BFG25A/X

NPN 5 GHz wideband transistor

Rev. 04 — 27 November 2007 Product data sheet

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NPN 5 GHz wideband transistor BFG25A/X

FEATURES

- Low current consumption (100 μA to 1 mA)
- Low noise figure
- Gold metallization ensures excellent reliability.

APPLICATIONS

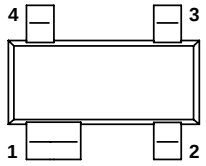
- RF low power amplifiers, such as pocket telephones, paging systems, with signal frequencies up to 2 GHz.

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



Top view MSB014

Marking code: %MU.

Fig.1 SOT143B.

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	$T_s \leq 165$ °C	–	–	32	mW
h_{FE}	DC current gain	I_C = 0.5 mA; V_{CE} = 1 V	50	80	200	
f_T	transition frequency	I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz; T_{amb} = 25 °C	3.5	5	–	GHz
G_{UM}	maximum unilateral power gain	I_C = 0.5 mA; V_{CE} = 1 V; f = 1 GHz; T_{amb} = 25 °C	–	18	–	dB
F	noise figure	I_C = 0.5 mA; V_{CE} = 1 V; f = 1 GHz; $\Gamma = \Gamma_{opt}$; T_{amb} = 25 °C	–	1.8	–	dB
		I_C = 1 mA; V_{CE} = 1 V; f = 1 GHz; $\Gamma = \Gamma_{opt}$; T_{amb} = 25 °C	–	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	$T_s \leq 165$ °C; note 1	–	32	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
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	note 1	320	K/W

Note

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

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector leakage current	$I_E = 0$; $V_{CB} = 5$ V	–	–	50	µA
h_{FE}	DC current gain	$I_C = 0.5$ mA; $V_{CE} = 1$ V	50	80	200	
C_{re}	feedback capacitance	$I_C = i_c = 0$; $V_{CB} = 1$ V; f = 1 MHz	–	0.21	0.3	pF
f_T	transition frequency	$I_C = 1$ mA; $V_{CE} = 1$ V; $T_{amb} = 25$ °C; f = 500 MHz	3.5	5	–	GHz
G_{UM}	maximum unilateral power gain (note 1)	$I_C = 0.5$ mA; $V_{CE} = 1$ V; f = 1 GHz; $T_{amb} = 25$ °C	–	18	–	dB
F	noise figure	$I_C = 0.5$ mA; $V_{CE} = 1$ V; f = 1 GHz; $\Gamma = \Gamma_{opt}$; $T_{amb} = 25$ °C	–	1.8	–	dB
		$I_C = 1$ mA; $V_{CE} = 1$ V; f = 1 GHz; $\Gamma = \Gamma_{opt}$; $T_{amb} = 25$ °C	–	2	–	dB

