

To our customers,

---

## Old Company Name in Catalogs and Other Documents

---

On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

Send any inquiries to <http://www.renesas.com/inquiry>.

## Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics 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 Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: “Standard”, “High Quality”, and “Specific”. The recommended applications for each Renesas Electronics product depends on the product’s quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as “Specific” without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as “Specific” or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is “Standard” unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.
  - “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.
  - “High Quality”: 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; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

NPN SILICON EPITAXIAL TRANSISTOR  
3 PINS ULTRA SUPER MINI MOLD

DESCRIPTION

The 2SC5008 is an NPN epitaxial silicon transistor designed for use in low noise and small signal amplifiers from VHF band to L band. Low noise figure, high gain, and high current capability achieve a very wide dynamic range and excellent linearity. This is achieved by direct nitride passivated base surface, process (NEST2 process) which is an NEC proprietary fabrication technique.

FEATURES

- Low Voltage Use.
- High  $f_t$ : 8.0 GHz TYP. (@  $V_{CE} = 3\text{ V}$ ,  $I_c = 5\text{ mA}$ ,  $f = 2\text{ GHz}$ )
- Low  $C_{re}$ : 0.3 pF TYP. (@  $V_{CE} = 3\text{ V}$ ,  $I_E = 0$ ,  $f = 1\text{ MHz}$ )
- Low NF: 1.9 dB TYP. (@  $V_{CE} = 3\text{ V}$ ,  $I_c = 5\text{ mA}$ ,  $f = 2\text{ GHz}$ )
- High  $|S_{21e}|^2$ : 7.5 dB TYP. (@  $V_{CE} = 3\text{ V}$ ,  $I_c = 5\text{ mA}$ ,  $f = 2\text{ GHz}$ )
- Ultra Super Mini Mold Package.

ORDERING INFORMATION

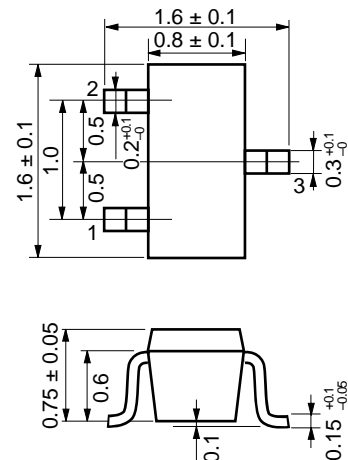
PART NUMBER	QUANTITY	PACKING STYLE
2SC5008	50 pcs./Unit	Embossed tape 8 mm wide. Pin3 (Collector) face to perforation side of the tape.
2SC5008-T1	3 kpcs./Reel	

\* Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs.

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

Collector to Base Voltage	$V_{CBO}$	20	V
Collector to Emitter Voltage	$V_{CEO}$	10	V
Emitter to Base Voltage	$V_{EBO}$	1.5	V
Collector Current	$I_c$	35	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 DIMENSIONS  
in millimeters



1. Emitter
2. Base
3. Collector

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

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I <sub>CB0</sub>			1.0	μA	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EB0</sub>			1.0	μA	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub>	80		160		V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA <sup>*1</sup>
Gain Bandwidth Product	f <sub>T</sub>	5.5	8.0		GHz	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA
Feed-back Capacitance	C <sub>re</sub>		0.3	0.7	pF	V <sub>CB</sub> = 3 V, I <sub>E</sub> = 0, f = 1 MHz <sup>*2</sup>
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	5.5	7.5		dB	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz
Noise Figure	NF		1.9	3.2	dB	V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz

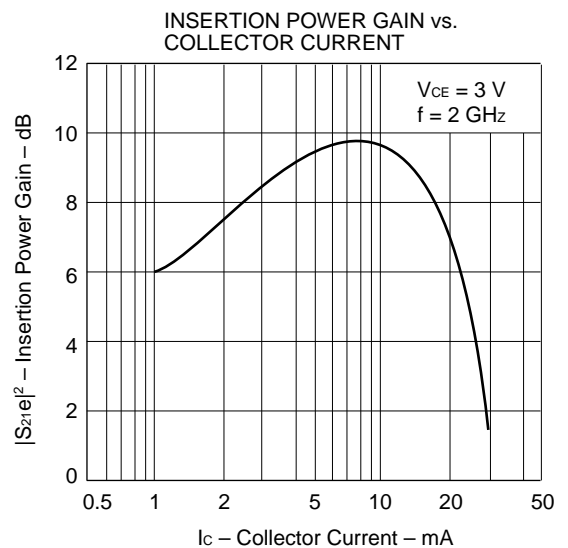
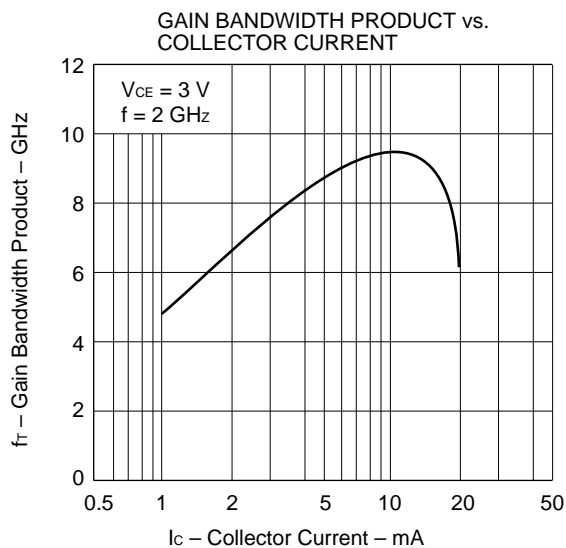
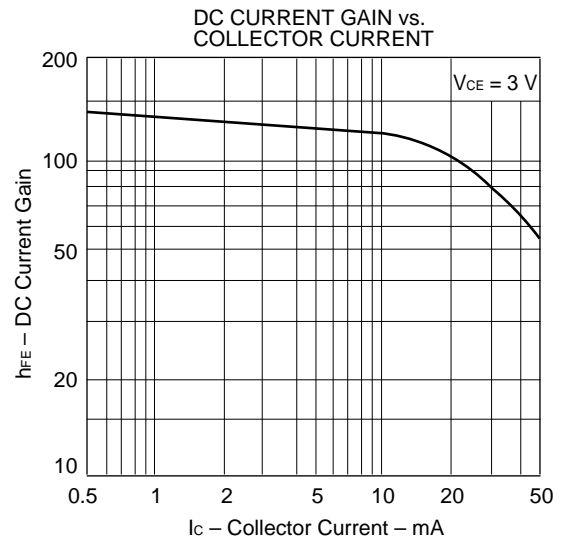
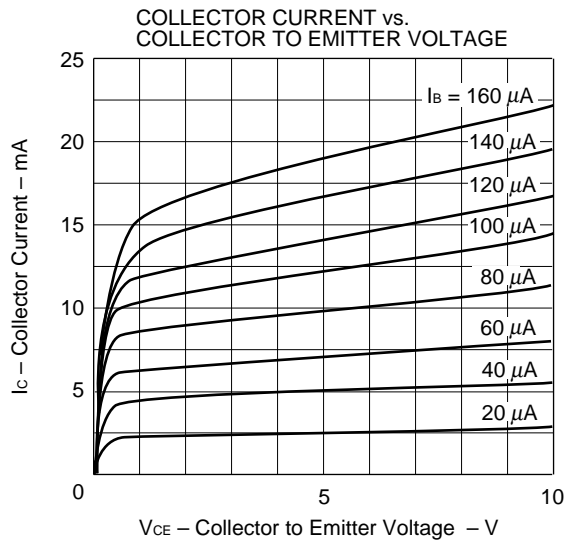
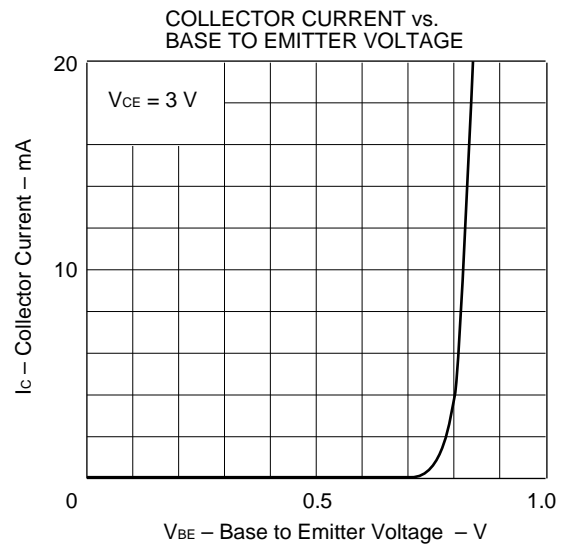
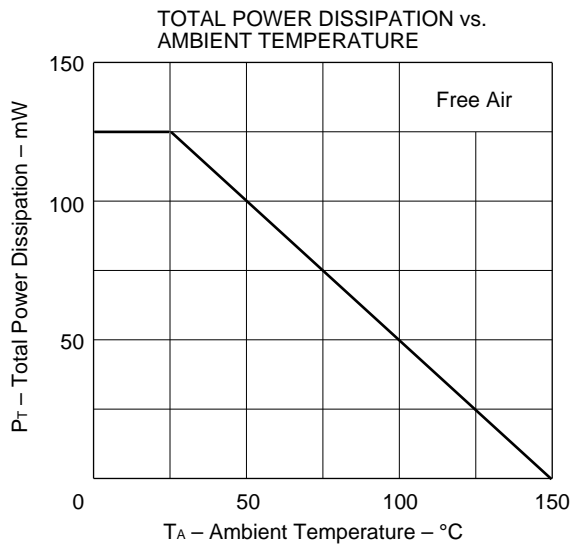
\*1 Pulse Measurement PW ≤ 350 μs, Duty Cycle ≤ 2 %

