

2SC4988

Silicon NPN Epitaxial

REJ03G0738-0300
(Previous ADE-208-004A)
Rev.3.00
Aug.10.2005

Application

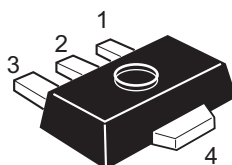
VHF / UHF wide band amplifier

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

RENESAS Package code: PLZZ0004CA-A
(Package name: UPAK[®])



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

Note: Marking is "FR".

*UPAK is a trademark of Renesas Technology Corp.

Attention: This device is very sensitive to electro static discharge.

It is recommended to adopt appropriate cautions when handling this transistor.

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	T_J	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

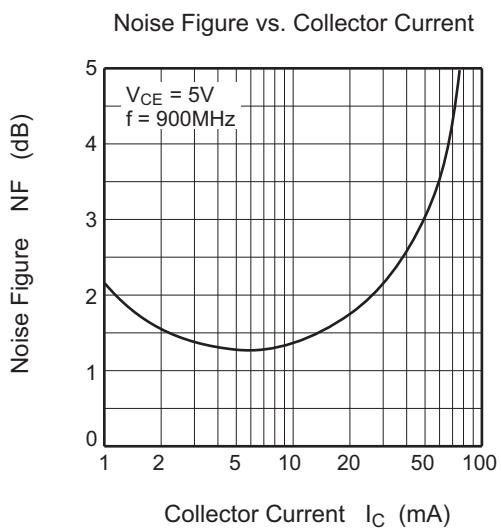
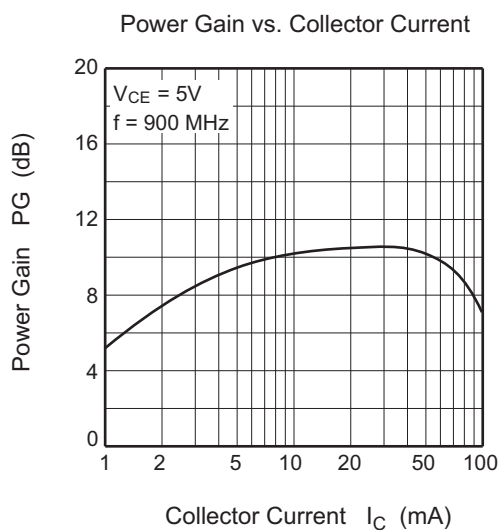
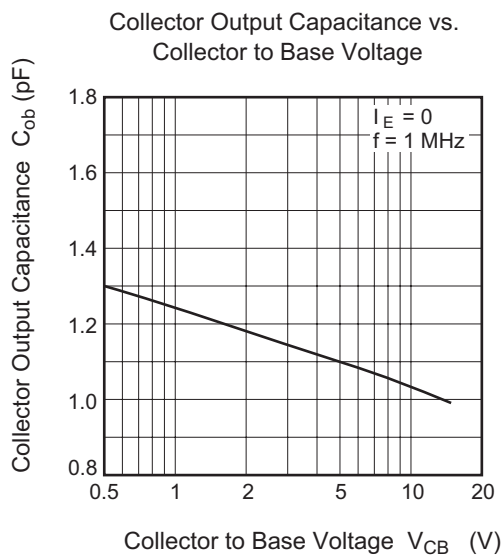
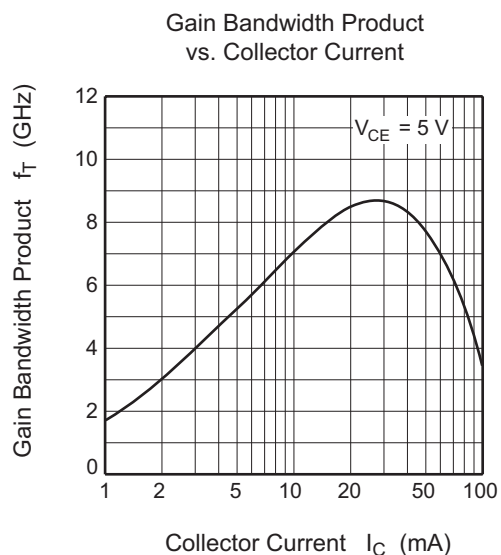
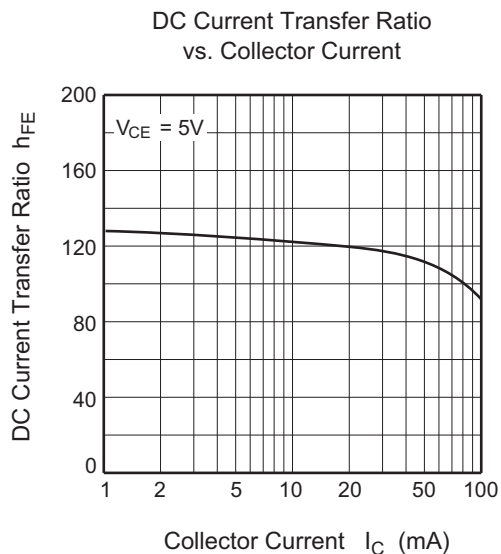
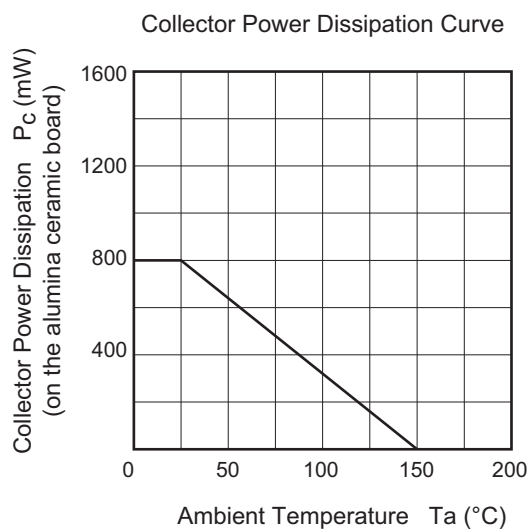
Note: 1. This value is allowed when using the alumina ceramics board (12.5 x 20 x 0.7 mm)

