

**2SC5847**

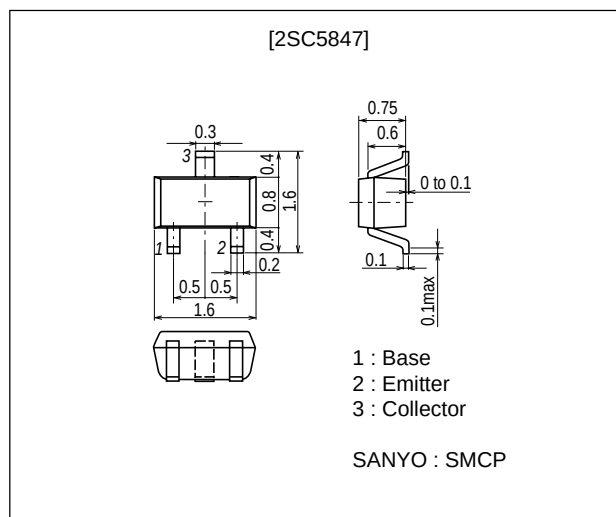
High-Frequency Low-Noise Amplifier and OSC Applications

Features

- Low noise : $NF=1.5\text{dB typ (}f=2\text{GHz)}.$
- High cutoff frequency : $f_T=6.0\text{GHz typ (}V_{CE}=1\text{V)}.$
: $f_T=10.5\text{GHz typ (}V_{CE}=3\text{V)}.$
- Low operating voltage.

