# MRF941
# MRFC941
# MRF942
# MMBR941,L
# MRF9411,L

*Advance Information*

**The RF Line**

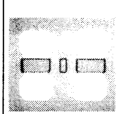
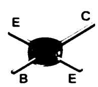
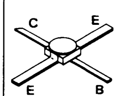
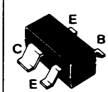
# NPN Silicon
# Low Noise, High-Frequency, Transistors

**$I_C$ = 15 mA
LOW NOISE
HIGH FREQUENCY
TRANSISTORS**

... designed for use in low noise, small-signal amplifiers. This series features low noise, high gain, and current capability offered in a variety of packages.

- Fully Implanted Base and Emitter Structure
- 9 Finger, 1.25 Micron Geometry with Gold Top Metal
- Gold Sintered Back Metal
- Tape and Reel packaging Options Available

3

| MAXIMUM RATINGS | | MRFC941  Chip | MRF941   Macro-X Case 317-01 | MRF942   Case 303-01 | MMBR941,L   SOT-23 Case 318-02 | MRF9411,L   Case 318B-01 (SOT-143) | |
|---|---|---|---|---|---|---|---|
| **Ratings** | **Symbol** | **Values** | | | | | **Unit** |
| Collector-Emitter Voltage | $V_{CEO}$ | 10 | 10 | 10 | 10 | 10 | Vdc |
| Collector-Base Voltage | $V_{CBO}$ | 20 | 20 | 20 | 20 | 20 | Vdc |
| Emitter-Base Voltage | $V_{EBO}$ | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | Vdc |
| Maximum Junction Temperature | $T_{Jmax}$ | 200 | 150 | 200 | 150 | 150 | °C |
| Collector Current — Continuous(3) | $I_C$ | 15 | 50 | 15 | 50 | 50 | mA |
| Storage Temperature | $T_{stg}$ | −65 to +200 | −65 to +150 | −65 to +200 | −55 to +150 | −65 to +150 | °C |

**ELECTRICAL CHARACTERISTICS**

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector-Emitter Breakdown Voltage ($I_C$ = 0.1 mA, $I_B$ = 0) | $V_{(BR)CEO}$ | 10 | 13 | — | Vdc |
| Collector-Base Breakdown Voltage ($I_C$ = 0.1 mA, $I_E$ = 0) | $V_{(BR)CBO}$ | 20 | 25 | — | Vdc |
| Emitter Cutoff Current ($V_{EB}$ = 1 V, $I_E$ = 0) | $I_{EBO}$ | — | — | 1 | μAdc |
| Collector Cutoff Current ($V_{CB}$ = 10 V, $I_E$ = 0) | $I_{CBO}$ | — | — | 1 | μAdc |
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain ($V_{CE}$ = 6 V, $I_C$ = 5 mA) | $h_{FE}$ | 50 | — | 200 | — |

Note 1. Case Temperature is measured on the collector lead where it first contacts the printed circuit board closest to the package.
Note 2. Device offered in other ceramic/plastic packages.
Note 3. $I_C$ — Continuous (MTBF ≈ 10 years)

(continued)

This document contains information on a new product. Specifications and information herein are subject to change without notice.

**ELECTRICAL CHARACTERISTICS — continued** ($T_C$ = 25°C unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Collector-Base Capacitance ($V_{CB}$ = 10 V, $I_E$ = 0, f = 1 MHz) | $C_{cb}$ | — | 0.2 | — | pF |
| Current Gain — Bandwidth Product ($V_{CE}$ = 6 V, $I_C$ = 15 mA, f = 1 GHz) | $f_T$ | — | 8 | — | GHz |
| **FUNCTIONAL TESTS** | | | | | |
| Associated Gain at Minimum Noise Figure | $G_{NF}$ | | | | dB |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 1 GHz) | | — | 16.5 | — | |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 2 GHz) | | — | 12.5 | — | |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 4 GHz) | | — | 9 | — | |
| Noise Figure | $NF_{min}$ | | | | dB |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 1 GHz) | | — | 1.2 | — | |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 2 GHz) | | — | 1.7 | — | |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 4 GHz) | | — | 2.8 | — | |

