

MGF1403B

LOW NOISE GaAs FET

DESCRIPTION

The MGF1403B low-noise GaAs FET with an N-channel Schottky gate is designed for use in S to Ku band amplifiers. The hermetically sealed metal-ceramic package assures minimum parasitic losses, and has a configuration suitable for microstrip circuits.

FEATURES

- Low noise figure $NF_{min} = 1.8 \text{ dB (TYP.)}$ @ $f = 12 \text{ GHz}$
- High associated gain $G_s = 10.5 \text{ dB (TYP.)}$ @ $f = 12 \text{ GHz}$
- High reliability and stability

APPLICATION

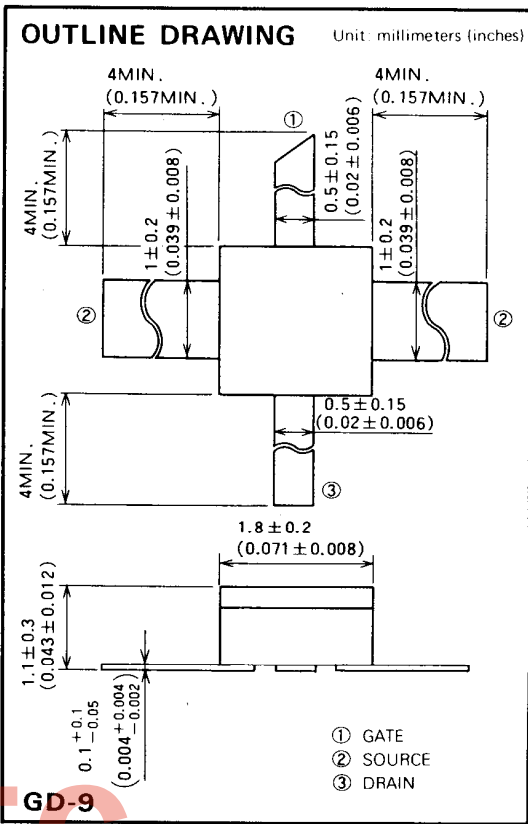
S to Ku band low-noise amplifiers.

QUALITY GRADE

- IG, IGX, IGV

RECOMMENDED BIAS CONDITIONS

- $V_{DS} = 3V$
- $I_D = 10mA$
- Refer to Bias Procedure



ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Symbol	Parameter	Rating	Unit
V_{GDO}	Gate to drain voltage	-6	V
V_{GSO}	Gate to source voltage	-6	V
I_D	Drain current	80	mA
P_T	Total power dissipation *1	240	mW
T_{ch}	Channel temperature	175	$^\circ\text{C}$
T_{stg}	Storage temperature	-55 ~ +175	$^\circ\text{C}$