Package Dimensions

unit : mm
2106A



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	$^\circ\text{C}$

Marking : NL

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

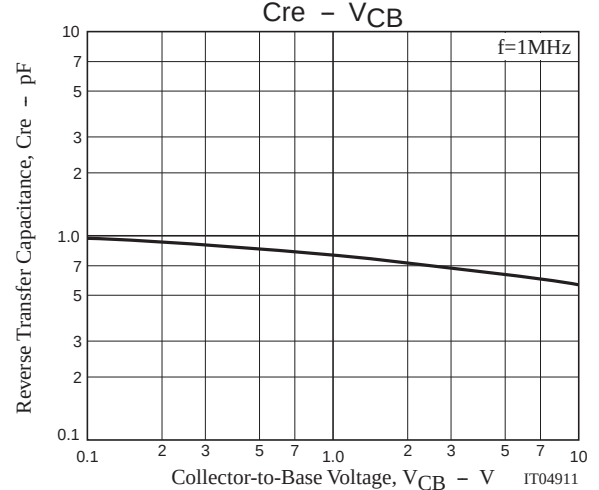
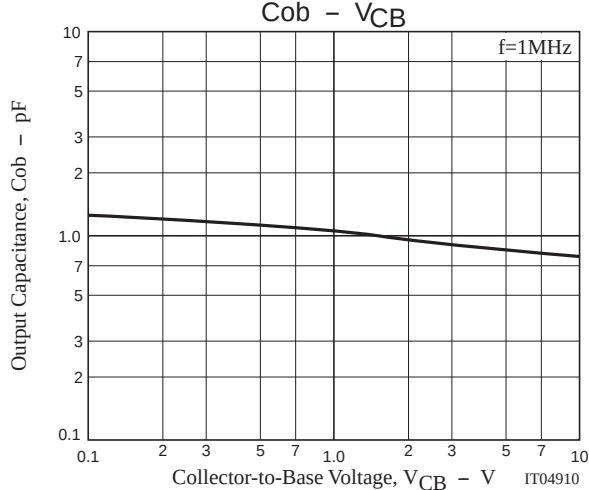
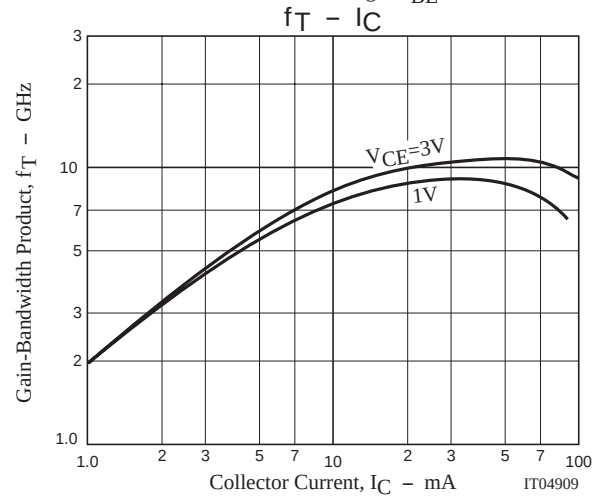
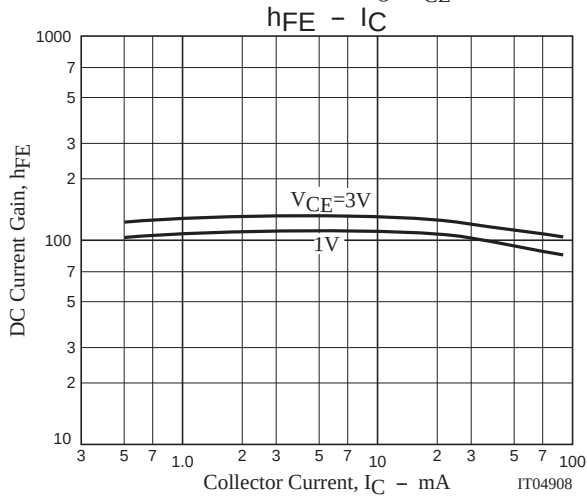
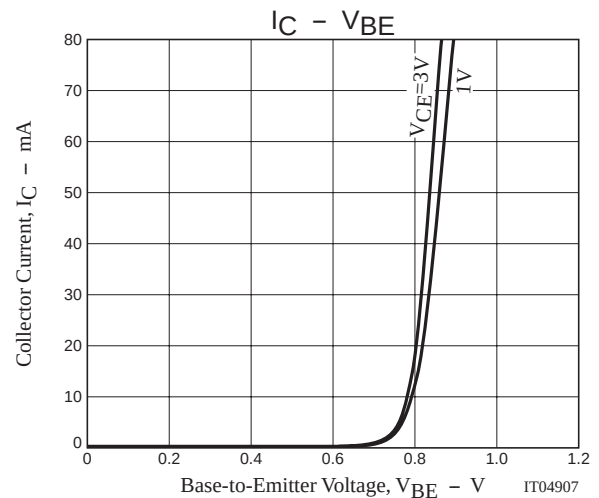
