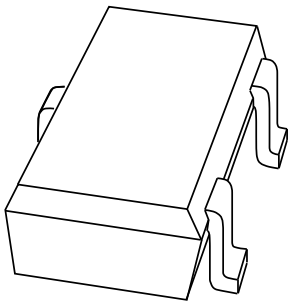


DATA SHEET



BFS540

NPN 9 GHz wideband transistor

Product specification
Supersedes data of 1997 Dec 05

2000 May 30



NPN 9 GHz wideband transistor

BFS540

FEATURES

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

APPLICATIONS

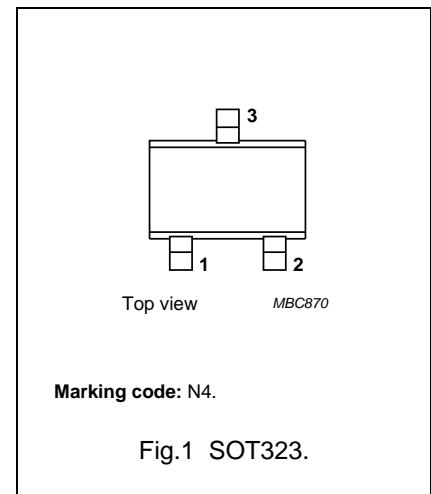
RF wideband amplifier applications such as satellite TV systems and RF portable communication equipment with signal frequencies up to 2 GHz.

DESCRIPTION

NPN transistor in a SOT323 plastic package.

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–	20	V
V_{CEO}	collector-emitter voltage	open base	–	–	15	V
I_C	DC collector current		–	–	120	mA
P_{tot}	total power dissipation	$T_s \leq 80\text{ °C}$; note 1	–	–	500	mW
h_{FE}	DC current gain	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $T_j = 25\text{ °C}$	100	120	250	
f_T	transition frequency	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	9	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	14	–	dB
F	noise figure	$I_C = 10\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	1.3	1.7	dB

Note

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

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 60134).

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		–	120	mA
P_{tot}	total power dissipation	$T_s \leq 80\text{ °C}$; note 1	–	500	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.

NPN 9 GHz wideband transistor

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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	$T_s \leq 80\text{ °C}$; note 1	190	K/W

Note

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

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CE} = 8\text{ V}$	–	–	50	nA
h_{FE}	DC current gain	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$	100	120	250	
C_e	emitter capacitance	$I_C = i_c = 0$; $V_{EB} = 0.5\text{ V}$; $f = 1\text{ MHz}$	–	2	–	pF
C_c	collector capacitance	$I_E = i_e = 0$; $V_{CB} = 8\text{ V}$; $f = 1\text{ MHz}$	–	0.9	–	pF
C_{re}	feedback capacitance	$I_C = 0$; $V_{CB} = 8\text{ V}$; $f = 1\text{ MHz}$	–	0.6	–	pF
f_T	transition frequency	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	9	–	GHz
G_{UM}	maximum unilateral power gain (note 1)	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	14	–	dB
		$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	8	–	dB
$ s_{21} ^2$	insertion power gain	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	12	13	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; $I_C = 10\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	1.3	1.8	dB
		$\Gamma_s = \Gamma_{opt}$; $I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	1.9	2.4	dB
		$\Gamma_s = \Gamma_{opt}$; $I_C = 10\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	2.1	–	dB
P_{L1}	output power at 1 dB gain compression	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $R_L = 50\text{ }\Omega$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	21	–	dBm
ITO	third order intercept point	note 2	–	34	–	dBm

