# MRF16006

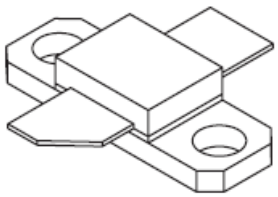
## The RF Line NPN Silicon Power Transistor
## 6.0W , 1.6GHz, 28V

M/A-COM Products
Released - Rev. 07.07

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

- Specified 28 V, 1.6 GHz Class C characteristics
  Output power = 6 W
  Minimum gain = 7.4 dB, @ 6 W
  Minimum efficiency = 40% @ 6 W
- Characterized with series equivalent large–signal parameters from 1500 MHz to 1700 MHz
- Silicon nitride passivated
- Gold metalized, emitter ballasted for long life and resistance to metal migration

**Product Image**



**CASE 395C–01, STYLE 2**

**MAXIMUM RATINGS** ($T_J$ = 25°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°C<br>Derate above 25°C | $P_D$ | 26<br>0.15 | Watts<br>W/°C |
| Storage Temperature Range | $T_{stg}$ | –65 to +150 | °C |

**THERMAL CHARACTERISTICS**

| | | | |
|---|---|---|---|
| Thermal Resistance — Junction to Case (1) (2) | $R_{\theta JC}$ | 6.8 | °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.





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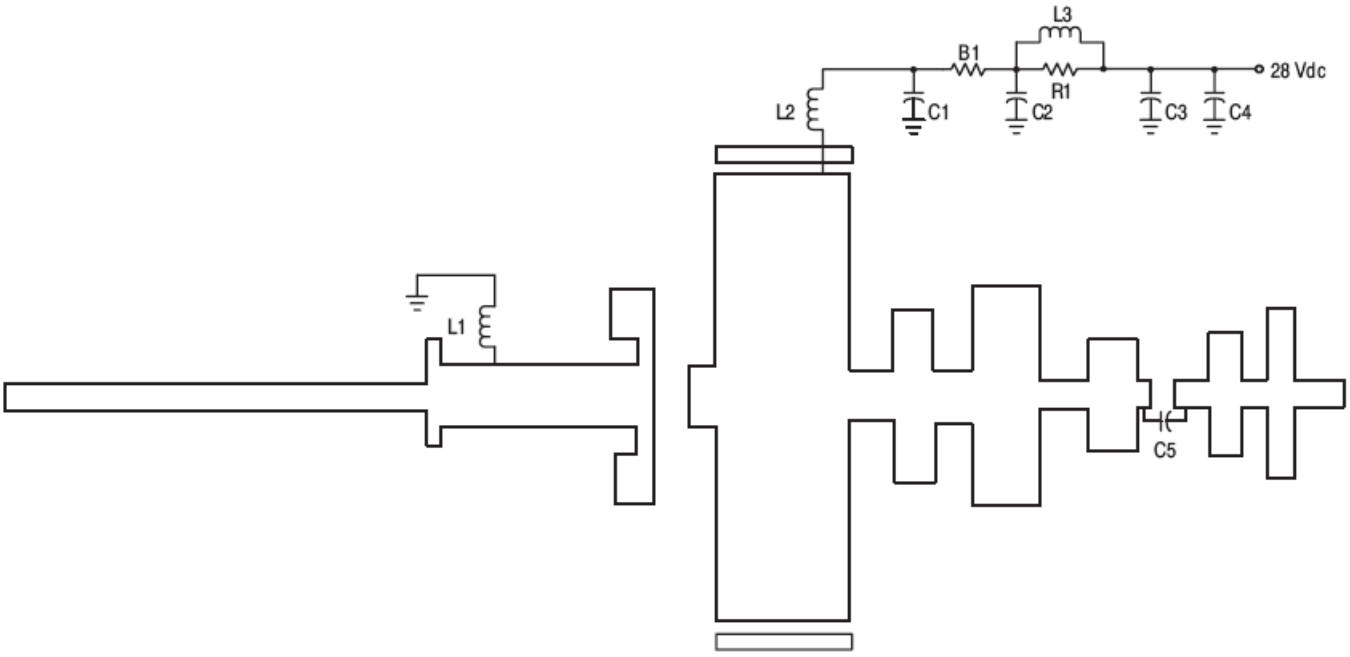
**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector–Emitter Breakdown Voltage ($I_C$ = 40 mAdc, $V_{BE}$ = 0) | $V_{(BR)CES}$ | 55 | — | — | Vdc |
| Collector–Base Breakdown Voltage ($I_C$ = 40 mAdc, $I_E$ = 0) | $V_{(BR)CBO}$ | 55 | — | — | Vdc |
| Emitter–Base Breakdown Voltage ($I_E$ = 2.5 mAdc, $I_C$ = 0) | $V_{(BR)EBO}$ | 4.0 | — | — | Vdc |
| Collector Cutoff Current (VCE = 28 Vdc, $V_{BE}$ = 0) | $I_{CES}$ | — | — | 2.5 | mAdc |
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain ($I_{CE}$ = 0.2 Adc, $V_{CE}$ = 5.0 Vdc) | $h_{FE}$ | 20 | — | 80 | — |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Output Capacitance ($V_{CB}$= 28 Vdc, f = 1.0 MHz) | $C_{ob}$ | 11 | — | — | pf |
| **FUNCTIONAL TESTS** | | | | | |
| Common–Base Amplifier Power Gain ($V_{CC}$ = 28 Vdc, $P_{out}$ = 6 Watts, f = 1600/1640 MHz) | $G_{pe}$ | 7.4 | — | — | dB |
| Collector Efficiency ($V_{CC}$ = 28 Vdc, $P_{out}$ = 6 Watts, f = 1600/1640 MHz) | $\eta$ | 40 | 45 | — | % |
| Return Loss ($V_{CC}$ = 28 Vdc, $P_{out}$ = 6 Watts, f = 1600/1640 MHz) | $I_{RL}$ | — | 8.0 | — | dB |
| Output Mismatch Stress ($V_{CC}$ = 28 Vdc, $P_{out}$ = 6 Watts, f = 1600 MHz, Load 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″, $\varepsilon_r$ = 2.55″, 2.0 oz. Copper

