DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR

μPA860TD

NPN SILICON RF TRANSISTOR (WITH 2 DIFFERENT ELEMENTS) IN A 6-PIN LEAD-LESS 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., $|S_{21e}|^2$ = 13.0 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, $Z_S = Z_{opt}$
- 6-pin lead-less 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
μPA860TD	50 pcs (Non reel)	• 8 mm wide embossed taping
μPA860TD-T3	10 kpcs/reel	• Pin 1 (Q1 Collector), Pin 6 (Q1 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
		210 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	11.0	13.0	–	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%

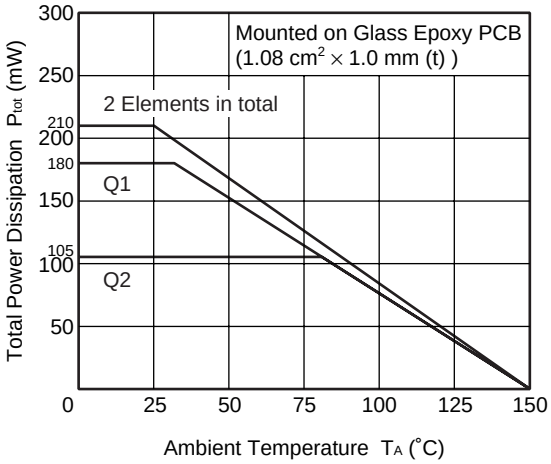
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

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

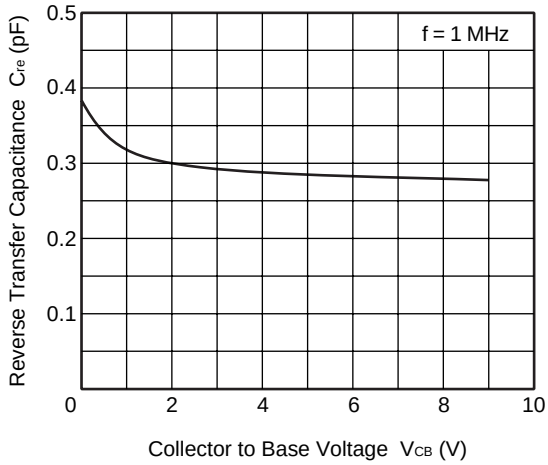
TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



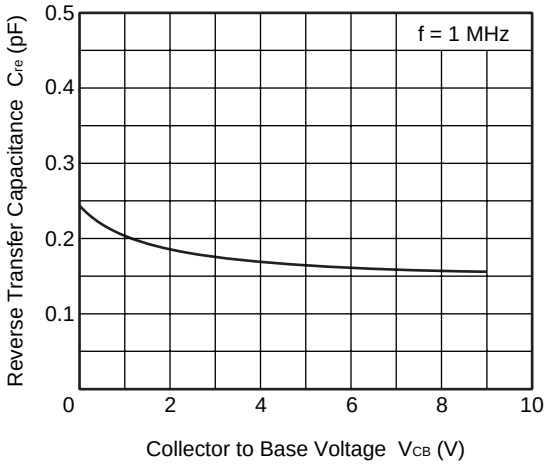
Q1

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



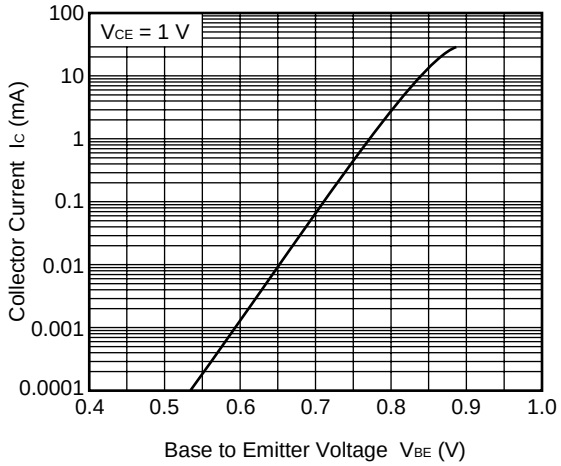
Q2

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



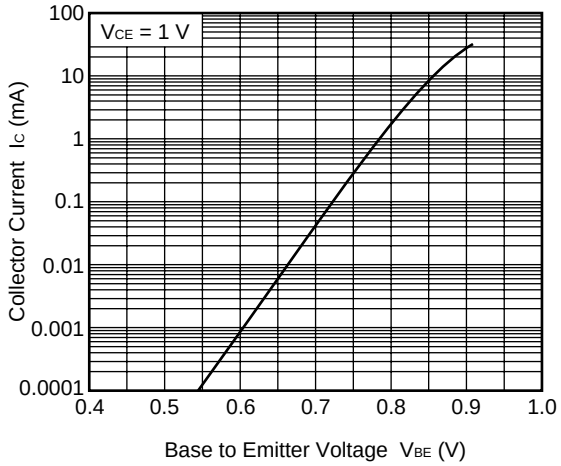
Q1

COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

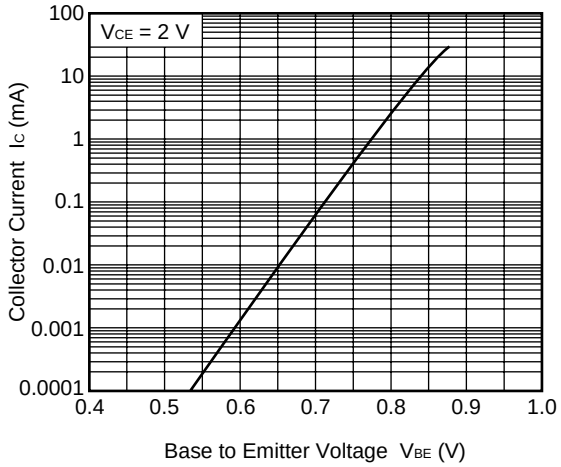


Q2

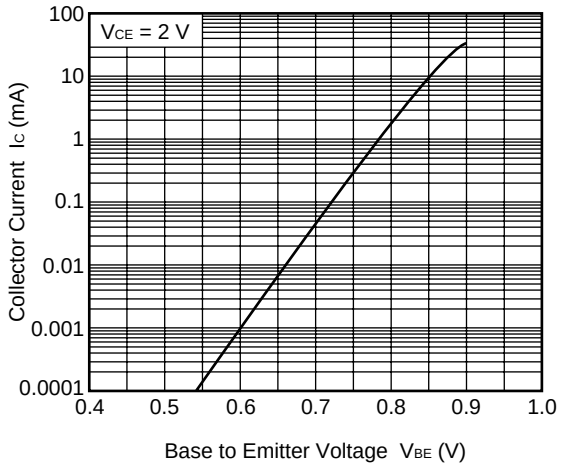
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



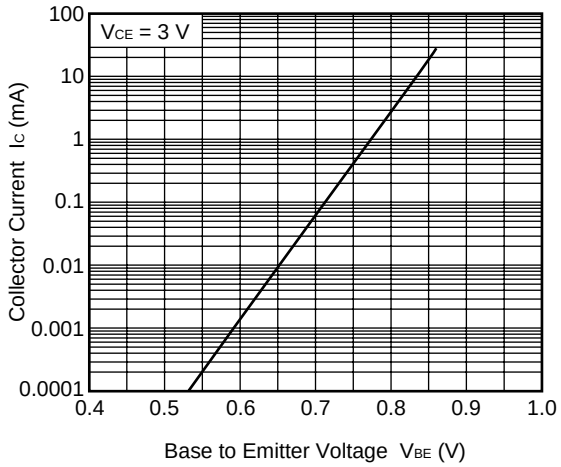
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

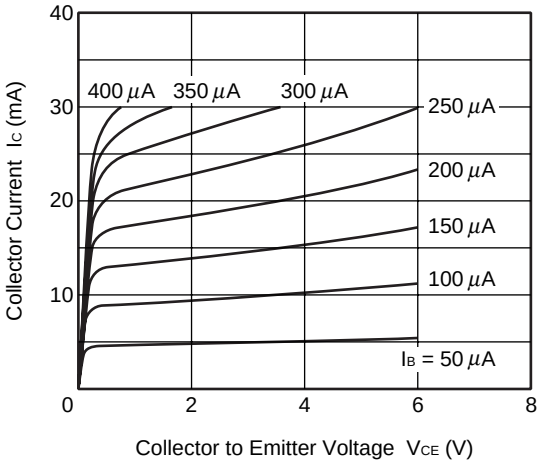


COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



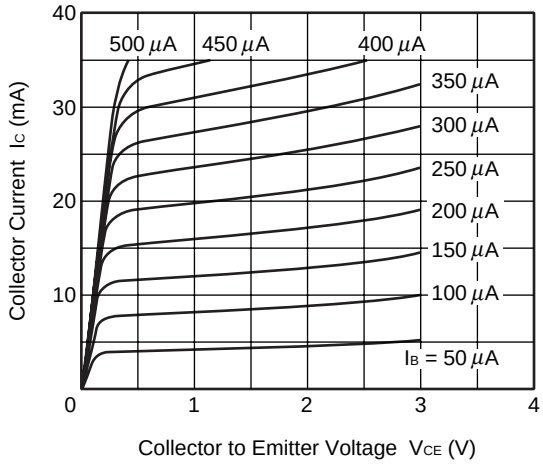
Q1

COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



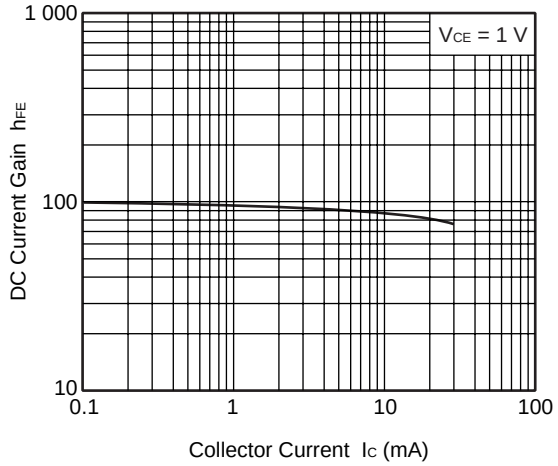
Q2

COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



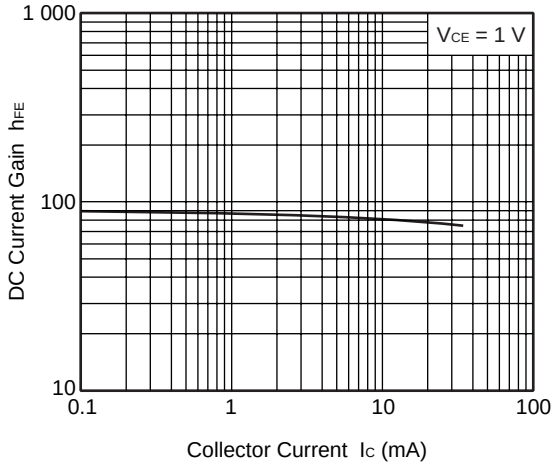
Q1

DC CURRENT GAIN vs.
COLLECTOR CURRENT

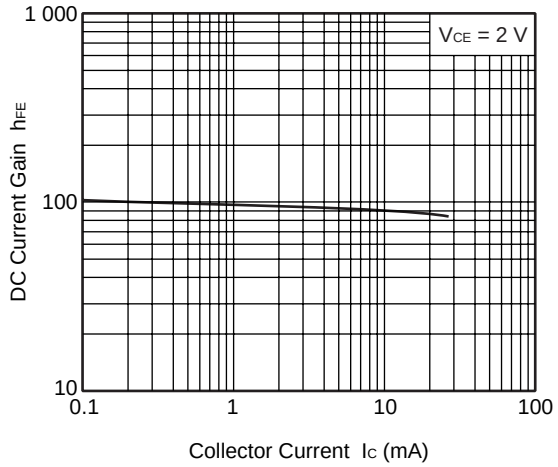


Q2

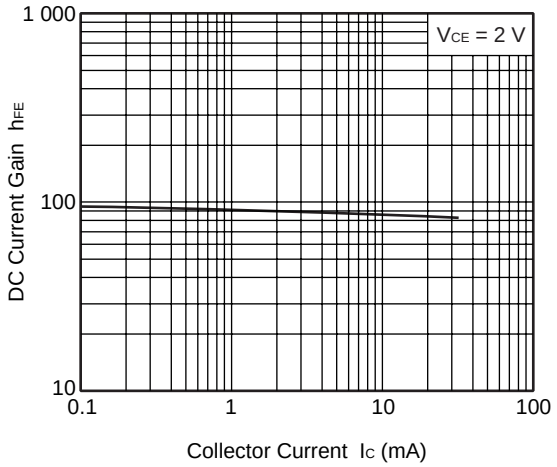
DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT



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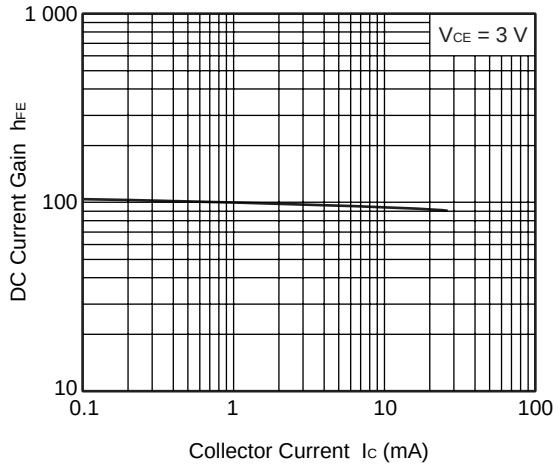
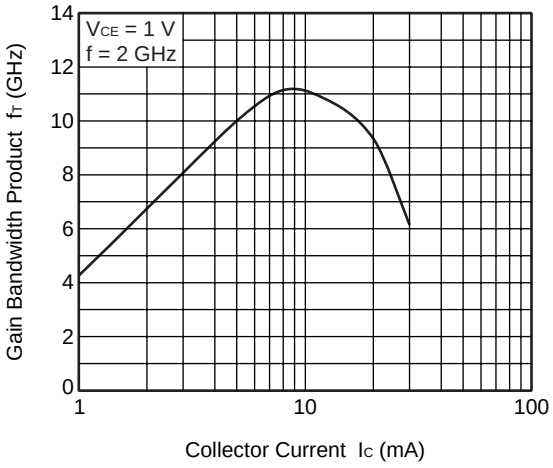


Q1

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



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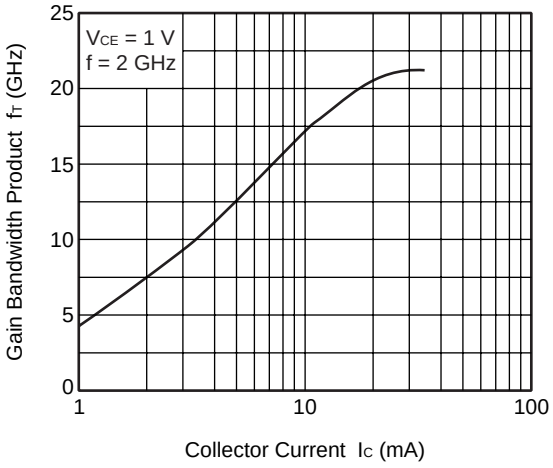
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



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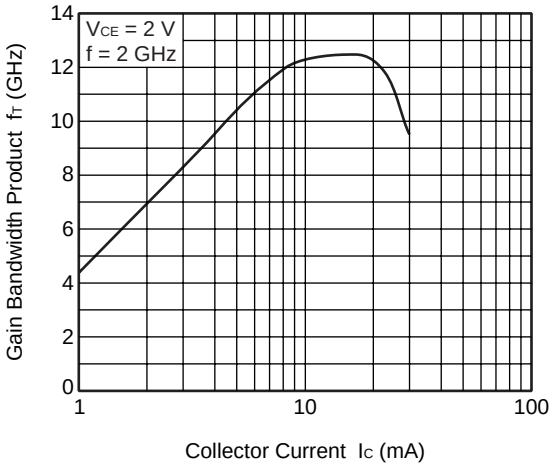

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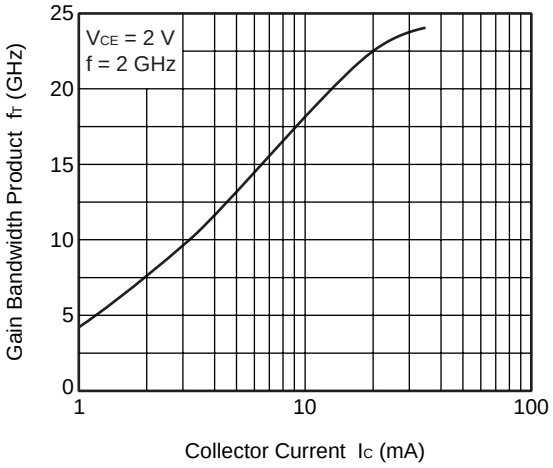

