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# 2SC4900

Silicon NPN Epitaxial

# HITACHI

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## Application

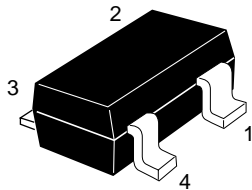
VHF / UHF wide band amplifier

## 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** ( $T_a = 25^\circ\text{C}$ )

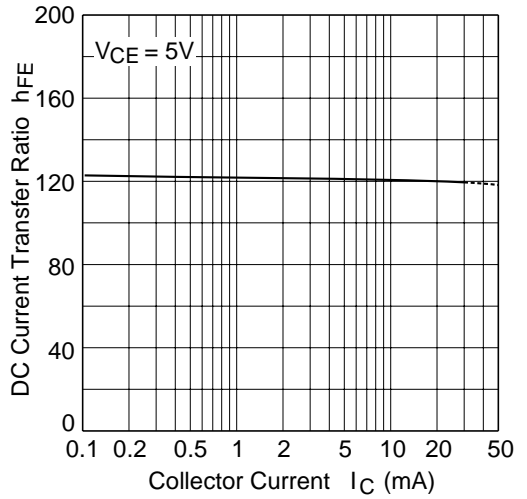
Item	Symbol	Ratings	Unit
Collector to base voltage	$V_{\text{CBO}}$	15	V
Collector to emitter voltage	$V_{\text{CEO}}$	9	V
Emitter to base voltage	$V_{\text{EBO}}$	1.5	V
Collector current	$I_{\text{C}}$	50	mA
Collector power dissipation	$P_{\text{C}}$	150	mW
Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
Storage temperature	$T_{\text{stg}}$	-55 to +150	$^\circ\text{C}$

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

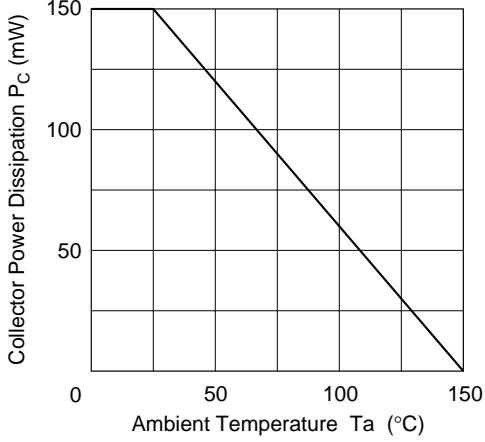
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(\text{BR})\text{CBO}}$	15	—	—	V	$I_{\text{C}} = 10 \mu\text{A}$ , $I_{\text{E}} = 0$
Collector cutoff current	$I_{\text{CBO}}$	—	—	10	$\mu\text{A}$	$V_{\text{CB}} = 12 \text{ V}$ , $I_{\text{E}} = 0$
	$I_{\text{CEO}}$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

Note: Marking is "YJ—".

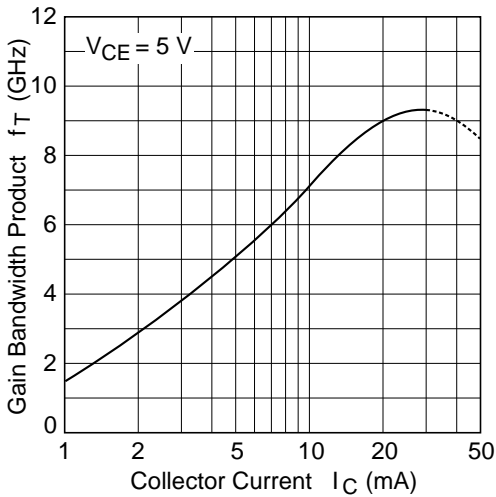
DC Current Transfer Ratio vs. Collector Current



