

DESCRIPTION

The MGF4910E series super-low-noise HEMT (High Electron Mobility Transistor) is designed for use in X to K band amplifiers. The hermetically sealed metal-ceramic package assures minimum parasitic losses, and has a configuration suitable for microstrip circuits.

The MGF4910E Series is mounted in the super 12 tape, and is electrically equivalent to MGF4310E Series.

FEATURES

- Low noise figure @f=12GHz
MGF4914E: NFmin.=1.00dB (MAX)
MGF4918E: NFmin.=0.60dB (MAX)
MGF4919E: NFmin.=0.50dB (MAX)
- High associated gain G_s=9.5dB(MIN) @f=12GHz

APPLICATION

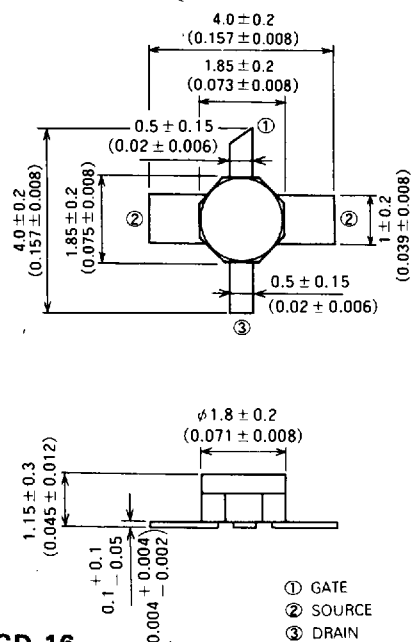
X to K band super-low-noise amplifiers.

QUALITY GRADE

- GG

RECOMMENDED BIAS CONDITIONS

- V_{DS}=2V I_D=10mA
- Refer to Bias Procedure

OUTLINE DRAWING Unit: millimeters (inches)**GD-16****ABSOLUTE MAXIMUM RATINGS** (T_a=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 |
| P _T | Total power dissipation | 50 | mW |
| T _{ch} | Channel temperature | 125 | °C |
| T _{stg} | Storage temperature | -65 ~ +125 | °C |

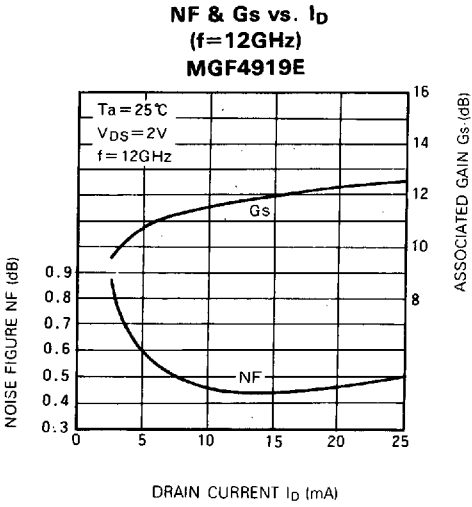
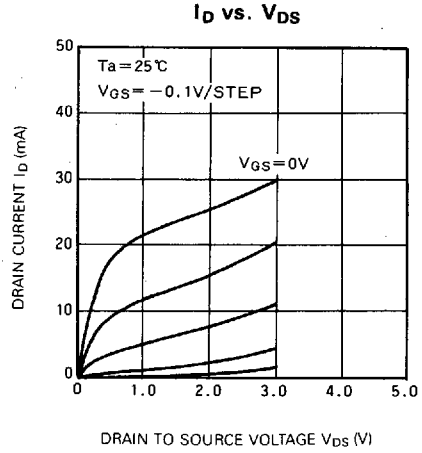
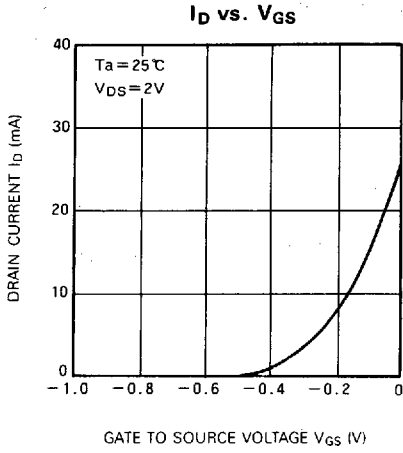
ELECTRICAL CHARACTERISTICS (T_a=25°C)

