
2SC4906

Silicon NPN Epitaxial

HITACHI

Application

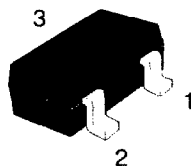
VHF / UHF wide band amplifier

Features

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

Outline

CMPAK



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

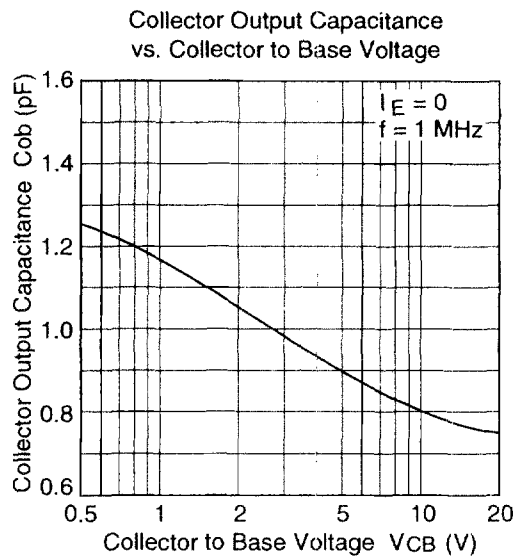
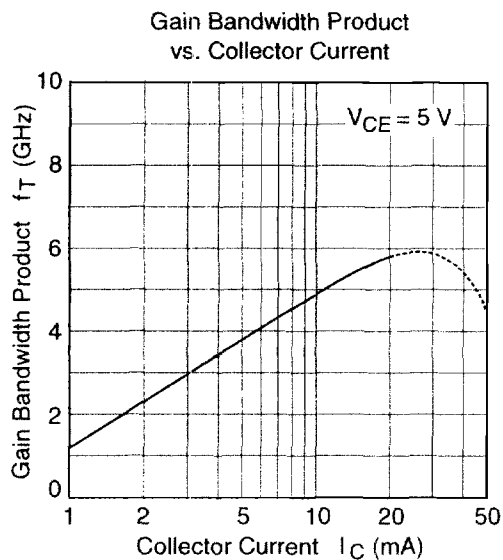
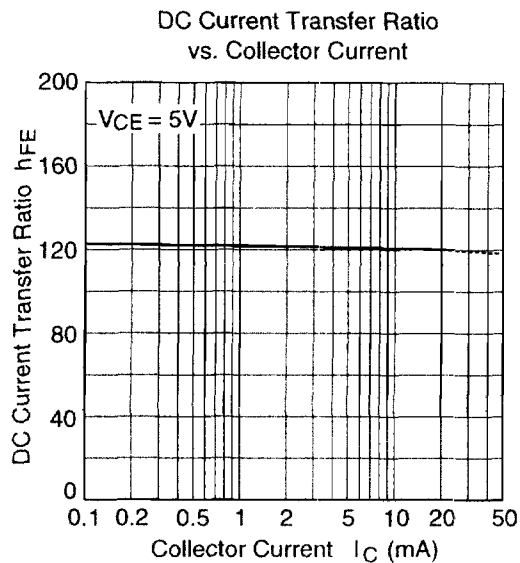
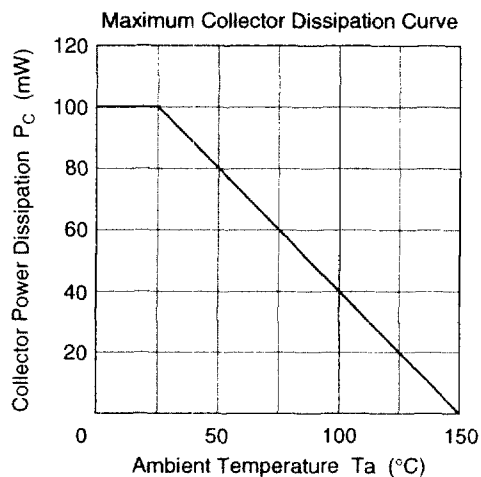
Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