Notes

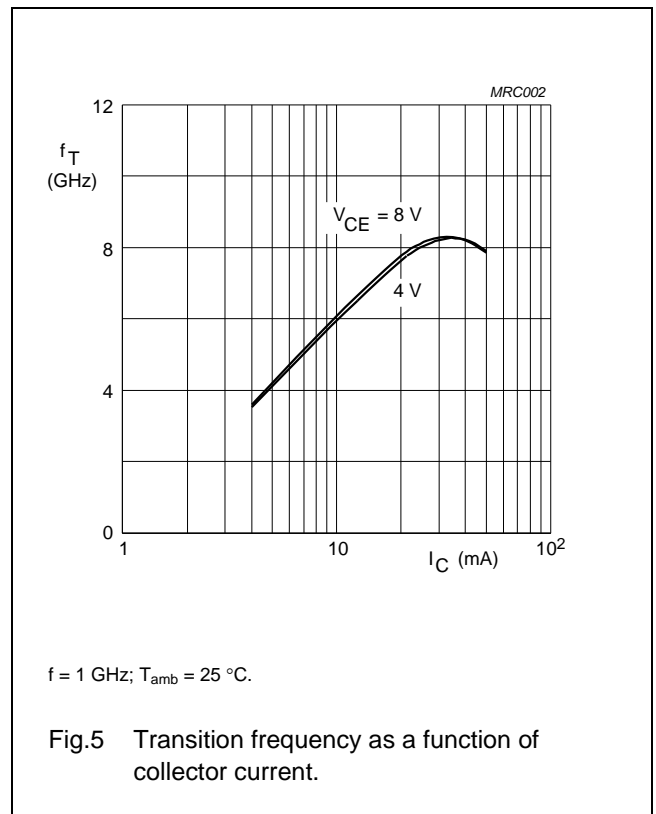
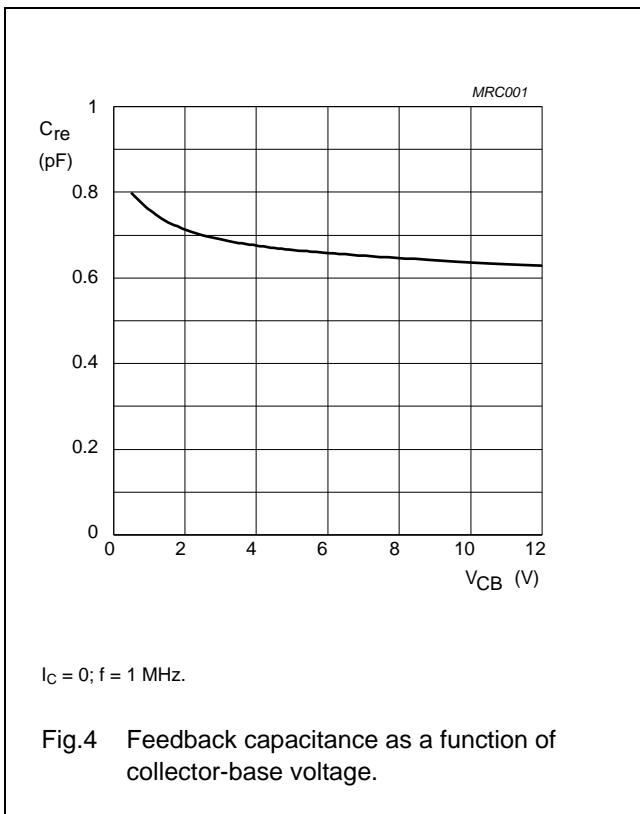
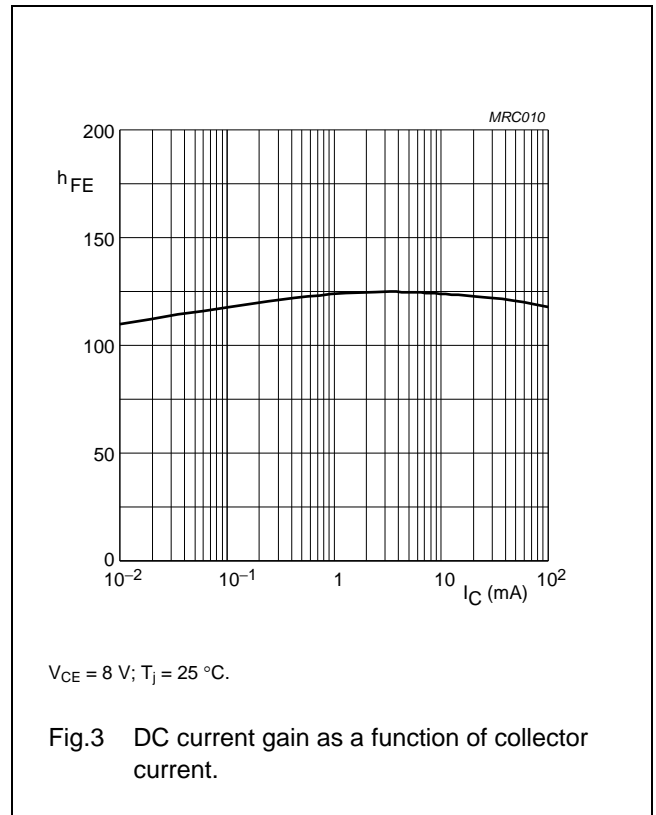
