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# 2SC4906

Silicon NPN Epitaxial

# HITACHI

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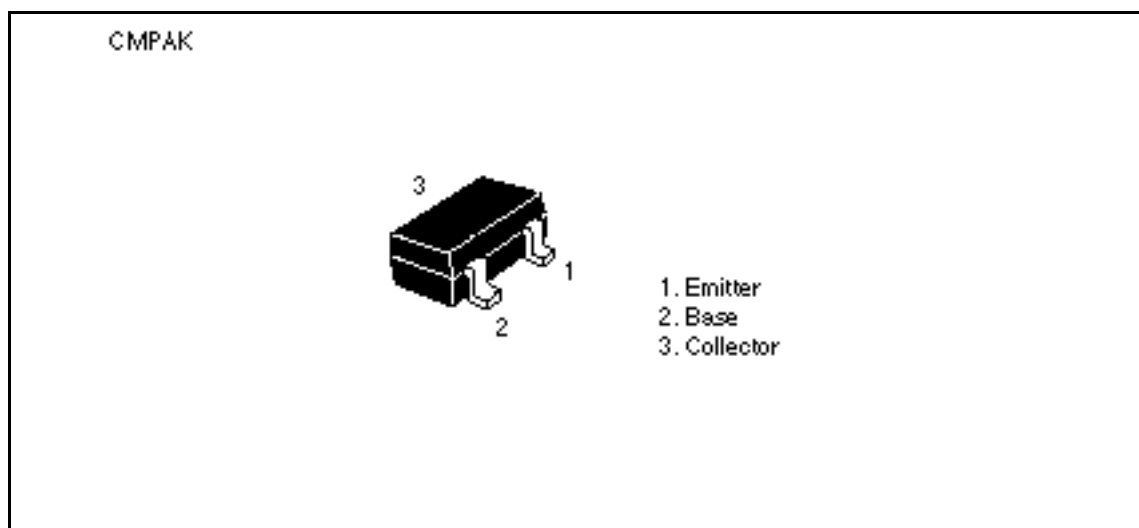
## Application

VHF / UHF wide band amplifier

## Features

- High gain bandwidth product  
 $f_T = 5.8 \text{ GHz Typ}$
- High gain, low noise figure  
 $PG = 12.0 \text{ dB Typ}$ ,  $NF = 1.6 \text{ dB Typ}$  at  $f = 900 \text{ MHz}$

## Outline



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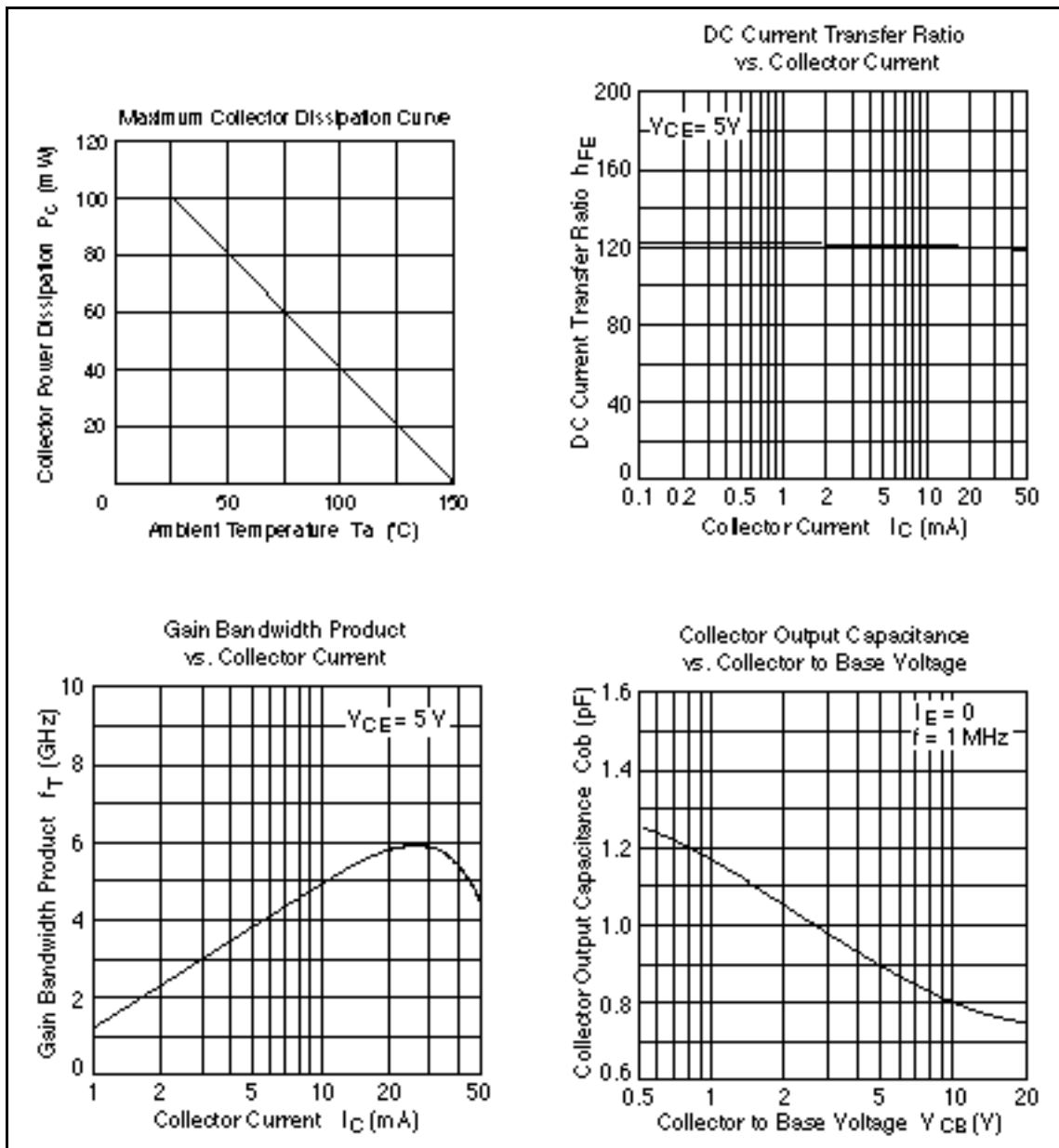
### Absolute Maximum Ratings (Ta = 25°C)