Note

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

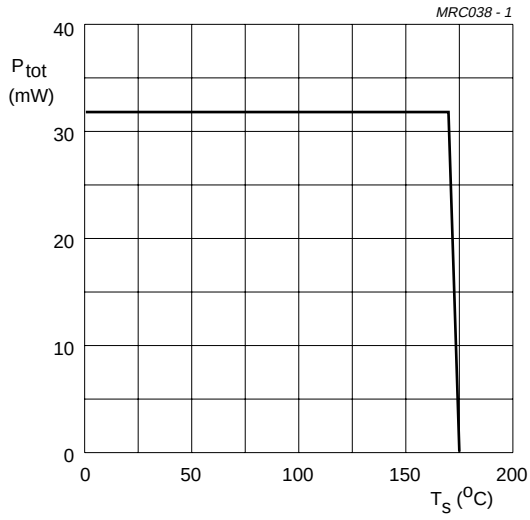
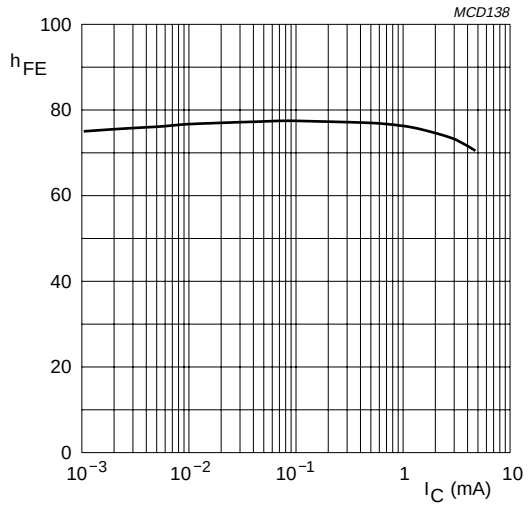
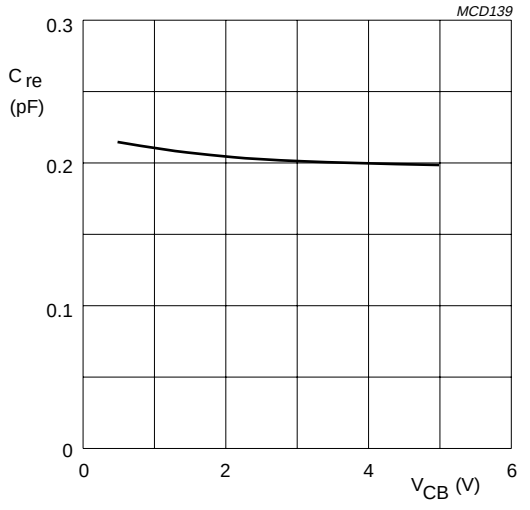


Fig.2 Power derating curve.



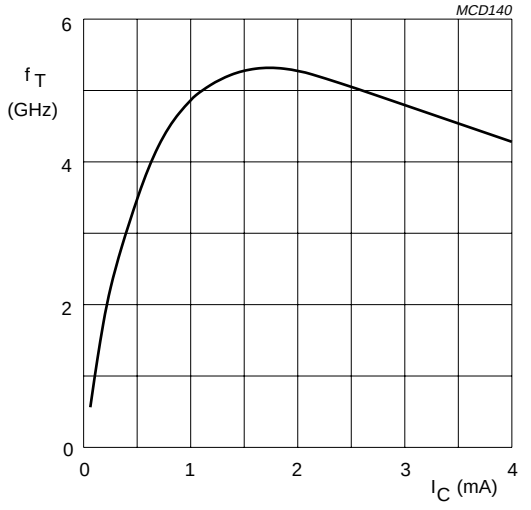
V_{CE} = 1 V.

Fig.3 DC current gain as a function of collector current; typical values.



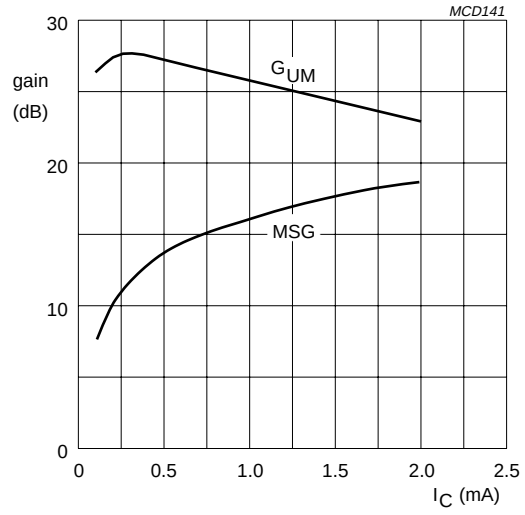
$I_C = i_c = 0$; f = 1 MHz.

Fig.4 Feedback capacitance as a function of collector-base voltage; typical values.



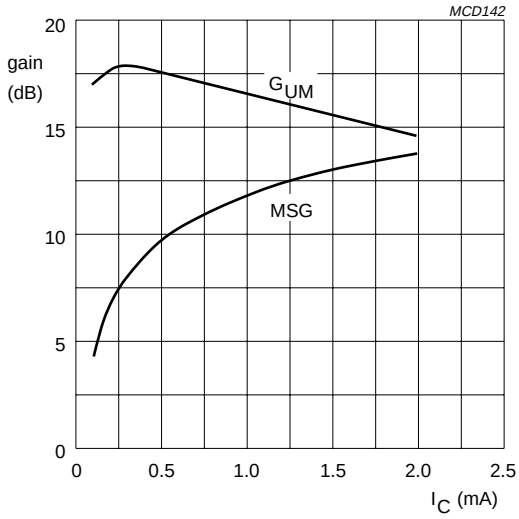
V_{CE} = 1 V; f = 500 MHz; T_{amb} = 25 °C.