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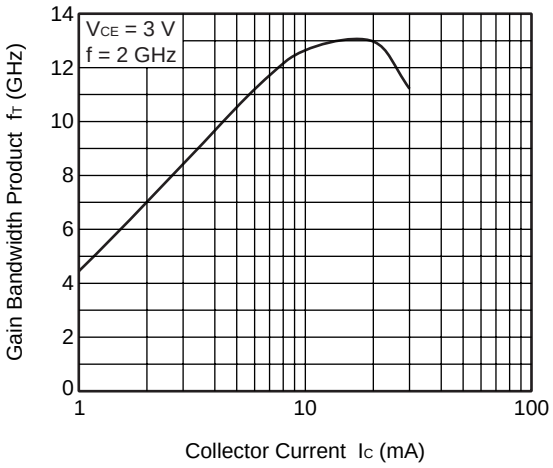
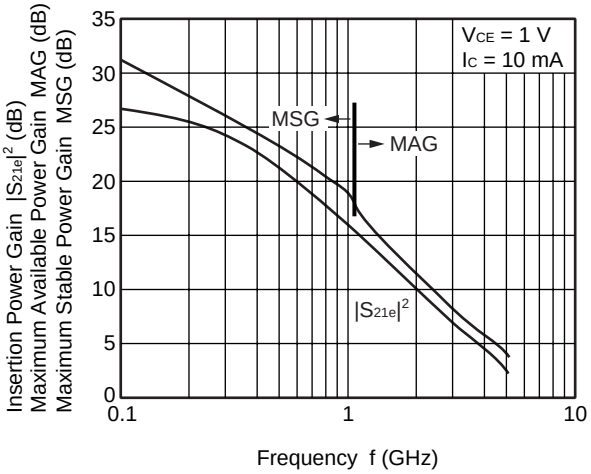


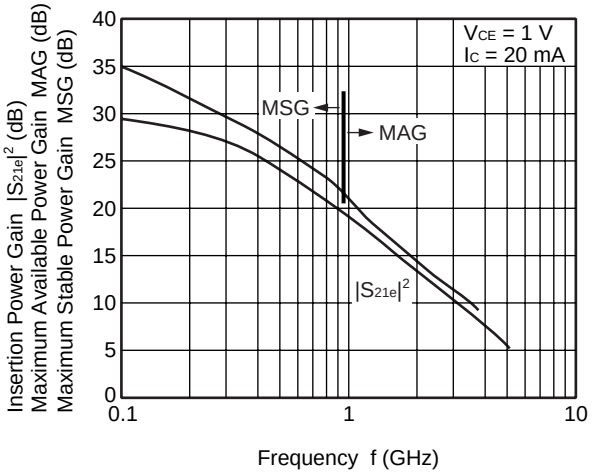
Q1

INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



Q2

INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



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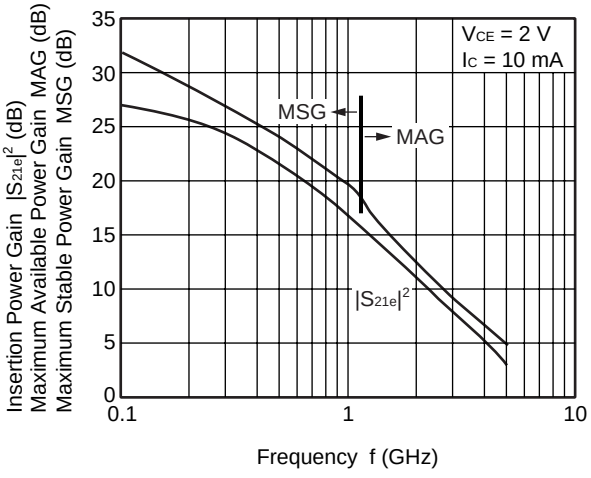

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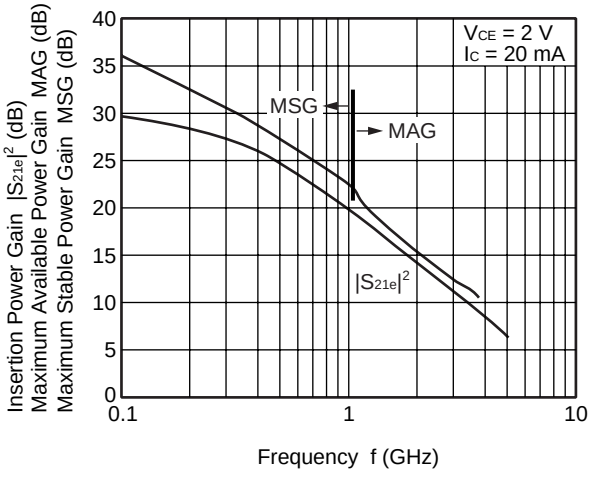

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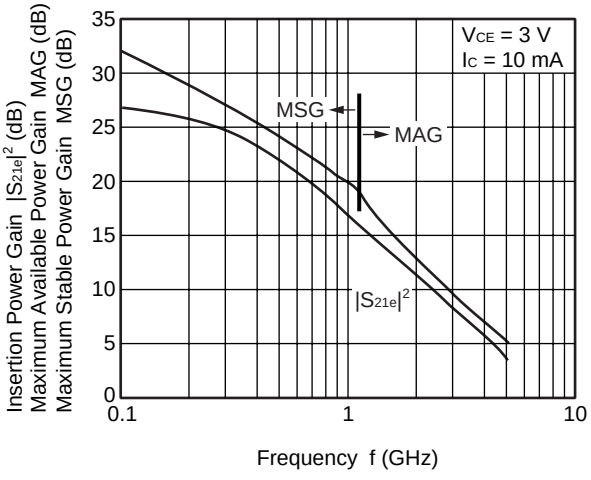

Q1

INSERTION POWER GAIN, MAG, MSG
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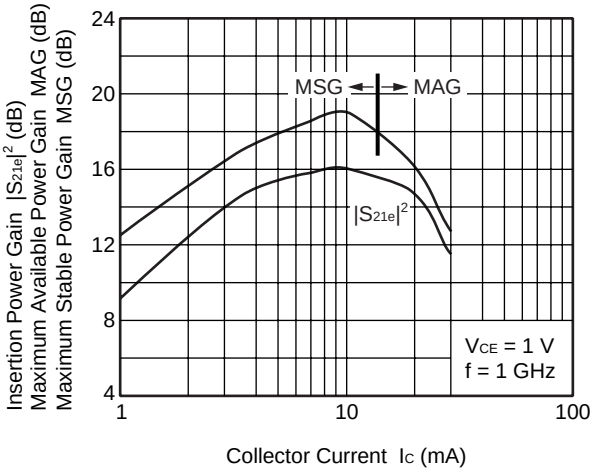
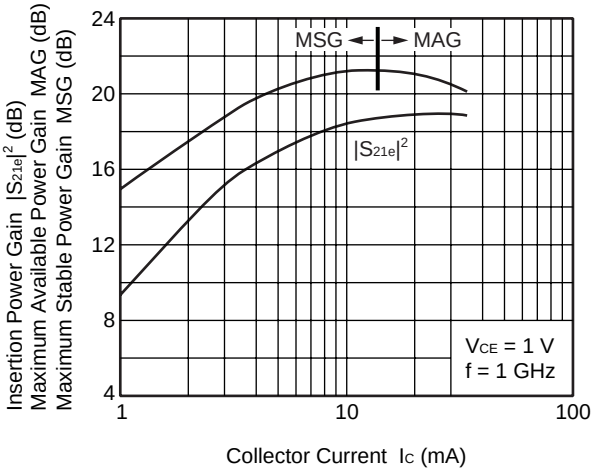


Q2

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



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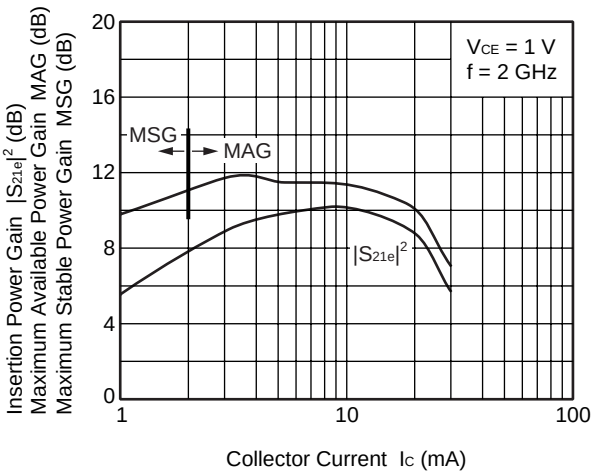

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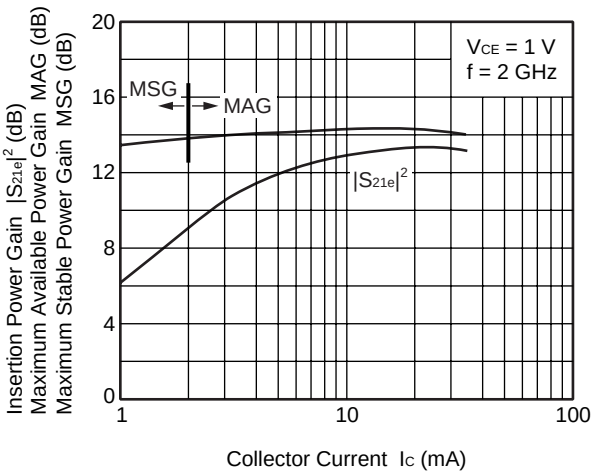

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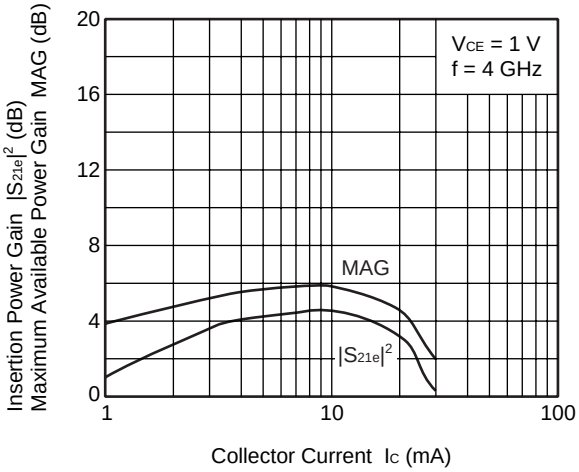

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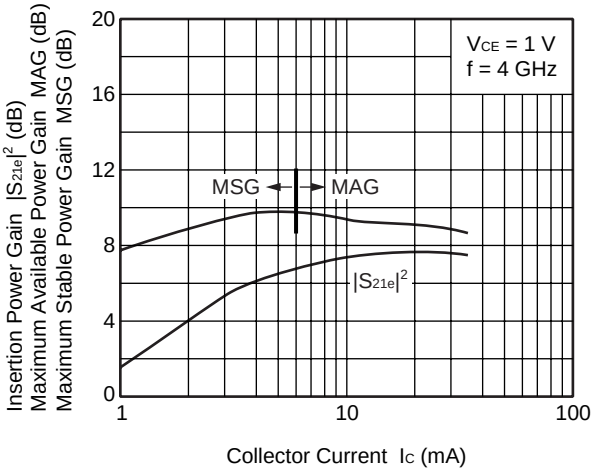

Q1

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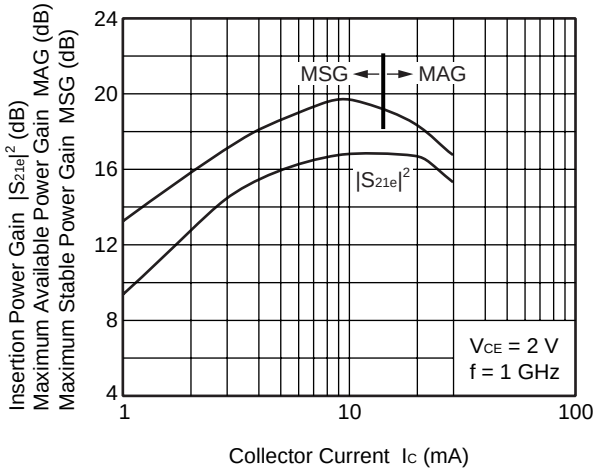
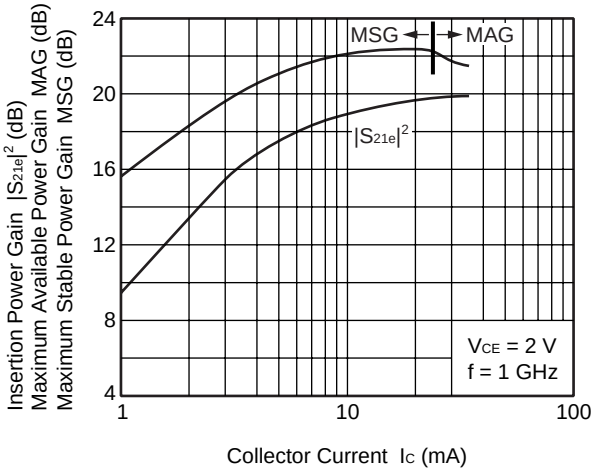


Q2

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



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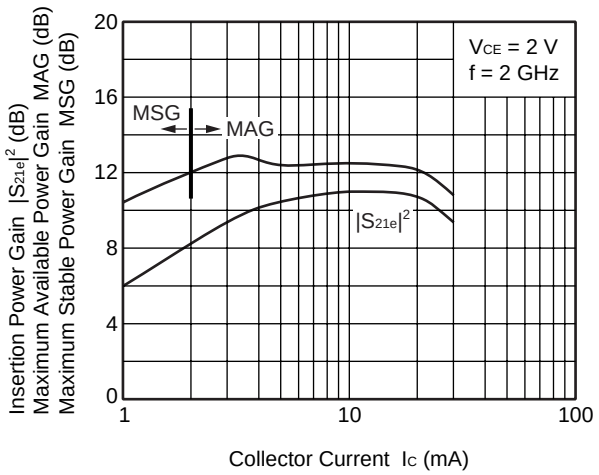
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
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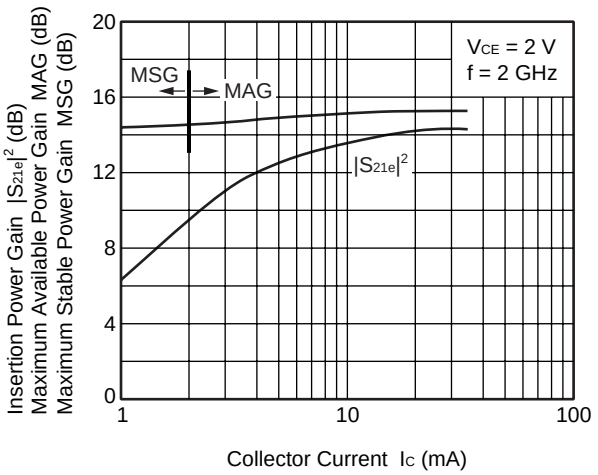

INSERTION POWER GAIN, MAG
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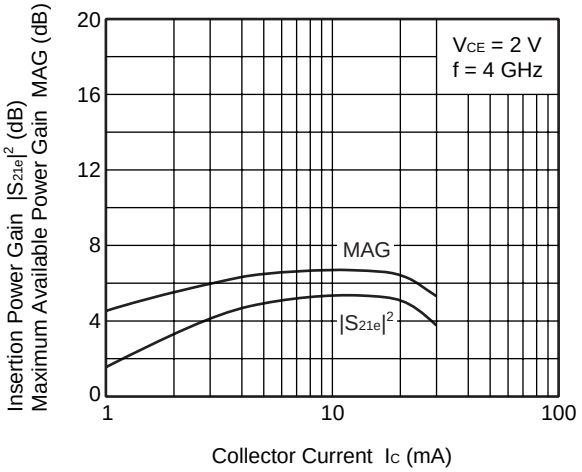

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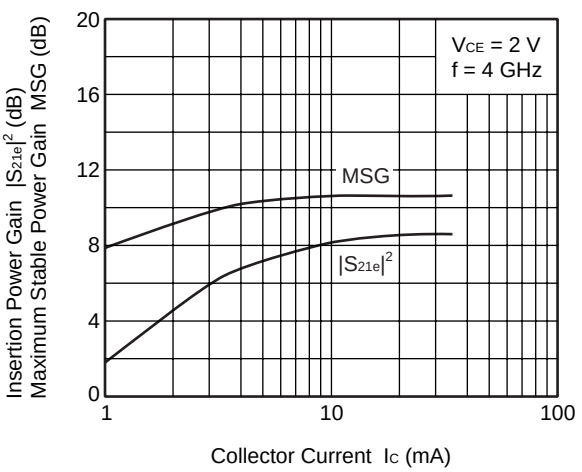

Q1

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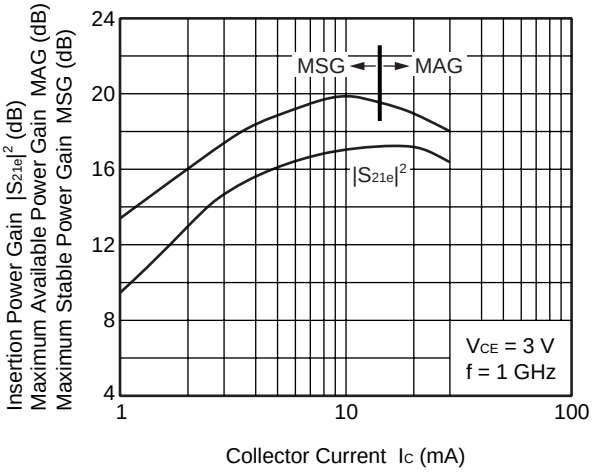

