

The RF Line

NPN SILICON RF POWER TRANSISTORS

... designed primarily for wideband large-signal driver and output amplifier stages in the 30–200 MHz frequency range.

- Guaranteed Performance at 150 MHz, 28 Vdc
 Output Power = 30 Watts
 Minimum Gain = 10 dB
- 100% Tested for Load Mismatch at All Phase Angles with 30:1 VSWR
- Gold Metallization System for High Reliability Applications

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|------------------|-------------|---------------|
| Collector-Emitter Voltage | V _{CEO} | 35 | Vdc |
| Collector-Base Voltage | V _{CBO} | 65 | Vdc |
| Emitter-Base Voltage | V _{EBO} | 4.0 | Vdc |
| Collector Current – Continuous | I _C | 3.4 | Adc |
| Total Device Dissipation @ T _C = 25°C (1) Derate above 25°C | P _D | 82 | Watts W/°C |
| Storage Temperature Range | T _{stg} | -65 to +150 | °C |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|------------------|------|------|
| Thermal Resistance, Junction to Case | R _{θJC} | 2.13 | °C/W |

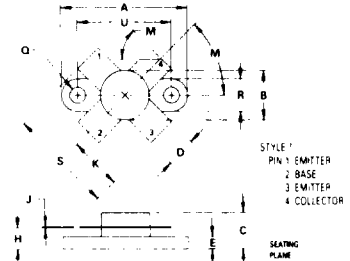
(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

MRF314
MRF314A

30 W – 30–200 MHz

RF POWER TRANSISTORS

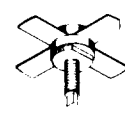
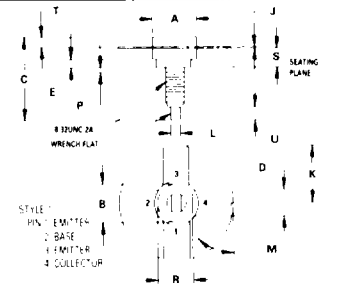
NPN SILICON



MRF314

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 24.39 | 25.14 | 0.960 | 0.990 |
| B | 9.40 | 9.90 | 0.370 | 0.390 |
| C | 5.82 | 7.13 | 0.229 | 0.281 |
| D | 5.47 | 5.98 | 0.215 | 0.235 |
| E | 2.16 | 2.66 | 0.085 | 0.105 |
| H | 3.81 | 4.57 | 0.150 | 0.180 |
| J | 0.11 | 0.15 | 0.004 | 0.006 |
| K | 10.04 | 10.28 | 0.395 | 0.405 |
| M | 40 | 50 | 40 | 50 |
| Q | 2.88 | 3.30 | 0.113 | 0.130 |
| R | 6.33 | 6.41 | 0.245 | 0.255 |
| S | 20.07 | 20.57 | 0.790 | 0.810 |
| U | 18.29 | 18.54 | 0.720 | 0.730 |

CASE 211-07



MRF314A

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 9.40 | 9.78 | 0.370 | 0.385 |
| B | 8.13 | 8.38 | 0.320 | 0.330 |
| C | 11.02 | 20.01 | 0.430 | 0.780 |
| D | 5.46 | 5.97 | 0.215 | 0.235 |
| E | 1.78 | | 0.070 | |
| J | 0.08 | 0.18 | 0.003 | 0.007 |
| K | 12.45 | | 0.490 | |
| L | 1.40 | 1.76 | 0.055 | 0.070 |
| M | 45 | NOM | 45 | NOM |
| P | | 1.27 | | 0.050 |
| R | 7.59 | 7.80 | 0.299 | 0.307 |
| S | 4.01 | 4.52 | 0.156 | 0.178 |
| T | 2.11 | 2.54 | 0.083 | 0.100 |
| U | 2.49 | 3.15 | 0.098 | 0.123 |

