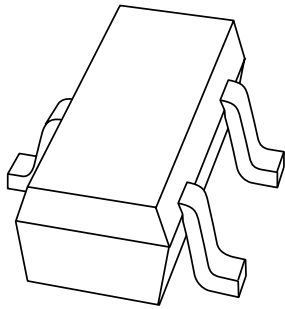


DATA SHEET



BFR520T NPN 9 GHz wideband transistor

Product specification
Supersedes data of 1999 Nov 02

2000 Apr 03

NPN 9 GHz wideband transistor

BFR520T

FEATURES

- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability
- SOT416 (SC-75) package.

APPLICATIONS

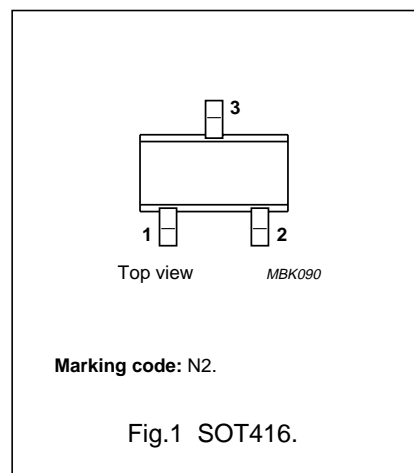
Wideband applications such as satellite TV tuners, cellular phones, cordless phones, pagers etc., with signal frequencies up to 2 GHz.

DESCRIPTION

Silicon NPN transistor encapsulated in a plastic SOT416 (SC-75) package.

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_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	–	15	V
I_C	DC collector current		–	–	70	mA
P_{tot}	total power dissipation	up to $T_s = 75\text{ °C}$; note 1	–	–	150	mW
h_{FE}	DC current gain	$I_C = 20\text{ mA}$; $V_{CE} = 6\text{ V}$; $T_j = 25\text{ °C}$	60	120	250	
f_T	transition frequency	$I_C = 20\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	9	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 20\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	15	–	dB
F	noise figure	$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	1.1	1.6	dB

Note

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

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	DC collector current		–	70	mA
P_{tot}	total power dissipation	up to $T_s = 75\text{ °C}$; note 1	–	150	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C

Note

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

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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	500	K/W

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0; V_{CE} = 6\text{ V}$	–	–	50	nA
h_{FE}	DC current gain	$I_C = 20\text{ mA}; V_{CE} = 6\text{ V}$	60	120	250	
C_e	emitter capacitance	$I_C = I_e = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	1	–	pF
C_c	collector capacitance	$I_E = I_e = 0; V_{CB} = 6\text{ V}; f = 1\text{ MHz}$	–	0.5	–	pF
C_{re}	feedback capacitance	$I_C = 0; V_{CB} = 6\text{ V}; f = 1\text{ MHz}$	–	0.4	–	pF
f_T	transition frequency	$I_C = 20\text{ mA}; V_{CE} = 6\text{ V}; f = 1\text{ GHz}; T_{amb} = 25\text{ °C}$	–	9	–	GHz
G_{UM}	maximum unilateral power gain; note 1	$I_C = 20\text{ mA}; V_{CE} = 6\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	15	–	dB
		$I_C = 20\text{ mA}; V_{CE} = 6\text{ V}; f = 2\text{ GHz}; T_{amb} = 25\text{ °C}$	–	9	–	dB
$ s_{21} ^2$	insertion power gain	$I_C = 20\text{ mA}; V_{CE} = 6\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	13	14	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}; I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	1.1	1.6	dB
		$\Gamma_s = \Gamma_{opt}; I_C = 20\text{ mA}; V_{CE} = 6\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	1.6	2.1	dB
		$\Gamma_s = \Gamma_{opt}; I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; f = 2\text{ GHz}; T_{amb} = 25\text{ °C}$	–	1.9	–	dB
P_{L1}	output power at 1 dB gain compression	$I_C = 20\text{ mA}; V_{CE} = 6\text{ V}; R_L = 50\text{ }\Omega; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	17	–	dBm
ITO	third order intercept point	note 2	–	26	–	dBm

