NEC

NPN SILICON RF TRANSISTOR
2SC5655

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

FEATURES

- 1006 package employed ($1.0 \times 0.6 \times 0.5$ mm)
- NF = 1.5 dB TYP., $|S_{21e}|^2$ = 4.5 dB TYP. @ V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5655	50 pcs (Non reel)	• 8 mm wide paper carrier taping
2SC5655-T1	10 kpcs/reel	• Pin 3 (collector) face the perforation side of the tape

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

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	9	V
Collector to Emitter Voltage	V_{CEO}	5.5	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	100	mA
Total Power Dissipation	P_{tot} Note	150	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	−65 to +150	°C

Note Mounted on 1.08 $cm^2 \times 1.0$ mm (t) glass epoxy substrate

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

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ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I_{CBO}	V_{CB} = 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	80	–	160	–
RF Characteristics						
Gain Bandwidth Product	f_T	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	3.5	5.5	–	GHz
Insertion Power Gain	$\|S_{21e}\|^2$	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	3.5	4.5	–	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%

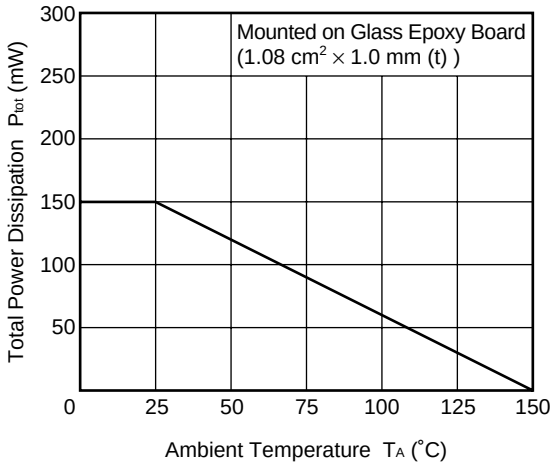
2. Collector to base capacitance measured using capacitance meter (self-balancing bridge method) when the emitter is connected to the guard pin

h_{FE} CLASSIFICATION

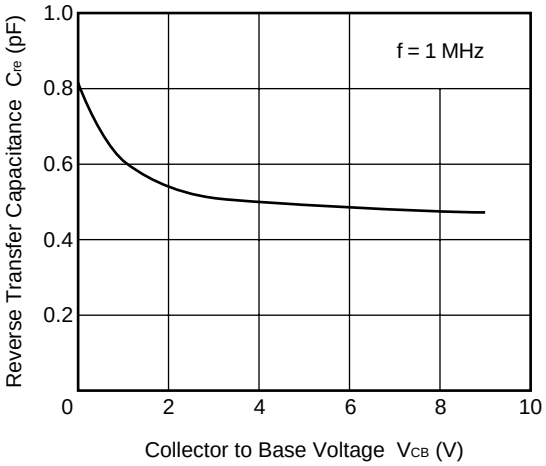
Rank	FB
Marking	K
h_{FE} Value	80 to 160

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

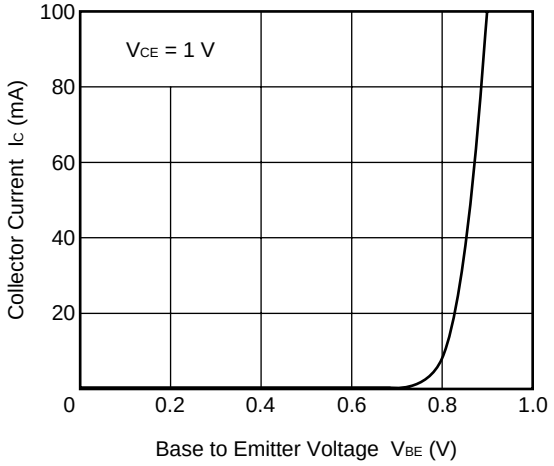
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



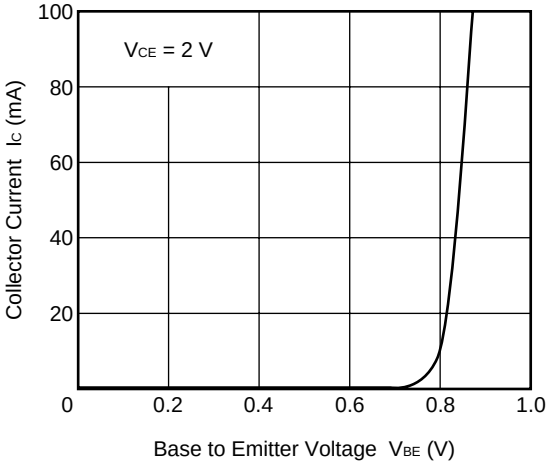
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



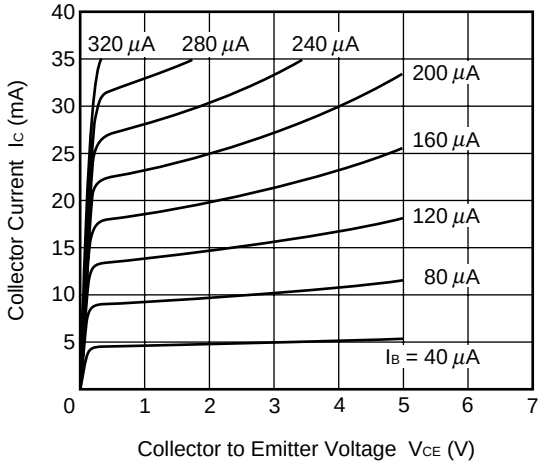
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



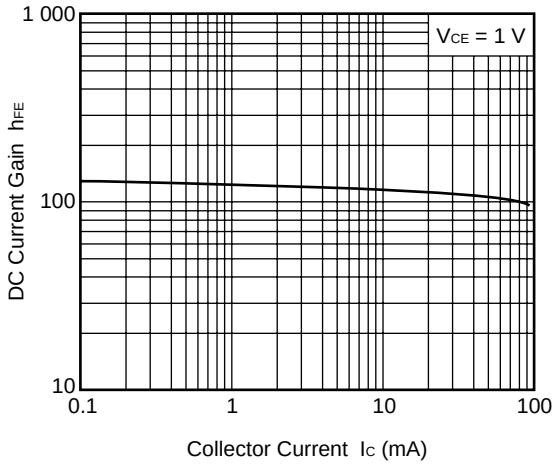
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



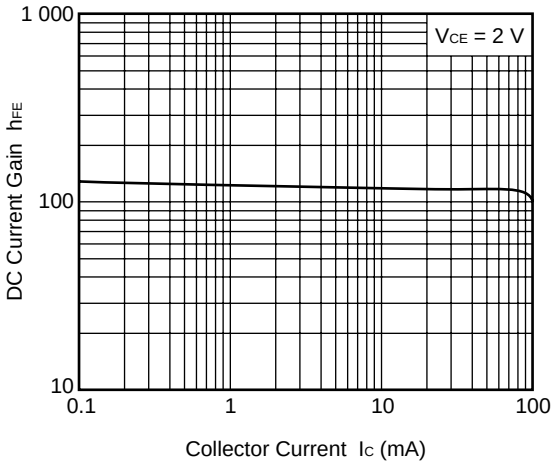
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



