

# 2SK3390

## Silicon N-Channel MOS FET UHF Power Amplifier

REJ03G0208-0300

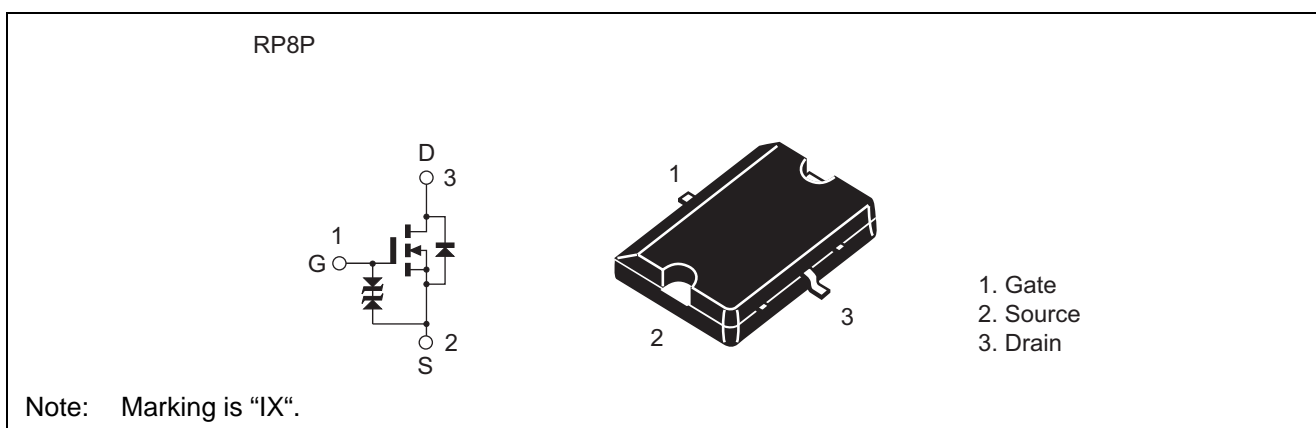
Rev.3.00

Aug.05.2004

### Features

- High power output, High gain, High efficiency  
PG = 17 dB, Pout = 6.31 W,  $\eta_{add} = 60\%$  min. (f = 836 MHz)
- Compact package capable of surface mounting

### Outline



This Device is sensitive to Electro Static Discharge. An Adequate handling procedure is requested.

### Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DSS}$	17	V
Gate to source voltage	$V_{GSS}$	$\pm 10$	V
Drain current	$I_D$	1	A
Drain peak current	$I_{D(pulse)}$ <sup>Note1</sup>	2.5	A
Channel dissipation	$P_{ch}$ <sup>Note2</sup>	20	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-45 to +150	°C

