MITSUBISHI ELECTRIC

< Low Noise GaAs HEMT >

MGF4941AL

Micro-X type plastic package

DESCRIPTION

The MGF4941AL super-low noise InGaAs HEMT (High Electron Mobility Transistor) is designed for use in Ku band amplifiers.

Outline Drawing

Fig.1

FEATURES

Low noise figure @ f=12GHz
NFmin. = 0.35dB (Typ.)

High associated gain @ f=12GHz
Gs = 13.5dB (Typ.)

APPLICATION

L to K band low noise amplifiers

QUALITY GRADE

GG

RECOMMENDED BIAS CONDITIONS

V_{DS}=2V, I_D=10mA

ORDERRING INFORMATION

Tape & reel 4000pcs./reel

RoHS COMPLIANT

MGF4941AL 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
V_{GDO}	Gate to drain voltage	-3	V
V_{GSO}	Gate to source voltage	-3	V
I_D	Drain current	IDSS	mA
PT	Total power dissipation	50	mW
T_{ch}	Channel temperature	125	°C
T_{stg}	Storage temperature	-55 to +125	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C)

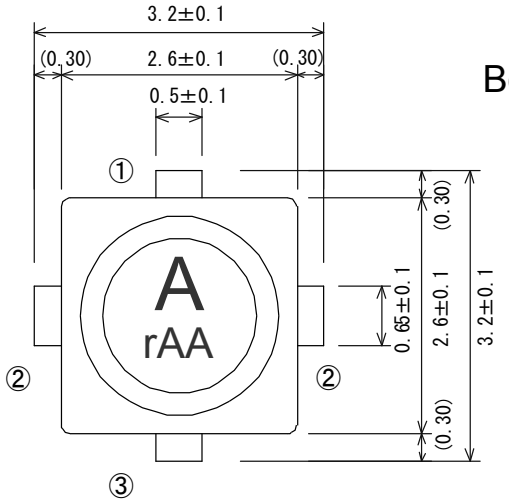
Symbol	Parameter	Test conditions	Limits			Unit
			MIN.	TYP.	MAX	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	I_G=-10μA	-3	--	--	V
I_{GSS}	Gate to source leakage current	V_{GS}=-2V,V_{DS}=0V	--	--	50	μA
I_{DSS}	Saturated drain current	V_{GS}=0V,V_{DS}=2V	15	--	60	mA
$V_{GS(off)}$	Gate to source cut-off voltage	V_{DS}=2V,I_D=500μA	-0.1	--	-1.5	V
Gs	Associated gain	V_{DS}=2V,	12.0	13.5	--	dB
NFmin.	Minimum noise figure	I_D=10mA,f=12GHz	--	0.35	0.5	dB

