

Ordering number:EN5045

NPN Epitaxial Planar Silicon Transistor



2SC5229

VHF to UHF Wide-Band Low-Noise Amplifier Applications

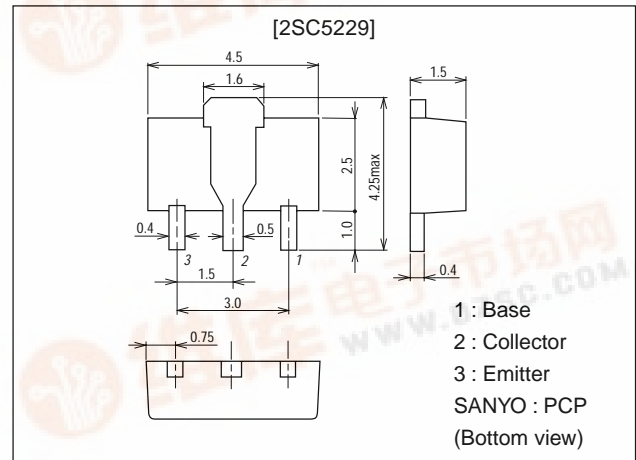
Features

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

Package Dimensions

unit:mm

2038A



Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CB0}		20	V
Collector-to-Emitter Voltage	V_{CEO}		10	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		70	mA
Collector Dissipation	P_C	Mounted on ceramic board (250mm ² ×0.8mm)	700	mW
Junction Temperature	T_J		150	°C
Storage Temperature	T_{stg}		-55 to +150	°C

Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CB0}	$V_{CB}=10\text{V}$, $I_E=0$			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