## TYPICAL CHARACTERISTICS

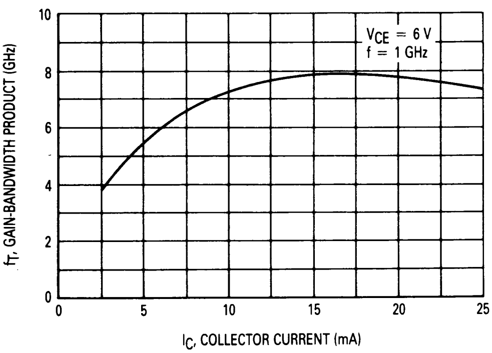



**Figure 1. Gain-Bandwidth Product versus Current**

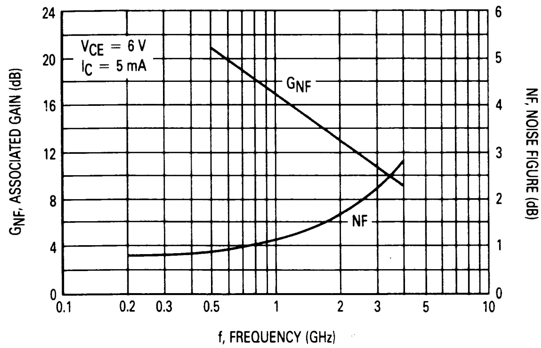



**Figure 2. Associated Gain and Optimum Noise Figure versus Frequency**

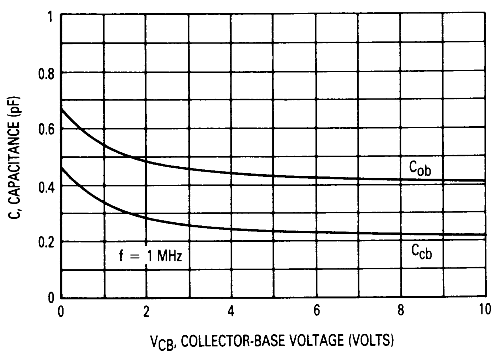



**Figure 3. Junction Capacitance versus Voltage**

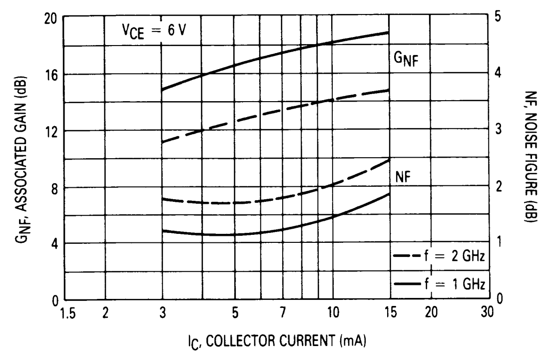



**Figure 4. Associated Gain and Optimum Noise Figure versus Collector Current**

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**MOTOROLA**
# SEMICONDUCTOR
**TECHNICAL DATA**

| MRF951 |
|---|
| MRFC951 |
| MRF952 |
| MMBR951,L |
| MRF9511,L |

*Advance Information*

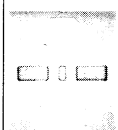
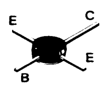
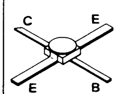
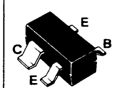
**The RF Line**

# NPN Silicon Low Noise, High-Frequency Transistors

**$I_C$ = 30 mA**
**LOW NOISE**
**HIGH FREQUENCY**
**TRANSISTORS**

. . . designed for use in high gain, low noise small-signal amplifiers. This series features excellent broadband linearity and is offered in a variety of packages.

- Fully Implanted Base and Emitter Structure
- 18 Finger, 1.25 Micron Geometry with Gold Top Metal
- Gold Sintered Back Metal
- Tape and Reel Packaging Options Available

| | | MRFC951 | MRF951 | MRF952 | MMBR951,L | MRF9511,L | |
|---|---|---|---|---|---|---|---|
| | |  |  |  |  |  | |
| **MAXIMUM RATINGS** | | **Chip** | **Macro-X Case 317-01** | **Case 303-01** | **SOT-23 Case 318-02** | **Case 318B-01 (SOT-143)** | |
| **Ratings** | **Symbol** | **Values** | | | | | **Unit** |
| Collector-Emitter Voltage | $V_{CEO}$ | 10 | 10 | 10 | 10 | 10 | Vdc |
| Collector-Base Voltage | $V_{CBO}$ | 20 | 20 | 20 | 20 | 20 | Vdc |
| Emitter-Base Voltage | $V_{EBO}$ | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | Vdc |
| Maximum Junction Temperature | $T_{Jmax}$ | 200 | 150 | 200 | 150 | 150 | °C |
| Collector Current — Continuous(3) | $I_C$ | 30 | 100 | 30 | 100 | 100 | mA |
| Storage Temperature | $T_{stg}$ | −65 to +200 | −65 to +150 | −65 to +200 | −55 to +150 | −65 to +150 | °C |

