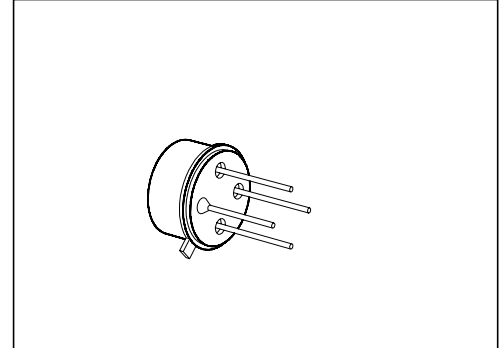


## GaAs MMIC

CGY 21

- Two-stage monolithic microwave IC (MMIC amplifier)
- All gold metallization
- Chip fully passivated
- Operating voltage range: 3 to 6 V
- $50 \Omega$  input/output;  $RL_{IN} RL_{OUT} > 10 \text{ dB}$
- Gain: 21 dB at 500 MHz
- Low noise figure: 3.9 dB at 500 MHz
- Bandwidth: 2 GHz
- Hermetically sealed package



**ESD: Electrostatic discharge sensitive device, observe handling precautions!**

Type	Ordering Code	Circuit Diagram (Pin Configuration)	Package <sup>1)</sup>
CGY 21	Q68000-A5953	<p>1 RF output, <math>V_S</math>                  2 Interstage, <math>V_S</math>                  3 RF input                  4 RF and DC ground, case</p> <p>EHA07017</p>	TO-12

<sup>1)</sup> For detailed information see chapter Package Outlines.

**Maximum Ratings**

Parameter	Symbol	Values	Unit
Supply voltage, $T_c \leq 80 \text{ }^\circ\text{C}$	$V_S$	6	V
Total power dissipation, $T_c \leq 50 \text{ }^\circ\text{C}$	$P_{\text{tot}}$	2	W
Channel temperature	$T_{\text{ch}}$	150	°C
Storage temperature range	$T_{\text{stg}}$	- 55 ... + 150	

**Thermal Resistance**

Channel - case	$R_{\text{thchC}}$	50	K/W
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**Note:** Exceeding any of the maximum ratings may cause permanent damage to the device. Appropriate handling procedures are required to protect the electrostatic sensitive IC against degradation due to excess voltage or excess current spikes. Excellent ground connection of lead 4 and the package (e. g. soldered on microstripline laminate) is required to achieve guaranteed RF performance and stable operation conditions and provides adequate heat sink. Low parasitic capacitance of the bias network to port 2 gives optimum gain and flatness. Input and output connections must be DC isolated by coupling capacitors.

