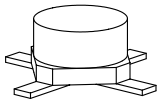
SIEMENS

NPN Silicon RF Transistor — BFQ 82

- For low-noise, high-gain amplifiers up to 2 GHz.
- Linear broadband applications at collector currents up to 40 mA.
- Hermetically sealed ceramic package.
- f_T = 8 GHz
  F = 1.1 dB at 800 MHz



ESD: **E**lectro**s**tatic **d**ischarge sensitive device, observe handling precautions!

Type	Marking	Ordering Code (tape and reel)	Pin Configuration 1	2	3	4	Package[1]
BFQ 82	82	Q62702-F1189	B	E	C	E	Cerec-X

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CE0}	12	V
Collector-emitter voltage, V_{BE} = 0	V_{CES}	20	
Collector-base voltage	V_{CB0}	20	
Emitter-base voltage	V_{EB0}	2	
Collector current	I_C	80	mA
Peak collector current, $f \geq$ 10 MHz	I_{CM}	80	
Base current	I_B	10	
Peak base current, $f \geq$ 10 MHz	I_{BM}	10	
Total power dissipation, $T_S \leq$ 95 °C[3]	P_{tot}	500	mW
Junction temperature	T_j	175	°C
Ambient temperature range	T_A	– 65 … + 175	
Storage temperature range	T_{stg}	– 65 … + 175	

Thermal Resistance

Junction - ambient[2]	$R_{th\ JA}$	≤ 240	K/W
Junction - case[3]	$R_{th\ JS}$	≤ 160	

1) For detailed information see chapter Package Outlines.
2) Package mounted on alumina 15 mm × 16.7 mm × 0.7 mm.
3) T_S is measured on the collector lead at the soldering point to the pcb.

Electrical Characteristics
at T_A = 25 °C, unless otherwise specified.

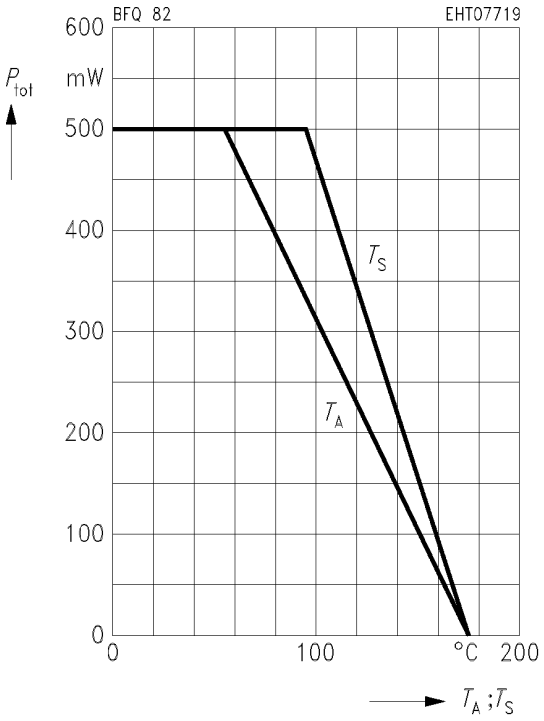
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage I_C = 1 mA, I_B = 0	$V_{(BR)CE0}$	12	–	–	V
Collector-emitter cutoff current V_{CE} = 20 V, V_{BE} = 0	I_{CES}	–	–	100	µA
Collector-base cutoff current V_{CB} = 10 V, I_E = 0 V_{CB} = 10 V, I_E = 0, T_A = 125 °C	I_{CB0}	 – –	 – –	 0.05 5	
Emitter-base cutoff current V_{EB} = 1 V, I_C = 0	I_{EB0}	–	–	1	
DC current gain I_C = 5 mA, V_{CE} = 8 V I_C = 30 mA, V_{CE} = 8 V	h_{FE}	 – 50	 110 120	 – 250	–

Electrical Characteristics
at T_A = 25 °C, unless otherwise specified.

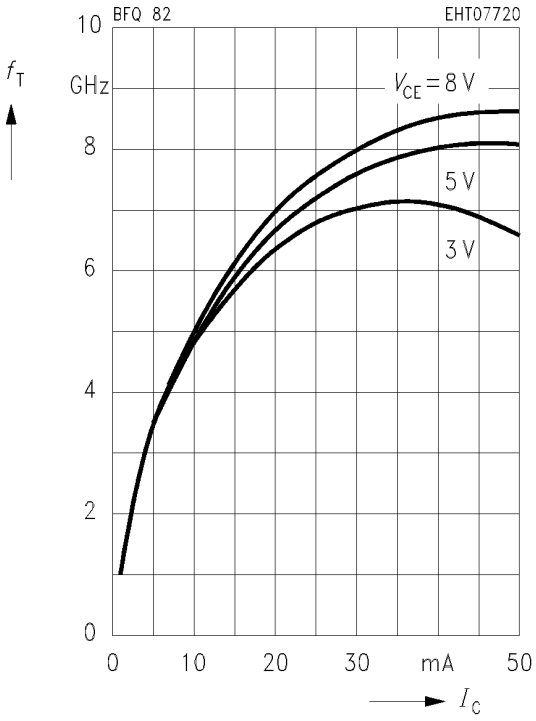
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency	f_T				GHz
I_C = 5 mA, V_{CE} = 8 V, f = 500 MHz		–	3.6	–	
I_C = 30 mA, V_{CE} = 8 V, f = 500 MHz		–	8	–	
Collector-base capacitance V_{CB} = 10 V, V_{BE} = v_{be} = 0, f = 1 MHz	C_{cb}	–	0.62	–	pF
Collector-emitter capacitance V_{CE} = 10 V, V_{BE} = v_{be} = 0, f = 1 MHz	C_{ce}	–	0.4	–	
Input capacitance V_{EB} = 0.5 V, I_C = i_c = 0, f = 1 MHz	C_{ibo}	–	2.5	–	
Output capacitance V_{CE} = 10 V, V_{BE} = v_{be} = 0, f = 1 MHz	C_{obs}	–	1.0	–	
Noise figure	F				dB
I_C = 5 mA, V_{CE} = 8 V, f = 10 MHz, Z_S = 75 Ω		–	0.7	–	
I_C = 30 mA, V_{CE} = 8 V, f = 800 MHz, Z_S = Z_{Sopt}		–	1.6	–	
I_C = 10 mA, V_{CE} = 8 V, f = 2 GHz, Z_S = Z_{Sopt}		–	2.3	–	
Power gain	G_{ma}[1)]				
I_C = 30 mA, V_{CE} = 8 V, f = 1 GHz, Z_0 = 50 Ω		–	17	–	
I_C = 30 mA, V_{CE} = 8 V, f = 2 GHz, Z_0 = 50 Ω		–	11	–	
Transducer gain I_C = 30 mA, V_{CE} = 8 V, f = 1 GHz, Z_0 = 50 Ω	$\lvert S_{21e} \rvert^2$	–	13.5	–	
Linear output voltage two-tone intermodulation test I_C = 40 mA, V_{CE} = 8 V, d_{IM} = 60 dB, f_1 = 806 MHz, f_2 = 810 MHz, Z_S = Z_L = 50 Ω	V_{o1} = V_{o2}	–	280	–	mV
Third order intercept point I_C = 40 mA, V_{CE} = 8 V, f = 800 MHz	IP_3	–	32	–	dBm

1) $\left| \frac{S_{21e}}{S_{12e}} \right| (k - \sqrt{k^2 - 1})$

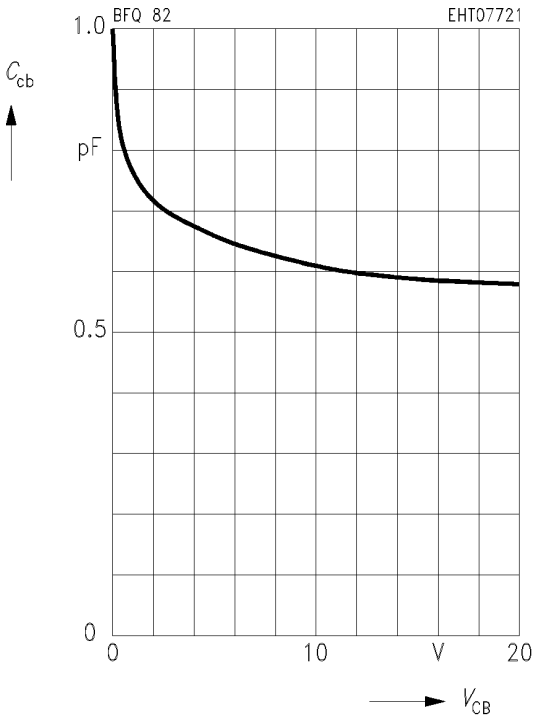
Total power dissipation $P_{tot} = f(T_A^*; T_S)$
* Package mounted on alumina



