

NPN 5 GHz wideband transistor

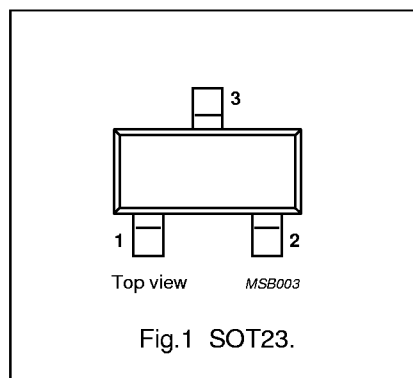
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DESCRIPTION

NPN silicon planar epitaxial transistor in a plastic SOT23 envelope. It is primarily intended for low noise, general RF applications.

PINNING

PIN	DESCRIPTION
Code: R7p	
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		—	—	100	mA
P_{tot}	total power dissipation	up to $T_s = 70\text{ °C}$; note 1	—	—	500	mW
h_{FE}	DC current gain	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $T_{amb} = 25\text{ °C}$	25	80	—	
f_T	transition frequency	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ °C}$	—	5	—	GHz
G_{UM}	maximum unilateral power gain	$I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ °C}$	—	11.5	—	dB
V_o	output voltage	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $R_L = 75\text{ }\Omega$; $T_{amb} = 25\text{ °C}$; $d_{im} = -60\text{ dB}$; $f_{(p+q-r)} = 793.25\text{ MHz}$	—	350	—	mV

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_{CEO}	collector-emitter voltage	open base	—	15	V
V_{EBO}	emitter-base voltage	open collector	—	3	V
I_C	DC collector current		—	100	mA
P_{tot}	total power dissipation	up to $T_s = 70\text{ °C}$; 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.

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THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 70\text{ °C}$; note 1	210 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	$I_E = 0$; $V_{CB} = 10\text{ V}$	–	–	100	nA
h_{FE}	DC current gain	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$	25	80	–	
f_T	transition frequency	$I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $f = 500\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	5	–	GHz
C_c	collector capacitance	$I_E = i_e = 0$; $V_{CB} = 10\text{ V}$; $f = 1\text{ MHz}$	–	1.5	–	pF
C_e	emitter capacitance	$I_C = i_c = 0$; $V_{EB} = 0.5\text{ V}$; $f = 1\text{ MHz}$	–	4.5	–	pF
C_{re}	feedback capacitance	$I_C = 0$; $V_{CE} = 10\text{ V}$; $f = 1\text{ MHz}$	–	1.2	–	pF
G_{UM}	maximum unilateral power gain (note 1)	$I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	11.5	–	dB
F	noise figure	$I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 800\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	3.5	–	dB
d_2	second order intermodulation distortion	note 2	–	–50	–	dB
V_o	output voltage	note 3	–	350	–	mV