Notes: 1. PW < 1sec, Tch < 150°C

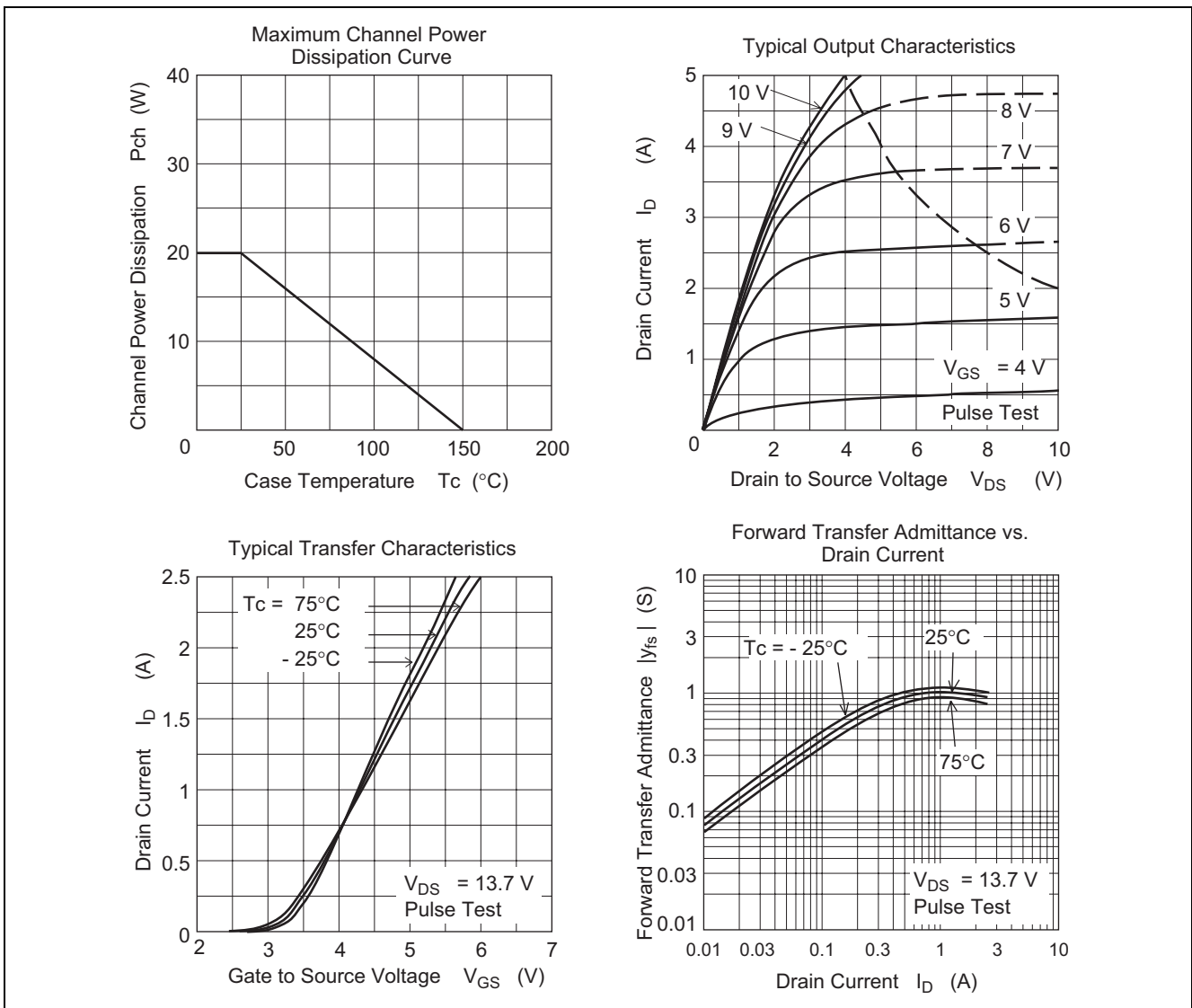
2. Value at Tc = 25°C

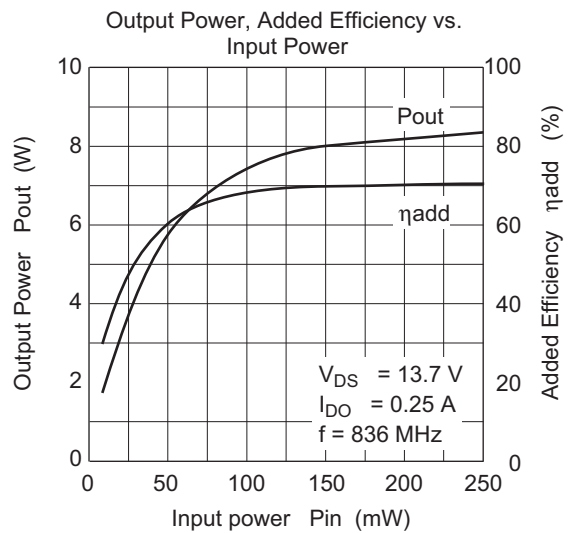
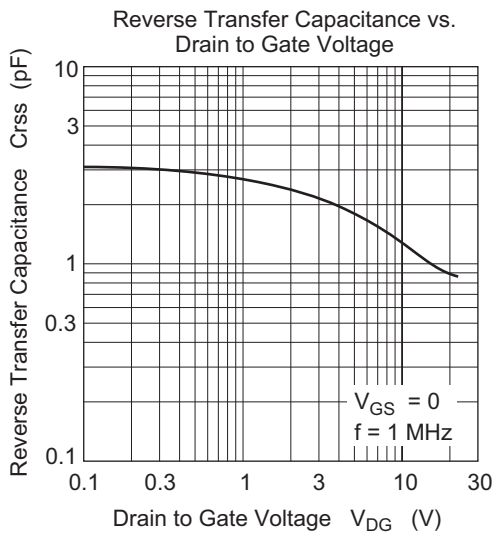
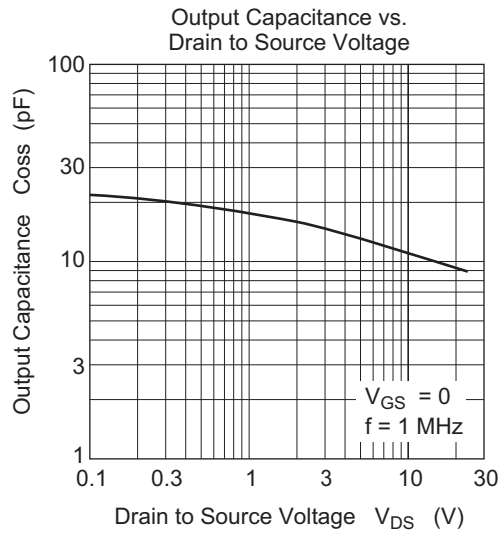
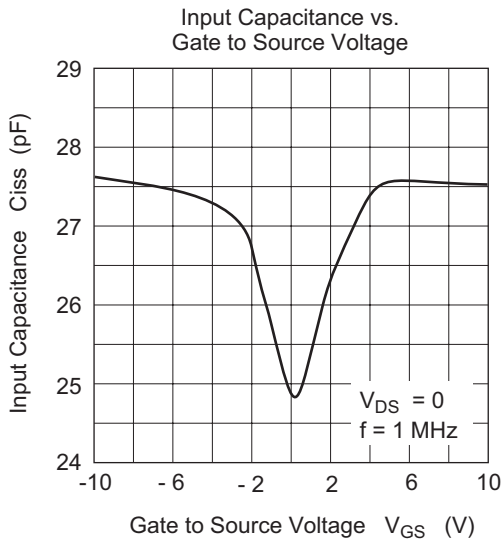
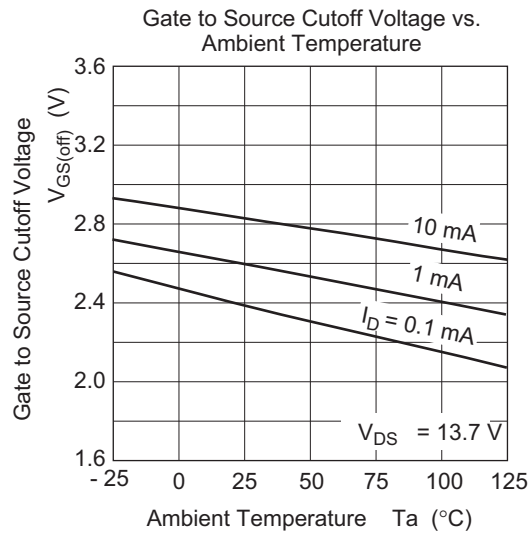
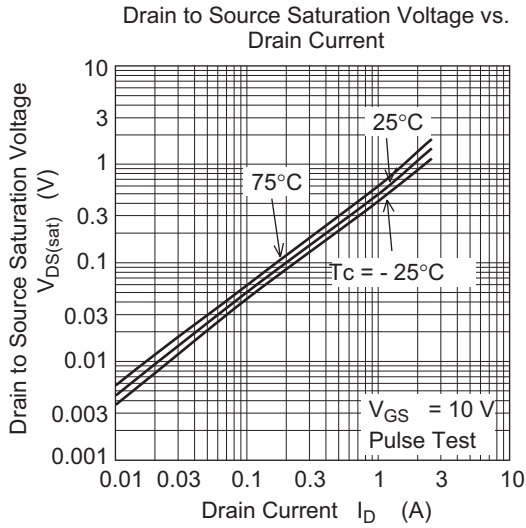
Electrical Characteristics

