DATA SHEET

BFG25A/X
NPN 5 GHz wideband transistor

Product specification
Supersedes data of September 1995
File under Discrete Semiconductors, SC14

1997 Oct 29

Philips
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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

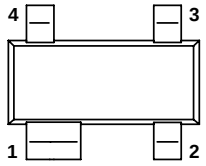
- RF low power amplifiers, such as pocket telephones, paging systems, with signal frequencies up to 2 GHz.

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: V11.

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

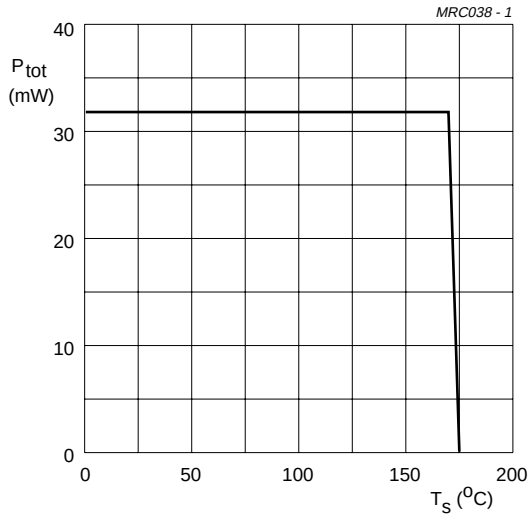
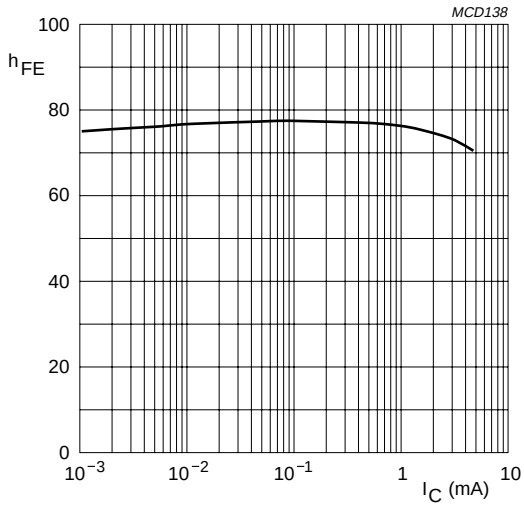
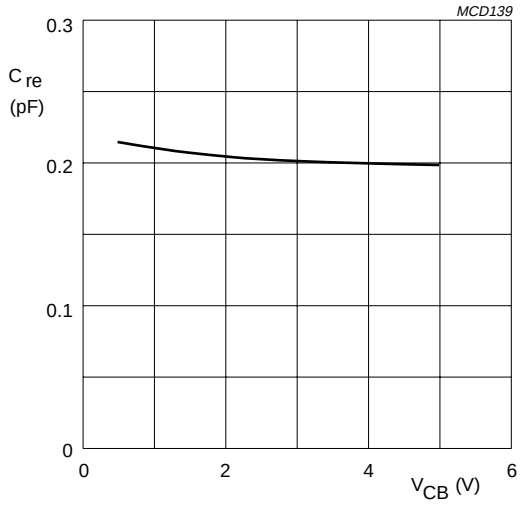


Fig.2 Power derating curve.



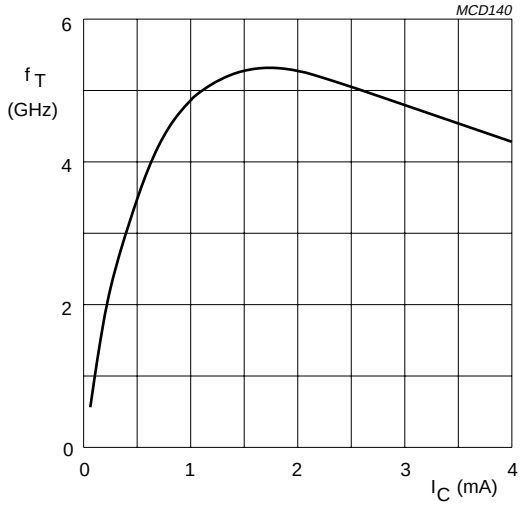
V_{CE} = 1 V.

