

NPN SILICON RF TRANSISTOR (WITH 2 DIFFERENT ELEMENTS)
IN A FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD

FEATURES

- Low voltage operation
- 2 different built-in transistors (2SC5435, 2SC5437)
 - Q1: Low phase distortion, high-gain transistor
 - NF = 1.5 dB TYP. @ $V_{CE} = 3\text{ V}$, $I_C = 3\text{ mA}$, $f = 2\text{ GHz}$
 - $f_T = 12.0\text{ GHz}$ TYP., $|S_{21e}|^2 = 8.5\text{ dB}$ TYP. @ $V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$, $f = 2\text{ GHz}$
 - Q2: Low phase distortion transistor
 - NF = 1.5 dB TYP. @ $V_{CE} = 3\text{ V}$, $I_C = 7\text{ mA}$, $f = 2\text{ GHz}$
 - NF = 1.7 dB TYP. @ $V_{CE} = 1\text{ V}$, $I_C = 3\text{ mA}$, $f = 2\text{ GHz}$
- Flat-lead 6-pin thin-type ultra super minimold package

BUILT-IN TRANSISTORS

	Q1	Q2
3-pin thin-type ultra super minimold part No.	2SC5435	2SC5437

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μ PA836TC	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 6 (Q1 Base), Pin 5 (Q2 Emitter), Pin 4 (Q2 Base) face the perforation side of the tape
μ PA836TC-T1	3 kpcs/reel	

Remark To order evaluation samples, contact your nearby sales office.
The unit sample quantity is 50 pcs.

Because this product uses high-frequency technology, avoid excessive static electricity, etc.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings		Unit
		Q1	Q2	
Collector to Base Voltage	V _{CBO}	9	9	V
Collector to Emitter Voltage	V _{CEO}	6	6	V
Emitter to Base Voltage	V _{EBO}	2	2	V
Collector Current	I _C	30	100	mA
Total Power Dissipation	P _{tot} ^{Note}	180	200	mW
		230 in 2 elements		
Junction Temperature	T _j	150		°C
Storage Temperature	T _{stg}	−65 to +150		°C

Note Mounted on 1.08 cm² × 1.0 mm (t) glass epoxy PCB

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$)

(1) Q1

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I_{CBO}	$V_{CB} = 5\text{ V}, I_E = 0\text{ mA}$	—	—	100	nA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1\text{ V}, I_C = 0\text{ mA}$	—	—	100	nA
DC Current Gain	h_{FE} ^{Note 1}	$V_{CE} = 3\text{ V}, I_C = 10\text{ mA}$	75	—	150	—
Gain Bandwidth Product	f_T	$V_{CE} = 3\text{ V}, I_C = 10\text{ mA}, f = 2\text{ GHz}$	10.0	12.0	—	GHz
Insertion Power Gain	$ S_{21e} ^2$	$V_{CE} = 3\text{ V}, I_C = 10\text{ mA}, f = 2\text{ GHz}$	7.0	8.5	—	dB
Noise Figure	NF	$V_{CE} = 3\text{ V}, I_C = 3\text{ mA}, f = 2\text{ GHz}, Z_S = Z_{opt}$	—	1.5	2.5	dB
Reverse Transfer Capacitance	C_{re} ^{Note 2}	$V_{CB} = 3\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$	—	0.4	0.7	pF

(2) Q2

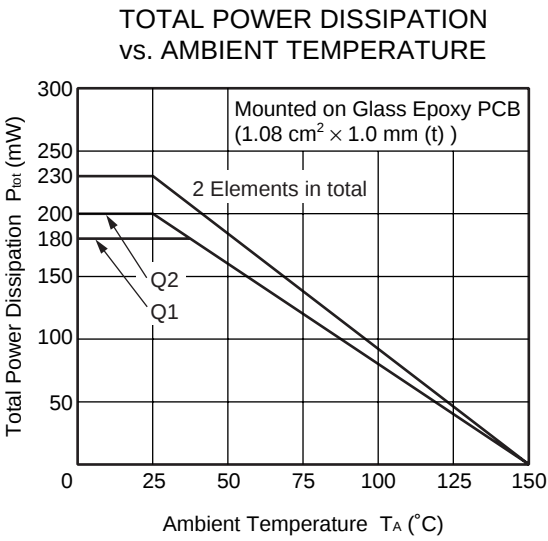
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I_{CBO}	$V_{CB} = 5\text{ V}, I_E = 0\text{ mA}$	—	—	100	nA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1\text{ V}, I_C = 0\text{ mA}$	—	—	100	nA
DC Current Gain	h_{FE} ^{Note 1}	$V_{CE} = 1\text{ V}, I_C = 3\text{ mA}$	80	—	160	—
Gain Bandwidth Product (1)	f_T	$V_{CE} = 1\text{ V}, I_C = 3\text{ mA}, f = 2\text{ GHz}$	4.0	4.5	—	GHz
Gain Bandwidth Product (2)	f_T	$V_{CE} = 3\text{ V}, I_C = 20\text{ mA}, f = 2\text{ GHz}$	—	9.0	—	GHz
Insertion Power Gain (1)	$ S_{21e} ^2$	$V_{CE} = 1\text{ V}, I_C = 3\text{ mA}, f = 2\text{ GHz}$	2.5	3.5	—	dB
Insertion Power Gain (2)	$ S_{21e} ^2$	$V_{CE} = 3\text{ V}, I_C = 20\text{ mA}, f = 2\text{ GHz}$	—	6.5	—	dB
Noise Figure (1)	NF	$V_{CE} = 1\text{ V}, I_C = 3\text{ mA}, f = 2\text{ GHz}, Z_S = Z_{opt}$	—	1.7	2.5	dB
Noise Figure (2)	NF	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 2\text{ GHz}, Z_S = Z_{opt}$	—	1.5	—	dB
Reverse Transfer Capacitance	C_{re} ^{Note 2}	$V_{CB} = 1\text{ V}, I_E = 0\text{ mA}, f = 1\text{ MHz}$	—	0.75	0.85	pF

- Notes** 1. Pulse measurement: $PW \leq 350\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

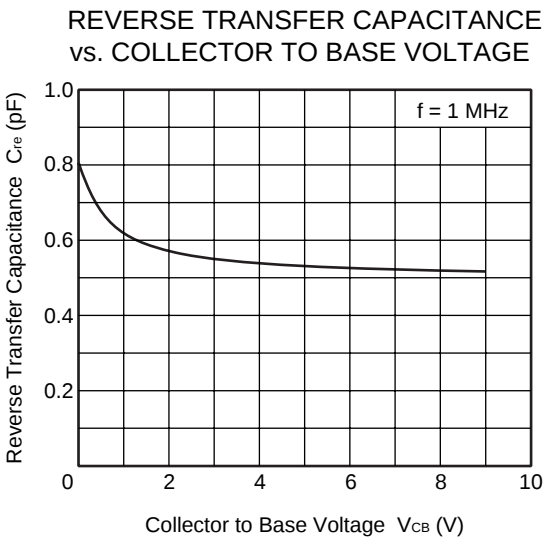
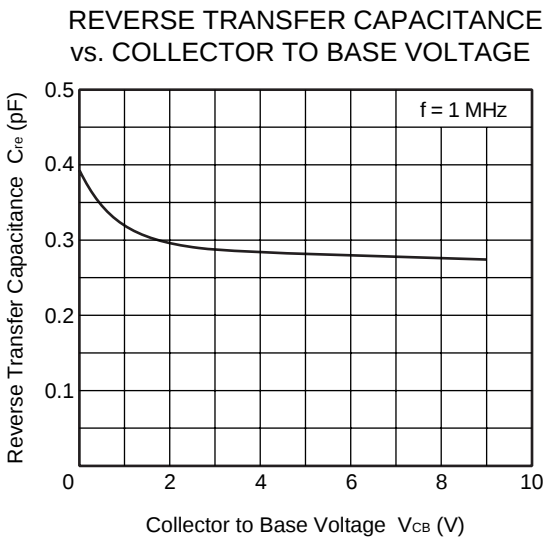
Rank	FB
Marking	47
h_{FE} Value of Q1	75 to 150
h_{FE} Value of Q2	80 to 160

TYPICAL CHARACTERISTICS (Unless otherwise specified, $T_A = +25^{\circ}\text{C}$)



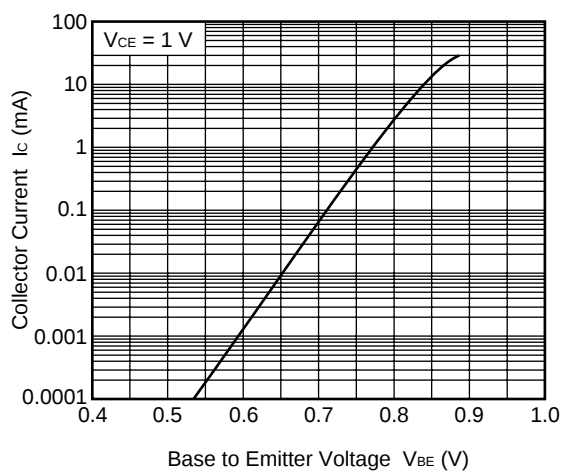
Q1

Q2



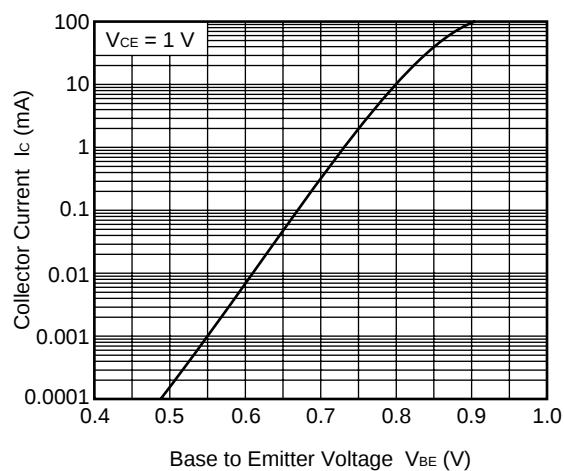
Q1

COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

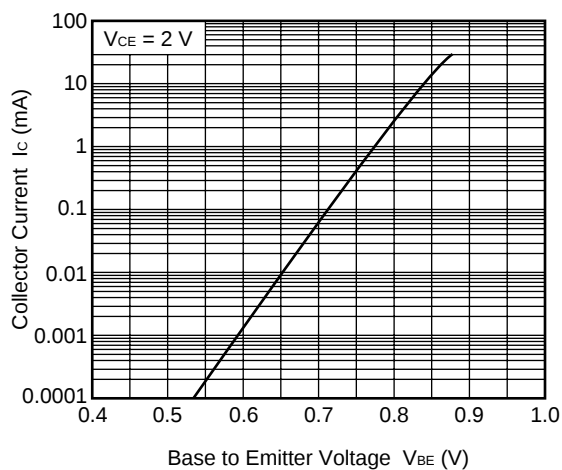


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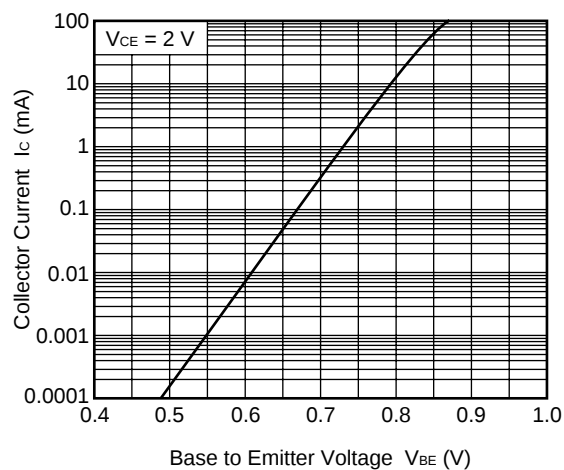
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



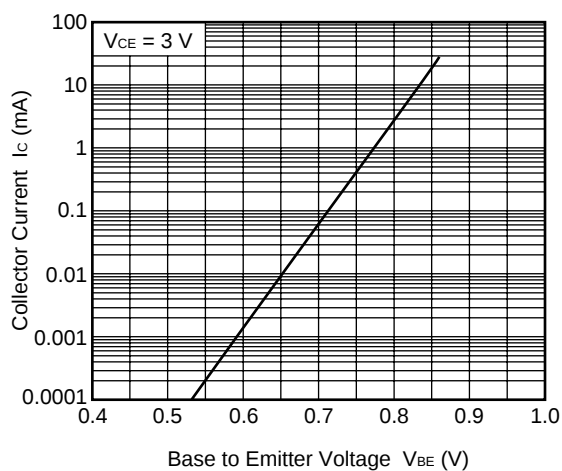
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



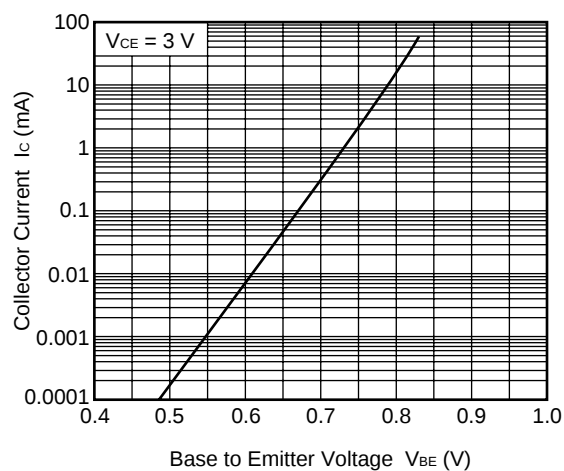
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



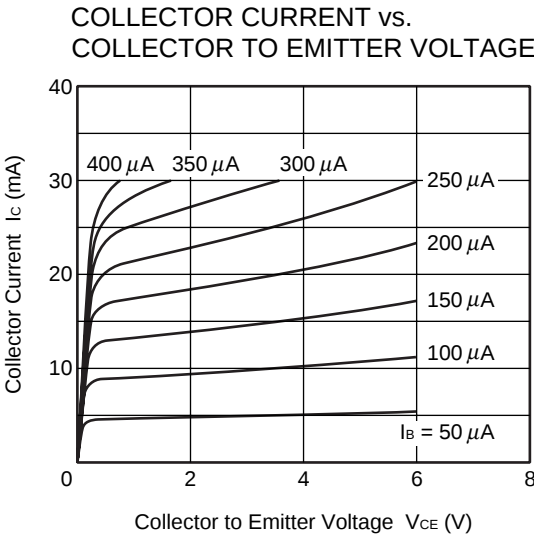
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



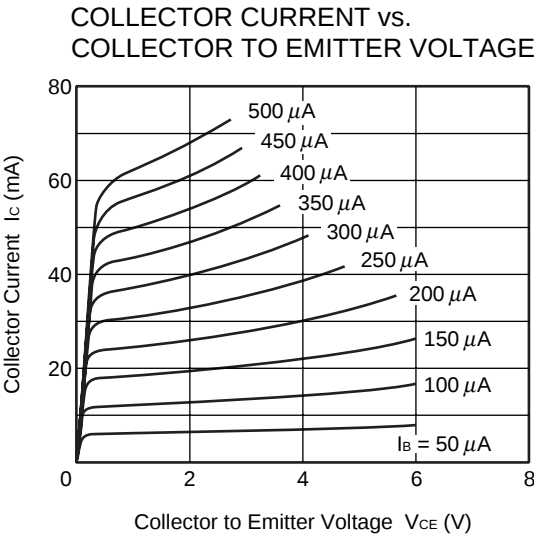
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



Q1

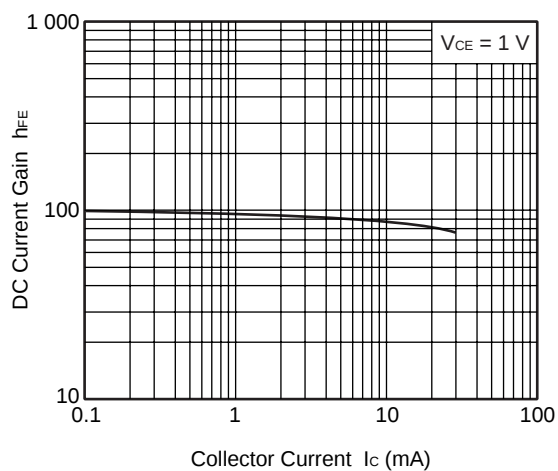


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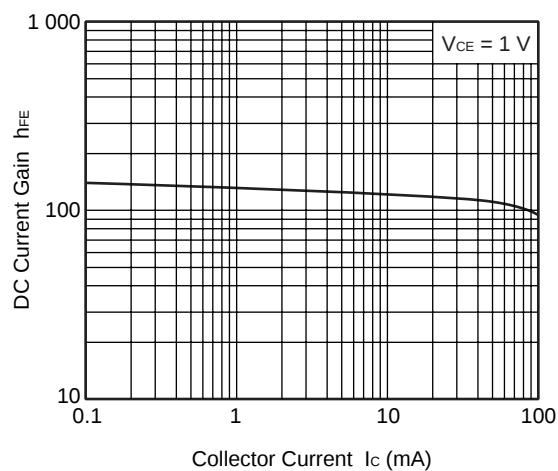
Q1

DC CURRENT GAIN vs.
COLLECTOR CURRENT

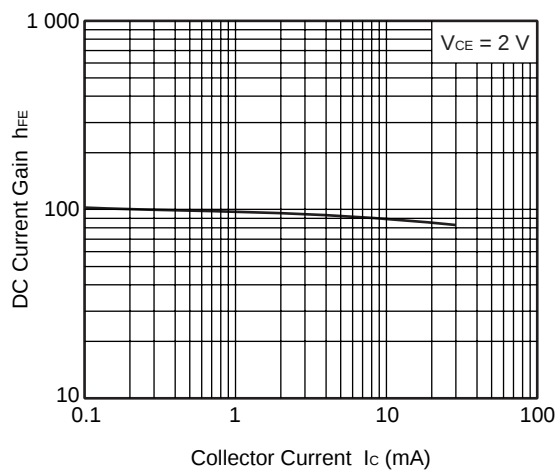


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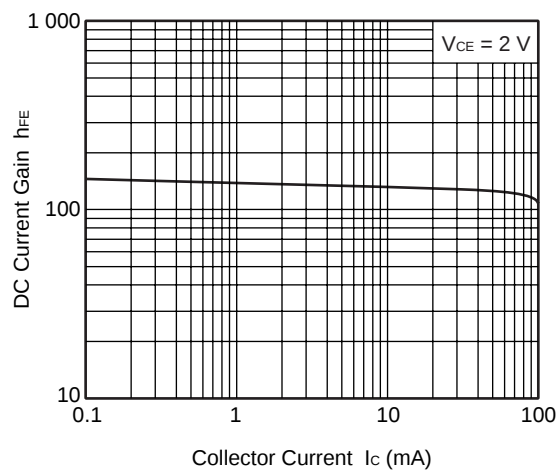
DC CURRENT GAIN vs.
COLLECTOR CURRENT



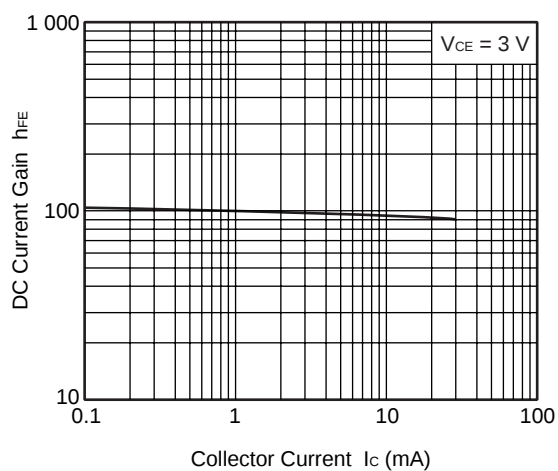
DC CURRENT GAIN vs.
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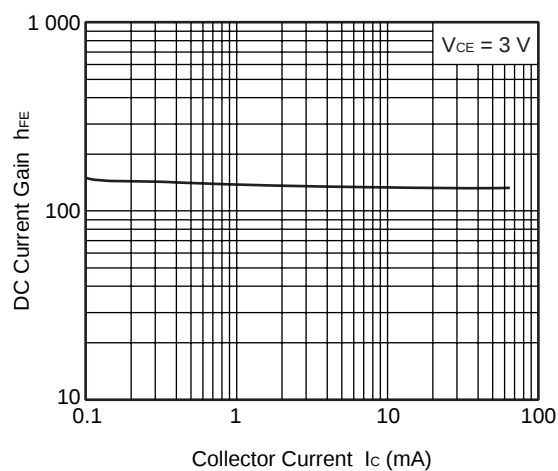
DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
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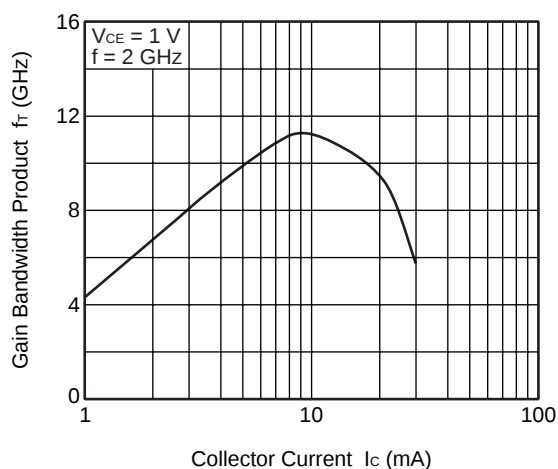


DC CURRENT GAIN vs.
COLLECTOR CURRENT



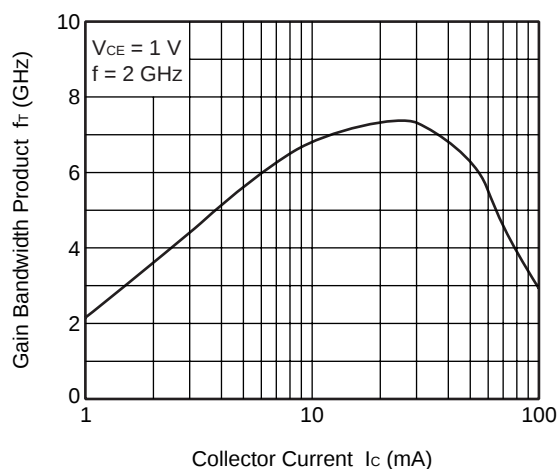
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GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT

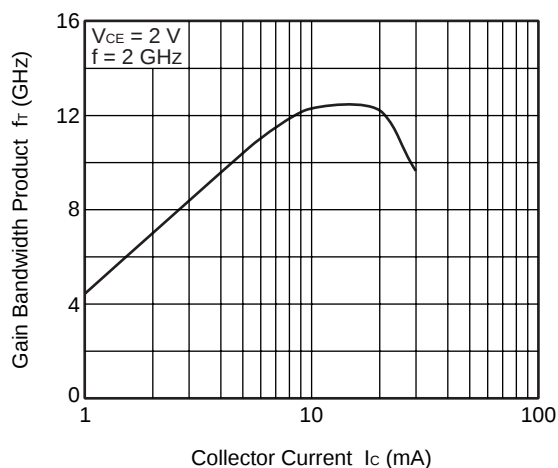


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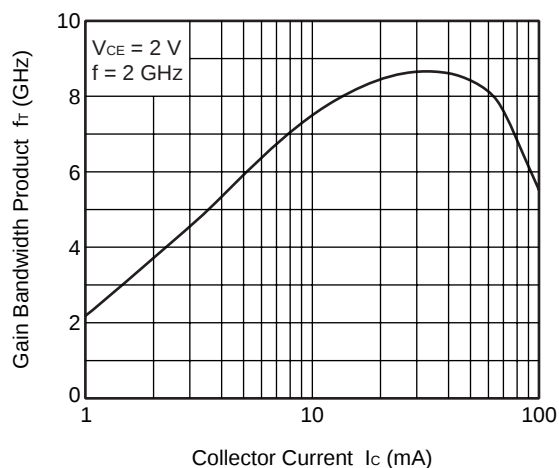
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



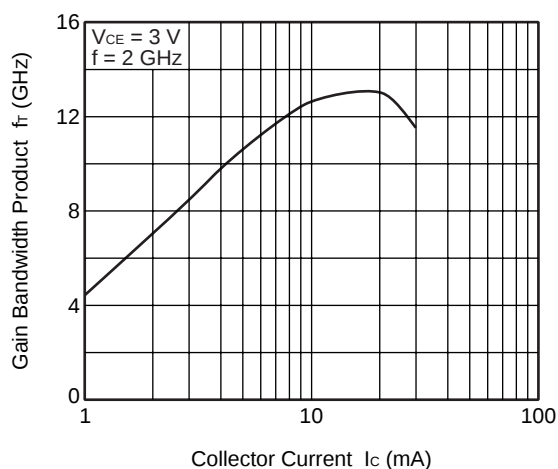
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



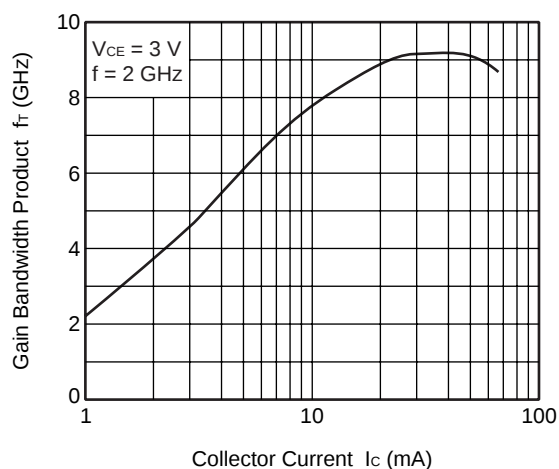
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT

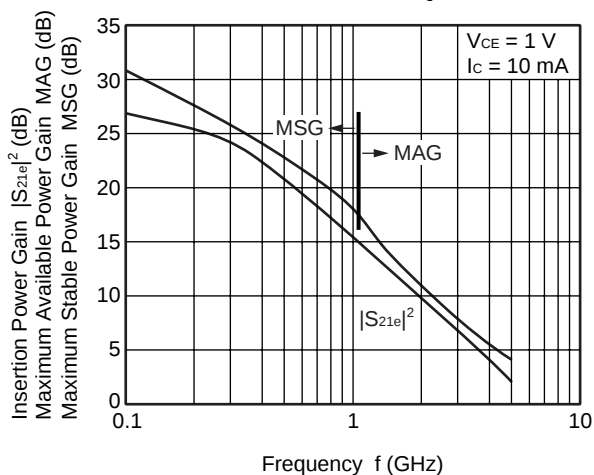


GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



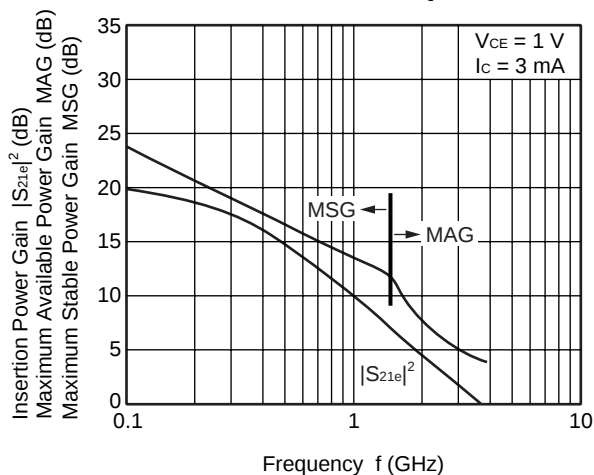
Q1

INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

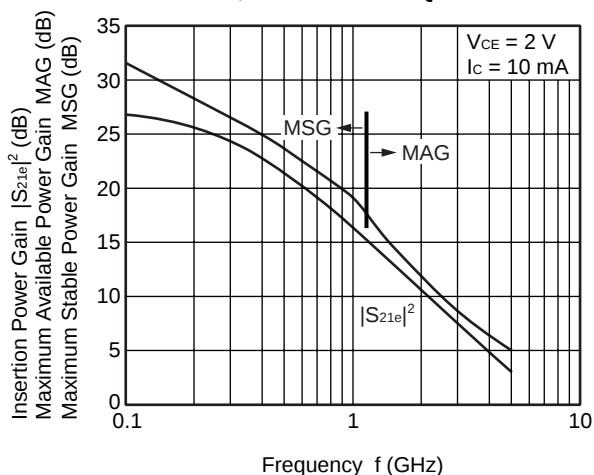


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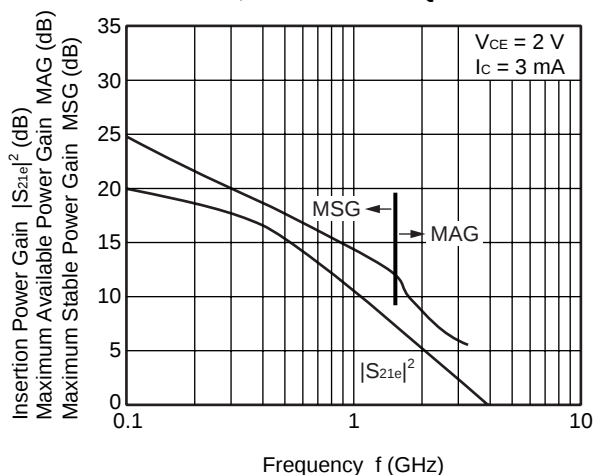
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MAG, MSG vs. FREQUENCY



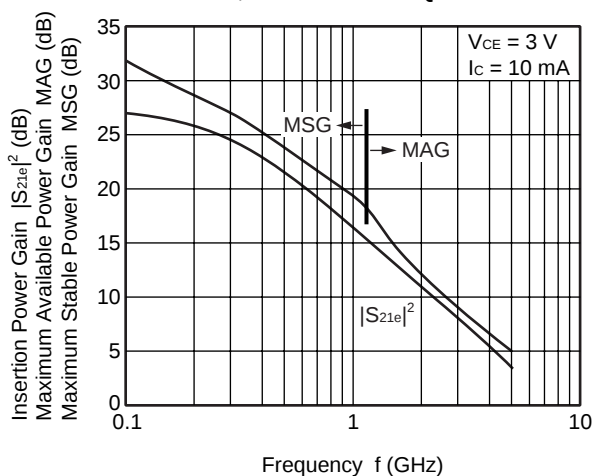
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



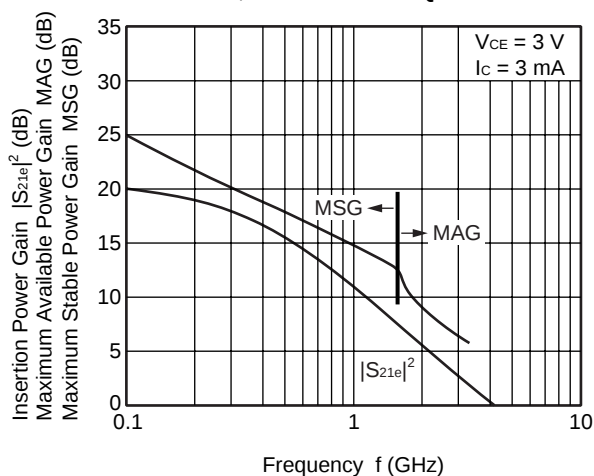
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

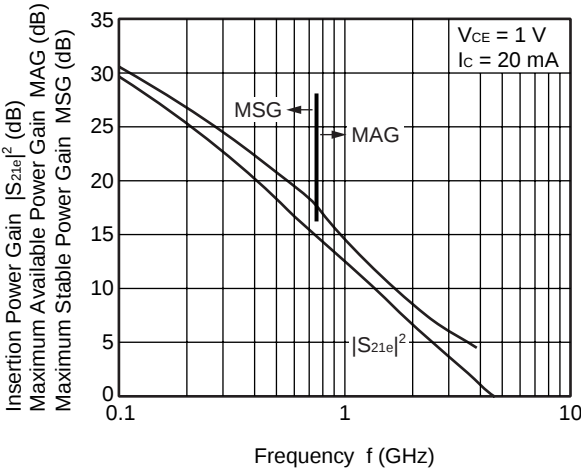


INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

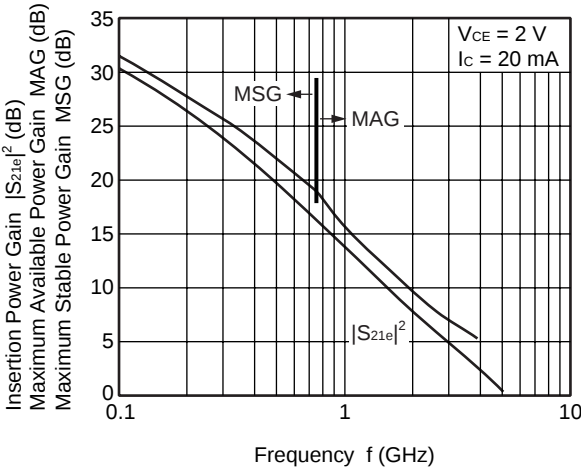


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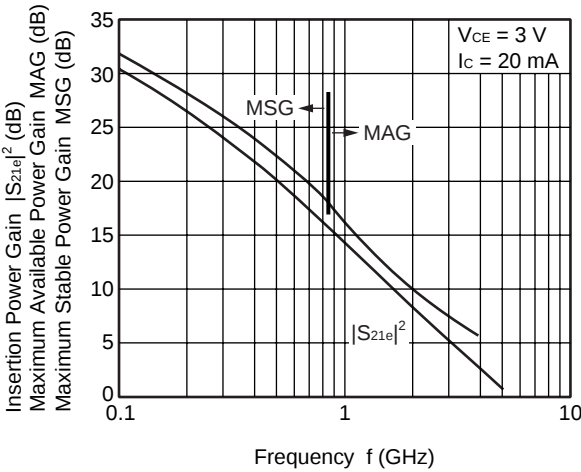
INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

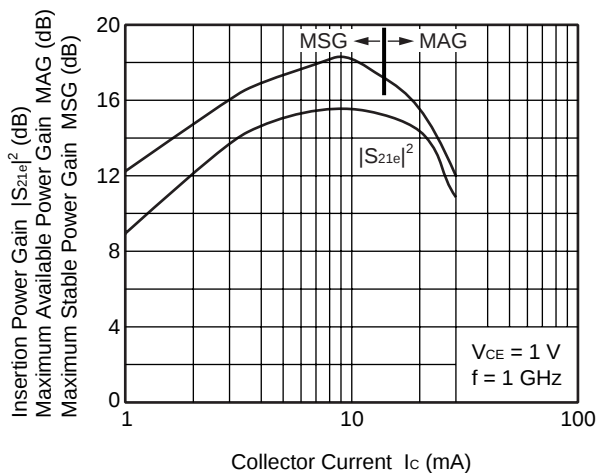


INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



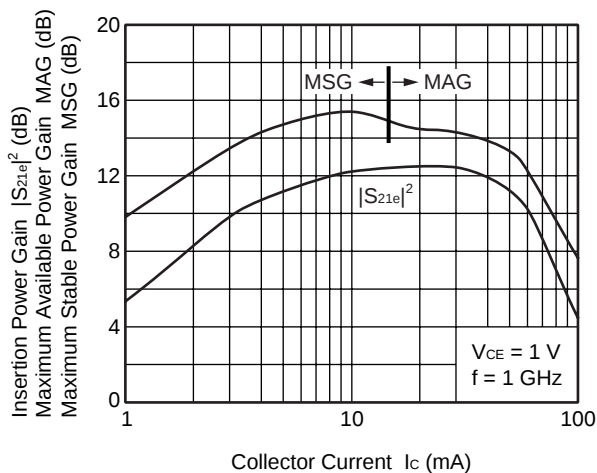
Q1

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT

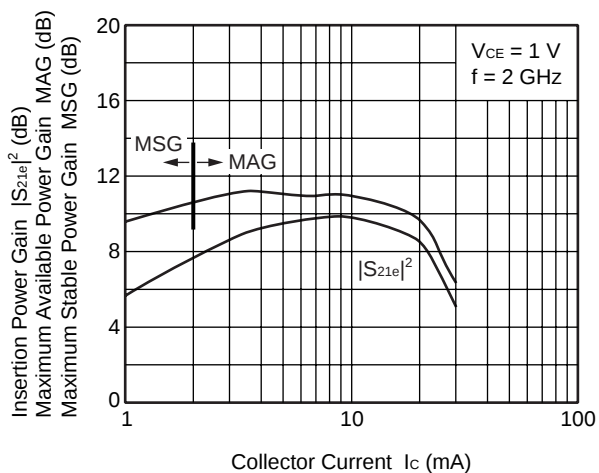


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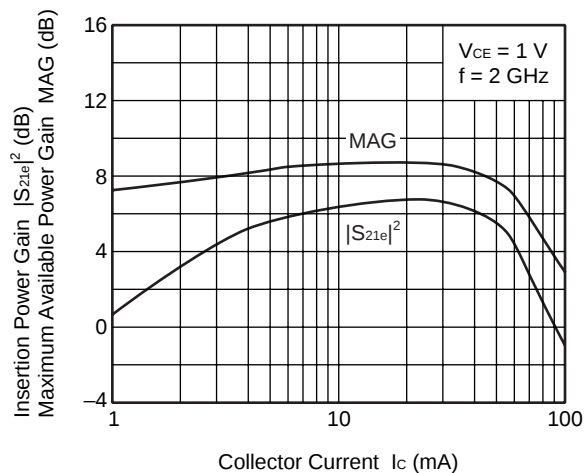
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



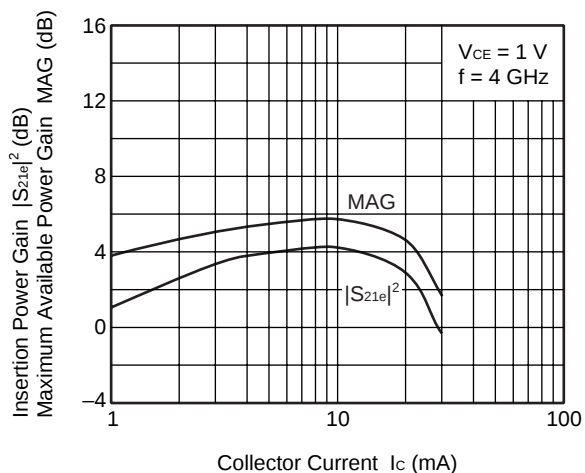
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



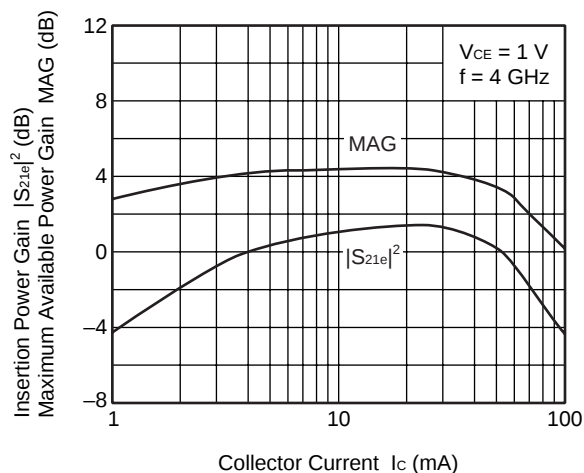
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT

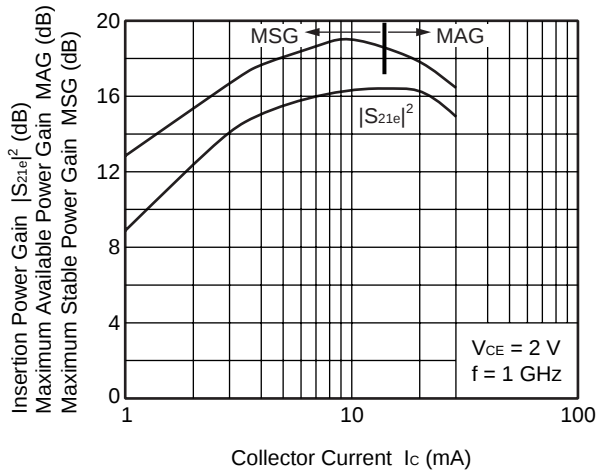


INSERTION POWER GAIN, MAG
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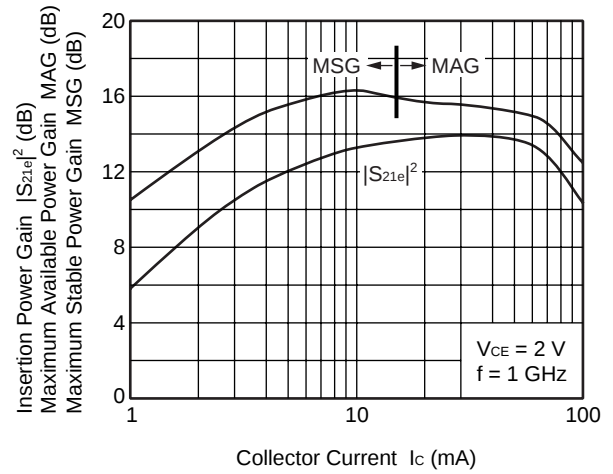
Q1

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT

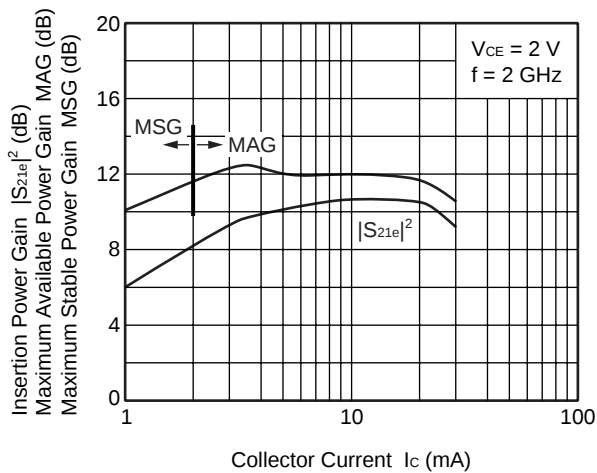


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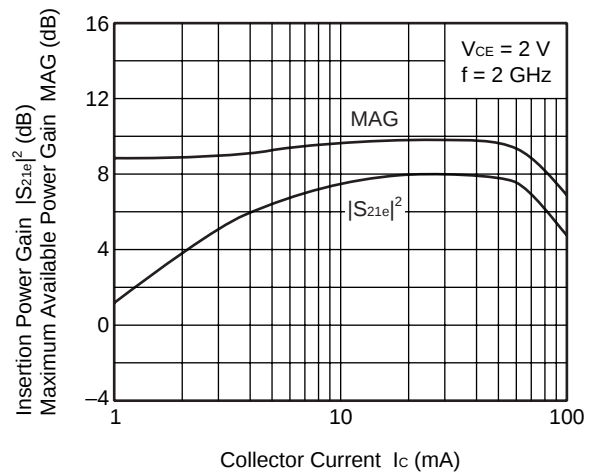
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



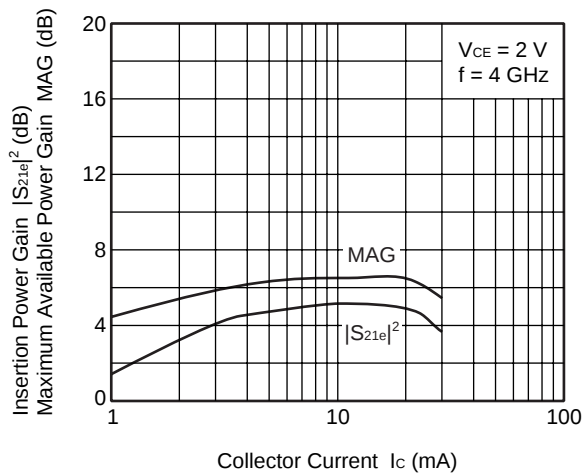
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



