

# DATA SHEET

**BFT25**

NPN 2 GHz wideband transistor

Product specification

November 1992



## NPN 2 GHz wideband transistor

## BFT25

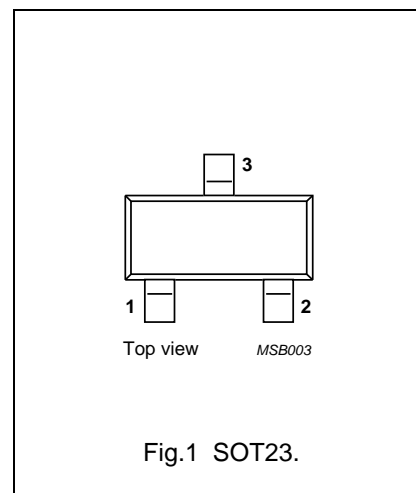
## DESCRIPTION

NPN transistor in a plastic SOT23 envelope.

It is primarily intended for use in RF low power amplifiers, such as in pocket phones, paging systems, etc. The transistor features low current consumption (100  $\mu$ A to 1 mA); due to its high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

## PINNING

PIN	DESCRIPTION
Code: V1p	
1	base
2	emitter
3	collector



## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	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 $T_s = 167\text{ }^{\circ}\text{C}$ ; note 1	—	30	mW
$f_T$	transition frequency	$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	2.3	—	GHz
$C_{re}$	feedback capacitance	$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	—	0.45	pF
$G_{UM}$	maximum unilateral power gain	$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	18	—	dB
$F$	noise figure	$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	3.8	—	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
$I_{CM}$	peak collector current	$f > 1\text{ MHz}$	—	10	mA
$P_{tot}$	total power dissipation	up to $T_s = 167\text{ }^{\circ}\text{C}$ ; note 1	—	30	mW
$T_{stg}$	storage temperature		−65	150	$^{\circ}\text{C}$
$T_j$	junction temperature		—	175	$^{\circ}\text{C}$

## Note

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

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## THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 167^\circ\text{C}$ ; note 1	260 K/W

## Note

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

## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0$ ; $V_{CB} = 5\text{ V}$	–	–	50	nA
$h_{FE}$	DC current gain	$I_C = 10\ \mu\text{A}$ ; $V_{CE} = 1\text{ V}$	20	30	–	
		$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$	20	40	–	
$f_T$	transition frequency	$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 500\text{ MHz}$	1.2	2.3	–	GHz
$C_c$	collector capacitance	$I_E = I_C = 0$ ; $V_{CB} = 0.5\text{ V}$ ; $f = 1\text{ MHz}$	–	–	0.6	pF
$C_e$	emitter capacitance	$I_C = I_E = 0$ ; $V_{EB} = 0$ ; $f = 1\text{ MHz}$	–	–	0.5	pF
$C_{re}$	feedback capacitance	$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25^\circ\text{C}$	–	–	0.45	pF
$G_{UM}$	maximum unilateral power gain (note 1)	$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25^\circ\text{C}$	–	18	–	dB
		$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 800\text{ MHz}$ ; $T_{amb} = 25^\circ\text{C}$	–	12	–	dB
F	noise figure	$I_C = 0.1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25^\circ\text{C}$	–	5.5	–	dB
		$I_C = 1\text{ mA}$ ; $V_{CE} = 1\text{ V}$ ; $f = 500\text{ MHz}$ ; $T_{amb} = 25^\circ\text{C}$	–	3.8	–	dB

