

MICROWAVE LOW NOISE AMPLIFIER  
NPN SILICON EPITAXIAL TRANSISTOR

FEATURES

- Low Voltage Operation, Low Phase Distortion
- Low Noise  
 $NF = 1.5 \text{ dB TYP. @ } V_{CE} = 3 \text{ V, } I_c = 7 \text{ mA, } f = 2 \text{ GHz}$   
 $NF = 1.7 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_c = 3 \text{ mA, } f = 2 \text{ GHz}$
- Large Absolute Maximum Collector Current  
 $I_c = 100 \text{ mA}$
- 4-Pin Compact Mini Mold Package

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC5194-T1	3 Kpcs/Reel	Embossed tape 8 mm wide. Pin 3 (Base), Pin 4 (Emitter) face to perforation side of the tape.
2SC5194-T2	3 Kpcs/Reel	Embossed tape 8 mm wide. Pin 1 (Collector), Pin 2 (Emitter) face to perforation side of the tape.

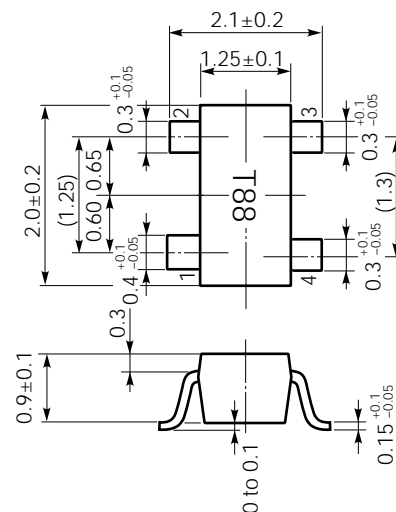
**Remark** If you require an evaluation sample, please contact an NEC Sales Representative. (Unit sample quantity is 50 pcs.)

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	$P_T$	150	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. Collector
2. Emitter
3. Base
4. Emitter

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>CBO</sub>	V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0			100	nA
Emitter Cutoff Current	I <sub>EBO</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 (1)	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz	3.0	4.0		dB
Insertion Power Gain (2)	S <sub>21e</sub>   <sup>2</sup>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 20 mA, f = 2.0 GHz		8.5		dB
Noise Figure (1)	NF	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz		1.7	2.5	dB
Noise Figure (2)	NF	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 2.0 GHz		1.5		dB
Gain Bandwidth Product (1)	f <sub>T</sub>	V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2.0 GHz	4	5		GHz
Gain Bandwidth Product (2)	f <sub>T</sub>	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 20 mA, f = 2.0 GHz		10		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>		0.65	0.8	pF

