

BFR92AW

NPN 5 GHz wideband transistor

Rev. 03 — 12 March 2008

Product data sheet

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FEATURES

- High power gain
- Gold metallization ensures excellent reliability
- SOT323 (S-mini) package.

APPLICATIONS

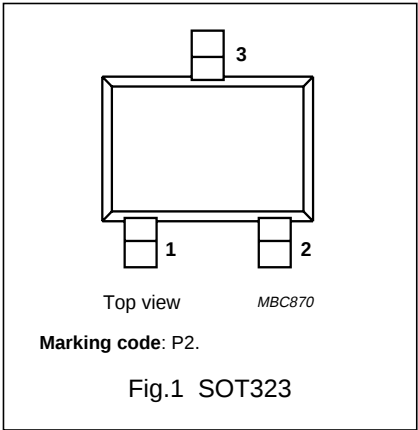
It is designed for use in RF amplifiers, mixers and oscillators with signal frequencies up to 1 GHz.

DESCRIPTION

Silicon NPN transistor encapsulated in a plastic SOT323 (S-mini) package. The BFR92AW uses the same crystal as the SOT23 version, BFR92A.

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



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	collector current (DC)		–	–	25	mA
P _{tot}	total power dissipation	up to T _s = 93 °C; note 1	–	–	300	mW
h _{FE}	current gain	I _C = 15 mA; V _{CE} = 10 V	65	90	135	
C _{re}	feedback capacitance	I _C = 0; V _{CE} = 10 V; f = 1 MHz; T _{amb} = 25 °C	–	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	I _C = 15 mA; V _{CE} = 10 V; f = 1 GHz; T _{amb} = 25 °C	–	14	–	dB
		I _C = 15 mA; V _{CE} = 10 V; f = 2 GHz; T _{amb} = 25 °C	–	8	–	dB
F	noise figure	I _C = 5 mA; V _{CE} = 10 V; f = 1 GHz; Γ _s = Γ _{opt}	–	2	–	dB
T _j	junction temperature		–	–	150	°C

Note

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

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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	–	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	up to $T_s = 93\text{ °C}$; see Fig.2; note 1	–	300	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 93\text{ °C}$; note 1	190	K/W

Note to the Limiting values and Thermal characteristics

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

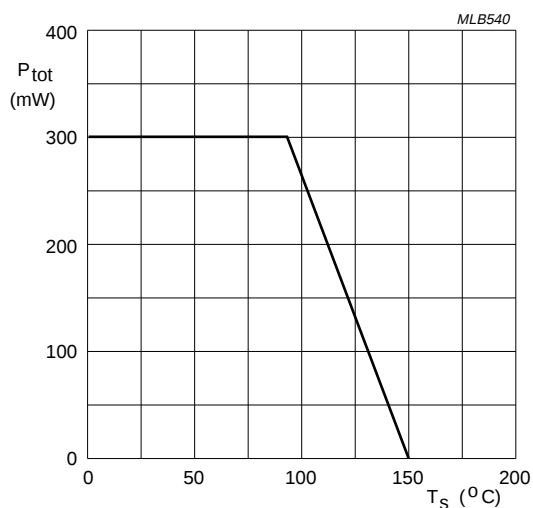


Fig.2 Power derating curve

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CHARACTERISTICS

$T_j = 25\text{ }^{\circ}\text{C}$ (unless otherwise specified).