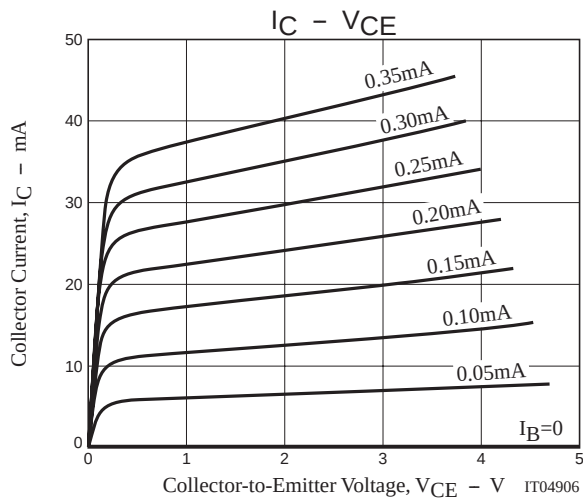
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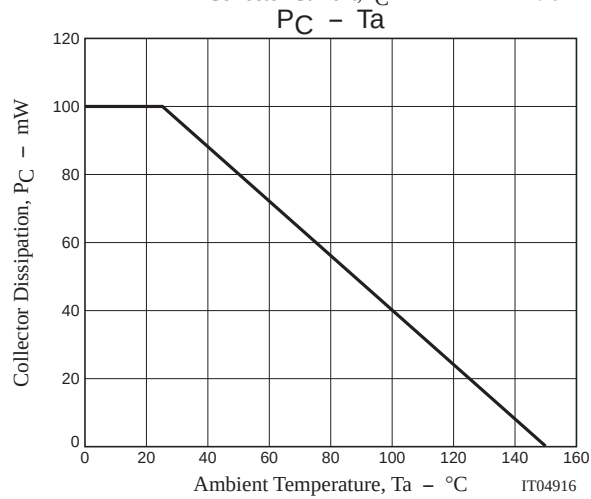
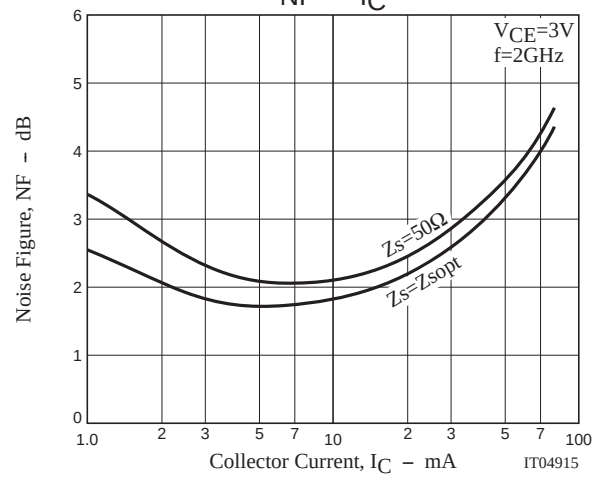
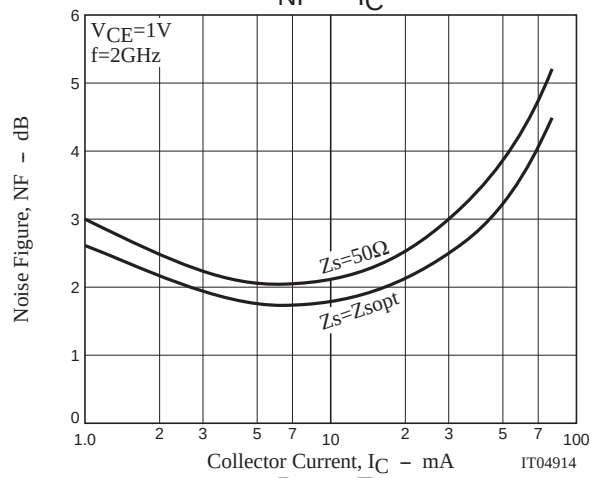
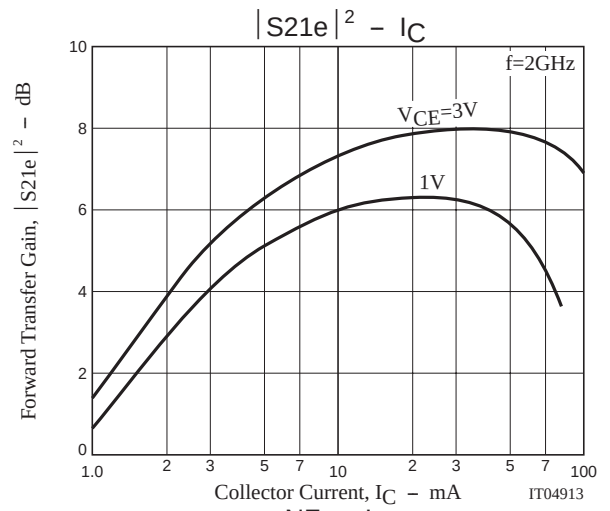
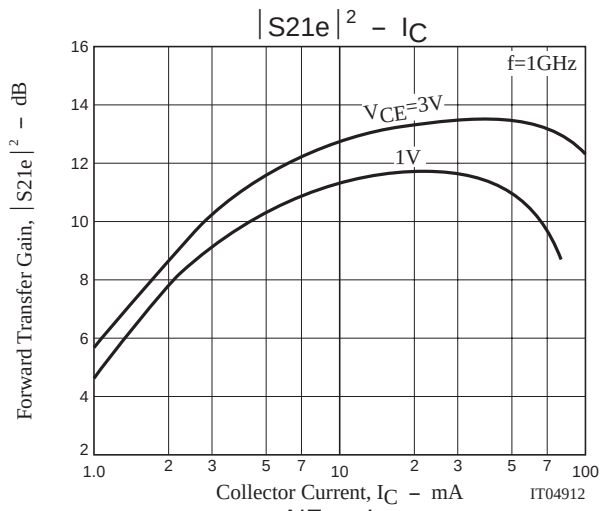
SANYO Electric Co.,Ltd. Semiconductor Company