**ELECTRICAL CHARACTERISTICS**

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector-Emitter Breakdown Voltage ($I_C$ = 0.1 mA, $I_B$ = 0) | $V_{(BR)CEO}$ | 10 | 13 | — | Vdc |
| Collector-Base Breakdown Voltage ($I_C$ = 0.1 mA, $I_E$ = 0) | $V_{(BR)CBO}$ | 20 | 25 | — | Vdc |
| Emitter Cutoff Current ($V_{EB}$ = 1 V, $I_E$ = 0) | $I_{EBO}$ | — | — | 1 | μAdc |
| Collector Cutoff Current ($V_{CB}$ = 10 V, $I_E$ = 0) | $I_{CBO}$ | — | — | 1 | μAdc |
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain ($V_{CE}$ = 6 V, $I_C$ = 5 mA) | $h_{FE}$ | 50 | — | 200 | — |

(continued)

Note 1. Case Temperature is measured on the collector lead where it first contacts the printed circuit board closest to the package.
Note 2. Device offered in other ceramic/plastic packages.
Note 3. $I_C$ — Continuous (MTBF ≈ 10 years)

**ELECTRICAL CHARACTERISTICS — continued** ($T_C$ = 25°C unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Collector-Base Capacitance ($V_{CB}$ = 10 V, $I_E$ = 0, f = 1 MHz) | $C_{cb}$ | — | 0.3 | — | pF |
| Current Gain — Bandwidth Product ($V_{CE}$ = 6 V, $I_C$ = 30 mA, f = 1 GHz) | $f_T$ | — | 7.5 | — | GHz |
| **FUNCTIONAL TESTS** | | | | | |
| Associated Gain at Minimum | $G_{NF}$ | | | | dB |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 1 GHz) | | — | 16.5 | — | |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 2 GHz) | | — | 12.5 | — | |
| Noise Figure | $NF_{min}$ | | | | dB |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 1 GHz) | | — | 1.2 | — | |
| ($V_{CE}$ = 6 V, $I_C$ = 5 mA, f = 2 GHz) | | — | 1.7 | — | |

## TYPICAL CHARACTERISTICS

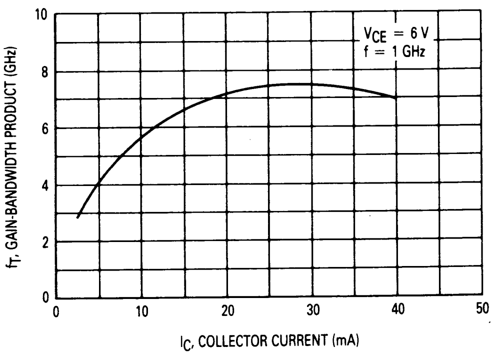



**Figure 1. Gain-Bandwidth Product versus Current**

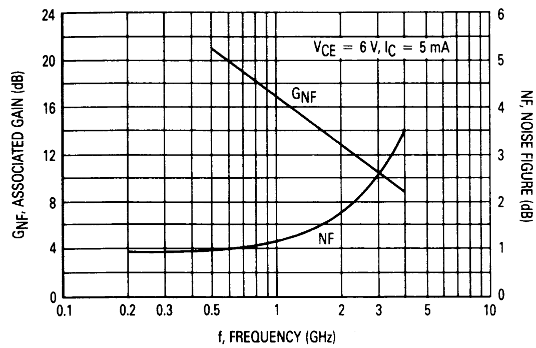



**Figure 2. Associated Gain and Optimum Noise Figure versus Frequency**

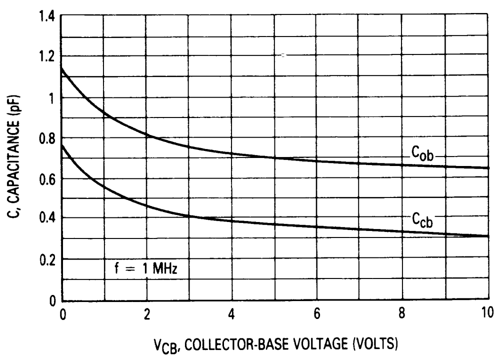



**Figure 3. Junction Capacitance versus Voltage**

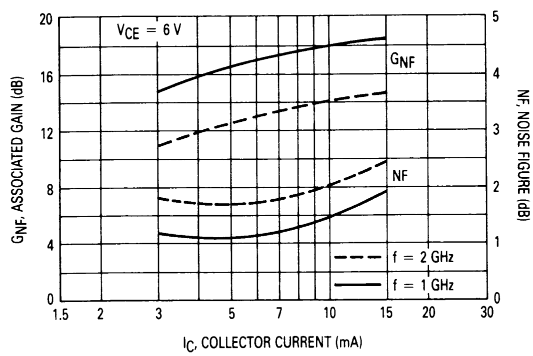



**Figure 4. Associated Gain and Optimum Noise Figure versus Collector Current**

**The RF Line**

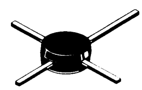
# N-Channel Dual-Gate GaAs Field-Effect Transistor

## MRF966
## MRFC966

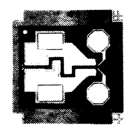
. . . depletion mode dual-gate MES FET designed for high frequency amplifier and mixer applications.

