

MICROWAVE LOW NOISE AMPLIFIER  
NPN SILICON EPITAXIAL TRANSISTOR

FEATURES

- Low Voltage Operation, Low Phase Distortion
- Low Noise  
 $NF = 1.5 \text{ dB TYP. @ } V_{CE} = 3 \text{ V, } I_C = 7 \text{ mA, } f = 2 \text{ GHz}$   
 $NF = 1.5 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_C = 3 \text{ mA, } f = 2 \text{ GHz}$
- Large Absolute Maximum Collector Current  
 $I_C = 100 \text{ mA}$
- Supercompact Mini Mold Package

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC5195	In-bulk products (50 pcs.)	Embossed tape 8 mm wide. Pin 3 (Collector) face to perforation side of the tape.
2SC5195-T1	Taped products (3 Kpcs/Reel)	

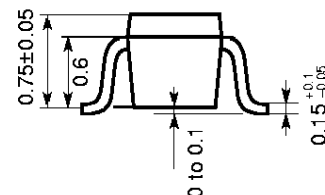
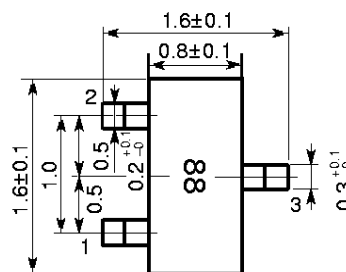
**Remark** If you require an evaluation sample, please contact an NEC Sales Representative. (Unit sample quantity is 50 pcs.)

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25 \text{ }^\circ\text{C}$ )

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	$V_{CBO}$	9	V
Collector to Emitter Voltage	$V_{CEO}$	6	V
Emitter to Base Voltage	$V_{EBO}$	2	V
Collector Current	$I_C$	100	mA
Total Power Dissipation	$P_T$	125	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^\circ\text{C}$

PACKAGE DRAWINGS

(Unit: mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

This device uses radio frequency technology. Take due precautions to protect it from excessive input levels such as static electricity.

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cutoff Current	I <sub>CB0</sub>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0			100	nA
Emitter Cutoff Current	I <sub>EB0</sub>	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0			100	nA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA <sup>Note 1</sup>	80		160	
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz	3	4		dB
Insertion Power Gain (1)	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 20 mA, f = 2.0 GHz		8		dB
Noise Figure (2)	NF	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz		1.7	2.5	dB
Noise Figure (1)	NF	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 2.0 GHz		1.5		dB
Gain Bandwidth Product (2)	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz	4.5	5		GHz
Gain Bandwidth Product (1)	f <sub>T</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 20 mA, f = 2.0 GHz		9.5		GHz
Collector Capacitance	C <sub>re</sub>	V <sub>CB</sub> = 1 V, I <sub>E</sub> = 0, f = 1.0 MHz <sup>Note 2</sup>		0.7	0.8	pF