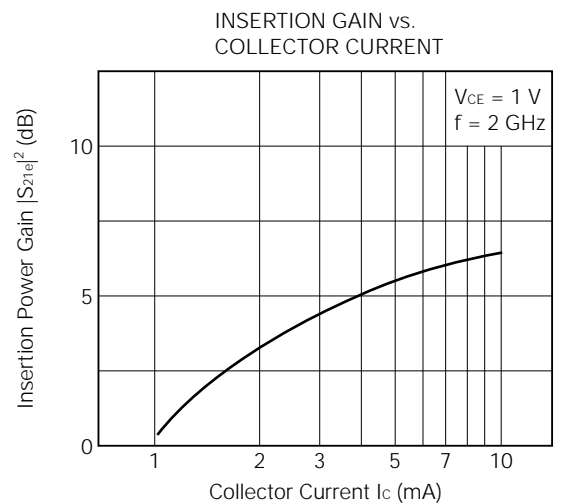
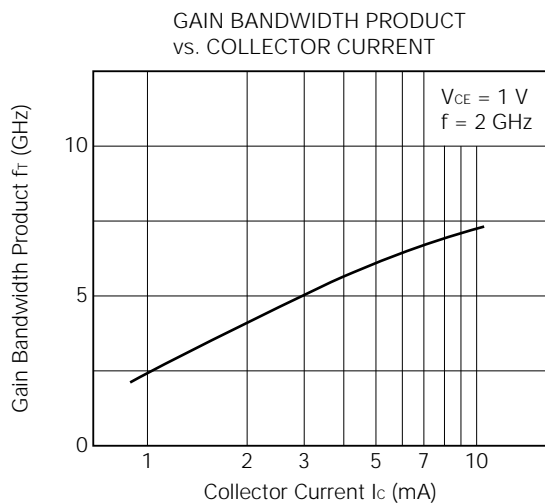
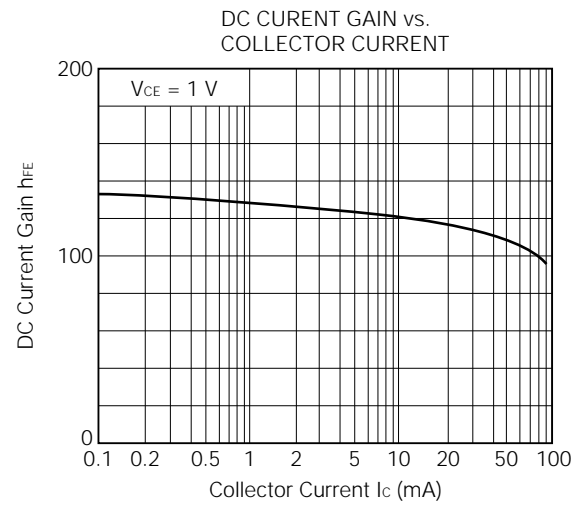
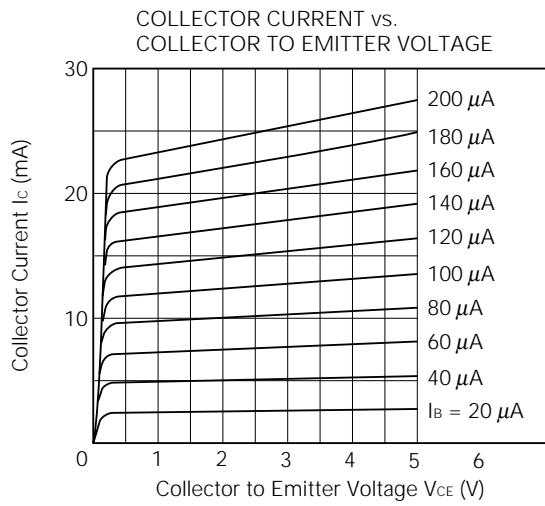
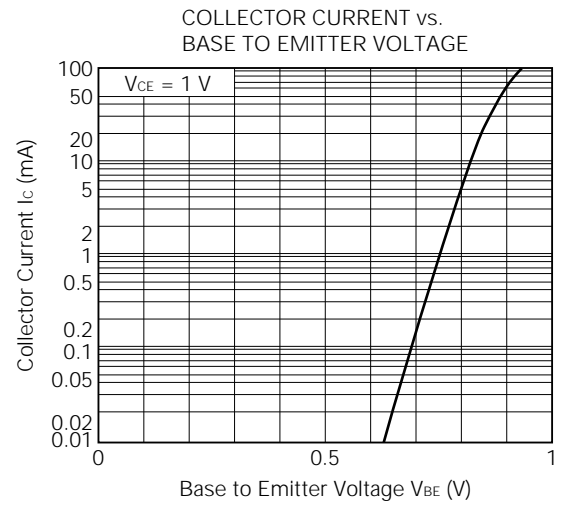
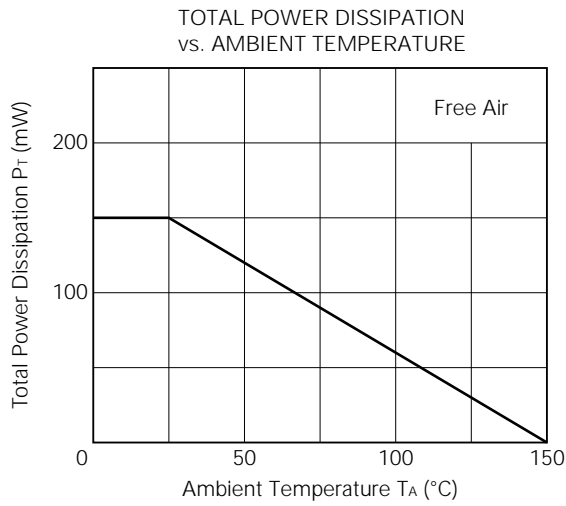
**Notes** 1. Pulse Measurement: PW ≤ 350 μs, Duty cycle ≤ 2 %, Pulsed

