3SK309

GaAs N Channel Dual Gate MES FET
UHF RF Amplifier

HITACHI

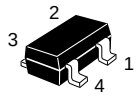
ADE-208-472B (Z)
3rd. Edition
Mar. 2001

Features

- Capable of low voltage operation (V_{DS} = 1.5 to 3 V)
- Excellent low noise characteristics (NF = 1.25 dB typ. at f = 900 MHz)
- High power gain (PG = 21.0 dB typ. at f = 900 MHz)

Outline

CMPAK-4



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

Note: Marking is “XV–”.

Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

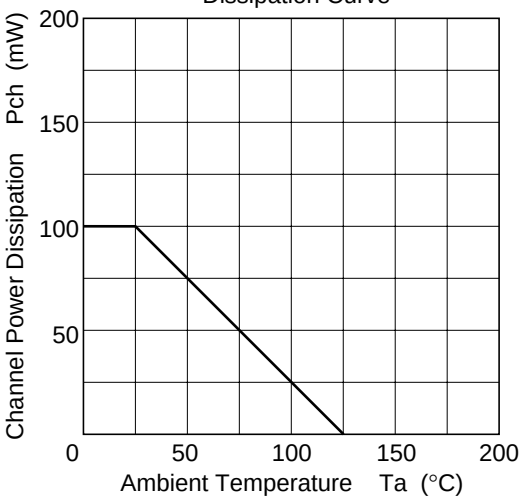
Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	6	V
Gate1 to source voltage	V_{G1S}	–4	V
Gate 2 to source voltage	V_{G2S}	–4	V
Drain current	I_D	18	mA
Channel power dissipation	Pch	100	mW
Channel temperature	Tch	125	°C
Storage temperature	Tstg	–55 to +125	°C

Electrical Characteristics (Ta = 25°C)

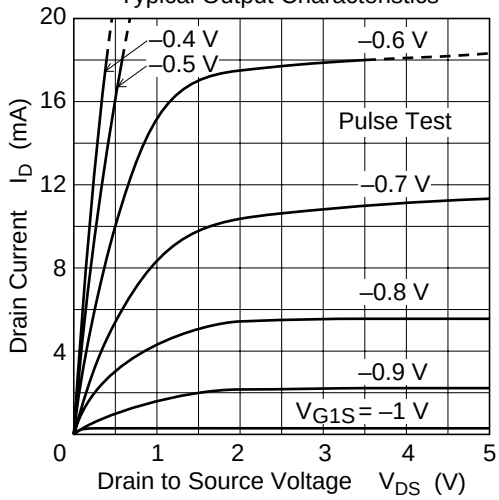
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Gate1 to cutoff current	I_{G1SS}	—	—	–20	µA	V_{G1S} = –4V, V_{G2S} = V_{DS} = 0
Gate2 to cutoff current	I_{G2SS}	—	—	–20	µA	V_{G2S} = –4V, V_{G1S} = V_{DS} = 0
Gate1 to source cutoff voltage	$V_{G1S(off)}$	–0.2	—	–1.5	V	V_{DS} = 3V, V_{G2S} = 0, I_D = 100µA
Gate2 to source cutoff voltage	$V_{G2S(off)}$	–0.2	—	–1.5	V	V_{DS} = 3V, V_{G1S} = 0, I_D = 100µA
Zero gate voltege drain current	I_{DSS}	25	40	60	mA	V_{DS} = 3 V, V_{G1S} = 0, V_{G2S} = 0
Forward transfer admittance	$\lvert y_{fs} \rvert$	30	40	—	mS	V_{DS} = 3V, V_{G2S} = 0, I_D = 5mA, f = 1kHz
Power gain	PG	18	21	—	dB	V_{DS} = 3V, V_{G2S} = 0
Noise figure	NF	—	1.25	1.5	dB	I_D = 5mA, f = 900MHz
Power gain	PG	—	20	—	dB	V_{DS} = 1.5V, V_{G2S} = 0
Noise figure	NF	—	1.3	—	dB	I_D = 3mA, f = 900MHz