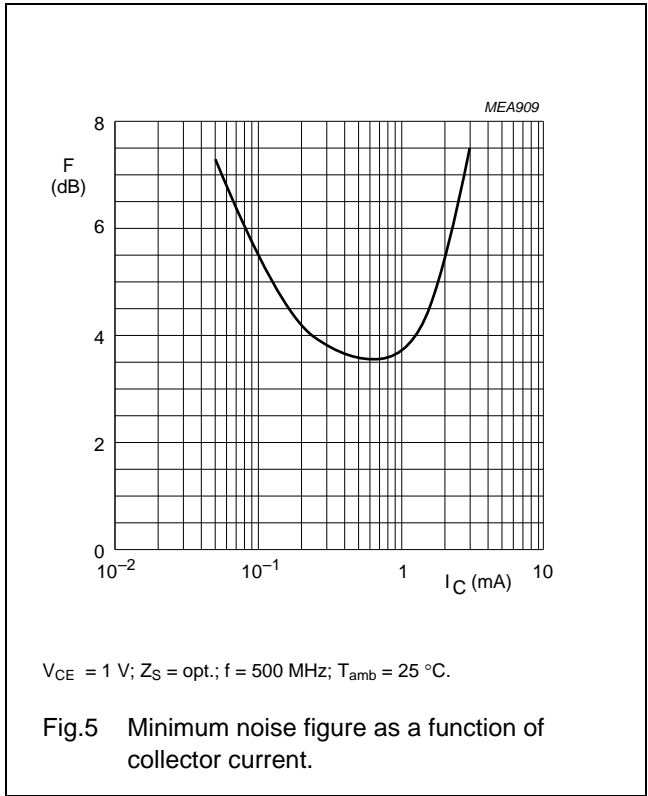
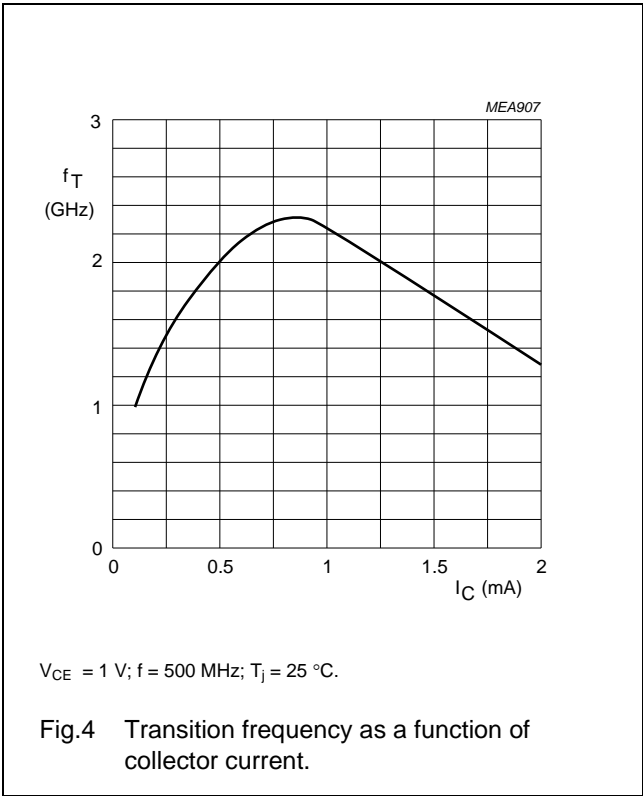
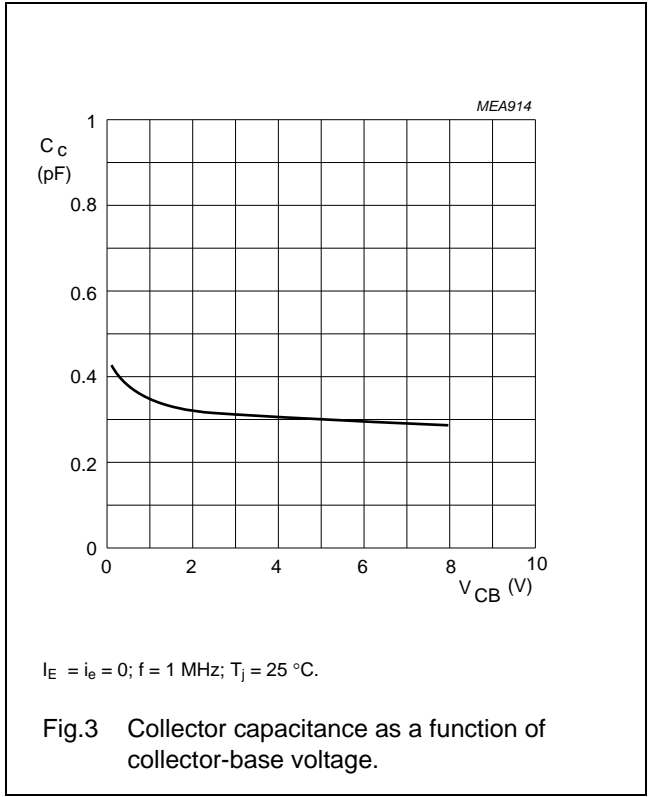
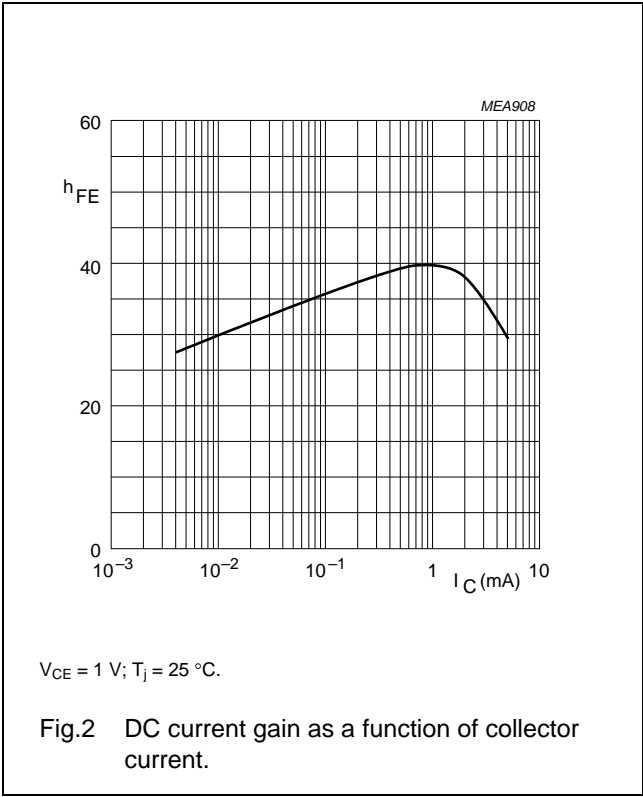
## Note

