

**2SC5502**

High-Frequency Low-Noise Amplifier Applications

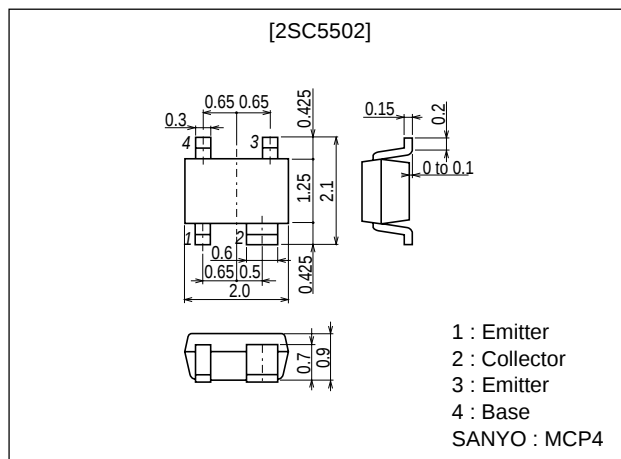
Features

- Low noise : $NF=1.1\text{dB}$ typ ($f=1\text{GHz}$).
- High gain : $|S_{21e}|^2=12\text{dB}$ typ ($f=1\text{GHz}$).
- High cutoff frequency : $f_T=8\text{GHz}$ typ.

Package Dimensions

unit:mm

2161



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		20	V
Collector-to-Emitter Voltage	V_{CEO}		12	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		100	mA
Collector Dissipation	P_C	Mounted on a ceramic board (250mm ² ×0.8mm)	500	mW
Junction Temperature	T_J		150	°C
Storage Temperature	T_{stg}		-55 to +150	°C

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

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	$V_{CB}=5\text{V}, I_E=0$			1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=1\text{V}, I_C=0$			10	μA
DC Current Gain	h_{FE1}	$V_{CE}=5\text{V}, I_C=30\text{mA}$	90*		270*	
	h_{FE2}	$V_{CE}=5\text{V}, I_C=70\text{mA}$	80			
Gain-Bandwidth Product	f_T	$V_{CE}=5\text{V}, I_C=30\text{mA}$	6	8		GHz
Reverse Transfer Capacitance	C_{re}	$V_{CB}=5\text{V}, f=1\text{MHz}$		0.6	1.0	pF

* : The 2SC5502 is classified by 30mA h_{FE} as follows :

Continued on next page.

Marking	TY	
Rank	4	5
h_{FE}	90 to 180	135 to 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.

