2SC4988

Silicon NPN Epitaxial

HITACHI

ADE-208-004
1st. Edition

Application

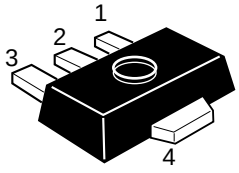
VHF / UHF wide band amplifier

Features

- High gain bandwidth product
  f_T = 8.5 GHz Typ
- High gain, low noise figure
  PG = 10.5 dB Typ, NF = 1.3 dB Typ at f = 900 MHz

Outline

UPAK



1. Base
2. Collector
3. Emitter
4. Collector (Flange)

Hitachi semiconductor

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	100	mA
Collector power dissipation	P_C	800*[1]	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

Note: 1. This value is allowed when using the alumina ceramics board (12.5 x 20 x 0.7 mm)

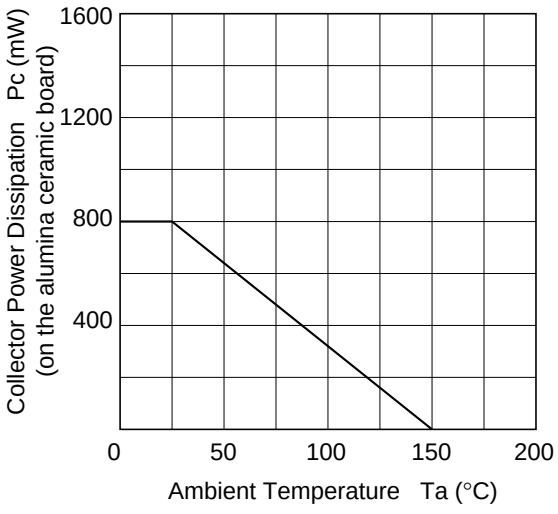
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	I_C = 10 µA, I_E = 0
Collector cutoff current	I_{CBO}	—	—	1	µA	V_{CB} = 12 V, I_E = 0
	I_{CEO}	—	—	1	mA	V_{CE} = 9 V, R_{BE} = ∞
Emitter cutoff current	I_{EBO}	—	—	10	µA	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	Cob	—	1.1	1.6	pF	V_{CB} = 5 V, I_E = 0, f = 1 MHz
Gain bandwidth product	f_T	5.5	8.5	—	GHz	V_{CE} = 5 V, I_C = 20 mA
Power gain	PG	7.5	10.5	—	dB	V_{CE} = 5 V, I_C = 20 mA, f = 900 MHz
Noise figure	NF	—	1.3	2.5	dB	V_{CE} = 5 V, I_C = 5 mA, f = 900 MHz

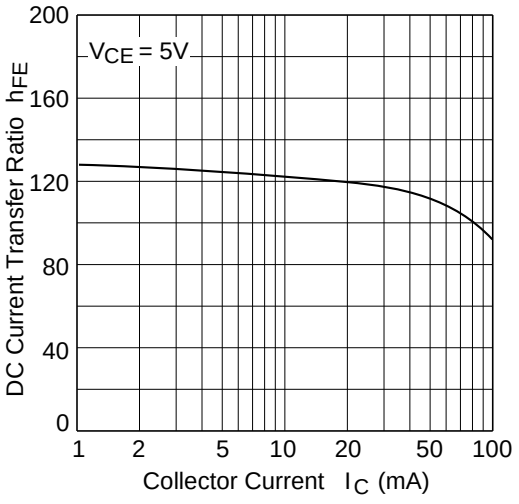
Note: Marking is “FR”.

Attention: This device is very sensitive to electro static discharge.
It is recommended to adopt appropriate cautions when handling this transistor.

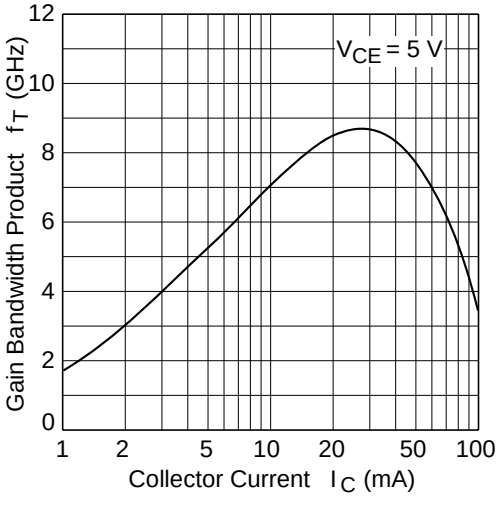
Collector Power Dissipation Curve



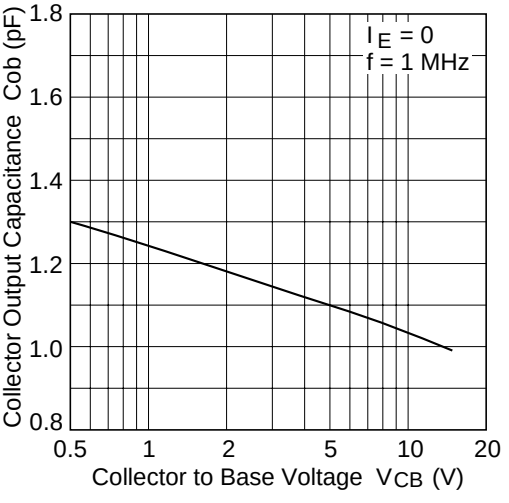
DC Current Transfer Ratio
vs. Collector Current



