Ordering number : ENN7435

NPN Epitaxial Planar Silicon Transistor

SBFP420D

UHF to C Band Low Noise Amplifier, Oscillation Applications

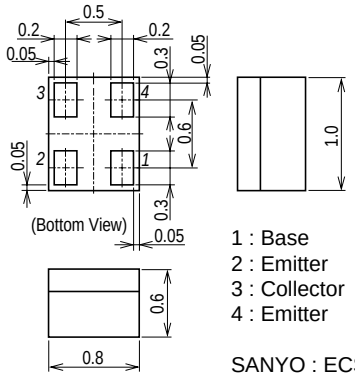
Features

- Low noise : NF=1.1dB typ (f=1.8GHz).
- High cut-off frequency : f_T=20GHz typ (V_{CE}=1V).
  : f_T=25GHz typ (V_{CE}=3V).
- Low voltage operation.
- High Gain : $|S21e|^2$=17dB typ (f=1.8GHz).
- Ultrasmall (1008 size), thin (0.6mm) leadless package.

Package Dimensions

unit : mm
2215

[SBFP420D]



1 : Base
2 : Emitter
3 : Collector
4 : Emitter

SANYO : ECSP1008-4

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		15	V
Collector-to-Emitter Voltage	V_{CEO}		4.5	V
Emitter-to-Base Voltage	V_{EBO}		1.5	V
Collector Current	I_C		35	mA
Collector Dissipation	P_C		100	mW
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		−55 to +150	°C

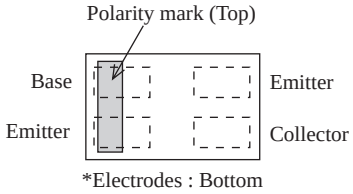
Electrical Characteristics at Ta=25°C

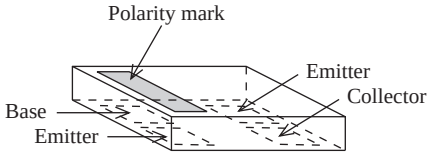
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=5V, I_E=0			200	nA
Emitter Cutoff Current	I_{EBO}	V_{EB}=1.5V, I_C=0			35	µA
DC Current Gain	h_{FE}	V_{CE}=4V, I_C=20mA	50		150	
Gain-Bandwidth Product	f_T1	V_{CE}=1V, I_C=10mA		20		GHz
	f_T2	V_{CE}=3V, I_C=30mA	18	25		GHz
Reverse Transfer Capacitance	Cre	V_{CB}=1V, f=1MHz		0.17	0.27	pF
Forward Transfer Gain	$\|S21e\|^2 1$	V_{CE}=1V, I_C=10mA, f=1.8GHz		16		dB
	$\|S21e\|^2 2$	V_{CE}=2V, I_C=20mA, f=1.8GHz	14	17		dB
Noise Figure	NF	V_{CE}=2V, I_C=5mA, f=1.8GHz		1.1	1.5	dB

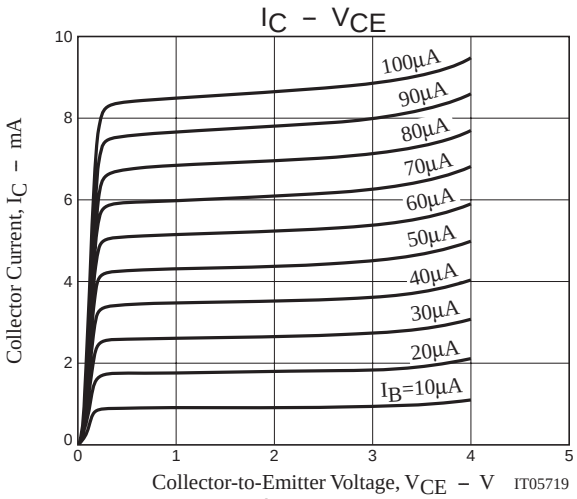
Marking : AD

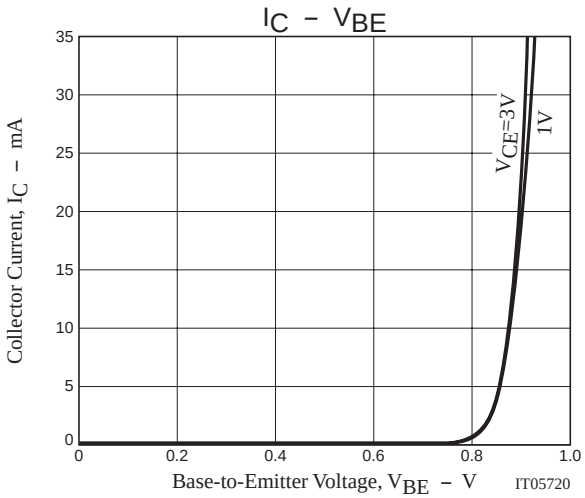
SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

