To all our customers

Regarding the change of names mentioned in the document, such as Hitachi Electric and Hitachi XX, to Renesas Technology Corp.

The semiconductor operations of Mitsubishi Electric and Hitachi were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Hitachi, Hitachi, Ltd., Hitachi Semiconductors, and other Hitachi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Renesas Technology Home Page: http://www.renesas.com

Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

Cautions

Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corporation product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corporation or a third party.
2. Renesas Technology Corporation assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corporation without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corporation or an authorized Renesas Technology Corporation product distributor for the latest product information before purchasing a product listed herein.
   The information described here may contain technical inaccuracies or typographical errors.
   Renesas Technology Corporation assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
   Please also pay attention to information published by Renesas Technology Corporation by various means, including the Renesas Technology Corporation Semiconductor home page (http://www.renesas.com).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corporation assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corporation semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corporation or an authorized Renesas Technology Corporation product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corporation is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
   Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corporation for further details on these materials or the products contained therein.

2SC5702

Silicon NPN Epitaxial
High Frequency Amplifier / Oscillator

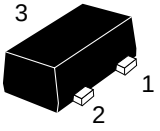
ADE-208-1414 (Z)
1st. Edition
Mar. 2001

Features

- High gain bandwidth product
  f_T = 8 GHz typ.
- High power gain and low noise figure ;
  PG = 13 dB typ., NF = 1.05 dB typ. at f = 900 MHz

Outline

MFPAK



1. Emitter
2. Base
3. Collector

Note: Marking is “ZS-”.

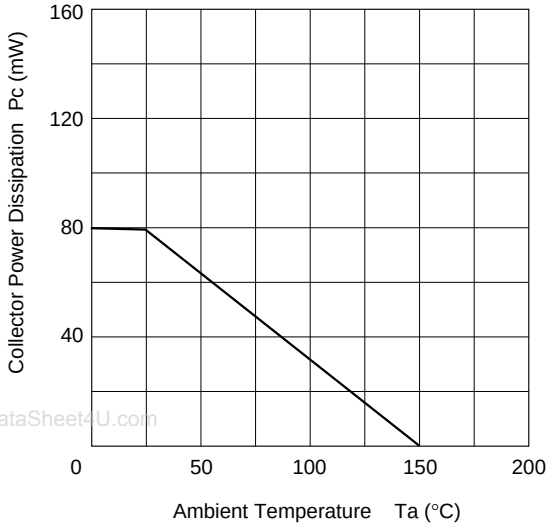
Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	6	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	50	mA
Collector power dissipation	Pc	80	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

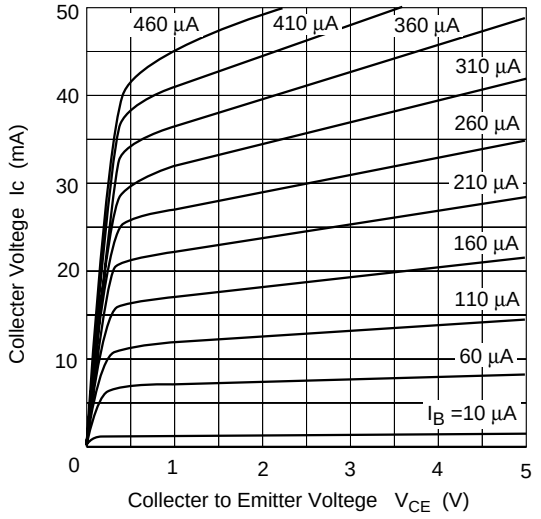
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	18.5	—	V	I_C = 10 µA, I_E = 0
Collector cutoff current	I_{CBO}	—	—	1	µA	V_{CB} = 10 V, I_E = 0
Collector cutoff current	I_{CEO}	—	—	1	mA	V_{CE} = 4 V, R_{BE} = ∞
Emitter cutoff current	I_{EBO}	—	—	10	mA	V_{EB} = 1.5V, I_C = 0
DC current transfer ratio	h_{FE}	80	120	160	V	V_{CE} = 1 V, I_C = 5 mA
Collector output capacitance	Cob	—	0.85	1.2	pF	V_{CB} = 1 V, I_E = 0 f = 1 MHz
Gain bandwidth product	f_T	6.5	8.0	—	GHz	V_{CE} = 1 V, I_C = 5 mA f = 1 MHz
Power gain	PG	11	13	—	dB	V_{CE} = 1 V, I_C = 5 mA f = 900 MHz
Noise figure	NF	—	1.05	1.9	dB	V_{CE} = 1 V, I_C = 5 mA f = 900 MHz