(Ta = 25°C)

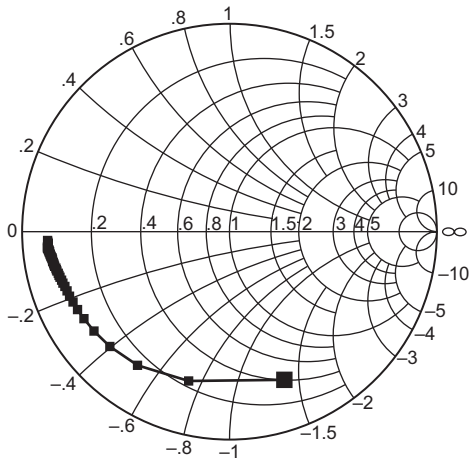
Item	Symbol	Min.	Typ	Max.	Unit	Test Conditions
Zero gate voltage drain current	$I_{DSS}$	—	—	10	$\mu A$	$V_{DS} = 13.7 V, V_{GS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 5$	$\mu A$	$V_{GS} = \pm 10 V, V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	2.2	—	3.0	V	$I_D = 1 mA, V_{DS} = 13.7 V$
Input capacitance	$C_{iss}$	—	27.5	—	pF	$V_{GS} = 5 V, V_{DS} = 0, f = 1 MHz$
Output capacitance	$C_{oss}$	—	10.5	—	pF	$V_{DS} = 13.7 V, V_{GS} = 0, f = 1 MHz$
Output Power	$P_{out}$	6.31	—	—	W	$V_{DS} = 13.7 V, I_{D0} = 0.25 A$ $f = 836 MHz, P_{in} = 126 mW$
Added Efficiency	$\eta_{add}$	60	—	—	%	$V_{DS} = 13.7 V, I_{D0} = 0.25 A$ $f = 836 MHz, P_{in} = 126 mW$

