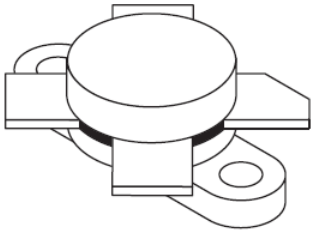
# RF Line NPN Silicon Power Transistor
# 150 W (PEP), 30 MHz, 28 V

**MRF422**
**Rev. V2**

## Features

- Specified 28 V, 30 MHz Characteristics:
  - Output Power = 150 W (PEP)
  - Minimum Gain = 10 dB
  - Efficiency = 40%
- Intermodulation Distortion @ 150 W (PEP), IMD = -30 dB (min.)
- 100% tested for load mismatch at all phase angles with 30:1 VSWR



**CASE 211–11, STYLE 1**

## Description

Designed primarily for applications as a high power linear amplifier from 2 to 30 MHz.

## Electrical Characteristics: $T_A$ = +25°C

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| **OFF Characteristics** | | | | | |
| Collector-Emitter Breakdown Voltage | $I_C$ = 200 mA, $I_B$ = 0<br>$I_C$ = 100 mA, $V_{BE}$ = 0 | V | 35<br>85 | — | — |
| Collector-Base Breakdown Voltage | $I_C$ = 100 mA, $I_E$ = 0 | V | 85 | — | — |
| Emitter-Base Breakdown Voltage | $I_E$ = 10 mA, $I_C$ = 0 | V | 3 | — | — |
| Collector Cutoff Current | $V_{CE}$ = 28 V, $V_{BE}$ = 0, $T_C$ = 25°C | mA | — | — | 20 |
| **ON Characteristics** | | | | | |
| DC Current Gain | $I_C$ = 5 A, $V_{CE}$ = 5 V | — | 15 | 30 | 120 |
| **DYNAMIC Characteristics** | | | | | |
| Output Capacitance | $V_{CB}$ = 28 V, $I_E$ = 0, 1 MHz | pF | — | 420 | — |

## Functional Tests:

$V_{CC}$ = 28 V, $P_{OUT}$ = 150 W (PEP), $I_{C(MAX)}$ = 6.7 A, $I_{CQ}$ = 150 mA, f = 30, 30.001 MHz

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Common-Emitter Amplifier Gain | — | dB | 10 | 13 | — |
| Collector Efficiency | — | % | — | 45 | — |
| Intermodulation Distortion[1] | — | dB | — | -33 | -30 |
| Output Power | 30 MHz | Watts (PEP) | 150 | — | — |

1. MIL-STD-1311 Version A, Test Method 2204, 2-Tone, Reference each tone.

## Absolute Maximum Ratings[2,3]

| Parameter | Absolute Maximum |
|---|---|
| Collector-Emitter Voltage | 40 V |
| Collector-Base Voltage | 85 V |
| Emitter-Base Voltage | 3 V |
| Collector Current - Continuous | 20 A |
| Withstanding Current | 30 A, 10 seconds |
| Total Device Dissipation @ $T_C$ = 25°C, Derate above 25°C | 290 W<br>1.66 W/°C |
| Storage Temperature | -65°C to +150°C |

2. Exceeding any one or combination of these limits may cause permanent damage to this device.
3. MACOM does not recommend sustained operation near these survivability limits.

## Thermal Characteristics

| Parameter | Absolute Maximum |
|---|---|
| Thermal Resistance, Junction to Case ($R_{\theta JC}$) | 0.6°C/W |

