NEC

NPN SILICON RF TRANSISTOR
2SC5704

NPN SILICON RF TRANSISTOR FOR LOW NOISE · HIGH-GAIN AMPLIFICATION 6-PIN LEAD-LESS MINIMOLD

FEATURES

- Ideal for low noise · high-gain amplification and oscillation at 3 GHz or over
  NF = 1.1 dB TYP. @ V_{CE} = 2 V, I_C = 5 mA, f = 2 GHz
- High f_T: f_T = 25.0 GHz TYP. @ V_{CE} = 3 V, I_C = 30 mA, f = 2 GHz
- 6-pin lead-less minimold package

ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5704	50 pcs (Non reel)	• 8 mm wide embossed taping
2SC5704-T3	10 kpcs/reel	• Pin 1 (Collector), Pin 6 (Emitter) 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}	15	V
Collector to Emitter Voltage	V_{CEO}	3.3	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	35	mA
Total Power Dissipation	P_{tot} Note	115	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.

Document No. P15364EJ1V0DS00 (1st edition)
Date Published April 2001 NS CP(K)
Printed in Japan

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	–	–	200	nA
Emitter Cut-off Current	I_{EBO}	V_{BE} = 1 V, I_C = 0 mA	–	–	200	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 2 V, I_C = 5 mA	50	70	100	–
RF Characteristics						
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 30 mA, f = 2 GHz	20.0	25.0	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	14.0	17.0	–	dB
Noise Figure	NF	V_{CE} = 2 , I_C = 5 mA, f = 2 Hz, $Z_S = Z_{opt}$	–	1.1	1.5	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 2 V, I_E = 0 mA, f = 1 MHz	–	0.14	0.24	pF
Maximum Available Power Gain	MAG Note 3	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	–	19.0	–	dB
Maximum Stable Power Gain	MSG Note 4	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	–	20.0	–	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	–	11.0	–	dBm
3rd Order Intermodulation Distortion Output Intercept Point	OIP_3	V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz	–	22.0	–	dBm

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

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

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

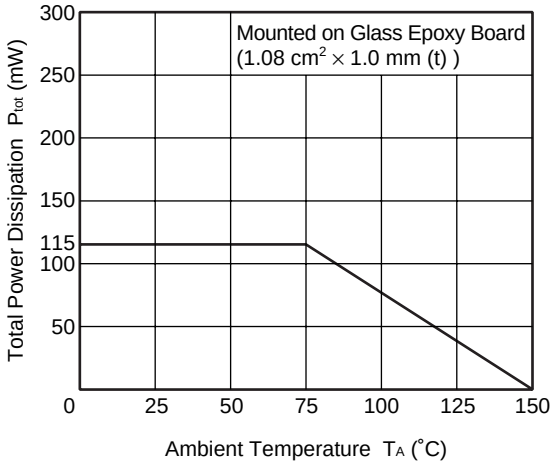
4. $MSG = \left| \frac{S_{21}}{S_{12}} \right|$

h_{FE} CLASSIFICATION

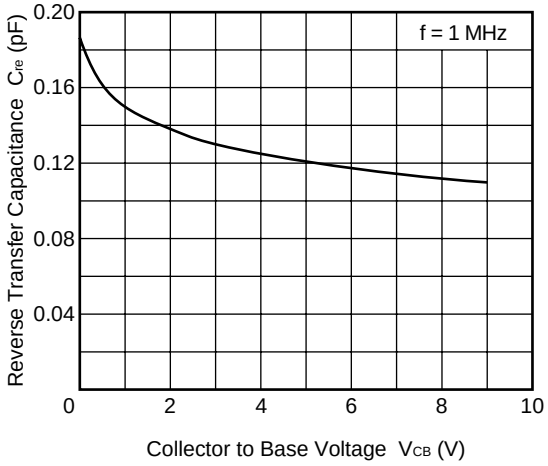
Rank	FB
Marking	zC
h_{FE} Value	50 to 100

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

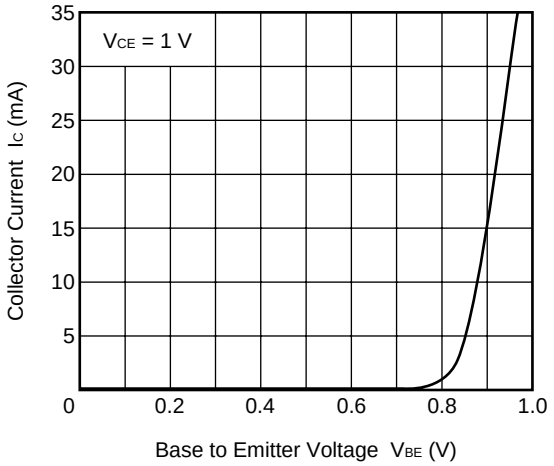
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



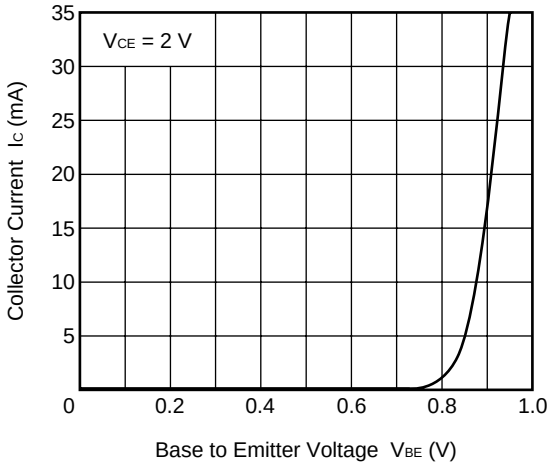
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



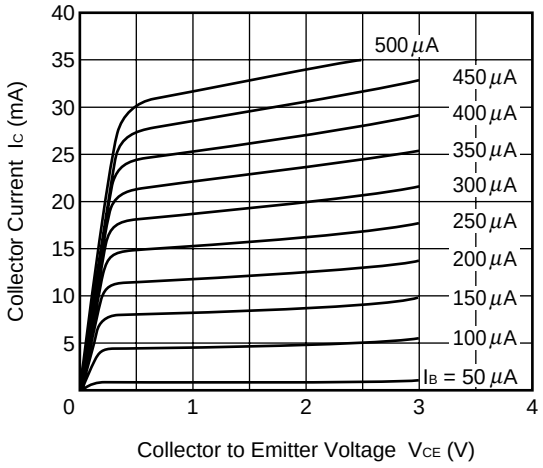
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



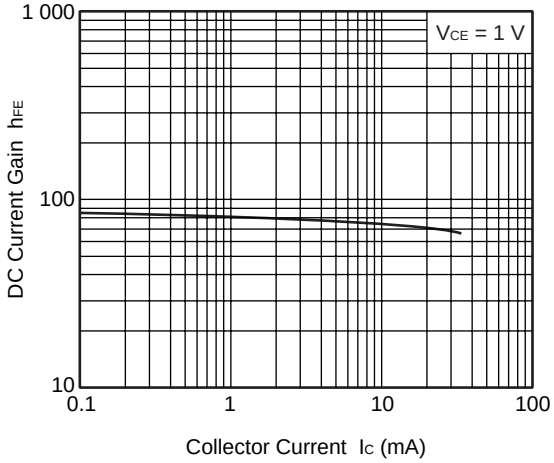
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



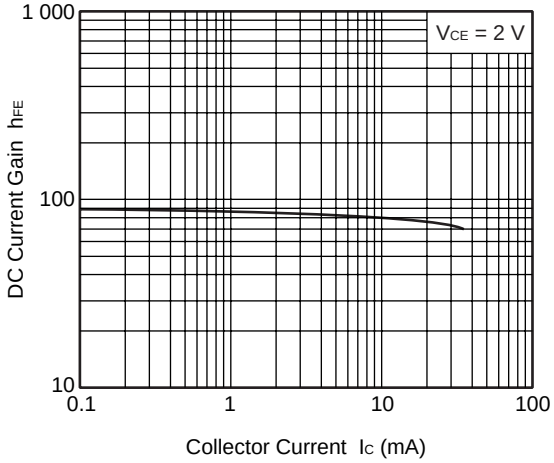
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



