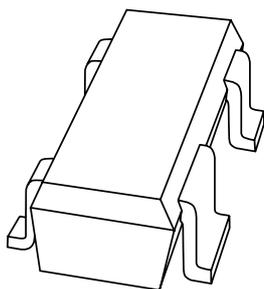


# DATA SHEET



## **BFG25AW; BFG25AW/X** NPN 5 GHz wideband transistors

Product specification  
Supersedes data of August 1995

1998 Sep 23

## NPN 5 GHz wideband transistors

## BFG25AW; BFG25AW/X

## FEATURES

- Low current consumption (100  $\mu$ A to 1 mA)
- Low noise figure
- Gold metallization ensures excellent reliability.

## APPLICATIONS

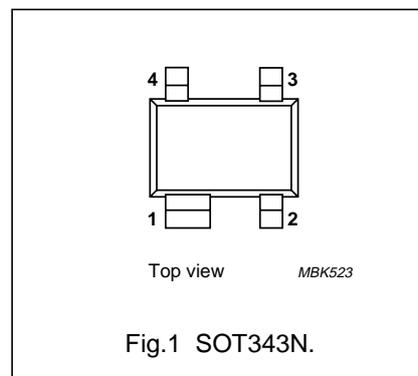
Wideband applications in UHF low power amplifiers, such as pocket telephones and paging systems.

## DESCRIPTION

NPN silicon planar epitaxial transistor in a 4-pin dual-emitter SOT343N plastic package.

## PINNING

PIN	DESCRIPTION
<b>BFG25AW</b>	
1	collector
2	base
3	emitter
4	emitter
<b>BFG25AW/X</b>	
1	collector
2	emitter
3	base
4	emitter



## MARKING

TYPE NUMBER	CODE
BFG25AW	N6
BFG25AW/X	V1

## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–	8	V
$V_{CEO}$	collector-emitter voltage	open base	–	–	5	V
$I_C$	collector current (DC)		–	–	6.5	mA
$P_{tot}$	total power dissipation	$T_s \leq 85\text{ }^\circ\text{C}$	–	–	500	mW
$h_{FE}$	DC current gain	$I_C = 0.5\text{ mA}; V_{CE} = 1\text{ V}$	50	80	200	
$C_{re}$	feedback capacitance	$I_C = 0; V_{CE} = 1\text{ V}; f = 1\text{ MHz}$	–	0.2	0.3	pF
$f_T$	transition frequency	$I_C = 1\text{ mA}; V_{CE} = 1\text{ V}; f = 500\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	3.5	5	–	GHz
$G_{UM}$	maximum unilateral power gain	$I_C = 0.5\text{ mA}; V_{CE} = 1\text{ V}; f = 1\text{ GHz}; T_{amb} = 25\text{ }^\circ\text{C}$	–	16	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}; I_C = 1\text{ mA}; V_{CE} = 1\text{ V}; f = 1\text{ GHz}$	–	2	–	dB

## 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	–	8	V
$V_{CEO}$	collector-emitter voltage	open base	–	5	V
$V_{EBO}$	emitter-base voltage	open collector	–	2	V
$I_C$	collector current (DC)		–	6.5	mA
$P_{tot}$	total power dissipation	$T_s \leq 85\text{ }^\circ\text{C};$ see Fig.2; note 1	–	500	mW
$T_{stg}$	storage temperature		–65	+150	$^\circ\text{C}$
$T_j$	junction temperature		–	175	$^\circ\text{C}$

## Note

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

## NPN 5 GHz wideband transistors

## BFG25AW; BFG25AW/X

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	$T_s \leq 85\text{ °C}$ ; note 1	180	K/W

