

## The RF Line

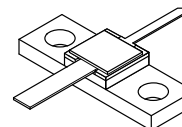
# Microwave Power Transistor

... designed for CW and long pulsed common base amplifier applications, such as JTIDS and Mode S, in the 0.96 to 1.215 GHz frequency range at high overall duty cycles.

- Guaranteed Performance @ 1.215 GHz, 28 Vdc  
Output Power = 5.0 Watts CW  
Minimum Gain = 8.5 dB, 10.3 dB (Typ)
- RF Performance Curves given for 28 Vdc and 36 Vdc Operation
- 100% Tested for Load Mismatch at All Phase Angles with 10:1 VSWR
- Hermetically Sealed Industry Standard Package
- Silicon Nitride Passivated
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Internal Input Matching for Broadband Operation
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

**MRF10005**

**5.0 W, 960–1215 MHz  
MICROWAVE POWER  
TRANSISTOR  
NPN SILICON**



**CASE 336E-02, STYLE 1**

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CES}$	55	Vdc
Collector–Base Voltage	$V_{CBO}$	55	Vdc
Emitter–Base Voltage	$V_{EBO}$	3.5	Vdc
Collector Current — Continuous (1)	$I_C$	1.25	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ (1) Derate above $25^\circ\text{C}$	$P_D$	25 143	Watt mW/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +200	$^\circ\text{C}$
Junction Temperature	$T_J$	200	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (2)	$R_{\theta JC}$	7.0	$^\circ\text{C}/\text{W}$

#### NOTES:

1. These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.
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
<b>OFF CHARACTERISTICS</b>					
Collector–Emitter Breakdown Voltage ( $I_C = 25\text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	55	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 25\text{ mAdc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	55	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 0.5\text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 28\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	1.0	mAdc

**ON CHARACTERISTICS**

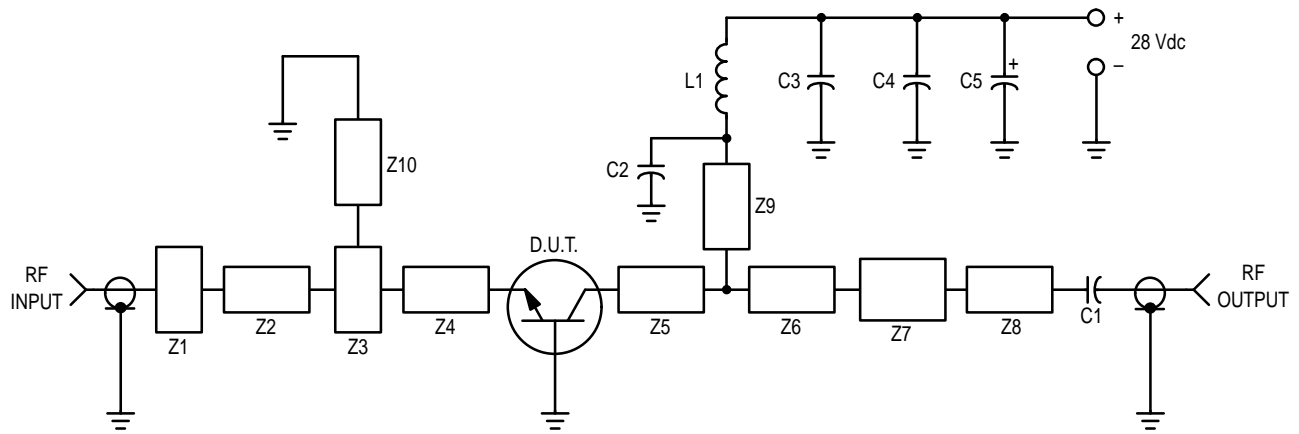
DC Current Gain ( $I_C = 500\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	20	—	100	—
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**DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 28\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	7.0	10	pF
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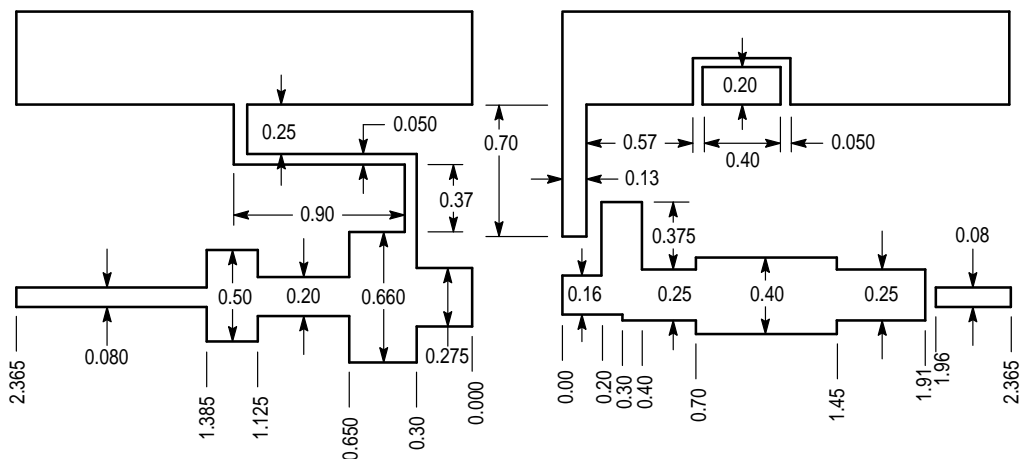
**FUNCTIONAL TESTS**

