

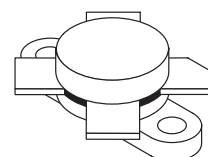
The RF Line  
**NPN Silicon**  
**RF Power Transistor**

Designed primarily for application as a high-power linear amplifier from 2.0 to 30 MHz.

- Specified 12.5 Volt, 30 MHz Characteristics —  
Output Power = 100 W (PEP)  
Minimum Gain = 10 dB  
Efficiency = 40%
- Intermodulation Distortion @ 100 W (PEP) —  
IMD = -30 dB (Min)
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR

**MRF421**

**100 W (PEP), 30 MHz**  
**RF POWER**  
**TRANSISTORS**  
**NPN SILICON**



CASE 211-11, STYLE 1

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	20	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	45	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	3.0	Vdc
Collector Current — Continuous	I <sub>C</sub>	20	Adc
Withstand Current — 10 s	—	30	Adc
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	290 1.66	Watts W/°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +150	°C

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	0.6	°C/W

**ELECTRICAL CHARACTERISTICS** (T<sub>C</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 50 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	20	—	—	Vdc
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 200 mAdc, V <sub>BE</sub> = 0)	V <sub>(BR)CES</sub>	45	—	—	Vdc
Collector-Base Breakdown Voltage (I <sub>C</sub> = 200 mAdc, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	45	—	—	Vdc
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 mAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	3.0	—	—	Vdc
Collector Cutoff Current (V <sub>CE</sub> = 16 Vdc, V <sub>BE</sub> = 0, T <sub>C</sub> = 25°C)	I <sub>CES</sub>	—	—	10	mAdc

(continued)

NOT RECOMMENDED FOR NEW DESIGN

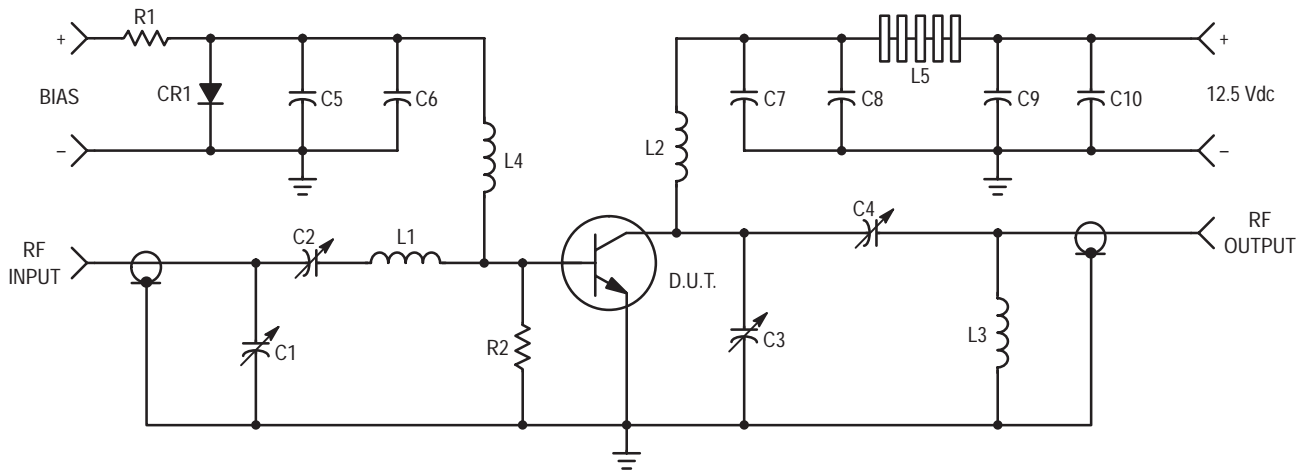
NOT RECOMMENDED FOR NEW DESIGN

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	10	70	—	—
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 12.5 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	550	800	pF
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 100 \text{ W}$ , $I_{C(max)} = 10 \text{ Adc}$ , $I_{CQ} = 150 \text{ mA}$ , $f = 30, 30.001 \text{ MHz}$ )	$G_{PE}$	10	12	—	dB
Collector Efficiency ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 100 \text{ W}$ , $I_{C(max)} = 10 \text{ Adc}$ , $I_{CQ} = 150 \text{ mA}$ , $f = 30, 30.001 \text{ MHz}$ )	$\eta$	40	—	—	%
Intermodulation Distortion (1) ( $V_{CE} = 12.5 \text{ Vdc}$ , $P_{out} = 100 \text{ W}$ , $I_C = 10 \text{ Adc}$ , $I_{CQ} = 150 \text{ mA}$ , $f = 30, 30.001 \text{ MHz}$ )	IMD	—	-33	-30	dB