## Note

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

## CHARACTERISTICS

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

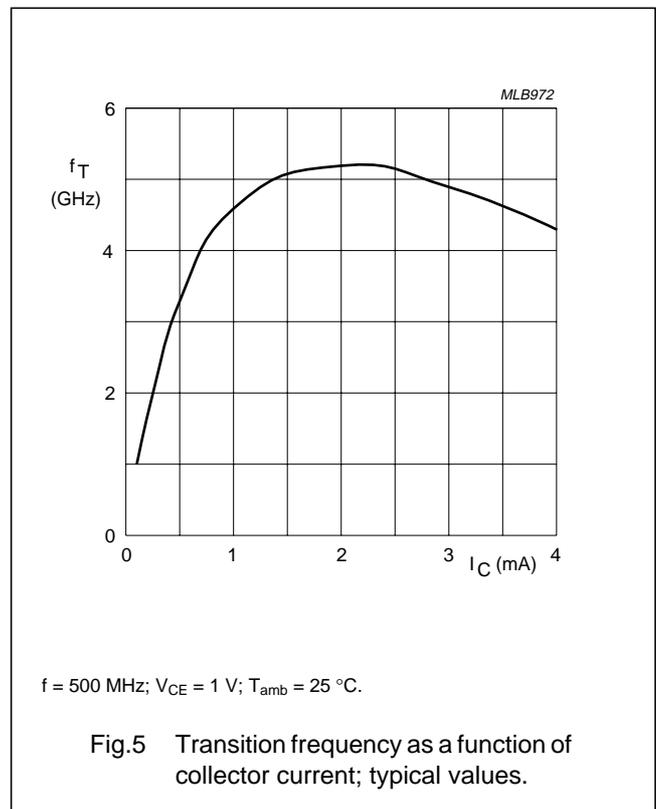
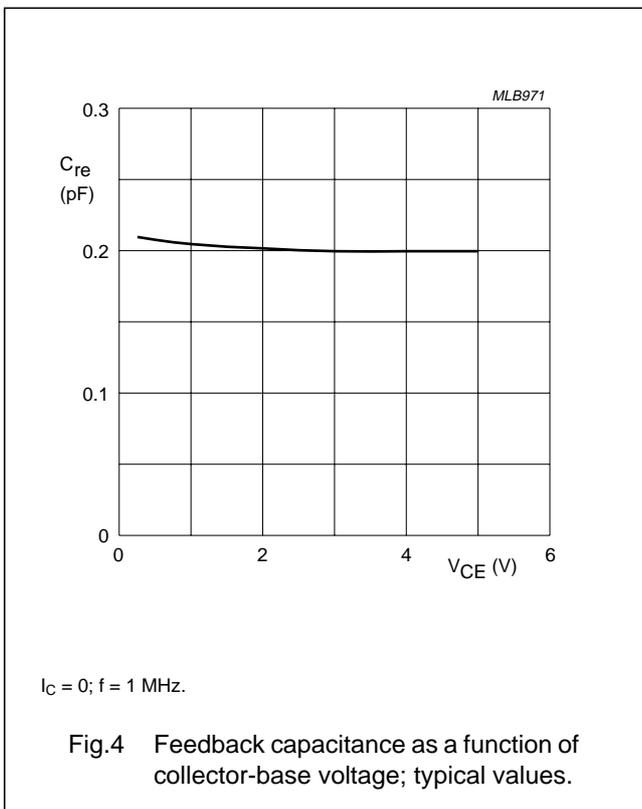
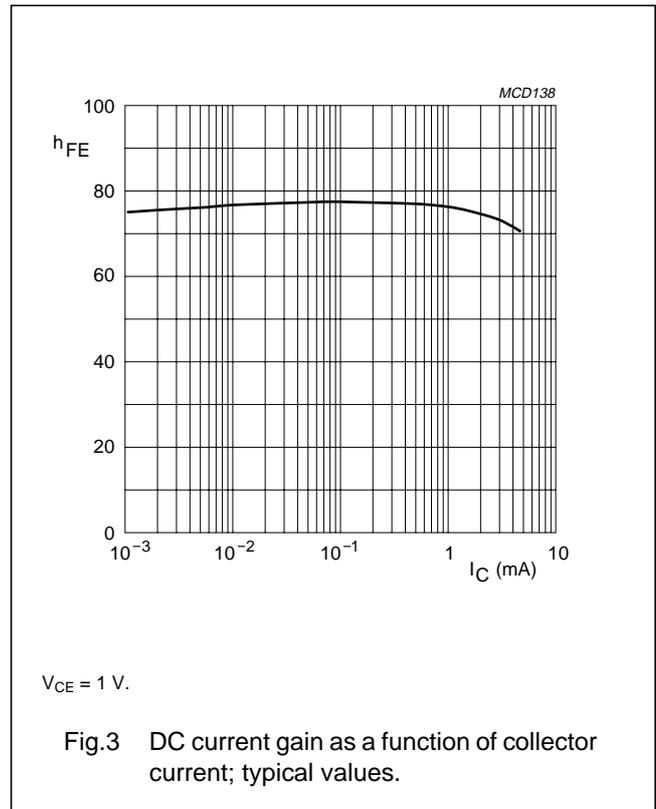
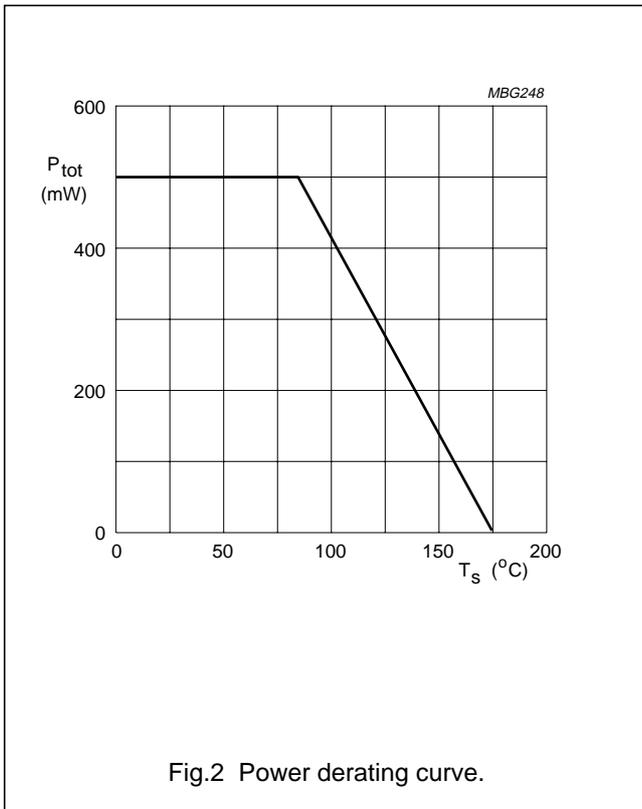
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\ \mu\text{A}$ ; $I_E = 0$	–	–	8	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 1\ \text{mA}$ ; $I_B = 0$	–	–	5	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100\ \mu\text{A}$ ; $I_C = 0$	–	–	2	V
$I_{CBO}$	collector leakage current	open emitter; $V_{CB} = 5\ \text{V}$ ; $I_E = 0$	–	–	50	nA
$h_{FE}$	DC current gain	$I_C = 0.5\ \text{mA}$ ; $V_{CE} = 1\ \text{V}$	50	80	200	
$C_{re}$	feedback capacitance	$I_C = 0$ ; $V_{CE} = 1\ \text{V}$ ; $f = 1\ \text{MHz}$	–	0.2	0.3	pF
$f_T$	transition frequency	$I_C = 1\ \text{mA}$ ; $V_{CE} = 1\ \text{V}$ ; $f = 1\ \text{GHz}$ ; $T_{amb} = 25\text{ °C}$	3.5	5	–	GHz
$G_{UM}$	maximum unilateral power gain; note 1	$I_C = 0.5\ \text{mA}$ ; $V_{CE} = 1\ \text{V}$ ; $f = 1\ \text{GHz}$ ; $T_{amb} = 25\text{ °C}$	–	16	–	dB
		$I_C = 0.5\ \text{mA}$ ; $V_{CE} = 1\ \text{V}$ ; $f = 2\ \text{GHz}$ ; $T_{amb} = 25\text{ °C}$	–	8	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$ ; $I_C = 0.5\ \text{mA}$ ; $V_{CE} = 1\ \text{V}$ ; $f = 1\ \text{GHz}$	–	1.9	–	dB
		$\Gamma_s = \Gamma_{opt}$ ; $I_C = 1\ \text{mA}$ ; $V_{CE} = 1\ \text{V}$ ; $f = 1\ \text{GHz}$	–	2	–	dB

## Note

- $G_{UM}$  is the maximum unilateral power gain, assuming  $S_{12}$  is zero.  $G_{UM} = 10 \log \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)}$  dB.