Transition frequency $f_T = f(I_C)$
f = 500 MHz



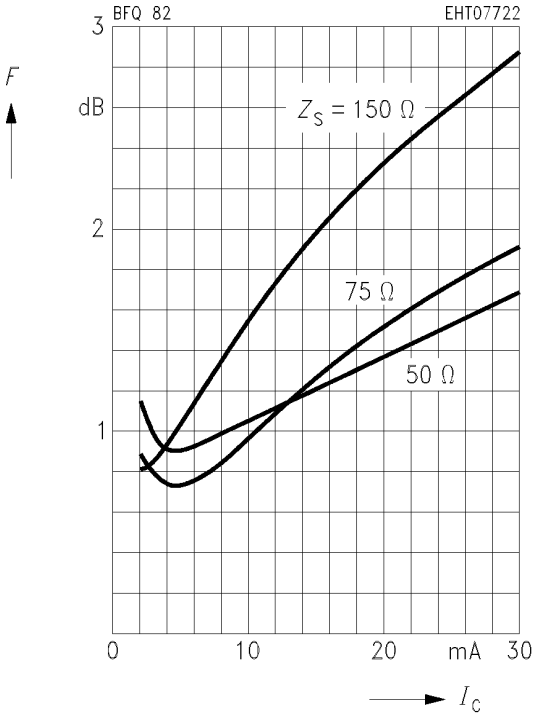
Collector-base capacitance $C_{cb} = f(V_{CB})$
$V_{BE} = v_{be} = 0$, f = 1 MHz



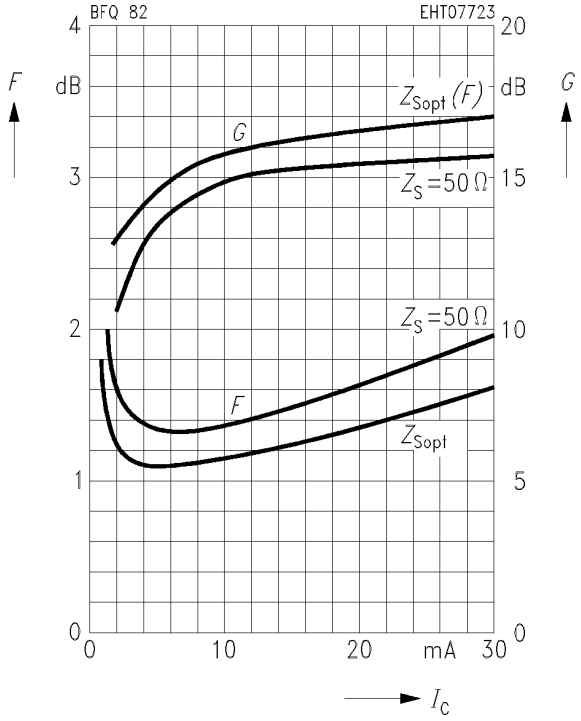
Common Emitter Noise Parameters

f	F_{min}	$G_p(F_{min})$	Γ_{opt}		R_N	N	$F_{50\,\Omega}$	$G_p(F_{50\,\Omega})$
GHz	**dB**	**dB**	**MAG**	**ANG**	Ω	–	**dB**	**dB**
I_C = 10 mA, V_{CE} = 8 V, Z_0 = 50 Ω								
0.01	1	–	(Z_S = 75 Ω)		–	–	1.05	–
0.8	1.15	15.7	–	–	–	–	1.35	14.7
2.0	2.3	9.5	–	–	–	–	2.8	7.5
I_C = 30 mA, V_{CE} = 8 V, Z_0 = 50 Ω								
0.01	1.65	–	(Z_S = 50 Ω)		–	–	1.65	–
0.8	1.6	17	–	–	–	–	1.95	15.8
2.0	2.6	10	–	–	–	–	3.3	8

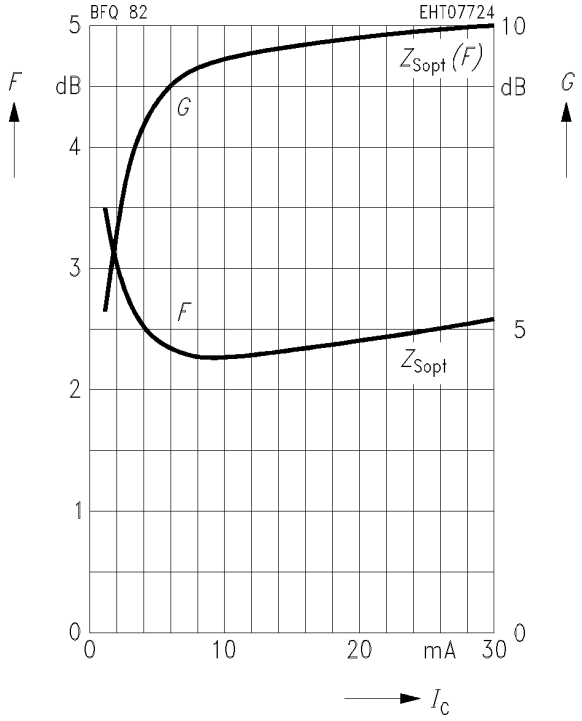
Noise figure $F = f(I_C)$
V_{CE} = 8 V, f = 10 MHz



Noise figure $F = f(I_C)$
Power gain $G = f(I_C)$
V_{CE} = 8 V, f = 800 MHz, Z_{Lopt} (G)

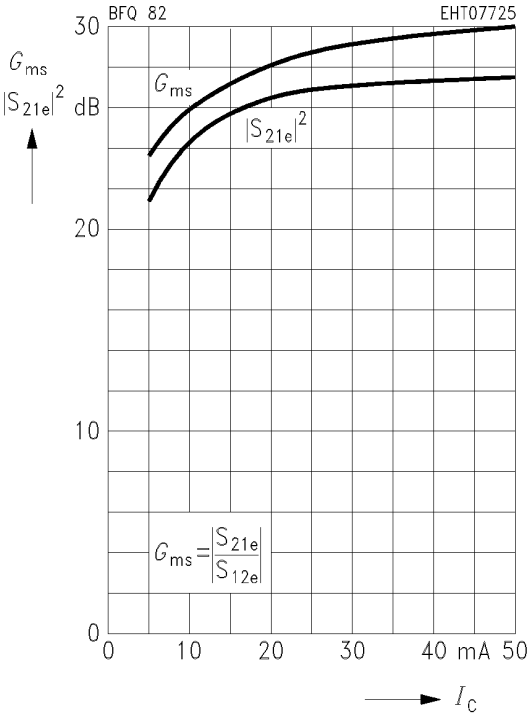


Noise figure $F = f(I_C)$
Power gain $G = f(I_C)$
V_{CE} = 8 V, f = 2 GHz, Z_{Lopt} (G)

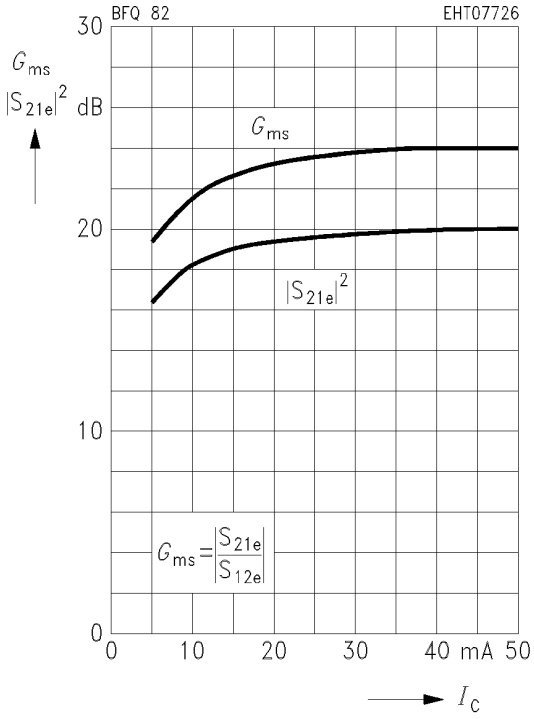


Common Emitter Power Gain

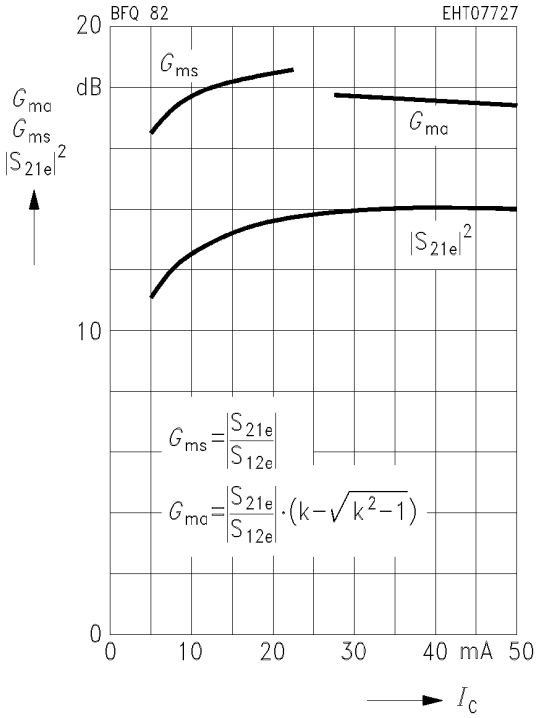
Power gain G_{ms}, $|S_{21e}|^2 = f(I_C)$
V_{CE} = 8 V, f = 200 MHz, Z_0 = 50 Ω



