DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR

μPA844TC

NPN SILICON RF TRANSISTOR (WITH 2 DIFFERENT ELEMENTS) IN A FLAT-LEAD 6-PIN THIN-TYPE ULTRA SUPER MINIMOLD

FEATURES

- Ideal for 3.6 to 4.2 GHz oscillation application
- 2 different built-in transistors (2SC5436, 2SC5668)

  Q1: 9.0 GHz f_T high-gain transistor

  f_T = 9.0 GHz TYP., $|S_{21e}|^2$ = 7.5 dB TYP. @ V_{CE} = 1 V, I_C = 10 mA, f = 2 GHz

  Q2: 21.0 GHz f_T high-gain transistor

  f_T = 21.0 GHz TYP., $|S_{21e}|^2$ = 11.5 dB TYP. @ V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz
- Flat-lead 6-pin thin-type ultra super minimold package

BUILT-IN TRANSISTORS

	Q1	Q2
3-pin thin-type ultra super minimold part No.	2SC5436	2SC5668

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA844TC	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 6 (Q1 Base), Pin 5 (Q2 Emitter), Pin 4 (Q2 Base) face the perforation side of the tape
μPA844TC-T1	3 kpcs/reel	

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

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

Document No. P15280EJ1V0DS00 (1st edition)
Date Published February 2001 NS CP(K)
Printed in Japan

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings		Unit
		Q1	Q2	
Collector to Base Voltage	V_{CBO}	5	15	V
Collector to Emitter Voltage	V_{CEO}	3	3.3	V
Emitter to Base Voltage	V_{EBO}	2	1.5	V
Collector Current	I_C	30	35	mA
Total Power Dissipation	P_{tot} Note	90	115	mW
		205 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} = 2 V, I_C = 20 mA	70	–	140	–
Gain Bandwidth Product (1)	f_T	V_{CE} = 1 V, I_C = 10 mA, f = 2 GHz	7.0	9.0	–	GHz
Gain Bandwidth Product (2)	f_T	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	9.0	11.0	–	GHz
Insertion Power Gain (1)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 10 mA, f = 2 GHz	6.0	7.5	–	dB
Insertion Power Gain (2)	$\lvert S_{21e} \rvert^2$	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	7.0	8.5	–	dB
Noise Figure (1)	NF	V_{CE} = 1 V, I_C = 3 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.3	2.0	dB
Noise Figure (2)	NF	V_{CE} = 2 V, I_C = 3 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.3	2.0	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 2 V, I_E = 0 mA, f = 1 MHz	–	0.4	0.8	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} = 2 V, I_C = 5 mA	50	70	100	–
Gain Bandwidth Product	f_T	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	18.0	21.0	–	GHz
Insertion Power Gain (1)	$\lvert S_{21e} \rvert^2$	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	9.0	11.5	–	dB
Insertion Power Gain (2)	$\lvert S_{21e} \rvert^2$	V_{CE} = 1 V, I_C = 10 mA, f = 2 GHz	8.5	11.0	–	dB
Noise Figure	NF	V_{CE} = 2 V, I_C = 5 mA, f = 2 GHz, $Z_S = Z_{opt}$	–	1.1	1.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 2 V, I_E = 0 mA, f = 1 MHz	–	0.24	0.3	pF
Maximum Available Power Gain	MAG Note 3	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	–	12.5	–	dB
Maximum Stable Power Gain	MSG Note 4	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	–	13.5	–	dB

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

2. Collector to base capacitance measured using capacitance meter (self-balancing bridge method) when the emitter is connected to the guard pin

3. $MAG = \left| \frac{S_{21}}{S_{12}} \right| (K - \sqrt{(K^2 - 1)})$

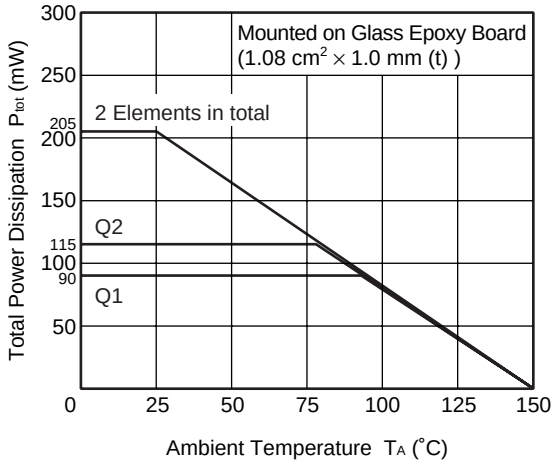
4. $MSG = \left| \frac{S_{21}}{S_{12}} \right|$

h_{FE} CLASSIFICATION

Rank	FB
Marking	2D
h_{FE} Value of Q1	70 to 140
h_{FE} Value of Q2	50 to 100

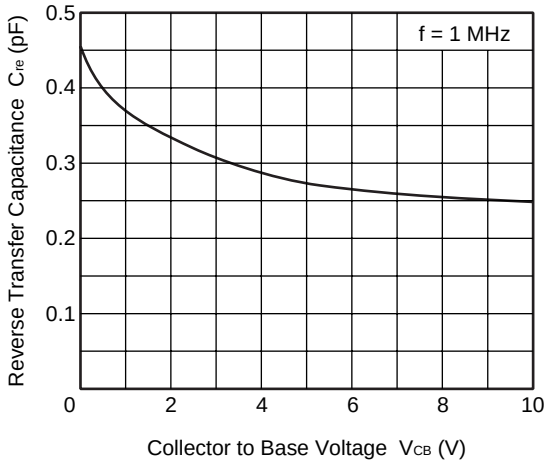
TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



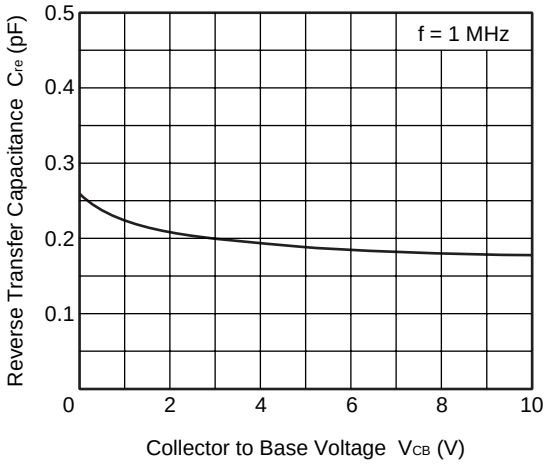
Q1

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



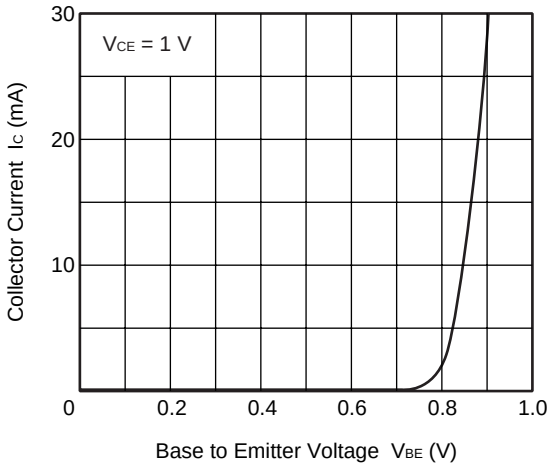
Q2

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



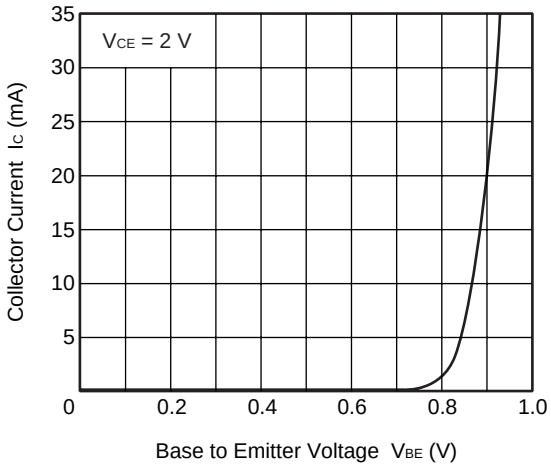
Q1

COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

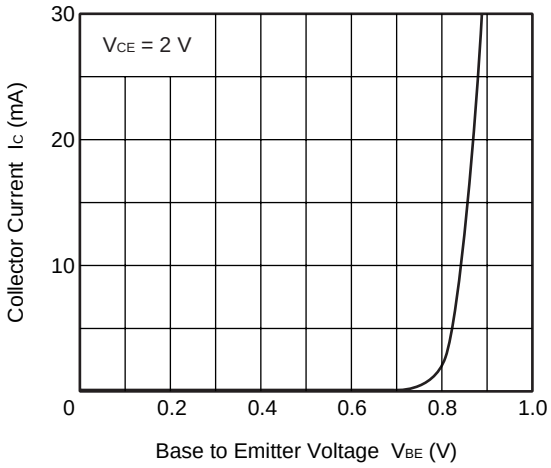


Q2

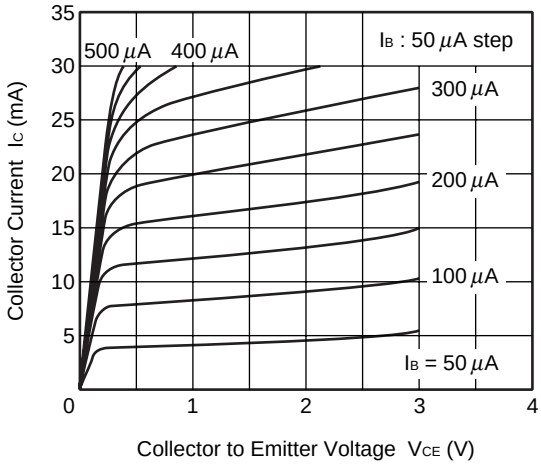
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



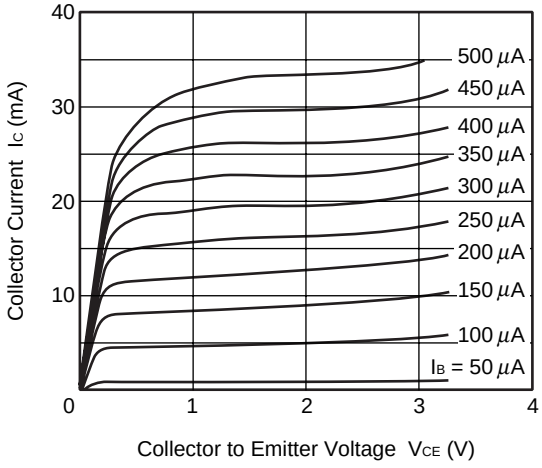
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE

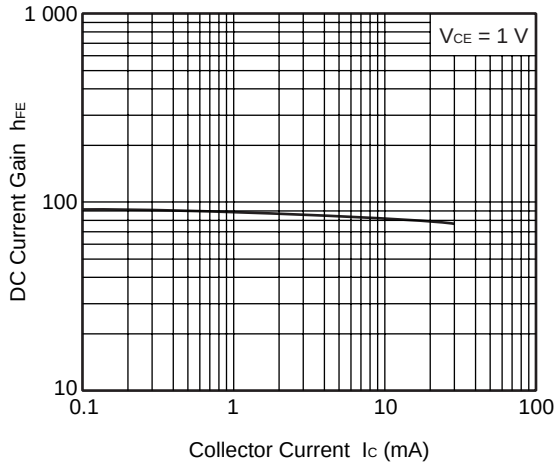


COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



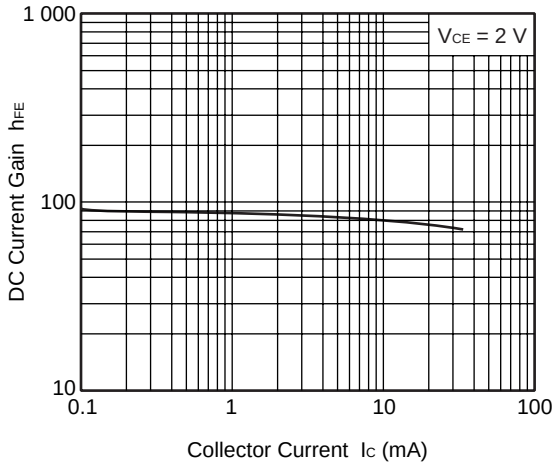
Q1

DC CURRENT GAIN vs.
COLLECTOR CURRENT

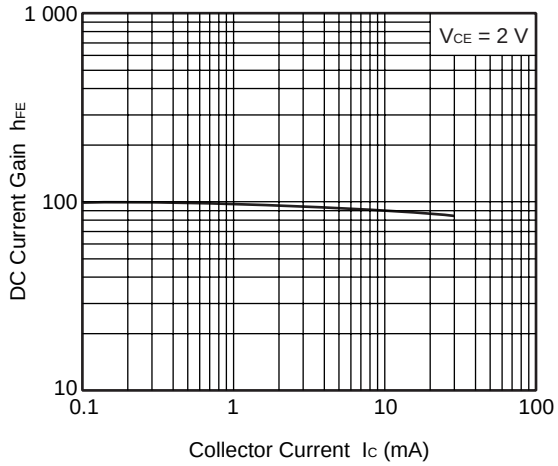


Q2

DC CURRENT GAIN vs.
COLLECTOR CURRENT

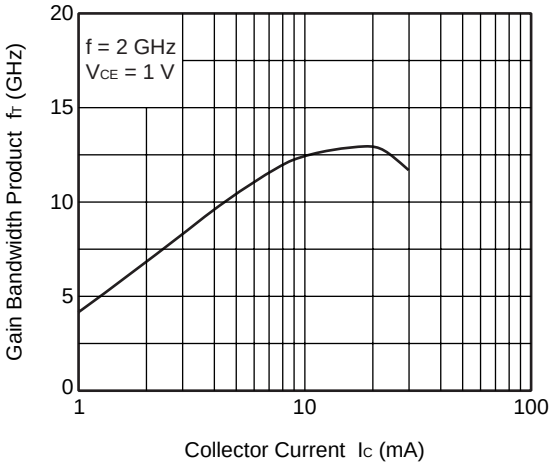


DC CURRENT GAIN vs.
COLLECTOR CURRENT



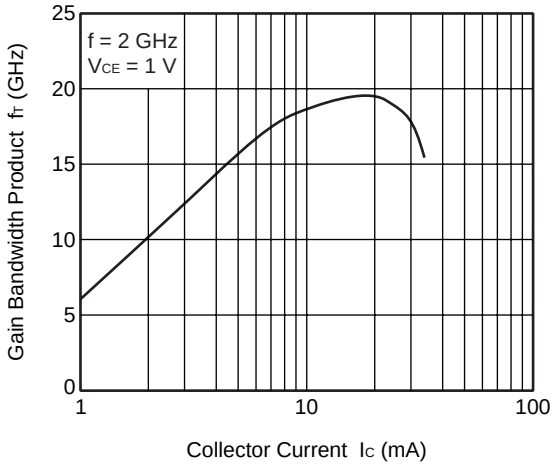
Q1

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT

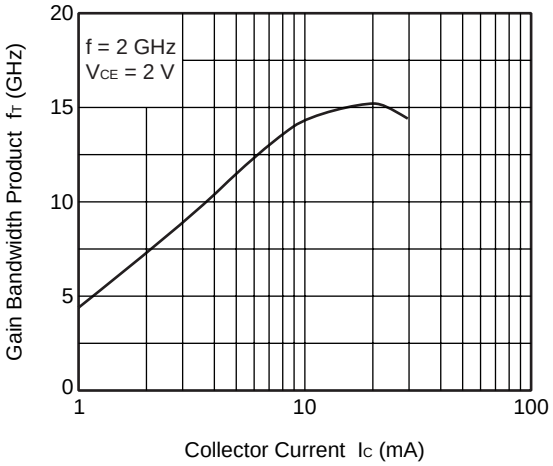


Q2

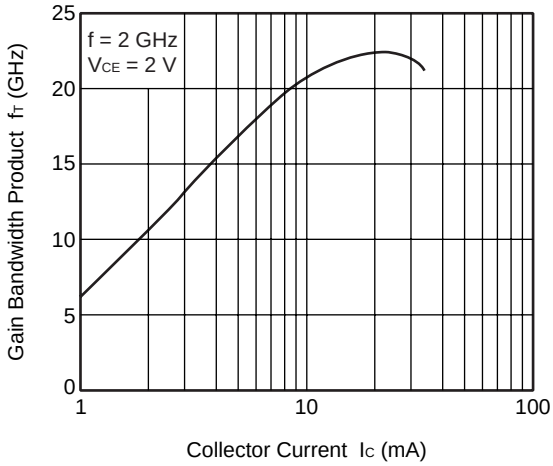
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT

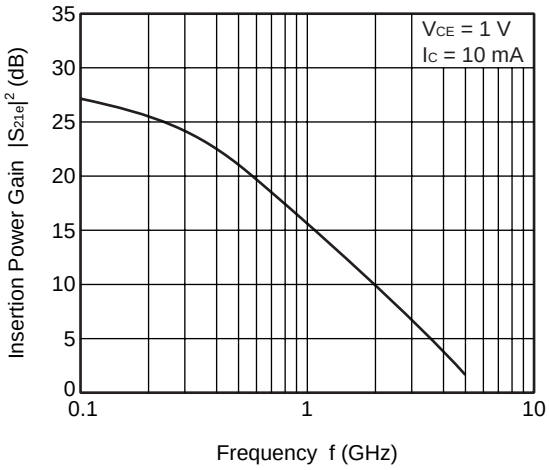


GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



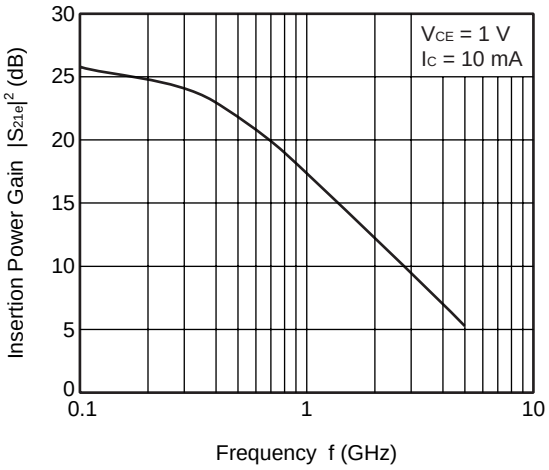
Q1

INSERTION POWER GAIN vs. FREQUENCY



Q2

INSERTION POWER GAIN vs. FREQUENCY



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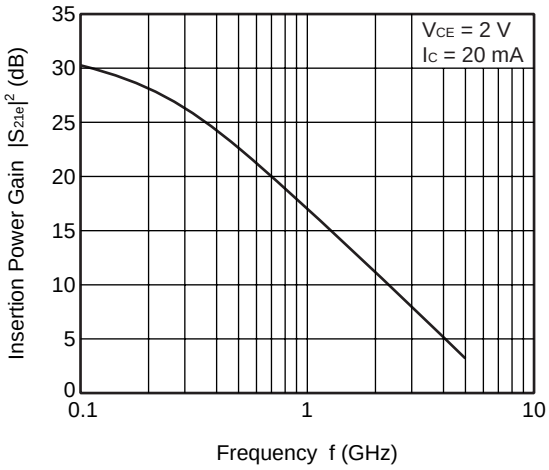
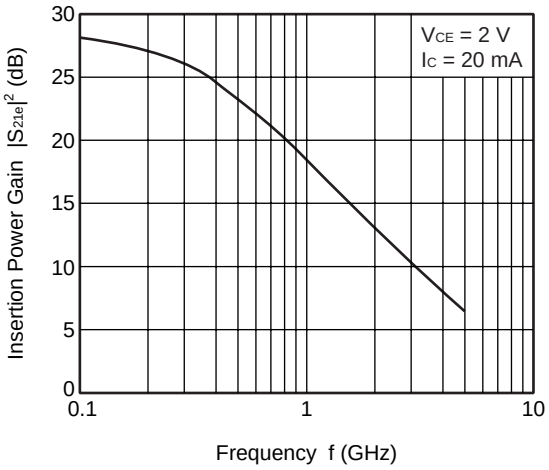
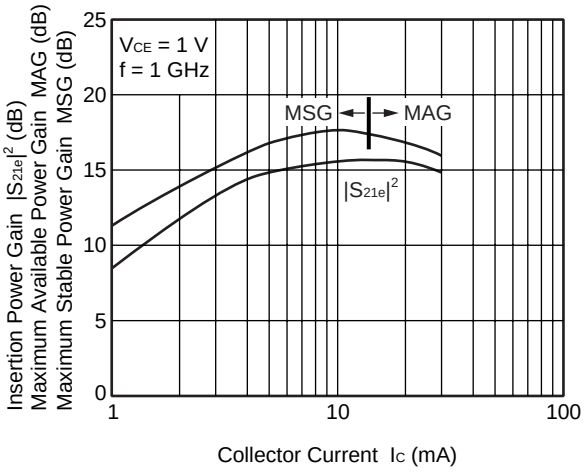


INSERTION POWER GAIN vs. FREQUENCY



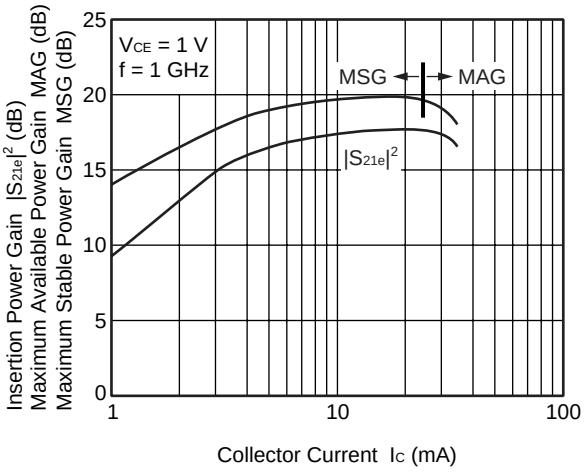
Q1

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT

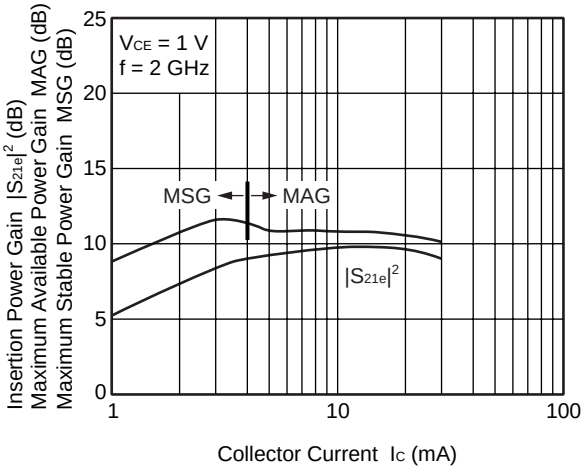


Q2

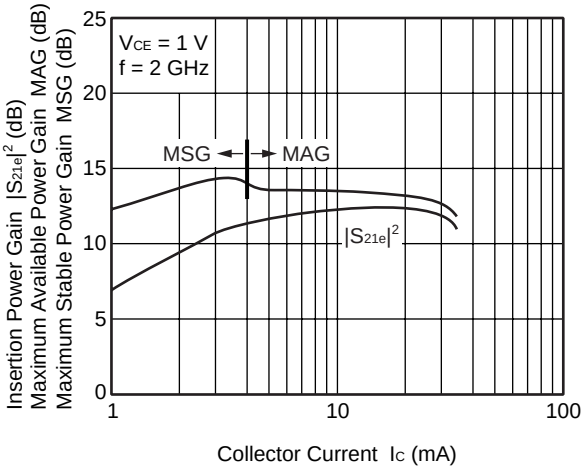
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



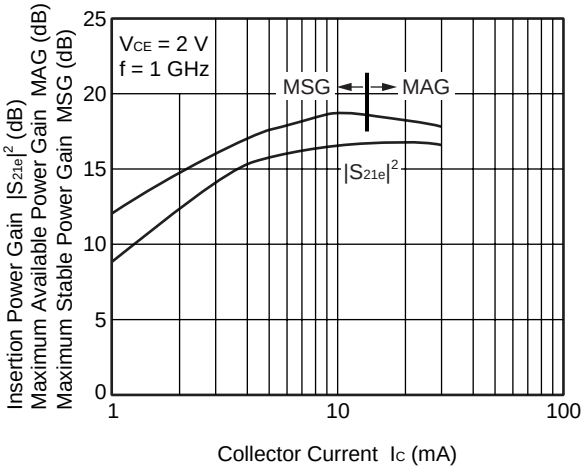
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



INSERTION POWER GAIN, MAG, MSG
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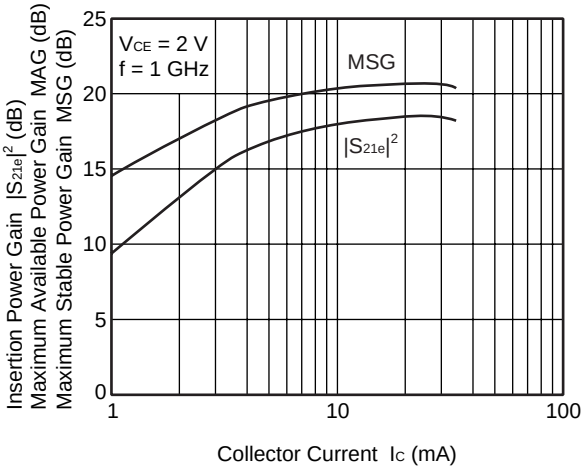
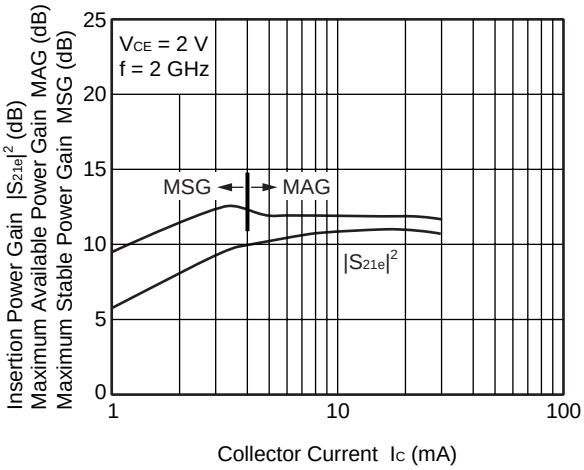


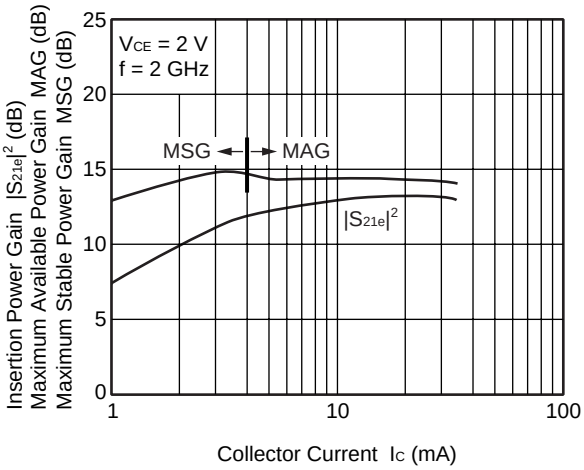
Q1

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



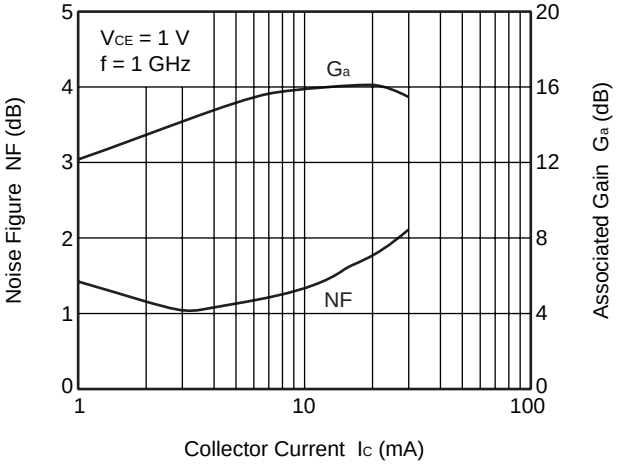
Q2

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



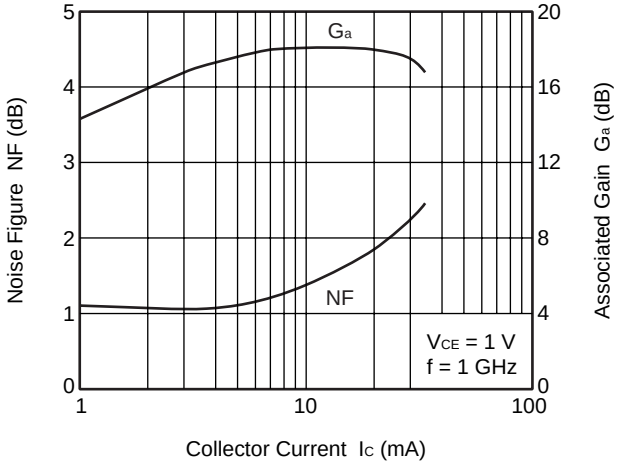
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

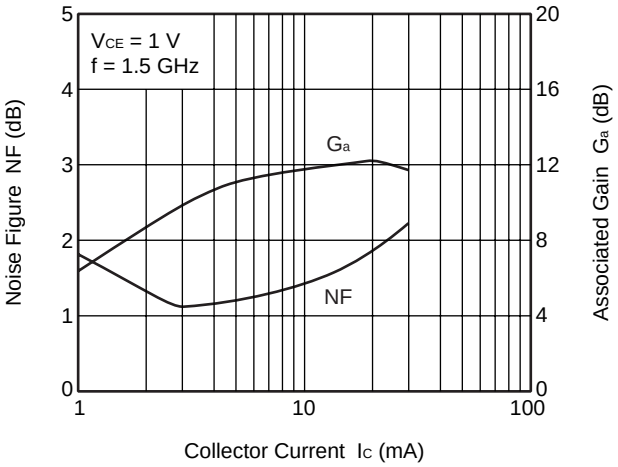


Q2

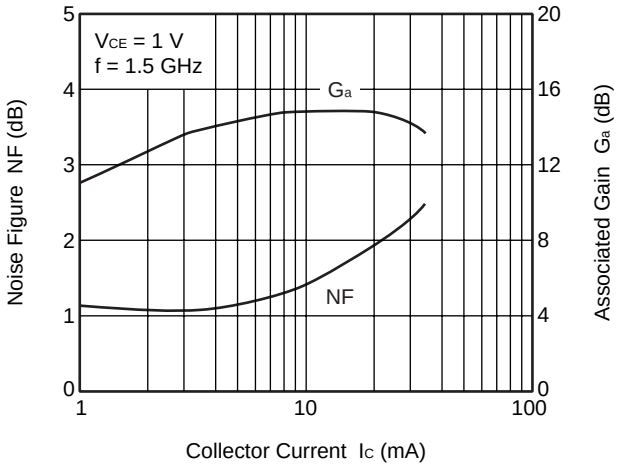
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



