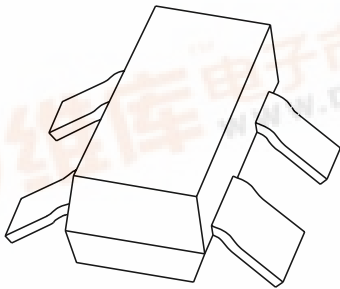


**DISCRETE SEMICONDUCTORS**

# 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

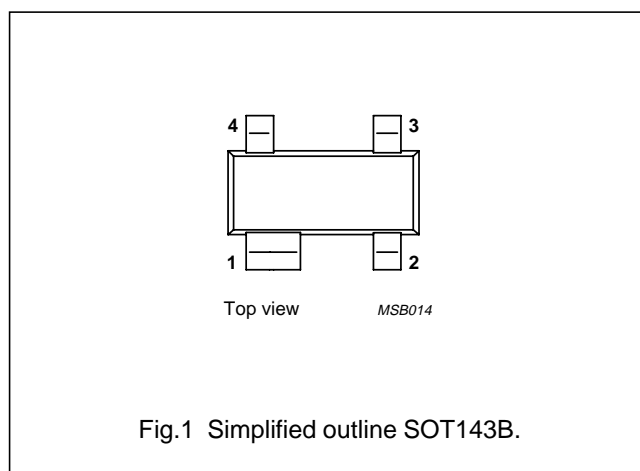
NPN silicon planar epitaxial transistor in a 4-pin dual-emitter SOT143B plastic package.

### 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	$T_s \leq 60\text{ }^\circ\text{C}$	–	–	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	$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	–	13	–	dB
$ S_{21} ^2$	insertion power gain	$I_C = 80\text{ mA}; V_{CE} = 4\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	–	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	$T_s \leq 60\text{ °C}$ ; see Fig.2; note 1	–	400	mW
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	175	°C

**Note**

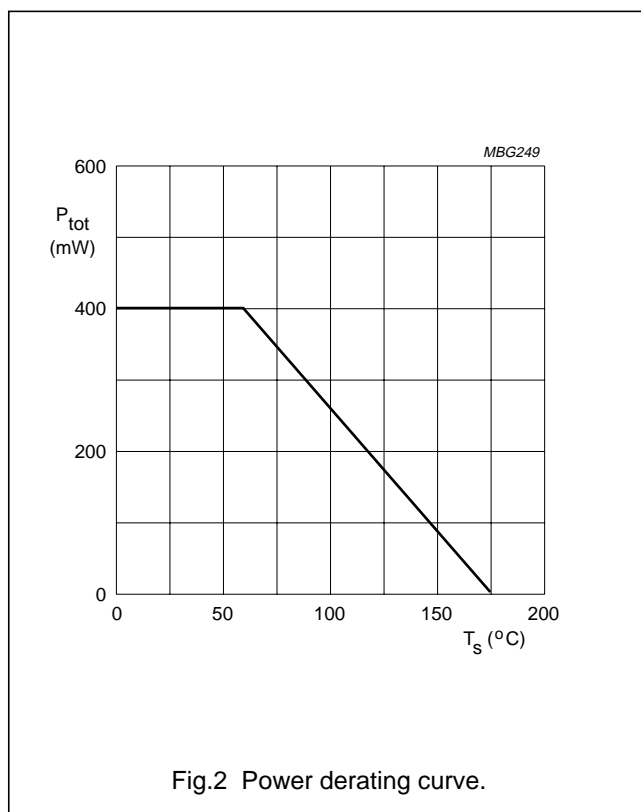
- $T_s$  is the temperature at the soldering point of the collector pin.

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	$T_s \leq 60\text{ °C}$ ; note 1	290	K/W

**Note**

- $T_s$  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.