* : 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

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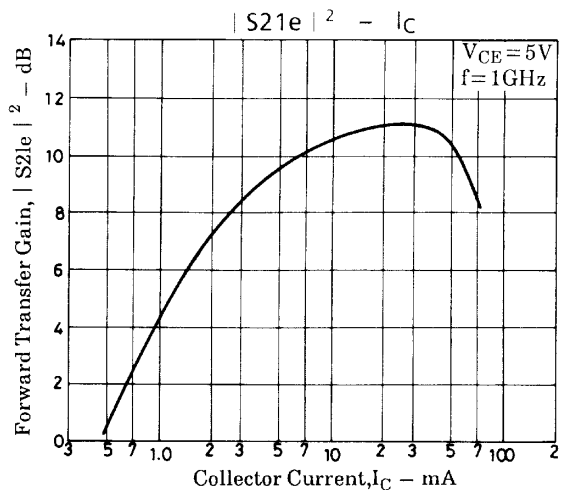
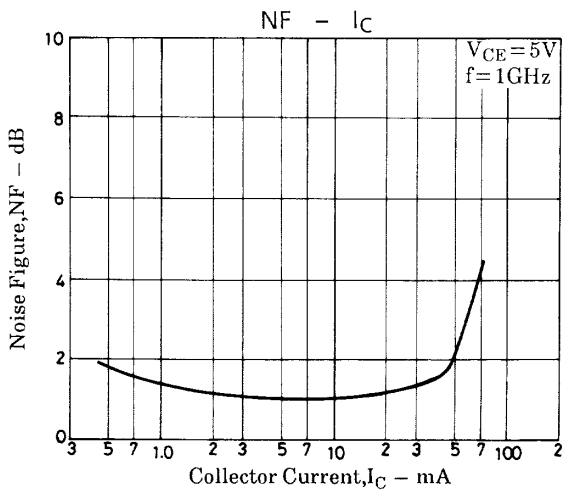
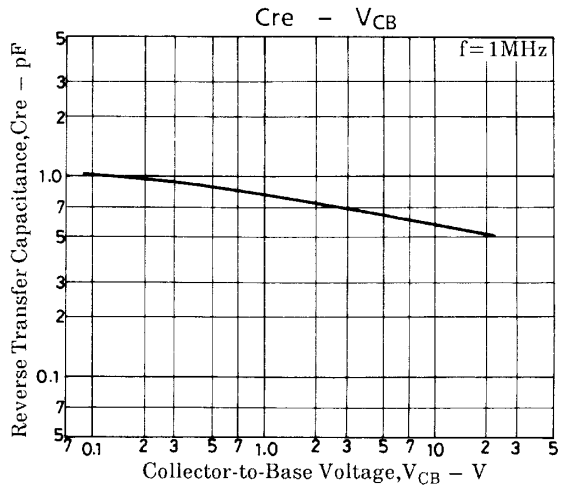
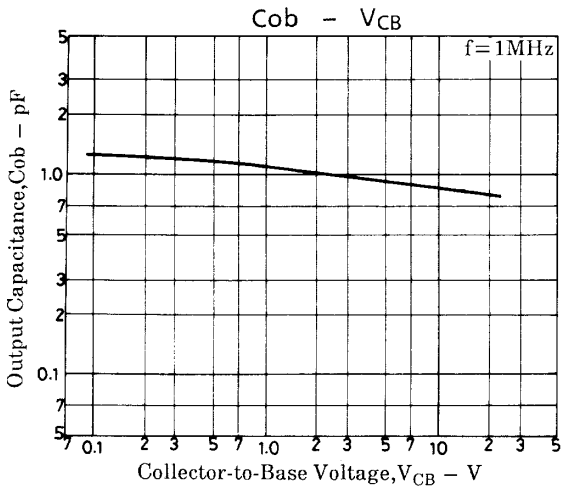
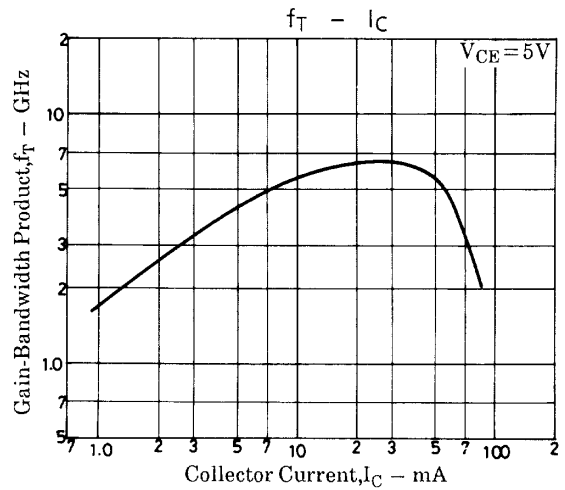
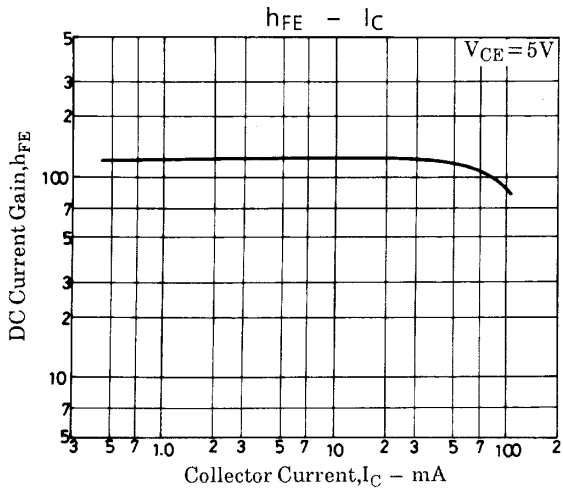
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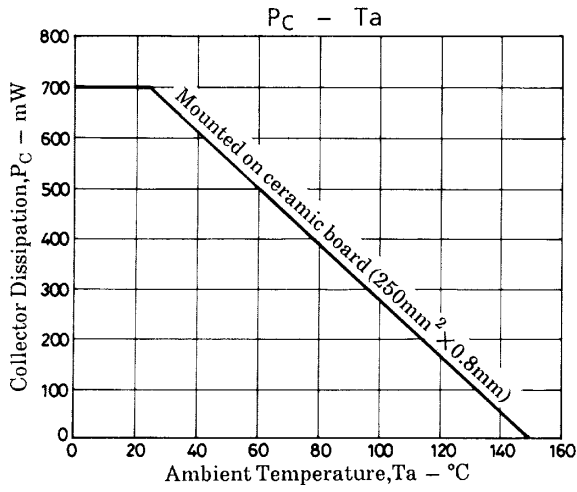
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Gain	$ S_{21e} ^2 1$	$V_{CE}=5V, I_C=20mA, f=1GHz$	8	10.5		dB
	$ S_{21e} ^2 2$	$V_{CE}=8V, I_C=40mA, f=1GHz$		11		dB
Noise Figure	NF1	$V_{CE}=5V, I_C=7mA, f=1GHz$		1.0	1.8	dB
	NF2	$V_{CE}=8V, I_C=40mA, f=1GHz$		1.7		dB

