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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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2SC5700

Silicon NPN Epitaxial
VHF/UHF wide band amplifier

RENESAS

ADE-208-1435 (Z)

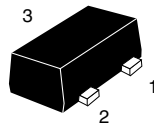
Rev.0
Jul. 2001

Features

- High power gain low noise figure at low power operation:
 $|S_{21}|^2 = 16$ dB typ, NF = 1.0 dB typ ($V_{CE} = 1$ V, $I_C = 5$ mA, $f = 900$ MHz)

Outline

MFPAK



1. Emitter
2. Base
3. Collector

Note: Marking is "WB-".

Absolute Maximum Ratings

(Ta = 25 °C)

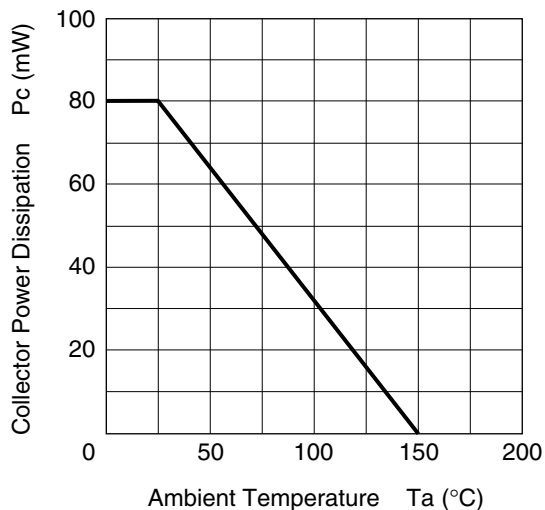
Parameter	Symbol	Value	Unit
Collector to base voltage	V _{CBO}	15	V
Collector to emitter voltage	V _{CEO}	4	V
Emitter to base voltage	V _{EBO}	1.5	V
Collector current	I _C	50	mA
Collector power dissipation	P _C	80	mW
Junction temperature	T _J	150	°C
Storage temperature	T _{stg}	-55 to +150	°C

Electrical Characteristics

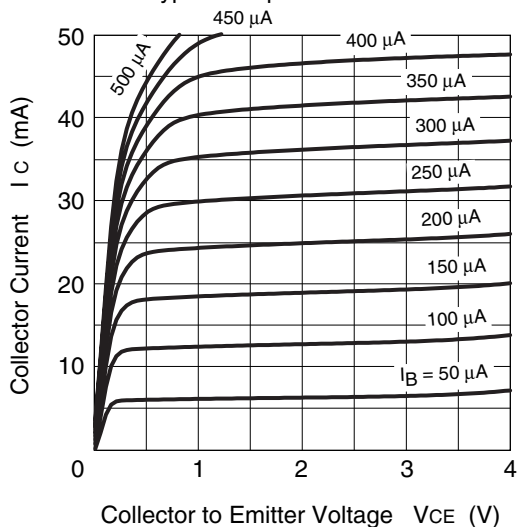
(Ta = 25°C)

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} = Infinite
Emitter cutoff current	I _{EBO}	—	—	200	nA	V _{EB} = 0.8 V, I _C = 0
DC current transfer ratio	h _{FE}	100	130	170	—	V _{CE} = 1 V, I _C = 5 mA
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	10	12	—	GHz	V _{CE} = 1V, I _C = 5 mA
Forward transmission coefficient	S ₂₁ ²	13	16	—	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, Γ _S = Γ _L = 50 ohm

