

# BFG25A/X

NPN 5 GHz wideband transistor

Rev. 04 — 27 November 2007

Product data sheet

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NXP Semiconductors

# NPN 5 GHz wideband transistor

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### FEATURES

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

### APPLICATIONS

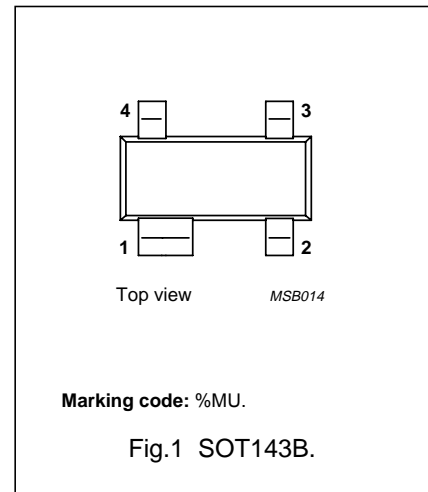
- RF low power amplifiers, such as pocket telephones, paging systems, with signal frequencies up to 2 GHz.

### DESCRIPTION

NPN silicon wideband transistor in a four-lead dual emitter SOT143B plastic package (cross emitter).

### PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter



### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage		–	–	8	V
$V_{CEO}$	collector-emitter voltage		–	–	5	V
$I_C$	collector current (DC)		–	–	6.5	mA
$P_{tot}$	total power dissipation	$T_s \leq 165\text{ }^\circ\text{C}$	–	–	32	mW
$h_{FE}$	DC current gain	$I_C = 0.5\text{ mA}; V_{CE} = 1\text{ V}$	50	80	200	
$f_T$	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	$I_C = 0.5\text{ mA}; V_{CE} = 1\text{ V}; f = 1\text{ GHz}; T_{amb} = 25\text{ }^\circ\text{C}$	–	18	–	dB
F	noise figure	$I_C = 0.5\text{ mA}; V_{CE} = 1\text{ V}; f = 1\text{ GHz}; \Gamma = \Gamma_{opt}; T_{amb} = 25\text{ }^\circ\text{C}$	–	1.8	–	dB
		$I_C = 1\text{ mA}; V_{CE} = 1\text{ V}; f = 1\text{ GHz}; \Gamma = \Gamma_{opt}; T_{amb} = 25\text{ }^\circ\text{C}$	–	2	–	dB

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**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter	–	8	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	5	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	2	V
I <sub>C</sub>	collector current (DC)		–	6.5	mA
P <sub>tot</sub>	total power dissipation	T <sub>s</sub> ≤ 165 °C; note 1	–	32	mW
T <sub>stg</sub>	storage temperature		–65	150	°C
T <sub>j</sub>	junction temperature		–	175	°C

**Note**

1. T<sub>s</sub> is the temperature at the soldering point of the collector pin.

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-s</sub>	thermal resistance from junction to soldering point	note 1	320	K/W

**Note**

1. T<sub>s</sub> is the temperature at the soldering point of the collector pin.

**CHARACTERISTICS**

T<sub>j</sub> = 25 °C unless otherwise specified.

