NPN 5 GHz wideband transistor BFS25A

FEATURES

- Low current consumption
- Low noise figure
- Gold metallization ensures excellent reliability
- SOT323 envelope.

PINNING

PIN	DESCRIPTION
Code: N6	
1	base
2	emitter
3	collector

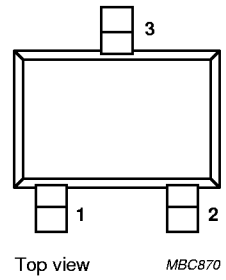


Fig.1 SOT323.

DESCRIPTION

NPN transistor in a plastic SOT323 envelope.

It is designed for use in RF amplifiers and oscillators in pagers and pocket phones with signal frequencies up to 2 GHz.

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	DC collector current		–	–	6.5	mA
P_{tot}	total power dissipation	up to T_s = 170 °C; note 1	–	–	32	mW
h_{FE}	DC current gain	I_C = 0.5 mA; V_{CE} = 1 V; T_j = 25 °C	50	80	200	
f_T	transition frequency	I_C = 1 mA; V_{CE} = 1 V; f = 1 GHz; 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	–	13	–	dB
F	noise figure	I_c = 0.5 mA; V_{CE} = 1 V; f = 1 GHz; T_{amb} = 25 °C	–	1.8	–	dB

LIMITING VALUES

In accordance with the Absolute Maximum 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	DC collector current		–	6.5	mA
P_{tot}	total power dissipation	up to T_s = 170 °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 tab.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	up to T_s = 170 °C; note 1	190 K/W

Note

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

CHARACTERISTICS

T_j = 25 °C, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 5 V	–	–	50	nA
h_{FE}	DC current gain	I_C = 0.5 mA; V_{CE} = 1 V	50	80	200	
C_{re}	feedback capacitance	I_C = 0; V_{CB} = 1 V; f = 1 MHz	–	0.3	0.45	pF
f_T	transition frequency	I_C = 1 mA; V_{CE} = 1 V; f = 1 GHz; T_{amb} = 25 °C	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	–	13	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; I_C = 0.5 mA; V_{CE} = 1 V; f = 1 GHz; T_{amb} = 25 °C	–	1.8	–	dB
		$\Gamma_s = \Gamma_{opt}$; I_C = 1 mA; V_{CE} = 1 V; f = 1 GHz; T_{amb} = 25 °C	–	2	–	dB

Note

1. G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and

$$G_{UM} = 10 \log \frac{|S_{21}|^2}{\left(1 - |S_{11}|^2\right)\left(1 - |S_{22}|^2\right)} \text{ dB.}$$

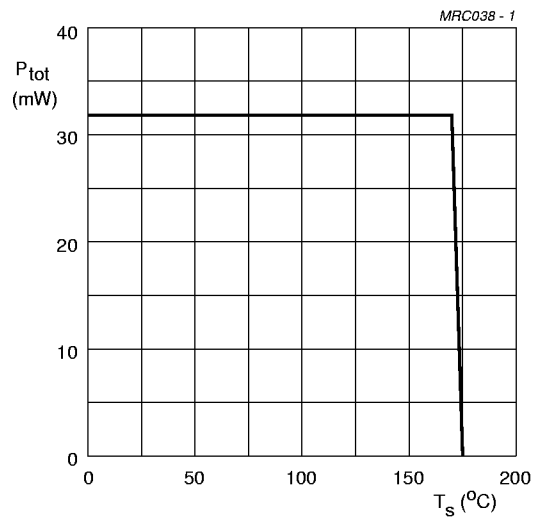
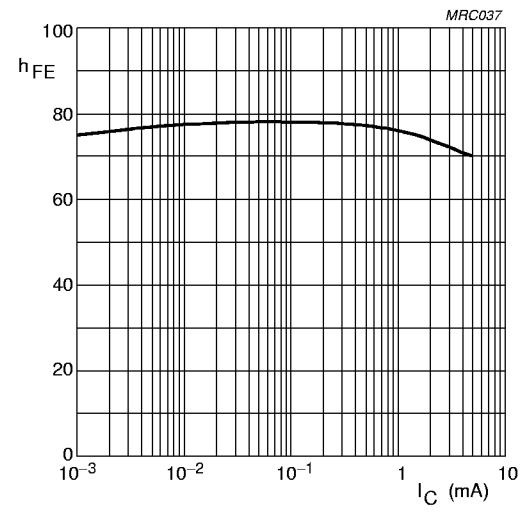
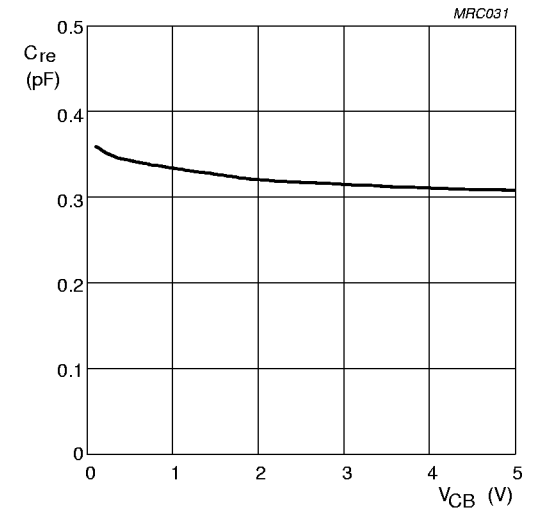