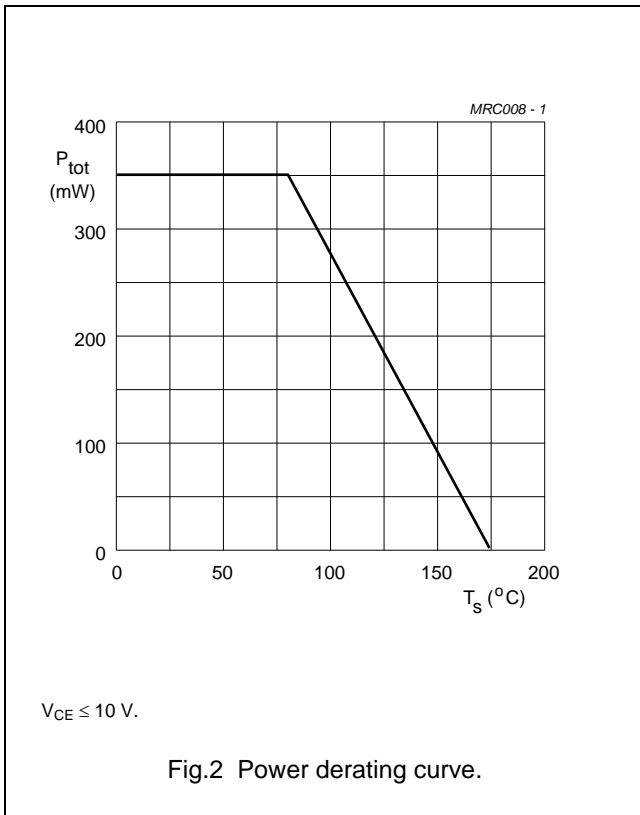
- G_{UM} is the maximum unilateral power gain, assuming s_{12} is zero and