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

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

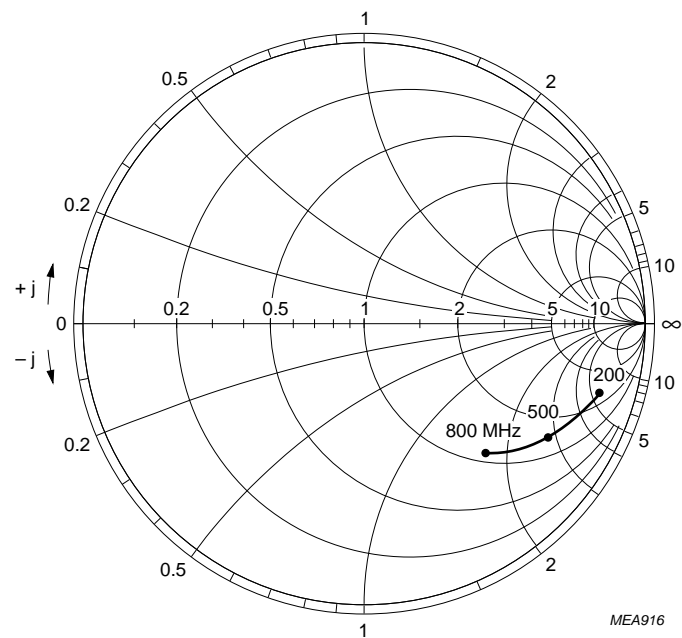
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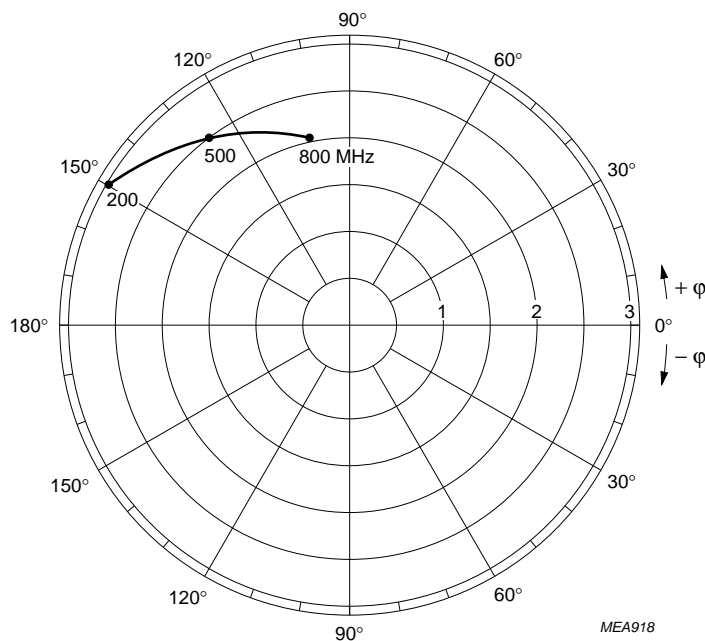
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$I_C = 1 \text{ mA}$ ;  $V_{CE} = 1 \text{ V}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ .  
 $Z_o = 50 \text{ }\Omega$ .