Notes

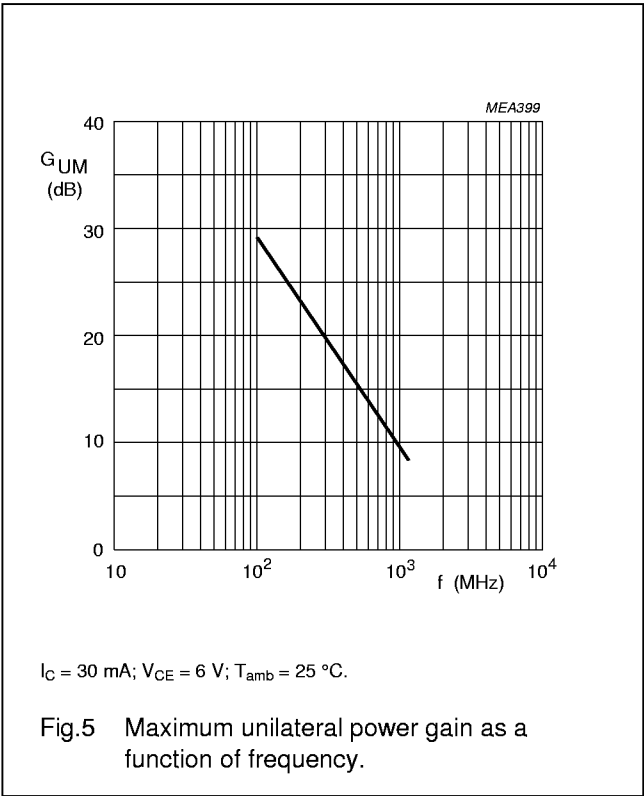
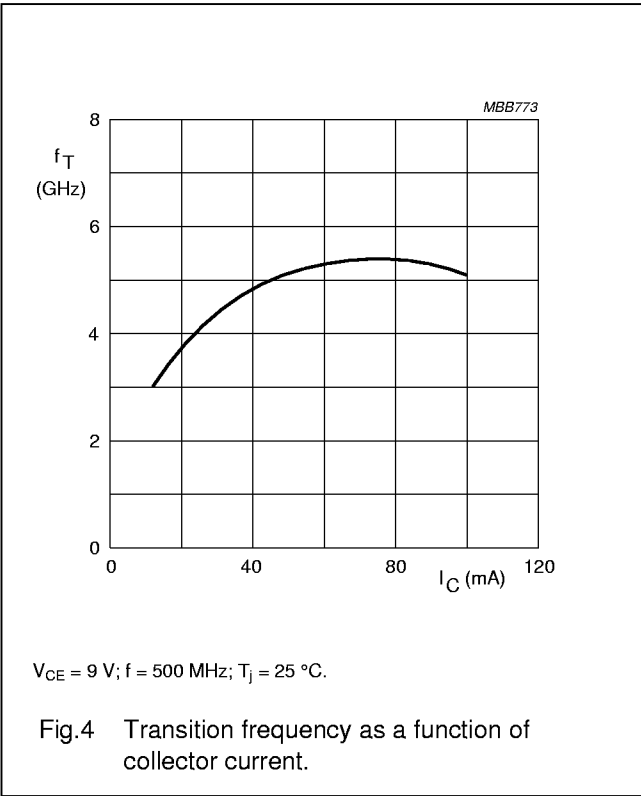
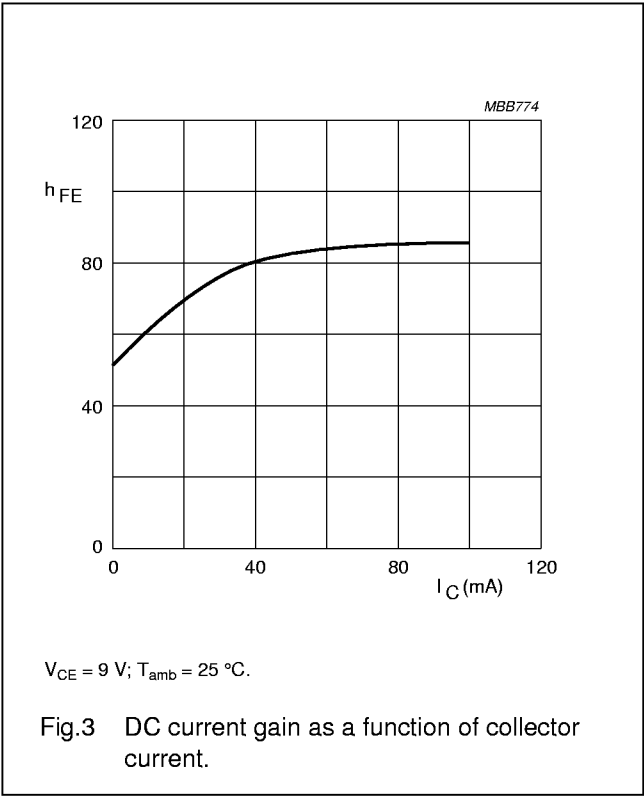
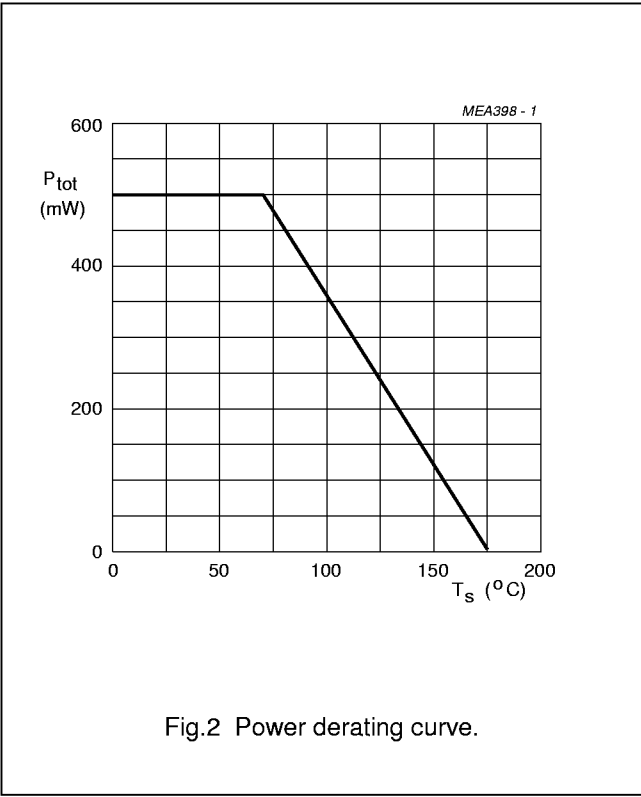
- G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and

