

TOSHIBA FIELD EFFECT TRANSISTOR GaAs N CHANNEL SINGLE GATE MODULATION DOPE TYPE

2SK3179

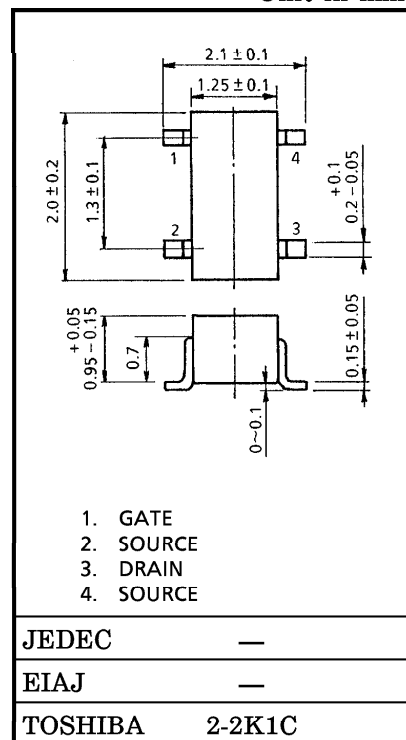
UHF~SHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm

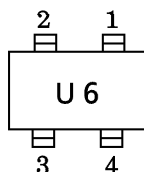
- Low Noise Figure
- High Gain

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Gate-Drain Voltage	V _{GDO}	-4	V
Gate-Source Voltage	V _{GSO}	-3	V
Drain Current	I _D	80	mA
Power Dissipation	P _D	100	mW
Channel Temperature	T _{ch}	125	°C
Storage Temperature Range	T _{stg}	-55~125	°C



MARKING



ELECTRICAL CHARACTERISTICS (Ta = 25°C)

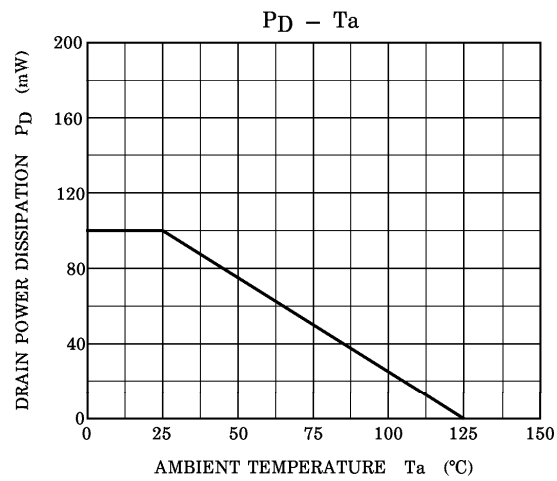
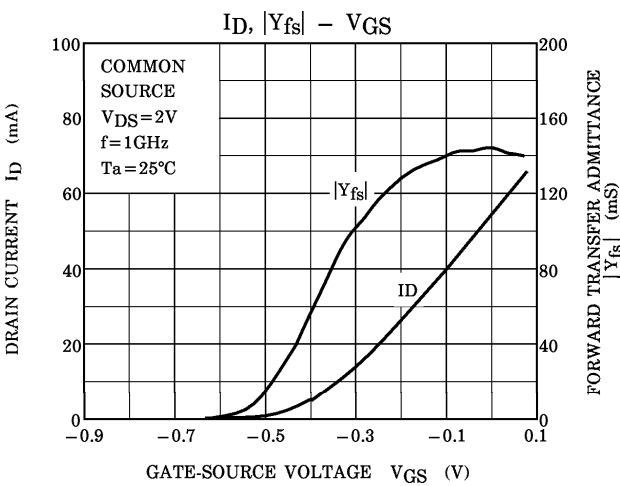
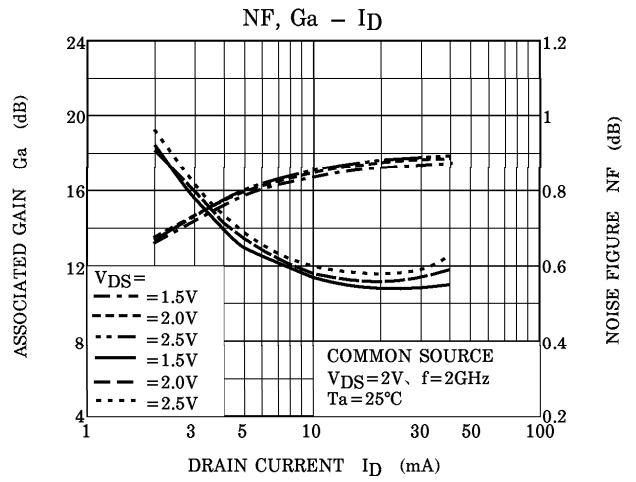
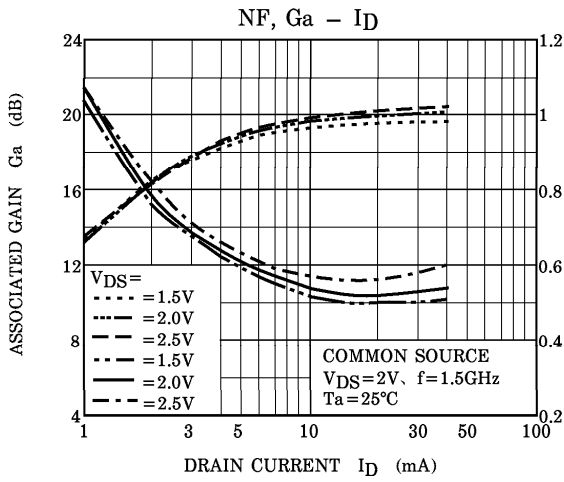
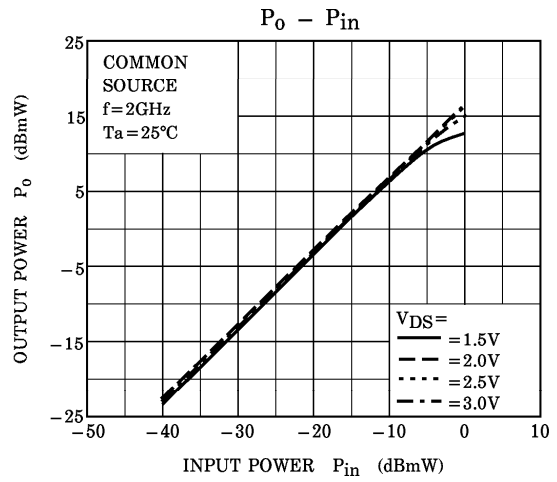
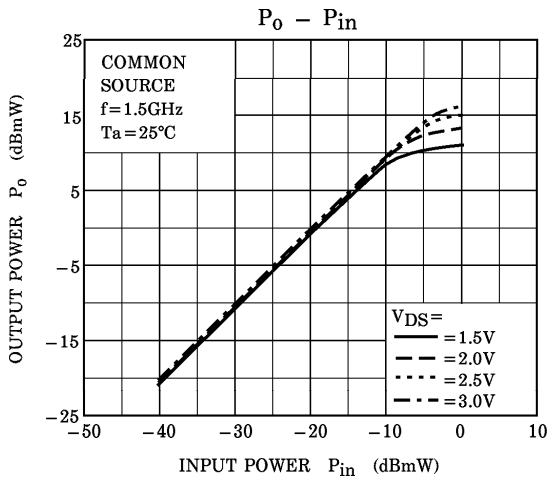
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current	I _{GSS}	V _{DS} = 0, V _{GS} = -2V	—	—	-20	μA
Drain Current	I _{DSS}	V _{DS} = 2V, V _{GS} = 0	40	55	80	mA
Gate-Source Cut-off Voltage	V _{GS (OFF)}	V _{DS} = 2V, I _D = 100 μA	-0.2	-0.8	-2	V
Forward Transfer Admittance	Y _{fs}	V _{DS} = 2V, I _D = 10mA, f = 1kHz	—	95	—	mS
Noise Figure 1	NF1	V _{DS} = 2V, I _D = 10mA, f = 1.5GHz	—	0.55	1.0	dB
Associated Gain 1	Ga1	V _{DS} = 2V, I _D = 10mA, f = 1.5GHz	17	19.5	—	dB
Noise Figure 2	NF2	V _{DS} = 2V, I _D = 10mA, f = 2GHz	—	0.6	—	dB
Associated Gain 2	Ga2	V _{DS} = 2V, I _D = 10mA, f = 2GHz	—	17	—	dB

