

## 2SC5812

Silicon NPN Epitaxial  
VHF/UHF wide band amplifier

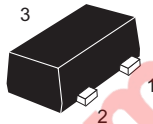
REJ03G0757-0100  
(Previous ADE-208-1468)  
Rev.1.00  
Aug.10.2005

### Application

- High power gain, Low noise figure at low power operation:  
 $|S_{21}|^2 = 17$  dB typ, NF = 1.0 dB typ ( $V_{CE} = 1$  V,  $I_C = 5$  mA,  $f = 900$  MHz)

### Outline

RENESAS Package code: PUSF0003ZA-A  
(Package name: MFPAK<sup>®</sup>)



1. Emitter
2. Base
3. Collector

Note: Marking is "WG-".

\*MFPAK is a trademark of Renesas Technology Corp.

### 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	$V_{CEO}$	4	V
Emitter to base voltage	$V_{EBO}$	1.5	V
Collector current	$I_C$	50	mA
Collector power dissipation	$P_C$	80	mW
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

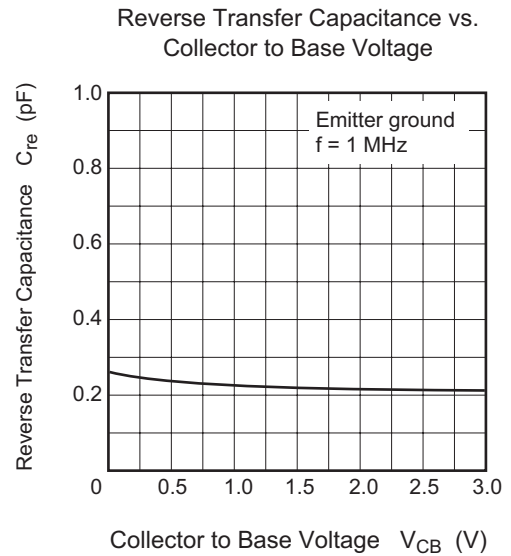
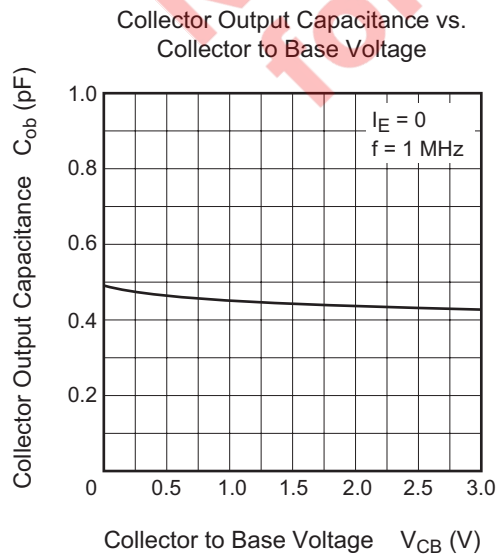
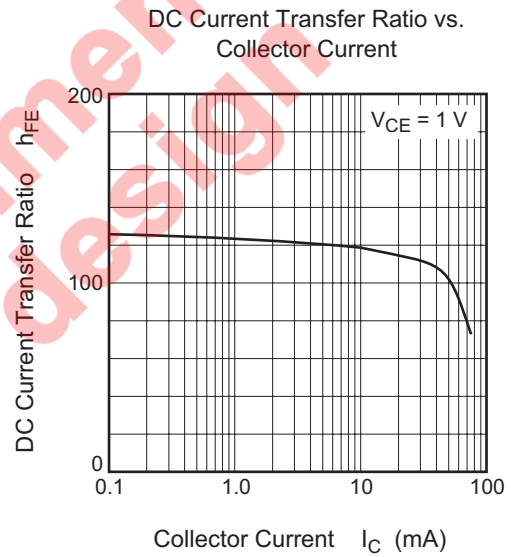
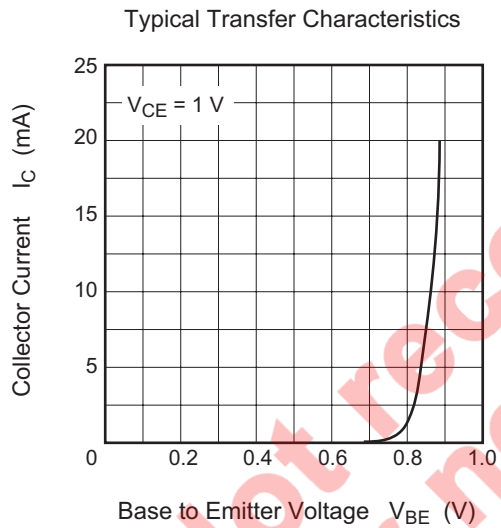
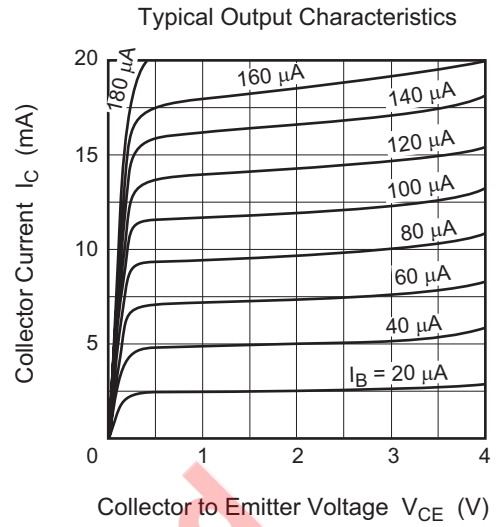
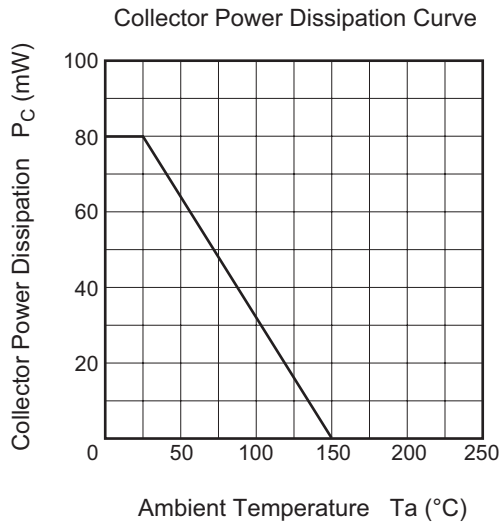
## Electrical Characteristics

