

2SC4988

Silicon NPN Epitaxial

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

Application

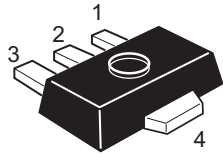
VHF / UHF wide band amplifier

Features

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

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

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

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	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

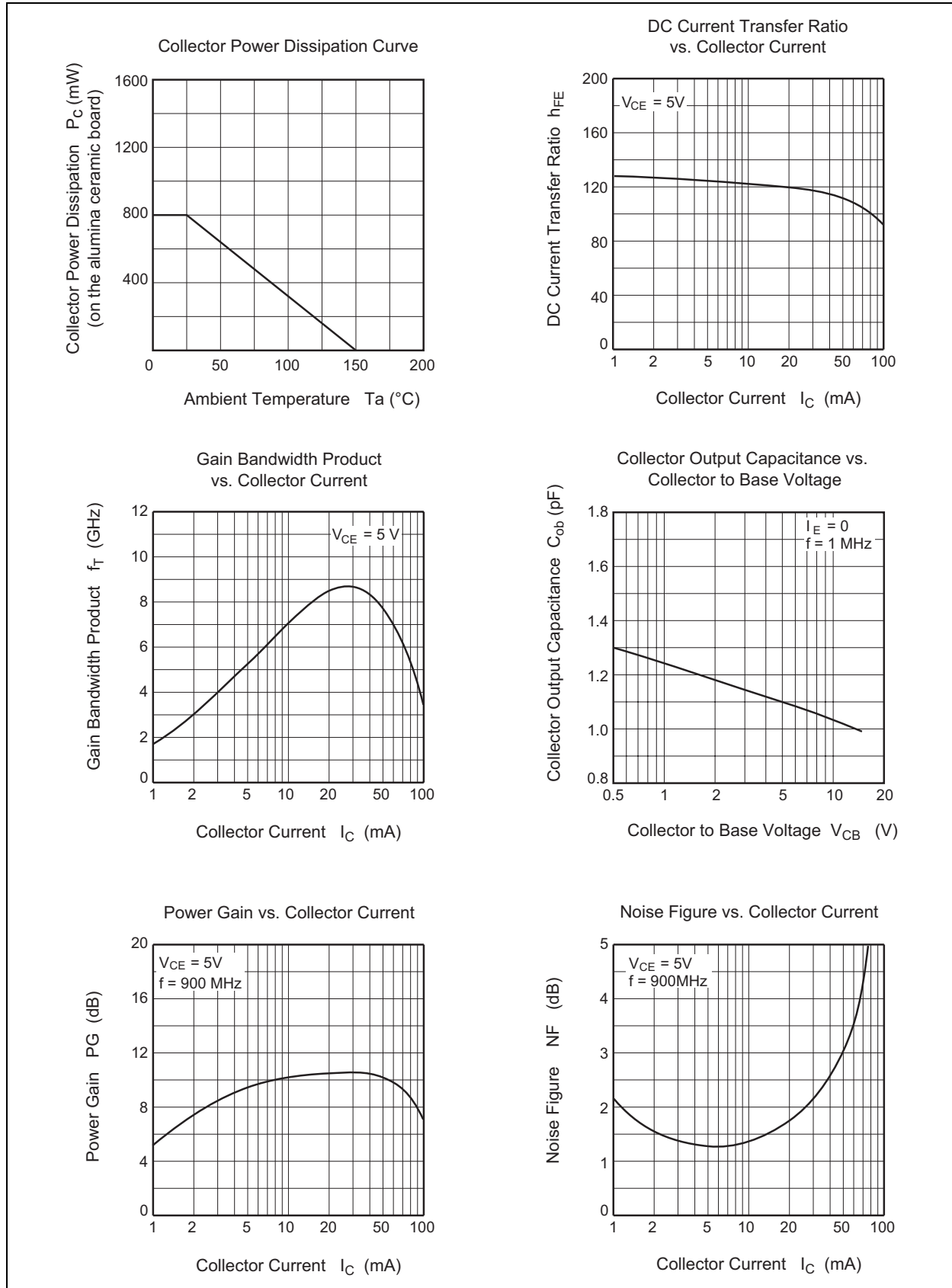
Note: 1. This value is allowed when using the alumina ceramics board (12.5 x 20 x 0.7 mm)

