

# MGF431xG

Super Low Noise InGaAs HEMT

## DESCRIPTION

The MGF431xG series super-low-noise HEMT(High Electron Mobility Transistor) is designed for use in L to K band amplifiers. The hermetically sealed metal-ceramic package assures minimum parasitic losses, and has a configuration suitable for microstrip circuits.

## FEATURES

- Low noise figure @ f=12GHz  
MGF4316G : NF min.=0.80dB (MAX.)  
MGF4319G : NF min.=0.50dB (MAX.)
- High associated gain @ f=12GHz  
Gs=12.0 dB (MIN.)

## APPLICATION

L to K band low noise amplifiers.

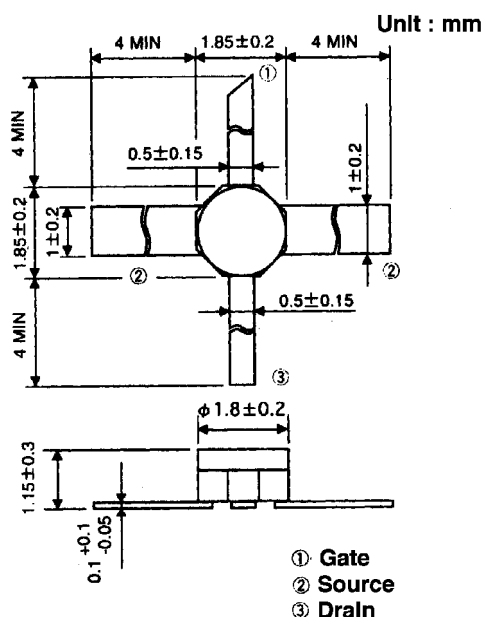
## QUALITY GRADE

- GG

## RECOMMENDED BIAS CONDITIONS

- V<sub>DS</sub>=2V , I<sub>D</sub>=10mA
- Refer to Bias Procedure

## OUTLINE DRAWING



GD-4

- ① Gate
- ② Source
- ③ Drain

## ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
V <sub>GDO</sub>	Gate to drain voltage	-4	V
V <sub>GSO</sub>	Gate to source voltage	-4	V
I <sub>D</sub>	Drain current	60	mA
P <sub>T</sub>	Total power dissipation	50	mW
T <sub>ch</sub>	Channel temperature	125	°C
T <sub>stg</sub>	Storage temperature	-65 ~ +125	°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 designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction or mishap.

## ELECTRICAL CHARACTERISTICS (Ta=25°C)

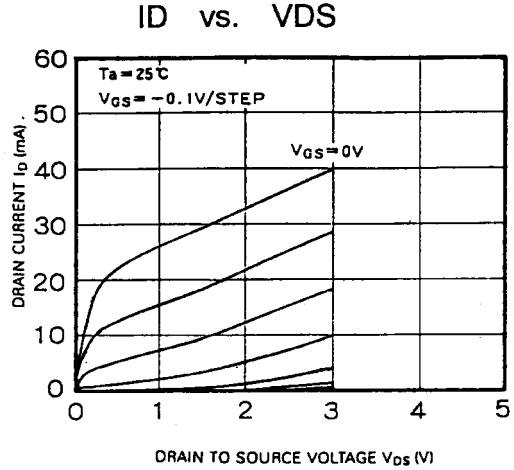
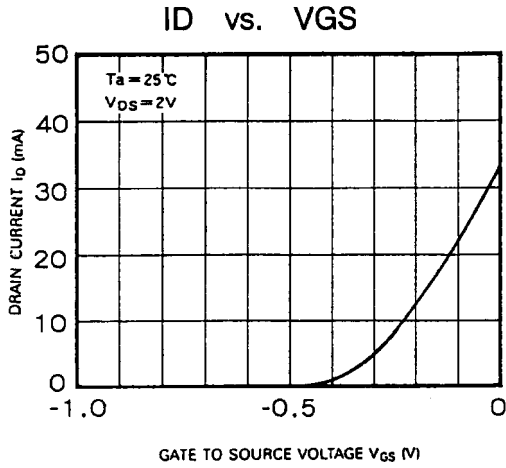
Symbol	Parameter	Test conditions	Limits			Unit	
			Min.	Typ.	Max		
V <sub>(BR)GDO</sub>	Gate to drain breakdown voltage	I <sub>G</sub> = -10μA	-3	—	—	V	
I <sub>GSS</sub>	Gate to source leakage current	V <sub>GS</sub> = -2V, V <sub>DS</sub> =0V	—	—	50	μA	
I <sub>DSS</sub>	Saturated drain current	V <sub>GS</sub> =0V, V <sub>DS</sub> =2V	15	—	60	mA	
V <sub>GS(off)</sub>	Gate to Source cut-off voltage	V <sub>DS</sub> =2V, I <sub>D</sub> =500μA	-0.1	—	-1.5	V	
g <sub>m</sub>	Transconductance	V <sub>DS</sub> =2V, I <sub>D</sub> =10mA	—	75	—	mS	
G <sub>s</sub>	Associated gain	V <sub>DS</sub> =2V, I <sub>D</sub> =10mA, f=12GHz	12	13.5	—	dB	
NF <sub>min</sub>	Minimum noise figure	V <sub>DS</sub> =2V, I <sub>D</sub> =10mA, f=12GHz	MGF4316G	—	—	0.8	dB
			MGF4319G	—	—	0.5	
R <sub>th(ch-a)</sub>	Thermal resistance	*1 Vf method	—	625	—	°C/W	