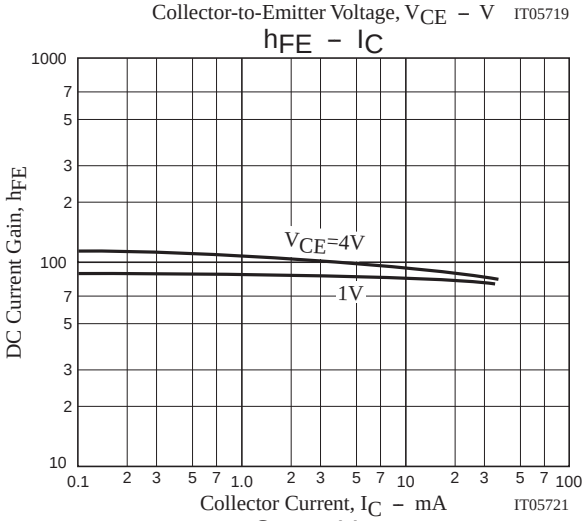
Electrical Connection (Top view)

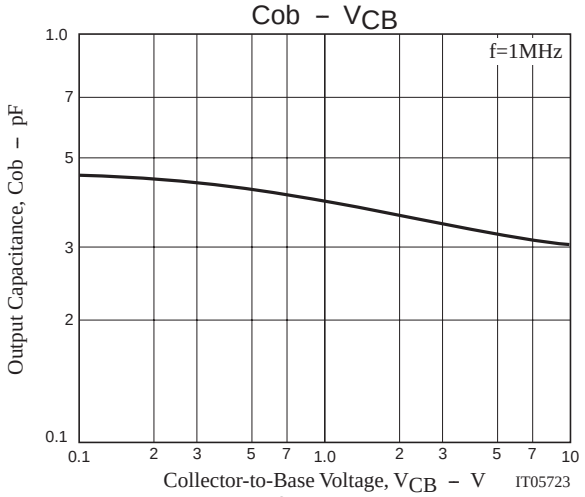


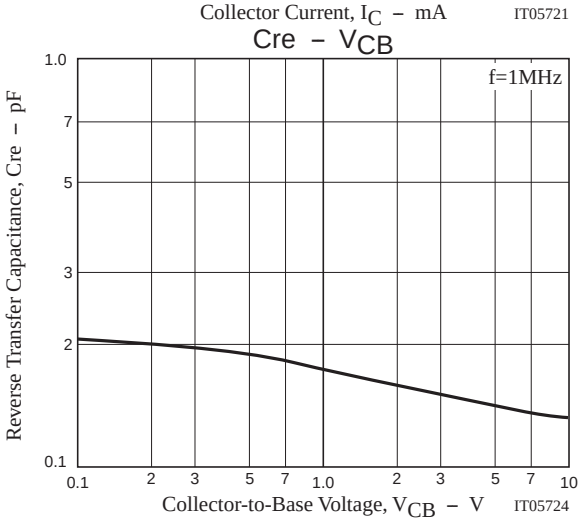


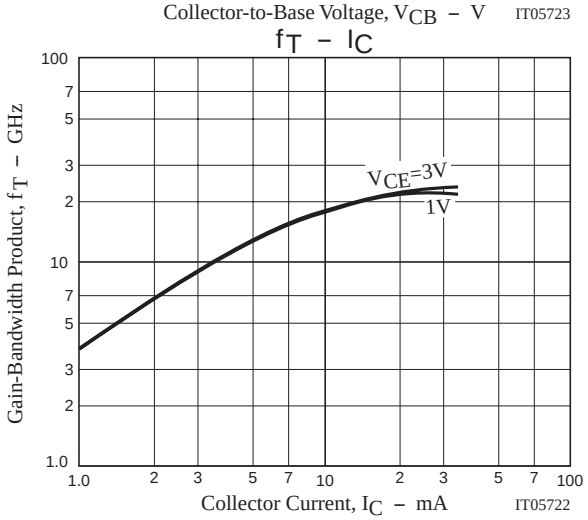


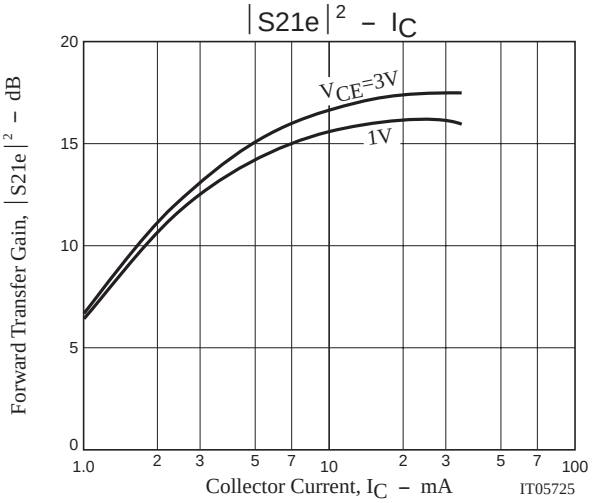