| Symbol | Parameter | Test conditions | Limits | | | Unit | |
|-----------------------|----------------------------------|--|----------|------|------|------|----|
| | | | Min | Typ | Max | | |
| V _{(BR)GDO} | Gate to drain breakdown voltage | I _G =-100μA | -3 | — | — | V | |
| V _{(BR)GSO} | Gate to source breakdown voltage | I _G =-100μA | -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 | 10 | 20 | 60 | mA | |
| V _{GS(off)} | Gate to source cut-off voltage | V _{DS} =2V, I _D =500μA | -0.1 | — | -1.5 | V | |
| g _m | Transconductance | V _{DS} =2V, I _D =10mA | 40 | 60 | — | mS | |
| G _s | Associated gain | | 9.5 | 11.5 | — | dB | |
| NF _{min} | Minimum noise figure | V _{DS} =2V, I _D =10mA, f=12GHz | MGF4914E | — | 0.80 | 1.00 | dB |
| | | | MGF4918E | — | 0.55 | 0.60 | dB |
| | | | MGF4919E | — | 0.45 | 0.50 | dB |
| R _{th(ch-a)} | Thermal Resistance | *1 ΔV _f method | — | — | 625 | °C/W | |

*1: Channel to ambient

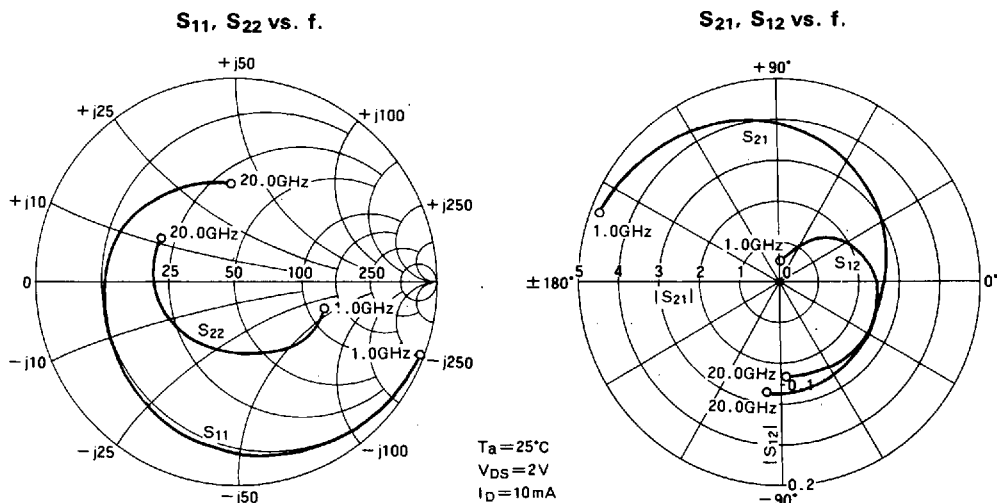
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TYPICAL CHARACTERISTICS (Ta=25°C)



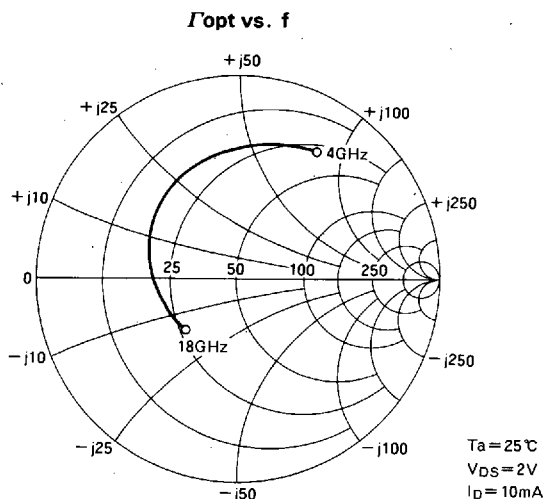
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SUPER LOW NOISE InGaAs HEMT

