

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

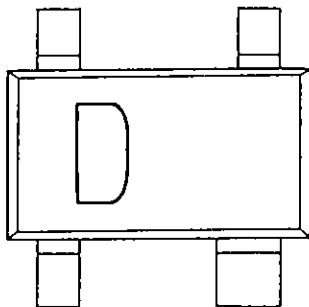
Structure

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

Absolute Maximum Ratings (Ta=25°C)

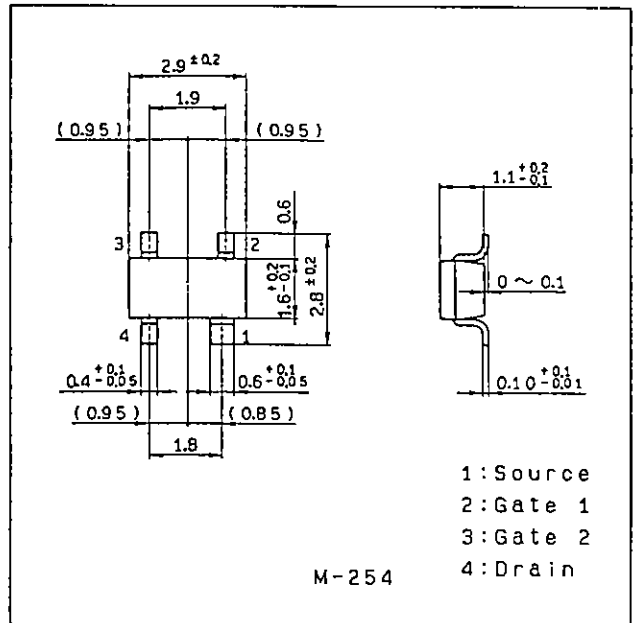
• Drain to source voltage	V _{DSX}	12	V
• Gate 1 to source voltage	V _{G1S}	-5	V
• Gate 2 to source voltage	V _{G2S}	-5	V
• Drain current	I _D	55	mA
• Channel temperature	T _{CH}	150	°C
• Storage temperature	T _{STG}	-55 to +150	°C
• Allowable power dissipation	P _D	150	mW

