DC COMPONENTS CO., LTD.

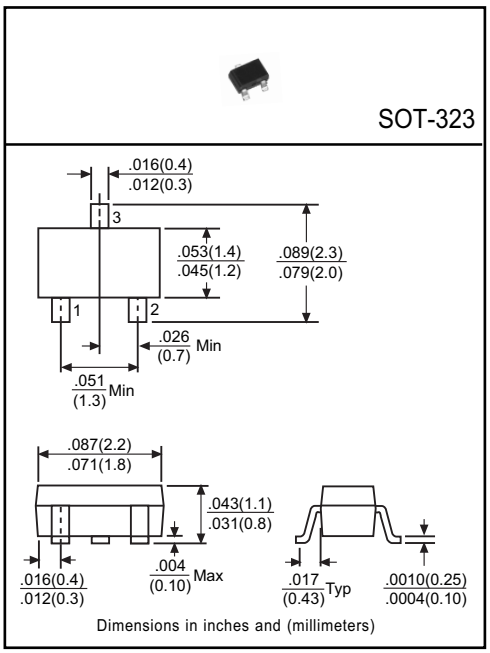
DISCRETE SEMICONDUCTORS

BFS505

TECHNICAL SPECIFICATIONS OF N-CHANNEL 9 GHz WIDEBAND TRANSISTOR

Description

* Low current consumption
* High power gain
* Low noise figure
* High transition frequency
* Gold metallization ensures excellent reliability



Pinning

1 = Base
2 = Emitter
3 = Collector

Absolute Maximum Ratings (T_A=25°C)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CES}	15	V
Emitter-Base Voltage	V_{EBO}	2.5	V
DC Collector Current	I_C	18	mA
Total Power Dissipation	P_{tot}	150	mW
Storage Temperature	T_{stg}	-65 to +150	°C

Electrical Characteristics

(Ratings at 25°C ambient temperature unless otherwise specified)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector-Base Voltage	V_{CBO}	-	-	20	V	open emitter
Collector-Emitter Voltage	V_{CES}	-	-	15	V	R_{BE}=0
Emitter-Base Voltage	V_{EBO}	-	-	2.5	V	open collector
DC Collector Current	I_C	-	-	18	mA	
Collector Cut-off Current	I_{CBO}	-	-	50	V	I_E=0, V_{CB}=6V
Emitter Capacitance	C_e	-	0.4	-	pF	I_C=ic=0, V_{EB}=0.5V, f=1MHz
Collector Capacitance	C_c	-	0.4	-	pF	I_E=ie=0, V_{CB}=6V, f=1MHz
Feedback Capacitance	C_{re}	-	0.3	-	pF	I_C=0, V_{CB}=0.5V, f=1MHz
DC Current Gain	h_{FE}	60	120	250		I_C=5mA, V_{CE}=6V, T_j=25°C
Total Power Dissipation	P_{tot}	-	-	150	mW	up to T_S=147°C (NOTE 1)
Transition Frequency	f_T	-	9	-	GHz	I_C=5mA, V_{CE}=6V, f=1GHz, T_{amb}=25°C
Storage Temperature	T_{stg}	-65	-	150	°C	
Thermal Resistance From Junction To Soldering Point	$R_{th\ j\text{-}s}$	-	190	-	K/W	up to T_S = 147°C (NOTE 1)

NOTE: 1. T_S is the temperature at the soldering point of the collector tab.

Electrical Characteristics

(Ratings at 25°C ambient temperature unless otherwise specified)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
Maximum Unilateral Power Gain (NOTE 2)	G_{UM}	-	17	-	dB	I_C=5mA, V_{CE}=6V, f=900MHz, T_{amb}=25°C
		-	10	-		I_C=5mA, V_{CE}=6V, f=2GHz, T_{amb}=25°C
Noise Figure ($\Gamma_s = \Gamma_{opt}$)	F	-	1.2	1.7	dB	I_C=1.25mA, V_{CE}=6V, f=900MHz, T_{amb}=25°C
		-	1.6	2.1		I_C=5mA, V_{CE}=6V, f=900MHz, T_{amb}=25°C
		-	1.9	-		I_C=1.25mA, V_{CE}=6V, f=2GHz, T_{amb}=25°C
Output Power at 1 dB Gain Compression	P_{L1}	-	4	-	dBm	I_C=5mA, V_{CE}=6V, R_L=50Ω, f=900MHz T_{amb}=25°C
Insertion Power Gain	$\|S_{21}\|^2$	13	14	-	dB	I_C=5mA, V_{CE}=6V, f=900MHz, T_{amb}=25°C
Third Order Intercept Point	ITO	-	10	-	dBm	NOTE 3

