

NPN Epitaxial Planar Silicon Transistor



# EC3H07B

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

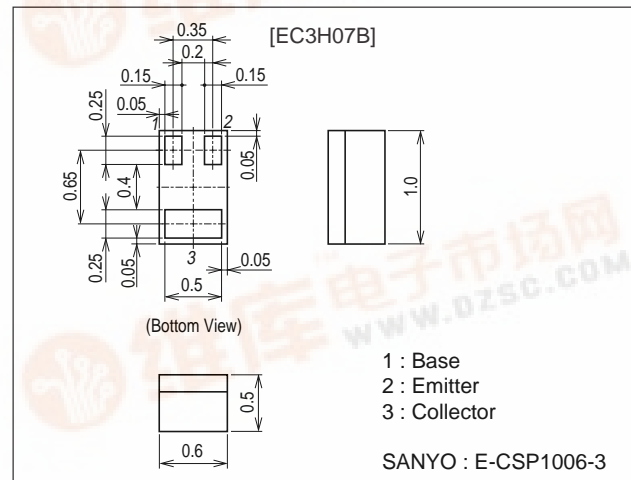
### Features

- Low noise : NF=1.5dB typ (f=2GHz).
- High cut-off frequency :  $f_T=10\text{GHz typ (}V_{CE}=1\text{V)}$ .  
:  $f_T=12.5\text{GHz typ (}V_{CE}=3\text{V)}$ .
- Low operating voltage.
- High gain :  $|S_{21e}|^2=9.5\text{dB typ (}f=2\text{GHz)}$ .
- Ultraminiature (1006 size) and thin (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	$V_{CBO}$		9	V
Collector-to-Emitter Voltage	$V_{CEO}$		4	V
Emitter-to-Base Voltage	$V_{EBO}$		2	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	$I_{CBO}$	$V_{CB}=5\text{V, }I_E=0$			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	$h_{FE}$	$V_{CE}=1\text{V, }I_C=5\text{mA}$	100		160	
Gain-Bandwidth Product	$f_{T1}$	$V_{CE}=1\text{V, }I_C=5\text{mA}$	8	10		GHz
	$f_{T2}$	$V_{CE}=3\text{V, }I_C=15\text{mA}$		12.5		GHz
Output Capacitance	$C_{ob}$	$V_{CB}=1\text{V, }f=1\text{MHz}$		0.55	0.7	pF
Reverse Transfer Capacitance	$C_{re}$	$V_{CB}=1\text{V, }f=1\text{MHz}$		0.4		pF
Forward Transfer Gain	$ S_{21e} ^{21}$	$V_{CE}=1\text{V, }I_C=5\text{mA, }f=2\text{GHz}$	8	9.5		dB
	$ S_{21e} ^{22}$	$V_{CE}=3\text{V, }I_C=15\text{mA, }f=2\text{GHz}$		10.5		dB
Noise Figure	NF	$V_{CE}=1\text{V, }I_C=3\text{mA, }f=2\text{GHz}$		1.5	2.3	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.

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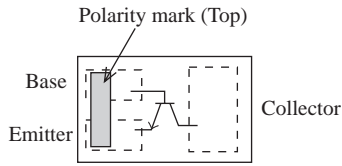


# EC3H07B

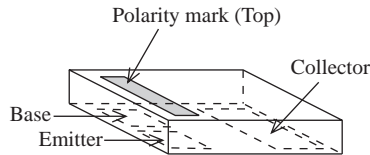
## Type No. Indication (Top view)



