MITSUBISHI ELECTRIC

< Low Noise GaAs HEMT >

MGF4953B

Leadless ceramic package

DESCRIPTION

The MGF4953B super-low noise InGaAs HEMT (High Electron Mobility Transistor) is designed for use in K band amplifiers.

The lead-less ceramic package assures minimum parasitic losses.

FEATURES

Low noise figure @ f=20GHz
NFmin. = 0.55dB (Typ.)
High associated gain @ f=20GHz
Gs = 10.5dB (Typ.)

APPLICATION

C to K band low noise amplifiers

QUALITY GRADE

GG

RECOMMENDED BIAS CONDITIONS

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

ORDERING INFORMATION

Tape & reel 10,000pcs/reel (MGF4953B-01)
Tape & reel 10,000pcs/reel (MGF4953B-70)

Outline Drawing

Fig.1

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⚠ **CAUSION!**
This device is sensitive to ElectroStatic Discharge (ESD). Care should be needed during transport and handling.

RoHS COMPLIANT

MGF4953B is a RoHS compliant product. RoHS compliance is indicated by the letter “G” after the Lot Marking.

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Ratings	Unit
V_{GDO}	Gate to drain voltage	-3	V
V_{GSO}	Gate to source voltage	-3	V
V_{DS}	Drain to source voltage	3	V
I_D	Drain current	60	mA
PT	Total power dissipation	50	mW
Tch	Channel temperature	125	°C
Tstg	Storage temperature	-55 to +125	°C
Top	Operation temperature	-55 to +125	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C)

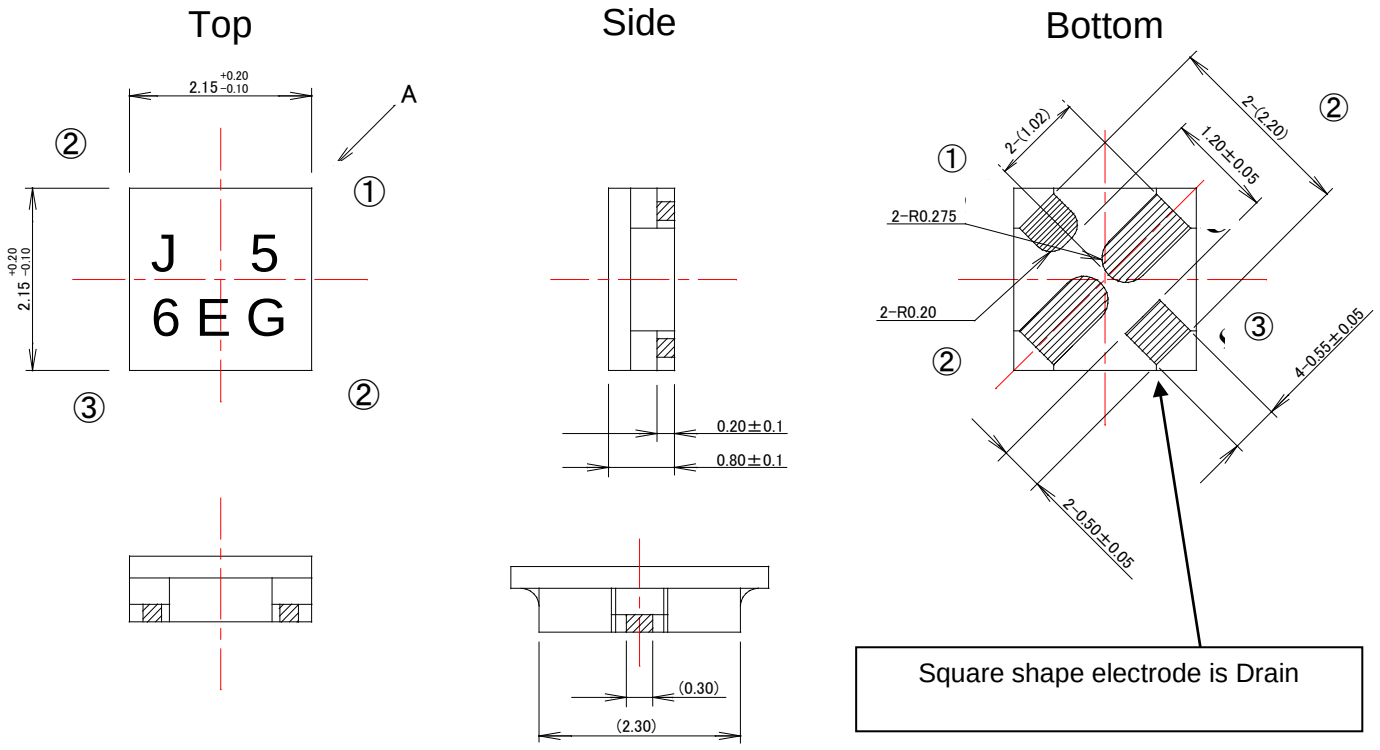
Symbol	Parameter	Test conditions	Limits			Unit
			MIN.	TYP.	MAX	
$V_{(BR)GDO}$	Gate to drain breakdown voltage	I_G=-10μA	-3	--	--	V
I_{GSS}	Gate to source leakage current	V_{GS}=-2V,V_{DS}=0V	--	--	50	μA
I_{DSS}	Saturated drain current	V_{GS}=0V,V_{DS}=2V	15	--	60	mA
$V_{GS(off)}$	Gate to source cut-off voltage	V_{DS}=2V,I_D=500μA	-0.1	--	-1.5	V
Gs	Associated gain	V_{DS}=2V,	9.0	10.5	--	dB
NFmin.	Minimum noise figure	I_D=10mA,f=20GHz	--	0.55	0.80	dB

