



SANYO Semiconductors

DATA SHEET

2SC6025 — NPN Epitaxial Planar Silicon Transistor

UHF to C Band Low-Noise Amplifier and OSC Applications

Features

- Low-noise use : NF=1.2dB typ (f=2GHz).
- High cut-off frequency : $f_T=14\text{GHz}$ typ ($V_{CE}=1\text{V}$).
- High cut-off frequency : $f_T=21\text{GHz}$ typ ($V_{CE}=3\text{V}$).
- Low operating voltage.
- High gain : $|S_{21e}|^2=12.5\text{dB}$ typ (f=2GHz).

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}		3.5	V
Emitter-to-Base Voltage	V_{EBO}		2	V
Collector Current	I_C		35	mA
Collector Dissipation	P_C		120	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}	$V_{EB}=1\text{V}, I_C=0$			1	μA
DC Current Gain	h_{FE}	$V_{CE}=3\text{V}, I_C=15\text{mA}$	80		160	
Gain-Bandwidth Product	f_T1	$V_{CE}=1\text{V}, I_C=5\text{mA}$		14		GHz
	f_T2	$V_{CE}=3\text{V}, I_C=15\text{mA}$	18	21		GHz
Output Capacitance	C_{ob}	$V_{CB}=1\text{V}, f=1\text{MHz}$		0.55	0.7	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB}=1\text{V}, f=1\text{MHz}$		0.25		pF
Forward Transfer Gain	$ S_{21e} ^21$	$V_{CE}=1\text{V}, I_C=5\text{mA}, f=2\text{GHz}$	9	10.5		dB
	$ S_{21e} ^22$	$V_{CE}=3\text{V}, I_C=15\text{mA}, f=2\text{GHz}$		12.5		dB
Noise Figure	NF	$V_{CE}=1\text{V}, I_C=5\text{mA}, f=2\text{GHz}$		1.2		dB

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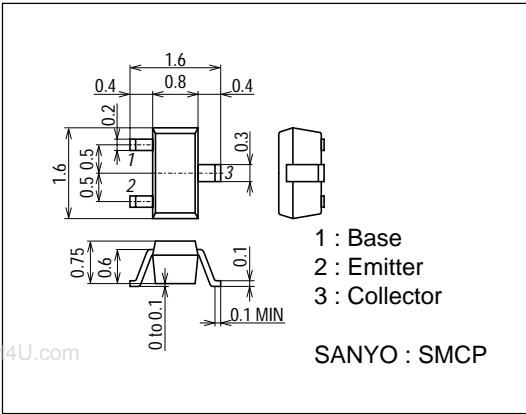
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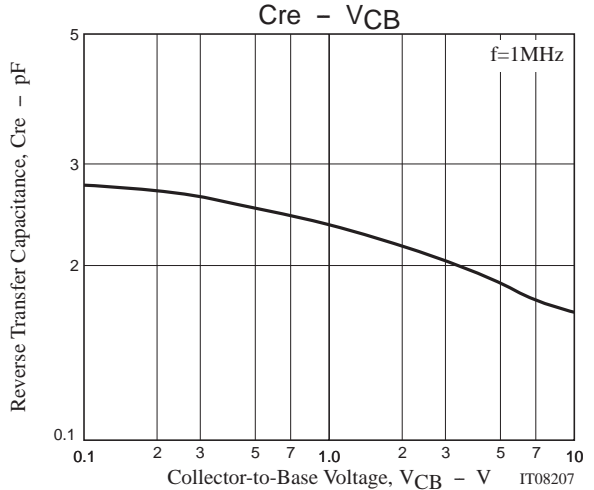
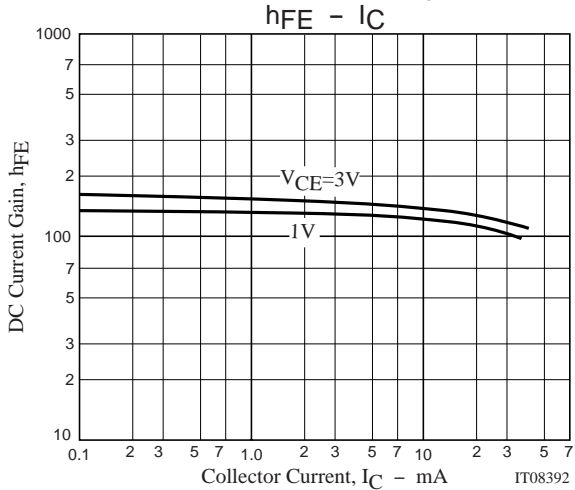
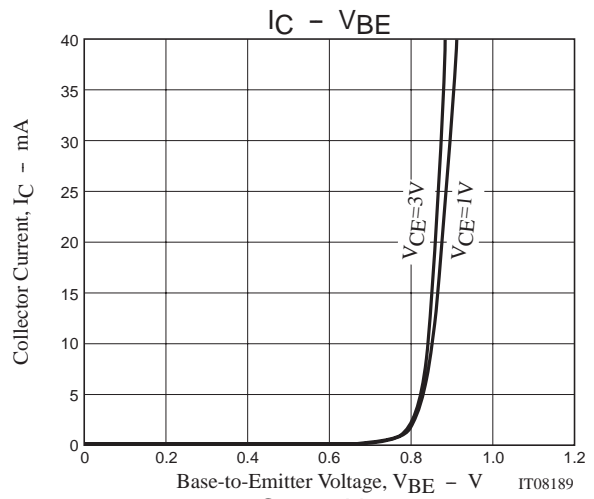
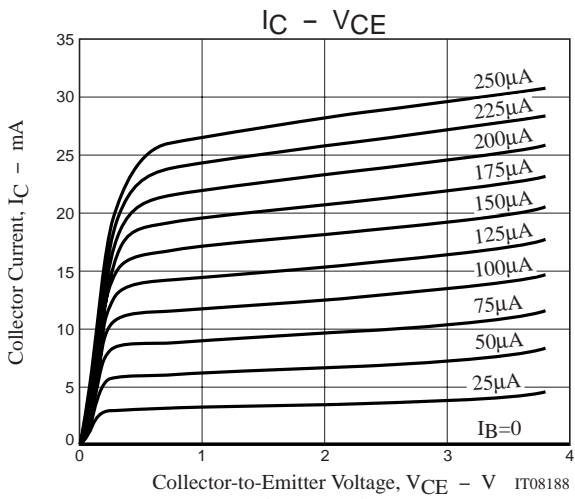
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Package Dimensions