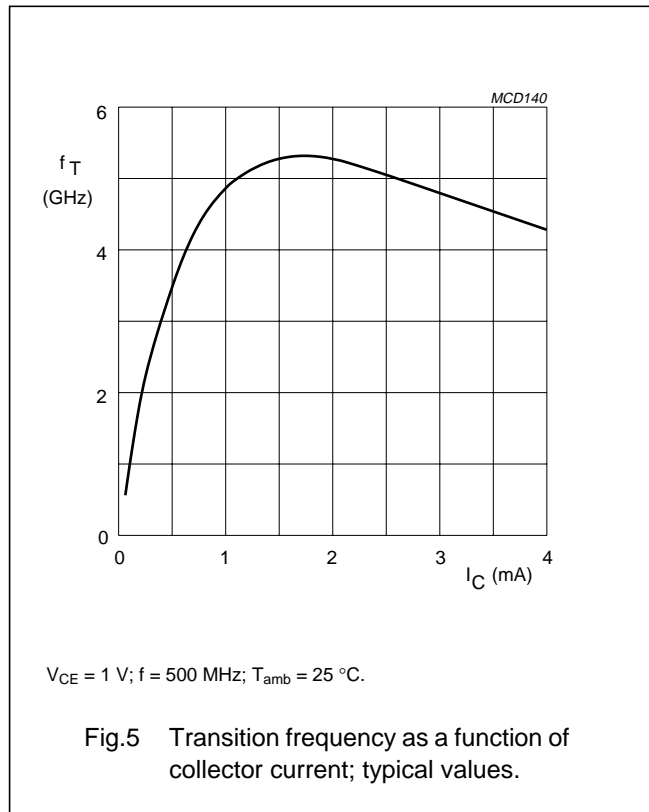
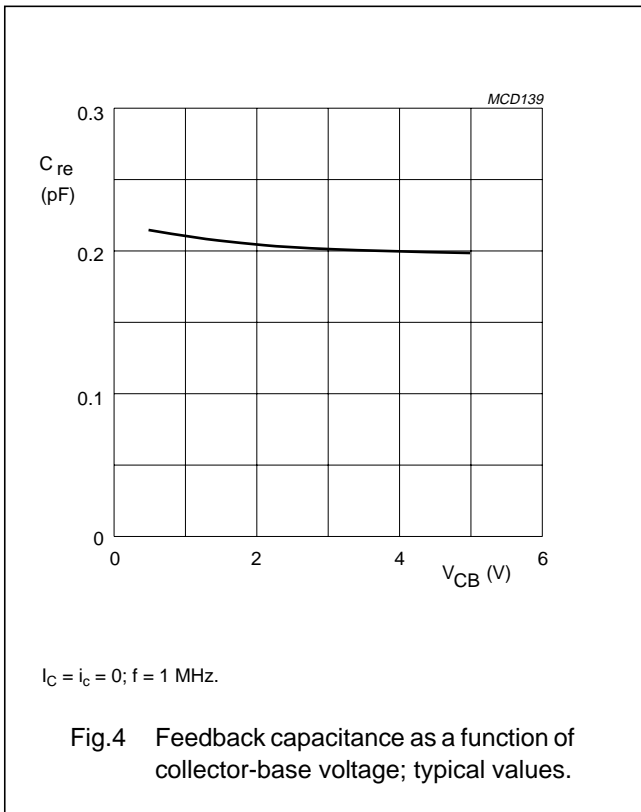
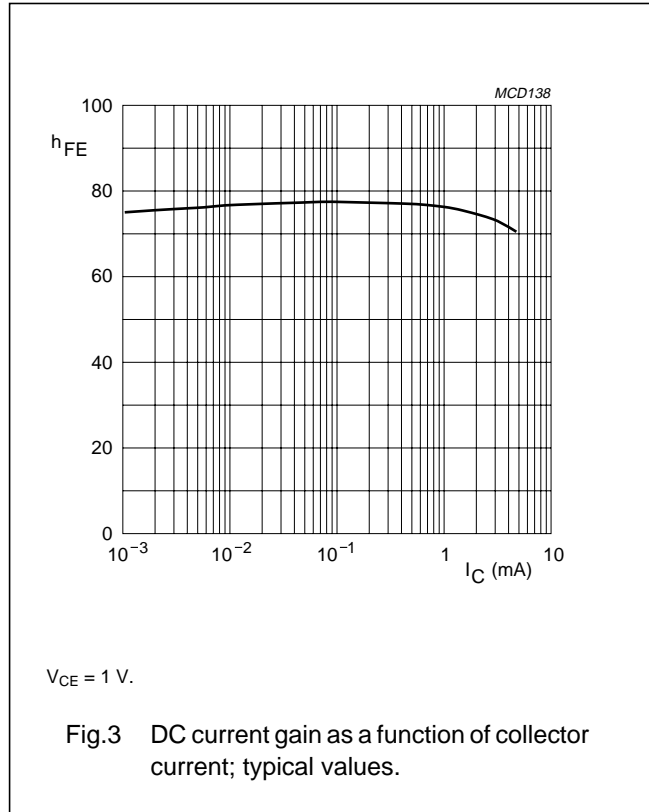
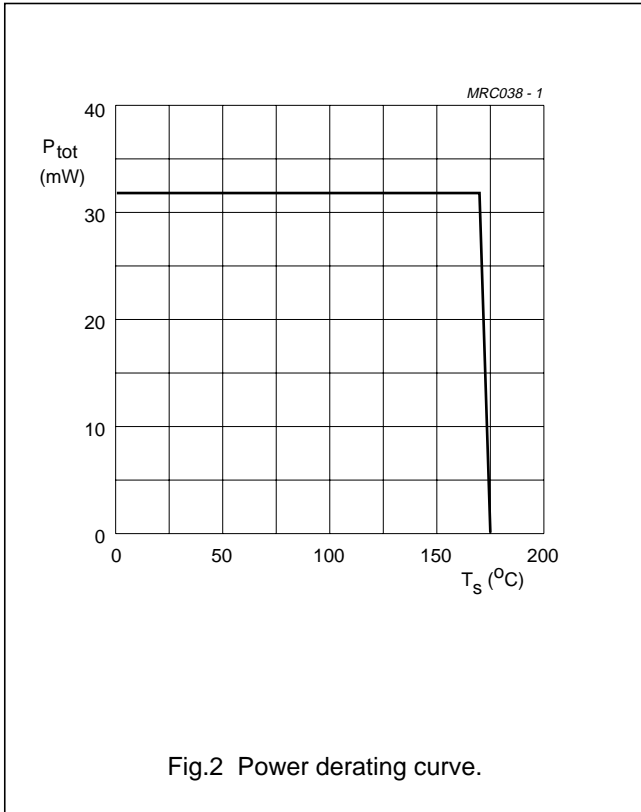
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I <sub>CBO</sub>	collector leakage current	I <sub>E</sub> = 0; V <sub>CB</sub> = 5 V	–	–	50	μA
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = 0.5 mA; V <sub>CE</sub> = 1 V	50	80	200	
C <sub>re</sub>	feedback capacitance	I <sub>C</sub> = i <sub>c</sub> = 0; V <sub>CB</sub> = 1 V; f = 1 MHz	–	0.21	0.3	pF
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 1 mA; V <sub>CE</sub> = 1 V; T <sub>amb</sub> = 25 °C; f = 500 MHz	3.5	5	–	GHz
G <sub>UM</sub>	maximum unilateral power gain (note 1)	I <sub>C</sub> = 0.5 mA; V <sub>CE</sub> = 1 V; f = 1 GHz; T <sub>amb</sub> = 25 °C	–	18	–	dB
F	noise figure	I <sub>C</sub> = 0.5 mA; V <sub>CE</sub> = 1 V; f = 1 GHz; Γ = Γ <sub>opt</sub> ; T <sub>amb</sub> = 25 °C	–	1.8	–	dB
		I <sub>C</sub> = 1 mA; V <sub>CE</sub> = 1 V; f = 1 GHz; Γ = Γ <sub>opt</sub> ; T <sub>amb</sub> = 25 °C	–	2	–	dB

