

DATA SHEET

BFR106

NPN 5 GHz wideband transistor

Product specification

September 1995



NPN 5 GHz wideband transistor

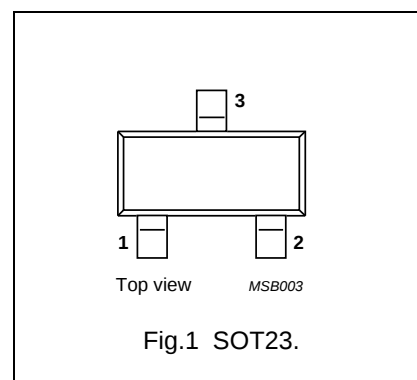
BFR106

DESCRIPTION

NPN silicon planar epitaxial transistor in a plastic SOT23 envelope. It is primarily intended for low noise, general RF applications.

PINNING

PIN	DESCRIPTION
Code: R7p	
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	DC collector current		—	—	100	mA
P_{tot}	total power dissipation	up to $T_s = 70\text{ °C}$; note 1	—	—	500	mW
h_{FE}	DC current gain	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $T_{amb} = 25\text{ °C}$	25	80	—	
f_T	transition frequency	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ °C}$	—	5	—	GHz
G_{UM}	maximum unilateral power gain	$I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ °C}$	—	11.5	—	dB
V_o	output voltage	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $R_L = 75\text{ }\Omega$; $T_{amb} = 25\text{ °C}$; $d_{im} = -60\text{ dB}$; $f_{(p+q-r)} = 793.25\text{ MHz}$	—	350	—	mV

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	—	3	V
I_C	DC collector current		—	100	mA
P_{tot}	total power dissipation	up to $T_s = 70\text{ °C}$; note 1	—	500	mW
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		—	175	°C

Note

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

NPN 5 GHz wideband transistor

BFR106

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 70\text{ °C}$; note 1	210 K/W

Note

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

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 10\text{ V}$	—	—	100	nA
h_{FE}	DC current gain	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$	25	80	—	
f_T	transition frequency	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ °C}$	—	5	—	GHz
C_c	collector capacitance	$I_E = I_{E0} = 0$; $V_{CB} = 10\text{ V}$; $f = 1\text{ MHz}$	—	1.5	—	pF
C_e	emitter capacitance	$I_C = I_{C0} = 0$; $V_{EB} = 0.5\text{ V}$; $f = 1\text{ MHz}$	—	4.5	—	pF
C_{re}	feedback capacitance	$I_C = 0$; $V_{CE} = 10\text{ V}$; $f = 1\text{ MHz}$	—	1.2	—	pF
G_{UM}	maximum unilateral power gain (note 1)	$I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ °C}$	—	11.5	—	dB
F	noise figure	$I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ °C}$	—	3.5	—	dB
d_2	second order intermodulation distortion	note 2	—	−50	—	dB
V_o	output voltage	note 3	—	350	—	mV

