

# MGF1908A

TAPE CARRIER LOW NOISE GaAs FET

## DESCRIPTION

The MGF1908A is a low noise GaAs FET with an N-channel Schottky gate, which is designed for use in S to X band amplifiers and oscillators. The hermetically sealed metal-ceramic package assures minimum parasitic losses, and has a configuration suitable for microstrip circuits. The MGF1908A is mounted in the Super 12 tape, and is electrically equivalent to MGF1303B.

## FEATURES

- Low Noise Figure  
NF<sub>min.</sub> = 2.3dB (MAX.) @ f=12GHz
- High Associated gain  
G<sub>s</sub>=8.0dB (MIN.) @ f=12GHz

## APPLICATION

S to Ku band low noise amplifiers

## QUALITY GRADE

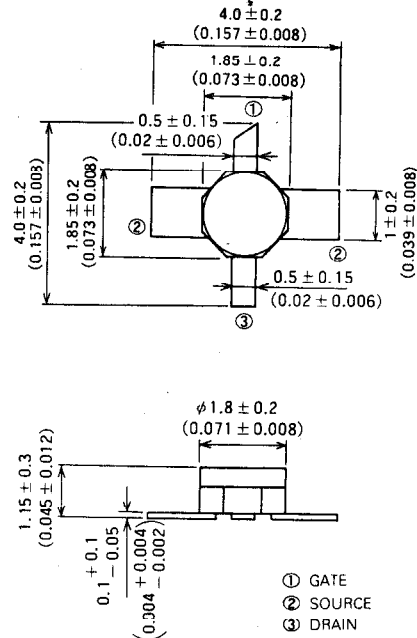
- General Grade (GG)

## RECOMMENDED BIAS CONDITIONS

V<sub>DS</sub>=3V, I<sub>D</sub>=10mA

## Outline Drawing

Unit: millimeters (inches)



GD-16

## ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
V <sub>GDO</sub>	Gate to drain voltage	-6	V
V <sub>GSO</sub>	Gate to source voltage	-6	V
I <sub>D</sub>	Drain current	80	mA
PT	Total power dissipation	240	mW
T <sub>ch</sub>	Channel temperature	175	°C
T <sub>stg</sub>	Storage temperature	-65 ~ +175	°C

Keep safety first in your circuit designs!

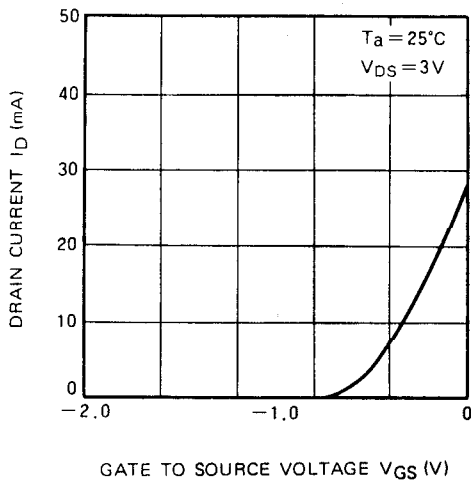
MITSUBISHI ELECTRIC Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designed, with appropriate measure such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction mishap.