**Note**

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

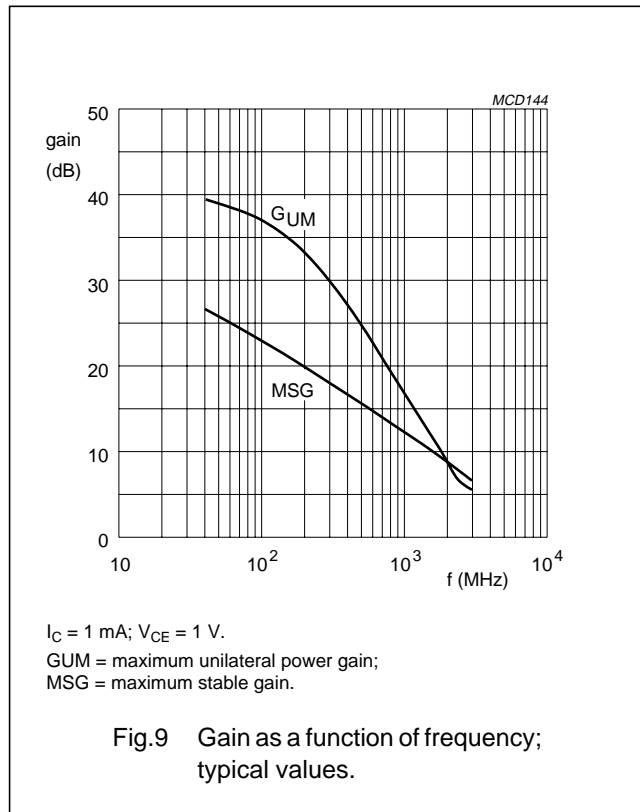
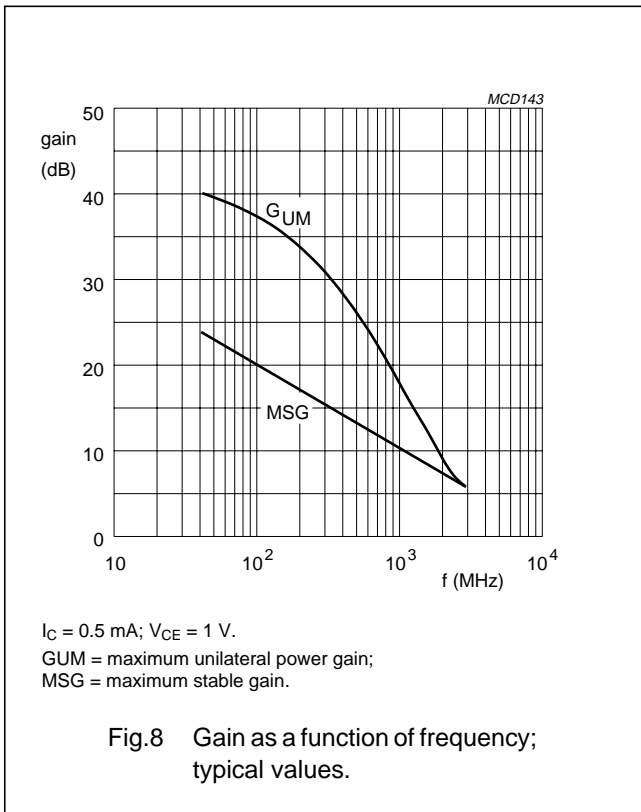
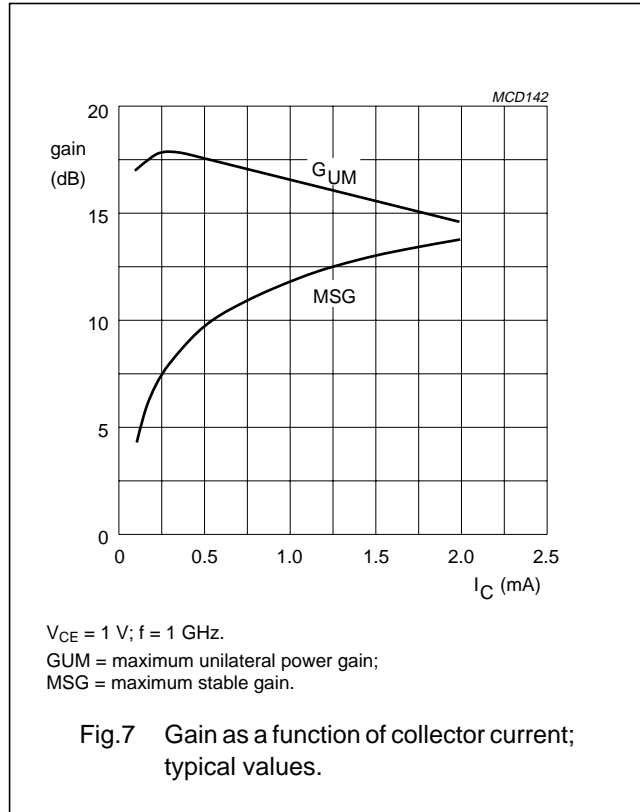
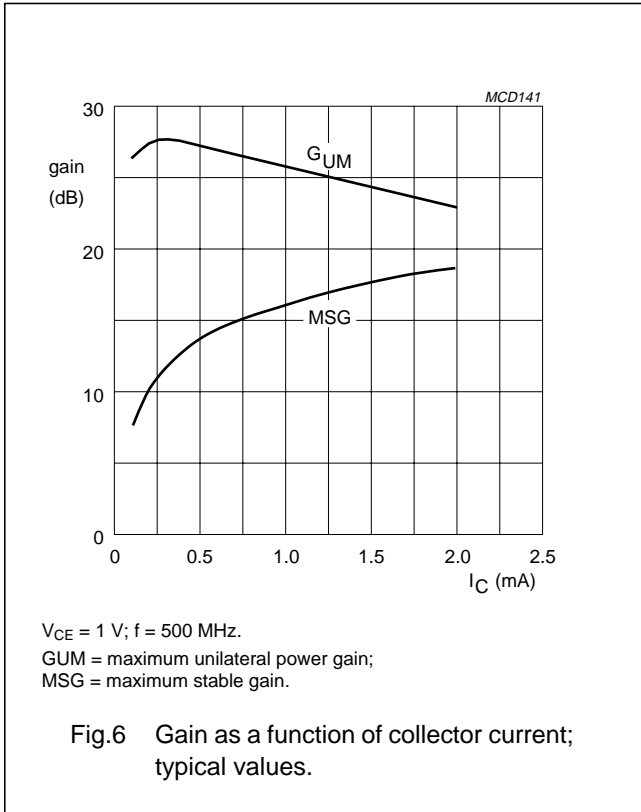
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