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

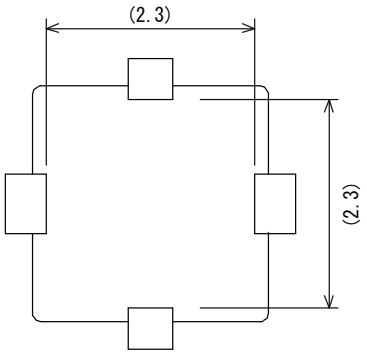
Publication Date : Apr., 2011

Fig.1

Top

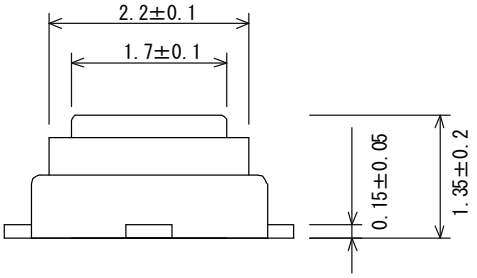


Bottom



Unit : mm

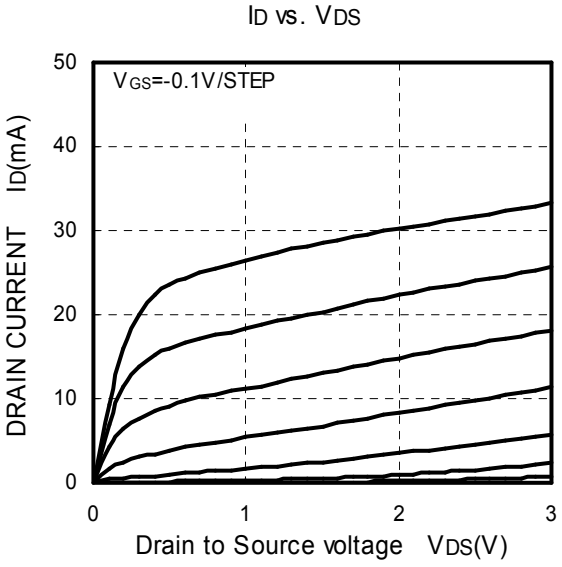
Side

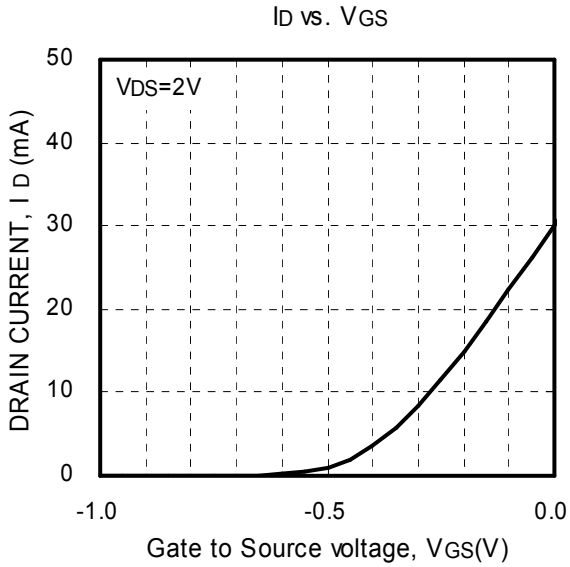


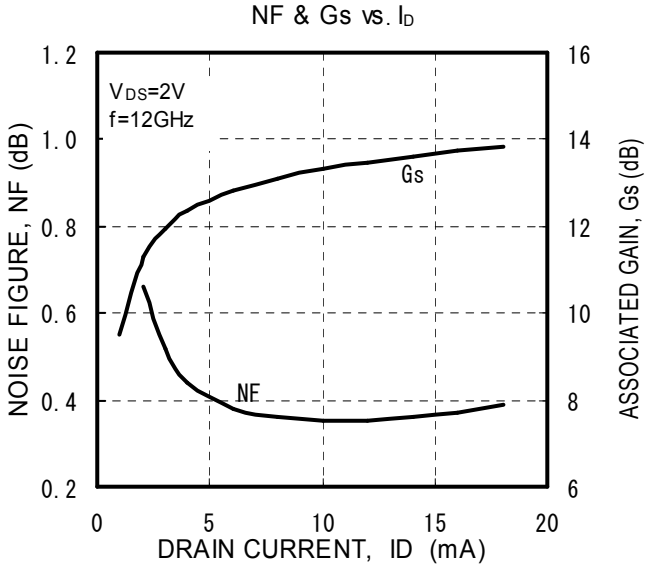
① Gate
② Source
③ Drain

(GD-32)

TYPICAL CHARACTERISTICS (Ta=25°C)