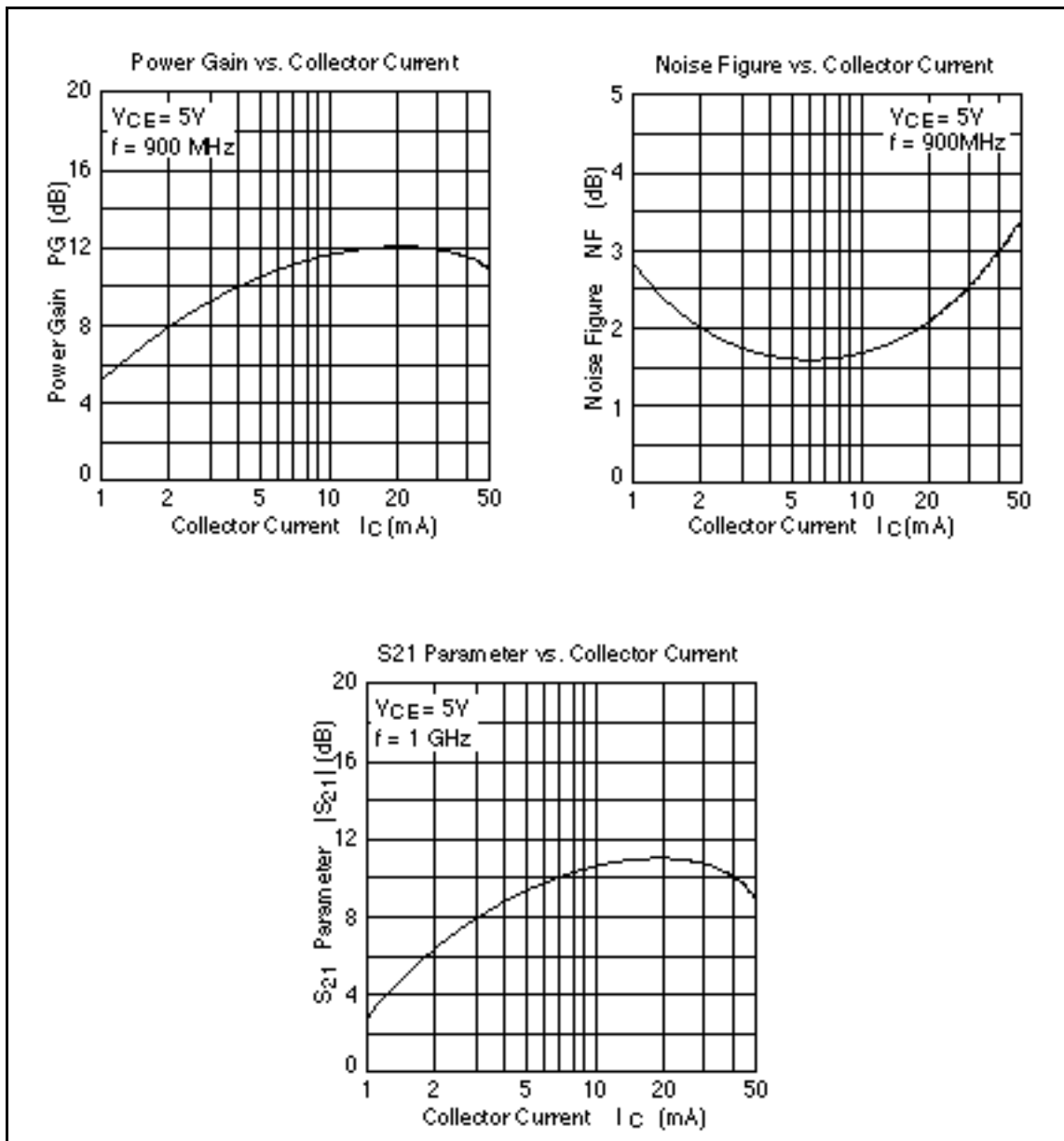
Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{CBO}$	20	V
Collector to emitter voltage	$V_{CEO}$	12	V
Emitter to base voltage	$V_{EBO}$	2	V
Collector current	$I_C$	50	mA
Collector power dissipation	$P_C$	100	mW
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-55 to +150	°C