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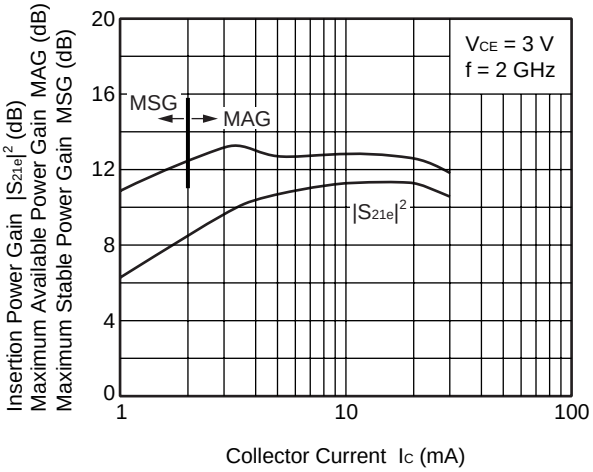
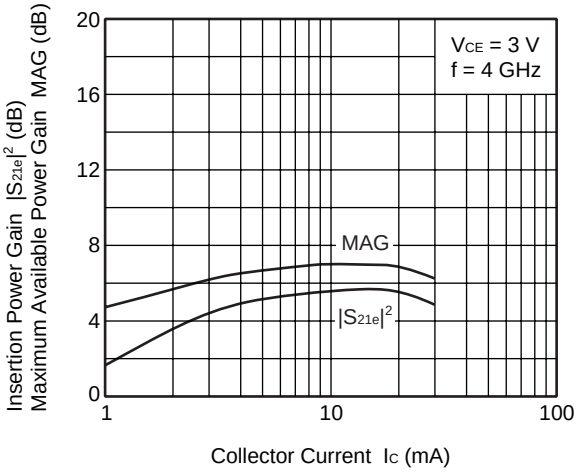
vs. COLLECTOR CURRENT

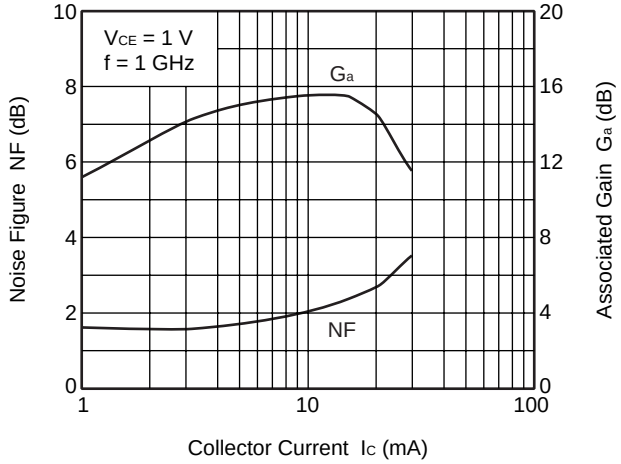


INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



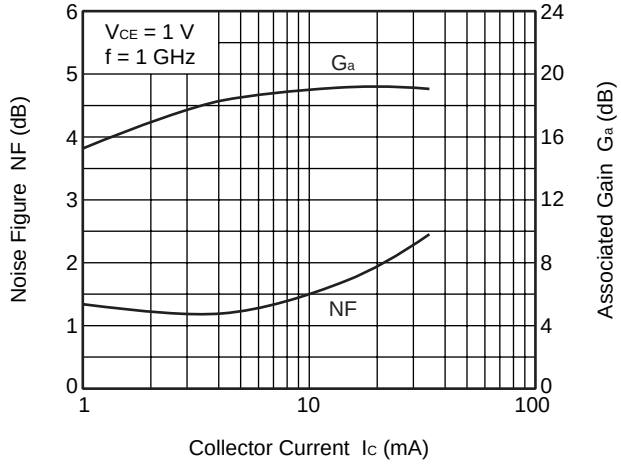
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

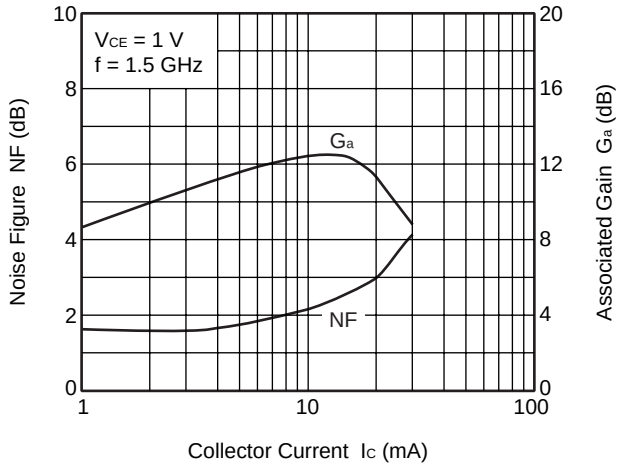


Q2

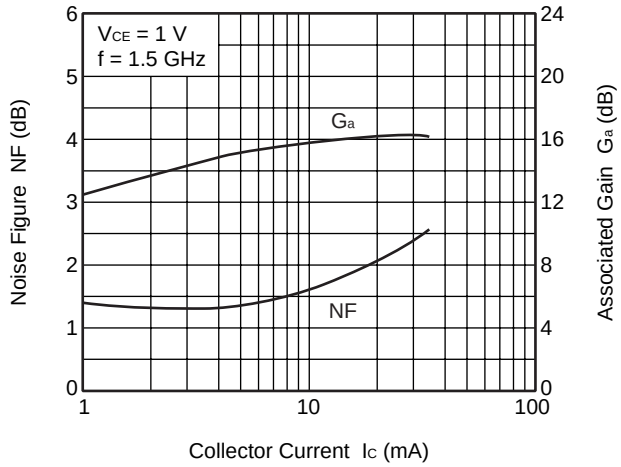
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



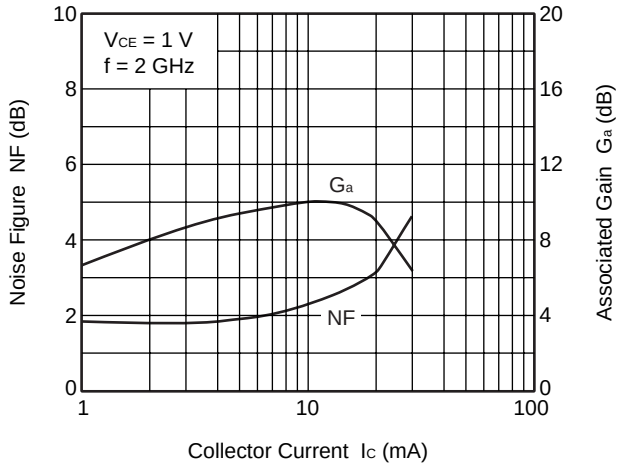
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



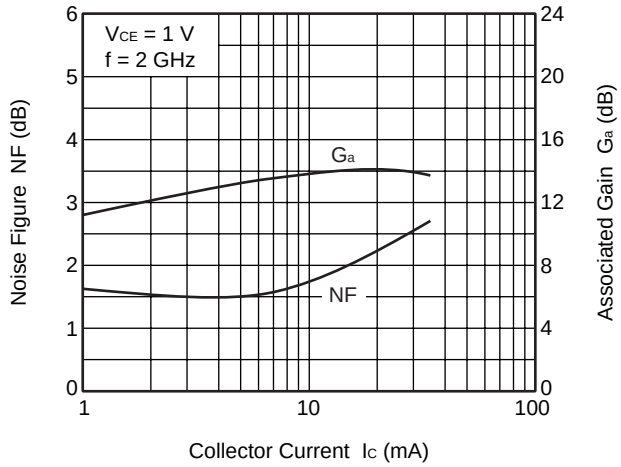
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

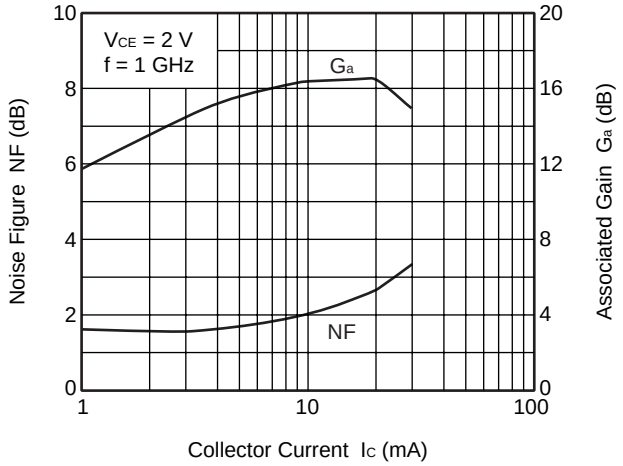


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



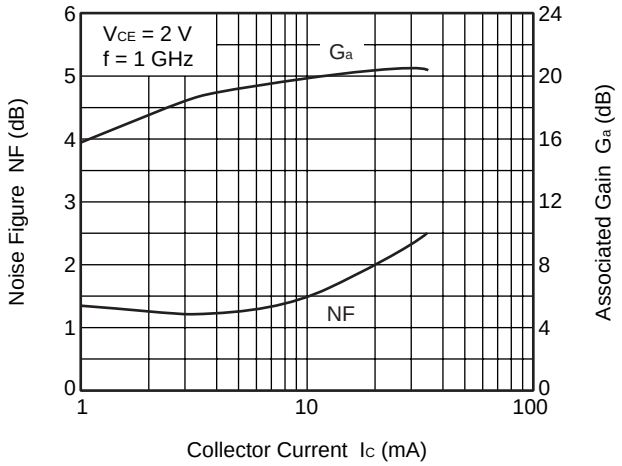
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

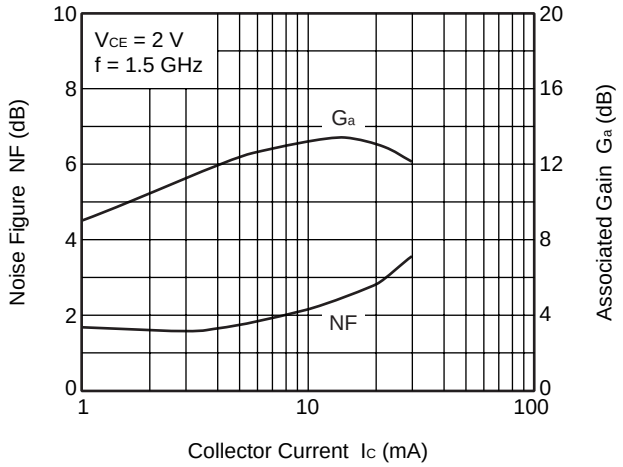


Q2

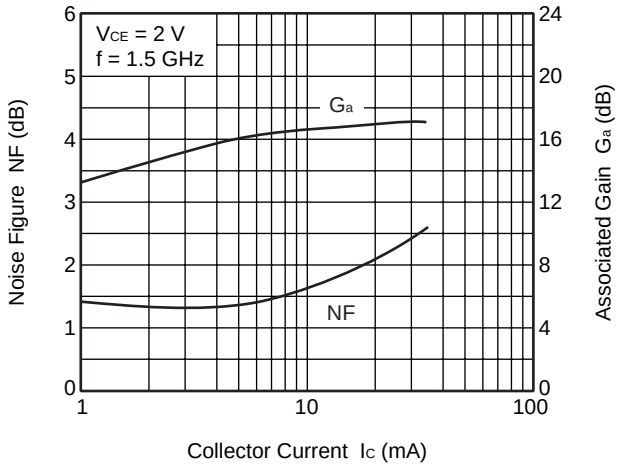
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



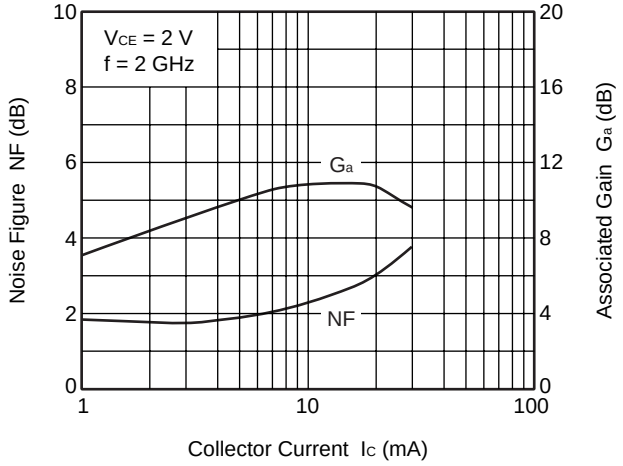
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



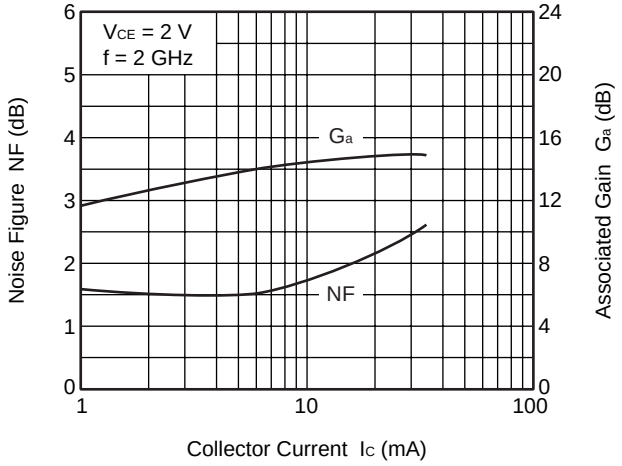
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

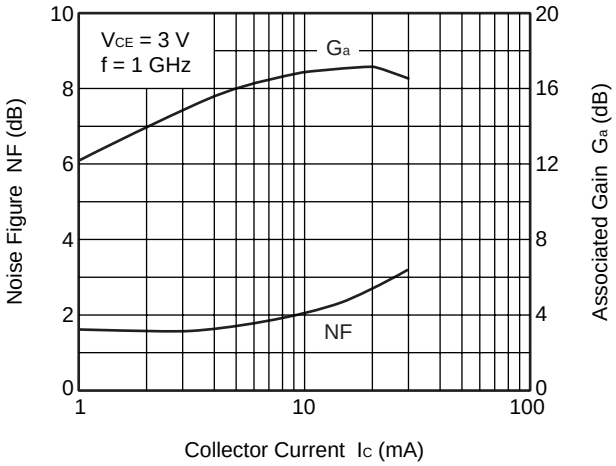


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

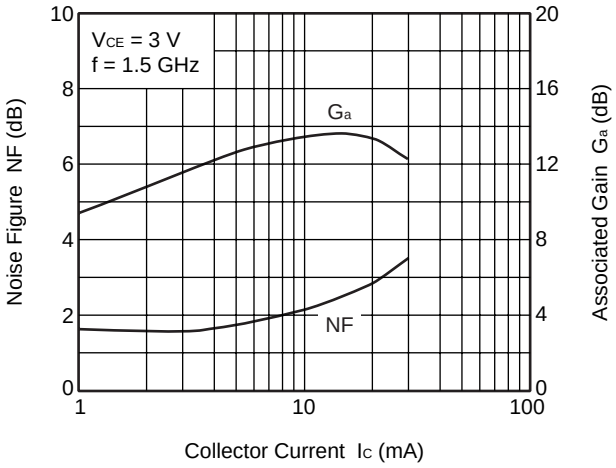


Q1

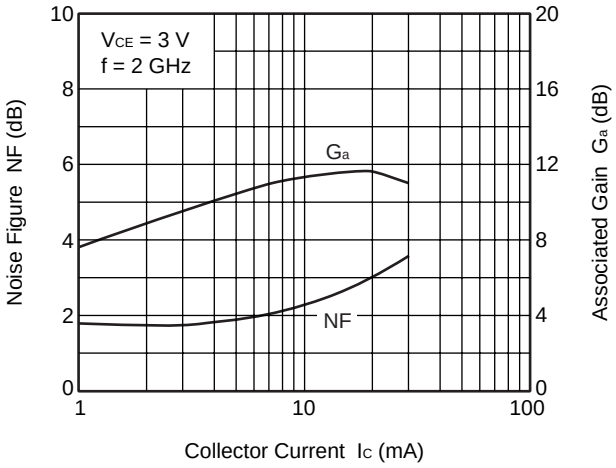
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



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	0.952	–7.1	3.547	172.9	0.020	86.6	0.992	–3.7
0.2	0.943	–14.4	3.539	167.2	0.040	80.9	0.989	–7.3
0.3	0.931	–21.5	3.494	161.1	0.060	76.6	0.971	–10.6
0.4	0.905	–28.3	3.407	154.8	0.079	72.0	0.951	–14.3
0.5	0.880	–35.8	3.352	148.4	0.096	67.8	0.929	–17.9
0.6	0.845	–43.0	3.274	142.1	0.112	63.4	0.900	–21.6
0.7	0.809	–50.3	3.172	136.6	0.127	59.1	0.870	–25.0
0.8	0.770	–57.2	3.067	130.7	0.140	55.3	0.837	–28.4
0.9	0.731	–64.5	2.965	125.0	0.152	51.5	0.807	–31.9
1.0	0.692	–71.4	2.864	119.5	0.161	48.1	0.775	–34.9
1.1	0.658	–78.5	2.756	114.6	0.169	44.8	0.746	–37.8
1.2	0.626	–85.5	2.640	110.0	0.177	42.1	0.717	–40.4
1.3	0.596	–92.3	2.536	105.5	0.182	39.4	0.693	–42.8
1.4	0.571	–98.7	2.420	101.1	0.186	36.9	0.669	–45.3
1.5	0.549	–104.8	2.325	96.9	0.190	34.8	0.648	–47.3
1.6	0.530	–110.8	2.237	93.2	0.193	32.8	0.628	–49.2
1.7	0.513	–116.9	2.141	89.7	0.195	31.1	0.609	–50.9
1.8	0.498	–122.2	2.059	86.1	0.196	29.5	0.592	–52.3
1.9	0.487	–127.6	1.976	83.4	0.197	28.2	0.577	–53.6
2.0	0.472	–132.0	1.907	80.2	0.198	27.0	0.562	–54.7
2.1	0.468	–137.5	1.844	77.5	0.198	26.1	0.552	–56.3
2.2	0.456	–141.5	1.769	74.8	0.198	25.3	0.538	–57.2
2.3	0.455	–147.0	1.721	72.3	0.199	24.5	0.533	–58.3
2.4	0.447	–150.7	1.663	69.8	0.200	23.9	0.518	–59.2
2.5	0.445	–155.3	1.611	67.5	0.200	23.5	0.512	–60.4
2.6	0.437	–158.8	1.570	65.5	0.200	22.7	0.505	–62.0
2.7	0.437	–162.3	1.517	63.2	0.200	22.3	0.499	–62.7
2.8	0.433	–166.1	1.469	61.3	0.199	22.1	0.491	–64.2
2.9	0.426	–169.4	1.409	58.1	0.200	21.3	0.472	–65.2
3.0	0.419	–173.8	1.381	55.7	0.200	21.3	0.465	–68.0
4.0	0.436	149.3	1.136	34.9	0.208	23.7	0.424	–88.2
5.0	0.503	118.2	0.905	16.8	0.232	24.5	0.397	–112.6

