Ordering number:EN5099

FC154

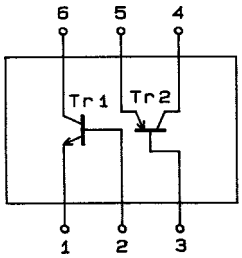
NPN/PNP Epitaxial Planar Silicon Transistor

High-Speed Switching, High-Frequency Amp Applications

Features

- Composite type with NPN transistor and a PNP transistor contained in the conventional CP package, improving the mounting efficiency greatly.
- The FC154 is formed with two chips, being equivalent to the 2SC4270 and the other the 2SA1699, placed in one package.

Electrical Connection

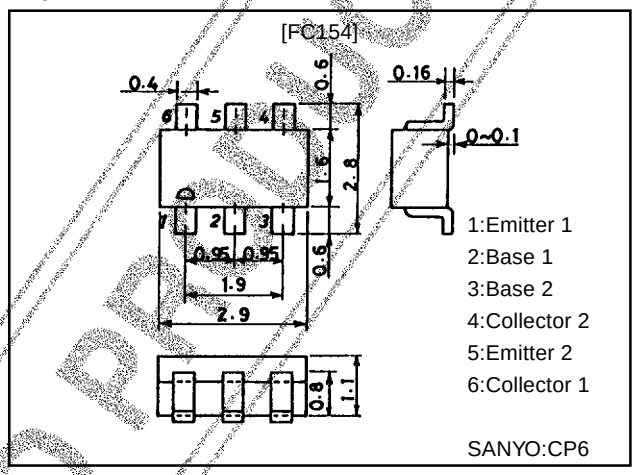


1:Emitter 1
2:Base 1
3:Base 2
4:Collector 2
5:Emitter 2
6:Collector 1

Package Dimensions

unit:mm

2104A



Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
[TR1 (NPN Tr)]				
Collector-to-Base Voltage	V_{CBO}		25	V
Collector-to-Emitter Voltage	V_{CEO}		15	V
Emitter-to-Base Voltage	V_{EBO}		3	V
Collector Current	I_C		50	mA
Collector Dissipation	P_C		200	mW
[TR2 (PNPTr)]				
Collector-to-Base Voltage	V_{CBO}		–20	V
Collector-to-Emitter Voltage	V_{CEO}		–15	V
Emitter-to-Base Voltage	V_{EBO}		–3	V
Collector Current	I_C		–50	mA
Collector Dissipation	P_C		200	mW
[Common Ratings]				
Total Dissipation	P_T		300	mW
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		–55 to +150	°C

Marking:154

Continued on next page.

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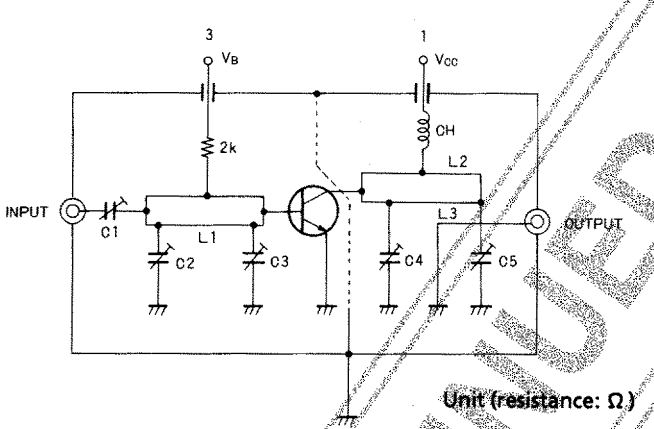
Continued from Preceding page.