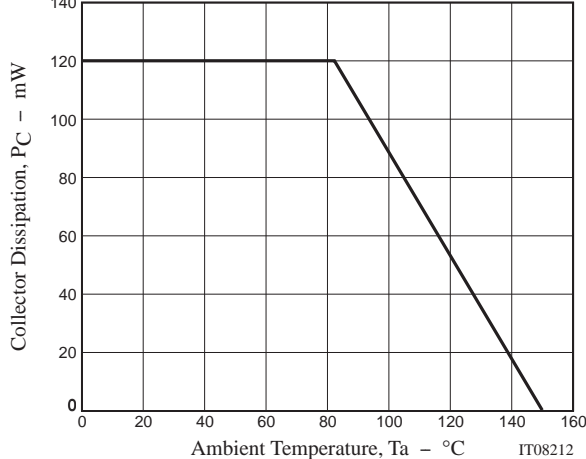
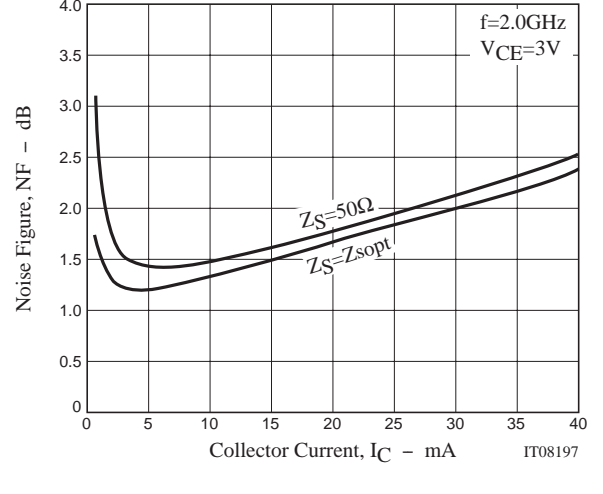
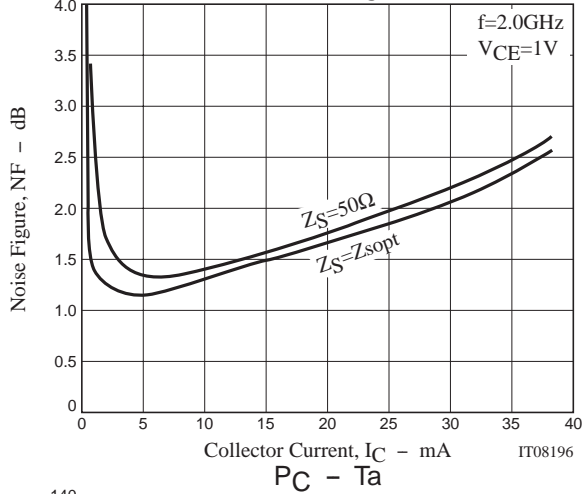
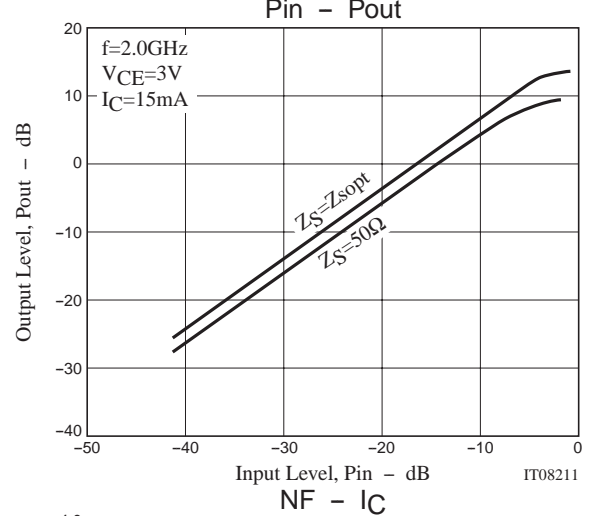
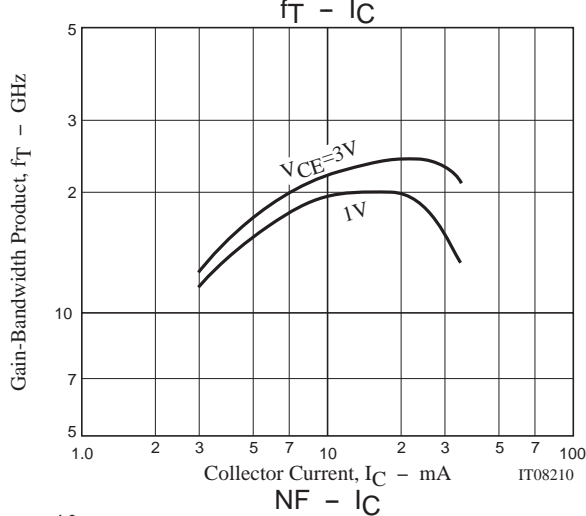
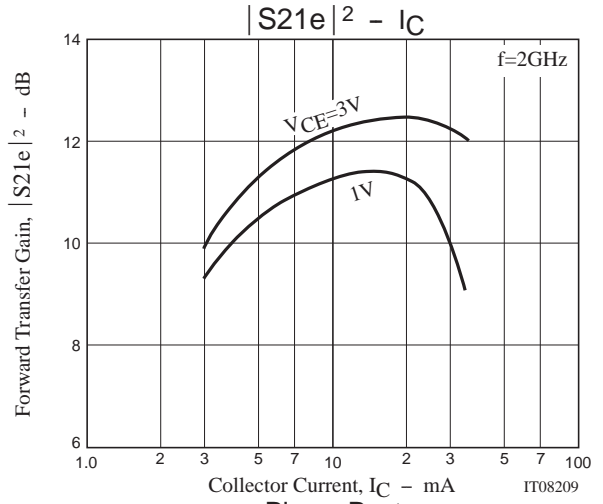