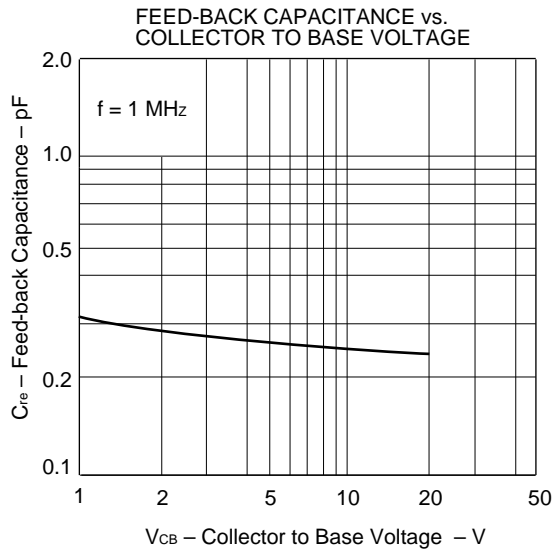
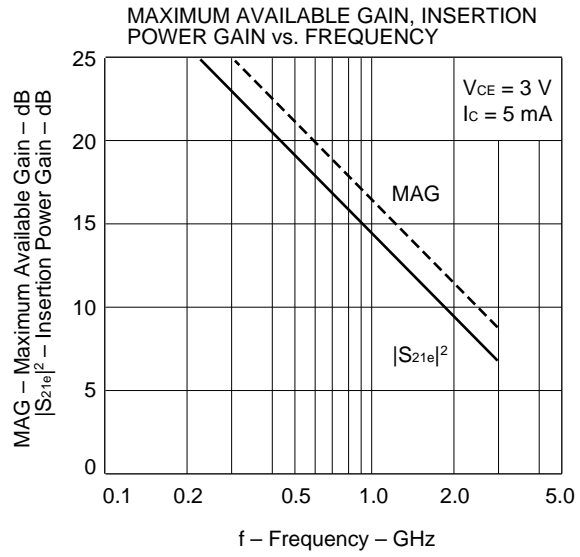
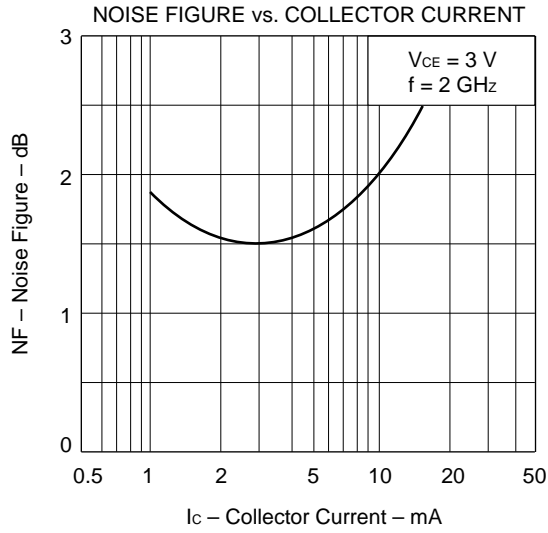
\*2 The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

