

MICROWAVE LOW NOISE AMPLIFIER  
NPN SILICON EPITAXIAL TRANSISTOR  
4 PINS MINI MOLD

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 Mini Mold Package  
 EIAJ: SC-61

ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC5192-T1	3 Kpcs/Reel	Embossed tape 8 mm wide. Pin 3 (Base), Pin 4 (Emitter) face to perforation side of the tape.
2SC5192-T2	3 Kpcs/Reel	Embossed tape 8 mm wide. Pin 1 (Collector), Pin 2 (Emitter) face to perforation side of the tape.

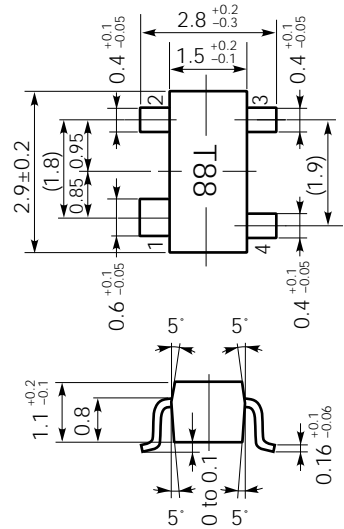
**Remark** If you require an evaluation sample, please contact an NEC Sales Representative. (Unit sample quantity is 50 pcs.)

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	$P_T$	200	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	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		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	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		9		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