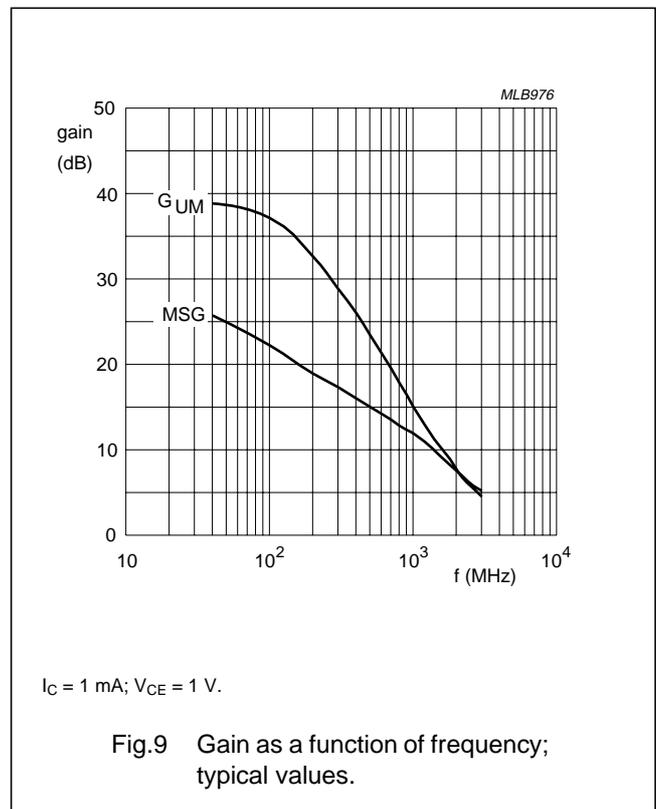
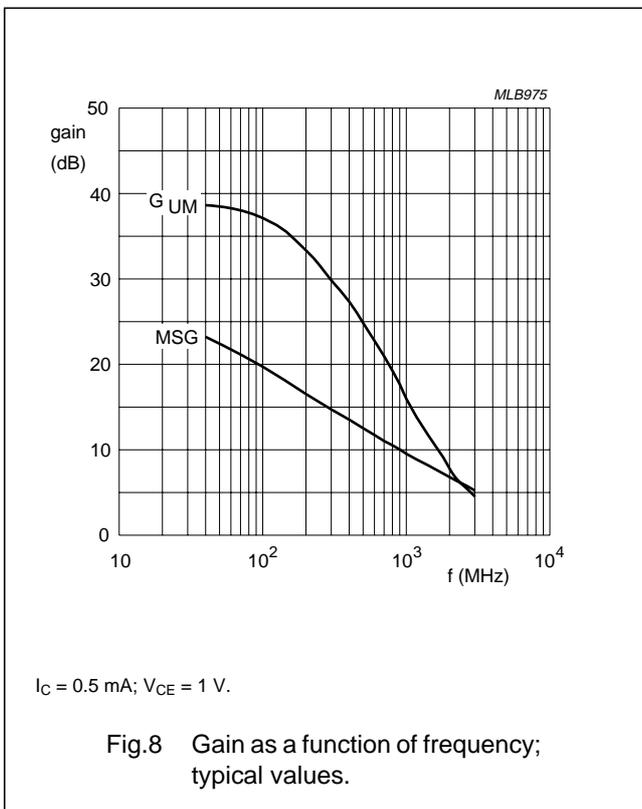
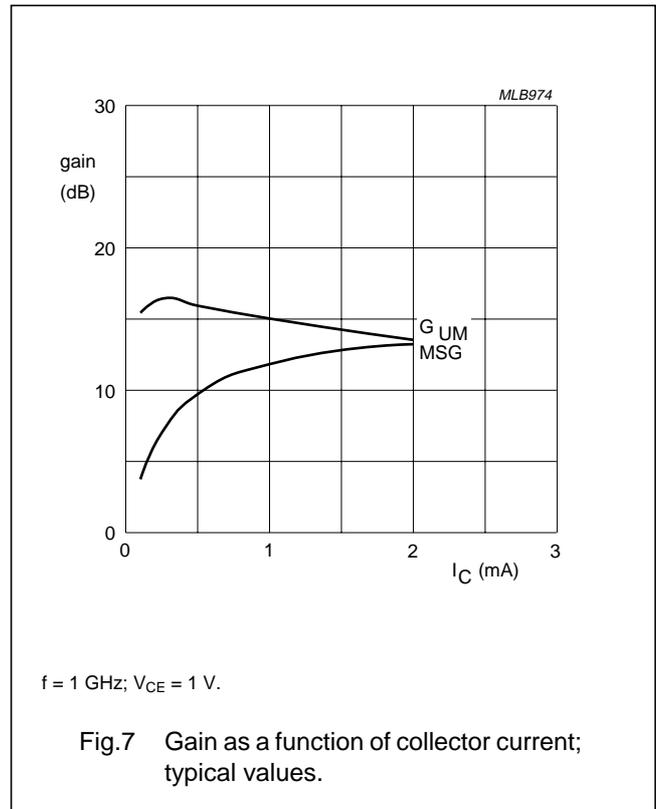
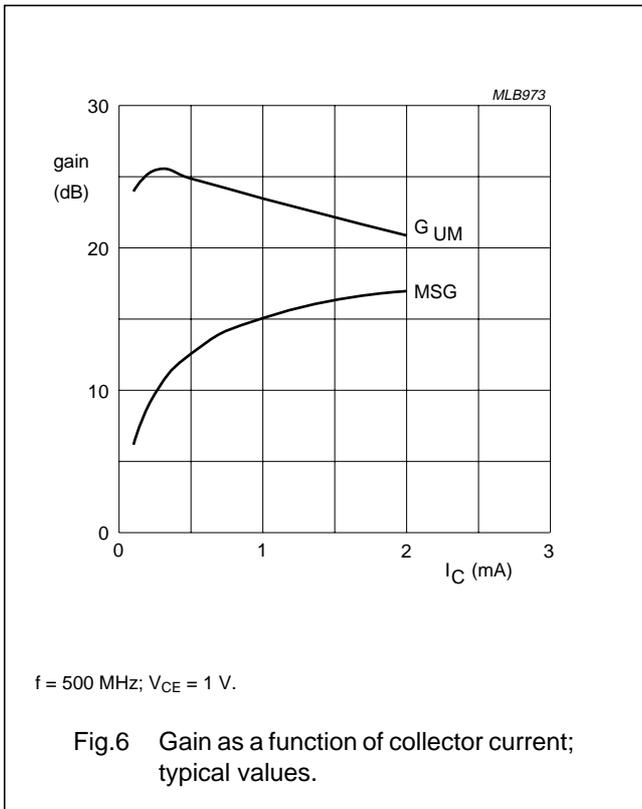