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

- $I_C = 30\text{ mA}$; $V_{CE} = 6\text{ V}$; $R_L = 75\text{ }\Omega$; $T_{amb} = 25\text{ °C}$; $f_{(p+q)} = 810\text{ MHz}$; $V_o = 100\text{ mV}$.
- $d_{im} = -60\text{ dB}$ (DIN 45004B); $I_C = 50\text{ mA}$; $V_{CE} = 9\text{ V}$; $R_L = 75\text{ }\Omega$; $T_{amb} = 25\text{ °C}$; $f_{(p+q-r)} = 793.25\text{ MHz}$.

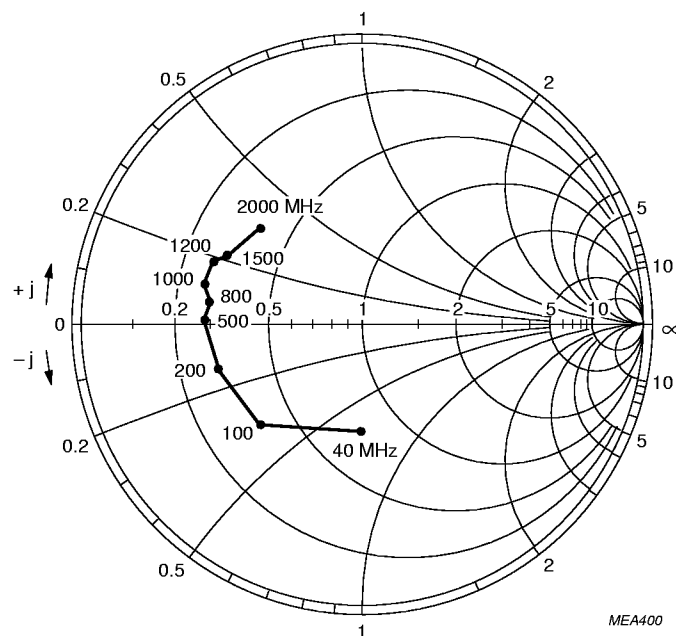
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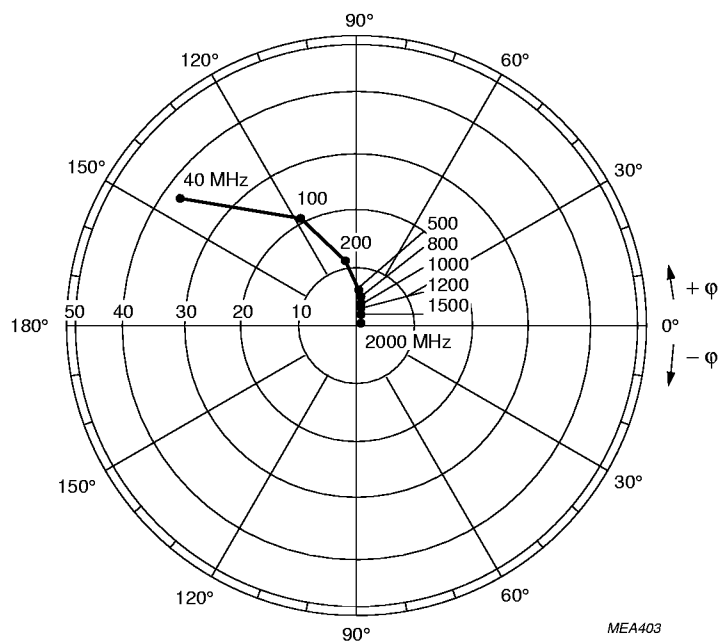
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$I_C = 30 \text{ mA}$; $V_{CE} = 6 \text{ V}$; $T_{\text{amb}} = 25^\circ\text{C}$.
 $Z_o = 50 \Omega$.