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

RANK	FB
Marking	44
h <sub>FE</sub>	80 to 160

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





**S-PARAMETER**

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 10 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.739	-23.1	15.190	151.5	.016	74.9	.922	-13.6	
200.00	.617	-45.5	13.966	131.9	.027	63.0	.804	-22.2	
300.00	.507	-64.6	12.474	115.9	.035	57.3	.699	-25.8	
400.00	.414	-81.0	10.826	102.7	.042	51.8	.632	-27.3	
500.00	.344	-94.7	9.421	91.8	.049	49.7	.583	-28.1	
600.00	.296	-105.9	8.147	82.9	.055	47.0	.550	-28.1	
700.00	.260	-116.6	7.211	74.9	.062	44.4	.525	-28.3	
800.00	.236	-126.3	6.434	67.7	.068	41.8	.506	-28.7	
900.00	.218	-136.2	5.806	60.9	.075	39.1	.490	-28.9	
1000.00	.205	-144.8	5.288	54.6	.083	36.4	.477	-29.6	
1100.00	.199	-153.1	4.864	48.6	.089	33.4	.466	-29.9	
1200.00	.194	-161.6	4.500	42.7	.096	30.2	.457	-31.0	
1300.00	.193	-168.9	4.191	37.0	.102	27.7	.449	-31.7	
1400.00	.194	-175.6	3.908	31.4	.111	24.2	.441	-32.8	
1500.00	.196	-178.7	3.680	26.2	.118	21.0	.435	-33.9	
1600.00	.202	-173.5	3.489	20.7	.125	17.6	.429	-35.5	
1700.00	.214	-167.9	3.317	15.0	.133	12.6	.417	-37.2	
1800.00	.222	-161.7	3.154	9.6	.139	9.4	.406	-38.2	
1900.00	.229	-156.3	2.994	4.2	.145	6.0	.397	-39.4	
2000.00	.237	-151.7	2.857	-1.0	.152	2.6	.390	-40.5	
2100.00	.246	-147.5	2.748	-6.1	.159	-0.9	.381	-42.1	
2200.00	.253	-144.6	2.626	-11.1	.167	-4.6	.374	-43.6	
2300.00	.263	-140.9	2.539	-16.2	.174	-8.0	.366	-45.2	
2400.00	.271	-137.9	2.445	-21.3	.182	-11.6	.357	-46.8	
2500.00	.283	-134.8	2.363	-26.3	.190	-15.2	.347	-48.4	
2600.00	.292	-132.0	2.288	-31.4	.197	-19.2	.338	-50.6	
2700.00	.303	-129.7	2.218	-36.4	.204	-22.9	.328	-52.5	
2800.00	.315	-127.4	2.147	-41.4	.211	-26.7	.318	-54.8	
2900.00	.326	-125.0	2.085	-46.3	.220	-30.8	.309	-56.9	
3000.00	.339	-122.7	2.032	-51.2	.227	-34.2	.299	-59.5	

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 7 mA, Z<sub>o</sub> = 50 Ω

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.815	-17.7	11.972	155.6	.016	77.0	.947	-11.5	
200.00	.732	-34.0	11.228	138.4	.029	63.4	.855	-20.4	
300.00	.634	-50.1	10.480	123.5	.039	56.1	.757	-25.1	
400.00	.539	-64.9	9.549	110.7	.047	51.8	.687	-27.9	
500.00	.455	-78.9	8.722	99.0	.054	47.4	.630	-29.6	
600.00	.392	-89.6	7.703	89.1	.060	44.0	.589	-30.5	
700.00	.336	-100.4	6.951	80.3	.066	41.4	.557	-30.9	
800.00	.297	-110.0	6.265	72.2	.073	38.5	.532	-31.5	
900.00	.268	-119.5	5.700	64.9	.079	35.8	.511	-31.9	
1000.00	.244	-128.0	5.221	58.3	.086	32.7	.494	-32.5	
1100.00	.228	-136.6	4.802	51.8	.092	29.7	.480	-32.9	
1200.00	.216	-145.2	4.479	45.5	.098	27.4	.468	-33.8	
1300.00	.208	-153.4	4.169	39.6	.106	24.0	.459	-34.4	
1400.00	.203	-160.8	3.900	33.9	.113	21.1	.449	-35.6	
1500.00	.202	-167.7	3.674	28.2	.121	17.5	.440	-36.6	
1600.00	.205	-173.8	3.478	22.7	.128	14.3	.433	-37.8	
1700.00	.214	-179.6	3.316	17.3	.135	10.2	.421	-39.7	
1800.00	.219	-172.5	3.153	11.6	.141	6.4	.409	-40.7	
1900.00	.223	-165.7	3.001	6.0	.146	3.5	.399	-41.7	
2000.00	.230	-160.0	2.874	.7	.153	0.0	.391	-43.0	
2100.00	.236	-155.4	2.753	-4.6	.160	-3.2	.382	-44.4	
2200.00	.244	-151.6	2.631	-9.6	.167	-6.9	.374	-45.7	
2300.00	.254	-147.1	2.548	-14.9	.174	-10.4	.365	-47.2	
2400.00	.262	-143.5	2.453	-20.0	.181	-13.8	.356	-49.0	
2500.00	.273	-140.2	2.370	-25.0	.189	-17.4	.346	-50.5	
2600.00	.281	-137.1	2.295	-30.2	.196	-21.0	.337	-52.7	
2700.00	.293	-134.1	2.228	-35.2	.203	-24.9	.328	-54.6	
2800.00	.303	-131.4	2.156	-40.2	.211	-28.3	.317	-56.7	
2900.00	.315	-128.6	2.092	-45.2	.218	-32.3	.307	-58.8	
3000.00	.326	-126.2	2.040	-50.1	.227	-36.1	.298	-61.4	

