NEC

NPN SILICON RF TRANSISTOR
2SC5614

NPN SILICON RF TRANSISTOR FOR HIGH-FREQUENCY LOW NOISE 3-PIN LEAD-LESS MINIMOLD

FEATURES

- NF = 1.4 dB TYP., $|S_{21e}|^2$ = 10.0 dB TYP. @ V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz
- 3-pin lead-less minimold package

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5614	50 pcs (Non reel)	• 8 mm wide embossed taping
2SC5614-T3	10 kpcs/reel	• Pin 2 (Base) face the perforation side of the tape

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

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	12	V
Emitter to Base Voltage	V_{EBO}	3.0	V
Collector Current	I_C	100	mA
Total Power Dissipation	P_{tot} Note	140	mW
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

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

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ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I_{CBO}	V_{CB} = 10 V, I_E = 0 mA	–	–	1 000	nA
Emitter Cut-off Current	I_{EBO}	V_{BE} = 1 V, I_C = 0 mA	–	–	1 000	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 3 V, I_C = 7 mA	80	–	145	–
RF Characteristics						
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz	3.0	4.5	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz	7.0	10.0	–	dB
Noise Figure	NF	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz, $Z_S = Z_{opt}$	–	1.4	2.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 3 V, I_E = 0 mA, f = 1 MHz	–	0.7	1.5	pF

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

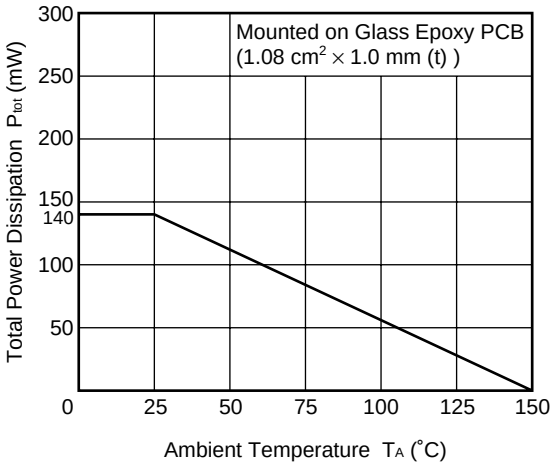
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

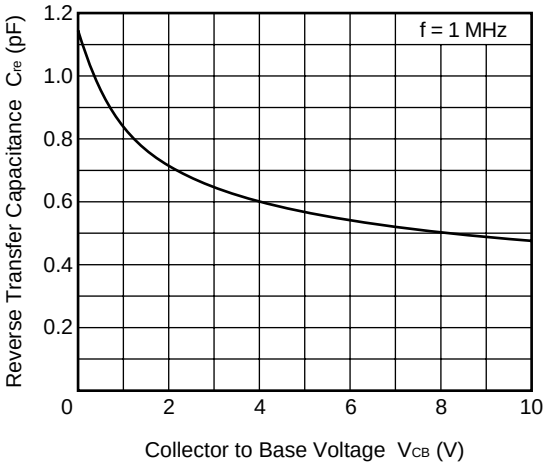
Rank	EB	FB
Marking	C1	C2
h_{FE} Value	80 to 110	100 to 145

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

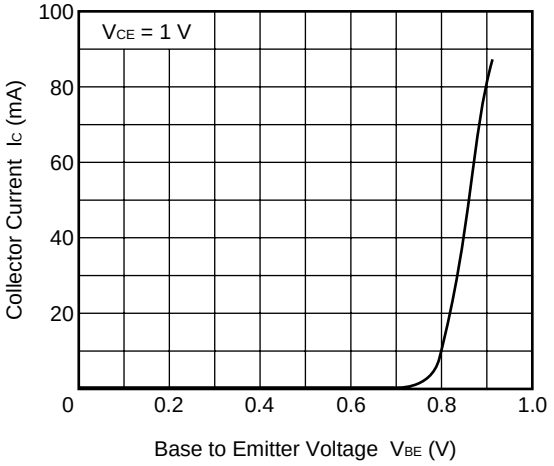
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



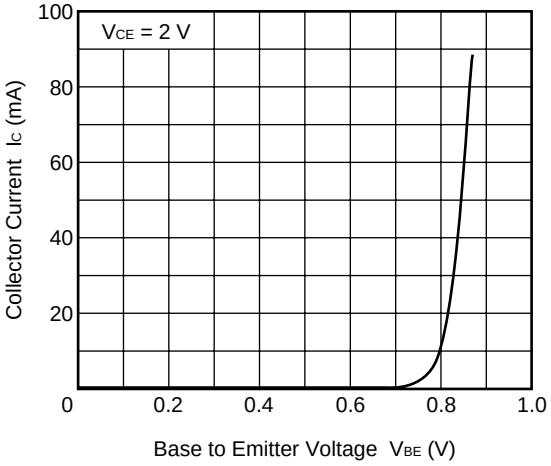
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



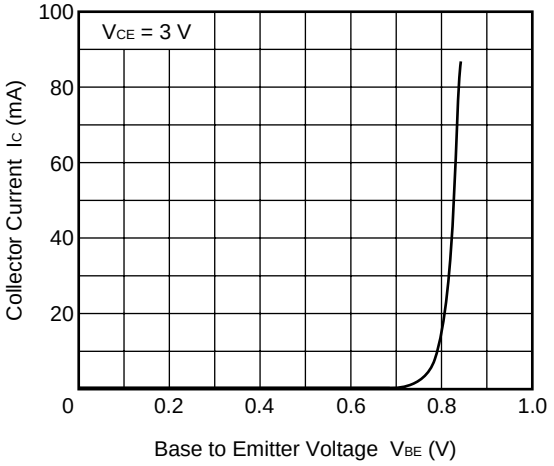
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



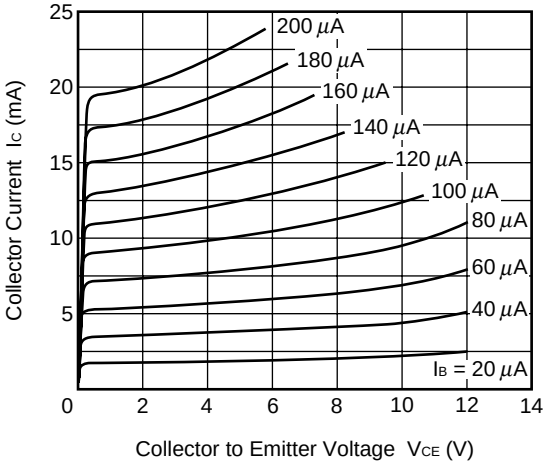
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



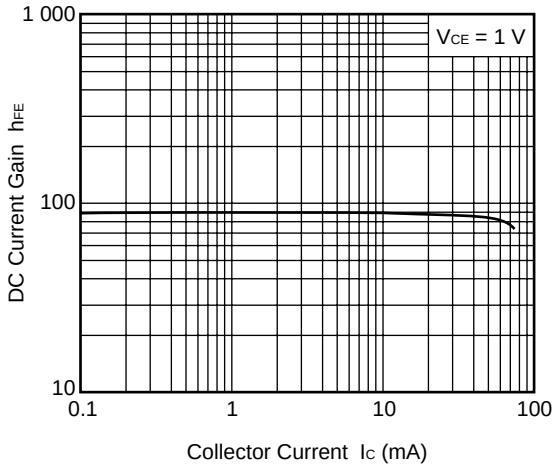
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



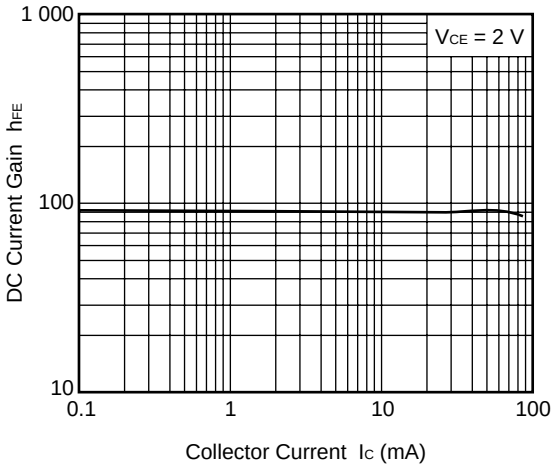
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



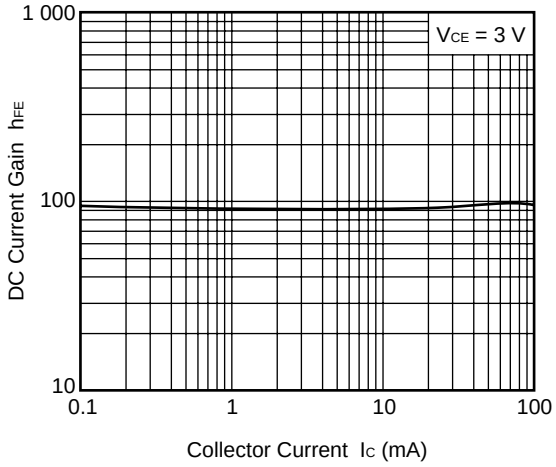
DC CURRENT GAIN vs.
COLLECTOR CURRENT



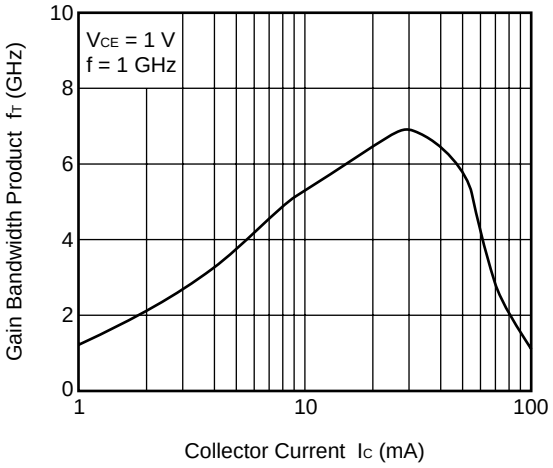
DC CURRENT GAIN vs.
COLLECTOR CURRENT



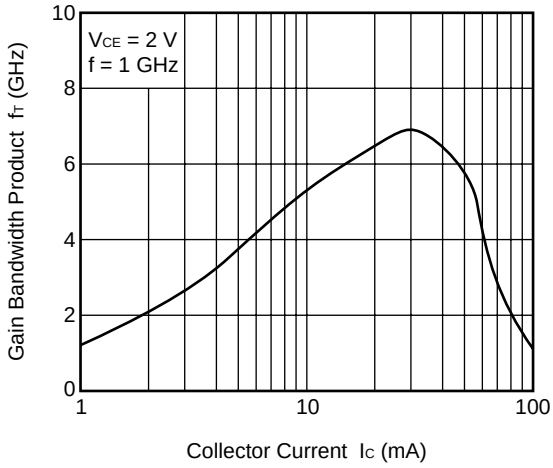
DC CURRENT GAIN vs.
COLLECTOR CURRENT



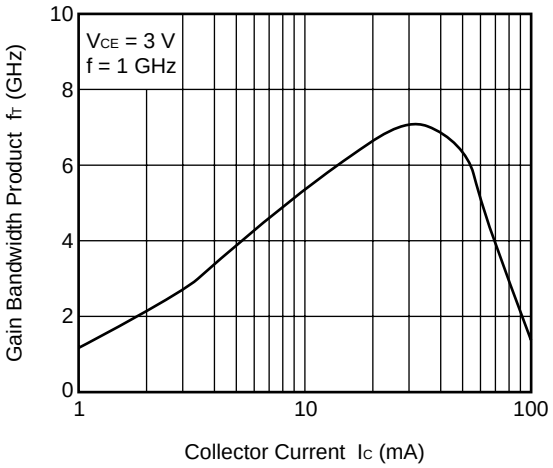
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