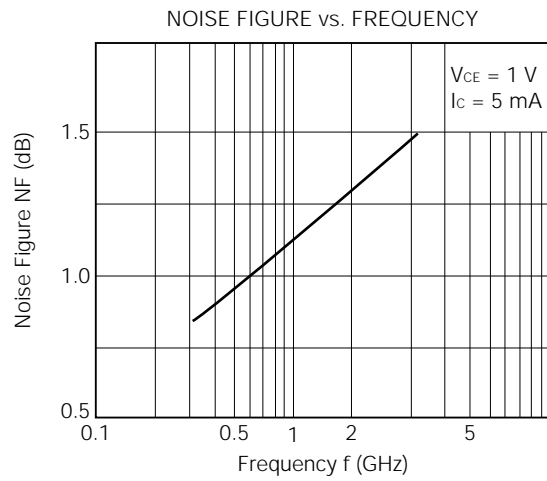
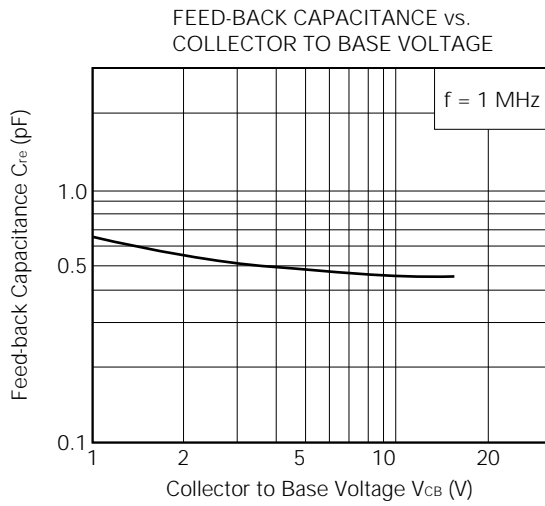
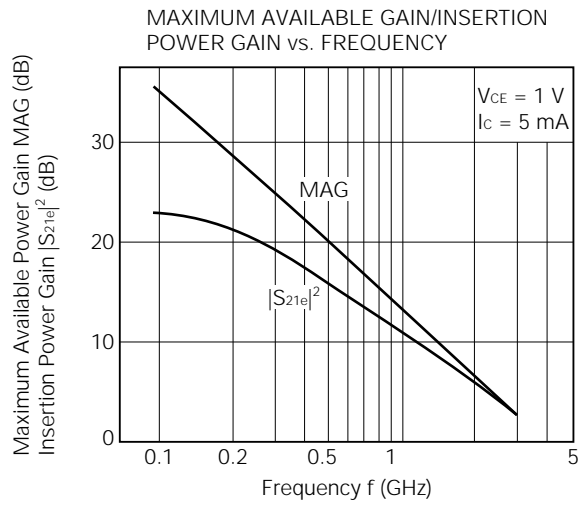
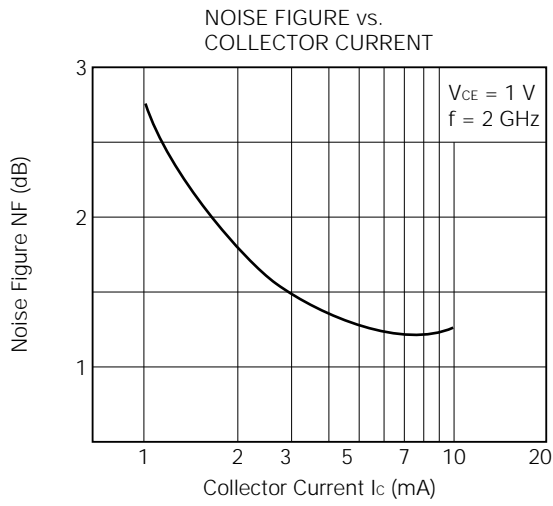
2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