Common–Base Amplifier Power Gain ( $V_{CC} = 28\text{ Vdc}$ , $P_{Out} = 5.0\text{ W}$ , $f = 1215\text{ MHz}$ )	$G_{PB}$	8.5	10.3	—	dB
Collector Efficiency ( $V_{CC} = 28\text{ Vdc}$ , $P_{Out} = 5.0\text{ W}$ , $f = 1215\text{ MHz}$ )	$\eta$	45	55	—	%
Load Mismatch ( $V_{CC} = 28\text{ Vdc}$ , $P_{Out} = 5.0\text{ W}$ , $f = 1215\text{ MHz}$ , $VSWR = 10:1$ All Phase Angles)	$\psi$	No Degradation in Output Power			



C1, C2, C3 — 220 pF 100 mil Chip Capacitor  
 C4 — 0.1  $\mu\text{F}$   
 C5 — 47  $\mu\text{F}/50\text{ V}$  Electrolytic  
 L1 — 3 turn #18 AWG, 1/8" ID, 0.18" Long

Z1–Z10 — Microstrip, see details below  
 Board Material — 0.030" Glass Teflon,  
 2.0 oz. Copper,  $\epsilon_r = 2.55$



**Figure 1. Test Circuit**

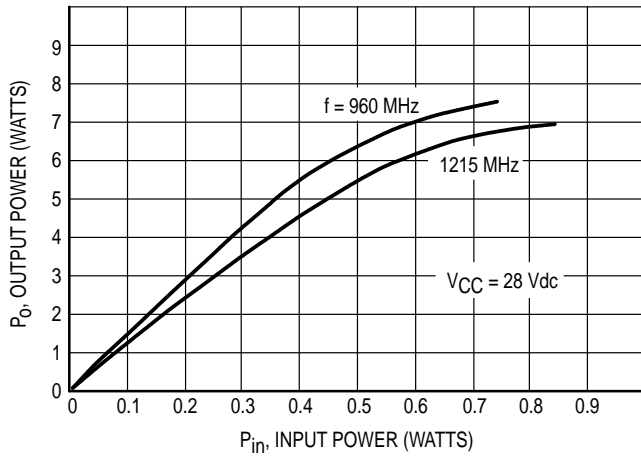


Figure 2. Output Power versus Input Power

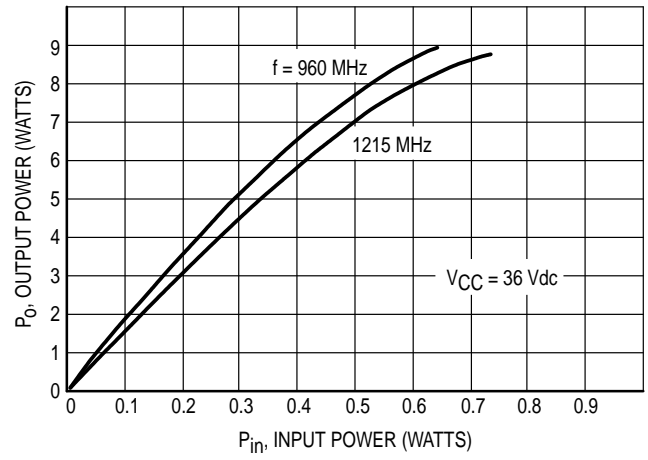


Figure 3. Output Power versus Input Power

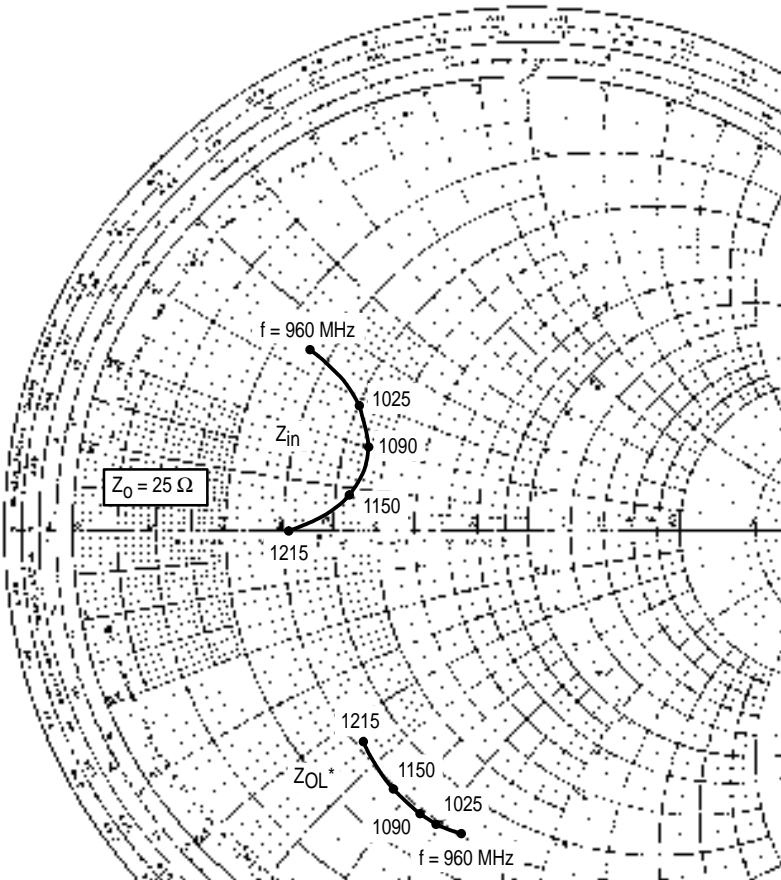