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

Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	$V_{CB}=5V, I_E=0$			1.0	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=1V, I_C=0$			10	μA
DC Current Gain	h_{FE}	$V_{CE}=1V, I_C=5mA$	100		160	
Gain-Bandwidth Product	f_{T1}	$V_{CE}=1V, I_C=5mA$	4.5	6.0		GHz
	f_{T2}	$V_{CE}=3V, I_C=40mA$	8.5	10.5		GHz
Output Capacitance	C_{ob}	$V_{CB}=1V, f=1MHz$		1.05	1.3	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=1V, f=1MHz$		0.8	1.0	pF
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





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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	0.958	-18.69	3.545	165.60	0.059	78.07	0.970	-11.10
200	0.933	-36.23	3.407	152.62	0.111	67.24	0.931	-21.25
400	0.861	-67.16	2.940	129.99	0.188	50.32	0.816	-37.70
600	0.796	-92.11	2.511	111.52	0.229	37.35	0.704	-49.62
800	0.734	-109.81	2.109	97.31	0.246	29.55	0.622	-57.64
1000	0.709	-125.88	1.870	85.16	0.255	23.00	0.573	-64.33
1200	0.675	-138.13	1.648	74.68	0.256	18.56	0.532	-70.70
1400	0.650	-148.61	1.468	65.69	0.252	15.81	0.510	-74.91
1600	0.631	-157.93	1.334	57.83	0.248	14.79	0.502	-79.34
1800	0.611	-165.92	1.234	50.87	0.240	14.56	0.497	-83.58
2000	0.596	-173.33	1.135	44.54	0.233	15.44	0.497	-87.67
2200	0.581	179.85	1.061	38.67	0.230	16.94	0.493	-92.07
2400	0.568	173.89	0.983	34.03	0.225	18.88	0.497	-95.37
2600	0.565	167.51	0.931	29.96	0.227	23.73	0.504	-100.33
2800	0.556	161.65	0.871	25.85	0.233	26.78	0.509	-104.20
3000	0.552	155.57	0.845	22.57	0.243	30.72	0.510	-109.23

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.835	-38.08	12.462	153.77	0.051	69.17	0.877	-27.54
200	0.747	-69.45	10.411	134.02	0.086	55.99	0.724	-48.11
400	0.629	-110.22	6.984	110.08	0.122	43.78	0.508	-72.79
600	0.576	-134.23	5.073	95.78	0.139	41.30	0.394	-87.67
800	0.544	-148.42	3.924	86.44	0.153	41.45	0.332	-97.57
1000	0.539	-159.32	3.258	78.03	0.169	41.66	0.305	-104.86
1200	0.524	-168.23	2.758	71.46	0.183	42.04	0.287	-113.00
1400	0.516	-175.55	2.386	65.24	0.201	42.69	0.275	-117.01
1600	0.509	178.13	2.140	59.66	0.217	42.49	0.272	-121.75
1800	0.498	172.03	1.932	54.39	0.233	42.68	0.266	-125.74
2000	0.489	166.37	1.763	49.66	0.250	42.49	0.270	-128.82
2200	0.485	160.79	1.635	45.22	0.270	42.06	0.269	-133.03
2400	0.469	156.36	1.514	41.05	0.284	40.86	0.262	-134.93
2600	0.469	150.95	1.435	37.62	0.303	40.82	0.269	-138.65
2800	0.461	146.31	1.353	33.39	0.322	39.95	0.268	-142.35
3000	0.463	142.14	1.292	30.09	0.341	38.98	0.272	-145.60

