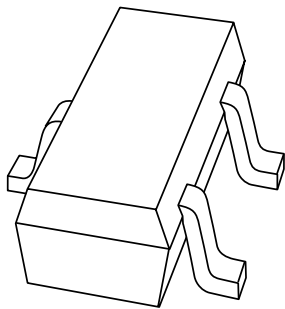


# DATA SHEET



## **BFR92AT** NPN 5 GHz wideband transistor

Product specification  
Supersedes data of 1999 Nov 02

2000 Mar 28

# NPN 5 GHz wideband transistor

# BFR92AT

### FEATURES

- High power gain
- Gold metallization ensures excellent reliability
- SOT416 (SC-75) package.

### APPLICATIONS

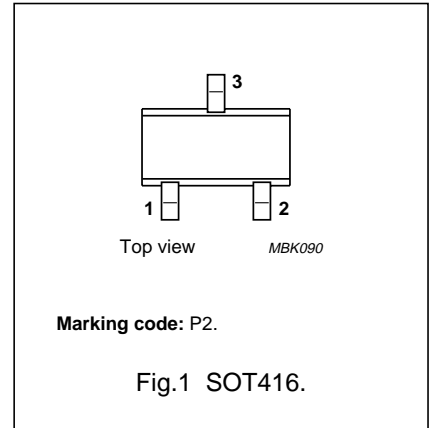
RF amplifiers, mixers and oscillators with signal frequencies up to 1 GHz.

### DESCRIPTION

Silicon NPN transistor encapsulated in a plastic SOT416 (SC-75) package. The BFR92AT 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 $T_s = 75\text{ °C}$ ; note 1	–	–	150	mW
$h_{FE}$	current gain	$I_C = 15\text{ mA}$ ; $V_{CE} = 10\text{ V}$	40	90	–	
$C_{re}$	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 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CB0</sub>	collector-base voltage	open emitter	–	20	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	15	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	2	V
I <sub>C</sub>	collector current (DC)		–	25	mA
P <sub>tot</sub>	total power dissipation	up to T <sub>s</sub> = 75 °C; see Fig.2; note 1	–	150	mW
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	150	°C

**Note**

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

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	VALUE	UNIT
R <sub>th j-s</sub>	thermal resistance from junction to soldering point	500	K/W

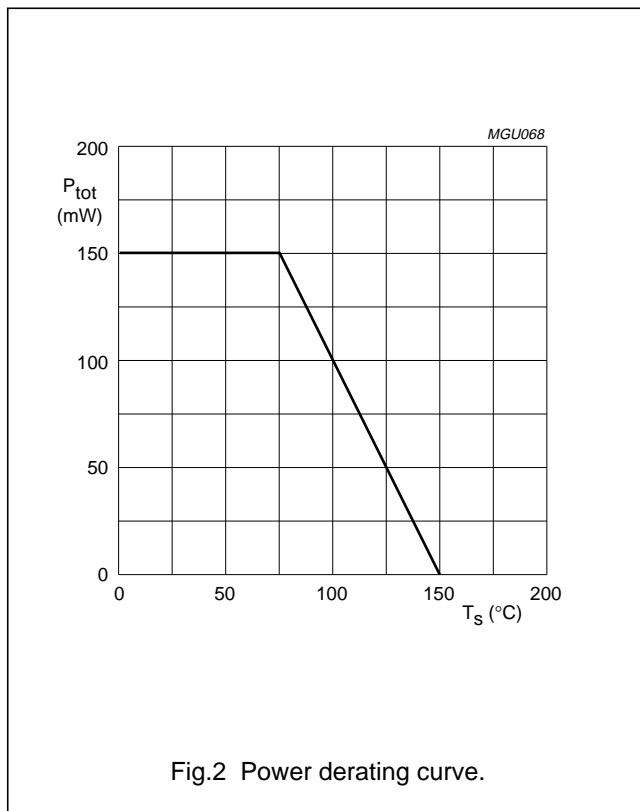


Fig.2 Power derating curve.