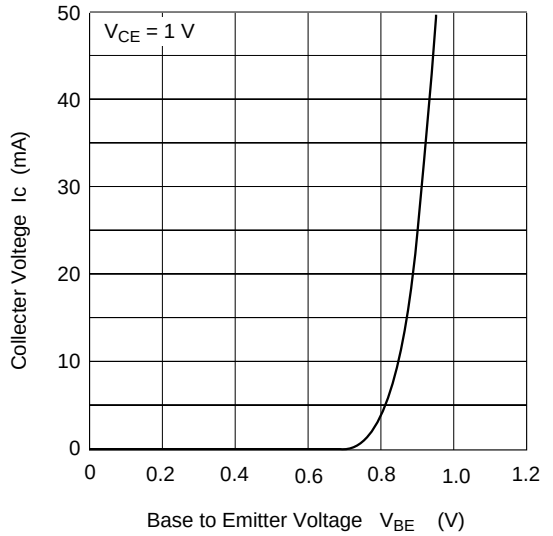
Maximum Collector Dissipation Curve



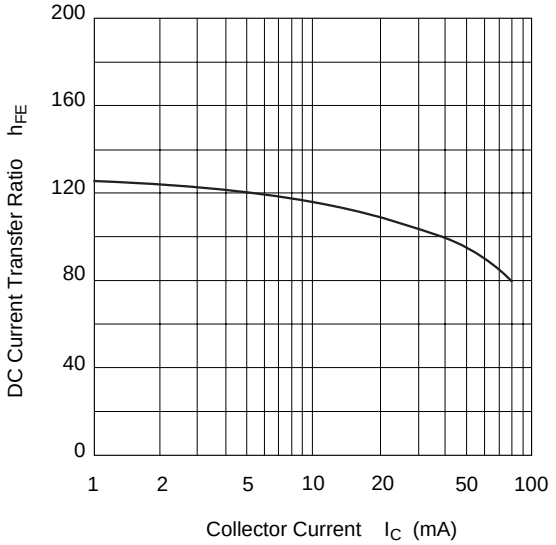
Collecter Voltage vs.
Collecter to Emitter Voltege



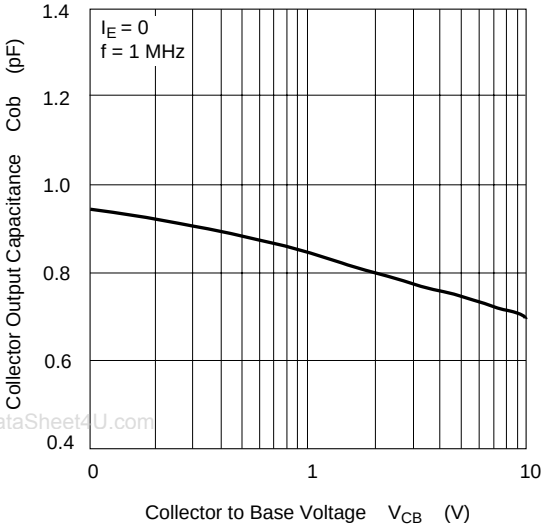
Collecter Voltage vs.
Base to Emitter Voltege



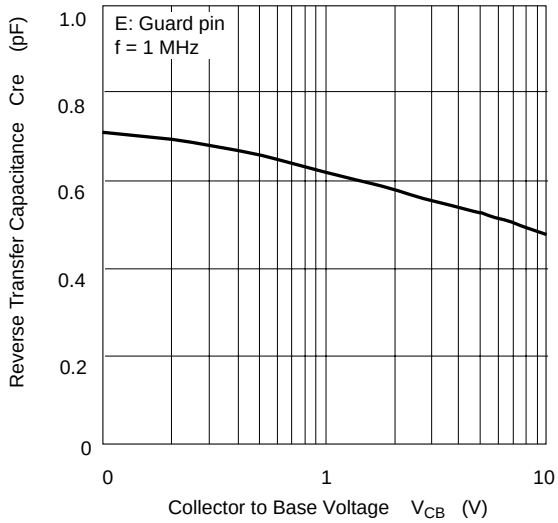
DC Current Transfet Ratio vs.
Collector Current



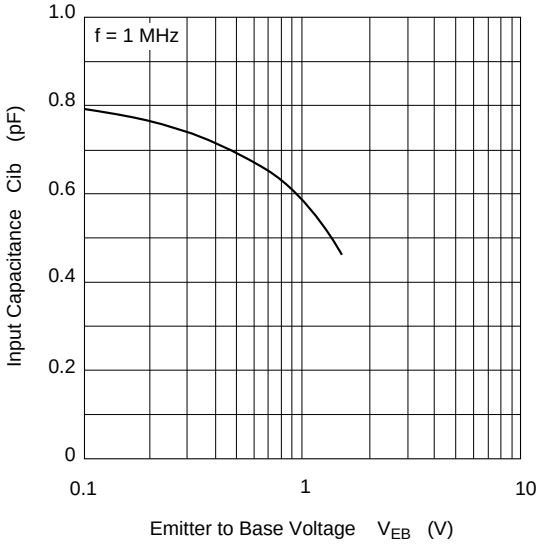
Collector Output Capacitance vs.
Collector to Base Voltage