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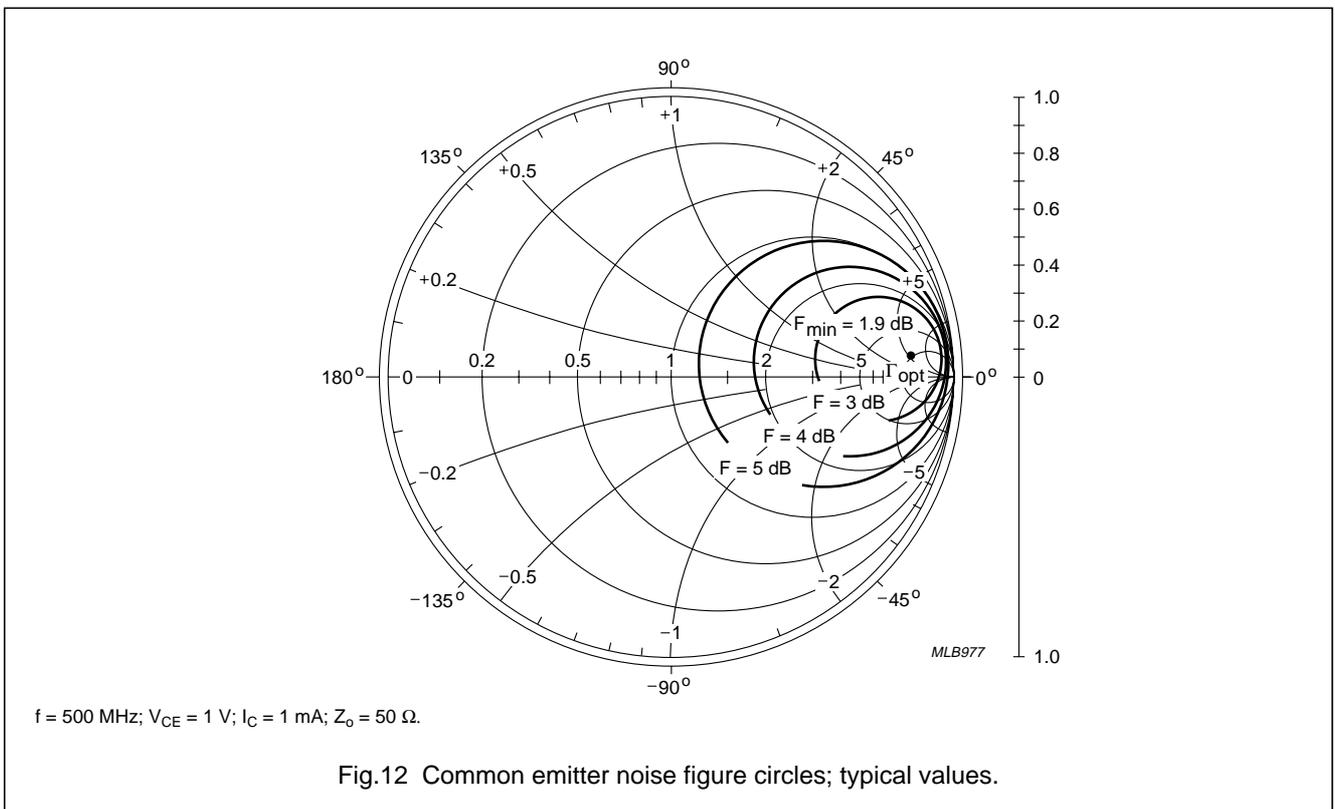
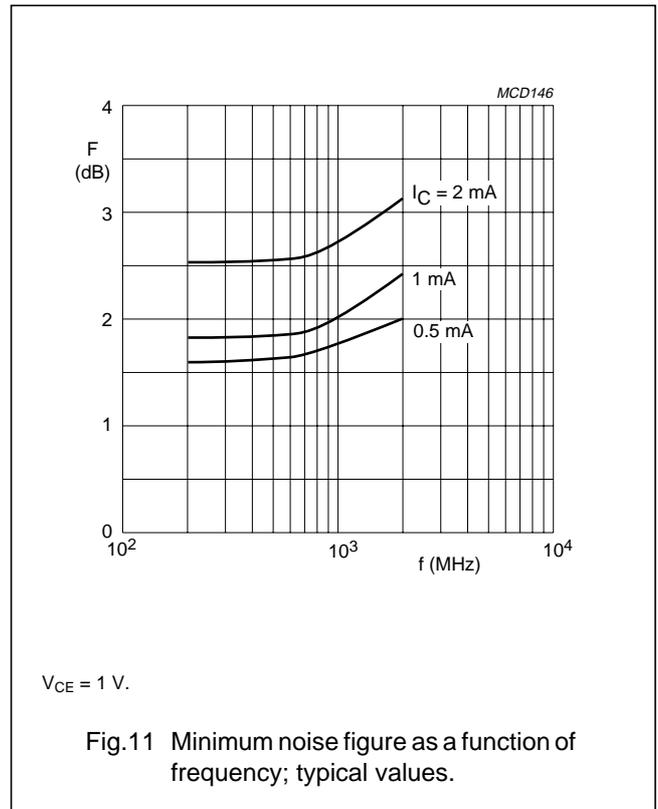
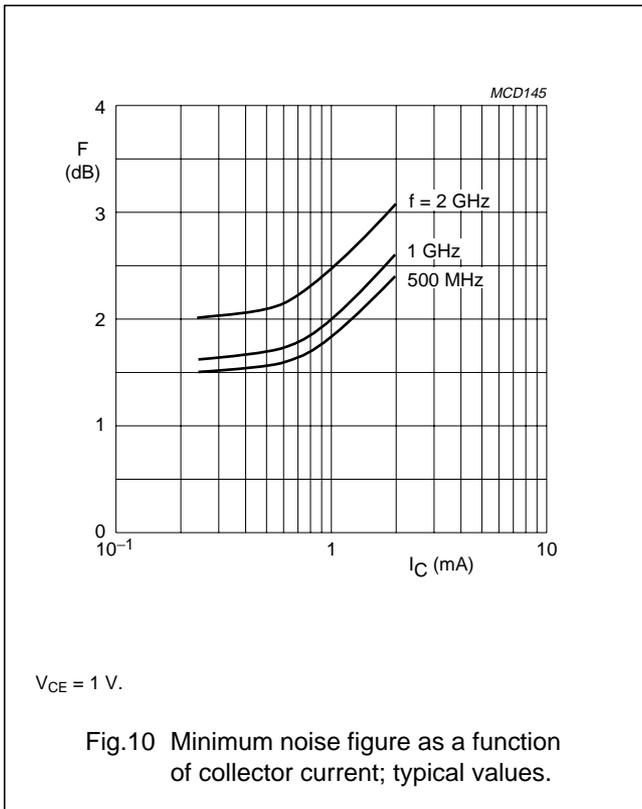
NPN 5 GHz wideband transistors