*1: $T_c = 25^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

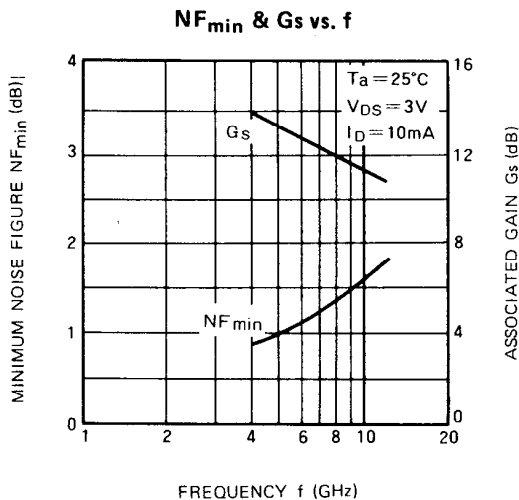
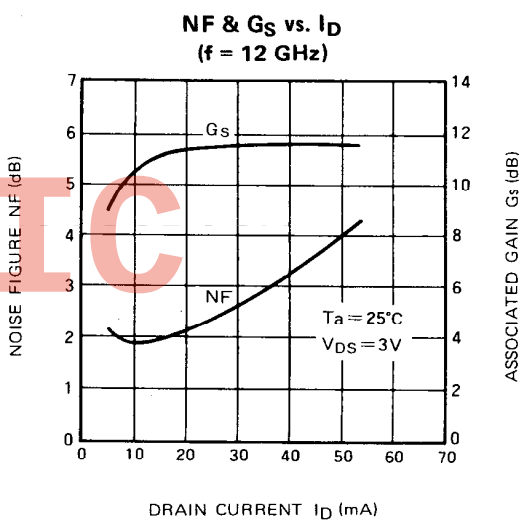
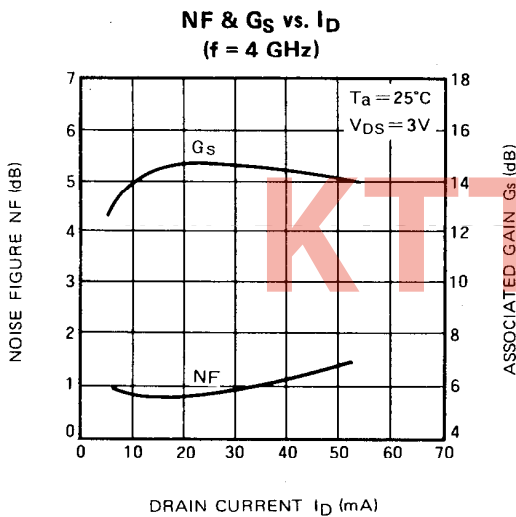
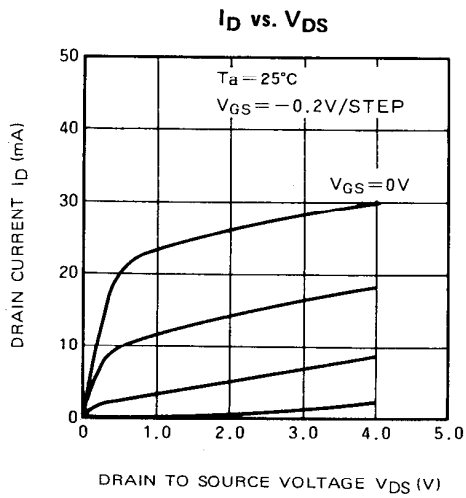
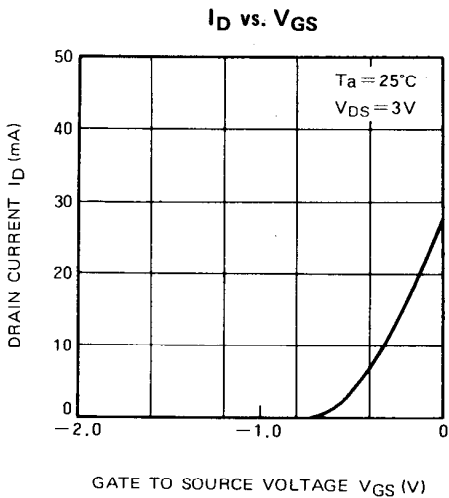
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	$I_G = -100\mu\text{A}$	-6	—	—	V
$V_{(BR)GSO}$	Gate to source breakdown voltage	$I_G = -100\mu\text{A}$	-6	—	—	V
I_{GSS}	Gate to source leakage current	$V_{GS} = -3V, V_{DS} = 0V$	—	—	10	μA
I_{DSS}	Saturated drain current	$V_{GS} = 0V, V_{DS} = 3V$	15	40	80	mA
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS} = 3V, I_D = 100\mu\text{A}$	-0.3	—	-3.5	V
g_m	Transconductance	$V_{DS} = 3V, I_D = 10mA$	20	40	—	mS
G_s	Associated gain	$V_{DS} = 3V, I_D = 10mA, f = 12GHz$	8	10.5	—	dB
NF_{min}	Minimum noise figure	$V_{DS} = 3V, I_D = 10mA, f = 12GHz$	—	1.8	2.3	dB
$R_{th(ch-a)}$	Thermal resistance *1	ΔV_f method	—	—	625	$^\circ\text{C/W}$

