

DATA SHEET

BFS505

NPN 9 GHz wideband transistor

Product specification

September 1995



NPN 9 GHz wideband transistor

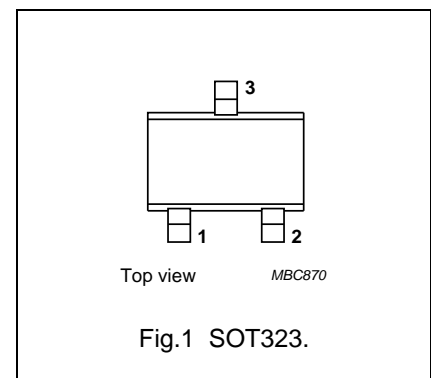
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FEATURES

- Low current consumption
- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability
- SOT323 envelope.

PINNING

PIN	DESCRIPTION
Code: N0	
1	base
2	emitter
3	collector



DESCRIPTION

NPN transistor in a plastic SOT323 envelope.

It is intended for low power amplifiers, oscillators and mixers particularly in RF portable communication equipment (cellular phones, cordless phones, pagers) up to 2 GHz.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CB0}	collector-base voltage	open emitter	–	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	–	15	V
I_C	DC collector current		–	–	18	mA
P_{tot}	total power dissipation	up to $T_s = 147\text{ °C}$; note 1	–	–	150	mW
h_{FE}	DC current gain	$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$; $T_j = 25\text{ °C}$	60	120	250	
f_T	transition frequency	$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	9	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	17	–	dB
F	noise figure	$I_C = 1.25\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	1.2	1.7	dB

Note

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

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LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	DC collector current		–	18	mA
P_{tot}	total power dissipation	up to $T_s = 147\text{ °C}$; note 1	–	150	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 147\text{ °C}$; note 1	190 K/W

Note

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

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CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0; V_{CB} = 6\text{ V}$	–	–	50	nA
h_{FE}	DC current gain	$I_C = 5\text{ mA}; V_{CE} = 6\text{ V}$	60	120	250	
C_e	emitter capacitance	$I_C = I_e = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	0.4	–	pF
C_c	collector capacitance	$I_E = I_e = 0; V_{CB} = 6\text{ V}; f = 1\text{ MHz}$	–	0.4	–	pF
C_{re}	feedback capacitance	$I_C = 0; V_{CB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	0.3	–	pF
f_T	transition frequency	$I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; f = 1\text{ GHz}; T_{amb} = 25\text{ °C}$	–	9	–	GHz
G_{UM}	maximum unilateral power gain (note 1)	$I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	17	–	dB
		$I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; f = 2\text{ GHz}; T_{amb} = 25\text{ °C}$	–	10	–	dB
$ S_{21} ^2$	insertion power gain	$I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	13	14	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}; I_C = 1.25\text{ mA}; V_{CE} = 6\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	1.2	1.7	dB
		$\Gamma_s = \Gamma_{opt}; I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	1.6	2.1	dB
		$\Gamma_s = \Gamma_{opt}; I_C = 1.25\text{ mA}; V_{CE} = 6\text{ V}; f = 2\text{ GHz}; T_{amb} = 25\text{ °C}$	–	1.9	–	dB
PL_1	output power at 1 dB gain compression	$I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; R_L = 50\text{ }\Omega; f = 900\text{ MHz}; T_{amb} = 25\text{ °C}$	–	4	–	dBm
ITO	third order intercept point	note 2	–	10	–	dBm

