

**DESCRIPTION**

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

**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

**Outline Drawing**

Fig.1

GD-32

**RECOMMENDED BIAS CONDITIONS**

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

**MITSUBISHI Proprietary**

Not to be reproduced or disclosed  
without permission by Mitsubishi Electric

**ORDERING INFORMATION**

Tape & reel 4000pcs./reel

**ABSOLUTE MAXIMUM RATINGS** (Ta=25°C)

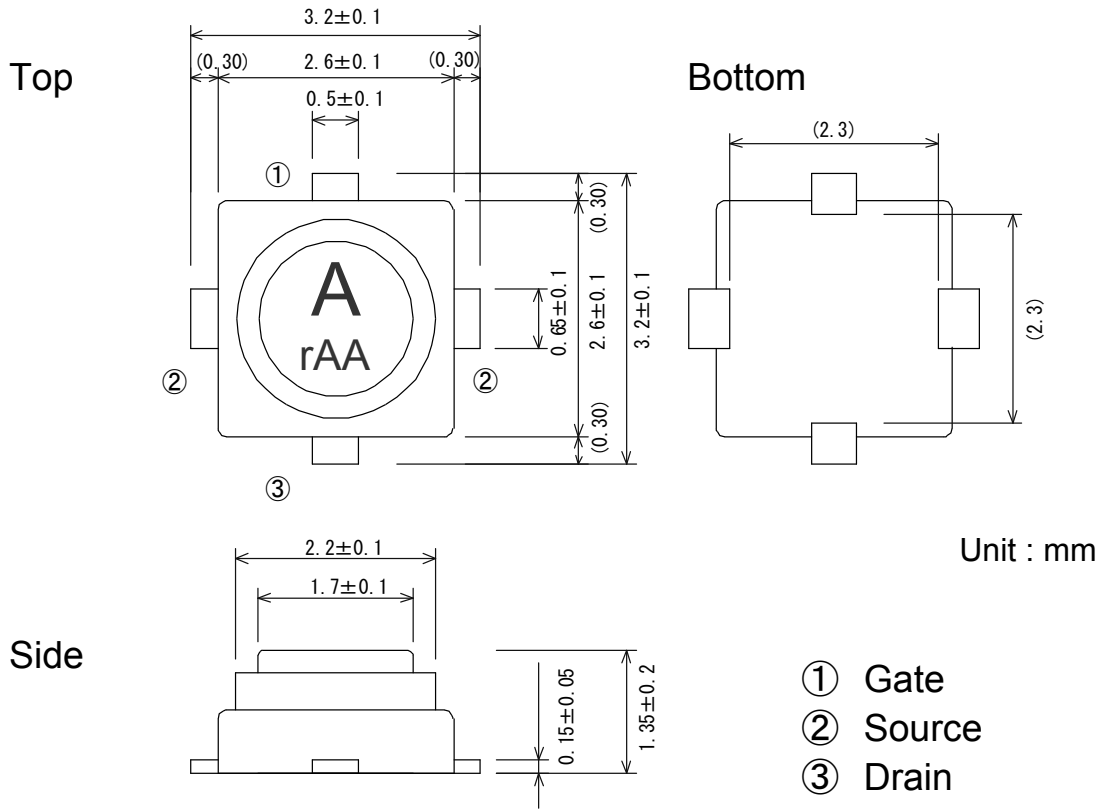
Symbol	Parameter	Ratings	Unit
$V_{GDO}$	Gate to drain voltage	-4	V
$V_{GSO}$	Gate to source voltage	-4	V
$I_D$	Drain current	IDSS	mA
PT	Total power dissipation	50	mW
$T_{ch}$	Channel temperature	125	°C
$T_{stg}$	Storage temperature	-55 to +125	°C

**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 designs, with appropriate measure such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction or mishap.

