To all our customers

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

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2SC4197

Silicon NPN Epitaxial

RENESAS

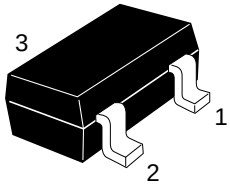
ADE-208-1097A (Z)
2nd. Edition
Mar. 2001

Application

UHF frequency converter, wide band amplifier

Outline

MPAK



1. Emitter
2. Base
3. Collector

Note: Marking is “TI–”.

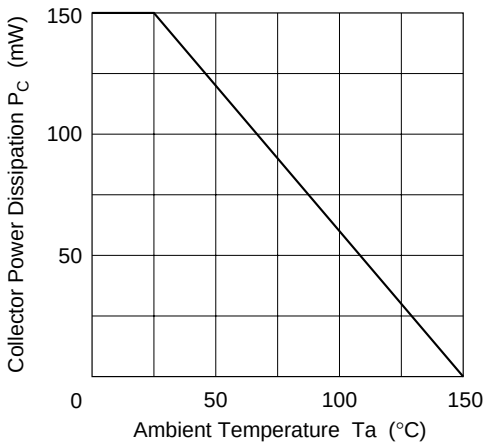
Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	25	V
Collector to emitter voltage	V_{CEO}	13	V
Emitter to base voltage	V_{EBO}	3	V
Collector current	I_C	50	mA
Collector power dissipation	P_C	150	mW
Junction temperature	Tj	150	°C
Storage temperature	Tstg	–55 to +150	°C

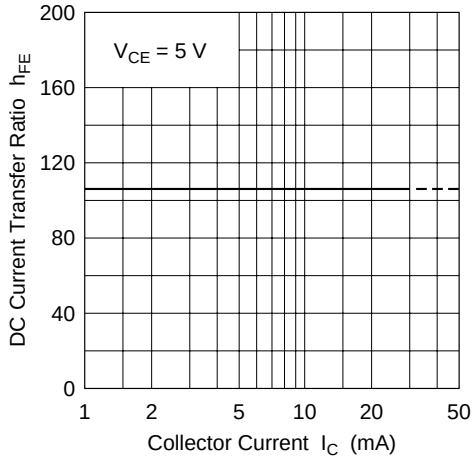
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	25	—	—	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}	—	—	10	µA	V_{CE} = 13 V, R_{BE} =
Emitter cutoff current	I_{EBO}	—	—	0.3	µA	V_{EB} = 3 V, I_C = 0
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	—	0.3	V	I_C = 20 mA, I_B = 4 mA
DC current transfer ratio	h_{FE}	50	—	180		V_{CE} = 5 V, I_C = 5 mA
Collector output capacitance	Cob	—	0.85	1.3	pF	V_{CB} = 10 V, I_E = 0, f = 1MHz
Gain bandwidth product	f_T	3.0	3.8	—	GHz	V_{CE} = 5 V, I_C = 20 mA
Conversion gain	CG	—	19	—	dB	V_{CC} = 5 V, I_C = 0.8 mA, f_{in} = 900 MHz
Noise figure	NF	—	8	—	dB	f_{osc} = 930 MHz (–5dBm), f_{out} = 30 MHz

