

3SK318

Silicon N-Channel Dual Gate MOS FET
UHF RF Amplifier

HITACHI

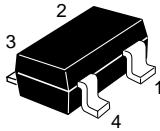
ADE-208-600(Z)
1st. Edition
February 1998

Features

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

Outline

CMPAK-4



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

Note: Marking is "YB-".

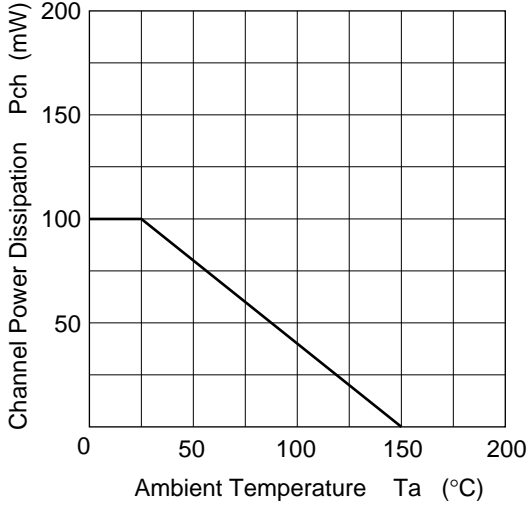
Absolute Maximum Ratings (Ta = 25°C)

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

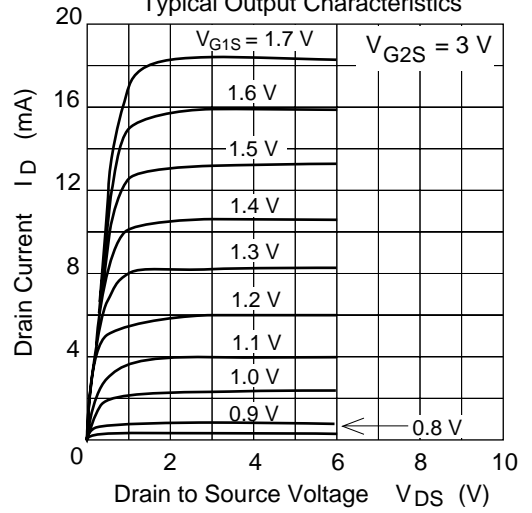
Electrical Characteristics (Ta = 25°C)

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	$I_D = 10mA, f = 900MHz$

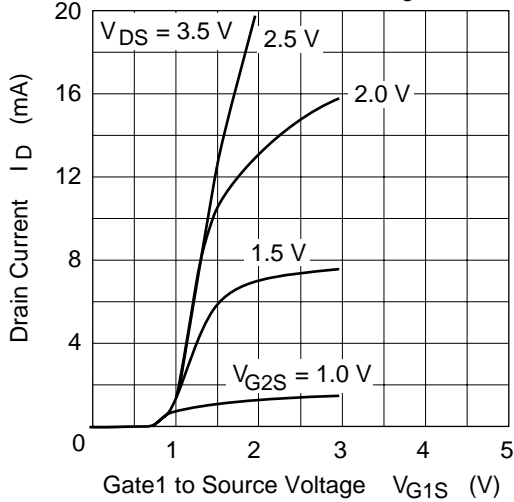
Maximum Channel Power Dissipation Curve



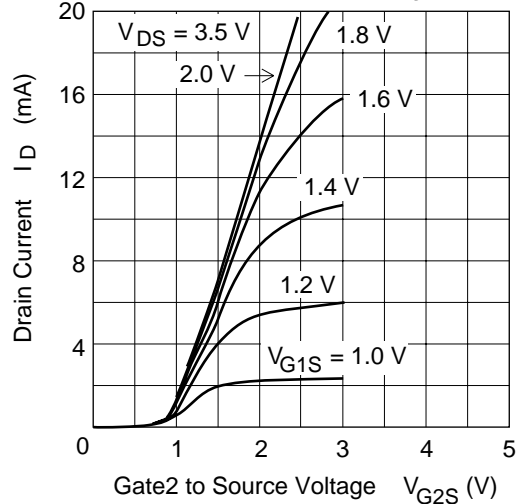
Typical Output Characteristics



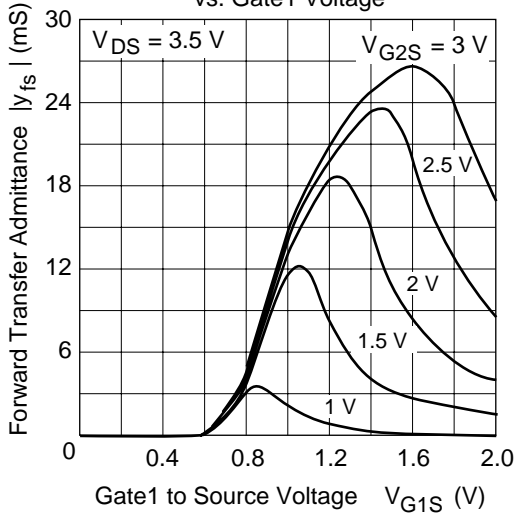
Drain Current vs. Gate1 to Source Voltage