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

- $I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $R_L = 50\text{ }\Omega$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$;
 $f_p = 900\text{ MHz}$; $f_q = 902\text{ MHz}$; measured at $f_{(2p-q)} = 898\text{ MHz}$ and at $f_{(2q-p)} = 904\text{ MHz}$.

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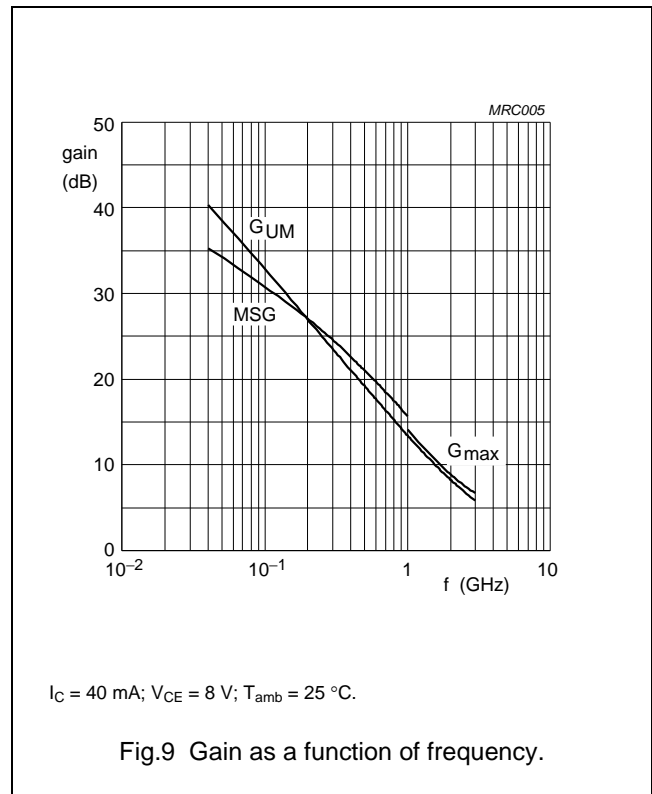