Fig.5 Transition frequency as a function of collector current; typical values.



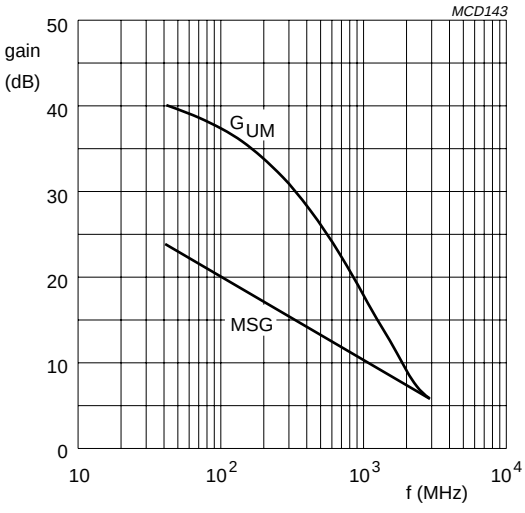
V_{CE} = 1 V; f = 500 MHz.
GUM = maximum unilateral power gain;
MSG = maximum stable gain.

Fig.6 Gain as a function of collector current; typical values.



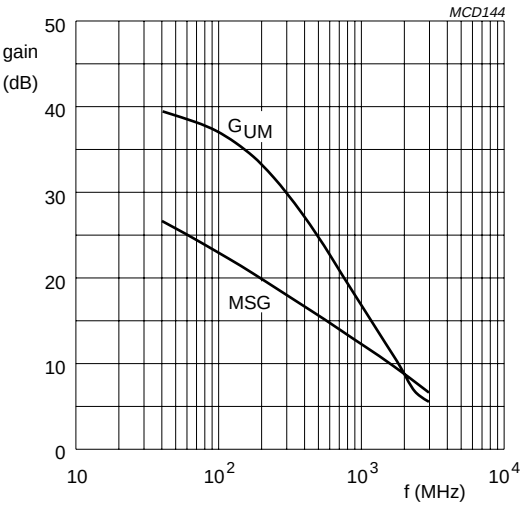
V_{CE} = 1 V; f = 1 GHz.
GUM = maximum unilateral power gain;
MSG = maximum stable gain.

Fig.7 Gain as a function of collector current; typical values.



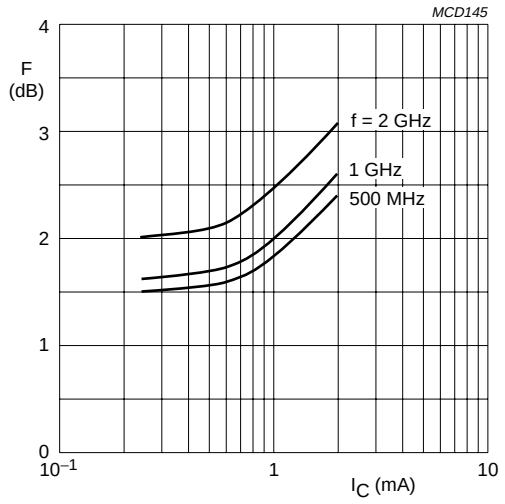
I_C = 0.5 mA; V_{CE} = 1 V.
GUM = maximum unilateral power gain;
MSG = maximum stable gain.

Fig.8 Gain as a function of frequency; typical values.



