

2SK3391

Silicon N-Channel MOS FET UHF Power Amplifier

REJ03G0209-0300

Rev.3.00

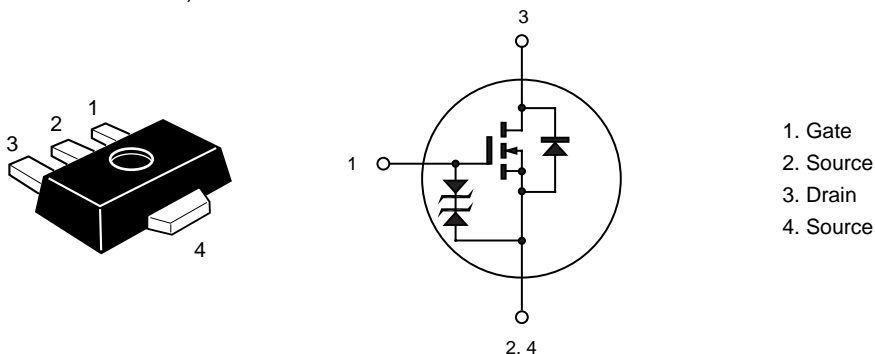
Nov 08, 2007

Features

- High power output, High gain, High efficiency
PG = 18 dB, Pout = 1.6 W, η_{add} = 58% min. (f = 836 MHz)
- Compact package capable of surface mounting

Outline

RENESAS Package code: PLZZ0004CA-A
(Package Name : UPAK®)



1. Gate
2. Source
3. Drain
4. Source

Note: Marking is "JX".

*UPAK is a trademark of Renesas Technology Corp.

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	17	V
Gate to source voltage	V_{GSS}	±10	V
Drain current	I_D	0.3	A
Drain peak current	$I_D(\text{pulse})$ ^{Note1}	0.75	A
Channel dissipation	Pch ^{Note2}	5	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

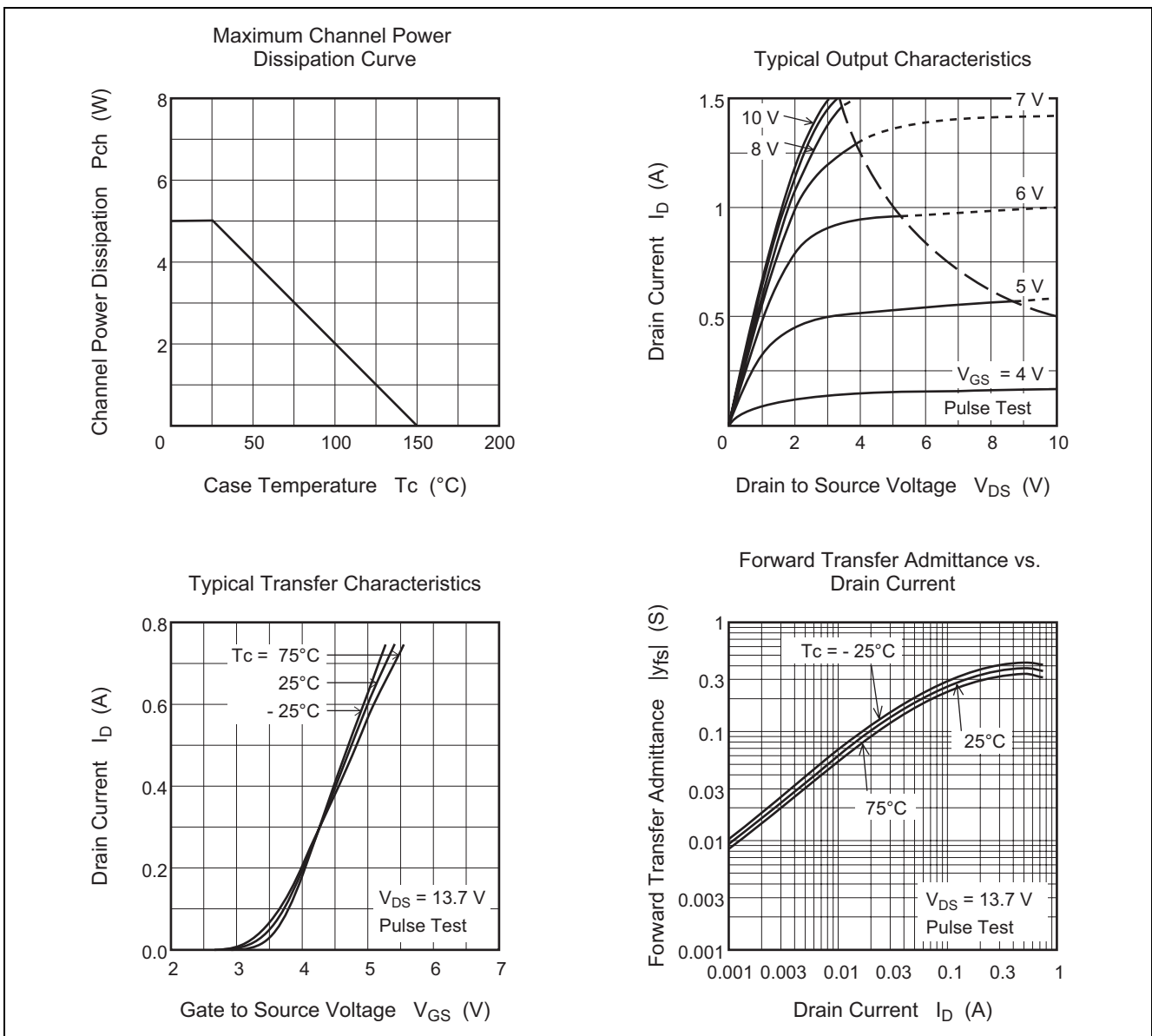
This device is sensitive to electro static discharge. An adequate careful handling procedure is requested.

