DATA SHEET

BFG31
PNP 5 GHz wideband transistor

Product specification
Supersedes data of November 1992
File under Discrete Semiconductors, SC14

1995 Sep 12

Philips
Semiconductors

PHILIPS

PNP 5 GHz wideband transistor BFG31

FEATURES

- High output voltage capability
- High gain bandwidth product
- Good thermal stability
- Gold metallization ensures excellent reliability.

DESCRIPTION

PNP planar epitaxial transistor mounted in a plastic SOT223 envelope.

It is intended for wideband amplifier applications.

NPN complement is the BFG97.

PINNING

PIN	DESCRIPTION
1	emitter
2	base
3	emitter
4	collector

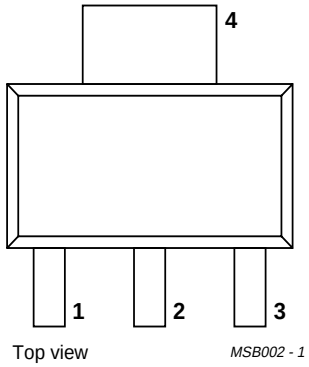


Fig.1 SOT223.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
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 = 135 °C ; note 1	–	–	1	W
h_{FE}	DC current gain	I_C = –70 mA; V_{CE} = –10 V; T_{amb} = 25 °C	25	–	–	
f_T	transition frequency	I_C = –70 mA; V_{CE} = –10 V; f = 500 MHz; T_{amb} = 25 °C	–	5.0	–	GHz
G_{UM}	maximum unilateral power gain	I_C = –70 mA; V_{CE} = –10 V; f = 800 MHz; T_{amb} = 25 °C	–	12	–	dB
V_o	output voltage	I_C = –100 mA; V_{CE} = –10 V; R_L = 75 Ω; T_{amb} = 25 °C	–	600	–	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 = 135 °C; note 1	–	1	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	175	°C

Note

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

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	up to T_s = 135 °C; note 1	40 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
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = –10 mA	–20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; I_C = –10 mA	–18	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; I_E = –0.1 mA	–3	–	–	V
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = –10 V	–	–	–1	µA
h_{FE}	DC current gain	I_C = –70 mA; V_{CE} = –10 V; T_{amb} = 25 °C	25	–	–	
C_{cb}	collector-base capacitance	I_C = 0; V_{CB} = –10 V; f = 1 MHz;	–	1.8	–	pF
C_{eb}	emitter-base capacitance	I_C = 0; V_{EB} = –10 V; f = 1 MHz	–	5	–	pF
C_{re}	feedback capacitance	I_C = 0; V_{CE} = –10 V; f = 1 MHz; T_{amb} = 25 °C	–	1.6	–	pF
f_T	transition frequency	I_C = –70 mA; V_{CE} = –10 V; f = 500 MHz; T_{amb} = 25 °C	–	5	–	GHz
G_{UM}	maximum unilateral power gain; note 1	I_C = –70 mA; V_{CE} = –10 V; f = 500 MHz; T_{amb} = 25 °C	–	16	–	dB
		I_C = –70 mA; V_{CE} = –10 V; f = 800 MHz; T_{amb} = 25 °C	–	12	–	dB
V_o	output voltage	note 2	–	600	–	mV
V_o	output voltage	note 3	–	550	–	mV

Notes

1. G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and $G_{UM} = 10 \log \frac{|s_{21}|^2}{(1-|s_{11}|^2)(1-|s_{22}|^2)}$ dB.
2. d_{im} = –60 dB; I_C = –70 mA; V_{CE} = –10 V; R_L = 75 Ω; T_{amb} = 25 °C;
   $V_p = V_o$ at d_{im} = –60 dB; f_p = 850.25 MHz;
   $V_q = V_o$ –6 dB; f_q = 858.25 MHz;
   $V_r = V_o$ –6 dB;f_r = 860.25 MHz;
   measured at $f_{(p+q-r)}$ = 848.25 MHz.
3. d_{im} = –60 dB (DIN 45004B); I_C = –70 mA; V_{CE} = –10 V; R_L = 75 Ω; T_{amb} = 25 °C;
   $V_p = V_o$ = at d_{im} = –60 dB; f_p = 445.25 MHz;
   $V_q = V_o$ –6 dB; f_q = 453.25 MHz;
   $V_r = V_o$ –6 dB; f_r = 455.25 MHz;
   measured at $f_{(p+q-r)}$ = 443.25 MHz.