Fig.2 Power derating curve.



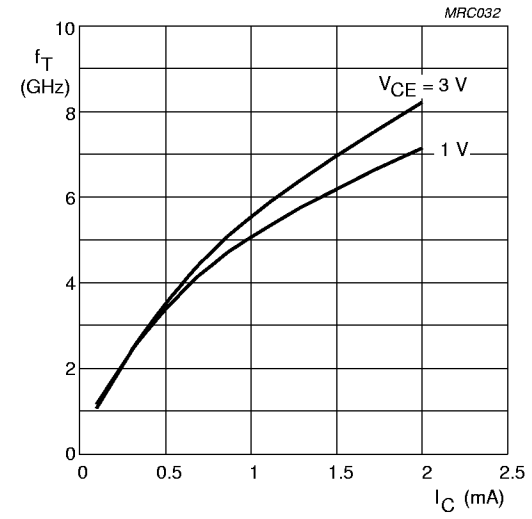
V_{CE} = 1 V; T_j = 25 °C.

Fig.3 DC current gain as a function of collector current.



I_C = 0; f = 1 MHz.

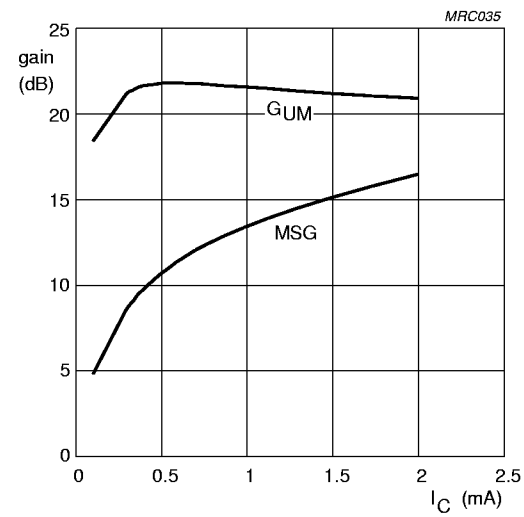
Fig.4 Feedback capacitance as a function of collector-base voltage.



f = 1 GHz; T_{amb} = 25 °C.

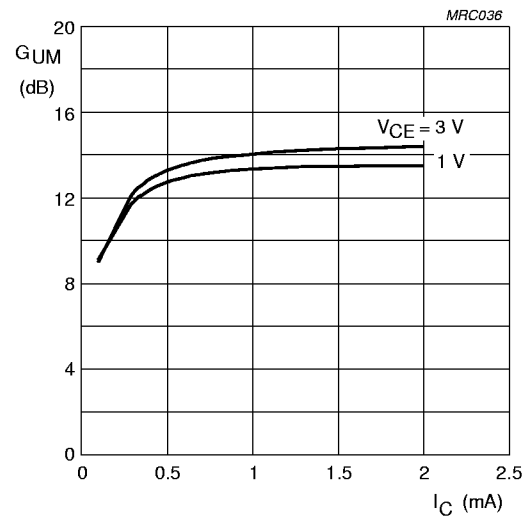
Fig.5 Transition frequency as a function of collector current.

