



EC3H02B

VHF to UHF Low-Noise Wide-Band Amplifier Applications

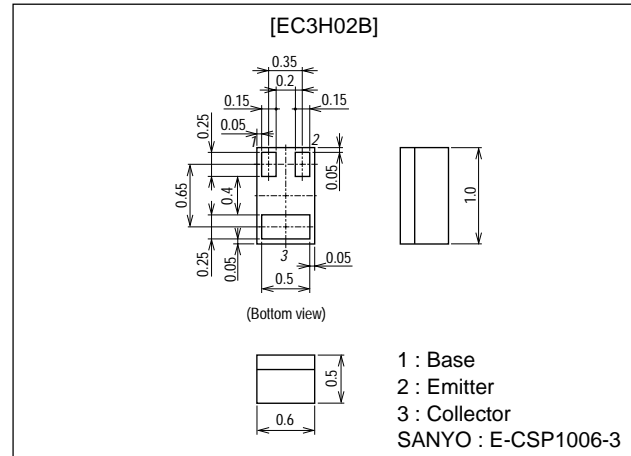
Features

- Low noise : $NF=1.0\text{dB}$ typ ($f=1\text{GHz}$).
- High gain : $|S_{21e}|^2=12\text{dB}$ typ ($f=1\text{GHz}$).
- High cutoff frequency : $f_T=7\text{GHz}$ typ.
- Ultrasmall (1006size), slim (0.5mm) leadless package.

Package Dimensions

unit:mm

2183



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CB0}		20	V
Collector-to-Emitter Voltage	V_{CE0}		10	V
Emitter-to-Base Voltage	V_{EB0}		2	V
Collector Current	I_C		70	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_{CB0}	$V_{CB}=10\text{V}, I_E=0$			1.0	μA
Emitter Cutoff Current	I_{EB0}	$V_{EB}=1\text{V}, I_C=0$			10	μA
DC Current Gain	h_{FE}	$V_{CE}=5\text{V}, I_C=20\text{mA}$	100		180	
Gain-Bandwidth Product	f_T	$V_{CE}=5\text{V}, I_C=20\text{mA}$	5	7		GHz
Output Capacitance	C_{ob}	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.7	1.2	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=10\text{V}, f=1\text{MHz}$		0.45		pF
Forward Transfer Gain	$ S_{21e} ^2$ 1	$V_{CE}=5\text{V}, I_C=20\text{mA}, f=1\text{GHz}$	9	12		dB
	$ S_{21e} ^2$ 2	$V_{CE}=2\text{V}, I_C=3\text{mA}, f=1\text{GHz}$		8.5		dB
Noise Figure	NF	$V_{CE}=5\text{V}, I_C=7\text{mA}, f=1\text{GHz}$		1.0	1.8	dB

■ 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

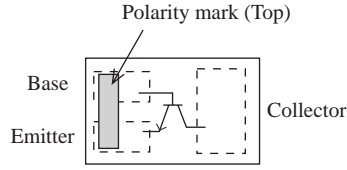
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

