Ordering number:EN5046

NPN Epitaxial Planar Silicon Transistor

2SC5230

VHF to UHF Wide-Band Low-Noise Amplifier Applications

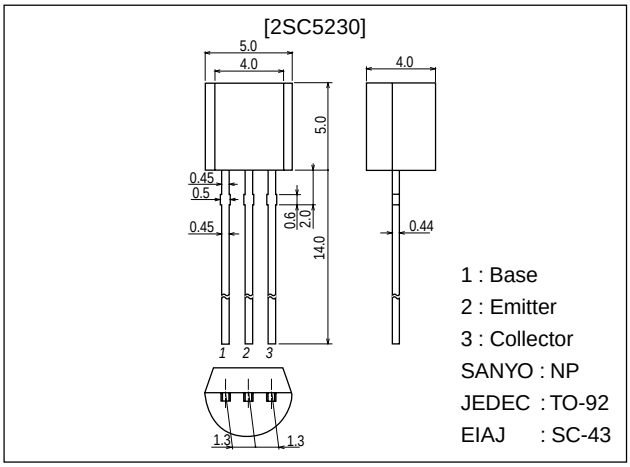
Features

- Low noise : NF=1.0dB typ (f=1GHz).
- High gain : $|S21e|^2$=10.5dB typ (f=1GHz).
- High cutoff frequency : f_T=6.5GHz typ.

Package Dimensions

unit:mm

2004B



Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		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		400	mW
Junction Temperature	Tj		150	˚C
Storage Temperature	Tstg		–55 to +150	˚C

Electrical Characteristics at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=10V, I_E=0			1.0	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=1V, I_C=0			10	μA
DC Current Gain	h_{FE}	V_{CE}=5V, I_C=20mA	60*		270*	
Gain-Bandwidth Product	f_T	V_{CE}=5V, I_C=20mA	4.5	6.5		GHz
Output Capacitance	Cob	V_{CB}=10V, f=1MHz		0.85	1.3	pF
Reverse Transfer Capacitance	Cre	V_{CB}=10V, f=1MHz		0.55		pF
Forward Transfer Gain	$\|S21e\|^2$	V_{CE}=5V, I_C=20mA, f=1GHz	8	10.5		dB
Noise Figure	NF	V_{CE}=5V, I_C=7mA, f=1GHz		1.0	1.8	dB

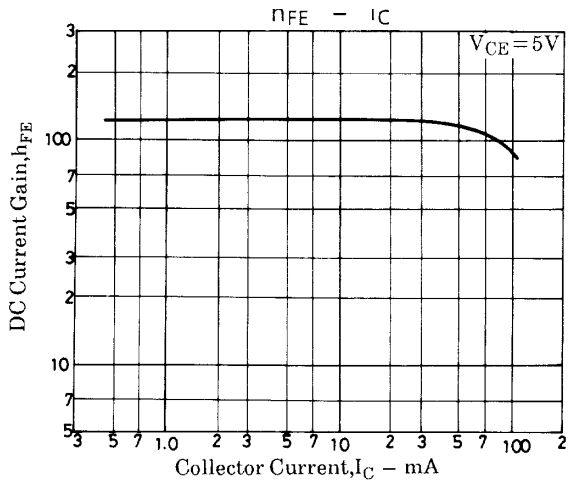
* : The 2SC5230 is classified by 20mA h_{FE} as follows :