(Ta = 25°C)

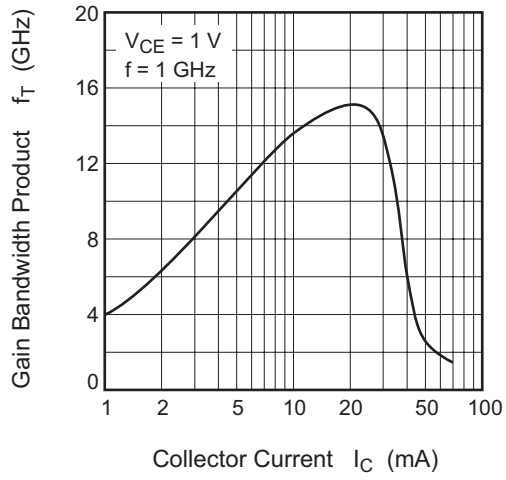
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	$I_{CBO}$	—	—	0.1	$\mu A$	$V_{CB} = 15 V, I_E = 0$
Collector cutoff current	$I_{CEO}$	—	—	1	$\mu A$	$V_{CE} = 4 V, R_{BE} = \infty$
Emitter cutoff current	$I_{EBO}$	—	—	0.1	$\mu A$	$V_{EB} = 0.8 V, I_C = 0$
DC current transfer ratio	$h_{FE}$	100	120	150		$V_{CE} = 1 V, I_C = 5 mA$
Reverse transfer capacitance	$C_{re}$	—	0.2	—	pF	$V_{CE} = 1 V$ , Emitter ground, $f = 1 MHz$
Collector output capacitance	$C_{ob}$	—	0.4	0.7	pF	$V_{CB} = 1 V, I_E = 0$ , $f = 1 MHz$
Gain bandwidth product	$f_T(1)$	8	11	—	GHz	$V_{CE} = 1 V, I_C = 5 mA$
Gain bandwidth product	$f_T(2)$	—	15	—	GHz	$V_{CE} = 1 V, I_C = 20 mA$
Forward transmission coefficient	$ S_{21} ^2$	14	17	—	dB	$V_{CE} = 1 V, I_C = 5 mA$ , $f = 900 MHz$
Noise figure	NF	—	1.0	1.7	dB	$V_{CE} = 1 V, I_C = 5 mA$ , $f = 900 MHz$ , $Z_S = Z_L = 50 \Omega$

