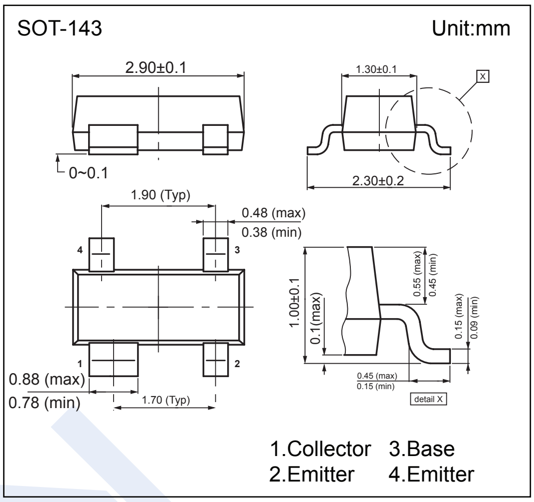
NPN 9GHz Wideband Transistor

BFG540



Features

- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability.

Absolute Maximum Ratings Ta = 25℃

Parameter	Symbol	Rating	Unit
Collector - Base Voltage	V_{CBO}	20	V
Collector - Emitter Voltage shorted base	V_{CES}	15	V
Emitter - Base Voltage	V_{EBO}	2.5	V
Collector Current - Continuous	I_C	120	mA
Total power dissipation Ts⩽ 60 °C [*1]	P_{tot}	400	mW
Thermal resistance from junction to soldering point [*1]	R_{thJS}	290	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature Range	T_{stg}	-65 to 150	℃

*1: Ts is the temperature at the soldering point of the collector pin.

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■ Electrical Characteristics T_j = 25℃, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector- base breakdown voltage	V_{CBO}	I_C= 100 μA， I_E= 0	20			
Collector- emitter breakdown voltage	V_{CEO}	I_C= 1 mA， I_B= 0	15			V
Emitter - base breakdown voltage	V_{EBO}	I_E= 100 μA， I_C= 0	2.5			
Collector-base cut-off current	I_{CBO}	V_{CB}= 8 V , I_E= 0			50	nA
DC current gain	h_{FE}	V_{CE}= 8V, I_C= 40mA	60		250	
Emitter capacitance	C_e	I_C=i_c=0; V_{EB}=0.5V; f=1MHz		2		
Collector capacitance	C_c	I_E=i_e=0; V_{CB}=8V; f=1MHz		0.9		pF
Feedback capacitance	C_{re}	I_C=0; V_{CB}=8V; f=1MHz		0.5		
Noise figure	F	Γ_s=Γ_{opt}; I_C=10mA; V_{CE}=8V;f=900MHz; T_{amb}=25℃		1.3	1.8	
		Γ_s=Γ_{opt}; I_C=40mA; V_{CE}=8V;f=900MHz; T_{amb}=25℃		1.9	2.4	
		Γ_s=Γ_{opt}; I_C=10mA; V_{CE}=8V;f=2GHz; T_{amb}=25℃		2.1		
Power gain, maximum available (Note 1)	G_{UM}	I_C=40mA; V_{CE}=8V; f=900MHz;T_{amb}=25℃		18		dB
		I_C=40mA; V_{CE}=8V; f=2GHz;T_{amb}=25℃		11		
Insertion power gain	$\|S_{21e}\|^2$	I_C=40mA; V_{CE}=8V; f=900MHz;T_{amb}=25℃	15	16		
Output power at 1dB gain compression	P_{L1}	I_C=40mA; V_{CE}=8V; R_L=50Ω;f=900MHz; T_{amb}=25℃		21		dBm
Third order intercept point	ITO	Note 2		34		
Output voltage	V_O	Note 3		500		mV
Second order intermodulation distortion	d_2	Note 4		-50		dB
Transition frequency	f_T	I_C=40mA; V_{CE}=8V; f=1GHz;T_{amb}=25℃		9		GHz

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. V_{CE} = 8 V; I_C = 40 mA; R_L = 50 Ω; T_{amb} = 25 °C;
   f_p = 900 MHz; f_q = 902 MHz;
   measured at $f_{(2p-q)}$ = 898 MHz and $f_{(2q-p)}$ = 904 MHz.
3. d_{im} = –60 dB (DIN 45004B); I_C = 40 mA; V_{CE} = 8 V; Z_L = Z_S = 75 Ω; T_{amb} = 25 °C;
   V_p = V_O; V_q = V_O –6 dB; V_r = V_O –6 dB;
   f_p = 795.25 MHz; f_q = 803.25 MHz; f_r = 805.25 MHz;
   measured at $f_{(p+q-r)}$ = 793.25 MHz.
4. I_C = 40 mA; V_{CE} = 8 V; V_O = 275 mV; T_{amb} = 25 °C;
   f_p = 250 MHz; f_q = 560 MHz; measured at $f_{(p+q)}$ = 810 MHz.

