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

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Keep safety first in your circuit designs!

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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3SK295

Silicon N-Channel Dual Gate MOS FET

RENESAS

ADE-208-387A (Z)
2nd. Edition
Mar. 2001

Application

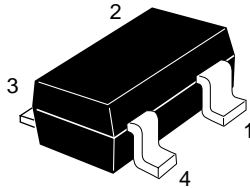
UHF RF amplifier

Features

- Low noise figure.
NF = 2.0 dB typ. at f = 900 MHz
- Capable of low voltage operation

Outline

MPAK-4



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

Note: Marking is "ZQ—"

Attention: This device is very sensitive to electro static discharge.

It is recommended to adopt appropriate cautions when handling this transistor.

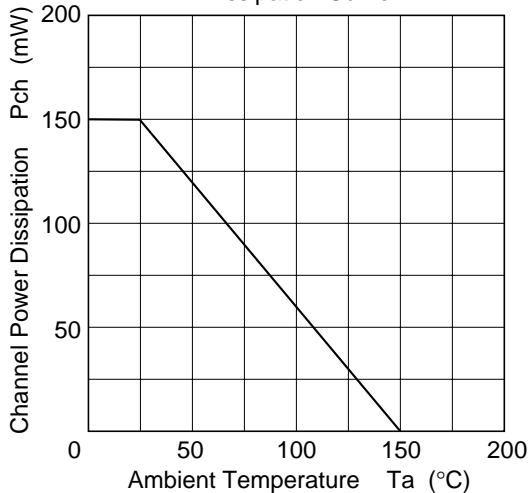
Absolute Maximum Ratings (Ta = 25°C)

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	Pch	150	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

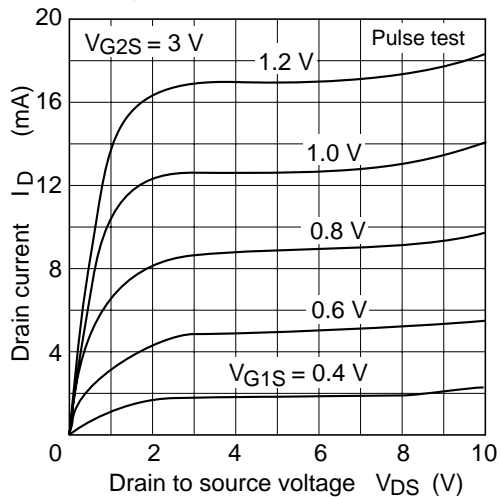
Electrical Characteristics (Ta = 25°C)

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	$V_{DS} = 6 V$, $V_{G1S} = 0.5V$, $V_{G2S} = 3 V$
Gate 1 to source cutoff voltage	$V_{G1S(off)}$	-0.5	—	+0.5	V	$V_{DS} = 10 V$, $V_{G2S} = 3V$, $I_D = 100 \mu A$
Gate 2 to source cutoff voltage	$V_{G2S(off)}$	0	—	+1.0	V	$V_{DS} = 10 V$, $V_{G1S} = 3V$, $I_D = 100 \mu A$
Forward transfer admittance	$ y_{fs} $	16	20.8	—	mS	$V_{DS} = 6 V$, $V_{G2S} = 3V$, $I_D = 10 mA$, $f = 1 kHz$
Input capacitance	C_{iss}	1.2	1.5	2.2	pF	$V_{DS} = 6 V$, $V_{G2S} = 3V$, $I_D = 10 mA$, $f = 1 MHz$
Output capacitance	C_{oss}	0.6	0.9	1.2	pF	
Reverse transfer capacitance	C_{rss}	—	0.01	0.03	pF	
Power gain	PG	16	19.5	—	dB	$V_{DS} = 4 V$, $V_{G2S} = 3V$, $I_D = 10 mA$, $f = 900 MHz$
Noise figure	NF	—	2.0	3	dB	

