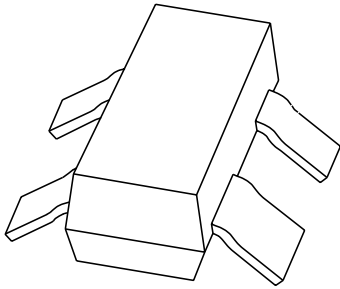


DATA SHEET



BFG590; BFG590/X NPN 5 GHz wideband transistors

Product specification
Supersedes data of 1995 Sep 19

1998 Oct 02

NPN 5 GHz wideband transistors

BFG590; BFG590/X

FEATURES

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

APPLICATIONS

- MATV/CATV amplifiers and RF communications subscriber equipment in the GHz range
- Ideally suitable for use in class-A, (A)B and C amplifiers with either pulsed or continuous drive.

DESCRIPTION

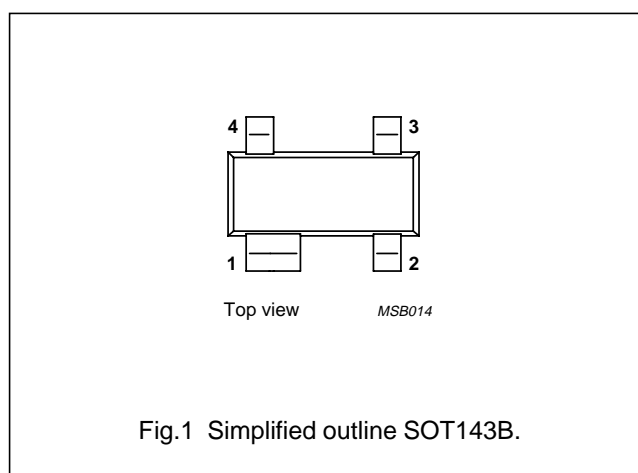
NPN silicon planar epitaxial transistor in a 4-pin dual-emitter SOT143B plastic package.

MARKING

TYPE NUMBER	CODE
BFG590	N38
BFG590/X	N44

PINNING

PIN	DESCRIPTION	
	BFG590	BFG590/X
1	collector	collector
2	base	emitter
3	emitter	base
4	emitter	emitter



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	–	–	15	V
I_C	collector current (DC)		–	–	200	mA
P_{tot}	total power dissipation	$T_s \leq 60\text{ °C}$	–	–	400	mW
h_{FE}	DC current gain	$I_C = 35\text{ mA}; V_{CE} = 8\text{ V}$	50	90	280	
C_{re}	feedback capacitance	$I_C = 0; V_{CE} = 8\text{ V}; f = 1\text{ MHz}$	–	0.7	–	pF
f_T	transition frequency	$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}; f = 1\text{ GHz}$	–	5	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	13	–	dB
$ S_{21} ^2$	insertion power gain	$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	11	–	dB

NPN 5 GHz wideband transistors

BFG590; BFG590/X

LIMITING VALUES

In accordance with the Absolute Maximum Rating 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	collector current (DC)		–	200	mA
P _{tot}	total power dissipation	T _s ≤ 60 °C; see Fig.2; note 1	–	400	mW
T _{stg}	storage temperature		–65	+150	°C
T _j	junction temperature		–	175	°C

Note

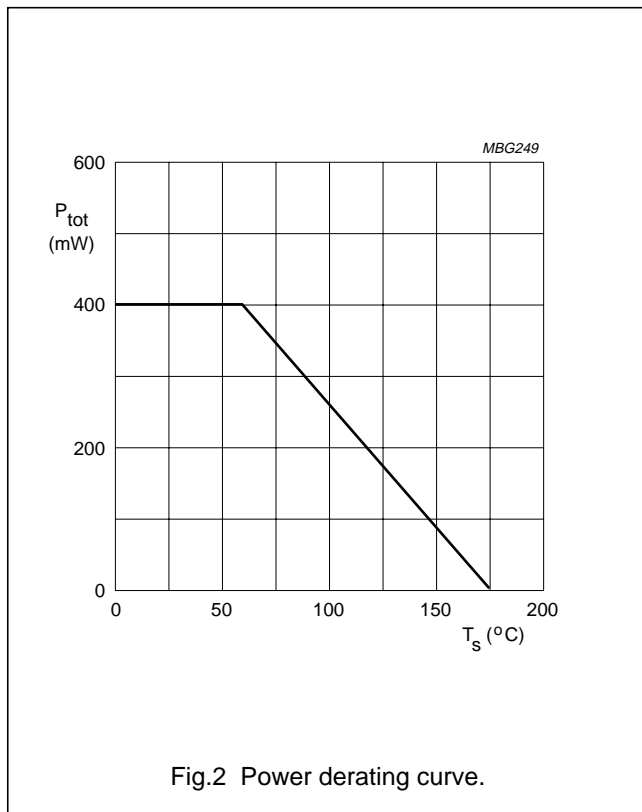
1. T_s is the temperature at the soldering point of the collector pin.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th j-s}	thermal resistance from junction to soldering point	T _s ≤ 60 °C; note 1	290	K/W

