

DATA SHEET

BFS17A

NPN 3 GHz wideband transistor

Product specification

September 1995



NPN 3 GHz wideband transistor

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DESCRIPTION

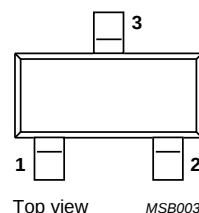
NPN transistor in a plastic SOT23 package.

APPLICATIONS

- It is intended for RF applications such as oscillators in TV tuners.

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



Marking code: E2p.

Fig.1 SOT23.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	—	25	V
V_{CEO}	collector-emitter voltage	open base	—	15	V
I_C	DC collector current		—	25	mA
P_{tot}	total power dissipation	up to $T_s = 70\text{ °C}$; note 1	—	300	mW
f_T	transition frequency	$I_C = 25\text{ mA}$; $V_{CE} = 5\text{ V}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ °C}$	2.8	—	GHz
G_{UM}	maximum unilateral power gain	$I_C = 14\text{ mA}$; $V_{CE} = 10\text{ V}$; $f = 800\text{ MHz}$	13.5	—	dB
F	noise figure	$I_C = 2\text{ mA}$; $V_{CE} = 5\text{ V}$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ °C}$	2.5	—	dB
V_O	output voltage	$d_{im} = -60\text{ dB}$; $I_C = 14\text{ mA}$; $V_{CE} = 10\text{ V}$; $R_L = 75\text{ }\Omega$; $T_{amb} = 25\text{ °C}$; $f_{(p+q-r)} = 793.25\text{ MHz}$	150	—	mV

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	—	25	V
V_{CEO}	collector-emitter voltage	open base	—	15	V
V_{EBO}	emitter-base voltage	open collector	—	2.5	V
I_C	DC collector current		—	25	mA
I_{CM}	peak collector current		—	50	mA
P_{tot}	total power dissipation	up to $T_s = 70\text{ °C}$; note 1	—	300	mW
T_{stg}	storage temperature		-65	+150	°C
T_j	junction temperature		—	150	°C

Note to the Quick reference data and the Limiting values

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

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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 70\text{ °C}$; note 1	260	K/W

Note

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

CHARACTERISTICS

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

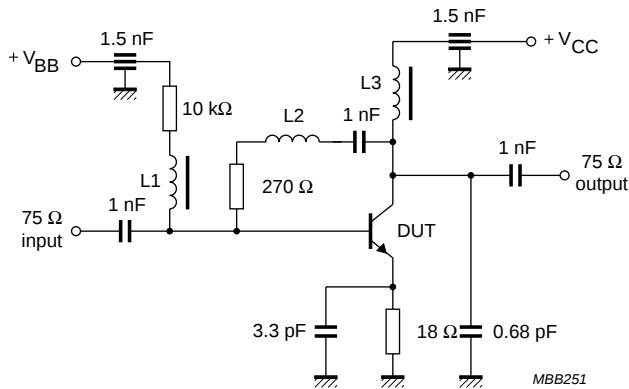
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 10\text{ V}$	–	–	50	nA
h_{FE}	DC current gain	$I_C = 2\text{ mA}$; $V_{CE} = 1\text{ V}$; $T_{amb} = 25\text{ °C}$	25	90	–	
		$I_C = 25\text{ mA}$; $V_{CE} = 1\text{ V}$; $T_{amb} = 25\text{ °C}$	25	90	–	
f_T	transition frequency	$I_C = 25\text{ mA}$; $V_{CE} = 5\text{ V}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	2.8	–	GHz
C_c	collector capacitance	$I_E = 0$; $V_{CB} = 10\text{ V}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	0.7	–	pF
C_e	emitter capacitance	$I_C = 0$; $V_{EB} = 0.5\text{ V}$; $f = 1\text{ MHz}$	–	1.25	–	pF
C_{re}	feedback capacitance	$I_C = 0$; $V_{CE} = 5\text{ V}$; $f = 1\text{ MHz}$	–	0.6	–	pF
G_{UM}	maximum unilateral power gain note 1	$I_C = 14\text{ mA}$; $V_{CE} = 10\text{ V}$; $f = 800\text{ MHz}$	–	13.5	–	dB
F	noise figure	$I_C = 2\text{ mA}$; $V_{CE} = 5\text{ V}$; $Z_S = 60\text{ }\Omega$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	2.5	–	dB
V_O	output voltage	note 2	–	150	–	mV

