

N – Channel FET Transistor

MGF1402

FET Transistor

6V / 100mA

DATASHEET

OEM –Mitsubishi

Source: Mitsubishi Databook 1989

MITSUBISHI SEMICONDUCTOR (GaAs FET)

MGF1402 (2SK274)

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

DESCRIPTIONS

The MGF1402 (2SK274) low-noise GaAs FET with an N-channel Schottky gate is designed for use in S to X band amplifiers and oscillators. The hermetically sealed metal-ceramic package assures minimum parasitic losses, and has a configuration suitable for microstrip circuits.

FEATURES

- Low noise figure $NF_{min} = 1.1 \text{ dB (TYP.) @ } f = 4 \text{ GHz}$
- High associated gain $G_S = 13 \text{ dB (TYP.) @ } f = 4 \text{ GHz}$
- High reliability and stability

APPLICATION

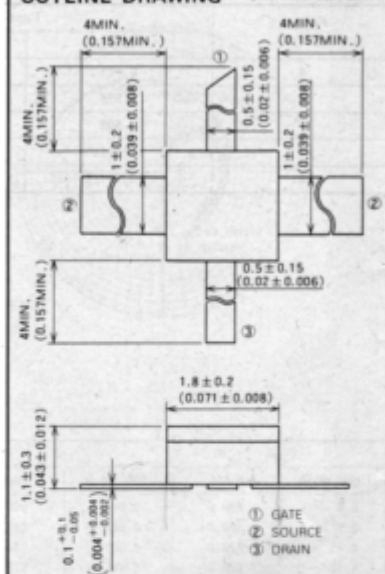
S to X band low-noise amplifiers and oscillators.

QUALITY GRADE

- IG, IGX, IGV, S

OUTLINE DRAWING

Unit: millimeters (mm)



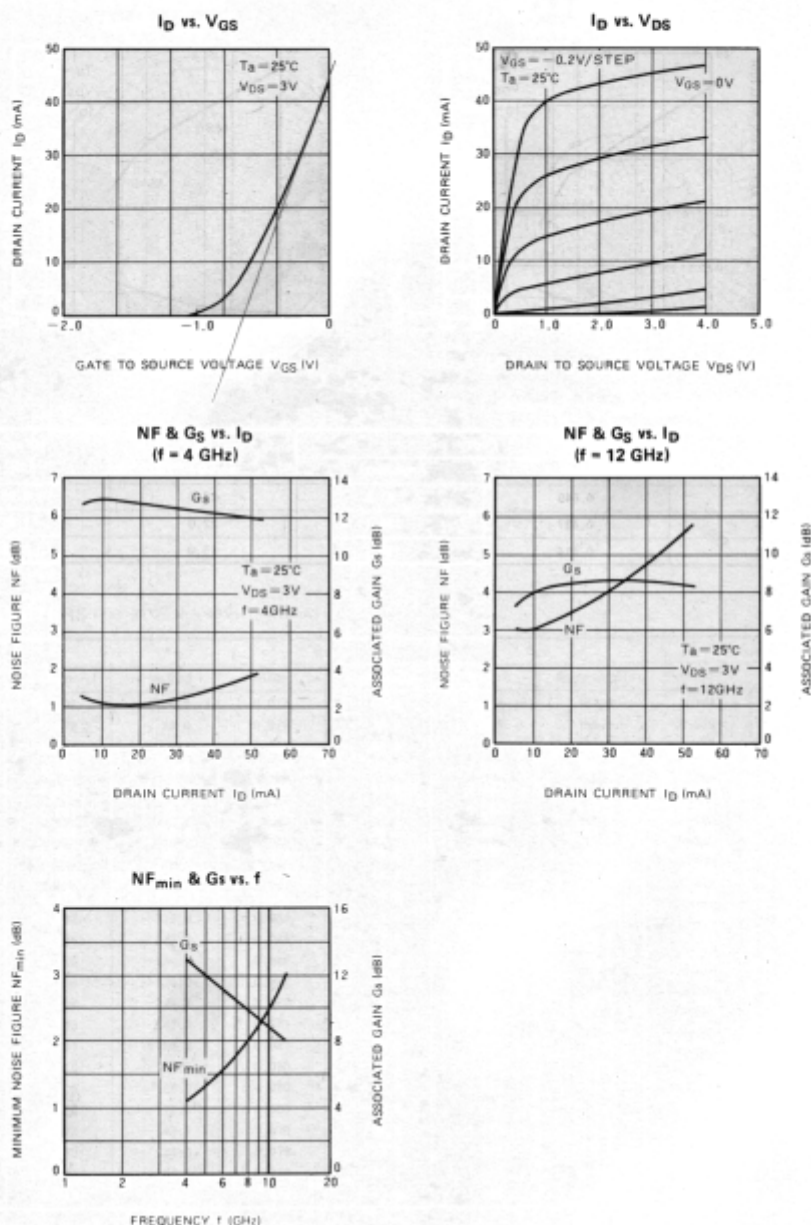
ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Symbol	Parameter	Rating	Unit
V_{DD}	Gate to drain voltage	— 6	V
V_{GS}	Gate to source voltage	— 6	V
I_D	Drain current	100	mA
P_T	Total power dissipation	360	mW
T_{CH}	Channel temperature	175	°C
T_{stg}	Storage temperature	— 55 ~ + 175	°C
$R_{th}(ch-a)$	Thermal resistance	416	°C/W

