# The RF Line
# NPN Silicon High-Frequency Transistors

. . . designed for low noise, wide dynamic range front–end amplifiers and low–noise VCO's. Available in a surface–mountable plastic package, as well as the popular TO–226AA (TO–92) package. This Motorola series of small–signal plastic transistors offers superior quality and performance at low cost.

- High Gain–Bandwidth Product
  $f_T$ = 8.0 GHz (Typ) @ 50 mA
- Low Noise Figure
  NF = 2.0 dB (Typ) @ f = 500 MHz (MMBR571LT1, T3)
  $NF_{(matched)}$ = 1.6 dB (Typ) @ f = 1.0 GHz (MRF5711LT1, MRF571)
- High Gain
  $G_{NF}$ = 17 dB (Typ) @ 30 mA/500 MHz (MMBR571LT1, T3)
- High Power Gain
  $G_{pe}$ (matched) = 13.5 dB (Typ) (MRF5711LT1)
- State–of–the–Art Technology
  Fine Line Geometry
  Ion–Implanted Arsenic Emitters
  Gold Top Metallization and Wires
  Silicon Nitride Passivation
- Available in tape and reel packaging options:
  T1 suffix = 3,000 units per reel
  T3 suffix = 10,000 units per reel

## MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector–Emitter Voltage | $V_{CEO}$ | 10 | Vdc |
| Collector–Base Voltage | $V_{CBO}$ | 20 | Vdc |
| Emitter–Base Voltage MPS571, MMBR571LT1<br>MRF5711LT1, MRF571 | $V_{EBO}$ | 3.0<br>2.5 | Vdc |
| Collector Current — Continuous MPS571, MMBR571LT1<br>MRF5711LT1 | $I_C$ | 80<br>70 | mA |
| Power Dissipation @ $T_A$ = 25°C MPS571 | $P_D$ | 625 | mW |
| Power Dissipation @ $T_{case}$ = 75°C<br>MMBR571LT1, MRF5711LT1<br>Derate linearly above $T_{case}$ = 75°C @<br>MMBR571LT1, MRF5711LT1, T3 | $P_{D(max)}$ | 0.333<br><br>4.44 | W<br><br>mW/°C |
| Total Device Dissipation @ $T_A$ = 25°C<br>Derate above 25°C MRF5711LT1 | $P_D$ | 0.58<br>4.64 | Watts<br>mW/°C |
| Total Device Dissipation (1) @ $T_C$ = 75°C<br>Derate above 75°C MRF5711LT1 | $P_D$ | 0.58<br>7.73 | Watts<br>mW/°C |
| Total Device Dissipation @ $T_C$ = 50°C (1) MRF571<br>Derate above 50°C | $P_D$ | 1.0<br>10 | Watts<br>mW/°C |
| Storage Temperature MPS571, MMBR571LT1<br>MRF5711LT1, MRF571 | $T_{stg}$ | −55 to +150<br>−65 to +150 | °C |
| Maximum Junction Temperature | $T_{Jmax}$ | 150 | °C |

## THERMAL CHARACTERISTICS

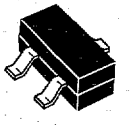
| Rating | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Ambient MRF5711LT1 | $R_{\theta JA}$ | 216 | °C/W |
| Thermal Resistance, Junction to Case<br>MRF5711LT1, MMBR571LT1, T3 | $R_{\theta JC}$ | 225 | °C/W |

## DEVICE MARKING

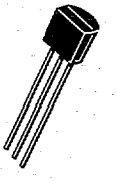
MMBR571LT1, T3 = 7X MRF5711LT1 = 02

# MMBR571LT1, T3
# MPS571 MRF571
# MRF5711LT1

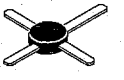
**$I_C$ = 80 mA**
**LOW NOISE**
**HIGH–FREQUENCY**
**TRANSISTORS**



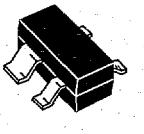
**CASE 318–07, STYLE 6**
**SOT–23**
**LOW PROFILE**
**MMBR571LT1**



**CASE 29–04, STYLE 2**
**TO–226AA**
**(TO–92)**
**MPS571**



**CASE 317–01, STYLE 2**
**MACRO–X**
**MRF571**



**CASE 318A–05, STYLE 1**
**SOT–143**
**LOW PROFILE**
**MRF5711LT1**

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

| Characteristic | | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Collector–Emitter Breakdown Voltage ($I_C$ = 1.0 mA, $I_B$ = 0) | | | $V_{(BR)CEO}$ | 10 | 12 | — | Vdc |
| Collector–Base Breakdown Voltage ($I_C$ = 0.1 mA, $I_E$ = 0) | | | $V_{(BR)CBO}$ | 20 | — | — | Vdc |
| Emitter–Base Breakdown Voltage ($I_E$ = 50 μAdc, $I_C$ = 0) | | | $V_{(BR)EBO}$ | 2.5 | — | — | Vdc |
| Collector Cutoff Current ($V_{CB}$ = 8.0 Vdc, $I_E$ = 0) | | | $I_{CBO}$ | — | — | 10 | μAdc |
| **ON CHARACTERISTICS** | | | | | | | |
| DC Current Gain ($I_C$ = 30 mAdc, $V_{CE}$ = 5.0 Vdc) | | | $h_{FE}$ | 50 | — | 300 | — |
| **DYNAMIC CHARACTERISTICS** | | | | | | | |
| Collector–Base Capacitance | | | $C_{cb}$ | | | | pF |
| ($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 1.0 MHz) | MPS571, MMBR571LT1, T3 | | | — | 0.7 | 1.0 | |
| ($V_{CB}$ = 6.0 Vdc, $I_E$ = 0, f = 1.0 MHz) | MRF5711LT1, MRF571 | | | — | 0.75 | 1.0 | |
| Current Gain–Bandwidth Product | MPS571 | | $f_T$ | — | 6.0 | — | GHz |
| ($V_{CE}$ = 5.0 Vdc, $I_C$ = 50 mAdc, f = 1.0 GHz) | MMBR571LT1 | | | — | 8.0 | — | |
| ($V_{CE}$ = 8.0 Vdc, $I_C$ = 50 mAdc, f = 1.0 GHz) | MRF5711LT1, MRF571 | | | — | 8.0 | — | |
| **FUNCTIONAL TESTS** | | | | | | | |
| Gain @ Noise Figure | MRF571 | f = 0.5 GHz | $G_{NF}$ | — | 16.5 | — | dB |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 6.0 Vdc) | MRF571 | f = 1.0 GHz | | 10 | 12 | — | |
| Noise Figure | MRF571 | f = 0.5 GHz | NF | | 1.0 | — | dB |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 6.0 Vdc) | MRF571 | f = 1.0 GHz | | — | 1.5 | 2.0 | |
| | | f = 2.0 GHz | | — | 2.8 | — | |
| Gain @ Noise Figure | | | $G_{NF}$ | | | | dB |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 5.0 Vdc) | MPS571 | f = 0.5 GHz | | — | 14 | — | |
| | | f = 1.0 GHz | | — | 9.0 | — | |
| | MMBR571LT1, T3 | f = 0.5 GHz | | — | 16.5 | — | |
| | | f = 1.0 GHz | | — | 10.5 | — | |
| ($I_C$ = 10 mA, $V_{CE}$ = 6.0 Vdc) | MRF5711LT1 | f = 1.0 GHz | | — | 13.5 | — | |
| Noise Figure | | | NF | | | | dB |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 5.0 Vdc) | MPS571 | f = 0.5 GHz | | — | 2.0 | — | |
| | | f = 1.0 GHz | | — | 2.6 | — | |
| | MMBR571LT1, T3 | f = 0.5 GHz | | — | 2.0 | — | |
| | | f = 1.0 GHz | | — | 2.6 | — | |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 6.0 Vdc) | MRF5711LT1 | f = 1.0 GHz | | — | 2.2 | — | |
| Noise Figure | | | $NF_{min}$ | — | 1.6 | — | dB |
| ($V_{CE}$ = 6.0 V, $I_C$ = 10 mA, f = 1.0 GHz) | MRF5711LT1 | | | | | | |
| Power Gain in 50 Ω System ($V_{CE}$ = 6.0 V, $I_C$ = 10 mA, f = 1.0 GHz) | | | $\|S_{21}\|^2$ | 9.0 | 10 | — | dB |