Notes

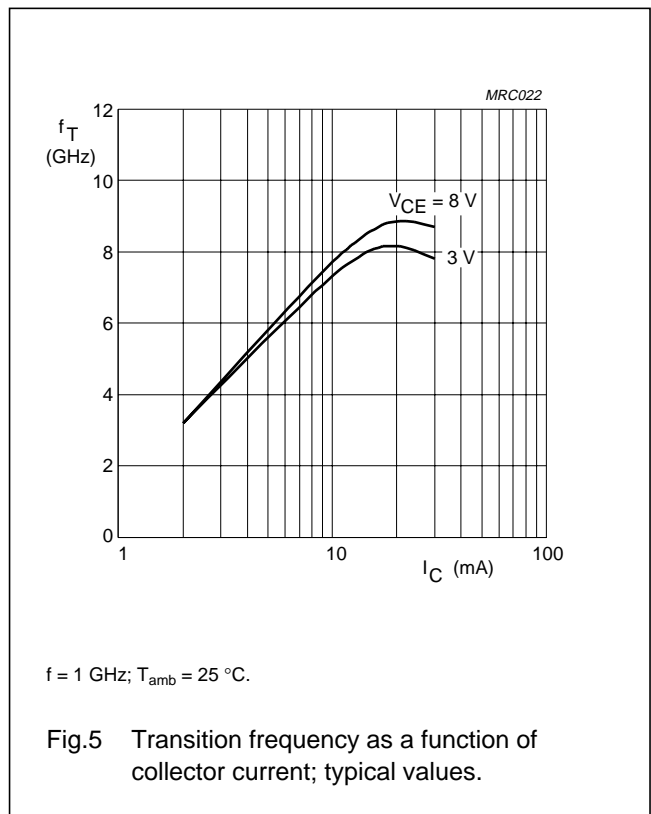
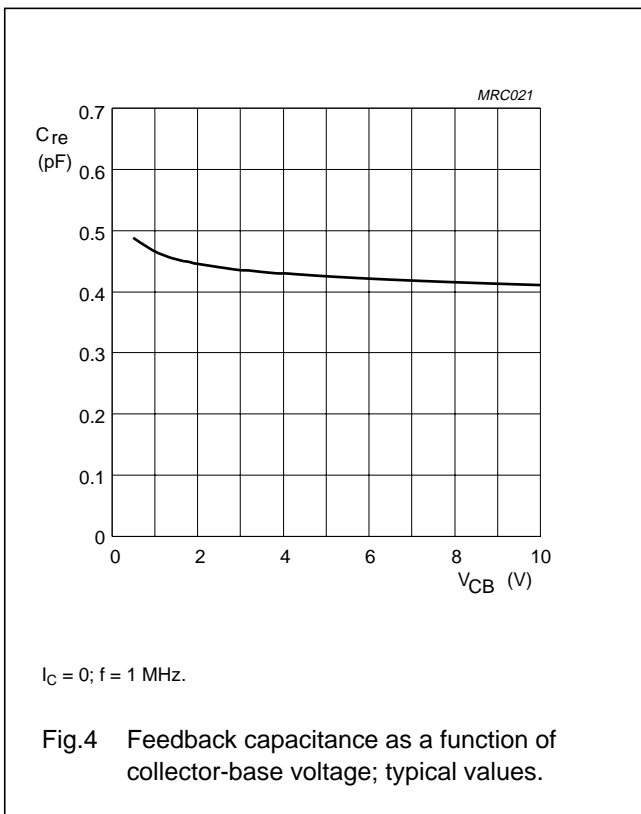
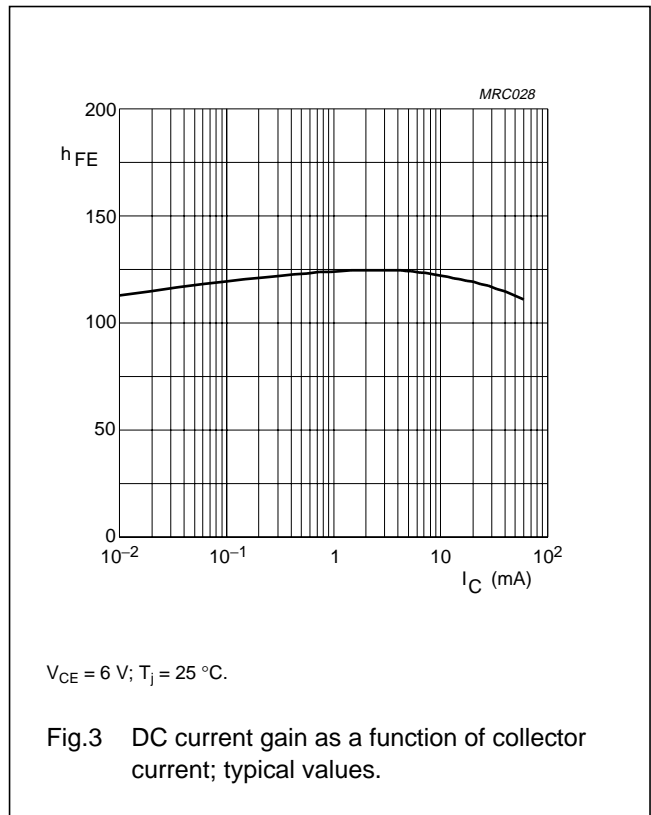
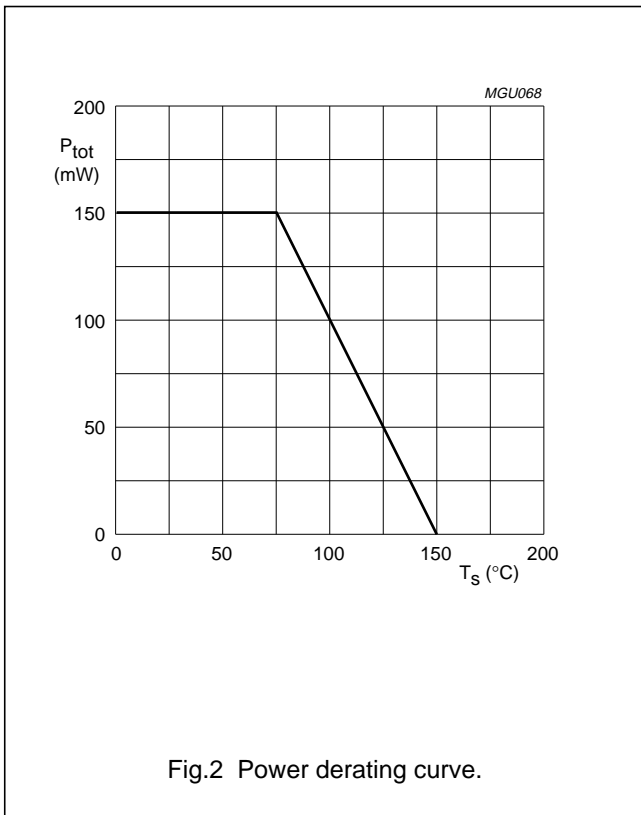
1. G_{UM} is the maximum unilateral power gain, assuming s_{12} is zero and

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

2. $I_C = 20\text{ mA}; V_{CE} = 6\text{ V}; R_L = 50\text{ }\Omega; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}; f_p = 900\text{ MHz}; f_q = 902\text{ MHz};$ measured at $f_{(2p-q)} = 898\text{ MHz}$ and at $f_{(2q-p)} = 904\text{ MHz}$.

