



EC3H11B

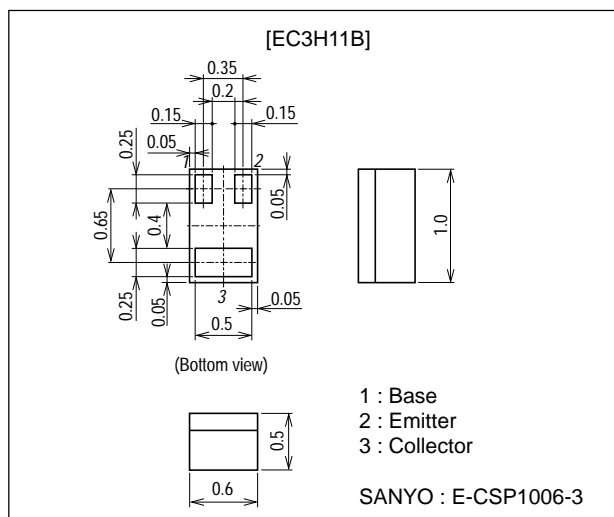
High-Frequency Low-Noise Amplifier and OSC Applications

Features

- Low noise : NF=1.5dB typ (f=2GHz).
- High cutoff frequency : $f_T=6.0\text{GHz}$ typ ($V_{CE}=1\text{V}$).
- Low operating voltage.
- 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_{CB0}		9	V
Collector-to-Emitter Voltage	V_{CEO}		4	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		80	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}	$V_{CB}=5\text{V}, I_E=0$			1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=1\text{V}, I_C=0$			10	μA
DC Current Gain	h_{FE}	$V_{CE}=1\text{V}, I_C=5\text{mA}$	100		160	
Gain-Bandwidth Product	f_T1	$V_{CE}=1\text{V}, I_C=5\text{mA}$	4.5	6.0		GHz
	f_T2	$V_{CE}=3\text{V}, I_C=40\text{mA}$	8.5	10.5		GHz
Output Capacitance	C_{ob}	$V_{CB}=1\text{V}, f=1\text{MHz}$		1.05	1.3	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=1\text{V}, f=1\text{MHz}$		0.8	1.0	pF

Marking : N

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■ 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.