Main Characteristics



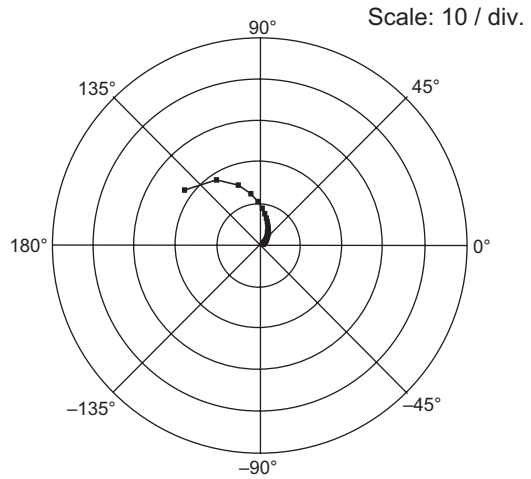


S<sub>11</sub> Parameter vs. Frequency



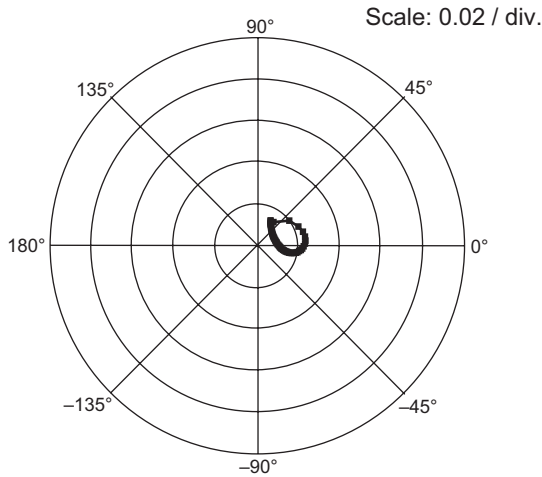
Test condition:  $V_{DS} = 13.7\text{ V}$ ,  $Z_O = 50\ \Omega$   
 50 to 2550 MHz (50 MHz step)  
 ■—■ ( $I_D = 250\text{ mA}$ )

S<sub>21</sub> Parameter vs. Frequency



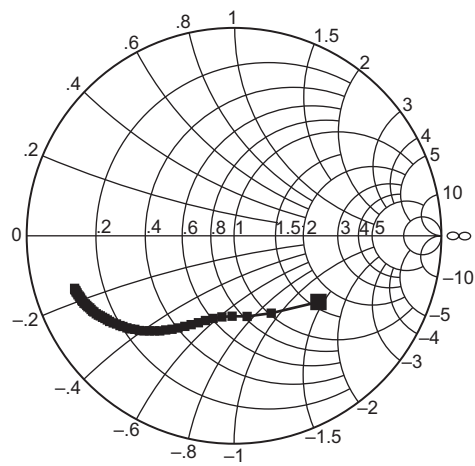
Test condition:  $V_{DS} = 13.7\text{ V}$ ,  $Z_O = 50\ \Omega$   
 50 to 2550 MHz (50 MHz step)  
 ■—■ ( $I_D = 250\text{ mA}$ )

S<sub>12</sub> Parameter vs. Frequency



Test condition:  $V_{DS} = 13.7\text{ V}$ ,  $Z_O = 50\ \Omega$   
 50 to 2550 MHz (50 MHz step)  
 ■—■ ( $I_D = 250\text{ mA}$ )

S<sub>22</sub> Parameter vs. Frequency



Test condition:  $V_{DS} = 13.7\text{ V}$ ,  $Z_O = 50\ \Omega$   
 50 to 2550 MHz (50 MHz step)  
 ■—■ ( $I_D = 250\text{ mA}$ )

## S Parameter

(V<sub>DS</sub> = 13.7 V, I<sub>D</sub> = 250 mA, Test Power Level = +5dBm, Z<sub>0</sub> = 50 Ω)