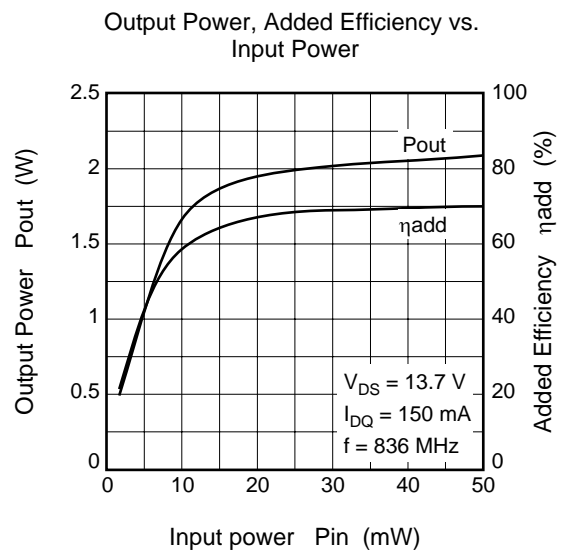
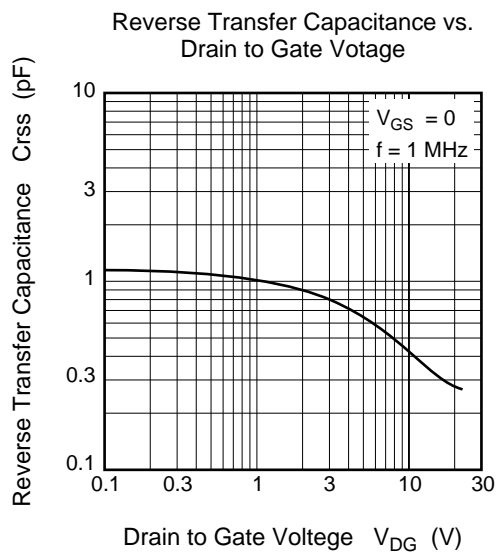
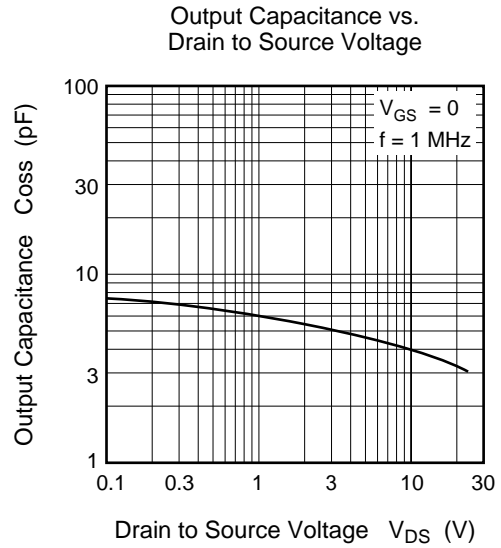
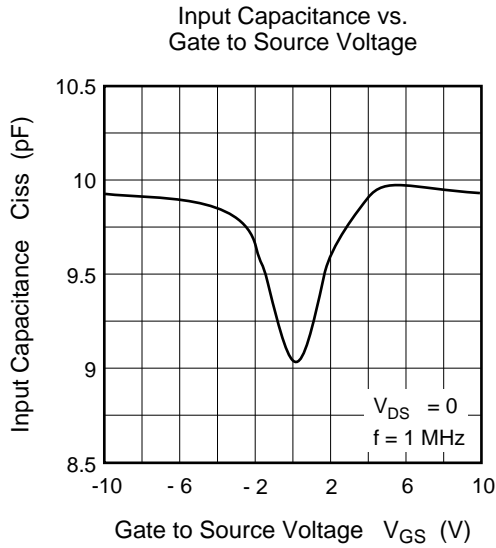
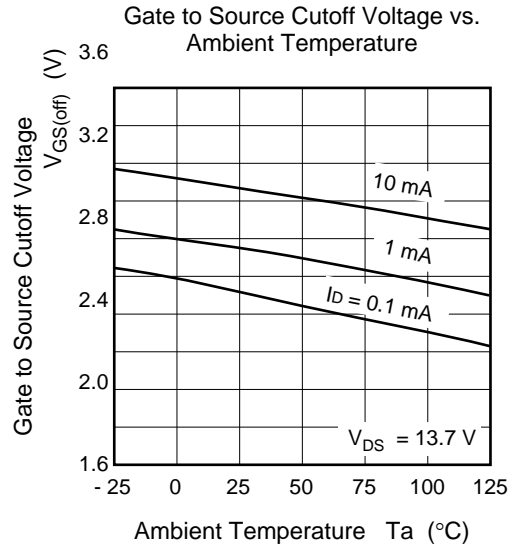
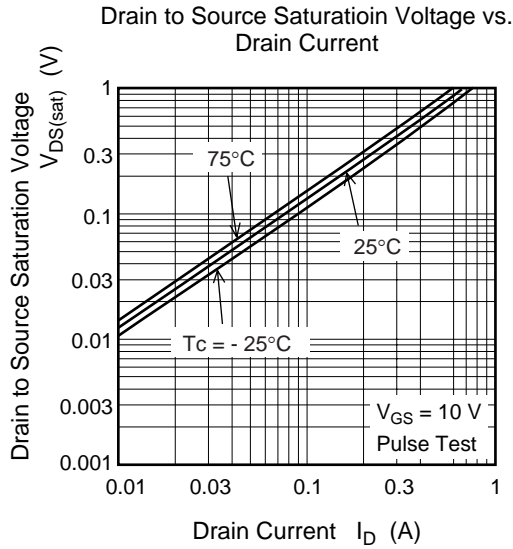
Electrical Characteristics

