

# DATA SHEET

**BFG17A**

**NPN 3 GHz wideband transistor**

Product specification  
File under Discrete Semiconductors, SC14

1995 Sep 12

## NPN 3 GHz wideband transistor

## BFG17A

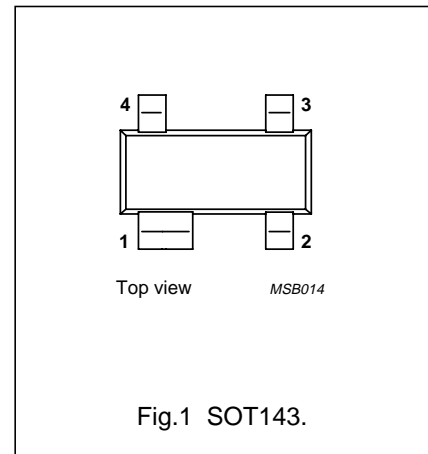
## DESCRIPTION

NPN wideband transistor in a microminiature plastic SOT143 surface mounting envelope with double emitter bonding.

It is intended for use in wideband aerial amplifiers using SMD technology.

## PINNING

PIN	DESCRIPTION
Code: E6	
1	collector
2	base
3	emitter
4	emitter



## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–	25	V
$V_{CEO}$	collector-emitter voltage	open base	–	–	15	V
$I_C$	DC collector current		–	–	50	mA
$P_{tot}$	total power dissipation	up to $T_s = 85\text{ °C}$ ; note 1	–	–	300	mW
$h_{FE}$	DC current gain	$I_C = 25\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $T_{amb} = 25\text{ °C}$	20	–	150	
$f_T$	transition frequency	$I_C = 25\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	2.8	–	GHz
$C_{re}$	feedback capacitance	$I_C = 0$ ; $V_{CE} = 5\text{ V}$ ; $f = 1\text{ MHz}$	–	0.4	–	pF
$G_{UM}$	maximum unilateral power gain	$I_C = 15\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 800\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	15	–	dB
F	noise figure	$I_C = 2\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $f = 800\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$ ; $Z_S = 60\text{ }\Omega$ ; $b_s = \text{opt.}$	–	2.5	–	dB

## LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	25	V
$V_{CEO}$	collector-emitter voltage	open base	–	15	V
$V_{EBO}$	emitter-base voltage	open collector	–	2.5	V
$I_C$	DC collector current		–	50	mA
$P_{tot}$	total power dissipation	up to $T_s = 85\text{ °C}$ ; note 1	–	300	mW
$T_{stg}$	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.

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## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 85\text{ °C}$ ; note 1	290	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.

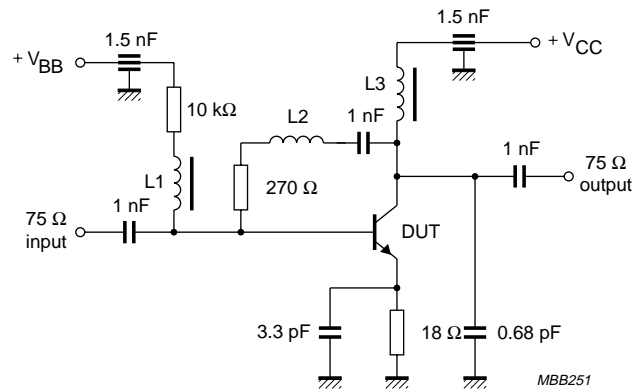
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0$ ; $V_{CB} = 10\text{ V}$	–	–	50	nA
$h_{FE}$	DC current gain	$I_C = 25\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $T_{amb} = 25\text{ °C}$	20	75	150	
$f_T$	transition frequency	$I_C = 25\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	2.8	–	GHz
$C_c$	collector capacitance	$I_E = 0$ ; $V_{CB} = 10\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	0.7	–	pF
$C_e$	emitter capacitance	$I_C = 0$ ; $V_{EB} = 0.5\text{ V}$ ; $f = 1\text{ MHz}$	–	1.25	–	pF
$C_{re}$	feedback capacitance	$I_C = 0$ ; $V_{CE} = 5\text{ V}$ ; $f = 1\text{ MHz}$	–	0.4	–	pF
$G_{UM}$	maximum unilateral power gain (note 1)	$I_C = 15\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 800\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	15	–	dB
F	noise figure	$I_C = 2\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $f = 800\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$ ; $Z_S = 60\text{ }\Omega$ ; $b_s = \text{opt.}$	–	2.5	–	dB
$V_o$	output voltage	note 2	–	150	–	mV