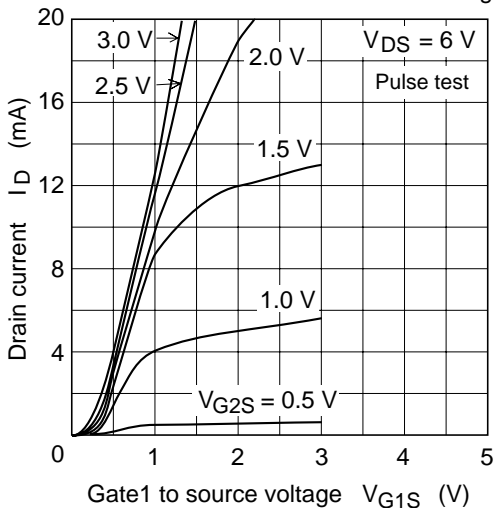
Maximum Channel Power Dissipation Curve



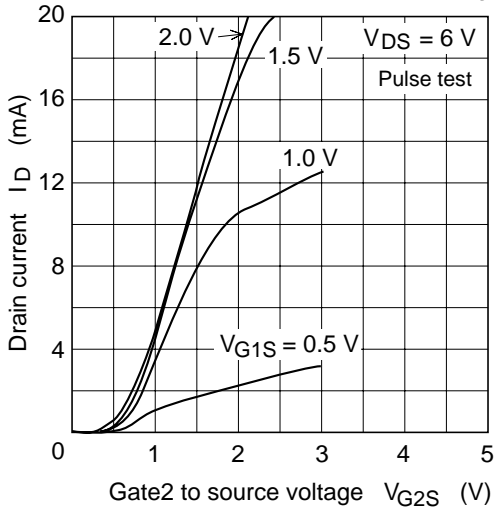
Typical Output Characteristics



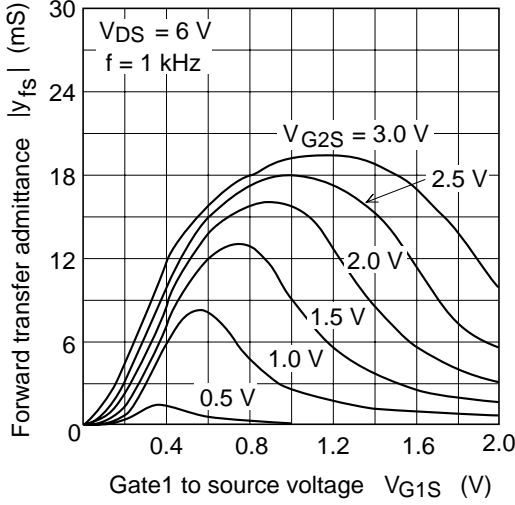
Drain Current vs. Gate1 to Source Voltage



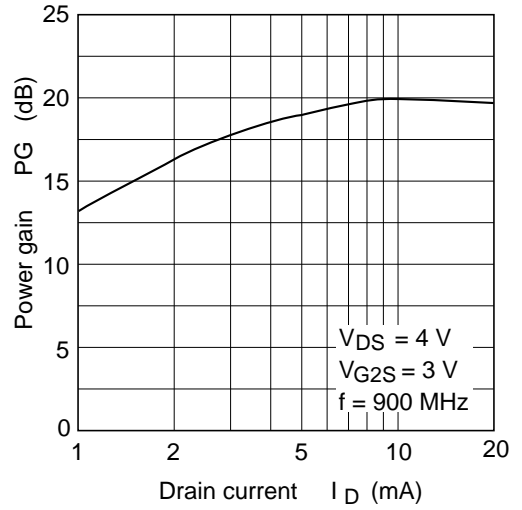
Drain Current vs. Gate2 to Source Voltage



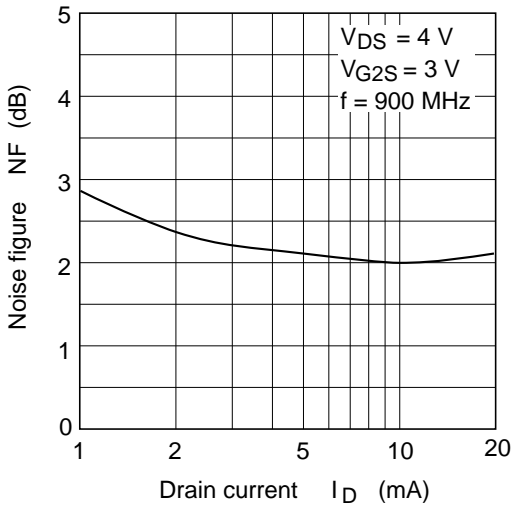
Forward Transfer Admittance vs. Gate1 to Source Voltage



