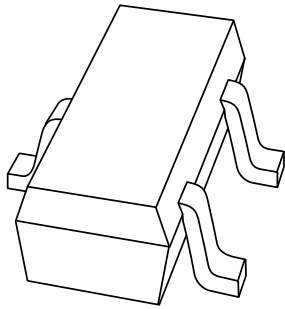


# DATA SHEET



## **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

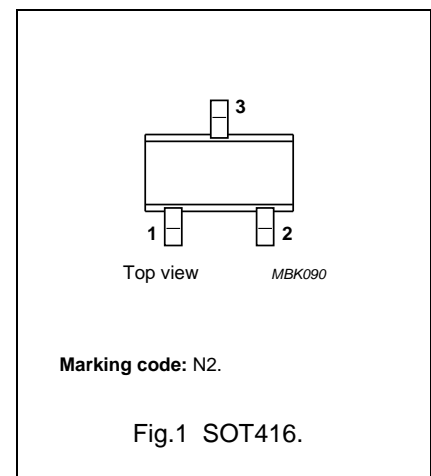
Wideband applications such as satellite TV tuners, cellular phones, cordless phones, pagers etc., with signal frequencies up to 2 GHz.

## 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	$I_C = I_C = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	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	$I_C = 20\text{ mA}; V_{CE} = 6\text{ V}; R_L = 50\ \Omega; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	