

**2SC5490**

## UHF to S Band Low-Noise Amplifier Applications

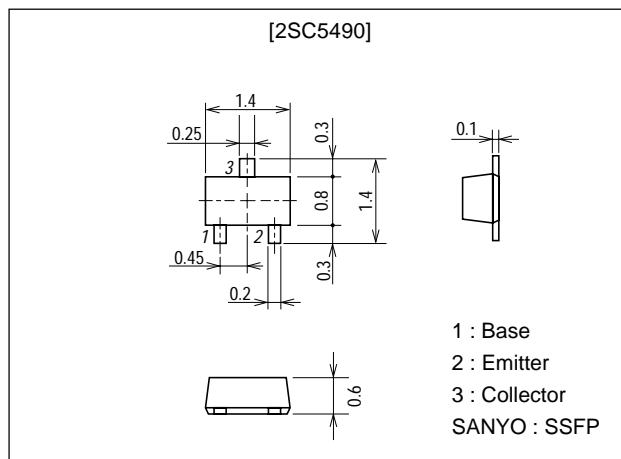
### Features

- Low noise :  $NF=0.9\text{dB}$  typ ( $f=1\text{GHz}$ ).  
:  $NF=1.4\text{dB}$  typ ( $f=1.5\text{GHz}$ ).
- High gain :  $|S_{21e}|^2=10\text{dB}$  typ ( $f=1.5\text{GHz}$ ).
- High cutoff frequency :  $f_T=11\text{GHz}$  typ.
- Ultrasmall, slim flat-lead package.  
( $1.4\text{mm}\times0.8\text{mm}\times0.6\text{mm}$ )
- Low voltage, low current operation.  
( $V_{CE}=1\text{V}$ ,  $I_C=1\text{mA}$ )  
:  $f_T=7\text{GHz}$  typ.  
:  $|S_{21e}|^2=5.5\text{dB}$  typ ( $f=1.5\text{GHz}$ )

### Package Dimensions

unit:mm

2159



### 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	$V_{CEO}$		10	V
Emitter-to-Base Voltage	$V_{EBO}$		1.5	V
Collector Current	$I_C$		30	mA
Collector Dissipation	$P_C$		100	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	$I_{CBO}$	$V_{CB}=10\text{V}$ , $I_E=0$			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	$f_{T1}$	$V_{CE}=5\text{V}$ , $I_C=10\text{mA}$	8	11		GHz
	$f_{T2}$	$V_{CE}=1\text{V}$ , $I_C=1\text{mA}$		7		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$		0.45	0.7	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$		0.3		pF

Marking : MN

Continued on next page.

■ 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.