Notes

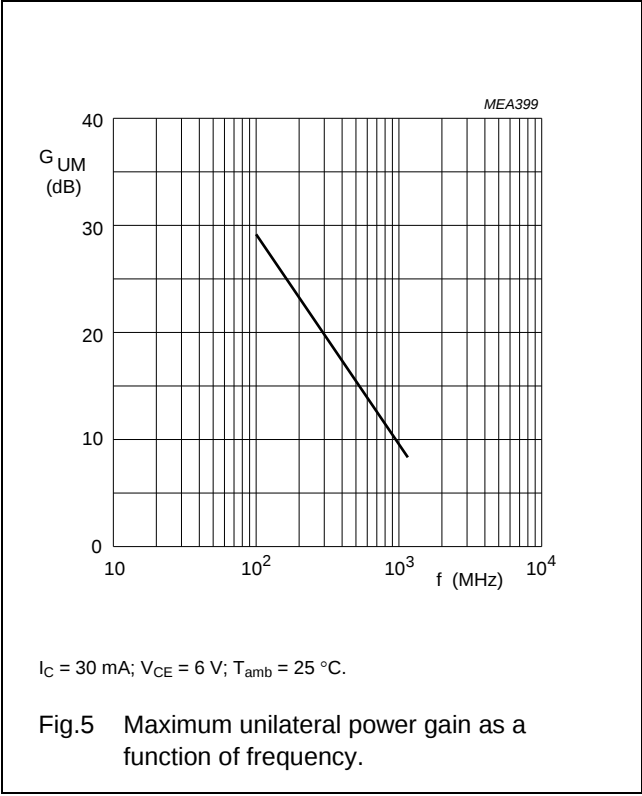
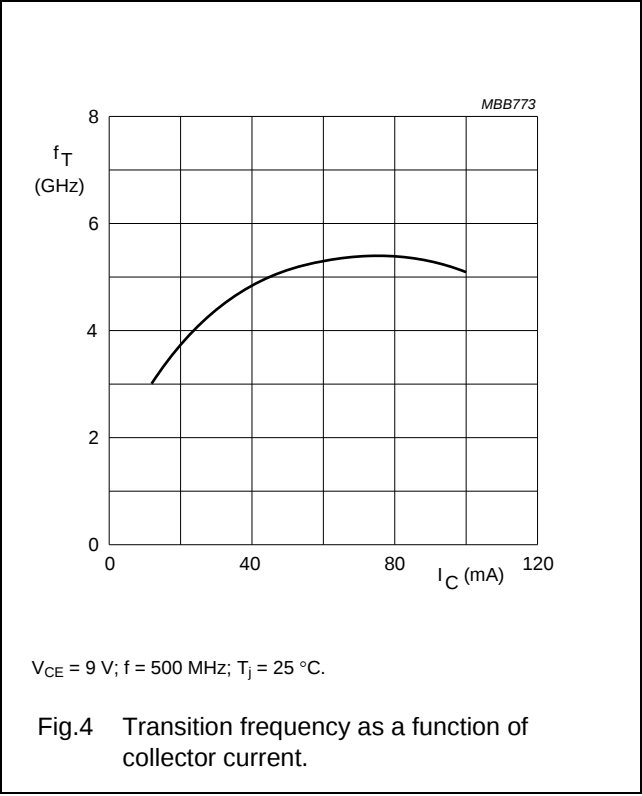
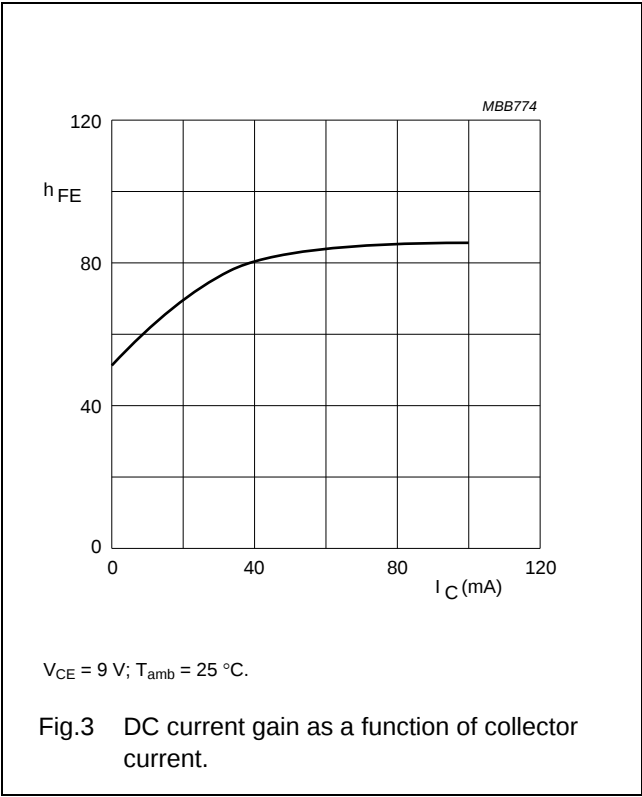
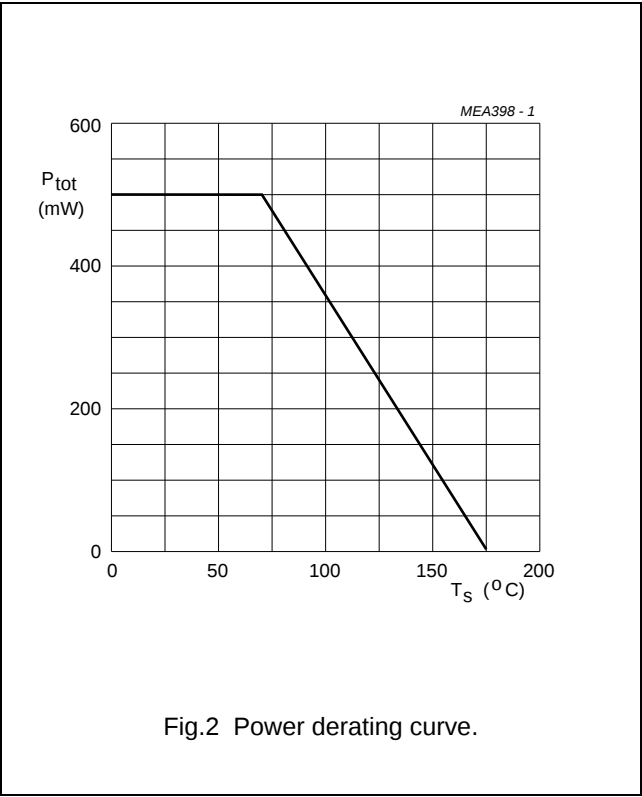
- G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and

