## DESCRIPTION

The MGF4941AL super-low noise HEMT (High Electron Mobility Transistor) is designed for use in Ku band amplifiers.

## FEATURES

Low noise figure @ f=12GHz
NFmin. = 0.35dB (Typ.)

High associated gain @ f=12GHz
Gs = 13.5dB (Typ.)

## APPLICATION

L to K band low noise amplifiers

## QUALITY GRADE

GG

## Outline Drawing

Fig.1

GD-32

## RECOMMENDED BIAS CONDITIONS

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



## ORDERING INFORMATION

Tape & reel 4000pcs./reel

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## ABSOLUTE MAXIMUM RATINGS (Ta=25°C )

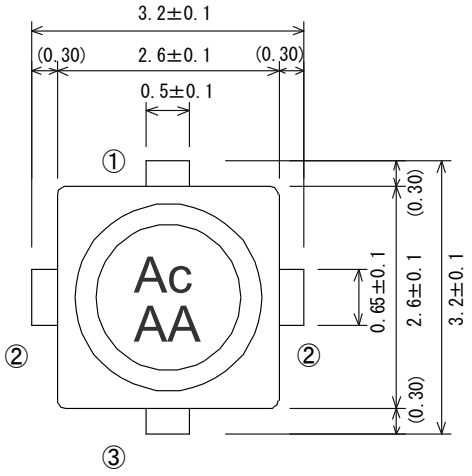
| Symbol | Parameter | Ratings | Unit |
|---|---|---|---|
| $V_{GDO}$ | Gate to drain voltage | -4 | V |
| $V_{GSO}$ | Gate to source voltage | -4 | V |
| $I_D$ | Drain current | IDSS | mA |
| PT | Total power dissipation | 50 | mW |
| $T_{ch}$ | Channel temperature | 125 | °C |
| $T_{stg}$ | Storage temperature | -55 to +125 | °C |

## ELECTRICAL CHARACTERISTICS (Ta=25°C )

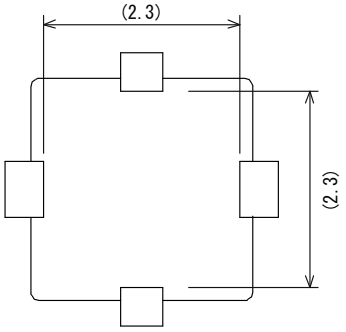
| Synbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | MIN. | TYP. | MAX | |
| $V_{(BR)GDO}$ | Gate to drain breakdown voltage | $I_G$=-10μA | -3 | -- | -- | V |
| $I_{GSS}$ | Gate to source leakage current | $V_{GS}$=-2V,$V_{DS}$=0V | -- | -- | 50 | μA |
| $I_{DSS}$ | 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 |
| Gs | Associated gain | $V_{DS}$=2V,$I_D$=10mA | 12.0 | 13.5 | -- | dB |
| NFmin. | Minimum noise figure | f=12GHz | -- | 0.35 | 0.5 | dB |