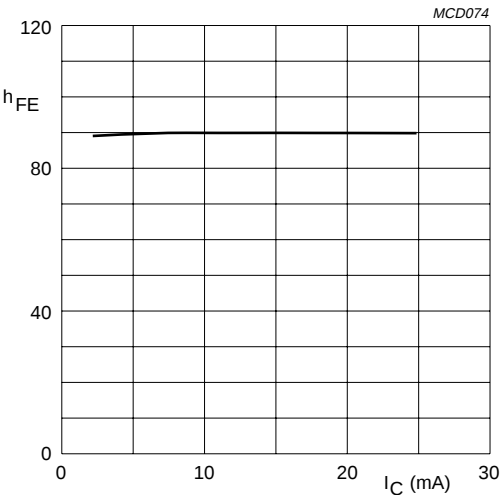
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector leakage current	$I_E = 0; V_{CB} = 10\text{ V}$	–	–	50	nA
h_{FE}	DC current gain	$I_C = 15\text{ mA}; V_{CE} = 10\text{ V}$	65	90	135	
C_c	collector capacitance	$I_E = i_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	–	0.6	–	pF
C_e	emitter capacitance	$I_C = i_c = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	0.9	–	pF
C_{re}	feedback capacitance	$I_C = 0; V_{CE} = 10\text{ V}; f = 1\text{ MHz}$	–	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; note 1	$I_C = 15\text{ mA}; V_{CE} = 10\text{ V}; f = 1\text{ GHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$	–	14	–	dB
		$I_C = 15\text{ mA}; V_{CE} = 10\text{ V}; f = 2\text{ GHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$	–	8	–	dB
F	noise figure	$I_C = 5\text{ mA}; V_{CE} = 10\text{ V}; f = 1\text{ GHz}; \Gamma_s = \Gamma_{opt}$	–	2	–	dB
		$I_C = 5\text{ mA}; V_{CE} = 10\text{ V}; f = 2\text{ GHz}; \Gamma_s = \Gamma_{opt}$	–	3	–	dB

Note

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.

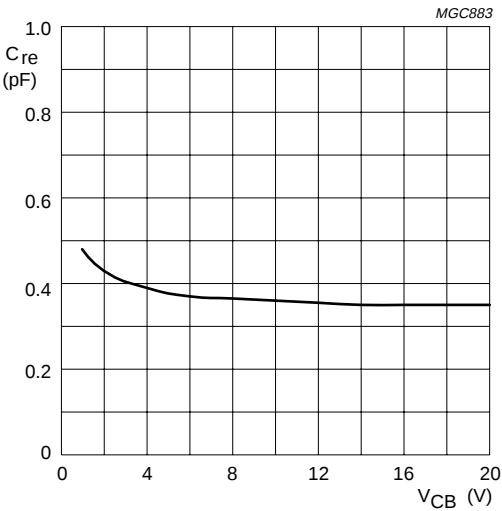
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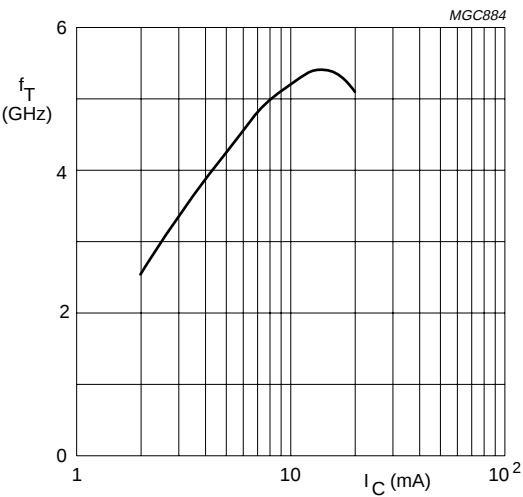
$V_{CE} = 10$ V.

Fig.3 DC current gain as a function of collector current; typical values.



$I_C = 0$; $f = 1$ MHz.

Fig.4 Feedback capacitance as a function of collector-base voltage; typical values.

