
2SC4874

Silicon NPN Epitaxial

HITACHI

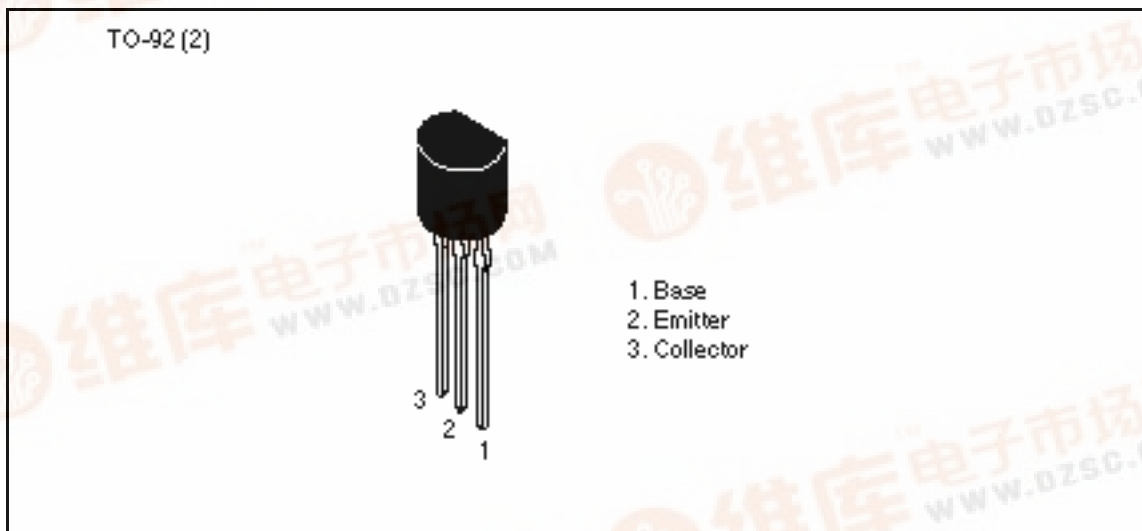
Application

VHF / UHF wide band amplifier

Features

- High gain bandwidth product
 $f_T = 5.8 \text{ GHz Typ}$
- High gain, low noise figure
 $PG = 10.0 \text{ dB Typ, NF} = 1.8 \text{ dB Typ at } f = 900 \text{ MHz}$

