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MRF321



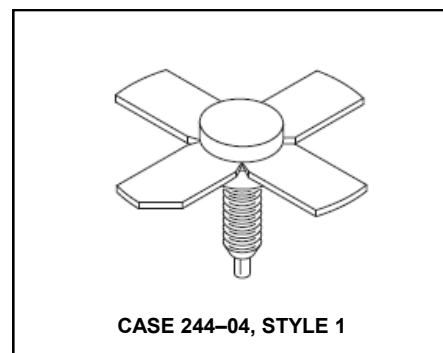
The RF Line NPN Silicon Power Transistor 10W, 400MHz, 28V

Rev. V1

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°C | P_D | 27 160 | Watts mW/ $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|-----------------|-----|--------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 6.4 | $^\circ\text{C/W}$ |

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

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

OFF CHARACTERISTICS

| | | | | | |
|--|---------------|-----|---|-----|------|
| Collector–Emitter Breakdown Voltage ($I_C = 20\text{ mAdc}$, $I_B = 0$) | $V_{(BR)CEO}$ | 33 | — | — | Vdc |
| Collector–Emitter Breakdown Voltage ($I_C = 20\text{ mAdc}$, $V_{BE} = 0$) | $V_{(BR)CES}$ | 60 | — | — | Vdc |
| Collector–Base Breakdown Voltage ($I_C = 20\text{ mAdc}$, $I_E = 0$) | $V_{(BR)CBO}$ | 60 | — | — | Vdc |
| Emitter–Base Breakdown Voltage ($I_E = 2.0\text{ mAdc}$, $I_C = 0$) | $V_{(BR)EBO}$ | 4.0 | — | — | Vdc |
| Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$) | I_{CBO} | — | — | 1.0 | mAdc |

ON CHARACTERISTICS

| | | | | | |
|--|----------|----|---|----|---|
| DC Current Gain ($I_C = 500\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$) | h_{FE} | 20 | — | 80 | — |
|--|----------|----|---|----|---|

NOTE:

(continued)

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

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

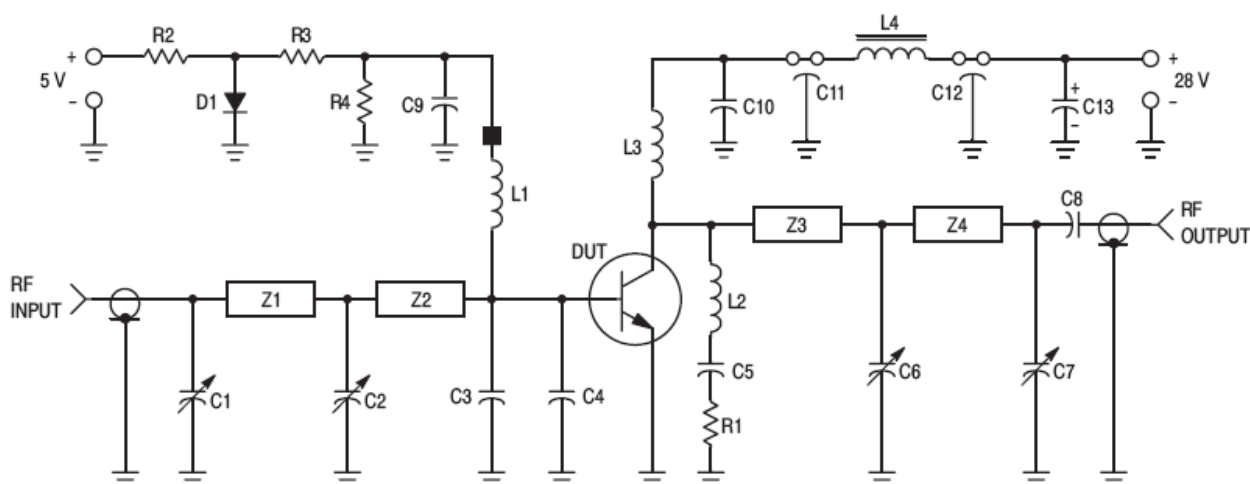
| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

DYNAMIC CHARACTERISTICS

| | | | | | |
|---|----------|---|----|----|----|
| Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$) | C_{ob} | — | 10 | 12 | pF |
|---|----------|---|----|----|----|