17	–	dBm
ITO	third order intercept point	note 2	–	26	–	dBm

## Notes

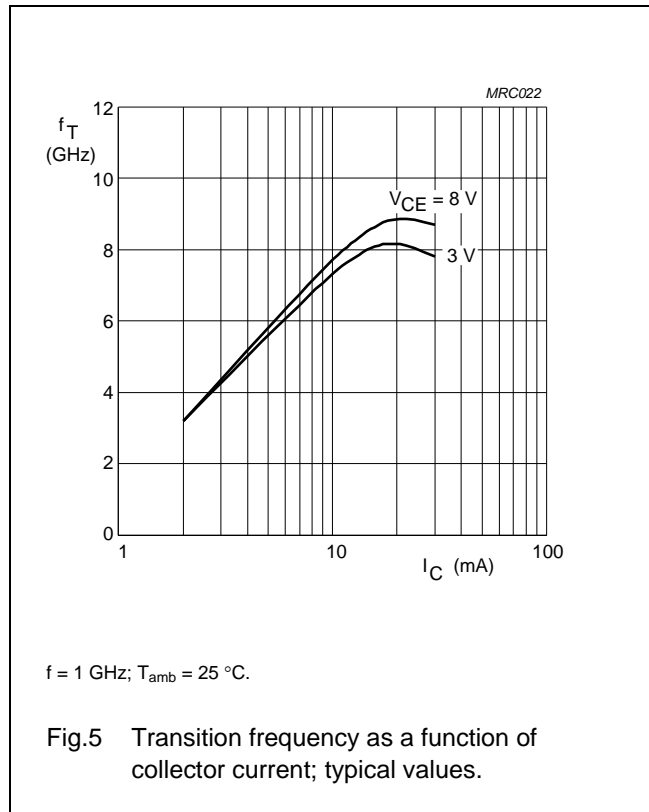
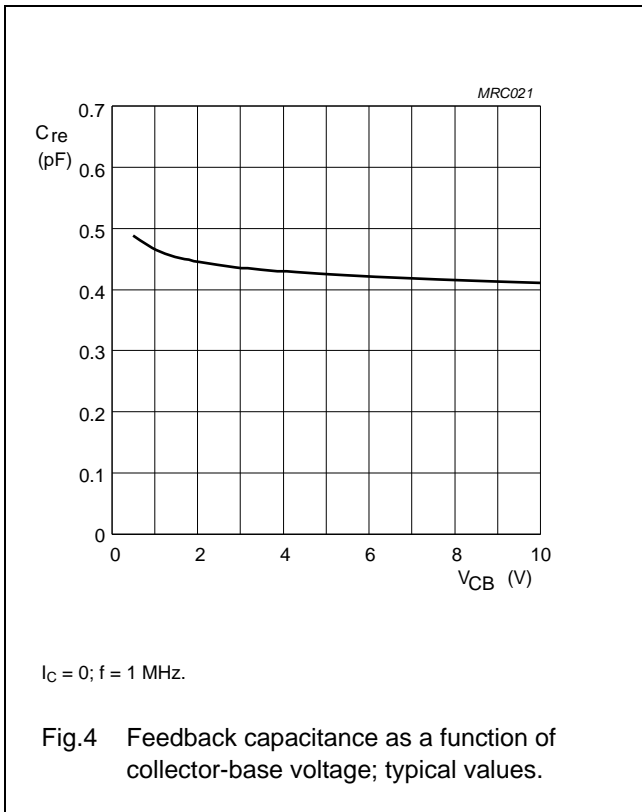
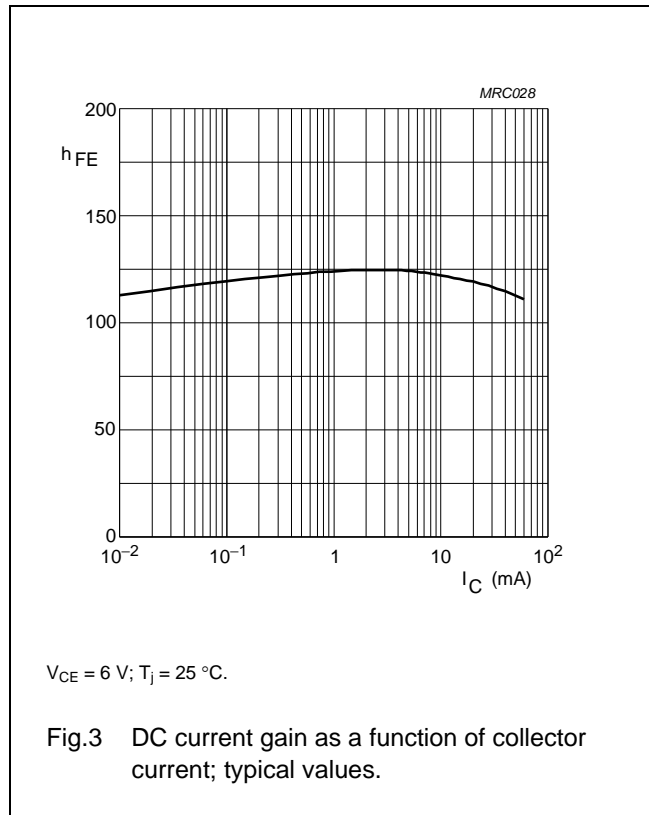
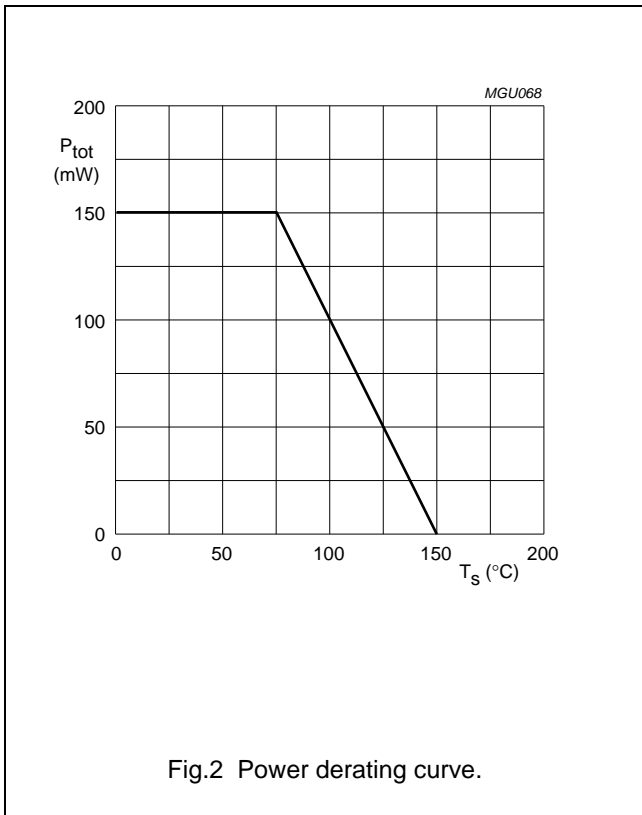