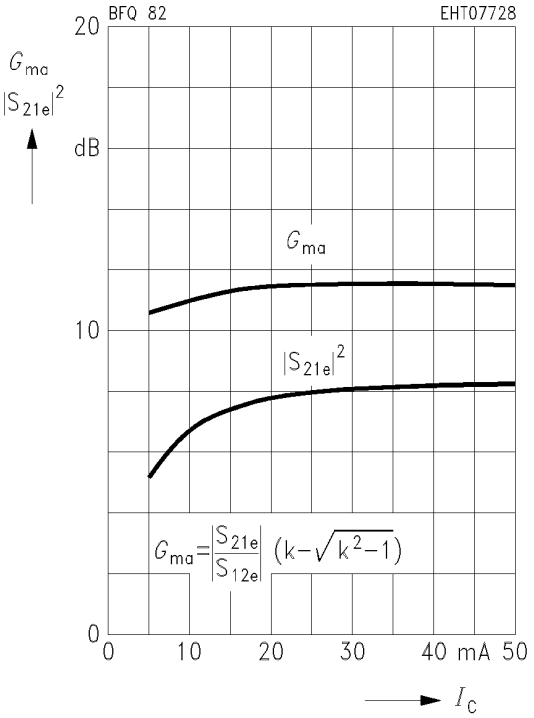
Power gain G_{ms}, $|S_{21e}|^2 = f(I_C)$
V_{CE} = 8 V, f = 500 MHz, Z_0 = 50 Ω



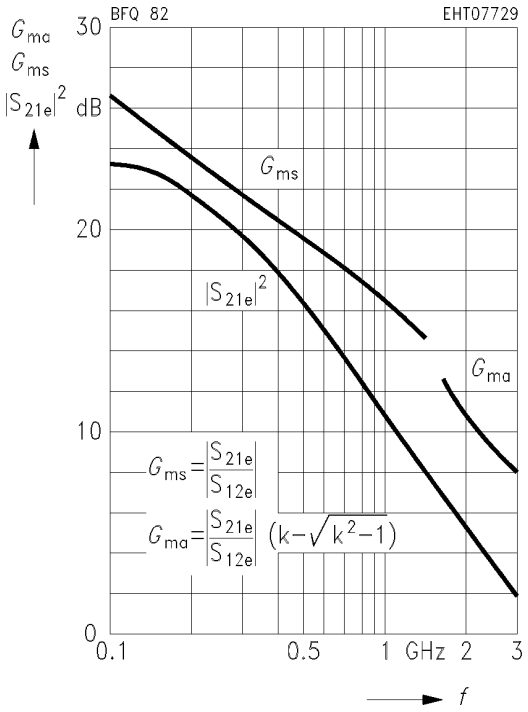
Power gain G_{ma}, G_{ms}, $|S_{21e}|^2 = f(I_C)$
V_{CE} = 8 V, f = 1 GHz, Z_0 = 50 Ω



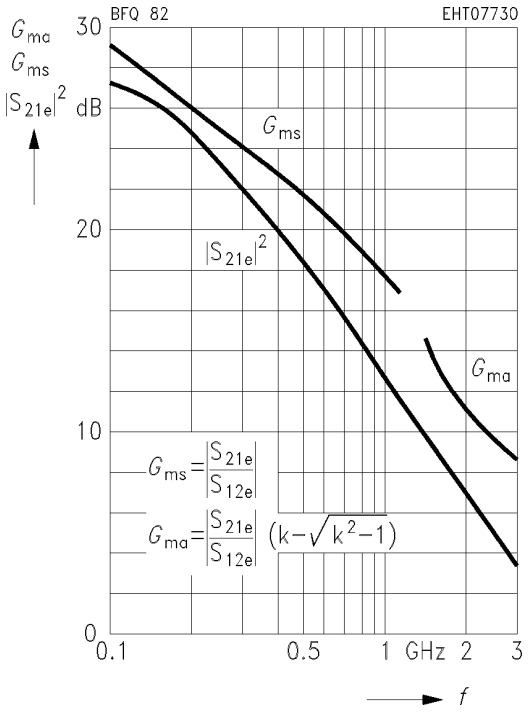
Power gain G_{ma}, $|S_{21e}|^2 = f(I_C)$
V_{CE} = 8 V, f = 2 GHz, Z_0 = 50 Ω



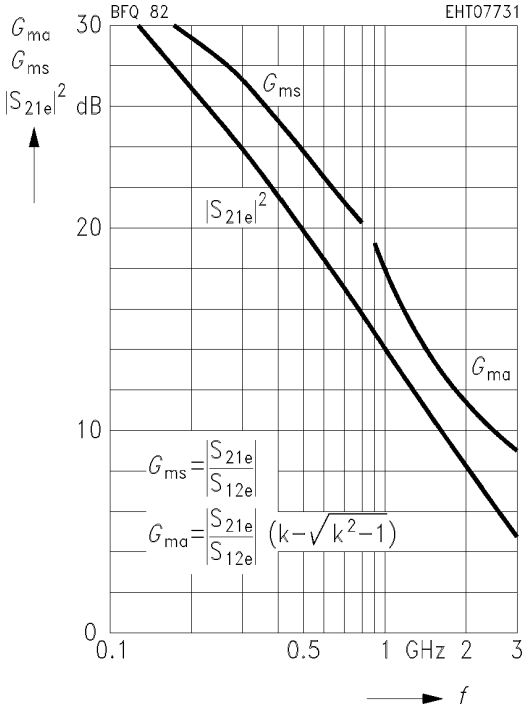
Power gain G_{ma}, G_{ms}, $|S_{21e}|^2 = f(f)$
I_C = 5 mA, V_{CE} = 8 V, Z_0 = 50 Ω



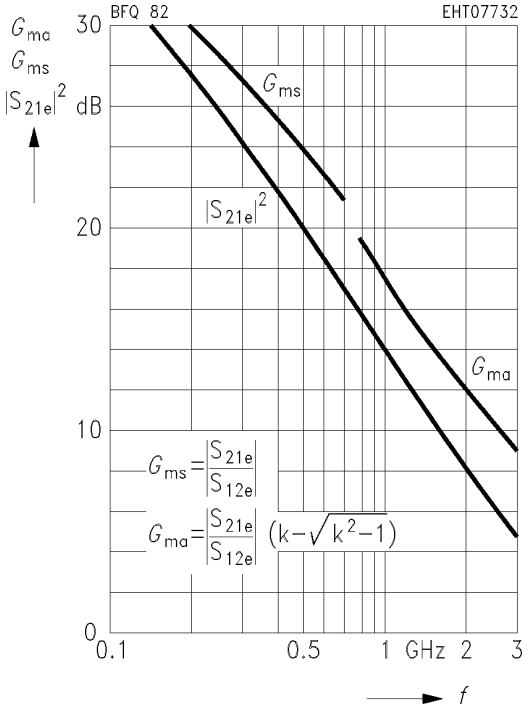
Power gain G_{ma}, G_{ms}, $|S_{21e}|^2 = f(f)$
I_C = 10 mA, V_{CE} = 8 V, Z_0 = 50 Ω



Power gain G_{ma}, G_{ms}, $|S_{21e}|^2 = f(f)$
I_C = 30 mA, V_{CE} = 8 V, Z_0 = 50 Ω



Power gain G_{ma}, G_{ms}, $|S_{21e}|^2 = f(f)$
I_C = 50 mA, V_{CE} = 8 V, Z_0 = 50 Ω



