SONY

SGM2016M/P

GaAs N-channel Dual-Gate MES FET

Description

The SGM2016M/P is an N-channel dual-gate GaAs MES FET for UHF-band low-noise amplification. This FET is suitable for a wide range of applications including UHF TV tuners, cellular radios, and DBS IF amplifiers.

Features

- Low voltage operation
- Low noise NF=1.2dB (typ.) at 900MHz
- High gain Ga=21dB (typ.) at 900MHz
- High stability
- Built-in gate protection diode

Application

UHF-band high-frequency amplifier, mixer, and oscillator

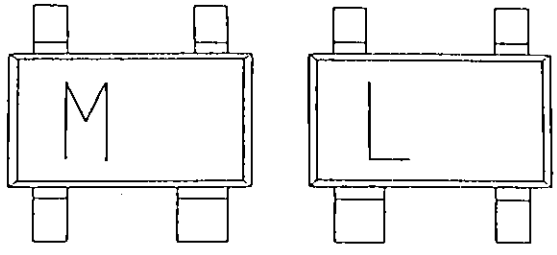
Structure

GaAs, N-channel, dual-gate metal semiconductor field-effect transistor

Absolute Maximum Ratings (Ta=25°C)

• Drain to source voltage	V_{DSX}	12	V
• Gate 1 to source voltage	V_{G1S}	−5	V
• Gate 2 to source voltage	V_{G2S}	−5	V
• Drain current	I_D	55	mA
• Allowable power dissipation	P_D	150	mW
• Channel temperature	Tch	150	°C
• Storage temperature	Tstg	−55 to +150	°C

Marking



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Package Outline

Unit : mm

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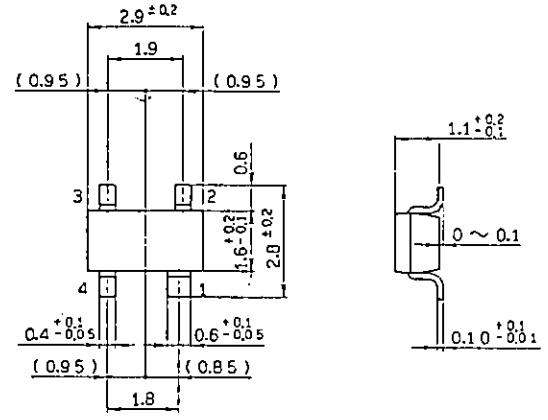

1 : Source
2 : Gate 1
3 : Gate 2
4 : Drain

M-254

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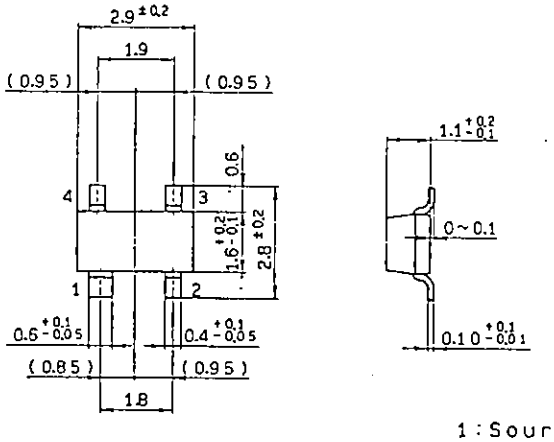

