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

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2SC4900

Silicon NPN Epitaxial

RENESAS

Application

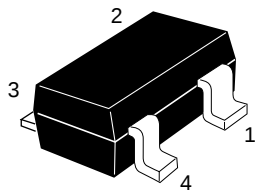
VHF / UHF wide band amplifier

Features

- High gain bandwidth product
 $f_T = 9 \text{ GHz Typ}$
- High gain, low noise figure
 $PG = 13.0 \text{ dB Typ}$, $NF = 1.2 \text{ dB Typ}$ at $f = 900 \text{ MHz}$

Outline

MPAK-4



1. Collector
2. Emitter
3. Base
4. Emitter

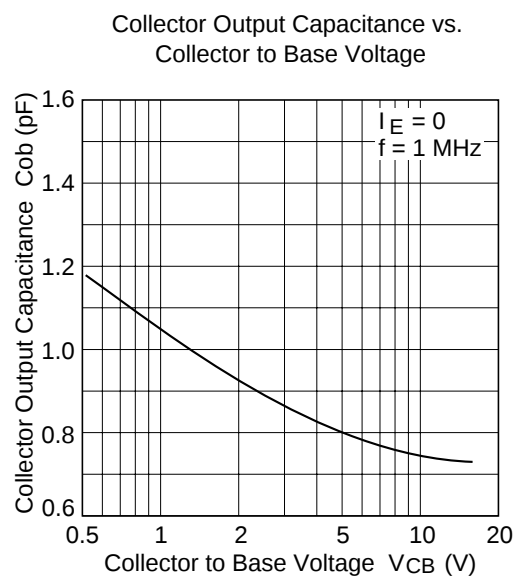
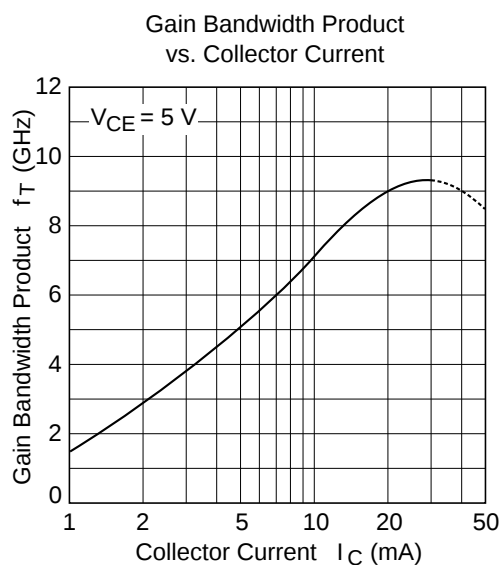
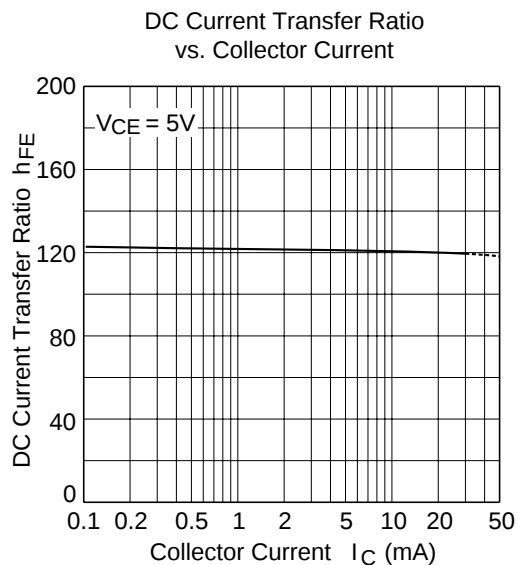
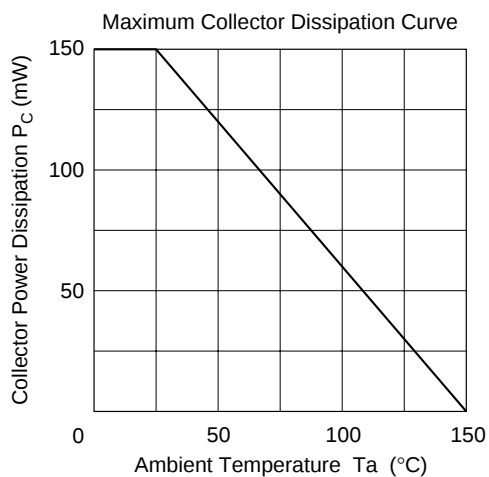
Absolute Maximum Ratings (Ta = 25°C)