*1: Channel to ambient

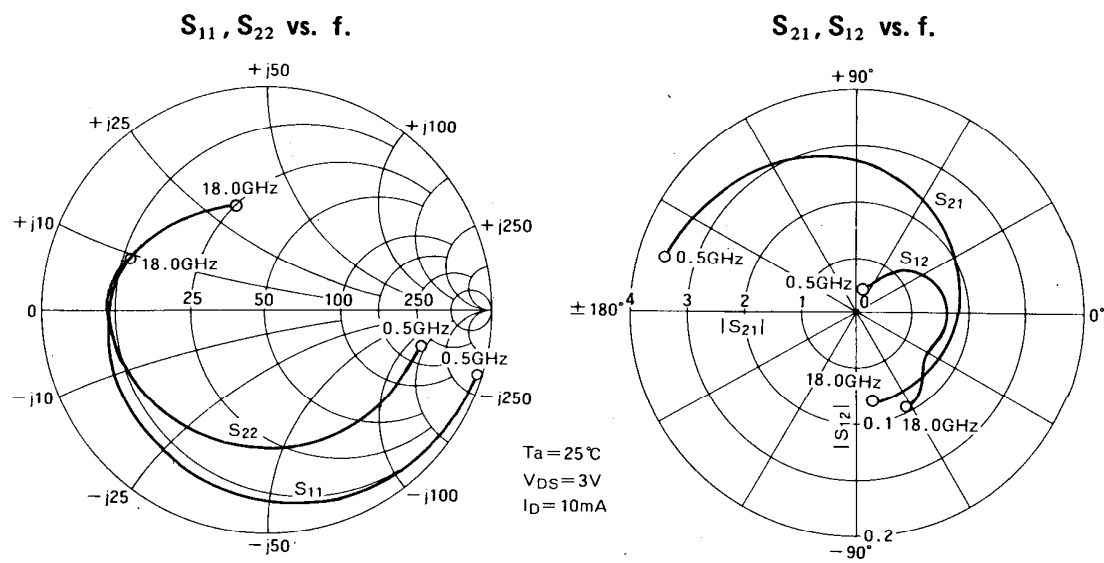
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TYPICAL CHARACTERISTICS



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S PARAMETERS ($T_a = 25^\circ\text{C}$, $V_{DS} = 3\text{V}$, $I_D = 10\text{mA}$)