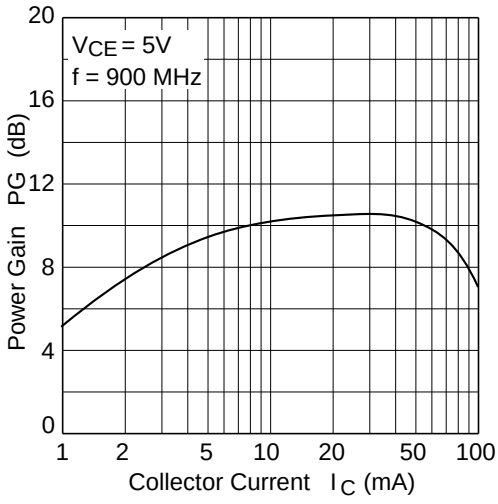
Gain Bandwidth Product
vs. Collector Current



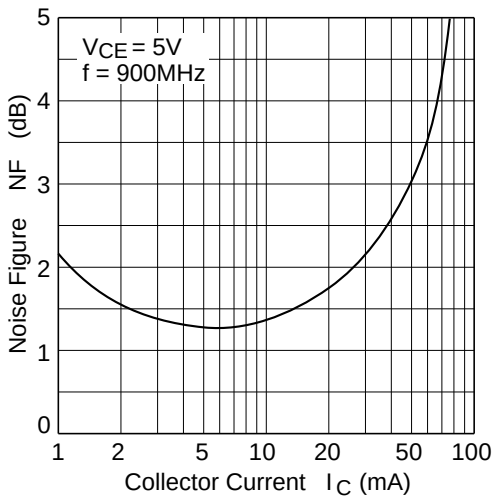
Collector Output Capacitance vs.
Collector to Base Voltage



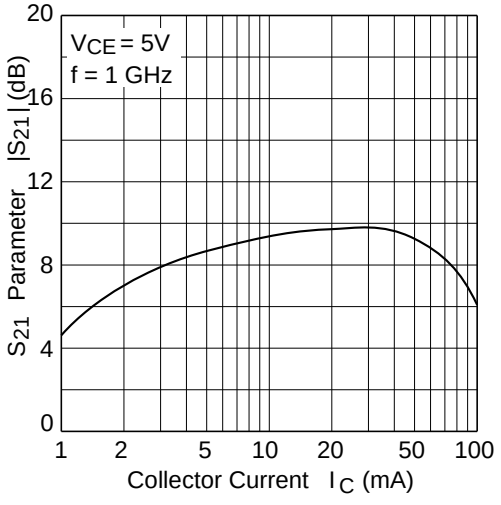
Power Gain vs. Collector Current



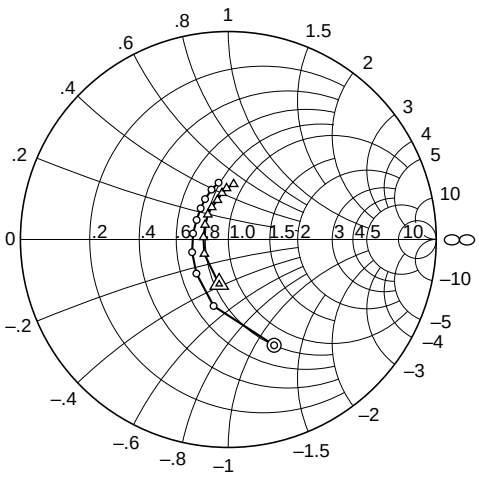
Noise Figure vs. Collector Current



S21 Parameter vs. Collector Current

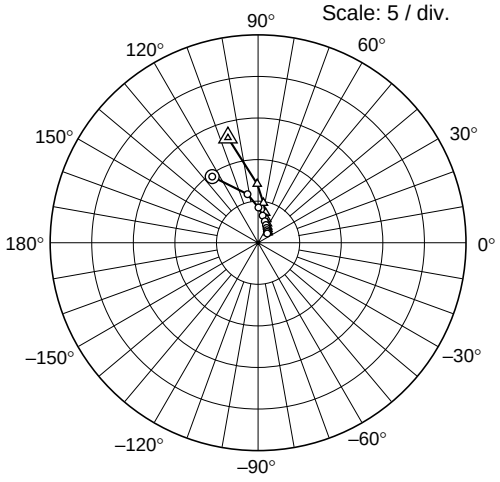


S11 Parameter vs. Frequency



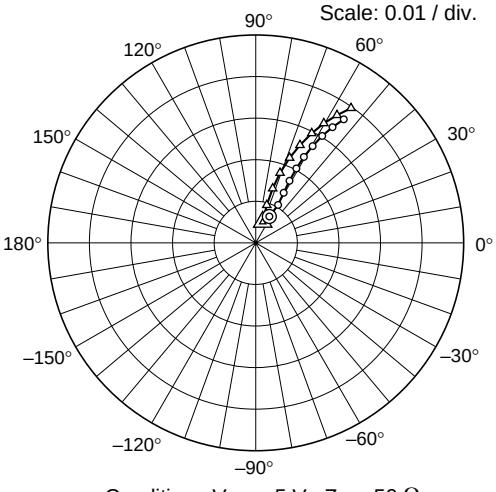
Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 20 mA)