- Excellent Receiver Front End
- Low Noise Figure — NF = 1.2 dB, 1 GHz (Typ)
- High Power Gain — $G_p$ = 17 dB, 1 GHz (Typ)
- Low Reverse Transfer Capacitance — $C_{rss}$ = 40 fF (Typ)
- High Transconductance — $g_m$ = 20 mS (Typ)
- Fully Characterized
- Gold Metallization

**N-CHANNEL DUAL-GATE GaAs FIELD-EFFECT TRANSISTOR**



**MRF966**
**CASE 317-01**



**CHIP**
**MRFC966**

3

### MAXIMUM RATINGS

| Rating | Symbol | MRFC966 | MRF966 | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 10 | 10 | Vdc |
| Gate-Source Voltage — Reverse | $V_{G1S}$<br>$V_{G2S}$ | −8<br>−8 | −8<br>−8 | Vdc |
| Gate-Source Voltage — Forward | $V_{G1S}$<br>$V_{G2S}$ | +1<br>+1 | +1<br>+1 | Vdc |
| Drain Current — Continuous | $I_D$ | 80 | 80 | mAdc |
| Total Power Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 350<br>$T_J$ = 125°C Max | 350<br>3.5 | mW<br>mW/°C |
| Storage Channel Temperature Range | $T_{stg}$ | −65 to +125 | −65 to +125 | °C |
| Junction Temperature Range | $T_J$ | −65 to +125 | −65 to +125 | °C |

### ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Drain-Source Breakdown Voltage<br>($V_{G1S}$ = $V_{G2S}$ = −4.5 Vdc, $I_D$ = 100 μA) | $V_{(BR)DSX}$ | 10 | — | — | Vdc |
| Gate 1-to-Source Cutoff Voltage ($V_{DS}$ = 5 Vdc, $V_{G2S}$ = 0, $I_D$ = 500 μA) | $V_{G1S(off)}$ | −2 | — | −4.5 | Vdc |
| Gate 2-to-Source Cutoff Voltage ($V_{DS}$ = 5 Vdc, $V_{G1S}$ = 0, $I_D$ = 500 μA) | $V_{G2S(off)}$ | −2 | — | −4.5 | Vdc |
| Gate 1 Leakage Current ($V_{G1S}$ = −5 Vdc, $V_{G2S}$ = $V_{DS}$ = 0) | $I_{G1SS}$ | — | — | 10 | μAdc |
| Gate 2 Leakage Current ($V_{G2S}$ = −5 Vdc, $V_{G1S}$ = $V_{DS}$ = 0) | $I_{G2SS}$ | — | — | 10 | μAdc |
| **ON CHARACTERISTICS** | | | | | |
| Zero-Gate Voltage Drain Current<br>($V_{DS}$ = 5 Vdc, $V_{G1S}$ = $V_{G2S}$ = 0) | $I_{DSS}$ | 30 | 50 | 80 | mAdc |
| **SMALL-SIGNAL CHARACTERISTICS** | | | | | |
| Transconductance<br>($V_{DS}$ = 5 Vdc, $V_{G2S}$ = 0, $I_D$ = 10 mA, f = 1 kHz) | $g_m$ | 18 | 20 | — | mS |
| Input Capacitance<br>($V_{DS}$ = 5 Vdc, $V_{G2S}$ = 0, $I_D$ = 10 mA, f = 1 MHz) | $C_{iss}$ | — | 1.5 | — | pF |
| Reverse Transfer Capacitance<br>($V_{DS}$ = 5 Vdc, $V_{G2S}$ = 0, $I_D$ = 10 mA, f = 1 MHz) | $C_{rss}$ | — | 0.04 | — | pF |

Handling and Packaging — MES devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MES devices should be observed.