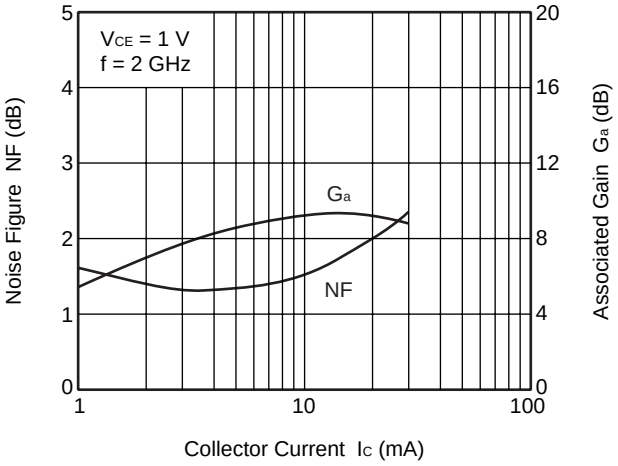
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



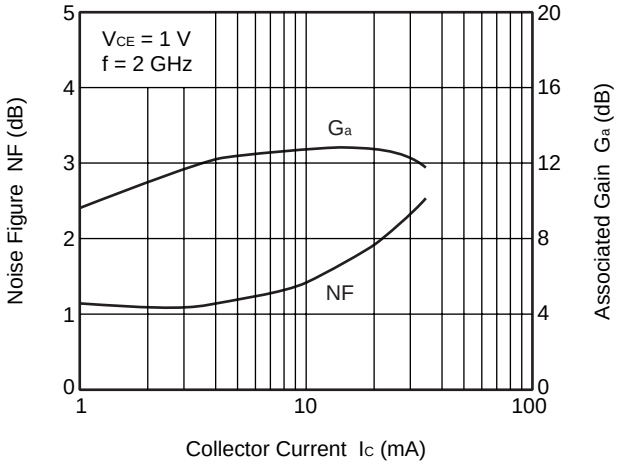
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

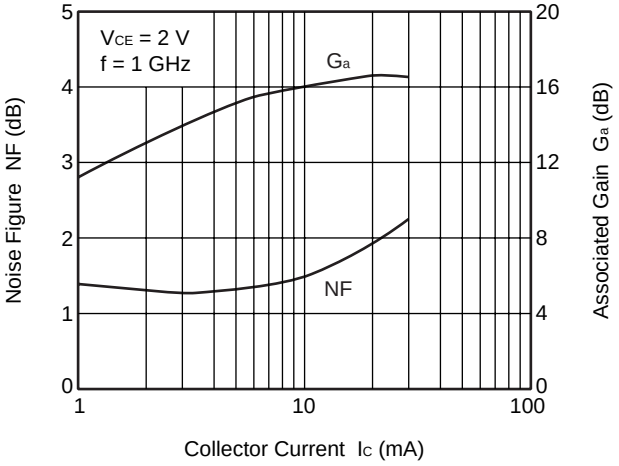


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



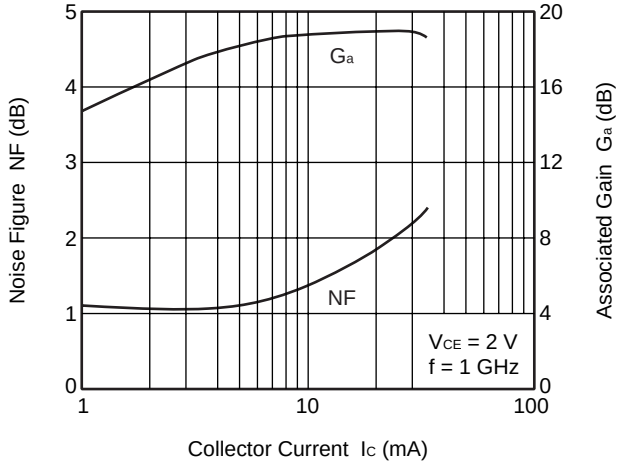
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

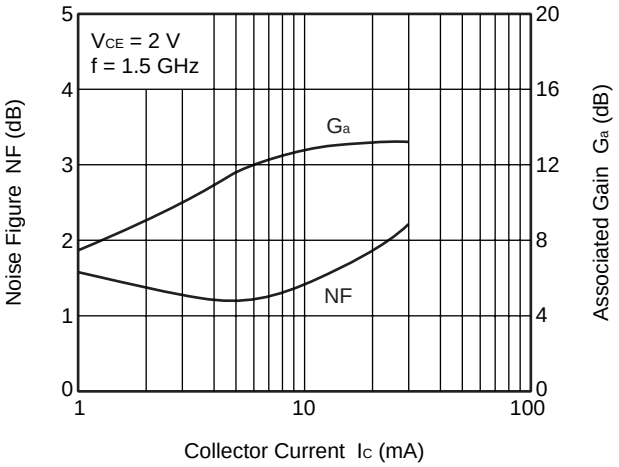


Q2

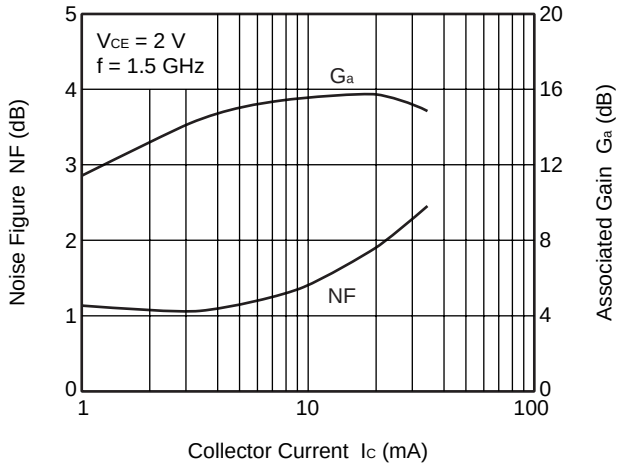
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



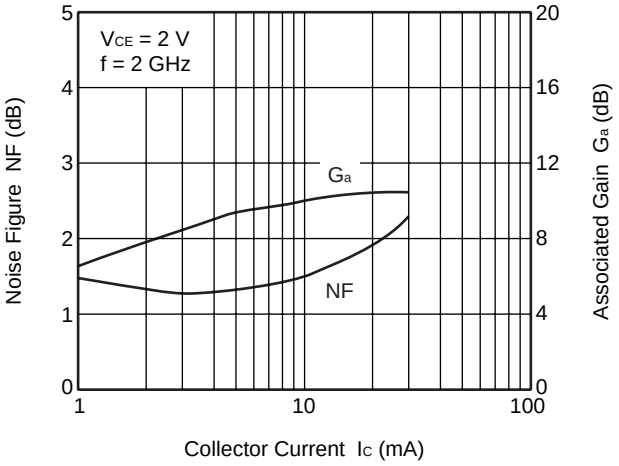
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



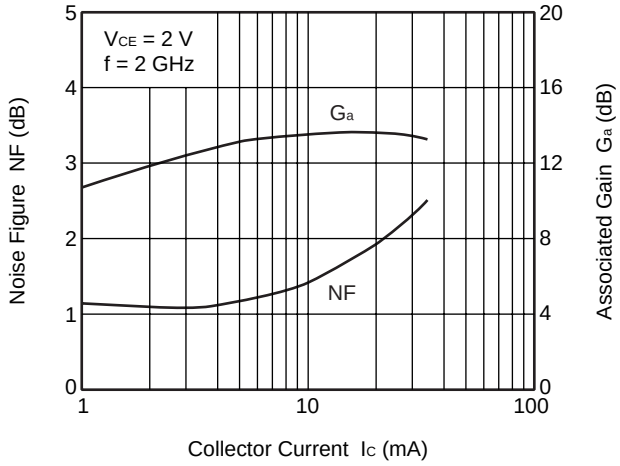
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS Q1

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

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

V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG Note
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.961	–9.2	3.473	171.0	0.025	81.9	0.988	–5.0	0.102	21.39
0.2	0.960	–16.7	3.379	165.6	0.051	79.4	0.977	–9.6	0.075	18.20
0.3	0.938	–24.8	3.391	158.3	0.076	73.7	0.958	–14.4	0.130	16.48
0.4	0.921	–32.8	3.303	150.9	0.100	68.6	0.938	–19.1	0.170	15.20
0.5	0.885	–40.6	3.206	144.4	0.120	63.7	0.912	–23.5	0.208	14.26
0.6	0.850	–48.4	3.116	138.0	0.140	59.1	0.880	–27.7	0.247	13.49
0.7	0.814	–56.2	2.996	131.3	0.156	54.8	0.847	–31.6	0.290	12.82
0.8	0.773	–63.5	2.908	125.5	0.171	50.7	0.815	–35.4	0.328	12.29
0.9	0.734	–70.9	2.794	119.8	0.184	47.0	0.782	–38.9	0.367	11.82
1.0	0.697	–78.2	2.693	114.3	0.195	43.4	0.750	–42.2	0.403	11.41
1.1	0.666	–85.3	2.580	109.4	0.205	40.1	0.718	–45.3	0.436	11.01
1.2	0.631	–92.5	2.480	104.4	0.212	36.9	0.687	–48.2	0.475	10.68
1.3	0.609	–99.8	2.396	99.7	0.219	33.9	0.660	–51.1	0.500	10.38
1.4	0.576	–106.8	2.300	95.1	0.225	31.2	0.630	–53.9	0.542	10.09
1.5	0.555	–114.2	2.217	90.6	0.230	28.6	0.605	–56.3	0.572	9.84
1.6	0.532	–120.8	2.124	86.4	0.234	26.3	0.579	–58.7	0.612	9.59
1.7	0.512	–128.0	2.041	82.1	0.237	24.0	0.556	–60.7	0.650	9.36
1.8	0.498	–135.4	1.979	78.9	0.238	21.9	0.531	–63.7	0.676	9.20
1.9	0.480	–142.2	1.899	74.6	0.241	19.9	0.511	–65.6	0.719	8.97
2.0	0.474	–148.4	1.833	71.0	0.242	18.2	0.492	–67.5	0.752	8.80
2.1	0.466	–155.5	1.763	67.3	0.242	16.8	0.473	–69.5	0.788	8.63
2.2	0.465	–161.1	1.718	64.2	0.240	15.6	0.455	–71.7	0.816	8.54
2.3	0.460	–166.4	1.651	61.1	0.240	14.4	0.441	–73.7	0.855	8.38
2.4	0.456	–171.6	1.593	57.9	0.239	13.3	0.428	–75.6	0.894	8.24
2.5	0.453	–177.2	1.551	54.9	0.237	12.2	0.412	–78.0	0.932	8.15
2.6	0.450	177.6	1.499	51.6	0.236	10.8	0.405	–80.6	0.968	8.02
2.7	0.449	172.0	1.459	49.2	0.235	9.8	0.396	–82.9	1.002	7.66
2.8	0.445	166.8	1.414	46.3	0.232	9.0	0.384	–85.4	1.051	6.46
2.9	0.442	161.5	1.363	43.8	0.230	8.0	0.372	–87.2	1.112	5.70
3.0	0.421	155.7	1.290	40.6	0.224	7.0	0.356	–90.6	1.246	4.62
4.0	0.553	125.3	1.038	19.6	0.226	9.6	0.312	–119.4	1.295	3.37
5.0	0.612	101.9	0.822	1.9	0.250	12.5	0.351	–156.4	1.357	1.60

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	0.902	–16.5	9.450	166.1	0.025	79.1	0.959	–10.0	0.124	25.76
0.2	0.865	–28.5	8.890	156.9	0.048	73.6	0.919	–19.2	0.146	22.65
0.3	0.812	–41.8	8.515	146.0	0.068	66.3	0.858	–27.9	0.224	20.96
0.4	0.752	–54.3	7.853	136.2	0.085	60.3	0.796	–35.3	0.288	19.65
0.5	0.686	–65.4	7.186	128.1	0.098	55.5	0.731	–41.6	0.351	18.64
0.6	0.626	–76.2	6.625	121.0	0.109	51.6	0.668	–47.1	0.412	17.82
0.7	0.571	–85.8	6.019	114.2	0.118	48.4	0.611	–51.8	0.477	17.08
0.8	0.523	–95.2	5.572	108.6	0.126	45.9	0.562	–55.9	0.534	16.47
0.9	0.485	–103.9	5.141	103.2	0.132	43.9	0.517	–59.4	0.589	15.92
1.0	0.451	–113.1	4.776	98.8	0.138	42.1	0.479	–62.9	0.638	15.41
1.1	0.425	–120.9	4.426	94.6	0.143	40.8	0.444	–66.0	0.687	14.92
1.2	0.406	–129.3	4.130	90.4	0.147	39.5	0.414	–68.8	0.731	14.48
1.3	0.392	–136.8	3.884	86.7	0.152	38.7	0.387	–71.9	0.768	14.07
1.4	0.376	–144.8	3.641	83.2	0.157	37.8	0.362	–74.8	0.811	13.66
1.5	0.369	–152.0	3.444	79.7	0.160	37.0	0.341	–77.6	0.845	13.32
1.6	0.362	–158.8	3.246	76.6	0.165	36.4	0.320	–80.3	0.881	12.94
1.7	0.361	–165.7	3.072	73.4	0.169	35.7	0.302	–82.6	0.912	12.60
1.8	0.363	–172.3	2.923	70.9	0.173	35.1	0.285	–86.2	0.939	12.28
1.9	0.362	–178.9	2.784	67.7	0.177	34.5	0.270	–88.8	0.966	11.96
2.0	0.365	176.5	2.660	65.0	0.181	33.9	0.255	–91.5	0.990	11.66
2.1	0.370	170.7	2.534	62.3	0.185	33.6	0.242	–94.6	1.016	10.59
2.2	0.380	166.8	2.442	59.8	0.189	33.3	0.230	–97.8	1.028	10.07
2.3	0.384	162.4	2.327	57.4	0.193	32.9	0.220	–101.1	1.053	9.41
2.4	0.385	158.7	2.233	54.9	0.198	32.4	0.213	–104.2	1.073	8.88
2.5	0.392	154.4	2.157	52.7	0.201	32.0	0.204	–108.2	1.089	8.48
2.6	0.393	150.1	2.071	50.0	0.206	31.2	0.200	–111.9	1.108	8.03
2.7	0.397	146.1	2.007	48.0	0.209	30.6	0.195	–116.0	1.125	7.68
2.8	0.399	141.7	1.939	45.8	0.213	30.0	0.192	–120.8	1.144	7.30
2.9	0.403	137.7	1.865	43.5	0.215	29.2	0.188	–125.2	1.171	6.88
3.0	0.390	132.7	1.759	41.4	0.215	28.3	0.183	–131.6	1.249	6.13
4.0	0.533	113.7	1.385	23.5	0.263	24.3	0.199	–171.3	1.154	4.84
5.0	0.589	95.2	1.091	7.6	0.304	17.2	0.286	162.4	1.172	3.04