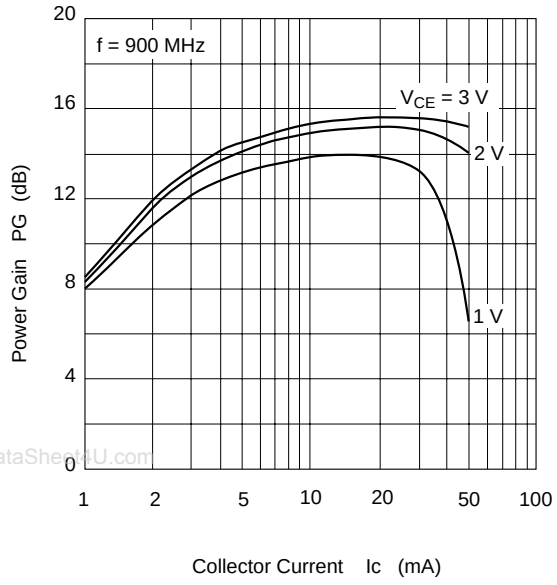
Reverse Transfer capacitance vs.
Collector To Base Voltage



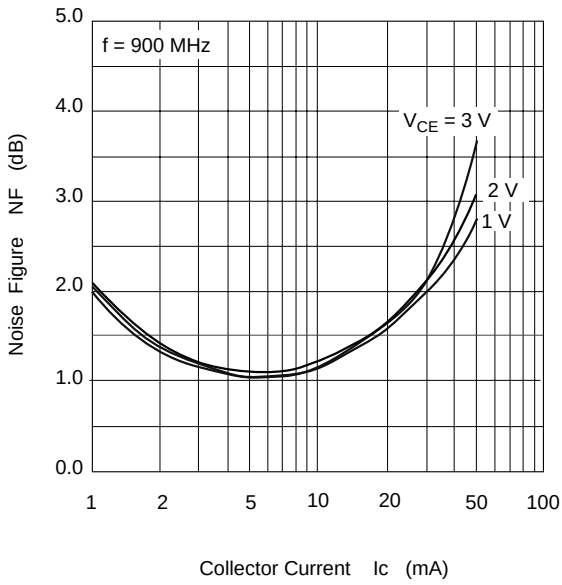
Collector Input Capacitance vs.
Emitter To Base Voltage



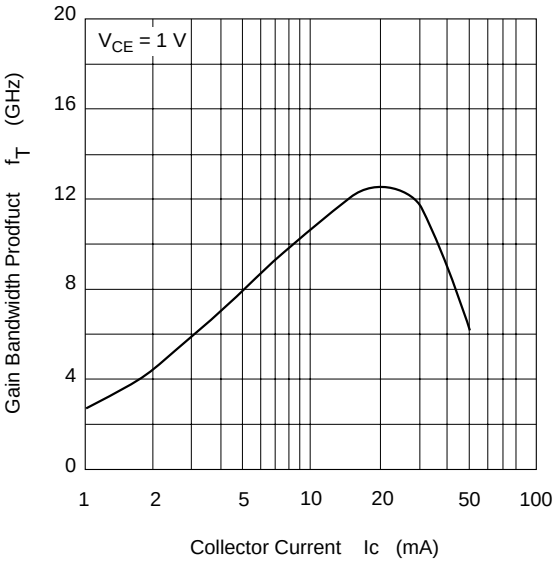
Power Gain vs. Collector Current



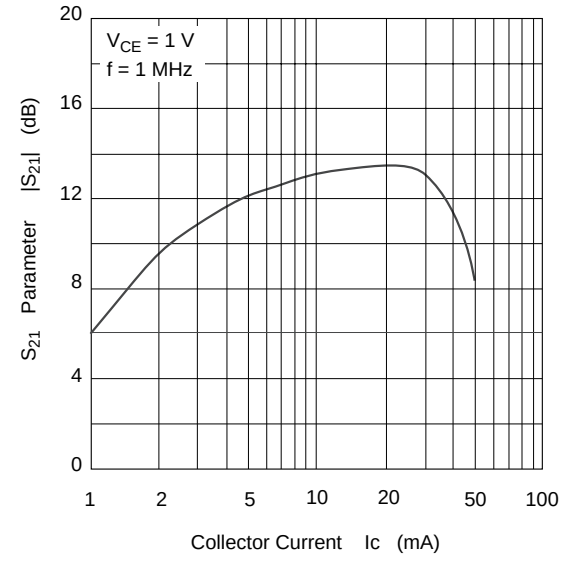
Noise Figure vs. Collector Current



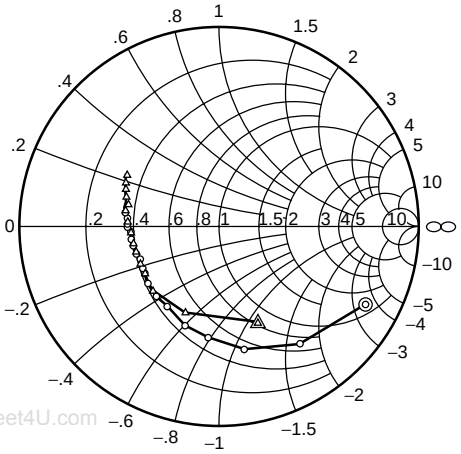
Gain Bandwidth Product vs. Collector Currnet