Not recommended  
for new design

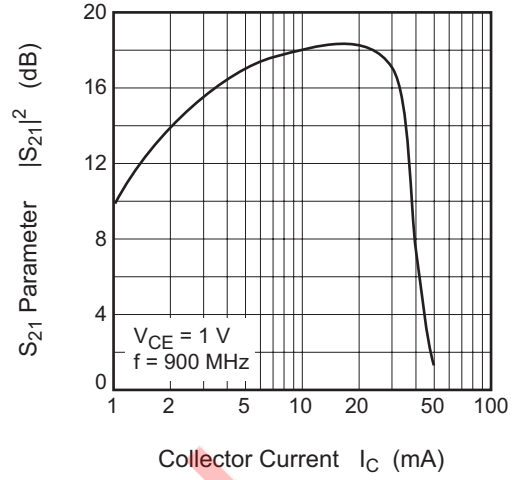
Main Characteristics



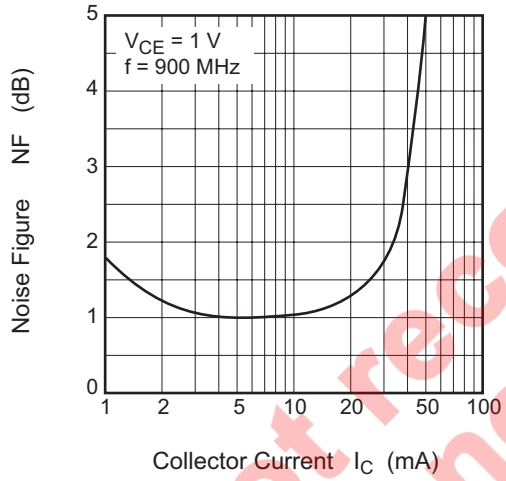
Gain Bandwidth Product vs. Collector Current



