

## MRF966



CASE 317-01, STYLE 1

DUAL GATE  
GaAs FET

N-CHANNEL

## MRF967



CASE 358-01, STYLE 2

DUAL GATE  
GaAs FET

N-CHANNEL

### MAXIMUM RATINGS

| Rating                                                                                    | Symbol                 | MRF966         | MRF967         | Unit        |
|-------------------------------------------------------------------------------------------|------------------------|----------------|----------------|-------------|
| Drain-Source Voltage                                                                      | $V_{DS}$               | 10             | 10             | Vdc         |
| Gate-Source Voltage — Reverse                                                             | $V_{G1S}$              | -8.0<br>-8.0   | -8.0<br>-8.0   | Vdc         |
| Gate-Source Voltage — Forward                                                             | $V_{G1S}$<br>$V_{G2S}$ | +1.0<br>+1.0   | +1.0<br>+1.0   | Vdc         |
| Drain Current                                                                             | $I_D$                  | 60             | 60             | mAdc        |
| Total Device Dissipation<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$                  | 350<br>3.5     | 350<br>3.5     | mW<br>mW/°C |
| Junction Temperature Range                                                                | $T_J$                  | -65 to<br>+125 | -65 to<br>+125 | °C          |
| Storage Channel Temperature<br>Range                                                      | $T_{stg}$              | -65 to<br>+125 | -65 to<br>+125 | °C          |

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

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

#### OFF CHARACTERISTICS

|                                                                                                 |                |      |   |      |                 |
|-------------------------------------------------------------------------------------------------|----------------|------|---|------|-----------------|
| Drain-Source Breakdown Voltage<br>( $V_{G1S} = V_{G2S} = -4.0$ Vdc, $I_D = 100$ $\mu\text{A}$ ) | $V_{(BR)DSX}$  | 10   | — | —    | Vdc             |
| Gate 1 Leakage Current<br>( $V_{G1S} = -5.0$ Vdc, $V_{G2S} = V_{DS} = 0$ )                      | $I_{G1SS}$     | —    | — | 10   | $\mu\text{Adc}$ |
| Gate 2 Leakage Current<br>( $V_{G2S} = -5.0$ Vdc, $V_{G1S} = V_{DS} = 0$ )                      | $I_{G2SS}$     | —    | — | 10   | $\mu\text{Adc}$ |
| Gate 1 to Source Cutoff Voltage<br>( $V_{DS} = 5.0$ Vdc, $V_{G2S} = 0$ )                        | $V_{G1S(off)}$ | -2.0 | — | -4.5 | Vdc             |
| Gate 2 to Source Cutoff Voltage<br>( $V_{DS} = 5.0$ Vdc, $V_{G1S} = 0$ )                        | $V_{G2S(off)}$ | -2.0 | — | -4.5 | Vdc             |

#### ON CHARACTERISTICS

|                                                                            |           |    |    |    |      |
|----------------------------------------------------------------------------|-----------|----|----|----|------|
| Zero-Gate-Voltage Drain<br>( $V_{DS} = 5.0$ Vdc, $V_{G1S} = V_{G2S} = 0$ ) | $I_{DSS}$ | 30 | 50 | 80 | mAdc |
|----------------------------------------------------------------------------|-----------|----|----|----|------|

#### SMALL-SIGNAL CHARACTERISTICS

|                                                                                                     |            |    |      |   |       |
|-----------------------------------------------------------------------------------------------------|------------|----|------|---|-------|
| Forward Transfer Admittance<br>( $V_{DS} = 5.0$ Vdc, $V_{G2S} = 0$ , $I_D = 10$ mA, $f = 1.0$ kHz)  | $ Y_{fs} $ | 14 | 20   | — | mmhos |
| Input Capacitance<br>( $V_{DS} = 5.0$ Vdc, $V_{G2S} = 0$ , $I_D = 10$ mA, $f = 1.0$ MHz)            | $C_{iss}$  | —  | 0.45 | — | pF    |
| Reverse Transfer Capacitance<br>( $V_{DS} = 5.0$ Vdc, $V_{G2S} = 0$ , $I_D = 10$ mA, $f = 1.0$ MHz) | $C_{rss}$  | —  | 0.04 | — | pF    |

#### FUNCTIONAL CHARACTERISTICS

|                                                                                                                                                |                  |          |          |     |    |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------|----------|-----|----|
| Noise Figure<br>( $V_{DS} = 5.0$ Vdc, $V_{G2S} = 0(1)$ , $I_{DS} = 10$ mA, $f = 1.0$ GHz)                                                      | NF               | —        | 1.2      | 1.5 | dB |
| Common Source Power Gain<br>( $V_{DS} = 5.0$ Vdc, $V_{G2S} = 0(1)$ ,<br>$I_{DS} = 10$ mA, $f = 1.0$ GHz)                                       | $G_{ps}$         | 13<br>15 | 15<br>18 | —   | dB |
| Intermodulation Distortion<br>( $V_{DS} = 5.0$ Vdc, $I_{DS} = 10$ mA, $f_1 = 995$ MHz,<br>$f_2 = 1001$ MHz, $V_{G2} = 0$ , $P_{in} = -40$ dBm) | IMD <sub>3</sub> | —        | -65      | —   | dB |