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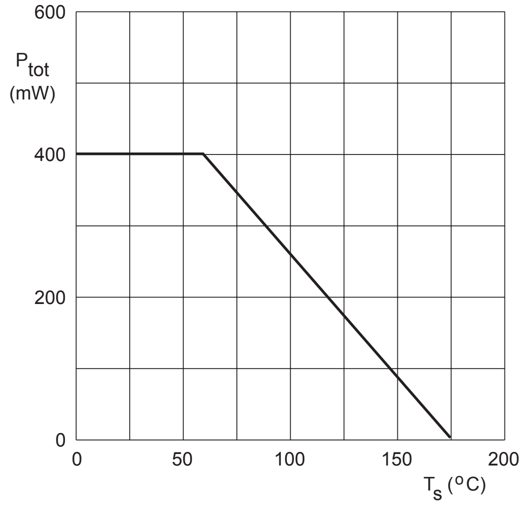
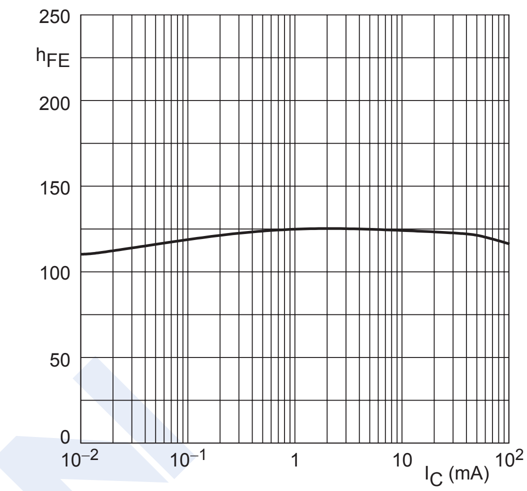
■ Typical Characterisitics



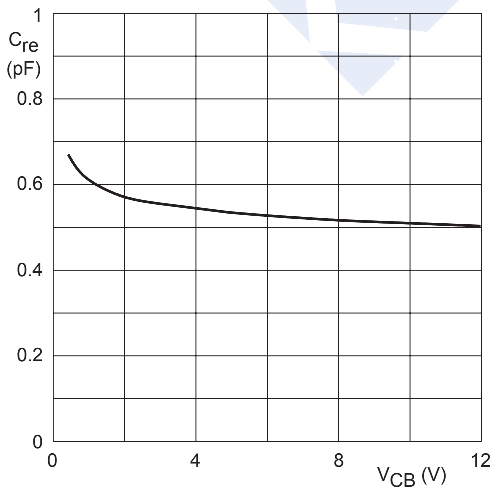
$V_{CE} \leq 10$ V.

Fig.1 Power derating curve.



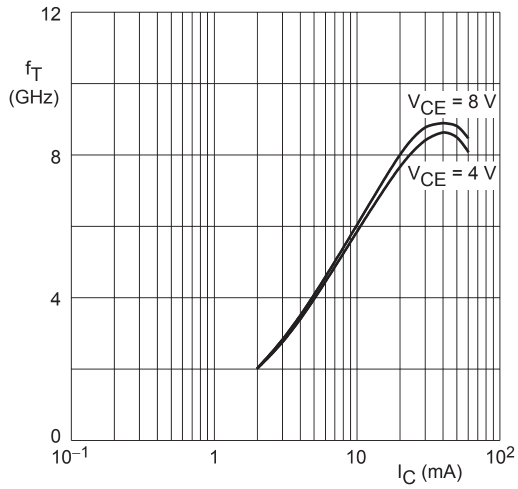
$V_{CE} = 8$ V; $T_j = 25$ °C.

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



$I_C = 0$; f = 1 MHz.

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



f = 1 GHz; $T_{amb} = 25$ °C.

