

MITSUBISHI SEMICONDUCTOR <GaAs FET>
MGFC1801
 FOR MICROWAVE LOW-NOISE AMPLIFIERS
 N-CHANNEL SCHOTTKY BARRIER GATE TYPE

DESCRIPTION

The MGFC1801 medium-power GaAs FET with an N-channel Schottky gate is designed for use in S to X band amplifiers and oscillators.

FEATURES

- High linear power gain
 $G_{lp} = 7\text{dB (MIN.)}$ @ $f=8\text{GHz}$
- High associated gain
 $P_{1dB} = 21.8\text{dBm (MIN.)}$ @ $f=8\text{GHz}$

APPLICATION

S to X band power amplifier and oscillators.

RECOMMENDED BIAS CONDITIONS

$V_{DS}=6\text{V}$, $I_D=100\text{mA}$
 Refer to Bias Procedure

OUTLINE DRAWING

Unit: millimeters

Fig.1

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.

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

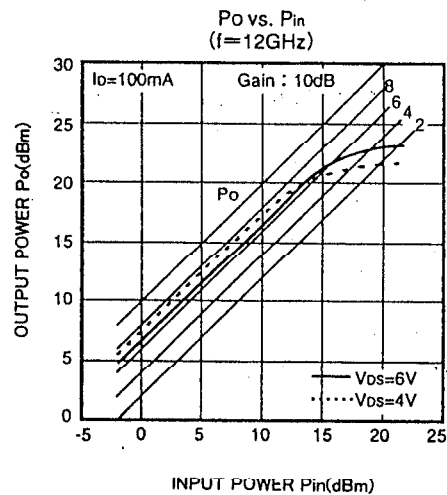
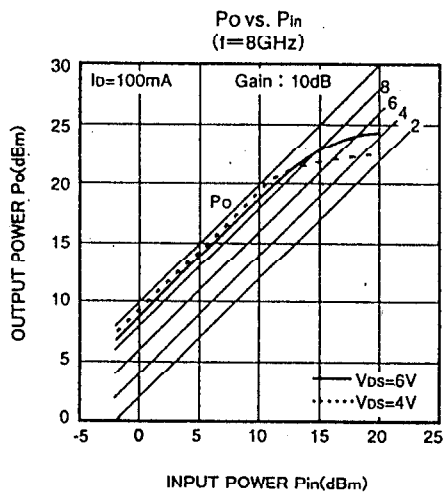
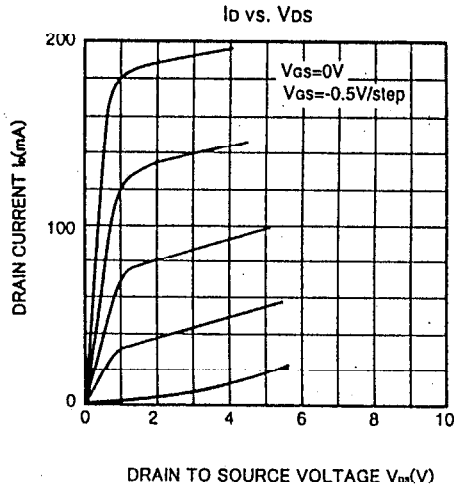
Symbol	Parameter	Ratings	Unit
V_{GDO}	Gate to drain voltage	-8	V
V_{GSO}	Gate to source voltage	-8	V
I_D	Drain current	250	mA
I_{GR}	Reverse gate current	-0.6	mA
I_{GF}	Forward gate current	1.5	mA
P_T	Total power dissipation	1.2	W
T_{ch}	Channel temperature	175	°C
T_{stg}	Storage temperature	-65~+175	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			MIN.	TYP.	MAX.	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	$I_G=-200\mu\text{A}$	-8	--	--	V
$V_{(BR)GSO}$	Gate to source breakdown voltage	$I_G=-200\mu\text{A}$	-8	--	--	V
I_{GSS}	Gate to source leakage current	$V_{GS}=-3\text{V}, V_{DS}=0\text{V}$	--	--	20	μA
I_{DSS}	Saturated drain current	$V_{GS}=0\text{V}, V_{DS}=3\text{V}$	150	200	250	mA
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS}=3\text{V}, I_D=100\mu\text{A}$	-1.5	--	-4.5	V
g_m	Transconductance	$V_{DS}=3\text{V}, I_D=100\text{mA}$	70	90	--	mS
G_{lp}	Linear power gain	$V_{DS}=6\text{V}, I_D=100\text{mA}, f=8\text{GHz}$	7	9	--	dB
P_{1dB}	Minimum noise figure	$V_{DS}=6\text{V}, I_D=100\text{mA}, f=8\text{GHz}$	21.8	23.0	--	dBm

TYPICAL CHARACTERISTICS

($T_a=25^\circ\text{C}$)