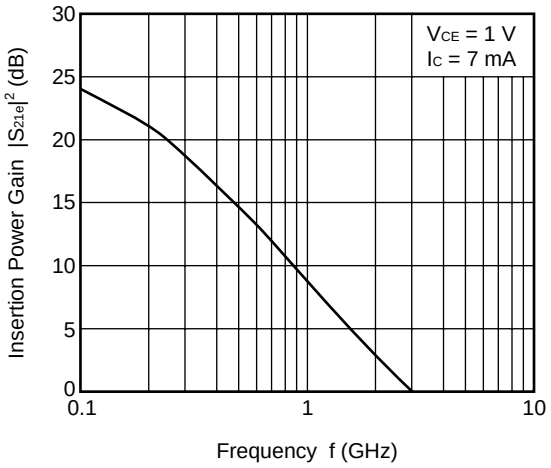
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



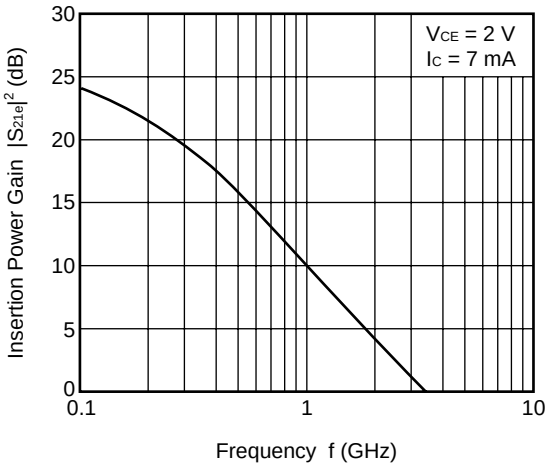
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



INSERTION POWER GAIN vs. FREQUENCY



INSERTION POWER GAIN vs. FREQUENCY



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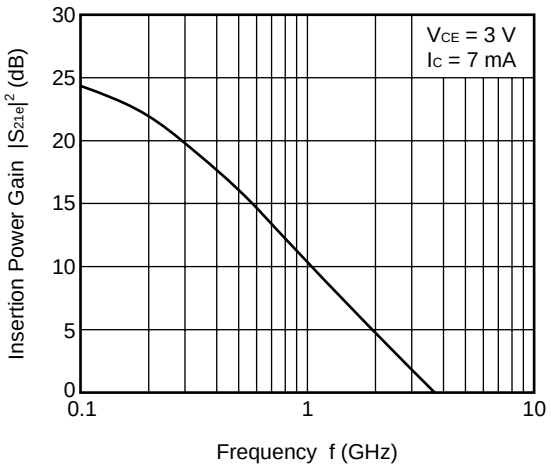
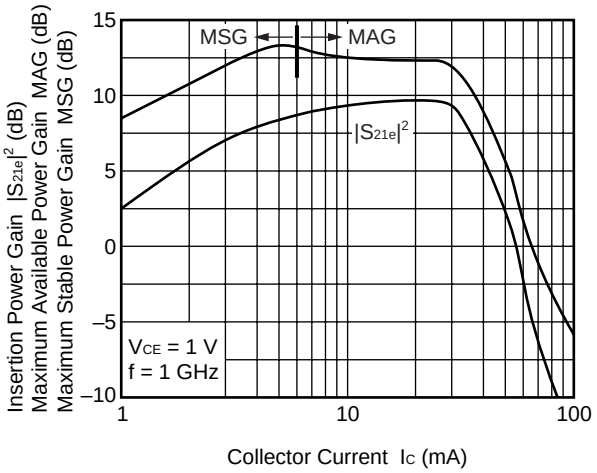
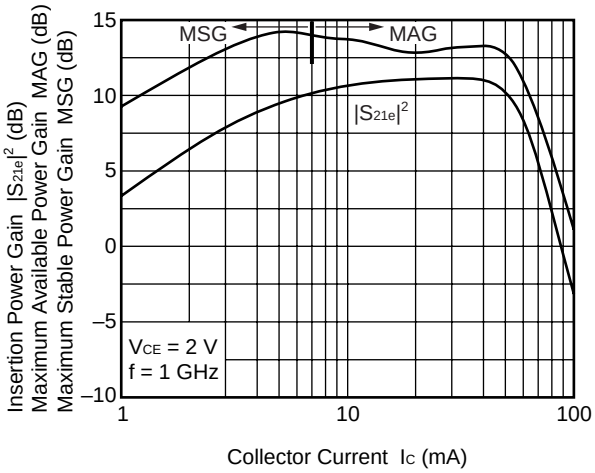


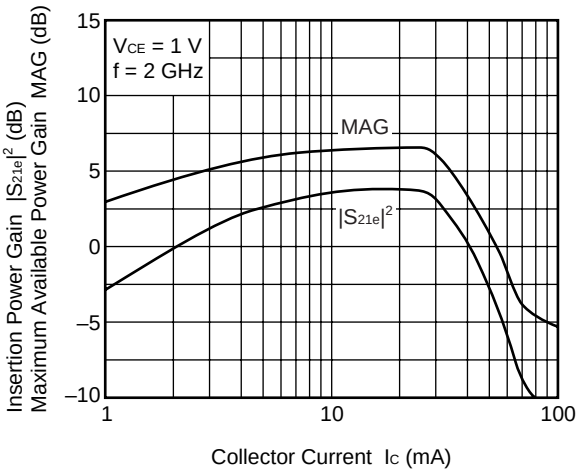
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



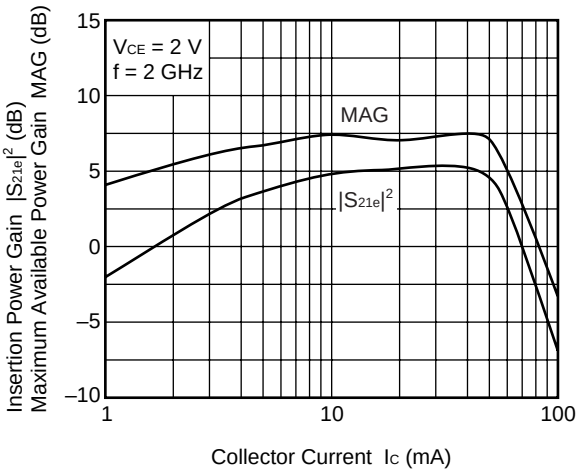
INSERTION POWER GAIN, MAG, MSG vs. COLLECTOR CURRENT



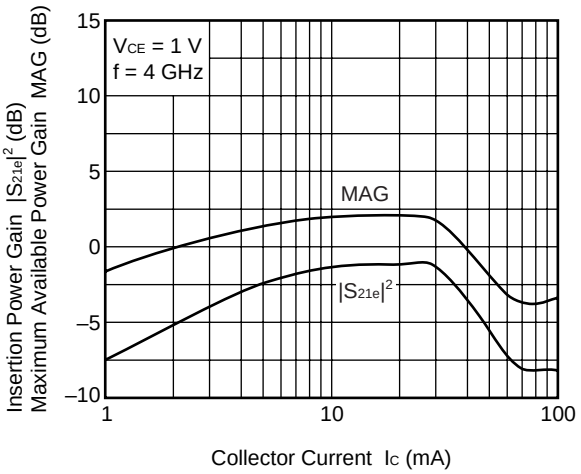
INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



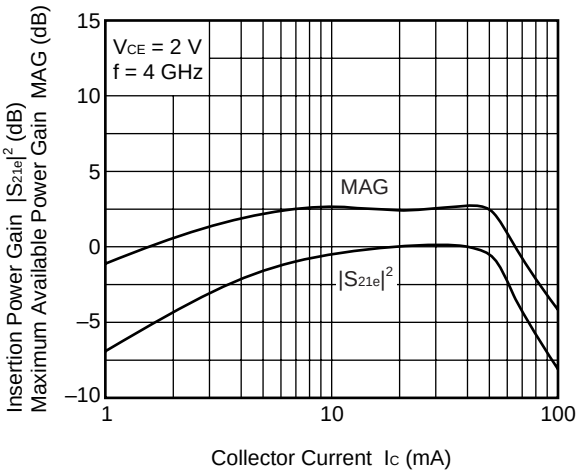
INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



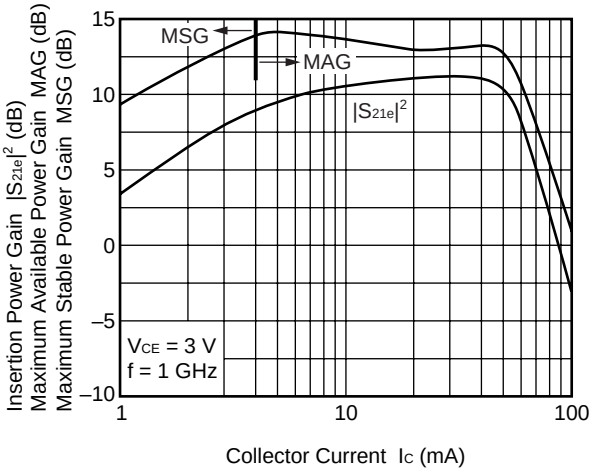
INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



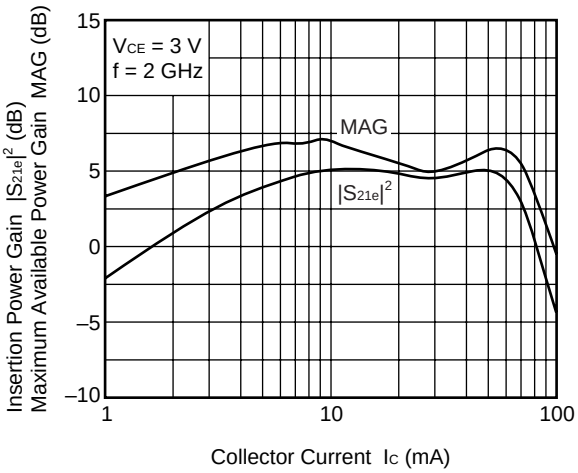
INSERTION POWER GAIN, MAG vs. COLLECTOR CURRENT