S21 Parameter vs. Frequency



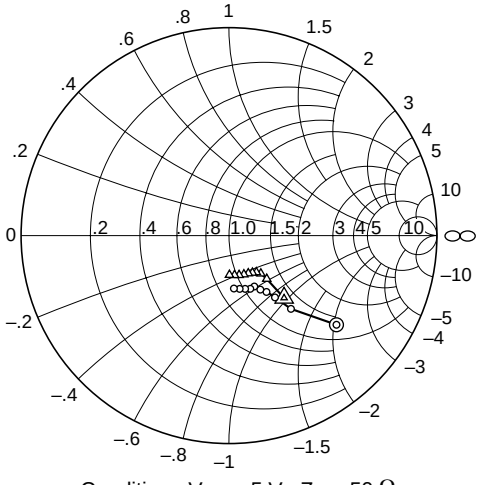
Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 20 mA)

S12 Parameter vs. Frequency



Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 20 mA)

S22 Parameter vs. Frequency



Condition: V_{CE} = 5 V , Zo = 50 Ω
200 to 2000 MHz (200 MHz step)
(I_C = 5 mA)
(I_C = 20 mA)

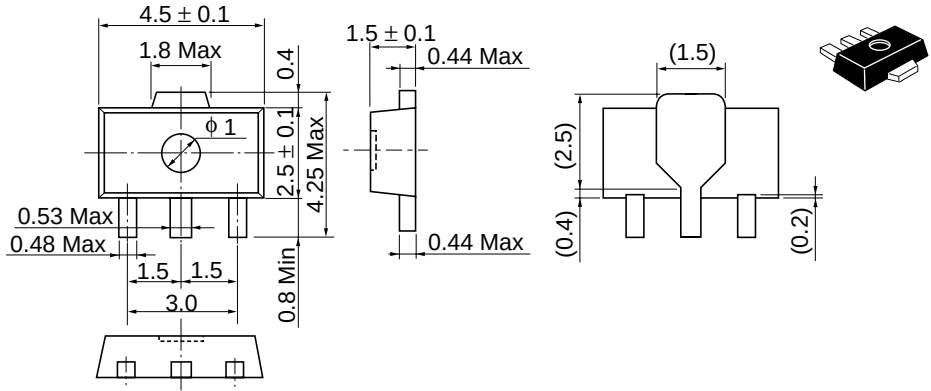
S Parameter (V_{CE} = 5 V, I_C = 5 mA, Z_O = 50 Ω)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.555	–66.6	9.68	124.7	0.0717	62.3	0.672	–39.7
400	0.328	–102.5	5.98	102.2	0.106	59.4	0.462	–49.8
600	0.225	–133.1	4.24	89.3	0.138	60.8	0.371	–53.4
800	0.185	–160.5	3.31	80.3	0.170	61.4	0.326	–56.4
1000	0.172	170.5	2.71	72.4	0.204	61.3	0.301	–59.9
1200	0.179	148.5	2.34	65.8	0.237	60.7	0.285	–63.6
1400	0.200	131.7	2.06	59.9	0.270	59.5	0.276	–68.2
1600	0.224	120.0	1.86	54.4	0.303	58.1	0.268	–73.2
1800	0.253	108.7	1.71	49.6	0.334	56.4	0.262	–78.7
2000	0.277	99.8	1.58	44.9	0.365	54.5	0.256	–84.7

S Parameter (V_{CE} = 5 V, I_C = 20 mA, Z_O = 50 Ω)

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.220	–101.8	13.13	106.0	0.0532	71.5	0.401	–48.6
400	0.135	–149.0	7.08	90.8	0.0946	73.6	0.277	–49.0
600	0.120	175.1	4.83	82.2	0.137	72.6	0.239	–50.1
800	0.132	148.0	3.70	75.5	0.178	70.8	0.221	–53.4
1000	0.155	129.6	3.02	69.5	0.220	68.2	0.212	–57.9
1200	0.174	117.3	2.58	63.9	0.258	65.6	0.205	–63.1
1400	0.196	105.5	2.26	58.8	0.296	62.9	0.201	–69.1
1600	0.225	97.8	2.04	54.1	0.331	60.3	0.197	–75.7
1800	0.246	92.0	1.86	50.0	0.364	57.5	0.193	–82.1
2000	0.267	84.5	1.72	45.7	0.397	54.7	0.190	–89.4

Unit: mm



Hitachi Code	UPAK
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.050 g

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