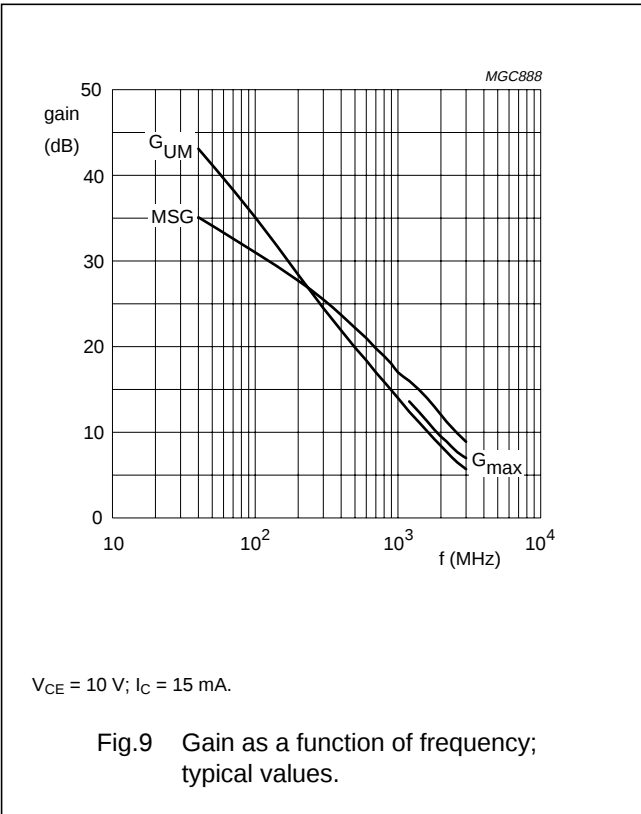
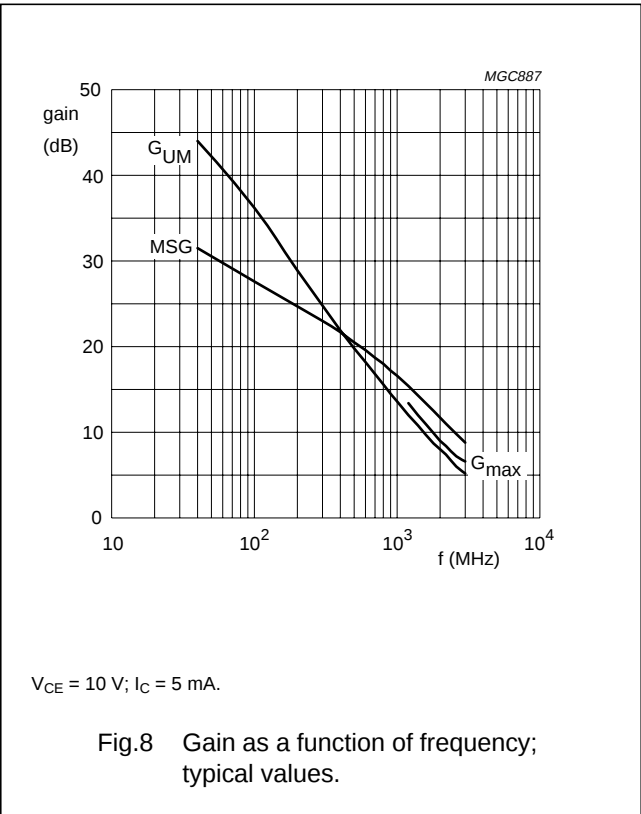