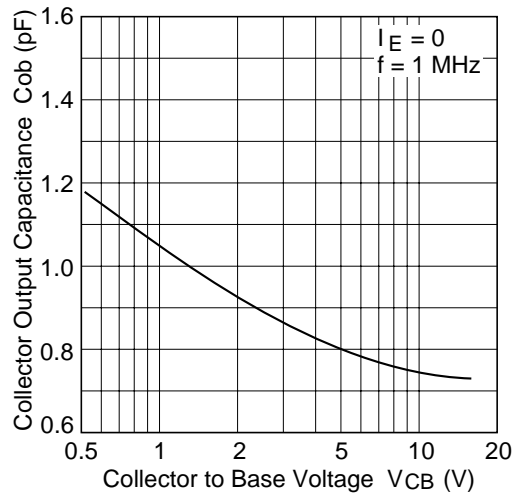
Maximum Collector Dissipation Curve



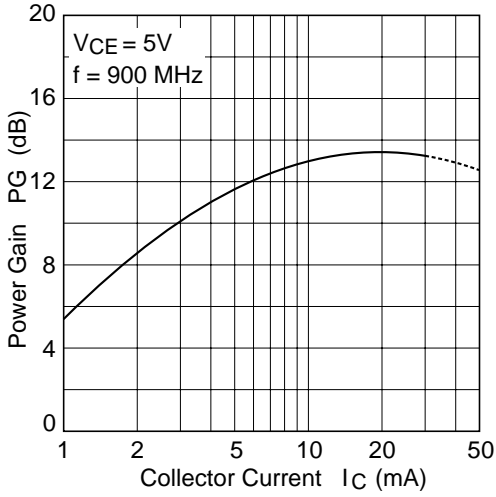
Gain Bandwidth Product vs. Collector Current



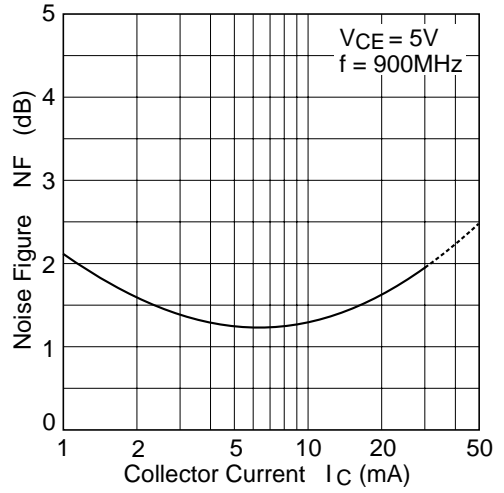
Collector Output Capacitance vs. Collector to Base Voltage