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

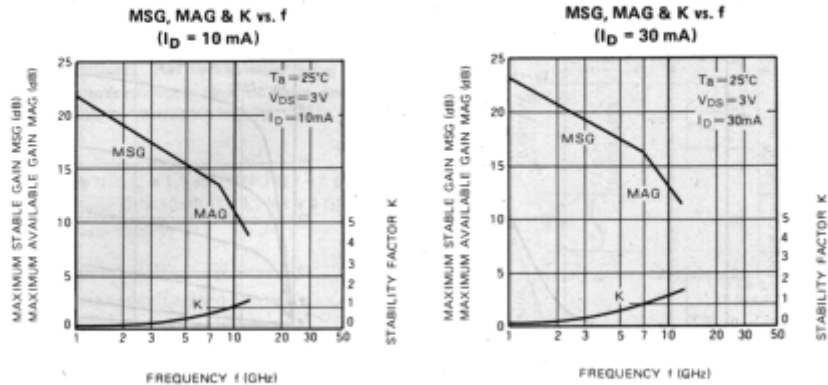
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{DSR(DDO)}$	Gate to drain breakdown voltage	$I_D = -100 \mu A$	-6			V
$V_{DSR(SD)}$	Gate to source breakdown voltage	$I_D = -100 \mu A$	-6			V
I_{DSS}	Gate to source leakage current	$V_{GS} = -3V, V_{DS} = 0V$			10	μA
I_{DSS}	Saturated drain current	$V_{GS} = 0V, V_{DS} = 3V$	30	60	100	mA
$V_{DS(off)}$	Gate to source cut-off voltage	$V_{DS} = 3V, I_D = 100 \mu A$	-0.3		-3.5	V
g_m	Transconductance	$V_{DS} = 3V, I_D = 10mA$	25	45		mS
G_S	Associated gain	$V_{DS} = 3V, I_D = 10mA$	f = 4 GHz	11	13	dB
			f = 8 GHz		10	
			f = 12GHz		8	
NF_{min}	Minimum noise figure	$V_{DS} = 3V, I_D = 10mA$	f = 4 GHz		1.1	dB
			f = 8 GHz		2.0	
			f = 12GHz		3.0	

MITSUBISHI SEMICONDUCTOR <GaAs FET>

MGF1402(2SK274)**FOR MICROWAVE LOW-NOISE AMPLIFIERS
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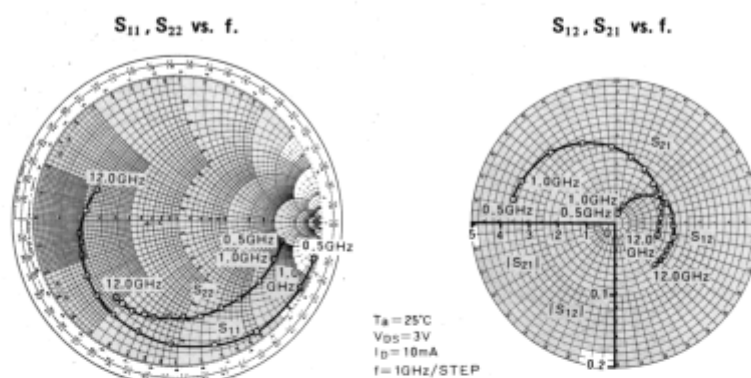
NOISE PARAMETERS ($V_{DS} = 3\text{ V}$, $I_D = 10\text{ mA}$)