In Figs 6 to 9, G_{UM} = maximum unilateral power gain; MSG = maximum stable gain; G_{max} = maximum available gain.



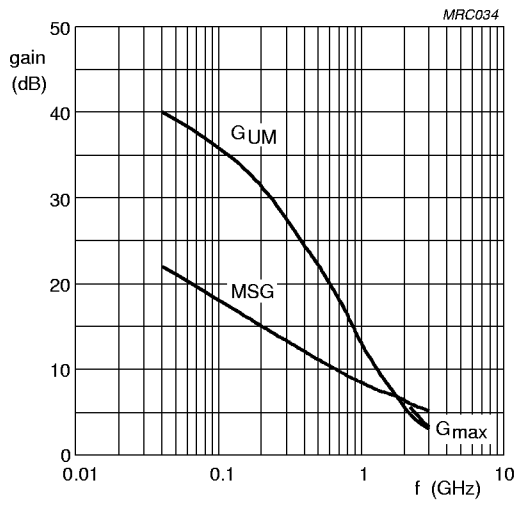
V_{CE} = 1 V; f = 500 MHz; T_{amb} = 25 °C.

Fig.6 Gain as a function of collector current.



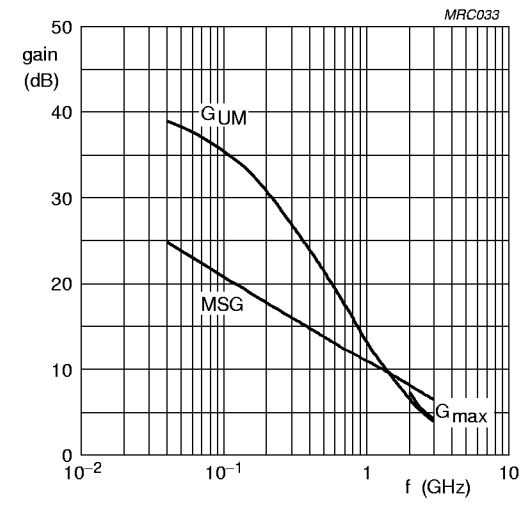
f = 1 GHz; T_{amb} = 25 °C.

Fig.7 Maximum unilateral power gain as a function of collector current.



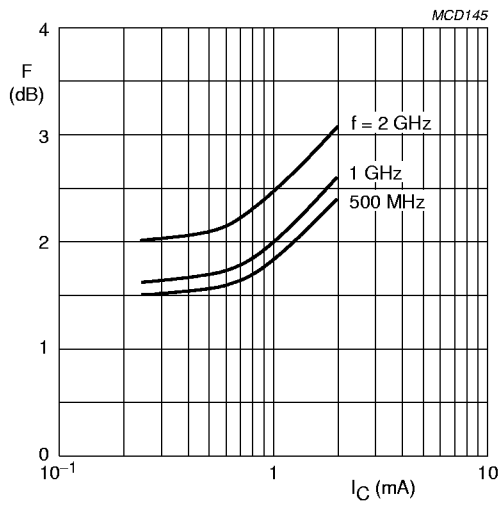
I_C = 0.5 mA; V_{CE} = 1 V; T_{amb} = 25 °C.

Fig.8 Gain as a function of frequency.