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

- $I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $R_L = 75\text{ }\Omega$; $T_{amb} = 25\text{ °C}$; $f_{(p+q)} = 810\text{ MHz}$; $V_o = 100\text{ mV}$.
- $d_{im} = -60\text{ dB}$ (DIN 45004B); $I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $R_L = 75\text{ }\Omega$; $T_{amb} = 25\text{ °C}$; $f_{(p+q-r)} = 793.25\text{ MHz}$.

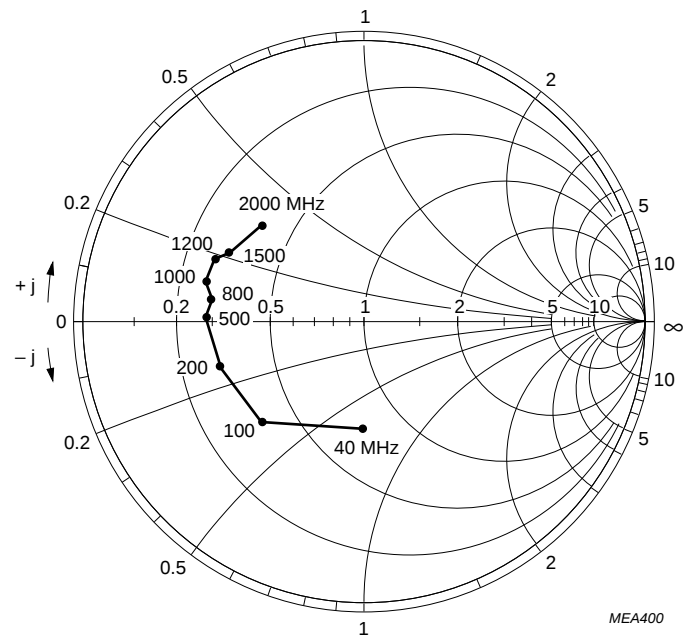
NPN 5 GHz wideband transistor

BFR106



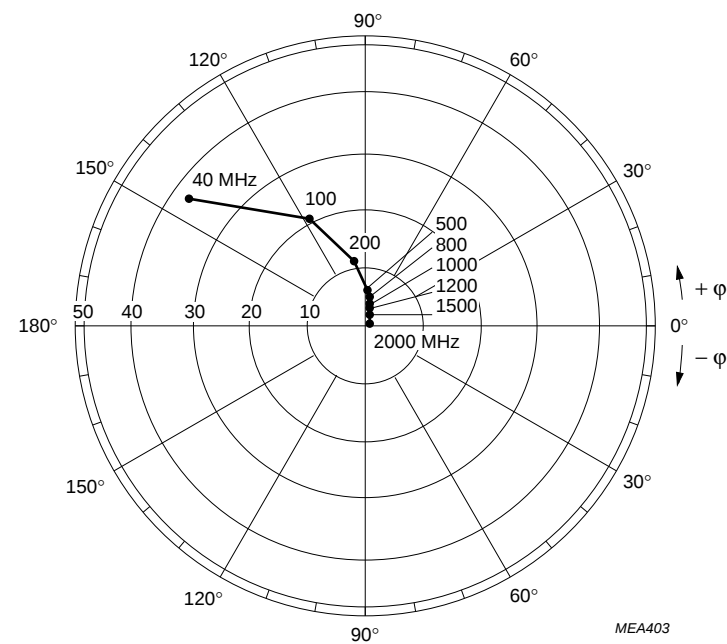
NPN 5 GHz wideband transistor

BFR106