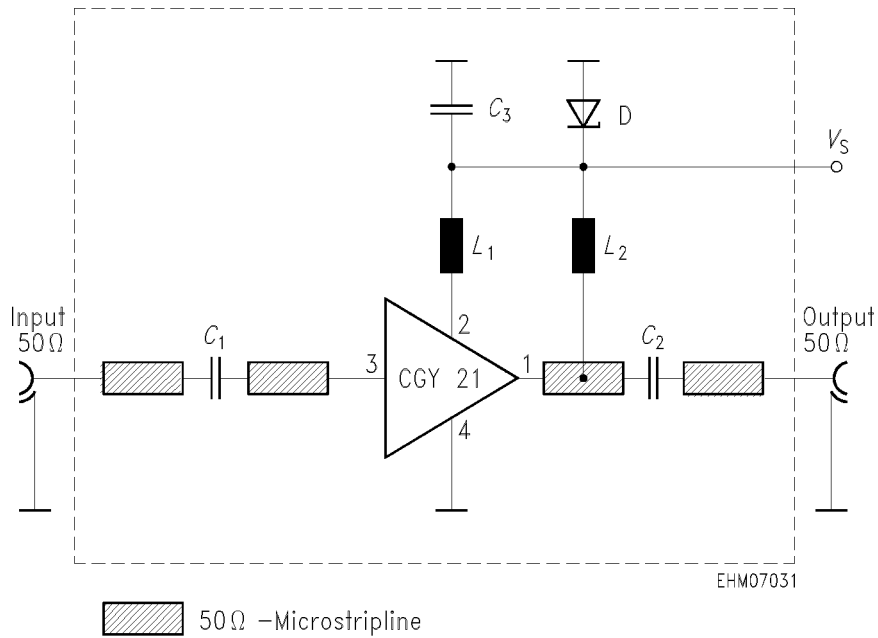
**Electrical Characteristics**

at  $T_A = 25\text{ }^\circ\text{C}$ ,  $V_S = 4.5\text{ V}$ ,  $R_S = R_L = 50\text{ }\Omega$ , unless otherwise specified,  
(for application circuit see next page).

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Operating current	$I_{op}$	–	160	200	mA
Power gain $f = 100\text{ MHz to }900\text{ MHz}$	$G$	19	21	–	dB
Gain flatness $f = 100\text{ MHz to }900\text{ MHz}$	$\Delta G$	–	1.5	2	
Noise figure $f = 100\text{ MHz to }900\text{ MHz}$	$F$	–	3.9	5.5	
Input return loss $f = 100\text{ MHz to }900\text{ MHz}$	$RL_{IN}$	–	12	9.5	
Output return loss $f = 100\text{ MHz to }900\text{ MHz}$	$RL_{OUT}$	–	12	9.5	
Third order intercept point two-tone intermodulation test $f = 806\text{ MHz}$ , $f = 810\text{ MHz}$ , $P_o = 10\text{ dBm}$ (both carriers)	$IP_3$	31	32.5	–	dBm
1 dB gain compression $f = 100\text{ MHz to }900\text{ MHz}$	$P_{1dB}$	–	19	–	

## Application Circuit

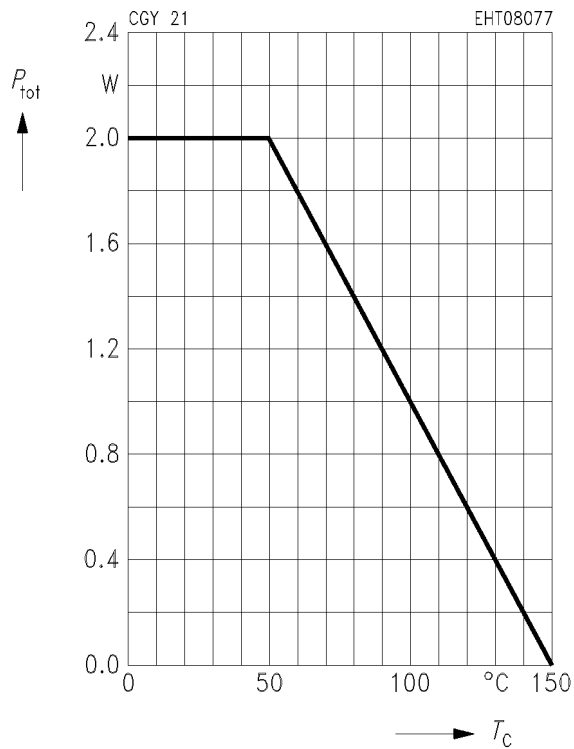
$f = 100 \text{ MHz to } 900 \text{ MHz}$