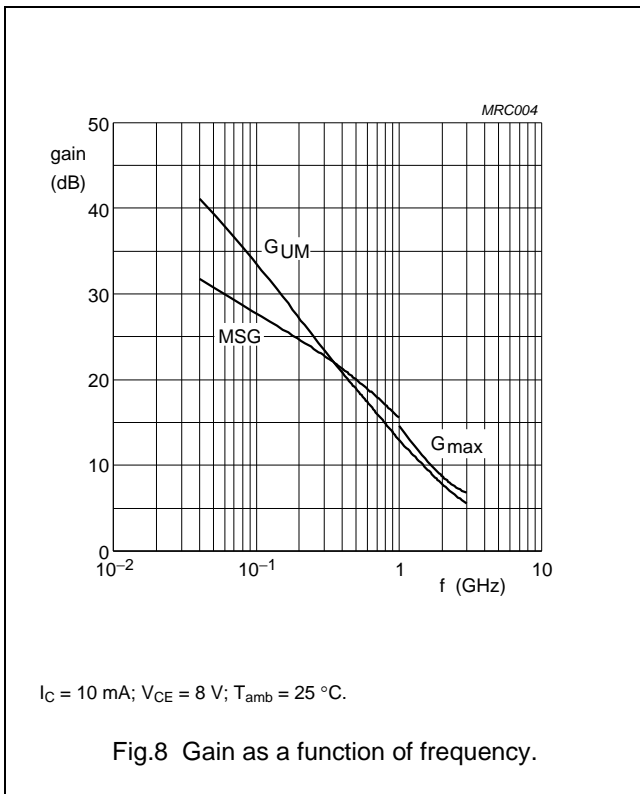
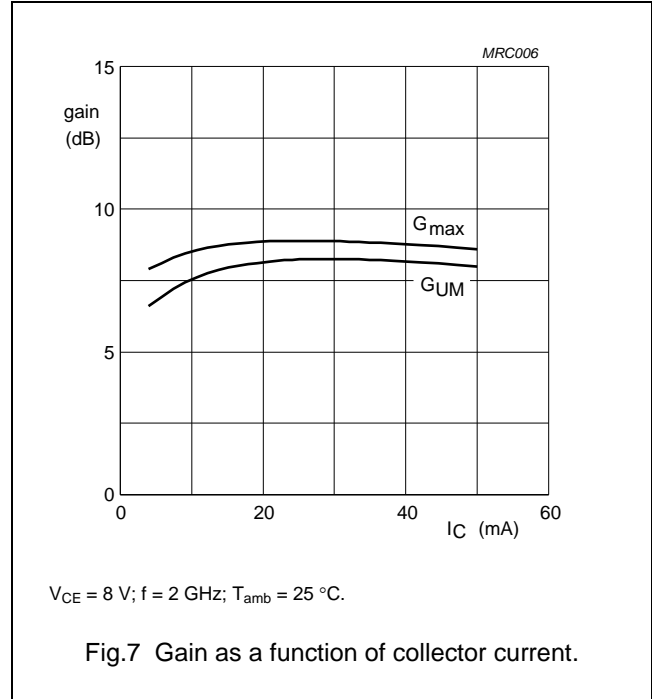
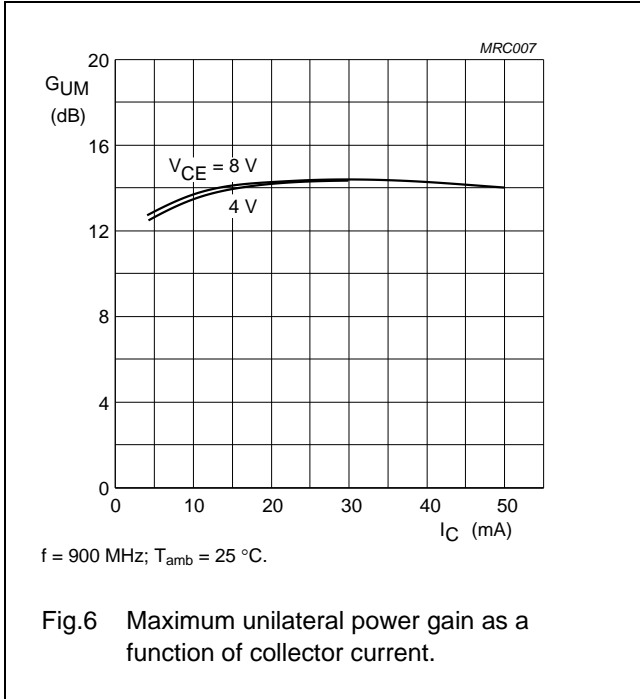
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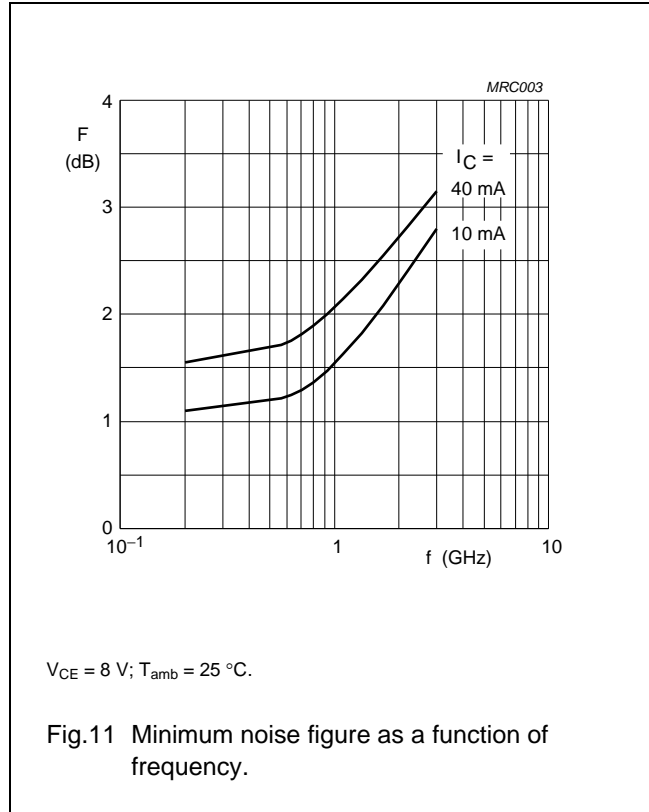
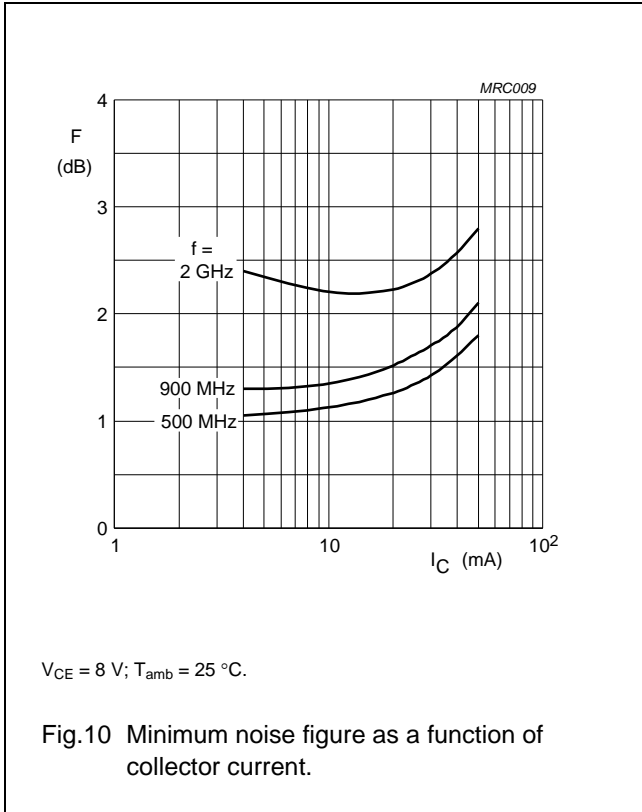
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In Figs 6 to 9, G_{UM} = maximum unilateral power gain; MSG = maximum stable gain; G_{max} = maximum available gain.