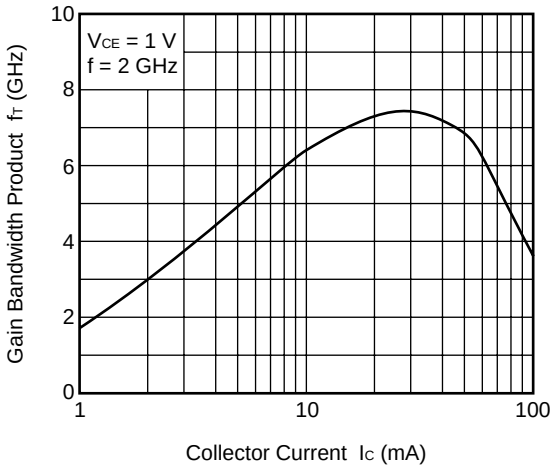
DC CURRENT GAIN vs.
COLLECTOR CURRENT



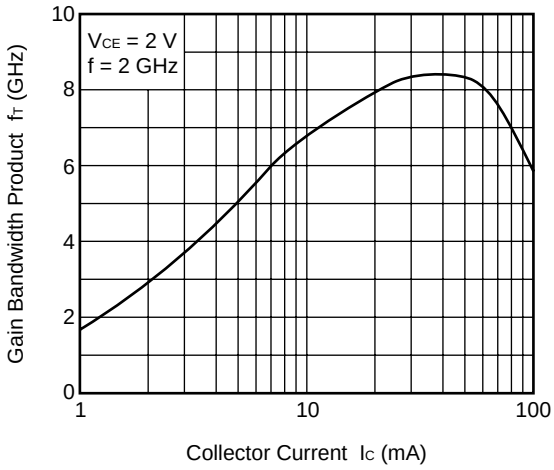
DC CURRENT GAIN vs.
COLLECTOR CURRENT



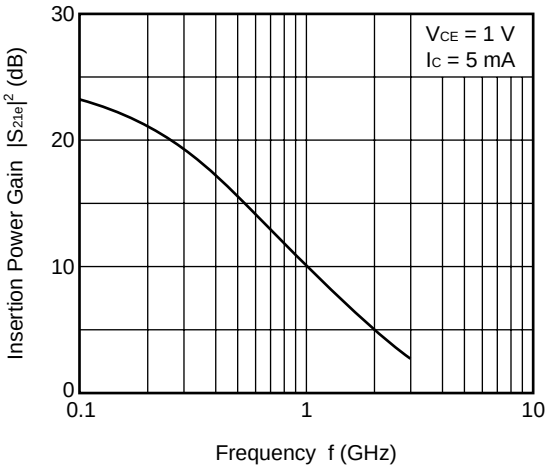
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



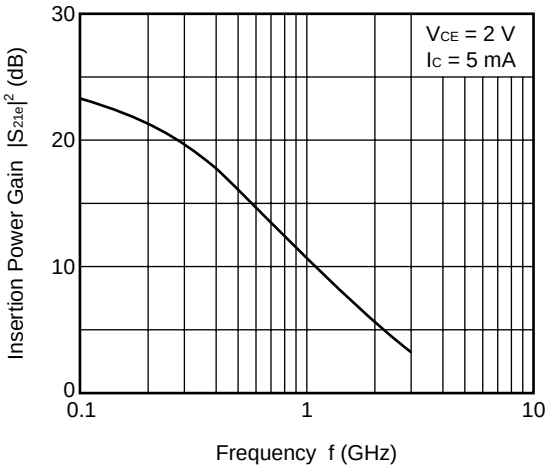
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



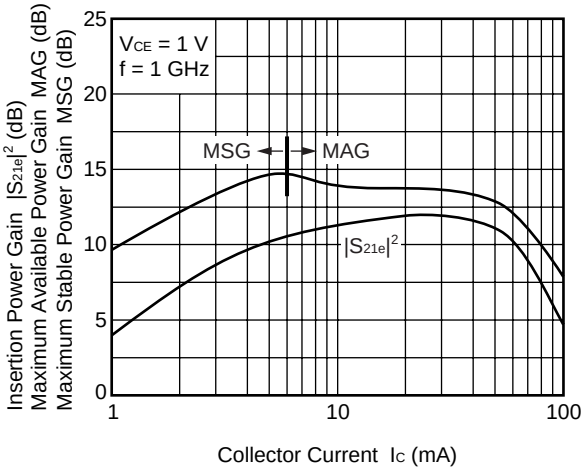
INSERTION POWER GAIN vs. FREQUENCY



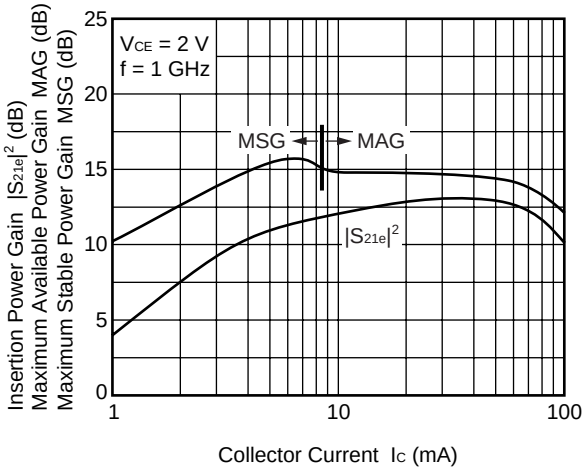
INSERTION POWER GAIN vs. FREQUENCY



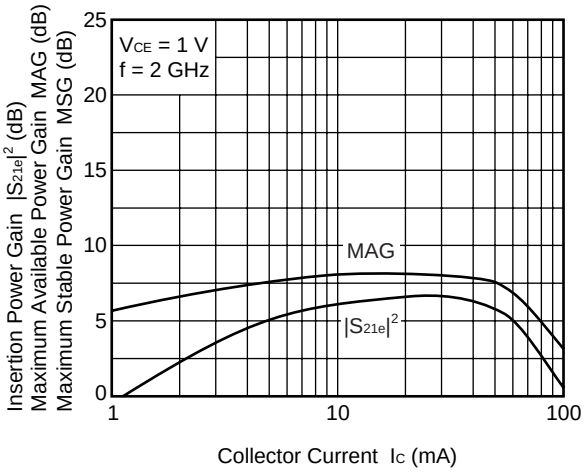
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



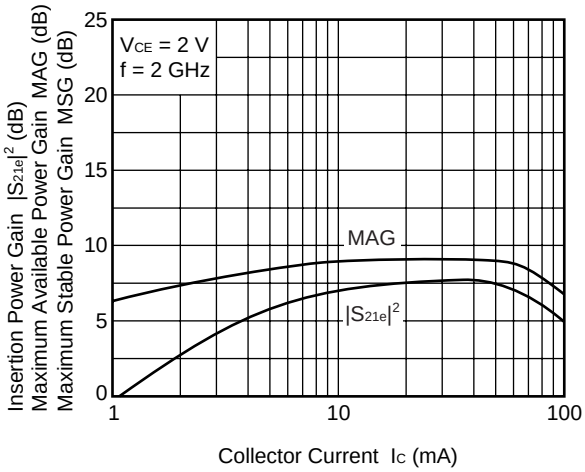
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



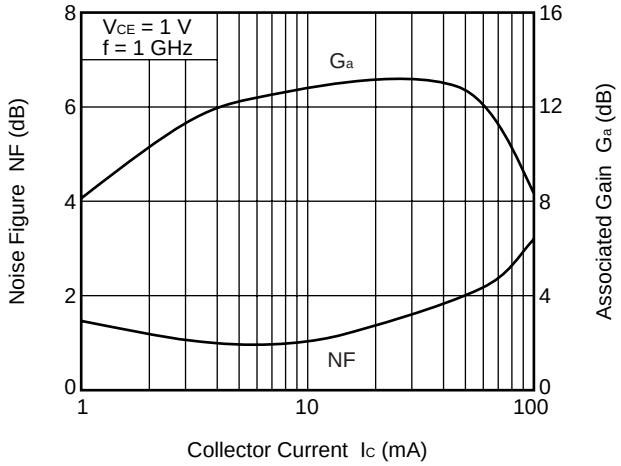
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



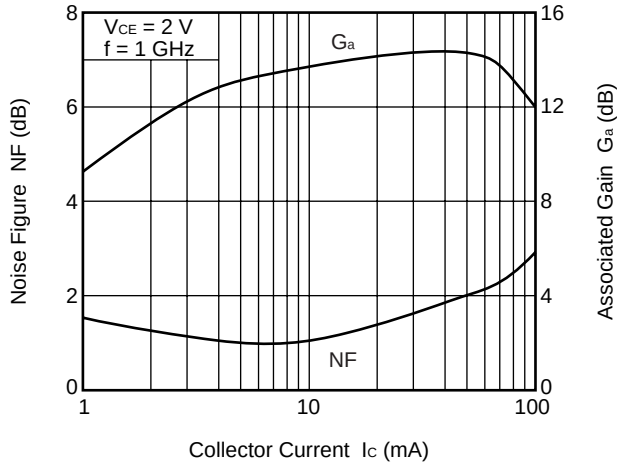
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



