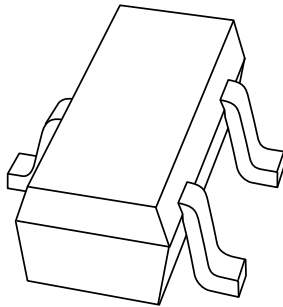


DATA SHEET



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

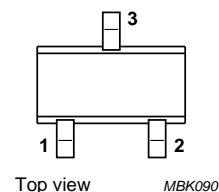
Wideband applications such as satellite TV tuners, cellular phones, cordless phones, pagers etc., with signal frequencies up to 2 GHz.

DESCRIPTION

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

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



Marking code: N2.

Fig.1 SOT416.

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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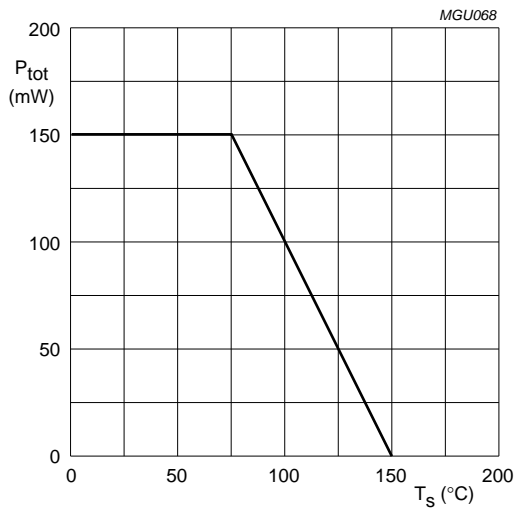
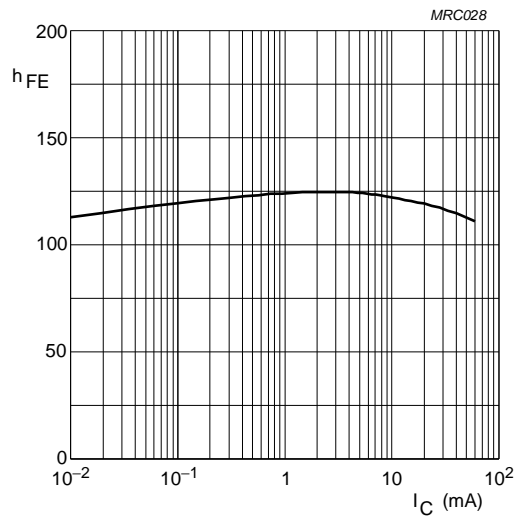
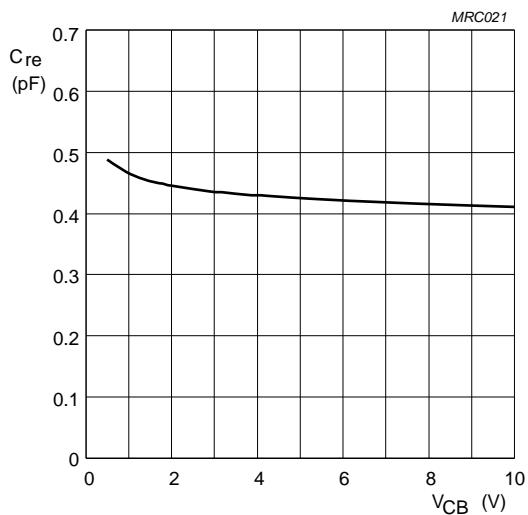


Fig.2 Power derating curve.