$S_{21}$  Parameter vs. Collector Current

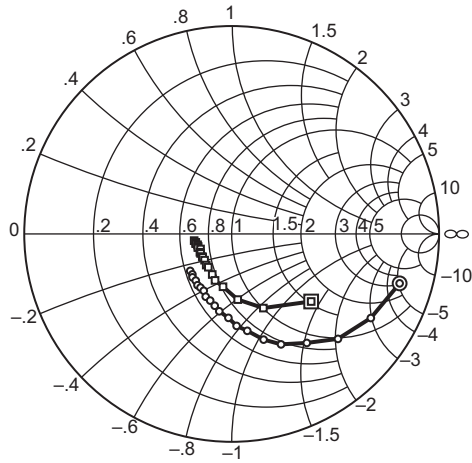


Noise Figure vs. Collector Current



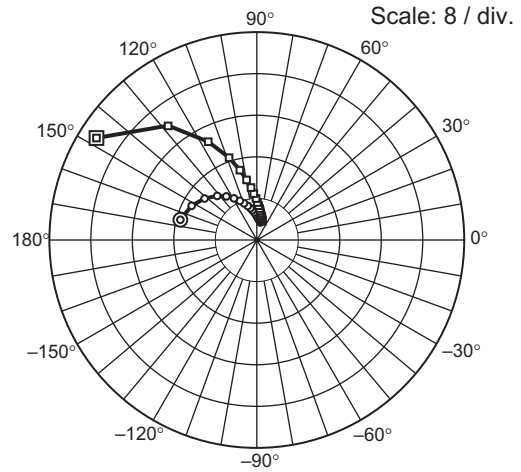
Not recommended for new design

S<sub>11</sub> Parameter vs. Frequency



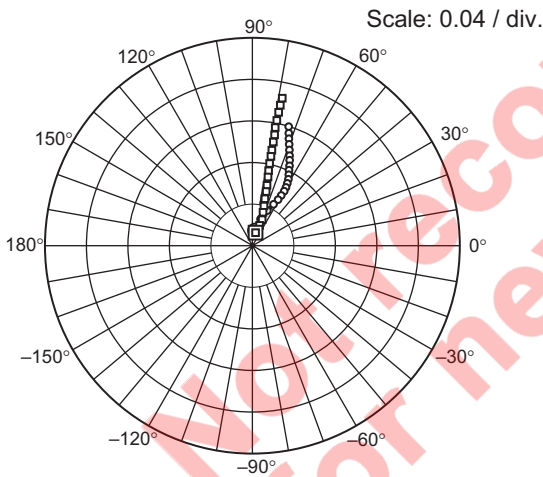
Test conditions: V<sub>CE</sub> = 1 V, Z<sub>O</sub> = 50 Ω  
 100 to 2000 MHz (100 MHz step)  
 ⊙—○ (I<sub>C</sub> = 5 mA)  
 ⊠—□ (I<sub>C</sub> = 20 mA)

S<sub>21</sub> Parameter vs. Frequency



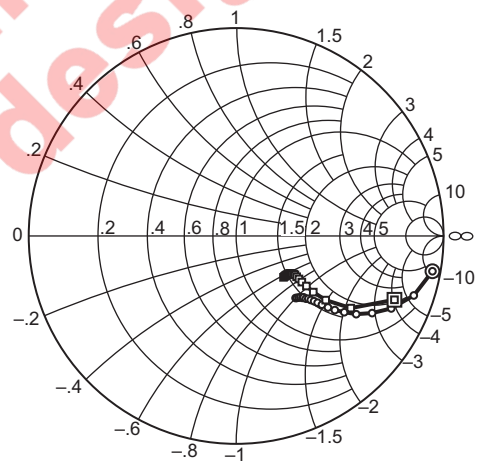
Test conditions: V<sub>CE</sub> = 1 V, Z<sub>O</sub> = 50 Ω  
 100 to 2000 MHz (100 MHz step)  
 ⊙—○ (I<sub>C</sub> = 5 mA)  
 ⊠—□ (I<sub>C</sub> = 20 mA)

S<sub>12</sub> Parameter vs. Frequency



Test conditions: V<sub>CE</sub> = 1 V, Z<sub>O</sub> = 50 Ω  
 100 to 2000 MHz (100 MHz step)  
 ⊙—○ (I<sub>C</sub> = 5 mA)  
 ⊠—□ (I<sub>C</sub> = 20 mA)

S<sub>22</sub> Parameter vs. Frequency



Test conditions: V<sub>CE</sub> = 1 V, Z<sub>O</sub> = 50 Ω  
 100 to 2000 MHz (100 MHz step)  
 ⊙—○ (I<sub>C</sub> = 5 mA)  
 ⊠—□ (I<sub>C</sub> = 20 mA)