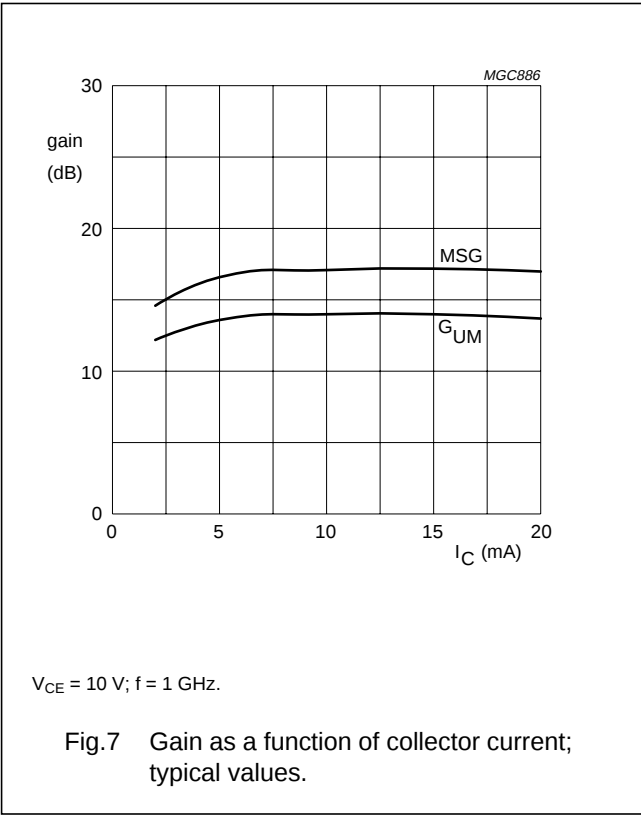
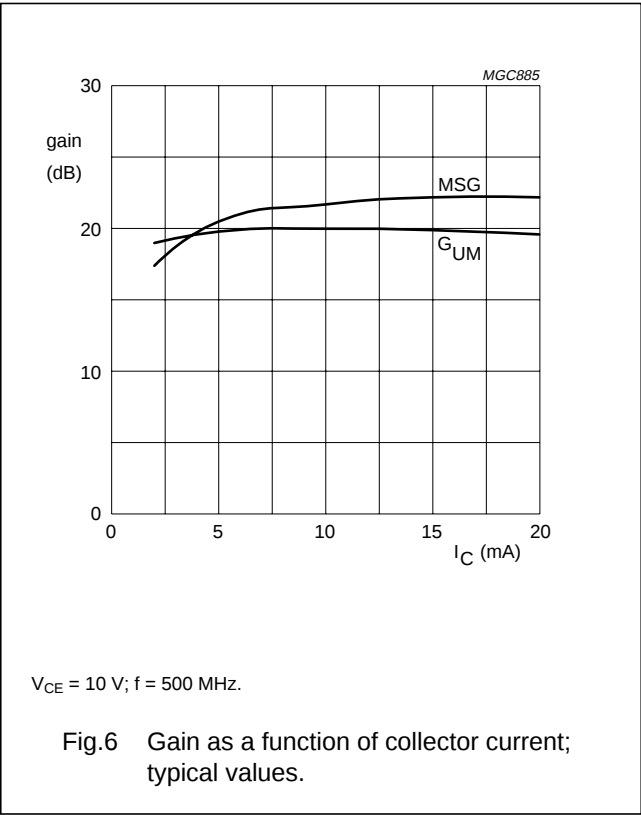