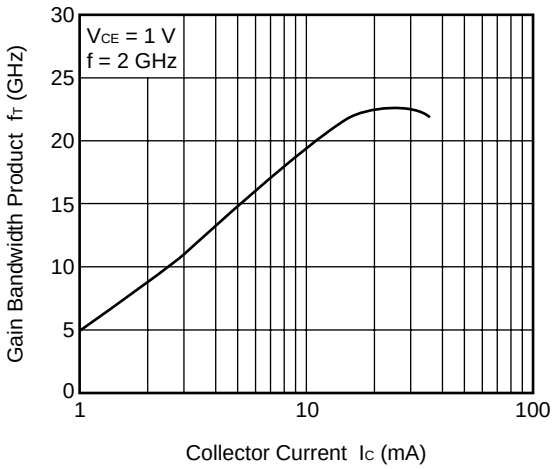
DC CURRENT GAIN vs.
COLLECTOR CURRENT



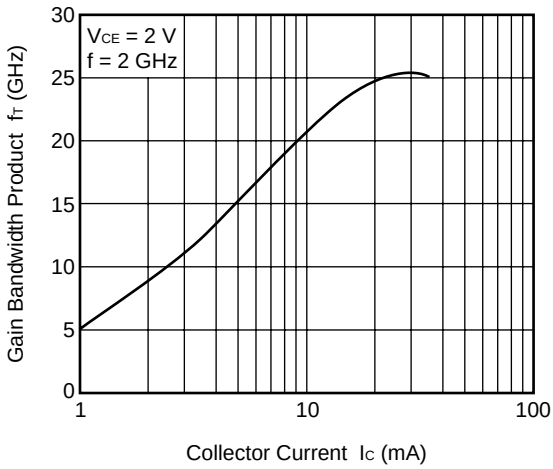
DC CURRENT GAIN vs.
COLLECTOR CURRENT



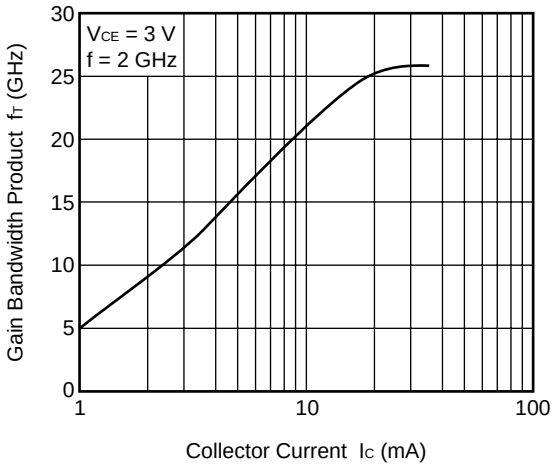
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



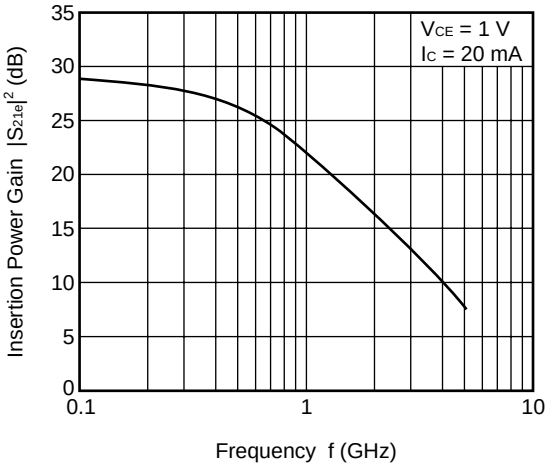
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



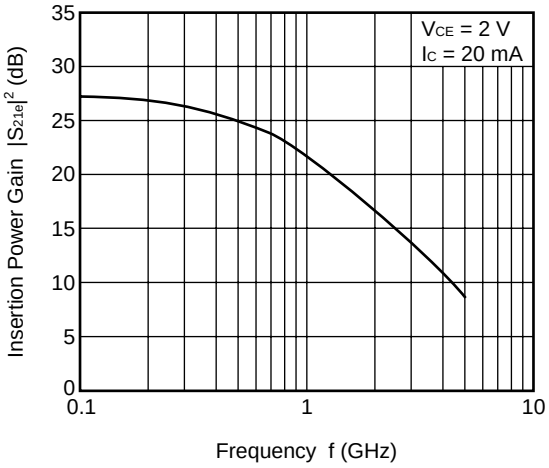
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



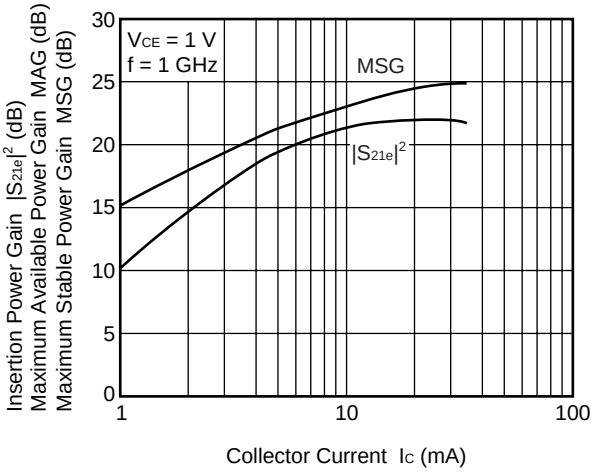
INSERTION POWER GAIN vs. FREQUENCY



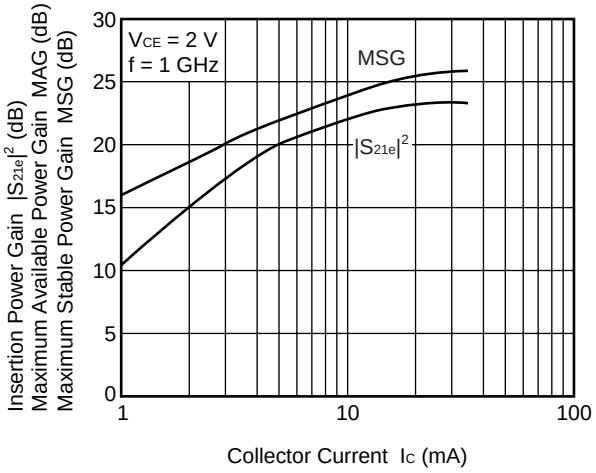
INSERTION POWER GAIN vs. FREQUENCY



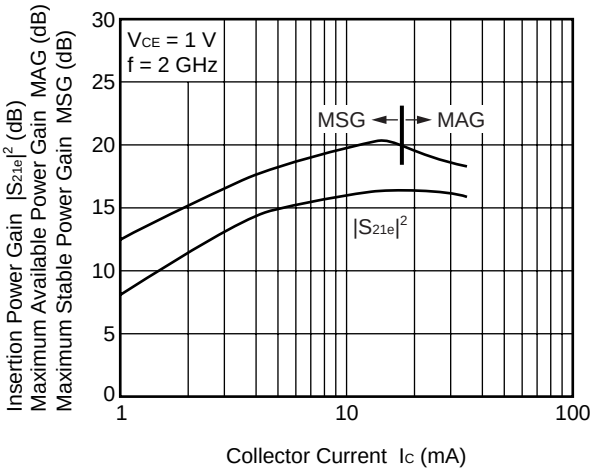
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



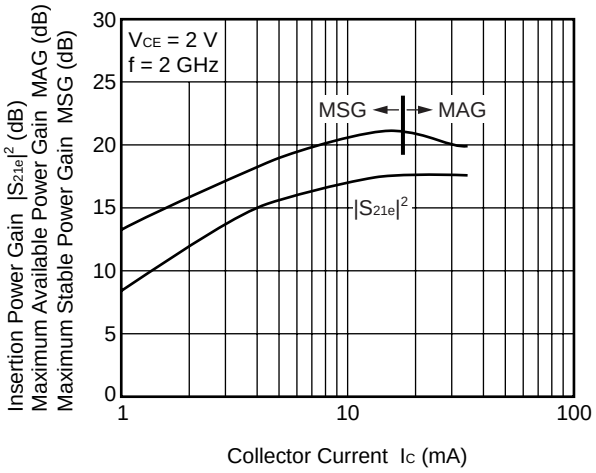
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



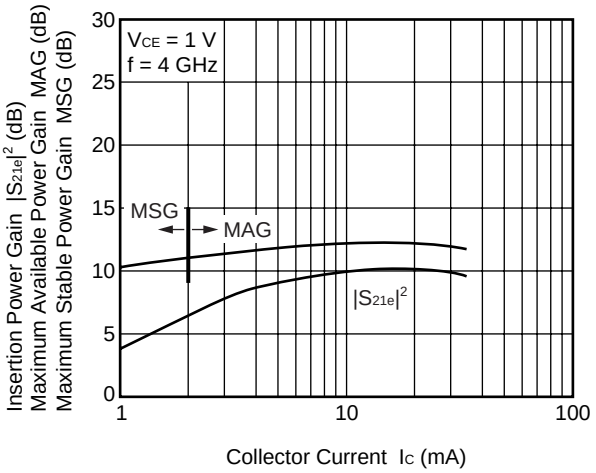
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



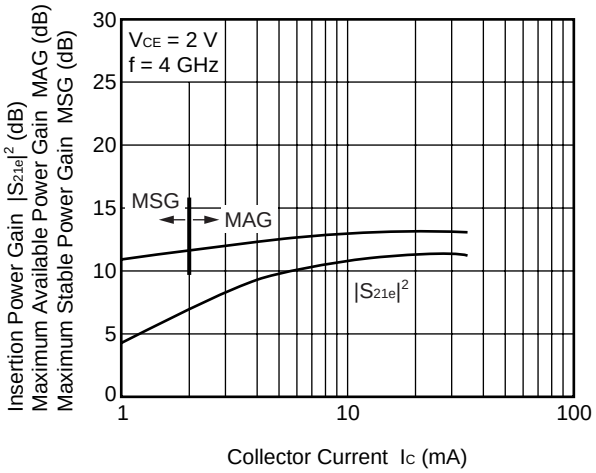
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