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	50	mA
Collector power dissipation	P_C	150	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	−55 to +150	°C

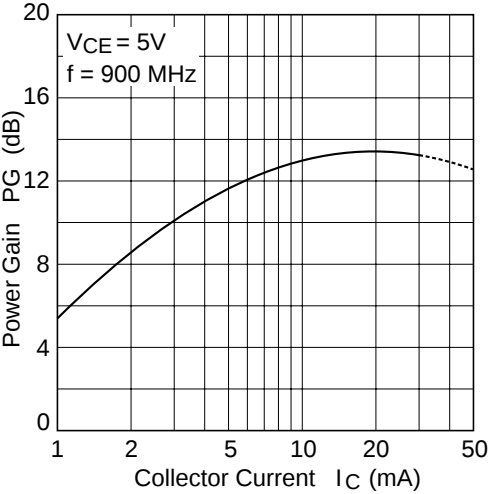
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10\text{ }\mu\text{A}$, $I_E = 0$
Collector cutoff current	I_{CBO}	—	—	10	μA	$V_{CB} = 12\text{ V}$, $I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 9\text{ V}$, $R_{BE} = \infty$
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		$V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$
Collector output capacitance	C_{ob}	—	0.8	1.3	pF	$V_{CB} = 5\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$
Gain bandwidth product	f_T	6.0	9.0	—	GHz	$V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$
Power gain	PG	10.5	13.5	—	dB	$V_{CE} = 5\text{ V}$, $I_C = 20\text{ mA}$, $f = 900\text{ MHz}$
Noise figure	NF	—	1.2	2.5	dB	$V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $f = 900\text{ MHz}$

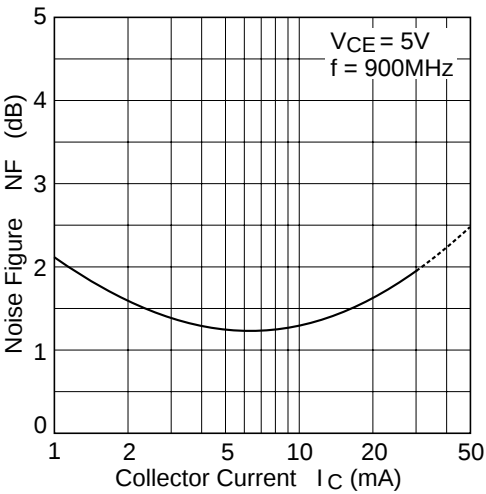
Note: Marking is “YJ—”.