1.  $G_{UM}$  is the maximum unilateral power gain, assuming  $s_{12}$  is zero and

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

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

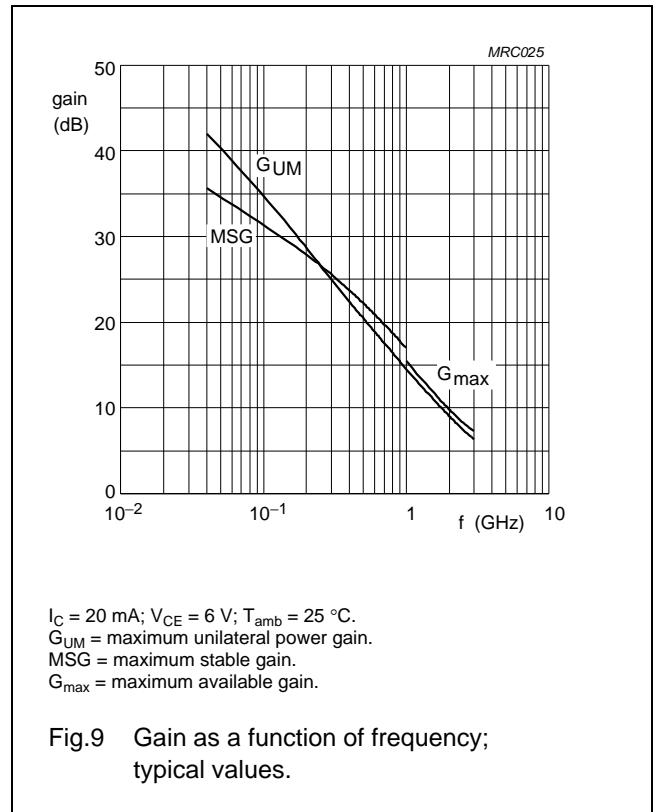
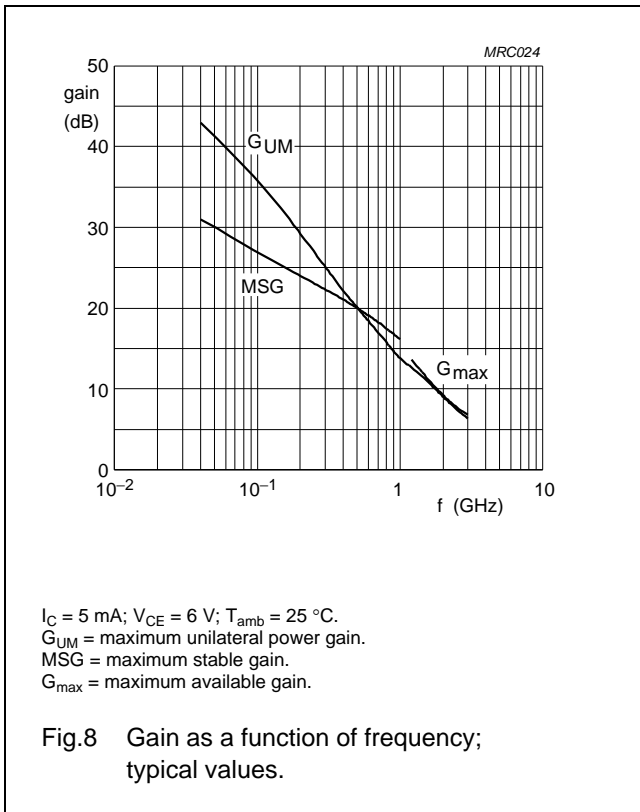
