
2SC4899

Silicon NPN Epitaxial

HITACHI

Application

VHF / UHF wide band amplifier

Features

- Σ High gain bandwidth product
 $f_T = 9 \text{ GHz Typ}$
- Σ High gain, low noise figure
PG = 14.0 dB Typ, NF = 1.2 dB Typ at $f = 900 \text{ MHz}$

Outline

CMPAK



- 1. Emitter
- 2. Base
- 3. Collector

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Absolute Maximum Ratings (Ta = 25°C)

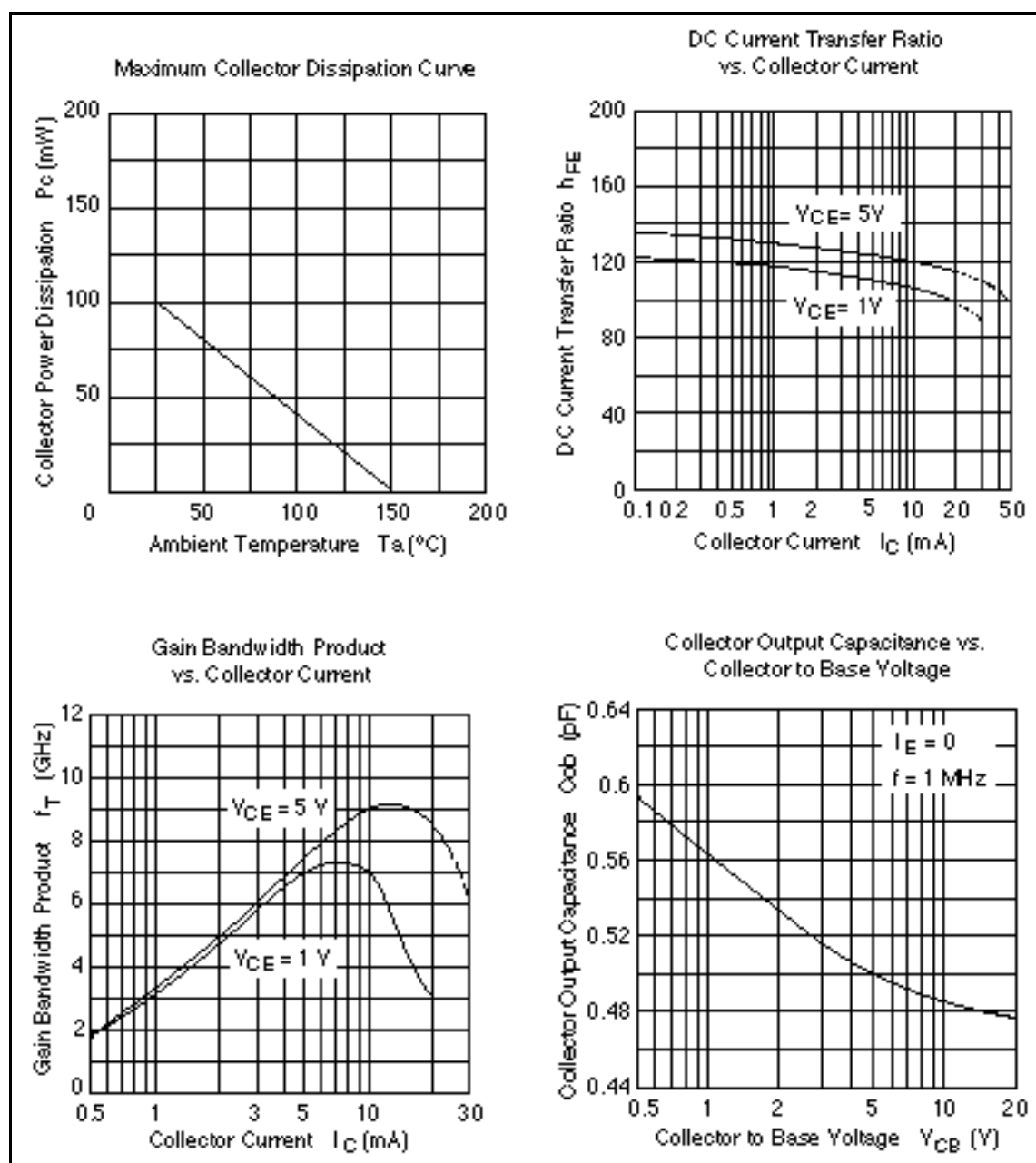
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	9	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	20	mA
Collector power dissipation	P_C	100	mW
Junction temperature	T_J	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