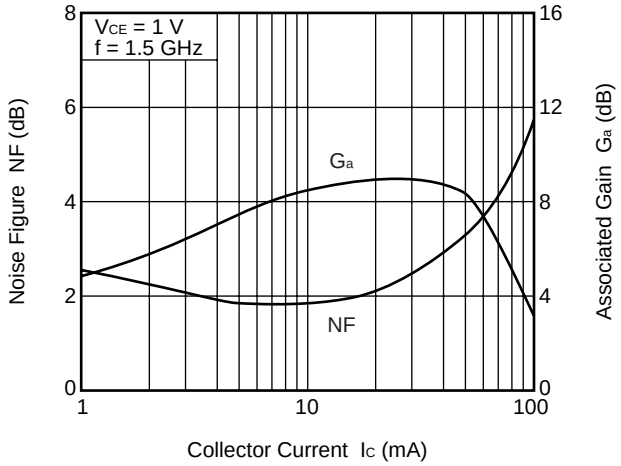
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



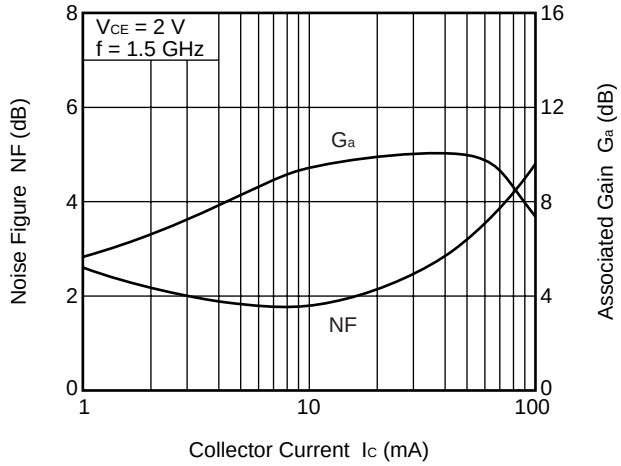
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



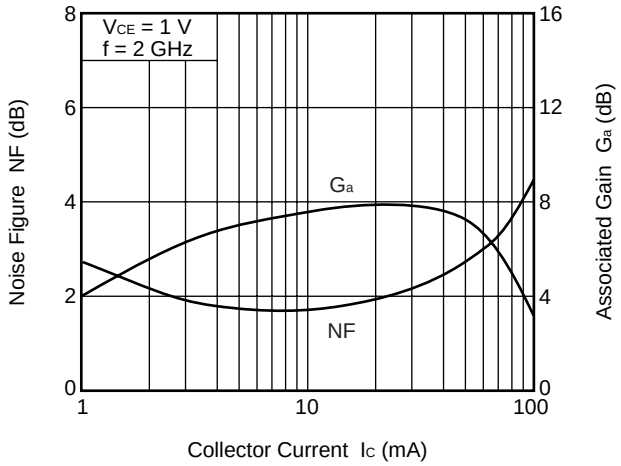
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



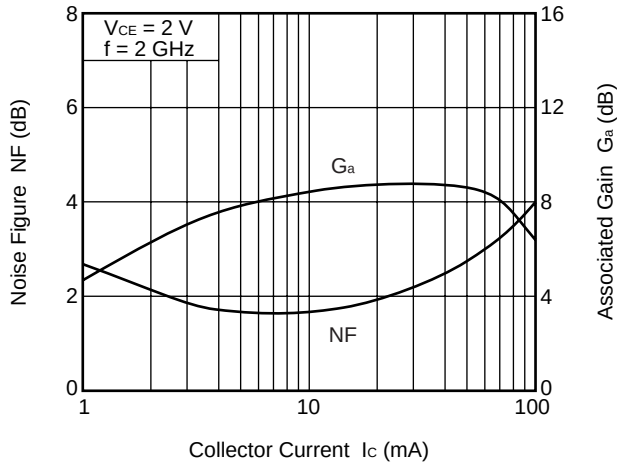
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

Note When K ≥ 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	0.945	–21.7	3.575	164.4	0.046	79.1	0.986	–8.1	0.037	18.86
0.2	0.929	–40.0	3.309	150.9	0.084	67.0	0.945	–15.5	0.114	15.96
0.3	0.886	–57.0	2.987	139.4	0.114	56.7	0.887	–21.6	0.174	14.17
0.4	0.858	–72.4	2.749	129.2	0.137	48.5	0.832	–26.9	0.209	13.02
0.5	0.823	–85.6	2.475	119.7	0.153	41.9	0.780	–31.0	0.266	12.09
0.6	0.789	–96.3	2.230	111.6	0.162	36.5	0.737	–34.4	0.329	11.39
0.7	0.766	–105.7	2.024	104.7	0.168	32.4	0.699	–37.4	0.386	10.81
0.8	0.743	–113.6	1.860	99.1	0.170	29.2	0.671	–39.9	0.445	10.38
0.9	0.733	–120.1	1.701	94.2	0.171	26.6	0.650	–42.4	0.495	9.97
1.0	0.723	–125.9	1.574	89.4	0.170	24.6	0.632	–44.7	0.556	9.67
1.1	0.715	–130.9	1.467	85.5	0.168	23.1	0.618	–46.9	0.613	9.42
1.2	0.709	–135.8	1.379	81.4	0.164	22.2	0.608	–49.0	0.670	9.24
1.3	0.703	–140.0	1.295	77.7	0.161	21.8	0.603	–51.0	0.728	9.06
1.4	0.697	–143.8	1.229	74.6	0.157	21.9	0.594	–53.0	0.796	8.94
1.5	0.695	–147.2	1.168	71.8	0.152	22.2	0.589	–54.8	0.857	8.84
1.6	0.692	–150.5	1.116	68.9	0.148	23.1	0.587	–56.6	0.923	8.79
1.7	0.689	–153.4	1.067	66.3	0.143	24.4	0.582	–58.5	1.001	8.51
1.8	0.684	–156.7	1.032	64.2	0.138	26.7	0.575	–60.4	1.079	7.02
1.9	0.682	–159.8	0.990	61.6	0.134	29.3	0.571	–62.4	1.155	6.29
2.0	0.676	–162.7	0.956	59.6	0.132	32.7	0.565	–64.1	1.242	5.65
2.1	0.676	–165.7	0.932	56.8	0.130	36.7	0.558	–66.2	1.297	5.30
2.2	0.674	–168.6	0.908	55.1	0.129	41.5	0.550	–68.6	1.350	4.94
2.3	0.672	–171.5	0.883	52.6	0.131	46.6	0.544	–71.1	1.386	4.60
2.4	0.667	–174.6	0.857	50.7	0.133	51.5	0.536	–73.6	1.438	4.15
2.5	0.666	–177.5	0.845	48.8	0.139	56.3	0.525	–76.8	1.426	3.96
2.6	0.663	179.3	0.823	47.0	0.147	60.6	0.518	–80.3	1.418	3.65
2.7	0.657	176.4	0.804	45.1	0.156	64.3	0.513	–83.8	1.409	3.32
2.8	0.661	173.2	0.786	43.3	0.168	67.8	0.507	–87.5	1.348	3.17
2.9	0.660	170.4	0.774	42.2	0.181	70.1	0.501	–90.8	1.302	3.01
3.0	0.657	167.6	0.752	41.1	0.196	71.9	0.491	–95.1	1.292	2.60
4.0	0.682	147.1	0.635	32.2	0.385	67.6	0.456	–142.7	1.018	1.34
5.0	0.657	137.9	0.627	29.4	0.537	52.6	0.464	167.8	1.051	–0.70