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**CHARACTERISTICS**

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

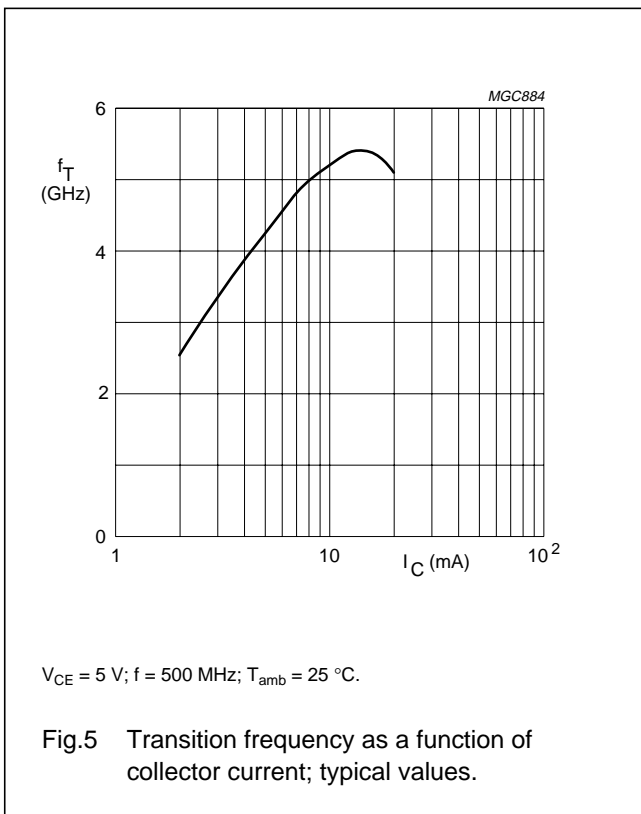
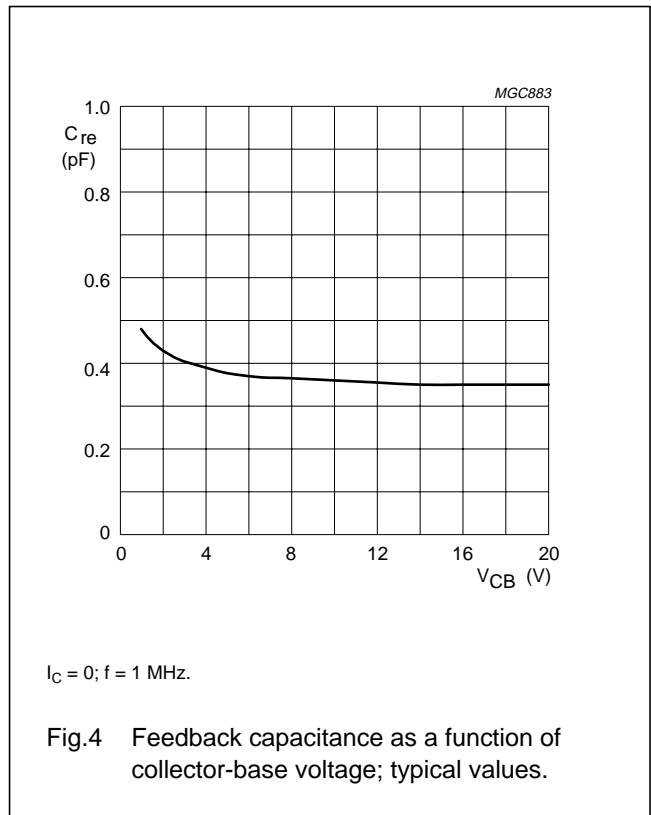
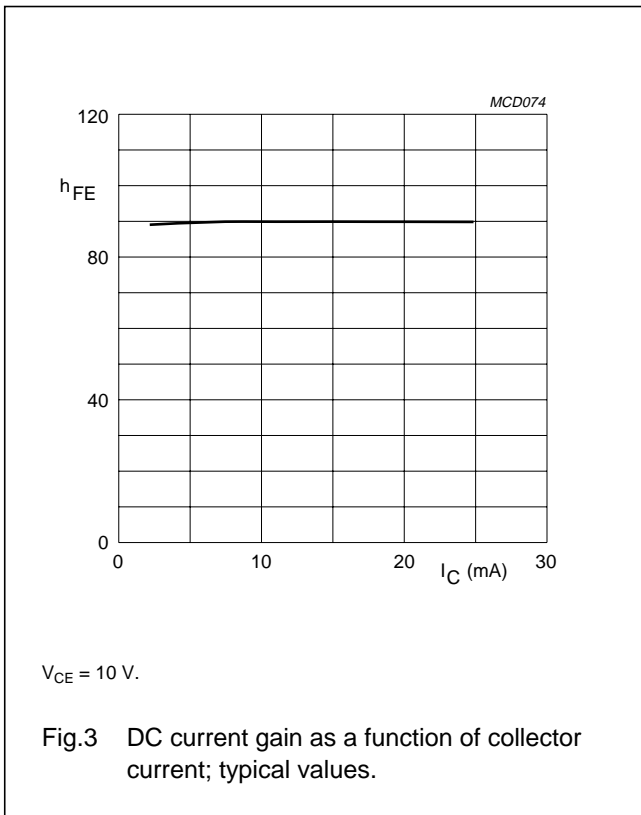
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector leakage current	$I_E = 0; V_{CB} = 10\text{ V}$	–	–	50	nA
$h_{FE}$	DC current gain	$I_C = 15\text{ mA}; V_{CE} = 10\text{ V}$	40	90	–	
$C_c$	collector capacitance	$I_E = I_E = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	–	0.6	–	pF
$C_e$	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

