NPN 2 GHz wideband transistor — BFR53

FEATURES

- Very low intermodulation distortion
- Very high power gain.

APPLICATIONS

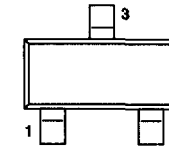
- Thick and thin-film circuits.

DESCRIPTION

NPN wideband transistor in a plastic SOT23 package.

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



Marking code: N1.

Fig.1 SOT23.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	18	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
I_{CM}	peak collector current	f > 1 MHz	–	100	mA
P_{tot}	total power dissipation	$T_s \leq 85$ °C	–	250	mW
C_{re}	feedback capacitance	I_C = 2 mA; V_{CE} = 5 V; f = 1 MHz; T_{amb} = 25 °C	0.9	–	pF
f_T	transition frequency	I_C = 25 mA; V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C	2	–	GHz
G_{UM}	maximum unilateral power gain	I_C = 30 mA; V_{CE} = 5 V; f = 800 MHz; T_{amb} = 25 °C	10.5	–	dB

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	18	V
V_{CEO}	collector-emitter voltage	open base	–	10	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	collector current (DC)		–	50	mA
I_{CM}	peak collector current	f > 1 MHz	–	100	mA
P_{tot}	total power dissipation	$T_s \leq 85$ °C (note 1)	–	250	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 pin.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	$T_s \leq 85$ °C; note 1	260	K/W

Note

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

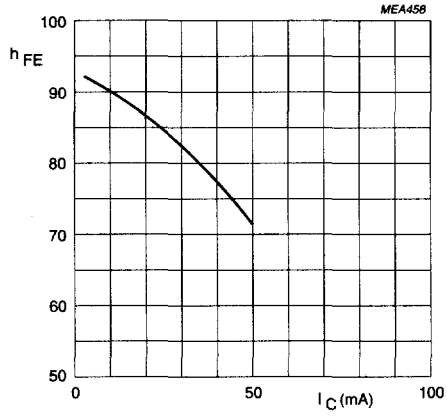
CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 10$ V	–	–	50	nA
h_{FE}	DC current gain	$I_C = 25$ mA; $V_{CE} = 5$ V; see Fig.2	25	–	–	
		$I_C = 50$ mA; $V_{CE} = 5$ V; see Fig.2	25	–	–	
C_c	collector capacitance	$I_E = i_e = 0$; $V_{CB} = 5$ V; f = 1 MHz; see Fig.3	–	0.9	–	pF
C_e	emitter capacitance	$I_C = i_c = 0$; $V_{EB} = 0.5$ V; f = 1 MHz	–	1.5	–	pF
C_{re}	feedback capacitance	$I_C = 2$ mA; $V_{CE} = 5$ V; f = 1 MHz; $T_{amb} = 25$ °C	–	0.9	–	pF
f_T	transition frequency	$I_C = 25$ mA; $V_{CE} = 5$ V; f = 500 MHz; see Fig.4	–	2	–	GHz
G_{UM}	maximum unilateral power gain (note 1)	$I_C = 30$ mA; $V_{CE} = 5$ V; f = 800 MHz; $T_{amb} = 25$ °C; see Fig.5	–	10.5	–	dB
F	noise figure	$I_C = 2$ mA; $V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25$ °C; see Fig.6	–	–	5	dB

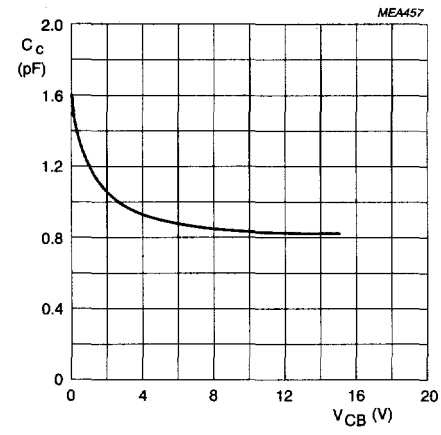
Note

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 .