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

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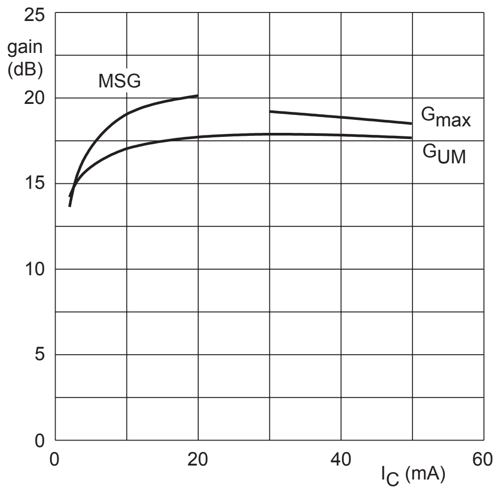
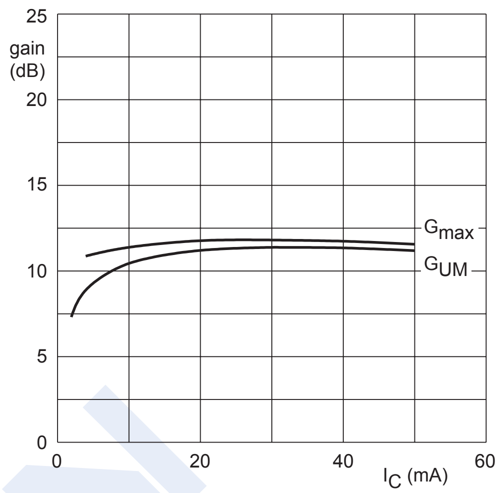


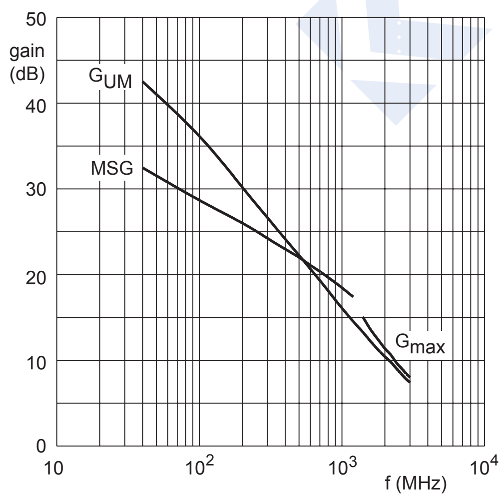
V_{CE} = 8 V; f = 900 MHz.
MSG = maximum stable gain; G_{max} = maximum available gain;
G_{UM} = maximum unilateral power gain.

Fig.5 Gain as a function of collector current.



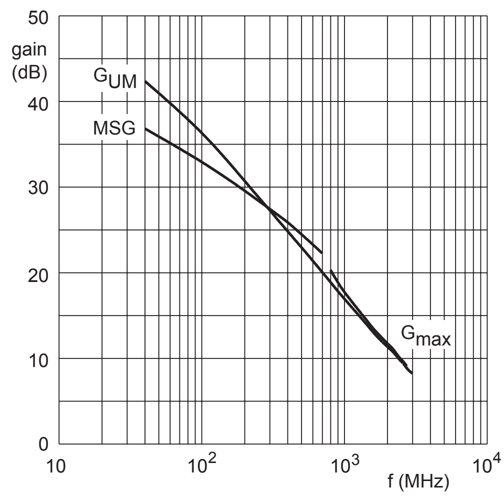
V_{CE} = 8 V; f = 2 GHz.
G_{max} = maximum available gain;
G_{UM} = maximum unilateral power gain.

Fig.6 Gain as a function of collector current.



I_C = 10 mA; V_{CE} = 8 V.
G_{UM} = maximum unilateral power gain;
MSG = maximum stable gain; G_{max} = maximum available gain.

Fig.7 Gain as a function of frequency.



I_C = 40 mA; V_{CE} = 8 V.
G_{UM} = maximum unilateral power gain;
MSG = maximum stable gain; G_{max} = maximum available gain.

Fig.8 Gain as a function of frequency.

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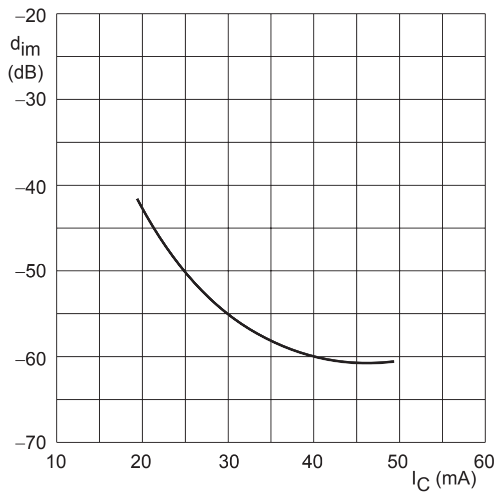


Fig.9 Intermodulation distortion as a function of collector current.

