

N – Channel FET Transistor

MGF1502

FET Transistor

6V / 80mA

DATASHEET

OEM –Mitsubishi

Source: Mitsubishi Databook 1989

MITSUBISHI SEMICONDUCTOR (GaAs FET)

MGF1502

**FOR MICROWAVE LOW-NOISE AMPLIFIERS
N-CHANNEL SCHOTTKY-BARRIER-GATE TYPE**

DESCRIPTION

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The MGF1502, low-noise GaAs FET with an N-channel Schottky gate, is designed for use in L to C band amplifiers.

FEATURES

- Low noise figure $NF_{min} = 1.5 \text{ dB (MAX.) @ } f = 4 \text{ GHz}$
- High associated gain $G_A = 10 \text{ dB (MIN.) @ } f = 4 \text{ GHz}$

APPLICATION

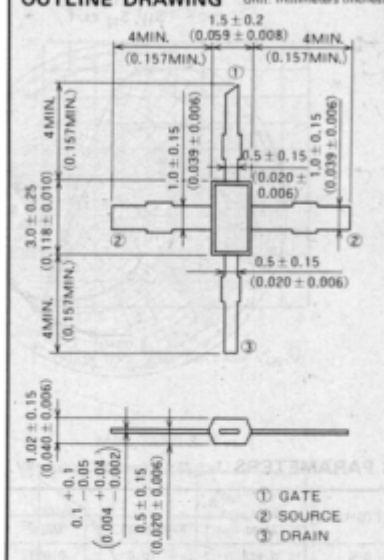
L to C band low-noise amplifiers.

QUALITY GRADE

- GG

OUTLINE DRAWING Unit: millimeters (inches)

Unit: millimeters (inches)



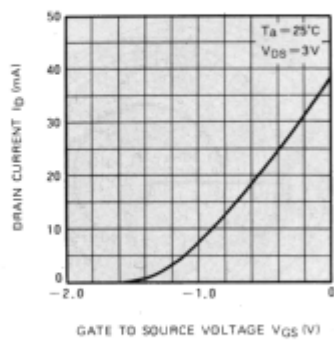
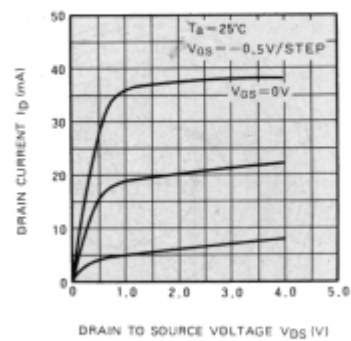
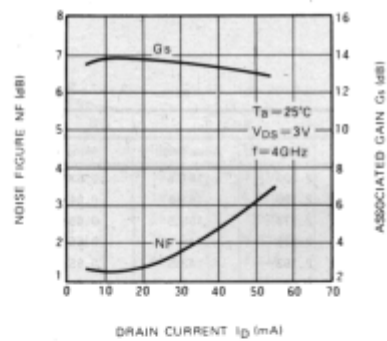
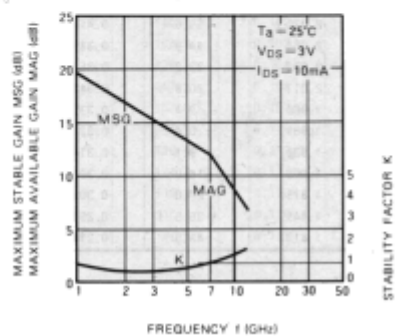
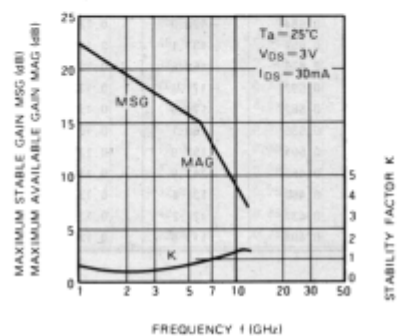
ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Symbol	Parameter	Rating	Unit
V_{GD0}	Gate to drain voltage	-6	V
V_{GS0}	Gate to source voltage	-6	V
I_D	Drain current	80	mA
P_T	Total power dissipation	300	mW
T_{ch}	Channel temperature	150	°C
T_{stg}	Storage temperature	-55 ~ +150	°C
$R_{th(ch-a)}$	Thermal resistance	416	°C/W