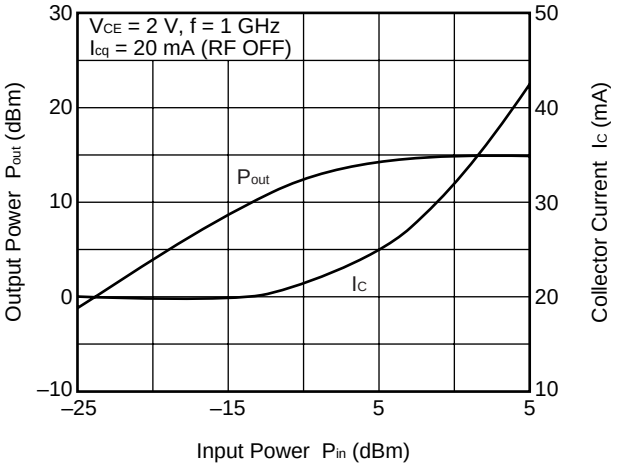
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



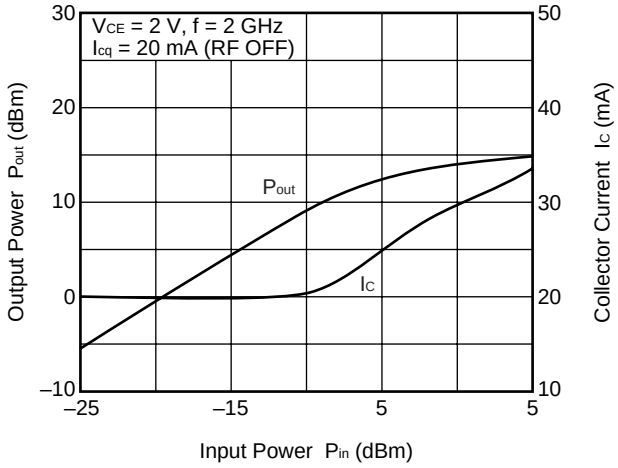
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



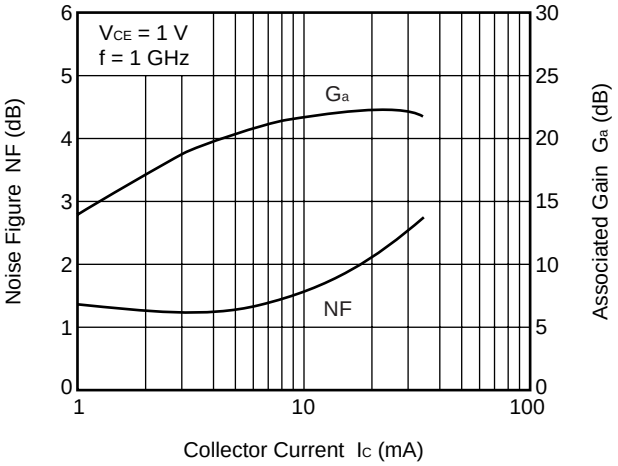
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



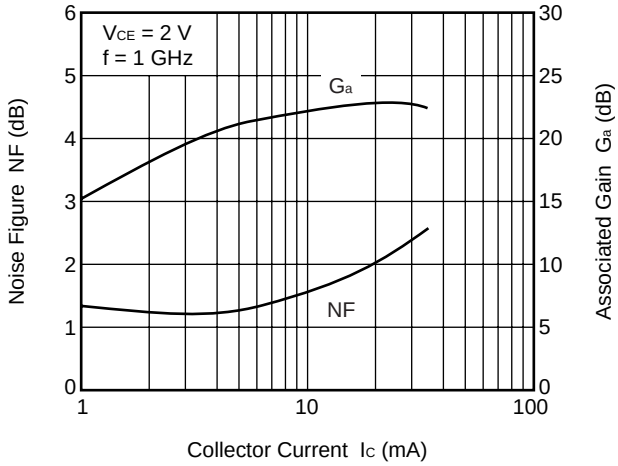
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



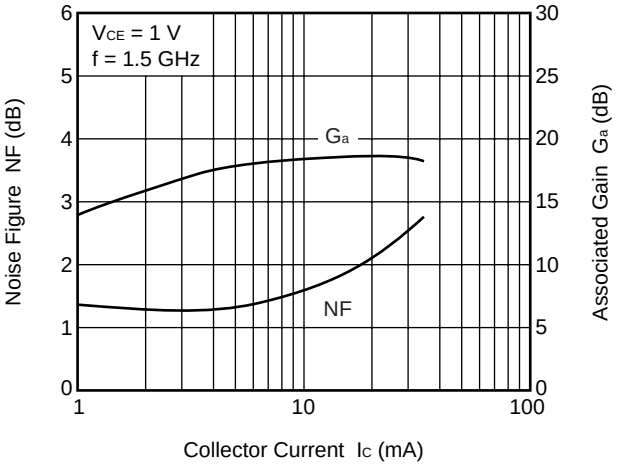
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



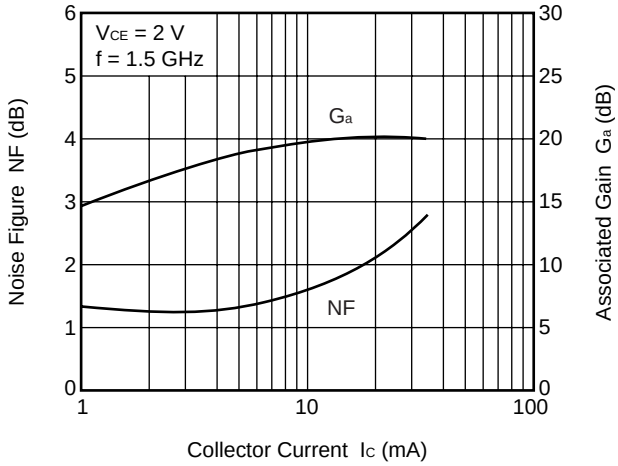
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



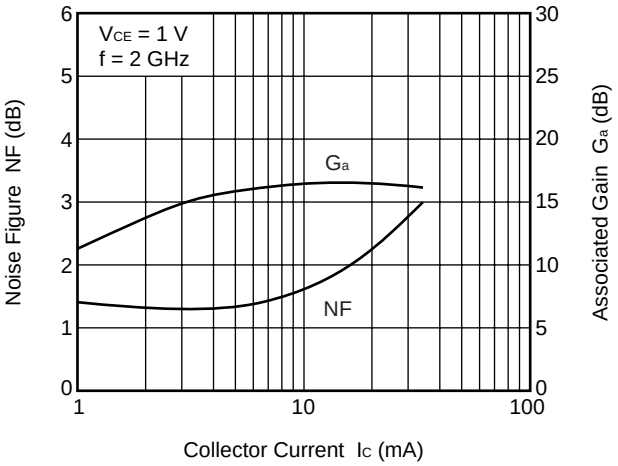
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



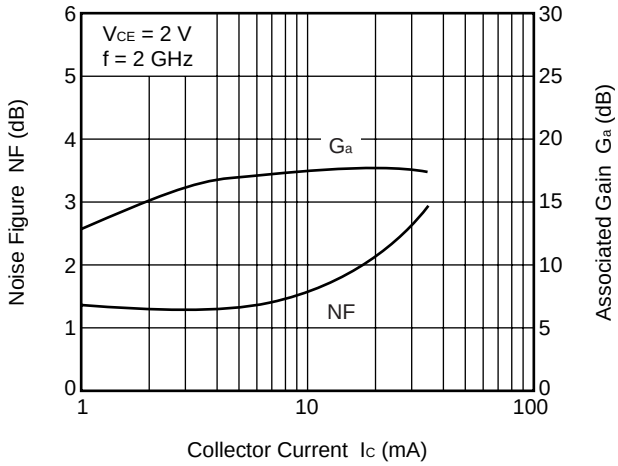
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