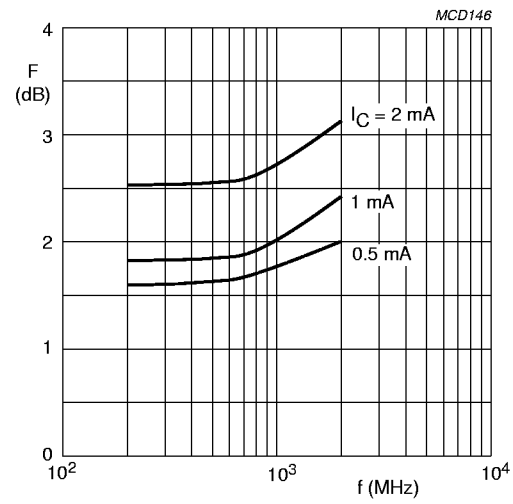
I_C = 1 mA; V_{CE} = 1 V; T_{amb} = 25 °C.

Fig.9 Gain as a function of frequency.



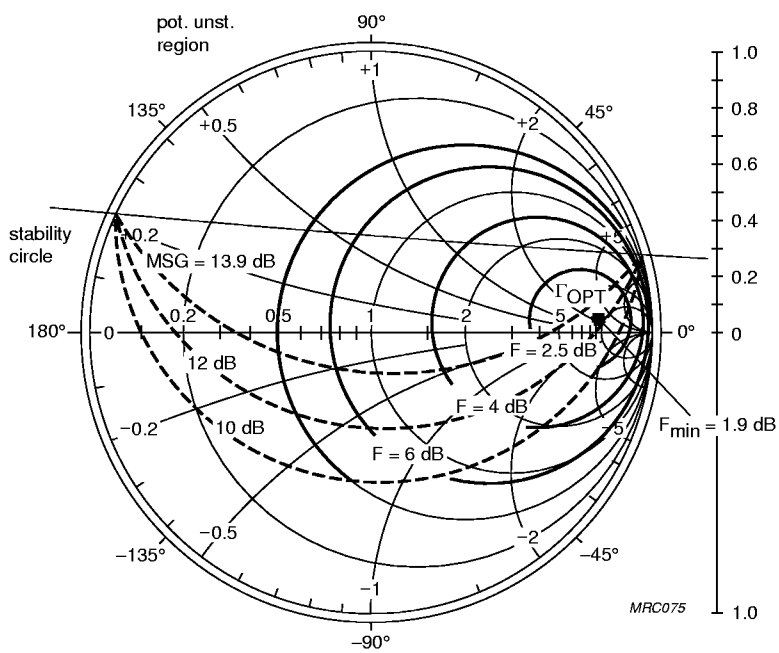
V_{CE} = 1 V; T_{amb} = 25 °C.

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



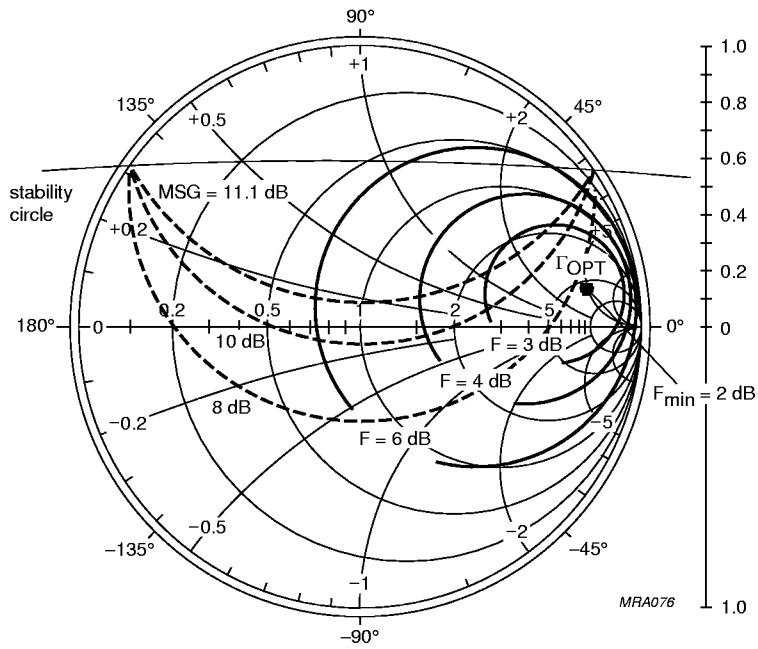
V_{CE} = 1 V; T_{amb} = 25 °C.