Outline



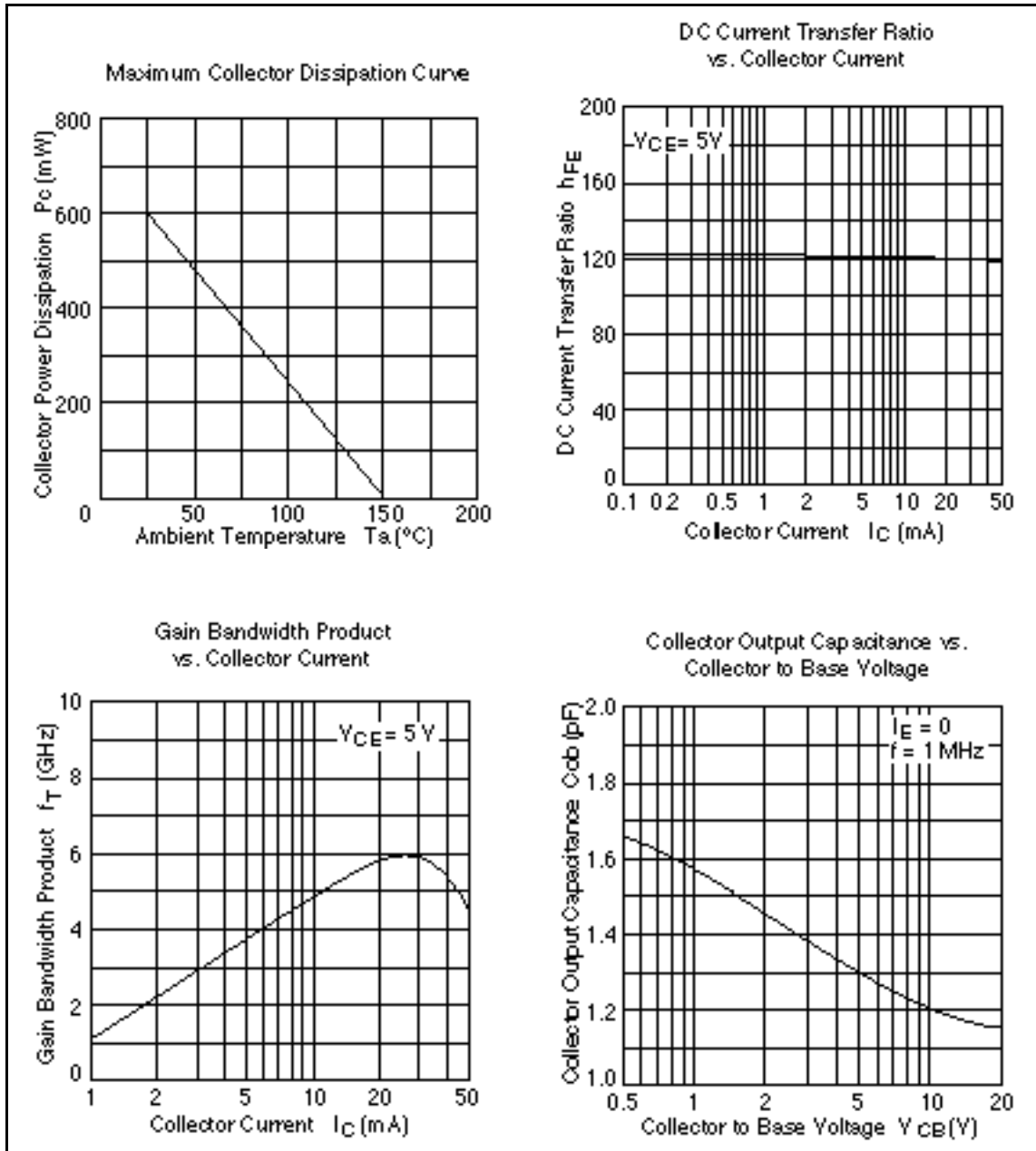
2SC4874

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	20	V
Collector to emitter voltage	V_{CEO}	12	V
Emitter to base voltage	V_{EBO}	2	V
Collector current	I_C	50	mA
Collector power dissipation	P_C	600	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

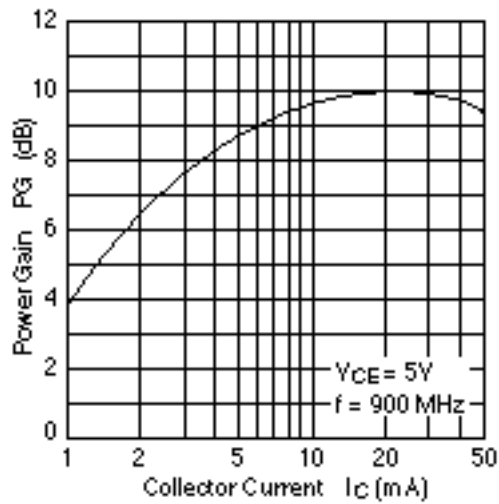
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	20	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{CB} = 15 V, I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 12 V, R_{BE} =$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 2 V, I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 5 V, I_C = 20 mA$
Collector output capacitance	C_{ob}	—	1.3	1.8	pF	$V_{CB} = 5 V, I_E = 0, f = 1 MHz$
Gain bandwidth product	f_T	4.0	5.8	—	GHz	$V_{CE} = 5 V, I_C = 20 mA$
Power gain	PG	7.5	10.0	—	dB	$V_{CE} = 5 V, I_C = 20 mA,$ $f = 900 MHz$
Noise figure	NF	—	1.8	3.0	dB	$V_{CE} = 5 V, I_C = 5 mA,$ $f = 900 MHz$