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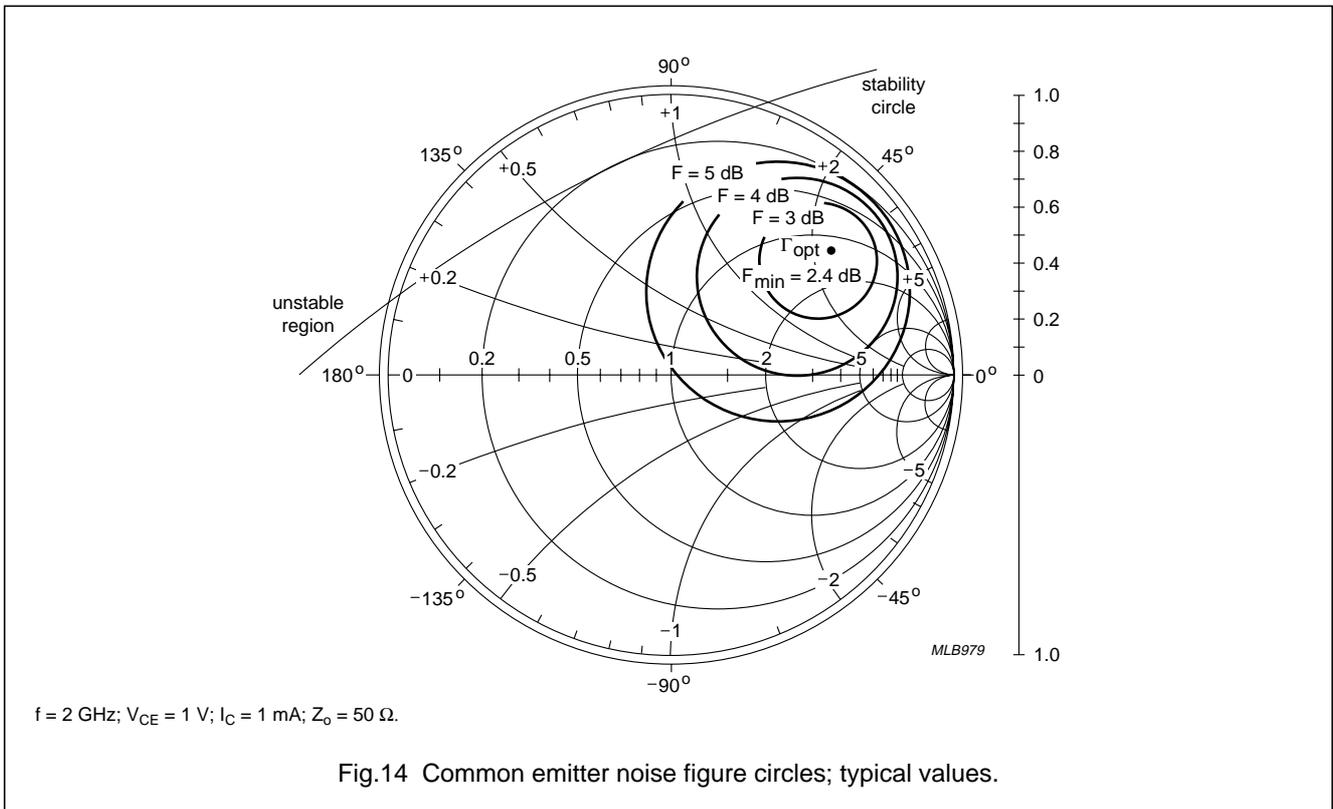
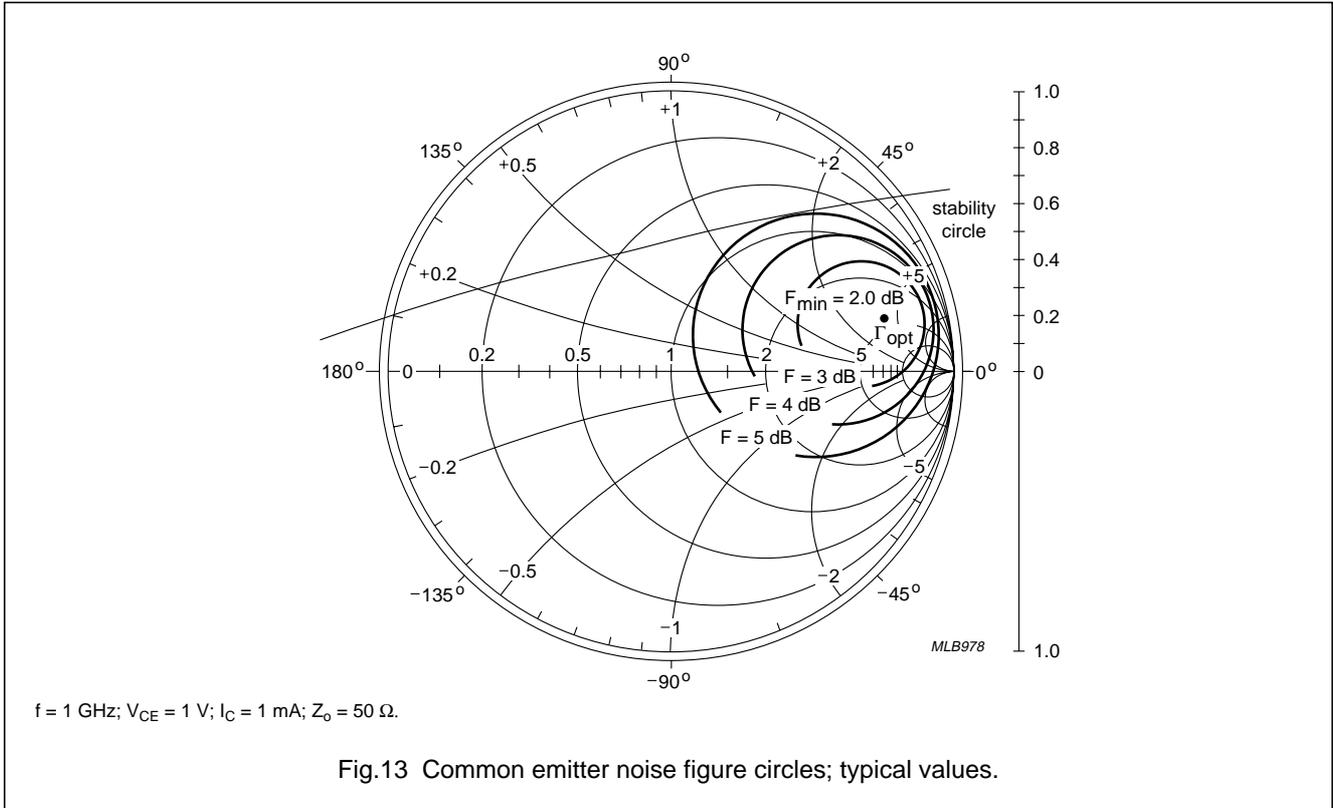
NPN 5 GHz wideband transistors