$V_{CE} = 5$ V; $f = 500$ MHz; $T_{amb} = 25$ °C.

Fig.5 Transition frequency as a function of collector current; typical values.

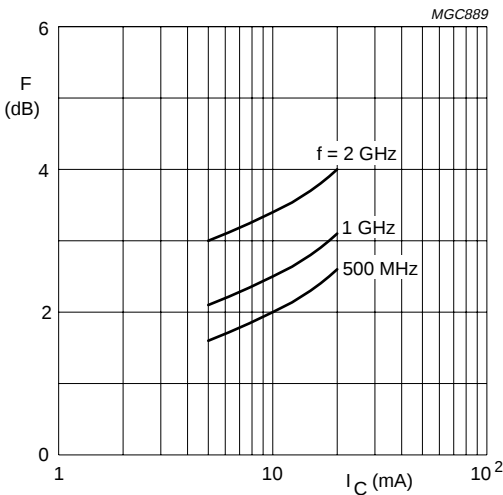
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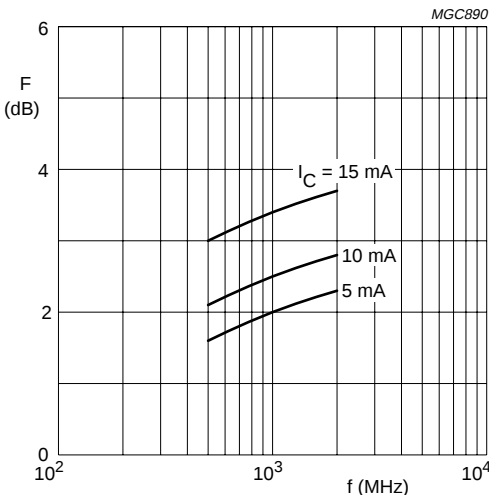
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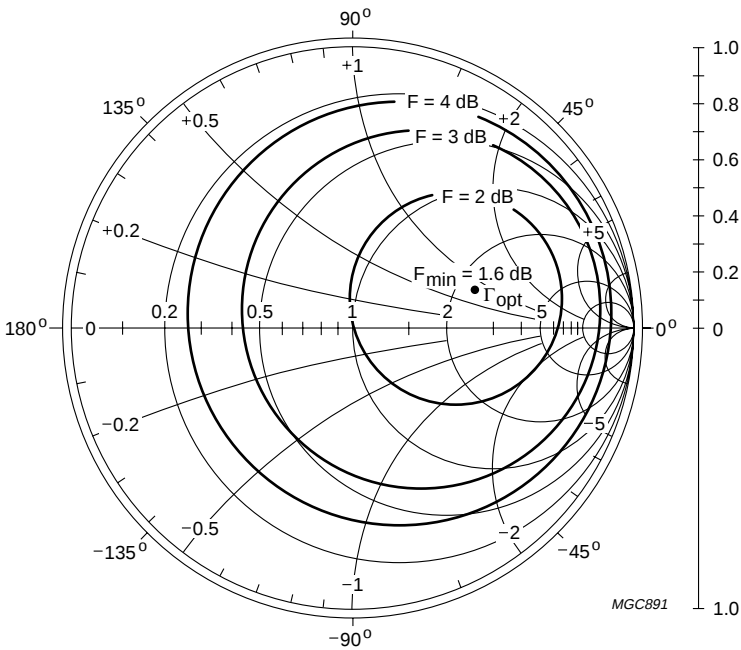
$V_{CE} = 10$ V.

Fig.10 Minimum noise figure as a function of collector current; typical values.



$V_{CE} = 10$ V.

Fig.11 Minimum noise figure as a function of frequency; typical values.



$f = 500$ MHz; $V_{CE} = 10$ V; $I_C = 5$ mA; $Z_0 = 50$ Ω .

Fig.12 Common emitter noise figure circles; typical values.

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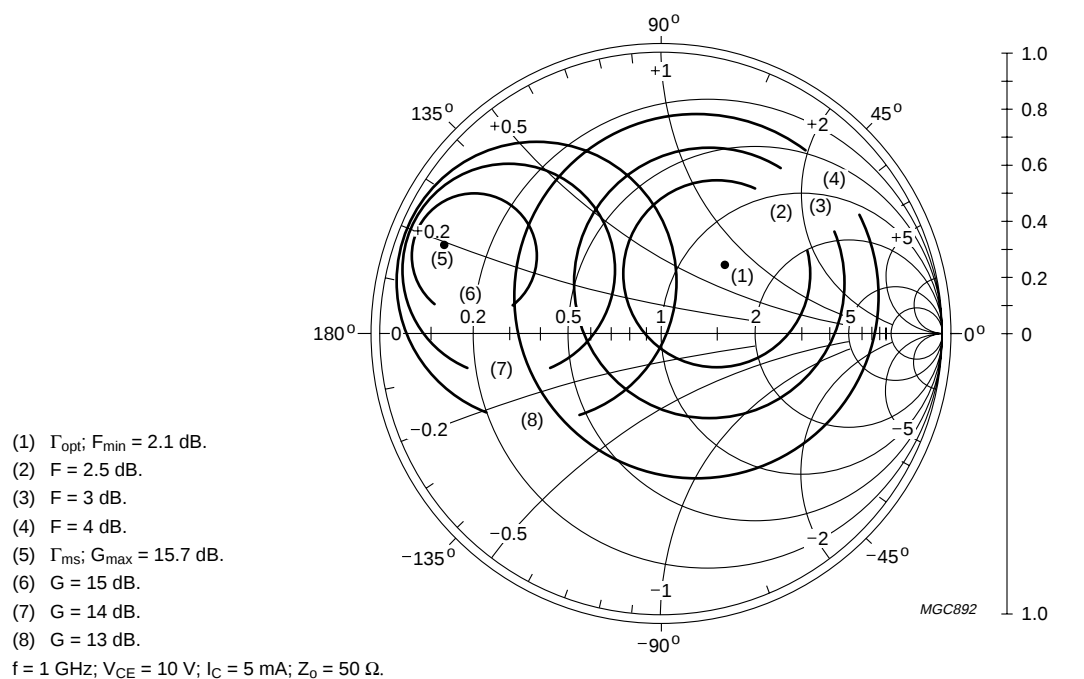