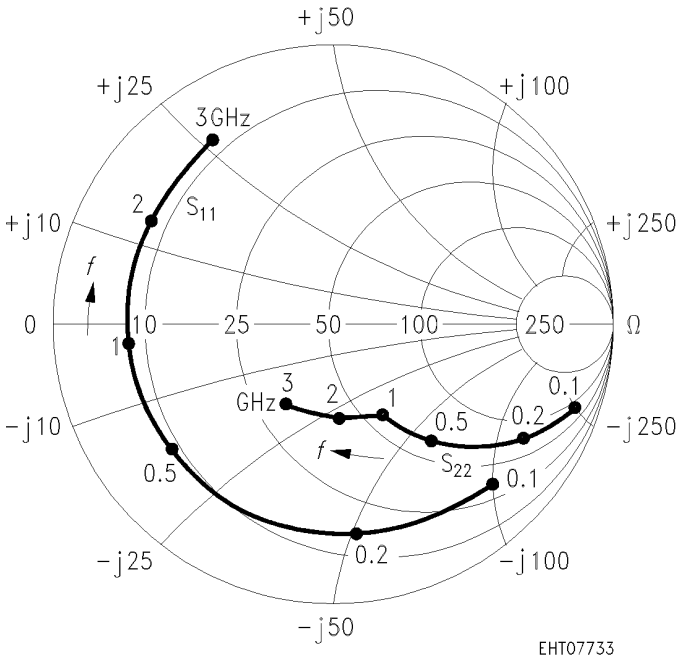
Common Emitter S Parameters

f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
I_C = 10 mA, V_{CE} = 3 V, Z_0 = 50 Ω								
0.10	0.549	– 117.0	34.54	127.9	0.020	53.4	0.627	– 55.5
0.15	0.598	– 136.2	26.39	116.1	0.023	48.5	0.486	– 69.3
0.20	0.620	– 147.9	20.98	108.4	0.026	47.7	0.394	– 79.1
0.25	0.633	– 155.9	17.29	103.0	0.028	47.7	0.333	– 86.8
0.30	0.641	– 161.4	14.67	98.9	0.031	48.7	0.288	– 93.1
0.40	0.651	– 169.7	11.21	92.7	0.035	51.2	0.234	– 103.1
0.50	0.655	– 175.5	9.06	87.8	0.040	53.3	0.203	– 110.8
0.60	0.657	– 180.0	7.60	83.8	0.045	54.9	0.183	– 117.4
0.70	0.661	175.8	6.53	80.1	0.051	56.1	0.170	– 123.1
0.80	0.665	172.6	5.74	76.6	0.056	56.9	0.161	– 127.8
0.90	0.671	169.6	5.09	73.6	0.061	57.2	0.154	– 132.8
1.00	0.673	166.7	4.58	70.6	0.067	57.5	0.149	– 136.9
1.20	0.680	161.2	3.82	65.6	0.078	57.4	0.142	– 145.3
1.40	0.679	155.8	3.31	60.6	0.089	56.7	0.139	– 150.8
1.50	0.680	153.4	3.10	58.1	0.095	55.8	0.140	– 152.4
1.60	0.683	151.1	2.92	55.3	0.101	55.1	0.141	– 154.4
1.80	0.688	146.7	2.59	49.9	0.112	53.1	0.146	– 159.0
2.00	0.701	143.0	2.33	45.3	0.122	51.3	0.151	– 165.6
2.50	0.729	133.3	1.90	35.3	0.150	46.8	0.175	– 178.4
3.00	0.735	122.1	1.62	23.5	0.177	40.6	0.199	174.5
I_C = 30 mA, V_{CE} = 3 V, Z_0 = 50 Ω								
0.10	0.664	– 71.4	22.66	142.7	0.029	59.7	0.815	– 33.7
0.15	0.666	– 94.9	19.20	130.2	0.038	50.7	0.694	– 44.5
0.20	0.666	– 112.0	16.25	121.0	0.043	44.9	0.593	– 52.4
0.25	0.664	– 124.8	13.90	113.9	0.046	40.9	0.514	– 58.2
0.30	0.666	– 134.3	12.07	108.4	0.049	38.5	0.452	– 62.5
0.40	0.670	– 148.4	9.48	99.9	0.052	36.1	0.366	– 68.6
0.50	0.670	– 158.0	7.78	93.6	0.056	35.7	0.313	– 72.8
0.60	0.671	– 165.3	6.57	88.4	0.058	35.9	0.275	– 76.1
0.70	0.675	– 171.5	5.67	83.8	0.061	36.6	0.249	– 79.0
0.80	0.679	– 176.4	5.01	79.6	0.064	37.4	0.231	– 81.3
0.90	0.684	179.2	4.45	76.0	0.067	38.2	0.214	– 83.7
1.00	0.686	175.4	4.01	72.5	0.070	39.5	0.203	– 85.8
1.20	0.693	168.4	3.35	66.5	0.077	41.3	0.185	– 90.5
1.40	0.691	162.0	2.90	60.9	0.084	42.8	0.177	– 94.9
1.50	0.692	159.3	2.72	58.1	0.089	43.0	0.177	– 97.2
1.60	0.697	156.5	2.56	55.1	0.093	43.3	0.177	– 99.6
1.80	0.703	151.4	2.28	49.3	0.101	43.3	0.177	– 105.1
2.00	0.713	147.0	2.05	44.2	0.109	43.3	0.176	– 112.0
2.50	0.741	136.2	1.67	33.1	0.133	42.5	0.188	– 130.5
3.00	0.748	124.5	1.42	20.7	0.157	39.0	0.215	– 144.6

Common Emitter S Parameters (continued)

f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
I_C = 5 mA, V_{CE} = 5 V, Z_0 = 50 Ω								
0.10	0.783	– 48.9	14.66	152.0	0.033	66.4	0.904	– 21.5
0.15	0.763	– 68.9	13.27	140.7	0.045	57.1	0.827	– 29.7
0.20	0.745	– 85.7	11.86	131.3	0.054	49.8	0.748	– 36.1
0.25	0.732	– 99.4	10.58	123.5	0.060	44.0	0.677	– 41.1
0.30	0.722	– 110.7	9.45	117.2	0.065	39.6	0.616	– 44.8
0.40	0.708	– 128.3	7.69	107.1	0.070	33.5	0.525	– 50.0
0.50	0.701	– 141.0	6.43	99.4	0.074	29.7	0.462	– 53.2
0.60	0.697	– 151.0	5.50	93.0	0.076	27.3	0.420	– 55.7
0.70	0.698	– 158.9	4.80	87.4	0.078	25.9	0.388	– 57.6
0.80	0.700	– 165.5	4.24	82.6	0.079	24.9	0.366	– 59.2
0.90	0.703	– 171.2	3.81	78.1	0.080	24.6	0.348	– 61.0
1.00	0.704	– 176.4	3.43	74.1	0.081	24.6	0.333	– 62.8
1.20	0.710	174.6	2.88	66.9	0.082	25.4	0.314	– 66.2
1.40	0.713	166.9	2.49	60.5	0.085	27.0	0.304	– 69.9
1.50	0.709	163.8	2.34	57.4	0.087	28.0	0.302	– 72.3
1.60	0.711	160.3	2.20	54.1	0.089	28.8	0.301	– 74.6
1.80	0.719	154.2	1.97	47.7	0.093	30.4	0.300	– 79.8
2.00	0.727	148.8	1.77	42.0	0.097	31.9	0.296	– 85.6
2.50	0.755	137.2	1.43	30.0	0.114	36.1	0.300	– 102.2
3.00	0.758	124.0	1.22	16.2	0.135	36.2	0.322	– 118.6

S_{11}, S_{22} = f (f)
I_C = 5 mA, V_{CE} = 5 V, Z_0 = 50 Ω



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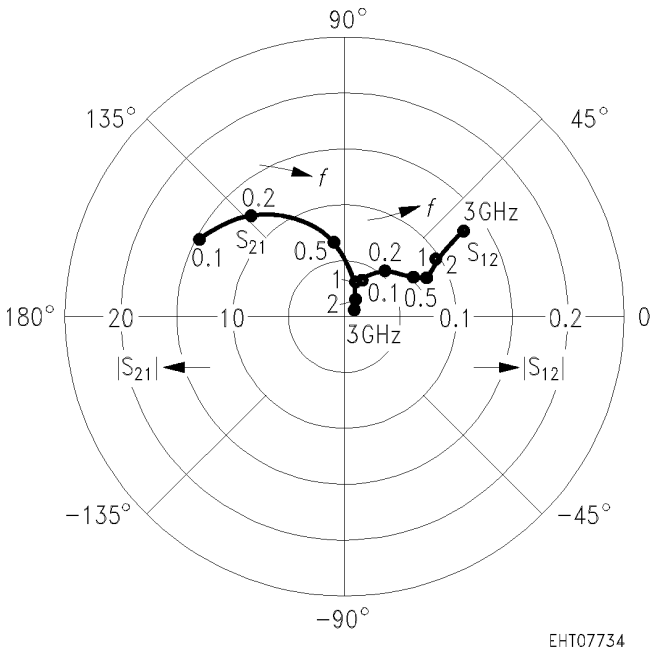
S_{12}, S_{21} = f (f)
I_C = 5 mA, V_{CE} = 5 V, Z_0 = 50 Ω



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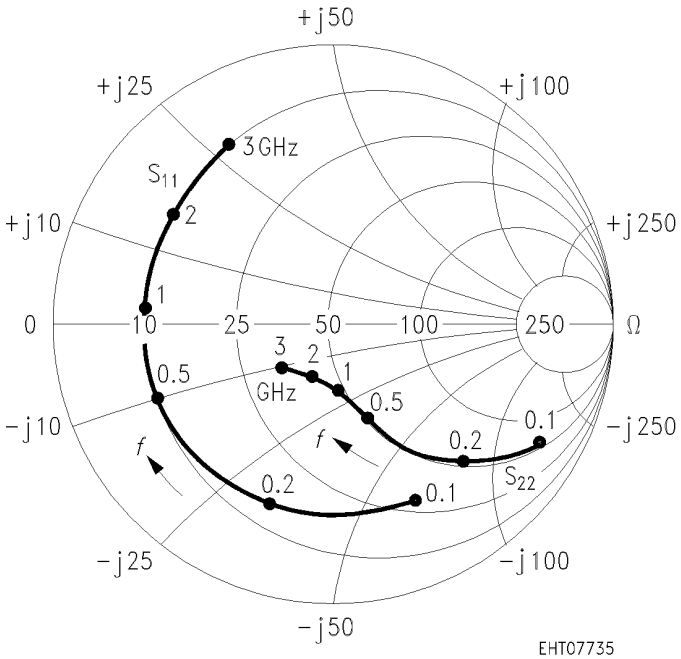
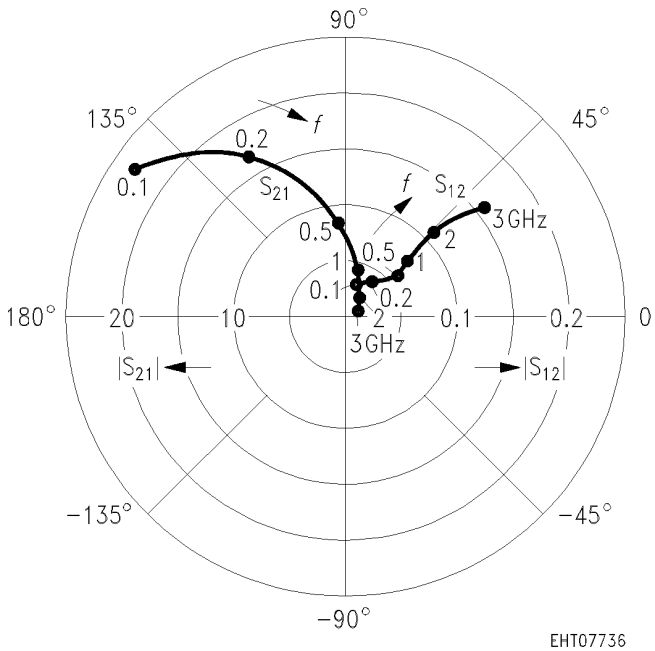
Common Emitter S Parameters (continued)