BFG25AW; BFG25AW/X



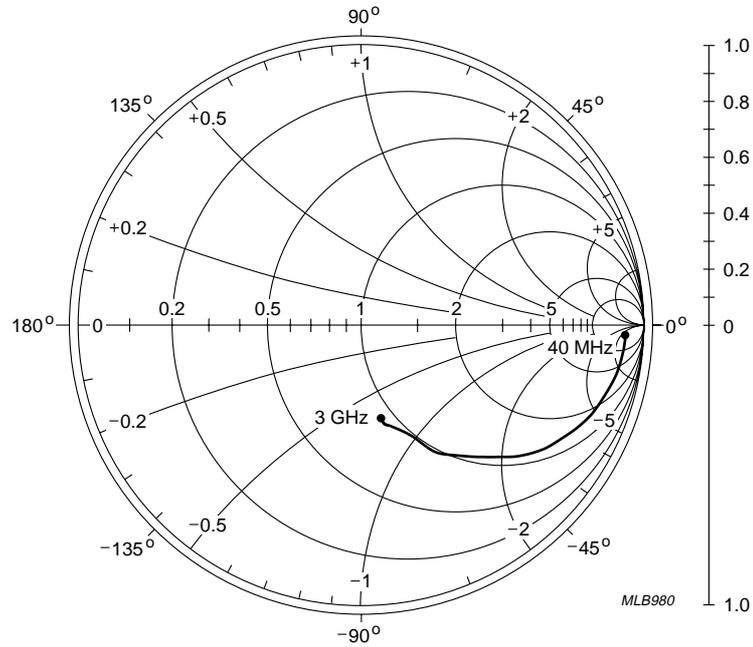
NPN 5 GHz wideband transistors

BFG25AW; BFG25AW/X



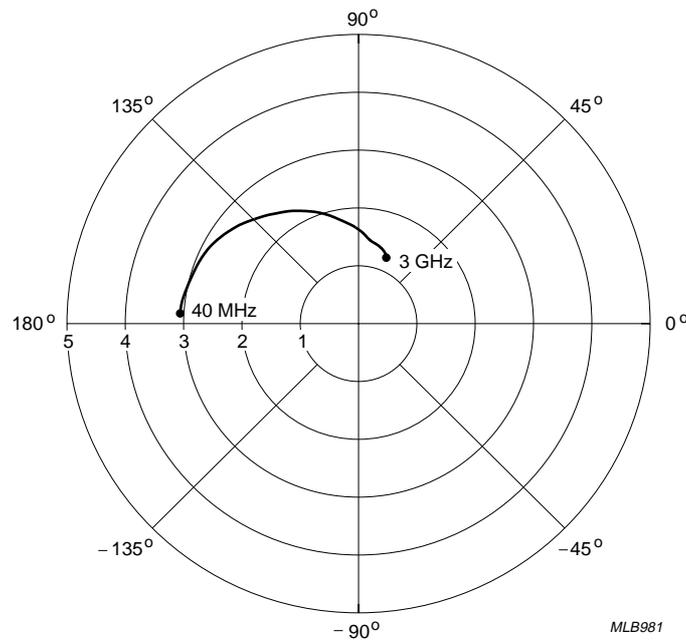
NPN 5 GHz wideband transistors

BFG25AW; BFG25AW/X



$V_{CE} = 1\text{ V}; I_C = 1\text{ mA}; Z_o = 50\ \Omega.$

Fig.15 Common emitter input reflection coefficient ( $S_{11}$ ); typical values.