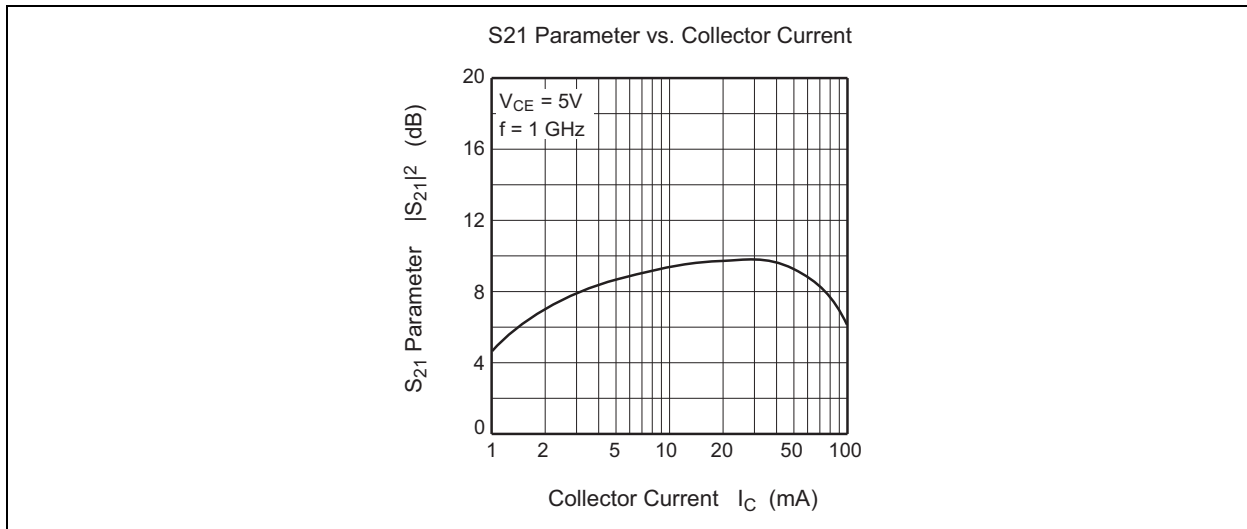
Electrical Characteristics

(Ta = 25°C)

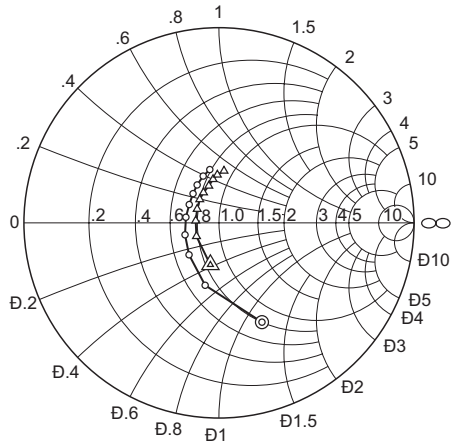
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{CB} = 12 V, I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 9 V, R_{BE} = \infty$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5 V, I_C = 0$
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



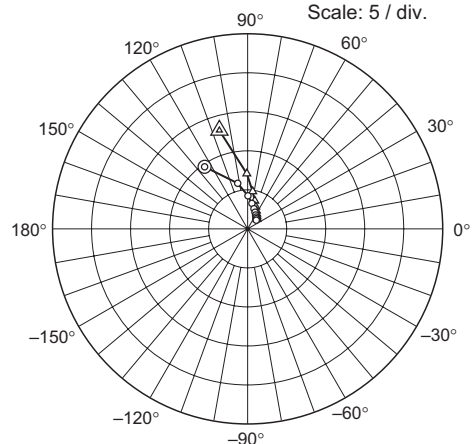


S11 Parameter vs. Frequency



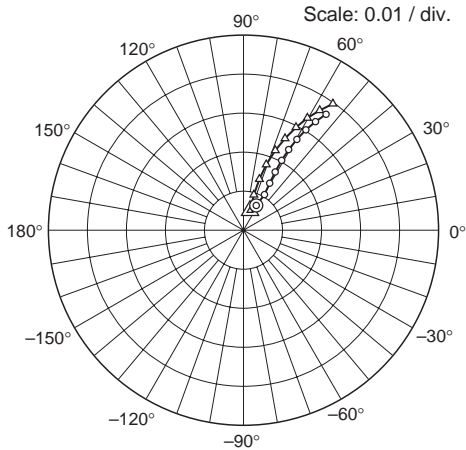
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 20\text{ mA}$)

