

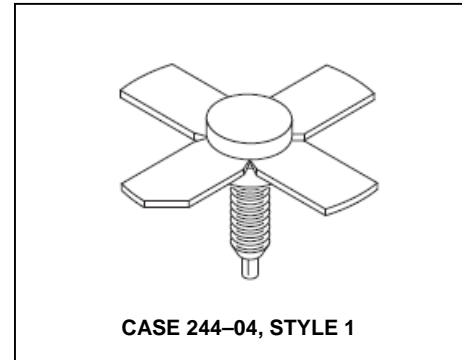
## The RF Line NPN Silicon Power Transistor 10W, 400MHz, 28V

M/A-COM Products  
Released - Rev. 07.07

Designed primarily for wideband large-signal driver and predriver amplifier stages in 200–500 MHz frequency range.

- Guaranteed performance at 400 MHz, 28 Vdc  
Output power = 10 W  
Power gain = 12 dB min.  
Efficiency = 50% min.
- 100% tested for load mismatch at all phase angles with 30:1 VSWR
- Gold metallization system for high reliability
- Computer-controlled wirebonding gives consistent input impedance

### Product Image



### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	33	Vdc
Collector–Base Voltage	$V_{CBO}$	60	Vdc
Emitter–Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous — Peak	$I_C$	1.1 1.5	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ (1) Derate above $25^\circ\text{C}$	$P_D$	27 160	Watts mW/°C

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	6.4	°C/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 ( $I_C = 20$ mAdc, $I_B = 0$ )	$V_{(BR)CEO}$	33	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 20$ mAdc, $V_{BE} = 0$ )	$V_{(BR)CES}$	60	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 20$ mAdc, $I_E = 0$ )	$V_{(BR)CBO}$	60	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 2.0$ mAdc, $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30$ Vdc, $I_E = 0$ )	$I_{CBO}$	—	—	1.0	mAdc

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 500$ mA, $V_{CE} = 5.0$ Vdc)	$h_{FE}$	20	—	80	—
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NOTE:

1. This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.

(continued)

**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.

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

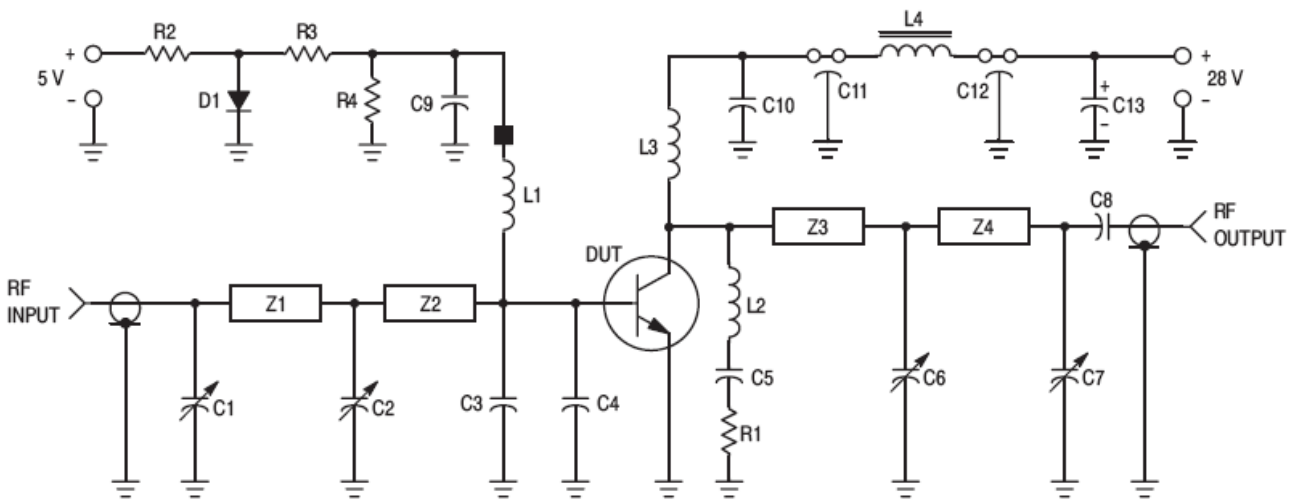
Characteristic	Symbol	Min	Typ	Max	Unit
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#### DYNAMIC CHARACTERISTICS

