

DESCRIPTION

The MGFC4453A low-noise HEMT (High Electron Mobility Transistor) is designed for use in X to K band amplifiers.

FEATURES

- Low noise figure @ $f=12\text{GHz}$
NFmin. = 0.40dB (TYP.)
- High associated gain @ $f=12\text{GHz}$
Gs = 13.0dB (TYP.)

APPLICATION

X to K band low noise amplifiers.

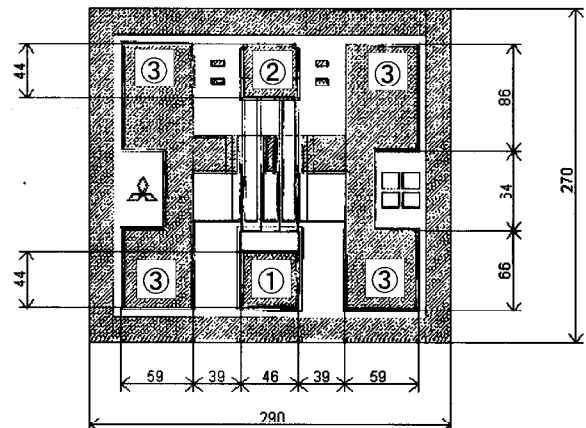
RECOMMENDED BIAS CONDITIONS

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

Refer to Bias Procedure

OUTLINE DRAWING

Unit : μm



Chip Thickness : $105^{+35}_{-30} \mu\text{m}$

① : Gate
② : Drain
③ : Source

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	60	mA
PT	Total power dissipation	50	mW
T_{ch}	Channel temperature	125	°C
T_{stg}	Storage temperature	-65 to +125	°C

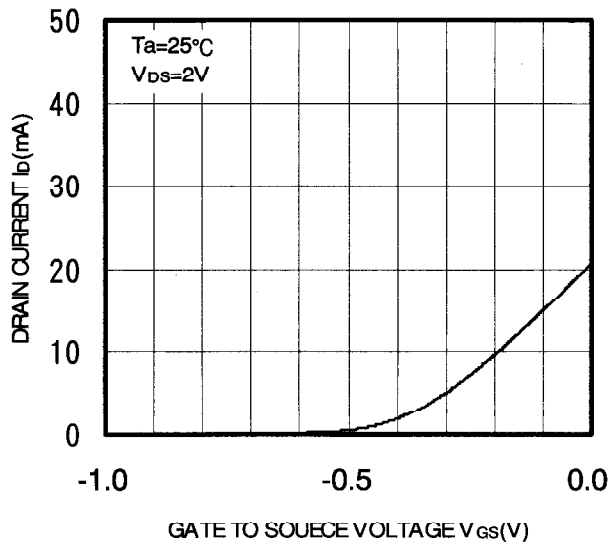
Keep safety first in your circuit designs!
Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures 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)

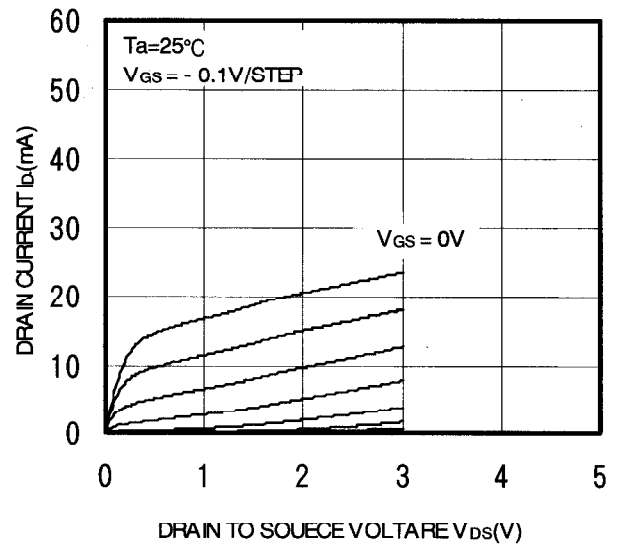
Symbol	Parameter	Test conditions	Limits			Unit
			MIN.	TYP.	MAX.	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	$I_G=-10\mu\text{A}$	-3	--	--	V
I_{GSS}	Gate to source leakage current	$V_{GS}=-2\text{V}, V_{DS}=0\text{V}$	--	--	50	μA
I_{DSS}	Saturated drain current	$V_{GS}=0\text{V}, V_{DS}=-2\text{V}$	15	--	60	mA
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS}=2\text{V}, I_D=500\mu\text{A}$	-0.1	--	-1.5	V
Gs	Associated gain	$V_{DS}=2\text{V}, I_D=10\text{mA}$	12.0	13.0	--	dB
NFmin.	Minimum noise figure	$f=12\text{GHz}$	--	0.40	0.50	dB

TYPICAL CHARACTERISTICS

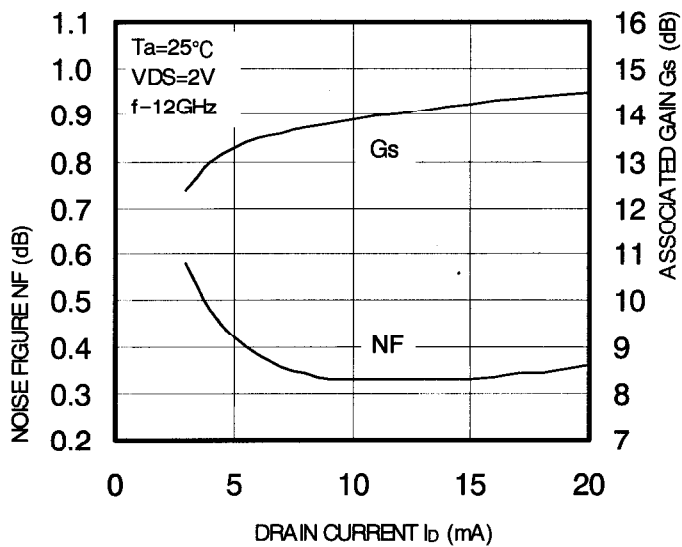
I_D vs. V_{GS}



I_D vs. V_{DS}



NF & G_s vs. I_D
 (f=12GHz)