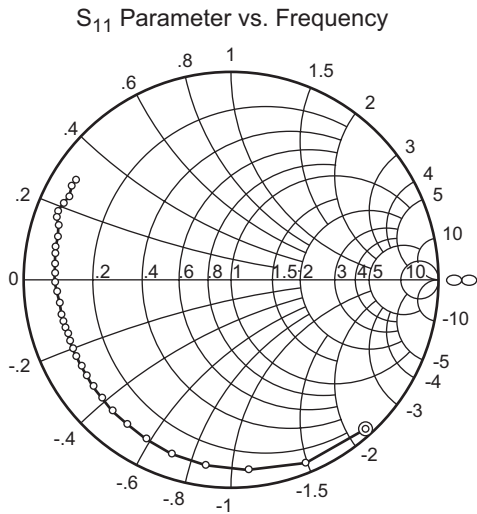
(Ta = 25°C)

Item	Symbol	Min.	Typ	Max.	Unit	Test Conditions
Zero gate voltage drain current	I_{DSS}	—	—	10	μA	$V_{DS} = 13.7 V, V_{GS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 5	μA	$V_{GS} = \pm 10 V, V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	2.3	—	3.1	V	$V_{DS} = 13.7 V, I_D = 1 mA$
Input capacitance	C_{iss}	—	10	—	pF	$V_{GS} = 5 V, V_{DS} = 0, f = 1 MHz$
Output capacitance	C_{oss}	—	3.5	—	pF	$V_{DS} = 13.7 V, V_{GS} = 0, f = 1 MHz$
Output Power	P_{out}	1.6	—	—	W	$V_{DS} = 13.7 V, I_{D0} = 150 mA$
Added Efficiency	η_{add}	58	—	—	%	$f = 836 MHz, P_{in} = 25.1 mW$