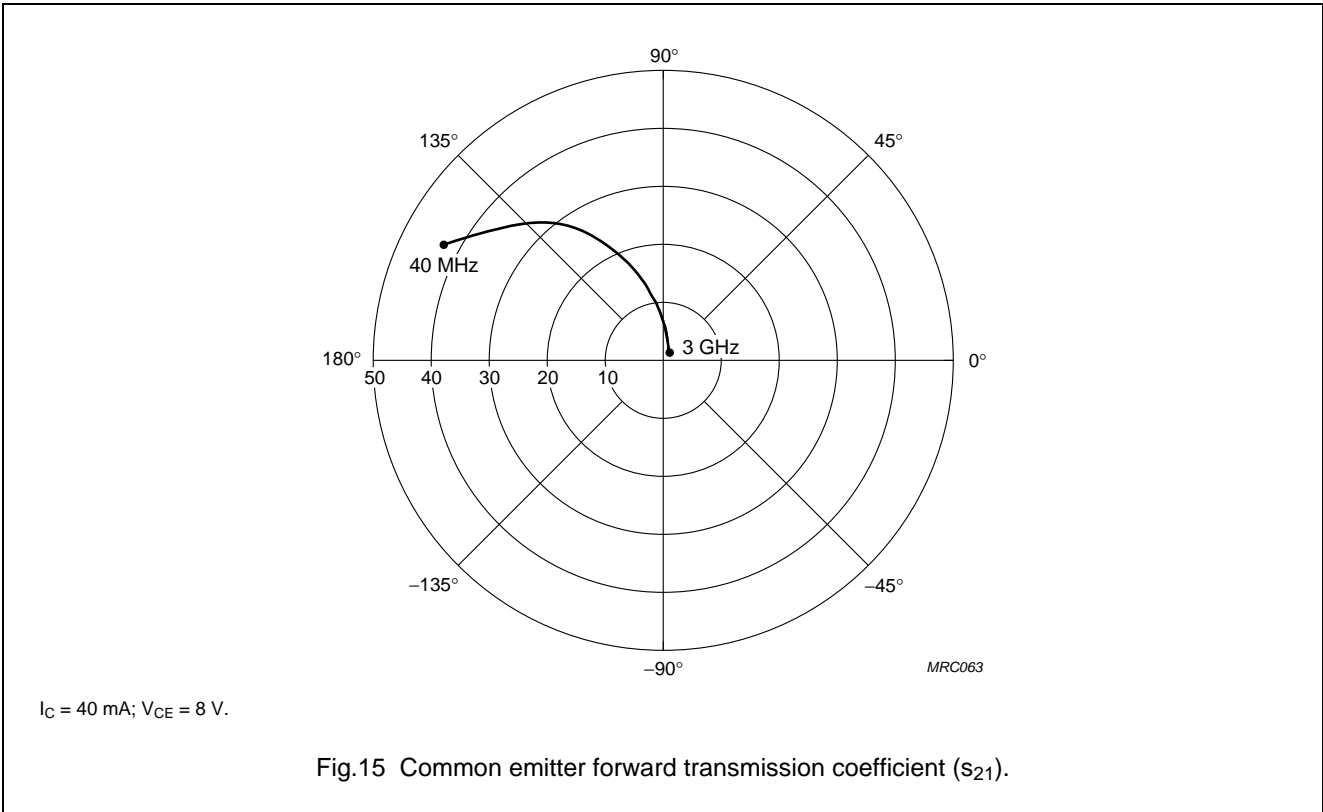
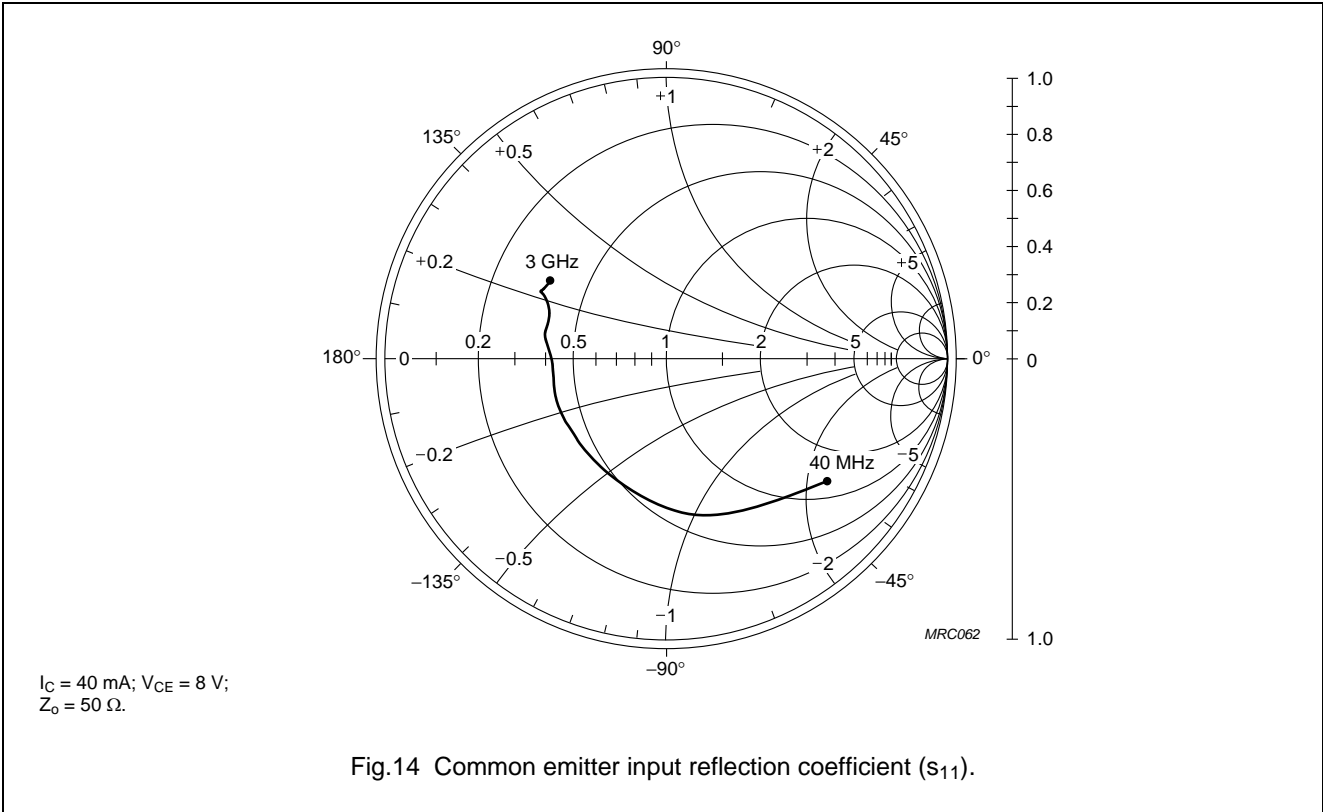
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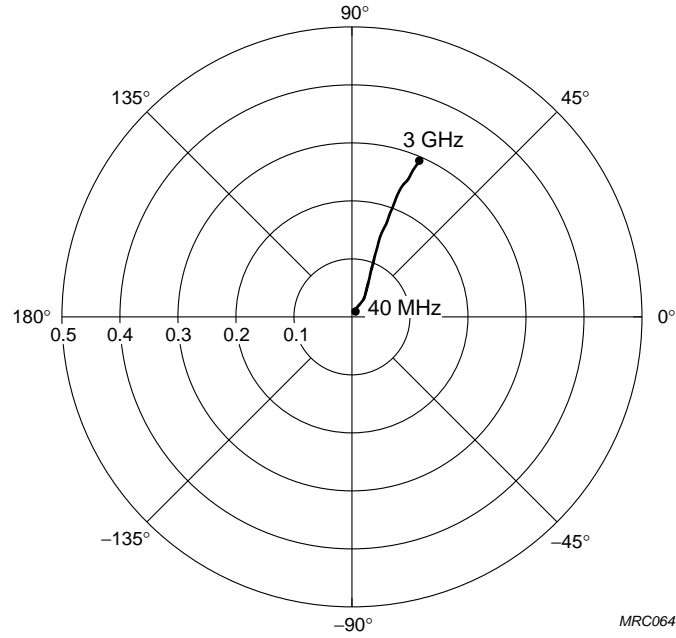