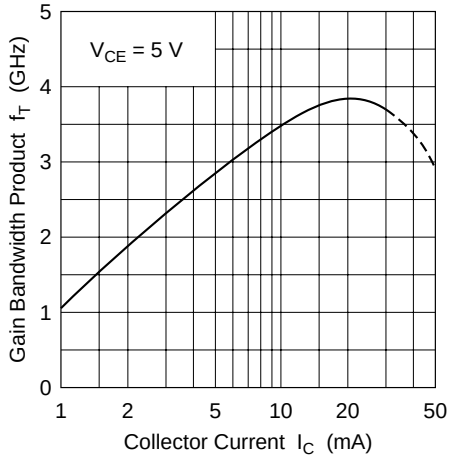
Maximum Collector Dissipation Curve



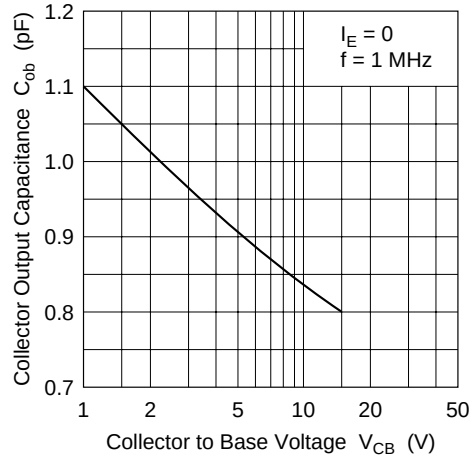
DC Current Transfer Ratio vs. Collector Current



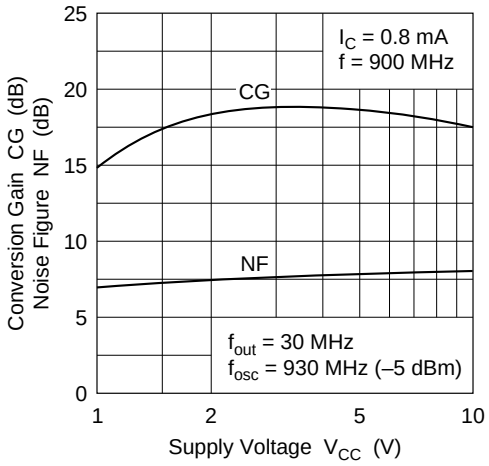
Gain Bandwidth Product vs. Collector Current



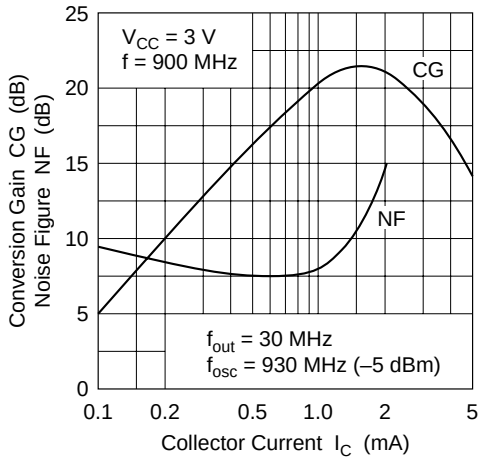
Collector Output Capacitance vs. Collector to Base Voltage



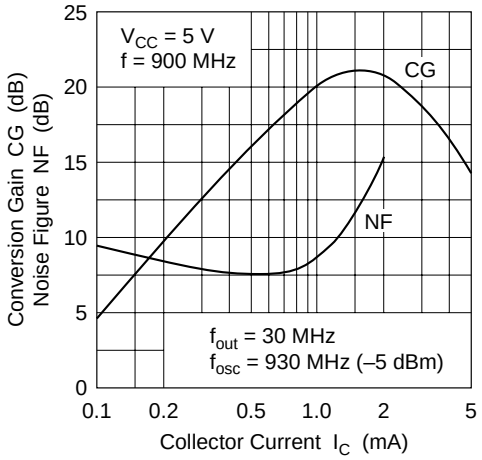
Conversion Gain, Noise Figure vs. Supply Voltage



