MGF1902B

TAPE CARRIER LOW NOISE GaAs FET

DESCRIPTION

The MGF1902B 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 MGF1902B is mounted in the Super 12 tape, and is electrically equivalent to MGF1302.

FEATURES

- Low noise figure NF_{min} = 4.0 dB (MAX.) @ f = 12 GHz
- High associated gain G_S = 5.0 dB (MIN.) @ f = 12 GHz

APPLICATION

S to X band low noise amplifiers and oscillators

QUALITY GRADE

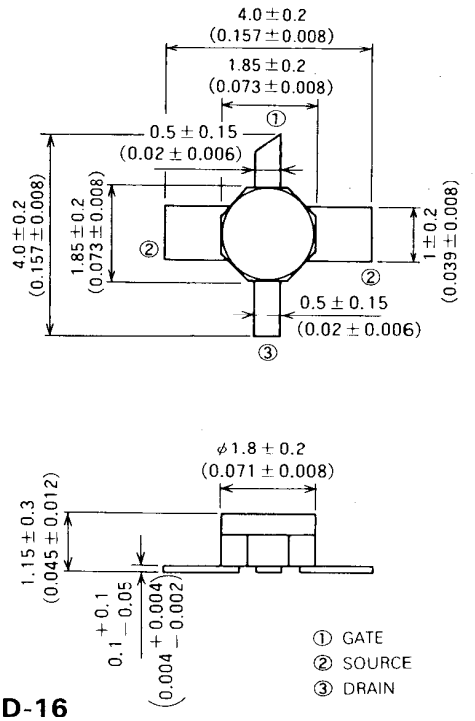
- GG

RECOMMENDED BIAS CONDITIONS

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

OUTLINE DRAWING

Unit: millimeters (inches)



GD-16

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
V_{GDO}	Gate to drain voltage	−6	V
V_{GSO}	Gate to source voltage	−6	V
I_D	Drain current	100	mA
P_T	Total power dissipation *1	360	mW
T_{ch}	Channel temperature	175	°C
T_{stg}	Storage temperature	−55~+175	°C
$T_{stg(T)}$	Storage temperature in tape	−30~+40	°C

*1 : Tc=25°C

ELECTRICAL CHARACTERISTICS (Ta=25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	I_G=−100μA	−6	—	—	V
$V_{(BR)GSO}$	Gate to source breakdown voltage	I_G=−100μA	−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	30	60	100	mA
$V_{GS(off)}$	Gate to source cut-off voltage	V_{DS}=3V, I_D=100μA	−0.3	—	−3.5	V
gm	Transconductance	V_{DS}=3V, I_D=10mA	25	45	—	mS
Gs	Associated gain	V_{DS}=3V, I_D=10mA, f=12GHz	5	—	—	dB
NFmin	Minimum noise figure	V_{DS}=3V, I_D=10mA, f=12GHz	—	—	4.0	dB
$R_{th(ch-a)}$	Thermal resistance *1	ΔVf method	—	—	416	°C/W

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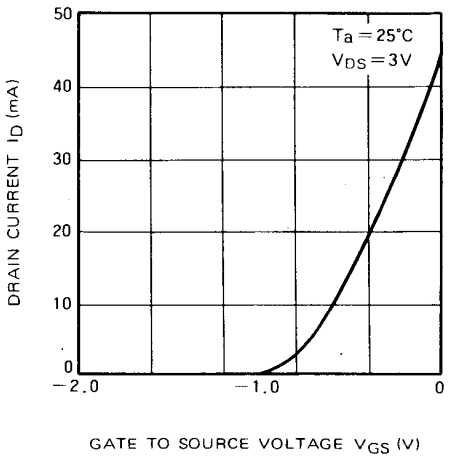
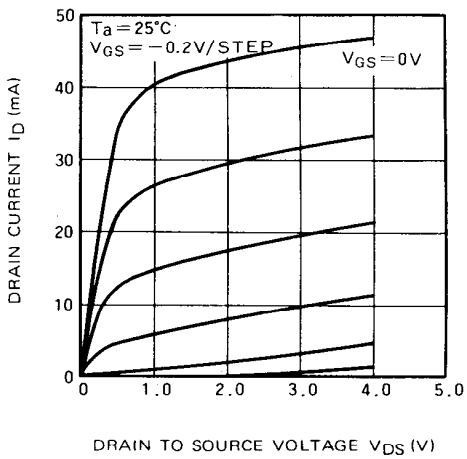
TYPICAL CHARACTERISTICS