(continued)

**ELECTRICAL CHARACTERISTICS — continued** ($T_A$ = 25°C unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **FUNCTIONAL CHARACTERISTICS** | | | | | |
| Noise Figure(1) ($V_{DS}$ = 5 Vdc, $V_{G2S}$ = 0, $I_{DS}$ = 10 mA, f = 1 GHz) | NF | — | 1.2 | 1.5 | dB |
| Common Source Power Gain(1) ($V_{DS}$ = 5 Vdc, $V_{G2S}$ = 0, $I_{DS}$ = 10 mA, f = 1 GHz) | $G_{ps}$ | 15 | 17 | — | dB |
| Intermodulation Distortion ($V_{DS}$ = 5 Vdc, $I_{DS}$ = 10 mA, $f_1$ = 995 MHz, $f_2$ = 1001 MHz, $V_{G2}$ = 0, $P_{in}$ = −40 dBm) | $IMD_3$ | — | −65 | — | dB |
| Linear Power Point(2) ($V_{DS}$ = 5 Vdc, $I_{DS}$ = 10 mA, $f_1$ = 995 MHz, $f_2$ = 1001 MHz, $V_{G2}$ = 0) | $P_L$ | — | +1 | — | dBm |
| Output Power at 1 dB Compression Point ($V_{DS}$ = 5 Vdc, $I_{DS}$ = 10 mA, f = 1 GHz) | $P_{out}$ | — | 10 | — | dBm |

NOTES:
1. Data taken using a 50 Ω test fixture, Microlab SF31N slug tuners, HP11590B bias networks and the HP8970A or Eaton 2075 noise figure meter. Note: $V_{G2S}$ = 0. Refer to Figure 11.
2. The linear power point is the output power level at which either the signal $2f_1 \pm f_2$ or $2f_2 \pm f_1$ are 30 dB below $f_1$ or $f_2$.