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	0.834	–22.3	14.387	162.3	0.023	75.6	0.929	–14.4	0.168	27.89
0.2	0.777	–38.1	13.010	149.8	0.045	70.2	0.854	–26.8	0.214	24.61
0.3	0.695	–55.0	11.901	136.9	0.061	62.3	0.762	–37.5	0.317	22.91
0.4	0.620	–69.6	10.442	126.6	0.074	57.2	0.674	–45.9	0.399	21.51
0.5	0.549	–82.3	9.203	118.4	0.083	53.4	0.596	–52.5	0.482	20.45
0.6	0.491	–93.7	8.199	111.6	0.091	51.2	0.526	–58.2	0.560	19.53
0.7	0.443	–104.0	7.272	105.5	0.098	49.4	0.470	–62.7	0.632	18.71
0.8	0.407	–115.2	6.583	100.5	0.104	48.3	0.424	–66.8	0.692	18.00
0.9	0.381	–123.9	6.000	96.0	0.110	47.4	0.385	–70.3	0.746	17.36
1.0	0.357	–133.3	5.487	91.9	0.116	46.8	0.352	–73.8	0.797	16.75
1.1	0.344	–140.8	5.049	88.4	0.122	46.3	0.324	–76.9	0.838	16.18
1.2	0.334	–149.9	4.656	84.8	0.128	45.9	0.301	–80.1	0.877	15.62
1.3	0.329	–156.5	4.359	81.6	0.133	45.6	0.280	–83.3	0.907	15.15
1.4	0.325	–164.3	4.061	78.6	0.139	45.1	0.261	–86.9	0.939	14.66
1.5	0.327	–170.8	3.826	75.5	0.145	44.8	0.245	–90.2	0.960	14.22
1.6	0.327	–176.9	3.590	72.7	0.150	44.3	0.230	–93.7	0.987	13.78
1.7	0.330	177.2	3.391	70.0	0.156	43.8	0.217	–97.0	1.007	12.85
1.8	0.339	171.8	3.209	67.8	0.162	43.4	0.205	–101.4	1.024	12.03
1.9	0.343	165.8	3.053	65.0	0.168	42.7	0.195	–105.3	1.039	11.39
2.0	0.349	162.3	2.913	62.6	0.173	42.1	0.185	–109.2	1.051	10.86
2.1	0.360	158.0	2.769	60.2	0.179	41.7	0.177	–113.7	1.064	10.35
2.2	0.368	154.7	2.660	58.0	0.185	41.3	0.170	–118.1	1.072	9.95
2.3	0.376	151.1	2.536	55.9	0.190	40.7	0.166	–122.9	1.084	9.48
2.4	0.378	147.8	2.430	53.5	0.196	40.0	0.162	–127.1	1.096	9.05
2.5	0.384	144.3	2.341	51.6	0.201	39.4	0.159	–132.2	1.105	8.68
2.6	0.389	141.1	2.247	49.0	0.207	38.4	0.159	–136.5	1.114	8.30
2.7	0.394	137.6	2.176	47.1	0.212	37.6	0.160	–141.8	1.122	7.99
2.8	0.395	133.5	2.096	45.2	0.217	36.7	0.163	–147.1	1.138	7.60
2.9	0.402	129.9	2.015	43.2	0.220	35.8	0.167	–152.0	1.155	7.24
3.0	0.391	125.2	1.903	41.1	0.221	34.7	0.170	–158.7	1.211	6.58
4.0	0.532	110.1	1.487	24.5	0.277	27.6	0.222	167.2	1.116	5.22
5.0	0.586	92.9	1.169	9.4	0.320	18.3	0.315	148.7	1.131	3.42

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	0.762	–25.9	18.345	158.9	0.023	74.8	0.899	–17.8	0.218	29.03
0.2	0.699	–46.6	16.059	144.3	0.042	67.0	0.795	–32.7	0.282	25.80
0.3	0.606	–65.4	14.035	130.7	0.055	60.6	0.682	–44.5	0.394	24.03
0.4	0.529	–81.1	11.913	120.2	0.066	56.4	0.584	–53.1	0.493	22.58
0.5	0.463	–94.2	10.228	112.5	0.074	53.9	0.504	–59.7	0.586	21.42
0.6	0.413	–106.9	8.957	106.2	0.081	52.7	0.439	–65.1	0.666	20.43
0.7	0.374	–117.4	7.862	100.7	0.088	51.9	0.387	–69.6	0.739	19.52
0.8	0.350	–128.1	7.058	96.1	0.094	51.4	0.347	–73.7	0.794	18.74
0.9	0.331	–137.3	6.377	92.0	0.101	51.3	0.313	–77.4	0.844	18.02
1.0	0.317	–146.9	5.805	88.4	0.107	51.0	0.286	–81.0	0.886	17.35
1.1	0.312	–154.3	5.325	85.1	0.113	50.8	0.262	–84.5	0.918	16.71
1.2	0.307	–162.1	4.903	81.9	0.120	50.6	0.243	–88.0	0.950	16.11
1.3	0.310	–168.8	4.563	78.9	0.127	50.3	0.226	–91.6	0.970	15.57
1.4	0.308	–175.3	4.241	76.1	0.133	49.9	0.212	–95.9	0.996	15.03
1.5	0.315	178.6	3.989	73.3	0.140	49.5	0.200	–99.8	1.010	13.95
1.6	0.318	173.2	3.743	70.7	0.146	49.0	0.189	–104.1	1.027	13.07
1.7	0.326	168.3	3.536	68.2	0.153	48.5	0.180	–108.1	1.039	12.44
1.8	0.334	163.4	3.338	66.2	0.159	47.9	0.171	–113.3	1.052	11.82
1.9	0.342	158.3	3.174	63.6	0.166	47.1	0.165	–118.1	1.060	11.32
2.0	0.348	155.5	3.027	61.3	0.172	46.3	0.159	–123.0	1.069	10.85
2.1	0.359	151.3	2.872	59.1	0.179	45.8	0.154	–128.2	1.078	10.37
2.2	0.367	148.8	2.760	57.1	0.185	45.2	0.151	–133.4	1.080	10.01
2.3	0.376	146.0	2.625	55.0	0.191	44.4	0.150	–138.5	1.089	9.56
2.4	0.379	142.9	2.516	52.8	0.198	43.5	0.150	–143.1	1.096	9.15
2.5	0.386	139.6	2.424	50.9	0.204	42.7	0.150	–148.3	1.102	8.81
2.6	0.390	136.1	2.324	48.5	0.210	41.6	0.153	–152.4	1.108	8.43
2.7	0.398	133.2	2.251	46.7	0.215	40.8	0.157	–157.5	1.113	8.15
2.8	0.398	129.7	2.164	44.7	0.220	39.7	0.165	–162.1	1.126	7.76
2.9	0.402	126.4	2.078	42.9	0.224	38.6	0.171	–166.2	1.142	7.38
3.0	0.393	121.7	1.966	41.1	0.225	37.4	0.179	–172.2	1.190	6.78
4.0	0.533	108.3	1.533	24.9	0.284	28.9	0.244	158.6	1.099	5.40
5.0	0.588	91.9	1.199	10.3	0.327	18.9	0.338	143.1	1.114	3.59

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	0.702	–32.6	22.894	155.1	0.021	71.0	0.858	–22.2	0.267	30.28
0.2	0.606	–55.8	19.053	138.1	0.038	65.1	0.721	–39.3	0.365	26.99
0.3	0.509	–77.7	15.901	124.2	0.049	59.8	0.592	–51.7	0.492	25.08
0.4	0.441	–94.4	13.087	114.2	0.058	57.2	0.493	–60.4	0.601	23.51
0.5	0.387	–108.2	11.029	107.2	0.066	55.9	0.416	–66.7	0.698	22.24
0.6	0.351	–121.1	9.515	101.5	0.073	55.8	0.358	–72.1	0.774	21.15
0.7	0.326	–132.2	8.272	96.5	0.080	55.6	0.313	–76.7	0.839	20.16
0.8	0.312	–142.8	7.381	92.2	0.087	55.8	0.279	–80.9	0.885	19.29
0.9	0.301	–151.2	6.627	88.7	0.094	55.8	0.252	–84.8	0.925	18.48
1.0	0.295	–160.4	6.012	85.3	0.101	55.5	0.230	–88.9	0.956	17.74
1.1	0.294	–166.8	5.510	82.3	0.108	55.5	0.212	–92.8	0.980	17.06
1.2	0.296	–174.1	5.054	79.5	0.116	54.9	0.197	–96.9	1.002	16.16
1.3	0.302	–179.2	4.693	76.7	0.123	54.7	0.185	–101.3	1.016	15.06
1.4	0.304	174.4	4.362	74.1	0.130	54.2	0.174	–106.2	1.032	14.15
1.5	0.313	169.8	4.099	71.4	0.137	53.6	0.167	–110.9	1.040	13.53
1.6	0.318	164.7	3.835	69.1	0.144	52.9	0.160	–116.0	1.053	12.83
1.7	0.325	160.5	3.622	66.7	0.152	52.3	0.154	–120.9	1.061	12.28
1.8	0.335	156.7	3.415	64.8	0.159	51.6	0.150	–126.7	1.069	11.73
1.9	0.347	152.0	3.243	62.4	0.166	50.7	0.147	–132.1	1.072	11.28
2.0	0.353	149.6	3.094	60.3	0.173	49.7	0.145	–137.5	1.076	10.85
2.1	0.364	145.9	2.939	58.2	0.179	48.9	0.144	–142.9	1.082	10.40
2.2	0.372	144.0	2.823	56.2	0.186	48.2	0.144	–148.2	1.082	10.06
2.3	0.380	141.5	2.683	54.2	0.193	47.3	0.146	–153.2	1.090	9.61
2.4	0.384	138.7	2.568	52.1	0.200	46.3	0.148	–157.6	1.094	9.21
2.5	0.390	135.9	2.470	50.3	0.206	45.3	0.152	–162.2	1.099	8.87
2.6	0.394	132.4	2.369	47.9	0.213	44.1	0.157	–165.8	1.103	8.50
2.7	0.402	129.8	2.293	46.2	0.219	43.1	0.163	–170.3	1.106	8.22
2.8	0.404	126.5	2.207	44.3	0.224	41.9	0.173	–174.0	1.116	7.86
2.9	0.409	123.4	2.124	42.4	0.228	40.7	0.182	–177.2	1.127	7.52
3.0	0.400	119.0	2.003	40.7	0.229	39.4	0.193	177.8	1.172	6.90
4.0	0.541	107.0	1.558	25.0	0.290	29.9	0.265	152.7	1.083	5.53
5.0	0.594	91.0	1.216	10.7	0.333	19.3	0.359	139.2	1.099	3.71

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	0.513	–48.1	30.789	146.4	0.019	68.0	0.744	–31.2	0.420	32.05
0.2	0.426	–82.2	23.059	127.0	0.032	64.1	0.558	–51.5	0.557	28.64
0.3	0.366	–107.0	17.787	113.8	0.040	62.1	0.427	–64.1	0.700	26.46
0.4	0.329	–124.4	14.003	105.2	0.048	61.7	0.342	–72.5	0.809	24.62
0.5	0.309	–138.5	11.482	99.4	0.056	62.2	0.282	–78.6	0.887	23.13
0.6	0.301	–149.9	9.771	94.8	0.064	62.7	0.240	–84.3	0.937	21.84
0.7	0.292	–158.8	8.405	90.6	0.072	63.1	0.210	–89.4	0.982	20.69
0.8	0.295	–167.9	7.435	87.0	0.080	63.1	0.187	–94.5	1.004	19.28
0.9	0.297	–174.4	6.676	84.0	0.088	62.8	0.170	–99.3	1.023	17.87
1.0	0.302	178.8	6.017	81.0	0.096	62.3	0.157	–104.4	1.039	16.76
1.1	0.304	174.2	5.496	78.5	0.104	62.1	0.147	–109.4	1.050	15.85
1.2	0.312	169.0	5.037	75.9	0.112	61.3	0.140	–114.8	1.060	15.02
1.3	0.319	165.1	4.669	73.4	0.120	60.6	0.135	–120.2	1.065	14.33
1.4	0.326	160.6	4.333	71.0	0.129	59.8	0.131	–126.2	1.072	13.64
1.5	0.334	157.2	4.064	68.5	0.136	58.9	0.130	–131.7	1.075	13.08
1.6	0.341	153.6	3.801	66.4	0.144	58.0	0.129	–137.5	1.081	12.48
1.7	0.349	150.4	3.587	64.2	0.152	57.1	0.129	–143.0	1.083	11.97
1.8	0.360	147.4	3.380	62.4	0.159	56.1	0.131	–148.9	1.086	11.47
1.9	0.373	144.1	3.209	60.2	0.167	54.9	0.134	–154.3	1.085	11.05
2.0	0.379	141.8	3.058	58.2	0.175	53.8	0.136	–159.3	1.087	10.64
2.1	0.391	139.4	2.901	56.2	0.182	52.7	0.140	–164.1	1.089	10.21
2.2	0.399	137.4	2.781	54.4	0.189	51.8	0.144	–168.6	1.088	9.86
2.3	0.406	135.3	2.645	52.5	0.196	50.6	0.151	–172.7	1.094	9.43
2.4	0.410	133.2	2.531	50.4	0.204	49.4	0.156	–176.1	1.096	9.05
2.5	0.415	130.6	2.436	48.8	0.210	48.3	0.162	–179.4	1.098	8.73
2.6	0.419	127.7	2.335	46.4	0.218	46.8	0.169	178.0	1.101	8.37
2.7	0.427	125.4	2.262	44.7	0.224	45.7	0.178	174.6	1.102	8.11
2.8	0.429	122.3	2.173	42.9	0.229	44.5	0.189	172.2	1.111	7.74
2.9	0.433	119.6	2.089	41.2	0.233	43.1	0.200	170.1	1.122	7.40
3.0	0.423	115.4	1.972	39.6	0.235	41.7	0.213	166.4	1.163	6.80
4.0	0.559	105.1	1.533	24.3	0.297	31.0	0.292	146.1	1.075	5.45
5.0	0.611	89.6	1.194	10.6	0.339	19.8	0.384	134.6	1.090	3.64

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	0.968	–9.2	3.396	171.9	0.022	81.3	0.991	–4.2	0.102	21.91
0.2	0.963	–14.8	3.331	166.7	0.043	80.2	0.982	–8.2	0.083	18.87
0.3	0.946	–22.1	3.344	160.1	0.064	75.1	0.968	–12.2	0.130	17.16
0.4	0.931	–29.8	3.265	153.3	0.084	70.7	0.949	–16.2	0.161	15.89
0.5	0.904	–36.5	3.184	147.3	0.102	66.4	0.928	–19.9	0.200	14.94
0.6	0.870	–43.8	3.114	141.4	0.119	62.2	0.904	–23.6	0.232	14.17
0.7	0.838	–50.6	3.016	134.9	0.134	58.1	0.875	–27.0	0.279	13.52
0.8	0.801	–57.3	2.943	129.6	0.148	54.3	0.848	–30.3	0.315	12.98
0.9	0.760	–64.2	2.844	124.0	0.160	50.8	0.820	–33.5	0.352	12.50
1.0	0.724	–70.9	2.756	118.9	0.170	47.3	0.793	–36.4	0.387	12.09
1.1	0.694	–77.5	2.652	114.1	0.180	44.1	0.764	–39.3	0.419	11.68
1.2	0.657	–84.3	2.565	109.0	0.188	41.0	0.737	–41.8	0.458	11.36
1.3	0.631	–91.2	2.485	104.6	0.195	38.3	0.710	–44.3	0.485	11.06
1.4	0.600	–97.9	2.397	100.1	0.201	35.5	0.684	–47.0	0.520	10.76
1.5	0.573	–104.7	2.321	95.5	0.206	33.0	0.659	–49.3	0.555	10.52
1.6	0.548	–111.2	2.231	91.4	0.210	30.7	0.634	–51.4	0.592	10.25
1.7	0.526	–118.0	2.145	87.1	0.214	28.5	0.614	–53.1	0.629	10.01
1.8	0.507	–125.4	2.095	83.9	0.216	26.3	0.588	–55.7	0.655	9.87
1.9	0.486	–132.3	2.012	79.8	0.219	24.4	0.569	–57.5	0.694	9.63
2.0	0.474	–138.5	1.947	76.0	0.220	22.6	0.551	–59.2	0.728	9.46
2.1	0.463	–145.4	1.878	72.3	0.221	21.3	0.533	–61.1	0.761	9.29
2.2	0.459	–151.4	1.828	69.1	0.221	20.1	0.514	–62.7	0.791	9.18
2.3	0.450	–157.1	1.759	66.0	0.220	19.0	0.500	–64.5	0.832	9.03
2.4	0.444	–162.5	1.698	62.7	0.220	17.8	0.488	–66.2	0.869	8.88
2.5	0.439	–168.4	1.660	59.7	0.219	16.7	0.470	–68.3	0.907	8.80
2.6	0.432	–174.0	1.599	56.3	0.218	15.4	0.462	–70.6	0.947	8.65
2.7	0.429	–179.6	1.560	54.0	0.217	14.4	0.453	–72.4	0.978	8.57
2.8	0.421	174.7	1.517	51.1	0.216	13.6	0.440	–74.7	1.027	7.47
2.9	0.418	169.2	1.459	48.4	0.213	12.4	0.426	–76.2	1.089	6.53
3.0	0.395	163.0	1.383	45.3	0.208	11.6	0.409	–79.3	1.219	5.40
4.0	0.525	128.9	1.121	23.7	0.214	14.6	0.352	–103.9	1.263	4.11
5.0	0.588	104.0	0.886	5.1	0.243	17.2	0.362	–140.6	1.316	2.24