## TYPICAL CHARACTERISTICS
## MPS571, MMBR571LT1, T3

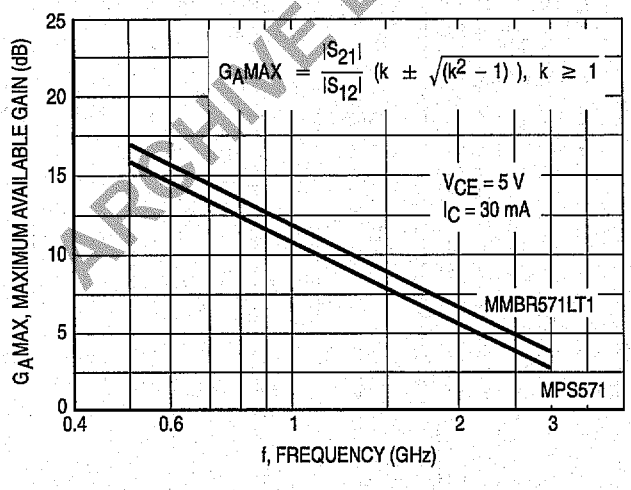



**Figure 1. Maximum Available Gain versus Frequency**

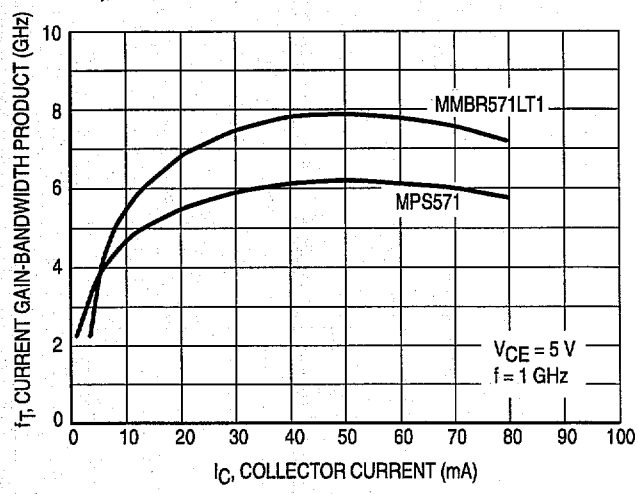



**Figure 2. Current Gain–Bandwidth versus Collector Current @ 1.0 GHz**

## TYPICAL CHARACTERISTICS
## MPS571, MMBR571LT1, T3

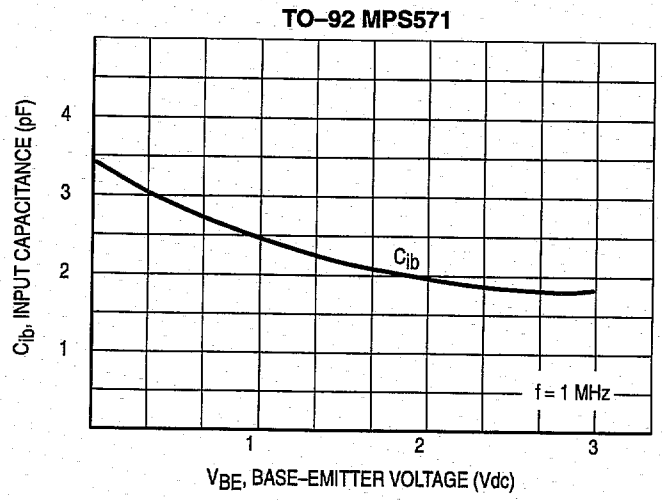



**Figure 3. Input Capacitance versus Emitter Base Voltage**

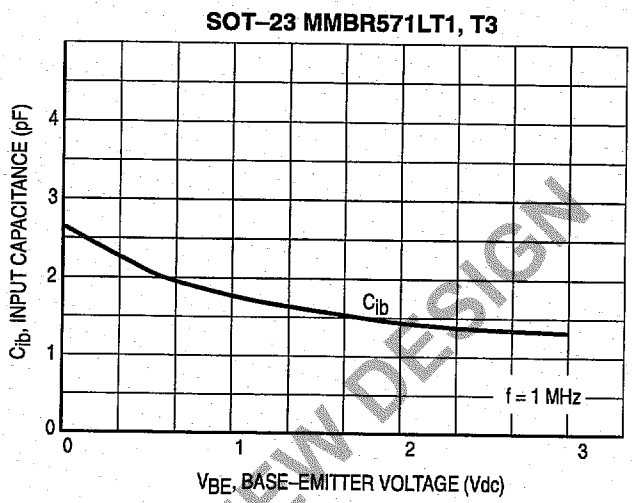



**Figure 4. Input Capacitance versus Emitter Base Voltage**

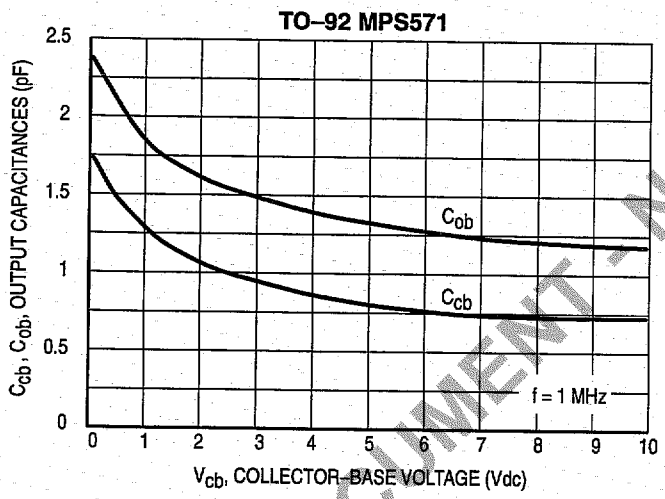



**Figure 5. Output Capacitances versus Collector–Base Voltage**

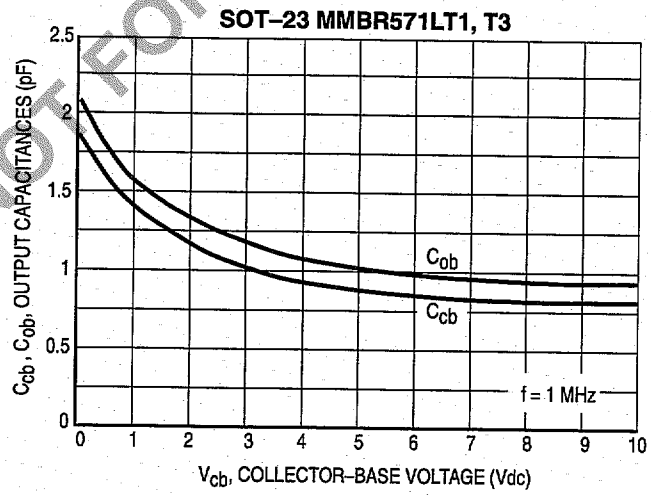



**Figure 6. Output Capacitances versus Collector–Base Voltage**

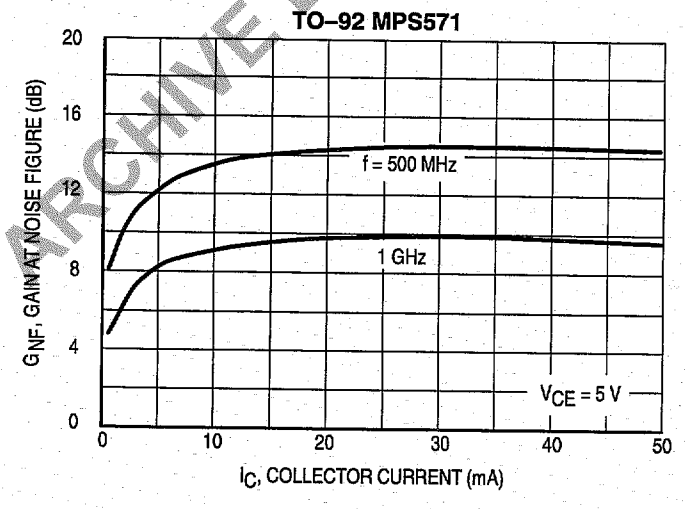



**Figure 7. Gain at Noise Figure versus Collector Current**

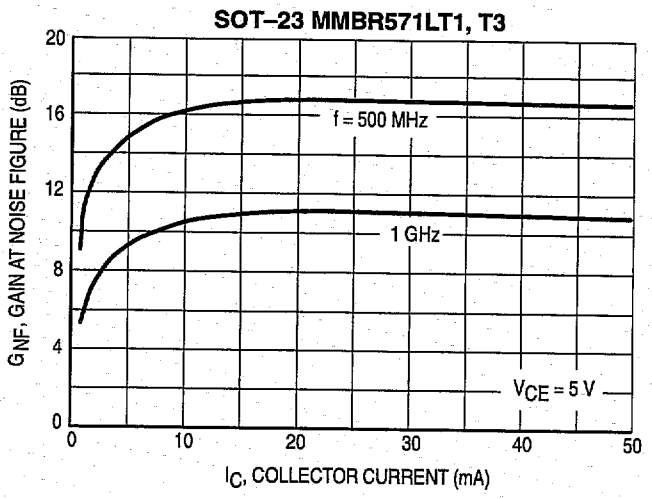



**Figure 8. Gain at Noise Figure versus Collector Current**

## TYPICAL CHARACTERISTICS
## MPS571, MMBR571LT1, T3

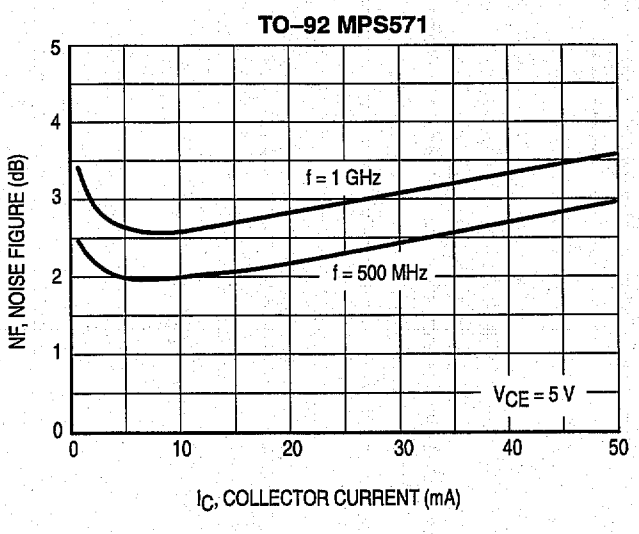



**Figure 9. Noise Figure versus Collector Current**

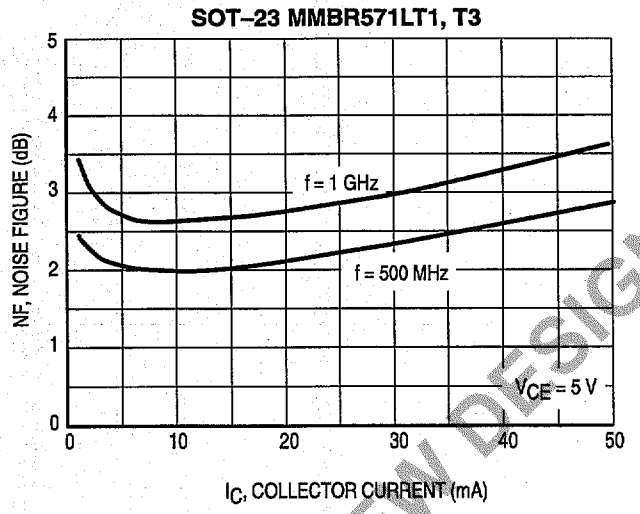



**Figure 10. Noise Figure versus Collector Current**

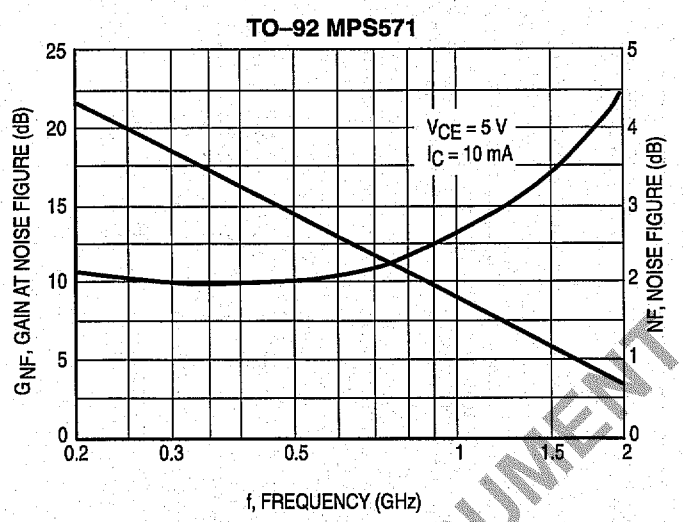



**Figure 11. Gain at Noise Figure and Noise Figure versus Frequency**

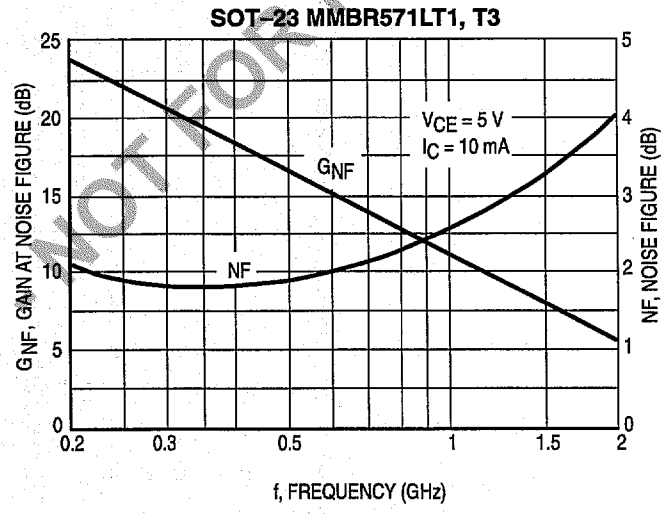



**Figure 12. Gain at Noise Figure and Noise Figure versus Frequency**

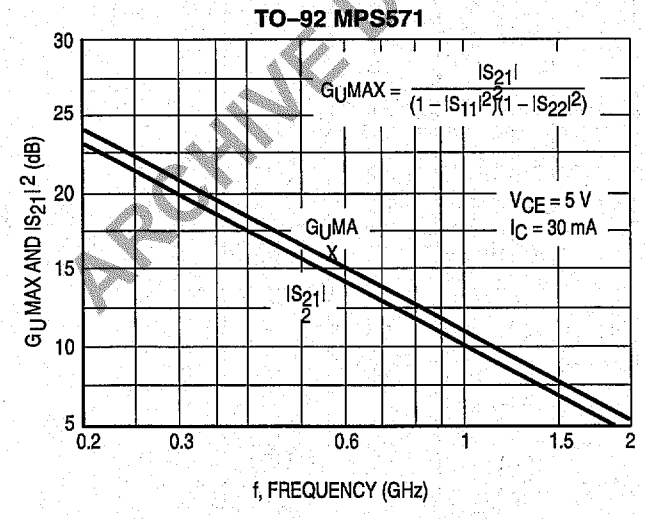