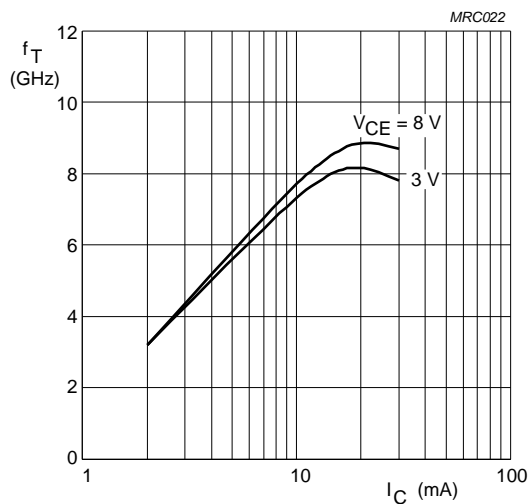
$V_{CE} = 6\text{ V}$; $T_j = 25\text{ °C}$.

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



$I_C = 0$; $f = 1\text{ MHz}$.

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

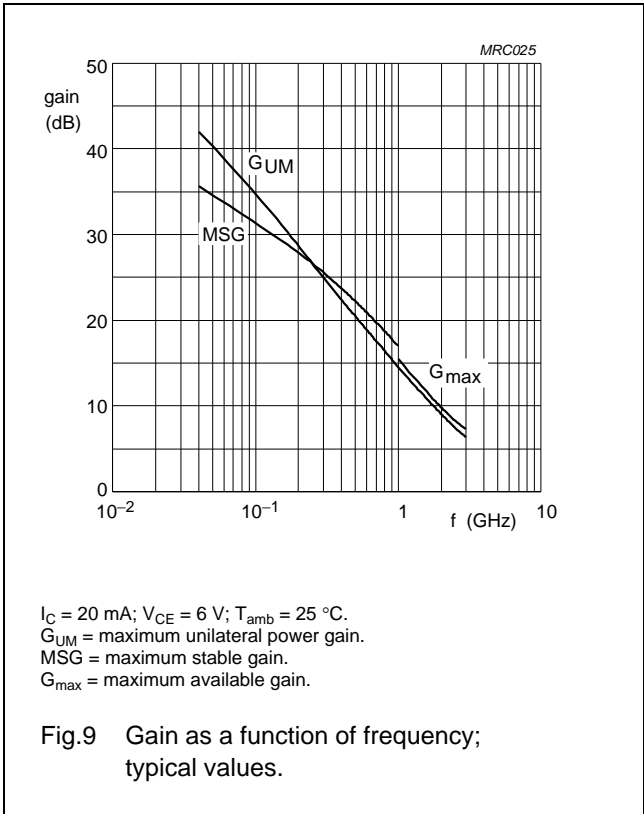
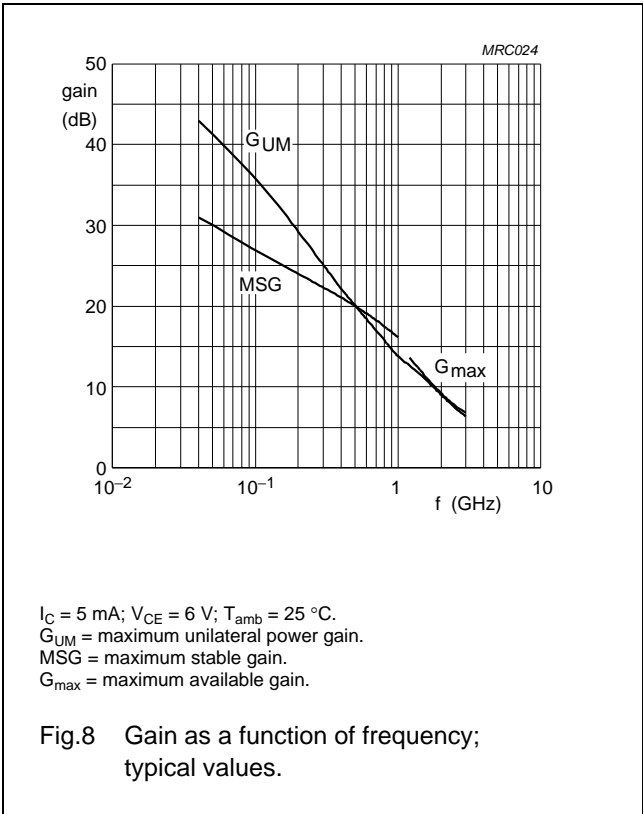
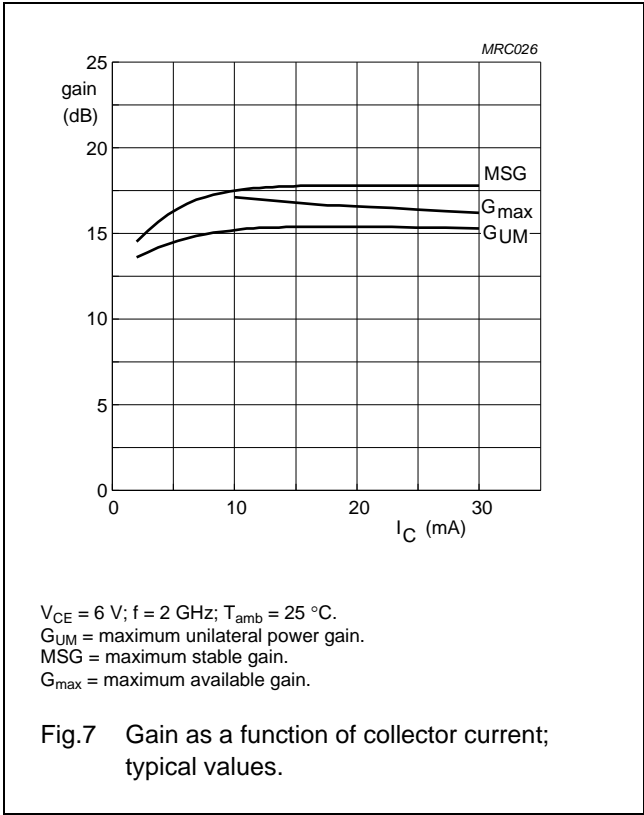
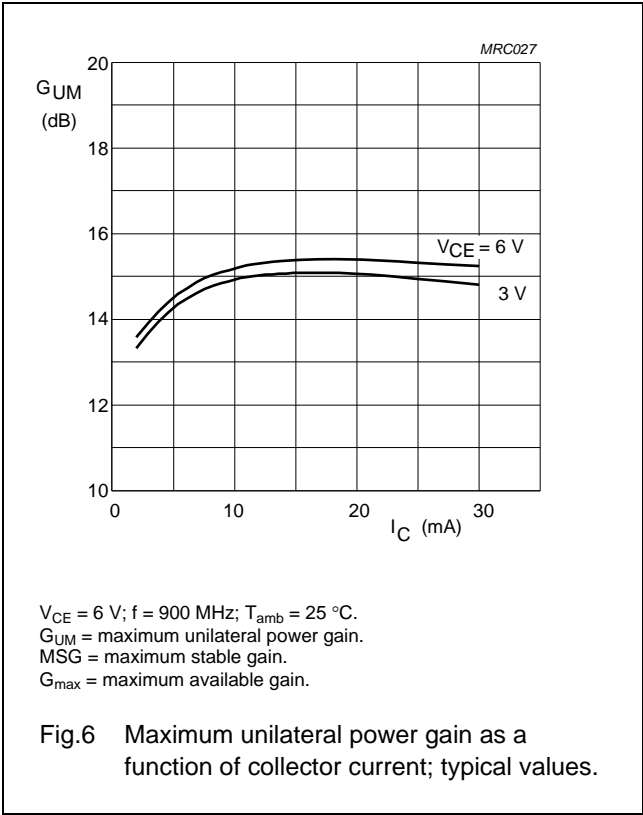


$f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$.