S_{21} Parameter vs. Collector Current

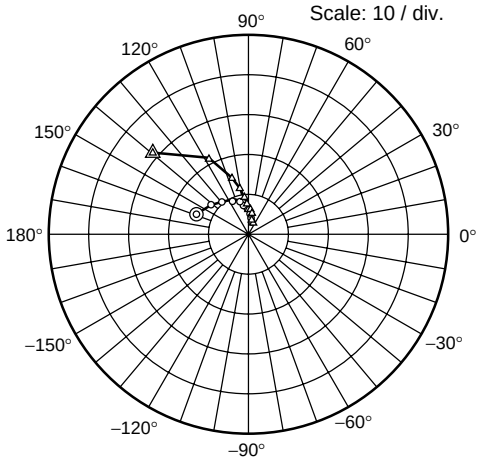


S11 Parameter vs. Frequency



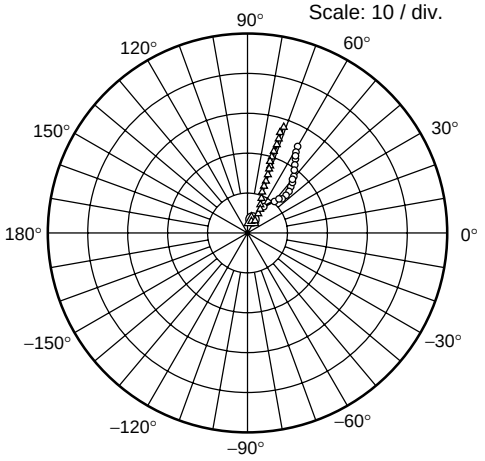
Condition : V_{CE} = 1 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S21 Paramter vs. Frequency



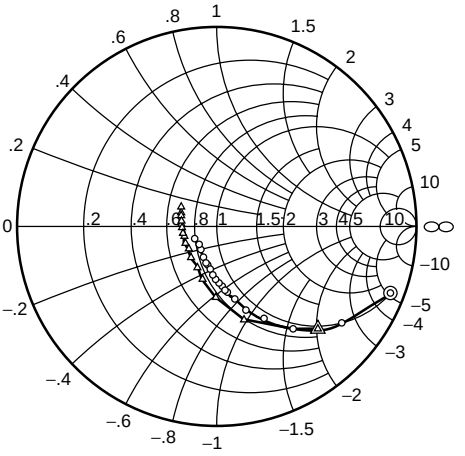
Condition : V_{CE} = 1 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S12 Parameter vs. Frequency



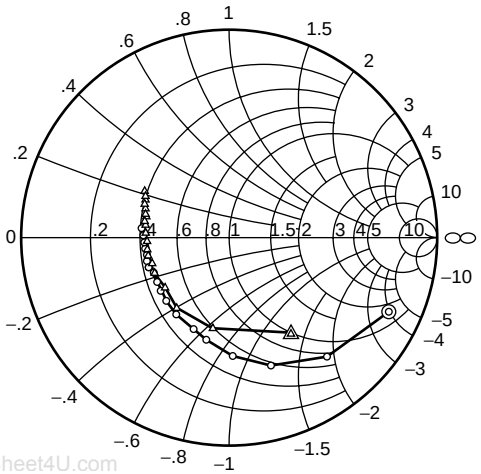
Condition : V_{CE} = 1 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S22 Parameter vs. Frequency



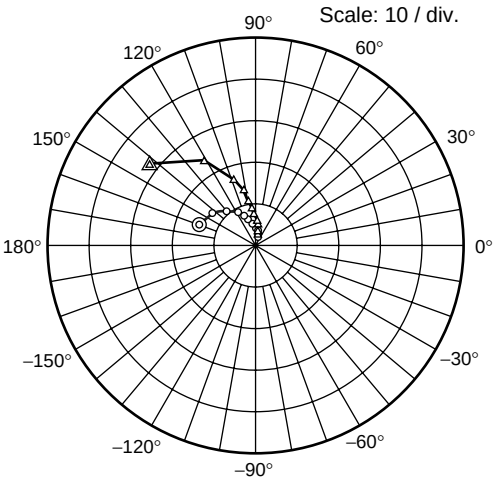
Condition : V_{CE} = 1 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S11 Parameter vs. Frequency