## S Parameter

 $(V_{CE} = 1 \text{ V}, I_C = 5 \text{ mA}, Z_O = 50 \Omega)$ 

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.842	-16.3	15.23	164.9	0.015	80.2	0.963	-10.1
200	0.783	-31.7	14.17	152.2	0.027	72.9	0.904	-18.4
300	0.719	-44.6	12.84	141.4	0.037	66.8	0.826	-24.9
400	0.637	-55.4	11.41	131.8	0.045	62.9	0.754	-29.4
500	0.582	-65.9	10.25	124.8	0.051	60.8	0.691	-32.9
600	0.531	-73.2	9.16	118.6	0.056	60.1	0.638	-35.0
700	0.472	-80.9	8.22	113.1	0.061	59.7	0.595	-36.7
800	0.443	-87.0	7.49	108.9	0.065	60.0	0.561	-37.7
900	0.404	-92.3	6.80	104.6	0.069	60.7	0.530	-38.5
1000	0.377	-99.2	6.26	101.0	0.073	61.5	0.508	-39.1
1100	0.355	-103.4	5.80	98.1	0.077	62.8	0.490	-39.7
1200	0.337	-108.0	5.38	94.8	0.081	64.1	0.474	-40.4
1300	0.327	-112.6	5.04	92.4	0.085	65.0	0.461	-40.8
1400	0.305	-116.3	4.71	90.1	0.090	66.4	0.452	-41.7
1500	0.299	-120.3	4.45	87.7	0.094	67.5	0.440	-42.0
1600	0.297	-123.8	4.20	86.0	0.099	68.5	0.437	-42.8
1700	0.284	-127.7	3.98	83.6	0.104	70.0	0.428	-43.4
1800	0.282	-132.2	3.80	81.7	0.109	71.1	0.423	-44.3
1900	0.272	-134.3	3.62	79.8	0.114	72.0	0.418	-45.3
2000	0.268	-138.4	3.47	77.9	0.120	73.0	0.414	-46.0