Main Characteristics

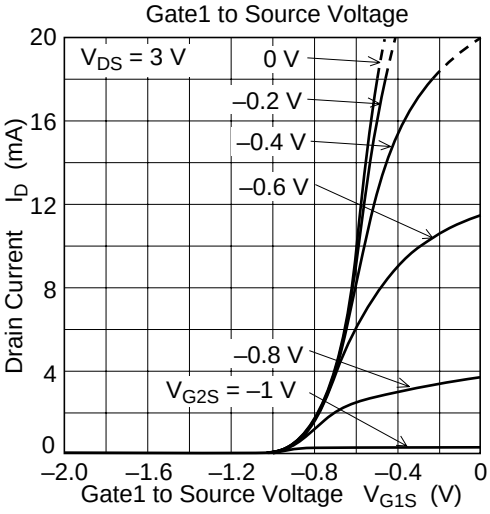
Maximum Channel Power Dissipation Curve



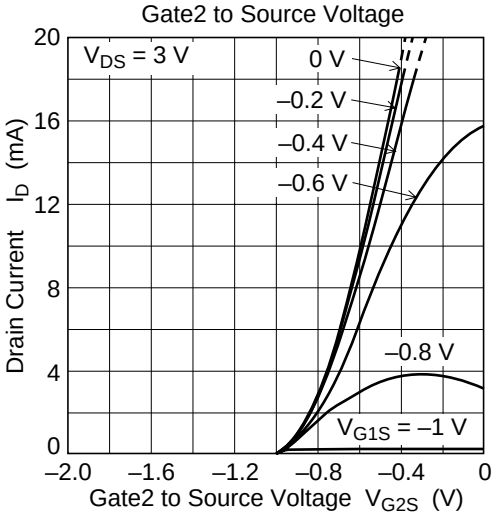
Typical Output Characteristics



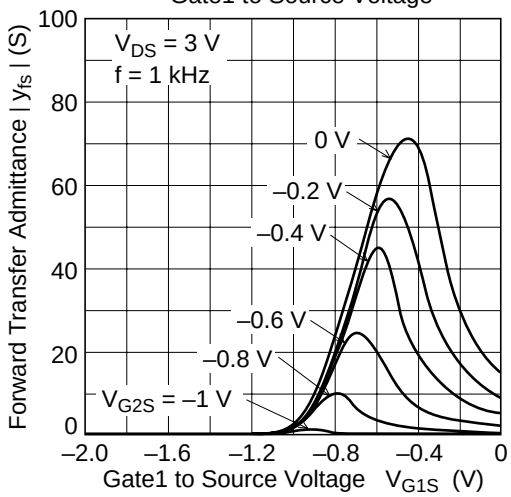
Drain Current vs. Gate1 to Source Voltage



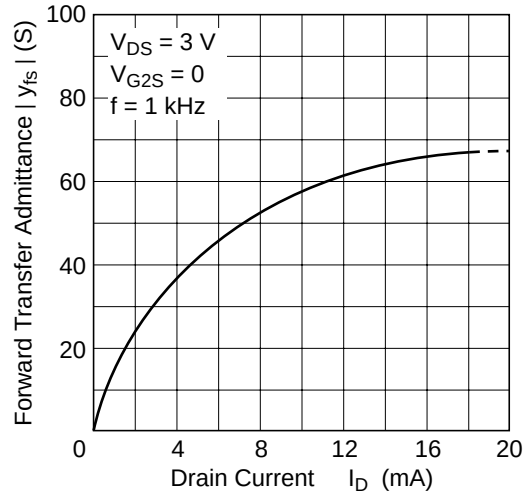
Drain Current vs. Gate2 to Source Voltage