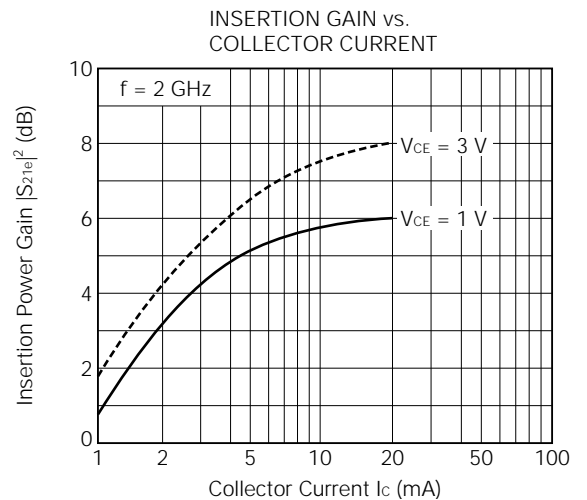
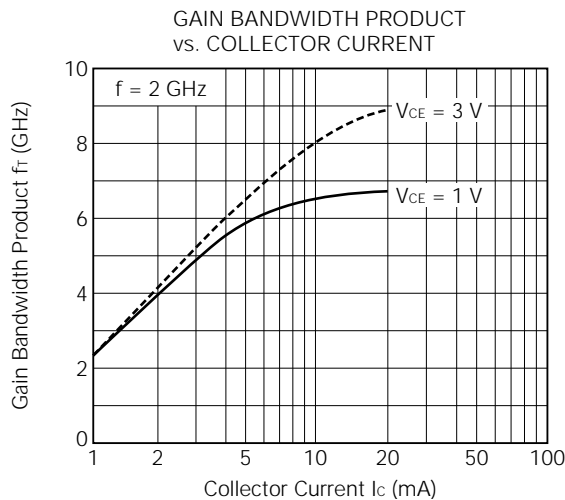
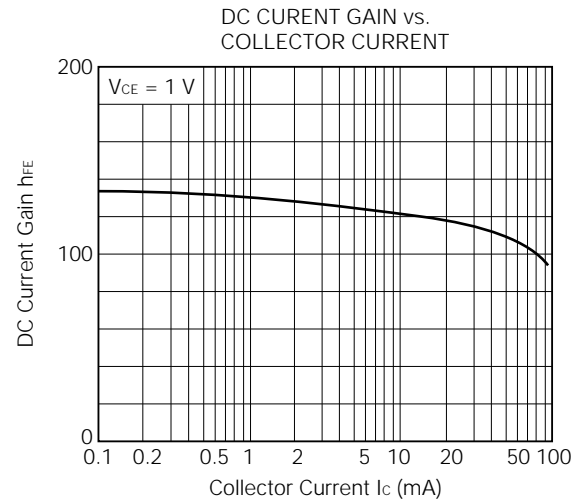
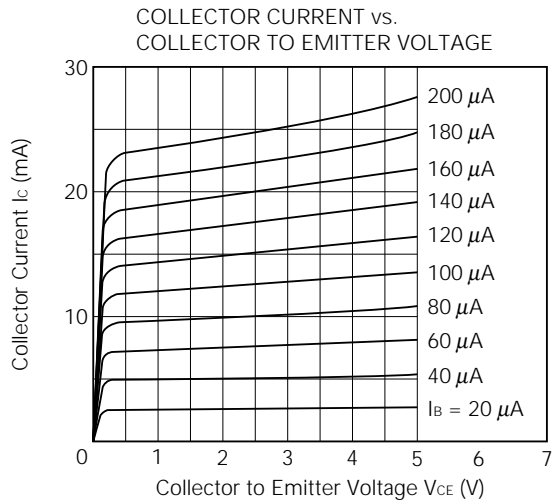
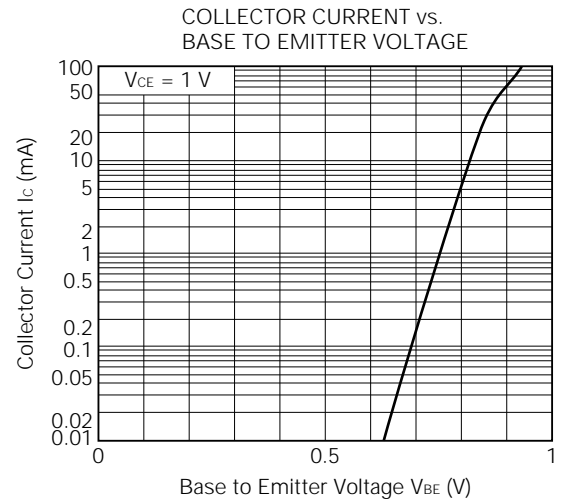
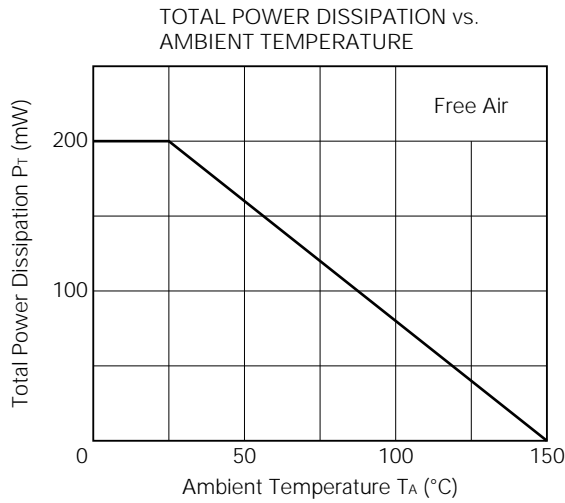
**Notes** 1. Pulse Measurement: PW ≤ 350 μs, Duty cycle ≤ 2 %, Pulsed