Output Capacitance ( $V_{CB} = 28\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	10	12	pF
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#### FUNCTIONAL TESTS (Figure 1)

Common-Emitter Amplifier Power Gain ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 10\text{ W}$ , $f = 400\text{ MHz}$ )	$G_{PE}$	12	13	—	dB
Collector Efficiency ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 10\text{ W}$ , $f = 400\text{ MHz}$ )	$\eta$	50	60	—	%
Load Mismatch ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 10\text{ W}$ , $f = 400\text{ MHz}$ , VSWR = 30:1 all phase angles)	$\psi$	No Degradation in Output Power			



C1, C2, C3 — 1.0–20 pF Johanson Trimmer (JMC 5501)  
 C3, C4 — 47 pF ATC Chip Capacitor  
 C5, C10 — 0.1  $\mu\text{F}$  Erie Redcap  
 C7 — 0.5–10 pF Johanson Trimmer (JMC 5201)  
 C8 — 0.018  $\mu\text{F}$  Vitramon Chip Capacitor  
 C9 — 200 pF UNELCO Capacitor  
 C11, C12 — 680 pF Feedthru  
 C13 — 1.0  $\mu\text{F}$ , 50 Volt Tantalum Capacitor  
 D1 — 1N4001  
 L1 — 0.33  $\mu\text{H}$  Molded Choke with Ferroxcube Bead  
 (Ferroxcube 56–590–65/4B) on Ground End of Coil  
 L2 — 4 Turns #20 Enamel, 1/8" ID

L3 — 6 Turns #20 Enamel, 1/4" ID  
 L4 — Ferroxcube VK200–19/4B  
 R1 — 5.1  $\Omega$ , 1/4 Watt  
 R2 — 120  $\Omega$ , 1.0 Watt  
 R3 — 20  $\Omega$ , 1/2 Watt  
 R4 — 47  $\Omega$ , 1/2 Watt  
 Z1 — Microstrip 0.1" W x 1.35" L  
 Z2 — Microstrip 0.1" W x 0.55" L  
 Z3 — Microstrip 0.1" W x 0.8" L  
 Z4 — Microstrip 0.1" W x 1.75" L  
 Board — Glass Teflon,  $\epsilon_R = 2.56$ ,  $t = 0.062$ "  
 Input/Output Connectors — Type N