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	0.864	–34.1	9.621	156.1	0.043	71.0	0.943	–16.5	0.129	23.50
0.2	0.808	–61.1	8.243	139.1	0.072	58.9	0.821	–29.3	0.185	20.56
0.3	0.734	–82.8	6.828	126.2	0.091	49.5	0.698	–37.7	0.275	18.76
0.4	0.691	–99.6	5.776	116.1	0.102	43.6	0.602	–43.3	0.353	17.52
0.5	0.654	–112.6	4.907	108.1	0.109	40.2	0.530	–47.0	0.439	16.53
0.6	0.627	–122.3	4.243	101.7	0.114	38.5	0.476	–49.4	0.528	15.72
0.7	0.611	–130.4	3.736	96.2	0.117	37.6	0.437	–51.4	0.608	15.04
0.8	0.598	–136.5	3.347	92.2	0.120	37.8	0.408	–53.2	0.683	14.47
0.9	0.590	–141.6	3.015	88.8	0.122	38.3	0.387	–54.5	0.753	13.92
1.0	0.584	–146.3	2.754	85.2	0.124	39.3	0.370	–56.0	0.821	13.45
1.1	0.579	–149.9	2.528	82.2	0.127	40.6	0.358	–57.3	0.885	13.00
1.2	0.574	–153.1	2.356	79.3	0.129	42.1	0.350	–58.5	0.940	12.60
1.3	0.570	–156.4	2.194	76.2	0.133	43.8	0.344	–59.6	0.991	12.19
1.4	0.566	–159.1	2.068	73.7	0.136	45.5	0.338	–60.6	1.030	10.75
1.5	0.564	–161.6	1.950	71.6	0.140	47.0	0.334	–61.7	1.069	9.84
1.6	0.560	–163.8	1.858	69.0	0.144	48.9	0.331	–62.5	1.098	9.20
1.7	0.557	–165.7	1.769	66.9	0.148	50.6	0.327	–63.3	1.127	8.60
1.8	0.553	–168.4	1.694	64.9	0.154	52.5	0.321	–64.5	1.151	8.07
1.9	0.551	–170.3	1.621	62.7	0.160	54.0	0.317	–65.4	1.165	7.60
2.0	0.547	–172.8	1.561	60.7	0.167	55.5	0.311	–66.4	1.176	7.17
2.1	0.546	–174.9	1.513	58.3	0.174	57.1	0.304	–67.7	1.174	6.86
2.2	0.545	–177.0	1.462	56.6	0.182	58.5	0.297	–69.5	1.177	6.50
2.3	0.545	–179.4	1.416	54.3	0.190	59.8	0.290	–71.3	1.172	6.20
2.4	0.541	178.6	1.374	52.4	0.199	60.8	0.282	–73.4	1.176	5.86
2.5	0.540	176.2	1.343	50.4	0.208	61.7	0.273	–76.0	1.166	5.62
2.6	0.542	173.7	1.308	48.4	0.218	62.3	0.265	–79.1	1.156	5.38
2.7	0.538	171.4	1.271	46.6	0.228	62.6	0.259	–82.9	1.159	5.04
2.8	0.542	168.9	1.244	44.7	0.239	63.3	0.252	–86.6	1.135	4.92
2.9	0.541	166.9	1.213	43.2	0.250	63.4	0.246	–90.3	1.132	4.65
3.0	0.542	164.5	1.184	41.4	0.260	63.5	0.240	–95.2	1.129	4.40
4.0	0.608	149.2	0.943	27.2	0.385	58.4	0.226	–148.9	0.994	3.89
5.0	0.623	142.0	0.821	19.6	0.502	49.0	0.289	160.5	0.992	2.14

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	0.786	–44.4	14.366	150.0	0.040	69.4	0.892	–23.6	0.144	25.60
0.2	0.709	–77.0	11.400	130.6	0.063	54.8	0.712	–39.2	0.265	22.58
0.3	0.637	–99.2	8.897	118.0	0.076	48.0	0.567	–48.1	0.389	20.71
0.4	0.603	–115.6	7.223	109.0	0.084	44.8	0.467	–53.4	0.489	19.35
0.5	0.580	–127.3	5.994	102.2	0.090	43.9	0.399	–56.5	0.587	18.25
0.6	0.558	–136.0	5.106	96.8	0.095	44.2	0.349	–58.6	0.688	17.31
0.7	0.547	–142.3	4.441	92.2	0.100	45.2	0.315	–60.3	0.773	16.49
0.8	0.540	–148.3	3.968	88.8	0.105	46.7	0.290	–61.7	0.838	15.79
0.9	0.537	–152.1	3.554	85.9	0.110	48.1	0.272	–62.8	0.895	15.10
1.0	0.534	–155.7	3.231	82.8	0.115	49.8	0.258	–63.9	0.948	14.49
1.1	0.526	–158.5	2.958	80.3	0.121	51.4	0.248	–64.8	0.997	13.89
1.2	0.526	–161.2	2.748	77.6	0.127	52.9	0.241	–65.6	1.027	12.36
1.3	0.521	–164.1	2.551	74.9	0.133	54.3	0.236	–66.0	1.059	11.33
1.4	0.518	–166.1	2.400	72.7	0.140	55.7	0.231	–66.4	1.077	10.64
1.5	0.518	–168.1	2.264	70.8	0.147	56.6	0.229	–66.9	1.091	10.04
1.6	0.513	–169.9	2.149	68.5	0.154	57.8	0.226	–67.1	1.104	9.48
1.7	0.511	–171.3	2.047	66.6	0.162	58.8	0.222	–67.2	1.114	8.97
1.8	0.507	–173.5	1.953	64.6	0.170	59.8	0.217	–67.8	1.124	8.47
1.9	0.506	–175.5	1.869	62.7	0.178	60.3	0.214	–68.0	1.123	8.07
2.0	0.500	–177.0	1.797	60.9	0.188	60.8	0.208	–68.4	1.128	7.63
2.1	0.500	–179.0	1.736	58.6	0.197	61.4	0.202	–69.1	1.124	7.32
2.2	0.500	179.3	1.677	57.0	0.206	61.9	0.195	–70.6	1.121	6.99
2.3	0.498	177.2	1.621	54.7	0.216	62.3	0.189	–72.1	1.118	6.67
2.4	0.495	175.5	1.570	52.9	0.225	62.3	0.182	–74.1	1.123	6.30
2.5	0.497	173.0	1.533	51.1	0.235	62.4	0.173	–76.7	1.111	6.11
2.6	0.498	171.2	1.485	49.2	0.246	62.2	0.165	–80.1	1.108	5.81
2.7	0.495	168.9	1.448	47.3	0.256	61.9	0.159	–84.4	1.108	5.53
2.8	0.498	167.0	1.411	45.5	0.267	61.9	0.153	–89.0	1.099	5.32
2.9	0.499	164.9	1.375	44.0	0.277	61.6	0.147	–93.7	1.095	5.08
3.0	0.501	163.1	1.340	42.2	0.286	61.3	0.143	–100.1	1.094	4.84
4.0	0.578	149.4	1.066	27.9	0.392	54.8	0.151	–166.3	1.003	4.01
5.0	0.603	143.5	0.920	18.9	0.491	46.5	0.235	147.2	0.991	2.72

