DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR

μPA862TC

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, 2SC5800)
  - Q1: High gain transistor suited for buffer applications
    - f_T = 12.0 GHz TYP., $|S_{21e}|^2$ = 8.5 dB TYP. @ V_{CE} = 3 V, I_C = 10 mA, f = 2 GHz
  - Q2: Low phase distortion transistor suited for OSC applications
    - f_T = 4.5 GHz TYP., $|S_{21e}|^2$ = 4.0 dB TYP. @ V_{CE} = 1 V, I_C = 5 mA, f = 2 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	2SC5800

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA862TC	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
μPA862TC-T1	3 kpcs/reel	

Remark To order evaluation samples, consult your NEC sales representative.
Unit sample quantity is 50 pcs.

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

Document No. P15733EJ1V0DS00 (1st edition)
Date Published September 2001 NS CP(K)
Printed in Japan

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	5.5	V
Emitter to Base Voltage	V_{EBO}	2	1.5	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 $cm^2 \times 1.0$ mm (t) glass epoxy PCB

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

(1) Q1

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I_{CBO}	V_{CB} = 5 V, I_E = 0 mA	–	–	100	nA
Emitter Cut-off Current	I_{EBO}	V_{BE} = 1 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 3 V, I_C = 10 mA	75	110	150	–
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 10 mA, f = 2 GHz	10.0	12.0	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 3 V, I_C = 10 mA, f = 2 GHz	7.0	8.5	–	dB
Noise Figure	NF	V_{CE} = 3 V, I_C = 3 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.5	2.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 3 V, I_E = 0 mA, f = 1 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 V, I_E = 0 mA	–	–	600	nA
Emitter Cut-off Current	I_{EBO}	V_{BE} = 1 V, I_C = 0 mA	–	–	600	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 1 V, I_C = 5 mA	100	120	145	–
Gain Bandwidth Product (1)	f_T	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	3.0	4.5	–	GHz
Gain Bandwidth Product (2)	f_T	V_{CE} = 1 V, I_C = 15 mA, f = 2 GHz	5.0	6.5	–	GHz
Insertion Power Gain (1)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	3.0	4.0	–	dB
Insertion Power Gain (2)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 15 mA, f = 2 GHz	4.5	5.5	–	dB
Noise Figure	NF	V_{CE} = 1 V, I_C = 10 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.9	2.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 0.5 V, I_E = 0 mA, f = 1 MHz	–	0.6	0.8	pF

Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

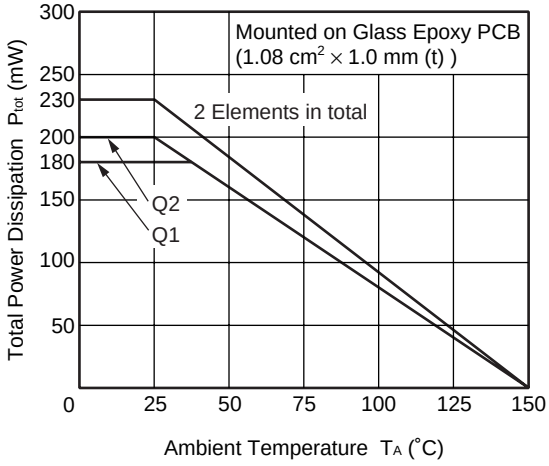
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

Rank	FB
Marking	5A
h_{FE} Value of Q1	75 to 150
h_{FE} Value of Q2	100 to 145

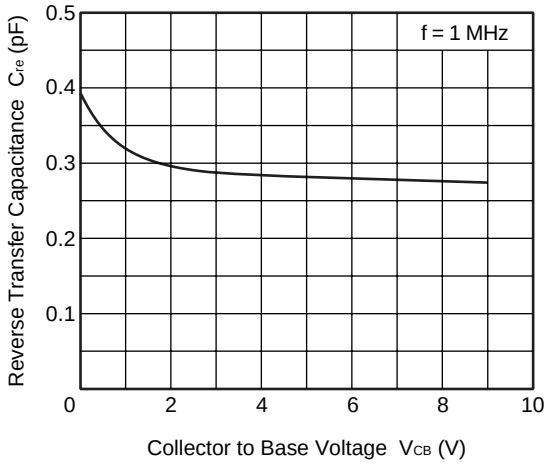
TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



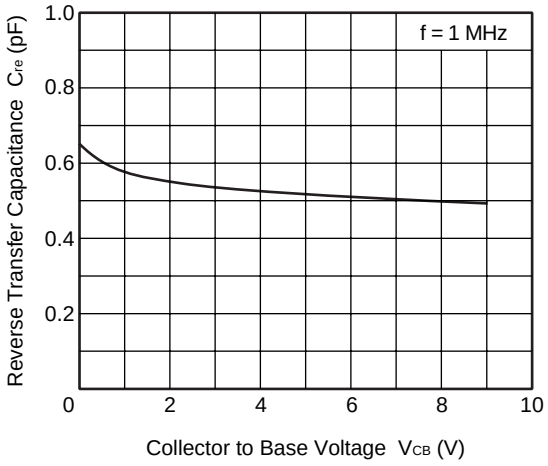
Q1

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



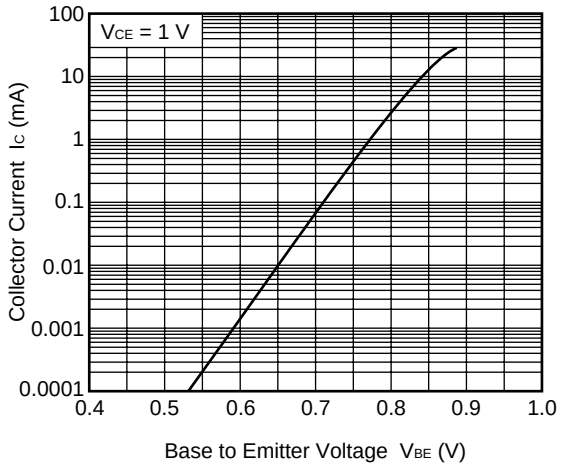
Q2

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



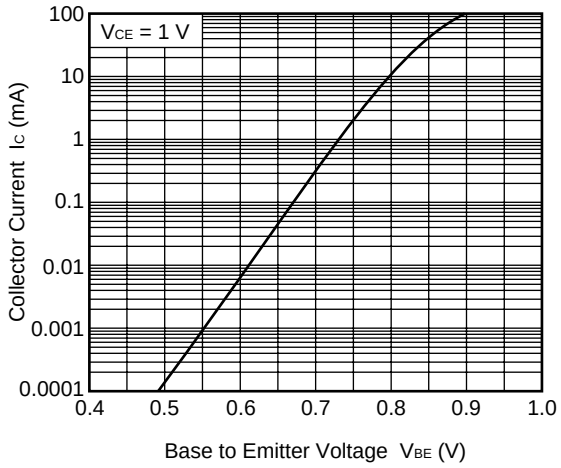
Q1

COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

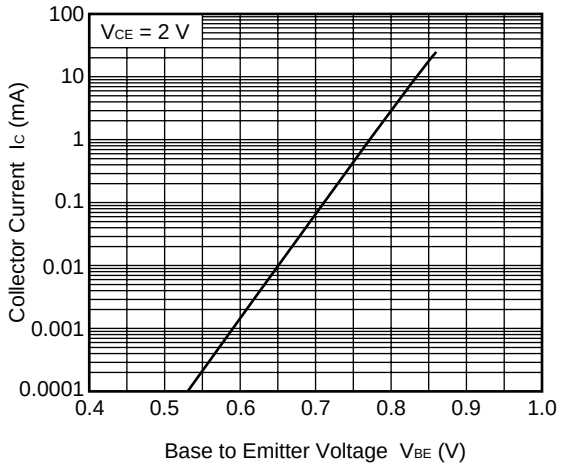


Q2

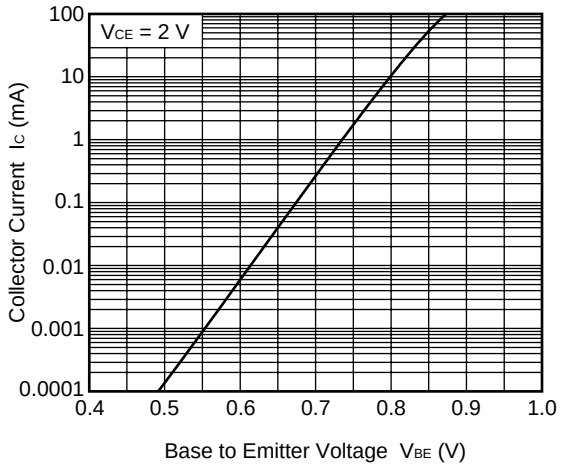
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



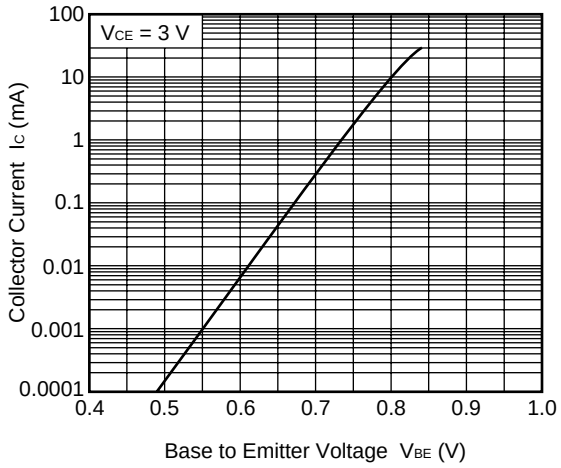
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