1 : Source
2 : Drain
3 : Gate 2
4 : Gate 1

M-255

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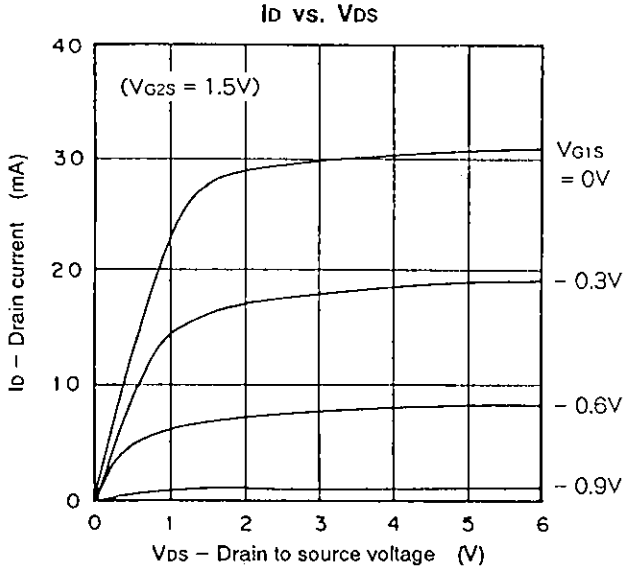
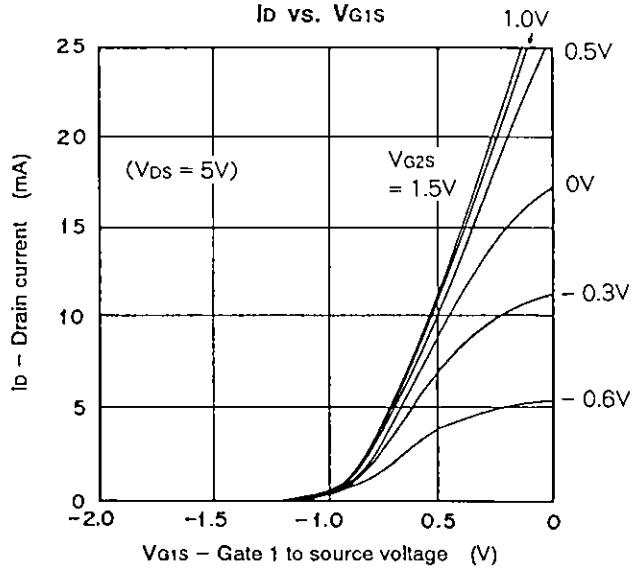
Electrical Characteristics (Ta=25℃)

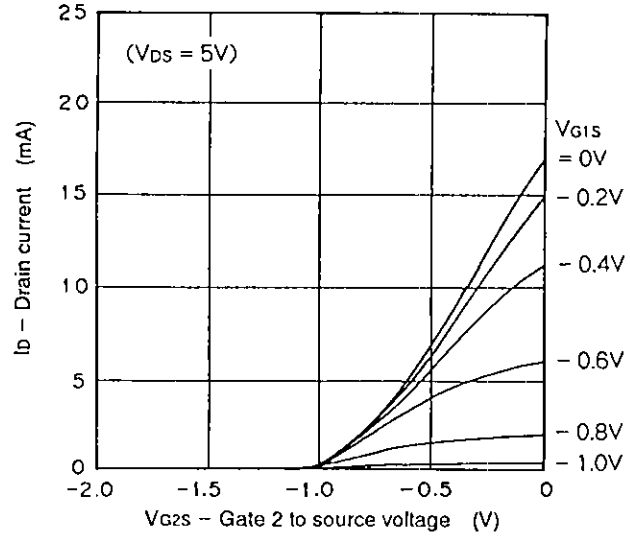
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain cut-off current	I_{DSX}	V_{DS}=12V V_{G1S}=–4V V_{G2S}=0V			50	μA
Gate 1 to source current	I_{G1SS}	V_{G1S}=–4.5V V_{G2S}=0V V_{DS}=0V			–8	μA
Gate 2 to source current	I_{G2SS}	V_{G2S}=–4.5V V_{G1S}=0V V_{DS}=0V			–8	μA
Drain saturation current	I_{DSS}	V_{DS}=5V V_{G1S}=0V V_{G2S}=0V	10		35	mA
Gate 1 to source cut-off voltage	V_{G1S} (OFF)	V_{DS}=5V I_D=100 μA V_{G2S}=0V			–2.5	V
Gate 2 to source cut-off voltage	V_{G2S} (OFF)	V_{DS}=5V I_D=100 μA V_{G1S}=0V			–2.5	V
Forward transfer admittance	gm	V_{DS}=5V I_D=10mA V_{G2S}=1.5V f=1kHz	20	30		mS
Input capacitance	Ciss	V_{DS}=5V I_D=10mA V_{G2S}=1.5V f=1MHz		0.9	2.0	pF
Feedback capacitance	Crss			25	40	fF
Noise figure	NF	V_{DS}=5V I_D=10mA V_{G2S}=1.5V f=900MHz		1.2	2.0	dB
NF associated gain	Ga		17	21		dB