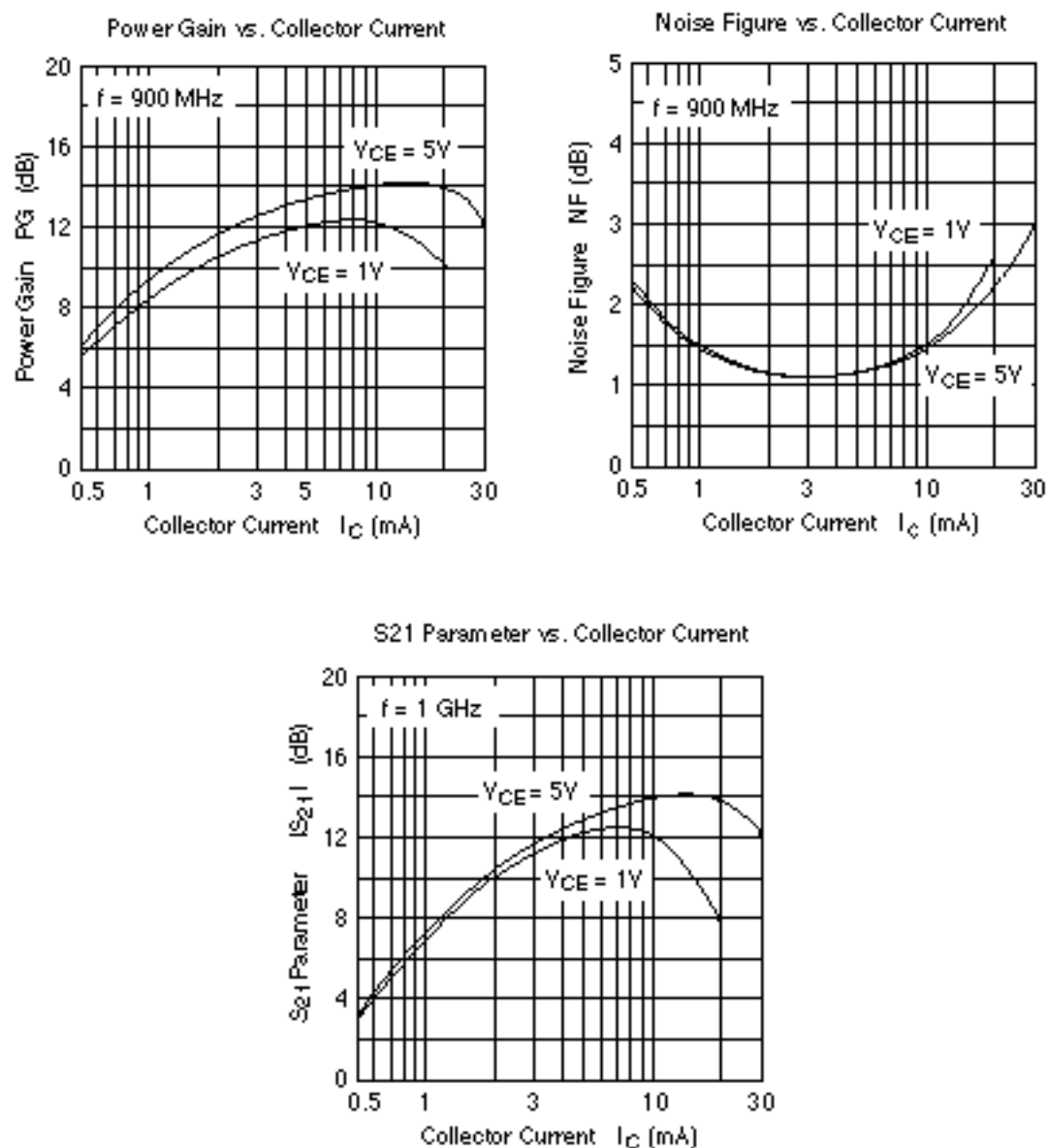
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector cutoff current	I_{CBO}	—	—	10	μA	$V_{CB} = 15\text{ V}$, $I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 9\text{ V}$, $R_{BE} = \bullet$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5\text{ V}$, $I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 5\text{ V}$, $I_C = 10\text{ mA}$
Collector output capacitance	C_{ob}	—	0.5	0.85	pF	$V_{CB} = 5\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$
Gain bandwidth product	f_T	6.0	9.0	—	GHz	$V_{CE} = 5\text{ V}$, $I_C = 10\text{ mA}$
Power gain	PG	11.0	14.0	—	dB	$V_{CE} = 5\text{ V}$, $I_C = 10\text{ mA}$, $f = 900\text{ MHz}$
Noise figure	NF	—	1.2	2.5	dB	$V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $f = 900\text{ MHz}$