Electrical Characteristics at Ta = 25˚C

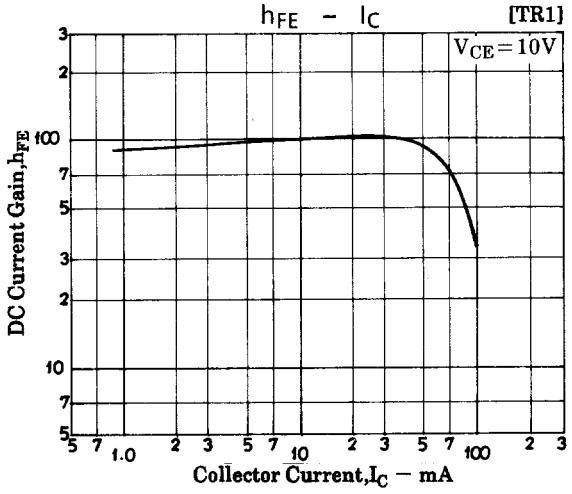
Parameter	Symbol	Conditons	Ratings			Unit
			min	typ	max	
[TR1 (NPN Tr)]						
Collector Cutoff Current	I_{CBO}	V_{CB}=20V, I_E=0			0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=2V, I_C=0			10	μA
DC Current Gain	h_{FE}	V_{CE}=10V, I_C=5mA	60		200	
Gain-Bandwidth Product	f_T	V_{CE}=10V, I_C=10mA	1.5	3.0		GHz
Output Capacitance	Cob	V_{CB}=10V, f=1MHz		0.7	1.0	pF
Power Gain	PG	V_{CE}=10V, I_C=10mA, f=0.9GHz		12		dB
Noise Figure	NF	V_{CE}=10V, I_C=3mA, f=0.9GHz		3.0		dB
[TR2 (PNPTr)]						
Collector Cutoff Current	I_{CBO}	V_{CB}=–15V, I_E=0			–0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=–2V, I_C=0			–0.1	μA
DC Current Gain	h_{FE}	V_{CE}=–10V, I_C=–5mA	20		100	
Gain-Bandwidth Product	f_T	V_{CE}=–10V, I_C=–5mA	1.5	3.0		GHz
Output Capacitance	Cob	V_{CB}=–10V, f=1MHz		1.0	1.5	pF
Forward Transfer Gain	$\|S21e\|^2$	V_{CE}=–10V, I_C=–5mA, f=0.9GHz	5			dB
Noise Figure	NF	V_{CE}=–10V, I_C=–3mA, f=0.9GHz		2.0		dB