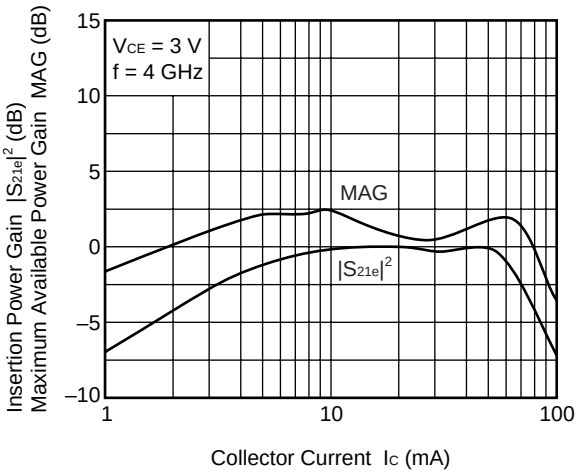
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



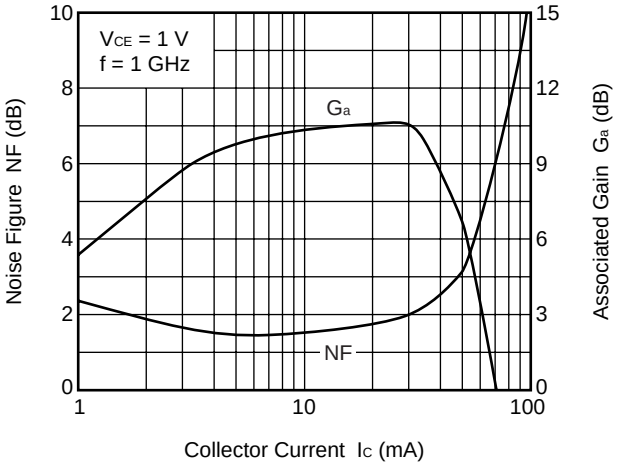
INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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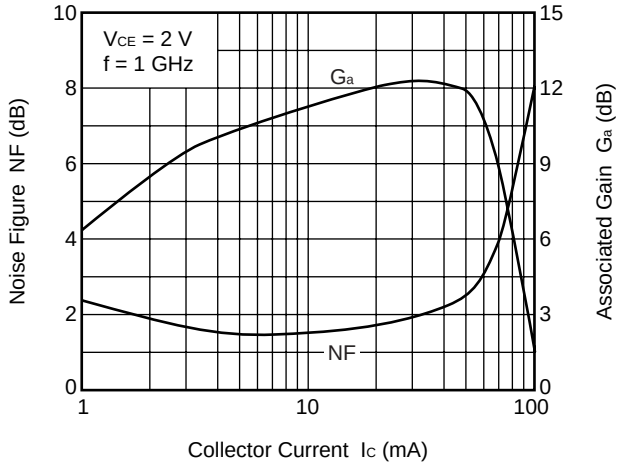

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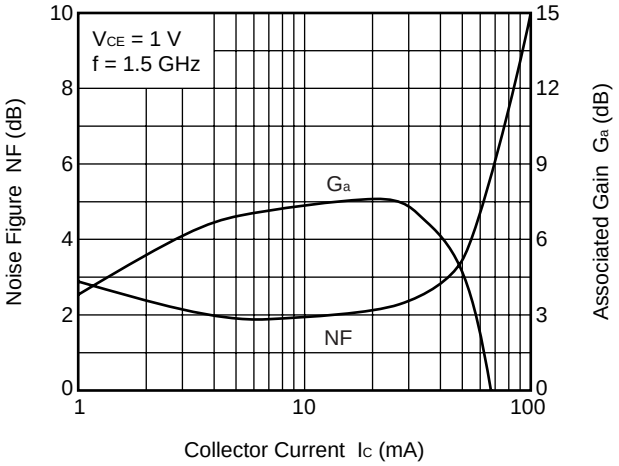

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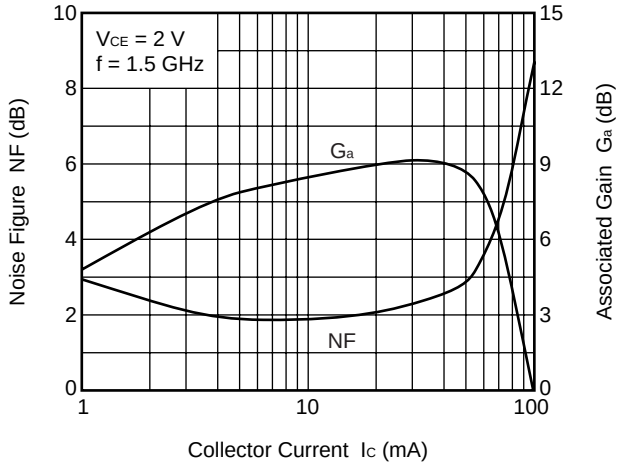

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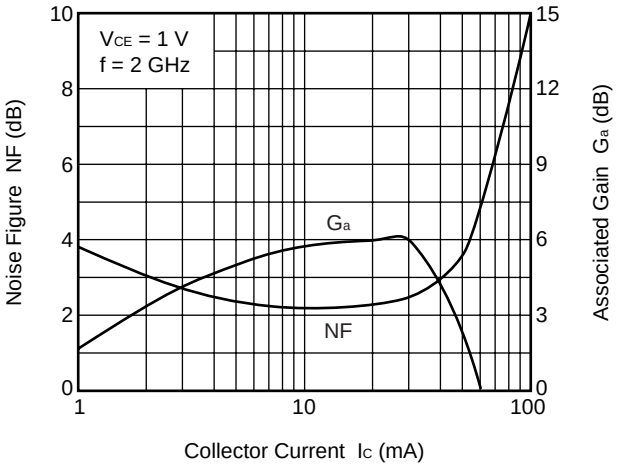

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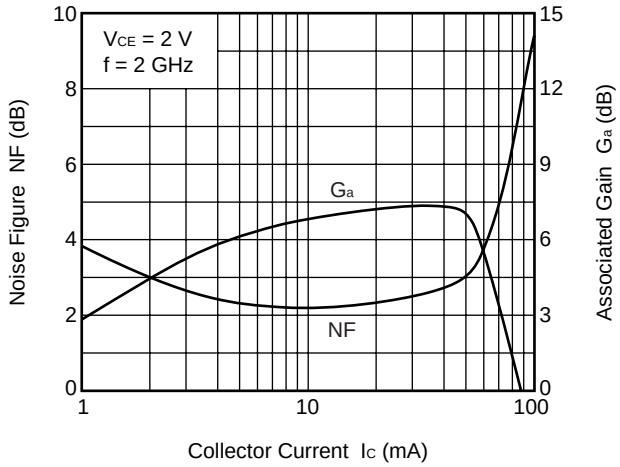

NOISE FIGURE, ASSOCIATED GAIN
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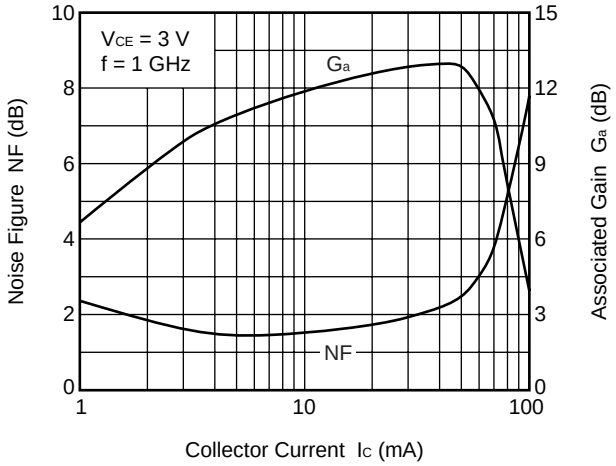

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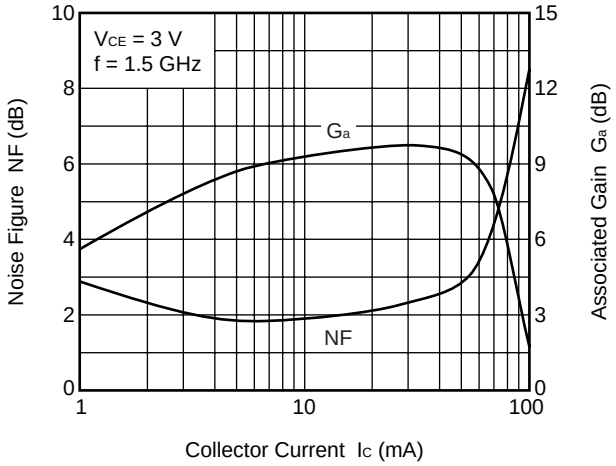
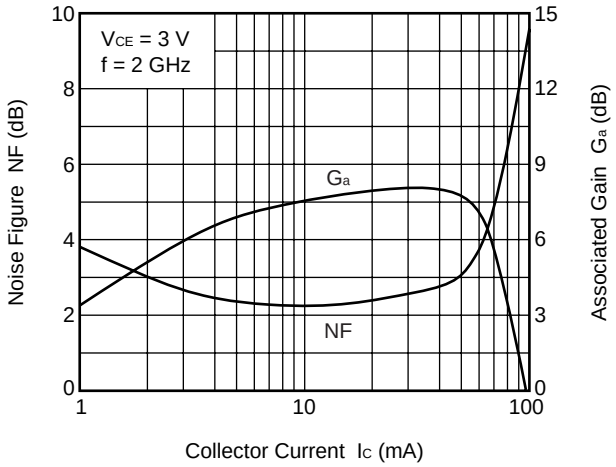


NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

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	0.931	–26.7	3.514	160.6	0.060	74.4	0.980	–10.6
0.2	0.914	–50.3	3.229	144.9	0.114	60.7	0.916	–20.0
0.3	0.844	–72.9	2.852	131.1	0.151	48.9	0.847	–27.2
0.4	0.813	–91.1	2.535	118.4	0.176	39.4	0.770	–33.1
0.5	0.780	–106.3	2.265	107.9	0.192	31.7	0.712	–37.3
0.6	0.747	–118.8	1.993	99.1	0.200	25.6	0.655	–41.1
0.7	0.728	–130.0	1.795	91.9	0.203	20.8	0.621	–44.0
0.8	0.712	–139.1	1.617	84.9	0.203	16.9	0.583	–47.0
0.9	0.707	–147.3	1.472	79.5	0.202	13.7	0.563	–49.9
1.0	0.706	–154.3	1.351	74.1	0.199	11.2	0.539	–53.0
1.1	0.700	–160.6	1.242	69.0	0.194	9.0	0.534	–56.2
1.2	0.702	–166.4	1.159	64.1	0.189	7.5	0.520	–59.4
1.3	0.703	–171.0	1.080	60.1	0.183	6.0	0.521	–62.5
1.4	0.701	–175.8	1.009	55.8	0.175	5.0	0.512	–65.9
1.5	0.702	–179.8	0.950	52.4	0.169	4.9	0.515	–69.2
1.6	0.707	176.0	0.894	48.5	0.161	5.1	0.509	–72.4
1.7	0.713	172.7	0.846	45.7	0.154	5.7	0.511	–75.8
1.8	0.715	168.9	0.802	42.0	0.147	7.3	0.506	–79.2
1.9	0.716	166.2	0.767	40.0	0.140	9.2	0.508	–82.7
2.0	0.729	163.3	0.724	36.9	0.135	12.2	0.506	–86.2
2.1	0.733	160.4	0.695	34.5	0.131	15.5	0.513	–90.1
2.2	0.741	158.1	0.678	33.2	0.128	19.5	0.511	–93.6
2.3	0.742	155.6	0.651	30.4	0.127	23.7	0.522	–97.4
2.4	0.748	152.7	0.628	29.8	0.126	27.8	0.521	–100.9
2.5	0.750	150.4	0.598	28.2	0.128	32.3	0.531	–104.7
2.6	0.757	147.9	0.575	26.1	0.131	36.0	0.531	–108.4
2.7	0.759	145.8	0.561	25.3	0.137	39.7	0.537	–111.9
2.8	0.766	143.6	0.542	24.0	0.144	42.7	0.541	–115.2
2.9	0.767	142.0	0.528	24.2	0.154	45.8	0.548	–118.6
3.0	0.766	139.3	0.508	23.3	0.163	48.1	0.543	–121.7
4.0	0.771	119.6	0.423	20.8	0.284	51.6	0.580	–154.3
5.0	0.797	104.7	0.434	19.3	0.400	37.6	0.619	171.3

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.826	–43.3	9.076	152.7	0.056	66.6	0.919	–22.4
0.2	0.782	–76.5	7.534	132.6	0.094	51.3	0.763	–38.8
0.3	0.710	–102.5	6.035	118.9	0.114	40.6	0.627	–49.1
0.4	0.688	–120.8	4.965	107.6	0.124	34.3	0.518	–56.3
0.5	0.668	–134.9	4.184	99.1	0.130	30.1	0.445	–60.7
0.6	0.646	–145.6	3.563	92.6	0.133	27.7	0.385	–64.9
0.7	0.641	–154.4	3.134	87.4	0.135	26.4	0.348	–67.8
0.8	0.635	–161.6	2.769	82.3	0.136	25.8	0.315	–71.5
0.9	0.638	–168.0	2.487	78.3	0.137	25.5	0.295	–74.5
1.0	0.640	–173.1	2.253	74.5	0.139	25.8	0.277	–78.5
1.1	0.639	–177.9	2.055	70.7	0.139	26.4	0.271	–81.5
1.2	0.642	177.9	1.898	67.0	0.140	27.3	0.261	–85.3
1.3	0.645	174.6	1.756	64.1	0.141	28.1	0.262	–88.0
1.4	0.646	170.6	1.634	60.5	0.142	29.2	0.255	–91.5
1.5	0.648	167.8	1.534	57.9	0.144	30.6	0.259	–94.1
1.6	0.654	164.4	1.443	54.8	0.146	32.0	0.253	–97.3
1.7	0.660	162.0	1.365	52.4	0.148	33.3	0.258	–100.1
1.8	0.662	159.0	1.294	49.4	0.152	35.0	0.254	–103.5
1.9	0.662	156.9	1.240	47.4	0.154	36.5	0.260	–106.5
2.0	0.673	154.5	1.176	44.6	0.158	38.0	0.259	–110.1
2.1	0.679	152.6	1.126	42.4	0.163	39.2	0.268	–113.4
2.2	0.682	150.8	1.095	40.8	0.167	40.6	0.270	–116.6
2.3	0.684	148.5	1.056	38.0	0.173	41.7	0.281	–119.8
2.4	0.689	146.3	1.020	36.9	0.177	42.7	0.282	–122.6
2.5	0.696	144.5	0.976	35.2	0.183	43.7	0.293	–125.6
2.6	0.700	142.5	0.944	32.9	0.189	44.2	0.297	–128.2
2.7	0.702	140.8	0.922	31.3	0.196	44.8	0.306	–131.1
2.8	0.708	139.2	0.893	29.6	0.202	45.0	0.310	–133.7
2.9	0.711	137.9	0.871	28.9	0.212	45.6	0.319	–136.4
3.0	0.710	135.4	0.838	27.3	0.219	46.0	0.319	–138.9
4.0	0.728	118.7	0.649	15.1	0.304	44.5	0.392	–165.5
5.0	0.774	105.5	0.568	7.7	0.392	33.9	0.467	164.5

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.747	–55.2	12.992	146.6	0.052	62.3	0.862	–31.5
0.2	0.707	–93.9	9.964	124.9	0.081	46.9	0.654	–51.8
0.3	0.653	–120.2	7.563	112.2	0.092	38.8	0.505	–63.9
0.4	0.640	–136.3	6.014	102.1	0.099	35.3	0.402	–72.4
0.5	0.628	–148.6	4.966	94.7	0.104	33.5	0.335	–78.1
0.6	0.616	–157.7	4.191	89.4	0.108	33.1	0.284	–84.2
0.7	0.614	–165.2	3.653	85.0	0.111	33.6	0.253	–88.7
0.8	0.613	–171.2	3.219	80.5	0.115	34.3	0.228	–94.4
0.9	0.621	–176.8	2.883	77.2	0.119	35.1	0.213	–98.6
1.0	0.626	179.1	2.606	73.9	0.123	36.2	0.202	–104.5
1.1	0.625	175.2	2.368	70.5	0.127	37.4	0.199	–107.8
1.2	0.629	171.7	2.183	67.2	0.132	38.6	0.194	–112.9
1.3	0.631	168.7	2.018	64.7	0.136	39.5	0.196	–115.1
1.4	0.632	165.3	1.876	61.6	0.140	40.4	0.193	–119.5
1.5	0.636	162.6	1.762	59.2	0.145	41.6	0.197	–121.2
1.6	0.641	159.7	1.656	56.3	0.150	42.6	0.194	–125.1
1.7	0.648	157.6	1.565	54.2	0.156	43.3	0.198	–127.1
1.8	0.650	154.8	1.483	51.5	0.161	44.3	0.197	–131.0
1.9	0.649	152.9	1.423	49.5	0.167	44.8	0.204	–133.1
2.0	0.657	151.1	1.344	47.1	0.173	45.5	0.205	–136.7
2.1	0.666	149.1	1.294	45.0	0.180	45.8	0.215	–138.9
2.2	0.669	147.4	1.255	43.5	0.186	46.3	0.217	–141.9
2.3	0.669	145.6	1.209	40.7	0.193	46.5	0.228	–144.0
2.4	0.677	143.5	1.170	39.7	0.199	46.7	0.230	–146.2
2.5	0.678	141.8	1.121	37.9	0.206	46.9	0.240	–148.0
2.6	0.683	139.9	1.084	35.6	0.212	46.9	0.243	–150.0
2.7	0.684	138.5	1.056	34.2	0.219	46.7	0.253	–151.9
2.8	0.690	136.8	1.028	32.5	0.226	46.4	0.255	–153.9
2.9	0.692	135.7	1.001	31.5	0.235	46.3	0.264	–155.7
3.0	0.692	133.6	0.970	29.9	0.242	46.2	0.265	–158.0
4.0	0.712	118.1	0.754	16.2	0.318	42.1	0.337	–178.3
5.0	0.764	105.6	0.651	6.7	0.392	31.9	0.416	155.8

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	0.695	–66.2	15.799	142.1	0.048	59.6	0.812	–38.7
0.2	0.660	–105.9	11.398	119.8	0.071	45.2	0.580	–61.5
0.3	0.627	–131.3	8.392	108.1	0.080	39.2	0.435	–74.9
0.4	0.617	–145.8	6.569	98.9	0.086	37.5	0.342	–85.0
0.5	0.614	–156.6	5.363	92.3	0.092	37.1	0.284	–92.2
0.6	0.605	–164.4	4.519	87.5	0.096	38.1	0.243	–100.2
0.7	0.605	–171.0	3.924	83.5	0.101	39.3	0.218	–106.1
0.8	0.607	–176.5	3.449	79.5	0.106	40.7	0.201	–113.5
0.9	0.616	178.9	3.084	76.5	0.112	41.7	0.191	–118.7
1.0	0.622	175.0	2.784	73.3	0.118	42.8	0.187	–125.4
1.1	0.619	171.4	2.527	70.4	0.123	44.1	0.186	–128.6
1.2	0.623	168.1	2.329	67.3	0.130	45.1	0.185	–133.9
1.3	0.628	165.4	2.154	64.8	0.136	45.8	0.188	–135.6
1.4	0.631	162.4	2.001	62.0	0.142	46.5	0.188	–140.1
1.5	0.630	159.9	1.878	59.9	0.149	47.2	0.191	–141.3
1.6	0.638	157.0	1.764	57.1	0.155	47.8	0.191	–145.2
1.7	0.642	155.1	1.665	55.1	0.161	48.1	0.195	–146.6
1.8	0.646	152.4	1.579	52.5	0.168	48.6	0.196	–150.4
1.9	0.647	150.8	1.516	50.6	0.175	48.7	0.202	–151.7
2.0	0.649	148.9	1.434	48.3	0.182	49.0	0.205	–155.3
2.1	0.658	147.1	1.377	46.2	0.189	48.8	0.213	–156.5
2.2	0.663	145.5	1.337	44.7	0.197	48.9	0.216	–159.1
2.3	0.663	143.8	1.289	42.1	0.204	48.8	0.226	–160.5
2.4	0.668	141.9	1.247	41.1	0.210	48.6	0.228	–162.4
2.5	0.674	140.4	1.195	39.4	0.218	48.5	0.237	–163.4
2.6	0.676	138.5	1.155	37.2	0.224	48.1	0.239	–165.1
2.7	0.679	136.9	1.132	35.7	0.231	47.7	0.247	–166.3
2.8	0.682	135.5	1.098	34.1	0.238	47.1	0.249	–168.1
2.9	0.684	134.5	1.068	33.0	0.247	46.8	0.258	–169.4
3.0	0.683	132.4	1.034	31.5	0.255	46.4	0.258	–171.5
4.0	0.703	117.5	0.808	17.3	0.326	40.9	0.325	172.2
5.0	0.757	105.5	0.696	7.0	0.394	30.8	0.401	149.1