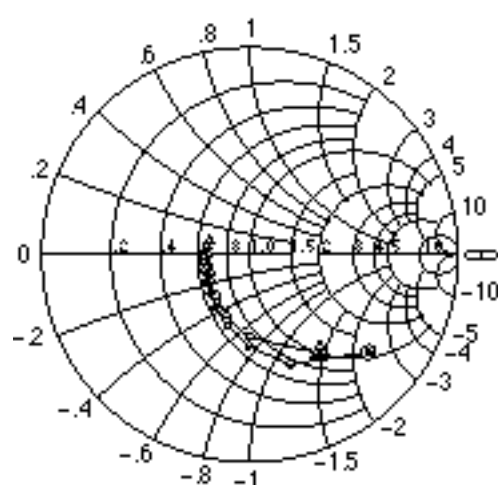
Note: Marking is "YH—".

Attention: This is electrostatic sensitive device.





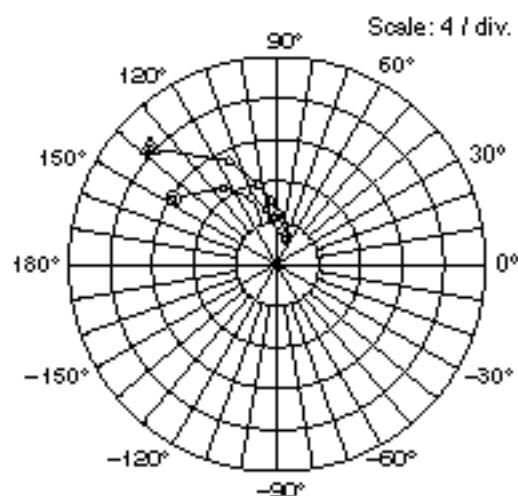
S11 Parameter vs. Frequency



Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
200 to 2000 MHz (200 MHz step)

⊙ — ($I_C = 5 \text{ mA}$)
△ — ($I_C = 10 \text{ mA}$)

