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# 3SK319

Silicon N-Channel Dual Gate MOS FET  
UHF RF Amplifier

# HITACHI

ADE-208-602 (Z)  
1st. Edition  
Feb. 1998

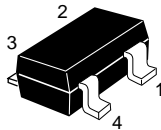
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## Features

- Low noise characteristics;  
(NF= 1.4 dB typ. at f= 900 MHz)
- Excellent cross modulation characteristics
- Capable low voltage operation; +B= 5V

## Outline

MPAK-4



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

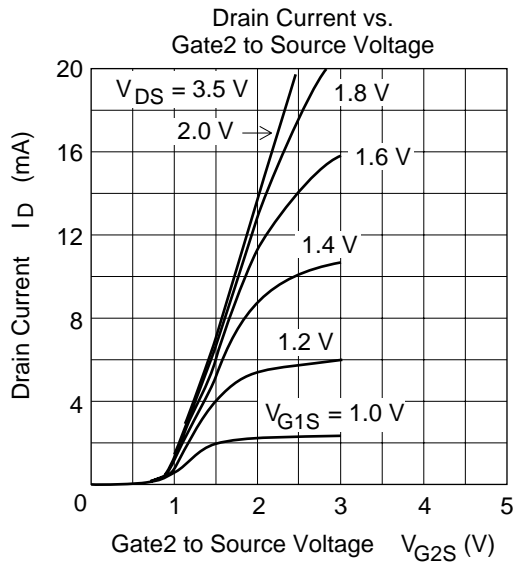
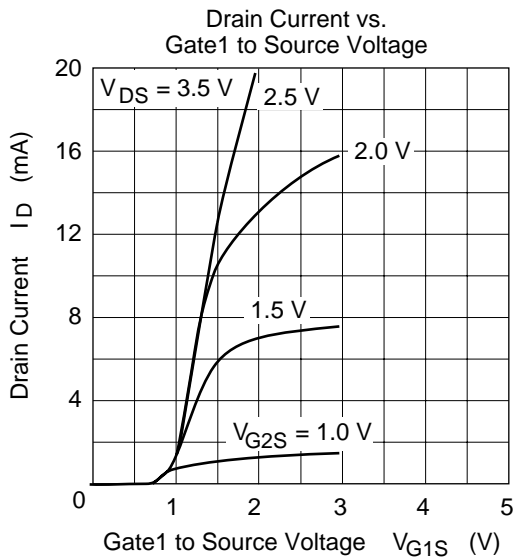
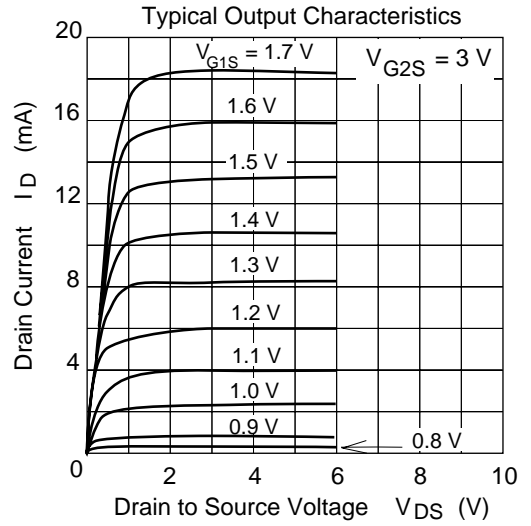
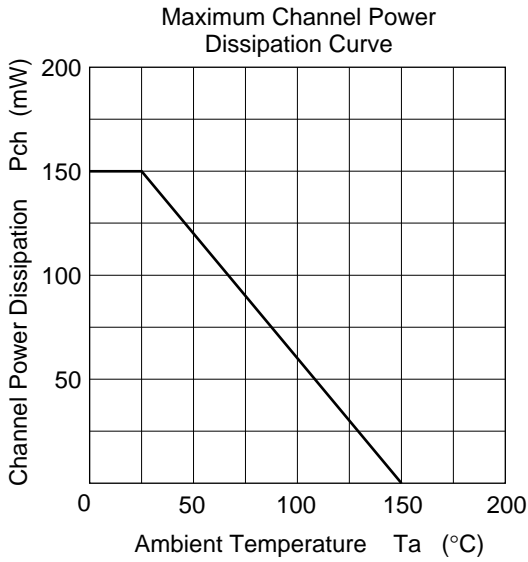
Note: Marking is "YB-".