Note: Gs and NFmin. are tested with sampling inspection.

Thermal resistance (Rth) of this product : 580°C/W

Publication Date : Sep., 2013

Fig.1

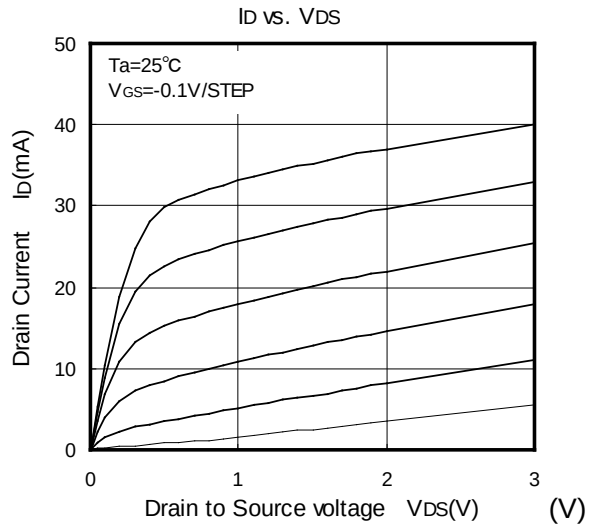


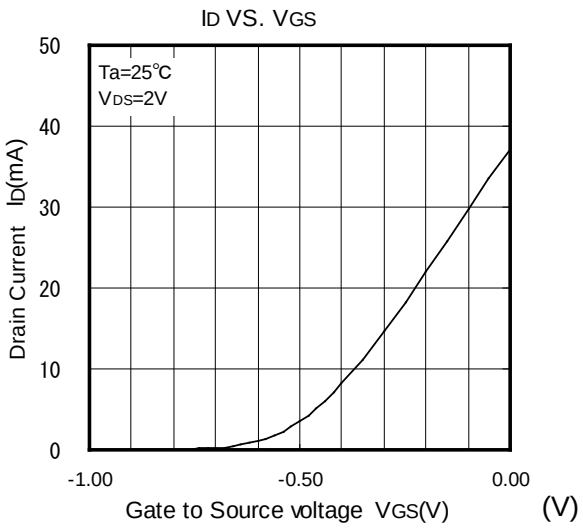
from "A" side view

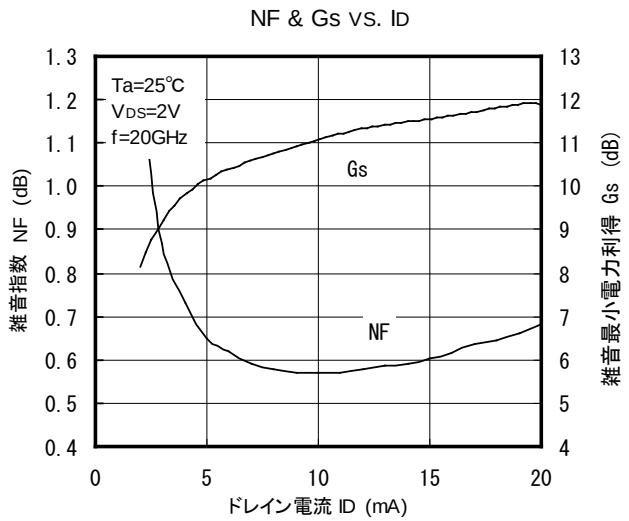
Unit: mm

① Gate
② Source
③ Drain

TYPICAL CHARACTERISTICS (Ta=25°C)







