

NPN Epitaxial Planar Silicon Transistor

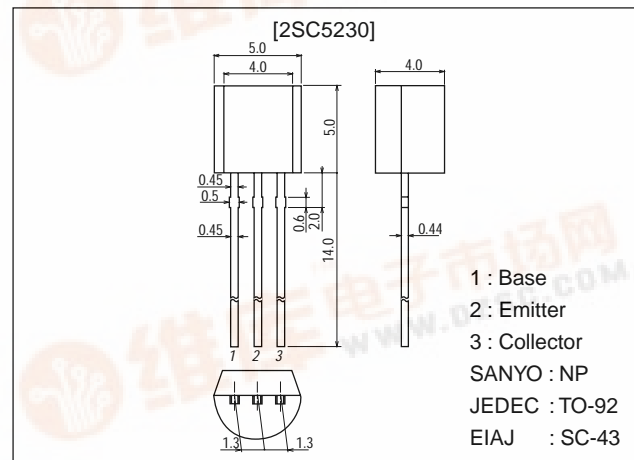
SANYO**2SC5230****VHF to UHF Wide-Band Low-Noise
Amplifier Applications****Features**

- Low noise : NF=1.0dB typ (f=1GHz).
- High gain : $|S_{21e}|^2=10.5\text{dB typ (f=1GHz)}$.
- High cutoff frequency : $f_T=6.5\text{GHz typ}$.

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	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_{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$	$V_{CE}=5\text{V}, I_C=20\text{mA}, f=1\text{GHz}$	8	10.5		dB
Noise Figure	NF	$V_{CE}=5\text{V}, I_C=7\text{mA}, f=1\text{GHz}$		1.0	1.8	dB