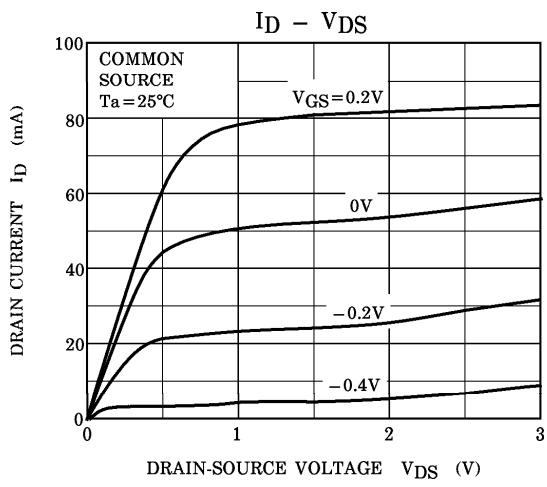
CAUTION

This device electrostatic sensitivity. Please handle with caution.

961001EAC1

- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.





S-PARAMETER

(COMMON SOURCE, $V_{DS}=1.5V$, $I_D=2mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.996	-3.1	3.523	177.0	0.0066	85.7	0.846	-2.2
200	0.995	-6.4	3.534	174.2	0.0135	83.5	0.845	-4.7
300	0.994	-9.6	3.526	171.0	0.0204	82.9	0.841	-7.0
400	0.989	-13.1	3.505	168.3	0.0271	81.2	0.838	-9.0
500	0.980	-15.9	3.455	165.4	0.0340	79.6	0.836	-11.0
600	0.979	-18.6	3.506	162.7	0.0404	77.6	0.834	-13.3
700	0.977	-22.0	3.460	159.7	0.0471	74.9	0.829	-15.6
800	0.967	-25.2	3.480	157.4	0.0533	73.0	0.822	-17.8
900	0.959	-28.5	3.425	154.7	0.0595	72.4	0.819	-19.9
1000	0.951	-30.8	3.396	151.7	0.0656	69.2	0.810	-22.0
1100	0.947	-33.8	3.375	149.6	0.0713	67.4	0.809	-24.6
1200	0.931	-36.8	3.360	145.9	0.0784	66.5	0.802	-26.5
1300	0.921	-39.9	3.320	144.2	0.0841	64.0	0.796	-28.5
1400	0.919	-42.7	3.317	140.8	0.0894	62.6	0.787	-30.7
1500	0.900	-45.1	3.297	138.0	0.0948	59.8	0.783	-32.7
1600	0.891	-48.4	3.289	135.7	0.0985	58.8	0.773	-34.7
1700	0.890	-51.4	3.263	133.1	0.1053	57.2	0.767	-36.8
1800	0.866	-53.3	3.214	130.1	0.1100	55.8	0.763	-38.7
1900	0.871	-57.3	3.196	128.9	0.1142	54.0	0.751	-40.6
2000	0.851	-59.6	3.135	125.0	0.1188	51.7	0.738	-42.7
2100	0.830	-61.1	3.107	124.1	0.1233	50.2	0.731	-44.2
2200	0.813	-64.0	3.039	120.4	0.1273	49.0	0.723	-46.0
2300	0.808	-66.2	3.002	119.1	0.1306	46.8	0.711	-47.7
2400	0.786	-68.2	2.977	115.3	0.1341	45.1	0.701	-49.4
2500	0.784	-71.9	2.963	113.7	0.1377	43.9	0.693	-51.2
2600	0.755	-74.7	2.916	110.5	0.1411	41.8	0.674	-52.9