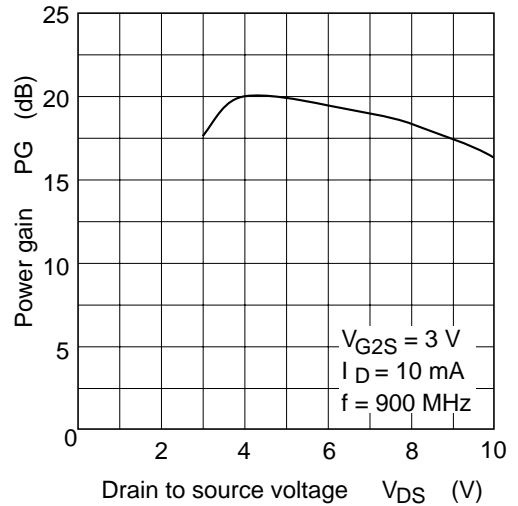
Power Gain vs. Drain Current



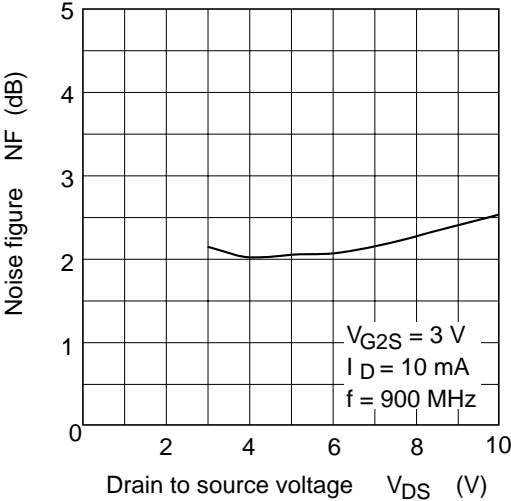
Noise Figure vs. Drain Current



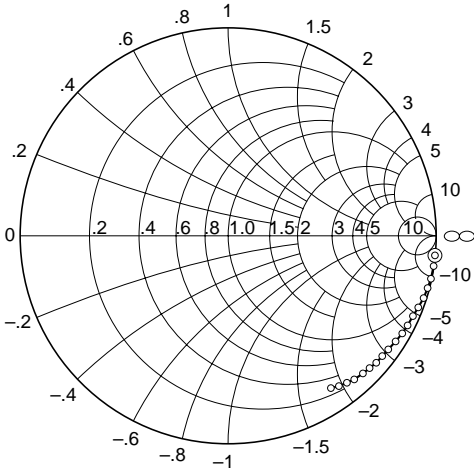
Power Gain vs. Drain to Source Voltage



Noise Figure vs. Drain to Source Voltage



S11 Parameter vs. Frequency

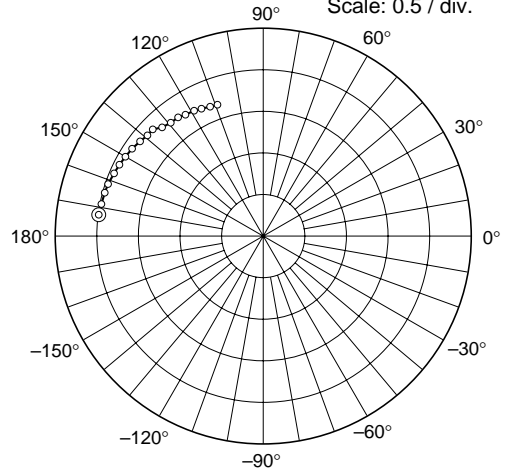


Condition: $V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$

100 to 1000 MHz (50 MHz step)



S21 Parameter vs. Frequency

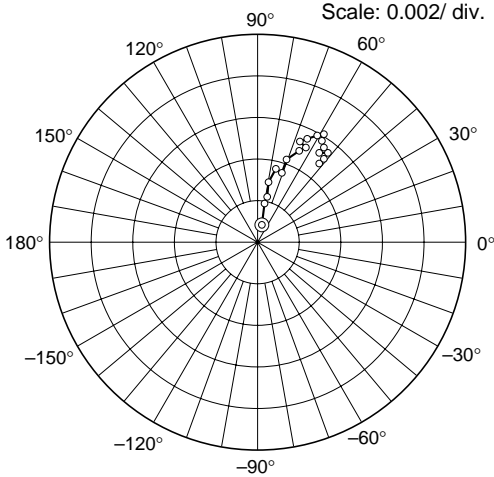


Condition: $V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$

100 to 1000 MHz (50 MHz step)



S12 Parameter vs. Frequency

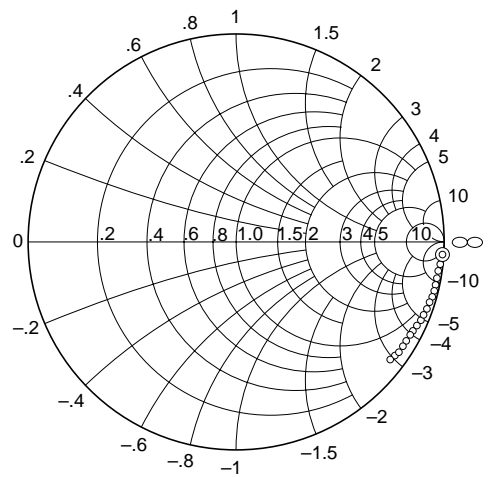


Condition: $V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$

100 to 1000 MHz (50 MHz step)