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	0.908	–14.9	9.530	166.9	0.020	78.6	0.966	–8.4	0.143	26.87
0.2	0.881	–24.5	9.004	158.8	0.041	75.6	0.932	–16.2	0.150	23.45
0.3	0.830	–36.6	8.712	148.8	0.058	69.0	0.882	–23.6	0.220	21.76
0.4	0.777	–47.9	8.116	139.5	0.073	63.5	0.825	–29.9	0.283	20.45
0.5	0.710	–57.7	7.526	131.7	0.085	58.8	0.769	–35.3	0.351	19.45
0.6	0.654	–67.5	6.984	124.7	0.096	55.2	0.711	–40.2	0.406	18.63
0.7	0.598	–76.0	6.421	118.0	0.104	52.2	0.658	–44.2	0.469	17.89
0.8	0.545	–84.7	5.984	112.4	0.112	49.6	0.612	–47.8	0.525	17.29
0.9	0.499	–92.8	5.563	107.1	0.118	47.6	0.570	–50.9	0.579	16.73
1.0	0.457	–100.9	5.161	102.3	0.124	46.0	0.531	–53.6	0.632	16.20
1.1	0.429	–108.5	4.819	98.3	0.129	44.5	0.496	–56.2	0.676	15.72
1.2	0.400	–116.6	4.501	94.1	0.134	43.4	0.466	–58.5	0.721	15.27
1.3	0.383	–124.1	4.242	90.5	0.138	42.3	0.440	–60.6	0.756	14.87
1.4	0.361	–131.5	3.988	86.9	0.143	41.5	0.414	–63.1	0.797	14.45
1.5	0.349	–139.6	3.786	83.3	0.147	40.6	0.392	–65.2	0.828	14.10
1.6	0.335	–146.5	3.568	80.3	0.152	40.0	0.371	–67.2	0.866	13.71
1.7	0.330	–153.6	3.386	77.1	0.156	39.4	0.352	–68.9	0.894	13.36
1.8	0.325	–161.2	3.225	74.5	0.160	38.8	0.333	–71.5	0.923	13.05
1.9	0.324	–168.2	3.074	71.4	0.165	38.1	0.317	–73.3	0.948	12.71
2.0	0.325	–173.5	2.942	68.7	0.169	37.6	0.301	–75.2	0.970	12.42
2.1	0.328	179.8	2.805	66.0	0.173	37.3	0.287	–77.2	0.993	12.11
2.2	0.333	175.4	2.702	63.5	0.176	37.0	0.273	–79.5	1.011	11.22
2.3	0.337	170.3	2.580	61.1	0.181	36.7	0.261	–81.8	1.033	10.44
2.4	0.339	165.9	2.479	58.5	0.184	36.1	0.251	–83.9	1.052	9.89
2.5	0.341	161.4	2.394	56.4	0.188	35.6	0.240	–86.8	1.070	9.42
2.6	0.345	156.4	2.300	53.6	0.193	34.9	0.234	–89.7	1.086	8.97
2.7	0.349	151.9	2.231	51.6	0.196	34.3	0.226	–92.7	1.102	8.62
2.8	0.349	147.5	2.149	49.5	0.200	33.6	0.219	–96.6	1.124	8.18
2.9	0.351	142.9	2.064	47.3	0.202	32.9	0.211	–100.0	1.153	7.71
3.0	0.341	137.4	1.954	45.0	0.202	32.0	0.200	–105.5	1.222	7.00
4.0	0.488	116.3	1.543	26.9	0.252	28.1	0.177	–145.1	1.135	5.64
5.0	0.552	97.1	1.214	10.3	0.296	20.6	0.244	178.1	1.150	3.79

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	0.852	–18.7	14.464	163.6	0.020	77.0	0.940	–11.8	0.181	28.66
0.2	0.800	–32.7	13.295	152.5	0.038	72.7	0.878	–22.3	0.211	25.41
0.3	0.727	–47.8	12.353	140.4	0.053	65.5	0.799	–31.4	0.307	23.68
0.4	0.648	–60.5	11.011	130.3	0.065	60.5	0.719	–38.6	0.393	22.32
0.5	0.572	–71.5	9.808	122.2	0.073	57.0	0.645	–44.2	0.477	21.26
0.6	0.513	–82.0	8.824	115.4	0.082	54.4	0.579	–48.8	0.549	20.34
0.7	0.456	–91.5	7.881	109.1	0.088	52.7	0.524	–52.6	0.621	19.51
0.8	0.411	–100.7	7.194	104.1	0.095	51.5	0.477	–55.8	0.680	18.81
0.9	0.376	–109.2	6.575	99.5	0.100	50.7	0.438	–58.5	0.733	18.16
1.0	0.345	–118.1	6.037	95.3	0.106	50.0	0.405	–61.0	0.782	17.55
1.1	0.325	–126.0	5.565	91.8	0.112	49.4	0.376	–63.2	0.822	16.97
1.2	0.307	–134.6	5.154	88.2	0.117	49.0	0.350	–65.3	0.861	16.44
1.3	0.297	–142.2	4.809	85.1	0.123	48.5	0.328	–67.5	0.890	15.93
1.4	0.285	–150.1	4.499	82.0	0.129	48.2	0.307	–69.9	0.922	15.44
1.5	0.283	–157.9	4.245	78.7	0.134	47.7	0.290	–72.3	0.944	15.02
1.6	0.279	–165.1	3.990	76.1	0.139	47.3	0.273	–74.4	0.969	14.56
1.7	0.280	–171.8	3.775	73.3	0.145	46.9	0.258	–76.5	0.987	14.15
1.8	0.283	–178.2	3.576	71.1	0.150	46.4	0.243	–79.4	1.007	13.25
1.9	0.289	175.2	3.404	68.5	0.157	45.8	0.230	–81.9	1.019	12.54
2.0	0.292	170.9	3.254	65.9	0.162	45.2	0.218	–84.3	1.033	11.92
2.1	0.301	165.3	3.094	63.6	0.167	44.8	0.206	–87.2	1.046	11.36
2.2	0.310	161.4	2.977	61.4	0.173	44.3	0.195	–90.3	1.053	10.96
2.3	0.316	157.6	2.835	59.2	0.178	43.7	0.187	–93.6	1.066	10.45
2.4	0.318	154.4	2.722	56.9	0.184	43.1	0.179	–96.7	1.076	10.02
2.5	0.325	149.9	2.625	55.0	0.189	42.5	0.172	–100.6	1.085	9.64
2.6	0.329	146.1	2.513	52.5	0.195	41.6	0.168	–104.3	1.097	9.21
2.7	0.334	142.2	2.437	50.7	0.199	40.8	0.163	–109.0	1.104	8.91
2.8	0.335	137.8	2.349	48.6	0.204	39.9	0.160	–114.3	1.119	8.51
2.9	0.341	134.0	2.255	46.7	0.208	38.9	0.158	–119.5	1.137	8.11
3.0	0.335	128.9	2.135	44.6	0.209	37.9	0.153	–127.3	1.187	7.48
4.0	0.480	112.5	1.670	27.8	0.266	31.1	0.171	–171.7	1.102	6.03
5.0	0.545	94.7	1.310	12.1	0.311	21.7	0.260	160.9	1.114	4.19

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	0.788	–21.2	18.584	160.6	0.019	73.9	0.915	–14.7	0.256	29.99
0.2	0.728	–39.3	16.528	147.2	0.036	70.2	0.827	–27.1	0.280	26.59
0.3	0.633	–55.8	14.772	134.2	0.048	63.7	0.726	–37.0	0.392	24.86
0.4	0.554	–69.8	12.776	123.9	0.058	59.8	0.635	–44.4	0.485	23.41
0.5	0.480	–81.4	11.099	116.1	0.066	57.1	0.557	–49.7	0.578	22.25
0.6	0.420	–92.6	9.789	109.7	0.073	55.8	0.492	–54.0	0.654	21.25
0.7	0.373	–102.4	8.647	104.0	0.080	54.9	0.440	–57.4	0.725	20.35
0.8	0.338	–112.0	7.795	99.4	0.086	54.5	0.398	–60.3	0.780	19.57
0.9	0.310	–121.0	7.076	95.2	0.092	54.2	0.362	–62.6	0.828	18.85
1.0	0.288	–130.9	6.448	91.5	0.098	53.9	0.333	–65.0	0.870	18.17
1.1	0.273	–138.8	5.923	88.3	0.104	53.6	0.308	–67.1	0.904	17.54
1.2	0.264	–147.6	5.477	84.9	0.110	53.3	0.287	–69.3	0.932	16.96
1.3	0.261	–154.7	5.093	82.2	0.117	53.0	0.269	–71.5	0.954	16.39
1.4	0.255	–162.5	4.751	79.3	0.123	52.6	0.251	–74.1	0.977	15.86
1.5	0.256	–169.8	4.467	76.4	0.129	52.2	0.237	–76.6	0.993	15.38
1.6	0.256	–176.5	4.197	73.9	0.136	51.7	0.223	–79.2	1.012	14.24
1.7	0.264	177.6	3.963	71.4	0.142	51.2	0.210	–81.8	1.023	13.54
1.8	0.269	171.9	3.747	69.3	0.148	50.6	0.198	–85.1	1.035	12.88
1.9	0.275	165.7	3.562	66.8	0.155	49.9	0.188	–88.3	1.044	12.33
2.0	0.283	162.3	3.394	64.6	0.161	49.2	0.177	–91.4	1.052	11.84
2.1	0.293	157.4	3.231	62.3	0.167	48.6	0.168	–95.1	1.061	11.36
2.2	0.303	154.1	3.108	60.3	0.173	48.1	0.159	–98.8	1.063	11.01
2.3	0.310	151.0	2.960	58.2	0.179	47.3	0.153	–103.1	1.072	10.54
2.4	0.313	147.8	2.835	56.1	0.185	46.5	0.147	–107.0	1.081	10.12
2.5	0.321	144.0	2.735	54.2	0.191	45.7	0.142	–111.9	1.085	9.78
2.6	0.325	140.5	2.617	51.8	0.197	44.7	0.141	–116.4	1.093	9.37
2.7	0.332	136.8	2.535	50.0	0.202	43.7	0.138	–122.1	1.099	9.06
2.8	0.335	132.9	2.443	48.2	0.208	42.8	0.139	–128.0	1.108	8.70
2.9	0.339	129.5	2.347	46.2	0.212	41.6	0.141	–133.8	1.124	8.31
3.0	0.333	124.4	2.218	44.4	0.213	40.4	0.142	–142.4	1.168	7.69
4.0	0.479	110.7	1.733	28.1	0.273	32.4	0.182	175.8	1.085	6.25
5.0	0.546	93.7	1.351	13.1	0.318	22.1	0.278	153.5	1.096	4.39

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	0.721	–26.0	23.344	157.1	0.018	71.0	0.880	–18.1	0.314	31.20
0.2	0.642	–47.0	19.960	141.5	0.033	68.8	0.762	–32.3	0.351	27.84
0.3	0.536	–65.5	17.100	127.9	0.044	62.8	0.644	–42.7	0.486	25.91
0.4	0.454	–80.1	14.274	117.9	0.052	60.5	0.547	–49.8	0.592	24.36
0.5	0.391	–92.5	12.140	110.7	0.059	58.8	0.470	–54.6	0.686	23.14
0.6	0.342	–104.4	10.565	104.8	0.066	58.5	0.410	–58.3	0.758	22.02
0.7	0.305	–114.8	9.214	99.6	0.073	58.3	0.363	–61.3	0.822	21.02
0.8	0.277	–125.2	8.252	95.4	0.079	58.3	0.327	–63.9	0.870	20.17
0.9	0.259	–134.5	7.432	91.6	0.086	58.2	0.297	–66.1	0.909	19.37
1.0	0.247	–144.4	6.759	88.2	0.093	58.1	0.273	–68.3	0.939	18.62
1.1	0.240	–152.3	6.194	85.3	0.100	57.8	0.252	–70.4	0.963	17.93
1.2	0.236	–160.8	5.700	82.3	0.106	57.4	0.235	–72.7	0.985	17.29
1.3	0.239	–167.1	5.299	79.9	0.113	57.2	0.219	–75.1	0.999	16.70
1.4	0.237	–174.9	4.927	77.1	0.120	56.7	0.205	–78.0	1.016	15.34
1.5	0.243	178.7	4.622	74.5	0.127	56.1	0.194	–81.0	1.025	14.63
1.6	0.248	173.0	4.339	72.1	0.134	55.5	0.182	–84.1	1.037	13.94
1.7	0.254	168.1	4.100	69.8	0.141	54.8	0.172	–87.3	1.044	13.37
1.8	0.265	163.0	3.869	67.9	0.148	54.1	0.162	–91.2	1.051	12.80
1.9	0.273	157.3	3.679	65.5	0.155	53.4	0.154	–95.2	1.056	12.32
2.0	0.279	154.9	3.511	63.4	0.161	52.4	0.145	–99.2	1.060	11.88
2.1	0.293	150.7	3.335	61.4	0.168	51.7	0.138	–103.8	1.065	11.43
2.2	0.302	148.4	3.199	59.4	0.174	51.0	0.132	–108.5	1.066	11.06
2.3	0.309	145.6	3.046	57.4	0.181	50.1	0.128	–113.7	1.074	10.61
2.4	0.315	142.5	2.921	55.3	0.187	49.1	0.125	–118.4	1.077	10.23
2.5	0.322	139.3	2.812	53.6	0.193	48.2	0.123	–123.9	1.082	9.88
2.6	0.326	135.8	2.696	51.2	0.200	47.0	0.123	–129.1	1.087	9.50
2.7	0.333	132.8	2.608	49.6	0.206	46.1	0.124	–135.4	1.091	9.20
2.8	0.337	129.2	2.514	47.6	0.211	44.9	0.129	–141.5	1.098	8.85
2.9	0.341	125.9	2.412	45.7	0.215	43.7	0.134	–147.4	1.112	8.46
3.0	0.335	120.9	2.280	44.0	0.217	42.5	0.139	–155.8	1.152	7.85
4.0	0.481	109.1	1.776	28.3	0.279	33.4	0.197	167.0	1.072	6.41
5.0	0.547	93.1	1.382	13.6	0.324	22.5	0.295	148.4	1.085	4.53