Freq. (GHz)	Γ_{opt}		R_n (Ω)	NF min (dB)
	Magn.	Angle (deg.)		
4	0.649	61.5	28.0	0.96
8	0.437	138.1	32.0	1.85
12	0.414	-168.1	15.0	2.76

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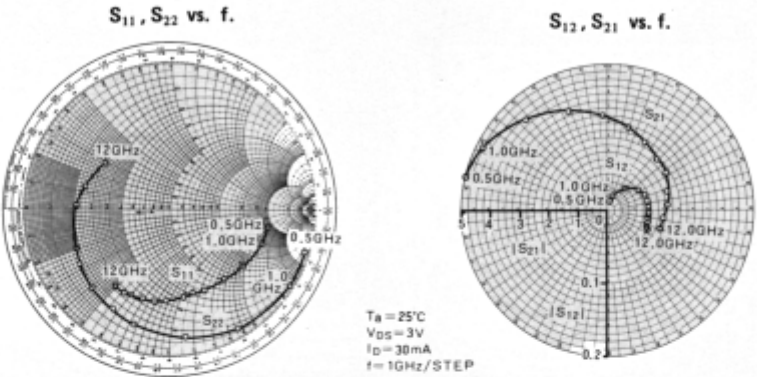
**S PARAMETERS** ($T_A = 25^\circ\text{C}$, $V_{DS} = 3\text{V}$, $I_D = 10\text{mA}$)

f (GHz)	S_{11}		S_{12}		S_{21}		S_{22}	
	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)
0.5	0.992	-14.5	0.014	80.6	3.694	167.0	0.741	-10.0
1.0	0.972	-28.0	0.026	70.5	3.589	155.5	0.729	-19.8
1.5	0.953	-42.3	0.038	60.1	3.479	144.1	0.716	-28.0
2.0	0.933	-53.9	0.049	51.2	3.330	133.3	0.704	-36.3
2.5	0.912	-64.7	0.063	43.6	3.177	123.0	0.695	-43.9
3.0	0.891	-73.6	0.068	35.9	3.020	112.1	0.687	-50.5
3.5	0.868	-83.9	0.071	29.0	2.851	102.7	0.680	-57.2
4.0	0.851	-92.5	0.074	22.0	2.692	93.5	0.676	-64.0
4.5	0.830	-101.3	0.077	15.4	2.526	85.6	0.671	-70.5
5.0	0.813	-109.0	0.080	9.0	2.396	77.3	0.669	-76.0
5.5	0.802	-116.6	0.081	3.1	2.259	69.4	0.670	-81.2
6.0	0.785	-123.8	0.081	-2.5	2.138	62.0	0.671	-86.2
6.5	0.776	-130.1	0.082	-7.2	2.035	55.5	0.675	-91.0
7.0	0.766	-136.0	0.082	-12.0	1.945	47.3	0.678	-95.1
7.5	0.754	-141.9	0.082	-16.1	1.875	40.1	0.696	-99.2
8.0	0.743	-147.3	0.081	-20.4	1.820	33.5	0.687	-103.0
8.5	0.731	-153.3	0.081	-24.3	1.758	26.5	0.689	-106.2
9.0	0.716	-159.2	0.080	-28.1	1.708	20.0	0.692	-109.5
9.5	0.702	-165.0	0.080	-31.0	1.660	14.9	0.692	-112.9
10.0	0.688	-172.3	0.080	-33.8	1.622	9.0	0.699	-116.0
10.5	0.672	-179.1	0.079	-36.0	1.579	4.5	0.693	-119.8
11.0	0.653	-174.5	0.079	-38.2	1.548	-0.6	0.695	-123.0
11.5	0.635	-168.0	0.079	-40.7	1.519	-6.0	0.692	-126.0
12.0	0.615	-160.1	0.079	-43.8	1.488	-11.7	0.692	-128.1

