

SANYO	No.5045	2SC5229
		NPN Epitaxial Planar Silicon Transistor
		VHF to UHF Wide-Band Low-Noise Amp Applications

Features

- Low noise : $NF = 1.0\text{dB typ (}f = 1\text{GHz)}$.
- High gain : $|S_{21e}|^2 = 10.5\text{dB typ (}f = 1\text{GHz)}$.
- High cutoff frequency : $f_T = 6.5\text{GHz typ}$.
- Medium power operation : $NF = 1.7\text{dB typ (}f = 1\text{GHz)}$
($V_{CE} = 8\text{V}, I_C = 40\text{mA}$) : $|S_{21e}|^2 = 11\text{dB typ (}f = 1\text{GHz)}$.

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

			unit
Collector-to-Base Voltage	V_{CB0}	20	V
Collector-to-Emitter Voltage	V_{CE0}	10	V
Emitter-to-Base Voltage	V_{EB0}	2	V
Collector Current	I_C	70	mA
Collector Dissipation	P_C	700	mW
		Mounted on ceramic board ($250\text{mm}^2 \times 0.8\text{mm}$)	
Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics at $T_a = 25^\circ\text{C}$

			min	typ	max	unit
Collector Cutoff Current	I_{CBO}	$V_{CB} = 10\text{V}, I_E = 0$			1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 1\text{V}, I_C = 0$			10	μA
DC Current Gain	h_{FE}	$V_{CE} = 5\text{V}, I_C = 20\text{mA}$	60*		270*	
Gain-Bandwidth Product	f_T	$V_{CE} = 5\text{V}, I_C = 20\text{mA}$	4.5	6.5		GHz
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}, f = 1\text{MHz}$		0.85	1.3	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB} = 10\text{V}, f = 1\text{MHz}$		0.55		pF
Forward Transfer Gain	$ S_{21e} ^2(1)$	$V_{CE} = 5\text{V}, I_C = 20\text{mA}, f = 1\text{GHz}$	8	10.5		dB
	$ S_{21e} ^2(2)$	$V_{CE} = 8\text{V}, I_C = 40\text{mA}, f = 1\text{GHz}$		11		dB
Noise Figure	NF(1)	$V_{CE} = 5\text{V}, I_C = 7\text{mA}, f = 1\text{GHz}$		1.0	1.8	dB
	NF(2)	$V_{CE} = 8\text{V}, I_C = 40\text{mA}, f = 1\text{GHz}$		1.7		dB

* : The 2SC5229 is classified by 20mA h_{FE} as follows :

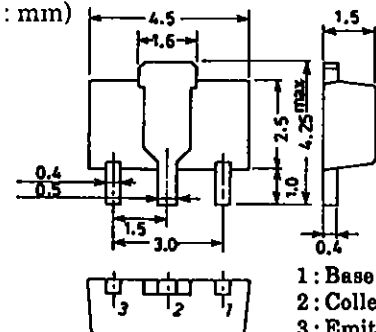
60	D	120	90	E	180	135	F	270
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Marking : CY

h_{FE} rank : D, E, F

Package Dimensions 2038A

(unit : mm)

