DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR

μPA842TC

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

FEATURES

- Flat-lead 6-pin thin-type ultra super minimold package
- 2 different built-in transistors (2SC5436, 2SC5600)

  Q1: Built-in low noise transistor

  NF = 1.3 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

BUILT-IN TRANSISTORS

	Q1	Q2
3-pin thin-type ultra super minimold part No.	2SC5436	2SC5600

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
μPA842TC	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
μPA842TC-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.

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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	200	mW
		230 in 2 elements		
Junction Temperature	T_j	150		°C
Storage Temperature	T_{stg}	−65 to +150		°C

Note Mounted on 1.08 $cm^2 \times$ 1.0 mm (t) glass epoxy 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	–	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	–	–	600	nA
Emitter Cut-off Current	I_{EBO}	V_{BE} = 1 V, I_C = 0 mA	–	–	600	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	3.5	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%

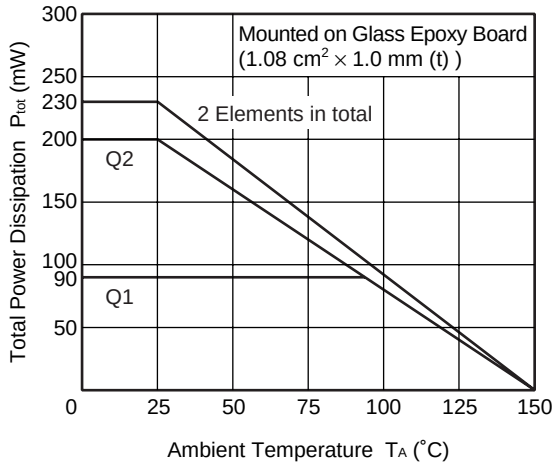
2. Collector to base capacitance measured using capacitance meter (self-balancing bridge method) when the emitter is connected to the guard pin

h_{FE} CLASSIFICATION

Rank	FB
Marking	2B
h_{FE} Value of Q1	70 to 140
h_{FE} Value of Q2	100 to 160

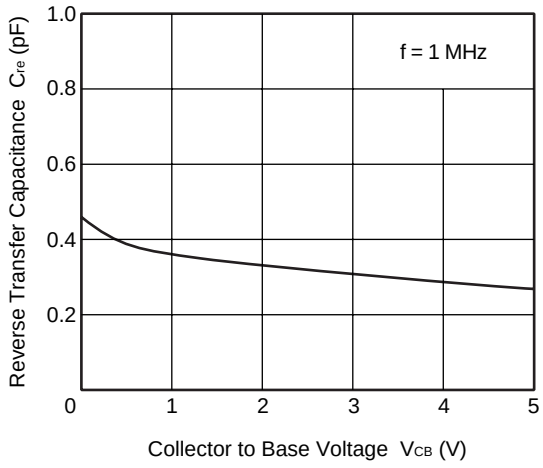
TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

TOTAL POWER DISSIPATION
vs. AMBIENT TEMPERATURE



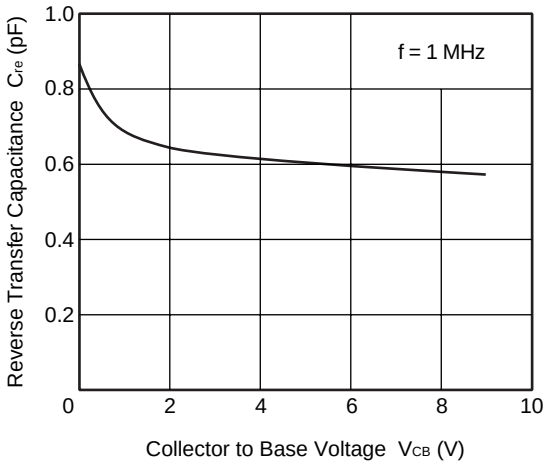
Q1

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



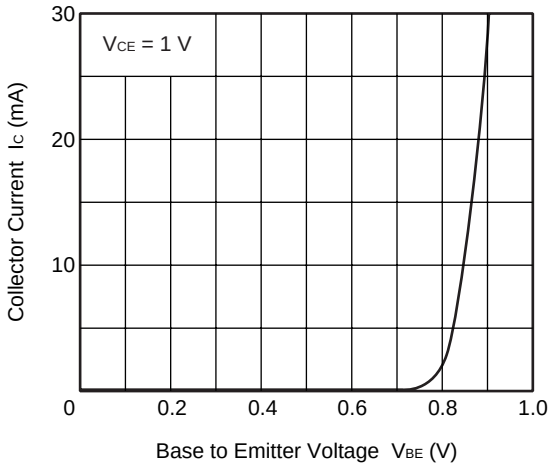
Q2

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



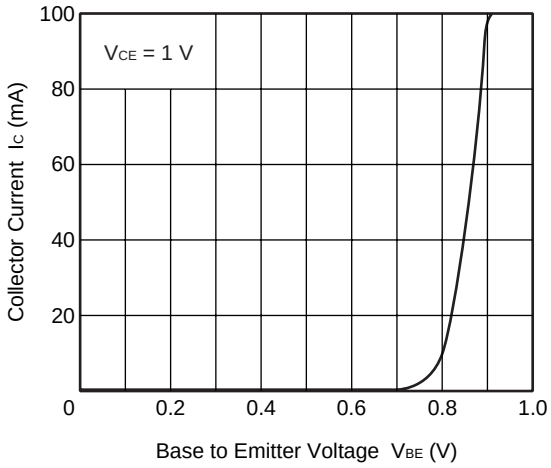
Q1

COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE

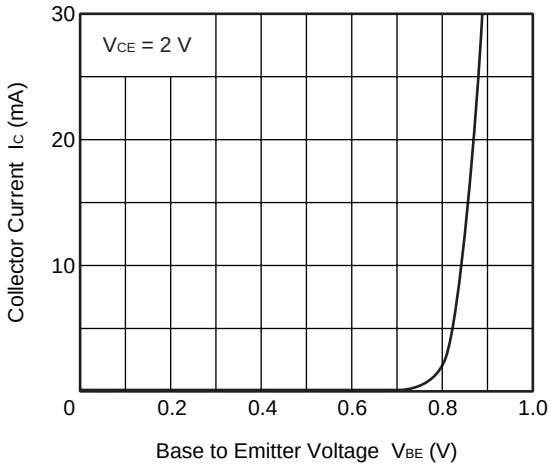


Q2

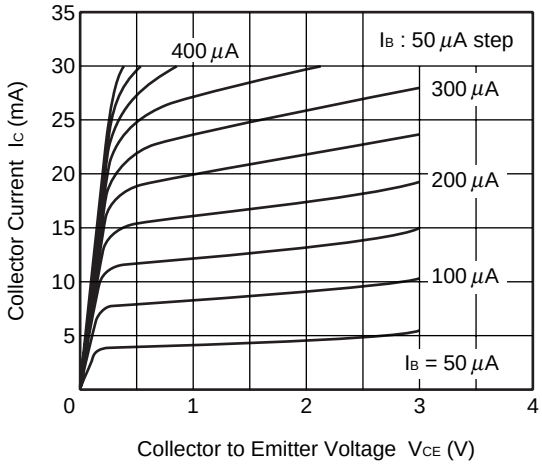
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



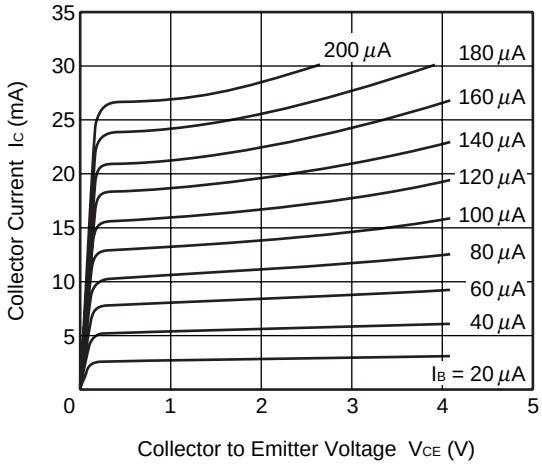
COLLECTOR CURRENT vs.
BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE