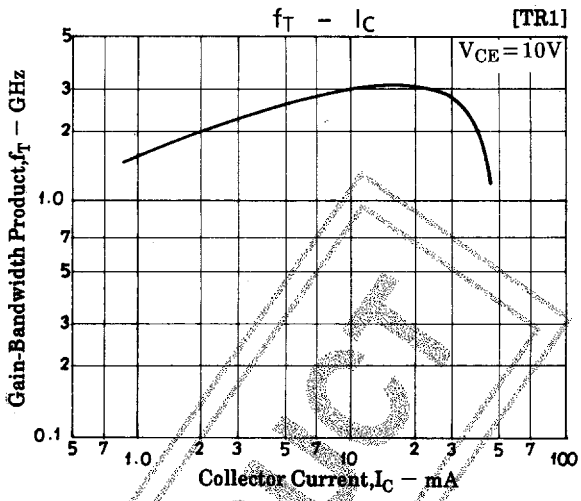
PG, NF Test Circuit

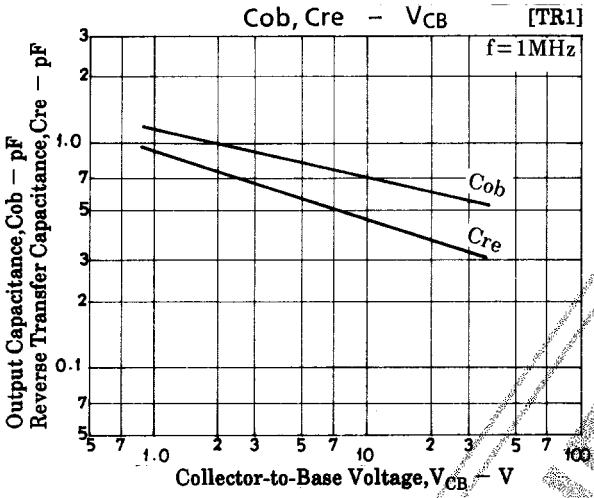


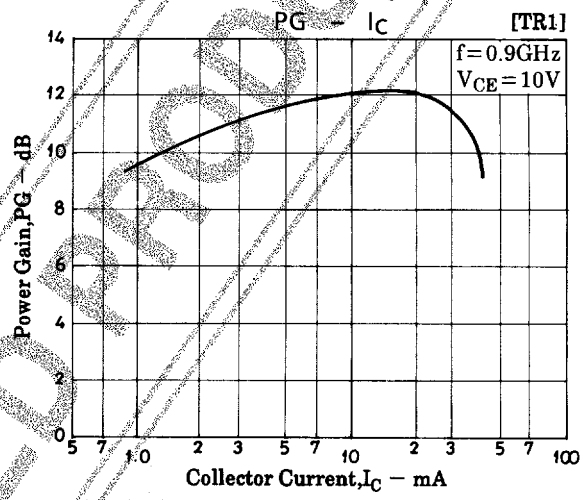
	900MHz
C1	~5pF
C2	~10pF
C3	~10pF
C4	~10pF
C5	~10pF
L1	W≒1.5mm, l≒25mm strip line
L2	W≒4mm, l≒25mm strip line
L3	0.5φ, l≒40mm
CH	2t+bead core

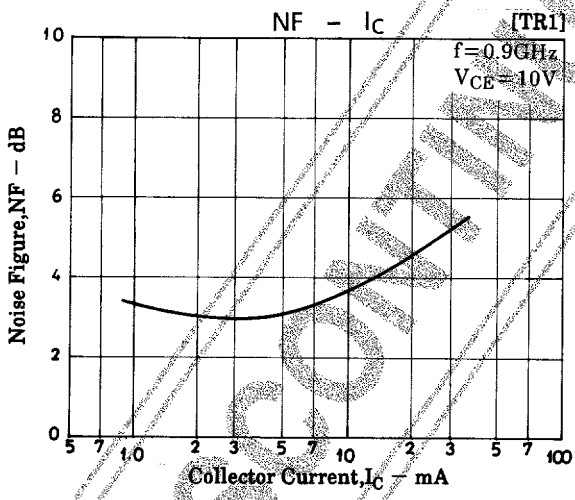
Unit (resistance: Ω)

