

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 $NF=1.2\text{dB}$ (typ.) at 900MHz
- High gain $G_a=21\text{dB}$ (typ.) at 900MHz
- High stability
- Built-in gate protection diode

Application

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

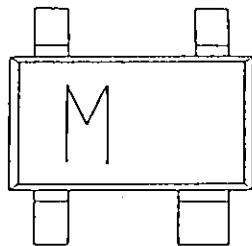
Structure

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

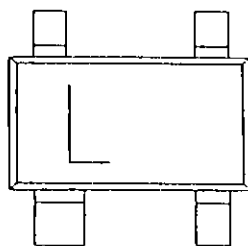
Absolute Maximum Ratings (Ta=25°C)

• 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	T_{ch}	150	°C
• Storage temperature	T_{stg}	-55 to +150	°C

Marking



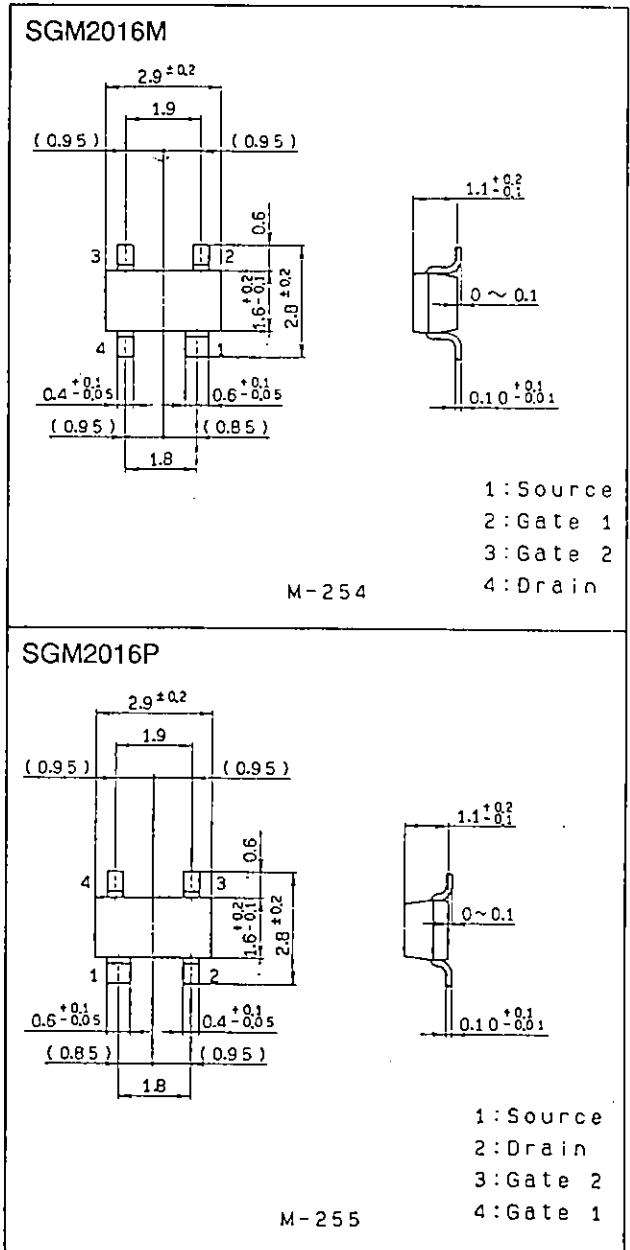
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Package Outline