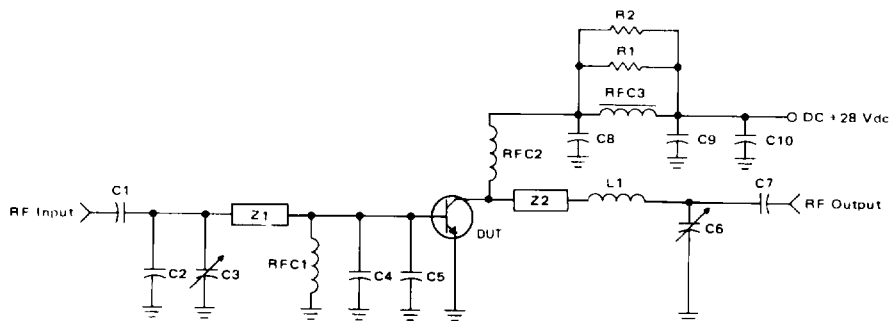
CASE 145A-09

MRF314, MRF314A

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

| Characteristics | Symbol | Min | Typ | Max | Unit |
|---|---------------|--------------------------------|------|-----|------|
| OFF CHARACTERISTICS | | | | | |
| Collector-Emitter Breakdown Voltage ($I_C = 30 \text{ mAdc}$, $I_B = 0$) | $V_{(BR)CEO}$ | 35 | — | — | Vdc |
| Collector-Emitter Breakdown Voltage ($I_C = 30 \text{ mAdc}$, $V_{BE} = 0$) | $V_{(BR)CES}$ | 65 | — | — | Vdc |
| Collector-Base Breakdown Voltage ($I_C = 30 \text{ mAdc}$, $I_E = 0$) | $V_{(BR)CBO}$ | 65 | — | — | Vdc |
| Emitter-Base Breakdown Voltage ($I_E = 3.0 \text{ mAdc}$, $I_C = 0$) | $V_{(BR)EBO}$ | 4.0 | — | — | Vdc |
| Collector Cutoff Current ($V_{CB} = 30 \text{ Vdc}$, $I_E = 0$) | I_{CBO} | — | — | 3.0 | mAdc |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain ($I_C = 1.5 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$) | h_{FE} | 20 | — | 80 | — |
| DYNAMIC CHARACTERISTICS | | | | | |
| Output Capacitance ($V_{CB} = 30 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$) | C_{ob} | — | 30 | 40 | pF |
| FUNCTIONAL TESTS (Figure 1) | | | | | |
| Common-Emitter Amplifier Power Gain ($V_{CC} = 28 \text{ Vdc}$, $P_{out} = 30 \text{ W}$, $f = 150 \text{ MHz}$) | G_{PE} | 10 | 13.5 | — | db |
| Collector Efficiency ($V_{CC} = 28 \text{ Vdc}$, $P_{out} = 30 \text{ W}$, $f = 150 \text{ MHz}$) | η_c | 50 | — | — | % |
| Load Mismatch ($V_{CC} = 28 \text{ Vdc}$, $P_{out} = 30 \text{ W}$, $f = 150 \text{ MHz}$, $V_{SWR} = 30.1$ all phase angles) | — | No Degradation in Power Output | | | |

FIGURE 1 — 150 MHz TEST CIRCUIT



C1, C7 - 18 pF, 100 mil ATC
 C2 - 68 pF, 100 mil ATC
 C3, C6 - Johanson #JMC 5501
 C4 - 270 pF, 100 mil ATC
 C5 - 240 pF, 100 mil ATC
 C8, C9 - 100 pF Underwood
 C10 - 1.0 μF Tantalum
 L1 - 2 Turns, 2.5" #20 Wire, $I_D = 0.275$ "

R1, R2 - 10 Ω , 1.0 W
 RFC1 - 15 μH Molded Coil
 RFC2 - 2 Turns, 2.5" #20 Wire, $I_D = 0.2$ "
 RFC3 - Ferroxcube VK200 - 19/48
 Z1 - Microstrip 0.168" W x 1.6" L
 Z2 - Microstrip 0.168" W x 1.2" L
 Board - Glass Teflon $\epsilon_R \approx 2.55$