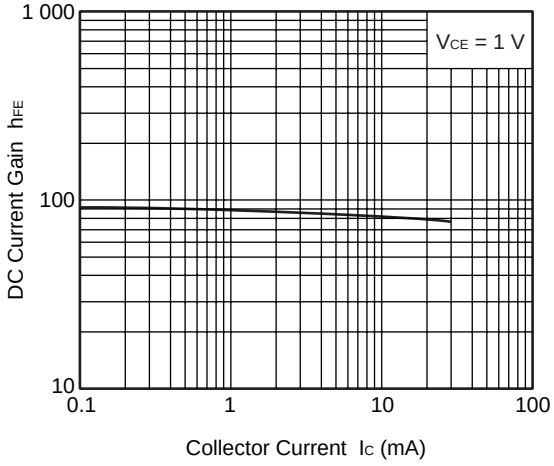


COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



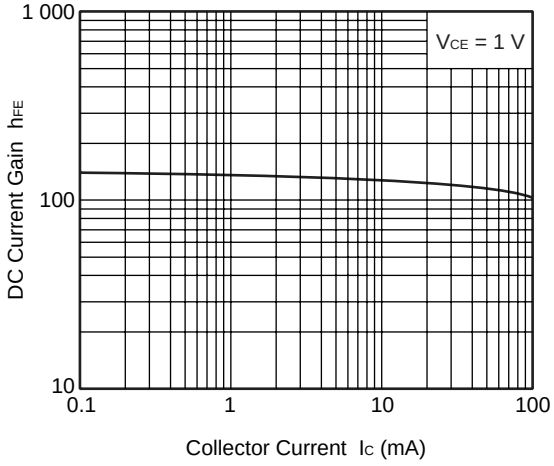
Q1

DC CURRENT GAIN vs.
COLLECTOR CURRENT

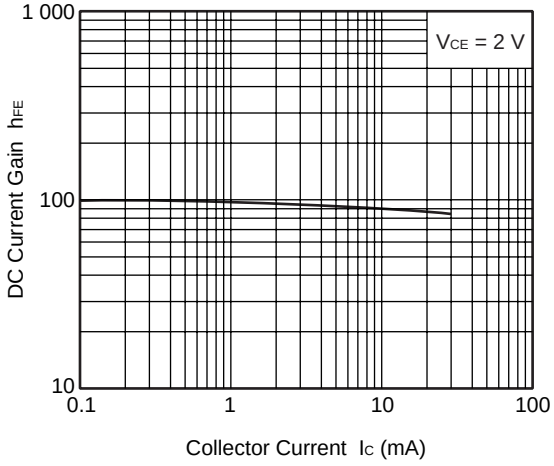


Q2

DC CURRENT GAIN vs.
COLLECTOR CURRENT

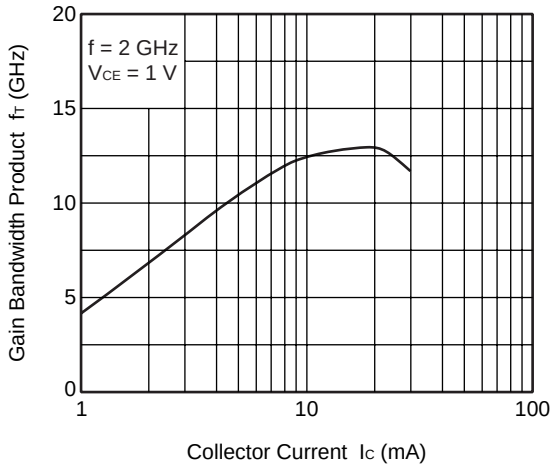


DC CURRENT GAIN vs.
COLLECTOR CURRENT



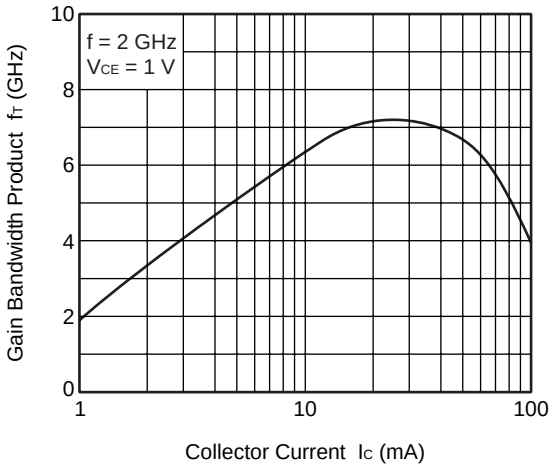
Q1

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT

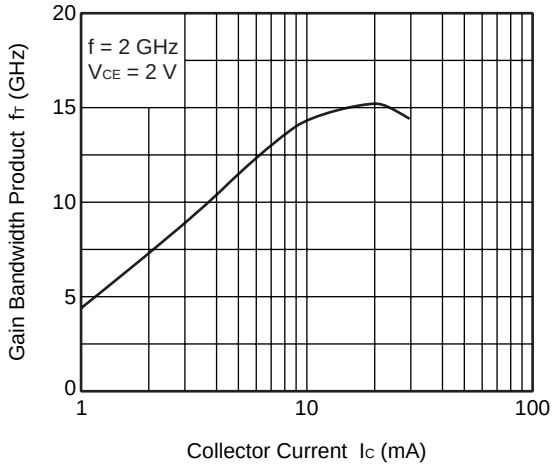


Q2

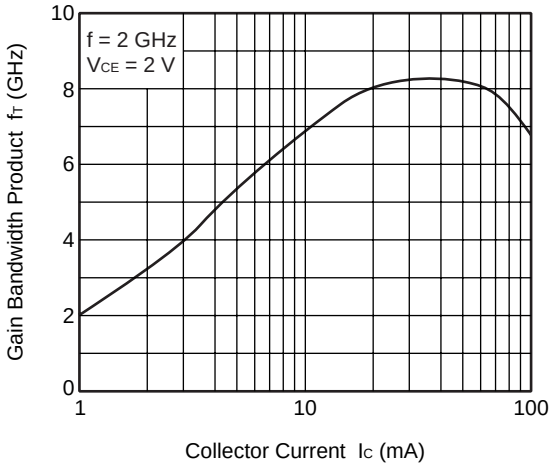
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT

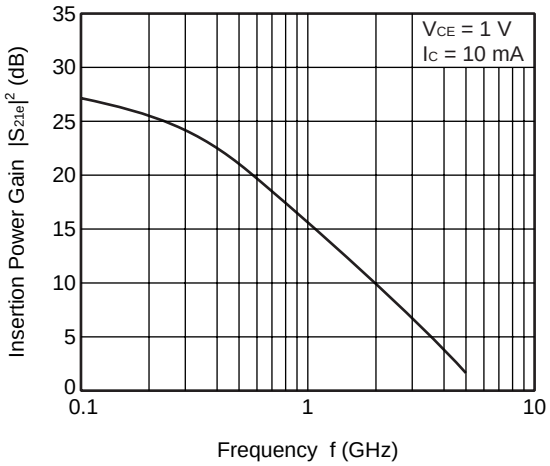


GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



Q1

INSERTION POWER GAIN vs. FREQUENCY



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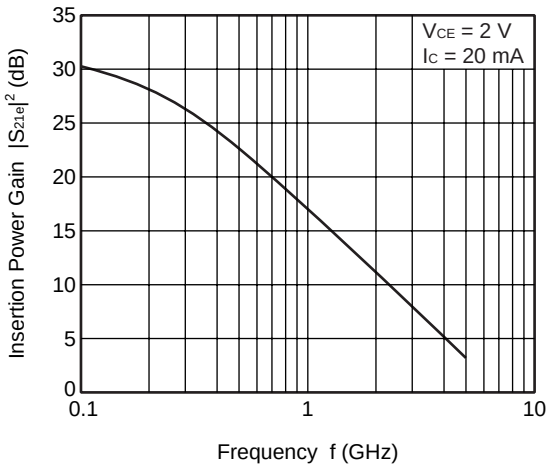
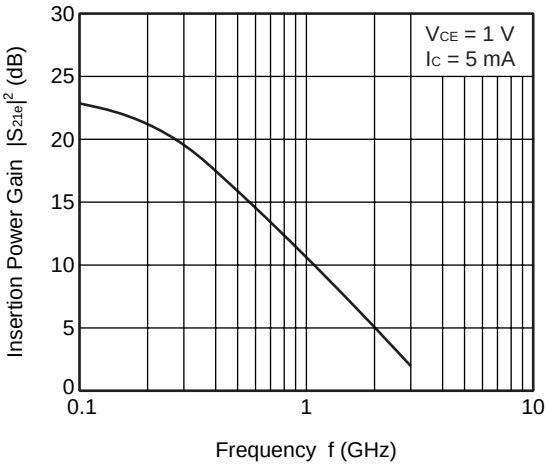


Q2

INSERTION POWER GAIN vs. FREQUENCY



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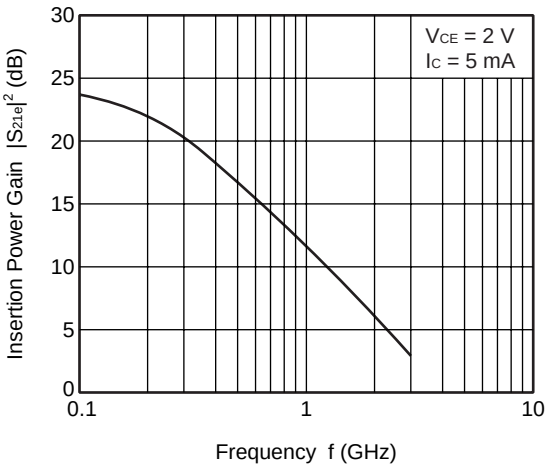
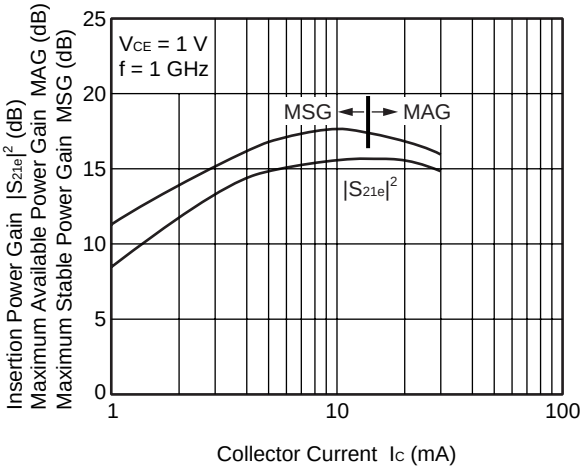


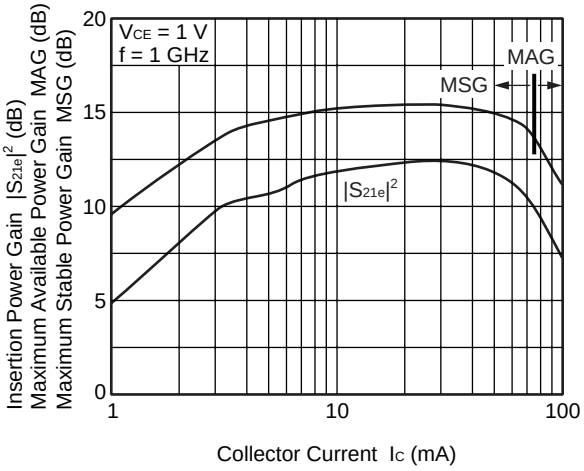
Q1

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



Q2

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



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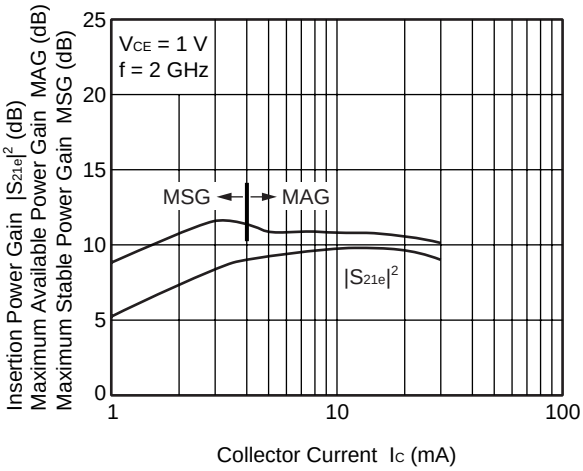