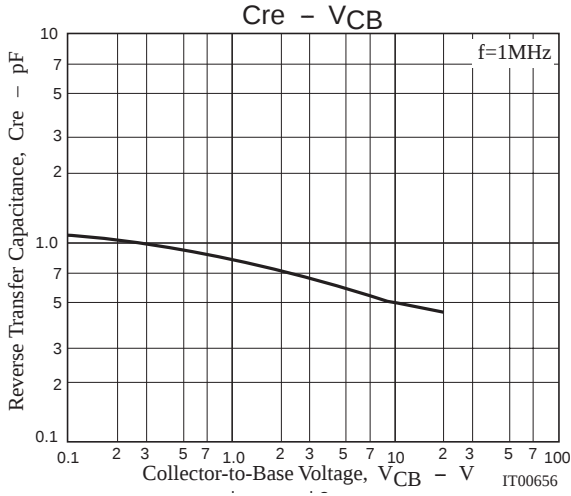
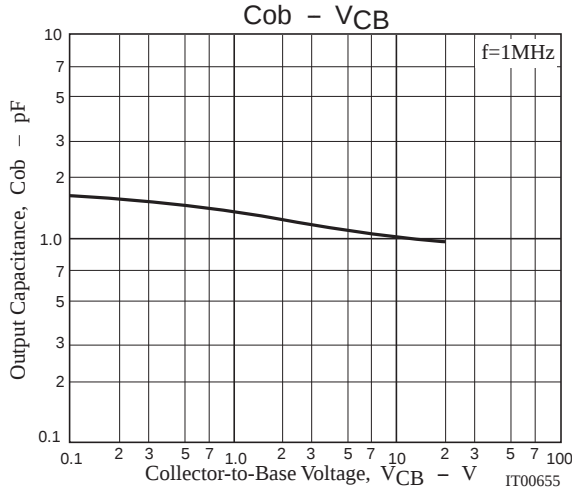
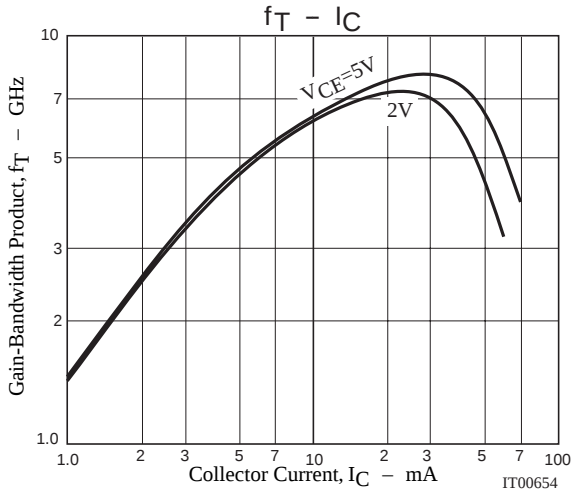
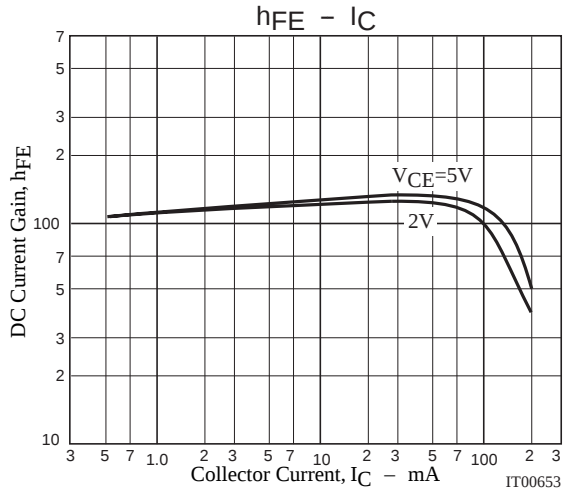
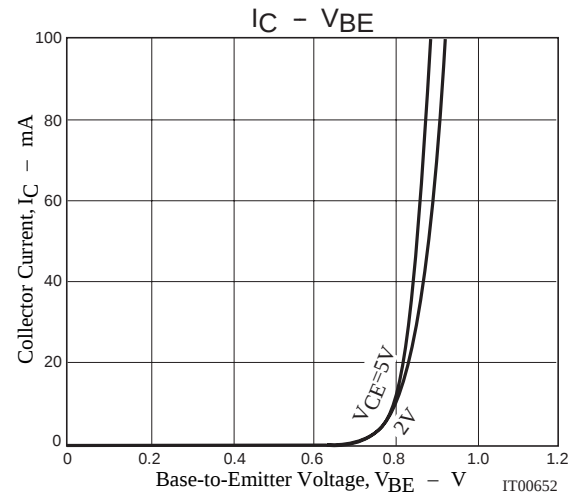
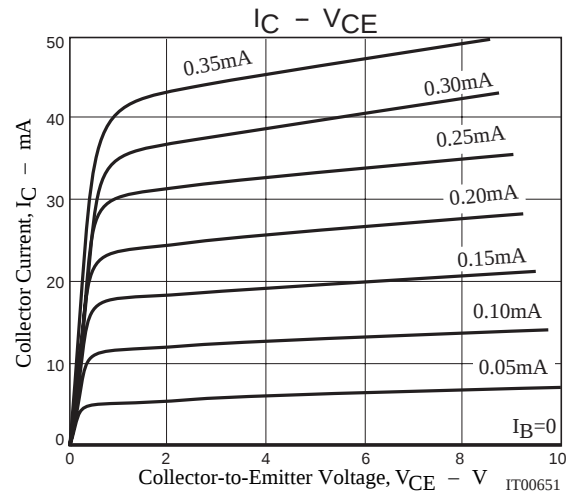
SANYO Electric Co.,Ltd. Semiconductor Company