## ELECTRICAL CHARACTERISTICS (Ta=25°C)

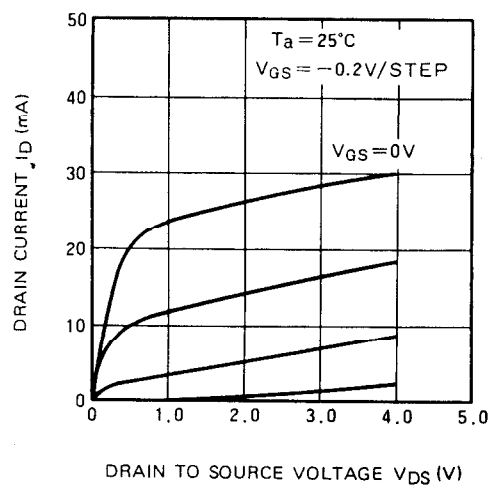
Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
V <sub>(BR)GDO</sub>	Gate to drain breakdown voltage	I <sub>G</sub> =-100 μA	-6	--	--	V
V <sub>(BR)GSO</sub>	Gate to source breakdown voltage	I <sub>G</sub> =-100 μA	-6	--	--	V
I <sub>GSS</sub>	Gate to source leakage current	V <sub>GS</sub> =-3V, V <sub>DS</sub> =0V	--	--	10	μA
I <sub>DSS</sub>	Saturated drain current	V <sub>GS</sub> =0V, V <sub>DS</sub> =3V	15	--	80	mA
V <sub>GS(off)</sub>	Gate to source cut-off voltage	V <sub>DS</sub> =3V, I <sub>D</sub> =100 μA	-0.3	--	-3.5	V
gm	Transconductance	V <sub>DS</sub> =3V, I <sub>D</sub> =10mA	20	--	--	mS
G <sub>s</sub>	Associated gain	V <sub>DS</sub> =2V, I <sub>D</sub> =10mA	8	--	--	dB
NF <sub>min.</sub>	Minimum noise figure	f=12GHz	--	--	2.3	dB

**TYPICAL CHARACTERISTICS**

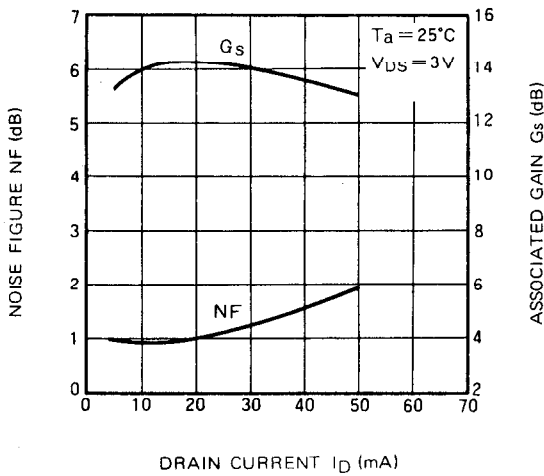
**$I_D$  vs.  $V_{GS}$**



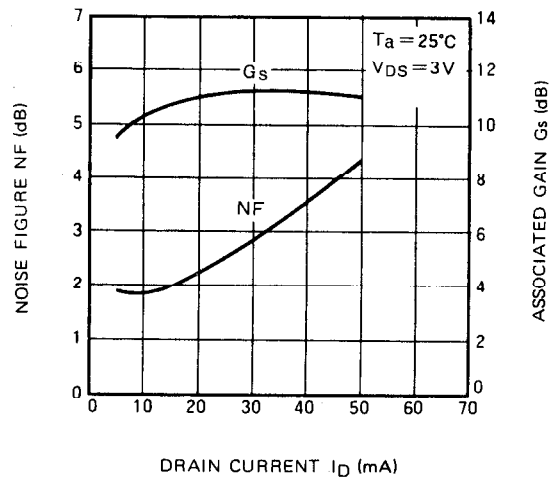
**$I_D$  vs.  $V_{DS}$**



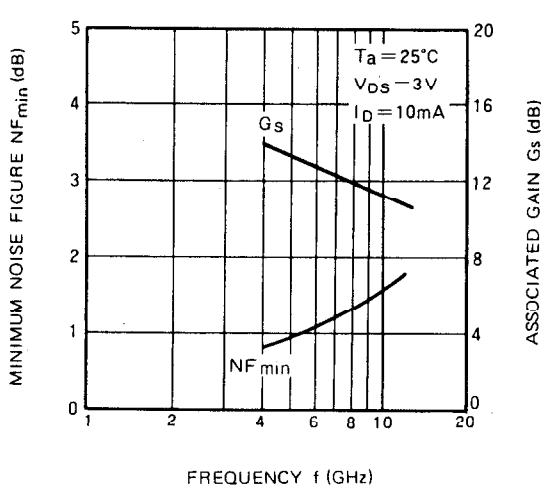
**NF &  $G_s$  vs.  $I_D$   
( $f = 4\text{ GHz}$ )**