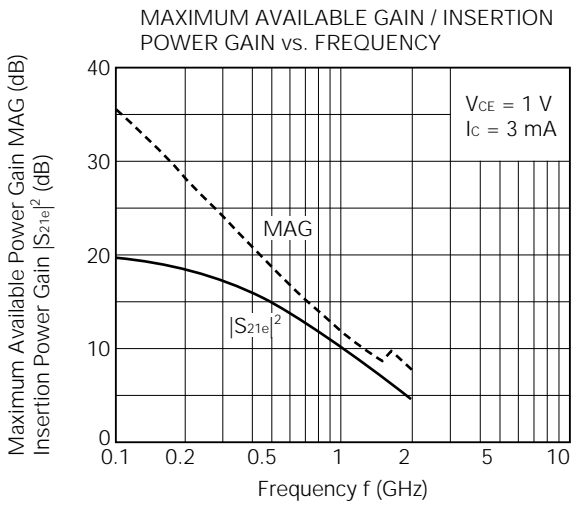
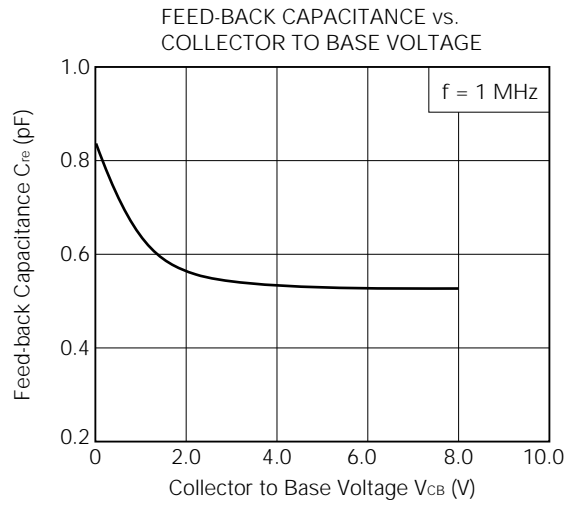
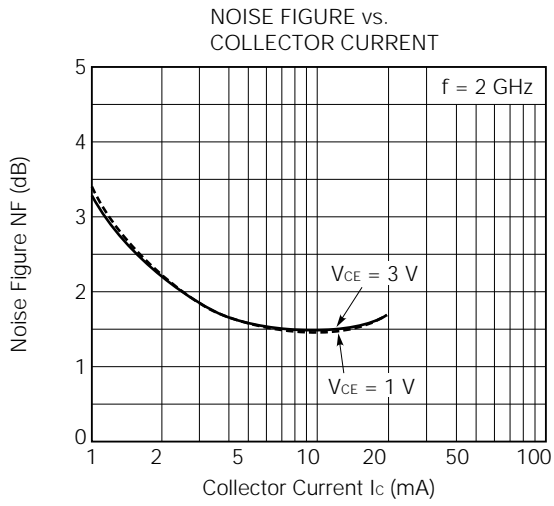
2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

**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)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.963	-17.1	3.502	166.5	0.048	79.4	0.983	-8.7
200.00	0.934	-34.1	3.413	154.0	0.087	69.6	0.957	-17.1
300.00	0.890	-49.7	3.238	142.6	0.130	60.0	0.906	-25.2
400.00	0.850	-65.3	3.026	131.1	0.156	50.7	0.851	-31.8
500.00	0.806	-79.9	2.825	120.8	0.178	41.8	0.801	-38.3
600.00	0.760	-92.6	2.598	111.3	0.198	37.0	0.744	-43.5
700.00	0.722	-104.8	2.419	103.0	0.209	31.0	0.702	-47.8
800.00	0.695	-116.4	2.238	95.5	0.221	25.2	0.646	-51.5
900.00	0.670	-127.6	2.102	87.9	0.223	20.9	0.615	-55.8
1000.00	0.643	-137.1	1.932	81.4	0.224	18.6	0.575	-58.7
1100.00	0.631	-147.2	1.820	75.3	0.230	14.2	0.544	-62.1
1200.00	0.626	-155.6	1.695	69.8	0.222	10.8	0.520	-66.3
1300.00	0.627	-164.2	1.611	64.4	0.222	8.4	0.497	-69.0
1400.00	0.623	-172.5	1.518	58.6	0.217	7.0	0.482	-72.9
1500.00	0.628	-179.3	1.432	54.0	0.217	2.9	0.468	-75.9
1600.00	0.630	175.7	1.364	49.7	0.212	2.0	0.450	-80.1
1700.00	0.625	168.3	1.280	45.0	0.202	1.0	0.442	-82.8
1800.00	0.629	162.8	1.223	41.3	0.201	0.0	0.433	-88.1
1900.00	0.629	157.5	1.168	37.2	0.190	-1.6	0.417	-89.2
2000.00	0.634	152.4	1.112	33.4	0.189	-0.7	0.419	-94.2

