DATA SHEET

BFG197; BFG197/X; BFG197/XR
NPN 7 GHz wideband transistor

Product specification
Supersedes data of November 1992
File under discrete semiconductors, SC14

1995 Sep 13

Philips
Semiconductors

PHILIPS

NPN 7 GHz wideband transistor

BFG197; BFG197/X; BFG197/XR

FEATURES

- High power gain
- Low noise figure
- Gold metallization ensures excellent reliability.

DESCRIPTION

The BFG197 is a silicon NPN transistor in a 4-pin, dual-emitter plastic SOT143 envelope. It is primarily intended for wideband applications in the GHz range, such as satellite TV systems and repeater amplifiers in fibre-optic systems.

PINNING

PIN	DESCRIPTION
BFG197 (Fig.1) Code: V5	
1	collector
2	base
3	emitter
4	emitter
BFG197/X (Fig.1) Code: V13	
1	collector
2	emitter
3	base
4	emitter
BFG197A/XR (Fig.2) Code: V35	
1	collector
2	emitter
3	base
4	emitter

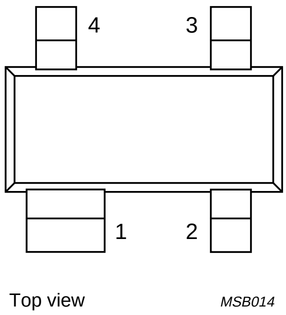


Fig.1 SOT143.

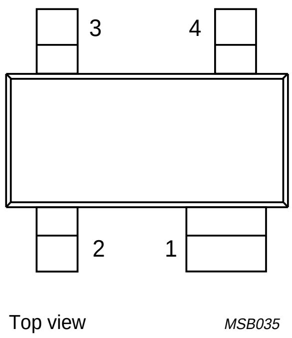


Fig.2 SOT143XR.

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	–	–	10	V
I_C	collector current	DC value	–	–	100	mA
P_{tot}	total power dissipation	up to T_s = 75 °C; note 1	–	–	350	mW
C_{re}	feedback capacitance	$I_C = i_c = 0$; V_{CB} = 8 V; f = 1 MHz	–	0.85	–	pF
f_T	transition frequency	I_C = 50 mA; V_{CE} = 4 V; f = 2 GHz	–	7.5	–	GHz
G_{UM}	maximum unilateral power gain	I_C = 50 mA; V_{CE} = 6 V; T_{amb} = 25 °C; f = 1 GHz	–	16	–	dB
		I_C = 50 mA; V_{CE} = 6 V; T_{amb} = 25 °C; f = 2 GHz	–	10	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; I_C = 15 mA; V_{CE} = 8 V; T_{amb} = 25 °C; f = 1 GHz	–	1.7	–	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 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	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 value, continuous	–	100	mA
P_{tot}	total power dissipation	up to T_s = 75 °C; note 1	–	350	mW
T_{stg}	storage temperature range		–65	+150	°C
T_j	junction operating temperature		–	175	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}s}$	from junction to soldering point; note 1	290	K/W

Note

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

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector leakage current	I_E = 0; V_{CB} = 5 V	–	–	100	nA
h_{FE}	DC current gain	I_C = 50 mA; V_{CE} = 5 V	40	110	–	
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 8 V; f = 1 MHz	–	1.5	–	pF
C_e	emitter capacitance	$I_C = i_c$ = 0; V_{EB} = 0.5 V; f = 1 MHz	–	3.3	–	pF
C_{re}	feedback capacitance	$I_C = i_c$ = 0; V_{CB} = 8 V; f = 1 MHz	–	0.85	–	pF
f_T	transition frequency	I_C = 50 mA; V_{CE} = 4 V; f = 2 GHz	–	7.5	–	GHz
G_{UM}	maximum unilateral power gain (note 1)	I_C = 50 mA; V_{CE} = 6 V; T_{amb} = 25 °C; f = 1 GHz	–	16	–	dB
		I_C = 50 mA; V_{CE} = 6 V; T_{amb} = 25 °C; f = 2 GHz	–	10	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; I_C = 15 mA; V_{CE} = 8 V; T_{amb} = 25 °C; f = 1 GHz	–	1.7	–	dB
		$\Gamma_s = \Gamma_{opt}$; I_C = 50 mA; V_{CE} = 6 V; T_{amb} = 25 °C; f = 2 GHz	–	2.3	–	dB
d_2	second order intermodulation distortion	V_{CE} = 6 V;V_o = 50 dBmV;	–	–51	–	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.