DRAIN CURRENT I_D (mA)

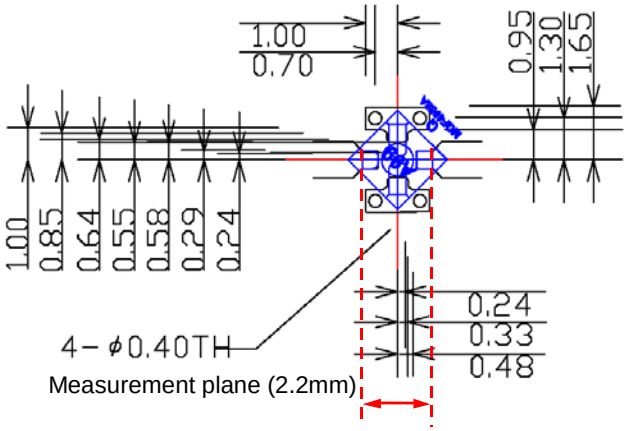
S PARAMETERS

(VDS=2V,ID=10mA, Ta=25°C)

Freq.	S11		S21		S12		S22	
(GHz)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
1	0.989	−4.0	5.212	166.6	0.038	82.4	0.689	−10.7
2	0.968	−20.4	5.101	152.0	0.046	72.4	0.669	−21.1
3	0.942	−36.8	4.989	137.3	0.054	62.4	0.640	−31.5
4	0.927	−53.2	4.877	122.7	0.062	52.4	0.604	−41.9
5	0.857	−69.5	4.766	108.0	0.070	42.4	0.554	−52.4
6	0.787	−85.8	4.655	93.4	0.078	32.4	0.505	−62.7
7	0.716	−101.5	4.524	79.3	0.085	23.5	0.454	−72.7
8	0.654	−119.2	4.378	64.9	0.093	13.5	0.399	−84.1
9	0.582	−135.3	4.162	52.0	0.095	4.9	0.341	−93.6
10	0.525	−152.8	4.008	39.5	0.095	−2.5	0.288	−102.8
11	0.494	−170.2	3.887	27.3	0.096	−8.4	0.250	−113.0
12	0.474	171.2	3.761	15.2	0.096	−14.2	0.212	−124.7
13	0.471	152.0	3.656	2.9	0.097	−20.6	0.180	−140.4
14	0.484	134.6	3.593	−9.4	0.096	−26.0	0.159	−156.4
15	0.501	118.4	3.522	−21.9	0.095	−33.2	0.155	−175.5
16	0.544	101.2	3.335	−36.1	0.098	−37.5	0.163	153.3
17	0.579	86.8	3.209	−49.3	0.099	−42.9	0.182	132.4
18	0.612	73.6	3.038	−62.7	0.101	−49.3	0.216	110.1
19	0.646	62.0	2.814	−73.7	0.102	−56.2	0.260	90.7
20	0.688	50.3	2.726	−85.1	0.107	−63.9	0.301	76.3
21	0.733	39.4	2.613	−96.7	0.112	−75.1	0.340	59.0
22	0.765	28.6	2.499	−108.3	0.115	−86.3	0.370	48.0
23	0.798	17.7	2.384	−120.0	0.119	−97.5	0.405	37.0
24	0.831	6.9	2.269	−131.6	0.123	−108.7	0.444	30.2
25	0.831	−3.9	2.152	−143.2	0.127	−119.9	0.483	23.1
26	0.814	−14.7	2.034	−154.8	0.131	−131.1	0.522	17.1