## TYPICAL CHARACTERISTICS

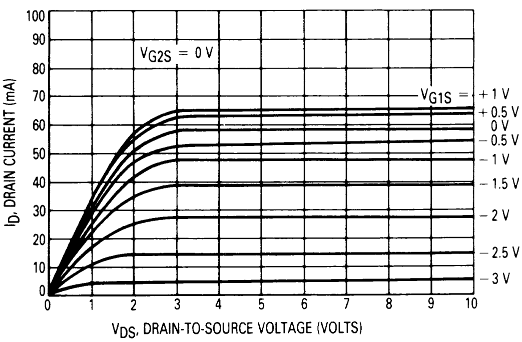



**Figure 1. Drain Current versus Drain-To-Source Voltage**

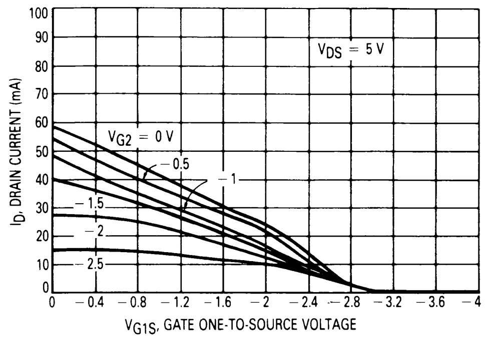



**Figure 2. Drain Current versus Gate One-To-Source Voltage**

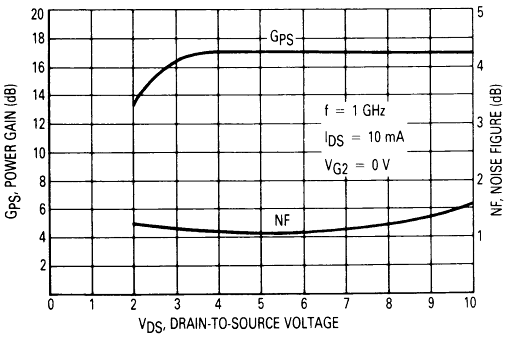



**Figure 3. Power Gain and Noise Figure versus Drain-To-Source Voltage**

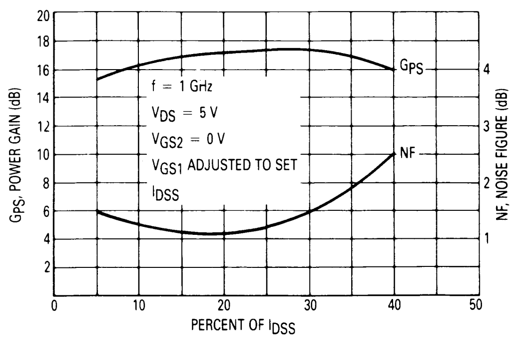



**Figure 4. Power Gain and Noise Figure versus Percent of $I_{DSS}$**

## TYPICAL CHARACTERISTICS

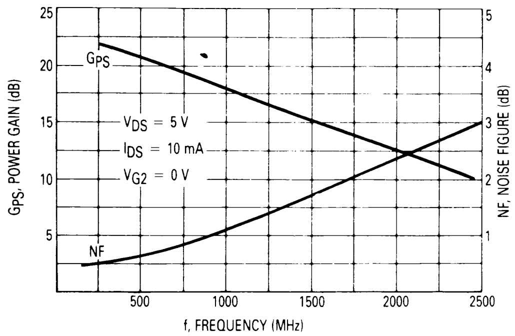



**Figure 5. Power Gain and Noise Figure versus Frequency**

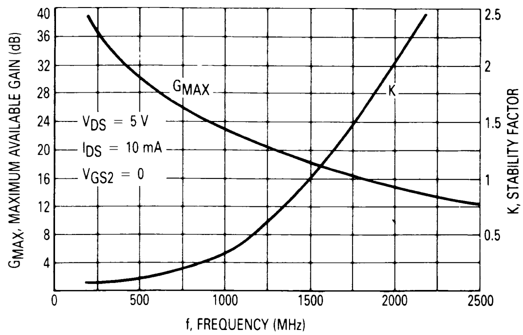



**Figure 6. Maximum Available Gain and Stability Factor versus Frequency**

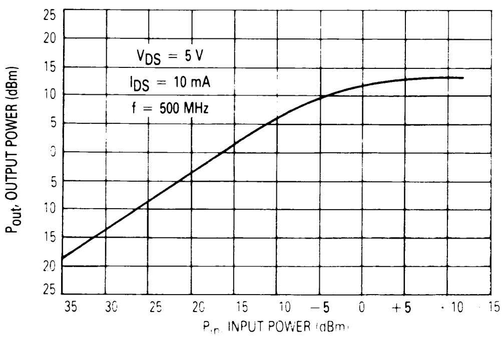



**Figure 7. Output Power versus Input Power @ 500 MHz**

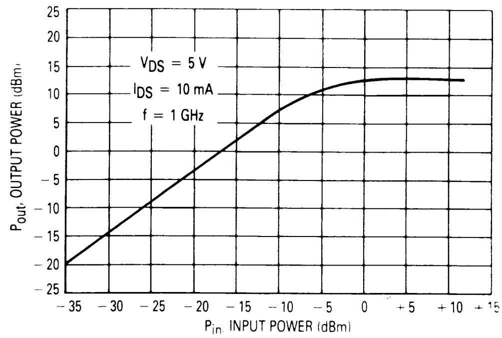



**Figure 8. Output Power versus Input Power @ 1 GHz**

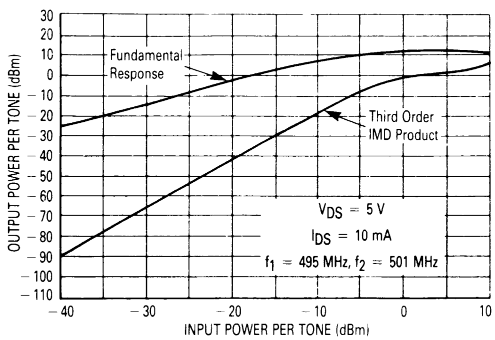



**Figure 9. Third Order Intermodulation Distortion @ 500 MHz**

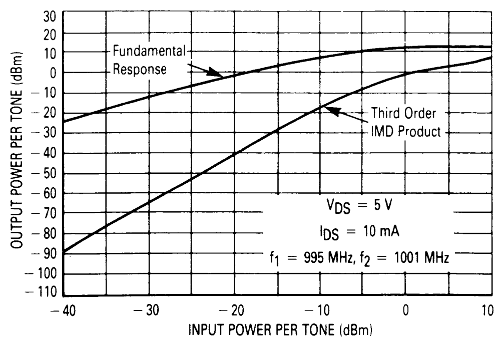



**Figure 10. Third Order Intermodulation Distortion @ 1 GHz**

3

## COMMON SOURCE S-PARAMETERS

| $V_{DS}$ (Volts) | $I_{DS}$ (mA) | f (MHz) | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $\lvert S_{11}\rvert$ | $\angle\phi$ | $\lvert S_{21}\rvert$ | $\angle\phi$ | $\lvert S_{12}\rvert$ | $\angle\phi$ | $\lvert S_{22}\rvert$ | $\angle\phi$ |
| 3 | 5 | 200 | 0.997 | −5.7 | 1.251 | 172.1 | 0.003 | 88.3 | 0.944 | −6.4 |
| | | 500 | 0.983 | −14.3 | 1.23 | 161.2 | 0.007 | 84.6 | 0.931 | −16 |
| | | 1000 | 0.941 | −28.3 | 1.201 | 142.4 | 0.013 | 78.5 | 0.9 | −32.2 |
| | | 1500 | 0.866 | −42.3 | 1.133 | 122 | 0.016 | 70.4 | 0.836 | −49.6 |
| | | 2000 | 0.762 | −55.4 | 1.011 | 101.1 | 0.018 | 56.2 | 0.744 | −67.5 |
| | | 2500 | 0.642 | −66.4 | 0.819 | 77.4 | 0.015 | 25.5 | 0.608 | −87.5 |
| | 10 | 200 | 0.995 | −6.2 | 1.60 | 172.0 | 0.002 | 84.1 | 0.93 | −6.3 |
| | | 500 | 0.981 | −15.1 | 1.58 | 161.3 | 0.007 | 82.5 | 0.92 | −15.8 |
| | | 1000 | 0.928 | −29.9 | 1.55 | 142.9 | 0.013 | 81.5 | 0.90 | −31.8 |
| | | 1500 | 0.838 | −44.4 | 1.46 | 122.3 | 0.016 | 74.7 | 0.84 | −49.4 |
| | | 2000 | 0.716 | −57.7 | 1.31 | 101.2 | 0.018 | 60.1 | 0.76 | −68.4 |
| | | 2500 | 0.584 | −67.5 | 1.06 | 77.4 | 0.015 | 26.7 | 0.63 | −89.8 |
| | 15 | 200 | 0.996 | −6.3 | 1.83 | 172.0 | 0.002 | 76.4 | 0.93 | −6.3 |
| | | 500 | 0.979 | −15.7 | 1.80 | 161.2 | 0.006 | 91.5 | 0.92 | −15.6 |