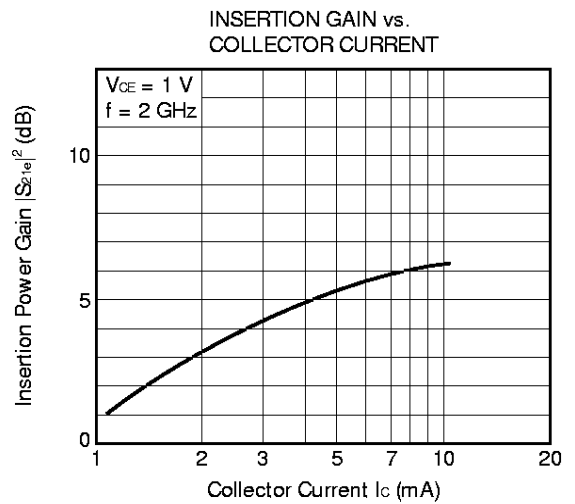
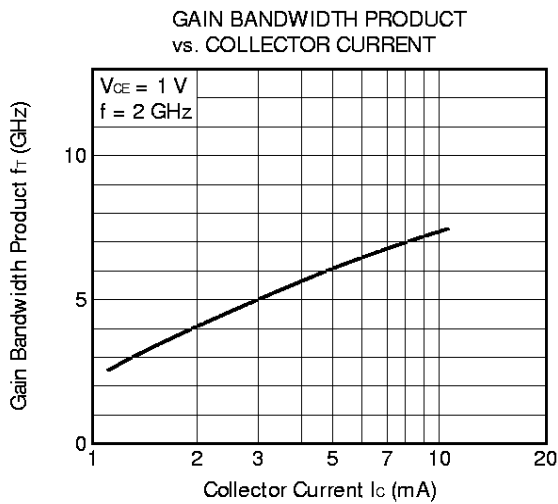
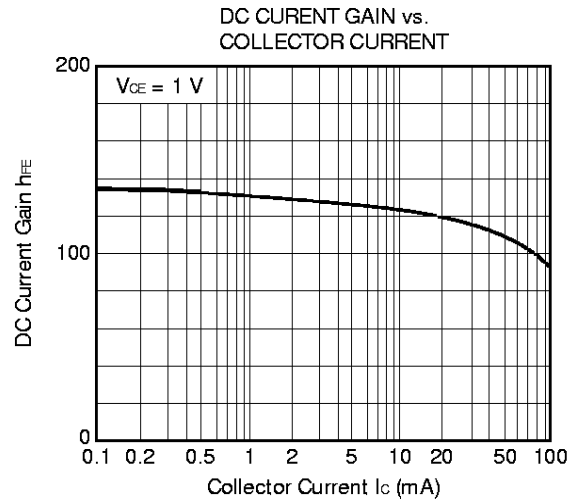
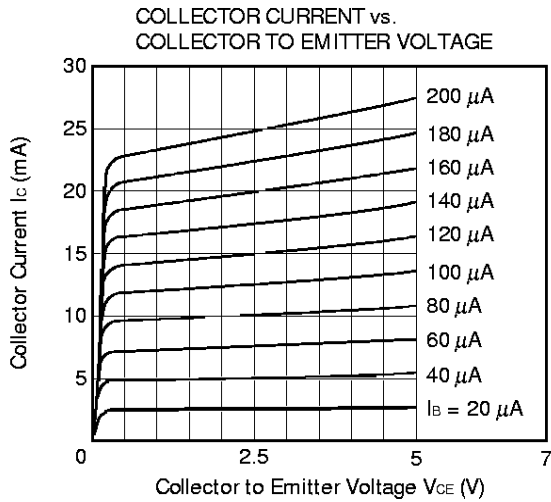
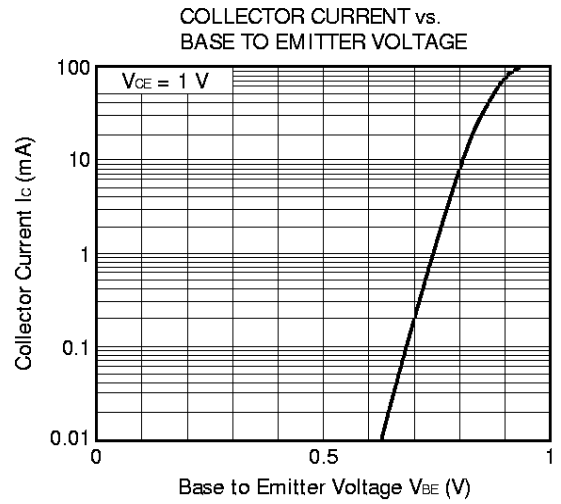
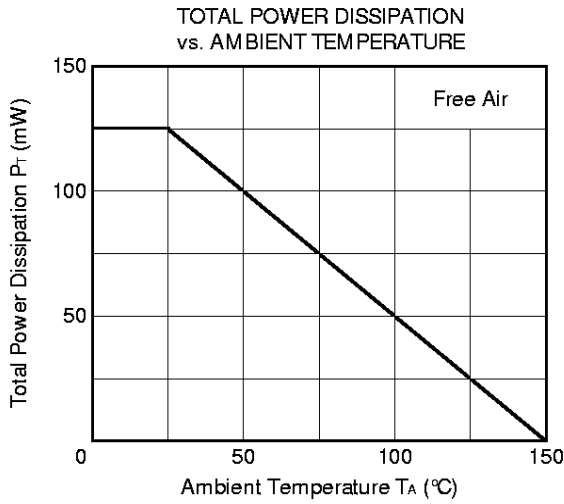
**Notes** 1. Pulse Measurement: PW ≤ 350 μs, Duty cycle ≤ 2 %, Pulsed