f (MHz)	S11		S21		S12		S22	
	Mag	Deg	Mag	Deg	Mag	Deg	Mag	Deg
50	0.761	-69.6	22.54	144.6	0.0130	56.7	0.518	-37.9
100	0.802	-105.3	18.78	124.5	0.0187	38.1	0.448	-64.1
150	0.841	-124.6	15.25	110.6	0.0210	24.5	0.425	-80.6
200	0.860	-136.3	12.40	100.9	0.0222	16.0	0.418	-91.1
250	0.872	-143.8	10.33	93.5	0.0226	9.7	0.427	-98.3
300	0.880	-149.2	8.68	87.2	0.0225	4.8	0.443	-104.0
350	0.887	-153.0	7.44	82.1	0.0223	1.3	0.465	-108.4
400	0.891	-155.9	6.50	77.5	0.0217	-2.3	0.488	-112.1
450	0.896	-158.1	5.70	73.3	0.0210	-5.1	0.513	-115.6
500	0.898	-160.1	5.05	69.7	0.0205	-7.3	0.535	-118.4
550	0.901	-161.7	4.53	66.0	0.0197	-9.2	0.560	-121.1
600	0.906	-162.9	4.06	62.8	0.0190	-11.0	0.582	-123.4
650	0.908	-164.0	3.67	59.8	0.0183	-12.3	0.604	-125.8
700	0.912	-165.0	3.33	57.1	0.0175	-13.5	0.627	-127.9
750	0.914	-165.7	3.04	54.6	0.0167	-14.1	0.644	-129.8
800	0.915	-166.4	2.78	52.2	0.0160	-14.6	0.661	-131.6
850	0.920	-167.2	2.56	49.8	0.0152	-15.0	0.679	-133.3
900	0.921	-167.7	2.36	47.8	0.0144	-14.7	0.696	-134.9
950	0.922	-168.2	2.19	45.8	0.0138	-14.3	0.708	-136.6
1000	0.926	-168.9	2.03	43.8	0.0132	-14.0	0.722	-137.9
1050	0.928	-169.3	1.89	41.9	0.0125	-12.9	0.733	-139.2
1100	0.928	-169.8	1.76	40.1	0.0119	-11.9	0.745	-140.7
1150	0.929	-170.2	1.65	38.6	0.0112	-10.5	0.754	-141.7
1200	0.932	-170.5	1.54	37.2	0.0107	-8.4	0.763	-143.0
1250	0.931	-171.0	1.45	35.7	0.0102	-6.4	0.773	-144.1
1300	0.933	-171.5	1.36	34.1	0.0098	-4.2	0.784	-145.4
1350	0.933	-171.8	1.29	32.8	0.0094	-1.6	0.790	-146.3
1400	0.936	-172.0	1.22	31.4	0.0090	1.5	0.796	-147.3
1450	0.937	-172.3	1.15	30.4	0.0087	5.1	0.803	-148.2
1500	0.939	-172.7	1.09	29.1	0.0085	8.0	0.809	-149.0
1550	0.940	-173.0	1.04	28.1	0.0083	11.6	0.816	-149.6
1600	0.942	-173.5	0.99	26.8	0.0081	15.5	0.822	-150.4
1650	0.941	-173.7	0.94	25.8	0.0080	20.0	0.828	-151.4
1700	0.942	-173.9	0.90	24.7	0.0079	23.4	0.832	-151.9
1750	0.942	-173.9	0.86	23.8	0.0080	27.6	0.835	-152.7
1800	0.944	-174.2	0.82	23.0	0.0081	31.1	0.837	-153.4
1850	0.944	-174.4	0.78	22.0	0.0082	34.8	0.843	-154.0
1900	0.947	-174.4	0.75	21.4	0.0083	38.1	0.846	-154.6
1950	0.947	-174.7	0.72	20.4	0.0086	41.8	0.849	-155.3
2000	0.950	-174.9	0.70	19.6	0.0089	44.6	0.854	-155.7
2050	0.946	-175.2	0.67	18.7	0.0091	47.2	0.857	-156.6
2100	0.950	-175.2	0.65	17.7	0.0094	49.6	0.858	-157.1
2150	0.946	-175.5	0.62	17.0	0.0097	52.0	0.860	-157.8
2200	0.947	-175.8	0.60	16.3	0.0101	54.5	0.862	-158.2
2250	0.946	-175.8	0.58	15.5	0.0105	55.9	0.863	-158.7
2300	0.947	-176.1	0.56	14.8	0.0109	57.9	0.866	-159.2
2350	0.945	-176.4	0.54	14.1	0.0112	59.6	0.867	-159.9
2400	0.943	-176.6	0.52	13.2	0.0116	60.6	0.870	-160.3
2450	0.945	-176.8	0.51	12.5	0.0121	61.7	0.869	-160.8
2500	0.946	-177.3	0.49	11.8	0.0125	63.0	0.873	-161.2
2550	0.946	-177.6	0.48	11.3	0.0129	64.1	0.872	-161.7

(V<sub>DS</sub> = 4.5 V, I<sub>D</sub> = 250 mA, Test Power Level = +5dBm, Z<sub>O</sub> = 50 Ω)