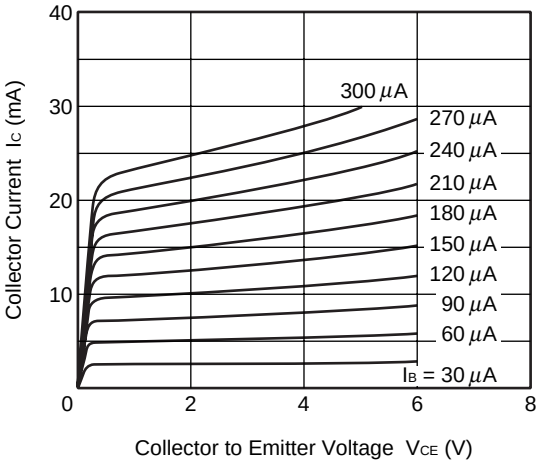


COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



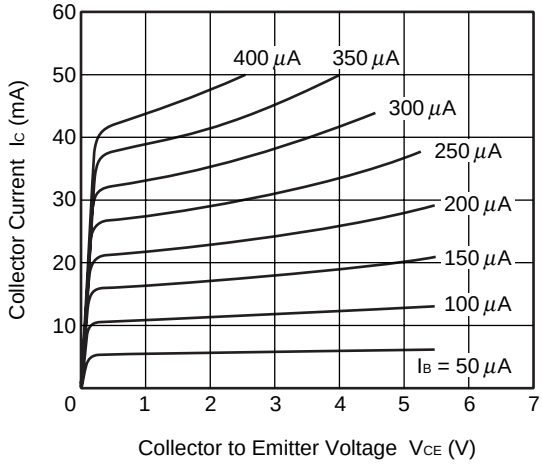
Q1

COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



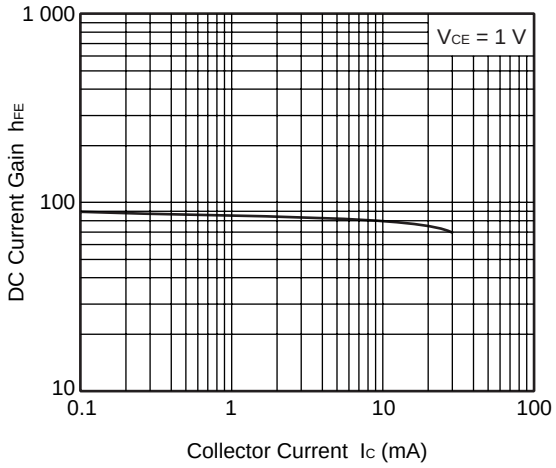
Q2

COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



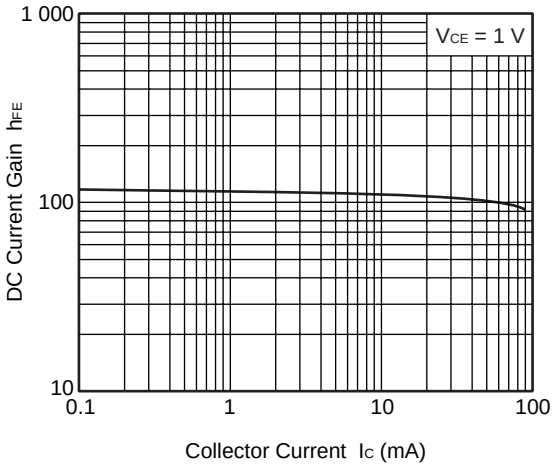
Q1

DC CURRENT GAIN vs.
COLLECTOR CURRENT



Q2

DC CURRENT GAIN vs.
COLLECTOR CURRENT



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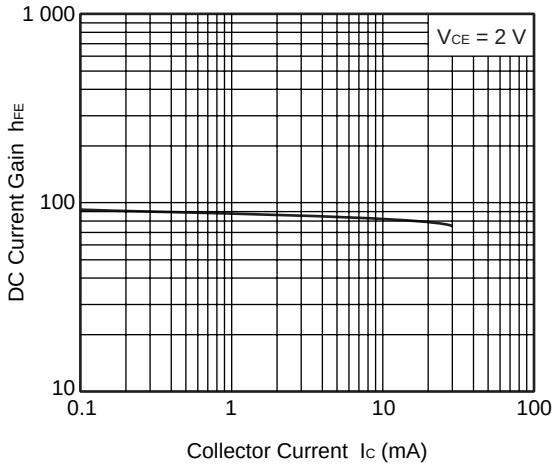
COLLECTOR CURRENT



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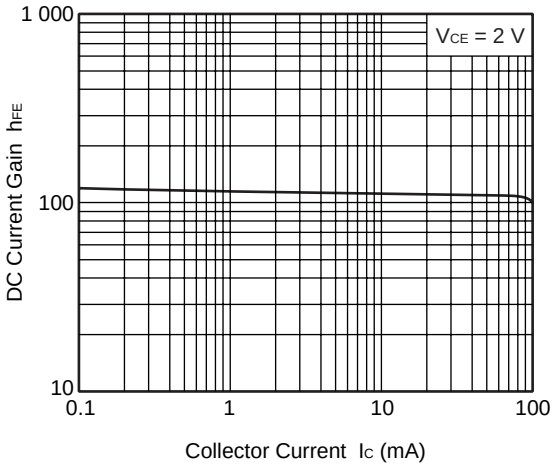

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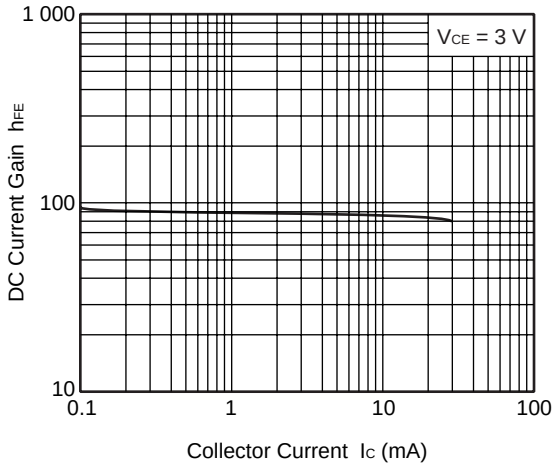
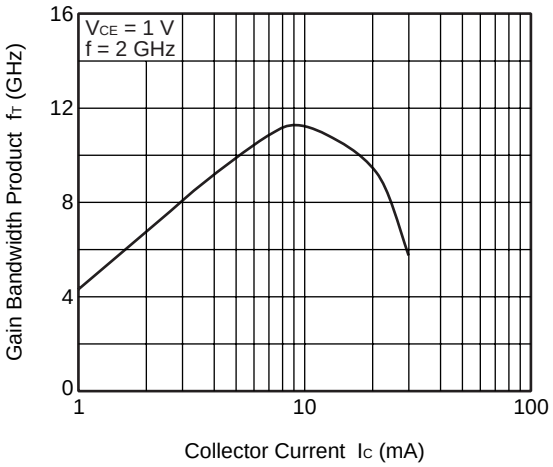


Q1

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



Q2

GAIN BANDWIDTH PRODUCT
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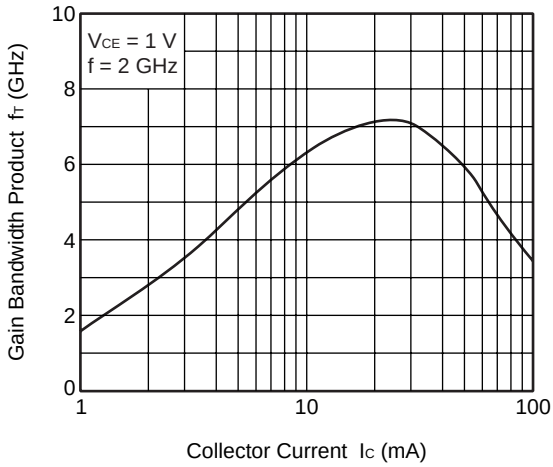

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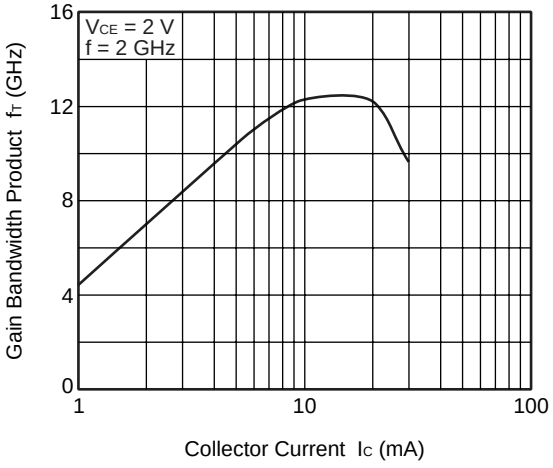

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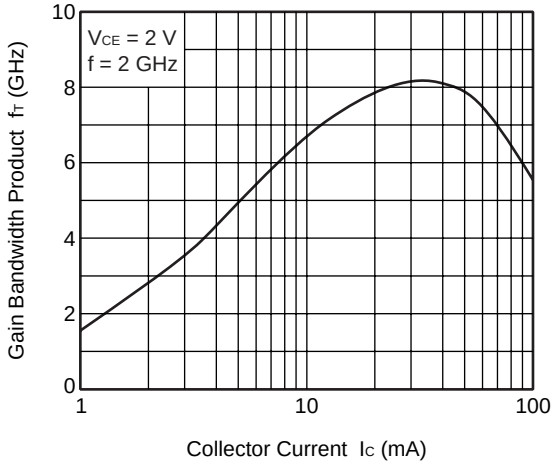

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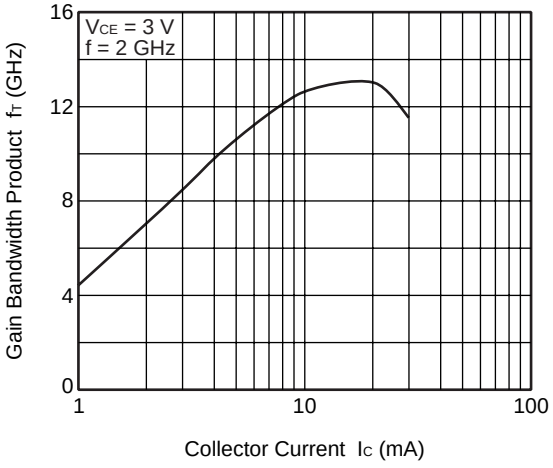
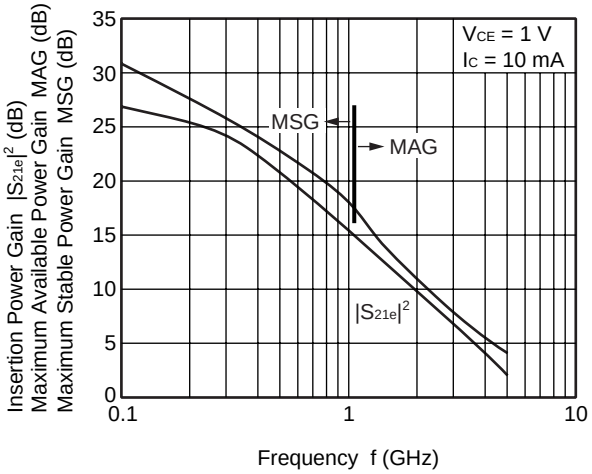


Q1

INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



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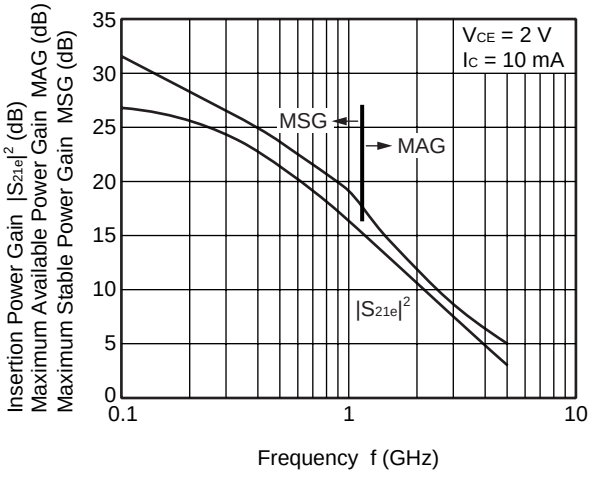

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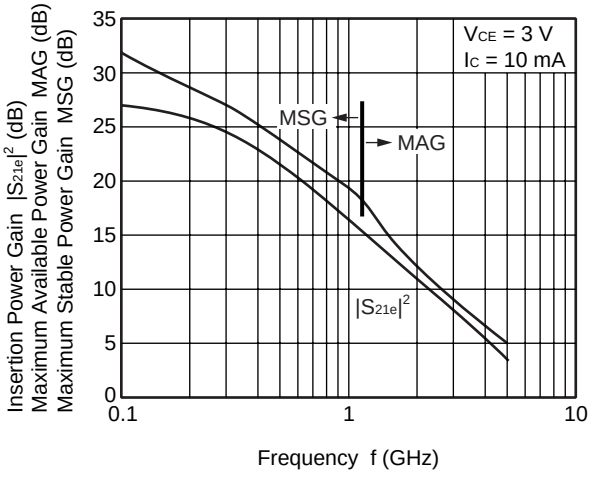
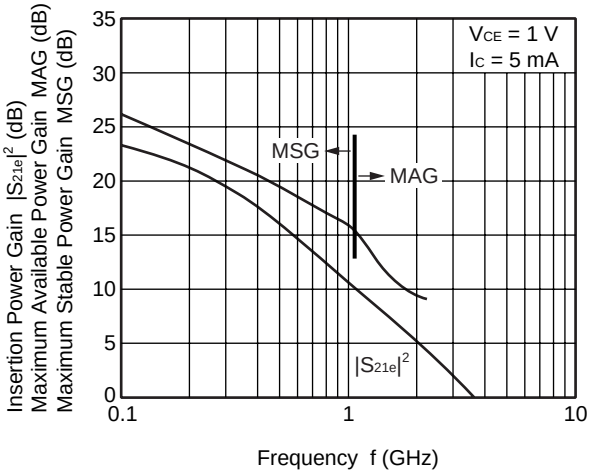