2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

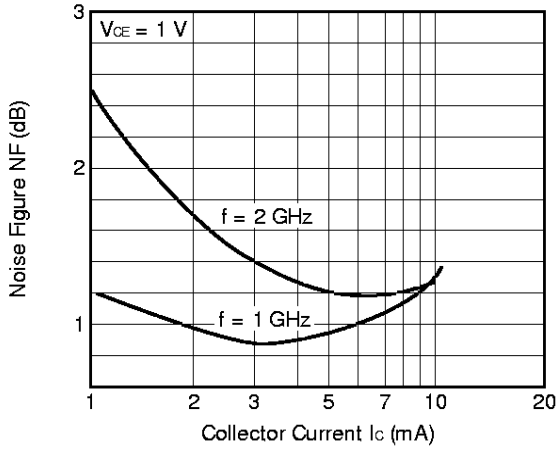
**h<sub>FE</sub> Classification**

Rank	FB
Marking	88
h <sub>FE</sub>	80 to 160

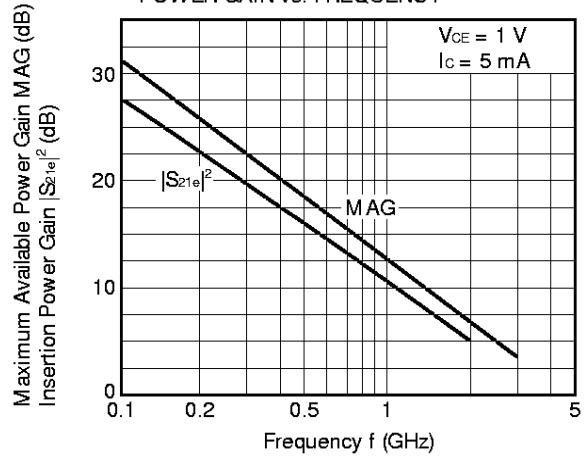
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)



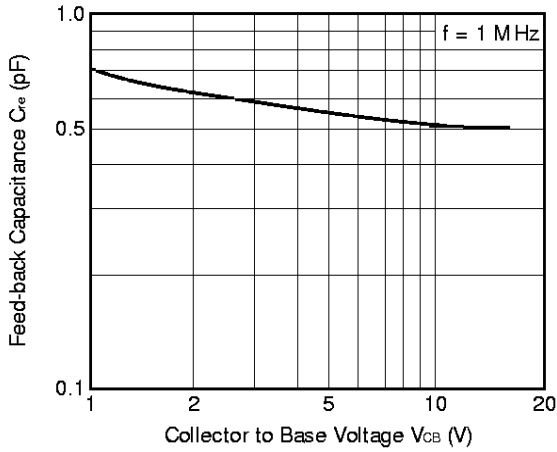
NOISE FIGURE vs.  
COLLECTOR CURRENT



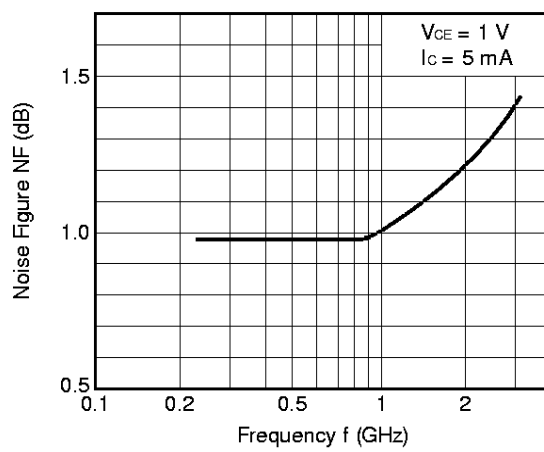
MAXIMUM AVAILABLE GAIN / INSERTION  
POWER GAIN vs. FREQUENCY