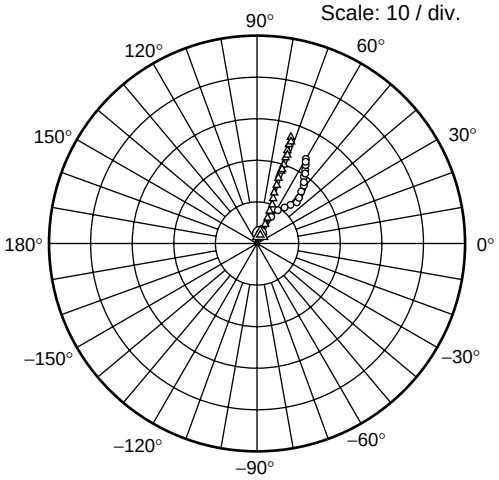
Condition : V_{CE} = 2 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S21 Paramter vs. Frequency



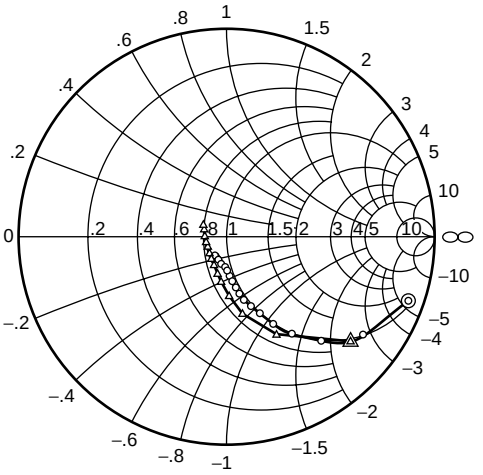
Condition : V_{CE} = 2 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S12 Parameter vs. Frequency



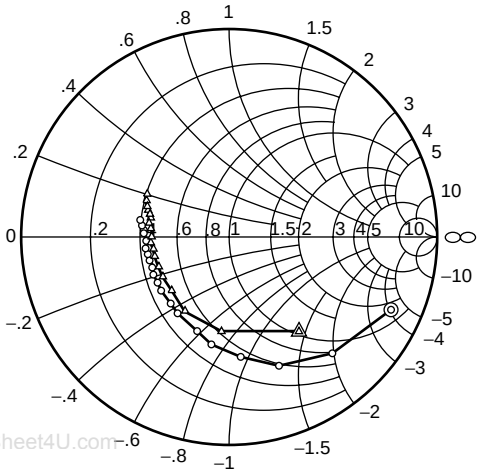
Condition : V_{CE} = 2 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S22 Parameter vs. Frequency



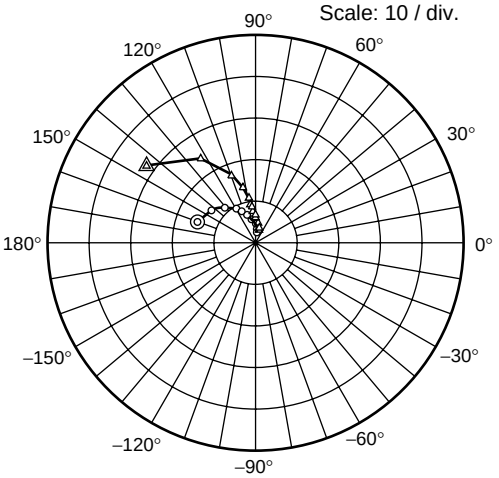
Condition : V_{CE} = 2 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S11 Parameter vs. Frequency



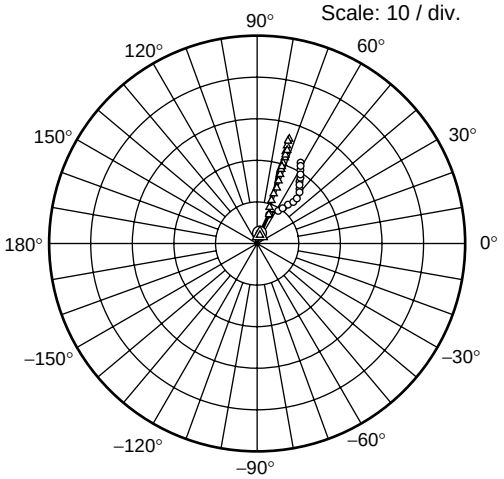
Condition : V_{CE} = 3 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S21 Paramter vs. Frequency



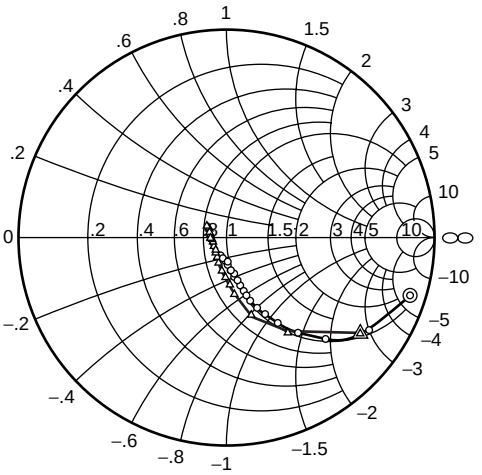
Condition : V_{CE} = 3 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S12 Parameter vs. Frequency