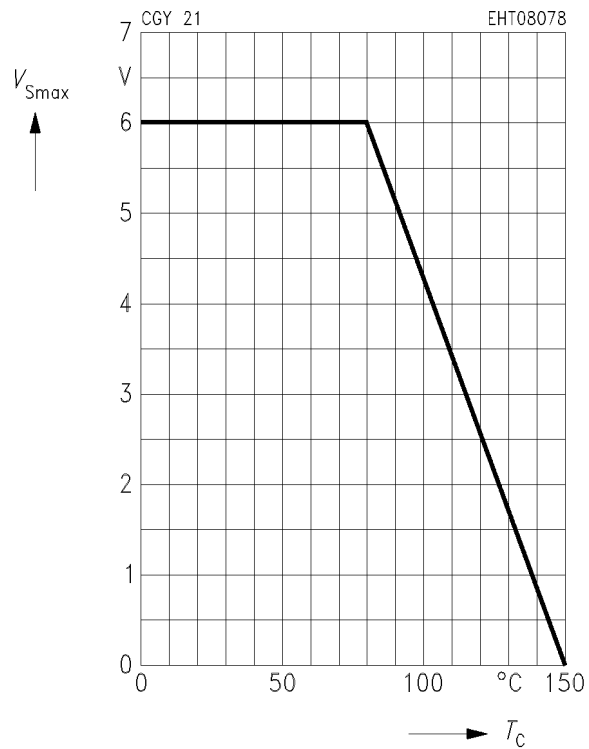
## Legend of components

$C_1, C_2, C_3$	1 nF chip capacitors
$L_1, L_2$	1 $\mu\text{H}$ inductance (B 78108 - T 1102K)
D	6 V2 Zener diode (BZW 22C6V2)

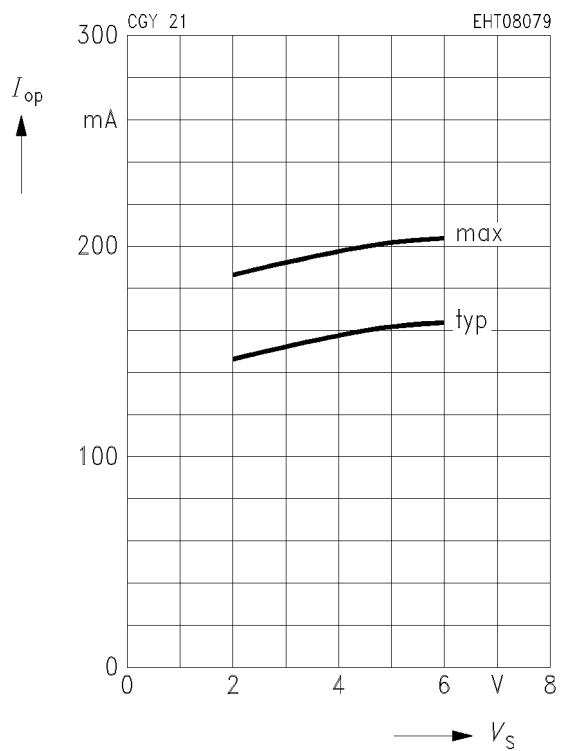
**Total power dissipation  $P_{tot} = f(T_c)$**