f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
I_C = 10 mA, V_{CE} = 5 V, Z_0 = 50 Ω								
0.10	0.670	– 68.9	23.03	143.5	0.028	60.6	0.822	– 32.5
0.15	0.664	– 92.4	19.59	131.0	0.037	51.4	0.705	– 43.2
0.20	0.661	– 109.9	16.65	121.7	0.042	45.5	0.604	– 51.1
0.25	0.660	– 122.6	14.30	114.5	0.045	41.6	0.525	– 56.7
0.30	0.660	– 132.6	12.45	108.9	0.048	39.1	0.462	– 60.9
0.40	0.658	– 147.1	9.79	100.3	0.052	36.6	0.376	– 66.9
0.50	0.660	– 157.1	8.04	93.9	0.055	35.8	0.319	– 70.8
0.60	0.662	– 164.9	6.80	88.6	0.058	36.1	0.283	– 73.9
0.70	0.664	– 171.0	5.88	83.9	0.061	36.8	0.256	– 76.4
0.80	0.669	– 176.3	5.17	79.8	0.064	37.4	0.237	– 78.5
0.90	0.672	179.2	4.62	76.0	0.067	38.4	0.222	– 80.8
1.00	0.675	175.0	4.16	72.5	0.070	39.2	0.209	– 83.1
1.20	0.682	167.4	3.48	66.2	0.076	40.8	0.191	– 87.2
1.40	0.687	160.9	3.00	60.5	0.084	41.9	0.182	– 91.0
1.50	0.684	158.2	2.82	57.7	0.088	42.5	0.181	– 93.2
1.60	0.684	155.1	2.65	54.7	0.092	42.6	0.180	– 95.5
1.80	0.693	149.8	2.37	48.8	0.101	42.6	0.181	– 101.1
2.00	0.701	144.9	2.13	43.6	0.108	42.2	0.179	– 107.6
2.50	0.732	134.5	1.73	32.6	0.132	41.4	0.188	– 124.6
3.00	0.735	122.0	1.47	19.2	0.156	37.4	0.215	– 139.6

***S*11, *S*22 = *f* (*f*)**
I_C = 10 mA, V_{CE} = 5 V, Z_0 = 50 Ω



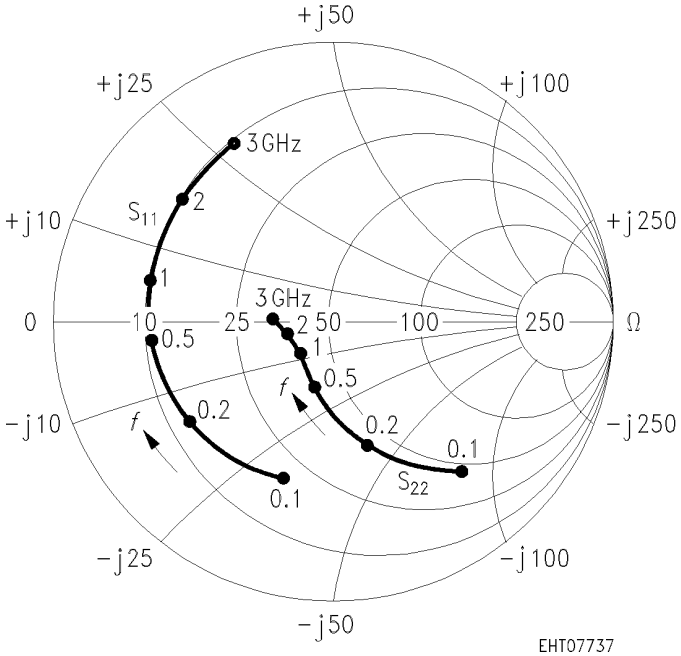
***S*12, *S*21 = *f* (*f*)**
I_C = 10 mA, V_{CE} = 5 V, Z_0 = 50 Ω



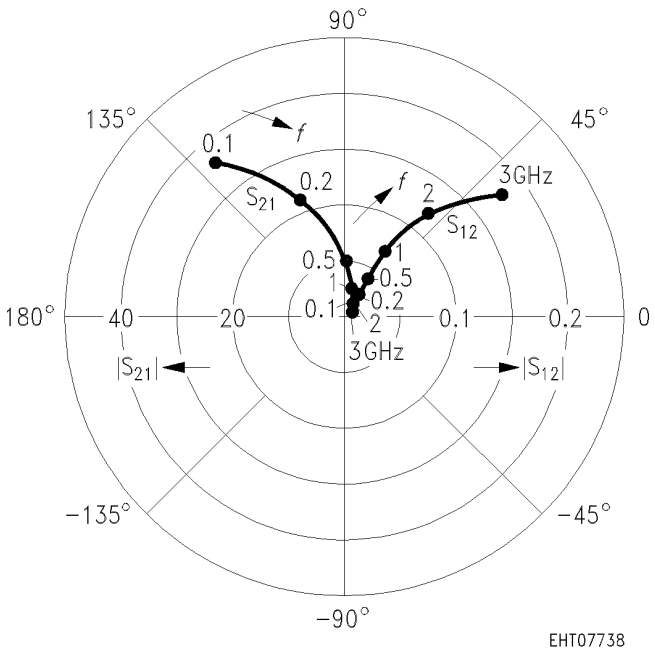
Common Emitter S Parameters (continued)

f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
I_C = 30 mA, V_{CE} = 5 V, Z_0 = 50 Ω								
0.10	0.545	– 111.4	35.72	129.0	0.020	54.2	0.642	– 53.6
0.15	0.584	– 132.2	27.43	117.1	0.023	49.3	0.501	– 67.2
0.20	0.605	– 145.0	21.91	109.2	0.026	47.9	0.407	– 76.8
0.25	0.617	– 153.2	18.11	103.7	0.029	47.9	0.342	– 84.3
0.30	0.625	– 159.3	15.39	99.5	0.031	48.7	0.297	– 90.3
0.40	0.631	– 168.3	11.77	93.0	0.035	50.9	0.239	– 100.0
0.50	0.637	– 174.7	9.54	88.2	0.040	52.8	0.205	– 107.7
0.60	0.641	– 179.7	7.99	84.0	0.046	54.4	0.184	– 113.8
0.70	0.644	176.4	6.87	80.2	0.051	55.6	0.171	– 119.2
0.80	0.648	172.8	6.03	76.8	0.056	56.2	0.161	– 123.9
0.90	0.652	169.5	5.36	73.6	0.061	56.4	0.154	– 128.3
1.00	0.657	166.4	4.82	70.7	0.067	56.6	0.148	– 133.2
1.20	0.665	160.2	4.03	65.4	0.078	56.3	0.140	– 140.9
1.40	0.671	154.6	3.47	60.3	0.089	55.5	0.134	– 146.8
1.50	0.665	152.3	3.26	57.8	0.095	54.8	0.135	– 148.8
1.60	0.666	149.6	3.06	55.0	0.101	54.0	0.136	– 150.7
1.80	0.674	145.0	2.73	49.7	0.112	51.9	0.141	– 155.2
2.00	0.682	141.1	2.45	44.8	0.122	49.9	0.146	– 161.6
2.50	0.713	131.4	1.99	34.7	0.150	45.3	0.164	– 174.4
3.00	0.715	119.8	1.69	22.1	0.175	38.8	0.191	178.0

S_{11}, S_{22} = f (f)
I_C = 30 mA, V_{CE} = 5 V, Z_0 = 50 Ω



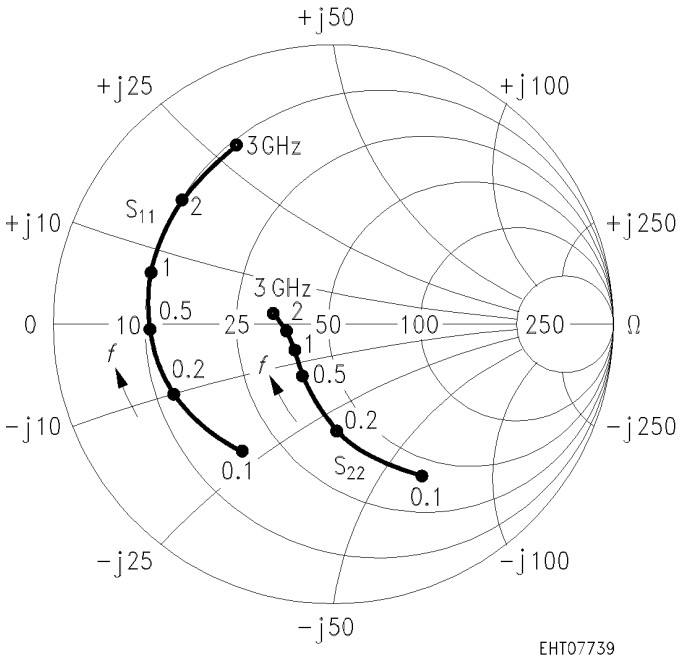
S_{12}, S_{21} = f (f)
I_C = 30 mA, V_{CE} = 5 V, Z_0 = 50 Ω