Unit : mm



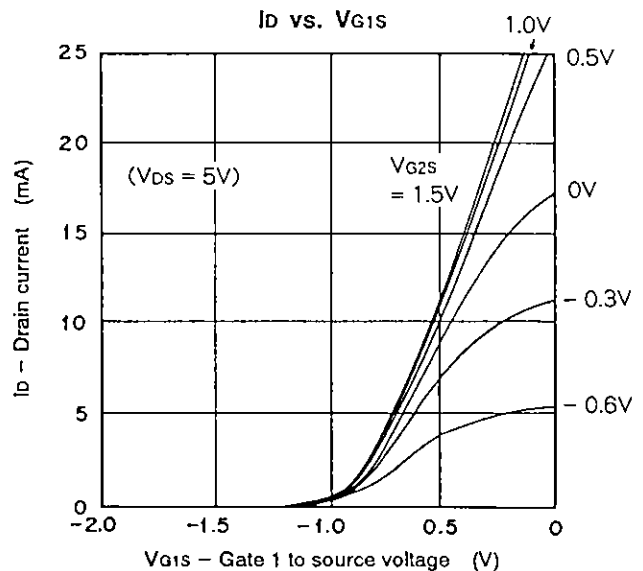
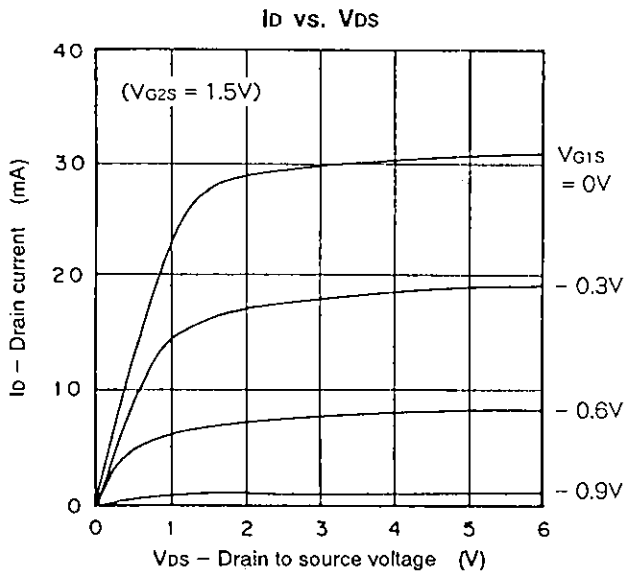
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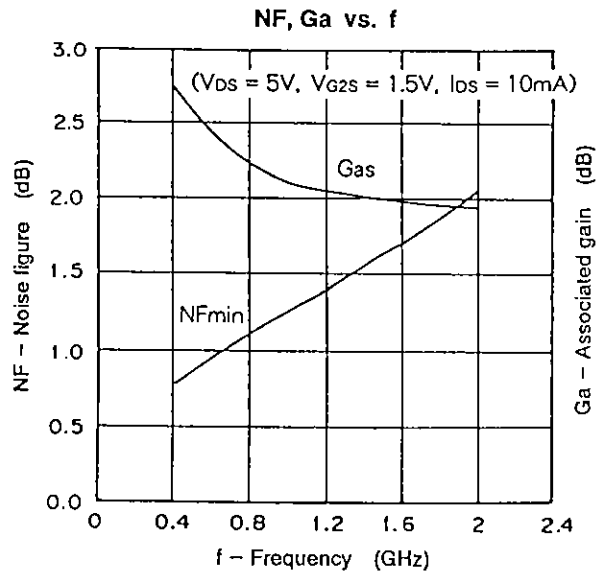
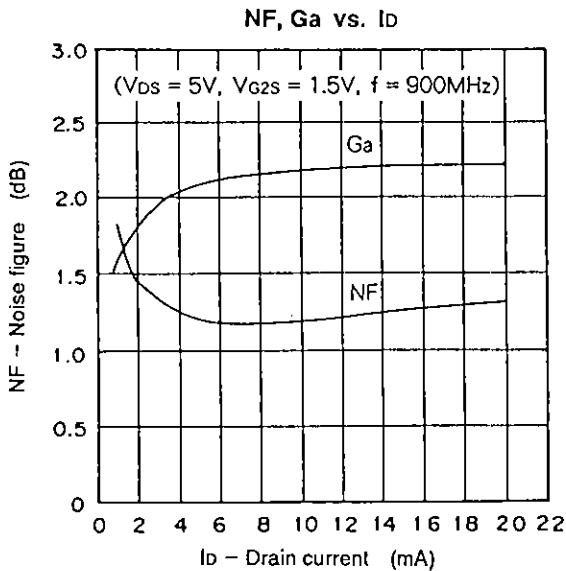