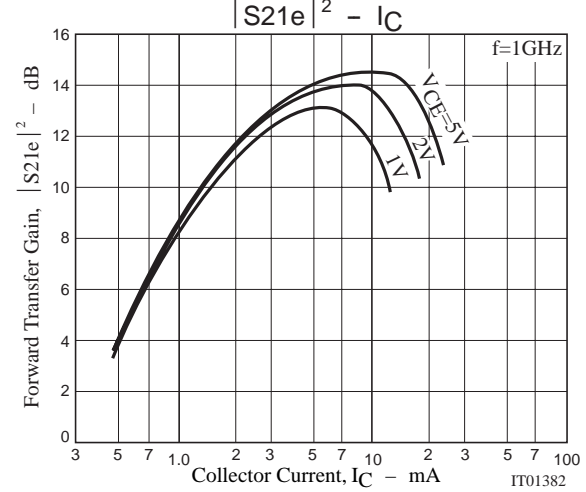
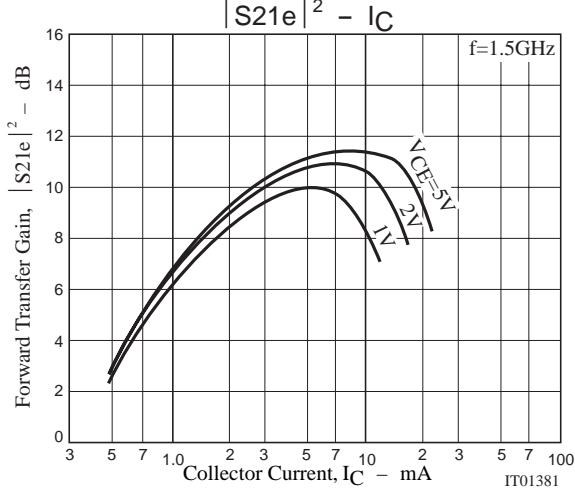
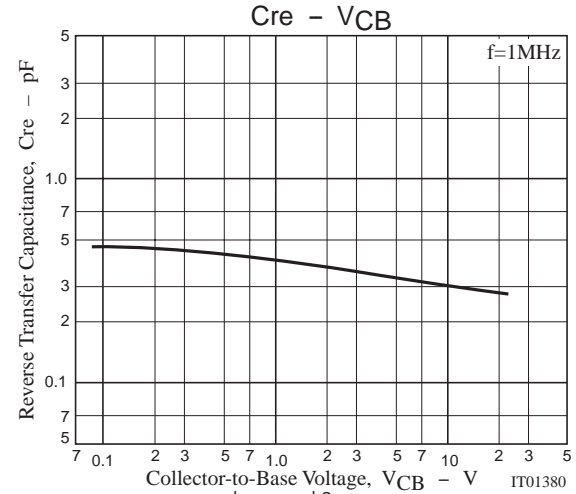
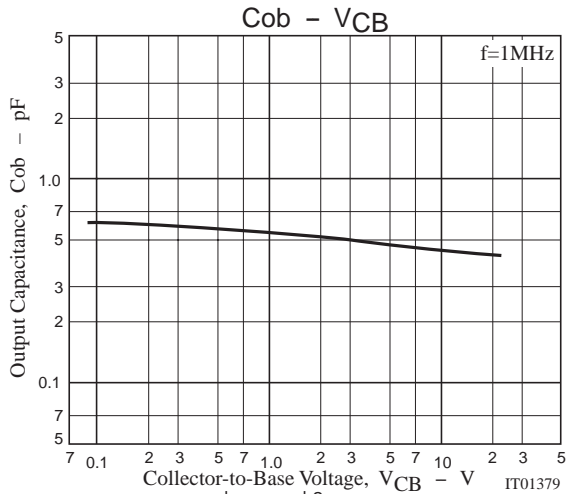
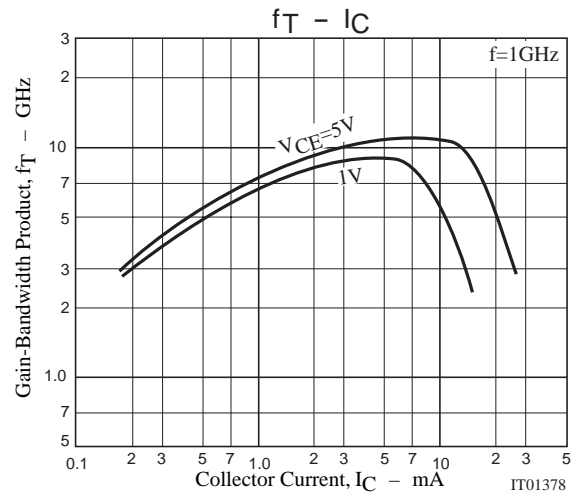
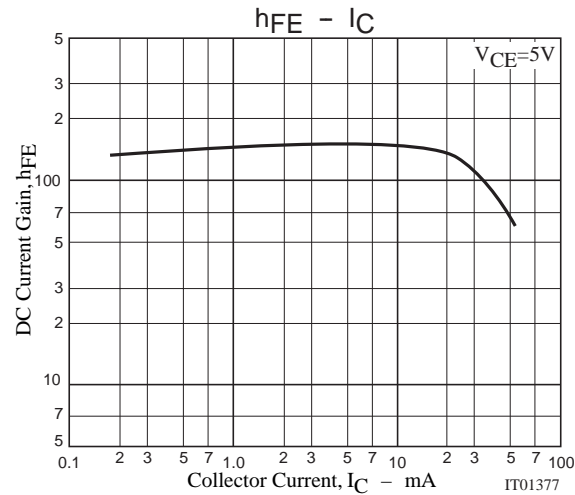
**SANYO Electric Co.,Ltd. Semiconductor Company**