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

Rank	FB
Marking	T88
h <sub>FE</sub>	80 to 160

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





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	0.928	-16.3	3.658	168.7	0.038	60.6	0.989	-7.0
200.00	0.919	-37.0	3.382	153.6	0.090	61.9	0.951	-13.4
300.00	0.886	-55.2	3.197	139.2	0.127	55.8	0.880	-27.4
400.00	0.866	-66.8	3.000	129.5	0.156	50.4	0.855	-32.8
500.00	0.827	-80.9	2.765	120.4	0.177	42.2	0.809	-39.9
600.00	0.756	-91.7	2.466	112.4	0.191	36.2	0.755	-41.9
700.00	0.738	-103.5	2.213	104.5	0.202	30.2	0.711	-47.1
800.00	0.725	-114.5	2.018	98.1	0.208	26.4	0.646	-48.3
900.00	0.706	-122.8	1.863	90.7	0.211	22.7	0.619	-52.6
1000.00	0.699	-132.2	1.712	85.6	0.210	18.8	0.569	-55.1
1100.00	0.675	-138.2	1.333	80.2	0.208	13.7	0.562	-59.2
1200.00	0.699	-145.9	1.463	76.2	0.206	9.6	0.534	-63.8
1300.00	0.718	-153.8	1.309	71.7	0.208	5.8	0.515	-65.8
1400.00	0.740	-157.1	1.235	69.1	0.208	4.0	0.504	-69.7
1500.00	0.713	-163.0	1.209	59.1	0.212	2.4	0.504	-69.9
1600.00	0.680	-166.4	1.192	55.2	0.210	2.8	0.497	-74.1
1700.00	0.697	-171.6	1.131	51.9	0.202	2.1	0.483	-76.3
1800.00	0.669	-178.6	1.119	50.5	0.194	2.7	0.486	-79.9
1900.00	0.696	178.7	1.018	47.5	0.187	1.1	0.478	-84.3
2000.00	0.702	174.8	0.955	46.1	0.178	1.2	0.490	-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	0.873	-29.6	9.700	161.1	0.040	54.3	0.949	-15.1
200.00	0.837	-59.1	8.346	142.1	0.084	52.9	0.850	-34.3
300.00	0.792	-82.4	7.422	126.2	0.110	46.2	0.730	-49.0
400.00	0.734	-98.8	6.092	115.4	0.125	40.4	0.643	-56.6
500.00	0.679	-114.6	5.149	107.5	0.131	35.0	0.558	-63.4
600.00	0.645	-126.9	4.519	101.8	0.137	32.0	0.500	-66.0
700.00	0.637	-137.1	3.994	95.0	0.142	28.7	0.451	-73.1
800.00	0.617	-147.5	3.563	89.3	0.143	27.4	0.395	-76.7
900.00	0.588	-153.9	3.142	84.4	0.143	26.4	0.354	-80.0
1000.00	0.600	-161.2	2.865	81.0	0.143	25.5	0.327	-83.7
1100.00	0.588	-168.1	2.535	77.1	0.143	23.5	0.321	-87.7
1200.00	0.619	-172.9	2.427	73.4	0.143	21.7	0.303	-93.3
1300.00	0.626	-178.8	2.222	69.4	0.145	20.3	0.280	-95.8
1400.00	0.639	-179.4	2.110	66.5	0.149	20.6	0.268	-100.0
1500.00	0.630	175.2	2.017	60.5	0.157	20.8	0.259	-100.4
1600.00	0.600	172.3	1.913	57.3	0.161	22.3	0.259	-103.1
1700.00	0.614	167.9	1.820	54.6	0.160	24.1	0.247	-109.6
1800.00	0.605	163.4	1.720	54.0	0.161	26.0	0.251	-112.4
1900.00	0.623	161.5	1.618	52.0	0.160	26.5	0.253	-116.8
2000.00	0.630	153.6	1.532	51.0	0.160	27.2	0.259	-117.9