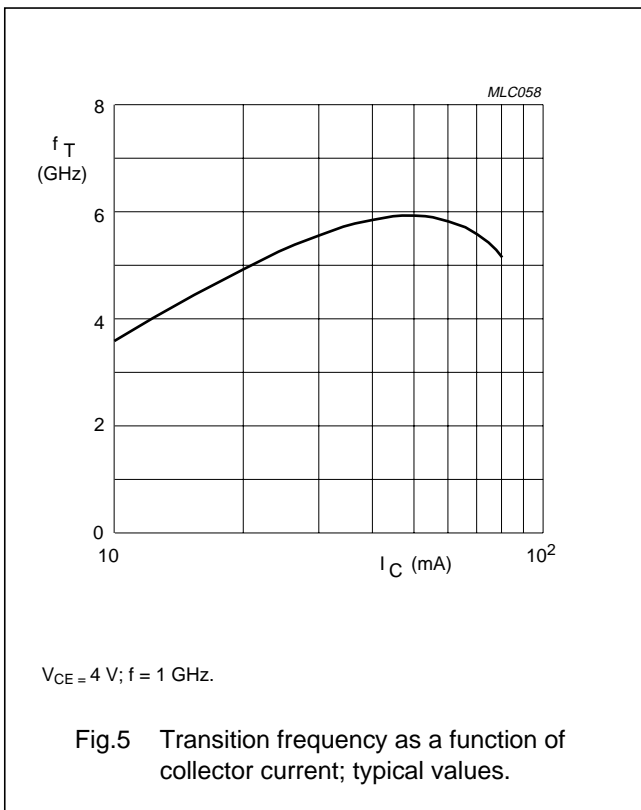
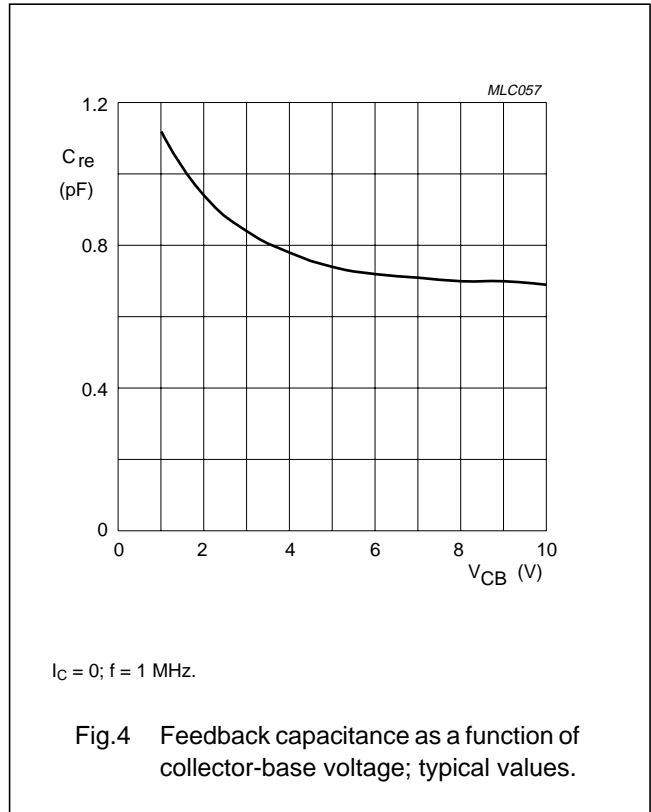
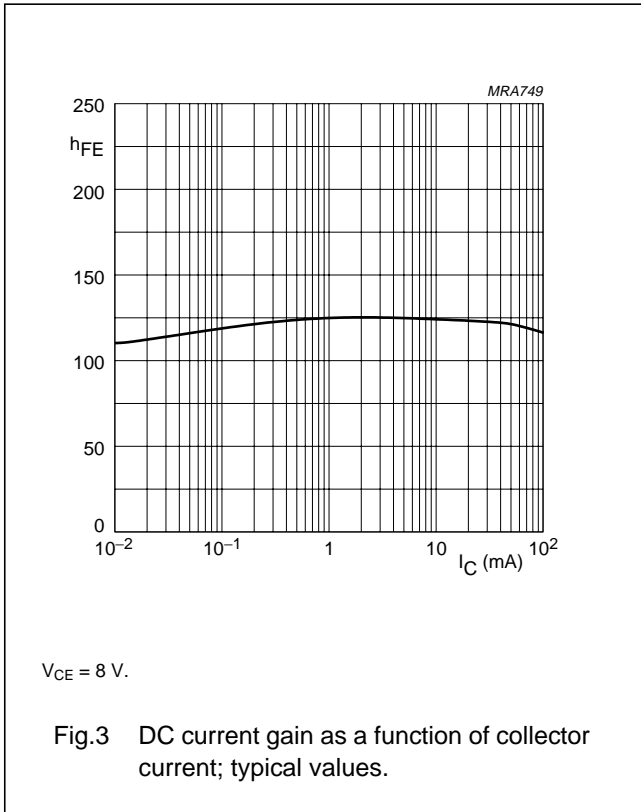
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 0.1\text{ mA}; I_E = 0$	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 10\text{ mA}; I_B = 0$	15	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 0.1\text{ mA}; I_C = 0$	3	–	–	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.