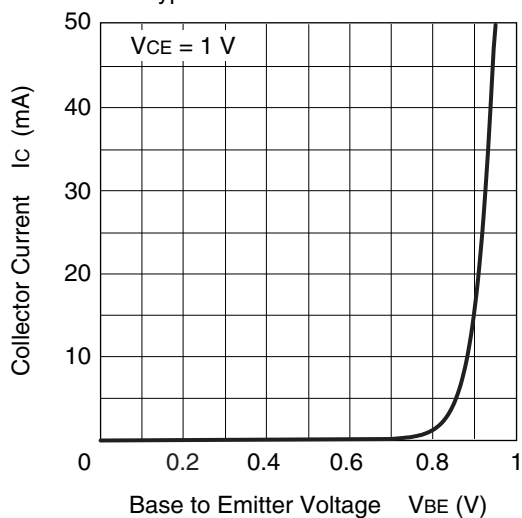
Collector Power Dissipation Curve



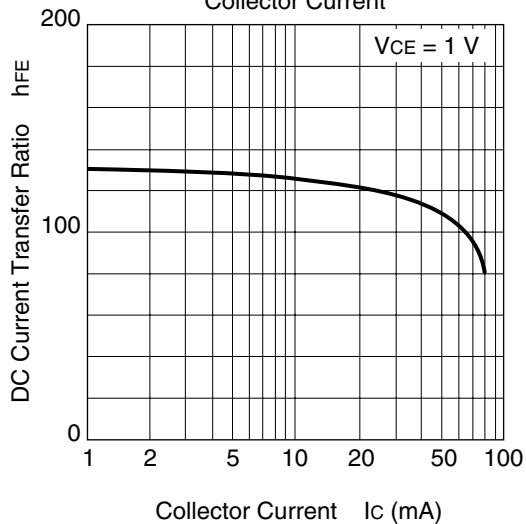
Typical Output Characteristics



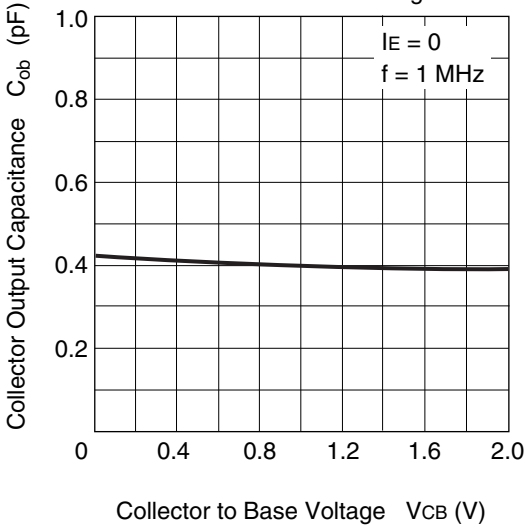
Typical Transfer Characteristics



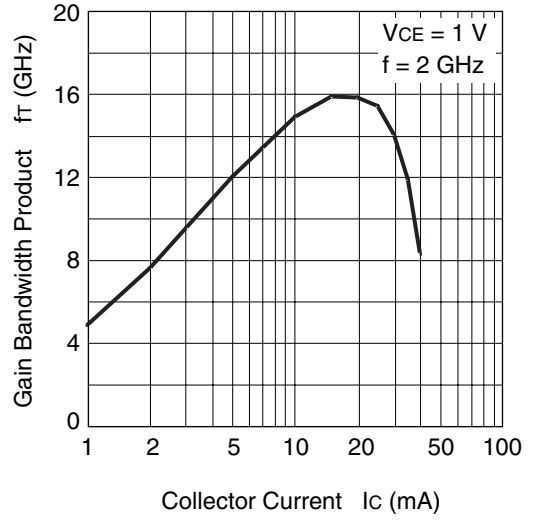
DC Current Transfer Ratio vs. Collector Current



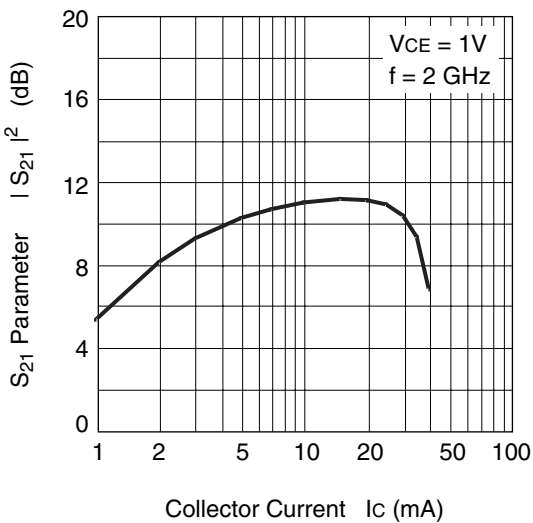
Collector Output Capacitance vs. Collector to Base Voltage



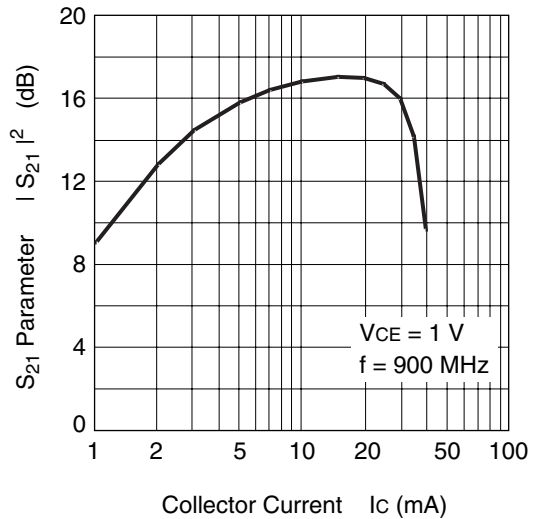
Gain Bandwidth Product vs. Collector Current