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	0.853	–13.4	9.491	169.0	0.019	83.5	0.980	–7.6
0.2	0.839	–25.7	9.175	158.6	0.038	75.3	0.952	–14.8
0.3	0.791	–37.4	8.690	149.4	0.054	69.5	0.897	–21.0
0.4	0.735	–48.4	8.100	140.7	0.068	64.1	0.841	–27.0
0.5	0.673	–59.7	7.538	132.5	0.080	59.6	0.778	–32.1
0.6	0.617	–69.9	6.973	125.3	0.089	55.5	0.717	–36.6
0.7	0.565	–79.4	6.435	119.2	0.097	52.3	0.660	–40.3
0.8	0.516	–88.6	5.919	113.5	0.103	49.9	0.608	–43.7
0.9	0.475	–97.9	5.470	108.4	0.109	47.9	0.564	–46.8
1.0	0.440	–106.4	5.081	103.7	0.113	46.2	0.525	–49.7
1.1	0.417	–114.8	4.728	99.6	0.118	44.9	0.493	–52.1
1.2	0.397	–122.6	4.398	95.9	0.122	44.2	0.463	–54.3
1.3	0.384	–130.3	4.113	92.2	0.125	43.4	0.441	–56.2
1.4	0.371	–137.5	3.859	89.0	0.129	42.8	0.421	–58.2
1.5	0.364	–143.4	3.637	85.8	0.132	42.3	0.404	–59.7
1.6	0.357	–149.6	3.441	83.0	0.135	42.1	0.389	–61.0
1.7	0.355	–155.0	3.252	80.4	0.138	41.9	0.375	–62.3
1.8	0.352	–159.9	3.090	77.7	0.141	41.8	0.362	–63.2
1.9	0.352	–164.5	2.940	75.6	0.145	41.9	0.353	–64.2
2.0	0.345	–168.5	2.810	73.2	0.148	41.7	0.340	–64.8
2.1	0.355	–172.8	2.697	71.1	0.151	41.8	0.334	–66.0
2.2	0.349	–176.2	2.578	69.3	0.154	41.9	0.321	–66.3
2.3	0.360	179.9	2.488	67.3	0.158	41.9	0.317	–67.1
2.4	0.357	177.4	2.396	65.4	0.162	41.9	0.304	–68.2
2.5	0.362	174.0	2.305	63.6	0.166	42.0	0.300	–69.1
2.6	0.359	171.4	2.235	62.4	0.169	42.0	0.294	–70.9
2.7	0.367	169.1	2.155	60.6	0.173	42.0	0.287	–70.9
2.8	0.366	165.8	2.079	59.2	0.177	41.8	0.282	–73.1
2.9	0.359	164.2	1.983	56.7	0.181	41.2	0.267	–74.4
3.0	0.358	159.3	1.937	54.8	0.185	41.3	0.267	–77.6
4.0	0.403	131.3	1.524	36.4	0.230	39.4	0.251	–102.6
5.0	0.486	107.7	1.201	21.1	0.275	32.1	0.242	–133.9

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	0.783	–18.8	14.076	165.6	0.018	80.3	0.964	–10.8
0.2	0.747	–34.7	13.183	152.2	0.036	72.3	0.907	–20.3
0.3	0.673	–49.8	12.003	141.1	0.049	65.6	0.823	–27.8
0.4	0.607	–62.9	10.741	131.5	0.060	61.0	0.742	–34.4
0.5	0.537	–76.1	9.603	123.1	0.068	57.1	0.663	–39.4
0.6	0.481	–87.4	8.612	116.2	0.075	54.3	0.594	–43.5
0.7	0.437	–98.0	7.754	110.7	0.081	52.7	0.535	–46.7
0.8	0.398	–108.0	6.998	105.4	0.086	51.5	0.486	–49.5
0.9	0.372	–118.1	6.348	100.9	0.091	50.6	0.444	–52.1
1.0	0.351	–127.1	5.824	96.9	0.095	50.1	0.410	–54.6
1.1	0.338	–135.6	5.367	93.4	0.100	49.8	0.383	–56.7
1.2	0.332	–143.4	4.940	90.4	0.104	49.8	0.359	–58.8
1.3	0.326	–151.0	4.598	87.4	0.109	49.7	0.342	–60.4
1.4	0.325	–156.9	4.286	84.5	0.113	49.6	0.326	–62.2
1.5	0.322	–162.3	4.028	81.7	0.117	49.5	0.313	–63.7
1.6	0.324	–167.9	3.798	79.3	0.122	49.6	0.303	–64.9
1.7	0.327	–172.4	3.582	77.0	0.126	49.6	0.291	–66.2
1.8	0.326	–176.7	3.393	74.6	0.131	49.6	0.282	–67.0
1.9	0.330	179.2	3.224	72.8	0.135	49.6	0.275	–68.1
2.0	0.326	176.0	3.078	70.5	0.140	49.6	0.264	–68.5
2.1	0.338	172.5	2.946	68.7	0.144	49.6	0.260	–69.7
2.2	0.336	170.4	2.817	67.1	0.148	49.7	0.248	–70.0
2.3	0.347	167.5	2.713	65.3	0.153	49.5	0.245	–70.8
2.4	0.345	165.2	2.609	63.6	0.159	49.4	0.234	–72.1
2.5	0.352	162.6	2.509	62.1	0.163	49.3	0.231	–72.9
2.6	0.351	160.3	2.432	60.8	0.168	49.3	0.224	–75.0
2.7	0.358	158.5	2.340	59.2	0.173	49.0	0.219	–74.9
2.8	0.359	155.9	2.260	57.8	0.178	48.6	0.215	–77.6
2.9	0.352	154.4	2.158	55.6	0.183	47.8	0.202	–79.5
3.0	0.353	150.0	2.104	53.8	0.188	47.8	0.205	–83.1
4.0	0.402	125.3	1.631	36.5	0.239	43.3	0.203	–111.7
5.0	0.486	104.8	1.283	22.1	0.288	33.9	0.212	–147.2

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	0.731	–22.4	17.662	162.6	0.018	78.1	0.946	–13.2
0.2	0.666	–42.3	16.079	147.1	0.033	70.1	0.866	–24.3
0.3	0.585	–59.7	14.117	135.1	0.045	63.9	0.761	–32.4
0.4	0.515	–74.0	12.267	125.3	0.054	59.6	0.666	–38.8
0.5	0.451	–88.1	10.693	117.2	0.061	57.0	0.584	–43.3
0.6	0.402	–100.5	9.403	110.6	0.067	55.3	0.515	–46.9
0.7	0.369	–111.7	8.357	105.7	0.072	54.5	0.460	–49.5
0.8	0.341	–122.4	7.466	100.9	0.077	54.0	0.414	–52.0
0.9	0.326	–132.1	6.722	96.9	0.082	53.8	0.378	–54.2
1.0	0.313	–141.7	6.135	93.3	0.087	54.0	0.348	–56.6
1.1	0.309	–149.3	5.624	90.1	0.092	53.9	0.325	–58.5
1.2	0.309	–156.8	5.163	87.3	0.097	54.2	0.304	–60.5
1.3	0.309	–163.3	4.802	84.6	0.102	54.2	0.290	–62.1
1.4	0.311	–168.8	4.464	82.0	0.107	54.2	0.278	–63.8
1.5	0.312	–173.7	4.191	79.4	0.112	54.3	0.267	–65.3
1.6	0.316	–178.2	3.945	77.1	0.117	54.2	0.259	–66.6
1.7	0.320	178.1	3.712	75.0	0.122	54.2	0.249	–67.9
1.8	0.320	174.4	3.516	72.8	0.127	54.2	0.241	–68.7
1.9	0.327	170.6	3.333	71.1	0.132	54.1	0.236	–69.8
2.0	0.324	168.0	3.181	69.1	0.137	53.9	0.227	–70.2
2.1	0.338	165.7	3.047	67.3	0.142	53.9	0.224	–71.4
2.2	0.334	162.9	2.914	65.8	0.147	53.8	0.212	–71.5
2.3	0.348	160.7	2.803	64.2	0.153	53.6	0.210	–72.5
2.4	0.345	159.0	2.694	62.5	0.158	53.3	0.199	–73.9
2.5	0.353	156.7	2.591	61.0	0.163	53.0	0.197	–74.8
2.6	0.353	154.3	2.509	59.9	0.169	52.8	0.192	–77.4
2.7	0.359	153.2	2.414	58.3	0.174	52.4	0.186	–77.2
2.8	0.361	150.8	2.330	57.2	0.179	51.8	0.183	–80.3
2.9	0.354	149.1	2.223	55.0	0.185	50.9	0.171	–82.7
3.0	0.355	145.1	2.167	53.2	0.191	50.7	0.175	–86.6
4.0	0.404	122.9	1.674	36.3	0.244	45.0	0.183	–117.4
5.0	0.490	103.1	1.316	22.5	0.294	34.8	0.204	–154.4

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	0.648	–29.0	21.750	159.0	0.017	76.3	0.924	–16.1
0.2	0.574	–52.1	18.960	141.4	0.030	67.2	0.810	–28.7
0.3	0.489	–71.7	15.944	128.7	0.040	62.5	0.686	–36.9
0.4	0.426	–88.0	13.412	119.2	0.048	59.7	0.584	–42.6
0.5	0.373	–103.3	11.427	111.5	0.054	58.2	0.504	–46.3
0.6	0.340	–116.3	9.904	105.5	0.060	57.8	0.440	–49.0
0.7	0.319	–127.6	8.699	101.1	0.065	57.4	0.391	–51.0
0.8	0.302	–138.3	7.716	96.8	0.071	57.6	0.351	–52.9
0.9	0.297	–147.7	6.924	93.2	0.076	57.8	0.320	–54.9
1.0	0.294	–156.2	6.289	90.0	0.081	58.1	0.294	–57.0
1.1	0.298	–163.2	5.752	87.1	0.086	58.3	0.275	–58.8
1.2	0.302	–168.7	5.272	84.8	0.092	58.6	0.258	–60.8
1.3	0.306	–175.1	4.878	82.1	0.097	58.6	0.247	–62.4
1.4	0.310	–179.3	4.535	79.7	0.103	58.6	0.238	–64.3
1.5	0.313	176.2	4.245	77.4	0.109	58.5	0.229	–65.8
1.6	0.320	172.7	4.002	75.3	0.114	58.4	0.223	–67.1
1.7	0.324	169.6	3.760	73.3	0.120	58.4	0.215	–68.4
1.8	0.327	166.6	3.562	71.2	0.125	58.1	0.209	–69.4
1.9	0.333	163.7	3.377	69.6	0.131	57.9	0.205	–70.6
2.0	0.332	161.1	3.223	67.6	0.136	57.7	0.197	–70.8
2.1	0.343	158.8	3.086	66.0	0.142	57.4	0.195	–72.2
2.2	0.340	156.9	2.947	64.5	0.147	57.1	0.184	–72.3
2.3	0.356	155.6	2.839	62.9	0.153	56.8	0.183	–73.4
2.4	0.353	153.7	2.728	61.4	0.159	56.3	0.173	–75.0
2.5	0.360	151.8	2.621	60.0	0.164	56.0	0.172	–76.1
2.6	0.360	149.9	2.540	58.9	0.170	55.6	0.166	–79.0
2.7	0.367	148.7	2.445	57.5	0.175	55.0	0.161	–79.1
2.8	0.368	146.5	2.360	56.3	0.181	54.3	0.159	–82.4
2.9	0.360	145.3	2.250	54.3	0.187	53.3	0.149	–85.4
3.0	0.361	141.2	2.191	52.6	0.193	53.0	0.154	–89.3
4.0	0.411	120.5	1.687	35.9	0.248	46.5	0.169	–122.4
5.0	0.496	101.9	1.322	22.3	0.298	35.7	0.200	–159.8

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	0.465	–48.9	26.851	149.0	0.016	74.9	0.815	–23.4
0.2	0.402	–84.3	20.632	128.1	0.026	63.2	0.639	–37.0
0.3	0.351	–109.5	15.878	115.8	0.033	60.8	0.504	–42.6
0.4	0.330	–127.2	12.668	107.4	0.040	61.1	0.415	–45.5
0.5	0.320	–142.0	10.429	101.3	0.045	61.7	0.354	–46.6
0.6	0.313	–152.8	8.867	96.4	0.051	62.6	0.309	–47.3
0.7	0.315	–161.6	7.698	92.8	0.057	63.4	0.276	–47.9
0.8	0.318	–169.6	6.765	89.3	0.063	63.8	0.249	–48.8
0.9	0.324	–175.5	6.024	86.4	0.069	64.1	0.230	–50.1
1.0	0.330	179.0	5.444	83.8	0.075	64.4	0.213	–52.0
1.1	0.339	174.7	4.967	81.3	0.081	64.5	0.202	–53.8
1.2	0.348	171.3	4.529	79.1	0.087	64.5	0.192	–56.2
1.3	0.356	167.3	4.195	76.9	0.093	64.5	0.186	–58.0
1.4	0.361	164.9	3.897	74.8	0.099	64.3	0.181	–60.2
1.5	0.367	161.8	3.642	72.6	0.105	64.1	0.177	–62.0
1.6	0.373	159.5	3.426	70.6	0.111	63.7	0.174	–63.6
1.7	0.376	157.3	3.218	68.8	0.117	63.4	0.171	–65.3
1.8	0.380	155.1	3.046	66.8	0.123	63.0	0.167	–66.4
1.9	0.385	153.2	2.890	65.3	0.129	62.7	0.166	–68.1
2.0	0.385	151.0	2.757	63.5	0.135	62.2	0.160	–68.5
2.1	0.398	149.9	2.640	61.9	0.141	61.7	0.161	–70.4
2.2	0.395	148.0	2.528	60.4	0.147	61.4	0.152	–70.7
2.3	0.406	147.1	2.432	59.0	0.153	60.8	0.152	–72.1
2.4	0.404	145.6	2.339	57.5	0.159	60.3	0.144	–74.4
2.5	0.410	144.5	2.250	56.2	0.165	59.7	0.145	–75.8
2.6	0.411	142.5	2.179	55.1	0.171	59.3	0.141	–79.3
2.7	0.416	141.9	2.100	53.8	0.177	58.6	0.136	–79.2
2.8	0.419	139.9	2.025	52.6	0.183	57.8	0.136	–83.7
2.9	0.408	138.8	1.931	50.7	0.189	56.7	0.127	–87.2
3.0	0.411	135.4	1.881	49.0	0.196	56.3	0.133	–91.9
4.0	0.459	116.0	1.452	32.2	0.253	48.5	0.160	–127.9
5.0	0.536	99.1	1.141	19.5	0.304	36.9	0.204	–164.6

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	0.965	–7.3	3.547	173.5	0.018	87.6	0.993	–3.2
0.2	0.946	–13.5	3.554	168.1	0.035	82.3	0.992	–6.3
0.3	0.930	–19.9	3.510	162.4	0.051	77.9	0.976	–9.0
0.4	0.911	–26.3	3.439	156.4	0.068	73.6	0.960	–12.3
0.5	0.887	–33.4	3.397	150.3	0.083	69.7	0.941	–15.4
0.6	0.855	–40.2	3.321	144.3	0.097	65.6	0.917	–18.7
0.7	0.821	–46.7	3.230	139.1	0.110	61.5	0.890	–21.8
0.8	0.786	–53.4	3.137	133.3	0.122	57.8	0.860	–24.8
0.9	0.746	–60.4	3.039	127.8	0.132	54.1	0.835	–27.8
1.0	0.708	–67.1	2.949	122.5	0.141	50.9	0.805	–30.7
1.1	0.672	–73.9	2.848	117.7	0.149	47.8	0.779	–33.2
1.2	0.642	–80.6	2.738	113.1	0.156	45.1	0.753	–35.5
1.3	0.611	–87.1	2.639	108.8	0.161	42.5	0.731	–37.8
1.4	0.585	–93.2	2.524	104.4	0.166	40.1	0.708	–40.0
1.5	0.562	–99.3	2.430	100.2	0.169	38.0	0.689	–41.9
1.6	0.540	–105.3	2.344	96.5	0.172	36.0	0.669	–43.7
1.7	0.523	–111.0	2.250	92.9	0.174	34.3	0.650	–45.3
1.8	0.506	–116.6	2.161	89.4	0.175	32.8	0.634	–46.6
1.9	0.493	–121.8	2.076	86.6	0.177	31.5	0.620	–47.9
2.0	0.476	–126.5	2.007	83.4	0.178	30.4	0.606	–49.0
2.1	0.468	–132.1	1.939	80.7	0.178	29.5	0.596	–50.4
2.2	0.455	–136.0	1.864	78.1	0.178	28.7	0.582	–51.1
2.3	0.452	–141.5	1.811	75.5	0.179	28.1	0.579	–52.0
2.4	0.446	–145.2	1.753	73.1	0.180	27.5	0.564	–53.0
2.5	0.442	–150.1	1.699	70.7	0.180	27.2	0.558	–54.0
2.6	0.432	–153.3	1.655	69.0	0.181	26.6	0.551	–55.4
2.7	0.432	–157.3	1.598	66.7	0.181	26.2	0.545	–56.1
2.8	0.425	–161.2	1.548	64.7	0.181	25.9	0.536	–57.5
2.9	0.419	–164.3	1.485	61.5	0.181	25.2	0.518	–58.5
3.0	0.410	–169.1	1.455	59.1	0.182	25.3	0.509	–61.0
4.0	0.421	152.7	1.199	38.3	0.193	28.8	0.466	–79.4
5.0	0.485	119.8	0.957	19.6	0.221	29.8	0.430	–101.8