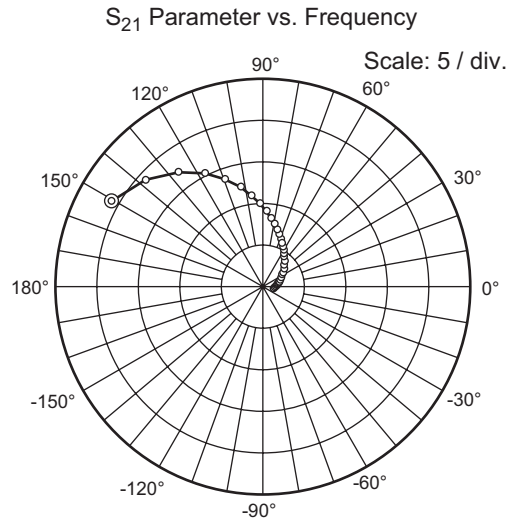
Main Characteristics



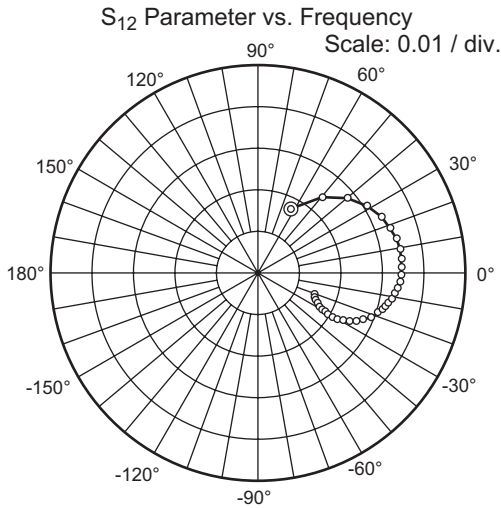




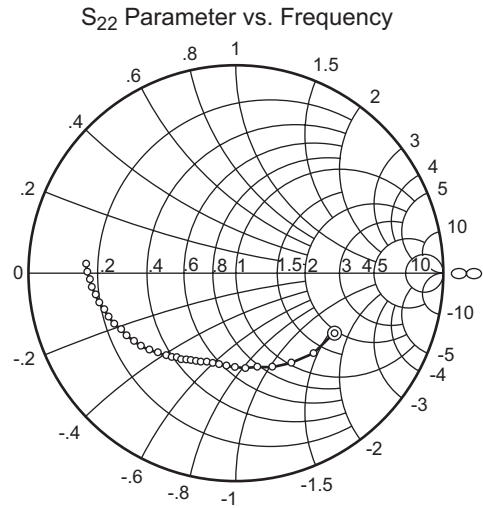
Condition: $V_{DS} = 13.7\text{ V}$, $I_{DQ} = 150\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz Step)
 1000 to 2500 MHz (100 MHz Step)



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 100 to 1000 MHz (50 MHz Step)
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Condition: $V_{DS} = 13.7\text{ V}$, $I_{DQ} = 150\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz Step)
 1000 to 2500 MHz (100 MHz Step)