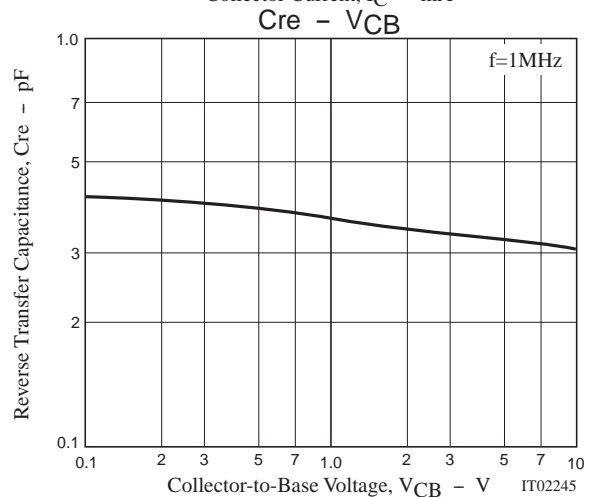
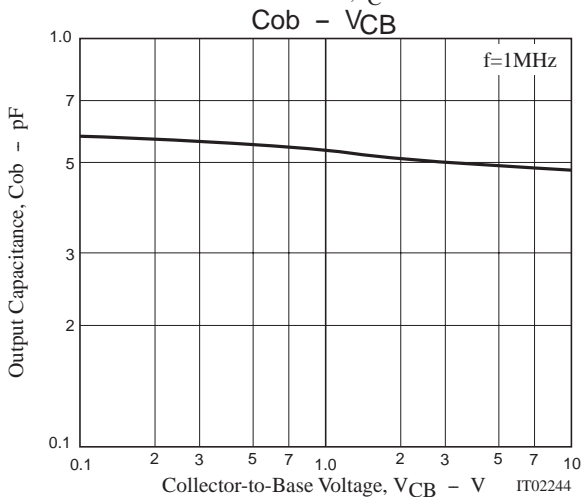
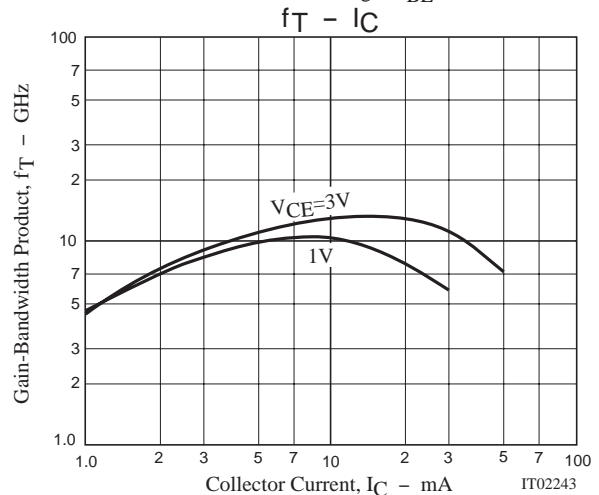
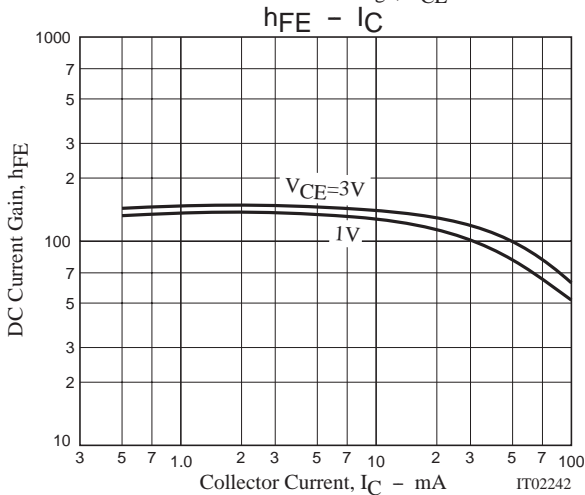
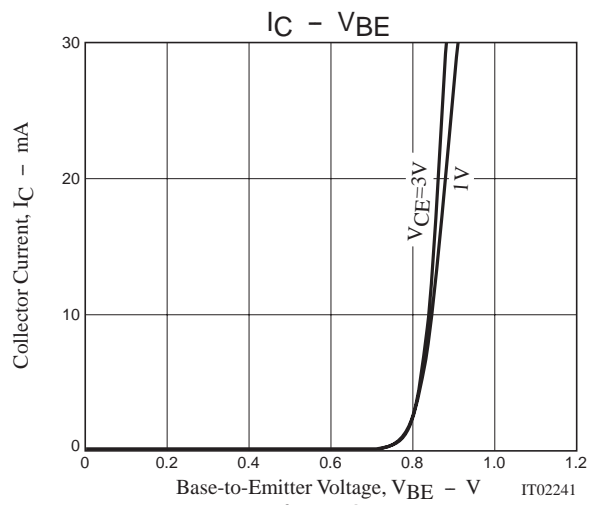
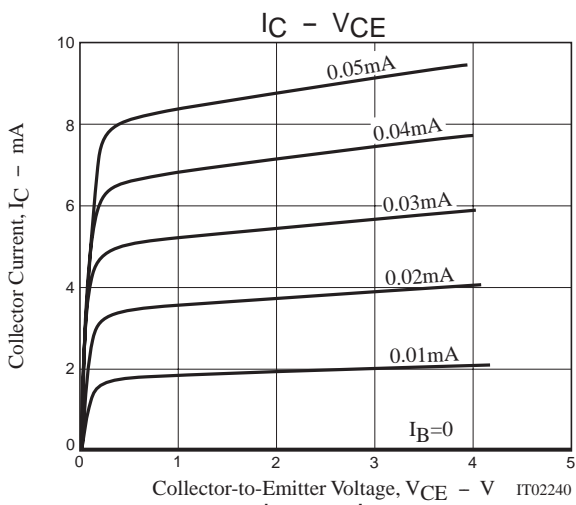
## Electrical Connection (Top view)