Q2

INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



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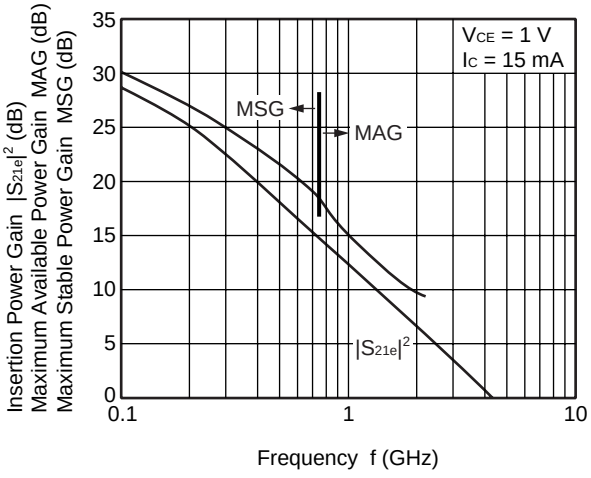

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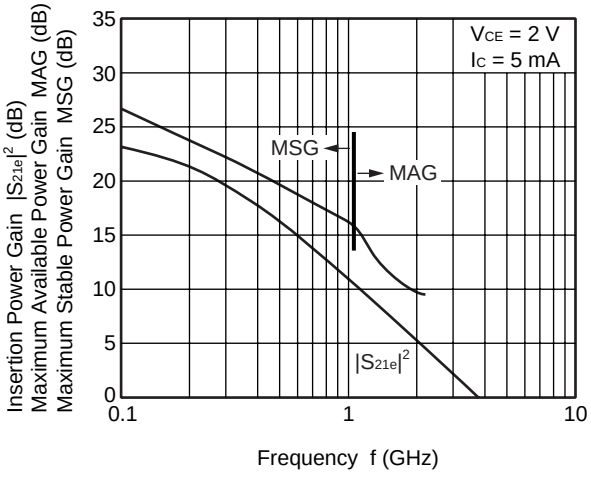

Q2

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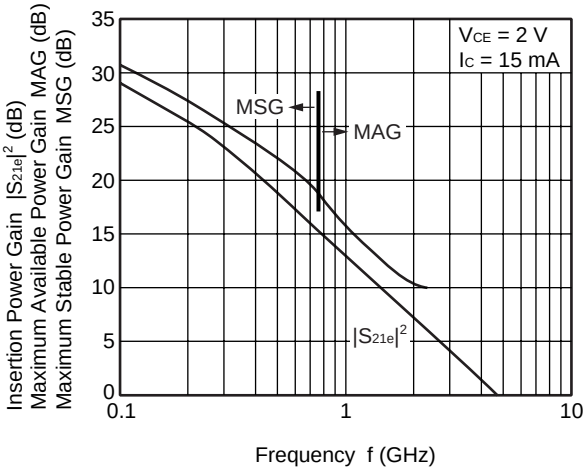
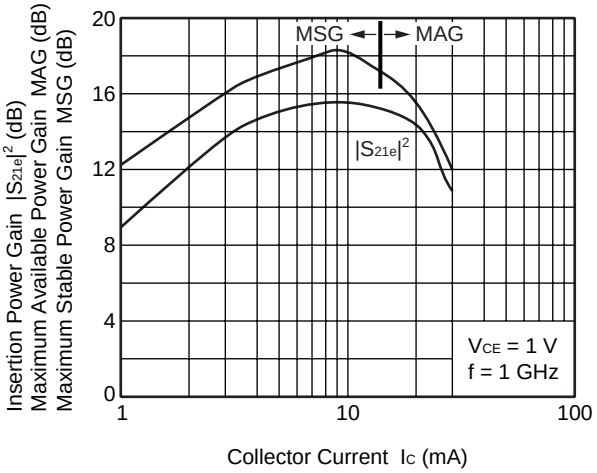


Q1

INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



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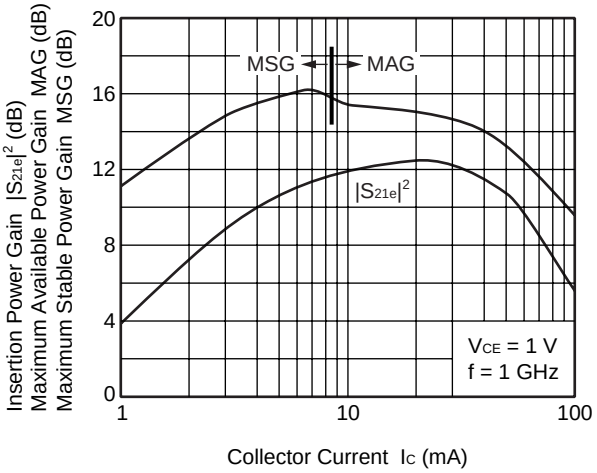

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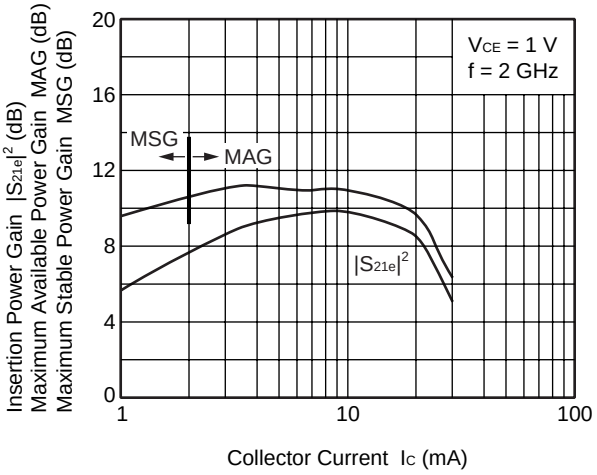

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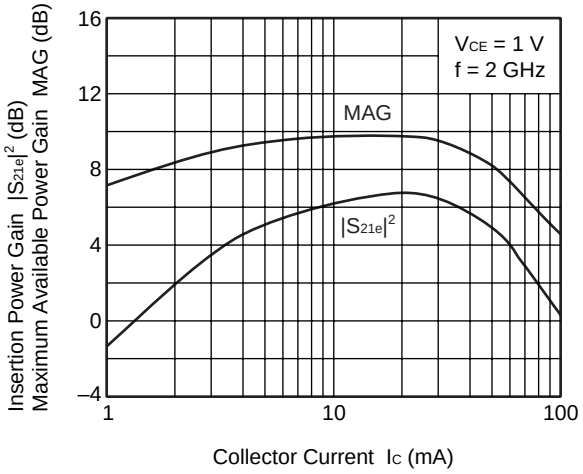

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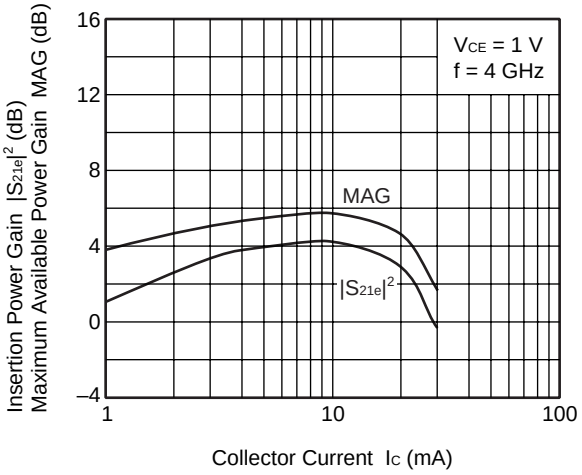

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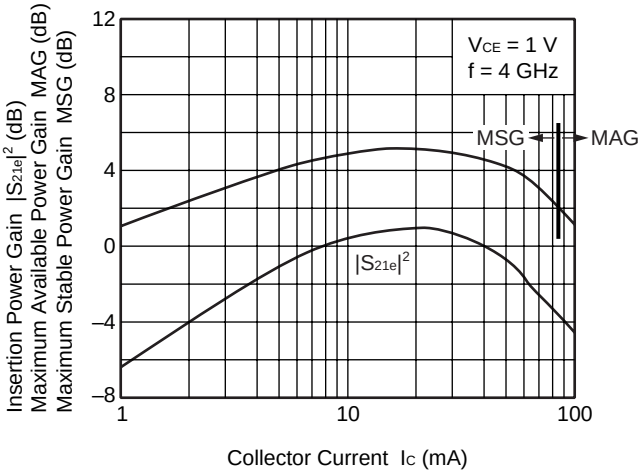

Q1

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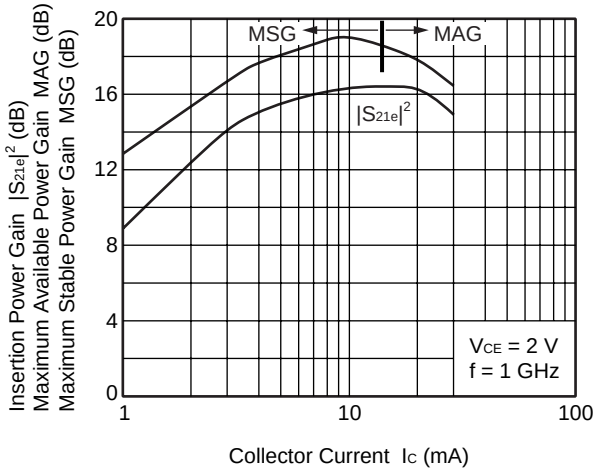
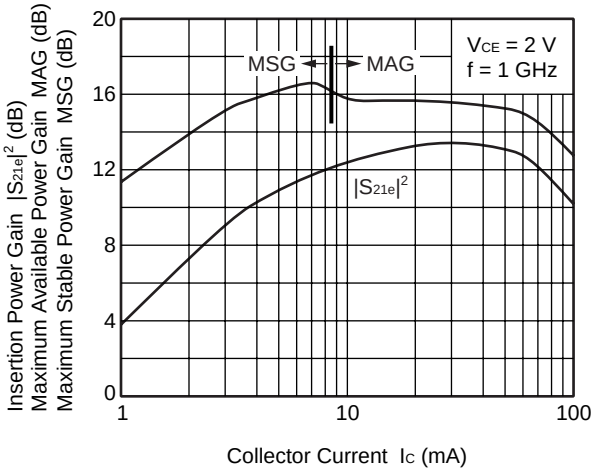


