To all our customers

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Renesas Technology Home Page: http://www.renesas.com

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

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Keep safety first in your circuit designs!

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   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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2SC5594

Silicon NPN Epitaxial
High Frequency Low Noise Amplifier

RENESAS

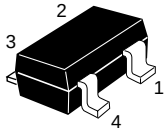
ADE-208-798 (Z)
1st. Edition
Nov. 2000

Features

- High gain bandwidth product
  f_T = 24 GHz typ.
- High power gain and low noise figure ;
  PG = 18 dB typ. , NF = 1.2 dB typ. at f = 1.8 GHz

Outline

CMPAK-4



1. Emitter
2. Collector
3. Emitter
4. Base

Note: Marking is “XP-”.

Absolute Maximum Ratings (Ta = 25°C)

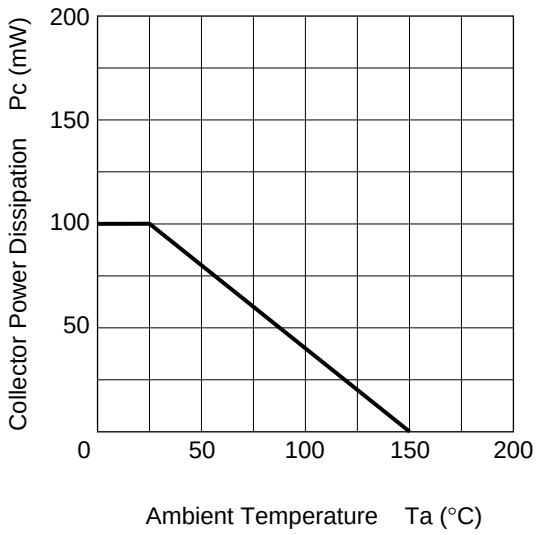
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	12	V
Collector to emitter voltage	V_{CEO}	4.5	V
Emitter to base voltage	V_{EBO}	0.8	V
Collector current	I_C	35	mA
Collector power dissipation	Pc	100	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

Electrical Characteristics (Ta = 25°C)

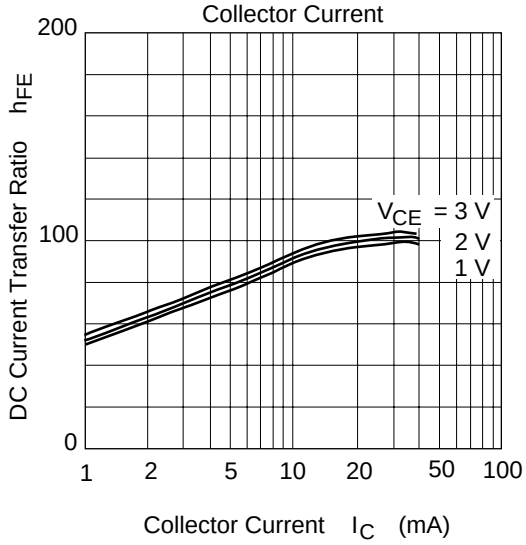
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	12	—	—	V	I_C = 10 µA , I_E = 0
Collector cutoff current	I_{CBO}	—	—	1	µA	V_{CB} = 10 V , I_E = 0
Collector cutoff current	I_{CEO}	—	—	1	µA	V_{CE} = 4 V , R_{BE} = ∞
Emitter cutoff current	I_{EBO}	—	—	12	µA	V_{EB} = 0.8 V , I_C = 0
DC current transfer ratio	h_{FE}	60	100	140	V	V_{CE} = 2 V , I_C = 20 mA
Collector output capacitance	Cob	—	0.3	0.6	pF	V_{CB} = 2 V , I_E = 0 f = 1 MHz
Gain bandwidth product	f_T	21	24	—	GHz	V_{CE} = 2 V , I_C = 30 mA f = 2 GHz
Power gain	PG	14	18	—	dB	V_{CE} = 2 V, I_C = 30 mA f = 1.8 GHz
Noise figure	NF	—	1.2	1.6	dB	V_{CE} = 2 V, I_C = 5 mA f = 1.8 GHz

