

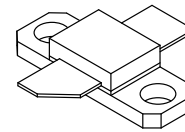
**The RF Line**  
**NPN Silicon**  
**RF Power Transistor**

**MRF16030**

**30 WATTS, 1.6 GHz**  
**RF POWER TRANSISTOR**  
**NPN SILICON**

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 = 30 Watts  
Minimum Gain = 7.5 dB, @ 30 Watts  
Minimum Efficiency = 40% @ 30 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



**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  | $I_C$     | 4.0         | Adc                                |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$     | 103<br>0.58 | Watts<br>$^\circ\text{C}/\text{W}$ |
| Storage Temperature Range  | $T_{stg}$ | -65 to +150 | $^\circ\text{C}$                   |

**THERMAL CHARACTERISTICS**

|   |                 |     |                           |
|---|-----------------|-----|---------------------------|
| Thermal Resistance — Junction to Case (1) (2) | $R_{\theta JC}$ | 1.7 | $^\circ\text{C}/\text{W}$ |
|---|-----------------|-----|---------------------------|

(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**

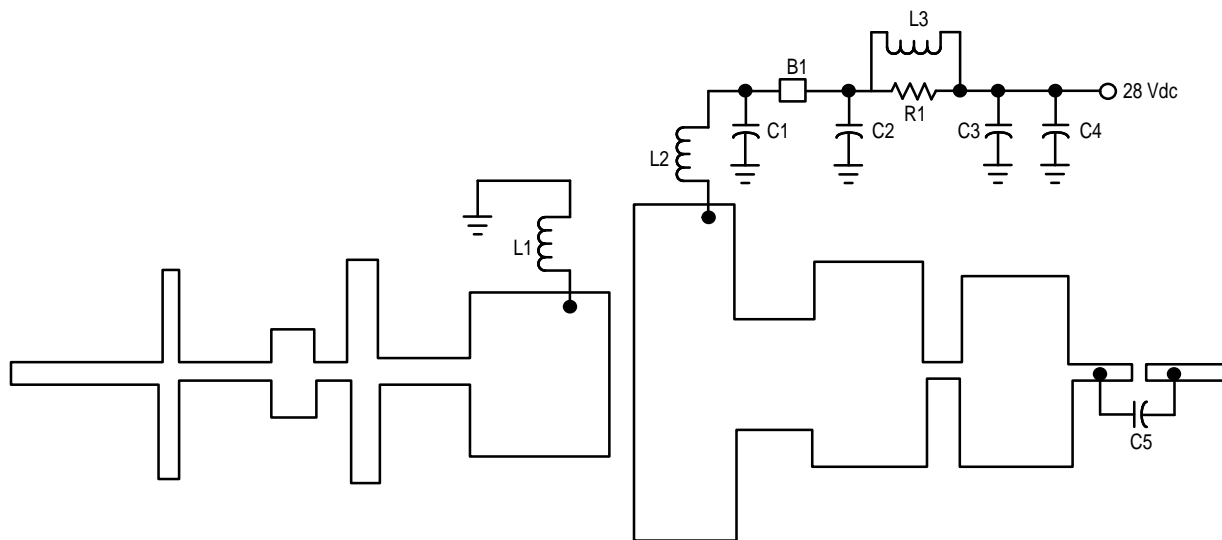
|  |               |     |   |    |                  |
|--|---------------|-----|---|----|------------------|
| Collector–Emitter Breakdown Voltage<br>( $I_C = 100\text{ mA}_{dc}$ , $V_{BE} = 0$ ) | $V_{(BR)CES}$ | 55  | — | —  | Vdc              |
| Collector–Base Breakdown Voltage<br>( $I_C = 100\text{ mA}_{dc}$ , $I_E = 0$ )       | $V_{(BR)CBO}$ | 55  | — | —  | Vdc              |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\text{ mA}_{dc}$ , $I_C = 0$ )          | $V_{(BR)EBO}$ | 4.0 | — | —  | Vdc              |
| Collector Cutoff Current<br>( $V_{CE} = 28\text{ Vdc}$ , $V_{BE} = 0$ )              | $I_{CES}$     | —   | — | 10 | mA <sub>dc</sub> |

