

# BFR92AW

NPN 5 GHz wideband transistor

Rev. 03 — 12 March 2008

Product data sheet

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## NPN 5 GHz wideband transistor

## BFR92AW

## FEATURES

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

## APPLICATIONS

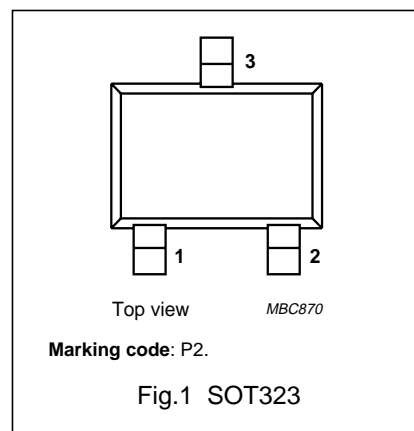
It is designed for use in RF amplifiers, mixers and oscillators with signal frequencies up to 1 GHz.

## 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 $T_s = 93\text{ °C}$ ; note 1	—	—	300	mW
$h_{FE}$	current gain	$I_C = 15\text{ mA}$ ; $V_{CE} = 10\text{ V}$	65	90	135	
$C_{re}$	feedback capacitance	$I_C = 0$ ; $V_{CE} = 10\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	—	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	$I_C = 15\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 1\text{ GHz}$ ; $T_{amb} = 25\text{ °C}$	—	14	—	dB
		$I_C = 15\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 2\text{ GHz}$ ; $T_{amb} = 25\text{ °C}$	—	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
$T_j$	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 $T_s = 93\text{ }^{\circ}\text{C}$ ; see Fig.2; note 1	–	300	mW
$T_{stg}$	storage temperature		–65	+150	$^{\circ}\text{C}$
$T_j$	junction temperature		–	150	$^{\circ}\text{C}$

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 93\text{ }^{\circ}\text{C}$ ; 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.