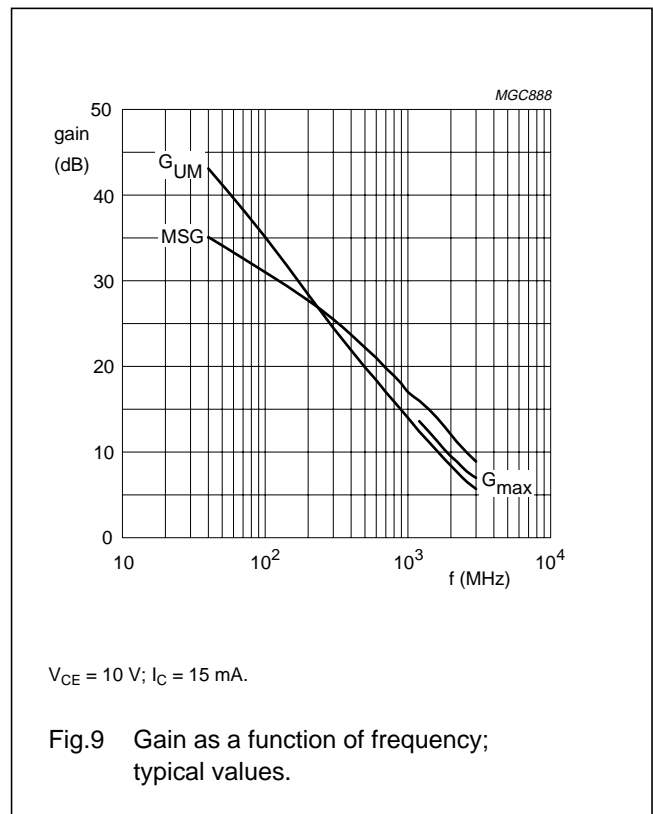
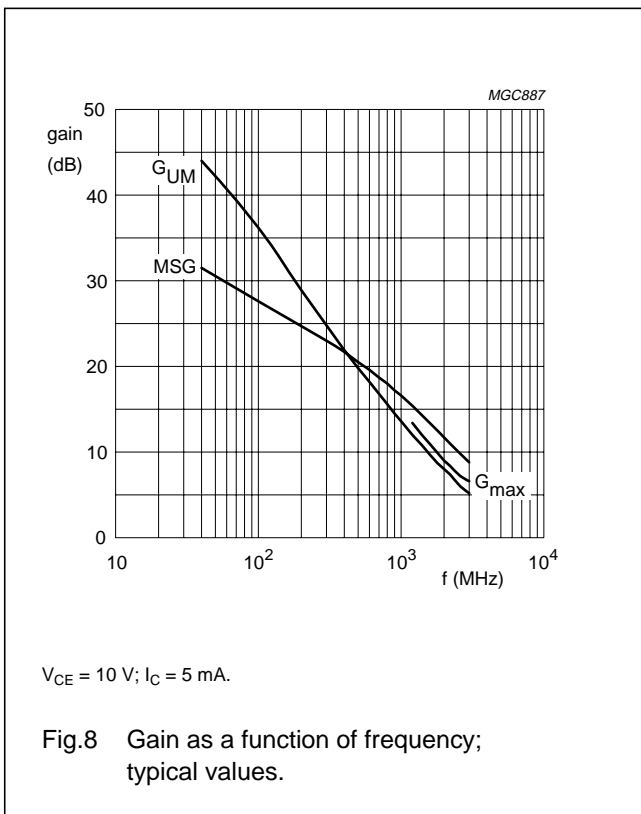
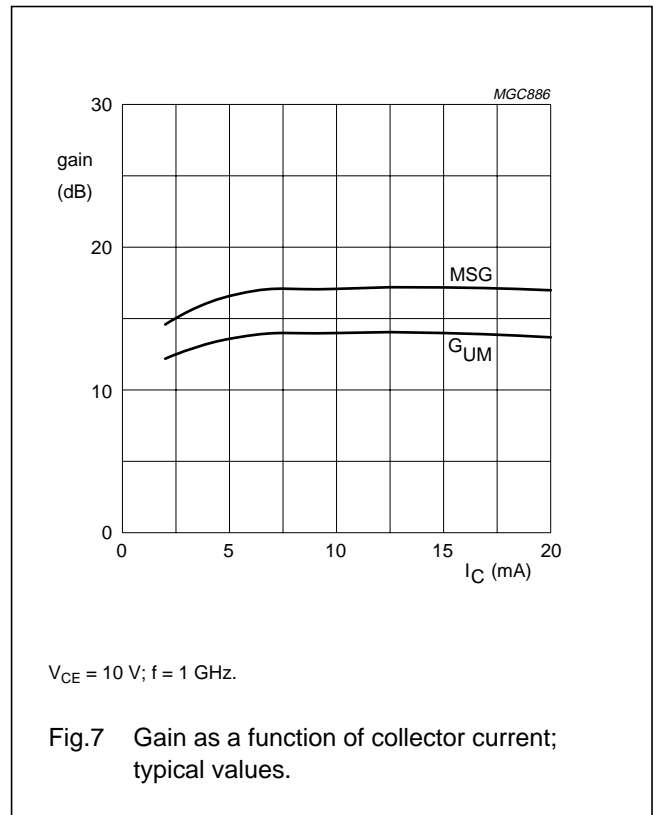
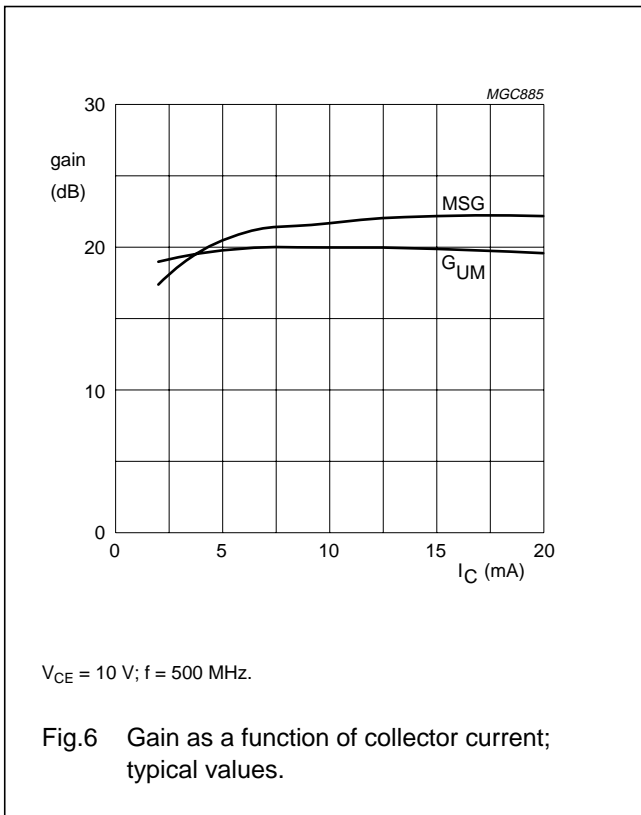