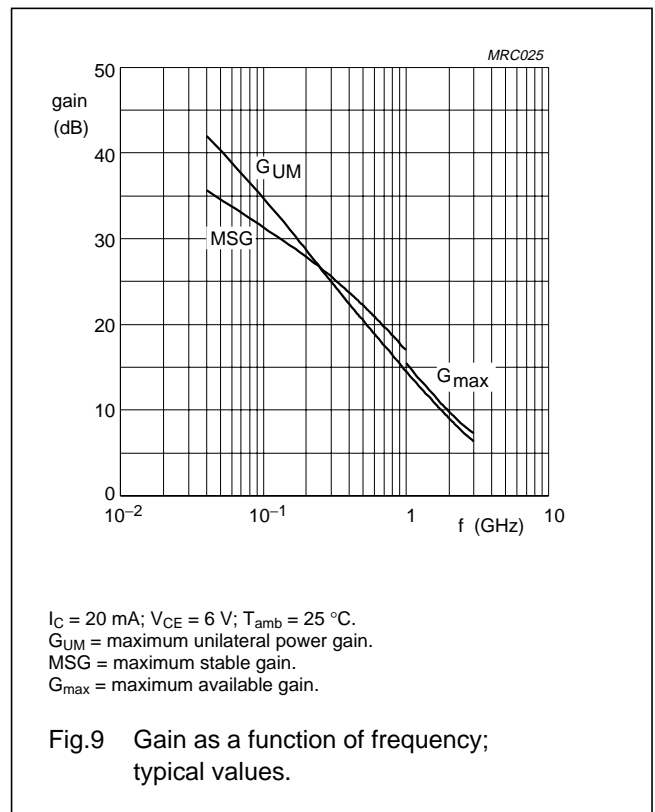
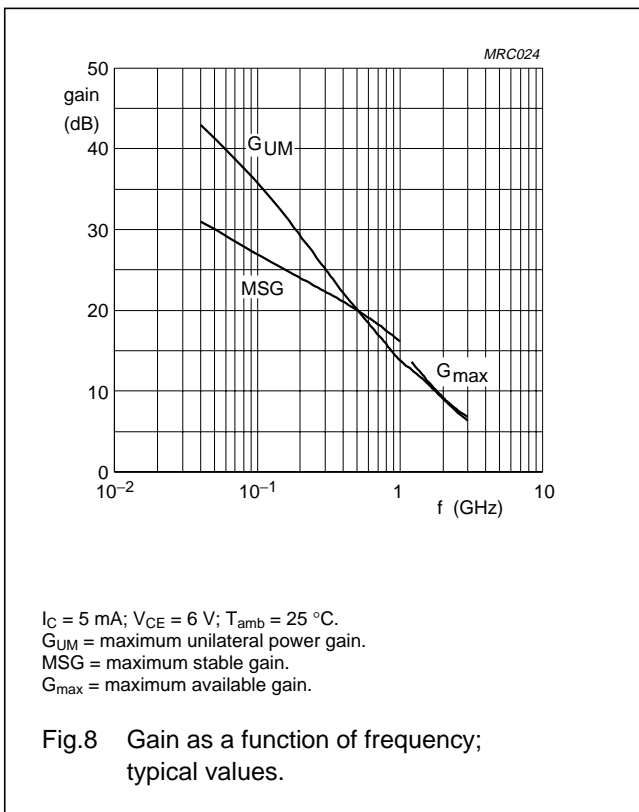
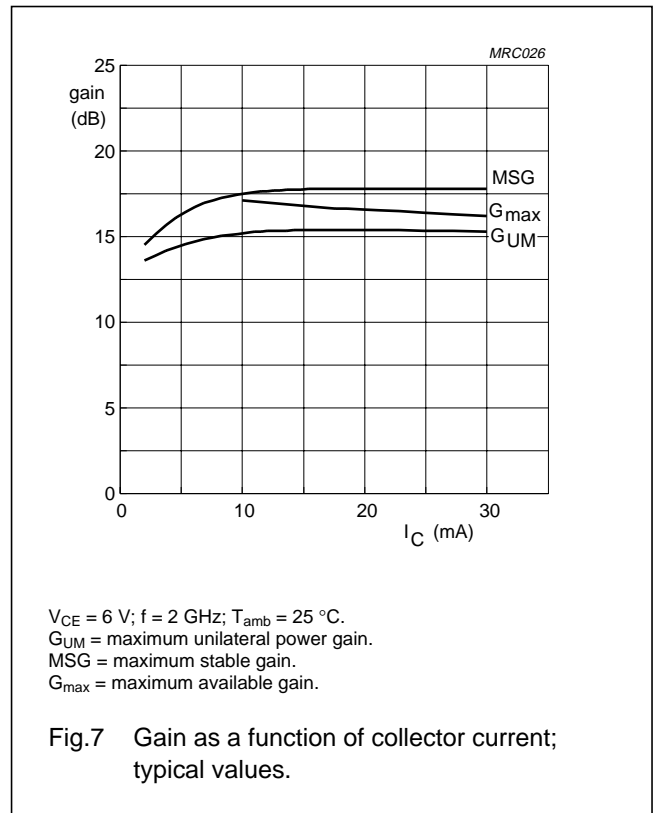
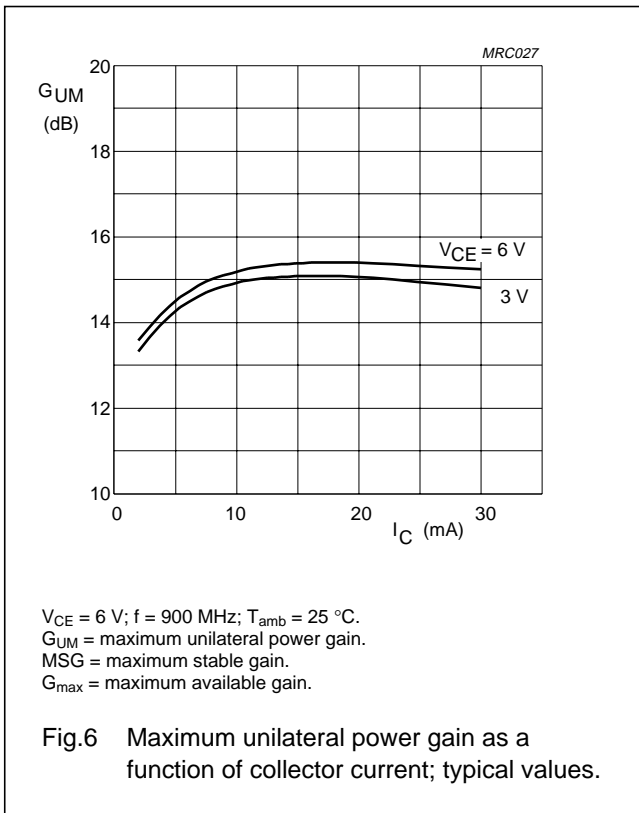
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