Fig.13 Common emitter noise figure circles; typical values.

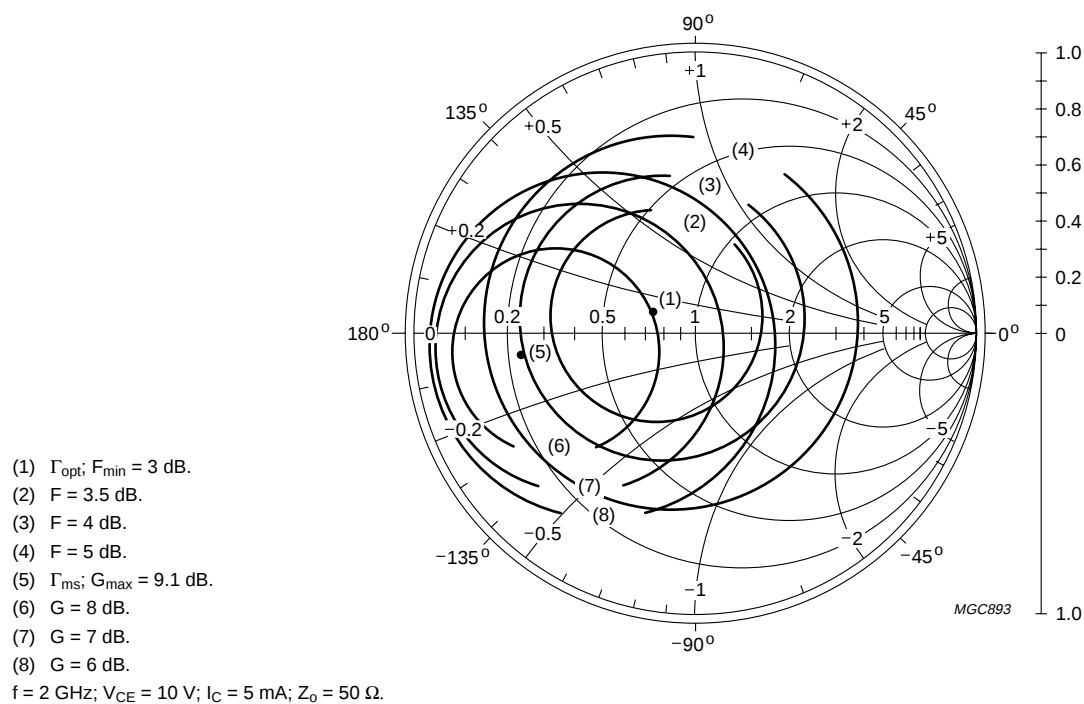
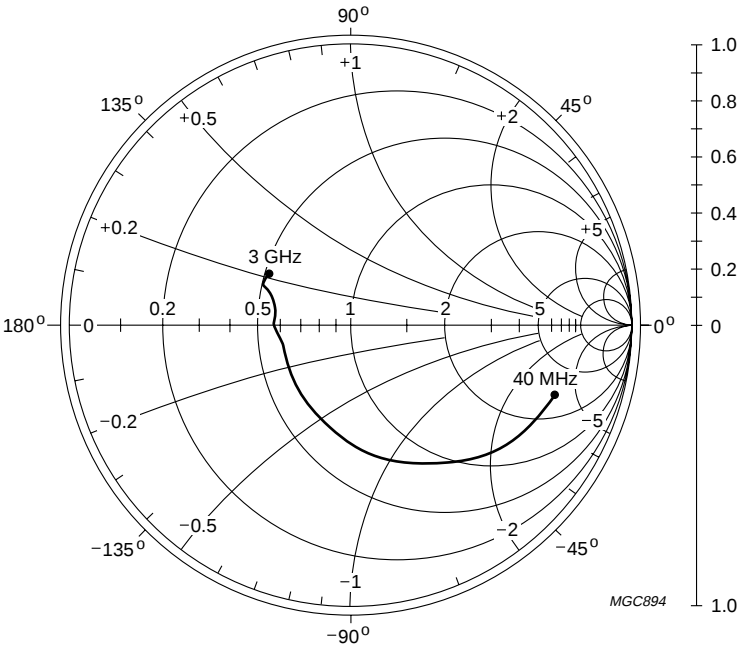