Common Emitter S Parameters (continued)

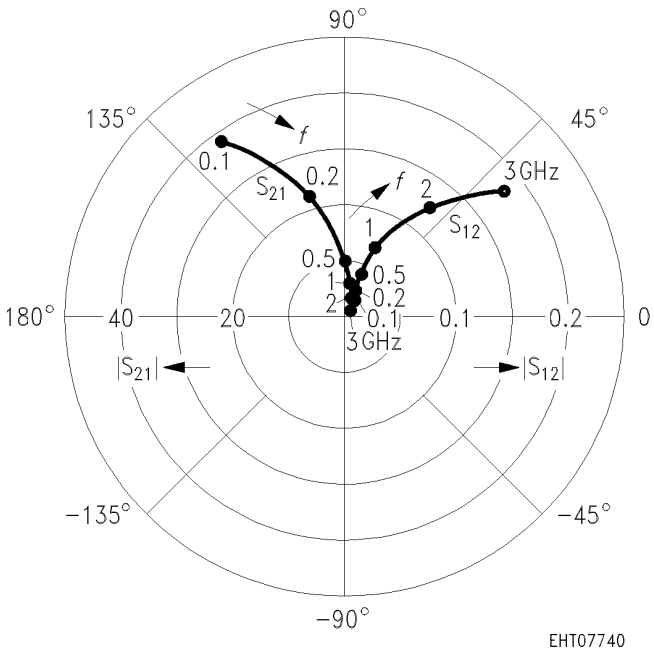
f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
I_C = 50 mA, V_{CE} = 5 V, Z_0 = 50 Ω								
0.10	0.541	– 128.9	38.90	123.5	0.016	53.8	0.560	– 62.3
0.15	0.587	– 145.8	28.86	112.3	0.020	51.3	0.425	– 76.6
0.20	0.609	– 155.7	22.67	105.3	0.022	51.6	0.344	– 87.0
0.25	0.622	– 162.0	18.56	100.5	0.025	53.0	0.291	– 95.2
0.30	0.629	– 166.9	15.69	96.7	0.027	54.7	0.255	– 101.9
0.40	0.635	– 173.9	11.94	90.9	0.032	57.5	0.212	– 112.8
0.50	0.640	– 179.2	9.64	86.4	0.038	59.3	0.186	– 121.3
0.60	0.645	176.3	8.07	82.5	0.044	60.4	0.172	– 127.8
0.70	0.649	173.1	6.93	79.0	0.050	61.1	0.164	– 133.4
0.80	0.651	169.8	6.08	75.8	0.055	61.2	0.157	– 138.2
0.90	0.656	167.0	5.41	72.7	0.061	61.1	0.153	– 142.6
1.00	0.660	164.0	4.85	69.9	0.067	60.8	0.151	– 147.3
1.20	0.668	158.5	4.05	64.7	0.079	59.9	0.147	– 154.8
1.40	0.673	153.1	3.49	59.9	0.091	58.5	0.143	– 160.5
1.50	0.668	150.9	3.28	57.3	0.097	57.6	0.144	– 162.2
1.60	0.671	148.3	3.09	54.7	0.103	56.5	0.145	– 163.8
1.80	0.676	143.8	2.75	49.4	0.115	53.9	0.150	– 167.6
2.00	0.685	140.1	2.46	44.6	0.125	51.5	0.157	– 173.2
2.50	0.716	130.6	2.00	34.7	0.153	46.4	0.177	175.7
3.00	0.717	119.1	1.70	22.2	0.179	39.2	0.202	169.6

S_{11}, S_{22} = f (f)
I_C = 50 mA, V_{CE} = 5 V, Z_0 = 50 Ω



EHT07739

S_{12}, S_{21} = f (f)
I_C = 50 mA, V_{CE} = 5 V, Z_0 = 50 Ω

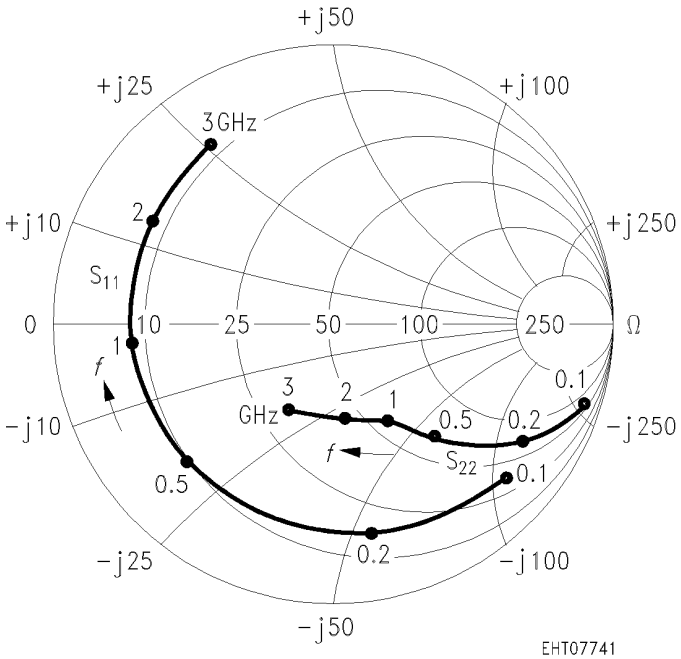


EHT07740

Common Emitter S Parameters (continued)

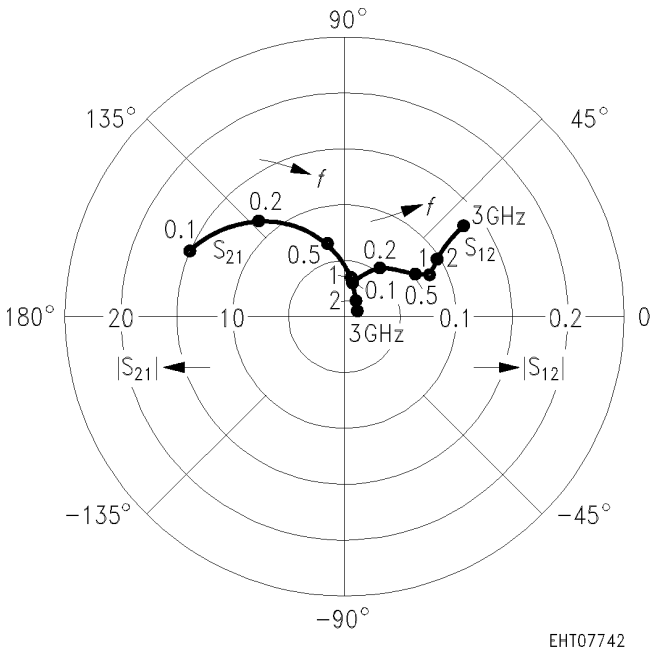
f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
I_C = 5 mA, V_{CE} = 8 V, Z_0 = 50 Ω								
0.10	0.792	– 47.3	14.67	152.6	0.033	66.9	0.908	– 20.9
0.15	0.771	– 67.0	13.33	141.4	0.044	57.6	0.833	– 28.9
0.20	0.751	– 83.6	11.96	132.1	0.053	50.5	0.756	– 35.2
0.25	0.736	– 97.1	10.69	124.4	0.059	44.8	0.686	– 40.1
0.30	0.724	– 108.5	9.57	118.0	0.064	40.3	0.626	– 43.9
0.40	0.707	– 126.2	7.82	107.8	0.070	34.1	0.535	– 49.0
0.50	0.699	– 139.2	6.55	100.1	0.073	30.1	0.472	– 52.3
0.60	0.695	– 149.4	5.61	93.6	0.076	27.6	0.428	– 54.7
0.70	0.695	– 157.5	4.90	88.1	0.077	26.3	0.397	– 56.6
0.80	0.696	– 164.3	4.33	83.2	0.079	25.1	0.374	– 58.2
0.90	0.698	– 170.0	3.89	78.7	0.080	24.9	0.355	– 59.9
1.00	0.699	– 175.4	3.51	74.6	0.080	24.8	0.340	– 61.6
1.20	0.704	175.4	2.95	67.4	0.082	25.5	0.320	– 64.9
1.40	0.708	167.6	2.54	61.0	0.085	27.0	0.310	– 68.6
1.50	0.706	164.5	2.39	58.0	0.086	27.9	0.308	– 70.9
1.60	0.705	160.9	2.25	54.6	0.088	28.8	0.307	– 73.1
1.80	0.715	154.8	2.01	48.3	0.093	30.3	0.305	– 78.3
2.00	0.723	149.3	1.81	42.6	0.096	31.9	0.301	– 83.9
2.50	0.750	137.4	1.47	30.6	0.113	35.9	0.303	– 100.1
3.00	0.755	124.3	1.25	16.8	0.134	36.1	0.323	– 116.5