INSERTION POWER GAIN, MAG, MSG
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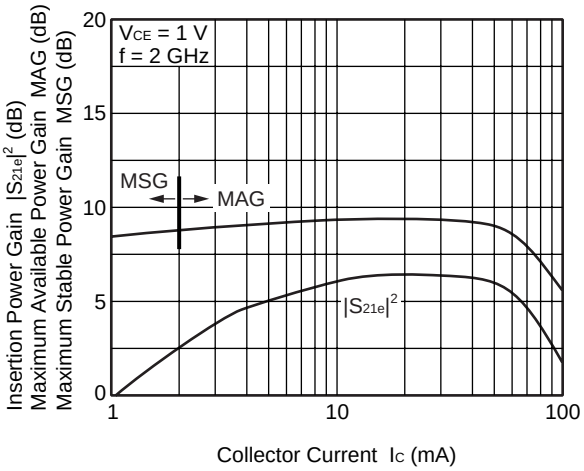

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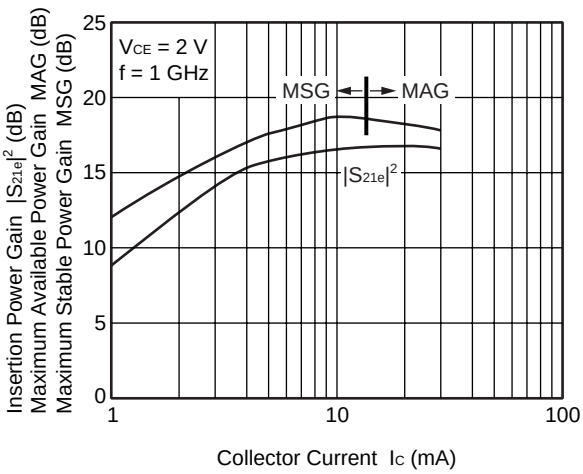

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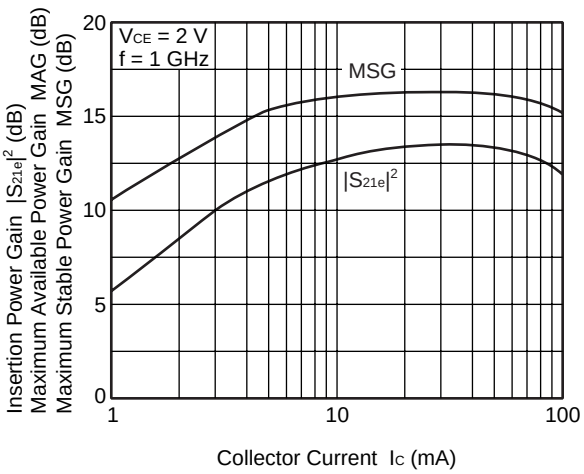

Q1

INSERTION POWER GAIN, MAG, MSG
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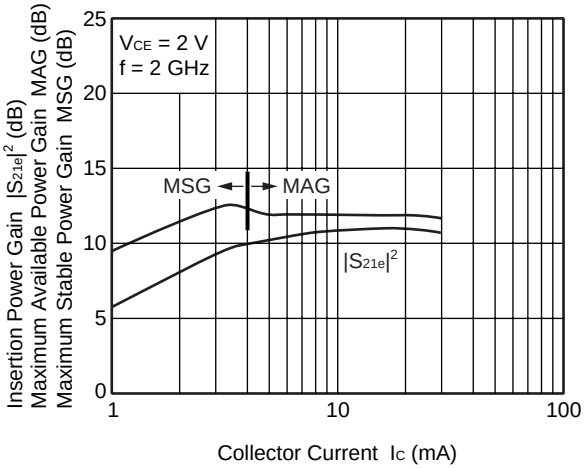
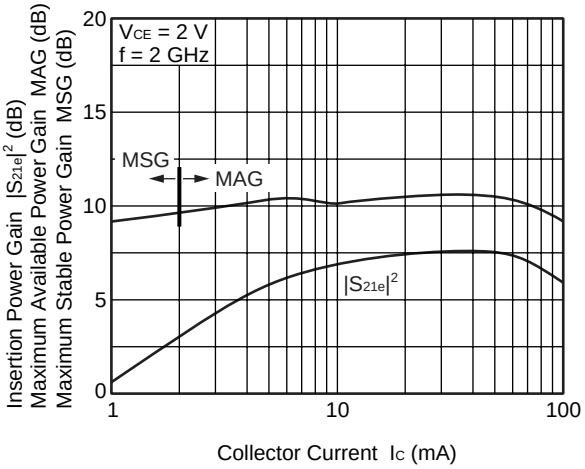


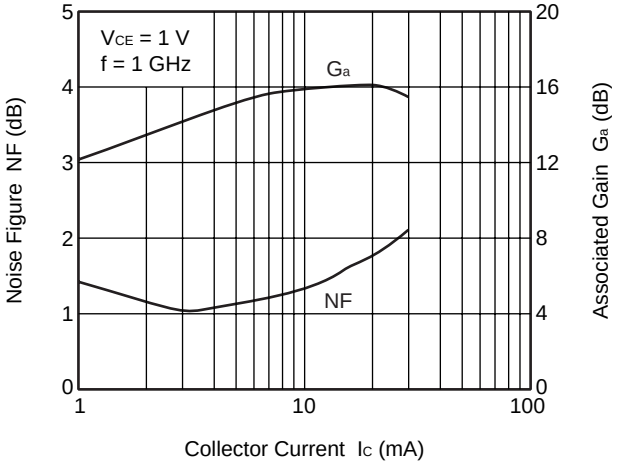
Q2

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



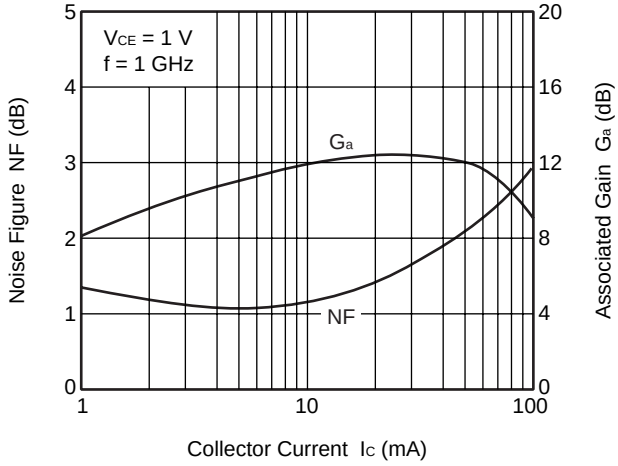
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

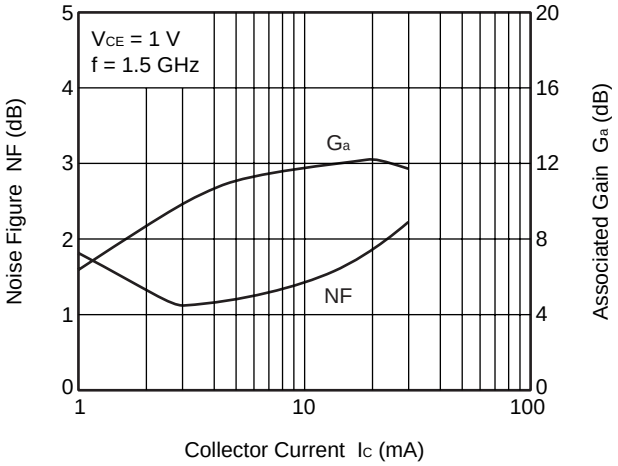


Q2

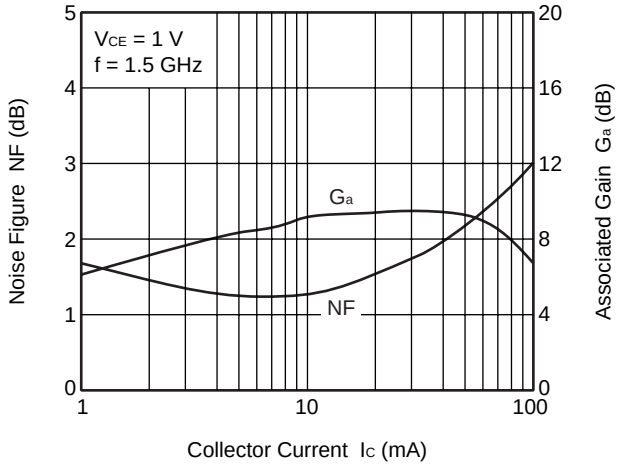
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



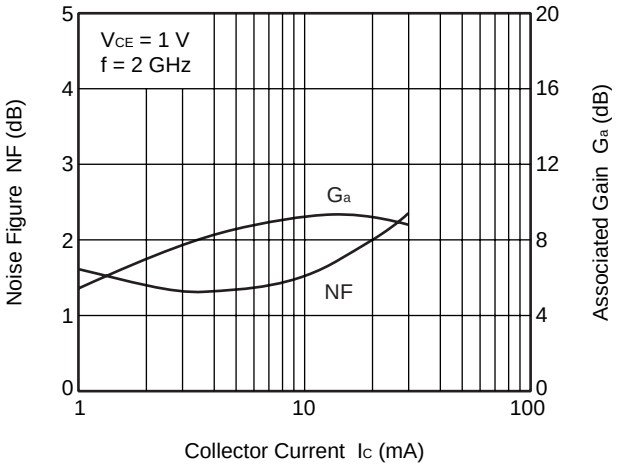
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



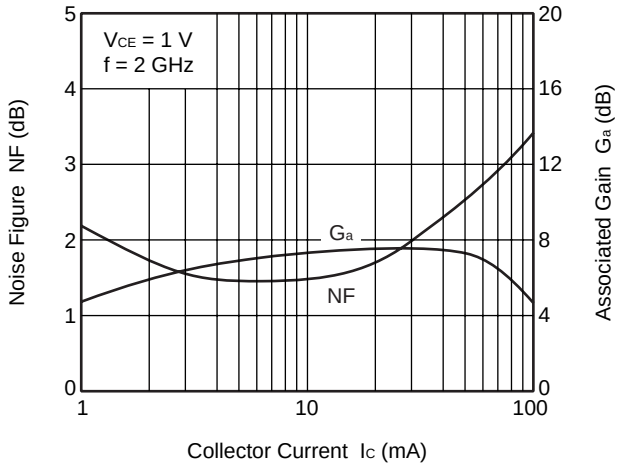
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