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	0.634	–79.8	18.820	136.8	0.043	54.1	0.749	–47.6
0.2	0.624	–119.7	12.703	114.7	0.061	44.0	0.506	–72.9
0.3	0.605	–142.2	9.081	104.1	0.068	40.9	0.374	–88.0
0.4	0.605	–154.8	7.016	96.0	0.074	41.5	0.298	–100.1
0.5	0.606	–163.6	5.685	90.0	0.081	42.4	0.252	–108.9
0.6	0.601	–171.0	4.774	85.8	0.087	44.1	0.223	–118.7
0.7	0.601	–176.6	4.141	82.2	0.093	45.8	0.206	–125.7
0.8	0.605	178.7	3.634	78.5	0.100	47.2	0.198	–133.8
0.9	0.612	174.6	3.247	75.7	0.107	48.3	0.193	–139.0
1.0	0.619	171.2	2.928	72.8	0.115	49.2	0.195	–145.1
1.1	0.619	167.8	2.656	70.1	0.122	50.2	0.196	–147.9
1.2	0.624	164.8	2.445	67.3	0.130	50.9	0.200	–152.5
1.3	0.625	162.4	2.263	65.0	0.137	51.1	0.202	–153.8
1.4	0.629	159.8	2.098	62.2	0.144	51.5	0.204	–157.7
1.5	0.629	157.4	1.968	60.3	0.152	51.8	0.207	–158.6
1.6	0.637	154.7	1.848	57.7	0.160	52.1	0.208	–162.2
1.7	0.641	153.1	1.748	55.8	0.167	52.0	0.212	–163.1
1.8	0.645	150.3	1.655	53.5	0.175	52.2	0.215	–166.7
1.9	0.644	149.1	1.592	51.6	0.182	51.9	0.220	–167.5
2.0	0.651	147.1	1.506	49.3	0.191	51.8	0.224	–170.6
2.1	0.658	145.4	1.445	47.2	0.198	51.4	0.231	–171.2
2.2	0.660	144.1	1.404	45.8	0.206	51.2	0.235	–173.6
2.3	0.660	142.4	1.351	43.4	0.214	50.6	0.243	–174.4
2.4	0.667	140.4	1.308	42.3	0.221	50.2	0.245	–176.2
2.5	0.670	139.0	1.252	40.7	0.228	49.8	0.252	–176.7
2.6	0.673	137.2	1.210	38.6	0.236	49.2	0.254	–178.2
2.7	0.672	135.7	1.186	37.0	0.243	48.6	0.261	–179.1
2.8	0.680	134.3	1.149	35.5	0.249	47.8	0.262	179.2
2.9	0.678	133.2	1.124	34.4	0.259	47.3	0.269	178.4
3.0	0.680	131.2	1.087	32.9	0.266	46.7	0.269	176.4
4.0	0.697	116.8	0.852	18.5	0.335	40.0	0.328	162.9
5.0	0.749	105.3	0.734	7.6	0.397	29.7	0.399	142.3

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	0.554	–109.6	23.098	126.9	0.035	49.2	0.618	–65.7
0.2	0.593	–143.2	13.919	106.4	0.046	45.9	0.399	–95.5
0.3	0.598	–159.8	9.647	98.3	0.053	46.9	0.307	–113.4
0.4	0.604	–168.1	7.354	91.5	0.061	50.4	0.264	–127.5
0.5	0.607	–174.6	5.895	86.7	0.070	52.6	0.240	–137.3
0.6	0.605	–179.9	4.939	83.1	0.079	54.7	0.232	–146.9
0.7	0.611	175.4	4.279	80.0	0.087	56.1	0.226	–153.2
0.8	0.611	171.9	3.745	76.8	0.096	57.1	0.229	–159.4
0.9	0.622	168.6	3.346	74.4	0.105	57.5	0.230	–163.2
1.0	0.628	165.8	3.007	71.8	0.115	57.9	0.238	–167.3
1.1	0.627	163.0	2.734	69.3	0.124	58.2	0.241	–169.3
1.2	0.630	160.5	2.512	66.8	0.133	58.3	0.247	–172.4
1.3	0.634	158.5	2.326	64.7	0.142	58.0	0.249	–173.2
1.4	0.635	155.9	2.155	62.2	0.150	57.7	0.254	–176.1
1.5	0.638	153.9	2.024	60.3	0.160	57.5	0.255	–176.7
1.6	0.644	151.4	1.898	57.9	0.168	57.2	0.259	–179.5
1.7	0.650	149.9	1.792	56.2	0.176	56.7	0.261	179.6
1.8	0.652	147.7	1.700	54.0	0.185	56.2	0.266	176.9
1.9	0.651	146.1	1.639	52.2	0.194	55.7	0.270	176.3
2.0	0.655	144.6	1.546	50.2	0.202	55.1	0.275	173.8
2.1	0.661	143.0	1.485	48.0	0.211	54.2	0.280	173.3
2.2	0.667	141.5	1.442	46.7	0.219	53.6	0.284	171.3
2.3	0.667	140.0	1.389	44.4	0.228	52.7	0.291	170.7
2.4	0.672	138.2	1.346	43.3	0.235	52.1	0.291	169.2
2.5	0.672	136.8	1.287	41.9	0.243	51.4	0.297	168.8
2.6	0.675	135.1	1.245	39.8	0.250	50.6	0.298	167.4
2.7	0.678	133.7	1.222	38.4	0.258	49.8	0.303	166.8
2.8	0.682	132.4	1.186	36.7	0.265	48.8	0.304	165.3
2.9	0.683	131.4	1.158	35.8	0.274	48.1	0.309	164.6
3.0	0.682	129.4	1.122	34.3	0.281	47.2	0.308	162.6
4.0	0.693	115.8	0.884	20.1	0.348	38.9	0.357	151.3
5.0	0.745	104.8	0.766	8.9	0.402	28.0	0.419	133.2

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	0.948	–24.3	3.545	162.2	0.047	75.8	0.987	–8.5
0.2	0.925	–46.4	3.295	148.1	0.090	63.3	0.938	–16.0
0.3	0.856	–67.5	2.954	135.2	0.123	52.5	0.884	–21.9
0.4	0.826	–85.3	2.664	122.9	0.144	43.3	0.819	–26.9
0.5	0.792	–100.5	2.405	112.9	0.159	35.6	0.769	–30.4
0.6	0.752	–113.2	2.132	104.1	0.168	29.6	0.716	–33.7
0.7	0.734	–124.6	1.934	97.0	0.172	24.8	0.684	–36.2
0.8	0.715	–134.0	1.748	90.1	0.172	20.9	0.649	–38.7
0.9	0.707	–142.7	1.594	84.8	0.172	17.6	0.628	–41.2
1.0	0.704	–150.1	1.464	79.5	0.169	15.3	0.605	–43.6
1.1	0.698	–156.9	1.349	74.5	0.166	13.2	0.598	–46.5
1.2	0.696	–163.0	1.254	69.7	0.161	11.9	0.583	–49.1
1.3	0.696	–167.9	1.168	65.6	0.156	10.5	0.583	–51.9
1.4	0.693	–173.0	1.095	61.3	0.150	9.9	0.573	–54.7
1.5	0.692	–177.3	1.031	58.0	0.145	10.0	0.576	–57.7
1.6	0.697	178.3	0.969	54.1	0.139	10.4	0.567	–60.6
1.7	0.704	174.7	0.920	51.4	0.133	11.3	0.568	–63.7
1.8	0.704	170.7	0.868	47.6	0.127	13.3	0.559	–66.5
1.9	0.706	167.9	0.830	45.5	0.121	15.7	0.561	–69.7
2.0	0.716	164.4	0.786	42.4	0.117	19.1	0.554	–72.7
2.1	0.724	161.7	0.752	40.1	0.115	23.0	0.560	–76.3
2.2	0.726	159.3	0.737	38.4	0.112	27.4	0.556	–79.3
2.3	0.728	156.5	0.705	35.9	0.112	31.9	0.564	–82.9
2.4	0.734	153.6	0.681	35.1	0.113	36.5	0.561	–86.1
2.5	0.737	151.2	0.649	33.6	0.116	41.0	0.567	–89.8
2.6	0.742	148.7	0.625	31.2	0.120	44.6	0.566	–93.3
2.7	0.744	146.5	0.610	29.9	0.127	48.3	0.571	–96.9
2.8	0.750	144.4	0.589	28.8	0.135	50.9	0.573	–99.9
2.9	0.750	142.7	0.570	28.8	0.145	53.9	0.577	–103.1
3.0	0.752	139.8	0.549	27.5	0.155	56.2	0.570	–106.1
4.0	0.756	119.5	0.447	23.3	0.278	58.3	0.588	–138.7
5.0	0.783	104.7	0.450	21.1	0.403	43.5	0.610	–174.5

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	0.846	–37.1	9.050	155.7	0.046	71.1	0.945	–17.1
0.2	0.797	–67.1	7.778	137.4	0.078	55.9	0.816	–30.2
0.3	0.719	–92.1	6.420	123.8	0.096	45.0	0.697	–38.7
0.4	0.685	–110.9	5.380	112.3	0.108	38.8	0.593	–44.3
0.5	0.656	–125.6	4.599	103.7	0.114	34.3	0.523	–47.5
0.6	0.631	–137.2	3.944	97.0	0.118	31.5	0.461	–50.3
0.7	0.619	–146.8	3.480	91.5	0.120	29.9	0.424	–52.1
0.8	0.609	–154.9	3.084	86.3	0.121	29.2	0.387	–54.2
0.9	0.610	–161.9	2.775	82.3	0.123	28.8	0.366	–56.2
1.0	0.613	–167.6	2.516	78.4	0.124	29.2	0.344	–58.7
1.1	0.610	–172.9	2.295	74.6	0.125	29.7	0.336	–61.0
1.2	0.613	–177.5	2.123	70.8	0.126	30.6	0.322	–63.5
1.3	0.615	178.6	1.963	67.7	0.127	31.4	0.321	–65.9
1.4	0.615	174.5	1.828	64.3	0.128	32.7	0.311	–68.5
1.5	0.618	171.3	1.716	61.6	0.130	34.1	0.313	–70.9
1.6	0.622	167.5	1.611	58.4	0.131	35.6	0.303	–73.4
1.7	0.629	164.8	1.526	56.1	0.134	37.0	0.305	–76.1
1.8	0.631	161.5	1.442	53.0	0.137	38.8	0.298	–78.7
1.9	0.632	159.5	1.383	51.0	0.139	40.4	0.300	–81.8
2.0	0.643	156.8	1.305	48.3	0.144	42.1	0.296	–84.7
2.1	0.649	154.5	1.254	46.0	0.148	43.6	0.301	–88.2
2.2	0.654	152.8	1.218	44.4	0.152	45.1	0.299	–91.1
2.3	0.655	150.5	1.170	41.8	0.157	46.3	0.306	–94.7
2.4	0.661	148.1	1.132	40.5	0.162	47.4	0.305	–97.4
2.5	0.665	146.3	1.082	38.6	0.168	48.5	0.313	–100.8
2.6	0.671	144.3	1.045	36.2	0.173	49.0	0.314	–103.7
2.7	0.674	142.4	1.022	34.8	0.181	49.8	0.320	–106.9
2.8	0.679	140.6	0.988	32.9	0.187	50.0	0.323	–109.5
2.9	0.681	139.3	0.959	31.9	0.197	50.7	0.328	–112.6
3.0	0.683	137.1	0.925	30.4	0.204	51.2	0.326	–115.1
4.0	0.706	119.8	0.711	17.1	0.291	50.1	0.376	–145.1
5.0	0.755	106.3	0.612	9.0	0.388	39.6	0.434	–179.1