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

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.886	-28.0	9.515	159.3	0.044	74.9	0.943	-17.6
200.00	0.809	-54.2	8.567	141.9	0.078	64.0	0.847	-32.1
300.00	0.734	-75.4	7.425	128.1	0.103	52.3	0.734	-44.8
400.00	0.661	-94.8	6.367	116.2	0.122	44.4	0.630	-53.5
500.00	0.608	-110.6	5.529	106.7	0.130	39.1	0.547	-61.0
600.00	0.568	-124.2	4.813	98.7	0.136	35.6	0.484	-66.5
700.00	0.544	-136.4	4.278	92.0	0.144	33.4	0.434	-70.6
800.00	0.531	-147.4	3.841	86.0	0.145	30.7	0.381	-76.2
900.00	0.520	-157.3	3.473	80.1	0.152	30.1	0.350	-78.8
1000.00	0.517	-165.2	3.151	75.3	0.160	29.5	0.316	-83.6
1100.00	0.506	174.0	2.905	70.6	0.163	27.3	0.293	-89.0
1200.00	0.511	179.5	2.670	66.4	0.166	26.0	0.270	-92.9
1300.00	0.520	172.5	2.506	61.9	0.168	26.8	0.253	-98.5
1400.00	0.526	166.5	2.330	57.6	0.170	26.3	0.250	-101.9
1500.00	0.533	161.0	2.181	53.8	0.173	25.8	0.233	-106.6
1600.00	0.532	157.2	2.054	50.6	0.177	26.1	0.228	-112.2
1700.00	0.543	151.0	1.921	47.0	0.181	23.7	0.219	-117.6
1800.00	0.553	146.8	1.834	43.6	0.187	22.5	0.223	-124.8
1900.00	0.563	143.0	1.734	40.4	0.191	24.6	0.201	-127.3
2000.00	0.566	138.0	1.661	37.2	0.192	24.9	0.208	-133.2

$V_{CE} = 1\text{ V}$ ,  $I_c = 5\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.823	-37.1	13.981	153.6	0.044	70.4	0.904	-25.0
200.00	0.715	-68.3	11.672	133.5	0.073	56.9	0.762	-43.3
300.00	0.633	-92.2	9.511	119.4	0.086	48.9	0.612	-58.0
400.00	0.566	-112.0	7.794	108.2	0.103	43.7	0.508	-66.4
500.00	0.525	-127.9	6.574	99.7	0.106	41.1	0.427	-74.9
600.00	0.504	-141.1	5.620	92.7	0.114	39.9	0.367	-81.4
700.00	0.487	-152.3	4.927	86.7	0.121	39.5	0.331	-86.5
800.00	0.483	-161.7	4.373	81.5	0.132	37.8	0.286	-93.8
900.00	0.477	-171.1	3.928	76.6	0.132	36.2	0.261	-99.0
1000.00	0.482	-177.9	3.550	72.3	0.141	37.9	0.240	-101.7
1100.00	0.483	174.7	3.252	68.1	0.144	36.4	0.222	-110.7
1200.00	0.487	169.3	2.984	64.5	0.153	36.8	0.210	-115.2
1300.00	0.496	163.0	2.794	60.3	0.161	36.4	0.190	-121.5
1400.00	0.504	157.9	2.590	56.4	0.169	35.1	0.199	-127.7
1500.00	0.521	152.8	2.420	52.8	0.175	35.4	0.188	-132.5
1600.00	0.524	150.2	2.282	49.9	0.181	33.1	0.184	-139.9
1700.00	0.529	144.0	2.127	46.6	0.191	32.0	0.174	-146.3
1800.00	0.540	141.0	2.031	43.5	0.201	30.6	0.199	-152.2
1900.00	0.547	137.1	1.913	40.5	0.204	30.3	0.180	-161.7
2000.00	0.551	133.2	1.829	37.7	0.202	31.4	0.184	-163.4

$V_{CE} = 1\text{ V}$ ,  $I_c = 7\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.741	-46.4	17.962	148.1	0.038	63.9	0.844	-31.3
200.00	0.630	-81.9	13.958	126.6	0.064	55.5	0.671	-53.0
300.00	0.554	-106.4	10.862	112.9	0.077	47.6	0.524	-68.1
400.00	0.506	-126.3	8.635	102.7	0.087	44.3	0.416	-77.7
500.00	0.475	-141.7	7.161	95.2	0.096	43.7	0.352	-86.7
600.00	0.465	-153.6	6.072	88.9	0.105	43.5	0.303	-95.3
700.00	0.462	-163.4	5.283	83.6	0.111	43.4	0.267	-100.2
800.00	0.458	-172.3	4.672	78.9	0.121	43.2	0.233	-108.2
900.00	0.462	-179.7	4.168	74.3	0.127	42.7	0.214	-113.6
1000.00	0.465	173.6	3.769	70.5	0.135	44.4	0.199	-120.9
1100.00	0.466	167.5	3.443	66.6	0.139	41.7	0.190	-129.1
1200.00	0.477	162.8	3.161	63.2	0.156	42.0	0.195	-136.0
1300.00	0.490	156.6	2.954	59.3	0.161	42.1	0.181	-142.3
1400.00	0.501	152.0	2.728	55.6	0.171	40.3	0.181	-147.5
1500.00	0.509	147.8	2.551	52.4	0.184	38.7	0.190	-153.3
1600.00	0.516	145.1	2.398	49.4	0.183	39.4	0.188	-162.7
1700.00	0.520	140.0	2.235	46.3	0.198	36.7	0.188	-165.2
1800.00	0.530	137.3	2.133	43.4	0.202	36.3	0.205	-173.6
1900.00	0.547	133.1	2.014	40.4	0.208	34.6	0.196	-178.2
2000.00	0.546	129.5	1.912	37.6	0.212	34.8	0.199	-179.5