S Parameter

 $(V_{DS} = 4.5 \text{ V}, I_{DQ} = 150 \text{ mA}, Z_o = 50 \Omega)$

f (MHz)	S11		S21		S12		S22	
	MAG	ANG (deg.)	MAG	ANG (deg.)	MAG	ANG (deg.)	MAG	ANG (deg.)
100	0.942	-62.0	12.61	141.7	0.036	52.5	0.426	-76.6
150	0.920	-85.7	11.22	128.5	0.045	38.2	0.455	-99.8
200	0.885	-105.8	10.04	116.4	0.050	28.2	0.473	-115.6
250	0.854	-120.3	9.15	107.5	0.053	20.8	0.484	-126.7
300	0.836	-130.3	8.11	100.8	0.054	15.1	0.503	-134.5
350	0.814	-138.2	7.32	95.3	0.055	10.3	0.509	-140.5
400	0.809	-144.2	6.64	90.6	0.056	6.2	0.517	-145.0
450	0.806	-148.9	6.04	86.7	0.056	2.3	0.520	-148.5
500	0.802	-152.9	5.54	82.9	0.056	-0.7	0.526	-151.5
550	0.796	-156.2	5.10	79.5	0.056	-3.6	0.530	-154.1
600	0.795	-159.2	4.71	76.4	0.055	-6.4	0.535	-156.2
650	0.795	-162.0	4.37	73.2	0.055	-8.8	0.540	-158.1
700	0.795	-164.5	4.06	70.3	0.055	-11.1	0.544	-159.8
750	0.796	-166.8	3.79	67.5	0.054	-13.1	0.550	-161.5
800	0.795	-168.7	3.53	64.6	0.053	-15.4	0.556	-162.9
850	0.796	-170.6	3.33	62.1	0.053	-17.2	0.561	-164.3
900	0.799	-172.6	3.15	59.5	0.052	-19.0	0.567	-165.6
950	0.802	-174.5	2.97	57.0	0.052	-20.7	0.574	-166.7
1000	0.802	-175.9	2.80	54.8	0.051	-22.6	0.580	-168.0
1050	0.802	-177.5	2.65	52.3	0.050	-24.4	0.586	-169.2
1100	0.803	-179.3	2.51	50.1	0.050	-26.0	0.592	-170.4
1150	0.807	-179.3	2.39	47.9	0.049	-27.4	0.597	-171.4
1200	0.809	-177.6	2.27	45.4	0.048	-28.8	0.602	-172.5
1250	0.813	-176.3	2.16	43.1	0.047	-30.2	0.606	-173.8
1300	0.818	-175.1	2.06	41.0	0.047	-31.6	0.612	-174.7
1350	0.818	-173.9	1.97	38.8	0.046	-33.0	0.617	-175.7
1400	0.820	-172.8	1.88	36.7	0.045	-34.1	0.620	-176.7
1450	0.817	-171.6	1.80	34.8	0.044	-35.4	0.625	-177.9
1500	0.821	-170.1	1.72	32.9	0.043	-36.5	0.630	-178.9
1550	0.825	-168.7	1.64	30.9	0.043	-37.7	0.635	-179.9
1600	0.830	-167.5	1.57	28.9	0.042	-38.9	0.639	-178.6
1650	0.832	-166.6	1.51	26.9	0.041	-40.0	0.646	-177.6
1700	0.833	-165.5	1.45	24.9	0.040	-41.0	0.649	-176.5
1750	0.831	-164.0	1.41	22.9	0.039	-42.1	0.654	-175.3
1800	0.833	-162.4	1.36	21.0	0.039	-42.7	0.660	-174.2
1850	0.836	-160.8	1.32	19.5	0.038	-43.6	0.664	-173.0
1900	0.842	-159.3	1.28	17.9	0.037	-44.3	0.670	-171.9
1950	0.854	-157.9	1.23	16.4	0.037	-45.5	0.675	-170.7
2000	0.869	-156.9	1.19	14.9	0.036	-46.4	0.682	-169.6
2050	0.871	-156.4	1.15	13.3	0.035	-47.2	0.684	-168.5
2100	0.870	-155.7	1.11	11.4	0.034	-48.2	0.689	-167.3
2150	0.864	-154.5	1.07	9.3	0.034	-48.6	0.696	-166.2
2200	0.860	-153.1	1.04	7.2	0.033	-49.4	0.699	-165.2
2250	0.858	-151.9	1.01	5.5	0.032	-50.1	0.702	-164.1
2300	0.855	-150.3	0.98	3.8	0.032	-50.8	0.706	-162.8
2350	0.860	-149.1	0.95	2.5	0.031	-51.5	0.713	-161.7
2400	0.868	-147.7	0.92	0.5	0.031	-51.9	0.714	-160.7
2450	0.868	-146.7	0.89	-1.1	0.030	-52.4	0.716	-159.6
2500	0.865	-145.2	0.86	-3.2	0.029	-53.1	0.720	-158.3