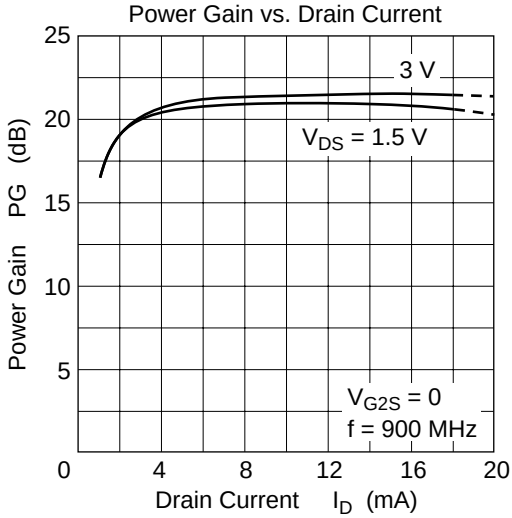
Forward Transfer Admittance vs. Gate1 to Source Voltage



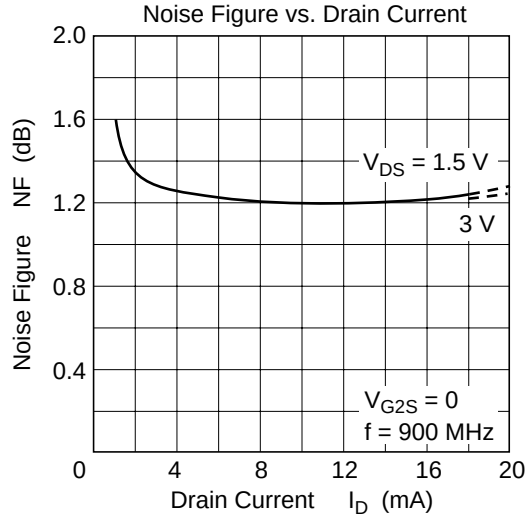
Forward Transfer Admittance vs. Drain Current



