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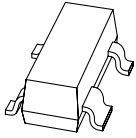
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BFG92A/X

NPN 5 GHz wideband transistor

Rev. 06 — 12 March 2008

Product data sheet

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NXP Semiconductors

NPN 5 GHz wideband transistor

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FEATURES

- High power gain
- Low noise figure
- Gold metallization ensures excellent reliability.

APPLICATIONS

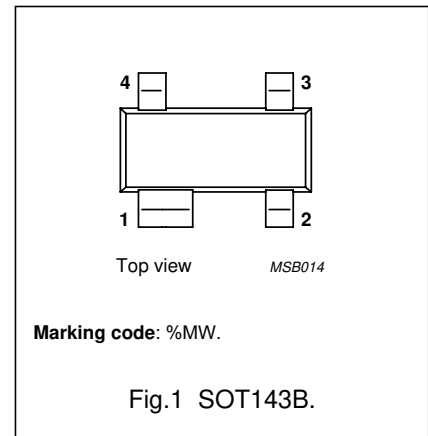
Wideband applications in the UHF and microwave range.

DESCRIPTION

Silicon NPN transistor in a 4-pin, dual-emitter SOT143B plastic package.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter



QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage		–	–	20	V
V_{CEO}	collector-emitter voltage		–	–	15	V
I_C	collector current (DC)		–	–	25	mA
P_{tot}	total power dissipation	$T_s \leq 60\text{ }^\circ\text{C}$	–	–	400	mW
C_{re}	feedback capacitance	$I_C = i_c = 0$; $V_{CB} = 10\text{ V}$; $f = 1\text{ MHz}$	–	0.35	–	pF
f_T	transition frequency	$I_C = 15\text{ mA}$; $V_{CE} = 10\text{ V}$; $f = 500\text{ MHz}$	3.5	5	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 15\text{ mA}$; $V_{CE} = 10\text{ V}$; $T_{amb} = 25\text{ }^\circ\text{C}$; $f = 1\text{ GHz}$	–	16	–	dB
		$I_C = 15\text{ mA}$; $V_{CE} = 10\text{ V}$; $T_{amb} = 25\text{ }^\circ\text{C}$; $f = 2\text{ GHz}$	–	11	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; $I_C = 5\text{ mA}$; $V_{CE} = 10\text{ V}$; $T_{amb} = 25\text{ }^\circ\text{C}$; $f = 1\text{ GHz}$	–	2	–	dB

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LIMITING VALUES

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

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	collector current (DC)		–	25	mA
P _{tot}	total power dissipation	T _s ≤ 60 °C; note 1	–	400	mW
T _{stg}	storage temperature range		–65	150	°C
T _j	junction temperature		–	175	°C

Note

1. T_s is the temperature at the soldering point of the collector pin.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th j-s}	thermal resistance from junction to soldering point	note 1	290	K/W

Note

1. T_s is the temperature at the soldering point of the collector pin.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