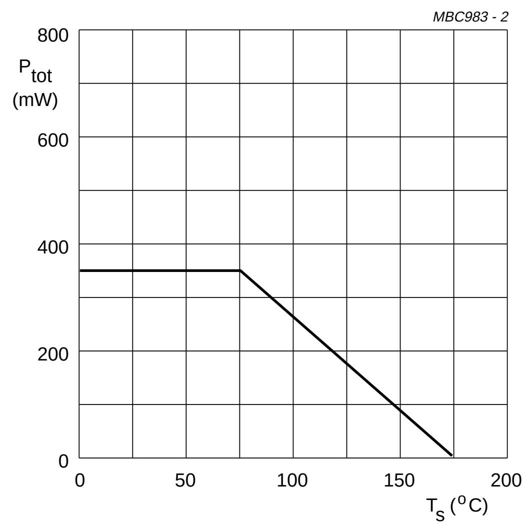
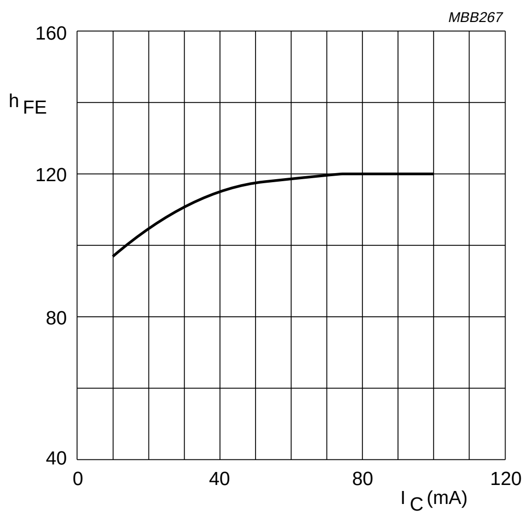
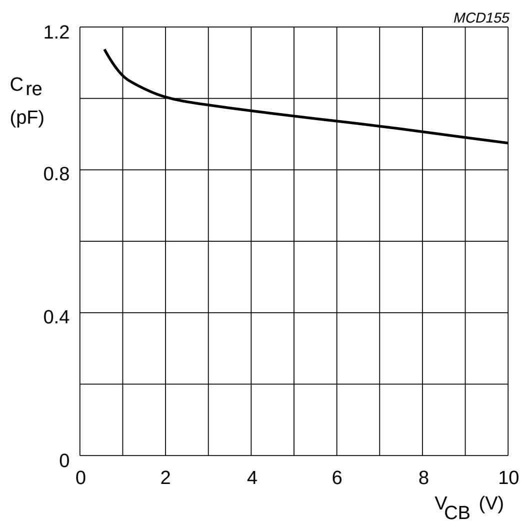


Fig.3 Power derating curve.



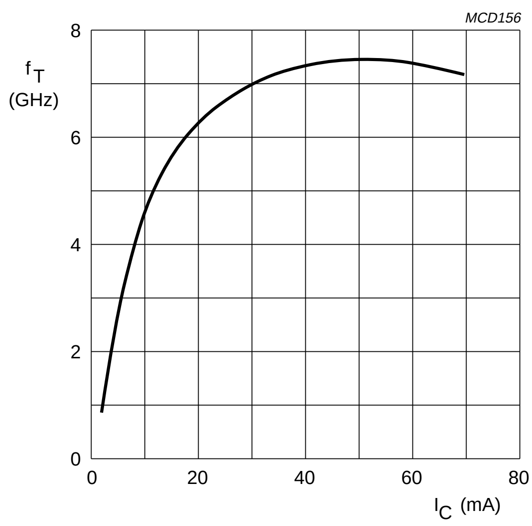
V_{CE} = 5 V.