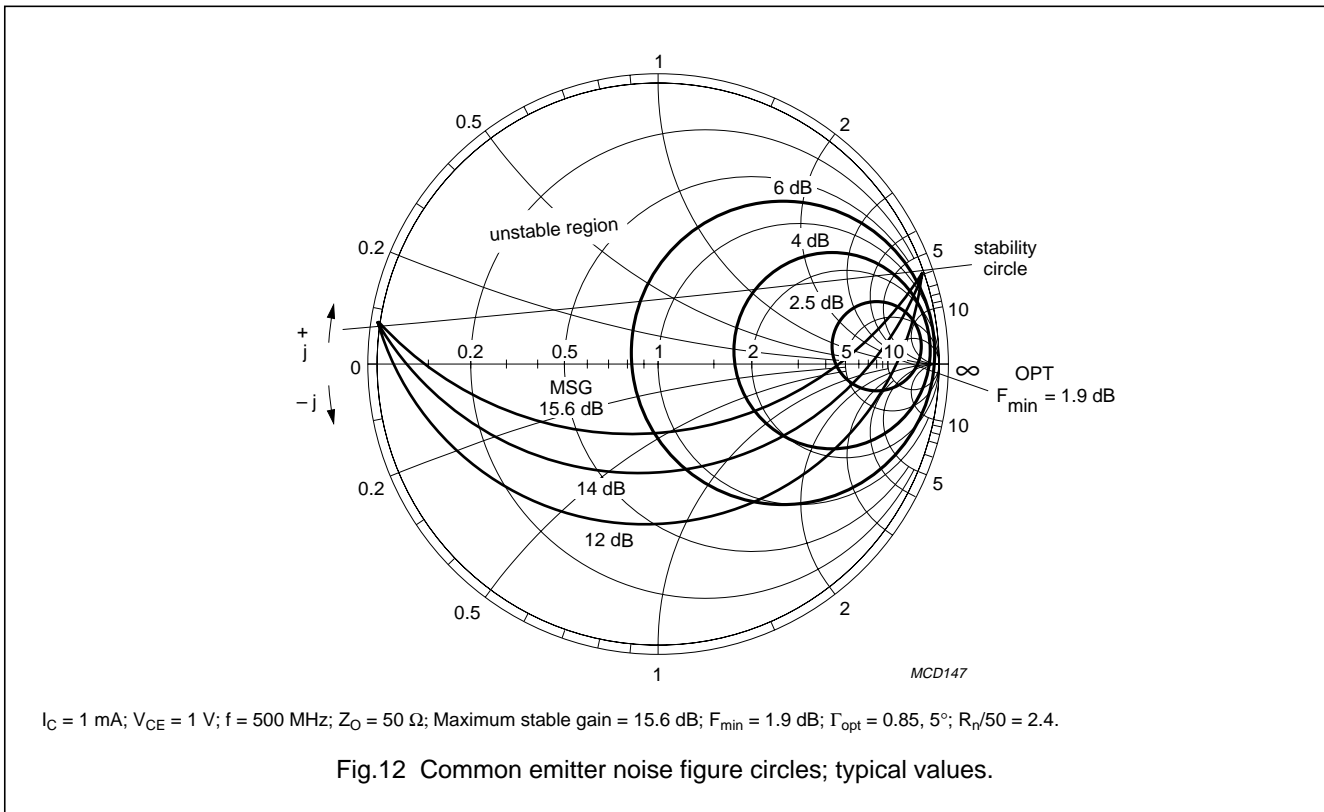
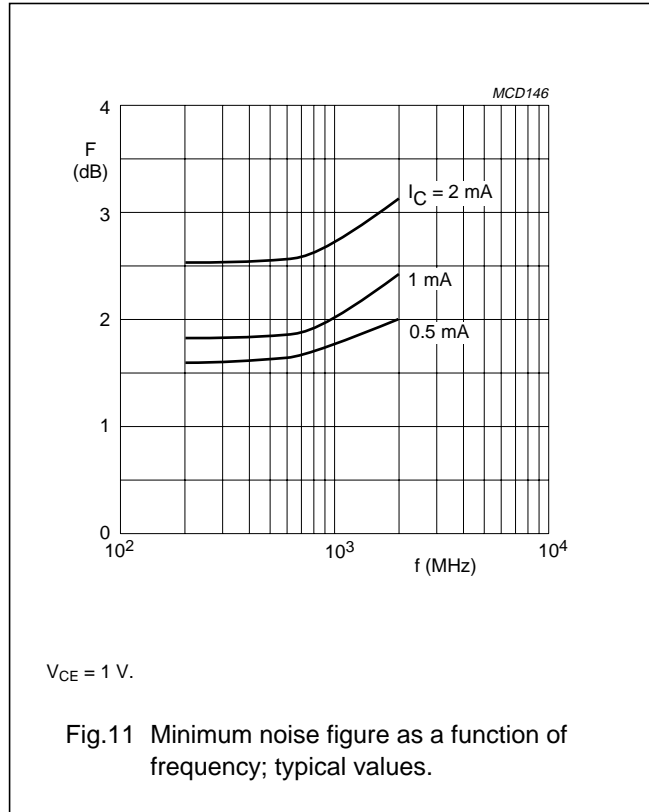
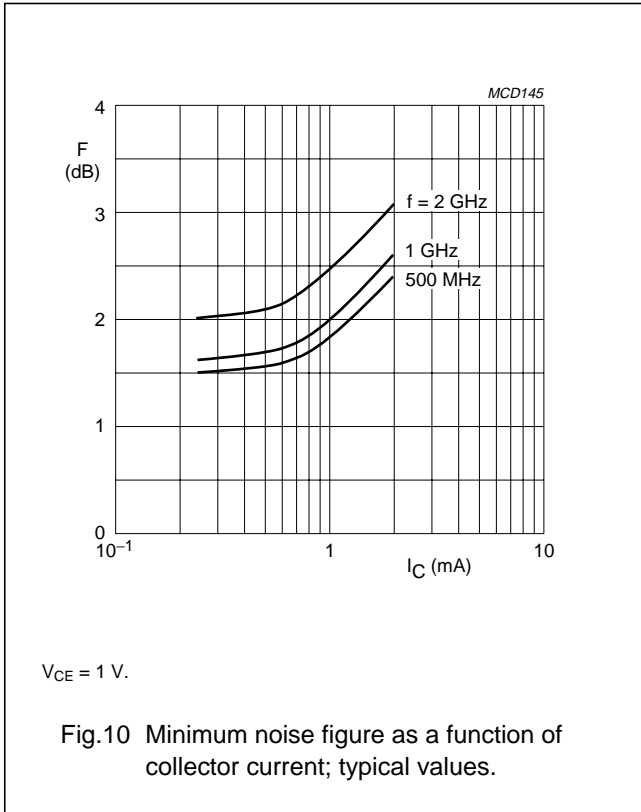
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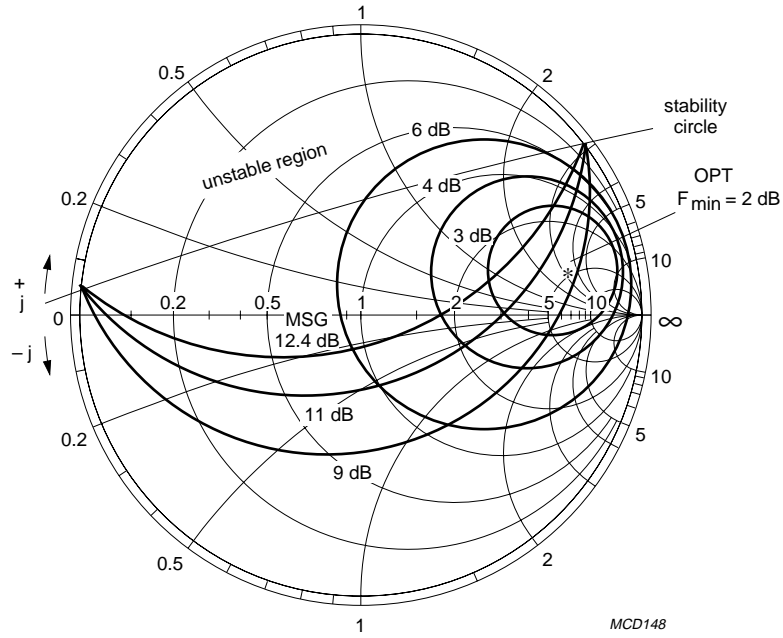
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