Notes

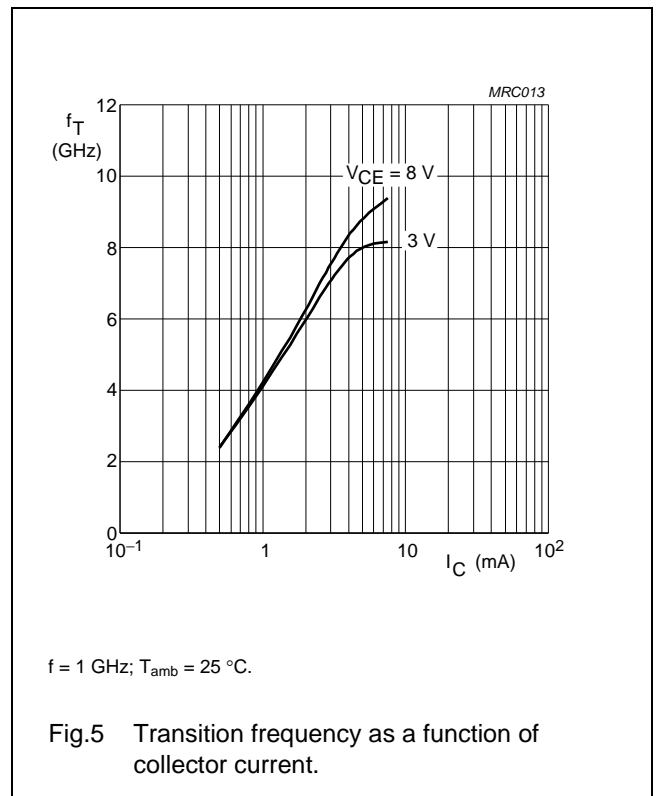
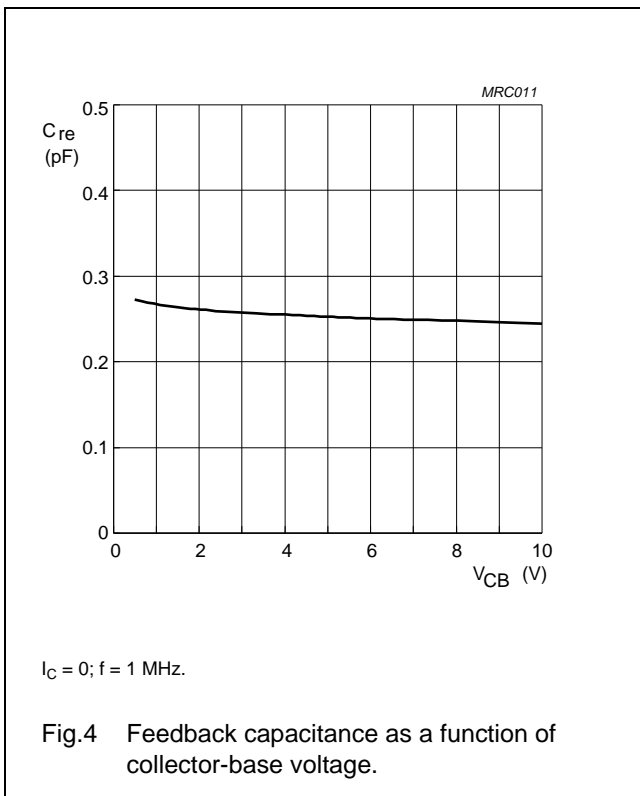
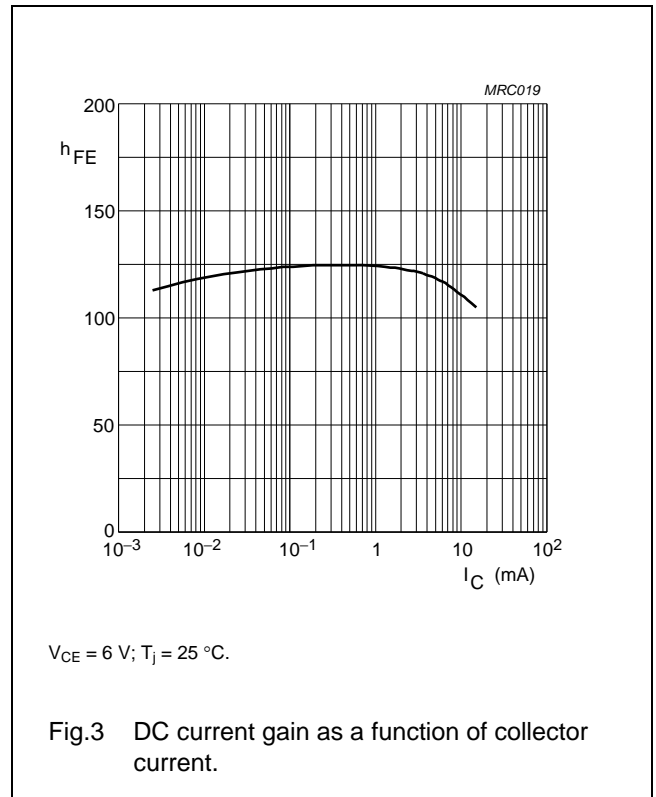
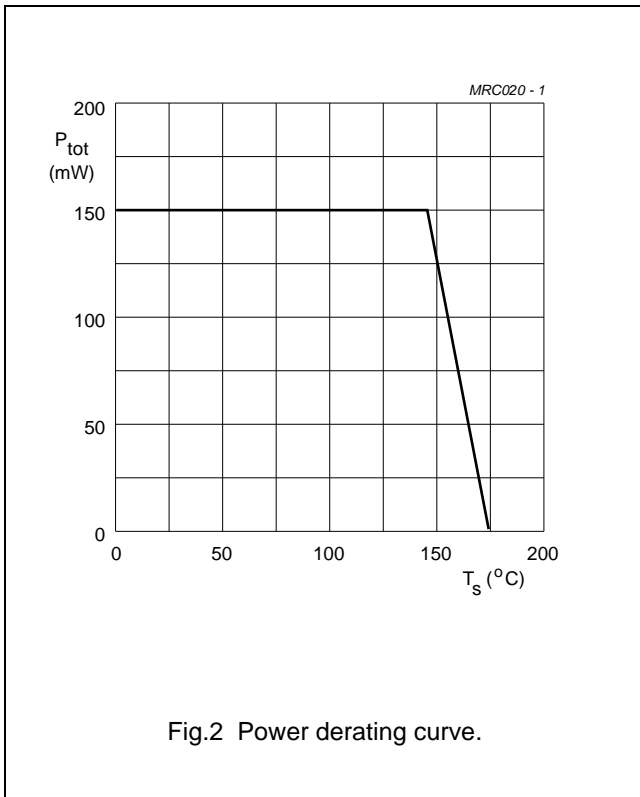
1. G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and