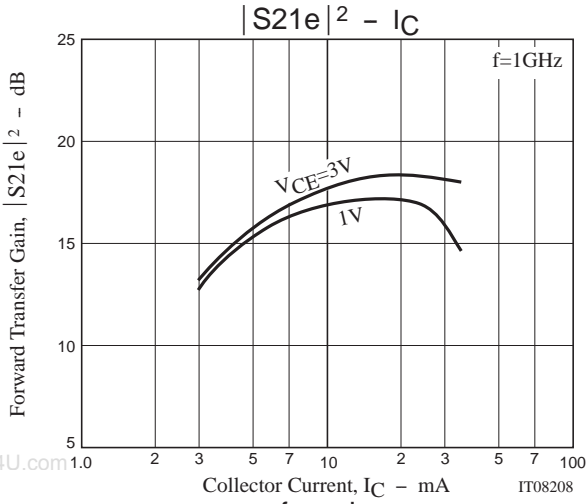
unit : mm
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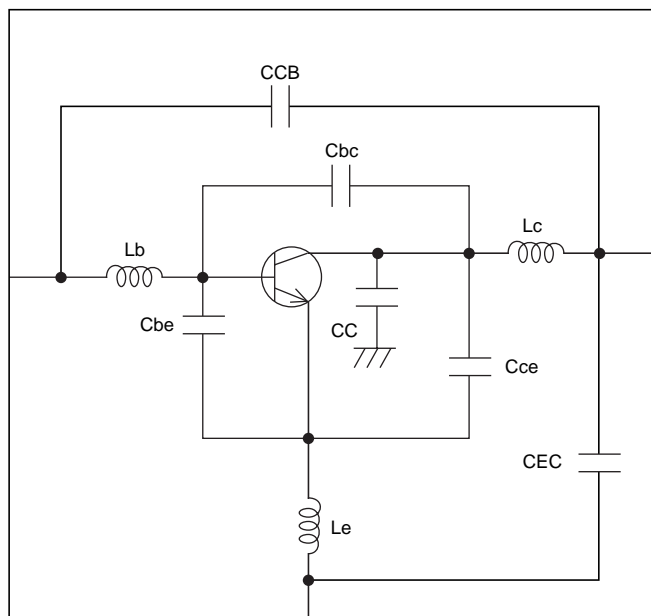
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SPIICE PARAMETERS