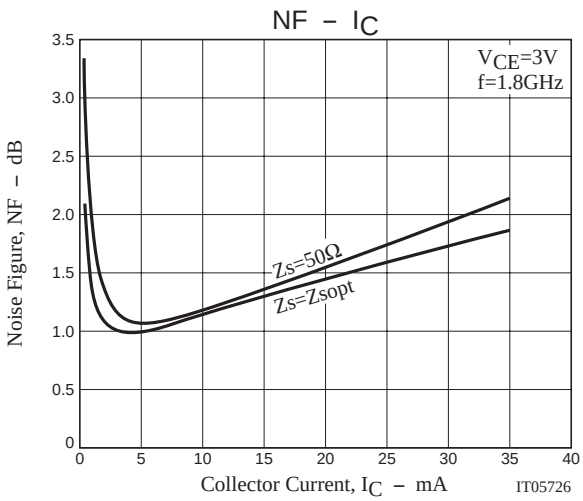


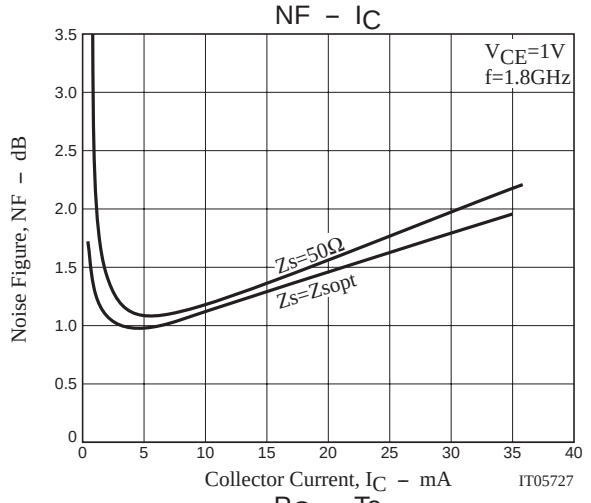


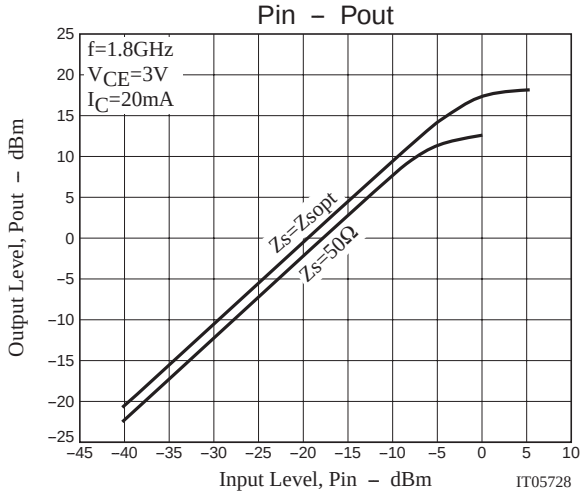


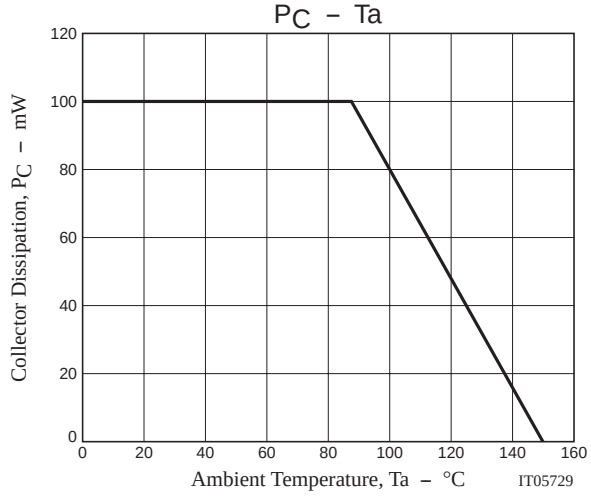



|S21e|² – IC
Forward Transfer Gain, |S21e|² – dB
VCE=3V
1V
Collector Current, IC – mA
IT05725


