

To all our customers

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

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# 2SC4900

Silicon NPN Epitaxial

**RENESAS**

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## Application

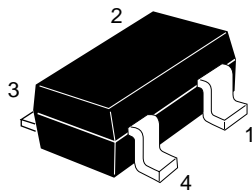
VHF / UHF wide band amplifier

## 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

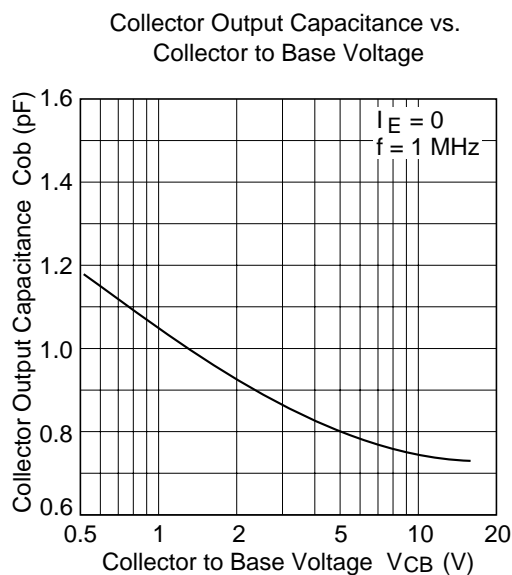
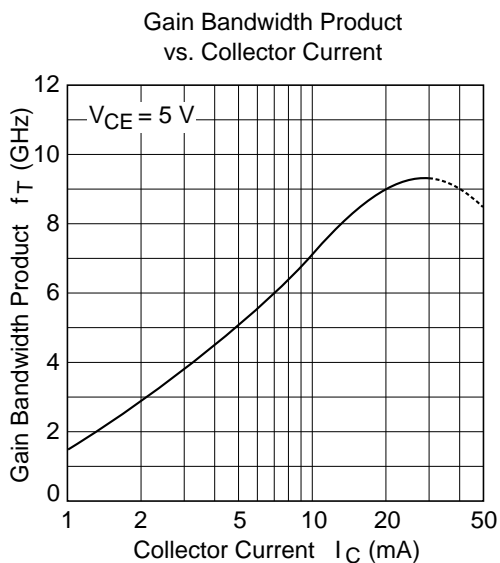
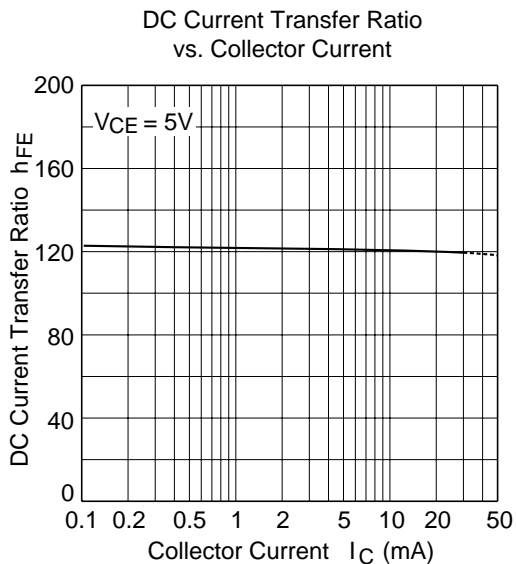
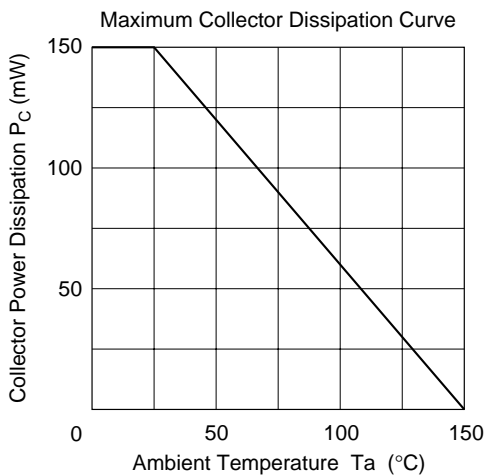
## Absolute Maximum Ratings (Ta = 25°C)

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

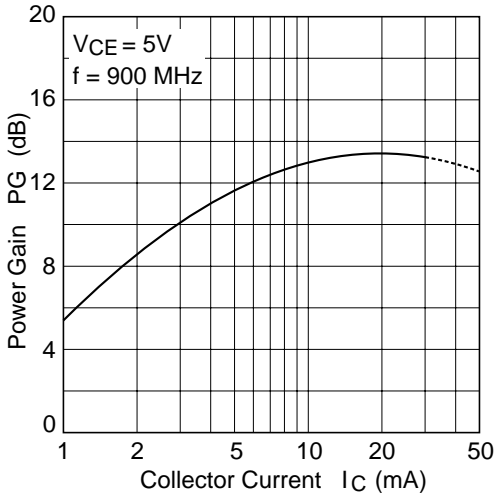
## Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	$I_{CBO}$	—	—	10	$\mu A$	$V_{CB} = 12 V, I_E = 0$
	$I_{CEO}$	—	—	1	mA	$V_{CE} = 9 V, R_{BE} = \infty$
Emitter cutoff current	$I_{EBO}$	—	—	10	$\mu A$	$V_{EB} = 1.5 V, I_C = 0$
DC current transfer ratio	$h_{FE}$	50	120	250		$V_{CE} = 5 V, I_C = 20 mA$
Collector output capacitance	$C_{ob}$	—	0.8	1.3	pF	$V_{CB} = 5 V, I_E = 0, f = 1 MHz$
Gain bandwidth product	$f_T$	6.0	9.0	—	GHz	$V_{CE} = 5 V, I_C = 20 mA$
Power gain	PG	10.5	13.5	—	dB	$V_{CE} = 5 V, I_C = 20 mA, f = 900 MHz$
Noise figure	NF	—	1.2	2.5	dB	$V_{CE} = 5 V, I_C = 5 mA, f = 900 MHz$