**ELECTRICAL CHARACTERISTICS** (Ta=25°C)

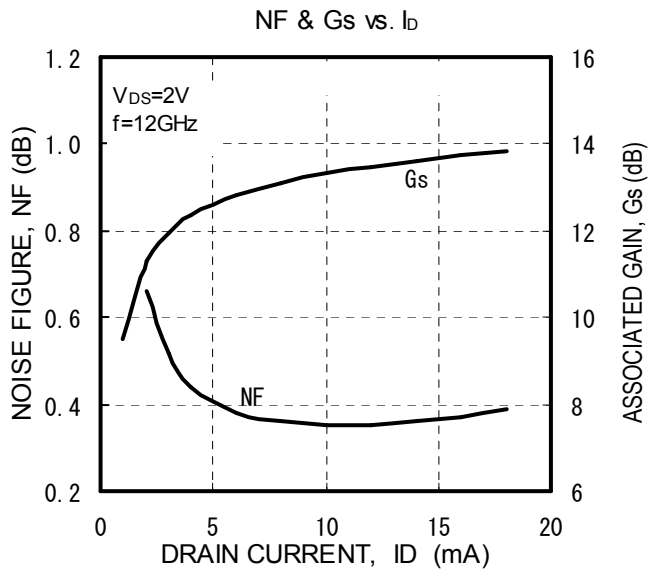
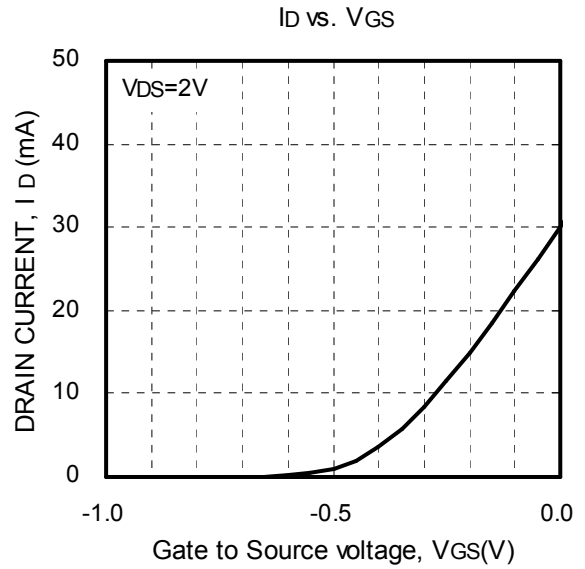
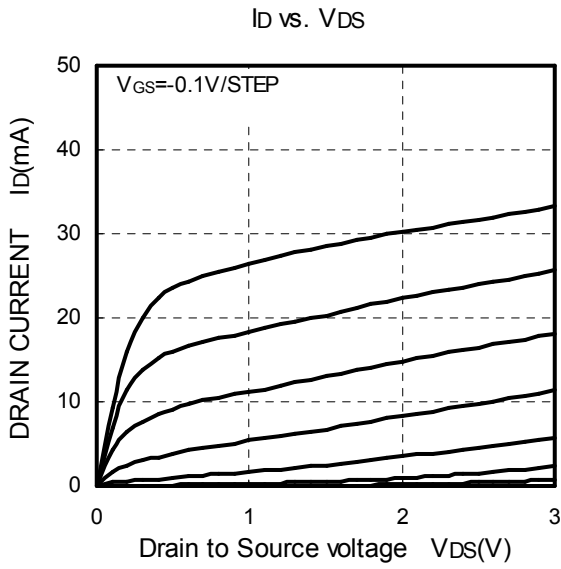
Symbol	Parameter	Test conditions	Limits			Unit
			MIN.	TYP.	MAX	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	$I_G=-10\mu A$	-3	--	--	V
$I_{GSS}$	Gate to source leakage current	$V_{GS}=-2V, V_{DS}=0V$	--	--	50	$\mu A$
$I_{DSS}$	Saturated drain current	$V_{GS}=0V, V_{DS}=2V$	15	--	60	mA
$V_{GS(off)}$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

Fig.1



(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	0.989	-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