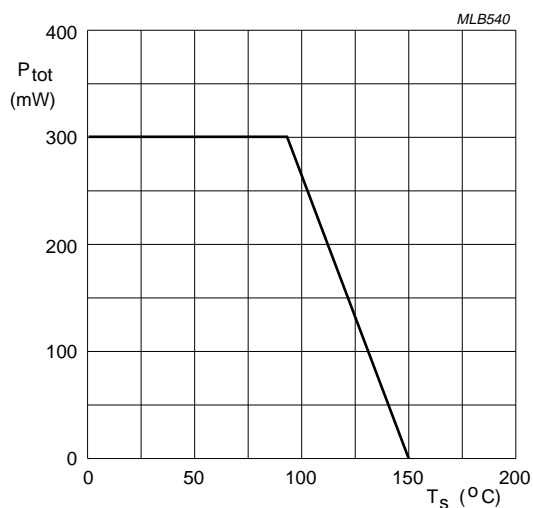


Fig.2 Power derating curve

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## CHARACTERISTICS

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

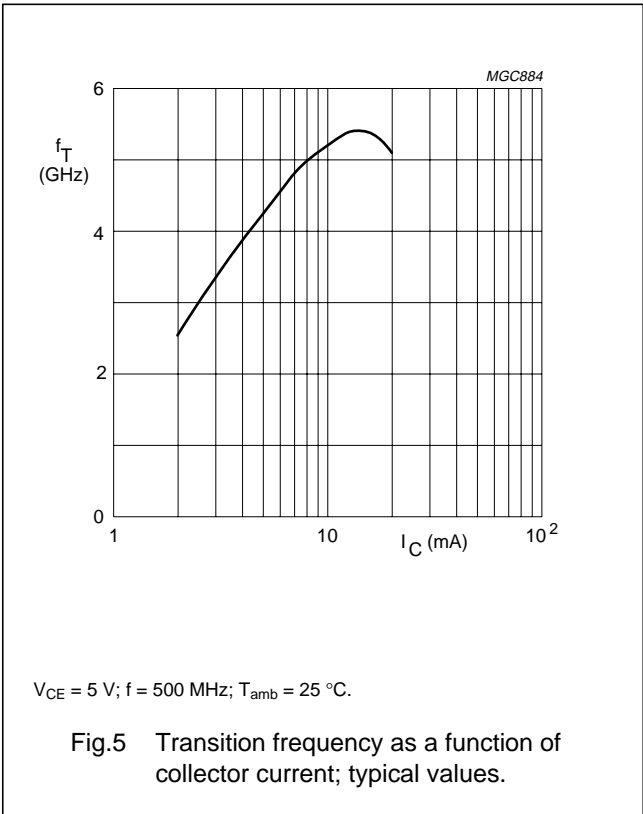
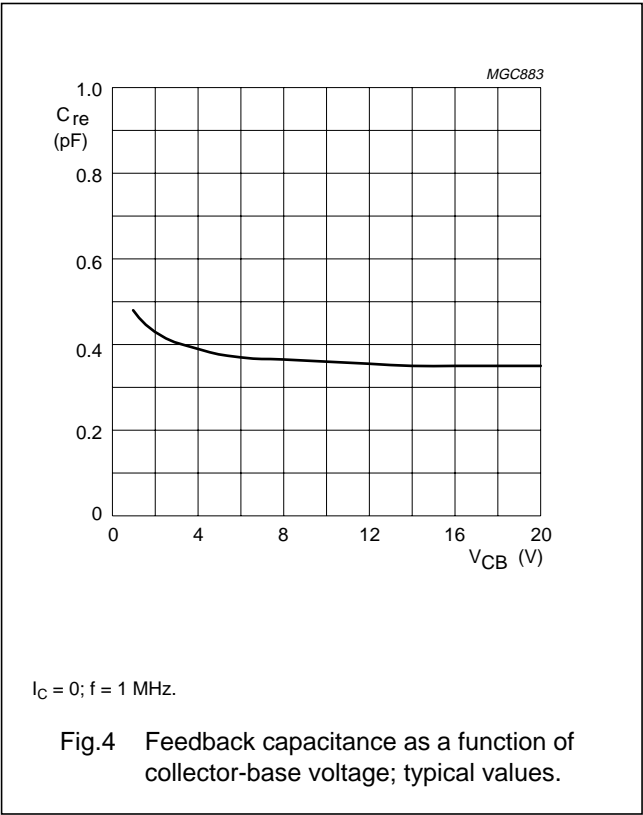
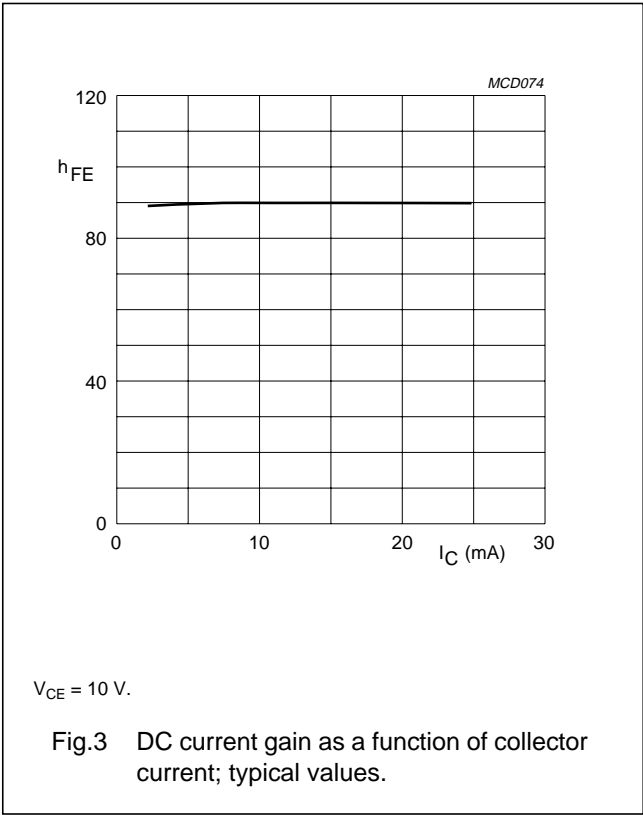
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector leakage current	$I_E = 0; V_{CB} = 10\text{ V}$	–	–	50	nA
$h_{FE}$	DC current gain	$I_C = 15\text{ mA}; V_{CE} = 10\text{ V}$	65	90	135	
$C_c$	collector capacitance	$I_E = i_e = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	–	0.6	–	pF
$C_e$	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	$I_C = 15\text{ mA}; V_{CE} = 10\text{ V}; f = 1\text{ GHz}; T_{amb} = 25\text{ °C}$	–	14	–	dB
		$I_C = 15\text{ mA}; V_{CE} = 10\text{ V}; f = 2\text{ GHz}; T_{amb} = 25\text{ °C}$	–	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.