Fig.14 Common emitter noise figure circles; typical values.

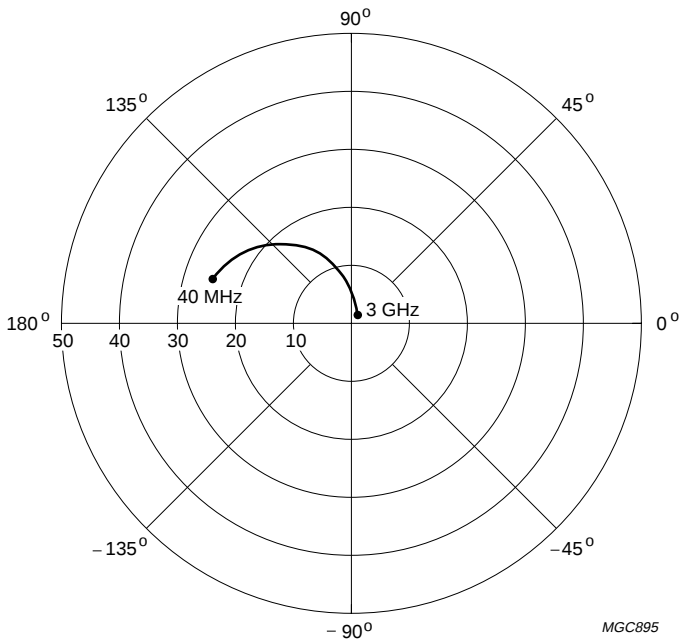
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$V_{CE} = 10\text{ V}$; $I_C = 15\text{ mA}$; $Z_0 = 50\ \Omega$.

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

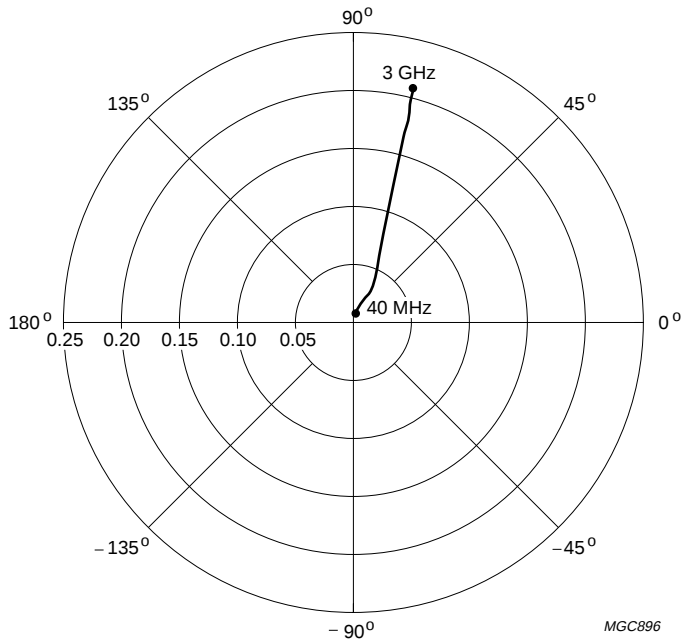


$V_{CE} = 10\text{ V}$; $I_C = 15\text{ mA}$.