Marking



Package Outline

Unit : mm



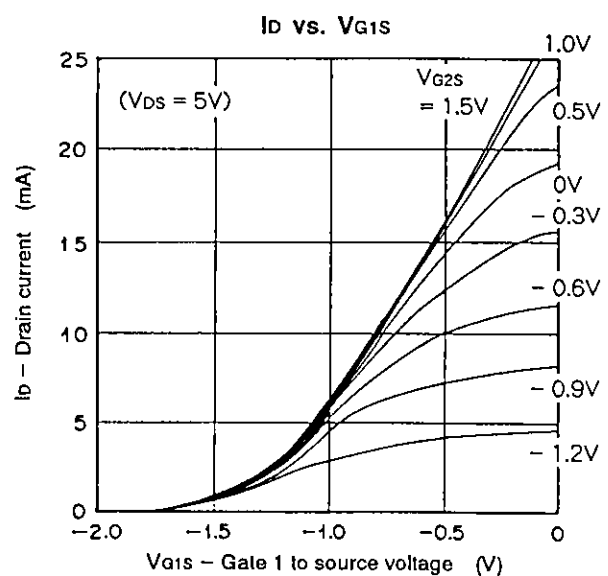
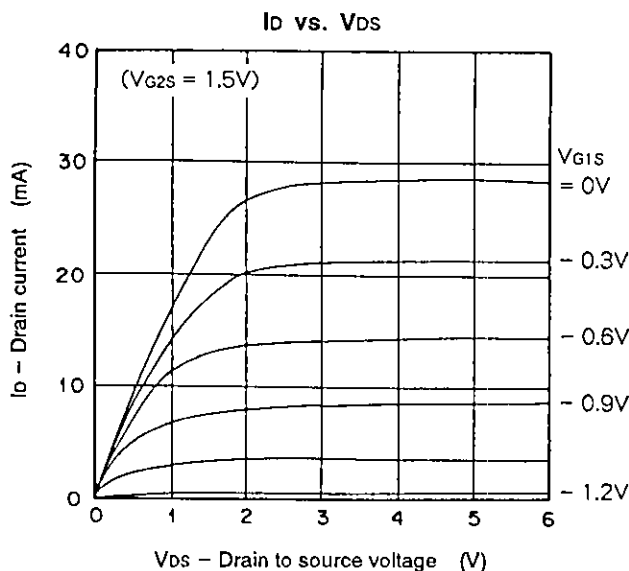
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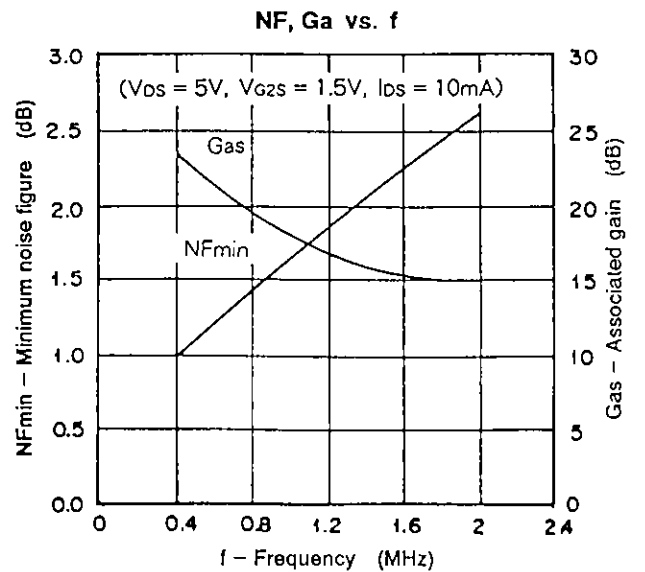
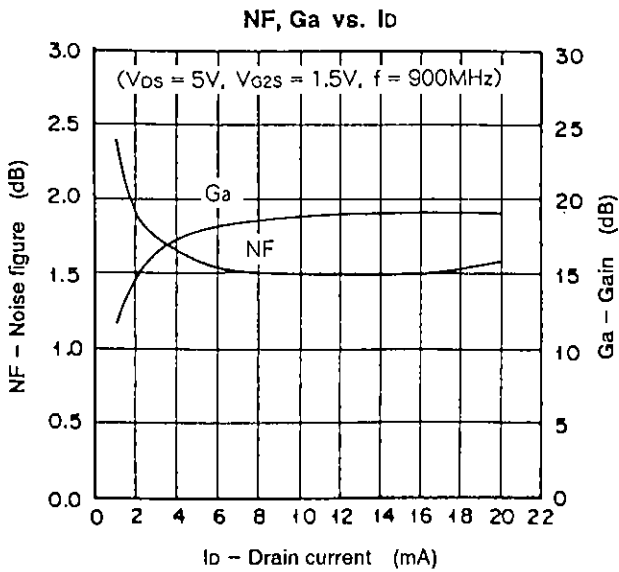
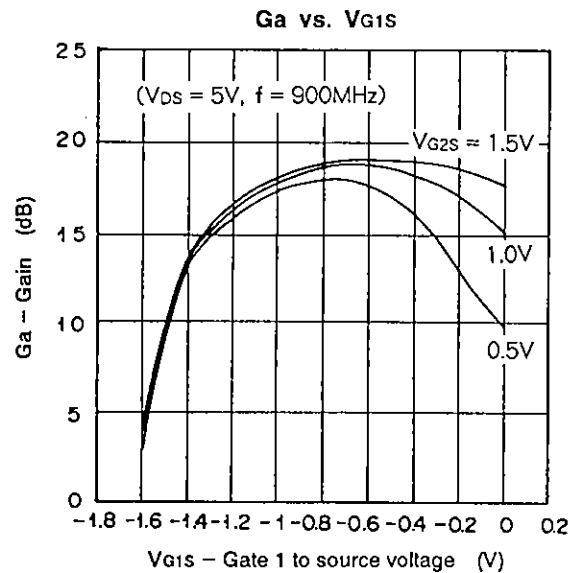
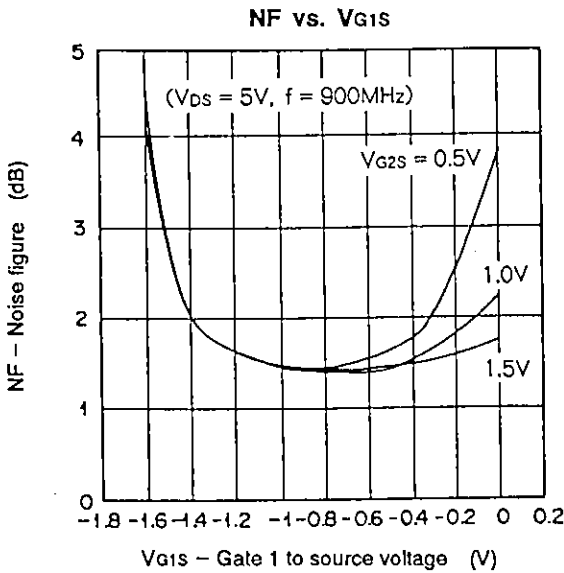
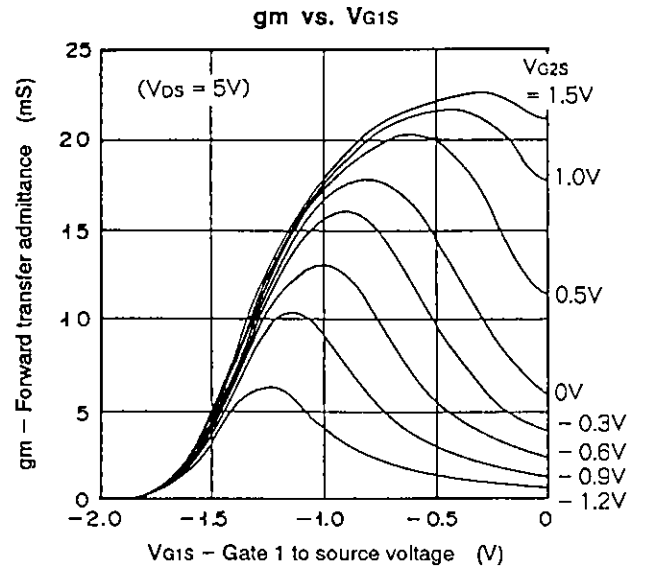
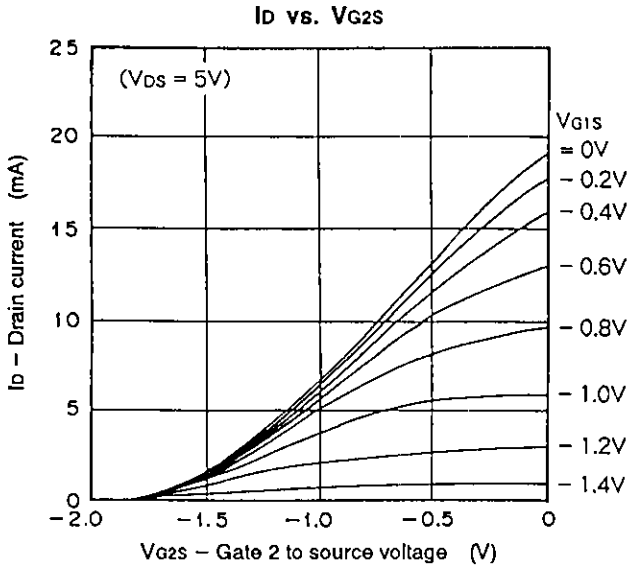
Electrical Characteristics