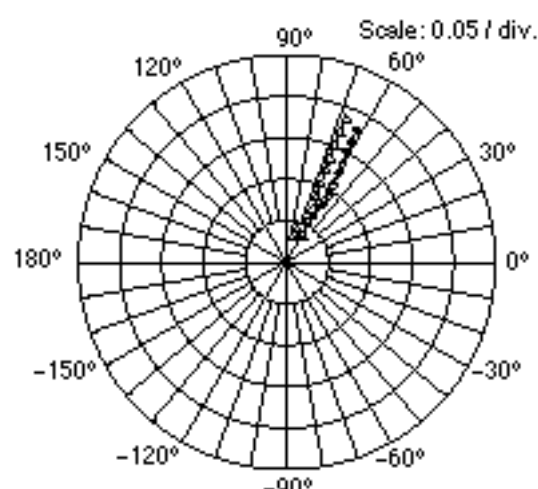
S21 Parameter vs. Frequency



Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
200 to 2000 MHz (200 MHz step)

⊙ — ($I_C = 5 \text{ mA}$)
△ — ($I_C = 10 \text{ mA}$)

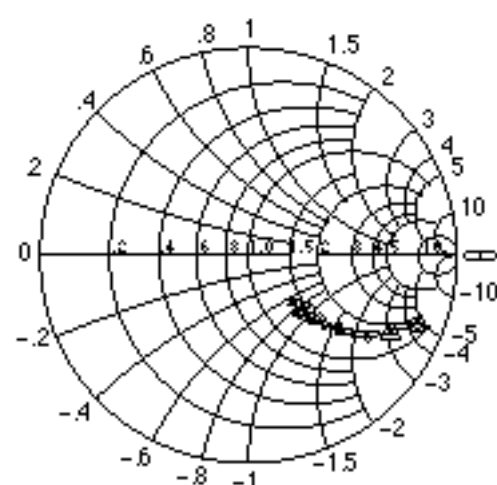
S12 Parameter vs. Frequency



Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
200 to 2000 MHz (200 MHz step)

⊙ — ($I_C = 5 \text{ mA}$)
△ — ($I_C = 10 \text{ mA}$)

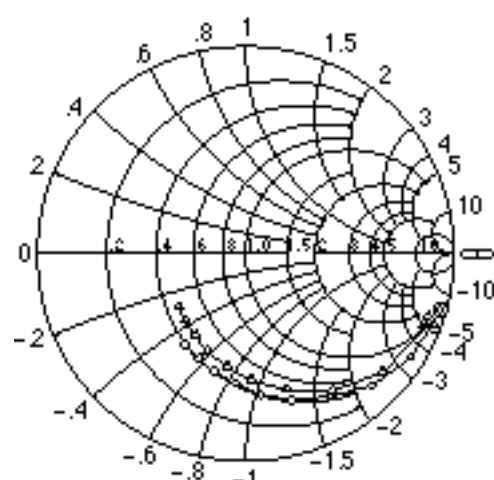
S22 Parameter vs. Frequency



Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
200 to 2000 MHz (200 MHz step)

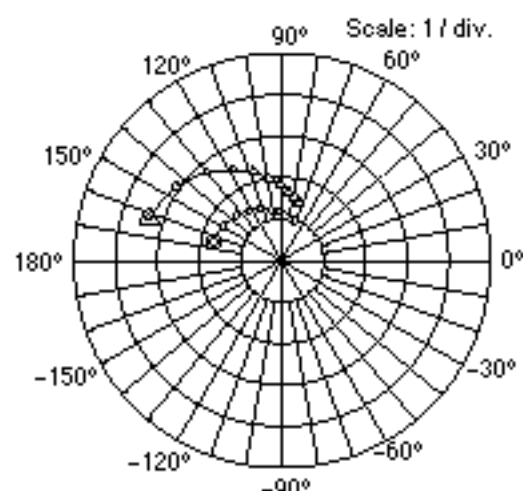
⊙ — ($I_C = 5 \text{ mA}$)
△ — ($I_C = 10 \text{ mA}$)