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	0.819	-39.2	14.097	155.3	0.039	48.7	0.919	-21.7
200.00	0.771	-74.7	11.500	134.1	0.076	46.3	0.770	-45.7
300.00	0.720	-100.5	9.255	118.0	0.095	41.9	0.629	-62.9
400.00	0.656	-118.2	7.530	107.7	0.104	37.8	0.523	-71.7
500.00	0.620	-132.7	6.220	101.6	0.108	35.5	0.437	-78.3
600.00	0.613	-144.3	5.425	96.6	0.113	34.2	0.389	-81.6
700.00	0.605	-153.0	4.738	90.2	0.117	32.3	0.355	-90.4
800.00	0.584	-162.3	4.170	85.3	0.118	32.5	0.300	-97.1
900.00	0.556	-167.5	3.639	81.4	0.120	33.0	0.272	-100.7
1000.00	0.575	-173.8	3.328	78.6	0.123	33.1	0.255	-104.6
1100.00	0.571	179.5	3.019	75.1	0.125	32.1	0.254	-108.6
1200.00	0.595	176.1	2.816	71.7	0.127	31.0	0.243	-115.5
1300.00	0.602	171.3	2.573	68.0	0.130	30.4	0.224	-119.7
1400.00	0.610	171.5	2.438	65.2	0.137	30.8	0.215	-124.6
1500.00	0.608	166.6	2.325	60.1	0.146	30.9	0.206	-126.6
1600.00	0.581	164.0	2.190	57.2	0.154	32.1	0.212	-131.2
1700.00	0.593	160.3	2.079	54.8	0.156	34.3	0.208	-137.1
1800.00	0.591	156.7	1.955	54.7	0.160	33.9	0.213	-139.2
1900.00	0.607	155.0	1.854	52.9	0.162	36.5	0.217	-142.7
2000.00	0.612	152.5	1.756	51.9	0.164	36.8	0.223	-143.1

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	0.760	-48.6	17.471	149.2	0.041	37.3	0.895	-26.2
200.00	0.715	-89.0	13.639	127.7	0.068	43.5	0.698	-55.1
300.00	0.670	-115.6	10.708	111.9	0.084	40.2	0.557	-75.1
400.00	0.611	-133.3	8.433	102.5	0.089	38.0	0.444	-85.0
500.00	0.592	-145.8	6.875	97.6	0.093	37.8	0.362	-91.6
600.00	0.600	-156.1	6.003	93.1	0.099	38.0	0.324	-95.0
700.00	0.591	-163.6	5.196	87.0	0.103	36.6	0.308	-103.3
800.00	0.571	-172.1	4.523	82.7	0.105	37.6	0.265	-115.1
900.00	0.542	-176.6	3.938	79.6	0.109	38.9	0.239	-119.2
1000.00	0.566	178.0	3.610	77.1	0.114	39.6	0.227	-122.5
1100.00	0.567	171.5	3.288	73.7	0.117	38.8	0.232	-123.6
1200.00	0.588	169.1	3.034	70.5	0.121	37.8	0.228	-133.5
1300.00	0.589	165.1	2.773	67.2	0.125	37.4	0.212	-139.2
1400.00	0.597	165.6	2.639	64.5	0.133	37.7	0.206	-144.1
1500.00	0.600	161.1	2.515	59.7	0.143	37.6	0.201	-146.8
1600.00	0.573	158.7	2.557	57.0	0.153	38.2	0.211	-150.6
1700.00	0.586	155.6	2.231	54.9	0.157	40.2	0.213	-156.6
1800.00	0.584	152.3	2.101	55.1	0.162	41.8	0.218	-158.1
1900.00	0.599	151.0	1.996	53.3	0.166	42.1	0.221	-160.7
2000.00	0.604	148.6	1.895	52.3	0.169	42.1	0.228	-160.4