**Max. supply voltage  $V_{Smax} = f(T_c)$**

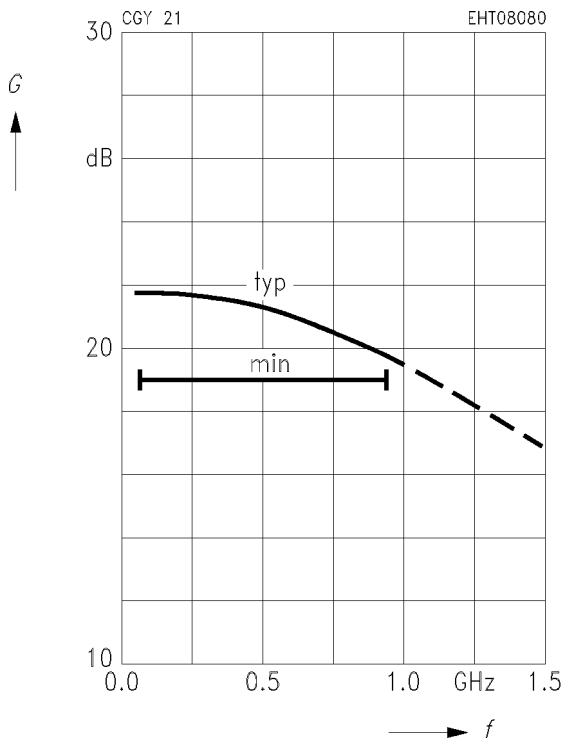


**Operating current  $I_{op} = f(V_s)$**



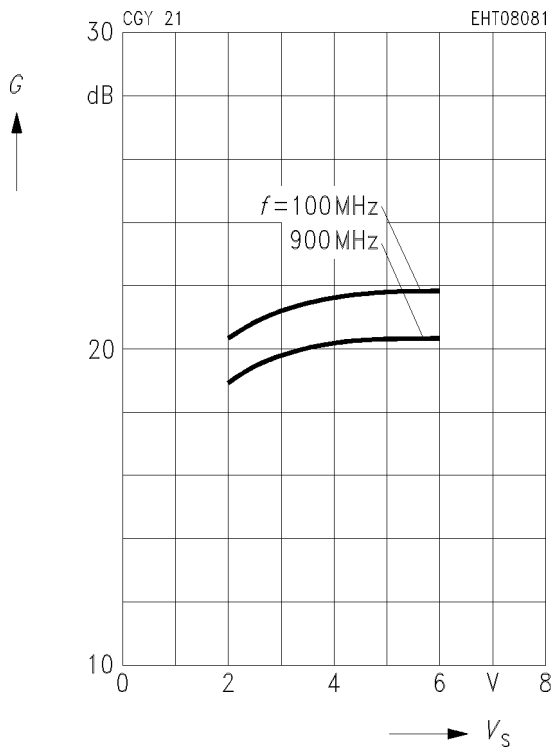
### Power gain $G = f(f)$

$V_s = 4.5 \text{ V}, R_s = R_L = 50 \Omega$



### Power gain $G = f(V_s)$

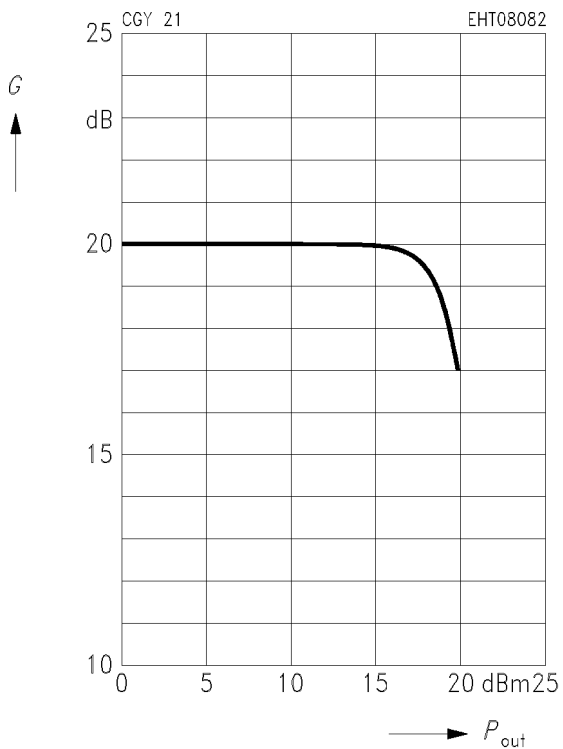