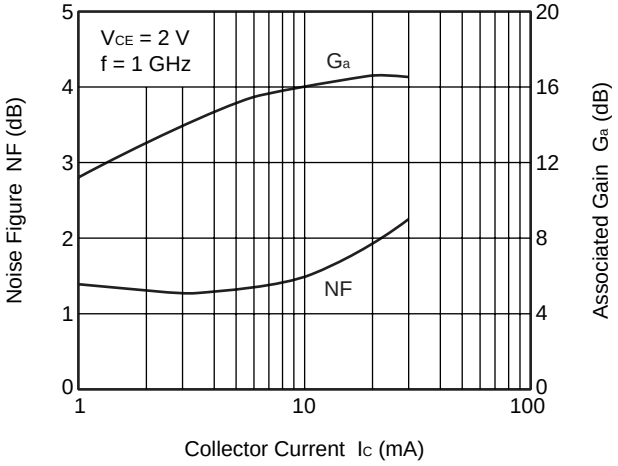


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



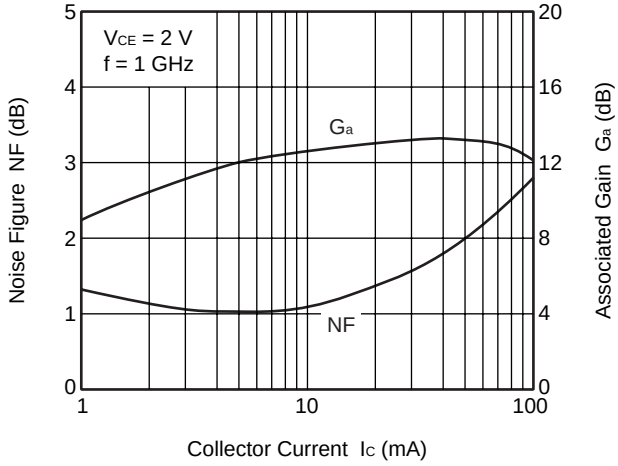
Q1

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT

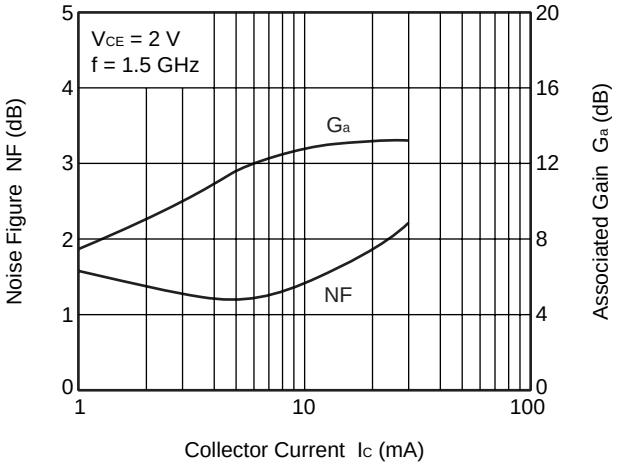


Q2

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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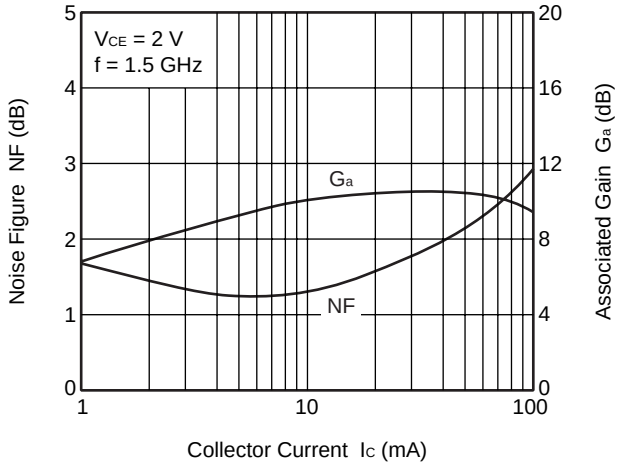
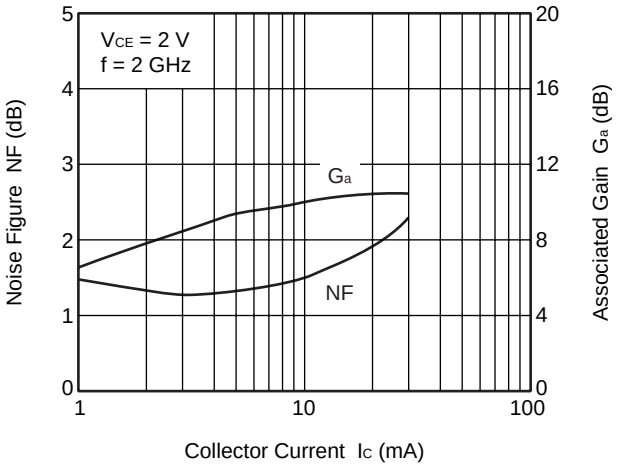
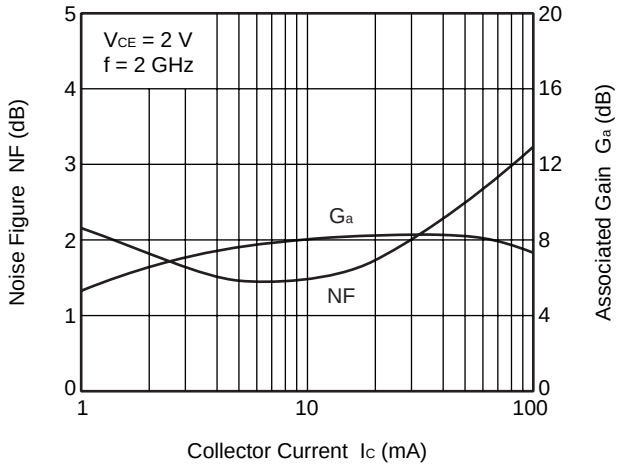


NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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	0.991	–19.4	3.621	166.8	0.048	87.1	0.999	–8.5	–0.113	18.76
0.2	0.984	–39.3	3.495	152.7	0.088	63.3	0.962	–15.4	0.147	15.98
0.3	0.946	–58.5	3.218	139.1	0.122	56.7	0.924	–22.5	0.113	14.22
0.4	0.896	–76.2	2.924	126.8	0.152	46.4	0.872	–28.3	0.171	12.84
0.5	0.851	–91.2	2.618	116.8	0.175	38.8	0.818	–33.2	0.208	11.75
0.6	0.816	–103.4	2.358	108.8	0.183	33.1	0.766	–37.2	0.241	11.09
0.7	0.790	–114.1	2.147	101.5	0.193	27.5	0.724	–40.7	0.288	10.45
0.8	0.787	–123.4	1.993	95.4	0.195	22.7	0.682	–43.6	0.316	10.10
0.9	0.774	–132.4	1.841	88.8	0.197	19.1	0.652	–46.3	0.356	9.69
1.0	0.771	–140.6	1.724	82.5	0.196	15.9	0.626	–48.9	0.387	9.45
1.1	0.760	–147.8	1.599	77.3	0.192	13.5	0.606	–51.4	0.431	9.21
1.2	0.751	–154.4	1.493	72.3	0.189	10.8	0.589	–53.9	0.484	8.98
1.3	0.744	–160.5	1.387	67.4	0.184	9.6	0.573	–56.6	0.542	8.78
1.4	0.738	–165.7	1.311	63.5	0.179	8.3	0.557	–59.7	0.598	8.65
1.5	0.737	–170.7	1.236	59.5	0.171	7.0	0.549	–62.8	0.657	8.59
1.6	0.737	–175.7	1.171	55.6	0.166	7.1	0.538	–65.6	0.713	8.50
1.7	0.741	179.8	1.123	52.3	0.159	6.3	0.531	–69.4	0.755	8.50
1.8	0.750	175.0	1.074	48.4	0.151	7.1	0.526	–72.6	0.785	8.51
1.9	0.750	170.2	1.021	44.5	0.144	8.9	0.522	–76.2	0.854	8.49
2.0	0.752	166.5	0.970	41.1	0.140	10.8	0.520	–80.3	0.918	8.42
2.1	0.752	162.8	0.920	38.0	0.135	13.5	0.513	–84.5	1.012	7.69
2.2	0.756	159.4	0.887	35.2	0.129	17.9	0.515	–88.9	1.064	6.84
2.3	0.757	156.5	0.849	32.6	0.127	21.9	0.511	–93.0	1.131	6.05
2.4	0.767	153.8	0.815	30.2	0.126	25.9	0.509	–98.0	1.141	5.82
2.5	0.772	151.1	0.790	28.1	0.130	31.0	0.505	–102.7	1.130	5.64
2.6	0.771	148.2	0.755	26.0	0.132	35.1	0.507	–107.2	1.193	4.92
2.7	0.782	145.1	0.728	23.8	0.137	39.7	0.507	–111.8	1.157	4.86
2.8	0.782	143.2	0.701	22.1	0.146	42.4	0.511	–116.4	1.139	4.54
2.9	0.781	140.7	0.673	20.0	0.157	46.5	0.511	–120.8	1.145	4.02
3.0	0.785	137.9	0.652	17.9	0.170	48.1	0.519	–125.6	1.079	4.13
4.0	0.824	119.0	0.517	9.4	0.299	46.5	0.598	–173.1	0.911	2.38
5.0	0.820	104.5	0.470	6.6	0.415	29.6	0.679	153.2	0.966	0.54