NOTE: 2. Gum is the maximum unilateral power gain, assuming S_{12} is zero and

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

3. I_C=5mA, V_{CE}=6V, R_L=50Ω, f=900MHz, T_{amb}=25°C

f_p=900MHz, f_q=902MHz, measured at $f_{(2p-q)}$=898MHz and at $f_{(2p-q)}$=904MHz.

Fig.1 Power derating curve.

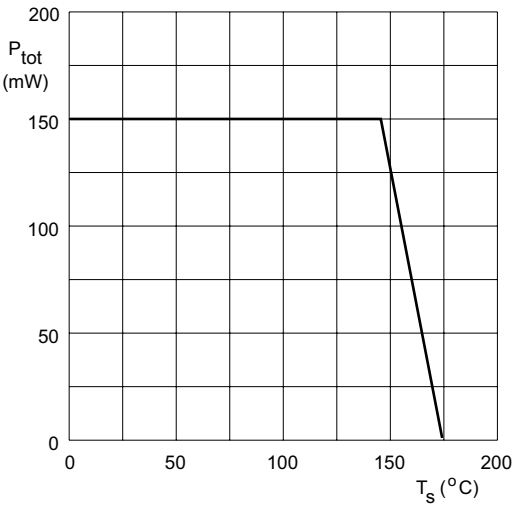
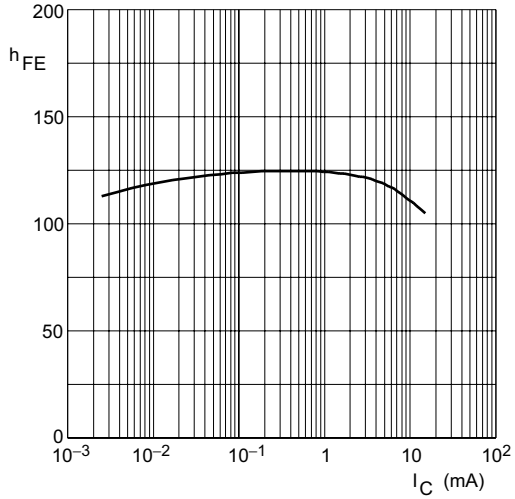
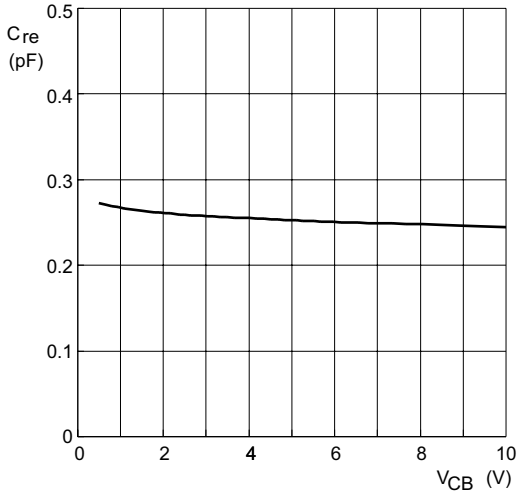


Fig.2 DC current gain as a function of collector current.



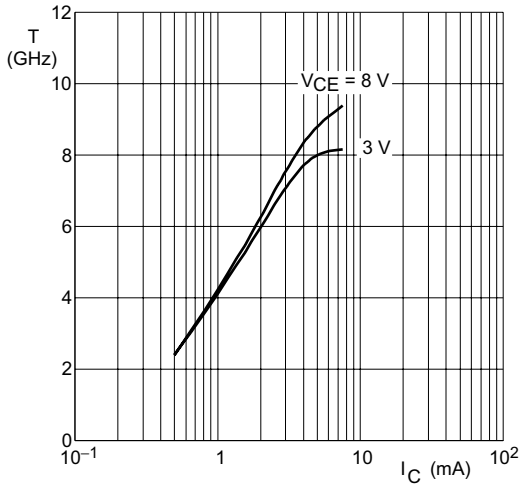
V_{CE} = 6 V; T_j = 25 °C.

