DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR

μPA860TC

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, 2SC5786)

  Q1: High-gain transistor

  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 suitable for 3 GHz or higher OSC applications

  f_T = 20.0 GHz TYP., $|S_{21e}|^2$ = 12.0 dB TYP. @ V_{CE} = 1 V, I_C = 20 mA, f = 2 GHz

  NF = 1.4 dB TYP. @ V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz, $Z_S = Z_{opt}$
- 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	2SC5786

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA860TC	50 pcs (Non reel)	• 8 mm wide embossed taping
μPA860TC-T1	3 kpcs/reel	• Pin 6 (Q1 Base), Pin 5 (Q2 Emitter), Pin 4 (Q2 Base) face the perforation side of the tape

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.

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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	3	V
Emitter to Base Voltage	V_{EBO}	2	1.5	V
Collector Current	I_C	30	35	mA
Total Power Dissipation	P_{tot} Note	180	105	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_{EB} = 1 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 3 V, I_C = 10 mA	75	–	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	–	–	100	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 1 V, I_C = 5 mA	50	75	100	–
Gain Bandwidth Product	f_T	V_{CE} = 1 V, I_C = 20 mA, f = 2 GHz	17.0	20.0	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 20 mA, f = 2 GHz	10.0	12.0	–	dB
Noise Figure	NF	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.4	2.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 0.5 V, I_E = 0 mA, f = 1 MHz	–	0.22	0.30	pF

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

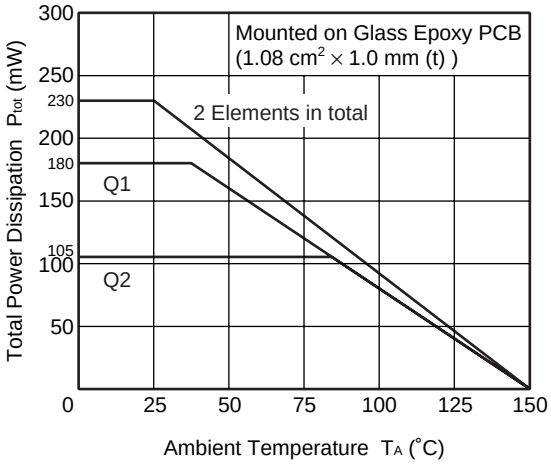
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

Rank	FB
Marking	2X
h_{FE} Value of Q1	75 to 150
h_{FE} Value of Q2	50 to 100

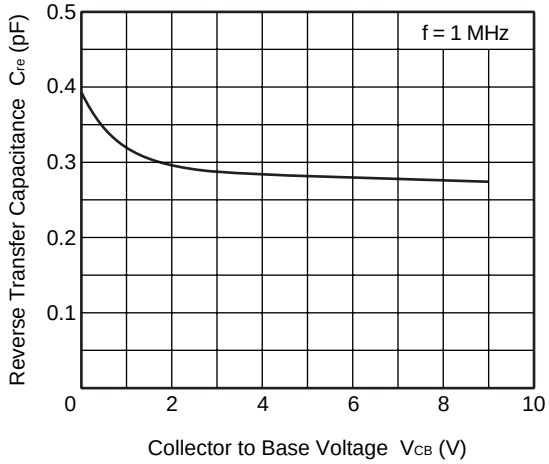
TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



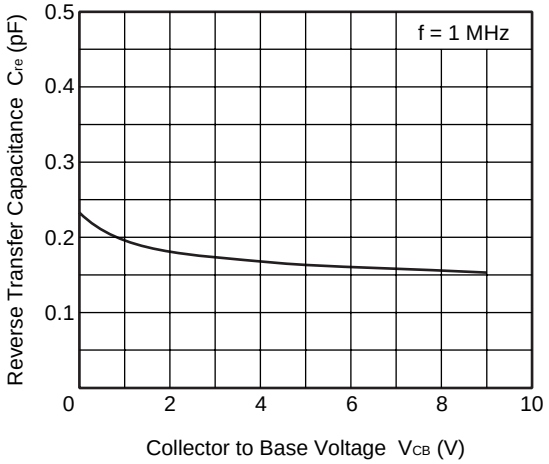
Q1

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



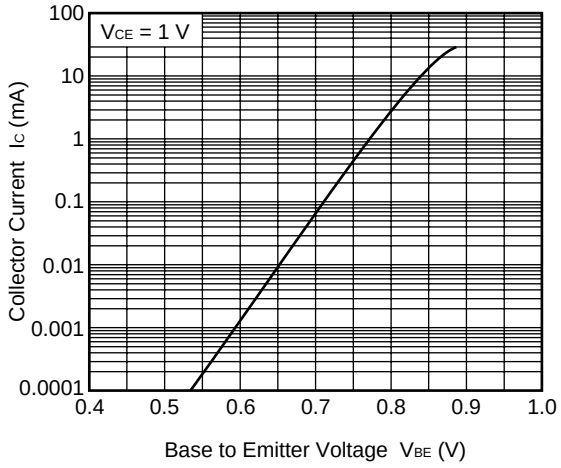
Q2

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



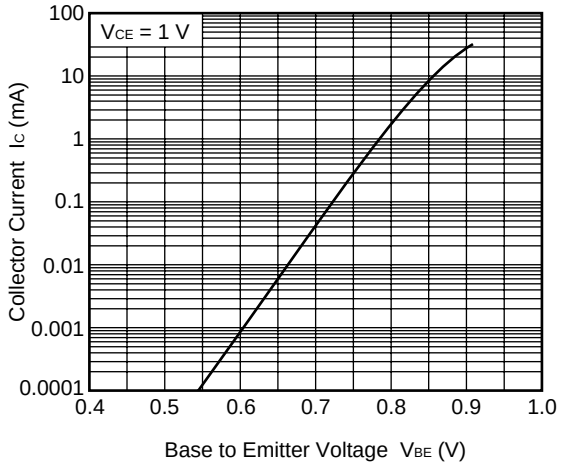
Q1

COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

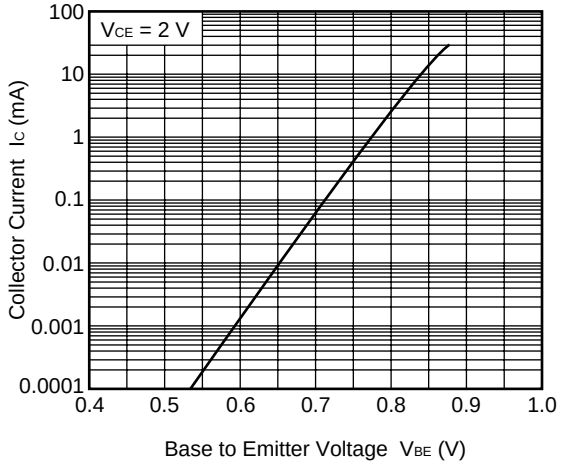


Q2

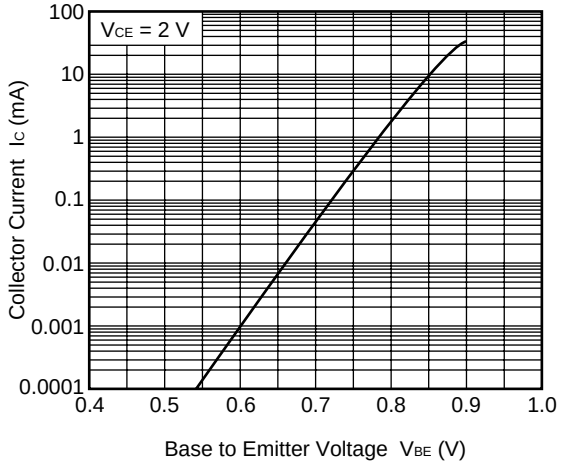
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



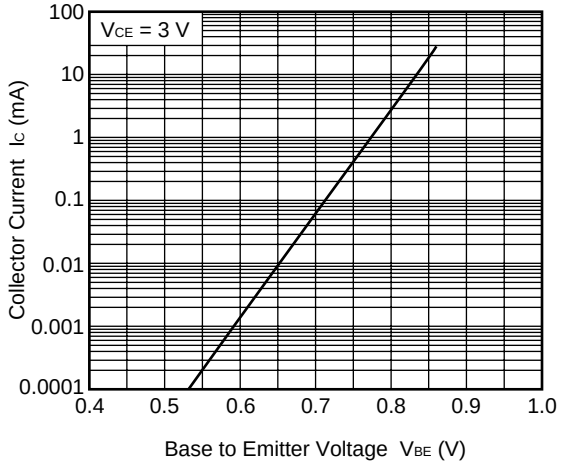
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

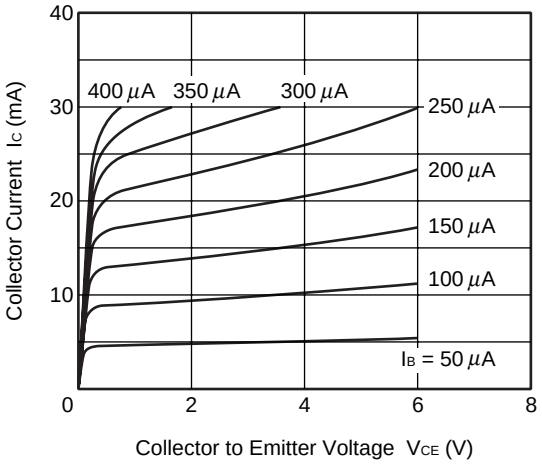


COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



Q1

COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



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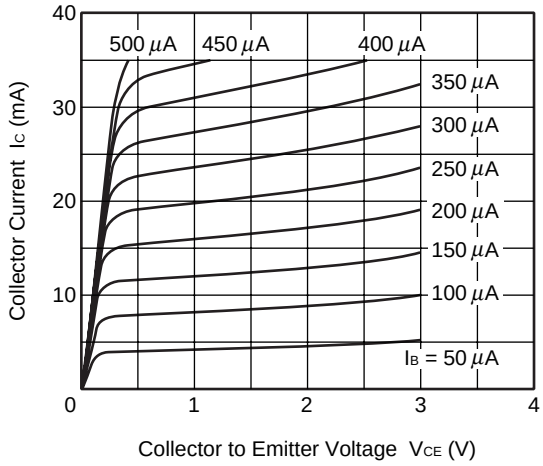
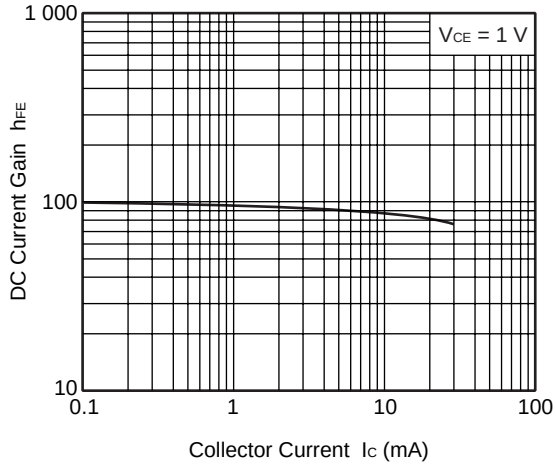
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



