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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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3SK290

Silicon N-Channel Dual Gate MOS FET

RENESAS

ADE-208-271
1st. Edition

Application

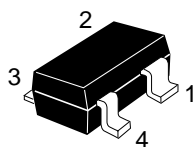
UHF RF amplifier

Features

- Low noise figure.
NF = 2.3 dB Typ. at $f = 900$ MHz
- High gain.
PG = 19.3 dB Typ. at $f = 900$ MHz

Outline

CMPAK-4



1. Source
2. Gate1
3. Gate2
4. Drain

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V _{DS}	12	V
Gate 1 to source voltage	V _{G1S}	±8	V
Gate 2 to source voltage	V _{G2S}	±8	V
Drain current	I _D	25	mA
Channel power dissipation	P _{ch}	100	mW
Channel temperature	T _{ch}	125	°C
Storage temperature	T _{stg}	−55 to +125	°C

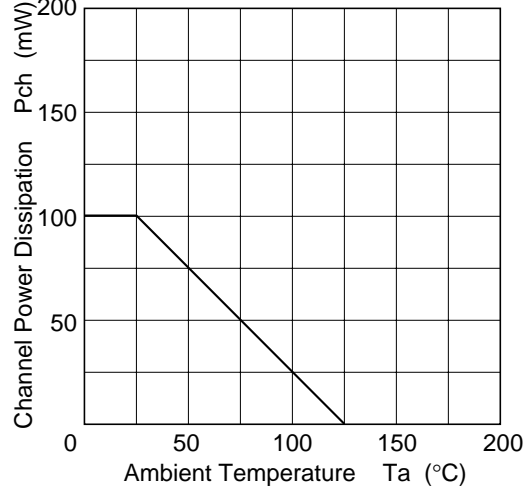
Attention: This device is very sensitive to electro static discharge.
It is recommended to adopt appropriate cautions when handling this transistor.

Electrical Characteristics (Ta = 25°C)

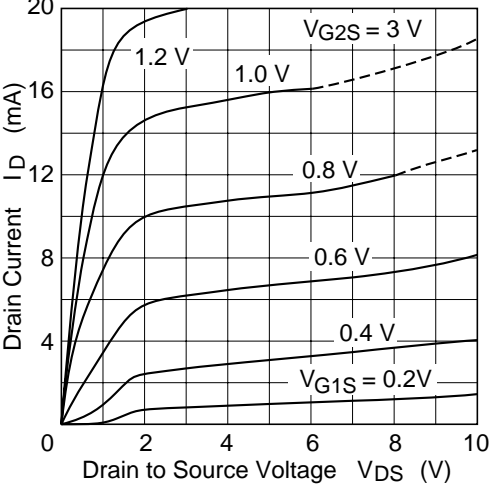
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSX}$	12	—	—	V	$I_D = 200\ \mu A$, $V_{G1S} = -3\ V$, $V_{G2S} = -3\ V$
Gate 1 to source breakdown voltage	$V_{(BR)G1SS}$	± 8	—	—	V	$I_{G1} = \pm 10\ \mu A$, $V_{G2S} = V_{DS} = 0$
Gate 2 to source breakdown voltage	$V_{(BR)G2SS}$	± 8	—	—	V	$I_{G2} = \pm 10\ \mu A$, $V_{G1S} = V_{DS} = 0$
Gate 1 cutoff current	I_{G1SS}	—	—	± 100	nA	$V_{G1S} = \pm 6\ V$, $V_{G2S} = V_{DS} = 0$
Gate 2 cutoff current	I_{G2SS}	—	—	± 100	nA	$V_{G2S} = \pm 6\ V$, $V_{G1S} = V_{DS} = 0$
Drain current	$I_{DS(on)}$	0.5	—	10	mA	$V_{DS} = 6\ V$, $V_{G1S} = 0.5\ V$, $V_{G2S} = 3\ V$
Gate 1 to source cutoff voltage	$V_{G1S(off)}$	-0.6	—	+0.5	V	$V_{DS} = 10\ V$, $V_{G2S} = 3\ V$, $I_D = 100\ \mu A$
Gate 2 to source cutoff voltage	$V_{G2S(off)}$	0	—	+1.0	V	$V_{DS} = 10\ V$, $V_{G1S} = 3\ V$, $I_D = 100\ \mu A$
Forward transfer admittance	$ y_{fs} $	16	22	—	mS	$V_{DS} = 6\ V$, $V_{G2S} = 3\ V$, $I_D = 10\ mA$, $f = 1\ kHz$
Input capacitance	C_{iss}	1.2	1.8	2.2	pF	$V_{DS} = 6\ V$, $V_{G2S} = 3V$, $I_D = 10\ mA$, $f = 1\ MHz$
Output capacitance	C_{oss}	0.7	1.2	1.4	pF	
Reverse transfer capacitance	C_{rss}	—	0.02	0.03	pF	
Power gain	PG	17	19.3	—	dB	$V_{DS} = 4\ V$, $V_{G2S} = 3\ V$, $I_D = 10\ mA$, $f = 900\ MHz$
Noise figure	NF	—	2.3	2.8	dB	

Note: Marking is "ZJ-".