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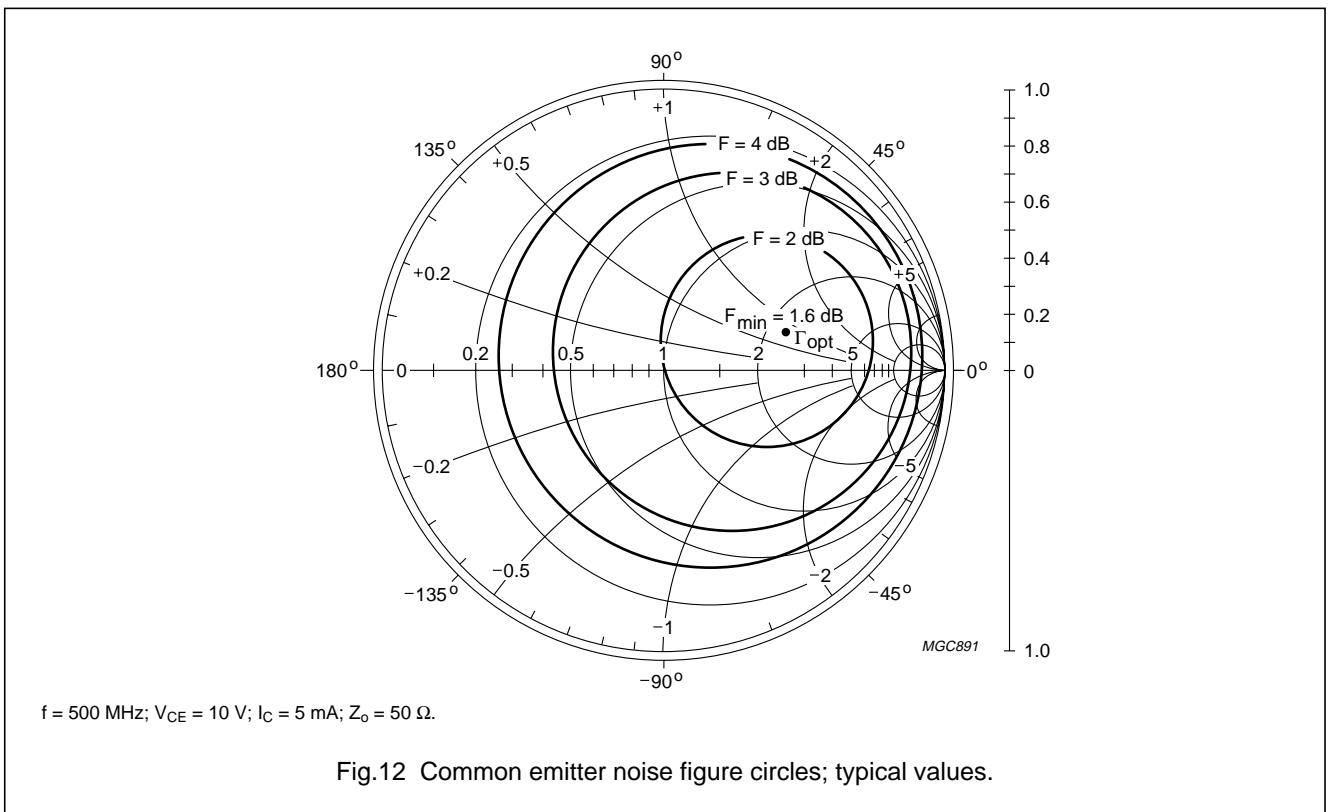
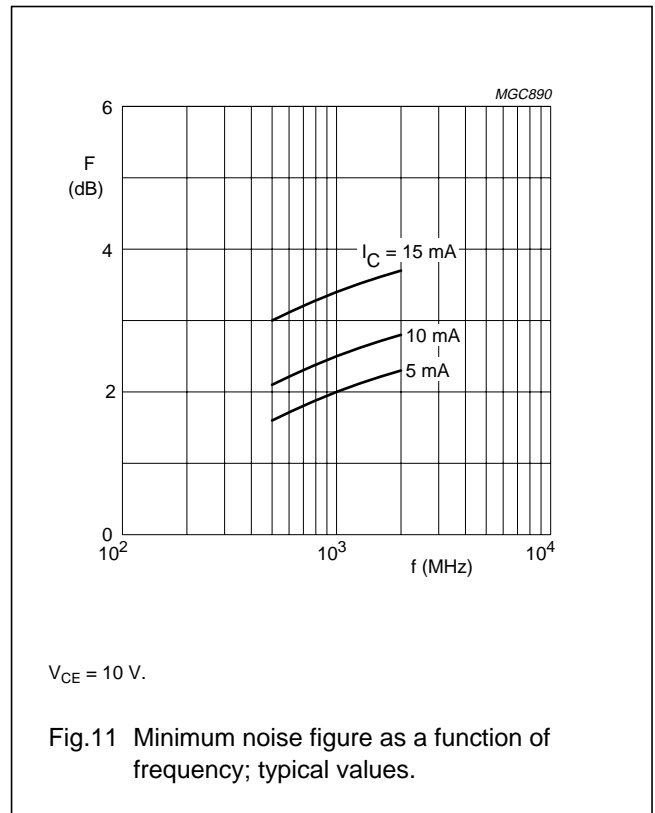