Freq. (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MSG/MAG (dB)
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.		
0.5	0.995	- 17.1	3.457	164.2	0.021	75.7	0.716	- 13.5	0.062	22.2
1.0	0.978	- 26.0	3.369	155.4	0.027	69.4	0.706	- 20.7	0.145	20.9
1.5	0.962	- 34.8	3.282	146.7	0.034	63.0	0.696	- 27.8	0.202	19.8
2.0	0.945	- 43.6	3.195	137.9	0.041	56.7	0.686	- 34.9	0.247	18.9
2.5	0.928	- 52.4	3.108	129.2	0.048	50.4	0.676	- 42.0	0.284	18.1
3.0	0.912	- 61.3	3.020	120.4	0.055	44.1	0.666	- 49.2	0.317	17.4
3.5	0.895	- 70.1	2.933	111.7	0.061	37.7	0.656	- 56.3	0.347	16.8
4.0	0.878	- 78.9	2.846	102.9	0.068	31.4	0.646	- 63.4	0.376	16.2
4.5	0.859	- 87.3	2.747	94.8	0.071	25.8	0.639	- 70.3	0.422	15.9
5.0	0.839	- 95.6	2.648	86.7	0.073	20.3	0.631	- 77.2	0.469	15.6
5.5	0.820	- 104.0	2.549	78.5	0.076	14.7	0.624	- 84.0	0.519	15.3
6.0	0.800	- 112.3	2.450	70.4	0.078	9.1	0.616	- 90.9	0.572	15.0
6.5	0.788	- 118.5	2.361	63.6	0.078	5.2	0.617	- 96.6	0.614	14.8
7.0	0.776	- 124.6	2.271	56.9	0.078	1.4	0.618	- 102.3	0.661	14.7
7.5	0.764	- 130.8	2.182	50.1	0.077	- 2.5	0.620	- 107.9	0.713	14.5
8.0	0.752	- 136.9	2.092	43.3	0.077	- 6.4	0.621	- 113.6	0.769	14.3
8.5	0.742	- 142.4	2.036	37.1	0.076	- 9.1	0.625	- 118.6	0.808	14.3
9.0	0.732	- 148.0	1.980	30.9	0.076	- 11.9	0.630	- 123.3	0.850	14.2
9.5	0.723	- 153.5	1.924	24.6	0.075	- 14.6	0.634	- 128.1	0.895	14.1
10.0	0.713	- 159.0	1.868	18.4	0.074	- 17.3	0.639	- 132.9	0.943	14.0
10.5	0.704	- 164.7	1.833	12.1	0.073	- 19.4	0.642	- 137.4	0.983	14.0
11.0	0.695	- 170.4	1.798	5.7	0.073	- 21.5	0.645	- 141.8	1.025	13.0
11.5	0.686	- 176.0	1.762	- 0.7	0.072	- 23.6	0.648	- 146.3	1.069	12.3
12.0	0.677	178.3	1.727	- 7.0	0.071	- 25.7	0.651	- 150.7	1.116	11.8
12.5	0.671	173.4	1.701	- 12.2	0.071	- 27.5	0.653	- 154.7	1.131	11.6
13.0	0.665	168.4	1.674	- 17.4	0.071	- 29.2	0.656	- 158.7	1.147	11.4
13.5	0.659	163.5	1.648	- 22.5	0.072	- 31.0	0.658	- 162.7	1.163	11.2
14.0	0.653	158.5	1.621	- 27.7	0.072	- 32.7	0.660	- 166.7	1.181	10.9
14.5	0.631	152.6	1.616	- 34.2	0.074	- 35.3	0.667	- 170.9	1.188	10.8
15.0	0.609	146.7	1.611	- 40.7	0.076	- 37.9	0.675	- 175.1	1.191	10.6
15.5	0.586	140.7	1.606	- 47.1	0.079	- 40.5	0.682	- 179.2	1.190	10.5
16.0	0.564	134.8	1.601	- 53.6	0.081	- 43.1	0.689	176.6	1.186	10.3
16.5	0.544	127.3	1.605	- 60.2	0.085	- 47.8	0.682	172.2	1.199	10.1
17.0	0.525	119.8	1.609	- 66.9	0.089	- 52.5	0.674	167.7	1.210	9.8
17.5	0.505	112.2	1.614	- 73.5	0.093	- 57.2	0.666	163.3	1.222	9.6
18.0	0.485	104.7	1.618	- 80.1	0.097	- 61.9	0.659	158.8	1.233	9.3

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

Freq. (GHz)	Γ _{opt}		R _n (Ω)	NF _{min} (dB)
	Magn.	Angle (deg.)		
4	0.723	57.3	18.0	0.77
8	0.582	97.6	20.0	1.38
12	0.515	145.6	13.0	1.78
14	0.478	179.0	15.0	2.02
18	0.393	-103.3	19.0	2.19

G_{lp} and P_{1dB} (T_a=25℃, V_D=3V, I_D=10mA)

	f=4GHz	f=12GHz
G _{lp} (dB)	15.5	11.1
P _{1dB} (dBm)	11.6	9.8

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