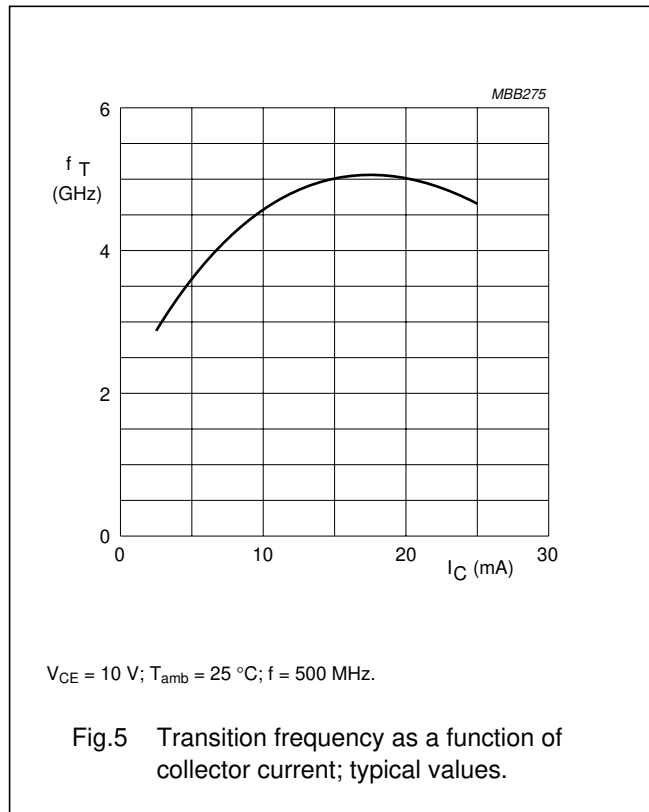
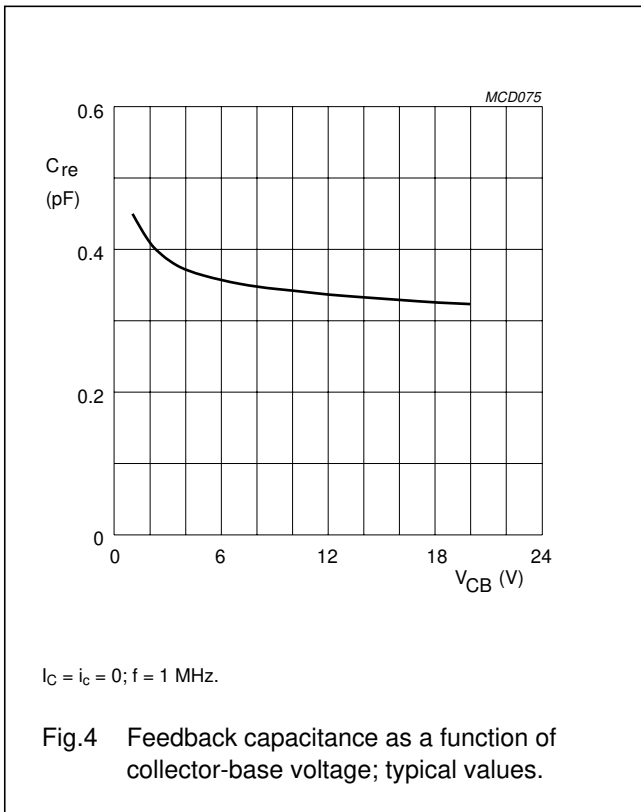
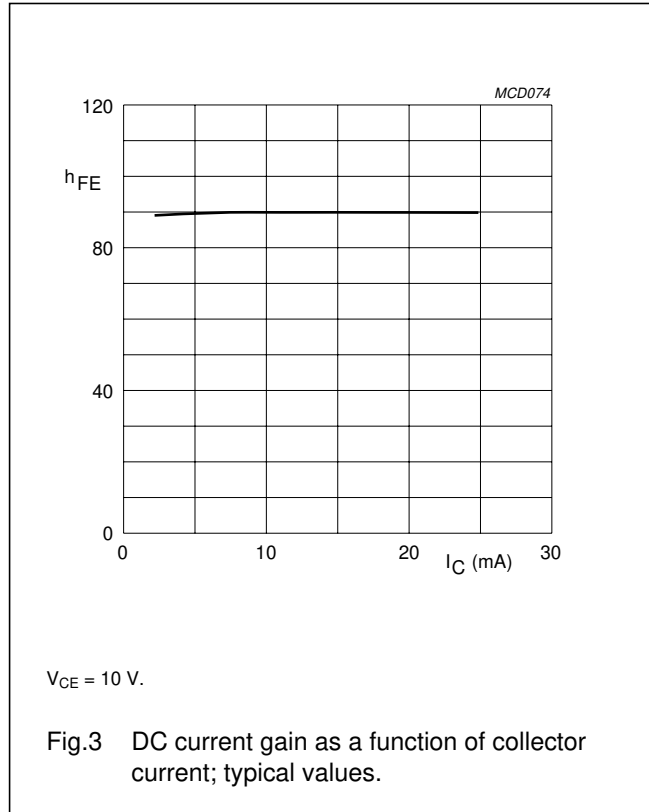
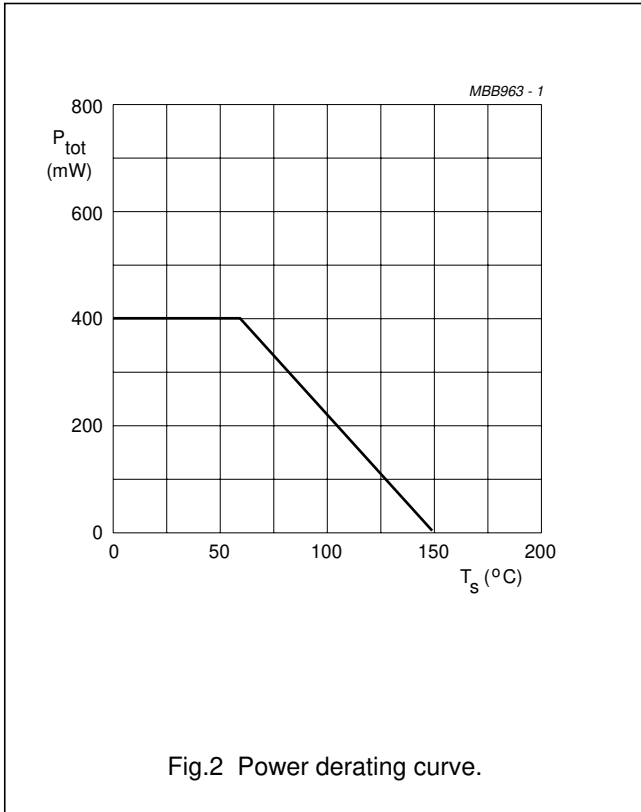
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I _{CBO}	collector leakage current	I _E = 0; V _{CB} = 10 V	–	–	50	nA
h _{FE}	DC current gain	I _C = 15 mA; V _{CE} = 10 V	65	90	135	
C _c	collector capacitance	I _E = i _e = 0; V _{CB} = 10 V; f = 1 MHz	–	0.6	–	pF
C _e	emitter capacitance	I _C = i _c = 0; V _{EB} = 10 V; f = 1 MHz	–	0.9	–	pF
C _{re}	feedback capacitance	I _C = i _c = 0; V _{CB} = 10 V; f = 1 MHz	–	0.35	–	pF
f _T	transition frequency	I _C = 15 mA; V _{CE} = 10 V; f = 500 MHz	3.5	5	–	GHz
G _{UM}	maximum unilateral power gain; note 1	I _C = 15 mA; V _{CE} = 10 V; T _{amb} = 25 °C; f = 1 GHz	–	16	–	dB
		I _C = 15 mA; V _{CE} = 10 V; T _{amb} = 25 °C; f = 2 GHz	–	11	–	dB
F	noise figure	Γ _s = Γ _{opt} ; I _C = 5 mA; V _{CE} = 10 V; T _{amb} = 25 °C; f = 1 GHz	–	2	–	dB
		Γ _s = Γ _{opt} ; I _C = 5 mA; V _{CE} = 10 V; T _{amb} = 25 °C; f = 2 GHz	–	3	–	dB

Note

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.