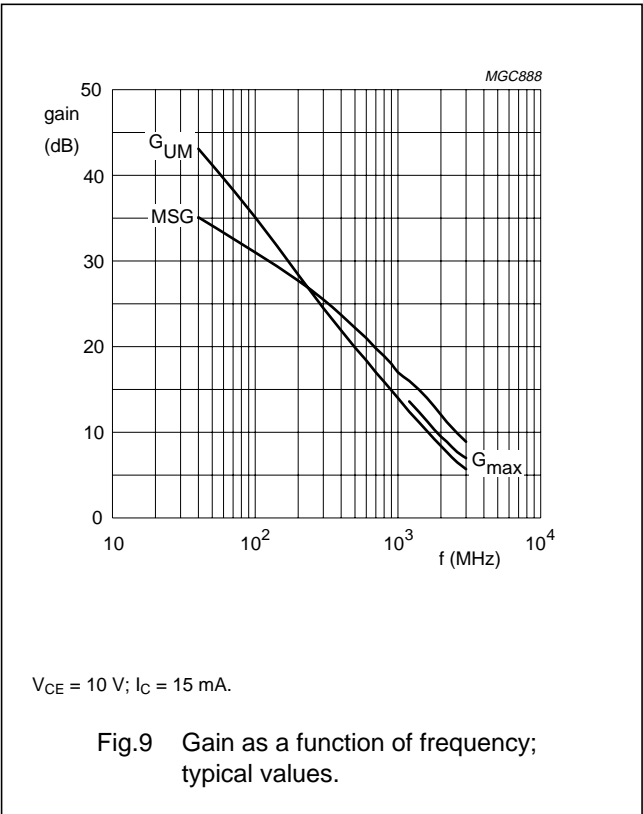
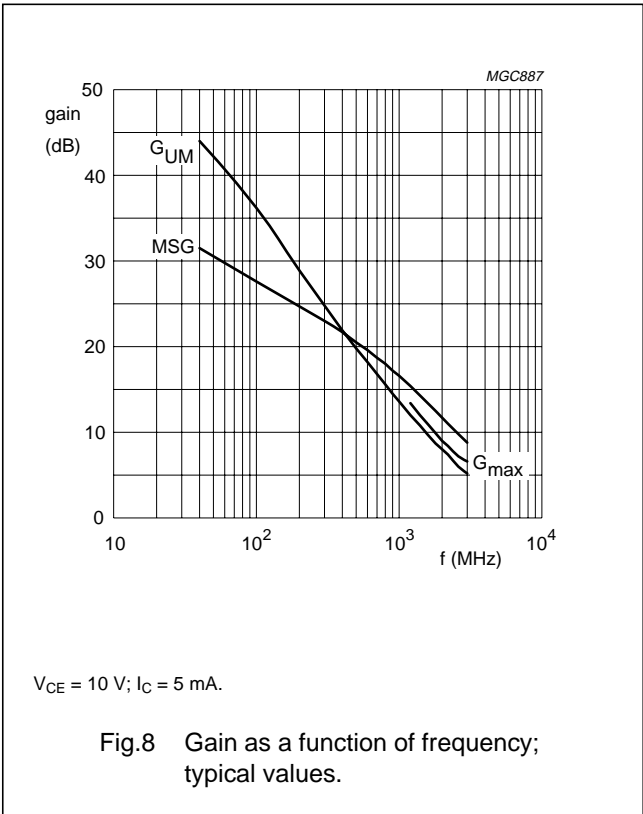
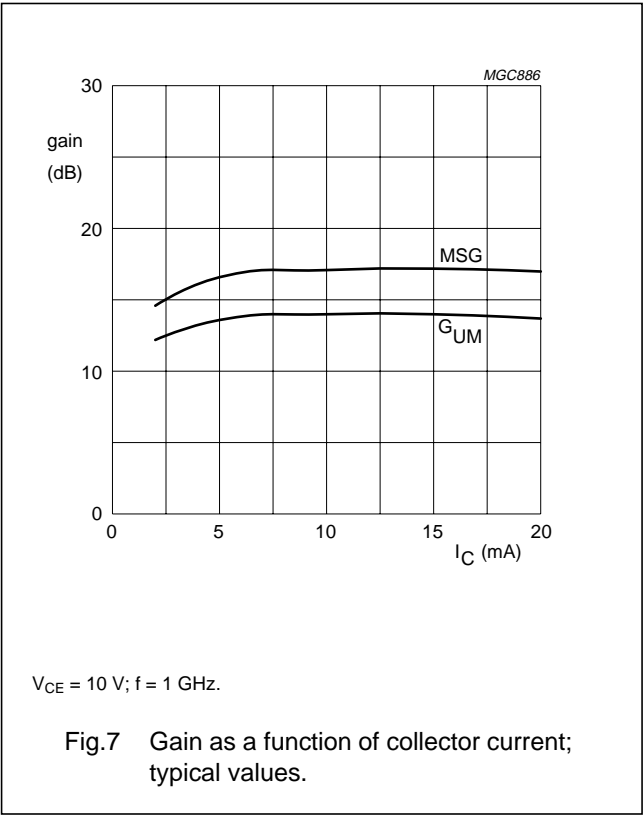
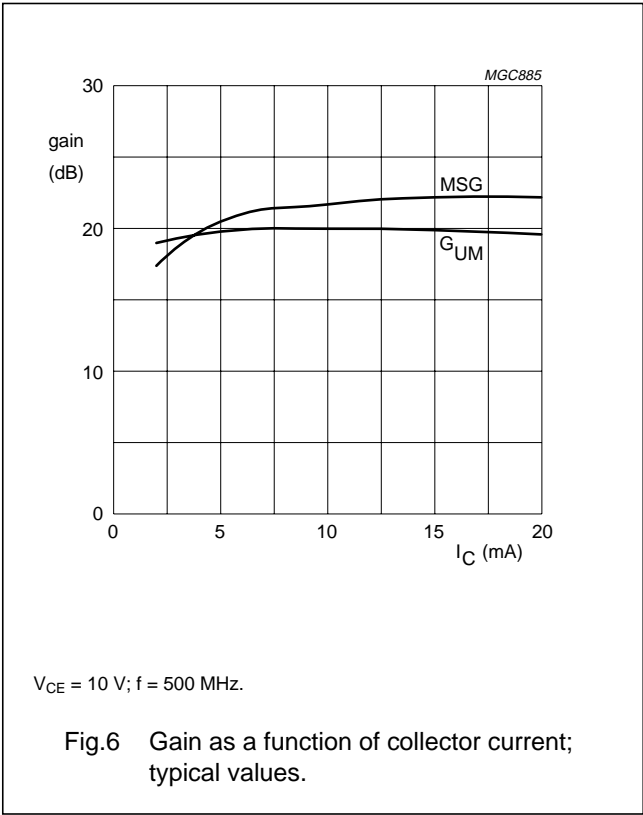