Fig.11 Minimum noise figure as a function of frequency.



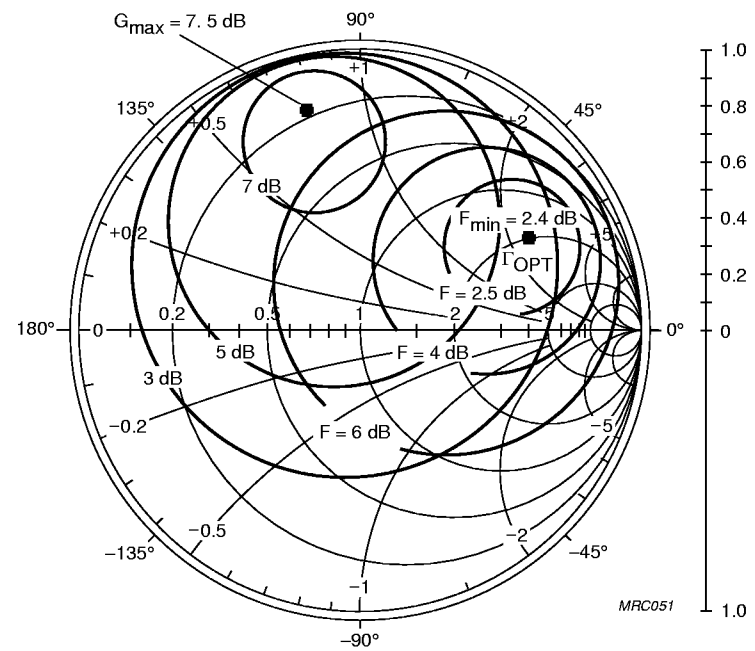
I_C = 1 mA; V_{CE} = 1 V;
f = 500 MHz; Z_o = 50 Ω.

Fig.12 Noise circle.



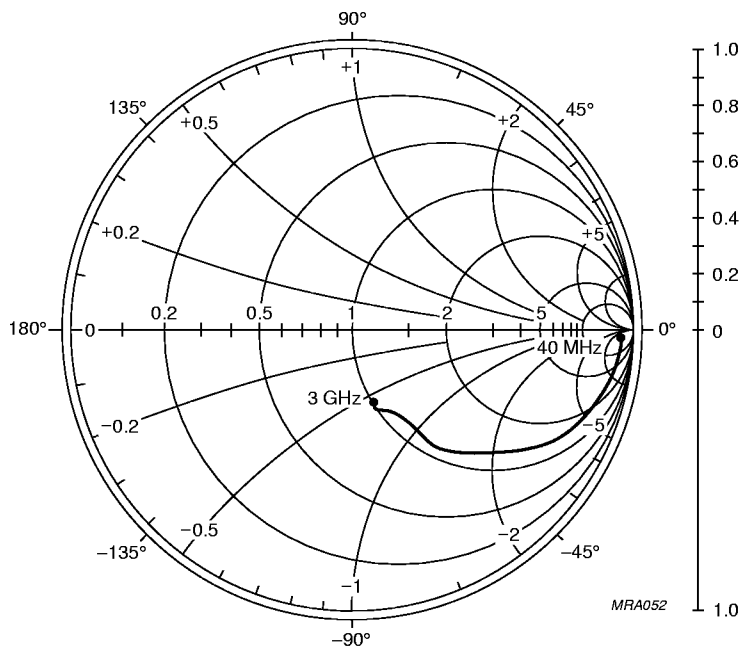
I_C = 1 mA; V_{CE} = 1 V;
f = 1 GHz; Z_o = 50 Ω.

Fig.13 Noise circle.