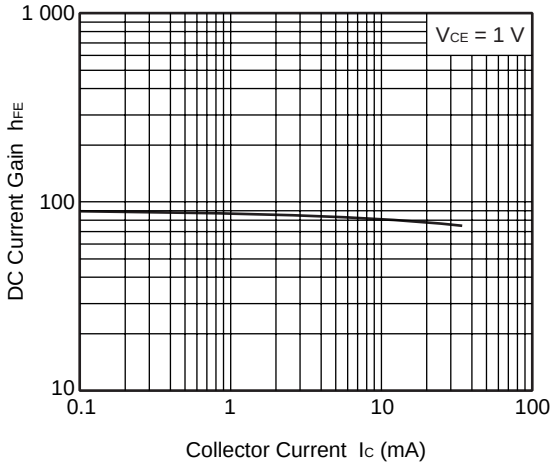
Q1

DC CURRENT GAIN vs.
COLLECTOR CURRENT

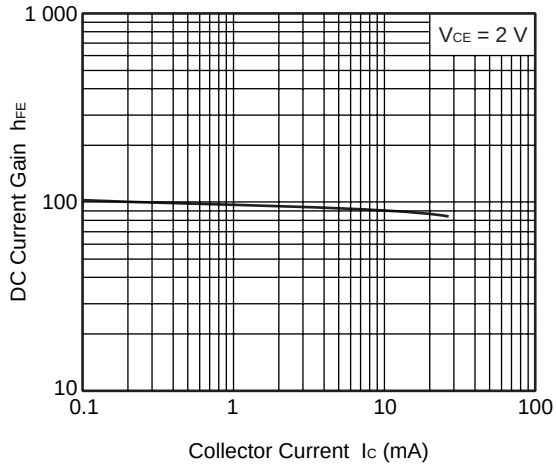


Q2

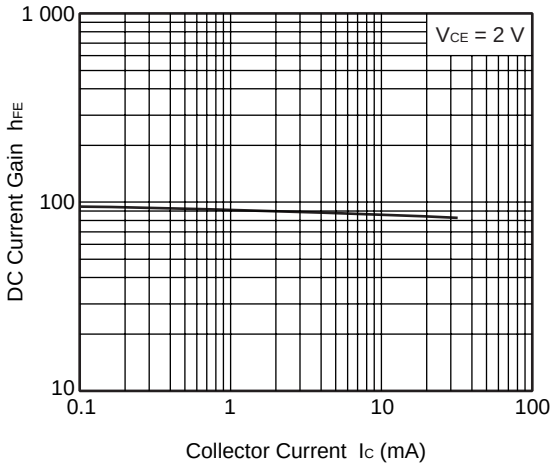
DC CURRENT GAIN vs.
COLLECTOR CURRENT



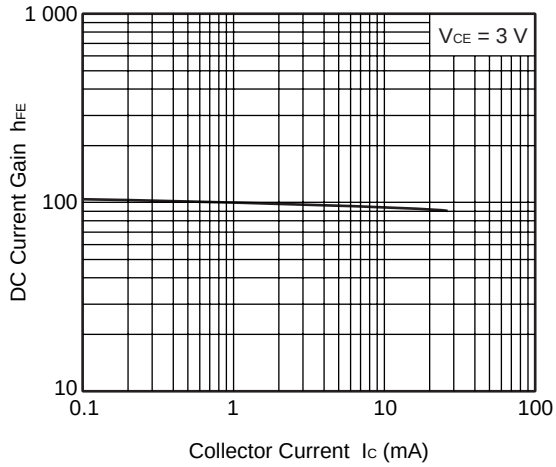
DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT

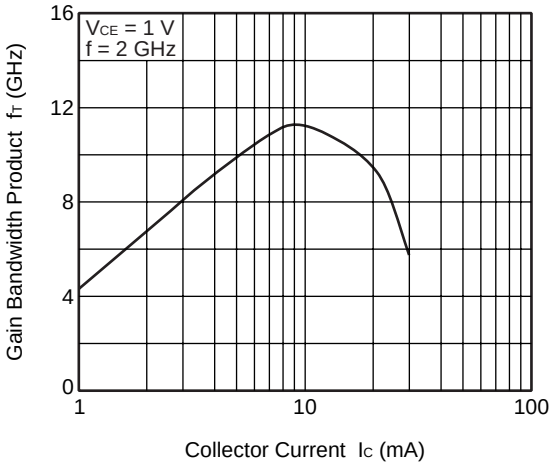


DC CURRENT GAIN vs.
COLLECTOR CURRENT



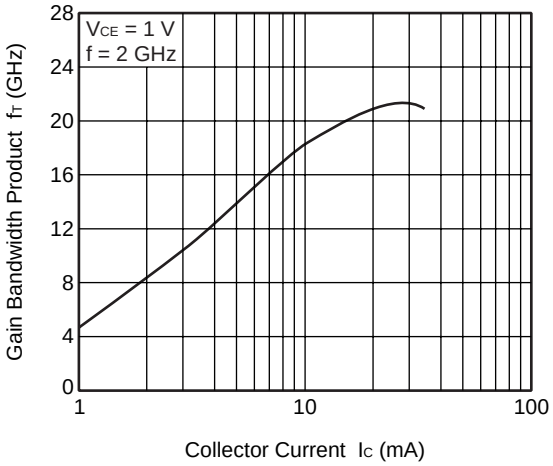
Q1

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



Q2

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
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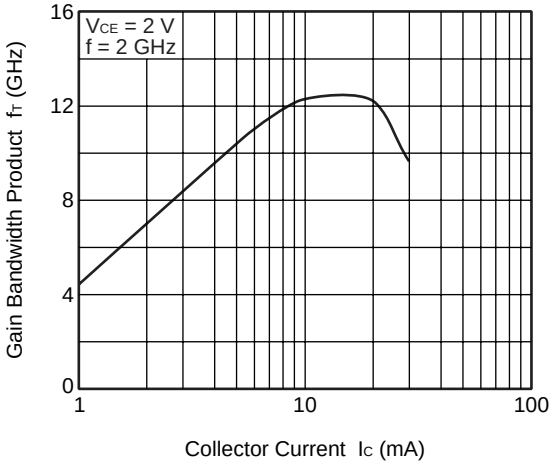

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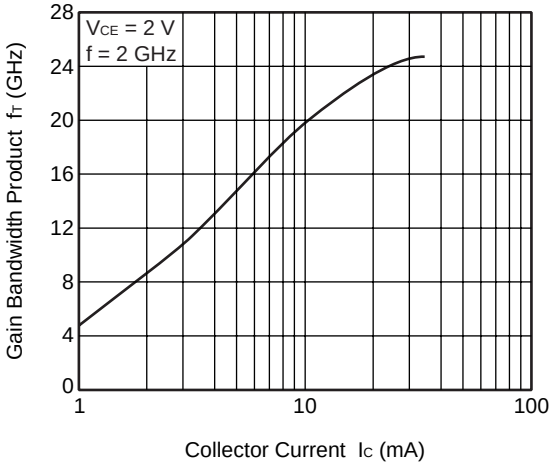

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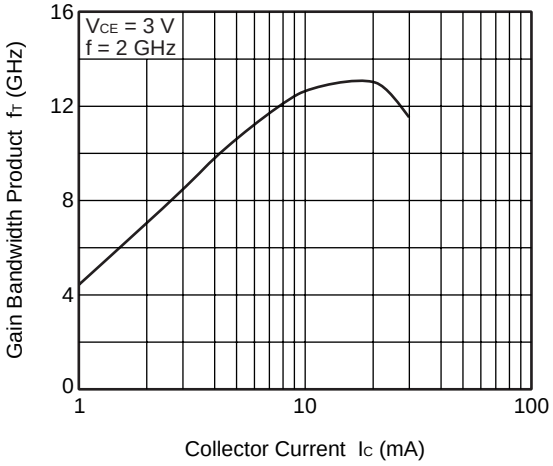
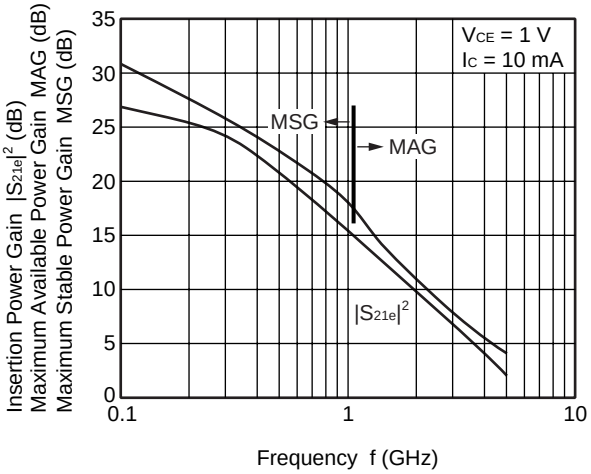


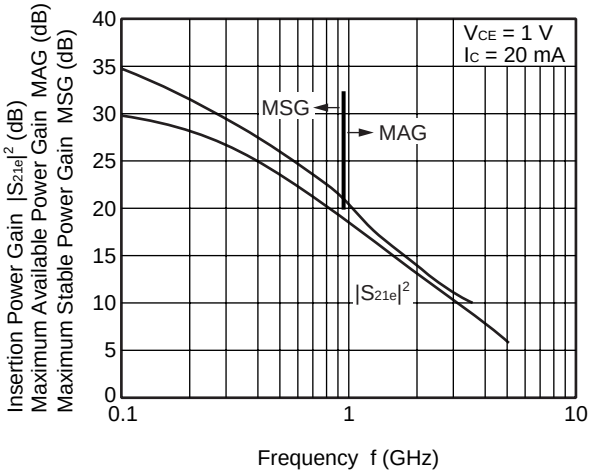
Q1

INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY

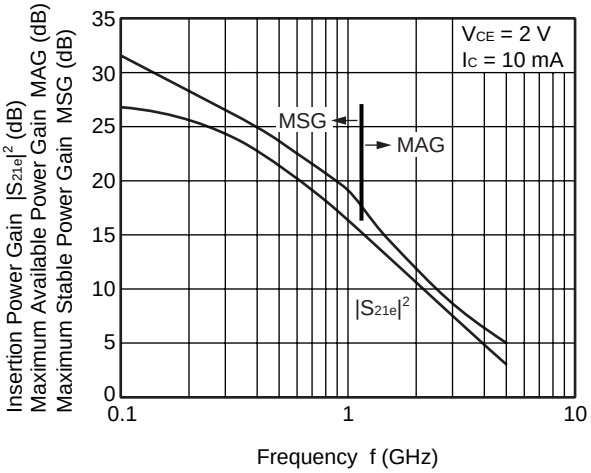


Q2

INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



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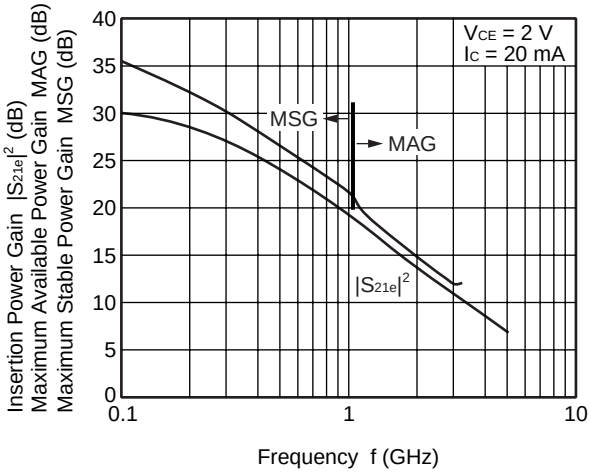