Fig.3 Feedback capacitance as a function of collector-base voltage.



I_C = 0; f = 1 MHz.

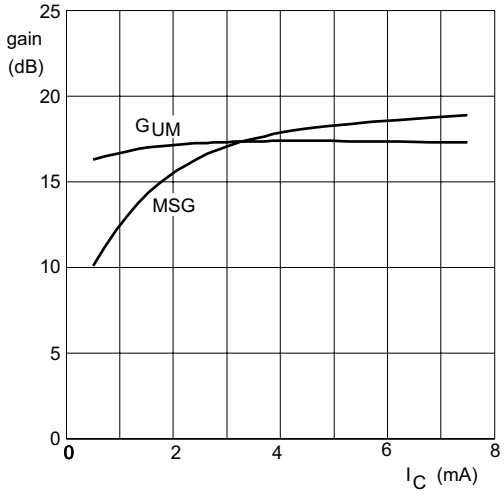
Fig.4 Transition frequency as a function of collector current.



f = 1 GHz; T_{amb} = 25 °C.

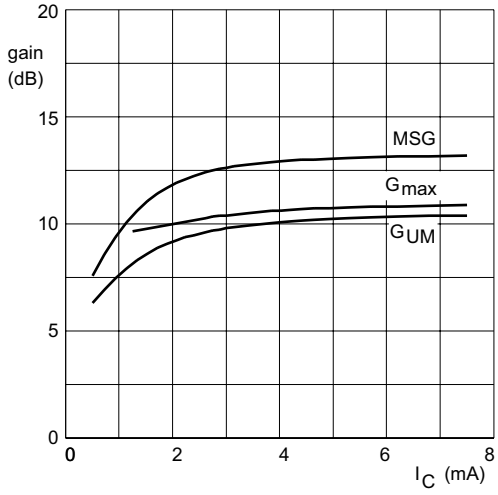
In Figs 5 to 8, G_{UM} = maximum unilateral power gain;
MSG = maximum stable gain; G_{max} = maximum available gain.

Fig.5 Gain as a function of collector current.



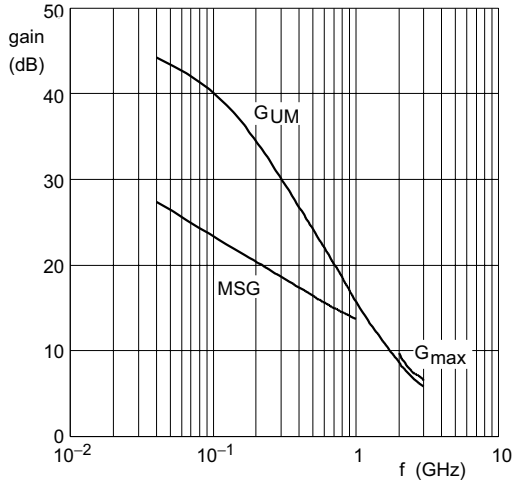
V_{CE} = 6 V; f = 900 MHz; T_{amb} = 25 °C.

Fig.6 Gain as a function of collector current.



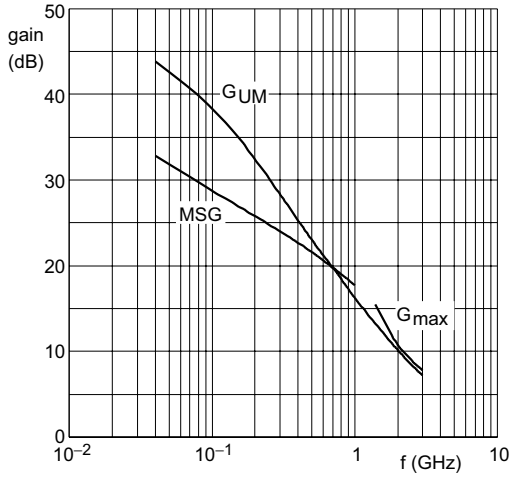
V_{CE} = 6 V; f = 2 GHz; T_{amb} = 25 °C.

