

**2SC5534**

## UHF to S Band Low-Noise Amplifier, OSC Applications

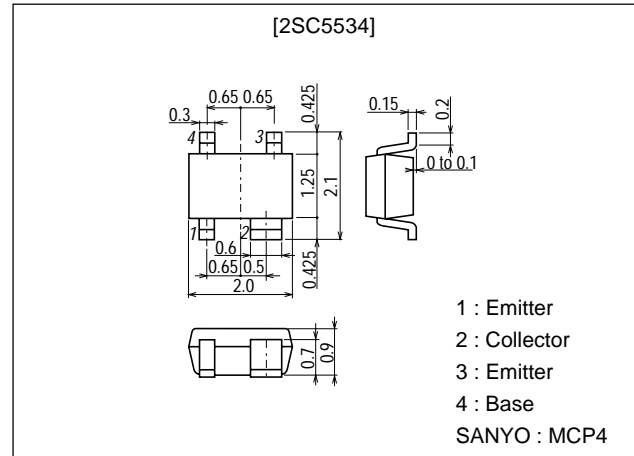
### Features

- Low noise :  $NF=1.2\text{dB typ (}f=2\text{GHz)}$ .
- High gain :  $|S_{21e}|^2=10\text{dB typ (}f=2\text{GHz)}$ .
- High cutoff frequency :  $f_T=13\text{GHz typ}$ .

### 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	$V_{CBO}$		9	V
Collector-to-Emitter Voltage	$V_{CEO}$		6	V
Emitter-to-Base Voltage	$V_{EBO}$		1.5	V
Collector Current	$I_C$		30	mA
Collector Dissipation	$P_C$		150	mW
Junction Temperature	$T_J$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=5\text{V}, I_E=0$			1.0	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=1\text{V}, I_C=0$			10	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE}=5\text{V}, I_C=10\text{mA}$	90		200	
Gain-Bandwidth Product	$f_T$	$V_{CE}=5\text{V}, I_C=10\text{mA}$	10	13		GHz
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=5\text{V}, f=1\text{MHz}$		0.3	0.6	pF
Forward Transfer Gain	$ S_{21e} ^2 1$	$V_{CE}=5\text{V}, I_C=10\text{mA}, f=2\text{GHz}$	8	10		dB
	$ S_{21e} ^2 2$	$V_{CE}=1\text{V}, I_C=3\text{mA}, f=2\text{GHz}$		8		dB
Noise Figure	NF	$V_{CE}=5\text{V}, I_C=5\text{mA}, f=2\text{GHz}$		1.2	2.0	dB