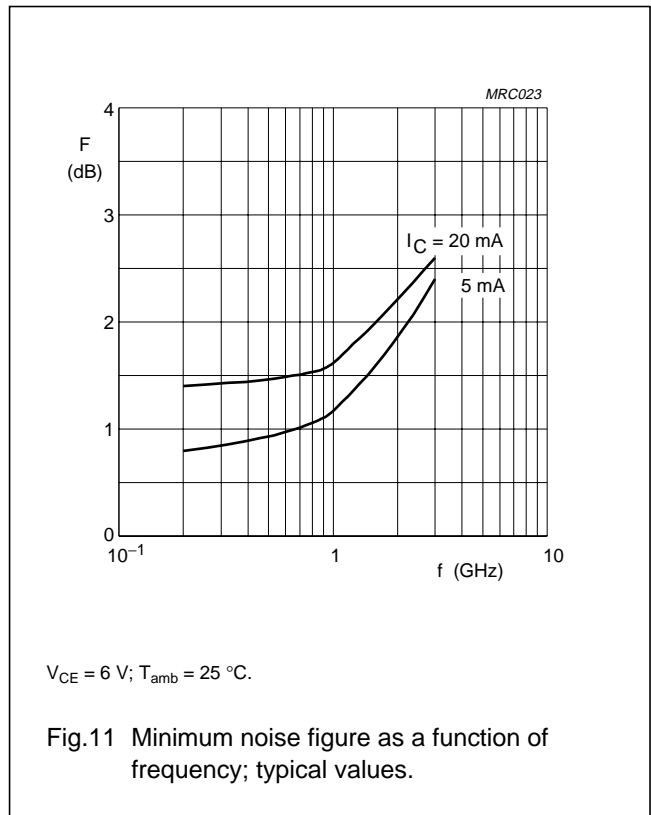
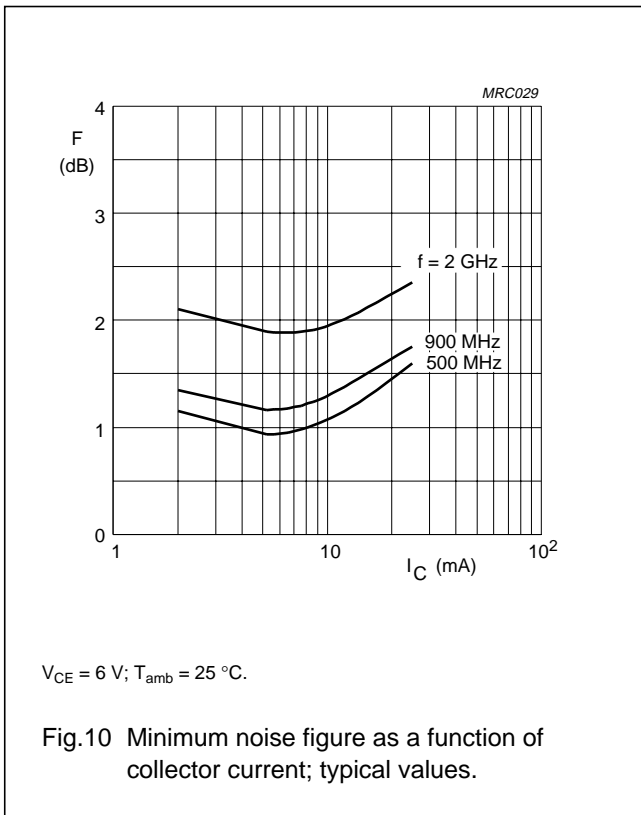
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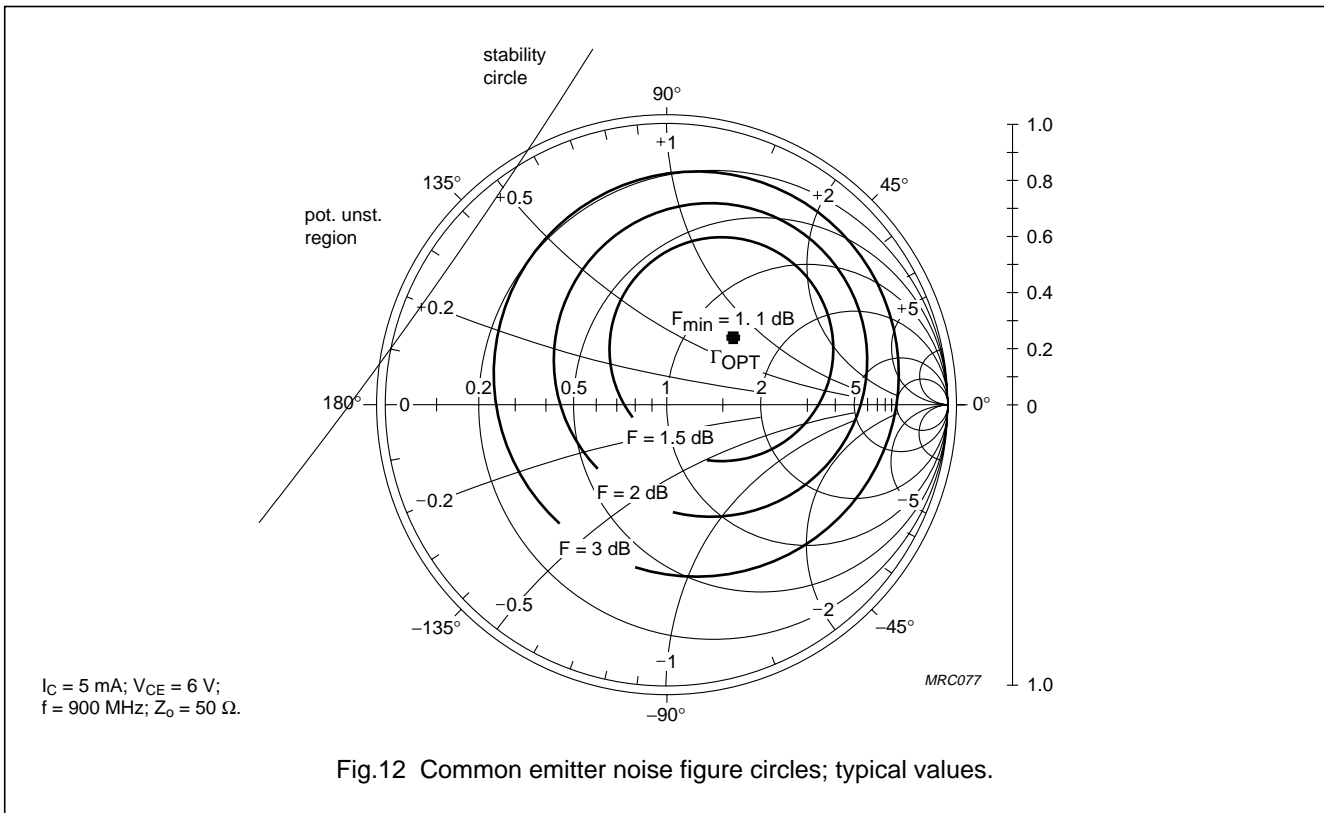