EC3H02B

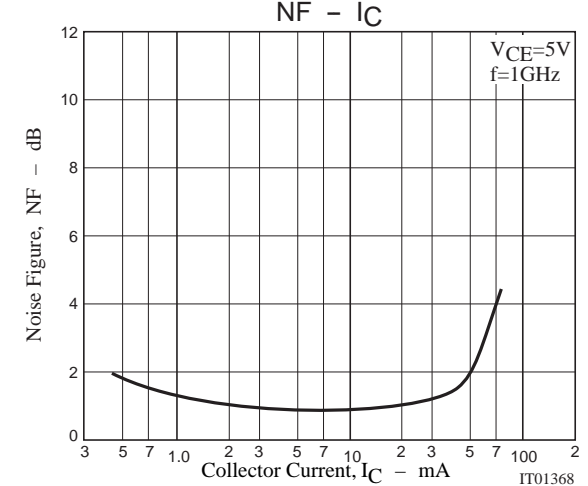
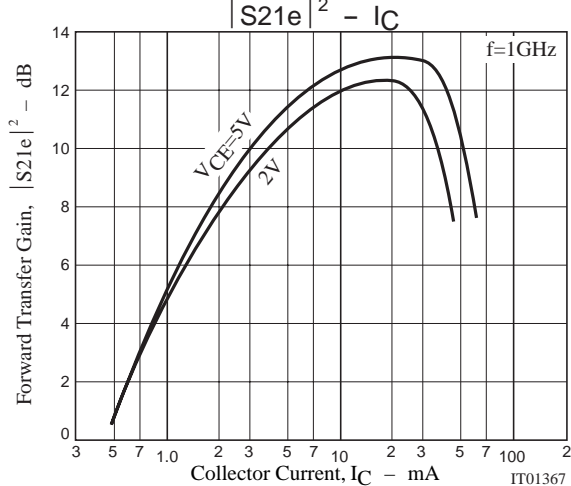
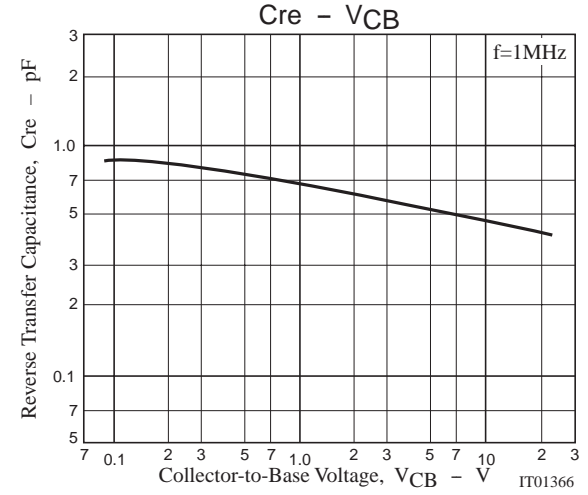
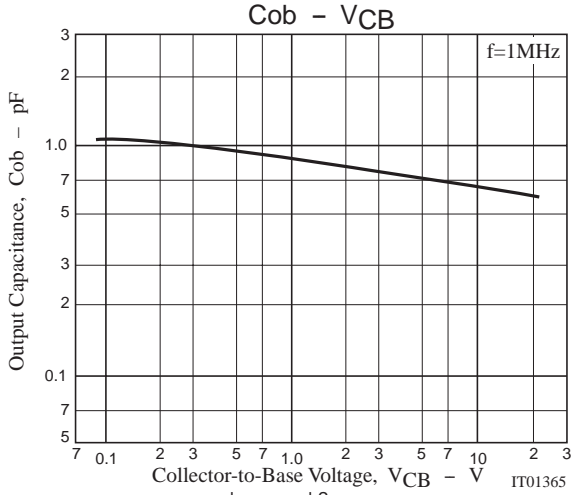
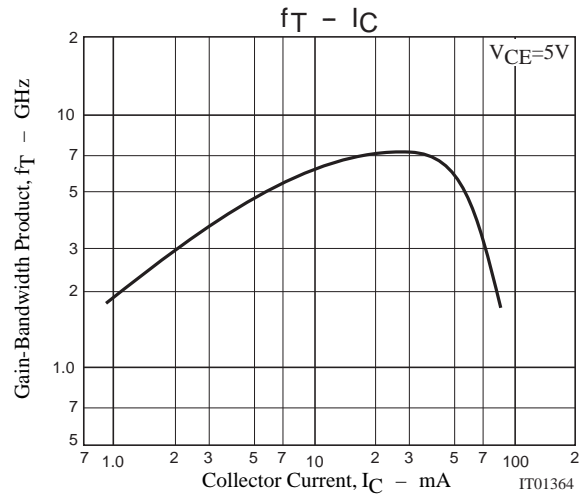
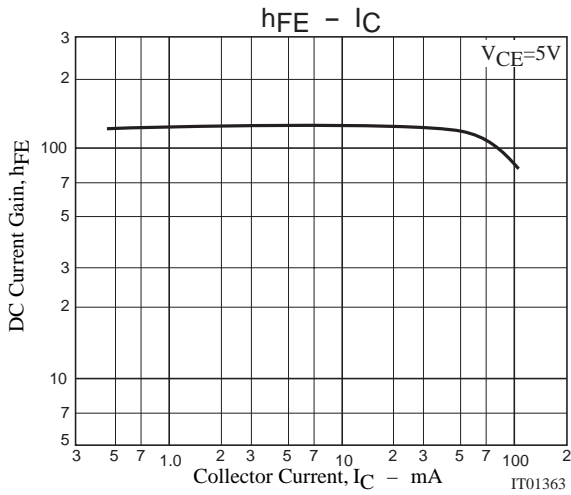
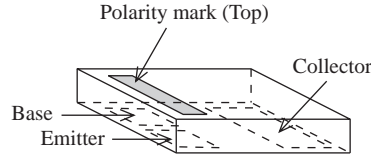
Type No. Indication (Top view)