FEED-BACK CAPACITANCE vs.  
COLLECTOR TO BASE VOLTAGE



NOISE FIGURE vs. FREQUENCY



S-PARAMETERS

$V_{CE} = 1\text{ V}$ ,  $I_C = 1\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.996	-19.0	3.632	166.2	0.039	66.4	0.989	-7.6
200.00	0.960	-37.5	3.266	153.8	0.096	63.3	0.944	-17.9
300.00	0.959	-35.2	3.200	140.1	0.141	56.6	0.884	-27.3
400.00	0.934	-69.6	3.015	128.0	0.172	48.5	0.837	-33.3
500.00	0.848	-83.7	2.686	119.0	0.187	40.4	0.785	-38.9
600.00	0.768	-92.1	2.409	113.0	0.200	36.4	0.748	-40.8
700.00	0.763	-104.0	2.226	105.1	0.216	30.6	0.710	-46.6
800.00	0.733	-116.4	2.025	97.7	0.219	25.8	0.637	-47.7
900.00	0.697	-124.6	1.848	90.5	0.220	23.2	0.604	-51.2
1000.00	0.678	-137.7	1.703	86.1	0.218	21.1	0.361	-52.7
1100.00	0.667	-138.0	1.560	80.4	0.218	17.3	0.534	-57.6
1200.00	0.673	-147.0	1.510	75.9	0.212	13.7	0.514	-62.6
1300.00	0.676	-153.6	1.359	71.8	0.209	10.7	0.492	-64.8
1400.00	0.689	-160.2	1.270	70.0	0.207	9.7	0.478	-63.7
1500.00	0.671	-166.1	1.265	61.1	0.214	8.2	0.483	-69.4
1600.00	0.644	-170.8	1.240	55.7	0.213	8.9	0.471	-73.4
1700.00	0.649	-176.4	1.174	51.7	0.205	9.2	0.460	-75.1
1800.00	0.605	176.0	1.183	49.6	0.197	11.7	0.450	-79.2
1900.00	0.633	171.5	1.100	47.0	0.192	12.1	0.440	-82.6
2000.00	0.640	165.5	1.034	45.8	0.184	13.3	0.442	-86.1

$V_{CE} = 1\text{ V}$ ,  $I_C = 3\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.901	-31.1	9.543	159.0	0.034	54.0	0.961	-16.2
200.00	0.830	-59.6	8.103	141.0	0.086	54.4	0.833	-34.0
300.00	0.784	-82.6	7.226	124.9	0.114	47.5	0.713	-48.5
400.00	0.715	-99.4	6.213	113.7	0.129	42.1	0.612	-56.1
500.00	0.643	-114.2	4.933	106.2	0.134	38.1	0.526	-61.0
600.00	0.600	-125.5	4.331	101.2	0.141	36.4	0.481	-62.6
700.00	0.590	-136.3	3.869	94.3	0.149	33.6	0.437	-69.4
800.00	0.568	-147.0	3.448	88.3	0.151	32.7	0.368	-72.6
900.00	0.536	-153.2	3.051	83.5	0.153	32.9	0.332	-75.3
1000.00	0.535	-160.4	2.791	80.1	0.157	33.4	0.304	-77.1
1100.00	0.571	-166.9	2.349	73.8	0.160	32.5	0.299	-81.3
1200.00	0.536	-173.3	2.398	72.1	0.161	31.8	0.280	-88.2
1300.00	0.547	179.9	2.211	68.4	0.164	31.3	0.255	-91.3
1400.00	0.536	178.2	2.098	65.8	0.169	31.6	0.241	-95.0
1500.00	0.550	172.3	2.031	60.4	0.180	31.2	0.236	-95.7
1600.00	0.528	169.3	1.920	56.3	0.189	32.1	0.231	-100.8
1700.00	0.534	163.8	1.840	32.8	0.194	33.4	0.217	-105.1
1800.00	0.517	158.2	1.740	51.4	0.198	35.5	0.214	110.3
1900.00	0.541	154.5	1.654	47.4	0.202	36.2	0.211	-115.4
2000.00	0.550	150.2	1.558	48.0	0.203	36.7	0.216	-118.6