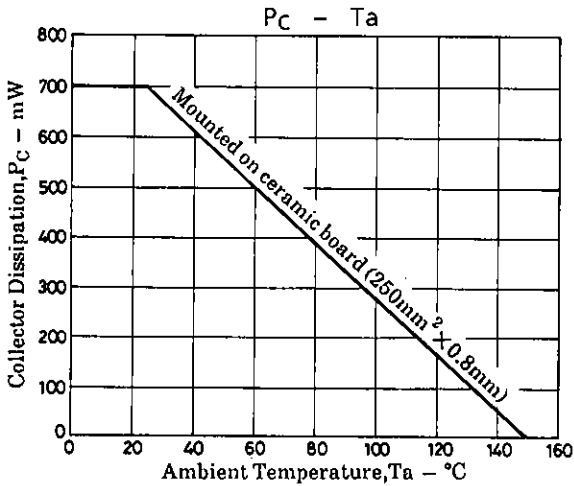
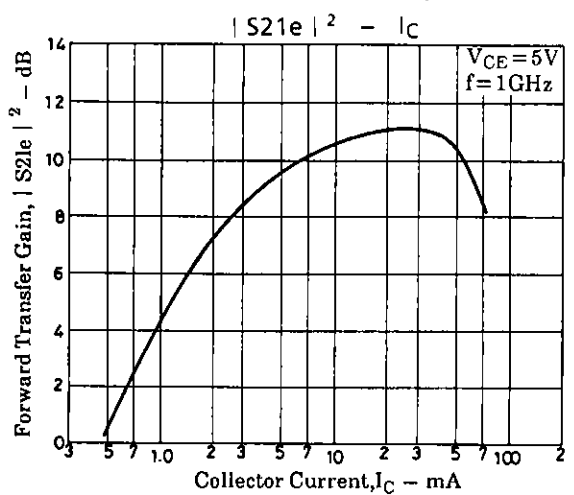
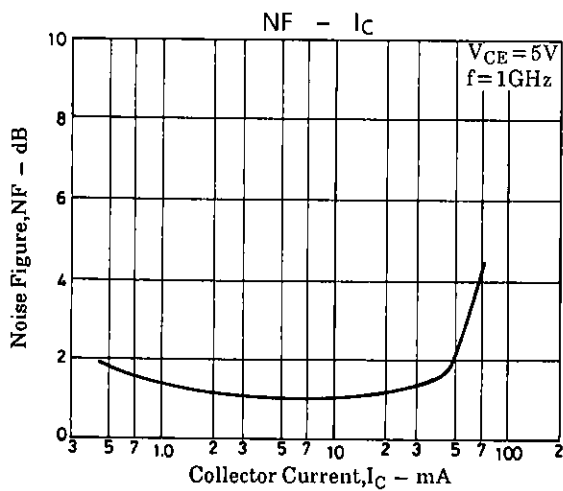
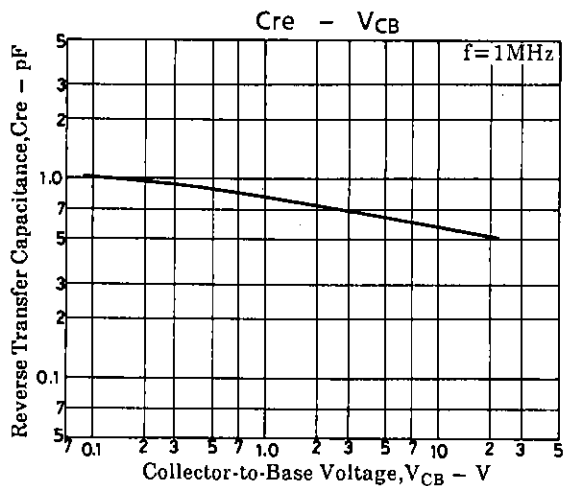
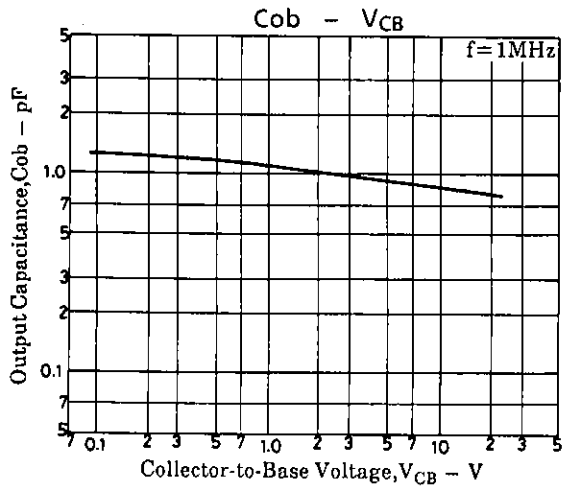
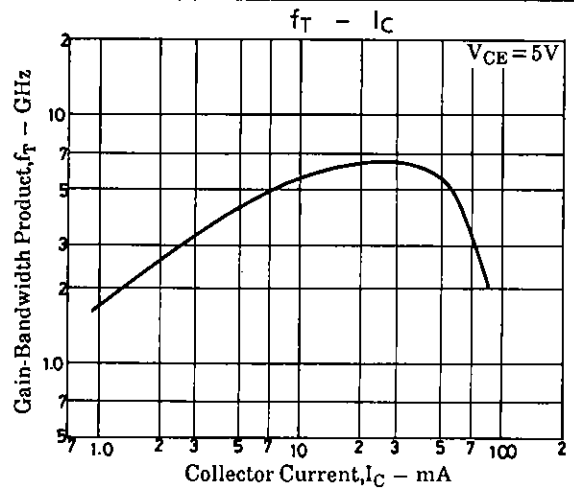
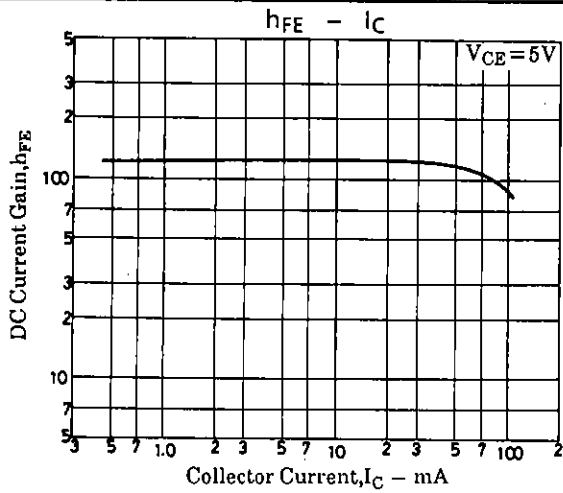