(COMMON SOURCE, $V_{DS}=1.5V$, $I_D=5mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.992	-3.8	5.834	176.1	0.0063	87.5	0.738	-3.0
200	0.991	-7.9	5.843	172.7	0.0121	84.7	0.740	-5.5
300	0.996	-11.5	5.809	169.1	0.0188	82.0	0.735	-8.1
400	0.980	-15.3	5.764	165.7	0.0250	80.6	0.733	-10.5
500	0.976	-19.0	5.642	162.2	0.0318	78.8	0.728	-13.1
600	0.968	-22.6	5.689	159.0	0.0368	77.5	0.721	-15.5
700	0.960	-26.3	5.596	155.5	0.0433	75.0	0.715	-18.1
800	0.942	-30.1	5.578	152.7	0.0484	73.3	0.708	-20.7
900	0.926	-33.4	5.435	149.5	0.0545	70.5	0.699	-23.0
1000	0.923	-36.3	5.395	145.9	0.0596	68.5	0.691	-25.7
1100	0.907	-40.0	5.311	143.7	0.0652	66.8	0.684	-28.1
1200	0.890	-43.2	5.248	139.6	0.0708	65.4	0.677	-30.5
1300	0.881	-46.5	5.123	137.5	0.0764	62.9	0.667	-32.7
1400	0.865	-49.2	5.093	133.7	0.0801	60.9	0.658	-35.0
1500	0.848	-52.5	5.037	130.8	0.0848	60.1	0.650	-37.0
1600	0.834	-56.0	4.954	128.5	0.0877	58.4	0.639	-39.1
1700	0.827	-58.8	4.869	125.2	0.0933	56.8	0.631	-41.1
1800	0.799	-61.7	4.789	122.1	0.0971	55.1	0.622	-43.4
1900	0.801	-65.0	4.714	120.5	0.1020	54.0	0.613	-45.4
2000	0.770	-67.7	4.621	116.9	0.1051	51.7	0.595	-47.3
2100	0.750	-70.1	4.527	115.8	0.1074	50.9	0.585	-48.9
2200	0.723	-72.1	4.382	112.4	0.1107	49.5	0.573	-50.7
2300	0.712	-74.9	4.320	110.7	0.1139	48.0	0.563	-52.3
2400	0.691	-77.7	4.233	107.2	0.1172	46.8	0.554	-54.0
2500	0.686	-80.5	4.179	105.3	0.1207	45.4	0.542	-55.2
2600	0.652	-83.5	4.083	102.3	0.1247	43.9	0.527	-56.8

S-PARAMETER

(COMMON SOURCE, $V_{DS}=1.5V$, $I_D=10mA$, $T_a=25^\circ C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.990	-4.5	8.048	175.4	0.0060	90.0	0.629	-3.2
200	0.986	-9.0	8.028	171.4	0.0116	87.0	0.630	-6.0
300	0.987	-13.2	8.008	167.3	0.0179	82.6	0.623	-8.8
400	0.974	-17.9	7.914	163.2	0.0229	80.8	0.620	-11.7
500	0.960	-22.0	7.704	159.2	0.0288	78.2	0.615	-14.3
600	0.948	-25.7	7.682	155.5	0.0344	77.5	0.610	-17.3
700	0.934	-29.7	7.526	151.4	0.0391	74.3	0.602	-20.0
800	0.918	-33.8	7.419	148.2	0.0441	73.2	0.591	-22.8
900	0.896	-37.5	7.217	144.5	0.0504	70.8	0.581	-25.3
1000	0.880	-41.2	7.117	140.7	0.0545	68.8	0.573	-28.0
1100	0.869	-44.8	6.952	138.1	0.0589	67.8	0.565	-30.4
1200	0.835	-48.8	6.794	134.1	0.0647	66.4	0.554	-33.0
1300	0.825	-52.1	6.600	131.6	0.0676	63.5	0.544	-35.2
1400	0.795	-54.8	6.498	128.0	0.0725	62.5	0.534	-37.3
1500	0.788	-58.0	6.367	124.6	0.0759	61.3	0.527	-39.4
1600	0.767	-62.2	6.250	122.1	0.0799	58.9	0.519	-41.4
1700	0.758	-64.1	6.081	119.1	0.0838	58.7	0.508	-43.6
1800	0.731	-67.4	5.910	116.2	0.0883	57.9	0.500	-45.6
1900	0.729	-70.9	5.832	114.1	0.0918	56.3	0.491	-47.6
2000	0.698	-73.3	5.635	110.4	0.0947	54.0	0.476	-49.4
2100	0.669	-75.5	5.523	109.5	0.0976	53.4	0.465	-50.5
2200	0.647	-79.2	5.321	106.3	0.1004	52.8	0.455	-52.2
2300	0.642	-79.5	5.162	104.5	0.1022	51.8	0.445	-53.5
2400	0.609	-82.9	5.103	101.0	0.1058	50.2	0.434	-54.9
2500	0.598	-86.3	4.972	99.2	0.1084	49.2	0.425	-56.1
2600	0.569	-88.8	4.859	96.4	0.1130	48.2	0.412	-57.2

(COMMON SOURCE, $V_{DS}=1.5V$, $I_D=20mA$, $T_a=25^\circ C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.995	-5.0	10.038	174.8	0.0060	87.6	0.516	-3.3
200	0.991	-10.2	10.039	170.2	0.0109	85.7	0.514	-6.2
300	0.980	-14.6	9.906	165.5	0.0155	81.7	0.511	-9.3
400	0.962	-20.0	9.731	160.9	0.0218	82.4	0.507	-12.2
500	0.955	-23.7	9.428	156.2	0.0263	79.7	0.502	-14.9
600	0.928	-29.0	9.398	152.2	0.0311	76.9	0.496	-17.7
700	0.914	-32.8	9.135	147.8	0.0368	75.6	0.488	-20.4
800	0.897	-37.2	8.969	144.3	0.0399	74.8	0.479	-23.2
900	0.866	-41.2	8.641	140.7	0.0453	73.3	0.470	-25.9
1000	0.846	-44.9	8.450	136.6	0.0495	70.3	0.461	-28.5
1100	0.822	-48.6	8.200	133.9	0.0549	69.9	0.454	-30.8
1200	0.799	-52.3	7.977	129.5	0.0589	68.5	0.443	-33.5
1300	0.781	-55.8	7.699	127.0	0.0625	66.4	0.436	-35.3
1400	0.754	-58.2	7.524	123.2	0.0663	64.9	0.428	-37.6
1500	0.738	-62.1	7.342	120.0	0.0697	64.2	0.420	-39.5
1600	0.714	-65.6	7.148	117.3	0.0730	62.9	0.414	-41.4
1700	0.700	-69.3	6.922	114.4	0.0772	62.5	0.407	-43.4
1800	0.676	-72.4	6.703	111.5	0.0809	60.9	0.400	-45.3
1900	0.672	-75.0	6.566	109.3	0.0849	59.4	0.393	-46.9
2000	0.644	-76.7	6.311	106.0	0.0873	58.6	0.379	-48.4
2100	0.621	-78.9	6.157	104.8	0.0911	57.6	0.370	-49.2
2200	0.587	-82.2	5.943	101.7	0.0939	56.5	0.361	-50.7
2300	0.583	-83.8	5.757	100.3	0.0975	55.7	0.355	-52.1
2400	0.553	-85.7	5.659	96.7	0.1006	54.9	0.345	-52.9
2500	0.552	-89.3	5.490	95.1	0.1037	54.0	0.339	-53.9
2600	0.508	-92.6	5.359	92.1	0.1073	53.3	0.328	-55.2