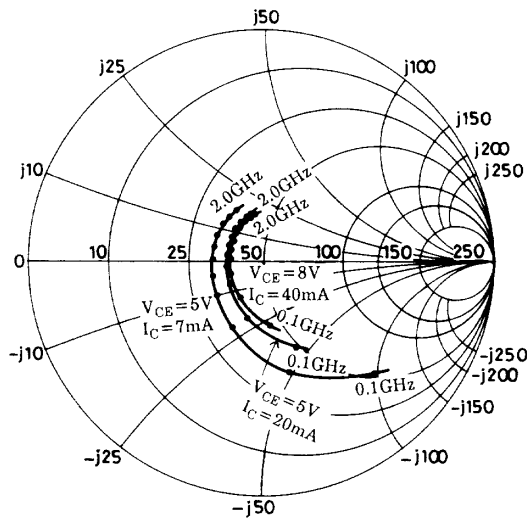


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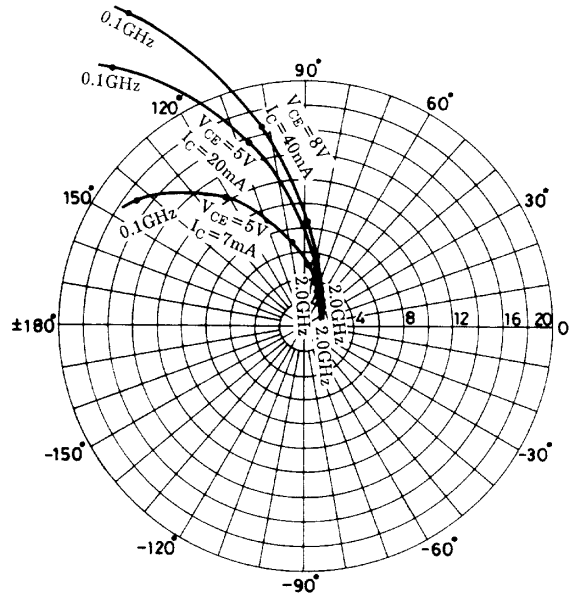


S Parameters

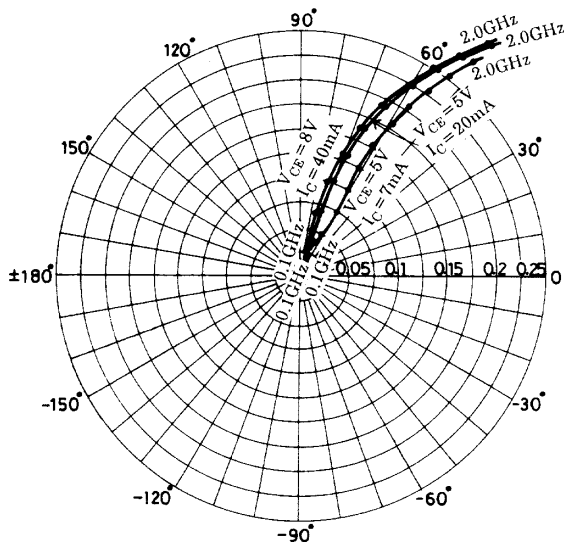
$f = 100\text{MHz}, 200 \text{ to } 2000\text{MHz} (200\text{MHz step})$



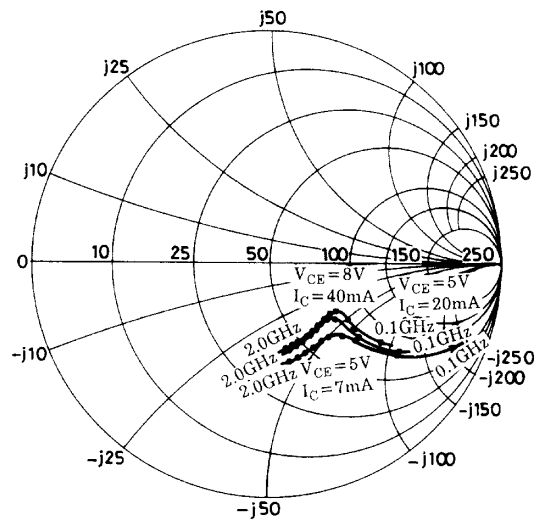
$f = 100\text{MHz}, 200 \text{ to } 2000\text{MHz} (200\text{MHz step})$



$f = 100\text{MHz}, 200 \text{ to } 2000\text{MHz} (200\text{MHz step})$



$f = 100\text{MHz}, 200 \text{ to } 2000\text{MHz} (200\text{MHz step})$



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S parameters (Common emitter)

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

Freq (MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠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

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

Freq (MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠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	137.3	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

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

Freq (MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠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

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