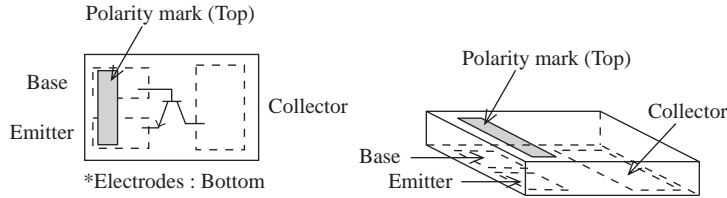
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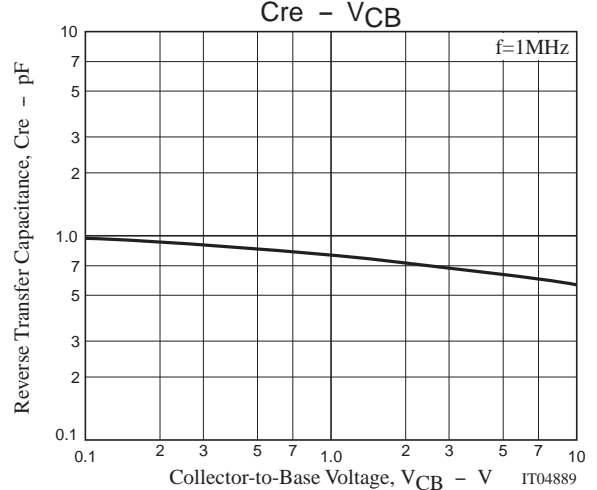
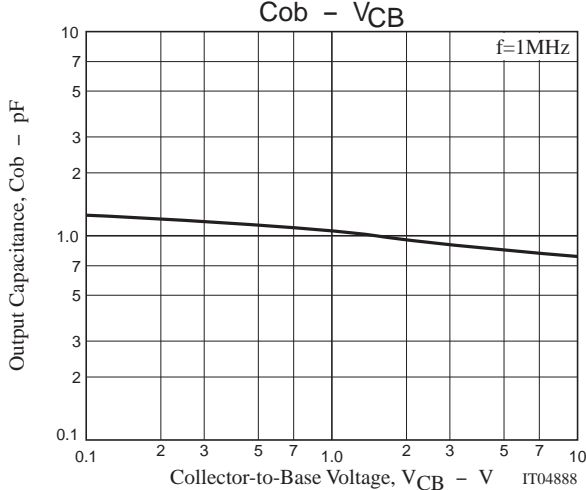
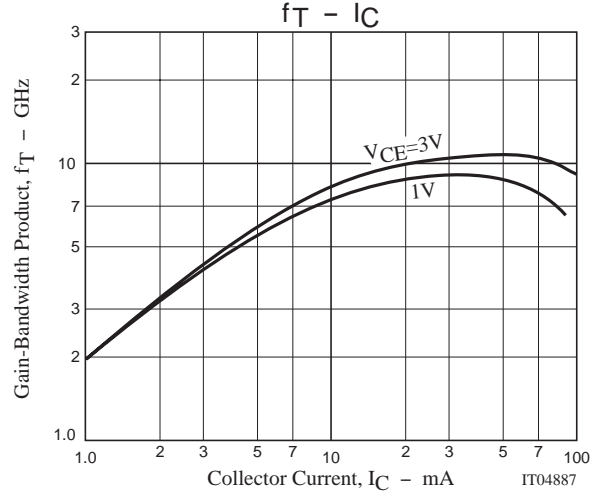
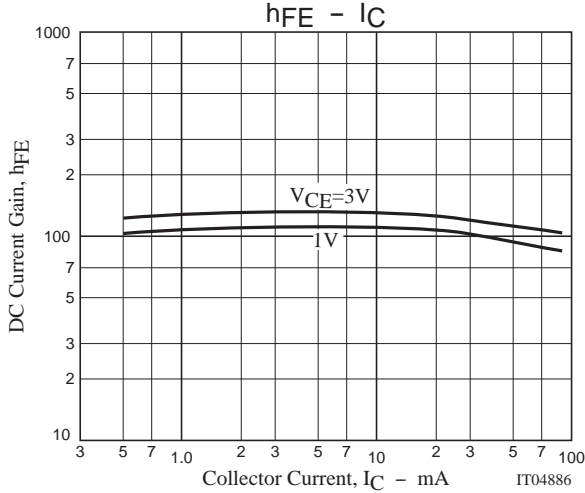
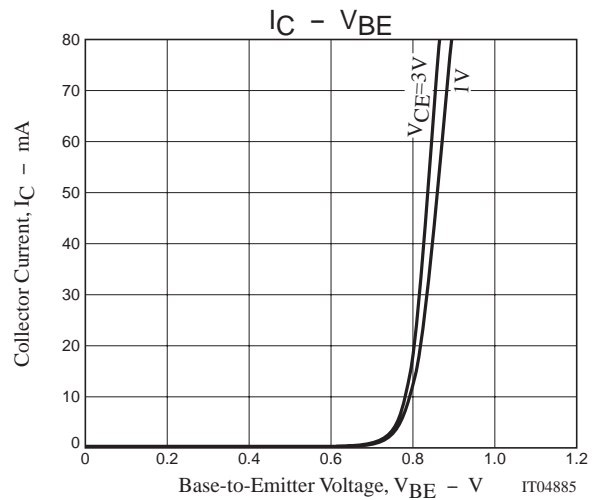
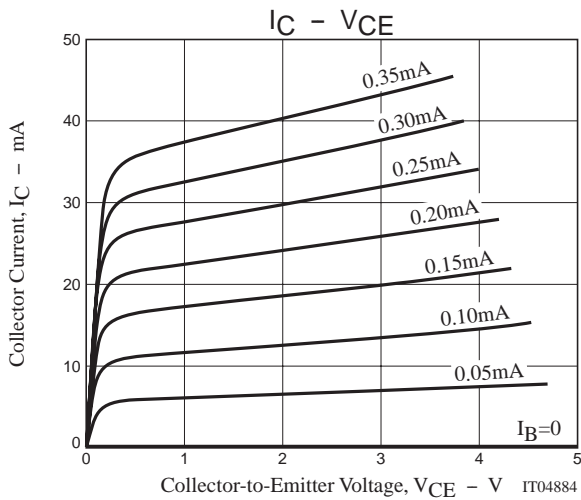
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Gain	S21e 21	V _{CE} =1V, I _C =5mA, f=2GHz	4	5		dB
	S21e 22	V _{CE} =3V, I _C =40mA, f=2GHz	6.5	8.0		dB
Noise Figure	NF	V _{CE} =1V, I _C =7mA, f=2GHz		1.5	2.3	dB

