MGF4410D Series

SUPER LOW NOISE InGaAs HEMT

DESCRIPTION

The MGF4410D series super-low-noise HEMT (High Electron Mobility Transistor) is designed for use in X 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
  - MGF4416D: NFmin.=0.80dB (MAX)
  - MGF4417D: NFmin.=0.70dB (MAX)
  - MGF4418D: NFmin.=0.60dB (MAX)
- High associated gain Gs=9.5dB(MIN) @f=12GHz

APPLICATION

X to K band super-low-noise amplifiers.

QUALITY GRADE

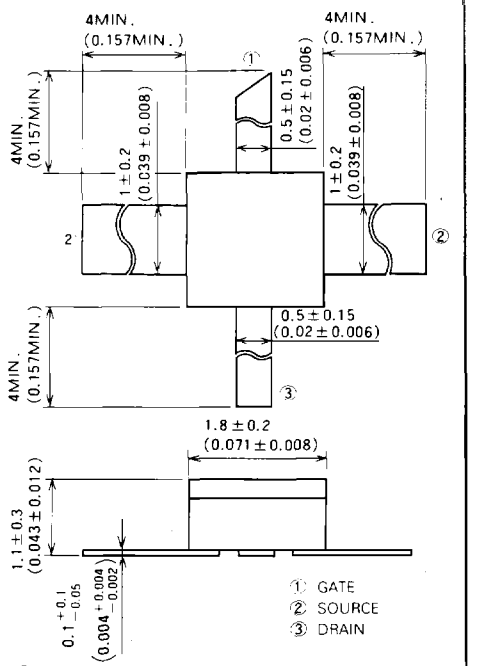
- IG

RECOMMENDED BIAS CONDITIONS

- V_{DS}=2V I_D=10mA
- Refer to Bias Procedure

OUTLINE DRAWING

Unit: millimeters (inches)



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ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

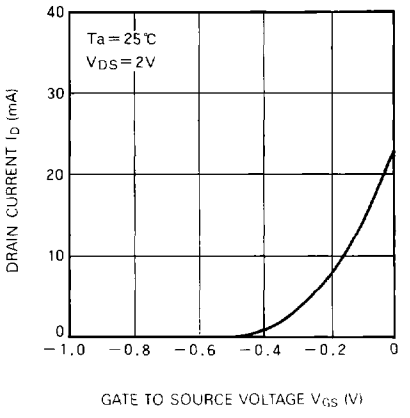
Symbol	Parameter	Ratings	Unit
V_{GDO}	Gate to drain voltage	−4	V
V_{GSO}	Gate to source voltage	−4	V
I_D	Drain current	60	mA
P_T	Total power dissipation	50	mW
Tch	Channel temperature	125	℃
Tstg	Storage temperature	−65 ~ +125	℃

ELECTRICAL CHARACTERISTICS (Ta=25℃)

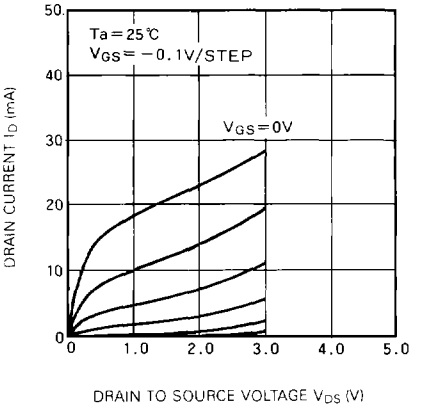
Symbol	Parameter	Test conditions		Limits			Unit
				Min	Typ	Max	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	I_G=−100μA		−3	—	—	V
$V_{(BR)GSO}$	Gate to source breakdown voltage	I_G=−100μA		−3	—	—	V
I_{GSS}	Gate to source leakage current	V_{GS}=−2V, V_{DS}=0V		—	—	50	μA
I_{DSS}	Saturated drain current	V_{GS}=0V, V_{DS}=2V		10	20	60	mA
$V_{GS(off)}$	Gate to source cut-off voltage	V_{DS}=2V, I_D=500μA		−0.1	—	−1.5	V
g_m	Transconductance	V_{DS}=2V, I_D=10mA		40	60	—	mS
Gs	Associated gain	V_{DS}=2V, I_D=10mA, f=12GHz		9.5	11.5	—	dB
NFmin	Minimum noise figure		MGF4416D	—	0.75	0.80	dB
			MGF4417D	—	0.65	0.70	dB
			MGF4418D	—	0.55	0.60	dB

TYPICAL CHARACTERISTICS (Ta = 25℃)

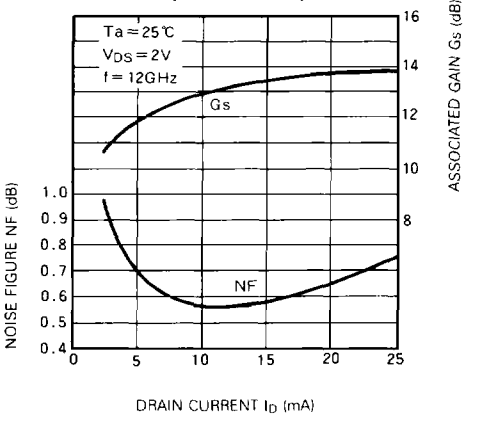
I_D vs. V_{GS}



I_D vs. V_{DS}



NF & Gs vs. I_D (f = 12GHz) (MGF4418D)