Note

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



NPN 5 GHz wideband transistors

BFG590; BFG590/X

CHARACTERISTICS

$T_j = 25\text{ °C}$ unless otherwise specified.

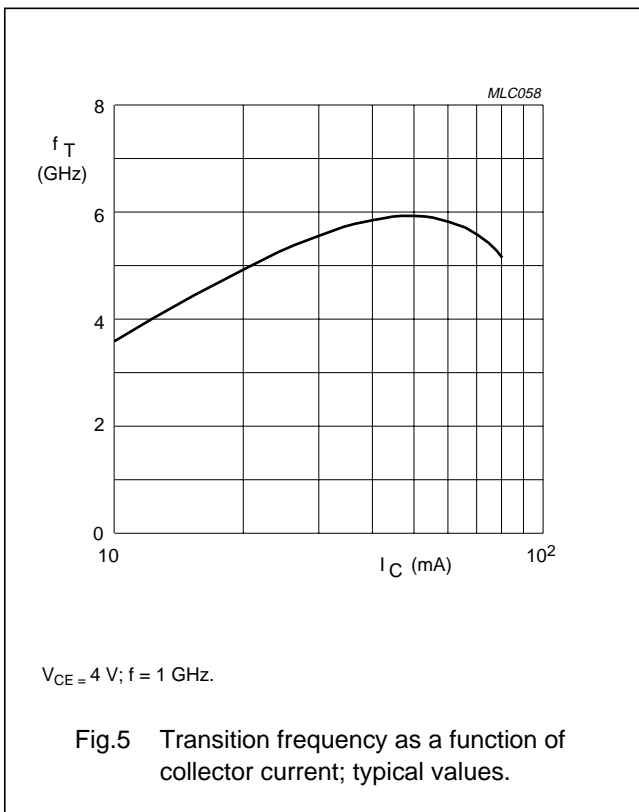
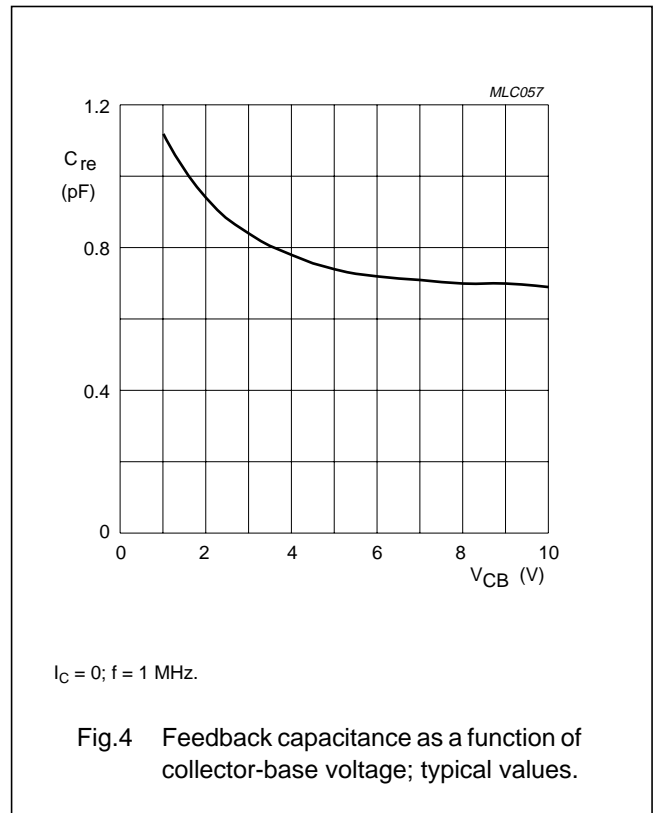
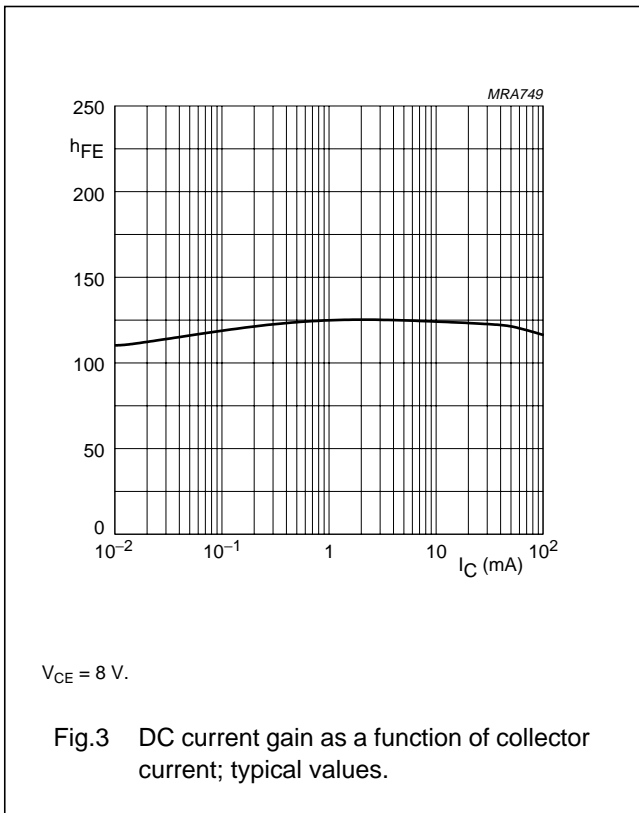
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 0.1\text{ mA}; I_E = 0$	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 10\text{ mA}; I_B = 0$	15	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 0.1\text{ mA}; I_C = 0$	3	–	–	V
I_{CBO}	collector-base leakage current	$V_{CB} = 10\text{ V}; I_E = 0$	–	–	100	nA
h_{FE}	DC current gain	$I_C = 70\text{ mA}; V_{CE} = 8\text{ V}$; see Fig.3	60	120	250	
f_T	transition frequency	$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}$; $f = 1\text{ GHz}$; see Fig.5	–	5	–	GHz
C_{re}	feedback capacitance	$I_C = 0; V_{CB} = 8\text{ V}; f = 1\text{ MHz}$; see Fig.4	–	0.7	–	pF
G_{UM}	maximum unilateral power gain; note 1	$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}$; $f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	13	–	dB
		$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}; f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	7.5	–	dB
$ S_{21} ^2$	insertion power gain	$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}$; $f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	11	–	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.