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

2. $I_C = 5\text{ mA}; V_{CE} = 6\text{ V}; R_L = 50\text{ }\Omega; f = 900\text{ MHz}; T_{amb} = 25\text{ °C};$
 $f_p = 900\text{ MHz}; f_q = 902\text{ MHz};$ measured at $f_{(2p-q)} = 898\text{ MHz}$ and at $f_{(2q-p)} = 904\text{ MHz}.$

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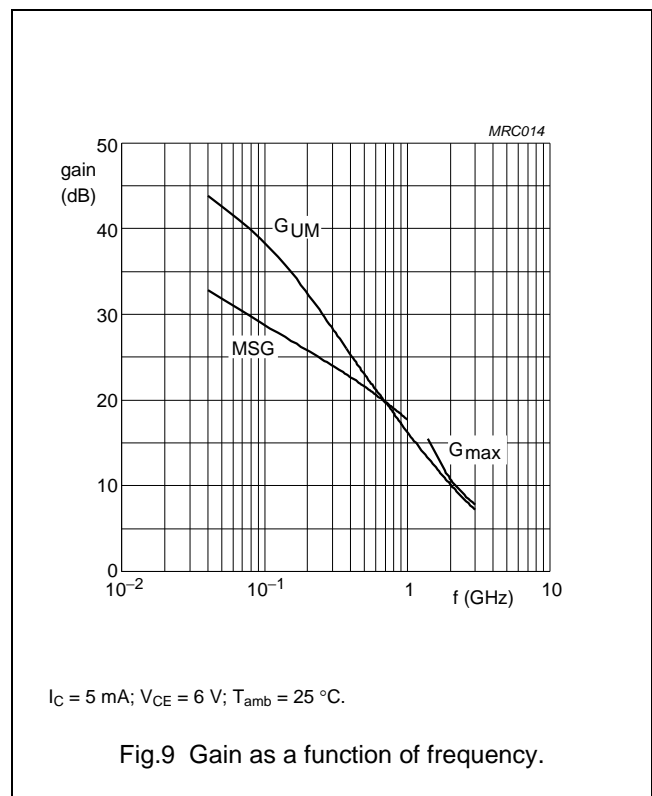