V<sub>CE</sub> = 1 V, I<sub>c</sub> = 10 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.676	-56.3	21.704	142.6	0.038	66.7	0.798	-38.5
200.00	0.561	-95.4	15.685	120.5	0.058	54.2	0.593	-62.6
300.00	0.498	-120.2	11.740	107.7	0.069	50.1	0.443	-78.3
400.00	0.467	-138.8	9.163	98.5	0.077	46.5	0.350	-88.7
500.00	0.453	-152.8	7.523	91.7	0.085	48.5	0.304	-99.0
600.00	0.452	-163.7	6.335	86.0	0.094	48.3	0.260	-107.8
700.00	0.449	-172.6	5.494	81.2	0.106	49.4	0.231	-114.9
800.00	0.452	179.8	4.847	76.8	0.119	47.6	0.213	-123.1
900.00	0.451	172.9	4.318	72.6	0.123	47.7	0.194	-131.3
1000.00	0.458	167.1	3.891	69.1	0.136	47.0	0.188	-135.6
1100.00	0.467	161.4	3.550	65.3	0.146	46.9	0.189	-145.9
1200.00	0.476	157.5	3.251	62.2	0.155	45.1	0.187	-152.3
1300.00	0.482	152.5	3.045	58.5	0.164	45.0	0.185	-158.8
1400.00	0.502	148.6	2.809	54.8	0.173	44.0	0.198	-161.4
1500.00	0.507	144.6	2.638	51.8	0.181	43.0	0.194	-170.2
1600.00	0.512	142.1	2.471	49.0	0.191	41.3	0.205	-174.3
1700.00	0.527	137.6	2.310	45.9	0.197	39.2	0.212	-178.3
1800.00	0.527	133.8	2.196	43.6	0.209	38.1	0.228	177.2
1900.00	0.543	130.8	2.065	40.6	0.217	37.3	0.224	169.1
2000.00	0.545	126.7	1.974	38.1	0.223	35.5	0.234	168.6

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 1 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.965	-14.8	3.499	168.1	0.034	82.6	0.987	-6.7
200.00	0.944	-29.7	3.439	157.3	0.066	72.1	0.969	-13.1
300.00	0.916	-43.8	3.305	147.1	0.093	64.7	0.940	-19.3
400.00	0.868	-57.8	3.130	136.5	0.116	55.3	0.898	-24.8
500.00	0.831	-71.2	2.978	126.8	0.136	48.8	0.855	-29.8
600.00	0.785	-83.5	2.769	117.8	0.150	41.7	0.816	-34.8
700.00	0.742	-95.4	2.610	109.8	0.167	37.0	0.778	-37.8
800.00	0.712	-106.8	2.435	102.4	0.172	32.5	0.728	-41.7
900.00	0.685	-117.6	2.307	95.0	0.180	26.4	0.703	-44.6
1000.00	0.656	-127.8	2.133	88.3	0.183	22.1	0.667	-47.4
1100.00	0.641	-137.8	2.029	82.3	0.182	19.2	0.637	-50.3
1200.00	0.631	-146.7	1.881	76.7	0.180	16.9	0.609	-53.6
1300.00	0.625	-155.8	1.801	71.4	0.179	13.1	0.592	-56.1
1400.00	0.622	-164.7	1.703	65.7	0.176	9.9	0.577	-59.2
1500.00	0.627	-172.0	1.605	61.0	0.176	9.6	0.561	-61.7
1600.00	0.622	-177.2	1.520	56.3	0.170	9.2	0.543	-64.7
1700.00	0.623	174.5	1.434	51.9	0.167	6.5	0.531	-67.1
1800.00	0.615	168.2	1.369	48.1	0.166	7.6	0.516	-71.0
1900.00	0.621	162.9	1.310	44.2	0.159	6.4	0.505	-73.2
2000.00	0.618	157.0	1.257	39.8	0.157	6.8	0.505	-74.4

