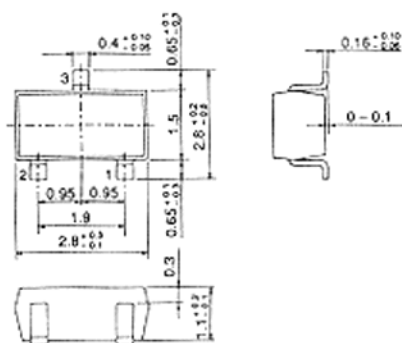


2SC4197

SILICON NPN EPITAXIAL

UHF FREQUENCY CONVERTER, WIDE BAND AMPLIFIER



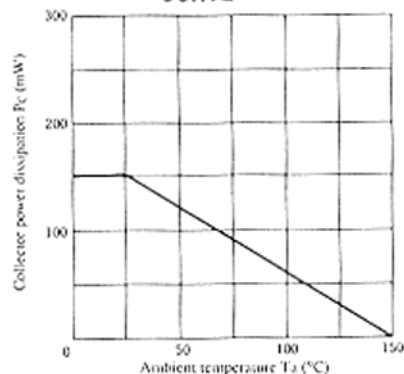
(MPAK)

1. Emitter
 2. Base
 3. Collector
- (Dimensions in mm)

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Item	Symbol	2SC4197	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	T_j	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

MAXIMUM COLLECTOR DISSIPATION CURVE

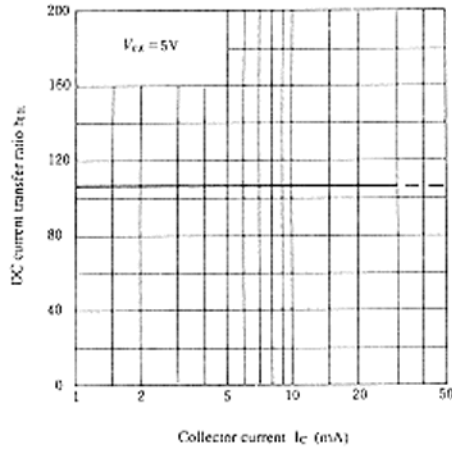


■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

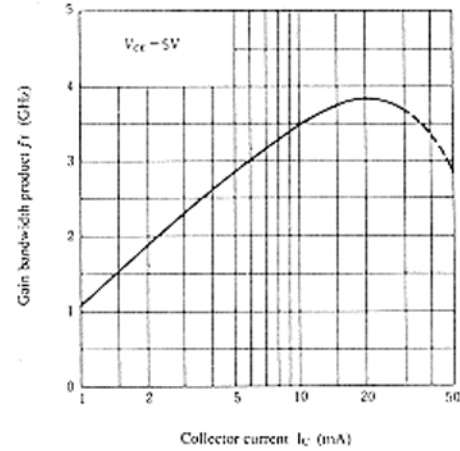
Item	Symbol	Test Condition	min.	typ.	max.	Unit
Collector to base breakdown voltage	$V_{(BR)CBO}$	$I_C = 10\mu A, I_E = 0$	25	—	—	V
Collector cutoff current	I_{CBO}	$V_{CB} = 15V, I_E = 0$	—	—	0.1	μA
Collector cutoff current	I_{CEO}	$V_{CE} = 13V, R_{BE} = \infty$	—	—	10	μA
Emitter cutoff current	I_{EBO}	$V_{EB} = 3V, I_C = 0$	—	—	0.3	μA
Collector to emitter saturation voltage	$V_{CE(sat)}$	$I_C = 20mA, I_B = 4mA$	—	—	0.3	V
DC current transfer ratio	h_{FE}	$V_{CE} = 5V, I_C = 5mA$	50	—	180	
Collector output capacitance	C_{ob}	$V_{CB} = 10V, I_E = 0, f = 1MHz$	—	0.85	1.3	pF
Gain bandwidth product	f_T	$V_{CE} = 5V, I_C = 20mA$	3.0	3.8	—	GHz
Conversion gain	CG	$V_{CC} = 5V, I_C = 0.8mA, f_{in} = 900MHz$	—	19	—	dB
Noise figure	NF	$f_{osc} = 930MHz(-5dBm), f_{out} = 30MHz$	—	8	—	dB

* Marking is [T]-.