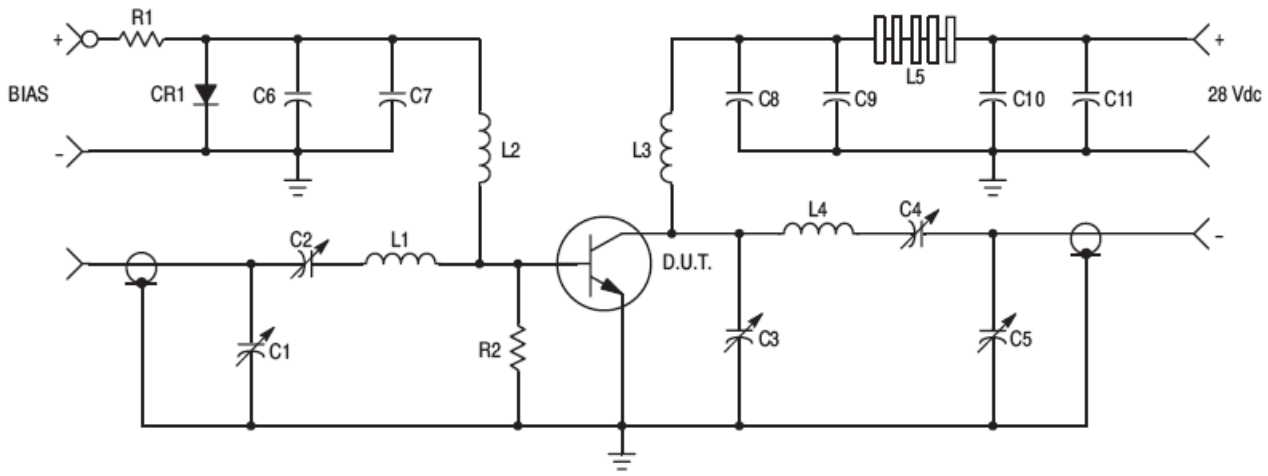
## Handling Procedures

Please observe the following precautions to avoid damage:

## Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Test Circuit Schematic, 30 MHz

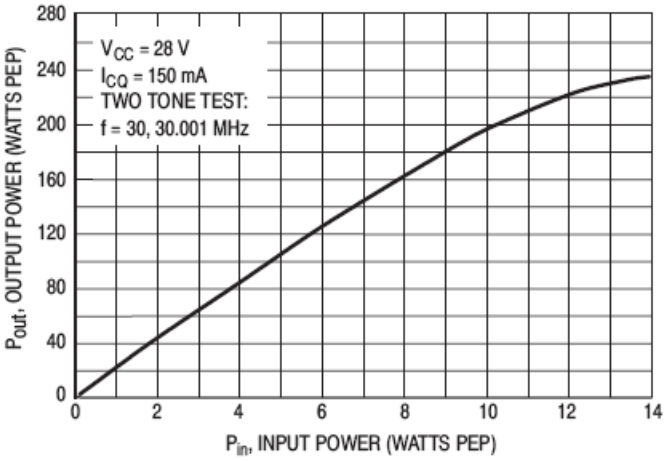



C1, C2, C3, C5 — 170–680 pF, ARCO 469
C4 — 80–480 pF, ARCO 466
C6, C8, C11 — ERIE 0.1 µF, 100 V
C7 — MALLORY 500 µF, 15 V Electrolytic
C9 — UNDERWOOD 1000 pF, 350 V
C10 — 10 µF, 50 V Electrolytic
R1 — 10 Ω, 25 Watt Wire Wound
R2 — 10 Ω, 1.0 Watt Carbon
CR1 — 1N4997

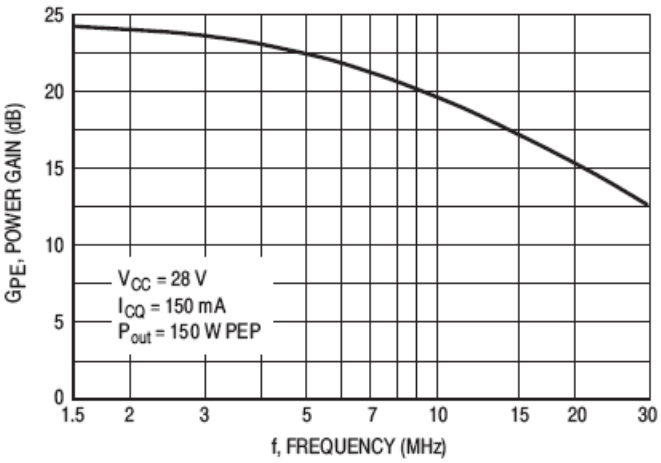
L1 — 3 Turns, #16 Wire, 5/16″ I.D., 5/16″ Long
L2 — 10 µH Molded Choke
L3 — 12 Turns, #16 Enameled Wire, Close Wound, 1/4″ Dia.
L4 — 5 Turns, 1/8″ Copper Tubing
L5 — 10 Ferrite Beads — FERROXCUBE #56–590–65/3B

