DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR

μPA858TD

NPN SILICON RF TRANSISTOR (WITH 2 DIFFERENT ELEMENTS) IN A 6-PIN LEAD-LESS MINIMOLD

FEATURES

- 2 different built-in transistors (2SC5737, 2SC5600)
  - Q1: Built-in low noise transistor
    - NF = 1.5 dB TYP. @ V_{CE} = 1 V, I_C = 3 mA, f = 2 GHz
  - Q2: Built-in low phase distortion transistor suited for OSC operation
    - f_T = 5.0 GHz TYP., $|S_{21e}|^2$ = 4.0 dB TYP. @ V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz
- 6-pin lead-less minimold package

BUILT-IN TRANSISTORS

	Q1	Q2
3-pin thin-type ultra super minimold part No.	2SC5737	2SC5600

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA858TD	50 pcs (Non reel)	• 8 mm wide embossed taping
μPA858TD-T3	10 kpcs/reel	• Pin 1 (Q1 Collector), Pin 6 (Q1 Base) face the perforation side of the tape

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

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

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ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings		Unit
		Q1	Q2	
Collector to Base Voltage	V_{CBO}	5	9	V
Collector to Emitter Voltage	V_{CEO}	3	5.5	V
Emitter to Base Voltage	V_{EBO}	2	1.5	V
Collector Current	I_C	30	100	mA
Total Power Dissipation	P_{tot} Note	90	190	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 substrate

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

(1) Q1

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I_{CBO}	V_{CB} = 5 V, I_E = 0 mA	–	–	100	nA
Emitter Cut-off Current	I_{EBO}	V_{BE} = 1 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 1 V, I_C = 10 mA	70	–	140	–
Gain Bandwidth Product	f_T	V_{CE} = 1 V, I_C = 10 mA, f = 2 GHz	10	12	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 10 mA, f = 2 GHz	7.0	9.0	–	dB
Noise Figure	NF	V_{CE} = 1 V, I_C = 3 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.5	2.0	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 0.5 V, I_E = 0 mA, f = 1 MHz	–	0.4	1.0	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_{BE} = 1 V, I_C = 0 mA	–	–	100	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 1 V, I_C = 5 mA	100	–	160	–
Gain Bandwidth Product (1)	f_T	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	4.5	5.0	–	GHz
Gain Bandwidth Product (2)	f_T	V_{CE} = 1 V, I_C = 15 mA, f = 2 GHz	5.5	6.5	–	GHz
Insertion Power Gain (1)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	3.5	4.0	–	dB
Insertion Power Gain (2)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 15 mA, f = 2 GHz	4.5	5.5	–	dB
Noise Figure	NF	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.5	2.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 0.5 V, I_E = 0 mA, f = 1 MHz	–	0.8	1.0	pF

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

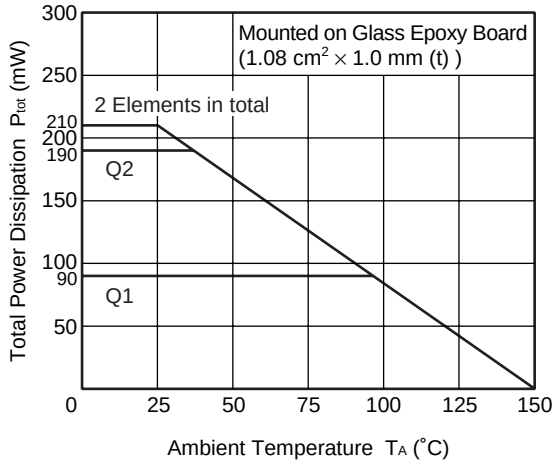
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

Rank	FB
Marking	vR
h_{FE} Value of Q1	70 to 140
h_{FE} Value of Q2	100 to 160

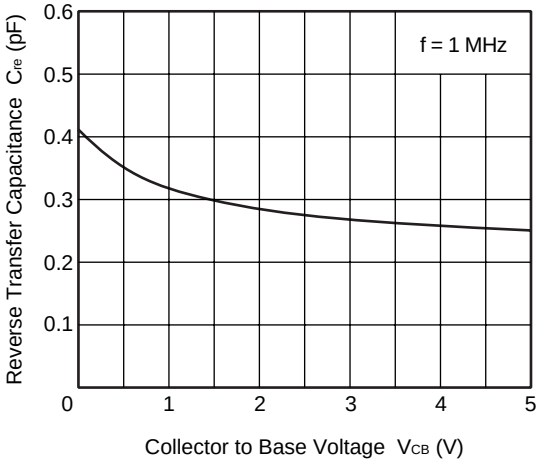
TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



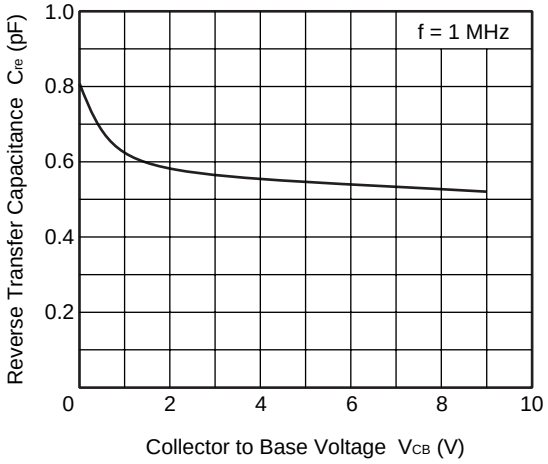
Q1

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



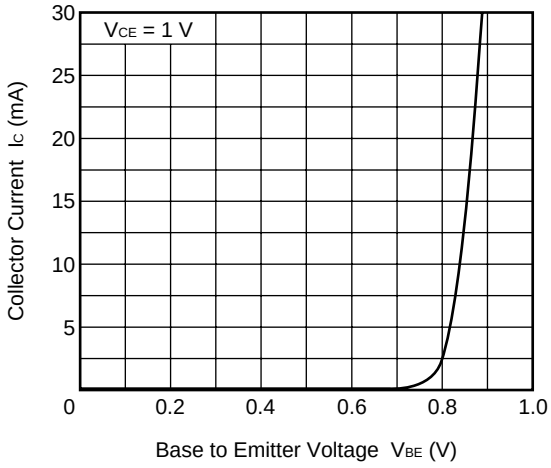
Q2

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



Q1

COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



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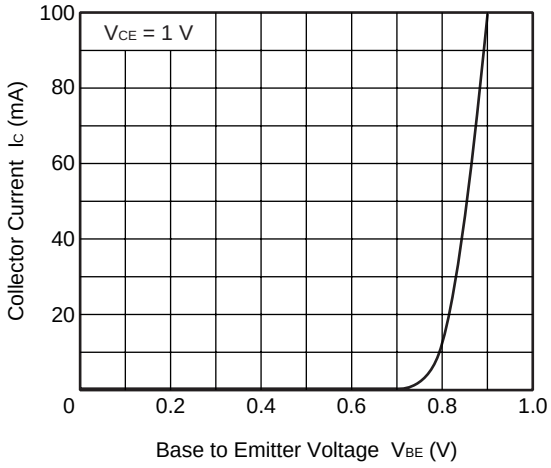
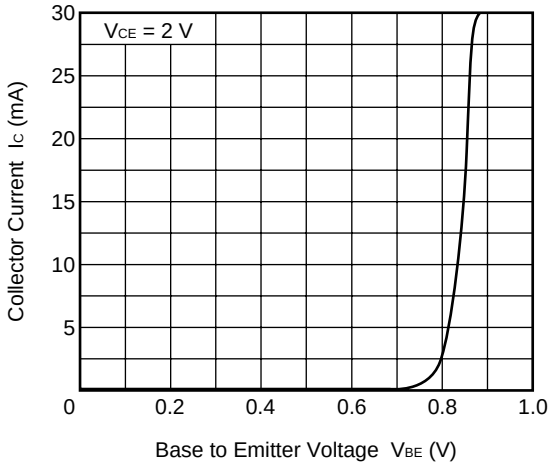
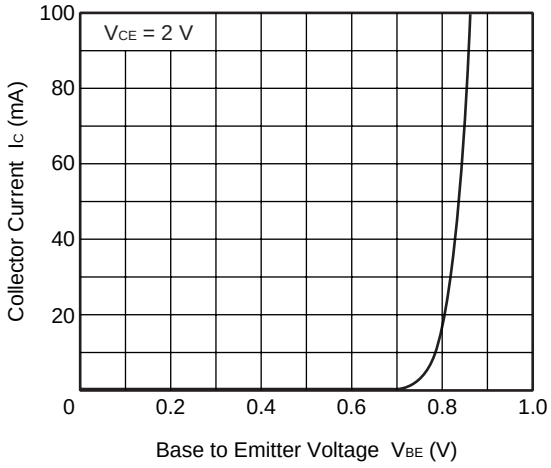
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



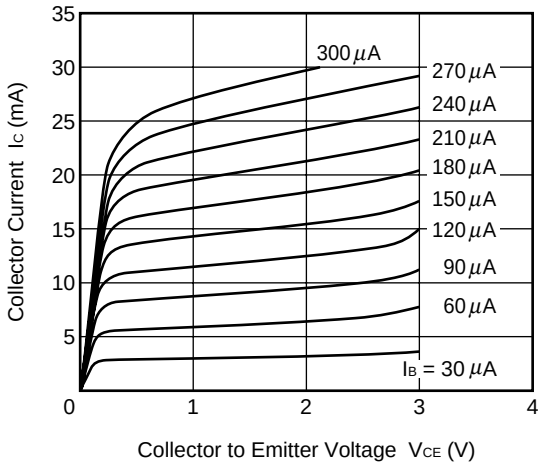
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



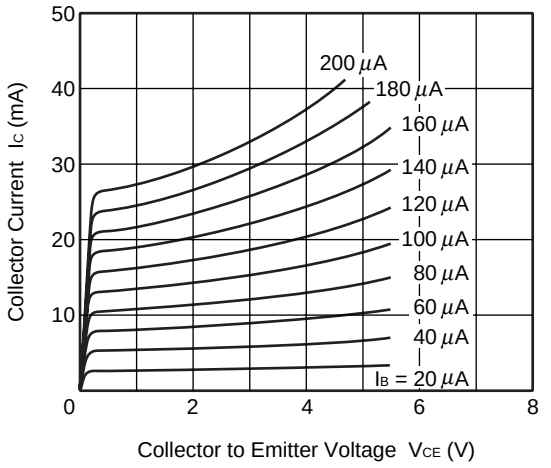
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE

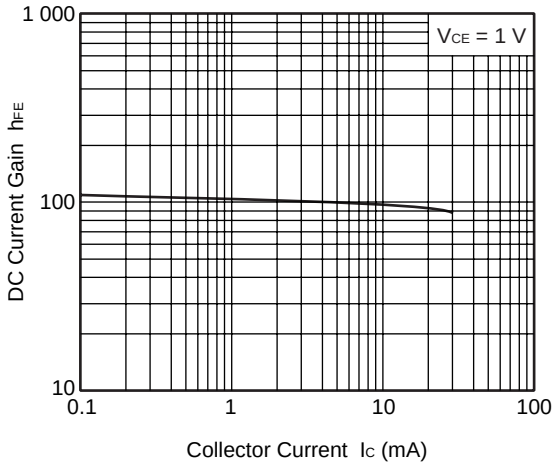


COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



Q1

DC CURRENT GAIN vs.
COLLECTOR CURRENT



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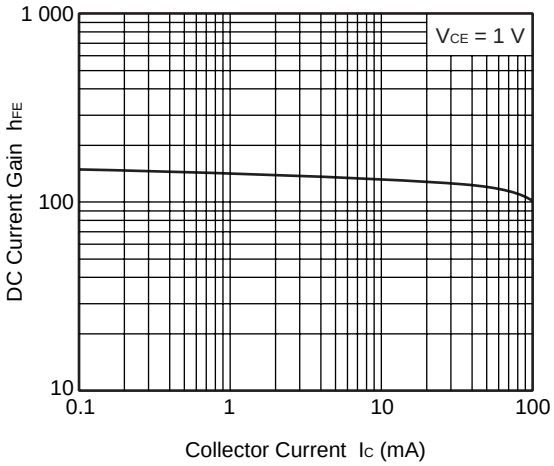
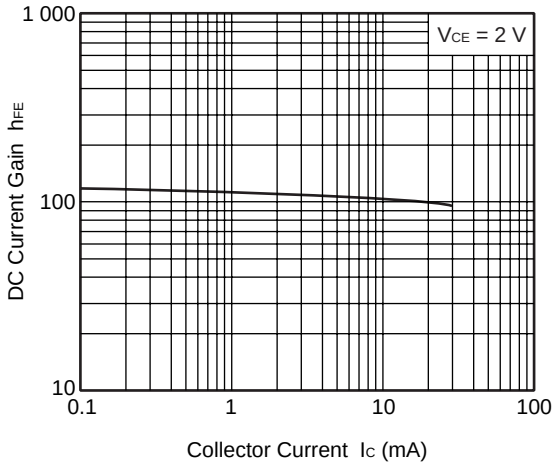
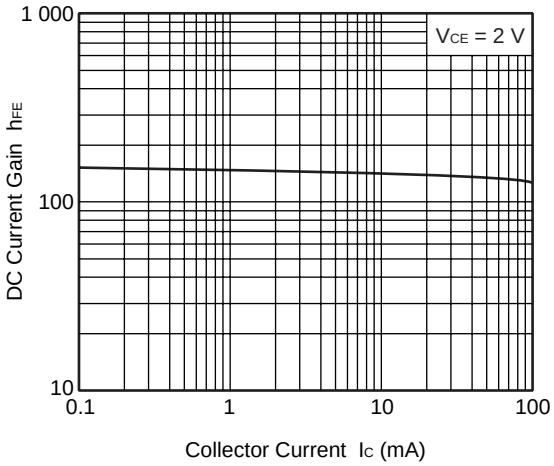
DC CURRENT GAIN vs.
COLLECTOR CURRENT



DC CURRENT GAIN vs.
COLLECTOR CURRENT

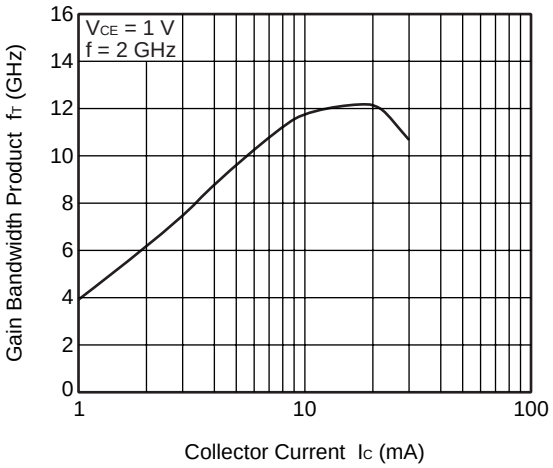


DC CURRENT GAIN vs.
COLLECTOR CURRENT



Q1

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



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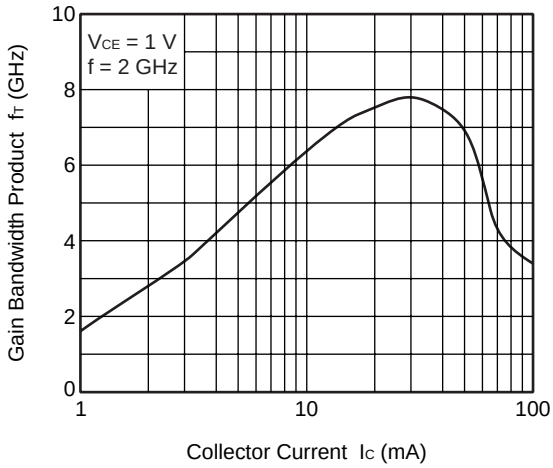
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
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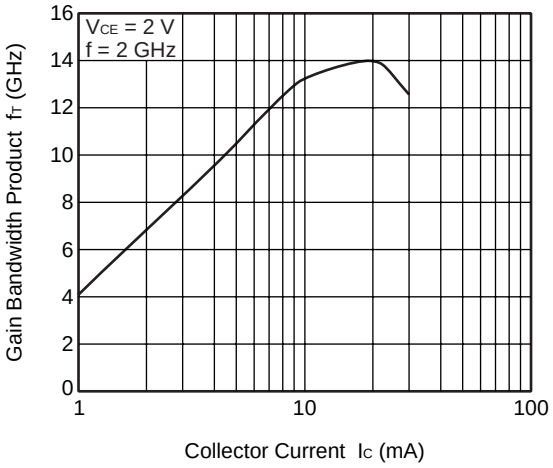