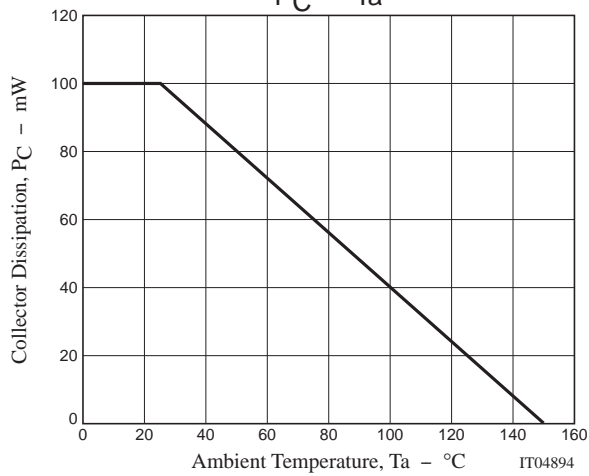
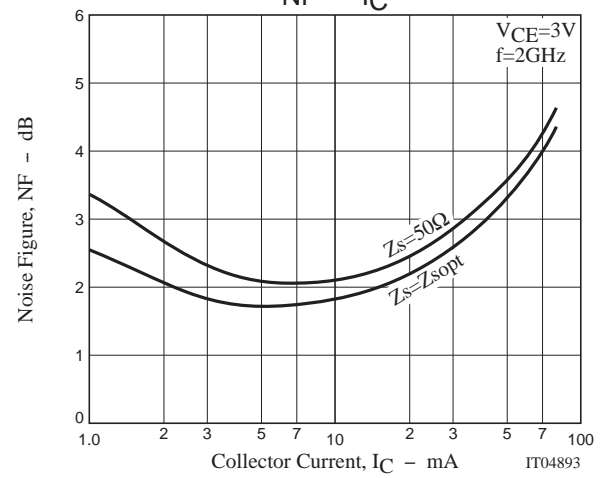
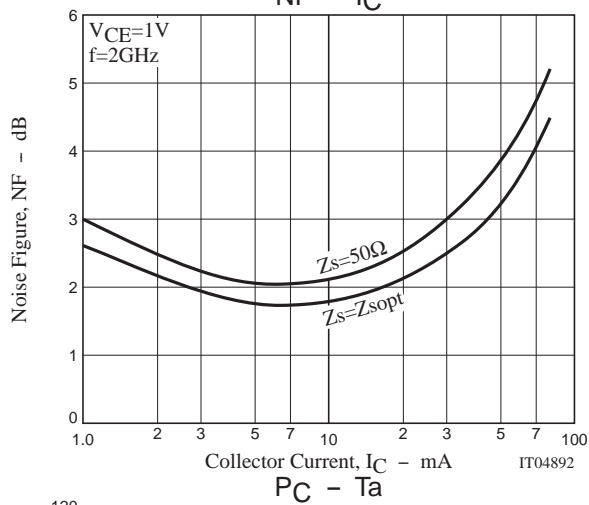
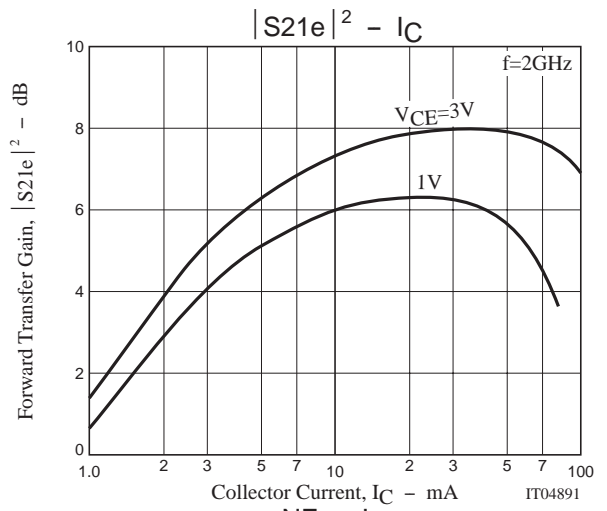
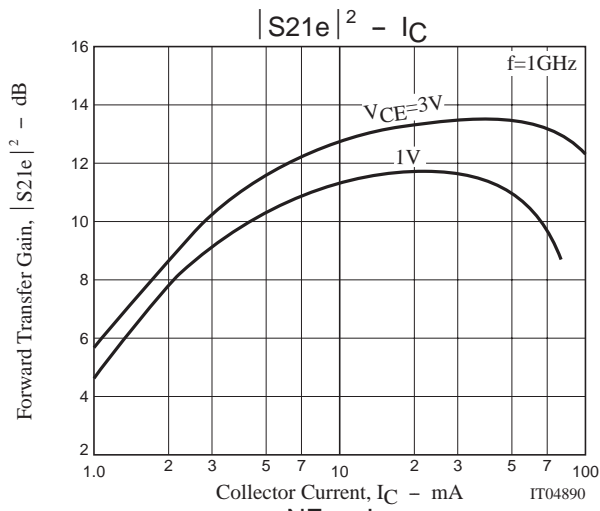
Electrical Connection (Top view)