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	0.875	–11.4	9.429	169.8	0.018	86.2	0.984	–6.3
0.2	0.845	–23.2	9.182	160.1	0.032	77.3	0.961	–12.4
0.3	0.804	–34.0	8.752	151.4	0.046	71.7	0.914	–17.7
0.4	0.751	–44.0	8.224	143.1	0.059	66.4	0.864	–22.7
0.5	0.693	–54.3	7.717	135.3	0.070	62.2	0.811	–27.2
0.6	0.636	–63.9	7.192	128.2	0.078	58.4	0.756	–31.1
0.7	0.585	–72.7	6.672	122.2	0.086	55.1	0.704	–34.4
0.8	0.531	–81.2	6.180	116.4	0.092	52.7	0.656	–37.3
0.9	0.490	–90.1	5.735	111.2	0.097	50.6	0.616	–40.0
1.0	0.449	–98.2	5.358	106.5	0.102	49.0	0.576	–42.4
1.1	0.422	–106.3	5.003	102.4	0.106	47.8	0.545	–44.4
1.2	0.398	–114.0	4.659	98.7	0.110	46.9	0.516	–46.2
1.3	0.380	–121.6	4.379	95.1	0.114	46.1	0.495	–47.8
1.4	0.365	–128.6	4.100	91.7	0.117	45.5	0.475	–49.5
1.5	0.353	–135.1	3.879	88.5	0.120	45.1	0.457	–50.8
1.6	0.345	–141.3	3.676	85.6	0.123	44.8	0.442	–51.9
1.7	0.339	–147.0	3.478	83.0	0.126	44.6	0.428	–53.0
1.8	0.333	–152.0	3.303	80.3	0.129	44.5	0.417	–53.8
1.9	0.331	–157.7	3.144	78.2	0.132	44.5	0.407	–54.6
2.0	0.325	–161.6	3.010	75.7	0.135	44.4	0.395	–55.1
2.1	0.332	–166.5	2.886	73.7	0.138	44.5	0.388	–56.2
2.2	0.324	–169.5	2.761	71.7	0.142	44.6	0.376	–56.4
2.3	0.334	–173.8	2.663	69.8	0.145	44.7	0.373	–57.0
2.4	0.330	–176.8	2.564	67.9	0.149	44.7	0.361	–57.7
2.5	0.336	179.5	2.468	66.2	0.153	44.9	0.357	–58.5
2.6	0.332	176.4	2.394	64.8	0.156	44.9	0.349	–59.8
2.7	0.340	174.1	2.306	63.0	0.160	44.9	0.344	–59.8
2.8	0.338	170.6	2.227	61.6	0.163	44.9	0.339	–61.4
2.9	0.332	168.5	2.123	59.0	0.167	44.4	0.323	–62.4
3.0	0.329	163.7	2.071	57.1	0.171	44.4	0.321	–65.2
4.0	0.371	133.9	1.630	39.0	0.215	43.1	0.293	–86.6
5.0	0.459	109.6	1.290	23.4	0.262	35.9	0.264	–114.5

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	0.812	–16.7	14.092	166.6	0.016	84.9	0.970	–8.9
0.2	0.760	–31.0	13.350	154.1	0.030	73.8	0.924	–17.1
0.3	0.690	–44.5	12.274	143.6	0.042	68.2	0.851	–23.4
0.4	0.623	–56.5	11.100	134.3	0.052	63.6	0.779	–29.0
0.5	0.554	–68.7	10.037	125.9	0.060	59.9	0.708	–33.3
0.6	0.494	–79.0	9.066	119.0	0.067	57.2	0.643	–36.8
0.7	0.445	–89.0	8.205	113.4	0.072	55.5	0.588	–39.5
0.8	0.401	–98.6	7.428	108.2	0.078	54.2	0.539	–41.7
0.9	0.370	–108.4	6.770	103.5	0.082	53.2	0.500	–43.8
1.0	0.342	–117.2	6.233	99.5	0.087	52.8	0.466	–45.7
1.1	0.324	–125.9	5.760	95.8	0.091	52.3	0.439	–47.3
1.2	0.316	–133.7	5.318	92.9	0.095	52.3	0.415	–48.9
1.3	0.305	–141.5	4.958	89.7	0.099	52.1	0.397	–50.1
1.4	0.299	–148.1	4.628	86.8	0.103	52.0	0.382	–51.5
1.5	0.296	–154.5	4.343	84.1	0.107	52.0	0.369	–52.6
1.6	0.296	–160.2	4.107	81.6	0.112	52.1	0.357	–53.6
1.7	0.294	–165.2	3.873	79.3	0.116	52.0	0.346	–54.5
1.8	0.295	–169.9	3.673	76.9	0.120	52.1	0.337	–55.1
1.9	0.297	–174.4	3.484	75.1	0.124	52.1	0.330	–55.9
2.0	0.291	–178.1	3.328	72.9	0.128	52.1	0.320	–56.2
2.1	0.304	177.7	3.185	71.1	0.132	52.2	0.315	–57.2
2.2	0.301	175.1	3.050	69.4	0.137	52.2	0.304	–57.1
2.3	0.314	172.1	2.938	67.7	0.141	52.2	0.302	–57.8
2.4	0.310	170.1	2.825	66.0	0.146	52.0	0.291	–58.5
2.5	0.319	167.1	2.717	64.5	0.151	52.0	0.288	–59.3
2.6	0.316	164.4	2.630	63.2	0.155	52.0	0.281	–60.7
2.7	0.324	162.5	2.533	61.7	0.160	51.7	0.277	–60.4
2.8	0.324	159.5	2.442	60.4	0.164	51.4	0.271	–62.3
2.9	0.317	158.0	2.333	58.0	0.169	50.6	0.257	–63.6
3.0	0.316	153.6	2.272	56.2	0.175	50.6	0.257	–66.7
4.0	0.366	127.8	1.762	39.2	0.225	46.8	0.239	–91.2
5.0	0.456	106.2	1.391	24.5	0.274	37.5	0.219	–123.8

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	0.725	–19.1	17.802	163.8	0.015	80.7	0.958	–11.0
0.2	0.685	–37.4	16.382	149.5	0.029	72.5	0.890	–20.4
0.3	0.607	–53.1	14.584	138.0	0.039	66.6	0.798	–27.3
0.4	0.533	–66.2	12.825	128.3	0.048	62.2	0.712	–32.7
0.5	0.464	–79.3	11.315	120.1	0.054	59.8	0.635	–36.4
0.6	0.410	–90.2	10.021	113.5	0.060	58.2	0.569	–39.2
0.7	0.370	–101.1	8.952	108.4	0.065	56.9	0.517	–41.4
0.8	0.333	–111.3	8.035	103.5	0.070	56.7	0.472	–43.1
0.9	0.310	–121.5	7.261	99.4	0.075	56.3	0.436	–44.8
1.0	0.292	–130.5	6.641	95.7	0.079	56.3	0.405	–46.4
1.1	0.285	–139.2	6.104	92.5	0.084	56.3	0.382	–47.8
1.2	0.279	–146.9	5.613	89.7	0.089	56.3	0.362	–49.3
1.3	0.277	–154.8	5.219	86.9	0.094	56.4	0.348	–50.4
1.4	0.277	–160.9	4.862	84.2	0.098	56.4	0.335	–51.8
1.5	0.277	–166.2	4.553	81.8	0.103	56.3	0.324	–52.8
1.6	0.279	–171.3	4.297	79.4	0.108	56.5	0.315	–53.8
1.7	0.282	–175.9	4.045	77.3	0.112	56.4	0.305	–54.7
1.8	0.284	–179.7	3.836	75.1	0.117	56.4	0.298	–55.3
1.9	0.288	176.4	3.635	73.4	0.122	56.4	0.292	–56.0
2.0	0.286	172.6	3.469	71.3	0.127	56.2	0.283	–56.2
2.1	0.297	169.8	3.321	69.6	0.131	56.1	0.280	–57.3
2.2	0.294	166.9	3.171	68.0	0.136	56.1	0.270	–57.0
2.3	0.307	164.9	3.059	66.4	0.141	55.9	0.268	–57.7
2.4	0.306	162.7	2.941	64.8	0.146	55.7	0.257	–58.4
2.5	0.313	160.6	2.825	63.3	0.151	55.5	0.255	–59.3
2.6	0.313	157.8	2.737	62.1	0.156	55.3	0.248	–60.8
2.7	0.318	156.6	2.635	60.6	0.161	54.9	0.244	–60.6
2.8	0.319	153.8	2.536	59.4	0.166	54.4	0.239	–62.8
2.9	0.312	152.3	2.423	57.2	0.172	53.6	0.226	–64.1
3.0	0.315	148.1	2.362	55.5	0.177	53.5	0.227	–67.5
4.0	0.367	124.5	1.825	39.0	0.230	48.3	0.214	–94.0
5.0	0.455	104.3	1.438	24.9	0.280	38.3	0.202	–129.6

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	0.670	–23.0	22.008	160.6	0.014	77.1	0.939	–13.3
0.2	0.595	–45.4	19.593	144.3	0.027	71.1	0.845	–23.9
0.3	0.510	–62.4	16.792	132.0	0.035	64.8	0.734	–30.8
0.4	0.439	–77.2	14.296	122.3	0.043	62.3	0.640	–35.7
0.5	0.380	–91.1	12.312	114.7	0.048	61.0	0.563	–38.7
0.6	0.336	–103.6	10.745	108.5	0.054	60.2	0.501	–40.8
0.7	0.306	–115.0	9.495	103.8	0.059	59.9	0.452	–42.2
0.8	0.281	–125.5	8.443	99.4	0.064	60.0	0.412	–43.5
0.9	0.269	–135.7	7.598	95.8	0.069	60.0	0.382	–44.7
1.0	0.258	–145.3	6.916	92.4	0.074	60.3	0.355	–46.2
1.1	0.259	–152.9	6.330	89.5	0.079	60.3	0.336	–47.3
1.2	0.260	–160.4	5.811	87.0	0.085	60.5	0.318	–48.7
1.3	0.262	–166.8	5.394	84.4	0.090	60.6	0.307	–49.8
1.4	0.267	–172.3	5.015	82.0	0.095	60.5	0.296	–51.2
1.5	0.269	–177.0	4.702	79.5	0.100	60.4	0.287	–52.2
1.6	0.274	178.4	4.422	77.5	0.105	60.4	0.280	–53.2
1.7	0.277	174.7	4.161	75.5	0.110	60.3	0.272	–54.1
1.8	0.280	171.1	3.940	73.5	0.115	60.0	0.266	–54.8
1.9	0.287	168.2	3.736	71.9	0.121	59.9	0.262	–55.6
2.0	0.284	165.3	3.564	70.0	0.126	59.6	0.254	–55.7
2.1	0.296	162.6	3.410	68.3	0.131	59.5	0.252	–56.8
2.2	0.294	160.5	3.258	66.8	0.136	59.3	0.242	–56.5
2.3	0.308	158.9	3.140	65.3	0.141	58.9	0.240	–57.3
2.4	0.304	156.9	3.017	63.8	0.147	58.5	0.230	–57.9
2.5	0.314	154.9	2.897	62.5	0.152	58.2	0.229	–59.0
2.6	0.313	152.8	2.804	61.2	0.157	57.9	0.222	–60.7
2.7	0.321	151.4	2.699	59.7	0.163	57.3	0.218	–60.5
2.8	0.321	148.9	2.602	58.5	0.168	56.8	0.214	–62.7
2.9	0.315	147.6	2.484	56.5	0.173	55.9	0.202	–64.3
3.0	0.317	143.3	2.421	54.9	0.179	55.6	0.204	–67.9
4.0	0.367	121.7	1.856	38.6	0.233	49.6	0.195	–96.6
5.0	0.457	103.0	1.462	24.9	0.284	39.0	0.190	–134.7

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	0.486	–36.9	29.425	153.6	0.013	79.1	0.883	–18.0
0.2	0.419	–65.2	23.883	133.9	0.023	68.4	0.737	–29.6
0.3	0.345	–87.4	19.002	121.4	0.029	65.7	0.608	–35.0
0.4	0.300	–104.1	15.432	112.6	0.035	64.8	0.516	–37.7
0.5	0.272	–120.6	12.867	106.0	0.041	65.2	0.451	–38.7
0.6	0.254	–133.4	11.011	100.8	0.046	65.3	0.402	–39.2
0.7	0.250	–145.0	9.606	97.0	0.052	65.7	0.365	–39.4
0.8	0.243	–155.2	8.466	93.4	0.058	66.4	0.336	–39.9
0.9	0.247	–163.0	7.570	90.3	0.063	66.5	0.314	–40.6
1.0	0.251	–170.3	6.858	87.5	0.069	66.7	0.294	–41.7
1.1	0.257	–176.3	6.251	85.0	0.074	66.7	0.281	–42.7
1.2	0.268	179.4	5.716	83.0	0.080	66.7	0.268	–44.2
1.3	0.273	174.3	5.300	80.7	0.086	66.5	0.261	–45.3
1.4	0.280	171.0	4.916	78.5	0.092	66.3	0.253	–46.8
1.5	0.284	167.4	4.605	76.4	0.097	66.1	0.248	–48.0
1.6	0.292	164.5	4.327	74.4	0.103	65.7	0.244	–49.2
1.7	0.295	161.9	4.068	72.6	0.108	65.4	0.238	–50.3
1.8	0.299	159.5	3.851	70.7	0.114	65.0	0.234	–51.0
1.9	0.307	156.5	3.650	69.2	0.119	64.6	0.231	–52.1
2.0	0.306	154.9	3.481	67.3	0.125	64.1	0.225	–52.1
2.1	0.319	152.8	3.334	65.8	0.130	63.8	0.224	–53.6
2.2	0.315	151.1	3.185	64.4	0.136	63.4	0.216	–53.2
2.3	0.329	150.6	3.067	63.0	0.142	62.9	0.216	–54.2
2.4	0.325	148.9	2.944	61.6	0.148	62.3	0.206	–55.0
2.5	0.335	147.6	2.832	60.3	0.153	61.9	0.206	–56.1
2.6	0.335	145.5	2.741	59.3	0.159	61.4	0.200	–58.1
2.7	0.340	144.9	2.639	58.0	0.164	60.7	0.197	–58.0
2.8	0.342	142.7	2.544	56.8	0.169	60.1	0.193	–60.5
2.9	0.333	141.9	2.424	54.9	0.175	58.9	0.182	–62.2
3.0	0.337	138.0	2.363	53.2	0.182	58.5	0.184	–66.3
4.0	0.387	118.4	1.811	37.2	0.237	51.5	0.179	–97.7
5.0	0.476	101.3	1.424	23.9	0.289	40.1	0.182	–138.2

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	0.951	–6.6	3.571	173.3	0.017	87.1	0.996	–2.9
0.2	0.948	–13.1	3.558	168.3	0.033	82.6	0.993	–5.9
0.3	0.935	–19.4	3.515	162.8	0.048	78.4	0.975	–8.6
0.4	0.911	–25.8	3.442	156.8	0.064	74.1	0.962	–11.7
0.5	0.890	–32.5	3.406	150.9	0.079	70.1	0.944	–14.6
0.6	0.858	–39.1	3.337	145.0	0.092	66.2	0.920	–17.8
0.7	0.825	–45.5	3.248	139.8	0.105	62.3	0.895	–20.6
0.8	0.789	–52.2	3.160	134.1	0.116	58.6	0.867	–23.6
0.9	0.752	–59.0	3.066	128.7	0.126	55.1	0.842	–26.6
1.0	0.714	–65.4	2.974	123.4	0.135	51.8	0.815	–29.3
1.1	0.680	–72.1	2.876	118.7	0.142	48.8	0.789	–31.8
1.2	0.646	–78.7	2.769	114.2	0.149	46.2	0.765	–34.1
1.3	0.615	–85.0	2.668	109.8	0.155	43.5	0.743	–36.2
1.4	0.591	–91.5	2.557	105.4	0.159	41.2	0.719	–38.4
1.5	0.566	–97.4	2.463	101.2	0.163	39.1	0.701	–40.3
1.6	0.546	–103.3	2.378	97.6	0.165	37.2	0.682	–42.0
1.7	0.525	–109.1	2.282	94.0	0.168	35.5	0.663	–43.5
1.8	0.507	–114.2	2.195	90.5	0.169	34.0	0.647	–44.8
1.9	0.494	–119.7	2.110	87.7	0.170	32.7	0.634	–46.2
2.0	0.477	–124.1	2.041	84.4	0.172	31.5	0.618	–47.2
2.1	0.467	–129.8	1.973	81.8	0.172	30.6	0.609	–48.6
2.2	0.453	–133.9	1.895	79.1	0.172	30.0	0.596	–49.3
2.3	0.451	–139.2	1.841	76.7	0.173	29.3	0.593	–50.2
2.4	0.442	–143.2	1.782	74.2	0.174	28.8	0.578	–51.1
2.5	0.438	–148.1	1.728	71.9	0.174	28.5	0.573	–52.1
2.6	0.429	–151.4	1.679	70.0	0.175	28.0	0.565	–53.2
2.7	0.429	–155.5	1.627	67.6	0.175	27.7	0.560	–53.8
2.8	0.422	–159.5	1.573	65.8	0.175	27.5	0.551	–55.0
2.9	0.414	–162.7	1.509	62.4	0.175	26.8	0.531	–56.0
3.0	0.405	–167.3	1.480	60.1	0.176	26.9	0.523	–58.6
4.0	0.413	153.8	1.219	39.3	0.189	30.5	0.479	–76.4
5.0	0.479	120.3	0.974	20.6	0.218	31.4	0.441	–98.5

