NPN 3 GHz wideband transistor BFS17A

DESCRIPTION

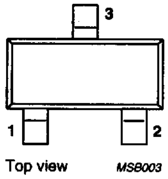
NPN transistor in a plastic SOT23 package.

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 $T_s = 70$ °C; note 1	–	300	mW
f_T	transition frequency	$I_C = 25$ mA; $V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25$ °C	2.8	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 14$ mA; $V_{CE} = 10$ V; f = 800 MHz	13.5	–	dB
F	noise figure	$I_C = 2$ mA; $V_{CE} = 5$ V; f = 800 MHz; $T_{amb} = 25$ °C	2.5	–	dB
V_O	output voltage	$d_{im} = -60$ dB; $I_C = 14$ mA; $V_{CE} = 10$ V; $R_L = 75\ \Omega$; $T_{amb} = 25$ °C; $f_{(p+q-r)} = 793.25$ 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 $T_s = 70$ °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

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

THERMAL CHARACTERISTICS

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

Note

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

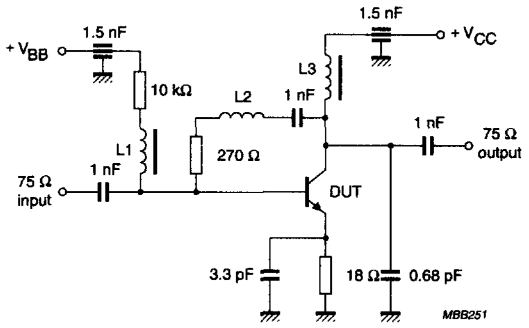
CHARACTERISTICS

$T_j = 25\ °C$ unless otherwise specified.

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

Notes

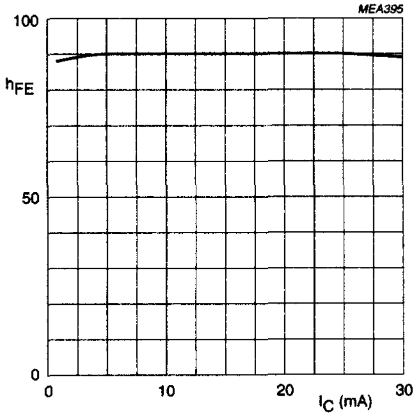
1. G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and $G_{UM} = 10\log\frac{|S_{21}|^2}{(1-|S_{11}|^2)(1-|S_{22}|^2)}$ dB.
2. $d_{im} = -60\ dB$ (DIN 45004B); $I_C = 14\ mA$; $V_{CE} = 10\ V$; $R_L = 75\ \Omega$; $T_{amb} = 25\ °C$;
   $V_p = V_O$; $f_p = 795.25\ MHz$;
   $V_q =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



L1 = L3 = 5 µH Ferroxcube choke.

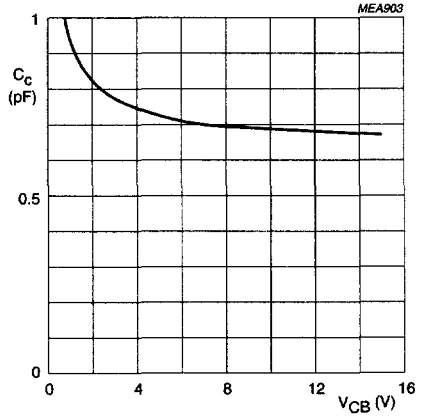
L2 = 3 turns 0.4 mm copper wire; winding pitch 1 mm; internal diameter 3 mm.

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



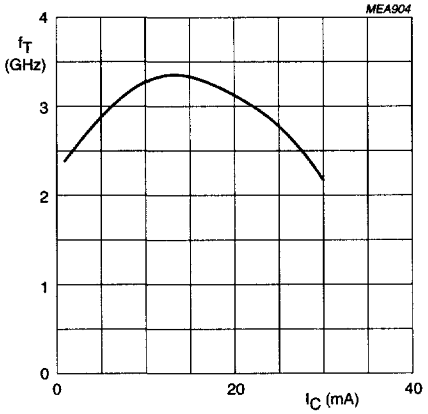
$V_{CE} = 1$ V; $T_{amb} = 25$ °C.

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



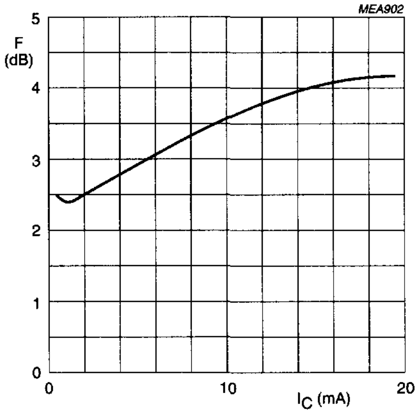
$I_E = 0$; f = 1 MHz; $T_{amb} = 25$ °C.

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



V_{CE} = 5 V; f = 500 MHz; T_{amb} = 25 °C.

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



V_{CE} = 5 V; Z_s = 60 Ω; f = 800 MHz; T_{amb} = 25 °C.

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