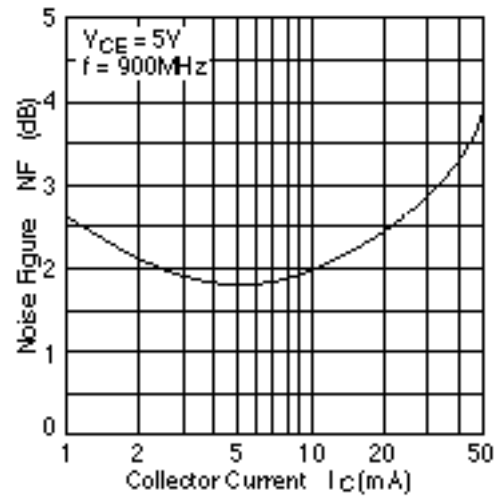


2SC4874

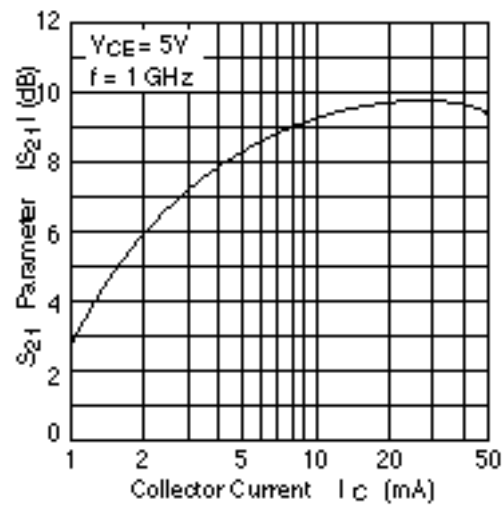
Power Gain vs. Collector Current



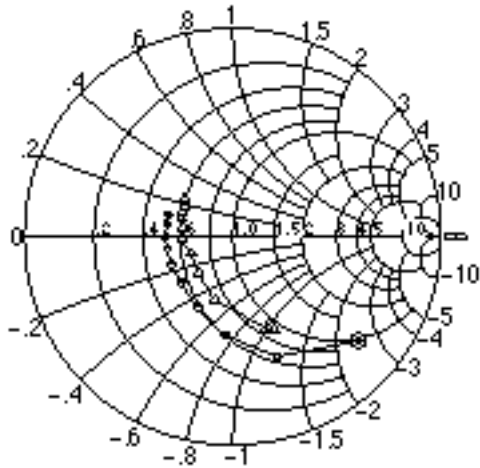
Noise Figure vs. Collector Current



S₂₁ Parameter vs. Collector Current

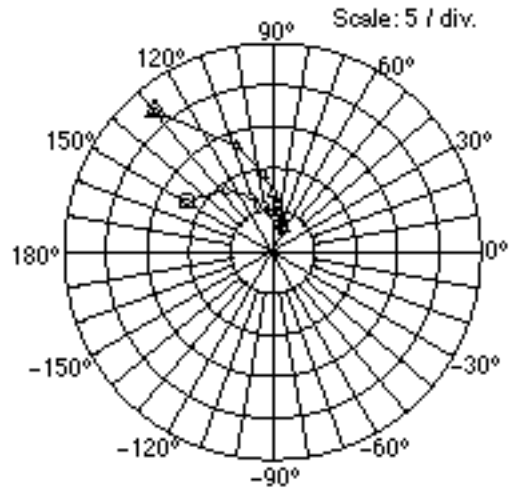


S11 Parameter vs. Frequency



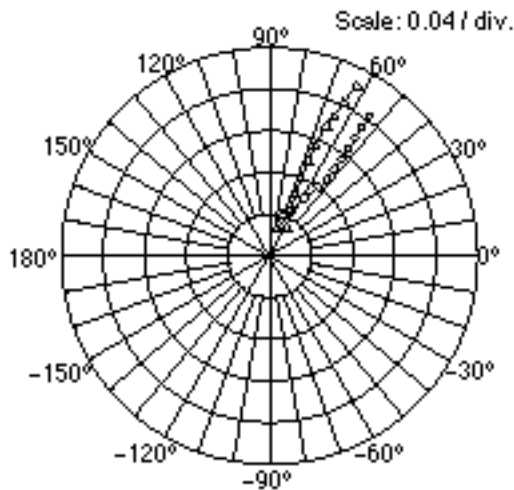
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (100 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 20\text{ mA}$)