**NOTE:**

1. To proposed EIA method of measurement. Reference peak envelope power.



C1, C2, C4 — 170–780 pF, ARCO 469  
 C3 — 80–480 pF, ARCO 466  
 C5, C7, C10 — ERIE 0.1  $\mu\text{F}$ , 100 V  
 C6 — MALLORY 500  $\mu\text{F}$  @ 15 V Electrolytic  
 C9 — 100  $\mu\text{F}$ , 15 V Electrolytic  
 C8 — 1000 pF, 350 V UNDERWOOD  
 R1 — 10  $\Omega$ , 25 Watt Wirewound

R2 — 10  $\Omega$ , 1.0 Watt Carbon  
 CR1 — 1N4997  
 L1 — 3 Turns, #16 Wire, 5/16" I.D., 5/16" Long  
 L2 — 12 Turns, #16 Enameled Wire Closewound, 1/4" I.D.  
 L3 — 1–3/4 Turns, 1/8" Tubing, 3/8" I.D., 3/8" Long  
 L4 — 10  $\mu\text{H}$  Molded Choke  
 L5 — 10 Ferrite Beads — FERROXCUBE #56–590–65/3B

**Figure 1. 30 MHz Test Circuit Schematic**

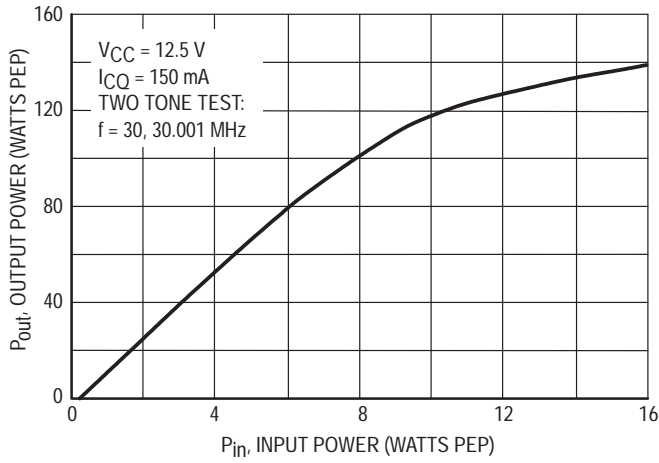


Figure 2. Output Power versus Input Power

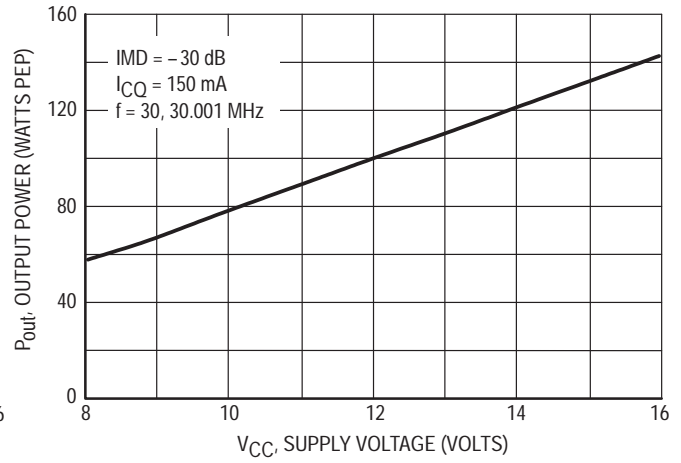


Figure 3. Output Power versus Supply Voltage

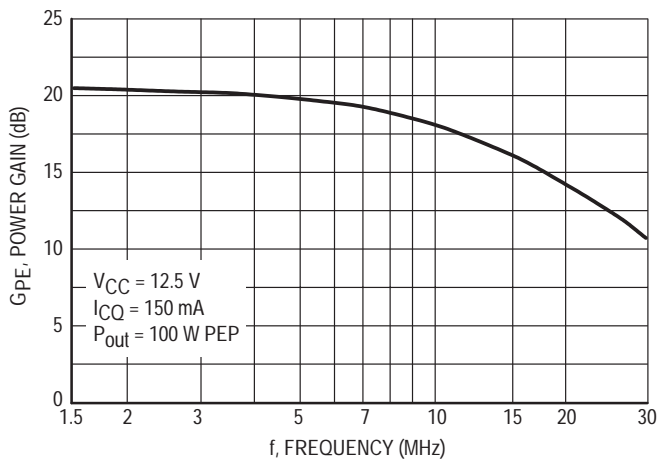


Figure 4. Power Gain versus Frequency

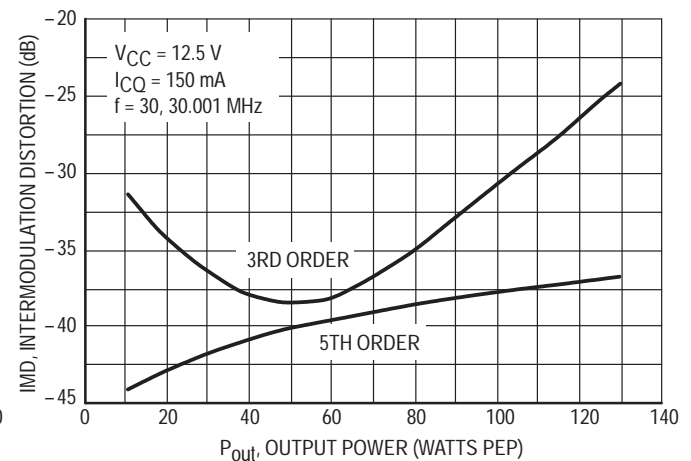


Figure 5. Intermodulation Distortion versus Output Power

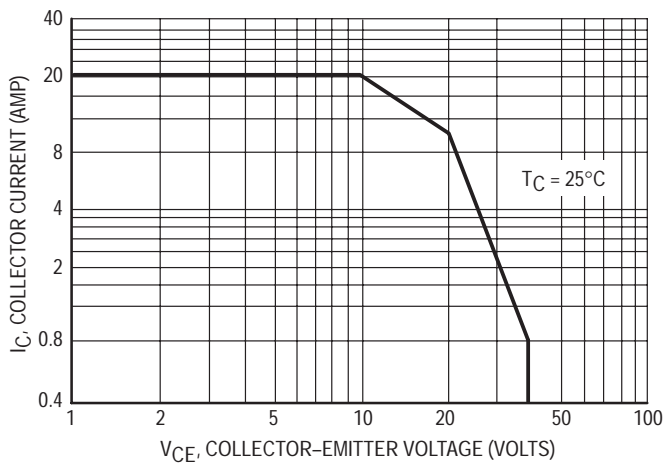


Figure 6. DC Safe Operating Area

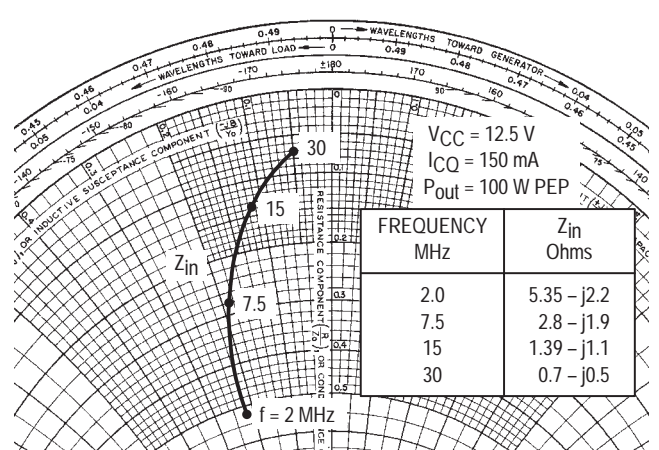


Figure 7. Series Equivalent Impedance

NOT RECOMMENDED FOR NEW DESIGN

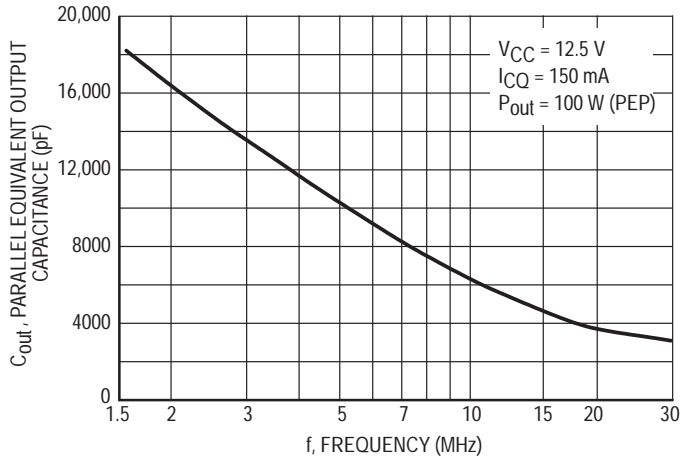


Figure 8. Output Capacitance versus Frequency

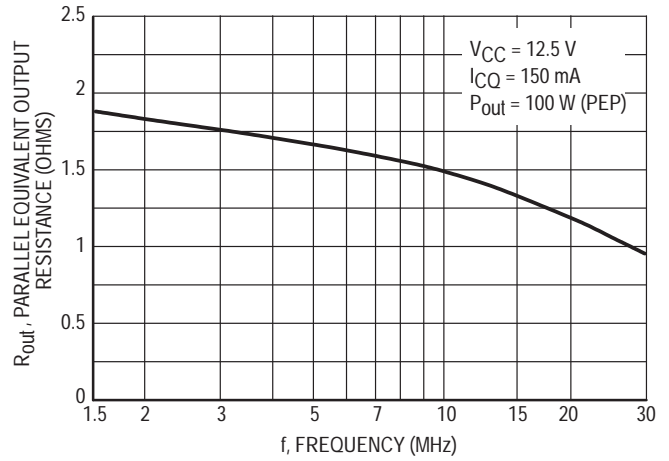