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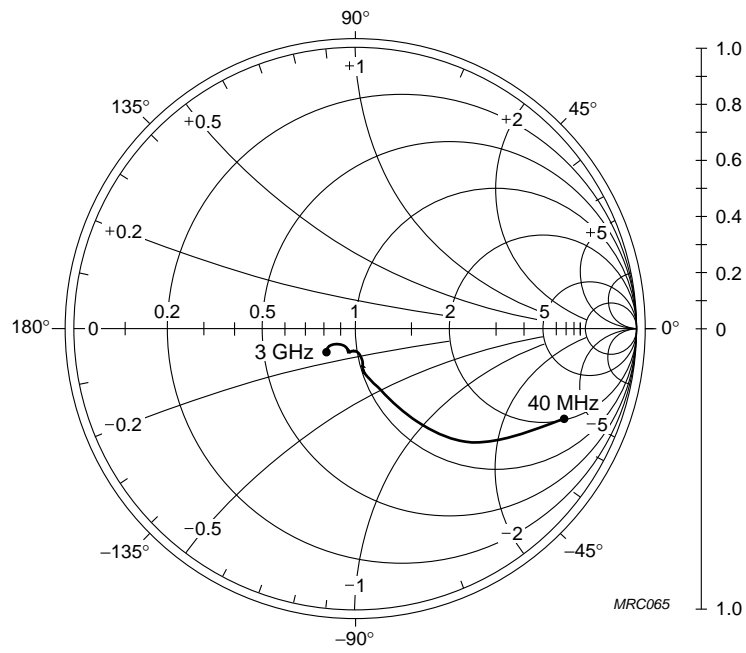
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$I_C = 40 \text{ mA}; V_{CE} = 8 \text{ V}.$