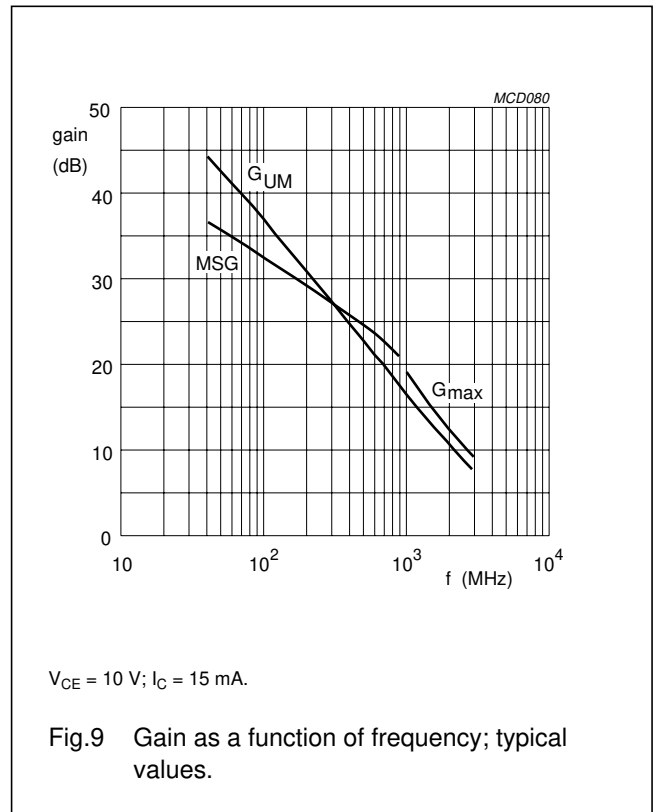
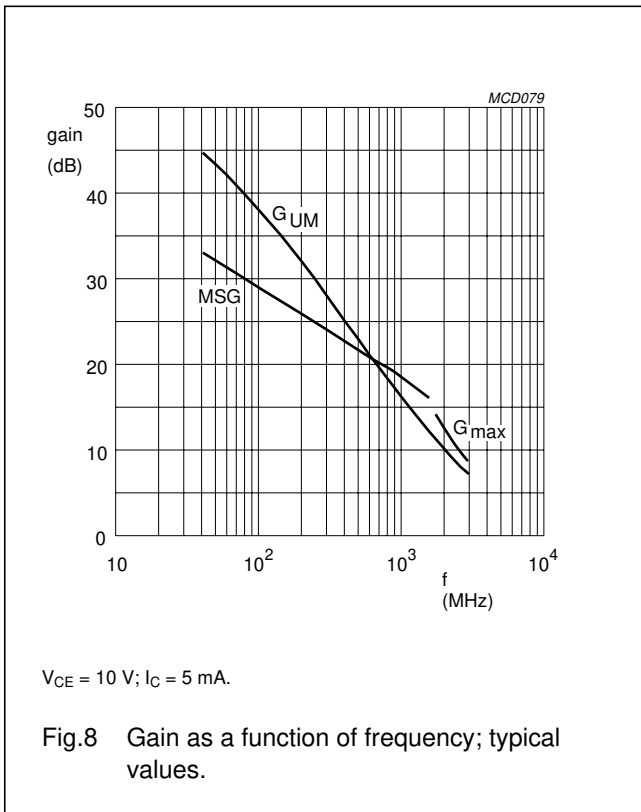
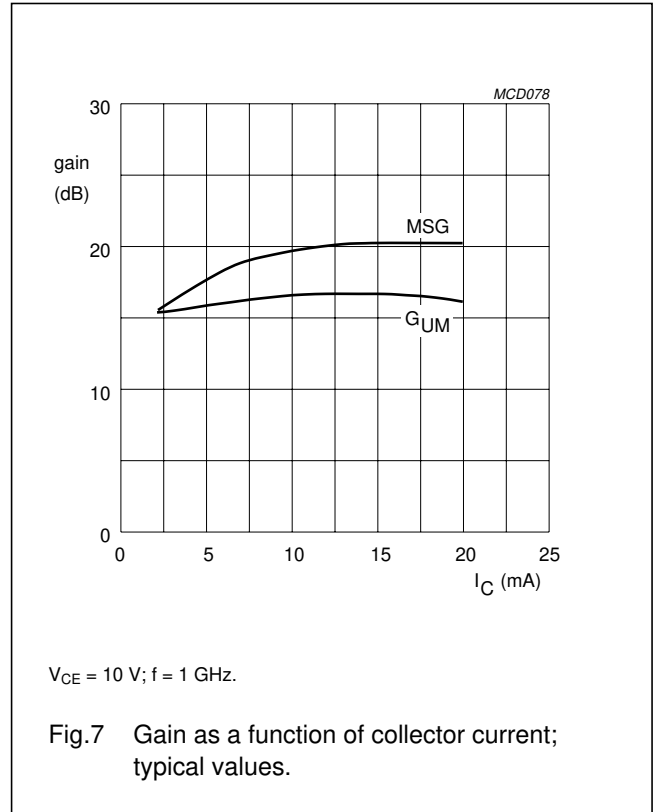
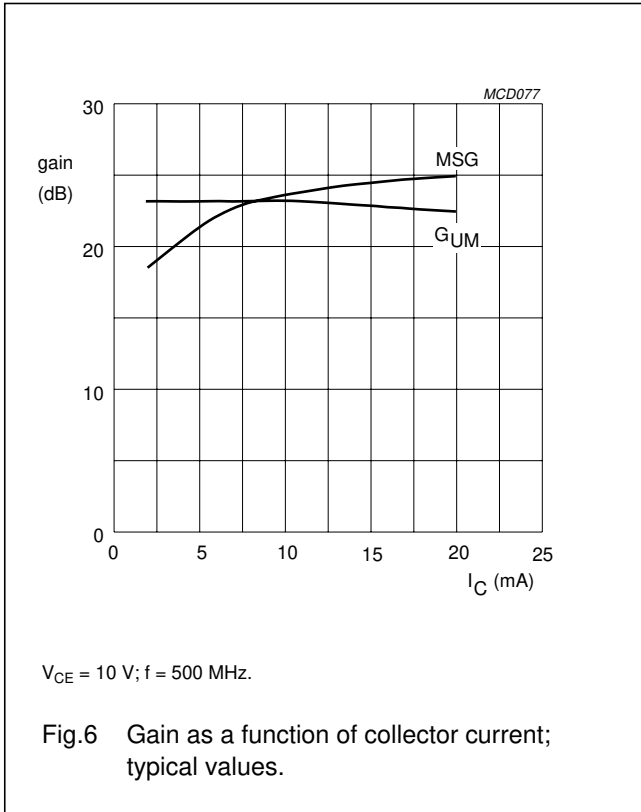
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