SONY

SGM2014M

GaAs N-channel Dual Gate MES FET

Description
The SGM2014M 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 TV tuners, cellular radios, and DBS IF amplifiers.

Features
- Low voltage operation
- Low noise: NF=1.5dB (typ.) at 900MHz
- High gain: Ga=18dB (typ.) at 900MHz
- Low cross-modulation
- High stability
- Built-in gate-protection diode
- Standard SOT-143 package

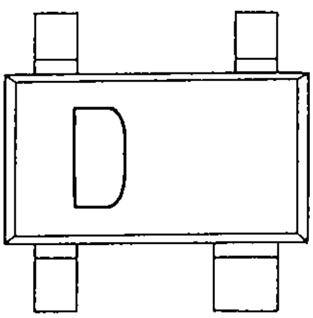
Application
UHF band amplifier, mixer and oscillator

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

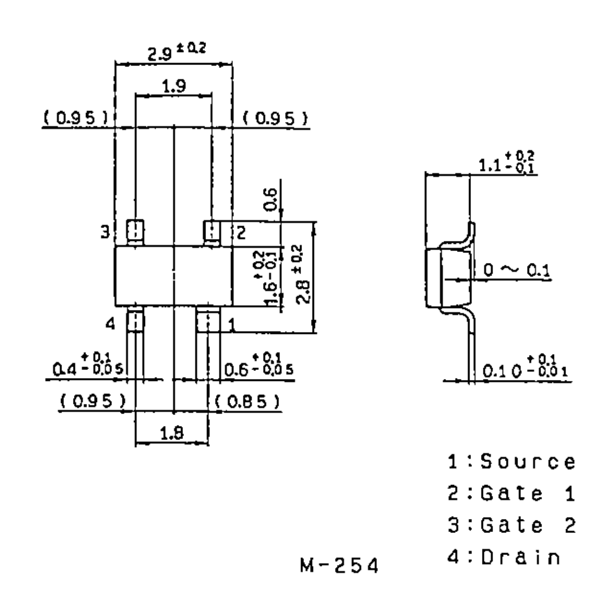
Absolute Maximum Ratings (Ta=25°C)

• 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
• Channel temperature	Tch	150	°C
• Storage temperature	Tstg	–55 to +150	°C
• Allowable power dissipation	P_D	150	mW

Marking



Package Outline
Unit : mm



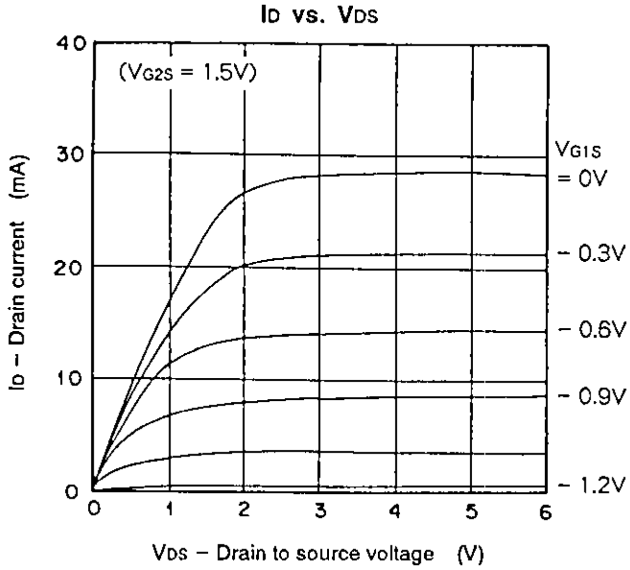
Electrical Characteristics

(Ta=25℃)