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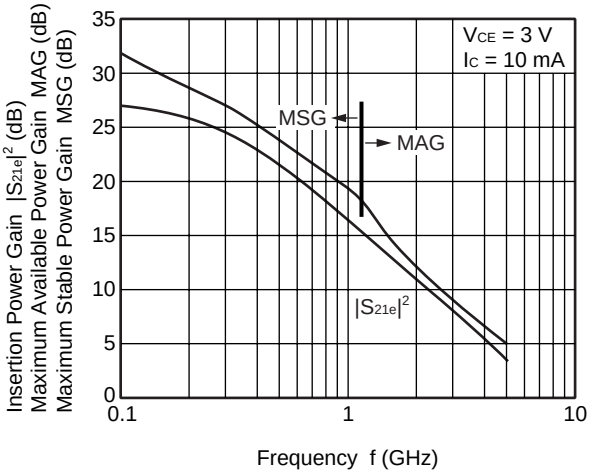
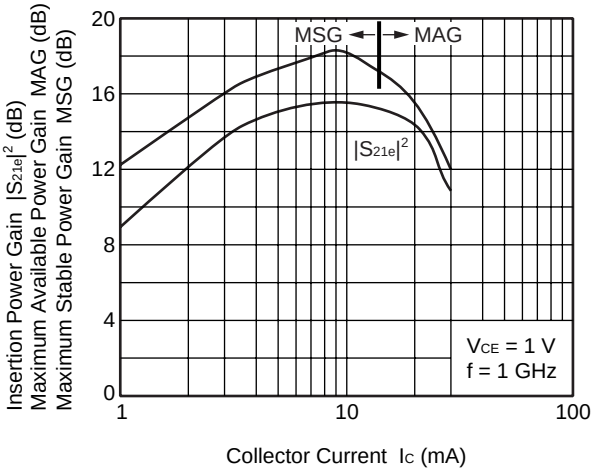


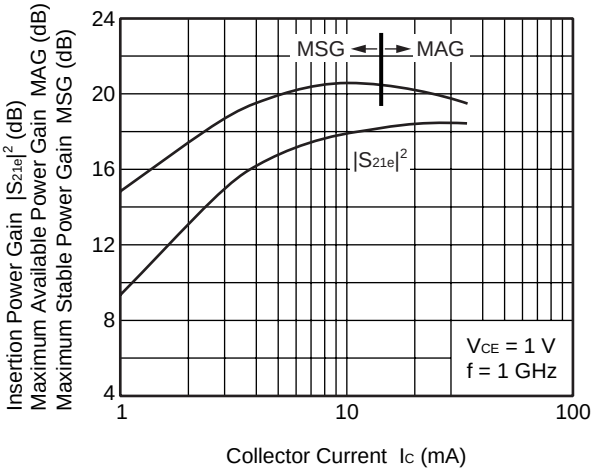
Q1

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



Q2

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
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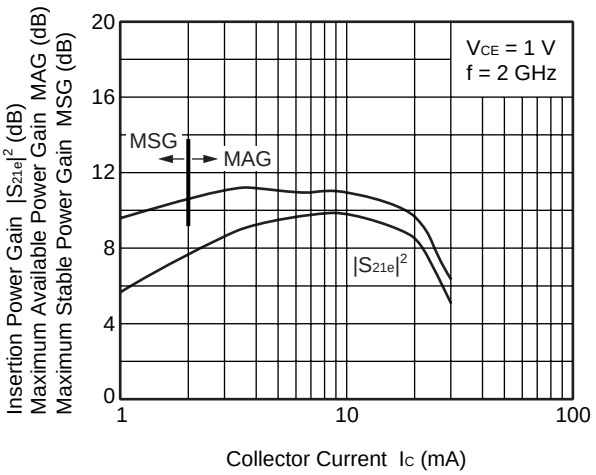
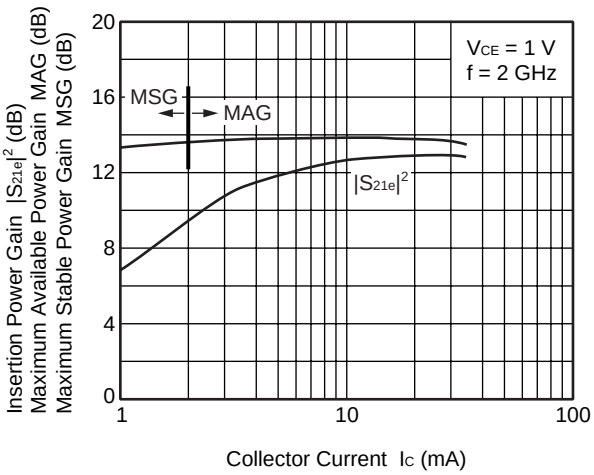
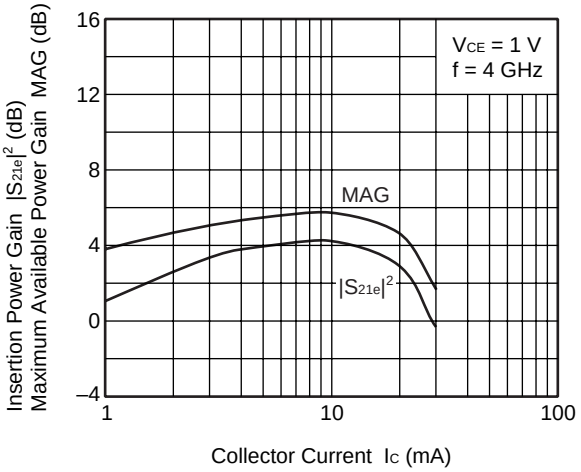


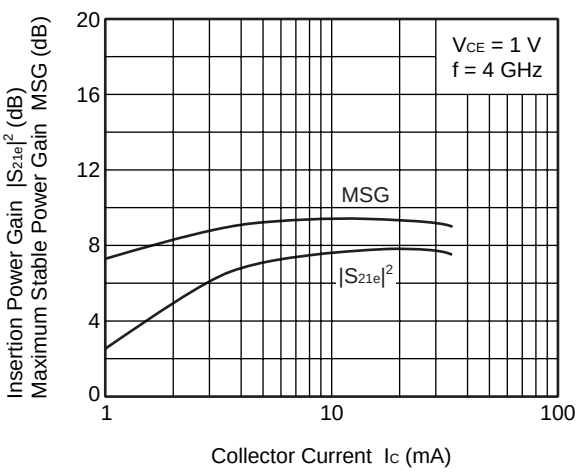
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT

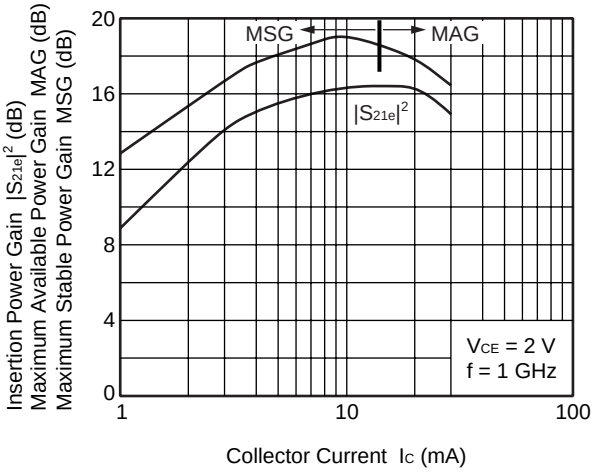


INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



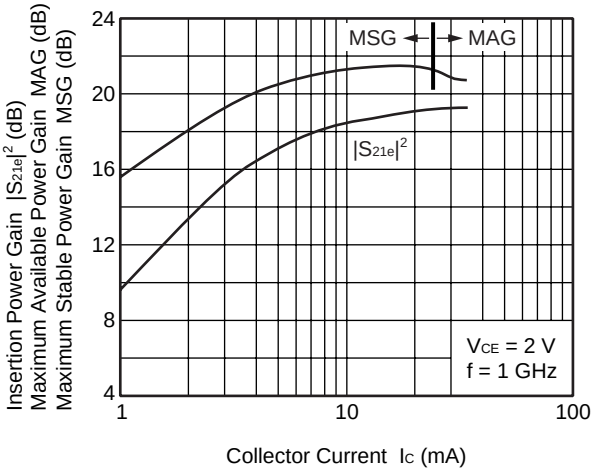
Q1

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT

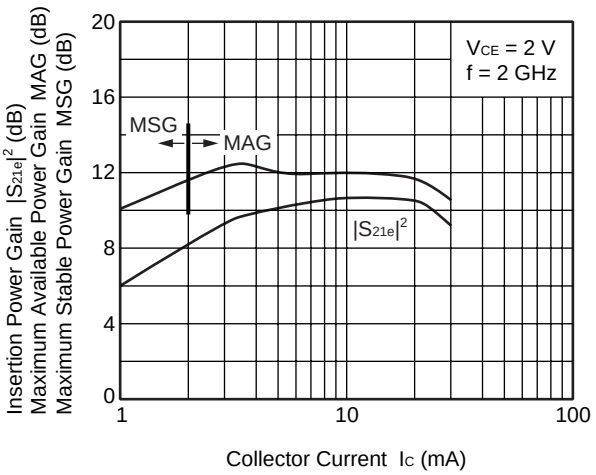


Q2

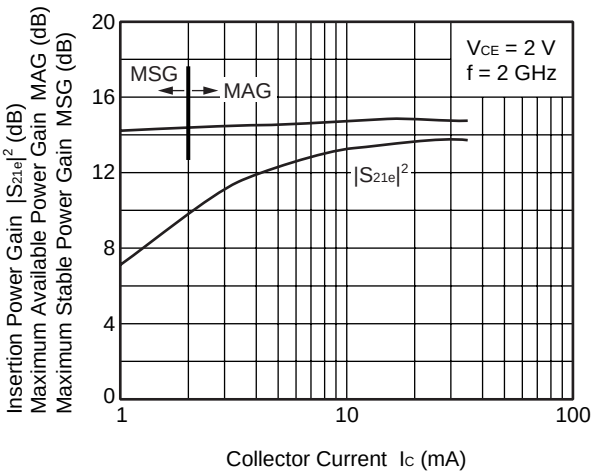
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



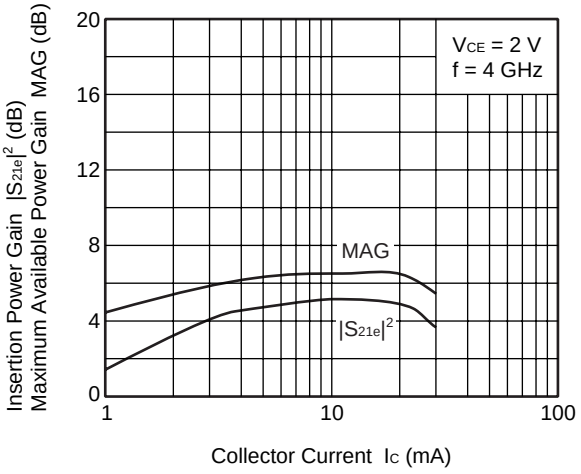
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