TYPICAL CHARACTERISTICS

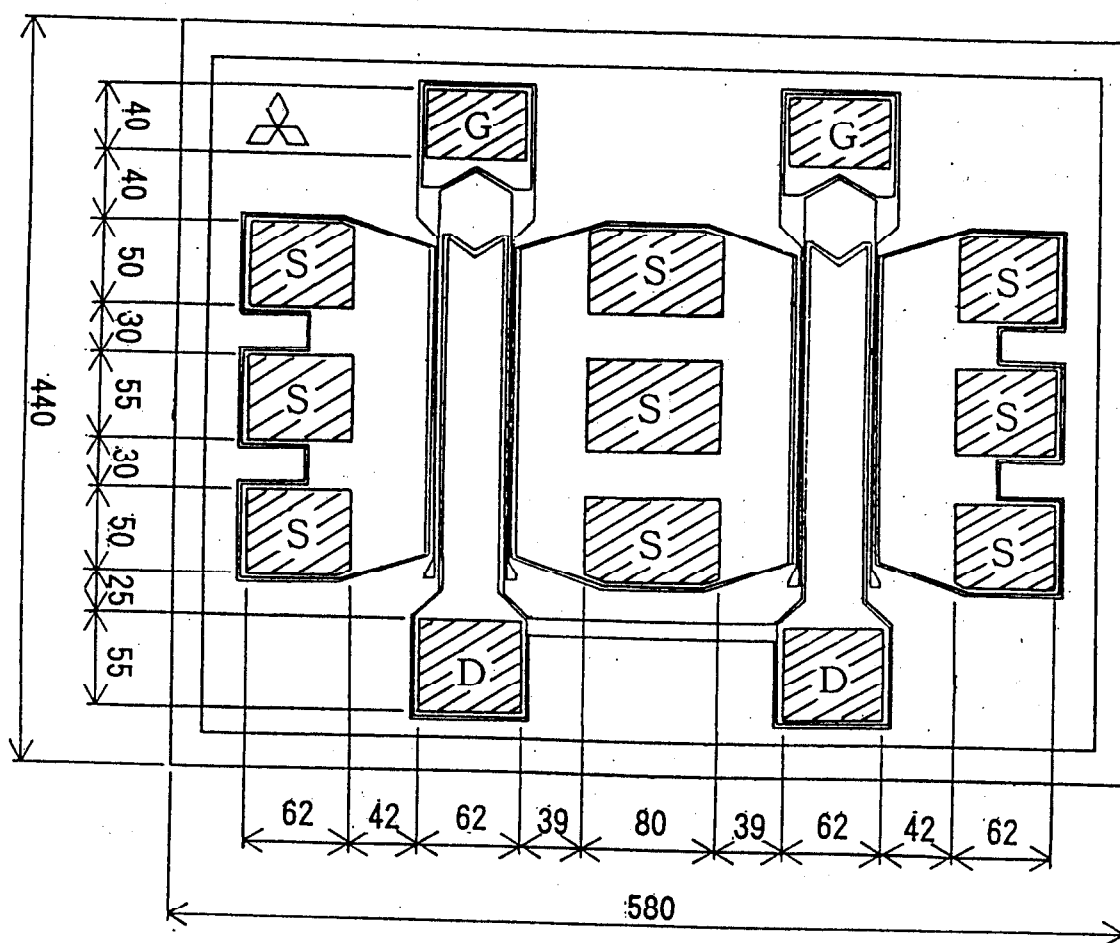
S PARAMETERS (Ta=25°C, VDS=6V, ID=100mA)

f (GHz)	S11		S21		S12		S22		MSG/MAG (dB)	K
	Magn.	Angle	Magn.	Angle	Magn.	Angle	Magn.	Angle		
1	0.982	-31.1	4.468	157.0	0.041	70.4	0.821	-16.1	20.34	0.058
2	0.942	-59.1	4.027	136.3	0.074	52.9	0.771	-30.5	17.35	0.115
3	0.898	-82.7	3.511	118.5	0.096	38.5	0.716	-42.6	15.62	0.173
4	0.862	-102.0	3.033	103.3	0.011	26.7	0.670	-52.8	14.41	0.231
5	0.837	-117.9	2.629	90.3	0.118	17.0	0.637	-61.7	13.49	0.288
6	0.819	-131.1	2.296	78.7	0.012	8.8	0.615	-70.0	12.77	0.346
7	0.808	-142.3	2.023	68.3	0.123	1.8	0.601	-77.8	12.17	0.403
8	0.801	-152.0	1.798	58.7	0.122	-4.4	0.595	-85.3	11.68	0.461
9	0.798	-160.5	1.609	49.8	0.120	-9.8	0.593	-92.6	11.26	0.519
10	0.798	-168.1	1.450	41.3	0.118	-14.7	0.595	-99.8	10.91	0.577
11	0.799	-175.0	1.313	33.3	0.114	-19.1	0.601	-106.9	10.61	0.636
12	0.801	-178.7	1.194	25.7	0.110	-23.1	0.609	-113.8	10.35	0.695
13	0.805	-172.9	1.091	18.4	0.106	-26.6	0.618	-120.6	10.13	0.755
14	0.810	-167.4	0.999	11.3	0.101	-29.7	0.629	-127.2	9.94	0.815
15	0.815	-162.3	0.916	4.6	0.097	-32.4	0.641	-133.7	9.77	0.876
16	0.820	-157.5	0.843	-1.9	0.092	-34.6	0.653	-140.0	9.62	0.936
17	0.826	-153.0	0.776	-8.1	0.087	-36.5	0.666	-146.1	9.49	0.997
18	0.831	-148.7	0.715	-14.1	0.083	-37.8	0.680	-152.1	7.90	1.057

OUTLINE DRAWING

Unit : μm

Fig. 1



Chip Thickness : $145 \pm 20 \mu\text{m}$

TECHNICAL NOTE

1. Characteristics and quality assurance

1.1 Electrical characteristics

- a. DC characteristics on spec. sheet show the test conditions and values using wafer-prober. DC characteristics are tested 100% devices.
- b. RF characteristics are tested using the corresponding packaged FET. When more than 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 with storage conditions. Our recommended storage conditions and period is as follows:

$$T_a = 25 \pm 3^\circ\text{C}$$

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 : 400 pcs. or 25 pcs. / each waffle pack

Custom order : 25-400 pcs. / each waffle pack by 25 pcs. 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. -21, -22 ...)

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 less than 30%.

2. Ordering information

Spec. No.	Visual Grade	Unit quantity for each waﬄe pack
-A01	A	100 pcs.
-A02	B	
-A03	C	
-A11	A	25 pcs.
-A12	B	
-A13	C	