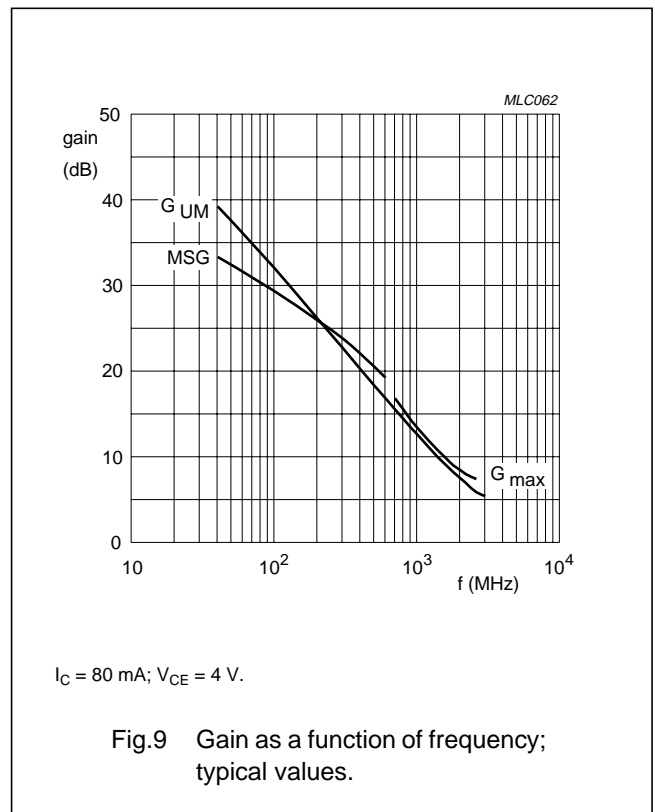
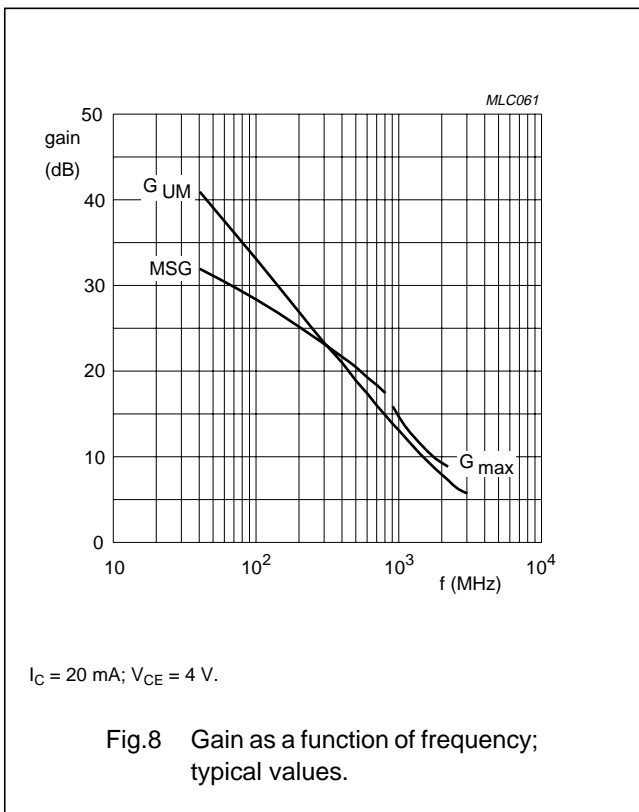