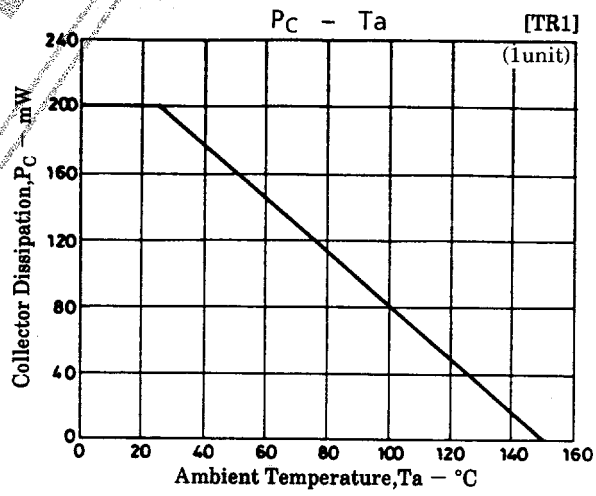






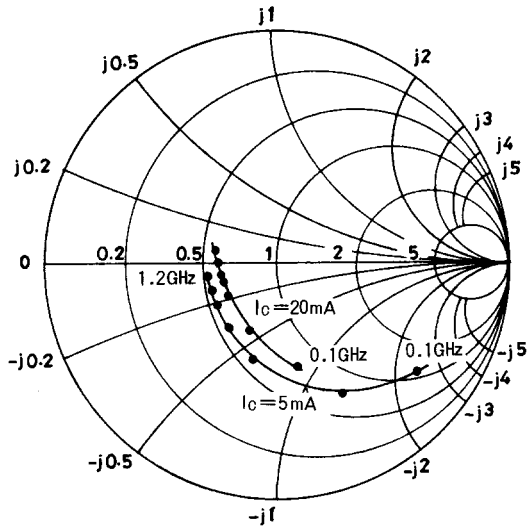




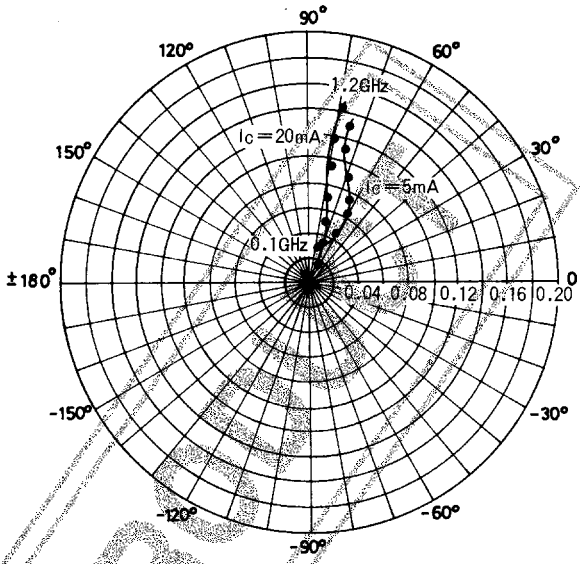


S parameter [TR1]

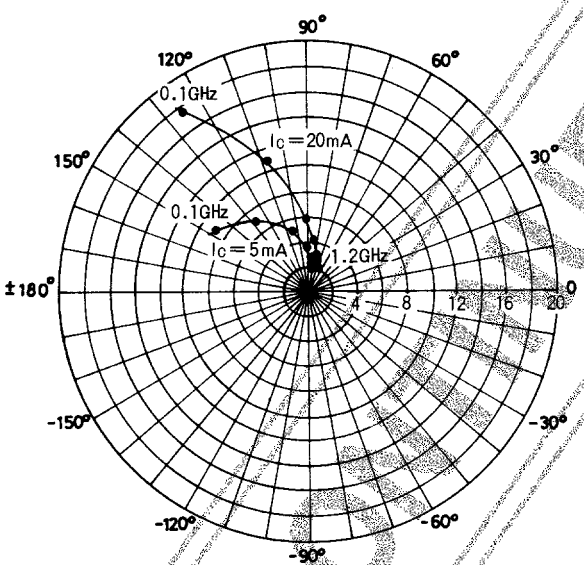
S11e : V_{CE}=10V
f=100MHz, 200 to 1200MHz (200MHz step)



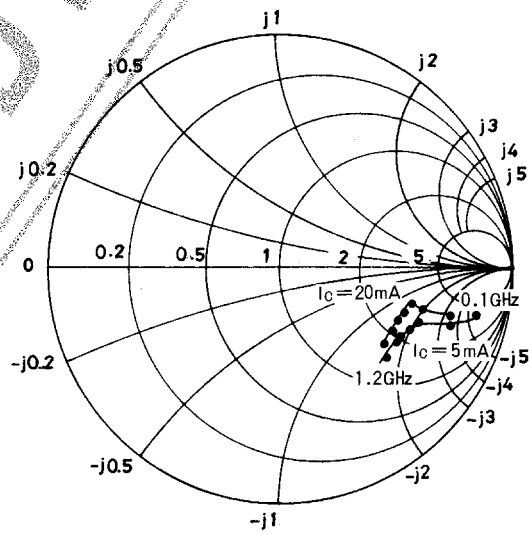
S12e : V_{CE}=10V
f=100MHz, 200 to 1200MHz (200MHz step)