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

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

V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	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	0.965	–4.5	3.490	175.8	0.011	88.9	0.992	–3.0	–0.006	24.87
0.2	0.954	–9.9	3.475	171.5	0.021	83.5	0.982	–5.9	0.045	22.25
0.3	0.949	–15.5	3.490	167.9	0.031	79.2	0.975	–8.6	0.058	20.51
0.4	0.944	–20.9	3.481	163.1	0.042	76.3	0.956	–11.5	0.076	19.23
0.5	0.935	–26.2	3.457	158.8	0.052	72.7	0.947	–14.2	0.097	18.24
0.6	0.934	–31.8	3.450	154.3	0.062	68.8	0.923	–17.2	0.119	17.46
0.7	0.918	–37.6	3.407	150.1	0.072	65.3	0.909	–19.8	0.138	16.77
0.8	0.906	–43.2	3.355	145.8	0.081	61.1	0.881	–22.7	0.172	16.18
0.9	0.892	–49.0	3.345	141.2	0.090	57.6	0.864	–25.8	0.189	15.71
1.0	0.876	–55.3	3.279	136.6	0.097	53.6	0.836	–28.7	0.218	15.27
1.1	0.859	–61.5	3.236	132.3	0.105	50.0	0.818	–31.8	0.230	14.88
1.2	0.842	–67.3	3.180	128.1	0.112	46.3	0.792	–34.5	0.259	14.55
1.3	0.832	–73.6	3.107	123.9	0.118	42.6	0.776	–37.4	0.266	14.19
1.4	0.818	–79.3	3.029	119.9	0.124	38.9	0.750	–40.0	0.293	13.88
1.5	0.806	–85.2	2.956	115.8	0.129	35.6	0.734	–42.8	0.305	13.60
1.6	0.793	–90.8	2.878	112.1	0.133	32.1	0.707	–45.2	0.333	13.35
1.7	0.785	–96.3	2.790	108.2	0.136	29.1	0.690	–47.6	0.350	13.11
1.8	0.772	–101.3	2.699	104.6	0.139	26.1	0.666	–49.5	0.385	12.90
1.9	0.762	–106.1	2.609	101.5	0.141	23.3	0.648	–51.6	0.408	12.67
2.0	0.756	–111.2	2.529	97.9	0.143	20.7	0.626	–53.3	0.435	12.48
2.1	0.744	–115.6	2.447	95.0	0.144	18.3	0.612	–55.1	0.461	12.29
2.2	0.740	–119.8	2.376	92.0	0.146	15.8	0.596	–56.4	0.488	12.12
2.3	0.733	–124.0	2.293	89.4	0.146	13.9	0.583	–58.1	0.509	11.95
2.4	0.731	–128.0	2.229	86.6	0.147	11.4	0.569	–59.5	0.533	11.80
2.5	0.729	–131.9	2.167	83.9	0.148	9.7	0.556	–61.3	0.549	11.66
2.6	0.723	–135.1	2.089	81.7	0.148	7.2	0.546	–62.4	0.584	11.49
2.7	0.723	–138.9	2.036	78.8	0.149	5.3	0.533	–64.2	0.601	11.35
2.8	0.720	–142.0	1.981	76.3	0.149	3.2	0.519	–65.1	0.635	11.24
2.9	0.712	–145.2	1.933	73.5	0.150	1.7	0.502	–67.1	0.674	11.11
3.0	0.710	–148.5	1.871	71.0	0.149	–0.1	0.489	–68.5	0.710	10.98
4.0	0.691	–178.8	1.539	48.4	0.144	–13.9	0.393	–90.3	0.958	10.29
5.0	0.694	155.9	1.196	26.3	0.127	–26.4	0.348	–113.0	1.398	5.98

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	0.885	–7.6	9.055	174.7	0.010	92.5	0.982	–4.9	–0.058	29.39
0.2	0.870	–15.0	8.938	168.1	0.020	79.5	0.967	–9.6	0.100	26.45
0.3	0.864	–23.5	8.912	162.8	0.030	75.2	0.950	–14.2	0.098	24.80
0.4	0.849	–31.4	8.766	156.7	0.039	71.2	0.921	–18.8	0.123	23.50
0.5	0.832	–39.5	8.568	151.1	0.048	66.9	0.897	–23.3	0.139	22.51
0.6	0.818	–47.4	8.396	145.4	0.056	62.1	0.857	–28.0	0.174	21.74
0.7	0.793	–55.3	8.116	140.1	0.064	57.8	0.825	–32.1	0.202	21.02
0.8	0.770	–63.3	7.831	134.9	0.071	53.3	0.779	–36.6	0.234	20.46
0.9	0.747	–71.2	7.600	129.5	0.077	49.5	0.746	–40.9	0.260	19.95
1.0	0.724	–79.1	7.272	124.5	0.081	45.5	0.702	–44.8	0.294	19.51
1.1	0.705	–86.7	7.021	119.9	0.085	41.8	0.669	–48.9	0.314	19.15
1.2	0.684	–94.0	6.726	115.5	0.089	38.6	0.630	–52.5	0.348	18.77
1.3	0.672	–101.5	6.419	111.2	0.092	35.1	0.604	–56.1	0.364	18.42
1.4	0.662	–107.6	6.132	107.4	0.095	32.3	0.568	–59.3	0.394	18.10
1.5	0.649	–114.0	5.854	103.6	0.097	29.5	0.543	–62.5	0.419	17.81
1.6	0.643	–119.6	5.599	100.2	0.098	27.1	0.511	–65.2	0.449	17.56
1.7	0.635	–124.9	5.329	96.8	0.100	24.7	0.489	–67.8	0.477	17.28
1.8	0.625	–129.9	5.073	93.8	0.100	22.7	0.460	–69.7	0.519	17.04
1.9	0.622	–134.1	4.871	91.2	0.101	20.8	0.442	–71.8	0.544	16.85
2.0	0.618	–138.8	4.657	88.0	0.102	19.2	0.418	–73.6	0.579	16.61
2.1	0.617	–143.0	4.467	85.7	0.102	17.8	0.402	–75.6	0.603	16.42
2.2	0.614	–146.4	4.303	83.2	0.102	16.3	0.383	–76.9	0.638	16.24
2.3	0.612	–150.2	4.119	81.1	0.102	15.1	0.370	–78.8	0.665	16.05
2.4	0.613	–153.5	3.972	78.7	0.102	13.8	0.353	–80.1	0.695	15.88
2.5	0.613	–156.8	3.827	76.4	0.103	12.7	0.341	–82.1	0.721	15.71
2.6	0.614	–159.6	3.684	74.5	0.103	11.2	0.328	–83.0	0.753	15.55
2.7	0.613	–162.6	3.553	72.3	0.103	10.3	0.315	–85.3	0.784	15.37
2.8	0.612	–165.1	3.444	70.2	0.103	9.1	0.300	–86.2	0.819	15.24
2.9	0.608	–168.1	3.324	67.9	0.103	8.3	0.286	–88.9	0.859	15.07
3.0	0.608	–170.8	3.212	65.7	0.103	7.5	0.273	–90.1	0.895	14.93
4.0	0.615	163.5	2.480	46.3	0.104	1.8	0.206	–123.6	1.158	11.37
5.0	0.635	143.3	1.899	28.4	0.103	–3.8	0.187	–152.5	1.464	8.60

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	0.829	–9.2	13.298	173.4	0.010	83.3	0.974	–6.3	0.095	31.45
0.2	0.809	–19.2	13.031	165.6	0.020	78.6	0.953	–12.5	0.112	28.23
0.3	0.793	–29.9	12.882	159.1	0.029	72.2	0.929	–18.3	0.133	26.54
0.4	0.773	–39.9	12.502	152.0	0.037	67.8	0.890	–24.3	0.154	25.31
0.5	0.748	–49.5	12.071	145.4	0.045	63.3	0.851	–30.0	0.183	24.31
0.6	0.729	–59.1	11.622	139.1	0.052	57.8	0.799	–35.6	0.227	23.51
0.7	0.702	–68.7	11.071	133.2	0.058	53.7	0.755	–40.7	0.256	22.81
0.8	0.675	–77.7	10.509	127.7	0.063	49.1	0.699	–45.8	0.303	22.25
0.9	0.654	–86.7	10.002	122.1	0.067	45.6	0.658	–50.6	0.331	21.73
1.0	0.632	–95.1	9.425	117.2	0.070	42.0	0.610	–55.2	0.370	21.26
1.1	0.619	–103.4	8.957	112.7	0.073	38.8	0.572	–59.6	0.396	20.87
1.2	0.605	–110.8	8.464	108.5	0.075	36.1	0.531	–63.7	0.432	20.50
1.3	0.597	–118.2	7.978	104.6	0.078	33.6	0.502	–67.5	0.456	20.12
1.4	0.591	–124.3	7.560	100.9	0.079	31.2	0.467	–71.1	0.492	19.80
1.5	0.582	–130.3	7.149	97.5	0.080	29.2	0.443	–74.4	0.523	19.49
1.6	0.580	–135.8	6.783	94.3	0.081	27.2	0.412	–77.4	0.560	19.22
1.7	0.575	–140.5	6.428	91.2	0.082	25.7	0.392	–80.2	0.592	18.93
1.8	0.570	–145.0	6.087	88.6	0.083	24.2	0.365	–82.5	0.637	18.67
1.9	0.571	–148.8	5.816	86.5	0.083	23.1	0.348	–84.8	0.665	18.45
2.0	0.570	–153.1	5.543	83.4	0.084	22.1	0.326	–86.9	0.703	18.21
2.1	0.570	–156.6	5.285	81.4	0.084	21.1	0.312	–89.3	0.731	17.96
2.2	0.570	–159.6	5.085	79.1	0.085	20.1	0.293	–91.0	0.767	17.77
2.3	0.572	–162.9	4.847	77.1	0.085	19.6	0.282	–93.3	0.797	17.56
2.4	0.573	–165.5	4.663	75.1	0.086	18.6	0.265	–94.9	0.829	17.36
2.5	0.576	–168.6	4.490	73.0	0.086	18.2	0.255	–97.4	0.854	17.16
2.6	0.576	–171.1	4.314	71.2	0.086	17.2	0.242	–98.7	0.891	16.98
2.7	0.578	–173.7	4.160	69.1	0.087	16.7	0.231	–101.7	0.918	16.78
2.8	0.577	–175.7	4.012	67.2	0.088	15.8	0.217	–103.2	0.954	16.61
2.9	0.573	–178.3	3.866	65.2	0.088	15.3	0.206	–106.9	0.995	16.42
3.0	0.576	179.2	3.733	63.1	0.088	15.1	0.194	–108.9	1.028	15.23
4.0	0.594	156.1	2.831	45.1	0.095	11.9	0.170	–152.0	1.247	11.77
5.0	0.619	137.8	2.158	29.0	0.101	6.4	0.178	178.0	1.452	9.29