Fig.4 DC current gain as a function of collector current.



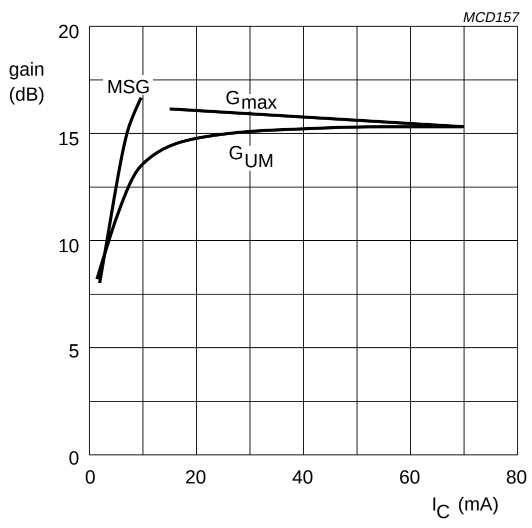
$I_C = i_c = 0$; f = 1 MHz.

Fig.5 Feedback capacitance as a function of collector-base voltage.



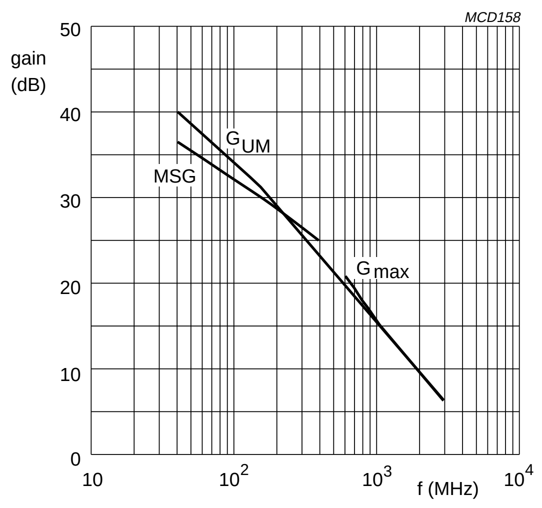
V_{CE} = 4 V; T_{amb} = 25 °C; f = 2 GHz.

Fig.6 Transition frequency as a function of collector current.



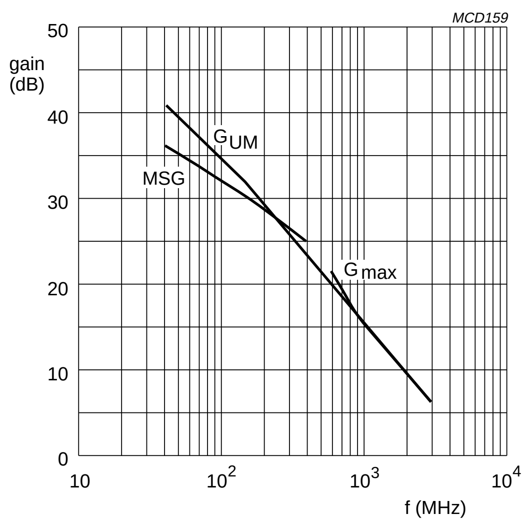
V_{CE} = 4 V; f = 1 GHz.

Fig.7 Gain as a function of collector current.



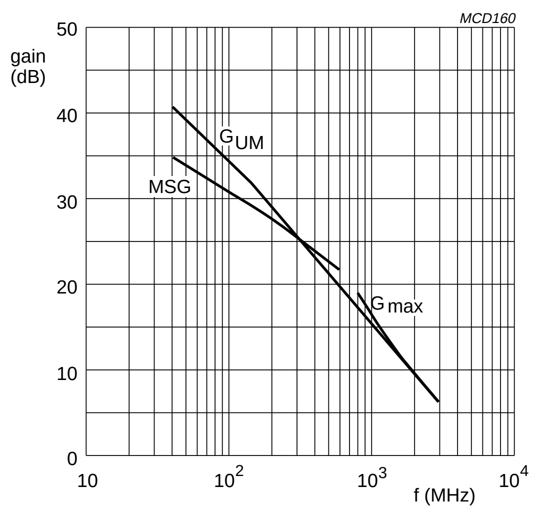
V_{CE} = 4 V; I_C = 50 mA.