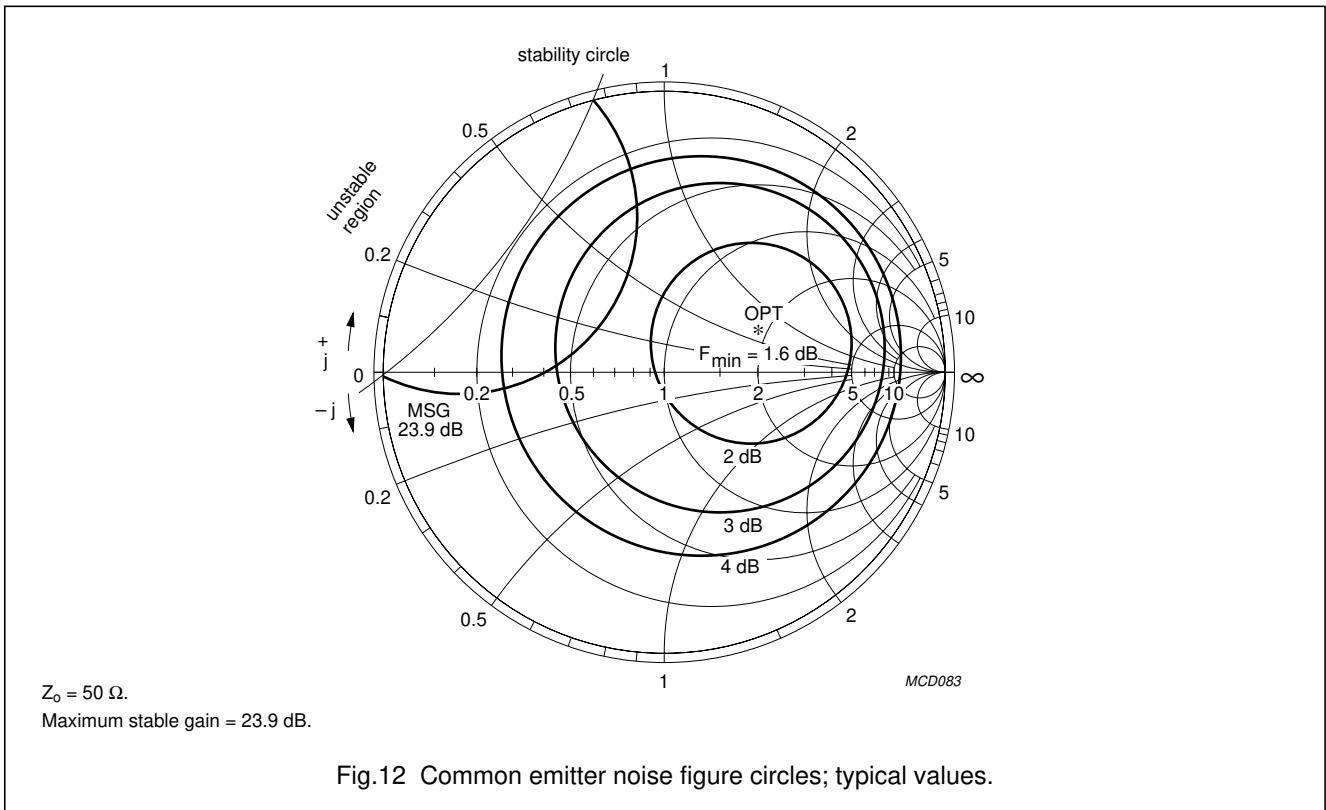
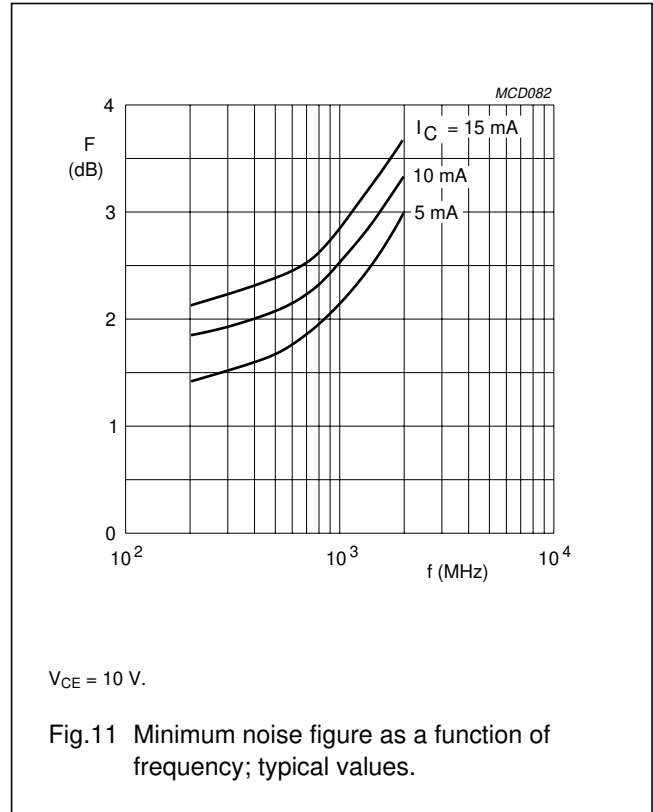
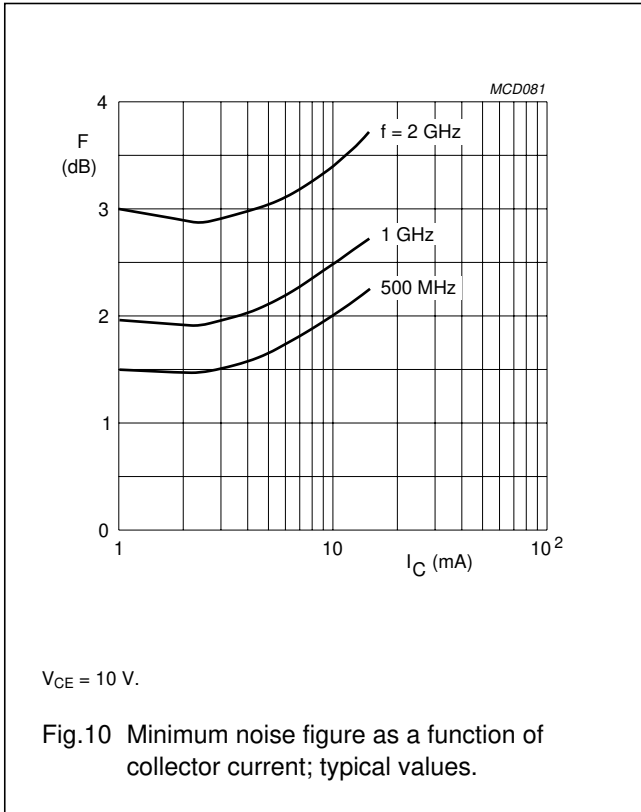
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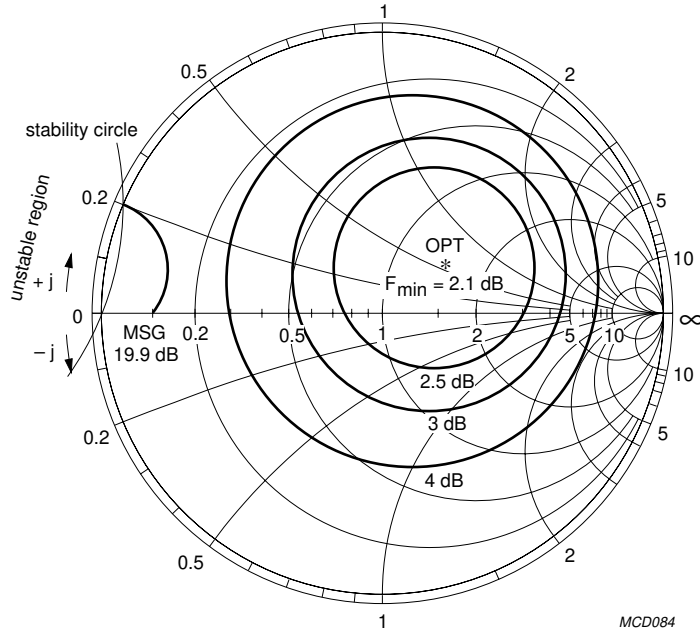