Conversion Gain, Noise Figure vs. Collector Current

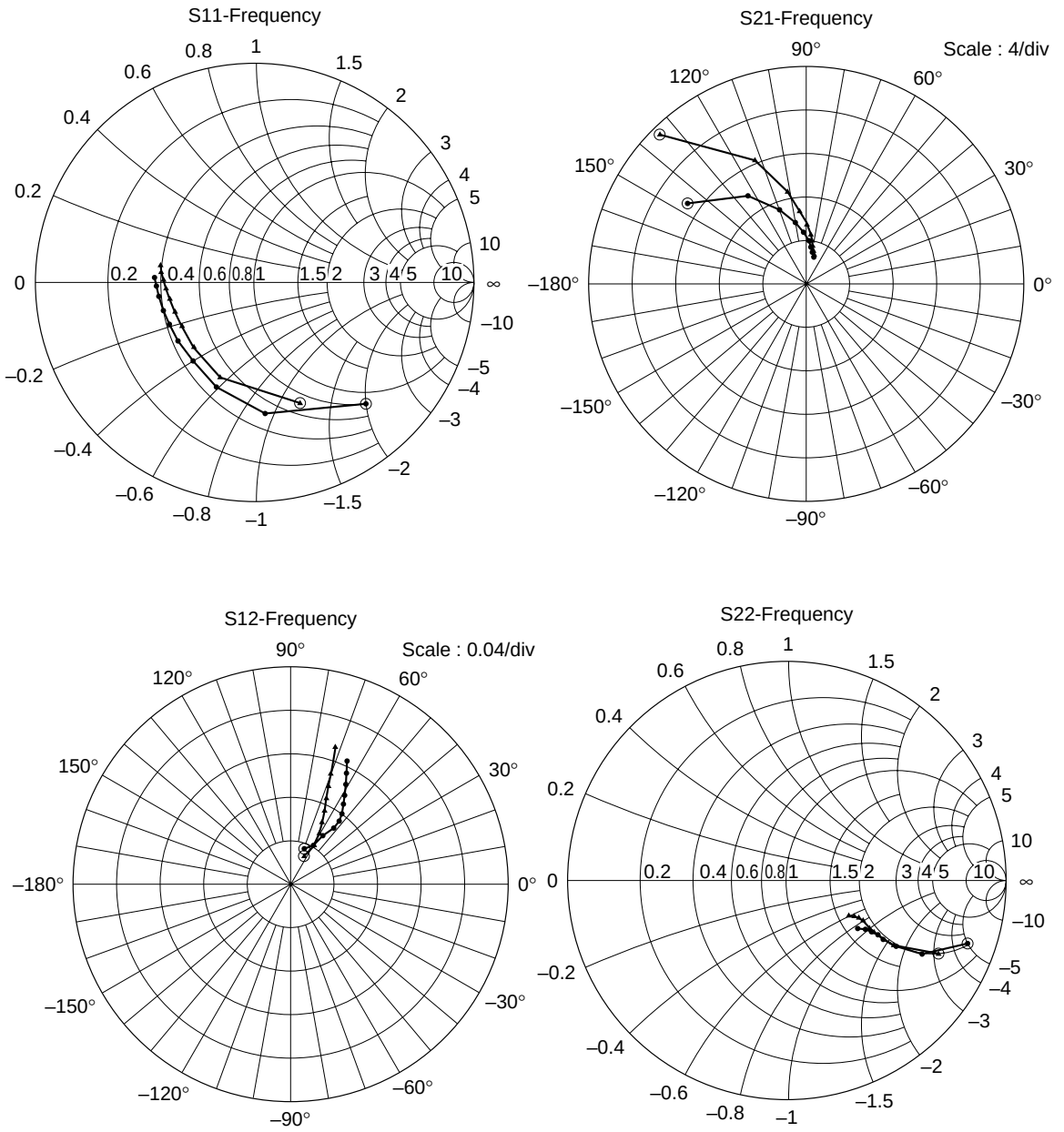


Conversion Gain, Noise Figure vs. Collector Current



S Parameters (Emitter Common)

Test Condition V_{CE} = 5 V, 100 MHz to 1000 MHz (100 MHz Step), Z_O = 50 Ω
I_C = 5 mA
I_C = 10 mA



S Parameters (Emitter Common)

Test Condition V_{CE} = 5 V, I_C = 5 mA, Z_O = 50 Ω

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.744	–48.4	13.142	145.9	0.034	67.5	0.876	–19.1
200	0.599	–85.5	9.669	123.5	0.053	55.9	0.702	–28.2
300	0.506	–110.7	7.201	109.5	0.064	52.6	0.586	–30.9
400	0.457	–128.9	5.696	100.6	0.072	52.7	0.520	–31.2
500	0.440	–143.5	4.687	93.9	0.079	54.3	0.480	–31.2
600	0.430	–155.1	3.977	88.1	0.087	57.1	0.452	–31.5
700	0.437	–163.2	3.453	83.5	0.095	59.4	0.432	–31.7
800	0.441	–170.9	3.070	79.1	0.104	61.3	0.417	–32.4
900	0.452	–177.1	2.746	75.4	0.113	63.6	0.402	–33.4
1000	0.462	177.5	2.508	71.9	0.122	65.6	0.390	–34.5