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	0.770	–12.3	16.673	172.6	0.010	86.5	0.965	–7.4	0.053	32.25
0.2	0.752	–23.1	16.257	163.6	0.019	75.8	0.939	–14.8	0.147	29.39
0.3	0.733	–35.2	15.908	156.1	0.027	71.2	0.907	–21.7	0.148	27.67
0.4	0.713	–46.6	15.287	148.2	0.035	65.6	0.860	–28.6	0.189	26.34
0.5	0.686	–57.7	14.568	141.1	0.042	61.0	0.811	–35.1	0.221	25.37
0.6	0.663	–68.7	13.841	134.4	0.048	55.7	0.750	–41.3	0.268	24.59
0.7	0.636	–78.8	12.973	128.4	0.053	51.1	0.699	–46.8	0.309	23.89
0.8	0.612	–88.6	12.166	122.9	0.057	47.1	0.638	–52.4	0.358	23.29
0.9	0.596	–97.9	11.447	117.4	0.061	43.7	0.594	–57.5	0.391	22.77
1.0	0.577	–106.6	10.683	112.7	0.063	40.9	0.544	–62.5	0.436	22.28
1.1	0.566	–115.1	10.058	108.3	0.065	38.0	0.507	–67.1	0.467	21.88
1.2	0.556	–122.3	9.433	104.2	0.067	35.9	0.467	–71.6	0.510	21.48
1.3	0.554	–129.5	8.845	100.4	0.068	33.7	0.439	–75.7	0.538	21.11
1.4	0.552	–135.5	8.326	97.1	0.070	31.8	0.406	–79.5	0.575	20.76
1.5	0.549	–141.3	7.840	93.8	0.071	30.1	0.384	–83.0	0.606	20.42
1.6	0.547	–146.2	7.403	90.9	0.072	28.9	0.355	–86.4	0.649	20.13
1.7	0.547	–150.6	7.000	88.1	0.073	27.7	0.337	–89.4	0.681	19.84
1.8	0.545	–154.6	6.627	85.7	0.073	26.8	0.312	–92.2	0.727	19.57
1.9	0.545	–158.2	6.304	83.4	0.074	26.1	0.298	–94.9	0.760	19.33
2.0	0.546	–161.6	6.004	80.7	0.074	25.0	0.277	–97.6	0.797	19.07
2.1	0.549	–164.9	5.711	78.8	0.075	24.7	0.265	–100.3	0.826	18.80
2.2	0.551	–167.6	5.488	76.7	0.076	23.9	0.248	–102.4	0.857	18.59
2.3	0.553	–170.6	5.223	75.0	0.077	23.7	0.239	–105.2	0.888	18.32
2.4	0.556	–172.9	5.028	73.1	0.077	23.0	0.223	–107.3	0.918	18.12
2.5	0.560	–175.4	4.824	71.1	0.078	22.6	0.214	–110.4	0.942	17.89
2.6	0.561	–177.9	4.632	69.3	0.079	22.2	0.202	–112.0	0.978	17.69
2.7	0.564	179.8	4.459	67.4	0.080	21.9	0.192	–115.7	1.003	17.16
2.8	0.562	178.0	4.310	65.6	0.081	21.1	0.180	–118.2	1.036	16.12
2.9	0.560	175.6	4.145	63.7	0.081	20.9	0.173	–122.9	1.073	15.41
3.0	0.563	173.4	4.004	61.7	0.082	20.5	0.162	–125.7	1.101	14.94
4.0	0.589	151.9	3.006	44.4	0.092	18.0	0.172	–170.4	1.270	12.03
5.0	0.615	134.9	2.297	28.7	0.102	11.7	0.194	162.7	1.419	9.67

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	0.712	–12.7	20.483	171.2	0.010	85.9	0.954	–8.6	0.112	33.32
0.2	0.683	–27.6	19.790	161.2	0.018	73.9	0.921	–17.4	0.182	30.39
0.3	0.668	–41.7	19.166	152.8	0.026	68.9	0.880	–25.4	0.183	28.74
0.4	0.642	–55.0	18.137	144.3	0.033	63.5	0.822	–33.3	0.228	27.37
0.5	0.615	–67.7	17.002	136.6	0.039	58.1	0.763	–40.6	0.273	26.37
0.6	0.595	–79.4	15.910	129.7	0.044	53.1	0.696	–47.3	0.324	25.58
0.7	0.572	–90.6	14.739	123.6	0.048	49.4	0.639	–53.4	0.368	24.86
0.8	0.555	–100.7	13.624	118.1	0.051	45.8	0.576	–59.3	0.422	24.24
0.9	0.542	–110.2	12.683	112.7	0.054	42.9	0.529	–64.9	0.464	23.70
1.0	0.529	–119.1	11.734	108.2	0.056	40.4	0.481	–70.3	0.513	23.20
1.1	0.528	–127.0	10.953	104.1	0.058	38.3	0.446	–75.2	0.546	22.78
1.2	0.522	–134.2	10.202	100.2	0.059	36.3	0.409	–80.0	0.592	22.34
1.3	0.523	–140.8	9.529	96.7	0.061	34.9	0.383	–84.3	0.625	21.96
1.4	0.525	–146.4	8.936	93.6	0.062	33.5	0.353	–88.6	0.663	21.58
1.5	0.524	–151.5	8.382	90.5	0.063	32.5	0.334	–92.4	0.699	21.23
1.6	0.528	–155.9	7.902	87.9	0.064	31.4	0.308	–96.2	0.739	20.92
1.7	0.531	–159.9	7.440	85.2	0.065	30.8	0.293	–99.5	0.771	20.59
1.8	0.530	–163.6	7.040	82.9	0.066	30.3	0.271	–103.0	0.816	20.30
1.9	0.530	–166.6	6.681	81.0	0.066	29.7	0.259	–106.0	0.852	20.03
2.0	0.535	–170.0	6.339	78.4	0.068	29.1	0.240	–109.3	0.886	19.73
2.1	0.535	–172.6	6.041	76.6	0.068	28.8	0.231	–112.5	0.916	19.45
2.2	0.537	–174.7	5.793	74.5	0.069	28.4	0.215	–115.4	0.948	19.22
2.3	0.542	–177.6	5.527	72.9	0.071	28.3	0.208	–118.6	0.971	18.94
2.4	0.545	–179.7	5.303	71.1	0.072	27.9	0.194	–121.5	1.001	18.56
2.5	0.549	178.2	5.095	69.2	0.073	27.6	0.187	–125.1	1.022	17.56
2.6	0.551	176.1	4.886	67.7	0.073	27.3	0.176	–127.9	1.054	16.81
2.7	0.553	174.0	4.699	65.9	0.075	26.9	0.170	–132.5	1.076	16.30
2.8	0.554	172.5	4.540	64.2	0.076	26.5	0.160	–136.0	1.102	15.83
2.9	0.549	170.1	4.365	62.3	0.077	26.3	0.157	–141.1	1.140	15.27
3.0	0.553	168.3	4.206	60.5	0.078	26.0	0.148	–144.9	1.163	14.88
4.0	0.583	148.4	3.139	43.8	0.090	23.2	0.185	175.0	1.291	12.17
5.0	0.613	132.6	2.388	29.2	0.103	16.3	0.216	151.9	1.399	9.88