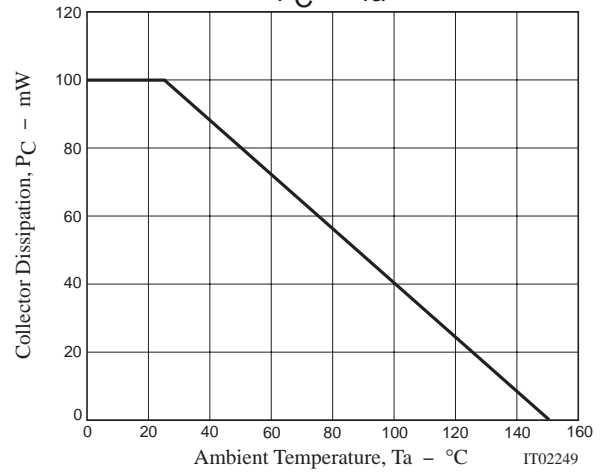
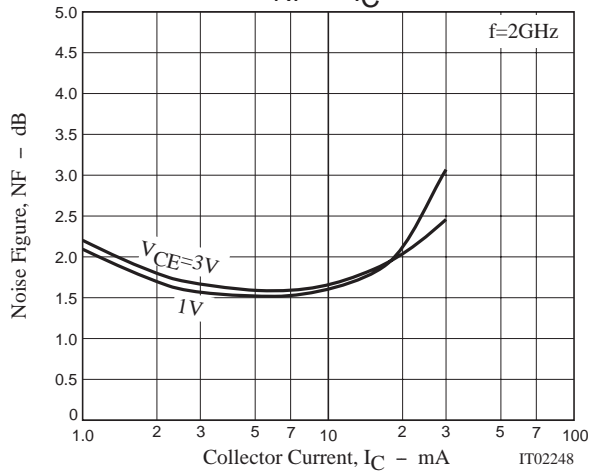
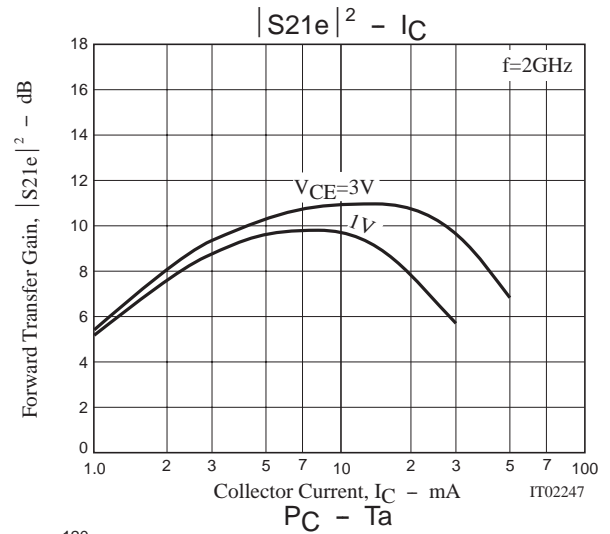
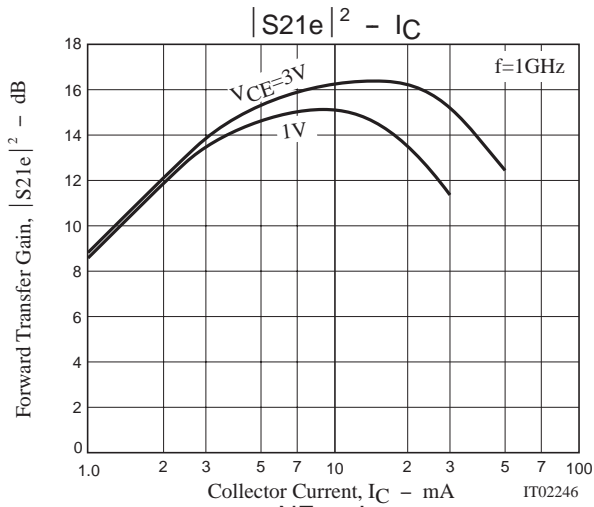
\*Electrodes : on the bottom