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 ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 10\text{ W}$, $f = 400\text{ MHz}$) | η | 50 | 60 | — | % |
| Load Mismatch ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 10\text{ W}$, $f = 400\text{ MHz}$, VSWR = 30:1 all phase angles) | ψ | 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 μF Erie Redcap
C7 — 0.5–10 pF Johanson Trimmer (JMC 5201)
C8 — 0.018 μF Vitramon Chip Capacitor
C9 — 200 pF UNELCO Capacitor
C11, C12 — 680 pF Feedthru
C13 — 1.0 μF , 50 Volt Tantalum Capacitor
D1 — 1N4001
L1 — 0.33 μH 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 Ω , 1/4 Watt
R2 — 120 Ω , 1.0 Watt
R3 — 20 Ω , 1/2 Watt
R4 — 47 Ω , 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

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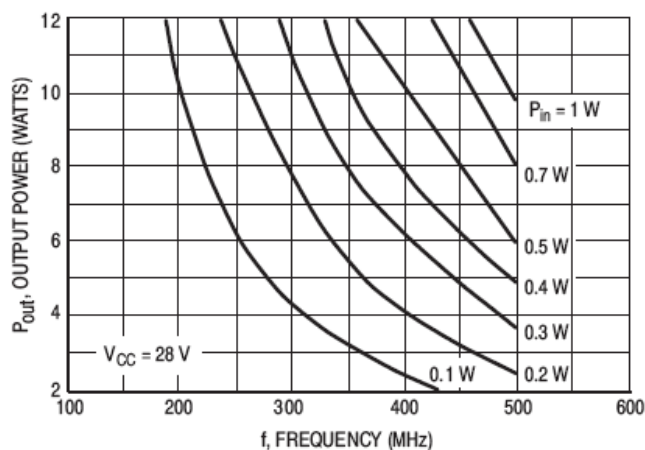