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	0.557	–20.7	27.541	168.8	0.008	73.3	0.917	–11.3	0.316	35.18
0.2	0.539	–39.7	26.127	156.5	0.017	71.5	0.871	–22.9	0.249	31.87
0.3	0.526	–58.1	24.637	146.2	0.024	65.1	0.810	–33.1	0.276	30.17
0.4	0.513	–75.4	22.525	136.7	0.029	59.6	0.733	–42.7	0.325	28.89
0.5	0.498	–90.0	20.502	128.5	0.034	54.7	0.660	–51.2	0.385	27.83
0.6	0.492	–103.4	18.627	121.4	0.037	50.6	0.585	–58.8	0.447	26.98
0.7	0.484	–114.9	16.883	115.5	0.040	47.3	0.524	–65.6	0.506	26.25
0.8	0.481	–124.9	15.305	110.4	0.042	45.1	0.465	–72.4	0.567	25.59
0.9	0.479	–133.8	14.003	105.5	0.044	43.4	0.422	–78.5	0.618	24.99
1.0	0.482	–141.6	12.786	101.5	0.046	42.1	0.380	–84.9	0.672	24.44
1.1	0.489	–148.4	11.831	97.8	0.047	40.6	0.352	–90.5	0.710	23.97
1.2	0.493	–154.6	10.930	94.3	0.049	39.9	0.322	–96.4	0.757	23.48
1.3	0.502	–159.5	10.123	91.2	0.050	39.1	0.303	–101.2	0.791	23.04
1.4	0.507	–164.1	9.456	88.5	0.052	38.6	0.281	–106.5	0.831	22.61
1.5	0.512	–167.6	8.833	85.7	0.053	38.1	0.268	–110.9	0.864	22.21
1.6	0.518	–171.2	8.288	83.5	0.054	37.8	0.249	–115.9	0.902	21.84
1.7	0.522	–174.4	7.785	81.2	0.056	37.4	0.239	–119.8	0.933	21.45
1.8	0.521	–176.8	7.345	79.1	0.057	37.3	0.223	–124.5	0.976	21.12
1.9	0.524	–179.6	6.969	77.2	0.058	37.1	0.217	–128.0	1.001	20.56
2.0	0.530	177.9	6.619	74.9	0.059	36.8	0.203	–132.5	1.029	19.42
2.1	0.532	176.1	6.284	73.3	0.061	36.9	0.199	–136.3	1.053	18.72
2.2	0.535	174.2	6.034	71.6	0.062	36.5	0.188	–140.5	1.075	18.18
2.3	0.540	172.2	5.741	70.0	0.064	36.7	0.185	–144.3	1.097	17.64
2.4	0.544	170.3	5.514	68.3	0.065	36.1	0.175	–148.6	1.116	17.20
2.5	0.548	168.6	5.273	66.5	0.067	36.0	0.173	–152.5	1.132	16.76
2.6	0.549	167.1	5.069	65.1	0.068	35.7	0.166	–156.5	1.157	16.31
2.7	0.553	165.4	4.863	63.5	0.070	35.4	0.166	–161.4	1.169	15.92
2.8	0.553	164.1	4.694	61.9	0.071	34.9	0.160	–165.8	1.189	15.55
2.9	0.551	162.0	4.498	60.2	0.073	34.6	0.163	–170.4	1.216	15.08
3.0	0.554	160.3	4.343	58.5	0.074	34.4	0.158	–174.9	1.233	14.75
4.0	0.589	143.1	3.214	42.5	0.091	30.4	0.222	158.1	1.299	12.22
5.0	0.619	128.7	2.446	28.8	0.106	21.8	0.260	140.2	1.362	10.03

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	0.981	–4.5	3.479	176.3	0.009	89.7	0.995	–2.6	–0.030	25.73
0.2	0.959	–9.4	3.474	172.0	0.018	82.6	0.985	–5.1	0.063	22.90
0.3	0.957	–14.4	3.495	168.6	0.026	80.5	0.979	–7.4	0.051	21.26
0.4	0.950	–19.7	3.487	164.2	0.035	77.0	0.965	–10.1	0.073	19.95
0.5	0.938	–24.6	3.468	160.2	0.044	74.1	0.957	–12.5	0.090	18.92
0.6	0.938	–29.9	3.472	155.9	0.053	70.1	0.936	–14.9	0.120	18.17
0.7	0.924	–35.3	3.431	152.0	0.061	67.2	0.924	–17.5	0.126	17.47
0.8	0.913	–40.7	3.393	147.7	0.069	63.3	0.898	–20.2	0.159	16.89
0.9	0.901	–46.4	3.386	143.3	0.077	59.7	0.884	–22.9	0.176	16.42
1.0	0.886	–52.3	3.330	139.0	0.084	56.0	0.859	–25.6	0.203	15.98
1.1	0.870	–58.2	3.297	134.9	0.091	52.4	0.843	–28.4	0.219	15.59
1.2	0.855	–63.9	3.249	130.7	0.097	48.9	0.821	–31.0	0.243	15.26
1.3	0.842	–70.0	3.183	126.6	0.103	45.2	0.806	–33.7	0.254	14.90
1.4	0.829	–75.5	3.114	122.7	0.108	41.6	0.782	–36.2	0.280	14.59
1.5	0.817	–81.2	3.044	118.6	0.113	38.4	0.767	–38.8	0.294	14.30
1.6	0.807	–86.7	2.972	115.0	0.117	35.0	0.743	–41.1	0.317	14.05
1.7	0.795	–92.2	2.889	111.1	0.120	31.9	0.728	–43.4	0.336	13.81
1.8	0.784	–97.3	2.802	107.7	0.122	28.9	0.703	–45.1	0.369	13.60
1.9	0.774	–102.1	2.714	104.5	0.125	26.3	0.687	–47.0	0.390	13.37
2.0	0.767	–106.9	2.639	100.9	0.126	23.7	0.666	–48.4	0.422	13.20
2.1	0.755	–111.6	2.555	98.1	0.128	21.3	0.654	–50.4	0.442	13.00
2.2	0.751	–115.7	2.484	95.1	0.129	18.9	0.637	–51.7	0.469	12.83
2.3	0.742	–120.1	2.400	92.4	0.130	16.8	0.626	–53.2	0.493	12.66
2.4	0.740	–123.9	2.333	89.7	0.131	14.4	0.612	–54.5	0.517	12.51
2.5	0.736	–127.8	2.275	86.9	0.132	12.6	0.600	–56.2	0.536	12.38
2.6	0.733	–131.3	2.193	84.8	0.132	10.0	0.589	–57.3	0.567	12.21
2.7	0.731	–135.1	2.141	81.9	0.133	8.3	0.575	–59.0	0.587	12.08
2.8	0.726	–138.2	2.083	79.4	0.133	6.2	0.563	–59.9	0.624	11.94
2.9	0.721	–141.4	2.034	76.6	0.133	4.7	0.545	–61.6	0.660	11.83
3.0	0.715	–144.8	1.976	74.1	0.133	2.9	0.534	–63.0	0.698	11.72
4.0	0.691	–175.6	1.633	51.7	0.130	–10.5	0.434	–82.8	0.957	10.99
5.0	0.694	158.5	1.282	29.3	0.114	–22.7	0.384	–103.7	1.401	6.73

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	0.890	–7.1	9.038	175.0	0.009	89.1	0.987	–4.0	–0.006	30.02
0.2	0.879	–14.0	8.938	169.1	0.017	81.0	0.974	–8.2	0.081	27.16
0.3	0.872	–21.4	8.937	164.2	0.025	76.1	0.960	–12.1	0.100	25.49
0.4	0.862	–28.8	8.822	158.5	0.033	72.7	0.937	–16.2	0.114	24.26
0.5	0.841	–36.0	8.650	153.2	0.041	69.1	0.916	–20.1	0.131	23.24
0.6	0.830	–43.3	8.522	147.8	0.048	64.5	0.883	–24.1	0.167	22.45
0.7	0.806	–50.9	8.288	142.6	0.055	60.7	0.854	–27.9	0.189	21.75
0.8	0.785	–58.1	8.035	137.6	0.061	56.2	0.812	–31.7	0.228	21.18
0.9	0.764	–65.7	7.840	132.5	0.067	52.6	0.783	–35.6	0.247	20.71
1.0	0.739	–73.1	7.546	127.6	0.072	48.7	0.743	–39.2	0.283	20.23
1.1	0.721	–80.5	7.318	123.2	0.075	45.0	0.712	–42.9	0.302	19.86
1.2	0.700	–87.3	7.033	118.7	0.079	41.8	0.676	–46.1	0.335	19.50
1.3	0.685	–94.7	6.748	114.6	0.082	38.4	0.650	–49.4	0.351	19.15
1.4	0.671	–100.9	6.475	110.8	0.085	35.6	0.616	–52.2	0.382	18.83
1.5	0.660	–107.2	6.206	106.8	0.087	32.8	0.592	–55.2	0.403	18.54
1.6	0.648	–112.9	5.949	103.3	0.088	30.1	0.559	–57.6	0.439	18.28
1.7	0.638	–118.3	5.683	99.9	0.090	27.9	0.538	–59.9	0.467	18.02
1.8	0.630	–123.4	5.437	96.9	0.091	25.8	0.511	–61.6	0.502	17.79
1.9	0.622	–127.9	5.199	94.2	0.091	23.8	0.490	–63.6	0.534	17.55
2.0	0.617	–132.6	4.997	90.9	0.092	22.2	0.467	–65.1	0.567	17.34
2.1	0.614	–137.0	4.791	88.6	0.093	20.8	0.451	–66.8	0.592	17.14
2.2	0.613	–140.5	4.622	86.0	0.093	19.2	0.433	–67.9	0.622	16.96
2.3	0.608	–144.5	4.428	83.9	0.093	18.2	0.420	–69.5	0.652	16.77
2.4	0.608	–147.8	4.271	81.5	0.094	16.6	0.402	–70.6	0.684	16.59
2.5	0.609	–151.3	4.130	79.3	0.094	15.5	0.390	–72.3	0.704	16.44
2.6	0.606	–154.4	3.970	77.3	0.094	14.1	0.377	–73.0	0.744	16.27
2.7	0.608	–157.6	3.838	75.0	0.094	13.1	0.363	–74.8	0.767	16.10
2.8	0.605	–160.2	3.718	72.9	0.094	11.9	0.349	–75.4	0.806	15.95
2.9	0.599	–162.9	3.597	70.6	0.095	11.0	0.334	–77.6	0.850	15.80
3.0	0.599	–165.8	3.473	68.4	0.094	10.3	0.321	–78.3	0.887	15.66
4.0	0.602	167.0	2.705	48.9	0.096	5.0	0.234	–105.8	1.154	12.13
5.0	0.622	146.0	2.082	30.8	0.096	–0.5	0.198	–131.2	1.455	9.36