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	0.905	–33.5	10.568	158.4	0.046	75.5	0.939	–19.2	0.021	23.62
0.2	0.856	–64.3	9.334	138.9	0.072	54.9	0.817	–32.8	0.153	21.11
0.3	0.777	–88.9	7.733	123.8	0.095	45.6	0.697	–43.2	0.223	19.11
0.4	0.715	–108.7	6.456	112.2	0.108	39.4	0.592	–50.5	0.300	17.76
0.5	0.674	–123.2	5.436	103.7	0.118	35.9	0.512	–55.3	0.379	16.64
0.6	0.654	–134.4	4.702	97.4	0.119	33.8	0.447	–58.9	0.450	15.96
0.7	0.641	–143.6	4.126	91.9	0.124	32.5	0.400	–61.7	0.519	15.23
0.8	0.642	–150.9	3.714	87.1	0.128	31.5	0.363	–64.3	0.567	14.64
0.9	0.636	–158.3	3.350	82.2	0.130	31.9	0.331	–66.2	0.631	14.11
1.0	0.636	–164.4	3.059	77.6	0.133	31.7	0.309	–69.0	0.678	13.63
1.1	0.631	–169.8	2.808	73.8	0.135	32.6	0.292	–70.7	0.737	13.19
1.2	0.626	–174.9	2.601	70.1	0.136	32.8	0.277	–73.5	0.799	12.81
1.3	0.627	–179.2	2.395	66.3	0.142	33.7	0.264	–76.5	0.835	12.27
1.4	0.625	177.0	2.234	63.3	0.146	34.9	0.251	–79.8	0.883	11.86
1.5	0.628	173.1	2.100	60.2	0.146	35.8	0.242	–83.4	0.931	11.57
1.6	0.633	169.2	1.983	57.0	0.151	36.1	0.233	–87.3	0.953	11.19
1.7	0.638	165.9	1.883	54.5	0.154	36.4	0.227	–91.5	0.977	10.87
1.8	0.647	162.2	1.790	51.2	0.156	37.9	0.221	–95.2	0.994	10.58
1.9	0.651	158.5	1.696	48.4	0.163	39.2	0.216	–99.6	1.011	9.55
2.0	0.657	155.7	1.611	45.2	0.169	39.7	0.212	–104.5	1.017	9.00
2.1	0.659	152.9	1.531	42.6	0.173	39.9	0.210	–110.1	1.045	8.16
2.2	0.663	150.6	1.464	40.1	0.179	40.9	0.212	–115.0	1.054	7.71
2.3	0.669	148.4	1.399	37.7	0.186	41.8	0.209	–119.4	1.058	7.29
2.4	0.678	146.3	1.353	35.6	0.192	42.4	0.213	–125.6	1.046	7.17
2.5	0.682	144.1	1.307	33.2	0.200	42.5	0.215	–130.9	1.038	6.95
2.6	0.684	142.1	1.250	31.1	0.204	42.8	0.220	–135.4	1.060	6.37
2.7	0.695	139.7	1.209	28.7	0.212	43.4	0.223	–140.7	1.041	6.32
2.8	0.695	138.2	1.161	26.7	0.219	42.9	0.232	–144.9	1.051	5.87
2.9	0.696	136.1	1.126	24.4	0.229	43.4	0.237	–149.6	1.047	5.59
3.0	0.704	133.7	1.097	22.1	0.238	43.2	0.250	–153.8	1.022	5.73
4.0	0.762	118.6	0.845	6.2	0.317	37.7	0.383	168.8	0.932	4.25
5.0	0.787	105.6	0.673	–3.7	0.404	25.2	0.507	145.0	0.918	2.22

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	0.857	–40.6	14.145	154.1	0.043	71.9	0.902	–24.7	0.065	25.14
0.2	0.790	–76.0	11.832	132.6	0.065	51.7	0.735	–41.3	0.194	22.59
0.3	0.706	–102.1	9.354	117.7	0.082	44.1	0.597	–52.2	0.289	20.60
0.4	0.656	–121.4	7.570	107.1	0.091	39.6	0.488	–59.9	0.388	19.19
0.5	0.624	–134.9	6.276	99.4	0.099	38.4	0.411	–64.4	0.482	18.02
0.6	0.612	–144.9	5.368	93.7	0.103	38.2	0.352	–68.6	0.563	17.17
0.7	0.605	–153.2	4.679	88.8	0.111	37.9	0.308	–71.1	0.629	16.27
0.8	0.607	–159.8	4.194	84.5	0.113	37.9	0.277	–74.4	0.685	15.70
0.9	0.604	–166.3	3.768	80.0	0.119	39.0	0.250	–76.9	0.737	15.00
1.0	0.608	–171.8	3.427	75.9	0.123	39.4	0.229	–80.0	0.780	14.45
1.1	0.602	–176.4	3.125	72.3	0.128	40.5	0.213	–81.9	0.834	13.87
1.2	0.603	179.2	2.887	68.9	0.133	40.8	0.202	–85.8	0.872	13.38
1.3	0.599	175.1	2.656	65.5	0.139	41.9	0.190	–89.9	0.917	12.83
1.4	0.603	171.6	2.477	62.7	0.145	42.1	0.179	–93.9	0.940	12.31
1.5	0.607	168.5	2.321	59.8	0.150	42.4	0.172	–99.2	0.968	11.91
1.6	0.614	164.6	2.192	57.0	0.157	42.9	0.164	–104.1	0.974	11.44
1.7	0.619	161.4	2.080	54.4	0.163	42.5	0.160	–109.2	0.986	11.06
1.8	0.628	158.0	1.973	51.4	0.167	43.5	0.156	–114.1	1.001	10.55
1.9	0.629	154.6	1.870	48.5	0.174	44.3	0.155	–120.5	1.020	9.45
2.0	0.637	152.1	1.777	45.7	0.181	43.6	0.154	–125.6	1.018	9.10
2.1	0.641	149.4	1.682	43.3	0.188	43.8	0.155	–132.6	1.036	8.37
2.2	0.646	147.7	1.609	40.8	0.193	43.7	0.161	–137.6	1.038	8.00
2.3	0.650	145.1	1.535	38.5	0.200	43.7	0.160	–142.9	1.054	7.44
2.4	0.657	143.2	1.480	36.3	0.207	43.7	0.167	–148.9	1.046	7.23
2.5	0.666	141.1	1.427	34.2	0.215	43.3	0.170	–154.2	1.035	7.07
2.6	0.662	138.8	1.363	32.2	0.220	43.6	0.178	–158.1	1.069	6.32
2.7	0.669	137.2	1.317	30.3	0.226	44.0	0.183	–162.8	1.066	6.07
2.8	0.672	136.3	1.279	28.5	0.236	43.3	0.194	–165.2	1.048	5.99
2.9	0.675	134.2	1.242	26.1	0.247	43.4	0.204	–169.8	1.042	5.77
3.0	0.685	132.1	1.213	23.8	0.255	42.5	0.217	–173.0	1.017	5.98
4.0	0.749	117.2	0.930	6.9	0.322	35.2	0.351	156.9	0.954	4.61
5.0	0.779	105.0	0.744	–3.7	0.400	23.3	0.468	138.0	0.929	2.70

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	0.793	–52.5	18.676	148.3	0.036	75.5	0.849	–32.7	–0.011	27.17
0.2	0.705	–91.2	14.443	125.2	0.055	47.4	0.631	–51.5	0.271	24.19
0.3	0.632	–116.9	10.828	111.4	0.068	44.5	0.490	–63.1	0.395	22.04
0.4	0.601	–134.5	8.561	101.8	0.078	42.2	0.386	–71.2	0.513	20.42
0.5	0.581	–146.5	6.991	95.3	0.085	43.9	0.319	–76.8	0.612	19.13
0.6	0.576	–155.0	5.919	90.4	0.090	44.9	0.268	–81.6	0.699	18.19
0.7	0.573	–162.1	5.127	86.0	0.098	44.8	0.232	–85.3	0.757	17.18
0.8	0.576	–167.8	4.573	82.0	0.104	45.6	0.206	–89.8	0.804	16.45
0.9	0.578	–173.2	4.096	78.0	0.112	46.9	0.183	–94.2	0.842	15.64
1.0	0.584	–177.7	3.709	74.4	0.118	47.6	0.169	–98.9	0.871	14.96
1.1	0.579	178.1	3.394	71.0	0.126	48.5	0.156	–102.0	0.907	14.30
1.2	0.579	174.0	3.123	68.0	0.132	48.8	0.147	–107.7	0.938	13.73
1.3	0.581	170.8	2.868	64.9	0.142	49.4	0.143	–113.0	0.956	13.06
1.4	0.581	167.7	2.675	62.4	0.150	49.2	0.135	–118.4	0.974	12.51
1.5	0.588	164.9	2.510	59.8	0.154	48.8	0.134	–125.1	0.995	12.11
1.6	0.593	161.4	2.353	57.0	0.165	49.0	0.131	–131.4	0.995	11.53
1.7	0.600	158.6	2.240	54.6	0.171	48.2	0.135	–137.9	1.003	10.85
1.8	0.609	155.5	2.125	51.7	0.177	48.7	0.134	–143.8	1.009	10.23
1.9	0.613	152.5	2.012	49.1	0.186	48.3	0.136	–149.7	1.012	9.68
2.0	0.621	150.3	1.915	46.4	0.193	47.6	0.139	–154.8	1.011	9.33
2.1	0.624	147.8	1.810	44.2	0.200	46.8	0.147	–161.6	1.029	8.51
2.2	0.631	146.1	1.729	41.9	0.208	47.1	0.155	–165.1	1.026	8.20
2.3	0.635	143.8	1.648	39.6	0.216	46.5	0.157	–169.7	1.034	7.70
2.4	0.642	142.4	1.591	37.6	0.224	45.8	0.170	–174.5	1.026	7.53
2.5	0.650	140.5	1.540	35.6	0.233	45.4	0.175	–178.7	1.015	7.46
2.6	0.651	138.4	1.476	33.5	0.237	44.8	0.185	178.9	1.032	6.85
2.7	0.664	136.6	1.422	31.2	0.244	44.2	0.193	174.3	1.022	6.74
2.8	0.662	135.3	1.368	29.3	0.252	43.8	0.202	172.7	1.030	6.29
2.9	0.663	133.1	1.327	27.2	0.263	43.4	0.212	169.6	1.027	6.02
3.0	0.671	131.1	1.297	25.1	0.270	42.4	0.222	167.6	1.014	6.08
4.0	0.733	117.7	1.008	8.8	0.335	34.3	0.353	146.8	0.962	4.79
5.0	0.768	105.6	0.811	–2.8	0.404	22.0	0.456	132.1	0.934	3.03