Fig.8 Gain as a function of frequency.



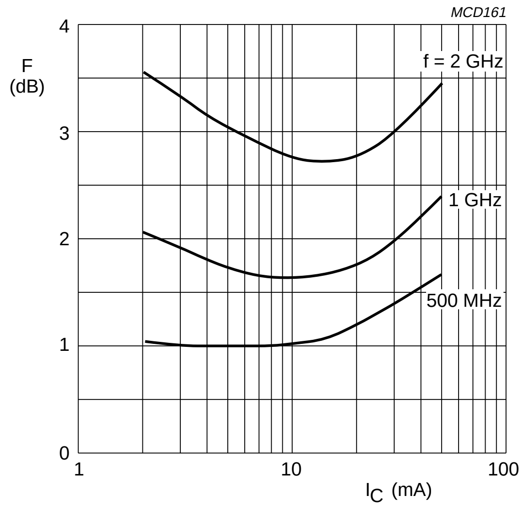
V_{CE} = 6 V; I_C = 50 mA.

Fig.9 Gain as a function of frequency.



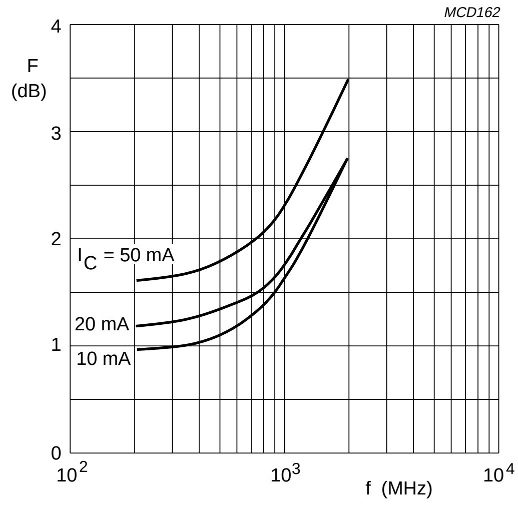
V_{CE} = 8 V; I_C = 30 mA.

Fig.10 Gain as a function of frequency.



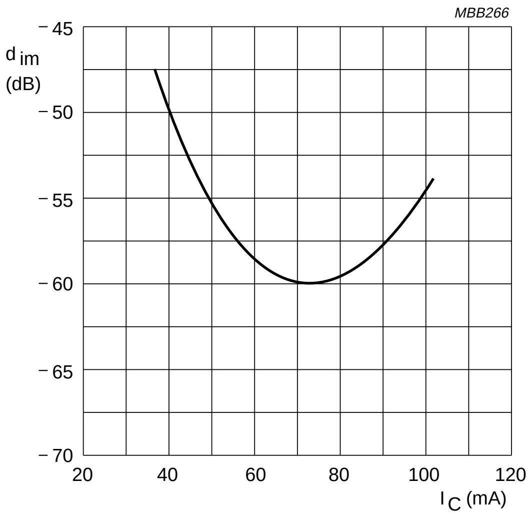
V_{CE} = 6 V.

Fig.11 Minimum noise figure as a function of collector current.



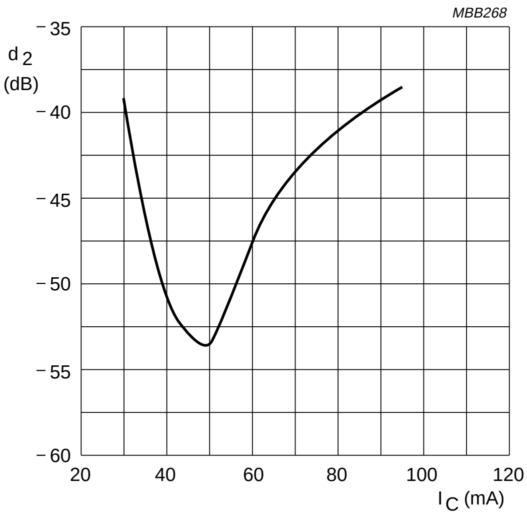
V_{CE} = 6 V.