NF – IC
VCE=3V
f=1.8GHz
Zs=50Ω
Zs=Zsopt
Noise Figure, NF – dB
Collector Current, IC – mA
IT05726


NF – IC
VCE=1V
f=1.8GHz
Zs=50Ω
Zs=Zsopt
Noise Figure, NF – dB
Collector Current, IC – mA
IT05727


Pin – Pout
f=1.8GHz
VCE=3V
IC=20mA
Zs=Zsopt
Zs=50Ω
Output Level, Pout – dBm
Input Level, Pin – dBm
IT05728


PC – Ta
Collector Dissipation, PC – mW
Ambient Temperature, Ta – °C
IT05729

S Parameters (Common emitter)

V_{CE}=1V, I_C=1mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.965	–11.9	2.513	167.8	0.025	81.7	0.992	–7.1
400	0.955	–22.6	2.215	157.9	0.047	74.3	0.968	–13.6
600	0.932	–35.0	2.442	149.3	0.068	67.3	0.935	–19.4
800	0.903	–46.4	2.437	139.3	0.087	60.5	0.898	–24.9
1000	0.888	–55.1	2.087	131.7	0.102	54.3	0.858	–30.1
1200	0.843	–69.4	2.483	124.3	0.115	49.1	0.813	–33.9
1400	0.811	–80.1	2.465	117.8	0.127	44.1	0.787	–37.4
1600	0.811	–86.4	2.054	112.3	0.132	38.8	0.741	–43.1
1800	0.777	–96.8	2.094	105.5	0.140	36.0	0.704	–44.4
2000	0.760	–103.9	1.917	100.0	0.146	32.3	0.680	–46.9
2200	0.733	–113.3	1.933	94.8	0.150	28.9	0.656	–49.5
2400	0.725	–119.3	1.770	90.4	0.152	26.0	0.636	–51.8
2600	0.711	–126.1	1.685	85.7	0.153	23.5	0.612	–54.4
2800	0.692	–133.2	1.648	81.3	0.154	21.7	0.592	–56.3
3000	0.684	–138.6	1.543	77.3	0.154	19.8	0.576	–58.2
3200	0.665	–145.7	1.543	73.3	0.154	18.3	0.562	–60.1
3400	0.661	–150.7	1.461	69.8	0.153	16.9	0.550	–61.9
3600	0.653	–156.0	1.409	66.3	0.152	15.8	0.539	–64.0
3800	0.644	–161.3	1.374	62.8	0.151	15.1	0.528	–65.8
4000	0.642	–165.7	1.309	59.6	0.150	14.4	0.520	–67.6
4200	0.633	–170.8	1.281	56.3	0.148	14.0	0.512	–69.5
4400	0.629	–175.2	1.236	53.3	0.147	13.8	0.504	–71.4
4600	0.628	–179.4	1.191	50.3	0.146	13.8	0.498	–73.3
4800	0.623	176.3	1.160	47.6	0.145	14.0	0.492	–75.3
5000	0.622	172.4	1.113	44.9	0.144	14.5	0.488	–77.2
5200	0.618	168.4	1.090	42.2	0.143	15.0	0.483	–79.2
5400	0.616	164.5	1.060	39.5	0.142	15.8	0.478	–81.3
5600	0.615	160.8	1.028	37.0	0.142	16.7	0.474	–83.3
5800	0.612	157.0	1.004	34.5	0.142	17.8	0.470	–85.4
6000	0.613	153.5	0.971	32.2	0.143	19.0	0.467	–87.5

S Parameters (Common emitter)