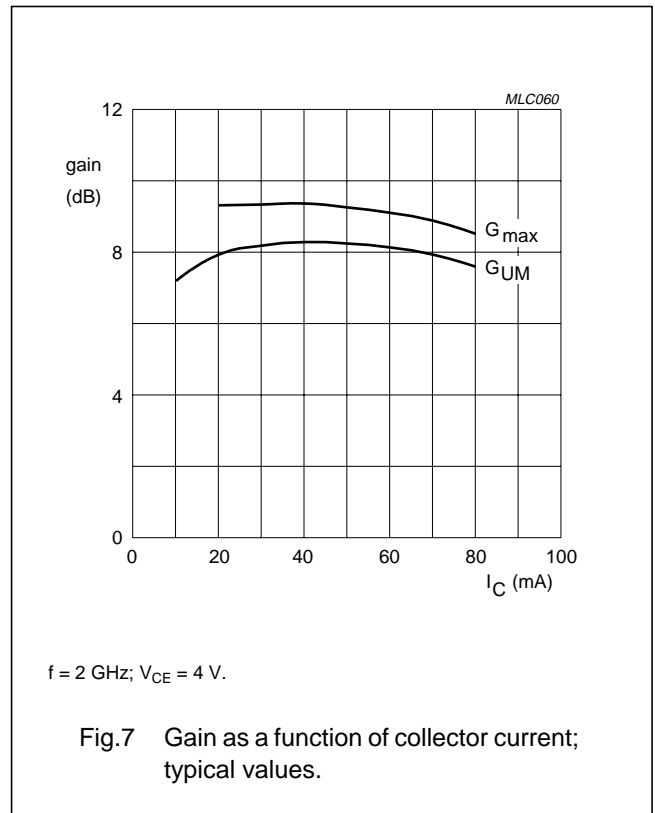
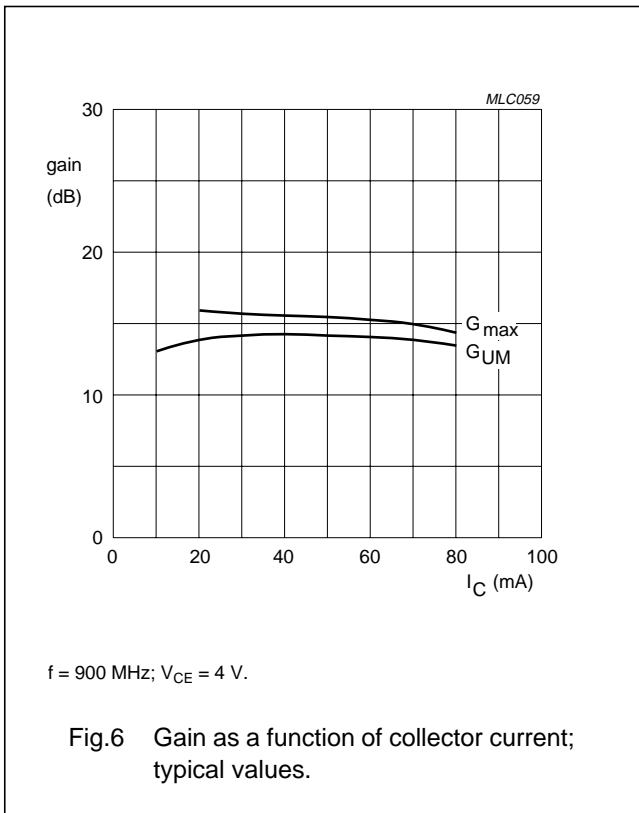
NPN 5 GHz wideband transistors

