

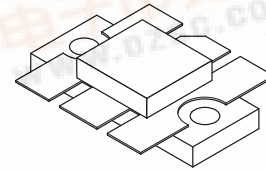
## The RF Line NPN Silicon RF Power Transistor

... designed primarily for wideband large-signal output and driver amplifier stages in the 100 to 500 MHz frequency range.

- Specified 28 Volt, 400 MHz Characteristics —  
Output Power = 100 Watts  
Minimum Gain = 7.0 dB  
Efficiency = 50% (Min)
- Built-In Matching Network for Broadband Operation Using Double Match Technique
- 100% Tested for Load Mismatch at all Phase Angles with 3:1 VSWR
- Gold Metallization System for High Reliability

**MRF329**

**100 W, 100 to 500 MHz  
CONTROLLED "Q"  
BROADBAND RF POWER  
TRANSISTOR  
NPN SILICON**



**CASE 333-04, STYLE 1**

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	30	Vdc
Collector-Base Voltage	$V_{CBO}$	60	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous — Peak	$I_C$	9.0 12	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above $25^\circ\text{C}$	$P_D$	270 1.54	Watts $W/^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (2)	$R_{\theta JC}$	0.65	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ( $I_C = 80 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	30	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 80 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 8.0 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc

### NOTES:

(continued)

- This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.
- Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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

Characteristic	Symbol	Min	Typ	Max	Unit
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## **OFF CHARACTERISTICS (continued)**

Collector–Base Breakdown Voltage ( $I_C = 80\text{ mAdc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	60	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	5.0	mAdc

## **ON CHARACTERISTICS**

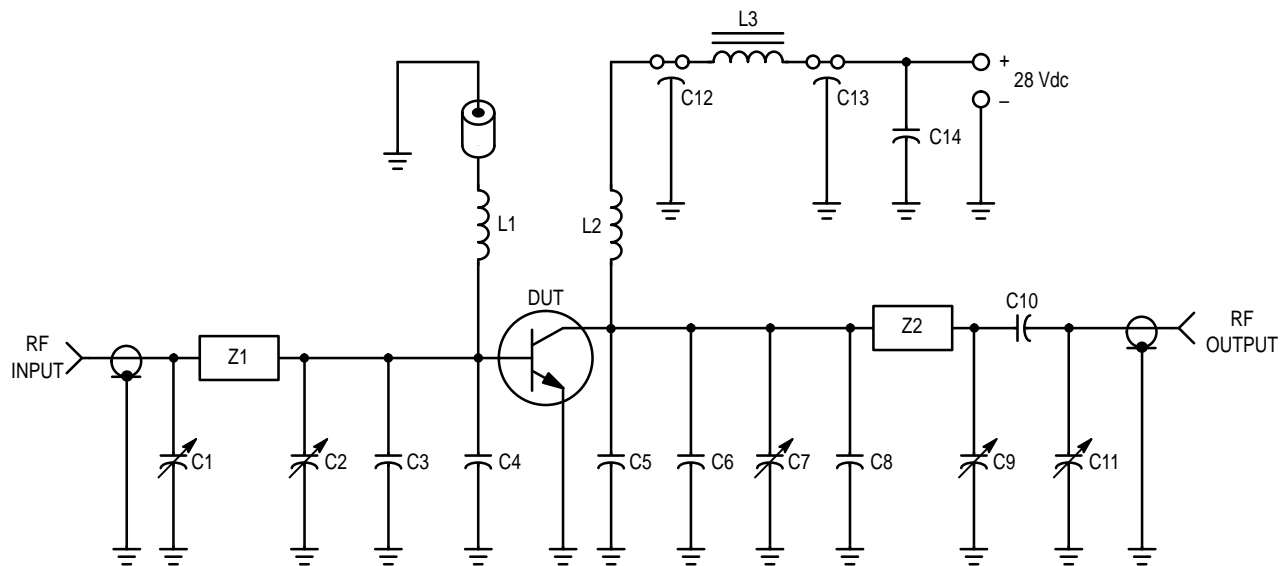
DC Current Gain ( $I_C = 4.0\text{ Adc}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	20	—	80	—
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## **DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 28\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	95	125	pF
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## **FUNCTIONAL TESTS** (Figure 1)