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	0.704	-61.8	21.034	144.3	0.032	37.4	0.861	-33.6
200.00	0.669	-103.2	15.396	121.8	0.062	41.3	0.626	-64.9
300.00	0.633	-129.6	11.781	106.8	0.074	40.3	0.494	-85.9
400.00	0.583	-146.3	9.058	98.7	0.078	40.1	0.388	-97.2
500.00	0.579	-156.5	7.353	94.7	0.082	41.9	0.316	-104.9
600.00	0.596	-165.4	6.413	90.5	0.089	42.8	0.284	-108.8
700.00	0.584	-171.9	5.493	84.8	0.094	41.9	0.281	-118.8
800.00	0.563	-179.4	4.762	80.9	0.097	43.2	0.254	-130.0
900.00	0.536	176.8	4.149	78.4	0.102	45.0	0.232	-134.8
1000.00	0.562	172.0	3.816	75.9	0.110	45.4	0.221	-137.9
1100.00	0.565	166.1	3.460	72.8	0.114	44.7	0.228	-139.7
1200.00	0.584	164.3	3.185	69.7	0.118	43.7	0.231	-147.3
1300.00	0.583	160.7	2.916	66.6	0.124	43.2	0.218	-153.7
1400.00	0.589	161.6	2.782	64.0	0.133	43.2	0.215	-158.6
1500.00	0.595	157.3	2.638	59.5	0.144	42.7	0.213	-161.3
1600.00	0.569	155.1	2.468	56.9	0.154	42.9	0.223	-164.1
1700.00	0.582	152.4	2.335	55.0	0.159	44.7	0.230	-169.5
1800.00	0.582	149.6	2.203	55.3	0.166	45.9	0.237	-170.5
1900.00	0.597	148.2	2.090	53.5	0.169	46.2	0.238	-172.9
2000.00	0.600	145.8	1.985	52.7	0.174	43.9	0.244	-172.1

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	1.033	-16.8	3.626	168.0	0.024	37.6	0.992	-4.3
200.00	0.994	-32.7	3.276	158.4	0.066	62.7	0.970	-13.2
300.00	1.016	-48.6	3.320	146.3	0.102	59.1	0.924	-20.7
400.00	1.004	-62.9	3.208	134.2	0.127	51.4	0.897	-25.2
500.00	0.904	-77.0	2.864	125.7	0.138	43.4	0.860	-30.0
600.00	0.822	-84.6	2.593	120.7	0.149	39.9	0.838	-31.2
700.00	0.829	-96.7	2.423	112.7	0.165	33.3	0.808	-36.8
800.00	0.794	-109.8	2.202	104.9	0.167	27.6	0.733	-37.2
900.00	0.747	-118.0	2.010	98.0	0.166	24.7	0.711	-40.1
1000.00	0.736	-125.8	1.857	94.1	0.166	22.0	0.667	-41.3
1100.00	0.718	-131.9	1.682	88.6	0.167	16.8	0.664	-46.0
1200.00	0.732	-141.3	1.625	83.8	0.164	12.1	0.619	-50.1
1300.00	0.732	-149.9	1.437	79.9	0.164	8.7	0.605	-51.2
1400.00	0.747	-153.1	1.368	78.9	0.163	7.7	0.602	-54.6
1500.00	0.729	-158.6	1.335	68.3	0.168	6.1	0.603	-55.4
1600.00	0.691	-163.0	1.321	63.0	0.165	6.4	0.595	-58.9
1700.00	0.699	-168.3	1.231	59.8	0.157	6.1	0.577	-60.1
1800.00	0.660	-175.2	1.245	58.5	0.150	7.9	0.579	-63.0
1900.00	0.693	-178.0	1.130	55.9	0.147	6.9	0.564	-66.3
2000.00	0.700	177.4	1.062	54.1	0.139	7.0	0.574	-68.7