Fig.6 Common emitter input reflection coefficient ( $S_{11}$ ).

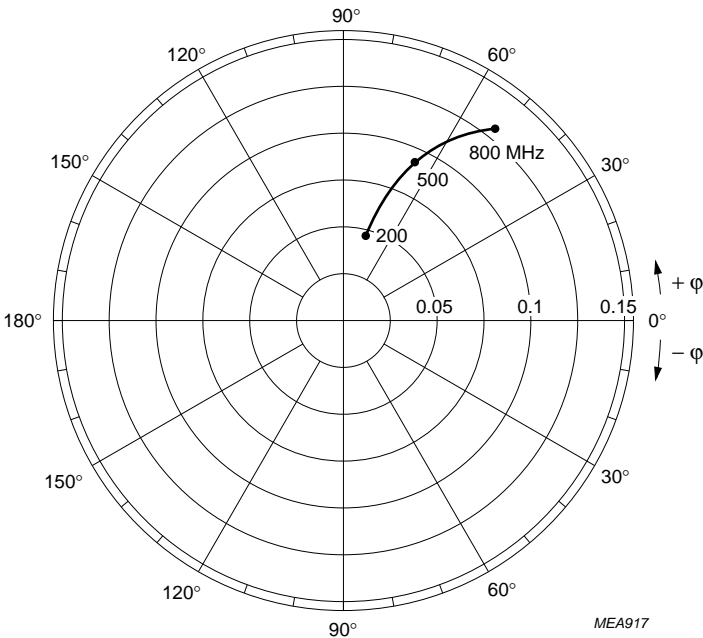


$I_C = 1 \text{ mA}$ ;  $V_{CE} = 1 \text{ V}$ ;  $T_{amb} = 25 \text{ }^\circ\text{C}$ .

Fig.7 Common emitter forward transmission coefficient ( $S_{21}$ ).

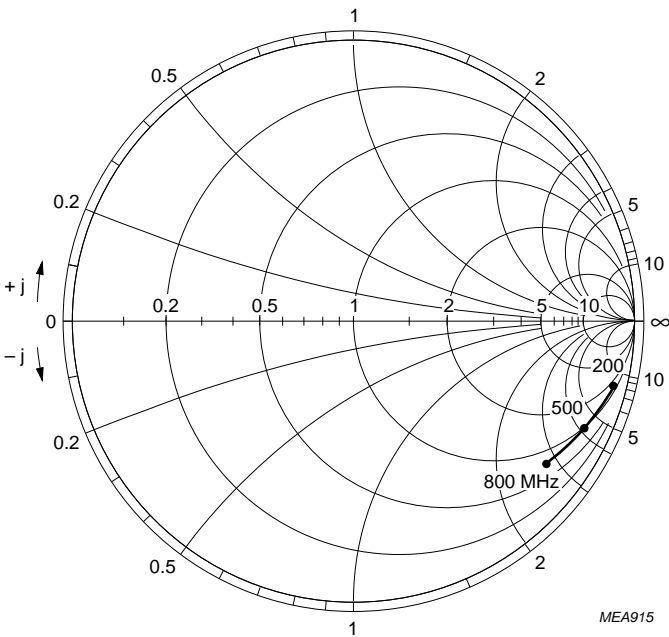
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$I_C = 1\text{ mA}$ ;  $V_{CE} = 1\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