## Notes

- $G_{UM}$  is the maximum unilateral power gain, assuming  $S_{12}$  is zero and  $G_{UM} = 10 \log \frac{|s_{21}|^2}{(1 - |s_{11}|^2)(1 - |s_{22}|^2)}$  dB..
- $d_{im} = -60\text{ dB}$  (DIN 45004B, para. 6,3: 3-tone);  $I_C = 14\text{ mA}$ ;  $V_{CE} = 10\text{ V}$ ;  $Z_L = 75\text{ }\Omega$ .  
 $V_p = V_o$ ;  $f_p = 795.25\text{ MHz}$ ;  
 $V_q = V_o - 6\text{ dB}$ ;  $f_q = 803.25\text{ MHz}$ ;  
 $V_r = V_o - 6\text{ dB}$ ;  $f_r = 805.25\text{ MHz}$ ;  
measured at  $f_{(p+q-r)} = 793.25\text{ MHz}$ .

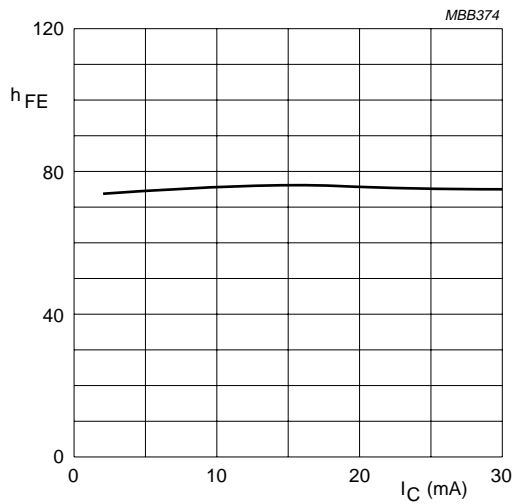
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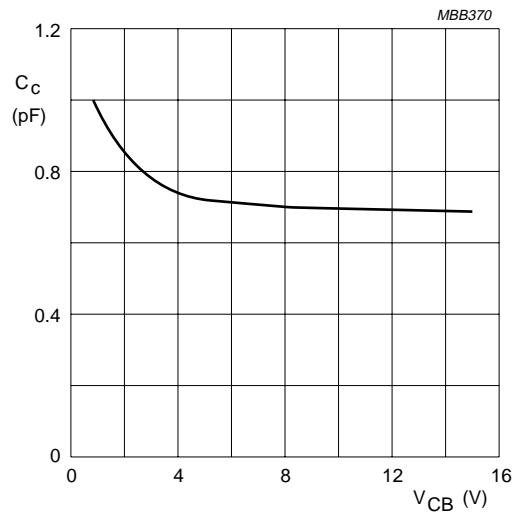
- (1) L1 = L3 = 5 μH Ferroxcube choke.
- (2) L2 = 3 turns 0.4 mm copper wire, internal diameter 3 mm, winding pitch 1 mm.

Fig.2 Intermodulation distortion and second order intermodulation distortion MATV test circuit.



V<sub>CE</sub> = 1 V; T<sub>amb</sub> = 25 °C.