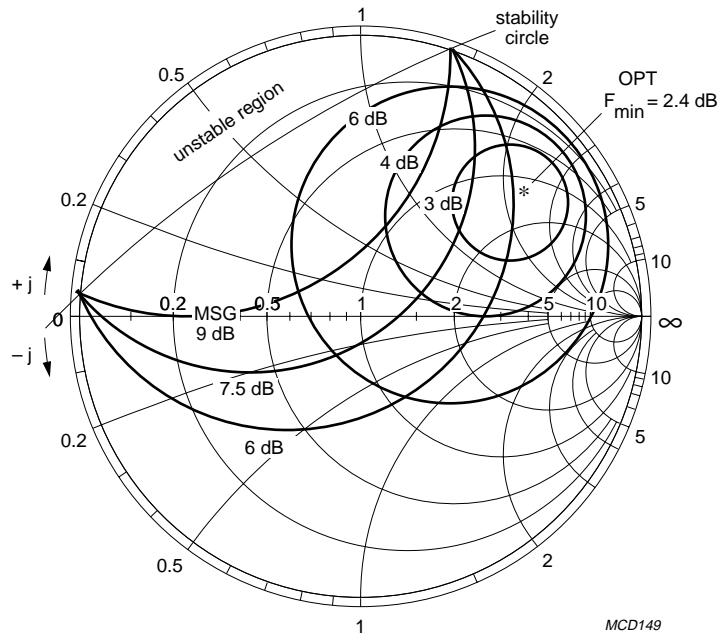
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$I_C = 1$  mA;  $V_{CE} = 1$  V;  $f = 1000$  MHz;  $Z_O = 50 \Omega$ ; Maximum stable gain = 12.4 dB;  $F_{min} = 2$  dB;  $\Gamma_{opt} = 0.78, 14^\circ$ ;  $R_n/50 = 2.6$ .