model : Gummel-Poon

Parameter	Value	Unit	Parameter	Value	Unit
IS	124.2a	A	TF	4.500p	S
BF	168.7		XTF	10.00m	
NF	1.007		VTF	8	V
VAF	5.762	V	ITF	549.7m	A
IKF	141.1m	A	PTF	25	°C
ISE	181.0f	A	CJC	168.1f	F
NE	2.295		VJC	165.7m	V
BR	11.54		MJC	571.4m	
NR	1		XCJC	330.0m	
VAR	3.43	V	TR	10.00p	S
IKR	21.00m	A	FC	800.0m	
ISC	1.800f	A	CJS	0	F
NC	1.24		VJS	0	V
RB	2.86	Ω	MJS	0	
IRB	100.0μ	A	LE	998.0p	F
RBM	1.254	Ω	LB	988.0n	F
RE	1.297	Ω	LC	723.0p	F
RC	2.552	Ω	Cbc	30.00f	F
XTB	0		Cbe	386.0f	F
EG	1.11	eV	Cce	85.00f	F
XTI	3		CC	30.00f	H
CJE	98.40f	F	CCB	211.0f	H
VJE	10	V	CEC	235.3.f	H
MJE	100.0m				

SCHEMATIC



IT08213

*Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production.

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S Parameters (Common emitter)

$V_{CE}=1V, I_C=5mA, Z_0=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.884	-18.0	8.097	156.1	0.029	80.9	0.928	-20.0
400	0.779	-38.0	8.134	137.1	0.054	74.3	0.808	-36.8
600	0.695	-53.9	6.928	124.9	0.074	68.2	0.681	-49.9
800	0.582	-69.9	6.257	112.6	0.090	65.0	0.582	-59.2
1000	0.469	-86.1	5.774	101.8	0.104	63.6	0.500	-66.0
1200	0.397	-98.4	5.105	93.9	0.117	62.9	0.441	-71.9
1400	0.354	-108.7	4.488	88.1	0.130	62.6	0.397	-76.6
1600	0.311	-118.3	4.055	82.4	0.143	62.3	0.361	-80.7
1800	0.285	-127.0	3.666	77.9	0.156	62.3	0.334	-84.9
2000	0.268	-135.6	3.350	73.6	0.170	61.9	0.312	-89.0
2200	0.254	-143.0	3.080	69.8	0.183	61.7	0.295	-92.6
2400	0.244	-151.0	2.869	66.0	0.197	61.4	0.280	-96.8
2600	0.238	-158.0	2.675	62.6	0.212	61.1	0.269	-100.6
2800	0.236	-164.9	2.513	59.3	0.226	60.5	0.260	-104.6
3000	0.235	-171.4	2.374	56.1	0.241	59.9	0.255	-108.7
3200	0.237	-177.3	2.252	53.1	0.257	59.2	0.250	-113.1
3400	0.240	176.9	2.147	50.1	0.272	58.5	0.248	-117.3
3600	0.245	171.8	2.055	47.2	0.289	57.6	0.246	-122.0
3800	0.252	167.0	1.971	44.4	0.305	56.6	0.247	-126.7
4000	0.259	162.3	1.895	41.6	0.322	55.4	0.248	-131.4
4200	0.267	157.8	1.826	38.9	0.338	54.2	0.250	-136.0
4400	0.276	153.8	1.765	36.2	0.354	52.9	0.253	-140.9
4600	0.286	149.8	1.705	33.6	0.371	51.6	0.257	-145.4
4800	0.296	146.1	1.654	31.0	0.388	50.2	0.262	-150.2
5000	0.306	142.5	1.604	28.5	0.404	48.8	0.268	-154.9
5200	0.315	139.1	1.557	26.1	0.421	47.2	0.274	-159.4
5400	0.328	135.8	1.515	23.7	0.437	45.7	0.281	-164.2
5600	0.339	132.4	1.473	21.4	0.453	44.0	0.289	-168.7
5800	0.350	129.4	1.434	19.1	0.470	42.4	0.297	-173.0
6000	0.361	126.7	1.399	16.8	0.485	40.7	0.305	-177.0

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S Parameters (Common emitter)

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.761	-28.4	13.148	148.0	0.026	79.5	0.851	-27.2
400	0.606	-55.3	12.589	125.9	0.047	73.4	0.673	-45.4
600	0.471	-77.1	10.264	110.2	0.063	71.3	0.536	-57.4
800	0.375	-93.5	8.283	99.6	0.080	70.7	0.443	-65.2
1000	0.310	-107.0	6.873	92.1	0.095	70.6	0.377	-70.9
1200	0.271	-118.0	5.836	86.3	0.111	70.1	0.331	-75.8
1400	0.247	-128.8	5.047	81.7	0.126	69.6	0.297	-79.9
1600	0.229	-138.3	4.461	77.5	0.142	69.1	0.272	-83.7
1800	0.218	-146.7	4.003	73.8	0.158	68.3	0.252	-87.7
2000	0.214	-155.0	3.632	70.2	0.175	67.4	0.236	-91.9
2200	0.209	-162.1	3.328	67.0	0.191	66.5	0.225	-95.5
2400	0.208	-169.2	3.081	63.7	0.207	65.4	0.215	-99.9
2600	0.209	-175.5	2.868	60.7	0.223	64.5	0.208	-104.0
2800	0.212	178.4	2.687	57.8	0.239	63.4	0.202	-108.3
3000	0.215	173.0	2.533	54.9	0.256	62.3	0.199	-112.7
3200	0.221	168.2	2.399	52.2	0.272	61.0	0.197	-117.6
3400	0.227	163.4	2.282	49.5	0.289	59.7	0.197	-121.9
3600	0.235	159.2	2.181	46.9	0.306	58.4	0.197	-126.9
3800	0.243	155.3	2.090	44.3	0.322	57.0	0.199	-131.9
4000	0.251	151.4	2.007	41.7	0.339	55.5	0.202	-136.7
4200	0.259	147.8	1.933	39.2	0.355	54.1	0.205	-141.6
4400	0.270	144.5	1.865	36.6	0.371	52.4	0.210	-146.7
4600	0.279	141.1	1.802	34.2	0.388	50.9	0.215	-151.3
4800	0.289	138.3	1.747	31.8	0.404	49.3	0.220	-156.1
5000	0.300	135.2	1.693	29.4	0.419	47.6	0.227	-160.7
5200	0.309	132.4	1.644	27.1	0.435	45.9	0.233	-165.2
5400	0.321	129.6	1.599	24.8	0.450	44.3	0.241	-169.9
5600	0.332	126.7	1.555	22.6	0.465	42.6	0.250	-174.2
5800	0.342	124.1	1.515	20.4	0.480	40.9	0.257	-178.2
6000	0.353	121.7	1.478	18.2	0.494	39.2	0.266	177.9

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S Parameters (Common emitter)