\*1 : Channel to ambient

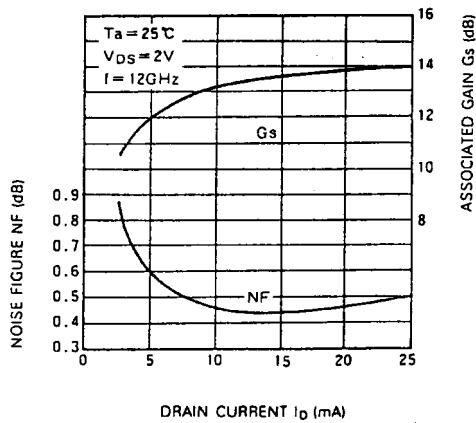
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## Typical Characteristics



## NF & Gs vs. ID (f=12GHz)



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## Typical Characteristics

### S Parameters (Ta=25°C , VDS=2V , ID=10mA )

f (GHz)	S11		S21		S12		S22		MSG/MAG (dB)	K
	Magn.	Angle	Magn.	Angle	Magn.	Angle	Magn.	Angle		
1	0.990	-22.3	5.775	158.1	0.020	71.9	0.533	-19.2	28.8	0.10
2	0.967	-40.6	5.585	140.6	0.035	61.8	0.514	-33.4	26.5	0.19
3	0.925	-53.2	5.401	128.9	0.051	53.3	0.489	-42.9	24.3	0.27
4	0.874	-70.9	5.161	111.8	0.064	42.4	0.457	-58.2	21.6	0.35
5	0.831	-88.8	4.899	96.8	0.075	29.3	0.424	-71.6	19.8	0.43
6	0.783	-105.7	4.626	80.8	0.083	19.0	0.391	-87.5	18.1	0.50
7	0.743	-120.6	4.316	67.9	0.087	9.1	0.369	-100.6	16.8	0.57
8	0.706	-132.1	4.100	56.4	0.090	4.1	0.357	-110.8	15.9	0.64
9	0.682	-144.7	3.887	43.2	0.093	-6.4	0.357	-122.3	15.1	0.69
10	0.670	-159.1	3.765	30.1	0.094	-14.3	0.351	-133.0	14.7	0.72
11	0.639	-171.8	3.617	17.5	0.095	-24.4	0.339	-143.5	14.0	0.80
12	0.617	175.3	3.526	4.5	0.096	-33.5	0.329	-154.0	13.5	0.86
13	0.591	163.1	3.421	-8.1	0.094	-42.5	0.328	-163.9	13.0	0.91
14	0.571	152.9	3.349	-17.4	0.094	-50.9	0.328	-171.3	12.7	0.95
15	0.565	140.1	3.333	-29.6	0.096	-61.1	0.343	179.5	12.7	0.96
16	0.560	125.8	3.349	-44.4	0.098	-74.1	0.351	170.5	12.7	0.98
17	0.533	109.8	3.356	-59.9	0.101	-88.8	0.337	161.8	12.5	1.01
18	0.484	91.2	3.337	-77.0	0.104	-105.1	0.310	151.6	12.1	1.11

### Noise Parameters (Ta=25°C , VDS=2V , ID=10mA )

f (GHz)	G opt.		Rn ( )	NFmin.(dB)		Gs (dB)
	Magn.	Angle		MGF4316G	MGF4319G	
4	0.76	49	12.5	0.31	0.24	18.3
8	0.59	95	4.7	0.47	0.35	15.9
12	0.48	139	2.3	0.60	0.45	13.5
14	0.41	166	1.8	0.69	0.50	12.3
18	0.34	-142	1.5	0.88	0.61	9.9