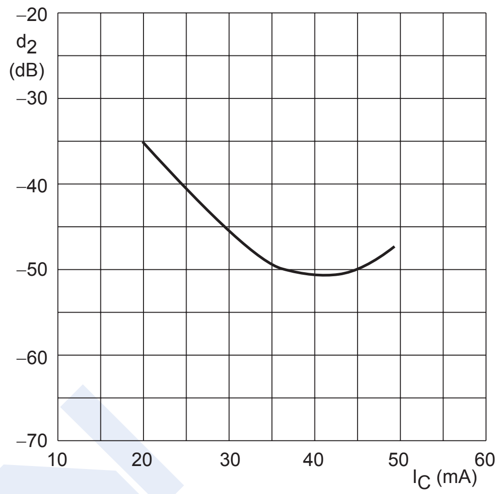
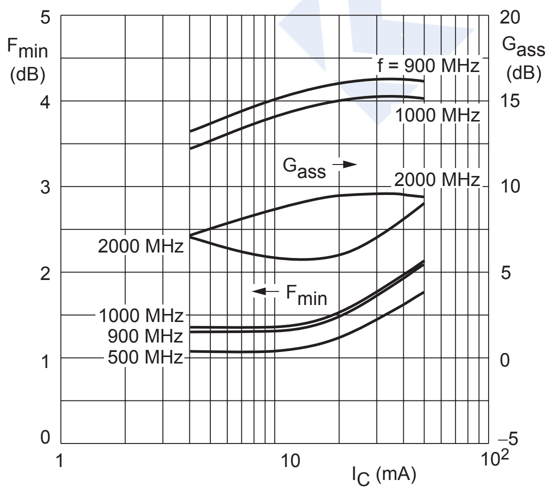
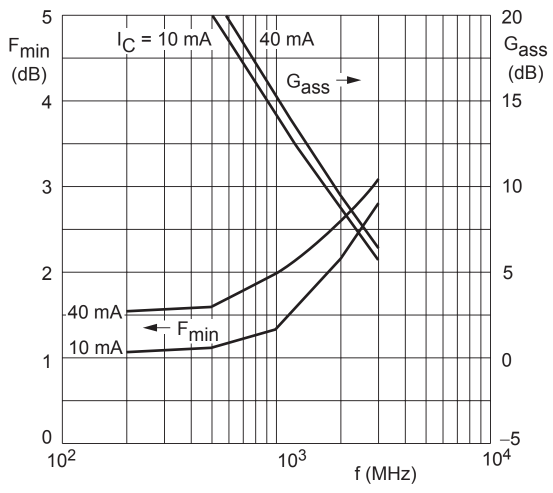


Fig.10 Second order intermodulation distortion as a function of collector current.



V_{CE} = 8 V.

Fig.11 Minimum noise figure and associated available gain as functions of collector current.



V_{CE} = 8 V.

Fig.12 Minimum noise figure and associated available gain as functions of frequency.