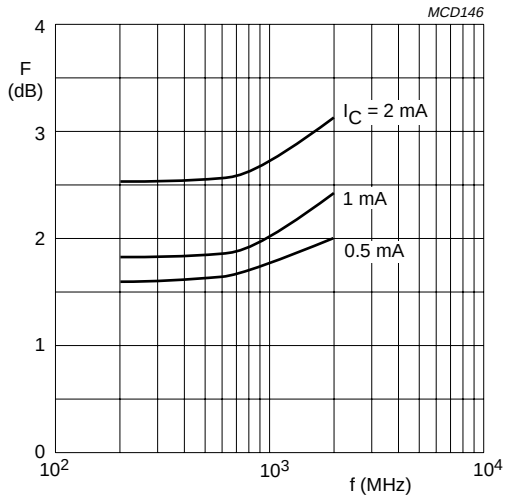
I_C = 1 mA; V_{CE} = 1 V.
GUM = maximum unilateral power gain;
MSG = maximum stable gain.

Fig.9 Gain as a function of frequency; typical values.



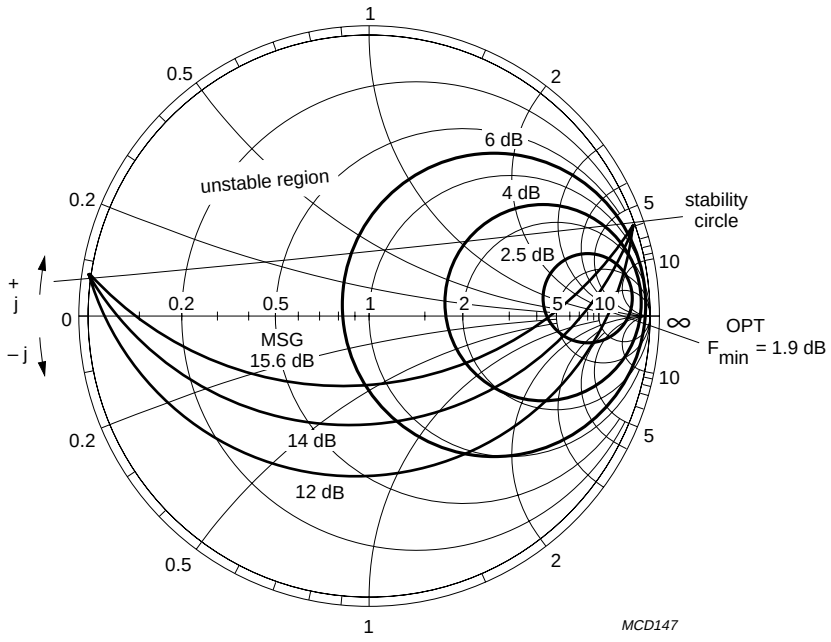
V_{CE} = 1 V.

Fig.10 Minimum noise figure as a function of collector current; typical values.



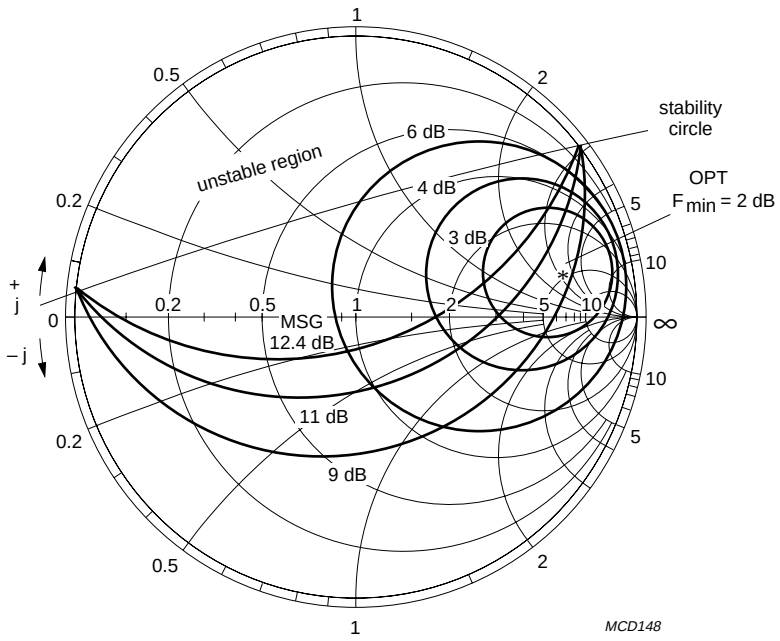
V_{CE} = 1 V.