Condition : V_{CE} = 3 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

S21 Paramter vs. Frequency



Condition : V_{CE} = 3 V, Zo = 50 Ω
100 to 2000 MHz (100 MHz STEP)
◎——○ (I_C = 5mA)
△——△ (I_C = 20mA)

Sparameter (V_{CE} = 1 V, I_C = 5 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.832	-28.2	14.18	159.9	0.0347	74.2	0.927	-20.7
200	0.723	-55.3	12.19	141.4	0.0624	61.4	0.789	-38.8
300	0.636	-78.0	10.17	127.5	0.0806	52.8	0.644	-52.3
400	0.559	-95.2	8.43	117.9	0.0920	48.9	0.532	-61.8
500	0.513	-110.1	7.15	110.6	0.1001	46.8	0.447	-69.1
600	0.473	-121.4	6.15	105.0	0.1065	45.8	0.378	-75.3
700	0.462	-132.4	5.40	100.2	0.1124	46.0	0.327	-79.8
800	0.443	-139.7	4.84	96.4	0.1182	46.7	0.285	-84.6
900	0.432	-148.1	4.32	92.6	0.1236	47.6	0.250	-89.4
1000	0.435	-153.9	3.94	89.6	0.1294	48.7	0.223	-93.3
1100	0.420	-160.5	3.60	87.2	0.1351	49.5	0.200	-97.4
1200	0.438	-165.4	3.33	84.5	0.1410	50.9	0.181	-102.3
1300	0.428	-168.8	3.11	82.2	0.1471	51.9	0.163	-107.4
1400	0.442	-175.3	2.87	80.0	0.1537	53.2	0.151	-111.4
1500	0.444	-177.1	2.75	78.0	0.1601	54.3	0.138	-117.3
1600	0.448	177.3	2.57	76.1	0.1671	55.2	0.130	-121.8
1700	0.464	176.0	2.44	73.9	0.1739	56.2	0.124	-128.5
1800	0.460	172.7	2.34	72.7	0.1810	56.9	0.119	-135.6
1900	0.474	170.1	2.21	70.7	0.1888	57.8	0.116	-142.0
2000	0.481	168.3	2.13	69.1	0.1952	58.6	0.114	-148.5

Sparameter (V_{CE} = 1 V, I_C = 20 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.534	-68.4	30.97	140.9	0.0258	65.2	0.735	-45.4
200	0.467	-111.9	20.56	119.2	0.0390	57.4	0.489	-73.4
300	0.451	-135.2	14.57	107.9	0.0490	58.2	0.350	-91.3
400	0.434	-149.5	11.16	101.6	0.0581	60.5	0.276	-104.5
500	0.438	-159.1	9.02	97.1	0.0673	63.1	0.231	-115.5
600	0.430	-165.9	7.58	93.7	0.0772	65.0	0.201	-125.9
700	0.441	-172.5	6.52	90.8	0.0872	66.5	0.182	-135.2
800	0.442	-175.8	5.75	88.3	0.0974	67.7	0.170	-144.0
900	0.451	178.4	5.09	86.1	0.1081	68.5	0.164	-152.6
1000	0.456	175.8	4.62	84.0	0.1184	69.5	0.158	-160.2
1100	0.452	171.2	4.22	82.5	0.1291	69.7	0.157	-166.8
1200	0.470	169.0	3.87	80.5	0.1395	70.2	0.158	-173.0
1300	0.462	166.2	3.62	79.0	0.1504	70.2	0.158	-179.2
1400	0.485	162.5	3.34	77.7	0.1608	70.7	0.162	176.1
1500	0.483	162.0	3.16	75.6	0.1719	70.7	0.164	171.1
1600	0.494	158.4	2.98	74.5	0.1826	70.6	0.168	167.2
1700	0.505	157.3	2.81	72.8	0.1935	70.5	0.175	164.0
1800	0.503	155.6	2.69	72.0	0.2040	70.4	0.181	160.4
1900	0.525	152.6	2.54	70.5	0.2148	70.5	0.189	157.1
2000	0.523	152.4	2.45	69.0	0.2247	70.2	0.195	154.1

Sparameter (V_{CE} = 2 V, I_C = 5 mA, Zo =50 Ω)