| | | 1000 | 0.921 | −30.9 | 1.76 | 142.3 | 0.012 | 82.3 | 0.90 | −31.6 |
| | | 1500 | 0.820 | −45.9 | 1.66 | 121.7 | 0.016 | 76.1 | 0.85 | −49.1 |
| | | 2000 | 0.689 | −58.7 | 1.48 | 100.6 | 0.016 | 64.1 | 0.77 | −68.2 |
| | | 2500 | 0.552 | −67.4 | 1.20 | 76.7 | 0.013 | 28.9 | 0.65 | −90.3 |
| | 20 | 200 | 0.995 | −6.5 | 1.97 | 171.9 | 0.003 | 85.7 | 0.92 | −6.2 |
| | | 500 | 0.977 | −16.2 | 1.93 | 160.7 | 0.007 | 89.0 | 0.91 | −15.3 |
| | | 1000 | 0.910 | −32.0 | 1.89 | 141.7 | 0.011 | 84.0 | 0.89 | −31.0 |
| | | 1500 | 0.804 | −47.1 | 1.79 | 120.9 | 0.016 | 78.3 | 0.85 | −48.4 |
| | | 2000 | 0.669 | −59.7 | 1.59 | 99.6 | 0.017 | 66.2 | 0.78 | −67.4 |
| | | 2500 | 0.531 | −67.7 | 1.29 | 75.8 | 0.012 | 32.7 | 0.66 | −89.2 |
| 5 | 5 | 200 | 0.997 | −5.8 | 1.27 | 172.8 | 0.002 | 102.6 | 0.97 | −3.8 |
| | | 500 | 0.983 | −14.3 | 1.26 | 162.6 | 0.004 | 82.3 | 0.97 | −9.4 |
| | | 1000 | 0.939 | −28.4 | 1.24 | 146.0 | 0.006 | 93.4 | 0.96 | −18.8 |
| | | 1500 | 0.866 | −42.6 | 1.21 | 128.4 | 0.008 | 102.6 | 0.95 | −28.3 |
| | | 2000 | 0.765 | −5.3 | 1.14 | 111.6 | 0.007 | 137.7 | 0.93 | −37.6 |
| | | 2500 | 0.642 | −68.4 | 1.05 | 93.1 | 0.012 | −179.0 | 0.92 | −47.0 |
| | 10 | 200 | 0.966 | −6.0 | 1.61 | 172.8 | 0.002 | 88.1 | 0.97 | −3.8 |
| | | 500 | 0.982 | −15.1 | 1.59 | 162.8 | 0.004 | 85.8 | 0.97 | −9.4 |
| | | 1000 | 0.928 | −29.9 | 1.57 | 146.1 | 0.006 | 94.6 | 0.96 | −18.6 |
| | | 1500 | 0.841 | −44.6 | 1.53 | 128.7 | 0.006 | 110.4 | 0.94 | −28.0 |
| | | 2000 | 0.724 | −58.3 | 1.42 | 111.6 | 0.008 | 152.6 | 0.93 | −37.0 |
| | | 2500 | 0.589 | −69.4 | 1.30 | 93.3 | 0.014 | 179.1 | 0.92 | −46.3 |
| | 15 | 200 | 0.997 | −6.2 | 1.82 | 172.6 | 0.001 | 103.2 | 0.97 | −3.7 |
| | | 500 | 0.979 | −15.6 | 1.80 | 162.5 | 0.003 | 85.3 | 0.96 | −9.3 |
| | | 1000 | 0.920 | −30.8 | 1.77 | 145.6 | 0.005 | 92.4 | 0.95 | −18.4 |
| | | 1500 | 0.824 | −45.8 | 1.72 | 127.9 | 0.007 | 116.3 | 0.94 | −27.3 |
| | | 2000 | 0.699 | −59.2 | 1.59 | 110.8 | 0.008 | 154.1 | 0.93 | −36.3 |
| | | 2500 | 0.560 | −69.6 | 1.44 | 92.6 | 0.017 | 176.2 | 0.92 | −45.4 |
| | 20 | 200 | 0.995 | −6.5 | 1.96 | 172.4 | 0.002 | 85.9 | 0.97 | −3.7 |
| | | 500 | 0.977 | −16.1 | 1.93 | 162.1 | 0.004 | 80.9 | 0.96 | −9.1 |
| | | 1000 | 0.913 | −31.7 | 1.90 | 144.9 | 0.005 | 92.1 | 0.95 | −17.9 |
| | | 1500 | 0.810 | −47.0 | 1.83 | 126.9 | 0.007 | 121.4 | 0.94 | −26.9 |
| | | 2000 | 0.679 | −60.4 | 1.69 | 109.7 | 0.009 | 153.4 | 0.93 | −35.6 |
| | | 2500 | 0.538 | −70.0 | 1.53 | 91.4 | 0.017 | 176.0 | 0.93 | −44.6 |