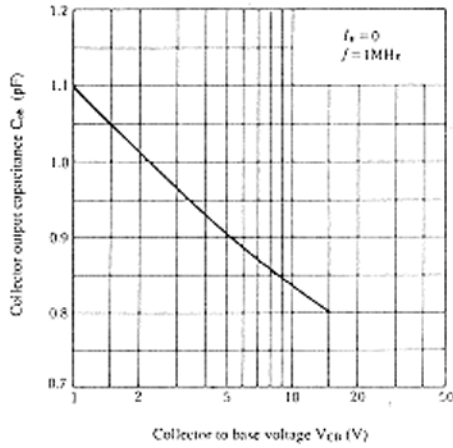
DC CURRENT TRANSFER RATIO VS. COLLECTOR CURRENT



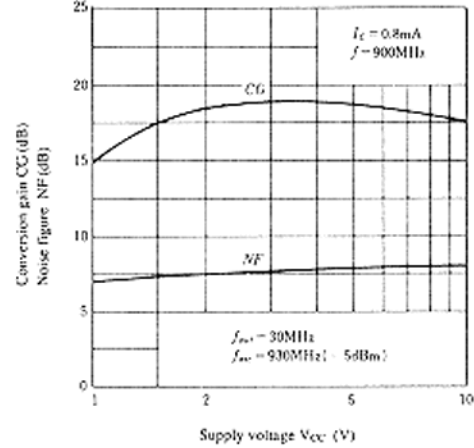
GAIN BANDWIDTH PRODUCT VS. COLLECTOR CURRENT



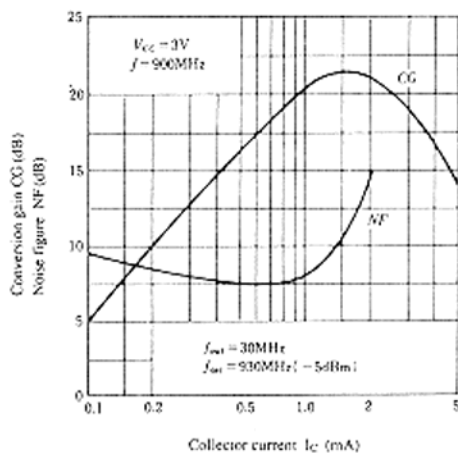
COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE



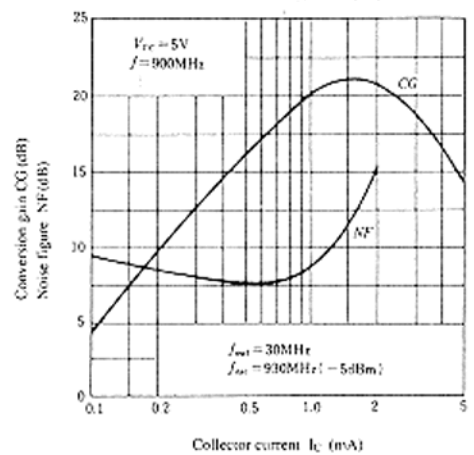
CONVERSION GAIN, NOISE FIGURE VS. SUPPLY VOLTAGE