BFG590; BFG590/X



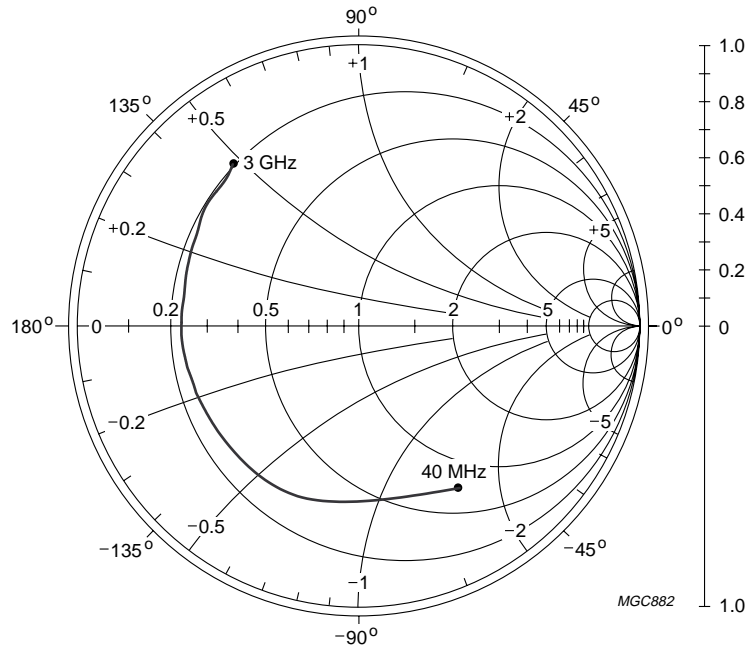
NPN 5 GHz wideband transistors

BFG590; BFG590/X



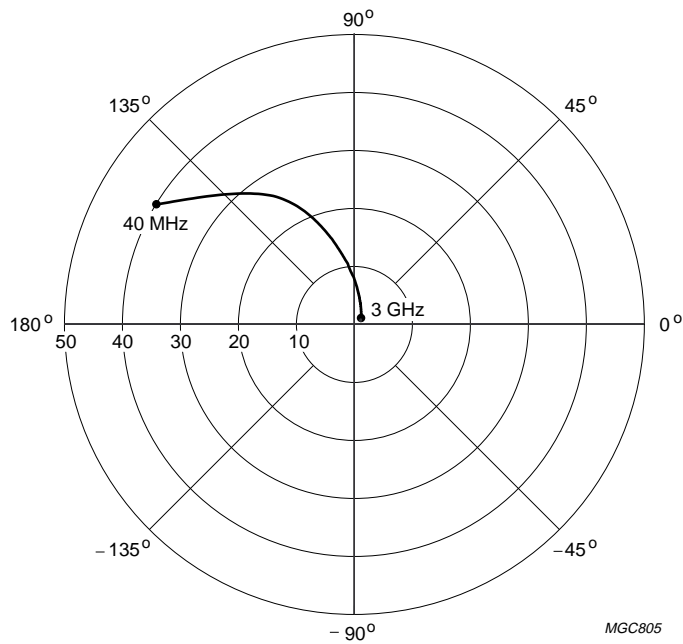
NPN 5 GHz wideband transistors

BFG590; BFG590/X



$I_C = 80 \text{ mA}; V_{CE} = 4 \text{ V}; Z_o = 50 \Omega.$

Fig.10 Common emitter input reflection coefficient (S_{11}); typical values.