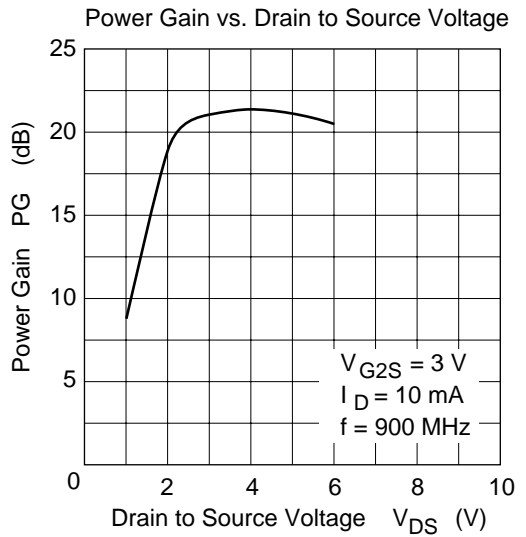
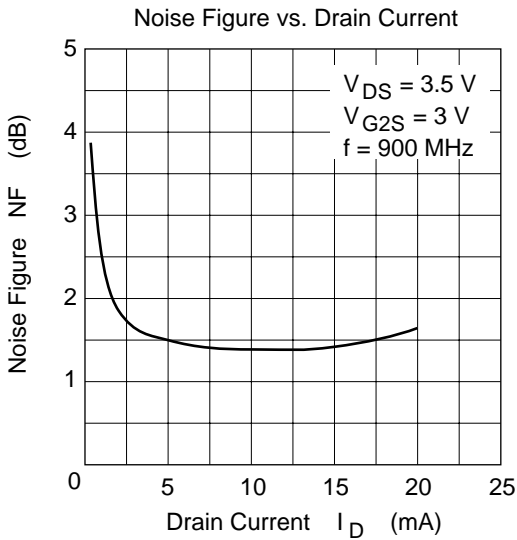
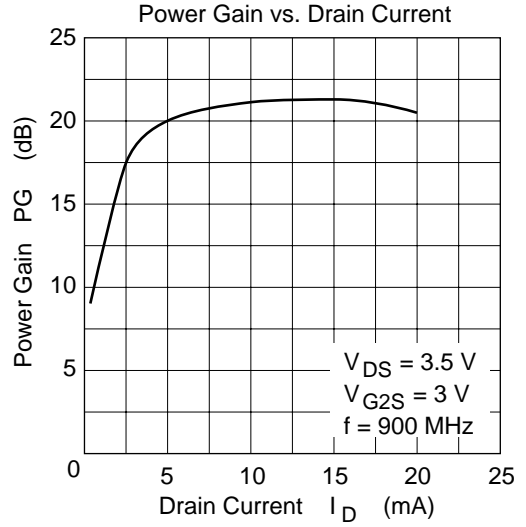
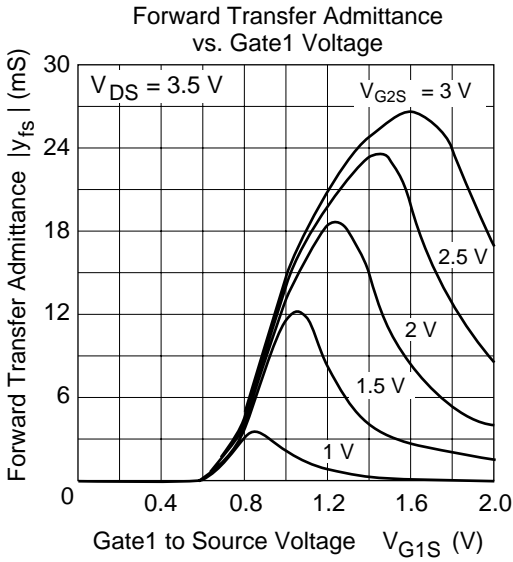
## Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DS}$	6	V
Gate1 to source voltage	$V_{G1S}$	±6	V
Gate2 to source voltage	$V_{G2S}$	±6	V
Drain current	$I_D$	20	mA
Channel power dissipation	Pch	150	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

