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

### MAXIMUM RATINGS

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

### THERMAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Resistance, Junction to Case</td>
<td>( R_{JAC} )</td>
<td>6.4</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

### ELECTRICAL CHARACTERISTICS (\( T_C = 25\,^\circ C \) unless otherwise noted)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector–Emitter Breakdown Voltage (( I_C = 20 , mA, , I_E = 0 ))</td>
<td>( V_{(BR)CEO} )</td>
<td>33</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Emitter Breakdown Voltage (( I_C = 20 , mA, , V_{BE} = 0 ))</td>
<td>( V_{(BR)CES} )</td>
<td>60</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector–Base Breakdown Voltage (( I_C = 20 , mA, , I_E = 0 ))</td>
<td>( V_{(BR)CBO} )</td>
<td>60</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Emitter–Base Breakdown Voltage (( I_E = 2.0 , mA, , I_C = 0 ))</td>
<td>( V_{(BR)EBO} )</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
<td>Vdc</td>
</tr>
<tr>
<td>Collector Cutoff Current (( V_{CB} = 30 , Vdc, , I_E = 0 ))</td>
<td>( I_{CEO} )</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
<td>mAdc</td>
</tr>
</tbody>
</table>

### ON CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Current Gain (( I_C = 500 , mA, , V_{CE} = 5.0 , Vdc ))</td>
<td>( h_{FE} )</td>
<td>20</td>
<td>—</td>
<td>80</td>
<td>—</td>
</tr>
</tbody>
</table>

**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.
**MRF321**

**The RF Line NPN Silicon Power Transistor**

10W, 400MHz, 28V

**ELECTRICAL CHARACTERISTICS — continued** (Tc = 25°C unless otherwise noted.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Capacitance</td>
<td>( C_{ob} )</td>
<td>—</td>
<td>10</td>
<td>12</td>
<td>pF</td>
</tr>
</tbody>
</table>

**DYNAMIC CHARACTERISTICS**

| COMMON-EMITTER AMPLIFIER POWER GAIN | \( G_{PE} \) | 12 | 13 | — | dB |
| Collector Efficiency | \( \eta \) | 50 | 60 | — | % |
| Load Mismatch | \( \psi \) | No Degradation in Output Power |

**Figure 1. 400 MHz Test Circuit Schematic**

C1, C2, C3 — 1.0–20 pF Johannson Trimmer (JMC 5501)
C3, C4 — 47 pF ATC Chip Capacitor
C5, C10 — 0.1 µF Erié Redcap
C7 — 0.5–10 pF Johannson Trimmer (JMC 5201)
C9 — 0.018 µF Vtranam 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 56–590–65/48) on Ground End of Coil
L2 — 4 Turns #20 Enamel, 1/8” ID
L3 — 6 Turns #20 Enamel, 1/4” ID
L4 — Ferroxcube V/K200–19/4B
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 0.65” L
Z3 — Microstrip 0.1” W x 0.8” L
Z4 — Microstrip 0.1” W x 1.75” L
Board — Glass Teflon, \( e_r = 2.66, t = 0.062” \)
Input/Output Connectors — Type N
The RF Line NPN Silicon Power Transistor
10W, 400MHz, 28V

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

Figure 6. Series Equivalent Impedance
MRF321

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

PACKAGE DIMENSIONS

MILLIMETERS | INCHES
---|---
A | 7.69 | 0.302
B | 9.23 | 0.363
C | 14.99 | 0.590
D | 5.48 | 0.215
E | 1.49 | 0.058
F | 1.52 | 0.060
J | 0.69 | 0.027
K | 11.65 | 0.458
M | 45.00 x 45.00
P | 1.77 | 0.070
S | 3.64 | 0.143
T | 1.49 | 0.058
U | 3.64 | 0.143

STYLE I:
1. Emitter
2. Base
3. Emitter
4. Collector

CASE 244-04
ISSUE J
MRF321
The RF Line NPN Silicon Power Transistor
10W, 400MHz, 28V

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