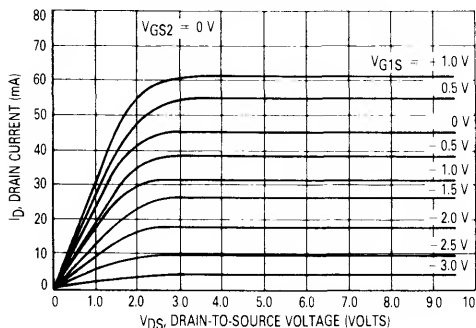
**ELECTRICAL CHARACTERISTICS** (continued) ( $T_A = 25^\circ\text{C}$  unless otherwise noted.)

| Characteristic                                                                                                                                        | Symbol    | Min | Typ  | Max | Unit |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----|------|-----|------|
| Linear Power Point(2)<br>( $V_{DS} = 5.0\text{ Vdc}$ , $I_{DS} = 10\text{ mA}$ ,<br>$f_1 = 995\text{ MHz}$ , $f_2 = 1001\text{ MHz}$ , $V_{G2} = 0$ ) | $P_L$     | —   | +1.0 | —   | dBm  |
| Output Power at 1 dB Compression Point<br>( $V_{DS} = 5.0\text{ Vdc}$ , $I_{DS} = 10\text{ mA}$ , $f = 1.0\text{ GHz}$ )                              | $P_{out}$ | —   | 10   | —   | dBm  |

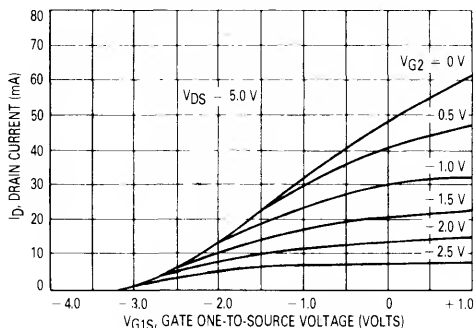
- (1) Data taken using a HP11608A 50  $\Omega$  test fixture, Microlab slug tuners, HP11590A bias networks and the HP8970A noise figure meter.  
Note:  $V_{G2S} = 0$ . Refer to Figure 16.
- (2) The linear power point is the output power level at which either the signal  $2f_1 \pm f_2$  or  $2f_2 \pm f_1$  are 30 dB below  $f_1$  or  $f_2$ .

**TYPICAL CHARACTERISTICS**  
**MRF966**

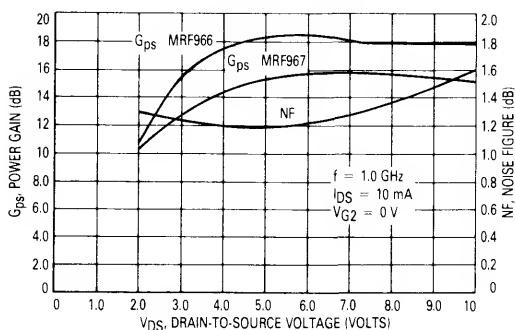
**FIGURE 1 — DRAIN CURRENT versus DRAIN-TO-SOURCE VOLTAGE**