Marking : RY

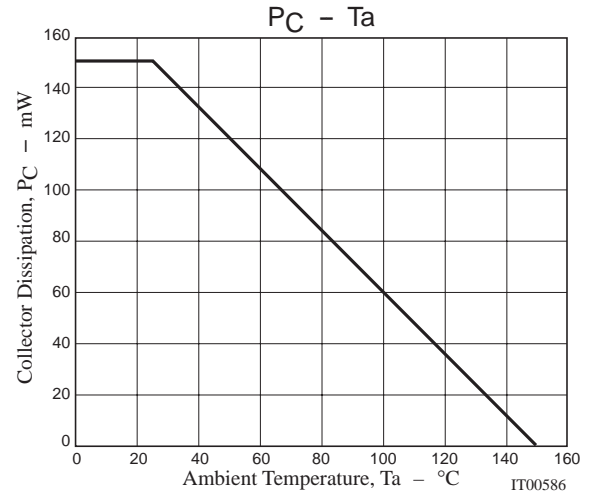
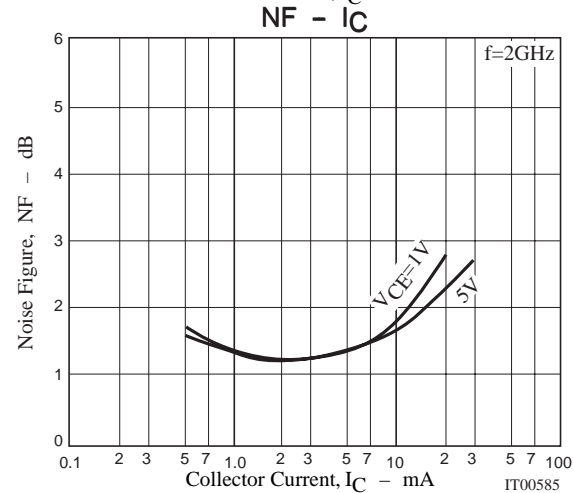
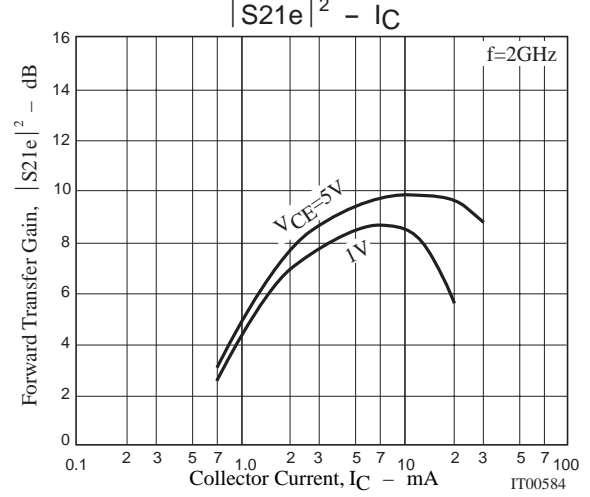
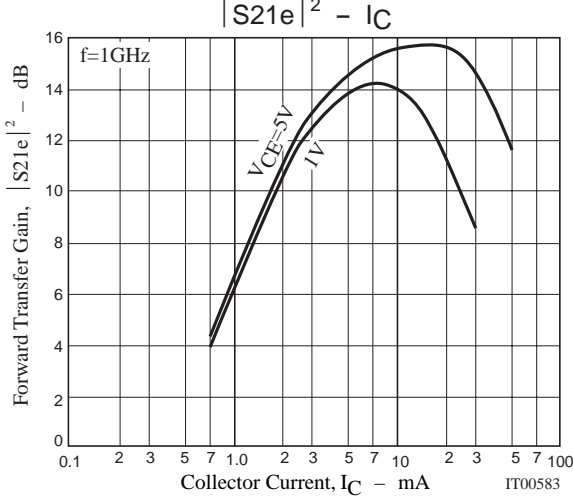
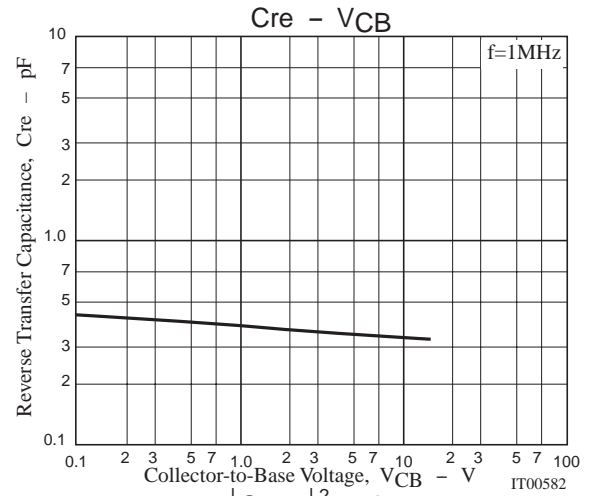
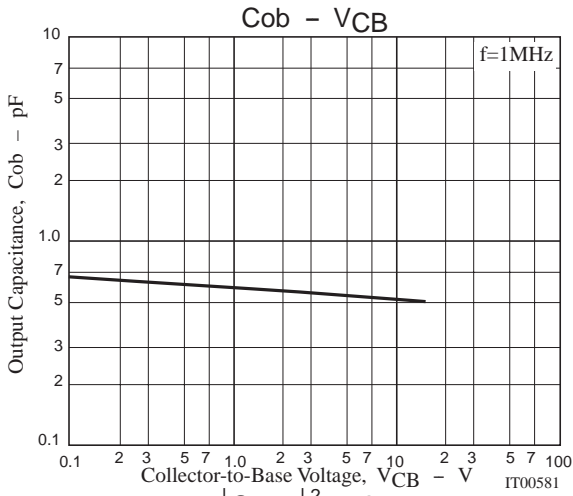
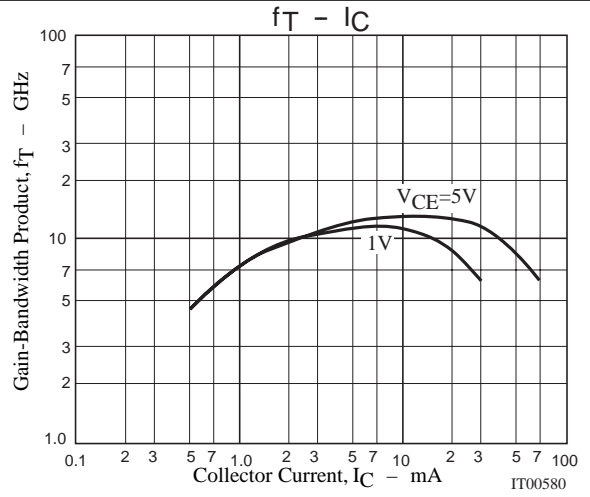
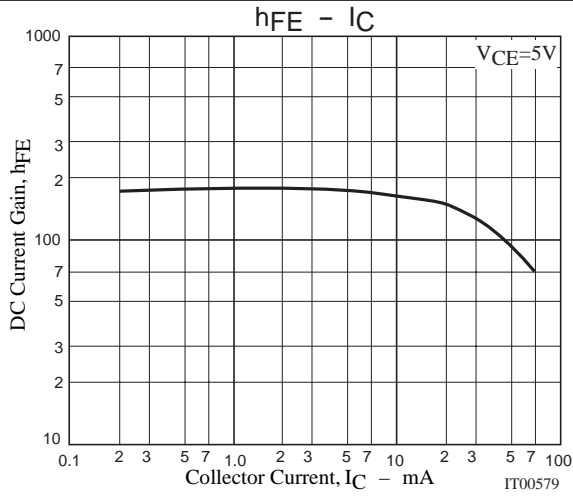
■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious 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