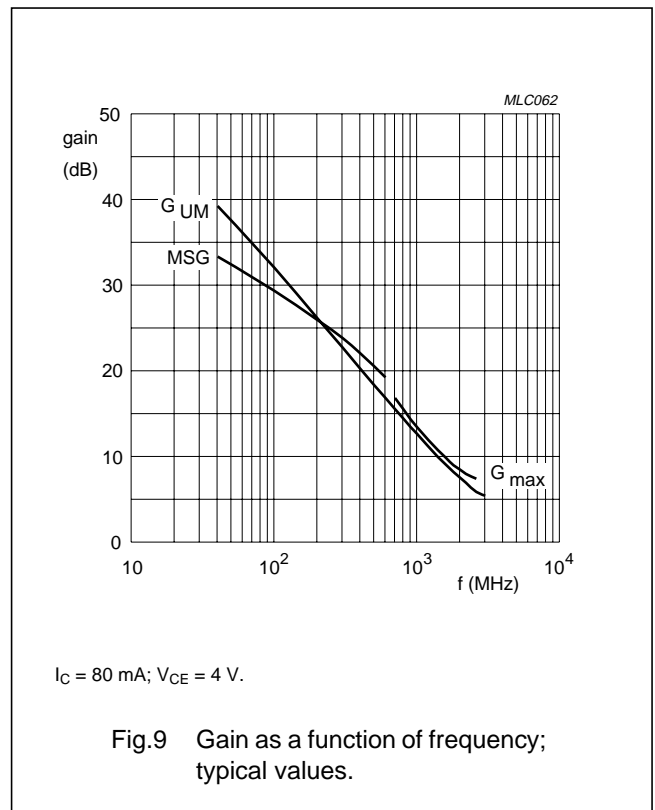
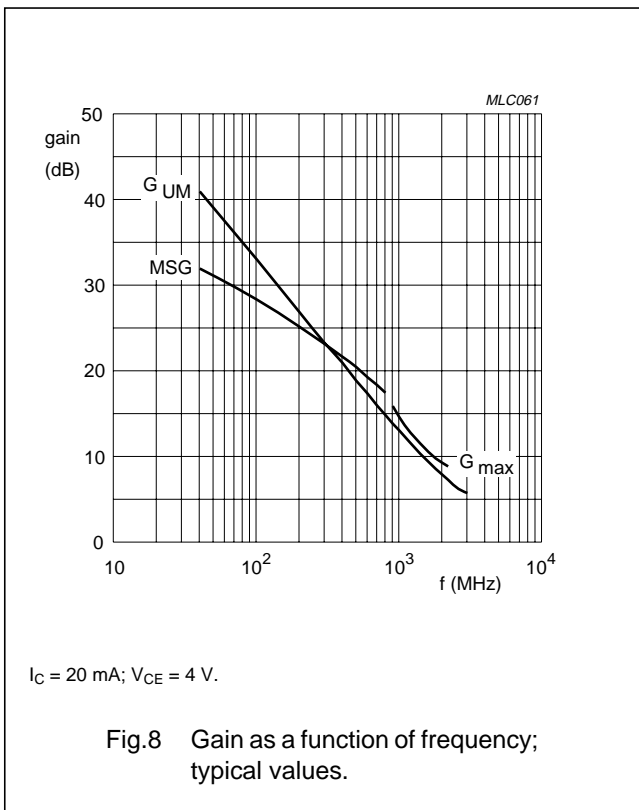
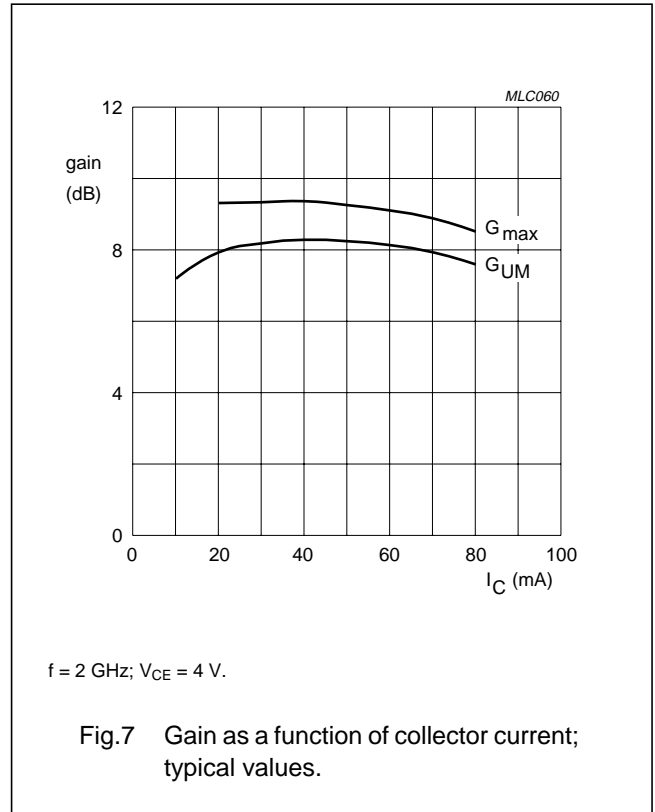
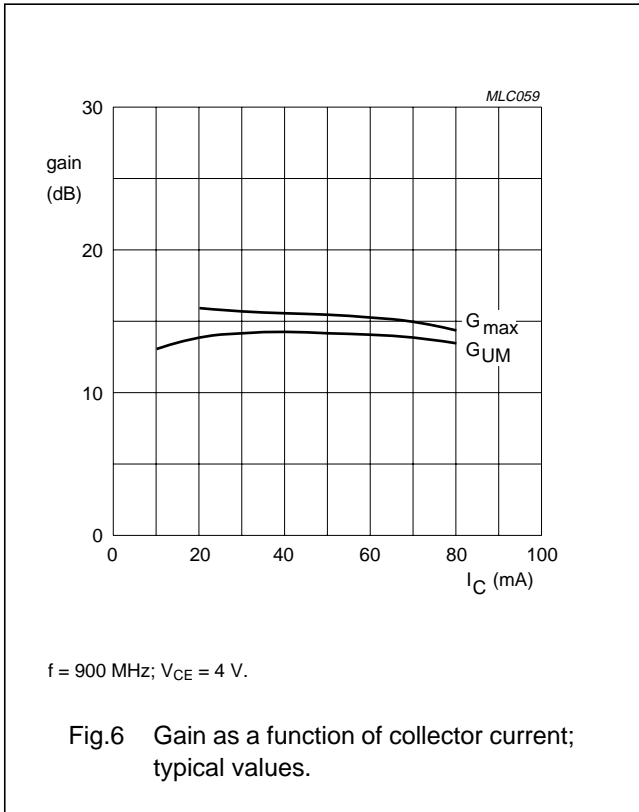
NPN 5 GHz wideband transistors