S-PARAMETER

(COMMON SOURCE, $V_{DS}=2V$, $I_D=2mA$, $T_a=25^\circ C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.996	-3.2	3.539	176.9	0.0063	86.6	0.851	-2.4
200	0.993	-5.9	3.562	174.2	0.0134	85.6	0.852	-4.5
300	0.995	-9.3	3.548	171.2	0.0194	83.3	0.850	-6.7
400	0.988	-12.6	3.534	168.4	0.0263	81.2	0.845	-9.0
500	0.984	-15.6	3.470	165.5	0.0323	79.3	0.844	-10.8
600	0.980	-18.6	3.528	163.0	0.0382	78.8	0.841	-13.2
700	0.974	-21.3	3.477	160.0	0.0449	75.4	0.842	-15.4
800	0.969	-25.0	3.517	157.7	0.0509	74.1	0.831	-17.4
900	0.961	-27.6	3.430	155.1	0.0577	72.0	0.828	-19.9
1000	0.954	-30.5	3.429	151.9	0.0642	69.3	0.818	-21.7
1100	0.944	-33.2	3.398	150.2	0.0692	68.5	0.817	-23.8
1200	0.934	-36.1	3.397	146.4	0.0753	66.1	0.809	-26.0
1300	0.923	-39.0	3.343	144.8	0.0810	64.2	0.804	-28.0
1400	0.922	-41.9	3.341	141.2	0.0863	62.2	0.797	-30.1
1500	0.909	-44.5	3.324	138.6	0.0912	60.8	0.789	-32.0
1600	0.896	-47.3	3.306	136.4	0.0950	58.8	0.782	-33.9
1700	0.897	-50.4	3.281	133.7	0.1010	58.2	0.775	-36.0
1800	0.862	-52.9	3.246	130.7	0.1053	56.0	0.768	-37.9
1900	0.872	-55.6	3.225	129.4	0.1107	54.0	0.763	-39.9
2000	0.844	-58.5	3.184	125.6	0.1164	52.3	0.748	-41.8
2100	0.840	-60.5	3.149	124.7	0.1192	50.6	0.738	-43.2
2200	0.812	-63.2	3.066	121.3	0.1234	49.2	0.730	-45.3
2300	0.808	-65.1	3.050	119.9	0.1267	47.9	0.720	-46.7
2400	0.795	-67.5	3.001	116.3	0.1309	46.2	0.708	-48.7
2500	0.778	-70.6	2.998	114.5	0.1330	44.4	0.700	-50.1
2600	0.754	-72.5	2.945	111.2	0.1391	42.2	0.685	-51.9

(COMMON SOURCE, $V_{DS}=2V$, $I_D=5mA$, $T_a=25^\circ C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	1.001	-4.0	6.027	176.3	0.0058	86.2	0.747	-2.8
200	0.991	-7.6	6.036	172.8	0.0118	81.2	0.746	-5.2
300	0.988	-11.5	6.027	169.0	0.0177	84.6	0.742	-7.9
400	0.974	-15.4	5.961	165.7	0.0245	79.6	0.739	-10.4
500	0.970	-18.7	5.834	162.1	0.0299	78.8	0.733	-12.9
600	0.968	-22.6	5.902	159.1	0.0354	77.0	0.731	-15.6
700	0.960	-25.8	5.796	155.4	0.0416	75.3	0.724	-17.9
800	0.946	-29.7	5.782	152.7	0.0463	73.0	0.715	-20.3
900	0.925	-33.5	5.637	149.4	0.0522	71.7	0.705	-22.9
1000	0.922	-36.2	5.591	145.8	0.0575	68.8	0.697	-25.2
1100	0.902	-39.7	5.503	143.6	0.0625	68.1	0.690	-27.5
1200	0.893	-42.9	5.411	139.7	0.0684	65.4	0.681	-30.0
1300	0.871	-46.3	5.301	137.6	0.0719	63.4	0.672	-32.0
1400	0.854	-49.3	5.262	133.8	0.0777	62.1	0.662	-34.3
1500	0.835	-51.7	5.176	130.7	0.0816	60.0	0.655	-36.4
1600	0.828	-56.1	5.129	128.5	0.0836	58.8	0.646	-38.5
1700	0.813	-58.9	5.031	125.5	0.0894	57.7	0.636	-40.5
1800	0.797	-60.7	4.925	122.5	0.0932	56.0	0.629	-42.5
1900	0.795	-64.8	4.890	120.6	0.0970	54.3	0.620	-44.6
2000	0.771	-67.2	4.750	116.8	0.1003	51.9	0.602	-46.2
2100	0.750	-69.5	4.675	115.8	0.1030	50.7	0.593	-47.9
2200	0.724	-72.5	4.525	112.4	0.1052	49.7	0.581	-49.4
2300	0.708	-74.0	4.440	111.0	0.1098	49.1	0.569	-51.1
2400	0.695	-77.0	4.379	107.5	0.1122	48.0	0.558	-52.5
2500	0.672	-79.2	4.298	105.6	0.1152	46.8	0.548	-53.8
2600	0.646	-82.3	4.223	102.3	0.1174	45.2	0.536	-55.7