Fig.11 Minimum noise figure as a function of frequency; typical values.



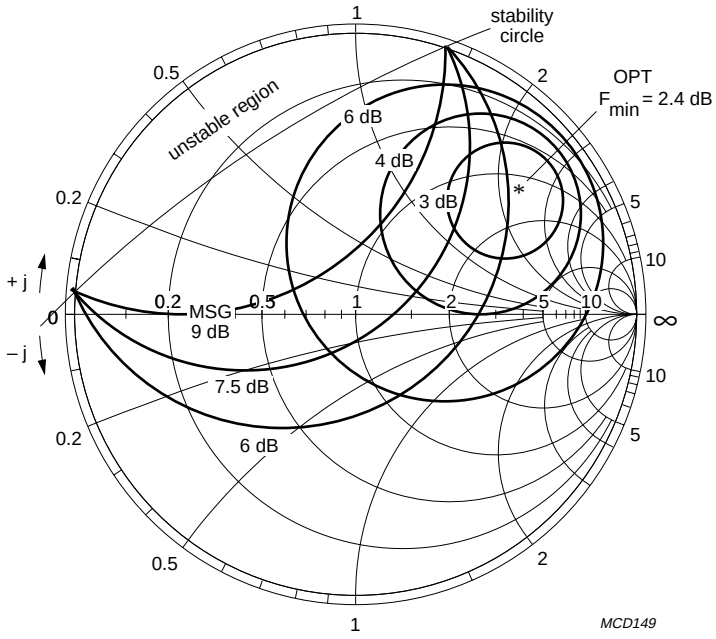
I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz; Z_O = 50 Ω; Maximum stable gain = 15.6 dB; F_{min} = 1.9 dB; Γ_{opt} = 0.85, 5°; $R_n/50$ = 2.4.

Fig.12 Common emitter noise figure circles; typical values.



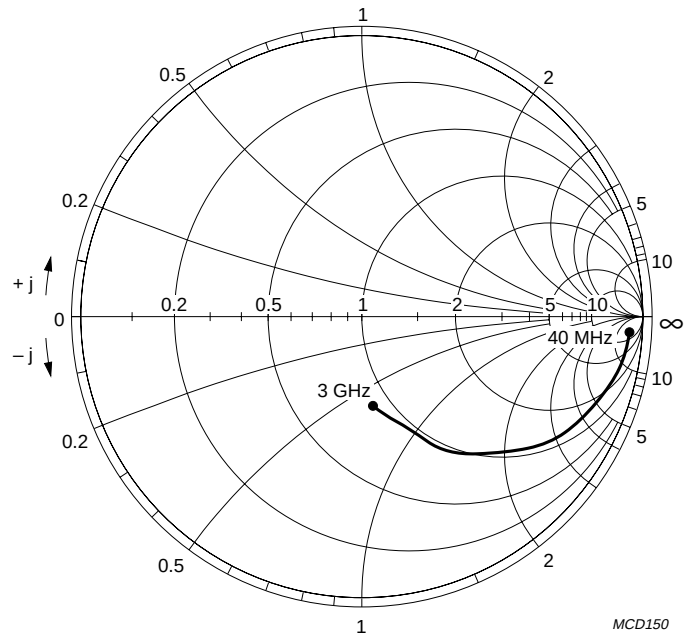
I_C = 1 mA; V_{CE} = 1 V; f = 1000 MHz; Z_O = 50 Ω; Maximum stable gain = 12.4 dB; F_{min} = 2 dB; Γ_{opt} = 0.78, 14°; $R_n/50$ = 2.6.