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	0.875	–11.6	9.462	170.0	0.016	80.1	0.985	–6.1
0.2	0.851	–22.5	9.220	160.5	0.031	77.7	0.963	–11.8
0.3	0.810	–32.9	8.796	152.0	0.044	72.2	0.918	–16.7
0.4	0.758	–42.6	8.287	143.8	0.056	67.3	0.872	–21.7
0.5	0.699	–52.5	7.800	136.0	0.066	63.1	0.820	–25.7
0.6	0.641	–61.9	7.283	129.0	0.075	59.2	0.767	–29.6
0.7	0.590	–70.5	6.773	123.1	0.083	56.1	0.718	–32.7
0.8	0.538	–78.8	6.291	117.4	0.088	53.7	0.670	–35.5
0.9	0.491	–87.3	5.841	112.1	0.094	51.6	0.629	–38.1
1.0	0.453	–95.1	5.459	107.4	0.099	50.1	0.592	–40.3
1.1	0.424	–103.3	5.101	103.3	0.103	48.8	0.561	–42.3
1.2	0.398	–111.0	4.754	99.7	0.106	48.0	0.532	–44.1
1.3	0.377	–118.4	4.479	96.0	0.110	47.2	0.511	–45.5
1.4	0.362	–125.3	4.192	92.7	0.113	46.5	0.491	–47.1
1.5	0.349	–131.7	3.968	89.4	0.116	46.1	0.474	–48.4
1.6	0.341	–138.1	3.758	86.5	0.120	45.8	0.459	–49.5
1.7	0.333	–144.2	3.555	83.9	0.123	45.6	0.445	–50.5
1.8	0.327	–149.3	3.383	81.1	0.126	45.4	0.433	–51.2
1.9	0.323	–154.9	3.217	79.0	0.129	45.4	0.423	–52.0
2.0	0.317	–158.8	3.078	76.5	0.132	45.5	0.412	–52.3
2.1	0.322	–163.8	2.952	74.5	0.135	45.5	0.405	–53.4
2.2	0.315	–167.3	2.826	72.5	0.138	45.6	0.394	–53.5
2.3	0.323	–171.9	2.729	70.6	0.141	45.6	0.391	–54.2
2.4	0.321	–174.5	2.623	68.7	0.145	45.8	0.378	–54.8
2.5	0.326	–178.5	2.528	67.0	0.149	45.9	0.375	–55.5
2.6	0.323	178.3	2.453	65.7	0.152	45.9	0.367	–56.8
2.7	0.329	175.8	2.363	63.9	0.155	45.8	0.362	–56.8
2.8	0.327	172.6	2.277	62.4	0.159	45.8	0.356	–58.3
2.9	0.322	170.4	2.176	59.9	0.163	45.2	0.340	–59.2
3.0	0.318	165.6	2.124	58.0	0.167	45.4	0.338	–61.9
4.0	0.360	135.1	1.668	40.0	0.211	44.3	0.306	–82.3
5.0	0.449	110.0	1.323	24.2	0.258	37.1	0.272	–109.0

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	0.800	–14.8	14.185	166.6	0.016	81.3	0.972	–8.5
0.2	0.762	–29.9	13.456	154.6	0.029	74.6	0.928	–16.1
0.3	0.699	–43.3	12.386	144.2	0.040	68.8	0.859	–22.2
0.4	0.632	–54.5	11.241	135.0	0.050	64.4	0.790	–27.6
0.5	0.560	–66.3	10.196	126.7	0.058	60.6	0.721	–31.6
0.6	0.500	–76.5	9.233	119.8	0.064	58.2	0.657	–35.0
0.7	0.451	–86.0	8.357	114.2	0.070	56.2	0.602	–37.4
0.8	0.404	–95.3	7.591	108.9	0.075	55.0	0.554	–39.6
0.9	0.369	–104.6	6.941	104.4	0.079	54.2	0.516	–41.6
1.0	0.339	–113.4	6.384	100.2	0.084	53.6	0.482	–43.4
1.1	0.321	–122.2	5.896	96.7	0.088	53.2	0.454	–44.8
1.2	0.309	–130.1	5.456	93.6	0.092	53.1	0.431	–46.3
1.3	0.298	–137.9	5.089	90.4	0.096	53.0	0.414	–47.5
1.4	0.292	–144.9	4.753	87.5	0.101	52.9	0.399	–48.8
1.5	0.285	–150.8	4.461	84.7	0.105	52.9	0.386	–49.8
1.6	0.284	–157.1	4.214	82.2	0.109	52.9	0.375	–50.8
1.7	0.283	–162.3	3.973	79.9	0.113	52.9	0.363	–51.6
1.8	0.282	–167.1	3.771	77.6	0.117	53.0	0.354	–52.2
1.9	0.283	–171.9	3.576	75.8	0.121	53.0	0.347	–52.9
2.0	0.280	–175.6	3.416	73.6	0.125	52.9	0.337	–53.1
2.1	0.290	–179.7	3.275	71.7	0.129	53.0	0.333	–54.1
2.2	0.289	177.4	3.131	70.0	0.133	53.0	0.322	–53.9
2.3	0.298	173.9	3.016	68.4	0.138	53.0	0.320	–54.6
2.4	0.297	171.5	2.900	66.7	0.143	52.8	0.308	–55.2
2.5	0.304	168.7	2.789	65.2	0.147	52.8	0.306	–56.0
2.6	0.302	165.9	2.700	64.0	0.152	52.7	0.299	–57.3
2.7	0.309	164.1	2.600	62.4	0.156	52.4	0.294	–57.3
2.8	0.310	161.1	2.507	61.1	0.160	52.1	0.289	–58.9
2.9	0.303	159.6	2.393	58.8	0.166	51.3	0.275	–60.0
3.0	0.304	154.7	2.335	56.9	0.171	51.3	0.274	–63.0
4.0	0.353	128.4	1.811	40.1	0.221	47.7	0.251	–85.9
5.0	0.441	106.4	1.435	25.2	0.270	38.6	0.224	–117.1

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	0.736	–18.2	17.762	164.3	0.014	81.1	0.961	–10.3
0.2	0.696	–35.5	16.431	150.3	0.028	71.8	0.898	–19.2
0.3	0.619	–50.5	14.686	138.8	0.038	67.4	0.810	–25.7
0.4	0.544	–63.0	12.978	129.3	0.046	63.4	0.727	–31.0
0.5	0.473	–75.5	11.479	121.2	0.052	60.7	0.652	–34.6
0.6	0.418	–86.5	10.202	114.6	0.058	59.0	0.588	–37.3
0.7	0.373	–96.5	9.131	109.4	0.063	57.7	0.535	–39.3
0.8	0.334	–106.4	8.216	104.5	0.068	57.3	0.491	–41.0
0.9	0.310	–116.3	7.430	100.4	0.073	57.0	0.456	–42.5
1.0	0.288	–125.7	6.799	96.6	0.077	57.0	0.425	–44.0
1.1	0.277	–134.5	6.255	93.3	0.082	56.7	0.402	–45.2
1.2	0.271	–142.6	5.762	90.5	0.087	56.9	0.381	–46.6
1.3	0.266	–150.7	5.365	87.7	0.091	56.8	0.366	–47.6
1.4	0.265	–156.6	4.988	85.1	0.096	56.9	0.353	–48.9
1.5	0.262	–162.8	4.679	82.5	0.101	57.0	0.342	–49.9
1.6	0.266	–168.0	4.408	80.2	0.105	57.1	0.333	–50.8
1.7	0.268	–172.8	4.153	78.0	0.110	56.9	0.324	–51.6
1.8	0.270	–177.0	3.940	75.8	0.114	57.0	0.316	–52.1
1.9	0.272	178.7	3.734	74.1	0.119	56.9	0.310	–52.9
2.0	0.272	175.5	3.565	72.1	0.124	56.8	0.301	–53.0
2.1	0.282	171.9	3.415	70.4	0.128	56.7	0.298	–54.0
2.2	0.275	169.3	3.262	68.8	0.133	56.6	0.288	–53.8
2.3	0.292	166.7	3.145	67.2	0.138	56.4	0.286	–54.4
2.4	0.290	164.8	3.021	65.6	0.143	56.2	0.275	–55.0
2.5	0.298	162.1	2.906	64.1	0.148	56.1	0.273	–55.8
2.6	0.297	159.4	2.812	63.0	0.153	55.9	0.267	–57.1
2.7	0.302	158.0	2.709	61.5	0.158	55.6	0.263	–56.8
2.8	0.304	155.1	2.610	60.3	0.162	55.2	0.257	–58.7
2.9	0.298	154.0	2.490	58.1	0.168	54.2	0.244	–59.9
3.0	0.299	149.4	2.429	56.4	0.173	54.1	0.244	–63.2
4.0	0.352	125.5	1.873	39.9	0.225	49.2	0.226	–88.1
5.0	0.443	104.8	1.478	25.7	0.275	39.2	0.204	–122.3

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	0.676	–22.3	22.003	161.3	0.014	82.7	0.944	–12.5
0.2	0.612	–42.9	19.679	145.3	0.025	71.9	0.855	–22.6
0.3	0.526	–59.1	16.963	133.1	0.034	66.5	0.749	–29.2
0.4	0.451	–73.0	14.543	123.5	0.042	63.2	0.658	–33.9
0.5	0.386	–86.6	12.577	115.7	0.047	61.7	0.583	–36.7
0.6	0.340	–98.4	10.996	109.6	0.053	60.8	0.521	–38.8
0.7	0.306	–109.1	9.727	104.9	0.058	60.4	0.473	–40.0
0.8	0.278	–119.8	8.676	100.4	0.063	60.5	0.433	–41.2
0.9	0.263	–130.2	7.819	96.7	0.068	60.4	0.402	–42.4
1.0	0.250	–139.7	7.112	93.3	0.073	60.8	0.375	–43.6
1.1	0.246	–148.1	6.522	90.4	0.078	60.8	0.356	–44.7
1.2	0.246	–155.8	5.980	87.9	0.083	61.0	0.337	–46.0
1.3	0.247	–163.1	5.562	85.3	0.088	61.0	0.326	–47.0
1.4	0.250	–168.6	5.172	82.9	0.093	61.0	0.315	–48.3
1.5	0.252	–173.7	4.838	80.5	0.098	60.8	0.306	–49.2
1.6	0.256	–178.4	4.560	78.3	0.103	60.8	0.298	–50.1
1.7	0.259	177.6	4.292	76.4	0.108	60.6	0.291	–51.0
1.8	0.264	173.8	4.069	74.3	0.113	60.4	0.284	–51.6
1.9	0.268	169.8	3.851	72.7	0.118	60.3	0.279	–52.3
2.0	0.267	167.1	3.675	70.8	0.123	60.1	0.272	–52.4
2.1	0.280	164.5	3.517	69.1	0.128	59.9	0.269	–53.4
2.2	0.277	161.9	3.364	67.6	0.133	59.7	0.260	–53.0
2.3	0.289	160.6	3.234	66.2	0.138	59.4	0.259	–53.8
2.4	0.288	158.7	3.110	64.7	0.144	59.0	0.248	–54.3
2.5	0.295	156.7	2.991	63.3	0.149	58.7	0.247	–55.2
2.6	0.296	154.1	2.893	62.1	0.154	58.5	0.240	–56.7
2.7	0.302	152.9	2.786	60.6	0.159	57.9	0.237	–56.3
2.8	0.303	150.5	2.686	59.5	0.164	57.5	0.231	–58.4
2.9	0.297	149.2	2.563	57.4	0.170	56.4	0.219	–59.7
3.0	0.299	144.6	2.496	55.7	0.176	56.1	0.220	–63.4
4.0	0.350	122.8	1.917	39.7	0.229	50.4	0.205	–90.2
5.0	0.444	103.5	1.513	25.9	0.280	39.6	0.190	–127.2

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	0.524	–31.2	29.776	154.7	0.013	79.3	0.896	–16.9
0.2	0.445	–59.6	24.547	135.5	0.022	69.8	0.758	–28.0
0.3	0.363	–80.1	19.730	122.9	0.029	66.8	0.631	–33.4
0.4	0.308	–95.6	16.104	113.9	0.035	65.3	0.540	–36.1
0.5	0.269	–112.0	13.477	107.4	0.040	65.7	0.475	–37.1
0.6	0.247	–124.7	11.550	102.1	0.046	65.9	0.424	–37.7
0.7	0.233	–136.9	10.103	98.2	0.051	66.0	0.387	–37.9
0.8	0.225	–147.7	8.906	94.4	0.057	66.7	0.357	–38.3
0.9	0.226	–156.8	7.971	91.4	0.062	66.8	0.334	–38.9
1.0	0.226	–164.9	7.224	88.5	0.068	67.0	0.314	–39.9
1.1	0.232	–172.0	6.593	86.0	0.073	67.0	0.300	–40.9
1.2	0.239	–176.8	6.038	84.0	0.079	67.0	0.287	–42.1
1.3	0.245	177.6	5.595	81.6	0.084	66.9	0.279	–43.1
1.4	0.253	174.0	5.198	79.5	0.090	66.6	0.271	–44.5
1.5	0.258	170.1	4.867	77.4	0.095	66.3	0.265	–45.6
1.6	0.265	166.8	4.569	75.4	0.101	65.9	0.261	–46.6
1.7	0.270	163.8	4.302	73.6	0.106	65.5	0.255	–47.6
1.8	0.273	161.0	4.071	71.7	0.112	65.3	0.250	–48.3
1.9	0.280	158.5	3.855	70.3	0.117	64.8	0.247	–49.3
2.0	0.279	156.3	3.676	68.4	0.122	64.4	0.241	–49.3
2.1	0.291	154.3	3.521	66.9	0.128	64.0	0.240	–50.6
2.2	0.289	152.4	3.365	65.5	0.134	63.6	0.232	–50.1
2.3	0.302	151.6	3.239	64.2	0.139	63.2	0.231	–51.1
2.4	0.299	150.2	3.110	62.8	0.145	62.6	0.222	–51.7
2.5	0.309	148.8	2.989	61.4	0.150	62.1	0.221	–52.7
2.6	0.308	146.5	2.894	60.4	0.156	61.7	0.215	–54.3
2.7	0.313	146.2	2.788	59.1	0.161	61.1	0.212	–53.8
2.8	0.314	143.9	2.685	58.0	0.166	60.4	0.207	–56.2
2.9	0.309	142.6	2.562	55.9	0.172	59.3	0.195	–57.7
3.0	0.311	138.8	2.494	54.4	0.178	59.0	0.197	–61.8
4.0	0.364	119.3	1.908	38.6	0.233	52.0	0.186	–91.3
5.0	0.454	101.8	1.502	25.3	0.284	40.8	0.178	–131.4

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	0.939	–6.2	3.508	173.4	0.013	87.2	0.994	–3.3
0.2	0.938	–13.5	3.434	168.0	0.025	80.8	0.988	–6.8
0.3	0.923	–20.1	3.419	162.6	0.037	76.4	0.976	–10.1
0.4	0.910	–27.1	3.412	156.4	0.049	72.1	0.964	–13.5
0.5	0.885	–34.2	3.341	150.4	0.059	67.9	0.947	–16.8
0.6	0.861	–41.1	3.280	144.8	0.069	63.1	0.928	–20.2
0.7	0.835	–48.3	3.196	139.2	0.077	59.2	0.905	–23.2
0.8	0.811	–55.4	3.129	133.7	0.084	55.3	0.882	–26.4
0.9	0.786	–62.2	3.040	128.4	0.090	51.4	0.860	–29.5
1.0	0.760	–69.0	2.941	123.1	0.094	47.9	0.835	–32.4
1.1	0.734	–75.6	2.845	118.3	0.098	44.7	0.813	–35.2
1.2	0.710	–81.8	2.739	113.7	0.100	41.8	0.791	–38.0
1.3	0.691	–87.9	2.644	109.0	0.102	39.3	0.768	–40.7
1.4	0.675	–93.4	2.534	104.6	0.102	37.1	0.749	–43.3
1.5	0.658	–98.7	2.446	100.5	0.102	35.5	0.731	–46.1
1.6	0.642	–103.9	2.359	96.6	0.101	34.0	0.715	–48.7
1.7	0.629	–108.4	2.269	92.7	0.099	33.0	0.700	–51.4
1.8	0.618	–113.0	2.182	89.1	0.097	32.7	0.689	–54.0
1.9	0.605	–116.9	2.106	85.8	0.095	32.9	0.676	–56.6
2.0	0.599	–121.0	2.037	82.7	0.092	33.4	0.666	–59.2
2.1	0.585	–125.0	1.968	79.5	0.089	34.3	0.657	–61.8
2.2	0.579	–128.6	1.912	76.6	0.086	35.7	0.650	–64.4
2.3	0.568	–132.6	1.851	73.7	0.083	37.8	0.644	–66.9
2.4	0.564	–136.1	1.799	70.9	0.081	40.4	0.638	–69.3
2.5	0.560	–140.0	1.744	68.4	0.080	43.7	0.632	–72.0
2.6	0.555	–143.3	1.683	65.7	0.079	47.7	0.628	–74.7
2.7	0.548	–147.3	1.629	62.9	0.079	52.4	0.625	–76.9
2.8	0.550	–150.6	1.592	60.1	0.081	57.2	0.625	–79.4
2.9	0.546	–154.0	1.566	57.6	0.083	62.6	0.620	–81.1
3.0	0.542	–157.5	1.520	55.5	0.087	67.3	0.613	–83.8
4.0	0.578	174.3	1.180	35.0	0.194	80.8	0.567	–113.3
5.0	0.647	155.0	0.908	13.4	0.336	54.9	0.451	–155.8