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

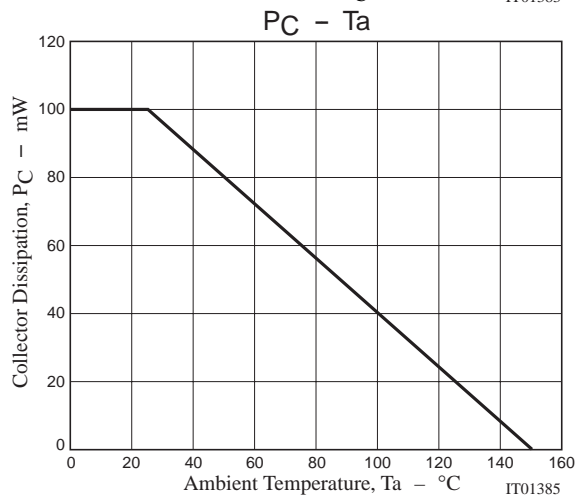
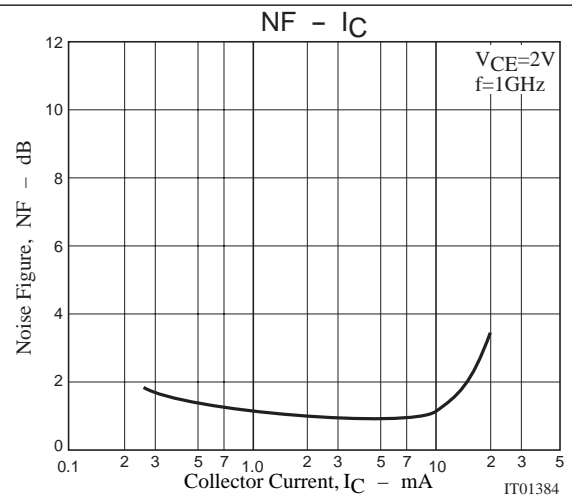
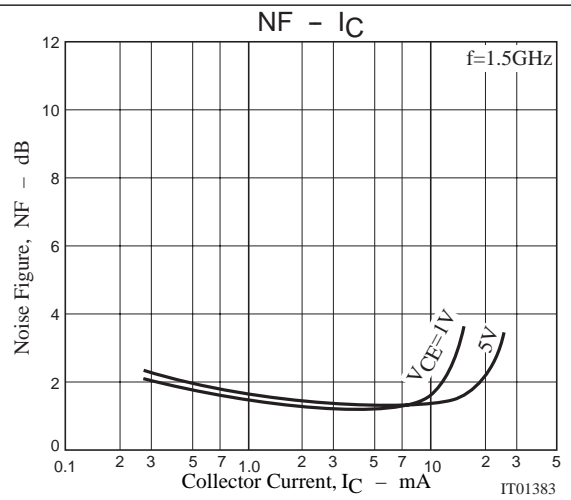
2SC5490

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Gain	$ S_{21e} ^2$ 1	$V_{CE}=5V, I_C=10mA, f=1.5GHz$	8	10		dB
	$ S_{21e} ^2$ 2	$V_{CE}=1V, I_C=1mA, f=1.5GHz$		5.5		dB
Noise Figure	NF1	$V_{CE}=5V, I_C=5mA, f=1.5GHz$		1.4	3.0	dB
	NF2	$V_{CE}=2V, I_C=3mA, f=1GHz$		0.9		dB



2SC5490



S Parameters (Common emitter)

