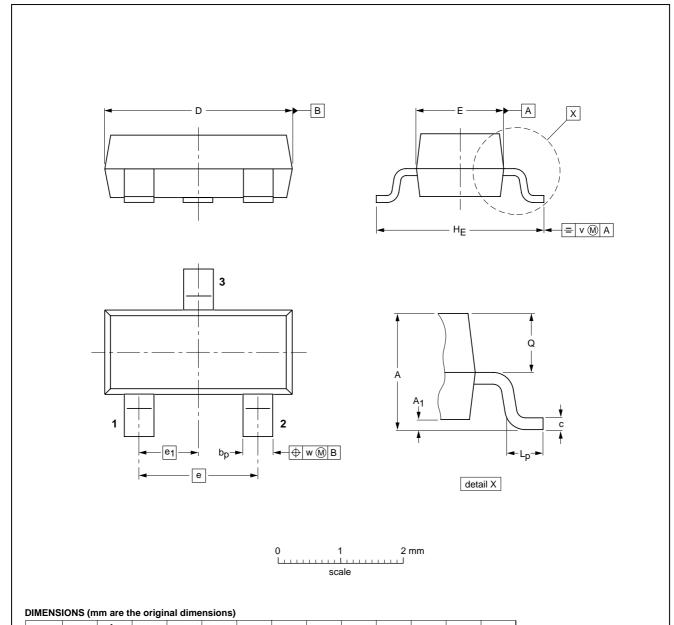
Fig.7 Minimum noise figure as a function of frequency.

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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



OUTLINE		REFER	RENCES	EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	EIAJ	PROJECTION	ISSUE DATE
SOT23					97-02-28

e₁

0.95

 ${\sf H_E}$

2.5

 $L_{\mathbf{p}}$

0.45

0.15

Q

0.55

0.2

w

0.1

Ε

1.4 1.2 е

1.9

UNIT

mm

bp

0.48

0.15

3.0

max.

0.1

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DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

Where application information is given, it is advisory and does not form part of the specification.

LIFE SUPPORT APPLICATIONS

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