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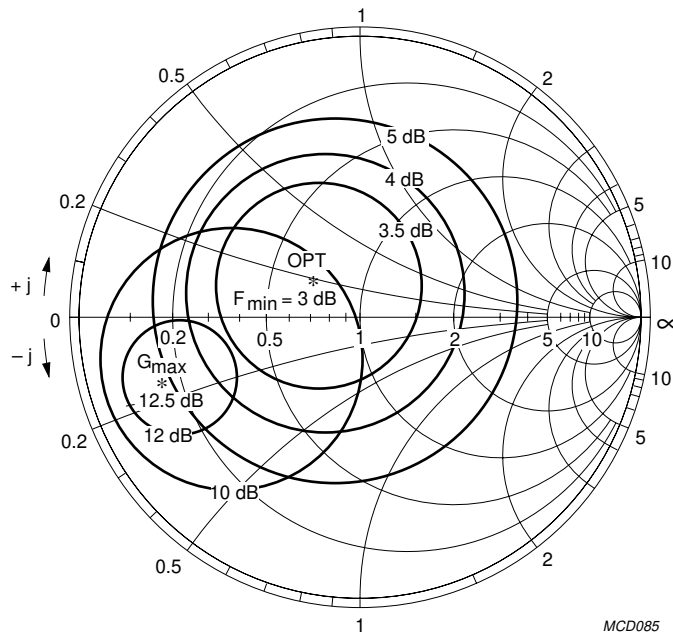
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$Z_0 = 50 \Omega$.
Maximum stable gain = 19.9 dB.