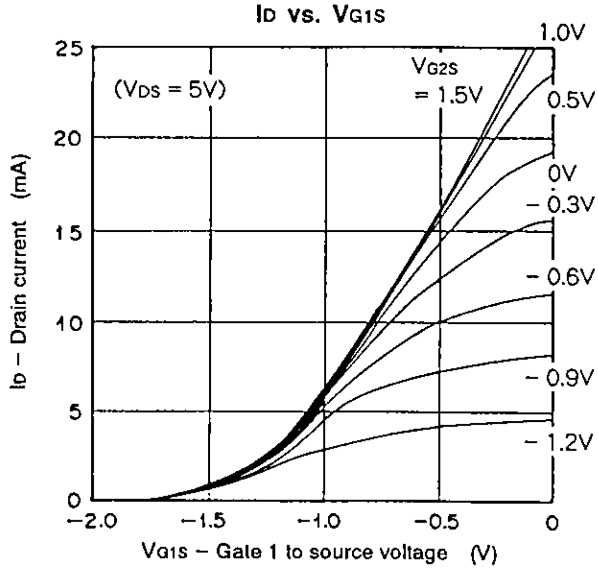
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain cut-off current	I_{DSX}	V_{DS}=12V V_{G1S}=–4V V_{G2S}=0V	50			μA
Gate 1 to source current	I_{G1SS}	V_{G1S}=–4.5V V_{G2S}=0V V_{DS}=0V			–8	μA
Gate 2 to source current	I_{G2SS}	V_{G2S}=–4.5V V_{G1S}=0V V_{DS}=0V			–8	μA
Drain saturation current	I_{DSS}	V_{DS}=5V V_{G1S}=0V V_{G2S}=0V	8		28	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	13	17		mS
Input capacitance	Ciss	V_{DS}=5V I_D=10mA V_{G2S}=1.5V f=1MHz		0.9	2	pF
Feedback capacitance	Crss			25	50	fF
Noise figure	NF	V_{DS}=5V I_D=10mA V_{G2S}=1.5V f=900MHz		1.5	2.5	dB
Associated gain	Ga		15	18		dB

Typical Characteristics (Ta=25℃)