S22 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{G2S} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$

100 to 1000 MHz (50 MHz step)



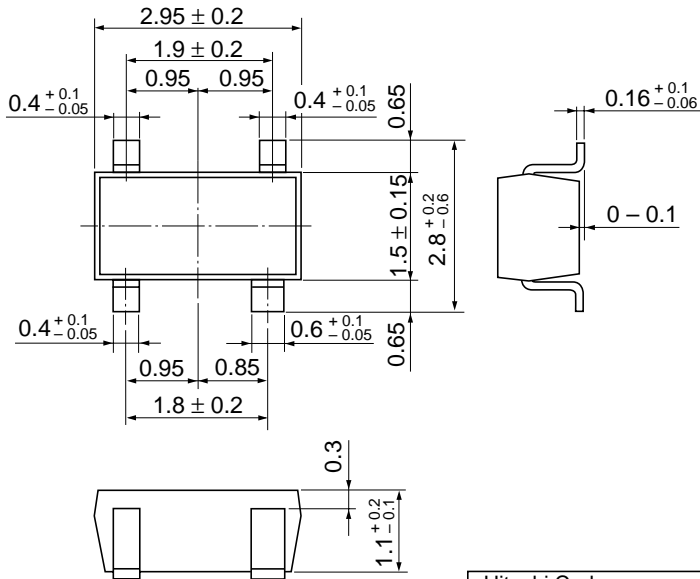
S Parameter ($V_{DS} = 4 \text{ V}$, $V_{G2S} = 3 \text{ V}$, $I_D = 10 \text{ mA}$, $Z_O = 50 \text{ } \Omega$)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.999	-6.1	1.98	172.2	0.00094	79.2	0.989	-4.2
150	0.998	-9.1	1.97	168.4	0.00189	80.4	0.987	-6.1
200	0.992	-11.9	1.96	165.0	0.00230	79.5	0.986	-7.9
250	0.988	-14.8	1.96	161.0	0.00286	79.9	0.984	-9.8
300	0.985	-17.9	1.94	157.1	0.00364	75.2	0.981	-11.5
350	0.976	-20.6	1.92	153.7	0.00353	71.8	0.978	-13.4
400	0.971	-23.2	1.91	149.9	0.00419	70.7	0.975	-15.2
450	0.964	-26.3	1.88	146.8	0.00495	65.5	0.972	-17.2
500	0.961	-29.1	1.87	142.8	0.00509	62.7	0.968	-19.1
550	0.951	-32.2	1.86	139.4	0.00530	66.6	0.963	-20.8
600	0.949	-35.0	1.86	136.1	0.00550	63.8	0.960	-22.8
650	0.935	-37.6	1.81	132.9	0.00601	58.2	0.956	-24.5
700	0.933	-40.5	1.78	129.4	0.00582	60.6	0.950	-26.3
750	0.923	-42.9	1.77	125.7	0.00572	58.5	0.945	-28.0
800	0.916	-45.8	1.75	122.6	0.00553	56.3	0.941	-29.9
850	0.908	-49.0	1.72	119.1	0.00514	56.3	0.936	-31.7
900	0.900	-51.2	1.70	115.8	0.00543	52.9	0.930	-33.4
950	0.890	-54.0	1.67	112.6	0.00506	52.4	0.924	-35.2
1000	0.876	-56.4	1.65	109.3	0.00469	51.9	0.919	-37.0

Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	MPAK-4
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.013 g

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HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits.

Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL	NorthAmerica	: http://semiconductor.hitachi.com/
	Europe	: http://www.hitachi-eu.com/hel/ecg
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	Japan	: http://www.hitachi.co.jp/Sicd/indx.htm

For further information write to:

Hitachi Semiconductor
(America) Inc.
179 East Tasman Drive,
San Jose, CA 95134
Tel: <1> (408) 433-1990
Fax: <1> (408) 433-0223

Hitachi Europe GmbH
Electronic Components Group
Dornacher Straße 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 585160

Hitachi Asia Ltd.
Hitachi Tower
16 Collyer Quay #20-00,
Singapore 049318
Tel : <65>-538-6533/538-8577
Fax : <65>-538-6933/538-3877
URL : <http://www.hitachi.com.sg>

Hitachi Asia Ltd.
(Taipei Branch Office)
4/F, No. 167, Tun Hwa North Road,
Hung-Kuo Building,
Taipei (105), Taiwan
Tel : <886>-(2)-2718-3666
Fax : <886>-(2)-2718-8180
Telex : 23222 HAS-TP
URL : <http://www.hitachi.com.tw>

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower,
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon,
Hong Kong
Tel : <852>-(2)-735-9218
Fax : <852>-(2)-730-0281
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