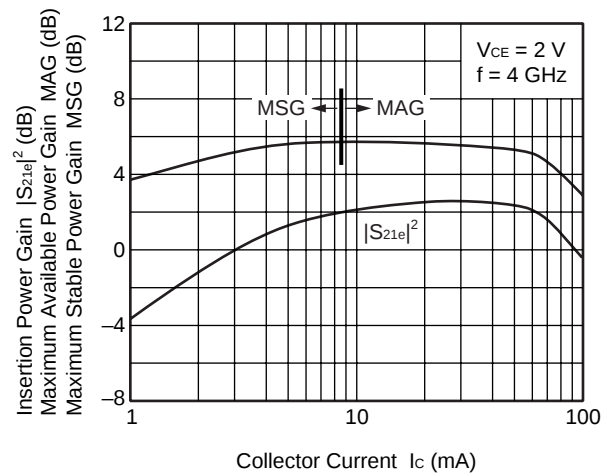
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT

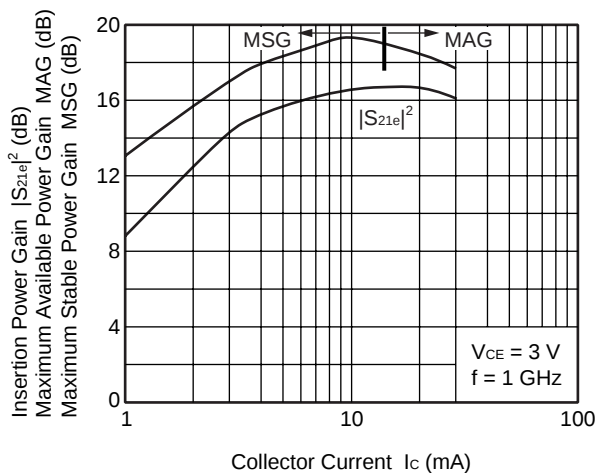


INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



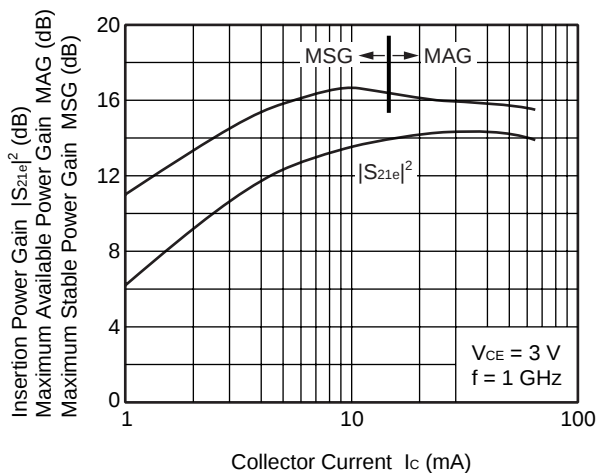
Q1

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT

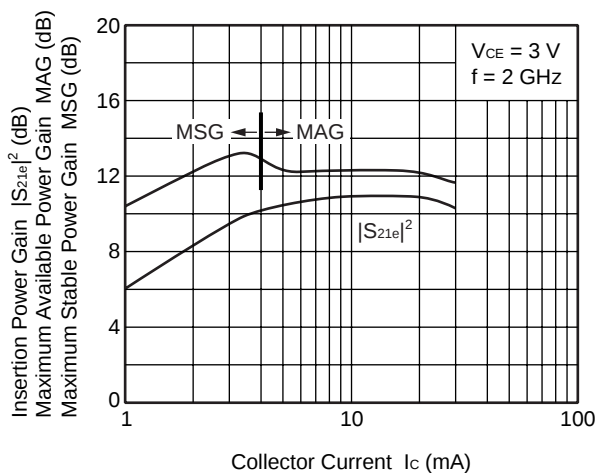


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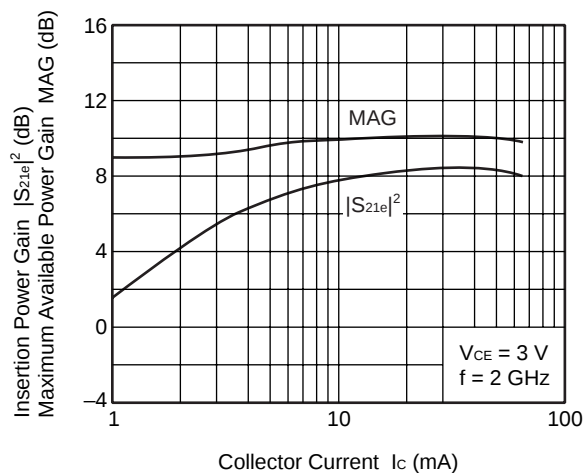
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



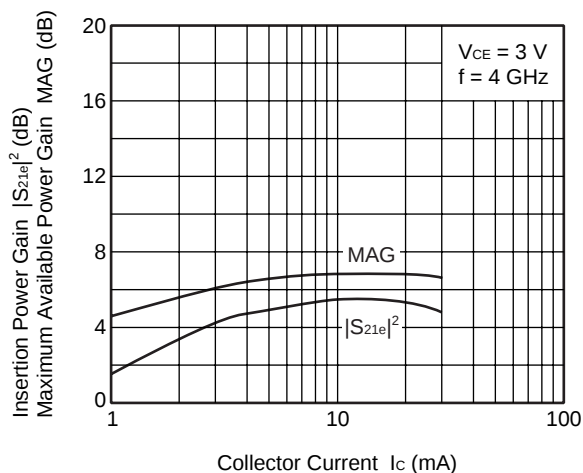
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



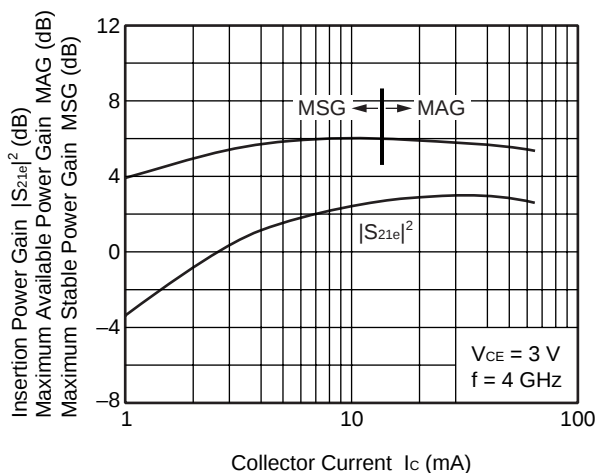
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT

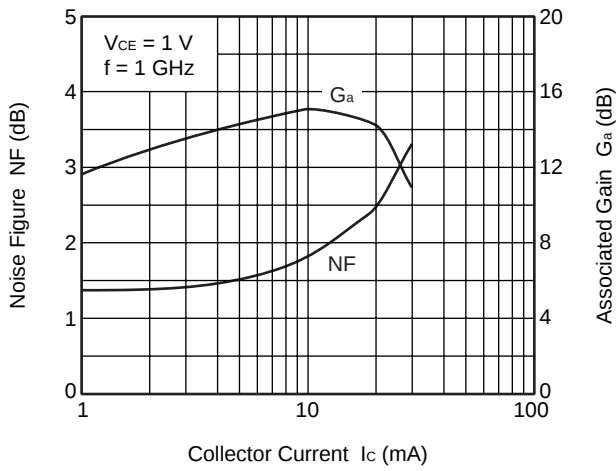


INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



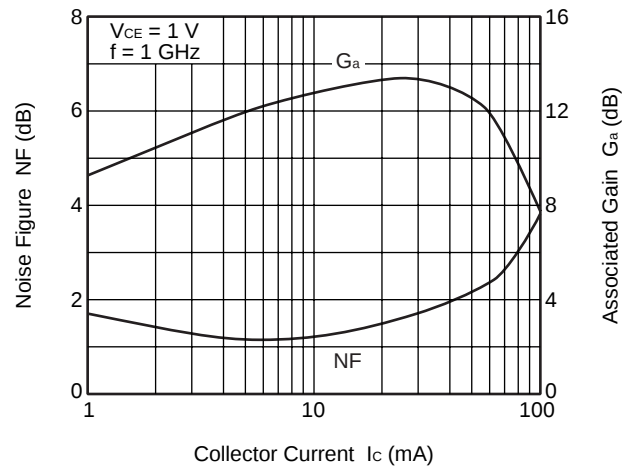
Q1

NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT

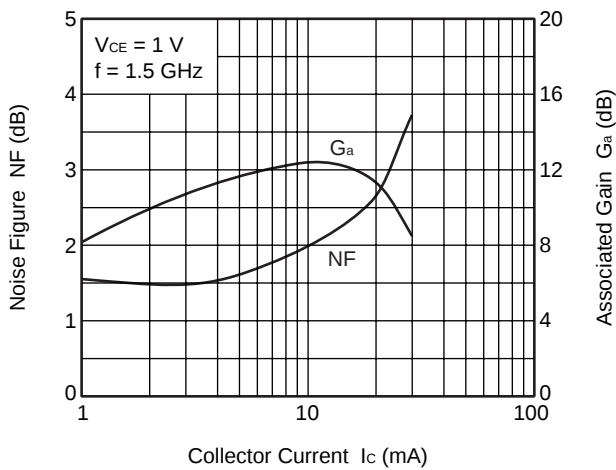


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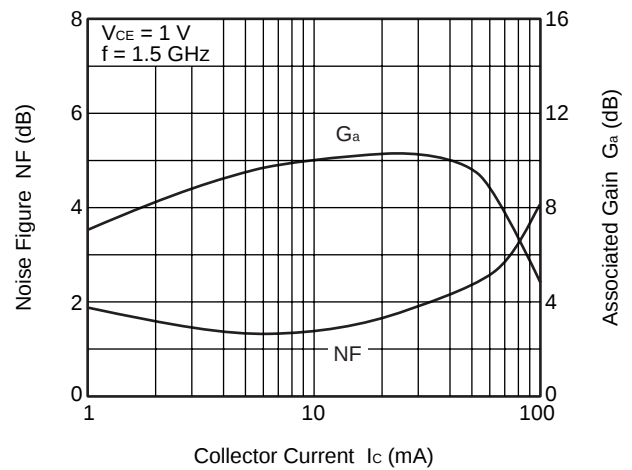
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



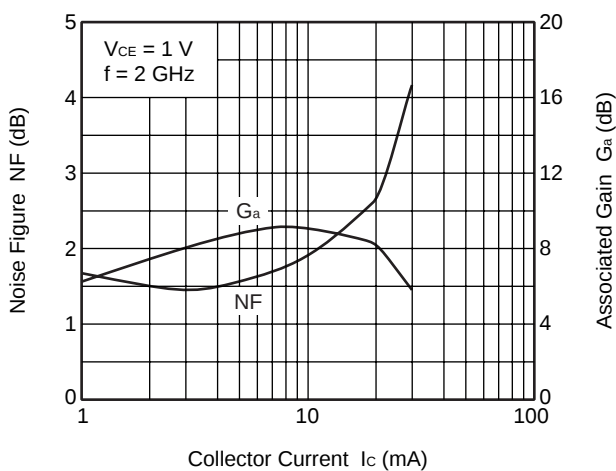
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



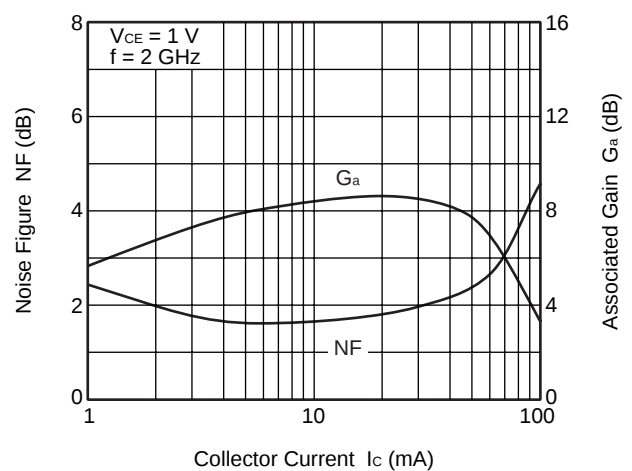
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT

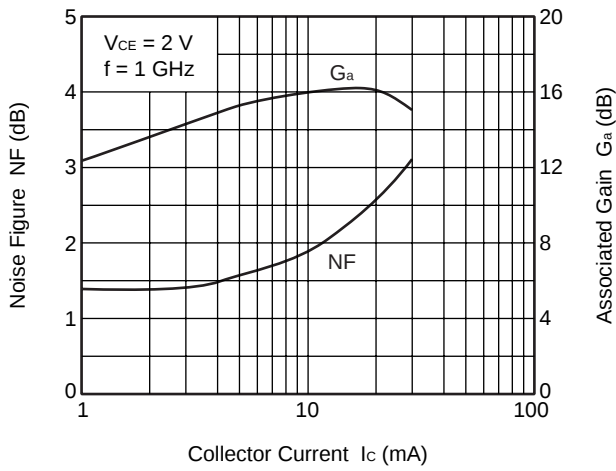


NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



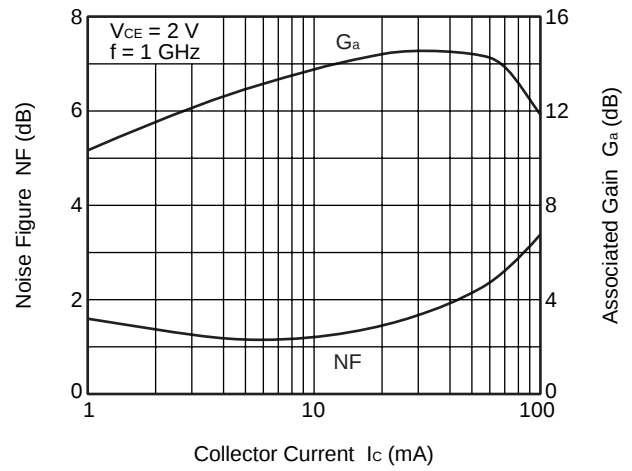
Q1

NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT

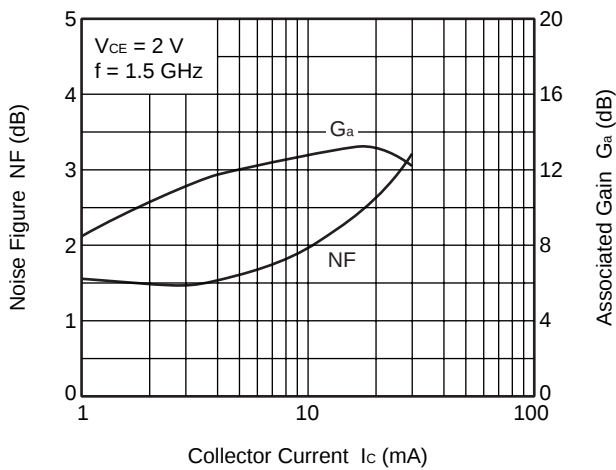


Q2

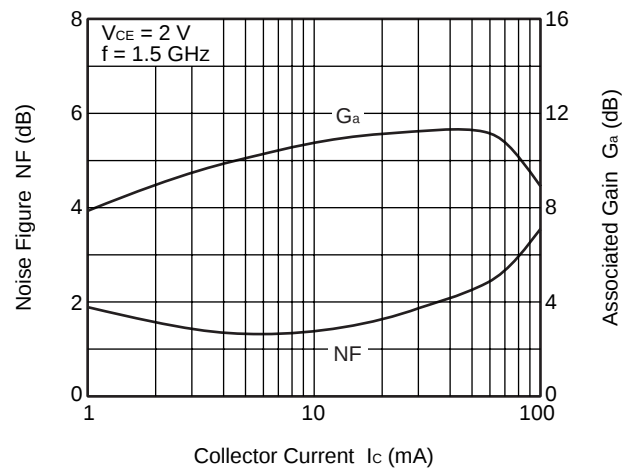
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



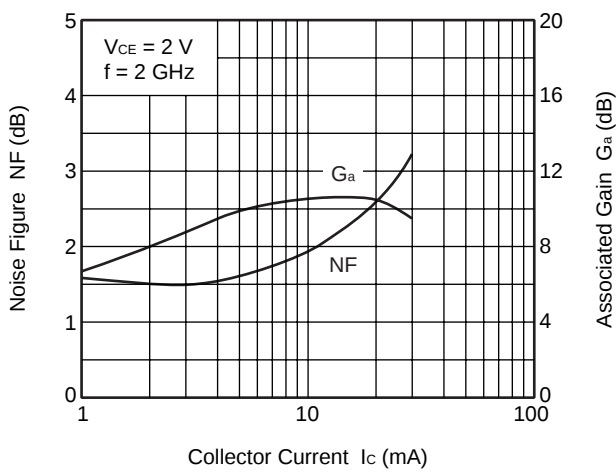
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



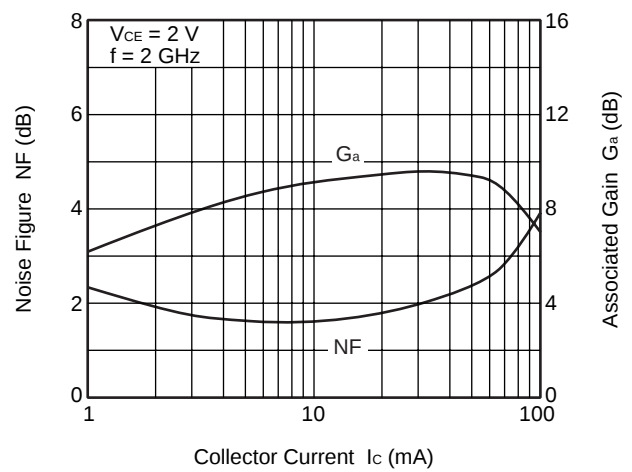
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT

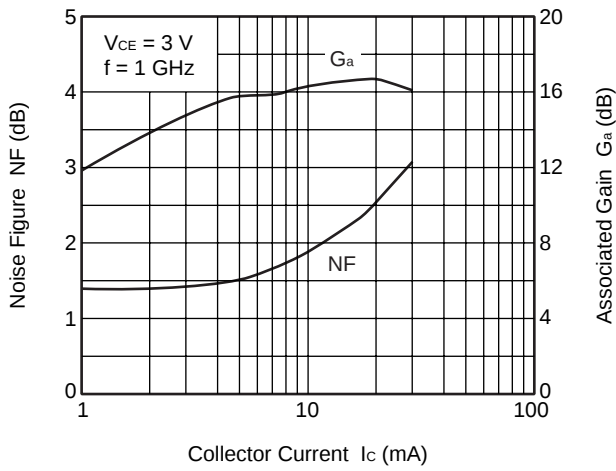


NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



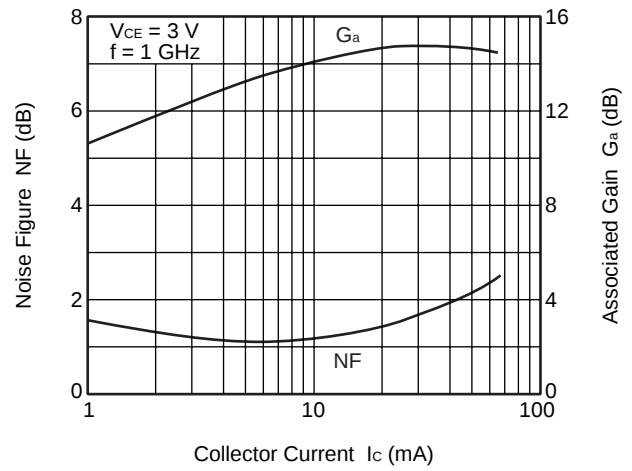
Q1

NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT

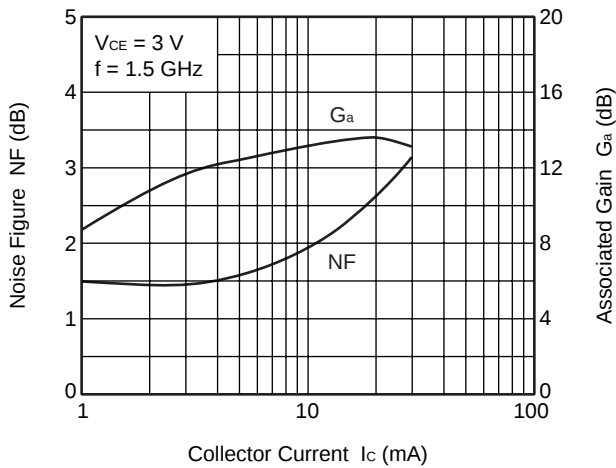


Q2

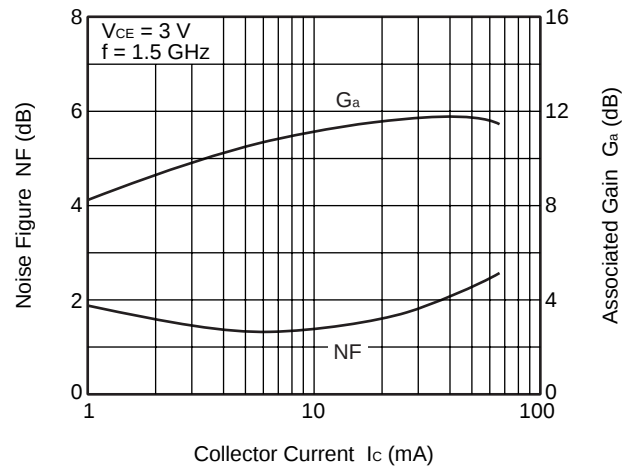
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



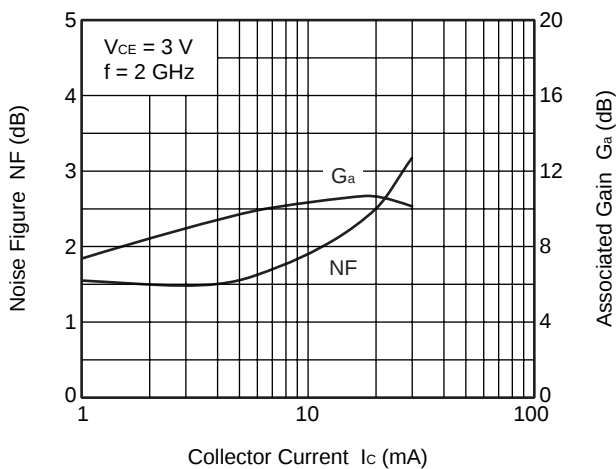
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