$R_s = R_L = 50 \Omega$



### Power gain $G = f(P_{out})$

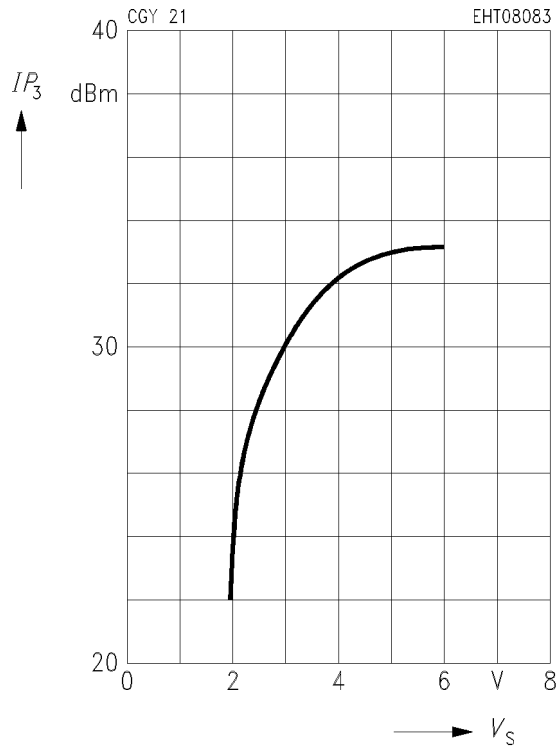
$V_s = 4.5 \text{ V}, R_s = R_L = 50 \Omega$

$f = 0.8 \text{ GHz}$



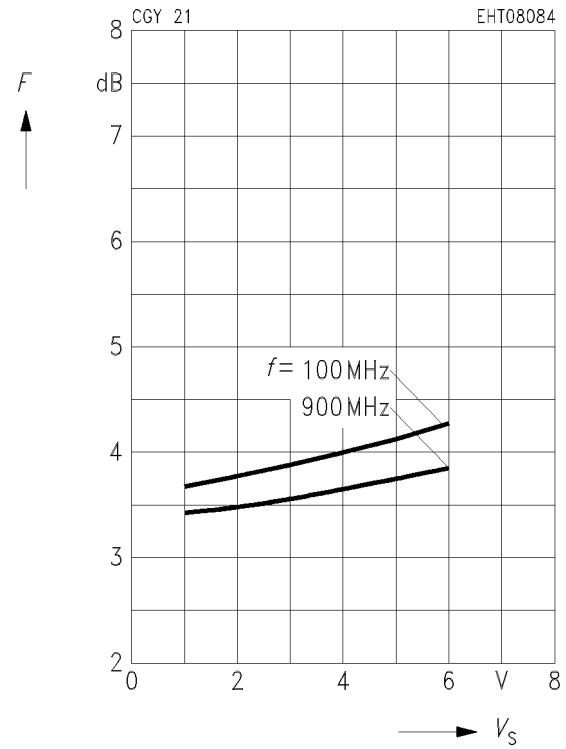
### Third order intercept point $IP_3 = f(V_S)$