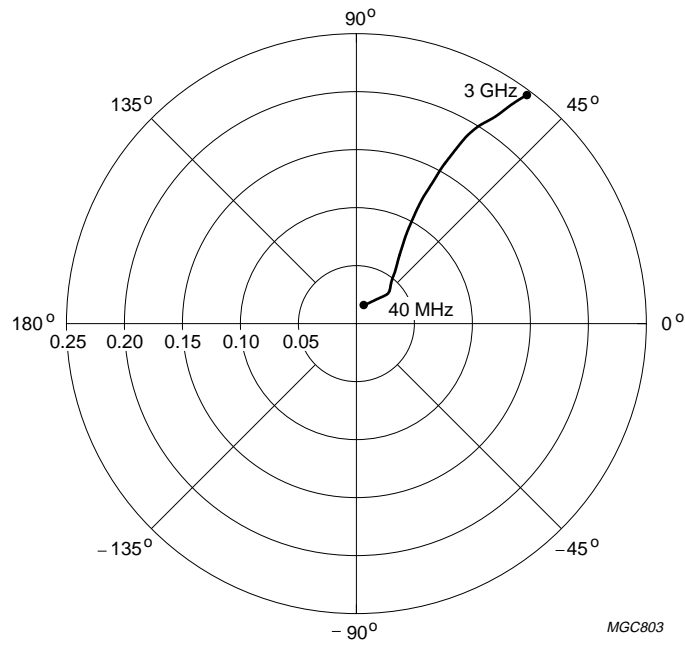


$I_C = 80 \text{ mA}; V_{CE} = 4 \text{ V}.$

Fig.11 Common emitter forward transmission coefficient (S_{21}); typical values.

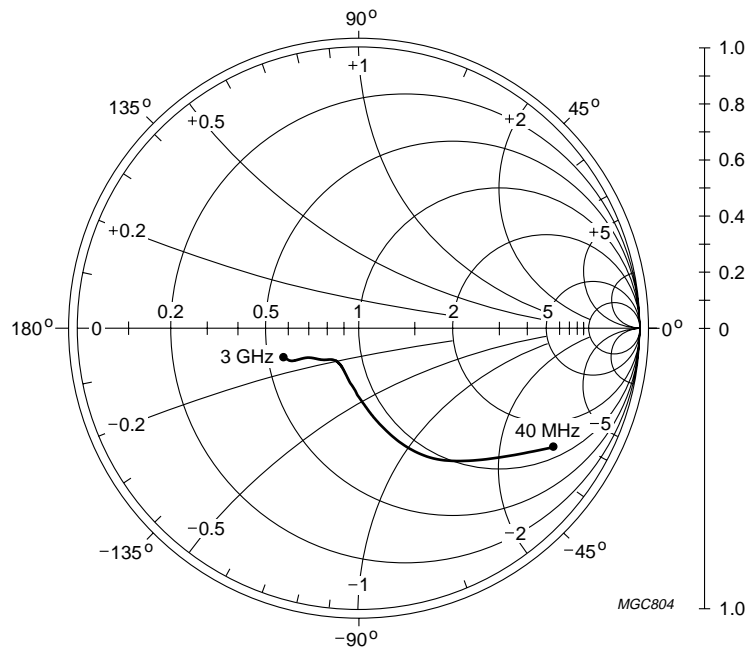
NPN 5 GHz wideband transistors

BFG590; BFG590/X



$I_C = 80 \text{ mA}$; $V_{CE} = 4 \text{ V}$.

Fig.12 Common emitter reverse transmission coefficient (S_{12}); typical values.



$I_C = 80 \text{ mA}$; $V_{CE} = 4 \text{ V}$; $Z_0 = 50 \Omega$.

Fig.13 Common emitter output reflection coefficient (S_{22}); typical values.