BFG590; BFG590/X



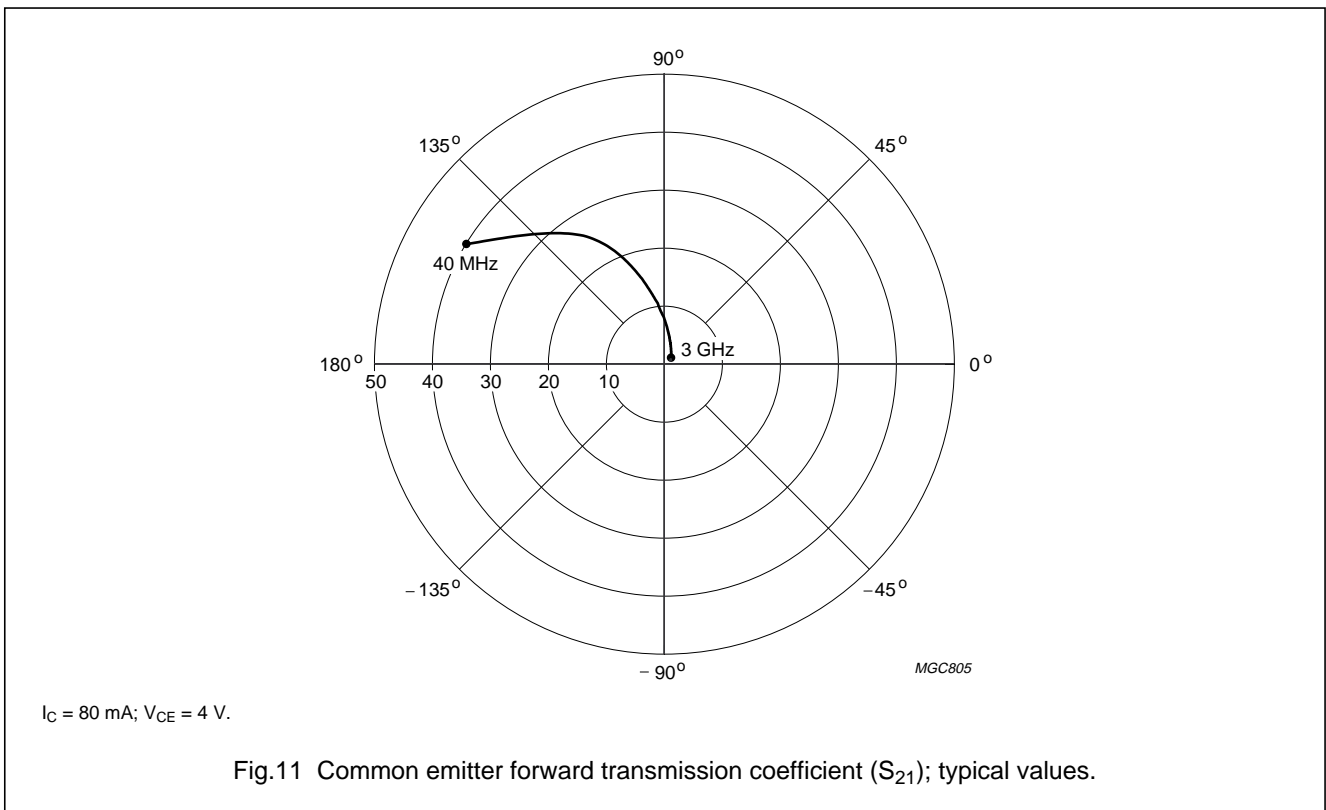