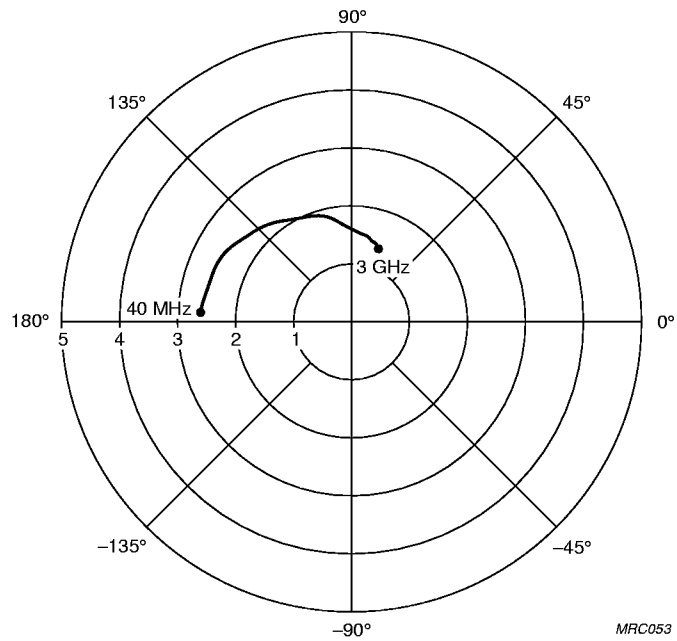
I_C = 1 mA; V_{CE} = 1 V;
f = 2 GHz; Z_o = 50 Ω.

Fig.14 Noise circle.



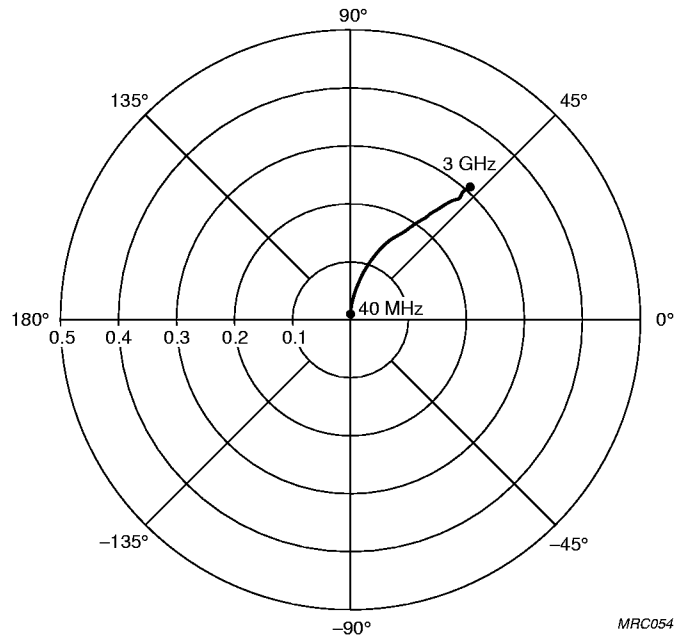
I_C = 1 mA; V_{CE} = 1 V;
Z_o = 50 Ω.

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



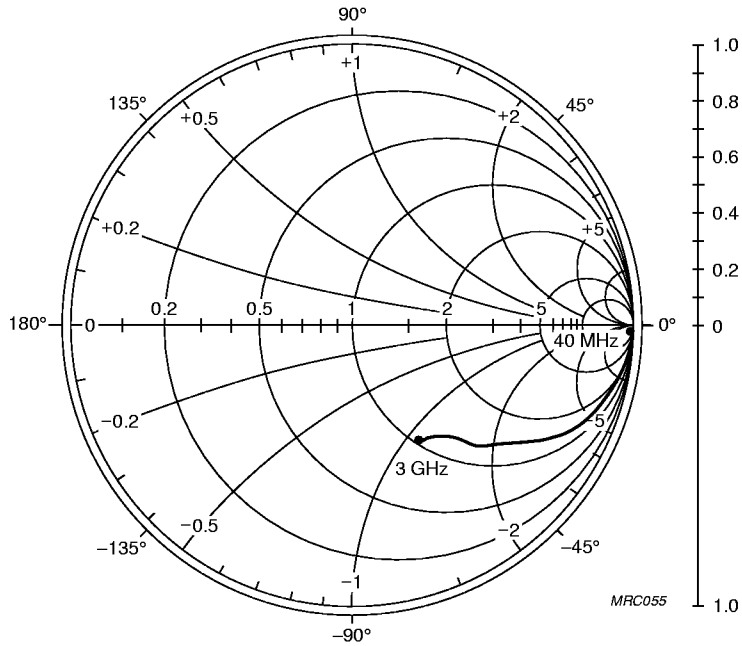
I_C = 1 mA; V_{CE} = 1 V.