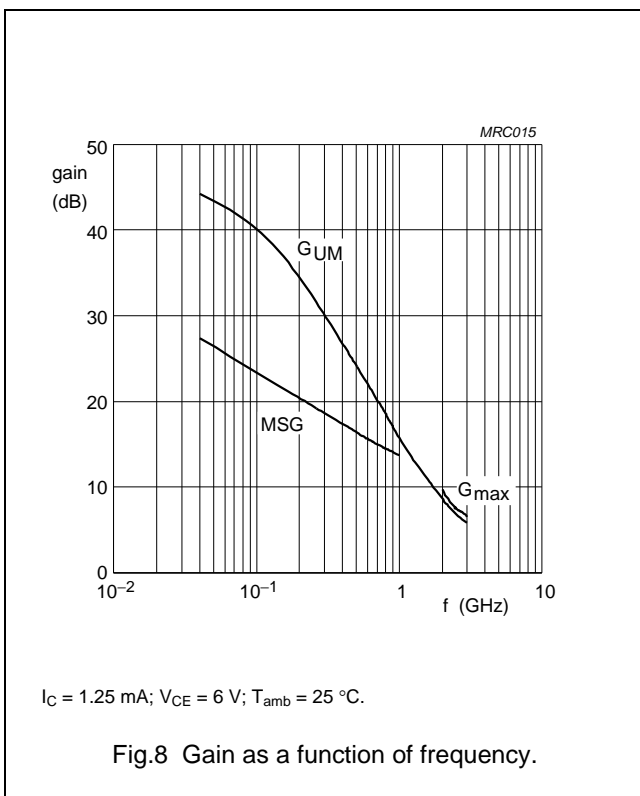
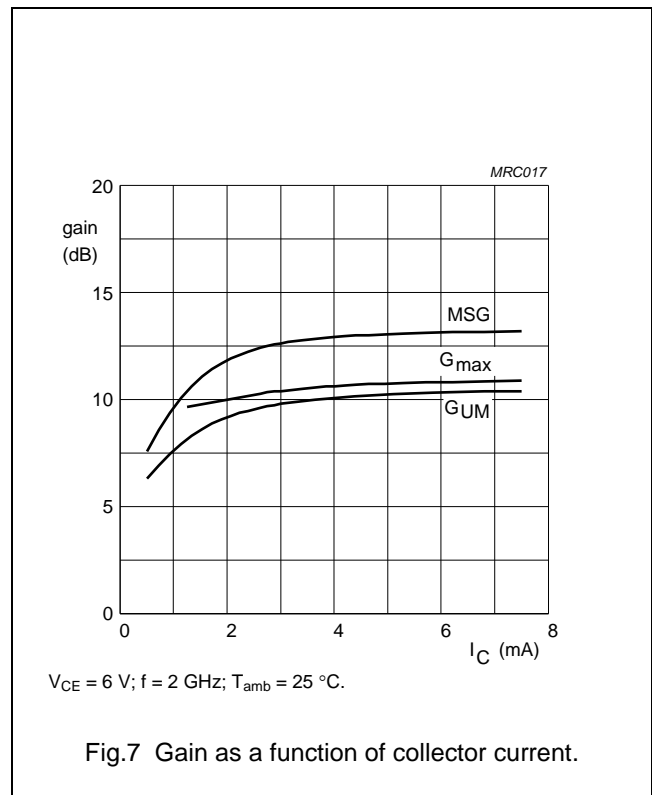
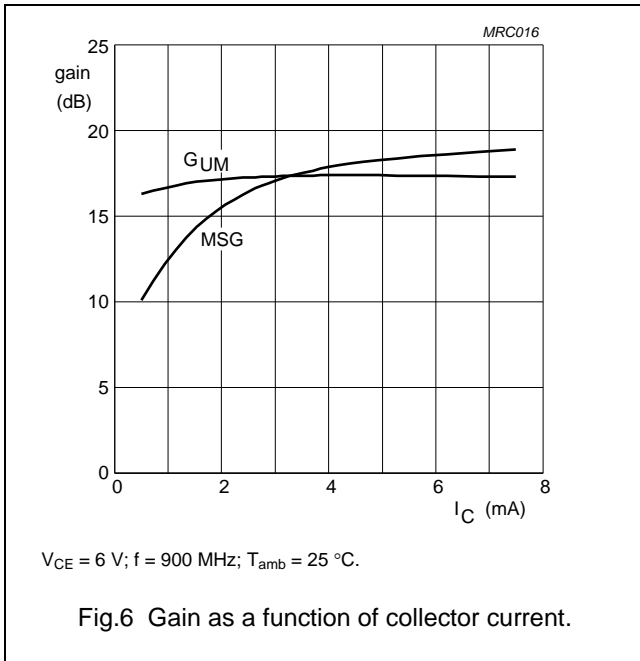
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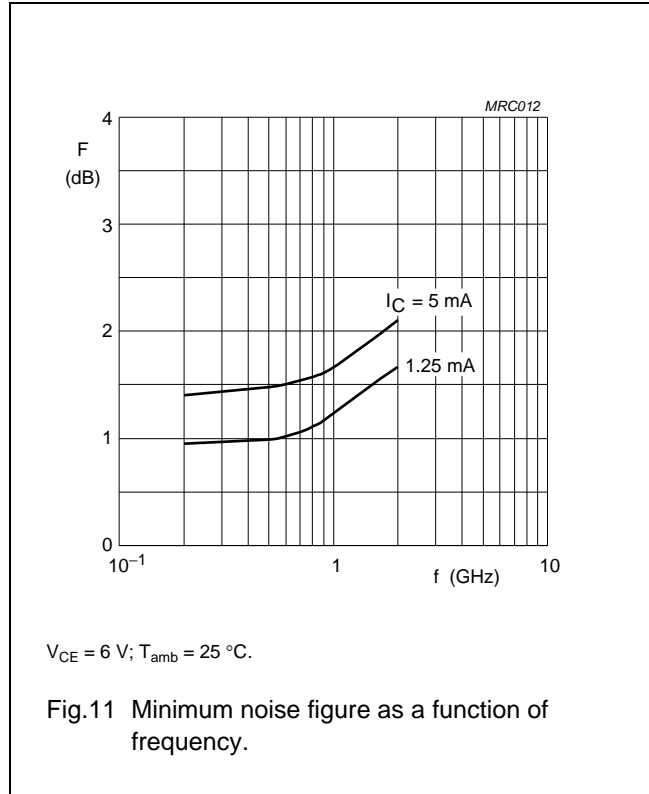
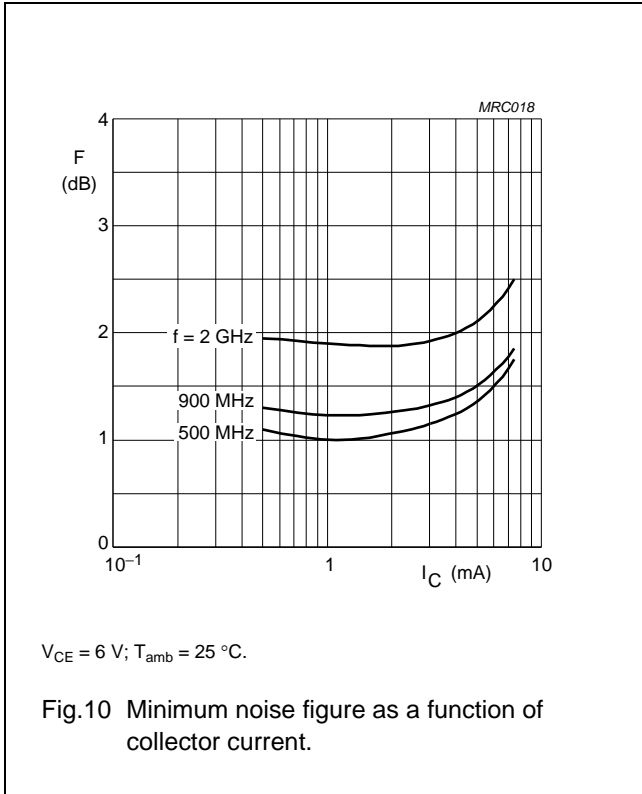
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In Figs 6 to 9, G_{UM} = maximum unilateral power gain; MSG = maximum stable gain; G_{max} = maximum available gain.