**S-PARAMETER**

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 5 mA, Z<sub>0</sub> = 50 Ω

FREQUENCY	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.870	-13.9	9.067	158.8	.017	76.2	.964	-9.7
200.00	.809	-27.3	8.687	143.1	.031	65.8	.897	-17.8
300.00	.733	-40.3	8.368	129.3	.042	58.0	.814	-23.3
400.00	.661	-53.0	7.864	117.5	.052	51.2	.748	-27.0
500.00	.575	-66.1	7.479	106.3	.059	45.9	.687	-29.5
600.00	.510	-76.2	6.765	96.3	.066	41.4	.643	-31.2
700.00	.440	-87.2	6.297	86.6	.072	38.2	.604	-32.3
800.00	.387	-96.8	5.812	77.7	.078	34.7	.574	-33.3
900.00	.345	-106.1	5.365	69.7	.083	32.7	.547	-33.9
1000.00	.309	-114.9	4.964	62.4	.090	29.2	.527	-34.7
1100.00	.283	-123.3	4.616	55.4	.096	25.9	.509	-35.2
1200.00	.261	-131.9	4.298	49.0	.101	23.0	.493	-36.1
1300.00	.246	-139.7	4.032	42.4	.107	20.4	.481	-36.7
1400.00	.234	-147.4	3.784	36.7	.115	17.1	.471	-37.8
1500.00	.227	-154.7	3.568	30.8	.122	14.2	.460	-38.9
1600.00	.227	-161.3	3.385	25.0	.129	11.2	.450	-40.2
1700.00	.231	-168.9	3.230	19.1	.137	7.1	.438	-41.9
1800.00	.231	-176.7	3.069	13.5	.141	3.4	.425	-42.8
1900.00	.233	176.3	2.929	7.8	.148	.7	.413	-44.0
2000.00	.237	169.5	2.802	2.3	.153	-2.4	.405	-45.2
2100.00	.242	163.9	2.690	-3.0	.159	-6.1	.396	-46.5
2200.00	.247	159.4	2.583	-8.3	.166	-9.3	.387	-48.0
2300.00	.256	154.3	2.495	-13.6	.173	-12.8	.377	-49.5
2400.00	.264	150.1	2.404	-18.8	.179	-16.2	.367	-51.1
2500.00	.274	146.2	2.324	-23.9	.187	-19.3	.358	-52.7
2600.00	.282	142.3	2.251	-29.2	.194	-23.3	.348	-54.8
2700.00	.292	139.2	2.188	-34.3	.200	-26.9	.339	-56.8
2800.00	.303	135.9	2.117	-39.4	.207	-30.2	.328	-59.0
2900.00	.313	132.9	2.056	-44.5	.215	-34.1	.319	-60.9
3000.00	.325	130.0	2.003	-49.5	.223	-37.5	.309	-63.5