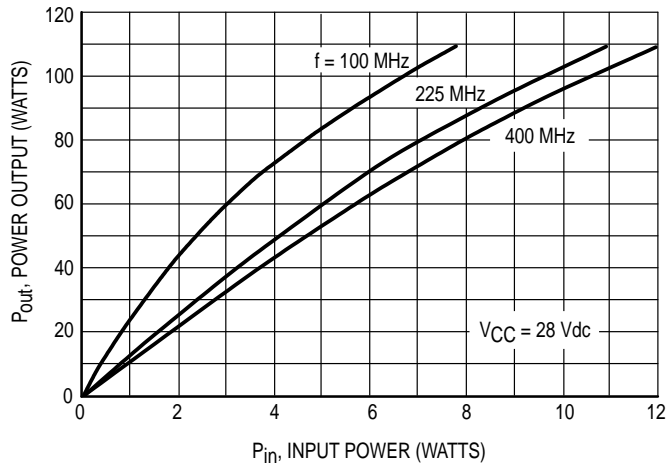
Common–Emitter Amplifier Power Gain ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 100\text{ W}$ , $f = 400\text{ MHz}$ )	$G_{PE}$	7.0	9.7	—	dB
Collector Efficiency ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 100\text{ W}$ , $f = 400\text{ MHz}$ )	$\eta$	50	60	—	%
Load Mismatch ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 100\text{ W}$ , $f = 400\text{ MHz}$ , $VSWR = 3:1$ all angles)	$\psi$	No Degradation in Output Power			



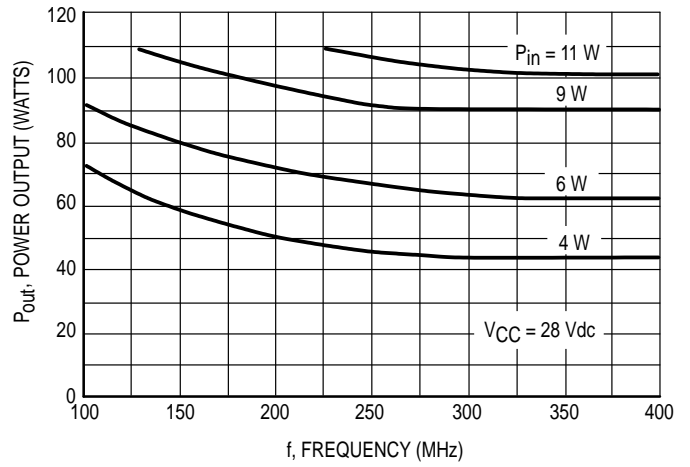
C1, C2, C7, C9 — 1.0–20 pF Johanson (JMC 5501)  
 C3, C4 — 36 pF 100 mil Chip Cap (ATC)  
 C5, C6 — 50 pF 100 mil Chip Cap (ATC)  
 C8 — 30 pF 100 mil Chip Cap (ATC)  
 C10 — 2.0–150 pF 100 mil Chip Caps in Parallel (ATC)  
 C11 — 1.0–10 pF Johanson (JMC 5201)  
 C12, C13 — 1000 pF UNELCO Feedthru  
 C14 — 0.1  $\mu\text{F}$  Erie Redcap

L1 — 0.15  $\mu\text{H}$  Molded Choke with Ferrite Bead  
 (Ferroxcube #56–590–65/4B) on Ground End  
 L2 — 4 Turns #18 AWG, 1/4" ID  
 L3 — Ferroxcube VK200–19/4B  
 Z1 — Microstrip Line 2300 mils L x 210 mils W  
 Z2 — Microstrip Line 2300 mils L x 280 mils W  
 Board — Glass Teflon,  $t = 0.062''$ ,  $\epsilon_r = 2.56$