**Figure 13. Maximum Unilateral Gain and Insertion Gain versus Frequency**

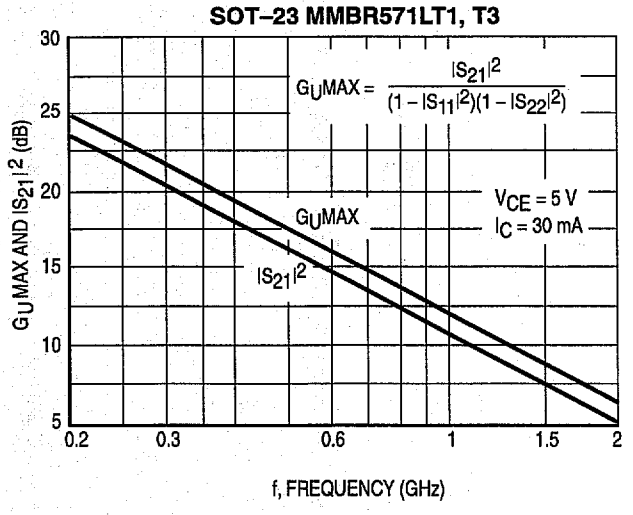



**Figure 14. Maximum Unilateral Gain and Insertion Gain versus Frequency**

## TYPICAL CHARACTERISTICS
## MRF5711LT1

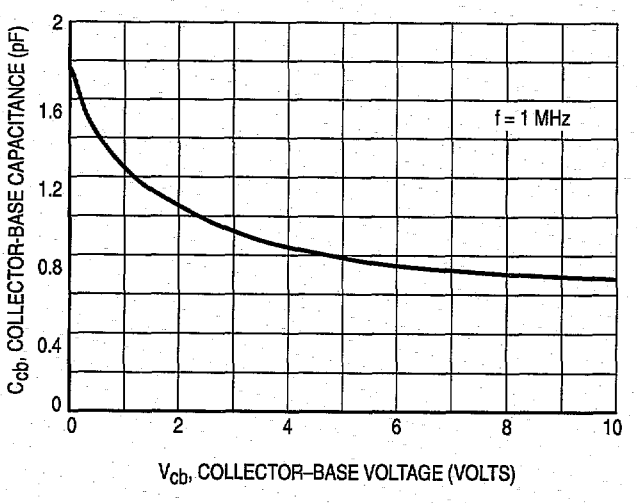



**Figure 15. Collector–Base Capacitance versus Collector–Base Voltage**

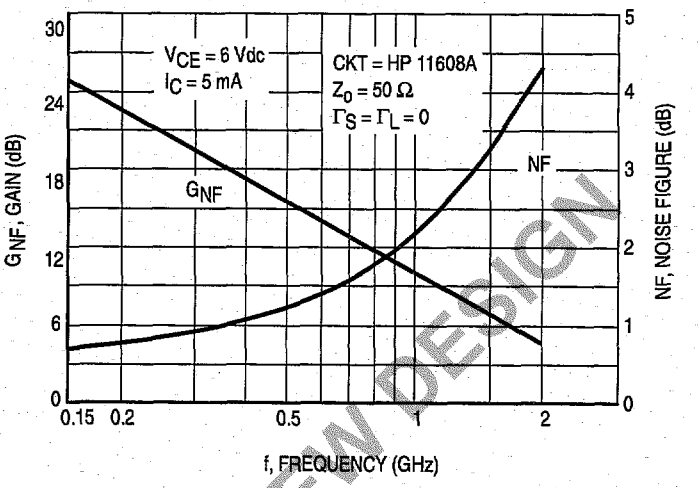



**Figure 16. Gain and Noise Figure versus Frequency**

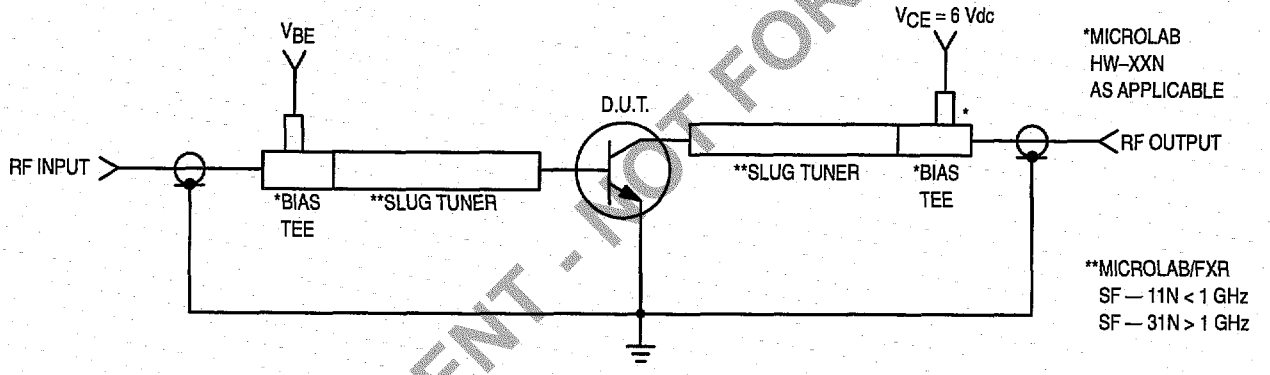



**Figure 17. Functional Circuit Schematic**

## TYPICAL CHARACTERISTICS
## MRF5711LT1

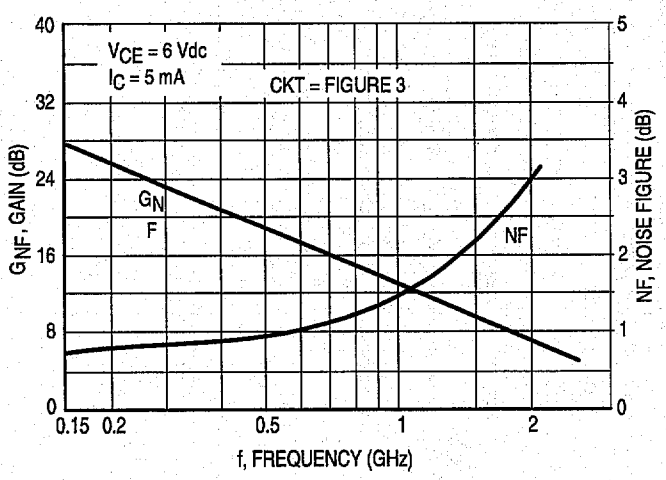



**Figure 18. Gain and Noise Figure versus Frequency**

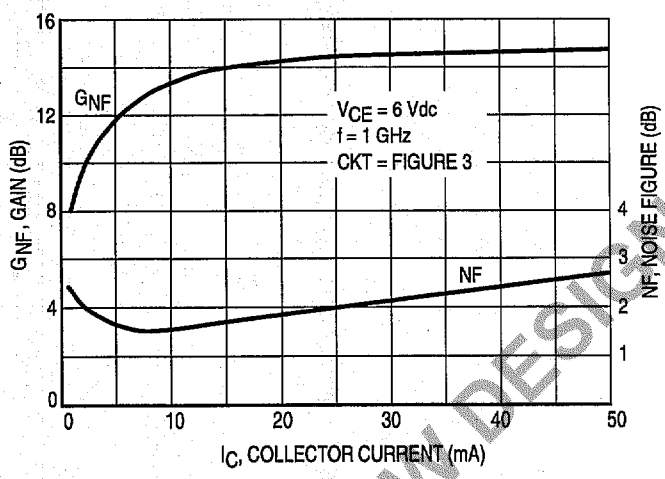



**Figure 19. Gain and Noise Figure versus Collector Current**

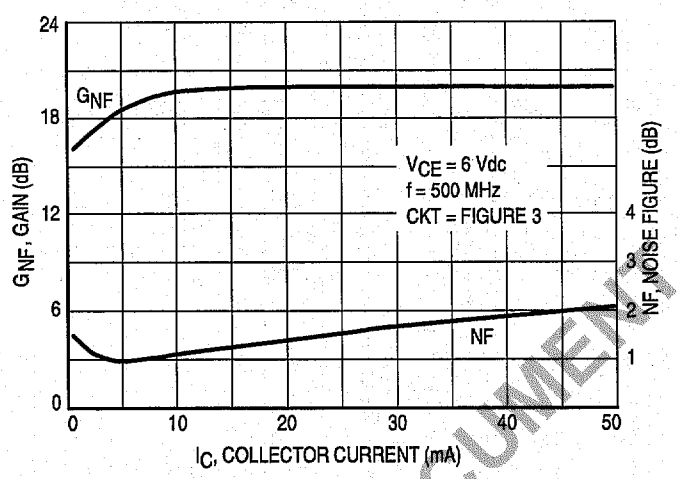



**Figure 20. Gain and Noise Figure versus Collector Current**

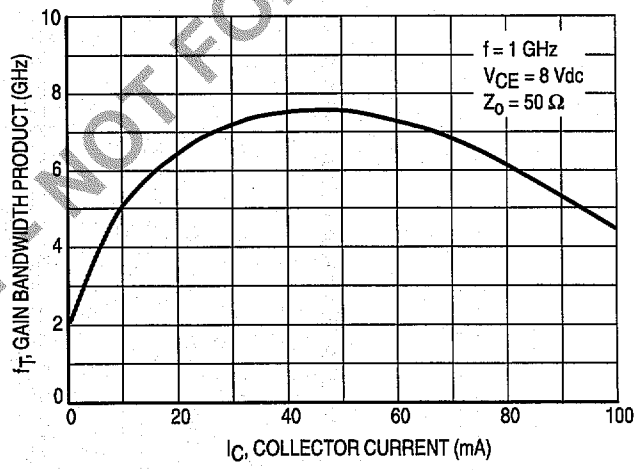



**Figure 21. Gain Bandwidth Product versus Collector Current**

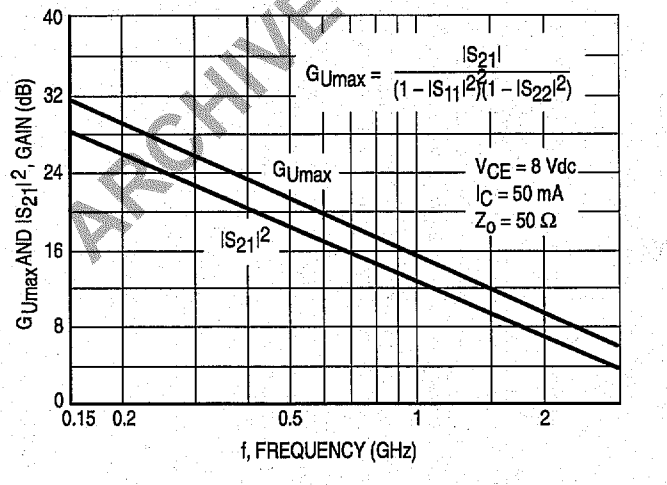



**Figure 22. $G_{Umax}$ and $|S_{21}|^2$ versus Frequency**

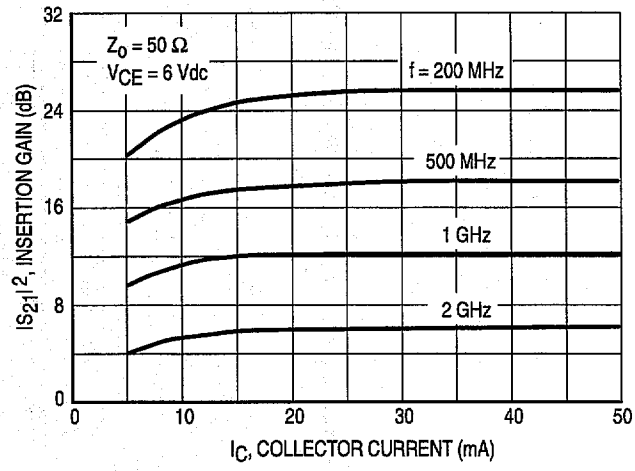



**Figure 23. Insertion Gain versus Collector Current**

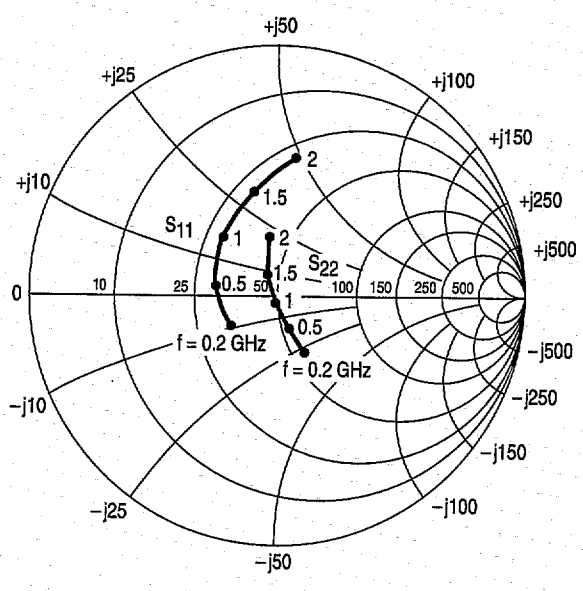



**Figure 24. Input/Output Reflection Coefficients versus Frequency**
**$V_{CE}$ = 5.0 V, $I_C$ = 30 mA**

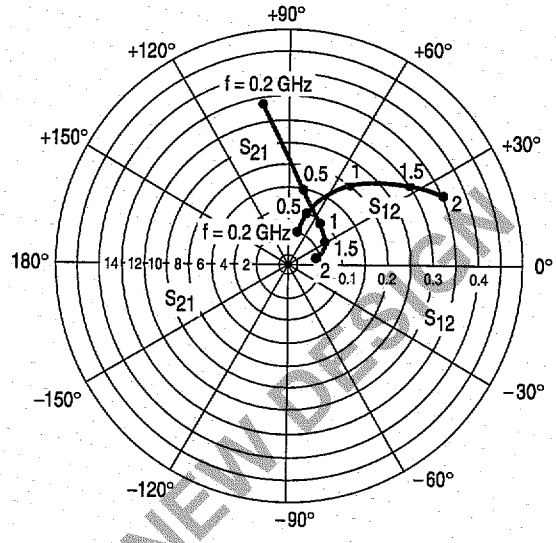