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

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.898	-23.3	9.607	162.0	0.033	75.5	0.956	-13.1
200.00	0.834	-45.3	8.890	146.4	0.059	65.2	0.892	-24.3
300.00	0.758	-64.2	7.932	133.5	0.081	54.5	0.801	-33.8
400.00	0.682	-82.0	6.964	121.9	0.095	49.4	0.711	-40.6
500.00	0.623	-97.2	6.174	112.4	0.105	44.9	0.636	-46.5
600.00	0.570	-110.9	5.436	104.2	0.110	41.7	0.573	-50.9
700.00	0.533	-122.3	4.874	97.3	0.120	37.4	0.522	-54.1
800.00	0.511	-134.8	4.398	91.2	0.122	35.7	0.474	-56.7
900.00	0.493	-145.1	4.012	85.4	0.127	33.8	0.443	-59.2
1000.00	0.477	-153.9	3.648	80.2	0.132	31.9	0.407	-61.6
1100.00	0.477	-163.5	3.380	75.5	0.136	33.6	0.383	-64.3
1200.00	0.471	-170.6	3.099	71.2	0.137	31.5	0.357	-66.9
1300.00	0.479	-178.8	2.915	66.9	0.141	32.2	0.337	-69.8
1400.00	0.486	174.1	2.724	62.7	0.149	30.1	0.325	-72.3
1500.00	0.492	167.4	2.554	58.6	0.149	30.6	0.311	-75.4
1600.00	0.493	164.1	2.399	55.3	0.152	29.4	0.298	-79.1
1700.00	0.498	156.6	2.247	51.7	0.164	31.3	0.290	-80.7
1800.00	0.503	152.4	2.144	48.2	0.165	29.4	0.274	-89.1
1900.00	0.513	148.8	2.032	44.9	0.169	30.0	0.253	-88.2
2000.00	0.519	143.3	1.944	41.8	0.170	29.8	0.250	-91.9

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

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.839	-29.8	14.278	157.2	0.031	77.2	0.935	-17.7
200.00	0.736	-56.5	12.457	138.9	0.053	65.0	0.819	-31.9
300.00	0.651	-77.6	10.528	125.1	0.071	56.2	0.694	-42.5
400.00	0.568	-96.3	8.837	113.9	0.081	48.5	0.594	-48.9
500.00	0.515	-111.8	7.559	105.1	0.091	46.6	0.515	-54.8
600.00	0.471	-125.7	6.524	97.8	0.094	44.8	0.452	-58.9
700.00	0.445	-137.6	5.768	91.7	0.101	41.4	0.408	-61.3
800.00	0.436	-148.3	5.134	86.4	0.107	41.0	0.363	-64.6
900.00	0.422	-158.6	4.637	81.3	0.112	40.5	0.335	-66.8
1000.00	0.421	-166.4	4.199	76.8	0.120	40.8	0.308	-69.0
1100.00	0.416	175.0	3.864	72.8	0.123	40.9	0.281	-71.7
1200.00	0.422	178.6	3.540	68.9	0.136	41.3	0.263	-75.9
1300.00	0.430	171.7	3.320	64.9	0.142	40.1	0.245	-80.3
1400.00	0.439	165.9	3.085	61.1	0.145	40.3	0.241	-81.6
1500.00	0.451	159.6	2.888	57.6	0.154	40.3	0.227	-86.3
1600.00	0.457	156.3	2.718	54.6	0.157	38.4	0.211	-90.4
1700.00	0.464	149.7	2.539	51.2	0.164	37.3	0.202	-92.0
1800.00	0.467	145.7	2.410	48.2	0.170	36.8	0.194	-102.8
1900.00	0.483	141.5	2.286	45.1	0.173	36.1	0.172	-102.5
2000.00	0.485	137.6	2.183	42.0	0.181	35.6	0.173	-107.3