TYPE: 2SK274 (2SK274) (2SK274) (2SK274)
PART NO. 2SK274 (2SK274) (2SK274) (2SK274)

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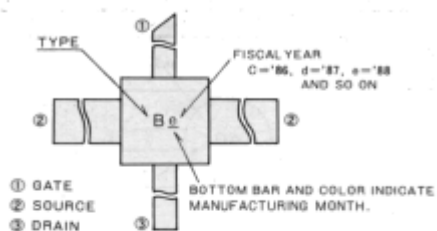


S PARAMETERS ($T_a = 25^\circ\text{C}$, $V_{DS} = 3\text{V}$, $I_D = 30\text{mA}$)

f (GHz)	S ₁₁		S ₁₂		S ₂₁		S ₂₂	
	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)
0.5	0.987	-16.5	0.011	80.2	5.041	166.1	0.686	-10.0
1.0	0.981	-32.3	0.022	69.6	4.759	153.6	0.676	-20.2
1.5	0.963	-48.0	0.031	59.2	4.467	142.2	0.663	-29.1
2.0	0.941	-60.5	0.039	50.4	4.193	131.6	0.638	-37.9
2.5	0.907	-72.7	0.046	42.0	3.936	121.0	0.630	-45.8
3.0	0.871	-82.8	0.050	34.3	3.694	111.0	0.614	-51.6
3.5	0.839	-96.6	0.053	27.8	3.467	101.9	0.602	-59.5
4.0	0.823	-106.8	0.055	22.0	3.273	92.5	0.598	-67.3
4.5	0.801	-112.5	0.056	16.8	3.101	84.6	0.592	-70.6
5.0	0.788	-119.5	0.057	12.2	2.934	76.3	0.595	-75.3
5.5	0.774	-126.2	0.057	7.9	2.799	68.6	0.602	-79.7
6.0	0.756	-134.5	0.057	4.3	2.676	61.3	0.604	-82.2
6.5	0.743	-142.8	0.057	0.8	2.559	54.0	0.613	-87.6
7.0	0.729	-148.2	0.057	-2.1	2.455	47.1	0.624	-93.1
7.5	0.716	-151.7	0.057	-4.5	2.371	40.0	0.638	-95.7
8.0	0.701	-156.1	0.057	-7.1	2.286	33.1	0.649	-99.2
8.5	0.687	-163.8	0.057	-10.0	2.213	26.0	0.649	-103.3
9.0	0.674	-172.0	0.057	-12.8	2.150	19.2	0.652	-106.2
9.5	0.664	-177.2	0.058	-15.1	2.089	13.0	0.653	-110.6
10.0	0.657	-177.7	0.058	-18.0	2.049	6.2	0.652	-114.1
10.5	0.639	-172.9	0.058	-20.1	2.014	-1.0	0.656	-116.1
11.0	0.617	-165.0	0.059	-21.9	1.979	-7.2	0.656	-118.4
11.5	0.590	-154.3	0.059	-24.2	1.950	-13.6	0.652	-121.3
12.0	0.557	-145.4	0.060	-26.0	1.923	-20.1	0.652	-124.9

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	GD-9	
MGF4401A	J		
MGF4402A	K		
MGF4403A	L		
MGF4404A	N		
MGF4405A	P		
MGF4901A	D	GD-7	Low Noise HEMT (Tape-Carrier)
MGF4902A	E		
MGF4903A	F		
MGF5000	A	GD-8	S.B.D.