**ON CHARACTERISTICS**

|  |          |    |    |    |   |
|--|----------|----|----|----|---|
| DC Current Gain<br>( $I_{CE} = 1.0\text{ Adc}$ , $V_{CE} = 5.0\text{ Vdc}$ ) | $h_{FE}$ | 20 | 35 | 80 | — |
|--|----------|----|----|----|---|

**FUNCTIONAL TESTS**

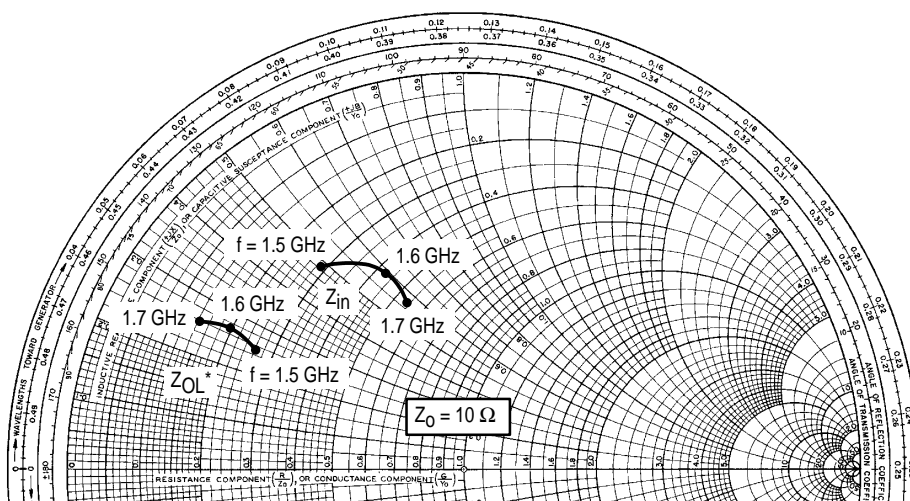
|  |          |                                |     |   |    |
|--|----------|--------------------------------|-----|---|----|
| Collector–Base Amplifier Power Gain<br>( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 30\text{ Watts}$ , $f = 1600/1640\text{ MHz}$ )   | $G_{pe}$ | 7.5                            | 7.7 | — | dB |
| Collector Efficiency<br>( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 30\text{ Watts}$ , $f = 1600/1640\text{ MHz}$ )  | $\eta$   | 40                             | 45  | — | %  |
| Input Return Loss<br>( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 30\text{ Watts}$ , $f = 1600/1640\text{ MHz}$ )   | $I_{RL}$ | 8.0                            | —   | — | dB |
| Output Mismatch Stress<br>$V_{CC} = 28\text{ Vdc}$ , $P_{out} = 30\text{ Watts}$ , $f = 1600\text{ MHz}$ , Load<br>$V_{SWR} = 3:1$ , 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      |
| 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         |

Figure 1. MRF16030 Test Fixture Schematic

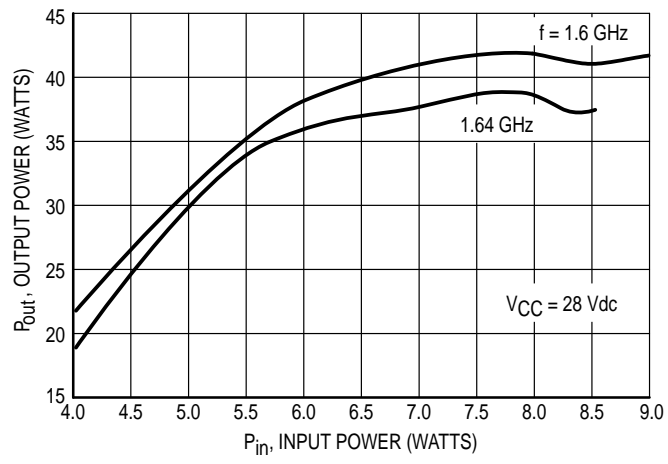


$V_{CC} = 28$  Vdc,  $P_{Out} = 30$  W

| f<br>MHz | $Z_{in}$<br>Ohms | $Z_{OL}^*$<br>Ohms |
|----------|------------------|--------------------|
| 1500     | $3.05 + j 4.88$  | $2.66 + j 2.53$    |
| 1600     | $4.32 + j 6.00$  | $1.79 + j 2.80$    |
| 1700     | $5.62 + j 5.79$  | $1.51 + j 2.64$    |