$f = 800 \text{ MHz}$ ,  $R_S = R_L = 50 \Omega$



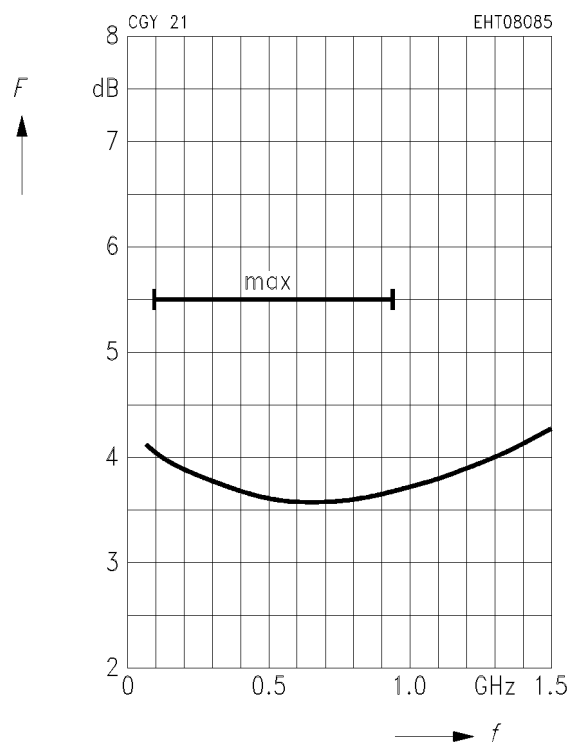
### Noise figure $F = f(V_S)$

$R_S = R_L = 50 \Omega$



### Noise figure $F = f(f)$

$V_S = 4.5 \text{ V}$ ,  $R_S = R_L = 50 \Omega$



## S Parameters

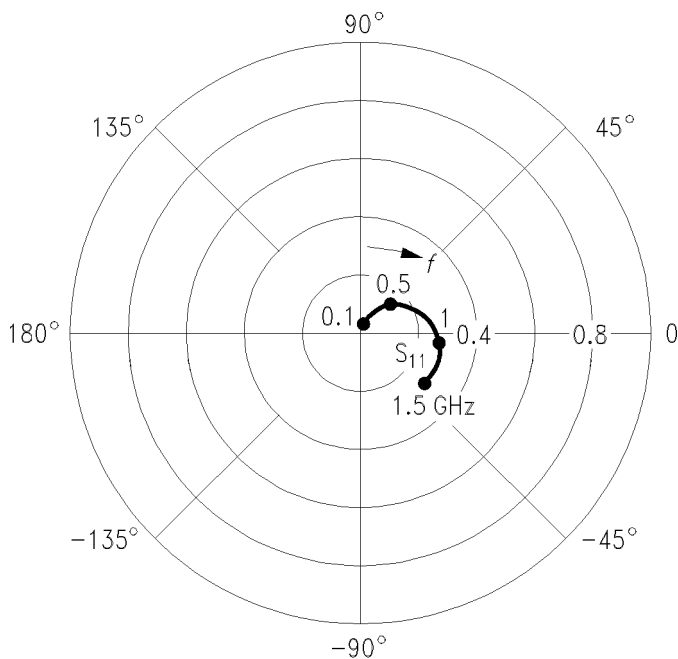
$f$	$S_{11}$		$S_{21}$		$S_{12}$		$S_{22}$	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
$V_s = 4.5 \text{ V}, Z_0 = 50 \Omega$								
0.1	0.02	49	13.82	- 10	0.012	- 2	0.11	3
0.3	0.08	55	13.63	- 34	0.012	- 7	0.13	11
0.5	0.14	34	13.03	- 58	0.012	- 13	0.15	18
0.7	0.18	17	12.1	- 81	0.011	- 19	0.19	20
0.9	0.23	0	10.93	- 104	0.011	- 24	0.24	20
1.1	0.27	- 15	9.48	- 127	0.01	- 29	0.29	16
1.3	0.28	- 28	7.91	- 149	0.009	- 31	0.33	12
1.5	0.25	- 39	6.29	- 171	0.008	- 32	0.36	5