Q2

INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



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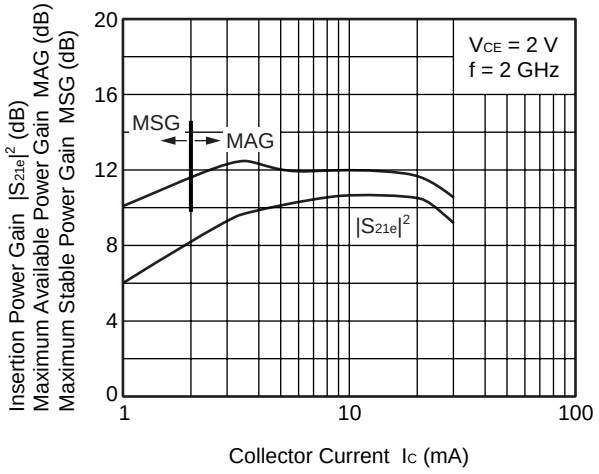

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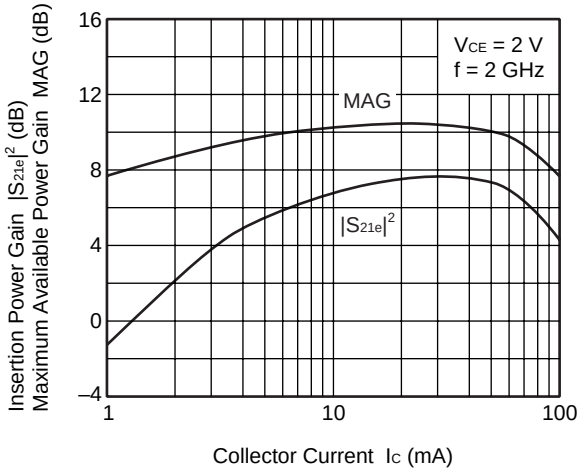

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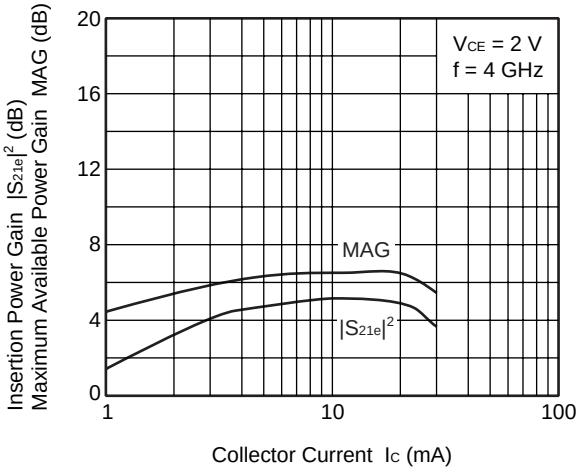
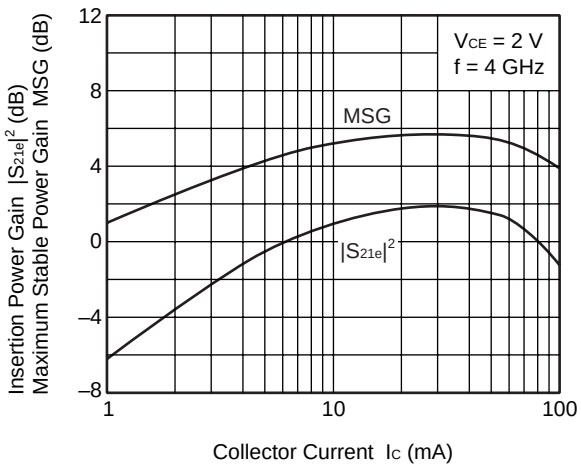
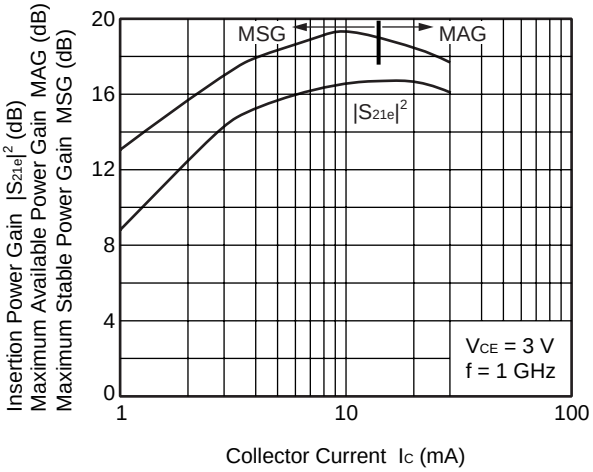


INSERTION POWER GAIN, MSG vs. COLLECTOR CURRENT

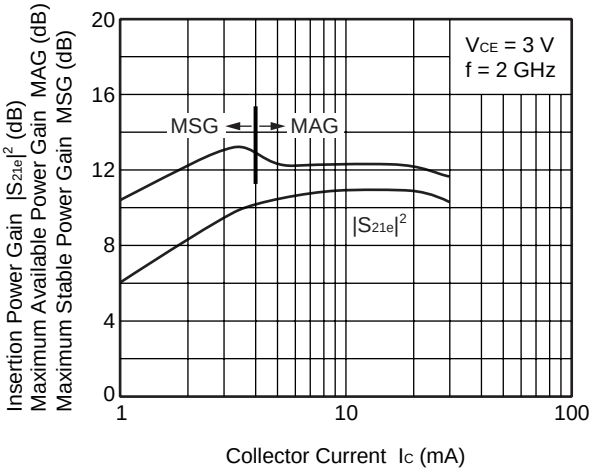


Q1

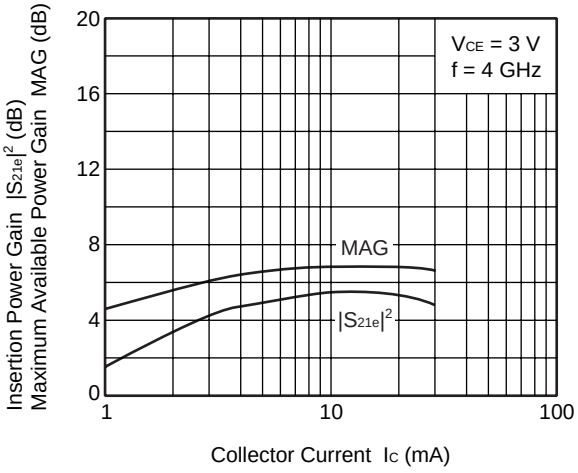
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT

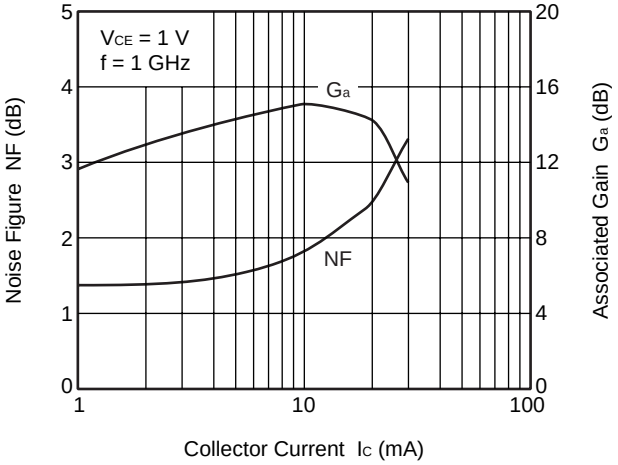


INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



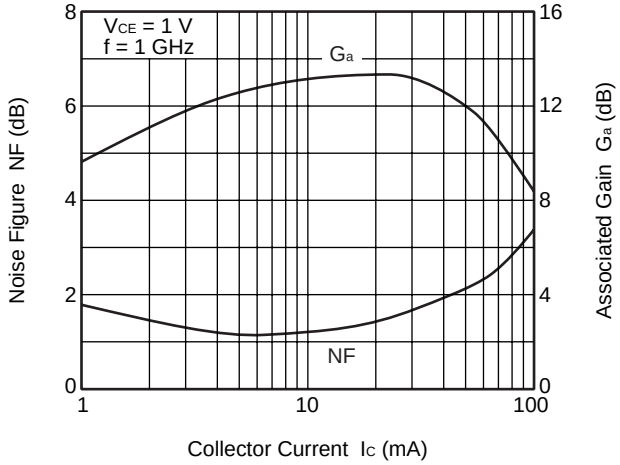
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

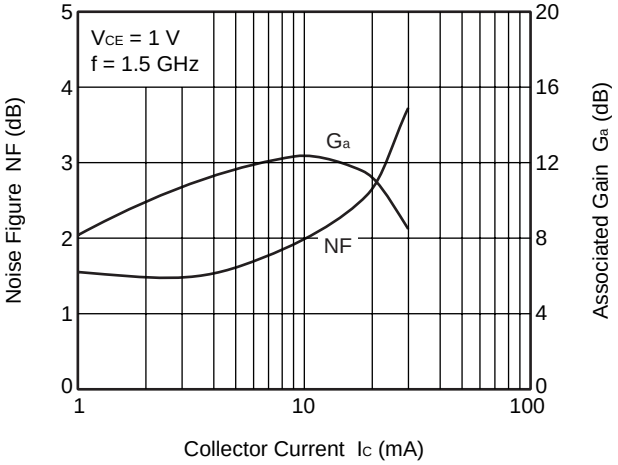


Q2

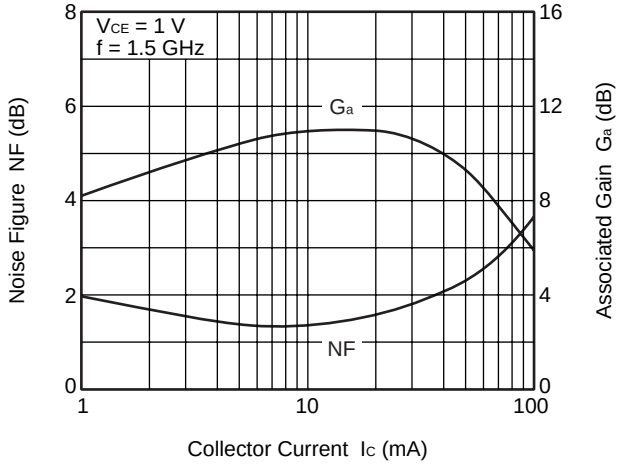
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



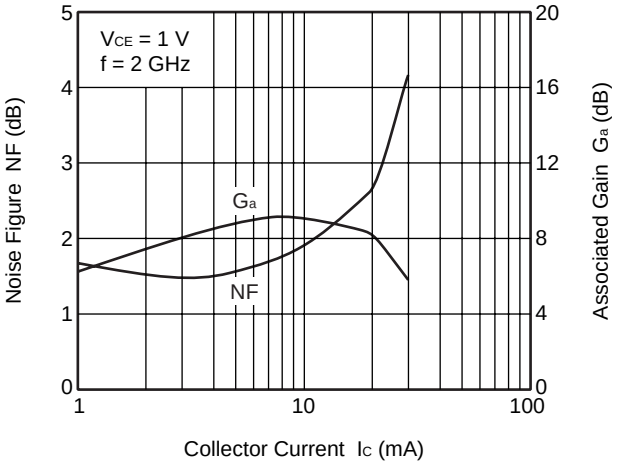
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



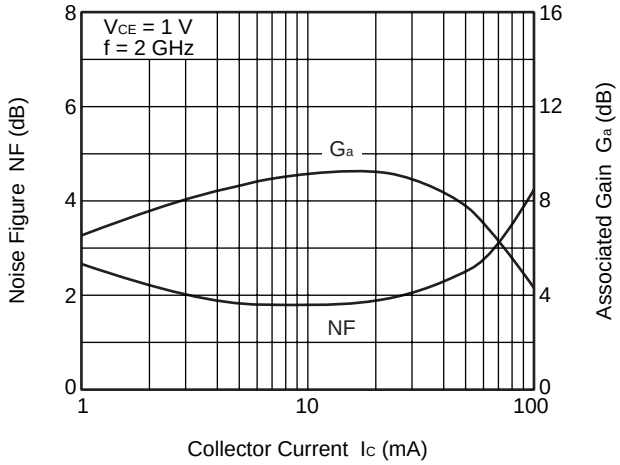
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

