

# DATA SHEET

**BFQ19**

**NPN 5 GHz wideband transistor**

Product specification  
File under Discrete Semiconductors, SC14

September 1995

## NPN 5 GHz wideband transistor

BFQ19

## DESCRIPTION

NPN transistor in a SOT89 plastic envelope intended for application in thick and thin-film circuits. It is primarily intended for use in UHF and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analyzers etc.

The transistor features very low intermodulation distortion and high power gain. Due to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

## PINNING

PIN	DESCRIPTION
Code: FB	
1	emitter
2	collector
3	base

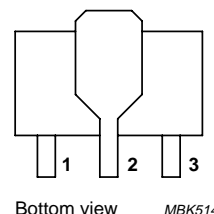


Fig.1 SOT89.

## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	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 $T_s = 145\text{ °C}$ (note 1)	—	1	W
$f_T$	transition frequency	$I_C = 50\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_j = 25\text{ °C}$	5.5	—	GHz
$C_{re}$	feedback capacitance	$I_C = 10\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	1.3	—	pF
F	noise figure	$I_C = 50\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $Z_s = \text{opt.}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	3.3	—	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	—	20	V
$V_{CEO}$	collector-emitter voltage	open base	—	15	V
$V_{EBO}$	emitter-base voltage	open collector	—	3.3	V
$I_C$	DC collector current		—	100	mA
$I_{CM}$	peak collector current	$f > 1\text{ MHz}$	—	150	mA
$P_{tot}$	total power dissipation	up to $T_s = 145\text{ °C}$ (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.

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## THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 145\text{ °C}$ (note 1)	30 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	$I_C = 70\text{ mA}$ ; $V_{CE} = 10\text{ V}$	25	80	–	
$C_c$	collector capacitance	$I_E = i_e = 0$ ; $V_{CB} = 10\text{ V}$ ; $f = 1\text{ MHz}$	–	1.6	–	pF
$C_e$	emitter capacitance	$I_C = i_c = 0$ ; $V_{EB} = 0.5\text{ V}$ ; $f = 1\text{ MHz}$	–	5	–	pF
$C_{re}$	feedback capacitance	$I_C = 10\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	1.3	–	pF
$f_T$	transition frequency	$I_C = 70\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 500\text{ MHz}$	4.4	5.5	–	GHz
$G_{UM}$	maximum unilateral power gain (note 1)	$I_C = 50\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	11.5	–	dB
		$I_C = 50\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 800\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	7.5	–	dB
F	noise figure	$I_C = 50\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $Z_s = \text{opt.}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	–	3.3	–	dB

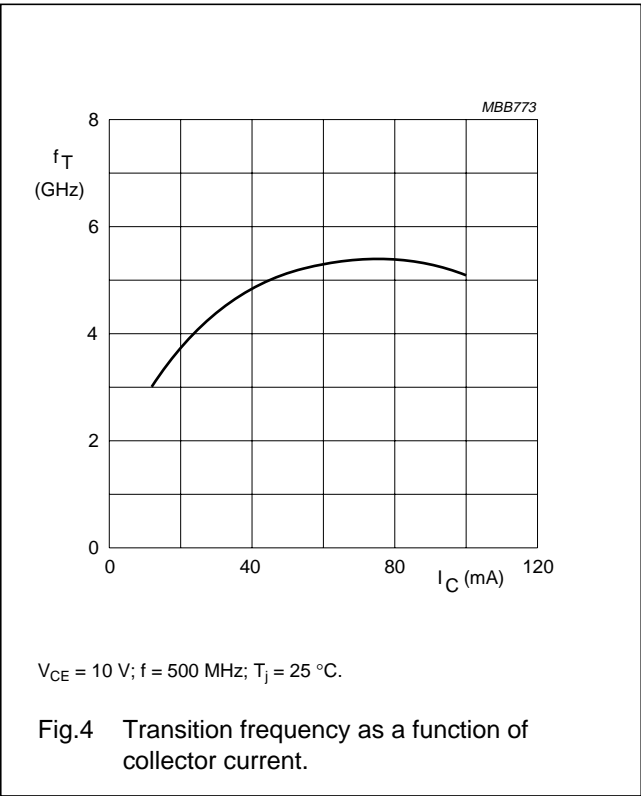
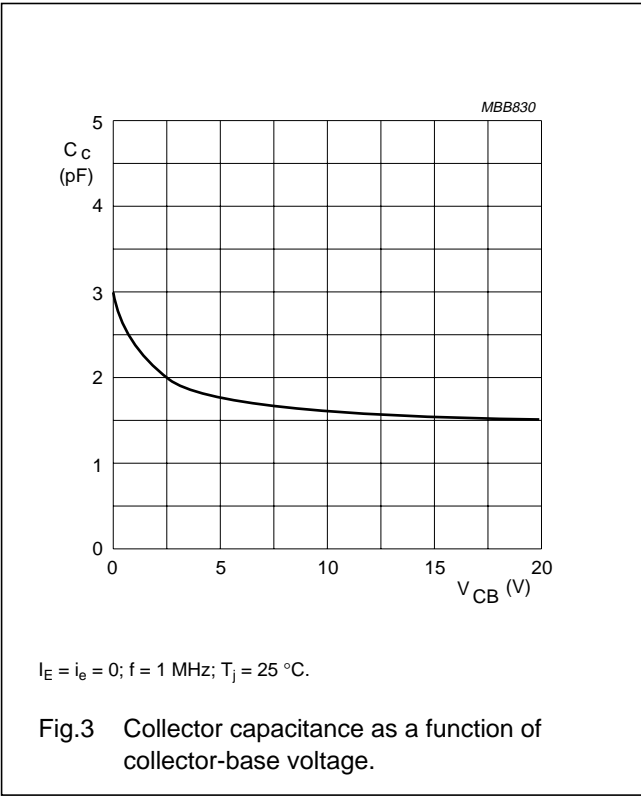
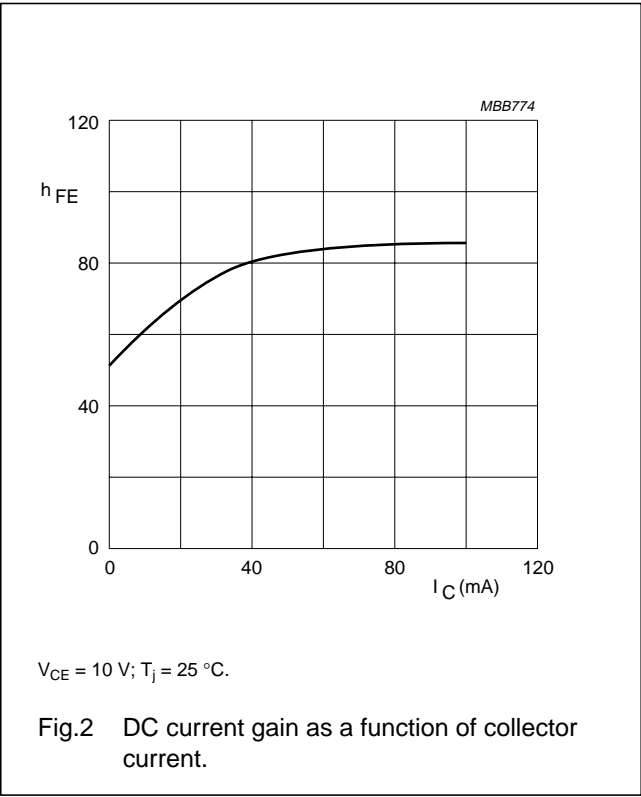
## Note