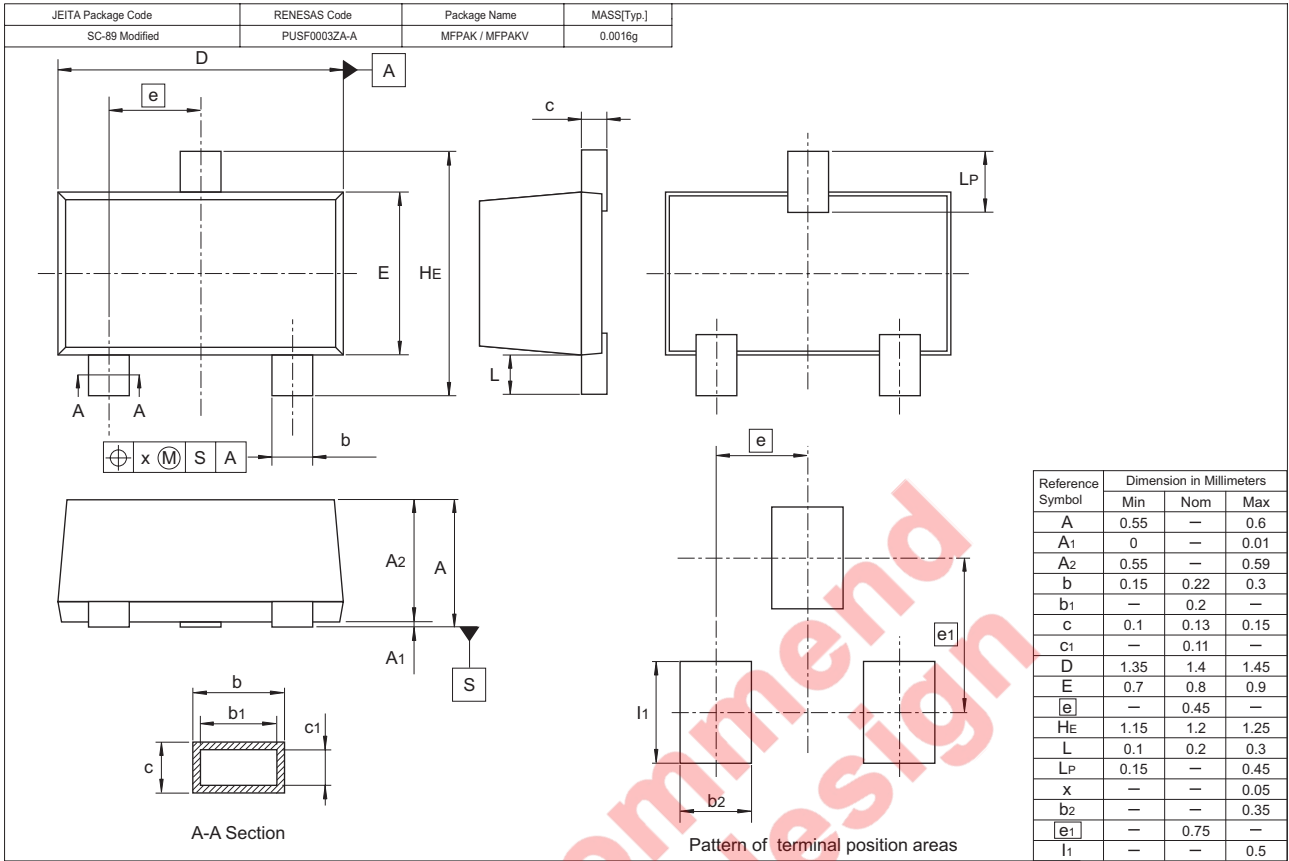
Not recommended for new designs

(V<sub>CE</sub> = 1 V, I<sub>C</sub> = 20 mA, Z<sub>O</sub> = 50 Ω)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.502	-40.3	36.64	147.5	0.013	76.3	0.824	-21.8
200	0.388	-66.7	27.85	127.8	0.021	70.3	0.653	-32.0
300	0.317	-84.6	21.13	116.2	0.027	69.3	0.531	-35.4
400	0.257	-99.2	16.75	108.5	0.034	72.2	0.460	-35.8
500	0.237	-109.6	13.87	103.5	0.040	73.6	0.416	-35.2
600	0.216	-115.5	11.77	99.5	0.047	75.0	0.387	-34.8
700	0.195	-125.0	10.19	96.1	0.054	75.6	0.367	-34.1
800	0.193	-129.2	9.00	93.5	0.060	76.3	0.352	-33.7
900	0.181	-135.9	8.03	90.8	0.068	77.1	0.340	-33.2
1000	0.179	-141.0	7.26	88.8	0.074	77.7	0.333	-33.3
1100	0.178	-142.4	6.66	86.8	0.081	78.1	0.326	-33.7
1200	0.176	-147.8	6.12	84.7	0.088	78.2	0.321	-34.0
1300	0.176	-150.0	5.68	83.2	0.094	78.4	0.317	-34.5
1400	0.166	-154.2	5.32	81.7	0.102	78.5	0.314	-35.1
1500	0.175	-158.0	4.97	80.0	0.109	78.6	0.311	-36.0
1600	0.172	-159.7	4.70	78.7	0.116	79.0	0.309	-36.8
1700	0.172	-162.4	4.43	77.0	0.123	78.9	0.307	-37.6
1800	0.179	-164.9	4.21	75.7	0.131	78.8	0.305	-38.6
1900	0.177	-166.8	4.01	74.3	0.138	78.7	0.304	-39.7
2000	0.183	-169.9	3.83	72.8	0.145	78.5	0.303	-40.8

Not recommended for new designs

### Package Dimensions



### Ordering Information

Part Name	Quantity	Shipping Container
2SC5812WG-TR-E	9000	φ 178 mm Reel, 8 mm Emboss Taping

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.



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