S_{11}, S_{22} = f (f)
I_C = 5 mA, V_{CE} = 8 V, Z_0 = 50 Ω



EHT07741

S_{12}, S_{21} = f (f)
I_C = 5 mA, V_{CE} = 8 V, Z_0 = 50 Ω

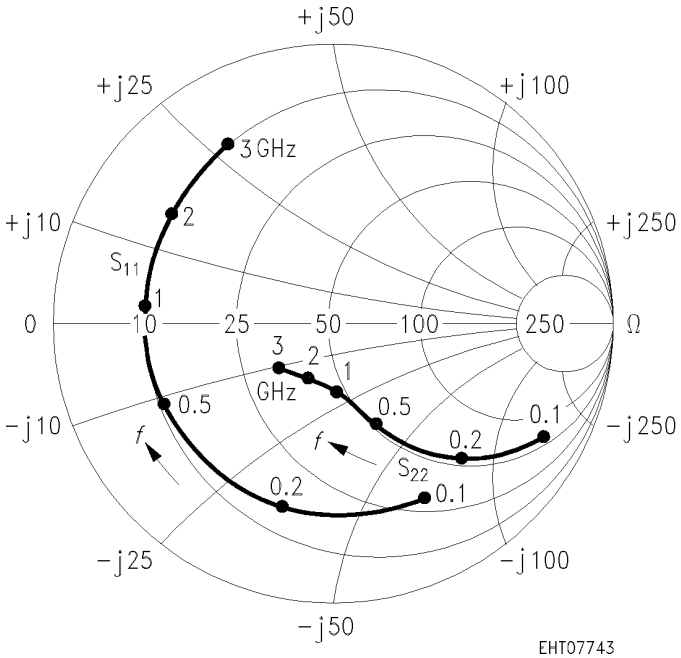


EHT07742

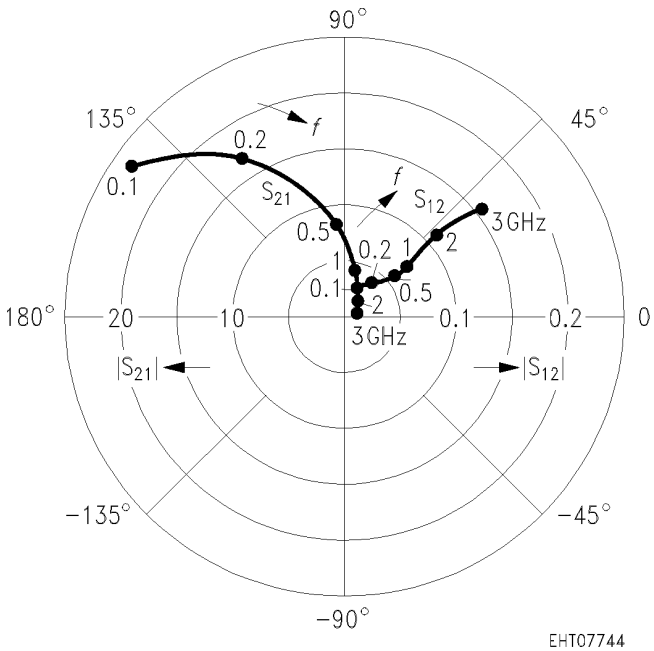
Common Emitter S Parameters (continued)

f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**	**MAG**	**ANG**
I_C = 10 mA, V_{CE} = 8 V, Z_0 = 50 Ω								
0.10	0.686	– 65.8	23.05	144.4	0.028	61.2	0.829	– 31.5
0.15	0.673	– 89.1	19.74	132.0	0.036	52.4	0.715	– 42.0
0.20	0.665	– 106.6	16.85	122.6	0.042	46.2	0.616	– 49.8
0.25	0.661	– 119.6	14.51	115.5	0.045	42.1	0.537	– 55.4
0.30	0.659	– 129.8	12.67	109.8	0.048	39.5	0.474	– 59.6
0.40	0.654	– 144.7	10.00	101.1	0.052	36.8	0.386	– 65.5
0.50	0.654	– 155.3	8.22	94.6	0.055	35.9	0.328	– 69.4
0.60	0.656	– 163.2	6.95	89.2	0.058	35.9	0.291	– 72.4
0.70	0.659	– 169.5	6.02	84.5	0.061	36.6	0.264	– 74.9
0.80	0.661	– 175.1	5.30	80.3	0.064	37.1	0.243	– 76.9
0.90	0.666	– 179.6	4.74	76.5	0.067	38.0	0.227	– 79.1
1.00	0.668	176.1	4.26	73.0	0.070	38.8	0.213	– 81.4
1.20	0.674	168.4	3.56	66.7	0.077	40.4	0.196	– 85.1
1.40	0.680	161.7	3.07	61.0	0.084	41.5	0.185	– 88.8
1.50	0.677	158.9	2.88	58.2	0.088	42.0	0.184	– 91.0
1.60	0.676	155.7	2.72	55.3	0.092	42.2	0.183	– 93.2
1.80	0.687	150.4	2.42	49.4	0.100	42.1	0.183	– 98.7
2.00	0.693	145.5	2.18	44.1	0.108	41.8	0.180	– 105.0
2.50	0.724	134.9	1.77	33.1	0.131	41.1	0.187	– 122.0
3.00	0.726	122.3	1.51	19.8	0.154	37.2	0.212	– 137.2

***S*₁₁, *S*₂₂ = *f* (*f*)**
I_C = 10 mA, V_{CE} = 8 V, Z_0 = 50 Ω



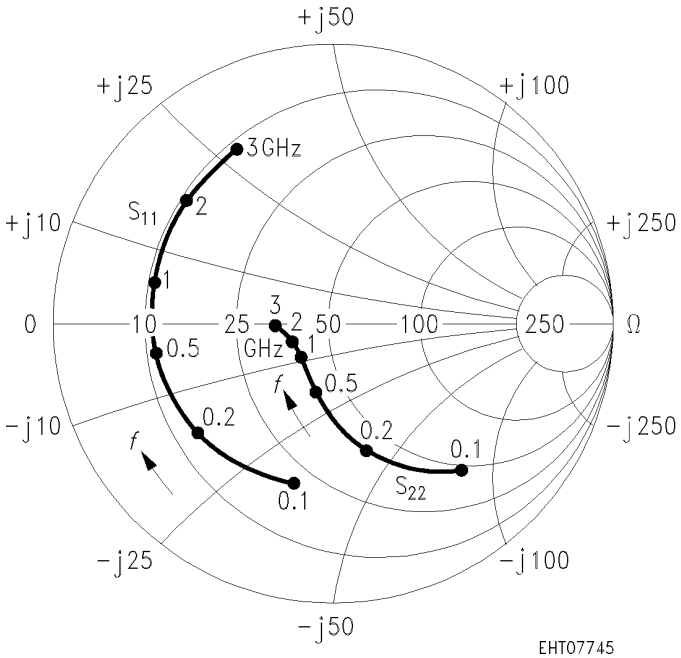
***S*₁₂, *S*₂₁ = *f* (*f*)**
I_C = 10 mA, V_{CE} = 8 V, Z_0 = 50 Ω



Common Emitter S Parameters (continued)

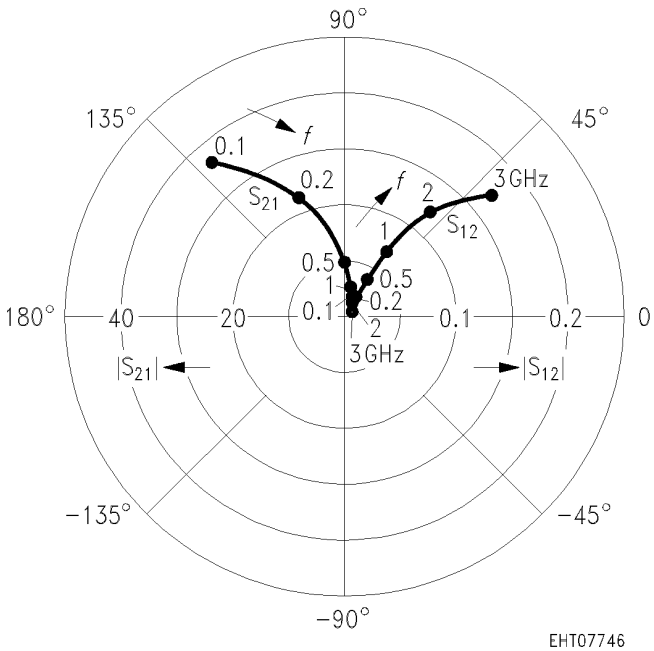
f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
I_C = 30 mA, V_{CE} = 8 V, Z_0 = 50 Ω								
0.10	0.559	– 105.0	36.41	130.0	0.020	54.4	0.651	– 52.3
0.15	0.585	– 127.1	28.14	117.9	0.024	49.3	0.510	– 65.9
0.20	0.600	– 140.8	22.54	110.0	0.027	47.2	0.415	– 75.6
0.25	0.610	– 149.6	18.67	104.4	0.029	47.2	0.350	– 82.9
0.30	0.616	– 156.3	15.87	100.1	0.032	47.8	0.303	– 89.0
0.40	0.621	– 166.0	12.17	93.5	0.036	50.2	0.244	– 98.6
0.50	0.626	– 172.7	9.86	88.6	0.041	51.9	0.208	– 106.2
0.60	0.628	– 178.1	8.27	84.4	0.046	53.2	0.187	– 112.3
0.70	0.633	177.6	7.11	80.7	0.051	54.6	0.172	– 117.8
0.80	0.636	173.8	6.24	77.2	0.056	55.2	0.161	– 122.5
0.90	0.641	170.7	5.55	74.1	0.062	55.6	0.154	– 127.0
1.00	0.646	167.3	4.99	71.1	0.067	55.7	0.148	– 131.9
1.20	0.653	161.1	4.17	65.8	0.078	55.6	0.138	– 139.8
1.40	0.657	155.4	3.59	60.8	0.089	54.8	0.132	– 145.8
1.50	0.655	153.1	3.37	58.2	0.095	54.2	0.132	– 147.8
1.60	0.654	150.4	3.17	55.5	0.101	53.3	0.133	– 149.8
1.80	0.663	145.8	2.82	50.2	0.112	51.3	0.138	– 154.5
2.00	0.671	141.6	2.53	45.3	0.122	49.2	0.142	– 161.1
2.50	0.702	132.0	2.06	35.3	0.149	44.8	0.159	– 174.2
3.00	0.706	120.2	1.75	22.6	0.174	38.3	0.185	178.2