Fig.13 Common emitter noise figure circles; typical values.

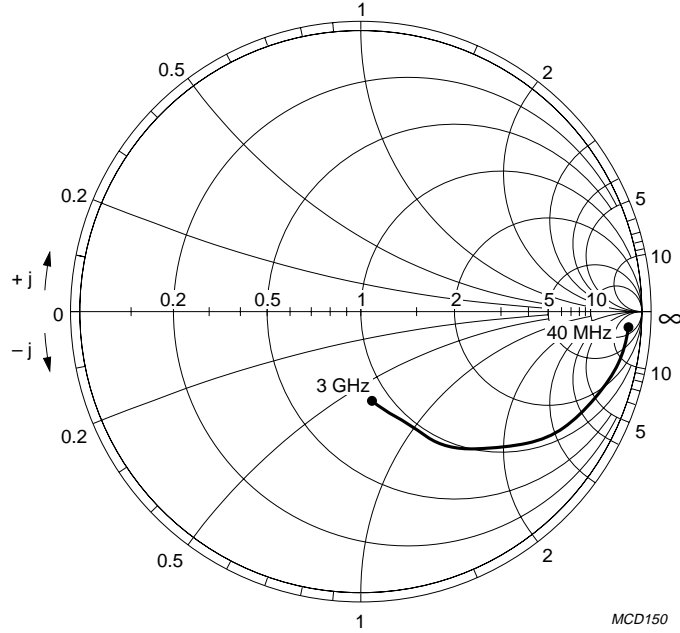


$I_C = 1$  mA;  $V_{CE} = 1$  V;  $f = 2000$  MHz;  $Z_O = 50 \Omega$ ; Maximum stable gain = 8.9 dB;  $F_{min} = 2.4$  dB;  $\Gamma_{opt} = 0.72, 38^\circ$ ;  $R_n/50 = 1.9$ .