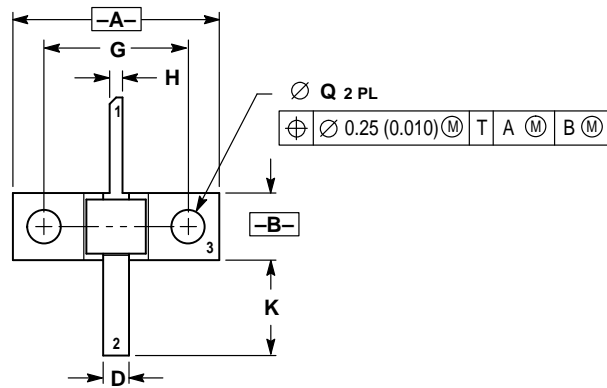
Figure 4. Series Equivalent Input/Output Impedances

$P_{out} = 5\text{ W}, V_{CC} = 28\text{ V}$

f MHz	$Z_{in}$ OHMS	$Z_{OL}^*$ OHMS
960	$6.5 + j8.5$	$7.4 - j18.9$
1025	$10.0 + j7.0$	$7.2 - j17.4$
1090	$11.2 + j4.9$	$7.1 - j16.3$
1150	$10.8 + j2.0$	$7.15 - j14.3$
1215	$7.8 + j0.0$	$7.8 - j11.2$

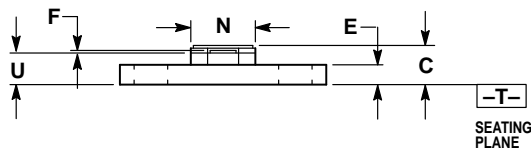
$Z_{OL}^*$  = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

# PACKAGE DIMENSIONS



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.790	0.810	20.07	20.57
B	0.253	0.267	6.43	6.78
C	0.144	0.160	3.66	4.06
D	0.093	0.107	2.37	2.71
E	0.074	0.080	1.88	2.03
F	0.002	0.006	0.06	0.15
G	0.560 BSC		14.22 BSC	
H	0.043	0.057	1.10	1.44
K	0.346	0.394	8.79	10.10
N	0.243	0.257	6.18	6.52
Q	0.125	0.135	3.18	3.42
U	0.117	0.128	2.98	3.25



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

## CASE 336E-02 ISSUE B

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MRF10005/D