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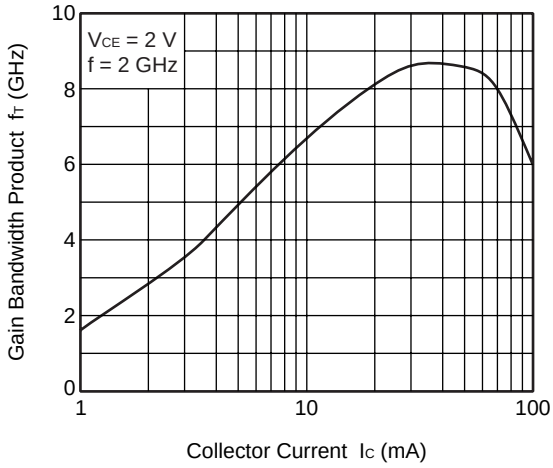
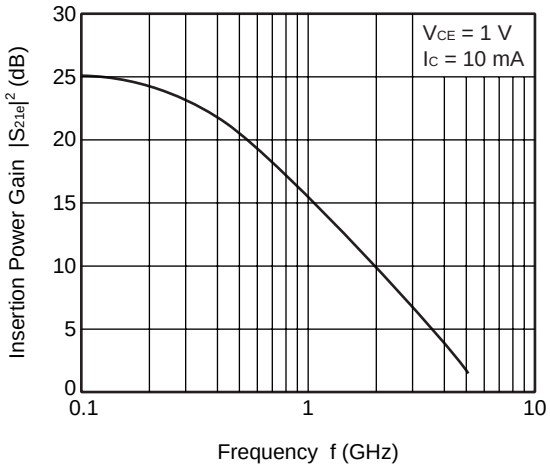


Q1

INSERTION POWER GAIN vs. FREQUENCY



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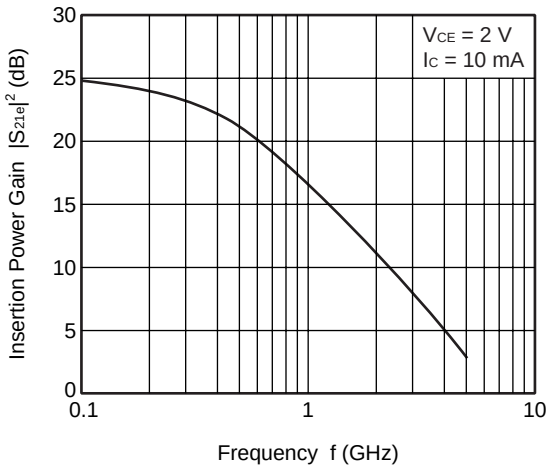
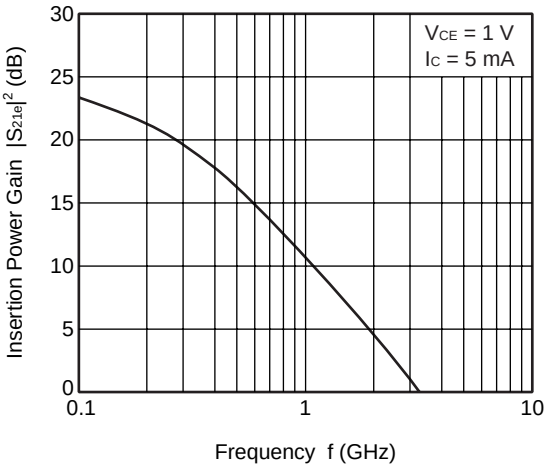


Q2

INSERTION POWER GAIN vs. FREQUENCY



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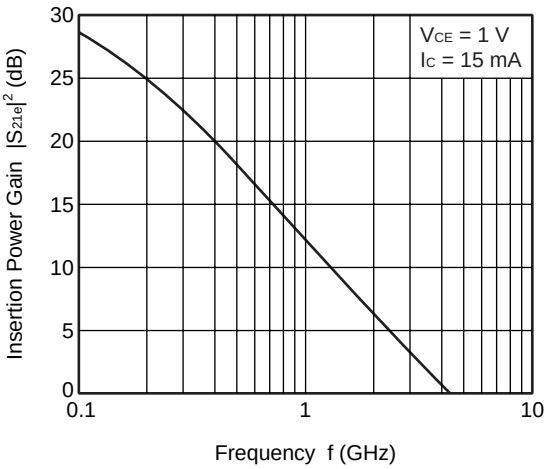

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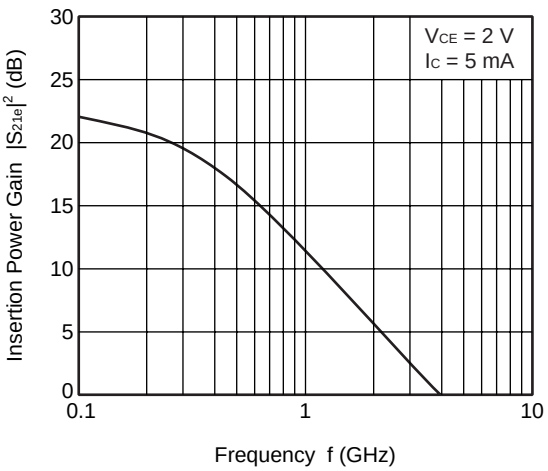
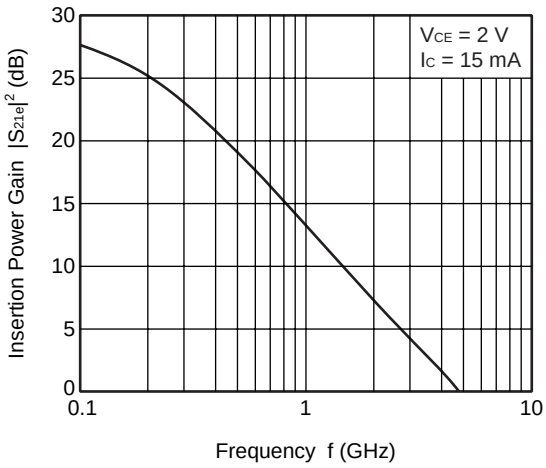


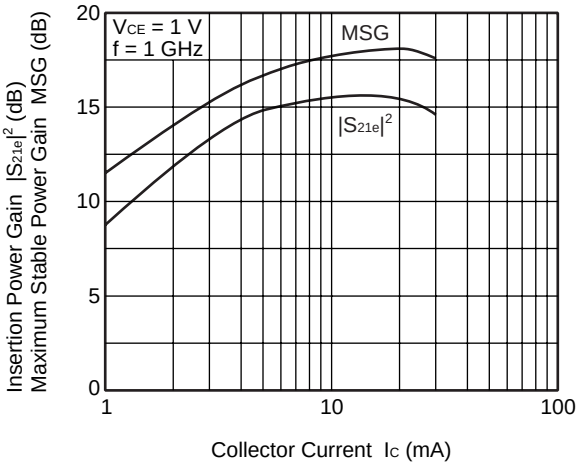
Q2

INSERTION POWER GAIN vs. FREQUENCY



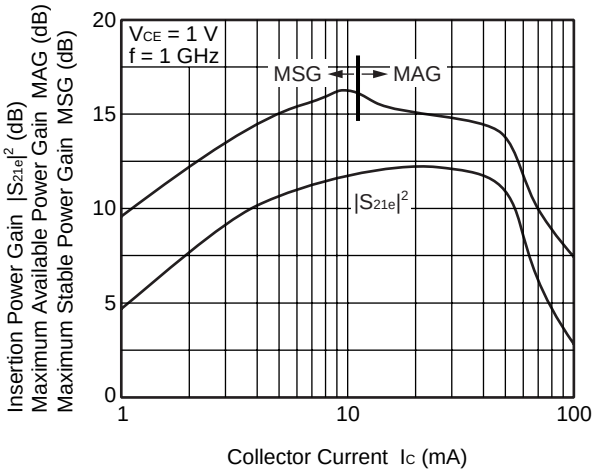
Q1

INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



Q2

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



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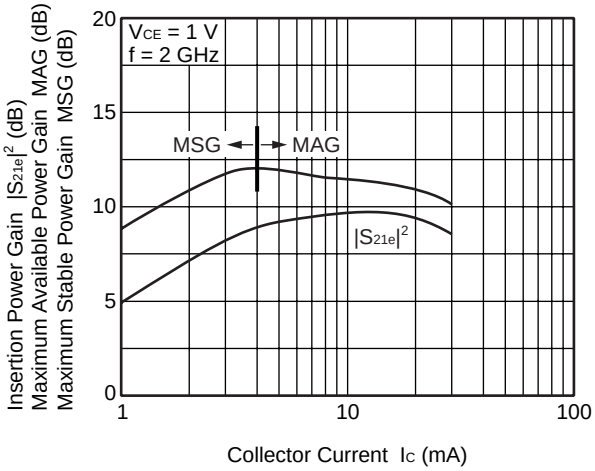

INSERTION POWER GAIN, MAG
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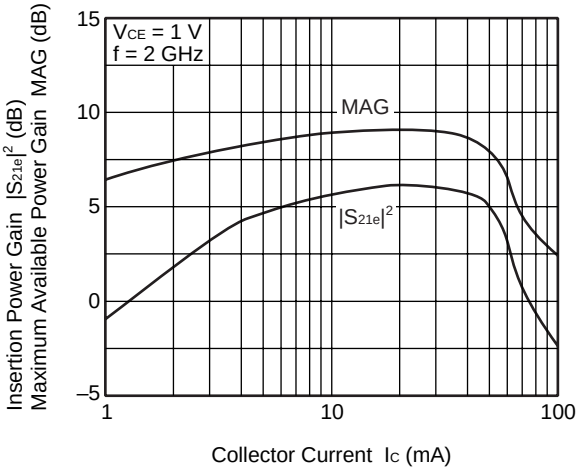

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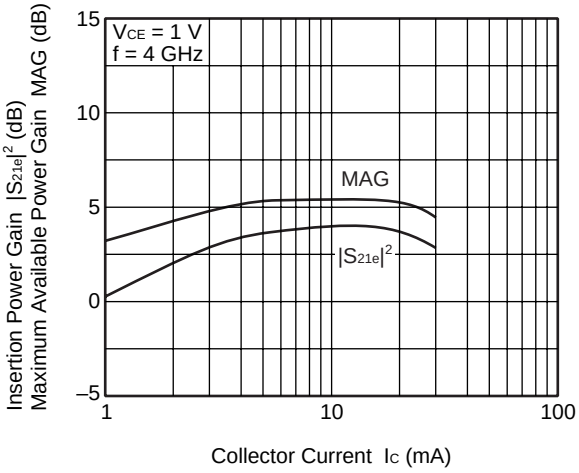

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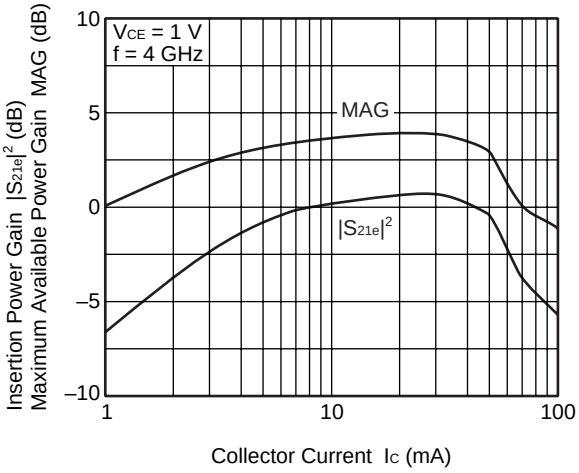

Q1

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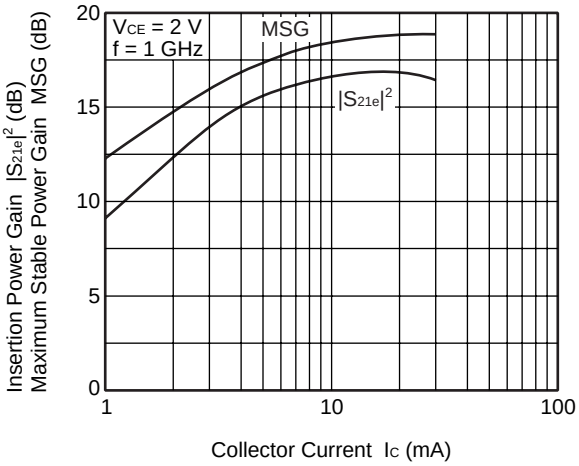
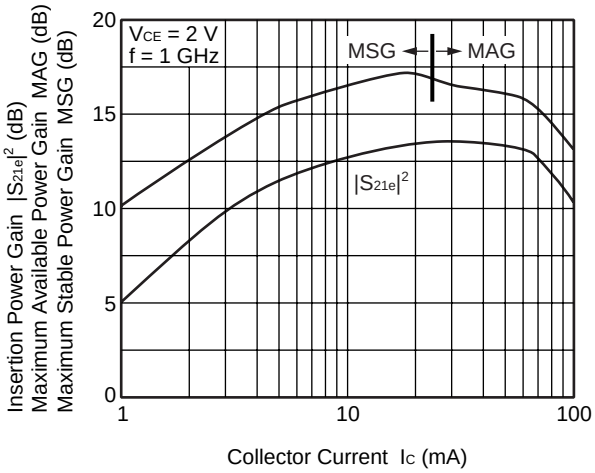
vs. COLLECTOR CURRENT

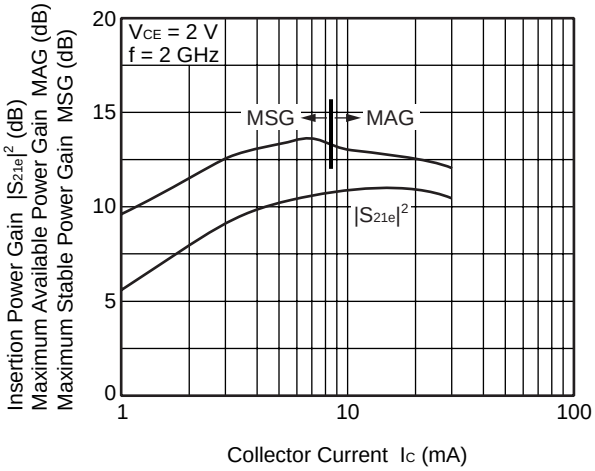


Q2

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG
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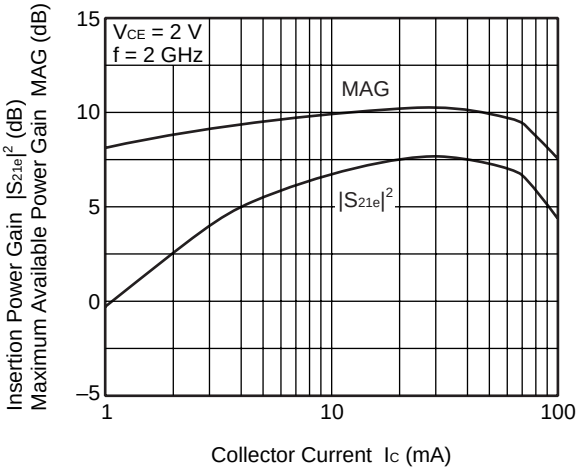

INSERTION POWER GAIN, MAG
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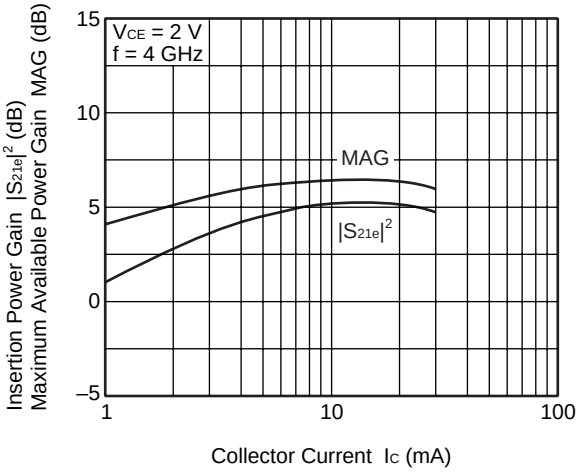
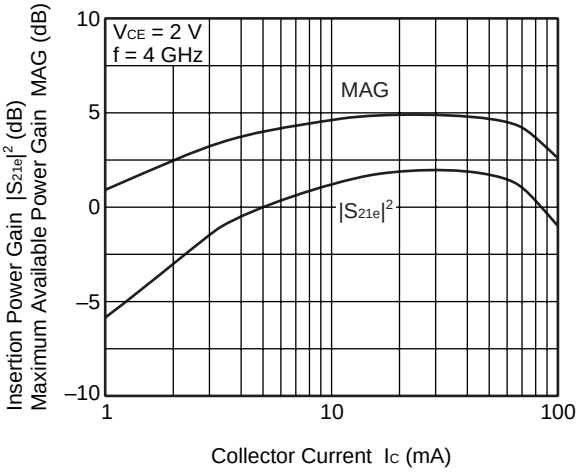
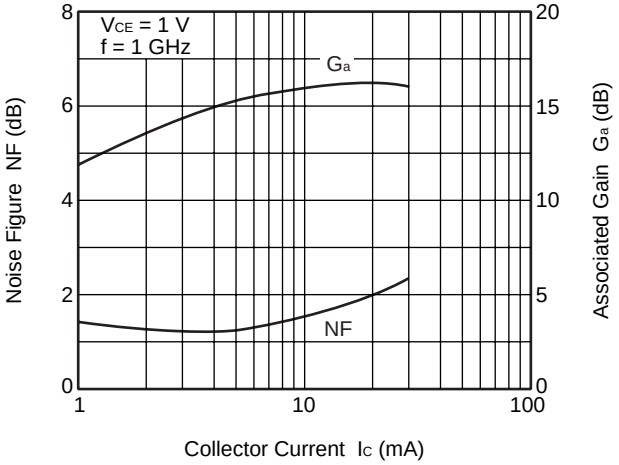


INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



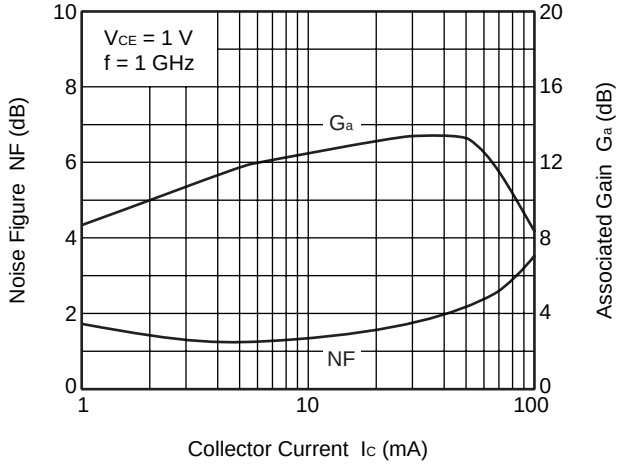
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

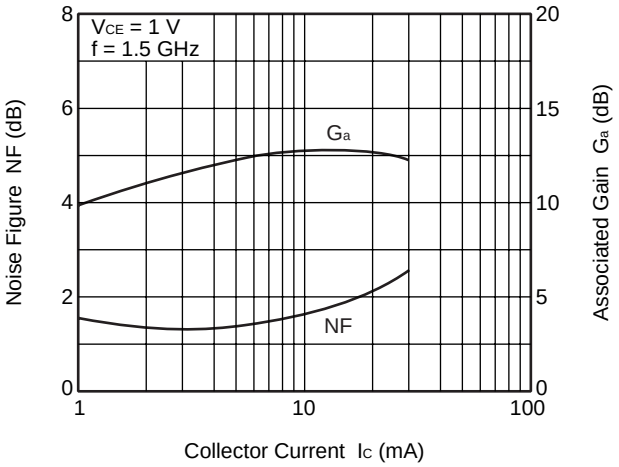


Q2

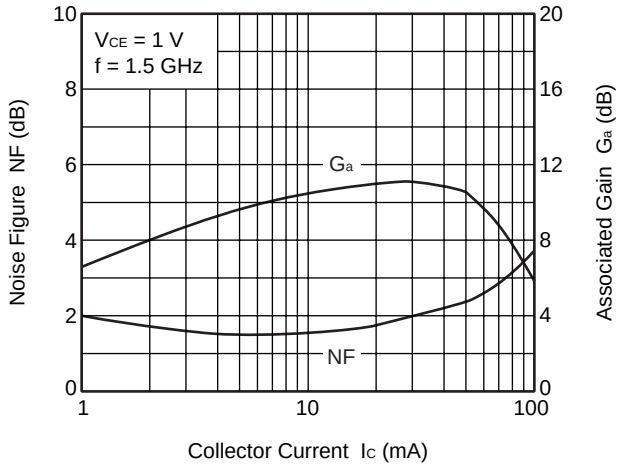
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



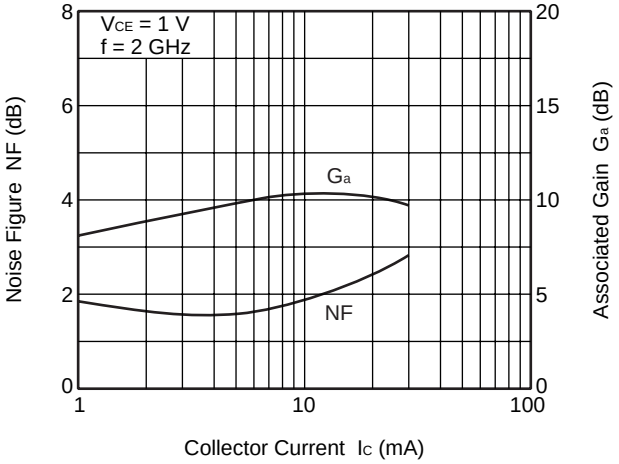
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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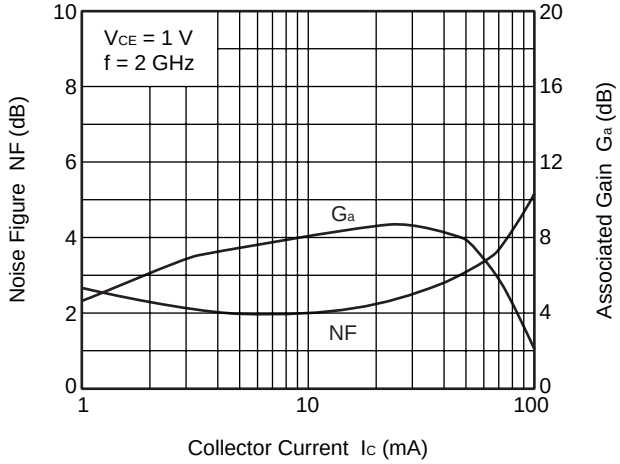
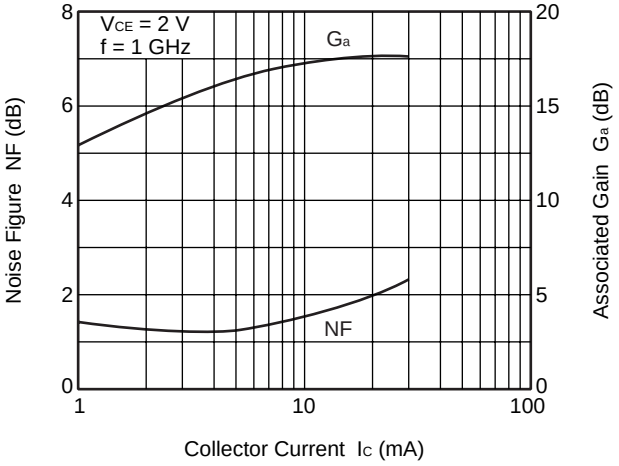


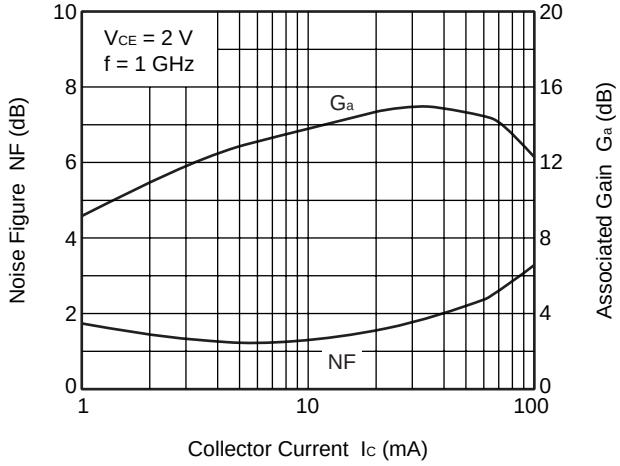
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

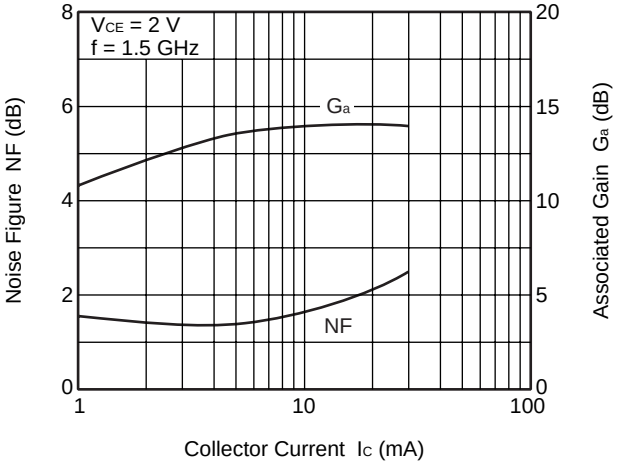


Q2

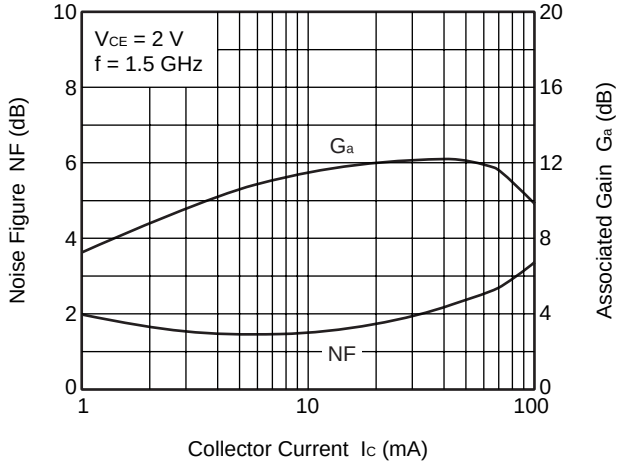
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



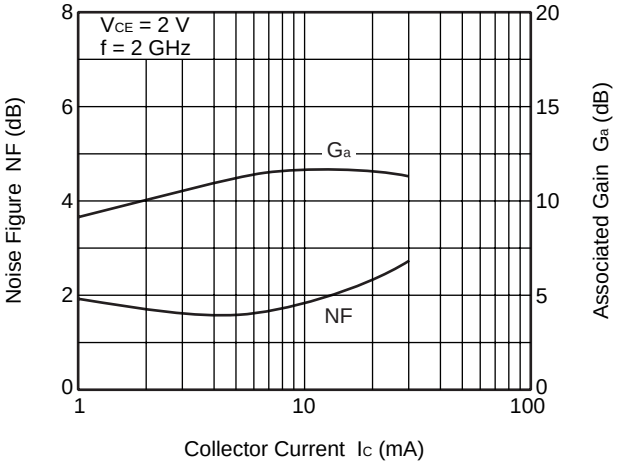
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



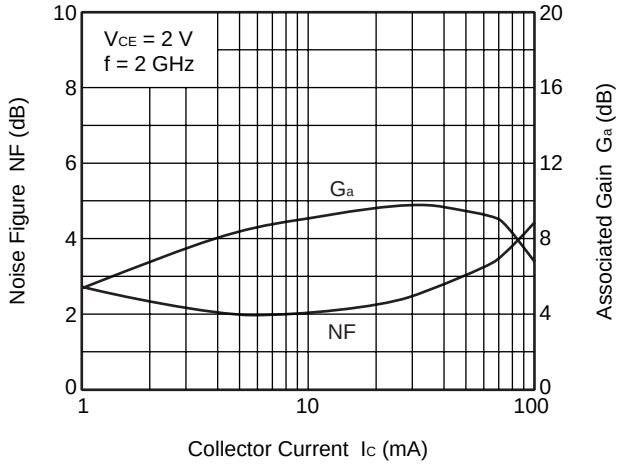
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS Q1

Note When K ≥ 1, the MAG (Maximum Available Power Gain) is used. $MAG = \left|\frac{S_{21}}{S_{12}}\right| (K - \sqrt{(K^2 - 1)})$

When K < 1, the MSG (Maximum Stable Power Gain) is used. $MSG = \left|\frac{S_{21}}{S_{12}}\right|$

V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG (dB) Note
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.961	−8.4	3.504	171.5	0.024	80.6	0.996	−4.3	0.135	21.57
0.2	0.961	−15.5	3.429	166.5	0.049	79.5	0.984	−8.6	0.090	18.43
0.3	0.921	−24.3	3.361	160.1	0.074	75.1	0.975	−12.7	0.105	16.60
0.4	0.914	−32.7	3.329	153.0	0.096	70.1	0.952	−17.1	0.141	15.38
0.5	0.894	−40.6	3.294	146.8	0.118	65.1	0.933	−21.2	0.175	14.46
0.6	0.854	−48.3	3.179	139.9	0.138	60.1	0.892	−25.5	0.232	13.63
0.7	0.821	−56.5	3.093	134.1	0.155	55.8	0.864	−29.3	0.255	12.99
0.8	0.782	−64.0	2.979	127.8	0.169	51.5	0.821	−33.2	0.304	12.46
0.9	0.743	−71.7	2.853	122.7	0.182	47.5	0.787	−36.9	0.335	11.94
1.0	0.714	−79.5	2.743	117.4	0.192	43.9	0.744	−40.4	0.368	11.54
1.1	0.682	−87.0	2.625	112.0	0.201	40.4	0.716	−43.8	0.400	11.15
1.2	0.658	−94.6	2.525	106.9	0.209	37.5	0.681	−46.9	0.430	10.82
1.3	0.633	−101.3	2.402	102.5	0.215	34.2	0.658	−49.9	0.460	10.49
1.4	0.607	−108.3	2.298	97.6	0.219	31.4	0.627	−52.5	0.504	10.21
1.5	0.583	−114.2	2.193	93.8	0.223	29.1	0.609	−55.1	0.536	9.94
1.6	0.567	−120.7	2.097	89.7	0.225	26.7	0.581	−57.2	0.577	9.70
1.7	0.556	−126.5	2.014	86.2	0.226	24.6	0.563	−59.4	0.606	9.51
1.8	0.536	−132.0	1.926	82.2	0.226	23.0	0.540	−60.9	0.661	9.31
1.9	0.528	−136.4	1.849	79.5	0.226	21.4	0.526	−63.0	0.694	9.13
2.0	0.525	−141.8	1.769	76.1	0.226	20.2	0.508	−64.4	0.728	8.94
2.1	0.524	−146.5	1.713	73.4	0.226	19.0	0.497	−66.4	0.750	8.80
2.2	0.521	−150.5	1.666	70.9	0.225	18.0	0.484	−67.7	0.780	8.70
2.3	0.517	−154.4	1.604	67.9	0.224	17.1	0.479	−69.7	0.808	8.54
2.4	0.513	−158.8	1.557	66.0	0.223	16.1	0.466	−70.9	0.845	8.45
2.5	0.513	−162.4	1.498	63.5	0.221	15.5	0.461	−72.7	0.878	8.31
2.6	0.511	−166.4	1.457	60.4	0.220	13.9	0.455	−74.6	0.910	8.21
2.7	0.510	−169.2	1.422	58.4	0.219	13.4	0.449	−76.1	0.938	8.13
2.8	0.507	−173.0	1.377	56.0	0.218	12.6	0.443	−77.0	0.976	8.01
2.9	0.504	−175.7	1.342	54.1	0.219	12.9	0.433	−78.4	1.007	7.35
3.0	0.499	−179.3	1.304	51.9	0.217	12.7	0.423	−79.5	1.062	6.27
4.0	0.515	146.5	1.036	30.8	0.211	15.9	0.367	−101.8	1.374	3.26
5.0	0.556	113.6	0.823	12.1	0.243	19.4	0.373	−129.5	1.443	1.34