Pay attention to handling since it is liable to be affected by static electricity due to the high-frequency process adopted.



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S Parameters (Common emitter)

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

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.964	-19.07	3.507	165.61	0.058	77.82	0.983	-10.63
200	0.940	-36.65	3.327	152.32	0.106	66.70	0.936	-20.97
400	0.878	-66.97	2.839	130.06	0.175	48.85	0.823	-36.84
600	0.823	-89.49	2.357	113.30	0.212	35.11	0.711	-46.92
800	0.783	-106.42	1.996	99.25	0.230	27.28	0.646	-55.07
1000	0.756	-118.66	1.746	88.71	0.237	20.78	0.599	-60.38
1200	0.729	-128.72	1.521	79.24	0.238	17.12	0.572	-64.14
1400	0.715	-136.62	1.353	71.05	0.233	14.54	0.556	-67.92
1600	0.704	-143.43	1.235	64.13	0.229	11.86	0.553	-71.89
1800	0.691	-149.92	1.141	58.12	0.219	10.66	0.548	-75.30
2000	0.676	-154.97	1.053	52.24	0.209	11.90	0.546	-78.98
2200	0.666	-160.29	0.984	46.80	0.201	12.64	0.546	-82.58
2400	0.654	-165.22	0.916	42.62	0.194	14.39	0.538	-85.98
2600	0.652	-169.54	0.860	38.70	0.188	16.89	0.543	-89.66
2800	0.639	-174.66	0.813	35.11	0.187	22.29	0.547	-93.09
3000	0.636	-178.58	0.769	32.17	0.185	26.82	0.547	-98.48

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

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.846	-40.41	12.794	153.73	0.049	70.40	0.894	-28.57
200	0.771	-72.62	10.651	133.89	0.081	54.06	0.740	-50.30
400	0.677	-112.29	7.058	110.50	0.110	39.95	0.515	-76.69
600	0.636	-132.29	5.105	97.98	0.120	37.08	0.400	-90.71
800	0.615	-144.75	3.981	88.29	0.130	35.33	0.351	-100.96
1000	0.603	-153.02	3.276	81.91	0.137	36.51	0.315	-106.69
1200	0.588	-158.73	2.774	75.75	0.147	38.56	0.296	-110.12
1400	0.576	-163.05	2.429	70.10	0.160	40.33	0.283	-113.34
1600	0.568	-167.84	2.175	65.36	0.170	40.77	0.277	-116.13
1800	0.563	-171.22	1.966	60.66	0.181	42.28	0.271	-117.78
2000	0.550	-174.69	1.814	56.27	0.193	43.79	0.259	-119.60
2200	0.539	-178.57	1.665	51.96	0.210	44.29	0.259	-122.86
2400	0.529	177.91	1.550	48.62	0.220	43.55	0.243	-124.49
2600	0.523	175.17	1.471	44.96	0.236	44.93	0.245	-125.10
2800	0.511	171.69	1.381	41.37	0.249	45.51	0.244	-126.90
3000	0.510	167.88	1.303	38.29	0.267	44.83	0.237	-130.18