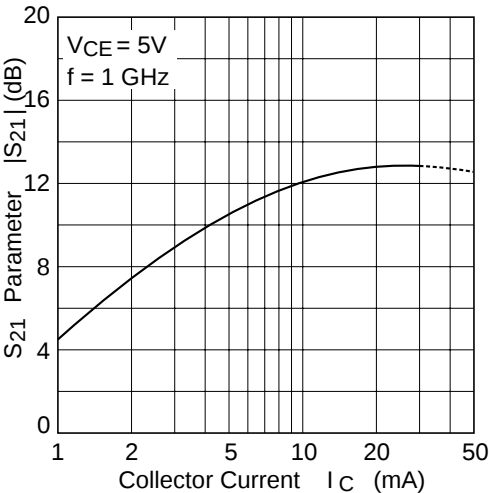
Power Gain vs. Collector Current



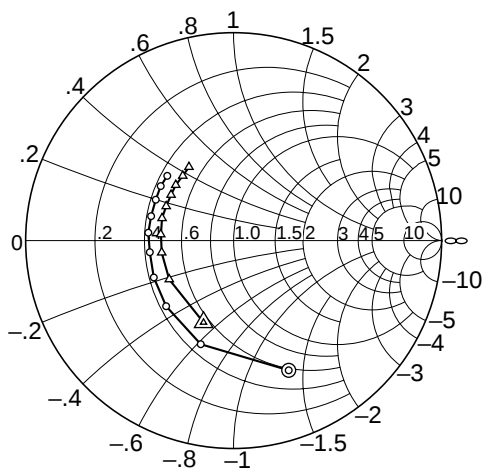
Noise Figure vs. Collector Current



S21 Parameter vs. Collector Current



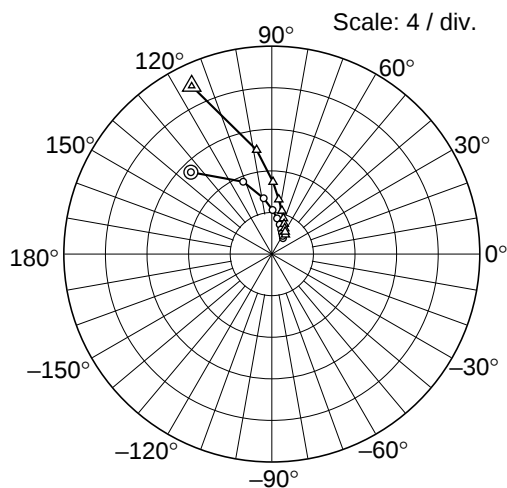
S11 Parameter vs. Frequency



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

○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

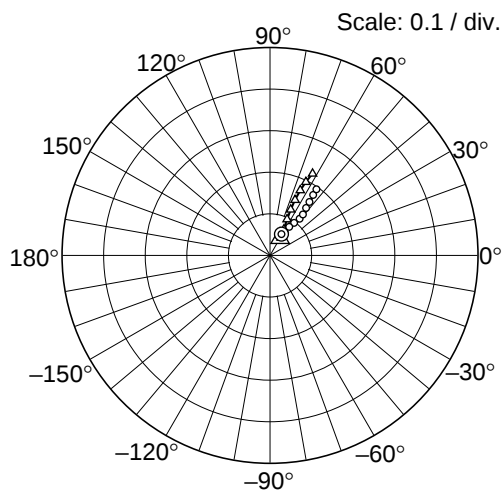
S21 Parameter vs. Frequency



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

○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

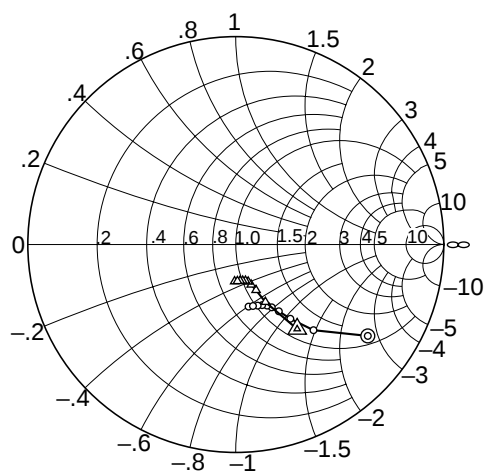
S12 Parameter vs. Frequency



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

○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

S22 Parameter vs. Frequency



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

○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

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.
200	0.678	-67.0	11.09	134.6	0.0572	59.2	0.772	-34.7
400	0.523	-107.6	7.49	111.6	0.0802	48.8	0.556	-47.8
600	0.453	-135.8	5.43	98.3	0.0933	47.1	0.443	-53.7
800	0.423	-155.2	4.24	89.0	0.105	47.8	0.382	-57.2
1000	0.407	-172.1	3.47	81.6	0.118	49.7	0.348	-60.2
1200	0.412	174.7	2.94	75.0	0.130	50.7	0.330	-62.9
1400	0.414	163.5	2.54	69.2	0.145	51.9	0.318	-66.5
1600	0.423	152.3	2.26	64.3	0.158	52.7	0.312	-70.3
1800	0.438	143.2	2.05	59.2	0.174	53.3	0.307	-74.4
2000	0.446	135.7	1.87	55.0	0.189	53.4	0.305	-78.4

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.
200	0.420	-110.3	17.91	115.5	0.0381	59.7	0.502	-54.1
400	0.362	-148.9	10.13	98.4	0.0572	62.2	0.311	-62.8
600	0.351	-170.5	6.94	89.2	0.0766	64.7	0.240	-66.1
800	0.352	175.2	5.29	82.9	0.0966	65.7	0.207	-69.1
1000	0.361	162.7	4.27	77.1	0.117	65.8	0.189	-71.6
1200	0.364	153.1	3.60	72.3	0.138	65.1	0.181	-75.1
1400	0.373	143.9	3.12	67.9	0.158	64.0	0.178	-79.3
1600	0.386	136.2	2.76	63.6	0.178	62.5	0.176	-83.3
1800	0.396	128.2	2.49	59.4	0.199	61.3	0.177	-87.5
2000	0.414	121.3	2.27	55.5	0.218	59.8	0.178	-91.9

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