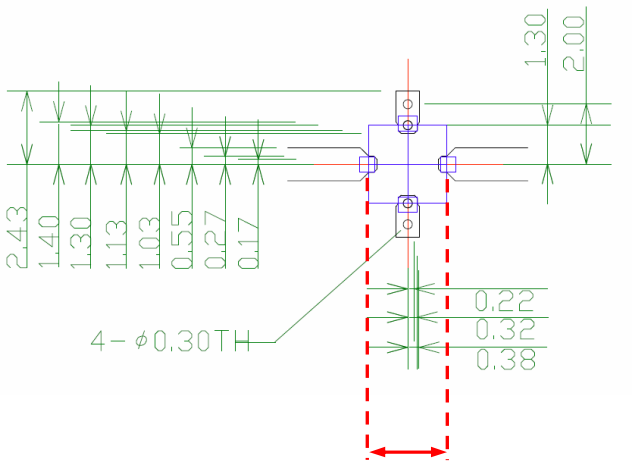


S PARAMETERS (VDS=2V,ID=10mA,Ta=room temperature)

Freq. (GHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
1	0.997	−18.3	5.603	158.4	0.023	73.4	0.702	−11.1
2	0.976	−30.0	5.399	145.6	0.033	67.2	0.668	−20.1
3	0.944	−41.7	5.195	132.7	0.043	61.0	0.634	−29.1
4	0.880	−53.4	4.991	119.8	0.053	54.8	0.600	−38.1
5	0.804	−67.6	4.874	105.3	0.064	46.8	0.563	−47.6
6	0.728	−82.3	4.743	90.7	0.074	39.0	0.519	−57.2
7	0.640	−98.0	4.569	76.0	0.082	31.0	0.467	−66.6
8	0.563	−116.4	4.389	61.2	0.091	22.3	0.406	−77.4
9	0.476	−134.2	4.123	47.5	0.095	15.2	0.343	−86.1
10	0.408	−153.5	3.898	34.7	0.095	9.9	0.285	−94.4
11	0.381	−174.5	3.736	22.2	0.101	5.8	0.245	−105.3
12	0.370	163.2	3.559	9.8	0.105	1.9	0.203	−119.0
13	0.385	141.3	3.391	−2.6	0.110	−3.1	0.167	−137.9
14	0.415	124.1	3.275	−14.2	0.113	−5.8	0.156	−157.0
15	0.458	109.1	3.148	−26.2	0.117	−10.7	0.153	178.7
16	0.529	94.8	2.961	−40.7	0.131	−15.1	0.214	144.7
17	0.586	83.3	2.817	−53.4	0.142	−19.9	0.257	125.9
18	0.643	73.3	2.620	−65.9	0.153	−26.4	0.317	106.1

Noise Parameter (V_{DS}=2V,I_D=10mA, Ta=room temperature)

Freq. (GHz)	NFmin (dB)	Γopt		Rn (Ω)
		(mag)	(ang)	
1	0.18	0.96	−32.8	17.0
2	0.19	0.93	−17.9	15.5
3	0.19	0.90	−3.0	14.0
4	0.20	0.84	11.9	12.5
5	0.23	0.79	26.8	11.0
6	0.24	0.74	41.7	9.5
7	0.26	0.65	56.6	8.0
8	0.29	0.53	73.6	6.0
9	0.31	0.44	92.6	4.5
10	0.34	0.34	113.6	3.5
11	0.37	0.28	136.5	2.5
12	0.40	0.25	161.2	2.5
13	0.45	0.25	−172.3	2.5
14	0.50	0.27	−144.2	3.0
15	0.55	0.33	−122.0	4.0
16	0.61	0.44	−97.0	5.6
17	0.66	0.55	−73.0	7.0
18	0.72	0.66	−47.0	8.7



Measurement plane (2.6mm)

Recommended foot pattern;
RO4003C/Rogers (εr=3.38, t=0.508mm)

Note:

We are ready to provide nonlinear model for ADS and MWO users. If you are interested, please contact our sales offices.