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 5 mA, Z<sub>O</sub> = 50 Ω

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.812	-40.5	13.835	153.5	0.036	51.3	0.914	-22.7
200.00	0.733	-74.9	11.096	132.3	0.078	48.7	0.742	-43.0
300.00	0.672	-99.8	8.862	116.3	0.097	45.0	0.599	-61.4
400.00	0.604	-117.1	7.167	106.1	0.106	42.9	0.489	-69.5
500.00	0.539	-131.2	5.890	100.2	0.111	41.1	0.404	-74.3
600.00	0.540	-142.3	5.131	95.6	0.119	41.2	0.361	-75.8
700.00	0.532	-151.5	4.515	89.5	0.126	40.0	0.329	-83.5
800.00	0.513	-160.7	3.985	84.6	0.130	40.3	0.274	-89.3
900.00	0.498	-165.9	3.496	80.4	0.136	41.3	0.242	-93.2
1000.00	0.493	-172.6	3.196	77.4	0.144	42.1	0.220	-95.3
1100.00	0.483	-179.2	2.924	73.5	0.150	41.9	0.219	-99.1
1200.00	0.501	176.0	2.736	70.2	0.154	41.7	0.211	-107.3
1300.00	0.510	170.3	2.514	66.8	0.160	41.1	0.192	-112.5
1400.00	0.519	169.4	2.390	64.2	0.168	41.2	0.178	-117.6
1500.00	0.518	164.2	2.296	59.6	0.180	40.5	0.173	-119.2
1600.00	0.498	161.6	2.164	56.0	0.193	40.4	0.175	-125.0
1700.00	0.506	136.6	2.066	52.7	0.201	41.3	0.168	-132.1
1800.00	0.496	131.7	1.942	51.7	0.209	42.7	0.172	-137.9
1900.00	0.518	148.3	1.848	49.3	0.215	42.9	0.174	-143.2
2000.00	0.526	144.5	1.751	48.6	0.220	42.8	0.181	-145.3

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 7 mA, Z<sub>O</sub> = 50 Ω

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.723	-48.8	17.674	148.0	0.040	43.6	0.869	-27.4
200.00	0.656	-88.8	13.024	125.3	0.069	46.3	0.656	-54.8
300.00	0.396	-114.3	10.093	110.2	0.082	44.9	0.510	-71.8
400.00	0.338	-131.1	7.935	101.3	0.092	44.8	0.406	-80.4
500.00	0.514	-143.7	6.491	96.3	0.098	45.6	0.327	-86.1
600.00	0.509	-153.9	5.611	92.0	0.107	46.7	0.288	-87.8
700.00	0.502	-161.6	4.884	86.5	0.115	46.3	0.269	-96.1
800.00	0.488	-169.7	4.301	82.1	0.121	46.7	0.226	-104.6
900.00	0.465	-174.3	3.766	78.5	0.129	47.9	0.200	-110.2
1000.00	0.473	179.6	3.446	75.7	0.139	48.5	0.181	-112.9
1100.00	0.467	173.2	3.139	72.1	0.147	48.3	0.183	-115.7
1200.00	0.485	169.4	2.924	69.1	0.154	47.8	0.184	-174.5
1300.00	0.494	164.3	2.690	65.9	0.161	47.1	0.170	-131.3
1400.00	0.502	164.1	2.561	63.4	0.171	46.8	0.160	-137.7
1500.00	0.504	159.1	2.445	59.0	0.184	45.7	0.155	-140.4
1600.00	0.485	156.9	2.307	53.7	0.198	45.1	0.163	-145.6
1700.00	0.493	152.2	2.200	52.6	0.207	45.6	0.162	-153.3
1800.00	0.487	147.7	2.063	51.8	0.217	46.3	0.172	-158.2
1900.00	0.509	144.7	1.964	50.0	0.224	46.4	0.176	-162.6
2000.00	0.517	141.1	1.854	48.9	0.230	46.0	0.184	-163.6