Fig.7 Gain as a function of frequency.



I_C = 1.25 mA; V_{CE} = 6 V; T_{amb} = 25 °C.

Fig.8 Gain as a function of frequency.



I_C = 5 mA; V_{CE} = 6 V; T_{amb} = 25 °C.

Fig.9 Minimum noise figure as a function of collector current.

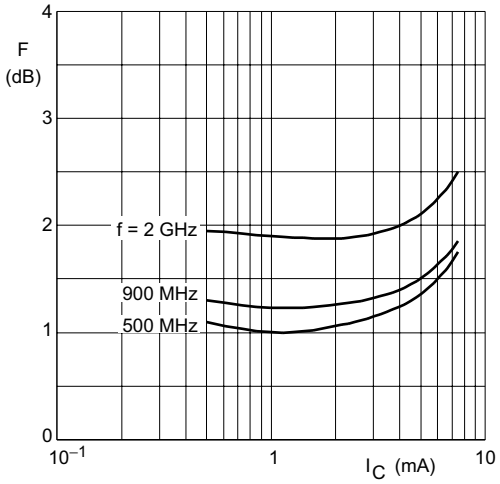
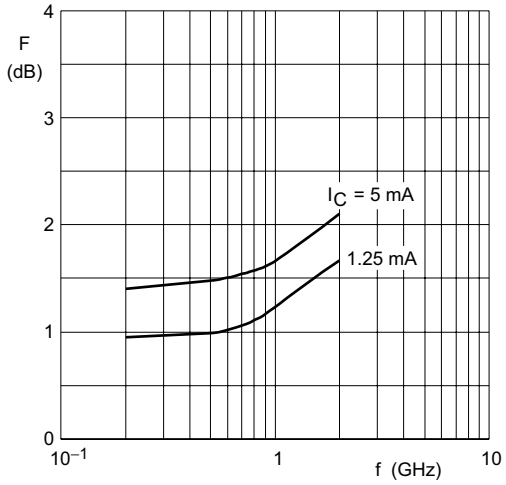
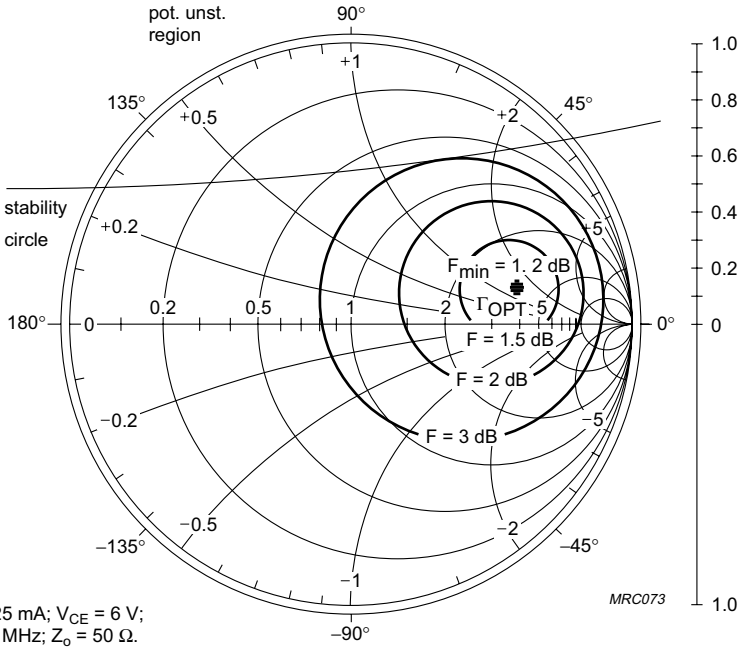


Fig.10 Minimum noise figure as a function of frequency.