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



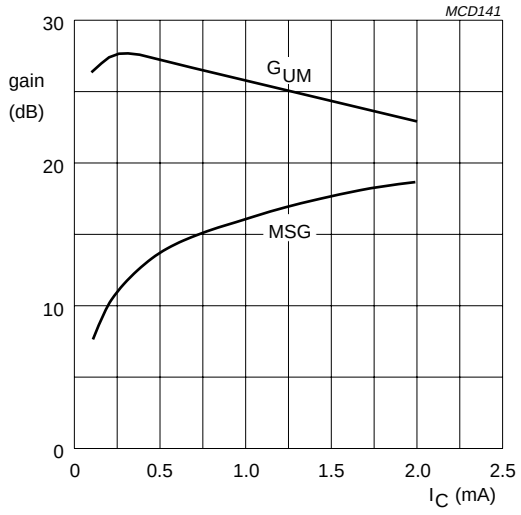
$I_C = i_c = 0$; f = 1 MHz.

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



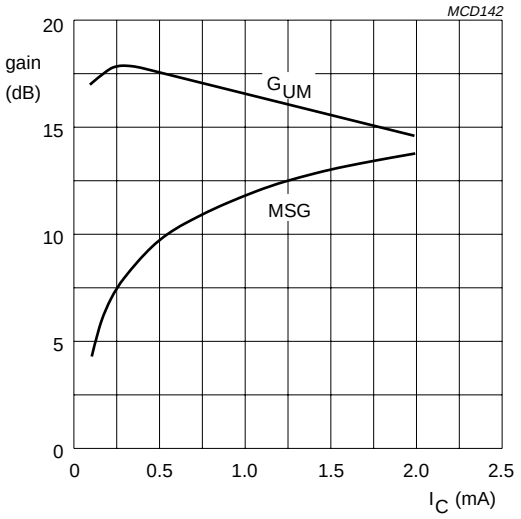
V_{CE} = 1 V; f = 500 MHz; T_{amb} = 25 °C.

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



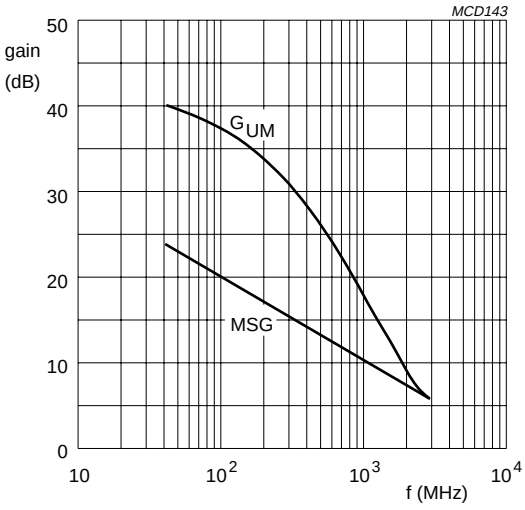
V_{CE} = 1 V; f = 500 MHz.
GUM = maximum unilateral power gain;
MSG = maximum stable gain.

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



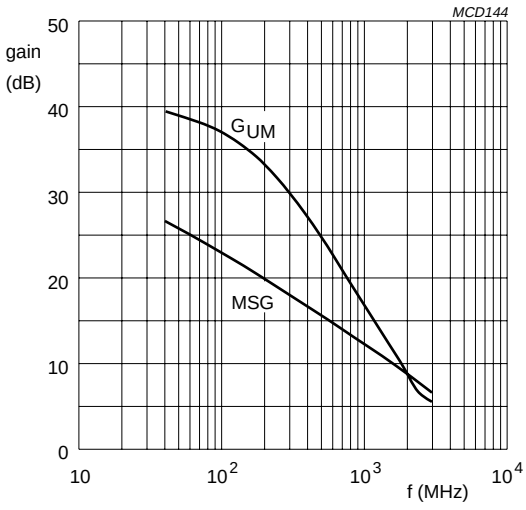
V_{CE} = 1 V; f = 1 GHz.
GUM = maximum unilateral power gain;
MSG = maximum stable gain.