V_{CE}=1V, I_C=5mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.825	–21.6	10.855	158.3	0.023	79.0	0.953	–16.0
400	0.785	–39.8	9.143	144.6	0.040	65.7	0.858	–28.7
600	0.706	–64.1	9.668	132.4	0.053	57.5	0.758	–38.1
800	0.658	–80.1	8.470	122.4	0.062	52.4	0.668	–45.6
1000	0.608	–95.8	7.634	113.3	0.069	48.8	0.592	–51.5
1200	0.553	–112.3	7.130	104.8	0.075	46.6	0.530	–55.5
1400	0.527	–123.6	6.391	98.7	0.079	44.6	0.488	–58.7
1600	0.512	–133.0	5.733	93.5	0.083	44.8	0.444	–62.5
1800	0.498	–140.6	5.158	89.0	0.088	44.2	0.410	–64.7
2000	0.489	–147.6	4.692	85.1	0.092	43.6	0.384	–66.8
2200	0.480	–154.1	4.317	81.3	0.096	43.6	0.362	–68.9
2400	0.476	–159.4	3.973	78.1	0.100	43.7	0.344	–70.7
2600	0.468	–165.0	3.700	74.7	0.105	43.8	0.327	–72.6
2800	0.464	–169.9	3.451	71.8	0.110	43.9	0.313	–74.3
3000	0.460	–174.3	3.232	68.9	0.114	44.0	0.301	–76.0
3200	0.458	–178.7	3.051	66.1	0.119	43.8	0.291	–77.7
3400	0.456	177.4	2.883	63.6	0.123	43.9	0.282	–79.3
3600	0.455	173.5	2.737	60.9	0.128	43.8	0.275	–81.1
3800	0.453	169.9	2.604	58.4	0.134	43.6	0.268	–82.7
4000	0.453	166.4	2.485	56.0	0.139	43.3	0.261	–84.5
4200	0.452	162.9	2.375	53.5	0.144	42.9	0.256	–86.2
4400	0.452	159.7	2.275	51.3	0.149	42.6	0.251	–88.2
4600	0.452	156.5	2.186	48.9	0.155	42.2	0.247	–90.1
4800	0.452	153.5	2.102	46.7	0.160	41.6	0.243	–92.0
5000	0.452	150.4	2.026	44.5	0.166	40.9	0.240	–93.9
5200	0.451	147.4	1.956	42.3	0.172	40.5	0.237	–95.8
5400	0.452	144.5	1.889	40.1	0.177	39.9	0.234	–97.8
5600	0.452	141.6	1.830	38.0	0.183	39.2	0.231	–99.9
5800	0.452	138.7	1.771	35.9	0.189	38.7	0.229	–101.9
6000	0.453	136.0	1.718	33.9	0.195	38.0	0.227	–103.8

S Parameters (Common emitter)

V_{CE}=1V, I_C=10mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.685	–32.5	18.349	152.1	0.021	74.8	0.904	–22.9
400	0.622	–59.7	15.120	135.3	0.033	61.7	0.747	–38.6
600	0.536	–90.8	14.363	120.7	0.043	56.8	0.619	–48.5
800	0.499	–108.7	11.882	110.8	0.049	54.8	0.523	–55.5
1000	0.466	–124.5	10.160	102.6	0.055	53.8	0.452	–60.7
1200	0.446	–136.7	8.770	96.4	0.061	53.3	0.399	–64.3
1400	0.435	–145.9	7.659	91.4	0.065	53.8	0.362	–67.3
1600	0.429	–153.5	6.757	87.1	0.072	54.0	0.331	–70.6
1800	0.425	–159.8	6.029	83.4	0.078	54.2	0.303	–72.9
2000	0.422	–165.3	5.446	80.1	0.083	54.2	0.284	–75.2
2200	0.421	–170.4	4.968	77.1	0.089	54.2	0.266	–77.3
2400	0.419	–174.9	4.566	74.2	0.095	54.2	0.252	–79.3
2600	0.418	–179.2	4.222	71.4	0.101	54.4	0.240	–81.4
2800	0.416	176.9	3.925	68.9	0.107	54.0	0.229	–83.5
3000	0.416	173.3	3.667	66.4	0.114	53.7	0.221	–85.1
3200	0.415	169.7	3.442	64.1	0.120	53.1	0.213	–87.1
3400	0.415	166.4	3.253	61.7	0.127	52.6	0.207	–89.1
3600	0.415	163.2	3.079	59.4	0.133	52.1	0.201	–91.1
3800	0.415	160.1	2.923	57.2	0.140	51.5	0.196	–93.0
4000	0.415	157.2	2.788	54.9	0.146	50.4	0.192	–95.1
4200	0.416	154.2	2.660	52.7	0.153	49.8	0.188	–97.2
4400	0.416	151.5	2.546	50.7	0.160	49.0	0.185	–99.3
4600	0.417	148.7	2.444	48.6	0.167	48.1	0.182	–101.4
4800	0.417	145.9	2.347	46.5	0.173	47.2	0.179	–103.7
5000	0.417	143.2	2.262	44.5	0.180	46.2	0.177	–105.6
5200	0.418	140.5	2.182	42.4	0.186	45.0	0.175	–107.8
5400	0.418	138.0	2.104	40.4	0.192	44.2	0.173	–110.2
5600	0.419	135.4	2.036	38.4	0.199	43.1	0.172	–112.3
5800	0.420	132.8	1.971	36.4	0.205	42.1	0.170	–114.5
6000	0.420	130.3	1.911	34.5	0.212	40.9	0.169	–116.9

S Parameters (Common emitter)

