

< Low Noise GaAs HEMT >

# MGF4938AM

4pin flat lead package

## DESCRIPTION

The MGF4938AM super-low noise InGaAs HEMT (High Electron Mobility Transistor) is designed for use in S to Ku band amplifiers.

The 4pin flat lead package is small-thin size, and offers high cost performance.

## FEATURES

- Very Low noise figure @ f=12GHz  
NFmin. = 0.32dB (Typ.)
- High associated gain @ f=12GHz  
Gs = 12.5dB (Typ.)

## APPLICATION

S to Ku band low noise amplifiers

## QUALITY GRADE

GG

## RECOMMENDED BIAS CONDITIONS

V<sub>DS</sub>=2V, I<sub>D</sub>=10mA

## ORDERING INFORMATION

Tape & reel 15000pcs/reel

## RoHS COMPLIANT

MGF4938AM is a RoHS compliant product. RoHS compliance is indicated by the letter "G" after the Lot Marking.

## ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

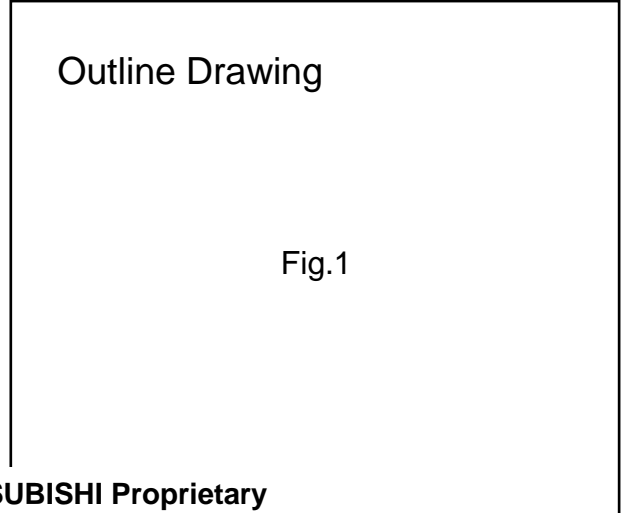
Symbol	Parameter	Ratings	Unit
VGDO	Gate to drain voltage	-3	V
VGSO	Gate to source voltage	-3	V
VDS	Drain to source voltage	3	V
ID	Drain current	IDSS	mA
PT	Total power dissipation	50	mW
T <sub>ch</sub>	Channel temperature	125	°C
T <sub>stg</sub>	Storage temperature	-55 to +125	°C
Top	Operation temperature	-55 to +125	°C

## 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	-3.5	--	--	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	12	--	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
Gs	Associated gain	V <sub>DS</sub> =2V,	11.0	12.5	--	dB
NFmin.	Minimum noise figure	I <sub>D</sub> =10mA, f=12GHz	--	0.32	0.47	dB

Note: Gs and NFmin. are tested with sampling inspection.

Thermal resistance (R<sub>th</sub>) of this product: 800 deg.C/W.



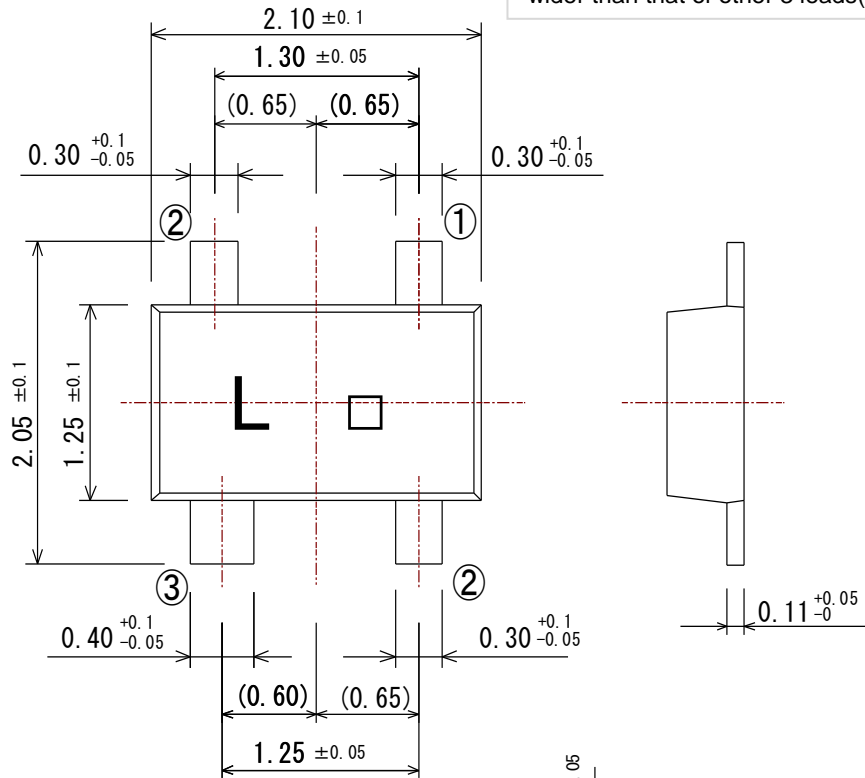
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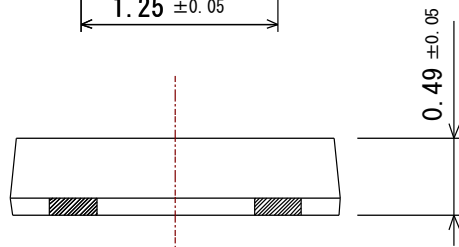
Fig.1