Typical Characteristics (Ta=25℃)

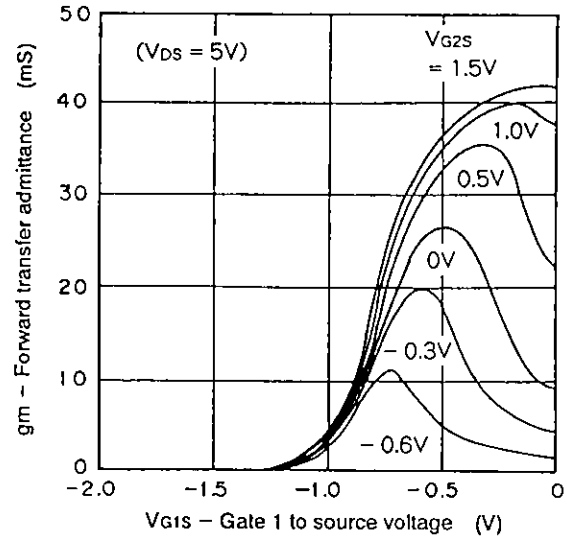




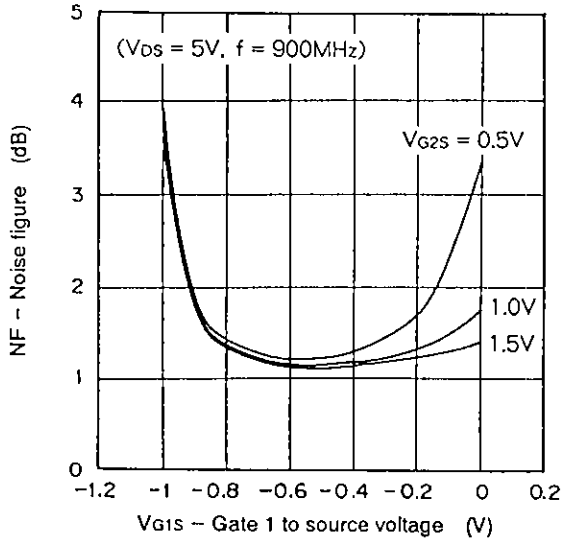
I_D vs. V_{G2S}



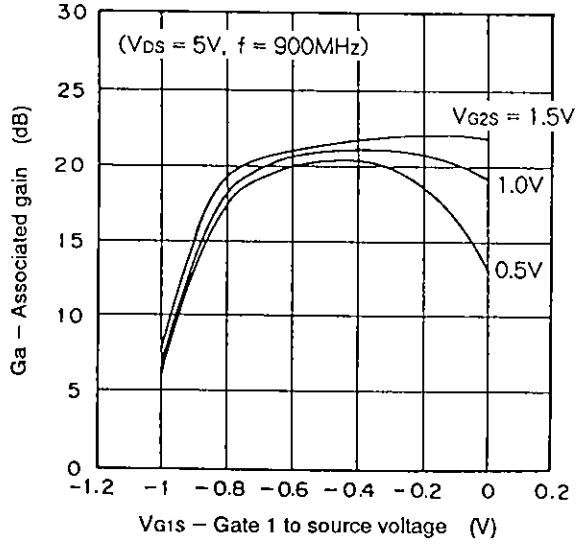
gm vs. V_{G1S}



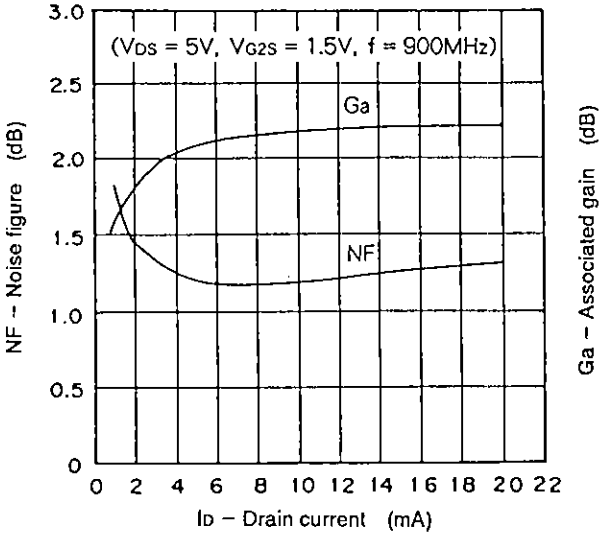
NF vs. V_{G1S}



