

To all our customers

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

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Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

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

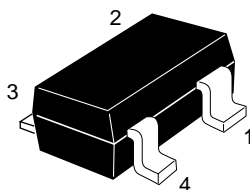
UHF RF amplifier

## 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.

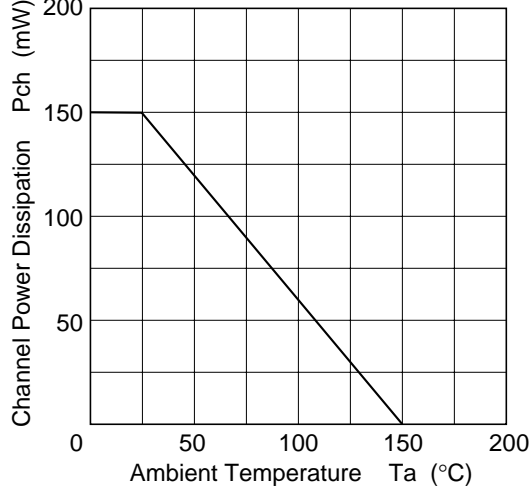
## Absolute Maximum Ratings (Ta = 25°C)

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

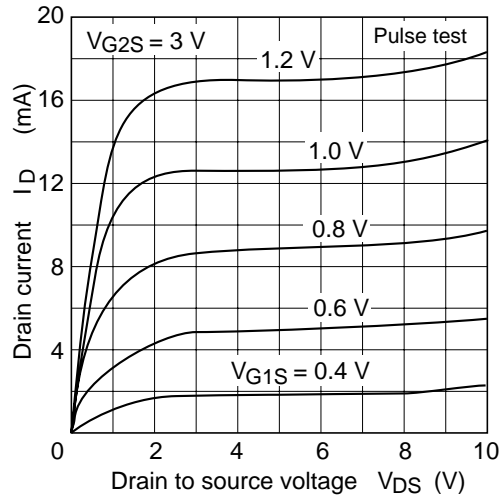
## Electrical Characteristics (Ta = 25°C)

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	$V_{DS} = 6 V$ , $V_{G1S} = 0.5 V$ , $V_{G2S} = 3 V$
Gate 1 to source cutoff voltage	$V_{G1S(off)}$	-0.5	—	+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	20.8	—	mS	$V_{DS} = 6 V$ , $V_{G2S} = 3 V$ , $I_D = 10 mA$ , $f = 1 kHz$
Input capacitance	Ciss	1.2	1.5	2.2	pF	$V_{DS} = 6 V$ , $V_{G2S} = 3 V$ , $I_D = 10 mA$ , $f = 1 MHz$
Output capacitance	Coss	0.6	0.9	1.2	pF	
Reverse transfer capacitance	Crss	—	0.01	0.03	pF	
Power gain	PG	16	19.5	—	dB	$V_{DS} = 4 V$ , $V_{G2S} = 3 V$ , $I_D = 10 mA$ , $f = 900 MHz$
Noise figure	NF	—	2.0	3	dB	

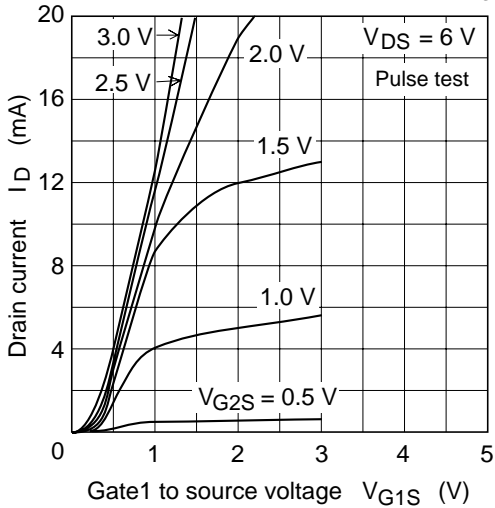
Maximum Channel Power  
Dissipation Curve