### Electrical Characteristics (Ta = 25°C)

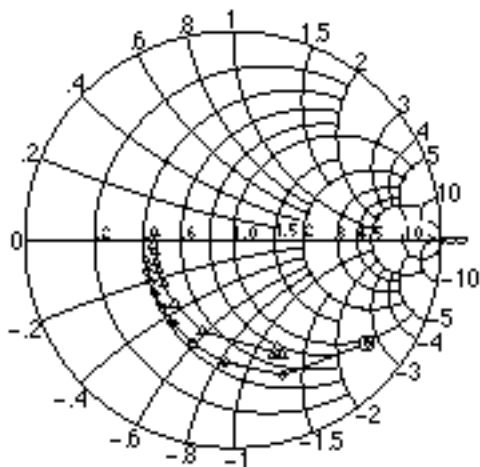
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	20	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	$I_{CBO}$	—	—	1	$\mu A$	$V_{CB} = 15 V, I_E = 0$
	$I_{CEO}$	—	—	1	mA	$V_{CE} = 12 V, R_{BE} =$
Emitter cutoff current	$I_{EBO}$	—	—	10	$\mu A$	$V_{EB} = 2 V, I_C = 0$
DC current transfer ratio	$h_{FE}$	50	120	250		$V_{CE} = 5 V, I_C = 20 mA$
Collector output capacitance	$C_{ob}$	—	0.9	1.4	pF	$V_{CB} = 5 V, I_E = 0,$ $f = 1 MHz$
Gain bandwidth product	$f_T$	4	5.8	—	GHz	$V_{CE} = 5 V, I_C = 20 mA$
Power gain	PG	9.5	12.0	—	dB	$V_{CE} = 5 V, I_C = 20 mA,$ $f = 900 MHz$
Noise figure	NF	—	1.6	3.0	dB	$V_{CE} = 5 V, I_C = 5 mA,$ $f = 900 MHz$

Note: Marking is "YN-".