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



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

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

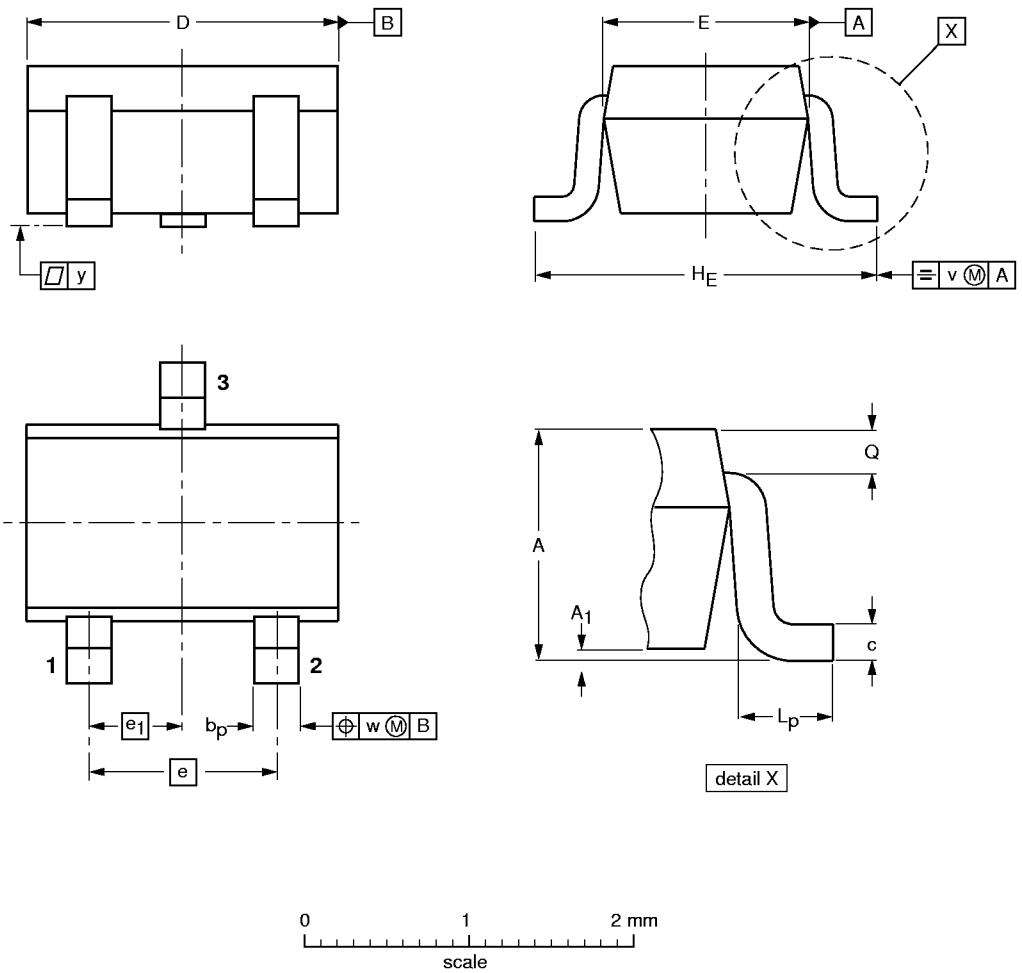


I_C = 1 mA; V_{CE} = 1 V;
Z_o = 50 Ω.

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

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads **SOT323**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.8	0.1	0.4 0.3	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT323			SC-70			97-02-28