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

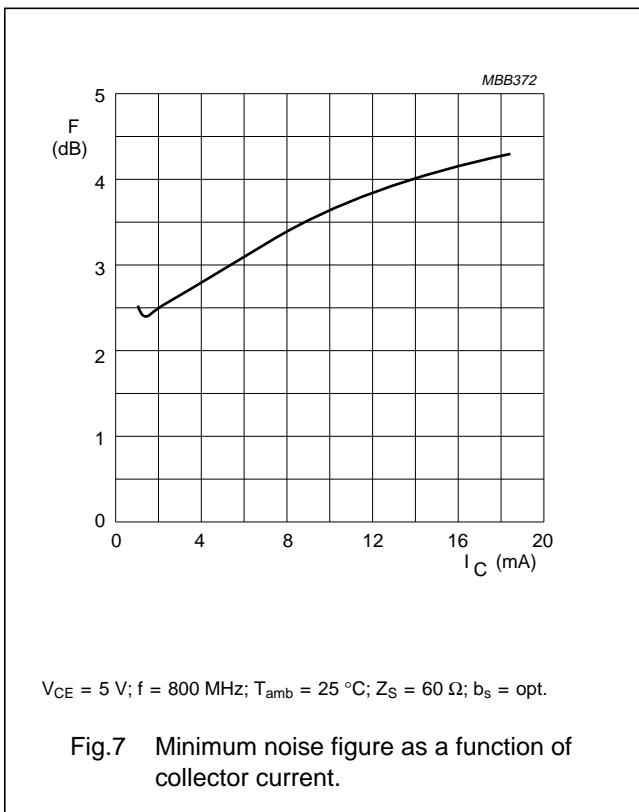
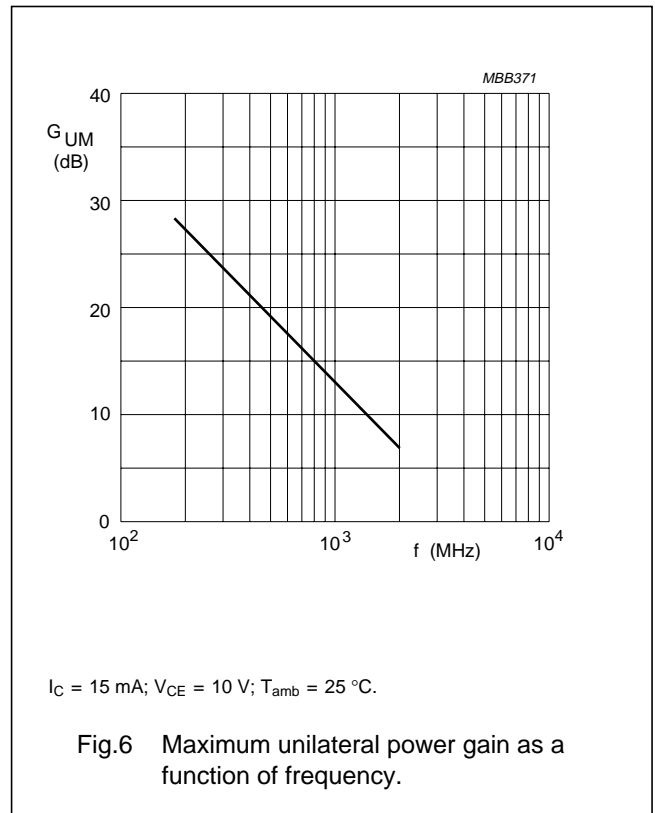
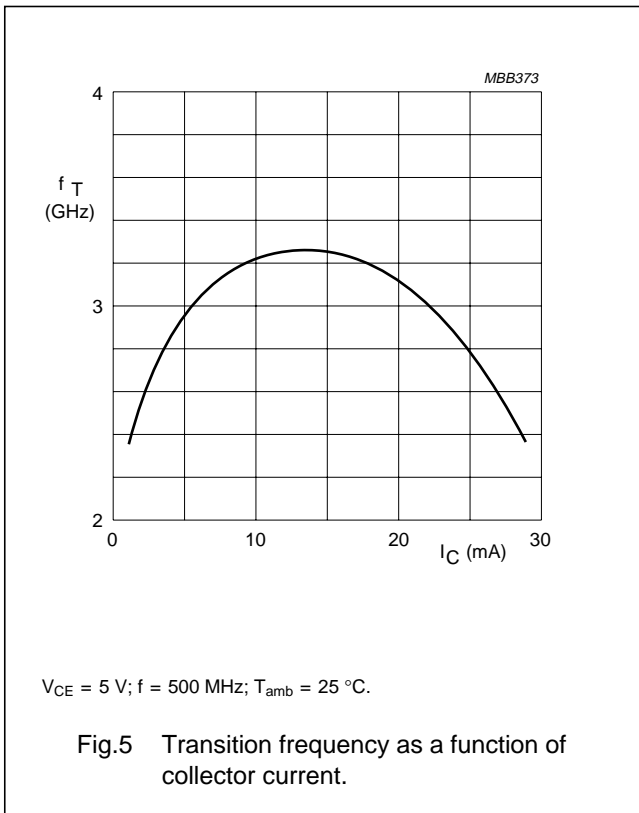