MRF314, MRF314A

TYPICAL PERFORMANCE CURVES

FIGURE 2 – OUTPUT POWER versus INPUT POWER

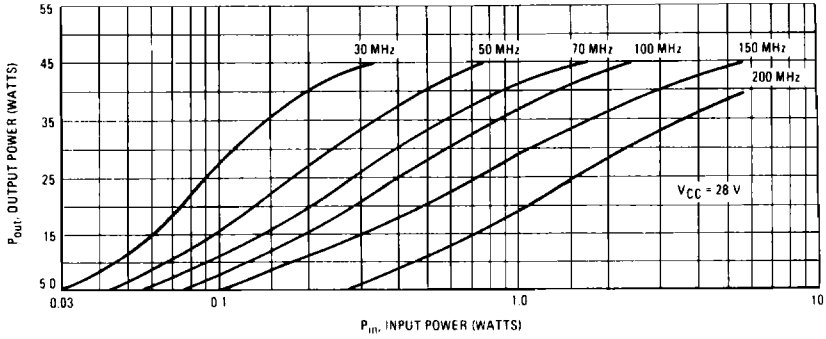


FIGURE 3 – OUTPUT POWER versus INPUT POWER

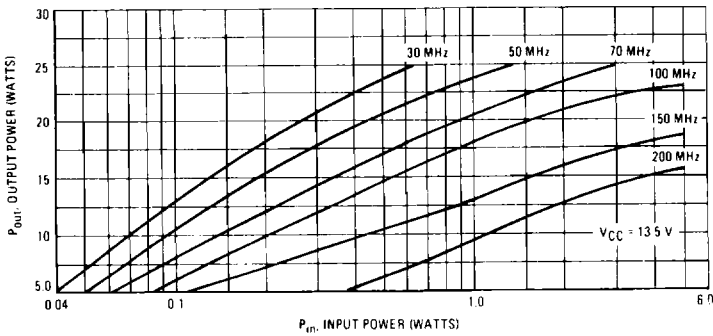


FIGURE 4 – POWER GAIN versus FREQUENCY

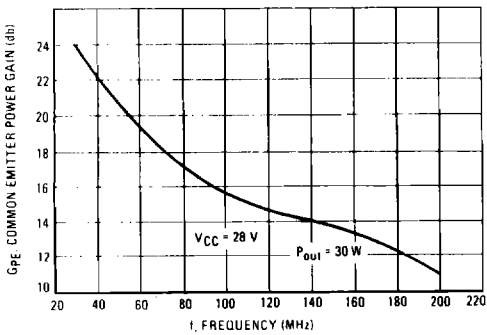
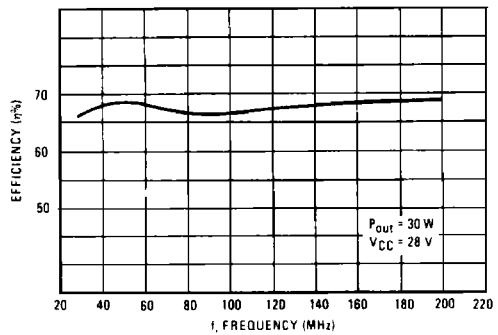


FIGURE 5 – EFFICIENCY (η %) versus FREQUENCY



2

MRF314, MRF314A

FIGURE 6 - SERIES EQUIVALENT INPUT/OUTPUT IMPEDANCE

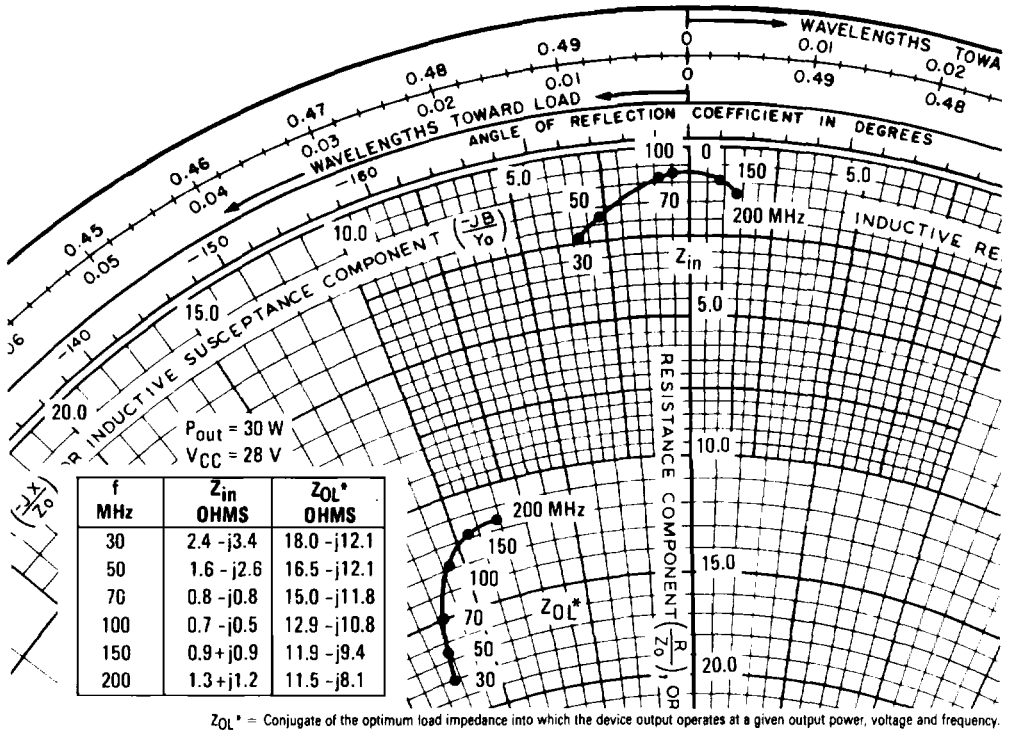


FIGURE 7 - TEST FIXTURE