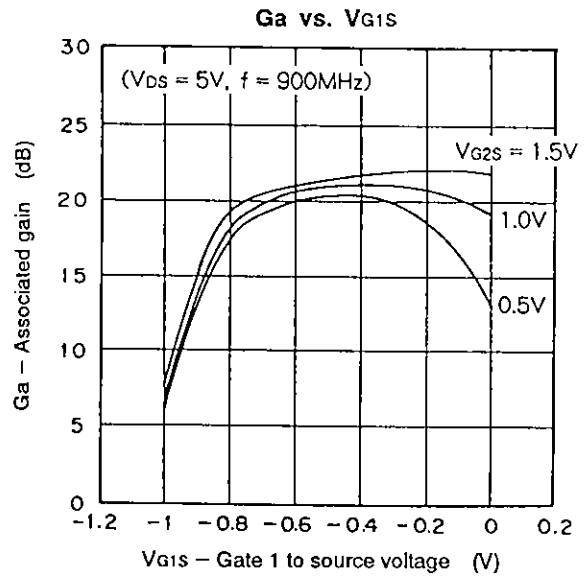
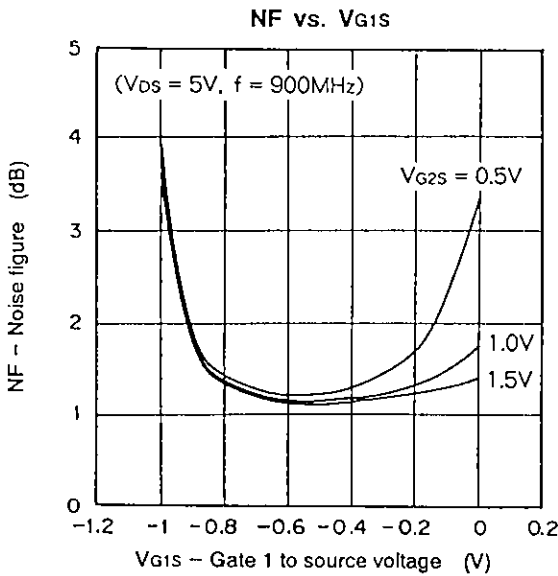
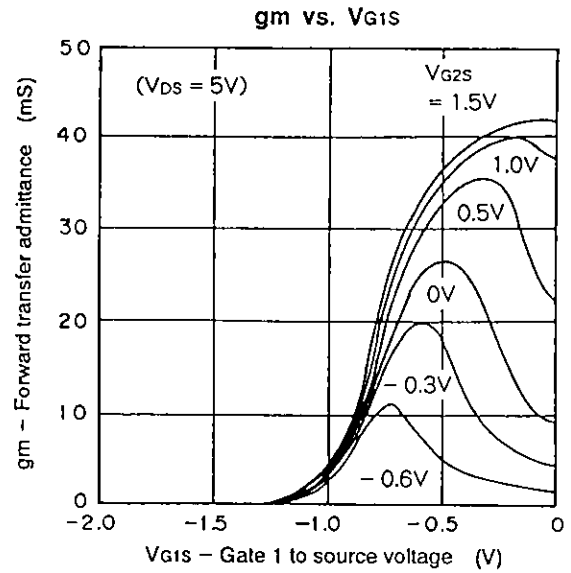
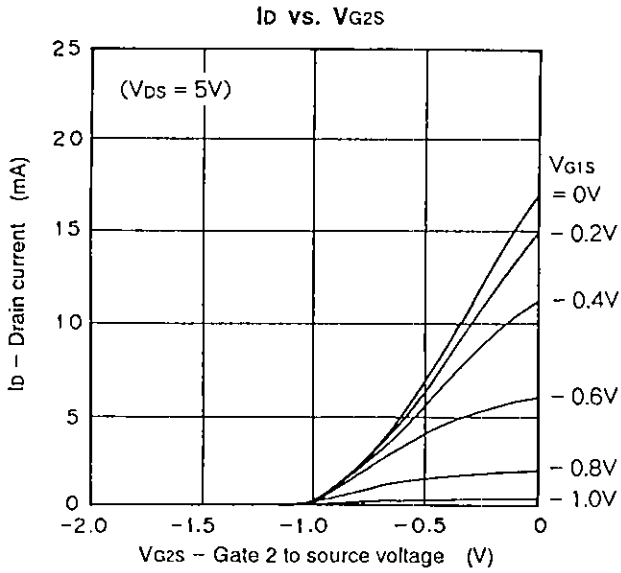
Electrical Characteristics