Fig.12 Common emitter noise figure circles; typical values.

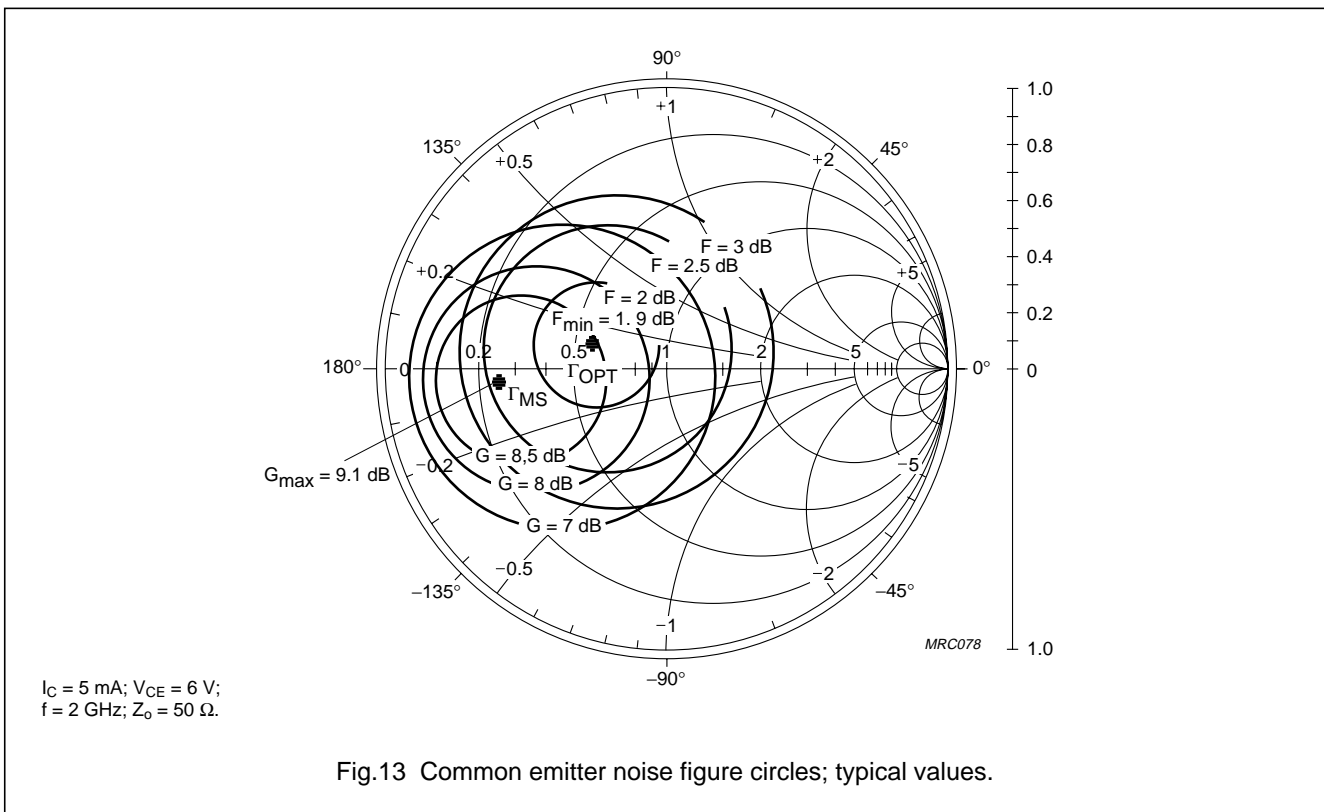