**FIGURE 2 — DRAIN CURRENT versus GATE ONE-TO-SOURCE VOLTAGE**



**FIGURE 3 — COMMON SOURCE POWER GAIN AND NOISE FIGURE versus DRAIN-TO-SOURCE VOLTAGE**



**FIGURE 4 — COMMON SOURCE POWER GAIN AND NOISE FIGURE versus PERCENT-OF-DRAIN CURRENT**

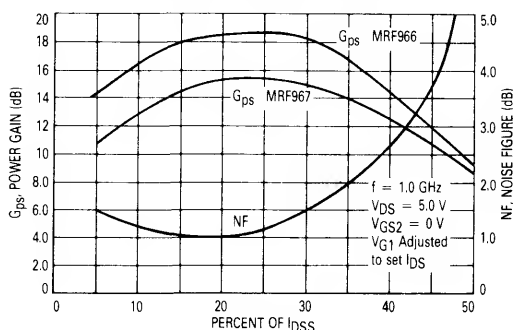


FIGURE 5 — COMMON SOURCE POWER GAIN  
AND NOISE FIGURE versus GATE  
ONE-TO-SOURCE VOLTAGE

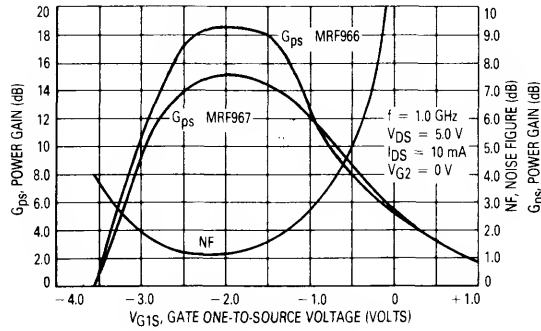


FIGURE 6 — COMMON SOURCE POWER GAIN  
AND NOISE FIGURE versus GATE  
CONTROL SUPPLY VOLTAGE

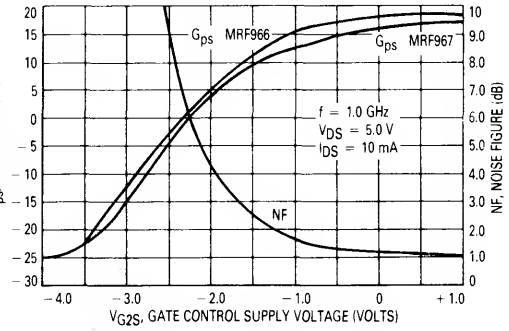


FIGURE 7 — COMMON SOURCE POWER GAIN  
AND NOISE FIGURE versus  
FREQUENCY

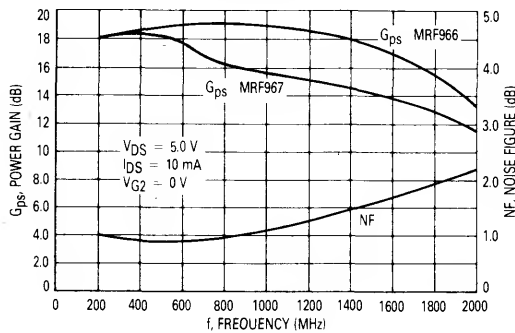


FIGURE 8 — MAXIMUM AVAILABLE GAIN  
AND STABILITY FACTOR  
versus FREQUENCY

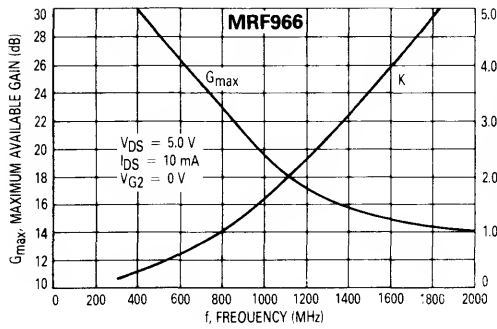


FIGURE 9 — MAXIMUM AVAILABLE GAIN AND STABILITY  
FACTOR versus FREQUENCY

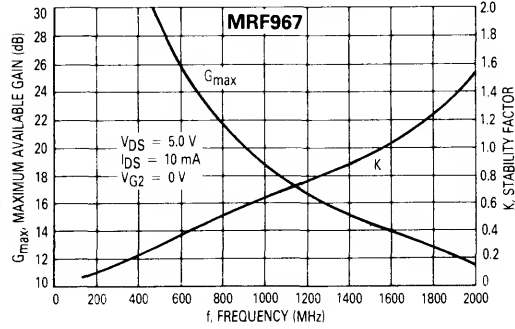


FIGURE 10 — OUTPUT POWER versus INPUT POWER @ 500 MHz

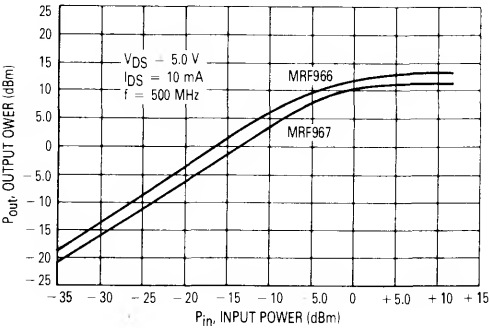
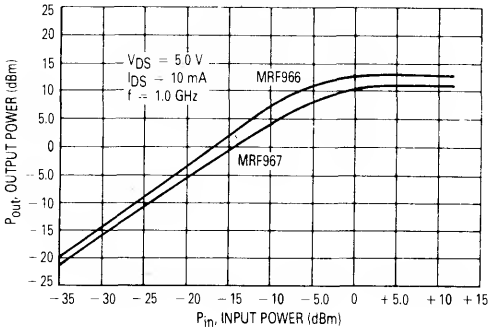


FIGURE 11 — OUTPUT POWER versus INPUT POWER @ 1.0 GHz



TYPICAL CHARACTERISTICS  
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FIGURE 12 — THIRD ORDER INTERMODULATION DISTORTION @ 500 MHz