Main Characteristics

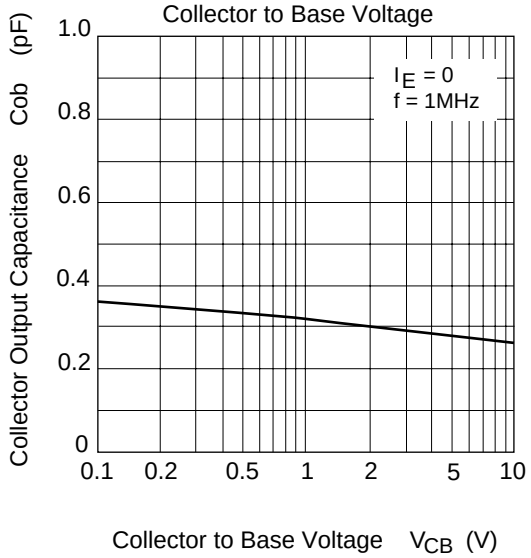
Maximum Collector Dissipation Curve



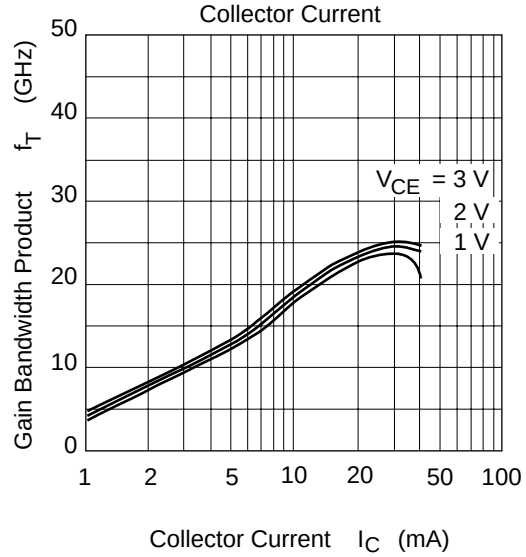
DC Current Transfer Ratio vs. Collector Current



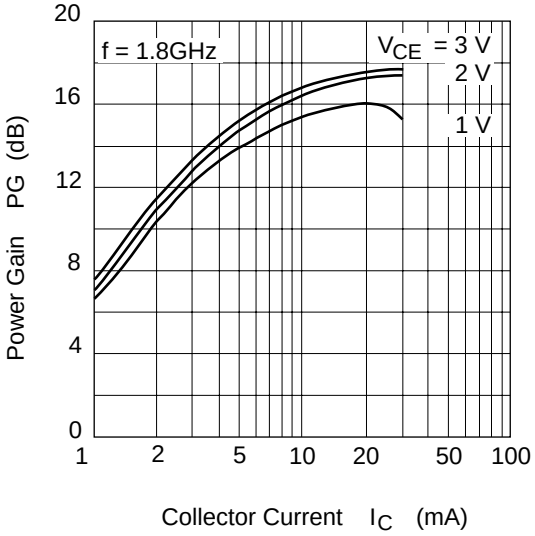
Collector Output Capacitance vs. Collector to Base Voltage



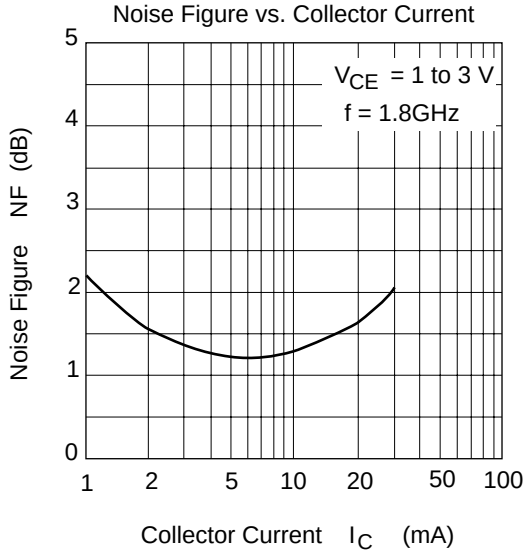
Gain Bandwidth Product vs. Collector Current