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



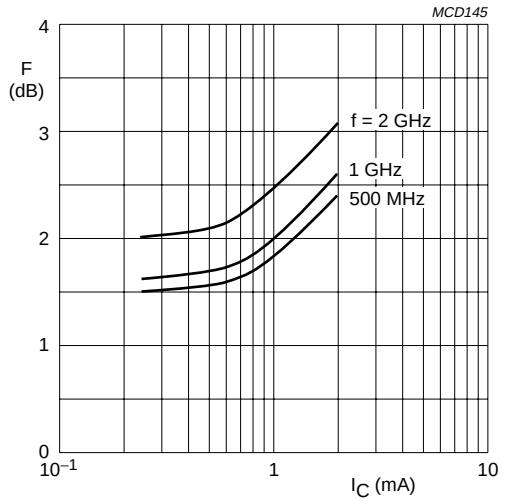
I_C = 0.5 mA; V_{CE} = 1 V.
GUM = maximum unilateral power gain;
MSG = maximum stable gain.

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



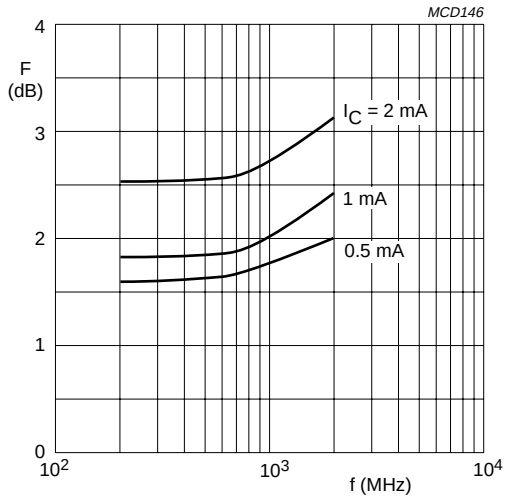
I_C = 1 mA; V_{CE} = 1 V.
GUM = maximum unilateral power gain;
MSG = maximum stable gain.

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



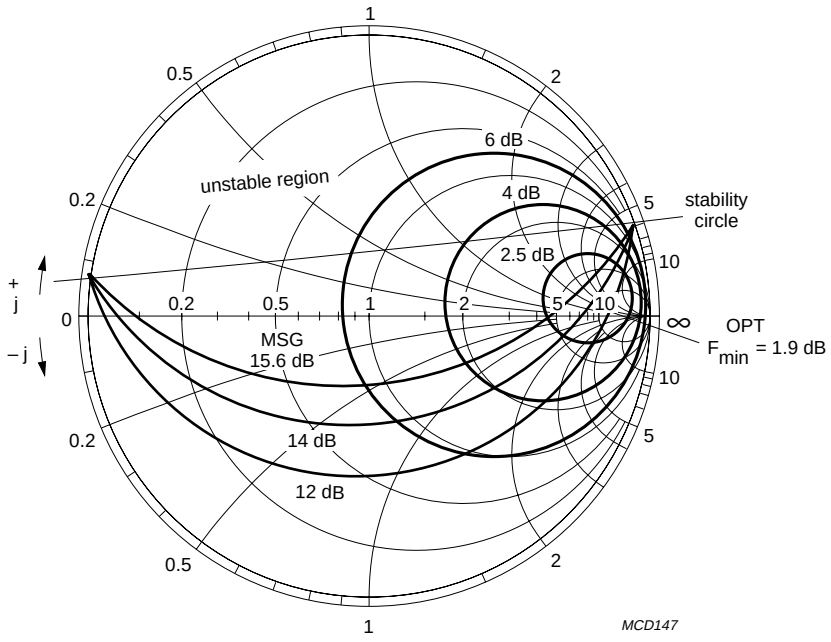
V_{CE} = 1 V.

