# MRF501
# MRF502

## The RF Line

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### NPN SILICON HIGH-FREQUENCY TRANSISTORS

. . . designed primarily for use in high-gain, low-noise amplifier, oscillator, and mixer applications. Can also be used in UHF converter applications.

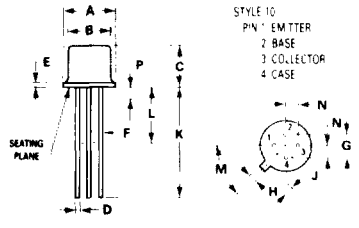
- High Current-Gain – Bandwidth Product –
  $f_T$ = 1.2 GHz (Typ) @ $I_C$ = 5.0 mAdc
- Low Noise Figure –
  NF = 4.0 dB (Typ) @ f = 200 MHz

**HIGH FREQUENCY TRANSISTORS**

**NPN SILICON**

**MAXIMUM RATINGS**

| Rating | Symbol | MRF501 | MRF502 | Unit |
|---|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 15 | | Vdc |
| Collector-Base Voltage | $V_{CBO}$ | 25 | 35 | Vdc |
| Emitter-Base Voltage | $V_{EBO}$ | 3.5 | | Vdc |
| Collector Current | $I_C$ | 50 | | mAdc |
| Total Device Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 200<br>1.14 | | mW<br>mW/°C |
| Storage Temperature Range | $T_{stg}$ | -65 to +200 | | °C |




NOTE: ALL RULES AND NOTES ASSOCIATED WITH TO-72 OUTLINE SHALL APPLY.

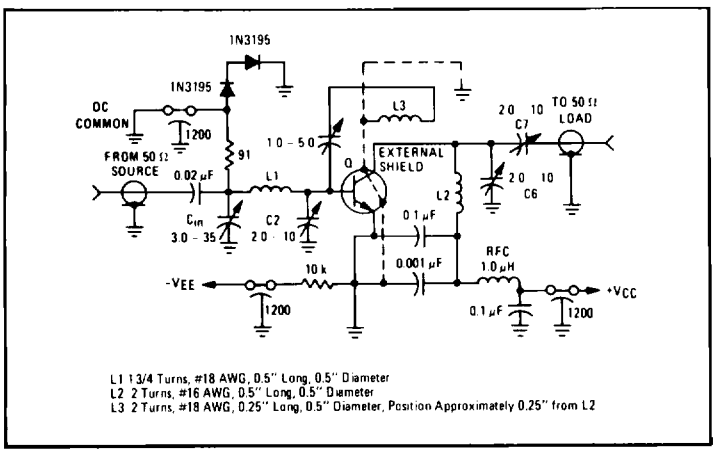
| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 5.31 | 5.84 | 0.209 | 0.230 |
| B | 4.52 | 4.95 | 0.178 | 0.195 |
| C | 4.32 | 5.33 | 0.170 | 0.210 |
| D | 0.41 | 0.53 | 0.016 | 0.021 |
| E | — | 0.76 | — | 0.030 |
| F | 0.41 | 0.48 | 0.016 | 0.019 |
| G | 2.54 BSC | | 0.100 BSC | |
| H | 0.91 | 1.17 | 0.036 | 0.046 |
| J | 0.71 | 1.22 | 0.028 | 0.048 |
| K | 12.70 | — | 0.500 | — |
| L | 6.35 | — | 0.250 | — |
| M | 45° BSC | | 45° BSC | |
| N | 1.27 BSC | | 0.050 BSC | |
| P | — | 1.27 | — | 0.050 |

**CASE 20-03**
**TO-206AF**
**(TO-72)**

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

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector-Emitter Breakdown Voltage ($I_C$ = 3.0 mAdc, $I_B$ = 0) | | $V_{(BR)CEO}$ | 15 | – | – | Vdc |
| Collector-Base Breakdown Voltage ($I_C$ = 1.0 μAdc, $I_E$ = 0) | MRF501<br>MRF502 | $V_{(BR)CBO}$ | 25<br>35 | –<br>– | –<br>– | Vdc |
| Emitter-Base Breakdown Voltage ($I_E$ = 1.0 μAdc, $I_C$ = 0) | | $V_{(BR)EBO}$ | 3.5 | – | – | Vdc |
| Collector Cutoff Current ($V_{CB}$ = 1.0 Vdc, $I_E$ = 0) | MRF501<br>MRF502 | $I_{CBO}$ | –<br>– | –<br>– | 50<br>20 | nAdc |
| **ON CHARACTERISTICS** | | | | | | |
| DC Current Gain ($I_C$ = 1.0 mAdc, $V_{CE}$ = 6.0 Vdc) | MRF501<br>MRF502 | $h_{FE}$ | 30<br>40 | –<br>– | 250<br>170 | |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Current Gain – Bandwdith Product ($I_C$ = 5.0 mAdc, $V_{CE}$ = 6.0 Vdc, f = 100 MHz) | MRF501<br>MRF502 | $f_T$ | 600<br>800 | 1000<br>1200 | –<br>– | MHz |
| Collector-Base Capacitance ($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 0.1 to 1.0 MHz) | | $C_{cb}$ | – | 0.6 | – | pF |
| Collector-Base Time Constant ($I_E$ = 2.0 mAdc, $V_{CB}$ = 6.0 Vdc, f = 31.8 MHz) | | $r_b'C_c$ | – | 8.0 | – | ps |
| Noise Figure (Figure 1) ($I_C$ = 1.5 mAdc, $V_{CE}$ = 6.0 Vdc, $R_S$ = 50 ohms, f = 200 MHz) | MRF501<br>MRF502 | NF | –<br>– | 4.5<br>4.0 | –<br>– | dB |
| **FUNCTIONAL TEST** | | | | | | |
| Common-Emitter Amplifier Power Gain (Figure 1) ($V_{CC}$ = 6.0 Vdc, $I_C$ = 5.0 mAdc, f = 200 MHz) | MRF501<br>MRF502 | $G_{pe}$ | –<br>– | 15<br>17 | –<br>– | dB |

**FIGURE 1 – 200 MHz AMPLIFIER POWER GAIN AND NOISE FIGURE CIRCUIT**




L1 1 3/4 Turns, #18 AWG, 0.5" Long, 0.5" Diameter
L2 2 Turns, #16 AWG, 0.5" Long, 0.5" Diameter
L3 2 Turns, #18 AWG, 0.25" Long, 0.5" Diameter, Position Approximately 0.25" from L2