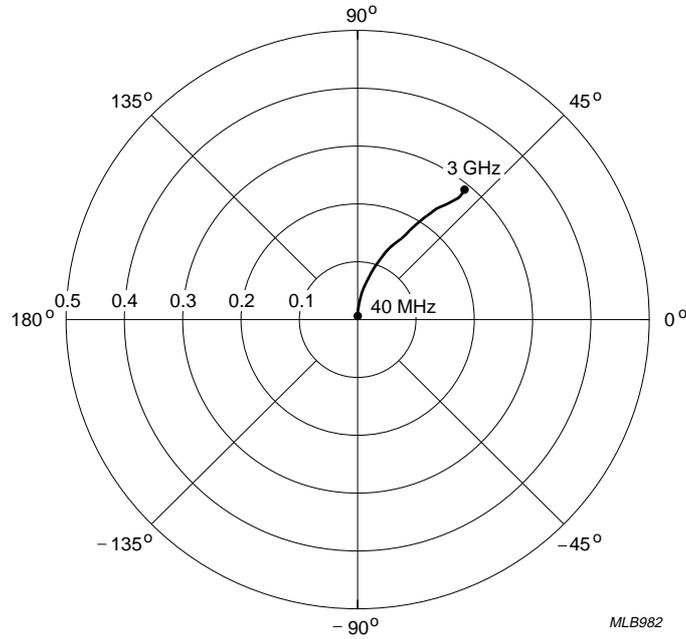


$V_{CE} = 1\text{ V}; I_C = 1\text{ mA}.$

Fig.16 Common emitter forward transmission coefficient ( $S_{21}$ ); typical values.

NPN 5 GHz wideband transistors

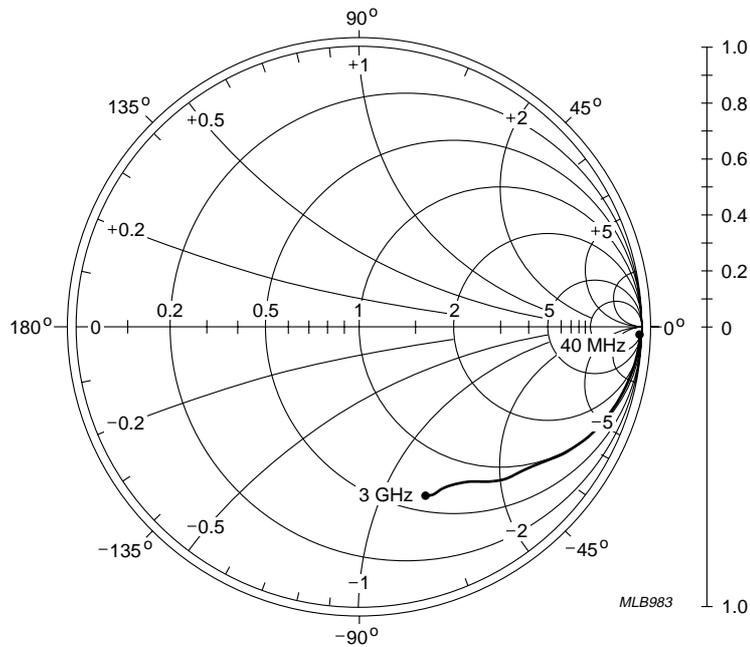
BFG25AW; BFG25AW/X



$V_{CE} = 1\text{ V}; I_C = 1\text{ mA}$ .

MLB982

Fig.17 Common emitter reverse transmission coefficient ( $S_{12}$ ); typical values.



$V_{CE} = 1\text{ V}; I_C = 1\text{ mA}; Z_o = 50\ \Omega$ .

MLB983

Fig.18 Common emitter output reflection coefficient ( $S_{22}$ ); typical values.

NPN 5 GHz wideband transistors

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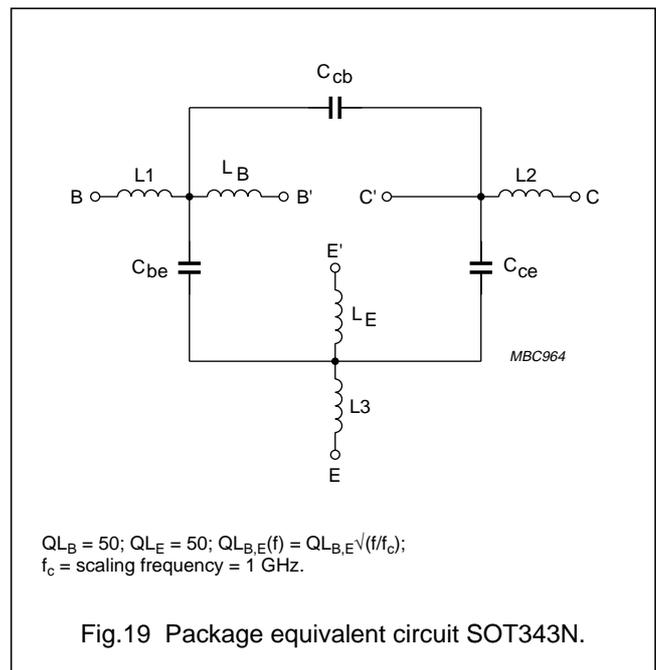
SPICE parameters for the BFG25W crystal