S11 Parameter vs. Frequency



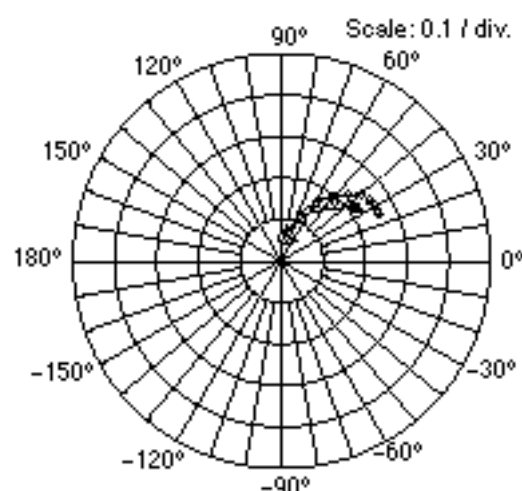
Condition: $V_{CE} = 1 \text{ V}$, $Z_o = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 0.5 \text{ mA}$)
 △ — △ ($I_C = 1 \text{ mA}$)

S21 Parameter vs. Frequency



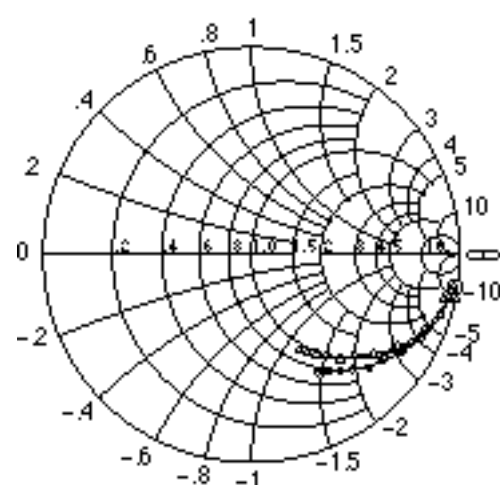
Condition: $V_{CE} = 1 \text{ V}$, $Z_o = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 0.5 \text{ mA}$)
 △ — △ ($I_C = 1 \text{ mA}$)

S12 Parameter vs. Frequency



Condition: $V_{CE} = 1 \text{ V}$, $Z_o = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 0.5 \text{ mA}$)
 △ — △ ($I_C = 1 \text{ mA}$)

S22 Parameter vs. Frequency



Condition: $V_{CE} = 1 \text{ V}$, $Z_o = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 0.5 \text{ mA}$)
 △ — △ ($I_C = 1 \text{ mA}$)

S Parameter ($V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $Z_o = 50\text{ }\Omega$, Emitter Common)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.814	-20.5	13.23	163.0	0.0214	79.4	0.961	-11.8
200	0.740	-39.5	11.84	147.6	0.0403	70.6	0.878	-22.3
300	0.648	-56.3	10.34	134.9	0.0550	64.1	0.780	-29.7
400	0.563	-69.7	8.99	125.2	0.0653	60.6	0.694	-34.9
500	0.499	-80.8	7.81	117.6	0.0744	58.4	0.626	-38.1
600	0.439	-90.8	6.81	111.1	0.0821	57.9	0.571	-40.3
700	0.393	-99.1	6.11	106.0	0.0888	57.8	0.528	-41.8
800	0.356	-107.0	5.44	101.6	0.0956	58.1	0.497	-42.6
900	0.322	-115.5	4.93	97.7	0.102	58.3	0.469	-43.0
1000	0.303	-123.2	4.51	94.6	0.109	59.2	0.452	-43.7
1100	0.275	-129.7	4.17	91.6	0.116	60.3	0.442	-43.8
1200	0.263	-135.1	3.86	88.7	0.125	59.8	0.435	-46.3
1300	0.253	-141.7	3.61	85.9	0.130	60.2	0.414	-47.3
1400	0.242	-148.6	3.37	83.5	0.137	60.6	0.399	-47.4
1500	0.237	-154.2	3.17	81.1	0.144	61.2	0.360	-47.8
1600	0.232	-160.0	3.00	78.7	0.151	61.5	0.383	-48.1
1700	0.224	-166.4	2.83	77.0	0.158	61.8	0.376	-48.8
1800	0.225	-171.0	2.70	74.9	0.165	62.0	0.370	-49.5
1900	0.228	-176.5	2.59	73.0	0.172	62.2	0.363	-50.2
2000	0.223	179.7	2.47	71.3	0.180	62.3	0.359	-51.4