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.940	-25.6	9.732	162.7	0.025	56.8	0.970	-10.1
200.00	0.892	-49.0	8.526	148.5	0.060	56.4	0.903	-23.7
300.00	0.873	-70.6	8.103	133.3	0.087	51.0	0.809	-36.0
400.00	0.804	-87.6	6.813	120.9	0.101	44.0	0.722	-42.0
500.00	0.713	-102.8	5.759	113.7	0.105	39.0	0.648	-45.7
600.00	0.662	-114.0	5.147	108.9	0.112	36.7	0.613	-46.6
700.00	0.654	-125.8	4.656	101.4	0.118	32.4	0.562	-53.1
800.00	0.621	-137.6	4.138	95.0	0.117	30.3	0.480	-53.9
900.00	0.579	-144.2	3.663	90.1	0.116	29.8	0.451	-55.0
1000.00	0.584	-151.7	3.332	87.1	0.117	29.3	0.421	-56.3
1100.00	0.571	-158.9	3.050	87.7	0.118	27.0	0.415	-60.6
1200.00	0.592	-165.5	2.866	78.7	0.117	25.1	0.383	-65.3
1300.00	0.596	-172.0	2.604	75.1	0.118	24.0	0.359	-65.6
1400.00	0.609	-173.0	2.478	72.9	0.121	24.6	0.351	-67.7
1500.00	0.599	-178.6	2.398	66.4	0.128	24.8	0.348	-68.1
1600.00	0.568	178.1	2.273	62.4	0.132	26.4	0.340	-71.9
1700.00	0.578	173.4	2.143	59.9	0.131	28.4	0.322	-75.5
1800.00	0.565	168.5	2.039	59.2	0.132	31.0	0.321	-76.0
1900.00	0.586	166.3	1.918	57.4	0.133	31.8	0.315	-79.6
2000.00	0.593	162.9	1.813	56.0	0.132	32.7	0.320	-81.5

V<sub>CE</sub> = 3 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	0.879	-31.8	14.413	158.3	0.028	34.2	0.965	-12.8
200.00	0.815	-61.2	12.159	141.3	0.057	49.3	0.840	-31.6
300.00	0.774	-85.7	10.485	125.0	0.078	46.9	0.719	-46.0
400.00	0.688	-104.0	8.723	113.5	0.086	42.3	0.604	-52.1
500.00	0.618	-119.0	7.234	107.4	0.088	39.4	0.523	-54.6
600.00	0.592	-130.9	6.423	102.7	0.094	38.7	0.491	-55.2
700.00	0.583	-141.7	3.688	95.7	0.098	35.7	0.445	-62.3
800.00	0.553	-152.3	4.996	90.3	0.098	35.5	0.368	-64.0
900.00	0.518	-157.8	4.380	86.4	0.100	36.5	0.338	-64.3
1000.00	0.530	-164.6	4.016	83.7	0.102	36.9	0.317	-65.4
1100.00	0.523	-172.1	3.672	79.7	0.104	35.6	0.314	-69.8
1200.00	0.541	-176.9	3.401	76.1	0.106	34.4	0.289	-75.3
1300.00	0.547	178.0	3.101	72.9	0.108	34.0	0.264	-75.9
1400.00	0.559	177.8	2.945	70.4	0.114	34.8	0.255	-77.6
1500.00	0.555	172.5	2.825	65.0	0.122	34.8	0.251	-78.1
1600.00	0.529	169.6	2.661	61.6	0.128	36.1	0.246	-82.5
1700.00	0.540	165.6	2.522	59.3	0.130	38.2	0.229	-85.3
1800.00	0.534	161.6	2.373	59.1	0.134	40.5	0.228	-87.8
1900.00	0.553	159.8	2.259	57.3	0.137	41.3	0.226	-91.5
2000.00	0.558	156.7	2.134	56.1	0.139	41.8	0.231	-93.5