**Figure 25. Forward/Reverse Transmission Coefficients versus Frequency**
**$V_{CE}$ = 5.0 V, $I_C$ = 30 mA**

| $V_{CE}$ (Volts) | $I_C$ (mA) | f (MHz) | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $\|S_{11}\|$ | ∠ϕ | $\|S_{21}\|$ | ∠ϕ | $\|S_{12}\|$ | ∠ϕ | $\|S_{22}\|$ | ∠ϕ |
| 5.0 | 5.0 | 200 | 0.62 | −80 | 8.22 | 122 | 0.07 | 56 | 0.63 | −44 |
| | | 500 | 0.40 | −148 | 4.52 | 87 | 0.11 | 50 | 0.36 | −58 |
| | | 1000 | 0.39 | 155 | 2.51 | 54 | 0.16 | 48 | 0.23 | −78 |
| | | 1500 | 0.46 | 122 | 1.86 | 32 | 0.23 | 42 | 0.15 | −114 |
| | | 2000 | 0.59 | 100 | 1.50 | 14 | 0.31 | 33 | 0.14 | 173 |
| | 15 | 200 | 0.33 | −121 | 12.88 | 105 | 0.05 | 67 | 0.37 | −59 |
| | | 500 | 0.28 | −175 | 5.62 | 79 | 0.10 | 65 | 0.18 | −67 |
| | | 1000 | 0.32 | 143 | 2.99 | 53 | 0.19 | 55 | 0.08 | −94 |
| | | 1500 | 0.40 | 117 | 2.14 | 32 | 0.27 | 42 | 0.07 | 171 |
| | | 2000 | 0.55 | 95 | 1.74 | 17 | 0.35 | 30 | 0.198 | 117 |
| | 30 | 200 | 0.23 | −143 | 13.65 | 99 | 0.05 | 75 | 0.26 | −62 |
| | | 500 | 0.23 | 169 | 5.75 | 76 | 0.11 | 70 | 0.13 | −68 |
| | | 1000 | 0.30 | 130 | 3.05 | 50 | 0.21 | 55 | 0.04 | −136 |
| | | 1500 | 0.41 | 106 | 2.11 | 28 | 0.29 | 38 | 0.12 | 130 |
| | | 2000 | 0.56 | 85 | 1.70 | 11 | 0.36 | 23 | 0.26 | 102 |
| | 50 | 200 | 0.21 | −158 | 13.96 | 96 | 0.05 | 79 | 0.21 | −61 |
| | | 500 | 0.23 | 162 | 5.82 | 75 | 0.11 | 72 | 0.11 | −66 |
| | | 1000 | 0.30 | 128 | 3.09 | 49 | 0.21 | 56 | 0.03 | −149 |
| | | 1500 | 0.41 | 105 | 2.11 | 28 | 0.29 | 39 | 0.12 | 127 |
| | | 2000 | 0.56 | 84 | 1.70 | 11 | 0.36 | 23 | 0.27 | 100 |