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S Parameter ($V_{CE} = 5\text{ V}$, $I_C = 10\text{ mA}$, $Z_o = 50\text{ }\Omega$, Emitter Common)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.688	-29.6	20.06	156.3	0.0201	76.3	0.921	-16.8
200	0.582	-54.7	16.54	137.5	0.0349	67.8	0.780	-28.9
300	0.479	-74.0	13.31	124.0	0.0459	64.0	0.653	-35.6
400	0.399	-89.5	10.97	114.9	0.0544	63.0	0.564	-39.0
500	0.345	-101.3	9.20	108.4	0.0624	62.6	0.501	-40.4
600	0.309	-111.2	7.87	103.1	0.0702	63.7	0.456	-41.0
700	0.280	-120.4	6.90	98.7	0.0782	64.3	0.424	-41.1
800	0.257	-128.5	6.09	95.2	0.0857	65.2	0.402	-41.2
900	0.243	-137.6	5.45	92.0	0.0936	66.0	0.384	-41.0
1000	0.227	-145.3	4.97	89.3	0.102	66.6	0.375	-40.8
1100	0.216	-153.0	4.56	86.8	0.111	67.3	0.373	-40.8
1200	0.207	-156.5	4.22	84.2	0.120	66.9	0.369	-43.5
1300	0.206	-163.1	3.93	82.2	0.126	67.1	0.350	-44.4
1400	0.209	-168.6	3.65	80.0	0.135	67.6	0.339	-44.5
1500	0.204	-176.8	3.43	77.9	0.143	67.5	0.334	-44.4
1600	0.203	180.0	3.24	75.9	0.151	67.7	0.330	-44.6
1700	0.207	173.7	3.06	74.2	0.160	67.6	0.325	-45.5
1800	0.211	169.8	2.91	72.5	0.168	67.5	0.322	-46.1
1900	0.215	164.6	2.78	71.1	0.177	67.4	0.317	-47.2
2000	0.204	161.2	2.66	69.2	0.185	67.2	0.314	-48.2

S Parameter ($V_{CE} = 1\text{ V}$, $I_C = 0.5\text{ mA}$, $Z_O = 50\text{ }\Omega$, Emitter Common)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.983	-7.8	1.76	172.6	0.0295	85.3	0.996	-4.5
200	0.974	-16.2	1.71	165.0	0.0604	79.3	0.987	-9.1
300	0.958	-24.3	1.69	157.1	0.0910	73.8	0.972	-13.7
400	0.936	-32.1	1.65	149.9	0.118	68.9	0.954	-17.9
500	0.904	-39.4	1.59	142.8	0.143	64.1	0.933	-22.0
600	0.877	-46.3	1.55	135.7	0.165	59.6	0.909	-26.0
700	0.845	-53.1	1.48	129.3	0.184	55.5	0.886	-29.3
800	0.799	-59.4	1.44	123.2	0.199	51.9	0.861	-32.9
900	0.781	-66.6	1.39	117.4	0.214	48.3	0.835	-35.9
1000	0.738	-72.6	1.36	112.3	0.225	45.3	0.810	-38.5
1100	0.714	-78.0	1.32	107.2	0.235	43.5	0.791	-40.9
1200	0.683	-83.8	1.25	102.6	0.249	40.2	0.783	-44.0
1300	0.657	-89.0	1.21	98.3	0.253	37.0	0.758	-46.7
1400	0.626	-94.6	1.18	93.8	0.256	34.8	0.734	-48.7
1500	0.603	-99.6	1.14	89.8	0.259	32.9	0.717	-50.9
1600	0.585	-104.8	1.09	85.9	0.260	31.1	0.702	-52.7
1700	0.567	-109.5	1.06	82.5	0.261	29.6	0.687	-54.7
1800	0.553	-114.2	1.04	79.1	0.261	28.0	0.674	-56.6
1900	0.538	-119.8	1.02	76.5	0.260	27.1	0.659	-58.7
2000	0.524	-123.9	0.994	73.7	0.258	25.6	0.647	-60.5