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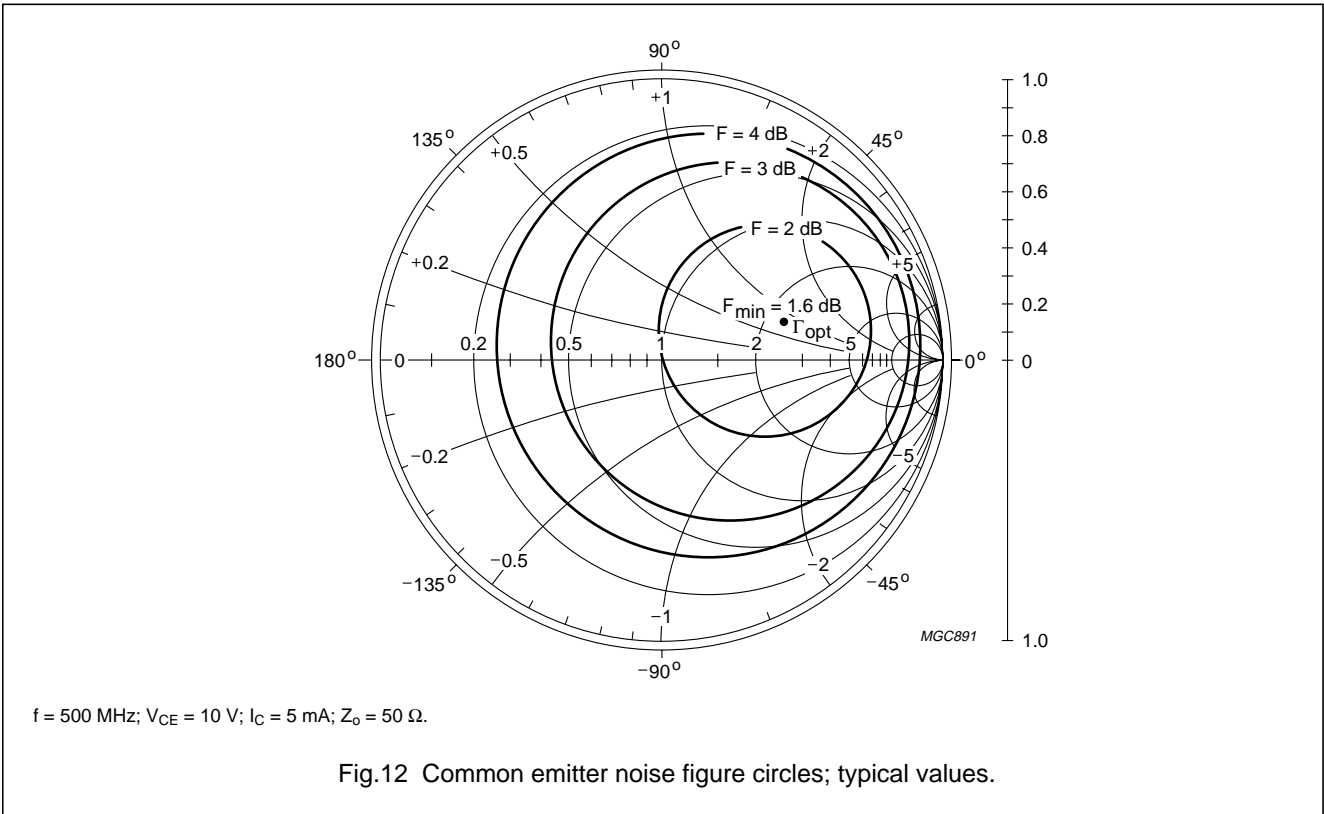
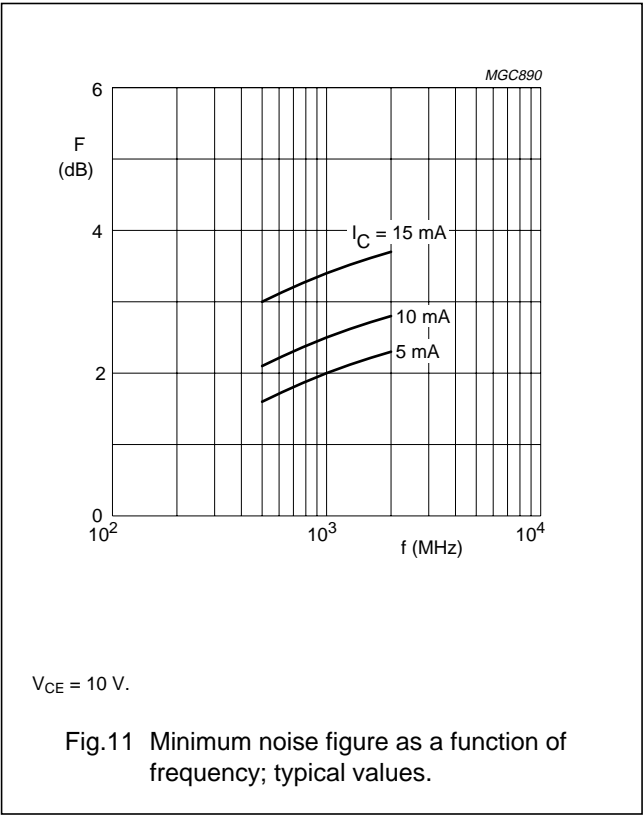