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

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

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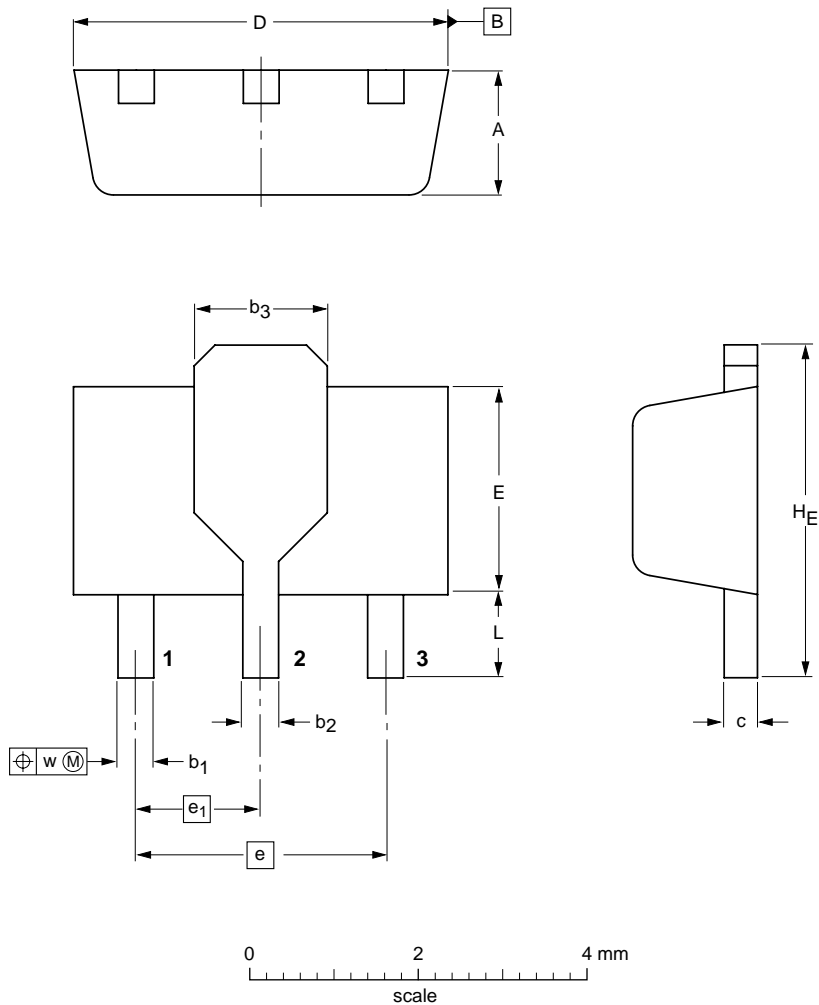
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PACKAGE OUTLINE


Plastic surface mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	b <sub>1</sub>	b <sub>2</sub>	b <sub>3</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L min.	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.37	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	0.8	0.13

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT89						97-02-28

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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.
<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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