MITSUBISHI SEMICONDUCTOR <GaAs FET>

# MGF4953A/MGF4954A

SUPER LOW NOISE InGaAs HEMT (Leadless Ceramic Package)

## DESCRIPTION

The MGF4953A/MGF4954A super-low noise HEMT (High Electron Mobility Transistor) is designed for use in C to K band amplifiers.

The lead-less ceramic package assures minimum parasitic losses.

## FEATURES

Low noise figure @ f=12GHz

MGF4953A : NFmin. = 0.40dB (Typ.)

MGF4954A : NFmin. = 0.60dB (Typ.)

High associated gain @ f=12GHz

Gs = 13.5dB (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 3000pcs./reel

## Outline Drawing

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 )

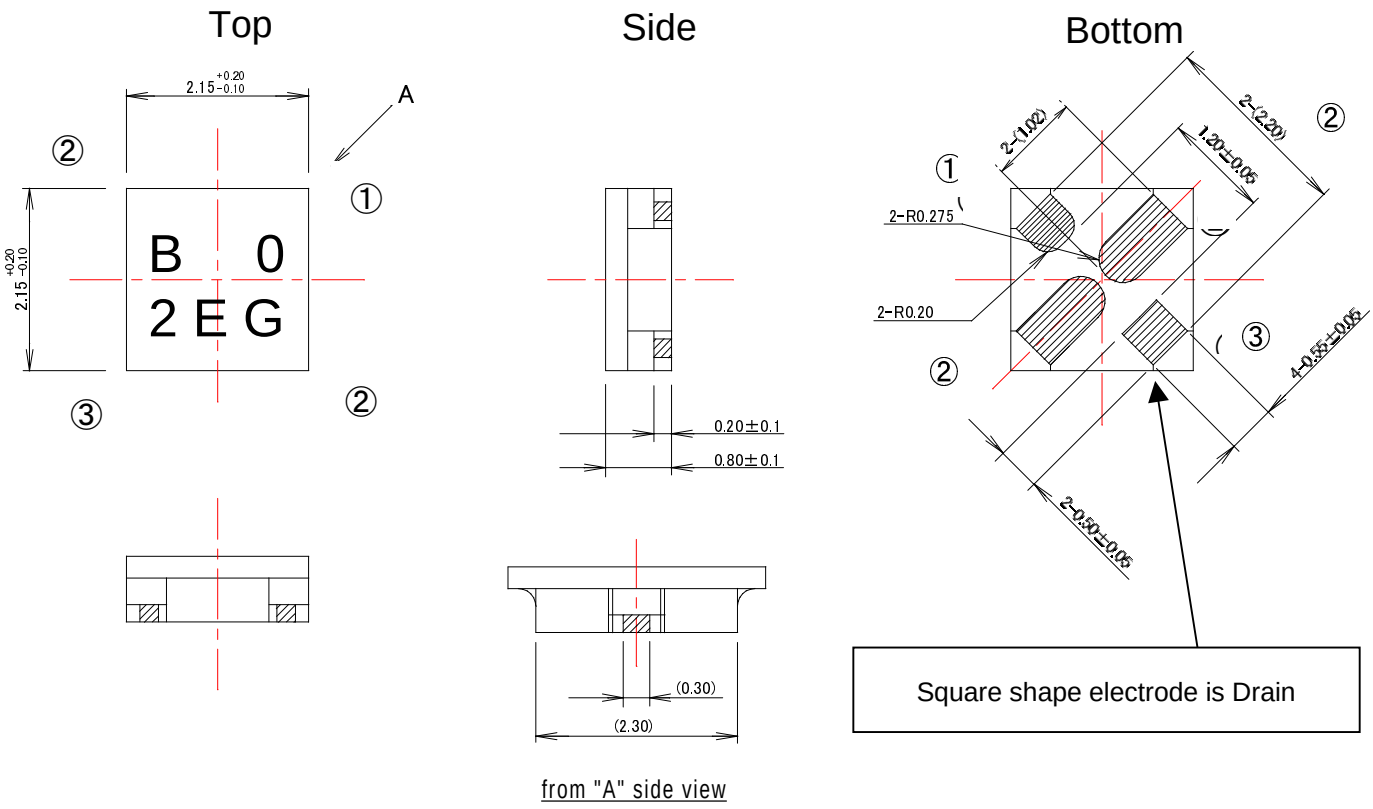
| Symbol | Parameter | Ratings | Unit |
|---|---|---|---|
| $V_{GDO}$ | Gate to drain voltage | -4 | V |
| $V_{GSO}$ | Gate to source voltage | -4 | V |
| $I_D$ | Drain current | 60 | mA |
| PT | Total power dissipation | 50 | mW |
| $T_{ch}$ | Channel temperature | 125 | °C |
| $T_{stg}$ | Storage temperature | -65 to +125 | °C |