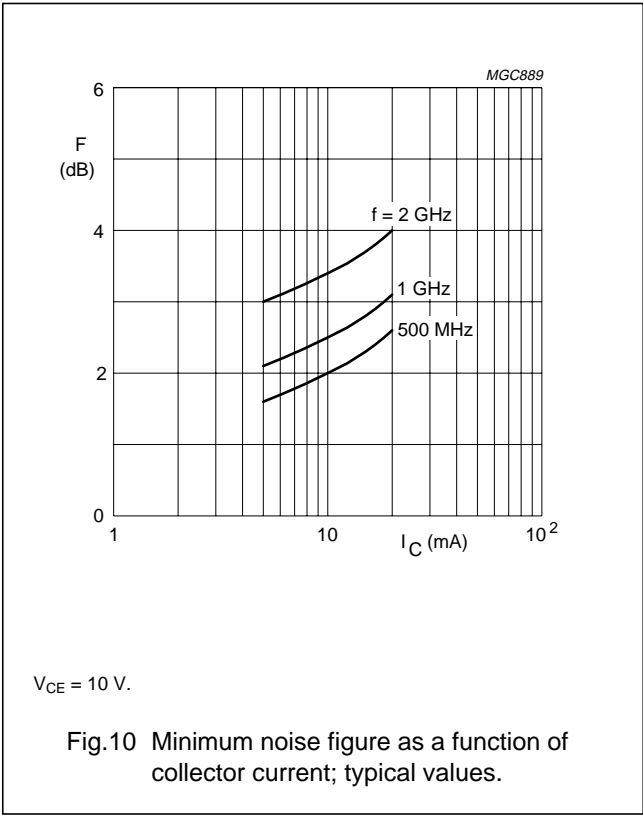
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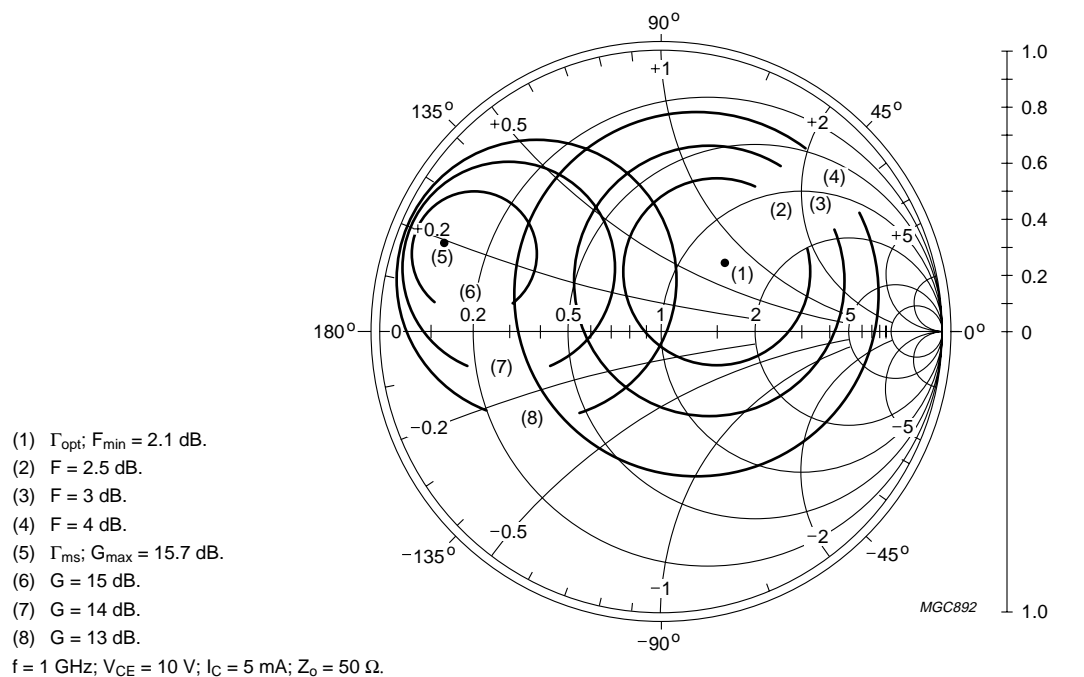