## Typical Performance Curves

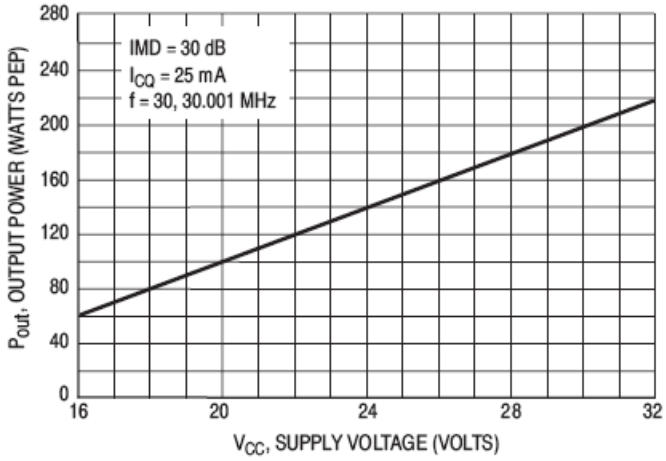
***Output Power vs Input Power***



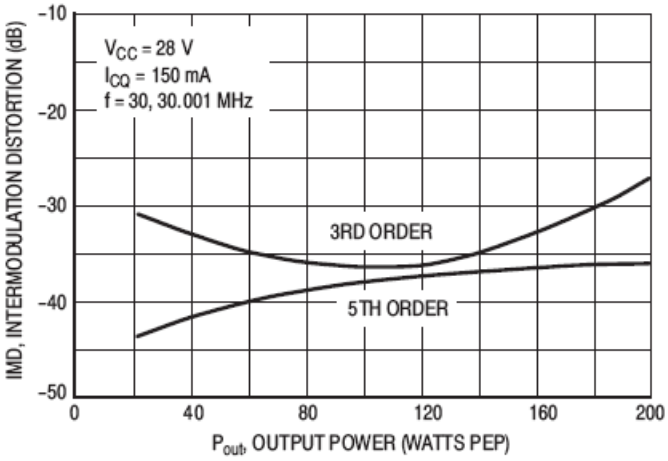

***Power Gain vs Frequency***



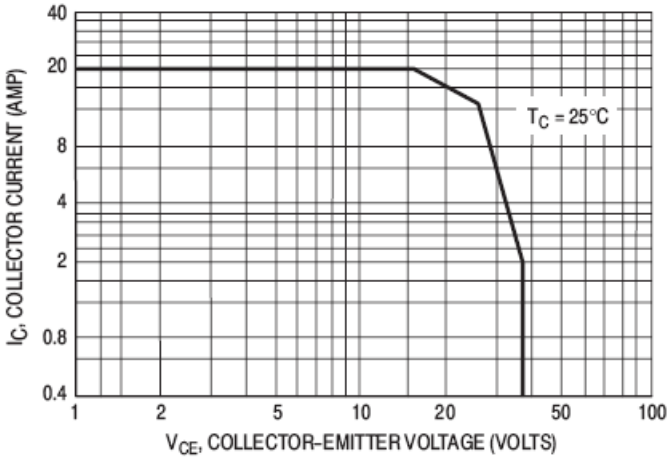

***Linear Output Power vs Supply Voltage***



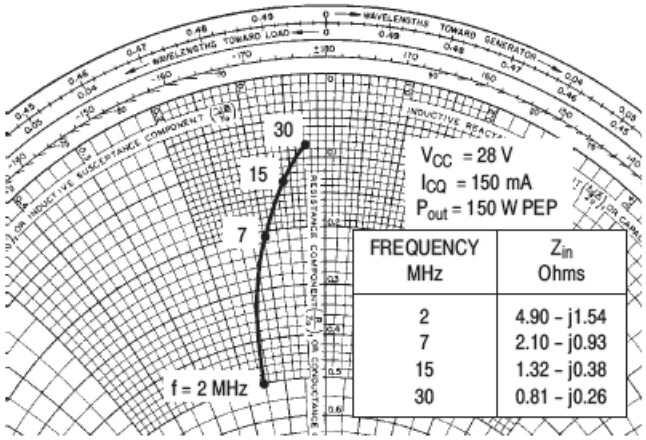

***Intermodulation Distortion vs Output Power***



### *DC Safe Operating Area*

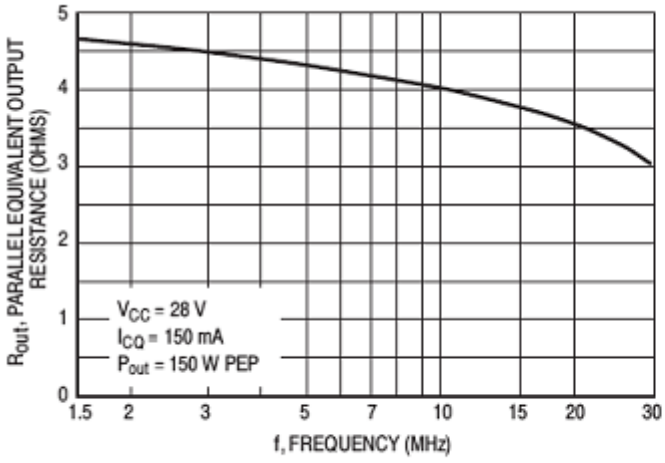