V_{CE}=1V, I_C=20mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.483	–61.7	25.818	143.2	0.016	72.0	0.830	–30.6
400	0.458	–100.6	20.544	122.8	0.027	61.2	0.624	–47.6
600	0.420	–122.2	17.275	110.4	0.035	60.2	0.490	–56.9
800	0.410	–137.3	13.707	102.0	0.040	59.7	0.403	–63.0
1000	0.402	–148.5	11.322	95.7	0.048	60.8	0.346	–67.5
1200	0.399	–156.9	9.556	90.8	0.054	61.4	0.303	–71.0
1400	0.397	–163.5	8.268	86.6	0.060	62.2	0.275	–73.8
1600	0.398	–169.1	7.234	83.1	0.068	63.2	0.251	–77.4
1800	0.398	–173.9	6.438	79.9	0.075	62.5	0.233	–79.7
2000	0.398	–178.3	5.798	77.0	0.081	62.1	0.218	–82.5
2200	0.399	177.8	5.275	74.4	0.088	61.8	0.205	–84.8
2400	0.400	174.2	4.844	71.8	0.095	61.4	0.195	–87.4
2600	0.400	170.7	4.470	69.3	0.102	60.8	0.186	–89.8
2800	0.400	167.5	4.150	67.0	0.109	60.1	0.178	–92.0
3000	0.400	164.5	3.874	64.8	0.117	59.4	0.172	–94.3
3200	0.401	161.6	3.630	62.7	0.124	58.6	0.167	–96.5
3400	0.401	158.6	3.429	60.5	0.131	57.5	0.163	–98.8
3600	0.401	155.9	3.243	58.3	0.138	56.6	0.159	–101.3
3800	0.402	153.3	3.076	56.2	0.146	55.6	0.156	–103.7
4000	0.403	150.6	2.932	54.1	0.153	54.6	0.153	–106.0
4200	0.404	148.1	2.795	52.1	0.160	53.4	0.150	–108.4
4400	0.404	145.6	2.675	50.1	0.168	52.2	0.148	–110.9
4600	0.405	143.1	2.567	48.1	0.175	51.1	0.147	–113.1
4800	0.405	140.6	2.465	46.2	0.181	49.9	0.145	–115.6
5000	0.406	138.2	2.376	44.2	0.188	48.6	0.144	–117.8
5200	0.407	135.7	2.289	42.2	0.195	47.6	0.143	–120.6
5400	0.407	133.3	2.207	40.3	0.202	46.4	0.143	–123.1
5600	0.408	131.0	2.136	38.4	0.209	45.1	0.142	–125.5
5800	0.408	128.6	2.067	36.5	0.216	43.9	0.142	–127.9
6000	0.408	126.1	2.004	34.6	0.223	42.5	0.141	–130.2

S Parameters (Common emitter)

V_{CE}=3V, I_C=1mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.968	–11.0	2.452	168.9	0.019	82.4	0.995	–5.7
400	0.959	–21.1	2.176	159.8	0.037	76.5	0.978	–11.0
600	0.940	–32.5	2.399	151.7	0.054	69.3	0.954	–15.7
800	0.914	–43.4	2.439	142.2	0.069	63.3	0.926	–20.4
1000	0.902	–51.6	2.071	135.0	0.082	57.7	0.896	–24.8
1200	0.860	–65.1	2.508	127.9	0.093	52.9	0.859	–28.2
1400	0.828	–75.6	2.526	121.5	0.103	48.0	0.839	–31.4
1600	0.831	–81.4	2.059	116.1	0.108	42.5	0.798	–36.6
1800	0.796	–91.8	2.149	109.4	0.116	40.0	0.764	–37.7
2000	0.779	–98.8	1.963	103.9	0.121	36.3	0.743	–40.1
2200	0.750	–108.3	2.004	98.7	0.125	33.1	0.721	–42.5
2400	0.740	–114.4	1.841	94.3	0.128	30.1	0.702	–44.6
2600	0.726	–121.1	1.743	89.7	0.128	27.7	0.679	–47.0
2800	0.704	–128.4	1.720	85.2	0.129	25.8	0.658	–48.8
3000	0.696	–133.8	1.605	81.2	0.130	24.1	0.643	–50.5
3200	0.675	–141.0	1.618	77.1	0.130	22.6	0.629	–52.2
3400	0.669	–146.3	1.534	73.6	0.130	21.4	0.617	–53.9
3600	0.660	–151.6	1.477	70.0	0.128	20.4	0.605	–55.7
3800	0.649	–157.1	1.445	66.4	0.128	19.5	0.594	–57.3
4000	0.646	–161.7	1.374	63.3	0.127	19.0	0.585	–58.9
4200	0.635	–167.0	1.349	59.9	0.126	18.9	0.577	–60.6
4400	0.629	–171.7	1.304	56.8	0.125	19.0	0.569	–62.3
4600	0.627	–175.9	1.253	53.9	0.124	19.1	0.562	–64.0
4800	0.621	179.6	1.223	51.1	0.123	19.4	0.556	–65.9
5000	0.619	175.6	1.173	48.4	0.123	20.2	0.551	–67.6
5200	0.615	171.3	1.148	45.6	0.122	20.8	0.545	–69.4
5400	0.612	167.4	1.116	42.9	0.121	22.2	0.540	–71.2
5600	0.610	163.4	1.081	40.4	0.122	23.1	0.535	–73.0
5800	0.606	159.5	1.057	37.8	0.122	24.5	0.530	–75.0
6000	0.606	155.9	1.021	35.5	0.123	25.8	0.527	–76.7