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA, Z<sub>0</sub> = 50 Ω

FREQUENCY	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.936	-10.5	5.612	163.6	.017	79.6	.981	-7.1
200.00	.892	-20.4	5.628	148.9	.034	69.7	.944	-14.0
300.00	.842	-30.5	5.602	136.8	.048	60.6	.887	-19.3
400.00	.785	-41.2	5.393	126.0	.060	53.2	.837	-23.7
500.00	.732	-50.8	5.328	116.2	.069	46.4	.782	-27.2
600.00	.681	-59.2	4.924	106.6	.077	40.6	.740	-29.9
700.00	.618	-68.7	4.767	97.2	.084	35.8	.698	-32.0
800.00	.564	-77.9	4.575	88.0	.090	31.0	.663	-33.9
900.00	.510	-86.9	4.365	79.4	.094	27.0	.627	-35.2
1000.00	.459	-96.0	4.191	70.9	.100	23.5	.599	-36.5
1100.00	.413	-104.8	3.991	62.9	.106	19.8	.577	-37.5
1200.00	.375	-113.0	3.790	55.7	.110	17.1	.558	-38.5
1300.00	.350	-120.8	3.588	48.7	.116	14.2	.542	-39.6
1400.00	.325	-128.3	3.410	42.0	.121	11.1	.525	-40.8
1500.00	.307	-135.8	3.234	35.7	.126	7.8	.513	-41.8
1600.00	.295	-142.9	3.086	29.5	.134	4.9	.499	-43.2
1700.00	.289	-150.9	2.960	23.3	.140	1.0	.486	-44.8
1800.00	.283	-158.6	2.830	17.0	.143	-2.7	.471	-46.0
1900.00	.276	-166.4	2.707	11.2	.148	-5.6	.457	-47.1
2000.00	.273	-174.1	2.597	5.4	.153	-8.5	.448	-48.4
2100.00	.273	179.6	2.504	-3	.159	-11.6	.435	-49.8
2200.00	.275	174.0	2.405	-5.9	.164	-14.4	.428	-51.3
2300.00	.280	167.8	2.332	-11.5	.170	-17.9	.417	-52.7
2400.00	.284	162.6	2.248	-16.9	.176	-20.9	.406	-54.2
2500.00	.292	157.7	2.177	-22.2	.182	-23.8	.396	-55.9
2600.00	.298	152.8	2.109	-27.6	.187	-27.3	.386	-57.9
2700.00	.307	148.7	2.051	-32.9	.194	-30.7	.376	-59.9
2800.00	.316	144.7	1.988	-38.1	.200	-33.8	.366	-61.8
2900.00	.326	140.9	1.934	-43.4	.207	-37.3	.356	-64.0
3000.00	.337	137.3	1.885	-48.6	.214	-40.5	.346	-66.6



**S-PARAMETER**

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

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.986	-6.4	1.963	167.5	.019	82.2	.996	-4.0	
200.00	.971	-13.0	2.022	157.2	.036	73.4	.987	-8.1	
300.00	.958	-19.5	2.075	147.4	.053	66.7	.966	-11.8	
400.00	.936	-26.5	2.082	137.6	.070	58.7	.953	-15.4	
500.00	.914	-32.8	2.114	129.5	.084	52.1	.929	-18.7	
600.00	.890	-39.0	2.011	120.8	.098	45.0	.909	-22.0	
700.00	.859	-45.3	1.993	112.4	.109	38.5	.883	-24.9	
800.00	.833	-51.7	1.967	103.7	.120	32.1	.859	-27.7	
900.00	.801	-58.0	1.916	95.7	.127	25.8	.830	-30.5	
1000.00	.769	-65.2	1.952	88.0	.137	20.2	.803	-33.0	
1100.00	.732	-72.5	1.972	79.8	.143	14.4	.776	-35.0	
1200.00	.693	-80.0	1.987	72.4	.148	9.7	.754	-37.1	
1300.00	.663	-86.7	1.945	64.6	.154	4.5	.734	-39.0	
1400.00	.626	-93.9	1.936	57.2	.157	-1	.712	-41.1	
1500.00	.596	-100.5	1.893	49.6	.162	-4.4	.693	-42.9	
1600.00	.570	-107.2	1.852	42.8	.165	-8.3	.676	-44.6	
1700.00	.542	-114.9	1.845	35.3	.170	-12.9	.660	-46.5	
1800.00	.523	-121.5	1.786	28.6	.172	-17.5	.640	-48.3	
1900.00	.497	-129.1	1.766	21.5	.174	-21.5	.622	-49.9	
2000.00	.471	-137.3	1.746	14.6	.174	-25.3	.610	-51.7	
2100.00	.456	-144.2	1.707	8.2	.174	-28.5	.595	-53.3	
2200.00	.443	-151.0	1.661	1.6	.176	-31.9	.583	-55.0	
2300.00	.430	-158.3	1.648	-4.8	.177	-35.1	.567	-56.8	
2400.00	.424	-164.8	1.598	-10.9	.178	-38.1	.557	-58.6	
2500.00	.419	-171.3	1.565	-17.0	.180	-40.5	.545	-60.5	
2600.00	.414	-177.8	1.534	-23.1	.182	-43.6	.534	-62.6	
2700.00	.412	176.4	1.504	-29.1	.183	-46.5	.523	-64.6	
2800.00	.413	170.5	1.466	-34.9	.186	-48.7	.515	-66.9	
2900.00	.414	164.7	1.442	-40.6	.189	-51.4	.504	-69.2	
3000.00	.419	159.5	1.413	-46.3	.191	-53.5	.495	-71.7	