SEQUENCE No.	PARAMETER	VALUE	UNIT
1	IS	13.77	aA
2	BF	85.65	–
3	NF	0.980	–
4	VAF	50.80	V
5	IKF	10.00	A
6	ISE	2.199	fA
7	NE	1.857	–
8	BR	16.97	–
9	NR	0.986	–
10	VAR	2.491	V
11	IKR	188.0	mA
12	ISC	205.1	aA
13	NC	1.107	–
14	RB	80.00	Ω
15	IRB	1.000	μA
16	RBM	80.00	Ω
17	RE	7.911	Ω
18	RC	5.300	Ω
19 <sup>(1)</sup>	XTB	0.000	–
20 <sup>(1)</sup>	EG	1.110	eV
21 <sup>(1)</sup>	XTI	3.000	–
22	CJE	223.0	fF
23	VJE	669.7	mV
24	MJE	0.060	–
25	TF	5.112	ps
26	XTF	7.909	–
27	VTF	1.338	V
28	ITF	5.662	mA
29	PTF	15.37	deg
30	CJC	229.0	fF
31	VJC	394.7	mV
32	MJC	0.043	–
33	XCJC	0.050	–
34	TR	13.26	ns
35 <sup>(1)</sup>	CJS	0.000	F

SEQUENCE No.	PARAMETER	VALUE	UNIT
36 <sup>(1)</sup>	VJS	750.0	mV
37 <sup>(1)</sup>	MJS	0.000	–
38	FC	0.988	–

Note

1. These parameters have not been extracted, the default values are shown.



List of components (see Fig.19)

DESIGNATION	VALUE	UNIT
C <sub>be</sub>	70	fF
C <sub>cb</sub>	50	fF
C <sub>ce</sub>	115	fF
L1	0.34	nH
L2	0.10	nH
L3	0.25	nH
L <sub>B</sub>	0.40	nH
L <sub>E</sub>	0.40	nH

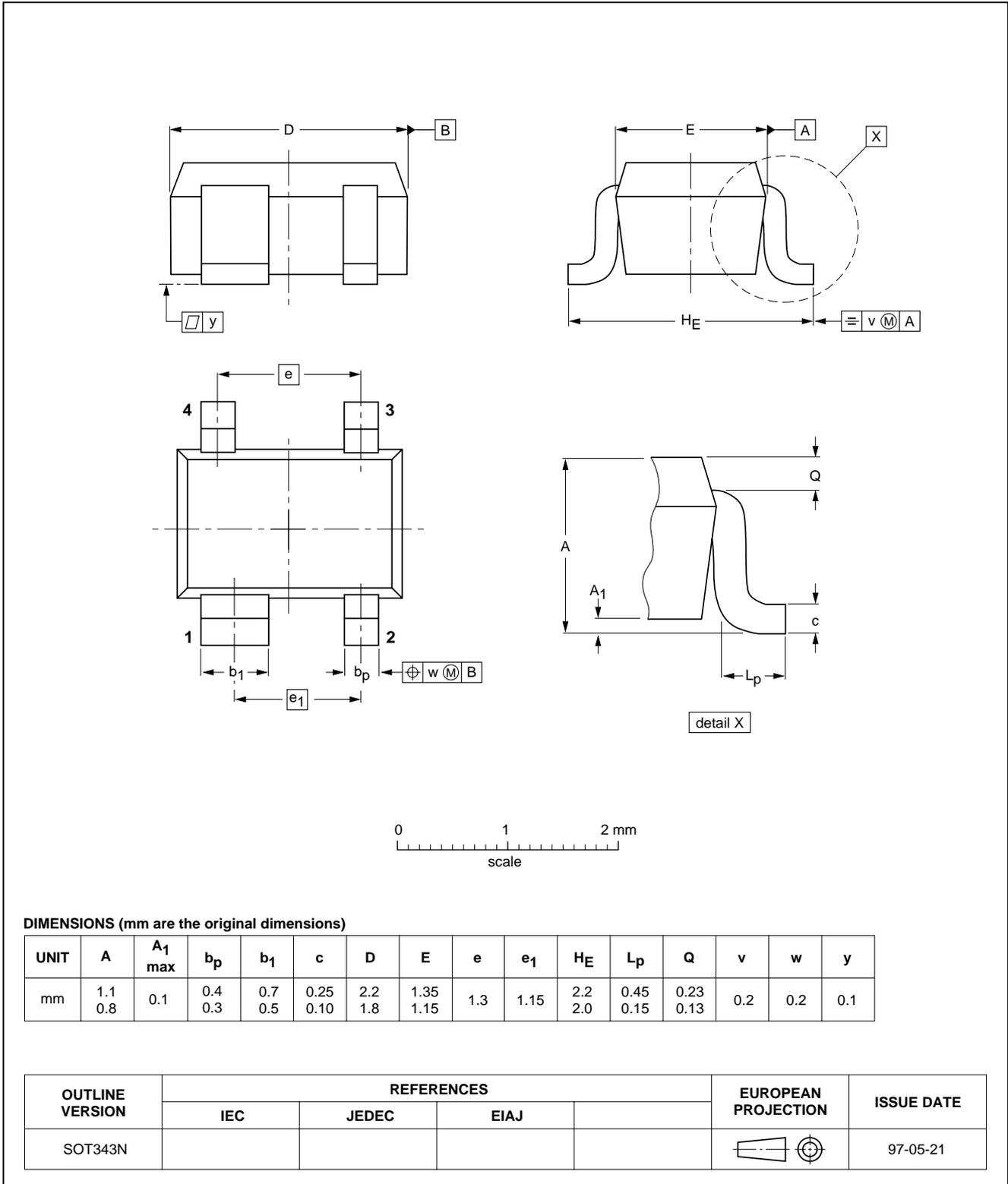
NPN 5 GHz wideband transistors

BFG25AW; BFG25AW/X

PACKAGE OUTLINES

Plastic surface mounted package; 4 leads

SOT343N



## NPN 5 GHz wideband transistors

## BFG25AW; BFG25AW/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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These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

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**NOTES**

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**NOTES**

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**NOTES**

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