Test Condition V_{CE} = 5 V, I_C = 10 mA, Z_O = 50 Ω

Freq.	S11		S21		S12		S22	
(MHz)	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.585	–69.3	19.233	134.4	0.028	63.8	0.768	–25.6
200	0.460	–110.1	12.238	112.6	0.041	58.1	0.564	–31.4
300	0.408	–133.9	8.571	101.3	0.052	60.0	0.468	–30.5
400	0.390	–149.7	6.608	94.5	0.062	62.9	0.420	–29.1
500	0.390	–160.7	5.348	88.7	0.073	65.3	0.394	–28.1
600	0.391	–169.8	4.503	84.4	0.084	67.7	0.375	–27.8
700	0.404	–176.7	3.884	80.3	0.095	69.1	0.361	–27.7
800	0.411	178.0	3.446	76.8	0.107	70.3	0.350	–28.2
900	0.426	173.1	3.069	73.4	0.119	71.5	0.339	–29.0
1000	0.436	169.8	2.803	70.7	0.131	72.2	0.330	–29.7

Y Parameters (Emitter Common)

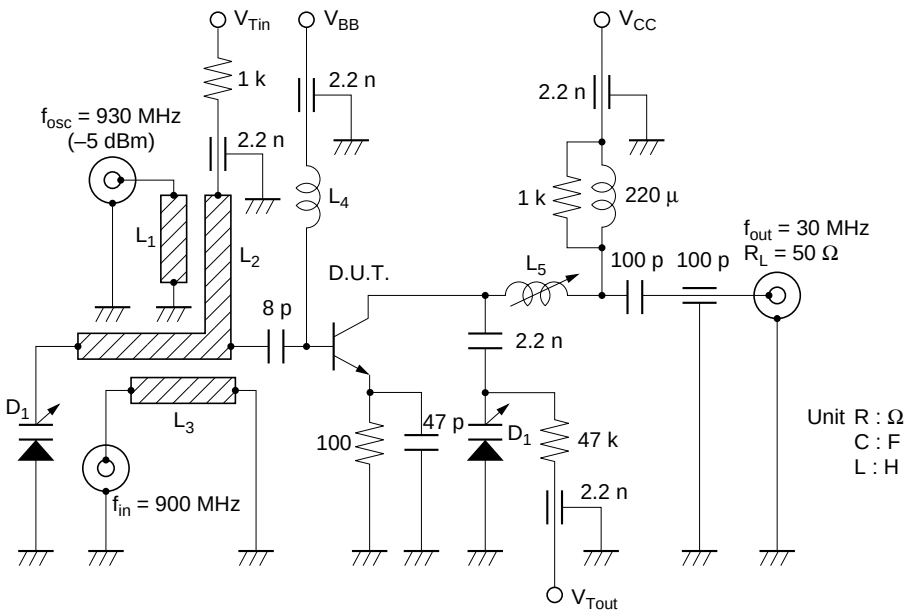
Test Condition V_{CE} = 5 V, I_C = 5 mA

Freq.	Yie (mS)		Yfe (mS)		Yre (mS)		Yoe (mS)	
(MHz)	REAL	IMAG.	REAL	IMAG.	REAL	IMAG.	REAL	IMAG.
100	2.663	5.357	161.804	–34.193	–0.002	–0.425	0.055	0.627
200	5.558	10.174	147.899	–63.499	–0.012	–0.880	0.025	1.270
300	9.651	13.450	125.634	–87.205	–0.041	–1.354	0.026	2.024
400	14.160	15.066	102.261	–102.289	–0.093	–1.820	0.044	2.772
500	18.753	15.624	80.041	–110.827	–0.150	–2.309	0.048	3.510
600	23.019	14.727	57.826	–114.923	–0.214	–2.798	0.124	4.301
700	26.444	13.908	40.437	–113.783	–0.263	–3.305	0.211	4.964
800	29.378	12.040	24.049	–111.316	–0.379	–3.822	0.268	5.828
900	31.931	9.960	10.602	–106.726	–0.466	–4.371	0.407	6.578
1000	33.671	7.667	–0.922	–101.485	–0.586	–4.913	0.524	7.381