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	0.732	–63.5	22.710	143.1	0.039	53.8	0.785	–39.4	0.253	27.70
0.2	0.643	–104.7	16.341	119.4	0.049	45.4	0.550	–60.5	0.351	25.20
0.3	0.586	–128.8	11.832	106.8	0.057	45.6	0.413	–72.6	0.500	23.14
0.4	0.571	–144.3	9.170	98.5	0.067	45.5	0.319	–81.7	0.618	21.33
0.5	0.557	–155.0	7.454	92.6	0.076	48.1	0.261	–88.2	0.716	19.89
0.6	0.558	–162.1	6.290	88.1	0.083	50.2	0.219	–94.3	0.789	18.80
0.7	0.557	–168.5	5.434	84.0	0.093	50.7	0.189	–99.9	0.834	17.67
0.8	0.564	–173.4	4.821	80.5	0.100	52.0	0.168	–106.1	0.870	16.83
0.9	0.565	–178.1	4.311	76.8	0.109	52.4	0.151	–111.7	0.897	15.96
1.0	0.570	177.9	3.906	73.2	0.118	52.9	0.142	–118.2	0.914	15.19
1.1	0.566	174.0	3.558	70.2	0.126	53.6	0.132	–122.8	0.948	14.52
1.2	0.568	170.6	3.282	67.4	0.135	53.2	0.129	–130.1	0.962	13.86
1.3	0.568	167.6	3.008	64.4	0.144	53.4	0.127	–136.0	0.980	13.19
1.4	0.570	164.7	2.811	62.0	0.154	53.2	0.125	–142.4	0.987	12.61
1.5	0.579	162.0	2.626	59.5	0.160	53.1	0.128	–148.7	0.999	12.14
1.6	0.584	158.9	2.467	56.9	0.170	52.0	0.132	–154.8	0.999	11.61
1.7	0.592	156.1	2.335	54.6	0.177	51.2	0.138	–160.0	1.006	10.74
1.8	0.600	153.5	2.219	51.7	0.184	51.1	0.141	–165.6	1.009	10.24
1.9	0.604	150.5	2.103	49.4	0.194	50.9	0.146	–171.0	1.010	9.73
2.0	0.611	148.4	1.992	46.7	0.202	49.7	0.154	–174.7	1.013	9.25
2.1	0.616	146.2	1.892	44.6	0.209	48.4	0.163	179.9	1.024	8.63
2.2	0.623	144.4	1.804	42.3	0.218	48.5	0.171	177.5	1.019	8.34
2.3	0.629	142.5	1.728	40.1	0.227	48.0	0.175	173.2	1.018	8.00
2.4	0.636	141.0	1.662	38.2	0.234	46.9	0.188	170.0	1.016	7.73
2.5	0.644	139.2	1.607	36.1	0.243	45.9	0.195	166.8	1.006	7.71
2.6	0.646	137.4	1.537	34.2	0.247	45.5	0.205	165.1	1.021	7.03
2.7	0.654	135.4	1.483	32.1	0.256	44.8	0.214	161.6	1.017	6.83
2.8	0.655	134.1	1.427	30.2	0.263	43.5	0.222	160.0	1.022	6.44
2.9	0.654	132.4	1.381	28.1	0.272	43.3	0.232	157.4	1.027	6.04
3.0	0.664	130.2	1.355	26.0	0.280	42.3	0.243	155.8	1.011	6.22
4.0	0.726	117.2	1.050	10.0	0.343	33.4	0.362	139.8	0.969	4.86
5.0	0.757	105.5	0.850	–1.8	0.406	20.9	0.453	127.1	0.949	3.21

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	0.581	–93.3	30.515	130.3	0.025	59.7	0.642	–56.5	0.285	30.92
0.2	0.551	–131.2	18.907	109.2	0.036	45.6	0.399	–80.4	0.551	27.19
0.3	0.535	–150.6	13.075	99.3	0.043	56.4	0.293	–95.0	0.745	24.85
0.4	0.535	–161.8	9.967	92.8	0.057	56.0	0.229	–107.7	0.814	22.41
0.5	0.535	–169.3	8.020	88.1	0.069	58.7	0.192	–117.4	0.869	20.66
0.6	0.537	–174.2	6.742	84.4	0.078	62.2	0.171	–127.6	0.920	19.39
0.7	0.540	–178.7	5.797	81.0	0.088	61.4	0.155	–135.9	0.944	18.20
0.8	0.549	177.6	5.132	77.8	0.099	61.0	0.148	–143.1	0.949	17.16
0.9	0.551	174.1	4.565	74.8	0.109	61.5	0.145	–151.1	0.967	16.24
1.0	0.558	170.8	4.128	71.5	0.119	61.1	0.145	–156.9	0.972	15.41
1.1	0.555	167.8	3.762	68.7	0.130	61.2	0.143	–161.8	0.983	14.62
1.2	0.557	165.0	3.470	66.2	0.139	60.0	0.148	–167.5	0.991	13.97
1.3	0.559	162.3	3.178	63.4	0.151	59.8	0.152	–171.6	0.997	13.24
1.4	0.563	160.1	2.966	61.4	0.162	58.2	0.157	–176.9	0.997	12.63
1.5	0.568	157.5	2.769	58.8	0.170	57.5	0.164	179.8	1.005	11.67
1.6	0.576	154.9	2.607	56.5	0.182	56.7	0.172	176.0	1.000	11.56
1.7	0.583	152.4	2.461	54.3	0.188	54.7	0.180	172.5	1.006	10.69
1.8	0.591	150.1	2.329	51.5	0.197	54.5	0.187	168.9	1.006	10.26
1.9	0.598	147.3	2.213	49.3	0.209	53.3	0.195	166.1	1.000	10.19
2.0	0.604	145.4	2.097	46.8	0.216	52.1	0.203	163.3	1.005	9.44
2.1	0.609	143.4	1.983	44.9	0.223	50.9	0.215	160.1	1.017	8.70
2.2	0.617	142.1	1.894	42.8	0.232	50.2	0.225	158.9	1.013	8.44
2.3	0.620	140.3	1.806	40.7	0.241	49.1	0.231	155.3	1.017	7.96
2.4	0.629	138.9	1.745	38.7	0.249	47.7	0.242	153.1	1.010	7.84
2.5	0.638	137.2	1.683	36.9	0.259	47.1	0.249	150.8	1.001	7.92
2.6	0.638	135.5	1.610	35.0	0.265	46.1	0.258	149.4	1.012	7.17
2.7	0.649	133.8	1.552	32.8	0.271	45.0	0.267	146.8	1.009	7.00
2.8	0.649	132.5	1.493	31.0	0.278	43.8	0.274	145.6	1.015	6.55
2.9	0.648	130.5	1.450	29.1	0.289	43.4	0.284	143.9	1.017	6.20
3.0	0.660	128.8	1.417	27.1	0.295	42.0	0.293	142.7	1.005	6.39
4.0	0.720	116.3	1.102	11.5	0.354	31.9	0.400	130.1	0.979	4.93
5.0	0.753	105.2	0.896	–0.1	0.411	19.3	0.470	119.4	0.962	3.39

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	0.984	–19.1	3.923	167.5	0.040	78.7	0.998	–7.6	0.028	19.96
0.2	0.989	–38.3	3.801	153.9	0.074	65.8	0.969	–13.9	0.110	17.10
0.3	0.942	–56.7	3.506	140.8	0.103	58.0	0.934	–20.3	0.113	15.32
0.4	0.898	–74.0	3.202	128.8	0.132	48.9	0.884	–25.7	0.160	13.84
0.5	0.853	–88.8	2.883	119.0	0.152	40.7	0.835	–30.3	0.204	12.78
0.6	0.816	–101.2	2.597	111.1	0.159	35.2	0.785	–33.9	0.235	12.12
0.7	0.791	–111.8	2.363	104.4	0.168	30.0	0.746	–37.1	0.272	11.49
0.8	0.781	–121.2	2.199	98.2	0.170	25.5	0.706	–39.8	0.308	11.11
0.9	0.768	–130.3	2.033	91.9	0.173	22.0	0.675	–42.1	0.348	10.71
1.0	0.766	–138.7	1.903	85.9	0.172	19.0	0.649	–44.4	0.376	10.44
1.1	0.754	–145.9	1.762	80.6	0.168	16.9	0.629	–46.6	0.427	10.21
1.2	0.745	–152.8	1.650	75.8	0.165	14.7	0.611	–48.8	0.475	9.99
1.3	0.735	–158.9	1.534	71.1	0.162	13.5	0.595	–51.2	0.540	9.77
1.4	0.727	–164.2	1.446	67.2	0.157	12.5	0.581	–53.9	0.602	9.63
1.5	0.727	–169.4	1.367	63.3	0.151	11.7	0.571	–56.7	0.656	9.56
1.6	0.729	–174.5	1.294	59.5	0.147	11.8	0.559	–59.2	0.710	9.45
1.7	0.731	–179.0	1.240	56.2	0.142	11.3	0.553	–62.4	0.754	9.42
1.8	0.739	176.0	1.184	52.1	0.135	13.7	0.547	–65.1	0.792	9.44
1.9	0.737	171.3	1.126	48.6	0.131	15.4	0.541	–68.4	0.858	9.34
2.0	0.743	167.4	1.072	45.0	0.127	18.0	0.537	–72.2	0.899	9.25
2.1	0.742	163.5	1.019	42.1	0.123	20.1	0.529	–75.8	0.998	9.18
2.2	0.746	160.3	0.977	39.0	0.120	25.3	0.529	–80.0	1.043	7.85
2.3	0.745	157.1	0.937	36.7	0.121	29.3	0.527	–83.5	1.085	7.11
2.4	0.754	154.5	0.903	34.3	0.121	33.6	0.520	–88.2	1.105	6.77
2.5	0.758	151.6	0.873	32.0	0.125	38.1	0.516	–92.4	1.105	6.48
2.6	0.758	148.7	0.837	29.7	0.128	42.5	0.514	–96.8	1.150	5.80
2.7	0.768	145.7	0.806	27.7	0.134	46.2	0.513	–101.2	1.106	5.80
2.8	0.769	143.8	0.777	25.6	0.143	48.5	0.515	–105.4	1.084	5.58
2.9	0.765	141.3	0.747	23.6	0.156	51.5	0.513	–109.5	1.086	5.02
3.0	0.774	138.4	0.725	21.3	0.168	52.9	0.518	–114.4	1.010	5.73
4.0	0.813	119.4	0.569	10.4	0.297	50.4	0.576	–162.6	0.869	2.83
5.0	0.816	105.0	0.498	6.5	0.419	33.1	0.654	161.3	0.927	0.75