Fig.16 Common emitter reverse transmission coefficient (s_{12}).



$I_C = 40 \text{ mA}; V_{CE} = 8 \text{ V};$
 $Z_o = 50 \Omega.$

Fig.17 Common emitter output reflection coefficient (s_{22}).

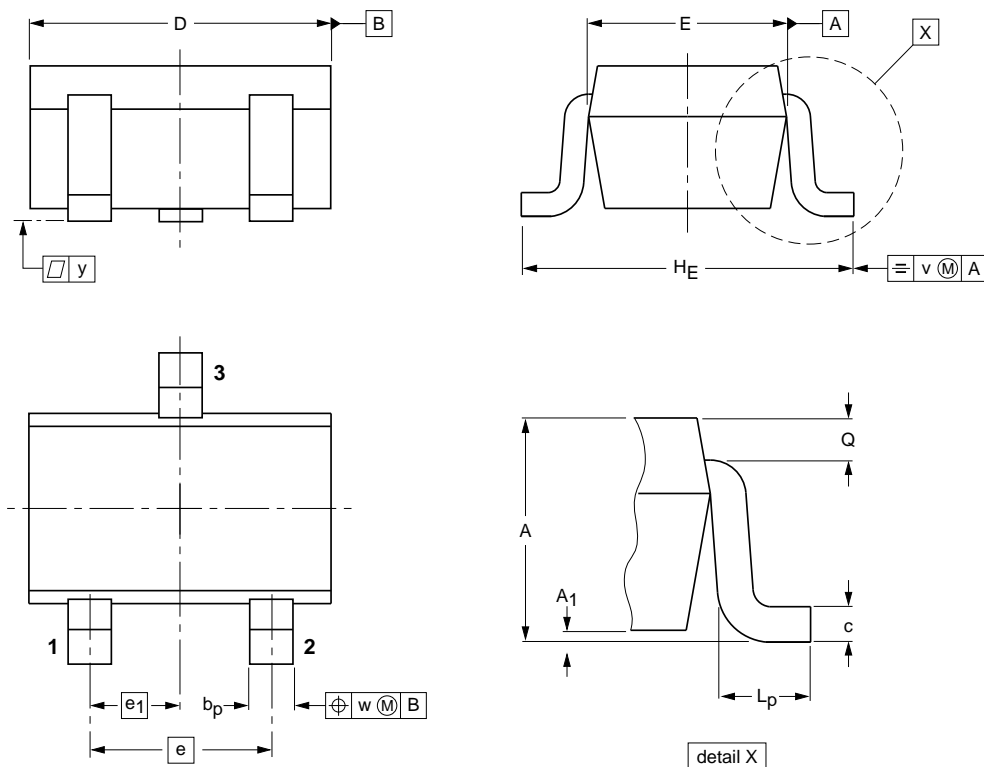
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PACKAGE OUTLINE

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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Contact information

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