S Parameter

 $(V_{DS} = 6\text{ V}, I_{DQ} = 150\text{ mA}, Z_o = 50\ \Omega)$

f (MHz)	S11		S21		S12		S22	
	MAG	ANG (deg.)	MAG	ANG (deg.)	MAG	ANG (deg.)	MAG	ANG (deg.)
100	0.941	-60.5	15.47	142.1	0.030	53.5	0.476	-61.7
150	0.916	-83.6	13.68	129.2	0.040	40.8	0.471	-83.8
200	0.886	-102.5	12.16	117.5	0.044	30.8	0.468	-100.1
250	0.856	-115.8	11.01	109.0	0.047	23.1	0.465	-112.0
300	0.838	-125.6	9.74	102.6	0.049	17.0	0.475	-120.8
350	0.824	-133.4	8.74	96.9	0.050	11.9	0.475	-127.9
400	0.816	-139.4	7.89	92.0	0.050	7.5	0.479	-133.1
450	0.812	-144.5	7.17	87.8	0.051	3.6	0.482	-137.2
500	0.807	-148.8	6.50	83.7	0.051	0.2	0.485	-140.7
550	0.804	-152.6	5.99	80.2	0.051	-2.6	0.489	-143.7
600	0.800	-155.8	5.50	76.9	0.050	-5.6	0.495	-146.1
650	0.797	-158.7	5.09	73.9	0.050	-8.2	0.500	-148.3
700	0.800	-161.7	4.73	70.5	0.049	-10.6	0.506	-150.3
750	0.800	-164.1	4.40	67.6	0.049	-12.6	0.513	-152.2
800	0.801	-166.2	4.11	64.7	0.048	-15.1	0.520	-153.9
850	0.802	-168.3	3.87	62.0	0.048	-16.7	0.526	-155.3
900	0.802	-170.3	3.65	59.4	0.047	-18.6	0.535	-156.9
950	0.803	-171.9	3.44	56.9	0.046	-20.4	0.543	-158.3
1000	0.807	-173.7	3.24	54.5	0.046	-22.2	0.551	-159.7
1050	0.806	-175.5	3.08	51.9	0.045	-24.0	0.559	-161.1
1100	0.808	-177.2	2.91	49.8	0.044	-25.7	0.566	-162.5
1150	0.811	-178.9	2.77	47.2	0.043	-27.1	0.574	-163.7
1200	0.815	-179.6	2.63	44.9	0.043	-28.5	0.580	-165.0
1250	0.818	-178.1	2.50	42.5	0.042	-29.9	0.586	-166.4
1300	0.824	-176.8	2.39	40.2	0.041	-31.2	0.594	-167.6
1350	0.824	-175.8	2.28	38.0	0.040	-32.6	0.600	-168.7
1400	0.827	-174.4	2.17	36.1	0.040	-33.6	0.605	-169.9
1450	0.825	-173.1	2.07	33.9	0.039	-34.9	0.611	-171.2
1500	0.827	-171.6	1.98	31.9	0.038	-36.0	0.617	-172.5
1550	0.832	-170.3	1.89	30.1	0.037	-37.1	0.622	-173.8
1600	0.838	-168.9	1.81	27.9	0.036	-38.2	0.628	-175.2
1650	0.842	-168.0	1.74	25.9	0.036	-39.2	0.636	-176.4
1700	0.840	-166.8	1.68	23.6	0.035	-40.2	0.640	-177.6
1750	0.838	-165.3	1.62	21.6	0.034	-41.1	0.646	-179.0
1800	0.840	-163.7	1.57	19.9	0.033	-41.5	0.652	-179.8
1850	0.843	-162.0	1.51	18.1	0.033	-42.3	0.658	-178.5
1900	0.852	-160.4	1.47	16.7	0.032	-42.9	0.664	-177.2
1950	0.860	-159.1	1.41	15.2	0.031	-43.9	0.670	-175.9
2000	0.873	-158.1	1.36	13.6	0.031	-44.6	0.677	-174.7
2050	0.879	-157.4	1.31	12.0	0.030	-45.4	0.680	-173.5
2100	0.877	-156.7	1.26	10.1	0.029	-46.1	0.686	-172.1
2150	0.871	-155.4	1.22	8.0	0.029	-46.3	0.693	-171.0
2200	0.869	-154.2	1.19	6.0	0.028	-46.9	0.697	-169.8
2250	0.865	-152.8	1.15	4.1	0.027	-47.4	0.701	-168.7
2300	0.863	-151.2	1.12	2.4	0.027	-47.7	0.705	-167.3
2350	0.868	-149.6	1.08	0.8	0.026	-48.2	0.712	-166.2
2400	0.875	-148.6	1.05	-0.9	0.026	-48.2	0.713	-165.1
2450	0.876	-147.4	1.01	-2.7	0.025	-48.7	0.716	-163.9
2500	0.872	-146.1	0.98	-4.6	0.025	-49.0	0.720	-162.4