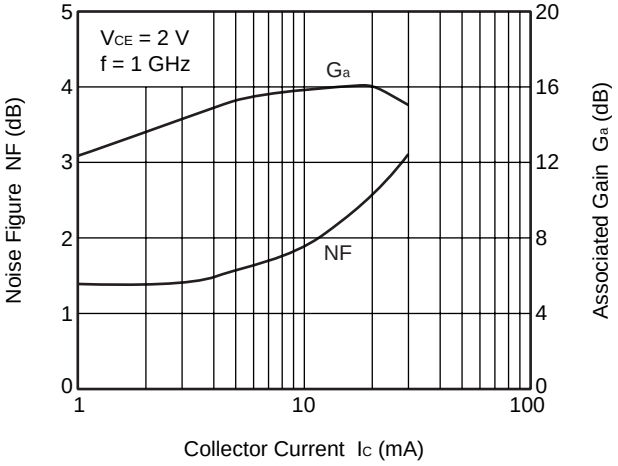


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



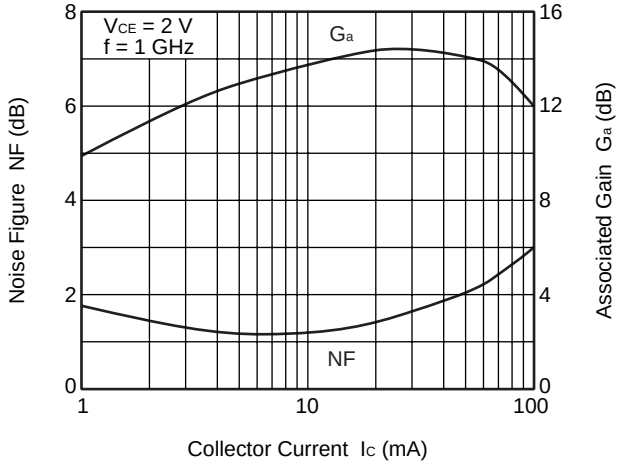
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

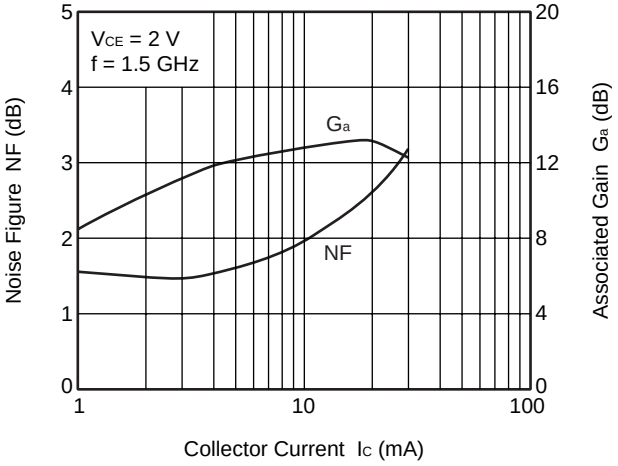


Q2

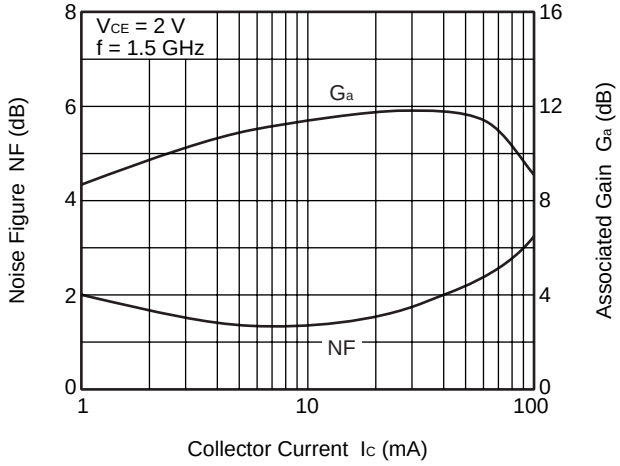
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



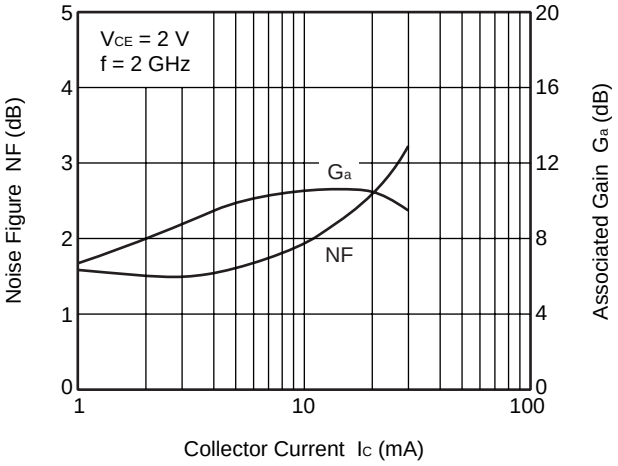
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



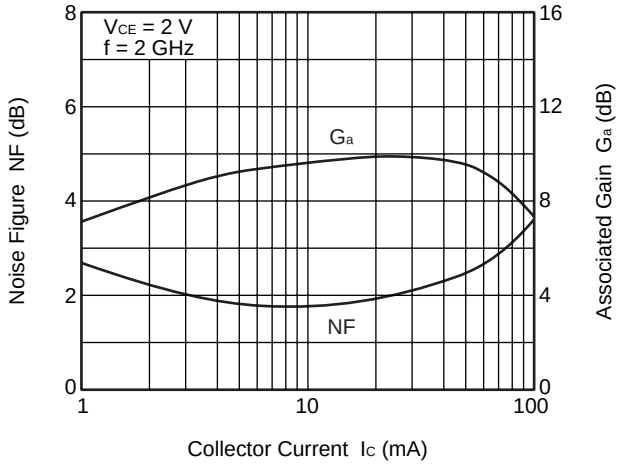
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

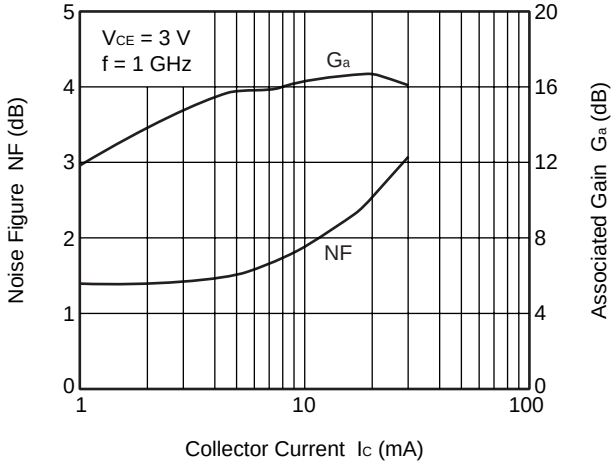


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

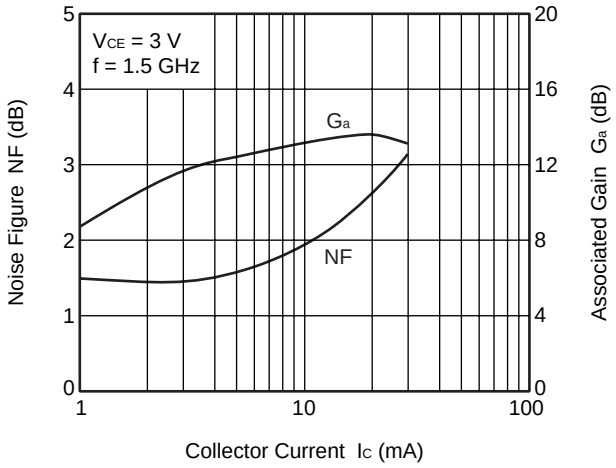


Q1

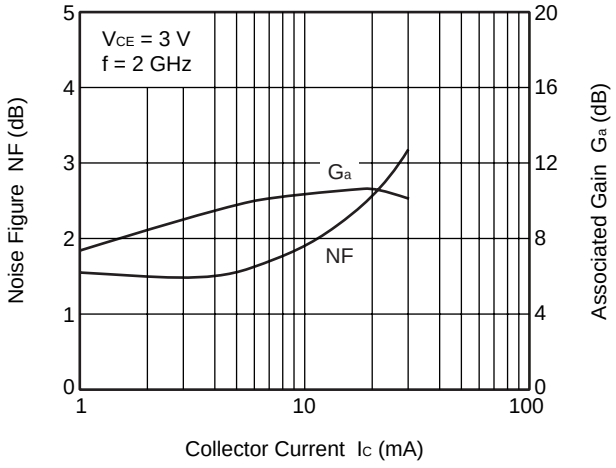
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



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, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	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	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.952	–23.2	3.464	165.0	0.039	75.8	0.987	–7.5
0.2	0.932	–46.1	3.323	148.7	0.069	63.4	0.948	–14.3
0.3	0.908	–67.1	3.079	135.6	0.094	52.4	0.899	–19.9
0.4	0.868	–84.6	2.757	123.7	0.111	42.6	0.850	–24.5
0.5	0.840	–99.6	2.469	113.6	0.121	35.0	0.807	–28.4
0.6	0.819	–112.9	2.226	105.2	0.127	28.6	0.770	–31.9
0.7	0.802	–124.0	2.006	97.2	0.129	23.4	0.742	–34.9
0.8	0.788	–133.7	1.821	90.3	0.128	19.4	0.719	–37.8
0.9	0.781	–142.1	1.671	84.2	0.125	15.9	0.698	–40.8
1.0	0.778	–149.9	1.539	78.8	0.121	13.4	0.683	–43.9
1.1	0.771	–156.4	1.426	73.5	0.115	11.7	0.670	–47.2
1.2	0.771	–162.7	1.333	68.5	0.108	10.7	0.658	–50.6
1.3	0.774	–168.2	1.243	64.0	0.101	10.9	0.649	–54.1
1.4	0.771	–173.4	1.168	59.7	0.094	12.3	0.644	–57.9
1.5	0.773	–178.5	1.101	55.6	0.086	15.2	0.638	–61.8
1.6	0.775	177.1	1.045	51.8	0.080	19.8	0.635	–65.8
1.7	0.779	172.9	0.989	48.0	0.075	26.6	0.631	–70.1
1.8	0.780	168.4	0.940	44.3	0.072	35.0	0.629	–74.6
1.9	0.783	164.5	0.891	41.1	0.073	44.5	0.629	–79.4
2.0	0.787	160.5	0.852	37.5	0.078	53.7	0.629	–84.1
2.1	0.794	157.0	0.810	34.5	0.086	60.9	0.630	–88.9
2.2	0.797	153.6	0.775	32.5	0.098	66.3	0.632	–93.8
2.3	0.802	150.5	0.739	30.4	0.111	69.8	0.633	–98.8
2.4	0.804	147.5	0.704	28.1	0.127	71.7	0.636	–103.8
2.5	0.805	144.8	0.675	26.5	0.144	72.0	0.639	–108.6
2.6	0.805	142.0	0.646	24.3	0.161	71.1	0.642	–113.4
2.7	0.807	140.1	0.621	23.0	0.174	69.1	0.643	–117.9
2.8	0.812	138.2	0.595	21.4	0.183	68.8	0.648	–122.0
2.9	0.812	135.6	0.580	20.1	0.196	69.2	0.648	–126.4
3.0	0.820	133.2	0.560	19.9	0.213	68.8	0.652	–131.1
4.0	0.836	113.0	0.477	13.6	0.377	47.5	0.671	–178.4
5.0	0.847	100.5	0.457	7.3	0.441	26.6	0.725	140.3