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	0.820	-38.9	17.998	153.7	0.023	51.2	0.949	-12.2
200.00	0.734	-72.7	14.931	134.9	0.054	48.6	0.780	-38.3
300.00	0.683	-98.8	12.431	118.7	0.069	44.5	0.636	-54.1
400.00	0.603	-117.4	10.006	108.2	0.075	42.4	0.315	-60.0
500.00	0.558	-131.7	8.204	102.9	0.077	41.9	0.433	-61.9
600.00	0.548	-143.3	7.226	98.4	0.083	42.4	0.403	-62.0
700.00	0.539	-152.7	6.334	92.0	0.086	40.5	0.367	-69.6
800.00	0.514	-162.3	5.531	87.3	0.088	41.1	0.298	-72.8
900.00	0.485	-167.3	4.834	84.1	0.091	42.6	0.268	-72.9
1000.00	0.501	-173.4	4.433	81.4	0.096	43.6	0.231	-73.7
1100.00	0.499	179.5	4.025	77.9	0.099	42.5	0.253	-78.1
1200.00	0.517	173.9	3.736	74.7	0.101	41.7	0.234	-84.9
1300.00	0.522	171.5	3.407	71.6	0.105	41.3	0.208	-86.2
1400.00	0.531	171.6	3.243	69.0	0.112	41.7	0.198	-88.1
1500.00	0.532	166.8	3.095	64.1	0.121	41.6	0.195	-88.8
1600.00	0.508	164.2	2.906	61.0	0.129	42.4	0.193	-94.0
1700.00	0.520	160.7	2.754	59.0	0.133	44.2	0.178	-98.4
1800.00	0.518	137.1	2.581	59.0	0.137	46.2	0.178	-101.1
1900.00	0.534	155.5	2.459	57.3	0.142	46.7	0.178	-104.8
2000.00	0.540	152.7	2.325	56.2	0.144	46.9	0.185	-106.6

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	0.734	-47.2	22.178	149.7	0.023	32.6	0.923	-23.1
200.00	0.665	-84.6	17.574	129.1	0.050	44.4	0.709	-45.1
300.00	0.610	-111.6	13.993	113.3	0.061	44.3	0.560	-61.3
400.00	0.542	-129.9	10.962	104.0	0.065	44.4	0.440	-67.2
500.00	0.517	-142.8	8.974	97.4	0.069	45.9	0.361	-68.8
600.00	0.520	-153.6	7.824	93.1	0.075	46.7	0.334	-68.3
700.00	0.511	-161.7	6.777	89.3	0.080	45.6	0.308	-76.5
800.00	0.490	-170.3	5.897	85.0	0.082	46.7	0.248	-81.6
900.00	0.464	-174.8	5.143	82.3	0.087	48.5	0.218	-82.1
1000.00	0.482	179.6	4.722	79.8	0.092	49.0	0.204	-82.3
1100.00	0.484	173.0	4.312	76.5	0.096	48.2	0.209	-86.7
1200.00	0.502	170.3	3.969	73.5	0.100	47.5	0.196	-94.9
1300.00	0.506	166.4	3.626	70.6	0.104	47.0	0.172	-97.7
1400.00	0.514	166.9	3.453	68.0	0.112	47.1	0.161	-100.1
1500.00	0.517	162.4	3.285	63.4	0.122	46.5	0.139	-101.0
1600.00	0.495	160.1	3.083	60.7	0.131	46.7	0.161	-106.7
1700.00	0.308	157.0	2.914	58.7	0.136	48.4	0.150	-113.1
1800.00	0.307	153.8	2.738	58.8	0.141	50.0	0.150	-116.0
1900.00	0.523	152.4	2.603	57.2	0.146	30.3	0.152	-119.5
2000.00	0.527	149.7	2.459	56.1	0.150	50.3	0.159	-120.7

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