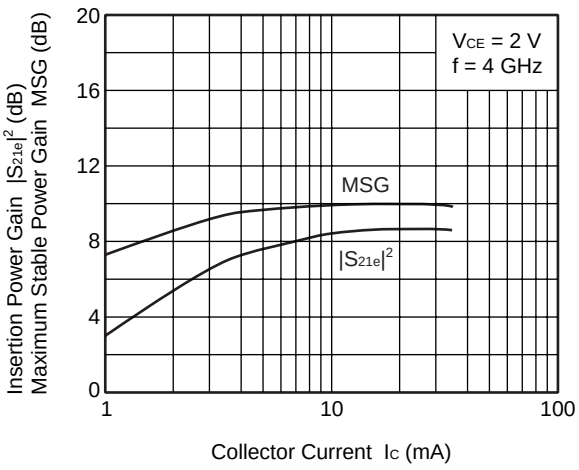
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT

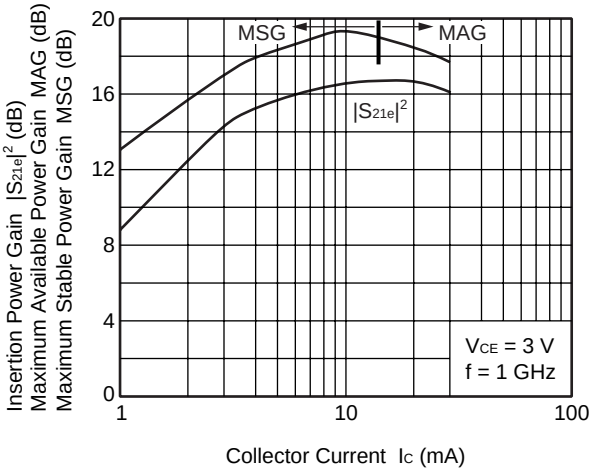


INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT

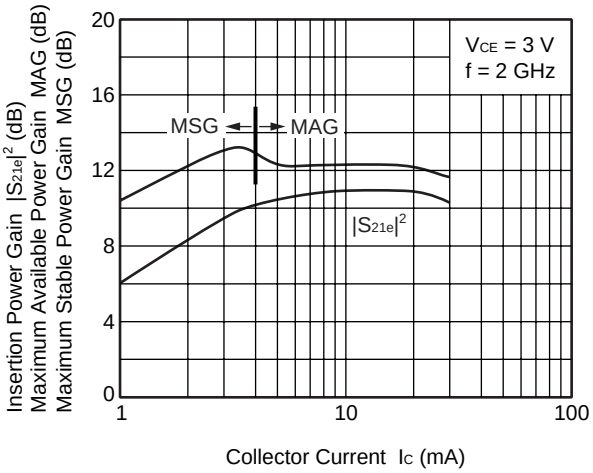


Q1

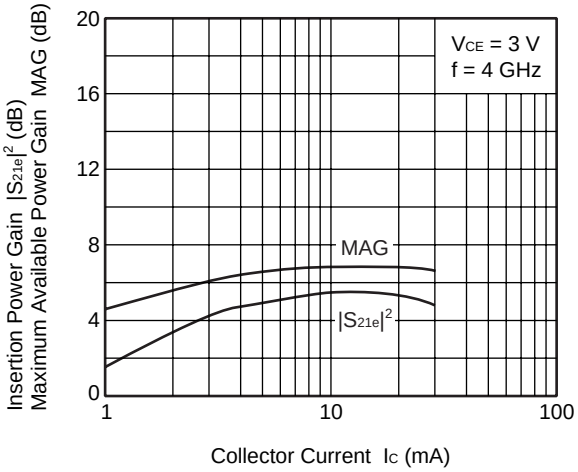
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT

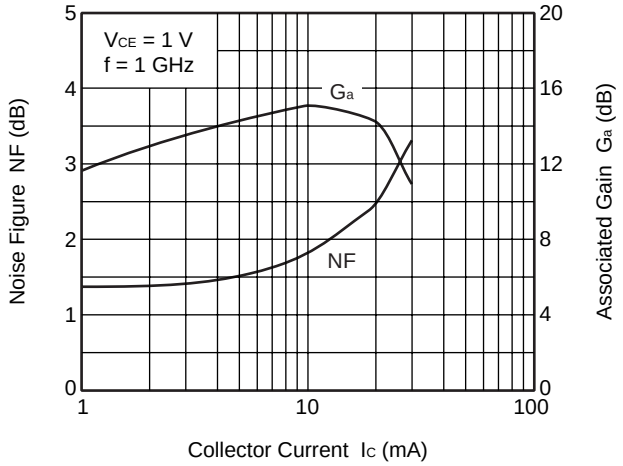


INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



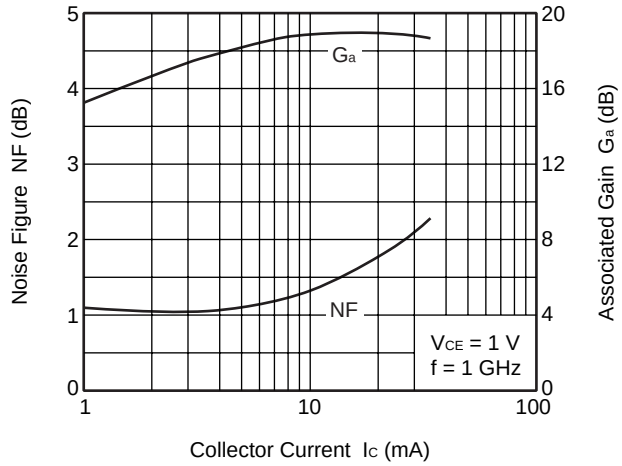
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

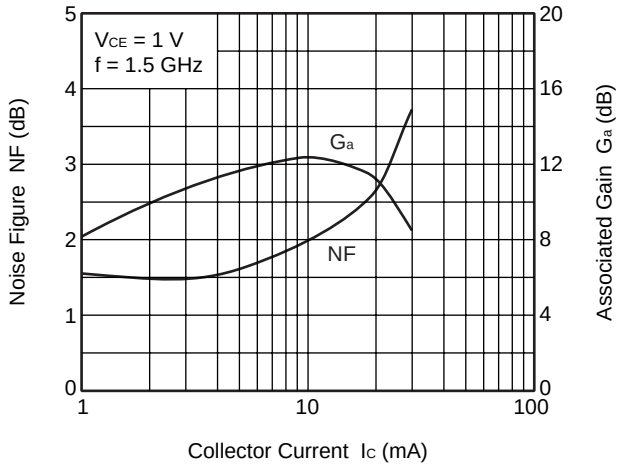


Q2

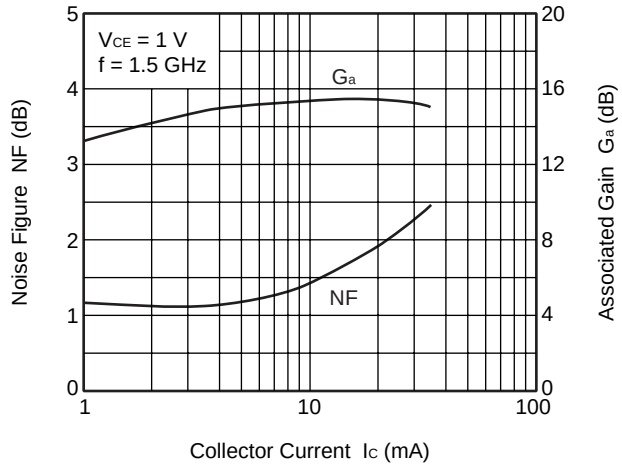
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



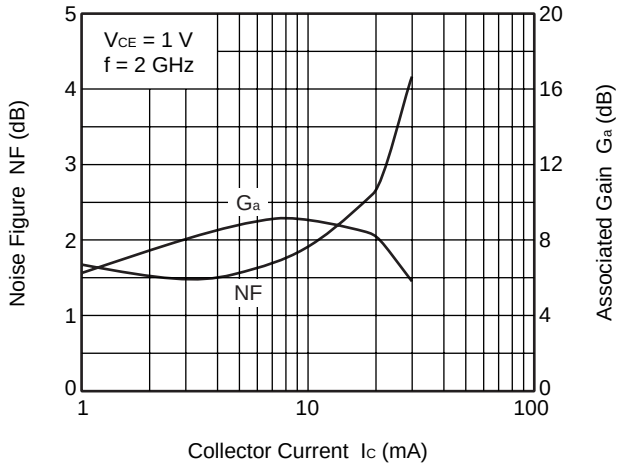
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



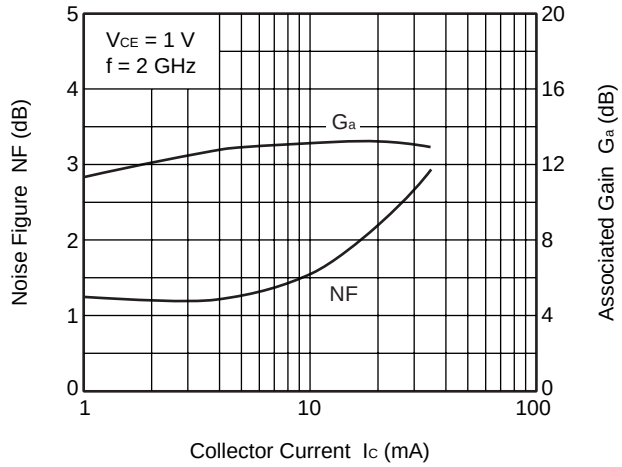
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

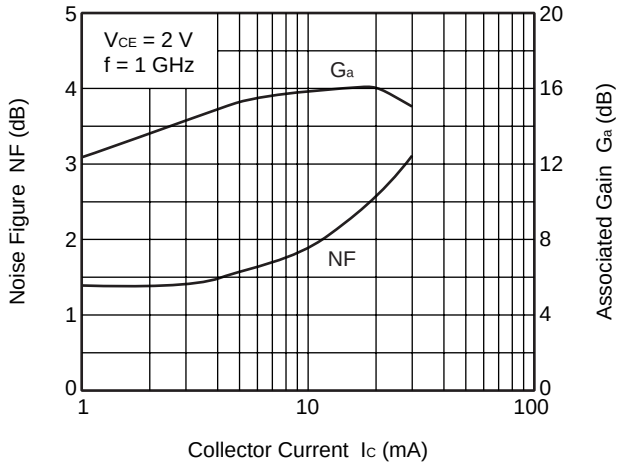


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



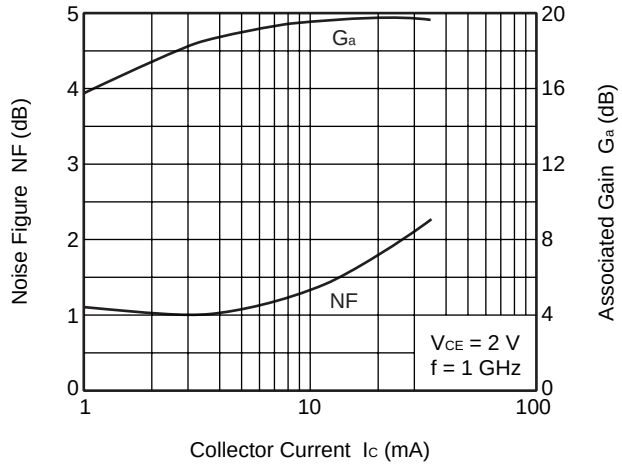
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