Fig.13 Common emitter noise figure circles; typical values.

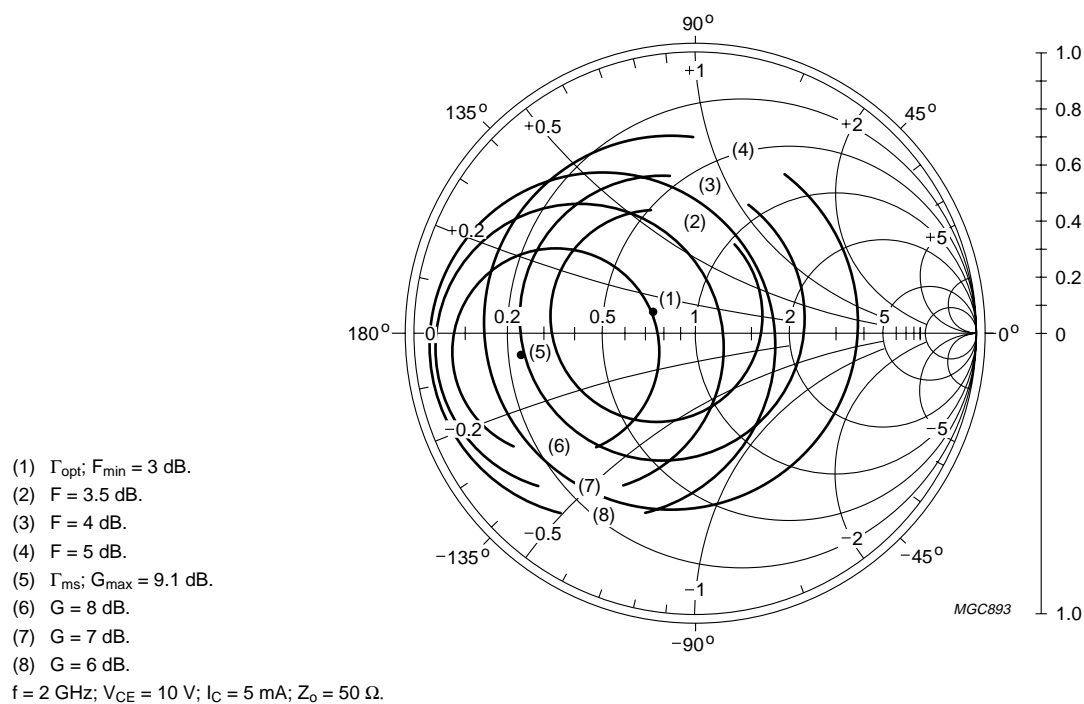
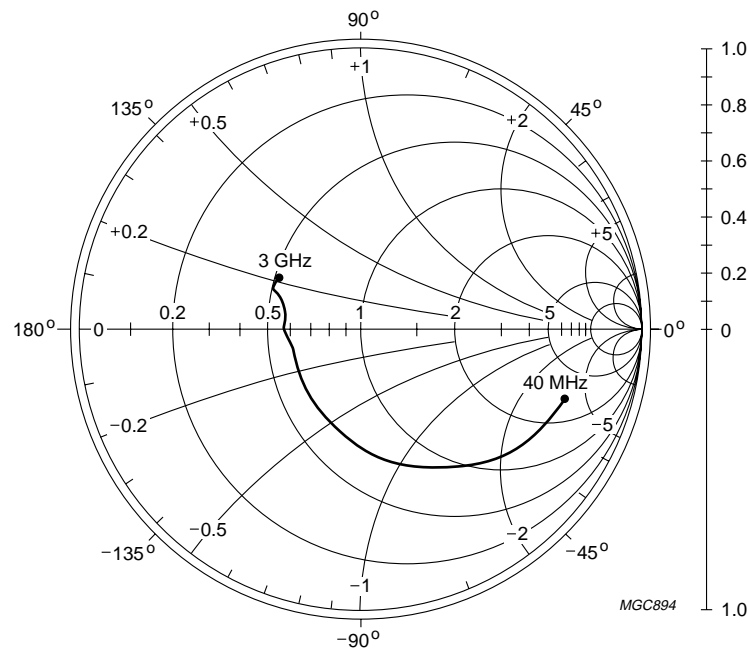