Notes

- G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and $G_{UM} = 10 \log \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)}$ dB.
- $d_{im} = -60\text{ dB}$ (DIN 45004B); $I_C = 14\text{ mA}$; $V_{CE} = 10\text{ V}$; $R_L = 75\text{ }\Omega$; $T_{amb} = 25\text{ °C}$;
 $V_p = V_O$; $f_p = 795.25\text{ MHz}$;
 $V_q = V_O - 6\text{ dB}$; $f_q = 803.25\text{ MHz}$;
 $V_r = V_O - 6\text{ dB}$; $f_r = 805.25\text{ MHz}$;
measured at $f_{(p+q-r)} = 793.25\text{ MHz}$.

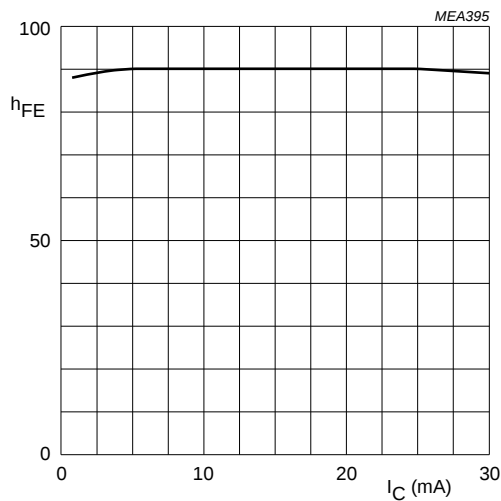
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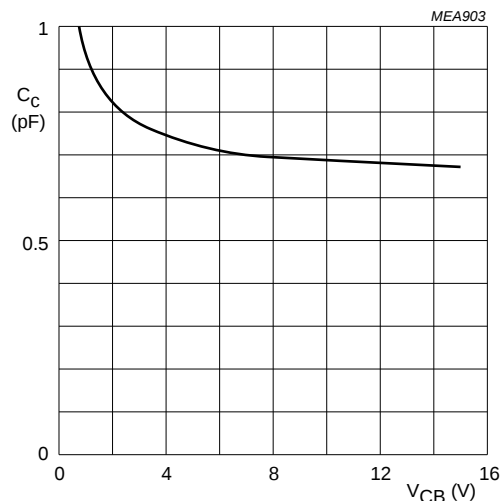
L1 = L3 = 5 μ H Ferroxcube choke.
L2 = 3 turns 0.4 mm copper wire; winding pitch 1 mm; internal diameter 3 mm.

Fig.2 Intermodulation distortion and second order intermodulation distortion test circuit.



$V_{CE} = 1$ V; $T_{amb} = 25$ °C.

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

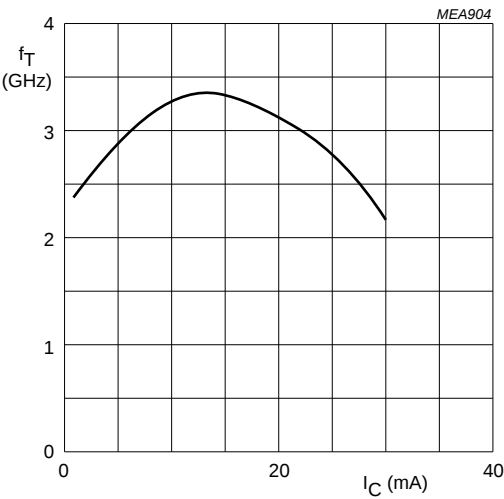


$I_E = 0$; $f = 1$ MHz; $T_{amb} = 25$ °C.

