

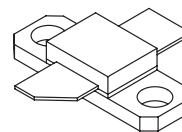
## The RF Line

# NPN Silicon

## RF Power Transistor

Designed for 28 Volt microwave large-signal, common base, Class-C CW amplifier applications in the range 1600 – 1640 MHz.

- Specified 28 Volt, 1.6 GHz Class-C Characteristics
  - Output Power = 6 Watts
  - Minimum Gain = 7.4 dB, @ 6 Watts
  - Minimum Efficiency = 40% @ 6 Watts
- Characterized with Series Equivalent Large-Signal Parameters from 1500 MHz to 1700 MHz
- Silicon Nitride Passivated
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration

**MRF16006****6.0 WATTS, 1.6 GHz  
RF POWER TRANSISTOR  
NPN SILICON****CASE 395C-01, STYLE 2**

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

| Rating                                                                                 | Symbol    | Value       | Unit                         |
|----------------------------------------------------------------------------------------|-----------|-------------|------------------------------|
| Collector-Emitter Voltage                                                              | $V_{CES}$ | 60          | Vdc                          |
| Emitter-Base Voltage                                                                   | $V_{EBO}$ | 4.0         | Vdc                          |
| Collector-Current                                                                      | $I_C$     | 1.0         | Adc                          |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$     | 26<br>0.15  | Watts<br>W/ $^\circ\text{C}$ |
| Storage Temperature Range                                                              | $T_{stg}$ | -65 to +150 | $^\circ\text{C}$             |

### THERMAL CHARACTERISTICS

|                                               |                 |     |                    |
|-----------------------------------------------|-----------------|-----|--------------------|
| Thermal Resistance — Junction to Case (1) (2) | $R_{\theta JC}$ | 6.8 | $^\circ\text{C/W}$ |
|-----------------------------------------------|-----------------|-----|--------------------|

(1) Thermal measurement performed using CW RF operating condition.

(2) Thermal resistance is determined under specified RF operating conditions by infrared measurement techniques.

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

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

**OFF CHARACTERISTICS**

|                                                                                  |               |     |   |     |      |
|----------------------------------------------------------------------------------|---------------|-----|---|-----|------|
| Collector–Emitter Breakdown Voltage<br>( $I_C = 40\text{ mAdc}$ , $V_{BE} = 0$ ) | $V_{(BR)CES}$ | 55  | — | —   | Vdc  |
| Collector–Base Breakdown Voltage<br>( $I_C = 40\text{ mAdc}$ , $I_E = 0$ )       | $V_{(BR)CBO}$ | 55  | — | —   | Vdc  |
| Emitter–Base Breakdown Voltage<br>( $I_E = 2.5\text{ mAdc}$ , $I_C = 0$ )        | $V_{(BR)EBO}$ | 4.0 | — | —   | Vdc  |
| Collector Cutoff Current<br>( $V_{CE} = 28\text{ Vdc}$ , $V_{BE} = 0$ )          | $I_{CES}$     | —   | — | 2.5 | mAdc |

**ON CHARACTERISTICS**

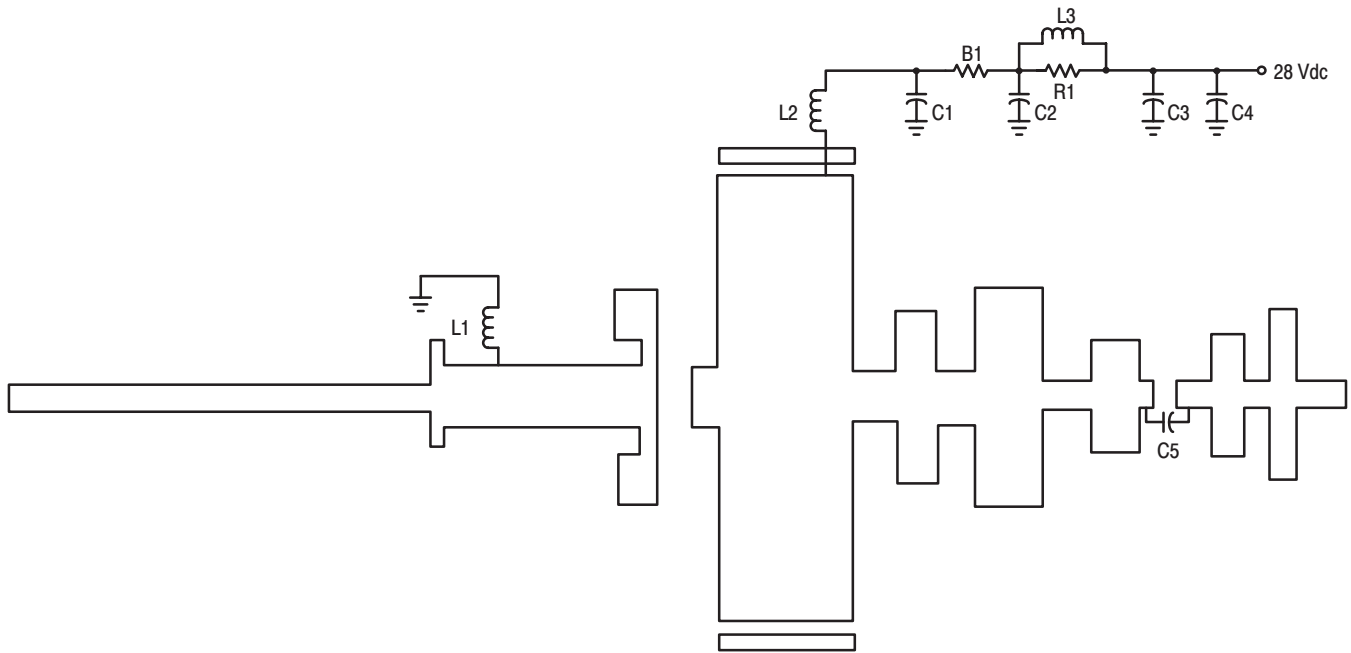
|                                                                              |          |    |   |    |   |
|------------------------------------------------------------------------------|----------|----|---|----|---|
| DC Current Gain<br>( $I_{CE} = 0.2\text{ Adc}$ , $V_{CE} = 5.0\text{ Vdc}$ ) | $h_{FE}$ | 20 | — | 80 | — |
|------------------------------------------------------------------------------|----------|----|---|----|---|