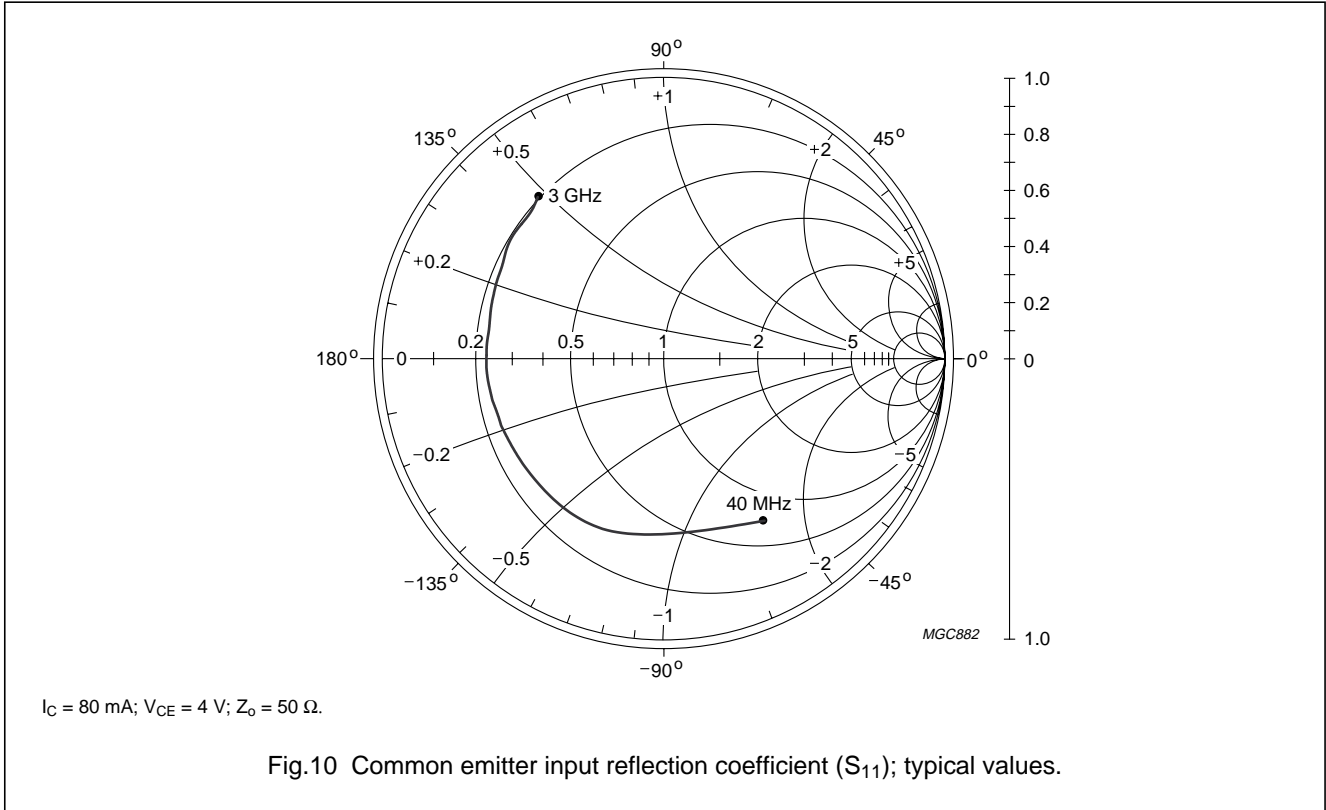
NPN 5 GHz wideband transistors