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

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)DDO}$	Gate to drain breakdown voltage	$I_D = -100\mu A$	-6			V
$V_{(BR)DSO}$	Gate to source breakdown voltage	$I_D = -100\mu A$	-6			V
I_{GSS}	Gate to source leakage current	$V_{GS} = -3V, V_{DS} = 0V$			10	μA
I_{DSS}	Saturated drain current	$V_{GS} = 0V, V_{DS} = 3V$	15	35	80	mA
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS} = 3V, I_D = 100\mu A$	-0.3		-3.5	V
g_m	Transconductance	$V_{DS} = 3V, I_D = 10mA$	10	25		mS
G_S	Associated gain	$V_{DS} = 3V, I_D = 10mA, f = 40Hz$	10			dB
NF_{min}	Minimum noise figure	$V_{DS} = 3V, I_D = 10mA, f = 40Hz$			1.5	dB

MITSUBISHI SEMICONDUCTOR (GaAs FET)

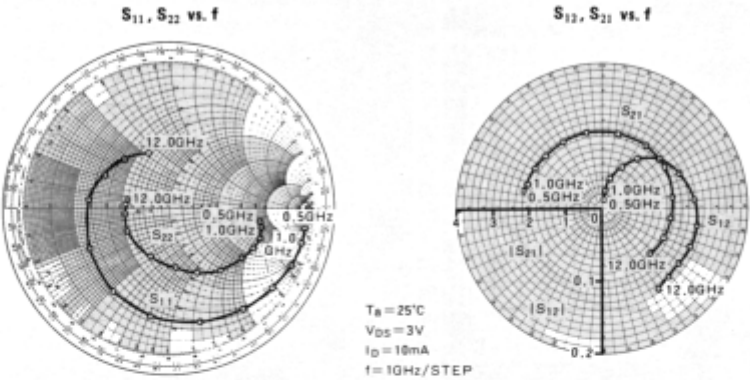
MGF1502**FOR MICROWAVE LOW-NOISE AMPLIFIERS
N-CHANNEL SCHOTTKY-BARRIER-GATE TYPE****TYPICAL CHARACTERISTICS** **I_D vs. V_{GS}**  **I_D vs. V_{DS}** **NF & G_s vs. I_D** **MSG, MAG & K vs. f
($I_D = 10\text{ mA}$)****MSG, MAG & K vs. f
($I_D = 30\text{ mA}$)**

MITSUBISHI SEMICONDUCTOR <GaAs FET>

MGF1502

FOR MICROWAVE LOW-NOISE AMPLIFIERS

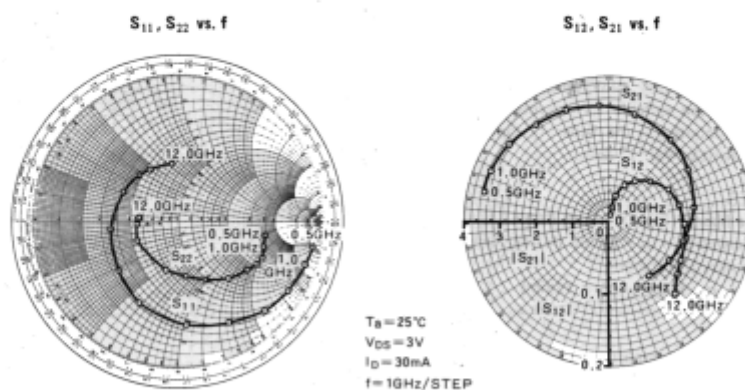
N-CHANNEL SCHOTTKY-BARRIER-GATE TYPE



S PARAMETERS ($T_a = 25^{\circ}\text{C}$, $V_{DS} = 3\text{V}$, $I_D = 10\text{mA}$)