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

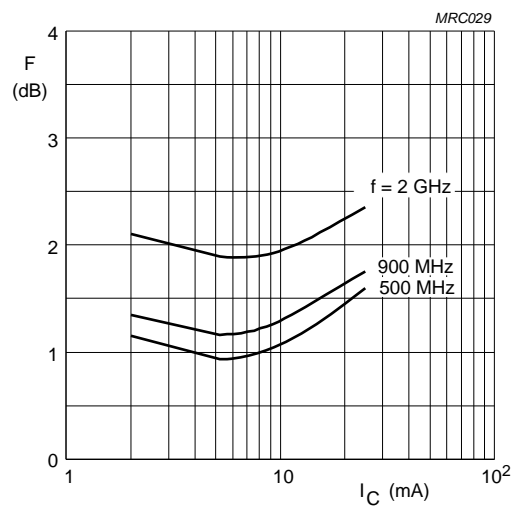
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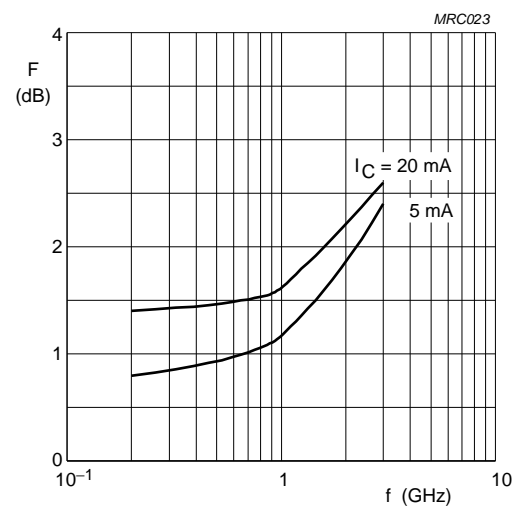
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$V_{CE} = 6\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