(Ta=25°C)

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	$V_{G1S} (OFF)$	$V_{DS}=5V$ $I_D=100 \mu A$ $V_{G2S}=0V$			-2.5	V
Gate 2 to source cut-off voltage	$V_{G2S} (OFF)$	$V_{DS}=5V$ $I_D=100 \mu A$ $V_{G1S}=0V$			-2.5	V
Forward transfer admittance	g_m	$V_{DS}=5V$ $I_D=10mA$ $V_{G2S}=1.5V$ $f=1kHz$	20	30		mS
Input capacitance	C_{iss}	$V_{DS}=5V$ $I_D=10mA$ $V_{G2S}=1.5V$ $f=1MHz$		0.9	2.0	pF
Feedback capacitance	C_{rss}	$V_{DS}=5V$ $I_D=10mA$ $V_{G2S}=1.5V$ $f=1MHz$		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	G_a	$V_{DS}=5V$ $I_D=10mA$ $V_{G2S}=1.5V$ $f=900MHz$	17	21		dB

Typical Characteristics (Ta=25°C)

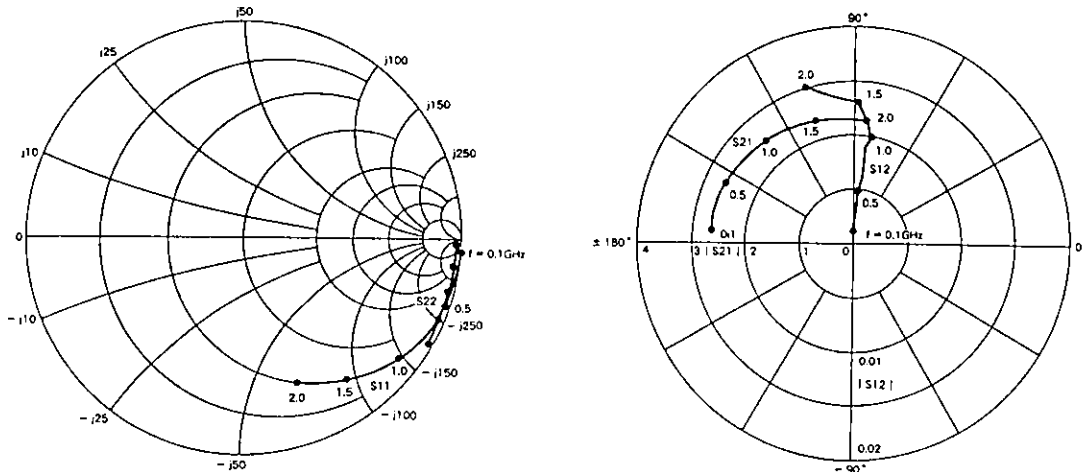




Noise Figure Characteristics ($V_{DS}=5V, V_{GS}=1.5V, I_D=10mA$)

f (MHz)	NF min (dB)	Gamma Optimum		Rn (Ω)	Ga (dB)	f (MHz)	NF min (dB)	Gamma Optimum		Rn (Ω)	Ga (dB)
		MAG	ANG					MAG	ANG		
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 ($V_{DS}=5V, V_{GS}=1.5V, I_D=10mA$)



f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	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°