To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

2SC5812

Silicon NPN Epitaxial
VHF/UHF wide band amplifier

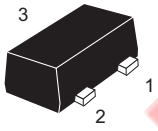
REJ03G0757-0100
(Previous ADE-208-1468)
Rev.1.00
Aug.10.2005

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®)



1. Emitter
2. Base
3. Collector

Note: Marking is "WG–".

*MFPAK is a trademark of Renesas Technology Corp.

Absolute Maximum Ratings

(Ta = 25°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	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

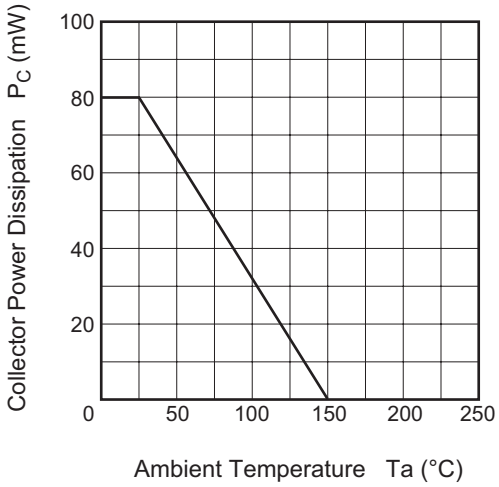
Electrical Characteristics

(Ta = 25°C)

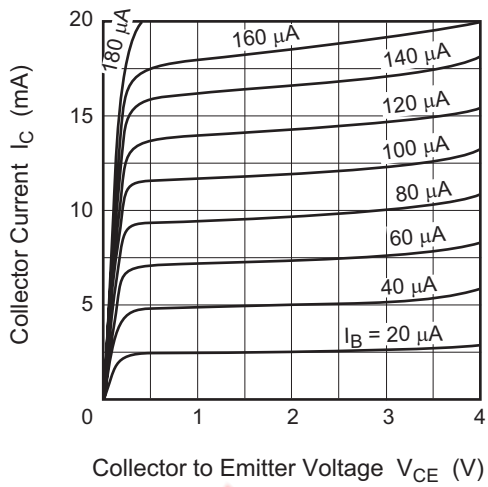
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	I_C = 10 µA, I_E = 0
Collector cutoff current	I_{CBO}	—	—	0.1	µA	V_{CB} = 15 V, I_E = 0
Collector cutoff current	I_{CEO}	—	—	1	µA	V_{CE} = 4 V, R_{BE} = ∞
Emitter cutoff current	I_{EBO}	—	—	0.1	µA	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} = 1V, I_C = 5 mA
Gain bandwidth product	f_T(2)	—	15	—	GHz	V_{CE} = 1V, 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 Ω