Fig.13 Common emitter noise figure circles; typical values.

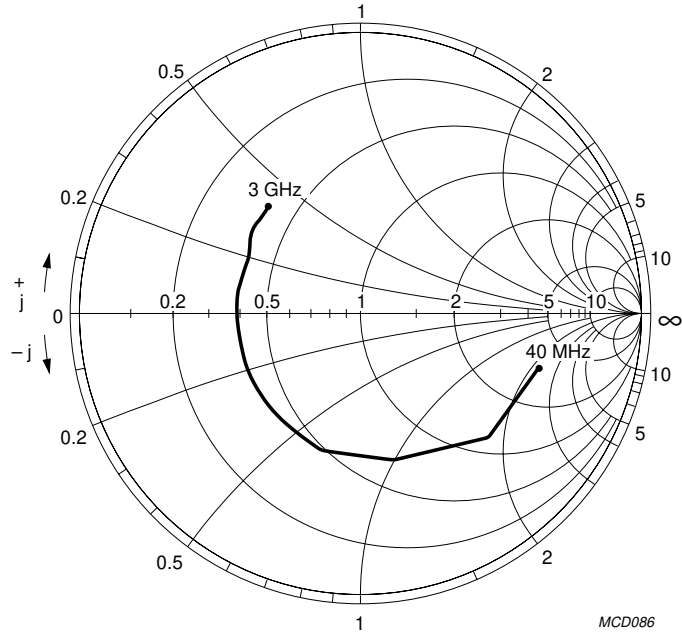


$Z_0 = 50 \Omega$.

Fig.14 Common emitter noise figure circles; typical values.

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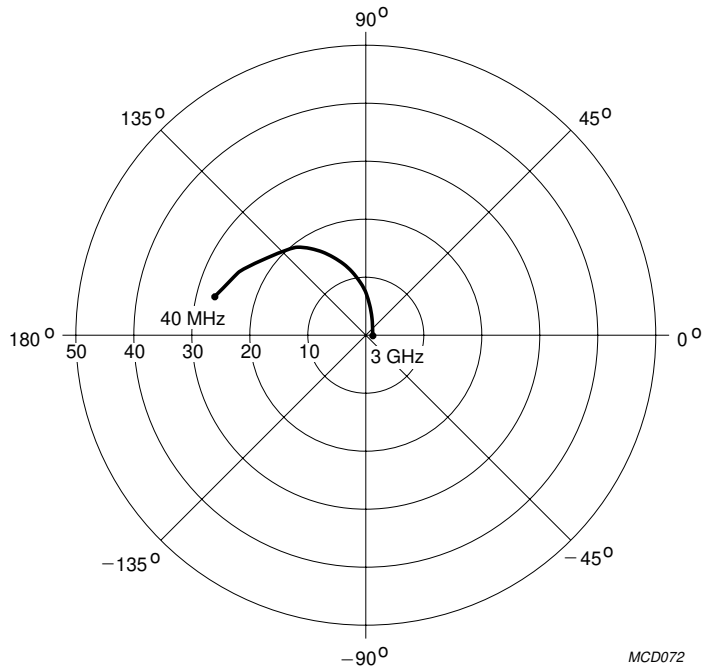
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$V_{CE} = 10\text{ V}; I_C = 15\text{ mA}$.

MCD086

Fig.15 Common emitter input reflection coefficient (S_{11}); typical values.



$V_{CE} = 10\text{ V}; I_C = 15\text{ mA}$.

MCD072

Fig.16 Common emitter forward transmission coefficient (S_{21}); typical values.

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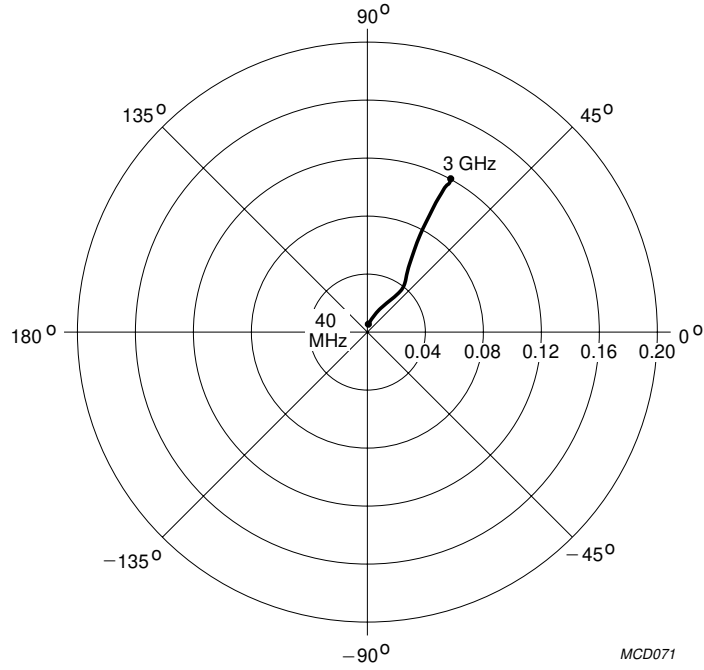