V<sub>CE</sub>=5V, I<sub>C</sub>=5mA, Z<sub>O</sub>=50Ω

Freq (MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
200	0.782	-37.1	12.043	148.4	0.038	69.7	0.889	-19.5
400	0.623	-65.4	9.431	126.6	0.057	60.8	0.758	-28.3
600	0.502	-85.6	7.415	112.2	0.072	56.5	0.646	-33.3
800	0.420	-102.4	6.000	101.5	0.083	55.2	0.577	-35.9
1000	0.369	-114.7	5.025	93.6	0.094	55.1	0.538	-37.6
1200	0.339	-127.2	4.323	86.7	0.105	55.6	0.513	-38.7
1400	0.311	-137.2	3.785	80.6	0.115	55.6	0.490	-39.7
1600	0.296	-144.9	3.391	75.3	0.127	56.7	0.480	-41.3
1800	0.285	-156.5	3.018	70.1	0.139	56.4	0.466	-43.5
2000	0.277	-164.2	2.767	65.7	0.150	56.7	0.460	-45.5

V<sub>CE</sub>=5V, I<sub>C</sub>=10mA, Z<sub>O</sub>=50Ω

Freq (MHz)	S <sub>11</sub>	∠S <sub>11</sub>	S <sub>21</sub>	∠S <sub>21</sub>	S <sub>12</sub>	∠S <sub>12</sub>	S <sub>22</sub>	∠S <sub>22</sub>
200	0.641	-52.7	16.527	137.8	0.031	67.4	0.820	-22.9
400	0.468	-85.4	11.299	115.7	0.048	60.5	0.643	-30.2
600	0.377	-106.6	8.303	103.1	0.060	60.0	0.549	-32.2
800	0.321	-124.1	6.502	94.0	0.072	60.9	0.499	-33.2
1000	0.293	-136.1	5.342	87.4	0.084	61.9	0.477	-33.9
1200	0.280	-146.7	4.546	81.4	0.097	62.7	0.462	-35.0
1400	0.266	-156.6	3.947	76.4	0.108	63.0	0.449	-36.2
1600	0.263	-163.2	3.527	71.4	0.123	63.7	0.444	-37.8
1800	0.263	-173.5	3.121	67.0	0.136	62.8	0.435	-39.9
2000	0.264	-179.8	2.864	62.8	0.150	62.4	0.434	-42.4

## 2SC5490

$V_{CE}=2V$ ,  $I_C=3mA$ ,  $Z_O=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.851	-30.4	8.644	154.1	0.042	73.0	0.937	-16.4
400	0.724	-55.7	7.310	133.8	0.073	61.3	0.820	-27.9
600	0.612	-76.1	6.083	118.6	0.093	54.2	0.709	-35.7
800	0.521	-93.0	5.085	106.9	0.107	50.4	0.628	-40.4
1000	0.461	-106.1	4.343	98.1	0.118	48.3	0.572	-43.7
1200	0.423	-118.6	3.806	90.0	0.128	47.5	0.536	-45.8
1400	0.382	-129.4	3.349	83.3	0.137	46.9	0.506	-47.3
1600	0.366	-138.0	3.036	77.5	0.147	47.4	0.485	-49.5
1800	0.341	-148.8	2.685	71.7	0.157	47.2	0.462	-51.9
2000	0.333	-157.7	2.479	66.7	0.167	47.6	0.453	-54.1

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.945	-18.7	3.431	162.9	0.053	78.1	0.982	-10.3
400	0.892	-36.9	3.263	147.1	0.099	66.9	0.939	-19.7
600	0.826	-52.9	3.004	133.2	0.136	57.5	0.879	-27.7
800	0.754	-67.9	2.765	120.4	0.164	49.7	0.815	-34.8
1000	0.691	-81.1	2.539	109.9	0.184	43.4	0.758	-40.0
1200	0.639	-94.3	2.366	99.8	0.199	38.4	0.727	-44.3
1400	0.589	-104.9	2.143	91.2	0.207	34.1	0.683	-47.8
1600	0.558	-114.1	1.969	83.6	0.213	31.7	0.653	-51.4
1800	0.522	-124.4	1.797	76.2	0.218	28.7	0.621	-54.9
2000	0.490	-134.9	1.701	69.7	0.219	27.0	0.601	-58.1

- 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.