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

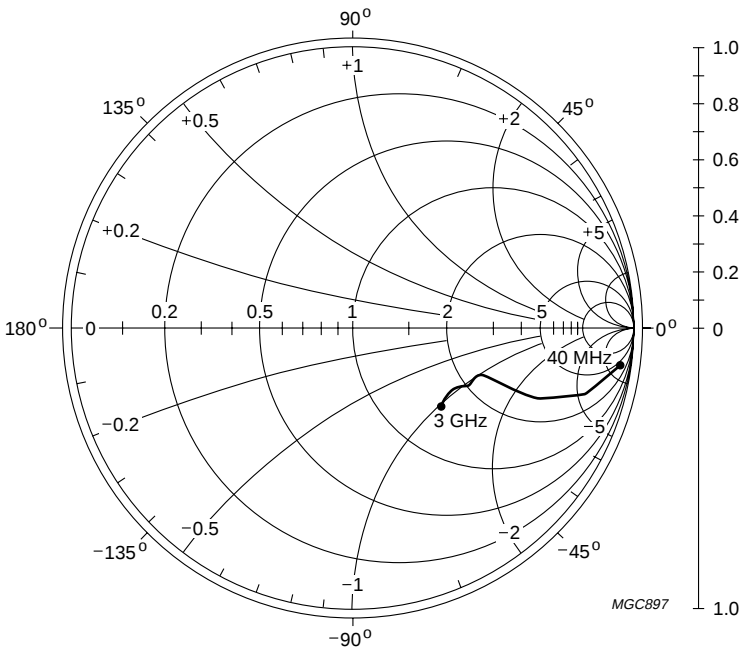
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$V_{CE} = 10\text{ V}$; $I_C = 15\text{ mA}$.

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



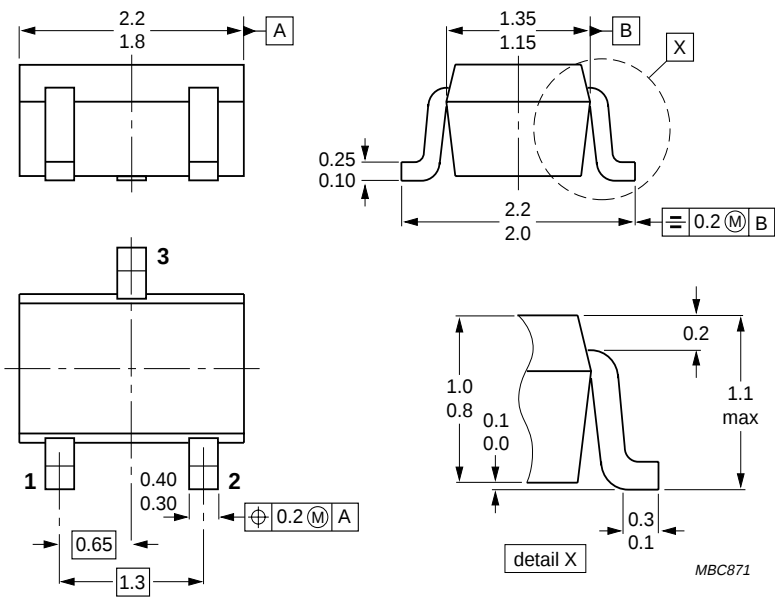
$V_{CE} = 10\text{ V}$; $I_C = 15\text{ mA}$; $Z_0 = 50\ \Omega$.

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

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PACKAGE OUTLINE



Dimensions in mm.

Fig.19 SOT323.

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

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Revision history

Revision history				
Document ID	Release date	Data sheet status	Change notice	Supersedes
BFR92AW_N_3	20080312	Product data sheet	-	BFR92AW_2
Modifications:	• Quick reference data and Characteristics Table; DC current gain value changed			
BFR92AW_2	19950918	Product specification	-	BFR92AW_1
BFR92AW_1	19921001	-	-	-



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Date of release: 12 March 2008

Document identifier: BFR92AW_N_3