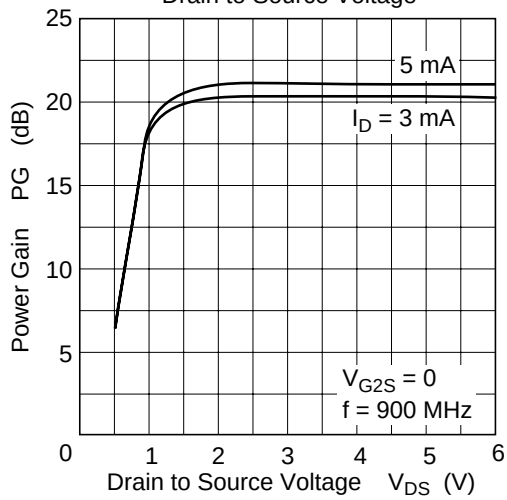
Power Gain vs. Drain Current



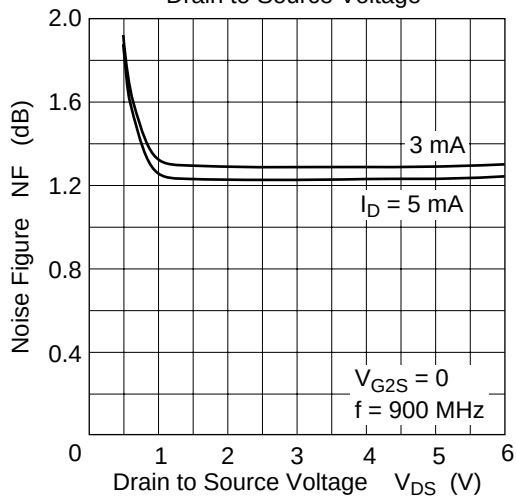
Noise Figure vs. Drain Current



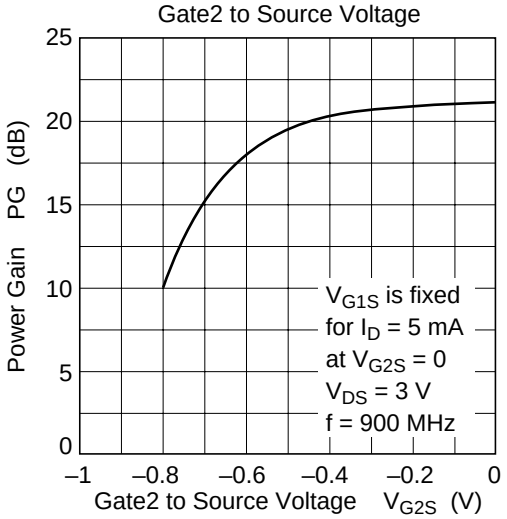
Power Gain vs.
Drain to Source Voltage



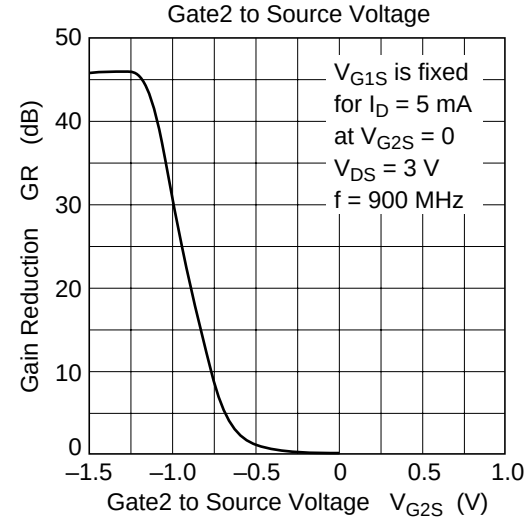
Noise Figure vs.
Drain to Source Voltage



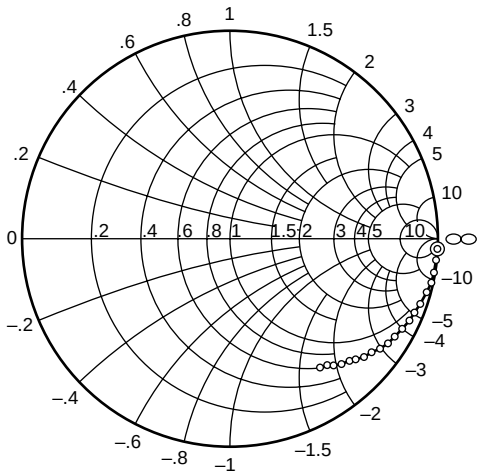
Power Gain vs.
Gate2 to Source Voltage



Gain Reduction vs.
Gate2 to Source Voltage

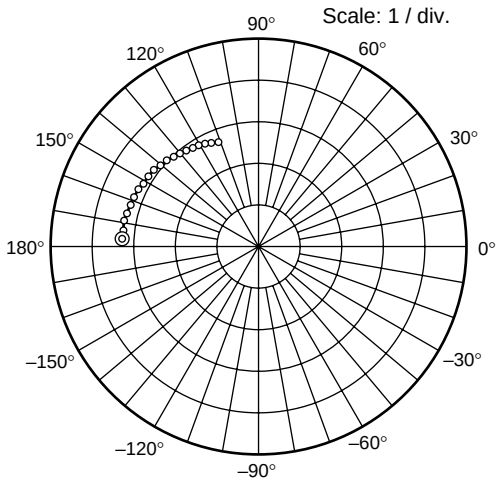


S11 Parameter vs. Frequency



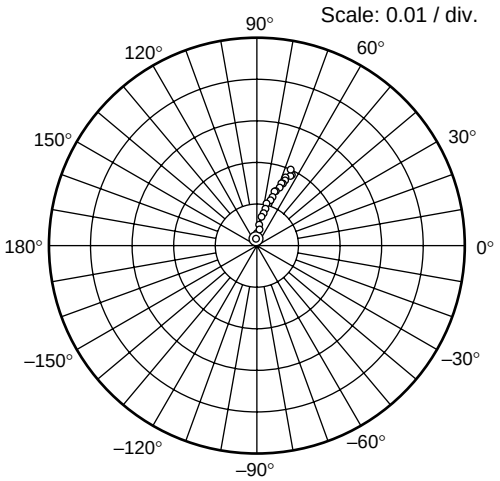
Test Condtion: V_{DS} = 3 V , V_{G2S} = 0 V
I_D = 5 mA , Zo = 50Ω
100 to 2000 MHz (100 MHz step)