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.878	–13.6	8.711	168.3	0.024	82.5	0.978	–8.4	0.088	25.55
0.2	0.871	–26.1	8.365	159.1	0.047	74.9	0.944	–16.6	0.133	22.54
0.3	0.808	–39.5	7.891	150.1	0.067	68.6	0.903	–24.0	0.171	20.68
0.4	0.773	–52.1	7.470	140.8	0.085	62.2	0.841	–31.1	0.229	19.42
0.5	0.726	–63.9	7.046	132.9	0.100	57.0	0.785	–37.3	0.278	18.46
0.6	0.665	–74.3	6.469	125.4	0.112	52.4	0.712	–43.0	0.351	17.61
0.7	0.620	–84.9	6.014	119.3	0.121	48.8	0.659	–47.9	0.393	16.95
0.8	0.576	–94.2	5.541	113.2	0.128	45.7	0.598	–52.4	0.457	16.36
0.9	0.541	–103.6	5.127	108.5	0.135	43.1	0.552	–56.7	0.502	15.79
1.0	0.517	–112.2	4.764	103.9	0.140	41.1	0.505	–60.5	0.549	15.31
1.1	0.491	–120.7	4.409	99.4	0.144	39.5	0.472	–64.1	0.594	14.85
1.2	0.477	–128.3	4.137	95.4	0.148	38.3	0.438	–67.7	0.635	14.46
1.3	0.465	–134.9	3.852	91.9	0.152	36.9	0.416	–70.6	0.673	14.05
1.4	0.451	–142.0	3.610	88.1	0.154	35.8	0.388	–73.6	0.722	13.69
1.5	0.442	–148.1	3.396	85.3	0.157	35.3	0.373	–75.8	0.757	13.34
1.6	0.438	–154.2	3.198	82.1	0.159	34.7	0.348	–78.2	0.801	13.02
1.7	0.438	–158.9	3.034	79.7	0.162	34.2	0.336	–80.3	0.829	12.72
1.8	0.430	–164.5	2.874	76.6	0.164	34.0	0.316	–82.1	0.877	12.43
1.9	0.426	–167.7	2.751	74.5	0.167	33.7	0.306	–84.2	0.907	12.17
2.0	0.435	–171.9	2.605	71.9	0.170	33.8	0.291	–85.8	0.933	11.86
2.1	0.439	–175.3	2.501	69.7	0.172	33.5	0.285	–88.2	0.952	11.62
2.2	0.438	–178.2	2.417	67.9	0.175	33.6	0.273	–89.5	0.976	11.40
2.3	0.436	179.1	2.317	65.4	0.178	33.5	0.270	–91.8	0.999	11.14
2.4	0.439	175.2	2.238	63.9	0.180	33.5	0.261	–92.9	1.023	10.01
2.5	0.440	172.4	2.144	62.1	0.183	33.5	0.258	–94.8	1.047	9.35
2.6	0.443	169.6	2.067	59.6	0.186	32.8	0.252	–96.2	1.066	8.89
2.7	0.442	167.3	2.020	58.0	0.189	32.8	0.248	–97.8	1.077	8.59
2.8	0.445	164.3	1.949	56.1	0.192	32.5	0.242	–98.7	1.096	8.17
2.9	0.444	162.5	1.894	54.5	0.197	32.8	0.236	–100.6	1.106	7.83
3.0	0.442	159.0	1.832	52.8	0.200	32.7	0.227	–101.7	1.135	7.38
4.0	0.478	132.4	1.395	34.7	0.239	31.9	0.213	–133.1	1.233	4.75
5.0	0.524	105.6	1.101	17.6	0.293	24.4	0.251	–161.8	1.235	2.84

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.835	–18.0	12.432	165.7	0.023	77.9	0.962	–11.7	0.139	27.24
0.2	0.798	–34.1	11.680	153.8	0.045	71.8	0.906	–22.3	0.174	24.17
0.3	0.718	–50.7	10.667	143.3	0.062	65.1	0.838	–31.6	0.226	22.34
0.4	0.673	–64.9	9.750	133.1	0.077	58.9	0.753	–39.9	0.304	21.03
0.5	0.621	–78.5	8.900	124.8	0.088	54.2	0.680	–46.6	0.365	20.04
0.6	0.559	–90.1	7.952	117.6	0.097	50.4	0.600	–52.9	0.451	19.14
0.7	0.518	–101.3	7.232	111.9	0.104	48.0	0.541	–58.0	0.509	18.43
0.8	0.482	–111.3	6.549	106.3	0.109	46.0	0.482	–62.7	0.576	17.78
0.9	0.461	–121.1	5.965	102.0	0.115	44.6	0.438	–67.1	0.624	17.16
1.0	0.446	–129.7	5.476	98.0	0.119	43.6	0.398	–71.4	0.674	16.61
1.1	0.431	–137.6	5.020	94.1	0.124	42.9	0.370	–75.3	0.720	16.08
1.2	0.425	–145.0	4.670	90.5	0.128	42.6	0.341	–79.3	0.761	15.63
1.3	0.420	–151.2	4.327	87.6	0.132	41.8	0.323	–82.4	0.797	15.17
1.4	0.415	–157.8	4.033	84.3	0.135	41.5	0.301	–85.9	0.839	14.74
1.5	0.410	–162.8	3.787	81.8	0.139	41.5	0.288	–88.2	0.872	14.34
1.6	0.412	–168.1	3.553	79.0	0.143	41.3	0.269	–91.2	0.907	13.95
1.7	0.415	–172.5	3.357	76.9	0.147	41.1	0.259	–93.6	0.931	13.59
1.8	0.414	–177.4	3.178	74.3	0.151	41.2	0.243	–96.0	0.966	13.24
1.9	0.409	–179.9	3.037	72.4	0.154	41.2	0.237	–98.4	0.990	12.94
2.0	0.419	176.4	2.869	70.1	0.159	41.3	0.224	–100.7	1.010	11.95
2.1	0.426	173.8	2.749	68.1	0.163	41.1	0.221	–103.5	1.019	11.42
2.2	0.426	171.4	2.652	66.4	0.167	41.2	0.211	–105.3	1.035	10.86
2.3	0.425	168.8	2.549	64.2	0.172	41.1	0.210	–107.8	1.048	10.36
2.4	0.428	165.6	2.456	62.9	0.176	41.0	0.202	–109.2	1.065	9.90
2.5	0.431	163.5	2.349	61.2	0.180	40.9	0.201	–111.5	1.079	9.44
2.6	0.435	160.6	2.267	58.9	0.185	40.4	0.196	–113.0	1.088	9.09
2.7	0.435	158.7	2.204	57.3	0.189	40.1	0.193	–115.0	1.096	8.79
2.8	0.437	156.2	2.129	55.7	0.193	39.6	0.188	–116.0	1.108	8.42
2.9	0.437	154.3	2.067	54.2	0.200	39.6	0.184	–118.4	1.111	8.12
3.0	0.434	151.5	1.997	52.6	0.204	39.4	0.176	–120.1	1.132	7.71
4.0	0.475	127.5	1.506	35.5	0.252	35.9	0.194	–153.6	1.185	5.17
5.0	0.517	102.6	1.186	19.3	0.308	25.6	0.250	–178.6	1.189	3.22

V_{CE} = 1 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.774	–20.9	15.184	163.6	0.021	78.7	0.946	–14.0	0.135	28.54
0.2	0.742	–40.3	13.955	150.1	0.043	70.1	0.872	–26.5	0.201	25.11
0.3	0.656	–58.3	12.422	138.8	0.059	62.6	0.785	–36.9	0.285	23.24
0.4	0.607	–74.1	11.049	128.3	0.071	57.3	0.689	–45.8	0.361	21.92
0.5	0.556	–88.6	9.870	119.8	0.081	53.0	0.609	–52.7	0.435	20.86
0.6	0.500	–100.8	8.697	113.1	0.088	50.4	0.528	–59.1	0.525	19.93
0.7	0.468	–112.4	7.821	107.7	0.094	48.7	0.472	–64.3	0.584	19.19
0.8	0.438	–122.5	7.013	102.4	0.099	47.6	0.417	–69.3	0.654	18.48
0.9	0.423	–132.2	6.352	98.6	0.105	46.5	0.377	–73.9	0.705	17.83
1.0	0.415	–140.6	5.789	95.0	0.110	46.2	0.340	–78.7	0.752	17.23
1.1	0.405	–147.9	5.296	91.3	0.114	45.9	0.316	–82.8	0.797	16.66
1.2	0.405	–154.8	4.903	88.1	0.119	45.9	0.292	–87.4	0.832	16.14
1.3	0.404	–160.3	4.538	85.3	0.124	45.5	0.277	–90.6	0.865	15.65
1.4	0.401	–166.3	4.214	82.3	0.128	45.4	0.259	–94.7	0.905	15.18
1.5	0.401	–171.1	3.956	80.0	0.133	45.4	0.249	–97.3	0.930	14.75
1.6	0.404	–175.9	3.705	77.5	0.137	45.4	0.232	–100.8	0.961	14.32
1.7	0.410	–179.5	3.503	75.4	0.142	45.3	0.226	–103.3	0.976	13.93
1.8	0.408	176.2	3.312	73.1	0.146	45.4	0.212	–106.4	1.007	13.03
1.9	0.405	173.5	3.162	71.4	0.151	45.4	0.208	–109.1	1.027	12.22
2.0	0.418	170.5	2.984	69.1	0.156	45.5	0.197	–111.9	1.040	11.60
2.1	0.423	168.0	2.858	67.2	0.161	45.2	0.196	–114.8	1.046	11.18
2.2	0.424	166.0	2.758	65.7	0.166	45.1	0.188	–117.0	1.056	10.76
2.3	0.424	163.7	2.647	63.5	0.171	45.0	0.187	–119.6	1.066	10.32
2.4	0.429	160.9	2.551	62.3	0.175	44.8	0.181	–121.3	1.076	9.95
2.5	0.430	158.9	2.437	60.6	0.181	44.6	0.181	–123.6	1.090	9.48
2.6	0.434	156.2	2.355	58.4	0.185	43.9	0.176	–125.2	1.095	9.16
2.7	0.435	154.4	2.289	57.1	0.191	43.6	0.175	–127.4	1.098	8.89
2.8	0.437	152.2	2.211	55.3	0.196	43.0	0.170	–128.8	1.106	8.55
2.9	0.435	150.6	2.142	53.9	0.202	42.8	0.168	–131.3	1.110	8.23
3.0	0.437	147.5	2.071	52.4	0.207	42.4	0.161	–133.7	1.123	7.87
4.0	0.477	125.2	1.553	35.9	0.259	37.6	0.196	–165.1	1.161	5.34
5.0	0.520	101.3	1.218	20.1	0.316	26.1	0.260	173.2	1.167	3.39

V_{CE} = 1 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.724	–24.8	18.069	161.1	0.022	77.2	0.925	–16.7	0.170	29.15
0.2	0.681	–47.1	16.226	146.0	0.041	67.7	0.830	–31.1	0.248	25.94
0.3	0.591	–67.7	13.997	134.1	0.055	61.2	0.727	–42.5	0.335	24.05
0.4	0.542	–84.4	12.159	123.5	0.066	56.5	0.622	–51.8	0.428	22.67
0.5	0.498	–99.6	10.637	115.3	0.074	52.9	0.540	–58.9	0.508	21.56
0.6	0.451	–112.2	9.261	109.0	0.081	51.0	0.462	–65.5	0.599	20.57
0.7	0.428	–123.6	8.230	103.9	0.086	50.2	0.408	–70.9	0.662	19.79
0.8	0.408	–133.7	7.343	99.2	0.092	49.4	0.359	–76.3	0.730	19.03
0.9	0.399	–142.7	6.616	95.5	0.097	49.0	0.323	–81.3	0.779	18.33
1.0	0.395	–150.4	6.012	92.1	0.103	49.1	0.293	–86.7	0.824	17.67
1.1	0.393	–157.3	5.480	89.0	0.108	49.2	0.273	–91.1	0.862	17.07
1.2	0.396	–163.5	5.054	85.9	0.113	49.3	0.253	–96.3	0.894	16.51
1.3	0.396	–168.6	4.671	83.4	0.118	49.0	0.242	–99.8	0.923	15.98
1.4	0.400	–173.9	4.336	80.4	0.123	49.0	0.227	–104.5	0.954	15.48
1.5	0.400	–178.2	4.066	78.5	0.128	49.1	0.220	–107.2	0.974	15.01
1.6	0.405	177.5	3.804	76.0	0.133	49.1	0.207	–111.4	0.999	14.55
1.7	0.412	174.6	3.586	74.2	0.138	48.9	0.202	–114.1	1.012	13.47
1.8	0.412	170.4	3.392	71.9	0.144	49.1	0.191	–117.9	1.034	12.59
1.9	0.410	168.0	3.243	70.3	0.149	48.9	0.189	–120.4	1.047	12.05
2.0	0.418	165.6	3.056	68.2	0.155	48.9	0.180	–124.0	1.062	11.44
2.1	0.426	163.3	2.923	66.4	0.161	48.5	0.181	–126.7	1.063	11.07
2.2	0.428	161.7	2.820	65.0	0.166	48.4	0.174	–129.5	1.070	10.70
2.3	0.427	159.6	2.706	62.8	0.172	48.1	0.176	–132.0	1.075	10.30
2.4	0.431	156.7	2.611	61.6	0.177	47.7	0.170	–134.0	1.084	9.93
2.5	0.434	155.0	2.495	60.1	0.182	47.4	0.171	–136.1	1.092	9.51
2.6	0.440	152.4	2.404	58.0	0.187	46.8	0.167	–137.9	1.096	9.20
2.7	0.437	150.9	2.340	56.5	0.193	46.3	0.167	–140.1	1.101	8.91
2.8	0.442	148.7	2.257	55.0	0.199	45.6	0.162	–141.8	1.103	8.60
2.9	0.440	147.1	2.190	53.7	0.205	45.2	0.162	–144.4	1.106	8.30
3.0	0.440	144.4	2.117	52.1	0.210	44.7	0.156	–147.0	1.117	7.94
4.0	0.479	123.5	1.580	36.0	0.265	38.8	0.205	–174.6	1.148	5.42
5.0	0.523	100.3	1.240	20.6	0.322	26.4	0.274	166.6	1.151	3.50

V_{CE} = 1 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.608	–35.8	22.647	156.5	0.020	69.4	0.869	–22.4	0.270	30.44
0.2	0.565	–63.1	19.141	138.2	0.039	63.6	0.736	–40.2	0.343	26.92
0.3	0.486	–88.1	15.689	125.8	0.049	57.8	0.610	–52.9	0.455	25.04
0.4	0.452	–106.0	13.073	115.8	0.058	55.3	0.501	–62.8	0.559	23.54
0.5	0.432	–121.3	11.093	108.2	0.065	53.2	0.424	–70.1	0.641	22.30
0.6	0.407	–133.7	9.495	102.6	0.072	53.0	0.357	–77.5	0.732	21.23
0.7	0.397	–144.1	8.346	98.2	0.077	52.9	0.312	–83.4	0.795	20.33
0.8	0.394	–152.7	7.372	94.0	0.083	53.3	0.273	–90.1	0.852	19.48
0.9	0.396	–160.6	6.613	91.0	0.089	53.2	0.248	–96.0	0.891	18.70
1.0	0.403	–166.5	5.971	87.9	0.095	53.5	0.228	–102.7	0.924	17.96
1.1	0.401	–172.0	5.424	85.1	0.101	53.9	0.216	–107.9	0.958	17.29
1.2	0.410	–177.1	4.996	82.3	0.107	54.0	0.205	–114.2	0.979	16.68
1.3	0.415	179.3	4.607	80.2	0.113	53.9	0.199	–117.9	0.999	16.10
1.4	0.420	174.9	4.267	77.5	0.119	53.9	0.191	–123.4	1.021	14.65
1.5	0.422	171.5	3.999	75.8	0.125	53.9	0.188	–126.2	1.034	13.91
1.6	0.429	167.8	3.738	73.5	0.131	53.9	0.181	–131.2	1.052	13.17
1.7	0.436	165.7	3.522	71.8	0.137	53.6	0.180	–133.6	1.059	12.63
1.8	0.438	162.3	3.330	69.8	0.143	53.5	0.174	–138.3	1.073	12.02
1.9	0.433	160.4	3.183	68.2	0.149	53.2	0.174	–140.6	1.082	11.54
2.0	0.445	158.4	3.000	66.2	0.155	52.9	0.170	–144.7	1.089	11.04
2.1	0.450	156.5	2.871	64.4	0.162	52.4	0.173	–146.9	1.088	10.68
2.2	0.452	155.0	2.763	63.1	0.168	52.1	0.169	–149.9	1.092	10.32
2.3	0.452	153.0	2.657	61.0	0.174	51.6	0.172	–152.0	1.094	9.97
2.4	0.455	151.0	2.558	60.0	0.180	51.1	0.168	–154.1	1.099	9.62
2.5	0.460	149.3	2.443	58.5	0.186	50.6	0.171	–155.9	1.105	9.22
2.6	0.464	147.2	2.354	56.5	0.192	49.8	0.168	–157.7	1.106	8.91
2.7	0.460	145.6	2.295	55.2	0.197	49.2	0.169	–159.6	1.109	8.65
2.8	0.464	143.7	2.216	53.5	0.203	48.3	0.166	–161.6	1.111	8.35
2.9	0.464	142.2	2.150	52.4	0.210	47.8	0.167	–163.7	1.110	8.08
3.0	0.464	140.0	2.076	50.8	0.216	47.1	0.163	–166.8	1.119	7.73
4.0	0.502	120.8	1.545	35.1	0.273	39.9	0.226	172.9	1.140	5.25
5.0	0.541	98.2	1.211	20.2	0.330	26.4	0.298	158.0	1.146	3.32

