

MITSUBISHI SEMICONDUCTOR <GaAs FET>
MGF1907A

TAPE CARRIER LOW NOISE GaAs FET

DESCRIPTION

The MGF1907A 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 MGF1907A is mounted in the Super 12 tape, and is electrically equivalent to MGF1302.

FEATURES

- Low Noise Figure
 NFmin. = 4.0dB (MAX.) @ f=12GHz
- High Associated gain
 Gs=5.0dB (MIN.) @ f=12GHz

APPLICATION

S to X band low noise amplifiers and oscillators

QUALITY GRADE

- General Grade (GG)

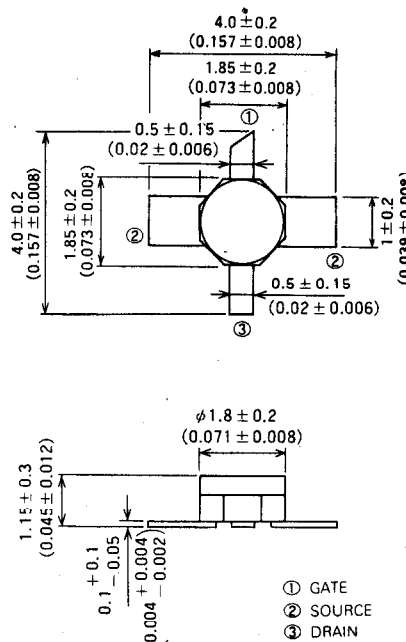
RECOMMENDED BIAS CONDITIONS

$V_{DS}=3V, I_D=10mA$

Outline Drawing

Unit : mm

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
PT	Total power dissipation	360	mW
T _{ch}	Channel temperature	175	°C
T _{stg}	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.

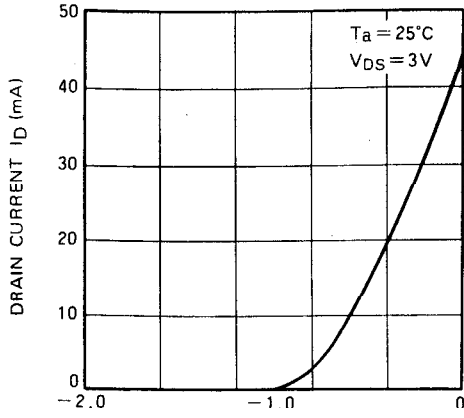
ELECTRICAL CHARACTERISTICS (Ta=25°C)

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
V _{(BR)GDO}	Gate to drain breakdown voltage	I _G =-100 μA	-6	--	--	V
V _{(BR)GSO}	Gate to source breakdown voltage	I _G =-100 μA	-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	--	100	mA
V _{GS(off)}	Gate to source cut-off voltage	V _{DS} =3V, I _D =100 μA	-0.3	--	-3.5	V
gm	Transconductance	V _{DS} =3V, I _D =10mA	25	45	--	mS
G _s	Associated gain	V _{DS} =2V, I _D =10mA	5	--	--	dB
NFmin.	Minimum noise figure	f=12GHz	--	--	4	dB

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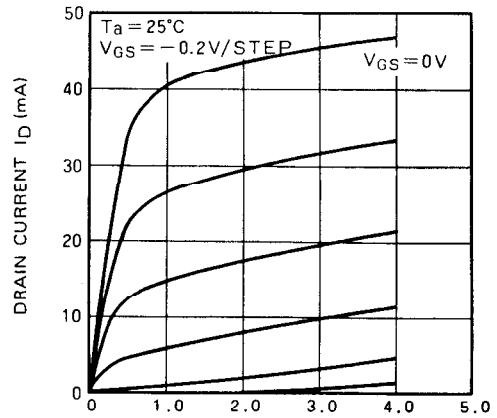
TYPICAL CHARACTERISTICS

I_D vs. V_{GS}



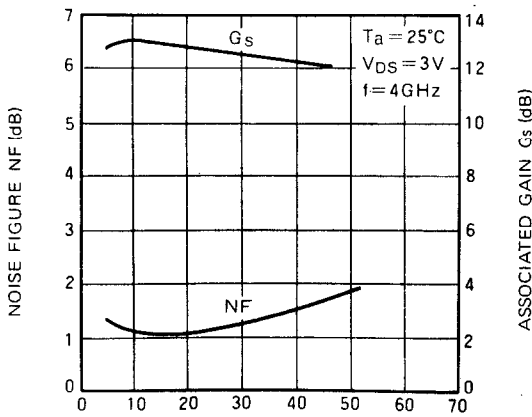
GATE TO SOURCE VOLTAGE V_{GS} (V)

I_D vs. V_{DS}



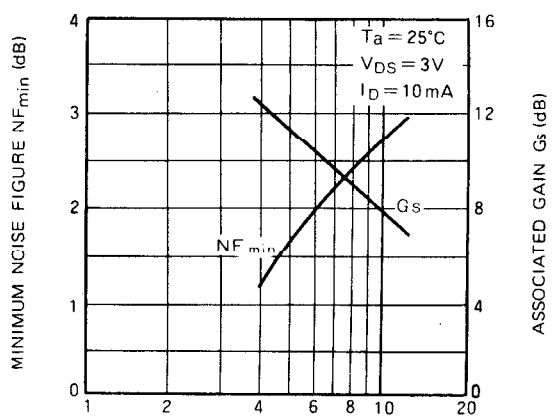
DRAIN TO SOURCE VOLTAGE V_{DS} (V)