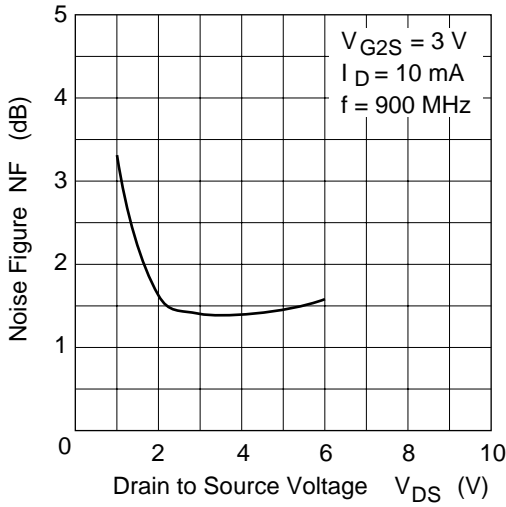
## Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	6	—	—	V	$I_D = 200\mu A, V_{G1S} = V_{G2S} = 0$
Gate1 to source breakdown voltage	$V_{(BR)G1SS}$	±6	—	—	V	$I_{G1} = \pm 10\mu A, V_{G2S} = V_{DS} = 0$
Gate2 to source breakdown voltage	$V_{(BR)G2SS}$	±6	—	—	V	$I_{G2} = \pm 10\mu A, V_{G1S} = V_{DS} = 0$
Gate1 to source cutoff current	$I_{G1SS}$	—	—	±100	nA	$V_{G1S} = \pm 5V, V_{G2S} = V_{DS} = 0$
Gate2 to source cutoff current	$I_{G2SS}$	—	—	±100	nA	$V_{G2S} = \pm 5V, V_{G1S} = V_{DS} = 0$
Gate1 to source cutoff voltage	$V_{G1S(off)}$	0.5	0.7	1.0	V	$V_{DS} = 5V, V_{G2S} = 3V, I_D = 100\mu A$
Gate2 to source cutoff voltage	$V_{G2S(off)}$	0.5	0.7	1.0	V	$V_{DS} = 5V, V_{G1S} = 3V, I_D = 100\mu A$
Drain current	$I_{DS(op)}$	0.5	4	10	mA	$V_{DS} = 3.5V, V_{G1S} = 1.1V, V_{G2S} = 3V$
Forward transfer admittance	$ y_{fs} $	18	24	32	mS	$V_{DS} = 3.5V, V_{G2S} = 3V$ $I_D = 10mA, f=1kHz$
Input capacitance	$C_{iss}$	1.3	1.6	1.9	pF	$V_{DS} = 3.5V, V_{G2S} = 3V$
Output capacitance	$C_{oss}$	0.9	1.2	1.5	pF	$I_D = 10mA, f= 1MHz$
Reverse transfer capacitance	$C_{rss}$	—	0.019	0.03	pF	
Power gain	PG	18	21	—	dB	$V_{DS} = 3.5V, V_{G2S} = 3V$
Noise figure	NF	—	1.4	2.2	dB	$I_D = 10mA, f=900MHz$

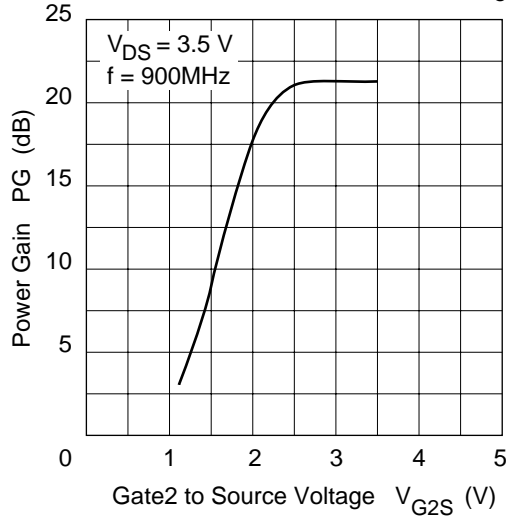




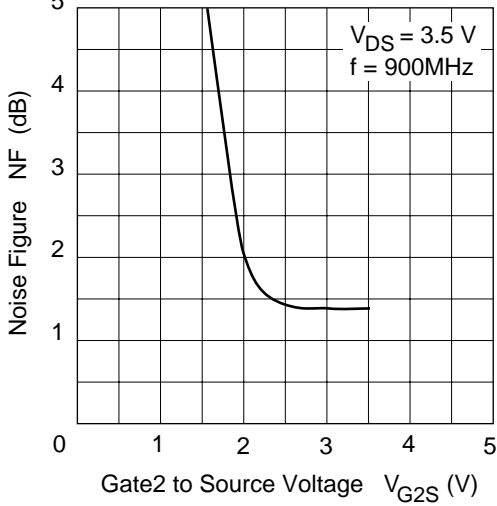
Noise Figure vs. Drain to Source Voltage