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

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
100.00	.849	-19.1	8.397	156.6	.021	75.5	.949	-11.9	
200.00	.764	-34.1	8.259	139.2	.037	63.8	.866	-21.8	
300.00	.681	-49.1	7.901	125.1	.051	54.8	.767	-28.2	
400.00	.612	-63.6	7.397	113.1	.060	48.4	.689	-32.3	
500.00	.534	-78.0	7.006	101.8	.068	42.2	.623	-35.2	
600.00	.473	-89.5	6.297	91.7	.076	38.7	.573	-37.0	
700.00	.414	-101.5	5.833	82.2	.082	35.3	.531	-38.1	
800.00	.371	-112.1	5.352	73.6	.089	31.9	.499	-39.2	
900.00	.339	-122.2	4.924	65.7	.095	28.7	.472	-39.9	
1000.00	.314	-131.4	4.557	58.5	.103	25.6	.448	-40.9	
1100.00	.295	-140.2	4.219	51.6	.109	22.8	.429	-41.2	
1200.00	.283	-148.3	3.935	45.2	.115	20.1	.414	-42.2	
1300.00	.275	-156.2	3.672	38.8	.122	16.9	.398	-42.8	
1400.00	.270	-163.3	3.448	32.9	.129	13.8	.385	-44.0	
1500.00	.267	-170.3	3.242	26.9	.136	10.7	.374	-45.0	
1600.00	.268	-176.4	3.081	21.1	.143	7.5	.362	-46.4	
1700.00	.273	177.8	2.927	15.4	.153	3.9	.353	-47.9	
1800.00	.280	172.2	2.783	9.6	.160	-1	.340	-49.5	
1900.00	.288	165.8	2.663	3.9	.165	-3.8	.326	-51.1	
2000.00	.294	160.1	2.540	-1.7	.171	-6.8	.316	-52.2	
2100.00	.301	155.4	2.445	-7.0	.177	-10.1	.304	-53.7	
2200.00	.307	151.6	2.347	-12.4	.186	-13.8	.293	-55.4	
2300.00	.317	147.3	2.260	-17.8	.192	-17.2	.284	-57.0	
2400.00	.324	143.6	2.177	-23.0	.199	-20.8	.272	-58.9	
2500.00	.334	140.2	2.105	-28.2	.207	-23.9	.261	-60.8	
2600.00	.345	137.0	2.037	-33.5	.214	-27.8	.251	-63.7	
2700.00	.354	134.0	1.977	-38.6	.221	-31.4	.241	-65.9	
2800.00	.365	131.0	1.913	-43.8	.228	-35.3	.230	-68.6	
2900.00	.377	128.2	1.856	-48.9	.235	-39.0	.220	-71.2	
3000.00	.387	125.5	1.808	-53.8	.244	-42.9	.210	-74.5	