This product adopts a high-frequency process. Please be careful when handling it because it is susceptible to static electricity.



## EC3H07B



### 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} $	$\angle S_{22}$
200	0.970	-13.4	3.174	166.3	0.046	79.8	0.981	-10.3
400	0.939	-26.1	3.115	153.6	0.087	70.3	0.948	-19.9
600	0.892	-38.6	2.986	141.5	0.122	61.2	0.899	-28.4
800	0.839	-50.0	2.803	130.5	0.149	54.2	0.849	-36.1
1000	0.791	-59.7	2.596	121.8	0.171	48.5	0.798	-42.4
1200	0.739	-69.5	2.426	112.0	0.185	43.3	0.757	-48.6
1400	0.686	-77.7	2.210	104.5	0.195	39.7	0.708	-54.0
1600	0.649	-85.1	2.077	97.8	0.204	36.1	0.680	-58.0
1800	0.623	-91.6	1.987	90.9	0.210	33.3	0.651	-61.7
2000	0.595	-97.8	1.871	84.8	0.212	31.3	0.632	-65.1
2200	0.568	-104.1	1.768	78.9	0.213	30.0	0.617	-68.2
2400	0.542	-109.7	1.682	73.4	0.217	28.8	0.611	-72.5
2600	0.523	-114.6	1.593	68.4	0.212	27.9	0.579	-75.1
2800	0.505	-119.6	1.541	64.1	0.209	29.2	0.570	-75.8
3000	0.489	-124.1	1.468	60.2	0.216	31.2	0.604	-75.7

## EC3H07B

V<sub>CE</sub>=1V, 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	0.859	-31.5	11.298	153.4	0.042	70.7	0.901	-22.4
400	0.740	-55.7	9.494	133.0	0.072	59.4	0.763	-38.4
600	0.619	-76.3	7.753	118.3	0.088	52.9	0.631	-49.6
800	0.546	-90.6	6.351	108.4	0.099	49.4	0.548	-56.1
1000	0.480	-104.5	5.414	100.0	0.108	48.0	0.471	-61.0
1200	0.443	-113.5	4.629	94.2	0.116	48.2	0.422	-64.5
1400	0.418	-121.2	4.063	88.7	0.124	48.6	0.399	-67.9
1600	0.393	-127.4	3.615	83.7	0.130	49.3	0.372	-70.3
1800	0.382	-132.4	3.292	79.3	0.140	49.9	0.356	-72.1
2000	0.372	-138.0	3.003	75.1	0.147	51.6	0.343	-74.1
2200	0.360	-143.3	2.764	71.2	0.157	51.9	0.333	-76.7
2400	0.352	-148.2	2.567	67.3	0.166	51.9	0.338	-79.6
2600	0.349	-152.4	2.408	63.9	0.173	52.6	0.310	-81.9
2800	0.348	-155.5	2.272	60.5	0.183	53.8	0.301	-83.5
3000	0.348	-158.1	2.154	57.7	0.194	53.9	0.293	-85.3