S-PARAMETER

(COMMON SOURCE, $V_{DS}=2V$, $I_D=10mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	1.000	-4.4	8.113	175.6	0.0055	85.7	0.655	-3.0
200	0.993	-8.5	8.084	171.6	0.0113	86.8	0.654	-5.8
300	0.986	-12.9	8.039	167.5	0.0167	81.2	0.650	-8.7
400	0.970	-17.4	7.944	163.4	0.0225	80.0	0.642	-11.5
500	0.965	-21.4	7.785	159.1	0.0277	78.8	0.641	-14.0
600	0.949	-25.4	7.755	155.9	0.0333	77.0	0.634	-16.9
700	0.935	-29.8	7.613	151.6	0.0387	75.7	0.627	-19.3
800	0.923	-33.6	7.519	148.2	0.0426	73.2	0.618	-22.0
900	0.898	-37.2	7.297	144.9	0.0484	72.5	0.609	-24.7
1000	0.885	-40.4	7.194	141.1	0.0525	69.0	0.597	-27.2
1100	0.863	-44.7	7.036	138.4	0.0574	68.2	0.588	-29.7
1200	0.842	-47.6	6.875	134.6	0.0620	66.2	0.579	-32.1
1300	0.833	-51.3	6.691	132.0	0.0665	64.9	0.567	-34.0
1400	0.808	-54.8	6.593	128.2	0.0694	62.5	0.558	-36.4
1500	0.781	-57.3	6.478	125.2	0.0747	61.4	0.550	-38.4
1600	0.773	-59.9	6.334	122.8	0.0763	60.0	0.539	-40.2
1700	0.769	-63.3	6.175	119.7	0.0818	58.8	0.531	-42.6
1800	0.727	-66.6	6.003	116.5	0.0849	58.3	0.523	-44.1
1900	0.726	-69.8	5.897	114.7	0.0885	56.5	0.515	-46.1
2000	0.701	-72.6	5.718	111.1	0.0912	53.9	0.498	-47.9
2100	0.683	-74.3	5.575	110.1	0.0939	53.9	0.488	-48.6
2200	0.647	-77.1	5.395	106.7	0.0969	52.8	0.479	-50.6
2300	0.635	-78.6	5.265	105.3	0.0993	52.1	0.469	-52.0
2400	0.626	-81.0	5.176	101.6	0.1039	51.2	0.460	-53.1
2500	0.607	-84.5	5.044	99.8	0.1053	49.5	0.449	-54.3
2600	0.569	-86.7	4.943	96.9	0.1088	48.7	0.436	-55.6

(COMMON SOURCE, $V_{DS}=2V$, $I_D=20mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.994	-5.1	10.235	174.8	0.0054	87.5	0.556	-3.4
200	0.994	-9.7	10.222	170.3	0.0102	87.1	0.554	-6.2
300	0.982	-14.5	10.077	165.5	0.0153	85.0	0.549	-9.1
400	0.964	-19.2	9.902	161.0	0.0207	81.6	0.543	-11.9
500	0.951	-23.9	9.625	156.6	0.0256	80.5	0.538	-14.5
600	0.930	-28.1	9.577	152.6	0.0305	78.3	0.532	-17.4
700	0.917	-32.5	9.313	148.1	0.0351	77.3	0.524	-20.0
800	0.897	-37.0	9.128	144.3	0.0384	74.2	0.514	-22.6
900	0.869	-41.2	8.813	140.7	0.0440	72.7	0.505	-25.3
1000	0.846	-43.9	8.604	136.9	0.0484	71.2	0.495	-27.5
1100	0.823	-48.0	8.332	134.0	0.0528	69.5	0.487	-30.1
1200	0.795	-51.7	8.130	129.9	0.0566	68.5	0.476	-32.4
1300	0.782	-54.7	7.846	127.3	0.0608	66.5	0.469	-34.3
1400	0.757	-58.3	7.679	123.6	0.0645	64.3	0.459	-36.2
1500	0.744	-61.8	7.475	120.2	0.0676	63.7	0.451	-38.1
1600	0.713	-64.8	7.275	117.7	0.0709	62.0	0.445	-39.9
1700	0.703	-67.9	7.053	114.7	0.0756	61.9	0.437	-42.0
1800	0.675	-70.5	6.877	111.6	0.0783	60.5	0.430	-43.7
1900	0.664	-72.7	6.701	109.8	0.0821	59.5	0.422	-45.1
2000	0.638	-75.1	6.448	106.2	0.0849	57.9	0.408	-47.2
2100	0.617	-77.6	6.258	105.3	0.0876	57.8	0.399	-47.6
2200	0.592	-80.7	6.035	102.3	0.0908	56.5	0.393	-49.1
2300	0.578	-82.0	5.866	100.6	0.0933	56.2	0.384	-50.3
2400	0.549	-84.0	5.767	97.2	0.0977	55.8	0.375	-51.3
2500	0.538	-87.6	5.609	95.7	0.0992	53.4	0.369	-52.0
2600	0.511	-90.8	5.437	92.7	0.1035	52.9	0.360	-52.6

S-PARAMETER

(COMMON SOURCE, $V_{DS}=2.5V$, $I_D=2mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.996	-3.4	3.442	177.0	0.0066	87.8	0.857	-2.3
200	0.993	-6.2	3.471	174.4	0.0128	84.5	0.856	-4.3
300	0.991	-9.0	3.468	171.4	0.0184	81.7	0.851	-6.4
400	0.983	-12.3	3.442	168.5	0.0252	81.7	0.852	-8.6
500	0.978	-15.3	3.379	165.8	0.0319	80.8	0.850	-10.7
600	0.981	-17.9	3.437	163.6	0.0378	76.4	0.846	-12.9
700	0.975	-21.3	3.397	160.3	0.0434	74.9	0.842	-14.9
800	0.967	-24.2	3.430	158.3	0.0496	74.0	0.835	-17.0
900	0.955	-27.1	3.357	155.5	0.0562	72.6	0.833	-19.2
1000	0.949	-29.7	3.357	152.4	0.0615	70.4	0.823	-21.2
1100	0.943	-33.0	3.320	150.7	0.0678	69.3	0.823	-23.4
1200	0.932	-35.8	3.313	147.0	0.0733	66.7	0.816	-25.5
1300	0.926	-37.6	3.257	145.3	0.0774	64.7	0.809	-27.4
1400	0.917	-41.0	3.262	142.0	0.0844	63.1	0.802	-29.3
1500	0.913	-43.4	3.256	139.5	0.0891	60.7	0.799	-31.3
1600	0.900	-46.2	3.253	137.2	0.0924	59.0	0.789	-33.2
1700	0.899	-49.5	3.208	134.3	0.0991	57.7	0.781	-35.2
1800	0.873	-51.4	3.183	131.7	0.1039	56.4	0.777	-37.0
1900	0.879	-54.4	3.174	130.6	0.1083	54.8	0.773	-39.0
2000	0.855	-57.4	3.130	126.2	0.1130	52.2	0.757	-41.0
2100	0.842	-58.7	3.093	125.8	0.1164	51.5	0.751	-42.4
2200	0.825	-61.9	3.018	122.0	0.1201	49.4	0.741	-44.4
2300	0.814	-63.3	2.981	120.9	0.1242	48.9	0.732	-45.9
2400	0.800	-65.7	2.978	117.4	0.1278	46.5	0.720	-47.5
2500	0.790	-69.6	2.952	115.6	0.1313	44.8	0.710	-49.2
2600	0.761	-72.2	2.911	112.5	0.1343	43.0	0.698	-51.0