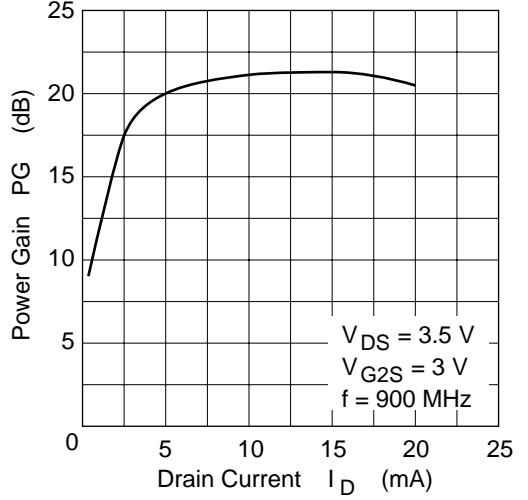
Drain Current vs. Gate2 to Source Voltage



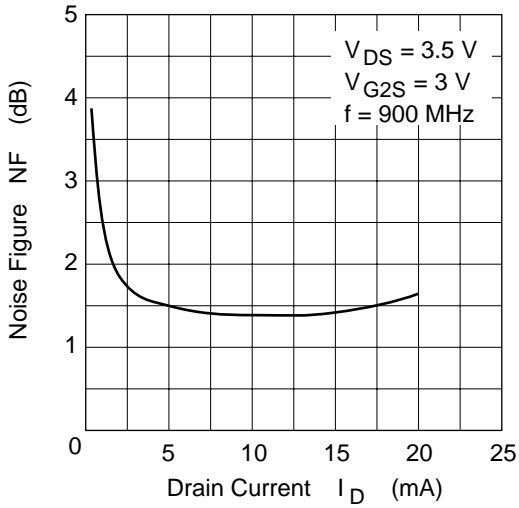
Forward Transfer Admittance vs. Gate1 Voltage