V<sub>CE</sub> = 1 V, I<sub>C</sub> = 10 mA, Z<sub>O</sub> = 50 Ω

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.639	-61.3	20.675	147.3	0.035	48.8	0.804	-36.3
200.00	0.590	-102.5	14.774	119.3	0.061	44.7	0.574	-63.1
300.00	0.541	-127.6	10.985	105.4	0.073	46.2	0.440	-81.7
400.00	0.498	-143.4	8.497	97.6	0.082	48.6	0.345	-91.1
500.00	0.487	-154.2	6.903	93.3	0.090	50.6	0.273	-98.0
600.00	0.492	-163.1	5.954	89.4	0.100	52.1	0.239	-100.0
700.00	0.485	-169.6	5.156	84.3	0.109	51.9	0.230	-108.6
800.00	0.473	-176.8	4.503	80.3	0.117	52.2	0.202	-119.4
900.00	0.451	179.1	3.934	77.1	0.126	53.0	0.181	-126.3
1000.00	0.462	173.5	3.602	74.4	0.138	53.2	0.165	-129.6
1100.00	0.459	167.6	3.283	71.1	0.148	52.9	0.168	-131.0
1200.00	0.477	164.4	3.050	68.3	0.156	52.2	0.175	-139.3
1300.00	0.484	160.0	2.814	65.2	0.164	51.3	0.167	-147.1
1400.00	0.491	160.0	2.674	62.8	0.175	50.5	0.160	-154.1
1500.00	0.496	155.4	2.551	58.7	0.188	49.2	0.157	-157.1
1600.00	0.477	153.3	2.401	55.4	0.203	48.1	0.167	-161.0
1700.00	0.486	149.0	2.287	52.5	0.213	48.4	0.172	-168.2
1800.00	0.482	144.7	2.141	51.8	0.224	48.9	0.185	-171.8
1900.00	0.503	141.9	2.042	50.1	0.231	48.7	0.190	-175.4
2000.00	0.512	138.5	1.927	49.1	0.238	48.0	0.198	-175.5

V<sub>CE</sub> = 3 V, I<sub>C</sub> = 1 mA, Z<sub>O</sub> = 50 Ω

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	1.007	-16.8	3.616	167.8	0.022	69.7	1.001	-5.4
200.00	0.975	-32.9	3.279	157.4	0.071	63.6	0.963	-13.4
300.00	0.977	-48.7	3.255	145.0	0.104	59.0	0.913	-20.9
400.00	0.962	-62.1	3.126	133.6	0.131	55.2	0.886	-25.4
500.00	0.881	-75.6	2.830	124.9	0.145	45.7	0.845	-30.3
600.00	0.797	-83.0	2.349	119.3	0.155	41.8	0.816	-31.5
700.00	0.792	-94.6	2.374	112.1	0.169	36.4	0.792	-36.4
800.00	0.756	-107.0	2.164	105.0	0.172	31.3	0.726	-37.0
900.00	0.721	-115.7	1.995	97.8	0.175	28.9	0.696	-39.7
1000.00	0.699	-123.7	1.839	93.4	0.174	27.0	0.652	-40.1
1100.00	0.688	-129.2	1.679	88.0	0.173	23.4	0.648	-44.7
1200.00	0.687	-138.5	1.636	83.5	0.169	20.0	0.597	-48.6
1300.00	0.685	-147.5	1.478	80.0	0.168	17.3	0.583	-50.2
1400.00	0.694	-153.3	1.419	78.7	0.166	16.4	0.568	-53.8
1500.00	0.674	-159.1	1.376	69.5	0.171	15.0	0.579	-54.5
1600.00	0.647	-164.2	1.352	63.9	0.170	15.9	0.567	-57.9
1700.00	0.654	-169.9	1.253	60.0	0.165	16.5	0.558	-58.9
1800.00	0.599	-177.9	1.296	57.1	0.158	19.6	0.546	-61.9
1900.00	0.630	177.0	1.199	54.8	0.156	20.8	0.533	-63.7
2000.00	0.630	170.4	1.129	53.0	0.149	22.6	0.533	-67.2