## ELECTRICAL CHARACTERISTICS (Ta=25°C )

| Synbol | 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 |
| gm | Transconductance | $V_{DS}$=2V,$I_D$=10mA | | -- | 70 | -- | mS |
| Gs | Associated gain | $V_{DS}$=2V, | | 12.0 | 13.5 | -- | dB |
| NFmin. | Minimum noise figure | $I_D$=10mA | MGF4953A | -- | 0.40 | 0.50 | dB |
| | | f=12GHz | MGF4954A | -- | 0.60 | 0.80 | dB |

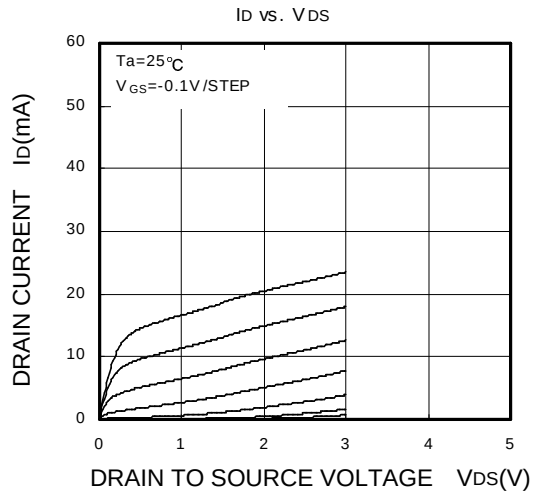
# Fig.1

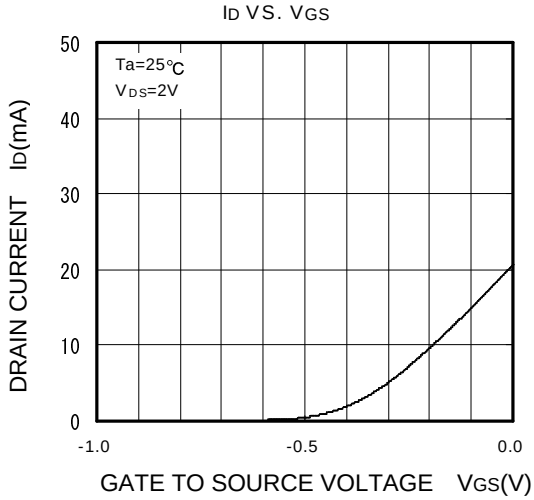
Unit : mm

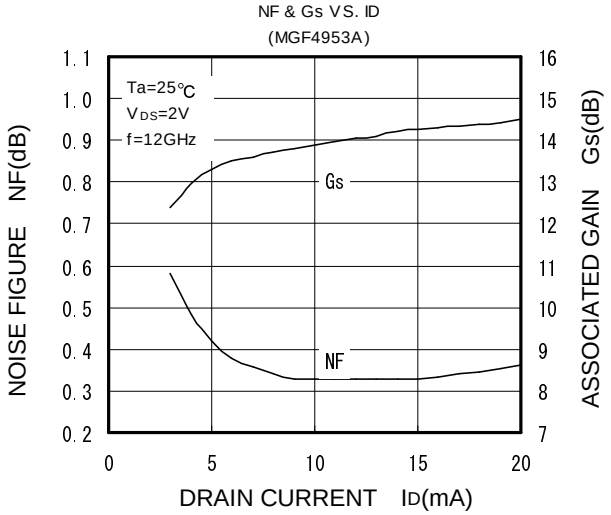



① Gate
② Source
③ Drain

## TYPICAL CHARACTERISTICS (Ta=25°C)



## S PARAMETERS

(Ta=25°C,VDS=2V,ID=10mA)