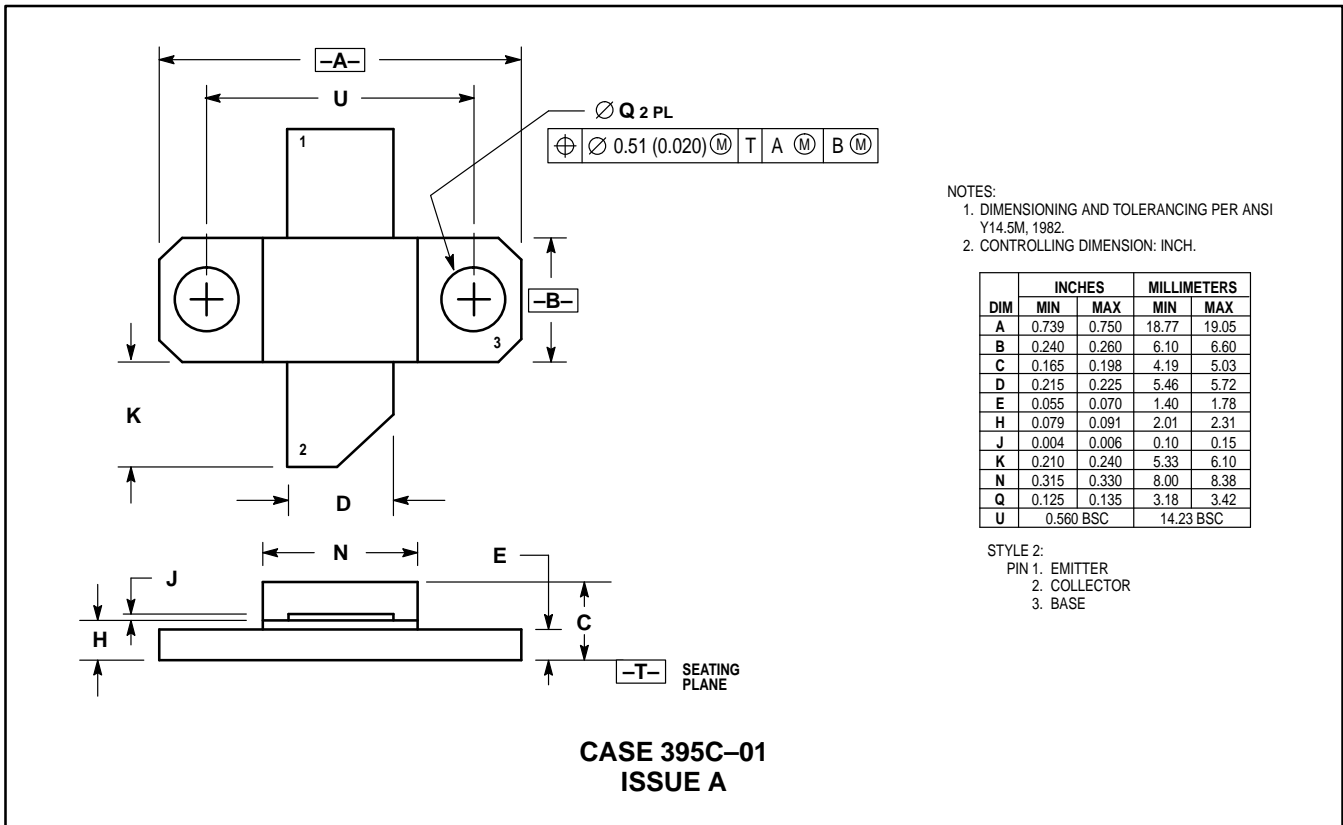
$Z_{OL}^*$  = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

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

*Specifications subject to change without notice.*

- **North America:** Tel. (800) 366-2266, Fax (800) 618-8883
- **Asia/Pacific:** Tel.+81-44-844-8296, Fax +81-44-844-8298
- **Europe:** Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

REV 3