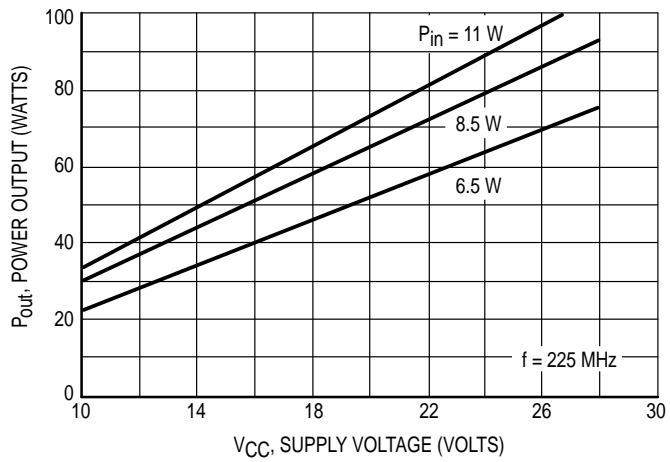
**Figure 1. 400 MHz Test Circuit**



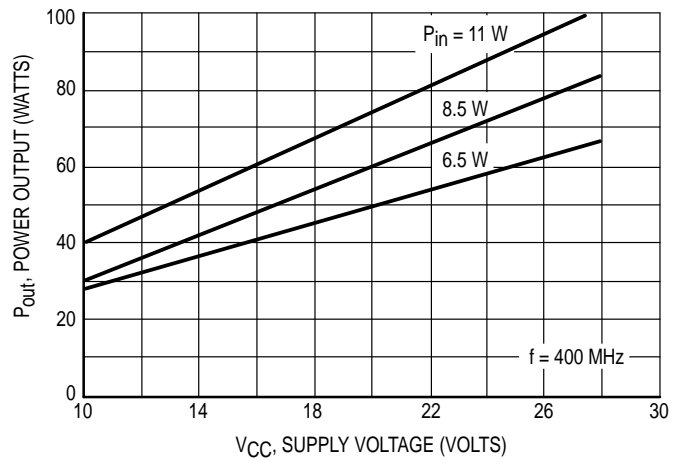
**Figure 2. Output Power versus Input Power**



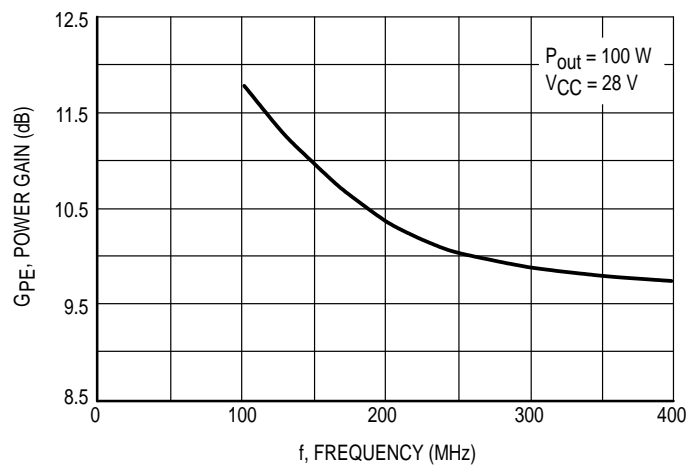
**Figure 3. Output Power versus Frequency**