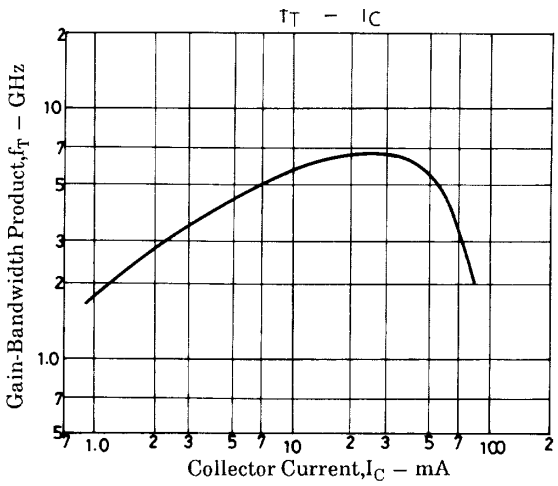
60	D	120	90	E	180	135	F	270

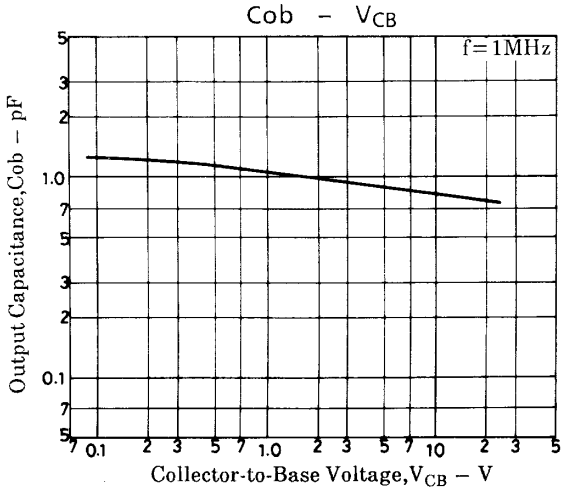
h_{FE} rank : D, E, F

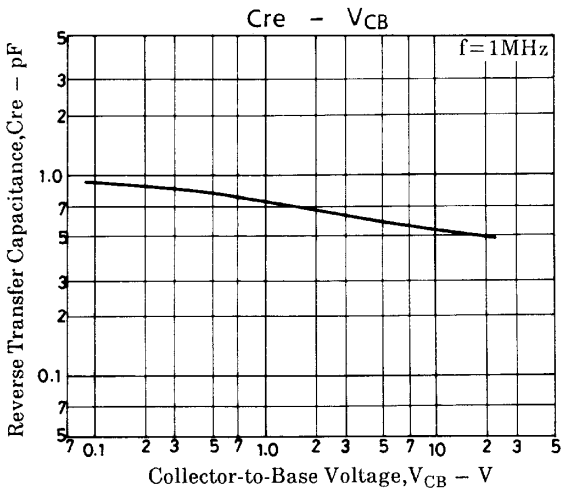
SANYO Electric Co.,Ltd. Semiconductor Bussiness Headquaters

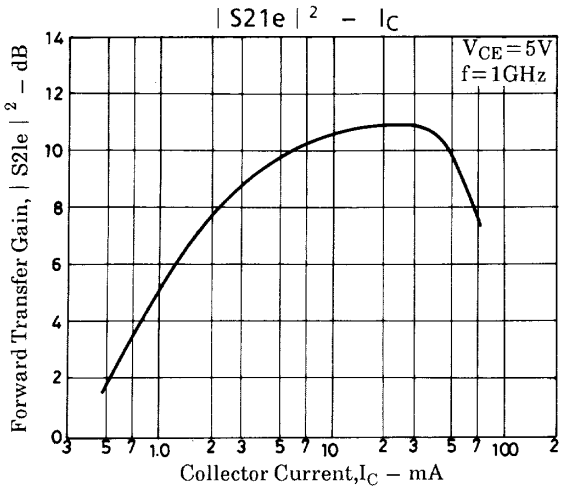
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