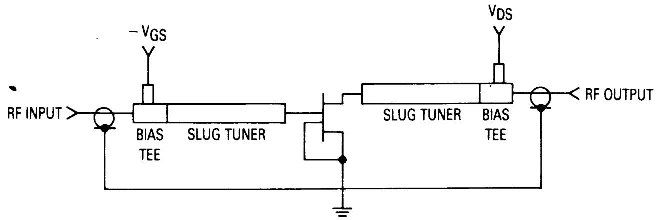
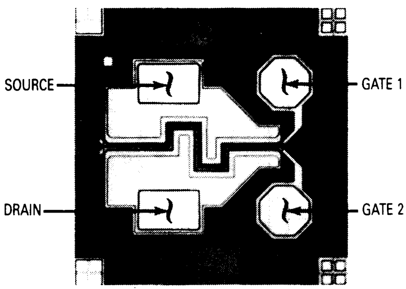



**Figure 11. 1 GHz Test Circuit Schematic**

| f (MHz) | $G_{NF}$ (dB) | NF (dB) | $\Gamma$MS $NF_{opt}$ | $\Gamma$ML $NF_{opt}$ |
|---|---|---|---|---|
| 450 | 20 | 0.6 | 0.82 $\angle 21°$ | 0.80 $\angle 11°$ |
| 1000 | 17 | 1.2 | 0.74 $\angle 21°$ | 0.77 $\angle 12°$ |

**Figure 12. Source and Load Impedance for Optimum Noise Figure**

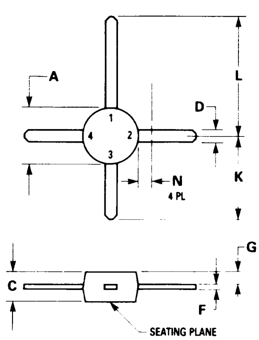



**MRFC966 Chip Topography**

Nominal Chip Size: 0.017″ x 0.020″ x 0.005″
Drain/Source Bond Pad: 0.003″ x 0.004″
Gate 1/Gate 2 Bond Pad: 0.0035″ x 0.0035″

3

## OUTLINE DIMENSIONS




NOTE:
DIMENSION D NOT APPLICABLE IN ZONE N.

| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 4.44 | 5.21 | 0.175 | 0.205 |
| C | 1.90 | 2.54 | 0.075 | 0.100 |
| D | 0.84 | 0.99 | 0.033 | 0.039 |
| F | 0.20 | 0.30 | 0.008 | 0.012 |
| G | 0.76 | 1.14 | 0.030 | 0.045 |
| K | 7.24 | 8.13 | 0.285 | 0.320 |
| L | 10.54 | 11.43 | 0.415 | 0.450 |
| N | — | 1.65 | — | 0.065 |

STYLE 1:
PIN 1. DRAIN
2. SOURCE
3. GATE 1
4. GATE 2

**CASE 317-01**
**PLASTIC MACRO-X**