**Table 1. MPS571 Common Emitter S–Parameters**

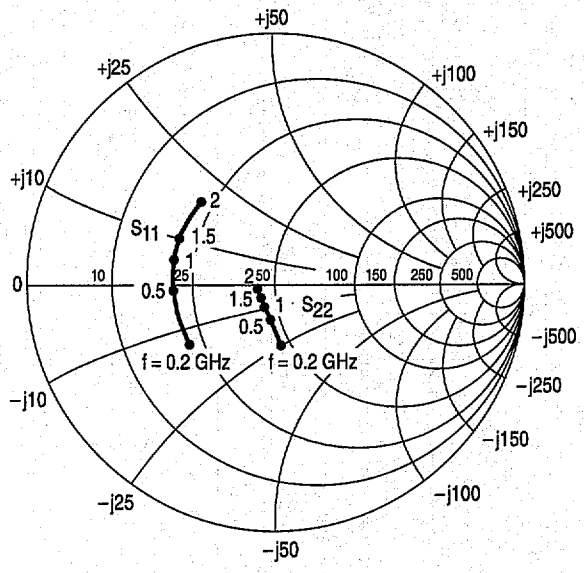



**Figure 26. Input/Output Reflection Coefficients versus Frequency**
**$V_{CE}$ = 5.0 V, $I_C$ = 30 mA**

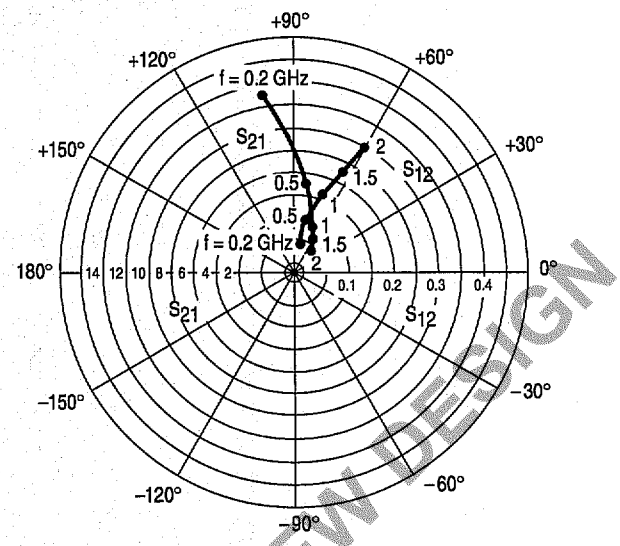
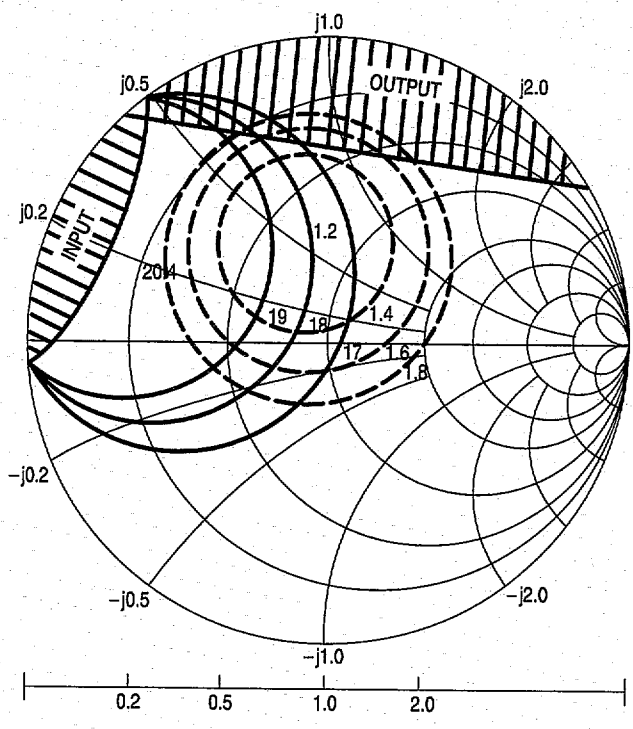



**Figure 27. Forward/Reverse Transmission Coefficients versus Frequency**
**$V_{CE}$ = 5.0 V, $I_C$ = 30 mA**

| $V_{CE}$ (Volts) | $I_C$ (mA) | f (MHz) | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $\|S_{11}\|$ | $\angle\phi$ | $\|S_{21}\|$ | $\angle\phi$ | $\|S_{12}\|$ | $\angle\phi$ | $\|S_{22}\|$ | $\angle\phi$ |
| 5.0 | 5.0 | 200 | 0.68 | −82 | 8.41 | 126 | 0.07 | 53 | 0.61 | −45 |
| | | 500 | 0.52 | −142 | 4.62 | 93 | 0.10 | 46 | 0.35 | −60 |
| | | 1000 | 0.50 | 179 | 2.57 | 72 | 0.14 | 53 | 0.26 | −71 |
| | | 1500 | 0.51 | 161 | 1.82 | 57 | 0.19 | 58 | 0.24 | −77 |
| | | 2000 | 0.52 | 143 | 1.48 | 45 | 0.24 | 59 | 0.22 | −86 |
| | 15 | 200 | 0.46 | −125 | 13.65 | 108 | 0.05 | 60 | 0.35 | −73 |
| | | 500 | 0.43 | −169 | 6.03 | 86 | 0.09 | 66 | 0.17 | −94 |
| | | 1000 | 0.44 | 168 | 3.20 | 72 | 0.16 | 67 | 0.14 | −111 |
| | | 1500 | 0.45 | 152 | 2.21 | 58 | 0.22 | 64 | 0.11 | −118 |
| | | 2000 | 0.46 | 137 | 1.80 | 48 | 0.29 | 59 | 0.10 | −131 |
| | 30 | 200 | 0.42 | −148 | 14.79 | 102 | 0.04 | 68 | 0.26 | −87 |
| | | 500 | 0.41 | −177 | 6.31 | 84 | 0.09 | 72 | 0.14 | −115 |
| | | 1000 | 0.42 | 165 | 3.35 | 71 | 0.16 | 70 | 0.12 | −135 |
| | | 1500 | 0.44 | 151 | 2.29 | 59 | 0.23 | 65 | 0.11 | −144 |
| | | 2000 | 0.44 | 135 | 1.84 | 48 | 0.30 | 60 | 0.10 | −157 |
| | 50 | 200 | 0.41 | −159 | 15.14 | 98 | 0.04 | 73 | 0.21 | −96 |
| | | 500 | 0.42 | 179 | 6.38 | 83 | 0.09 | 75 | 0.13 | −124 |
| | | 1000 | 0.43 | 163 | 3.35 | 70 | 0.16 | 71 | 0.12 | −143 |
| | | 1500 | 0.44 | 148 | 2.32 | 58 | 0.23 | 66 | 0.10 | −151 |
| | | 2000 | 0.45 | 134 | 1.84 | 48 | 0.30 | 60 | 0.09 | −163 |

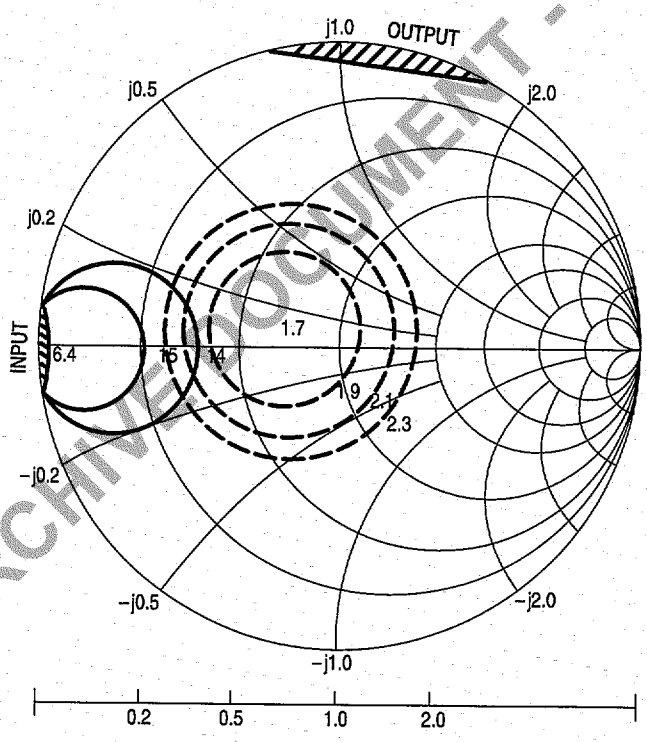
**Table 2. MMBR571LT1 Common Emitter S–Parameters**




$V_{CE}$ = 5 V
$I_C$ = 10 mA
▨ = Area of Instability

| f (GHz) | NF OPT | ΓMS NF OPT | Rn | K |
|---|---|---|---|---|
| 0.5 | 1.20 dB | 0.36 ∠ 104° | 7 | 0.63 |

**Figure 28. MRF5711LT1 Constant Gain and Noise Figure Contours (f = 0.5 GHz)**




$V_{CE}$ = 5 V
$I_C$ = 10 mA
▨ = Area of Instability

| f (GHz) | NF OPT | ΓMS NF OPT | Rn | K |
|---|---|---|---|---|
| 1.0 | 1.70 dB | 0.20 ∠ 162° | 8 | 0.94 |

**Figure 29. MRF5711LT1 Constant Gain and noise Figure Contours (f = 1.0 GHz)**

| $V_{CE}$ (Vdc) | $I_C$ (mA) | f (MHz) | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $\|S_{11}\|$ | $\angle\phi$ | $\|S_{21}\|$ | $\angle\phi$ | $\|S_{12}\|$ | $\angle\phi$ | $\|S_{22}\|$ | $\angle\phi$ |
| 6.0 | 5.0 | 200 | 0.79 | −90 | 10.9 | 128 | 0.06 | 46 | 0.70 | −45 |
| | | 500 | 0.72 | −144 | 5.7 | 96 | 0.08 | 28 | 0.42 | −66 |
| | | 1000 | 0.69 | −177 | 3.0 | 75 | 0.09 | 28 | 0.31 | −77 |
| | | 1500 | 0.66 | 164 | 2.0 | 59 | 0.10 | 32 | 0.34 | −89 |
| | | 2000 | 0.65 | 147 | 1.6 | 47 | 0.12 | 38 | 0.32 | −94 |
| | 10 | 200 | 0.72 | −115 | 15.2 | 118 | 0.05 | 41 | 0.55 | −66 |
| | | 500 | 0.69 | −160 | 6.9 | 92 | 0.06 | 34 | 0.30 | −92 |
| | | 1000 | 0.67 | 174 | 3.6 | 74 | 0.08 | 42 | 0.21 | −108 |
| | | 1500 | 0.64 | 159 | 2.4 | 60 | 0.10 | 46 | 0.23 | −114 |
| | | 2000 | 0.64 | 143 | 1.8 | 49 | 0.12 | 50 | 0.20 | −116 |
| | 50 | 200 | 0.67 | −159 | 20 | 102 | 0.02 | 48 | 0.33 | −111 |
| | | 500 | 0.67 | 179 | 8.2 | 85 | 0.04 | 58 | 0.33 | −142 |
| | | 1000 | 0.66 | 174 | 3.8 | 72 | 0.07 | 65 | 0.21 | −158 |
| | | 1500 | 0.63 | 151 | 2.7 | 61 | 0.10 | 64 | 0.22 | −158 |
| | | 2000 | 0.58 | 138 | 2.1 | 51 | 0.14 | 62 | 0.17 | −165 |
| 8.0 | 5.0 | 200 | 0.80 | −87 | 11.1 | 130 | 0.06 | 47 | 0.71 | −42 |
| | | 500 | 0.72 | −141 | 5.9 | 97 | 0.08 | 30 | 0.44 | −60 |
| | | 1000 | 0.70 | −177 | 3.1 | 75 | 0.09 | 28 | 0.33 | −68 |
| | | 1500 | 0.66 | 166 | 2.1 | 60 | 0.10 | 32 | 0.35 | −80 |
| | | 2000 | 0.61 | 149 | 1.6 | 47 | 0.12 | 39 | 0.35 | −85 |
| | 10 | 200 | 0.72 | −113 | 15.6 | 119 | 0.05 | 42 | 0.56 | −61 |
| | | 500 | 0.68 | −159 | 7.2 | 92 | 0.06 | 34 | 0.31 | −82 |
| | | 1000 | 0.66 | 175 | 3.7 | 74 | 0.08 | 41 | 0.21 | −92 |
| | | 1500 | 0.64 | 160 | 2.5 | 61 | 0.09 | 47 | 0.23 | −101 |
| | | 2000 | 0.60 | 144 | 2.0 | 49 | 0.13 | 50 | 0.21 | −103 |
| | 50 | 200 | 0.66 | −156 | 20.9 | 103 | 0.02 | 48 | 0.31 | −101 |
| | | 500 | 0.65 | −179 | 8.6 | 85 | 0.04 | 58 | 0.19 | −128 |
| | | 1000 | 0.64 | 164 | 4.3 | 72 | 0.07 | 65 | 0.16 | −144 |
| | | 1500 | 0.61 | 153 | 2.9 | 61 | 0.10 | 65 | 0.17 | −142 |
| | | 2000 | 0.58 | 137 | 2.3 | 51 | 0.13 | 64 | 0.14 | −145 |