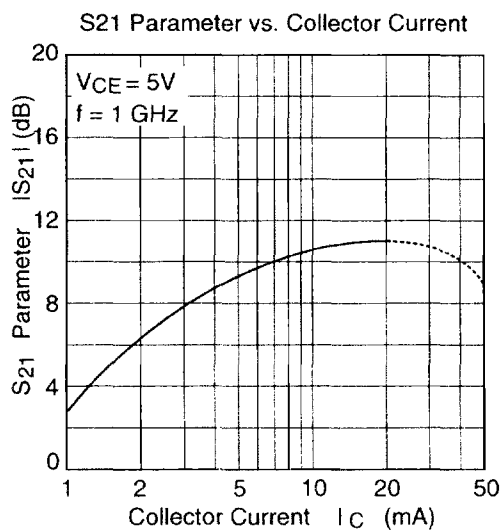
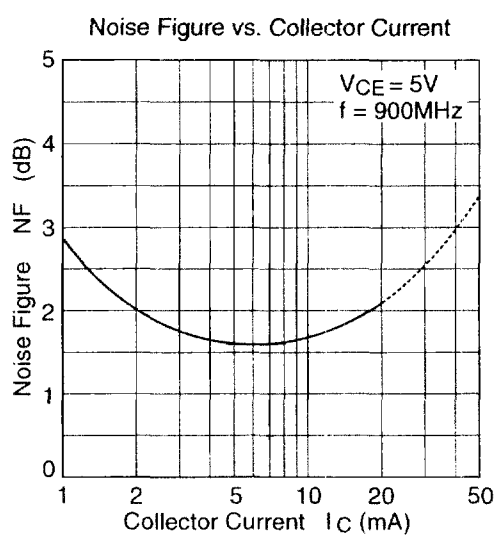
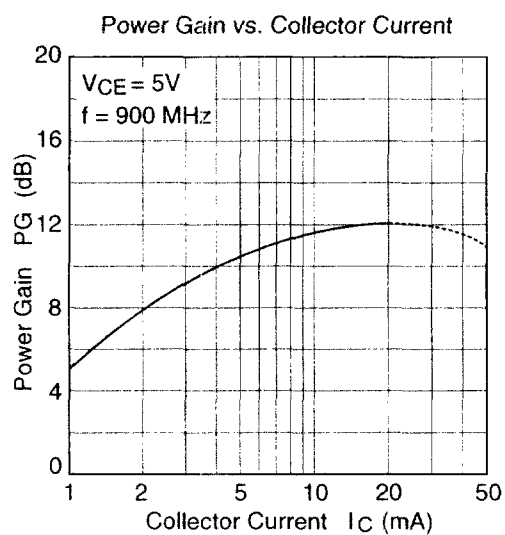
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	20	V
Collector to emitter voltage	V_{CEO}	12	V
Emitter to base voltage	V_{EBO}	2	V
Collector current	I_{C}	50	mA
Collector power dissipation	P_{C}	100	mW
Junction temperature	T_{j}	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics ($T_a = 25^\circ\text{C}$)

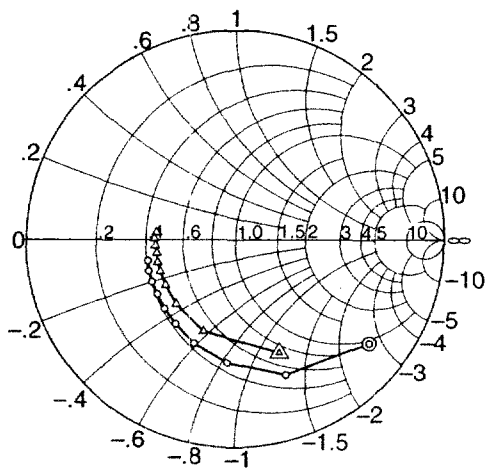
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(\text{BR})\text{CBO}}$	20	—	—	V	$I_{\text{C}} = 10\text{ }\mu\text{A}$, $I_{\text{E}} = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{\text{CB}} = 15\text{ V}$, $I_{\text{E}} = 0$
	I_{CEO}	—	—	1	mA	$V_{\text{CE}}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

Note: Marking is "YN—".





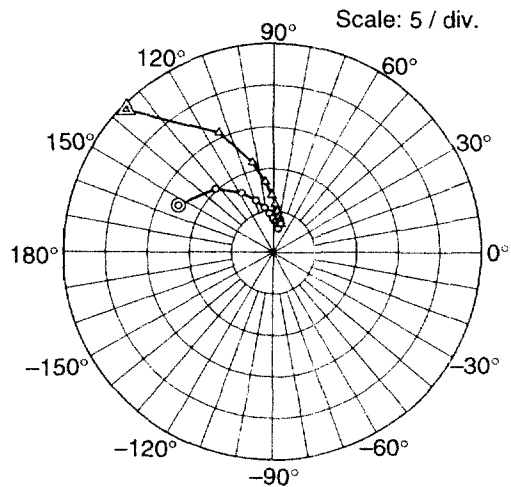
S11 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
100 to 1000 MHz (100 MHz step)

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

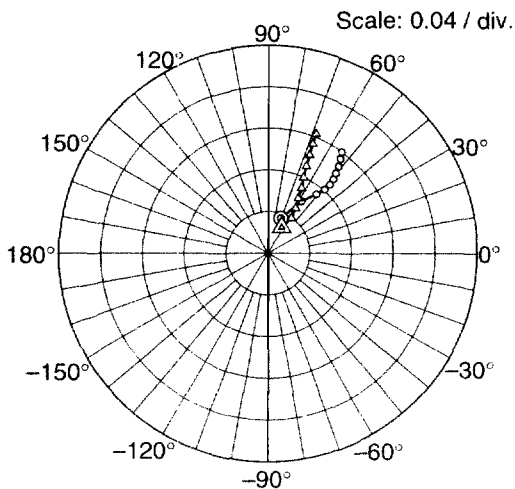
S21 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
100 to 1000 MHz (100 MHz step)

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

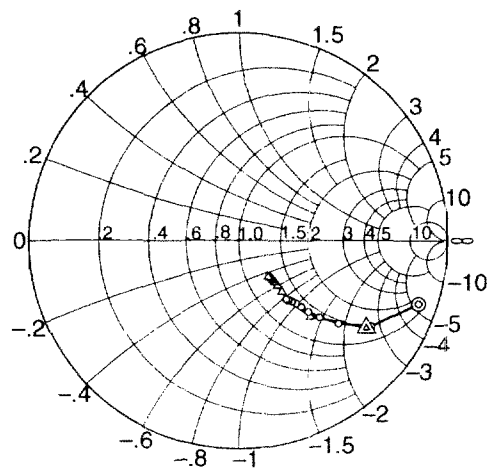
S12 Parameter vs. Frequency



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)

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

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