V_{CE} = 2 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.946	–7.0	3.466	172.3	0.019	87.8	0.998	–3.5	0.029	22.55
0.2	0.966	–13.6	3.390	167.9	0.041	80.9	0.989	–7.0	0.084	19.21
0.3	0.934	–21.4	3.330	162.2	0.061	76.9	0.983	–10.3	0.099	17.39
0.4	0.925	–29.0	3.308	155.7	0.081	72.4	0.964	–14.1	0.132	16.12
0.5	0.910	–36.1	3.293	150.0	0.099	68.0	0.950	–17.5	0.166	15.20
0.6	0.875	–43.1	3.205	143.5	0.117	63.5	0.917	–21.2	0.218	14.38
0.7	0.845	–50.5	3.139	138.2	0.132	59.6	0.896	–24.6	0.236	13.75
0.8	0.809	–57.5	3.042	132.2	0.145	55.4	0.859	–28.1	0.285	13.21
0.9	0.769	–64.6	2.931	127.3	0.158	51.7	0.828	–31.4	0.315	12.68
1.0	0.741	–71.7	2.838	122.2	0.168	48.2	0.791	–34.4	0.349	12.28
1.1	0.710	–78.9	2.733	117.0	0.177	44.9	0.766	–37.6	0.374	11.89
1.2	0.681	–86.1	2.648	112.0	0.184	42.0	0.733	–40.4	0.407	11.57
1.3	0.656	–92.7	2.527	107.6	0.191	38.7	0.714	–43.2	0.432	11.22
1.4	0.629	–99.3	2.434	102.8	0.196	35.9	0.683	–45.6	0.475	10.95
1.5	0.602	–105.4	2.328	98.9	0.200	33.6	0.667	–48.1	0.503	10.67
1.6	0.583	–111.7	2.237	94.8	0.202	31.2	0.640	–50.1	0.543	10.44
1.7	0.568	–117.4	2.156	91.3	0.204	29.1	0.623	–52.3	0.569	10.24
1.8	0.548	–123.2	2.067	87.3	0.205	27.3	0.599	–53.8	0.620	10.03
1.9	0.534	–127.6	1.986	84.5	0.206	25.7	0.583	–55.6	0.658	9.85
2.0	0.532	–133.3	1.904	81.0	0.206	24.5	0.566	–56.8	0.687	9.66
2.1	0.528	–138.1	1.844	78.2	0.207	23.2	0.554	–58.9	0.707	9.51
2.2	0.521	–142.2	1.794	75.7	0.206	22.3	0.541	–59.9	0.740	9.40
2.3	0.513	–146.4	1.727	72.8	0.206	21.4	0.535	–61.6	0.771	9.24
2.4	0.507	–151.0	1.681	70.8	0.205	20.4	0.522	–63.0	0.805	9.14
2.5	0.503	–155.0	1.616	68.4	0.203	19.7	0.516	–64.5	0.839	9.00
2.6	0.503	–159.0	1.575	65.3	0.203	18.2	0.511	–66.3	0.864	8.90
2.7	0.499	–162.1	1.537	63.2	0.202	17.7	0.504	–67.8	0.893	8.81
2.8	0.497	–166.0	1.489	60.7	0.201	16.9	0.498	–68.5	0.929	8.69
2.9	0.493	–168.8	1.444	58.8	0.203	17.3	0.489	–69.5	0.960	8.52
3.0	0.485	–173.0	1.406	56.6	0.201	17.0	0.478	–70.6	1.013	7.74
4.0	0.491	150.8	1.120	35.1	0.200	20.7	0.412	–90.2	1.317	4.11
5.0	0.533	116.2	0.889	15.8	0.235	24.2	0.402	–115.8	1.377	2.12

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.899	–12.1	8.488	169.7	0.019	84.5	0.984	–6.7	0.053	26.45
0.2	0.889	–22.1	8.219	161.7	0.039	76.8	0.958	–13.3	0.131	23.22
0.3	0.830	–33.1	7.859	153.5	0.056	71.9	0.928	–19.3	0.165	21.44
0.4	0.803	–44.3	7.532	145.0	0.073	66.2	0.878	–25.2	0.218	20.14
0.5	0.760	–54.6	7.205	137.6	0.087	61.4	0.834	–30.5	0.262	19.17
0.6	0.699	–63.9	6.714	130.3	0.099	56.8	0.770	–35.5	0.335	18.33
0.7	0.652	–73.5	6.322	124.3	0.108	53.5	0.722	–39.9	0.373	17.67
0.8	0.603	–82.1	5.886	118.4	0.115	50.1	0.665	–43.9	0.434	17.08
0.9	0.564	–90.8	5.494	113.6	0.122	47.6	0.620	–47.6	0.476	16.52
1.0	0.532	–99.1	5.140	108.9	0.128	45.4	0.574	–50.9	0.522	16.05
1.1	0.502	–107.2	4.793	104.4	0.133	43.6	0.541	–54.1	0.562	15.58
1.2	0.481	–115.1	4.524	100.1	0.137	42.2	0.505	–57.1	0.602	15.20
1.3	0.464	–121.9	4.219	96.5	0.140	40.6	0.483	–59.6	0.635	14.78
1.4	0.445	–129.3	3.973	92.7	0.143	39.5	0.452	–62.1	0.684	14.43
1.5	0.430	–135.2	3.751	89.8	0.147	38.7	0.435	–64.0	0.717	14.08
1.6	0.419	–141.5	3.539	86.4	0.149	38.1	0.409	–66.1	0.763	13.75
1.7	0.416	–147.0	3.366	83.9	0.152	37.3	0.395	–67.7	0.789	13.47
1.8	0.405	–153.0	3.195	80.8	0.154	37.1	0.375	–69.0	0.832	13.16
1.9	0.398	–156.6	3.052	78.6	0.156	36.7	0.363	–70.8	0.867	12.91
2.0	0.404	–161.9	2.896	76.0	0.159	36.6	0.346	–71.9	0.893	12.59
2.1	0.406	–165.5	2.786	73.7	0.162	36.4	0.338	–74.0	0.909	12.35
2.2	0.405	–168.9	2.685	71.9	0.165	36.5	0.326	–74.9	0.936	12.13
2.3	0.404	–172.1	2.582	69.4	0.168	36.3	0.321	–76.7	0.955	11.87
2.4	0.405	–175.9	2.489	67.9	0.170	36.2	0.311	–77.5	0.979	11.66
2.5	0.405	–179.3	2.387	66.0	0.173	36.2	0.306	–79.2	1.001	11.19
2.6	0.407	177.2	2.310	63.5	0.175	35.6	0.301	–80.3	1.017	10.40
2.7	0.405	174.9	2.249	61.9	0.179	35.5	0.295	–81.6	1.032	9.91
2.8	0.405	171.7	2.169	59.9	0.182	35.2	0.290	–82.1	1.051	9.38
2.9	0.406	169.4	2.101	58.4	0.186	35.5	0.282	–83.4	1.064	8.98
3.0	0.403	165.8	2.038	56.5	0.189	35.4	0.273	–84.2	1.089	8.50
4.0	0.437	136.6	1.557	38.2	0.228	34.9	0.233	–110.9	1.188	5.73
5.0	0.486	108.0	1.225	20.9	0.281	27.8	0.245	–141.1	1.197	3.71

V_{CE} = 2 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.839	–14.1	11.944	167.5	0.019	80.9	0.971	–8.9	0.130	27.97
0.2	0.830	–27.6	11.355	157.5	0.038	75.6	0.931	–17.4	0.154	24.77
0.3	0.756	–41.5	10.589	148.1	0.053	68.9	0.882	–25.0	0.210	22.98
0.4	0.714	–53.8	9.885	138.6	0.067	63.4	0.813	–32.0	0.280	21.68
0.5	0.664	–65.6	9.207	130.6	0.079	58.7	0.751	–37.7	0.339	20.68
0.6	0.597	–75.8	8.378	123.3	0.088	54.9	0.675	–43.1	0.421	19.80
0.7	0.549	–86.0	7.729	117.5	0.095	52.4	0.621	–47.4	0.473	19.09
0.8	0.504	–95.6	7.074	111.8	0.101	50.1	0.561	–51.5	0.537	18.45
0.9	0.470	–104.8	6.490	107.4	0.107	48.3	0.516	–55.2	0.585	17.84
1.0	0.446	–113.3	6.003	103.2	0.112	47.2	0.472	–58.6	0.633	17.31
1.1	0.423	–121.7	5.544	99.0	0.116	46.2	0.441	–61.8	0.677	16.80
1.2	0.408	–129.7	5.178	95.3	0.120	45.6	0.409	–64.9	0.717	16.34
1.3	0.397	–136.4	4.804	92.2	0.124	44.6	0.388	–67.4	0.753	15.88
1.4	0.386	–143.5	4.496	88.7	0.128	44.1	0.362	–70.0	0.795	15.46
1.5	0.380	–149.3	4.229	86.1	0.132	43.9	0.348	–72.0	0.823	15.06
1.6	0.377	–155.5	3.978	83.2	0.135	43.6	0.325	–74.1	0.860	14.68
1.7	0.377	–160.5	3.769	81.0	0.139	43.3	0.313	–75.9	0.882	14.33
1.8	0.370	–166.1	3.569	78.2	0.143	43.3	0.295	–77.4	0.921	13.99
1.9	0.364	–169.3	3.407	76.3	0.146	43.2	0.285	–79.4	0.947	13.68
2.0	0.372	–173.3	3.226	73.9	0.150	43.2	0.270	–80.6	0.968	13.32
2.1	0.379	–176.8	3.093	71.8	0.154	43.1	0.265	–82.9	0.976	13.02
2.2	0.378	–180.0	2.980	70.2	0.158	43.1	0.254	–83.9	0.995	12.75
2.3	0.377	177.8	2.861	67.9	0.163	43.0	0.250	–86.0	1.008	11.91
2.4	0.378	174.1	2.758	66.6	0.166	42.8	0.241	–86.8	1.027	11.21
2.5	0.381	171.3	2.638	64.9	0.170	42.8	0.238	–88.8	1.042	10.66
2.6	0.385	168.3	2.548	62.5	0.174	42.2	0.233	–89.8	1.048	10.31
2.7	0.386	166.2	2.479	61.0	0.178	42.0	0.228	–91.2	1.056	9.98
2.8	0.388	163.2	2.389	59.2	0.182	41.4	0.223	–91.7	1.069	9.57
2.9	0.386	161.3	2.316	57.7	0.188	41.6	0.217	–93.3	1.077	9.21
3.0	0.385	158.0	2.240	56.1	0.192	41.3	0.208	–94.2	1.094	8.79
4.0	0.425	131.8	1.694	39.0	0.239	38.5	0.191	–126.6	1.151	6.14
5.0	0.476	105.0	1.325	22.6	0.296	28.7	0.223	–157.5	1.160	4.09

V_{CE} = 2 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.805	–16.7	14.517	166.0	0.018	80.4	0.961	–10.6	0.131	29.13
0.2	0.780	–31.7	13.607	154.4	0.036	73.4	0.907	–20.5	0.194	25.74
0.3	0.699	–47.1	12.452	144.1	0.051	67.3	0.843	–28.9	0.257	23.88
0.4	0.652	–60.6	11.390	134.3	0.063	62.0	0.761	–36.4	0.331	22.56
0.5	0.598	–73.5	10.393	126.0	0.073	57.6	0.690	–42.4	0.398	21.53
0.6	0.530	–84.2	9.318	119.0	0.081	54.5	0.612	–47.9	0.487	20.59
0.7	0.487	–95.1	8.489	113.5	0.088	52.7	0.555	–52.1	0.541	19.86
0.8	0.446	–104.6	7.695	107.9	0.093	51.0	0.497	–56.2	0.611	19.17
0.9	0.419	–114.0	7.017	103.8	0.098	49.8	0.453	–59.9	0.660	18.54
1.0	0.400	–122.8	6.442	99.9	0.103	49.1	0.413	–63.5	0.706	17.95
1.1	0.382	–131.1	5.929	96.2	0.108	48.6	0.384	–66.6	0.749	17.40
1.2	0.376	–138.7	5.500	92.7	0.112	48.4	0.355	–70.0	0.784	16.90
1.3	0.368	–145.5	5.107	89.7	0.117	47.7	0.337	–72.5	0.818	16.42
1.4	0.362	–152.2	4.760	86.5	0.121	47.5	0.313	–75.4	0.855	15.95
1.5	0.356	–157.8	4.465	84.2	0.126	47.4	0.301	–77.3	0.882	15.51
1.6	0.357	–163.6	4.196	81.5	0.130	47.3	0.280	–79.7	0.914	15.10
1.7	0.360	–168.2	3.966	79.5	0.134	47.0	0.270	–81.6	0.932	14.72
1.8	0.354	–173.5	3.758	76.8	0.138	47.1	0.253	–83.5	0.963	14.34
1.9	0.352	–176.3	3.587	75.1	0.142	46.9	0.246	–85.5	0.982	14.02
2.0	0.363	–180.0	3.387	72.8	0.147	47.1	0.232	–87.0	0.998	13.62
2.1	0.367	176.6	3.250	70.8	0.152	46.8	0.228	–89.6	1.005	12.86
2.2	0.369	174.2	3.127	69.3	0.156	46.8	0.218	–90.8	1.018	12.18
2.3	0.368	171.7	3.002	67.1	0.161	46.6	0.215	–93.1	1.029	11.66
2.4	0.371	168.5	2.893	66.0	0.166	46.4	0.207	–94.0	1.040	11.20
2.5	0.375	166.1	2.764	64.3	0.170	46.2	0.205	–96.0	1.053	10.70
2.6	0.378	163.2	2.666	62.1	0.175	45.6	0.200	–97.0	1.059	10.35
2.7	0.376	161.3	2.599	60.6	0.179	45.3	0.196	–98.8	1.065	10.06
2.8	0.380	158.8	2.502	58.9	0.184	44.7	0.191	–99.3	1.073	9.68
2.9	0.379	156.6	2.425	57.6	0.191	44.7	0.186	–101.2	1.077	9.35
3.0	0.378	153.2	2.346	55.9	0.195	44.2	0.178	–102.4	1.093	8.95
4.0	0.422	129.2	1.762	39.4	0.246	40.1	0.177	–137.7	1.132	6.34
5.0	0.472	103.7	1.373	23.5	0.303	29.1	0.222	–167.1	1.142	4.27