Drain lead (③) width is always at least 0.03mm wider than that of other 3 leads(① and ②)

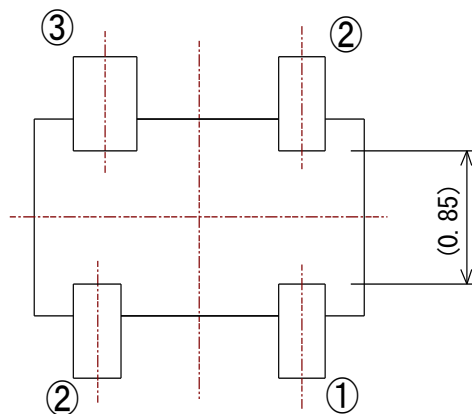
Top



Side



Bottom



Unit: mm

- ① Gate
- ② Source
- ③ Drain

(GD-30)

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4pin flat lead package

## S PARAMETERS

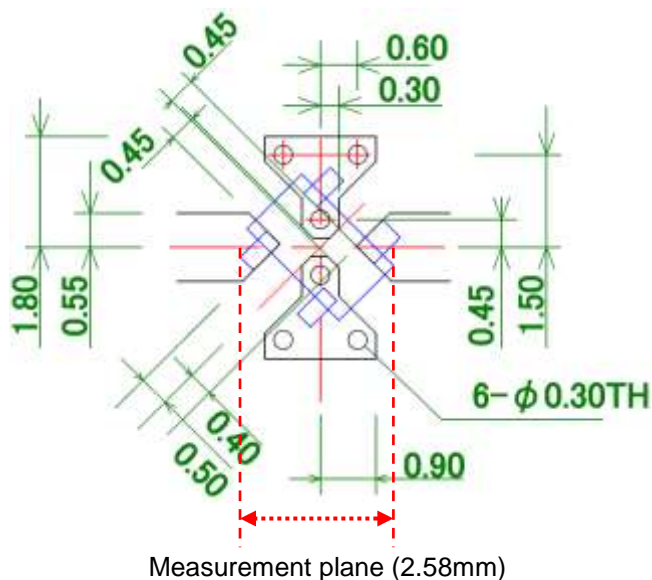
( $V_{DS}=2V, I_D=10mA, T_a=room\ temperature$ )

Freq. (GHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
6	0.785	-85.7	5.150	90.9	0.081	27.7	0.491	-75.4
7	0.701	-104.9	5.070	74.2	0.091	16.1	0.439	-90.8
8	0.623	-126.4	4.886	57.6	0.101	3.4	0.388	-108.7
9	0.536	-148.2	4.592	42.1	0.102	-8.7	0.331	-125.0
10	0.465	-171.2	4.287	27.9	0.100	-19.6	0.272	-139.2
11	0.445	166.4	4.079	14.4	0.101	-28.3	0.244	-156.1
12	0.443	143.3	3.872	0.9	0.102	-36.9	0.223	-174.1
13	0.472	119.8	3.657	-13.6	0.102	-47.0	0.209	164.7
14	0.510	99.8	3.462	-27.2	0.101	-55.5	0.195	146.3
15	0.553	82.2	3.262	-40.6	0.100	-65.5	0.194	125.5
16	0.603	65.9	3.011	-56.3	0.098	-73.0	0.220	104.1
17	0.640	52.4	2.749	-69.7	0.095	-80.9	0.230	85.9
18	0.676	40.4	2.485	-82.2	0.095	-88.1	0.256	68.1

## Noise Parameter

( $V_{DS}=2V, I_D=10mA, T_a=room\ temperature$ )