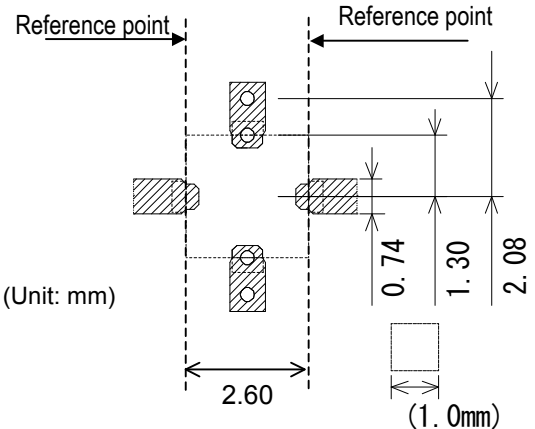
## NOISE PARAMETERS (VDS=2V, ID=10mA, Ta=25°C)

Freq. (GHz)	$\Gamma_{opt}$		rn	NFmin (dB)
	(mag)	(ang)		
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 normalised by 50 ohm.

Board:  $\epsilon_r=2.2$ 

Thickness: 0.25mm

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

## S PARAMETERS

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

Freq. (GHz)	S11		S21		S12		S22	
	(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. (GHz)	S11		S21		S12		S22	
	(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

**Requests Regarding Safety Designs**

Mitsubishi Electric constantly strives to raise the level of its quality and reliability. Despite these concerted efforts, however, there will be occasions when our semiconductor products suffer breakdowns, malfunctions or other problems. In view of this reality, it is requested that every feasible precaution be taken in the pursuit of redundancy design, malfunction prevention design and other safety-related designs, to prevent breakdowns or malfunctions in our products from resulting in accidents involving people, fires, social losses or other problems, thereby upholding the highest levels of safety in the products when in use by customers.

**Matters of Importance when Using these Materials**

1. These materials are designed as reference materials to ensure that all customers purchase Mitsubishi Electric semiconductors best suited to their specific use applications. Please be aware, however, that the technical information contained in these materials does not comprise consent for the execution or use of intellectual property rights or other rights owned by Mitsubishi Electric Corporation.
2. Mitsubishi Electric does not assume responsibility for damages resulting from the use of product data, graphs, charts, programs, algorithms or other applied circuit examples described in these materials, or for the infringement of the rights of third-party owners resulting from such use.
3. The data, graphs, charts, programs, algorithms and all other information described in these materials were current at the issue of these materials, with Mitsubishi Electric reserving the right to make any necessary updates or changes in the products or specifications in these materials without prior notice. Before purchasing Mitsubishi Electric semiconductor products, therefore, please obtain the latest available information from Mitsubishi Electric directly or an authorized dealer.
4. Every possible effort has been made to ensure that the information described in these materials is fully accurate. However, Mitsubishi Electric assumes no responsibility for damages resulting from inaccuracies occurring within these materials.
5. When using the product data, technical contents indicated on the graphs, charts, programs or algorithms described in these materials, assessments should not be limited to only the technical contents, programs and algorithm units. Rather, it is requested that ample evaluations be made of each individual system as a whole, with the customer assuming full responsibility for decisions on the propriety of application. Mitsubishi Electric does not accept responsibility for the propriety of application.
6. The products described in these materials, with the exception of special mention concerning use and reliability, have been designed and manufactured with the purpose of use in general electronic machinery. Accordingly these products have not been designed and manufactured with the purpose of application in machinery or systems that will be used under conditions that can affect human life, or in machinery or systems used in social infrastructure that demand a particularly high degree of reliability. When considering the use of the products described in these materials in transportation machinery (automobiles, trains, vessels), for objectives related to medical treatment, aerospace, nuclear power control, submarine repeaters or systems or other specialized applications, please consult with Mitsubishi Electric directly or an authorized dealer.
7. When considering use of products for purposes other than the specific applications described in these materials, please inquire at Mitsubishi Electric or an authorized dealer.
8. The prior consent of Mitsubishi Electric in writing is required for any reprinting or reproduction of these materials.
9. Please direct any inquiries regarding further details of these materials, or any other comments or matters of attention, to Mitsubishi Electric or an authorized dealer.