S21e : V_{CE}=10V
f=100MHz, 200 to 1200MHz (200MHz step)



S22e : V_{CE}=10V
f=100MHz, 200 to 1200MHz (200MHz step)



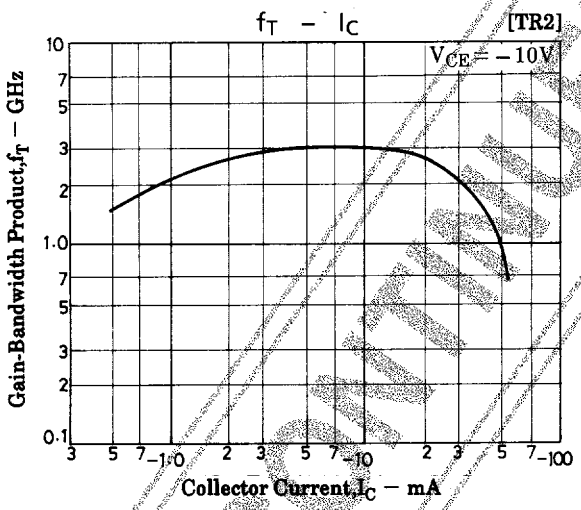
S parameter (Common emitter) [TR1]

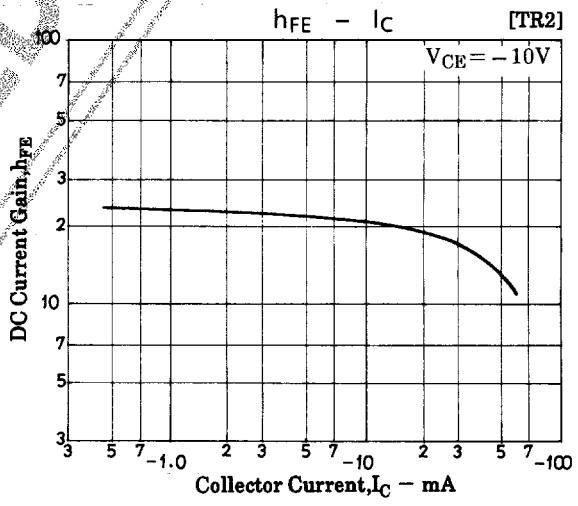
$V_{CE}=10V$, $I_C=5mA$, $Z_O=50\Omega$

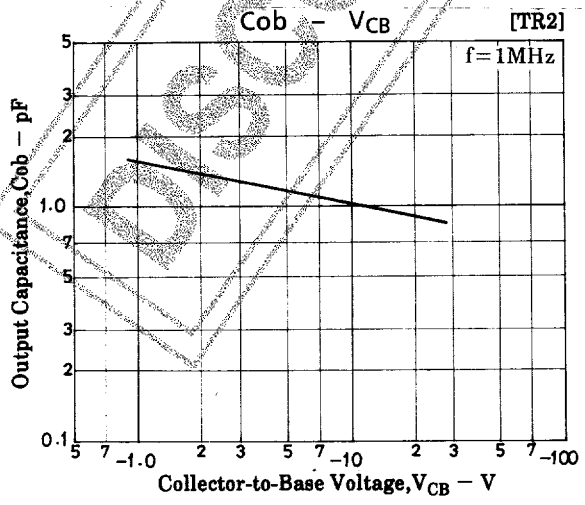
Freq (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.771	−35.1	8.763	147.2	0.027	69.3	0.890	−14.2
200	0.613	−64.7	7.004	127.6	0.043	59.8	0.780	−19.7
400	0.429	−110.7	4.882	103.1	0.061	58.1	0.660	−22.8
600	0.361	−133.5	3.471	90.5	0.075	63.1	0.625	−25.1
800	0.355	−148.4	2.693	81.6	0.091	68.1	0.612	−28.6
900	0.331	−153.7	2.450	78.9	0.100	70.5	0.609	−29.9
1000	0.328	−158.9	2.236	75.5	0.110	72.5	0.607	−31.6
1200	0.326	−167.9	1.932	69.9	0.130	74.7	0.608	−35.7