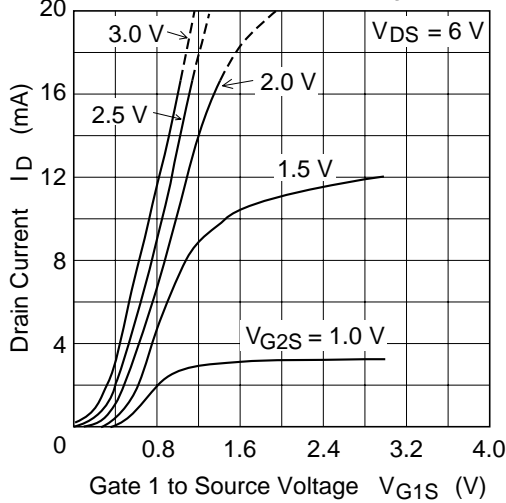
Maximum Channel Power
Dissipation Curve



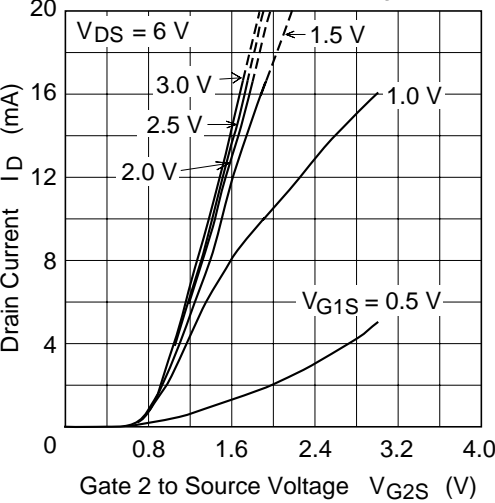
Typical Output Characteristics

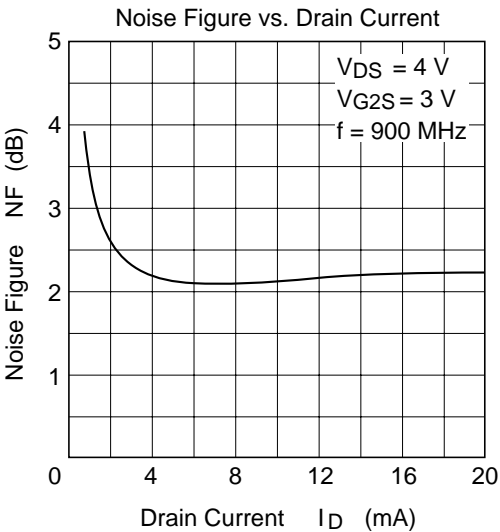
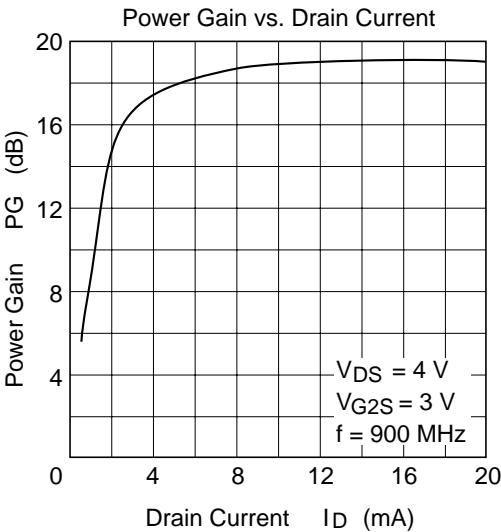
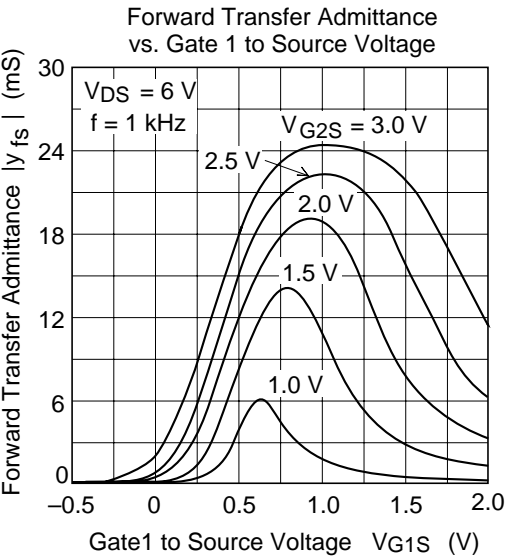