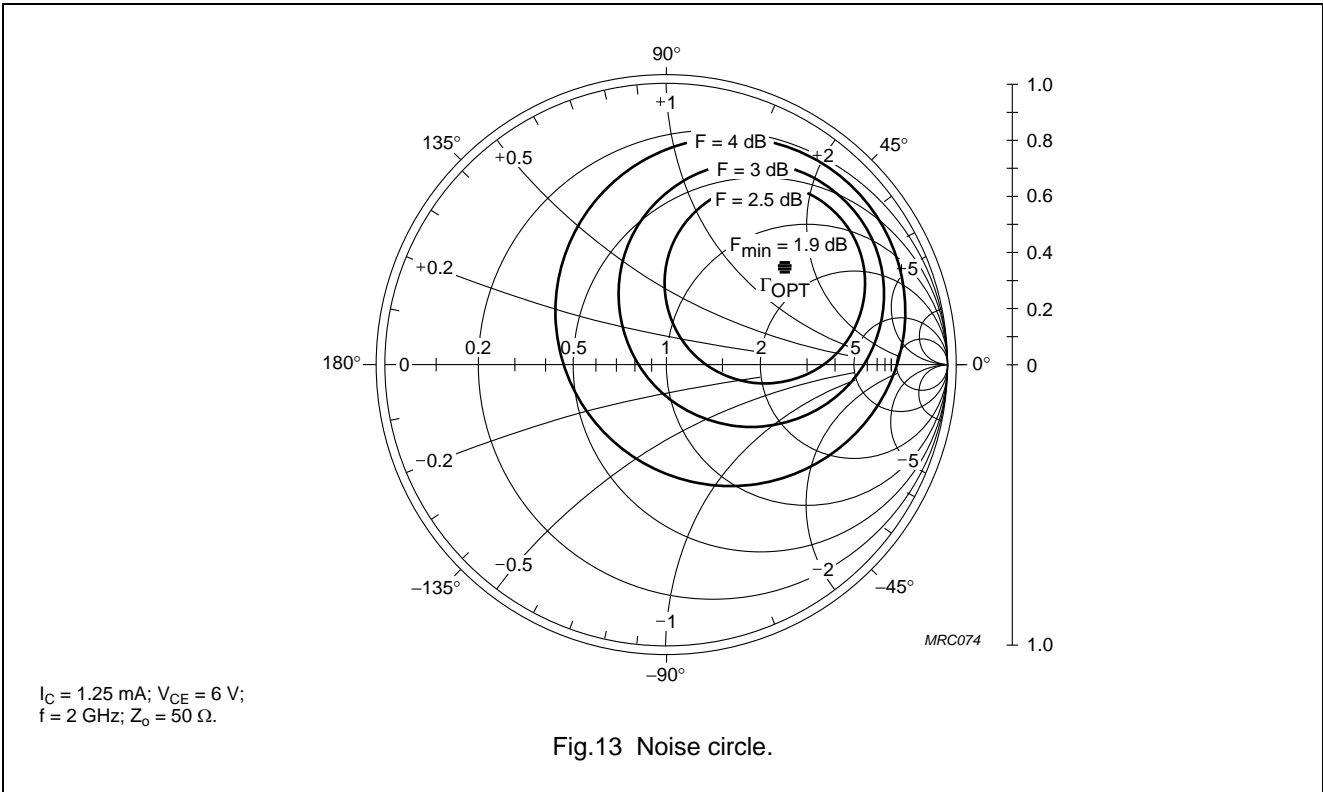
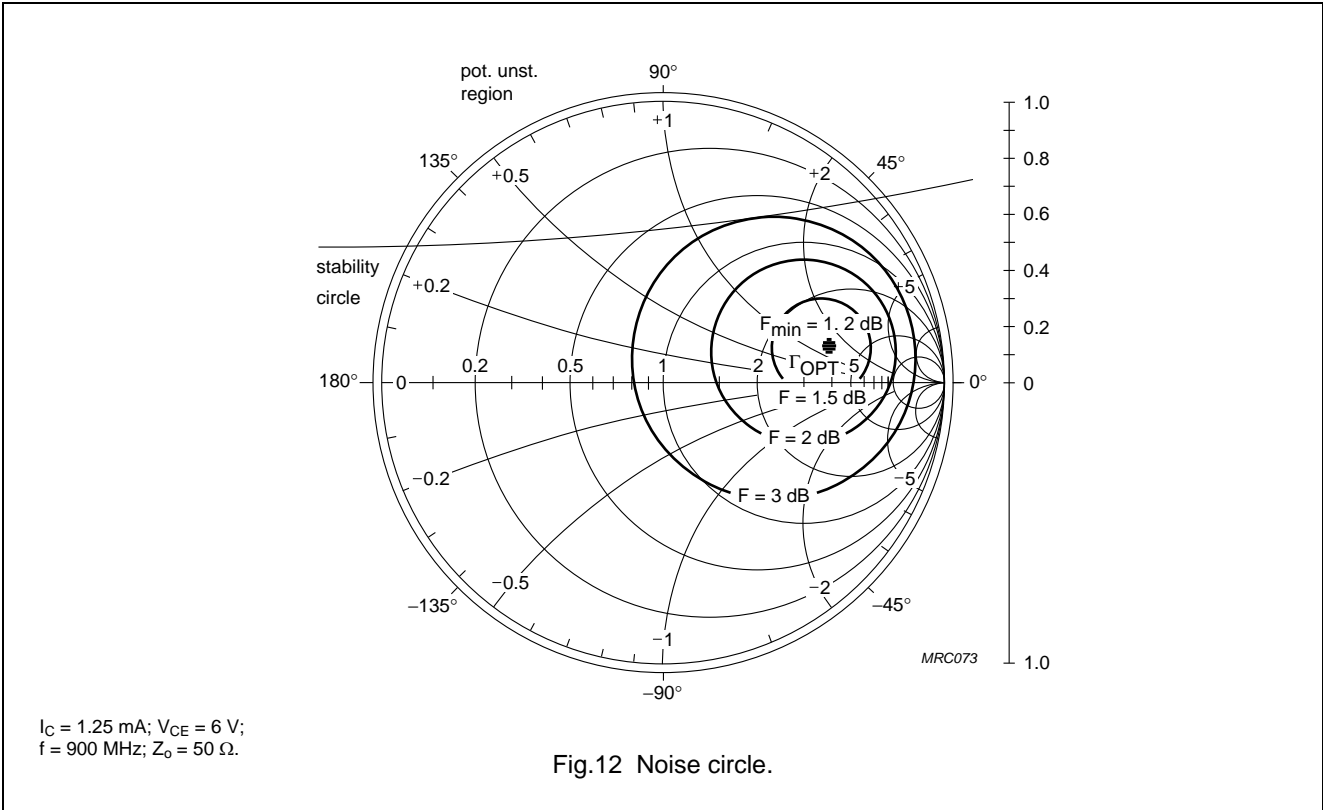
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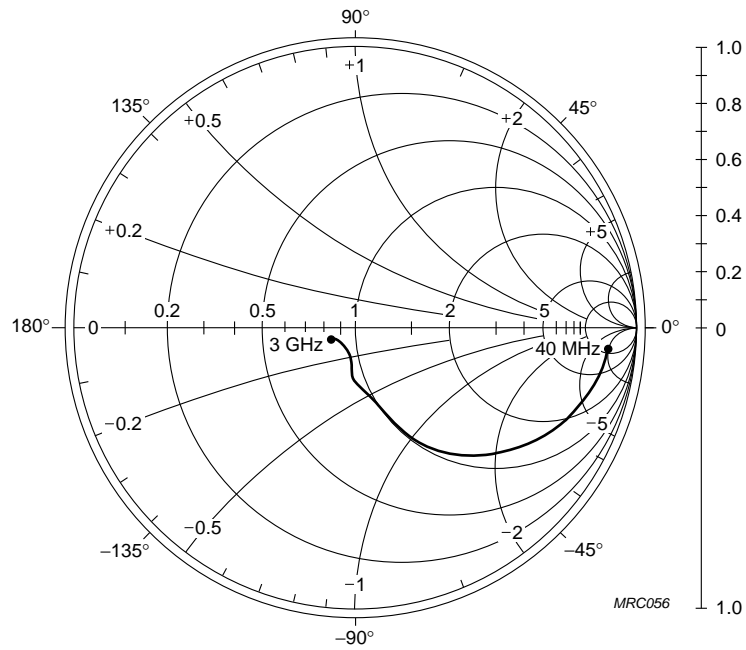