$V_{CE}=1V, I_C=15mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.631	-43.0	15.419	141.1	0.025	76.7	0.789	-31.4
400	0.473	-71.4	14.382	117.8	0.043	74.1	0.591	-49.3
600	0.361	-91.2	11.142	103.4	0.060	74.2	0.464	-60.2
800	0.297	-107.0	8.699	94.6	0.077	74.0	0.381	-67.3
1000	0.255	-119.7	7.085	88.4	0.094	73.9	0.324	-72.4
1200	0.232	-131.4	5.969	83.4	0.110	73.2	0.286	-77.1
1400	0.218	-141.2	5.147	79.3	0.127	72.4	0.257	-81.2
1600	0.209	-150.5	4.536	75.5	0.144	71.5	0.236	-84.8
1800	0.205	-158.4	4.057	72.1	0.161	70.4	0.220	-89.2
2000	0.205	-165.9	3.679	68.7	0.178	69.2	0.207	-93.5
2200	0.204	-172.5	3.367	65.6	0.194	68.2	0.198	-97.2
2400	0.207	-178.7	3.115	62.6	0.211	66.8	0.190	-101.9
2600	0.210	175.6	2.898	59.7	0.228	65.6	0.185	-106.2
2800	0.215	170.2	2.714	56.9	0.245	64.3	0.180	-110.8
3000	0.221	165.5	2.556	54.2	0.261	62.9	0.179	-115.4
3200	0.226	161.2	2.421	51.5	0.279	61.5	0.178	-120.3
3400	0.234	157.1	2.302	48.9	0.296	60.1	0.179	-125.0
3600	0.242	153.4	2.199	46.4	0.312	58.6	0.180	-130.3
3800	0.250	150.0	2.107	43.8	0.329	57.1	0.183	-135.4
4000	0.259	146.5	2.022	41.3	0.346	55.5	0.187	-140.3
4200	0.268	143.2	1.948	38.8	0.362	53.9	0.191	-145.3
4400	0.278	140.3	1.878	36.4	0.378	52.2	0.196	-150.3
4600	0.288	137.2	1.815	34.0	0.395	50.5	0.202	-155.0
4800	0.297	134.6	1.759	31.6	0.410	48.9	0.207	-159.8
5000	0.308	131.7	1.705	29.3	0.426	47.2	0.215	-164.4
5200	0.317	129.1	1.655	27.0	0.441	45.4	0.222	-168.7
5400	0.329	126.6	1.609	24.8	0.456	43.7	0.231	-173.4
5600	0.339	123.9	1.566	22.6	0.470	42.0	0.239	-177.6
5800	0.349	121.5	1.525	20.5	0.485	40.2	0.247	178.5
6000	0.360	119.2	1.488	18.3	0.499	38.5	0.256	174.7

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S Parameters (Common emitter)

$V_{CE}=1V, I_C=20mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.522	-61.0	16.301	135.2	0.024	77.2	0.735	-34.3
400	0.384	-89.3	14.295	112.3	0.041	75.8	0.534	-51.5
600	0.307	-104.6	11.085	99.7	0.058	76.1	0.416	-61.7
800	0.264	-119.5	8.621	91.9	0.076	76.1	0.342	-68.3
1000	0.236	-131.5	7.018	86.4	0.093	75.8	0.292	-73.3
1200	0.222	-142.4	5.908	81.7	0.110	74.7	0.258	-78.0
1400	0.216	-151.9	5.087	77.8	0.128	73.8	0.234	-82.0
1600	0.211	-160.2	4.482	74.2	0.145	72.7	0.216	-85.9
1800	0.210	-167.2	4.011	70.9	0.162	71.5	0.202	-90.4
2000	0.214	-174.1	3.634	67.6	0.180	70.1	0.191	-94.9
2200	0.214	179.9	3.326	64.7	0.197	68.9	0.183	-98.9
2400	0.218	174.6	3.078	61.6	0.214	67.5	0.176	-103.9
2600	0.223	169.4	2.863	58.8	0.231	66.2	0.173	-108.2
2800	0.229	164.7	2.680	56.1	0.249	64.7	0.170	-113.0
3000	0.235	160.4	2.525	53.4	0.266	63.3	0.169	-117.9
3200	0.241	156.6	2.391	50.7	0.283	61.8	0.169	-122.8
3400	0.249	152.9	2.274	48.2	0.300	60.3	0.170	-127.7
3600	0.257	149.4	2.172	45.6	0.317	58.7	0.173	-133.0
3800	0.266	146.3	2.080	43.1	0.334	57.0	0.177	-138.3
4000	0.275	143.0	1.996	40.6	0.351	55.5	0.182	-143.2
4200	0.284	140.0	1.923	38.2	0.367	53.8	0.186	-148.1
4400	0.293	137.3	1.854	35.7	0.383	52.0	0.192	-153.1
4600	0.304	134.4	1.792	33.4	0.400	50.4	0.198	-157.9
4800	0.313	131.9	1.735	31.0	0.416	48.7	0.205	-162.5
5000	0.323	129.2	1.682	28.7	0.431	46.9	0.213	-167.0
5200	0.332	126.8	1.633	26.5	0.446	45.1	0.221	-171.3
5400	0.344	124.3	1.588	24.2	0.461	43.4	0.229	-175.9
5600	0.354	121.7	1.546	22.1	0.475	41.6	0.239	-180.0
5800	0.364	119.4	1.505	20.0	0.489	39.8	0.247	176.2
6000	0.374	117.2	1.469	17.8	0.503	38.0	0.256	172.5

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S Parameters (Common emitter)