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

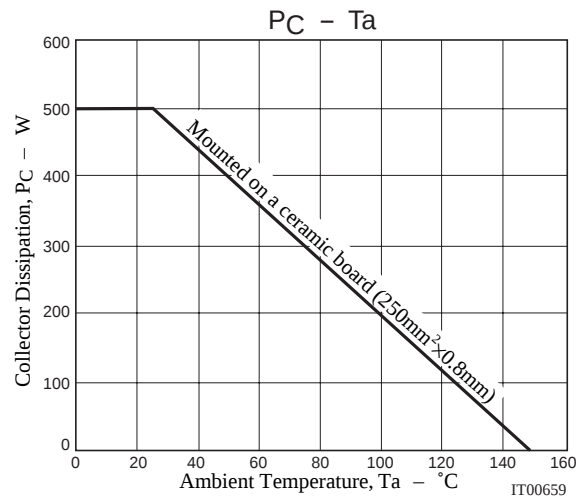
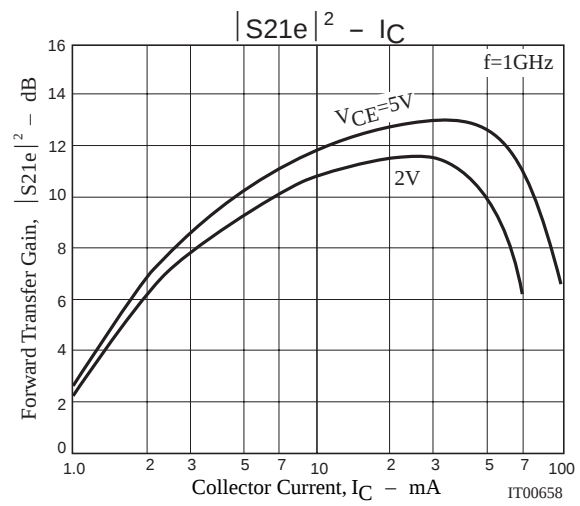
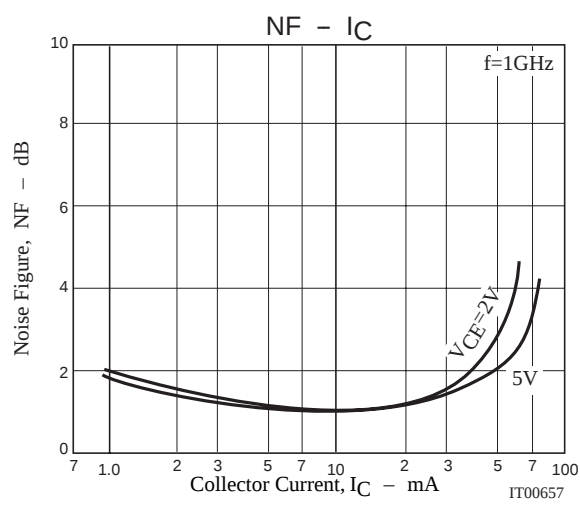
2SC5502

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Gain	$ S_{21e} ^2$	$V_{CE}=5V, I_C=30mA, f=1GHz$	10	12		dB
Noise Figure	NF	$V_{CE}=5V, I_C=7mA, f=1GHz$		1.1	2.0	dB



2SC5502



S Parameters (Common emitter)