Test Condition V_{CE} = 5 V, I_C = 10 mA

Freq.	Yie (mS)		Yfe (mS)		Yre (mS)		Yoe (mS)	
(MHz)	REAL	IMAG.	REAL	IMAG.	REAL	IMAG.	REAL	IMAG.
100	5.212	6.660	273.909	–97.915	–0.002	–0.430	0.029	0.527
200	10.124	10.767	208.225	–154.453	–0.015	–0.876	0.011	1.307
300	15.094	11.730	141.558	–172.198	–0.044	–1.347	0.047	2.035
400	18.933	10.991	93.174	–169.490	–0.089	–1.817	0.064	2.735
500	21.811	10.074	58.181	–158.809	–0.133	–2.299	0.096	3.501
600	23.927	8.389	32.829	–146.284	–0.195	–2.785	0.173	4.226
700	25.848	7.170	15.188	–134.592	–0.276	–3.302	0.224	5.010
800	26.851	5.955	2.733	–123.322	–0.353	–3.808	0.282	5.760
900	28.097	4.633	–7.642	–113.209	–0.443	–4.375	0.394	6.551
1000	28.686	3.829	–13.979	–104.651	–0.523	–4.908	0.466	7.215

Conversion Gain and Noise Figure Test Circuit

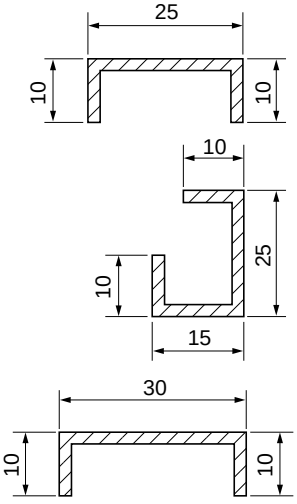


D_1 : 1 SV 188

L_1 : ϕ 1 mm Enameled Copper Wire.

L_2 : ϕ 1 mm Enameled Copper Wire.

L_3 : ϕ 1 mm Enameled Copper Wire.



Unit : mm

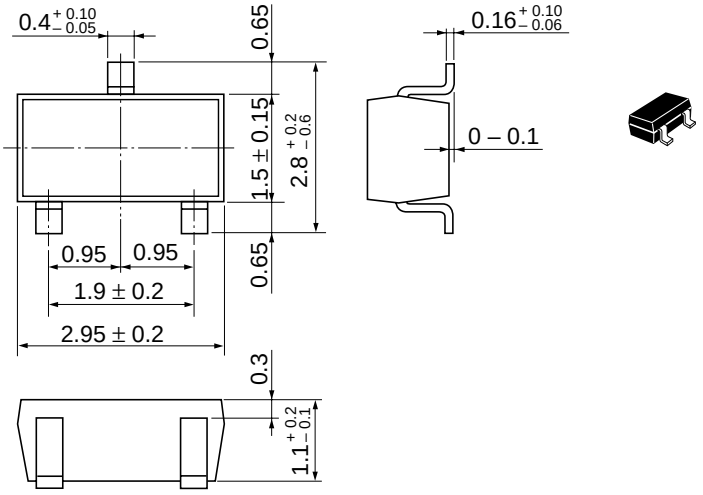
L_4 : ϕ 0.5 mm Enameled Copper Wire 1 Turn Inside Dia 3 mm

L_5 : Inside Dia 5 mm Bobin, ϕ 0.2 mm Enameled Copper Wire 20 Turns with Ferrite Core.

Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	MPAK
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.011 g

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