S_{11}, S_{22} = f (f)
I_C = 30 mA, V_{CE} = 8 V, Z_0 = 50 Ω



EHT07745

S_{12}, S_{21} = f (f)
I_C = 30 mA, V_{CE} = 8 V, Z_0 = 50 Ω

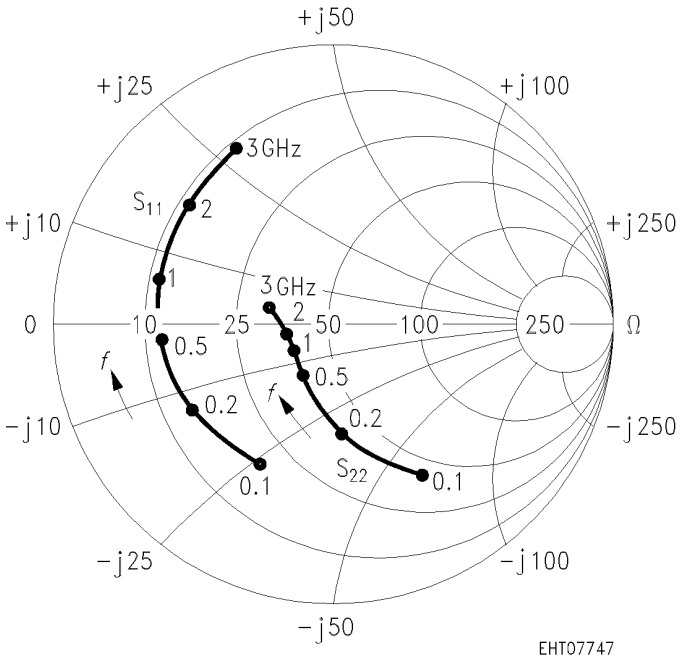


EHT07746

Common Emitter S Parameters (continued)

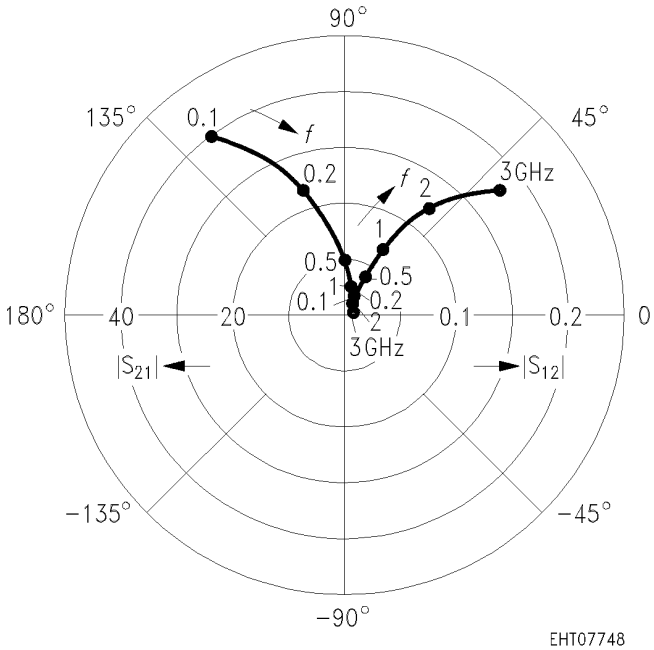
f	S_{11}		S_{21}		S_{12}		S_{22}	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
I_C = 50 mA, V_{CE} = 8 V, Z_0 = 50 Ω								
0.10	0.548	– 120.2	39.95	124.5	0.017	53.4	0.569	– 60.7
0.15	0.582	– 139.4	29.82	113.2	0.020	50.0	0.434	– 75.0
0.20	0.599	– 150.9	23.47	106.0	0.023	50.2	0.351	– 85.2
0.25	0.610	– 158.0	19.26	101.1	0.026	51.5	0.296	– 93.2
0.30	0.616	– 163.4	16.29	97.3	0.028	53.1	0.259	– 99.9
0.40	0.621	– 171.5	12.41	91.4	0.033	55.7	0.213	– 110.7
0.50	0.625	– 177.3	10.01	86.9	0.039	57.7	0.186	– 119.1
0.60	0.629	178.2	8.39	83.0	0.045	58.9	0.171	– 125.6
0.70	0.632	174.6	7.20	79.4	0.050	59.7	0.162	– 131.4
0.80	0.636	171.1	6.32	76.2	0.056	59.9	0.155	– 136.2
0.90	0.640	168.1	5.62	73.1	0.062	59.9	0.151	– 140.8
1.00	0.644	165.1	5.05	70.3	0.067	59.7	0.147	– 145.6
1.20	0.652	159.2	4.21	65.2	0.079	58.9	0.142	– 153.4
1.40	0.657	153.8	3.63	60.4	0.091	57.5	0.138	– 159.4
1.50	0.653	151.6	3.41	57.8	0.097	56.6	0.138	– 161.1
1.60	0.655	149.0	3.21	55.1	0.103	55.5	0.139	– 162.8
1.80	0.663	144.5	2.85	49.9	0.115	53.0	0.145	– 166.7
2.00	0.670	140.8	2.56	45.1	0.125	50.8	0.151	– 172.7
2.50	0.700	131.2	2.08	35.3	0.153	45.6	0.169	176.0
3.00	0.704	119.6	1.77	22.7	0.178	38.6	0.193	169.8

S_{11}, S_{22} = f (f)
I_C = 50 mA, V_{CE} = 8 V, Z_0 = 50 Ω



EHT07747

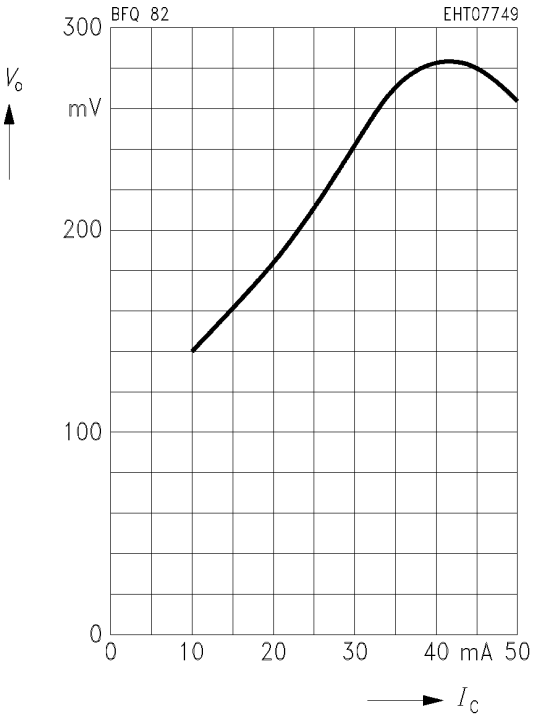
S_{12}, S_{21} = f (f)
I_C = 50 mA, V_{CE} = 8 V, Z_0 = 50 Ω



EHT07748

Common Emitter Large Signal Parameters

Linear output voltage $V_o = f(I_C)$
V_{CE} = 8 V, d_{IM} = 60 dB, f_1 = 806 MHz,
f_2 = 810 MHz, $Z_S = Z_L$ = 50 Ω



Note:

The transistor is driven by 2 adjacent signals f_1, f_2 with equal output power levels P_o for each carrier.
The distance d_{IM} between P_o and the third order intermodulation products P_{IM}
($2f_1 - f_2$ or $2f_2 - f_1$) is:

$d_{IM} = P_o - P_{IM}$
where P_o = 10 log (V_o^2 / (50 Ω · 1 mW)) (dBm)
and V_o = linear output voltage of each carrier.

The 3rd order intercept point IP_3 will be found by extrapolation to the point where P_{IM} would be identical to P_o:

IP_3 (output) = $P_o + d_{IM}/2$.

Linear output voltages for other d_{IM} (e.g. 50 dB) can be calculated thereby.