Figure 2. Output Power versus Frequency

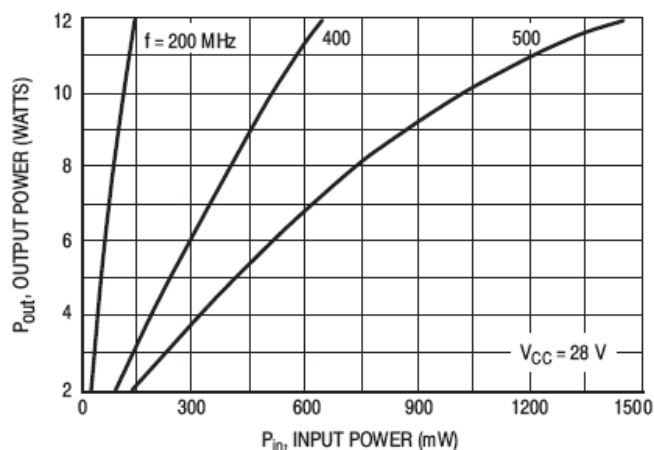


Figure 3. Output Power versus Input Power

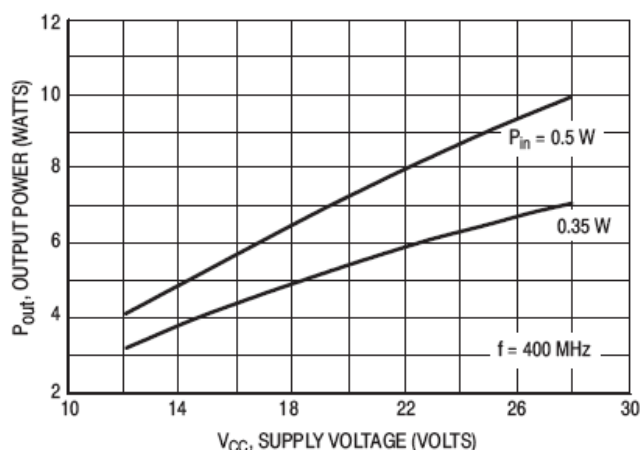


Figure 4. Output Power versus Supply Voltage

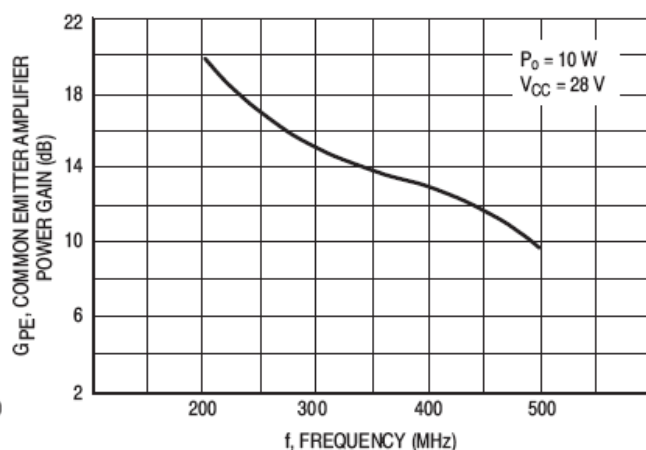


Figure 5. Power Gain versus Frequency

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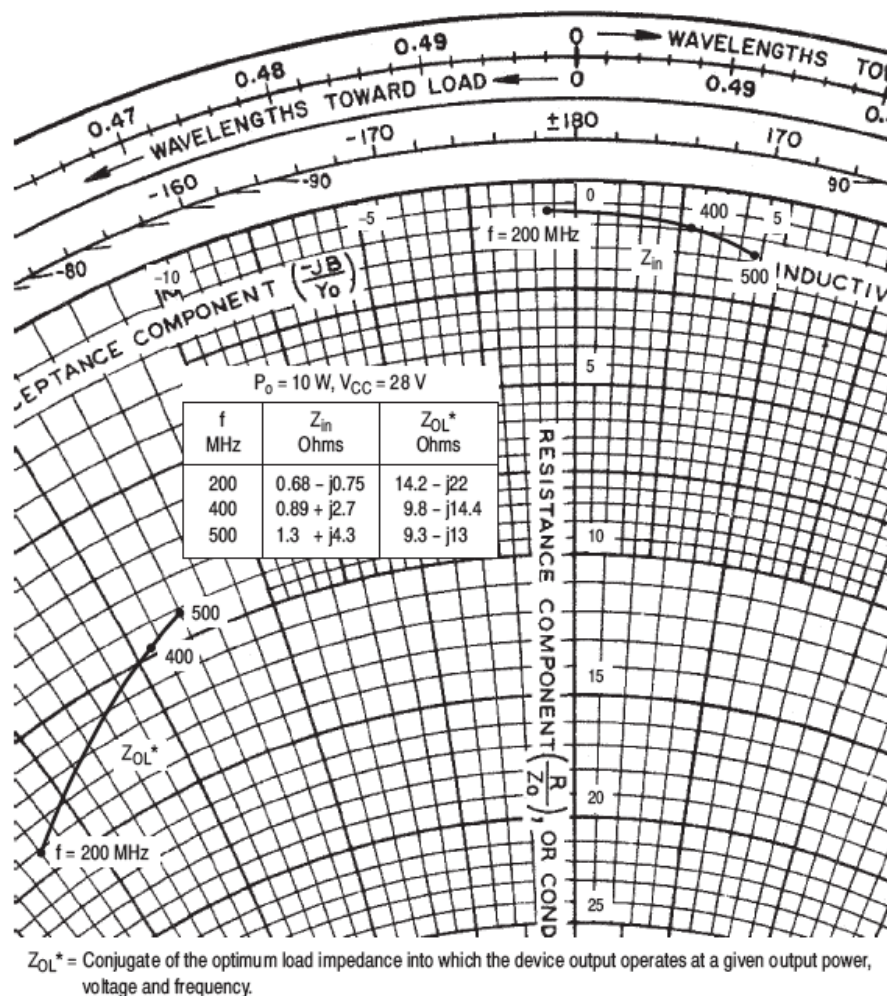


Figure 6. Series Equivalent Impedance

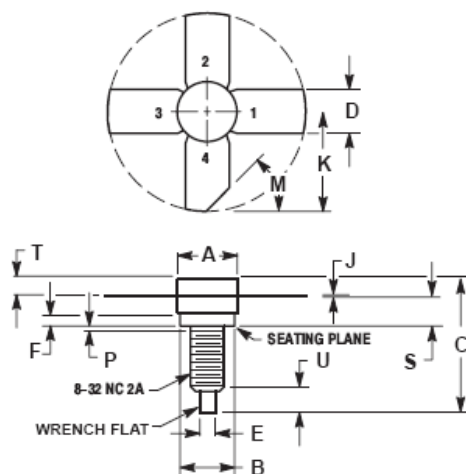
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PACKAGE DIMENSIONS



| 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 |

STYLE1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

CASE 244-04
ISSUE J

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