Figure 1. 400 MHz Test Circuit Schematic

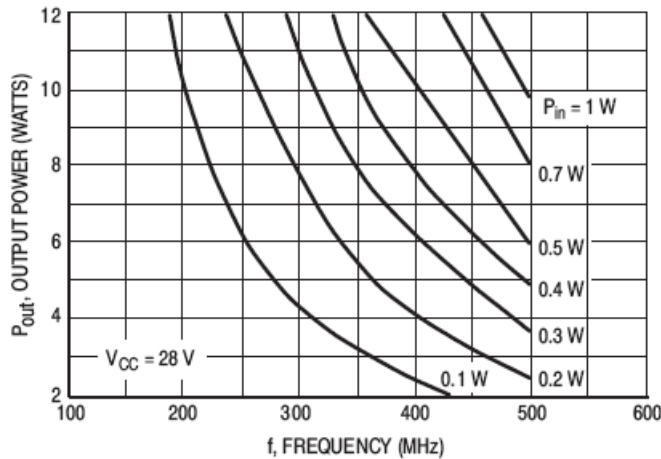


Figure 2. Output Power versus Frequency

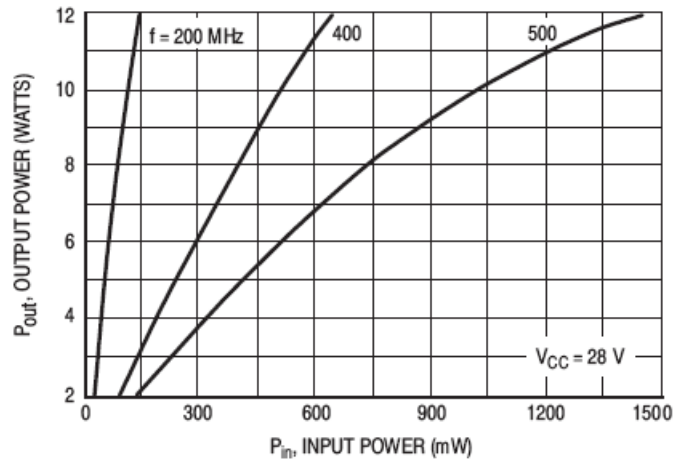


Figure 3. Output Power versus Input Power

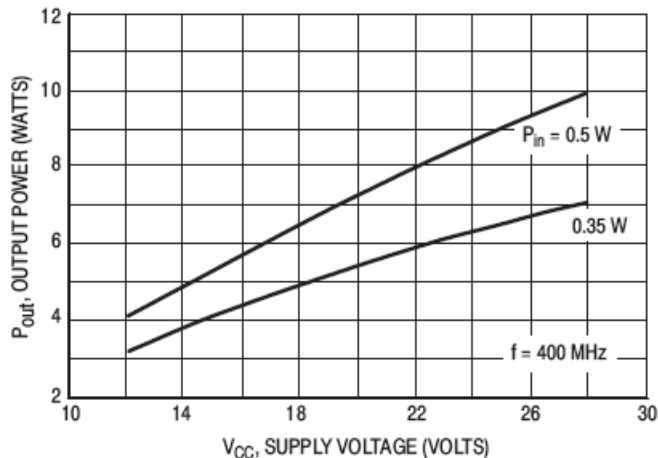


Figure 4. Output Power versus Supply Voltage

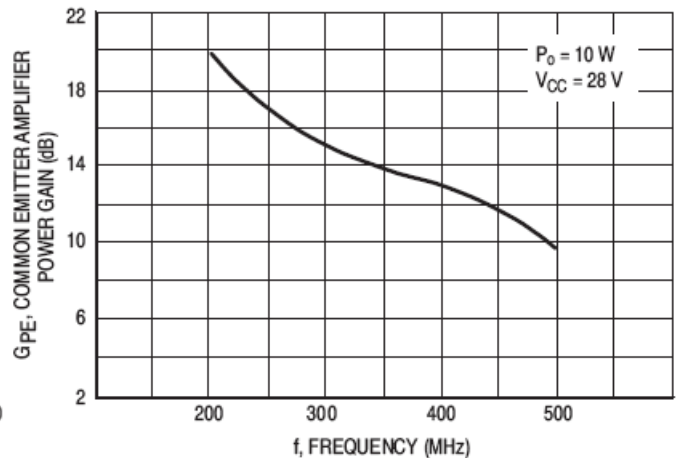


Figure 5. Power Gain versus Frequency

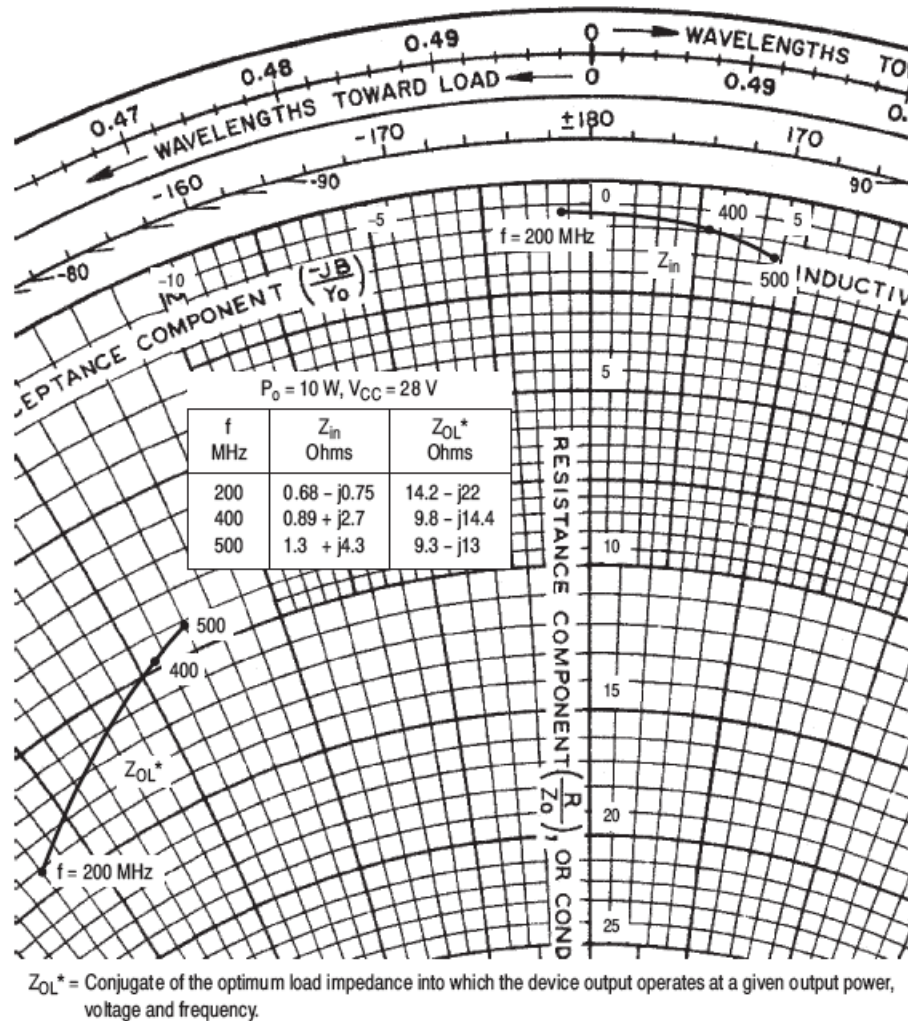


Figure 6. Series Equivalent Impedance

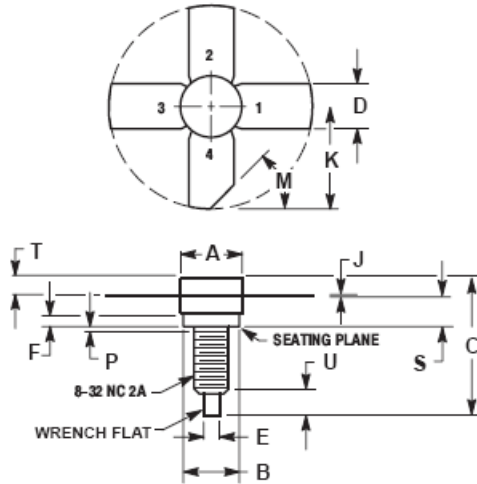
# MRF321



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## PACKAGE DIMENSIONS



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	7.06	7.26	0.278	0.286
B	6.20	6.50	0.244	0.256
C	14.99	16.51	0.590	0.650
D	5.46	5.96	0.215	0.235
E	1.40	1.65	0.055	0.065
G	1.52	---	0.060	---
J	0.08	0.17	0.003	0.007
K	11.05	---	0.435	---
M	45° NOM		45° NOM	
P	---	1.27	---	0.050
S	3.00	3.25	0.118	0.128
T	1.40	1.77	0.055	0.070
U	2.92	3.68	0.115	0.145

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

CASE 244-04  
ISSUE J