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



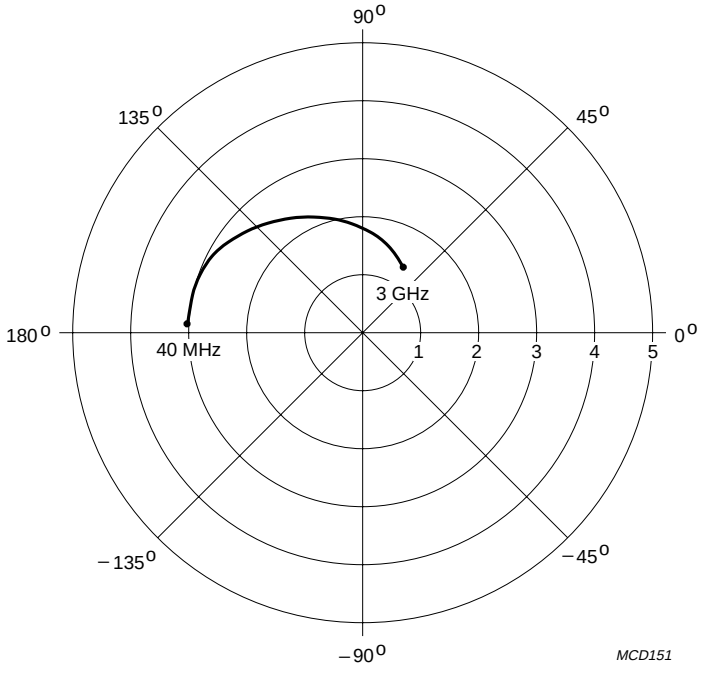
I_C = 1 mA; V_{CE} = 1 V; f = 2000 MHz; Z_O = 50 Ω; Maximum stable gain = 8.9 dB; F_{min} = 2.4 dB; Γ_{opt} = 0.72, 38°; $R_n/50$ = 1.9.

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



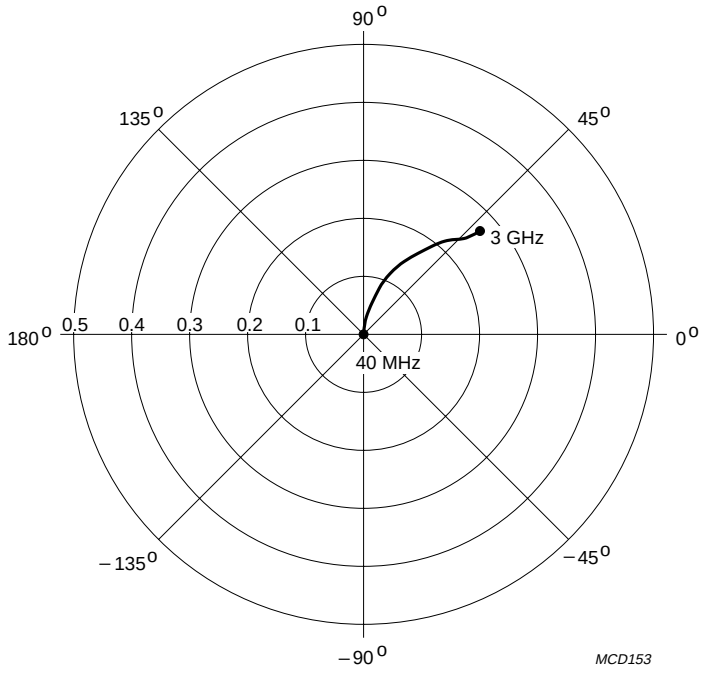
I_C = 1 mA; V_{CE} = 1 V; Z_o = 50 Ω.

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



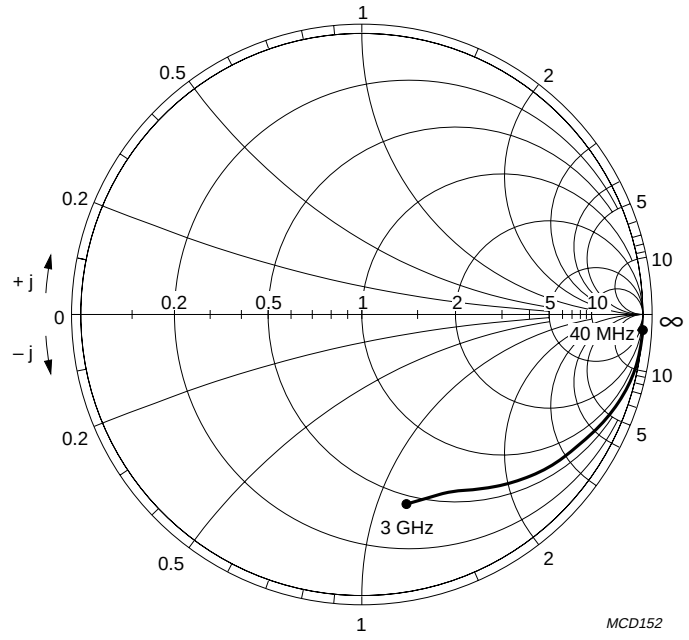
I_C = 1 mA; V_{CE} = 1 V.