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	0.939	–28.4	9.630	161.3	0.036	84.0	0.964	–14.7	–0.098	24.25
0.2	0.887	–55.9	8.779	143.3	0.066	56.2	0.866	–26.0	0.184	21.23
0.3	0.805	–79.1	7.497	128.6	0.086	49.6	0.767	–35.0	0.200	19.40
0.4	0.742	–98.6	6.405	116.9	0.100	42.7	0.673	–41.2	0.268	18.05
0.5	0.693	–113.8	5.459	108.0	0.111	38.7	0.595	–45.4	0.339	16.92
0.6	0.667	–125.5	4.762	101.3	0.114	35.8	0.532	–48.4	0.406	16.22
0.7	0.647	–135.2	4.207	95.5	0.120	33.2	0.484	–50.7	0.475	15.46
0.8	0.644	–143.4	3.803	90.6	0.120	32.3	0.445	–52.6	0.527	15.02
0.9	0.635	–151.3	3.446	85.7	0.124	31.8	0.415	–54.0	0.584	14.45
1.0	0.635	–158.0	3.157	80.8	0.126	31.6	0.390	–55.7	0.629	14.00
1.1	0.628	–163.9	2.903	76.6	0.126	32.3	0.373	–57.2	0.694	13.64
1.2	0.624	–169.4	2.694	72.9	0.128	32.3	0.355	–59.3	0.747	13.23
1.3	0.620	–174.1	2.470	69.4	0.130	33.5	0.341	–61.4	0.810	12.79
1.4	0.618	–178.2	2.313	66.2	0.133	34.3	0.327	–63.8	0.855	12.39
1.5	0.620	177.4	2.176	62.9	0.134	35.0	0.316	–66.6	0.904	12.10
1.6	0.624	173.3	2.053	59.8	0.138	36.7	0.304	–69.0	0.928	11.71
1.7	0.629	169.5	1.954	57.1	0.140	36.7	0.296	–72.4	0.956	11.44
1.8	0.637	165.7	1.854	53.7	0.142	38.7	0.289	–75.2	0.984	11.17
1.9	0.639	162.0	1.761	50.7	0.148	40.5	0.281	–78.0	0.996	10.75
2.0	0.645	159.0	1.676	47.4	0.153	41.1	0.276	–82.4	1.006	9.93
2.1	0.647	155.7	1.589	45.0	0.157	41.9	0.265	–86.6	1.044	8.76
2.2	0.655	153.4	1.526	42.4	0.162	43.4	0.266	–90.9	1.035	8.58
2.3	0.656	150.7	1.458	39.9	0.168	44.4	0.262	–94.1	1.051	7.99
2.4	0.665	148.8	1.406	37.6	0.174	44.6	0.258	–100.1	1.044	7.79
2.5	0.672	146.4	1.359	35.4	0.182	45.7	0.255	–104.3	1.029	7.70
2.6	0.673	144.2	1.300	33.3	0.186	46.3	0.255	–108.9	1.054	7.02
2.7	0.685	142.0	1.256	30.8	0.194	47.0	0.253	–114.2	1.029	7.07
2.8	0.687	140.1	1.210	28.8	0.202	47.0	0.259	–118.6	1.027	6.79
2.9	0.684	137.8	1.165	26.5	0.212	47.5	0.259	–123.2	1.040	6.18
3.0	0.695	135.6	1.139	24.1	0.221	47.7	0.268	–128.1	1.000	7.00
4.0	0.755	119.7	0.873	7.3	0.307	42.7	0.369	–174.8	0.899	4.54
5.0	0.786	106.5	0.695	–3.1	0.403	29.5	0.492	156.0	0.872	2.37

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	0.851	–39.0	15.112	155.3	0.035	66.6	0.912	–21.9	0.135	26.34
0.2	0.782	–71.7	12.744	134.3	0.057	53.4	0.758	–36.6	0.218	23.50
0.3	0.693	–97.3	10.222	119.5	0.070	49.0	0.624	–46.3	0.290	21.65
0.4	0.638	–116.7	8.302	108.8	0.082	42.9	0.516	–52.4	0.405	20.03
0.5	0.601	–130.4	6.897	101.1	0.089	41.6	0.441	–56.1	0.499	18.89
0.6	0.587	–141.0	5.911	95.5	0.092	40.7	0.383	–58.9	0.581	18.08
0.7	0.576	–149.5	5.156	90.5	0.099	40.9	0.342	–60.5	0.649	17.19
0.8	0.577	–156.5	4.615	86.4	0.102	41.6	0.306	–62.2	0.706	16.56
0.9	0.573	–163.0	4.155	82.1	0.109	42.4	0.282	–63.9	0.752	15.83
1.0	0.576	–168.7	3.779	77.8	0.113	42.6	0.260	–65.5	0.796	15.26
1.1	0.571	–173.5	3.453	74.4	0.117	44.4	0.246	–66.9	0.845	14.70
1.2	0.570	–178.0	3.187	71.1	0.122	44.3	0.231	–69.3	0.883	14.16
1.3	0.569	177.9	2.929	67.8	0.129	45.1	0.218	–71.6	0.918	13.56
1.4	0.569	174.3	2.740	64.9	0.135	46.0	0.206	–74.6	0.949	13.09
1.5	0.575	170.6	2.566	62.2	0.139	46.6	0.197	–78.2	0.973	12.68
1.6	0.580	167.0	2.418	59.5	0.147	47.0	0.188	–81.7	0.977	12.16
1.7	0.585	163.7	2.295	56.9	0.151	46.2	0.181	–86.1	0.996	11.82
1.8	0.597	160.5	2.181	53.8	0.158	47.7	0.172	–89.9	0.991	11.41
1.9	0.600	157.0	2.065	51.2	0.165	48.0	0.165	–93.8	1.004	10.60
2.0	0.605	154.4	1.961	48.3	0.174	47.4	0.164	–99.0	1.001	10.36
2.1	0.609	151.8	1.860	46.0	0.177	47.6	0.155	–105.4	1.031	9.12
2.2	0.615	149.7	1.777	43.6	0.185	48.1	0.158	–110.6	1.026	8.84
2.3	0.621	147.8	1.702	41.3	0.192	47.9	0.154	–115.2	1.029	8.43
2.4	0.630	145.8	1.639	39.2	0.199	47.6	0.157	–122.8	1.022	8.25
2.5	0.636	143.7	1.586	37.0	0.208	47.8	0.155	–128.5	1.012	8.16
2.6	0.639	141.4	1.520	34.9	0.213	47.2	0.159	–133.1	1.025	7.57
2.7	0.650	139.5	1.463	32.8	0.220	47.0	0.160	–139.4	1.018	7.42
2.8	0.651	138.0	1.412	30.7	0.227	46.6	0.166	–143.8	1.022	7.04
2.9	0.650	136.1	1.363	28.5	0.238	46.8	0.171	–149.3	1.025	6.62
3.0	0.660	133.6	1.335	26.2	0.246	45.9	0.182	–153.2	0.999	7.35
4.0	0.727	119.4	1.027	9.1	0.319	39.2	0.305	168.2	0.930	5.08
5.0	0.766	106.9	0.821	–3.0	0.398	26.9	0.425	146.9	0.891	3.14

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	0.802	–45.9	18.711	151.1	0.032	69.2	0.878	–27.4	0.085	27.68
0.2	0.723	–81.9	15.009	129.1	0.051	50.4	0.681	–43.1	0.271	24.70
0.3	0.629	–107.3	11.524	114.8	0.061	48.0	0.546	–52.9	0.379	22.75
0.4	0.588	–126.5	9.192	104.9	0.072	44.9	0.436	–59.0	0.498	21.07
0.5	0.562	–139.3	7.548	97.9	0.080	44.8	0.368	–62.6	0.593	19.77
0.6	0.551	–148.8	6.424	92.8	0.083	46.6	0.313	–65.1	0.683	18.87
0.7	0.547	–156.7	5.569	88.2	0.091	45.3	0.275	–66.9	0.744	17.88
0.8	0.550	–162.5	4.976	84.5	0.097	47.0	0.247	–69.1	0.785	17.11
0.9	0.550	–168.4	4.460	80.4	0.104	47.8	0.223	–70.6	0.824	16.32
1.0	0.554	–173.6	4.045	76.6	0.110	48.7	0.203	–72.9	0.859	15.65
1.1	0.549	–178.1	3.698	73.3	0.117	50.0	0.191	–74.4	0.895	15.01
1.2	0.549	177.8	3.404	70.2	0.122	50.2	0.177	–77.8	0.930	14.45
1.3	0.548	174.2	3.128	67.1	0.131	50.5	0.169	–80.9	0.950	13.78
1.4	0.549	170.9	2.924	64.6	0.138	50.1	0.156	–84.2	0.970	13.26
1.5	0.556	167.6	2.740	62.0	0.144	50.9	0.148	–89.3	0.988	12.81
1.6	0.562	164.1	2.574	59.3	0.153	51.0	0.141	–94.4	0.989	12.26
1.7	0.567	161.3	2.441	56.7	0.158	50.3	0.136	–99.2	1.000	11.88
1.8	0.577	158.1	2.314	53.9	0.164	51.0	0.129	–104.2	1.007	10.98
1.9	0.582	154.9	2.194	51.2	0.174	50.7	0.125	–109.7	1.005	10.59
2.0	0.591	152.4	2.087	48.5	0.181	50.0	0.125	–115.5	1.001	10.44
2.1	0.595	150.2	1.973	46.4	0.188	49.5	0.121	–124.0	1.019	9.37
2.2	0.602	148.0	1.887	44.1	0.195	49.7	0.127	–130.2	1.019	9.02
2.3	0.606	146.0	1.804	41.9	0.202	49.2	0.123	–135.3	1.027	8.51
2.4	0.613	144.4	1.738	39.9	0.211	48.7	0.130	–143.2	1.017	8.36
2.5	0.621	142.3	1.682	37.7	0.219	48.2	0.132	–148.7	1.008	8.31
2.6	0.624	140.6	1.608	35.7	0.223	48.0	0.137	–153.3	1.023	7.65
2.7	0.636	138.5	1.550	33.5	0.231	47.4	0.142	–160.2	1.014	7.54
2.8	0.635	137.1	1.495	31.7	0.239	46.4	0.149	–163.6	1.020	7.11
2.9	0.637	135.1	1.446	29.3	0.249	46.5	0.158	–168.3	1.018	6.83
3.0	0.646	133.0	1.415	27.2	0.256	45.6	0.168	–171.3	1.001	7.21
4.0	0.714	119.1	1.091	10.4	0.325	37.7	0.296	158.1	0.947	5.26
5.0	0.753	106.9	0.872	–2.2	0.399	25.6	0.407	140.8	0.912	3.40