V<sub>CE</sub>=1V, 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	0.747	-46.5	15.679	144.0	0.039	66.9	0.807	-30.4
400	0.588	-77.7	11.464	122.1	0.059	55.5	0.614	-46.8
600	0.490	-98.9	8.634	108.9	0.072	51.8	0.485	-55.5
800	0.438	-114.0	6.882	99.9	0.082	52.0	0.410	-60.2
1000	0.404	-125.0	5.688	93.3	0.091	53.3	0.362	-62.9
1200	0.384	-133.1	4.844	87.9	0.100	55.0	0.330	-64.4
1400	0.371	-139.6	4.207	83.1	0.111	56.1	0.312	-67.3
1600	0.357	-145.5	3.734	78.6	0.121	56.4	0.299	-69.3
1800	0.350	-150.9	3.354	74.9	0.132	57.6	0.287	-70.4
2000	0.348	-155.0	3.069	71.0	0.141	58.8	0.280	-72.5
2200	0.344	-158.7	2.818	67.7	0.152	59.4	0.275	-75.6
2400	0.342	-163.1	2.615	64.0	0.165	58.9	0.280	-78.4
2600	0.341	-165.4	2.435	60.8	0.175	60.2	0.262	-79.9
2800	0.341	-168.4	2.287	57.9	0.187	60.5	0.257	-81.5
3000	0.349	-171.5	2.181	55.4	0.200	59.5	0.255	-83.7

V<sub>CE</sub>=1V, I<sub>C</sub>=20mA, 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	0.598	-71.6	16.506	131.7	0.036	57.2	0.648	-37.6
400	0.476	-108.0	10.451	110.5	0.050	52.1	0.448	-50.7
600	0.429	-128.1	7.427	99.3	0.061	54.2	0.353	-55.1
800	0.410	-141.1	5.736	91.8	0.071	56.7	0.307	-57.5
1000	0.398	-149.3	4.699	85.9	0.080	58.4	0.282	-59.0
1200	0.393	-155.7	3.949	81.0	0.092	60.5	0.268	-60.1
1400	0.388	-160.9	3.420	76.7	0.104	61.9	0.265	-63.5
1600	0.383	-165.3	3.042	72.4	0.116	62.8	0.261	-65.4
1800	0.382	-169.0	2.726	68.7	0.126	63.5	0.261	-67.7
2000	0.382	-172.0	2.491	65.1	0.139	64.4	0.259	-70.2
2200	0.382	-175.0	2.294	61.9	0.152	65.1	0.258	-74.0
2400	0.381	-177.9	2.131	58.4	0.166	64.7	0.268	-77.5
2600	0.383	179.9	2.003	55.4	0.175	64.6	0.254	-80.2
2800	0.386	177.0	1.859	52.4	0.191	65.0	0.253	-82.3
3000	0.390	175.0	1.765	49.6	0.205	64.2	0.252	-85.1

## EC3H07B

V<sub>CE</sub>=3V, I<sub>C</sub>=1mA, 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	0.973	-12.2	3.240	167.1	0.040	80.6	0.984	-9.2
400	0.946	-24.1	3.185	155.4	0.077	72.0	0.957	-17.9
600	0.901	-35.8	3.049	144.0	0.108	63.2	0.915	-25.8
800	0.850	-46.4	2.870	134.1	0.133	56.5	0.871	-33.0
1000	0.813	-55.6	2.679	124.0	0.155	51.3	0.825	-39.1
1200	0.753	-64.9	2.493	116.4	0.167	46.1	0.784	-44.9
1400	0.713	-72.1	2.332	108.5	0.178	42.5	0.740	-49.7
1600	0.678	-79.4	2.215	100.4	0.188	39.1	0.713	-53.8
1800	0.643	-86.8	2.042	93.6	0.191	36.2	0.689	-57.5
2000	0.609	-92.9	1.916	87.7	0.195	34.4	0.670	-60.9
2200	0.581	-98.9	1.811	81.8	0.196	33.1	0.653	-64.1
2400	0.552	-104.5	1.726	76.4	0.200	32.3	0.646	-68.2
2600	0.530	-109.0	1.632	71.6	0.195	31.3	0.611	-70.8
2800	0.510	-113.8	1.552	67.4	0.194	33.0	0.601	-71.5
3000	0.493	-118.3	1.505	63.6	0.200	35.3	0.635	-71.4