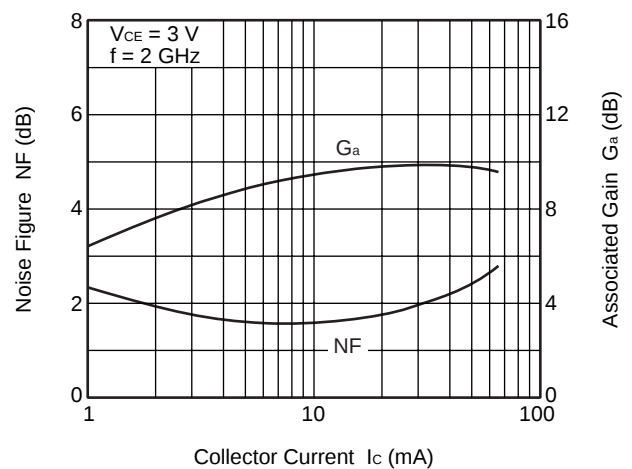
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS Q1

V_{CE} = 1 V, I_C = 1 mA, Z₀ = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.942	-7.5	3.602	171.5	0.022	84.4	0.992	-4.4
0.2	0.947	-15.3	3.530	166.0	0.044	79.8	0.986	-8.6
0.3	0.923	-23.2	3.489	158.7	0.064	75.0	0.970	-12.8
0.4	0.896	-30.5	3.394	152.1	0.084	70.1	0.950	-16.9
0.5	0.864	-38.2	3.311	145.7	0.101	65.4	0.925	-20.7
0.6	0.831	-45.5	3.218	139.1	0.118	61.2	0.899	-24.4
0.7	0.795	-52.7	3.113	133.5	0.133	57.2	0.870	-27.9
0.8	0.757	-59.6	3.007	127.4	0.146	53.4	0.840	-31.2
0.9	0.719	-66.5	2.907	121.8	0.157	50.0	0.810	-34.4
1.0	0.681	-73.3	2.804	116.3	0.167	46.6	0.781	-37.3
1.1	0.644	-80.2	2.700	111.2	0.176	43.6	0.752	-40.1
1.2	0.610	-87.0	2.595	106.5	0.183	40.8	0.723	-42.5
1.3	0.574	-94.1	2.490	101.8	0.189	38.1	0.694	-44.9
1.4	0.548	-100.4	2.395	97.3	0.195	35.5	0.669	-47.3
1.5	0.523	-107.8	2.307	93.0	0.199	33.2	0.644	-49.5
1.6	0.497	-114.7	2.237	88.7	0.203	31.1	0.619	-51.6
1.7	0.476	-121.6	2.146	84.8	0.207	29.1	0.596	-53.7
1.8	0.459	-128.3	2.070	80.8	0.209	27.4	0.575	-55.5
1.9	0.441	-135.3	1.996	77.1	0.212	25.6	0.555	-57.4
2.0	0.431	-142.4	1.931	73.4	0.214	24.3	0.535	-59.1
2.1	0.420	-149.1	1.867	69.6	0.214	23.1	0.517	-61.0
2.2	0.411	-155.1	1.807	66.6	0.214	22.0	0.500	-62.8
2.3	0.405	-161.9	1.747	63.3	0.214	20.6	0.484	-64.6
2.4	0.400	-168.2	1.691	60.0	0.213	19.6	0.468	-66.4
2.5	0.395	-174.4	1.636	57.0	0.213	18.6	0.452	-68.3
2.6	0.394	179.9	1.581	54.4	0.211	17.5	0.440	-70.3
2.7	0.384	174.6	1.520	51.8	0.207	17.1	0.428	-71.7
2.8	0.383	171.0	1.486	49.9	0.205	17.8	0.424	-72.9
2.9	0.392	167.8	1.453	47.6	0.207	18.0	0.420	-74.8
3.0	0.398	163.3	1.432	45.1	0.210	18.1	0.409	-77.5
4.0	0.486	127.6	1.130	21.9	0.227	16.4	0.345	-105.7
5.0	0.566	106.2	0.897	3.4	0.254	16.1	0.355	-143.1

V_{CE} = 1 V, I_C = 3 mA, Z₀ = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.869	-13.8	9.468	167.2	0.021	81.8	0.977	-8.6
0.2	0.844	-27.0	9.026	156.9	0.041	75.0	0.942	-16.4
0.3	0.780	-39.1	8.497	146.5	0.057	68.0	0.889	-23.6
0.4	0.716	-50.4	7.860	137.5	0.072	62.5	0.828	-29.7
0.5	0.657	-60.9	7.272	129.5	0.083	58.1	0.767	-34.8
0.6	0.594	-70.9	6.668	122.0	0.093	54.6	0.708	-39.1
0.7	0.539	-80.0	6.150	116.0	0.101	51.7	0.655	-42.6
0.8	0.494	-88.5	5.668	109.9	0.108	49.4	0.610	-45.6
0.9	0.452	-97.4	5.247	104.8	0.114	47.6	0.567	-48.3
1.0	0.415	-105.5	4.872	99.9	0.120	46.3	0.531	-50.5
1.1	0.385	-113.8	4.546	95.6	0.125	45.1	0.499	-52.7
1.2	0.361	-122.2	4.234	91.7	0.130	44.1	0.471	-54.5
1.3	0.339	-130.1	3.961	87.8	0.135	43.2	0.445	-56.3
1.4	0.327	-137.7	3.729	84.4	0.140	42.3	0.420	-58.2
1.5	0.319	-145.9	3.513	81.1	0.144	41.7	0.399	-59.9
1.6	0.309	-153.5	3.341	77.8	0.148	41.1	0.381	-61.8
1.7	0.307	-160.9	3.163	74.7	0.153	40.6	0.362	-63.5
1.8	0.306	-167.8	3.010	71.8	0.158	40.1	0.345	-65.1
1.9	0.307	-174.3	2.863	69.0	0.162	39.7	0.329	-66.9
2.0	0.310	179.6	2.736	66.3	0.167	39.3	0.314	-68.6
2.1	0.313	173.8	2.622	63.4	0.171	39.0	0.299	-70.5
2.2	0.316	169.0	2.514	61.0	0.175	38.5	0.286	-72.6
2.3	0.325	163.1	2.410	58.3	0.179	38.0	0.274	-74.7
2.4	0.327	158.7	2.315	55.9	0.183	37.4	0.260	-77.0
2.5	0.334	153.8	2.232	53.5	0.186	37.0	0.247	-79.2
2.6	0.340	149.9	2.142	51.4	0.189	36.3	0.237	-81.4
2.7	0.338	145.3	2.055	49.4	0.191	36.3	0.226	-83.3
2.8	0.341	142.8	1.996	48.0	0.195	36.9	0.223	-84.2
2.9	0.349	141.6	1.950	45.9	0.202	36.7	0.222	-86.9
3.0	0.360	138.7	1.914	43.8	0.209	36.2	0.214	-90.7
4.0	0.464	114.6	1.472	24.2	0.256	28.5	0.181	-134.3
5.0	0.553	99.2	1.169	8.1	0.296	21.2	0.234	-176.7

$V_{CE} = 1\text{ V}$, $I_C = 5\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.804	-18.0	14.154	163.1	0.020	79.7	0.959	-12.0
0.2	0.743	-35.8	13.017	150.0	0.038	71.7	0.891	-22.4
0.3	0.656	-51.2	11.714	137.8	0.051	64.5	0.805	-30.8
0.4	0.578	-64.4	10.376	127.9	0.063	59.8	0.720	-37.2
0.5	0.510	-76.3	9.244	119.7	0.071	56.6	0.644	-41.9
0.6	0.451	-87.3	8.211	112.6	0.079	54.4	0.580	-45.7
0.7	0.404	-97.5	7.385	107.0	0.086	52.8	0.527	-48.5
0.8	0.367	-107.1	6.661	101.8	0.091	51.9	0.484	-50.7
0.9	0.333	-116.5	6.059	97.2	0.097	51.4	0.446	-52.7
1.0	0.310	-125.4	5.559	93.0	0.103	50.8	0.415	-54.5
1.1	0.292	-134.5	5.130	89.2	0.109	50.4	0.388	-56.0
1.2	0.281	-142.6	4.750	85.8	0.114	50.0	0.365	-57.5
1.3	0.269	-151.3	4.403	82.6	0.120	49.6	0.345	-59.0
1.4	0.267	-158.7	4.115	79.5	0.126	49.1	0.327	-60.6
1.5	0.269	-166.6	3.867	76.7	0.131	48.6	0.310	-62.3
1.6	0.270	-173.8	3.665	73.8	0.137	48.5	0.294	-64.2
1.7	0.272	-179.8	3.457	71.1	0.143	48.0	0.278	-66.0
1.8	0.279	-173.9	3.283	68.5	0.149	47.5	0.265	-67.8
1.9	0.283	-168.5	3.117	66.0	0.155	47.0	0.252	-69.8
2.0	0.294	-163.6	2.972	63.5	0.160	46.5	0.239	-71.9
2.1	0.299	-159.2	2.838	60.9	0.166	46.1	0.226	-74.3
2.2	0.306	-155.2	2.720	58.8	0.171	45.6	0.215	-76.8
2.3	0.315	-150.4	2.599	56.5	0.177	44.8	0.204	-79.4
2.4	0.323	-146.7	2.492	54.2	0.182	44.1	0.193	-82.3
2.5	0.331	-142.6	2.401	52.0	0.186	43.4	0.182	-85.4
2.6	0.337	-139.2	2.299	50.1	0.191	42.7	0.172	-88.3
2.7	0.339	-135.2	2.206	48.3	0.194	42.5	0.162	-90.6
2.8	0.341	-133.6	2.141	47.1	0.200	42.9	0.160	-91.8
2.9	0.349	-133.0	2.092	45.1	0.208	42.3	0.161	-95.3
3.0	0.359	-130.6	2.053	43.0	0.215	41.6	0.157	-100.1
4.0	0.466	-110.4	1.572	24.8	0.267	31.7	0.153	-154.5
5.0	0.552	-97.1	1.248	9.5	0.309	22.7	0.232	-167.2

$V_{CE} = 1\text{ V}$, $I_C = 7\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.734	-22.2	17.839	159.8	0.019	79.6	0.940	-14.7
0.2	0.661	-43.6	15.818	144.7	0.036	69.6	0.844	-26.7
0.3	0.566	-60.4	13.713	131.7	0.047	63.1	0.736	-35.4
0.4	0.485	-75.5	11.756	121.9	0.056	59.1	0.641	-41.5
0.5	0.420	-88.1	10.221	113.8	0.064	57.3	0.563	-45.5
0.6	0.371	-99.5	8.926	107.3	0.071	55.9	0.502	-48.5
0.7	0.333	-110.6	7.932	102.2	0.077	55.2	0.452	-50.7
0.8	0.302	-120.1	7.085	97.3	0.083	55.0	0.413	-52.4
0.9	0.280	-130.6	6.405	93.1	0.090	54.7	0.381	-53.9
1.0	0.264	-139.9	5.841	89.3	0.096	54.7	0.354	-55.3
1.1	0.256	-148.9	5.358	85.9	0.102	54.4	0.332	-56.7
1.2	0.251	-157.2	4.946	82.7	0.108	54.1	0.312	-58.1
1.3	0.248	-165.4	4.576	79.7	0.115	53.9	0.295	-59.5
1.4	0.248	-171.6	4.279	76.8	0.121	53.2	0.279	-61.1
1.5	0.256	-178.5	4.000	74.2	0.127	52.8	0.265	-62.9
1.6	0.261	-175.2	3.788	71.6	0.133	52.5	0.251	-64.8
1.7	0.266	-169.0	3.567	69.2	0.140	52.0	0.238	-66.8
1.8	0.276	-163.9	3.385	66.7	0.146	51.4	0.226	-68.8
1.9	0.282	-159.4	3.214	64.5	0.153	50.8	0.214	-70.8
2.0	0.292	-155.5	3.061	62.2	0.159	50.2	0.202	-73.1
2.1	0.301	-151.3	2.922	59.6	0.165	49.7	0.192	-75.9
2.2	0.305	-148.2	2.795	57.7	0.171	49.0	0.182	-78.8
2.3	0.317	-144.2	2.671	55.5	0.177	48.2	0.172	-81.9
2.4	0.326	-140.7	2.559	53.2	0.182	47.3	0.161	-85.4
2.5	0.335	-137.5	2.463	51.2	0.188	46.5	0.152	-89.1
2.6	0.340	-134.2	2.360	49.3	0.193	45.7	0.143	-92.6
2.7	0.344	-131.0	2.264	47.7	0.197	45.4	0.133	-95.5
2.8	0.344	-128.9	2.195	46.4	0.203	45.5	0.132	-97.0
2.9	0.352	-128.5	2.143	44.5	0.211	44.8	0.134	-100.9
3.0	0.365	-126.7	2.103	42.5	0.219	44.0	0.131	-106.8
4.0	0.470	-108.7	1.608	24.7	0.272	32.9	0.148	-165.7
5.0	0.556	-95.9	1.277	9.8	0.314	23.4	0.238	-160.2

$V_{CE} = 1\text{ V}$, $I_C = 10\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.639	-30.0	21.992	155.9	0.018	74.1	0.911	-17.8
0.2	0.565	-52.4	18.566	138.6	0.033	67.0	0.783	-31.2
0.3	0.463	-71.9	15.405	125.1	0.042	62.6	0.657	-39.7
0.4	0.393	-88.1	12.789	115.7	0.051	59.7	0.558	-44.9
0.5	0.340	-101.9	10.885	108.3	0.057	59.3	0.484	-48.0
0.6	0.302	-114.3	9.379	102.3	0.064	58.9	0.429	-50.1
0.7	0.276	-126.0	8.244	97.6	0.071	58.8	0.385	-51.4
0.8	0.258	-136.4	7.308	93.2	0.077	58.9	0.353	-52.6
0.9	0.246	-146.9	6.588	89.5	0.084	58.8	0.325	-53.7
1.0	0.237	-155.7	5.973	85.9	0.091	58.7	0.304	-54.7
1.1	0.237	-164.1	5.477	82.8	0.098	58.5	0.285	-55.8
1.2	0.239	-171.3	5.037	80.0	0.104	58.2	0.269	-57.1
1.3	0.239	-178.7	4.653	77.3	0.111	57.7	0.254	-58.4
1.4	0.246	175.5	4.339	74.7	0.118	57.2	0.241	-60.1
1.5	0.256	170.5	4.057	72.3	0.125	56.6	0.229	-61.9
1.6	0.261	164.6	3.837	69.7	0.131	56.1	0.217	-64.0
1.7	0.271	160.0	3.612	67.4	0.138	55.5	0.206	-66.1
1.8	0.282	155.6	3.424	65.2	0.145	54.7	0.195	-68.3
1.9	0.287	151.8	3.243	62.9	0.152	53.9	0.185	-70.8
2.0	0.299	148.6	3.090	60.8	0.159	53.2	0.175	-73.4
2.1	0.307	145.3	2.952	58.4	0.166	52.5	0.165	-76.5
2.2	0.314	142.0	2.820	56.5	0.171	51.6	0.156	-79.6
2.3	0.325	139.1	2.694	54.4	0.178	50.8	0.147	-83.3
2.4	0.335	135.9	2.579	52.2	0.184	49.8	0.138	-87.4
2.5	0.343	133.1	2.486	50.2	0.189	48.9	0.128	-92.1
2.6	0.347	130.2	2.379	48.4	0.194	48.1	0.121	-96.0
2.7	0.355	127.0	2.282	46.8	0.199	47.7	0.113	-99.6
2.8	0.354	125.6	2.212	45.8	0.205	47.5	0.112	-101.7
2.9	0.361	125.3	2.160	43.7	0.214	46.7	0.114	-106.3
3.0	0.373	123.8	2.120	41.9	0.221	45.8	0.113	-112.6
4.0	0.478	106.9	1.619	24.4	0.276	34.2	0.147	-173.7
5.0	0.561	94.8	1.282	10.0	0.318	24.1	0.244	155.3

$V_{CE} = 1\text{ V}$, $I_C = 20\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.457	-51.4	27.029	145.4	0.016	67.4	0.799	-25.2
0.2	0.382	-84.9	20.070	125.3	0.027	64.3	0.611	-38.8
0.3	0.320	-109.1	15.319	112.8	0.035	62.3	0.482	-44.3
0.4	0.292	-128.1	12.104	104.7	0.043	62.8	0.400	-46.4
0.5	0.273	-142.3	10.018	98.6	0.049	63.5	0.347	-46.9
0.6	0.268	-153.4	8.485	93.6	0.057	64.1	0.310	-46.9
0.7	0.267	-163.1	7.355	89.9	0.064	64.7	0.283	-47.0
0.8	0.267	-171.2	6.486	86.3	0.071	64.7	0.263	-47.2
0.9	0.272	-178.6	5.806	83.0	0.078	64.6	0.246	-47.6
1.0	0.273	175.3	5.243	80.0	0.086	64.3	0.233	-48.1
1.1	0.280	169.9	4.785	77.2	0.093	63.9	0.221	-49.1
1.2	0.287	165.5	4.399	74.6	0.100	63.4	0.211	-50.0
1.3	0.295	160.6	4.053	72.1	0.108	62.7	0.202	-51.3
1.4	0.303	157.2	3.787	69.7	0.115	61.9	0.193	-53.1
1.5	0.315	153.6	3.536	67.4	0.122	61.1	0.184	-55.3
1.6	0.323	150.2	3.333	65.0	0.129	60.5	0.174	-57.5
1.7	0.329	146.5	3.135	62.9	0.136	59.7	0.166	-59.8
1.8	0.341	143.7	2.971	60.7	0.144	58.8	0.157	-62.2
1.9	0.349	140.9	2.815	58.6	0.151	57.8	0.149	-65.0
2.0	0.358	138.5	2.682	56.6	0.158	56.9	0.140	-68.0
2.1	0.367	135.7	2.553	54.2	0.165	56.0	0.132	-71.6
2.2	0.373	134.0	2.444	52.4	0.171	55.1	0.125	-75.5
2.3	0.383	131.4	2.334	50.3	0.178	54.0	0.117	-79.7
2.4	0.392	128.8	2.236	48.2	0.184	52.9	0.109	-84.9
2.5	0.402	126.4	2.152	46.2	0.190	52.0	0.101	-90.0
2.6	0.406	124.4	2.061	44.6	0.195	50.9	0.095	-95.5
2.7	0.410	121.6	1.975	43.2	0.200	50.5	0.087	-99.9
2.8	0.411	120.5	1.918	42.0	0.207	50.4	0.088	-101.9
2.9	0.418	120.2	1.876	40.0	0.216	49.4	0.093	-108.2
3.0	0.426	118.8	1.841	38.1	0.224	48.4	0.093	-116.3
4.0	0.523	103.7	1.406	21.1	0.279	35.9	0.143	-179.0
5.0	0.596	92.0	1.116	6.8	0.323	25.5	0.249	153.4

$V_{CE} = 2\text{ V}$, $I_C = 1\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.957	-7.3	3.472	172.2	0.018	83.4	0.995	-3.7
0.2	0.954	-14.0	3.430	167.1	0.036	81.3	0.989	-7.3
0.3	0.932	-21.1	3.400	160.4	0.055	76.3	0.976	-10.8
0.4	0.908	-28.0	3.320	154.2	0.071	71.8	0.959	-14.3
0.5	0.877	-34.7	3.254	148.1	0.087	67.7	0.941	-17.6
0.6	0.847	-41.5	3.173	141.9	0.101	63.7	0.919	-20.9
0.7	0.813	-48.3	3.086	136.5	0.115	60.0	0.895	-24.0
0.8	0.780	-54.8	2.996	130.7	0.126	56.4	0.872	-26.9
0.9	0.743	-61.3	2.908	125.3	0.137	53.1	0.845	-29.6
1.0	0.706	-67.7	2.818	120.0	0.146	50.0	0.820	-32.3
1.1	0.669	-74.3	2.729	115.0	0.155	47.0	0.793	-34.8
1.2	0.637	-80.6	2.635	110.5	0.162	44.2	0.768	-36.9
1.3	0.601	-87.0	2.531	105.8	0.168	41.6	0.744	-39.1
1.4	0.571	-93.4	2.443	101.5	0.174	39.1	0.720	-41.3
1.5	0.544	-100.3	2.360	97.1	0.178	36.8	0.696	-43.2
1.6	0.517	-106.7	2.300	92.9	0.182	34.7	0.673	-45.2
1.7	0.493	-113.6	2.210	88.8	0.186	32.8	0.651	-47.0
1.8	0.471	-120.3	2.136	84.9	0.189	31.1	0.633	-48.7
1.9	0.453	-127.2	2.065	81.2	0.191	29.4	0.615	-50.5
2.0	0.438	-133.8	2.000	77.6	0.193	28.1	0.596	-52.0
2.1	0.423	-140.3	1.939	73.8	0.194	27.0	0.578	-53.6
2.2	0.413	-146.6	1.880	70.6	0.194	25.8	0.562	-55.3
2.3	0.403	-153.7	1.823	67.2	0.194	24.5	0.546	-56.8
2.4	0.394	-160.2	1.763	64.1	0.194	23.4	0.531	-58.4
2.5	0.389	-166.6	1.709	61.1	0.193	22.4	0.514	-60.2
2.6	0.383	-172.6	1.650	58.2	0.191	21.4	0.502	-61.8
2.7	0.373	-178.4	1.591	55.8	0.188	21.0	0.490	-63.1
2.8	0.368	177.9	1.554	54.0	0.185	21.9	0.487	-64.1
2.9	0.376	174.3	1.520	51.6	0.188	22.3	0.483	-65.8
3.0	0.379	169.8	1.497	49.0	0.191	22.4	0.472	-68.4
4.0	0.464	131.1	1.186	25.4	0.211	21.7	0.403	-92.9
5.0	0.549	108.5	0.948	6.5	0.245	22.0	0.390	-127.8