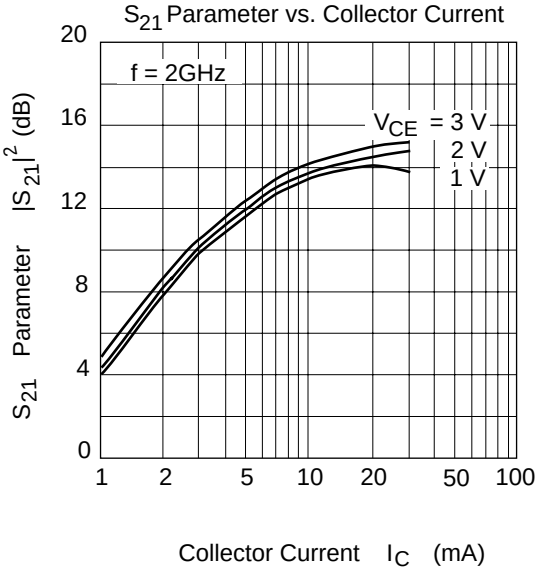
Power Gain vs. Collector Current



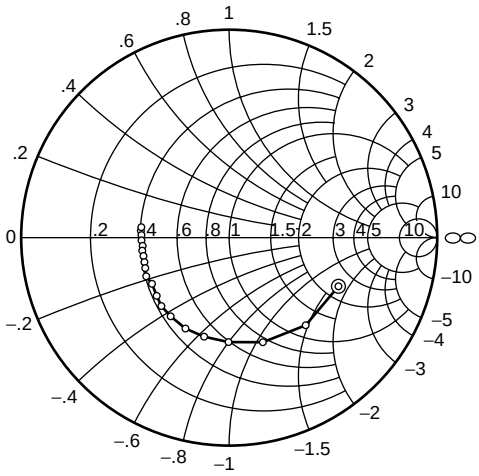
Noise Figure vs. Collector Current



S_{21} Parameter vs. Collector Current



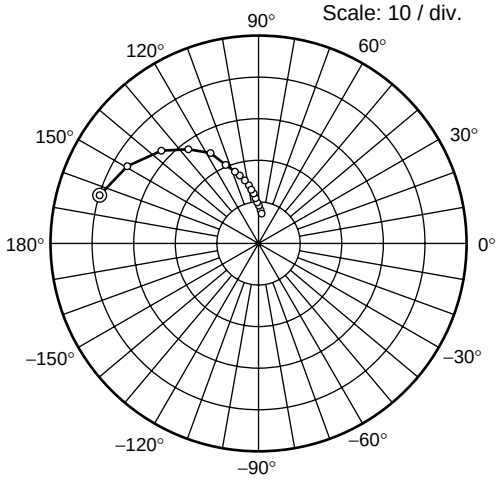
S11 Parameter vs. Frequency



Condition ; V_{CE} = 2 V , I_C = 20 mA

100 to 2000 MHz (100 MHz step)

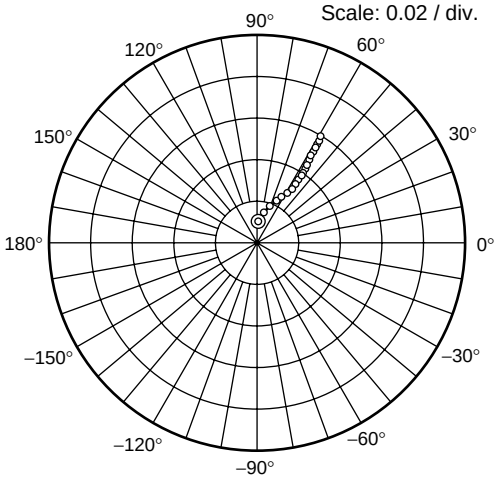
S21 Parameter vs. Frequency



Condition ; V_{CE} = 2 V , I_C = 20 mA

100 to 2000 MHz (100 MHz step)