**Table 3. MRF5711LT1, T3 Common Emitter S–Parameters**

## TYPICAL CHARACTERISTICS
## MRF571

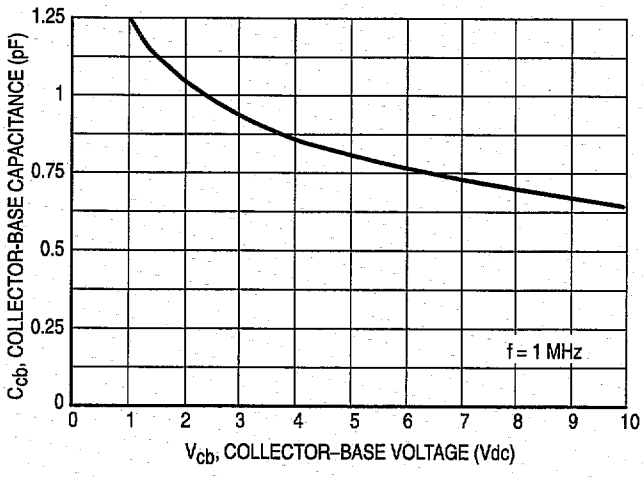



**Figure 30. $C_{cb}$, Collector–Base Capacitance versus Voltage**

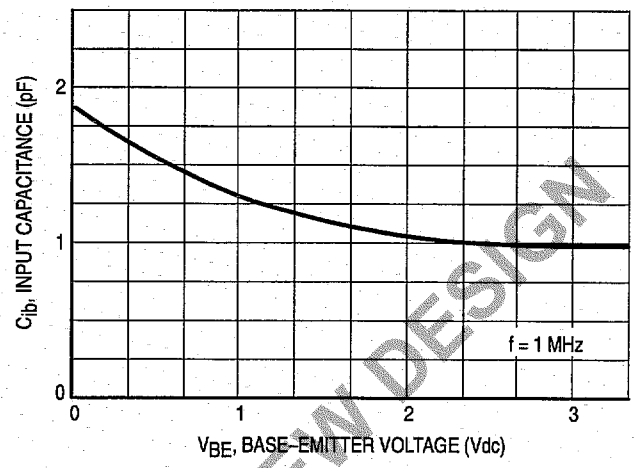



**Figure 31. $C_{ib}$, Input Capacitance versus Emitter Base Voltage**

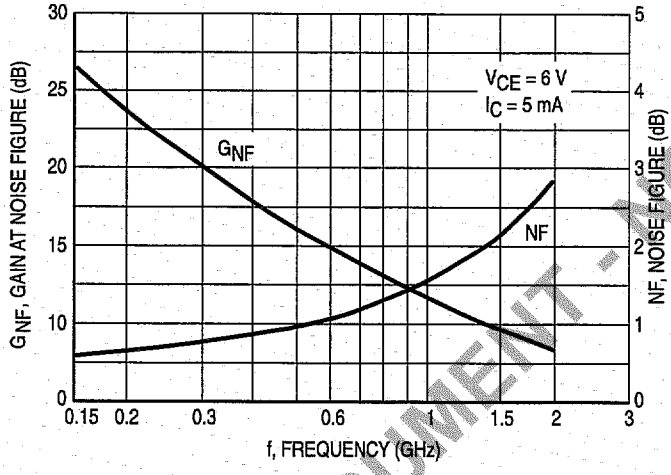



**Figure 32. Gain at Noise Figure and Noise Figure versus Frequency**

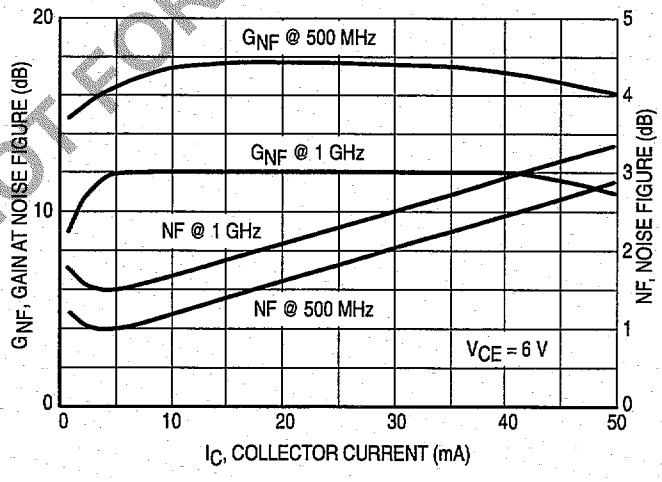



**Figure 33. Gain at Noise Figure and Noise Figure versus Collector Current**

## TYPICAL CHARACTERISTICS
## MRF571

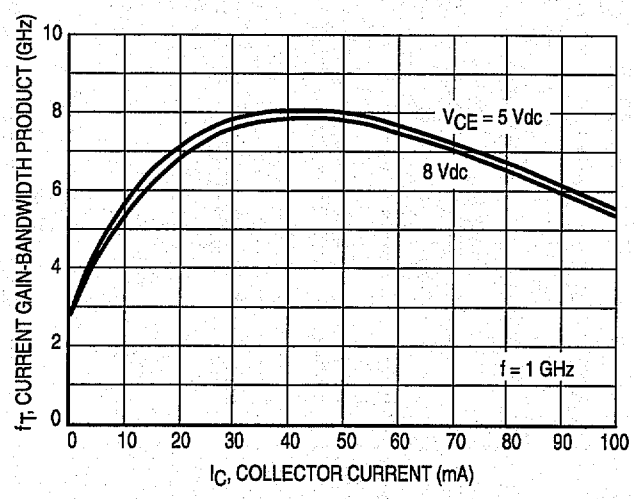



**Figure 34. $f_T$, Current Gain–Bandwidth Product versus Collector Current**

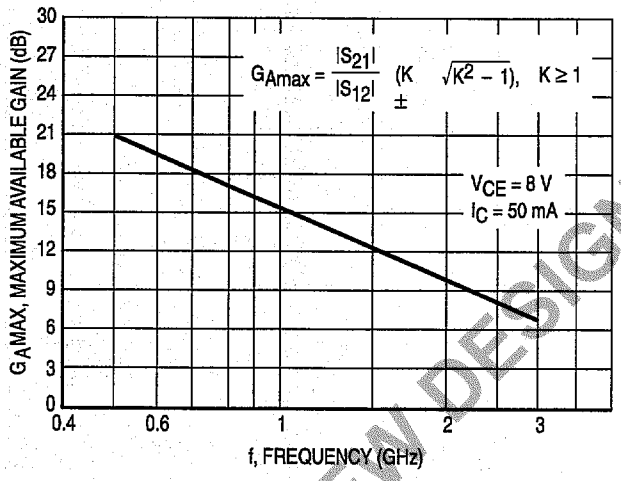



**Figure 35. $G_{Amax}$, Maximum Available Gain versus Frequency**

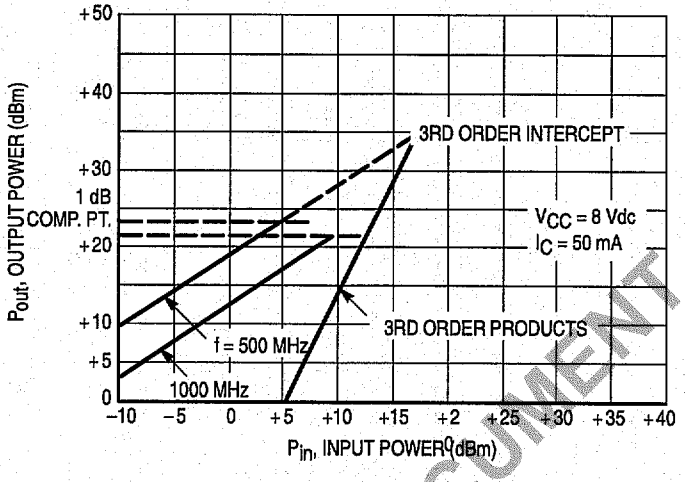



**Figure 36. 1.0 dB Compression Point and Third Order Intercept**

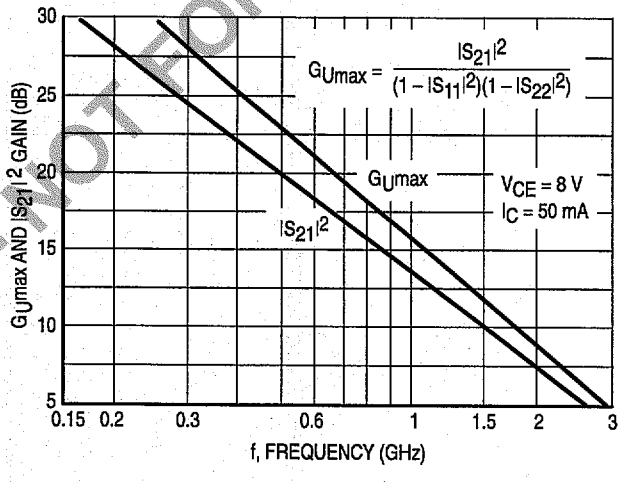



**Figure 37. $G_{U}max$ and $|S_{21}|^2$ versus Frequency**

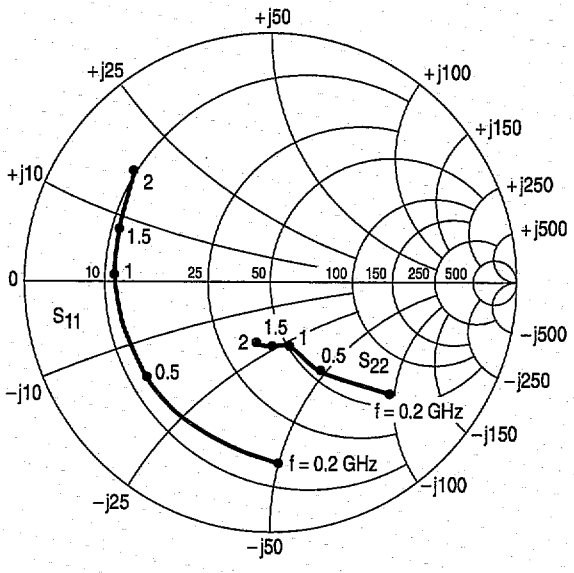



**Figure 38. Input/Output Reflection Coefficients versus Frequency (GHz)**
**$V_{CE}$ = 6.0 V, $I_C$ = 5.0 mA**

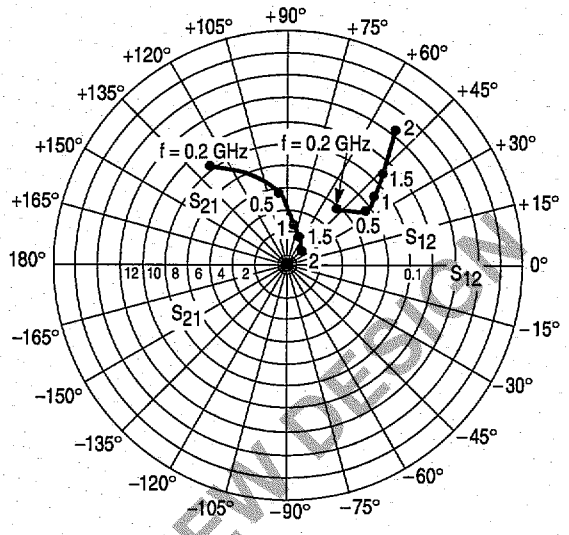
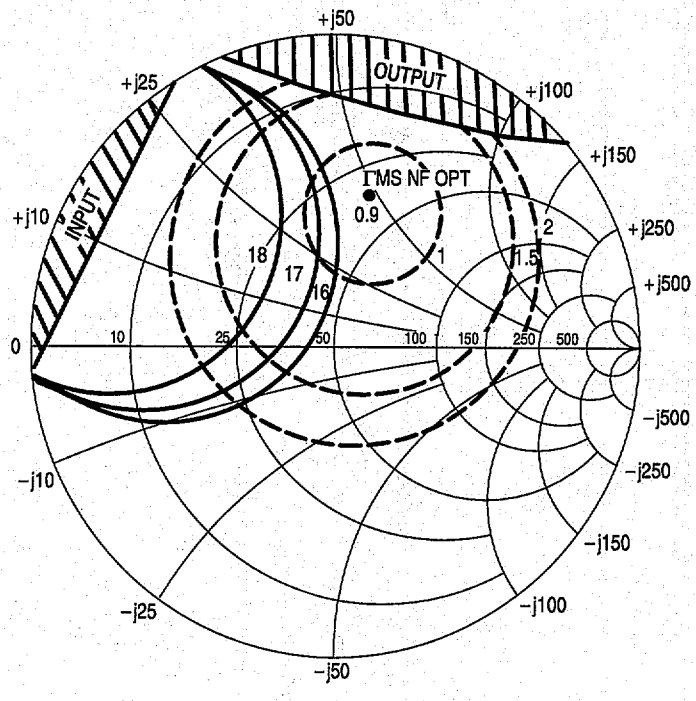



**Figure 39. Forward/Reverse Transmission Coefficients versus Frequency (GHz)**
**$V_{CE}$ = 6.0 V, $I_C$ = 5.0 mA**

| $V_{CE}$ (Volts) | $I_C$ (mA) | f (MHz) | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $\|S_{11}\|$ | ∠ϕ | $\|S_{21}\|$ | ∠ϕ | $\|S_{12}\|$ | ∠ϕ | $\|S_{22}\|$ | ∠ϕ |
| 6.0 | 5 | 200 | 0.74 | −86 | 10.5 | 129 | 0.06 | 48 | 0.69 | −42 |
| | | 500 | 0.62 | −143 | 5.5 | 97 | 0.08 | 33 | 0.41 | −59 |
| | | 1000 | 0.61 | 178 | 3.0 | 78 | 0.09 | 37 | 0.28 | −69 |