f (GHz)	S ₁₁		S ₁₂		S ₂₁		S ₂₂	
	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)
0.5	0.950	- 9.1	0.012	83.0	2.200	167.6	0.635	- 7.5
1.0	0.945	- 14.0	0.023	79.9	2.190	161.6	0.647	- 10.6
1.5	0.942	- 19.2	0.033	76.5	2.178	155.5	0.653	- 14.4
2.0	0.931	- 24.9	0.044	72.6	2.175	149.4	0.655	- 18.1
2.5	0.918	- 31.2	0.054	68.7	2.163	142.5	0.653	- 21.9
3.0	0.905	- 38.1	0.063	64.4	2.155	135.9	0.644	- 25.5
3.5	0.881	- 45.5	0.073	59.5	2.148	128.5	0.630	- 29.5
4.0	0.858	- 53.3	0.083	54.1	2.138	120.5	0.610	- 35.0
4.5	0.832	- 63.5	0.092	48.0	2.133	111.5	0.585	- 41.5
5.0	0.804	- 74.0	0.101	41.3	2.123	101.7	0.556	- 50.0
5.5	0.774	- 86.1	0.110	33.4	2.113	90.0	0.524	- 59.1
6.0	0.745	- 99.9	0.118	25.0	2.101	78.0	0.487	- 66.2
6.6	0.715	- 112.7	0.124	15.6	2.089	66.5	0.449	- 72.5
7.0	0.684	- 124.0	0.129	6.0	2.070	55.6	0.414	- 84.0
7.5	0.655	- 137.1	0.131	- 2.9	2.054	44.9	0.389	- 95.0
8.0	0.624	- 152.5	0.133	- 10.8	2.032	33.2	0.365	- 109.9
8.5	0.592	- 171.3	0.133	- 18.0	2.011	20.8	0.348	- 136.6
9.0	0.562	174.5	0.133	- 24.6	1.986	9.4	0.335	- 150.2
9.5	0.535	163.1	0.132	- 30.6	1.961	- 0.4	0.324	- 163.6
10.0	0.509	152.9	0.131	- 36.2	1.934	- 9.1	0.314	- 172.7
10.5	0.485	142.0	0.130	- 41.0	1.905	- 18.0	0.307	- 179.9
11.0	0.460	131.8	0.131	- 45.5	1.875	- 27.0	0.302	175.2
11.5	0.437	121.2	0.133	- 50.2	1.845	- 35.5	0.297	171.4
12.0	0.408	111.6	0.136	- 55.2	1.813	- 43.5	0.294	169.5

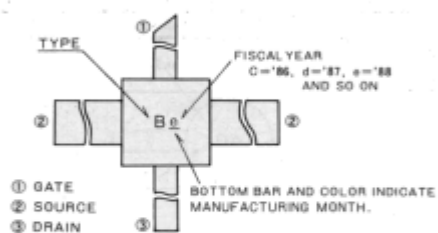
MITSUBISHI SEMICONDUCTOR <GaAs FET>

MGF1502**FOR MICROWAVE LOW-NOISE AMPLIFIERS
N-CHANNEL SCHOTTKY-BARRIER-GATE TYPE****S PARAMETERS** ($T_a = 25^\circ\text{C}$, $V_{DS} = 3\text{V}$, $I_D = 30\text{mA}$)

f (GHz)	S_{11}		S_{12}		S_{21}		S_{22}	
	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)
0.5	0.950	-10.5	0.010	82.4	3.568	167.1	0.610	-7.9
1.0	0.935	-18.0	0.020	79.8	3.548	157.0	0.622	-16.1
1.5	0.919	-25.1	0.029	78.0	3.499	148.7	0.630	-20.2
2.0	0.902	-32.1	0.038	75.3	3.459	142.1	0.631	-24.1
2.5	0.878	-40.0	0.048	72.0	3.420	134.3	0.627	-26.2
3.0	0.851	-45.6	0.055	68.1	3.373	127.0	0.617	-29.0
3.5	0.820	-53.2	0.062	63.4	3.323	119.1	0.603	-29.6
4.0	0.785	-62.9	0.068	57.8	3.273	110.8	0.582	-35.3
4.5	0.750	-73.9	0.075	51.2	3.214	103.3	0.556	-41.1
5.0	0.708	-85.7	0.081	44.1	3.210	95.0	0.525	-49.1
5.5	0.668	-100.2	0.086	36.0	3.076	84.8	0.486	-58.0
6.0	0.627	-115.6	0.093	27.9	3.003	75.9	0.449	-64.0
6.5	0.585	-128.3	0.097	20.0	2.921	66.2	0.414	-69.7
7.0	0.546	-140.1	0.100	12.2	2.831	55.0	0.386	-81.2
7.5	0.512	-154.3	0.102	5.8	2.732	45.1	0.365	-89.8
8.0	0.481	-172.1	0.104	-1.8	2.621	33.0	0.346	-104.0
8.5	0.454	167.9	0.106	-8.0	2.518	20.9	0.332	-132.6
9.0	0.435	153.0	0.107	-14.9	2.402	9.3	0.320	-154.7
9.5	0.422	141.5	0.110	-21.1	2.317	-1.1	0.309	-166.2
10.0	0.414	130.4	0.112	-28.0	2.188	-12.0	0.301	-176.3
10.5	0.406	124.3	0.115	-33.2	2.089	-23.2	0.295	179.1
11.0	0.401	119.8	0.120	-37.1	2.000	-32.8	0.291	178.0
11.5	0.399	110.5	0.126	-40.6	1.921	-42.2	0.287	177.6
12.0	0.398	96.5	0.137	-43.8	1.860	-52.4	0.283	176.9