	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.837	-25.5	14.31	161.2	0.0306	75.8	0.938	-18.2
200	0.739	-50.1	12.50	143.5	0.0559	63.3	0.813	-34.5
300	0.646	-72.1	10.58	129.9	0.0736	55.0	0.674	-46.5
400	0.565	-88.6	8.85	120.2	0.0848	51.0	0.563	-54.9
500	0.513	-103.4	7.58	112.7	0.0928	48.7	0.476	-61.1
600	0.466	-114.0	6.56	106.9	0.0996	47.7	0.405	-66.1
700	0.444	-125.7	5.77	102.1	0.1055	48.0	0.351	-69.5
800	0.429	-133.3	5.17	98.1	0.1106	48.5	0.307	-72.7
900	0.412	-142.2	4.62	94.1	0.1162	49.2	0.269	-76.1
1000	0.411	-148.8	4.22	91.1	0.1214	50.0	0.239	-78.3
1100	0.395	-155.5	3.87	88.6	0.1276	51.2	0.215	-80.7
1200	0.410	-161.6	3.57	85.7	0.1331	52.3	0.192	-84.0
1300	0.401	-165.3	3.34	83.6	0.1387	53.4	0.171	-86.6
1400	0.413	-172.1	3.08	81.4	0.1447	54.6	0.156	-88.9
1500	0.417	-174.3	2.94	79.1	0.1510	55.8	0.139	-92.9
1600	0.415	-179.2	2.75	77.4	0.1579	56.4	0.128	-95.6
1700	0.431	177.8	2.63	75.0	0.1644	57.6	0.117	-100.4
1800	0.426	175.2	2.50	73.8	0.1709	58.4	0.106	-105.7
1900	0.447	171.4	2.38	71.8	0.1781	59.6	0.097	-112.2
2000	0.450	169.9	2.28	70.1	0.1850	60.2	0.090	-118.3

Sparameter (V_{CE} = 2 V, I_C = 20 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.548	-58.6	32.28	143.9	0.0231	67.8	0.777	-38.8
200	0.451	-99.9	22.20	121.9	0.0363	59.6	0.527	-62.6
300	0.415	-125.6	15.97	110.2	0.0464	60.1	0.373	-76.9
400	0.390	-141.4	12.32	103.5	0.0545	61.7	0.283	-86.7
500	0.392	-152.5	9.97	98.7	0.0632	63.8	0.226	-95.1
600	0.382	-160.9	8.41	95.2	0.0726	65.6	0.184	-102.9
700	0.387	-168.1	7.23	92.0	0.0823	67.1	0.155	-110.3
800	0.387	-172.8	6.39	89.5	0.0914	68.5	0.133	-118.3
900	0.390	-178.6	5.66	87.1	0.1019	69.2	0.117	-127.6
1000	0.399	178.2	5.13	85.0	0.1114	70.2	0.104	-136.9
1100	0.400	172.6	4.69	83.4	0.1213	70.6	0.097	-146.4
1200	0.412	170.4	4.29	81.5	0.1309	71.1	0.092	-156.2
1300	0.409	167.8	4.01	79.9	0.1411	71.1	0.091	-166.0
1400	0.433	163.6	3.70	78.6	0.1518	71.6	0.092	-174.7
1500	0.426	162.4	3.50	76.8	0.1615	71.4	0.093	176.8
1600	0.435	158.8	3.30	75.4	0.1714	71.5	0.097	170.5
1700	0.454	157.9	3.10	73.6	0.1817	71.8	0.103	165.0
1800	0.446	155.5	2.97	72.7	0.1918	71.2	0.109	159.1
1900	0.475	153.5	2.81	71.1	0.2021	71.3	0.117	155.2
2000	0.473	152.7	2.71	69.9	0.2113	71.1	0.125	150.3

Sparameter (V_{CE} = 3 V, I_C = 5 mA, Zo = 50 Ω)