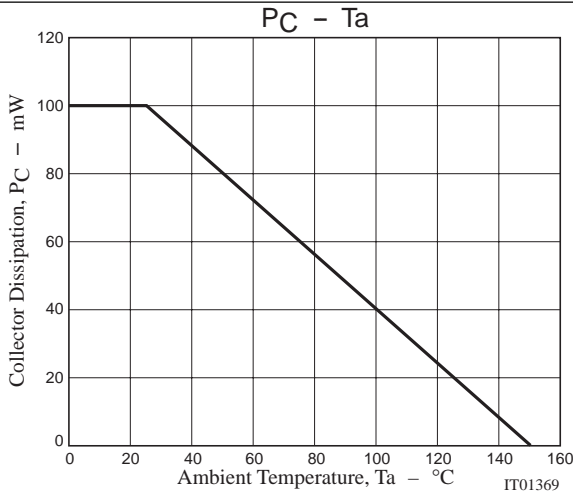
Electrical Connection (Top view)



* Electrodes : on the bottom



EC3H02B



S Parameters (Common emitter)

V_{CE}=1V, 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	0.955	-22.6	3.418	163.3	0.056	76.0	0.975	-10.5
200	0.922	-43.0	3.109	148.7	0.104	63.2	0.921	-19.6
400	0.845	-77.2	2.617	124.8	0.165	44.2	0.794	-32.9
600	0.782	-101.8	2.156	107.7	0.189	31.3	0.694	-41.5
800	0.746	-119.1	1.788	94.2	0.200	23.5	0.630	-47.7
1000	0.734	-131.1	1.498	83.7	0.201	17.7	0.596	-52.2
1200	0.717	-141.2	1.326	74.6	0.198	14.7	0.573	-57.6
1400	0.707	-148.9	1.154	66.6	0.193	12.0	0.559	-61.9
1600	0.708	-155.5	1.029	60.2	0.182	10.7	0.561	-66.1
1800	0.711	-161.6	0.953	54.6	0.171	10.8	0.561	-71.6
2000	0.712	-166.5	0.880	49.3	0.160	13.0	0.569	-76.5

V_{CE}=1V, I_C=5mA, Z_O=50Ω

Freq (MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.818	-47.9	13.330	150.0	0.049	64.3	0.869	-29.8
200	0.739	-83.2	10.545	129.6	0.076	49.6	0.681	-50.0
400	0.661	-122.9	6.688	107.4	0.098	37.8	0.445	-71.3
600	0.627	-142.2	4.726	95.9	0.106	35.4	0.334	-81.7
800	0.616	-153.8	3.653	87.5	0.114	36.3	0.279	-89.2
1000	0.614	-161.8	2.989	80.7	0.122	38.4	0.252	-94.7
1200	0.611	-167.3	2.534	75.1	0.130	40.8	0.238	-99.0
1400	0.607	-172.2	2.207	70.1	0.139	43.1	0.231	-102.8
1600	0.607	-176.6	1.965	65.5	0.149	45.1	0.227	-106.4
1800	0.610	179.8	1.776	61.1	0.159	47.1	0.230	-109.8
2000	0.609	176.9	1.627	57.0	0.171	48.6	0.237	-112.1