Freq. (GHz)	NFmin (dB)	$\Gamma_{opt}$		Rn/50 ( $\Omega$ )
		(mag)	(ang)	
6	0.19	0.713	39.7	0.198
7	0.20	0.646	55.8	0.182
8	0.21	0.580	74.1	0.149
9	0.24	0.517	94.0	0.123
10	0.26	0.458	115.6	0.096
11	0.29	0.408	138.6	0.068
12	0.32	0.368	162.4	0.057
13	0.34	0.340	-173.2	0.044
14	0.38	0.326	-149.0	0.040
15	0.40	0.328	-125.0	0.047
16	0.43	0.346	-101.8	0.068
17	0.47	0.382	-79.5	0.084
18	0.50	0.437	-57.7	0.116



Board:  $\epsilon_r=3.38$   
 Thickness: 0.508mm  
 (Rogers RO4003C)  
 (6- $\phi$ 0.3: through-hole)

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4pin flat lead package

## S PARAMETERS

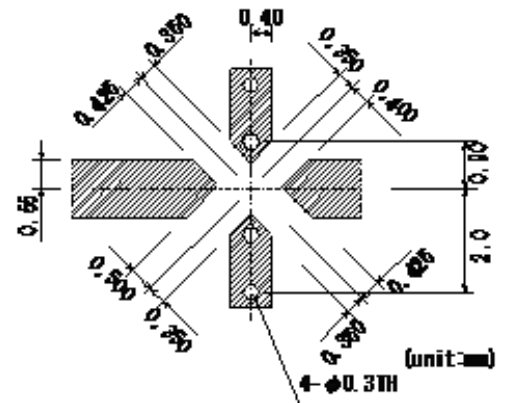
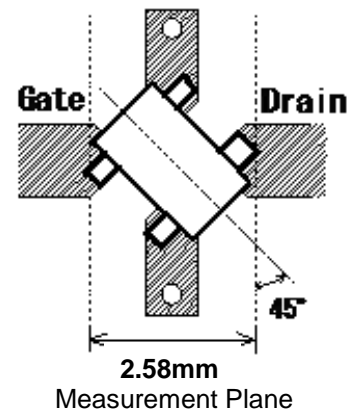
( $V_{DS}=2V$ ,  $I_D=10mA$ ,  $T_a=room\ temperature$ )

Freq. (GHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
6	0.739	-81.6	4.930	89.5	0.076	34.2	0.485	-67.4
7	0.648	-99.0	4.810	73.6	0.086	24.8	0.430	-79.4
8	0.564	-118.4	4.656	57.9	0.097	14.4	0.372	-93.0
9	0.469	-139.2	4.402	43.0	0.098	4.6	0.306	-107.0
10	0.389	-163.2	4.127	29.0	0.098	-4.5	0.236	-119.2
11	0.369	172.4	3.949	15.7	0.101	-11.2	0.196	-137.1
12	0.373	146.3	3.772	2.1	0.104	-18.0	0.166	-159.1
13	0.416	120.8	3.557	-12.5	0.107	-26.8	0.157	170.7
14	0.459	100.8	3.352	-25.4	0.107	-34.0	0.155	146.3
15	0.510	83.8	3.172	-38.3	0.106	-42.3	0.176	120.5
16	0.574	69.3	2.971	-53.5	0.108	-48.1	0.235	101.1
17	0.618	57.5	2.739	-66.7	0.107	-54.3	0.272	88.2
18	0.665	46.7	2.515	-79.7	0.110	-61.2	0.313	74.1

## Noise Parameter

( $V_{DS}=2V$ ,  $I_D=10mA$ ,  $T_a=room\ temperature$ )

Freq. (GHz)	NFmin. (dB)	$\Gamma_{opt}$		Rn/50 ( $\Omega$ )
		(mag)	(ang)	
6	0.23	0.664	31.0	0.201
7	0.24	0.586	49.4	0.185
8	0.25	0.510	70.4	0.151
9	0.28	0.440	93.6	0.125
10	0.29	0.377	118.6	0.091
11	0.31	0.327	144.6	0.072
12	0.34	0.291	171.4	0.063
13	0.36	0.273	-162.2	0.059
14	0.40	0.275	-136.0	0.054
15	0.42	0.299	-112.0	0.060
16	0.45	0.344	-89.4	0.081
17	0.48	0.417	-69.4	0.112
18	0.51	0.516	-51.0	0.143



Board:  $\epsilon_r=3.38$

Thickness: 0.508mm

(Rogers RO4003C)

(4- $\phi 0.3$ : through-hole)

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