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.885	–34.7	9.492	158.3	0.035	71.4	0.945	–14.6
0.2	0.819	–65.5	8.394	137.9	0.060	56.0	0.834	–25.9
0.3	0.764	–90.2	7.116	123.5	0.075	45.8	0.726	–32.8
0.4	0.719	–108.8	5.951	112.3	0.084	39.1	0.640	–37.4
0.5	0.689	–122.9	5.062	103.5	0.088	34.9	0.574	–40.2
0.6	0.671	–134.8	4.394	96.6	0.091	32.4	0.528	–42.8
0.7	0.663	–144.2	3.853	90.4	0.092	31.2	0.494	–44.5
0.8	0.652	–152.1	3.424	84.9	0.092	30.7	0.467	–46.5
0.9	0.647	–158.9	3.091	80.2	0.092	31.1	0.446	–48.6
1.0	0.648	–165.0	2.813	75.9	0.093	32.4	0.429	–51.0
1.1	0.646	–170.2	2.585	71.7	0.092	34.1	0.415	–53.5
1.2	0.649	–175.2	2.396	67.8	0.093	36.2	0.403	–56.5
1.3	0.651	–179.4	2.226	64.0	0.094	38.6	0.394	–59.6
1.4	0.651	176.5	2.081	60.4	0.096	41.4	0.387	–63.0
1.5	0.658	172.4	1.953	57.0	0.099	44.4	0.381	–66.7
1.6	0.662	169.0	1.849	53.6	0.102	47.2	0.377	–70.5
1.7	0.669	165.5	1.749	50.4	0.107	50.2	0.373	–74.7
1.8	0.670	161.9	1.659	47.0	0.112	52.7	0.371	–79.1
1.9	0.675	158.9	1.575	44.0	0.119	55.0	0.370	–83.7
2.0	0.684	155.4	1.505	40.6	0.126	57.1	0.371	–88.3
2.1	0.691	152.7	1.432	37.7	0.135	58.6	0.373	–93.1
2.2	0.693	149.9	1.371	35.2	0.144	59.8	0.375	–97.9
2.3	0.703	147.6	1.316	32.7	0.154	60.5	0.379	–102.9
2.4	0.707	145.1	1.254	30.1	0.165	60.8	0.385	–107.7
2.5	0.712	143.0	1.204	27.7	0.177	60.5	0.392	–112.4
2.6	0.716	140.7	1.150	25.0	0.189	59.7	0.400	–117.0
2.7	0.724	139.5	1.109	23.1	0.197	58.4	0.406	–121.3
2.8	0.732	137.7	1.065	20.9	0.203	58.0	0.414	–125.2
2.9	0.734	135.5	1.036	18.8	0.212	58.4	0.419	–129.6
3.0	0.743	133.4	0.999	17.1	0.224	58.4	0.425	–133.9
4.0	0.800	115.7	0.736	0.7	0.354	44.2	0.493	–178.7
5.0	0.843	102.3	0.578	–7.8	0.424	26.5	0.619	140.5

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.795	–43.5	14.399	152.4	0.035	68.5	0.899	–20.7
0.2	0.726	–80.0	11.772	130.2	0.053	52.6	0.734	–34.2
0.3	0.674	–105.5	9.387	116.0	0.063	44.8	0.602	–41.1
0.4	0.635	–122.9	7.583	105.9	0.069	40.5	0.511	–45.0
0.5	0.613	–135.9	6.305	98.1	0.073	39.2	0.447	–47.1
0.6	0.603	–146.7	5.395	92.2	0.076	38.9	0.402	–48.9
0.7	0.597	–155.0	4.690	86.8	0.079	39.6	0.370	–50.2
0.8	0.594	–161.6	4.142	82.1	0.082	41.0	0.346	–51.8
0.9	0.591	–167.4	3.722	77.9	0.085	42.5	0.327	–53.6
1.0	0.596	–172.4	3.372	74.2	0.088	44.3	0.311	–55.9
1.1	0.594	–177.1	3.091	70.5	0.092	46.2	0.299	–58.3
1.2	0.601	178.8	2.861	66.8	0.096	47.9	0.288	–61.3
1.3	0.605	175.1	2.651	63.6	0.101	49.7	0.279	–64.5
1.4	0.608	171.6	2.474	60.3	0.106	51.3	0.273	–68.2
1.5	0.611	168.1	2.322	57.2	0.112	52.9	0.267	–72.0
1.6	0.613	164.9	2.195	54.1	0.118	54.2	0.263	–76.1
1.7	0.624	162.0	2.073	51.1	0.124	55.4	0.260	–80.6
1.8	0.628	158.6	1.965	48.1	0.131	56.2	0.259	–85.4
1.9	0.632	156.0	1.865	45.3	0.139	57.1	0.258	–90.4
2.0	0.640	152.9	1.780	42.0	0.147	57.7	0.260	–95.3
2.1	0.649	150.4	1.698	39.3	0.156	58.1	0.263	–100.5
2.2	0.652	147.9	1.627	36.8	0.164	58.3	0.266	–105.6
2.3	0.661	145.8	1.561	34.4	0.173	58.1	0.271	–110.7
2.4	0.666	143.9	1.492	32.0	0.184	57.8	0.279	–115.6
2.5	0.672	141.7	1.434	29.6	0.194	57.1	0.286	–120.3
2.6	0.677	139.9	1.372	26.9	0.205	55.9	0.296	–124.8
2.7	0.685	138.6	1.322	25.0	0.211	54.6	0.304	–129.0
2.8	0.696	137.1	1.274	22.8	0.216	54.1	0.313	–132.9
2.9	0.699	135.2	1.244	20.5	0.224	54.3	0.319	–137.1
3.0	0.707	133.0	1.202	18.8	0.234	54.1	0.325	–141.2
4.0	0.778	116.5	0.890	0.3	0.345	41.6	0.405	176.4
5.0	0.836	103.5	0.677	–11.5	0.413	25.9	0.559	138.3

V_{CE} = 1 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.752	–51.4	18.241	148.0	0.033	64.7	0.856	–25.8
0.2	0.663	–91.2	13.998	124.7	0.048	51.0	0.655	–40.3
0.3	0.621	–116.6	10.735	111.1	0.055	45.6	0.516	–46.9
0.4	0.587	–132.7	8.506	102.0	0.061	43.7	0.427	–50.2
0.5	0.573	–144.3	7.006	95.0	0.065	44.0	0.368	–51.8
0.6	0.567	–154.3	5.951	89.6	0.069	44.7	0.327	–53.4
0.7	0.566	–161.5	5.152	84.7	0.074	46.3	0.298	–54.6
0.8	0.565	–167.4	4.538	80.5	0.079	48.1	0.276	–56.0
0.9	0.563	–172.4	4.069	76.6	0.084	49.6	0.258	–57.8
1.0	0.568	–177.0	3.681	73.2	0.089	51.3	0.244	–60.2
1.1	0.572	178.9	3.370	69.8	0.094	52.6	0.232	–62.7
1.2	0.574	175.2	3.112	66.4	0.100	53.8	0.223	–66.1
1.3	0.581	172.0	2.880	63.3	0.107	54.8	0.214	–69.6
1.4	0.583	168.6	2.687	60.2	0.113	55.8	0.209	–73.6
1.5	0.590	165.5	2.520	57.2	0.120	56.6	0.204	–78.0
1.6	0.593	162.5	2.381	54.4	0.127	57.2	0.201	–82.6
1.7	0.601	159.7	2.250	51.6	0.135	57.6	0.198	–87.7
1.8	0.605	156.6	2.130	48.5	0.143	57.9	0.198	–93.1
1.9	0.610	154.0	2.027	46.0	0.150	57.9	0.199	–98.4
2.0	0.621	151.1	1.930	42.8	0.159	58.0	0.202	–103.8
2.1	0.630	149.0	1.839	40.2	0.168	57.8	0.205	–109.4
2.2	0.632	146.6	1.762	37.8	0.176	57.6	0.211	–114.6
2.3	0.641	144.5	1.695	35.4	0.185	57.0	0.217	–119.9
2.4	0.645	142.4	1.621	33.1	0.195	56.5	0.225	–124.8
2.5	0.650	140.8	1.558	30.8	0.205	55.4	0.234	–129.3
2.6	0.657	139.0	1.489	28.2	0.215	54.1	0.245	–133.6
2.7	0.665	137.8	1.438	26.5	0.221	52.6	0.254	–137.6
2.8	0.676	136.4	1.388	24.0	0.225	52.1	0.263	–141.4
2.9	0.682	134.3	1.356	21.7	0.232	52.1	0.270	–145.4
3.0	0.687	132.7	1.312	20.1	0.242	51.8	0.276	–149.2
4.0	0.764	117.0	0.976	1.0	0.341	39.8	0.362	170.8
5.0	0.832	104.1	0.742	–11.8	0.407	25.2	0.525	135.7

V_{CE} = 1 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.662	–62.3	22.776	142.2	0.030	61.0	0.795	–32.1
0.2	0.598	–104.8	16.175	119.0	0.041	50.5	0.564	–47.2
0.3	0.571	–128.5	11.965	106.3	0.048	48.0	0.427	–53.3
0.4	0.547	–143.2	9.328	98.2	0.054	48.2	0.345	–56.2
0.5	0.538	–153.6	7.599	92.0	0.059	49.6	0.292	–57.5
0.6	0.536	–161.8	6.421	87.1	0.065	51.4	0.256	–59.1
0.7	0.542	–167.8	5.548	82.8	0.071	53.1	0.230	–60.3
0.8	0.539	–173.2	4.849	78.9	0.078	54.8	0.211	–61.8
0.9	0.540	–177.2	4.361	75.4	0.084	56.1	0.195	–64.0
1.0	0.546	178.6	3.945	72.2	0.091	57.2	0.182	–66.9
1.1	0.549	175.2	3.605	69.0	0.098	58.0	0.172	–69.9
1.2	0.554	171.6	3.327	65.9	0.105	58.6	0.163	–74.0
1.3	0.560	168.7	3.077	63.0	0.113	59.0	0.156	–78.3
1.4	0.564	165.7	2.869	60.1	0.121	59.3	0.153	–83.2
1.5	0.570	162.7	2.690	57.2	0.129	59.4	0.149	–88.6
1.6	0.577	160.1	2.538	54.5	0.136	59.3	0.147	–94.0
1.7	0.585	157.6	2.398	51.8	0.145	59.3	0.147	–100.0
1.8	0.587	154.8	2.267	49.0	0.153	58.9	0.149	–106.3
1.9	0.595	152.4	2.155	46.5	0.161	58.5	0.151	–112.3
2.0	0.602	149.3	2.053	43.5	0.170	58.2	0.156	–118.1
2.1	0.611	147.3	1.957	40.9	0.179	57.7	0.162	–123.8
2.2	0.615	145.2	1.879	38.6	0.188	57.1	0.169	–129.0
2.3	0.623	143.3	1.807	36.4	0.196	56.2	0.178	–134.1
2.4	0.628	141.6	1.728	34.1	0.205	55.4	0.187	–138.7
2.5	0.634	139.9	1.662	31.8	0.215	54.1	0.197	–142.7
2.6	0.639	138.1	1.588	29.4	0.224	52.7	0.208	–146.5
2.7	0.648	137.3	1.537	27.6	0.230	51.1	0.218	–150.0
2.8	0.660	135.7	1.484	25.4	0.234	50.5	0.228	–153.5
2.9	0.664	133.9	1.449	23.1	0.241	50.4	0.236	–157.2
3.0	0.673	131.9	1.405	21.2	0.250	49.9	0.242	–160.5
4.0	0.749	117.2	1.051	2.4	0.340	38.0	0.330	163.1
5.0	0.821	104.5	0.803	–11.7	0.401	24.4	0.498	131.8