$V_{CE} = 2\text{ V}$, $I_C = 3\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.883	-12.3	9.482	167.9	0.017	79.9	0.982	-7.2
0.2	0.845	-24.1	9.101	158.4	0.034	76.5	0.953	-13.9
0.3	0.794	-35.1	8.623	148.6	0.049	70.3	0.907	-19.9
0.4	0.734	-45.9	8.047	140.0	0.062	65.2	0.855	-25.2
0.5	0.674	-55.5	7.500	132.1	0.072	60.9	0.801	-29.5
0.6	0.616	-64.6	6.932	124.9	0.081	57.4	0.749	-33.1
0.7	0.560	-73.1	6.428	118.8	0.089	54.7	0.700	-36.4
0.8	0.508	-81.2	5.945	112.9	0.095	52.5	0.659	-38.9
0.9	0.463	-89.0	5.529	107.8	0.101	50.8	0.620	-41.0
1.0	0.424	-96.6	5.137	102.9	0.107	49.5	0.586	-43.1
1.1	0.392	-104.3	4.825	98.5	0.112	48.3	0.556	-44.8
1.2	0.363	-111.8	4.503	94.6	0.116	47.3	0.528	-46.3
1.3	0.337	-119.4	4.217	90.9	0.121	46.5	0.503	-47.7
1.4	0.319	-127.2	3.976	87.4	0.125	45.7	0.482	-49.2
1.5	0.308	-135.0	3.754	84.0	0.130	45.0	0.462	-50.6
1.6	0.293	-142.7	3.579	80.8	0.134	44.6	0.441	-51.9
1.7	0.283	-150.6	3.389	77.8	0.139	44.0	0.424	-53.4
1.8	0.280	-158.3	3.228	74.8	0.143	43.5	0.409	-54.5
1.9	0.279	-165.3	3.073	72.1	0.148	43.2	0.394	-55.9
2.0	0.278	-171.6	2.942	69.4	0.152	42.9	0.379	-57.1
2.1	0.279	-177.9	2.823	66.5	0.156	42.6	0.365	-58.6
2.2	0.281	176.2	2.709	64.1	0.160	42.1	0.352	-60.2
2.3	0.286	170.2	2.599	61.6	0.164	41.7	0.338	-61.7
2.4	0.292	164.7	2.499	59.1	0.167	41.2	0.325	-63.3
2.5	0.296	158.8	2.406	56.7	0.171	40.7	0.312	-64.9
2.6	0.300	154.3	2.309	54.4	0.174	40.1	0.301	-66.4
2.7	0.302	149.2	2.218	52.6	0.176	40.2	0.290	-67.5
2.8	0.301	146.9	2.156	51.2	0.180	40.9	0.288	-68.1
2.9	0.310	145.5	2.105	49.1	0.186	40.8	0.286	-70.2
3.0	0.319	142.4	2.066	47.0	0.193	40.4	0.277	-73.1
4.0	0.430	116.9	1.595	27.2	0.242	33.1	0.214	-106.7
5.0	0.525	100.8	1.278	10.6	0.286	25.8	0.224	-151.6

$V_{CE} = 2\text{ V}$, $I_C = 5\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.798	-16.1	14.241	164.4	0.016	77.7	0.967	-9.9
0.2	0.759	-32.2	13.202	152.1	0.032	73.3	0.911	-18.7
0.3	0.678	-45.7	12.011	140.4	0.044	67.2	0.837	-25.8
0.4	0.601	-57.9	10.754	130.8	0.054	62.4	0.761	-31.2
0.5	0.531	-68.5	9.663	122.7	0.063	59.4	0.694	-35.4
0.6	0.468	-78.4	8.647	115.6	0.070	57.2	0.635	-38.4
0.7	0.414	-87.8	7.815	110.0	0.076	55.7	0.584	-40.6
0.8	0.372	-96.3	7.086	104.6	0.082	54.8	0.543	-42.4
0.9	0.335	-105.1	6.475	99.9	0.087	54.0	0.508	-43.8
1.0	0.305	-113.2	5.944	95.6	0.092	53.6	0.478	-45.1
1.1	0.281	-121.7	5.494	92.0	0.098	53.1	0.452	-46.3
1.2	0.263	-130.2	5.102	88.7	0.103	52.8	0.430	-47.4
1.3	0.248	-138.9	4.739	85.3	0.108	52.5	0.410	-48.4
1.4	0.239	-146.8	4.439	82.3	0.114	52.2	0.392	-49.6
1.5	0.239	-155.3	4.167	79.5	0.119	51.7	0.377	-50.8
1.6	0.234	-163.6	3.958	76.6	0.124	51.5	0.361	-52.1
1.7	0.234	-170.7	3.734	74.0	0.130	51.1	0.346	-53.3
1.8	0.238	-177.2	3.548	71.4	0.136	50.7	0.333	-54.6
1.9	0.242	176.1	3.373	68.9	0.141	50.2	0.321	-56.0
2.0	0.251	170.7	3.220	66.4	0.147	49.7	0.308	-57.3
2.1	0.253	165.4	3.081	63.8	0.152	49.4	0.295	-58.8
2.2	0.262	160.6	2.949	61.8	0.157	49.0	0.283	-60.5
2.3	0.269	155.2	2.823	59.5	0.162	48.2	0.272	-62.2
2.4	0.277	150.7	2.705	57.2	0.167	47.5	0.260	-64.0
2.5	0.286	146.6	2.606	55.0	0.172	46.9	0.248	-65.8
2.6	0.289	142.7	2.502	53.0	0.176	46.3	0.238	-67.4
2.7	0.293	138.1	2.402	51.3	0.179	46.1	0.227	-68.4
2.8	0.294	136.2	2.328	50.1	0.184	46.4	0.226	-69.2
2.9	0.302	135.5	2.272	48.2	0.192	46.0	0.225	-71.6
3.0	0.314	133.1	2.231	46.2	0.200	45.5	0.217	-75.0
4.0	0.424	112.5	1.716	27.6	0.252	35.9	0.164	-117.4
5.0	0.520	98.9	1.371	12.0	0.297	27.0	0.197	-167.2

$V_{CE} = 2\text{ V}$, $I_C = 7\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.738	-19.7	17.973	161.3	0.016	81.6	0.952	-12.2
0.2	0.679	-38.0	16.180	147.0	0.030	72.4	0.872	-22.2
0.3	0.585	-53.6	14.255	134.4	0.041	66.2	0.777	-29.5
0.4	0.501	-66.6	12.357	124.7	0.049	62.1	0.691	-34.6
0.5	0.437	-78.2	10.826	116.8	0.057	59.7	0.618	-38.1
0.6	0.378	-88.4	9.532	110.0	0.063	58.6	0.560	-40.3
0.7	0.333	-98.2	8.481	104.9	0.069	58.3	0.514	-41.9
0.8	0.298	-107.6	7.618	99.9	0.075	57.8	0.477	-43.1
0.9	0.268	-116.9	6.915	95.8	0.081	57.5	0.446	-44.1
1.0	0.246	-125.5	6.306	91.9	0.086	57.5	0.421	-45.0
1.1	0.230	-135.3	5.803	88.5	0.092	57.0	0.400	-46.0
1.2	0.220	-144.5	5.372	85.4	0.098	56.8	0.381	-46.8
1.3	0.211	-152.6	4.975	82.5	0.104	56.5	0.364	-47.8
1.4	0.212	-160.8	4.649	79.6	0.110	56.1	0.350	-48.8
1.5	0.213	-168.6	4.350	77.1	0.116	55.7	0.336	-50.1
1.6	0.215	-176.3	4.122	74.5	0.121	55.4	0.322	-51.3
1.7	0.220	177.0	3.887	71.9	0.127	54.9	0.309	-52.6
1.8	0.226	170.6	3.690	69.5	0.134	54.3	0.297	-53.9
1.9	0.233	165.6	3.507	67.2	0.140	53.9	0.285	-55.2
2.0	0.241	160.9	3.339	64.9	0.146	53.3	0.273	-56.5
2.1	0.250	155.7	3.196	62.5	0.152	52.8	0.262	-58.3
2.2	0.254	151.9	3.057	60.6	0.157	52.2	0.251	-60.0
2.3	0.265	147.8	2.922	58.4	0.162	51.4	0.241	-61.9
2.4	0.276	143.7	2.804	56.1	0.168	50.6	0.229	-63.9
2.5	0.285	139.9	2.699	54.1	0.173	49.8	0.218	-65.8
2.6	0.291	136.9	2.586	52.4	0.178	49.0	0.208	-67.6
2.7	0.294	132.7	2.479	50.8	0.181	48.8	0.197	-68.5
2.8	0.294	131.4	2.405	49.7	0.187	49.0	0.197	-69.2
2.9	0.301	131.1	2.351	47.7	0.195	48.4	0.196	-72.1
3.0	0.313	129.0	2.306	45.9	0.203	47.7	0.189	-76.0
4.0	0.427	110.5	1.774	27.8	0.257	37.1	0.144	-124.7
5.0	0.521	97.7	1.411	12.5	0.303	27.6	0.191	-175.6

$V_{CE} = 2\text{ V}$, $I_C = 10\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.668	-24.3	22.264	157.9	0.016	76.4	0.932	-14.6
0.2	0.590	-45.9	19.222	141.5	0.028	70.3	0.823	-25.7
0.3	0.486	-62.4	16.245	128.4	0.037	65.2	0.711	-32.9
0.4	0.407	-76.7	13.671	118.7	0.044	62.8	0.619	-37.1
0.5	0.345	-88.8	11.735	111.2	0.051	61.7	0.549	-39.5
0.6	0.298	-100.2	10.178	105.1	0.057	61.3	0.496	-41.0
0.7	0.262	-110.7	8.949	100.4	0.064	61.2	0.454	-41.9
0.8	0.235	-120.6	7.982	95.9	0.070	61.1	0.423	-42.5
0.9	0.215	-131.2	7.200	92.1	0.076	61.1	0.397	-43.1
1.0	0.202	-140.9	6.546	88.6	0.082	61.1	0.376	-43.7
1.1	0.195	-150.3	6.005	85.5	0.088	60.9	0.358	-44.4
1.2	0.193	-158.7	5.531	82.7	0.094	60.5	0.342	-45.2
1.3	0.190	-167.6	5.118	79.9	0.101	60.2	0.329	-46.1
1.4	0.194	-174.1	4.770	77.4	0.107	59.7	0.316	-47.2
1.5	0.205	178.6	4.469	75.0	0.113	59.2	0.304	-48.6
1.6	0.207	171.4	4.230	72.6	0.120	58.8	0.291	-49.8
1.7	0.214	166.1	3.987	70.1	0.126	58.3	0.280	-51.0
1.8	0.222	160.9	3.782	68.0	0.133	57.6	0.269	-52.4
1.9	0.232	156.2	3.587	65.7	0.139	56.8	0.259	-53.9
2.0	0.243	152.4	3.420	63.7	0.146	56.2	0.248	-55.3
2.1	0.250	148.5	3.264	61.3	0.152	55.5	0.237	-57.3
2.2	0.259	145.3	3.126	59.4	0.157	54.8	0.227	-59.2
2.3	0.270	141.6	2.988	57.3	0.164	53.9	0.218	-61.1
2.4	0.279	138.7	2.865	55.2	0.169	52.9	0.206	-63.4
2.5	0.290	134.9	2.751	53.2	0.175	52.0	0.194	-65.6
2.6	0.297	131.7	2.635	51.4	0.179	50.9	0.183	-67.6
2.7	0.300	127.3	2.521	49.9	0.182	50.7	0.171	-67.8
2.8	0.294	126.7	2.447	49.1	0.188	51.2	0.174	-67.6
2.9	0.304	126.7	2.401	47.2	0.198	50.4	0.176	-71.6
3.0	0.319	125.3	2.355	45.3	0.206	49.5	0.169	-76.2
4.0	0.427	108.6	1.801	27.5	0.260	38.0	0.130	-130.8
5.0	0.521	96.8	1.439	12.8	0.306	28.2	0.190	178.1

$V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.503	-36.5	29.728	149.9	0.013	74.0	0.871	-19.4
0.2	0.396	-65.0	23.339	130.9	0.024	69.3	0.710	-31.0
0.3	0.316	-85.6	18.324	118.0	0.031	66.6	0.585	-36.0
0.4	0.263	-102.3	14.692	109.5	0.038	66.8	0.501	-37.9
0.5	0.226	-117.1	12.253	103.0	0.044	66.5	0.445	-38.3
0.6	0.203	-130.4	10.446	97.8	0.051	66.7	0.406	-38.3
0.7	0.193	-142.6	9.086	93.8	0.057	67.4	0.377	-38.1
0.8	0.188	-152.9	8.028	90.1	0.064	67.4	0.356	-38.1
0.9	0.183	-163.3	7.195	86.8	0.071	67.1	0.339	-38.3
1.0	0.184	-171.2	6.511	83.7	0.077	66.9	0.325	-38.6
1.1	0.187	-179.4	5.959	81.1	0.084	66.5	0.313	-39.1
1.2	0.192	175.2	5.473	78.5	0.091	65.9	0.302	-39.8
1.3	0.199	168.7	5.056	76.1	0.098	65.3	0.292	-40.7
1.4	0.205	164.0	4.701	73.9	0.104	64.6	0.283	-41.9
1.5	0.216	159.7	4.403	71.6	0.111	63.9	0.273	-43.3
1.6	0.228	154.6	4.153	69.3	0.118	63.3	0.263	-44.7
1.7	0.236	150.9	3.909	67.2	0.124	62.6	0.253	-46.1
1.8	0.246	147.3	3.708	65.1	0.131	61.7	0.244	-47.5
1.9	0.256	144.0	3.511	63.2	0.138	60.8	0.236	-49.1
2.0	0.266	141.8	3.350	61.2	0.145	59.9	0.226	-50.7
2.1	0.276	138.5	3.195	58.9	0.152	59.1	0.216	-52.8
2.2	0.280	136.5	3.059	57.2	0.157	58.2	0.207	-54.8
2.3	0.295	133.1	2.921	55.2	0.164	57.1	0.198	-56.9
2.4	0.303	130.8	2.799	53.1	0.170	56.1	0.187	-59.2
2.5	0.313	128.5	2.693	51.3	0.176	55.1	0.176	-61.5
2.6	0.320	125.7	2.578	49.6	0.180	54.1	0.166	-63.5
2.7	0.324	122.4	2.468	48.1	0.184	53.7	0.156	-63.7
2.8	0.321	121.4	2.396	47.4	0.190	53.9	0.159	-64.5
2.9	0.330	122.0	2.345	45.3	0.200	52.9	0.160	-68.7
3.0	0.340	120.9	2.302	43.6	0.208	52.0	0.153	-73.6
4.0	0.446	106.4	1.765	26.5	0.264	39.9	0.118	-133.8
5.0	0.539	95.2	1.404	11.9	0.310	29.3	0.187	174.7

$V_{CE} = 3\text{ V}$, $I_C = 1\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.959	-6.5	3.440	172.2	0.017	84.9	0.996	-3.4
0.2	0.952	-13.3	3.397	167.5	0.035	81.2	0.990	-6.8
0.3	0.934	-20.5	3.367	160.8	0.050	77.0	0.978	-10.1
0.4	0.908	-26.9	3.289	154.9	0.066	72.6	0.962	-13.5
0.5	0.886	-33.5	3.229	149.1	0.081	68.6	0.947	-16.5
0.6	0.851	-40.2	3.156	142.8	0.095	64.7	0.926	-19.5
0.7	0.818	-46.7	3.073	137.6	0.107	61.0	0.904	-22.4
0.8	0.786	-53.0	2.988	131.9	0.119	57.6	0.882	-25.2
0.9	0.751	-59.4	2.904	126.6	0.129	54.5	0.857	-27.8
1.0	0.715	-65.6	2.817	121.4	0.137	51.3	0.834	-30.4
1.1	0.679	-72.0	2.734	116.5	0.146	48.4	0.809	-32.7
1.2	0.646	-78.2	2.643	112.0	0.153	45.7	0.786	-34.8
1.3	0.610	-84.5	2.544	107.3	0.159	43.1	0.762	-36.8
1.4	0.581	-90.7	2.461	102.9	0.164	40.6	0.739	-38.9
1.5	0.553	-97.5	2.384	98.6	0.169	38.4	0.717	-40.8
1.6	0.523	-103.7	2.320	94.6	0.173	36.4	0.696	-42.7
1.7	0.499	-110.4	2.237	90.4	0.177	34.4	0.675	-44.5
1.8	0.475	-117.1	2.159	86.5	0.179	32.8	0.657	-46.1
1.9	0.458	-123.6	2.091	82.7	0.182	31.1	0.639	-47.6
2.0	0.440	-130.6	2.025	79.2	0.184	29.8	0.621	-49.2
2.1	0.425	-137.1	1.972	75.3	0.185	28.8	0.603	-50.8
2.2	0.412	-143.0	1.908	72.3	0.185	27.6	0.587	-52.3
2.3	0.400	-150.6	1.850	68.9	0.186	26.4	0.571	-53.8
2.4	0.391	-157.0	1.791	65.7	0.185	25.2	0.557	-55.4
2.5	0.384	-163.7	1.738	62.5	0.185	24.1	0.543	-56.9
2.6	0.375	-169.8	1.677	59.7	0.184	23.0	0.528	-58.5
2.7	0.361	-175.8	1.612	57.1	0.180	22.7	0.516	-59.6
2.8	0.357	-178.9	1.573	55.5	0.176	23.9	0.516	-60.6
2.9	0.365	177.6	1.542	53.0	0.180	24.4	0.512	-62.1
3.0	0.370	172.0	1.519	50.3	0.183	24.6	0.500	-64.6
4.0	0.446	132.0	1.203	26.9	0.205	24.1	0.431	-88.0
5.0	0.526	109.6	0.967	8.1	0.241	24.0	0.411	-121.8

$V_{CE} = 3\text{ V}$, $I_C = 3\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.873	-11.4	9.469	168.4	0.016	83.4	0.983	-6.6
0.2	0.855	-23.0	9.072	159.1	0.032	77.1	0.956	-12.9
0.3	0.801	-34.0	8.645	149.4	0.046	71.3	0.914	-18.5
0.4	0.742	-43.8	8.074	141.0	0.058	66.2	0.864	-23.4
0.5	0.683	-53.0	7.553	133.2	0.068	61.8	0.814	-27.6
0.6	0.624	-61.9	7.004	126.0	0.077	58.6	0.766	-31.1
0.7	0.569	-70.1	6.508	120.1	0.084	55.9	0.720	-33.9
0.8	0.519	-78.0	6.031	114.1	0.091	53.8	0.680	-36.4
0.9	0.472	-85.5	5.613	109.0	0.096	52.1	0.643	-38.4
1.0	0.431	-92.8	5.234	104.1	0.102	50.6	0.610	-40.3
1.1	0.396	-100.2	4.907	99.9	0.107	49.5	0.581	-41.8
1.2	0.366	-107.5	4.597	95.9	0.111	48.5	0.554	-43.2
1.3	0.337	-115.1	4.307	92.1	0.116	47.8	0.530	-44.6
1.4	0.319	-122.4	4.054	88.7	0.120	46.9	0.507	-45.8
1.5	0.302	-130.4	3.841	85.3	0.124	46.3	0.489	-47.1
1.6	0.286	-137.9	3.664	82.1	0.128	45.9	0.470	-48.5
1.7	0.279	-145.8	3.473	79.0	0.133	45.4	0.454	-49.8
1.8	0.270	-153.5	3.305	76.0	0.137	45.0	0.438	-50.8
1.9	0.266	-160.7	3.152	73.3	0.142	44.5	0.423	-52.0
2.0	0.266	-168.1	3.020	70.6	0.146	44.3	0.409	-53.2
2.1	0.264	-174.7	2.892	67.6	0.150	44.0	0.394	-54.5
2.2	0.268	179.9	2.779	65.3	0.154	43.6	0.382	-55.9
2.3	0.269	173.2	2.668	62.8	0.158	43.2	0.369	-57.3
2.4	0.275	167.1	2.564	60.2	0.161	42.6	0.356	-58.8
2.5	0.278	161.5	2.469	57.8	0.165	42.1	0.343	-60.2
2.6	0.281	156.0	2.370	55.5	0.168	41.7	0.332	-61.5
2.7	0.282	151.1	2.274	53.7	0.170	41.7	0.320	-62.1
2.8	0.279	148.4	2.209	52.5	0.173	42.6	0.320	-62.8
2.9	0.290	147.2	2.158	50.3	0.180	42.5	0.319	-64.6
3.0	0.300	144.0	2.118	48.2	0.187	42.2	0.310	-67.3
4.0	0.407	117.6	1.638	28.4	0.235	34.8	0.240	-97.5
5.0	0.496	102.2	1.312	12.1	0.280	27.5	0.231	-140.8