BFG590; BFG590/X



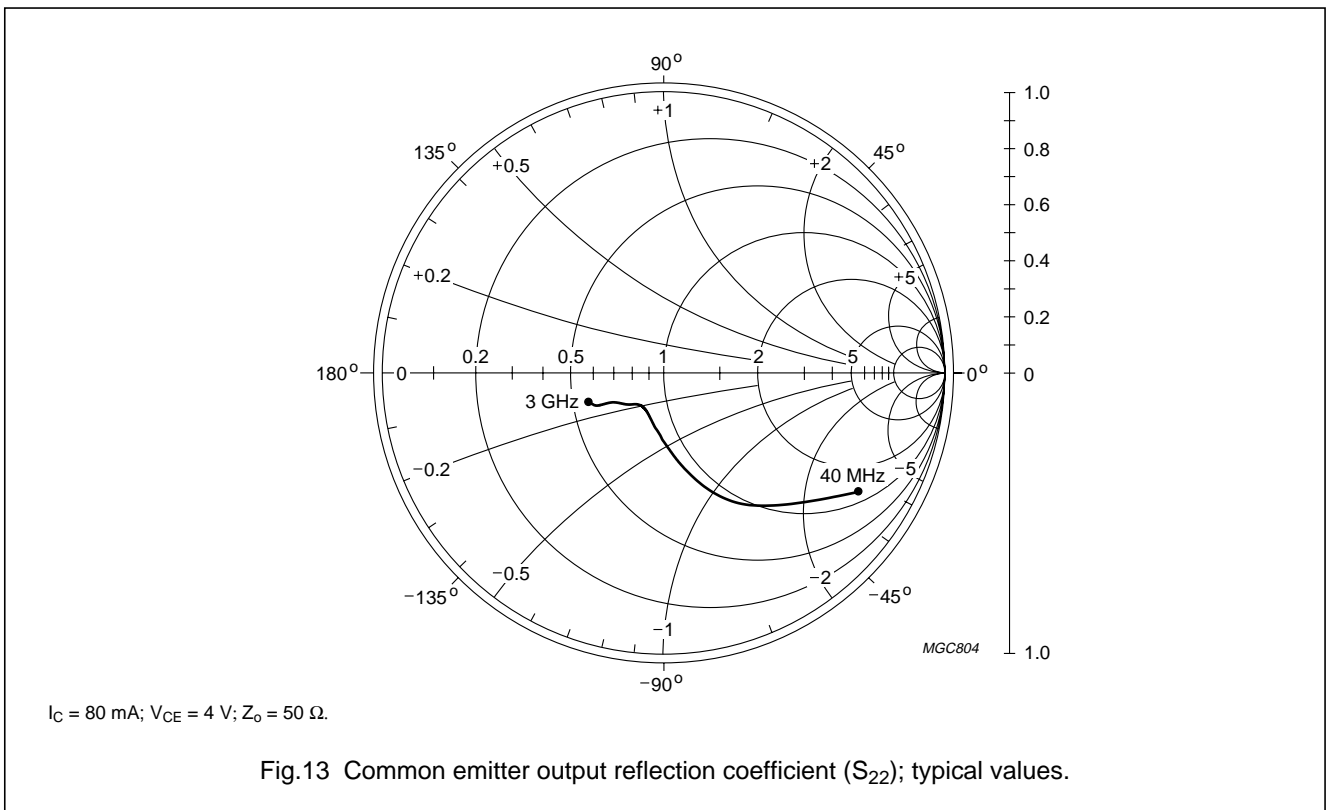
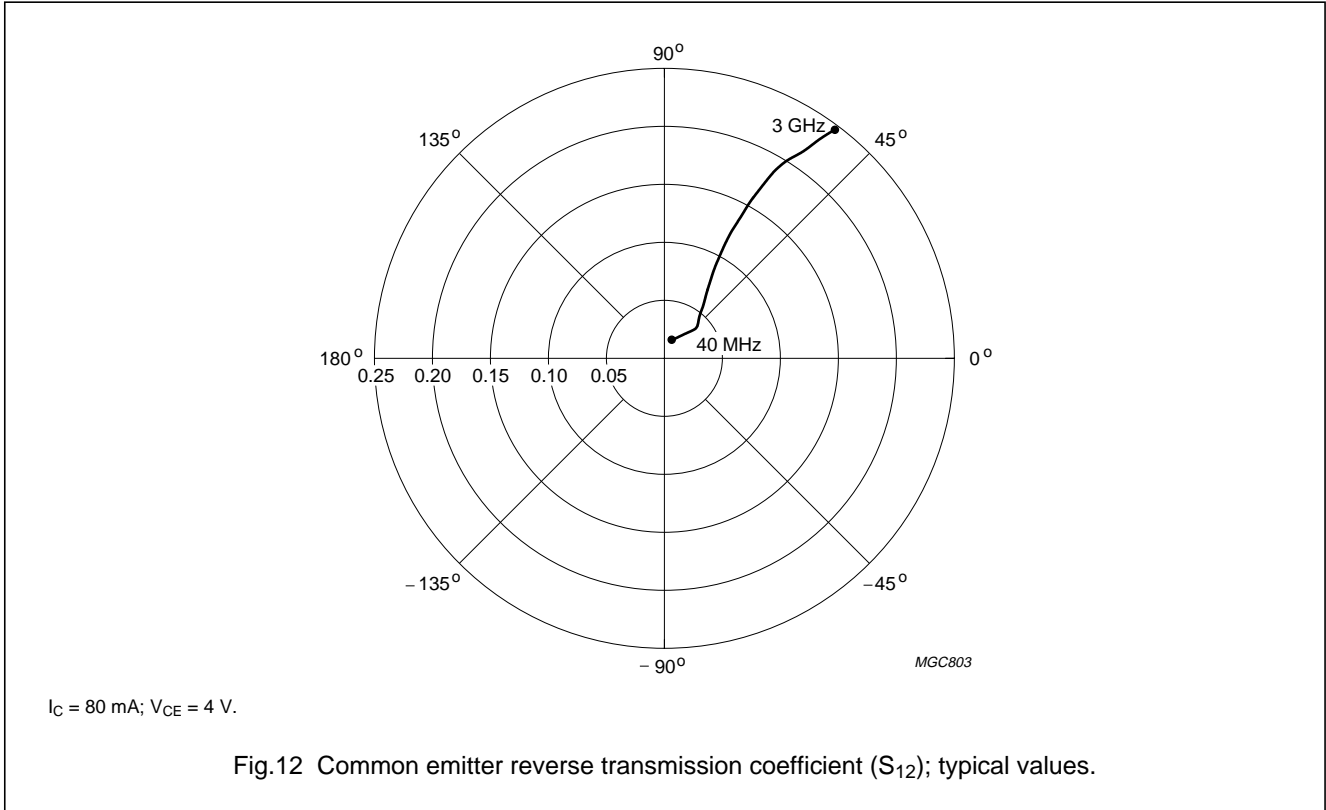
NPN 5 GHz wideband transistors