Main Characteristics

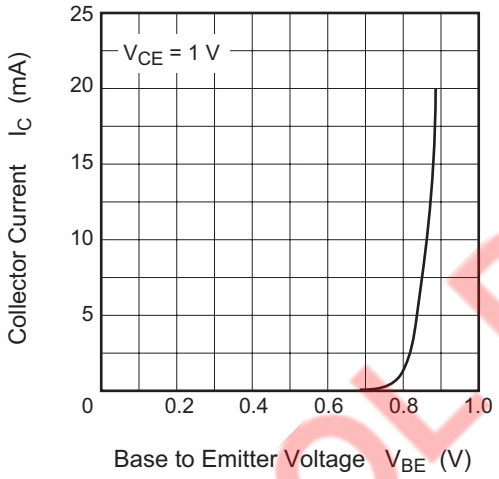
Collector Power Dissipation Curve



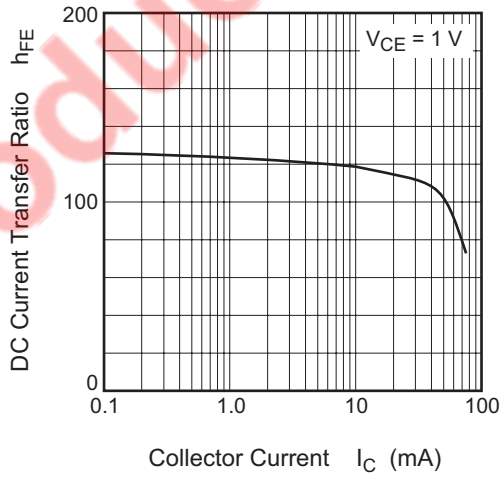
Typical Output Characteristics



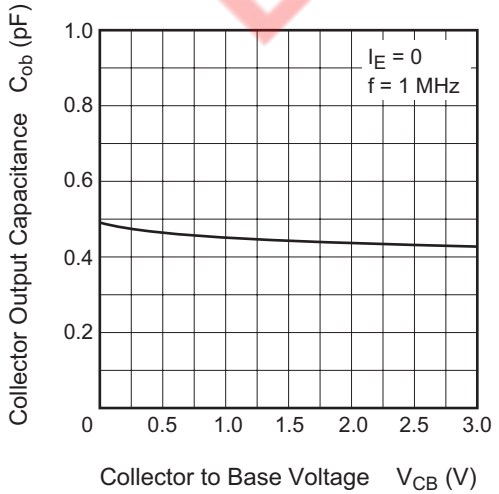
Typical Transfer Characteristics



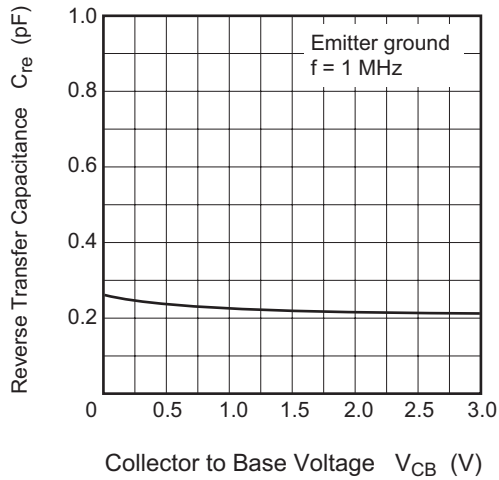
DC Current Transfer Ratio vs. Collector Current



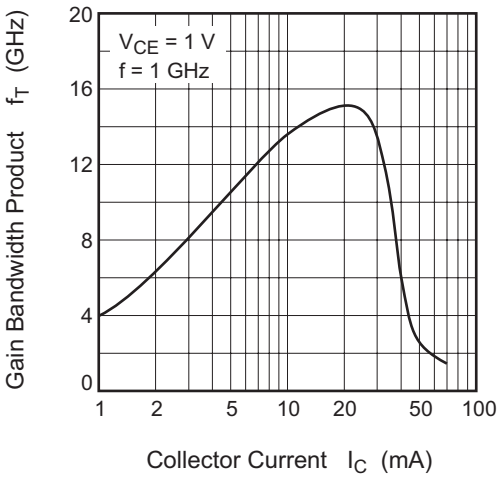
Collector Output Capacitance vs. Collector to Base Voltage



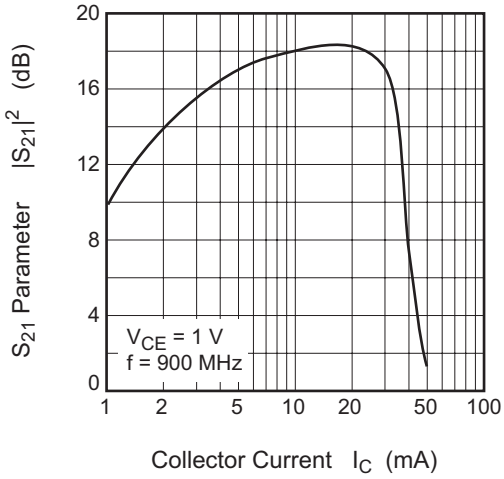
Reverse Transfer Capacitance vs. Collector to Base Voltage



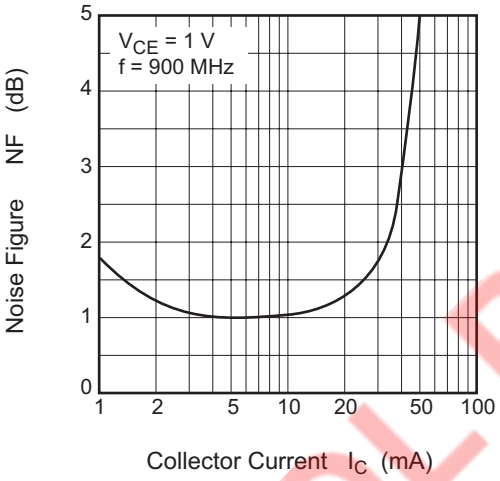
Gain Bandwidth Product vs. Collector Current