* : The 2SC5230 is classified by 20mA h_{FE} as follows :
 h_{FE} rank : D, E, F

60	D	120	90	E	180	135	F	270
----	---	-----	----	---	-----	-----	---	-----

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

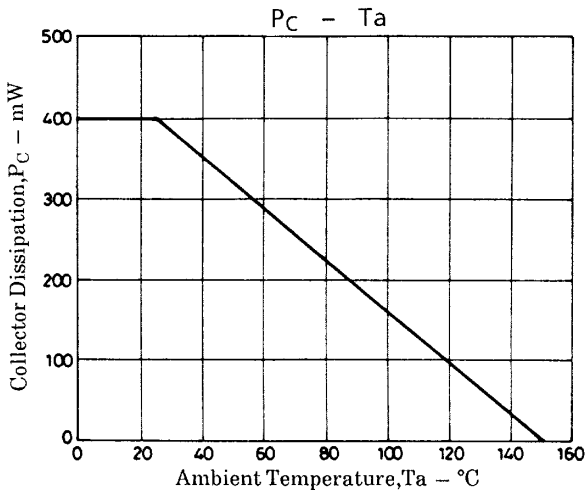
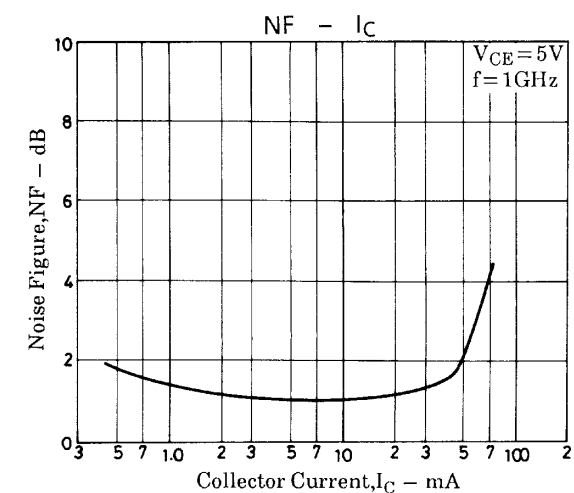
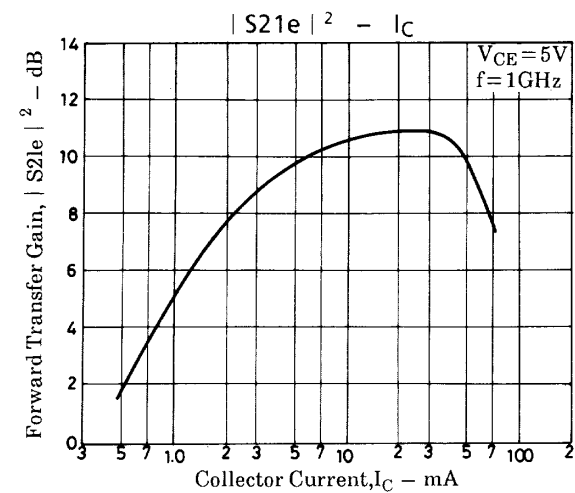
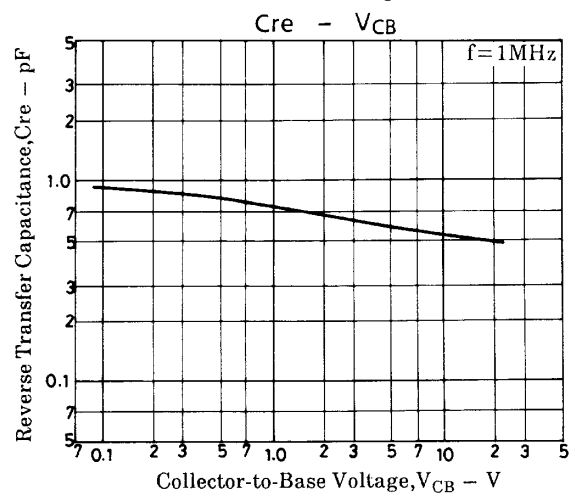
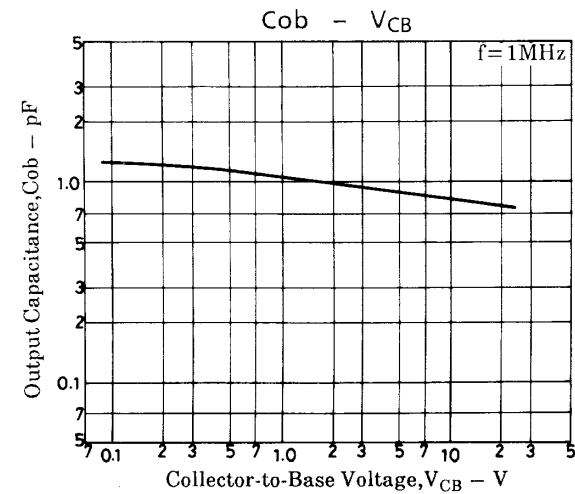
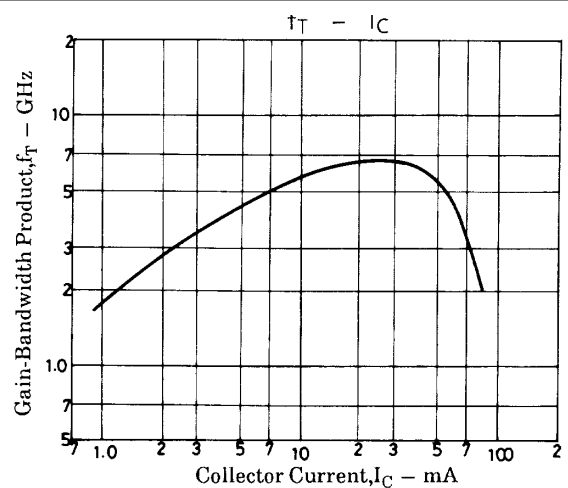
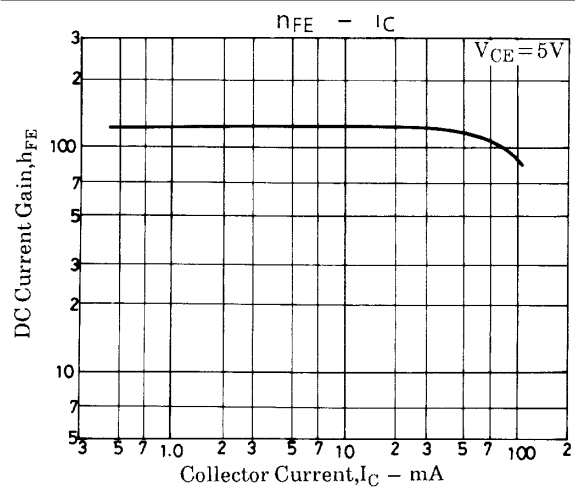
■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