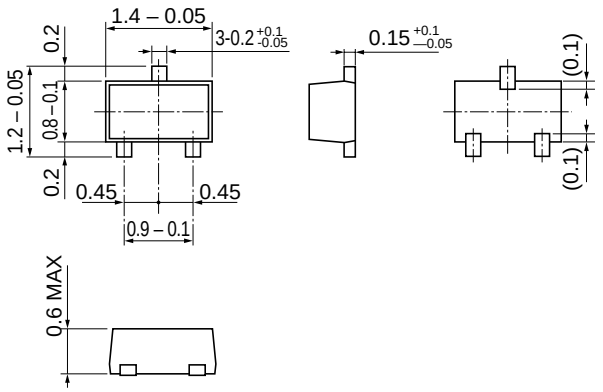
	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.846	-24.1	14.25	161.9	0.0287	75.9	0.9420	-17.0
200	0.748	-48.1	12.56	144.7	0.0534	64.3	0.8245	-32.2
300	0.656	-69.0	10.71	131.2	0.0705	56.4	0.6904	-43.6
400	0.573	-84.9	9.03	121.3	0.0817	52.0	0.5802	-51.5
500	0.516	-99.3	7.75	113.8	0.0895	49.6	0.4932	-57.4
600	0.469	-110.6	6.72	108.0	0.0961	48.6	0.4224	-61.6
700	0.442	-121.8	5.92	102.9	0.1015	48.5	0.3680	-64.4
800	0.423	-130.4	5.31	99.0	0.1071	49.0	0.3229	-67.1
900	0.404	-139.8	4.75	95.2	0.1128	49.9	0.2856	-69.5
1000	0.399	-146.0	4.34	92.0	0.1177	50.7	0.2535	-71.2
1100	0.382	-153.0	3.97	89.3	0.1230	51.7	0.2285	-72.9
1200	0.397	-159.3	3.69	86.5	0.1289	53.2	0.2052	-74.8
1300	0.385	-163.3	3.44	84.5	0.1344	54.2	0.1839	-76.6
1400	0.400	-169.7	3.18	81.8	0.1400	55.1	0.1680	-78.0
1500	0.401	-171.9	3.03	79.7	0.1462	56.2	0.1496	-80.5
1600	0.399	-177.2	2.84	77.8	0.1528	57.4	0.1381	-82.1
1700	0.415	179.5	2.70	75.7	0.1590	58.2	0.1251	-85.4
1800	0.411	176.8	2.57	74.4	0.1658	59.0	0.1122	-89.0
1900	0.430	173.0	2.44	72.3	0.1727	60.1	0.1018	-93.2
2000	0.433	171.4	2.35	70.7	0.1793	61.0	0.0914	-97.8

Sparameter (V_{CE} = 3 V, I_C = 20 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.564	-54.4	32.56	145.1	0.0221	69.2	0.7913	-35.9
200	0.449	-94.6	22.76	123.2	0.0353	60.3	0.5457	-58.3
300	0.408	-119.2	16.50	111.2	0.0448	60.4	0.3871	-71.0
400	0.377	-136.7	12.76	104.4	0.0529	62.0	0.2929	-78.9
500	0.370	-148.4	10.36	99.6	0.0618	64.1	0.2311	-85.4
600	0.360	-157.6	8.71	95.8	0.0707	65.9	0.1861	-91.3
700	0.365	-165.0	7.52	92.7	0.0801	67.5	0.1524	-96.6
800	0.364	-170.4	6.64	90.0	0.0890	68.4	0.1274	-102.7
900	0.366	-176.1	5.87	87.7	0.0991	69.6	0.1061	-110.4
1000	0.370	-179.9	5.33	85.4	0.1081	70.1	0.0893	-117.9
1100	0.373	174.6	4.87	83.7	0.1178	70.6	0.0768	-126.7
1200	0.387	172.5	4.47	81.8	0.1274	71.1	0.0685	-138.6
1300	0.379	168.0	4.16	80.4	0.1375	71.4	0.0630	-150.7
1400	0.409	164.7	3.85	78.9	0.1473	71.7	0.0603	-162.8
1500	0.399	163.4	3.64	77.1	0.1568	71.6	0.0596	-175.0
1600	0.419	159.1	3.43	75.7	0.1667	71.8	0.0631	174.3
1700	0.427	159.5	3.24	73.9	0.1765	71.8	0.0681	166.3
1800	0.427	156.2	3.09	73.2	0.1862	71.3	0.0757	157.4
1900	0.446	154.6	2.93	71.8	0.1963	71.7	0.0829	152.5
2000	0.444	153.5	2.80	70.2	0.2057	71.4	0.0914	146.9

Package Dimensions

Unit: mm



Hitachi Code	MFPAK
JEDEC	
EIAJ	
Mass (reference value)	0.0016 g

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

HITACHI

Hitachi, Ltd.
Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL NorthAmerica : http://semiconductor.hitachi.com/
Europe : http://www.hitachi-eu.com/hel/ecg
Asia : http://sicapac.hitachi-asia.com
Japan : http://www.hitachi.co.jp/Sicd/indx.htm

For further information write to:

Hitachi Semiconductor
(America) Inc.
179 East Tasman Drive,
San Jose,CA 95134
Tel: <1> (408) 433-1990
Fax: <1>(408) 433-0223

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 585200

Hitachi Europe GmbH
Electronic Components Group
Dornacher Straße 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Asia Ltd.
Hitachi Tower
16 Collyer Quay #20-00,
Singapore 049318
Tel : <65>-538-6533/538-8577
Fax : <65>-538-6933/538-3877
URL : http://www.hitachi.com.sg

Hitachi Asia Ltd.
(Taipei Branch Office)
4/F, No. 167, Tun Hwa North Road,
Hung-Kuo Building,
Taipei (105), Taiwan
Tel : <886>-(2)-2718-3666
Fax : <886>-(2)-2718-8180
Telex : 23222 HAS-TP
URL : http://www.hitachi.com.tw

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower,
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon,
Hong Kong
Tel : <852>-(2)-735-9218
Fax : <852>-(2)-730-0281
URL : http://semiconductor.hitachi.com.hk

Colophon 3.0