S21 Parameter vs. Frequency



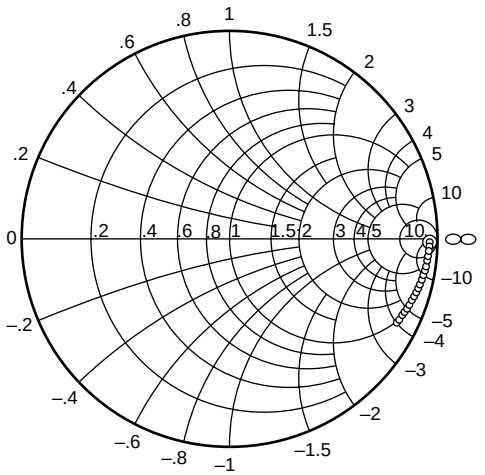
Test Condtion: V_{DS} = 3 V , V_{G2S} = 0 V
I_D = 5 mA , Zo = 50Ω Ω
100 to 2000 MHz (100 MHz step)

S12 Parameter vs. Frequency



Test Condtion: V_{DS} = 3 V , V_{G2S} = 0 V
I_D = 5 mA , Zo = 50Ω
100 to 2000 MHz (100 MHz step)

S22 Parameter vs. Frequency

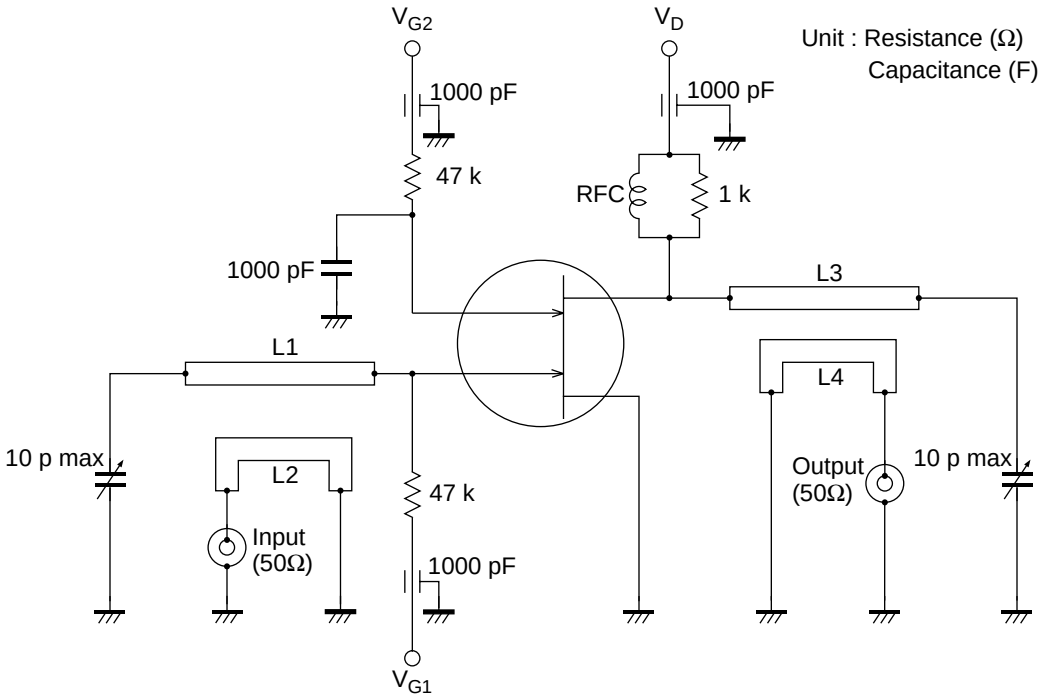


Test Condtion: V_{DS} = 3 V , V_{G2S} = 0 V
I_D = 5 mA , Zo = 50Ω
100 to 2000 MHz (100 MHz step)