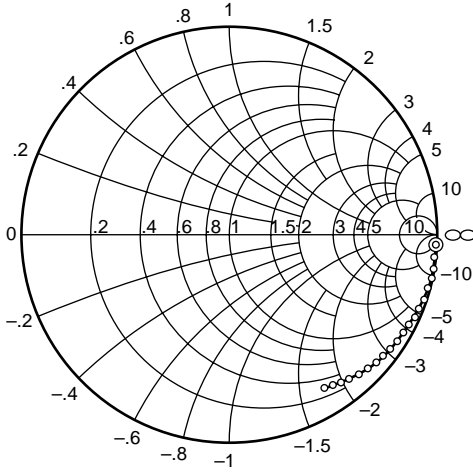
Power Gain vs. Gate2 to Source Voltage



Noise Figure vs. Gate2 to Source Voltage



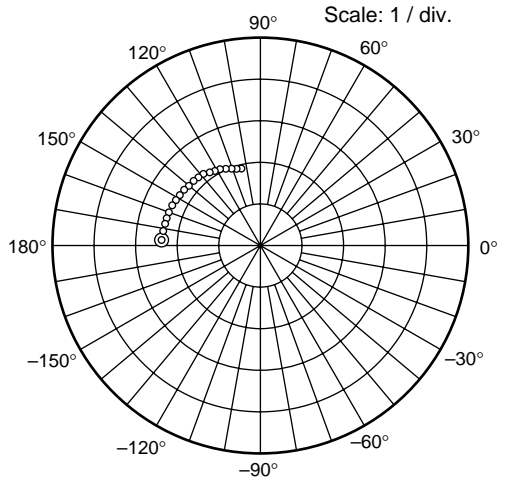
S11 Parameter vs. Frequency



Test Condition :  $V_{DS} = 3.5\text{ V}$ ,  $V_{G2S} = 3\text{ V}$   
 $I_D = 10\text{ mA}$   
 50 to 1000 MHz (50 MHz step)



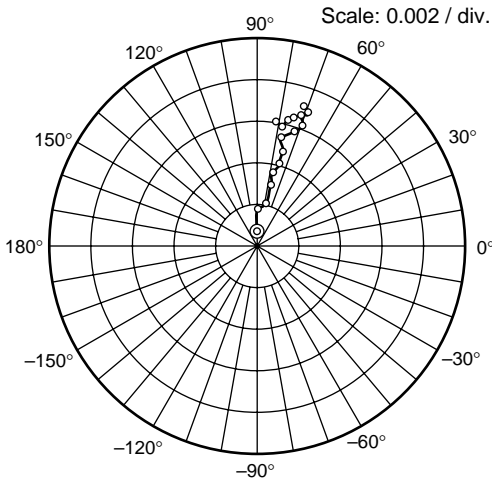
S21 Parameter vs. Frequency



Test Condition :  $V_{DS} = 3.5\text{ V}$ ,  $V_{G2S} = 3\text{ V}$   
 $I_D = 10\text{ mA}$   
 50 to 1000 MHz (50 MHz step)



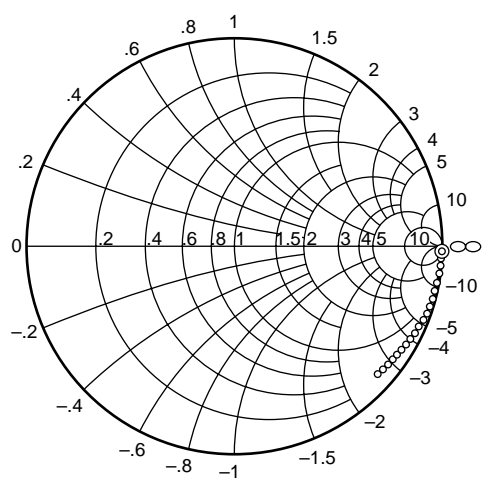
S12 Parameter vs. Frequency



Test Condition :  $V_{DS} = 3.5\text{ V}$ ,  $V_{G2S} = 3\text{ V}$   
 $I_D = 10\text{ mA}$   
 50 to 1000 MHz (50 MHz step)