I<sub>E</sub> = 0; f = 1 MHz; T<sub>amb</sub> = 25 °C

Fig.4 Collector capacitance as a function of collector-base voltage.

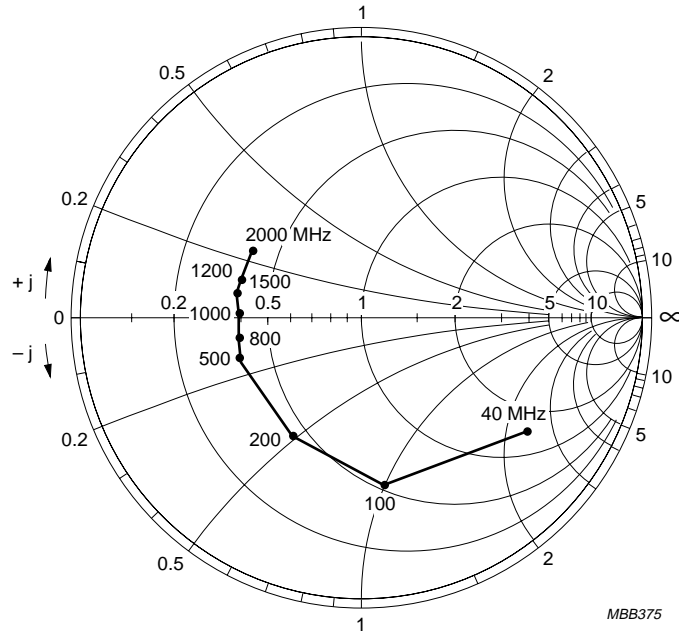
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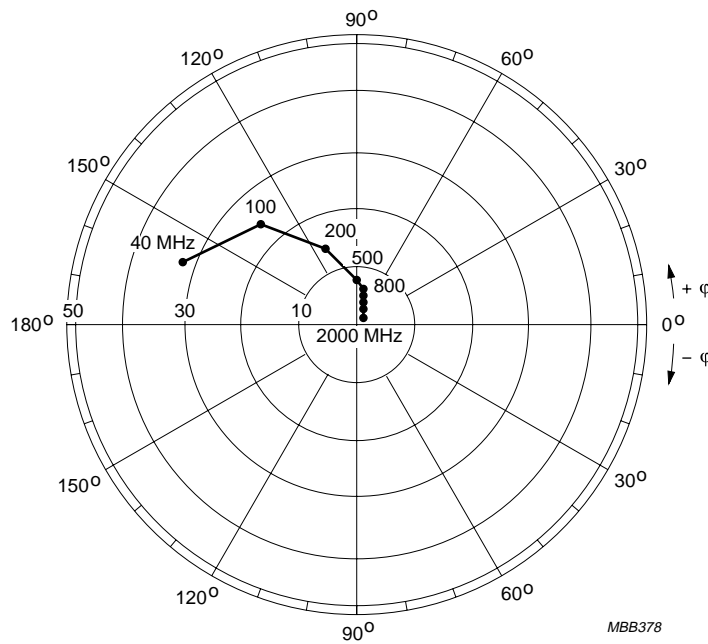
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MBB375