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	0.553	–38.3	32.555	149.3	0.015	70.7	0.792	–25.0	0.409	33.50
0.2	0.449	–65.8	25.226	130.9	0.028	68.1	0.623	–41.0	0.535	29.62
0.3	0.367	–87.5	19.898	117.5	0.036	64.9	0.492	–50.6	0.678	27.49
0.4	0.306	–104.4	15.851	108.6	0.044	64.7	0.403	–56.1	0.785	25.61
0.5	0.270	–118.4	13.132	102.5	0.051	64.6	0.339	–59.3	0.861	24.15
0.6	0.247	–131.4	11.207	97.6	0.058	64.7	0.293	–61.9	0.913	22.86
0.7	0.231	–142.5	9.657	93.4	0.065	65.0	0.258	–63.9	0.956	21.70
0.8	0.224	–152.4	8.577	89.9	0.073	65.1	0.232	–65.9	0.981	20.71
0.9	0.220	–161.1	7.689	86.8	0.080	65.0	0.211	–67.6	1.003	19.47
1.0	0.223	–169.9	6.966	83.8	0.088	64.6	0.194	–69.6	1.017	18.22
1.1	0.222	–176.0	6.341	81.3	0.095	64.2	0.179	–71.8	1.030	17.17
1.2	0.227	177.6	5.834	78.7	0.102	63.6	0.168	–74.3	1.040	16.33
1.3	0.234	172.6	5.411	76.2	0.110	63.0	0.157	–77.0	1.046	15.61
1.4	0.240	167.1	5.026	74.0	0.118	62.3	0.147	–80.6	1.052	14.91
1.5	0.250	162.6	4.713	71.6	0.125	61.4	0.139	–84.1	1.055	14.33
1.6	0.257	158.4	4.414	69.5	0.132	60.5	0.131	–88.2	1.061	13.72
1.7	0.265	154.4	4.159	67.3	0.140	59.7	0.125	–92.5	1.064	13.19
1.8	0.276	151.5	3.928	65.6	0.147	58.7	0.117	–97.5	1.067	12.69
1.9	0.289	147.2	3.737	63.5	0.155	57.6	0.113	–102.9	1.065	12.28
2.0	0.294	145.1	3.561	61.4	0.161	56.5	0.107	–108.5	1.068	11.84
2.1	0.307	142.0	3.383	59.4	0.169	55.6	0.104	–114.4	1.069	11.42
2.2	0.316	140.3	3.247	57.7	0.175	54.7	0.101	–120.6	1.069	11.07
2.3	0.324	138.1	3.088	55.8	0.182	53.6	0.100	–127.3	1.074	10.64
2.4	0.329	135.7	2.958	53.9	0.189	52.4	0.100	–132.8	1.076	10.25
2.5	0.338	133.0	2.847	52.1	0.196	51.4	0.101	–139.2	1.077	9.93
2.6	0.340	130.1	2.726	49.9	0.203	50.0	0.105	–144.5	1.081	9.54
2.7	0.350	127.6	2.638	48.2	0.208	48.9	0.110	–151.0	1.083	9.27
2.8	0.351	124.2	2.544	46.5	0.214	47.6	0.117	–156.6	1.090	8.91
2.9	0.356	121.1	2.440	44.7	0.219	46.4	0.126	–161.8	1.103	8.53
3.0	0.351	117.2	2.307	43.0	0.220	45.0	0.136	–169.7	1.138	7.95
4.0	0.494	107.1	1.787	27.9	0.284	34.8	0.208	159.0	1.061	6.48
5.0	0.558	91.8	1.393	13.6	0.329	23.2	0.310	143.6	1.072	4.63

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	0.955	–6.3	3.322	173.7	0.014	81.6	0.996	–4.5	0.096	23.77
0.2	0.954	–11.1	3.261	168.0	0.030	82.2	0.987	–8.7	0.061	20.37
0.3	0.942	–16.5	3.284	162.5	0.044	77.1	0.975	–13.0	0.105	18.73
0.4	0.938	–22.0	3.227	156.6	0.057	72.9	0.964	–17.4	0.133	17.53
0.5	0.915	–27.1	3.181	151.1	0.069	68.7	0.947	–21.6	0.170	16.61
0.6	0.894	–32.6	3.137	145.7	0.081	65.1	0.928	–25.8	0.194	15.87
0.7	0.871	–38.0	3.068	139.9	0.091	61.2	0.907	–29.7	0.233	15.26
0.8	0.840	–42.9	3.024	134.8	0.101	57.8	0.884	–33.7	0.267	14.77
0.9	0.810	–48.3	2.957	129.5	0.109	54.5	0.861	–37.6	0.300	14.33
1.0	0.782	–53.1	2.899	124.6	0.116	51.3	0.837	–41.5	0.336	13.99
1.1	0.758	–58.0	2.823	120.0	0.122	48.2	0.814	–45.2	0.365	13.65
1.2	0.730	–63.3	2.763	114.9	0.126	45.6	0.788	–48.8	0.403	13.40
1.3	0.706	–68.0	2.707	110.6	0.130	43.0	0.763	–52.4	0.435	13.18
1.4	0.676	–72.8	2.634	106.1	0.133	40.7	0.737	–56.1	0.479	12.97
1.5	0.652	–78.1	2.580	101.5	0.135	38.5	0.716	–59.7	0.514	12.82
1.6	0.627	–82.7	2.504	97.2	0.136	36.7	0.694	–63.0	0.559	12.67
1.7	0.605	–87.5	2.432	92.7	0.136	35.1	0.674	–66.3	0.607	12.54
1.8	0.580	–93.1	2.394	89.3	0.134	33.9	0.650	–70.3	0.647	12.50
1.9	0.558	–97.8	2.322	84.9	0.134	32.8	0.633	–73.5	0.703	12.38
2.0	0.541	–102.5	2.257	80.9	0.133	32.4	0.615	–76.8	0.757	12.31
2.1	0.522	–107.8	2.194	77.0	0.130	32.6	0.599	–80.3	0.813	12.26
2.2	0.510	–112.6	2.149	73.3	0.128	33.5	0.582	–83.5	0.866	12.26
2.3	0.500	–117.0	2.081	69.9	0.126	34.7	0.570	–86.9	0.922	12.19
2.4	0.491	–121.6	2.026	66.1	0.124	36.2	0.558	–90.3	0.978	12.15
2.5	0.478	–126.2	1.988	62.8	0.122	38.2	0.545	–93.9	1.036	10.94
2.6	0.468	–131.0	1.925	59.1	0.121	40.7	0.535	–98.1	1.097	10.11
2.7	0.459	–135.2	1.884	56.2	0.122	43.2	0.528	–101.8	1.130	9.70
2.8	0.451	–139.9	1.836	52.9	0.125	46.2	0.524	–105.4	1.149	9.34
2.9	0.446	–144.4	1.787	50.2	0.127	48.6	0.516	–108.8	1.175	8.94
3.0	0.438	–149.2	1.714	46.9	0.132	51.0	0.507	–113.3	1.221	8.31
4.0	0.508	170.4	1.357	19.9	0.248	62.1	0.525	–155.7	0.864	7.38
5.0	0.625	141.5	1.019	–1.3	0.391	42.5	0.598	159.4	0.756	4.16

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	0.881	–9.5	8.749	168.9	0.012	79.1	0.981	–6.9	0.177	28.48
0.2	0.868	–16.8	8.374	162.5	0.028	78.9	0.958	–13.3	0.141	24.69
0.3	0.836	–25.1	8.251	153.8	0.041	73.5	0.924	–19.6	0.205	23.09
0.4	0.802	–32.7	7.853	145.6	0.052	69.0	0.885	–25.4	0.265	21.78
0.5	0.751	–39.5	7.429	138.4	0.061	64.9	0.840	–30.7	0.329	20.83
0.6	0.704	–46.4	7.060	131.8	0.070	61.9	0.794	–35.4	0.383	20.04
0.7	0.659	–52.6	6.624	125.2	0.077	59.0	0.748	–39.7	0.443	19.35
0.8	0.609	–58.0	6.269	119.8	0.083	56.9	0.706	–43.7	0.500	18.77
0.9	0.566	–63.6	5.916	114.4	0.088	55.2	0.667	–47.1	0.555	18.27
1.0	0.523	–68.7	5.597	109.5	0.093	53.6	0.630	–50.3	0.611	17.80
1.1	0.492	–73.8	5.264	105.3	0.097	52.7	0.596	–53.3	0.658	17.34
1.2	0.458	–78.7	4.996	100.8	0.101	51.9	0.565	–56.1	0.708	16.95
1.3	0.431	–83.6	4.747	96.9	0.104	51.3	0.536	–58.9	0.752	16.57
1.4	0.403	–88.0	4.503	93.1	0.108	51.1	0.510	–61.7	0.797	16.20
1.5	0.380	–93.0	4.310	89.4	0.111	50.9	0.487	–64.5	0.833	15.88
1.6	0.357	–97.3	4.103	85.9	0.115	50.9	0.464	–67.0	0.876	15.53
1.7	0.338	–102.4	3.918	82.5	0.119	50.9	0.446	–69.5	0.909	15.19
1.8	0.320	–107.9	3.761	79.8	0.122	51.3	0.427	–72.5	0.939	14.89
1.9	0.303	–113.1	3.607	76.3	0.126	51.3	0.411	–75.0	0.968	14.56
2.0	0.296	–117.7	3.469	73.2	0.130	51.6	0.396	–77.6	0.989	14.26
2.1	0.285	–123.6	3.333	70.2	0.134	52.2	0.382	–80.4	1.011	13.32
2.2	0.280	–128.5	3.225	67.4	0.138	52.9	0.369	–83.1	1.024	12.73
2.3	0.276	–132.8	3.099	64.7	0.143	53.4	0.359	–86.1	1.040	12.14
2.4	0.271	–136.7	2.994	61.9	0.147	53.8	0.350	–89.0	1.052	11.68
2.5	0.267	–142.3	2.907	59.4	0.152	54.2	0.339	–92.3	1.060	11.30
2.6	0.263	–146.5	2.809	56.5	0.158	54.5	0.334	–95.9	1.067	10.92
2.7	0.263	–151.0	2.734	54.1	0.164	54.6	0.328	–99.7	1.065	10.67
2.8	0.260	–155.2	2.657	51.7	0.170	54.8	0.323	–103.6	1.066	10.36
2.9	0.261	–159.9	2.567	49.4	0.176	54.7	0.317	–107.3	1.072	10.00
3.0	0.258	–165.0	2.472	46.8	0.182	54.5	0.310	–112.2	1.085	9.54
4.0	0.359	160.6	1.975	24.6	0.270	51.8	0.332	–154.2	0.952	8.64
5.0	0.506	139.5	1.558	3.2	0.374	37.3	0.437	163.3	0.838	6.20

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	0.808	–12.1	12.742	166.7	0.013	77.2	0.966	–8.7	0.225	29.80
0.2	0.794	–21.0	11.967	158.1	0.027	76.7	0.929	–16.6	0.209	26.43
0.3	0.745	–30.7	11.489	147.6	0.038	71.9	0.875	–23.9	0.291	24.76
0.4	0.694	–39.5	10.618	138.4	0.048	68.0	0.817	–30.2	0.364	23.43
0.5	0.631	–46.6	9.770	130.6	0.056	64.4	0.758	–35.4	0.449	22.40
0.6	0.578	–53.6	9.019	123.8	0.064	62.2	0.700	–40.1	0.516	21.51
0.7	0.524	–59.7	8.263	117.6	0.069	60.3	0.647	–43.7	0.588	20.75
0.8	0.474	–64.9	7.672	112.1	0.075	59.4	0.602	–47.1	0.650	20.10
0.9	0.434	–70.2	7.110	107.2	0.080	58.5	0.563	–49.9	0.705	19.48
1.0	0.395	–75.6	6.612	102.7	0.085	58.0	0.527	–52.6	0.755	18.91
1.1	0.368	–80.0	6.156	98.8	0.090	57.6	0.494	–55.0	0.800	18.35
1.2	0.338	–84.9	5.782	94.9	0.095	57.5	0.466	–57.2	0.843	17.87
1.3	0.316	–89.4	5.448	91.4	0.100	57.6	0.441	–59.3	0.875	17.38
1.4	0.292	–94.2	5.129	87.9	0.104	57.4	0.418	–61.9	0.909	16.91
1.5	0.275	–99.5	4.870	84.7	0.109	57.5	0.399	–64.0	0.934	16.50
1.6	0.257	–103.5	4.611	81.6	0.114	57.6	0.381	–66.3	0.960	16.06
1.7	0.243	–108.9	4.384	78.8	0.120	57.5	0.365	–68.5	0.978	15.64
1.8	0.231	–114.9	4.189	76.2	0.125	57.6	0.348	–71.2	0.995	15.25
1.9	0.219	–121.0	4.009	73.3	0.131	57.5	0.336	–73.6	1.008	14.33
2.0	0.215	–125.5	3.845	70.5	0.136	57.4	0.322	–75.9	1.019	13.67
2.1	0.208	–132.0	3.682	67.9	0.142	57.6	0.310	–78.7	1.029	13.09
2.2	0.208	–137.4	3.558	65.3	0.148	57.6	0.299	–81.4	1.032	12.72
2.3	0.208	–142.1	3.408	63.0	0.153	57.5	0.290	–84.4	1.040	12.24
2.4	0.204	–146.1	3.286	60.5	0.160	57.4	0.283	–87.3	1.045	11.84
2.5	0.204	–151.6	3.188	58.3	0.166	57.2	0.274	–90.7	1.047	11.51
2.6	0.204	–155.6	3.074	55.5	0.172	56.8	0.269	–94.4	1.049	11.16
2.7	0.206	–160.9	2.985	53.5	0.179	56.4	0.263	–98.6	1.048	10.88
2.8	0.208	–164.6	2.900	51.2	0.186	56.1	0.259	–103.0	1.046	10.62
2.9	0.213	–169.5	2.802	49.3	0.192	55.5	0.253	–107.0	1.049	10.29
3.0	0.211	–175.0	2.693	46.8	0.199	54.8	0.247	–112.5	1.060	9.82
4.0	0.325	154.2	2.151	26.6	0.281	49.0	0.272	–157.1	0.970	8.83
5.0	0.469	136.8	1.725	6.4	0.372	35.1	0.377	161.5	0.882	6.66

V_{CE} = 1 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	0.764	–14.0	15.802	165.0	0.012	78.0	0.954	–10.1	0.231	31.24
0.2	0.736	–23.9	14.611	154.6	0.027	76.5	0.903	–18.9	0.258	27.41
0.3	0.673	–34.8	13.702	143.2	0.037	71.4	0.834	–26.9	0.355	25.72
0.4	0.612	–43.9	12.369	133.5	0.046	67.8	0.765	–33.2	0.444	24.32
0.5	0.546	–51.3	11.152	125.6	0.053	65.0	0.697	–38.3	0.533	23.26
0.6	0.488	–58.1	10.136	119.0	0.060	63.4	0.636	–42.5	0.607	22.29
0.7	0.441	–64.1	9.142	112.8	0.066	62.6	0.582	–45.7	0.677	21.44
0.8	0.392	–69.2	8.390	107.7	0.071	61.8	0.539	–48.5	0.738	20.71
0.9	0.357	–74.2	7.708	103.0	0.077	61.3	0.500	–50.8	0.790	20.02
1.0	0.320	–79.1	7.125	98.9	0.082	61.2	0.467	–53.0	0.837	19.39
1.1	0.297	–83.4	6.591	95.3	0.088	61.2	0.439	–55.0	0.872	18.77
1.2	0.269	–88.3	6.150	91.6	0.093	61.0	0.414	–56.8	0.907	18.22
1.3	0.253	–93.1	5.764	88.4	0.098	61.2	0.392	–58.9	0.931	17.68
1.4	0.232	–97.9	5.412	85.4	0.104	61.0	0.371	–61.1	0.955	17.15
1.5	0.220	–103.2	5.128	82.3	0.110	60.9	0.354	–63.1	0.971	16.69
1.6	0.205	–107.7	4.841	79.5	0.116	60.9	0.338	–65.2	0.991	16.22
1.7	0.196	–113.7	4.609	76.7	0.122	60.7	0.323	–67.3	1.001	15.62
1.8	0.186	–120.5	4.385	74.4	0.128	60.6	0.309	–69.9	1.011	14.71
1.9	0.175	–127.5	4.190	71.7	0.135	60.2	0.297	–72.3	1.020	14.07
2.0	0.174	–131.7	4.020	69.1	0.141	59.8	0.284	–74.7	1.026	13.58
2.1	0.172	–139.3	3.842	66.7	0.147	59.7	0.274	–77.4	1.032	13.08
2.2	0.174	–145.0	3.708	64.4	0.153	59.6	0.264	–80.2	1.033	12.73
2.3	0.176	–149.3	3.551	62.1	0.160	59.3	0.256	–83.2	1.037	12.29
2.4	0.177	–153.7	3.422	59.7	0.166	58.7	0.249	–86.3	1.039	11.93
2.5	0.178	–158.9	3.314	57.7	0.173	58.4	0.241	–89.7	1.040	11.61
2.6	0.177	–163.4	3.186	55.0	0.180	57.7	0.236	–93.7	1.044	11.21
2.7	0.183	–167.9	3.101	53.1	0.187	57.1	0.231	–98.1	1.039	10.99
2.8	0.184	–172.4	3.009	50.9	0.194	56.5	0.226	–102.9	1.039	10.70
2.9	0.192	–176.5	2.910	49.1	0.200	55.8	0.222	–107.3	1.040	10.40
3.0	0.191	177.4	2.795	46.7	0.207	54.9	0.215	–113.2	1.051	9.93
4.0	0.311	150.1	2.231	27.6	0.288	47.7	0.243	–160.1	0.977	8.90
5.0	0.455	134.5	1.794	8.1	0.373	33.9	0.349	159.3	0.905	6.82