(Ta=25°C)

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	g _m	V _{DS} =5V I _D =10mA V _{G2S} =1.5V f=1kHz	13	17		mS
Input capacitance	C _{iss}	V _{DS} =5V I _D =10mA		0.9	2	pF
Feedback capacitance	C _{rss}	V _{G2S} =1.5V f=1MHz		25	50	fF
Noise figure	NF	V _{DS} =5V I _D =10mA V _{G2S} =1.5V		1.5	2.5	dB
Associated gain	G _a	f=900MHz	15	18		dB

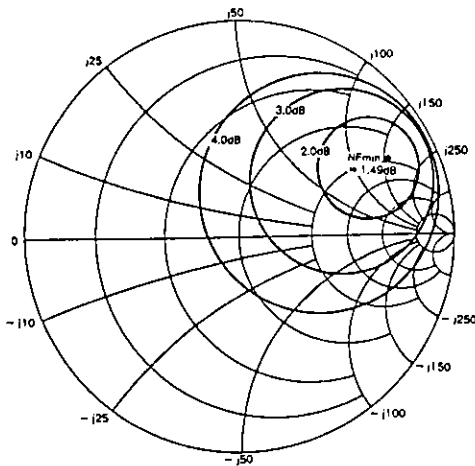
Typical Characteristics (Ta=25°C)





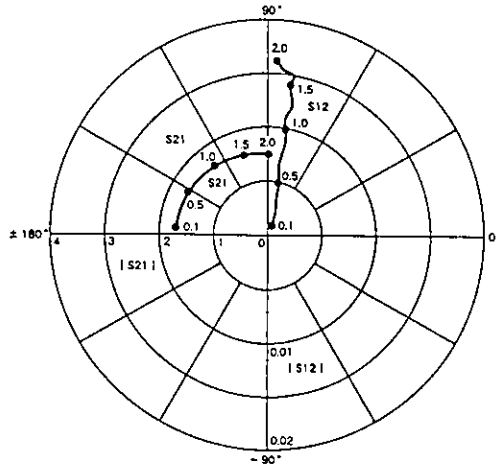
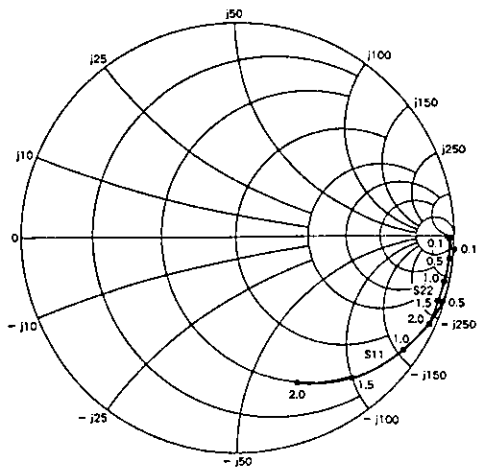
Noise Figure Characteristics (V_{DS}=5V, V_{G2S}=1.5V, I_D=10mA)

at 900MHz



f (MHz)	Ga (dB)	NFmin (dB)	NF ₅₀ (dB)	Rn (Ω)	Γ (S)	
					MAG	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		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	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°