$V_{CE} = 3\text{ V}$, $I_C = 5\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.814	-16.1	14.203	164.8	0.015	81.6	0.970	-9.2
0.2	0.769	-30.5	13.198	152.8	0.030	74.7	0.918	-17.4
0.3	0.685	-43.5	12.084	141.3	0.042	68.3	0.849	-24.0
0.4	0.611	-55.3	10.862	131.9	0.051	63.7	0.778	-29.1
0.5	0.544	-65.4	9.785	123.8	0.059	60.7	0.712	-32.8
0.6	0.477	-74.8	8.798	116.8	0.066	58.3	0.655	-35.7
0.7	0.423	-83.8	7.960	111.1	0.072	56.8	0.607	-37.7
0.8	0.378	-91.8	7.237	105.8	0.078	55.9	0.568	-39.3
0.9	0.337	-100.3	6.628	101.2	0.083	55.2	0.533	-40.9
1.0	0.306	-108.2	6.085	96.9	0.088	54.7	0.504	-41.9
1.1	0.279	-116.3	5.645	93.1	0.094	54.3	0.480	-42.9
1.2	0.258	-124.6	5.231	89.6	0.099	53.9	0.458	-43.9
1.3	0.242	-132.9	4.861	86.4	0.104	53.6	0.439	-44.8
1.4	0.232	-140.9	4.564	83.4	0.109	53.3	0.421	-45.9
1.5	0.228	-149.6	4.282	80.5	0.114	52.9	0.405	-47.1
1.6	0.221	-157.6	4.071	77.7	0.120	52.6	0.391	-48.3
1.7	0.221	-166.2	3.842	75.0	0.125	52.3	0.376	-49.4
1.8	0.221	-173.7	3.653	72.4	0.131	51.8	0.363	-50.5
1.9	0.225	179.7	3.473	70.0	0.136	51.5	0.351	-51.6
2.0	0.229	173.8	3.316	67.5	0.141	51.0	0.338	-52.8
2.1	0.236	168.4	3.172	65.0	0.147	50.7	0.327	-54.2
2.2	0.240	163.0	3.040	62.9	0.151	50.2	0.315	-55.7
2.3	0.248	157.3	2.913	60.6	0.157	49.5	0.304	-57.2
2.4	0.258	152.5	2.793	58.3	0.162	48.8	0.292	-58.8
2.5	0.264	147.7	2.687	56.1	0.166	48.2	0.280	-60.3
2.6	0.269	143.7	2.580	54.2	0.170	47.4	0.269	-61.7
2.7	0.270	138.9	2.472	52.6	0.173	47.3	0.258	-62.5
2.8	0.270	137.4	2.401	51.4	0.178	47.6	0.258	-63.0
2.9	0.279	136.4	2.342	49.4	0.186	47.2	0.257	-65.5
3.0	0.293	134.2	2.302	47.5	0.194	46.6	0.248	-68.6
4.0	0.401	112.8	1.768	28.9	0.246	37.0	0.185	-105.2
5.0	0.494	99.8	1.413	13.4	0.291	28.2	0.194	-155.2

$V_{CE} = 3\text{ V}$, $I_C = 7\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.748	-19.7	17.954	161.9	0.015	80.1	0.956	-11.2
0.2	0.689	-36.3	16.223	148.0	0.028	73.1	0.883	-20.6
0.3	0.602	-50.6	14.364	135.6	0.039	66.9	0.795	-27.5
0.4	0.516	-62.8	12.538	125.9	0.047	62.9	0.711	-32.2
0.5	0.448	-74.0	11.028	118.0	0.054	60.8	0.640	-35.4
0.6	0.388	-83.9	9.737	111.3	0.060	59.6	0.585	-37.5
0.7	0.338	-93.2	8.687	106.1	0.066	59.1	0.540	-38.9
0.8	0.300	-101.6	7.815	101.2	0.072	58.7	0.503	-40.0
0.9	0.267	-110.5	7.097	96.9	0.077	58.5	0.474	-40.9
1.0	0.242	-119.1	6.487	93.1	0.083	58.1	0.449	-41.7
1.1	0.223	-128.4	5.973	89.6	0.089	58.1	0.428	-42.5
1.2	0.213	-137.0	5.528	86.3	0.094	57.7	0.409	-43.1
1.3	0.202	-146.1	5.117	83.5	0.100	57.5	0.394	-44.0
1.4	0.197	-154.4	4.780	80.8	0.106	57.1	0.379	-45.0
1.5	0.199	-163.3	4.483	78.1	0.111	56.7	0.365	-46.1
1.6	0.195	-171.6	4.244	75.5	0.117	56.5	0.352	-47.3
1.7	0.199	-179.1	4.011	73.0	0.123	56.0	0.339	-48.4
1.8	0.207	174.1	3.808	70.6	0.129	55.5	0.327	-49.5
1.9	0.211	167.8	3.617	68.2	0.135	54.9	0.317	-50.8
2.0	0.221	163.0	3.451	65.9	0.141	54.5	0.305	-51.9
2.1	0.227	157.8	3.296	63.5	0.146	54.0	0.293	-53.6
2.2	0.232	154.1	3.159	61.5	0.152	53.3	0.283	-55.2
2.3	0.244	149.2	3.025	59.4	0.157	52.4	0.273	-56.7
2.4	0.253	145.3	2.896	57.2	0.163	51.7	0.261	-58.4
2.5	0.261	141.1	2.790	55.1	0.167	51.0	0.249	-59.9
2.6	0.265	137.3	2.673	53.5	0.172	50.2	0.239	-61.4
2.7	0.270	132.8	2.564	51.8	0.176	49.8	0.229	-62.3
2.8	0.270	131.1	2.485	50.8	0.181	50.1	0.229	-62.9
2.9	0.279	131.1	2.427	48.8	0.189	49.5	0.228	-65.5
3.0	0.288	128.9	2.380	46.9	0.197	48.7	0.220	-68.9
4.0	0.399	110.9	1.828	29.1	0.251	38.3	0.161	-110.6
5.0	0.490	98.6	1.460	13.8	0.296	28.6	0.183	-163.8

$V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.688	-23.3	22.283	158.5	0.014	79.2	0.938	-13.5
0.2	0.597	-42.7	19.400	142.6	0.026	70.3	0.837	-23.9
0.3	0.505	-58.7	16.494	129.6	0.035	66.0	0.730	-30.6
0.4	0.418	-72.1	13.956	120.0	0.043	63.9	0.641	-34.6
0.5	0.354	-83.3	12.029	112.5	0.049	62.6	0.573	-36.8
0.6	0.303	-93.5	10.453	106.3	0.055	62.1	0.522	-38.1
0.7	0.263	-103.9	9.233	101.6	0.061	62.1	0.481	-38.9
0.8	0.235	-113.5	8.223	97.0	0.067	62.1	0.450	-39.6
0.9	0.211	-123.8	7.438	93.2	0.073	61.9	0.424	-40.1
1.0	0.195	-132.7	6.753	89.6	0.079	61.9	0.404	-40.6
1.1	0.181	-143.1	6.211	86.6	0.085	61.6	0.386	-41.2
1.2	0.177	-151.3	5.726	83.7	0.091	61.3	0.371	-41.8
1.3	0.173	-161.2	5.289	81.0	0.097	61.0	0.357	-42.7
1.4	0.174	-169.3	4.933	78.3	0.103	60.5	0.345	-43.6
1.5	0.183	-176.7	4.625	75.9	0.109	60.1	0.333	-44.7
1.6	0.184	175.2	4.376	73.6	0.116	59.6	0.321	-45.9
1.7	0.192	169.3	4.122	71.3	0.122	59.2	0.310	-47.1
1.8	0.200	163.8	3.915	69.0	0.128	58.4	0.300	-48.3
1.9	0.208	159.0	3.715	67.0	0.135	57.8	0.290	-49.6
2.0	0.217	154.5	3.542	64.8	0.141	57.1	0.279	-50.9
2.1	0.224	150.0	3.385	62.5	0.147	56.6	0.268	-52.4
2.2	0.232	146.0	3.237	60.7	0.153	55.8	0.259	-54.1
2.3	0.243	142.2	3.095	58.5	0.158	54.8	0.248	-55.8
2.4	0.255	139.0	2.968	56.5	0.164	54.0	0.237	-57.6
2.5	0.263	135.6	2.855	54.5	0.169	53.1	0.226	-59.4
2.6	0.269	132.4	2.739	52.9	0.174	52.2	0.216	-60.9
2.7	0.275	127.8	2.624	51.4	0.178	51.9	0.206	-61.6
2.8	0.274	127.1	2.543	50.3	0.184	51.9	0.206	-62.3
2.9	0.282	127.2	2.483	48.5	0.192	51.3	0.206	-65.2
3.0	0.290	125.6	2.434	46.6	0.200	50.4	0.197	-69.0
4.0	0.401	109.1	1.868	29.2	0.254	39.1	0.143	-115.7
5.0	0.493	97.7	1.490	14.4	0.299	29.2	0.178	-171.0

$V_{CE} = 3\text{ V}$, $I_C = 20\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.520	-33.1	30.236	151.1	0.013	79.6	0.885	-18.0
0.2	0.420	-59.2	24.043	132.4	0.022	69.4	0.733	-28.9
0.3	0.330	-77.6	19.027	119.6	0.030	68.5	0.612	-33.8
0.4	0.265	-92.4	15.371	110.8	0.036	67.2	0.528	-35.7
0.5	0.221	-106.8	12.856	104.4	0.043	67.6	0.473	-36.0
0.6	0.195	-119.6	10.974	99.1	0.049	67.5	0.434	-36.0
0.7	0.176	-131.4	9.567	95.1	0.055	68.0	0.405	-35.8
0.8	0.167	-142.4	8.457	91.4	0.062	68.0	0.383	-35.9
0.9	0.158	-153.7	7.585	88.1	0.068	68.0	0.366	-36.0
1.0	0.155	-163.2	6.875	85.0	0.075	67.6	0.352	-36.3
1.1	0.157	-172.6	6.291	82.3	0.081	67.0	0.340	-36.8
1.2	0.160	-179.8	5.782	79.9	0.088	66.7	0.329	-37.3
1.3	0.167	172.4	5.332	77.5	0.095	65.9	0.320	-38.2
1.4	0.174	167.6	4.965	75.3	0.101	65.2	0.310	-39.4
1.5	0.187	162.1	4.645	73.0	0.107	64.7	0.300	-40.8
1.6	0.194	157.3	4.383	70.8	0.114	64.1	0.290	-41.9
1.7	0.203	152.3	4.137	68.6	0.121	63.3	0.281	-43.1
1.8	0.212	148.6	3.925	66.6	0.128	62.5	0.271	-44.5
1.9	0.223	145.5	3.721	64.4	0.134	61.5	0.263	-46.0
2.0	0.233	142.3	3.546	62.4	0.141	60.6	0.254	-47.5
2.1	0.243	139.5	3.381	60.3	0.147	59.9	0.244	-49.2
2.2	0.248	136.7	3.243	58.5	0.153	58.9	0.235	-50.9
2.3	0.261	134.2	3.098	56.5	0.159	57.9	0.225	-52.9
2.4	0.272	131.5	2.969	54.6	0.165	56.8	0.214	-54.9
2.5	0.283	128.5	2.857	52.5	0.171	55.8	0.201	-57.1
2.6	0.289	125.3	2.722	50.8	0.175	54.5	0.189	-58.7
2.7	0.293	120.7	2.592	49.5	0.177	54.1	0.176	-57.4
2.8	0.282	120.7	2.529	49.4	0.184	55.2	0.187	-56.8
2.9	0.295	122.3	2.489	47.2	0.195	54.1	0.189	-62.1
3.0	0.308	120.7	2.437	45.2	0.203	52.9	0.179	-66.7
4.0	0.415	106.8	1.863	28.3	0.257	40.8	0.126	-118.7
5.0	0.505	96.3	1.488	13.7	0.304	30.2	0.173	-176.5

S-PARAMETERS Q2

V_{CE} = 1 V, I_C = 1 mA, Z_o = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.966	-19.4	3.744	166.8	0.044	80.2	0.985	-8.2
0.2	0.922	-37.0	3.444	153.0	0.083	68.4	0.950	-15.9
0.3	0.891	-53.4	3.247	141.8	0.116	58.5	0.899	-22.7
0.4	0.849	-68.8	2.992	130.9	0.143	50.5	0.845	-28.4
0.5	0.811	-82.6	2.751	121.6	0.161	43.3	0.792	-33.2
0.6	0.772	-94.9	2.528	112.9	0.175	37.2	0.743	-37.2
0.7	0.747	-106.0	2.334	105.6	0.185	32.2	0.701	-40.6
0.8	0.724	-115.8	2.154	99.0	0.191	27.8	0.664	-43.7
0.9	0.710	-125.1	1.996	92.8	0.194	24.1	0.631	-46.5
1.0	0.694	-133.7	1.865	86.8	0.196	21.0	0.602	-49.1
1.1	0.684	-141.4	1.738	81.6	0.196	18.2	0.577	-51.6
1.2	0.682	-148.2	1.646	76.7	0.195	15.8	0.555	-54.2
1.3	0.673	-154.9	1.539	71.9	0.192	13.7	0.536	-56.9
1.4	0.671	-160.8	1.455	67.5	0.189	12.1	0.520	-59.7
1.5	0.671	-166.2	1.382	63.3	0.185	10.8	0.505	-62.5
1.6	0.672	-171.4	1.314	59.4	0.181	10.0	0.493	-65.7
1.7	0.673	-176.0	1.247	55.5	0.177	9.5	0.482	-68.9
1.8	0.672	179.3	1.187	51.4	0.172	9.3	0.472	-72.3
1.9	0.676	175.2	1.139	48.6	0.167	9.7	0.463	-75.7
2.0	0.683	171.2	1.091	44.9	0.163	10.7	0.456	-79.6
2.1	0.687	167.6	1.049	41.6	0.159	12.2	0.449	-83.6
2.2	0.685	164.4	1.009	38.3	0.156	14.3	0.442	-87.9
2.3	0.689	161.0	0.972	35.4	0.152	16.3	0.433	-92.1
2.4	0.691	157.8	0.933	33.0	0.150	19.0	0.423	-95.6
2.5	0.696	154.8	0.901	30.6	0.149	21.8	0.427	-98.8
2.6	0.701	152.2	0.874	28.3	0.151	24.8	0.435	-103.7
2.7	0.706	149.3	0.848	25.7	0.154	27.8	0.437	-108.8
2.8	0.710	146.9	0.826	23.9	0.157	30.8	0.441	-113.4
2.9	0.717	144.7	0.800	21.3	0.163	32.9	0.443	-118.0
3.0	0.716	141.9	0.781	19.5	0.170	35.1	0.441	-122.9
4.0	0.767	119.8	0.615	4.9	0.285	37.3	0.499	-173.1
5.0	0.790	105.9	0.510	-2.5	0.386	23.1	0.586	145.4

V_{CE} = 1 V, I_C = 3 mA, Z_o = 50 Ω

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.867	-31.5	9.973	159.4	0.041	74.1	0.948	-16.7
0.2	0.801	-57.3	8.535	141.6	0.074	60.3	0.841	-30.6
0.3	0.736	-78.9	7.394	128.3	0.094	50.4	0.726	-40.7
0.4	0.679	-97.3	6.307	117.3	0.108	44.0	0.626	-48.0
0.5	0.639	-111.6	5.435	108.7	0.117	39.6	0.545	-53.2
0.6	0.611	-124.1	4.747	101.3	0.123	36.5	0.480	-57.2
0.7	0.595	-134.4	4.221	95.5	0.128	34.5	0.430	-60.4
0.8	0.581	-142.9	3.781	90.3	0.132	33.2	0.390	-63.0
0.9	0.576	-150.7	3.422	85.6	0.135	32.6	0.356	-65.8
1.0	0.569	-157.6	3.131	81.0	0.138	32.3	0.329	-68.2
1.1	0.568	-163.9	2.871	76.9	0.141	32.0	0.305	-70.8
1.2	0.572	-169.1	2.674	73.1	0.144	32.1	0.284	-73.3
1.3	0.570	-174.4	2.474	69.3	0.147	32.3	0.266	-76.3
1.4	0.571	-178.9	2.317	65.9	0.150	32.6	0.251	-79.4
1.5	0.576	176.9	2.178	62.6	0.154	32.9	0.237	-82.8
1.6	0.580	172.9	2.055	59.4	0.157	33.3	0.225	-86.6
1.7	0.583	169.3	1.941	56.2	0.161	33.9	0.215	-90.8
1.8	0.588	165.8	1.838	53.1	0.165	34.3	0.206	-95.1
1.9	0.596	162.5	1.756	50.7	0.169	34.8	0.199	-99.7
2.0	0.603	159.9	1.674	47.7	0.175	35.3	0.193	-105.0
2.1	0.606	157.2	1.607	44.8	0.179	35.8	0.189	-110.4
2.2	0.608	154.6	1.536	42.2	0.184	36.4	0.185	-116.1
2.3	0.611	151.7	1.473	39.6	0.189	36.6	0.181	-121.8
2.4	0.615	149.2	1.418	37.3	0.194	37.1	0.176	-126.4
2.5	0.622	146.8	1.367	35.2	0.200	37.5	0.179	-129.8
2.6	0.627	144.5	1.328	32.7	0.207	37.6	0.187	-134.8
2.7	0.634	142.5	1.287	30.5	0.213	37.9	0.194	-140.7
2.8	0.640	140.6	1.246	28.6	0.220	38.1	0.199	-145.8
2.9	0.644	139.0	1.210	25.8	0.227	37.7	0.206	-150.6
3.0	0.647	136.5	1.184	23.8	0.235	37.5	0.211	-155.7
4.0	0.708	118.2	0.926	5.7	0.316	29.9	0.316	161.7
5.0	0.760	106.4	0.722	-7.0	0.386	18.7	0.445	132.2

$V_{CE} = 1\text{ V}$, $I_C = 5\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.796	-41.6	14.919	153.3	0.038	71.2	0.905	-23.7
0.2	0.702	-73.0	11.916	133.1	0.065	56.5	0.743	-41.5
0.3	0.631	-96.8	9.710	119.6	0.079	48.5	0.598	-52.9
0.4	0.590	-115.2	7.903	109.5	0.088	44.1	0.491	-60.7
0.5	0.561	-128.7	6.624	102.0	0.095	42.0	0.412	-66.2
0.6	0.543	-139.9	5.679	95.6	0.101	41.0	0.353	-70.5
0.7	0.536	-149.3	4.984	90.5	0.107	41.0	0.308	-74.2
0.8	0.529	-156.4	4.424	86.1	0.112	41.0	0.273	-77.4
0.9	0.529	-162.7	3.978	81.9	0.118	41.4	0.245	-80.8
1.0	0.528	-169.1	3.616	78.0	0.124	41.8	0.222	-84.1
1.1	0.531	-173.9	3.299	74.5	0.129	42.1	0.202	-88.0
1.2	0.536	-178.5	3.064	71.1	0.135	42.4	0.185	-92.0
1.3	0.537	-177.0	2.829	67.8	0.141	42.6	0.171	-96.5
1.4	0.539	-173.3	2.644	64.6	0.148	42.9	0.160	-101.5
1.5	0.546	-169.7	2.481	61.7	0.154	43.0	0.150	-107.1
1.6	0.550	-166.5	2.336	58.9	0.160	43.0	0.142	-113.2
1.7	0.557	-163.4	2.200	56.0	0.167	43.1	0.137	-119.7
1.8	0.561	-160.1	2.082	53.2	0.173	42.9	0.133	-126.5
1.9	0.571	-157.5	1.986	50.9	0.180	42.7	0.132	-133.2
2.0	0.581	-155.2	1.894	48.1	0.187	42.4	0.132	-140.1
2.1	0.583	-152.8	1.812	45.7	0.194	42.3	0.134	-146.9
2.2	0.584	-150.3	1.734	43.1	0.201	42.1	0.137	-153.5
2.3	0.588	-147.9	1.655	40.7	0.207	41.6	0.139	-160.2
2.4	0.595	-145.6	1.594	38.6	0.214	41.5	0.139	-165.4
2.5	0.600	-143.7	1.536	36.6	0.220	41.3	0.145	-168.2
2.6	0.605	-141.6	1.490	34.3	0.229	40.8	0.155	-171.4
2.7	0.612	-139.6	1.443	32.1	0.237	40.4	0.165	-176.1
2.8	0.619	-137.7	1.397	30.3	0.244	39.9	0.173	-179.9
2.9	0.625	-136.4	1.357	27.6	0.251	39.1	0.184	-176.7
3.0	0.626	-134.5	1.331	25.7	0.258	38.4	0.191	-173.0
4.0	0.688	-117.1	1.039	7.8	0.331	28.0	0.304	-143.2
5.0	0.746	-106.3	0.817	-5.4	0.390	16.8	0.423	-121.8

$V_{CE} = 1\text{ V}$, $I_C = 7\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.723	-50.4	18.865	148.4	0.036	67.9	0.864	-29.8
0.2	0.627	-86.1	14.169	127.2	0.057	54.2	0.664	-49.8
0.3	0.572	-109.7	11.030	114.2	0.069	48.1	0.511	-61.9
0.4	0.542	-127.3	8.797	104.8	0.077	46.1	0.408	-70.1
0.5	0.522	-139.7	7.248	98.1	0.084	45.6	0.336	-76.2
0.6	0.511	-149.6	6.168	92.5	0.090	45.7	0.284	-81.3
0.7	0.508	-158.0	5.392	87.7	0.097	46.5	0.245	-85.8
0.8	0.506	-164.0	4.760	83.8	0.104	47.0	0.215	-90.1
0.9	0.509	-170.0	4.253	79.9	0.111	47.6	0.191	-94.8
1.0	0.510	-175.3	3.862	76.3	0.119	48.0	0.172	-99.5
1.1	0.514	-179.9	3.524	73.1	0.126	48.2	0.157	-105.0
1.2	0.519	-176.4	3.267	69.9	0.133	48.3	0.144	-110.8
1.3	0.521	-172.3	3.010	66.8	0.141	48.4	0.135	-117.4
1.4	0.526	-168.9	2.812	63.9	0.149	48.3	0.128	-124.4
1.5	0.532	-166.1	2.633	61.2	0.156	48.0	0.124	-131.8
1.6	0.538	-162.7	2.481	58.5	0.165	47.7	0.122	-139.6
1.7	0.543	-160.1	2.333	55.8	0.172	47.4	0.122	-147.0
1.8	0.550	-157.0	2.206	53.1	0.180	46.8	0.124	-154.2
1.9	0.557	-154.8	2.102	51.1	0.187	46.2	0.128	-160.7
2.0	0.567	-152.4	2.005	48.6	0.196	45.6	0.133	-166.8
2.1	0.573	-150.2	1.911	46.0	0.203	45.2	0.140	-172.5
2.2	0.573	-148.0	1.832	43.6	0.211	44.6	0.146	-177.9
2.3	0.580	-145.8	1.750	41.3	0.218	43.8	0.152	-176.4
2.4	0.582	-143.7	1.682	39.3	0.224	43.3	0.154	-172.0
2.5	0.588	-141.7	1.621	37.3	0.232	42.8	0.161	-170.1
2.6	0.595	-139.8	1.571	35.2	0.241	42.2	0.171	-168.1
2.7	0.602	-138.0	1.522	33.0	0.248	41.5	0.182	-164.9
2.8	0.606	-136.2	1.471	31.2	0.256	40.9	0.192	-161.9
2.9	0.616	-134.8	1.429	28.6	0.263	39.8	0.202	-159.8
3.0	0.618	-132.8	1.400	26.7	0.271	38.9	0.209	-156.9
4.0	0.680	-116.5	1.094	9.3	0.340	27.1	0.319	-133.5
5.0	0.738	-105.8	0.863	-4.5	0.393	15.8	0.427	-115.5