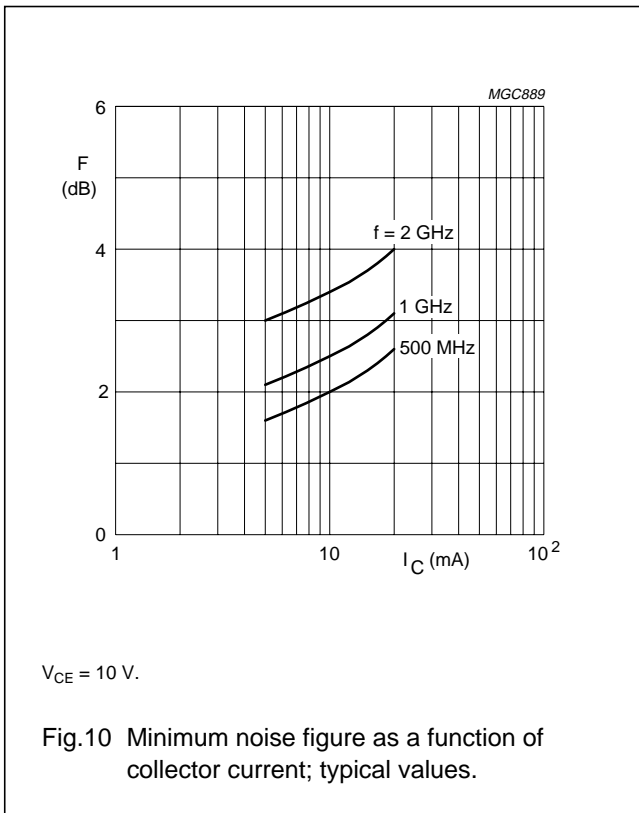
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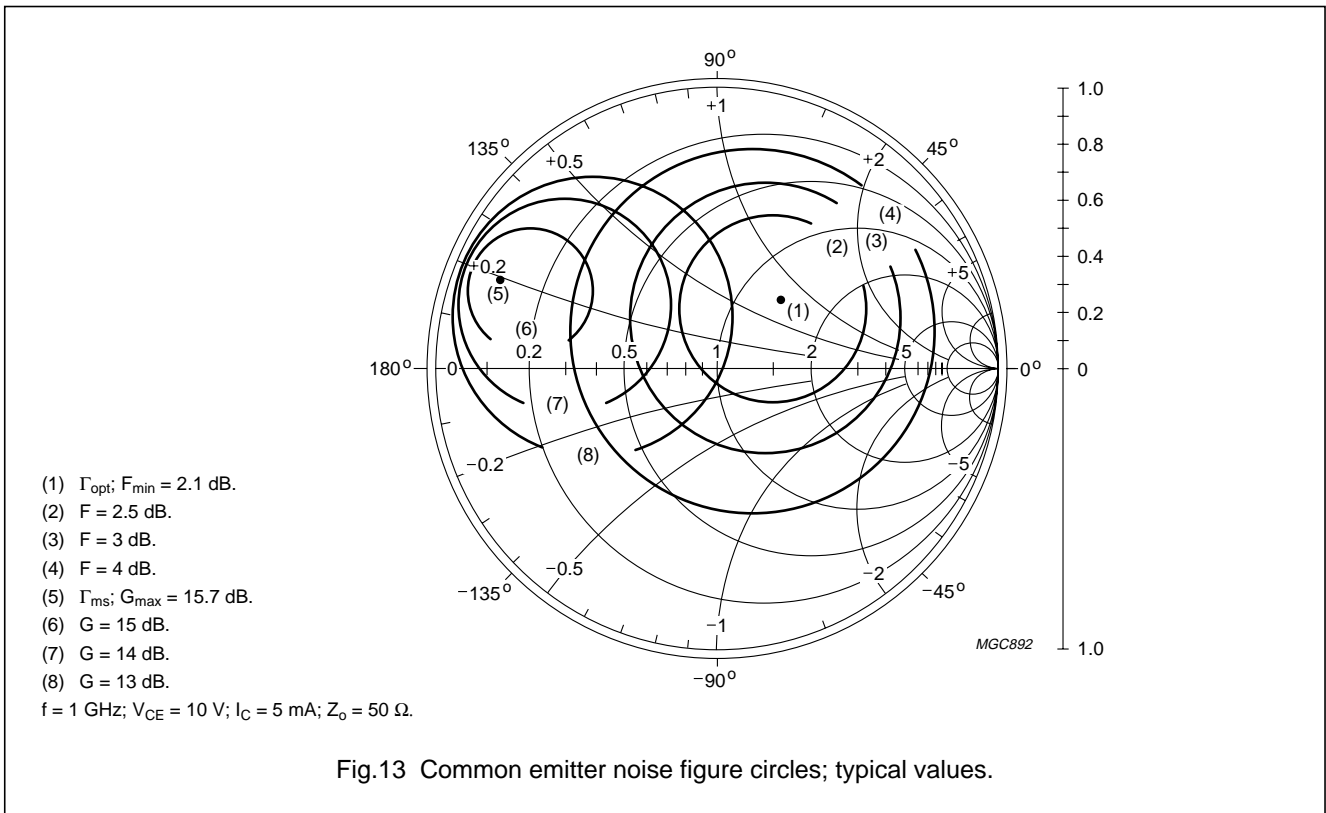