1 : Base
2 : Collector
3 : Emitter

SANYO : PCP
(Bottom View)

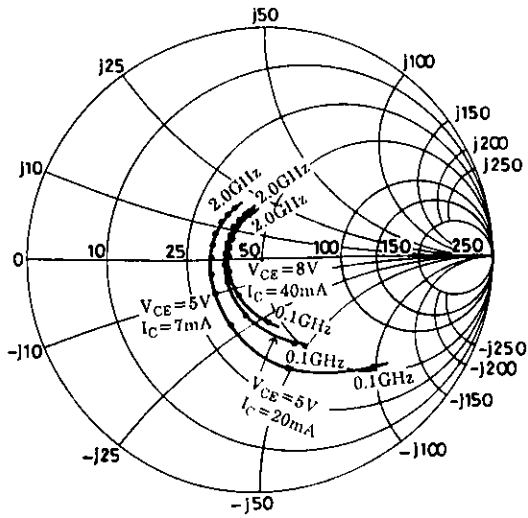
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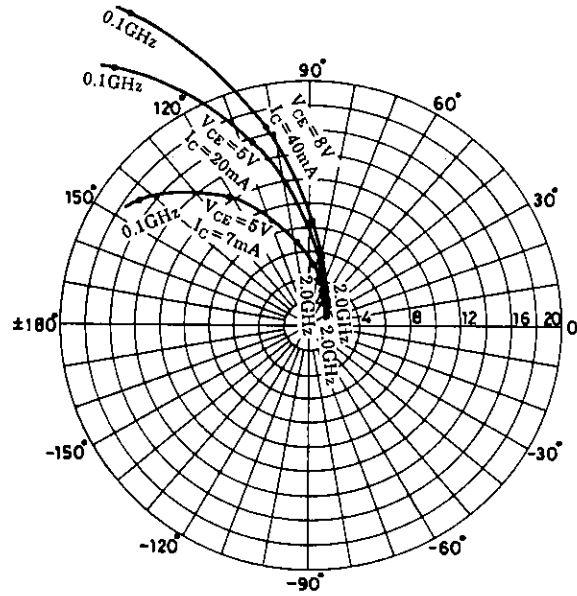


S Parameter

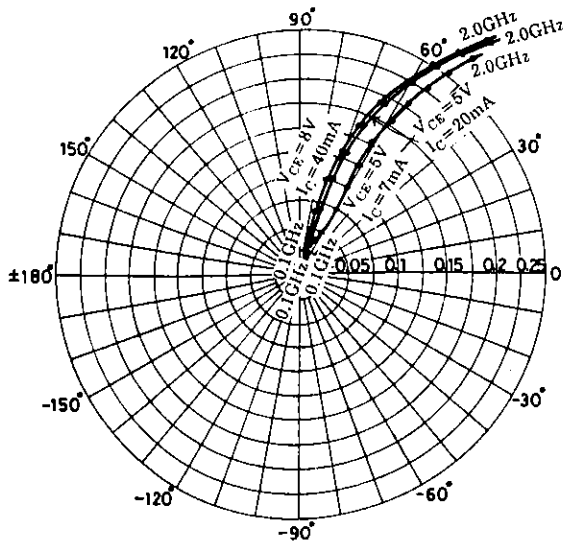
f=100MHz, 200 to 2000MHz (200MHz step)