NF & G_s vs. I_D

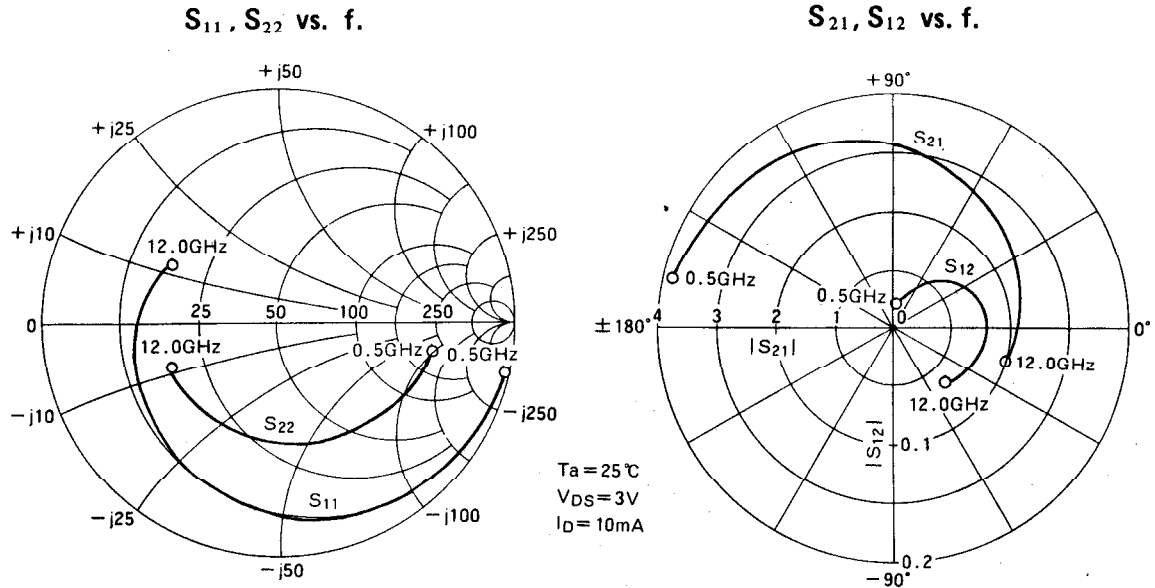


DRAIN CURRENT I_D (mA)

NF_{min} & G_s vs. f



FREQUENCY f (GHz)

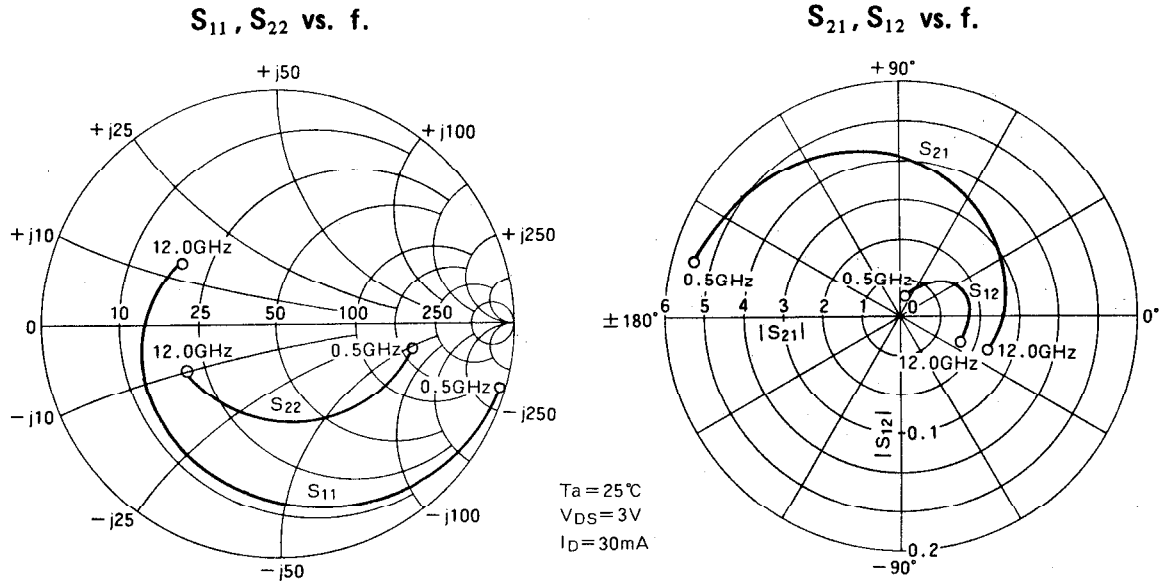


S PARAMETERS ($T_a=25^\circ\text{C}$, $V_{DS}=3\text{V}$, $I_D=10\text{mA}$)

Freq. (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MSG/MAG (dB)
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.		
0.5	0.997	-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

MGF1907A

TAPE CARRIER LOW NOISE GaAs FET



S PARAMETERS ($T_a = 25^\circ\text{C}$, $V_{DS} = 3\text{V}$, $I_D = 30\text{mA}$)

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	-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)	$f_{dpt.}$		R_n (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

G_{LP} and P_{1dB} ($T_a=25^\circ C$, $V_D=3V$)

	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