V_{CE} = 1 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	0.704	–15.1	19.149	162.9	0.012	76.4	0.938	–11.7	0.291	31.94
0.2	0.657	–27.9	17.352	150.9	0.025	75.6	0.869	–21.6	0.317	28.47
0.3	0.588	–39.1	15.831	138.6	0.035	71.1	0.786	–29.9	0.432	26.61
0.4	0.525	–48.7	13.968	128.6	0.043	68.1	0.706	–36.2	0.528	25.12
0.5	0.457	–55.9	12.321	120.8	0.050	66.0	0.634	–40.7	0.626	23.94
0.6	0.405	–62.5	11.025	114.4	0.057	65.3	0.572	–44.3	0.697	22.90
0.7	0.357	–68.0	9.834	108.5	0.062	64.7	0.521	–47.0	0.767	21.97
0.8	0.317	–72.9	8.933	103.8	0.069	64.5	0.479	–49.3	0.819	21.15
0.9	0.285	–77.8	8.157	99.4	0.074	64.5	0.445	–51.1	0.861	20.40
1.0	0.255	–82.8	7.489	95.6	0.080	64.2	0.416	–52.9	0.898	19.69
1.1	0.235	–87.2	6.894	92.2	0.087	64.3	0.390	–54.6	0.926	19.01
1.2	0.212	–92.7	6.421	88.9	0.092	64.2	0.368	–56.1	0.952	18.42
1.3	0.200	–97.4	6.006	86.0	0.099	64.1	0.349	–57.8	0.968	17.85
1.4	0.184	–102.7	5.617	83.2	0.105	64.0	0.331	–59.9	0.985	17.28
1.5	0.172	–108.5	5.314	80.1	0.111	63.7	0.316	–61.9	0.996	16.79
1.6	0.161	–114.2	5.018	77.7	0.118	63.4	0.301	–63.9	1.008	15.76
1.7	0.155	–120.2	4.755	75.2	0.125	63.1	0.289	–66.0	1.015	15.07
1.8	0.148	–128.0	4.516	72.9	0.131	62.8	0.276	–68.4	1.022	14.45
1.9	0.143	–135.1	4.323	70.3	0.138	62.1	0.265	–71.0	1.026	13.97
2.0	0.146	–141.1	4.142	67.8	0.145	61.6	0.253	–73.5	1.027	13.55
2.1	0.145	–148.8	3.955	65.5	0.152	61.3	0.244	–76.3	1.032	13.06
2.2	0.151	–153.6	3.809	63.3	0.159	60.9	0.235	–79.1	1.031	12.73
2.3	0.154	–158.4	3.646	61.2	0.165	60.4	0.227	–82.3	1.035	12.29
2.4	0.156	–162.2	3.514	58.9	0.172	59.7	0.220	–85.5	1.035	11.95
2.5	0.161	–168.0	3.398	56.9	0.179	59.1	0.213	–89.2	1.035	11.64
2.6	0.163	–171.8	3.272	54.4	0.186	58.3	0.209	–93.3	1.036	11.28
2.7	0.170	–176.0	3.182	52.7	0.193	57.5	0.203	–98.2	1.033	11.05
2.8	0.172	179.8	3.083	50.6	0.201	56.8	0.200	–103.4	1.033	10.75
2.9	0.178	176.0	2.978	48.8	0.207	55.9	0.195	–108.3	1.035	10.43
3.0	0.181	170.1	2.862	46.6	0.214	54.8	0.190	–114.8	1.044	9.99
4.0	0.306	145.7	2.277	28.2	0.293	46.6	0.222	–164.0	0.983	8.90
5.0	0.448	132.4	1.838	9.4	0.374	32.7	0.330	156.5	0.920	6.91

V_{CE} = 1 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	0.547	–20.1	24.880	158.9	0.011	77.4	0.890	–14.6	0.394	33.48
0.2	0.501	–35.2	21.478	143.9	0.023	73.9	0.792	–26.3	0.466	29.63
0.3	0.428	–48.8	18.648	130.7	0.032	71.5	0.686	–34.7	0.581	27.66
0.4	0.366	–58.6	15.760	120.7	0.040	69.9	0.598	–40.2	0.684	25.97
0.5	0.310	–65.9	13.527	113.4	0.046	68.8	0.527	–43.8	0.773	24.65
0.6	0.269	–72.8	11.828	107.5	0.054	68.9	0.471	–46.3	0.832	23.44
0.7	0.234	–78.0	10.384	102.3	0.060	68.8	0.426	–48.2	0.887	22.38
0.8	0.204	–84.1	9.359	98.0	0.067	68.9	0.391	–49.6	0.921	21.46
0.9	0.181	–89.6	8.456	94.2	0.074	68.9	0.363	–50.8	0.950	20.60
1.0	0.159	–97.3	7.721	90.7	0.080	68.7	0.340	–52.2	0.970	19.82
1.1	0.149	–102.3	7.095	87.8	0.087	68.5	0.320	–53.5	0.986	19.10
1.2	0.138	–109.6	6.561	84.8	0.094	68.2	0.303	–54.9	0.999	18.43
1.3	0.130	–116.0	6.125	82.0	0.101	67.8	0.287	–56.5	1.008	17.28
1.4	0.123	–123.0	5.715	79.5	0.109	67.4	0.273	–58.5	1.016	16.44
1.5	0.121	–132.0	5.379	76.9	0.116	66.8	0.261	–60.5	1.020	15.80
1.6	0.115	–138.2	5.071	74.3	0.123	66.3	0.249	–62.7	1.027	15.15
1.7	0.117	–146.2	4.810	72.0	0.130	65.7	0.238	–64.9	1.029	14.64
1.8	0.119	–153.5	4.559	70.2	0.137	65.1	0.227	–67.5	1.032	14.10
1.9	0.122	–162.7	4.346	67.7	0.145	64.2	0.218	–70.5	1.032	13.66
2.0	0.130	–167.1	4.162	65.4	0.153	63.5	0.208	–73.1	1.031	13.28
2.1	0.137	–173.6	3.971	63.2	0.160	62.8	0.199	–76.3	1.033	12.84
2.2	0.145	–176.3	3.825	61.2	0.167	62.2	0.191	–79.6	1.030	12.52
2.3	0.153	–179.9	3.653	59.2	0.175	61.4	0.184	–83.5	1.032	12.10
2.4	0.157	177.3	3.515	57.0	0.182	60.5	0.179	–87.1	1.032	11.75
2.5	0.164	173.3	3.399	55.2	0.189	59.6	0.173	–91.4	1.031	11.46
2.6	0.170	170.2	3.272	52.8	0.197	58.6	0.170	–96.4	1.031	11.12
2.7	0.177	166.7	3.179	51.1	0.204	57.5	0.165	–102.2	1.029	10.87
2.8	0.181	163.9	3.075	49.2	0.212	56.7	0.163	–108.5	1.030	10.56
2.9	0.191	161.2	2.974	47.4	0.219	55.6	0.160	–114.4	1.030	10.27
3.0	0.197	155.6	2.855	45.3	0.225	54.4	0.157	–122.0	1.038	9.83
4.0	0.326	138.6	2.262	27.7	0.304	44.8	0.207	–174.0	0.987	8.72
5.0	0.461	127.3	1.827	9.7	0.379	30.8	0.319	149.9	0.938	6.83

V_{CE} = 2 V, I_C = 1 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	0.949	–6.3	3.349	174.1	0.012	80.3	0.996	–4.1	0.114	24.51
0.2	0.958	–10.6	3.284	168.2	0.026	81.2	0.990	–8.1	0.084	21.09
0.3	0.950	–15.5	3.307	163.3	0.038	77.8	0.978	–12.2	0.101	19.34
0.4	0.942	–20.6	3.253	157.6	0.050	73.6	0.967	–16.3	0.134	18.11
0.5	0.921	–25.6	3.217	152.2	0.061	69.7	0.953	–20.2	0.168	17.20
0.6	0.899	–30.9	3.173	147.0	0.072	66.2	0.934	–24.2	0.193	16.45
0.7	0.878	–36.0	3.116	141.3	0.081	62.8	0.914	–27.9	0.229	15.86
0.8	0.853	–40.6	3.076	136.5	0.089	59.4	0.894	–31.6	0.262	15.38
0.9	0.822	–45.5	3.012	131.4	0.096	56.3	0.874	–35.3	0.296	14.95
1.0	0.794	–50.1	2.954	126.6	0.102	53.2	0.849	–39.0	0.333	14.60
1.1	0.771	–55.0	2.881	122.1	0.108	50.4	0.827	–42.6	0.361	14.27
1.2	0.741	–59.8	2.828	117.2	0.112	47.9	0.803	–46.0	0.402	14.04
1.3	0.720	–64.7	2.774	112.9	0.115	45.4	0.781	–49.4	0.429	13.82
1.4	0.692	–69.1	2.707	108.6	0.118	43.4	0.758	–53.0	0.470	13.62
1.5	0.669	–74.0	2.655	103.9	0.119	41.4	0.736	–56.2	0.512	13.49
1.6	0.639	–78.5	2.581	99.7	0.120	39.9	0.715	–59.6	0.561	13.33
1.7	0.619	–83.2	2.508	95.4	0.120	38.5	0.695	–62.7	0.606	13.20
1.8	0.597	–88.5	2.479	92.1	0.119	37.7	0.673	–66.4	0.644	13.20
1.9	0.570	–92.8	2.402	87.6	0.118	37.0	0.656	–69.5	0.709	13.08
2.0	0.554	–97.6	2.345	83.5	0.117	36.9	0.638	–72.5	0.762	13.02
2.1	0.535	–102.7	2.282	79.6	0.115	37.7	0.622	–75.8	0.821	12.98
2.2	0.519	–107.2	2.236	76.0	0.113	39.1	0.606	–79.0	0.879	12.97
2.3	0.508	–111.5	2.175	72.5	0.111	40.8	0.593	–82.2	0.933	12.92
2.4	0.498	–115.8	2.115	68.8	0.110	43.0	0.582	–85.5	0.988	12.84
2.5	0.484	–120.5	2.078	65.5	0.109	45.5	0.567	–88.9	1.045	11.49
2.6	0.473	–124.6	2.016	61.8	0.109	48.7	0.557	–92.7	1.098	10.74
2.7	0.465	–129.4	1.976	58.9	0.112	51.6	0.551	–96.4	1.111	10.45
2.8	0.453	–133.7	1.931	55.6	0.116	55.0	0.546	–99.9	1.120	10.11
2.9	0.448	–138.2	1.874	52.9	0.120	57.6	0.539	–103.1	1.135	9.70
3.0	0.437	–143.0	1.805	49.6	0.126	60.1	0.528	–107.5	1.167	9.09
4.0	0.497	175.7	1.439	22.2	0.256	68.2	0.538	–148.9	0.793	7.51
5.0	0.620	145.0	1.080	–0.3	0.406	45.8	0.607	164.1	0.705	4.25

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	0.883	–9.0	8.743	169.2	0.012	78.7	0.984	–6.3	0.189	28.61
0.2	0.876	–15.5	8.392	163.3	0.025	78.9	0.963	–12.1	0.148	25.31
0.3	0.847	–23.1	8.290	154.9	0.036	74.4	0.932	–17.8	0.208	23.64
0.4	0.814	–30.2	7.918	147.1	0.046	70.6	0.898	–23.2	0.257	22.34
0.5	0.768	–36.6	7.557	140.2	0.055	66.6	0.858	–28.0	0.323	21.40
0.6	0.723	–42.9	7.176	133.6	0.062	63.7	0.814	–32.4	0.377	20.60
0.7	0.677	–48.6	6.752	127.2	0.069	61.0	0.773	–36.3	0.438	19.90
0.8	0.634	–53.5	6.441	121.8	0.074	59.0	0.733	–39.8	0.495	19.37
0.9	0.589	–58.4	6.083	116.8	0.079	57.5	0.695	–43.2	0.549	18.85
1.0	0.548	–63.2	5.767	111.9	0.083	56.1	0.661	–46.2	0.603	18.40
1.1	0.514	–67.6	5.454	107.5	0.087	55.2	0.627	–48.9	0.656	17.95
1.2	0.480	–72.5	5.171	103.1	0.091	54.5	0.597	–51.4	0.704	17.54
1.3	0.454	–76.4	4.932	99.3	0.094	54.1	0.570	–54.1	0.746	17.18
1.4	0.425	–80.4	4.701	95.5	0.098	53.9	0.544	–56.7	0.791	16.82
1.5	0.399	–85.0	4.496	91.6	0.101	54.0	0.522	–59.0	0.832	16.49
1.6	0.375	–88.8	4.282	88.3	0.104	54.1	0.499	–61.4	0.873	16.13
1.7	0.354	–93.2	4.100	84.9	0.108	54.4	0.481	–63.7	0.906	15.80
1.8	0.334	–97.9	3.940	82.2	0.111	54.9	0.463	–66.2	0.937	15.51
1.9	0.314	–102.6	3.786	78.8	0.115	55.1	0.448	–68.5	0.964	15.17
2.0	0.304	–106.9	3.647	75.7	0.119	55.7	0.432	–70.8	0.984	14.86
2.1	0.290	–111.9	3.513	72.6	0.123	56.3	0.418	–73.2	1.006	14.09
2.2	0.283	–116.8	3.399	69.9	0.127	57.3	0.406	–75.8	1.018	13.44
2.3	0.279	–121.0	3.268	67.1	0.131	57.9	0.395	–78.4	1.031	12.87
2.4	0.270	–124.5	3.160	64.3	0.136	58.5	0.386	–81.0	1.042	12.40
2.5	0.264	–129.6	3.070	61.8	0.141	59.0	0.376	–83.8	1.048	12.02
2.6	0.259	–133.6	2.968	58.9	0.147	59.5	0.369	–87.1	1.052	11.65
2.7	0.254	–138.0	2.894	56.7	0.153	59.6	0.362	–90.6	1.051	11.39
2.8	0.251	–142.4	2.813	54.2	0.160	59.9	0.357	–94.1	1.047	11.14
2.9	0.248	–147.0	2.723	52.0	0.166	59.9	0.350	–97.3	1.050	10.78
3.0	0.244	–152.3	2.622	49.2	0.173	59.6	0.341	–101.9	1.060	10.31
4.0	0.332	169.7	2.117	27.0	0.266	57.4	0.349	–142.1	0.912	9.02
5.0	0.491	145.8	1.684	4.7	0.379	41.8	0.443	172.5	0.790	6.48