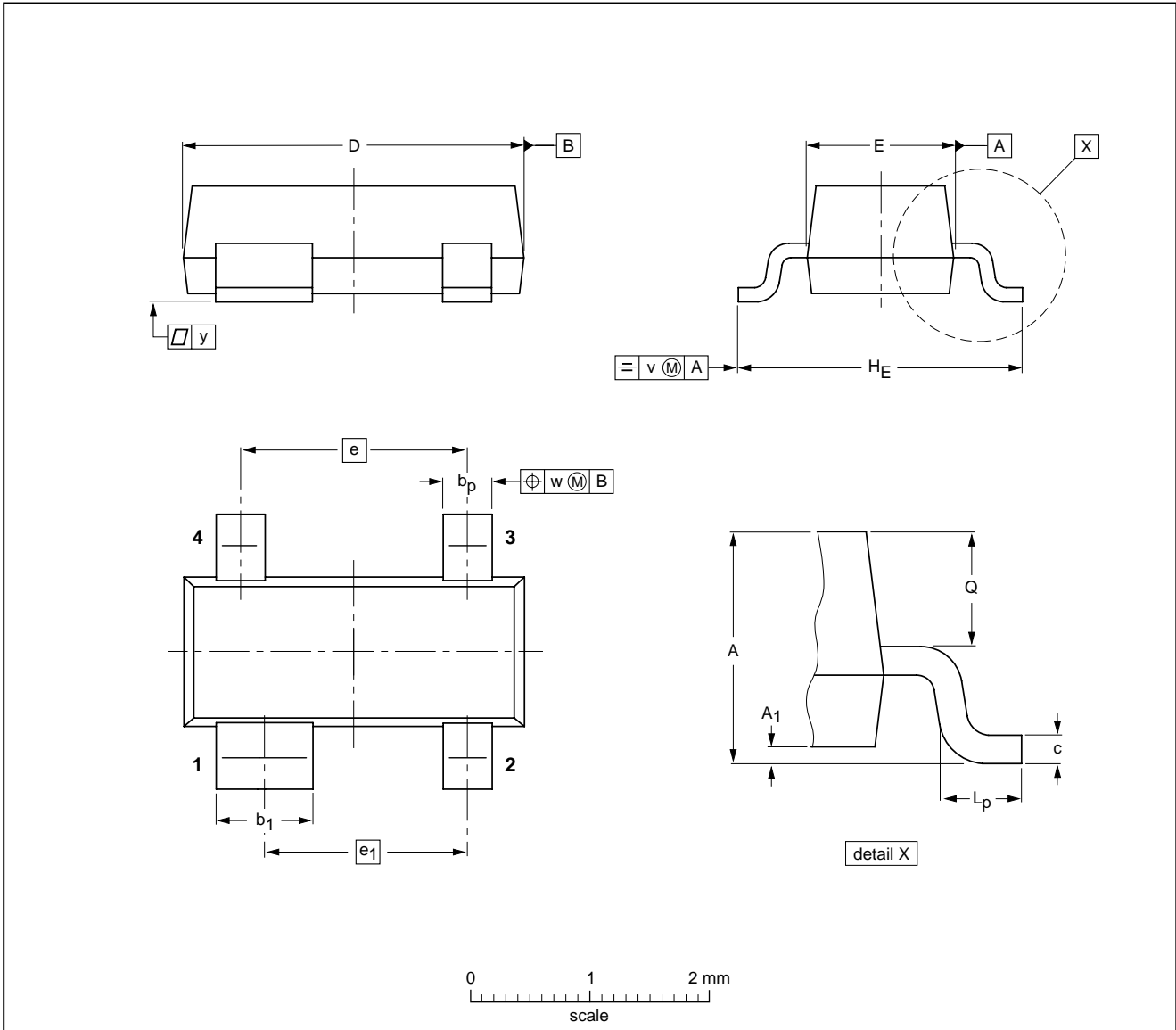
NPN 5 GHz wideband transistors

BFG590; BFG590/X

PACKAGE OUTLINE

Plastic surface mounted package; 4 leads

SOT143B



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max	b _p	b ₁	c	D	E	e	e ₁	H _E	L _p	Q	v	w	y
mm	1.1 0.9	0.1	0.48 0.38	0.88 0.78	0.15 0.09	3.0 2.8	1.4 1.2	1.9	1.7	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT143B						97-02-28

NPN 5 GHz wideband transistors

BFG590; BFG590/X

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.	

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