Fig.14 Common emitter noise figure circles; typical values.



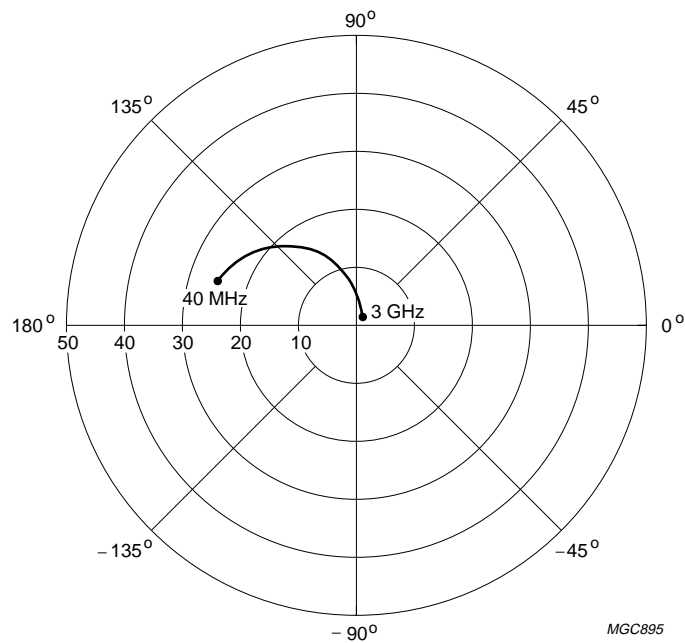
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$V_{CE} = 10\text{ V}$ ;  $I_C = 15\text{ mA}$ ;  $Z_o = 50\ \Omega$ .