$V_{CE} = 1\text{ V}$, $I_C = 10\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.648	-63.1	23.217	142.6	0.033	66.7	0.806	-36.9
0.2	0.559	-100.4	16.239	121.1	0.050	53.2	0.576	-59.0
0.3	0.520	-123.8	12.188	108.9	0.059	50.2	0.428	-71.9
0.4	0.506	-139.2	9.515	100.6	0.067	50.1	0.335	-80.9
0.5	0.491	-150.2	7.780	94.6	0.075	50.7	0.273	-87.9
0.6	0.487	-159.1	6.560	89.6	0.083	51.5	0.229	-94.4
0.7	0.491	-166.0	5.692	85.2	0.091	52.4	0.198	-100.6
0.8	0.488	-171.4	5.017	81.8	0.099	53.0	0.174	-106.5
0.9	0.495	-176.1	4.489	78.3	0.108	53.5	0.156	-113.0
1.0	0.495	178.9	4.058	74.9	0.117	53.6	0.143	-119.6
1.1	0.500	175.1	3.694	71.9	0.125	53.7	0.134	-127.0
1.2	0.510	171.9	3.424	69.0	0.134	53.4	0.127	-134.5
1.3	0.512	168.4	3.160	66.1	0.143	53.0	0.124	-142.3
1.4	0.515	165.2	2.947	63.3	0.152	52.7	0.123	-149.9
1.5	0.523	162.5	2.757	60.7	0.160	52.0	0.125	-157.4
1.6	0.529	159.8	2.594	58.2	0.169	51.3	0.129	-164.3
1.7	0.536	157.2	2.439	55.6	0.177	50.8	0.134	-170.7
1.8	0.542	154.5	2.303	53.0	0.186	49.8	0.140	-176.5
1.9	0.552	152.3	2.195	50.9	0.194	49.1	0.147	178.8
2.0	0.559	150.0	2.089	48.5	0.203	48.2	0.155	173.9
2.1	0.570	148.0	1.994	46.1	0.211	47.3	0.164	170.0
2.2	0.567	146.2	1.909	43.8	0.219	46.5	0.172	165.7
2.3	0.575	144.2	1.825	41.6	0.226	45.5	0.180	161.7
2.4	0.576	142.0	1.751	39.7	0.233	44.8	0.184	158.0
2.5	0.583	140.1	1.689	37.8	0.242	44.1	0.190	156.5
2.6	0.587	138.5	1.635	35.8	0.251	43.1	0.200	154.8
2.7	0.594	136.6	1.582	33.8	0.259	42.3	0.211	152.5
2.8	0.602	134.9	1.529	32.0	0.266	41.5	0.221	149.9
2.9	0.609	133.7	1.488	29.5	0.274	40.3	0.231	148.6
3.0	0.611	132.0	1.457	27.6	0.281	39.2	0.238	146.0
4.0	0.674	116.0	1.135	10.5	0.348	26.4	0.342	126.4
5.0	0.732	105.9	0.898	-2.7	0.397	15.2	0.440	110.7

$V_{CE} = 1\text{ V}$, $I_C = 20\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.495	-91.9	30.431	131.0	0.027	63.2	0.669	-52.2
0.2	0.473	-130.8	18.860	111.0	0.038	56.5	0.426	-77.3
0.3	0.463	-148.2	13.424	101.1	0.047	57.6	0.306	-92.4
0.4	0.469	-158.9	10.241	94.6	0.057	59.6	0.241	-103.9
0.5	0.469	-166.4	8.266	89.7	0.066	61.0	0.201	-113.7
0.6	0.469	-173.1	6.934	85.4	0.077	61.8	0.175	-123.4
0.7	0.477	-178.0	5.990	81.9	0.086	62.1	0.159	-132.4
0.8	0.480	178.1	5.269	78.8	0.097	62.1	0.149	-140.4
0.9	0.486	174.7	4.702	75.8	0.107	61.9	0.143	-148.4
1.0	0.490	170.7	4.253	72.8	0.118	61.3	0.140	-155.7
1.1	0.496	167.6	3.871	70.1	0.128	60.7	0.142	-162.8
1.2	0.503	165.5	3.571	67.5	0.138	59.8	0.144	-169.0
1.3	0.509	162.4	3.288	64.8	0.148	58.9	0.149	-174.9
1.4	0.513	159.9	3.069	62.2	0.158	58.0	0.154	179.8
1.5	0.520	157.7	2.866	59.9	0.167	56.9	0.162	174.9
1.6	0.527	155.2	2.695	57.5	0.177	55.6	0.170	170.6
1.7	0.532	153.1	2.531	55.1	0.186	54.7	0.179	166.6
1.8	0.538	150.5	2.389	52.7	0.196	53.4	0.188	162.9
1.9	0.548	148.7	2.273	50.9	0.205	52.3	0.197	160.1
2.0	0.558	146.7	2.163	48.5	0.214	50.9	0.207	157.0
2.1	0.564	145.2	2.062	46.4	0.222	49.8	0.216	154.4
2.2	0.566	143.3	1.972	44.1	0.231	48.7	0.225	151.3
2.3	0.571	141.3	1.882	42.1	0.239	47.4	0.234	148.4
2.4	0.575	139.3	1.810	40.2	0.246	46.5	0.239	145.6
2.5	0.581	137.8	1.743	38.4	0.255	45.5	0.245	144.3
2.6	0.588	136.2	1.685	36.4	0.264	44.2	0.254	143.0
2.7	0.592	134.5	1.630	34.4	0.273	43.3	0.265	141.2
2.8	0.601	133.1	1.576	32.8	0.280	42.2	0.275	139.1
2.9	0.607	131.8	1.534	30.2	0.288	40.9	0.284	138.1
3.0	0.610	130.0	1.502	28.3	0.295	39.7	0.290	136.0
4.0	0.673	114.9	1.170	11.9	0.359	25.6	0.386	119.0
5.0	0.731	105.0	0.926	-1.1	0.403	14.1	0.469	104.8

$V_{CE} = 2\text{ V}$, $I_C = 1\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.976	-17.6	3.667	168.1	0.035	81.3	0.989	-6.8
0.2	0.930	-34.0	3.400	155.2	0.069	69.8	0.962	-13.2
0.3	0.899	-49.3	3.239	144.7	0.097	61.1	0.920	-18.8
0.4	0.858	-64.0	3.014	134.4	0.120	53.5	0.876	-23.8
0.5	0.824	-77.3	2.795	125.4	0.138	46.6	0.831	-28.0
0.6	0.789	-89.4	2.589	116.9	0.150	40.6	0.788	-31.5
0.7	0.763	-100.6	2.408	109.8	0.160	35.5	0.749	-34.6
0.8	0.736	-110.6	2.232	103.2	0.165	31.1	0.717	-37.3
0.9	0.720	-119.9	2.079	97.1	0.170	27.5	0.686	-39.9
1.0	0.702	-128.5	1.949	91.1	0.172	24.4	0.659	-42.1
1.1	0.691	-136.7	1.820	85.9	0.172	21.6	0.636	-44.4
1.2	0.686	-143.7	1.720	81.1	0.171	19.3	0.616	-46.6
1.3	0.677	-150.7	1.615	76.3	0.169	17.3	0.597	-48.8
1.4	0.672	-156.7	1.527	71.8	0.166	15.8	0.581	-51.2
1.5	0.669	-162.2	1.452	67.9	0.163	14.7	0.568	-53.6
1.6	0.670	-167.8	1.380	63.8	0.160	13.9	0.555	-56.3
1.7	0.668	-172.9	1.314	59.7	0.155	13.7	0.544	-59.1
1.8	0.671	-177.9	1.253	55.9	0.151	13.8	0.533	-61.9
1.9	0.674	177.9	1.202	53.0	0.147	14.5	0.525	-65.0
2.0	0.681	173.9	1.153	49.5	0.144	15.7	0.516	-68.3
2.1	0.680	170.2	1.108	46.0	0.140	17.6	0.508	-71.8
2.2	0.679	166.6	1.066	42.9	0.138	20.0	0.500	-75.5
2.3	0.683	163.2	1.026	39.8	0.135	22.3	0.490	-79.2
2.4	0.686	159.8	0.989	37.5	0.134	25.4	0.479	-82.1
2.5	0.690	156.8	0.952	35.1	0.134	28.5	0.481	-85.1
2.6	0.694	154.0	0.927	32.9	0.136	32.0	0.484	-89.5
2.7	0.695	150.9	0.900	30.3	0.139	35.3	0.485	-94.2
2.8	0.703	148.3	0.875	28.3	0.144	38.3	0.486	-98.2
2.9	0.710	145.9	0.850	25.7	0.150	40.6	0.484	-102.4
3.0	0.708	143.2	0.829	23.8	0.159	42.7	0.477	-107.1
4.0	0.756	120.7	0.655	8.3	0.281	44.1	0.501	-157.0
5.0	0.782	106.6	0.535	-0.6	0.392	28.1	0.569	157.2

$V_{CE} = 2\text{ V}$, $I_C = 3\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.884	-27.7	10.031	161.3	0.033	76.7	0.958	-13.7
0.2	0.816	-51.5	8.757	144.4	0.061	63.1	0.870	-25.3
0.3	0.746	-72.1	7.720	131.6	0.080	54.1	0.769	-33.8
0.4	0.683	-89.7	6.684	120.7	0.093	47.6	0.678	-39.9
0.5	0.643	-104.4	5.803	112.1	0.101	43.1	0.601	-44.3
0.6	0.609	-116.8	5.117	104.8	0.108	39.8	0.541	-47.3
0.7	0.584	-127.6	4.572	98.8	0.113	37.8	0.491	-49.6
0.8	0.568	-136.5	4.110	93.5	0.116	36.5	0.452	-51.5
0.9	0.561	-144.6	3.728	88.7	0.120	35.7	0.420	-53.4
1.0	0.551	-151.8	3.419	84.2	0.123	35.5	0.392	-54.9
1.1	0.547	-158.8	3.141	80.1	0.126	35.4	0.369	-56.6
1.2	0.550	-164.3	2.929	76.4	0.128	35.3	0.348	-58.3
1.3	0.546	-169.7	2.713	72.7	0.131	35.7	0.330	-60.3
1.4	0.547	-174.6	2.543	69.1	0.135	36.1	0.314	-62.3
1.5	0.551	-179.1	2.392	66.0	0.138	36.6	0.300	-64.5
1.6	0.555	176.7	2.257	62.8	0.141	37.1	0.286	-67.0
1.7	0.559	173.0	2.130	59.6	0.145	37.8	0.274	-69.8
1.8	0.559	168.9	2.020	56.5	0.149	38.4	0.263	-72.7
1.9	0.569	165.8	1.925	54.0	0.153	39.0	0.253	-75.9
2.0	0.578	162.6	1.842	51.1	0.159	39.6	0.244	-79.7
2.1	0.583	159.8	1.766	48.2	0.163	40.4	0.235	-83.6
2.2	0.582	157.3	1.694	45.5	0.168	41.0	0.227	-87.7
2.3	0.586	154.3	1.619	43.0	0.173	41.3	0.218	-91.9
2.4	0.589	151.4	1.557	40.6	0.178	41.8	0.209	-95.0
2.5	0.597	149.3	1.501	38.5	0.184	42.4	0.209	-98.3
2.6	0.602	147.0	1.459	36.3	0.190	42.6	0.212	-103.2
2.7	0.608	144.7	1.415	33.8	0.198	43.0	0.212	-109.0
2.8	0.616	142.6	1.368	32.0	0.204	43.2	0.211	-113.7
2.9	0.623	141.1	1.328	29.3	0.211	42.8	0.212	-119.0
3.0	0.623	138.7	1.299	27.2	0.219	42.6	0.211	-124.3
4.0	0.689	119.9	1.015	8.4	0.305	35.5	0.274	-177.1
5.0	0.746	107.7	0.789	-5.8	0.384	23.5	0.397	144.8

$V_{CE} = 2\text{ V}$, $I_C = 5\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.805	-37.0	15.169	155.8	0.032	73.1	0.926	-19.4
0.2	0.713	-65.0	12.420	136.5	0.055	59.5	0.784	-34.1
0.3	0.635	-87.7	10.329	123.2	0.068	51.4	0.651	-43.5
0.4	0.585	-106.6	8.571	112.9	0.077	47.2	0.548	-49.6
0.5	0.547	-120.4	7.228	105.2	0.084	45.3	0.470	-53.5
0.6	0.523	-132.0	6.231	98.9	0.090	44.1	0.410	-56.1
0.7	0.510	-141.5	5.483	93.4	0.095	43.7	0.365	-58.2
0.8	0.500	-149.7	4.882	89.1	0.100	43.7	0.331	-59.8
0.9	0.501	-156.6	4.393	84.8	0.105	44.2	0.302	-61.4
1.0	0.495	-163.4	3.999	80.9	0.111	44.7	0.278	-62.9
1.1	0.497	-169.0	3.663	77.3	0.116	45.1	0.256	-64.7
1.2	0.500	-173.5	3.404	74.0	0.122	45.4	0.238	-66.5
1.3	0.503	-178.4	3.139	70.6	0.127	45.7	0.222	-68.8
1.4	0.504	177.4	2.935	67.6	0.133	46.1	0.207	-71.3
1.5	0.508	173.6	2.753	64.7	0.139	46.2	0.194	-74.0
1.6	0.516	170.0	2.596	61.8	0.146	46.3	0.182	-77.4
1.7	0.521	166.8	2.446	58.9	0.152	46.4	0.171	-81.0
1.8	0.525	163.4	2.316	56.2	0.158	46.4	0.162	-85.1
1.9	0.536	160.7	2.208	54.0	0.165	46.3	0.153	-89.7
2.0	0.543	158.0	2.104	51.3	0.172	46.1	0.146	-94.8
2.1	0.545	155.4	2.013	48.7	0.179	46.1	0.139	-100.5
2.2	0.550	152.9	1.928	46.2	0.185	46.1	0.134	-106.3
2.3	0.554	150.6	1.841	43.7	0.191	45.6	0.127	-113.0
2.4	0.557	148.3	1.769	41.6	0.197	45.5	0.120	-117.4
2.5	0.565	146.2	1.710	39.7	0.204	45.3	0.122	-121.9
2.6	0.570	144.0	1.657	37.4	0.212	44.9	0.126	-127.6
2.7	0.579	141.9	1.605	35.3	0.220	44.6	0.130	-135.0
2.8	0.583	140.0	1.553	33.3	0.227	44.3	0.132	-141.0
2.9	0.591	138.7	1.510	30.8	0.234	43.4	0.138	-146.8
3.0	0.595	136.6	1.477	28.7	0.242	42.7	0.140	-152.9
4.0	0.663	119.3	1.151	10.5	0.319	32.8	0.235	160.6
5.0	0.728	108.2	0.900	-4.1	0.385	21.3	0.361	132.6

$V_{CE} = 2\text{ V}$, $I_C = 7\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.729	-43.6	19.311	151.3	0.030	71.6	0.889	-24.2
0.2	0.636	-76.2	15.000	130.9	0.050	58.2	0.712	-40.7
0.3	0.563	-100.0	11.950	117.7	0.060	51.5	0.566	-50.3
0.4	0.522	-117.7	9.637	108.0	0.068	49.3	0.462	-56.2
0.5	0.495	-131.1	8.022	101.2	0.075	48.7	0.389	-59.9
0.6	0.479	-141.7	6.837	95.3	0.081	48.5	0.334	-62.4
0.7	0.472	-150.9	5.989	90.4	0.087	49.0	0.294	-64.4
0.8	0.468	-157.7	5.295	86.4	0.094	49.4	0.262	-66.0
0.9	0.470	-164.1	4.754	82.7	0.101	50.2	0.236	-67.8
1.0	0.468	-170.1	4.322	79.0	0.107	50.6	0.215	-69.5
1.1	0.470	-175.0	3.934	75.9	0.114	50.9	0.196	-71.7
1.2	0.477	-179.0	3.654	72.8	0.121	51.2	0.180	-73.9
1.3	0.479	176.8	3.373	69.7	0.128	51.3	0.165	-76.9
1.4	0.481	173.0	3.149	66.8	0.135	51.3	0.153	-80.3
1.5	0.489	169.6	2.952	64.2	0.142	51.0	0.141	-84.3
1.6	0.495	166.3	2.776	61.5	0.150	50.8	0.130	-88.9
1.7	0.500	163.4	2.612	58.8	0.157	50.6	0.121	-94.2
1.8	0.505	160.2	2.472	56.1	0.165	50.2	0.113	-100.2
1.9	0.514	157.9	2.358	53.9	0.172	49.7	0.108	-106.8
2.0	0.525	155.3	2.246	51.4	0.180	49.1	0.103	-114.4
2.1	0.530	152.9	2.149	48.8	0.187	48.8	0.100	-122.3
2.2	0.533	150.8	2.052	46.5	0.194	48.4	0.098	-130.2
2.3	0.540	148.6	1.963	44.1	0.201	47.6	0.096	-139.0
2.4	0.543	146.3	1.885	42.2	0.208	47.1	0.093	-145.9
2.5	0.550	144.2	1.815	40.3	0.215	46.8	0.097	-150.2
2.6	0.556	142.5	1.759	38.3	0.224	46.1	0.104	-155.2
2.7	0.563	140.5	1.704	36.0	0.231	45.5	0.112	-161.9
2.8	0.569	138.7	1.647	34.3	0.239	44.9	0.118	-167.6
2.9	0.577	137.5	1.601	31.7	0.246	43.8	0.127	-172.2
3.0	0.579	135.6	1.568	29.8	0.254	43.0	0.132	-177.2
4.0	0.650	119.0	1.222	11.9	0.327	31.8	0.238	147.0
5.0	0.718	108.0	0.958	-2.9	0.387	20.2	0.359	124.6

$V_{CE} = 2\text{ V}$, $I_C = 10\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.638	-53.6	24.095	146.0	0.028	67.6	0.841	-29.8
0.2	0.550	-88.8	17.479	124.8	0.044	56.9	0.628	-48.0
0.3	0.493	-113.5	13.408	112.3	0.053	53.4	0.479	-57.5
0.4	0.469	-130.1	10.580	103.7	0.060	52.7	0.381	-63.1
0.5	0.452	-142.3	8.681	97.4	0.067	53.2	0.315	-66.7
0.6	0.441	-151.7	7.357	92.2	0.075	53.9	0.267	-69.4
0.7	0.443	-159.4	6.392	87.8	0.082	54.8	0.231	-71.6
0.8	0.442	-165.5	5.648	84.2	0.090	55.4	0.203	-73.7
0.9	0.445	-170.9	5.054	80.8	0.098	55.8	0.181	-75.9
1.0	0.445	-176.3	4.582	77.4	0.106	56.2	0.162	-78.3
1.1	0.451	179.3	4.174	74.5	0.114	56.1	0.146	-81.5
1.2	0.459	176.2	3.865	71.6	0.122	56.0	0.133	-85.1
1.3	0.460	172.0	3.564	68.7	0.130	55.7	0.121	-89.7
1.4	0.465	168.9	3.323	65.9	0.138	55.4	0.110	-94.9
1.5	0.472	165.7	3.116	63.4	0.146	54.9	0.101	-101.2
1.6	0.480	162.8	2.931	60.9	0.155	54.3	0.093	-108.6
1.7	0.484	160.2	2.754	58.3	0.163	53.7	0.088	-116.8
1.8	0.491	157.4	2.605	55.8	0.171	53.0	0.085	-125.9
1.9	0.503	155.2	2.477	53.9	0.179	52.4	0.084	-134.7
2.0	0.510	153.2	2.362	51.4	0.187	51.5	0.085	-144.3
2.1	0.515	150.8	2.254	49.1	0.195	50.8	0.089	-152.8
2.2	0.519	148.8	2.158	46.8	0.203	50.1	0.092	-161.3
2.3	0.525	146.6	2.060	44.6	0.210	49.0	0.096	-169.5
2.4	0.532	144.5	1.979	42.7	0.217	48.4	0.098	-176.4
2.5	0.538	142.6	1.905	40.8	0.225	47.8	0.103	-179.2
2.6	0.544	141.1	1.848	38.8	0.234	46.7	0.111	177.5
2.7	0.550	139.0	1.787	36.7	0.242	45.9	0.122	172.9
2.8	0.558	137.5	1.728	35.0	0.249	45.2	0.129	168.6
2.9	0.566	136.2	1.679	32.5	0.257	44.1	0.140	166.1
3.0	0.567	134.3	1.644	30.6	0.264	43.1	0.147	161.9
4.0	0.640	118.6	1.277	13.1	0.334	30.5	0.256	136.2
5.0	0.709	107.9	1.003	-1.1	0.390	19.0	0.367	117.9