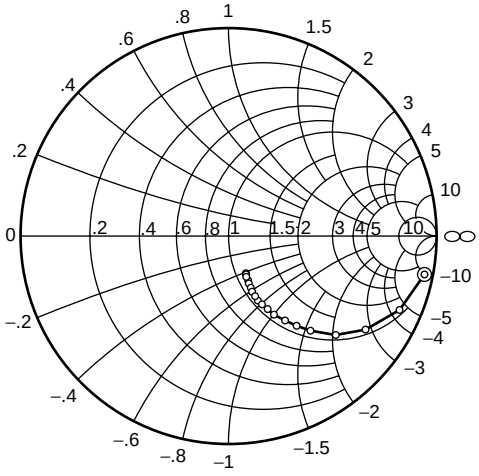
S12 Parameter vs. Frequency



Condition ; V_{CE} = 2 V , I_C = 20 mA

100 to 2000 MHz (100 MHz step)

S22 Parameter vs. Frequency



Condition ; V_{CE} = 2 V , I_C = 20 mA

100 to 2000 MHz (100 MHz step)

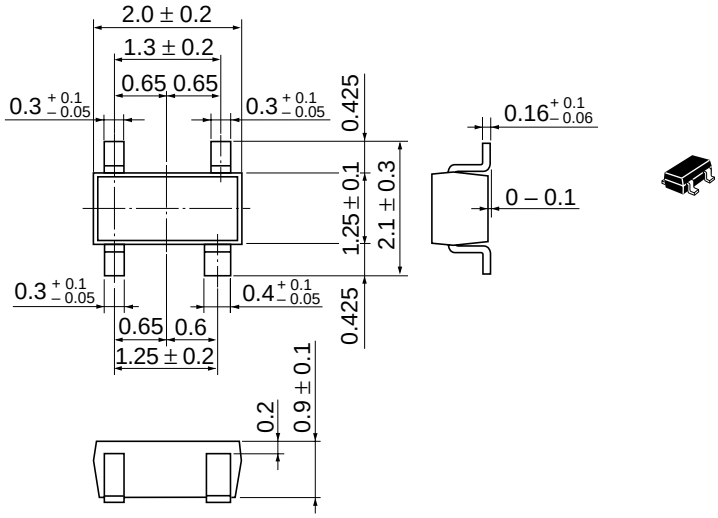
Sparameter (V_{CE} = 2 V, I_C = 20 mA, Zo = 50 Ω)

	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.577	–24.5	40.31	164.2	0.00674	82.9	0.963	–11.5
200	0.560	–49.8	36.64	149.3	0.0130	74.5	0.897	–23.7
300	0.541	–72.2	32.05	136.3	0.0182	68.8	0.803	–34.4
400	0.504	–90.2	27.56	126.5	0.0225	63.6	0.708	–42.4
500	0.495	–104.5	23.84	118.8	0.0256	61.3	0.622	–48.4
600	0.477	–116.9	20.64	113.1	0.0285	58.9	0.548	–53.1
700	0.458	–126.4	18.11	108.4	0.0311	57.7	0.487	–56.2
800	0.456	–134.5	16.13	105.1	0.0336	57.3	0.437	–58.7
900	0.448	–142.5	14.46	101.6	0.0355	57.8	0.394	–60.4
1000	0.435	–147.9	13.15	99.2	0.0382	56.8	0.360	–61.9
1100	0.438	–153.6	12.01	96.6	0.0399	57.4	0.331	–63.0
1200	0.430	–158.5	11.06	94.4	0.0422	57.0	0.306	–63.3
1300	0.425	–162.6	10.24	93.0	0.0443	58.1	0.288	–63.5
1400	0.426	–166.9	9.56	91.1	0.0462	58.3	0.269	–64.0
1500	0.424	–171.1	8.99	89.6	0.0488	58.3	0.253	–64.1
1600	0.425	–174.1	8.45	88.0	0.0508	58.5	0.241	–64.1
1700	0.428	–177.4	7.98	86.6	0.0527	58.8	0.230	–64.0
1800	0.424	179.7	7.59	85.0	0.0556	58.8	0.220	–64.0
1900	0.426	176.6	7.19	83.8	0.0578	59.0	0.212	–63.9
2000	0.428	174.7	6.84	82.4	0.0595	58.8	0.204	–63.7

Package Dimensions

Unit: mm

Unit: mm



Hitachi Code	CMPAK-4(T)
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.006 g

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