Fig.17 Common emitter reverse transmission coefficient (S_{12}); typical values.

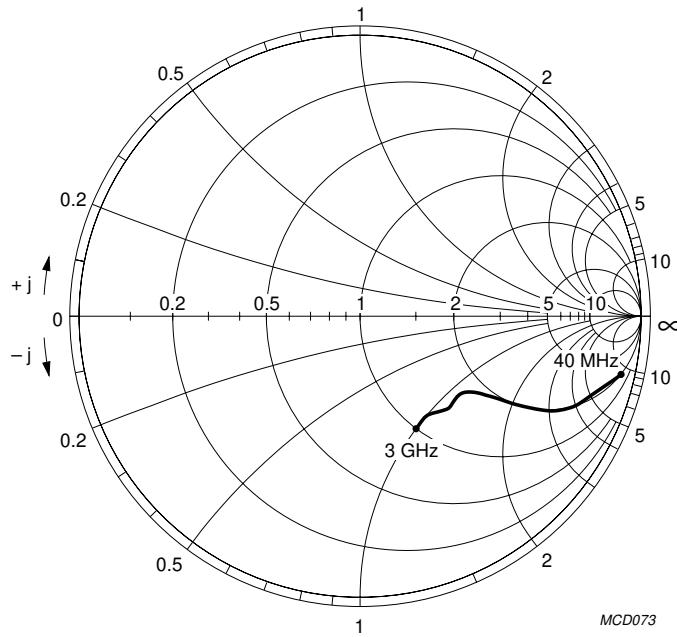


Fig.18 Common emitter output reflection coefficient (S_{22}); typical values.

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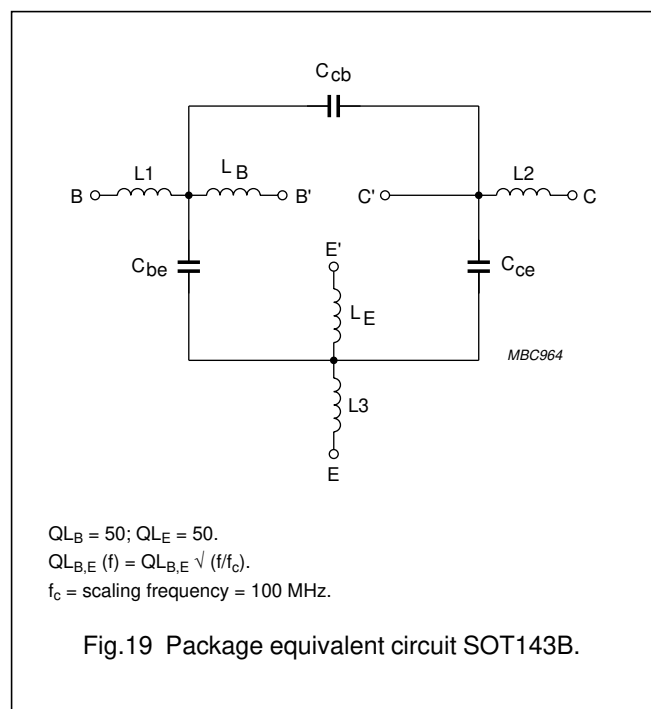
SPICE parameters for BFR90A/X die

SEQUENCE No.	PARAMETER	VALUE	UNIT
1	IS	411.8	aA
2	BF	102.6	–
3	NF	997.2	m
4	VAF	62.67	V
5	IKF	3.200	A
6	ISE	4.010	fA
7	NE	1.577	–
8	BR	18.10	–
9	NR	996.2	m
10	VAR	3.369	V
11	IKR	1.281	A
12	ISC	279.9	aA
13	NC	1.075	–
14	RB	10.00	Ω
15	IRB	1.000	μA
16	RBM	10.00	Ω
17	RE	1.164	Ω
18	RC	2.320	Ω
19 (note 1)	XTB	0.000	–
20 (note 1)	EG	1.110	eV
21 (note 1)	XTI	3.000	–
22	CJE	890.5	fF
23	VJE	600.0	mV
24	MJE	258.5	m
25	TF	15.49	ps
26	XTF	39.14	–
27	VTF	2.152	V
28	ITF	213.7	mA
29	PTF	0.000	deg
30	CJC	546.5	fF
31	VJC	380.8	mV
32	MJC	202.9	m
33	XCJC	150.0	m
34	TR	5.618	ns
35 (note 1)	CJS	0.000	F

SEQUENCE No.	PARAMETER	VALUE	UNIT
36 (note 1)	VJS	750.0	mV
37 (note 1)	MJS	0.000	–
38	FC	850.0	m