S PARAMETERS

(VDS=2V,ID=10mA,Ta=room temperature)

Freq.	S11		S21		S12		S22	
(GHz)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
1	0.989	-13.9	5.497	164.6	0.017	78.9	0.637	-10.6
2	0.967	-28.2	5.416	149.6	0.028	70.9	0.626	-21.1
3	0.929	-41.5	5.278	135.0	0.040	61.7	0.610	-31.1
4	0.882	-54.4	5.172	121.5	0.051	53.3	0.586	-40.5
5	0.822	-65.9	4.932	108.0	0.061	45.9	0.572	-50.8
6	0.757	-79.5	4.959	94.1	0.071	37.6	0.538	-60.3
7	0.686	-93.3	4.826	80.4	0.080	29.9	0.502	-69.8
8	0.611	-108.8	4.732	66.8	0.086	22.7	0.456	-78.6
9	0.533	-125.1	4.587	53.6	0.092	16.2	0.408	-86.5
10	0.463	-143.6	4.403	40.5	0.096	10.2	0.359	-93.8
11	0.411	-164.1	4.140	27.8	0.100	4.8	0.311	-100.7
12	0.382	174.7	4.010	15.6	0.105	0.1	0.267	-108.9
13	0.378	152.3	3.782	3.3	0.111	-4.7	0.221	-119.3
14	0.395	131.4	3.653	-9.1	0.115	-9.7	0.182	-135.4
15	0.435	113.6	3.514	-21.3	0.121	-14.6	0.152	-157.0
16	0.486	99.0	3.366	-32.9	0.126	-19.8	0.134	177.7
17	0.543	86.2	3.172	-45.3	0.133	-25.5	0.139	145.4
18	0.603	73.7	3.049	-57.7	0.140	-31.2	0.183	115.8
19	0.663	61.2	2.877	-70.2	0.147	-37.9	0.251	95.1
20	0.704	50.1	2.641	-81.3	0.152	-45.0	0.309	80.2
21	0.746	40.5	2.470	-91.5	0.156	-52.4	0.363	70.0
22	0.778	32.3	2.311	-102.3	0.156	-58.0	0.411	59.8

NOISE PARAMETERS (VDS=2V,ID=10mA, Ta=25°C)

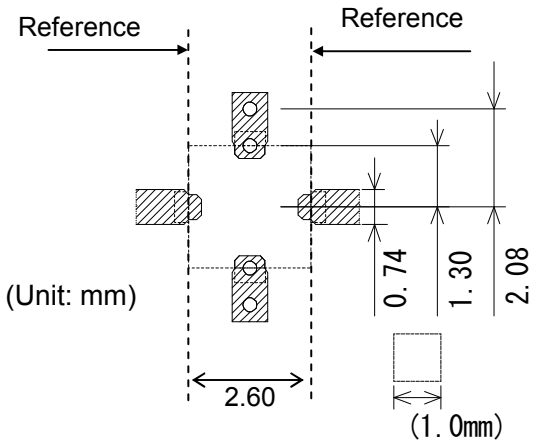
Freq.	Γopt		rn	NFmin
(GHz)	(mag)	(ang)		(dB)
2	0.671	13.9	0.370	0.20
4	0.598	37.2	0.262	0.22
6	0.537	60.8	0.197	0.25
8	0.474	86.2	0.155	0.29
10	0.399	119.2	0.102	0.32
12	0.329	147.6	0.062	0.35
14	0.299	173.6	0.069	0.40
16	0.349	-143.9	0.083	0.49
18	0.392	-106.5	0.109	0.59
20	0.432	-73.0	0.146	0.73
22	0.467	-42.7	0.180	0.96

Note: rn is normarised by 50 ohm.