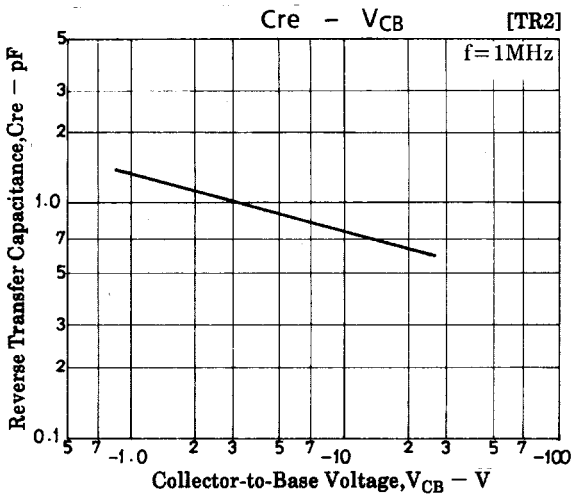
$V_{CE}=10V$, $I_C=20mA$, $Z_O=50\Omega$

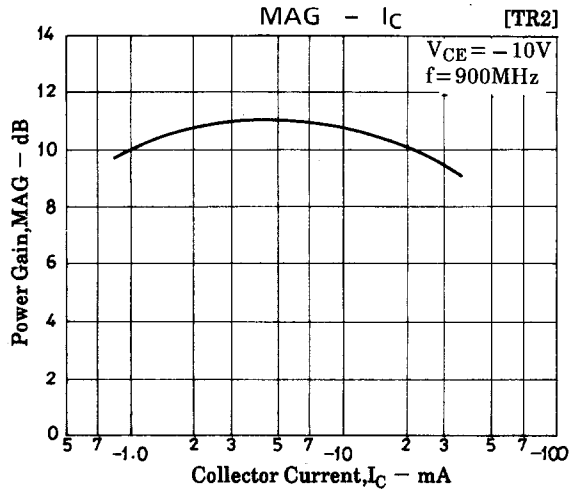
Freq (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.447	−78.1	17.728	125.0	0.020	66.0	0.752	−18.5
200	0.338	−113.2	10.936	107.5	0.031	66.5	0.639	−18.5
400	0.290	−146.6	5.773	91.4	0.052	72.1	0.580	−18.5
600	0.281	−159.3	3.956	83.0	0.074	75.7	0.571	−21.1
800	0.285	−168.8	2.982	76.2	0.095	77.6	0.566	−25.2
900	0.289	−171.3	2.703	74.0	0.106	78.6	0.563	−26.7
1000	0.291	−174.4	2.454	71.3	0.118	79.4	0.565	−28.6
1200	0.297	178.1	2.116	66.5	0.140	79.0	0.569	−33.1