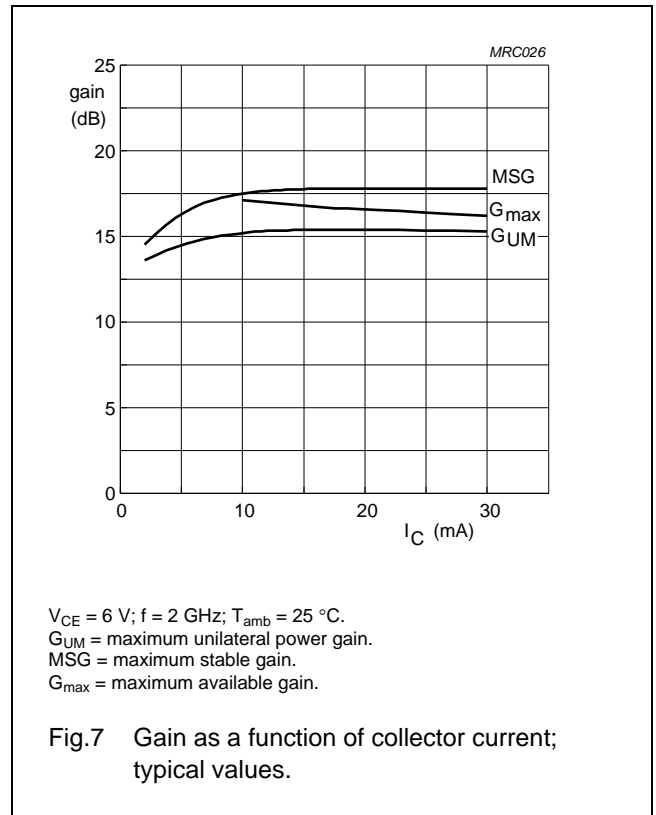
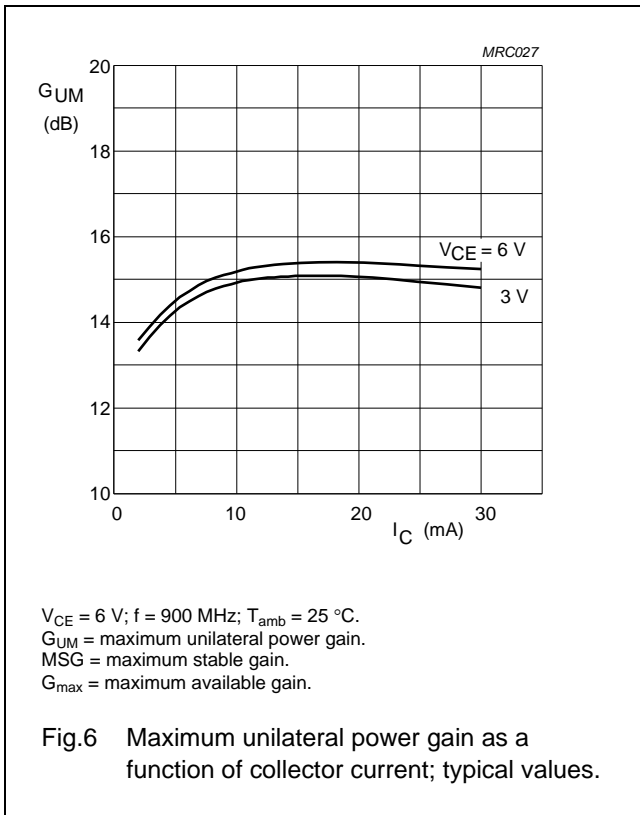
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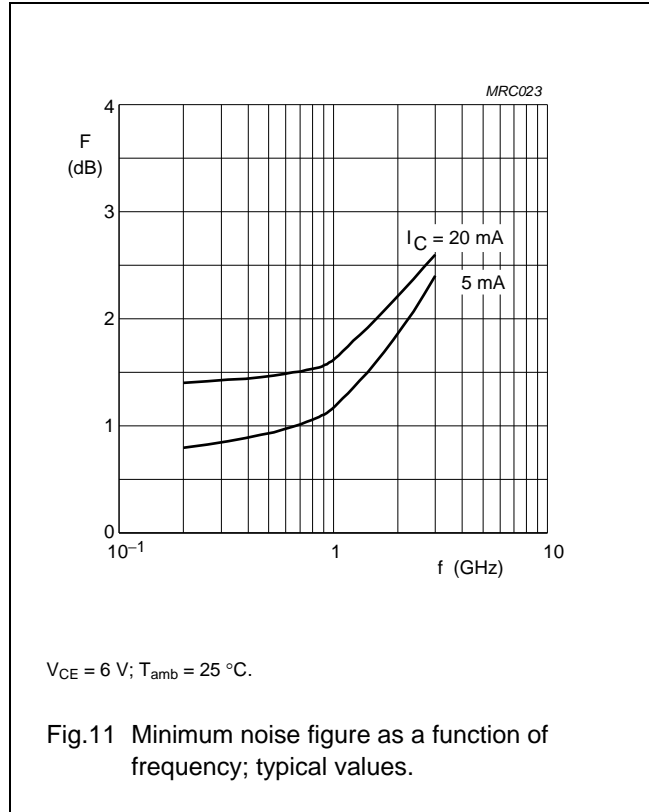
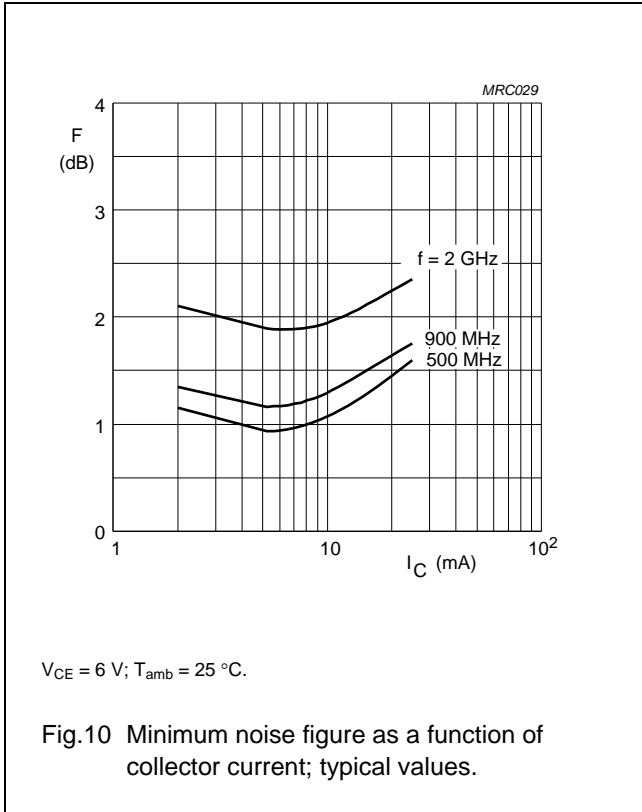
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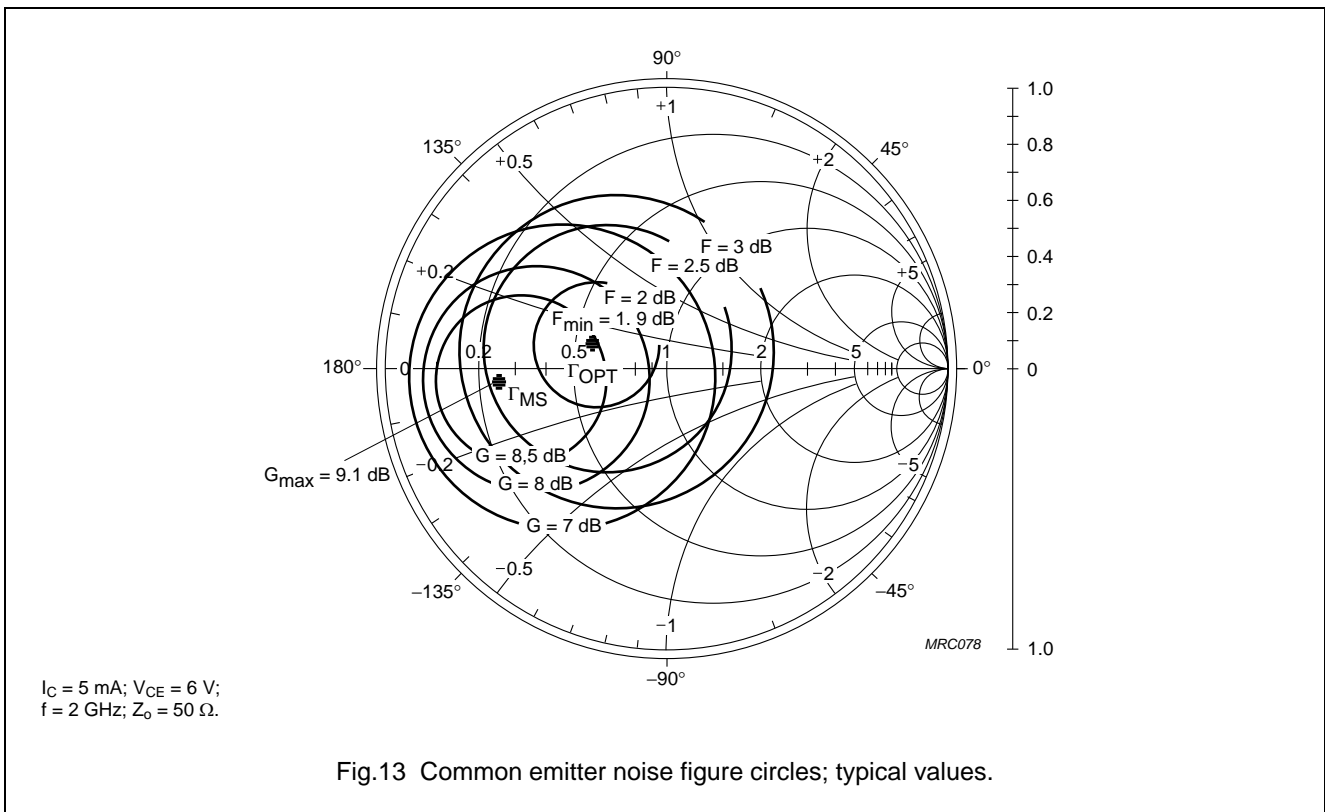