$V_{CE} = 3\text{ V}$ ,  $I_c = 3\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.917	-25.8	9.668	161.9	0.022	49.8	0.976	-11.1
200.00	0.852	-49.6	8.385	146.2	0.064	56.6	0.883	-24.7
300.00	0.808	-70.7	7.736	130.9	0.088	52.8	0.778	-36.0
400.00	0.742	-86.4	6.482	119.3	0.103	47.0	0.695	-41.4
500.00	0.657	-101.0	5.525	111.8	0.109	43.1	0.621	-45.2
600.00	0.594	-111.4	4.878	106.9	0.114	42.0	0.579	-45.6
700.00	0.578	-122.9	4.396	100.2	0.121	39.2	0.537	-50.4
800.00	0.553	-134.5	3.948	94.4	0.123	37.7	0.469	-51.0
900.00	0.517	-141.4	3.515	89.0	0.127	38.1	0.434	-52.3
1000.00	0.506	-149.2	3.201	85.6	0.130	38.6	0.402	-52.1
1100.00	0.491	-155.4	2.930	81.2	0.133	38.0	0.396	-55.7
1200.00	0.499	-163.1	2.760	77.5	0.134	37.5	0.364	-60.4
1300.00	0.507	-170.8	2.539	74.0	0.137	37.2	0.342	-61.6
1400.00	0.513	-173.8	2.423	71.7	0.141	37.7	0.328	-63.8
1500.00	0.505	-179.5	2.346	66.3	0.150	37.4	0.327	-64.1
1600.00	0.485	176.9	2.233	62.1	0.157	38.5	0.320	-67.3
1700.00	0.490	171.1	2.118	58.7	0.163	39.7	0.306	-68.6
1800.00	0.468	164.9	2.017	56.9	0.167	42.2	0.295	-71.9
1900.00	0.492	160.6	1.907	53.0	0.172	43.2	0.283	-74.2
2000.00	0.499	155.6	1.804	53.5	0.175	44.1	0.285	-77.3

$V_{CE} = 3\text{ V}$ ,  $I_c = 5\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.844	-32.2	14.254	157.1	0.026	43.6	0.949	-15.0
200.00	0.757	-62.0	11.790	138.2	0.059	51.0	0.806	-32.6
300.00	0.687	-85.1	9.852	122.3	0.077	49.6	0.674	-45.0
400.00	0.609	-101.4	8.167	111.7	0.086	47.2	0.575	-30.2
500.00	0.544	-116.0	6.786	105.3	0.093	45.6	0.496	-52.9
600.00	0.502	-127.4	5.941	100.6	0.098	46.1	0.436	-52.3
700.00	0.489	-137.9	5.275	94.6	0.105	45.0	0.418	-57.1
800.00	0.470	-148.2	4.669	89.6	0.108	44.8	0.358	-57.9
900.00	0.441	-154.3	4.119	85.1	0.113	46.0	0.325	-58.8
1000.00	0.437	-161.6	3.749	82.0	0.120	47.0	0.300	-58.2
1100.00	0.423	-168.4	3.443	78.2	0.126	46.9	0.297	-61.3
1200.00	0.437	-174.3	3.209	74.9	0.130	46.8	0.274	-66.8
1300.00	0.446	178.9	2.964	71.7	0.135	46.5	0.253	-68.2
1400.00	0.453	176.9	2.806	69.3	0.142	46.7	0.238	-70.0
1500.00	0.448	171.6	2.696	64.8	0.152	46.1	0.236	-70.3
1600.00	0.434	168.9	2.552	61.0	0.163	46.3	0.231	-74.0
1700.00	0.440	163.3	2.434	57.9	0.171	47.0	0.217	-76.1
1800.00	0.428	157.8	2.291	56.5	0.178	48.6	0.208	-80.2
1900.00	0.451	154.0	2.178	54.8	0.185	49.2	0.199	-83.4
2000.00	0.459	149.5	2.056	53.5	0.190	49.4	0.201	-86.7