$V_{CE}=1V, I_C=25mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.458	-78.5	16.372	130.6	0.023	77.5	0.692	-36.3
400	0.350	-106.3	13.415	108.9	0.040	75.9	0.490	-52.9
600	0.290	-118.9	10.522	97.5	0.058	76.5	0.381	-62.7
800	0.260	-132.5	8.230	90.2	0.075	77.3	0.315	-69.2
1000	0.239	-142.9	6.748	84.9	0.093	76.5	0.270	-74.2
1200	0.230	-152.4	5.702	80.5	0.111	75.4	0.240	-79.0
1400	0.228	-160.8	4.912	76.6	0.128	74.5	0.218	-83.1
1600	0.226	-168.4	4.332	73.1	0.146	73.3	0.202	-87.1
1800	0.227	-174.6	3.881	69.8	0.164	72.0	0.190	-91.9
2000	0.232	179.4	3.516	66.5	0.181	70.6	0.181	-96.7
2200	0.235	174.1	3.219	63.6	0.199	69.3	0.174	-100.7
2400	0.239	169.4	2.984	60.6	0.216	67.8	0.169	-106.0
2600	0.244	164.8	2.778	57.8	0.234	66.3	0.166	-110.5
2800	0.250	160.4	2.601	55.0	0.251	64.9	0.164	-115.5
3000	0.256	156.5	2.450	52.4	0.268	63.4	0.165	-120.5
3200	0.263	153.0	2.321	49.7	0.286	61.8	0.166	-125.5
3400	0.271	149.5	2.206	47.1	0.303	60.3	0.168	-130.4
3600	0.280	146.3	2.109	44.6	0.320	58.7	0.171	-135.8
3800	0.288	143.3	2.020	42.1	0.337	57.1	0.176	-141.0
4000	0.298	140.3	1.939	39.6	0.355	55.4	0.181	-146.0
4200	0.306	137.4	1.867	37.1	0.371	53.6	0.187	-150.8
4400	0.316	134.8	1.800	34.6	0.388	51.9	0.194	-155.8
4600	0.325	132.1	1.740	32.3	0.404	50.2	0.200	-160.4
4800	0.335	129.6	1.686	30.0	0.420	48.4	0.207	-165.0
5000	0.345	127.0	1.634	27.7	0.435	46.6	0.216	-169.4
5200	0.354	124.5	1.586	25.4	0.451	44.8	0.224	-173.8
5400	0.365	122.1	1.543	23.2	0.465	43.1	0.233	-178.1
5600	0.375	119.6	1.501	21.1	0.480	41.3	0.243	177.8
5800	0.385	117.4	1.462	19.0	0.494	39.4	0.252	174.0
6000	0.395	115.2	1.426	16.8	0.508	37.6	0.261	170.4

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S Parameters (Common emitter)

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.903	-15.3	8.152	157.3	0.023	85.3	0.941	-16.6
400	0.820	-32.6	8.273	140.0	0.045	79.3	0.850	-31.6
600	0.732	-47.2	7.296	127.6	0.065	73.5	0.736	-43.5
800	0.635	-59.8	6.411	116.1	0.080	70.1	0.636	-51.9
1000	0.520	-75.1	6.117	105.6	0.093	68.0	0.554	-58.2
1200	0.428	-86.3	5.532	96.9	0.106	67.3	0.492	-62.9
1400	0.374	-95.0	4.901	90.9	0.119	66.7	0.445	-66.8
1600	0.329	-103.3	4.415	85.5	0.131	66.3	0.408	-70.4
1800	0.297	-110.6	3.996	80.8	0.144	66.2	0.379	-73.7
2000	0.269	-118.0	3.666	76.4	0.157	66.1	0.355	-76.9
2200	0.250	-125.1	3.376	72.5	0.170	65.7	0.336	-80.0
2400	0.235	-132.5	3.141	68.8	0.184	65.5	0.320	-83.2
2600	0.224	-139.3	2.935	65.4	0.198	65.0	0.309	-86.5
2800	0.216	-146.0	2.758	62.0	0.212	64.7	0.298	-89.9
3000	0.209	-152.8	2.603	58.9	0.226	64.2	0.289	-93.3
3200	0.207	-159.1	2.471	55.9	0.242	63.5	0.284	-97.0
3400	0.208	-165.2	2.357	53.0	0.257	62.8	0.279	-100.8
3600	0.210	-171.1	2.255	50.1	0.273	62.0	0.276	-105.0
3800	0.214	-176.8	2.164	47.2	0.290	61.1	0.274	-109.4
4000	0.219	177.7	2.081	44.4	0.306	60.0	0.273	-113.8
4200	0.226	172.8	2.006	41.7	0.323	58.9	0.273	-118.3
4400	0.233	168.0	1.937	39.0	0.340	57.6	0.273	-123.0
4600	0.240	163.2	1.874	36.3	0.357	56.3	0.276	-127.9
4800	0.251	158.9	1.815	33.7	0.375	54.9	0.278	-132.7
5000	0.261	154.8	1.761	31.2	0.391	53.6	0.281	-137.5
5200	0.272	150.9	1.708	28.7	0.409	52.1	0.285	-142.4
5400	0.282	147.2	1.662	26.3	0.426	50.5	0.291	-147.3
5600	0.293	143.5	1.617	23.9	0.443	49.0	0.296	-151.9
5800	0.305	140.1	1.576	21.5	0.460	47.3	0.302	-156.7
6000	0.317	136.9	1.535	19.2	0.478	45.6	0.309	-161.3

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S Parameters (Common emitter)