S Parameter

 $(V_{DS} = 7.5 \text{ V}, I_{DQ} = 150 \text{ mA}, Z_o = 50 \Omega)$

f (MHz)	S11		S21		S12		S22	
	MAG	ANG (deg.)	MAG	ANG (deg.)	MAG	ANG (deg.)	MAG	ANG (deg.)
100	0.946	-58.3	17.64	143.8	0.027	55.8	0.500	-52.7
150	0.920	-80.2	15.56	130.9	0.036	42.9	0.483	-73.1
200	0.889	-98.1	13.78	119.7	0.040	32.7	0.470	-88.9
250	0.867	-110.4	12.44	111.4	0.043	25.1	0.460	-101.0
300	0.844	-120.8	10.97	104.3	0.045	18.8	0.453	-110.0
350	0.832	-129.0	9.80	98.4	0.046	13.5	0.458	-117.7
400	0.821	-135.6	8.80	93.3	0.047	8.9	0.461	-123.3
450	0.819	-141.1	7.96	88.8	0.047	4.8	0.463	-127.8
500	0.816	-145.8	7.25	84.6	0.047	1.2	0.466	-131.6
550	0.809	-149.8	6.64	80.7	0.047	-1.8	0.469	-135.0
600	0.807	-153.2	6.09	77.4	0.046	-4.7	0.475	-137.7
650	0.804	-156.5	5.63	74.1	0.046	-7.3	0.481	-140.0
700	0.806	-159.3	5.22	70.7	0.046	-9.8	0.488	-142.4
750	0.806	-161.9	4.86	67.7	0.045	-12.1	0.494	-144.5
800	0.806	-164.2	4.54	64.7	0.044	-14.3	0.502	-146.3
850	0.807	-166.3	4.26	62.0	0.044	-16.3	0.510	-148.2
900	0.808	-168.6	4.02	59.3	0.043	-18.0	0.519	-149.9
950	0.811	-170.4	3.79	56.8	0.043	-19.9	0.528	-151.5
1000	0.812	-172.2	3.57	54.3	0.042	-21.8	0.537	-153.1
1050	0.816	-174.0	3.38	51.8	0.041	-23.4	0.546	-154.6
1100	0.814	-175.8	3.21	49.3	0.041	-25.2	0.555	-156.1
1150	0.818	-177.5	3.05	47.0	0.040	-26.5	0.563	-157.6
1200	0.820	-179.1	2.89	44.5	0.039	-28.0	0.569	-159.1
1250	0.826	-179.4	2.75	42.1	0.038	-29.3	0.578	-160.6
1300	0.829	-178.0	2.62	39.8	0.037	-30.7	0.585	-161.9
1350	0.831	-176.8	2.50	37.5	0.037	-31.9	0.592	-163.2
1400	0.832	-175.5	2.38	35.4	0.036	-33.1	0.597	-164.6
1450	0.830	-174.1	2.28	33.2	0.035	-34.0	0.605	-166.0
1500	0.835	-172.6	2.17	31.3	0.034	-35.1	0.611	-167.4
1550	0.835	-171.2	2.07	29.2	0.034	-36.2	0.618	-168.8
1600	0.843	-169.7	1.98	27.1	0.033	-37.2	0.624	-170.4
1650	0.846	-168.8	1.90	25.1	0.032	-38.1	0.632	-171.6
1700	0.845	-167.4	1.83	22.9	0.031	-38.9	0.636	-173.0
1750	0.845	-166.1	1.77	21.1	0.030	-39.8	0.642	-174.5
1800	0.845	-164.5	1.71	19.1	0.030	-40.0	0.649	-175.9
1850	0.848	-162.7	1.65	17.2	0.029	-40.8	0.656	-177.2
1900	0.855	-161.2	1.60	15.7	0.028	-41.3	0.661	-178.6
1950	0.867	-159.9	1.54	14.3	0.028	-42.0	0.668	-180.0
2000	0.880	-158.8	1.49	12.6	0.027	-42.5	0.676	-178.7
2050	0.883	-158.1	1.43	10.9	0.026	-43.0	0.679	-177.4
2100	0.882	-157.2	1.37	9.1	0.026	-43.5	0.685	-176.0
2150	0.876	-156.1	1.33	7.0	0.025	-43.5	0.692	-174.7
2200	0.873	-154.6	1.29	4.8	0.025	-43.9	0.697	-173.5
2250	0.871	-153.3	1.25	3.1	0.024	-44.0	0.701	-172.2
2300	0.869	-151.8	1.21	1.5	0.023	-44.2	0.705	-170.7
2350	0.873	-150.3	1.17	-0.1	0.023	-44.5	0.712	-169.7
2400	0.880	-149.0	1.14	-2.2	0.022	-44.4	0.714	-168.4
2450	0.881	-147.7	1.10	-3.7	0.022	-44.4	0.717	-167.1
2500	0.878	-146.5	1.06	-5.5	0.021	-44.6	0.721	-165.6

S Parameter

(V_{DS} = 13.7 V, I_{DQ} = 150 mA, Z_o = 50 Ω)