**NF &  $G_s$  vs.  $I_D$   
( $f = 12\text{ GHz}$ )**

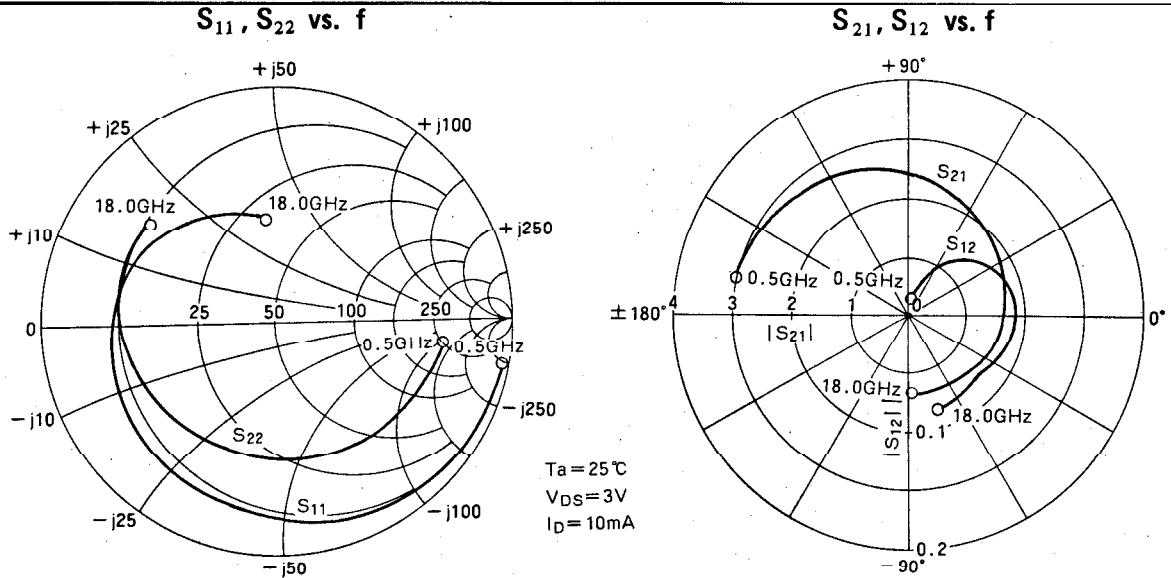


**$NF_{min}$  &  $G_s$  vs.  $f$**



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## S PARAMETERS (Ta=25°C, VDS=3V, ID=10mA)