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	0.831	–9.2	13.327	174.2	0.008	82.0	0.979	–5.2	0.105	32.28
0.2	0.815	–17.2	13.091	166.8	0.016	78.2	0.962	–10.5	0.129	29.02
0.3	0.805	–26.7	12.973	160.8	0.024	74.1	0.942	–15.5	0.127	27.29
0.4	0.787	–35.7	12.695	154.1	0.032	70.2	0.911	–20.7	0.148	26.05
0.5	0.764	–44.6	12.309	147.9	0.039	65.8	0.878	–25.6	0.177	25.04
0.6	0.747	–53.3	11.942	141.9	0.045	61.3	0.832	–30.4	0.213	24.26
0.7	0.718	–62.1	11.440	136.4	0.050	57.1	0.794	–35.1	0.243	23.56
0.8	0.692	–70.6	10.929	131.0	0.055	52.6	0.742	–39.4	0.290	22.97
0.9	0.668	–79.2	10.485	125.6	0.059	49.1	0.704	–43.7	0.317	22.47
1.0	0.644	–87.4	9.946	120.6	0.063	45.6	0.656	–47.8	0.359	22.00
1.1	0.627	–95.3	9.491	116.2	0.065	42.4	0.621	–51.7	0.384	21.62
1.2	0.607	–102.8	9.024	111.8	0.068	39.6	0.581	–55.2	0.424	21.24
1.3	0.599	–109.9	8.557	107.8	0.070	37.0	0.552	–58.7	0.445	20.88
1.4	0.590	–116.5	8.133	104.1	0.072	34.5	0.517	–61.8	0.479	20.54
1.5	0.581	–122.6	7.716	100.6	0.073	32.4	0.492	–64.6	0.506	20.23
1.6	0.574	–128.2	7.330	97.4	0.074	30.4	0.460	–67.3	0.546	19.95
1.7	0.570	–133.4	6.970	94.2	0.075	28.8	0.439	–69.7	0.574	19.67
1.8	0.562	–138.0	6.618	91.5	0.075	27.4	0.412	–71.4	0.621	19.43
1.9	0.559	–142.1	6.314	89.0	0.076	26.0	0.394	–73.5	0.651	19.18
2.0	0.560	–146.6	6.025	86.1	0.077	24.7	0.371	–75.0	0.687	18.94
2.1	0.558	–150.4	5.767	84.0	0.078	23.9	0.357	–76.9	0.715	18.71
2.2	0.556	–153.4	5.539	81.6	0.078	23.1	0.338	–78.1	0.753	18.53
2.3	0.557	–157.2	5.299	79.8	0.078	22.2	0.325	–79.8	0.782	18.31
2.4	0.560	–160.2	5.100	77.5	0.079	21.3	0.308	–80.7	0.811	18.10
2.5	0.561	–163.2	4.918	75.5	0.079	20.8	0.297	–82.7	0.837	17.92
2.6	0.561	–165.8	4.714	73.7	0.079	19.8	0.284	–83.3	0.876	17.73
2.7	0.563	–168.4	4.546	71.7	0.080	19.4	0.271	–85.5	0.902	17.53
2.8	0.561	–170.7	4.401	69.8	0.081	18.6	0.257	–86.2	0.939	17.37
2.9	0.556	–173.4	4.228	67.6	0.081	18.0	0.244	–88.8	0.982	17.15
3.0	0.560	–176.0	4.091	65.7	0.082	17.7	0.231	–89.7	1.013	16.32
4.0	0.576	159.6	3.124	47.4	0.088	14.8	0.172	–126.9	1.228	12.61
5.0	0.601	140.4	2.398	30.8	0.095	9.4	0.157	–158.1	1.431	10.12

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	0.786	–9.7	16.732	173.2	0.009	90.5	0.972	–6.1	0.020	32.61
0.2	0.761	–20.4	16.371	164.9	0.016	77.5	0.951	–12.4	0.144	30.08
0.3	0.748	–31.1	16.148	158.1	0.023	72.8	0.924	–18.3	0.150	28.41
0.4	0.728	–41.5	15.593	150.9	0.030	69.0	0.884	–24.2	0.172	27.15
0.5	0.700	–51.5	14.982	144.1	0.036	63.6	0.844	–29.8	0.215	26.15
0.6	0.682	–61.2	14.352	137.6	0.042	58.8	0.790	–35.2	0.259	25.35
0.7	0.651	–71.3	13.588	131.6	0.047	54.7	0.744	–40.1	0.295	24.65
0.8	0.627	–80.3	12.804	126.3	0.050	50.5	0.687	–44.8	0.344	24.04
0.9	0.602	–89.3	12.172	120.8	0.054	47.2	0.644	–49.4	0.381	23.53
1.0	0.584	–97.9	11.429	116.0	0.056	44.4	0.595	–53.7	0.420	23.06
1.1	0.567	–106.2	10.819	111.6	0.059	41.5	0.558	–57.8	0.454	22.66
1.2	0.555	–113.5	10.202	107.6	0.060	39.1	0.517	–61.5	0.495	22.27
1.3	0.547	–120.8	9.597	103.8	0.062	36.9	0.489	–65.1	0.521	21.87
1.4	0.543	–127.2	9.067	100.3	0.064	35.0	0.453	–68.2	0.559	21.53
1.5	0.538	–133.0	8.561	96.8	0.065	33.4	0.431	–71.4	0.589	21.20
1.6	0.532	–138.3	8.115	94.0	0.066	31.9	0.399	–73.9	0.634	20.90
1.7	0.534	–143.3	7.671	91.0	0.067	30.7	0.380	–76.4	0.660	20.60
1.8	0.528	–147.6	7.284	88.5	0.067	29.6	0.354	–78.4	0.708	20.34
1.9	0.525	–151.2	6.932	86.2	0.068	28.8	0.338	–80.5	0.743	20.08
2.0	0.528	–155.3	6.607	83.4	0.069	27.7	0.316	–82.3	0.779	19.82
2.1	0.529	–158.9	6.304	81.4	0.070	27.3	0.303	–84.4	0.806	19.57
2.2	0.530	–161.4	6.049	79.4	0.070	26.7	0.284	–85.6	0.842	19.36
2.3	0.531	–164.7	5.774	77.4	0.071	26.3	0.273	–87.6	0.872	19.12
2.4	0.536	–167.6	5.556	75.3	0.072	25.5	0.257	–88.7	0.897	18.90
2.5	0.537	–170.3	5.335	73.5	0.073	25.4	0.246	–91.0	0.924	18.67
2.6	0.539	–172.6	5.121	71.6	0.073	24.8	0.233	–91.7	0.961	18.48
2.7	0.540	–175.2	4.938	69.7	0.074	24.3	0.222	–94.2	0.988	18.26
2.8	0.538	–177.3	4.768	67.9	0.074	23.7	0.209	–95.3	1.023	17.14
2.9	0.535	–179.7	4.601	66.0	0.075	23.3	0.197	–98.6	1.059	16.38
3.0	0.539	177.9	4.434	64.0	0.076	23.1	0.185	–99.8	1.085	15.87
4.0	0.562	155.3	3.345	46.6	0.086	20.8	0.151	–144.3	1.260	12.83
5.0	0.592	137.6	2.570	30.9	0.096	14.6	0.154	–176.7	1.402	10.51