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



I_C = 1 mA; V_{CE} = 1 V.

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

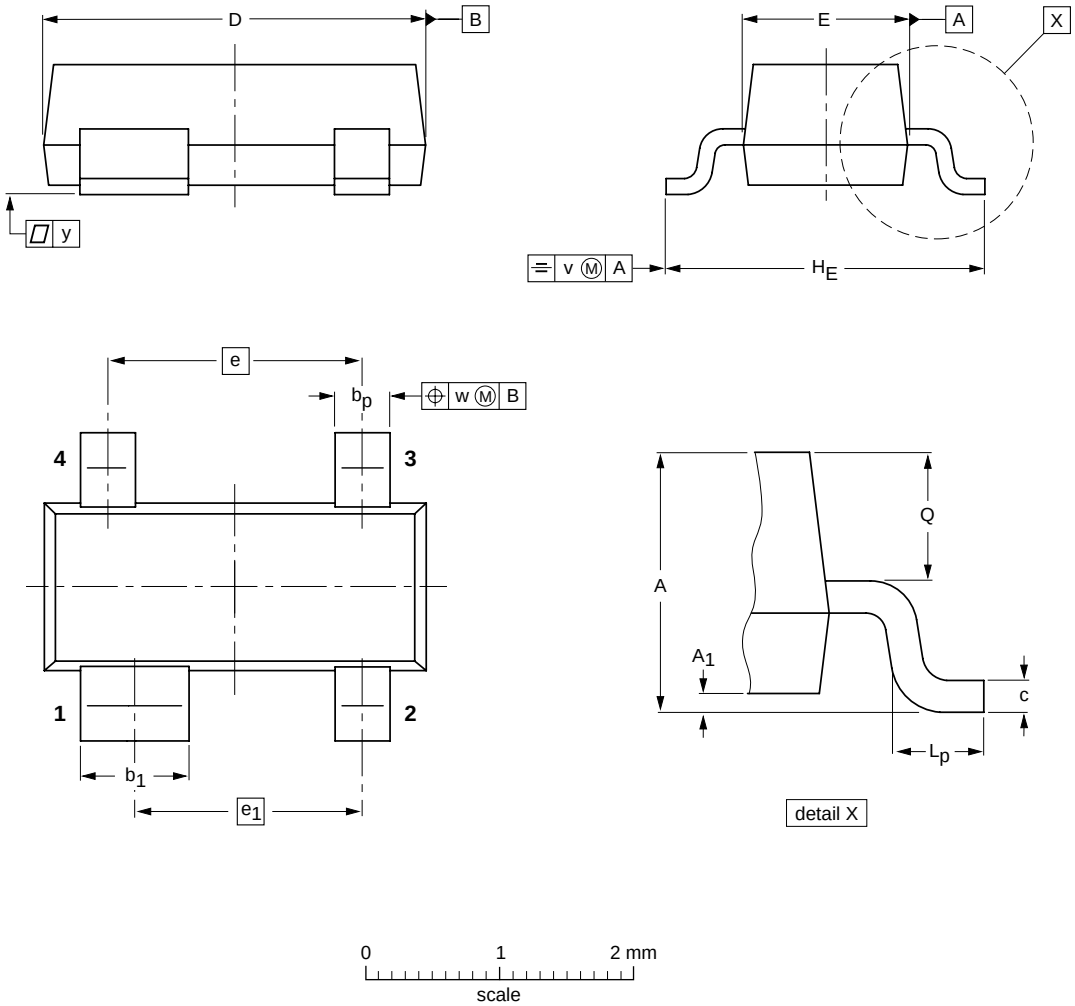


I_C = 1 mA; V_{CE} = 1 V; Z_o = 50 Ω.

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

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

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Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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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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