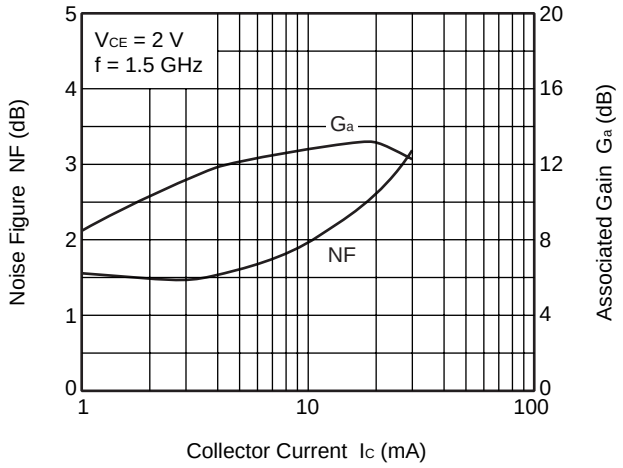


Q2

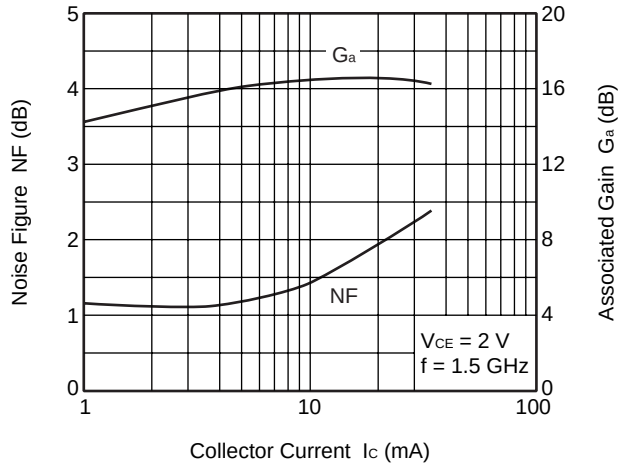
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



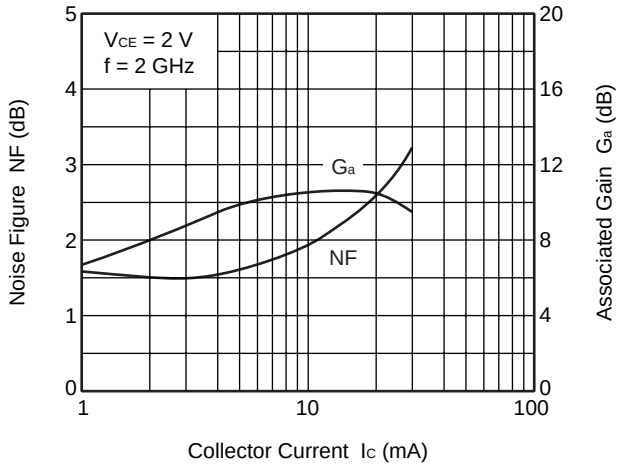
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



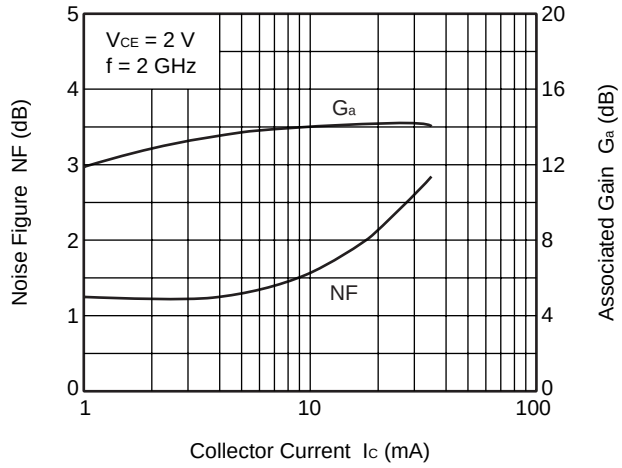
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

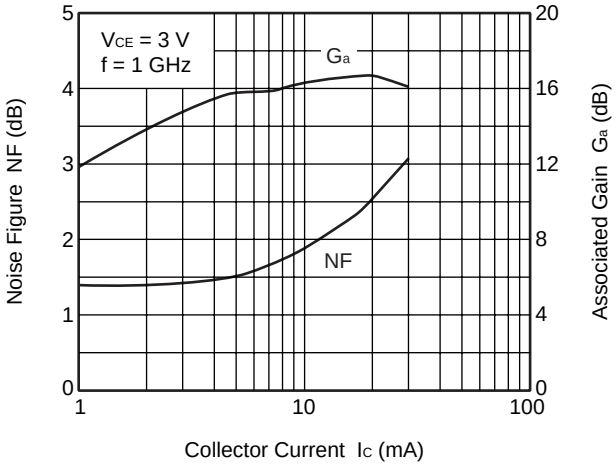


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

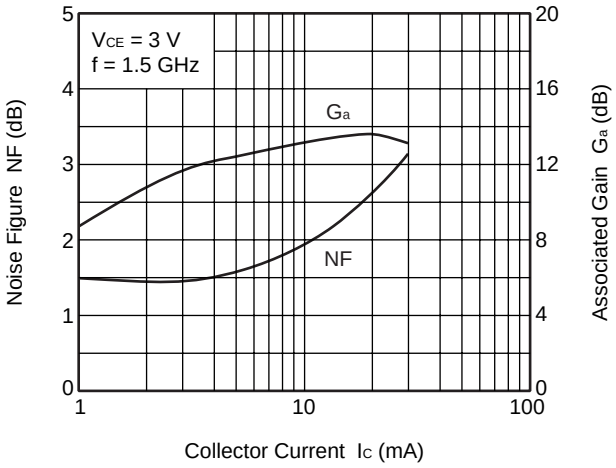


Q1

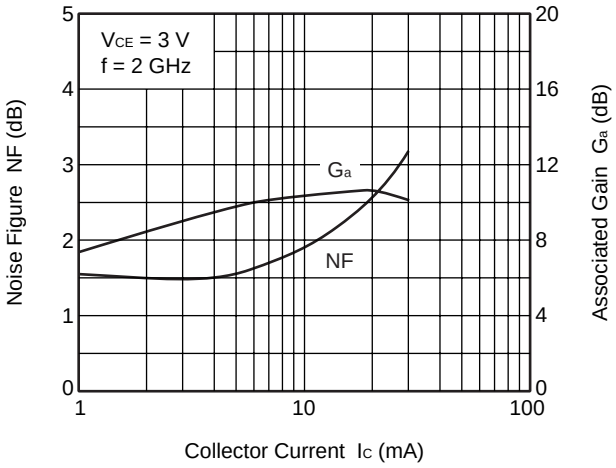
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



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	0.940	–8.1	3.572	172.4	0.014	86.2	0.992	–3.8
0.2	0.949	–13.7	3.474	167.9	0.025	80.3	0.987	–7.4
0.3	0.927	–19.8	3.407	161.2	0.038	75.6	0.976	–11.0
0.4	0.913	–26.2	3.371	155.7	0.049	71.9	0.962	–14.6
0.5	0.889	–32.9	3.316	149.6	0.060	67.6	0.946	–18.1
0.6	0.866	–39.3	3.245	143.9	0.069	63.7	0.930	–21.4
0.7	0.839	–45.6	3.160	138.5	0.078	60.0	0.908	–24.6
0.8	0.810	–51.9	3.090	133.3	0.085	56.5	0.887	–27.6
0.9	0.779	–57.8	3.007	127.9	0.091	53.1	0.865	–30.7
1.0	0.752	–63.9	2.941	122.9	0.096	50.4	0.842	–33.4
1.1	0.722	–70.0	2.866	118.2	0.100	47.6	0.820	–36.2
1.2	0.695	–75.9	2.780	113.5	0.103	45.1	0.797	–38.7
1.3	0.669	–81.7	2.708	109.2	0.105	42.7	0.775	–41.2
1.4	0.646	–87.8	2.621	104.5	0.107	40.8	0.754	–43.9
1.5	0.620	–93.9	2.562	100.2	0.107	39.2	0.734	–46.4
1.6	0.598	–99.9	2.481	95.6	0.107	38.2	0.715	–48.8
1.7	0.578	–105.6	2.420	91.6	0.106	37.2	0.696	–51.4
1.8	0.558	–111.3	2.334	87.5	0.105	36.8	0.680	–53.7
1.9	0.544	–117.0	2.269	83.8	0.104	37.0	0.664	–56.2
2.0	0.529	–122.8	2.208	80.1	0.102	38.0	0.649	–58.6
2.1	0.515	–128.3	2.152	76.1	0.100	39.6	0.635	–61.2
2.2	0.506	–133.4	2.089	72.7	0.098	41.7	0.624	–64.0
2.3	0.498	–138.7	2.038	69.3	0.097	44.2	0.613	–66.6
2.4	0.495	–143.8	1.995	65.9	0.097	47.1	0.603	–69.4
2.5	0.484	–148.7	1.933	62.7	0.097	50.5	0.594	–72.3
2.6	0.482	–153.5	1.877	59.5	0.099	54.4	0.585	–75.3
2.7	0.480	–158.3	1.832	56.5	0.102	58.1	0.580	–78.6
2.8	0.479	–162.5	1.792	53.5	0.107	61.6	0.576	–81.4
2.9	0.480	–166.2	1.744	50.7	0.113	64.3	0.569	–84.2
3.0	0.476	–171.0	1.705	47.9	0.121	66.8	0.558	–87.8
4.0	0.544	152.8	1.345	21.8	0.255	68.7	0.547	–128.1
5.0	0.664	127.6	1.005	0.3	0.400	47.3	0.583	–177.0