# Fig.1

Top

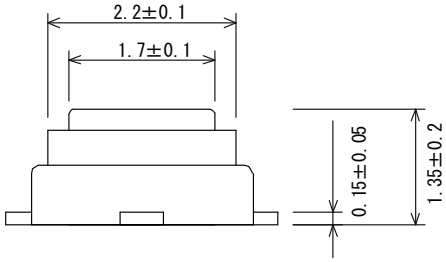



Bottom




Unit : mm

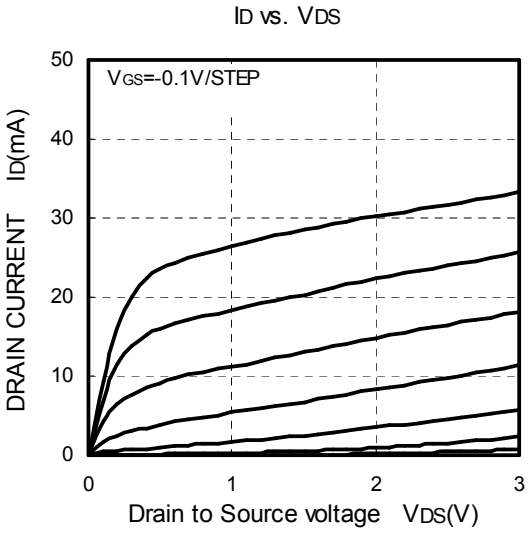
Side

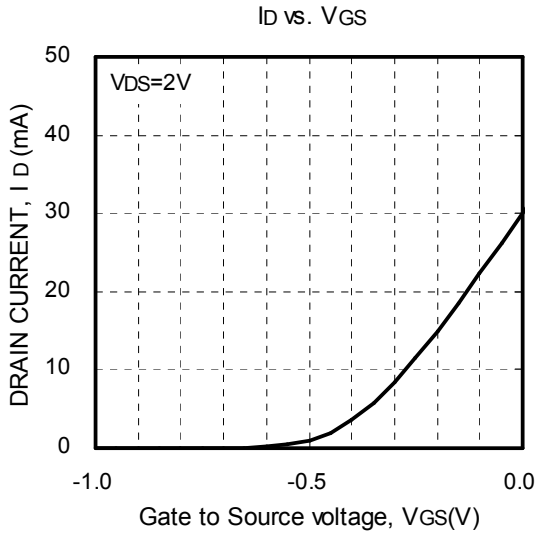


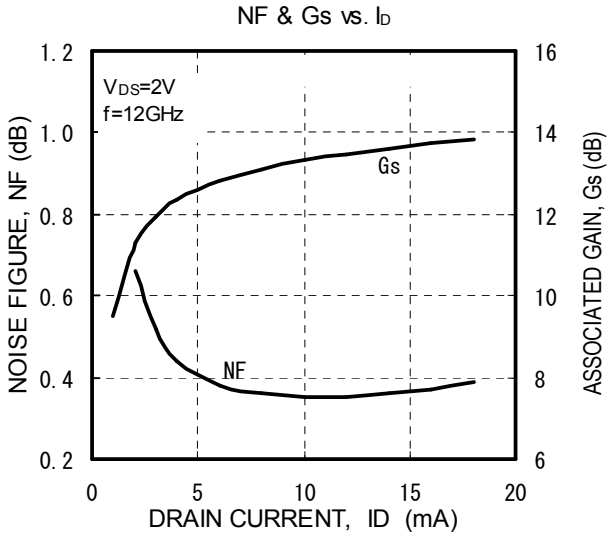

① Gate
② Source
③ Drain

(GD-32)

## TYPICAL CHARACTERISTICS (Ta=25°C)



## S PARAMETERS

(VDS=2V,ID=10mA,Ta=room temperature)

| Freq. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (GHz) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) |
| 1 | 0.989 | -13.9 | 5.497 | 164.6 | 0.017 | 78.9 | 0.637 | -10.6 |
| 2 | 0.967 | -28.2 | 5.416 | 149.6 | 0.028 | 70.9 | 0.626 | -21.1 |
| 3 | 0.929 | -41.5 | 5.278 | 135.0 | 0.040 | 61.7 | 0.610 | -31.1 |
| 4 | 0.882 | -54.4 | 5.172 | 121.5 | 0.051 | 53.3 | 0.586 | -40.5 |
| 5 | 0.822 | -65.9 | 4.932 | 108.0 | 0.061 | 45.9 | 0.572 | -50.8 |
| 6 | 0.757 | -79.5 | 4.959 | 94.1 | 0.071 | 37.6 | 0.538 | -60.3 |
| 7 | 0.686 | -93.3 | 4.826 | 80.4 | 0.080 | 29.9 | 0.502 | -69.8 |
| 8 | 0.611 | -108.8 | 4.732 | 66.8 | 0.086 | 22.7 | 0.456 | -78.6 |
| 9 | 0.533 | -125.1 | 4.587 | 53.6 | 0.092 | 16.2 | 0.408 | -86.5 |
| 10 | 0.463 | -143.6 | 4.403 | 40.5 | 0.096 | 10.2 | 0.359 | -93.8 |
| 11 | 0.411 | -164.1 | 4.140 | 27.8 | 0.100 | 4.8 | 0.311 | -100.7 |
| 12 | 0.382 | 174.7 | 4.010 | 15.6 | 0.105 | 0.1 | 0.267 | -108.9 |
| 13 | 0.378 | 152.3 | 3.782 | 3.3 | 0.111 | -4.7 | 0.221 | -119.3 |
| 14 | 0.395 | 131.4 | 3.653 | -9.1 | 0.115 | -9.7 | 0.182 | -135.4 |
| 15 | 0.435 | 113.6 | 3.514 | -21.3 | 0.121 | -14.6 | 0.152 | -157.0 |
| 16 | 0.486 | 99.0 | 3.366 | -32.9 | 0.126 | -19.8 | 0.134 | 177.7 |
| 17 | 0.543 | 86.2 | 3.172 | -45.3 | 0.133 | -25.5 | 0.139 | 145.4 |
| 18 | 0.603 | 73.7 | 3.049 | -57.7 | 0.140 | -31.2 | 0.183 | 115.8 |
| 19 | 0.663 | 61.2 | 2.877 | -70.2 | 0.147 | -37.9 | 0.251 | 95.1 |
| 20 | 0.704 | 50.1 | 2.641 | -81.3 | 0.152 | -45.0 | 0.309 | 80.2 |
| 21 | 0.746 | 40.5 | 2.470 | -91.5 | 0.156 | -52.4 | 0.363 | 70.0 |
| 22 | 0.778 | 32.3 | 2.311 | -102.3 | 0.156 | -58.0 | 0.411 | 59.8 |