BFG590; BFG590/X



NPN 5 GHz wideband transistors

BFG590; BFG590/X





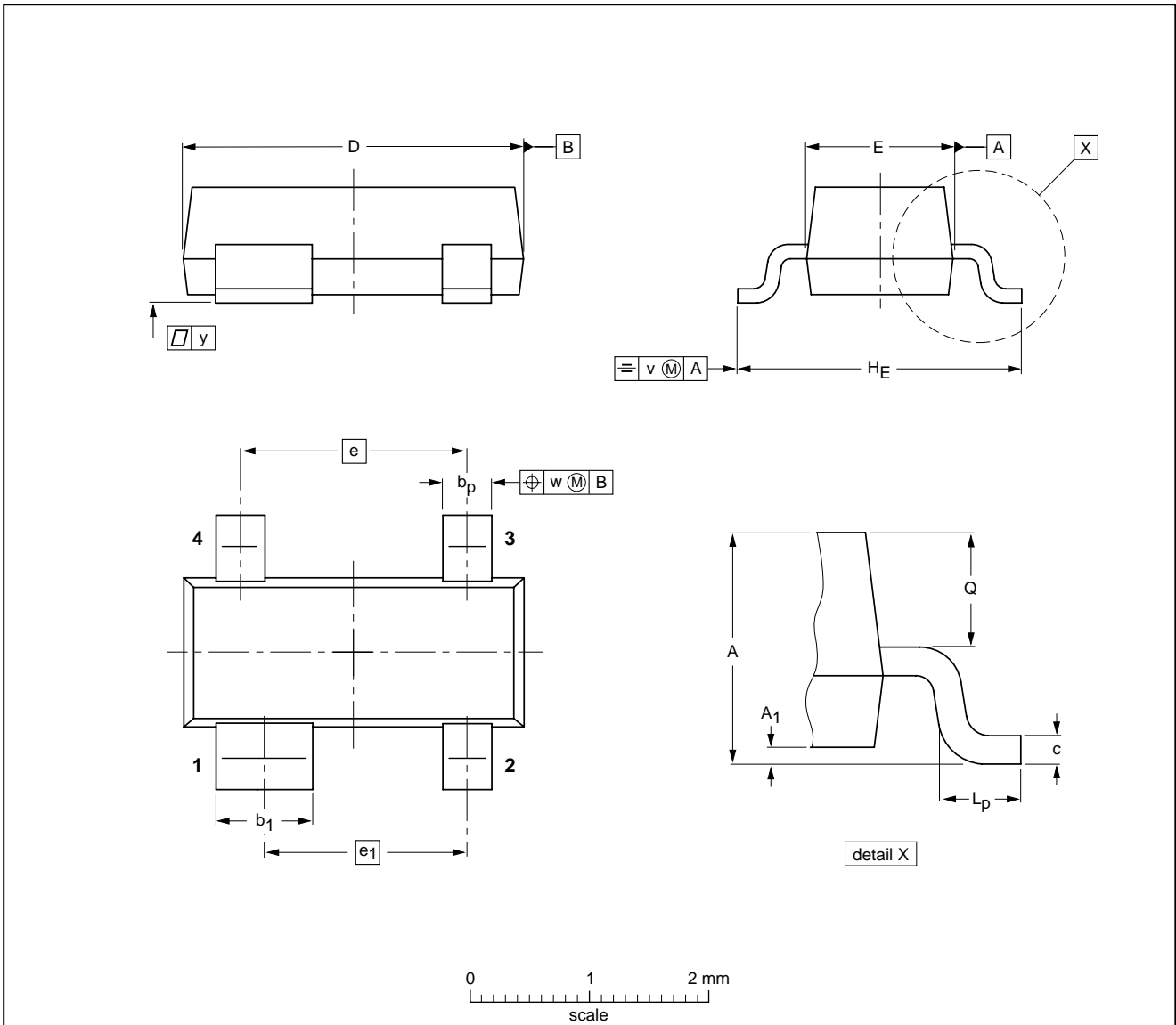
NPN 5 GHz wideband transistors

BFG590; BFG590/X

PACKAGE OUTLINE

Plastic surface mounted package; 4 leads

SOT143B



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max	b <sub>p</sub>	b <sub>1</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	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**

<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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**Argentina:** see South America

**Australia:** 34 Waterloo Road, NORTH RYDE, NSW 2113,  
Tel. +61 2 9805 4455, Fax. +61 2 9805 4466

**Austria:** Computerstr. 6, A-1101 WIEN, P.O. Box 213, Tel. +43 160 1010,  
Fax. +43 160 101 1210

**Belarus:** Hotel Minsk Business Center, Bld. 3, r. 1211, Volodarski Str. 6,  
220050 MINSK, Tel. +375 172 200 733, Fax. +375 172 200 773

**Belgium:** see The Netherlands

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Tel. +359 2 689 211, Fax. +359 2 689 102