V_{CE} = 2 V, I_C = 10 mA, Z_O = 50 Ω

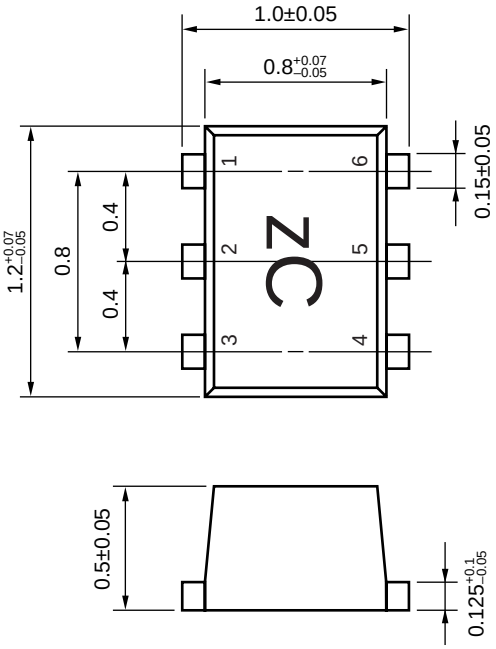
Frequency	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG/MSG
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)		(dB)
0.1	0.721	–11.6	20.644	172.1	0.008	84.3	0.962	–7.1	0.128	33.93
0.2	0.695	–24.0	20.063	162.8	0.015	75.5	0.937	–14.5	0.179	31.26
0.3	0.680	–36.3	19.597	155.1	0.022	70.4	0.904	–21.3	0.190	29.50
0.4	0.657	–48.3	18.704	147.1	0.028	66.3	0.853	–28.0	0.222	28.19
0.5	0.632	–59.7	17.713	140.0	0.034	61.7	0.803	–34.2	0.258	27.20
0.6	0.607	–70.5	16.752	133.2	0.038	56.8	0.741	–40.1	0.314	26.39
0.7	0.581	–81.1	15.649	127.2	0.043	53.2	0.688	–45.4	0.354	25.65
0.8	0.558	–91.0	14.594	121.7	0.046	49.3	0.627	–50.4	0.411	25.05
0.9	0.541	–100.5	13.697	116.2	0.048	46.6	0.582	–55.2	0.448	24.52
1.0	0.525	–109.3	12.728	111.7	0.051	43.9	0.533	–59.6	0.497	24.01
1.1	0.517	–117.4	11.962	107.4	0.052	41.6	0.496	–63.8	0.532	23.60
1.2	0.508	–124.9	11.200	103.6	0.054	39.8	0.456	–67.8	0.577	23.17
1.3	0.507	–132.0	10.468	99.9	0.055	38.2	0.428	–71.5	0.608	22.77
1.4	0.505	–137.9	9.865	96.7	0.057	36.7	0.396	–74.8	0.648	22.41
1.5	0.504	–143.4	9.280	93.6	0.058	35.5	0.375	–77.9	0.678	22.04
1.6	0.505	–148.1	8.764	90.9	0.059	34.4	0.346	–80.8	0.720	21.73
1.7	0.505	–152.7	8.264	88.0	0.060	33.8	0.328	–83.4	0.754	21.41
1.8	0.502	–156.5	7.822	85.7	0.060	33.0	0.303	–85.8	0.803	21.13
1.9	0.501	–160.1	7.431	83.6	0.061	32.3	0.289	–88.1	0.836	20.83
2.0	0.507	–163.5	7.080	81.0	0.062	31.7	0.269	–90.2	0.865	20.55
2.1	0.509	–166.6	6.737	79.2	0.064	31.4	0.256	–92.6	0.894	20.25
2.2	0.510	–169.2	6.477	77.0	0.064	31.0	0.240	–94.2	0.925	20.03
2.3	0.514	–172.1	6.169	75.5	0.065	30.9	0.230	–96.5	0.953	19.76
2.4	0.516	–174.4	5.930	73.5	0.066	30.2	0.215	–98.0	0.983	19.53
2.5	0.520	–176.8	5.685	71.7	0.067	30.1	0.205	–100.7	1.005	18.85
2.6	0.520	–179.1	5.463	70.0	0.068	29.8	0.193	–101.8	1.040	17.84
2.7	0.526	178.8	5.257	68.2	0.069	29.4	0.183	–105.2	1.054	17.37
2.8	0.525	176.9	5.082	66.5	0.070	29.0	0.170	–106.7	1.086	16.82
2.9	0.520	174.5	4.888	64.5	0.071	28.6	0.162	–111.1	1.119	16.26
3.0	0.526	172.7	4.718	62.7	0.072	28.4	0.150	–112.8	1.140	15.88
4.0	0.554	151.5	3.530	45.9	0.085	26.0	0.147	–161.9	1.272	13.06
5.0	0.585	134.9	2.702	31.2	0.097	19.3	0.164	168.4	1.380	10.77

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	0.590	–16.1	27.877	170.0	0.008	85.5	0.938	–9.1	0.184	35.30
0.2	0.557	–32.8	26.790	158.9	0.013	74.2	0.901	–18.5	0.236	32.98
0.3	0.546	–48.9	25.594	149.5	0.020	68.4	0.851	–26.9	0.257	31.12
0.4	0.527	–63.8	23.769	140.5	0.025	63.5	0.783	–34.9	0.309	29.83
0.5	0.503	–77.8	21.934	132.6	0.029	58.9	0.719	–42.0	0.363	28.79
0.6	0.489	–90.2	20.219	125.6	0.033	54.7	0.645	–48.4	0.428	27.91
0.7	0.470	–102.0	18.495	119.7	0.035	51.4	0.587	–54.0	0.485	27.17
0.8	0.460	–112.1	16.930	114.4	0.038	49.0	0.524	–59.6	0.547	26.50
0.9	0.457	–122.0	15.605	109.3	0.040	46.9	0.478	–64.4	0.593	25.92
1.0	0.451	–130.5	14.342	105.2	0.042	45.4	0.432	–69.2	0.649	25.37
1.1	0.456	–137.9	13.324	101.2	0.043	44.0	0.397	–73.6	0.687	24.91
1.2	0.456	–144.7	12.372	97.6	0.045	43.2	0.364	–78.1	0.733	24.43
1.3	0.464	–150.8	11.488	94.4	0.046	42.3	0.340	–81.9	0.762	23.95
1.4	0.467	–155.5	10.748	91.6	0.048	41.6	0.312	–85.8	0.806	23.55
1.5	0.472	–160.2	10.069	88.8	0.049	41.0	0.295	–89.2	0.837	23.15
1.6	0.477	–164.4	9.470	86.3	0.050	40.6	0.271	–92.7	0.876	22.79
1.7	0.479	–167.7	8.911	83.9	0.051	40.3	0.257	–95.6	0.908	22.41
1.8	0.480	–170.8	8.423	81.8	0.052	40.1	0.236	–98.8	0.947	22.06
1.9	0.482	–173.5	7.975	80.0	0.053	39.7	0.225	–101.6	0.980	21.75
2.0	0.487	–176.3	7.590	77.5	0.055	39.3	0.207	–104.6	1.004	21.00
2.1	0.490	–179.0	7.214	75.8	0.056	39.2	0.199	–107.6	1.027	20.07
2.2	0.495	179.3	6.922	74.0	0.058	39.1	0.184	–110.1	1.048	19.45
2.3	0.499	177.0	6.602	72.6	0.059	38.9	0.177	–113.2	1.070	18.87
2.4	0.501	175.4	6.321	70.8	0.060	38.3	0.164	–115.5	1.091	18.36
2.5	0.506	173.3	6.069	69.0	0.062	38.4	0.158	–119.3	1.107	17.93
2.6	0.507	171.5	5.820	67.5	0.063	38.1	0.146	–121.4	1.133	17.44
2.7	0.509	169.8	5.596	65.8	0.065	37.9	0.140	–126.3	1.149	17.03
2.8	0.513	168.2	5.400	64.3	0.066	37.3	0.130	–129.4	1.164	16.67
2.9	0.509	166.2	5.190	62.5	0.067	37.2	0.126	–135.2	1.194	16.20
3.0	0.513	164.4	5.014	60.8	0.069	36.8	0.117	–138.8	1.206	15.88
4.0	0.547	146.1	3.712	44.8	0.085	33.3	0.157	175.8	1.284	13.23
5.0	0.582	131.3	2.845	30.8	0.100	24.6	0.190	152.1	1.337	11.07

PACKAGE DIMENSIONS

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



PIN CONNECTIONS

1. Collector
2. Emitter
3. Emitter
4. Base
5. Emitter
6. Emitter

[MEMO]

[MEMO]

- **The information in this document is current as of April, 2001. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
- No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
- NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
- NEC semiconductor products are classified into the following three quality grades:
  "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application.
  "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).

M8E 00.4