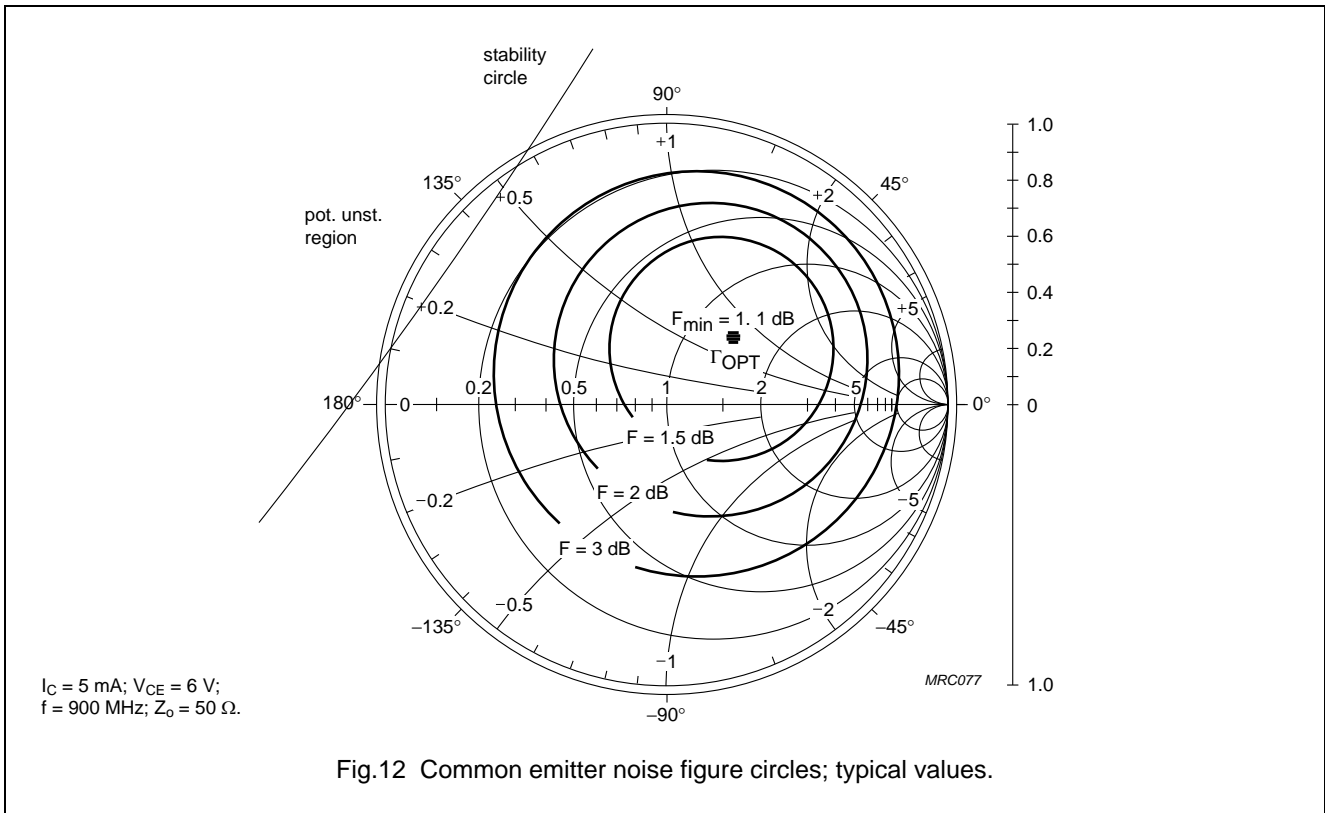
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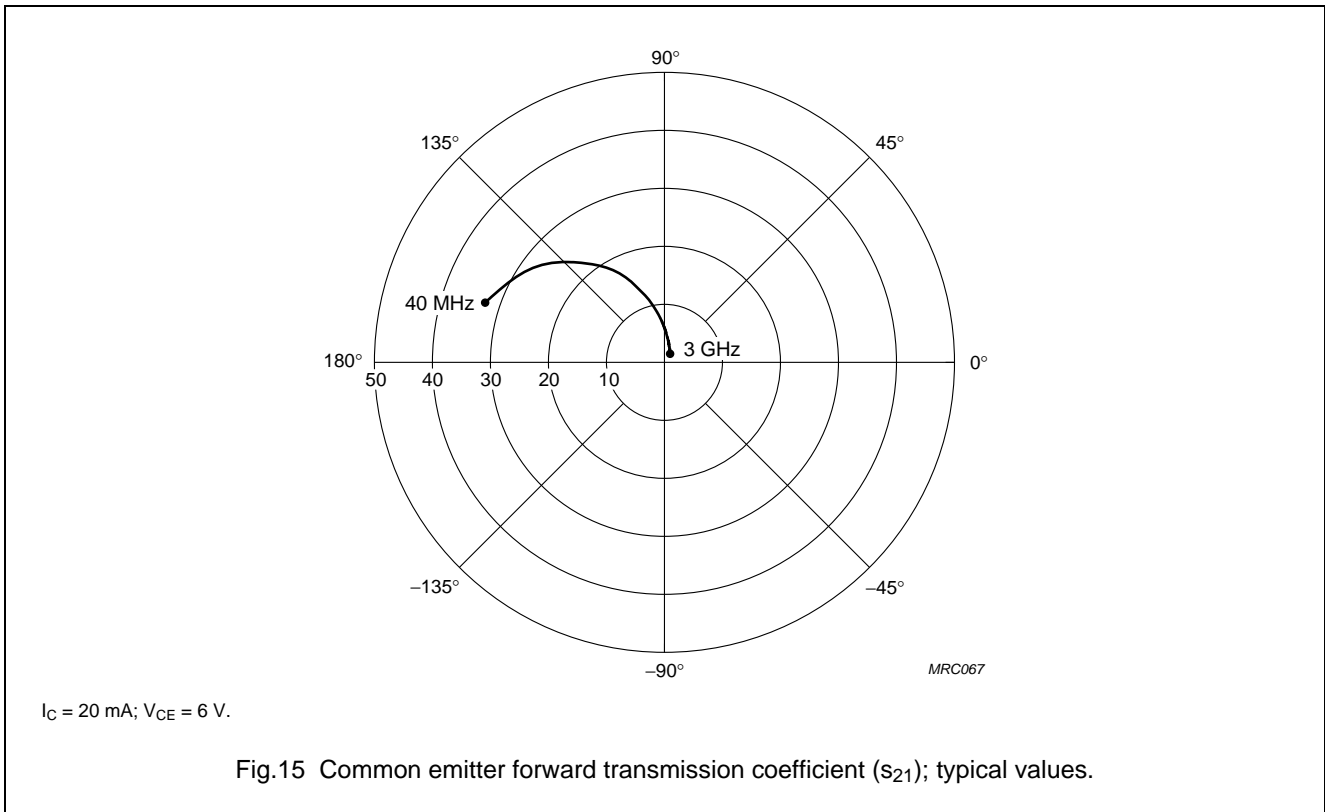
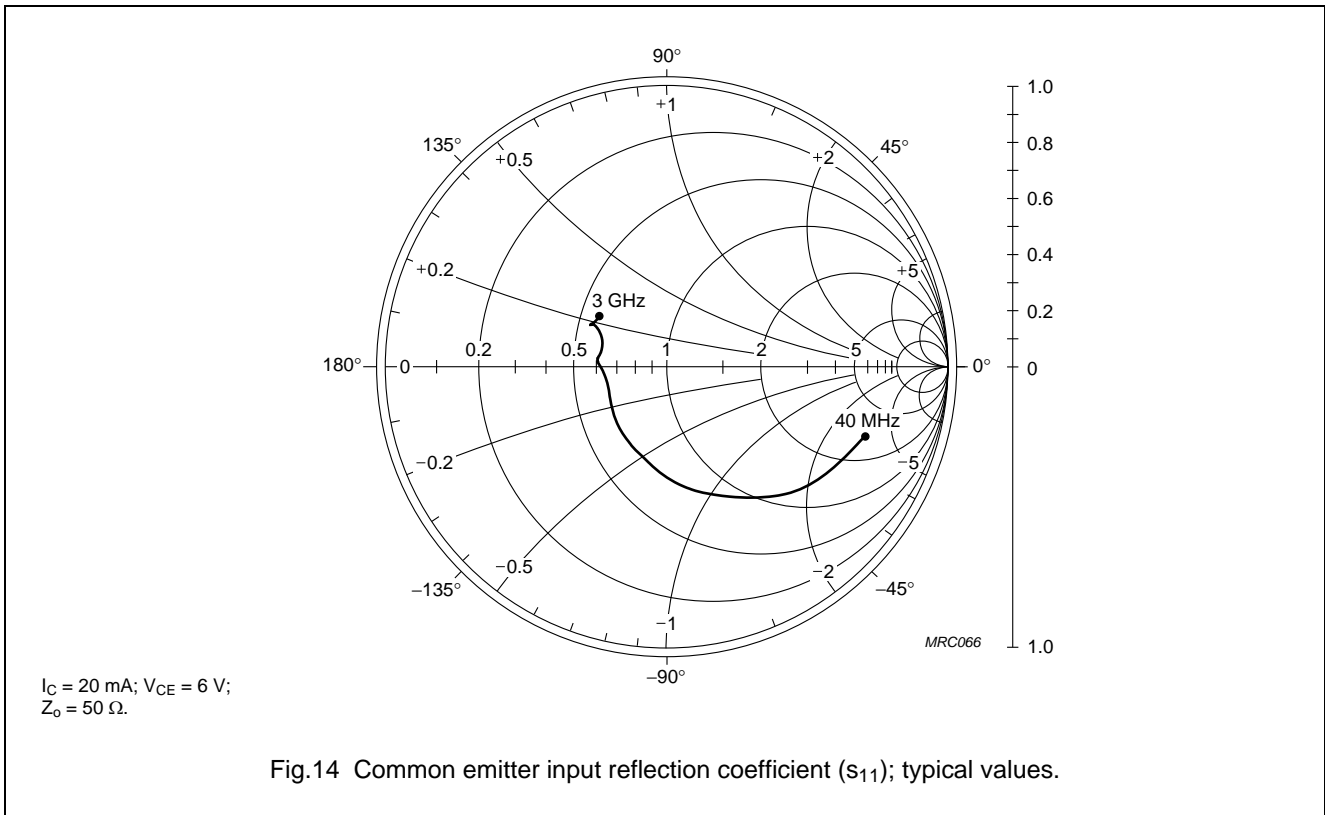
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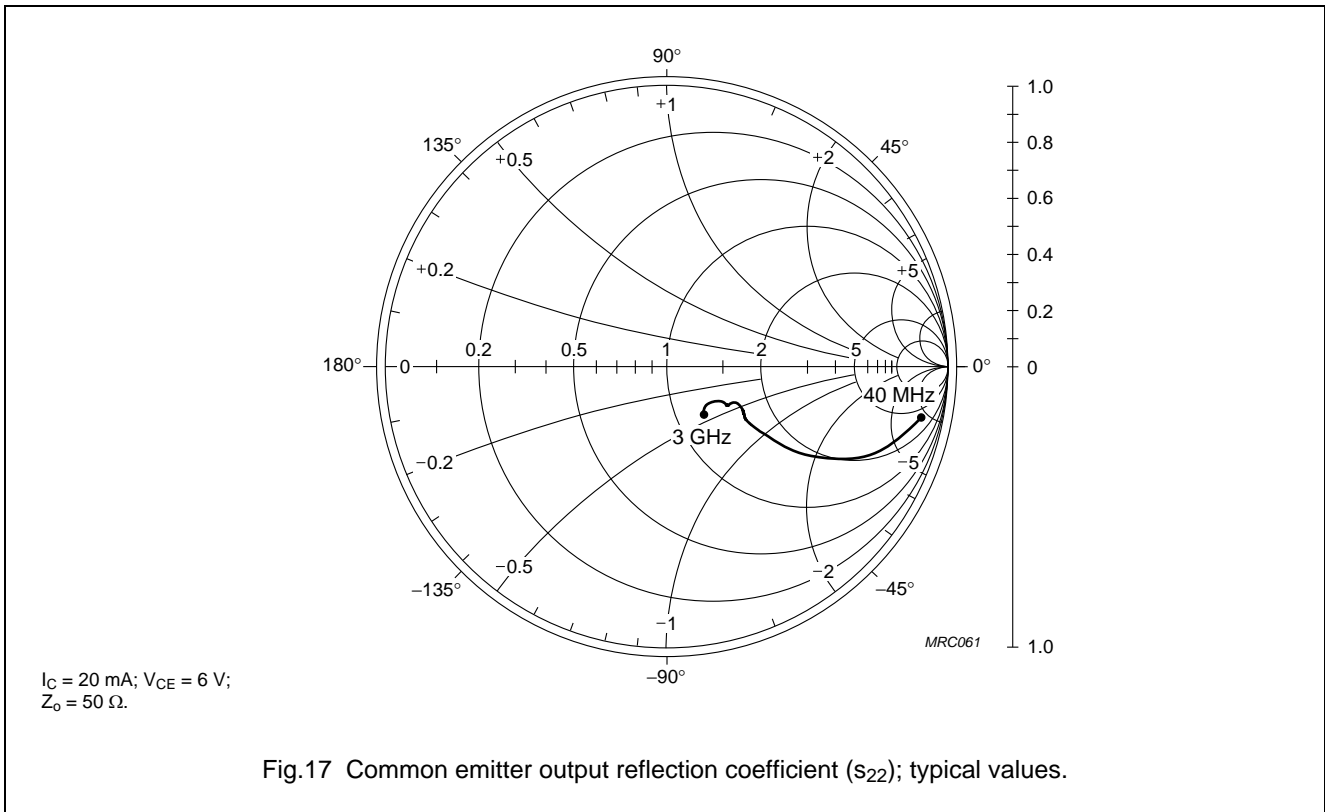