(COMMON SOURCE, $V_{DS}=2.5V$, $I_D=5mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.996	-3.9	5.846	176.3	0.0058	86.1	0.760	-2.7
200	0.991	-7.4	5.855	173.0	0.0120	84.6	0.759	-5.1
300	0.987	-10.8	5.842	169.4	0.0175	82.4	0.758	-7.7
400	0.980	-14.9	5.796	166.1	0.0235	80.5	0.752	-10.1
500	0.968	-18.1	5.683	162.7	0.0292	78.8	0.749	-12.4
600	0.967	-21.8	5.725	159.7	0.0344	77.8	0.745	-15.0
700	0.957	-25.4	5.648	156.0	0.0404	74.4	0.737	-17.3
800	0.944	-28.9	5.627	153.4	0.0460	73.5	0.730	-19.8
900	0.928	-32.6	5.490	150.4	0.0510	72.2	0.722	-22.1
1000	0.919	-35.2	5.456	146.7	0.0555	69.1	0.716	-24.6
1100	0.905	-39.0	5.369	144.3	0.0614	68.0	0.707	-26.8
1200	0.894	-41.9	5.310	140.6	0.0660	66.4	0.700	-29.1
1300	0.876	-45.5	5.194	138.3	0.0705	63.9	0.689	-31.1
1400	0.857	-47.9	5.143	134.8	0.0754	62.3	0.681	-33.2
1500	0.851	-51.0	5.080	131.7	0.0787	60.5	0.673	-35.5
1600	0.835	-54.0	5.023	129.1	0.0831	58.6	0.664	-37.4
1700	0.815	-56.6	4.940	126.5	0.0864	57.5	0.652	-39.3
1800	0.793	-60.3	4.838	123.4	0.0922	56.4	0.645	-41.4
1900	0.799	-63.2	4.791	122.0	0.0941	54.9	0.634	-43.4
2000	0.773	-65.6	4.688	118.2	0.0988	53.6	0.621	-45.2
2100	0.758	-68.3	4.593	116.8	0.1008	51.6	0.613	-46.7
2200	0.733	-70.4	4.455	113.5	0.1040	50.3	0.598	-48.2
2300	0.722	-71.7	4.378	112.0	0.1073	49.1	0.588	-49.8
2400	0.698	-74.8	4.330	108.5	0.1105	48.2	0.579	-51.4
2500	0.679	-78.5	4.249	106.8	0.1132	46.4	0.568	-52.7
2600	0.650	-79.8	4.153	103.6	0.1158	45.0	0.556	-54.3

S-PARAMETER

(COMMON SOURCE, $V_{DS}=2.5V$, $I_D=10mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.990	-4.6	8.150	175.6	0.0056	85.9	0.668	-3.1
200	0.986	-8.8	8.178	171.6	0.0105	82.3	0.668	-5.7
300	0.988	-13.0	8.080	167.4	0.0159	80.6	0.660	-8.3
400	0.970	-17.5	8.012	163.4	0.0220	81.2	0.657	-11.2
500	0.964	-21.1	7.821	159.3	0.0268	79.3	0.652	-13.6
600	0.947	-25.4	7.840	156.0	0.0314	77.5	0.645	-16.2
700	0.931	-28.9	7.703	152.0	0.0371	75.7	0.639	-18.9
800	0.926	-33.1	7.581	148.7	0.0420	72.2	0.630	-21.4
900	0.897	-36.8	7.365	145.4	0.0472	71.3	0.620	-24.1
1000	0.879	-39.8	7.259	141.6	0.0510	70.1	0.609	-26.5
1100	0.865	-43.6	7.082	138.7	0.0555	67.9	0.603	-28.8
1200	0.840	-46.9	6.936	134.8	0.0593	66.3	0.591	-31.2
1300	0.821	-50.8	6.738	132.4	0.0642	64.9	0.582	-33.3
1400	0.807	-53.9	6.637	128.6	0.0678	63.2	0.572	-35.4
1500	0.785	-56.3	6.522	125.4	0.0715	61.6	0.561	-37.3
1600	0.767	-60.1	6.397	123.0	0.0727	60.1	0.552	-39.2
1700	0.751	-61.8	6.230	119.9	0.0789	59.3	0.545	-41.3
1800	0.734	-66.4	6.064	116.8	0.0831	58.0	0.538	-43.0
1900	0.721	-68.6	5.960	115.1	0.0863	57.1	0.530	-45.1
2000	0.701	-71.2	5.775	111.4	0.0884	54.9	0.509	-46.4
2100	0.681	-73.1	5.648	110.3	0.0904	53.7	0.502	-47.7
2200	0.644	-76.4	5.444	107.2	0.0931	53.3	0.491	-49.0
2300	0.640	-78.4	5.313	105.4	0.0970	52.7	0.481	-50.5
2400	0.614	-80.5	5.241	102.0	0.0998	51.9	0.472	-51.8
2500	0.603	-83.1	5.096	100.4	0.1023	50.7	0.463	-52.8
2600	0.563	-85.0	4.989	97.4	0.1046	48.6	0.451	-54.0

