

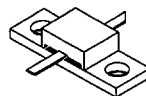
## The RF Line Microwave Power Transistor

... designed primarily for wideband, large-signal output and driver amplifier stages in the 1.4 to 1.7 GHz frequency range.

- Designed for Class C, Common Base Power Amplifiers
- Specified 28 Volt, 1.7 GHz Characteristics:  
Output Power — 2.0 to 25 Watts  
Power Gain — 7.0 to 8.0 dB Min  
Collector Efficiency — 40 to 45% Min
- Built-In Matching Network for Broadband Operation
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors

**MRA1417-6**

7.0 to 8.0 dB  
1.4 to 1.7 GHz  
**2.0 TO 25 WATT'S BROADBAND  
MICROWAVE POWER TRANSISTOR**



**CASE 394, STYLE 1  
(MRA .25)**

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Base Voltage	$V_{CES}$	50	Vdc
Emitter-Base Voltage	$V_{EBO}$	3.5	Vdc
Collector Current — Continuous	$I_C$	1.0	Adc
Operating Junction Temperature	$T_J$	200	°C
Storage Temperature Range	$T_{stg}$	-65 to +150	°C

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, RF, Junction to Case	$R_{\theta JC}$	8.0	°C/W

### ELECTRICAL CHARACTERISTICS

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

#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ( $I_C = 40$ mA, $V_{BE} = 0$ )	$V_{(BR)CES}$	50	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 0.5$ mA, $I_C = 0$ )	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 28$ V, $I_E = 0$ )	$I_{CBO}$	—	—	1.0	mAdc

#### ON CHARACTERISTICS

DC Current Gain ( $I_C = 0.2$ A, $V_{CE} = 5.0$ V)	$h_{FE}$	10	—	100	—
---	----------	----	---	-----	---

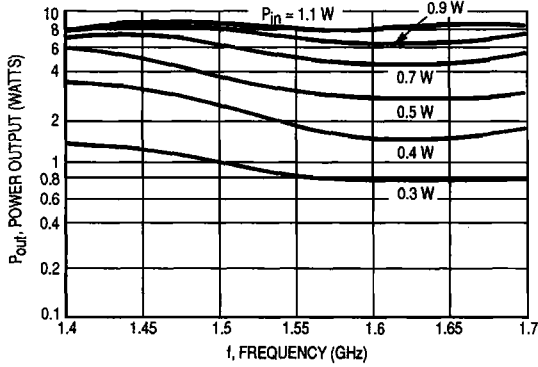
#### DYNAMIC CHARACTERISTICS

Output Capacitance ( $V_{CB} = 28$ V, $I_E = 0$ , $f = 1.0$ MHz)	$C_{ob}$	—	—	8.0	pF
---	----------	---	---	-----	----

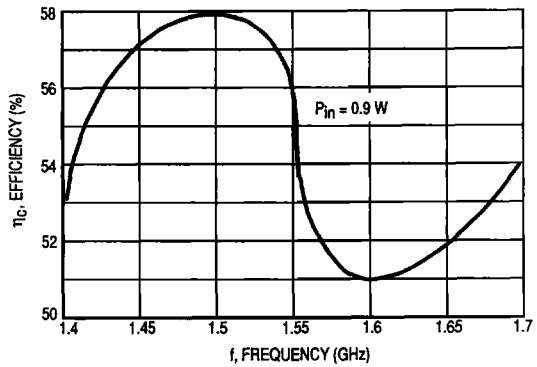
#### FUNCTIONAL TESTS

Common-Base Amplifier Power Gain ( $V_{CE} = 28$ V, $P_{out} = 6.0$ W, $f = 1.4$ & $1.7$ GHz)	$G_{PB}$	7.4	—	—	dB
Collector Efficiency ( $V_{CE} = 28$ V, $P_{out} = 6.0$ W, $f = 1.4$ & $1.7$ GHz)	$\eta_c$	40	—	—	%

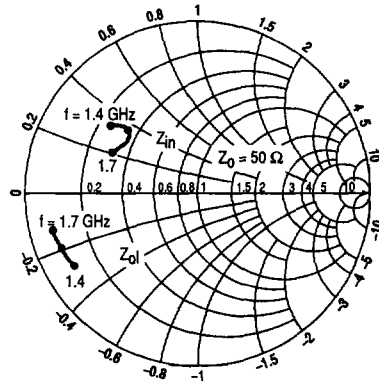
# **TYPICAL CHARACTERISTICS** **MRA1417-6 — 6.0 WATTS BROADBAND**



**Figure 1. Power Output versus Frequency**

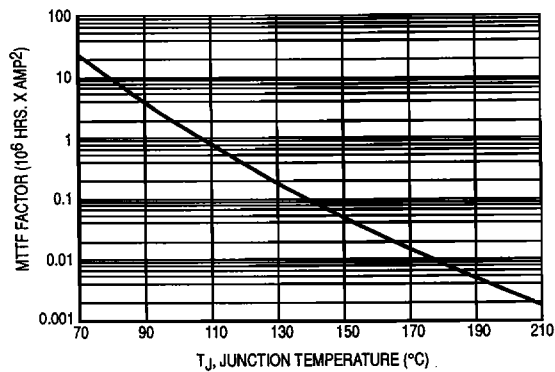


**Figure 2. Efficiency versus Frequency**

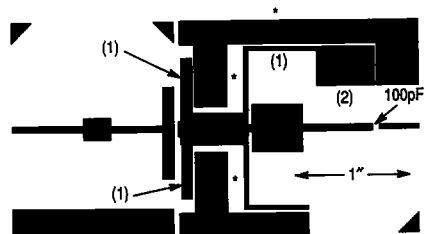


**Figure 3. Series Equivalent Input/Output Impedance**  
**VCC = 28 V**

The graph shown below displays MTTF in hours x ampere<sup>2</sup> emitter current for each of the devices. Life tests at elevated temperatures have correlated to better than  $\pm 10\%$  to the theoretical prediction for metal failure. Sample MTTF calculations based on operating conditions are included below.



**Figure 4. MTTF Factor**  
(Normalized to 1.0 Ampere<sup>2</sup> Continuous Duty)



Board material: 18 mil dielectric thickness teflon fiberglass.  
 \*Ground through to backside ground plane.  
 (1) Bypass 100 pF chip capacitor.  
 (2) V<sub>CC</sub> bypassed by 0.1  $\mu$ F chip and 5.0  $\mu$ F electrolytic.

**Figure 5. Test Circuit Boards (Not to Scale)**