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

Freq.	NFmin	Γopt		Rn
(GHz)	(dB)	(mag)	(ang)	(Ω)
12	0.38	0.44	140.9	2.5
13	0.40	0.40	160.3	1.5
14	0.43	0.38	−179.4	2.0
15	0.45	0.36	−158.4	2.0
16	0.48	0.36	−136.6	3.0
17	0.50	0.36	−114.2	4.0
18	0.53	0.38	−91.2	6.0
19	0.57	0.39	−67.9	8.5
20	0.63	0.41	−44.5	11.5
21	0.72	0.45	−21.1	15.0
22	0.80	0.48	2.1	19.0
23	0.92	0.54	25.2	24.0
24	1.00	0.57	48.1	29.5
25	1.14	0.61	70.9	37.5
26	1.24	0.63	93.6	50.0



Board; RO4003C (Rogers Corp.)
εr=3.38, t=0.508mm, Au (Cu) =0.035mm

Note:
We are ready to provide nonlinear model for ADS and MWO users. If you are interested, please contact our sales offices.

S PARAMETERS

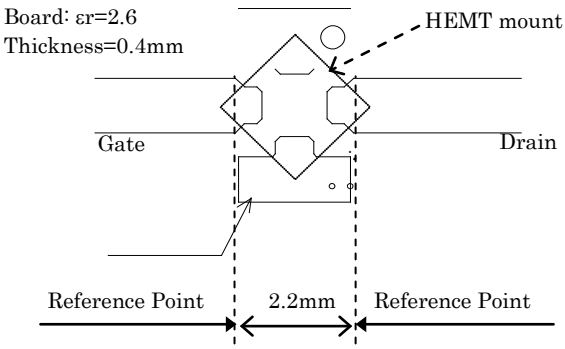
(VDS=2V,ID=10mA, Ta=25°C)

Freq.	S11		S21		S12		S22	
(GHz)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
1	0.989	-13.0	4.537	165.8	0.014	78.9	0.637	-9.7
2	0.973	-25.9	4.502	152.9	0.028	71.8	0.629	-19.6
3	0.949	-38.7	4.472	140.4	0.041	62.7	0.621	-29.2
4	0.926	-52.0	4.460	127.3	0.054	53.2	0.608	-39.0
5	0.890	-64.9	4.431	114.9	0.066	44.4	0.592	-48.2
6	0.828	-81.1	4.394	99.8	0.076	33.4	0.539	-60.1
7	0.776	-95.6	4.311	86.3	0.085	24.1	0.505	-70.2
8	0.723	-110.6	4.230	73.2	0.093	15.2	0.469	-80.4
9	0.662	-126.6	4.094	59.9	0.099	5.4	0.423	-90.7
10	0.605	-142.6	3.943	47.4	0.102	-4.0	0.368	-100.2
11	0.551	-158.2	3.826	35.4	0.102	-12.9	0.318	-108.8
12	0.514	-174.5	3.740	23.7	0.100	-19.7	0.279	-116.3
13	0.488	167.0	3.622	11.2	0.099	-28.1	0.232	-126.2
14	0.486	149.0	3.572	-1.1	0.098	-32.1	0.203	-138.3
15	0.480	131.8	3.512	-12.6	0.094	-38.4	0.169	-148.1
16	0.509	113.0	3.425	-26.2	0.099	-43.0	0.148	-175.1
17	0.536	95.1	3.349	-39.1	0.099	-49.9	0.133	157.1
18	0.569	78.2	3.226	-52.1	0.100	-58.5	0.132	120.7
19	0.609	62.7	3.091	-66.1	0.099	-66.5	0.160	92.2
20	0.642	47.3	2.934	-79.2	0.096	-75.2	0.204	67.8
21	0.674	34.3	2.752	-91.8	0.091	-83.8	0.250	50.6
22	0.707	21.1	2.617	-104.8	0.089	-92.5	0.293	37.0
23	0.742	9.2	2.471	-117.4	0.082	-102.8	0.350	23.8
24	0.753	-2.2	2.307	-130.2	0.081	-111.9	0.390	13.5
25	0.775	-12.5	2.139	-142.4	0.072	-118.9	0.430	2.4
26	0.803	-22.5	2.008	-155.0	0.069	-135.9	0.474	-5.7

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

Freq.	Γopt		Rn	NFmin
(GHz)	(mag)	(ang)		(dB)
18	0.358	-137.2	0.12	0.51
20	0.372	-91.0	0.14	0.55
22	0.390	-47.7	0.63	0.77
24	0.417	-14.9	1.05	1.05
26	0.473	10.5	1.26	1.25

Note) Rn is normalized by 50ohm



Note:

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