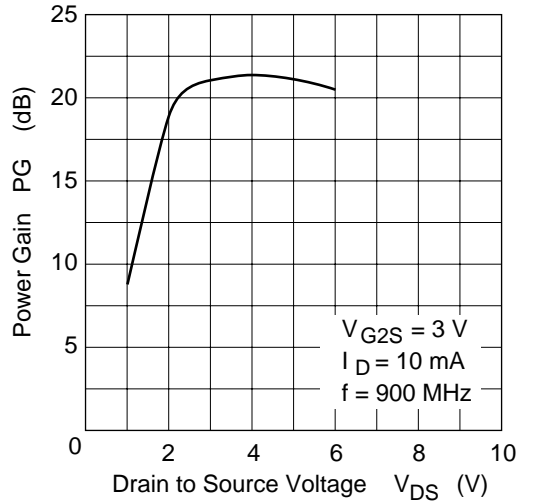
Power Gain vs. Drain Current



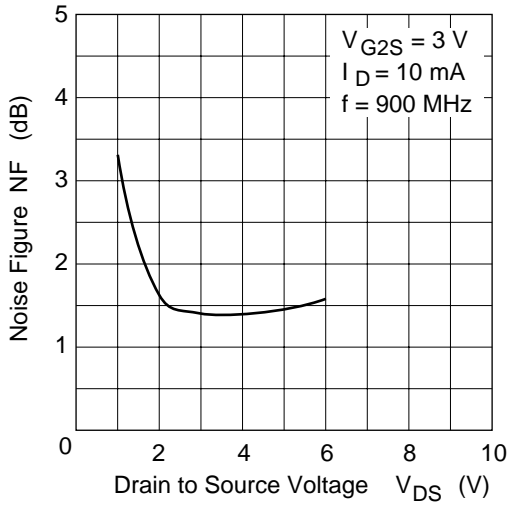
Noise Figure vs. Drain Current



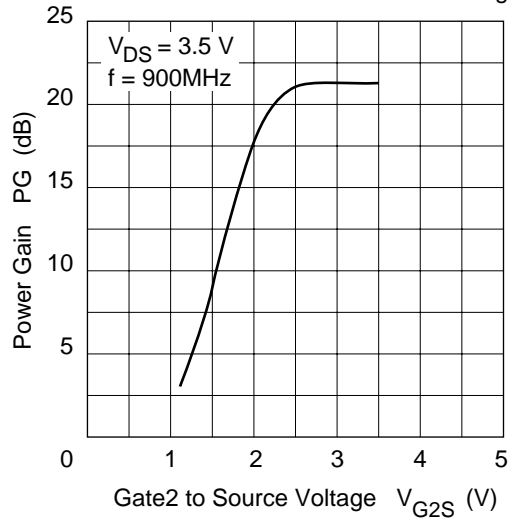
Power Gain vs. Drain to Source Voltage



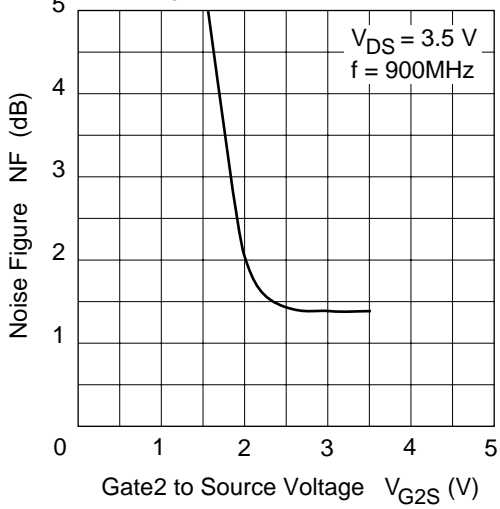
Noise Figure vs. Drain to Source Voltage



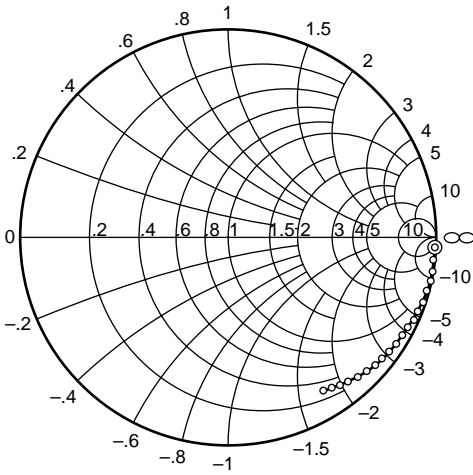
Power Gain vs. Gate2 to Source Voltage



Noise Figure vs. Gate2 to Source Voltage



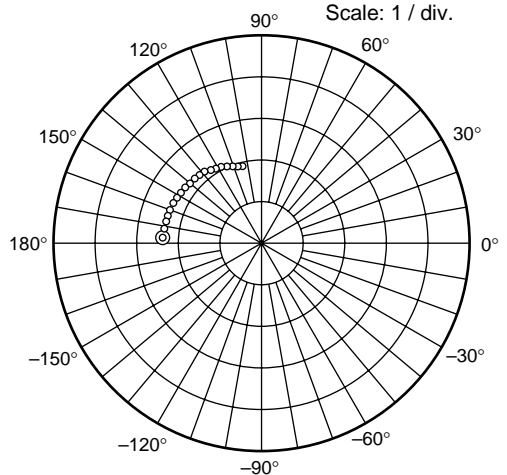
S11 Parameter vs. Frequency



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)



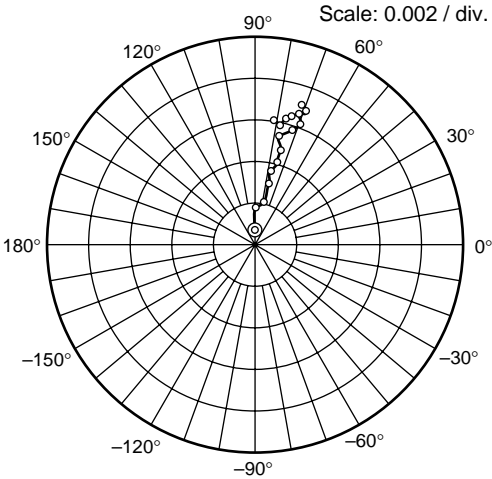
S21 Parameter vs. Frequency



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)



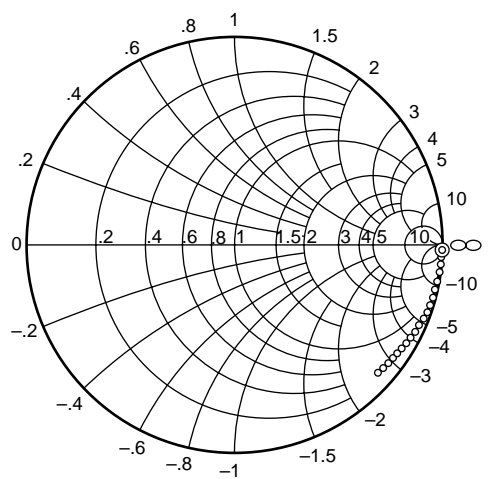
S12 Parameter vs. Frequency



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

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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 North America : <http://semiconductor.hitachi.com/>
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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) 778322

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3F, Hung Kuo Building, No.167,
Tun-Hwa North Road, Taipei (105)
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180

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
Telex: 40815 HITEC HX

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