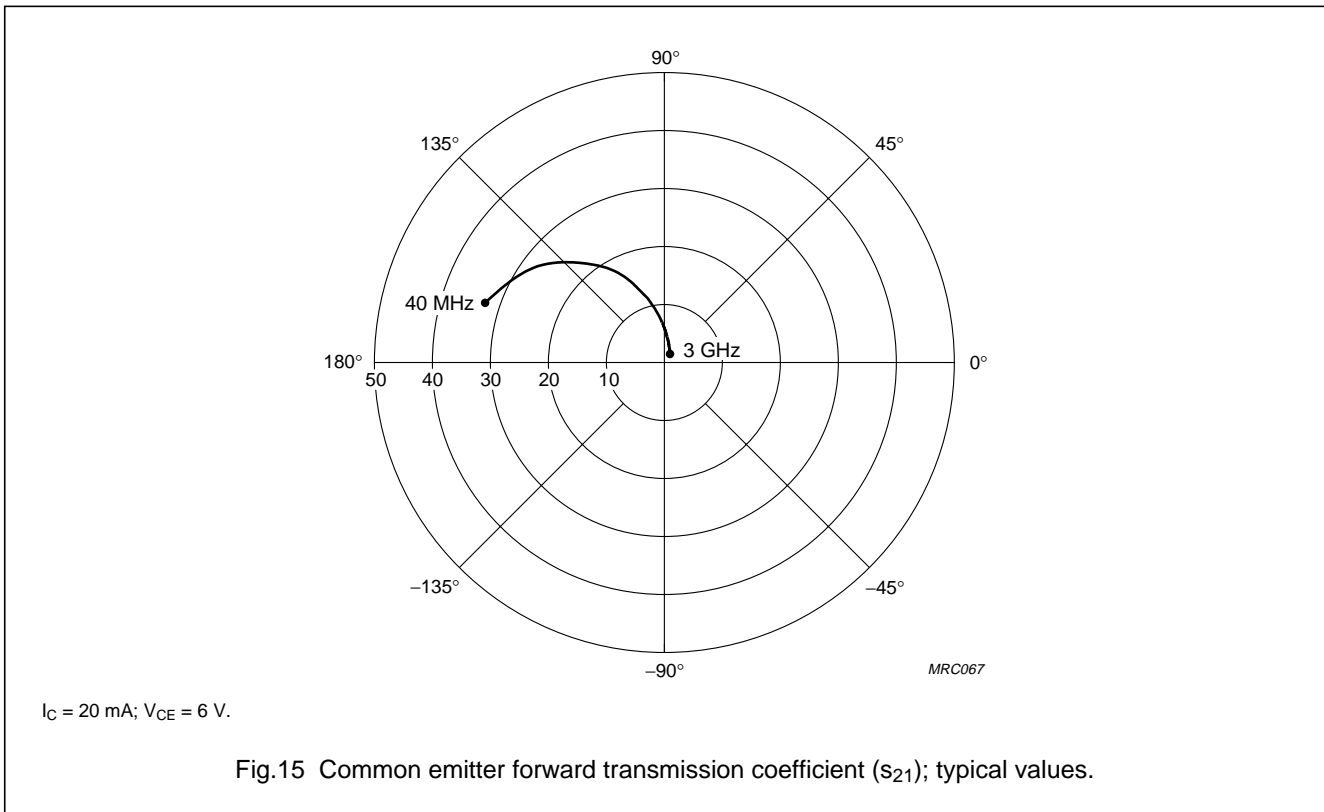
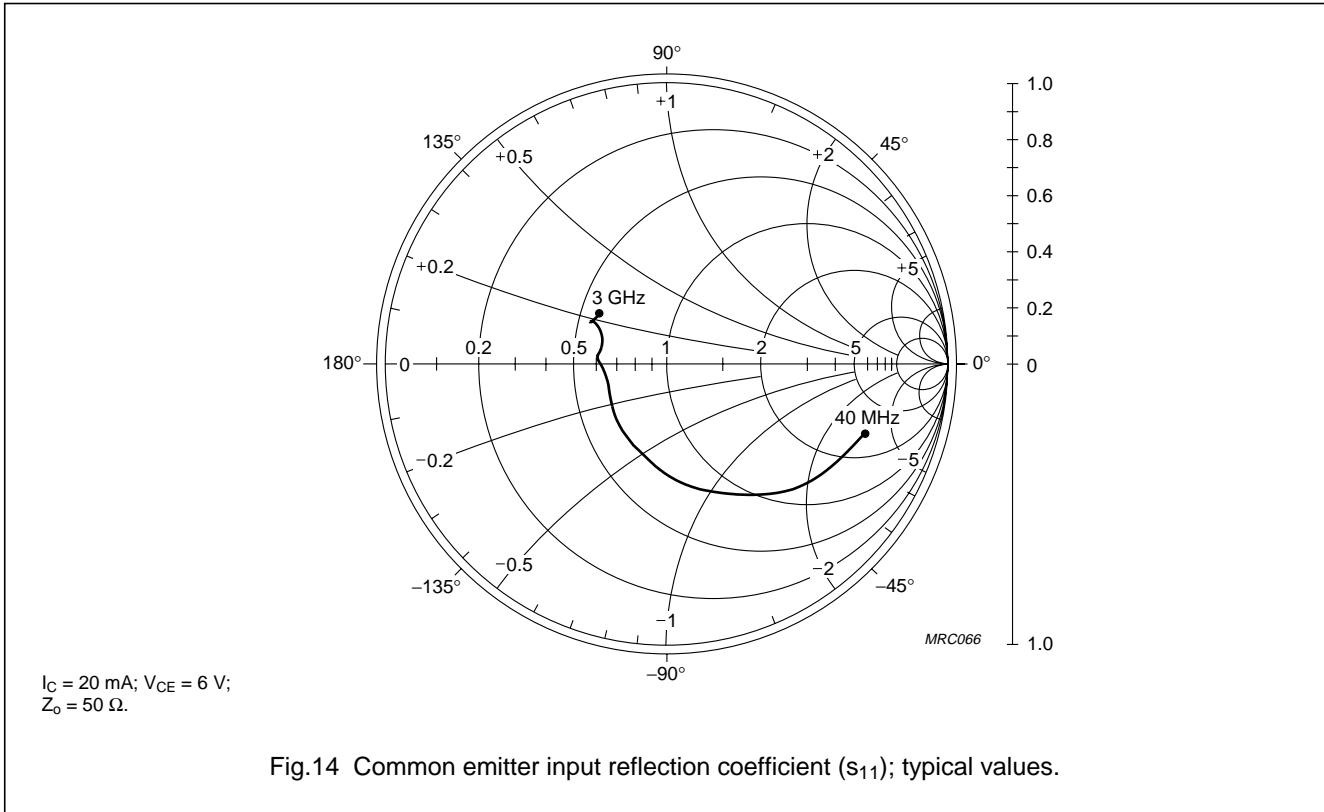