Board: εr=2.2

Thickness: 0.25mm

(4−φ0.3: through−hole)



Note:

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S PARAMETERS

(VDS=0V,VGS=0V,Ta=room temperature)

Freq.	S11		S21		S12		S22	
(GHz)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
1	0.996	-12.6	0.008	90.7	0.008	93.1	0.700	167.0
2	0.998	-25.4	0.019	92.4	0.019	92.2	0.696	154.5
3	0.988	-38.1	0.032	90.0	0.032	90.6	0.703	142.2
4	0.984	-50.8	0.048	86.4	0.048	86.3	0.708	129.1
5	0.971	-62.6	0.068	80.5	0.069	81.0	0.710	117.1
6	0.963	-77.1	0.092	72.6	0.092	72.7	0.718	104.8
7	0.949	-92.8	0.119	62.9	0.120	62.9	0.730	92.6
8	0.936	-110.9	0.149	51.8	0.150	52.2	0.739	81.3
9	0.915	-131.2	0.181	39.2	0.182	39.5	0.750	70.7
10	0.892	-153.9	0.211	25.5	0.211	25.9	0.760	60.8
11	0.878	-178.2	0.235	10.8	0.237	11.1	0.769	51.6
12	0.870	157.5	0.252	-3.9	0.252	-3.9	0.785	42.8
13	0.868	133.9	0.258	-18.6	0.259	-18.6	0.795	34.7
14	0.875	113.0	0.257	-32.0	0.257	-32.0	0.805	26.9
15	0.883	94.9	0.250	-44.4	0.249	-44.1	0.815	19.2
16	0.895	79.7	0.238	-55.0	0.238	-54.9	0.824	11.6
17	0.901	66.6	0.225	-64.2	0.225	-64.0	0.833	5.2
18	0.912	54.7	0.213	-72.0	0.215	-71.8	0.845	0.1
19	0.923	43.8	0.205	-78.8	0.205	-78.7	0.856	-3.7
20	0.934	34.0	0.201	-85.1	0.202	-85.5	0.861	-8.4
21	0.947	25.0	0.195	-92.1	0.193	-92.7	0.859	-13.1
22	0.945	17.6	0.188	-98.3	0.188	-98.5	0.854	-18.2

(VDS=0V,VGS=-2.5V,Ta=room temperature)

Freq.	S11		S21		S12		S22	
(GHz)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
1	1.003	-8.2	0.022	80.5	0.023	79.5	0.998	-9.2
2	0.998	-16.7	0.045	72.1	0.045	71.9	0.990	-18.6
3	0.994	-24.6	0.067	62.9	0.067	63.2	0.995	-27.7
4	0.991	-32.2	0.088	54.8	0.089	54.7	0.993	-36.7
5	0.986	-38.9	0.109	46.3	0.110	46.5	0.993	-46.8
6	0.983	-46.7	0.133	37.4	0.132	37.5	0.985	-56.3
7	0.977	-54.4	0.157	28.6	0.158	28.7	0.982	-65.6
8	0.972	-63.3	0.183	18.8	0.184	18.6	0.970	-75.4
9	0.963	-72.7	0.211	8.3	0.210	8.5	0.962	-85.2
10	0.950	-83.2	0.237	-2.6	0.238	-2.7	0.956	-95.5
11	0.938	-94.7	0.263	-14.9	0.264	-14.8	0.945	-106.4
12	0.929	-107.7	0.289	-27.8	0.289	-27.8	0.932	-118.6
13	0.916	-121.9	0.310	-42.3	0.312	-42.2	0.921	-132.8
14	0.911	-137.5	0.326	-58.6	0.327	-58.7	0.914	-149.6
15	0.904	-155.7	0.324	-76.7	0.325	-76.6	0.909	-167.8
16	0.903	-175.3	0.305	-95.2	0.306	-95.4	0.911	173.5
17	0.910	163.6	0.269	-114.1	0.271	-114.4	0.916	153.5
18	0.914	142.1	0.219	-131.5	0.220	-131.6	0.924	133.0
19	0.912	121.4	0.172	-145.0	0.172	-144.9	0.926	114.9
20	0.927	103.4	0.136	-160.1	0.136	-160.2	0.939	99.3
21	0.955	87.0	0.089	-178.2	0.090	-176.6	0.961	84.2
22	0.971	72.1	0.048	167.9	0.049	171.4	0.968	69.8

Note: We are ready to provide nonlinear model for ADS and MWO users. If you are interested, please contact our sales offices.

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