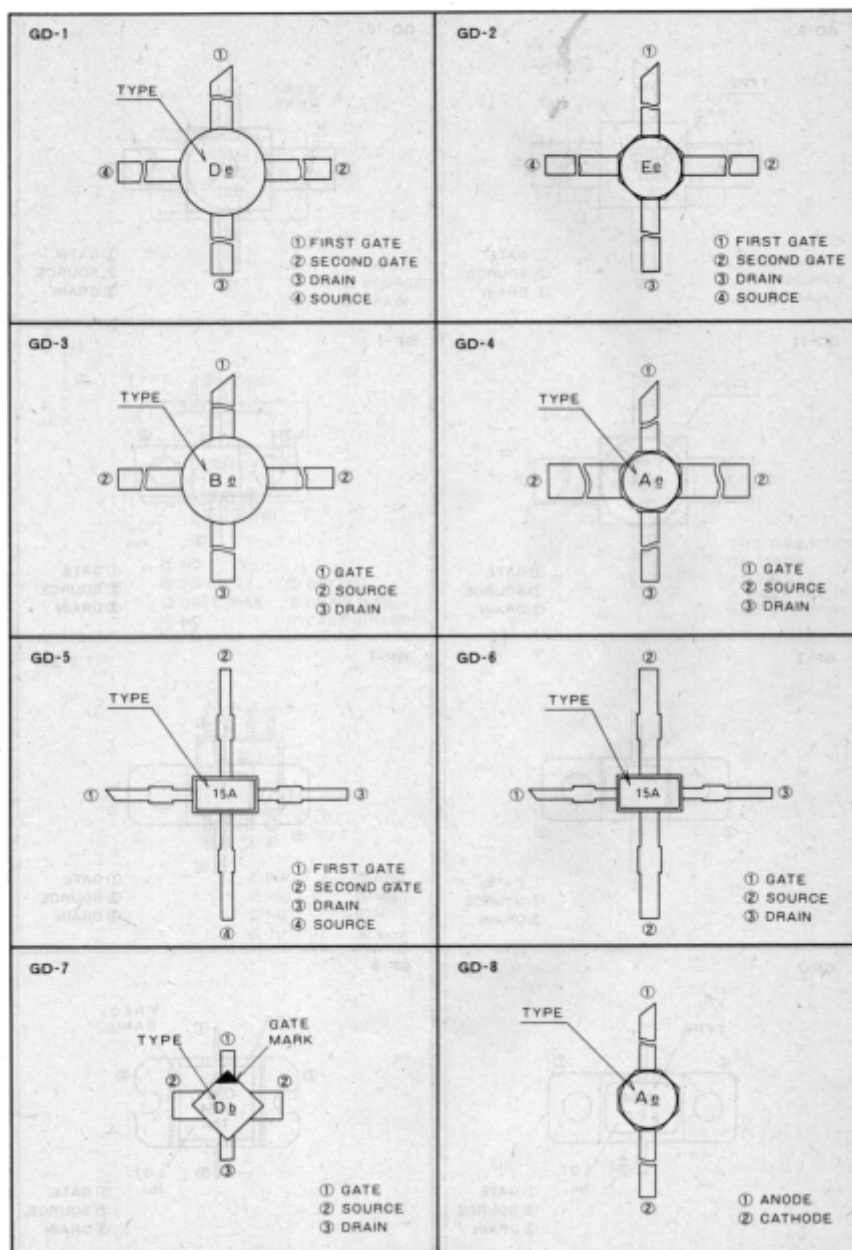
MITSUBISHI SEMICONDUCTOR <GaAs FET>
SYMBOL ON PACKAGE