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

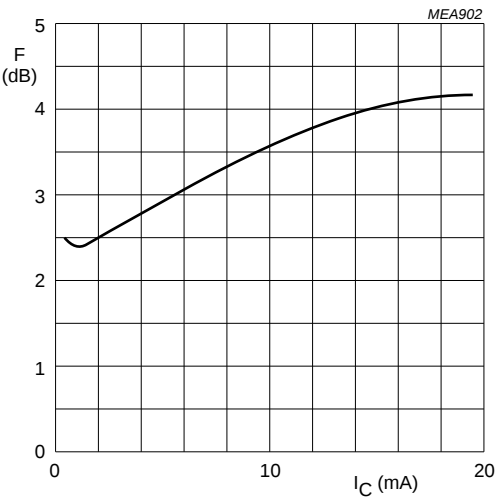
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$V_{CE} = 5\text{ V}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

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



$V_{CE} = 5\text{ V}$; $Z_s = 60\text{ }\Omega$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

Fig.6 Minimum noise figure as a function of collector current.

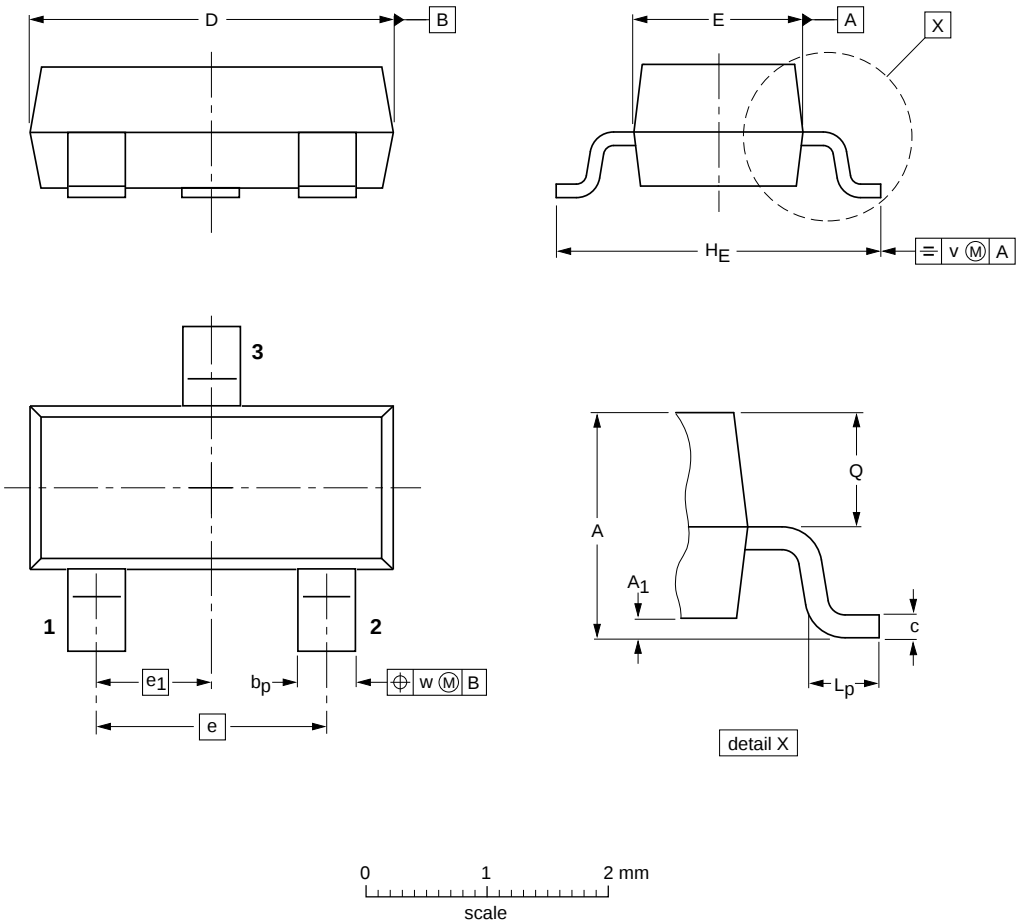
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23



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 0.9	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				04-11-04 06-03-16

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DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
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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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