Fig.13 Common emitter noise figure circles; typical values.

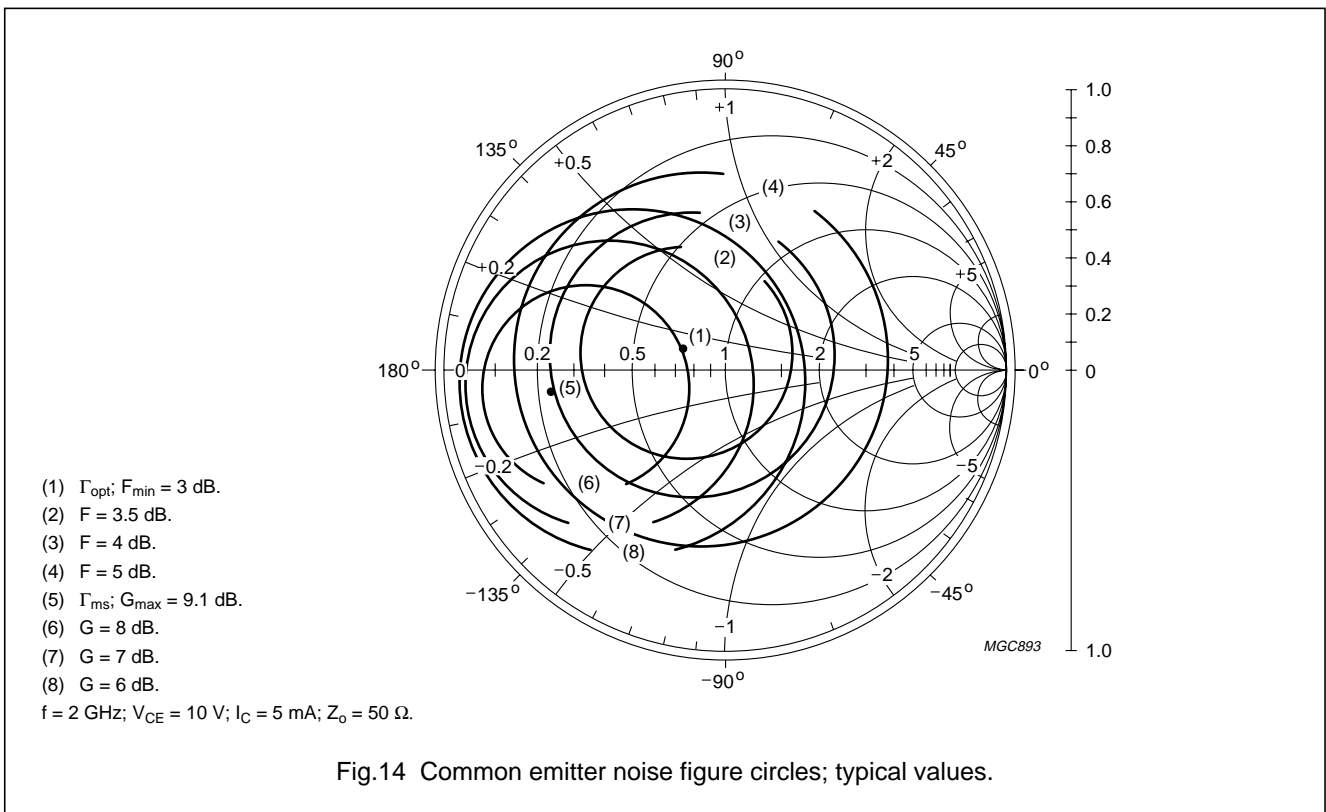
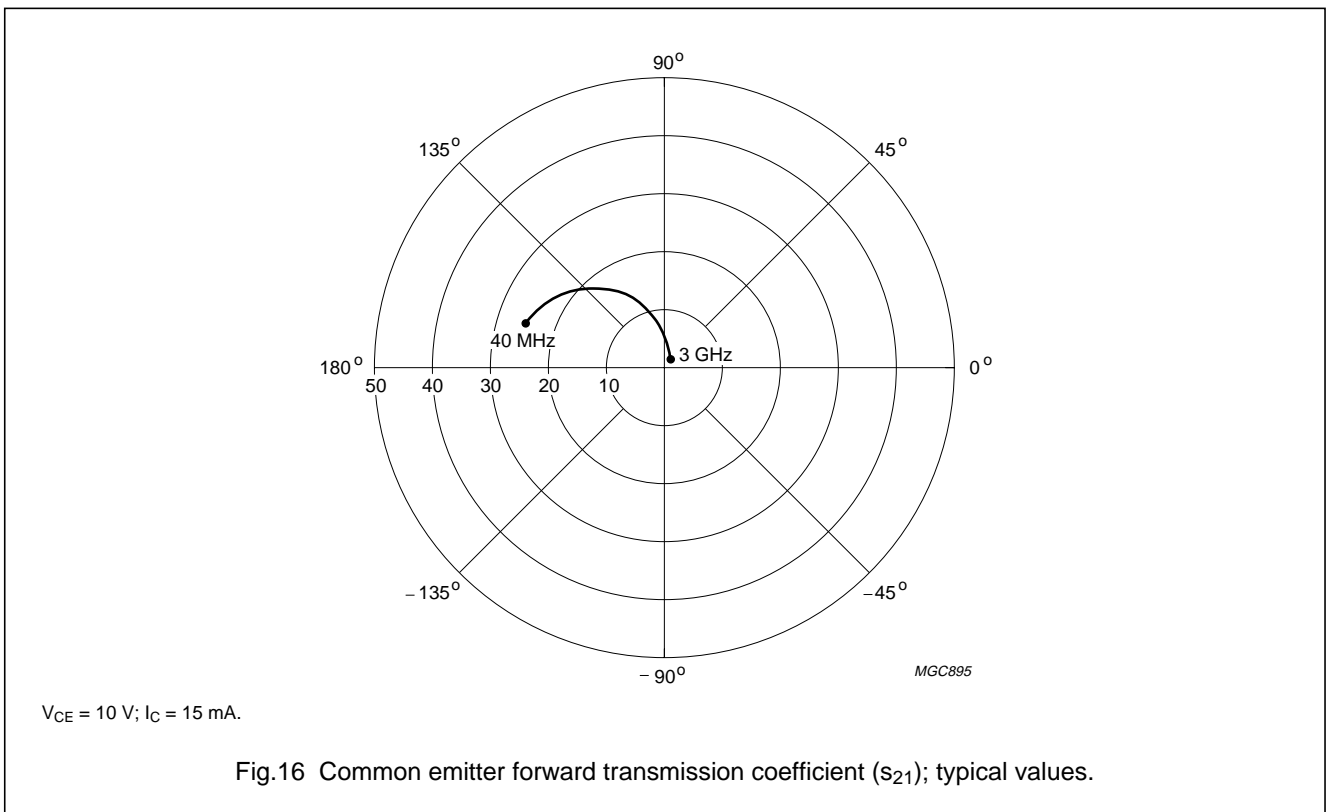
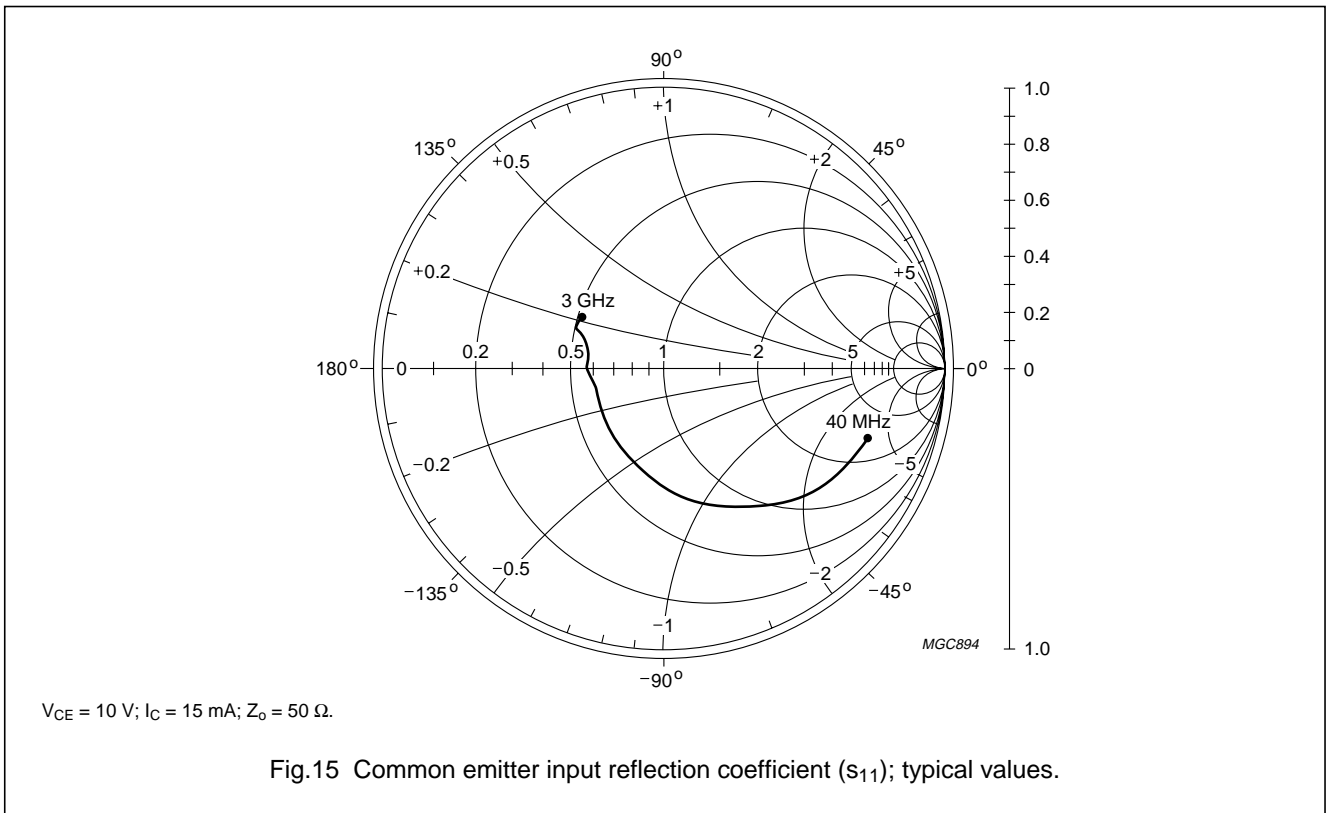