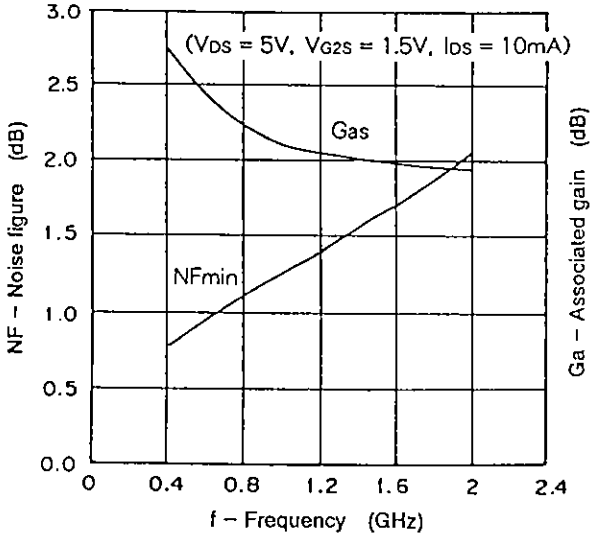
Ga vs. V_{G1S}



NF, Ga vs. I_D



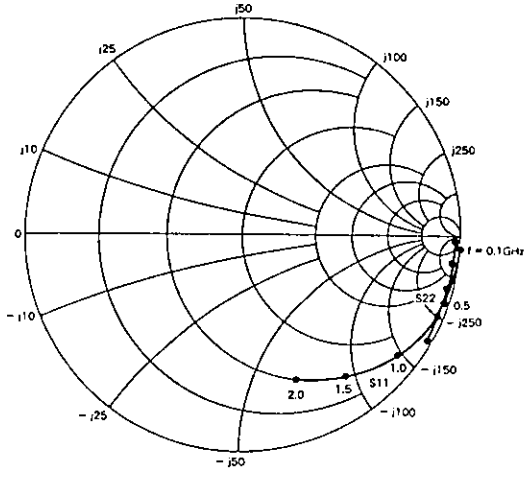
NF, Ga vs. f

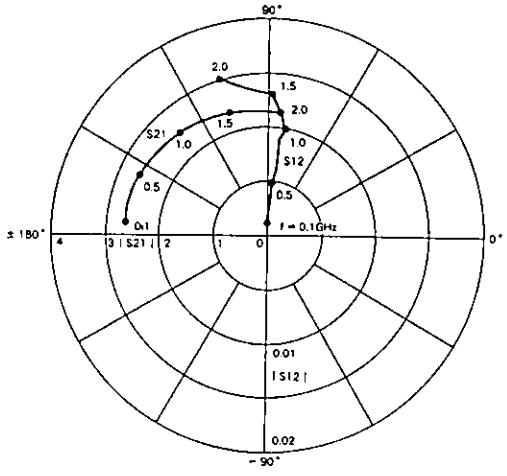


Noise Figure Characteristics (V_{DS}=5V, V_{G2S}=1.5V, I_D=10mA)