V_{CE}=2V, I_C=1mA, Z_O=50Ω

Freq (MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.965	-24.2	2.014	161.0	0.046	73.8	0.973	-10.2
200	0.940	-45.5	2.365	143.6	0.086	60.0	0.926	-17.5
400	0.878	-85.2	2.060	117.9	0.134	38.5	0.852	-27.4
600	0.824	-114.7	1.796	97.5	0.153	24.5	0.743	-37.5
800	0.804	-134.1	1.391	81.6	0.155	14.5	0.712	-43.3
1000	0.765	-152.3	1.309	68.5	0.153	7.9	0.734	-47.8
1200	0.765	-163.6	1.032	56.6	0.141	3.7	0.704	-54.7
1400	0.745	-175.6	0.952	46.7	0.128	2.7	0.681	-61.5
1600	0.725	173.8	0.897	39.4	0.117	1.5	0.700	-67.4
1800	0.727	165.5	0.840	31.4	0.105	8.8	0.735	-72.8
2000	0.715	157.0	0.713	23.8	0.095	13.8	0.769	-79.0

2SC5502

$V_{CE}=2V$, $I_C=5mA$, $Z_0=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.840	-41.5	10.284	149.7	0.041	65.7	0.884	-24.5
200	0.757	-78.0	9.025	128.9	0.062	49.3	0.706	-39.6
400	0.675	-122.7	6.076	104.0	0.082	36.1	0.492	-53.7
600	0.623	-149.7	4.636	87.6	0.090	33.2	0.403	-59.4
800	0.610	-164.5	3.574	76.9	0.095	33.9	0.360	-64.1
1000	0.603	-174.9	2.854	67.6	0.104	34.1	0.346	-68.0
1200	0.563	175.3	2.448	59.2	0.111	35.9	0.336	-73.3
1400	0.586	167.4	2.118	51.8	0.120	38.0	0.344	-77.5
1600	0.581	160.0	1.882	45.2	0.132	38.7	0.357	-81.4
1800	0.581	153.6	1.677	38.3	0.141	38.8	0.368	-86.0
2000	0.577	147.1	1.488	31.6	0.157	39.9	0.380	-90.8

$V_{CE}=2V$, $I_C=10mA$, $Z_0=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.727	-60.0	17.305	141.4	0.035	59.3	0.787	-36.3
200	0.643	-104.1	13.452	118.3	0.050	47.3	0.553	-55.0
400	0.587	-145.0	8.031	96.0	0.064	41.8	0.354	-68.8
600	0.571	-163.3	5.556	83.7	0.076	43.9	0.279	-75.8
800	0.565	-175.3	4.249	74.8	0.088	45.6	0.248	-81.0
1000	0.557	175.5	3.425	66.6	0.102	46.6	0.240	-84.2
1200	0.554	167.8	2.884	59.3	0.116	47.0	0.240	-88.6
1400	0.550	161.2	2.480	52.6	0.129	47.4	0.243	-93.2
1600	0.547	154.8	2.182	46.6	0.146	46.2	0.254	-96.7
1800	0.543	148.5	1.964	40.2	0.160	45.2	0.267	-99.7
2000	0.541	142.8	1.764	34.3	0.178	43.6	0.279	-103.9

$V_{CE}=2V$, $I_C=20mA$, $Z_0=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.601	-88.1	25.245	130.6	0.028	55.8	0.668	-48.8
200	0.565	-129.8	16.396	109.1	0.039	48.4	0.428	-69.0
400	0.552	-160.2	9.005	91.0	0.054	50.8	0.262	-85.3
600	0.547	-173.8	6.121	81.0	0.069	54.5	0.208	-93.6
800	0.545	176.8	4.625	73.2	0.086	55.2	0.192	-99.7
1000	0.541	169.2	3.717	65.8	0.103	55.3	0.185	-103.8
1200	0.537	162.4	3.129	59.3	0.121	53.9	0.190	-107.6
1400	0.535	156.6	2.687	52.8	0.138	52.7	0.197	-111.1
1600	0.531	150.6	2.374	47.5	0.156	50.4	0.206	-113.7
1800	0.529	144.9	2.130	41.4	0.173	48.4	0.216	-117.0
2000	0.525	139.4	1.919	35.6	0.191	46.0	0.229	-119.4