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	0.836	–10.9	12.756	167.2	0.012	77.0	0.971	–7.7	0.234	30.29
0.2	0.802	–18.8	12.044	159.0	0.023	78.1	0.938	–14.9	0.206	27.11
0.3	0.761	–28.1	11.614	149.1	0.034	73.4	0.889	–21.5	0.284	25.33
0.4	0.714	–35.6	10.808	140.2	0.043	69.5	0.837	–27.3	0.362	24.03
0.5	0.658	–42.2	9.995	132.8	0.050	66.2	0.782	–32.1	0.441	23.00
0.6	0.601	–48.5	9.266	126.0	0.057	64.0	0.730	–36.2	0.511	22.12
0.7	0.547	–54.0	8.532	119.5	0.062	62.6	0.679	–39.7	0.584	21.36
0.8	0.503	–58.8	7.960	114.4	0.068	61.6	0.636	–42.6	0.642	20.70
0.9	0.460	–63.2	7.386	109.4	0.072	61.0	0.597	–45.1	0.700	20.08
1.0	0.423	–67.3	6.901	104.9	0.077	60.4	0.564	–47.5	0.751	19.53
1.1	0.391	–71.4	6.442	100.9	0.082	60.2	0.533	–49.7	0.795	18.97
1.2	0.359	–75.4	6.048	97.0	0.086	60.0	0.506	–51.6	0.840	18.49
1.3	0.337	–79.1	5.712	93.7	0.090	60.1	0.482	–53.6	0.871	18.00
1.4	0.312	–82.9	5.396	90.3	0.095	60.3	0.459	–55.6	0.904	17.53
1.5	0.291	–87.2	5.127	87.0	0.100	60.4	0.440	–57.6	0.930	17.12
1.6	0.272	–90.8	4.851	84.0	0.104	60.6	0.422	–59.7	0.956	16.67
1.7	0.256	–95.4	4.613	81.1	0.109	60.7	0.407	–61.4	0.975	16.25
1.8	0.239	–100.0	4.425	78.7	0.115	61.0	0.390	–63.6	0.991	15.87
1.9	0.224	–105.2	4.238	75.7	0.120	60.9	0.377	–65.7	1.004	15.09
2.0	0.218	–109.6	4.071	72.9	0.126	60.9	0.364	–67.7	1.012	14.44
2.1	0.207	–115.1	3.904	70.3	0.131	61.2	0.352	–70.0	1.022	13.83
2.2	0.205	–120.4	3.774	67.8	0.137	61.4	0.341	–72.4	1.023	13.48
2.3	0.202	–124.7	3.620	65.4	0.142	61.6	0.332	–74.9	1.030	12.99
2.4	0.197	–129.0	3.495	62.9	0.148	61.4	0.324	–77.4	1.034	12.60
2.5	0.194	–133.7	3.390	60.7	0.154	61.3	0.315	–80.2	1.035	12.28
2.6	0.191	–138.6	3.272	58.1	0.161	61.1	0.309	–83.4	1.036	11.93
2.7	0.188	–143.2	3.183	56.0	0.167	60.8	0.303	–86.9	1.034	11.67
2.8	0.187	–147.6	3.088	53.8	0.174	60.5	0.297	–90.7	1.032	11.39
2.9	0.187	–152.2	2.991	51.8	0.181	60.0	0.290	–94.2	1.033	11.07
3.0	0.186	–158.4	2.882	49.3	0.188	59.3	0.282	–99.1	1.040	10.64
4.0	0.285	164.2	2.321	29.1	0.273	54.2	0.284	–141.0	0.942	9.29
5.0	0.442	144.2	1.878	8.1	0.373	39.6	0.377	173.4	0.843	7.02

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	0.783	–11.7	15.876	165.6	0.012	80.1	0.961	–9.0	0.222	31.22
0.2	0.749	–21.4	14.757	155.8	0.023	76.3	0.916	–16.9	0.268	28.07
0.3	0.694	–30.8	13.937	145.0	0.032	73.4	0.854	–24.0	0.348	26.33
0.4	0.634	–39.2	12.673	135.4	0.041	69.3	0.791	–29.8	0.441	24.94
0.5	0.572	–45.5	11.501	127.6	0.047	66.8	0.727	–34.3	0.532	23.87
0.6	0.519	–51.7	10.499	121.1	0.054	65.5	0.672	–38.2	0.598	22.90
0.7	0.467	–56.7	9.521	115.0	0.059	64.3	0.620	–41.1	0.675	22.08
0.8	0.423	–61.3	8.773	109.9	0.064	64.1	0.578	–43.4	0.730	21.34
0.9	0.383	–64.9	8.079	105.3	0.069	63.6	0.541	–45.4	0.786	20.66
1.0	0.346	–68.7	7.474	101.0	0.074	63.6	0.510	–47.4	0.832	20.03
1.1	0.320	–72.0	6.943	97.4	0.080	63.5	0.480	–49.1	0.869	19.41
1.2	0.292	–76.2	6.485	93.8	0.084	63.6	0.456	–50.5	0.904	18.86
1.3	0.273	–79.8	6.096	90.7	0.090	63.7	0.436	–52.2	0.925	18.32
1.4	0.251	–83.2	5.724	87.7	0.095	63.8	0.416	–54.1	0.951	17.79
1.5	0.236	–87.4	5.433	84.6	0.100	63.8	0.398	–55.9	0.967	17.34
1.6	0.217	–90.7	5.142	81.8	0.106	63.8	0.383	–57.6	0.986	16.86
1.7	0.206	–95.5	4.883	79.0	0.112	63.7	0.369	–59.4	0.996	16.41
1.8	0.192	–100.7	4.657	76.8	0.118	63.8	0.355	–61.4	1.006	15.51
1.9	0.178	–106.1	4.458	74.1	0.124	63.4	0.343	–63.5	1.013	14.86
2.0	0.172	–111.0	4.275	71.5	0.130	63.2	0.331	–65.4	1.019	14.34
2.1	0.164	–117.6	4.092	69.0	0.136	63.3	0.320	–67.6	1.025	13.82
2.2	0.164	–122.6	3.954	66.7	0.142	63.2	0.310	–69.9	1.023	13.51
2.3	0.161	–127.4	3.790	64.5	0.148	62.9	0.302	–72.4	1.028	13.05
2.4	0.162	–131.5	3.659	62.2	0.155	62.6	0.294	–75.0	1.027	12.73
2.5	0.157	–137.1	3.542	60.2	0.161	62.2	0.286	–77.8	1.029	12.38
2.6	0.155	–142.3	3.416	57.6	0.168	61.7	0.280	–81.1	1.030	12.03
2.7	0.157	–146.6	3.324	55.7	0.174	61.2	0.274	–84.6	1.026	11.81
2.8	0.156	–152.2	3.228	53.6	0.182	60.8	0.268	–88.6	1.024	11.55
2.9	0.158	–156.8	3.123	51.7	0.188	60.0	0.261	–92.3	1.026	11.21
3.0	0.157	–163.9	3.007	49.4	0.195	59.1	0.252	–97.4	1.033	10.77
4.0	0.263	160.3	2.416	30.2	0.278	52.8	0.253	–141.1	0.955	9.39
5.0	0.421	142.8	1.966	10.1	0.372	38.5	0.343	172.9	0.869	7.23

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

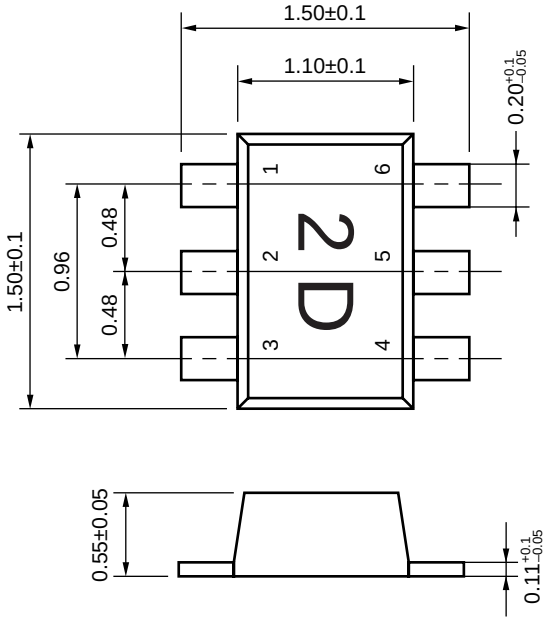
Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)	K	MAG/MSG (dB)
0.1	0.728	–13.6	19.317	163.6	0.010	85.0	0.947	–10.2	0.193	32.74
0.2	0.682	–24.1	17.623	152.2	0.022	76.8	0.888	–19.1	0.316	29.06
0.3	0.615	–34.4	16.228	140.4	0.031	72.6	0.812	–26.5	0.427	27.23
0.4	0.554	–42.6	14.421	130.8	0.038	69.9	0.740	–32.0	0.523	25.75
0.5	0.489	–48.8	12.834	122.9	0.045	68.3	0.672	–36.2	0.616	24.60
0.6	0.435	–54.2	11.534	116.5	0.051	67.2	0.613	–39.3	0.691	23.55
0.7	0.390	–58.4	10.320	110.7	0.056	66.9	0.565	–41.6	0.758	22.63
0.8	0.345	–61.9	9.420	106.0	0.062	66.6	0.524	–43.6	0.814	21.82
0.9	0.311	–65.8	8.618	101.6	0.067	66.6	0.491	–45.2	0.857	21.08
1.0	0.281	–69.9	7.927	97.7	0.073	66.6	0.463	–46.5	0.891	20.37
1.1	0.260	–72.3	7.332	94.5	0.079	66.6	0.437	–47.8	0.920	19.70
1.2	0.237	–76.0	6.820	91.2	0.084	66.7	0.417	–49.2	0.946	19.10
1.3	0.221	–79.2	6.397	88.2	0.090	66.7	0.398	–50.6	0.962	18.53
1.4	0.203	–83.2	5.982	85.4	0.096	66.6	0.381	–52.3	0.978	17.95
1.5	0.187	–87.2	5.670	82.6	0.102	66.6	0.366	–53.8	0.989	17.46
1.6	0.171	–90.7	5.347	79.9	0.108	66.3	0.352	–55.4	1.004	16.59
1.7	0.161	–95.5	5.076	77.5	0.114	66.1	0.340	–57.1	1.010	15.89
1.8	0.151	–101.3	4.833	75.3	0.120	65.9	0.327	–59.1	1.015	15.29
1.9	0.140	–107.7	4.620	72.7	0.127	65.3	0.317	–61.1	1.018	14.78
2.0	0.138	–113.1	4.433	70.3	0.134	64.9	0.305	–63.0	1.019	14.35
2.1	0.131	–120.9	4.243	68.0	0.140	64.7	0.295	–65.2	1.023	13.89
2.2	0.131	–126.3	4.092	65.8	0.147	64.4	0.286	–67.5	1.022	13.55
2.3	0.132	–131.6	3.917	63.8	0.153	64.0	0.278	–69.9	1.025	13.12
2.4	0.131	–135.9	3.777	61.6	0.160	63.4	0.271	–72.5	1.025	12.77
2.5	0.132	–141.8	3.661	59.6	0.166	62.9	0.263	–75.4	1.023	12.50
2.6	0.131	–147.5	3.526	57.2	0.173	62.1	0.257	–78.8	1.024	12.14
2.7	0.134	–152.8	3.430	55.3	0.180	61.5	0.251	–82.5	1.020	11.93
2.8	0.133	–156.8	3.326	53.3	0.188	60.8	0.245	–86.6	1.019	11.63
2.9	0.136	–162.9	3.218	51.5	0.194	60.0	0.238	–90.5	1.021	11.31
3.0	0.138	–169.9	3.095	49.3	0.201	59.0	0.229	–95.9	1.027	10.86
4.0	0.250	157.0	2.490	31.0	0.282	51.7	0.227	–141.7	0.962	9.46
5.0	0.406	141.0	2.032	11.8	0.371	37.4	0.317	171.9	0.889	7.38

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

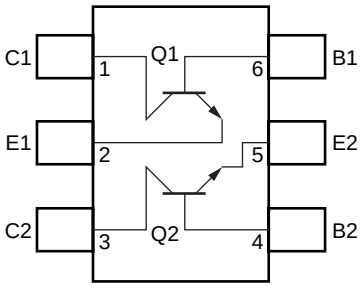
Frequency (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG (dB)
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		
0.1	0.590	–15.7	25.430	160.0	0.011	79.0	0.915	–12.3	0.360	33.83
0.2	0.536	–29.0	22.234	145.8	0.020	76.1	0.830	–22.5	0.445	30.39
0.3	0.469	–39.3	19.543	133.1	0.028	73.6	0.733	–29.8	0.569	28.45
0.4	0.403	–46.9	16.685	123.2	0.035	72.2	0.651	–34.6	0.673	26.77
0.5	0.350	–52.9	14.440	115.8	0.041	71.0	0.583	–37.6	0.760	25.48
0.6	0.305	–57.4	12.702	110.0	0.047	71.3	0.528	–39.6	0.822	24.29
0.7	0.266	–61.1	11.192	104.7	0.053	71.2	0.486	–40.9	0.875	23.21
0.8	0.235	–64.5	10.105	100.5	0.060	71.3	0.452	–42.0	0.910	22.29
0.9	0.214	–66.8	9.165	96.6	0.066	71.3	0.425	–42.9	0.939	21.45
1.0	0.186	–69.6	8.370	93.2	0.072	71.1	0.403	–43.9	0.962	20.66
1.1	0.173	–72.5	7.703	90.2	0.079	71.1	0.384	–44.7	0.976	19.92
1.2	0.154	–76.7	7.119	87.3	0.084	70.9	0.367	–45.8	0.992	19.26
1.3	0.145	–80.2	6.663	84.7	0.091	70.6	0.353	–47.0	0.999	18.65
1.4	0.130	–84.2	6.225	82.1	0.098	70.3	0.339	–48.5	1.008	17.50
1.5	0.120	–89.9	5.873	79.5	0.104	69.9	0.327	–50.0	1.013	16.82
1.6	0.110	–93.4	5.538	77.2	0.111	69.4	0.316	–51.6	1.018	16.15
1.7	0.103	–100.6	5.259	74.9	0.118	68.9	0.305	–53.3	1.018	15.66
1.8	0.098	–108.1	4.991	73.0	0.125	68.5	0.295	–55.2	1.021	15.13
1.9	0.088	–117.3	4.776	70.6	0.132	67.7	0.286	–57.3	1.021	14.70
2.0	0.090	–122.7	4.562	68.4	0.139	67.0	0.275	–59.2	1.021	14.26
2.1	0.089	–134.1	4.364	66.2	0.146	66.5	0.266	–61.5	1.021	13.86
2.2	0.095	–140.5	4.208	64.3	0.153	66.0	0.258	–63.8	1.018	13.57
2.3	0.098	–146.7	4.025	62.3	0.160	65.4	0.250	–66.4	1.020	13.15
2.4	0.101	–151.5	3.882	60.3	0.167	64.6	0.244	–69.1	1.018	12.83
2.5	0.103	–158.8	3.751	58.5	0.174	63.8	0.237	–72.0	1.018	12.52
2.6	0.105	–162.8	3.613	56.2	0.181	62.8	0.231	–75.6	1.018	12.18
2.7	0.112	–167.9	3.509	54.4	0.188	61.9	0.224	–79.6	1.015	11.96
2.8	0.114	–172.6	3.412	52.6	0.196	61.1	0.218	–84.2	1.013	11.71
2.9	0.121	–177.1	3.294	50.8	0.203	60.1	0.211	–88.3	1.014	11.38
3.0	0.126	175.3	3.170	48.7	0.210	59.0	0.202	–94.1	1.020	10.94
4.0	0.248	149.7	2.543	31.4	0.290	50.5	0.202	–143.6	0.967	9.43
5.0	0.403	136.9	2.078	12.9	0.375	36.1	0.291	169.3	0.907	7.44

PACKAGE DIMENSIONS

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



(Top View)



PIN CONNECTIONS

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

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