**S-PARAMETER**

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

FREQUENCY	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.928	-11.2	5.570	160.2	.022	78.7	.974	-8.7
200.00	.876	-22.9	5.562	146.9	.040	67.5	.928	-16.9
300.00	.821	-34.2	5.509	134.3	.057	57.4	.859	-23.0
400.00	.758	-45.7	5.289	123.2	.070	49.7	.798	-28.0
500.00	.705	-56.7	5.198	113.1	.081	43.3	.738	-32.0
600.00	.652	-66.1	4.787	103.2	.089	37.0	.689	-35.2
700.00	.588	-76.8	4.617	93.6	.097	31.9	.640	-37.5
800.00	.535	-87.1	4.406	84.1	.103	27.6	.601	-39.4
900.00	.484	-97.1	4.187	75.5	.108	23.9	.565	-41.0
1000.00	.438	-107.0	3.986	67.1	.115	20.3	.533	-42.6
1100.00	.401	-116.3	3.771	59.1	.120	16.5	.508	-43.6
1200.00	.371	-125.4	3.566	51.8	.125	13.4	.486	-44.7
1300.00	.350	-133.4	3.362	44.8	.131	10.3	.468	-45.7
1400.00	.333	-141.3	3.177	38.3	.137	7.0	.449	-47.2
1500.00	.320	-148.7	3.015	31.8	.143	4.1	.436	-48.3
1600.00	.312	-156.1	2.872	25.8	.149	1.1	.421	-49.7
1700.00	.310	-162.9	2.745	19.5	.157	-2.5	.408	-51.4
1800.00	.310	-170.2	2.623	13.4	.162	-6.5	.391	-52.9
1900.00	.309	-177.5	2.514	7.3	.165	-9.7	.377	-54.2
2000.00	.310	175.4	2.407	1.4	.171	-12.7	.366	-55.5
2100.00	.313	169.8	2.318	-4.2	.177	-16.1	.351	-57.2
2200.00	.317	164.9	2.227	-9.8	.182	-19.1	.343	-58.5
2300.00	.324	159.5	2.157	-15.4	.188	-22.3	.330	-60.4
2400.00	.331	155.0	2.076	-20.8	.194	-25.6	.319	-62.2
2500.00	.338	150.6	2.012	-26.2	.200	-28.8	.307	-64.1
2600.00	.346	146.5	1.947	-31.7	.207	-32.4	.296	-66.8
2700.00	.356	142.6	1.894	-36.9	.213	-35.6	.285	-69.0
2800.00	.365	139.0	1.833	-42.3	.220	-39.1	.274	-71.8
2900.00	.375	135.7	1.782	-47.5	.226	-42.7	.265	-74.3
3000.00	.386	132.4	1.737	-52.7	.234	-46.1	.254	-77.2

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

FREQUENCY	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.983	-6.8	1.986	166.5	.022	83.1	.993	-4.6
200.00	.968	-14.0	2.016	156.0	.044	73.1	.983	-9.3
300.00	.952	-21.0	2.067	145.7	.064	65.2	.959	-13.6
400.00	.925	-28.5	2.064	135.9	.083	56.7	.942	-17.7
500.00	.904	-35.3	2.096	127.1	.100	49.8	.913	-21.6
600.00	.878	-41.8	1.992	118.1	.116	42.7	.889	-25.2
700.00	.844	-48.6	1.971	109.4	.129	35.5	.859	-28.5
800.00	.816	-55.6	1.945	100.6	.141	28.7	.829	-31.7
900.00	.782	-62.3	1.900	92.3	.151	22.5	.795	-34.8
1000.00	.749	-69.9	1.926	84.3	.159	16.3	.765	-37.4
1100.00	.709	-77.8	1.940	76.0	.166	11.1	.736	-39.7
1200.00	.673	-85.8	1.952	68.2	.172	5.8	.709	-42.0
1300.00	.639	-92.8	1.904	60.4	.178	.8	.686	-44.2
1400.00	.606	-100.6	1.889	52.8	.182	-3.9	.661	-46.3
1500.00	.578	-107.5	1.837	45.2	.185	-8.9	.641	-48.2
1600.00	.551	-114.6	1.801	38.0	.189	-12.8	.621	-50.2
1700.00	.526	-122.6	1.782	30.7	.195	-17.6	.603	-52.2
1800.00	.509	-129.5	1.727	23.8	.196	-22.3	.582	-54.4
1900.00	.487	-137.3	1.702	16.9	.196	-26.3	.562	-56.1
2000.00	.466	-145.4	1.674	9.8	.198	-30.1	.548	-57.9
2100.00	.454	-152.5	1.637	3.4	.198	-33.7	.530	-59.6
2200.00	.446	-159.2	1.590	-3.1	.199	-36.9	.519	-61.7
2300.00	.437	-166.3	1.571	-9.5	.200	-40.5	.502	-63.5
2400.00	.433	-172.8	1.520	-15.7	.201	-43.8	.490	-65.7
2500.00	.430	-179.0	1.488	-21.7	.201	-46.5	.477	-67.7
2600.00	.429	174.8	1.459	-27.8	.203	-49.3	.466	-70.0
2700.00	.429	169.2	1.425	-33.7	.204	-52.3	.453	-72.4
2800.00	.433	163.8	1.390	-39.5	.206	-55.1	.443	-75.1
2900.00	.437	158.6	1.363	-45.3	.208	-57.9	.431	-77.5
3000.00	.443	153.5	1.336	-50.9	.211	-60.2	.421	-80.5

[MEMO]

**[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.