Fig.14 Common emitter noise figure circles; typical values.



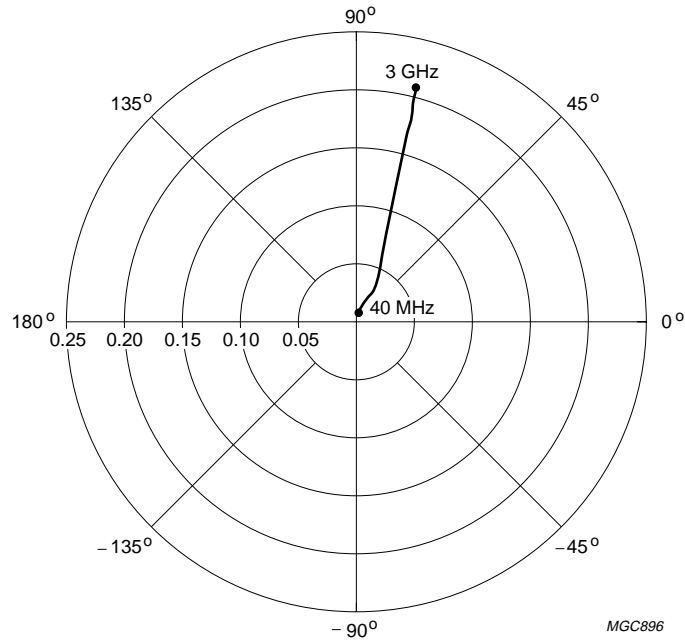
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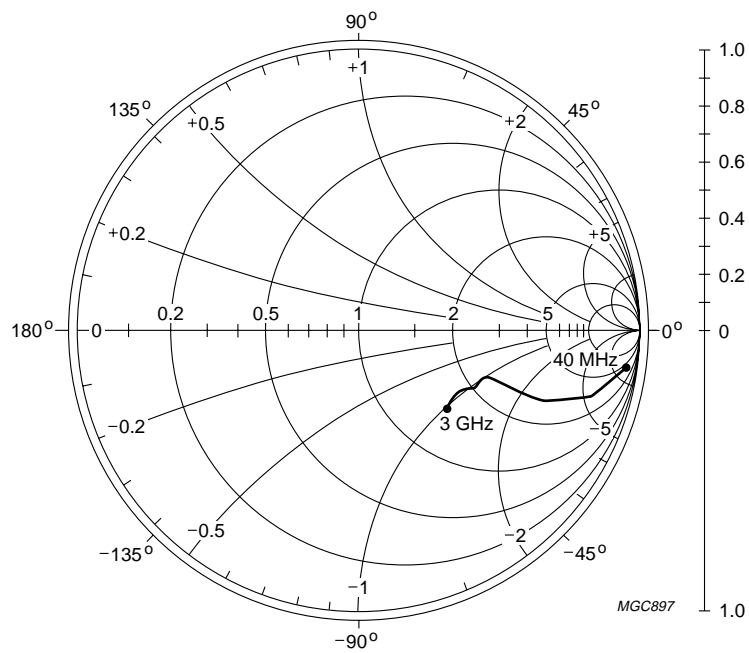
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$V_{CE} = 10\text{ V}; I_C = 15\text{ mA}$ .