$V_{CE} = 2\text{ V}$, $I_C = 20\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.486	-81.5	32.771	135.4	0.023	66.0	0.723	-41.7
0.2	0.429	-117.5	21.075	114.6	0.034	59.2	0.475	-61.1
0.3	0.414	-138.2	15.252	104.1	0.043	60.0	0.340	-70.5
0.4	0.407	-151.0	11.705	97.2	0.051	61.5	0.262	-76.4
0.5	0.407	-159.7	9.491	92.1	0.060	63.2	0.211	-80.7
0.6	0.404	-166.7	7.958	87.9	0.069	63.5	0.174	-84.7
0.7	0.412	-173.1	6.891	84.3	0.078	64.0	0.148	-88.8
0.8	0.415	-177.5	6.070	81.2	0.088	64.1	0.128	-92.7
0.9	0.421	178.9	5.412	78.2	0.097	63.9	0.113	-97.5
1.0	0.424	174.7	4.897	75.2	0.107	63.5	0.100	-102.9
1.1	0.430	171.3	4.454	72.5	0.116	62.9	0.091	-110.0
1.2	0.438	169.0	4.118	70.0	0.126	62.2	0.083	-117.8
1.3	0.442	165.5	3.792	67.4	0.135	61.3	0.079	-127.3
1.4	0.448	162.8	3.533	64.9	0.144	60.5	0.077	-137.2
1.5	0.455	160.4	3.305	62.6	0.153	59.5	0.077	-147.2
1.6	0.464	158.3	3.105	60.3	0.163	58.3	0.080	-156.9
1.7	0.470	156.0	2.921	57.8	0.171	57.4	0.084	-165.7
1.8	0.478	153.5	2.756	55.5	0.180	56.3	0.091	-173.5
1.9	0.485	151.6	2.626	53.7	0.189	55.2	0.098	-179.5
2.0	0.496	149.7	2.500	51.5	0.198	54.0	0.107	174.9
2.1	0.504	147.8	2.385	49.2	0.206	53.0	0.115	169.9
2.2	0.507	145.8	2.276	47.1	0.215	51.9	0.124	165.1
2.3	0.514	144.0	2.176	45.0	0.222	50.6	0.132	160.1
2.4	0.519	142.0	2.090	43.1	0.229	49.7	0.137	155.9
2.5	0.525	140.1	2.012	41.4	0.238	48.9	0.144	154.4
2.6	0.531	138.7	1.944	39.5	0.247	47.6	0.152	153.0
2.7	0.539	136.9	1.881	37.6	0.255	46.7	0.164	150.6
2.8	0.546	135.4	1.818	35.8	0.263	45.7	0.174	148.0
2.9	0.553	134.4	1.766	33.3	0.270	44.4	0.184	146.8
3.0	0.556	132.7	1.731	31.5	0.277	43.3	0.191	144.1
4.0	0.631	117.5	1.340	14.6	0.345	29.6	0.296	125.5
5.0	0.701	107.4	1.054	0.4	0.395	17.7	0.395	110.2

$V_{CE} = 3\text{ V}$, $I_C = 1\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.963	-17.1	3.821	168.2	0.034	80.1	0.989	-6.6
0.2	0.933	-33.7	3.531	155.5	0.065	70.7	0.963	-12.8
0.3	0.900	-48.9	3.363	145.3	0.091	61.5	0.924	-18.2
0.4	0.859	-63.3	3.134	135.0	0.113	54.0	0.878	-23.0
0.5	0.823	-76.4	2.908	126.1	0.129	47.4	0.836	-27.1
0.6	0.789	-88.6	2.695	117.8	0.142	41.4	0.794	-30.4
0.7	0.760	-99.8	2.505	110.7	0.150	36.4	0.757	-33.4
0.8	0.734	-109.6	2.325	104.2	0.156	32.2	0.723	-35.9
0.9	0.717	-118.8	2.165	98.3	0.160	28.7	0.694	-38.3
1.0	0.698	-127.6	2.031	92.3	0.162	25.7	0.668	-40.5
1.1	0.684	-135.7	1.899	87.2	0.162	23.0	0.645	-42.6
1.2	0.680	-142.8	1.794	82.5	0.161	20.8	0.625	-44.7
1.3	0.671	-149.9	1.683	77.6	0.160	18.9	0.607	-46.9
1.4	0.665	-156.0	1.593	73.3	0.157	17.6	0.592	-49.2
1.5	0.664	-161.7	1.514	69.2	0.155	16.5	0.577	-51.4
1.6	0.662	-167.2	1.439	65.3	0.152	16.0	0.565	-54.0
1.7	0.663	-172.3	1.367	61.4	0.147	15.8	0.553	-56.6
1.8	0.662	-177.2	1.305	57.4	0.144	16.2	0.544	-59.4
1.9	0.668	178.5	1.249	54.7	0.141	17.0	0.534	-62.3
2.0	0.674	174.4	1.199	51.2	0.138	18.4	0.525	-65.4
2.1	0.672	170.7	1.153	47.8	0.135	20.5	0.516	-68.6
2.2	0.672	167.3	1.109	44.6	0.133	23.0	0.509	-72.2
2.3	0.675	163.6	1.068	41.6	0.131	25.2	0.498	-75.7
2.4	0.677	160.2	1.026	39.2	0.130	28.3	0.487	-78.5
2.5	0.680	157.0	0.994	36.9	0.131	31.5	0.489	-81.3
2.6	0.687	154.2	0.967	34.4	0.133	34.8	0.493	-85.5
2.7	0.689	151.2	0.937	32.1	0.137	38.0	0.492	-89.9
2.8	0.697	148.8	0.913	30.0	0.142	41.0	0.492	-93.9
2.9	0.699	146.4	0.884	27.3	0.149	43.1	0.489	-97.9
3.0	0.700	143.6	0.863	25.4	0.157	45.1	0.482	-102.5
4.0	0.749	121.1	0.682	9.1	0.279	45.9	0.495	-151.6
5.0	0.781	106.8	0.553	-0.2	0.389	29.8	0.559	161.8

$V_{CE} = 3\text{ V}$, $I_C = 3\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.880	-26.3	10.060	161.9	0.032	78.5	0.962	-12.9
0.2	0.818	-50.0	8.802	145.4	0.058	63.9	0.879	-23.8
0.3	0.750	-69.5	7.806	132.7	0.076	55.2	0.782	-31.8
0.4	0.689	-87.1	6.799	121.9	0.089	48.6	0.694	-37.7
0.5	0.646	-101.6	5.934	113.4	0.097	44.1	0.620	-41.8
0.6	0.608	-114.2	5.225	105.9	0.104	40.7	0.558	-44.7
0.7	0.582	-125.1	4.681	99.8	0.108	38.9	0.512	-46.8
0.8	0.565	-134.2	4.220	94.6	0.112	37.5	0.473	-48.6
0.9	0.556	-142.4	3.830	89.9	0.116	36.9	0.441	-50.3
1.0	0.545	-150.0	3.513	85.3	0.119	36.5	0.414	-51.6
1.1	0.540	-156.8	3.229	81.2	0.121	36.4	0.391	-53.2
1.2	0.543	-162.4	3.011	77.5	0.124	36.5	0.370	-54.7
1.3	0.538	-168.1	2.788	73.8	0.127	36.6	0.352	-56.4
1.4	0.538	-173.0	2.616	70.3	0.130	37.2	0.336	-58.2
1.5	0.541	-177.7	2.461	67.1	0.133	37.7	0.321	-60.2
1.6	0.544	178.1	2.323	64.0	0.137	38.3	0.308	-62.5
1.7	0.547	174.2	2.192	60.7	0.140	39.0	0.296	-64.9
1.8	0.551	170.3	2.082	57.6	0.145	39.5	0.284	-67.6
1.9	0.561	166.8	1.986	55.1	0.148	40.3	0.274	-70.4
2.0	0.566	163.8	1.896	52.2	0.154	40.9	0.264	-73.7
2.1	0.571	160.7	1.821	49.4	0.158	41.6	0.255	-77.2
2.2	0.571	158.0	1.742	46.6	0.163	42.4	0.246	-81.0
2.3	0.578	155.4	1.670	44.1	0.168	42.7	0.236	-84.7
2.4	0.582	152.4	1.606	41.8	0.173	43.2	0.226	-87.4
2.5	0.589	150.0	1.549	39.6	0.179	43.8	0.226	-90.4
2.6	0.590	147.9	1.501	37.5	0.185	44.2	0.227	-95.0
2.7	0.599	145.5	1.456	35.1	0.192	44.5	0.226	-100.4
2.8	0.607	143.2	1.409	33.0	0.199	44.7	0.224	-105.1
2.9	0.611	141.8	1.371	30.5	0.206	44.4	0.224	-109.8
3.0	0.614	139.5	1.340	28.5	0.214	44.2	0.220	-115.0
4.0	0.681	120.5	1.046	9.5	0.300	37.3	0.265	-169.0
5.0	0.742	108.3	0.812	-5.2	0.380	25.3	0.384	150.2

$V_{CE} = 3\text{ V}$, $I_C = 5\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.815	-34.8	15.209	156.6	0.030	73.4	0.929	-18.1
0.2	0.715	-62.6	12.563	137.7	0.052	60.0	0.797	-32.0
0.3	0.635	-84.7	10.525	124.5	0.065	53.0	0.668	-41.0
0.4	0.586	-103.1	8.768	114.1	0.075	48.3	0.567	-46.6
0.5	0.543	-117.1	7.426	106.2	0.081	46.2	0.490	-50.2
0.6	0.519	-129.0	6.411	99.7	0.087	45.0	0.431	-52.5
0.7	0.503	-139.2	5.649	94.6	0.092	44.7	0.386	-54.3
0.8	0.492	-147.1	5.039	90.1	0.097	44.7	0.351	-55.6
0.9	0.488	-154.3	4.540	85.8	0.102	45.1	0.323	-56.9
1.0	0.485	-161.2	4.132	81.9	0.108	45.5	0.299	-58.1
1.1	0.485	-167.2	3.782	78.4	0.113	45.9	0.278	-59.5
1.2	0.490	-171.6	3.516	75.0	0.118	46.3	0.260	-61.0
1.3	0.488	-176.7	3.245	71.8	0.123	46.6	0.244	-62.8
1.4	0.490	179.2	3.037	68.6	0.129	47.0	0.229	-64.9
1.5	0.494	175.2	2.848	65.8	0.135	47.2	0.215	-67.2
1.6	0.503	171.6	2.685	63.0	0.141	47.3	0.203	-69.8
1.7	0.505	168.2	2.533	60.1	0.147	47.5	0.191	-72.8
1.8	0.511	164.7	2.394	57.3	0.154	47.5	0.181	-76.2
1.9	0.521	161.8	2.281	55.0	0.160	47.4	0.171	-79.9
2.0	0.529	159.1	2.175	52.3	0.167	47.3	0.162	-84.2
2.1	0.534	156.6	2.085	49.7	0.174	47.4	0.154	-89.0
2.2	0.536	154.0	1.994	47.2	0.180	47.2	0.146	-94.0
2.3	0.543	151.7	1.910	44.8	0.186	46.8	0.138	-99.3
2.4	0.546	149.1	1.833	42.9	0.192	46.7	0.130	-103.1
2.5	0.552	147.0	1.766	40.8	0.199	46.6	0.130	-107.1
2.6	0.559	145.2	1.715	38.7	0.207	46.2	0.132	-112.9
2.7	0.566	142.9	1.660	36.4	0.214	45.8	0.133	-120.2
2.8	0.572	141.1	1.605	34.7	0.222	45.5	0.132	-126.1
2.9	0.579	139.5	1.559	32.1	0.229	44.7	0.136	-132.4
3.0	0.581	137.5	1.526	30.0	0.237	44.0	0.136	-138.9
4.0	0.655	120.4	1.192	11.6	0.314	34.3	0.215	168.1
5.0	0.722	108.7	0.927	-3.2	0.380	22.9	0.341	137.3

$V_{CE} = 3\text{ V}$, $I_C = 7\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.749	-42.5	19.394	152.3	0.028	72.1	0.898	-22.7
0.2	0.636	-73.2	15.233	132.1	0.047	58.8	0.728	-38.2
0.3	0.566	-96.1	12.222	118.9	0.058	52.7	0.586	-47.3
0.4	0.518	-114.6	9.908	109.2	0.066	50.3	0.482	-52.7
0.5	0.489	-127.8	8.275	102.2	0.072	49.4	0.409	-55.8
0.6	0.468	-138.9	7.062	96.3	0.078	49.3	0.354	-57.9
0.7	0.461	-148.3	6.181	91.5	0.085	49.9	0.314	-59.4
0.8	0.455	-155.3	5.493	87.3	0.091	50.2	0.282	-60.5
0.9	0.456	-161.7	4.920	83.6	0.097	50.9	0.257	-61.9
1.0	0.453	-167.9	4.468	80.0	0.104	51.4	0.235	-63.0
1.1	0.455	-173.2	4.075	76.8	0.111	51.8	0.216	-64.8
1.2	0.460	-177.2	3.787	73.7	0.117	51.9	0.200	-66.4
1.3	0.462	178.3	3.489	70.6	0.124	52.0	0.185	-68.8
1.4	0.467	174.3	3.259	67.7	0.131	52.1	0.172	-71.1
1.5	0.472	171.1	3.057	65.0	0.138	51.9	0.159	-74.1
1.6	0.480	167.8	2.878	62.4	0.146	51.7	0.147	-77.6
1.7	0.486	164.7	2.709	59.7	0.153	51.5	0.137	-81.9
1.8	0.492	161.6	2.562	57.0	0.160	51.0	0.127	-86.4
1.9	0.501	158.9	2.441	55.0	0.167	50.6	0.120	-91.6
2.0	0.508	156.3	2.328	52.4	0.175	50.2	0.113	-97.9
2.1	0.515	153.8	2.224	49.9	0.182	49.8	0.107	-104.6
2.2	0.517	151.9	2.128	47.5	0.190	49.4	0.102	-111.6
2.3	0.525	149.5	2.035	45.3	0.196	48.6	0.096	-119.8
2.4	0.528	147.3	1.956	43.3	0.203	48.2	0.090	-125.8
2.5	0.535	145.1	1.884	41.3	0.210	47.8	0.092	-130.7
2.6	0.541	143.4	1.825	39.3	0.218	47.1	0.096	-137.1
2.7	0.549	141.3	1.770	37.1	0.226	46.6	0.101	-145.3
2.8	0.556	139.6	1.709	35.4	0.233	45.9	0.105	-152.0
2.9	0.563	138.2	1.662	32.7	0.241	45.0	0.112	-157.8
3.0	0.567	136.2	1.627	30.8	0.249	44.2	0.115	-164.0
4.0	0.638	119.6	1.266	12.8	0.322	33.1	0.214	152.9
5.0	0.711	108.7	0.993	-2.0	0.382	21.8	0.338	128.9

$V_{CE} = 3\text{ V}$, $I_C = 10\text{ mA}$, $Z_o = 50\ \Omega$

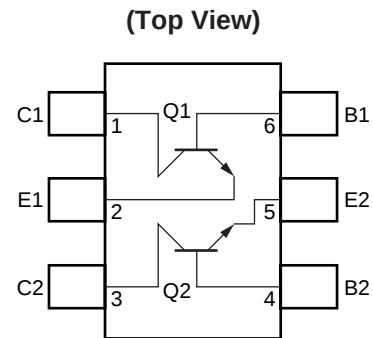
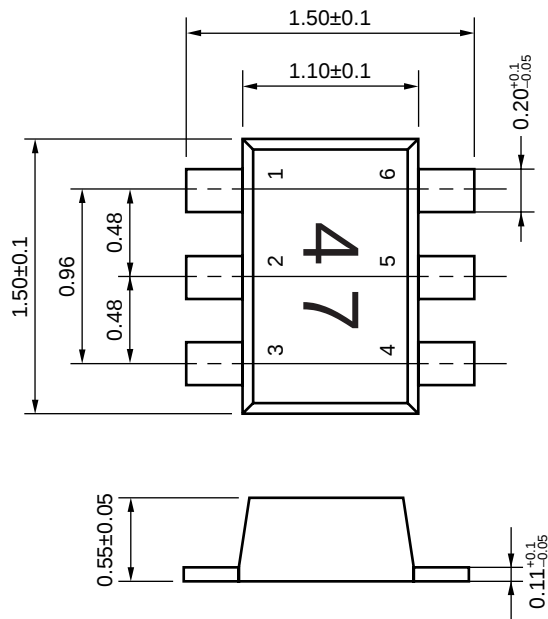
Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.657	-50.7	24.244	147.2	0.026	69.0	0.854	-27.9
0.2	0.557	-85.1	17.843	126.1	0.042	57.7	0.647	-44.9
0.3	0.491	-109.3	13.773	113.5	0.051	53.9	0.499	-53.8
0.4	0.460	-126.1	10.903	104.7	0.058	53.5	0.401	-58.8
0.5	0.443	-138.5	8.976	98.3	0.065	54.0	0.334	-61.7
0.6	0.431	-148.4	7.610	93.1	0.073	54.3	0.285	-63.6
0.7	0.428	-157.2	6.619	88.8	0.080	55.4	0.249	-65.1
0.8	0.425	-162.9	5.862	85.1	0.087	55.9	0.222	-66.3
0.9	0.429	-168.6	5.238	81.6	0.095	56.4	0.199	-67.8
1.0	0.429	-174.1	4.754	78.4	0.103	56.7	0.181	-69.3
1.1	0.433	-178.9	4.330	75.4	0.111	56.8	0.164	-71.6
1.2	0.441	177.8	4.013	72.5	0.118	56.6	0.149	-73.8
1.3	0.443	173.7	3.698	69.6	0.126	56.4	0.136	-76.9
1.4	0.447	170.4	3.449	66.9	0.134	56.2	0.124	-80.6
1.5	0.455	167.1	3.232	64.4	0.142	55.6	0.113	-85.1
1.6	0.460	164.3	3.040	62.0	0.150	55.1	0.104	-90.6
1.7	0.469	161.5	2.861	59.3	0.158	54.5	0.095	-97.2
1.8	0.474	158.6	2.706	56.8	0.166	53.9	0.088	-104.5
1.9	0.486	156.1	2.574	54.7	0.174	53.0	0.084	-112.5
2.0	0.493	154.0	2.456	52.3	0.183	52.3	0.081	-121.8
2.1	0.500	151.8	2.344	49.9	0.190	51.6	0.079	-131.7
2.2	0.503	149.8	2.242	47.6	0.198	50.9	0.079	-140.9
2.3	0.510	147.6	2.144	45.6	0.205	49.9	0.080	-151.6
2.4	0.514	145.4	2.057	43.6	0.212	49.3	0.078	-159.5
2.5	0.521	143.6	1.982	41.7	0.220	48.7	0.083	-163.9
2.6	0.526	141.9	1.920	39.9	0.228	47.9	0.090	-168.4
2.7	0.536	140.0	1.859	37.8	0.236	47.2	0.099	-174.7
2.8	0.543	138.5	1.798	36.0	0.243	46.3	0.107	-179.9
2.9	0.549	136.9	1.746	33.5	0.251	45.1	0.116	-176.3
3.0	0.552	135.2	1.706	31.7	0.259	44.3	0.122	-171.6
4.0	0.629	119.3	1.323	14.1	0.329	32.1	0.229	140.7
5.0	0.703	108.5	1.041	-0.7	0.385	20.6	0.345	121.5

$V_{CE} = 3\text{ V}$, $I_C = 20\text{ mA}$, $Z_o = 50\ \Omega$

Frequency (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.479	-76.3	33.397	136.8	0.022	69.0	0.739	-39.0
0.2	0.428	-111.3	21.739	116.0	0.033	60.5	0.494	-57.0
0.3	0.402	-134.1	15.826	105.3	0.041	60.8	0.358	-65.2
0.4	0.390	-147.5	12.185	98.1	0.050	62.1	0.278	-69.8
0.5	0.384	-157.0	9.888	93.0	0.058	63.3	0.226	-72.8
0.6	0.386	-164.5	8.302	88.7	0.067	63.8	0.188	-75.2
0.7	0.392	-170.8	7.198	85.0	0.076	64.4	0.160	-77.5
0.8	0.392	-175.3	6.325	81.9	0.085	64.4	0.140	-79.7
0.9	0.399	-179.3	5.644	78.9	0.095	64.5	0.123	-82.7
1.0	0.401	176.2	5.114	76.1	0.104	64.0	0.108	-85.9
1.1	0.409	173.1	4.645	73.4	0.113	63.5	0.096	-90.9
1.2	0.416	170.0	4.301	70.8	0.122	62.7	0.086	-96.6
1.3	0.421	166.8	3.956	68.1	0.131	62.0	0.078	-104.1
1.4	0.426	164.1	3.690	65.6	0.140	61.1	0.071	-112.8
1.5	0.434	161.8	3.452	63.5	0.149	60.1	0.067	-123.1
1.6	0.440	159.1	3.244	61.1	0.158	59.0	0.066	-134.5
1.7	0.446	156.7	3.051	58.7	0.167	58.2	0.066	-145.9
1.8	0.455	154.4	2.883	56.4	0.176	57.1	0.069	-156.6
1.9	0.466	152.7	2.743	54.7	0.184	56.0	0.075	-165.4
2.0	0.475	150.8	2.611	52.5	0.193	54.7	0.081	-173.5
2.1	0.481	148.8	2.492	50.3	0.201	53.8	0.089	179.5
2.2	0.485	147.1	2.382	48.0	0.209	52.7	0.096	173.1
2.3	0.492	145.0	2.270	46.0	0.217	51.5	0.105	166.7
2.4	0.498	143.0	2.183	44.1	0.224	50.6	0.109	161.3
2.5	0.505	141.2	2.101	42.4	0.232	49.7	0.116	159.6
2.6	0.511	139.8	2.035	40.5	0.242	48.6	0.124	158.0
2.7	0.519	137.9	1.966	38.6	0.250	47.6	0.135	155.2
2.8	0.525	136.6	1.900	36.9	0.257	46.6	0.145	152.1
2.9	0.535	135.3	1.851	34.5	0.265	45.4	0.155	150.7
3.0	0.536	133.5	1.804	32.5	0.272	44.2	0.162	147.8
4.0	0.613	118.5	1.399	15.6	0.340	30.8	0.269	127.9
5.0	0.690	108.2	1.099	1.5	0.389	19.2	0.374	112.8

PACKAGE DIMENSIONS

FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

1. Collector (Q1)
2. Emitter (Q1)
3. Collector (Q2)
4. Base (Q2)
5. Emitter (Q2)
6. Base (Q1)

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