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.716	-55.56	19.025	144.11	0.046	64.12	0.782	-40.11
200	0.620	-92.98	13.902	122.78	0.071	52.44	0.583	-65.91
400	0.543	-131.90	8.246	101.93	0.097	49.12	0.388	-93.48
600	0.522	-151.26	5.754	90.37	0.116	49.02	0.316	-109.80
800	0.505	-162.22	4.391	82.68	0.136	50.79	0.277	-121.22
1000	0.506	-170.68	3.606	75.59	0.159	51.59	0.267	-128.29
1200	0.498	-177.78	3.034	69.84	0.180	51.69	0.261	-135.64
1400	0.491	176.11	2.622	64.44	0.202	51.53	0.258	-139.90
1600	0.489	170.57	2.333	59.33	0.224	50.13	0.258	-143.95
1800	0.481	165.30	2.108	54.70	0.245	49.34	0.257	-147.81
2000	0.476	160.00	1.912	50.36	0.267	48.05	0.259	-150.21
2200	0.471	154.66	1.783	46.31	0.286	46.48	0.261	-154.78
2400	0.454	150.77	1.648	42.51	0.305	44.78	0.253	-156.88
2600	0.457	145.86	1.556	39.26	0.327	43.71	0.263	-159.74
2800	0.451	141.35	1.471	35.25	0.347	42.02	0.262	-164.02
3000	0.453	137.17	1.402	32.03	0.365	40.56	0.264	-166.39

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$V_{CE}=1V$, $I_C=40mA$, $Z_O=50\Omega$

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.494	-102.52	26.600	126.78	0.034	59.36	0.546	-69.55
200	0.506	-136.91	16.053	108.02	0.050	58.94	0.390	-101.67
400	0.512	-161.23	8.633	93.04	0.077	61.64	0.308	-131.35
600	0.516	-172.32	5.839	84.20	0.104	62.52	0.291	-144.91
800	0.509	-178.39	4.415	78.39	0.132	62.88	0.287	-153.50
1000	0.517	175.86	3.600	72.08	0.161	61.71	0.290	-157.66
1200	0.512	170.68	3.022	67.14	0.186	60.40	0.298	-162.65
1400	0.507	165.95	2.609	62.48	0.214	58.95	0.297	-165.66
1600	0.506	161.62	2.321	57.91	0.240	56.12	0.301	-168.28
1800	0.500	157.24	2.094	53.57	0.262	54.15	0.304	-170.81
2000	0.496	152.56	1.899	49.62	0.287	52.10	0.307	-172.63
2200	0.493	147.77	1.771	46.02	0.311	49.89	0.313	-176.27
2400	0.474	144.08	1.636	42.34	0.332	47.31	0.302	-178.93
2600	0.478	139.72	1.550	39.47	0.352	45.70	0.312	179.07
2800	0.469	135.36	1.467	35.65	0.375	43.26	0.313	175.27
3000	0.473	131.70	1.399	32.42	0.395	41.42	0.314	172.94

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

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.972	-15.82	3.205	167.57	0.047	79.38	0.976	-8.53
200	0.952	-31.07	3.106	156.17	0.092	70.52	0.948	-16.69
400	0.892	-58.57	2.786	135.28	0.162	54.55	0.862	-30.29
600	0.834	-81.93	2.456	117.78	0.203	42.19	0.766	-40.80
800	0.771	-100.04	2.112	103.49	0.224	33.80	0.693	-47.92
1000	0.742	-115.97	1.901	91.11	0.238	26.95	0.643	-54.29
1200	0.702	-128.95	1.684	80.47	0.239	22.02	0.602	-59.59
1400	0.672	-140.14	1.504	70.90	0.236	18.88	0.579	-63.43
1600	0.649	-150.10	1.383	62.82	0.233	16.88	0.564	-67.75
1800	0.624	-158.54	1.273	55.58	0.224	16.20	0.555	-71.49
2000	0.604	-166.48	1.181	49.11	0.216	17.07	0.554	-75.43
2200	0.591	-173.84	1.098	42.71	0.212	19.01	0.552	-79.70
2400	0.572	179.58	1.014	37.82	0.205	20.84	0.554	-82.80
2600	0.565	172.73	0.971	33.63	0.205	25.69	0.555	-87.59
2800	0.556	166.58	0.908	29.12	0.210	29.68	0.562	-91.70
3000	0.553	160.23	0.869	25.93	0.221	34.11	0.564	-95.96