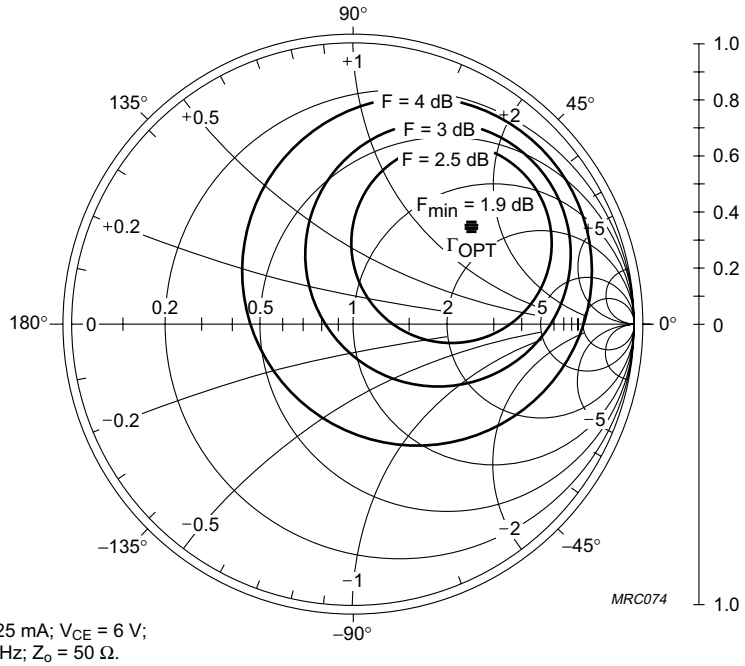
V_{CE} = 6 V; T_{amb} = 2 5 ° C.

Fig.11 Noise circle.



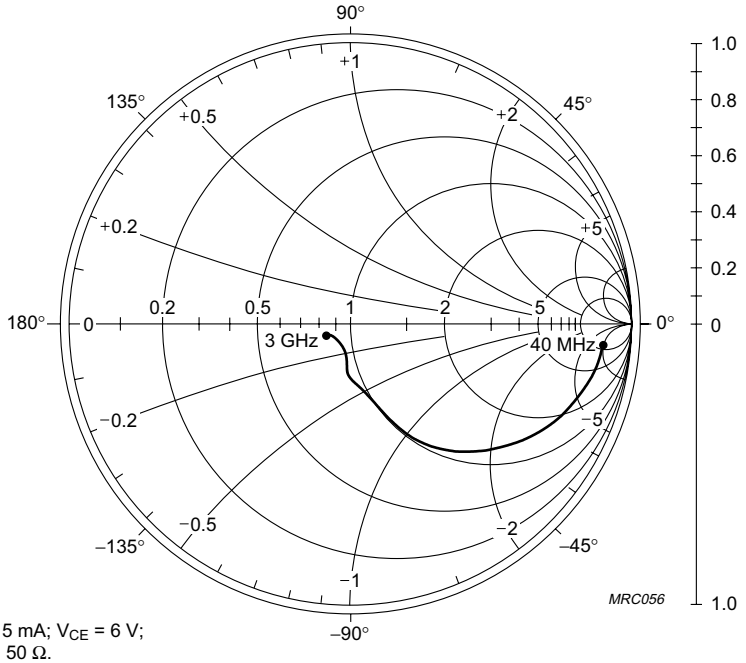
I_C = 1.25 mA; V_{CE} = 6 V;
f = 900 MHz; Z_o = 50 Ω.

Fig.12 Noise circle.



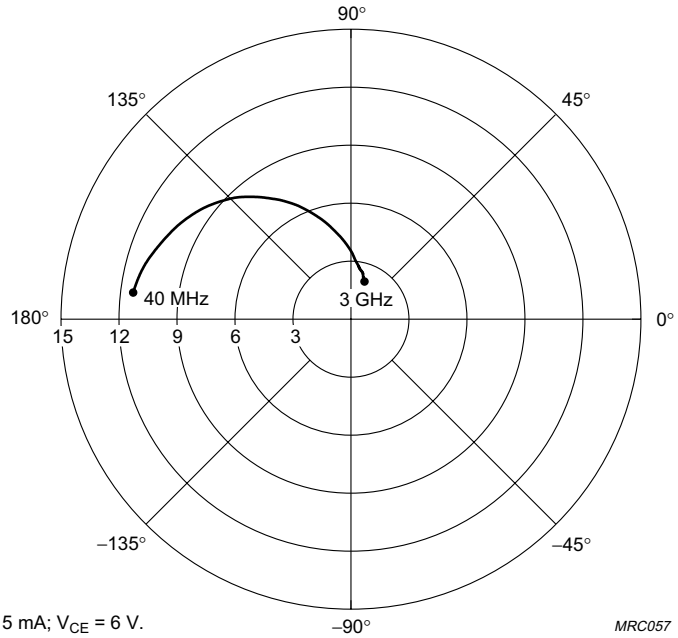
I_C = 1.25 mA; V_{CE} = 6 V;
f = 2 GHz; Z_o = 50 Ω.