$$S_{11} = f(f)$$

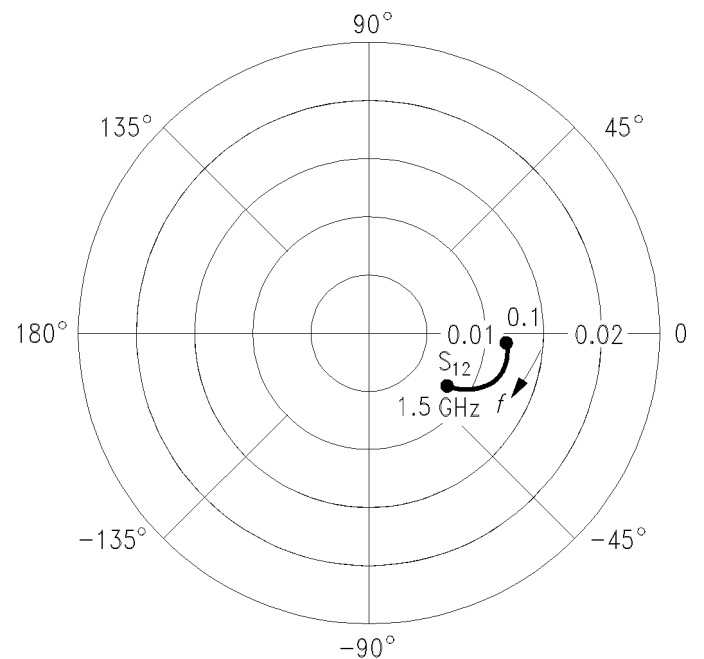
$V_s = 4.5 \text{ V}, Z_0 = 50 \Omega$

$$S_{12} = f(f)$$

$V_s = 4.5 \text{ V}, Z_0 = 50 \Omega$



EHT08086



EHT08087



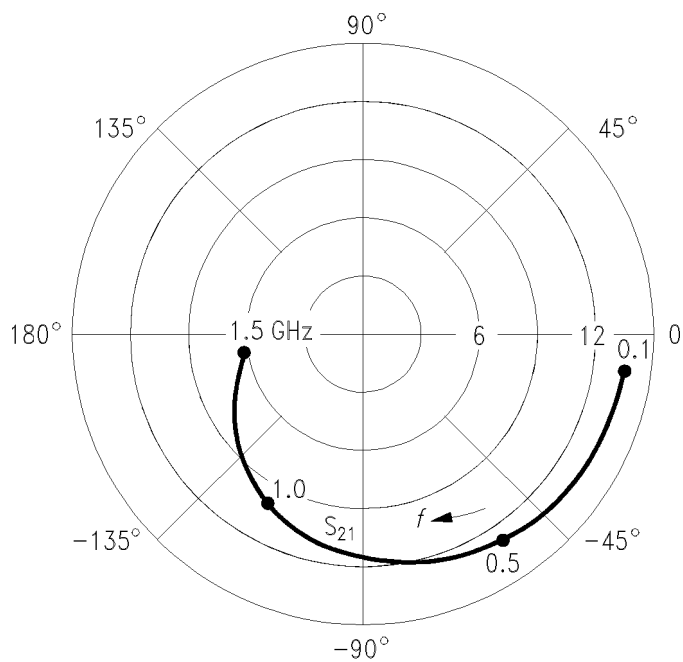
## S Parameters (continued)

$$S_{21} = f(f)$$

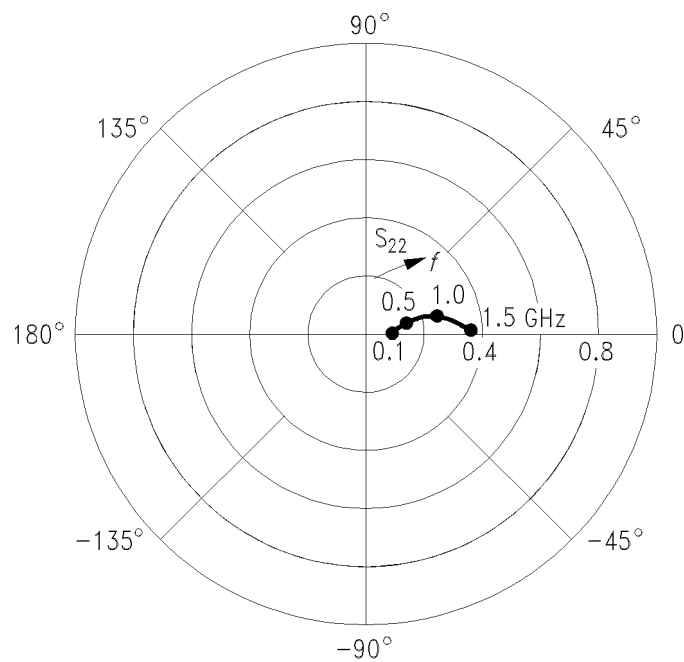
$V_s = 4.5 \text{ V}, Z_0 = 50 \Omega$

$$S_{22} = f(f)$$

$V_s = 4.5 \text{ V}, Z_0 = 50 \Omega$



EHT08088



EHT08089