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



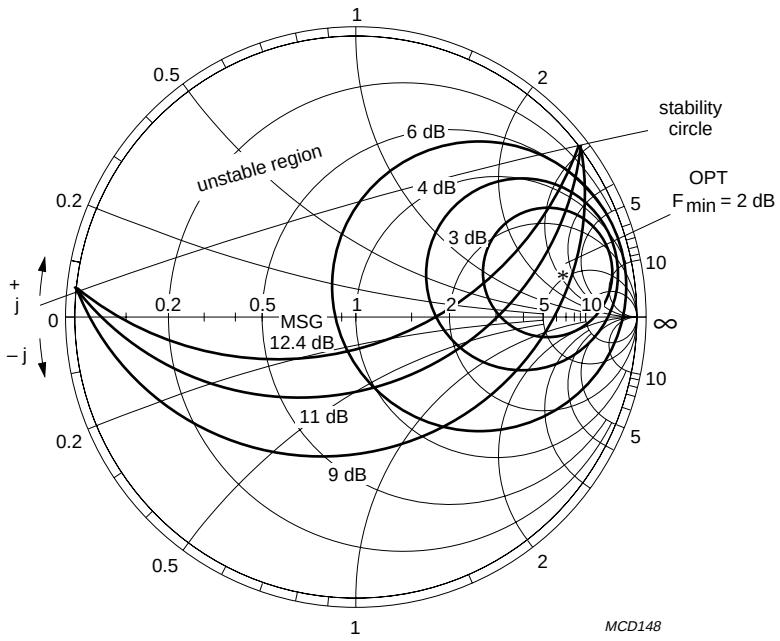
V_{CE} = 1 V.

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



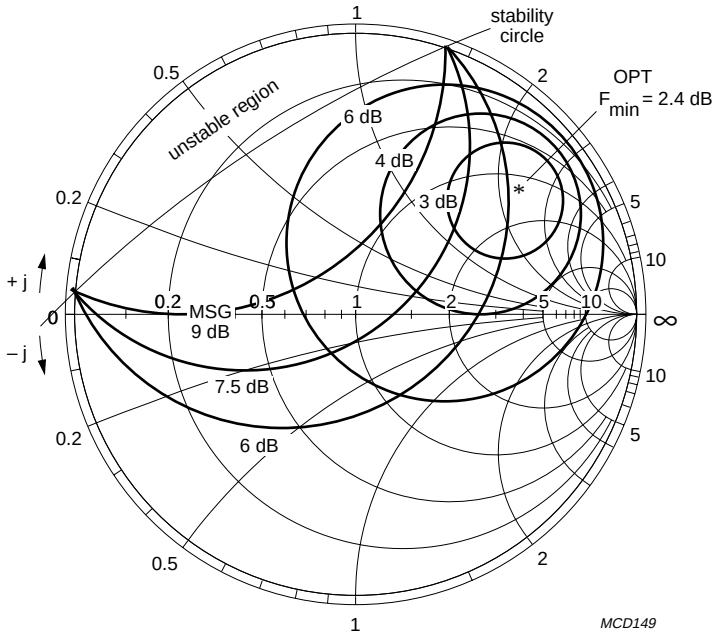
I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz; Z_O = 50 Ω; Maximum stable gain = 15.6 dB; F_{min} = 1.9 dB; Γ_{opt} = 0.85, 5°; $R_n/50$ = 2.4.

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



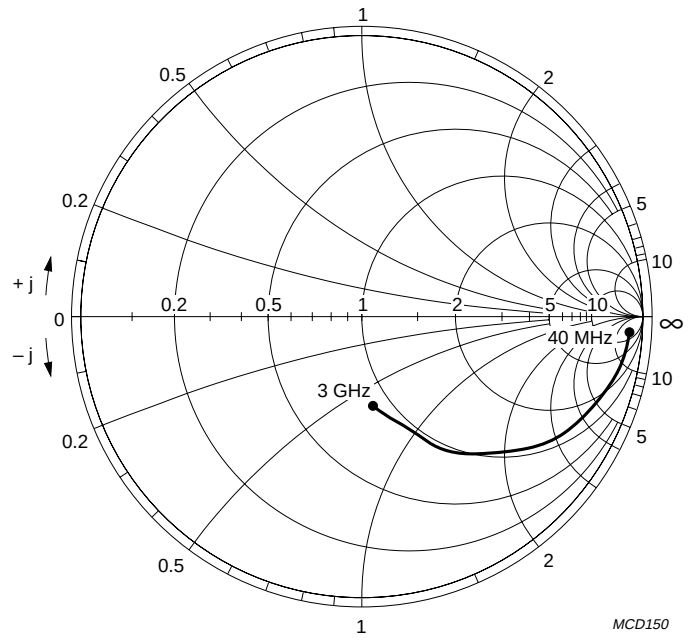
I_C = 1 mA; V_{CE} = 1 V; f = 1000 MHz; Z_O = 50 Ω; Maximum stable gain = 12.4 dB; F_{min} = 2 dB; Γ_{opt} = 0.78, 14°; $R_n/50$ = 2.6.