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

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.806	-21.8	14.515	150.7	0.021	81.2	0.884	-21.8
400	0.672	-45.0	13.289	129.8	0.040	79.0	0.740	-38.1
600	0.535	-63.4	10.969	114.3	0.056	76.3	0.606	-48.7
800	0.419	-78.1	9.068	102.9	0.071	75.1	0.510	-55.4
1000	0.337	-89.8	7.593	94.8	0.087	74.2	0.440	-60.1
1200	0.284	-99.1	6.461	88.9	0.102	73.7	0.390	-63.7
1400	0.248	-107.8	5.600	84.1	0.116	73.2	0.353	-66.7
1600	0.223	-116.0	4.948	80.0	0.131	72.5	0.325	-69.5
1800	0.205	-123.6	4.438	76.2	0.146	71.7	0.303	-72.3
2000	0.190	-131.4	4.031	72.8	0.161	70.9	0.286	-75.1
2200	0.181	-138.9	3.695	69.5	0.176	70.1	0.271	-78.1
2400	0.174	-146.7	3.419	66.3	0.192	69.1	0.260	-81.2
2600	0.171	-153.4	3.184	63.4	0.208	68.2	0.252	-84.5
2800	0.169	-160.2	2.984	60.5	0.223	67.3	0.243	-87.9
3000	0.168	-167.0	2.809	57.7	0.239	66.2	0.237	-91.4
3200	0.171	-172.8	2.662	55.0	0.255	65.1	0.233	-95.3
3400	0.175	-178.4	2.553	52.4	0.272	63.9	0.230	-99.3
3600	0.181	176.4	2.419	49.8	0.287	62.7	0.227	-103.7
3800	0.187	171.5	2.319	47.2	0.304	61.3	0.226	-108.2
4000	0.195	166.9	2.227	44.6	0.321	60.0	0.225	-112.9
4200	0.203	162.5	2.145	42.1	0.338	58.5	0.226	-117.7
4400	0.211	158.5	2.070	39.5	0.354	57.0	0.227	-122.7
4600	0.220	154.4	2.001	37.1	0.370	55.5	0.229	-127.7
4800	0.231	150.8	1.936	34.7	0.387	54.0	0.231	-132.8
5000	0.242	147.4	1.878	32.3	0.403	52.5	0.235	-137.8
5200	0.253	144.0	1.822	29.9	0.419	50.8	0.239	-142.7
5400	0.264	141.0	1.772	27.6	0.436	49.2	0.244	-147.7
5600	0.275	137.9	1.726	25.4	0.452	47.6	0.250	-152.5
5800	0.286	134.9	1.682	23.1	0.467	45.9	0.256	-157.4
6000	0.299	132.2	1.638	20.9	0.483	44.2	0.262	-162.1

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S Parameters (Common emitter)

$V_{CE}=3V, I_C=15mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.714	-27.6	19.486	145.9	0.020	81.3	0.841	-24.7
400	0.549	-53.7	16.232	122.3	0.037	80.2	0.675	-40.5
600	0.412	-72.2	12.452	107.1	0.053	78.5	0.544	-50.0
800	0.323	-85.9	9.778	97.4	0.069	78.3	0.456	-55.6
1000	0.266	-96.7	7.959	90.9	0.084	77.7	0.395	-59.6
1200	0.228	-106.2	6.702	85.8	0.100	76.9	0.352	-62.5
1400	0.202	-115.3	5.777	81.6	0.116	76.0	0.321	-65.3
1600	0.184	-124.1	5.092	77.9	0.132	75.0	0.297	-67.9
1800	0.172	-132.2	4.556	74.5	0.147	74.0	0.279	-70.5
2000	0.163	-140.0	4.125	71.2	0.163	72.8	0.264	-73.4
2200	0.158	-148.2	3.780	68.2	0.179	71.7	0.252	-76.2
2400	0.156	-155.9	3.491	65.2	0.195	70.6	0.242	-79.3
2600	0.155	-162.5	3.247	62.5	0.211	69.4	0.235	-82.7
2800	0.157	-169.5	3.042	59.7	0.227	68.1	0.228	-86.0
3000	0.158	-175.8	2.861	57.1	0.243	67.0	0.222	-89.5
3200	0.162	178.7	2.709	54.5	0.260	65.8	0.219	-93.5
3400	0.169	173.9	2.576	51.9	0.276	64.4	0.216	-97.7
3600	0.175	169.3	2.460	49.4	0.293	63.0	0.214	-102.1
3800	0.183	164.7	2.356	46.9	0.310	61.6	0.213	-106.8
4000	0.192	160.7	2.263	44.4	0.326	60.2	0.212	-111.4
4200	0.200	156.8	2.179	42.0	0.343	58.7	0.212	-116.3
4400	0.210	153.1	2.102	39.6	0.359	57.0	0.213	-121.5
4600	0.219	149.6	2.030	37.1	0.375	55.5	0.215	-126.6
4800	0.230	146.5	1.965	34.8	0.391	53.9	0.218	-131.7
5000	0.241	143.4	1.906	32.5	0.408	52.3	0.220	-136.7
5200	0.252	140.3	1.849	30.2	0.424	50.6	0.224	-141.8
5400	0.263	137.7	1.799	27.9	0.440	49.0	0.229	-146.8
5600	0.274	134.9	1.751	25.7	0.455	47.3	0.234	-151.8
5800	0.286	132.2	1.706	23.5	0.470	45.6	0.239	-156.7
6000	0.297	129.6	1.663	21.3	0.485	43.9	0.246	-161.5

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S Parameters (Common emitter)