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.757	–18.6	17.288	164.0	0.017	79.7	0.949	–12.5	0.160	30.09
0.2	0.730	–36.4	15.936	151.1	0.035	71.7	0.879	–23.8	0.231	26.58
0.3	0.638	–53.4	14.259	140.2	0.048	65.7	0.798	–33.0	0.306	24.72
0.4	0.585	–68.3	12.756	129.9	0.059	60.9	0.706	–40.9	0.390	23.35
0.5	0.532	–81.3	11.422	121.7	0.068	57.1	0.628	–46.9	0.465	22.27
0.6	0.470	–93.0	10.109	115.0	0.075	54.9	0.550	–52.4	0.553	21.29
0.7	0.432	–103.8	9.097	109.6	0.081	53.4	0.494	–56.6	0.614	20.51
0.8	0.398	–113.9	8.189	104.6	0.086	52.5	0.439	–60.6	0.680	19.78
0.9	0.379	–123.8	7.416	100.7	0.092	51.7	0.398	–64.3	0.728	19.08
1.0	0.367	–132.2	6.779	97.0	0.097	51.5	0.361	–68.0	0.772	18.45
1.1	0.355	–140.6	6.207	93.5	0.102	51.4	0.335	–71.3	0.812	17.86
1.2	0.351	–147.9	5.767	90.4	0.107	51.2	0.309	–74.9	0.845	17.33
1.3	0.348	–154.3	5.316	87.7	0.111	50.9	0.293	–77.5	0.875	16.79
1.4	0.347	–160.2	4.956	84.7	0.116	50.7	0.273	–80.7	0.906	16.31
1.5	0.344	–165.8	4.648	82.4	0.121	50.7	0.262	–82.8	0.927	15.84
1.6	0.345	–171.1	4.359	80.0	0.126	50.6	0.244	–85.5	0.955	15.39
1.7	0.350	–175.2	4.119	78.0	0.131	50.4	0.236	–87.5	0.968	14.99
1.8	0.351	179.5	3.895	75.7	0.136	50.4	0.220	–89.7	0.991	14.58
1.9	0.346	177.2	3.718	73.9	0.140	50.3	0.215	–92.0	1.008	13.67
2.0	0.358	174.3	3.513	71.8	0.146	50.3	0.202	–93.8	1.019	12.98
2.1	0.363	171.3	3.363	69.9	0.151	49.9	0.199	–96.6	1.025	12.52
2.2	0.366	169.3	3.238	68.5	0.156	49.8	0.190	–98.1	1.032	12.08
2.3	0.363	166.6	3.107	66.3	0.161	49.6	0.188	–100.6	1.042	11.60
2.4	0.367	163.6	2.991	65.3	0.166	49.2	0.181	–101.7	1.052	11.17
2.5	0.370	161.7	2.858	63.7	0.171	49.0	0.180	–103.9	1.061	10.72
2.6	0.375	158.8	2.757	61.6	0.176	48.3	0.175	–105.0	1.065	10.39
2.7	0.375	157.4	2.679	60.1	0.181	47.9	0.172	–106.9	1.068	10.11
2.8	0.377	154.5	2.585	58.5	0.186	47.2	0.167	–107.5	1.073	9.77
2.9	0.376	152.8	2.509	57.2	0.193	47.0	0.164	–109.8	1.075	9.47
3.0	0.377	149.9	2.424	55.6	0.198	46.5	0.156	–111.2	1.086	9.09
4.0	0.422	126.9	1.809	39.6	0.251	41.3	0.171	–147.7	1.120	6.47
5.0	0.472	102.4	1.411	24.0	0.309	29.4	0.226	–174.9	1.127	4.43

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.693	–23.2	20.755	161.5	0.018	76.8	0.924	–15.1	0.214	30.68
0.2	0.646	–44.1	18.601	146.4	0.034	69.2	0.833	–28.1	0.291	27.43
0.3	0.554	–63.5	16.123	134.7	0.045	64.2	0.733	–38.2	0.376	25.56
0.4	0.502	–79.4	14.027	124.5	0.055	59.7	0.630	–46.3	0.474	24.09
0.5	0.457	–94.1	12.284	116.5	0.062	57.1	0.551	–52.1	0.550	22.96
0.6	0.407	–106.1	10.702	110.1	0.069	55.8	0.474	–57.3	0.642	21.91
0.7	0.383	–117.8	9.538	105.3	0.074	55.1	0.420	–61.5	0.699	21.09
0.8	0.356	–128.4	8.513	100.5	0.080	54.7	0.370	–65.4	0.765	20.28
0.9	0.346	–137.6	7.666	97.1	0.085	54.4	0.333	–69.2	0.810	19.55
1.0	0.344	–145.8	6.969	93.8	0.091	54.4	0.301	–73.2	0.847	18.85
1.1	0.337	–153.3	6.358	90.7	0.096	54.5	0.279	–76.6	0.883	18.19
1.2	0.339	–160.1	5.876	87.6	0.102	54.6	0.257	–80.6	0.910	17.62
1.3	0.341	–165.1	5.440	85.1	0.107	54.2	0.244	–83.4	0.931	17.07
1.4	0.343	–171.1	5.040	82.3	0.112	54.1	0.227	–87.0	0.959	16.53
1.5	0.345	–175.7	4.720	80.4	0.118	54.2	0.219	–89.2	0.974	16.03
1.6	0.348	179.7	4.413	78.0	0.123	54.1	0.203	–92.2	0.997	15.54
1.7	0.355	176.3	4.170	76.3	0.128	53.9	0.197	–94.5	1.005	14.67
1.8	0.356	171.7	3.950	74.0	0.134	53.8	0.184	–97.3	1.023	13.77
1.9	0.354	169.7	3.765	72.5	0.139	53.5	0.180	–99.8	1.035	13.18
2.0	0.364	167.1	3.555	70.4	0.145	53.3	0.169	–102.2	1.044	12.61
2.1	0.371	164.7	3.399	68.6	0.151	53.0	0.168	–105.2	1.045	12.23
2.2	0.371	163.0	3.275	67.2	0.156	52.7	0.160	–107.1	1.051	11.84
2.3	0.372	161.1	3.140	65.2	0.162	52.3	0.160	–109.9	1.056	11.43
2.4	0.374	158.2	3.027	64.1	0.167	51.9	0.154	–111.0	1.063	11.05
2.5	0.380	156.5	2.892	62.6	0.173	51.5	0.154	–113.5	1.068	10.65
2.6	0.383	153.7	2.786	60.5	0.178	50.7	0.149	–114.7	1.072	10.31
2.7	0.383	152.3	2.707	59.2	0.183	50.2	0.147	–116.9	1.073	10.04
2.8	0.387	150.0	2.611	57.6	0.189	49.4	0.143	–117.7	1.076	9.72
2.9	0.384	148.5	2.536	56.2	0.195	49.0	0.140	–120.2	1.079	9.41
3.0	0.386	145.6	2.448	54.8	0.201	48.5	0.133	–122.3	1.088	9.06
4.0	0.431	124.7	1.820	39.2	0.256	42.2	0.165	–158.8	1.114	6.46
5.0	0.478	100.9	1.416	24.1	0.314	29.5	0.228	177.0	1.124	4.41

S-PARAMETERS Q2

V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.969	–20.0	3.596	166.2	0.045	76.0	0.989	–7.4	0.092	19.04
0.2	0.946	–39.8	3.407	153.4	0.086	67.1	0.949	–14.7	0.087	15.99
0.3	0.906	–58.9	3.167	140.9	0.119	56.7	0.898	–21.1	0.128	14.25
0.4	0.868	–75.3	2.906	129.3	0.145	47.6	0.839	–26.5	0.186	13.01
0.5	0.843	–90.0	2.676	119.9	0.164	39.8	0.783	–30.9	0.226	12.13
0.6	0.806	–103.7	2.427	110.7	0.176	33.1	0.728	–34.8	0.282	11.39
0.7	0.778	–115.5	2.212	103.1	0.184	27.3	0.686	–37.9	0.333	10.79
0.8	0.760	–125.9	2.016	96.3	0.188	22.4	0.647	–41.0	0.382	10.31
0.9	0.749	–135.1	1.840	89.9	0.190	18.1	0.618	–43.9	0.428	9.87
1.0	0.741	–143.3	1.700	84.0	0.189	14.6	0.593	–46.6	0.477	9.55
1.1	0.732	–150.5	1.571	78.9	0.187	11.4	0.576	–49.4	0.530	9.25
1.2	0.731	–157.1	1.451	74.0	0.183	8.8	0.560	–52.0	0.580	8.99
1.3	0.734	–162.8	1.356	69.6	0.179	6.5	0.551	–54.8	0.621	8.80
1.4	0.734	–167.8	1.266	65.4	0.174	4.5	0.543	–57.5	0.680	8.62
1.5	0.736	–172.3	1.190	61.5	0.168	3.1	0.540	–60.2	0.729	8.50
1.6	0.739	–176.3	1.121	57.7	0.163	1.9	0.535	–62.8	0.791	8.38
1.7	0.743	179.9	1.054	54.5	0.156	1.1	0.537	–65.4	0.844	8.29
1.8	0.744	176.4	1.000	51.2	0.150	0.9	0.534	–68.0	0.920	8.25
1.9	0.745	172.8	0.947	48.2	0.143	0.9	0.537	–70.5	0.997	8.21
2.0	0.749	170.0	0.903	45.1	0.137	1.8	0.535	–72.9	1.076	6.52
2.1	0.751	167.1	0.871	43.0	0.130	2.9	0.539	–75.5	1.134	6.03
2.2	0.752	164.4	0.831	40.5	0.125	4.4	0.538	–78.0	1.240	5.29
2.3	0.756	161.4	0.799	38.4	0.119	6.6	0.543	–80.5	1.302	4.97
2.4	0.761	158.7	0.769	36.1	0.115	8.9	0.539	–83.0	1.386	4.56
2.5	0.762	156.0	0.738	34.0	0.111	12.2	0.542	–85.9	1.474	4.15
2.6	0.766	153.3	0.711	32.4	0.107	15.8	0.543	–88.8	1.555	3.83
2.7	0.764	150.5	0.686	30.4	0.106	20.0	0.545	–91.7	1.636	3.45
2.8	0.768	147.9	0.658	29.1	0.106	24.2	0.545	–94.4	1.691	3.09
2.9	0.755	144.8	0.625	27.0	0.109	28.0	0.542	–97.5	1.861	2.24
3.0	0.749	141.3	0.605	24.8	0.113	32.5	0.539	–101.1	1.923	1.75
4.0	0.781	123.7	0.468	14.0	0.181	51.3	0.579	–134.6	1.464	0.09
5.0	0.789	101.1	0.394	12.0	0.286	40.3	0.626	–164.0	1.283	–1.81

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.913	–33.3	9.705	159.5	0.044	72.6	0.948	–16.0	0.062	23.46
0.2	0.851	–61.4	8.525	141.8	0.075	58.1	0.834	–29.6	0.131	20.56
0.3	0.780	–86.0	7.262	127.5	0.096	47.1	0.717	–39.4	0.205	18.80
0.4	0.732	–105.4	6.153	116.2	0.108	39.5	0.612	–46.6	0.276	17.54
0.5	0.704	–120.5	5.315	107.6	0.116	34.1	0.531	–51.5	0.344	16.61
0.6	0.680	–133.0	4.598	100.4	0.120	30.4	0.464	–55.7	0.417	15.83
0.7	0.667	–143.3	4.040	94.4	0.123	27.6	0.416	–58.8	0.485	15.17
0.8	0.657	–152.1	3.589	89.4	0.124	25.9	0.377	–62.0	0.557	14.61
0.9	0.655	–159.4	3.209	84.7	0.125	24.5	0.349	–64.8	0.620	14.08
1.0	0.653	–165.8	2.911	80.5	0.125	24.1	0.327	–67.8	0.686	13.66
1.1	0.655	–171.3	2.662	76.7	0.126	23.6	0.312	–70.6	0.743	13.26
1.2	0.658	–176.5	2.436	73.2	0.126	23.6	0.299	–73.4	0.805	12.88
1.3	0.663	179.6	2.259	69.9	0.125	23.8	0.293	–76.2	0.855	12.57
1.4	0.665	175.8	2.101	66.8	0.126	24.4	0.287	–78.8	0.913	12.24
1.5	0.667	172.4	1.964	63.7	0.125	25.2	0.286	–81.2	0.967	11.95
1.6	0.673	169.6	1.845	61.0	0.126	25.9	0.282	–83.7	1.010	11.04
1.7	0.677	166.6	1.731	58.4	0.126	27.0	0.285	–85.8	1.056	9.92
1.8	0.678	164.0	1.637	55.7	0.127	28.4	0.283	–88.0	1.112	9.07
1.9	0.680	161.6	1.555	53.3	0.128	29.5	0.287	–89.9	1.147	8.51
2.0	0.681	159.4	1.481	50.7	0.130	31.2	0.286	–91.9	1.193	7.93
2.1	0.684	157.0	1.425	48.7	0.131	32.6	0.290	–94.0	1.209	7.60
2.2	0.685	155.0	1.361	46.6	0.134	33.8	0.289	–96.1	1.244	7.11
2.3	0.691	152.5	1.310	44.8	0.136	35.3	0.293	–98.1	1.243	6.85
2.4	0.692	150.5	1.263	42.7	0.140	36.4	0.291	–100.3	1.265	6.47
2.5	0.696	148.2	1.216	40.7	0.144	37.8	0.294	–102.8	1.264	6.19
2.6	0.698	146.0	1.172	38.8	0.147	38.9	0.296	–105.2	1.284	5.83
2.7	0.698	143.8	1.131	36.9	0.151	39.8	0.298	–108.0	1.299	5.47
2.8	0.698	141.6	1.088	35.2	0.156	40.5	0.300	–110.5	1.314	5.09
2.9	0.688	138.9	1.039	32.9	0.163	40.5	0.302	–113.6	1.361	4.47
3.0	0.685	135.9	1.004	30.6	0.169	41.2	0.303	–116.9	1.373	4.08
4.0	0.726	121.3	0.781	15.4	0.222	44.3	0.375	–147.7	1.243	2.50
5.0	0.753	101.1	0.605	4.5	0.295	34.3	0.461	–171.6	1.156	0.72

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.843	–43.2	14.558	153.7	0.041	66.1	0.905	–23.2	0.130	25.50
0.2	0.769	–77.8	11.865	133.5	0.066	53.2	0.736	–40.7	0.185	22.54
0.3	0.702	–104.2	9.473	119.4	0.080	43.8	0.590	–52.0	0.283	20.72
0.4	0.664	–122.6	7.711	109.1	0.088	38.1	0.481	–60.0	0.380	19.44
0.5	0.651	–136.6	6.482	101.4	0.093	34.9	0.403	–65.5	0.458	18.45
0.6	0.633	–147.8	5.516	95.3	0.096	33.3	0.344	–70.5	0.552	17.59
0.7	0.628	–156.5	4.788	90.2	0.099	32.4	0.302	–74.5	0.629	16.85
0.8	0.627	–164.0	4.217	86.0	0.101	32.5	0.270	–78.9	0.704	16.20
0.9	0.627	–170.1	3.760	82.0	0.104	32.6	0.248	–82.9	0.771	15.59
1.0	0.629	–175.3	3.396	78.5	0.106	33.3	0.231	–87.1	0.834	15.06
1.1	0.631	179.8	3.092	75.3	0.108	33.7	0.221	–90.8	0.891	14.56
1.2	0.637	175.6	2.827	72.2	0.111	34.5	0.213	–94.5	0.939	14.06
1.3	0.641	172.2	2.615	69.3	0.113	35.5	0.210	–97.7	0.981	13.63
1.4	0.647	168.9	2.430	66.6	0.117	36.4	0.207	–100.9	1.015	12.45
1.5	0.649	166.3	2.268	64.0	0.119	37.4	0.207	–103.3	1.055	11.36
1.6	0.653	163.6	2.133	61.4	0.122	38.1	0.206	–106.1	1.081	10.67
1.7	0.659	161.3	2.002	59.1	0.126	39.0	0.209	–107.7	1.103	10.07
1.8	0.660	159.0	1.892	56.8	0.129	40.2	0.208	–110.0	1.138	9.41
1.9	0.663	156.7	1.796	54.6	0.133	40.9	0.211	–111.4	1.149	8.96
2.0	0.665	154.7	1.712	52.1	0.137	41.8	0.210	–113.3	1.169	8.48
2.1	0.668	152.7	1.643	50.3	0.141	42.6	0.214	–114.9	1.173	8.14
2.2	0.667	151.0	1.575	48.5	0.146	43.1	0.213	–116.9	1.192	7.68
2.3	0.671	148.8	1.512	46.7	0.151	43.7	0.217	–118.4	1.189	7.38
2.4	0.673	146.8	1.458	44.6	0.156	44.0	0.216	–120.5	1.193	7.06
2.5	0.675	145.0	1.405	42.8	0.161	44.4	0.220	–122.6	1.192	6.75
2.6	0.676	142.9	1.356	41.2	0.166	44.7	0.220	–124.9	1.203	6.40
2.7	0.678	140.9	1.306	39.2	0.172	44.8	0.224	–127.5	1.207	6.07
2.8	0.678	138.6	1.261	37.6	0.177	44.6	0.226	–130.0	1.214	5.73
2.9	0.667	136.4	1.204	35.2	0.185	43.8	0.231	–132.9	1.251	5.12
3.0	0.663	133.4	1.165	33.1	0.192	43.7	0.234	–135.8	1.267	4.72
4.0	0.706	119.9	0.909	17.7	0.241	42.5	0.318	–161.9	1.188	3.14
5.0	0.737	100.6	0.705	5.2	0.303	31.8	0.406	179.3	1.135	1.43