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	–9.2	9.304	170.6	0.012	79.8	0.981	–5.6
0.2	0.823	–19.6	8.965	162.0	0.024	78.1	0.960	–11.2
0.3	0.788	–29.3	8.695	154.3	0.034	72.8	0.928	–16.4
0.4	0.755	–38.7	8.380	146.1	0.044	68.3	0.889	–21.2
0.5	0.706	–47.8	7.899	138.8	0.051	64.3	0.844	–25.5
0.6	0.664	–56.4	7.471	132.3	0.058	60.3	0.799	–29.3
0.7	0.620	–64.8	7.003	126.0	0.063	57.4	0.754	–32.8
0.8	0.581	–73.1	6.609	120.4	0.067	54.9	0.713	–35.7
0.9	0.546	–80.4	6.192	115.2	0.071	52.9	0.674	–38.4
1.0	0.516	–87.3	5.800	110.4	0.074	51.6	0.640	–40.9
1.1	0.492	–94.4	5.459	106.1	0.076	50.6	0.607	–43.1
1.2	0.468	–100.3	5.124	102.2	0.078	50.0	0.579	–45.0
1.3	0.449	–106.2	4.842	98.3	0.080	49.8	0.554	–47.1
1.4	0.437	–111.6	4.556	94.8	0.082	49.9	0.532	–49.0
1.5	0.427	–116.4	4.321	91.6	0.083	50.5	0.513	–50.9
1.6	0.417	–121.2	4.113	88.5	0.085	51.2	0.496	–53.0
1.7	0.406	–125.4	3.910	85.3	0.087	52.0	0.481	–55.0
1.8	0.399	–128.9	3.726	82.7	0.088	52.9	0.470	–57.0
1.9	0.391	–132.5	3.555	80.1	0.090	54.1	0.461	–59.1
2.0	0.388	–135.7	3.410	77.6	0.092	55.6	0.451	–61.1
2.1	0.378	–139.5	3.274	75.1	0.094	57.0	0.444	–63.1
2.2	0.374	–142.5	3.155	72.7	0.097	58.1	0.438	–65.3
2.3	0.370	–145.8	3.035	70.3	0.100	59.4	0.435	–67.2
2.4	0.367	–148.6	2.928	68.1	0.103	60.6	0.429	–69.3
2.5	0.366	–152.1	2.833	66.1	0.107	61.8	0.425	–71.3
2.6	0.361	–154.9	2.724	64.1	0.111	63.1	0.422	–73.5
2.7	0.358	–158.5	2.634	61.8	0.115	64.4	0.421	–75.4
2.8	0.361	–161.0	2.563	59.5	0.121	65.4	0.421	–77.6
2.9	0.360	–163.8	2.504	57.5	0.125	67.0	0.417	–79.0
3.0	0.361	–166.8	2.428	55.7	0.130	67.9	0.414	–81.3
4.0	0.428	172.6	1.871	37.8	0.213	68.9	0.365	–107.9
5.0	0.552	159.7	1.458	17.2	0.317	50.2	0.312	–145.9

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	0.766	–11.3	13.912	168.1	0.013	79.8	0.968	–7.4
0.2	0.736	–24.0	13.080	157.4	0.022	77.6	0.930	–14.6
0.3	0.681	–35.5	12.387	148.3	0.032	71.8	0.879	–20.8
0.4	0.635	–46.8	11.598	139.1	0.039	67.2	0.821	–26.2
0.5	0.574	–56.6	10.628	131.4	0.046	63.7	0.762	–30.6
0.6	0.529	–65.6	9.782	124.7	0.051	61.1	0.705	–34.3
0.7	0.483	–74.5	8.986	118.6	0.056	59.6	0.653	–37.3
0.8	0.445	–82.9	8.274	113.4	0.060	58.2	0.607	–39.8
0.9	0.416	–90.5	7.639	108.6	0.063	57.4	0.569	–42.0
1.0	0.391	–97.9	7.066	104.3	0.066	57.1	0.533	–44.1
1.1	0.372	–104.6	6.569	100.5	0.070	57.1	0.503	–45.7
1.2	0.356	–110.5	6.124	97.1	0.073	57.2	0.475	–47.4
1.3	0.345	–116.1	5.734	93.6	0.076	57.6	0.452	–48.9
1.4	0.337	–121.5	5.372	90.7	0.079	58.1	0.434	–50.6
1.5	0.330	–126.1	5.069	87.8	0.082	59.0	0.417	–52.3
1.6	0.325	–130.8	4.793	85.1	0.085	59.6	0.402	–54.0
1.7	0.316	–134.4	4.541	82.4	0.088	60.4	0.390	–55.8
1.8	0.313	–137.9	4.319	80.1	0.092	61.2	0.380	–57.5
1.9	0.311	–140.8	4.114	77.8	0.095	61.9	0.371	–59.3
2.0	0.309	–143.8	3.932	75.6	0.099	62.9	0.364	–61.0
2.1	0.303	–147.2	3.765	73.5	0.103	63.4	0.358	–62.9
2.2	0.300	–150.2	3.626	71.3	0.107	64.1	0.353	–65.0
2.3	0.296	–152.7	3.488	69.2	0.111	64.6	0.351	–66.9
2.4	0.295	–155.9	3.358	67.1	0.116	65.0	0.346	–68.9
2.5	0.293	–158.8	3.241	65.4	0.120	65.4	0.344	–70.8
2.6	0.293	–162.2	3.114	63.3	0.125	65.9	0.341	–72.8
2.7	0.294	–165.4	3.005	61.2	0.131	66.4	0.341	–74.6
2.8	0.295	–167.7	2.923	59.2	0.136	66.6	0.340	–76.7
2.9	0.296	–170.1	2.853	57.3	0.141	67.4	0.338	–78.1
3.0	0.295	–173.0	2.760	55.7	0.146	67.5	0.335	–80.1
4.0	0.372	170.5	2.118	39.1	0.223	65.1	0.284	–107.0
5.0	0.507	160.6	1.662	20.5	0.314	47.7	0.246	–143.8

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	0.697	–14.5	17.553	166.2	0.012	84.3	0.953	–8.9
0.2	0.654	–27.9	16.248	154.0	0.021	76.3	0.904	–17.2
0.3	0.601	–40.4	15.037	143.8	0.030	70.4	0.837	–24.0
0.4	0.545	–52.5	13.728	134.2	0.037	67.8	0.766	–29.6
0.5	0.482	–62.8	12.356	126.3	0.043	64.9	0.698	–33.7
0.6	0.436	–72.1	11.174	119.8	0.048	62.8	0.639	–37.1
0.7	0.394	–81.3	10.094	114.1	0.052	61.9	0.585	–39.8
0.8	0.364	–89.7	9.213	109.1	0.056	61.5	0.541	–42.0
0.9	0.339	–97.6	8.434	104.7	0.060	61.2	0.502	–43.7
1.0	0.320	–105.0	7.740	100.8	0.063	61.4	0.469	–45.3
1.1	0.306	–112.0	7.160	97.2	0.067	61.6	0.441	–46.7
1.2	0.294	–118.0	6.649	94.2	0.071	62.1	0.417	–48.0
1.3	0.286	–123.5	6.204	91.2	0.075	62.7	0.396	–49.5
1.4	0.282	–128.3	5.812	88.3	0.079	63.0	0.378	–51.0
1.5	0.278	–132.9	5.465	85.8	0.083	63.6	0.363	–52.5
1.6	0.277	–137.7	5.155	83.3	0.087	64.1	0.349	–54.1
1.7	0.275	–140.7	4.878	80.8	0.091	64.6	0.338	–55.7
1.8	0.269	–144.2	4.630	78.6	0.095	65.2	0.329	–57.3
1.9	0.269	–147.4	4.402	76.4	0.100	65.6	0.322	–59.1
2.0	0.272	–149.4	4.206	74.4	0.104	66.0	0.315	–60.9
2.1	0.266	–152.7	4.020	72.5	0.109	66.3	0.310	–62.7
2.2	0.263	–155.8	3.868	70.4	0.113	66.4	0.306	–64.8
2.3	0.260	–159.1	3.714	68.4	0.118	66.5	0.304	–66.5
2.4	0.259	–161.4	3.576	66.5	0.123	66.7	0.300	–68.7
2.5	0.262	–164.5	3.446	64.9	0.128	66.7	0.299	–70.5
2.6	0.260	–167.2	3.319	63.1	0.133	66.8	0.296	–72.7
2.7	0.258	–170.3	3.195	61.2	0.139	67.0	0.296	–74.4
2.8	0.262	–172.6	3.103	59.3	0.145	66.8	0.296	–76.5
2.9	0.263	–174.8	3.029	57.6	0.150	67.3	0.293	–77.7
3.0	0.266	–177.1	2.932	55.9	0.155	67.2	0.291	–79.9
4.0	0.346	168.6	2.243	40.3	0.230	63.1	0.241	–107.9
5.0	0.485	160.5	1.761	22.7	0.313	46.0	0.208	–144.4

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	0.611	–16.9	21.835	163.8	0.011	76.4	0.935	–10.6
0.2	0.565	–32.0	19.735	150.0	0.020	75.8	0.868	–20.1
0.3	0.497	–45.9	17.767	139.1	0.028	71.6	0.785	–27.3
0.4	0.445	–58.7	15.782	129.1	0.034	67.6	0.704	–32.9
0.5	0.388	–69.6	13.915	121.5	0.040	66.6	0.631	–36.7
0.6	0.345	–79.0	12.371	115.2	0.044	65.4	0.569	–39.6
0.7	0.309	–89.1	11.063	110.0	0.049	65.0	0.519	–41.8
0.8	0.286	–98.0	9.996	105.2	0.054	65.3	0.476	–43.6
0.9	0.268	–106.1	9.076	101.2	0.058	65.3	0.442	–44.9
1.0	0.257	–113.2	8.292	97.7	0.062	65.7	0.411	–46.3
1.1	0.250	–120.6	7.645	94.5	0.067	66.1	0.385	–47.5
1.2	0.245	–126.5	7.080	91.7	0.071	66.5	0.362	–48.6
1.3	0.239	–132.1	6.587	88.9	0.076	66.7	0.343	–49.9
1.4	0.239	–136.6	6.142	86.3	0.080	67.1	0.327	–51.2
1.5	0.238	–140.9	5.772	84.0	0.085	67.4	0.313	–52.6
1.6	0.238	–145.4	5.439	81.6	0.089	67.6	0.301	–54.2
1.7	0.236	–148.3	5.136	79.4	0.094	68.0	0.291	–55.7
1.8	0.237	–150.8	4.878	77.4	0.099	68.2	0.283	–57.3
1.9	0.236	–154.1	4.628	75.4	0.104	68.3	0.277	–59.1
2.0	0.237	–155.8	4.424	73.6	0.109	68.2	0.271	–60.8
2.1	0.233	–159.4	4.227	71.8	0.114	68.3	0.267	–62.6
2.2	0.233	–162.0	4.062	69.7	0.119	68.1	0.263	–64.8
2.3	0.232	–164.1	3.900	67.9	0.125	68.0	0.262	–66.6
2.4	0.233	–166.8	3.751	66.2	0.130	67.9	0.259	–68.7
2.5	0.234	–170.0	3.619	64.6	0.135	67.7	0.257	–70.5
2.6	0.234	–172.6	3.483	62.8	0.141	67.4	0.256	–72.8
2.7	0.233	–175.3	3.351	61.1	0.147	67.3	0.256	–74.5
2.8	0.238	–178.1	3.256	59.2	0.153	67.1	0.256	–76.6
2.9	0.240	–179.0	3.173	57.5	0.158	67.2	0.254	–77.9
3.0	0.243	178.2	3.069	56.0	0.164	66.8	0.252	–80.1
4.0	0.325	166.7	2.337	41.1	0.236	61.5	0.201	–109.7
5.0	0.463	160.2	1.834	24.5	0.314	44.4	0.174	–146.6

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	0.428	–23.4	29.961	159.0	0.010	83.9	0.884	–14.2
0.2	0.373	–41.7	25.683	142.5	0.018	74.9	0.782	–25.8
0.3	0.317	–58.5	21.883	130.7	0.025	72.6	0.675	–33.2
0.4	0.273	–73.0	18.582	120.9	0.031	71.5	0.585	–38.2
0.5	0.236	–85.5	15.880	113.9	0.036	71.2	0.513	–41.1
0.6	0.211	–96.8	13.809	108.3	0.041	71.2	0.457	–43.2
0.7	0.194	–108.3	12.158	103.6	0.047	71.4	0.411	–44.6
0.8	0.186	–118.2	10.857	99.6	0.052	71.7	0.374	–45.8
0.9	0.182	–126.0	9.781	96.2	0.057	71.7	0.344	–46.8
1.0	0.181	–133.6	8.877	93.2	0.062	71.9	0.318	–47.8
1.1	0.183	–140.6	8.151	90.5	0.068	71.9	0.297	–48.7
1.2	0.186	–145.8	7.525	88.1	0.073	72.3	0.278	–49.7
1.3	0.190	–150.9	6.978	85.6	0.079	71.9	0.262	–50.9
1.4	0.194	–153.9	6.493	83.4	0.084	71.9	0.248	–52.2
1.5	0.198	–157.2	6.097	81.3	0.090	71.8	0.237	–53.6
1.6	0.202	–160.9	5.728	79.3	0.095	71.5	0.227	–55.2
1.7	0.202	–163.3	5.406	77.2	0.101	71.4	0.218	–56.9
1.8	0.205	–165.7	5.122	75.5	0.106	71.0	0.212	–58.6
1.9	0.206	–167.7	4.860	73.8	0.112	71.0	0.207	–60.3
2.0	0.208	–168.6	4.642	72.1	0.118	70.5	0.202	–62.4
2.1	0.208	–172.3	4.432	70.4	0.123	70.1	0.199	–64.3
2.2	0.207	–174.4	4.256	68.7	0.129	69.8	0.197	–66.7
2.3	0.208	–176.5	4.083	66.9	0.135	69.3	0.195	–68.6
2.4	0.209	–179.0	3.925	65.3	0.141	68.7	0.194	–71.0
2.5	0.212	178.9	3.780	63.9	0.147	68.2	0.193	–73.0
2.6	0.214	176.6	3.637	62.3	0.153	67.6	0.192	–75.5
2.7	0.215	174.1	3.503	60.6	0.159	67.3	0.192	–77.5
2.8	0.218	172.0	3.399	59.0	0.165	66.7	0.192	–79.8
2.9	0.222	171.1	3.304	57.4	0.171	66.5	0.190	–81.1
3.0	0.224	168.9	3.195	55.9	0.176	65.9	0.190	–83.5
4.0	0.309	162.0	2.423	41.9	0.248	58.8	0.144	–119.6
5.0	0.444	157.3	1.886	26.8	0.317	41.7	0.131	–159.9

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	0.952	–6.1	3.476	173.7	0.011	87.4	0.996	–2.9
0.2	0.939	–12.5	3.416	168.6	0.021	81.5	0.990	–6.1
0.3	0.924	–19.1	3.414	163.5	0.031	76.6	0.979	–9.1
0.4	0.913	–25.7	3.403	157.4	0.041	73.1	0.968	–12.2
0.5	0.891	–32.4	3.339	151.8	0.050	69.1	0.954	–15.1
0.6	0.870	–38.9	3.286	146.4	0.058	64.7	0.937	–18.2
0.7	0.842	–46.0	3.213	140.9	0.066	60.8	0.918	–21.0
0.8	0.819	–52.7	3.152	135.6	0.072	57.2	0.897	–23.9
0.9	0.794	–59.3	3.075	130.4	0.077	53.5	0.878	–26.8
1.0	0.769	–65.8	2.983	125.3	0.081	50.1	0.856	–29.6
1.1	0.745	–72.3	2.888	120.4	0.084	47.1	0.836	–32.2
1.2	0.722	–78.0	2.790	116.2	0.086	44.3	0.814	–34.8
1.3	0.701	–83.9	2.699	111.6	0.087	41.9	0.795	–37.5
1.4	0.682	–89.5	2.591	107.3	0.087	40.0	0.777	–40.1
1.5	0.665	–94.8	2.505	103.2	0.087	38.5	0.761	–42.6
1.6	0.649	–99.9	2.425	99.3	0.085	37.4	0.746	–45.2
1.7	0.635	–104.5	2.334	95.2	0.084	36.9	0.732	–47.7
1.8	0.624	–108.9	2.249	91.7	0.082	36.9	0.721	–50.2
1.9	0.611	–113.1	2.173	88.3	0.079	37.5	0.710	–52.6
2.0	0.603	–116.8	2.104	85.3	0.077	38.6	0.698	–55.2
2.1	0.588	–121.1	2.038	82.1	0.074	40.1	0.690	–57.6
2.2	0.582	–125.0	1.982	79.1	0.071	42.5	0.684	–60.3
2.3	0.570	–128.8	1.918	76.2	0.069	45.5	0.678	–62.6
2.4	0.562	–132.3	1.860	73.5	0.068	49.1	0.672	–65.0
2.5	0.560	–136.4	1.810	70.8	0.068	53.6	0.666	–67.4
2.6	0.552	–139.8	1.745	68.2	0.068	59.0	0.661	–70.0
2.7	0.547	–143.6	1.693	65.5	0.070	64.3	0.659	–72.2
2.8	0.546	–146.8	1.655	62.7	0.073	69.6	0.659	–74.7
2.9	0.540	–150.4	1.629	60.1	0.077	75.2	0.654	–76.3
3.0	0.538	–153.7	1.579	58.0	0.082	79.8	0.649	–78.9
4.0	0.566	177.0	1.234	37.4	0.199	87.7	0.601	–107.0
5.0	0.638	157.6	0.955	15.3	0.345	59.3	0.479	–148.8