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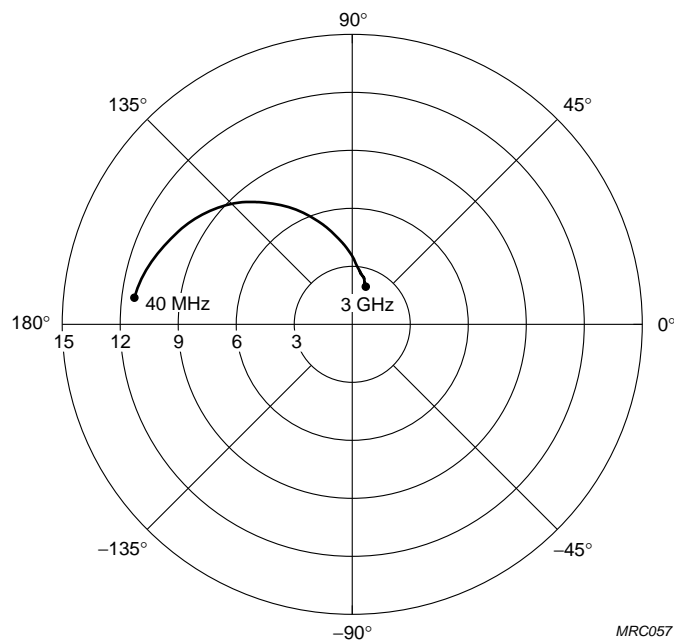
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$I_C = 5 \text{ mA}; V_{CE} = 6 \text{ V};$
 $Z_0 = 50 \Omega.$