Drain Current vs.
Gate 1 to Source Voltage

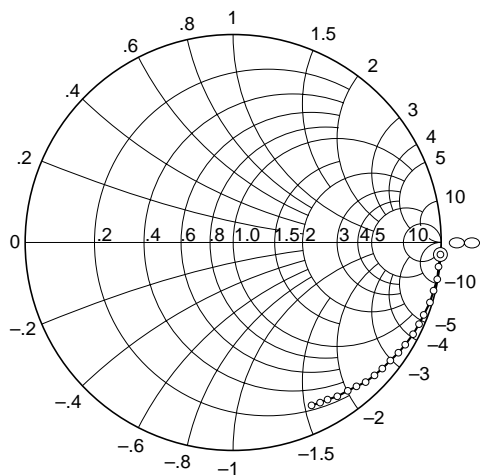


Drain Current vs.
Gate 2 to Source Voltage

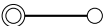




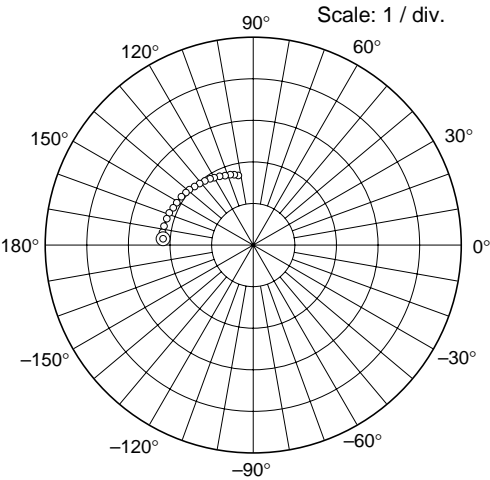
S11 Parameter vs. Frequency



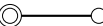
Condition: $V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
50 to 1000 MHz (50 MHz step)



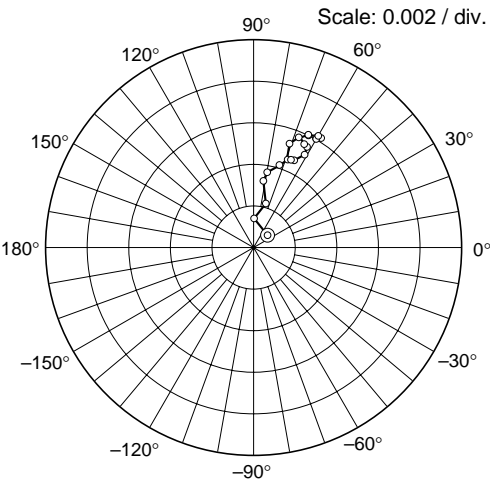
S21 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
50 to 1000 MHz (50 MHz step)



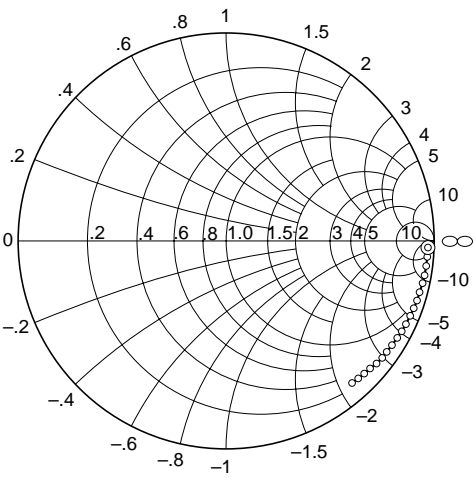
S12 Parameter vs. Frequency



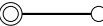
Condition: $V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
50 to 1000 MHz (50 MHz step)



S22 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
50 to 1000 MHz (50 MHz step)



S Parameter ($V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$, $I_D = 10\text{ mA}$, $Z_O = 50\text{ }\Omega$)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
50	0.998	-3.3	2.17	176	0.001	41.3	0.971	-1.9
100	0.994	-6.7	2.20	172	0.001	88.9	0.971	-4.5
150	0.997	-10.2	2.19	168	0.002	74.4	0.970	-7.1
200	0.991	-13.5	2.17	163	0.003	81.6	0.969	-9.8
250	0.993	-16.9	2.16	159	0.004	79.7	0.967	-12.1
300	0.980	-20.8	2.12	155	0.004	72.6	0.965	-14.8
350	0.976	-23.7	2.10	151	0.005	66.9	0.962	-17.3
400	0.971	-27.0	2.08	146	0.005	70.9	0.959	-19.7
450	0.962	-30.7	2.05	142	0.006	67.7	0.956	-22.1
500	0.955	-33.7	2.03	139	0.006	63.9	0.953	-24.8
550	0.945	-36.9	1.99	135	0.006	64.1	0.950	-27.2
600	0.939	-40.2	1.96	131	0.006	63.9	0.946	-29.5
650	0.927	-43.3	1.93	127	0.006	59.9	0.942	-32.1
700	0.925	-46.5	1.90	123	0.006	60.0	0.939	-34.6
750	0.911	-49.4	1.87	120	0.006	58.3	0.933	-36.7
800	0.901	-52.3	1.84	116	0.006	60.3	0.930	-39.1
850	0.893	-55.9	1.81	112	0.005	62.0	0.925	-41.5
900	0.881	-59.0	1.78	108	0.005	61.2	0.921	-43.8
950	0.876	-61.5	1.75	105	0.005	65.0	0.917	-46.1
1000	0.869	-64.3	1.71	102	0.005	68.8	0.913	-48.4

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