Power GaAs FET

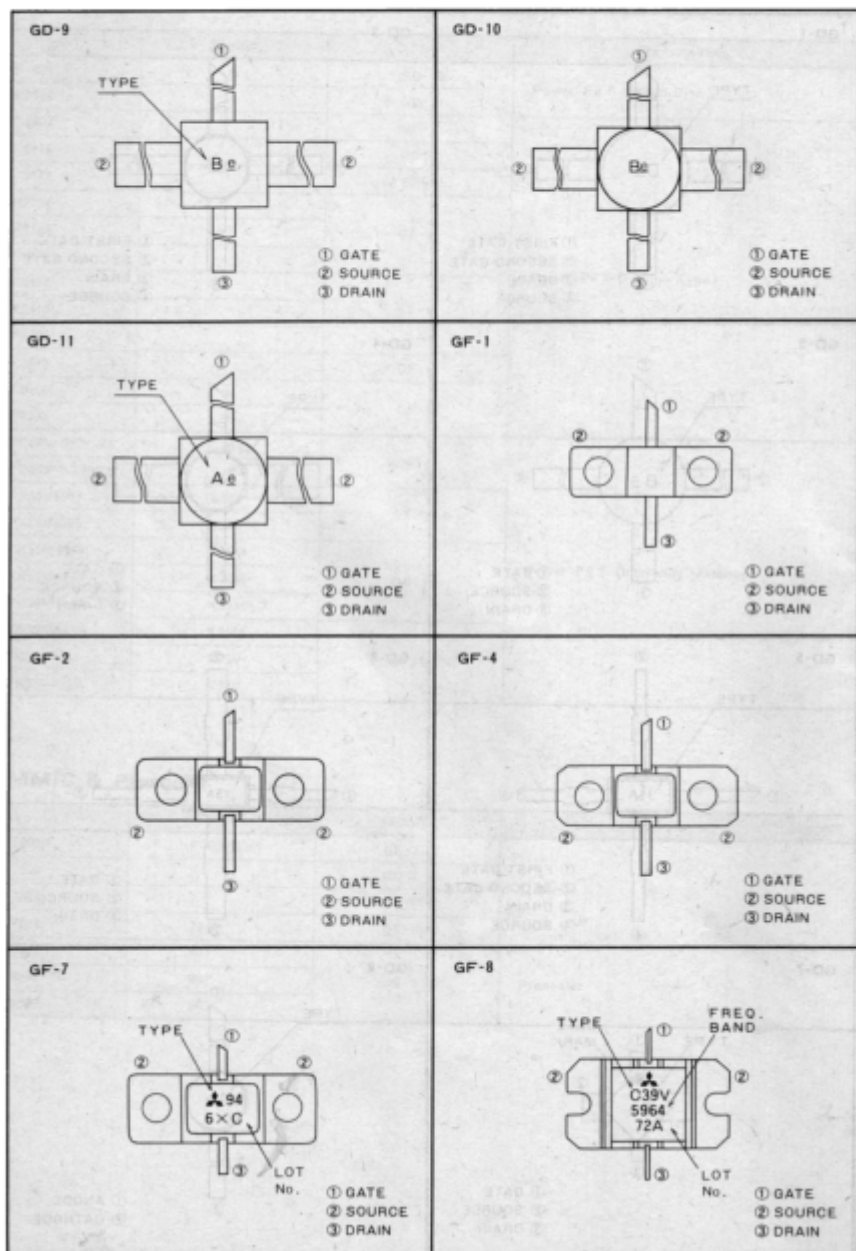
Type	Symbol	Outline	Classification
MGF1801	B	GD-10	Power FET (Micro Disk)
MGF1801	A	GD-11	
MGF1802		GF-1	Power FET (Frangle Type)
MGF2116		GF-2	
MGF2117		GF-1	
MGF2124			
MGF2148		GF-4	
MGF2172			
MGF2407			
MGF2415		GF-1	
MGF2430			
MGF2445		GF-4	
MGF0904	94	GF-7	Power FET (Internally Matched)
MGF0905	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

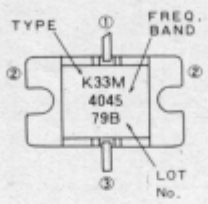
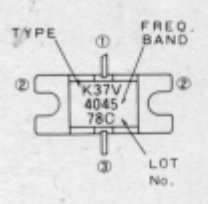
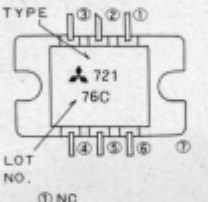
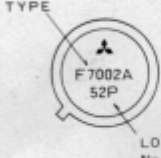
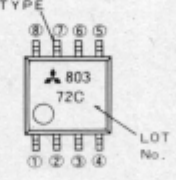
Type	Symbol	Outline	Classification
MGF7002A	F7002A	GE-1	MMIC
MGF7003	F	GD-4	
MGF7004	2	GD-6	
MGF7201	721	GF-15	
MGF8001	801	GE-2	Prescaler
MGF8002	802		
MGF8003	803		

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

Note: The scales are not same for each figure.

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