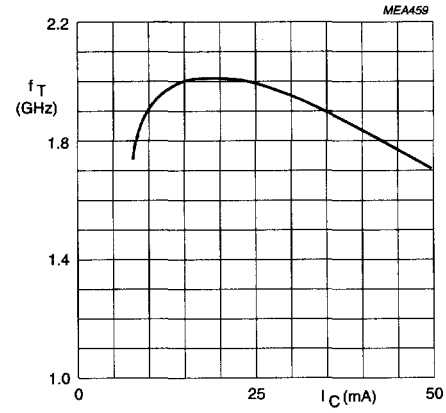
V_{CE} = 5 V; T_j = 25 °C.

Fig.2 DC current gain as a function of collector current; typical values.



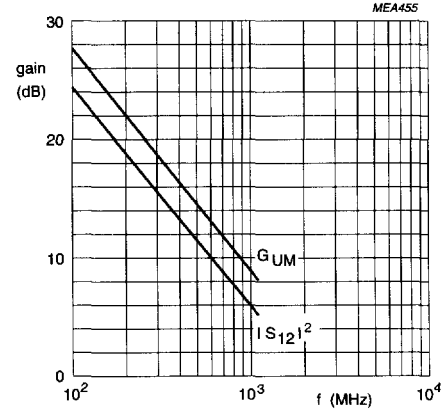
$I_E = i_e$ = 0; f = 1 MHz; T_j = 25 °C.

Fig.3 Collector capacitance as a function of collector-base voltage; typical values.



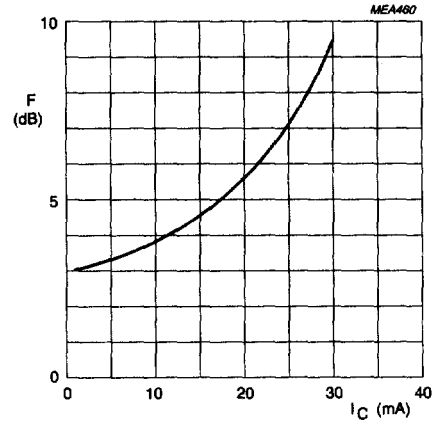
V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C.

Fig.4 Transition frequency as a function of collector current; typical values.



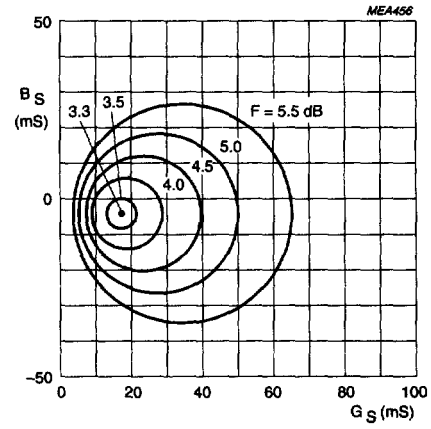
I_C = 30 mA; V_{CE} = 5 V; T_{amb} = 25 °C.

Fig.5 Gain as a function of frequency; typical values.



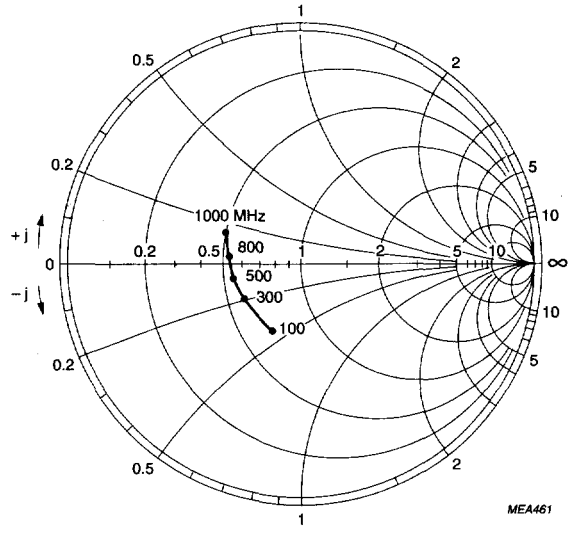
V_{CE} = 5 V; f = 500 MHz; G_S = 20 mS; B_S is tuned; T_{amb} = 25 °C.

Fig.6 Minimum noise figure as a function of collector current; typical values.