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	0.710	–53.7	18.078	145.0	0.038	64.9	0.843	–29.5	0.213	26.79
0.2	0.641	–89.3	13.451	124.7	0.056	53.2	0.627	–46.6	0.335	23.79
0.3	0.577	–111.8	10.116	112.9	0.066	49.0	0.477	–55.6	0.483	21.85
0.4	0.554	–126.7	8.036	104.7	0.073	47.7	0.383	–60.7	0.597	20.39
0.5	0.536	–136.9	6.582	98.8	0.080	48.2	0.321	–63.7	0.702	19.15
0.6	0.526	–144.9	5.585	93.9	0.086	49.6	0.276	–65.9	0.790	18.12
0.7	0.517	–150.5	4.825	89.7	0.092	51.3	0.246	–67.8	0.867	17.18
0.8	0.513	–155.0	4.291	86.8	0.099	53.1	0.224	–69.2	0.921	16.37
0.9	0.508	–158.3	3.840	84.3	0.106	54.7	0.208	–70.2	0.970	15.59
1.0	0.508	–161.6	3.492	81.5	0.113	56.3	0.196	–71.2	1.005	14.49
1.1	0.502	–164.0	3.194	79.1	0.121	57.7	0.187	–72.0	1.038	13.04
1.2	0.500	–166.1	2.960	76.7	0.129	58.9	0.182	–72.5	1.055	12.19
1.3	0.498	–168.5	2.744	74.1	0.137	59.8	0.177	–72.3	1.074	11.37
1.4	0.495	–170.3	2.580	72.1	0.145	60.7	0.173	–72.4	1.082	10.75
1.5	0.492	–172.1	2.432	70.3	0.153	61.3	0.170	–72.4	1.095	10.13
1.6	0.488	–173.5	2.306	68.1	0.162	61.9	0.167	–72.0	1.099	9.62
1.7	0.487	–175.0	2.194	66.2	0.171	62.4	0.164	–71.3	1.102	9.15
1.8	0.482	–176.7	2.089	64.5	0.180	62.9	0.159	–71.4	1.109	8.63
1.9	0.482	–178.1	2.000	62.5	0.190	63.0	0.156	–71.1	1.104	8.26
2.0	0.476	–179.8	1.918	60.8	0.200	63.1	0.151	–70.8	1.108	7.82
2.1	0.479	178.5	1.855	58.6	0.210	63.2	0.145	–71.2	1.097	7.57
2.2	0.475	176.9	1.790	57.1	0.219	63.2	0.138	–72.3	1.099	7.20
2.3	0.474	175.1	1.728	54.9	0.230	63.2	0.133	–73.7	1.097	6.86
2.4	0.473	173.5	1.672	53.3	0.240	62.9	0.126	–75.6	1.097	6.54
2.5	0.474	171.4	1.633	51.3	0.250	62.7	0.118	–78.7	1.088	6.34
2.6	0.475	169.1	1.584	49.4	0.260	62.0	0.110	–82.6	1.086	6.05
2.7	0.472	167.7	1.537	47.8	0.271	61.5	0.104	–88.0	1.089	5.73
2.8	0.475	165.6	1.499	45.9	0.282	61.4	0.099	–94.2	1.081	5.52
2.9	0.478	163.7	1.460	44.5	0.291	60.8	0.094	–100.7	1.078	5.29
3.0	0.481	161.8	1.421	42.7	0.300	60.2	0.092	–109.2	1.078	5.04
4.0	0.560	149.6	1.126	28.6	0.397	52.9	0.128	174.6	1.010	3.91
5.0	0.590	144.0	0.974	19.2	0.490	45.0	0.221	136.0	0.994	2.99

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	0.617	–65.2	22.105	139.1	0.034	63.1	0.778	–36.3	0.274	28.09
0.2	0.577	–103.4	15.353	118.7	0.049	53.3	0.536	–54.7	0.424	24.96
0.3	0.532	–124.2	11.143	108.1	0.058	51.5	0.392	–63.7	0.591	22.87
0.4	0.512	–137.1	8.698	100.9	0.065	52.2	0.307	–69.1	0.716	21.25
0.5	0.506	–146.5	7.062	95.6	0.073	53.9	0.253	–72.5	0.808	19.87
0.6	0.499	–152.6	5.945	91.6	0.081	55.9	0.214	–75.1	0.885	18.68
0.7	0.492	–157.2	5.137	87.8	0.088	57.7	0.188	–77.5	0.945	17.64
0.8	0.490	–161.6	4.562	85.0	0.097	59.2	0.170	–79.5	0.983	16.74
0.9	0.490	–163.9	4.075	82.9	0.105	60.6	0.156	–80.8	1.012	15.21
1.0	0.487	–166.8	3.696	80.3	0.113	62.0	0.145	–82.1	1.039	13.92
1.1	0.481	–168.5	3.377	78.1	0.123	62.9	0.138	–82.9	1.062	12.88
1.2	0.483	–170.5	3.129	75.8	0.132	63.5	0.133	–83.1	1.065	12.19
1.3	0.478	–172.7	2.906	73.4	0.141	64.1	0.128	–82.4	1.078	11.43
1.4	0.475	–173.9	2.728	71.5	0.151	64.6	0.124	–82.0	1.082	10.83
1.5	0.474	–175.5	2.565	69.8	0.160	64.8	0.121	–81.3	1.086	10.25
1.6	0.470	–176.7	2.435	67.7	0.170	65.0	0.118	–80.2	1.087	9.76
1.7	0.468	–177.9	2.312	66.0	0.179	65.1	0.115	–78.4	1.089	9.28
1.8	0.463	–179.6	2.202	64.2	0.190	65.2	0.110	–77.8	1.092	8.80
1.9	0.461	179.0	2.106	62.5	0.200	65.0	0.107	–76.6	1.090	8.40
2.0	0.459	177.7	2.021	60.8	0.211	64.7	0.102	–75.7	1.088	8.02
2.1	0.458	176.0	1.950	58.5	0.221	64.5	0.096	–75.5	1.084	7.69
2.2	0.457	174.8	1.882	57.1	0.231	64.1	0.090	–76.6	1.081	7.36
2.3	0.457	173.2	1.814	55.1	0.242	63.9	0.085	–77.9	1.078	7.04
2.4	0.455	171.8	1.755	53.3	0.252	63.3	0.078	–80.0	1.080	6.70
2.5	0.456	169.8	1.710	51.6	0.263	62.8	0.070	–84.2	1.074	6.48
2.6	0.456	168.0	1.654	49.9	0.273	61.9	0.064	–89.5	1.074	6.15
2.7	0.456	166.2	1.607	48.0	0.283	61.3	0.059	–98.5	1.075	5.87
2.8	0.461	164.3	1.567	46.2	0.294	60.7	0.056	–108.8	1.066	5.69
2.9	0.463	162.7	1.527	44.8	0.304	60.1	0.054	–120.2	1.064	5.46
3.0	0.463	160.7	1.486	43.1	0.313	59.4	0.055	–132.6	1.067	5.18
4.0	0.547	149.6	1.176	29.3	0.403	51.3	0.128	154.5	1.014	3.91
5.0	0.582	144.4	1.018	19.7	0.488	43.6	0.222	125.7	0.997	3.19

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	0.484	–95.0	28.796	128.1	0.027	60.6	0.625	–51.0	0.415	30.28
0.2	0.487	–130.6	17.695	109.3	0.038	57.6	0.380	–70.5	0.639	26.70
0.3	0.476	–146.5	12.316	100.9	0.047	59.9	0.265	–81.0	0.801	24.20
0.4	0.476	–154.5	9.404	95.5	0.056	62.4	0.202	–88.6	0.892	22.22
0.5	0.476	–160.8	7.578	91.4	0.066	64.3	0.164	–94.6	0.954	20.60
0.6	0.475	–164.9	6.367	88.0	0.076	66.0	0.138	–100.4	0.993	19.23
0.7	0.472	–168.1	5.463	85.0	0.086	67.3	0.121	–105.8	1.024	17.06
0.8	0.473	–171.0	4.855	82.7	0.097	68.1	0.109	–110.3	1.035	15.86
0.9	0.471	–172.4	4.326	80.7	0.107	68.7	0.100	–113.7	1.052	14.67
1.0	0.473	–174.5	3.921	78.4	0.117	69.3	0.092	–117.1	1.058	13.77
1.1	0.468	–175.7	3.582	76.5	0.128	69.6	0.087	–119.3	1.068	12.87
1.2	0.468	–177.2	3.312	74.5	0.139	69.5	0.082	–119.9	1.066	12.19
1.3	0.463	–178.5	3.070	72.3	0.150	69.4	0.076	–119.4	1.072	11.47
1.4	0.461	–179.6	2.880	70.6	0.161	69.2	0.071	–119.2	1.070	10.91
1.5	0.459	179.1	2.712	68.9	0.171	68.8	0.067	–118.2	1.070	10.37
1.6	0.454	178.4	2.569	67.0	0.182	68.6	0.062	–116.1	1.070	9.87
1.7	0.452	177.5	2.441	65.3	0.193	68.1	0.056	–113.7	1.069	9.42
1.8	0.446	176.2	2.324	63.7	0.204	67.7	0.050	–113.3	1.070	8.94
1.9	0.444	175.3	2.222	61.9	0.216	67.0	0.045	–110.9	1.068	8.54
2.0	0.443	173.8	2.126	60.4	0.227	66.4	0.039	–110.5	1.065	8.16
2.1	0.440	172.6	2.053	58.2	0.238	65.8	0.033	–111.3	1.062	7.84
2.2	0.441	171.6	1.975	56.9	0.248	65.0	0.028	–117.4	1.061	7.49
2.3	0.443	169.8	1.908	55.0	0.260	64.4	0.024	–126.0	1.055	7.22
2.4	0.439	168.9	1.840	53.3	0.270	63.5	0.021	–142.1	1.060	6.84
2.5	0.443	167.1	1.794	51.5	0.281	62.8	0.021	–163.6	1.052	6.65
2.6	0.447	165.4	1.737	49.9	0.292	61.6	0.025	177.7	1.049	6.39
2.7	0.441	164.1	1.685	48.1	0.302	60.7	0.032	168.1	1.054	6.04
2.8	0.445	162.1	1.640	46.5	0.313	60.0	0.041	161.7	1.052	5.80
2.9	0.449	160.5	1.596	45.1	0.323	59.1	0.050	157.1	1.050	5.58
3.0	0.451	159.2	1.554	43.4	0.331	58.3	0.059	154.8	1.051	5.33
4.0	0.538	148.6	1.224	29.9	0.414	49.1	0.159	132.3	1.017	3.92
5.0	0.572	144.2	1.058	20.5	0.491	41.5	0.247	112.9	1.004	2.95