2SC5502

$V_{CE}=5V$, $I_C=1mA$, $Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.969	-22.2	2.804	161.2	0.036	74.9	0.986	-6.7
200	0.939	-44.4	2.293	146.2	0.066	62.3	0.948	-13.9
400	0.891	-81.0	2.036	121.5	0.102	41.0	0.845	-25.2
600	0.843	-109.9	1.811	101.4	0.117	27.9	0.814	-30.0
800	0.787	-134.0	1.760	85.8	0.121	18.6	0.780	-35.6
1000	0.776	-149.4	1.342	72.5	0.117	13.6	0.730	-41.8
1200	0.739	-164.5	1.290	61.6	0.108	10.0	0.748	-46.6
1400	0.732	-175.0	1.102	51.6	0.099	10.0	0.776	-51.6
1600	0.730	175.5	0.953	43.8	0.090	14.9	0.783	-57.2
1800	0.712	166.0	0.787	34.7	0.083	19.5	0.781	-62.8
2000	0.702	157.5	0.773	28.1	0.086	32.9	0.774	-68.6

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.809	-43.4	13.671	148.9	0.030	64.5	0.878	-22.7
200	0.716	-80.4	11.979	127.1	0.046	50.7	0.697	-35.7
400	0.612	-126.9	7.867	102.7	0.060	41.3	0.502	-44.8
600	0.573	-150.3	5.706	88.1	0.068	41.7	0.422	-47.7
800	0.559	-164.9	4.406	78.0	0.077	42.7	0.393	-50.5
1000	0.546	-176.1	3.550	69.1	0.086	44.8	0.375	-53.7
1200	0.542	175.1	3.010	61.3	0.095	46.0	0.379	-57.3
1400	0.538	167.5	2.560	54.0	0.106	47.5	0.378	-61.6
1600	0.535	160.7	2.280	47.8	0.119	48.3	0.386	-65.8
1800	0.533	153.8	2.036	41.0	0.131	47.9	0.394	-70.2
2000	0.529	147.7	1.836	34.6	0.145	48.0	0.409	-74.4

$V_{CE}=5V$, $I_C=10mA$, $Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.748	-51.9	18.026	144.6	0.028	63.3	0.831	-27.1
200	0.648	-93.0	14.173	122.7	0.041	50.7	0.629	-40.7
400	0.565	-136.3	8.983	98.8	0.054	45.6	0.432	-49.0
600	0.538	-157.4	6.282	85.9	0.064	46.4	0.364	-51.1
800	0.530	-170.4	4.798	76.7	0.075	48.4	0.333	-53.8
1000	0.523	179.9	3.880	68.4	0.086	49.9	0.319	-56.9
1200	0.517	171.5	3.275	61.2	0.098	51.1	0.320	-60.6
1400	0.513	164.5	2.807	54.3	0.111	51.5	0.323	-65.0
1600	0.512	158.1	2.470	48.4	0.125	50.7	0.336	-68.5
1800	0.511	151.6	2.227	41.8	0.139	50.1	0.341	-73.4
2000	0.508	145.6	2.001	35.8	0.155	49.0	0.354	-77.5

2SC5502

$V_{CE}=5V$, $I_C=30mA$, $Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.546	-89.2	31.405	129.4	0.021	59.0	0.673	-40.3
200	0.508	-129.7	19.738	108.7	0.030	53.9	0.441	-52.2
400	0.493	-159.3	10.703	91.5	0.043	58.1	0.286	-56.2
600	0.490	-172.8	7.268	81.6	0.057	60.6	0.241	-57.9
800	0.490	178.0	5.510	74.2	0.073	61.3	0.226	-60.3
1000	0.485	170.7	4.415	67.0	0.088	60.6	0.221	-63.9
1200	0.484	164.0	3.712	60.6	0.104	59.9	0.227	-68.0
1400	0.480	158.1	3.177	54.3	0.120	58.3	0.233	-72.1
1600	0.480	152.7	2.769	49.0	0.137	56.4	0.243	-75.9
1800	0.479	146.8	2.513	42.9	0.153	54.0	0.253	-80.5
2000	0.479	141.5	2.265	37.3	0.170	51.6	0.265	-84.7

- 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.

This catalog provides information as of January, 2000. Specifications and information herein are subject to change without notice.