Fig.14 Common emitter input reflection coefficient (S_{11}).

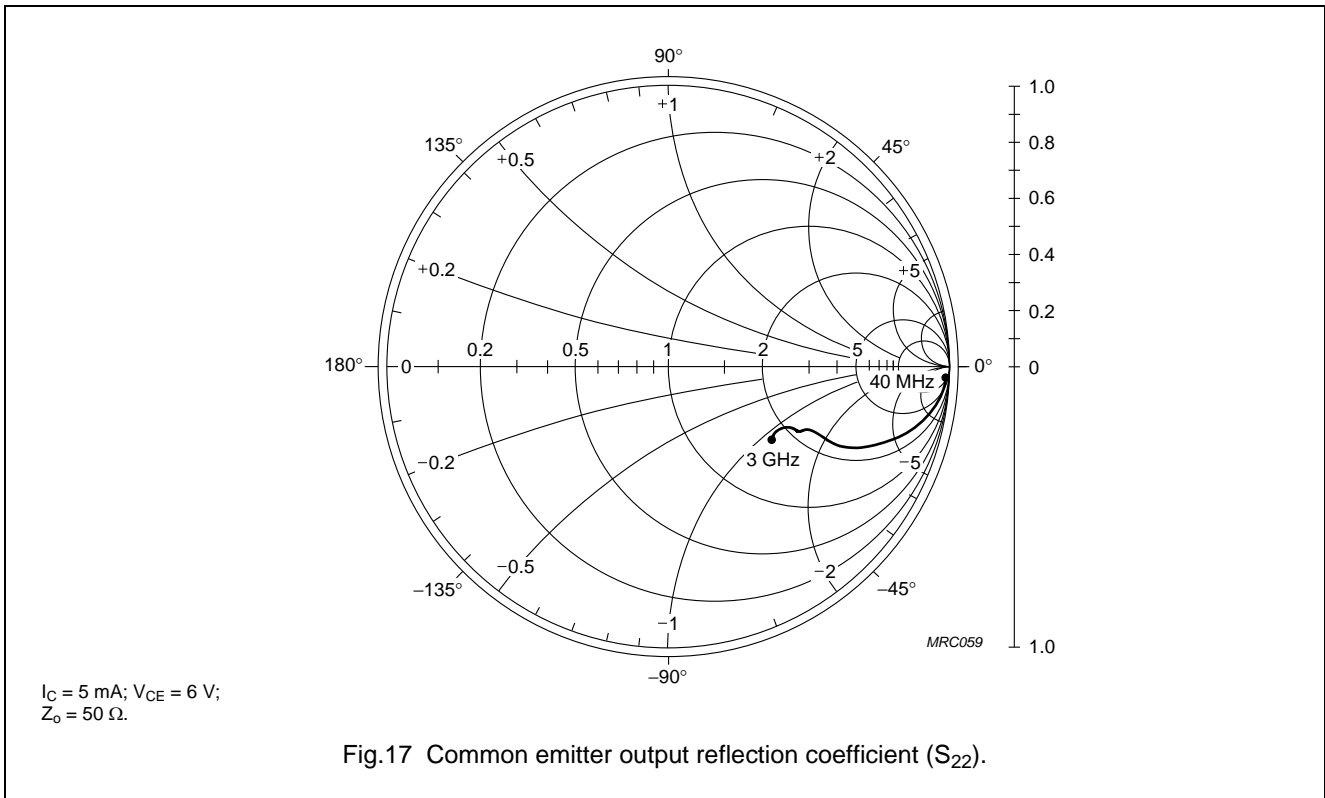
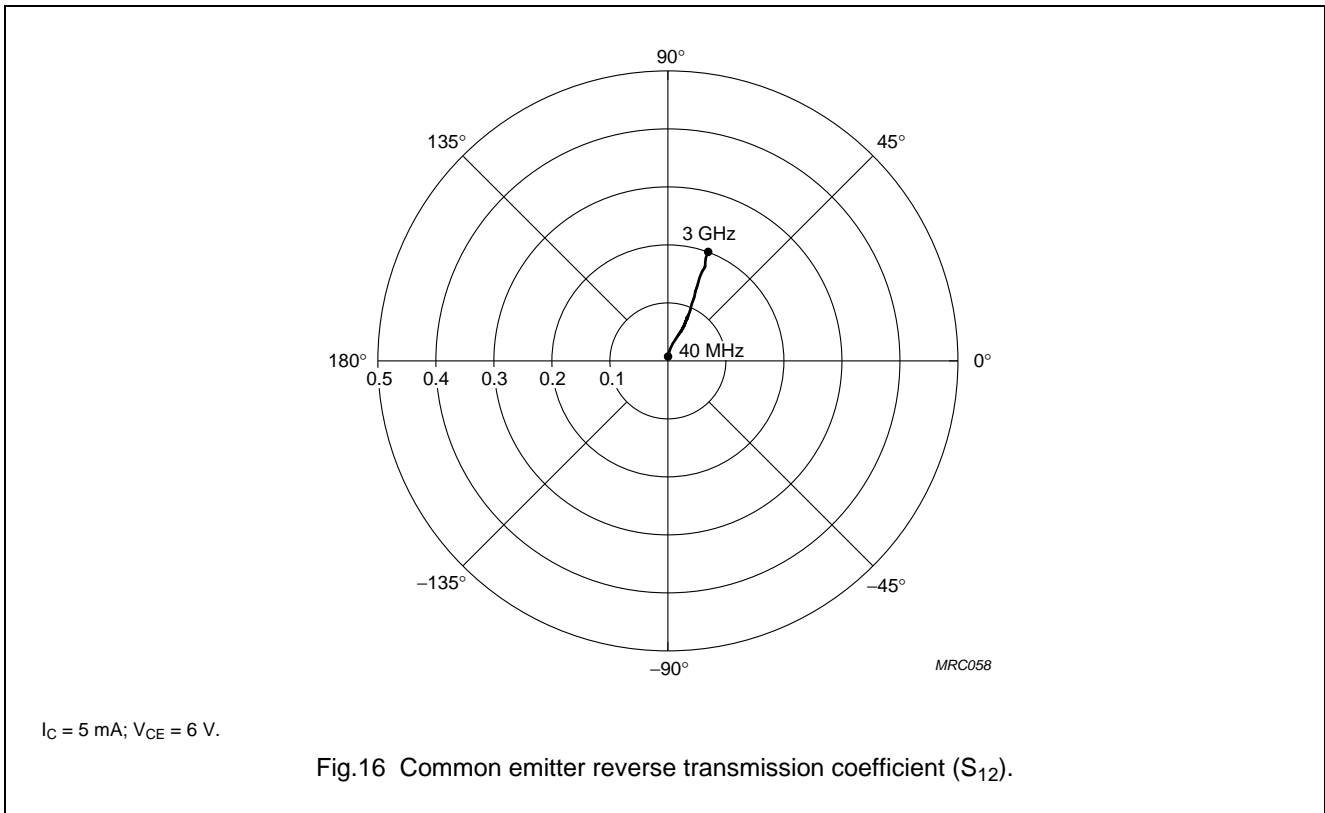