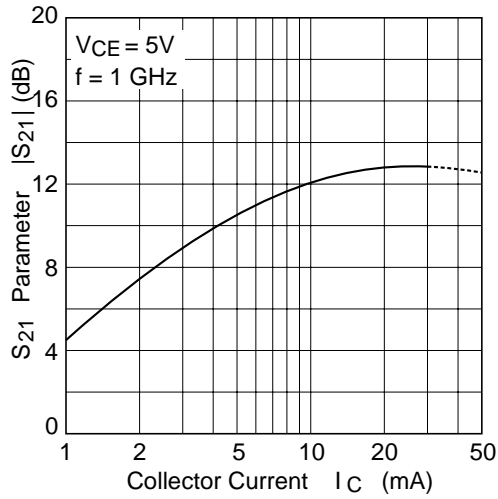
Power Gain vs. Collector Current



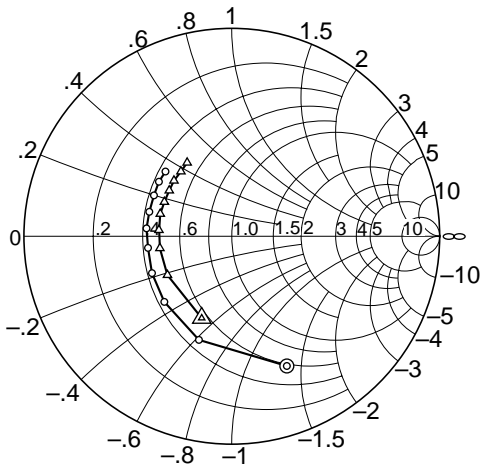
Noise Figure vs. Collector Current



S21 Parameter vs. Collector Current



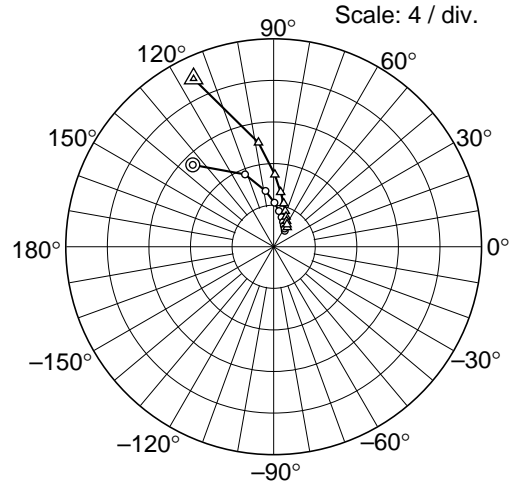
S11 Parameter vs. Frequency



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

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

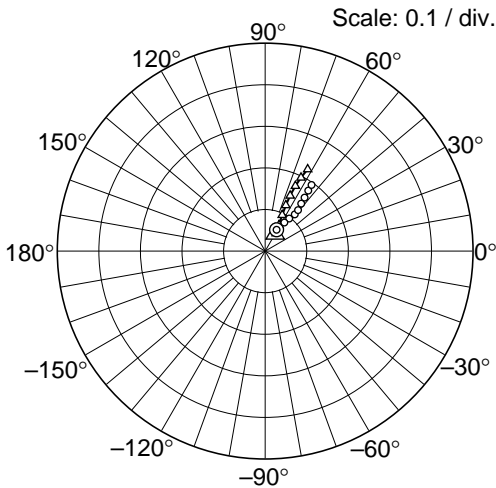
S21 Parameter vs. Frequency



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

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

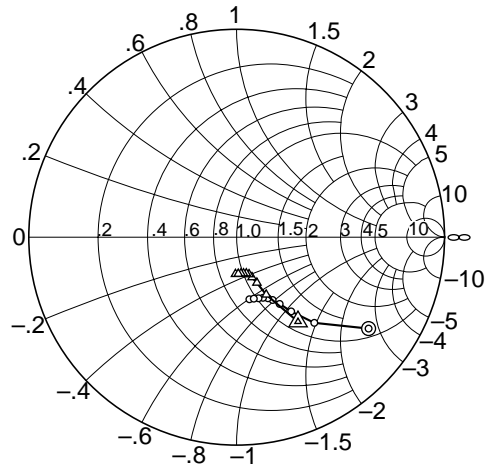
S12 Parameter vs. Frequency



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)

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

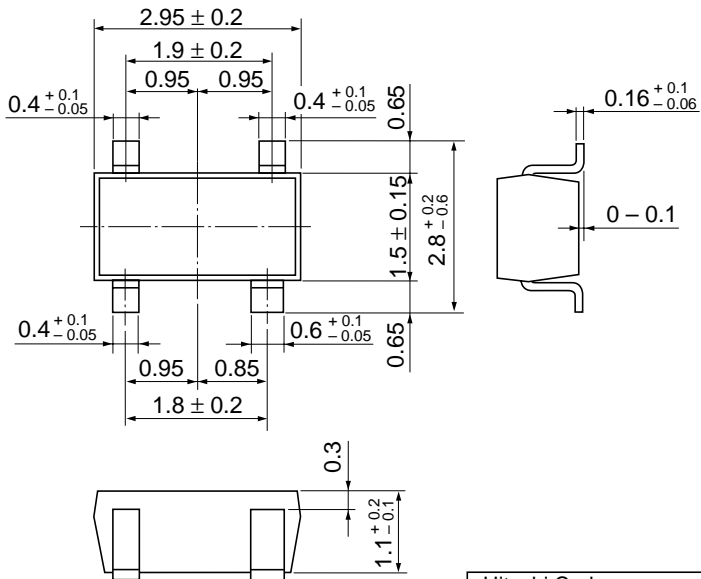
## 2SC4900

**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



Hitachi Code	MPAK-4
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.013 g

## Cautions

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