### *Series Input Impedance*

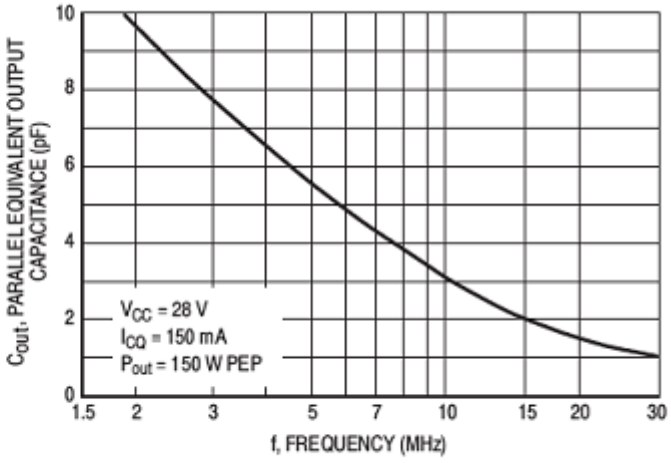



| FREQUENCY MHz | $Z_{in}$ Ohms |
|---|---|
| 2 | 4.90 – j1.54 |
| 7 | 2.10 – j0.93 |
| 15 | 1.32 – j0.38 |
| 30 | 0.81 – j0.26 |

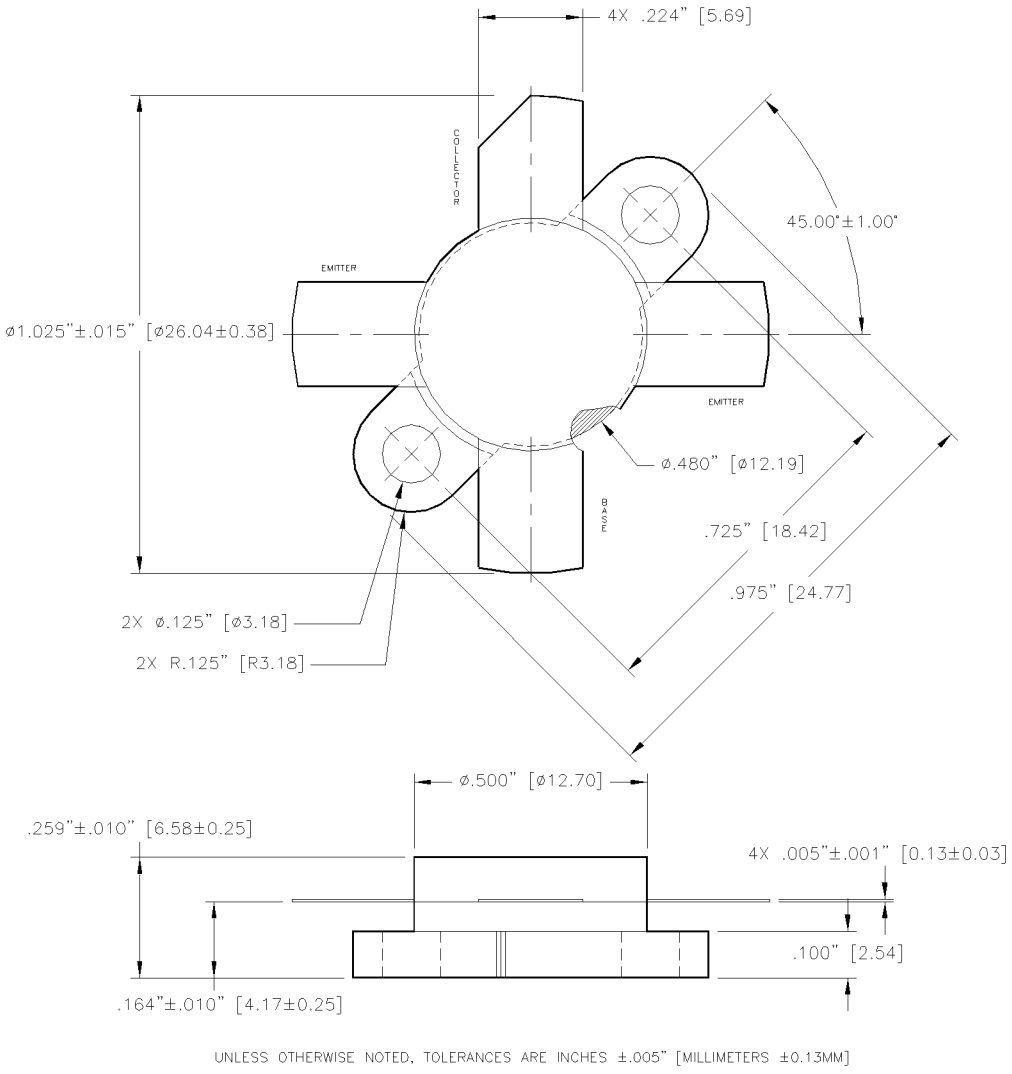
### *Output Resistance vs. Frequency*




### *Output Capacitance vs Frequency*



## Outline: Case 211-11, Style 1




UNLESS OTHERWISE NOTED, TOLERANCES ARE INCHES ±.005" [MILLIMETERS ±0.13MM]