V<sub>CE</sub> = 3 V, I<sub>C</sub> = 7 mA, Z<sub>O</sub> = 50 Ω

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.770	-40.0	18.346	132.6	0.023	36.3	0.939	-20.0
200.00	0.666	-73.3	14.212	131.4	0.054	48.3	0.733	-39.5
300.00	0.588	-97.6	11.480	116.0	0.068	48.8	0.585	-32.1
400.00	0.516	-114.1	9.252	106.4	0.077	49.5	0.483	-56.7
500.00	0.471	-128.3	7.604	100.8	0.083	49.7	0.406	-58.3
600.00	0.446	-139.5	6.608	96.4	0.089	51.0	0.372	-57.1
700.00	0.436	-148.8	5.788	91.0	0.097	50.8	0.341	-61.9
800.00	0.422	-158.0	5.104	86.6	0.102	50.9	0.287	-63.3
900.00	0.398	-163.6	4.477	82.8	0.109	52.1	0.256	-64.2
1000.00	0.398	-170.5	4.074	79.8	0.117	52.9	0.233	-62.9
1100.00	0.391	-177.1	3.744	76.3	0.125	52.8	0.233	-65.9
1200.00	0.404	177.9	3.472	73.4	0.131	32.5	0.218	-72.5
1300.00	0.413	172.1	3.212	70.3	0.138	52.0	0.198	-74.5
1400.00	0.420	170.7	3.041	68.0	0.146	51.8	0.184	-76.2
1500.00	0.419	165.7	2.904	63.8	0.157	50.9	0.181	-76.5
1600.00	0.407	163.4	2.752	60.4	0.169	50.6	0.179	-81.1
1700.00	0.414	158.2	2.621	57.4	0.178	50.8	0.165	-84.2
1800.00	0.408	153.0	2.462	56.5	0.187	51.9	0.159	-89.7
1900.00	0.429	149.8	2.340	54.7	0.194	52.1	0.152	-93.8
2000.00	0.437	143.6	2.212	53.5	0.200	52.0	0.155	-97.4

V<sub>CE</sub> = 3 V, I<sub>C</sub> = 10 mA, Z<sub>O</sub> = 50 Ω

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.686	-46.4	21.798	147.0	0.027	33.4	0.895	-23.1
200.00	0.580	-84.7	16.506	125.3	0.048	47.1	0.657	-45.9
300.00	0.506	-109.6	12.733	110.8	0.060	50.4	0.506	-58.0
400.00	0.447	-126.2	10.027	102.2	0.069	52.6	0.408	-62.1
500.00	0.420	-139.2	8.183	97.3	0.076	54.4	0.336	-63.5
600.00	0.408	-149.9	7.058	93.3	0.084	56.0	0.306	-61.2
700.00	0.401	-157.8	6.167	88.4	0.092	55.7	0.283	-66.1
800.00	0.391	-166.1	5.399	84.4	0.099	56.1	0.235	-68.5
900.00	0.370	-171.1	4.744	81.0	0.107	57.0	0.206	-69.5
1000.00	0.373	-177.6	4.311	78.2	0.117	57.3	0.188	-67.6
1100.00	0.369	176.0	3.939	75.0	0.126	57.0	0.191	-70.4
1200.00	0.383	171.9	3.667	72.3	0.132	56.6	0.178	-78.4
1300.00	0.392	166.9	3.381	69.4	0.140	55.9	0.159	-81.3
1400.00	0.399	165.9	3.207	67.1	0.149	53.3	0.146	-83.4
1500.00	0.400	161.2	3.064	63.2	0.161	54.2	0.143	-83.7
1600.00	0.390	139.2	2.884	60.0	0.173	53.4	0.143	-89.1
1700.00	0.397	154.5	2.741	57.1	0.183	53.4	0.131	-94.0
1800.00	0.394	149.5	2.584	56.2	0.193	54.1	0.127	-101.0
1900.00	0.414	146.5	2.457	54.6	0.201	54.1	0.123	-106.2
2000.00	0.423	142.7	2.314	53.6	0.208	53.7	0.128	-109.6

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