**DYNAMIC CHARACTERISTICS**

|                                                                           |          |    |   |   |    |
|---------------------------------------------------------------------------|----------|----|---|---|----|
| Output Capacitance<br>( $V_{CB} = 28\text{ Vdc}$ , $f = 1.0\text{ MHz}$ ) | $C_{ob}$ | 11 | — | — | pf |
|---------------------------------------------------------------------------|----------|----|---|---|----|

**FUNCTIONAL TESTS**

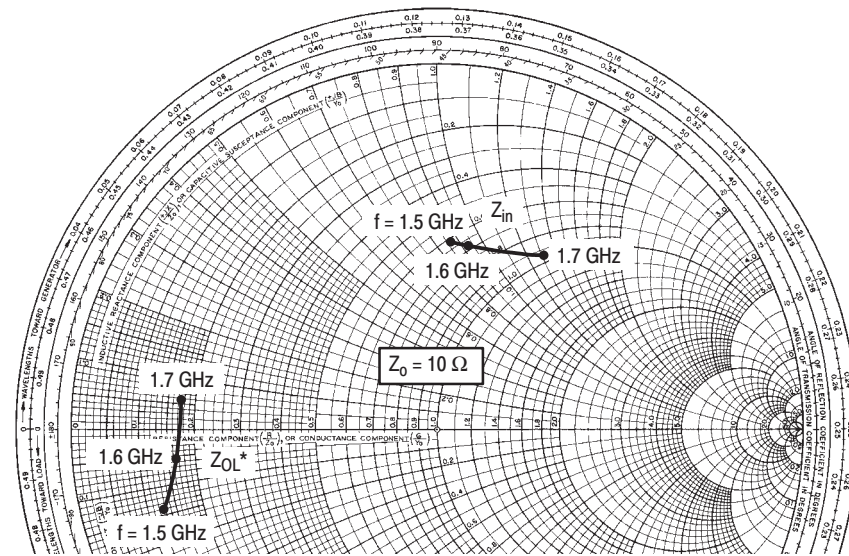
|                                                                                                                                                                       |          |                                |     |   |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------|-----|---|----|
| Common–Base Amplifier Power Gain<br>( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 6\text{ Watts}$ , $f = 1600/1640\text{ MHz}$ )                                            | $G_{pe}$ | 7.4                            | —   | — | dB |
| Collector Efficiency<br>( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 6\text{ Watts}$ , $f = 1600/1640\text{ MHz}$ )                                                        | $\eta$   | 40                             | 45  | — | %  |
| Return Loss<br>( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 6\text{ Watts}$ , $f = 1600/1640\text{ MHz}$ )                                                                 | $I_{RL}$ | —                              | 8.0 | — | dB |
| Output Mismatch Stress<br>( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 6\text{ Watts}$ , $f = 1600\text{ MHz}$ , Load<br>VSWR = 3:1 all phase angles at frequency of test) | $\Psi$   | No Degradation in Output Power |     |   |    |