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	0.955	–20.5	3.432	165.6	0.038	81.4	0.991	–6.8	0.002	19.56
0.2	0.941	–37.2	3.224	153.0	0.071	68.6	0.958	–12.9	0.108	16.60
0.3	0.898	–53.3	2.941	142.3	0.098	59.0	0.910	–18.1	0.164	14.79
0.4	0.873	–68.1	2.726	132.3	0.118	51.2	0.864	–22.8	0.196	13.65
0.5	0.836	–81.2	2.481	123.2	0.132	44.6	0.821	–26.6	0.246	12.73
0.6	0.805	–91.6	2.246	115.2	0.142	39.3	0.780	–29.7	0.312	12.00
0.7	0.780	–101.2	2.054	108.3	0.148	35.0	0.748	–32.2	0.368	11.43
0.8	0.760	–109.2	1.894	102.7	0.151	31.7	0.721	–34.8	0.418	11.00
0.9	0.746	–116.0	1.740	97.8	0.152	29.1	0.701	–37.1	0.469	10.60
1.0	0.733	–122.0	1.611	93.1	0.150	27.0	0.683	–39.1	0.534	10.30
1.1	0.724	–127.4	1.502	89.1	0.148	25.6	0.670	–41.0	0.589	10.05
1.2	0.716	–132.4	1.417	85.2	0.145	24.7	0.660	–43.2	0.647	9.89
1.3	0.711	–136.8	1.329	81.3	0.142	24.4	0.653	–44.9	0.706	9.71
1.4	0.704	–140.7	1.259	78.3	0.138	24.5	0.646	–46.5	0.773	9.59
1.5	0.700	–144.6	1.197	75.7	0.134	24.7	0.643	–48.4	0.834	9.50
1.6	0.695	–148.0	1.145	72.6	0.130	26.0	0.640	–50.0	0.904	9.46
1.7	0.692	–150.9	1.096	70.2	0.125	27.3	0.635	–51.5	0.982	9.43
1.8	0.685	–154.3	1.057	67.8	0.120	29.9	0.629	–53.2	1.074	7.77
1.9	0.681	–157.6	1.011	65.3	0.117	32.8	0.625	–55.0	1.161	6.93
2.0	0.679	–160.7	0.976	63.3	0.115	36.7	0.619	–56.3	1.232	6.40
2.1	0.674	–163.8	0.954	60.8	0.113	41.4	0.614	–58.2	1.294	6.01
2.2	0.672	–166.9	0.926	58.9	0.112	46.7	0.605	–60.3	1.359	5.58
2.3	0.670	–169.8	0.902	56.7	0.114	52.4	0.600	–62.2	1.387	5.28
2.4	0.664	–172.9	0.878	54.6	0.117	57.8	0.592	–64.5	1.433	4.85
2.5	0.664	–176.0	0.863	52.9	0.123	63.1	0.582	–67.1	1.406	4.66
2.6	0.661	–179.4	0.838	50.8	0.131	67.9	0.575	–70.0	1.394	4.32
2.7	0.654	177.6	0.822	49.0	0.141	71.8	0.570	–73.0	1.364	4.05
2.8	0.657	174.5	0.806	47.5	0.154	75.4	0.564	–76.1	1.292	3.96
2.9	0.652	171.4	0.791	46.5	0.167	77.6	0.554	–79.0	1.264	3.66
3.0	0.650	168.5	0.771	44.8	0.182	79.4	0.545	–82.6	1.241	3.32
4.0	0.674	147.3	0.649	36.0	0.378	74.8	0.486	–125.8	0.967	2.34
5.0	0.642	138.1	0.642	32.5	0.542	58.3	0.455	–176.6	1.029	–0.31

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	0.879	–31.4	9.462	158.3	0.038	75.1	0.956	–13.5	0.086	24.00
0.2	0.821	–55.4	8.281	142.1	0.062	61.9	0.855	–24.2	0.177	21.25
0.3	0.750	–75.9	7.003	129.6	0.080	52.5	0.748	–31.4	0.266	19.44
0.4	0.704	–92.4	6.001	119.5	0.091	46.4	0.661	–36.2	0.340	18.21
0.5	0.661	–105.8	5.155	111.3	0.097	42.5	0.593	–39.2	0.425	17.23
0.6	0.631	–115.8	4.478	104.8	0.102	40.6	0.542	–41.3	0.509	16.41
0.7	0.609	–124.3	3.958	99.2	0.106	39.9	0.503	–42.9	0.590	15.74
0.8	0.595	–131.0	3.564	95.1	0.108	39.7	0.474	–44.3	0.662	15.19
0.9	0.587	–136.3	3.212	91.6	0.110	40.2	0.454	–45.4	0.730	14.65
1.0	0.578	–141.2	2.933	87.9	0.112	41.2	0.437	–46.6	0.802	14.19
1.1	0.570	–145.2	2.696	84.8	0.114	42.4	0.425	–47.7	0.870	13.75
1.2	0.566	–148.9	2.508	82.0	0.116	44.0	0.416	–48.7	0.924	13.36
1.3	0.561	–152.3	2.338	78.9	0.119	45.8	0.411	–49.6	0.973	12.94
1.4	0.553	–155.0	2.200	76.4	0.122	47.6	0.405	–50.6	1.023	11.64
1.5	0.552	–157.8	2.074	74.2	0.125	49.3	0.401	–51.5	1.060	10.71
1.6	0.548	–160.3	1.973	71.8	0.128	51.3	0.399	–52.3	1.092	10.02
1.7	0.544	–162.4	1.879	69.8	0.132	53.3	0.395	–53.0	1.120	9.42
1.8	0.537	–165.0	1.798	67.6	0.137	55.4	0.389	–54.0	1.150	8.83
1.9	0.535	–167.3	1.717	65.6	0.142	57.1	0.388	–54.8	1.163	8.36
2.0	0.532	–169.5	1.654	63.6	0.149	59.0	0.382	–55.5	1.168	7.97
2.1	0.528	–171.8	1.600	61.1	0.156	60.8	0.376	–56.5	1.170	7.61
2.2	0.528	–174.1	1.552	59.5	0.163	62.5	0.368	–57.9	1.167	7.31
2.3	0.525	–176.6	1.501	57.3	0.171	64.1	0.362	–59.2	1.165	6.97
2.4	0.522	–178.7	1.454	55.4	0.179	65.3	0.355	–60.7	1.168	6.62
2.5	0.520	178.5	1.423	53.5	0.188	66.3	0.346	–62.7	1.155	6.41
2.6	0.520	176.0	1.381	51.4	0.197	67.1	0.338	–65.0	1.147	6.13
2.7	0.517	173.7	1.343	49.6	0.207	67.7	0.332	–67.7	1.146	5.81
2.8	0.520	171.1	1.314	47.8	0.217	68.5	0.325	–70.5	1.123	5.69
2.9	0.520	169.1	1.284	46.4	0.228	68.7	0.316	–73.0	1.112	5.46
3.0	0.523	166.9	1.247	44.7	0.238	69.0	0.308	–76.8	1.109	5.18
4.0	0.585	151.0	1.001	30.0	0.369	64.8	0.251	–120.7	0.957	4.34
5.0	0.606	143.7	0.867	21.5	0.498	54.6	0.260	–176.6	0.951	2.41