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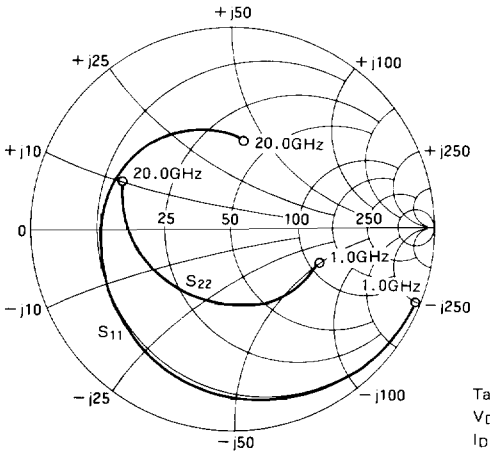
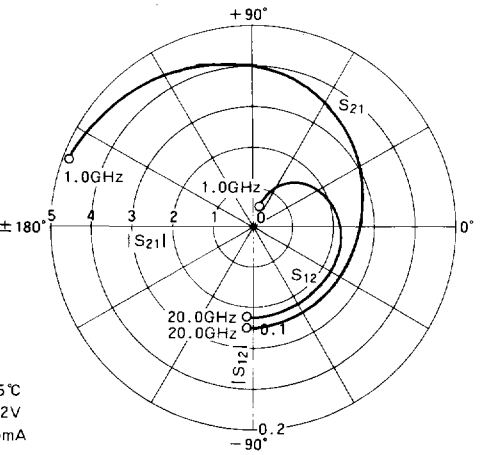
S_{11}, S_{22} vs. f.



S_{21}, S_{12} vs. f.

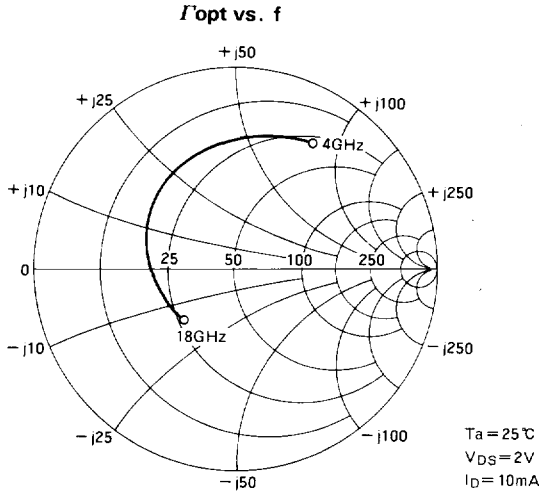


Ta=25℃
V_{DS}=2V
I_D=10mA

S PARAMETERS (Ta=25℃, V_{DS}=2V, I_D=10mA)

f (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MSG/MAG (dB)
	Magn.	Angle deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)		
1.0	0.980	− 23.7	4.902	158.3	0.021	73.9	0.475	− 19.3	0.109	23.78
2.0	0.960	− 41.7	4.702	142.0	0.034	62.8	0.465	− 32.8	0.203	21.40
3.0	0.919	− 59.6	4.502	125.6	0.048	51.6	0.437	− 46.3	0.309	19.76
4.0	0.878	− 77.6	4.302	109.3	0.061	40.5	0.418	− 59.8	0.383	18.48
5.0	0.832	− 94.7	4.028	94.0	0.068	30.3	0.399	− 73.8	0.478	17.69
6.0	0.786	−111.8	3.754	78.8	0.076	20.2	0.380	− 87.8	0.573	16.93
7.0	0.755	−124.7	3.504	65.8	0.079	13.0	0.381	− 98.1	0.647	16.44
8.0	0.725	−137.7	3.253	52.8	0.083	5.8	0.381	−108.5	0.728	15.93
9.0	0.702	−149.2	3.088	40.6	0.086	− 1.2	0.386	−118.0	0.784	15.55
10.0	0.679	−160.8	2.922	28.4	0.089	− 8.2	0.390	−127.5	0.844	15.16
11.0	0.660	−171.9	2.796	16.8	0.090	−15.1	0.402	−135.3	0.899	14.92
12.0	0.641	177.0	2.670	5.3	0.091	−22.1	0.415	−143.2	0.956	14.67
13.0	0.627	168.3	2.588	− 5.7	0.091	−28.0	0.430	−150.6	1.000	14.54
14.0	0.613	159.6	2.507	−16.8	0.091	−34.0	0.445	−158.1	1.044	13.11
15.0	0.592	147.9	2.466	−28.7	0.093	−42.2	0.466	−166.5	1.060	12.76
16.0	0.571	136.2	2.426	−40.6	0.094	−50.5	0.487	−175.0	1.071	12.48
17.0	0.540	122.5	2.463	−53.7	0.094	−61.2	0.512	178.0	1.082	12.41
18.0	0.510	108.9	2.499	−66.9	0.095	−71.9	0.537	171.1	1.086	12.41
19.0	0.479	95.2	2.535	−80.0	0.096	−82.6	0.562	164.1	1.083	12.48
20.0	0.449	81.6	2.572	−93.2	0.096	−93.3	0.587	157.2	1.073	12.63

NOISE PARAMETERS



f (GHz)	Γopt		Rn (Ω)	NFmin (dB)			Gs (dB)
	Magn.	Angle(deg.)		MGF4416D	MGF4417D	MGF4418D	
4	0.73	58	13.6	0.36	0.31	0.29	15.9
8	0.57	122	5.6	0.56	0.49	0.43	12.8
12	0.45	160	2.1	0.75	0.65	0.55	11.5
14	0.41	−178	1.9	0.85	0.74	0.63	10.0
18	0.35	−134	1.7	1.04	0.92	0.80	7.4