Sparameter (V_{DS} = 3V, V_{G2S} = 0, I_D = 5mA, Zo = 50Ω)

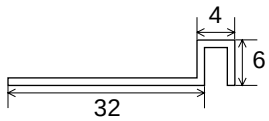
	S11		S21		S12		S22	
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.999	–2.8	3.29	176.7	0.00167	95.2	0.963	–0.9
200	0.997	–5.9	3.27	173.1	0.00302	89.0	0.963	–2.2
300	0.995	–9.4	3.29	169.0	0.00394	80.5	0.961	–3.5
400	0.992	–12.3	3.26	165.8	0.00506	83.7	0.959	–5.0
500	0.981	–15.2	3.23	161.9	0.00703	80.8	0.957	–6.3
600	0.968	–18.9	3.22	158.3	0.00797	78.1	0.955	–8.0
700	0.956	–21.8	3.20	154.4	0.00911	76.9	0.953	–9.2
800	0.949	–24.5	3.15	151.3	0.0104	77.1	0.949	–10.6
900	0.935	–27.6	3.14	147.4	0.0114	73.2	0.946	–12.0
1000	0.922	–30.7	3.12	143.7	0.0123	72.1	0.942	–13.5
1100	0.912	–33.5	3.06	140.3	0.0137	71.9	0.939	–14.7
1200	0.895	–36.2	3.03	136.7	0.0139	70.8	0.935	–16.0
1300	0.873	–38.7	2.97	133.3	0.0150	68.5	0.931	–17.3
1400	0.860	–41.4	2.93	130.1	0.0161	68.5	0.926	–18.6
1500	0.838	–43.8	2.89	126.9	0.0162	67.2	0.922	–20.2
1600	0.822	–45.6	2.85	123.6	0.0171	66.6	0.918	–21.5
1700	0.807	–48.3	2.83	120.5	0.0178	67.2	0.913	–22.7
1800	0.787	–50.7	2.79	117.4	0.0185	66.0	0.909	–23.8
1900	0.767	–52.4	2.74	114.4	0.0186	64.3	0.905	–25.5
2000	0.756	–55.0	2.69	110.9	0.0190	63.7	0.901	–26.6

Power Gain, Noise Figure Test Circuit

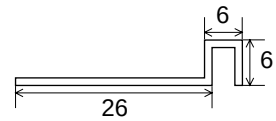


L1 to L4 : ϕ1 mm copper wire

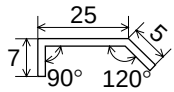
L1 :



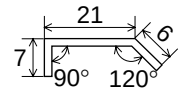
L3 :



L2 :



L4 :



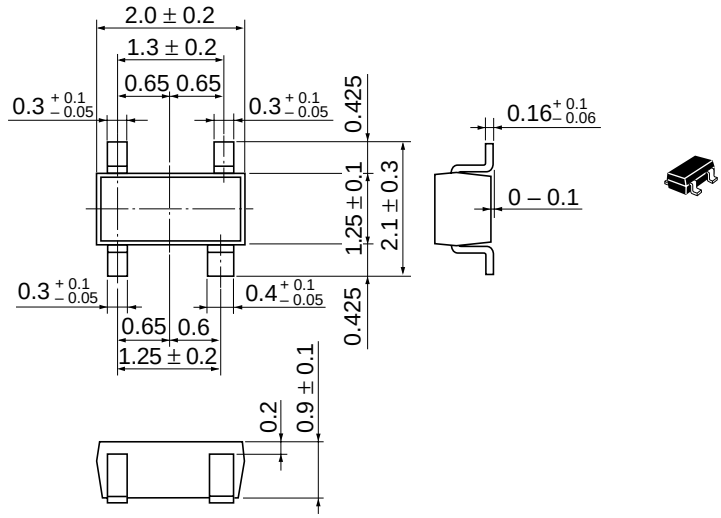
Unit : mm

RFC : 3 turn, 6 mm inside dia (ϕ1 mm enameled copper wire)

Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	CMPAK-4(T)
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.006 g

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