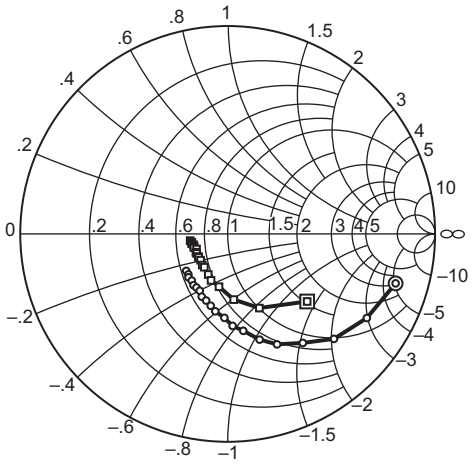
S_{21} Parameter vs. Collector Current



Noise Figure vs. Collector Current

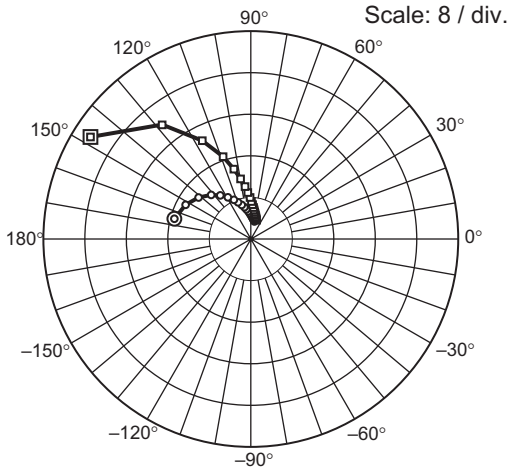


S_{11} Parameter vs. Frequency



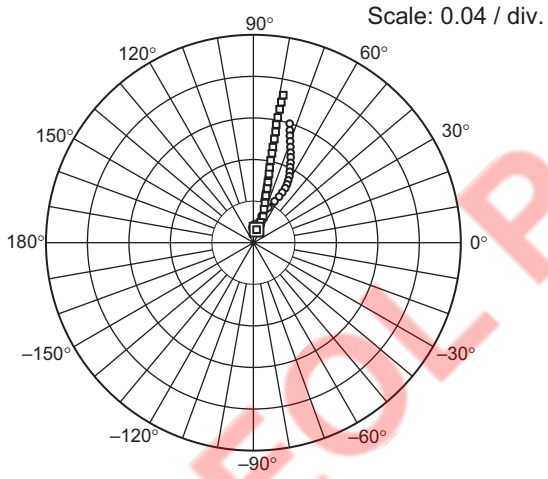
Test conditions: V_{CE} = 1 V , Z_O = 50 Ω
100 to 2000 MHz (100 MHz step)
(●—○) (I_C = 5 mA)
(■—□) (I_C = 20 mA)

S_{21} Parameter vs. Frequency



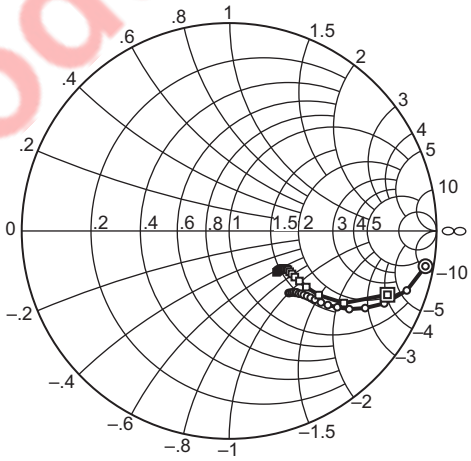
Test conditions: V_{CE} = 1 V , Z_O = 50 Ω
100 to 2000 MHz (100 MHz step)
(●—○) (I_C = 5 mA)
(■—□) (I_C = 20 mA)

S_{12} Parameter vs. Frequency



Test conditions: V_{CE} = 1 V , Z_O = 50 Ω
100 to 2000 MHz (100 MHz step)
(●—○) (I_C = 5 mA)
(■—□) (I_C = 20 mA)