$V_{CE}=3V$, $I_C=20mA$, $Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.638	-32.3	22.950	142.4	0.019	80.4	0.813	-26.1
400	0.465	-59.0	17.658	117.7	0.036	80.4	0.637	-41.5
600	0.349	-77.2	12.983	103.5	0.051	80.9	0.512	-49.9
800	0.278	-90.7	10.012	94.9	0.067	80.4	0.429	-55.0
1000	0.234	-102.0	8.091	89.0	0.083	79.4	0.374	-58.5
1200	0.204	-111.9	6.783	84.3	0.099	78.4	0.334	-61.3
1400	0.183	-121.5	5.841	80.3	0.116	77.4	0.305	-63.8
1600	0.171	-130.5	5.137	76.8	0.132	76.3	0.284	-66.2
1800	0.163	-138.4	4.594	73.5	0.148	75.2	0.268	-68.9
2000	0.157	-146.5	4.158	70.4	0.164	74.0	0.254	-71.7
2200	0.154	-154.2	3.807	67.4	0.180	72.7	0.243	-74.7
2400	0.154	-161.6	3.517	64.6	0.196	71.5	0.233	-77.8
2600	0.156	-167.9	3.270	61.8	0.213	70.3	0.227	-81.2
2800	0.158	-174.1	3.062	59.1	0.229	68.9	0.220	-84.7
3000	0.161	179.8	2.881	56.5	0.245	67.6	0.215	-88.3
3200	0.166	174.9	2.727	54.0	0.262	66.3	0.213	-92.3
3400	0.173	170.4	2.593	51.5	0.279	64.9	0.210	-96.8
3600	0.181	166.1	2.475	49.0	0.296	63.5	0.208	-101.3
3800	0.188	162.0	2.371	46.5	0.312	62.0	0.207	-106.1
4000	0.198	158.2	2.277	44.1	0.329	60.5	0.207	-111.0
4200	0.207	154.9	2.192	41.7	0.347	58.9	0.208	-116.0
4400	0.215	151.3	2.114	39.2	0.363	57.3	0.209	-121.2
4600	0.226	147.8	2.042	36.8	0.379	55.7	0.211	-126.5
4800	0.237	144.8	1.978	34.5	0.395	54.0	0.214	-131.9
5000	0.248	141.8	1.917	32.2	0.411	52.4	0.218	-136.9
5200	0.258	139.0	1.860	29.9	0.427	50.7	0.222	-142.1
5400	0.270	136.3	1.809	27.6	0.444	49.0	0.227	-147.2
5600	0.281	133.6	1.760	25.5	0.459	47.3	0.233	-152.2
5800	0.292	131.0	1.715	23.2	0.474	45.6	0.239	-157.1
6000	0.304	128.5	1.672	21.2	0.489	43.8	0.246	-161.9

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S Parameters (Common emitter)

$V_{CE}=3V, I_C=25mA, Z_0=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
200	0.567	-36.8	25.354	139.3	0.018	81.7	0.790	-27.0
400	0.403	-63.6	18.284	114.6	0.034	81.9	0.612	-41.5
600	0.306	-81.7	13.142	101.3	0.050	82.2	0.492	-49.2
800	0.249	-95.9	10.045	93.3	0.066	81.4	0.415	-53.8
1000	0.213	-107.6	8.091	87.6	0.083	80.3	0.363	-57.0
1200	0.189	-117.8	6.768	83.2	0.099	79.6	0.326	-59.6
1400	0.173	-127.9	5.821	79.3	0.115	78.5	0.300	-62.1
1600	0.165	-137.0	5.119	75.9	0.131	77.4	0.280	-64.5
1800	0.159	-145.0	4.572	72.6	0.148	76.1	0.265	-67.1
2000	0.155	-152.9	4.140	69.6	0.164	74.9	0.253	-69.9
2200	0.155	-160.4	3.791	66.7	0.180	73.6	0.242	-72.9
2400	0.158	-167.2	3.501	63.8	0.197	72.2	0.233	-76.1
2600	0.160	-173.2	3.255	61.2	0.214	70.9	0.228	-79.6
2800	0.164	-179.0	3.048	58.4	0.230	69.6	0.221	-83.1
3000	0.168	175.7	2.866	55.9	0.246	68.2	0.217	-86.8
3200	0.174	171.0	2.715	53.4	0.263	66.9	0.214	-90.8
3400	0.181	167.0	2.579	50.8	0.280	65.4	0.212	-95.2
3600	0.189	163.0	2.463	48.4	0.297	63.9	0.210	-99.8
3800	0.197	159.1	2.360	45.9	0.314	62.4	0.210	-104.6
4000	0.207	155.6	2.266	43.4	0.331	60.9	0.210	-109.7
4200	0.216	152.3	2.181	41.0	0.348	59.3	0.211	-114.8
4400	0.225	149.1	2.103	38.6	0.364	57.7	0.212	-120.0
4600	0.236	145.8	2.032	36.2	0.382	56.0	0.214	-125.3
4800	0.247	142.9	1.967	33.9	0.398	54.3	0.217	-130.6
5000	0.258	140.2	1.906	31.6	0.415	52.7	0.221	-135.7
5200	0.269	137.4	1.850	29.2	0.431	51.0	0.225	-141.1
5400	0.280	134.8	1.798	27.0	0.447	49.2	0.230	-146.3
5600	0.292	132.1	1.750	24.8	0.462	47.5	0.236	-151.3
5800	0.303	129.6	1.705	22.6	0.478	45.7	0.242	-156.3
6000	0.315	127.1	1.662	20.4	0.493	43.9	0.249	-161.1

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