S21 Parameter vs. Frequency



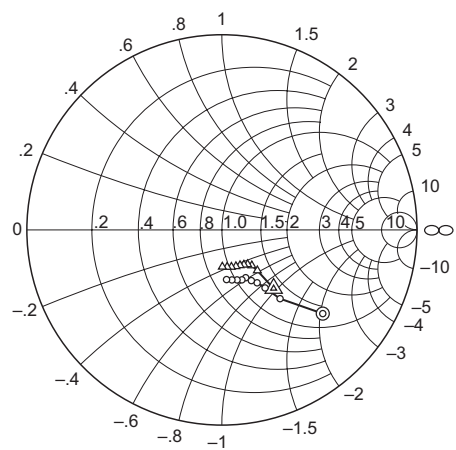
Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
 200 to 2000 MHz (200 MHz step)
 ○ — ○ ($I_C = 5\text{ mA}$)
 △ — △ ($I_C = 20\text{ mA}$)

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

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

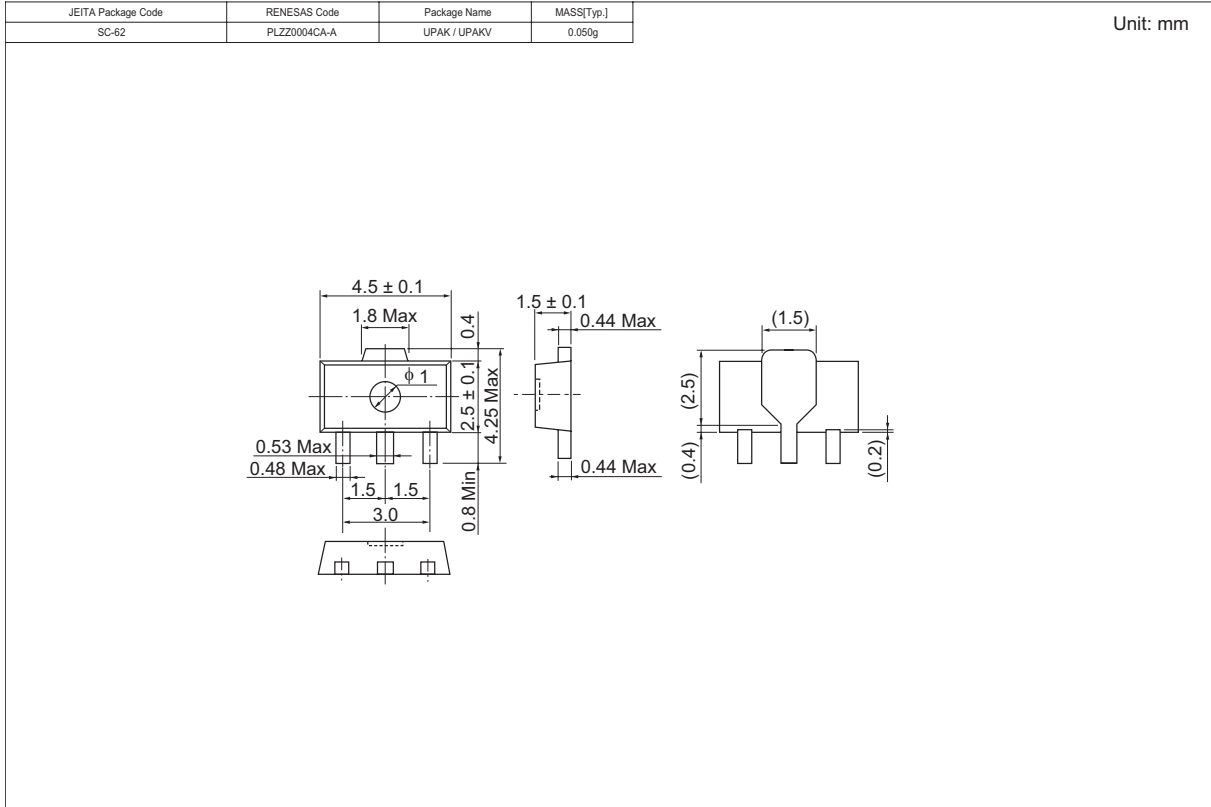
Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.555	-66.6	9.68	124.7	0.0717	62.3	0.672	-39.7
400	0.328	-102.5	5.98	102.2	0.106	59.4	0.462	-49.8
600	0.225	-133.1	4.24	89.3	0.138	60.8	0.371	-53.4
800	0.185	-160.5	3.31	80.3	0.170	61.4	0.326	-56.4
1000	0.172	170.5	2.71	72.4	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



Ordering Information

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

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