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	0.873	–8.6	9.284	171.0	0.011	89.2	0.985	–4.8
0.2	0.835	–17.7	8.953	163.0	0.020	78.4	0.966	–9.8
0.3	0.806	–26.9	8.719	155.7	0.029	74.3	0.939	–14.2
0.4	0.771	–35.2	8.437	147.8	0.037	69.7	0.905	–18.6
0.5	0.724	–43.8	8.004	140.8	0.044	66.2	0.867	–22.4
0.6	0.680	–51.6	7.599	134.4	0.050	62.5	0.827	–25.9
0.7	0.636	–59.9	7.170	128.4	0.055	59.7	0.787	–28.8
0.8	0.596	–67.1	6.784	122.8	0.059	57.4	0.748	–31.6
0.9	0.561	–74.4	6.399	117.6	0.062	55.4	0.713	–34.1
1.0	0.528	–81.0	6.017	112.8	0.064	54.3	0.680	–36.2
1.1	0.500	–87.5	5.679	108.5	0.066	53.4	0.651	–38.4
1.2	0.476	–93.5	5.347	104.7	0.068	52.8	0.624	–40.2
1.3	0.456	–99.1	5.065	100.6	0.070	52.8	0.600	–42.1
1.4	0.440	–104.2	4.769	97.2	0.071	53.2	0.579	–43.9
1.5	0.426	–109.1	4.541	93.9	0.073	53.9	0.561	–45.8
1.6	0.412	–113.8	4.318	90.7	0.074	54.8	0.545	–47.6
1.7	0.403	–117.6	4.117	87.6	0.076	56.0	0.531	–49.5
1.8	0.394	–121.7	3.927	84.9	0.078	57.3	0.521	–51.4
1.9	0.386	–124.8	3.755	82.3	0.079	58.8	0.510	–53.3
2.0	0.380	–128.3	3.604	79.9	0.081	60.3	0.501	–55.0
2.1	0.370	–131.6	3.460	77.4	0.083	62.0	0.495	–57.0
2.2	0.364	–134.9	3.340	75.0	0.086	63.5	0.489	–59.1
2.3	0.357	–138.1	3.214	72.6	0.089	64.8	0.485	–60.9
2.4	0.352	–141.3	3.105	70.4	0.092	66.4	0.480	–62.9
2.5	0.350	–144.5	2.998	68.4	0.096	68.0	0.476	–64.7
2.6	0.345	–147.7	2.887	66.3	0.100	69.3	0.473	–66.9
2.7	0.342	–151.3	2.787	64.0	0.105	70.8	0.472	–68.6
2.8	0.340	–153.8	2.715	61.7	0.110	72.1	0.472	–70.6
2.9	0.342	–156.9	2.657	59.7	0.115	73.8	0.469	–71.8
3.0	0.340	–159.7	2.574	57.8	0.119	74.6	0.465	–74.0
4.0	0.402	178.1	1.993	39.8	0.206	75.6	0.417	–98.5
5.0	0.538	165.0	1.576	18.6	0.319	55.8	0.358	–134.4

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	0.779	–10.5	13.917	168.8	0.010	85.6	0.973	–6.3
0.2	0.746	–22.0	13.213	158.7	0.019	75.8	0.942	–12.6
0.3	0.701	–31.9	12.534	150.2	0.027	73.7	0.897	–17.9
0.4	0.653	–41.9	11.812	141.3	0.034	69.1	0.846	–22.7
0.5	0.595	–51.1	10.927	133.6	0.040	66.4	0.795	–26.5
0.6	0.545	–59.1	10.101	127.1	0.044	63.3	0.742	–29.8
0.7	0.498	–67.4	9.326	121.2	0.049	61.8	0.695	–32.4
0.8	0.461	–74.8	8.643	115.8	0.052	60.9	0.653	–34.7
0.9	0.427	–82.1	8.006	111.0	0.055	60.0	0.616	–36.7
1.0	0.398	–88.4	7.437	106.7	0.058	59.8	0.583	–38.4
1.1	0.374	–95.0	6.931	102.8	0.061	59.9	0.555	–39.9
1.2	0.356	–101.0	6.476	99.4	0.064	60.2	0.528	–41.3
1.3	0.341	–106.4	6.077	95.9	0.067	60.8	0.507	–42.7
1.4	0.328	–110.9	5.698	92.8	0.069	61.4	0.488	–44.1
1.5	0.320	–115.6	5.390	90.1	0.072	62.4	0.473	–45.7
1.6	0.311	–120.3	5.108	87.3	0.075	63.2	0.458	–47.3
1.7	0.303	–124.2	4.840	84.6	0.078	64.2	0.445	–48.8
1.8	0.299	–127.3	4.603	82.2	0.082	65.0	0.436	–50.4
1.9	0.293	–130.9	4.391	79.9	0.085	66.1	0.428	–52.0
2.0	0.290	–133.8	4.206	77.7	0.088	67.0	0.421	–53.6
2.1	0.282	–137.2	4.027	75.5	0.092	67.9	0.415	–55.4
2.2	0.277	–140.0	3.880	73.4	0.096	68.5	0.410	–57.3
2.3	0.273	–143.2	3.726	71.3	0.100	69.0	0.408	–59.0
2.4	0.271	–146.0	3.589	69.3	0.104	69.9	0.404	–60.8
2.5	0.267	–149.3	3.468	67.5	0.109	70.4	0.400	–62.6
2.6	0.267	–152.4	3.336	65.6	0.114	70.9	0.398	–64.6
2.7	0.265	–154.8	3.221	63.6	0.119	71.6	0.398	–66.2
2.8	0.265	–158.0	3.132	61.6	0.125	72.0	0.398	–68.2
2.9	0.265	–160.6	3.055	59.7	0.130	72.8	0.395	–69.3
3.0	0.267	–163.6	2.962	58.1	0.134	73.1	0.393	–71.4
4.0	0.338	177.8	2.284	41.7	0.214	71.2	0.341	–94.9
5.0	0.485	168.0	1.819	22.8	0.311	53.3	0.296	–128.4

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	0.715	–12.6	17.576	167.0	0.009	82.2	0.962	–7.6
0.2	0.678	–24.4	16.393	155.5	0.018	78.5	0.920	–14.6
0.3	0.622	–35.9	15.295	145.9	0.025	72.7	0.862	–20.5
0.4	0.565	–46.2	14.103	136.5	0.032	69.3	0.799	–25.4
0.5	0.504	–55.6	12.794	128.9	0.037	66.8	0.738	–29.1
0.6	0.457	–63.9	11.622	122.3	0.041	65.3	0.684	–32.0
0.7	0.410	–71.8	10.579	116.6	0.046	64.0	0.635	–34.1
0.8	0.375	–79.4	9.702	111.5	0.049	64.0	0.593	–36.1
0.9	0.345	–86.3	8.914	107.1	0.053	63.8	0.558	–37.5
1.0	0.320	–92.9	8.205	103.2	0.056	64.1	0.525	–38.9
1.1	0.302	–99.7	7.608	99.7	0.060	64.5	0.499	–40.2
1.2	0.288	–105.5	7.081	96.4	0.063	64.9	0.476	–41.3
1.3	0.277	–111.2	6.629	93.4	0.066	65.5	0.455	–42.5
1.4	0.268	–115.4	6.199	90.6	0.070	66.0	0.437	–43.7
1.5	0.261	–119.9	5.843	87.9	0.074	66.9	0.423	–45.1
1.6	0.257	–124.9	5.515	85.5	0.077	67.2	0.410	–46.5
1.7	0.251	–128.4	5.237	82.9	0.081	68.1	0.399	–47.9
1.8	0.247	–131.3	4.963	80.7	0.085	68.7	0.391	–49.3
1.9	0.243	–134.8	4.726	78.6	0.089	69.3	0.384	–50.9
2.0	0.244	–137.4	4.522	76.7	0.093	69.8	0.377	–52.4
2.1	0.236	–140.6	4.328	74.7	0.098	70.1	0.372	–54.1
2.2	0.234	–143.5	4.163	72.6	0.102	70.5	0.367	–56.0
2.3	0.230	–146.3	3.999	70.7	0.106	70.8	0.366	–57.6
2.4	0.227	–148.8	3.848	68.8	0.111	71.0	0.363	–59.4
2.5	0.227	–152.6	3.713	67.1	0.116	71.2	0.360	–61.1
2.6	0.225	–155.1	3.567	65.4	0.121	71.4	0.358	–63.1
2.7	0.224	–158.3	3.440	63.5	0.127	71.6	0.358	–64.7
2.8	0.224	–161.1	3.348	61.5	0.132	71.7	0.358	–66.6
2.9	0.225	–163.8	3.264	59.8	0.137	72.3	0.355	–67.7
3.0	0.226	–166.3	3.162	58.2	0.142	72.3	0.353	–69.7
4.0	0.304	176.9	2.428	42.8	0.218	68.9	0.299	–93.1
5.0	0.457	168.5	1.940	24.8	0.308	51.7	0.261	–125.6

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

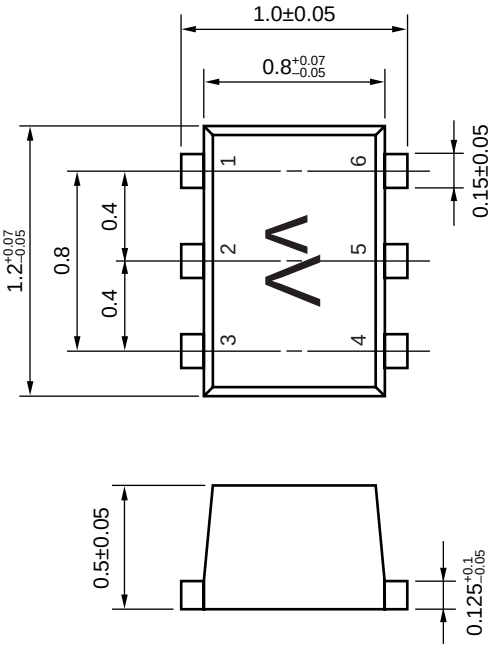
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.637	–14.8	21.965	164.8	0.010	83.2	0.948	–8.9
0.2	0.587	–27.8	20.062	151.7	0.017	78.8	0.889	–17.0
0.3	0.526	–39.9	18.254	141.3	0.024	73.0	0.817	–23.2
0.4	0.471	–50.7	16.367	131.6	0.029	70.4	0.745	–27.9
0.5	0.408	–59.7	14.570	124.0	0.035	68.7	0.679	–31.1
0.6	0.365	–68.0	13.041	117.7	0.039	67.8	0.622	–33.6
0.7	0.324	–76.1	11.704	112.4	0.043	67.6	0.574	–35.4
0.8	0.292	–83.8	10.634	107.7	0.047	67.6	0.534	–36.8
0.9	0.270	–90.8	9.697	103.6	0.051	67.9	0.501	–38.0
1.0	0.250	–97.8	8.878	100.0	0.055	68.4	0.471	–39.1
1.1	0.236	–104.3	8.203	96.8	0.059	68.6	0.447	–40.0
1.2	0.226	–110.4	7.593	93.9	0.063	69.2	0.426	–40.8
1.3	0.219	–116.3	7.089	91.1	0.067	69.7	0.408	–41.8
1.4	0.215	–120.8	6.617	88.4	0.071	70.1	0.392	–42.8
1.5	0.212	–125.0	6.234	86.2	0.076	70.5	0.380	–44.1
1.6	0.207	–129.8	5.878	83.9	0.080	70.8	0.367	–45.3
1.7	0.204	–133.1	5.564	81.5	0.084	71.2	0.358	–46.7
1.8	0.203	–135.6	5.279	79.6	0.089	71.4	0.350	–48.0
1.9	0.201	–139.3	5.017	77.5	0.093	71.7	0.344	–49.5
2.0	0.202	–142.3	4.776	75.6	0.098	71.9	0.338	–51.0
2.1	0.194	–145.2	4.573	73.8	0.102	72.0	0.333	–52.7
2.2	0.195	–147.9	4.406	71.9	0.107	71.9	0.330	–54.6
2.3	0.193	–150.6	4.229	70.0	0.112	71.9	0.329	–56.1
2.4	0.190	–153.7	4.067	68.3	0.117	71.9	0.326	–58.0
2.5	0.191	–156.5	3.920	66.8	0.123	71.8	0.323	–59.6
2.6	0.189	–159.7	3.771	65.0	0.128	71.7	0.322	–61.6
2.7	0.190	–162.4	3.637	63.3	0.134	71.7	0.322	–63.2
2.8	0.189	–164.8	3.530	61.5	0.139	71.5	0.322	–65.0
2.9	0.193	–167.3	3.439	59.9	0.144	71.8	0.320	–66.2
3.0	0.194	–169.6	3.331	58.4	0.150	71.5	0.318	–68.2
4.0	0.275	176.0	2.552	43.6	0.223	67.1	0.262	–91.7
5.0	0.430	169.3	2.036	27.1	0.306	50.3	0.228	–123.4

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

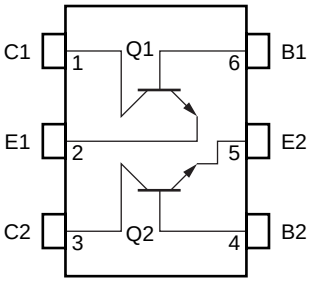
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.465	–18.5	30.468	160.3	0.008	84.6	0.909	–11.5
0.2	0.412	–33.3	26.532	144.8	0.015	76.9	0.821	–21.2
0.3	0.352	–46.4	22.972	133.3	0.021	74.2	0.726	–27.4
0.4	0.299	–57.7	19.710	123.6	0.026	73.8	0.643	–31.4
0.5	0.248	–66.8	17.017	116.4	0.031	73.7	0.578	–33.7
0.6	0.219	–74.6	14.874	110.9	0.036	73.7	0.525	–35.2
0.7	0.191	–83.7	13.151	106.2	0.041	74.1	0.481	–36.1
0.8	0.176	–92.3	11.784	102.1	0.046	74.1	0.447	–36.8
0.9	0.162	–100.2	10.656	98.7	0.050	74.3	0.419	–37.4
1.0	0.152	–108.1	9.689	95.6	0.055	74.6	0.394	–38.0
1.1	0.149	–115.6	8.916	92.8	0.060	74.6	0.374	–38.6
1.2	0.145	–122.6	8.232	90.4	0.064	74.8	0.356	–39.1
1.3	0.142	–127.6	7.650	88.0	0.070	74.6	0.341	–39.9
1.4	0.143	–132.6	7.133	85.7	0.075	74.8	0.328	–40.8
1.5	0.146	–136.6	6.697	83.6	0.080	74.7	0.317	–41.9
1.6	0.147	–141.8	6.306	81.7	0.084	74.8	0.307	–43.2
1.7	0.148	–144.3	5.966	79.5	0.090	74.6	0.299	–44.3
1.8	0.148	–146.9	5.653	77.8	0.095	74.4	0.292	–45.6
1.9	0.148	–149.6	5.370	76.1	0.100	74.2	0.287	–47.1
2.0	0.150	–151.3	5.109	74.4	0.105	73.9	0.282	–48.7
2.1	0.147	–154.5	4.885	72.7	0.110	73.6	0.279	–50.3
2.2	0.149	–157.1	4.692	71.0	0.116	73.4	0.276	–52.2
2.3	0.148	–159.5	4.495	69.3	0.121	73.0	0.276	–53.8
2.4	0.149	–162.6	4.322	67.7	0.126	72.5	0.273	–55.7
2.5	0.149	–165.4	4.172	66.2	0.132	72.1	0.272	–57.5
2.6	0.146	–168.7	4.011	64.7	0.138	71.8	0.270	–59.5
2.7	0.148	–171.5	3.863	63.1	0.143	71.5	0.271	–61.2
2.8	0.151	–173.6	3.753	61.5	0.149	70.9	0.271	–63.0
2.9	0.154	–175.5	3.647	60.0	0.154	70.9	0.269	–64.2
3.0	0.158	–178.1	3.532	58.6	0.160	70.6	0.268	–66.2
4.0	0.243	173.1	2.692	44.9	0.231	64.6	0.209	–90.6
5.0	0.396	169.0	2.137	30.1	0.306	47.9	0.179	–122.2

PACKAGE DIMENSIONS

6-PIN LEAD-LESS 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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►**Business issue**

NEC Compound Semiconductor Devices, Ltd.
5th Sales Group, Sales Division TEL: +81-3-3798-6372 FAX: +81-3-3798-6783 E-mail: salesinfo@csd-nec.com

NEC Compound Semiconductor Devices Hong Kong Limited
Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309
Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859
Korea Branch Office TEL: +82-2-528-0301 FAX: +82-2-528-0302

NEC Electron Devices European Operations http://www.nec.de/
TEL: +49-211-6503-101 FAX: +49-211-6503-487

California Eastern Laboratories, Inc. http://www.cel.com/
TEL: +1-408-988-3500 FAX: +1-408-988-0279

►**Technical issue**

NEC Compound Semiconductor Devices, Ltd. http://www.csd-nec.com/
Sales Engineering Group, Sales Division
E-mail: techinfo@csd-nec.com FAX: +81-44-435-1918