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	0.764	–46.1	13.036	150.9	0.042	67.8	0.902	–23.9
0.2	0.715	–81.5	10.486	130.4	0.069	52.0	0.724	–40.1
0.3	0.646	–107.6	8.238	117.3	0.081	43.4	0.582	–49.4
0.4	0.617	–125.0	6.672	106.7	0.089	39.4	0.474	–55.4
0.5	0.603	–138.5	5.571	99.1	0.094	36.8	0.404	–58.8
0.6	0.583	–148.9	4.729	93.3	0.098	36.1	0.347	–62.0
0.7	0.578	–157.5	4.135	88.7	0.101	36.3	0.311	–64.0
0.8	0.575	–164.2	3.649	84.1	0.104	36.8	0.278	–66.9
0.9	0.581	–170.4	3.270	80.7	0.108	37.6	0.260	–69.1
1.0	0.584	–175.3	2.957	77.2	0.112	38.5	0.241	–72.5
1.1	0.583	180.0	2.691	73.9	0.115	39.8	0.234	–75.0
1.2	0.587	175.9	2.481	70.6	0.119	41.1	0.222	–78.3
1.3	0.589	172.7	2.296	67.8	0.123	41.9	0.221	–80.7
1.4	0.591	169.0	2.133	64.8	0.127	43.0	0.213	–83.8
1.5	0.594	166.2	2.001	62.4	0.132	44.1	0.215	–86.0
1.6	0.599	162.6	1.878	59.6	0.137	45.2	0.207	–89.0
1.7	0.606	160.7	1.775	57.5	0.142	45.9	0.209	–91.5
1.8	0.609	157.7	1.681	54.6	0.147	47.0	0.203	–94.7
1.9	0.610	155.6	1.610	52.7	0.152	47.7	0.207	–97.6
2.0	0.616	153.6	1.520	50.2	0.158	48.6	0.202	–101.1
2.1	0.626	151.4	1.461	48.0	0.164	49.2	0.209	–104.5
2.2	0.632	149.8	1.416	46.4	0.170	49.8	0.207	–107.5
2.3	0.631	147.8	1.362	43.9	0.176	50.2	0.216	–111.0
2.4	0.637	145.5	1.319	42.8	0.182	50.4	0.215	–113.5
2.5	0.642	144.0	1.261	41.0	0.189	50.8	0.224	–116.7
2.6	0.646	142.1	1.216	38.6	0.195	50.5	0.226	–119.1
2.7	0.648	140.4	1.192	37.1	0.202	50.6	0.232	–122.1
2.8	0.654	138.8	1.152	35.3	0.209	50.3	0.234	–124.2
2.9	0.655	137.6	1.119	34.2	0.218	50.5	0.240	–127.1
3.0	0.656	135.4	1.081	32.6	0.225	50.4	0.239	–129.5
4.0	0.684	119.5	0.832	18.1	0.302	47.1	0.298	–156.4
5.0	0.742	106.7	0.705	7.8	0.384	37.3	0.363	172.4

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	0.706	–54.8	16.113	147.0	0.039	63.5	0.863	–29.3
0.2	0.660	–92.2	12.286	125.6	0.061	49.7	0.654	–47.6
0.3	0.597	–117.7	9.335	113.0	0.071	43.4	0.506	–57.6
0.4	0.585	–134.6	7.432	103.4	0.078	40.9	0.402	–64.2
0.5	0.572	–147.0	6.125	96.4	0.083	40.1	0.336	–67.9
0.6	0.563	–156.2	5.175	91.2	0.088	40.6	0.283	–72.1
0.7	0.561	–164.0	4.518	87.0	0.093	41.6	0.251	–74.8
0.8	0.556	–170.1	3.972	82.8	0.097	42.7	0.222	–78.9
0.9	0.566	–175.5	3.553	79.7	0.102	43.6	0.206	–82.0
1.0	0.570	–179.9	3.207	76.6	0.108	44.9	0.190	–86.6
1.1	0.569	176.1	2.917	73.5	0.113	46.1	0.185	–89.6
1.2	0.573	172.3	2.685	70.5	0.119	47.2	0.175	–94.1
1.3	0.578	169.4	2.483	68.0	0.124	47.8	0.176	–96.4
1.4	0.580	165.9	2.306	65.0	0.129	48.6	0.169	–100.5
1.5	0.582	163.1	2.167	62.8	0.136	49.4	0.171	–102.3
1.6	0.587	160.1	2.030	60.2	0.142	50.1	0.165	–106.3
1.7	0.595	158.0	1.920	58.1	0.148	50.4	0.168	–108.5
1.8	0.599	155.2	1.814	55.5	0.154	51.1	0.163	–112.5
1.9	0.595	153.6	1.741	53.7	0.160	51.4	0.167	–115.2
2.0	0.608	151.4	1.643	51.3	0.167	51.7	0.165	–119.1
2.1	0.614	149.6	1.577	49.1	0.174	51.8	0.172	–122.0
2.2	0.617	148.2	1.529	47.6	0.180	51.9	0.172	–125.4
2.3	0.620	146.1	1.472	45.1	0.188	51.9	0.180	–128.1
2.4	0.626	143.9	1.422	44.0	0.194	51.9	0.181	–130.5
2.5	0.630	142.6	1.362	42.3	0.201	51.9	0.189	–133.0
2.6	0.632	140.6	1.314	40.0	0.208	51.4	0.191	–135.1
2.7	0.636	139.1	1.285	38.6	0.214	51.1	0.198	–137.6
2.8	0.641	137.6	1.243	36.8	0.221	50.6	0.199	–139.6
2.9	0.644	136.4	1.211	35.8	0.230	50.4	0.206	–142.0
3.0	0.644	134.3	1.169	34.2	0.237	50.2	0.205	–144.3
4.0	0.670	119.0	0.904	19.2	0.310	45.4	0.267	–167.3
5.0	0.728	106.9	0.765	7.9	0.384	35.7	0.334	164.2

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	0.655	–63.2	19.152	142.9	0.036	59.5	0.818	–35.1
0.2	0.610	–102.5	13.837	121.0	0.055	49.1	0.587	–55.2
0.3	0.567	–128.3	10.234	109.4	0.063	44.3	0.440	–65.8
0.4	0.558	–142.9	8.023	100.5	0.070	43.8	0.344	–73.3
0.5	0.556	–154.0	6.568	94.1	0.076	44.0	0.284	–78.0
0.6	0.547	–162.6	5.523	89.5	0.081	45.4	0.237	–83.7
0.7	0.544	–169.4	4.812	85.6	0.087	46.9	0.208	–87.5
0.8	0.546	–175.0	4.223	81.8	0.093	48.1	0.185	–93.4
0.9	0.554	–179.8	3.776	78.9	0.099	49.1	0.172	–97.6
1.0	0.560	176.3	3.406	76.0	0.106	50.2	0.160	–104.0
1.1	0.560	172.6	3.093	73.2	0.112	51.3	0.157	–107.3
1.2	0.566	169.0	2.847	70.3	0.119	52.1	0.152	–112.9
1.3	0.569	166.4	2.631	68.0	0.126	52.5	0.153	–115.1
1.4	0.571	163.3	2.440	65.2	0.132	52.9	0.149	–120.0
1.5	0.575	160.9	2.291	63.2	0.140	53.3	0.151	–121.6
1.6	0.582	157.8	2.149	60.5	0.146	53.7	0.148	–126.2
1.7	0.587	156.0	2.027	58.6	0.153	53.7	0.151	–128.0
1.8	0.591	153.2	1.920	56.2	0.161	54.0	0.148	–132.6
1.9	0.587	151.6	1.841	54.3	0.167	53.9	0.153	–134.7
2.0	0.598	149.5	1.737	52.1	0.175	53.9	0.153	–138.9
2.1	0.606	148.3	1.668	50.1	0.182	53.7	0.161	–141.0
2.2	0.610	146.4	1.614	48.5	0.189	53.5	0.162	–144.2
2.3	0.609	144.7	1.554	46.1	0.197	53.2	0.170	–146.2
2.4	0.616	142.7	1.504	45.1	0.203	52.9	0.171	–148.4
2.5	0.620	141.3	1.439	43.4	0.210	52.7	0.179	–150.1
2.6	0.624	139.4	1.389	41.2	0.217	52.0	0.180	–151.9
2.7	0.626	138.0	1.358	39.8	0.224	51.5	0.187	–153.7
2.8	0.632	136.5	1.317	38.1	0.231	50.9	0.188	–155.5
2.9	0.634	135.4	1.281	36.9	0.240	50.5	0.195	–157.3
3.0	0.634	133.4	1.239	35.3	0.247	50.0	0.194	–159.7
4.0	0.661	118.7	0.958	20.5	0.317	44.2	0.255	–178.4
5.0	0.721	107.0	0.814	8.8	0.385	34.4	0.322	155.8