Freq. (GHz)	S11		S21		S12		S22		K	MSG/MAG (dB)
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.		
0.5	0.995	-12.1	2.991	167.7	0.016	77.1	0.728	-9.0	0.125	22.7
1.0	0.984	-21.8	2.937	158.6	0.026	71.3	0.708	-16.6	0.163	20.5
1.5	0.973	-31.5	2.883	149.5	0.036	65.5	0.688	-24.2	0.179	19.0
2.0	0.962	-41.2	2.829	140.4	0.046	59.7	0.668	-31.8	0.189	17.9
2.5	0.942	-50.5	2.762	131.5	0.054	52.9	0.657	-39.1	0.249	17.1
3.0	0.921	-59.9	2.696	122.6	0.061	46.0	0.646	-46.4	0.299	16.4
3.5	0.900	-69.2	2.629	113.6	0.069	39.2	0.636	-53.7	0.344	15.8
4.0	0.880	-78.5	2.563	104.7	0.077	32.3	0.625	-61.0	0.385	15.2
4.5	0.860	-87.1	2.479	96.4	0.080	26.3	0.614	-68.2	0.432	14.9
5.0	0.840	-95.7	2.395	88.1	0.084	20.4	0.604	-75.5	0.482	14.6
5.5	0.821	-104.3	2.311	79.8	0.087	14.4	0.593	-82.7	0.534	14.3
6.0	0.801	-112.9	2.227	71.5	0.090	8.4	0.582	-89.9	0.589	13.9
6.5	0.787	-119.8	2.146	64.2	0.089	3.9	0.581	-96.7	0.639	13.8
7.0	0.773	-126.7	2.066	57.0	0.089	-0.6	0.581	-103.4	0.694	13.7
7.5	0.759	-133.5	1.985	49.7	0.088	-5.1	0.580	-110.2	0.757	13.5
8.0	0.745	-140.4	1.905	42.4	0.087	-9.6	0.579	-116.9	0.827	13.4
8.5	0.735	-146.1	1.857	36.1	0.086	-12.2	0.580	-122.2	0.877	13.4
9.0	0.725	-151.8	1.808	29.8	0.084	-14.9	0.581	-127.6	0.933	13.3
9.5	0.714	-157.4	1.760	23.4	0.083	-17.5	0.583	-132.9	0.993	13.3
10.0	0.704	-163.1	1.712	17.1	0.082	-20.1	0.584	-138.2	1.059	11.7
10.5	0.694	-169.2	1.675	10.6	0.081	-23.3	0.596	-143.7	1.088	11.3
11.0	0.685	-175.4	1.637	4.2	0.081	-26.5	0.607	-149.2	1.116	11.0
11.5	0.675	-178.5	1.600	-2.3	0.080	-29.7	0.619	-154.7	1.145	10.7
12.0	0.665	-172.4	1.563	-8.8	0.079	-32.9	0.631	-160.2	1.174	10.4
12.5	0.653	-167.0	1.531	-14.7	0.078	-34.4	0.636	-165.5	1.229	10.1
13.0	0.641	-161.5	1.498	-20.7	0.077	-35.9	0.642	-170.9	1.288	9.7
13.5	0.629	-156.1	1.466	-26.6	0.075	-37.3	0.647	-176.2	1.352	9.4
14.0	0.617	-150.6	1.434	-32.5	0.074	-38.8	0.653	-178.5	1.420	9.0
14.5	0.601	-144.4	1.426	-38.9	0.075	-42.4	0.659	-173.9	1.444	8.9
15.0	0.586	-138.3	1.418	-45.2	0.076	-46.1	0.664	-169.3	1.465	8.7
15.5	0.571	-132.1	1.409	-51.6	0.076	-49.7	0.670	-164.6	1.484	8.5
16.0	0.555	-125.9	1.401	-57.9	0.077	-53.3	0.675	-160.0	1.501	8.4
16.5	0.526	-117.9	1.386	-65.3	0.079	-58.1	0.674	-155.0	1.576	8.0
17.0	0.497	-110.0	1.371	-72.6	0.080	-62.9	0.674	-150.0	1.646	7.6
17.5	0.468	-102.0	1.356	-80.0	0.082	-67.6	0.673	-144.9	1.713	7.3
18.0	0.439	-94.0	1.341	-87.3	0.084	-72.4	0.672	-139.9	1.776	6.9

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**NOISE PARAMETERS** ( $V_{DS}=3V$ ,  $I_D=10mA$ )

Freq. (GHz)	$\Gamma_{opt.}$		Rn ( $\Omega$ )	NF min. (dB)
	Magn.	Angle (deg.)		
1	0.768	12.1	19.3	0.67
2	0.732	21.0	18.9	0.72
3	0.714	37.2	18.4	0.78
4	0.688	52.0	18.0	0.83
5	0.665	66.3	17.3	0.98
6	0.650	79.1	16.7	1.13
7	0.633	90.6	16.1	1.27
8	0.617	102.2	15.5	1.42
9	0.597	112.4	14.9	1.52
10	0.575	123.5	14.2	1.62
11	0.550	134.8	13.6	1.73
12	0.523	146.3	13.0	1.83
13	0.503	160.0	14.2	1.94
14	1.475	174.2	15.5	2.05
15	0.441	-171.9	16.6	2.12
16	0.420	-155.0	17.8	2.20
17	0.394	-138.1	18.9	2.28
18	0.372	-112.2	20.0	2.35

**G<sub>LP</sub> and P<sub>1dB</sub>** ( $T_a=25^\circ C$ ,  $V_D=3V$ ,  $I_D=10mA$ )

	f=4GHz	f=12GHz
G <sub>LP</sub> (dB)	15.5	11.1
P <sub>1dB</sub> (dBm)	11.6	9.8