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



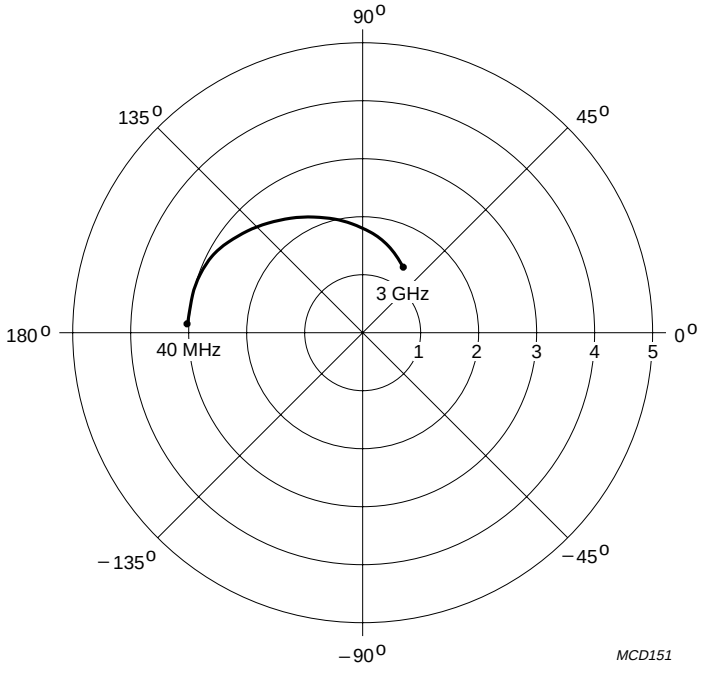
I_C = 1 mA; V_{CE} = 1 V; f = 2000 MHz; Z_O = 50 Ω; Maximum stable gain = 8.9 dB; F_{min} = 2.4 dB; Γ_{opt} = 0.72, 38°; $R_n/50$ = 1.9.

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



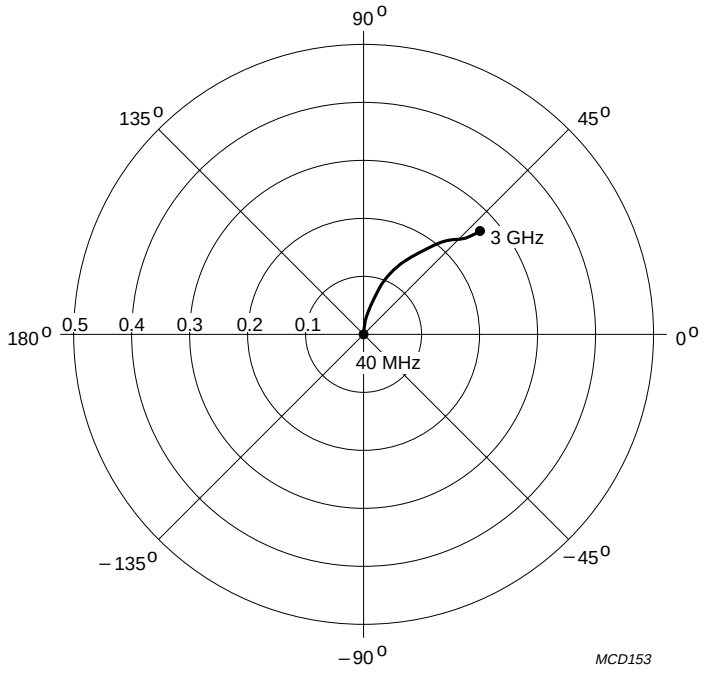
I_C = 1 mA; V_{CE} = 1 V; Z_o = 50 Ω.