(COMMON SOURCE, $V_{DS}=2.5V$, $I_D=20mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.993	-4.9	10.342	174.8	0.0049	86.5	0.580	-3.3
200	0.985	-9.7	10.308	170.3	0.0099	83.1	0.578	-6.1
300	0.983	-14.4	10.190	165.6	0.0145	83.7	0.573	-8.9
400	0.959	-19.1	10.023	160.9	0.0201	81.7	0.567	-11.6
500	0.953	-23.4	9.746	156.6	0.0249	80.2	0.562	-14.2
600	0.932	-27.9	9.703	152.4	0.0301	78.7	0.557	-17.0
700	0.908	-32.1	9.424	148.2	0.0340	75.4	0.547	-19.6
800	0.889	-36.5	9.263	144.7	0.0378	74.7	0.538	-22.2
900	0.870	-40.1	8.907	140.7	0.0420	73.0	0.527	-24.4
1000	0.844	-43.6	8.707	137.0	0.0471	70.6	0.517	-27.0
1100	0.826	-47.2	8.477	133.9	0.0506	69.6	0.509	-29.2
1200	0.787	-51.1	8.211	130.1	0.0547	68.6	0.498	-31.5
1300	0.778	-54.4	7.950	127.4	0.0587	66.2	0.489	-33.2
1400	0.747	-57.5	7.789	123.7	0.0611	65.4	0.480	-35.1
1500	0.732	-60.9	7.562	120.5	0.0650	63.9	0.473	-37.1
1600	0.716	-64.0	7.368	117.9	0.0678	62.3	0.466	-38.8
1700	0.692	-67.1	7.146	114.9	0.0722	62.0	0.458	-40.6
1800	0.674	-68.8	6.921	111.8	0.0761	61.1	0.450	-42.4
1900	0.658	-73.0	6.774	110.2	0.0786	59.6	0.443	-44.0
2000	0.632	-74.8	6.531	106.5	0.0819	58.4	0.429	-45.4
2100	0.615	-76.9	6.355	105.6	0.0840	57.7	0.420	-46.1
2200	0.588	-79.3	6.122	102.7	0.0865	57.3	0.411	-47.5
2300	0.575	-80.4	5.938	100.8	0.0897	56.9	0.406	-48.6
2400	0.557	-84.7	5.837	97.4	0.0926	55.2	0.397	-49.6
2500	0.536	-86.8	5.671	95.9	0.0955	54.0	0.390	-50.3
2600	0.511	-88.8	5.530	93.1	0.0990	53.5	0.379	-51.2

S-PARAMETER

(COMMON SOURCE, $V_{DS}=3V$, $I_D=2mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.995	-3.5	3.428	177.2	0.0065	85.8	0.855	-2.1
200	0.993	-6.1	3.444	174.5	0.0122	83.9	0.852	-4.4
300	0.994	-8.8	3.445	171.6	0.0185	82.0	0.848	-6.4
400	0.979	-12.3	3.423	168.8	0.0247	82.0	0.850	-8.5
500	0.984	-15.0	3.362	165.9	0.0311	80.7	0.845	-10.4
600	0.972	-17.9	3.411	163.6	0.0363	77.5	0.843	-12.7
700	0.975	-20.8	3.394	160.6	0.0422	75.6	0.839	-14.5
800	0.966	-23.8	3.400	158.5	0.0479	74.0	0.835	-16.9
900	0.959	-26.3	3.340	156.0	0.0540	71.8	0.832	-18.7
1000	0.943	-29.1	3.340	152.7	0.0597	70.2	0.825	-20.8
1100	0.934	-31.5	3.316	151.0	0.0653	68.3	0.820	-22.9
1200	0.929	-35.0	3.284	147.4	0.0706	67.3	0.813	-25.0
1300	0.927	-37.9	3.269	145.7	0.0763	64.6	0.808	-26.8
1400	0.912	-40.0	3.250	142.5	0.0816	62.9	0.802	-29.0
1500	0.913	-43.3	3.251	139.8	0.0861	61.5	0.796	-30.8
1600	0.890	-46.0	3.238	137.6	0.0904	59.3	0.789	-32.6
1700	0.885	-48.9	3.206	135.0	0.0952	58.5	0.781	-34.5
1800	0.871	-50.8	3.164	132.2	0.1011	57.3	0.773	-36.4
1900	0.878	-54.3	3.169	130.6	0.1058	55.1	0.770	-38.3
2000	0.858	-56.2	3.106	127.1	0.1095	53.6	0.759	-40.3
2100	0.847	-58.1	3.098	126.4	0.1133	52.1	0.746	-41.7
2200	0.819	-61.2	3.016	122.9	0.1163	50.1	0.740	-43.4
2300	0.811	-62.3	2.982	121.4	0.1204	48.9	0.731	-45.1
2400	0.806	-65.5	2.965	117.9	0.1240	47.0	0.721	-46.9
2500	0.792	-68.2	2.948	116.0	0.1280	45.6	0.712	-48.4
2600	0.759	-70.8	2.911	113.0	0.1308	43.9	0.699	-50.1

(COMMON SOURCE, $V_{DS}=3V$, $I_D=5mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.987	-4.3	5.844	176.4	0.0057	80.6	0.759	-2.6
200	0.987	-7.4	5.871	173.3	0.0111	82.4	0.760	-5.1
300	0.982	-10.9	5.841	169.5	0.0165	84.0	0.758	-7.6
400	0.974	-14.8	5.801	166.2	0.0225	79.8	0.753	-9.9
500	0.974	-18.0	5.691	162.7	0.0285	79.8	0.747	-12.3
600	0.959	-21.4	5.721	159.8	0.0336	77.6	0.746	-14.7
700	0.956	-25.1	5.654	156.2	0.0390	74.5	0.739	-16.9
800	0.944	-28.6	5.633	153.5	0.0445	72.9	0.731	-19.4
900	0.931	-31.5	5.501	150.3	0.0495	71.4	0.724	-21.7
1000	0.915	-34.5	5.466	147.0	0.0541	69.1	0.716	-24.1
1100	0.903	-38.4	5.366	144.5	0.0593	67.8	0.709	-26.2
1200	0.877	-41.4	5.316	140.9	0.0642	66.7	0.700	-28.5
1300	0.879	-44.9	5.201	138.9	0.0683	64.0	0.691	-30.5
1400	0.856	-47.4	5.163	135.0	0.0725	62.2	0.683	-32.7
1500	0.838	-50.3	5.099	132.2	0.0767	60.7	0.678	-34.5
1600	0.829	-53.9	5.038	129.7	0.0797	59.1	0.665	-36.6
1700	0.822	-56.9	4.964	126.8	0.0841	57.7	0.656	-38.5
1800	0.802	-59.1	4.871	123.9	0.0880	57.4	0.647	-40.4
1900	0.797	-62.6	4.795	122.1	0.0920	55.3	0.642	-42.5
2000	0.764	-65.0	4.709	118.5	0.0958	53.4	0.623	-44.3
2100	0.749	-67.1	4.632	117.5	0.0977	52.4	0.615	-45.5
2200	0.720	-69.4	4.486	113.8	0.1017	50.6	0.605	-47.2
2300	0.714	-71.3	4.402	112.5	0.1036	50.2	0.594	-48.6
2400	0.701	-74.0	4.355	108.8	0.1076	47.9	0.582	-50.3
2500	0.684	-77.2	4.264	107.2	0.1096	47.1	0.575	-51.4
2600	0.654	-79.7	4.184	104.2	0.1119	45.7	0.562	-53.1