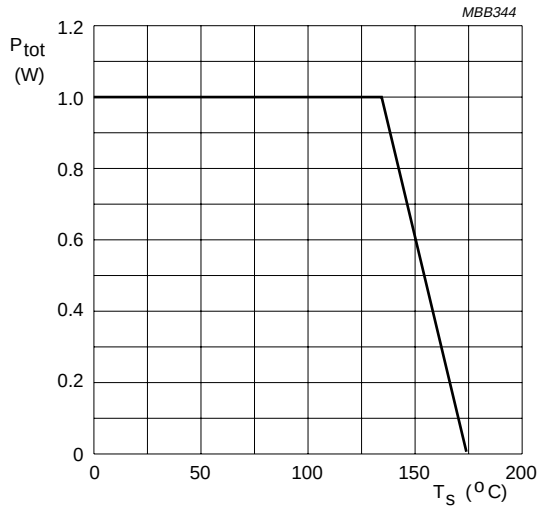
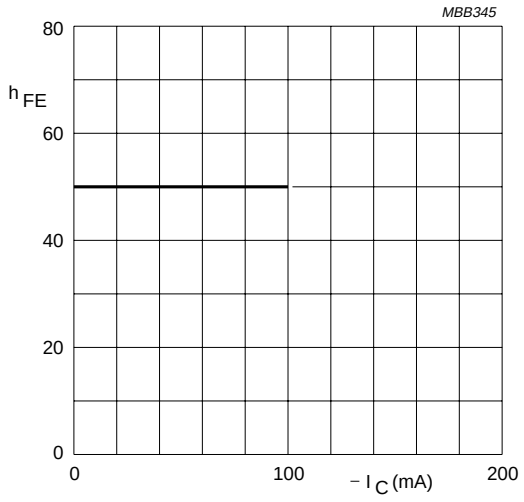
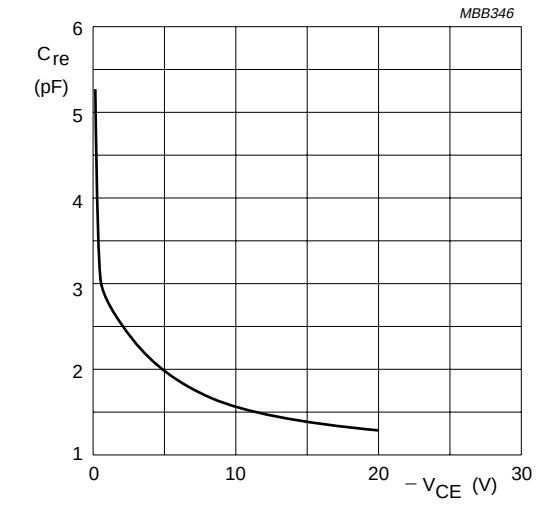


Fig.2 Power derating curve.



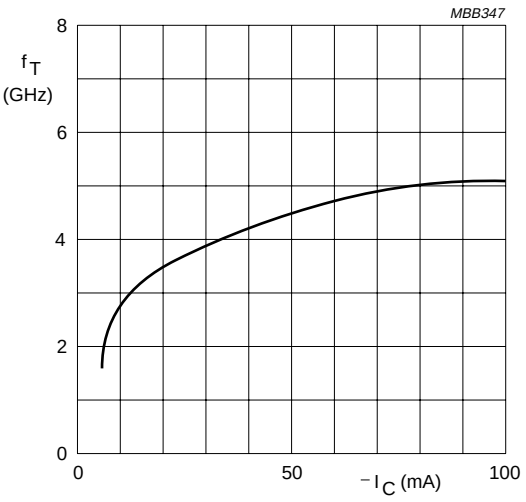
V_{CE} = –10 V; T_{amb} = 25 °C.

Fig.3 DC current gain as a function of collector current.



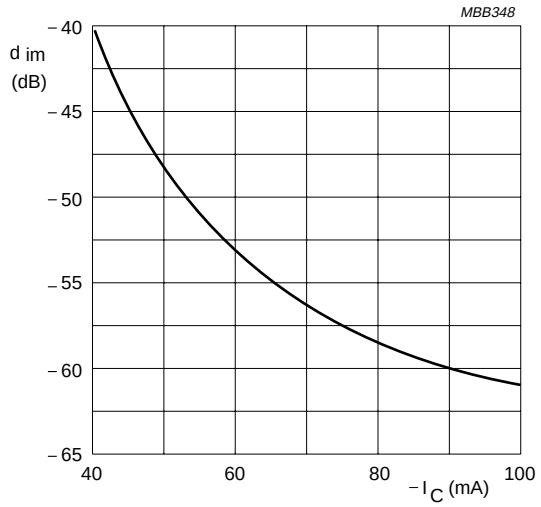
f = 1 MHz; T_{amb} = 25 °C

Fig.4 Feedback capacitance as a function of collector-emitter voltage.



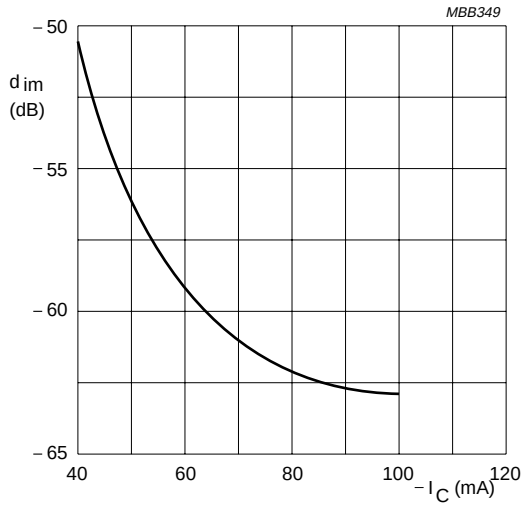
V_{CE} = –10 V; T_{amb} = 25 °C.