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

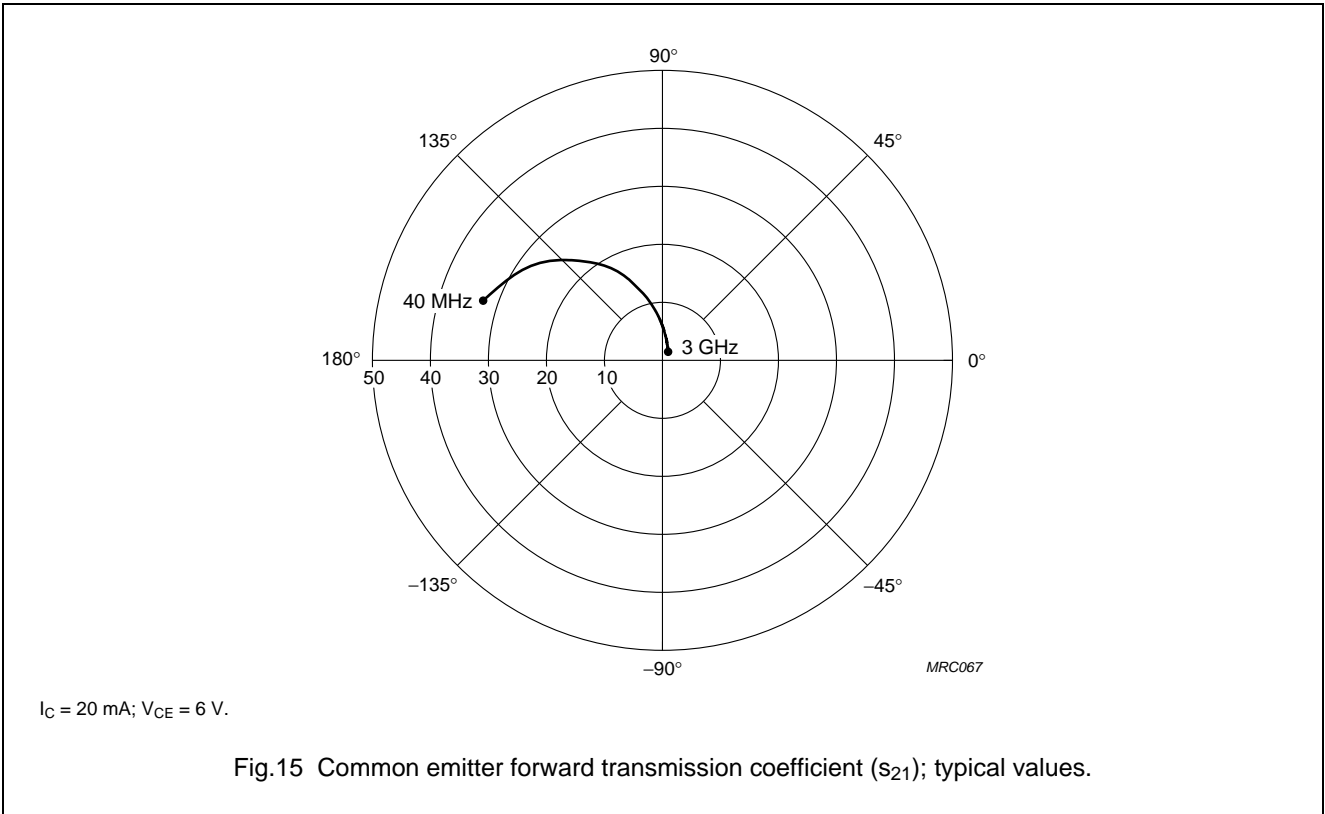
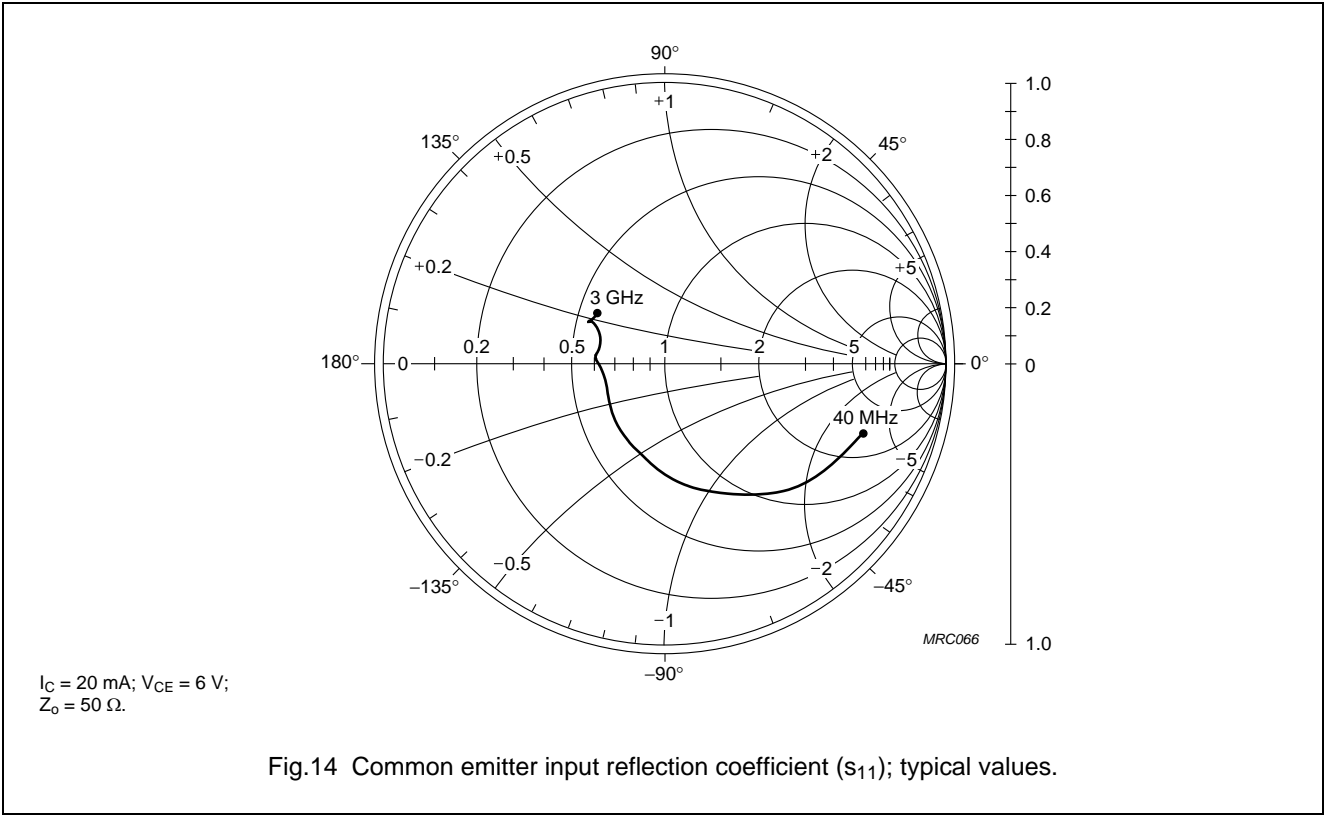