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

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.738	-59.68	19.727	144.13	0.045	62.75	0.805	-42.82
200	0.662	-98.07	14.275	122.74	0.063	47.87	0.608	-71.16
400	0.611	-134.39	8.407	102.28	0.081	42.69	0.409	-101.75
600	0.593	-149.16	5.843	92.24	0.095	44.33	0.335	-117.32
800	0.583	-158.42	4.493	84.57	0.109	45.89	0.310	-127.11
1000	0.572	-163.82	3.659	79.16	0.125	48.28	0.288	-133.34
1200	0.560	-168.59	3.106	73.78	0.138	50.36	0.272	-137.61
1400	0.549	-172.10	2.727	69.18	0.156	51.31	0.266	-140.26
1600	0.545	-174.99	2.429	64.76	0.171	52.10	0.256	-142.55
1800	0.539	-178.32	2.191	60.61	0.188	51.01	0.249	-144.34
2000	0.524	179.02	2.013	56.58	0.202	51.48	0.240	-146.46
2200	0.515	175.61	1.855	52.42	0.222	51.69	0.239	-148.77
2400	0.511	172.50	1.724	49.41	0.238	50.30	0.219	-152.27
2600	0.497	169.64	1.632	46.34	0.253	50.53	0.211	-151.67
2800	0.488	166.07	1.534	42.54	0.274	49.13	0.207	-154.24
3000	0.482	162.94	1.447	39.57	0.293	47.51	0.201	-157.39

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V_{CE}=1V, I_C=40mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.546	-107.89	27.438	127.13	0.030	52.01	0.594	-74.53
200	0.574	-140.04	16.492	108.37	0.042	53.83	0.445	-109.47
400	0.591	-160.66	8.782	93.77	0.057	57.13	0.361	-138.63
600	0.588	-168.39	5.968	86.59	0.077	60.06	0.340	-150.47
800	0.590	-172.98	4.533	80.60	0.096	62.00	0.339	-156.88
1000	0.584	-176.25	3.698	75.82	0.118	63.44	0.327	-161.14
1200	0.569	-179.37	3.127	71.57	0.137	63.30	0.317	-164.56
1400	0.559	178.15	2.741	66.94	0.160	61.99	0.311	-166.03
1600	0.554	175.84	2.442	62.93	0.181	60.91	0.306	-168.41
1800	0.546	173.41	2.206	59.17	0.200	59.42	0.298	-170.60
2000	0.535	170.91	2.022	55.41	0.219	57.70	0.290	-173.47
2200	0.523	167.91	1.876	51.67	0.243	56.45	0.283	-175.72
2400	0.517	165.10	1.739	48.87	0.261	54.89	0.270	-179.45
2600	0.508	162.54	1.650	45.82	0.281	53.48	0.258	179.25
2800	0.495	159.68	1.560	42.26	0.301	51.47	0.246	176.23
3000	0.494	156.81	1.471	39.71	0.321	49.79	0.242	172.97

V_{CE}=3V, 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	0.972	-16.53	3.352	167.63	0.046	78.74	0.989	-8.07
200	0.954	-31.95	3.178	155.74	0.086	70.82	0.951	-16.50
400	0.903	-59.51	2.794	135.14	0.148	53.57	0.867	-29.93
600	0.852	-81.50	2.391	118.76	0.184	40.99	0.772	-38.74
800	0.816	-98.19	2.069	105.11	0.203	32.29	0.707	-45.79
1000	0.779	-110.99	1.803	94.60	0.211	24.42	0.661	-50.92
1200	0.752	-121.24	1.605	85.04	0.211	21.11	0.634	-54.31
1400	0.731	-129.46	1.430	77.00	0.213	18.20	0.618	-57.53
1600	0.718	-137.31	1.311	70.11	0.209	16.46	0.609	-61.09
1800	0.703	-143.58	1.204	63.32	0.199	14.14	0.611	-64.04
2000	0.689	-149.78	1.109	57.29	0.193	14.65	0.602	-67.62
2200	0.673	-155.35	1.037	52.03	0.185	16.60	0.601	-71.09
2400	0.661	-160.61	0.966	47.68	0.179	17.95	0.590	-74.27
2600	0.660	-165.12	0.904	42.97	0.169	20.86	0.598	-77.27
2800	0.644	-170.34	0.841	39.64	0.166	25.75	0.600	-80.74
3000	0.637	-175.52	0.807	36.49	0.171	31.58	0.600	-85.13