CONVERSION GAIN, NOISE FIGURE VS. COLLECTOR CURRENT




CONVERSION GAIN, NOISE FIGURE VS. COLLECTOR CURRENT



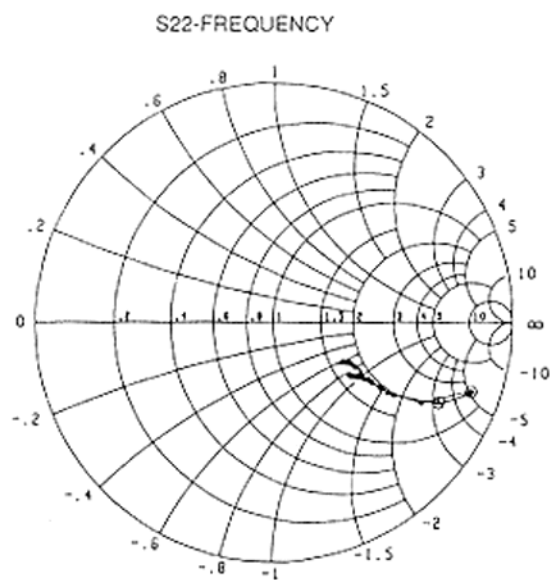
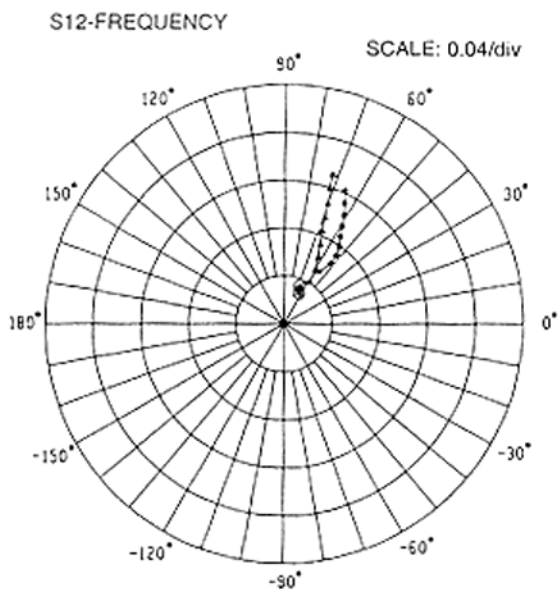
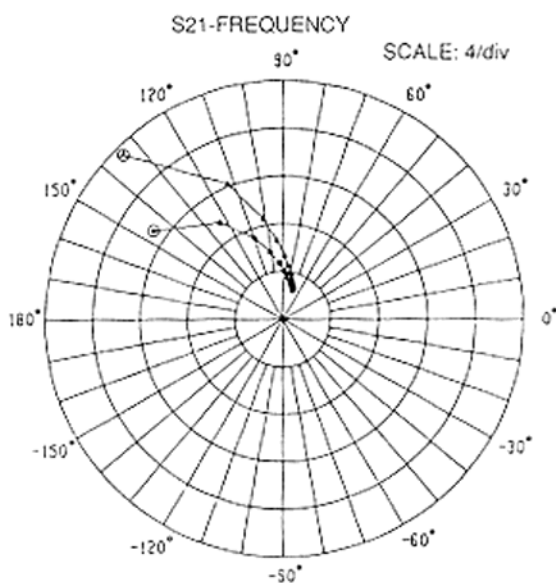
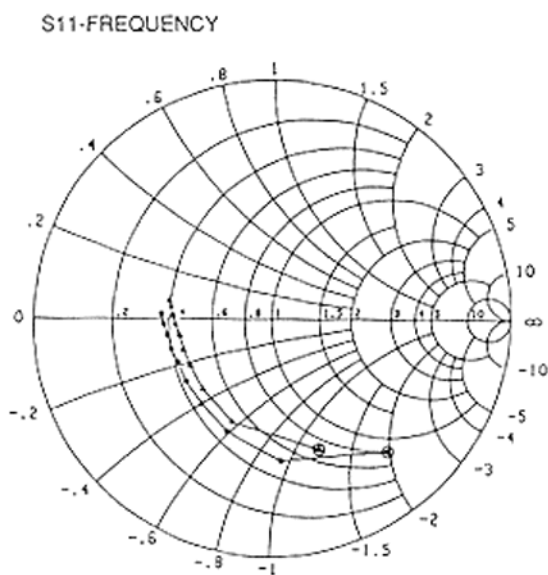
2SC4197

■ S PARAMETERS (Emitter Common)

Test Condition: $V_{CE} = 5V$, 100MHz to 1000MHz (100MHz STEP), $Z_D = 50\Omega$

$I_C = 5mA$ 

$I_C = 10mA$ 



■ S PARAMETERS (Emitter Common)