$I_C = 30 \text{ mA}$; $V_{CE} = 6 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$.
 $Z_0 = 50 \text{ }\Omega$.

Fig.6 Common emitter input reflection coefficient (S_{11}).

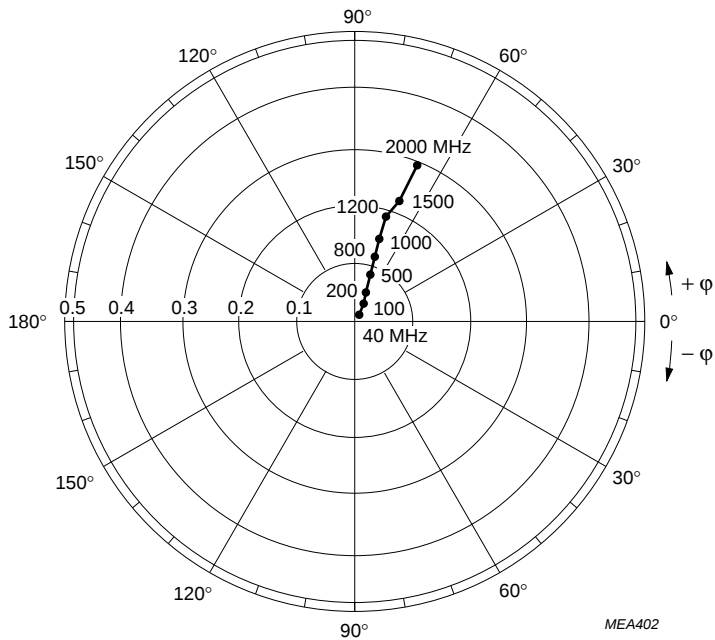


$I_C = 30 \text{ mA}$; $V_{CE} = 6 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$.

Fig.7 Common emitter forward transmission coefficient (S_{21}).

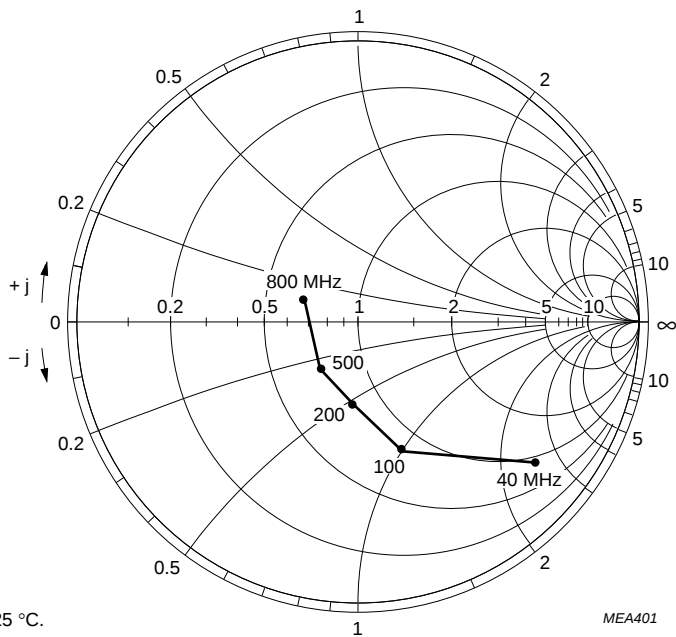
NPN 5 GHz wideband transistor

BFR106



$I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

Fig.8 Common emitter reverse transmission coefficient (S_{12}).