f (MHz)	S11		S21		S12		S22	
	Mag	Deg	Mag	Deg	Mag	Deg	Mag	Deg
50	0.832	-65.3	9.46	146.5	0.0232	49.0	0.376	-103.4
100	0.820	-115.8	9.28	120.3	0.0310	27.6	0.471	-133.2
150	0.857	-138.4	8.01	105.4	0.0335	16.6	0.518	-144.8
200	0.866	-149.1	6.79	96.7	0.0342	9.9	0.539	-150.6
250	0.869	-154.9	5.80	91.0	0.0345	5.5	0.553	-153.8
300	0.871	-158.7	4.94	86.1	0.0343	1.5	0.566	-155.8
350	0.875	-161.2	4.30	82.3	0.0339	-1.4	0.577	-156.7
400	0.876	-163.1	3.79	78.7	0.0335	-4.3	0.590	-157.4
450	0.880	-164.5	3.37	75.5	0.0328	-6.4	0.601	-158.0
500	0.883	-165.8	3.01	72.7	0.0323	-8.4	0.613	-158.1
550	0.884	-166.8	2.71	69.9	0.0315	-10.2	0.627	-158.8
600	0.887	-167.6	2.46	67.3	0.0308	-11.9	0.637	-158.7
650	0.889	-168.2	2.24	65.0	0.0300	-13.3	0.649	-158.8
700	0.892	-168.9	2.05	62.5	0.0293	-14.8	0.660	-159.1
750	0.893	-169.2	1.88	60.5	0.0284	-15.6	0.670	-159.3
800	0.896	-169.9	1.74	58.4	0.0276	-16.5	0.682	-159.4
850	0.899	-170.2	1.61	56.5	0.0269	-17.5	0.694	-159.6
900	0.901	-170.6	1.50	54.6	0.0260	-18.2	0.704	-159.9
950	0.903	-170.8	1.39	52.7	0.0252	-18.7	0.714	-160.3
1000	0.907	-171.2	1.30	51.0	0.0244	-19.1	0.723	-160.6
1050	0.909	-171.5	1.22	49.4	0.0237	-19.4	0.732	-161.0
1100	0.910	-171.8	1.15	47.8	0.0230	-19.7	0.739	-161.1
1150	0.913	-172.3	1.08	46.2	0.0221	-19.9	0.746	-161.5
1200	0.912	-172.3	1.02	45.0	0.0214	-19.8	0.754	-162.0
1250	0.915	-172.6	0.96	43.3	0.0207	-19.7	0.761	-162.3
1300	0.919	-172.9	0.91	42.1	0.0200	-19.7	0.769	-162.9
1350	0.918	-173.2	0.86	40.8	0.0194	-19.1	0.775	-163.1
1400	0.920	-173.5	0.82	39.5	0.0187	-18.6	0.780	-163.5
1450	0.922	-173.6	0.78	38.4	0.0181	-18.0	0.788	-163.8
1500	0.923	-173.9	0.74	37.2	0.0174	-17.1	0.793	-164.1
1550	0.927	-174.2	0.71	36.2	0.0168	-16.3	0.797	-164.1
1600	0.928	-174.4	0.68	35.1	0.0163	-15.6	0.803	-164.6
1650	0.927	-174.6	0.65	34.1	0.0157	-14.4	0.809	-164.8
1700	0.928	-174.6	0.62	33.1	0.0152	-13.1	0.813	-165.4
1750	0.930	-174.7	0.59	32.2	0.0148	-12.0	0.814	-165.7
1800	0.931	-175.0	0.57	31.7	0.0143	-10.3	0.818	-165.9
1850	0.931	-175.2	0.55	30.5	0.0139	-8.6	0.821	-166.2
1900	0.934	-175.1	0.53	29.8	0.0136	-6.8	0.826	-166.3
1950	0.936	-175.4	0.51	29.1	0.0132	-5.5	0.828	-166.8
2000	0.937	-175.4	0.49	28.1	0.0129	-2.9	0.833	-167.2
2050	0.932	-175.7	0.47	27.3	0.0126	-0.9	0.835	-167.6
2100	0.936	-175.8	0.46	26.3	0.0123	1.0	0.838	-168.0
2150	0.935	-176.0	0.44	25.6	0.0121	3.3	0.838	-168.4
2200	0.937	-176.3	0.43	25.1	0.0119	6.2	0.842	-168.7
2250	0.936	-176.3	0.41	24.2	0.0118	8.0	0.844	-169.0
2300	0.937	-176.6	0.40	23.4	0.0116	10.7	0.848	-169.2
2350	0.937	-176.7	0.39	22.8	0.0116	12.8	0.847	-169.8
2400	0.937	-177.2	0.38	22.0	0.0116	15.3	0.852	-170.0
2450	0.938	-177.3	0.37	21.3	0.0116	17.8	0.852	-170.2
2500	0.937	-177.7	0.36	20.6	0.0116	19.8	0.853	-170.6
2550	0.939	-177.9	0.35	20.2	0.0116	22.4	0.852	-170.9