Fig.12 Minimum noise figure as a function of frequency.



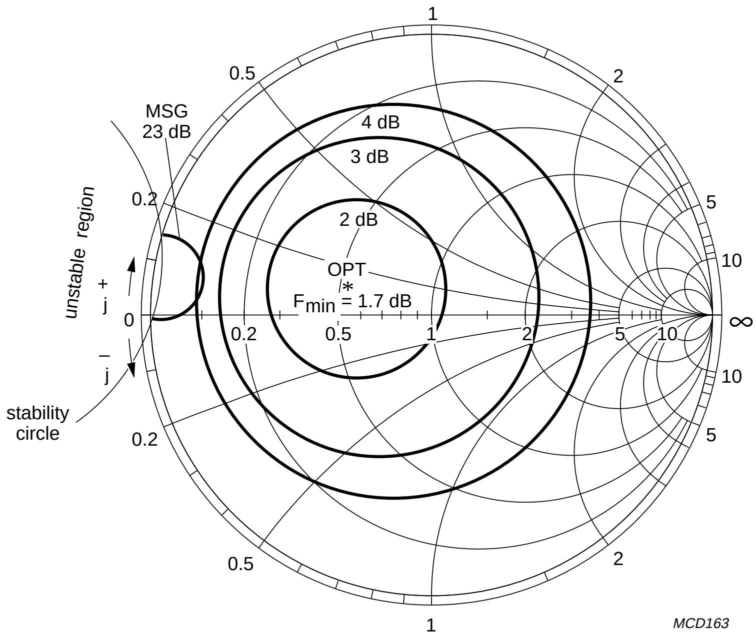
V_{CE} = 8 V ; V_o = 700 mV; $f_{(p+q-r)}$ = 793.25 MHz; T_{amb} = 25 °C.

Fig.13 Intermodulation distortion, typical values.



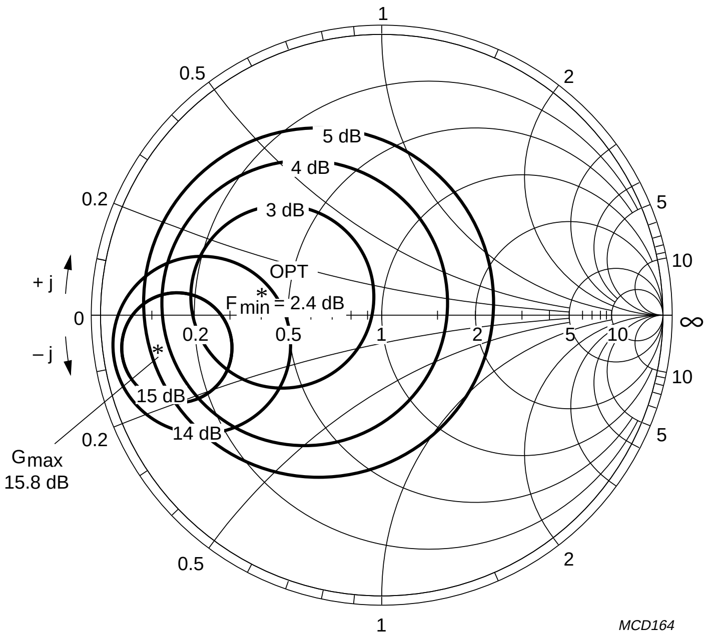
V_{CE} = 8 V; V_o = 50 mV; $f_{(p+q-r)}$ = 810 MHz; T_{amb} = 25 °C.

Fig.14 Second order intermodulation distortion, typical values.



Z_o = 50 Ω.
Maximum stable gain = 23 dB.

Fig.15 Noise circle figure.



Z_o = 50 Ω.

Fig.16 Noise circle figure.

$Z_o = 50\ \Omega$.

Fig.17 Noise circle figure.