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	0.846	–11.1	9.568	169.0	0.014	85.6	0.973	–6.1
0.2	0.837	–19.7	9.131	160.9	0.024	77.8	0.955	–11.9
0.3	0.791	–28.5	8.687	152.0	0.034	73.3	0.919	–17.3
0.4	0.752	–36.9	8.295	144.3	0.044	68.8	0.878	–22.1
0.5	0.703	–45.0	7.825	136.6	0.052	64.8	0.836	–26.3
0.6	0.651	–52.6	7.349	130.0	0.059	62.0	0.794	–29.9
0.7	0.604	–59.3	6.867	123.9	0.064	59.5	0.751	–33.1
0.8	0.556	–66.0	6.456	118.4	0.069	57.7	0.713	–35.7
0.9	0.514	–72.0	6.049	113.2	0.073	56.3	0.677	–38.2
1.0	0.479	–78.0	5.724	108.3	0.077	55.5	0.644	–40.2
1.1	0.445	–84.0	5.392	104.1	0.081	54.9	0.615	–42.1
1.2	0.415	–89.7	5.071	99.9	0.084	54.7	0.589	–43.8
1.3	0.388	–95.0	4.806	96.3	0.087	54.7	0.563	–45.5
1.4	0.364	–101.1	4.550	92.5	0.090	54.8	0.542	–47.3
1.5	0.347	–106.0	4.345	88.9	0.093	55.1	0.522	–48.8
1.6	0.327	–112.5	4.135	85.3	0.097	55.7	0.503	–50.6
1.7	0.313	–117.7	3.965	82.2	0.100	56.1	0.485	–52.4
1.8	0.301	–123.7	3.777	79.1	0.103	56.6	0.471	–54.2
1.9	0.292	–129.4	3.619	76.2	0.108	57.2	0.458	–56.0
2.0	0.284	–135.1	3.483	73.4	0.112	58.3	0.445	–57.8
2.1	0.278	–139.7	3.353	70.3	0.116	59.1	0.432	–59.9
2.2	0.274	–145.1	3.231	67.7	0.120	59.7	0.421	–62.1
2.3	0.276	–150.1	3.122	65.1	0.125	60.3	0.412	–64.2
2.4	0.275	–155.0	3.024	62.4	0.130	60.8	0.402	–66.5
2.5	0.275	–159.1	2.925	59.9	0.136	61.2	0.393	–69.0
2.6	0.276	–163.7	2.831	57.7	0.142	61.8	0.385	–71.6
2.7	0.278	–168.1	2.752	55.3	0.148	62.1	0.379	–74.6
2.8	0.282	–171.7	2.678	53.0	0.154	62.3	0.373	–77.0
2.9	0.285	–174.9	2.596	50.7	0.161	62.2	0.369	–79.4
3.0	0.288	–179.3	2.539	48.4	0.169	62.0	0.357	–82.6
4.0	0.385	151.3	2.016	26.1	0.262	56.9	0.337	–122.2
5.0	0.546	130.9	1.581	4.6	0.363	42.4	0.393	–171.2

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	0.754	–13.6	14.303	166.4	0.013	85.7	0.959	–8.0
0.2	0.745	–24.2	13.356	155.9	0.023	77.0	0.921	–15.3
0.3	0.680	–33.9	12.330	145.3	0.032	72.3	0.866	–21.5
0.4	0.623	–43.4	11.418	136.6	0.040	68.1	0.807	–26.6
0.5	0.563	–51.9	10.453	128.5	0.047	65.3	0.749	–30.7
0.6	0.508	–59.3	9.520	121.7	0.053	63.3	0.697	–33.8
0.7	0.456	–65.7	8.685	115.8	0.058	62.5	0.649	–36.3
0.8	0.414	–72.1	7.990	110.6	0.063	61.9	0.609	–38.4
0.9	0.374	–77.4	7.359	105.8	0.067	61.4	0.575	–40.1
1.0	0.342	–83.1	6.851	101.5	0.072	61.3	0.545	–41.5
1.1	0.314	–88.8	6.382	97.6	0.076	61.5	0.518	–42.8
1.2	0.288	–94.0	5.956	94.1	0.081	61.6	0.495	–43.9
1.3	0.268	–99.3	5.596	91.0	0.085	61.8	0.473	–45.3
1.4	0.250	–104.9	5.248	87.6	0.090	62.0	0.456	–46.5
1.5	0.234	–110.8	4.987	84.6	0.095	62.3	0.437	–47.9
1.6	0.224	–116.9	4.700	81.4	0.099	62.5	0.422	–49.3
1.7	0.213	–123.2	4.491	78.8	0.105	62.7	0.407	–50.9
1.8	0.207	–128.9	4.265	75.8	0.110	62.8	0.394	–52.4
1.9	0.201	–135.0	4.083	73.4	0.115	62.8	0.382	–54.2
2.0	0.200	–140.8	3.913	71.0	0.121	63.1	0.371	–55.9
2.1	0.195	–146.2	3.769	68.3	0.127	63.4	0.359	–57.9
2.2	0.198	–150.9	3.617	66.0	0.132	63.4	0.349	–60.0
2.3	0.198	–156.2	3.487	63.7	0.138	63.2	0.340	–62.1
2.4	0.202	–160.9	3.373	61.3	0.145	62.9	0.331	–64.3
2.5	0.204	–165.8	3.257	59.1	0.151	62.7	0.321	–66.8
2.6	0.209	–170.5	3.151	57.0	0.157	62.6	0.315	–69.3
2.7	0.213	–173.9	3.057	55.0	0.164	62.4	0.308	–72.2
2.8	0.217	–178.2	2.968	52.8	0.171	61.9	0.303	–74.7
2.9	0.223	178.8	2.874	50.6	0.178	61.3	0.298	–77.1
3.0	0.226	174.6	2.810	48.6	0.185	60.8	0.287	–80.1
4.0	0.332	148.3	2.227	28.2	0.270	53.1	0.260	–122.5
5.0	0.495	130.5	1.779	8.6	0.355	39.9	0.319	–173.6

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	0.698	–14.7	18.055	164.1	0.012	82.0	0.943	–9.5
0.2	0.663	–27.8	16.522	151.9	0.022	78.3	0.890	–17.9
0.3	0.590	–38.0	14.890	140.3	0.030	72.2	0.819	–24.4
0.4	0.526	–47.6	13.444	131.2	0.037	69.2	0.748	–29.5
0.5	0.465	–55.7	12.033	123.2	0.044	67.0	0.684	–33.0
0.6	0.411	–62.6	10.755	116.5	0.050	65.8	0.630	–35.6
0.7	0.364	–68.8	9.684	111.1	0.055	65.6	0.583	–37.6
0.8	0.326	–74.6	8.807	106.3	0.060	65.2	0.546	–39.1
0.9	0.295	–79.4	8.049	101.6	0.065	65.2	0.514	–40.3
1.0	0.263	–85.2	7.432	97.8	0.070	65.4	0.488	–41.2
1.1	0.240	–90.2	6.879	94.3	0.075	65.6	0.463	–42.4
1.2	0.220	–96.4	6.390	90.9	0.080	65.7	0.443	–43.2
1.3	0.204	–101.1	5.974	87.9	0.086	65.7	0.424	–44.2
1.4	0.188	–106.7	5.596	84.9	0.091	65.8	0.408	–45.4
1.5	0.177	–112.4	5.291	82.2	0.097	65.7	0.393	–46.7
1.6	0.168	–119.8	5.004	79.3	0.103	65.9	0.379	–48.0
1.7	0.162	–125.9	4.757	76.9	0.109	65.6	0.366	–49.6
1.8	0.157	–133.0	4.517	74.3	0.114	65.4	0.354	–51.0
1.9	0.155	–138.5	4.314	72.1	0.121	65.3	0.342	–52.7
2.0	0.154	–145.3	4.130	69.8	0.127	65.2	0.332	–54.4
2.1	0.155	–151.5	3.966	67.3	0.133	65.0	0.321	–56.4
2.2	0.158	–156.4	3.803	65.2	0.139	64.7	0.311	–58.6
2.3	0.160	–161.4	3.668	63.1	0.146	64.2	0.302	–60.6
2.4	0.167	–166.0	3.541	60.8	0.152	63.7	0.293	–62.9
2.5	0.171	–171.0	3.415	58.7	0.159	63.2	0.284	–65.4
2.6	0.179	–174.6	3.306	56.8	0.166	62.7	0.277	–68.0
2.7	0.181	–179.3	3.204	54.9	0.173	62.3	0.270	–70.9
2.8	0.188	176.9	3.111	52.8	0.179	61.7	0.265	–73.5
2.9	0.195	173.9	3.016	50.8	0.187	60.8	0.260	–75.9
3.0	0.199	170.5	2.941	48.8	0.194	60.2	0.249	–79.0
4.0	0.309	146.1	2.328	29.5	0.275	51.1	0.219	–124.3
5.0	0.471	129.7	1.873	10.5	0.353	38.2	0.283	–177.6

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	0.599	–17.0	22.473	161.5	0.012	86.0	0.920	–11.2
0.2	0.564	–30.8	19.993	147.4	0.020	76.9	0.849	–20.6
0.3	0.489	–42.4	17.474	135.3	0.028	73.5	0.762	–27.3
0.4	0.424	–51.5	15.321	125.8	0.035	70.6	0.683	–31.9
0.5	0.366	–59.1	13.430	118.0	0.041	69.2	0.616	–34.8
0.6	0.318	–65.0	11.823	111.8	0.047	68.8	0.564	–36.9
0.7	0.277	–71.2	10.517	106.6	0.053	69.1	0.521	–38.2
0.8	0.244	–76.4	9.461	102.2	0.058	69.0	0.488	–39.1
0.9	0.217	–80.5	8.598	98.0	0.064	69.1	0.460	–40.0
1.0	0.194	–86.0	7.887	94.4	0.070	69.1	0.436	–40.6
1.1	0.175	–91.5	7.284	91.3	0.076	69.2	0.416	–41.2
1.2	0.159	–97.2	6.729	88.5	0.082	69.0	0.398	–42.1
1.3	0.148	–102.0	6.288	85.8	0.087	68.8	0.383	–43.1
1.4	0.136	–109.1	5.870	83.0	0.094	68.6	0.368	–44.1
1.5	0.128	–114.9	5.548	80.5	0.100	68.4	0.355	–45.3
1.6	0.123	–123.2	5.219	77.5	0.107	68.2	0.341	–46.5
1.7	0.120	–129.7	4.960	75.4	0.113	67.7	0.330	–48.1
1.8	0.118	–138.1	4.705	73.0	0.119	67.3	0.318	–49.6
1.9	0.118	–145.0	4.490	70.9	0.126	66.9	0.307	–51.3
2.0	0.121	–151.5	4.295	68.7	0.133	66.4	0.297	–53.1
2.1	0.125	–158.0	4.124	66.4	0.139	66.1	0.287	–55.1
2.2	0.129	–163.3	3.953	64.5	0.146	65.4	0.277	–57.3
2.3	0.134	–167.5	3.805	62.5	0.152	64.8	0.269	–59.4
2.4	0.141	–172.6	3.672	60.2	0.159	64.0	0.259	–61.8
2.5	0.147	–177.3	3.545	58.3	0.166	63.4	0.250	–64.4
2.6	0.154	178.8	3.426	56.5	0.173	62.7	0.244	–66.8
2.7	0.158	174.4	3.319	54.7	0.180	62.0	0.236	–70.1
2.8	0.165	171.7	3.218	52.7	0.187	61.2	0.231	–72.7
2.9	0.174	168.9	3.121	50.7	0.195	60.3	0.226	–75.2
3.0	0.178	165.0	3.047	48.9	0.202	59.4	0.215	–78.5
4.0	0.292	143.2	2.400	30.4	0.280	49.5	0.185	–127.9
5.0	0.453	128.3	1.939	12.1	0.353	36.7	0.257	176.9