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	0.549	–76.6	23.030	136.8	0.033	56.0	0.742	–45.1
0.2	0.532	–116.4	15.386	115.1	0.047	48.8	0.495	–68.1
0.3	0.503	–139.6	10.990	105.0	0.053	47.3	0.360	–80.8
0.4	0.502	–152.5	8.498	97.1	0.060	48.6	0.279	–91.2
0.5	0.502	–161.9	6.883	91.4	0.067	50.2	0.230	–98.4
0.6	0.497	–169.4	5.775	87.5	0.075	52.0	0.196	–107.4
0.7	0.497	–175.3	5.003	84.0	0.081	53.6	0.176	–114.0
0.8	0.501	179.6	4.395	80.6	0.089	54.7	0.163	–122.5
0.9	0.510	175.1	3.924	78.1	0.097	55.6	0.157	–128.2
1.0	0.514	171.7	3.537	75.4	0.105	56.2	0.155	–135.5
1.1	0.516	168.3	3.211	72.9	0.112	56.7	0.154	–139.0
1.2	0.522	165.4	2.953	70.2	0.121	57.1	0.156	–144.6
1.3	0.525	163.0	2.730	68.1	0.128	57.1	0.157	–146.1
1.4	0.529	159.9	2.527	65.6	0.135	57.1	0.158	–151.0
1.5	0.533	157.7	2.377	63.7	0.144	57.2	0.160	–152.0
1.6	0.538	154.8	2.228	61.3	0.151	57.2	0.160	–156.6
1.7	0.547	153.1	2.100	59.4	0.159	56.8	0.163	–157.6
1.8	0.548	150.4	1.991	57.3	0.167	56.7	0.165	–162.1
1.9	0.547	148.7	1.911	55.5	0.174	56.3	0.170	–163.1
2.0	0.559	147.2	1.807	53.4	0.182	56.0	0.172	–166.9
2.1	0.564	145.7	1.730	51.4	0.190	55.3	0.179	–167.8
2.2	0.567	144.2	1.678	50.0	0.197	55.0	0.181	–170.7
2.3	0.569	142.3	1.613	47.7	0.205	54.3	0.189	–171.5
2.4	0.575	140.5	1.560	46.5	0.212	53.8	0.189	–173.5
2.5	0.579	139.1	1.493	45.0	0.219	53.3	0.196	–174.2
2.6	0.583	137.3	1.443	43.0	0.226	52.5	0.197	–175.9
2.7	0.586	136.1	1.409	41.5	0.233	51.8	0.203	–176.8
2.8	0.591	134.5	1.370	39.9	0.240	51.0	0.203	–178.6
2.9	0.590	133.7	1.330	38.8	0.249	50.4	0.209	–179.5
3.0	0.594	131.6	1.291	37.2	0.256	49.8	0.208	178.1
4.0	0.621	117.7	1.002	22.5	0.321	42.8	0.262	164.7
5.0	0.684	106.4	0.855	10.7	0.382	32.8	0.326	142.9

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	0.927	–23.2	3.447	162.7	0.042	76.6	0.990	–7.4
0.2	0.926	–44.0	3.209	149.1	0.080	64.1	0.945	–14.0
0.3	0.849	–64.3	2.896	136.6	0.108	53.3	0.898	–19.3
0.4	0.814	–81.4	2.621	124.5	0.128	44.4	0.839	–23.7
0.5	0.771	–96.4	2.382	114.6	0.142	37.0	0.795	–26.8
0.6	0.729	–109.3	2.117	105.9	0.149	31.0	0.747	–29.7
0.7	0.702	–120.9	1.919	99.0	0.153	26.4	0.719	–31.9
0.8	0.681	–130.8	1.736	92.2	0.154	22.4	0.685	–34.2
0.9	0.670	–139.7	1.588	86.9	0.154	19.2	0.666	–36.6
1.0	0.664	–147.2	1.459	81.8	0.151	17.0	0.643	–38.8
1.1	0.654	–154.2	1.346	76.8	0.148	14.8	0.637	–41.4
1.2	0.654	–160.6	1.255	72.2	0.144	13.7	0.623	–43.8
1.3	0.653	–165.8	1.167	68.2	0.139	12.4	0.622	–46.5
1.4	0.649	–171.4	1.093	64.1	0.134	11.9	0.614	–49.0
1.5	0.650	–175.8	1.027	60.7	0.129	12.2	0.615	–51.9
1.6	0.653	179.5	0.969	56.7	0.124	12.7	0.605	–54.5
1.7	0.656	175.7	0.920	54.1	0.118	13.9	0.606	–57.5
1.8	0.659	171.8	0.869	50.5	0.113	16.1	0.600	–60.1
1.9	0.658	168.7	0.830	48.3	0.108	18.9	0.598	–63.2
2.0	0.669	165.3	0.785	45.2	0.104	22.8	0.593	–66.0
2.1	0.677	162.3	0.754	42.8	0.102	26.9	0.596	–69.3
2.2	0.680	159.7	0.736	41.5	0.100	31.6	0.592	–72.2
2.3	0.682	157.0	0.708	38.7	0.101	36.6	0.598	–75.6
2.4	0.688	154.0	0.683	38.0	0.102	41.3	0.595	–78.5
2.5	0.692	151.5	0.649	36.3	0.105	46.3	0.599	–82.1
2.6	0.696	149.0	0.627	34.2	0.110	49.9	0.599	–85.5
2.7	0.702	146.6	0.611	33.0	0.117	53.8	0.602	–88.9
2.8	0.707	144.4	0.591	31.6	0.125	56.5	0.604	–91.8
2.9	0.708	142.6	0.573	31.2	0.135	59.4	0.604	–94.9
3.0	0.708	140.0	0.550	30.2	0.146	61.5	0.597	–97.8
4.0	0.719	119.5	0.446	25.7	0.269	63.0	0.604	–129.8
5.0	0.751	104.6	0.446	23.5	0.399	47.9	0.613	–165.9

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	0.843	–34.1	9.148	156.3	0.040	70.8	0.948	–15.5
0.2	0.790	–63.4	7.921	138.2	0.068	56.3	0.827	–27.3
0.3	0.698	–88.5	6.579	124.9	0.085	46.5	0.715	–34.6
0.4	0.656	–107.0	5.531	113.5	0.095	40.1	0.618	–39.3
0.5	0.623	–121.8	4.742	105.0	0.101	35.5	0.551	–41.8
0.6	0.591	–133.7	4.075	98.2	0.104	32.8	0.492	–43.9
0.7	0.579	–143.9	3.597	92.9	0.106	31.4	0.456	–45.1
0.8	0.567	–152.0	3.192	87.6	0.107	30.8	0.421	–46.7
0.9	0.567	–159.6	2.871	83.8	0.109	30.5	0.401	–48.3
1.0	0.568	–165.5	2.606	79.9	0.110	31.1	0.379	–50.2
1.1	0.563	–171.1	2.379	76.2	0.111	31.9	0.371	–52.2
1.2	0.567	–176.0	2.198	72.5	0.112	33.0	0.357	–54.3
1.3	0.571	–180.0	2.035	69.5	0.113	33.8	0.356	–56.5
1.4	0.571	175.8	1.893	66.2	0.114	35.3	0.345	–58.6
1.5	0.572	172.1	1.779	63.5	0.116	37.0	0.347	–61.0
1.6	0.576	168.3	1.670	60.3	0.118	38.7	0.338	–63.1
1.7	0.583	165.7	1.581	58.0	0.120	40.2	0.339	–65.7
1.8	0.584	162.3	1.495	55.1	0.122	42.2	0.331	–67.9
1.9	0.587	160.2	1.429	53.0	0.125	43.9	0.332	–70.8
2.0	0.596	157.4	1.350	50.4	0.130	45.8	0.327	–73.3
2.1	0.604	155.1	1.296	48.0	0.134	47.4	0.330	–76.7
2.2	0.606	153.2	1.259	46.3	0.138	49.1	0.327	–79.3
2.3	0.610	150.8	1.212	43.7	0.143	50.4	0.333	–82.8
2.4	0.617	148.5	1.170	42.7	0.148	51.6	0.331	–85.4
2.5	0.621	146.6	1.119	40.8	0.154	52.9	0.336	–88.9
2.6	0.628	144.6	1.082	38.5	0.160	53.3	0.338	–91.6
2.7	0.630	142.8	1.054	36.6	0.166	54.2	0.342	–94.8
2.8	0.636	140.8	1.017	35.1	0.173	54.4	0.343	–97.2
2.9	0.637	139.5	0.988	34.0	0.183	55.1	0.347	–100.4
3.0	0.638	137.2	0.952	32.4	0.190	55.7	0.344	–102.9
4.0	0.669	119.7	0.730	19.1	0.279	54.8	0.380	–133.3
5.0	0.724	106.2	0.621	10.5	0.380	44.1	0.422	–168.7

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	0.747	–44.6	13.503	151.2	0.036	64.7	0.905	–21.9
0.2	0.695	–77.7	10.893	130.9	0.059	52.7	0.733	–36.5
0.3	0.612	–103.8	8.571	118.0	0.071	44.5	0.596	–44.3
0.4	0.578	–121.6	6.963	107.6	0.078	40.5	0.492	–48.9
0.5	0.559	–135.1	5.821	100.0	0.083	38.4	0.426	–51.0
0.6	0.534	–146.1	4.939	94.2	0.087	38.0	0.370	–53.0
0.7	0.530	–155.3	4.322	89.7	0.089	38.1	0.337	–54.0
0.8	0.523	–162.4	3.816	85.2	0.092	38.9	0.305	–55.8
0.9	0.527	–168.7	3.419	81.9	0.096	39.9	0.286	–57.4
1.0	0.532	–174.0	3.090	78.5	0.099	41.0	0.266	–59.6
1.1	0.531	–178.6	2.814	75.2	0.103	42.4	0.259	–61.6
1.2	0.534	177.1	2.599	72.1	0.106	43.8	0.247	–64.0
1.3	0.538	173.8	2.403	69.4	0.110	44.7	0.246	–66.2
1.4	0.541	169.7	2.230	66.3	0.114	46.0	0.236	–68.5
1.5	0.543	166.9	2.092	64.1	0.119	47.3	0.238	–70.7
1.6	0.549	163.4	1.965	61.2	0.124	48.4	0.229	–73.1
1.7	0.554	161.0	1.856	59.1	0.128	49.3	0.231	–75.6
1.8	0.560	157.9	1.757	56.4	0.133	50.5	0.223	–78.0
1.9	0.559	156.0	1.683	54.4	0.138	51.2	0.225	–81.1
2.0	0.571	153.6	1.589	52.0	0.144	52.3	0.220	–83.8
2.1	0.578	151.8	1.524	49.8	0.150	52.8	0.224	–87.5
2.2	0.580	150.0	1.477	48.3	0.156	53.5	0.221	–90.2
2.3	0.582	148.1	1.421	45.8	0.162	53.9	0.227	–93.9
2.4	0.588	145.8	1.371	44.7	0.168	54.2	0.226	–96.3
2.5	0.594	144.1	1.315	42.8	0.174	54.6	0.232	–99.9
2.6	0.599	142.1	1.270	40.5	0.180	54.5	0.233	–102.2
2.7	0.603	140.5	1.240	38.9	0.187	54.5	0.239	–105.5
2.8	0.608	138.9	1.199	37.1	0.194	54.3	0.239	–107.5
2.9	0.610	137.6	1.164	36.1	0.203	54.5	0.244	–110.9
3.0	0.612	135.4	1.124	34.5	0.210	54.5	0.242	–113.1
4.0	0.646	119.5	0.864	19.9	0.288	51.4	0.287	–142.6
5.0	0.707	106.7	0.727	9.2	0.374	41.6	0.339	–176.7