MITSUBISHI SEMICONDUCTOR <GaAs FET> SYMBOL ON PACKAGE

EXAMPLE OF SYMBOL ON MICRO DISK PACKAGE



	Without bottom bar	with bottom bar
Blue	Apr.	Oct.
Orange	May	Nov.
Black	June	Dec.
Red	July	Jan.
Green	Aug.	Feb.
Brown	Sep.	Mar.


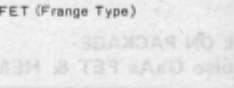
* Left side character indicates the type number.
* Right side character, bottom bar and the color indicate manufacturing year and month.

SYMBOL ON PACKAGE Low Noise GaAs FET & HEMT

Type	Symbol	Outline	Classification
MGF1100	D	GD-1	Low Noise Dual Gate
MGF1102	E	GD-2	
MGF1202	B	GD-3	
MGF1302	A	GD-4	Low Noise FET
MGF1303	B		
MGF1304A	E		
MGF1305	D	GD-9	
MGF1402	B		
MGF1412	C		
MGF1403	D		
MGF1404	E		
MGF1405	F		
MGF1423	G		
MGF1425	H		
MGF1501	I	GD-5	Low Noise Dual Gate FET (Mold)
MGF1502	I	GD-6	Low Noise FET (Mold)
MGF1902	A	GD-7	Low Noise FET (Tape-Carrier)
MGF1903	B		
MGF1904	C		
MGF4301A	R	GD-4	Low Noise HEMT
MGF4302A	S		
MGF4303A	M		
MGF4304A	N		
MGF4305A	P		
MGF4401A	J	GD-9	
MGF4402A	K		
MGF4403A	L		
MGF4404A	N		
MGF4405A	P		
MGF4901A	D	GD-7	Low Noise HEMT (Tape-Carrier)
MGF4902A	E		
MGF4903A	F		
MGF3000	A	GD-8	S.B.D.