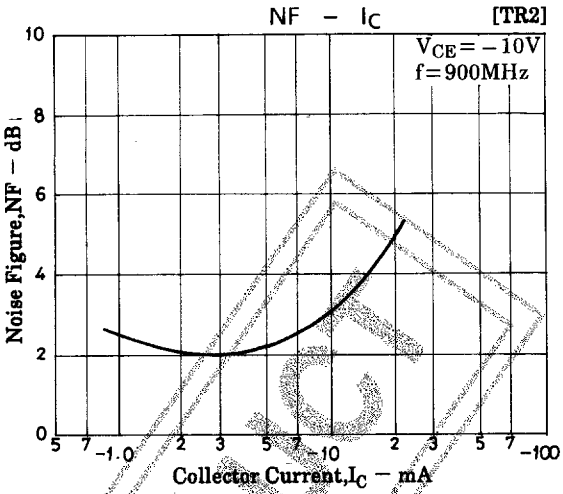


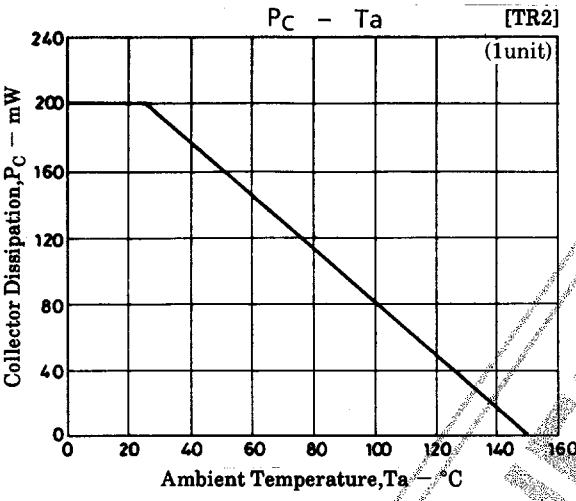






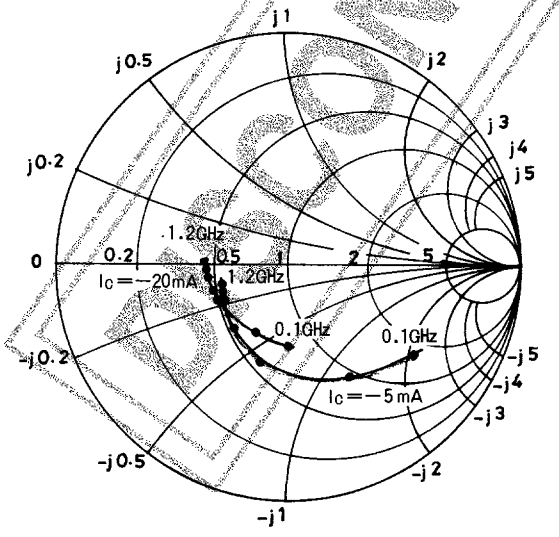




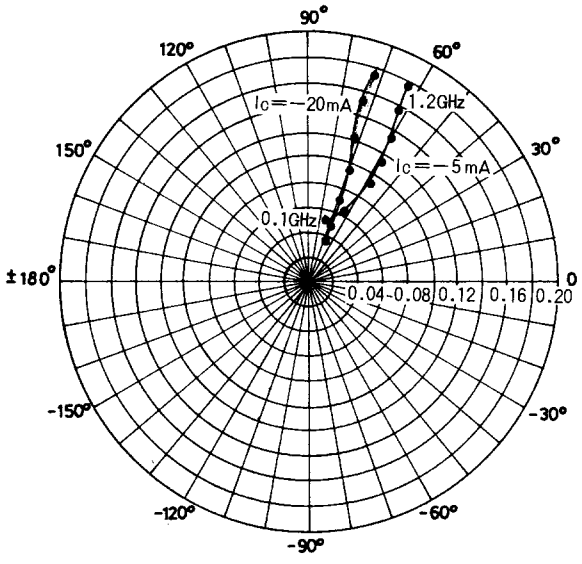


S parameter [TR2]

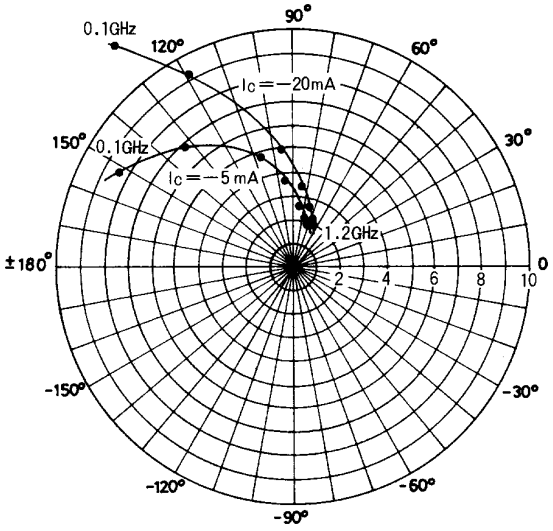
S11e : $V_{CE} = -10V$
f = 100MHz, 200 to 1200MHz (200MHz step)