**Canada:** PHILIPS SEMICONDUCTORS/COMPONENTS,  
Tel. +1 800 234 7381

**China/Hong Kong:** 501 Hong Kong Industrial Technology Centre,  
72 Tat Chee Avenue, Kowloon Tong, HONG KONG,  
Tel. +852 2319 7888, Fax. +852 2319 7700

**Colombia:** see South America

**Czech Republic:** see Austria

**Denmark:** Prags Boulevard 80, PB 1919, DK-2300 COPENHAGEN S,  
Tel. +45 32 88 2636, Fax. +45 31 57 0044

**Finland:** Sinikalliontie 3, FIN-02630 ESPOO,  
Tel. +358 9 615800, Fax. +358 9 61580920

**France:** 51 Rue Carnot, BP317, 92156 SURESNES Cedex,  
Tel. +33 1 40 99 6161, Fax. +33 1 40 99 6427

**Germany:** Hammerbrookstraße 69, D-20097 HAMBURG,  
Tel. +49 40 23 53 60, Fax. +49 40 23 536 300

**Greece:** No. 15, 25th March Street, GR 17778 TAVROS/ATHENS,  
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**Hungary:** see Austria

**India:** Philips INDIA Ltd, Band Box Building, 2nd floor,  
254-D, Dr. Annie Besant Road, Worli, MUMBAI 400 025,  
Tel. +91 22 493 8541, Fax. +91 22 493 0966

**Indonesia:** PT Philips Development Corporation, Semiconductors Division,  
Gedung Philips, Jl. Buncit Raya Kav.99-100, JAKARTA 12510,  
Tel. +62 21 794 0040 ext. 2501, Fax. +62 21 794 0080

**Ireland:** Newstead, Clonskeagh, DUBLIN 14,  
Tel. +353 1 7640 000, Fax. +353 1 7640 200

**Israel:** RAPAC Electronics, 7 Kehilat Saloniki St, PO Box 18053,  
TEL AVIV 61180, Tel. +972 3 645 0444, Fax. +972 3 649 1007

**Italy:** PHILIPS SEMICONDUCTORS, Piazza IV Novembre 3,  
20124 MILANO, Tel. +39 2 6752 2531, Fax. +39 2 6752 2557

**Japan:** Philips Bldg 13-37, Kohnan 2-chome, Minato-ku,  
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**Korea:** Philips House, 260-199 Itaewon-dong, Yongsan-ku, SEOUL,  
Tel. +82 2 709 1412, Fax. +82 2 709 1415

**Malaysia:** No. 76 Jalan Universiti, 46200 PETALING JAYA, SELANGOR,  
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**Mexico:** 5900 Gateway East, Suite 200, EL PASO, TEXAS 79905,  
Tel. +9-5 800 234 7381

**Middle East:** see Italy

**Netherlands:** Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB,  
Tel. +31 40 27 82785, Fax. +31 40 27 88399

**New Zealand:** 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,  
Tel. +64 9 849 4160, Fax. +64 9 849 7811

**Norway:** Box 1, Manglerud 0612, OSLO,  
Tel. +47 22 74 8000, Fax. +47 22 74 8341

**Pakistan:** see Singapore

**Philippines:** Philips Semiconductors Philippines Inc.,  
106 Valero St. Salcedo Village, P.O. Box 2108 MCC, MAKATI,  
Metro MANILA, Tel. +63 2 816 6380, Fax. +63 2 817 3474

**Poland:** Ul. Lukiska 10, PL 04-123 WARSZAWA,  
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Tel. +7 095 755 6918, Fax. +7 095 755 6919

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Tel. +65 350 2538, Fax. +65 251 6500

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2092 JOHANNESBURG, P.O. Box 7430 Johannesburg 2000,  
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**South America:** Al. Vicente Pinzon, 173, 6th floor,  
04547-130 SÃO PAULO, SP, Brazil,  
Tel. +55 11 821 2333, Fax. +55 11 821 2382

**Spain:** Balmes 22, 08007 BARCELONA,  
Tel. +34 93 301 6312, Fax. +34 93 301 4107

**Sweden:** Kottbygatan 7, Akalla, S-16485 STOCKHOLM,  
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Tel. +66 2 745 4090, Fax. +66 2 398 0793

**Turkey:** Talatpasa Cad. No. 5, 80640 GÜLTEPE/ISTANBUL,  
Tel. +90 212 279 2770, Fax. +90 212 282 6707

**Ukraine:** PHILIPS UKRAINE, 4 Patrice Lumumba str., Building B, Floor 7,  
252042 KIEV, Tel. +380 44 264 2776, Fax. +380 44 268 0461

**United Kingdom:** Philips Semiconductors Ltd., 276 Bath Road, Hayes,  
MIDDLESEX UB3 5BX, Tel. +44 181 730 5000, Fax. +44 181 754 8421

**United States:** 811 East Arques Avenue, SUNNYVALE, CA 94088-3409,  
Tel. +1 800 234 7381

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