Fig.13 Common emitter noise figure circles; typical values.

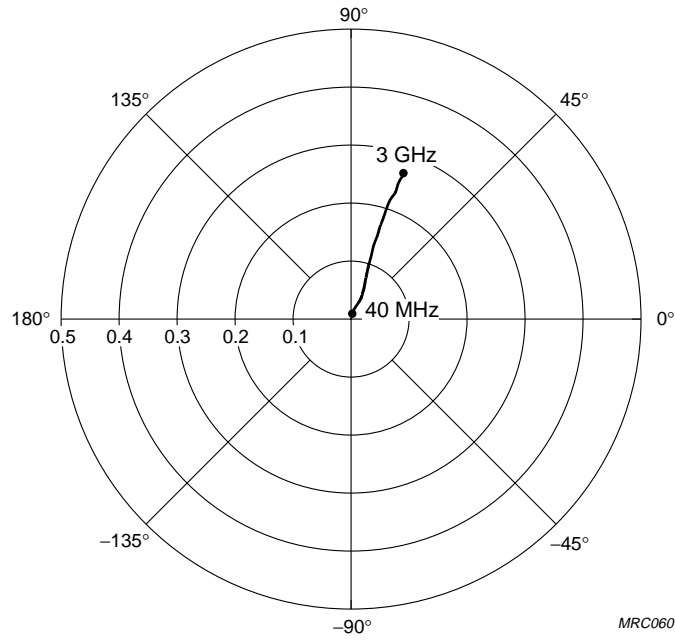
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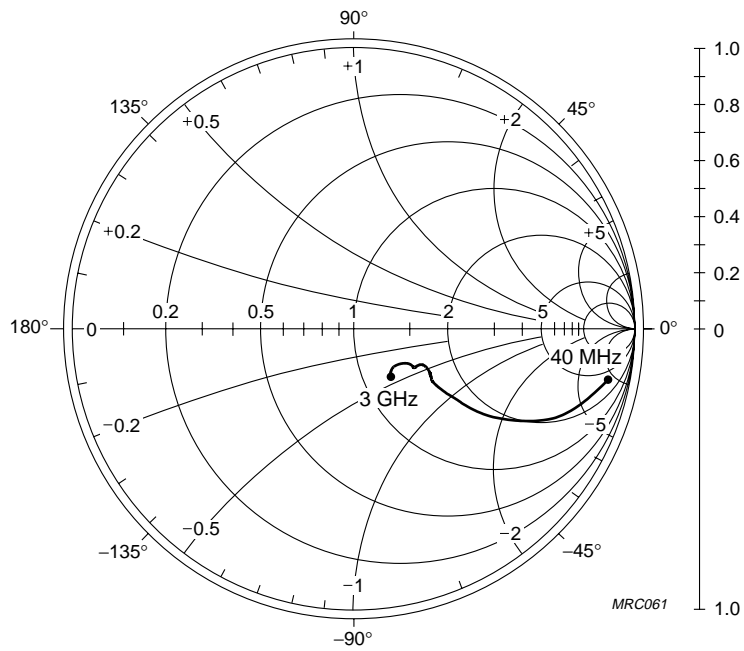
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$I_C = 20 \text{ mA}; V_{CE} = 6 \text{ V}.$

