

# New Jersey Semi-Conductor Products, Inc.

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## The RF Line

### NPN SILICON RF POWER TRANSISTORS

... designed for power amplifier applications in industrial, commercial and amateur radio equipment to 30 MHz.

- Specified 12.5 Volt, 30 MHz Characteristics -
  - Output Power = 50 Watts
  - Minimum Gain = 11 dB
  - Efficiency = 50%

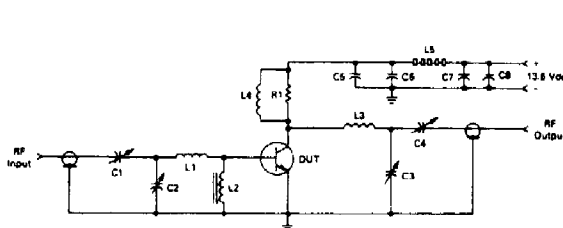
#### MAXIMUM RATINGS

| Rating   | Symbol    | Value       | Unit         |
|--|-----------|-------------|--------------|
| Collector-Emitter Voltage  | $V_{CE0}$ | 20          | Vdc          |
| Collector-Base Voltage   | $V_{CB0}$ | 40          | Vdc          |
| Emitter-Base Voltage   | $V_{EB0}$ | 4.0         | - Vdc        |
| Collector Current - Continuous   | $I_C$     | 7.5         | Adc          |
| Total Device Dissipation @ $T_C = 25^\circ C$<br>Derate above $25^\circ C$ | $P_D$     | 115         | Watts<br>W/C |
| Storage Temperature Range  | $T_{stg}$ | -65 to +150 | $^\circ C$   |

#### THERMAL CHARACTERISTICS

| Characteristic                       | Symbol          | Max  | Unit         |
|--------------------------------------|-----------------|------|--------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 1.53 | $^\circ C/W$ |

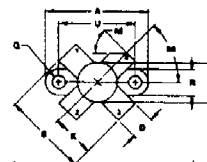
FIGURE 1 — 30 MHz TEST CIRCUIT SCHEMATIC



- C1 — 14-150 pF, ARCO 424
- C2, C3, C4 — 170-780 pF, ARCO 469
- C5, C8 — ERIE 0.1  $\mu F$  100 V RED CAPS
- C6 — 1000 pF UNELCO, 350 Vdc
- C7 — 10  $\mu F$ , 35 Vdc
- R1 — 100  $\Omega$ , 2.0 W Carbon
- L1 — 0.15  $\mu H$  Molded Choke MILLER
- L2 — FERROXCUBE, VK200 20 4B
- L3 — 3 Turns, #14 Bare Tinned Wire, 0.3" (0.79) I.D. x 0.38" (0.97) Long
- L4 — 9 Turns, #20 Enamel Wire, Close Wound on R1
- L5 — FERROXCUBE #56-570-653B, 5 Ferrite Beads, on 1" Long #20 Wire
- Input/Output Connectors — Type N
- Board — Glass Teflon Mounted on a 4" x 4" x 2" SEEZAK Box

## MRF450 MRF450A

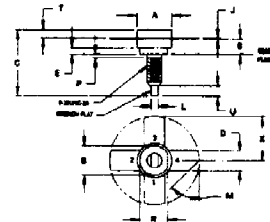
50 W — 30 MHz  
 RF POWER  
 TRANSISTORS  
 NPN SILICON



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

| DIM | MILLIMETERS |       | INCHES |       |
|-----|-------------|-------|--------|-------|
|     | MIN         | MAX   | MIN    | MAX   |
| A   | 24.29       | 25.13 | 0.956  | 1.000 |
| B   | 1.60        | 1.90  | 0.063  | 0.075 |
| C   | 1.60        | 1.12  | 0.063  | 0.045 |
| D   | 1.02        | 1.06  | 0.040  | 0.042 |
| E   | 1.78        | 1.78  | 0.070  | 0.070 |
| F   | 2.81        | 1.57  | 0.110  | 0.062 |
| G   | 0.71        | 0.71  | 0.028  | 0.028 |
| H   | 15.88       | 15.88 | 0.625  | 0.625 |
| M   | 0.7         | 0.7   | 0.028  | 0.028 |
| N   | 2.68        | 2.68  | 0.105  | 0.105 |
| P   | 1.02        | 1.02  | 0.040  | 0.040 |
| Q   | 20.87       | 20.87 | 0.822  | 0.822 |
| V   | 0.25        | 0.25  | 0.010  | 0.010 |