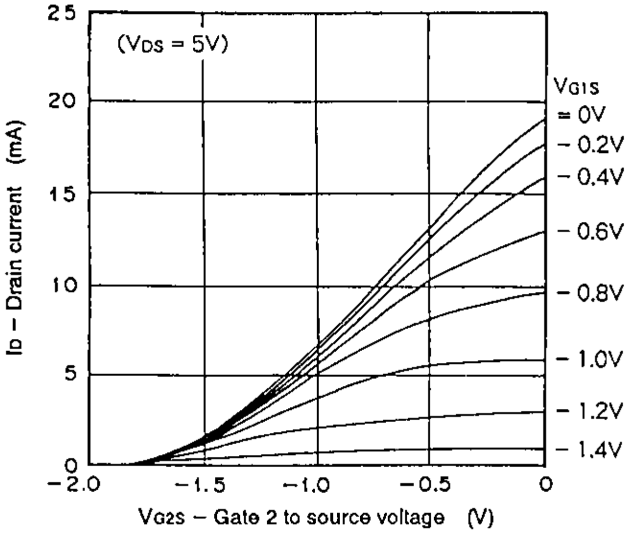
I_D vs. V_{DS}



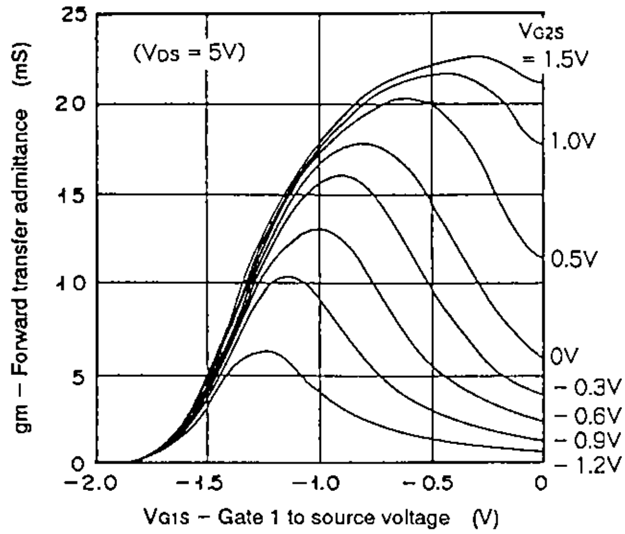
I_D vs. V_{G1S}



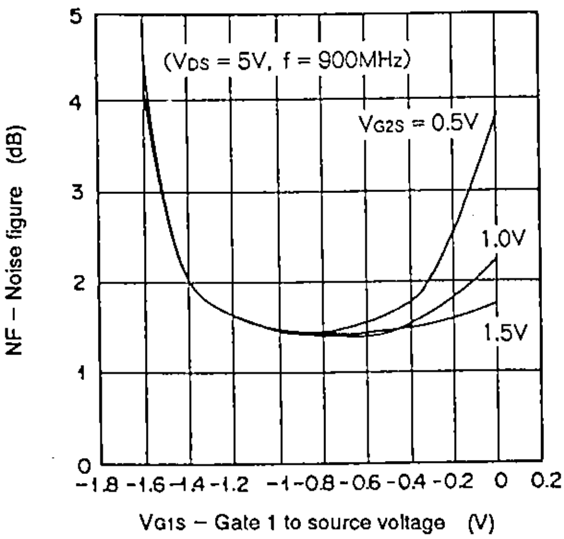
ID vs. VG2S



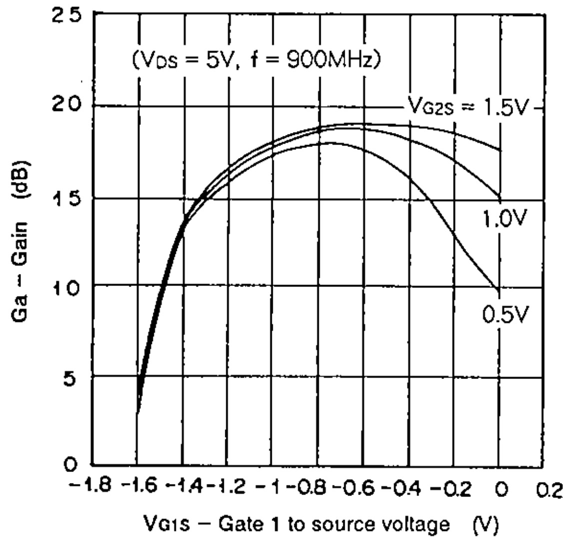
gm vs. VG1S



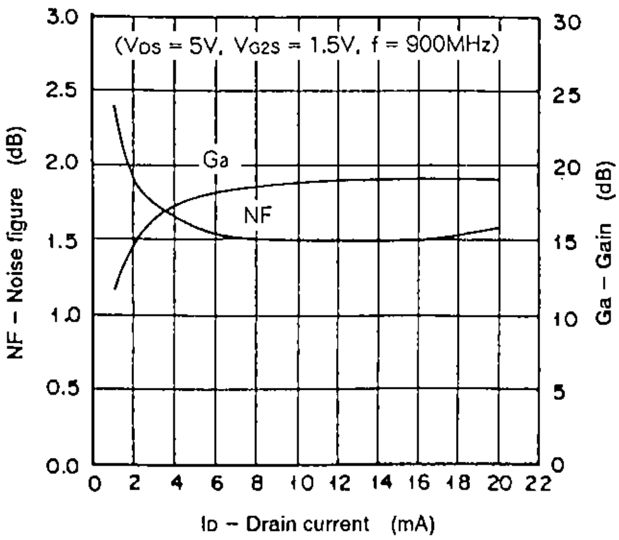
NF vs. VG1S



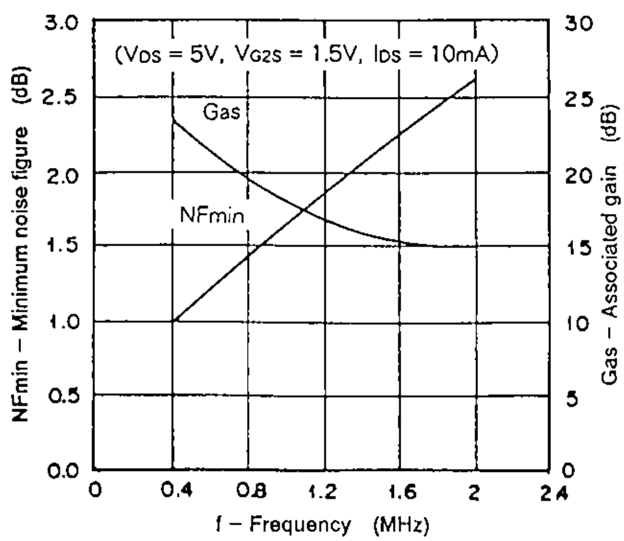
Ga vs. VG1S



NF, Ga vs. ID

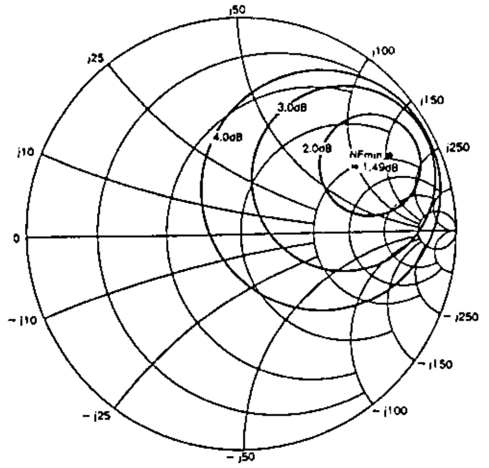


NF, Ga vs. f



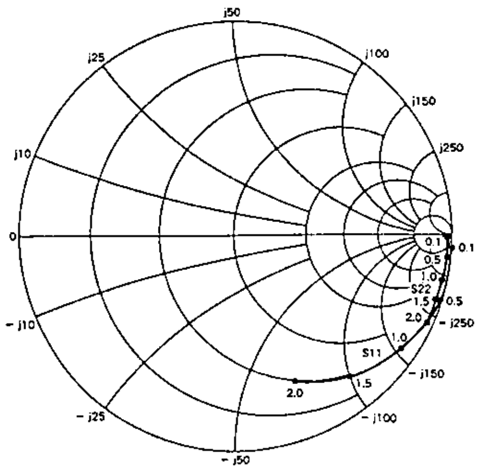
Noise Figure Characteristics (V_{DS}=5V, V_{G2S}=1.5V, I_D=10mA)

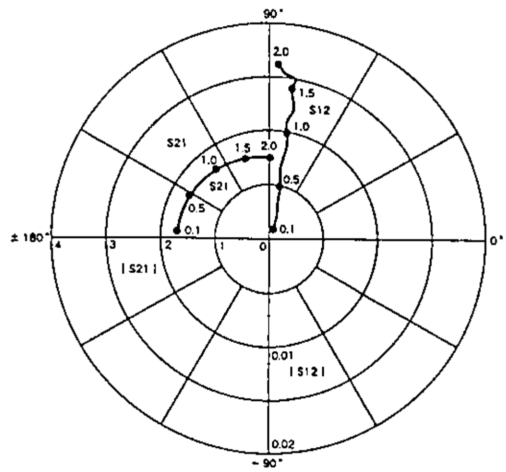
at 900MHz



f (MHz)	Ga (dB)	NFmin (dB)	NF_{50} (dB)	Rn (Ω)	Γ (S) MAG	Γ (S) ANG
600	21.2	1.18	3.32	53.4	0.83	15.7°
700	20.3	1.28	3.31	52.7	0.81	18.1°
800	19.4	1.38	3.30	52.0	0.78	20.4°
900	18.7	1.49	3.30	51.2	0.76	22.7°
1000	18.0	1.59	3.30	50.5	0.74	25.0°

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	−3.4°	1.706	175.5°	.001	71.9°	.979	−1.2°
200	1.000	−6.8°	1.709	170.3°	.002	88.6°	.979	−2.5°