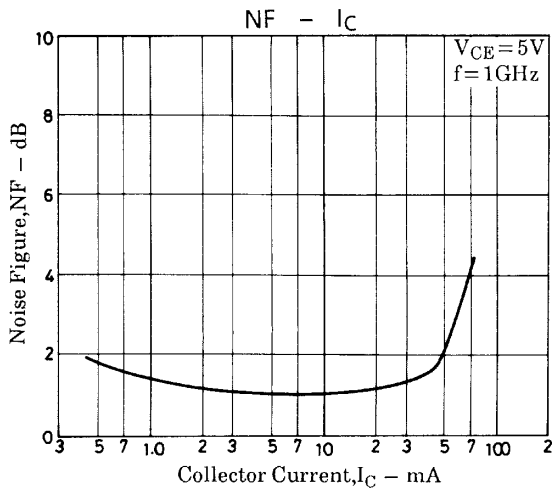

hFE – IC
VCE=5V
DC Current Gain,hFE
Collector Current,IC – mA

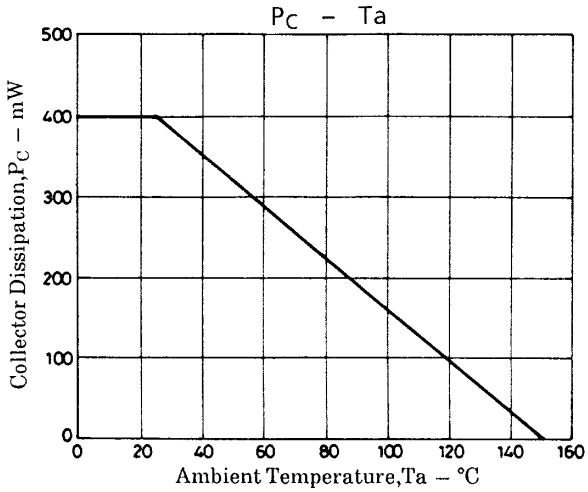

fT – IC
Gain-Bandwidth Product,fT – GHz
Collector Current,IC – mA


Cob – VCB
f=1MHz
Output Capacitance,Cob – pF
Collector-to-Base Voltage,VCB – V


Cre – VCB
f=1MHz
Reverse Transfer Capacitance,Cre – pF
Collector-to-Base Voltage,VCB – V

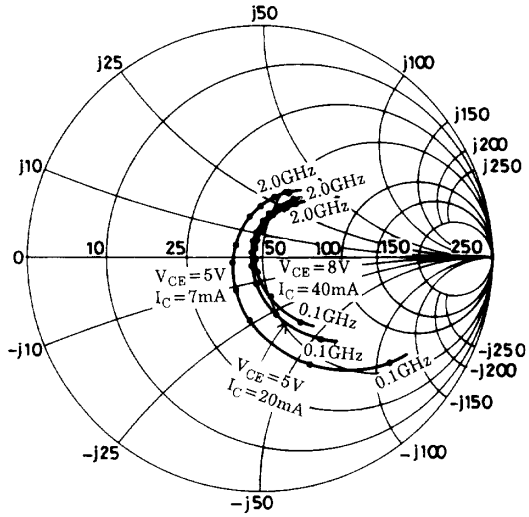

| S21e |2 – IC
VCE=5V
f=1GHz
Forward Transfer Gain, | S21e |2 – dB
Collector Current,IC – mA


NF – IC
VCE=5V
f=1GHz
Noise Figure,NF – dB
Collector Current,IC – mA

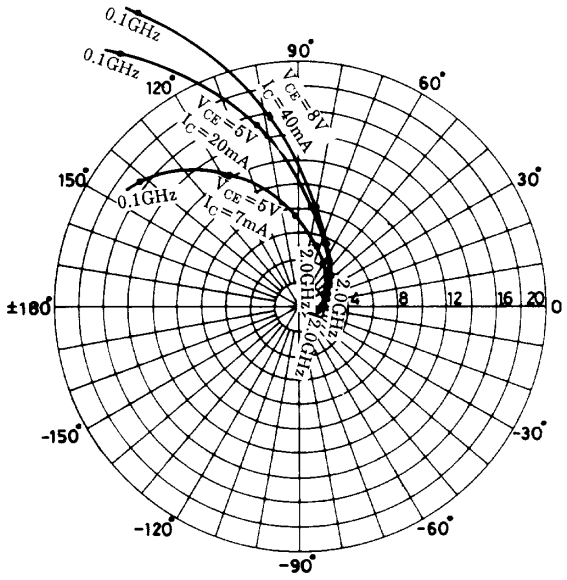

PC – Ta
Collector Dissipation,PC – mW
Ambient Temperature,Ta – °C

S Parameters

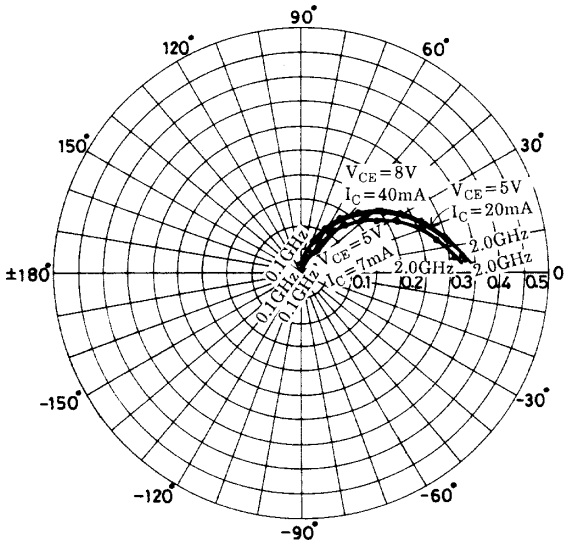
f=100MHz, 200 to 2000MHz (200MHz step)