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	0.397	–23.7	30.878	156.5	0.010	80.6	0.860	–14.6
0.2	0.362	–37.8	25.804	139.2	0.019	78.0	0.753	–25.4
0.3	0.294	–47.5	21.204	126.5	0.025	75.8	0.647	–31.6
0.4	0.248	–56.0	17.748	117.3	0.032	75.0	0.565	–35.0
0.5	0.207	–62.1	15.100	110.2	0.039	74.6	0.505	–36.7
0.6	0.176	–68.6	13.046	104.8	0.046	74.6	0.460	–37.4
0.7	0.146	–72.3	11.428	100.4	0.052	74.7	0.425	–37.9
0.8	0.128	–77.2	10.183	96.5	0.059	74.4	0.399	–38.2
0.9	0.111	–81.7	9.171	93.0	0.065	74.3	0.378	–38.5
1.0	0.098	–87.4	8.364	89.9	0.072	73.9	0.360	–38.8
1.1	0.087	–93.7	7.677	87.2	0.079	73.5	0.345	–39.4
1.2	0.079	–102.7	7.078	84.6	0.086	73.1	0.330	–39.9
1.3	0.074	–109.8	6.579	82.3	0.092	72.4	0.318	–40.9
1.4	0.068	–118.5	6.138	79.9	0.099	71.9	0.307	–41.8
1.5	0.065	–129.6	5.786	77.6	0.106	71.2	0.295	–43.1
1.6	0.067	–142.3	5.437	75.1	0.113	70.6	0.283	–44.4
1.7	0.070	–150.5	5.155	73.1	0.120	69.8	0.273	–46.2
1.8	0.075	–157.7	4.886	71.0	0.128	69.0	0.262	–47.8
1.9	0.080	–165.9	4.658	69.1	0.134	68.1	0.252	–49.7
2.0	0.089	–174.3	4.450	67.2	0.142	67.5	0.241	–51.6
2.1	0.095	–178.3	4.258	65.1	0.149	66.7	0.232	–53.9
2.2	0.102	177.8	4.088	63.3	0.156	65.9	0.223	–56.4
2.3	0.111	174.3	3.928	61.4	0.163	64.9	0.214	–58.7
2.4	0.121	171.9	3.782	59.3	0.170	64.0	0.205	–61.4
2.5	0.129	166.9	3.653	57.5	0.178	63.0	0.196	–64.1
2.6	0.136	165.9	3.529	55.8	0.185	62.2	0.189	–67.1
2.7	0.145	162.4	3.415	54.0	0.192	61.3	0.182	–70.6
2.8	0.153	160.1	3.309	52.2	0.199	60.3	0.176	–73.8
2.9	0.161	157.2	3.204	50.3	0.207	59.1	0.171	–76.7
3.0	0.168	154.1	3.130	48.6	0.215	58.2	0.161	–80.6
4.0	0.282	137.7	2.453	31.1	0.290	46.9	0.140	–142.0
5.0	0.438	125.1	1.976	14.4	0.356	33.9	0.234	163.5

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	0.947	–7.1	3.606	172.3	0.012	85.2	0.993	–3.4
0.2	0.950	–12.8	3.495	168.4	0.022	80.3	0.988	–6.8
0.3	0.931	–18.7	3.427	162.0	0.032	76.8	0.977	–10.1
0.4	0.919	–25.1	3.407	156.7	0.043	72.6	0.967	–13.4
0.5	0.895	–31.3	3.353	150.8	0.052	68.6	0.952	–16.6
0.6	0.874	–37.3	3.289	145.3	0.060	64.9	0.937	–19.6
0.7	0.843	–43.4	3.206	140.0	0.068	61.6	0.917	–22.6
0.8	0.815	–49.2	3.138	135.1	0.074	58.2	0.899	–25.6
0.9	0.787	–54.9	3.057	129.8	0.079	55.3	0.878	–28.4
1.0	0.761	–60.8	2.996	124.9	0.083	52.4	0.858	–30.9
1.1	0.730	–66.7	2.926	120.2	0.087	50.0	0.838	–33.5
1.2	0.704	–72.5	2.844	115.7	0.089	47.6	0.816	–35.9
1.3	0.676	–77.9	2.773	111.5	0.091	45.4	0.797	–38.3
1.4	0.648	–83.8	2.693	106.9	0.092	43.8	0.778	–40.6
1.5	0.626	–89.4	2.634	102.6	0.092	42.5	0.758	–43.1
1.6	0.602	–95.5	2.554	98.0	0.092	41.8	0.741	–45.3
1.7	0.583	–101.0	2.499	94.1	0.091	41.4	0.724	–47.8
1.8	0.561	–106.7	2.411	90.1	0.090	41.7	0.708	–50.0
1.9	0.543	–112.3	2.348	86.4	0.088	42.4	0.694	–52.2
2.0	0.527	–117.8	2.287	82.7	0.087	44.2	0.681	–54.5
2.1	0.515	–122.8	2.233	78.8	0.086	46.5	0.667	–56.9
2.2	0.504	–128.6	2.173	75.3	0.084	49.6	0.657	–59.5
2.3	0.495	–133.7	2.122	72.0	0.084	52.6	0.647	–62.0
2.4	0.487	–138.6	2.077	68.6	0.085	56.3	0.636	–64.5
2.5	0.478	–143.6	2.016	65.4	0.087	60.5	0.628	–67.2
2.6	0.474	–148.5	1.967	62.1	0.090	64.9	0.621	–70.2
2.7	0.471	–153.2	1.917	59.3	0.095	68.8	0.616	–73.3
2.8	0.469	–157.5	1.874	56.3	0.101	72.2	0.612	–75.8
2.9	0.467	–161.5	1.825	53.6	0.109	74.6	0.605	–78.4
3.0	0.463	–166.2	1.780	50.7	0.118	76.7	0.593	–81.8
4.0	0.526	156.1	1.418	24.2	0.259	74.6	0.580	–120.3
5.0	0.654	130.0	1.057	2.3	0.401	51.8	0.607	–167.6

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	0.852	–9.5	9.594	169.4	0.012	83.6	0.977	–5.4
0.2	0.851	–18.1	9.149	161.9	0.021	78.1	0.961	–10.7
0.3	0.802	–26.1	8.740	153.2	0.030	74.5	0.930	–15.3
0.4	0.765	–34.2	8.388	145.8	0.038	70.4	0.895	–19.8
0.5	0.718	–41.6	7.954	138.3	0.045	66.4	0.857	–23.6
0.6	0.670	–48.5	7.489	131.8	0.051	64.0	0.818	–26.9
0.7	0.621	–54.6	7.026	125.8	0.056	61.4	0.778	–29.7
0.8	0.575	–60.8	6.627	120.5	0.061	59.8	0.744	–32.2
0.9	0.533	–66.3	6.227	115.2	0.065	58.8	0.711	–34.3
1.0	0.496	–71.9	5.895	110.5	0.068	58.2	0.681	–36.1
1.1	0.460	–77.1	5.571	106.3	0.071	57.8	0.654	–38.0
1.2	0.428	–82.3	5.253	102.3	0.074	57.8	0.628	–39.4
1.3	0.402	–87.0	4.995	98.7	0.077	57.5	0.605	–41.0
1.4	0.373	–92.1	4.736	94.9	0.080	58.0	0.586	–42.5
1.5	0.351	–97.4	4.538	91.4	0.083	58.5	0.566	–44.1
1.6	0.331	–102.8	4.309	87.8	0.086	59.4	0.548	–45.5
1.7	0.314	–107.6	4.141	84.7	0.089	60.1	0.534	–47.2
1.8	0.297	–112.7	3.951	81.6	0.092	60.8	0.519	–48.7
1.9	0.287	–118.6	3.793	78.7	0.096	61.7	0.506	–50.4
2.0	0.276	–123.7	3.656	75.8	0.101	63.0	0.495	–52.1
2.1	0.270	–129.1	3.528	72.7	0.105	64.1	0.483	–53.9
2.2	0.262	–133.7	3.400	70.3	0.109	64.9	0.474	–55.9
2.3	0.258	–138.4	3.289	67.7	0.113	65.5	0.465	–57.9
2.4	0.257	–143.5	3.191	65.0	0.119	66.3	0.455	–59.8
2.5	0.253	–148.0	3.087	62.6	0.124	66.7	0.446	–62.2
2.6	0.253	–152.6	2.992	60.3	0.130	67.6	0.440	–64.4
2.7	0.254	–157.2	2.914	58.0	0.136	68.0	0.434	–66.9
2.8	0.257	–161.0	2.836	55.6	0.143	68.3	0.431	–69.3
2.9	0.257	–164.8	2.750	53.4	0.150	68.2	0.425	–71.2
3.0	0.257	–169.6	2.685	51.0	0.158	68.3	0.413	–74.0
4.0	0.350	158.3	2.159	28.8	0.255	63.2	0.388	–109.8
5.0	0.520	136.1	1.718	6.7	0.363	48.1	0.427	–158.0

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	0.769	–11.7	14.341	166.9	0.010	84.7	0.965	–6.9
0.2	0.760	–21.7	13.434	157.0	0.020	79.4	0.933	–13.5
0.3	0.703	–30.8	12.463	146.9	0.028	73.4	0.884	–18.9
0.4	0.645	–39.5	11.626	138.4	0.035	69.6	0.831	–23.5
0.5	0.588	–46.7	10.697	130.6	0.041	67.0	0.778	–27.1
0.6	0.530	–53.0	9.812	123.8	0.046	65.4	0.731	–29.9
0.7	0.481	–59.1	8.986	118.0	0.051	64.6	0.687	–32.2
0.8	0.435	–64.5	8.284	112.9	0.056	63.8	0.650	–33.9
0.9	0.396	–69.0	7.673	108.0	0.060	63.7	0.619	–35.6
1.0	0.362	–73.9	7.136	103.7	0.064	63.9	0.589	–36.8
1.1	0.332	–78.2	6.681	99.9	0.068	64.1	0.565	–38.0
1.2	0.303	–83.0	6.230	96.4	0.072	64.4	0.543	–38.9
1.3	0.282	–87.1	5.858	93.3	0.076	64.5	0.524	–40.0
1.4	0.259	–91.4	5.508	90.0	0.080	65.2	0.506	–41.1
1.5	0.241	–96.1	5.245	87.0	0.085	65.4	0.490	–42.4
1.6	0.226	–102.0	4.961	83.7	0.089	66.0	0.475	–43.6
1.7	0.211	–106.3	4.743	81.2	0.094	66.3	0.462	–45.1
1.8	0.200	–111.6	4.511	78.5	0.099	66.5	0.450	–46.3
1.9	0.192	–117.5	4.311	75.9	0.104	66.8	0.439	–47.8
2.0	0.185	–123.8	4.146	73.5	0.110	67.3	0.428	–49.3
2.1	0.180	–128.2	3.984	70.8	0.115	67.6	0.418	–51.0
2.2	0.178	–133.5	3.840	68.6	0.120	67.8	0.408	–52.9
2.3	0.177	–138.8	3.701	66.3	0.126	67.7	0.401	–54.7
2.4	0.178	–144.2	3.582	63.9	0.132	67.6	0.392	–56.7
2.5	0.174	–149.6	3.464	61.8	0.138	67.4	0.384	–58.8
2.6	0.176	–153.8	3.355	59.8	0.144	67.6	0.377	–61.0
2.7	0.178	–159.2	3.256	57.8	0.151	67.4	0.371	–63.4
2.8	0.183	–163.0	3.170	55.6	0.157	67.1	0.367	–65.7
2.9	0.185	–167.1	3.067	53.5	0.165	66.5	0.361	–67.4
3.0	0.187	–171.7	2.992	51.6	0.173	66.1	0.350	–70.2
4.0	0.286	157.3	2.406	31.3	0.259	59.1	0.314	–106.3
5.0	0.460	137.0	1.953	10.5	0.353	45.6	0.345	–156.5