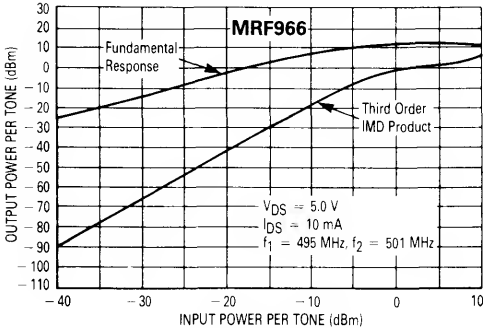


FIGURE 13 — THIRD ORDER INTERMODULATION DISTORTION @ 500 MHz

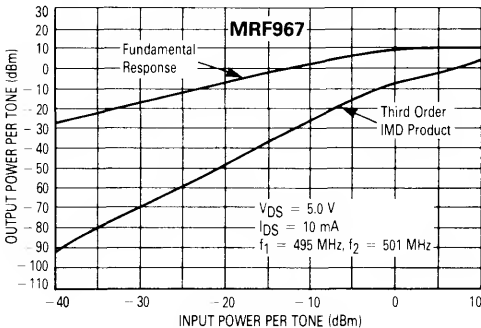


FIGURE 14 — THIRD ORDER INTERMODULATION DISTORTION @ 1.0 GHz

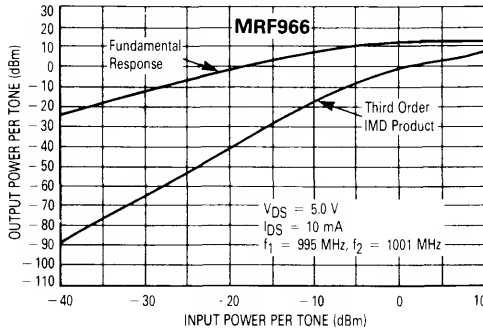
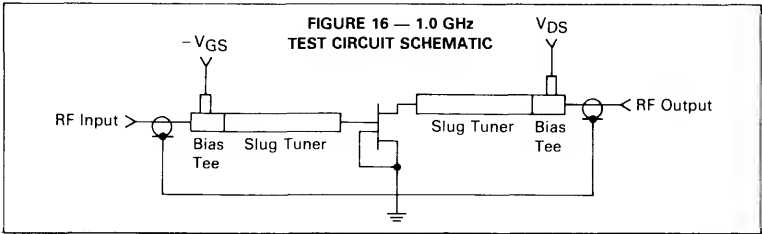
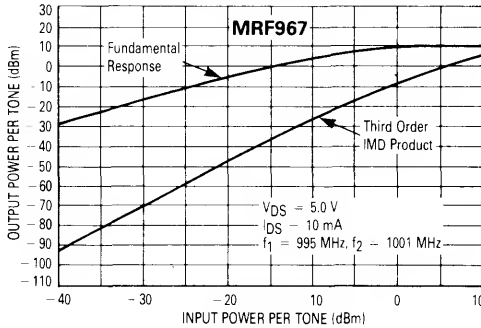


FIGURE 15 — THIRD ORDER INTERMODULATION DISTORTION @ 1.0 GHz



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FIGURE 17 — CONSTANT GAIN AND NOISE FIGURE  
CONTOURS AT  $V_{DS} = 5.0\text{ V}$ ,  $I_{DS} = 10\text{ mA}$ ,  $f = 500\text{ MHz}$   
(MATCHED OUTPUT)