Test Condition: $V_{CE} = 5V$, $I_C = 5mA$, $Z_0 = 50\Omega$

FREQ. (MHz)	S11		S21		S12		S22	
	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: $V_{CE} = 5V$, $I_C = 10mA$, $Z_0 = 50\Omega$

FREQ. (MHz)	S11		S21		S12		S22	
	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: $V_{CE} = 5V$, $I_C = 5mA$

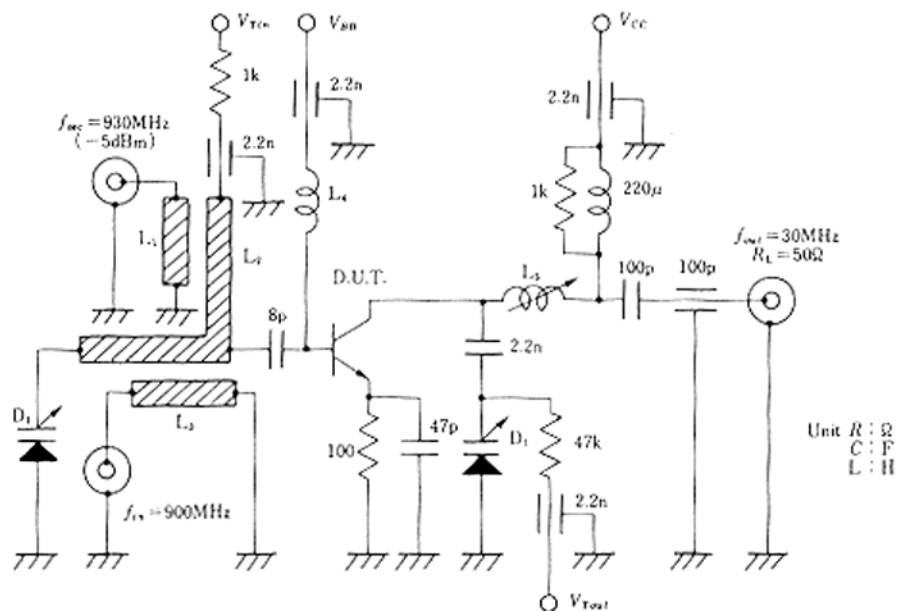
FREQ. (MHz)	Yie (mS)		Yfe (mS)		Yre (mS)		Yoe (mS)	
	REAL	IMAG.	REAL	IMAG.	REAL	IMAG.	REAL	IMAG.
100	2.663	5.357	161.804	-34.193	-0.002	-0.425	0.055	0.627
200	5.558	10.174	147.899	-63.499	-0.012	-0.880	0.025	1.270
300	9.651	13.450	125.634	-87.205	-0.041	-1.354	0.026	2.024
400	14.160	15.066	102.261	-102.289	-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: $V_{CE} = 5V$, $I_C = 10mA$

FREQ. (MHz)	Yie (mS)		Yfe (mS)		Yre (mS)		Yoe (mS)	
	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

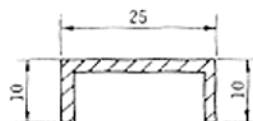
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■ CONVERSION GAIN AND NOISE FIGURE TEST CIRCUIT

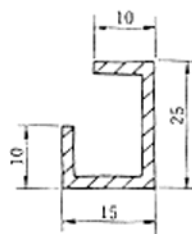


D₁ : 1SV188

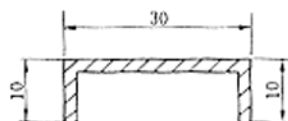
L₁ : φ1mm Enameled Copper Wire.



L₂ : φ1mm Enameled Copper Wire.



L₃ : φ1mm Enameled Copper Wire.



Unit : mm

L₄ : φ0.5mm Enameled Copper Wire 1 Turn Inside Dia 3mm

L₅ : Inside dia 5mm Bobin, φ0.2mm Enameled Copper Wire 20 Turns with Ferrite Core.