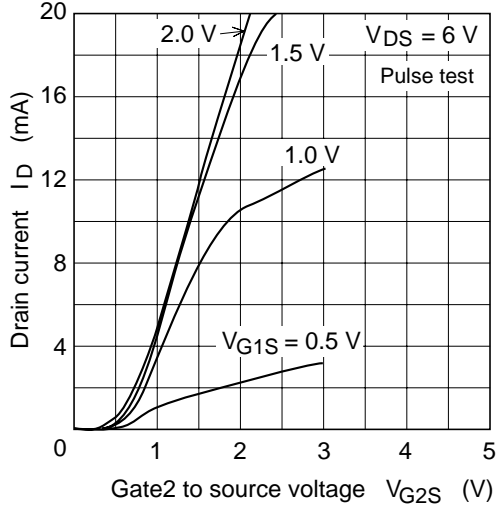
Typical Output Characteristics

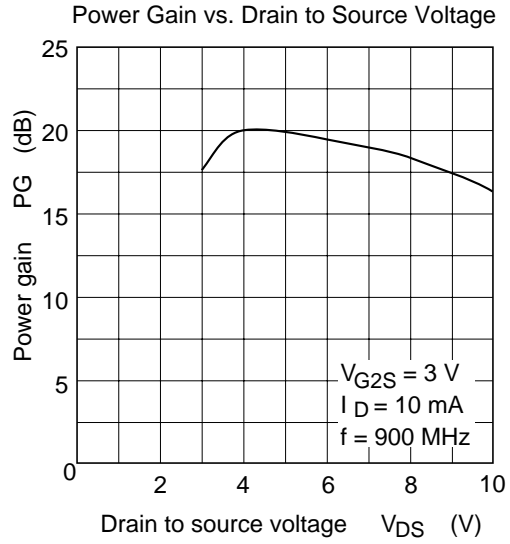
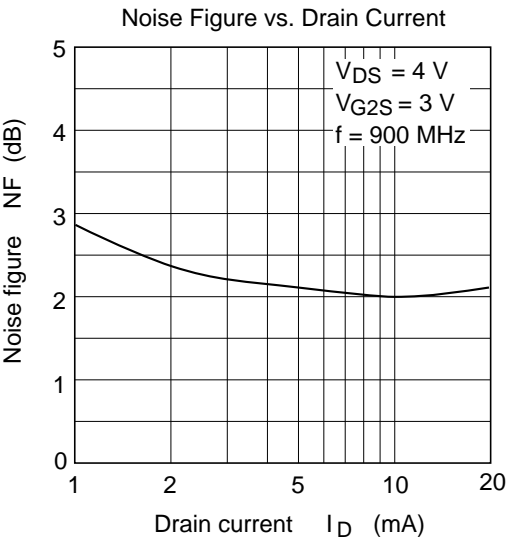
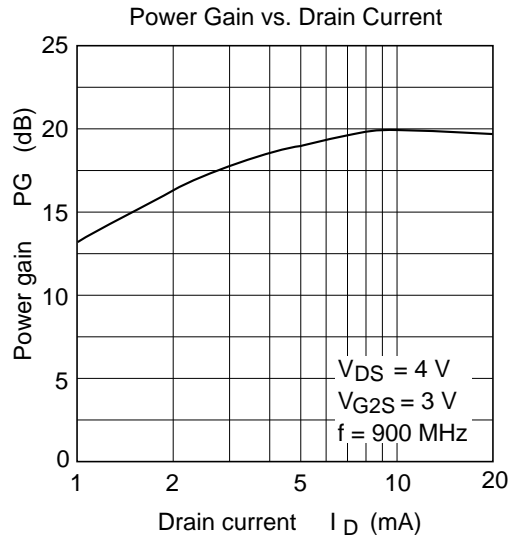
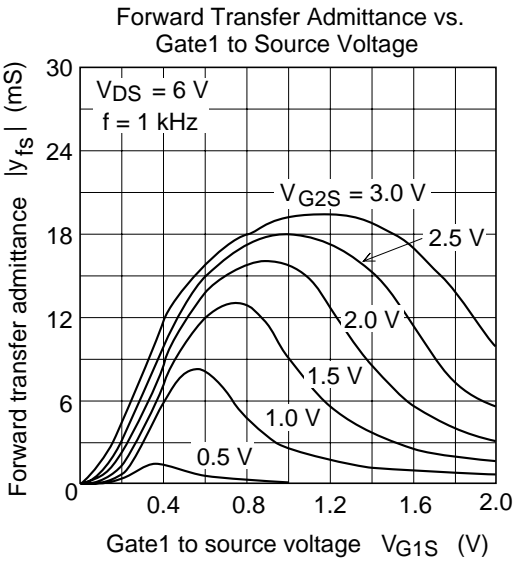


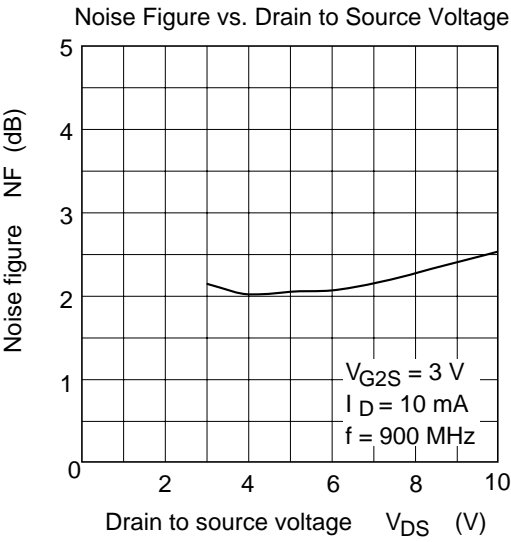
Drain Current vs. Gate1 to Source Voltage