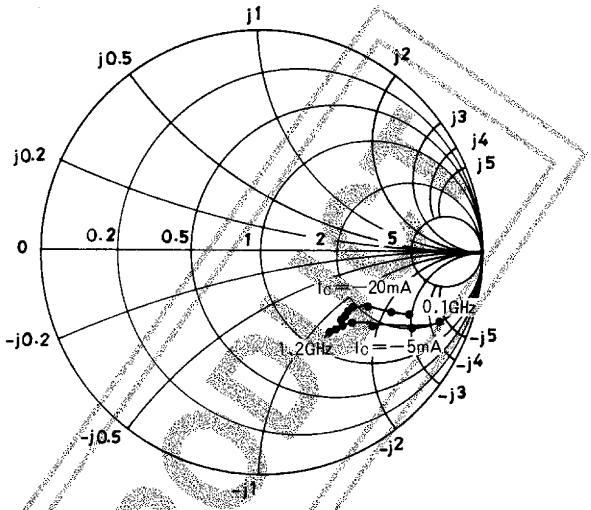
S12e : $V_{CE} = -10V$
f = 100MHz, 200 to 1200MHz (200MHz step)



S21e : V_{CE} = −10V
f=100MHz, 200 to 1200MHz (200MHz step)



S22e : V_{CE} = −10V
f=100MHz, 200 to 1200MHz (200MHz step)



S parameter (Common emitter) [TR2]

V_{CE} = −10V, I_C = −5mA, Z_O = 50Ω

Freq (MHz)	$\lvert S_{11} \rvert$	$\angle S_{11}$	$\lvert S_{21} \rvert$	$\angle S_{21}$	$\lvert S_{12} \rvert$	$\angle S_{12}$	$\lvert S_{22} \rvert$	$\angle S_{22}$
100	0.707	−33.1	8.215	151.1	0.043	68.6	0.856	−19.8
200	0.589	−60.3	6.763	132.2	0.059	62.0	0.761	−25.4
400	0.435	−104.7	4.810	106.5	0.089	56.4	0.584	−34.2
600	0.373	−128.1	3.503	93.2	0.110	57.3	0.508	−36.6
800	0.349	−144.4	2.728	83.4	0.130	59.5	0.474	−39.0
900	0.346	−150.1	2.492	80.0	0.142	60.9	0.464	−40.3
1000	0.344	−155.4	2.266	76.8	0.154	61.4	0.459	−41.7
1200	0.340	−163.6	1.971	70.6	0.176	62.1	0.452	−45.2

V_{CE} = −10V, I_C = −20mA, Z_O = 50Ω

Freq (MHz)	$\lvert S_{11} \rvert$	$\angle S_{11}$	$\lvert S_{21} \rvert$	$\angle S_{21}$	$\lvert S_{12} \rvert$	$\angle S_{12}$	$\lvert S_{22} \rvert$	$\angle S_{22}$
100	0.348	−92.8	12.039	129.4	0.031	67.3	0.727	−22.9
200	0.330	−116.7	9.073	118.2	0.041	66.0	0.634	−24.8
400	0.350	−151.2	4.962	95.1	0.068	67.7	0.510	−26.5
600	0.353	−164.5	3.408	84.4	0.093	69.9	0.481	−28.1
800	0.360	−172.9	2.591	76.4	0.118	71.6	0.470	−31.1
900	0.366	−176.2	2.346	73.3	0.131	72.0	0.467	−32.9
1000	0.371	−178.4	2.142	70.8	0.146	71.8	0.467	−34.8
1200	0.379	176.2	1.851	65.2	0.171	71.1	0.466	−39.1