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

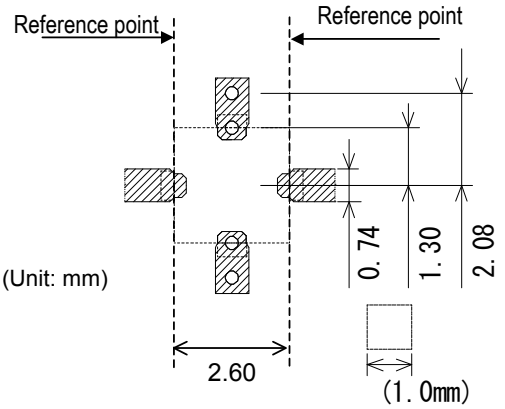
| Freq. | Γopt | | rn | NFmin |
|---|---|---|---|---|
| (GHz) | (mag) | (ang) | | (dB) |
| 2 | 0.671 | 13.9 | 0.370 | 0.20 |
| 4 | 0.598 | 37.2 | 0.262 | 0.22 |
| 6 | 0.537 | 60.8 | 0.197 | 0.25 |
| 8 | 0.474 | 86.2 | 0.155 | 0.29 |
| 10 | 0.399 | 119.2 | 0.102 | 0.32 |
| 12 | 0.329 | 147.6 | 0.062 | 0.35 |
| 14 | 0.299 | 173.6 | 0.069 | 0.40 |
| 16 | 0.349 | -143.9 | 0.083 | 0.49 |
| 18 | 0.392 | -106.5 | 0.109 | 0.59 |
| 20 | 0.432 | -73.0 | 0.146 | 0.73 |
| 22 | 0.467 | -42.7 | 0.180 | 0.96 |

Note: rn is normarised by 50 ohm.

Board: εr=2.2

Thickness: 0.25mm

(4-φ0.3: through-hole)



# S PARAMETERS

($V_{DS}$=0V,$V_{GS}$=0V,Ta=room temperature)

| Freq. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (GHz) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) |
| 1 | 0.996 | -12.6 | 0.008 | 90.7 | 0.008 | 93.1 | 0.700 | 167.0 |
| 2 | 0.998 | -25.4 | 0.019 | 92.4 | 0.019 | 92.2 | 0.696 | 154.5 |
| 3 | 0.988 | -38.1 | 0.032 | 90.0 | 0.032 | 90.6 | 0.703 | 142.2 |
| 4 | 0.984 | -50.8 | 0.048 | 86.4 | 0.048 | 86.3 | 0.708 | 129.1 |
| 5 | 0.971 | -62.6 | 0.068 | 80.5 | 0.069 | 81.0 | 0.710 | 117.1 |
| 6 | 0.963 | -77.1 | 0.092 | 72.6 | 0.092 | 72.7 | 0.718 | 104.8 |
| 7 | 0.949 | -92.8 | 0.119 | 62.9 | 0.120 | 62.9 | 0.730 | 92.6 |
| 8 | 0.936 | -110.9 | 0.149 | 51.8 | 0.150 | 52.2 | 0.739 | 81.3 |
| 9 | 0.915 | -131.2 | 0.181 | 39.2 | 0.182 | 39.5 | 0.750 | 70.7 |
| 10 | 0.892 | -153.9 | 0.211 | 25.5 | 0.211 | 25.9 | 0.760 | 60.8 |
| 11 | 0.878 | -178.2 | 0.235 | 10.8 | 0.237 | 11.1 | 0.769 | 51.6 |
| 12 | 0.870 | 157.5 | 0.252 | -3.9 | 0.252 | -3.9 | 0.785 | 42.8 |
| 13 | 0.868 | 133.9 | 0.258 | -18.6 | 0.259 | -18.6 | 0.795 | 34.7 |
| 14 | 0.875 | 113.0 | 0.257 | -32.0 | 0.257 | -32.0 | 0.805 | 26.9 |
| 15 | 0.883 | 94.9 | 0.250 | -44.4 | 0.249 | -44.1 | 0.815 | 19.2 |
| 16 | 0.895 | 79.7 | 0.238 | -55.0 | 0.238 | -54.9 | 0.824 | 11.6 |
| 17 | 0.901 | 66.6 | 0.225 | -64.2 | 0.225 | -64.0 | 0.833 | 5.2 |
| 18 | 0.912 | 54.7 | 0.213 | -72.0 | 0.215 | -71.8 | 0.845 | 0.1 |
| 19 | 0.923 | 43.8 | 0.205 | -78.8 | 0.205 | -78.7 | 0.856 | -3.7 |
| 20 | 0.934 | 34.0 | 0.201 | -85.1 | 0.202 | -85.5 | 0.861 | -8.4 |
| 21 | 0.947 | 25.0 | 0.195 | -92.1 | 0.193 | -92.7 | 0.859 | -13.1 |
| 22 | 0.945 | 17.6 | 0.188 | -98.3 | 0.188 | -98.5 | 0.854 | -18.2 |