V_{CE} = 1 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.794	–52.8	18.401	149.1	0.038	64.6	0.862	–29.1	0.121	26.86
0.2	0.722	–90.1	14.049	127.9	0.059	50.3	0.658	–49.1	0.230	23.75
0.3	0.655	–116.7	10.776	114.2	0.069	42.2	0.507	–61.3	0.358	21.92
0.4	0.631	–134.0	8.572	104.8	0.075	38.9	0.403	–70.1	0.465	20.55
0.5	0.622	–146.4	7.099	97.8	0.080	37.5	0.332	–76.5	0.558	19.49
0.6	0.613	–156.3	5.999	92.4	0.084	37.3	0.281	–82.9	0.654	18.56
0.7	0.612	–164.2	5.187	87.9	0.087	37.3	0.246	–88.0	0.733	17.75
0.8	0.613	–170.6	4.552	84.1	0.091	38.2	0.221	–94.0	0.804	17.00
0.9	0.617	–176.0	4.042	80.5	0.095	38.9	0.204	–99.0	0.863	16.30
1.0	0.620	179.4	3.649	77.4	0.098	40.0	0.193	–104.5	0.918	15.70
1.1	0.623	175.0	3.320	74.4	0.102	40.8	0.187	–108.9	0.964	15.12
1.2	0.628	171.0	3.034	71.5	0.106	41.6	0.183	–113.2	1.004	14.17
1.3	0.636	168.2	2.801	69.0	0.110	42.6	0.183	–116.6	1.030	13.00
1.4	0.638	165.3	2.602	66.5	0.115	43.4	0.183	–119.9	1.060	12.06
1.5	0.643	162.8	2.430	64.0	0.119	44.2	0.184	–122.1	1.080	11.38
1.6	0.648	160.5	2.287	61.6	0.124	44.8	0.185	–124.9	1.093	10.81
1.7	0.652	158.2	2.142	59.4	0.128	45.4	0.188	–126.2	1.111	10.21
1.8	0.652	156.2	2.028	57.2	0.133	46.2	0.188	–128.5	1.133	9.63
1.9	0.655	154.1	1.922	55.2	0.138	46.5	0.192	–129.5	1.141	9.16
2.0	0.656	152.2	1.834	52.8	0.143	47.0	0.190	–131.3	1.155	8.70
2.1	0.658	150.5	1.762	51.2	0.148	47.3	0.194	–132.5	1.155	8.37
2.2	0.659	148.6	1.688	49.4	0.154	47.3	0.193	–134.5	1.162	7.97
2.3	0.663	146.5	1.618	47.7	0.160	47.4	0.196	–135.8	1.158	7.65
2.4	0.664	144.9	1.562	45.6	0.166	47.4	0.196	–137.8	1.161	7.32
2.5	0.667	142.9	1.505	43.8	0.172	47.5	0.199	–139.4	1.155	7.04
2.6	0.668	141.0	1.451	42.2	0.177	47.3	0.201	–141.6	1.161	6.69
2.7	0.669	139.1	1.400	40.4	0.183	47.0	0.204	–144.0	1.167	6.36
2.8	0.669	137.1	1.350	38.9	0.189	46.4	0.207	–146.2	1.176	6.00
2.9	0.658	134.9	1.290	36.6	0.197	45.3	0.214	–148.7	1.205	5.42
3.0	0.652	132.0	1.248	34.4	0.204	45.0	0.217	–151.1	1.223	5.01
4.0	0.698	119.0	0.977	19.3	0.252	41.9	0.304	–172.3	1.157	3.49
5.0	0.727	100.4	0.760	6.3	0.309	30.6	0.388	172.3	1.129	1.72

V_{CE} = 1 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.719	–63.4	22.631	143.4	0.035	62.6	0.806	–36.4	0.167	28.07
0.2	0.660	–103.7	16.109	121.7	0.051	48.3	0.574	–58.7	0.306	24.97
0.3	0.621	–129.0	11.887	109.3	0.059	43.2	0.427	–71.9	0.446	23.04
0.4	0.606	–144.9	9.279	100.8	0.064	41.5	0.335	–82.0	0.568	21.58
0.5	0.602	–155.7	7.600	94.6	0.070	41.5	0.276	–89.7	0.666	20.37
0.6	0.602	–164.2	6.377	89.9	0.074	42.6	0.236	–98.0	0.758	19.35
0.7	0.602	–170.9	5.497	85.8	0.079	43.4	0.209	–104.6	0.833	18.45
0.8	0.606	–176.6	4.826	82.4	0.083	44.6	0.192	–112.1	0.892	17.63
0.9	0.609	178.8	4.278	79.3	0.089	45.6	0.183	–118.2	0.942	16.83
1.0	0.615	174.6	3.852	76.4	0.094	46.7	0.178	–124.3	0.982	16.14
1.1	0.619	170.8	3.506	73.6	0.099	47.5	0.177	–128.7	1.016	14.74
1.2	0.624	167.4	3.197	71.1	0.104	48.3	0.177	–133.0	1.043	13.59
1.3	0.632	164.8	2.953	68.6	0.109	49.0	0.179	–136.0	1.059	12.83
1.4	0.635	162.0	2.744	66.2	0.115	49.5	0.182	–139.1	1.078	12.07
1.5	0.639	159.7	2.559	63.9	0.120	50.0	0.184	–140.8	1.092	11.42
1.6	0.642	157.6	2.406	61.7	0.126	50.3	0.186	–143.3	1.102	10.86
1.7	0.648	155.7	2.257	59.6	0.132	50.4	0.189	–144.3	1.109	10.34
1.8	0.648	153.8	2.136	57.6	0.137	50.8	0.190	–146.5	1.125	9.77
1.9	0.648	151.8	2.028	55.6	0.143	50.8	0.193	–147.0	1.132	9.31
2.0	0.651	150.0	1.932	53.5	0.149	51.0	0.193	–148.8	1.136	8.88
2.1	0.656	148.3	1.856	51.8	0.155	50.9	0.195	–149.7	1.128	8.60
2.2	0.654	146.7	1.777	50.1	0.161	50.6	0.194	–151.7	1.137	8.17
2.3	0.658	144.9	1.704	48.5	0.168	50.4	0.197	–152.7	1.133	7.85
2.4	0.659	142.9	1.647	46.5	0.174	50.0	0.197	–154.5	1.131	7.55
2.5	0.660	141.2	1.586	44.8	0.181	49.7	0.200	–156.0	1.129	7.24
2.6	0.663	139.4	1.529	43.1	0.187	49.4	0.201	–158.1	1.132	6.92
2.7	0.663	137.7	1.477	41.4	0.193	48.7	0.205	–160.1	1.135	6.60
2.8	0.661	135.5	1.423	39.8	0.199	48.0	0.209	–162.0	1.147	6.21
2.9	0.650	133.4	1.358	37.6	0.207	46.6	0.215	–163.6	1.175	5.63
3.0	0.645	130.5	1.314	35.5	0.215	45.9	0.219	–165.8	1.188	5.24
4.0	0.691	118.2	1.031	20.7	0.261	41.5	0.304	177.8	1.138	3.70
5.0	0.720	99.8	0.808	7.5	0.316	29.5	0.383	165.3	1.118	2.00

V_{CE} = 1 V, I_C = 20 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.604	–90.6	29.779	132.5	0.030	54.5	0.674	–52.0	0.286	30.02
0.2	0.594	–129.7	18.706	111.9	0.039	47.9	0.431	–78.3	0.472	26.82
0.3	0.587	–149.6	13.156	101.8	0.046	48.2	0.315	–94.2	0.638	24.61
0.4	0.589	–161.3	10.043	95.2	0.052	49.5	0.255	–107.4	0.758	22.88
0.5	0.590	–169.2	8.131	90.0	0.058	51.4	0.220	–118.0	0.850	21.50
0.6	0.592	–175.4	6.789	86.2	0.064	53.4	0.202	–128.3	0.919	20.24
0.7	0.597	179.5	5.830	82.9	0.071	54.6	0.193	–136.0	0.967	19.17
0.8	0.603	174.8	5.103	79.9	0.077	55.5	0.191	–143.6	1.004	17.82
0.9	0.610	171.2	4.515	77.2	0.084	56.3	0.191	–148.8	1.028	16.27
1.0	0.614	168.1	4.060	74.7	0.091	56.8	0.195	–153.6	1.049	15.13
1.1	0.620	165.0	3.677	72.2	0.098	57.1	0.200	–156.6	1.065	14.19
1.2	0.627	162.1	3.365	70.1	0.105	57.3	0.205	–159.4	1.074	13.41
1.3	0.632	160.0	3.105	67.8	0.112	57.5	0.209	–161.3	1.080	12.72
1.4	0.636	157.7	2.883	65.7	0.119	57.3	0.214	–163.3	1.088	12.05
1.5	0.642	155.7	2.690	63.6	0.125	57.3	0.217	–164.4	1.089	11.50
1.6	0.644	153.7	2.527	61.6	0.132	57.0	0.221	–166.1	1.095	10.94
1.7	0.648	152.1	2.374	59.7	0.139	56.8	0.223	–166.6	1.097	10.44
1.8	0.650	150.4	2.246	57.7	0.145	56.6	0.225	–168.4	1.101	9.95
1.9	0.649	148.6	2.130	55.8	0.152	56.1	0.227	–168.7	1.107	9.47
2.0	0.655	147.0	2.033	53.9	0.159	55.7	0.227	–170.4	1.102	9.13
2.1	0.654	145.5	1.950	52.3	0.166	55.2	0.228	–171.2	1.104	8.74
2.2	0.653	143.7	1.870	50.6	0.173	54.5	0.228	–173.0	1.108	8.35
2.3	0.656	142.3	1.789	49.1	0.180	53.8	0.230	–173.8	1.104	8.01
2.4	0.659	140.4	1.730	47.3	0.187	53.1	0.230	–175.5	1.098	7.75
2.5	0.660	138.8	1.667	45.6	0.195	52.5	0.232	–176.6	1.094	7.45
2.6	0.660	137.1	1.609	44.1	0.201	51.7	0.234	–178.6	1.100	7.11
2.7	0.660	135.3	1.551	42.3	0.208	50.8	0.238	180.0	1.103	6.77
2.8	0.659	133.5	1.496	41.0	0.214	49.7	0.242	178.5	1.113	6.40
2.9	0.649	131.3	1.432	38.8	0.222	48.0	0.248	177.6	1.133	5.88
3.0	0.644	128.5	1.383	36.8	0.230	47.1	0.251	176.0	1.144	5.49
4.0	0.686	117.0	1.085	22.3	0.275	40.9	0.330	164.8	1.116	3.88
5.0	0.716	99.2	0.853	9.3	0.325	28.2	0.397	155.2	1.106	2.21

V_{CE} = 2 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.979	–18.5	3.473	167.8	0.037	77.8	0.993	–5.8	0.067	19.77
0.2	0.959	–35.7	3.322	156.0	0.071	69.5	0.962	–12.0	0.080	16.69
0.3	0.914	–53.4	3.132	144.2	0.101	60.1	0.921	–17.2	0.126	14.93
0.4	0.877	–69.0	2.916	133.2	0.125	51.6	0.872	–22.1	0.179	13.70
0.5	0.849	–83.3	2.719	124.1	0.143	44.3	0.828	–26.0	0.214	12.81
0.6	0.813	–96.7	2.499	115.1	0.155	37.8	0.778	–29.3	0.269	12.07
0.7	0.785	–108.6	2.294	107.6	0.164	32.1	0.739	–32.3	0.312	11.47
0.8	0.763	–119.1	2.105	100.7	0.168	27.3	0.701	–35.1	0.364	10.98
0.9	0.747	–128.7	1.933	94.3	0.171	23.2	0.674	–37.7	0.409	10.53
1.0	0.734	–137.3	1.792	88.5	0.171	19.8	0.649	–40.2	0.460	10.20
1.1	0.725	–145.0	1.665	83.2	0.170	16.6	0.630	–42.8	0.507	9.90
1.2	0.724	–152.0	1.540	78.3	0.168	14.1	0.615	–45.1	0.553	9.63
1.3	0.722	–158.2	1.440	74.1	0.165	11.8	0.605	–47.7	0.596	9.41
1.4	0.721	–163.7	1.348	69.7	0.161	10.1	0.595	–50.2	0.650	9.22
1.5	0.722	–168.6	1.268	65.7	0.157	8.9	0.591	–52.5	0.699	9.08
1.6	0.723	–173.0	1.197	61.9	0.152	7.9	0.584	–55.1	0.759	8.96
1.7	0.728	–177.0	1.128	58.8	0.147	7.3	0.584	–57.4	0.802	8.84
1.8	0.728	179.3	1.068	55.3	0.142	7.2	0.581	–59.8	0.877	8.78
1.9	0.726	175.6	1.016	52.4	0.137	7.5	0.583	–62.2	0.943	8.71
2.0	0.732	172.5	0.969	49.2	0.131	8.4	0.579	–64.3	1.007	8.17
2.1	0.734	169.2	0.936	47.1	0.127	9.8	0.583	–66.6	1.045	7.39
2.2	0.733	166.5	0.891	44.7	0.122	11.3	0.580	–68.9	1.153	6.26
2.3	0.735	163.3	0.857	42.6	0.118	13.2	0.582	–71.2	1.206	5.86
2.4	0.739	160.5	0.827	40.2	0.115	15.6	0.578	–73.5	1.268	5.46
2.5	0.741	157.6	0.796	38.1	0.113	18.7	0.580	–76.1	1.324	5.08
2.6	0.743	154.9	0.769	36.4	0.110	21.7	0.580	–78.8	1.392	4.72
2.7	0.742	152.1	0.740	34.2	0.110	25.4	0.579	–81.4	1.458	4.27
2.8	0.742	149.3	0.709	32.8	0.111	28.8	0.578	–83.9	1.523	3.80
2.9	0.732	146.0	0.677	30.5	0.114	31.8	0.572	–86.7	1.644	3.04
3.0	0.725	142.5	0.653	28.1	0.119	35.6	0.568	–90.2	1.704	2.51
4.0	0.758	124.4	0.511	16.1	0.184	52.1	0.587	–122.6	1.354	0.89
5.0	0.768	101.7	0.421	12.0	0.286	41.6	0.624	–153.2	1.226	–1.18

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)	K	MAG/MSG (dB)
0.1	0.923	–26.4	8.742	163.2	0.037	76.3	0.968	–11.8	0.054	23.78
0.2	0.881	–50.3	7.981	147.8	0.065	63.7	0.889	–22.5	0.111	20.87
0.3	0.813	–72.5	7.075	134.4	0.087	53.5	0.796	–30.8	0.175	19.09
0.4	0.753	–90.5	6.189	123.0	0.102	45.7	0.704	–37.3	0.252	17.82
0.5	0.719	–106.0	5.482	114.1	0.112	39.6	0.627	–41.9	0.308	16.91
0.6	0.685	–119.4	4.820	106.4	0.118	35.5	0.560	–45.6	0.375	16.12
0.7	0.663	–130.5	4.287	100.1	0.122	32.1	0.508	–48.4	0.437	15.47
0.8	0.648	–140.4	3.833	94.7	0.124	29.9	0.465	–51.0	0.500	14.91
0.9	0.638	–148.6	3.452	89.6	0.126	28.1	0.433	–53.4	0.560	14.38
1.0	0.634	–155.9	3.146	85.1	0.126	27.1	0.406	–55.7	0.618	13.96
1.1	0.631	–162.6	2.886	81.1	0.127	26.3	0.387	–58.0	0.675	13.56
1.2	0.632	–168.3	2.648	77.3	0.127	26.0	0.371	–60.2	0.730	13.18
1.3	0.635	–173.2	2.456	73.9	0.127	25.9	0.361	–62.5	0.778	12.85
1.4	0.638	–177.5	2.290	70.6	0.128	26.0	0.351	–64.7	0.826	12.53
1.5	0.639	178.6	2.140	67.4	0.128	26.5	0.347	–66.8	0.878	12.24
1.6	0.643	175.2	2.016	64.5	0.128	27.1	0.340	–68.9	0.918	11.96
1.7	0.647	171.9	1.893	61.7	0.129	27.9	0.341	–70.9	0.960	11.67
1.8	0.649	169.2	1.791	59.0	0.129	28.9	0.336	–72.7	1.009	10.85
1.9	0.650	166.1	1.699	56.5	0.130	29.8	0.338	–74.6	1.049	9.80
2.0	0.655	163.7	1.619	53.8	0.131	31.2	0.334	–76.3	1.080	9.19
2.1	0.655	161.0	1.557	51.9	0.133	32.6	0.337	–78.2	1.108	8.69
2.2	0.656	158.8	1.489	49.7	0.135	33.6	0.334	–80.1	1.143	8.14
2.3	0.658	156.3	1.430	47.7	0.137	34.9	0.337	–81.9	1.160	7.76
2.4	0.662	153.9	1.377	45.5	0.140	35.9	0.334	–83.9	1.173	7.40
2.5	0.665	151.5	1.329	43.6	0.143	37.2	0.335	–86.0	1.180	7.10
2.6	0.666	149.1	1.279	41.8	0.146	38.3	0.334	–88.2	1.207	6.68
2.7	0.667	147.0	1.236	39.7	0.150	39.1	0.334	–90.8	1.217	6.35
2.8	0.668	144.5	1.185	38.1	0.154	39.8	0.334	–93.1	1.240	5.91
2.9	0.657	141.6	1.135	35.6	0.160	39.8	0.332	–96.1	1.291	5.26
3.0	0.651	138.5	1.096	33.1	0.167	40.6	0.331	–99.2	1.318	4.79
4.0	0.699	123.2	0.858	17.3	0.217	44.4	0.372	–131.4	1.188	3.35
5.0	0.730	102.5	0.660	4.6	0.289	35.2	0.446	–158.8	1.110	1.56