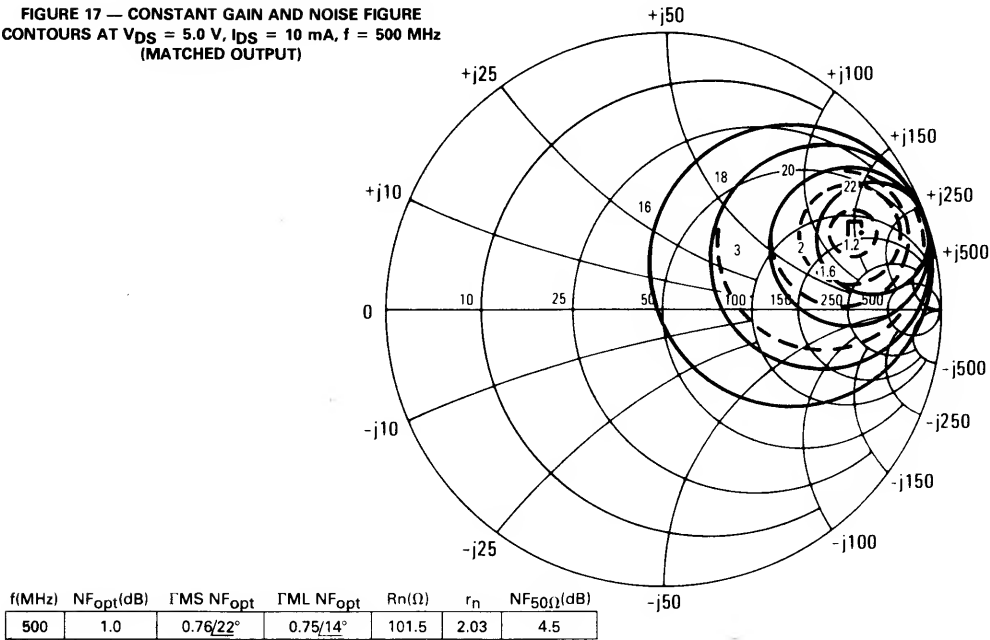
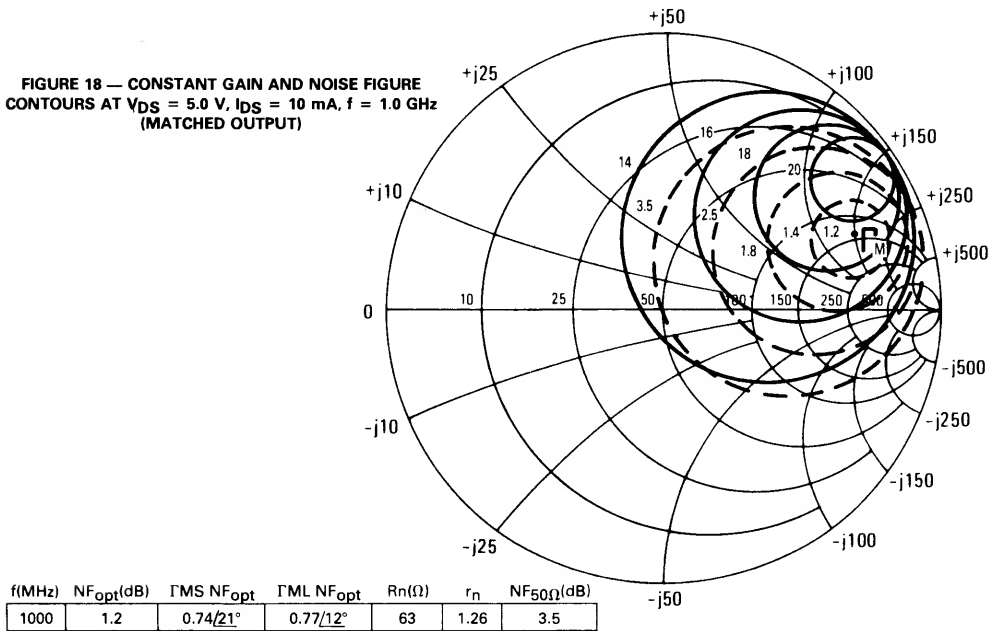


FIGURE 18 — CONSTANT GAIN AND NOISE FIGURE  
CONTOURS AT  $V_{DS} = 5.0\text{ V}$ ,  $I_{DS} = 10\text{ mA}$ ,  $f = 1.0\text{ GHz}$   
(MATCHED OUTPUT)