S Parameters (Common emitter)

V_{CE}=3V, I_C=5mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.842	–18.9	10.781	160.6	0.015	74.9	0.968	–12.4
400	0.808	–35.1	9.216	147.7	0.031	68.0	0.891	–22.4
600	0.733	–56.5	9.827	136.2	0.042	62.2	0.810	–29.8
800	0.680	–71.8	8.816	126.2	0.051	55.8	0.734	–35.9
1000	0.631	–85.8	7.959	117.4	0.057	52.6	0.665	–40.7
1200	0.562	–102.7	7.659	108.4	0.063	50.7	0.610	–43.7
1400	0.527	–114.3	6.938	102.1	0.066	48.1	0.570	–46.4
1600	0.508	–123.6	6.235	96.7	0.071	48.0	0.527	–49.3
1800	0.490	–131.7	5.643	91.9	0.075	47.6	0.494	–51.0
2000	0.476	–139.0	5.140	87.8	0.079	47.1	0.469	–52.7
2200	0.463	–146.1	4.746	83.9	0.082	47.1	0.446	–54.2
2400	0.457	–151.7	4.366	80.5	0.086	46.9	0.428	–55.5
2600	0.447	–157.7	4.068	77.1	0.090	47.1	0.410	–57.1
2800	0.441	–163.0	3.800	74.0	0.094	47.3	0.395	–58.2
3000	0.435	–167.7	3.558	71.1	0.098	47.3	0.383	–59.4
3200	0.430	–172.5	3.361	68.3	0.102	47.6	0.373	–60.8
3400	0.428	–176.7	3.173	65.7	0.107	47.4	0.363	–61.9
3600	0.424	179.2	3.013	63.0	0.111	47.5	0.355	–63.3
3800	0.423	175.3	2.865	60.5	0.116	47.5	0.347	–64.6
4000	0.422	171.5	2.731	58.0	0.120	47.0	0.340	–65.9
4200	0.420	167.9	2.611	55.6	0.125	46.9	0.334	–67.3
4400	0.420	164.4	2.500	53.3	0.130	46.7	0.329	–68.7
4600	0.419	161.0	2.399	51.0	0.135	46.1	0.323	–70.2
4800	0.419	157.8	2.304	48.8	0.140	45.7	0.318	–71.8
5000	0.419	154.6	2.218	46.6	0.145	45.3	0.315	–73.3
5200	0.419	151.5	2.141	44.3	0.150	44.9	0.310	–74.8
5400	0.418	148.4	2.068	42.2	0.156	44.2	0.307	–76.5
5600	0.418	145.3	2.001	40.0	0.160	43.7	0.303	–78.1
5800	0.419	142.3	1.935	37.9	0.166	43.1	0.300	–79.8
6000	0.420	139.4	1.875	35.9	0.172	42.5	0.297	–81.4

S Parameters (Common emitter)