EC3H02B

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.890	-32.1	9.129	158.3	0.042	72.1	0.938	-17.1
200	0.827	-59.6	7.989	141.0	0.073	57.6	0.824	-30.2
400	0.725	-98.7	5.823	117.5	0.104	41.8	0.618	-45.5
600	0.666	-121.9	4.355	103.4	0.115	34.5	0.496	-52.3
800	0.641	-136.9	3.448	93.1	0.121	32.2	0.429	-56.5
1000	0.631	-147.3	2.854	85.1	0.125	32.0	0.392	-59.9
1200	0.624	-154.9	2.436	78.5	0.128	33.1	0.372	-62.9
1400	0.618	-161.3	2.124	72.8	0.131	35.2	0.360	-66.0
1600	0.616	-166.7	1.894	67.5	0.134	37.6	0.352	-69.1
1800	0.618	-171.4	1.715	62.7	0.139	40.3	0.351	-72.9
2000	0.618	-175.1	1.571	58.1	0.144	43.2	0.357	-76.4

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.715	-60.8	21.486	143.7	0.035	62.1	0.806	-36.1
200	0.643	-98.6	15.499	122.8	0.051	49.2	0.580	-56.8
400	0.589	-135.1	9.112	103.3	0.065	44.8	0.355	-75.8
600	0.570	-151.5	6.296	93.9	0.075	47.3	0.261	-84.5
800	0.564	-161.1	4.816	86.9	0.087	50.9	0.215	-90.9
1000	0.563	-167.7	3.921	81.1	0.098	53.6	0.192	-95.4
1200	0.560	-172.3	3.308	76.3	0.112	56.0	0.181	-99.0
1400	0.558	-176.2	2.867	72.1	0.125	57.7	0.172	-102.6
1600	0.558	180.0	2.550	68.1	0.139	58.8	0.169	-105.3
1800	0.562	176.8	2.293	64.2	0.155	59.5	0.170	-107.8
2000	0.561	174.4	2.092	60.5	0.169	59.8	0.176	-109.2

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

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.797	-42.9	17.630	152.0	0.030	68.4	0.892	-22.3
200	0.708	-76.1	14.170	132.4	0.048	55.1	0.723	-36.7
400	0.608	-116.0	9.186	110.4	0.064	45.4	0.494	-48.9
600	0.565	-136.4	6.534	98.9	0.073	44.6	0.385	-52.5
800	0.550	-148.8	5.055	90.8	0.081	46.8	0.329	-54.0
1000	0.547	-157.0	4.134	84.3	0.089	49.9	0.299	-55.4
1200	0.541	-163.2	3.497	79.0	0.098	52.4	0.285	-56.7
1400	0.537	-168.1	3.025	74.4	0.109	55.0	0.277	-57.9
1600	0.539	-172.5	2.687	70.0	0.119	57.0	0.270	-60.1
1800	0.540	-176.5	2.425	65.8	0.130	58.6	0.271	-63.0
2000	0.540	-179.4	2.212	61.9	0.142	59.9	0.277	-65.8

EC3H02B

$V_{CE}=5V, I_C=20mA, Z_0=50\Omega$

Freq (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.618	-71.5	30.252	138.1	0.023	60.6	0.748	-37.0
200	0.554	-110.5	20.311	117.7	0.034	52.7	0.511	-52.9
400	0.519	-143.1	11.419	100.5	0.046	54.5	0.306	-62.6
600	0.507	-156.8	7.810	92.4	0.058	58.7	0.230	-64.0
800	0.504	-165.0	5.941	86.2	0.071	62.2	0.193	-64.9
1000	0.505	-170.5	4.816	81.1	0.084	64.7	0.175	-66.0
1200	0.504	-174.3	4.051	76.8	0.098	66.2	0.167	-67.0
1400	0.502	-177.8	3.502	73.0	0.112	67.2	0.162	-68.2
1600	0.504	178.9	3.107	69.3	0.127	67.4	0.159	-70.1
1800	0.508	176.0	2.788	65.7	0.142	67.4	0.161	-72.4
2000	0.507	173.9	2.539	62.3	0.155	67.1	0.169	-74.8

- 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 September, 2000. Specifications and information herein are subject to change without notice.