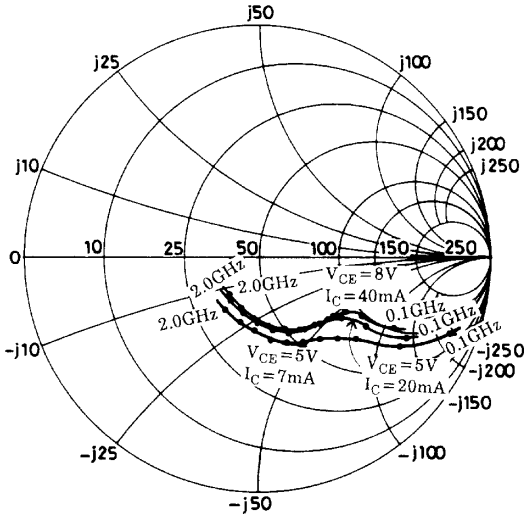
f=100MHz, 200 to 2000MHz (200MHz step)



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



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



S parameters (Common emitter)

V_{CE}=5V, I_C=7mA, Z_O=50Ω

Freq (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.706	–39.4	16.564	141.8	0.029	70.7	0.866	–22.2
200	0.504	–65.6	12.172	117.3	0.048	62.0	0.699	–32.9
400	0.272	–98.9	7.268	90.7	0.076	56.7	0.535	–40.9
600	0.167	–127.5	5.116	73.6	0.105	52.5	0.470	–46.9
800	0.116	–167.7	3.946	59.5	0.134	47.7	0.429	–54.5
1000	0.118	154.0	3.253	47.0	0.163	41.7	0.403	–63.3
1200	0.141	124.4	2.750	35.1	0.194	35.3	0.379	–72.7
1400	0.182	104.9	2.424	23.9	0.224	28.5	0.354	–83.0
1600	0.222	89.6	2.188	12.9	0.255	21.3	0.321	–94.3
1800	0.264	77.4	1.985	2.0	0.285	13.9	0.293	–107.3
2000	0.301	66.8	1.830	–8.6	0.315	6.2	0.267	–123.1

V_{CE}=5V, I_C=20mA, Z_O=50Ω

Freq (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.431	–53.7	25.126	125.0	0.024	71.2	0.704	–29.4
200	0.251	–75.2	15.206	103.1	0.040	68.6	0.533	–34.1
400	0.110	–100.5	8.172	82.6	0.073	65.2	0.433	–37.2
600	0.051	–137.1	5.608	68.5	0.107	59.3	0.395	–43.5
800	0.046	146.2	4.281	56.4	0.141	52.6	0.367	–52.2
1000	0.077	113.8	3.529	45.1	0.174	45.3	0.345	–62.1
1200	0.112	97.4	2.973	34.1	0.207	37.7	0.324	–72.4
1400	0.156	86.8	2.615	23.5	0.240	29.8	0.298	–83.8
1600	0.194	77.9	2.349	13.3	0.273	21.7	0.263	–96.2
1800	0.239	68.1	2.125	2.7	0.304	13.6	0.235	–110.7
2000	0.283	60.6	1.953	–7.5	0.334	5.1	0.209	–128.6

V_{CE}=8V, I_C=40mA, Z_O=50Ω

Freq (MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
100	0.325	–59.7	27.400	118.6	0.021	72.3	0.638	–28.9
200	0.174	–77.9	15.667	98.7	0.037	71.6	0.498	–30.1
400	0.068	–103.4	8.249	80.2	0.071	67.7	0.430	–33.2
600	0.026	–160.0	5.633	67.1	0.104	61.4	0.401	–39.8
800	0.050	117.9	4.288	55.2	0.137	54.4	0.377	–49.0
1000	0.081	103.3	3.524	44.3	0.170	46.8	0.357	–59.1
1200	0.120	91.3	2.981	33.8	0.204	39.0	0.340	–69.6
1400	0.160	82.1	2.616	23.3	0.236	31.0	0.312	–80.9
1600	0.195	73.4	2.349	13.2	0.269	23.0	0.279	–93.1
1800	0.237	65.5	2.131	3.0	0.300	14.7	0.250	–107.3
2000	0.280	57.8	1.962	–7.3	0.331	6.3	0.223	–124.4