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	0.700	–13.3	18.223	164.8	0.011	91.6	0.951	–8.2
0.2	0.683	–24.5	16.737	153.2	0.019	78.1	0.906	–15.6
0.3	0.612	–33.9	15.188	142.2	0.026	73.7	0.843	–21.3
0.4	0.554	–42.2	13.789	133.2	0.033	70.8	0.779	–25.8
0.5	0.495	–49.3	12.420	125.3	0.039	68.2	0.721	–29.0
0.6	0.439	–55.3	11.177	118.6	0.044	67.8	0.671	–31.3
0.7	0.391	–60.1	10.094	113.3	0.049	67.5	0.628	–33.0
0.8	0.349	–64.9	9.215	108.4	0.053	67.5	0.593	–34.3
0.9	0.315	–68.5	8.436	103.8	0.058	67.6	0.564	–35.4
1.0	0.285	–72.5	7.807	99.9	0.062	68.0	0.539	–36.2
1.1	0.257	–76.5	7.244	96.5	0.067	68.2	0.516	–37.1
1.2	0.235	–80.6	6.736	93.3	0.072	68.2	0.497	–37.7
1.3	0.218	–84.2	6.299	90.3	0.077	68.4	0.480	–38.8
1.4	0.198	–88.0	5.901	87.3	0.082	68.6	0.465	–39.6
1.5	0.184	–92.4	5.607	84.6	0.087	68.8	0.450	–40.7
1.6	0.170	–98.3	5.285	81.6	0.092	69.0	0.437	–41.9
1.7	0.161	–103.6	5.040	79.3	0.098	69.0	0.426	–43.3
1.8	0.151	–108.5	4.795	76.8	0.103	68.9	0.415	–44.5
1.9	0.144	–114.9	4.580	74.5	0.109	68.9	0.405	–45.9
2.0	0.138	–121.5	4.393	72.3	0.115	68.9	0.395	–47.5
2.1	0.134	–127.0	4.219	69.8	0.121	68.9	0.384	–49.2
2.2	0.133	–132.6	4.059	67.7	0.127	68.7	0.376	–51.0
2.3	0.133	–138.1	3.911	65.7	0.133	68.3	0.368	–52.7
2.4	0.137	–144.3	3.780	63.5	0.139	67.9	0.359	–54.6
2.5	0.136	–149.9	3.652	61.4	0.146	67.6	0.351	–56.8
2.6	0.139	–155.5	3.532	59.6	0.152	67.3	0.344	–58.9
2.7	0.140	–161.2	3.431	57.7	0.159	66.9	0.338	–61.3
2.8	0.144	–165.0	3.331	55.7	0.165	66.3	0.333	–63.5
2.9	0.149	–168.5	3.228	53.7	0.173	65.5	0.328	–65.3
3.0	0.151	–174.1	3.156	51.7	0.180	65.0	0.316	–68.0
4.0	0.252	155.6	2.524	32.5	0.262	57.0	0.274	–104.8
5.0	0.425	136.8	2.066	13.1	0.349	43.8	0.301	–157.0

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

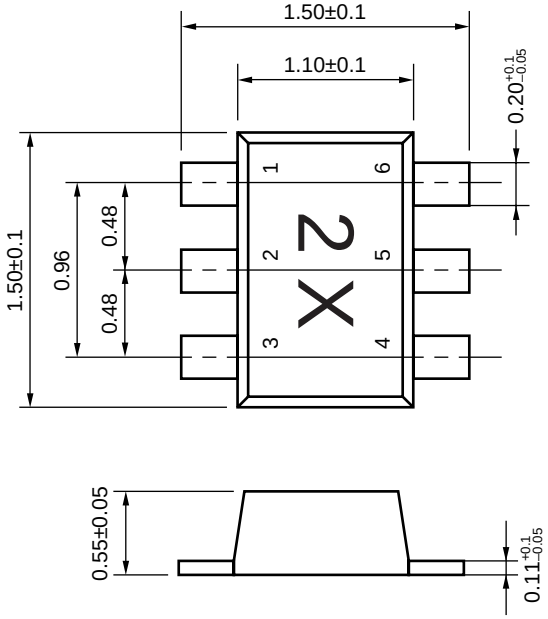
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.637	–14.3	22.693	162.3	0.010	87.0	0.933	–9.6
0.2	0.595	–27.0	20.365	149.0	0.018	78.1	0.871	–17.8
0.3	0.514	–36.2	17.944	137.1	0.024	73.7	0.794	–23.6
0.4	0.455	–44.2	15.875	127.8	0.031	72.0	0.722	–27.6
0.5	0.399	–50.3	13.992	120.1	0.036	70.9	0.662	–30.2
0.6	0.349	–55.1	12.371	113.9	0.042	70.8	0.613	–31.8
0.7	0.307	–59.6	11.051	108.7	0.047	70.9	0.571	–33.0
0.8	0.271	–63.2	9.970	104.3	0.052	70.9	0.540	–33.8
0.9	0.244	–65.7	9.087	100.1	0.057	71.1	0.515	–34.5
1.0	0.220	–68.9	8.345	96.5	0.062	71.4	0.493	–35.0
1.1	0.199	–71.8	7.711	93.5	0.068	71.5	0.475	–35.6
1.2	0.180	–75.1	7.136	90.5	0.073	71.7	0.458	–36.2
1.3	0.164	–79.2	6.672	87.9	0.078	71.3	0.443	–37.0
1.4	0.150	–81.5	6.231	85.1	0.084	71.5	0.430	–37.9
1.5	0.137	–86.8	5.904	82.6	0.090	71.3	0.417	–38.9
1.6	0.126	–92.3	5.565	79.9	0.096	71.2	0.406	–40.0
1.7	0.117	–96.6	5.297	77.8	0.101	70.9	0.395	–41.3
1.8	0.107	–103.4	5.018	75.5	0.107	70.6	0.385	–42.5
1.9	0.104	–109.3	4.790	73.5	0.113	70.2	0.375	–44.0
2.0	0.099	–117.7	4.598	71.3	0.120	70.1	0.366	–45.4
2.1	0.097	–123.9	4.418	69.0	0.126	69.9	0.356	–47.2
2.2	0.097	–131.2	4.240	67.1	0.132	69.4	0.347	–49.0
2.3	0.097	–137.4	4.080	65.2	0.139	68.7	0.340	–50.7
2.4	0.100	–144.2	3.939	63.0	0.145	68.1	0.331	–52.6
2.5	0.099	–150.7	3.810	61.1	0.152	67.6	0.323	–54.6
2.6	0.106	–157.4	3.684	59.5	0.158	67.0	0.316	–56.8
2.7	0.108	–162.6	3.574	57.7	0.165	66.4	0.309	–59.2
2.8	0.113	–166.6	3.471	55.8	0.172	65.7	0.304	–61.4
2.9	0.119	–171.6	3.360	53.8	0.179	64.8	0.299	–63.2
3.0	0.122	–177.2	3.278	52.0	0.187	64.1	0.287	–65.9
4.0	0.228	154.4	2.624	33.7	0.266	55.3	0.241	–103.8
5.0	0.401	136.5	2.154	15.0	0.347	42.3	0.264	–158.9

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

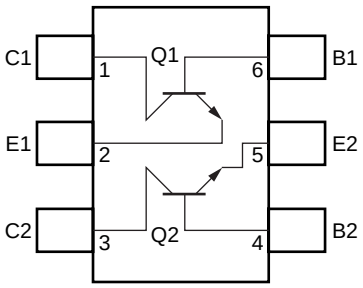
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.454	–16.4	31.502	157.4	0.009	86.0	0.886	–12.2
0.2	0.407	–29.2	26.713	141.0	0.016	80.5	0.793	–21.4
0.3	0.338	–38.0	22.219	128.4	0.022	76.8	0.697	–26.6
0.4	0.290	–42.9	18.784	119.4	0.028	76.7	0.621	–29.4
0.5	0.246	–47.1	16.067	112.4	0.034	76.1	0.566	–30.7
0.6	0.216	–49.0	13.920	106.8	0.040	76.4	0.524	–31.3
0.7	0.190	–50.7	12.220	102.4	0.046	76.1	0.492	–31.5
0.8	0.169	–52.7	10.912	98.6	0.052	76.3	0.468	–31.7
0.9	0.152	–52.9	9.855	95.0	0.058	76.1	0.449	–31.9
1.0	0.137	–54.4	8.992	92.1	0.064	76.1	0.433	–32.1
1.1	0.123	–56.5	8.262	89.4	0.069	75.8	0.419	–32.6
1.2	0.112	–58.6	7.625	86.9	0.076	75.5	0.406	–33.1
1.3	0.103	–60.3	7.094	84.6	0.082	75.0	0.395	–33.9
1.4	0.092	–62.2	6.620	82.2	0.088	74.5	0.384	–34.7
1.5	0.083	–65.3	6.255	80.1	0.094	74.0	0.374	–35.7
1.6	0.074	–71.9	5.888	77.6	0.101	73.5	0.363	–36.8
1.7	0.066	–77.6	5.587	75.7	0.108	72.9	0.354	–38.2
1.8	0.059	–86.7	5.288	73.7	0.114	72.2	0.345	–39.5
1.9	0.055	–95.2	5.043	71.9	0.120	71.5	0.335	–41.0
2.0	0.049	–109.1	4.828	69.9	0.127	71.1	0.326	–42.5
2.1	0.048	–118.1	4.639	67.9	0.134	70.5	0.317	–44.3
2.2	0.052	–128.5	4.455	66.2	0.140	69.9	0.309	–46.1
2.3	0.055	–138.1	4.281	64.4	0.147	69.0	0.301	–47.8
2.4	0.059	–148.5	4.128	62.4	0.154	68.1	0.292	–49.9
2.5	0.060	–156.9	3.987	60.7	0.161	67.3	0.283	–51.9
2.6	0.068	–163.3	3.854	59.0	0.168	66.6	0.277	–54.0
2.7	0.072	–171.6	3.738	57.5	0.175	65.7	0.269	–56.5
2.8	0.078	–176.6	3.623	55.7	0.181	64.8	0.264	–58.7
2.9	0.085	178.9	3.512	53.9	0.189	63.7	0.259	–60.4
3.0	0.090	173.0	3.425	52.0	0.197	63.0	0.248	–63.2
4.0	0.200	149.6	2.726	35.0	0.272	52.9	0.192	–104.2
5.0	0.370	134.2	2.240	17.8	0.346	40.0	0.217	–165.2

PACKAGE DIMENSIONS

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



(Top View)



PIN CONNECTIONS

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

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►**Technical issue**

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