MRF966 COMMON-SOURCE S-PARAMETERS

| V <sub>DS</sub><br>(Volts) | I <sub>DS</sub><br>(mA) | f<br>(MHz) | S <sub>11</sub> |      | S <sub>21</sub> |     | S <sub>12</sub> |     | S <sub>22</sub> |      |
|----------------------------|-------------------------|------------|-----------------|------|-----------------|-----|-----------------|-----|-----------------|------|
|                            |                         |            | S <sub>11</sub> | ∠φ   | S <sub>21</sub> | ∠φ  | S <sub>12</sub> | ∠φ  | S <sub>22</sub> | ∠φ   |
| 3.0                        | 5.0                     | 200        | 0.99            | −4.0 | 1.10            | 171 | 0.002           | 94  | 0.96            | −3.0 |
|                            |                         | 500        | 0.96            | −12  | 1.07            | 155 | 0.004           | 79  | 0.95            | −8.0 |
|                            |                         | 1000       | 0.92            | −24  | 1.06            | 134 | 0.008           | 71  | 0.93            | −17  |
|                            |                         | 1500       | 0.84            | −38  | 1.00            | 112 | 0.008           | 70  | 0.90            | −26  |
|                            |                         | 2000       | 0.71            | −49  | 0.96            | 90  | 0.006           | 100 | 0.86            | −34  |
|                            | 10                      | 200        | 0.99            | −5.0 | 1.31            | 171 | 0.002           | 82  | 0.95            | −3.0 |
|                            |                         | 500        | 0.96            | −13  | 1.28            | 155 | 0.005           | 78  | 0.94            | −8.0 |
|                            |                         | 1000       | 0.90            | −26  | 1.25            | 134 | 0.008           | 73  | 0.91            | −17  |
|                            |                         | 1500       | 0.81            | −40  | 1.19            | 112 | 0.009           | 72  | 0.88            | −27  |
|                            |                         | 2000       | 0.67            | −51  | 1.08            | 90  | 0.008           | 100 | 0.84            | −35  |
|                            | 15                      | 200        | 0.99            | −5.0 | 1.34            | 170 | 0.002           | 92  | 0.93            | −3.0 |
|                            |                         | 500        | 0.96            | −14  | 1.30            | 155 | 0.005           | 78  | 0.93            | −8.0 |
|                            |                         | 1000       | 0.90            | −27  | 1.29            | 133 | 0.009           | 73  | 0.91            | −17  |
|                            |                         | 1500       | 0.79            | −42  | 1.23            | 111 | 0.009           | 74  | 0.87            | −26  |
|                            |                         | 2000       | 0.65            | −53  | 1.12            | 88  | 0.009           | 98  | 0.83            | −34  |
|                            | 20                      | 200        | 0.99            | −5.0 | 1.24            | 170 | 0.002           | 95  | 0.91            | −3.0 |
|                            |                         | 500        | 0.96            | −15  | 1.21            | 154 | 0.006           | 80  | 0.90            | −8.0 |
|                            |                         | 1000       | 0.89            | −29  | 1.20            | 131 | 0.010           | 74  | 0.88            | −17  |
|                            |                         | 1500       | 0.79            | −45  | 1.17            | 108 | 0.011           | 74  | 0.85            | −26  |
|                            |                         | 2000       | 0.64            | −57  | 1.08            | 84  | 0.012           | 94  | 0.83            | −33  |
| 5.0                        | 5.0                     | 200        | 0.99            | −5.0 | 1.33            | 170 | 0.001           | 84  | 0.97            | −3.0 |
|                            |                         | 500        | 0.98            | −13  | 1.29            | 156 | 0.004           | 70  | 0.97            | −9.0 |
|                            |                         | 1000       | 0.90            | −27  | 1.25            | 132 | 0.006           | 78  | 0.95            | −17  |
|                            |                         | 1500       | 0.81            | −40  | 1.19            | 112 | 0.005           | 73  | 0.91            | −25  |
|                            |                         | 2000       | 0.68            | −51  | 1.00            | 94  | 0.006           | 115 | 0.88            | −35  |
|                            | 10                      | 200        | 0.99            | −5.0 | 1.66            | 170 | 0.001           | 75  | 0.97            | −3.0 |
|                            |                         | 500        | 0.97            | −14  | 1.63            | 156 | 0.004           | 76  | 0.96            | −9.0 |
|                            |                         | 1000       | 0.89            | −28  | 1.56            | 132 | 0.006           | 79  | 0.94            | −17  |
|                            |                         | 1500       | 0.78            | −41  | 1.47            | 112 | 0.005           | 80  | 0.90            | −25  |
|                            |                         | 2000       | 0.65            | −52  | 1.23            | 94  | 0.007           | 121 | 0.87            | −35  |
|                            | 15                      | 200        | 0.99            | −5.0 | 1.84            | 170 | 0.001           | 78  | 0.96            | −3.0 |
|                            |                         | 500        | 0.97            | −14  | 1.80            | 155 | 0.004           | 72  | 0.95            | −8.0 |
|                            |                         | 1000       | 0.89            | −29  | 1.71            | 131 | 0.006           | 79  | 0.94            | −17  |
|                            |                         | 1500       | 0.77            | −42  | 1.61            | 110 | 0.005           | 83  | 0.90            | −25  |
|                            |                         | 2000       | 0.63            | −52  | 1.34            | 93  | 0.007           | 119 | 0.87            | −34  |
|                            | 20                      | 200        | 0.99            | −5.0 | 1.89            | 170 | 0.001           | 71  | 0.96            | −3.0 |
|                            |                         | 500        | 0.97            | −15  | 1.84            | 155 | 0.004           | 78  | 0.95            | −9.0 |
|                            |                         | 1000       | 0.87            | −30  | 1.75            | 130 | 0.006           | 80  | 0.93            | −17  |
|                            |                         | 1500       | 0.75            | −43  | 1.64            | 109 | 0.006           | 84  | 0.90            | −24  |
|                            |                         | 2000       | 0.61            | −54  | 1.37            | 91  | 0.008           | 123 | 0.87            | −34  |

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FIGURE 19 — CONSTANT GAIN AND NOISE FIGURE  
CONTOURS AT  $V_{DS} = 5.0\text{ V}$ ,  $I_{DS} = 10\text{ mA}$ ,  $f = 500\text{ MHz}$   
(MATCHED OUTPUT)