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S Parameter ($V_{CE} = 1\text{ V}$, $I_C = 1\text{ mA}$, $Z_o = 50\text{ }\Omega$, Emitter Common)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.956	-10.5	3.49	171.1	0.0298	83.7	0.991	-6.1
200	0.938	-20.8	3.37	162.3	0.0596	77.0	0.972	-12.0
300	0.912	-31.1	3.26	153.2	0.0874	70.7	0.945	-18.1
400	0.871	-40.9	3.12	145.1	0.112	65.1	0.910	-23.4
500	0.830	-50.1	2.94	137.9	0.133	60.0	0.871	-28.1
600	0.782	-57.6	2.80	130.6	0.151	56.0	0.831	-32.5
700	0.740	-65.8	2.63	124.0	0.164	51.9	0.795	-36.1
800	0.686	-73.0	2.48	118.2	0.175	48.8	0.759	-39.4
900	0.656	-80.7	2.35	112.5	0.185	45.9	0.725	-42.4
1000	0.613	-87.2	2.24	107.9	0.192	43.8	0.694	-44.8
1100	0.582	-93.3	2.13	103.8	0.200	42.8	0.672	-47.0
1200	0.551	-99.1	2.00	99.3	0.210	40.3	0.662	-49.8
1300	0.532	-104.7	1.91	95.3	0.210	38.1	0.631	-52.4
1400	0.505	-111.4	1.82	91.6	0.213	37.2	0.606	-53.8
1500	0.483	-116.3	1.74	88.1	0.215	36.3	0.587	-55.6
1600	0.461	-121.2	1.66	84.9	0.216	35.6	0.573	-57.3
1700	0.445	-127.2	1.59	81.9	0.217	34.9	0.558	-58.6
1800	0.435	-132.0	1.54	78.9	0.219	35.0	0.545	-60.3
1900	0.425	-137.6	1.49	76.7	0.221	34.7	0.531	-61.8
2000	0.413	-141.4	1.45	73.9	0.221	34.6	0.519	-63.5

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HITACHI

Hitachi, Ltd.

Semiconductor & IC Div.

Nippon Bldg., 2-6-2, Ohite-machi, Chiyoda-ku, Tokyo 100, Japan

Tel: Tokyo (03) 3270-2111

Fax: (03) 3270-5109

For further information write to:

Hitachi America, Ltd.
Semiconductor & IC Div.
2000 Sierra Point Parkway
Brisbane, CA 94005-4835
U.S.A.
Tel: 415-589-8000
Fax: 415-589-4207

Hitachi Europe GmbH
Electronic Components Group
Continental Europe
Dornacher Straße 3
D-85622 Feldkirchen
München
Tel: 089-9 94 80-0
Fax: 089-9 29 30 00

Hitachi Europe Ltd.
Electronic Components Div.
Northern Europe Headquarters
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA
United Kingdom
Tel: 0628-585000
Fax: 0628-778322

Hitachi Asia Pte. Ltd.
45 Collyer Quay #20-00
Hitachi Tower
Singapore 0404
Tel: 535-2100
Fax: 535-1533

Hitachi Asia (Hong Kong) Ltd.
Unit 705, North Tower,
World Finance Centre
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon
Hong Kong
Tel: 27359218
Fax: 27306074