f (MHz)	NF min (dB)	Gamma Optimum MAG	Gamma Optimum ANG	Rn (Ω)	Ga (dB)	f (MHz)	NF min (dB)	Gamma Optimum MAG	Gamma Optimum ANG	Rn (Ω)	Ga (dB)
200	0.75	0.92	6.4°	40.2	30.5	1200	1.41	0.66	29.3°	35.4	20.1
300	0.81	0.89	9.3°	39.8	28.7	1300	1.48	0.64	31.3°	34.9	19.9
400	0.87	0.85	11.9°	39.3	27.2	1400	1.56	0.62	33.5°	34.4	19.7
500	0.94	0.82	14.4°	38.9	25.8	1500	1.63	0.60	35.7°	33.8	19.7
600	1.00	0.79	16.8°	38.4	24.5	1600	1.70	0.59	38.1°	33.3	19.8
700	1.07	0.77	19.0°	37.9	23.4	1700	1.78	0.57	40.6°	32.7	20.0
800	1.13	0.74	21.1°	37.4	22.5	1800	1.85	0.55	43.4°	32.2	20.4
900	1.20	0.72	23.2°	36.9	21.7	1900	1.93	0.54	46.3°	31.6	20.9
1000	1.27	0.70	25.2°	36.4	21.0	2000	2.01	0.52	49.4°	31.0	21.4
1100	1.34	0.68	27.2°	35.9	20.5						

S-parameters vs. Frequency Characteristics (V_{DS}=5V, V_{G2S}=1.5V, I_D=10mA)





f (MHz)	S_{11} MAG	S_{11} ANG	S_{21} MAG	S_{21} ANG	S_{12} MAG	S_{12} ANG	S_{22} MAG	S_{22} ANG
100	1.000	–3.7°	2.633	175.1°	.001	92.3°	.974	–1.4°
200	1.000	–7.3°	2.629	170.0°	.002	88.0°	.972	–2.8°
300	.992	–11.1°	2.615	165.0°	.004	86.6°	.977	–4.5°
400	.985	–14.8°	2.603	159.8°	.004	82.1°	.974	–6.0°
500	.977	–18.4°	2.594	154.8°	.005	88.3°	.969	–7.4°
600	.964	–22.2°	2.576	149.9°	.007	83.1°	.972	–8.8°
700	.952	–25.8°	2.557	145.0°	.008	83.0°	.971	–10.3°
800	.940	–29.4°	2.541	139.9°	.009	82.7°	.970	–11.7°
900	.922	–32.9°	2.524	135.5°	.009	83.7°	.966	–13.1°
1000	.905	–36.4°	2.484	130.3°	.010	79.9°	.970	–14.4°
1100	.890	–39.7°	2.460	125.6°	.012	86.3°	.965	–16.1°
1200	.870	–43.2°	2.437	121.0°	.012	83.8°	.968	–17.4°
1300	.851	–46.6°	2.425	116.6°	.012	80.8°	.967	–18.7°
1400	.833	–50.1°	2.403	111.8°	.012	85.4°	.969	–20.1°
1500	.813	–53.2°	2.381	107.3°	.013	88.2°	.969	–21.5°
1600	.791	–56.3°	2.345	102.8°	.013	86.8°	.969	–23.1°
1700	.772	–59.5°	2.333	98.1°	.013	90.3°	.970	–24.6°
1800	.751	–62.6°	2.309	93.5°	.014	93.3°	.971	–25.9°
1900	.733	–65.6°	2.289	89.1°	.014	102.7°	.975	–27.6°
2000	.716	–68.6°	2.281	84.4°	.015	107.5°	.979	–29.1°