V<sub>CE</sub>=3V, 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	0.876	-27.6	11.400	155.7	0.036	73.0	0.919	-19.4
400	0.756	-50.7	9.463	137.5	0.065	61.9	0.788	-34.8
600	0.634	-70.0	8.035	122.7	0.081	55.4	0.673	-44.7
800	0.555	-83.7	6.684	112.7	0.093	51.2	0.588	-50.8
1000	0.490	-95.2	5.807	103.8	0.101	50.0	0.515	-55.3
1200	0.450	-103.5	5.045	97.1	0.107	50.0	0.477	-58.1
1400	0.421	-111.2	4.444	91.5	0.116	50.3	0.442	-61.5
1600	0.392	-117.2	3.968	86.3	0.123	51.4	0.413	-63.7
1800	0.376	-123.2	3.601	82.0	0.131	52.0	0.393	-65.4
2000	0.359	-128.9	3.300	77.8	0.138	53.2	0.377	-67.3
2200	0.345	-133.9	3.026	74.3	0.149	53.9	0.360	-69.6
2400	0.336	-138.9	2.798	70.4	0.157	54.0	0.361	-72.2
2600	0.333	-142.0	2.636	66.9	0.164	54.2	0.335	-73.9
2800	0.329	-145.8	2.477	63.6	0.174	55.5	0.331	-74.9
3000	0.333	-148.6	2.369	60.7	0.184	55.7	0.327	-77.1

V<sub>CE</sub>=3V, 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	0.782	-38.7	16.264	148.0	0.034	68.7	0.853	-25.8
400	0.618	-67.3	12.556	126.5	0.055	58.7	0.671	-41.8
600	0.512	-86.2	9.670	113.1	0.067	55.8	0.544	-49.9
800	0.444	-101.0	7.790	103.6	0.077	54.5	0.462	-54.7
1000	0.398	-112.0	6.474	96.8	0.086	55.1	0.408	-57.2
1200	0.372	-120.3	5.540	91.1	0.096	56.5	0.373	-59.0
1400	0.352	-127.6	4.824	86.4	0.105	57.9	0.351	-61.1
1600	0.333	-133.0	4.287	82.0	0.115	58.3	0.334	-62.8
1800	0.323	-139.0	3.864	78.3	0.122	59.6	0.320	-63.9
2000	0.318	-143.6	3.524	74.6	0.135	60.3	0.311	-65.0
2200	0.311	-147.8	3.233	71.3	0.144	60.7	0.302	-67.6
2400	0.306	-152.1	3.008	67.7	0.155	60.3	0.306	-70.4
2600	0.303	-154.0	2.801	64.6	0.165	61.1	0.286	-71.5
2800	0.305	-158.4	2.623	61.6	0.175	62.0	0.281	-72.2
3000	0.308	-161.8	2.503	59.1	0.188	61.5	0.275	-73.7

## EC3H07B

V<sub>CE</sub>=3V, I<sub>C</sub>=20mA, 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	0.598	-71.6	16.506	131.7	0.036	57.2	0.648	-37.6
400	0.476	-108.0	10.451	110.5	0.050	52.1	0.448	-50.7
600	0.429	-128.1	7.427	99.3	0.061	54.2	0.353	-55.1
800	0.410	-141.1	5.736	91.8	0.071	56.7	0.307	-57.5
1000	0.398	-149.3	4.699	85.9	0.080	58.4	0.282	-59.0
1200	0.393	-155.7	3.949	81.0	0.092	60.5	0.268	-60.1
1400	0.388	-160.9	3.420	76.7	0.104	61.9	0.265	-63.5
1600	0.383	-165.3	3.042	72.4	0.116	62.8	0.261	-65.4
1800	0.382	-169.0	2.726	68.7	0.126	63.5	0.261	-67.7
2000	0.382	-172.0	2.491	65.1	0.139	64.4	0.259	-70.2
2200	0.382	-175.0	2.294	61.9	0.152	65.1	0.258	-74.0
2400	0.381	-177.9	2.131	58.4	0.166	64.7	0.268	-77.5
2600	0.383	179.9	2.003	55.4	0.175	64.6	0.254	-80.2
2800	0.386	177.0	1.859	52.4	0.191	65.0	0.253	-82.3
3000	0.390	175.0	1.765	49.6	0.205	64.2	0.252	-85.1

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