MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

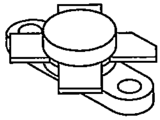
MRF315

The RF Line
NPN Silicon RF Power Transistors

. . . designed primarily for wideband large-signal output amplifier stages in the 30 to 200 MHz frequency range.

- Guaranteed Performance at 150 MHz, 28 Vdc
  Output Power = 45 Watts
  Minimum Gain = 9.0 dB
- 100% Tested for Load Mismatch at All Phase Angles with 30:1 VSWR
- Gold Metallization System for High Reliability Applications

45 W, 30 to 200 MHz
RF POWER
TRANSISTORS
NPN SILICON



CASE 211-07, STYLE 1

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	4.0	Adc
Total Device Dissipation @ T_C = 25°C (1) Derate above 25°C	P_D	110 0.63	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.59	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

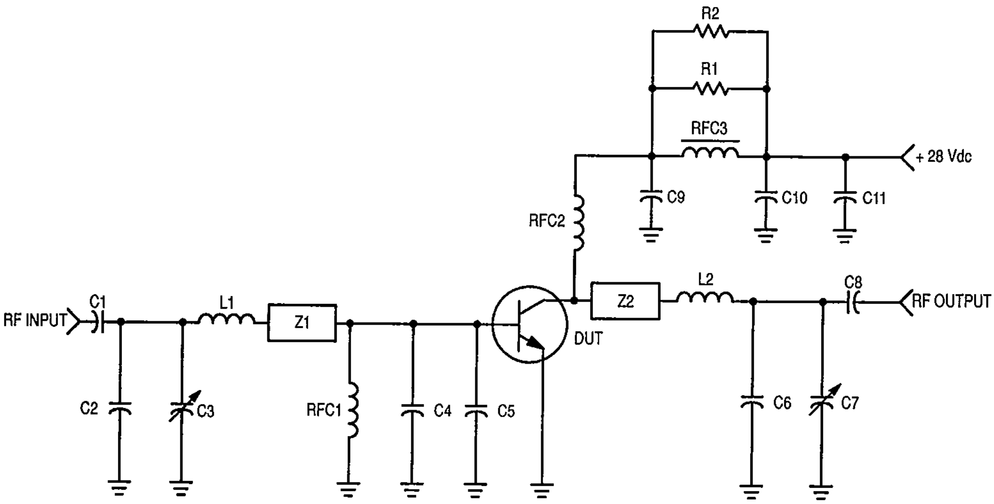
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 40 mAdc, I_B = 0)	$V_{(BR)CEO}$	35	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 40 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	65	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 40 mAdc, I_E = 0)	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 4.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	—	—	4.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 2.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	20	—	80	—

(continued)

NOTE:
1. These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

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

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	45	60	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 45 W, f = 150 MHz)	G_{PE}	9.0	11	—	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 45 W, f = 150 MHz)	η	50	—	—	%
Load Mismatch (V_{CC} = 28 Vdc, P_{out} = 45 W, f = 150 MHz, VSWR = 30:1 all phase angles)	—	No Degradation in Power Output			



C1 — 30 pF, 100 mil ATC
C2 — 47 pF, 100 mil ATC
C3, C7 — Johanson #JMC 5501
C4, C5 — 200 pF, 100 mil ATC
C6 — 24 pF, 100 mil ATC
C8 — 27 pF, 100 mil ATC
C9, C10 — 100 pF Underwood
C11 — 1.0 µF Tantalum

L1 — 0.5″ #18 Wire
L2 — 2 Turns, 1.5″ #20 Wire, ID = 0.15″
R1, R2 — 10 Ω, 1.0 W
RFC1 — 15 µH Molded Coil
RFC2 — 2 Turns, 2.5″ #18 Wire, ID = 0.2″
RFC3 — Ferroxcube VK200-19/4B
Z1, Z2 — Microstrip 0.168″ W x 1.25″ L
Board — Glass Teflon $\varepsilon_r \approx 2.55$