$V_{CE} = 6\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

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

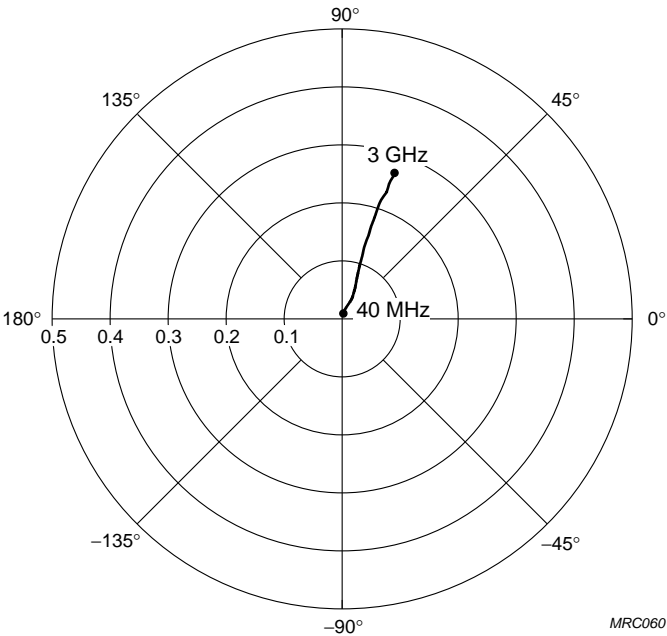
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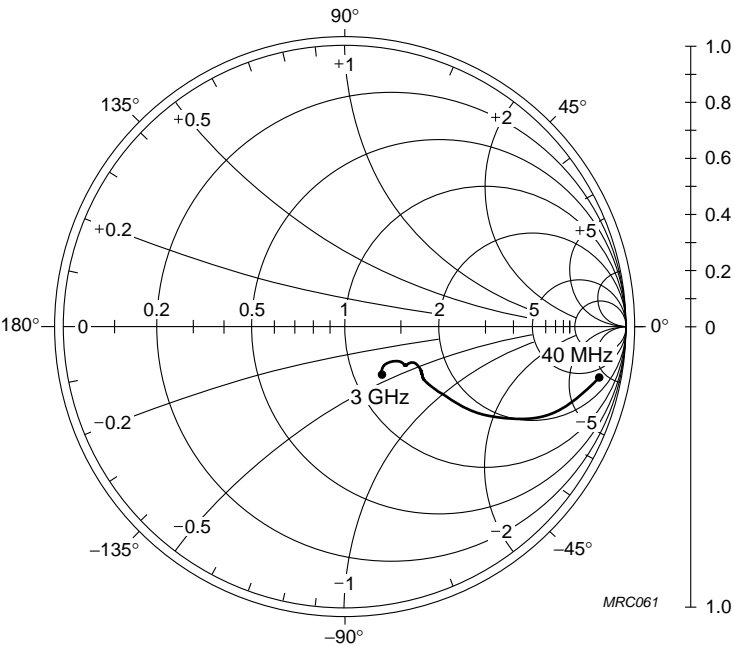
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$I_C = 20\text{ mA}$; $V_{CE} = 6\text{ V}$.