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

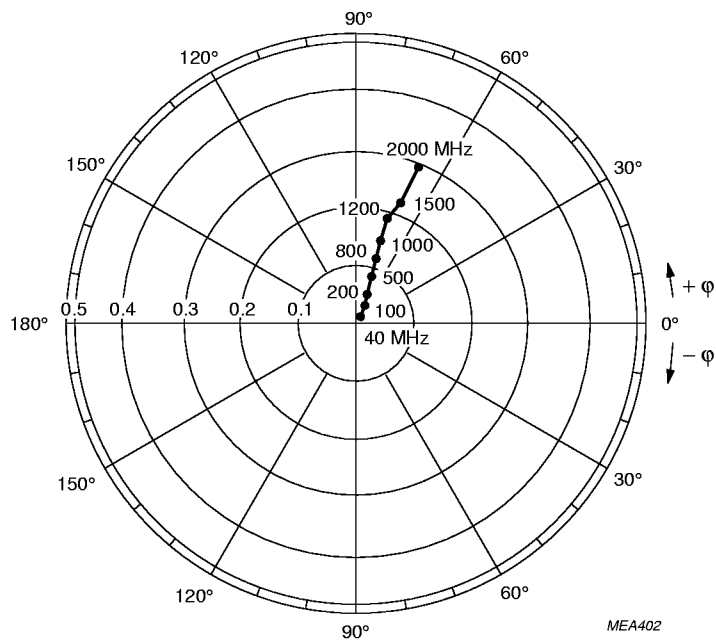


$I_C = 30 \text{ mA}$; $V_{CE} = 6 \text{ V}$; $T_{\text{amb}} = 25^\circ\text{C}$.

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

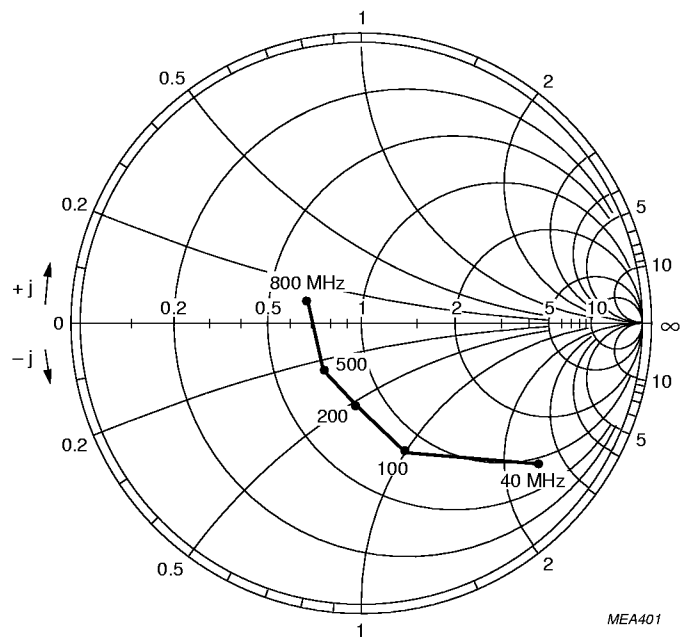
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$I_C = 30 \text{ mA}$; $V_{CE} = 6 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$.

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



$I_C = 30 \text{ mA}$; $V_{CE} = 6 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$.
 $Z_0 = 50 \text{ } \Omega$.

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

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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23