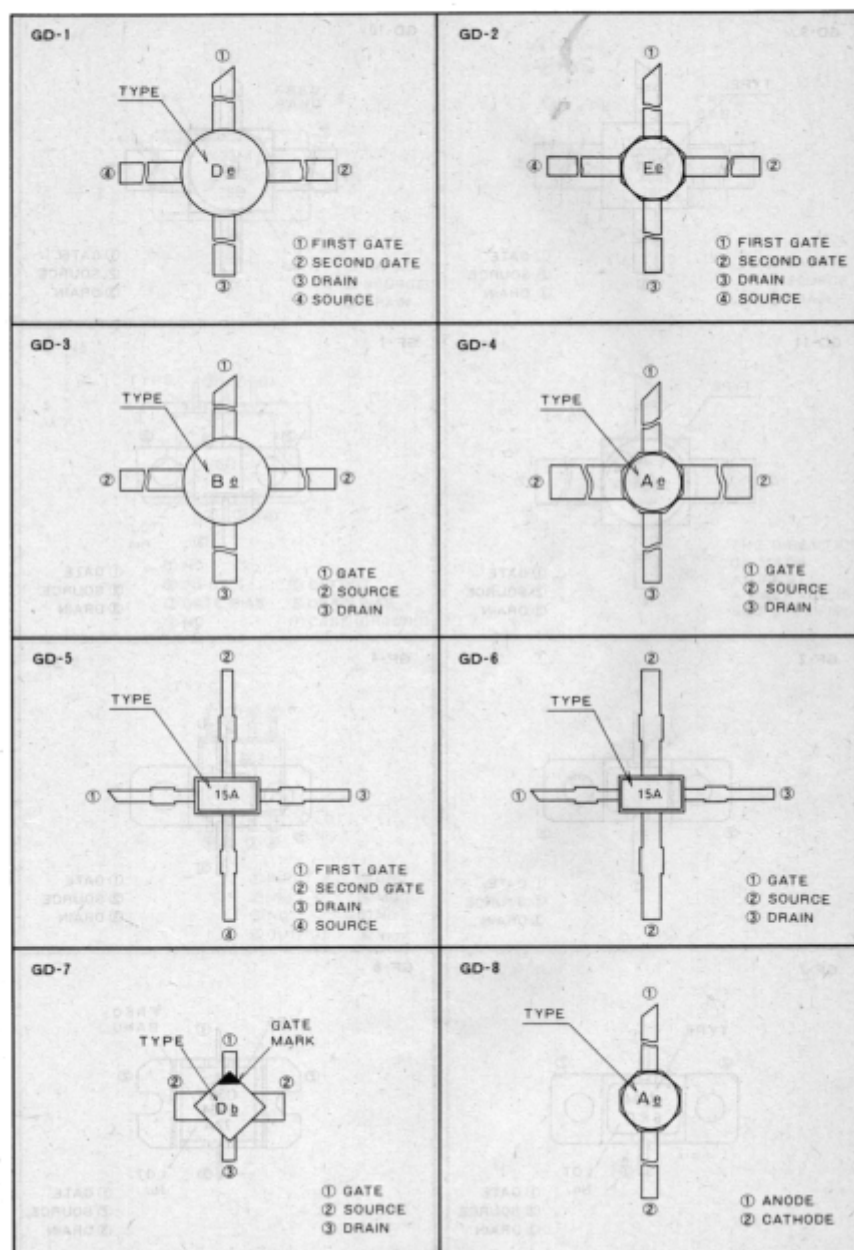
MITSUBISHI SEMICONDUCTOR <GaAs FET>
SYMBOL ON PACKAGE