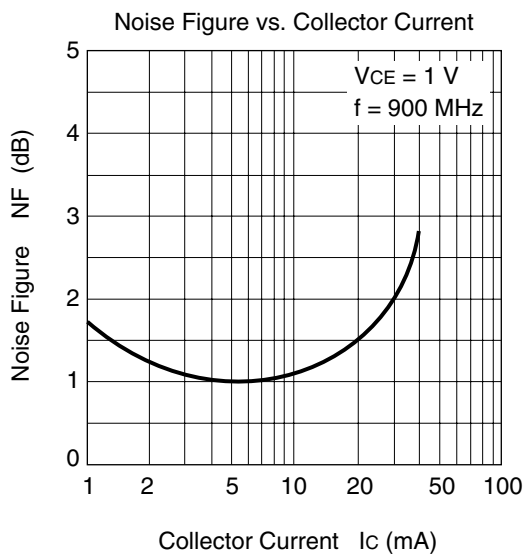


S_{21} Parameter vs. Collector Current

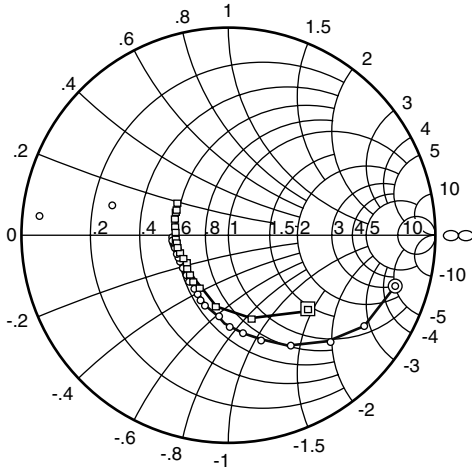


S_{21} Parameter vs. Collector Current



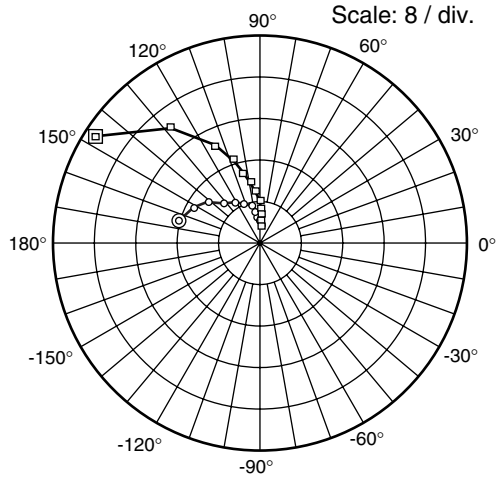


S₁₁ Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_0 = 50\ \Omega$
 100 to 2000 MHz (100 MHz Step)
 ○—○ ($I_C = 5\text{ mA}$)
 □—□ ($I_C = 20\text{ mA}$)

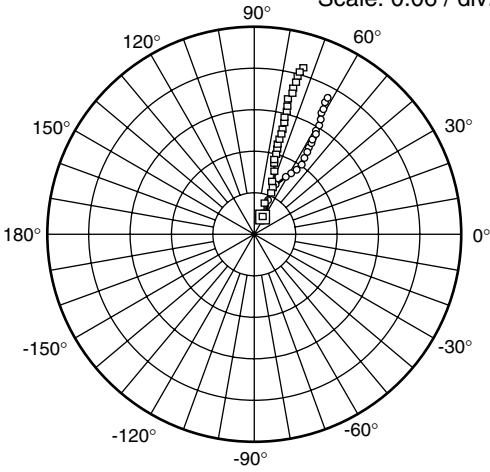
S₂₁ Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_0 = 50\ \Omega$
 100 to 2000 MHz (100 MHz Step)
 ○—○ ($I_C = 5\text{ mA}$)
 □—□ ($I_C = 20\text{ mA}$)

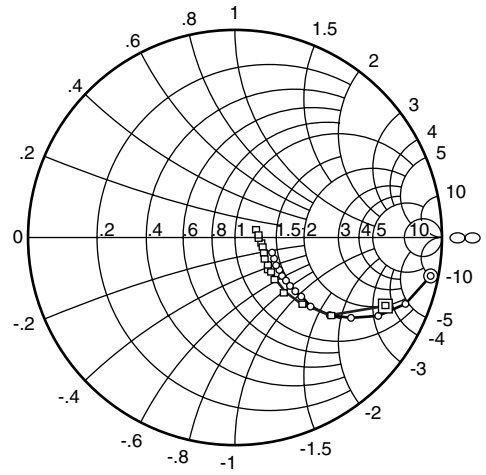
S₁₂ Parameter vs. Frequency

Scale: 0.06 / div.