$I_C = 15 \text{ mA}; V_{CE} = 10 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}; Z_o = 50 \text{ } \Omega.$

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



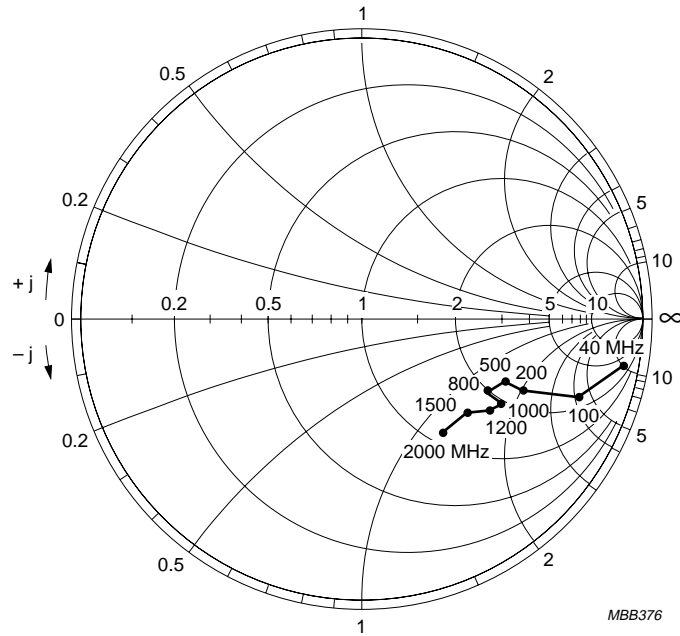
MBB378

$I_C = 15 \text{ mA}; V_{CE} = 10 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}.$

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

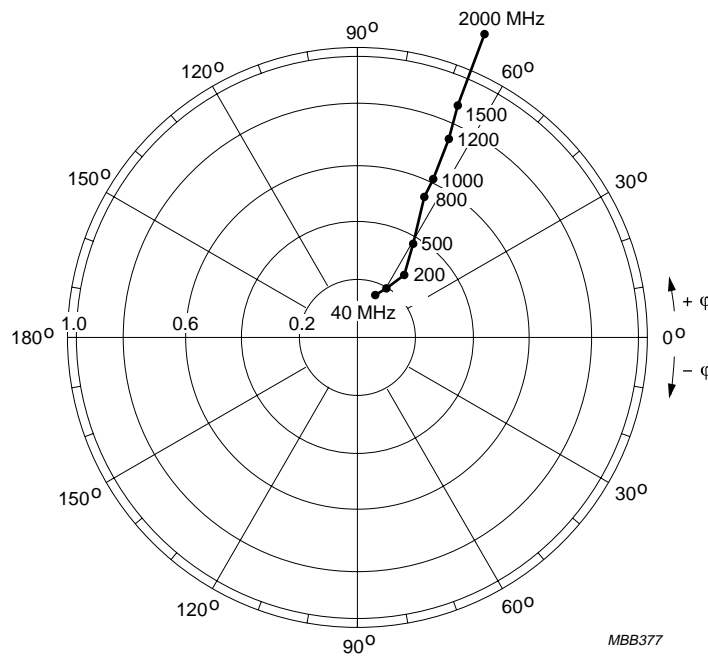
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$I_C = 15 \text{ mA}; V_{CE} = 10 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}.$

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



$I_C = 15 \text{ mA}; V_{CE} = 10 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}; Z_o = 50 \text{ } \Omega.$

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





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**DEFINITIONS**

<b>Data sheet status</b>	
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.
Short-form specification	The data in this specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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