Fig.14 Common emitter noise figure circles; typical values.

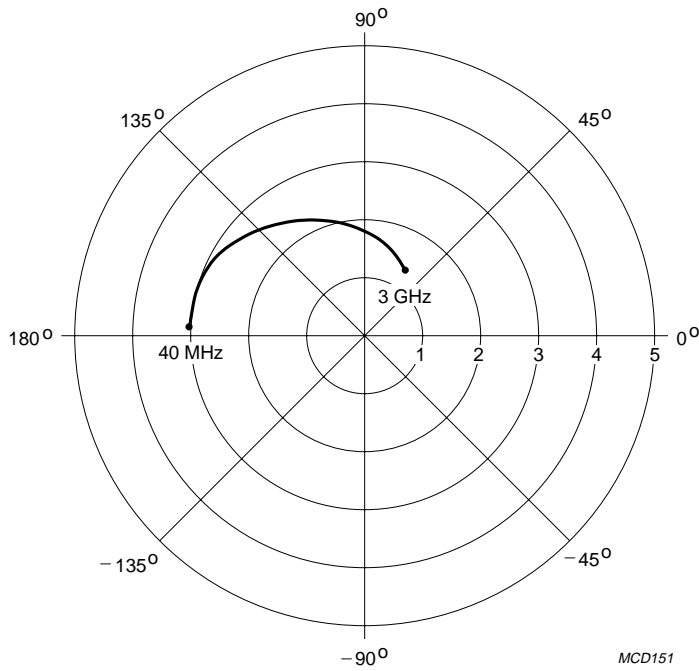
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$I_C = 1 \text{ mA}$ ;  $V_{CE} = 1 \text{ V}$ ;  $Z_0 = 50 \Omega$ .

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



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

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



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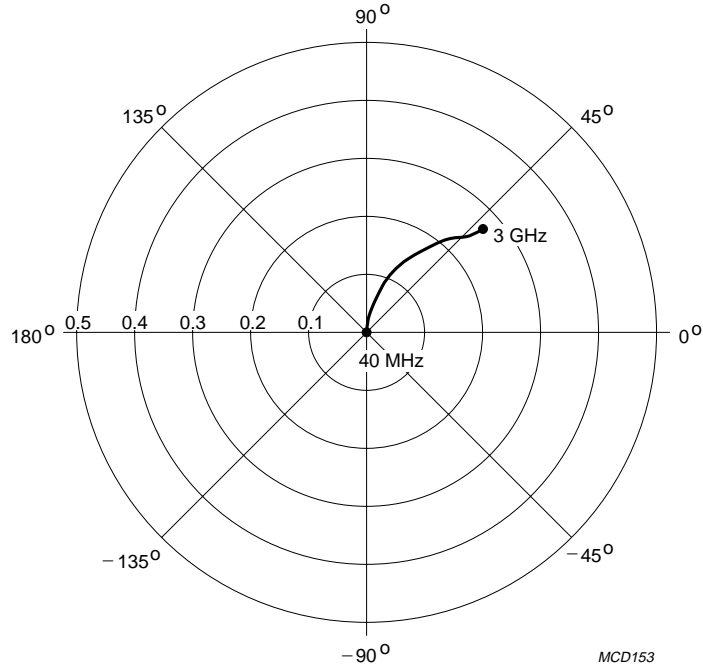


Fig.17 Common emitter reverse transmission coefficient ( $S_{12}$ ); typical values.

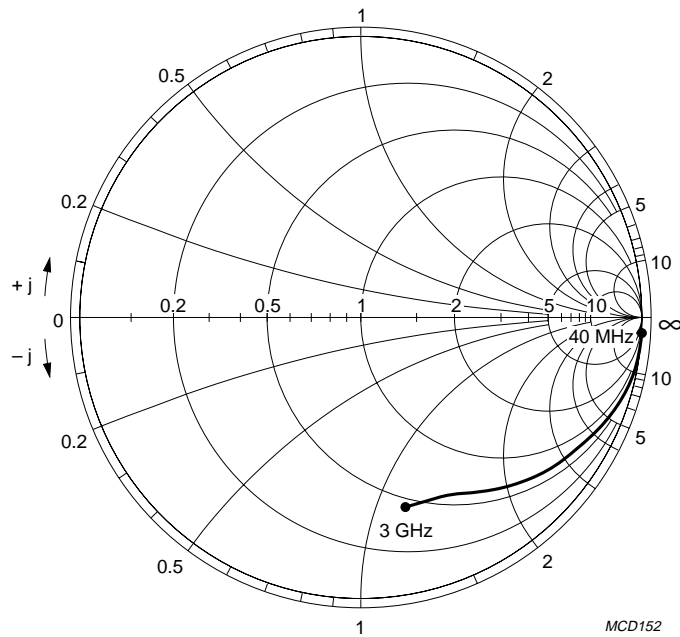


Fig.18 Common emitter output reflection coefficient ( $S_{22}$ ); typical values.