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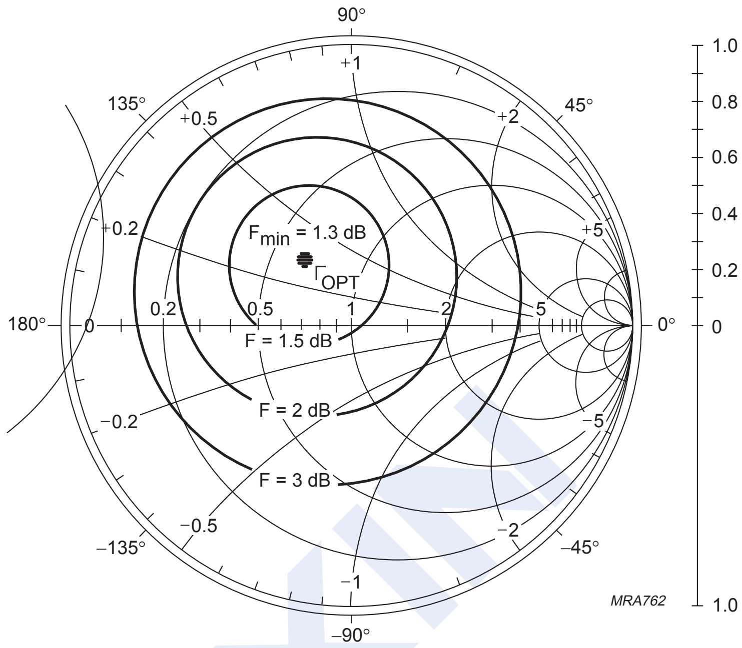
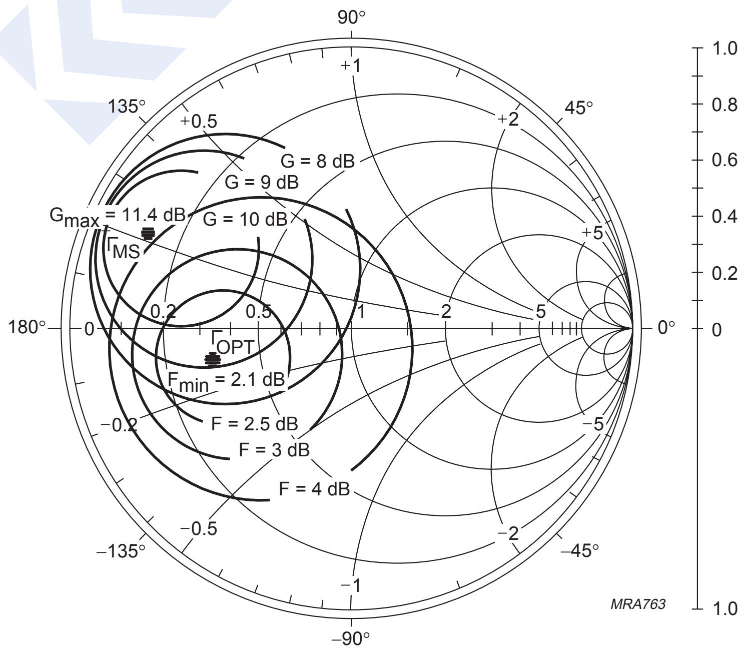


I_C = 10 mA; V_{CE} = 8 V; Z_o = 50 Ω; f = 900 MHz.

Fig.13 Noise circle figure.



I_C = 10 mA; V_{CE} = 8 V; Z_o = 50 Ω; f = 2 GHz.

Fig.14 Noise circle figure.

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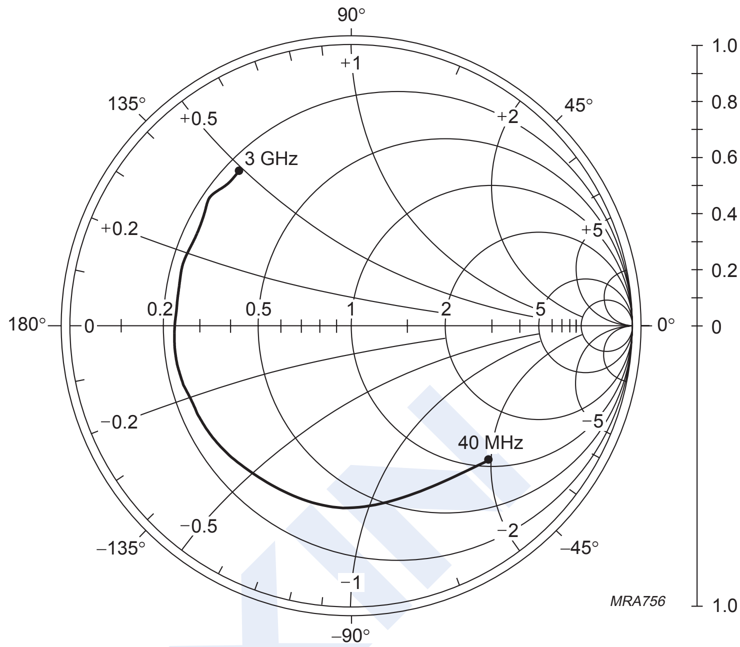
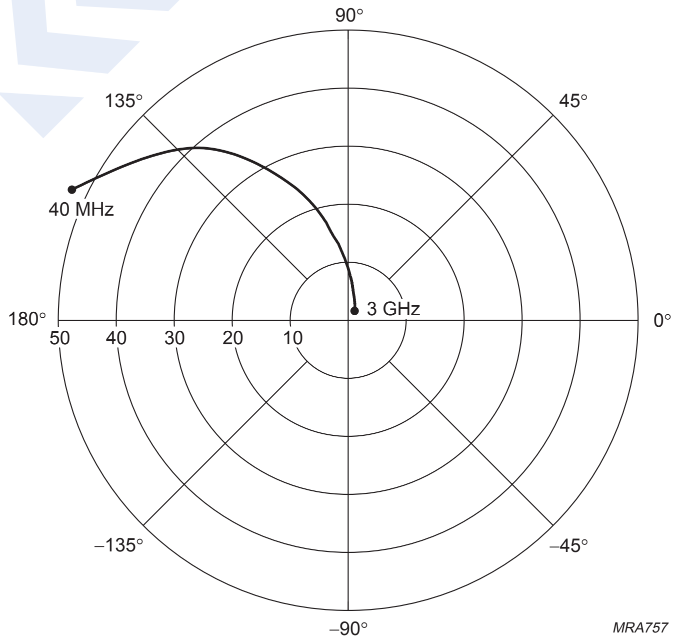