Fig.16 Common emitter reverse transmission coefficient (s_{12}); typical values.



$I_C = 20 \text{ mA}; V_{CE} = 6 \text{ V};$
 $Z_0 = 50 \Omega.$

Fig.17 Common emitter output reflection coefficient (s_{22}); typical values.

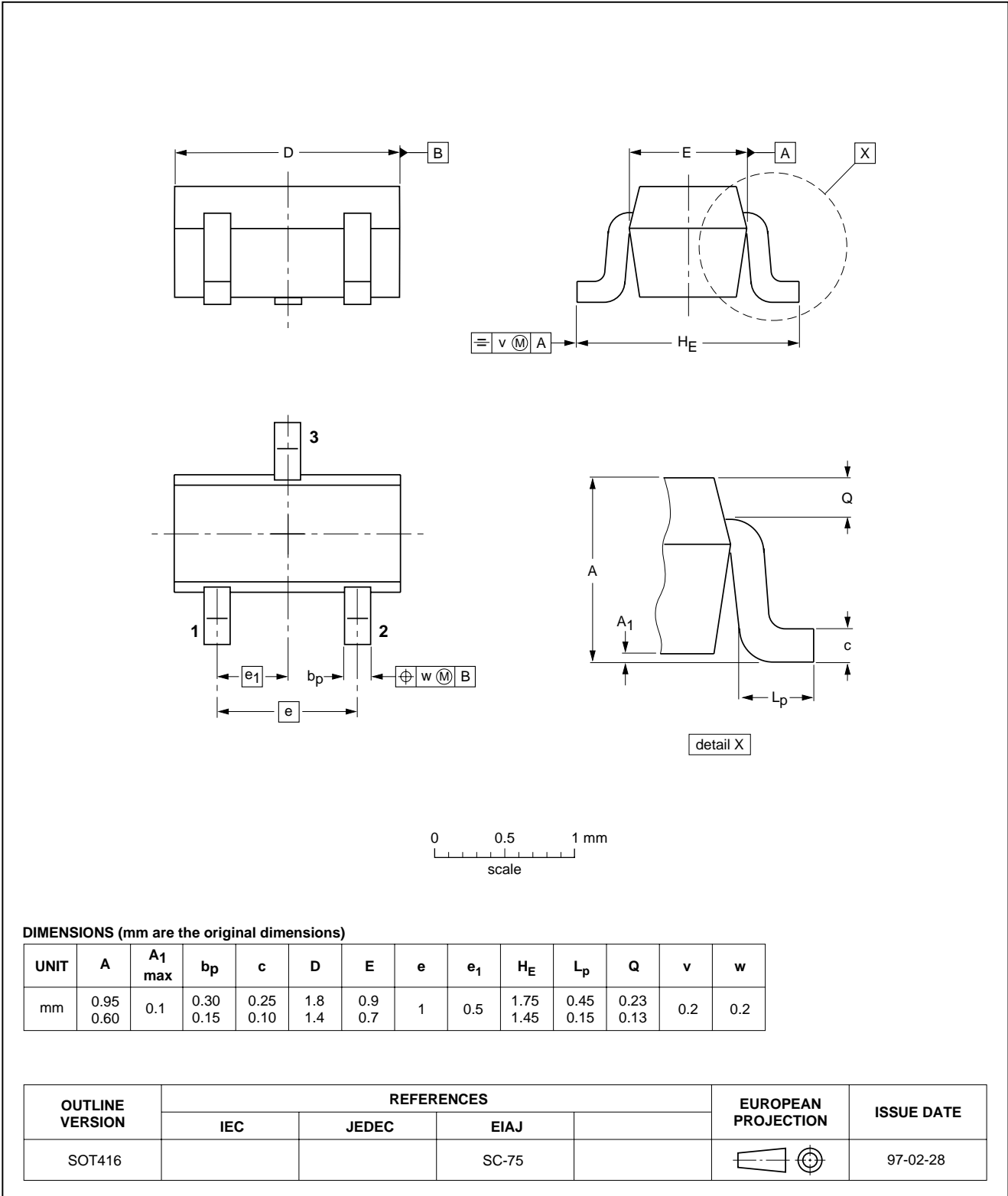
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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT416



NPN 9 GHz wideband transistor

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DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS ⁽¹⁾
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