V_{CE} = 2 V, I_C = 5 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)	K	MAG/MSG (dB)
0.1	0.884	–32.2	12.773	159.4	0.033	73.9	0.946	–16.4	0.066	25.84
0.2	0.817	–61.2	11.148	141.8	0.061	60.3	0.826	–30.2	0.147	22.64
0.3	0.735	–85.5	9.420	127.8	0.078	49.9	0.704	–40.1	0.240	20.84
0.4	0.682	–104.3	7.946	116.8	0.088	43.8	0.596	–47.2	0.324	19.55
0.5	0.654	–119.4	6.846	108.4	0.095	39.4	0.514	–52.1	0.393	18.58
0.6	0.628	–132.2	5.914	101.6	0.099	36.6	0.447	–56.1	0.472	17.74
0.7	0.614	–142.6	5.188	96.0	0.103	34.8	0.397	–59.2	0.543	17.03
0.8	0.603	–151.5	4.596	91.3	0.105	33.8	0.356	–62.1	0.616	16.41
0.9	0.600	–158.8	4.108	86.9	0.108	33.3	0.327	–64.9	0.677	15.80
1.0	0.600	–165.2	3.733	83.0	0.110	33.5	0.303	–67.7	0.736	15.32
1.1	0.599	–171.0	3.410	79.4	0.112	33.5	0.286	–70.4	0.792	14.84
1.2	0.604	–176.2	3.123	76.1	0.114	33.9	0.272	–73.0	0.839	14.37
1.3	0.609	179.6	2.891	73.1	0.116	34.4	0.264	–75.7	0.878	13.95
1.4	0.612	176.0	2.690	70.2	0.119	35.1	0.256	–78.2	0.922	13.56
1.5	0.615	172.6	2.512	67.4	0.121	35.8	0.252	–80.3	0.958	13.18
1.6	0.618	169.5	2.361	64.7	0.124	36.6	0.247	–82.7	0.993	12.81
1.7	0.624	166.8	2.217	62.3	0.126	37.3	0.247	–84.5	1.017	11.64
1.8	0.624	164.2	2.098	59.7	0.129	38.3	0.243	–86.5	1.052	10.71
1.9	0.625	161.7	1.989	57.6	0.132	39.0	0.245	–87.9	1.078	10.07
2.0	0.628	159.3	1.894	55.1	0.135	39.9	0.242	–89.7	1.102	9.51
2.1	0.635	157.0	1.818	53.3	0.139	40.8	0.244	–91.4	1.101	9.22
2.2	0.634	155.0	1.741	51.3	0.143	41.3	0.241	–93.1	1.126	8.70
2.3	0.637	152.7	1.672	49.5	0.147	42.0	0.243	–94.7	1.130	8.36
2.4	0.637	150.6	1.610	47.2	0.152	42.3	0.241	–96.6	1.142	7.97
2.5	0.640	148.6	1.552	45.4	0.157	43.0	0.242	–98.7	1.142	7.67
2.6	0.643	146.3	1.496	43.6	0.161	43.3	0.241	–100.8	1.152	7.31
2.7	0.643	144.2	1.442	41.8	0.166	43.5	0.241	–103.4	1.165	6.93
2.8	0.642	141.9	1.388	40.3	0.171	43.5	0.241	–105.8	1.182	6.51
2.9	0.634	139.2	1.328	37.7	0.178	42.9	0.242	–109.0	1.213	5.95
3.0	0.626	136.4	1.282	35.4	0.185	42.9	0.243	–112.1	1.236	5.48
4.0	0.678	122.1	1.005	19.4	0.232	43.0	0.298	–143.6	1.151	4.01
5.0	0.714	102.5	0.776	5.7	0.295	33.1	0.379	–167.1	1.095	2.33

V_{CE} = 2 V, I_C = 7 mA, Z_O = 50 Ω

Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)	K	MAG/MSG (dB)
0.1	0.841	–38.1	15.815	156.7	0.034	68.6	0.925	–19.9	0.131	26.68
0.2	0.770	–68.5	13.281	137.6	0.057	57.5	0.778	–35.8	0.190	23.68
0.3	0.692	–94.2	10.864	123.6	0.071	48.9	0.641	–46.5	0.282	21.84
0.4	0.641	–113.0	8.964	113.1	0.080	43.2	0.530	–54.2	0.381	20.51
0.5	0.619	–127.6	7.608	105.3	0.086	40.1	0.448	–59.3	0.458	19.48
0.6	0.598	–139.6	6.522	98.8	0.090	38.6	0.383	–63.9	0.544	18.62
0.7	0.588	–149.5	5.686	93.7	0.093	37.6	0.336	–67.4	0.620	17.86
0.8	0.583	–157.7	5.030	89.4	0.097	37.3	0.299	–71.2	0.688	17.16
0.9	0.583	–164.4	4.483	85.3	0.100	37.5	0.273	–74.5	0.748	16.52
1.0	0.584	–170.4	4.049	81.7	0.103	38.1	0.251	–78.0	0.805	15.95
1.1	0.585	–175.7	3.698	78.5	0.106	38.6	0.237	–81.4	0.853	15.42
1.2	0.589	179.7	3.381	75.5	0.110	39.1	0.225	–84.6	0.896	14.89
1.3	0.595	175.9	3.129	72.7	0.113	39.8	0.218	–87.6	0.931	14.44
1.4	0.597	172.3	2.911	69.9	0.116	40.4	0.212	–90.6	0.966	13.98
1.5	0.604	169.3	2.715	67.3	0.120	41.2	0.209	–92.9	0.991	13.56
1.6	0.607	166.5	2.552	64.8	0.123	41.8	0.205	–95.6	1.015	12.39
1.7	0.611	163.9	2.395	62.6	0.127	42.4	0.206	–97.3	1.037	11.57
1.8	0.614	161.5	2.267	60.2	0.131	43.2	0.202	–99.5	1.060	10.88
1.9	0.614	159.1	2.150	58.1	0.136	43.6	0.205	–100.8	1.079	10.29
2.0	0.616	157.1	2.047	55.7	0.140	44.2	0.201	–102.7	1.097	9.76
2.1	0.621	155.0	1.965	53.9	0.145	44.8	0.203	–104.1	1.094	9.47
2.2	0.620	153.0	1.882	52.1	0.149	45.0	0.200	–106.0	1.113	8.96
2.3	0.624	150.9	1.804	50.3	0.154	45.2	0.202	–107.3	1.114	8.62
2.4	0.625	148.6	1.740	48.3	0.160	45.3	0.199	–109.3	1.120	8.26
2.5	0.628	146.5	1.676	46.4	0.165	45.6	0.201	–111.3	1.120	7.96
2.6	0.630	144.7	1.617	44.8	0.170	45.6	0.200	–113.4	1.124	7.64
2.7	0.630	142.7	1.557	42.9	0.176	45.4	0.201	–116.1	1.135	7.24
2.8	0.630	140.4	1.502	41.2	0.181	45.0	0.201	–118.6	1.148	6.86
2.9	0.620	138.0	1.434	38.9	0.188	44.1	0.204	–121.8	1.177	6.27
3.0	0.614	135.1	1.385	36.7	0.195	43.9	0.205	–124.7	1.198	5.83
4.0	0.668	121.4	1.086	21.0	0.242	42.2	0.269	–154.2	1.130	4.34
5.0	0.704	102.3	0.841	7.0	0.299	31.7	0.352	–174.3	1.093	2.63

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

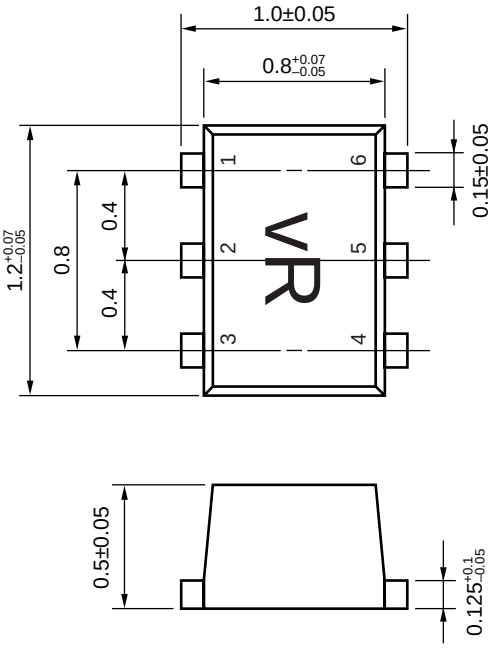
Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)	K	MAG/MSG (dB)
0.1	0.792	–43.7	19.358	153.1	0.032	68.6	0.894	–24.2	0.134	27.78
0.2	0.720	–78.0	15.514	133.0	0.053	55.6	0.720	–42.1	0.225	24.70
0.3	0.642	–104.1	12.302	119.1	0.064	47.7	0.571	–53.6	0.346	22.82
0.4	0.606	–122.4	9.911	109.3	0.071	43.7	0.461	–61.8	0.448	21.42
0.5	0.588	–136.0	8.295	102.0	0.077	41.7	0.384	–67.5	0.537	20.34
0.6	0.573	–147.4	7.048	96.2	0.081	41.5	0.325	–72.8	0.626	19.40
0.7	0.567	–156.5	6.125	91.5	0.085	41.2	0.283	–77.1	0.700	18.57
0.8	0.566	–164.0	5.393	87.5	0.089	41.7	0.250	–82.0	0.768	17.84
0.9	0.565	–169.9	4.799	83.8	0.093	42.2	0.228	–86.3	0.825	17.11
1.0	0.570	–175.3	4.332	80.6	0.097	43.0	0.211	–90.8	0.872	16.49
1.1	0.572	179.8	3.941	77.6	0.102	43.7	0.200	–95.0	0.914	15.89
1.2	0.579	175.6	3.608	74.8	0.106	44.2	0.191	–99.1	0.947	15.32
1.3	0.586	172.1	3.333	72.1	0.110	45.0	0.187	–102.5	0.972	14.80
1.4	0.590	169.0	3.099	69.6	0.115	45.5	0.183	–106.0	0.996	14.31
1.5	0.592	166.1	2.893	67.2	0.119	46.1	0.182	–108.4	1.020	12.97
1.6	0.597	163.5	2.718	64.9	0.124	46.6	0.180	–111.5	1.037	12.23
1.7	0.600	161.2	2.550	62.7	0.129	47.0	0.181	–113.1	1.053	11.55
1.8	0.604	159.0	2.412	60.5	0.134	47.6	0.178	–115.6	1.068	10.97
1.9	0.604	156.6	2.287	58.4	0.139	47.7	0.180	–116.7	1.081	10.42
2.0	0.607	154.5	2.179	56.1	0.144	48.0	0.177	–118.6	1.092	9.95
2.1	0.610	153.0	2.090	54.6	0.149	48.3	0.178	–119.9	1.092	9.61
2.2	0.610	150.9	2.002	52.7	0.155	48.2	0.176	–121.9	1.103	9.16
2.3	0.614	149.0	1.919	51.0	0.161	48.1	0.178	–123.2	1.101	8.84
2.4	0.613	146.9	1.851	49.0	0.167	47.9	0.176	–125.2	1.107	8.47
2.5	0.618	145.0	1.781	47.3	0.173	47.8	0.177	–127.1	1.102	8.19
2.6	0.621	143.2	1.717	45.6	0.178	47.6	0.176	–129.2	1.106	7.86
2.7	0.619	141.1	1.657	43.7	0.184	47.3	0.178	–132.0	1.117	7.47
2.8	0.618	138.8	1.592	42.2	0.189	46.6	0.180	–134.4	1.132	7.04
2.9	0.610	136.7	1.521	40.0	0.197	45.5	0.184	–137.3	1.153	6.50
3.0	0.603	133.8	1.471	37.9	0.204	45.0	0.186	–140.1	1.171	6.07
4.0	0.658	120.7	1.154	22.5	0.250	41.8	0.258	–165.5	1.117	4.56
5.0	0.695	102.2	0.898	8.3	0.304	30.7	0.339	177.8	1.089	2.88

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

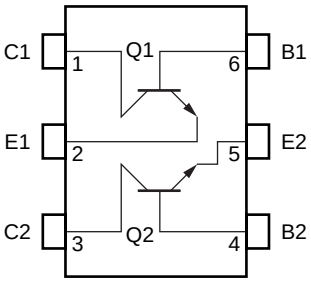
Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)	K	MAG/MSG (dB)
0.1	0.696	–58.8	26.734	145.0	0.030	62.3	0.816	–34.0	0.223	29.50
0.2	0.621	–98.8	19.291	123.6	0.043	51.4	0.592	–55.5	0.340	26.49
0.3	0.574	–124.2	14.365	111.1	0.052	47.9	0.442	–68.2	0.484	24.45
0.4	0.554	–140.9	11.256	102.6	0.058	47.1	0.347	–77.6	0.603	22.91
0.5	0.551	–152.0	9.232	96.4	0.063	47.4	0.284	–84.8	0.696	21.67
0.6	0.545	–161.3	7.772	91.7	0.068	48.4	0.240	–92.5	0.781	20.56
0.7	0.546	–168.2	6.696	87.8	0.073	49.2	0.211	–98.9	0.845	19.60
0.8	0.550	–174.4	5.880	84.5	0.079	50.3	0.191	–106.3	0.896	18.72
0.9	0.555	–179.4	5.213	81.3	0.085	51.1	0.179	–112.3	0.935	17.88
1.0	0.562	176.4	4.692	78.5	0.091	52.0	0.171	–118.6	0.965	17.14
1.1	0.565	172.3	4.269	75.9	0.096	52.4	0.169	–123.5	0.992	16.47
1.2	0.572	168.8	3.896	73.4	0.102	52.9	0.167	–128.4	1.013	15.12
1.3	0.580	166.0	3.597	71.0	0.108	53.3	0.168	–131.8	1.024	14.27
1.4	0.582	163.2	3.343	68.8	0.114	53.5	0.169	–135.3	1.039	13.45
1.5	0.588	160.6	3.114	66.6	0.120	53.8	0.170	–137.4	1.050	12.77
1.6	0.592	158.7	2.929	64.4	0.126	53.8	0.171	–140.3	1.055	12.22
1.7	0.596	156.5	2.748	62.5	0.132	53.9	0.173	–141.4	1.063	11.65
1.8	0.596	154.7	2.597	60.4	0.138	53.8	0.173	–144.1	1.076	11.06
1.9	0.599	152.8	2.464	58.6	0.144	53.5	0.175	–144.7	1.078	10.63
2.0	0.603	151.0	2.347	56.4	0.150	53.5	0.173	–146.9	1.080	10.22
2.1	0.604	149.2	2.249	54.9	0.156	53.2	0.174	–147.9	1.082	9.83
2.2	0.602	147.7	2.157	53.3	0.163	52.8	0.173	–150.0	1.089	9.40
2.3	0.608	145.8	2.065	51.6	0.170	52.3	0.174	–151.0	1.083	9.10
2.4	0.607	143.8	1.992	49.7	0.176	51.8	0.173	–153.1	1.085	8.75
2.5	0.612	142.2	1.917	48.1	0.183	51.3	0.175	–154.7	1.080	8.48
2.6	0.609	140.5	1.848	46.5	0.189	50.7	0.175	–157.1	1.091	8.07
2.7	0.612	138.6	1.781	44.8	0.195	50.1	0.178	–159.0	1.093	7.75
2.8	0.611	136.6	1.717	43.3	0.201	49.1	0.181	–161.2	1.100	7.39
2.9	0.602	134.3	1.640	41.1	0.209	47.6	0.187	–162.9	1.120	6.83
3.0	0.595	131.5	1.582	39.1	0.216	46.8	0.190	–165.1	1.136	6.40
4.0	0.648	119.5	1.239	24.3	0.262	41.8	0.267	177.6	1.100	4.82
5.0	0.687	101.4	0.965	10.3	0.312	29.7	0.341	165.7	1.085	3.13

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)

[MEMO]

[MEMO]

[MEMO]

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  (Note)
  (1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.
  (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

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