| | | | |
|---|---|---|---|
| B1 | Fair Rite Bead on #24 Wire | C4 | 47 µF, 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 µF, Dipped Mica Cap | L3 | 9 Turns, #24 Enamel |
| C3 | 0.1 µF, Chip Cap | R1 | 82 Ω, 1.0 W, Carbon Resistor |

**Figure 1. MRF16006 Test Fixture Schematic**





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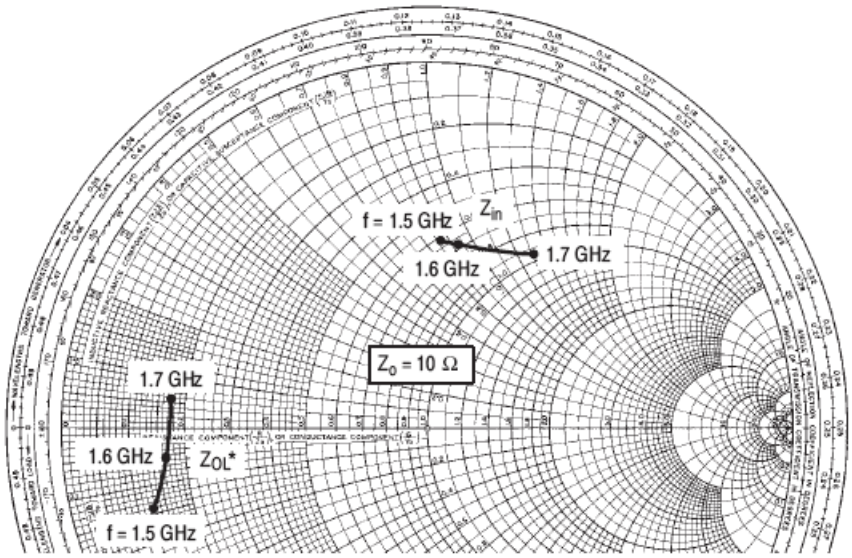


$V_{CC}$ = 28 Vdc, $P_{out}$ = 6 W

| 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**





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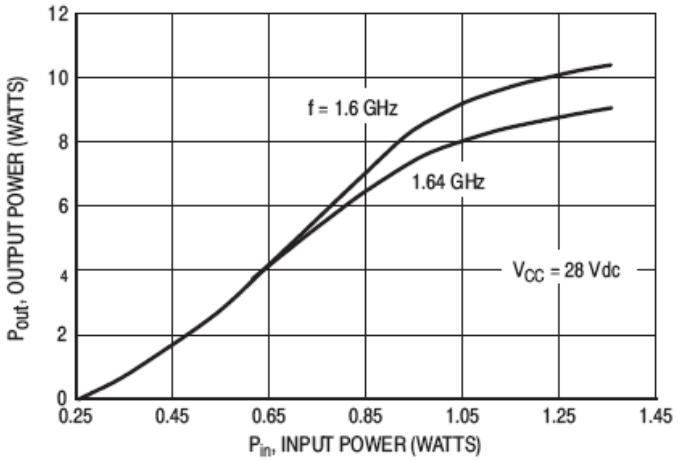
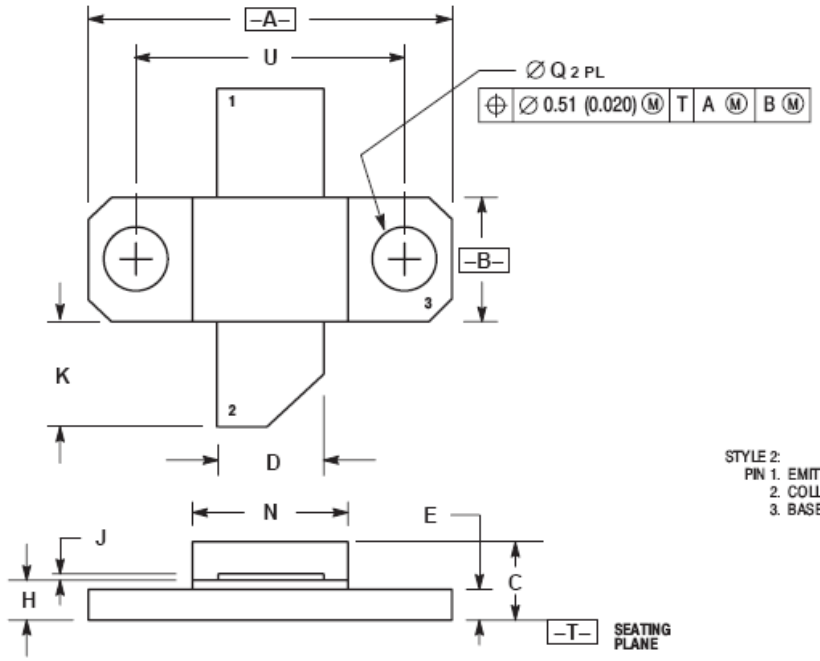



**Figure 3. Output Power versus Input Power**

## 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





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