# 2SC5534



## 2SC5534

### S Parameters (Common emitter)

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.972	-7.6	2.444	170.6	0.025	83.8	0.994	-5.5
200	0.961	-14.6	1.998	162.7	0.050	77.4	0.981	-11.2
400	0.939	-28.3	2.323	146.8	0.096	65.7	0.955	-21.0
600	0.894	-42.8	2.325	133.2	0.132	56.9	0.902	-29.8
800	0.838	-57.4	2.138	121.7	0.161	46.5	0.835	-40.0
1000	0.822	-67.0	2.050	110.1	0.180	39.8	0.804	-45.1
1200	0.758	-81.7	2.062	98.8	0.188	31.6	0.741	-53.1
1400	0.696	-95.6	2.092	87.1	0.202	27.0	0.708	-57.9
1600	0.661	-106.7	1.869	79.0	0.224	21.3	0.711	-62.0
1800	0.619	-117.7	1.835	69.0	0.218	17.0	0.695	-65.7
2000	0.573	-130.1	1.720	60.4	0.220	14.0	0.658	-70.4

$V_{CE}=1V, I_C=3mA, Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.911	-13.0	7.001	165.4	0.024	79.8	0.975	-9.8
200	0.880	-24.5	6.275	153.8	0.046	71.3	0.928	-19.1
400	0.771	-49.7	5.664	135.6	0.081	57.4	0.830	-33.3
600	0.694	-69.0	5.349	119.0	0.101	49.1	0.696	-44.7
800	0.605	-89.2	4.927	104.5	0.117	42.5	0.623	-51.9
1000	0.510	-110.0	4.174	94.3	0.128	39.0	0.575	-56.8
1200	0.470	-122.8	3.766	83.6	0.136	36.1	0.539	-61.3
1400	0.441	-132.5	3.342	74.6	0.143	34.7	0.497	-65.7
1600	0.402	-146.9	3.010	67.4	0.153	33.1	0.469	-69.2
1800	0.369	-160.6	2.690	60.5	0.163	31.4	0.472	-72.2
2000	0.358	-169.2	2.493	53.0	0.171	31.8	0.460	-75.3

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.852	-18.4	10.066	162.2	0.024	78.5	0.960	-12.9
200	0.801	-34.1	9.399	147.8	0.043	67.7	0.878	-24.7
400	0.657	-66.9	8.237	126.1	0.071	54.4	0.728	-40.3
600	0.557	-90.7	6.839	110.0	0.086	48.2	0.592	-49.4
800	0.476	-112.2	5.735	97.2	0.100	44.4	0.516	-55.3
1000	0.410	-132.6	4.892	85.6	0.109	43.4	0.468	-59.3
1200	0.382	-144.5	4.202	77.5	0.120	41.9	0.446	-63.0
1400	0.360	-155.6	3.623	70.0	0.130	40.9	0.416	-66.4
1600	0.344	-166.5	3.244	63.5	0.142	40.4	0.403	-69.4
1800	0.328	-178.7	2.947	56.3	0.152	39.5	0.401	-72.5
2000	0.320	172.2	2.670	50.0	0.165	38.3	0.398	-75.4

## 2SC5534

$V_{CE}=1V, I_C=10mA, Z_0=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.711	-33.6	15.894	154.5	0.022	74.6	0.909	-18.3
200	0.627	-60.8	13.816	136.0	0.039	63.0	0.773	-31.8
400	0.495	-102.8	10.266	111.5	0.057	53.4	0.573	-45.5
600	0.427	-126.6	7.718	97.2	0.070	51.4	0.459	-51.0
800	0.392	-144.9	6.075	87.0	0.082	50.2	0.404	-54.4
1000	0.370	-160.0	4.948	77.8	0.093	50.7	0.372	-56.9
1200	0.357	-170.5	4.237	70.8	0.108	50.2	0.360	-60.2
1400	0.348	-179.9	3.648	63.9	0.120	49.8	0.349	-63.0
1600	0.342	171.6	3.229	58.3	0.134	48.6	0.347	-65.7
1800	0.341	162.2	2.904	51.7	0.148	47.7	0.350	-69.2
2000	0.338	154.9	2.628	45.9	0.161	45.6	0.352	-72.4