| | | 1500 | 0.65 | 158 | 2.0 | 62 | 0.11 | 44 | 0.26 | −88 |
| | | 2000 | 0.70 | 140 | 1.6 | 51 | 0.14 | 51 | 0.27 | −99 |
| | 10 | 200 | 0.64 | −111 | 15 | 118 | 0.04 | 44 | 0.53 | −59 |
| | | 500 | 0.58 | −160 | 6.9 | 93 | 0.06 | 42 | 0.27 | −77 |
| | | 1000 | 0.59 | 168 | 3.7 | 77 | 0.09 | 52 | 0.16 | −91 |
| | | 1500 | 0.63 | 151 | 2.5 | 64 | 0.12 | 56 | 0.16 | −113 |
| | | 2000 | 0.67 | 134 | 2.0 | 53 | 0.16 | 57 | 0.16 | −118 |
| | 50 | 200 | 0.56 | −160 | 20.4 | 102 | 0.02 | 57 | 0.27 | −98 |
| | | 500 | 0.57 | 176 | 8.4 | 86 | 0.05 | 67 | 0.14 | −130 |
| | | 1000 | 0.60 | 156 | 4.4 | 75 | 0.09 | 70 | 0.11 | −164 |
| | | 1500 | 0.62 | 152 | 2.9 | 64 | 0.13 | 68 | 0.13 | −175 |
| | | 2000 | 0.66 | 127 | 2.4 | 53 | 0.18 | 62 | 0.11 | −178 |
| 8.0 | 5 | 200 | 0.75 | −83 | 10.7 | 129 | 0.06 | 49 | 0.71 | −39 |
| | | 500 | 0.62 | −140 | 5.1 | 98 | 0.08 | 34 | 0.43 | −54 |
| | | 1000 | 0.60 | −179 | 3.7 | 78 | 0.09 | 38 | 0.31 | −62 |
| | | 1500 | 0.64 | 159 | 2.1 | 62 | 0.10 | 45 | 0.29 | −80 |
| | | 2000 | 0.69 | 141 | 1.7 | 52 | 0.13 | 52 | 0.29 | −91 |
| | 10 | 200 | 0.64 | −99 | 15.1 | 120 | 0.05 | 46 | 0.54 | −60 |
| | | 500 | 0.52 | −152 | 7.1 | 94 | 0.07 | 45 | 0.32 | −75 |
| | | 1000 | 0.52 | 170 | 3.7 | 76 | 0.10 | 54 | 0.15 | −82 |
| | | 1500 | 0.52 | 150 | 2.5 | 62 | 0.13 | 56 | 0.16 | −108 |
| | | 2000 | 0.57 | 133 | 2.0 | 51 | 0.18 | 55 | 0.16 | −107 |
| | 50 | 200 | 0.52 | −153 | 19.6 | 102 | 0.03 | 56 | 0.28 | −92 |
| | | 500 | 0.52 | 178 | 8.1 | 86 | 0.05 | 67 | 0.16 | −98 |
| | | 1000 | 0.56 | 157 | 4.1 | 73 | 0.10 | 70 | 0.06 | −130 |
| | | 1500 | 0.54 | 139 | 2.8 | 62 | 0.13 | 68 | 0.11 | −146 |
| | | 2000 | 0.59 | 126 | 2.2 | 52 | 0.19 | 63 | 0.10 | −137 |

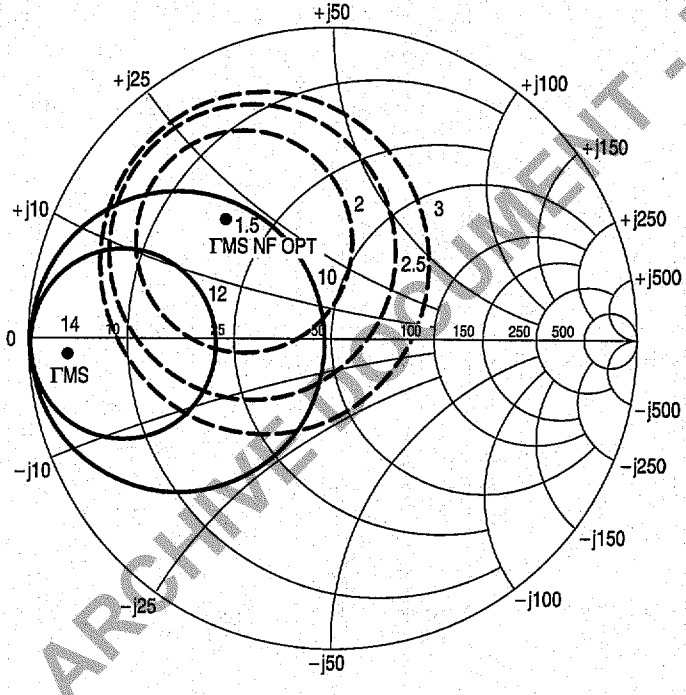
**Table 4. MRF571 Common Emitter S–Parameters**