V_{CE}=3V, I_C=10mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.709	–27.1	18.955	155.1	0.015	74.2	0.927	–17.6
400	0.651	–50.3	15.902	139.2	0.027	65.6	0.799	–29.8
600	0.547	–79.2	15.340	124.6	0.035	60.1	0.687	–37.4
800	0.497	–97.1	12.952	114.5	0.041	57.5	0.599	–42.6
1000	0.453	–113.0	11.179	105.9	0.047	56.7	0.533	–46.2
1200	0.422	–126.2	9.750	99.2	0.052	56.9	0.483	–48.6
1400	0.404	–136.3	8.549	93.9	0.055	56.8	0.447	–50.4
1600	0.395	–144.5	7.567	89.4	0.062	57.5	0.414	–52.4
1800	0.389	–151.4	6.757	85.5	0.066	57.1	0.388	–54.0
2000	0.384	–157.5	6.108	82.0	0.071	57.2	0.367	–55.4
2200	0.380	–163.1	5.572	78.9	0.077	57.3	0.349	–56.8
2400	0.377	–167.9	5.119	76.0	0.082	57.4	0.335	–57.9
2600	0.374	–172.8	4.732	73.1	0.087	57.2	0.322	–59.2
2800	0.372	–177.1	4.397	70.5	0.093	57.4	0.311	–60.4
3000	0.370	178.9	4.107	68.0	0.098	56.8	0.300	–61.6
3200	0.369	175.1	3.855	65.6	0.104	56.4	0.293	–62.8
3400	0.369	171.5	3.638	63.3	0.110	55.8	0.285	–64.1
3600	0.368	168.0	3.442	60.9	0.116	55.2	0.279	–65.4
3800	0.368	164.8	3.269	58.7	0.121	54.7	0.273	–66.7
4000	0.369	161.6	3.111	56.4	0.128	54.0	0.267	–68.0
4200	0.369	158.4	2.966	54.3	0.134	53.3	0.262	–69.5
4400	0.369	155.4	2.837	52.2	0.140	52.5	0.258	–71.1
4600	0.370	152.4	2.721	50.1	0.146	51.5	0.253	–72.6
4800	0.371	149.6	2.612	48.0	0.151	50.7	0.250	–74.3
5000	0.371	146.8	2.515	46.0	0.158	49.6	0.247	–76.0
5200	0.371	144.0	2.424	43.9	0.164	48.8	0.243	–77.4
5400	0.372	141.3	2.337	41.9	0.169	47.9	0.241	–79.2
5600	0.373	138.5	2.260	39.9	0.175	46.9	0.237	–80.8
5800	0.373	135.8	2.184	38.0	0.182	46.0	0.234	–82.6
6000	0.375	133.2	2.116	36.1	0.188	44.9	0.232	–84.3

S Parameters (Common emitter)

V_{CE}=3V, I_C=20mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.521	–41.9	29.747	149.1	0.013	75.8	0.866	–22.8
400	0.451	–76.8	23.811	129.0	0.022	65.1	0.698	–35.6
600	0.389	–106.1	19.370	114.5	0.029	64.6	0.574	–42.2
800	0.366	–123.5	15.515	105.4	0.034	63.2	0.491	–46.0
1000	0.353	–136.7	12.836	98.6	0.040	64.0	0.435	–48.4
1200	0.345	–146.6	10.875	93.3	0.046	64.4	0.394	–50.2
1400	0.342	–154.7	9.403	88.9	0.052	64.6	0.362	–51.6
1600	0.341	–161.1	8.260	85.0	0.058	65.5	0.341	–53.1
1800	0.340	–166.5	7.347	81.7	0.064	65.0	0.321	–54.6
2000	0.341	–171.5	6.612	78.7	0.070	64.9	0.304	–56.0
2200	0.341	–175.8	6.017	75.9	0.076	64.3	0.290	–57.2
2400	0.341	–179.9	5.520	73.3	0.082	63.8	0.279	–58.4
2600	0.340	176.3	5.090	70.7	0.088	63.8	0.268	–59.7
2800	0.341	172.7	4.721	68.4	0.095	63.0	0.259	–60.8
3000	0.340	169.4	4.406	66.1	0.101	62.3	0.252	–62.2
3200	0.341	166.3	4.127	64.0	0.107	61.5	0.245	–63.5
3400	0.341	163.2	3.894	61.8	0.114	60.7	0.239	–64.8
3600	0.342	160.2	3.679	59.6	0.120	59.6	0.234	–66.2
3800	0.343	157.3	3.490	57.6	0.126	58.7	0.229	–67.7
4000	0.343	154.4	3.323	55.5	0.133	57.8	0.224	–69.3
4200	0.344	151.7	3.166	53.4	0.140	56.6	0.221	–70.8
4400	0.345	149.0	3.027	51.5	0.146	55.4	0.216	–72.4
4600	0.346	146.2	2.902	49.5	0.153	54.2	0.213	–74.1
4800	0.347	143.7	2.785	47.6	0.159	53.4	0.210	–75.8
5000	0.348	141.2	2.680	45.6	0.165	52.0	0.207	–77.5
5200	0.348	138.6	2.581	43.6	0.171	50.9	0.204	–79.2
5400	0.350	136.2	2.488	41.7	0.178	49.9	0.202	–80.9
5600	0.351	133.6	2.405	39.8	0.184	48.7	0.199	–82.8
5800	0.352	131.1	2.326	37.9	0.191	47.4	0.196	–84.5
6000	0.353	128.7	2.252	36.1	0.197	46.2	0.194	–86.3