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

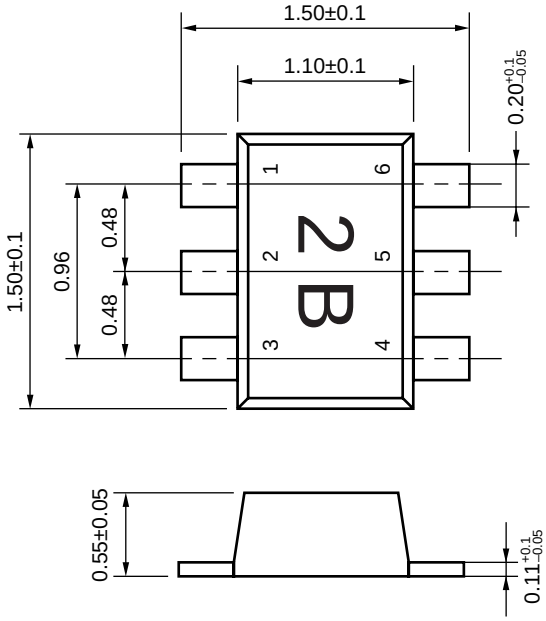
Frequency (GHz)	S_{11} MAG.	S_{11} ANG. (deg.)	S_{21} MAG.	S_{21} ANG. (deg.)	S_{12} MAG.	S_{12} ANG. (deg.)	S_{22} MAG.	S_{22} ANG. (deg.)	K	MAG/MSG (dB)
0.1	0.750	–56.5	23.514	146.0	0.027	64.8	0.823	–33.9	0.112	29.36
0.2	0.644	–95.7	17.490	122.6	0.045	47.2	0.593	–51.3	0.357	25.88
0.3	0.572	–120.7	12.917	109.5	0.054	46.3	0.456	–60.9	0.490	23.82
0.4	0.541	–137.5	10.084	100.7	0.063	48.6	0.356	–67.2	0.612	22.06
0.5	0.526	–149.2	8.204	94.5	0.073	49.9	0.292	–70.9	0.700	20.53
0.6	0.523	–157.4	6.928	89.9	0.077	52.7	0.245	–74.0	0.781	19.52
0.7	0.521	–163.9	5.995	85.9	0.086	52.5	0.212	–76.3	0.825	18.41
0.8	0.523	–169.3	5.321	82.3	0.093	53.4	0.187	–79.3	0.868	17.58
0.9	0.527	–174.6	4.765	78.7	0.102	54.0	0.166	–81.7	0.888	16.68
1.0	0.531	–178.7	4.312	75.1	0.108	54.9	0.153	–85.3	0.919	16.02
1.1	0.526	177.4	3.932	72.2	0.117	55.8	0.139	–87.4	0.942	15.26
1.2	0.528	173.5	3.628	69.5	0.125	55.4	0.128	–92.4	0.962	14.64
1.3	0.529	170.1	3.328	66.6	0.135	55.2	0.122	–96.6	0.972	13.92
1.4	0.534	167.5	3.108	63.9	0.143	55.3	0.112	–101.6	0.980	13.36
1.5	0.537	164.5	2.906	61.5	0.149	55.0	0.110	–108.4	0.998	12.89
1.6	0.543	161.3	2.723	58.8	0.160	54.0	0.107	–115.8	0.994	12.30
1.7	0.551	158.6	2.583	56.8	0.165	53.3	0.104	–122.9	1.004	11.55
1.8	0.562	155.9	2.448	54.1	0.172	53.6	0.101	–129.8	1.005	11.11
1.9	0.567	152.4	2.323	51.5	0.181	53.0	0.100	–136.5	1.008	10.54
2.0	0.574	150.6	2.204	48.8	0.190	51.8	0.104	–143.6	1.005	10.19
2.1	0.578	148.1	2.090	46.8	0.197	51.6	0.109	–152.9	1.021	9.39
2.2	0.586	146.6	1.996	44.7	0.205	51.1	0.117	–156.8	1.016	9.13
2.3	0.591	144.5	1.905	42.4	0.214	50.1	0.117	–163.6	1.017	8.70
2.4	0.600	142.7	1.836	40.4	0.222	49.4	0.126	–169.5	1.011	8.54
2.5	0.607	141.2	1.774	38.5	0.230	48.7	0.132	–174.4	1.005	8.45
2.6	0.610	139.5	1.698	36.6	0.236	48.2	0.141	–177.7	1.015	7.82
2.7	0.622	137.2	1.636	34.4	0.242	47.6	0.147	177.2	1.011	7.64
2.8	0.624	136.0	1.578	32.5	0.250	46.6	0.156	175.1	1.013	7.31
2.9	0.624	134.2	1.527	30.4	0.261	46.2	0.167	171.3	1.013	6.99
3.0	0.636	132.0	1.493	28.4	0.267	45.3	0.176	169.7	0.997	7.47
4.0	0.702	119.0	1.156	11.7	0.333	36.2	0.301	147.8	0.956	5.41
5.0	0.744	106.9	0.927	–0.8	0.400	24.1	0.401	134.1	0.927	3.64

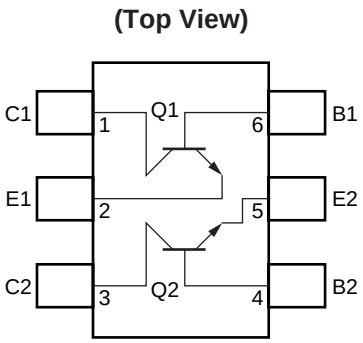
V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

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	0.576	–82.7	32.751	133.7	0.019	74.7	0.684	–47.8	0.229	32.37
0.2	0.516	–122.3	20.941	111.9	0.033	49.5	0.430	–67.0	0.558	27.98
0.3	0.491	–143.9	14.639	101.4	0.039	56.1	0.309	–77.0	0.743	25.75
0.4	0.490	–156.1	11.171	94.7	0.051	59.8	0.235	–85.3	0.819	23.37
0.5	0.484	–164.6	9.005	89.8	0.065	60.6	0.188	–90.6	0.859	21.41
0.6	0.489	–170.0	7.567	86.3	0.072	63.7	0.157	–97.0	0.914	20.24
0.7	0.489	–175.5	6.505	82.5	0.082	62.6	0.134	–102.3	0.936	18.99
0.8	0.496	–179.0	5.770	79.5	0.090	62.8	0.119	–108.6	0.957	18.08
0.9	0.499	176.8	5.143	76.4	0.102	63.4	0.107	–115.2	0.959	17.03
1.0	0.506	173.6	4.652	73.3	0.112	62.7	0.101	–122.0	0.962	16.18
1.1	0.504	170.4	4.245	70.5	0.121	62.9	0.094	–127.8	0.979	15.47
1.2	0.507	167.5	3.891	67.9	0.130	61.6	0.092	–135.7	0.987	14.76
1.3	0.510	164.8	3.578	65.4	0.141	61.2	0.093	–142.2	0.989	14.03
1.4	0.514	162.2	3.339	63.2	0.151	60.2	0.091	–150.6	0.993	13.44
1.5	0.521	160.0	3.125	61.0	0.159	59.8	0.097	–157.2	0.999	12.94
1.6	0.527	157.0	2.931	58.4	0.171	58.4	0.102	–163.1	0.994	12.35
1.7	0.534	154.7	2.767	56.5	0.177	57.0	0.110	–168.7	1.002	11.67
1.8	0.545	152.2	2.633	53.7	0.184	56.7	0.115	–174.5	1.000	11.46
1.9	0.548	149.4	2.488	51.5	0.195	56.0	0.120	–179.7	1.002	10.79
2.0	0.560	147.7	2.358	49.3	0.205	54.3	0.129	176.7	0.996	10.61
2.1	0.565	145.5	2.233	47.1	0.210	53.3	0.139	171.2	1.009	9.69
2.2	0.571	143.9	2.132	45.1	0.221	52.6	0.149	169.6	1.004	9.45
2.3	0.575	142.3	2.034	42.9	0.229	51.4	0.156	165.1	1.009	8.91
2.4	0.586	140.8	1.960	41.0	0.237	50.5	0.167	162.2	1.002	8.87
2.5	0.594	139.3	1.892	39.1	0.246	49.5	0.174	158.6	0.997	8.86
2.6	0.595	137.6	1.809	37.3	0.252	48.6	0.183	156.7	1.008	8.00
2.7	0.610	135.7	1.743	35.2	0.258	47.4	0.192	153.6	1.002	8.02
2.8	0.609	134.4	1.678	33.5	0.265	46.5	0.198	152.8	1.009	7.42
2.9	0.610	132.5	1.627	31.3	0.276	46.0	0.210	150.2	1.008	7.15
3.0	0.620	130.6	1.588	29.4	0.283	44.7	0.218	149.4	0.999	7.50
4.0	0.689	118.1	1.231	13.3	0.343	34.7	0.334	135.3	0.972	5.55
5.0	0.733	106.8	0.996	0.9	0.403	22.3	0.412	124.5	0.946	3.93

PACKAGE DIMENSIONS

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





PIN CONNECTIONS

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

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