S PARAMETERS (T_a = 25°C, V_{DS} = 2V, I_D = 10mA)

| Freq. (GHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | K | MSG/MAG (dB) |
|----------------|-----------------|--------|-----------------|-------|-----------------|-------|-----------------|--------|-------|-----------------|
| | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | | |
| 1.0 | 0.979 | -24.6 | 4.894 | 156.5 | 0.028 | 71.0 | 0.493 | -21.2 | 0.156 | 22.4 |
| 2.0 | 0.946 | -41.3 | 4.662 | 141.4 | 0.040 | 60.0 | 0.464 | -34.0 | 0.263 | 20.7 |
| 3.0 | 0.913 | -58.1 | 4.431 | 126.3 | 0.052 | 49.0 | 0.435 | -46.9 | 0.338 | 19.3 |
| 4.0 | 0.880 | -74.8 | 4.199 | 111.2 | 0.064 | 38.0 | 0.406 | -59.7 | 0.400 | 18.2 |
| 5.0 | 0.840 | -92.5 | 3.949 | 95.5 | 0.074 | 29.2 | 0.388 | -74.9 | 0.450 | 17.3 |
| 6.0 | 0.801 | -110.2 | 3.700 | 79.7 | 0.084 | 20.3 | 0.371 | -90.0 | 0.503 | 16.4 |
| 7.0 | 0.772 | -121.1 | 3.474 | 69.3 | 0.089 | 13.5 | 0.361 | -99.4 | 0.570 | 15.9 |
| 8.0 | 0.743 | -132.0 | 3.248 | 58.8 | 0.094 | 6.6 | 0.351 | -108.7 | 0.642 | 15.4 |
| 9.0 | 0.717 | -145.1 | 3.072 | 45.9 | 0.096 | -0.3 | 0.355 | -120.5 | 0.699 | 15.1 |
| 10.0 | 0.692 | -158.1 | 2.896 | 33.0 | 0.098 | -7.2 | 0.359 | -132.3 | 0.762 | 14.7 |
| 11.0 | 0.673 | -170.6 | 2.765 | 20.1 | 0.098 | -16.4 | 0.368 | -141.8 | 0.828 | 14.5 |
| 12.0 | 0.655 | 177.0 | 2.634 | 7.1 | 0.098 | -25.6 | 0.378 | -151.3 | 0.900 | 14.3 |
| 13.0 | 0.644 | 170.7 | 2.556 | 0.2 | 0.098 | -28.8 | 0.378 | -157.3 | 0.952 | 14.2 |
| 14.0 | 0.632 | 164.4 | 2.477 | -6.8 | 0.097 | -31.9 | 0.378 | -163.3 | 1.008 | 13.5 |
| 15.0 | 0.621 | 154.4 | 2.431 | -18.9 | 0.098 | -39.7 | 0.401 | -170.3 | 1.024 | 13.0 |
| 16.0 | 0.609 | 144.4 | 2.385 | -31.0 | 0.098 | -47.4 | 0.424 | -177.2 | 1.040 | 12.6 |
| 17.0 | 0.584 | 132.3 | 2.391 | -45.0 | 0.102 | -59.4 | 0.426 | 175.1 | 1.070 | 12.1 |
| 18.0 | 0.558 | 120.2 | 2.398 | -59.0 | 0.107 | -71.3 | 0.428 | 167.3 | 1.097 | 11.6 |
| 19.0 | 0.515 | 107.3 | 2.385 | -73.4 | 0.109 | -84.5 | 0.425 | 158.6 | 1.196 | 10.7 |
| 20.0 | 0.472 | 94.3 | 2.372 | -87.8 | 0.110 | -97.6 | 0.421 | 149.9 | 1.287 | 10.1 |

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SUPER LOW NOISE InGaAs HEMT**NOISE PARAMETERS**

| f (GHz) | Γ_{opt} | | R_n (Ω) | NFmin (dB) | | | G_s (dB) |
|------------|----------------|--------------|-----------------------|------------|----------|----------|---------------|
| | Magn. | Angle (deg.) | | MGF4914E | MGF4918E | MGF4919E | |
| 4 | 0.75 | 58 | 12.5 | 0.41 | 0.29 | 0.27 | 16.5 |
| 8 | 0.59 | 120 | 4.5 | 0.62 | 0.43 | 0.40 | 12.8 |
| 12 | 0.47 | 160 | 1.7 | 0.90 | 0.55 | 0.45 | 11.5 |
| 14 | 0.42 | 179 | 1.5 | 1.03 | 0.63 | 0.56 | 10.0 |
| 18 | 0.37 | -136 | 1.4 | 1.29 | 0.80 | 0.69 | 7.4 |