V_{CE} = 1 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.525	–92.4	30.494	130.7	0.024	60.9	0.639	–45.6
0.2	0.514	–132.1	18.912	109.2	0.032	54.6	0.397	–61.1
0.3	0.515	–149.5	13.262	99.0	0.039	56.4	0.282	–67.0
0.4	0.509	–160.0	10.156	92.6	0.047	58.8	0.219	–70.4
0.5	0.509	–167.4	8.208	87.5	0.055	61.2	0.178	–72.6
0.6	0.513	–173.6	6.884	83.5	0.063	62.6	0.152	–76.0
0.7	0.518	–177.9	5.922	79.9	0.071	63.4	0.132	–79.0
0.8	0.520	177.9	5.173	76.5	0.080	64.1	0.118	–82.4
0.9	0.522	174.8	4.631	73.4	0.089	64.4	0.107	–87.3
1.0	0.530	171.6	4.172	70.4	0.097	64.4	0.100	–93.3
1.1	0.535	168.6	3.818	67.5	0.106	64.4	0.093	–99.5
1.2	0.541	166.0	3.518	64.6	0.115	63.9	0.091	–106.9
1.3	0.547	163.6	3.254	62.0	0.124	63.5	0.089	–114.3
1.4	0.551	161.1	3.033	59.3	0.133	63.0	0.092	–121.5
1.5	0.559	158.5	2.844	56.6	0.142	62.4	0.094	–129.1
1.6	0.565	156.2	2.678	54.1	0.151	61.7	0.099	–135.5
1.7	0.571	153.8	2.530	51.6	0.160	60.8	0.106	–141.9
1.8	0.577	151.4	2.393	49.0	0.168	59.9	0.114	–147.3
1.9	0.581	149.2	2.275	46.7	0.177	59.0	0.121	–152.4
2.0	0.590	146.8	2.164	43.7	0.186	58.2	0.131	–156.5
2.1	0.598	144.7	2.062	41.5	0.196	57.1	0.141	–160.5
2.2	0.605	142.7	1.979	39.3	0.204	56.1	0.151	–163.9
2.3	0.614	140.9	1.903	37.1	0.213	55.0	0.162	–167.0
2.4	0.617	139.3	1.822	34.9	0.222	53.8	0.173	–169.6
2.5	0.620	137.8	1.750	32.8	0.231	52.3	0.184	–172.0
2.6	0.629	136.2	1.676	30.3	0.240	50.6	0.195	–173.9
2.7	0.637	135.5	1.624	28.8	0.245	49.0	0.206	–176.0
2.8	0.649	134.2	1.566	26.4	0.249	48.2	0.217	–178.3
2.9	0.653	132.2	1.534	24.2	0.255	48.0	0.225	179.0
3.0	0.658	130.7	1.488	22.5	0.263	47.3	0.229	176.3
4.0	0.739	116.9	1.117	4.0	0.341	34.8	0.318	147.7
5.0	0.812	104.6	0.868	–10.4	0.394	22.4	0.481	123.7

V_{CE} = 2 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.954	–23.0	3.401	166.0	0.036	76.3	0.987	–6.9
0.2	0.938	–44.8	3.285	149.6	0.064	64.8	0.953	–13.2
0.3	0.915	–65.3	3.061	137.0	0.087	53.2	0.908	–18.5
0.4	0.877	–82.7	2.752	125.3	0.103	43.9	0.865	–23.1
0.5	0.846	–97.5	2.483	115.1	0.113	36.2	0.823	–26.7
0.6	0.821	–110.7	2.238	106.9	0.119	29.8	0.789	–30.1
0.7	0.805	–122.1	2.021	99.0	0.121	24.6	0.762	–33.0
0.8	0.791	–131.9	1.841	92.0	0.120	20.4	0.739	–35.8
0.9	0.784	–140.2	1.687	86.0	0.118	17.1	0.719	–38.6
1.0	0.778	–148.0	1.557	80.6	0.114	14.7	0.704	–41.7
1.1	0.774	–154.9	1.443	75.4	0.108	13.0	0.692	–44.7
1.2	0.771	–161.5	1.351	70.3	0.101	12.1	0.680	–48.1
1.3	0.773	–167.1	1.264	66.0	0.094	12.3	0.672	–51.5
1.4	0.772	–172.3	1.185	61.5	0.087	14.1	0.665	–55.2
1.5	0.773	–177.2	1.117	57.5	0.080	17.4	0.660	–58.9
1.6	0.774	178.0	1.062	53.6	0.073	22.3	0.657	–62.8
1.7	0.780	173.7	1.005	49.9	0.069	29.9	0.653	–66.9
1.8	0.779	169.1	0.955	46.4	0.067	39.3	0.651	–71.3
1.9	0.783	165.3	0.909	43.0	0.069	49.2	0.648	–75.9
2.0	0.786	161.0	0.867	39.4	0.075	58.4	0.649	–80.4
2.1	0.793	157.4	0.822	36.6	0.084	65.5	0.648	–85.2
2.2	0.793	154.2	0.789	34.5	0.096	70.7	0.649	–89.9
2.3	0.800	150.9	0.753	32.2	0.110	73.8	0.649	–94.9
2.4	0.800	148.0	0.716	29.8	0.126	75.5	0.653	–99.7
2.5	0.802	145.1	0.689	28.3	0.143	75.4	0.654	–104.5
2.6	0.804	142.3	0.656	26.1	0.160	74.2	0.655	–109.2
2.7	0.804	140.3	0.633	24.8	0.173	72.2	0.656	–113.5
2.8	0.809	138.6	0.607	23.1	0.182	71.6	0.660	–117.7
2.9	0.810	136.0	0.590	21.9	0.195	71.9	0.659	–122.0
3.0	0.817	133.4	0.570	21.7	0.213	71.5	0.662	–126.7
4.0	0.831	113.2	0.486	15.0	0.380	49.5	0.675	–174.2
5.0	0.842	100.7	0.468	8.2	0.445	28.0	0.720	143.3

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.878	–32.8	9.466	159.1	0.033	72.4	0.950	–13.5
0.2	0.821	–62.6	8.449	139.3	0.057	57.8	0.850	–23.8
0.3	0.773	–87.1	7.237	125.1	0.070	47.4	0.748	–30.5
0.4	0.721	–105.2	6.092	113.9	0.079	40.4	0.666	–34.8
0.5	0.689	–119.6	5.200	105.1	0.084	36.3	0.602	–37.6
0.6	0.670	–131.7	4.528	98.2	0.086	33.5	0.557	–39.9
0.7	0.656	–141.6	3.977	92.0	0.087	32.2	0.522	–41.5
0.8	0.649	–149.6	3.542	86.5	0.087	31.9	0.495	–43.5
0.9	0.641	–156.5	3.200	81.8	0.087	32.3	0.474	–45.4
1.0	0.641	–163.1	2.912	77.4	0.088	33.6	0.457	–47.6
1.1	0.638	–168.2	2.678	73.3	0.088	35.3	0.443	–50.1
1.2	0.642	–173.3	2.483	69.2	0.088	37.5	0.431	–52.8
1.3	0.644	–177.8	2.309	65.6	0.089	40.1	0.421	–55.8
1.4	0.644	178.0	2.158	62.0	0.091	43.1	0.415	–59.0
1.5	0.647	173.9	2.029	58.5	0.094	46.3	0.408	–62.4
1.6	0.651	170.2	1.919	55.2	0.097	49.4	0.403	–66.0
1.7	0.656	166.9	1.814	52.0	0.102	52.3	0.399	–70.0
1.8	0.663	162.9	1.721	48.6	0.107	55.0	0.396	–74.1
1.9	0.666	159.9	1.638	45.6	0.114	57.3	0.394	–78.5
2.0	0.672	156.7	1.560	42.2	0.121	59.7	0.394	–82.9
2.1	0.679	153.5	1.484	39.3	0.130	61.3	0.394	–87.5
2.2	0.684	150.9	1.426	36.9	0.139	62.5	0.396	–92.1
2.3	0.693	148.3	1.363	34.3	0.149	63.2	0.398	–97.0
2.4	0.695	146.0	1.302	31.7	0.160	63.4	0.403	–101.8
2.5	0.702	143.9	1.251	29.4	0.172	63.1	0.408	–106.4
2.6	0.706	141.4	1.196	26.5	0.184	62.3	0.415	–111.0
2.7	0.712	140.1	1.149	24.7	0.193	60.8	0.420	–115.2
2.8	0.722	138.5	1.105	22.5	0.199	60.5	0.427	–119.4
2.9	0.726	136.2	1.077	20.1	0.208	60.9	0.430	–123.6
3.0	0.732	134.0	1.037	18.7	0.221	60.9	0.436	–128.0
4.0	0.794	116.1	0.771	1.6	0.354	46.4	0.492	–173.4
5.0	0.839	102.8	0.595	–7.9	0.426	28.0	0.612	144.0

V_{CE} = 2 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.809	–40.7	14.445	153.7	0.031	66.0	0.910	–19.0
0.2	0.734	–76.3	12.020	132.0	0.050	54.3	0.757	–31.5
0.3	0.678	–101.4	9.665	117.7	0.060	46.1	0.629	–38.2
0.4	0.633	–119.1	7.866	107.6	0.066	42.0	0.539	–41.7
0.5	0.607	–132.3	6.561	99.8	0.069	40.4	0.477	–43.6
0.6	0.595	–143.5	5.632	93.8	0.073	40.0	0.432	–45.4
0.7	0.587	–151.9	4.903	88.3	0.075	40.7	0.400	–46.5
0.8	0.581	–159.1	4.333	83.6	0.078	42.0	0.376	–47.8
0.9	0.579	–164.9	3.897	79.4	0.081	43.6	0.356	–49.4
1.0	0.582	–170.2	3.533	75.6	0.084	45.5	0.340	–51.4
1.1	0.583	–174.9	3.240	71.9	0.088	47.4	0.327	–53.6
1.2	0.586	–179.4	3.000	68.3	0.092	49.2	0.316	–56.3
1.3	0.588	176.9	2.778	65.1	0.096	51.0	0.307	–59.2
1.4	0.592	173.3	2.595	61.8	0.101	52.9	0.300	–62.6
1.5	0.596	169.7	2.437	58.7	0.107	54.5	0.293	–66.0
1.6	0.599	166.4	2.304	55.6	0.113	55.9	0.288	–69.8
1.7	0.607	163.2	2.177	52.7	0.119	57.2	0.284	–73.9
1.8	0.612	159.9	2.062	49.6	0.126	58.2	0.282	–78.4
1.9	0.615	157.2	1.960	46.7	0.134	58.9	0.280	–83.1
2.0	0.626	154.1	1.866	43.6	0.142	59.7	0.280	–87.7
2.1	0.634	151.6	1.779	40.8	0.150	60.1	0.281	–92.7
2.2	0.638	149.1	1.707	38.5	0.159	60.2	0.283	–97.5
2.3	0.646	146.7	1.640	36.0	0.168	60.2	0.287	–102.5
2.4	0.651	144.8	1.567	33.5	0.178	59.9	0.292	–107.4
2.5	0.657	142.7	1.503	31.2	0.189	59.1	0.298	–112.2
2.6	0.663	140.8	1.440	28.6	0.199	58.1	0.306	–116.7
2.7	0.672	139.5	1.387	26.7	0.207	56.6	0.313	–121.1
2.8	0.681	138.1	1.339	24.3	0.211	56.2	0.321	–125.2
2.9	0.686	135.9	1.305	22.0	0.219	56.4	0.325	–129.4
3.0	0.695	134.0	1.263	20.3	0.230	56.3	0.331	–133.6
4.0	0.766	117.6	0.936	1.3	0.343	43.8	0.399	–177.3
5.0	0.834	104.1	0.710	–11.2	0.415	27.5	0.547	142.1