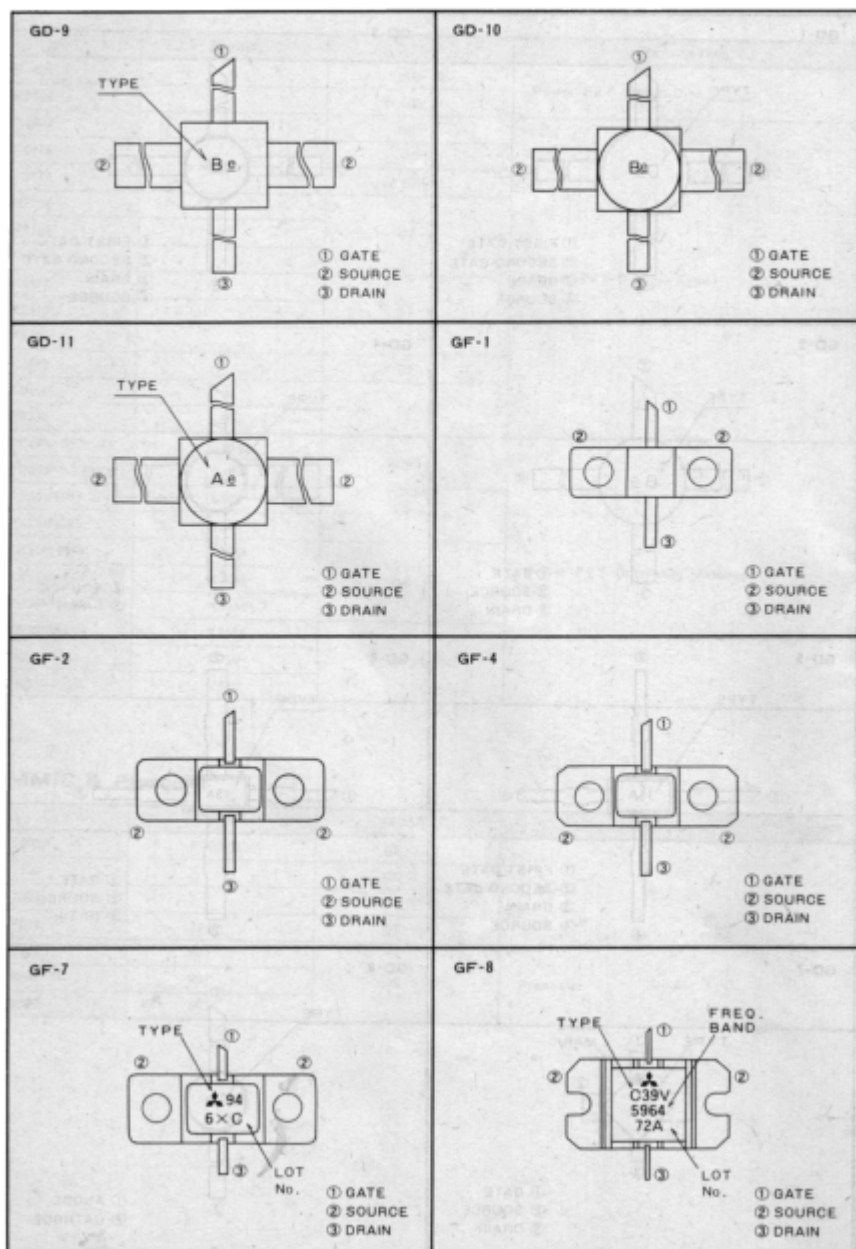
Power GaAs FET

Type	Symbol	Outline	Classification
MGF1801	B	GD-10	Power FET (Micro Disk)
MGF1801	A	GD-11	
MGF1802		GF-1	 Power FET (Frangle Type)
MGF2116		GF-2	
MGF2117		GF-1	
MGF2124		GF-4	
MGF2148			
MGF2172			
MGF2407			
MGF2415		GF-1	
MGF2430		GF-4	
MGF2445			
MGF0904	94	GF-7	 Power FET (Internally Matched)
MGF0905	95		
MGFC36V SERIES	C36V	GF-8	
MGFC39V SERIES	C39V		
MGFX35V9095	X35V	GF-14	
MGFX38V9095	X38V		
MGFK25M4045	K25M	GF-11	
MGFK30M4045	K30M		
MGFK33M4045	K33M		
MGFK35M4045	K35M	GF-14	
MGFK35V4045	K35V		
MGFK37V4045	K37V		

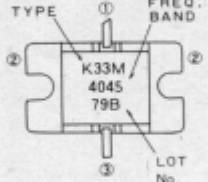
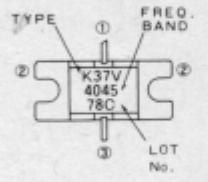
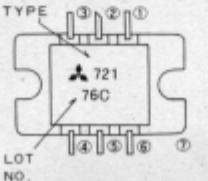
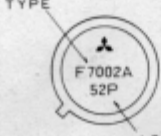
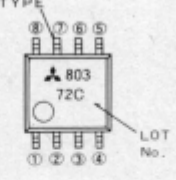
GaAs MMIC & Prescaler

Type	Symbol	Outline	Classification
MGF7002A	F7002A	GE-1	MMIC
MGF7003	F	GD-4	
MGF7004	2	GD-6	
MGF7201	721	GF-15	
MGF8001	801	GE-2	Prescaler
MGF8002	802		
MGF8003	803		

**MITSUBISHI SEMICONDUCTOR <GaAs FET>
SYMBOL ON PACKAGE**

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MITSUBISHI SEMICONDUCTOR <GaAs FET>
SYMBOL ON PACKAGE

<p>GF-11</p>  <p>① GATE ② SOURCE ③ DRAIN</p>	<p>GF-14</p>  <p>① GATE ② SOURCE ③ DRAIN</p>
<p>GF-15</p>  <p>① NC ② INPUT ③ GATE BIAS ④ NC ⑤ OUTPUT ⑥ DRAIN BIAS ⑦ CASE (GROUND)</p>	<p>GE-1</p>  <p>THE DIRECTION OF MARK AGAINST A PACKAGE IS NOT SPECIFIED</p>
<p>GE-2</p>  <p>① INPUT ② VDD ③ NC ④ OUTPUT ⑤ GND ⑥ MOD ⑦ NC ⑧ VREF</p>	