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

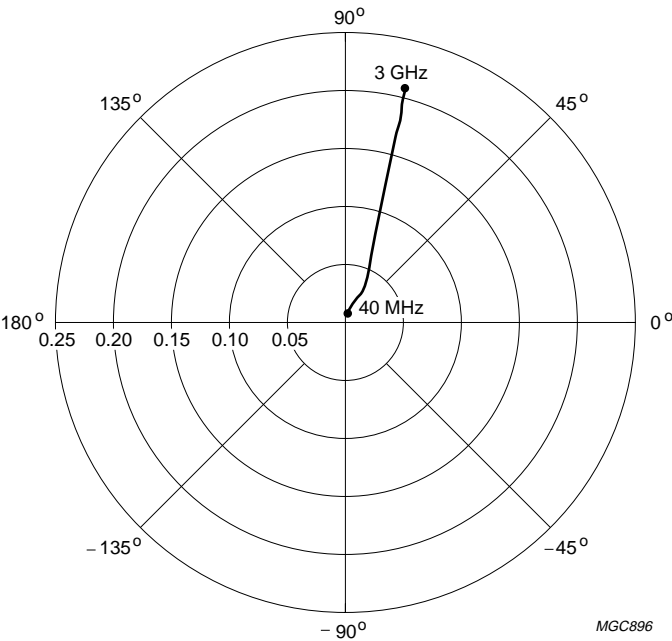


$V_{CE} = 10\text{ V}$ ;  $I_C = 15\text{ mA}$ .

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

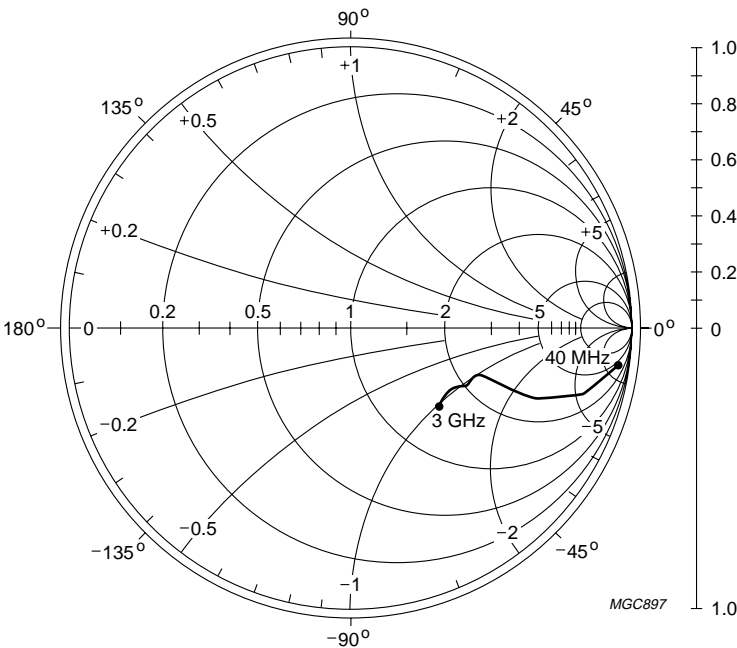
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$V_{CE} = 10\text{ V}$ ;  $I_C = 15\text{ mA}$ .

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



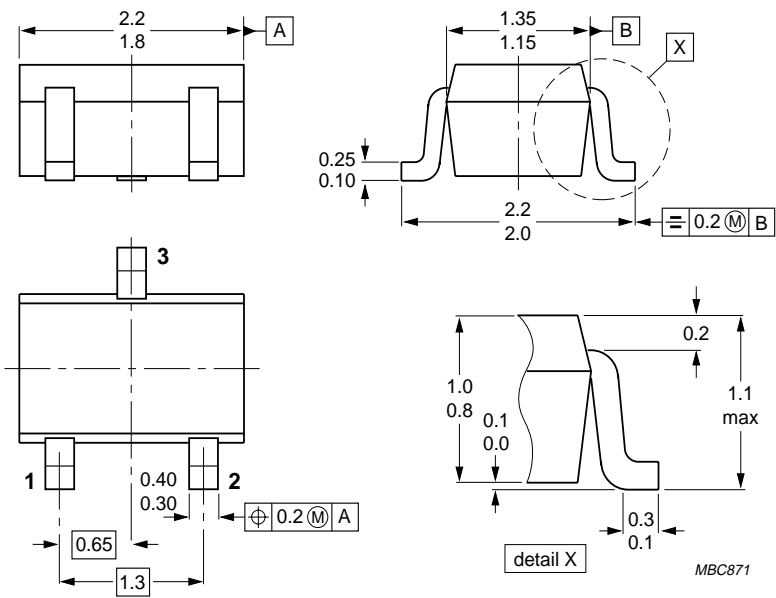
$V_{CE} = 10\text{ V}$ ;  $I_C = 15\text{ mA}$ ;  $Z_o = 50\ \Omega$ .

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

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PACKAGE OUTLINE



Dimensions in mm.

Fig.19 SOT323.

## Legal information

### Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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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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