MGC896

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



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

MGC897

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

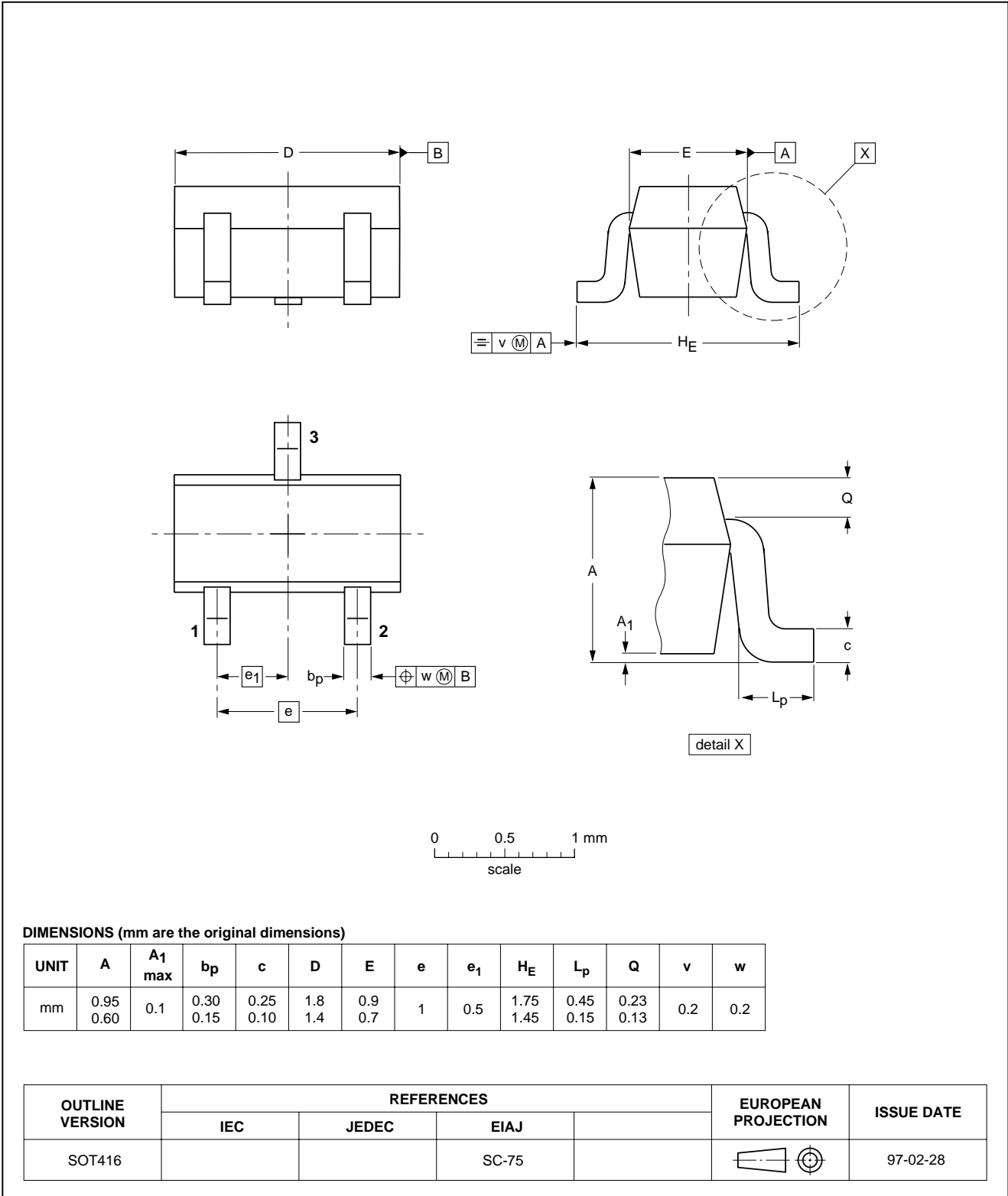
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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT416



## NPN 5 GHz wideband transistor

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## DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS <sup>(1)</sup>
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
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**NOTES**

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