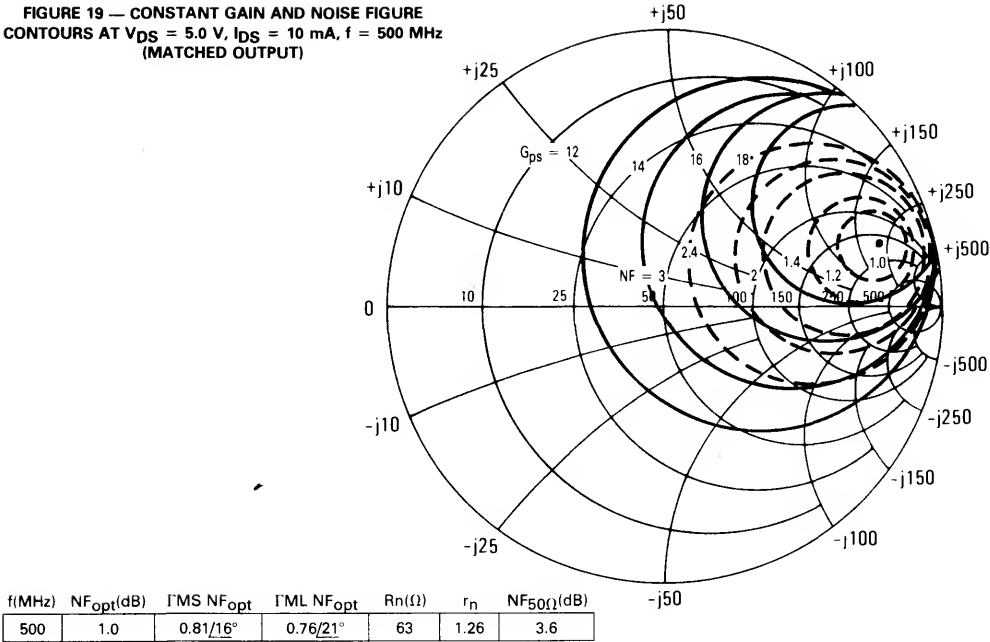
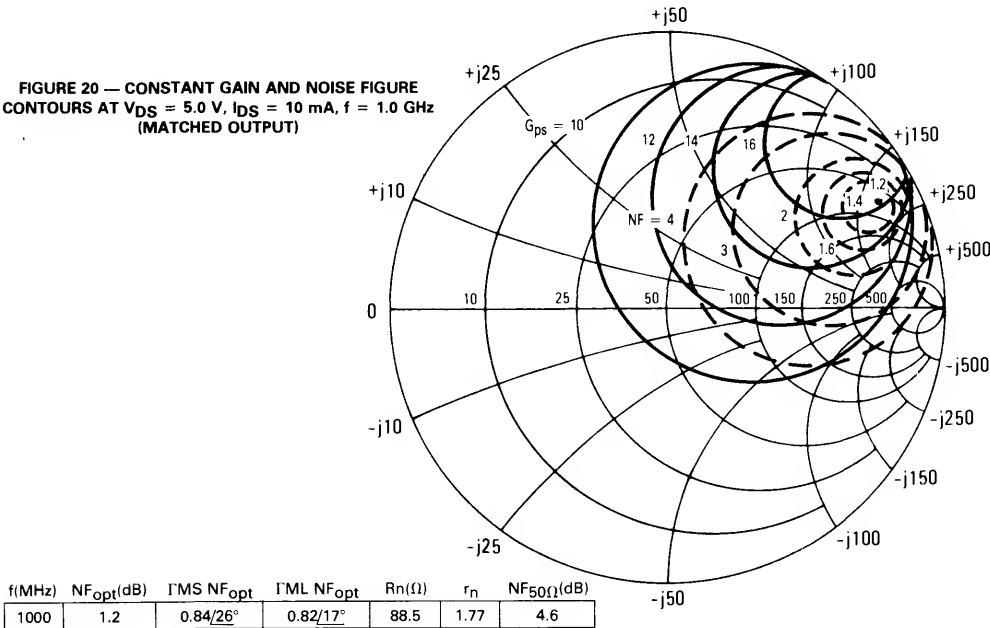


FIGURE 20 — CONSTANT GAIN AND NOISE FIGURE  
CONTOURS AT  $V_{DS} = 5.0\text{ V}$ ,  $I_{DS} = 10\text{ mA}$ ,  $f = 1.0\text{ GHz}$   
(MATCHED OUTPUT)