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	0.796	–40.2	14.618	152.2	0.034	70.1	0.913	–19.5	0.160	26.29
0.2	0.720	–69.7	11.882	133.6	0.054	57.7	0.756	–32.7	0.264	23.39
0.3	0.637	–92.3	9.465	121.1	0.066	50.6	0.619	–40.1	0.385	21.54
0.4	0.603	–108.4	7.795	111.8	0.075	47.4	0.524	–44.2	0.476	20.20
0.5	0.570	–120.8	6.517	104.7	0.080	46.3	0.458	–46.4	0.577	19.09
0.6	0.546	–129.4	5.554	99.2	0.085	46.6	0.409	–47.6	0.676	18.14
0.7	0.528	–136.8	4.841	94.5	0.090	47.4	0.375	–48.5	0.766	17.33
0.8	0.520	–142.9	4.332	91.0	0.094	48.9	0.350	–49.4	0.828	16.63
0.9	0.513	–146.8	3.878	88.2	0.099	50.3	0.332	–49.9	0.893	15.94
1.0	0.508	–151.1	3.526	84.9	0.104	52.0	0.319	–50.5	0.944	15.32
1.1	0.503	–154.2	3.233	82.4	0.109	53.7	0.309	–51.1	0.992	14.74
1.2	0.499	–157.2	3.001	79.9	0.114	55.2	0.302	–51.6	1.022	13.28
1.3	0.495	–159.9	2.787	77.1	0.120	56.7	0.299	–52.0	1.051	12.28
1.4	0.491	–162.2	2.616	75.0	0.126	58.1	0.294	–52.4	1.073	11.51
1.5	0.488	–164.2	2.465	73.1	0.132	59.2	0.292	–52.8	1.092	10.85
1.6	0.486	–166.3	2.337	70.9	0.139	60.6	0.290	–53.0	1.100	10.34
1.7	0.481	–168.0	2.218	68.9	0.146	61.6	0.289	–53.1	1.112	9.78
1.8	0.477	–170.2	2.116	67.1	0.153	62.6	0.284	–53.6	1.122	9.27
1.9	0.474	–171.9	2.023	65.1	0.161	63.3	0.282	–53.9	1.123	8.85
2.0	0.469	–174.0	1.941	63.5	0.170	64.1	0.278	–54.0	1.127	8.41
2.1	0.469	–175.9	1.878	61.2	0.179	64.8	0.273	–54.4	1.117	8.14
2.2	0.468	–177.7	1.813	59.5	0.187	65.4	0.267	–55.4	1.115	7.80
2.3	0.468	–179.7	1.752	57.5	0.196	66.0	0.261	–56.3	1.108	7.51
2.4	0.462	178.5	1.695	55.7	0.205	66.2	0.255	–57.5	1.115	7.11
2.5	0.463	176.2	1.653	53.8	0.215	66.5	0.246	–59.1	1.104	6.90
2.6	0.466	173.9	1.605	52.1	0.225	66.4	0.237	–61.2	1.096	6.66
2.7	0.461	172.1	1.559	50.2	0.234	66.2	0.231	–63.8	1.098	6.33
2.8	0.465	169.8	1.519	48.6	0.244	66.4	0.223	–66.6	1.087	6.14
2.9	0.465	167.7	1.485	47.1	0.254	66.2	0.215	–69.3	1.082	5.92
3.0	0.466	165.7	1.444	45.3	0.264	65.9	0.207	–73.3	1.083	5.63
4.0	0.546	152.1	1.148	30.7	0.373	60.4	0.150	–124.5	0.979	4.88
5.0	0.578	146.2	0.988	21.0	0.482	51.9	0.178	171.7	0.959	3.12

V_{CE} = 2 V, I_C = 7 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.737	–47.9	18.556	147.7	0.032	68.8	0.870	–24.3	0.181	27.69
0.2	0.650	–80.7	14.270	128.0	0.049	56.3	0.678	–38.7	0.329	24.66
0.3	0.571	–103.2	10.919	115.8	0.059	51.0	0.533	–45.7	0.479	22.70
0.4	0.540	–118.7	8.753	107.3	0.066	50.0	0.440	–49.2	0.589	21.23
0.5	0.520	–129.9	7.211	101.1	0.072	50.4	0.378	–50.8	0.688	20.00
0.6	0.501	–138.5	6.123	96.2	0.078	51.7	0.334	–51.5	0.781	18.97
0.7	0.488	–144.5	5.303	91.8	0.084	53.4	0.304	–52.1	0.862	18.03
0.8	0.481	–149.5	4.726	88.9	0.090	55.0	0.282	–52.6	0.916	17.22
0.9	0.480	–153.3	4.229	86.4	0.096	56.6	0.267	–52.7	0.961	16.46
1.0	0.475	–156.9	3.840	83.4	0.102	58.3	0.255	–53.0	0.998	15.75
1.1	0.471	–159.3	3.508	81.1	0.109	59.7	0.247	–53.3	1.032	13.99
1.2	0.467	–161.8	3.247	78.8	0.116	60.9	0.242	–53.6	1.052	13.07
1.3	0.464	–164.5	3.015	76.2	0.124	62.0	0.239	–53.4	1.068	12.28
1.4	0.461	–166.3	2.831	74.3	0.131	62.9	0.235	–53.6	1.078	11.63
1.5	0.457	–168.1	2.662	72.4	0.139	63.6	0.234	–53.6	1.090	11.00
1.6	0.456	–169.7	2.524	70.3	0.147	64.4	0.233	–53.4	1.092	10.52
1.7	0.452	–171.2	2.397	68.5	0.155	65.0	0.232	–53.0	1.097	10.01
1.8	0.446	–172.8	2.284	66.8	0.163	65.5	0.228	–53.0	1.103	9.50
1.9	0.445	–174.8	2.180	64.9	0.172	65.8	0.227	–52.9	1.100	9.10
2.0	0.440	–176.4	2.091	63.3	0.181	66.1	0.224	–52.6	1.101	8.68
2.1	0.440	–178.3	2.019	61.0	0.191	66.3	0.219	–52.7	1.092	8.39
2.2	0.438	–179.6	1.948	59.6	0.200	66.5	0.213	–53.4	1.093	8.03
2.3	0.437	178.3	1.880	57.5	0.210	66.6	0.209	–54.0	1.088	7.72
2.4	0.436	176.7	1.818	55.8	0.219	66.5	0.202	–54.9	1.088	7.39
2.5	0.434	174.9	1.774	54.1	0.228	66.4	0.194	–56.3	1.082	7.15
2.6	0.437	172.6	1.719	52.3	0.238	66.0	0.186	–58.0	1.077	6.88
2.7	0.434	171.1	1.669	50.6	0.248	65.6	0.179	–60.7	1.079	6.57
2.8	0.436	168.8	1.625	48.8	0.259	65.5	0.171	–63.6	1.072	6.35
2.9	0.437	167.0	1.584	47.6	0.268	65.0	0.163	–66.4	1.070	6.10
3.0	0.440	164.9	1.540	45.7	0.277	64.6	0.155	–70.9	1.071	5.83
4.0	0.525	152.6	1.223	31.3	0.378	58.1	0.101	–133.6	0.989	5.10
5.0	0.562	147.2	1.051	21.4	0.477	50.2	0.147	157.6	0.967	3.43