f (MHz)	S11		S21		S12		S22	
	MAG	ANG (deg.)	MAG	ANG (deg.)	MAG	ANG (deg.)	MAG	ANG (deg.)
100	0.968	-47.9	20.87	150.6	0.017	63.3	0.557	-31.9
150	0.951	-67.8	19.11	137.9	0.024	49.8	0.536	-46.4
200	0.918	-85.0	17.04	126.4	0.028	39.6	0.512	-58.9
250	0.897	-98.0	15.32	117.2	0.031	31.5	0.488	-69.3
300	0.882	-109.0	13.72	109.6	0.033	24.6	0.466	-77.5
350	0.870	-118.4	12.29	102.7	0.034	18.8	0.460	-85.1
400	0.855	-125.9	11.02	97.1	0.034	13.9	0.454	-91.3
450	0.852	-132.2	10.01	92.3	0.035	9.5	0.451	-96.3
500	0.846	-137.6	9.12	87.8	0.035	5.7	0.451	-100.7
550	0.841	-142.4	8.37	83.3	0.035	2.3	0.451	-104.8
600	0.835	-146.5	7.69	79.6	0.035	-0.8	0.456	-108.3
650	0.833	-150.2	7.11	75.8	0.034	-3.5	0.464	-111.6
700	0.833	-153.6	6.58	72.4	0.034	-6.4	0.469	-114.7
750	0.836	-156.5	6.14	68.9	0.033	-8.5	0.477	-117.7
800	0.833	-159.2	5.72	65.9	0.033	-11.0	0.486	-120.4
850	0.832	-161.8	5.37	62.8	0.032	-12.8	0.494	-122.9
900	0.834	-164.1	5.05	59.9	0.032	-14.7	0.503	-125.4
950	0.834	-166.1	4.75	57.1	0.031	-16.4	0.514	-127.8
1000	0.836	-168.2	4.50	54.6	0.031	-18.3	0.525	-130.2
1050	0.837	-170.3	4.24	51.8	0.030	-19.8	0.535	-132.5
1100	0.838	-172.3	4.03	49.1	0.029	-21.4	0.544	-134.7
1150	0.839	-174.5	3.83	46.3	0.029	-22.7	0.554	-136.8
1200	0.843	-176.0	3.63	44.0	0.028	-23.9	0.563	-138.8
1250	0.848	-177.7	3.46	41.6	0.027	-24.9	0.571	-140.9
1300	0.851	-179.3	3.29	39.1	0.026	-25.9	0.580	-142.8
1350	0.851	179.5	3.13	36.8	0.026	-27.0	0.588	-144.7
1400	0.852	177.9	2.98	34.4	0.025	-27.6	0.594	-146.5
1450	0.851	176.4	2.85	32.3	0.024	-28.4	0.602	-148.4
1500	0.853	175.0	2.72	30.0	0.023	-29.1	0.609	-150.3
1550	0.857	173.3	2.59	27.8	0.023	-29.5	0.616	-152.1
1600	0.861	171.8	2.48	25.6	0.022	-30.2	0.623	-154.0
1650	0.864	170.8	2.37	23.5	0.022	-30.3	0.631	-155.7
1700	0.862	169.4	2.29	21.2	0.021	-30.7	0.637	-157.5
1750	0.860	167.9	2.20	19.4	0.020	-30.7	0.643	-159.3
1800	0.861	166.2	2.13	17.3	0.020	-30.4	0.651	-161.0
1850	0.866	164.3	2.05	15.5	0.019	-30.1	0.657	-162.7
1900	0.873	162.6	1.98	13.9	0.019	-29.7	0.664	-164.5
1950	0.884	161.3	1.90	12.2	0.018	-29.7	0.671	-166.2
2000	0.895	160.4	1.83	10.6	0.018	-29.5	0.679	-167.9
2050	0.901	159.5	1.77	8.5	0.017	-28.9	0.683	-169.4
2100	0.898	158.7	1.70	6.7	0.017	-28.5	0.689	-171.1
2150	0.891	157.4	1.65	4.6	0.016	-27.4	0.697	-172.8
2200	0.887	155.9	1.60	2.5	0.016	-26.8	0.702	-174.2
2250	0.882	154.5	1.54	0.7	0.016	-26.2	0.705	-175.7
2300	0.880	153.0	1.49	-0.9	0.015	-24.9	0.709	-177.4
2350	0.887	151.4	1.45	-2.8	0.015	-24.2	0.718	-178.9
2400	0.892	149.9	1.40	-4.7	0.015	-22.7	0.720	179.7
2450	0.894	148.7	1.35	-6.4	0.015	-21.7	0.724	178.3
2500	0.890	147.5	1.31	-8.5	0.015	-20.7	0.727	176.6

Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]	Unit: mm
UPAK	SC-62	PLZZ0004CA-A	UPAK / UPAKV	0.050g	

The drawing shows three views of the package:

- Top View:** Overall width is 4.5 ± 0.1 mm. The lead spacing is 1.5 mm. The lead width is 0.48 mm Max. The lead height is 0.53 mm Max. The diameter of the central hole is $\phi 1$ mm. The distance from the hole to the lead edge is 1.8 mm Max. The total length of the package is 4.25 mm Max. The distance from the hole to the bottom edge is 2.5 ± 0.1 mm. The distance from the lead edge to the bottom edge is 0.8 mm Min.
- Side View:** The package height is 1.5 ± 0.1 mm. The lead height is 0.44 mm Max. The distance from the lead edge to the bottom edge is 0.44 mm Max.
- Bottom View:** The lead width is (1.5) mm. The lead height is (0.4) mm. The distance from the lead edge to the bottom edge is (0.2) mm.

Ordering Information

Part Name	Quantity	Shipping Container
2SK3391JXTL-E	1000 pcs.	ϕ 178 mm Reel, 12 mm Emboss Taping

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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