V_{CE} = 2 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.750	–48.3	18.478	149.4	0.029	65.5	0.870	–23.5
0.2	0.666	–86.4	14.439	126.5	0.044	52.5	0.682	–37.1
0.3	0.615	–111.7	11.202	112.9	0.052	46.9	0.545	–43.4
0.4	0.578	–128.7	8.918	103.6	0.058	44.7	0.457	–46.3
0.5	0.563	–140.7	7.370	96.4	0.062	45.0	0.397	–47.7
0.6	0.553	–151.0	6.260	91.0	0.066	45.8	0.356	–49.0
0.7	0.546	–158.5	5.415	86.1	0.071	47.4	0.327	–49.8
0.8	0.546	–165.0	4.769	81.8	0.075	48.9	0.305	–50.9
0.9	0.546	–170.1	4.296	78.0	0.080	50.7	0.287	–52.5
1.0	0.550	–174.9	3.887	74.5	0.085	52.3	0.272	–54.5
1.1	0.551	–178.9	3.555	71.1	0.090	53.9	0.260	–56.6
1.2	0.556	177.0	3.286	67.7	0.096	55.1	0.250	–59.5
1.3	0.560	173.6	3.042	64.8	0.102	56.1	0.241	–62.5
1.4	0.563	170.2	2.837	61.7	0.108	57.2	0.235	–66.1
1.5	0.567	166.8	2.662	58.7	0.115	58.1	0.228	–69.9
1.6	0.575	163.9	2.519	55.8	0.122	58.6	0.224	–73.9
1.7	0.581	161.1	2.378	53.1	0.130	59.1	0.220	–78.5
1.8	0.587	157.8	2.253	50.1	0.137	59.5	0.218	–83.5
1.9	0.590	155.4	2.141	47.5	0.145	59.6	0.217	–88.5
2.0	0.600	152.4	2.042	44.4	0.153	59.7	0.218	–93.6
2.1	0.608	150.1	1.946	41.8	0.162	59.6	0.220	–99.0
2.2	0.611	148.0	1.869	39.4	0.171	59.4	0.223	–104.2
2.3	0.621	145.8	1.790	37.1	0.180	58.9	0.227	–109.4
2.4	0.627	143.8	1.712	34.8	0.189	58.3	0.233	–114.4
2.5	0.632	142.1	1.646	32.5	0.199	57.3	0.240	–119.3
2.6	0.637	140.2	1.574	29.9	0.209	56.1	0.249	–123.8
2.7	0.646	139.2	1.522	28.1	0.215	54.5	0.257	–128.2
2.8	0.658	137.5	1.467	25.7	0.220	54.0	0.265	–132.3
2.9	0.663	135.6	1.431	23.3	0.226	54.1	0.270	–136.4
3.0	0.670	133.9	1.385	21.8	0.236	53.8	0.276	–140.4
4.0	0.749	118.2	1.039	2.3	0.339	41.9	0.349	177.5
5.0	0.822	105.0	0.785	–11.5	0.407	26.9	0.510	139.5

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

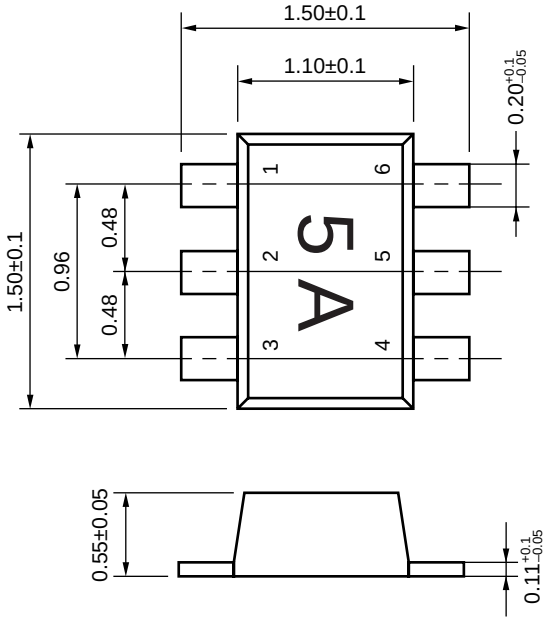
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.674	–58.6	23.287	144.2	0.027	64.1	0.815	–29.1
0.2	0.598	–99.1	16.892	120.9	0.039	52.1	0.594	–43.4
0.3	0.557	–123.3	12.619	108.1	0.046	49.4	0.458	–48.9
0.4	0.531	–138.4	9.887	99.8	0.052	49.4	0.375	–51.2
0.5	0.518	–149.6	8.083	93.4	0.057	51.0	0.322	–52.0
0.6	0.517	–158.4	6.837	88.5	0.062	52.5	0.285	–53.2
0.7	0.516	–165.0	5.894	84.2	0.068	54.1	0.259	–53.8
0.8	0.517	–170.4	5.186	80.3	0.075	55.6	0.239	–54.8
0.9	0.517	–175.1	4.645	76.7	0.081	57.1	0.223	–56.4
1.0	0.520	–179.2	4.196	73.7	0.087	58.3	0.210	–58.6
1.1	0.525	177.0	3.840	70.5	0.094	59.1	0.199	–60.9
1.2	0.528	173.6	3.545	67.3	0.101	59.7	0.189	–64.2
1.3	0.534	170.4	3.280	64.4	0.108	60.1	0.181	–67.7
1.4	0.538	167.5	3.060	61.5	0.116	60.5	0.176	–71.8
1.5	0.546	164.5	2.868	58.7	0.123	60.8	0.170	–76.3
1.6	0.550	161.5	2.708	56.0	0.131	60.7	0.167	–81.1
1.7	0.558	159.2	2.556	53.5	0.139	60.7	0.164	–86.3
1.8	0.564	156.0	2.420	50.6	0.147	60.4	0.163	–92.1
1.9	0.569	153.8	2.303	48.2	0.156	60.0	0.163	–97.9
2.0	0.579	150.8	2.194	45.0	0.164	59.7	0.165	–103.6
2.1	0.587	148.8	2.087	42.7	0.173	59.3	0.169	–109.7
2.2	0.590	146.5	2.007	40.3	0.181	58.6	0.173	–115.1
2.3	0.599	144.5	1.926	38.1	0.190	57.9	0.179	–120.7
2.4	0.607	142.8	1.844	35.8	0.199	57.0	0.187	–125.7
2.5	0.610	141.1	1.769	33.6	0.209	55.9	0.195	–130.3
2.6	0.617	139.3	1.695	31.1	0.218	54.4	0.205	–134.7
2.7	0.629	138.5	1.640	29.3	0.224	52.8	0.214	–138.8
2.8	0.639	137.3	1.583	27.1	0.228	52.3	0.223	–142.8
2.9	0.643	135.1	1.547	24.7	0.234	52.2	0.228	–146.9
3.0	0.652	133.3	1.499	23.0	0.244	51.8	0.233	–150.5
4.0	0.733	118.6	1.125	3.7	0.336	39.9	0.312	170.0
5.0	0.812	105.7	0.858	–10.9	0.400	26.1	0.477	135.9

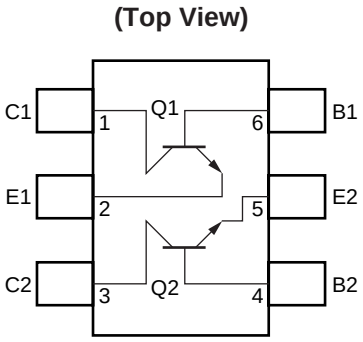
V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.528	–81.5	31.976	133.4	0.022	59.6	0.681	–40.7
0.2	0.487	–124.3	20.409	111.5	0.031	55.8	0.436	–54.6
0.3	0.475	–143.7	14.456	100.8	0.038	57.2	0.317	–58.8
0.4	0.472	–155.2	11.107	94.2	0.045	59.5	0.251	–60.4
0.5	0.472	–163.4	8.988	89.0	0.053	62.1	0.209	–61.0
0.6	0.477	–170.1	7.554	85.1	0.060	63.4	0.182	–62.5
0.7	0.479	–175.1	6.482	81.3	0.068	64.3	0.161	–63.6
0.8	0.482	–179.1	5.689	78.0	0.076	65.0	0.145	–65.0
0.9	0.485	177.4	5.099	74.9	0.085	65.3	0.133	–67.7
1.0	0.490	173.8	4.584	72.1	0.093	65.4	0.122	–71.3
1.1	0.495	171.2	4.194	69.2	0.102	65.4	0.113	–75.1
1.2	0.503	168.3	3.865	66.4	0.110	65.1	0.107	–80.6
1.3	0.506	165.7	3.575	63.8	0.118	64.6	0.101	–86.3
1.4	0.512	163.1	3.330	61.1	0.127	64.2	0.099	–93.0
1.5	0.520	160.5	3.120	58.6	0.136	63.7	0.097	–100.0
1.6	0.522	158.1	2.942	56.1	0.144	62.9	0.097	–107.2
1.7	0.530	155.9	2.777	53.6	0.153	62.3	0.098	–114.7
1.8	0.539	153.2	2.625	51.1	0.162	61.4	0.103	–122.0
1.9	0.543	150.9	2.496	48.8	0.170	60.5	0.107	–128.9
2.0	0.553	148.5	2.375	46.0	0.179	59.7	0.114	–135.0
2.1	0.561	146.4	2.266	43.6	0.188	58.7	0.122	–140.7
2.2	0.565	144.6	2.174	41.5	0.197	57.7	0.130	–145.6
2.3	0.578	142.4	2.091	39.2	0.205	56.7	0.139	–150.1
2.4	0.583	141.0	1.999	37.1	0.214	55.5	0.149	–154.1
2.5	0.586	139.6	1.922	35.0	0.224	54.0	0.160	–157.3
2.6	0.593	138.0	1.844	32.7	0.232	52.4	0.171	–160.1
2.7	0.603	137.3	1.782	31.0	0.238	50.7	0.182	–163.2
2.8	0.615	136.0	1.726	28.9	0.241	50.0	0.192	–166.4
2.9	0.620	134.1	1.686	26.5	0.247	49.8	0.199	–169.7
3.0	0.625	132.4	1.634	24.8	0.256	49.1	0.203	–172.8
4.0	0.713	118.7	1.231	5.8	0.336	36.9	0.285	154.7
5.0	0.798	106.3	0.954	–9.3	0.392	24.4	0.452	127.9

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)

[MEMO]

[MEMO]

[MEMO]

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