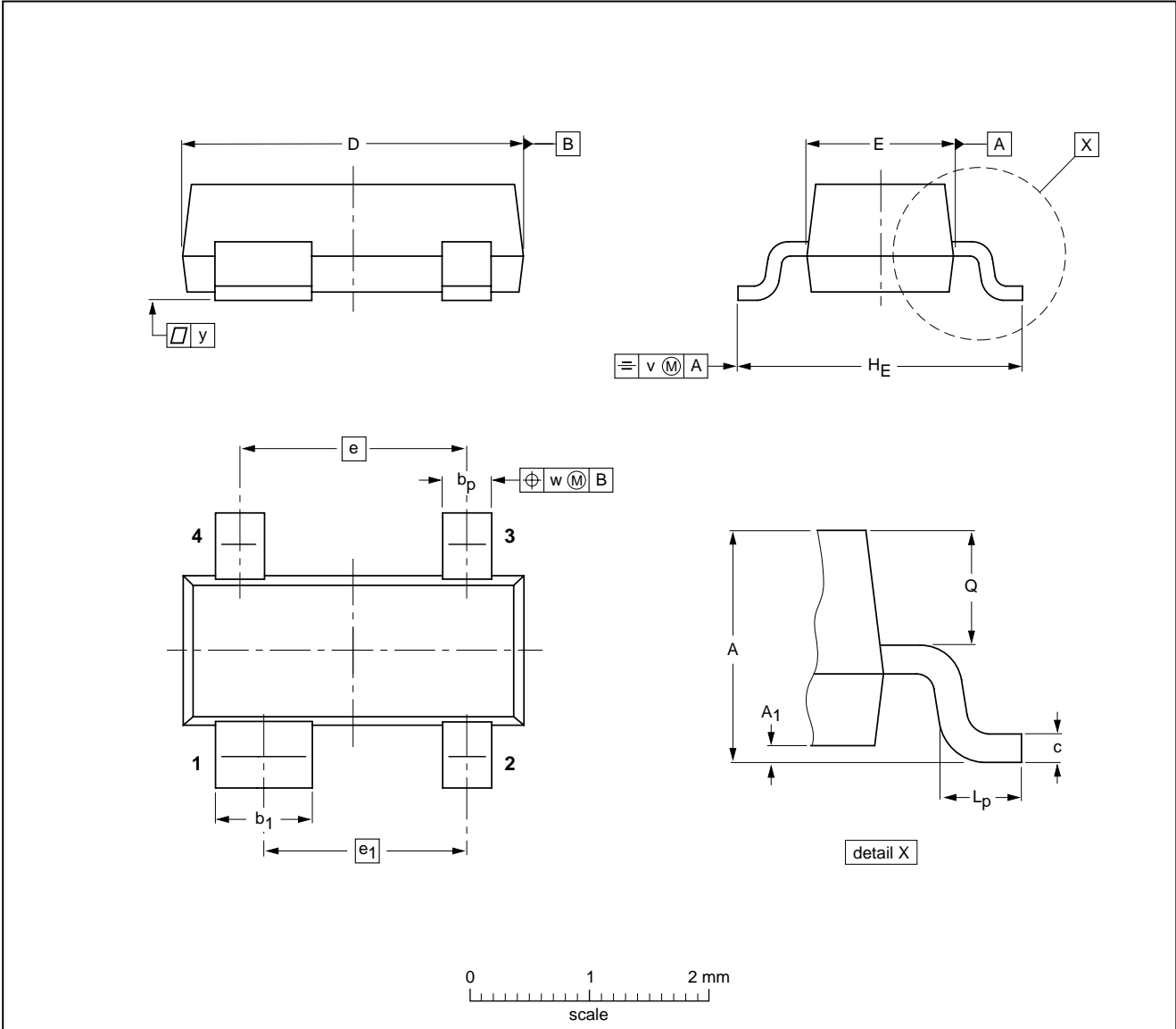
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PACKAGE OUTLINE

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

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### Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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## Revision history

### Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BFG25AX_N_4	20071127	Product data sheet	-	BFG25AX_3
Modifications:	• Fig. 1 on page 2; Figure note changed			
BFG25AX_3 (9397 750 02767)	19971029	Product specification	-	BFG25AX_2
BFG25AX_2	19950901	Product specification	-	BFG25AX_1
BFG25AX_1	19921101	Product specification	-	-

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