I_C = 40 mA; V_{CE} = 8 V; Z_o = 50 Ω.

Fig.15 Common emitter input reflection coefficient (s_{11}).



I_C = 40 mA; V_{CE} = 8 V.

Fig.16 Common emitter forward transmission coefficient (s_{21}).

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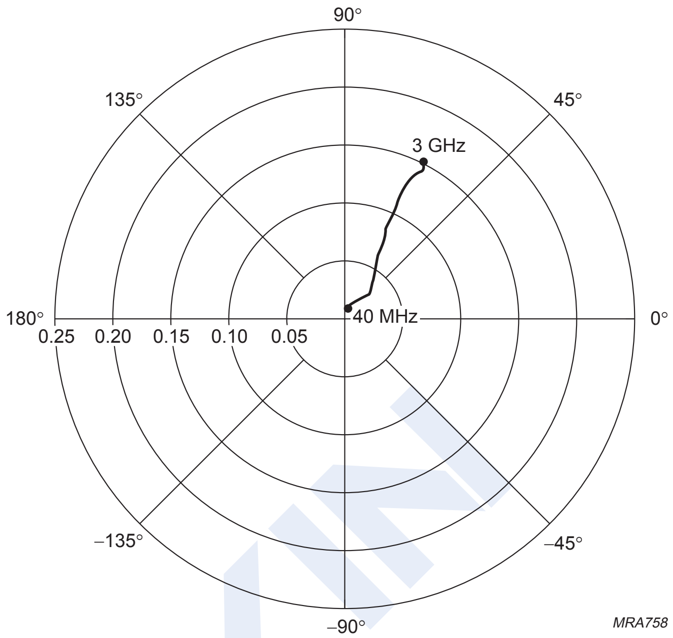
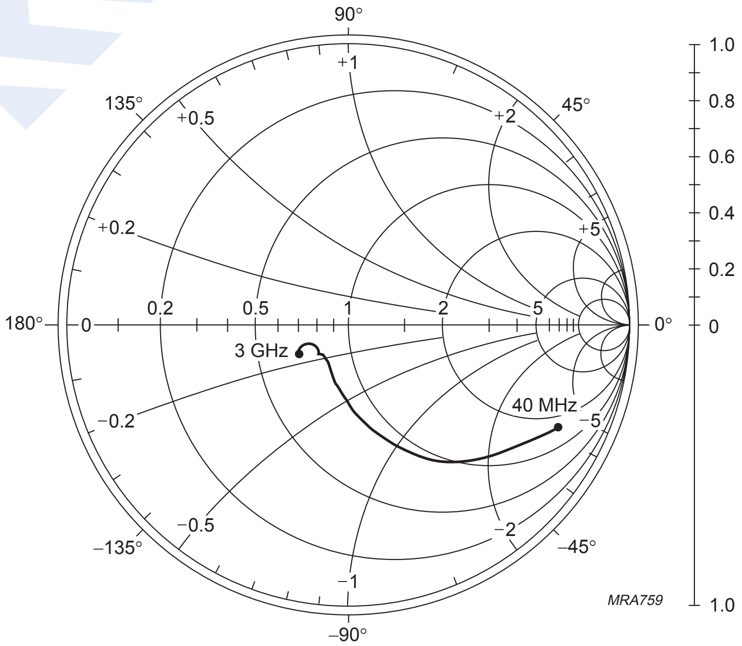


I_C = 40 mA; V_{CE} = 8 V.

Fig.17 Common emitter reverse transmission coefficient (s_{12}).



I_C = 40 mA; V_{CE} = 8 V; Z_o = 50 Ω.

Fig.18 Common emitter output reflection coefficient (s_{22}).