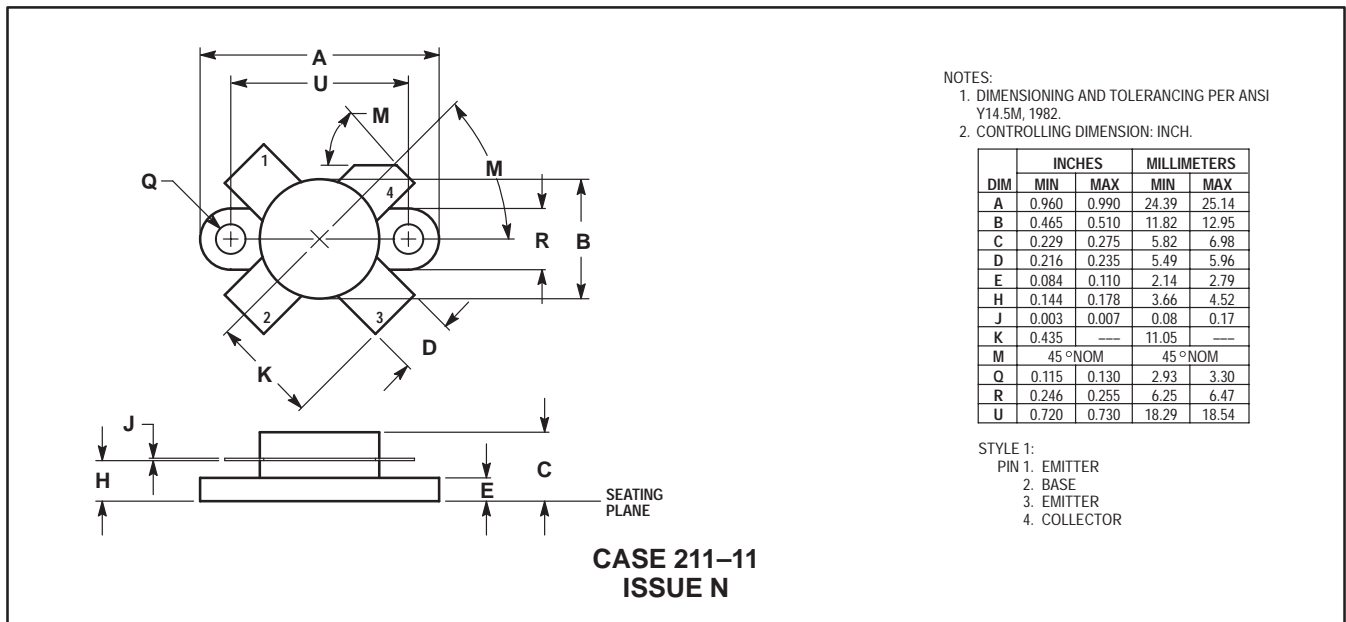


Figure 9. Output Resistance versus Frequency

PACKAGE DIMENSIONS



Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;  
 P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center,  
 3-20-1, Minami-Azabu, Minato-ku, Tokyo 106-8573 Japan.  
 81-3-3440-3569

Customer Focus Center: 1-800-521-6274

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 1-602-244-6609  
 Motorola Fax Back System – US & Canada ONLY 1-800-774-1848  
 – http://sps.motorola.com/mfax/

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre,  
 2, Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.  
 852-26668334

HOME PAGE: <http://motorola.com/sp/>



NOT RECOMMENDED FOR NEW DESIGN