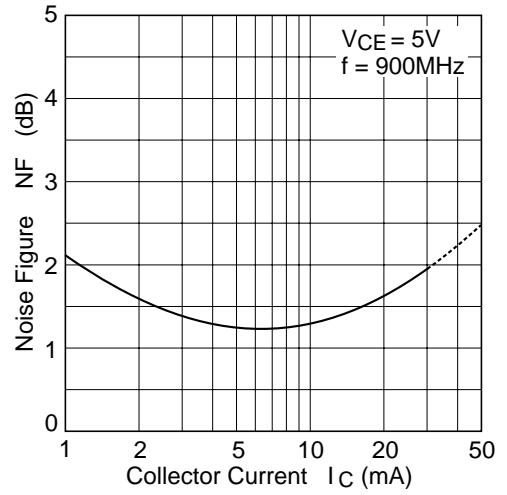
Note: Marking is "YJ-".



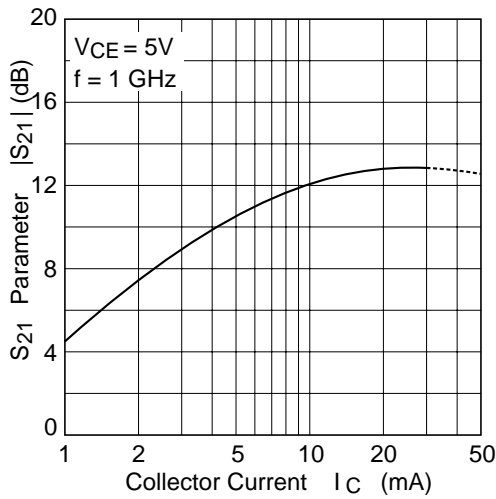
Power Gain vs. Collector Current



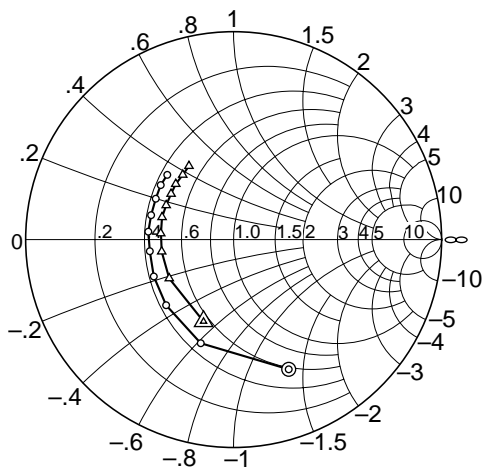
Noise Figure vs. Collector Current



S21 Parameter vs. Collector Current



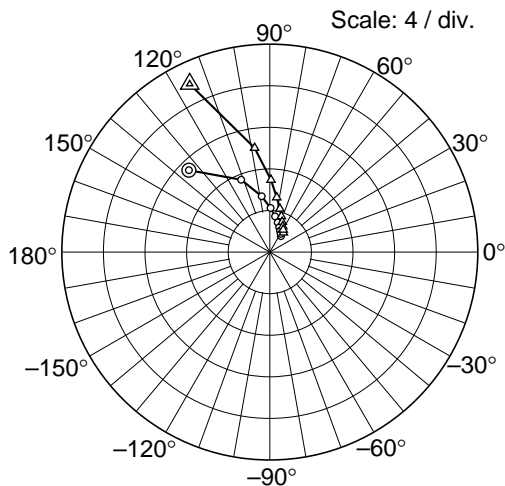
S11 Parameter vs. Frequency



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

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

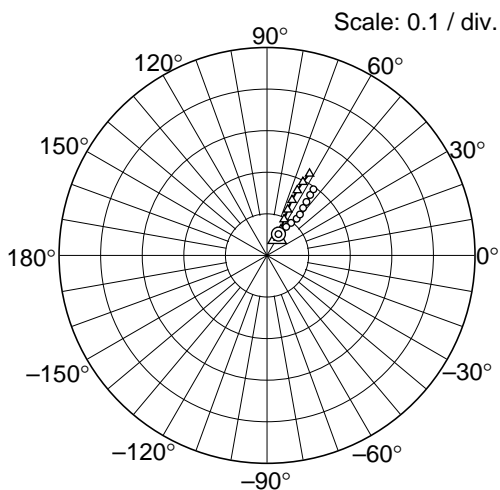
S21 Parameter vs. Frequency



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

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

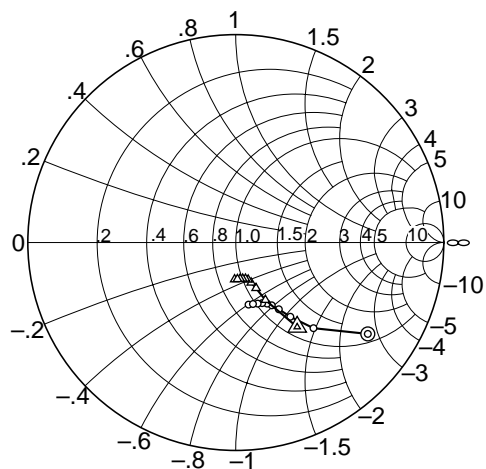
S12 Parameter vs. Frequency



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 ( $V_{CE} = 5\text{ V}$ , $I_C = 5\text{ mA}$ , $Z_0 = 50\ \Omega$ , 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 ( $V_{CE} = 5\text{ V}$ , $I_C = 20\text{ mA}$ , $Z_0 = 50\ \Omega$ , 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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