V_{CE}=3V, 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	0.870	-33.86	12.897	157.16	0.040	70.77	0.914	-22.40
200	0.795	-61.76	11.175	138.79	0.070	58.48	0.783	-40.32
400	0.685	-100.29	7.821	115.46	0.100	43.05	0.563	-62.52
600	0.628	-122.10	5.784	102.15	0.110	40.21	0.438	-73.89
800	0.600	-135.82	4.537	92.35	0.118	39.26	0.373	-81.80
1000	0.580	-144.70	3.752	85.42	0.128	38.97	0.331	-86.66
1200	0.563	-151.46	3.184	79.23	0.135	41.42	0.307	-88.45
1400	0.549	-156.68	2.773	73.72	0.147	42.78	0.290	-90.45
1600	0.540	-161.28	2.499	68.64	0.157	43.73	0.280	-92.53
1800	0.535	-165.08	2.256	64.02	0.166	45.68	0.276	-94.32
2000	0.522	-169.18	2.061	59.60	0.177	46.22	0.268	-95.53
2200	0.510	-172.97	1.896	55.02	0.192	47.18	0.268	-97.86
2400	0.502	-176.47	1.751	51.77	0.202	47.65	0.248	-98.90
2600	0.492	179.74	1.661	48.29	0.216	47.77	0.250	-98.90
2800	0.479	176.65	1.544	44.43	0.234	48.00	0.250	-99.70
3000	0.474	172.76	1.453	41.37	0.247	47.87	0.243	-102.59

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V_{CE}=3V, I_C=10mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.771	-48.66	20.357	148.93	0.037	68.13	0.839	-33.35
200	0.679	-83.54	15.703	128.11	0.055	53.15	0.655	-56.93
400	0.592	-121.97	9.711	106.53	0.073	46.54	0.430	-82.38
600	0.559	-139.58	6.851	95.83	0.088	46.77	0.329	-95.67
800	0.545	-149.99	5.252	87.97	0.100	46.90	0.289	-104.99
1000	0.534	-157.10	4.303	82.27	0.112	50.25	0.260	-110.24
1200	0.517	-162.27	3.628	77.17	0.125	52.99	0.241	-112.59
1400	0.505	-165.64	3.151	72.11	0.144	53.01	0.227	-115.26
1600	0.497	-169.29	2.821	67.64	0.157	53.79	0.218	-117.91
1800	0.495	-172.56	2.512	63.14	0.174	53.53	0.210	-118.16
2000	0.482	-175.09	2.323	59.48	0.189	54.21	0.204	-119.97
2200	0.470	-178.73	2.137	55.43	0.204	54.20	0.196	-122.83
2400	0.457	177.56	1.973	52.43	0.220	52.42	0.180	-122.98
2600	0.457	174.28	1.863	49.12	0.239	51.98	0.177	-122.43
2800	0.441	171.63	1.746	45.54	0.252	51.56	0.175	-121.25
3000	0.433	168.02	1.641	42.45	0.272	51.17	0.164	-125.12

V_{CE}=3V, I_C=40mA, Z_O=50Ω

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.544	-85.43	32.056	133.37	0.027	61.73	0.653	-56.38
200	0.520	-123.17	20.372	113.28	0.038	55.39	0.453	-86.38
400	0.519	-150.43	11.110	97.17	0.054	58.03	0.309	-115.37
600	0.514	-159.90	7.589	89.45	0.072	60.60	0.261	-129.69
800	0.508	-166.53	5.776	83.41	0.089	63.91	0.252	-137.12
1000	0.502	-170.43	4.686	78.67	0.108	63.24	0.235	-141.63
1200	0.490	-173.86	3.957	74.15	0.125	64.51	0.223	-145.31
1400	0.480	-176.10	3.428	70.14	0.144	63.86	0.219	-147.22
1600	0.472	-178.32	3.070	66.44	0.167	63.55	0.212	-149.77
1800	0.469	179.43	2.758	62.43	0.182	60.82	0.203	-150.93
2000	0.458	176.91	2.514	58.95	0.202	59.63	0.196	-152.87
2200	0.447	174.35	2.321	55.20	0.224	58.16	0.186	-154.84
2400	0.445	171.38	2.143	52.21	0.241	57.64	0.171	-159.37
2600	0.430	168.42	2.019	49.46	0.257	56.24	0.162	-158.75
2800	0.417	165.14	1.892	45.90	0.276	54.65	0.151	-159.12
3000	0.410	162.36	1.784	42.94	0.297	52.67	0.142	-163.78

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