Figure 1. 150 MHz Test Circuit

TYPICAL PERFORMANCE CURVES

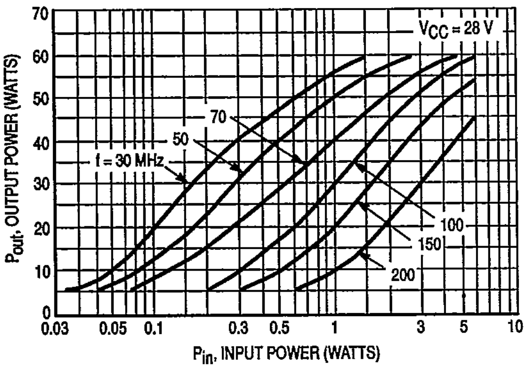


Figure 2. Output Power versus Input Power

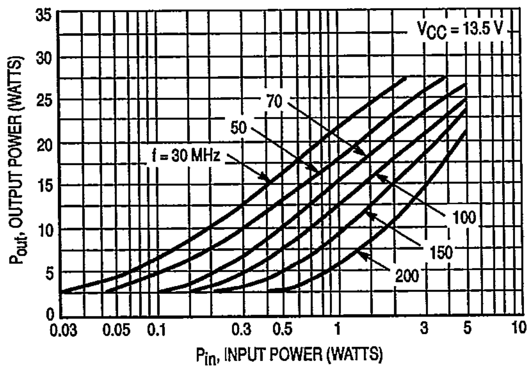


Figure 3. Output Power versus Input Power

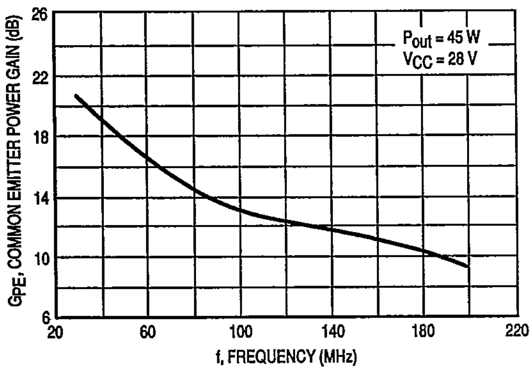


Figure 4. Power Gain versus Frequency

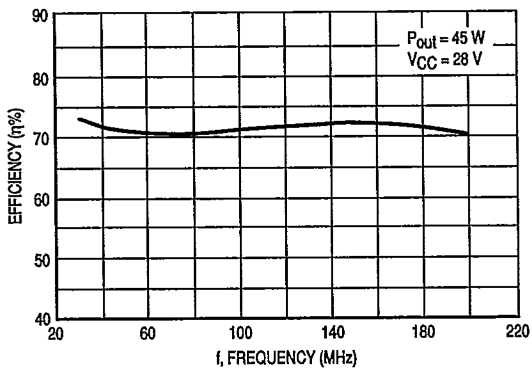


Figure 5. Efficiency versus Frequency

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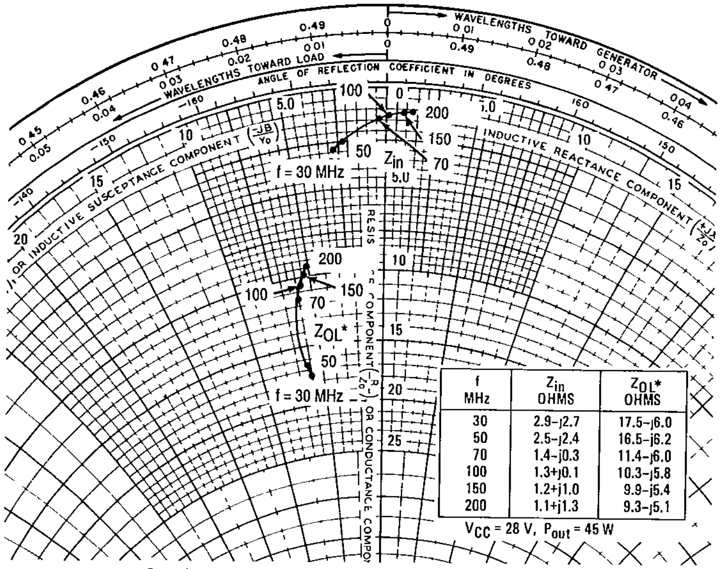

f MHz	Z_{in} OHMS	Z_{OL}* OHMS
30	2.9–j2.7	17.5–j6.0
50	2.5–j2.4	16.5–j6.2
70	1.4–j0.3	11.4–j6.0
100	1.3+j0.1	10.3–j5.8
150	1.2+j1.0	9.9–j5.4
200	1.1+j1.3	9.3–j5.1

V_{CC} = 28 V, P_{out} = 45 W

Z_{OL}* = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency

Figure 6. Series Equivalent Input/Output Impedance

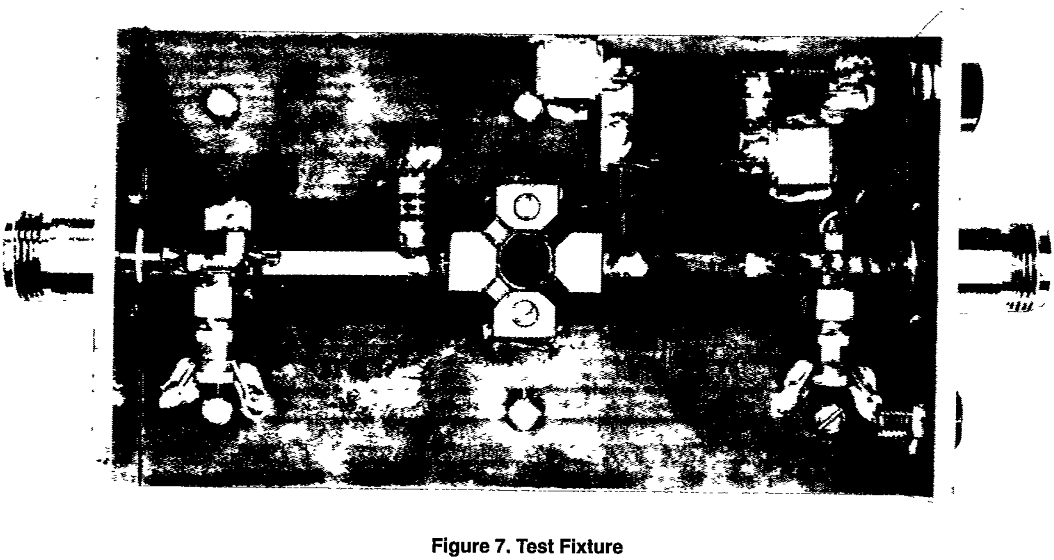

Figure 7. Test Fixture