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	0.691	–51.4	16.747	147.1	0.034	63.6	0.865	–27.1
0.2	0.631	–88.0	12.780	125.8	0.053	51.0	0.660	–43.4
0.3	0.558	–114.4	9.693	113.5	0.062	44.4	0.515	–51.3
0.4	0.532	–131.1	7.738	104.0	0.068	42.6	0.414	–56.0
0.5	0.515	–143.7	6.392	97.2	0.073	41.9	0.351	–58.1
0.6	0.501	–153.9	5.404	92.0	0.078	42.6	0.299	–60.4
0.7	0.497	–161.6	4.709	87.9	0.082	43.8	0.269	–61.6
0.8	0.494	–168.2	4.143	83.8	0.086	44.8	0.240	–64.0
0.9	0.503	–174.1	3.709	80.8	0.091	46.3	0.223	–65.8
1.0	0.506	–178.7	3.346	77.7	0.096	47.6	0.205	–68.8
1.1	0.506	177.1	3.045	74.7	0.101	48.9	0.200	–71.1
1.2	0.512	173.0	2.806	71.7	0.106	50.2	0.188	–74.2
1.3	0.515	169.9	2.594	69.3	0.111	50.8	0.188	–76.5
1.4	0.517	166.5	2.408	66.6	0.117	51.7	0.179	–79.4
1.5	0.523	163.8	2.259	64.3	0.122	52.5	0.181	–81.5
1.6	0.526	160.6	2.119	61.6	0.128	53.3	0.173	–84.4
1.7	0.534	158.5	2.003	59.7	0.134	53.6	0.175	–86.9
1.8	0.538	155.4	1.894	57.2	0.140	54.4	0.168	–89.9
1.9	0.538	153.4	1.814	55.4	0.146	54.7	0.171	–93.0
2.0	0.549	151.6	1.711	52.9	0.153	55.2	0.166	–96.3
2.1	0.555	149.8	1.641	50.9	0.159	55.2	0.172	–100.1
2.2	0.560	148.3	1.594	49.3	0.165	55.6	0.170	–103.0
2.3	0.562	146.4	1.530	47.0	0.172	55.6	0.176	–106.7
2.4	0.570	144.0	1.480	45.8	0.178	55.5	0.176	–109.1
2.5	0.572	142.7	1.416	44.1	0.185	55.5	0.183	–112.5
2.6	0.578	140.8	1.367	41.9	0.191	55.1	0.183	–114.7
2.7	0.581	139.1	1.336	40.3	0.198	54.8	0.190	–117.8
2.8	0.587	137.5	1.291	38.6	0.205	54.4	0.190	–119.8
2.9	0.589	136.5	1.257	37.4	0.214	54.2	0.196	–122.9
3.0	0.590	134.3	1.214	35.9	0.221	54.0	0.194	–125.1
4.0	0.623	119.1	0.934	21.1	0.294	49.6	0.244	–152.8
5.0	0.690	107.2	0.787	9.7	0.371	40.1	0.301	175.0

V_{CE} = 3 V, I_C = 10 mA, Z_O = 50 Ω

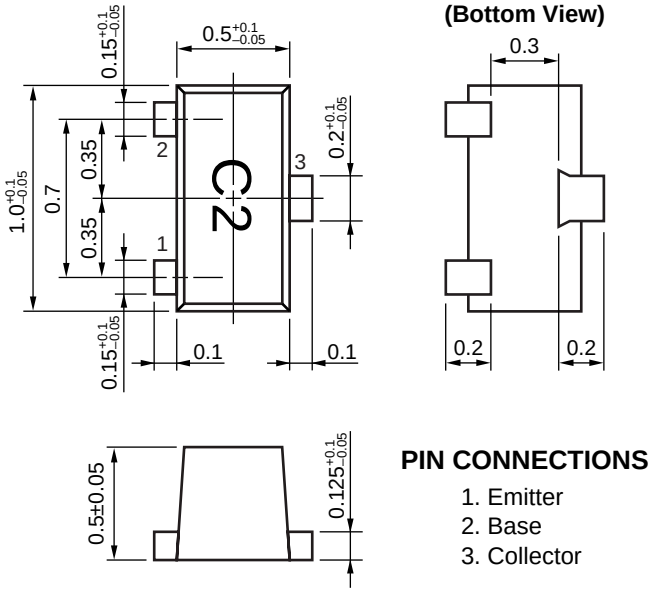
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.1	0.650	–55.8	19.340	143.8	0.031	62.2	0.830	–31.7
0.2	0.575	–95.7	14.139	122.2	0.049	50.1	0.604	–49.4
0.3	0.511	–121.1	10.493	110.7	0.056	45.7	0.458	–57.9
0.4	0.495	–137.0	8.273	101.7	0.062	45.1	0.361	–63.2
0.5	0.482	–148.9	6.777	95.4	0.068	45.4	0.300	–65.7
0.6	0.469	–158.3	5.713	90.7	0.073	46.7	0.252	–69.0
0.7	0.468	–165.6	4.962	86.8	0.078	48.4	0.222	–70.8
0.8	0.467	–172.1	4.372	83.1	0.083	49.5	0.196	–74.2
0.9	0.474	–177.6	3.906	80.3	0.089	50.7	0.181	–76.8
1.0	0.479	178.5	3.524	77.4	0.095	51.9	0.165	–81.2
1.1	0.480	174.2	3.202	74.6	0.101	53.0	0.160	–83.8
1.2	0.486	170.5	2.949	71.9	0.108	53.9	0.151	–88.3
1.3	0.489	167.7	2.726	69.4	0.114	54.4	0.151	–90.4
1.4	0.493	164.3	2.529	66.8	0.120	55.0	0.144	–94.4
1.5	0.497	161.6	2.376	64.7	0.126	55.5	0.146	–96.2
1.6	0.503	158.6	2.225	62.2	0.133	55.8	0.139	–100.1
1.7	0.512	156.6	2.104	60.3	0.139	56.0	0.141	–102.4
1.8	0.516	153.4	1.993	57.9	0.146	56.2	0.135	–106.4
1.9	0.513	151.9	1.909	56.0	0.152	56.4	0.139	–109.5
2.0	0.522	150.2	1.801	53.7	0.159	56.4	0.135	–113.5
2.1	0.530	148.4	1.730	51.9	0.166	56.3	0.142	–116.8
2.2	0.535	146.9	1.673	50.3	0.173	56.3	0.140	–120.2
2.3	0.537	145.0	1.609	47.9	0.180	56.1	0.148	–123.4
2.4	0.545	142.9	1.555	46.9	0.186	55.8	0.148	–125.9
2.5	0.549	141.4	1.490	45.3	0.193	55.6	0.155	–128.6
2.6	0.554	139.6	1.436	43.0	0.200	55.0	0.156	–130.6
2.7	0.557	138.1	1.404	41.5	0.207	54.6	0.162	–133.3
2.8	0.563	136.5	1.358	40.0	0.213	54.0	0.162	–135.3
2.9	0.563	135.7	1.322	38.7	0.222	53.7	0.169	–137.9
3.0	0.566	133.4	1.277	37.1	0.229	53.3	0.167	–140.2
4.0	0.602	118.7	0.986	22.4	0.299	48.0	0.220	–164.4
5.0	0.670	107.2	0.835	10.4	0.369	38.5	0.280	165.7

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	0.509	–65.0	22.473	136.2	0.028	57.5	0.732	–43.4
0.2	0.411	–100.6	14.794	114.9	0.038	48.3	0.481	–63.8
0.3	0.341	–126.0	10.550	104.9	0.044	47.5	0.345	–73.8
0.4	0.321	–140.3	8.172	97.7	0.050	49.8	0.263	–81.5
0.5	0.311	–152.4	6.616	92.3	0.056	51.4	0.213	–86.3
0.6	0.300	–162.6	5.546	88.4	0.062	53.4	0.175	–93.2
0.7	0.300	–169.8	4.817	85.4	0.068	55.3	0.152	–98.0
0.8	0.301	–176.1	4.222	82.2	0.074	56.5	0.134	–106.0
0.9	0.309	177.9	3.769	79.8	0.081	57.8	0.125	–111.0
1.0	0.315	173.6	3.401	77.3	0.088	58.5	0.118	–119.4
1.1	0.317	169.5	3.094	74.9	0.094	59.4	0.117	–122.9
1.2	0.324	166.0	2.853	72.4	0.101	59.9	0.114	–129.6
1.3	0.329	163.5	2.635	70.5	0.107	59.9	0.116	–131.4
1.4	0.333	160.0	2.447	68.1	0.114	60.3	0.114	–137.2
1.5	0.341	157.4	2.299	66.3	0.121	60.5	0.116	–138.2
1.6	0.346	154.1	2.157	64.0	0.128	60.4	0.114	–143.8
1.7	0.353	152.2	2.035	62.4	0.134	60.3	0.116	–145.0
1.8	0.360	148.9	1.933	60.2	0.141	60.3	0.116	–150.6
1.9	0.358	147.4	1.855	58.6	0.148	60.1	0.120	–151.9
2.0	0.373	145.9	1.752	56.7	0.155	59.7	0.121	–156.9
2.1	0.379	144.6	1.682	54.8	0.162	59.3	0.128	–157.8
2.2	0.382	143.4	1.628	53.6	0.169	59.1	0.129	–161.3
2.3	0.384	141.6	1.564	51.1	0.176	58.7	0.136	–162.4
2.4	0.391	139.5	1.513	50.2	0.182	58.3	0.136	–164.6
2.5	0.399	138.3	1.452	48.6	0.189	57.9	0.143	–165.4
2.6	0.402	136.8	1.402	46.7	0.195	57.2	0.143	–167.4
2.7	0.406	135.3	1.369	45.2	0.201	56.6	0.149	–168.4
2.8	0.415	133.6	1.328	43.7	0.208	55.9	0.149	–170.4
2.9	0.417	132.9	1.295	42.4	0.216	55.6	0.155	–171.6
3.0	0.419	130.7	1.254	41.1	0.222	55.0	0.153	–174.0
4.0	0.465	117.1	0.985	27.1	0.288	49.0	0.202	171.0
5.0	0.546	107.3	0.847	15.2	0.349	39.6	0.265	147.0

PACKAGE DIMENSIONS

3-PIN LEAD-LESS MINIMOLD (UNIT: mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

[MEMO]

[MEMO]

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