Fig.5 Transition frequency as a function of collector current.



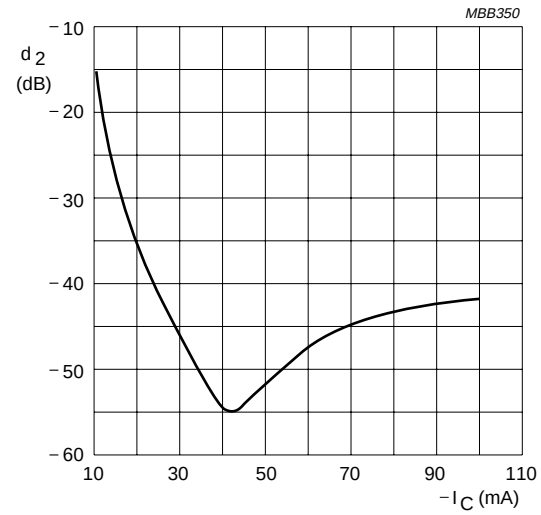
V_{CE} = –10 V; V_o = 650 mV; T_{amb} = 25 °C;
$f_{(p+q-r)}$ = 443.25 MHz.

Fig.6 Intermodulation distortion as a function of collector current.



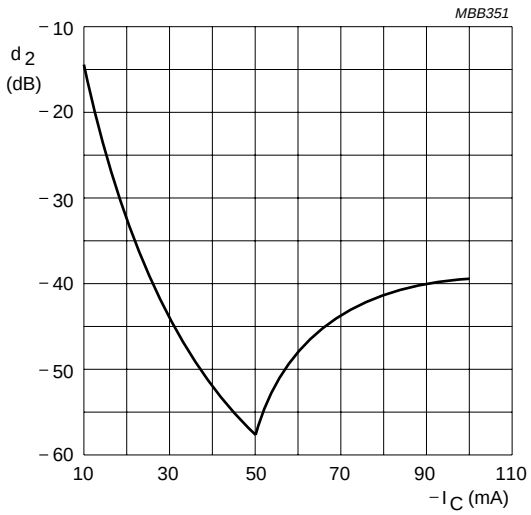
V_{CE} = –10 V; V_o = 550 mV; T_{amb} = 25 °C;
$f_{(p+q-r)}$ = 848.25 MHz.

Fig.7 Intermodulation distortion as a function of collector current.



V_{CE} = –10 V; V_o = 50 dBmV; T_{amb} = 25 °C;
$f_{(p+q)}$ = 450 MHz.

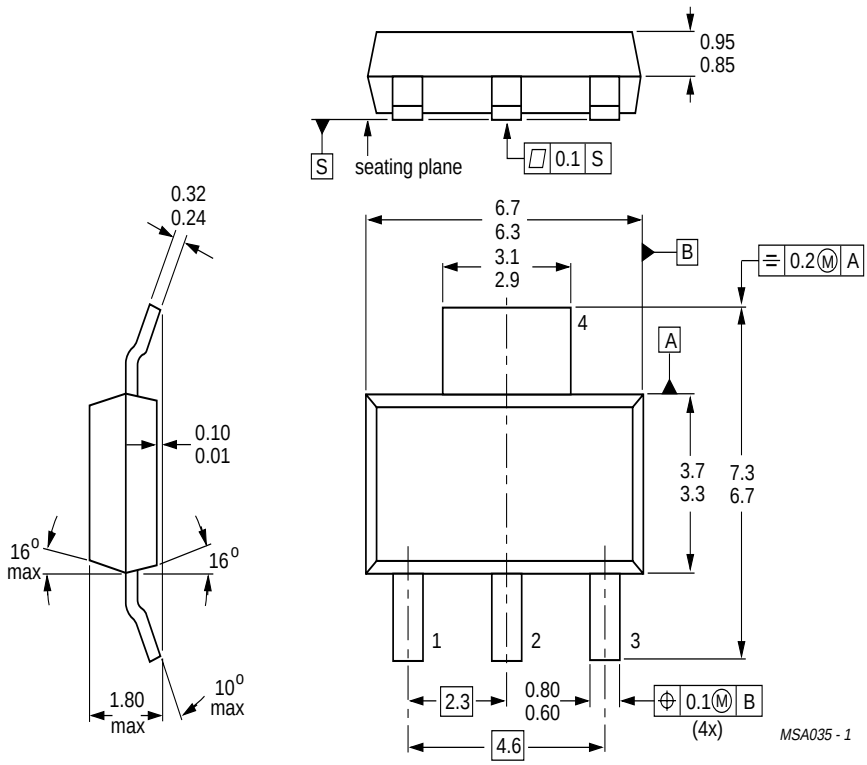
Fig.8 Second order intermodulation distortion as a function of collector current.



V_{CE} = –10 V; V_o = 50 dBmV; T_{amb} = 25 °C;
$f_{(p+q)}$ = 810 MHz.

Fig.9 Second order intermodulation distortion as a function of collector current.

PACKAGE OUTLINE



Dimensions in mm.

Fig.10 SOT223.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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