CASE 211-07  
 MRF450



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

| DIM | MILLIMETERS |       | INCHES |       |
|-----|-------------|-------|--------|-------|
|     | MIN         | MAX   | MIN    | MAX   |
| A   | 1.40        | 1.70  | 0.055  | 0.067 |
| B   | 0.13        | 0.20  | 0.005  | 0.008 |
| C   | 11.02       | 11.02 | 0.434  | 0.434 |
| D   | 1.40        | 1.07  | 0.055  | 0.042 |
| E   | 1.78        | 1.78  | 0.070  | 0.070 |
| F   | 1.02        | 1.02  | 0.040  | 0.040 |
| G   | 1.60        | 1.60  | 0.063  | 0.063 |
| H   | 0.7         | 0.7   | 0.028  | 0.028 |
| I   | 1.78        | 1.78  | 0.070  | 0.070 |
| J   | 1.02        | 1.02  | 0.040  | 0.040 |
| K   | 1.11        | 1.11  | 0.044  | 0.044 |
| L   | 1.40        | 1.40  | 0.055  | 0.055 |

CASE 145A-09  
 MRF450A

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## MRF450, MRF450A

### ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted.)

| Characteristic   | Symbol           | Min | Typ       | Max | Unit            |
|--|------------------|-----|-----------|-----|-----------------|
| <b>OFF CHARACTERISTICS</b>   |                  |     |           |     |                 |
| Collector-Emitter Breakdown Voltage<br>(I <sub>C</sub> = 100 mA dc, I <sub>B</sub> = 0)  | V(BR)CEO         | 20  | —         | —   | V <sub>dc</sub> |
| Collector-Emitter Breakdown Voltage<br>(I <sub>C</sub> = 20 mA dc, V <sub>BE</sub> = 0)  | V(BR)CES         | 40  | —         | —   | V <sub>dc</sub> |
| Collector-Base Breakdown Voltage<br>(I <sub>C</sub> = 20 mA dc, I <sub>E</sub> = 0)  | V(BR)CBO         | 40  | —         | —   | V <sub>dc</sub> |
| Emitter-Base Breakdown Voltage<br>(I <sub>E</sub> = 10 mA dc, I <sub>C</sub> = 0)  | V(BR)EBO         | 4.0 | —         | —   | V <sub>dc</sub> |
| <b>ON CHARACTERISTICS</b>  |                  |     |           |     |                 |
| DC Current Gain<br>(I <sub>C</sub> = 1.0 A dc, V <sub>CE</sub> = 5.0 V dc)   | h <sub>FE</sub>  | 10  | —         | —   | —               |
| <b>DYNAMIC CHARACTERISTICS</b>   |                  |     |           |     |                 |
| Output Capacitance<br>(V <sub>CB</sub> = 15 V dc, I <sub>E</sub> = 0, f = 1.0 MHz)   | C <sub>ob</sub>  | —   | —         | 200 | pF              |
| <b>FUNCTIONAL TESTS (Figure 1)</b>   |                  |     |           |     |                 |
| Common-Emitter Amplifier Power Gain<br>(V <sub>CC</sub> = 13.6 V dc, P <sub>out</sub> = 50 W, I <sub>C(max)</sub> = 6.13 A dc, f = 30 MHz) | G <sub>PE</sub>  | 11  | 15        | —   | dB              |
| Collector Efficiency<br>(V <sub>CC</sub> = 13.6 V dc, P <sub>out</sub> = 50 W, I <sub>C(max)</sub> = 6.13 A dc, f = 30 MHz)                | η                | 50  | —         | —   | %               |
| Series Equivalent Input Impedance<br>(V <sub>CC</sub> = 13.6 V dc, P <sub>out</sub> = 50 W, f = 30 MHz)                                    | Z <sub>in</sub>  | —   | 1.56-j.89 | —   | Ohms            |
| Series Equivalent Output Impedance<br>(V <sub>CC</sub> = 13.6 V dc, P <sub>out</sub> = 50 W, f = 30 MHz)                                   | Z <sub>out</sub> | —   | 174-j.50  | —   | Ohms            |

FIGURE 2 — INPUT POWER versus OUTPUT POWER

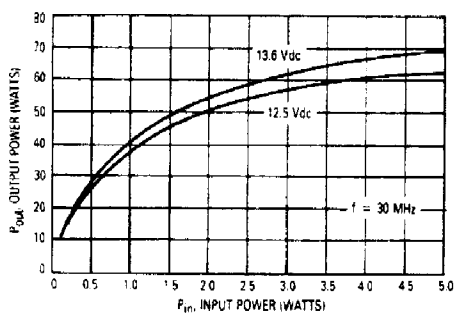


FIGURE 3 — OUTPUT POWER versus SUPPLY VOLTAGE