$V_{CE}$ = 6.0 V, $I_C$ = 5.0 mA
f = 500 MHz
▨ — REGION OF INSTABILITY

| f (GHz) | NF OPT (dB) | Rn (Ω) | NF50 Ω (dB) |
|---|---|---|---|
| 0.5 | 0.9 | 9.3 | 1.3 |

| ΓMS NF OPT | K |
|---|---|
| 0.49 ∠ 74° | 0.58 |



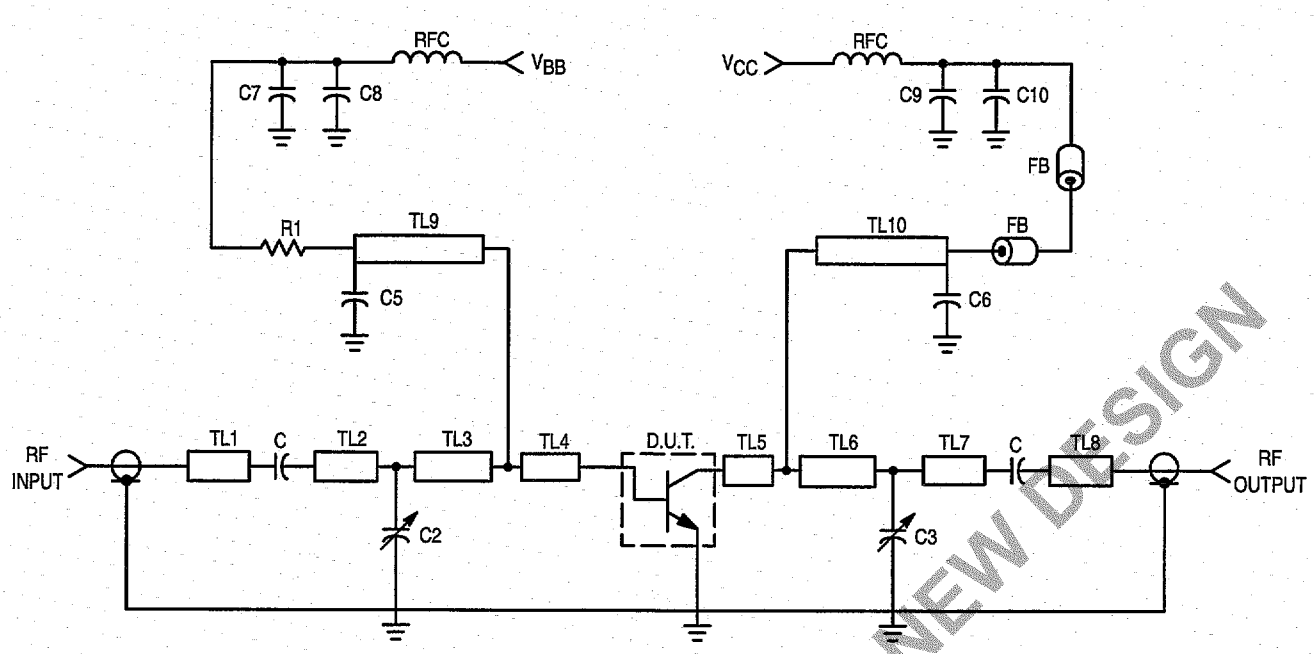

$V_{CE}$ = 6.0 V, $I_C$ = 5.0 mA
f = 1.0 GHz

| f (GHz) | NF OPT (dB) | Rn (Ω) | NF50 Ω (dB) | ΓMS NF OPT |
|---|---|---|---|---|
| 1.0 | 1.5 | 7.5 | 2.2 | 0.48 ∠ 134° |

| ΓMS | ΓML |
|---|---|
| 0.89 ∠ −179° | 0.81 ∠ 66° |



**Figure 40. MRF571 Constant Gain and Noise Figure Contours**

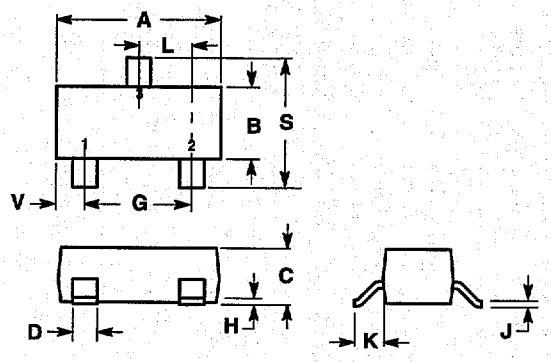



C1, C4, C5, C6, C8, C9 — 100 pF Chip Capacitor
C2, C3 — 0.8–8.0 pF Johanson Capacitor
C7, C10 — 10 μF Tantalum Capacitor
R1 — 1.0 kOhms Res.
RFC — VK–200, Ferroxcube
FB — Ferrite Bead, Ferroxcube 56–590–65/3B
Board Material — 0.0625″ Glass Teflon, $\varepsilon_r = 2.55$

TL1, TL7, TL8 — Microstrip 0.162″ x 0.600″
TL2 — Microstrip 0.162″ x 1.060″
TL3 — Microstrip 0.162″ x 0.700″
TL4, TL5 — Microstrip 0.162″ x 0.440″
TL6 — Microstrip 0.162″ x 1.140″
TL8, TL9 — Microstrip 0.020″ x 2.130″

**Figure 41. MRF571 Test Circuit Schematic**

## PACKAGE DIMENSIONS

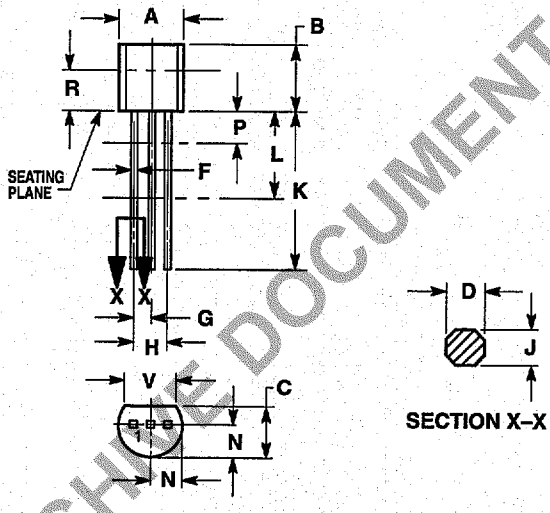



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIUMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.1102 | 0.1197 | 2.80 | 3.04 |
| B | 0.0472 | 0.0551 | 1.20 | 1.40 |
| C | 0.0350 | 0.0440 | 0.89 | 1.11 |
| D | 0.0150 | 0.0200 | 0.37 | 0.50 |
| G | 0.0701 | 0.0807 | 1.78 | 2.04 |
| H | 0.0005 | 0.0040 | 0.013 | 0.100 |
| J | 0.0034 | 0.0070 | 0.085 | 0.177 |
| K | 0.0180 | 0.0236 | 0.45 | 0.60 |
| L | 0.0350 | 0.0401 | 0.89 | 1.02 |
| S | 0.0830 | 0.0984 | 2.10 | 2.50 |
| V | 0.0177 | 0.0236 | 0.45 | 0.60 |

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

**CASE 318–07**
**ISSUE AD**
**MMBR571LT1**

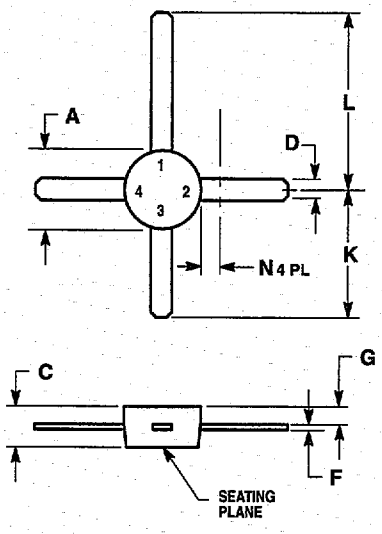



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.175 | 0.205 | 4.45 | 5.20 |
| B | 0.170 | 0.210 | 4.32 | 5.33 |
| C | 0.125 | 0.165 | 3.18 | 4.19 |
| D | 0.016 | 0.022 | 0.41 | 0.55 |
| F | 0.016 | 0.019 | 0.41 | 0.48 |
| G | 0.045 | 0.055 | 1.15 | 1.39 |
| H | 0.095 | 0.105 | 2.42 | 2.66 |
| J | 0.015 | 0.020 | 0.39 | 0.50 |
| K | 0.500 | — | 12.70 | — |
| L | 0.250 | — | 6.35 | — |
| N | 0.080 | 0.105 | 2.04 | 2.66 |
| P | — | 0.100 | — | 2.54 |
| R | 0.115 | — | 2.93 | — |
| V | 0.135 | — | 3.43 | — |

STYLE 2:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

**CASE 29–04**
**ISSUE AD**
**MPS571**

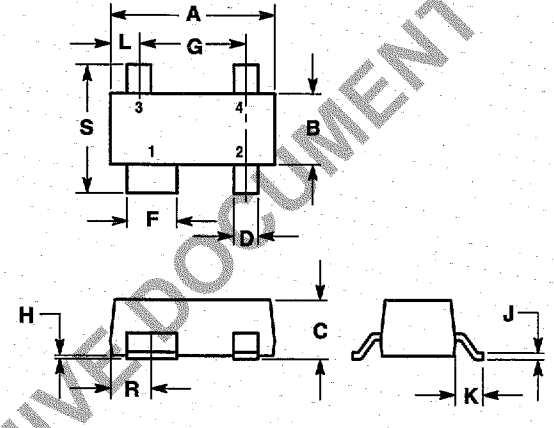



NOTES:
1. DIMENSION D NOT APPLICABLE IN ZONE N.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | 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 | 0.080 | 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 2:
PIN 1. COLLECTOR
2. EMITTER
3. BASE
4. EMITTER

**CASE 317–01**
**ISSUE E**
**MRF571**




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 2.80 | 3.04 | 0.110 | 0.120 |
| B | 1.20 | 1.39 | 0.047 | 0.055 |
| C | 0.84 | 1.14 | 0.033 | 0.045 |
| D | 0.39 | 0.50 | 0.015 | 0.020 |
| F | 0.79 | 0.93 | 0.031 | 0.037 |
| G | 1.78 | 2.03 | 0.070 | 0.080 |
| H | 0.013 | 0.10 | 0.0005 | 0.004 |
| J | 0.08 | 0.15 | 0.003 | 0.006 |
| K | 0.46 | 0.60 | 0.018 | 0.024 |
| L | 0.445 | 0.60 | 0.0175 | 0.024 |
| R | 0.72 | 0.83 | 0.028 | 0.033 |
| S | 2.11 | 2.48 | 0.083 | 0.098 |

STYLE 1:
PIN 1. COLLECTOR
2. EMITTER
3. EMITTER
4. BASE

**CASE 318A–05**
**ISSUE J**
**MRF5711LT1**

# NOTES

# NOTES

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