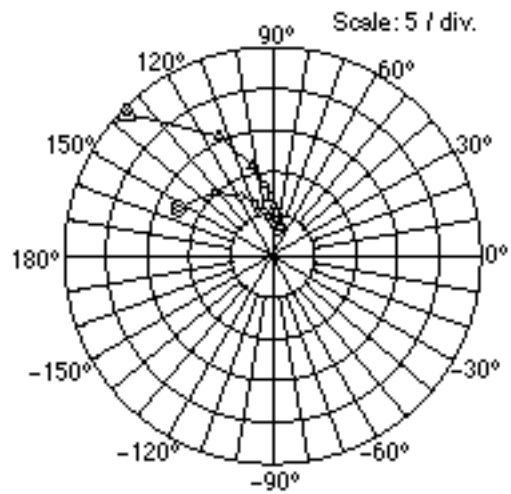


S11 Parameter vs. Frequency



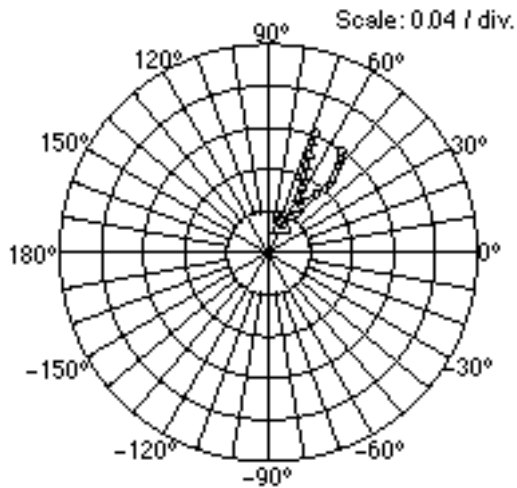
Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
 100 to 1000 MHz (100 MHz step)  
 ○ — ○ ( $I_C = 5\text{ mA}$ )  
 △ — △ ( $I_C = 20\text{ mA}$ )

S21 Parameter vs. Frequency



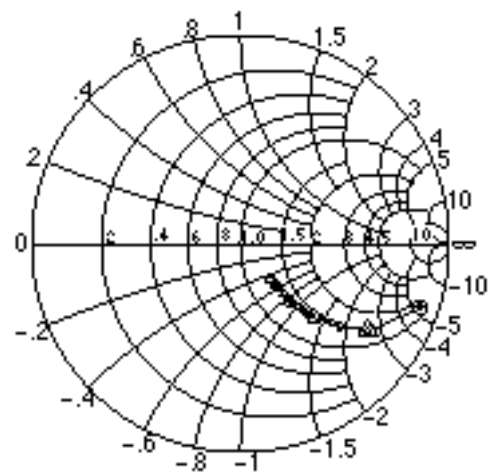
Condition:  $V_{CE} = 5\text{ V}$ ,  $Z_o = 50\ \Omega$   
 100 to 1000 MHz (100 MHz step)  
 ○ — ○ ( $I_C = 5\text{ mA}$ )  
 △ — △ ( $I_C = 20\text{ mA}$ )

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

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

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.813	-37.6	12.67	153.5	0.0354	71.0	0.912	-19.4
200	0.693	-69.6	10.22	132.5	0.0587	57.7	0.756	-32.9
300	0.591	-93.5	8.04	118.3	0.0727	51.0	0.623	-39.9
400	0.534	-111.3	6.54	108.7	0.0812	48.7	0.536	-43.6
500	0.492	-124.9	5.44	101.4	0.0880	48.2	0.477	-45.6
600	0.471	-135.5	4.66	95.8	0.0943	48.8	0.437	-46.6
700	0.453	-144.9	4.07	91.0	0.100	49.9	0.408	-47.5
800	0.445	-153.1	3.61	86.5	0.107	51.2	0.388	-48.7
900	0.438	-160.1	3.25	82.6	0.114	52.9	0.373	-49.7
1000	0.429	-166.4	2.96	79.2	0.120	54.3	0.362	-50.9

**S Parameter** ( $V_{CE} = 5\text{ V}$ ,  $I_C = 20\text{ mA}$ ,  $Z_o = 50$  , Emitter common)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.583	-68.6	24.42	135.9	0.0274	63.1	0.741	-34.5
200	0.463	-108.7	15.65	114.4	0.0399	57.0	0.502	-46.7
300	0.416	-132.2	10.99	103.4	0.0500	59.1	0.382	-49.6
400	0.396	-147.6	8.46	96.8	0.0596	61.8	0.320	-49.8
500	0.388	-156.9	6.85	91.9	0.0699	63.3	0.285	-49.3
600	0.385	-163.6	5.77	87.9	0.0798	65.3	0.263	-48.9
700	0.379	-170.3	4.97	84.5	0.0908	66.6	0.249	-49.1
800	0.383	-175.8	4.37	81.2	0.102	67.4	0.238	-49.2
900	0.389	179.2	3.92	78.1	0.113	68.1	0.231	-49.8
1000	0.380	174.7	3.55	75.6	0.123	68.4	0.226	-51.2

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