S-PARAMETER

(COMMON SOURCE, $V_{DS}=3V$, $I_D=10mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.995	-4.6	8.223	175.7	0.0059	85.2	0.673	-3.1
200	0.986	-8.9	8.213	171.8	0.0105	86.3	0.673	-5.5
300	0.982	-12.8	8.169	167.7	0.0152	82.1	0.667	-8.7
400	0.962	-17.1	8.050	163.6	0.0204	81.5	0.663	-10.9
500	0.959	-20.7	7.870	159.4	0.0258	80.7	0.660	-13.3
600	0.949	-24.7	7.936	155.9	0.0307	77.2	0.654	-16.0
700	0.931	-28.8	7.710	152.0	0.0354	74.8	0.645	-18.4
800	0.917	-32.5	7.624	148.9	0.0400	74.0	0.637	-21.0
900	0.899	-36.3	7.406	145.4	0.0453	72.2	0.629	-23.4
1000	0.873	-39.5	7.309	141.6	0.0494	69.5	0.617	-26.0
1100	0.859	-43.0	7.130	138.9	0.0541	68.4	0.609	-28.0
1200	0.830	-46.4	6.996	135.1	0.0577	67.2	0.599	-30.5
1300	0.828	-50.0	6.783	132.4	0.0622	65.4	0.589	-32.2
1400	0.798	-53.4	6.687	128.8	0.0658	63.5	0.577	-34.7
1500	0.783	-56.5	6.542	125.6	0.0689	61.8	0.571	-36.3
1600	0.764	-59.2	6.434	123.1	0.0722	61.0	0.560	-38.1
1700	0.752	-62.1	6.256	120.3	0.0754	59.6	0.550	-40.0
1800	0.729	-65.2	6.099	117.0	0.0801	58.0	0.544	-42.1
1900	0.724	-68.2	5.983	115.4	0.0832	56.8	0.536	-43.7
2000	0.694	-70.6	5.807	111.6	0.0856	55.0	0.519	-45.4
2100	0.676	-73.0	5.698	110.6	0.0881	54.5	0.511	-46.4
2200	0.651	-75.8	5.494	107.4	0.0909	53.7	0.500	-47.8
2300	0.634	-76.5	5.357	106.0	0.0937	53.1	0.490	-49.2
2400	0.614	-79.1	5.258	102.5	0.0963	52.2	0.483	-50.3
2500	0.592	-83.0	5.136	100.6	0.0982	50.7	0.473	-51.4
2600	0.565	-84.3	5.025	97.7	0.1022	49.5	0.462	-52.6

(COMMON SOURCE, $V_{DS}=3V$, $I_D=20mA$, $T_a=25^{\circ}C$, $Z_L=Z_S=50\Omega$)

FREQ. (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.990	-4.9	10.329	174.8	0.0052	80.7	0.601	-3.2
200	0.989	-9.7	10.281	170.3	0.0096	83.6	0.598	-6.0
300	0.974	-14.5	10.214	165.6	0.0141	83.6	0.593	-8.8
400	0.958	-19.0	10.042	161.3	0.0194	81.6	0.588	-11.4
500	0.941	-23.4	9.743	156.8	0.0238	80.3	0.582	-14.0
600	0.928	-27.6	9.709	152.6	0.0277	77.5	0.577	-16.4
700	0.905	-31.4	9.438	148.2	0.0329	76.8	0.568	-19.0
800	0.890	-35.7	9.225	145.0	0.0365	75.1	0.557	-21.5
900	0.868	-39.6	8.892	141.1	0.0414	71.9	0.546	-24.0
1000	0.843	-43.4	8.747	137.2	0.0446	71.1	0.537	-26.3
1100	0.827	-46.7	8.458	134.3	0.0492	69.5	0.528	-28.5
1200	0.792	-51.1	8.229	130.4	0.0535	68.1	0.519	-30.6
1300	0.780	-53.8	7.954	127.8	0.0565	66.7	0.510	-32.4
1400	0.745	-57.2	7.790	123.8	0.0599	65.5	0.500	-34.4
1500	0.728	-60.8	7.598	120.9	0.0633	64.3	0.493	-36.1
1600	0.716	-63.0	7.422	118.2	0.0664	62.6	0.483	-37.7
1700	0.689	-66.3	7.188	115.1	0.0702	62.1	0.476	-39.6
1800	0.673	-68.7	6.991	112.1	0.0738	61.6	0.469	-41.1
1900	0.661	-71.4	6.773	110.5	0.0761	59.7	0.464	-42.9
2000	0.636	-74.3	6.566	107.0	0.0803	57.8	0.447	-44.3
2100	0.612	-76.4	6.374	106.0	0.0812	57.8	0.439	-44.9
2200	0.589	-79.0	6.130	102.8	0.0847	57.4	0.431	-46.2
2300	0.571	-79.9	5.978	101.2	0.0869	56.5	0.423	-47.3
2400	0.543	-82.7	5.862	97.9	0.0896	55.2	0.417	-48.2
2500	0.532	-85.1	5.688	96.3	0.0934	54.2	0.408	-48.8
2600	0.512	-87.3	5.522	93.4	0.0965	54.2	0.401	-50.0

NOISE PARAMETER
(COMMON SOURCE, $V_{DS}=2V$, $T_a=25^\circ C$)

f (GHz)	I_D (mA)	NF min (dB)	$ \Gamma_{opt} $	$\angle\Gamma_{opt}$	R_n (Ω)
1.5	2	0.80	0.59	16	25
1.5	5	0.60	0.56	19	15
1.5	10	0.55	0.54	26	11
2	2	0.90	0.58	26	15
2	5	0.65	0.54	28	10
2	10	0.60	0.50	29	7