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



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

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

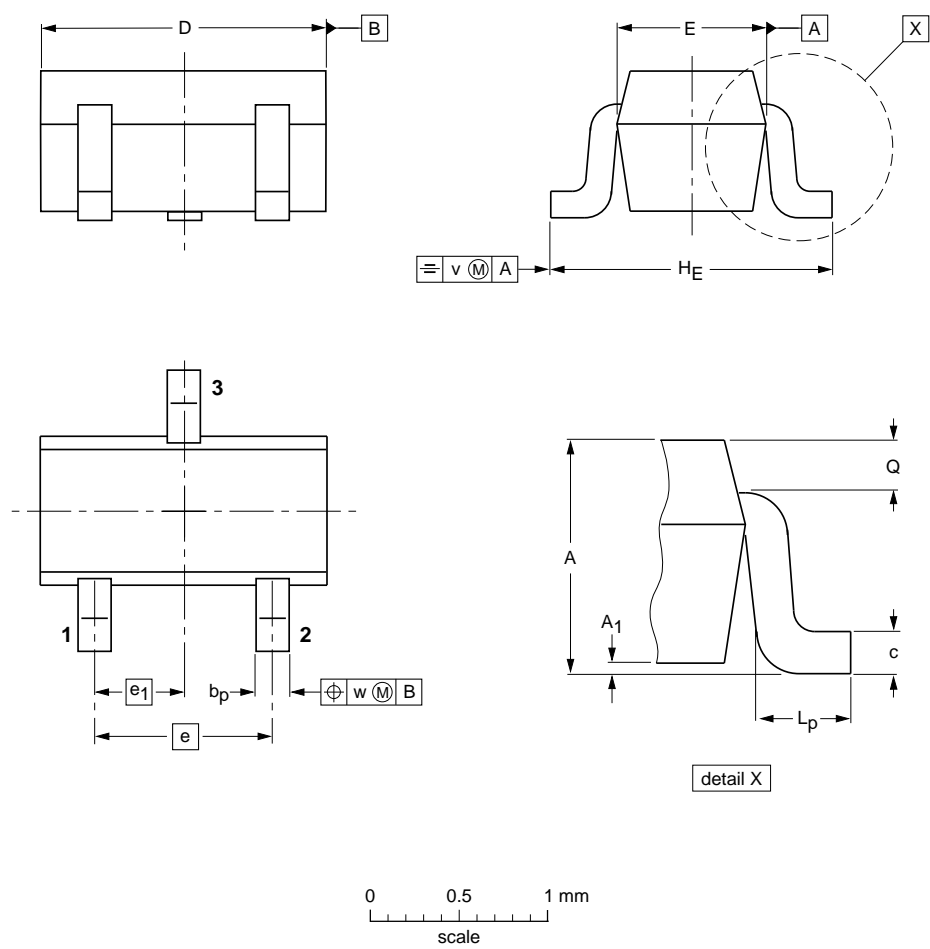
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT416



DIMENSIONS (mm are the original dimensions)

UNIT	A	A1 max	bp	c	D	E	e	e1	HE	Lp	Q	v	w
mm	0.95 0.60	0.1	0.30 0.15	0.25 0.10	1.8 1.4	0.9 0.7	1	0.5	1.75 1.45	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT416			SC-75			04-11-04 06-03-16

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DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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Contact information

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