Board Material – Teflon® Glass Laminate Dielectric  
Thickness – 0.30",  $\epsilon_r = 2.55$ ", 2.0 oz. Copper

|        |                              |        |                                      |
|--------|------------------------------|--------|--------------------------------------|
| B1     | Fair Rite Bead on #24 Wire   | C4     | 47 $\mu$ F, 50 V, Electrolytic Cap   |
| C1, C5 | 100 pF, B Case, ATC Chip Cap | L1, L2 | 3 Turns, #18, 0.133" ID, 0.15" Long  |
| C2     | 0.1 $\mu$ F, Dipped Mica Cap | L3     | 9 Turns, #24 Enamel                  |
| C3     | 0.1 $\mu$ F, Chip Cap        | R1     | 82 $\Omega$ , 1.0 W, Carbon Resistor |

Figure 1. MRF16006 Test Fixture Schematic



$V_{CC} = 28$  Vdc,  $P_{out} = 6$  W

| f<br>MHz | $Z_{in}$<br>Ohms | $Z_{OL}^*$<br>Ohms |
|----------|------------------|--------------------|
| 1500     | $6.28 + j 8.53$  | $1.22 - j 1.37$    |
| 1600     | $7.04 + j 9.00$  | $1.58 - j 0.53$    |
| 1700     | $9.55 + j 12.86$ | $1.71 + j 0.39$    |

$Z_{OL}^*$  = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

Figure 2. Series Equivalent Input/Output Impedance

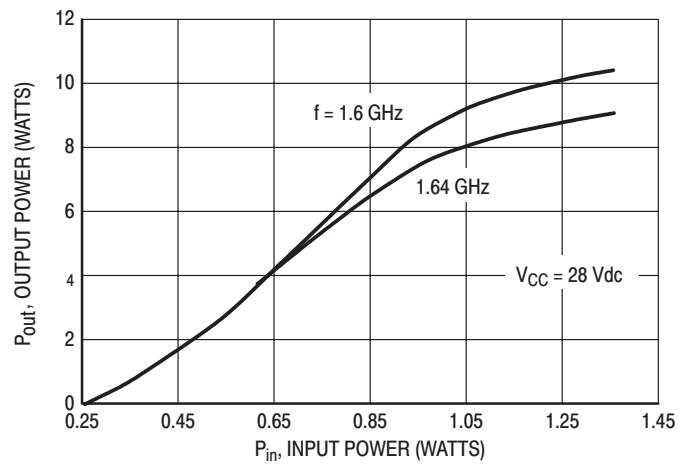
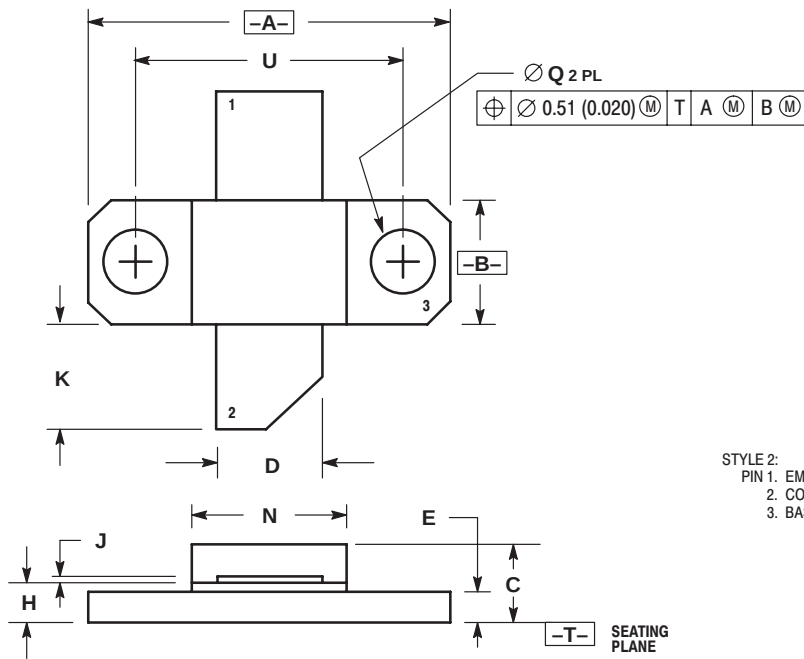


Figure 3. Output Power versus Input Power

## PACKAGE DIMENSIONS



### NOTES:

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

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.739     | 0.750 | 18.77       | 19.05 |
| B   | 0.240     | 0.260 | 6.10        | 6.60  |
| C   | 0.165     | 0.198 | 4.19        | 5.03  |
| D   | 0.215     | 0.225 | 5.46        | 5.72  |
| E   | 0.055     | 0.070 | 1.40        | 1.78  |
| H   | 0.079     | 0.091 | 2.01        | 2.31  |
| J   | 0.004     | 0.006 | 0.10        | 0.15  |
| K   | 0.210     | 0.240 | 5.33        | 6.10  |
| N   | 0.315     | 0.330 | 8.00        | 8.38  |
| Q   | 0.125     | 0.135 | 3.18        | 3.42  |
| U   | 0.560 BSC |       | 14.23 BSC   |       |

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

CASE 395C-01  
ISSUE A

Specifications subject to change without notice.

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