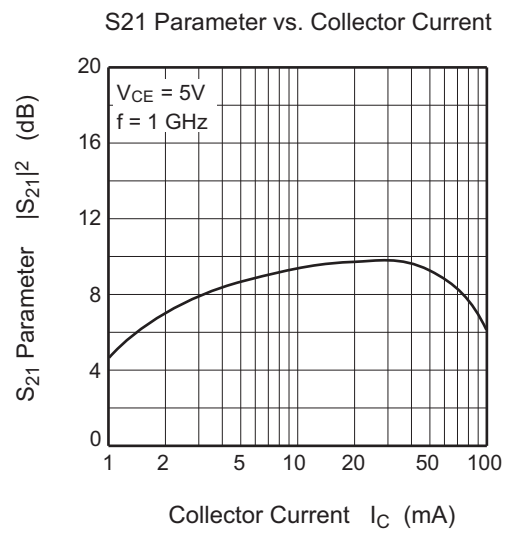
Electrical Characteristics

(Ta = 25°C)

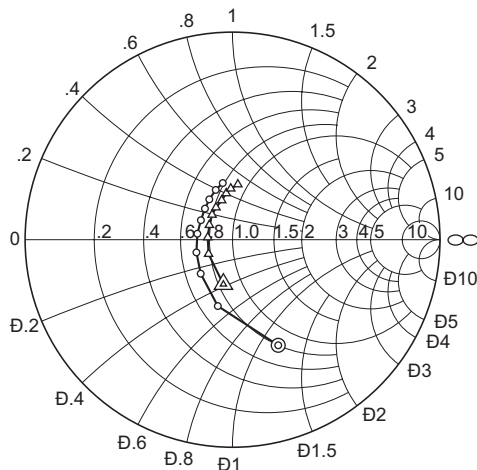
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10\ \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{CB} = 12\ V, I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 9\ V, R_{BE} = \infty$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5\ V, I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 5\ V, I_C = 20\ mA$
Collector output capacitance	C_{ob}	—	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	$V_{CE} = 5\ V, I_C = 5\ mA,$ $f = 900\ MHz$