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

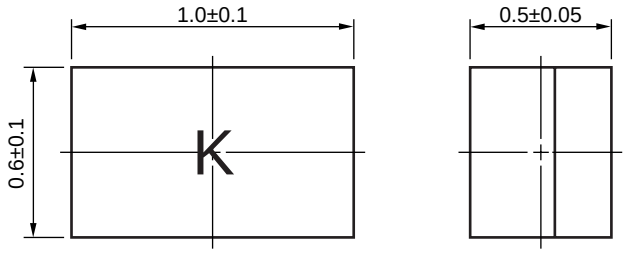
Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.654	–57.5	22.815	142.5	0.030	67.2	0.818	–29.6	0.236	28.87
0.2	0.578	–92.7	16.390	122.3	0.044	55.7	0.595	–44.6	0.414	25.74
0.3	0.513	–114.9	12.109	111.1	0.052	53.6	0.450	–51.0	0.580	23.68
0.4	0.492	–128.8	9.545	103.5	0.059	54.1	0.365	–53.9	0.697	22.09
0.5	0.477	–139.1	7.796	97.9	0.066	55.4	0.309	–55.1	0.793	20.72
0.6	0.465	–145.9	6.585	93.8	0.073	57.3	0.270	–55.3	0.871	19.55
0.7	0.456	–151.3	5.686	89.8	0.080	59.0	0.243	–55.7	0.935	18.51
0.8	0.453	–155.8	5.045	87.0	0.087	60.7	0.225	–55.9	0.974	17.61
0.9	0.453	–158.8	4.517	84.7	0.095	62.2	0.212	–55.7	1.003	16.46
1.0	0.447	–162.4	4.086	82.1	0.103	63.4	0.201	–55.8	1.033	14.87
1.1	0.446	–163.9	3.737	80.0	0.111	64.4	0.194	–55.8	1.050	13.90
1.2	0.441	–166.1	3.454	77.9	0.119	65.3	0.191	–55.6	1.064	13.07
1.3	0.440	–168.2	3.208	75.5	0.128	66.0	0.188	–55.1	1.070	12.37
1.4	0.434	–169.9	3.006	73.6	0.137	66.4	0.186	–54.7	1.079	11.71
1.5	0.433	–171.4	2.827	71.9	0.145	66.8	0.185	–54.4	1.082	11.15
1.6	0.429	–172.8	2.675	69.9	0.154	67.2	0.185	–53.7	1.086	10.62
1.7	0.427	–174.1	2.538	68.2	0.163	67.3	0.184	–52.8	1.085	10.16
1.8	0.422	–175.6	2.419	66.5	0.172	67.5	0.182	–52.4	1.086	9.69
1.9	0.421	–177.1	2.306	64.8	0.181	67.4	0.181	–51.6	1.084	9.28
2.0	0.416	–178.3	2.211	63.1	0.191	67.4	0.178	–51.0	1.085	8.86
2.1	0.417	179.9	2.130	61.0	0.201	67.3	0.174	–50.6	1.077	8.55
2.2	0.414	178.6	2.057	59.6	0.210	67.2	0.169	–50.9	1.077	8.21
2.3	0.416	177.0	1.982	57.7	0.220	67.1	0.165	–51.1	1.070	7.92
2.4	0.412	175.4	1.916	56.0	0.230	66.6	0.159	–51.7	1.074	7.55
2.5	0.413	173.6	1.865	54.3	0.240	66.3	0.151	–52.9	1.067	7.33
2.6	0.413	171.8	1.809	52.7	0.250	65.7	0.143	–54.4	1.066	7.03
2.7	0.412	170.0	1.756	50.9	0.259	65.2	0.136	–57.0	1.066	6.73
2.8	0.416	167.9	1.713	49.2	0.269	64.7	0.128	–60.2	1.059	6.55
2.9	0.419	166.3	1.664	47.9	0.279	64.1	0.120	–63.2	1.057	6.29
3.0	0.421	164.3	1.619	46.2	0.288	63.5	0.112	–68.1	1.058	6.02
4.0	0.508	152.8	1.283	32.1	0.383	56.4	0.068	–152.8	0.996	5.25
5.0	0.551	148.0	1.102	22.1	0.475	48.6	0.138	141.5	0.974	3.66

V_{CE} = 2 V, I_C = 20 mA, Z_O = 50 Ω

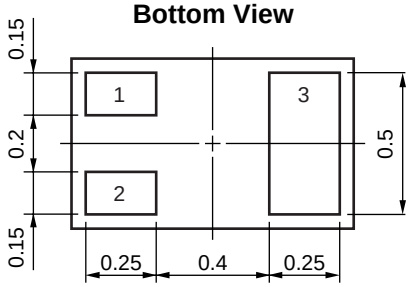
Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.490	–82.9	31.120	131.4	0.025	63.9	0.678	–41.4	0.397	31.03
0.2	0.453	–119.2	19.690	112.3	0.033	59.7	0.431	–56.0	0.630	27.70
0.3	0.428	–137.3	13.829	103.3	0.043	61.2	0.309	–61.0	0.788	25.10
0.4	0.426	–147.6	10.636	97.5	0.051	63.5	0.241	–63.2	0.880	23.17
0.5	0.426	–154.9	8.581	93.1	0.060	65.5	0.199	–64.0	0.940	21.55
0.6	0.422	–159.7	7.213	89.7	0.069	67.2	0.170	–64.2	0.984	20.20
0.7	0.417	–163.4	6.194	86.6	0.079	68.8	0.150	–64.5	1.016	18.20
0.8	0.417	–166.5	5.489	84.3	0.088	69.5	0.136	–64.7	1.032	16.88
0.9	0.420	–168.4	4.890	82.4	0.097	70.2	0.126	–64.2	1.042	15.77
1.0	0.416	–170.3	4.431	80.2	0.107	70.6	0.119	–63.7	1.053	14.77
1.1	0.412	–171.8	4.040	78.3	0.116	71.0	0.114	–63.1	1.064	13.86
1.2	0.410	–173.5	3.734	76.3	0.126	71.1	0.112	–62.1	1.065	13.16
1.3	0.407	–174.7	3.462	74.1	0.136	71.0	0.111	–60.2	1.067	12.47
1.4	0.404	–175.8	3.246	72.5	0.146	71.0	0.109	–58.7	1.067	11.89
1.5	0.403	–176.6	3.048	71.0	0.156	70.8	0.109	–57.0	1.067	11.34
1.6	0.398	–178.0	2.886	69.1	0.166	70.5	0.110	–54.9	1.065	10.85
1.7	0.396	–178.7	2.739	67.5	0.176	70.2	0.110	–52.4	1.063	10.40
1.8	0.391	–179.8	2.601	65.9	0.186	69.9	0.109	–50.5	1.066	9.89
1.9	0.389	179.0	2.485	64.2	0.196	69.4	0.110	–48.5	1.061	9.52
2.0	0.388	177.9	2.375	62.8	0.206	68.9	0.108	–46.5	1.060	9.11
2.1	0.385	176.7	2.287	60.7	0.217	68.4	0.106	–45.0	1.056	8.78
2.2	0.386	175.6	2.202	59.5	0.227	67.8	0.102	–44.1	1.055	8.45
2.3	0.386	174.2	2.122	57.7	0.237	67.4	0.099	–43.4	1.051	8.14
2.4	0.383	173.1	2.048	56.0	0.247	66.7	0.093	–42.9	1.054	7.77
2.5	0.385	171.4	1.994	54.3	0.257	66.0	0.086	–42.9	1.048	7.55
2.6	0.388	169.7	1.927	52.8	0.267	65.0	0.079	–43.2	1.047	7.25
2.7	0.385	168.3	1.870	51.1	0.277	64.2	0.072	–46.0	1.049	6.94
2.8	0.387	166.1	1.819	49.5	0.287	63.6	0.064	–49.1	1.047	6.69
2.9	0.392	164.8	1.772	48.2	0.297	62.8	0.055	–52.3	1.043	6.48
3.0	0.395	163.3	1.724	46.5	0.305	62.1	0.047	–59.6	1.044	6.23
4.0	0.489	153.0	1.358	33.0	0.392	53.9	0.064	147.9	1.004	5.03
5.0	0.533	148.7	1.166	23.1	0.474	46.3	0.156	117.9	0.987	3.91

PACKAGE DIMENSIONS

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



Bottom View



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

[MEMO]

[MEMO]

[MEMO]

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  "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
  "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
  "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.
  The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.
  (Note)
  (1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.
  (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

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