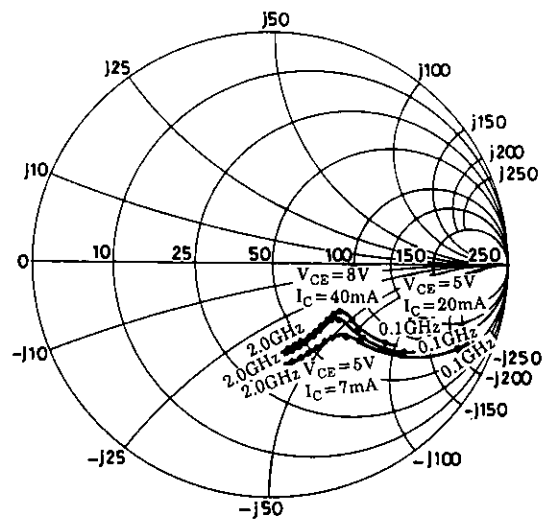
f=100MHz, 200 to 2000MHz (200MHz step)



f=100MHz, 200 to 2000MHz (200MHz step)



f=100MHz, 200 to 2000MHz (200MHz step)



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S Parameter (Common emitter)

 $V_{CE} = 5V, I_C = 7mA, Z_0 = 50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.682	-44.8	16.999	143.0	0.032	69.4	0.848	-24.7
200	0.496	-75.3	12.278	120.6	0.050	61.3	0.663	-36.3
400	0.311	-113.7	7.273	98.2	0.076	60.0	0.492	-43.2
600	0.234	-142.0	5.064	85.4	0.100	61.2	0.435	-46.6
800	0.210	-164.2	3.912	76.2	0.125	61.5	0.413	-50.2
1000	0.201	177.1	3.210	68.5	0.152	61.1	0.408	-54.1
1200	0.204	160.1	2.736	60.8	0.179	59.6	0.411	-58.6
1400	0.213	146.2	2.388	53.9	0.205	57.6	0.416	-63.6
1600	0.226	132.4	2.108	47.3	0.231	55.7	0.423	-68.8
1800	0.232	123.1	1.902	41.7	0.256	53.6	0.431	-73.3
2000	0.242	113.6	1.725	36.5	0.283	51.3	0.438	-77.3

 $V_{CE} = 5V, I_C = 20mA, Z_0 = 50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.399	-68.1	26.168	127.2	0.024	69.1	0.663	-35.1
200	0.249	-103.2	15.690	106.6	0.040	69.4	0.468	-41.0
400	0.163	-144.3	8.404	90.2	0.071	71.4	0.362	-42.1
600	0.143	-173.4	5.707	80.5	0.102	70.5	0.337	-45.2
800	0.144	166.1	4.343	73.5	0.133	68.5	0.330	-49.5
1000	0.150	151.3	3.559	66.8	0.165	66.1	0.337	-54.1
1200	0.162	137.7	3.028	60.2	0.195	63.0	0.343	-59.4
1400	0.177	126.4	2.633	53.7	0.225	59.7	0.353	-64.9
1600	0.191	115.0	2.326	48.0	0.252	56.6	0.360	-70.9
1800	0.200	106.9	2.100	42.9	0.279	53.5	0.369	-75.2
2000	0.204	99.8	1.915	37.9	0.307	50.6	0.376	-79.3

 $V_{CE} = 8V, I_C = 40mA, Z_0 = 50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.277	-83.1	29.257	119.1	0.021	72.6	0.576	-36.1
200	0.176	-119.8	16.497	101.9	0.037	74.5	0.414	-37.4
400	0.140	-160.6	8.638	87.9	0.069	74.9	0.343	-37.3
600	0.131	172.7	5.847	79.2	0.100	73.2	0.329	-41.1
800	0.136	155.2	4.445	72.3	0.132	70.7	0.328	-46.1
1000	0.144	140.8	3.627	66.0	0.164	67.7	0.335	-51.3
1200	0.159	130.3	3.089	59.7	0.194	64.3	0.344	-57.0
1400	0.173	120.1	2.686	53.5	0.224	50.9	0.354	-52.7
1600	0.188	110.0	2.365	48.0	0.251	57.7	0.362	-68.8
1800	0.188	101.8	2.134	42.7	0.278	54.5	0.372	-73.3
2000	0.206	95.8	1.937	38.1	0.305	51.3	0.380	-77.5