Main Characteristics



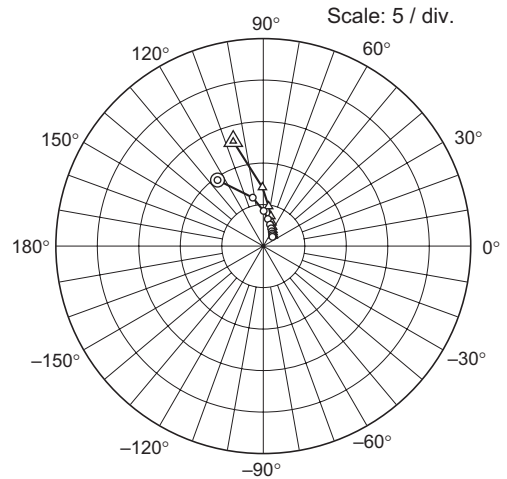


S11 Parameter vs. Frequency



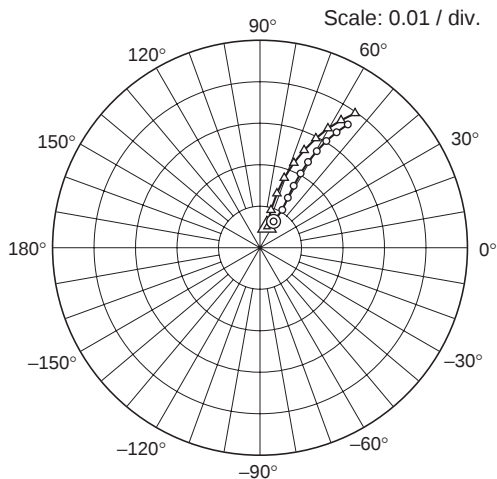
Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

S21 Parameter vs. Frequency



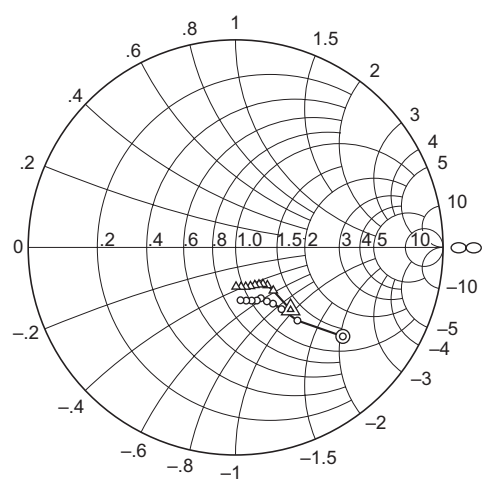
Condition: $V_{CE} = 5 \text{ V}$, $Z_o = 50 \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 5 \text{ mA}$)
 △ — △ ($I_C = 20 \text{ mA}$)

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

Freq. (MHz)	S11		S21		S12		S22	
	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 $(V_{CE} = 5\text{ V}, I_C = 20\text{ mA}, Z_O = 50\ \Omega)$

Freq. (MHz)	S11		S21		S12		S22	
	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

Package Dimensions

JEITA Package Code	RENESAS Code	Package Name	MASS[Typ.]	Unit: mm
SC-62	PLZZ0004CA-A	UPAK / UPAKV	0.050g	

The drawing shows three views of the package:

- Top View:** Overall width is 4.5 ± 0.1 mm. The central circular feature has a diameter of $\phi 1$ mm. The distance from the center to the top edge is 1.8 Max mm. The distance from the center to the bottom edge is 2.5 ± 0.1 mm. The distance from the center to the left edge is 0.53 Max mm. The distance from the center to the right edge is 0.48 Max mm. The distance between the two mounting holes is 3.0 mm. The distance from the center to the bottom edge of the mounting holes is 0.8 Min mm. The distance from the center to the top edge of the mounting holes is 4.25 Max mm.
- Side View:** The height of the package is 1.5 ± 0.1 mm. The distance from the top edge to the bottom edge of the mounting holes is 0.44 Max mm. The distance from the bottom edge to the bottom edge of the mounting holes is 0.44 Max mm.
- Front View:** The width of the package is 1.5 mm. The distance from the top edge to the bottom edge of the mounting holes is (2.5) mm. The distance from the bottom edge to the bottom edge of the mounting holes is (0.4) mm. The distance from the bottom edge to the bottom edge of the mounting holes is (0.2) mm.

Ordering Information

Part Name	Quantity	Shipping Container
2SC4988FRTL-E	1000	ϕ 178 mm Reel, 8 mm Emboss Taping

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