($V_{DS}$=0V,$V_{GS}$=-2.5V,Ta=room temperature)

| Freq. | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (GHz) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) | (mag) | (ang) |
| 1 | 1.003 | -8.2 | 0.022 | 80.5 | 0.023 | 79.5 | 0.998 | -9.2 |
| 2 | 0.998 | -16.7 | 0.045 | 72.1 | 0.045 | 71.9 | 0.990 | -18.6 |
| 3 | 0.994 | -24.6 | 0.067 | 62.9 | 0.067 | 63.2 | 0.995 | -27.7 |
| 4 | 0.991 | -32.2 | 0.088 | 54.8 | 0.089 | 54.7 | 0.993 | -36.7 |
| 5 | 0.986 | -38.9 | 0.109 | 46.3 | 0.110 | 46.5 | 0.993 | -46.8 |
| 6 | 0.983 | -46.7 | 0.133 | 37.4 | 0.132 | 37.5 | 0.985 | -56.3 |
| 7 | 0.977 | -54.4 | 0.157 | 28.6 | 0.158 | 28.7 | 0.982 | -65.6 |
| 8 | 0.972 | -63.3 | 0.183 | 18.8 | 0.184 | 18.6 | 0.970 | -75.4 |
| 9 | 0.963 | -72.7 | 0.211 | 8.3 | 0.210 | 8.5 | 0.962 | -85.2 |
| 10 | 0.950 | -83.2 | 0.237 | -2.6 | 0.238 | -2.7 | 0.956 | -95.5 |
| 11 | 0.938 | -94.7 | 0.263 | -14.9 | 0.264 | -14.8 | 0.945 | -106.4 |
| 12 | 0.929 | -107.7 | 0.289 | -27.8 | 0.289 | -27.8 | 0.932 | -118.6 |
| 13 | 0.916 | -121.9 | 0.310 | -42.3 | 0.312 | -42.2 | 0.921 | -132.8 |
| 14 | 0.911 | -137.5 | 0.326 | -58.6 | 0.327 | -58.7 | 0.914 | -149.6 |
| 15 | 0.904 | -155.7 | 0.324 | -76.7 | 0.325 | -76.6 | 0.909 | -167.8 |
| 16 | 0.903 | -175.3 | 0.305 | -95.2 | 0.306 | -95.4 | 0.911 | 173.5 |
| 17 | 0.910 | 163.6 | 0.269 | -114.1 | 0.271 | -114.4 | 0.916 | 153.5 |
| 18 | 0.914 | 142.1 | 0.219 | -131.5 | 0.220 | -131.6 | 0.924 | 133.0 |
| 19 | 0.912 | 121.4 | 0.172 | -145.0 | 0.172 | -144.9 | 0.926 | 114.9 |
| 20 | 0.927 | 103.4 | 0.136 | -160.1 | 0.136 | -160.2 | 0.939 | 99.3 |
| 21 | 0.955 | 87.0 | 0.089 | -178.2 | 0.090 | -176.6 | 0.961 | 84.2 |
| 22 | 0.971 | 72.1 | 0.048 | 167.9 | 0.049 | 171.4 | 0.968 | 69.8 |

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