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



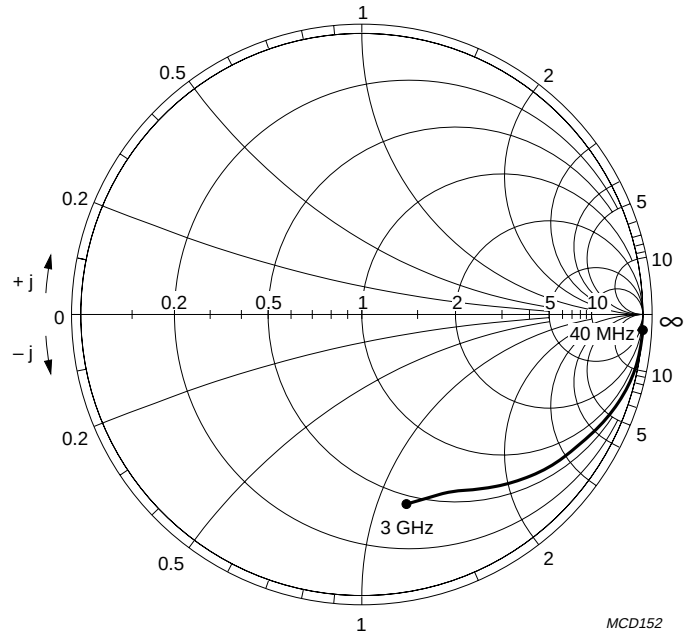
I_C = 1 mA; V_{CE} = 1 V.

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.

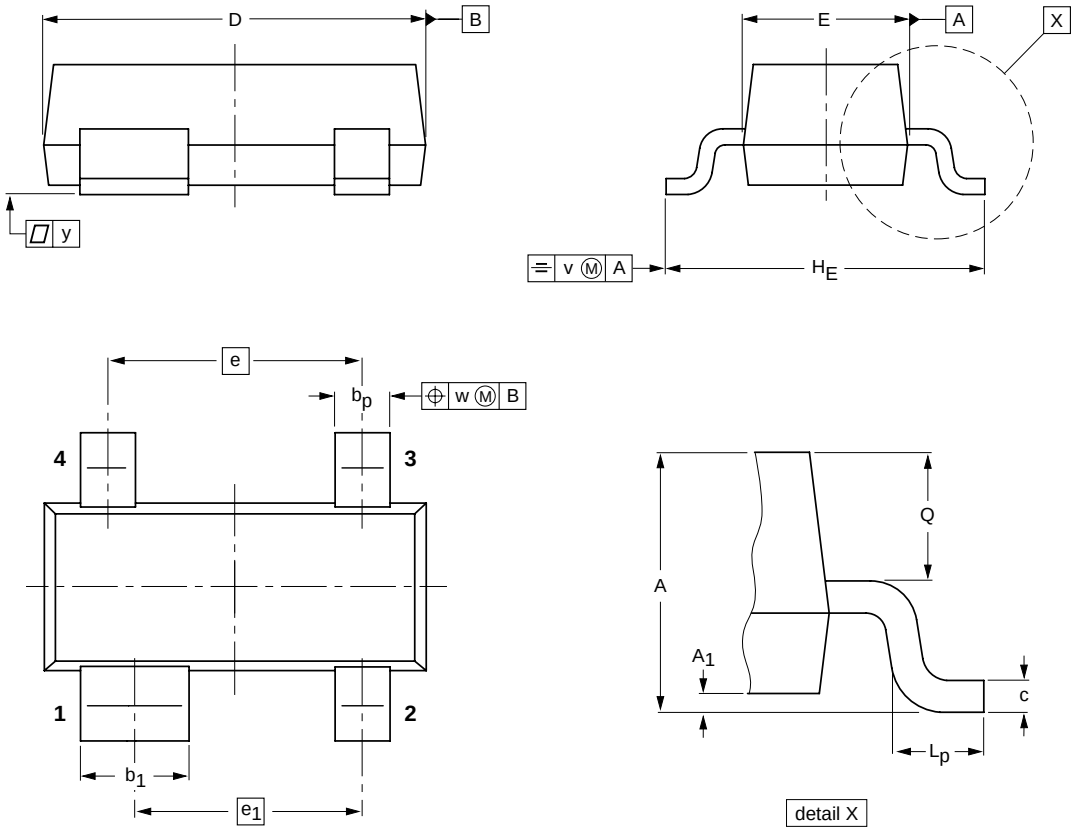


I_C = 1 mA; V_{CE} = 1 V; Z_o = 50 Ω.

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

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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