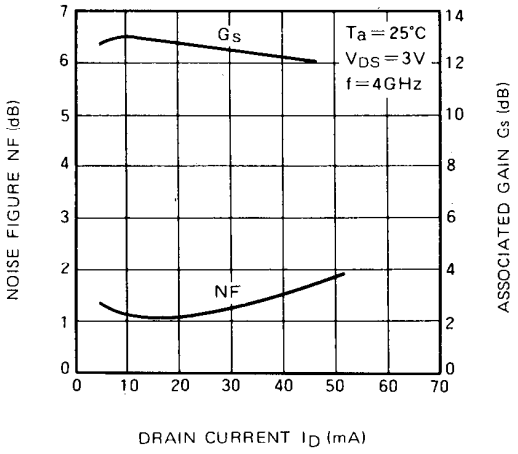
I_D vs. V_{GS}



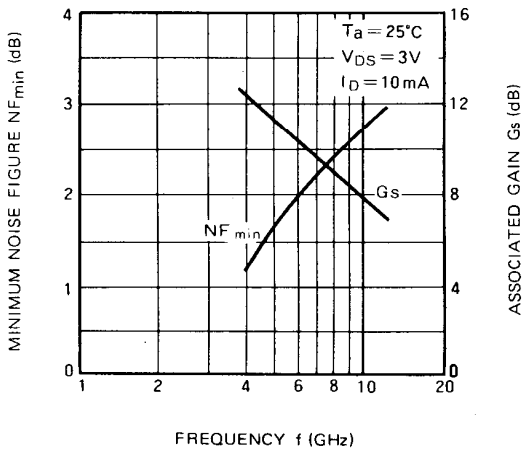
I_D vs. V_{DS}



NF & Gs vs. I_D



NF_{min} & Gs vs. f



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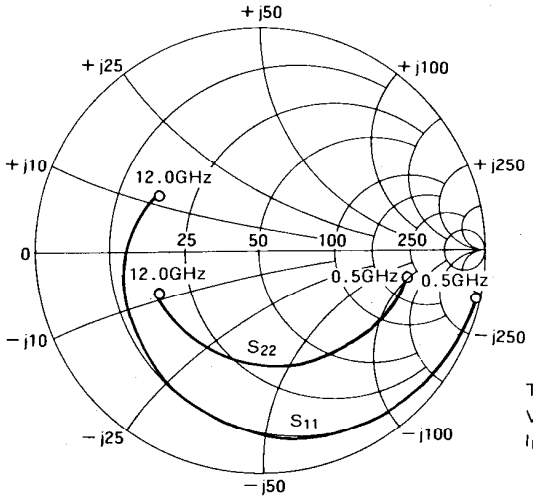
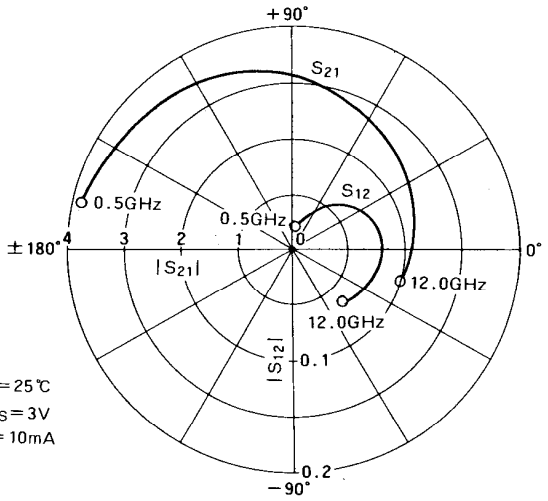
S_{11}, S_{22} vs. f.