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

Freq(MHz)	S ₁₁	∠S ₁₁	S ₂₁	∠S ₂₁	S ₁₂	∠S ₁₂	S ₂₂	∠S ₂₂
100	0.861	-32.01	12.675	156.76	0.043	73.41	0.891	-22.10
200	0.776	-59.30	10.914	138.55	0.074	59.95	0.764	-39.30
400	0.635	-97.83	7.678	114.67	0.108	48.47	0.551	-60.23
600	0.565	-122.73	5.697	99.96	0.127	44.03	0.431	-72.42
800	0.520	-137.87	4.459	90.16	0.141	43.87	0.355	-80.37
1000	0.508	-150.24	3.707	81.75	0.155	43.74	0.320	-86.59
1200	0.489	-160.10	3.157	74.87	0.171	44.35	0.295	-93.19
1400	0.477	-168.27	2.727	68.66	0.184	45.40	0.277	-96.71
1600	0.470	-175.03	2.432	63.04	0.204	44.95	0.269	-100.69
1800	0.459	178.66	2.206	57.81	0.215	45.01	0.265	-104.74
2000	0.451	171.85	2.003	52.98	0.234	44.76	0.263	-108.28
2200	0.445	166.37	1.860	48.42	0.251	44.99	0.259	-112.40
2400	0.429	161.49	1.715	44.21	0.267	43.75	0.250	-113.95
2600	0.432	156.03	1.620	40.78	0.285	43.82	0.257	-117.79
2800	0.423	150.90	1.526	36.42	0.303	42.80	0.250	-121.83
3000	0.426	146.29	1.455	33.18	0.321	42.07	0.252	-125.12

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$V_{CE}=3V$, $I_C=10mA$, $Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.756	-45.05	19.529	148.46	0.039	69.09	0.808	-32.29
200	0.641	-78.52	15.063	127.70	0.062	57.94	0.632	-53.48
400	0.521	-118.14	9.345	106.01	0.089	52.69	0.415	-75.98
600	0.479	-139.80	6.609	93.78	0.106	51.19	0.321	-89.28
800	0.455	-152.16	5.059	85.92	0.127	52.62	0.270	-98.82
1000	0.453	-161.92	4.161	78.83	0.148	53.76	0.249	-105.45
1200	0.445	-170.21	3.503	72.88	0.167	53.20	0.235	-113.22
1400	0.437	-177.07	3.034	67.62	0.188	53.28	0.225	-117.51
1600	0.436	177.08	2.694	62.56	0.208	51.99	0.222	-121.90
1800	0.429	171.47	2.430	57.93	0.228	51.64	0.219	-126.07
2000	0.424	165.72	2.206	53.56	0.247	50.28	0.225	-129.16
2200	0.420	159.89	2.047	49.40	0.269	49.10	0.221	-133.98
2400	0.404	155.57	1.887	45.57	0.286	47.31	0.210	-136.35
2600	0.407	150.53	1.778	42.31	0.307	46.34	0.219	-139.18
2800	0.400	145.68	1.674	38.25	0.326	45.05	0.214	-144.44
3000	0.406	141.56	1.598	34.95	0.346	43.20	0.218	-147.88

$V_{CE}=3V$, $I_C=40mA$, $Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.516	-76.98	30.239	132.79	0.031	65.77	0.614	-52.07
200	0.454	-114.96	19.239	112.91	0.045	59.98	0.413	-77.55
400	0.426	-146.78	10.582	96.57	0.072	61.88	0.273	-103.47
600	0.421	-161.27	7.221	87.56	0.096	63.62	0.231	-117.73
800	0.415	-169.26	5.469	81.48	0.120	63.75	0.212	-128.32
1000	0.422	-175.88	4.462	75.58	0.146	63.26	0.211	-134.59
1200	0.420	178.19	3.745	70.44	0.172	62.05	0.212	-141.46
1400	0.418	172.79	3.227	65.90	0.196	60.43	0.212	-144.97
1600	0.419	168.17	2.870	61.48	0.220	58.01	0.218	-148.87
1800	0.415	163.53	2.582	57.23	0.243	55.92	0.221	-151.66
2000	0.412	158.20	2.338	53.54	0.265	54.25	0.226	-153.73
2200	0.410	152.69	2.166	49.54	0.289	52.37	0.229	-158.88
2400	0.393	148.94	1.995	45.99	0.307	49.63	0.218	-161.67
2600	0.400	144.34	1.874	43.16	0.328	48.43	0.229	-164.18
2800	0.393	139.97	1.771	39.28	0.350	46.04	0.230	-168.80
3000	0.399	136.21	1.680	36.16	0.368	44.16	0.233	-171.88

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