S21 Parameter vs. Frequency



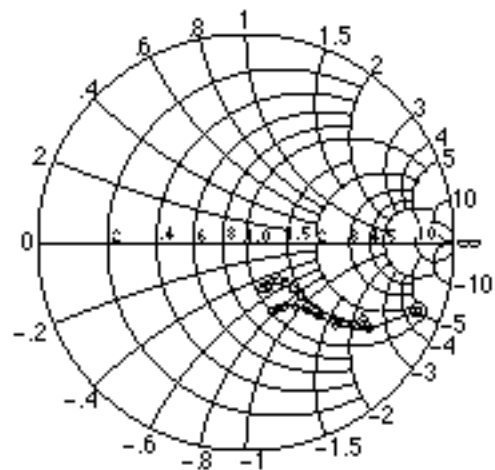
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (100 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 20\text{ mA}$)

S12 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (100 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 20\text{ mA}$)

S22 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (100 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 20\text{ mA}$)

2SC4874

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

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.784	-39.6	12.03	149.8	0.0396	71.3	0.890	-21.4
200	0.614	-69.7	9.23	127.0	0.0651	59.5	0.718	-35.3
300	0.474	-94.3	7.06	111.6	0.0810	55.0	0.587	-42.3
400	0.378	-116.3	5.66	100.6	0.0926	53.3	0.499	-45.3
500	0.330	-138.0	4.68	91.9	0.104	53.5	0.435	-48.1
600	0.322	-155.5	4.03	85.2	0.116	53.5	0.387	-52.5
700	0.320	-169.9	3.52	78.9	0.127	53.8	0.360	-58.2
800	0.325	-179.7	3.13	73.8	0.140	54.1	0.353	-63.5
900	0.321	168.8	2.81	68.5	0.152	54.4	0.353	-67.3
1000	0.326	161.1	2.58	63.8	0.165	54.6	0.348	-69.9

S Parameter ($V_{CE} = 5 \text{ V}$, $I_C = 20 \text{ mA}$, $Z_O = 50 \Omega$, Emitter Common)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.477	-68.2	21.97	130.0	0.0297	66.5	0.686	-35.2
200	0.318	-105.4	13.32	108.8	0.0469	65.3	0.468	-44.2
300	0.240	-133.3	9.19	97.1	0.0633	66.9	0.372	-44.8
400	0.215	-157.6	7.05	89.5	0.0797	67.6	0.318	-44.4
500	0.224	-177.3	5.68	83.8	0.0968	67.5	0.276	-45.4
600	0.242	170.0	4.81	78.6	0.113	67.2	0.246	-49.5
700	0.263	161.0	4.15	74.0	0.130	66.2	0.230	-56.8
800	0.270	154.9	3.66	69.7	0.146	65.1	0.231	-63.8
900	0.273	147.6	3.27	65.5	0.163	64.1	0.238	-68.4
1000	0.291	141.7	2.99	61.8	0.180	62.8	0.237	-71.5

When using this document, keep the following in mind:

1. This document may, wholly or partially, be subject to change without notice.
2. All rights are reserved: No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without Hitachi's permission.
3. Hitachi will not be held responsible for any damage to the user that may result from accidents or any other reasons during operation of the user's unit according to this document.
4. Circuitry and other examples described herein are meant merely to indicate the characteristics and performance of Hitachi's semiconductor products. Hitachi assumes no responsibility for any intellectual property claims or other problems that may result from applications based on the examples described herein.
5. No license is granted by implication or otherwise under any patents or other rights of any third party or Hitachi, Ltd.
6. **MEDICAL APPLICATIONS:** Hitachi's products are not authorized for use in **MEDICAL APPLICATIONS** without the written consent of the appropriate officer of Hitachi's sales company. Such use includes, but is not limited to, use in life support systems. Buyers of Hitachi's products are requested to notify the relevant Hitachi sales offices when planning to use the products in **MEDICAL APPLICATIONS**.

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 415-589-8300
Fax 415-589-4207

Hitachi Europe GmbH
Electronic Components Group
Continental Europe
Dornacher StraÙe 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
Whitbrook Park
Lower Cookham Road
M Maidenhead
Berkshire SL6 8YA
United Kingdom
Tel 0628-885000
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 27308074