MRF967 COMMON-SOURCE S-PARAMETERS

| V <sub>DS</sub><br>(Volts) | I <sub>DS</sub><br>(mA) | f<br>(MHz) | S <sub>11</sub> |     | S <sub>21</sub> |     | S <sub>12</sub> |    | S <sub>22</sub> |     |
|----------------------------|-------------------------|------------|-----------------|-----|-----------------|-----|-----------------|----|-----------------|-----|
|                            |                         |            | S <sub>11</sub> | ∠φ  | S <sub>21</sub> | ∠φ  | S <sub>12</sub> | ∠φ | S <sub>22</sub> | ∠φ  |
| 3.0                        | 5.0                     | 200        | 0.99            | −5  | 1.19            | 170 | 0.005           | 77 | 0.96            | −4  |
|                            |                         | 500        | 0.97            | −14 | 1.16            | 155 | 0.016           | 73 | 0.94            | −11 |
|                            |                         | 1000       | 0.92            | −27 | 1.11            | 131 | 0.030           | 65 | 0.93            | −21 |
|                            |                         | 1500       | 0.86            | −40 | 1.03            | 111 | 0.040           | 54 | 0.87            | −31 |
|                            |                         | 2000       | 0.78            | −52 | 0.96            | 91  | 0.048           | 45 | 0.83            | −43 |
|                            | 10                      | 200        | 0.99            | −5  | 1.47            | 170 | 0.006           | 81 | 0.95            | −4  |
|                            |                         | 500        | 0.97            | −15 | 1.43            | 155 | 0.016           | 73 | 0.93            | −11 |
|                            |                         | 1000       | 0.91            | −29 | 1.39            | 131 | 0.031           | 65 | 0.92            | −21 |
|                            |                         | 1500       | 0.84            | −43 | 1.29            | 111 | 0.040           | 54 | 0.86            | −31 |
|                            |                         | 2000       | 0.75            | −56 | 1.19            | 90  | 0.047           | 45 | 0.81            | −44 |
|                            | 15                      | 200        | 1.00            | −6  | 1.50            | 170 | 0.006           | 82 | 0.93            | −4  |
|                            |                         | 500        | 0.97            | −16 | 1.46            | 155 | 0.016           | 74 | 0.91            | −11 |
|                            |                         | 1000       | 0.89            | −31 | 1.42            | 131 | 0.031           | 64 | 0.90            | −21 |
|                            |                         | 1500       | 0.83            | −46 | 1.33            | 110 | 0.040           | 53 | 0.84            | −31 |
|                            |                         | 2000       | 0.73            | −59 | 1.24            | 89  | 0.048           | 45 | 0.79            | −43 |
|                            | 20                      | 200        | 1.00            | −6  | 1.33            | 170 | 0.007           | 78 | 0.90            | −3  |
|                            |                         | 500        | 0.97            | −17 | 1.30            | 154 | 0.017           | 73 | 0.88            | −10 |
|                            |                         | 1000       | 0.89            | −33 | 1.27            | 129 | 0.033           | 64 | 0.88            | −21 |
|                            |                         | 1500       | 0.82            | −49 | 1.21            | 108 | 0.043           | 53 | 0.82            | −30 |
|                            |                         | 2000       | 0.73            | −63 | 1.14            | 86  | 0.050           | 44 | 0.78            | −42 |
| 5.0                        | 5.0                     | 200        | 0.99            | −5  | 1.17            | 170 | 0.006           | 84 | 0.97            | −3  |
|                            |                         | 500        | 0.97            | −14 | 1.16            | 155 | 0.014           | 76 | 0.97            | −9  |
|                            |                         | 1000       | 0.93            | −27 | 1.11            | 131 | 0.027           | 65 | 0.94            | −18 |
|                            |                         | 1500       | 0.87            | −28 | 1.07            | 110 | 0.039           | 57 | 0.93            | −28 |
|                            |                         | 2000       | 0.79            | −53 | 0.97            | 91  | 0.045           | 50 | 0.88            | −37 |
|                            | 10                      | 200        | 0.99            | −5  | 1.47            | 170 | 0.006           | 84 | 0.97            | −3  |
|                            |                         | 500        | 0.97            | −15 | 1.43            | 156 | 0.014           | 76 | 0.96            | −9  |
|                            |                         | 1000       | 0.92            | −29 | 1.35            | 132 | 0.027           | 65 | 0.93            | −18 |
|                            |                         | 1500       | 0.85            | −44 | 1.32            | 111 | 0.038           | 57 | 0.90            | −29 |
|                            |                         | 2000       | 0.77            | −56 | 1.19            | 91  | 0.044           | 49 | 0.86            | −37 |
|                            | 15                      | 200        | 1.00            | −6  | 1.53            | 170 | 0.006           | 85 | 0.96            | −3  |
|                            |                         | 500        | 0.98            | −15 | 1.48            | 156 | 0.014           | 77 | 0.95            | −9  |
|                            |                         | 1000       | 0.91            | −29 | 1.41            | 131 | 0.027           | 64 | 0.93            | −18 |
|                            |                         | 1500       | 0.85            | −46 | 1.37            | 110 | 0.038           | 57 | 0.90            | −28 |
|                            |                         | 2000       | 0.75            | −58 | 1.24            | 90  | 0.043           | 49 | 0.86            | −36 |
|                            | 20                      | 200        | 1.00            | −6  | 1.32            | 170 | 0.006           | 85 | 0.95            | −3  |
|                            |                         | 500        | 0.98            | −16 | 1.29            | 155 | 0.015           | 76 | 0.95            | −8  |
|                            |                         | 1000       | 0.91            | −32 | 1.23            | 129 | 0.027           | 64 | 0.92            | −17 |
|                            |                         | 1500       | 0.88            | −49 | 1.21            | 107 | 0.038           | 55 | 0.90            | −27 |
|                            |                         | 2000       | 0.75            | −62 | 1.11            | 87  | 0.043           | 48 | 0.86            | −36 |

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