Condition: $V_{CE} = 1\text{ V}$, $Z_0 = 50\ \Omega$
 100 to 2000 MHz (100 MHz Step)
 ○—○ ($I_C = 5\text{ mA}$)
 □—□ ($I_C = 20\text{ mA}$)

S₂₂ Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_0 = 50\ \Omega$
 100 to 2000 MHz (100 MHz Step)
 ○—○ ($I_C = 5\text{ mA}$)
 □—□ ($I_C = 20\text{ mA}$)

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	0.855	-16.3	15.67	165.4	0.018	81.2	0.962	-10.7
200	0.784	-32.7	14.42	152.1	0.035	72.2	0.889	-20.9
300	0.703	-48.4	12.92	140.6	0.048	65.3	0.791	-28.9
400	0.616	-60.4	11.41	131.2	0.059	61.2	0.698	-34.6
500	0.540	-72.1	10.09	123.5	0.067	58.6	0.618	-38.2
600	0.475	-81.4	8.94	117.2	0.074	57.3	0.549	-40.7
700	0.428	-90.3	8.00	112.3	0.080	56.6	0.492	-42.1
800	0.385	-99.1	7.23	108.2	0.085	56.1	0.445	-42.5
900	0.348	-106.5	6.54	104.2	0.091	56.3	0.404	-42.7
1000	0.320	-113.6	6.00	100.9	0.096	57.3	0.373	-42.0
1100	0.297	-121.6	5.51	98.2	0.101	57.4	0.344	-41.6
1200	0.283	-128.8	5.14	95.4	0.106	57.8	0.321	-40.7
1300	0.271	-134.6	4.80	93.1	0.111	58.7	0.298	-39.1
1400	0.262	-142.4	4.47	90.8	0.117	59.2	0.283	-37.5
1500	0.254	-149.0	4.23	89.0	0.122	60.0	0.263	-36.3
1600	0.246	-155.3	3.99	87.0	0.128	60.5	0.252	-34.6
1700	0.248	-160.8	3.79	85.3	0.134	61.1	0.238	-33.0
1800	0.249	-167.3	3.59	83.7	0.140	61.5	0.226	-31.3
1900	0.253	-172.0	3.44	81.9	0.145	62.1	0.215	-29.6
2000	0.253	-177.5	3.29	80.5	0.151	62.7	0.204	-27.2

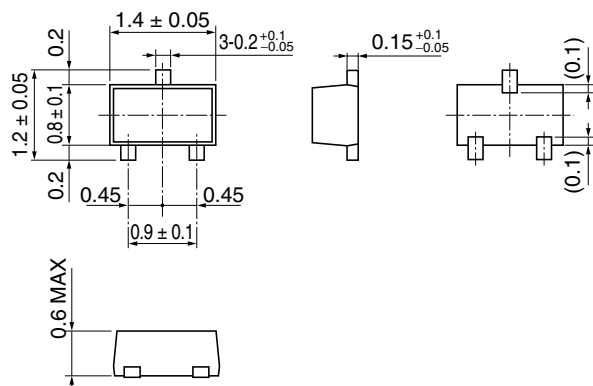
2SC5700

($V_{CE} = 1 \text{ V}$, $I_C = 20 \text{ mA}$, $Z_o = 50 \Omega$)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.526	-43.0	37.91	148.3	0.015	75.0	0.817	-25.2
200	0.406	-76.6	27.98	127.5	0.025	67.3	0.605	-40.0
300	0.334	-100.0	20.76	115.3	0.033	66.9	0.453	-45.9
400	0.284	-116.6	16.30	108.1	0.040	68.0	0.360	-47.1
500	0.263	-131.4	13.33	103.0	0.047	69.8	0.300	-46.2
600	0.243	-143.4	11.24	99.2	0.055	71.1	0.257	-44.4
700	0.242	-152.6	9.74	96.3	0.063	72.0	0.226	-41.4
800	0.236	-159.6	8.57	93.6	0.071	72.7	0.203	-38.2
900	0.230	-167.8	7.62	91.4	0.078	73.5	0.184	-34.3
1000	0.239	-173.4	6.91	89.4	0.086	74.1	0.170	-30.5
1100	0.240	-179.4	6.31	87.7	0.094	73.9	0.160	-26.8
1200	0.247	175.6	5.82	85.9	0.102	74.1	0.150	-22.6
1300	0.246	172.4	5.38	84.4	0.110	74.4	0.143	-18.1
1400	0.255	167.4	5.02	82.9	0.117	74.3	0.138	-14.0
1500	0.257	163.8	4.71	81.3	0.126	74.2	0.133	-9.6
1600	0.265	160.2	4.45	80.1	0.134	74.4	0.130	-5.3
1700	0.268	158.7	4.19	78.9	0.142	74.2	0.128	-1.2
1800	0.282	154.1	3.97	77.6	0.149	73.9	0.125	2.5
1900	0.283	152.7	3.80	76.4	0.157	74.1	0.123	7.1
2000	0.300	150.3	3.63	75.4	0.165	73.7	0.123	11.8

Package Dimensions

As of January, 2001
Unit: mm



Hitachi Code	MFPAK
JEDEC	—
EIAJ	—
Mass (reference value)	0.0016 g

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