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

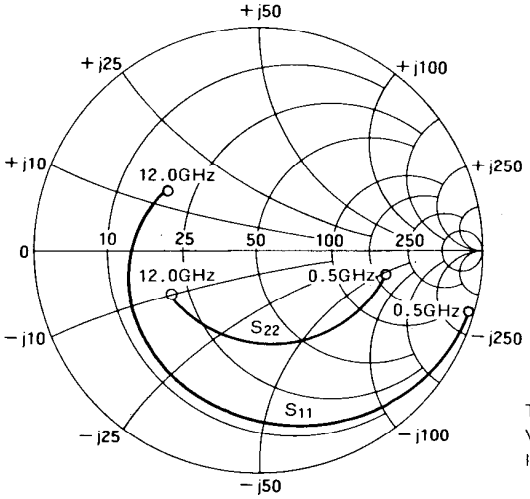


Ta = 25℃
V_{DS} = 3V
I_D = 10mA

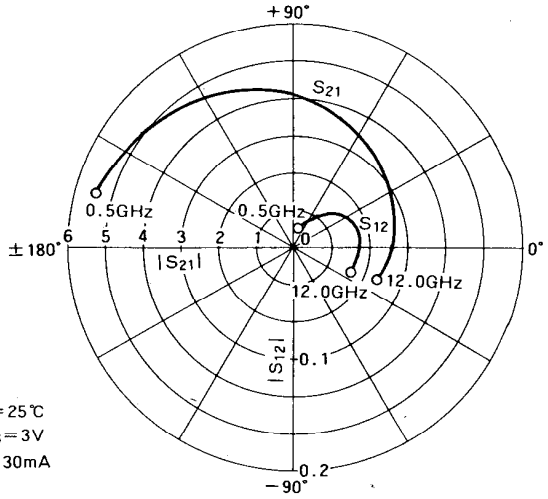
S PARAMETERS (Ta = 25℃, V_{DS} = 3V, I_D = 10mA)

Freq. (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	MSG/MAG (dB)
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.		
0.5	0.997	− 13.3	3.809	167.6	0.019	80.1	0.664	− 10.3	0.042	23.0
1.0	0.975	− 23.1	3.727	158.4	0.026	73.1	0.650	− 17.3	0.180	21.6
1.5	0.952	− 32.8	3.644	149.1	0.033	66.0	0.636	− 24.2	0.271	20.4
2.0	0.929	− 42.5	3.561	139.9	0.040	58.9	0.622	− 31.2	0.341	19.5
2.5	0.906	− 52.2	3.478	130.7	0.047	51.8	0.608	− 38.2	0.398	18.7
3.0	0.884	− 62.0	3.396	121.5	0.054	44.8	0.594	− 45.2	0.449	18.0
3.5	0.861	− 71.7	3.313	112.2	0.061	37.7	0.580	− 52.1	0.494	17.3
4.0	0.838	− 81.4	3.230	103.0	0.068	30.6	0.566	− 59.1	0.537	16.8
4.5	0.811	− 90.9	3.124	94.4	0.071	24.5	0.551	− 66.2	0.604	16.5
5.0	0.783	−100.3	3.018	85.8	0.074	18.5	0.537	− 73.3	0.674	16.1
5.5	0.756	−109.8	2.913	77.2	0.076	12.4	0.522	− 80.3	0.746	15.8
6.0	0.729	−119.2	2.807	68.6	0.079	6.3	0.507	− 87.4	0.822	15.5
6.5	0.709	−127.0	2.710	61.1	0.078	1.1	0.503	− 93.7	0.902	15.4
7.0	0.689	−134.9	2.614	53.5	0.078	− 4.1	0.499	−100.1	0.989	15.3
7.5	0.670	−142.7	2.517	46.0	0.077	− 9.2	0.494	−106.4	1.085	13.4
8.0	0.650	−150.5	2.421	38.4	0.076	−14.4	0.490	−112.7	1.190	12.4
8.5	0.633	−157.6	2.364	31.5	0.075	−18.1	0.487	−118.2	1.271	11.8
9.0	0.617	−164.7	2.308	24.5	0.074	−21.9	0.485	−123.7	1.357	11.3
9.5	0.600	−171.8	2.251	17.6	0.074	−25.6	0.482	−129.2	1.449	10.9
10.0	0.584	−178.9	2.194	10.6	0.073	−29.3	0.479	−134.7	1.547	10.4
10.5	0.568	173.3	2.149	3.4	0.072	−33.9	0.483	−140.1	1.641	10.1
11.0	0.551	165.5	2.103	− 3.9	0.071	−38.4	0.487	−145.5	1.739	9.7
11.5	0.535	157.7	2.058	−11.1	0.069	−43.0	0.491	−150.8	1.844	9.4
12.0	0.519	149.9	2.012	−18.3	0.068	−47.5	0.495	−156.2	1.954	9.1