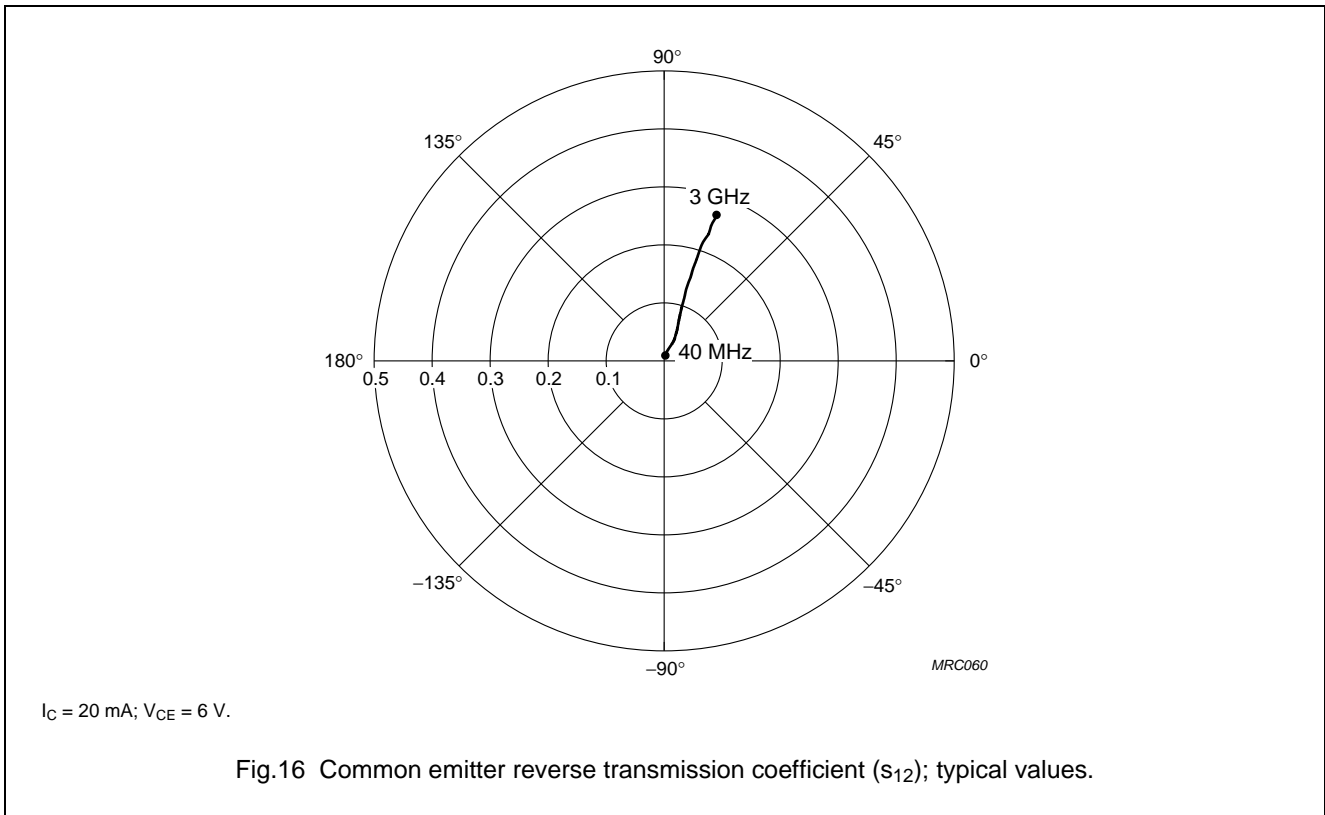
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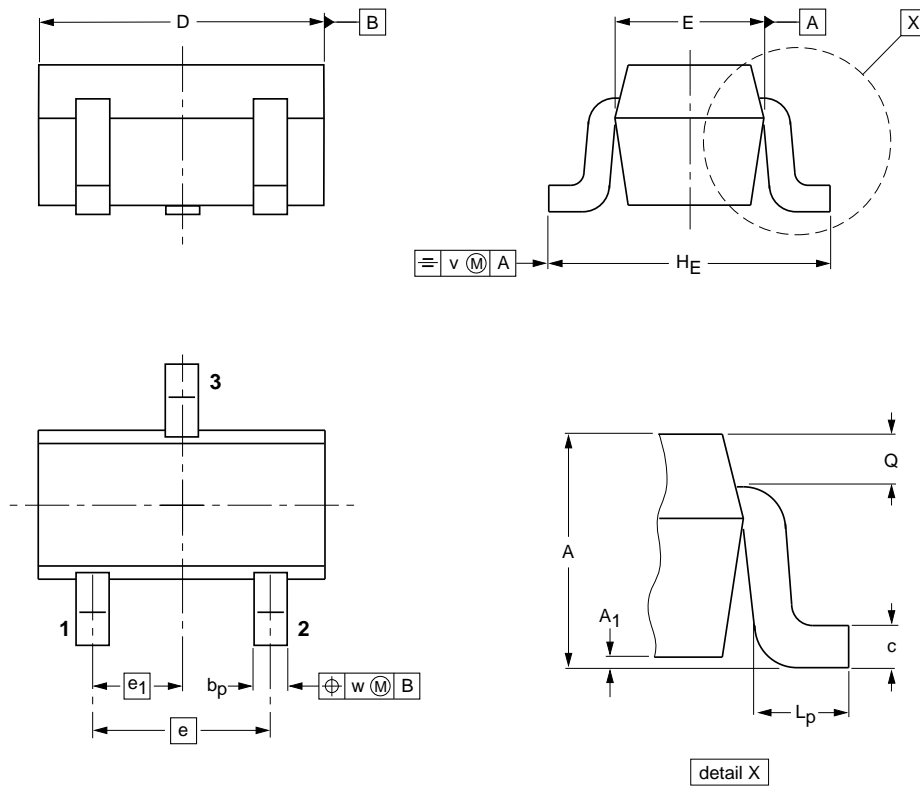
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT416



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	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

## NPN 9 GHz wideband transistor

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## DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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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