$I_C = 5 \text{ mA}; V_{CE} = 6 \text{ V}.$

Fig.15 Common emitter forward transmission coefficient (S_{21}).

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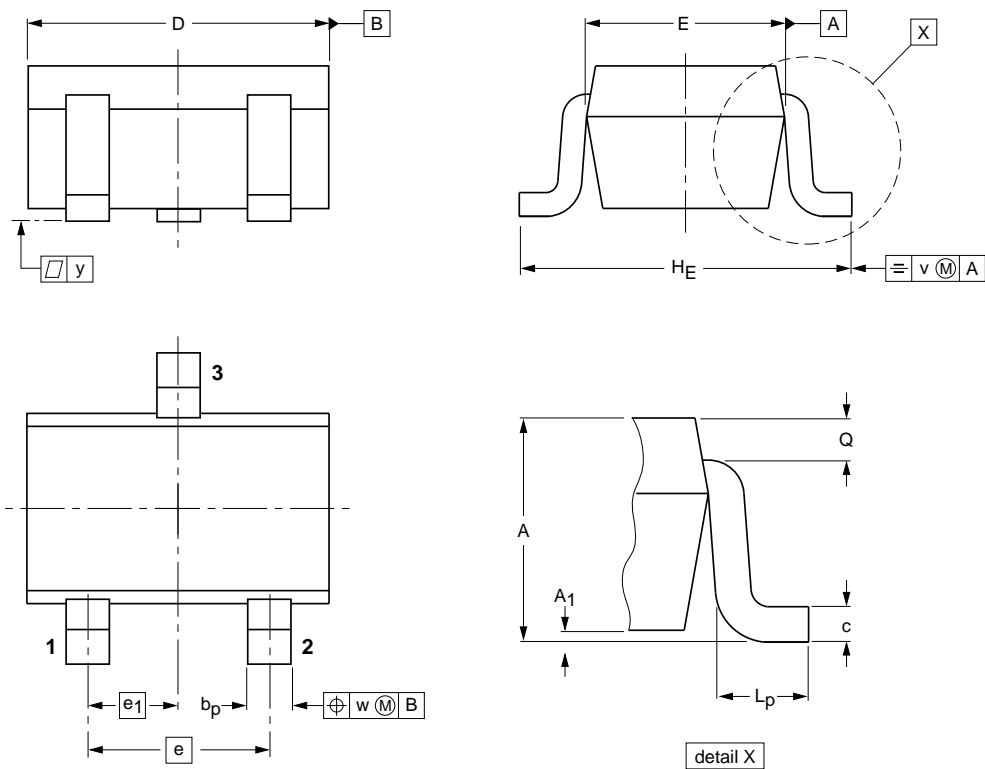
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PACKAGE OUTLINE

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	JEITA			
SOT323			SC-70			04-11-04 06-03-16

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DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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