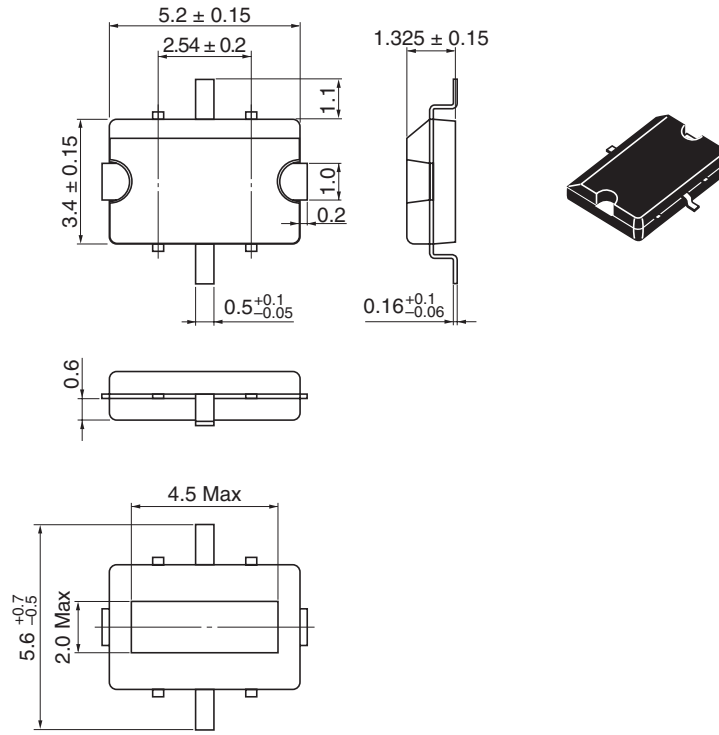
f (MHz)	S11		S21		S12		S22	
	Mag	Deg	Mag	Deg	Mag	Deg	Mag	Deg
50	0.748	-68.2	12.89	146.5	0.0214	53.3	0.372	-84.0
100	0.820	-116.0	11.53	120.1	0.0281	30.4	0.428	-119.1
150	0.850	-137.0	9.88	105.7	0.0304	18.7	0.466	-133.7
200	0.860	-146.8	8.27	97.3	0.0315	11.1	0.487	-141.1
250	0.866	-152.4	7.00	91.3	0.0318	6.2	0.502	-144.8
300	0.867	-156.4	5.90	86.3	0.0316	1.7	0.517	-147.5
350	0.876	-159.2	5.10	82.1	0.0313	-1.4	0.532	-148.8
400	0.877	-161.4	4.45	78.3	0.0308	-4.3	0.548	-149.7
450	0.880	-163.1	3.94	75.0	0.0302	-6.9	0.564	-150.9
500	0.883	-164.4	3.50	71.7	0.0295	-9.0	0.578	-151.1
550	0.885	-165.5	3.15	69.0	0.0288	-10.7	0.594	-151.7
600	0.889	-166.4	2.85	66.1	0.0281	-12.4	0.610	-152.3
650	0.891	-167.1	2.58	63.5	0.0272	-13.8	0.623	-152.6
700	0.895	-167.9	2.36	61.1	0.0265	-15.2	0.639	-153.1
750	0.898	-168.4	2.16	59.0	0.0256	-16.2	0.654	-153.5
800	0.900	-168.9	1.99	56.6	0.0248	-17.1	0.667	-153.9
850	0.900	-169.3	1.84	54.7	0.0240	-18.0	0.679	-154.4
900	0.904	-169.6	1.71	52.8	0.0232	-18.6	0.694	-154.7
950	0.908	-170.1	1.59	50.9	0.0224	-19.0	0.705	-155.5
1000	0.910	-170.5	1.49	49.1	0.0216	-19.2	0.715	-156.0
1050	0.912	-170.8	1.39	47.5	0.0208	-19.6	0.725	-156.5
1100	0.913	-171.2	1.30	45.8	0.0200	-19.6	0.732	-157.0
1150	0.916	-171.6	1.22	44.1	0.0193	-19.6	0.741	-157.5
1200	0.919	-171.9	1.15	42.9	0.0185	-19.2	0.752	-157.9
1250	0.920	-172.3	1.08	41.4	0.0178	-18.9	0.759	-158.5
1300	0.921	-172.4	1.02	40.1	0.0172	-18.0	0.768	-159.1
1350	0.920	-172.7	0.97	38.8	0.0165	-17.6	0.775	-159.6
1400	0.924	-172.9	0.92	37.6	0.0159	-16.8	0.783	-159.9
1450	0.926	-173.2	0.87	36.5	0.0153	-15.8	0.788	-160.4
1500	0.927	-173.5	0.83	35.2	0.0147	-14.5	0.792	-160.8
1550	0.929	-173.8	0.79	34.2	0.0142	-13.2	0.800	-161.3
1600	0.930	-173.9	0.75	33.0	0.0137	-11.8	0.803	-161.6
1650	0.930	-174.2	0.72	31.9	0.0132	-10.0	0.811	-162.0
1700	0.931	-174.2	0.69	31.0	0.0128	-8.5	0.816	-162.7
1750	0.932	-174.4	0.66	30.2	0.0123	-6.6	0.818	-162.9
1800	0.935	-174.7	0.63	29.4	0.0120	-4.6	0.822	-163.3
1850	0.935	-174.8	0.61	28.3	0.0117	-2.0	0.827	-163.5
1900	0.938	-174.8	0.58	27.9	0.0114	0.5	0.830	-163.9
1950	0.937	-175.1	0.56	26.8	0.0111	2.6	0.832	-164.4
2000	0.942	-175.2	0.54	26.4	0.0109	5.6	0.836	-164.9
2050	0.936	-175.5	0.52	25.2	0.0108	8.0	0.840	-165.3
2100	0.940	-175.7	0.50	24.5	0.0106	11.2	0.842	-165.7
2150	0.940	-175.8	0.49	23.6	0.0105	13.7	0.843	-166.3
2200	0.938	-176.1	0.47	22.9	0.0105	16.9	0.846	-166.5
2250	0.938	-176.1	0.45	22.2	0.0105	19.4	0.844	-166.7
2300	0.940	-176.4	0.44	21.5	0.0105	22.2	0.850	-167.2
2350	0.940	-176.5	0.43	20.8	0.0106	24.8	0.849	-167.5
2400	0.939	-176.9	0.41	20.0	0.0107	27.5	0.855	-167.9
2450	0.941	-177.0	0.40	19.5	0.0108	30.0	0.855	-168.2
2500	0.939	-177.6	0.39	18.9	0.0110	32.1	0.859	-168.6
2550	0.943	-177.6	0.38	18.2	0.0112	34.5	0.857	-169.0