S_{22} Parameter vs. Frequency



Test conditions: V_{CE} = 1 V , Z_O = 50 Ω
100 to 2000 MHz (100 MHz step)
(●—○) (I_C = 5 mA)
(■—□) (I_C = 20 mA)

S Parameter

(V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω)

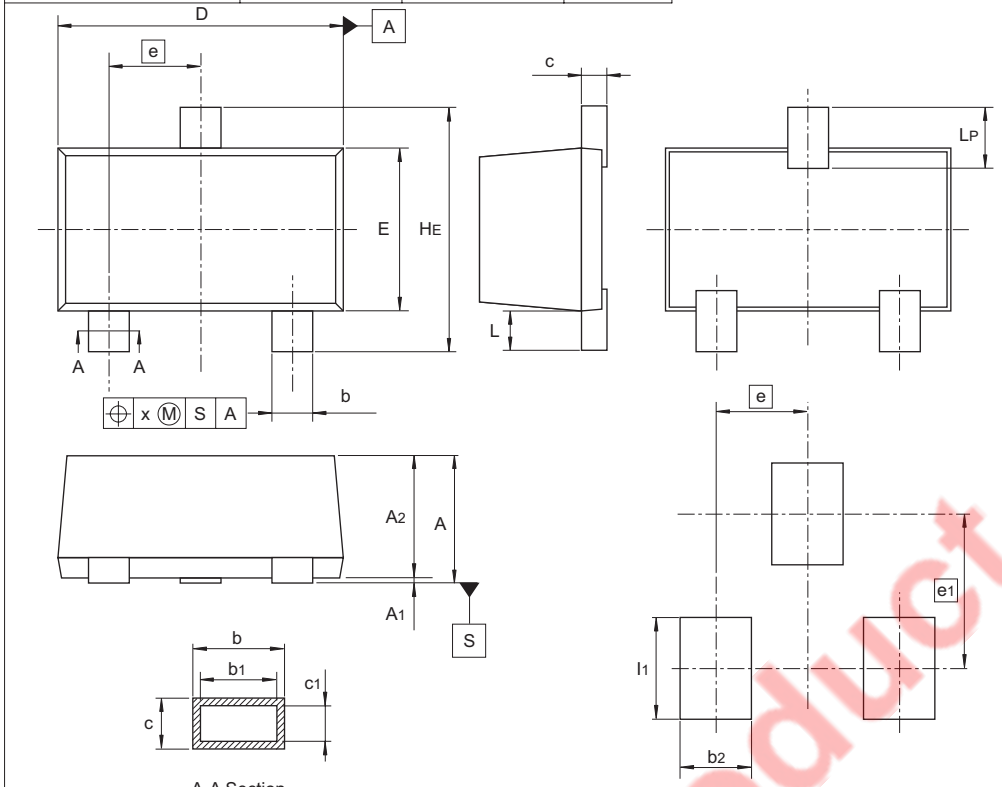
f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.842	–16.3	15.23	164.9	0.015	80.2	0.963	–10.1
200	0.783	–31.7	14.17	152.2	0.027	72.9	0.904	–18.4
300	0.719	–44.6	12.84	141.4	0.037	66.8	0.826	–24.9
400	0.637	–55.4	11.41	131.8	0.045	62.9	0.754	–29.4
500	0.582	–65.9	10.25	124.8	0.051	60.8	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

(V_{CE} = 1 V, I_C = 20 mA, Z_O = 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

Package Dimensions

JEITA Package Code	RENESAS Code	Package Name	MASS[Typ.]
SC-89 Modified	PUSF0003ZA-A	MFPAK / MFPAKV	0.0016g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	0.55	—	0.6
A_1	0	—	0.01
A_2	0.55	—	0.59
b	0.15	0.22	0.3
b_1	—	0.2	—
c	0.1	0.13	0.15
c_1	—	0.11	—
D	1.35	1.4	1.45
E	0.7	0.8	0.9
e	—	0.45	—
H_E	1.15	1.2	1.25
L	0.1	0.2	0.3
L_P	0.15	—	0.45
x	—	—	0.05
b_2	—	—	0.35
e_1	—	0.75	—
l_1	—	—	0.5

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.

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

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http://www.renesas.com

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Colophon .3.0