SANYO Electric Co., Ltd. Semiconductor Business Headquarters

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



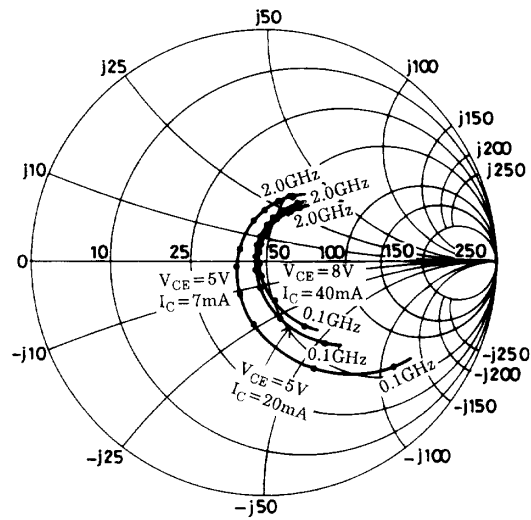
2SC5230



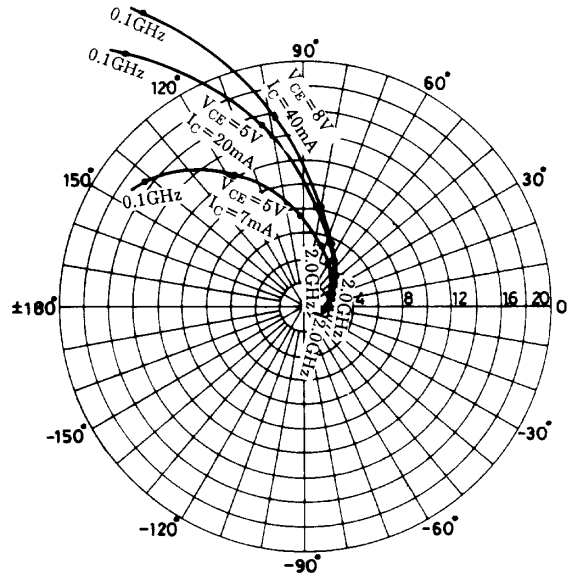
2SC5230

S Parameters

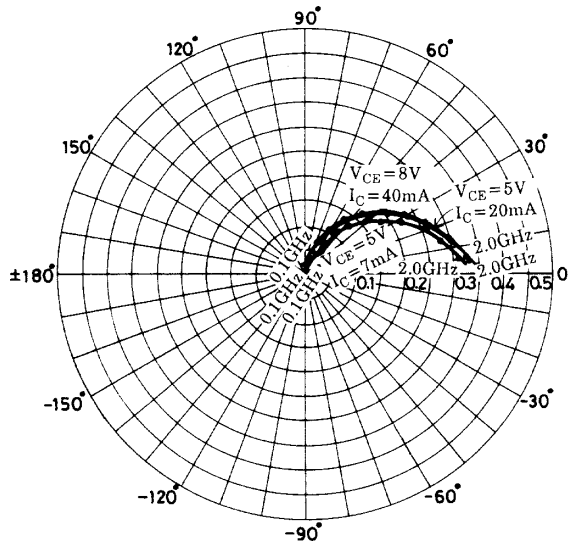
f = 100MHz, 200 to 2000MHz (200MHz step)



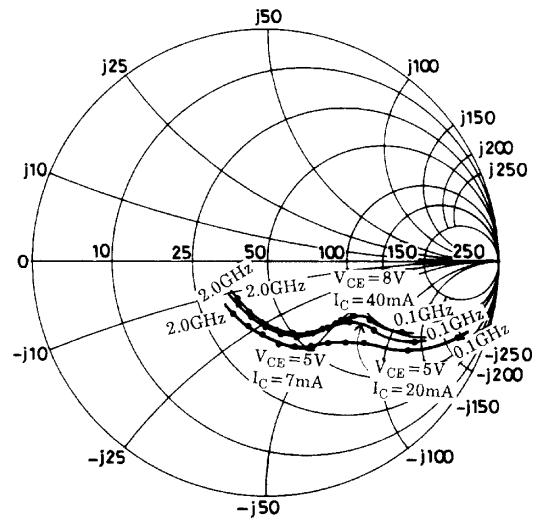
f = 100MHz, 200 to 2000MHz (200MHz step)



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



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



2SC5230

S parameters (Common emitter)

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.706	-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

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.431	-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

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.325	-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

- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products(including technical data,services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.