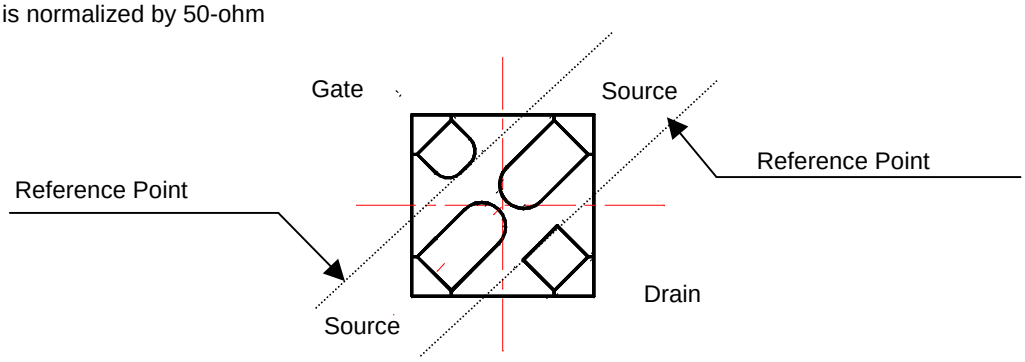
| Freq | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (GHz) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) |
| 1 | 0.911 | -12.7 | 4.924 | 168.1 | 0.008 | 70.3 | 0.709 | -10.7 |
| 2 | 0.894 | -29.2 | 4.806 | 155.3 | 0.031 | 68.8 | 0.691 | -22.7 |
| 3 | 0.875 | -40.7 | 4.796 | 142.7 | 0.043 | 62.2 | 0.682 | -30.1 |
| 4 | 0.858 | -53.9 | 4.672 | 131.6 | 0.061 | 49.4 | 0.652 | -41.7 |
| 5 | 0.830 | -66.5 | 4.524 | 121.2 | 0.066 | 42.9 | 0.639 | -49.6 |
| 6 | 0.797 | -77.7 | 4.308 | 109.5 | 0.073 | 33.5 | 0.631 | -58.5 |
| 7 | 0.770 | -87.0 | 4.114 | 101.1 | 0.080 | 26.2 | 0.628 | -64.4 |
| 8 | 0.751 | -94.2 | 3.984 | 90.8 | 0.089 | 22.1 | 0.625 | -71.0 |
| 9 | 0.727 | -103.0 | 3.886 | 81.4 | 0.090 | 17.4 | 0.624 | -76.1 |
| 10 | 0.713 | -110.8 | 3.881 | 75.0 | 0.101 | 9.2 | 0.628 | -80.4 |
| 11 | 0.686 | -119.9 | 3.886 | 66.0 | 0.110 | 2.2 | 0.612 | -87.5 |
| 12 | 0.636 | -132.8 | 3.937 | 54.7 | 0.120 | -4.6 | 0.581 | -94.3 |
| 13 | 0.590 | -146.6 | 4.078 | 45.0 | 0.127 | -13.0 | 0.540 | -101.0 |
| 14 | 0.538 | -165.8 | 4.163 | 31.5 | 0.136 | -25.2 | 0.485 | -112.5 |
| 15 | 0.507 | 170.2 | 4.239 | 18.9 | 0.144 | -35.8 | 0.396 | -122.4 |
| 16 | 0.506 | 140.8 | 4.238 | 4.5 | 0.151 | -48.2 | 0.283 | -137.3 |
| 17 | 0.552 | 110.4 | 4.067 | -10.5 | 0.151 | -62.0 | 0.159 | -162.3 |
| 18 | 0.625 | 86.0 | 3.791 | -26.5 | 0.145 | -74.0 | 0.076 | 120.8 |
| 19 | 0.696 | 65.9 | 3.428 | -40.5 | 0.137 | -85.8 | 0.164 | 54.1 |
| 20 | 0.745 | 50.8 | 3.045 | -54.3 | 0.118 | -97.6 | 0.271 | 31.6 |
| 21 | 0.791 | 38.2 | 2.677 | -66.5 | 0.109 | -106.8 | 0.375 | 20.9 |
| 22 | 0.794 | 28.2 | 2.281 | -76.2 | 0.102 | -114.0 | 0.455 | 14.3 |
| 23 | 0.776 | 18.4 | 1.984 | -84.5 | 0.091 | -118.9 | 0.539 | 8.5 |
| 24 | 0.802 | 11.0 | 1.828 | -93.8 | 0.078 | -127.7 | 0.607 | 5.7 |
| 25 | 0.796 | 2.9 | 1.626 | -102.1 | 0.071 | -130.2 | 0.675 | 2.1 |
| 26 | 0.799 | -8.5 | 1.424 | -114.5 | 0.064 | -138.3 | 0.730 | 0.9 |

## NOISE PARAMETERS

(Ta=25°C,VDS=2V,ID=10mA)

| f | Gamma-opt | | Rn | NFmin. | Gs |
|---|---|---|---|---|---|
| (GHz) | Magn. | Angle | (ohm) | (dB) | (dB) |
| 4 | 0.64 | 52.7 | 0.27 | 0.22 | 18.3 |
| 8 | 0.61 | 103.5 | 0.15 | 0.28 | 15.9 |
| 12 | 0.55 | 146.4 | 0.06 | 0.35 | 13.5 |
| 14 | 0.51 | 161.9 | 0.04 | 0.39 | 12.5 |
| 18 | 0.41 | 175.3 | 0.03 | 0.48 | 11.0 |
| 20 | 0.35 | -177.3 | 0.05 | 0.55 | 10.5 |

Note) Rn is normalized by 50-ohm



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