S22 Parameter vs. Frequency



Test Condition :  $V_{DS} = 3.5\text{ V}$ ,  $V_{G2S} = 3\text{ V}$   
 $I_D = 10\text{ mA}$   
 50 to 1000 MHz (50 MHz step)



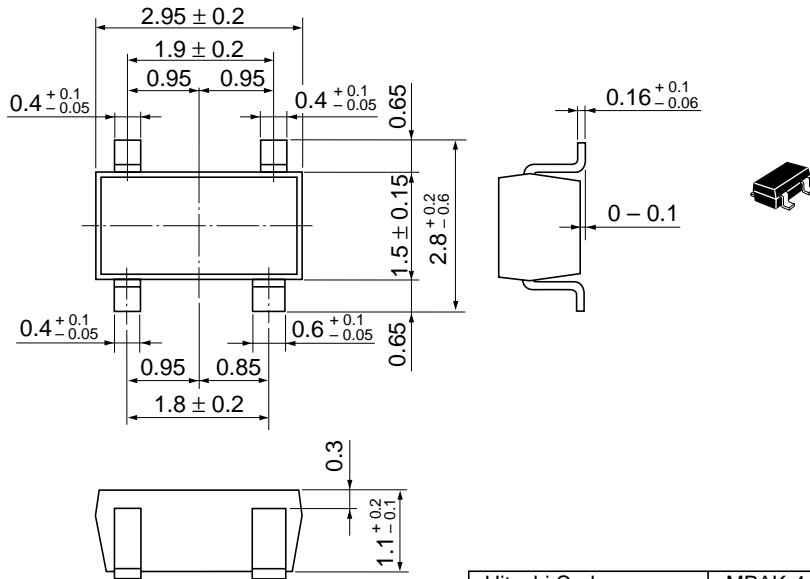
**Sparameter** ( $V_{DS} = 3.5V$ ,  $V_{G2S} = 3V$ ,  $I_D = 10mA$ ,  $Z_o = 50\Omega$ )

f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
50	1.000	-2.8	2.41	176.3	0.00068	89.1	0.999	-2.2
100	0.998	-5.8	2.41	171.9	0.00176	88.5	0.996	-4.5
150	0.997	-9.1	2.39	167.6	0.00223	80.7	0.996	-6.7
200	0.994	-12.2	2.38	163.7	0.00303	76.6	0.994	-8.7
250	0.994	-15.1	2.37	159.8	0.00365	79.1	0.991	-11.0
300	0.986	-18.5	2.35	155.5	0.00414	75.4	0.988	-13.2
350	0.978	-21.3	2.30	151.4	0.00484	75.0	0.983	-15.3
400	0.972	-24.1	2.28	147.6	0.00533	78.0	0.980	-17.4
450	0.969	-27.0	2.26	143.6	0.00588	71.6	0.976	-19.6
500	0.954	-29.7	2.23	140.0	0.00617	69.5	0.971	-21.7
550	0.955	-32.8	2.19	135.9	0.00666	71.5	0.966	-23.7
600	0.941	-35.7	2.17	132.2	0.00672	70.6	0.960	-25.6
650	0.932	-38.3	2.14	128.6	0.00694	69.0	0.955	-27.8
700	0.924	-41.3	2.09	125.0	0.00709	71.4	0.948	-29.9
750	0.919	-44.1	2.07	121.5	0.00689	69.0	0.942	-31.8
800	0.905	-46.9	2.03	117.9	0.00699	68.9	0.937	-33.8
850	0.896	-49.2	2.00	114.7	0.00644	74.2	0.930	-35.8
900	0.884	-52.4	1.96	110.4	0.00633	75.5	0.923	-37.6
950	0.880	-54.7	1.93	107.1	0.00585	77.8	0.917	-39.8
1000	0.866	-57.7	1.89	103.8	0.00605	82.1	0.910	-41.9

## Package Dimensions

As of January, 2001

Unit: mm



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

## Cautions

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