Fig.8 Common emitter reverse transmission coefficient ( $S_{12}$ ).



$I_C = 1\text{ mA}$ ;  $V_{CE} = 1\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .  
 $Z_0 = 50\text{ }\Omega$ .

Fig.9 Common emitter output reflection coefficient ( $S_{22}$ ).

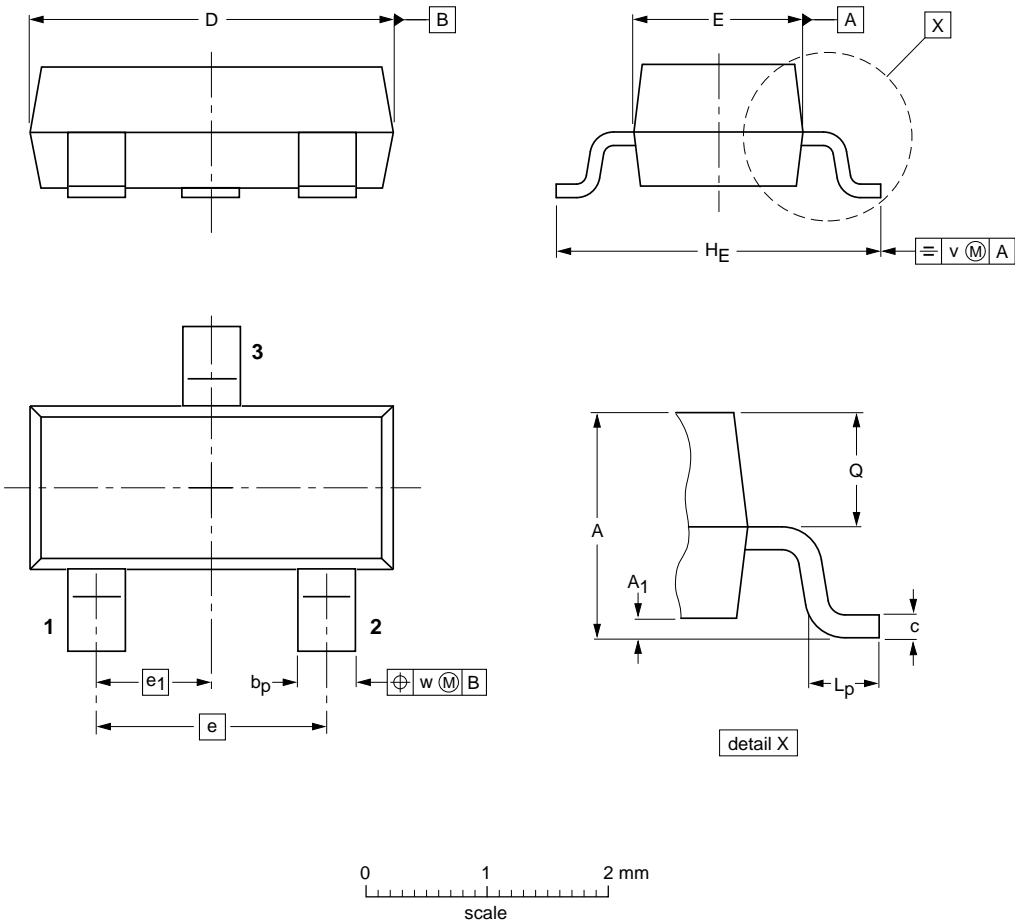
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max.	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT23		TO-236AB				<del>04-11-04</del> 06-03-16

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## DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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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