$V_{CE} = 3\text{ V}$ ,  $I_c = 7\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.769	-35.8	18.610	152.6	0.026	73.9	0.890	-22.5
200.00	0.658	-66.3	15.310	132.5	0.051	59.8	0.743	-38.5
300.00	0.561	-88.8	12.331	118.8	0.061	53.2	0.604	-49.4
400.00	0.485	-107.9	10.032	108.3	0.071	51.0	0.504	-55.6
500.00	0.444	-124.0	8.438	100.3	0.076	48.0	0.423	-60.5
600.00	0.411	-137.7	7.186	93.6	0.084	49.0	0.371	-64.1
700.00	0.397	-148.5	6.299	88.2	0.093	46.8	0.327	-66.8
800.00	0.395	-158.2	5.583	83.4	0.101	47.6	0.290	-70.2
900.00	0.386	-167.9	5.020	78.8	0.106	48.0	0.268	-73.3
1000.00	0.389	-175.7	4.526	74.7	0.118	44.9	0.245	-75.7
1100.00	0.392	176.0	4.151	70.8	0.126	44.6	0.226	-79.4
1200.00	0.396	170.9	3.801	67.5	0.131	45.8	0.203	-83.8
1300.00	0.404	164.8	3.555	63.7	0.140	44.1	0.195	-87.1
1400.00	0.417	158.7	3.304	60.1	0.150	45.1	0.189	-92.1
1500.00	0.426	153.6	3.091	56.6	0.157	45.6	0.177	-96.9
1600.00	0.432	151.9	2.906	53.9	0.162	42.7	0.168	-103.4
1700.00	0.443	145.2	2.712	50.6	0.173	41.8	0.160	-106.6
1800.00	0.446	141.4	2.588	48.1	0.179	41.6	0.157	-115.7
1900.00	0.466	137.6	2.435	45.2	0.182	41.7	0.141	-120.9
2000.00	0.470	133.4	2.339	42.2	0.192	37.3	0.146	-125.3

$V_{CE} = 3\text{ V}$ ,  $I_c = 10\text{ mA}$ ,  $Z_o = 50\ \Omega$

FREQUENCY (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.698	-42.9	22.901	147.9	0.025	67.3	0.849	-26.9
200.00	0.570	-77.2	17.709	126.7	0.042	60.5	0.666	-44.8
300.00	0.482	-100.1	13.726	113.5	0.055	53.5	0.527	-55.1
400.00	0.424	-119.5	10.922	103.8	0.066	52.4	0.424	-60.8
500.00	0.391	-134.8	9.033	96.5	0.073	52.7	0.359	-66.2
600.00	0.370	-147.6	7.653	90.6	0.083	52.2	0.307	-69.7
700.00	0.364	-158.4	6.669	85.5	0.090	53.4	0.276	-72.5
800.00	0.361	-167.4	5.894	81.1	0.097	52.7	0.243	-75.0
900.00	0.363	-176.0	5.278	76.9	0.107	51.5	0.223	-79.0
1000.00	0.366	177.1	4.764	73.1	0.113	50.6	0.201	-79.3
1100.00	0.368	170.5	4.356	69.6	0.123	50.9	0.182	-85.7
1200.00	0.378	165.3	3.992	66.4	0.129	50.8	0.174	-94.5
1300.00	0.391	159.7	3.733	62.8	0.138	49.8	0.156	-96.1
1400.00	0.402	154.4	3.461	59.4	0.151	47.6	0.158	-101.5
1500.00	0.417	150.4	3.221	56.2	0.162	47.2	0.149	-107.4
1600.00	0.420	147.3	3.035	53.6	0.164	46.2	0.138	-117.4
1700.00	0.431	142.1	2.831	50.6	0.172	44.9	0.135	-120.2
1800.00	0.434	138.4	2.703	47.7	0.179	44.2	0.142	-130.9
1900.00	0.454	135.4	2.547	45.0	0.189	43.0	0.126	-137.6
2000.00	0.461	130.8	2.434	42.1	0.196	40.8	0.127	-143.0

## [MEMO]

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customer must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device 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: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices in "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact NEC Sales Representative in advance.

Anti-radioactive design is not implemented in this product.