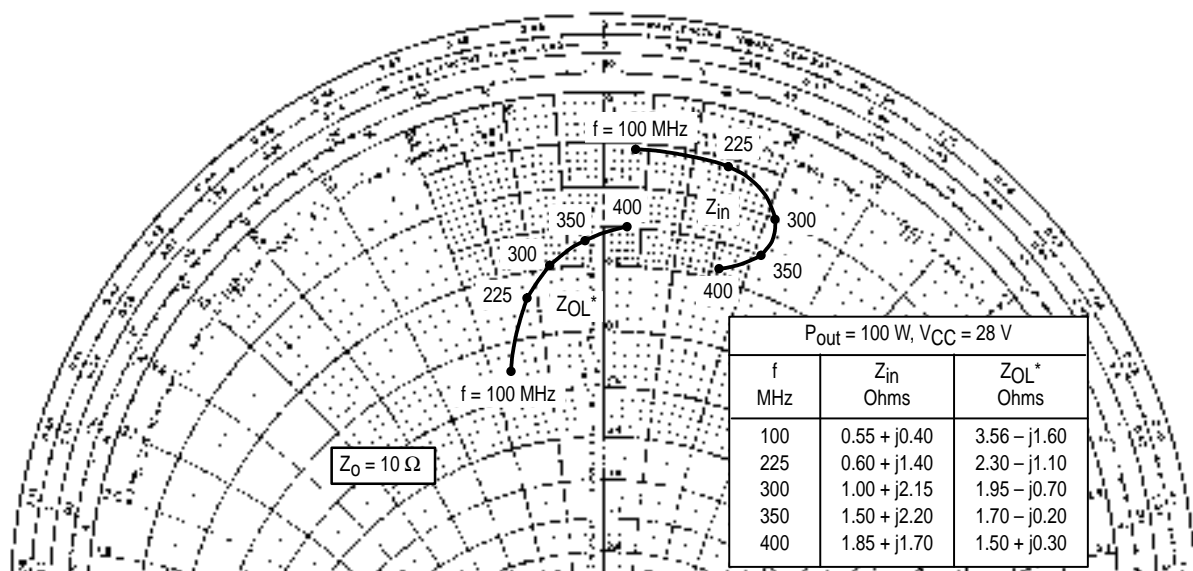
**Figure 4. Output Power versus Supply Voltage**



**Figure 5. Output Power versus Supply Voltage**



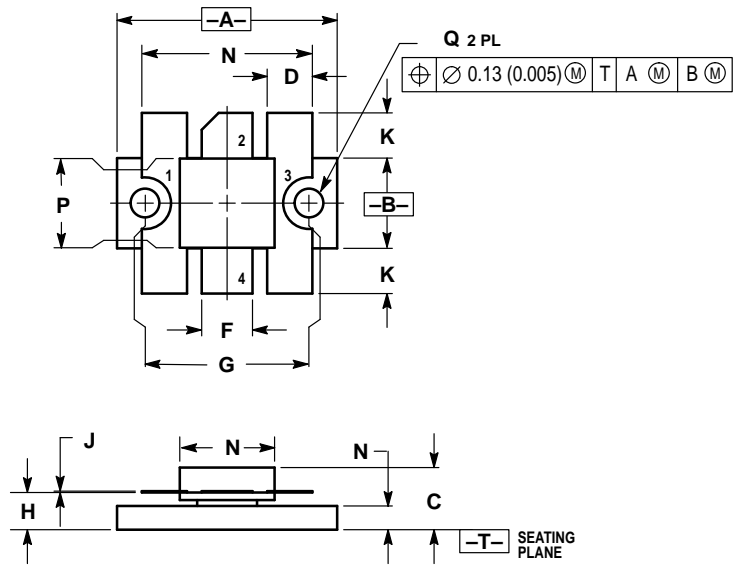
**Figure 6. Power Gain versus Frequency**



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

**Figure 7. Series Equivalent Input/Output Impedance**

PACKAGE DIMENSIONS




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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.965	0.985	24.51	25.02
B	0.390	0.410	9.91	10.41
C	0.250	0.290	6.73	7.36
D	0.190	0.210	4.83	5.33
E	0.095	0.115	2.42	2.92
F	0.215	0.235	5.47	5.96
G	0.725 BSC		18.42 BSC	
H	0.155	0.175	3.94	4.44
J	0.004	0.006	0.10	0.15
K	0.195	0.205	4.95	5.21
L	0.740	0.770	18.80	19.55
N	0.415	0.425	10.54	10.80
P	0.390	0.400	9.91	10.16
Q	0.120	0.135	3.05	3.42

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

CASE 333-04  
ISSUE E

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MP5000D