(V<sub>DS</sub> = 7.5 V, I<sub>D</sub> = 250 mA, Test Power Level = +5dBm, Z<sub>O</sub> = 50 Ω)

f (MHz)	S11		S21		S12		S22	
	Mag	Deg	Mag	Deg	Mag	Deg	Mag	Deg
50	0.776	-73.4	16.83	144.2	0.0187	53.9	0.386	-70.8
100	0.816	-115.0	13.62	120.7	0.0256	31.7	0.407	-107.1
150	0.846	-134.4	11.45	106.6	0.0283	19.5	0.434	-123.4
200	0.858	-144.1	9.48	98.2	0.0296	12.4	0.452	-131.8
250	0.867	-150.2	7.89	91.8	0.0297	6.9	0.468	-136.7
300	0.871	-154.7	6.64	86.4	0.0296	2.3	0.483	-139.7
350	0.875	-157.6	5.69	82.0	0.0292	-1.1	0.502	-141.5
400	0.880	-160.0	4.97	77.9	0.0288	-4.0	0.519	-142.8
450	0.881	-161.8	4.37	74.4	0.0282	-6.7	0.539	-144.0
500	0.885	-163.2	3.88	71.1	0.0274	-8.8	0.557	-144.9
550	0.887	-164.5	3.49	67.9	0.0267	-10.6	0.578	-145.9
600	0.892	-165.5	3.15	65.2	0.0259	-12.4	0.594	-146.5
650	0.894	-166.2	2.85	62.6	0.0251	-13.9	0.612	-146.9
700	0.898	-167.1	2.60	60.1	0.0243	-15.3	0.628	-148.1
750	0.901	-167.6	2.38	57.9	0.0234	-16.4	0.642	-148.8
800	0.902	-168.2	2.19	55.5	0.0226	-17.2	0.659	-149.2
850	0.905	-168.9	2.02	53.5	0.0218	-18.0	0.672	-150.0
900	0.909	-169.2	1.87	51.3	0.0210	-18.2	0.687	-150.6
950	0.911	-169.7	1.74	49.5	0.0202	-18.8	0.700	-151.5
1000	0.913	-170.0	1.62	47.7	0.0194	-19.0	0.712	-152.2
1050	0.915	-170.4	1.51	46.1	0.0187	-18.9	0.723	-152.8
1100	0.917	-170.8	1.42	44.4	0.0179	-19.0	0.733	-153.5
1150	0.919	-171.2	1.33	42.8	0.0172	-18.4	0.741	-154.2
1200	0.921	-171.5	1.25	41.3	0.0164	-17.9	0.752	-154.8
1250	0.925	-171.8	1.18	40.0	0.0158	-17.4	0.759	-155.5
1300	0.923	-172.1	1.11	38.8	0.0152	-16.5	0.767	-156.3
1350	0.923	-172.3	1.05	37.3	0.0146	-15.4	0.775	-156.8
1400	0.926	-172.6	0.99	36.0	0.0140	-14.3	0.784	-157.3
1450	0.928	-172.9	0.94	34.9	0.0134	-13.1	0.789	-157.8
1500	0.930	-173.2	0.89	33.7	0.0128	-11.3	0.796	-158.3
1550	0.933	-173.6	0.85	32.7	0.0124	-9.5	0.801	-158.6
1600	0.933	-173.8	0.81	31.6	0.0120	-7.7	0.806	-159.3
1650	0.937	-174.1	0.77	30.6	0.0115	-5.8	0.814	-159.7
1700	0.934	-174.1	0.74	29.6	0.0111	-3.0	0.816	-160.5
1750	0.934	-174.2	0.71	28.7	0.0108	-1.1	0.823	-160.6
1800	0.937	-174.5	0.68	27.9	0.0106	2.1	0.824	-161.1
1850	0.937	-174.6	0.65	26.9	0.0103	4.7	0.829	-161.7
1900	0.940	-174.7	0.63	26.3	0.0101	8.0	0.833	-161.9
1950	0.940	-174.9	0.60	25.4	0.0100	10.8	0.838	-162.4
2000	0.943	-175.1	0.58	24.6	0.0098	14.0	0.840	-163.0
2050	0.941	-175.2	0.56	23.8	0.0098	16.9	0.842	-163.4
2100	0.943	-175.7	0.54	23.0	0.0098	20.2	0.845	-163.8
2150	0.939	-175.6	0.52	22.1	0.0098	23.1	0.845	-164.5
2200	0.941	-175.9	0.50	21.7	0.0099	26.1	0.849	-164.7
2250	0.940	-176.0	0.49	20.7	0.0100	28.7	0.849	-165.2
2300	0.942	-176.3	0.47	20.1	0.0101	31.8	0.855	-165.5
2350	0.941	-176.5	0.45	19.3	0.0103	34.4	0.852	-165.9
2400	0.943	-176.9	0.44	18.6	0.0105	36.9	0.857	-166.4
2450	0.943	-177.1	0.43	17.9	0.0108	39.1	0.859	-166.7
2500	0.941	-177.5	0.41	17.2	0.0110	41.2	0.859	-167.0
2550	0.943	-177.6	0.40	16.8	0.0113	43.6	0.859	-167.5

## Package Dimensions

As of January, 2003  
Unit: mm



Package Code	RP8P
JEDEC	—
JEITA	—
Mass (reference value)	0.08 g

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Part Name	Quantity	Shipping Container
2SK3390IX	1000	Taping

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