300	.996	−10.4°	1.695	165.7°	.003	75.7°	.978	−3.7°
400	.998	−13.8°	1.702	161.1°	.004	86.4°	.979	−4.9°
500	.987	−17.3°	1.691	156.1°	.005	79.1°	.980	−6.1°
600	.977	−20.8°	1.686	151.4°	.006	81.1°	.978	−7.4°
700	.967	−24.2°	1.678	146.8°	.007	81.8°	.975	−8.5°
800	.953	−27.6°	1.664	141.9°	.008	80.2°	.974	−9.8°
900	.936	−30.9°	1.654	137.6°	.009	79.8°	.971	−11.0°
1000	.923	−34.5°	1.643	132.9°	.010	80.6°	.971	−12.3°
1100	.906	−37.9°	1.622	127.9°	.011	80.9°	.968	−13.8°
1200	.891	−41.2°	1.619	123.8°	.011	82.5°	.972	−14.5°
1300	.872	−44.6°	1.607	119.4°	.012	79.4°	.971	−15.6°
1400	.855	−48.0°	1.596	114.9°	.013	79.7°	.971	−16.9°
1500	.834	−51.1°	1.583	110.4°	.014	81.6°	.971	−18.1°
1600	.814	−54.5°	1.567	106.0°	.013	81.4°	.967	−19.2°
1700	.792	−57.6°	1.556	101.6°	.014	80.0°	.967	−20.3°
1800	.771	−60.8°	1.541	97.2°	.015	80.1°	.966	−21.6°
1900	.752	−64.0°	1.528	93.1°	.015	82.3°	.966	−22.9°
2000	.731	−67.3°	1.517	88.7°	.016	87.6°	.968	−24.1°