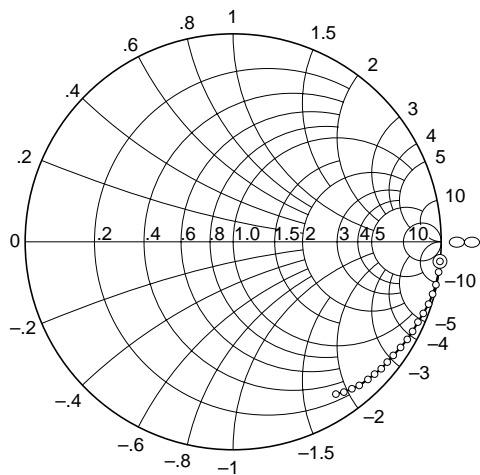
Drain Current vs. Gate2 to Source Voltage







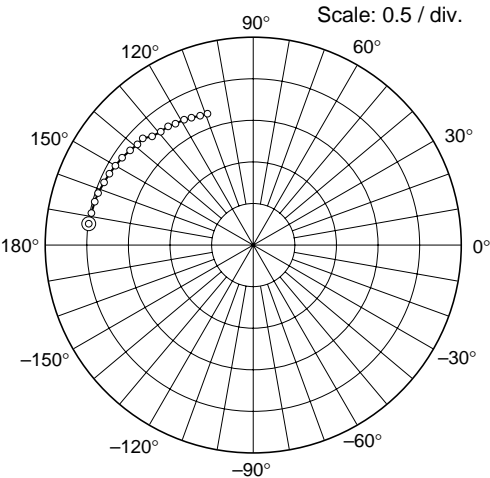
S11 Parameter vs. Frequency



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

⊙—○

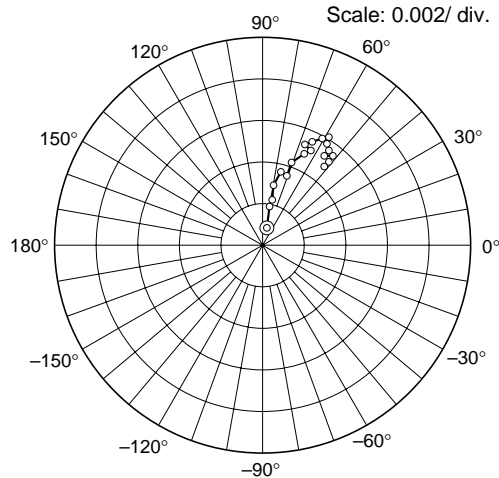
S21 Parameter vs. Frequency



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

⊙—○

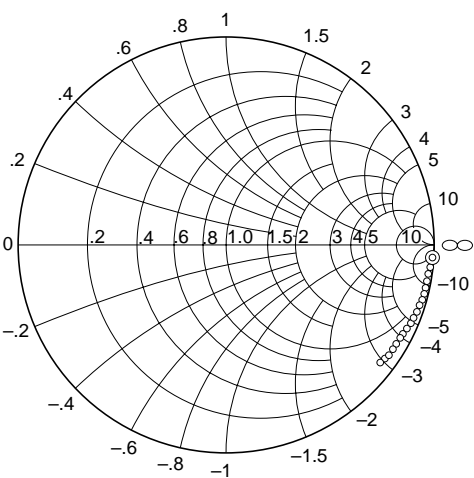
S12 Parameter vs. Frequency



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

⊙—○

S22 Parameter vs. Frequency



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

⊙—○

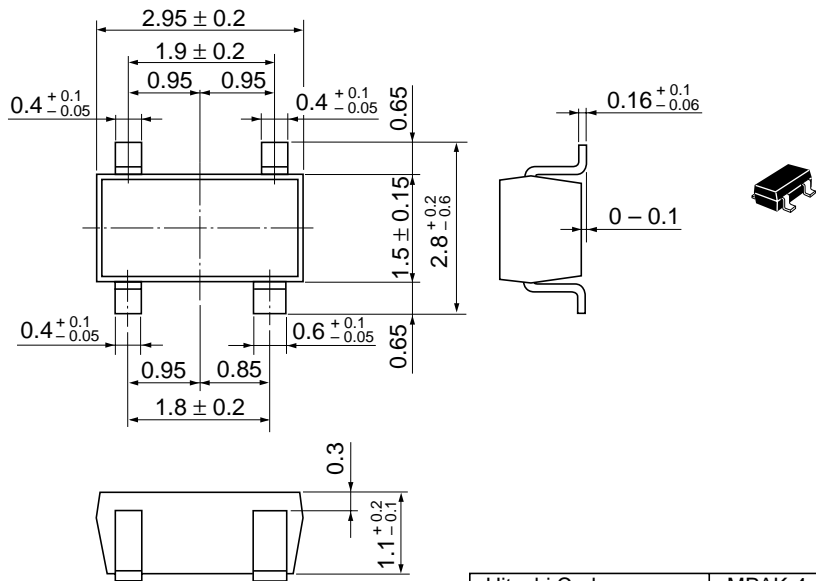


**S Parameter** ( $V_{DS} = 4\text{ V}$ ,  $V_{G2S} = 3\text{ V}$ ,  $I_D = 10\text{ mA}$ ,  $Z_O = 50\text{ }\Omega$  )

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	: <a href="http://semiconductor.hitachi.com/">http://semiconductor.hitachi.com/</a>
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## 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

URL: <http://www.hitachi.com.hk>