$I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.
 $Z_0 = 50\text{ }\Omega$.

Fig.9 Common emitter output reflection coefficient (S_{22}).

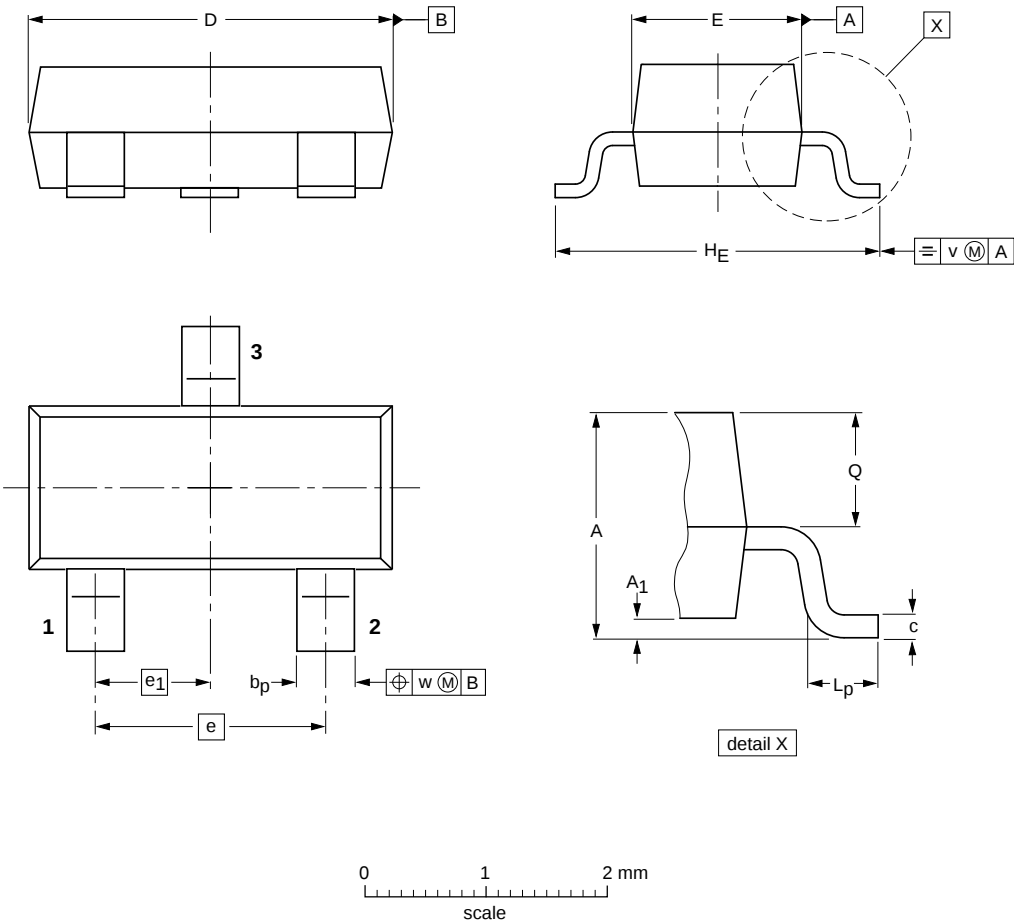
NPN 5 GHz wideband transistor

BFR106

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max.	b _p	c	D	E	e	e ₁	H _E	L _p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT23		TO-236AB				04-11-04 06-03-16

NPN 5 GHz wideband transistor

BFR106

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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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