Note

1. These parameters have not been extracted, the default values are shown.



List of components (see Fig.19)

DESIGNATION	VALUE	UNIT
C _{be}	84	fF
C _{cb}	17	fF
C _{ce}	191	fF
L1	0.12	nH
L2	0.21	nH
L3	0.06	nH
L _B	0.95	nH
L _E	0.40	nH

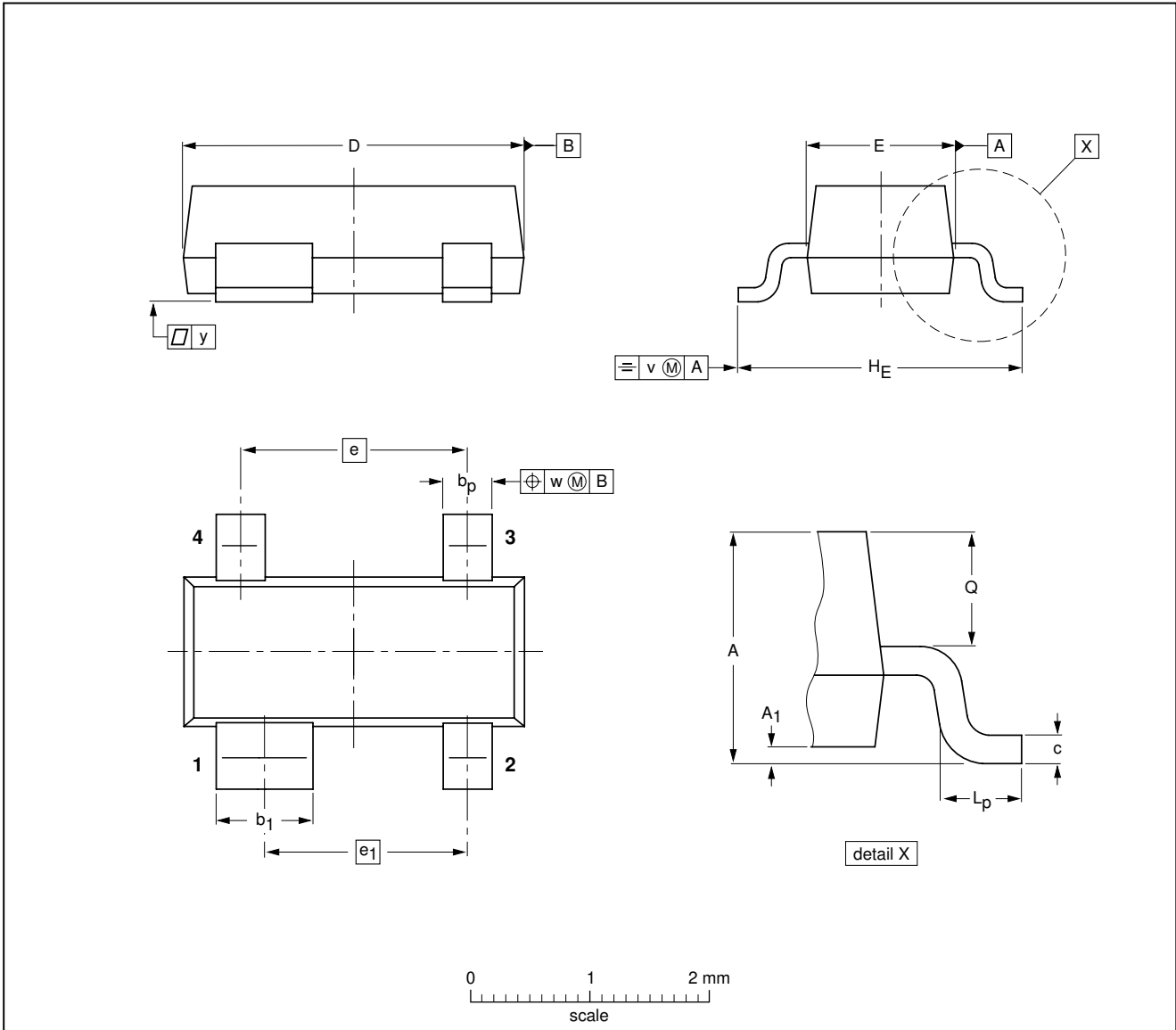
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PACKAGE OUTLINES

Plastic surface mounted package; 4 leads

SOT143B



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max	b _p	b ₁	c	D	E	e	e ₁	H _E	L _p	Q	v	w	y
mm	1.1 0.9	0.1	0.48 0.38	0.88 0.78	0.15 0.09	3.0 2.8	1.4 1.2	1.9	1.7	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT143B						97-02-28

Legal information

Data sheet status

Document status ^{[1][2]}	Product status ^[3]	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.

[1] Please consult the most recently issued document before initiating or completing a design.

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

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Revision history

Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BFG92AX_N_6	20080312	Product data sheet	-	BFG92AX_N_5
Modifications:	<ul style="list-style-type: none"> Characteristics Table; DC current gain value changed 			
BFG92AX_N_5	20071126	Product data sheet	-	BFG92AX_4
BFG92AX_4 (9397 750 04344)	19980923	Product specification	-	BFG92SERIES_3
BFG92SERIES_3	19950912	Product specification	-	BFG92SERIES_2
BFG92SERIES_2	19921101	Product specification	-	BFG92_SERIES_1
BFG92_SERIES_1	-	-	-	-

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