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



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



Ta = 25℃
V_{DS} = 3V
I_D = 30mA

S PARAMETERS (Ta = 25℃, V_{DS} = 3V, I_D = 30mA)

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	− 16.4	5.393	164.9	0.017	78.7	0.579	− 11.4	0.067	25.0
1.0	0.966	− 27.1	5.224	155.4	0.022	72.1	0.564	− 18.3	0.233	23.8
1.5	0.936	− 37.7	5.056	145.8	0.027	65.4	0.549	− 25.1	0.350	22.7
2.0	0.906	− 48.3	4.888	136.3	0.032	58.8	0.534	− 32.0	0.442	21.8
2.5	0.876	− 48.9	4.720	126.8	0.037	52.2	0.519	− 38.9	0.520	21.1
3.0	0.847	− 69.6	7.552	117.3	0.042	45.6	0.504	− 45.8	0.589	20.3
3.5	0.817	− 80.2	4.383	107.7	0.047	38.9	0.489	− 52.6	0.652	19.7
4.0	0.787	− 90.8	4.215	98.2	0.052	32.3	0.474	− 59.5	0.713	19.1
4.5	0.758	−100.6	4.040	89.7	0.054	27.5	0.461	− 66.2	0.800	18.8
5.0	0.729	−110.3	3.865	81.2	0.055	22.6	0.447	− 72.9	0.893	18.5
5.5	0.700	−120.1	3.690	72.7	0.056	17.8	0.433	− 79.6	0.993	18.2
6.0	0.671	−129.8	3.515	64.2	0.058	12.9	0.420	− 86.3	1.101	15.9
6.5	0.652	−137.9	3.378	56.8	0.058	9.4	0.418	− 92.5	1.188	15.0
7.0	0.632	−146.0	3.241	49.5	0.058	5.9	0.417	− 98.7	1.282	14.3
7.5	0.612	−154.0	3.103	42.1	0.058	2.3	0.416	−104.9	1.386	13.6
8.0	0.593	−162.1	2.966	34.7	0.058	− 1.2	0.414	−111.1	1.501	12.9
8.5	0.577	−177.0	2.883	27.8	0.057	− 3.4	0.414	−116.3	1.596	12.5
9.0	0.561	175.6	2.799	20.9	0.057	− 5.5	0.413	−121.5	1.699	12.0
9.5	0.545	168.1	2.716	14.0	0.057	− 7.7	0.413	−126.7	1.810	11.6
10.0	0.529	160.3	2.633	7.1	0.056	− 9.8	0.413	−131.9	1.929	11.2
10.5	0.515	152.4	2.571	0.2	0.056	−12.9	0.419	−137.0	1.998	10.9
11.0	0.502	144.6	2.508	− 6.8	0.056	−16.0	0.426	−142.1	2.070	10.6
11.5	0.488	136.7	2.446	−13.7	0.056	−19.0	0.433	−147.1	2.145	10.3
12.0	0.475	147.5	2.384	−20.6	0.056	−22.1	0.439	−152.2	2.223	10.1

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

Freq. (GHz)	Γopt.		Rn (Ω)	NFmin. (dB)
	Mang.	Angle (deg.)		
1	0.747	5.6	25.7	0.77
2	0.683	22.4	26.3	0.82
3	0.638	42.2	26.9	0.89
4	0.595	63.5	27.5	0.96
5	0.562	80.2	28.1	1.19
6	0.530	97.9	28.7	1.41
7	0.503	115.2	28.3	1.63
8	0.475	134.5	30.0	1.85
9	0.450	150.7	26.3	2.08
10	0.430	167.2	22.6	2.30
11	0.408	−174.5	18.8	2.53
12	0.385	−155.3	15.0	2.76

Glp and P1dB (Ta=25℃, V_D=3V)

	f=4GHz		f=12GHz	
	I_D=10mA	I_D=30mA	I_D=10mA	I_D=30mA
G_{LP} (dB)	15.5	16.8	9.6	10.5
P_{1dB} (dBm)	12.6	14.5	10.5	12.7