$V_{CE}=5V, I_C=1mA, Z_0=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.976	-6.5	2.336	171.5	0.022	84.4	0.996	-4.4
200	0.961	-13.8	2.319	163.3	0.042	77.8	0.985	-9.4
400	0.939	-26.6	2.408	149.0	0.080	67.6	0.954	-19.9
600	0.905	-39.5	2.006	137.3	0.112	58.6	0.929	-26.0
800	0.840	-55.0	2.177	125.4	0.139	49.7	0.885	-33.9
1000	0.827	-64.2	2.115	114.1	0.154	43.1	0.806	-41.9
1200	0.748	-79.7	2.176	102.8	0.175	35.8	0.797	-46.9
1400	0.713	-90.1	1.949	93.3	0.192	30.3	0.788	-50.7
1600	0.693	-99.0	1.716	85.5	0.196	25.4	0.759	-55.8
1800	0.623	-112.5	1.910	74.3	0.199	20.5	0.716	-60.9
2000	0.584	-123.6	1.687	66.2	0.200	17.9	0.684	-64.8

$V_{CE}=5V, I_C=3mA, Z_0=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.923	-11.1	6.639	167.1	0.021	79.9	0.984	-8.4
200	0.893	-21.8	6.408	155.9	0.039	73.7	0.945	-16.2
400	0.818	-41.3	5.503	139.6	0.070	60.9	0.858	-29.0
600	0.717	-62.0	5.590	122.7	0.089	52.2	0.755	-38.5
800	0.628	-80.3	5.046	109.8	0.101	46.4	0.672	-45.8
1000	0.566	-94.0	4.297	99.7	0.116	42.3	0.620	-50.5
1200	0.491	-109.7	4.009	88.6	0.125	38.9	0.569	-55.0
1400	0.432	-123.5	3.610	78.9	0.130	37.8	0.541	-58.6
1600	0.390	-136.2	3.301	71.4	0.141	36.5	0.529	-61.6
1800	0.364	-146.6	2.980	64.0	0.151	33.4	0.518	-64.7
2000	0.337	-158.0	2.696	57.3	0.156	34.0	0.505	-67.6

## 2SC5534

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.875	-14.9	10.148	164.2	0.020	79.7	0.971	-10.8
200	0.825	-28.9	9.923	150.6	0.036	70.7	0.909	-20.6
400	0.706	-55.4	8.394	131.2	0.062	57.9	0.774	-34.6
600	0.583	-78.9	7.349	114.2	0.077	52.0	0.645	-43.3
800	0.491	-98.7	6.285	101.4	0.090	48.1	0.573	-48.7
1000	0.414	-115.9	5.367	90.3	0.099	46.7	0.523	-52.4
1200	0.369	-129.5	4.670	81.6	0.111	43.9	0.491	-55.8
1400	0.339	-140.7	4.025	73.9	0.119	43.6	0.466	-59.0
1600	0.311	-153.4	3.634	67.2	0.131	43.1	0.450	-61.6
1800	0.290	-165.2	3.288	60.3	0.141	41.9	0.448	-64.4
2000	0.280	-174.2	2.993	53.9	0.152	41.1	0.442	-67.1

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.773	-23.2	16.803	159.2	0.019	76.2	0.941	-15.0
200	0.688	-44.4	15.341	142.5	0.033	67.2	0.835	-26.6
400	0.530	-78.6	11.914	118.5	0.051	57.4	0.644	-40.0
600	0.412	-105.6	9.118	102.8	0.064	54.2	0.534	-45.8
800	0.351	-124.7	7.233	92.1	0.076	53.8	0.467	-49.3
1000	0.314	-139.3	5.946	83.0	0.088	53.3	0.428	-51.6
1200	0.289	-153.1	5.077	75.5	0.100	52.8	0.409	-54.1
1400	0.272	-165.3	4.359	68.6	0.111	51.6	0.397	-57.0
1600	0.263	-174.8	3.870	62.9	0.125	50.8	0.395	-59.6
1800	0.256	174.7	3.495	56.8	0.138	49.6	0.392	-62.3
2000	0.252	165.3	3.156	51.0	0.151	47.8	0.392	-65.3

- 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 December, 1999. Specifications and information herein are subject to change without notice.