Fig.13 Common emitter input reflection coefficient (S_{11}).



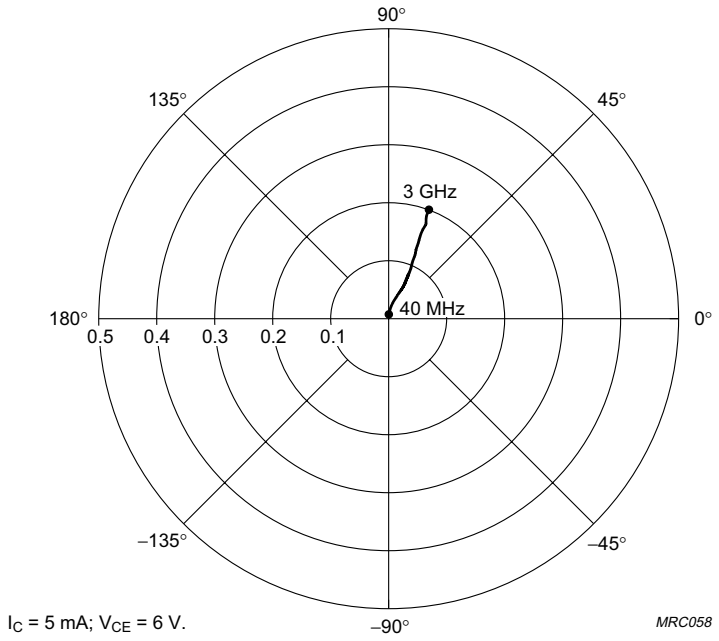
I_C = 5 mA; V_{CE} = 6 V;
Z_o = 50 Ω.

Fig.14 Common emitter forward transmission coefficient (S_{21}).



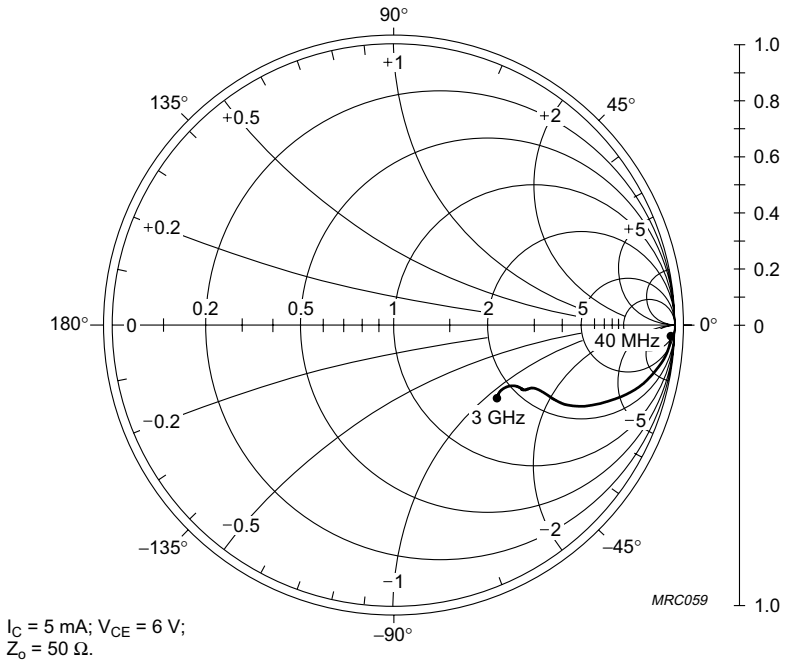
I_C = 5 mA; V_{CE} = 6 V.

Fig.15 Common emitter reverse transmission coefficient (S_{12}).



I_C = 5 mA; V_{CE} = 6 V.

Fig.16 Common emitter output reflection coefficient (S_{22}).



I_C = 5 mA; V_{CE} = 6 V;
Z_o = 50 Ω.