TYPICAL CHARACTERISTICS

S PARAMETERS (Ta=25°C,VDS=2V,ID=10mA)

f (GHz)	S11		S21		S12		S22		MSG/MAG (dB)	K
	Magn.	Angle	Magn.	Angle	Magn.	Angle	Magn.	Angle		
1	0.998	-7.9	5.458	173.4	0.010	84.7	0.573	-5.9	27.37	0.03
2	0.994	-15.8	5.424	166.8	0.198	79.5	0.569	-11.8	14.38	0.50
3	0.987	-23.6	5.369	160.3	0.029	74.3	0.561	-17.6	22.62	0.08
4	0.977	-31.4	5.295	153.8	0.039	69.1	0.551	-23.4	21.37	0.11
5	0.964	-39.0	5.204	147.4	0.047	64.1	0.539	-29.1	20.41	0.14
6	0.950	-46.5	5.098	141.2	0.056	59.2	0.525	-34.8	19.63	0.16
7	0.935	-53.9	4.980	135.1	0.063	54.4	0.509	-40.4	18.97	0.19
8	0.919	-61.2	4.852	129.1	0.070	49.8	0.492	-45.9	18.40	0.22
9	0.902	-68.3	4.718	123.3	0.076	45.3	0.474	-51.4	17.91	0.25
10	0.885	-75.3	4.578	117.6	0.082	41.0	0.455	-56.8	17.46	0.27
11	0.869	-82.0	4.436	112.0	0.087	36.9	0.437	-62.1	17.06	0.30
12	0.853	-88.7	4.292	106.6	0.092	32.8	0.418	-67.5	16.70	0.33
13	0.837	-95.1	4.149	101.4	0.096	29.0	0.400	-72.8	16.37	0.36
14	0.822	-101.4	4.007	96.3	0.099	25.3	0.382	-78.1	16.08	0.38
15	0.809	-107.6	3.868	91.3	0.102	21.7	0.365	-83.5	15.80	0.41
16	0.796	-113.6	3.732	86.4	0.104	18.3	0.349	-88.9	15.54	0.44
17	0.785	-119.4	3.599	81.7	0.106	15.0	0.333	-94.3	15.30	0.47
18	0.774	-125.0	3.470	77.1	0.108	11.9	0.319	-99.9	15.08	0.50
19	0.765	-130.5	3.345	72.5	0.109	8.8	0.306	-105.5	14.87	0.53
20	0.757	-135.9	3.225	68.1	0.110	5.9	0.295	-111.3	14.68	0.55
21	0.750	-141.0	3.108	63.8	0.110	3.1	0.285	-117.1	14.50	0.58
22	0.744	-146.1	2.996	59.6	0.111	0.4	0.276	-123.0	14.32	0.61
23	0.740	-150.9	2.889	55.4	0.111	-2.1	0.269	-128.9	14.16	0.64
24	0.736	-155.6	2.785	51.4	0.111	-4.6	0.264	-134.9	14.01	0.67
25	0.733	-160.2	2.685	47.4	0.110	-7.0	0.260	-140.9	13.86	0.70
26	0.731	-164.6	2.589	43.4	0.110	-9.3	0.257	-146.8	13.72	0.72

TECHNICAL NOTE

1.Characteristics and quality assurance

1.1 Electrical characteristics

- a. DC characteristics on spec.sheet show the test conditions and values using wefer-prober.DC characteristics are tested 100%devices.
- b. RF characteristics are tested using the corresponding packaged FET.When more then 80% of the samples satisfy the value of RF characteristics on spec.sheet,that wafer is accepted for shipment.

1.2 Quality assurance and reliability

- a. Mechanical characteristics are tested using corresponding package with sampling test.
- b. Visual inspection is complied with MITSUBISHI's technical note.
- c. The electrical characteristics and the quality assurance test are sampling test. And so the shipped chips are contained some sub-standard articles.
- d. After opening the packing , the quality of chips are influenced s storage conditions. Our recommended storage conditions and period is as follows:

$T_a=25\pm3^{\circ}\text{C}$

MITSUBISHI's packing + Desiccator 6 months

Opened packing + Desiccator 2 months

In the desiccator , leave the chips in the pack keeping up -side-up and store in a clean and dry environment , preferable dry N2.

e. Packing quantity

Standard:100pcs.or 25pcs./ each waffle pack

Custom order:25~ 100pcs./each waffle pack by 25pcs.step

In case of long storage exceeding 2 months at customer after opening the packing , total quantity of order shall be separated and small unit quantity of each orders shall be custom ordered. In this case , we may prepare special spec. No for each customer. (ex . -A21,-A22...)

1.3 Others

The device shall not be returned in the following case.

- a. Inadequate storage
- b. Mishandling
- c. Incorrect die/wire bonding
- d. RF characteristics failure rate then 30%.
- e. Exceed the recommended storage period
- f. Visual failure rate less than 10%

2.Ordering information

Spec. No.	Visual Grade	Unit quantity for each waffle pack
-A02	B	100pcs
-A03	C	
-A12	B	25pcs
-A13	C	