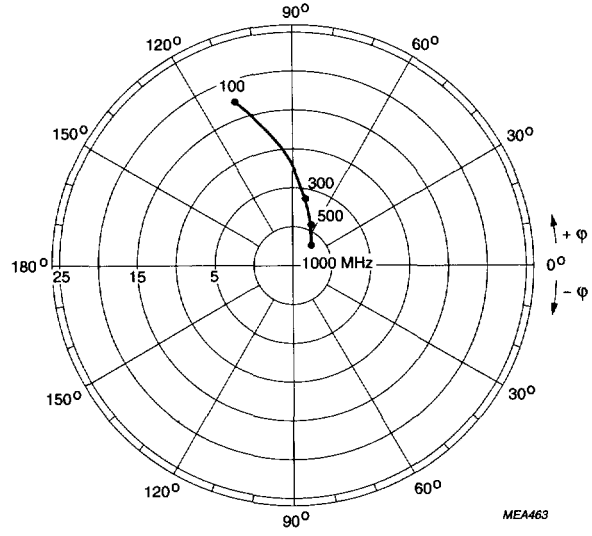
I_C = 2 mA; V_{CE} = 5 V; f = 500 MHz; T_{amb} = 25 °C.

Fig.7 Circles of constant noise figure; typical values.



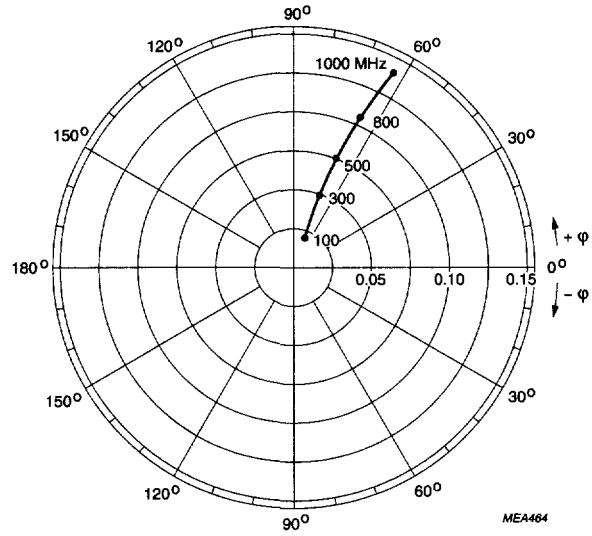
I_C = 30 mA; V_{CE} = 5 V; Z_o = 50 Ω; T_{amb} = 25 °C.

Fig.8 Common emitter input reflection coefficient (S_{11}).



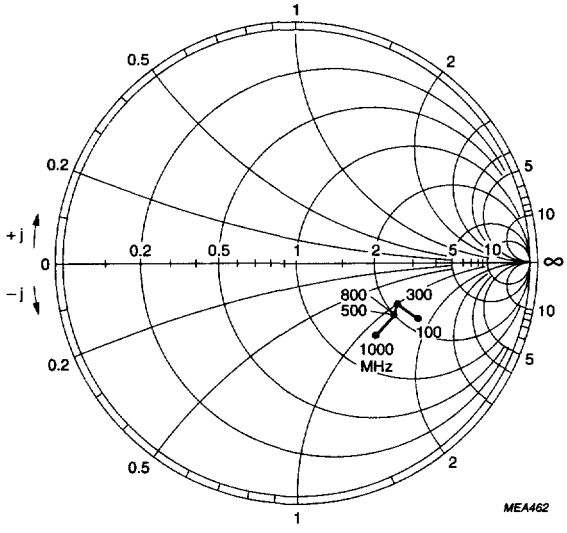
I_C = 30 mA; V_{CE} = 5 V; T_{amb} = 25 °C.

Fig.9 Common emitter forward transmission coefficient (S_{21}).



I_C = 30 mA; V_{CE} = 5 V; T_{amb} = 25 °C.

Fig.10 Common emitter reverse transmission coefficient (S_{12}).



I_C = 30 mA; V_{CE} = 5 V; Z_o = 50 Ω; T_{amb} = 25 °C.

Fig.11 Common emitter output reflection coefficient (S_{22}).