MRF315
MRF315A

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The RF Line

45 W – 30-200 MHz

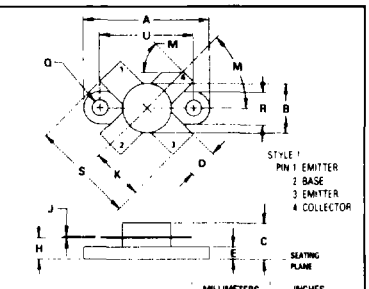
RF POWER TRANSISTORS

NPN SILICON

NPN SILICON RF POWER TRANSISTORS

. . . designed primarily for wideband large-signal output amplifier stages in the 30–200 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



MRF315

CASE 211-07

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.39	25.14	0.960	0.990
B	9.40	9.90	0.370	0.390
C	5.82	7.13	0.229	0.281
D	5.47	5.96	0.215	0.235
E	2.16	2.66	0.085	0.105
H	3.81	4.57	0.150	0.180
J	0.11	0.15	0.004	0.006
K	10.04	10.28	0.395	0.405
M	40	50	40	50
Q	2.88	3.30	0.113	0.130
R	6.23	6.47	0.245	0.255
S	20.07	20.57	0.790	0.810
U	18.29	18.54	0.720	0.730

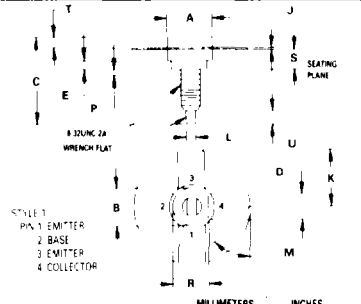
MAXIMUM RATINGS

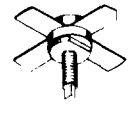
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	4.0	Adc
Total Device Dissipation @ $T_C = 25^oC$ (1) Derate above 25^oC	P_D	110 0.63	Watts $W/^oC$
Storage Temperature Range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

THERMAL CHARACTERISTICS

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

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





MRF315A

CASE 145A-09

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.02	20.07	0.670	0.790
D	5.46	5.97	0.215	0.235
E	1.78		0.070	–
J	0.08	0.15	0.003	0.007
K	12.45	–	0.490	–
L	1.40	1.78	0.055	0.070
M	45 NOM		45 NOM	
P		1.27	–	0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

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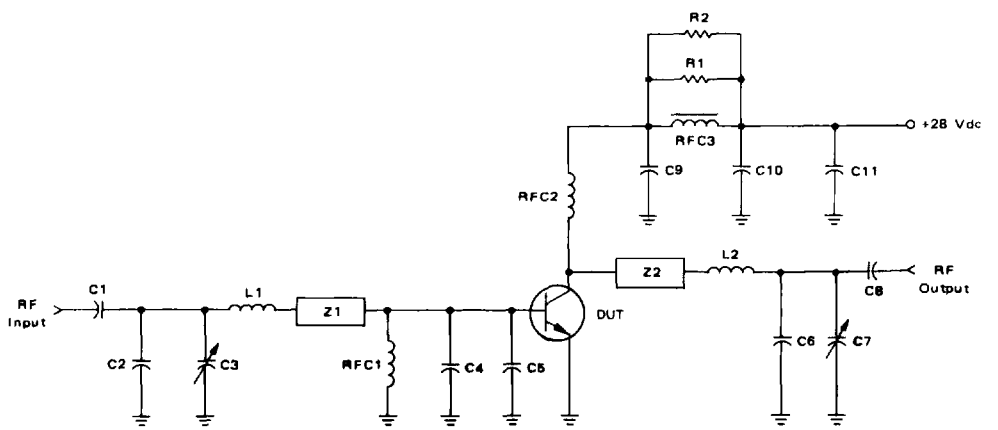
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristics	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	–
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				

FIGURE 1 – 150 MHz TEST CIRCUIT



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"
Z1, Z2 – Microstrip 0.168" W x 1.25" L
RFC1 – 15 μH Molded Coil
RFC2 – 2 Turns, 2.5" #18 Wire, ID = 0.2"
RFC3 – Ferroxcube VK200–19/4B
R1, R2 – 10 Ω, 1.0 W
Board – Glass Teflon $\epsilon_R \approx 2.55$

TYPICAL PERFORMANCE CURVES

FIGURE 2 – OUTPUT POWER versus INPUT POWER

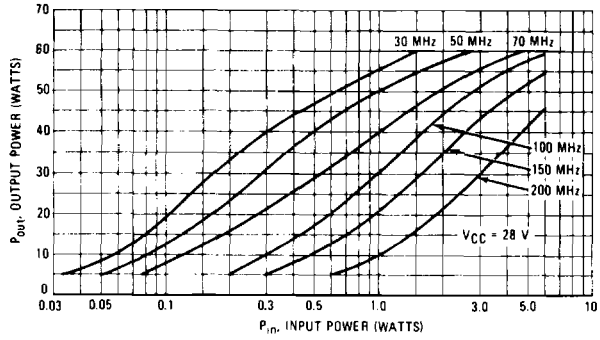


FIGURE 3 – OUTPUT POWER versus INPUT POWER

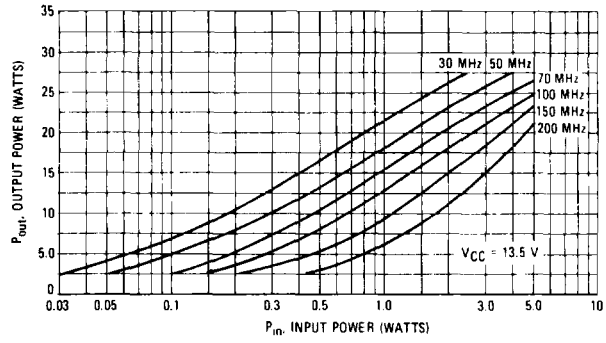


FIGURE 4 – POWER GAIN versus FREQUENCY

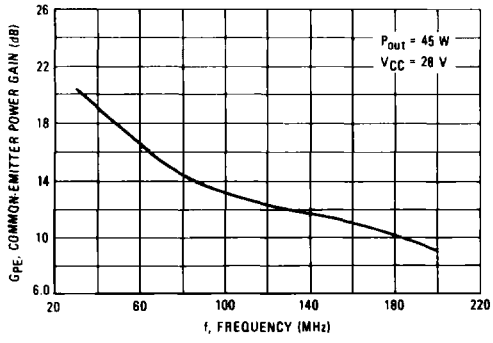


FIGURE 5 – EFFICIENCY versus FREQUENCY

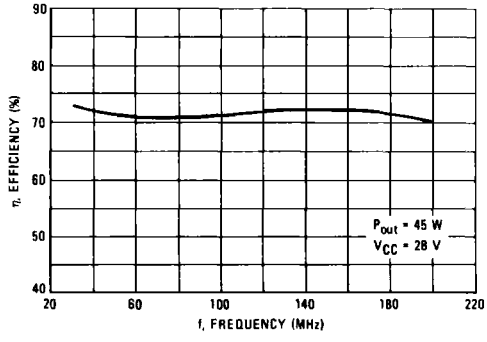


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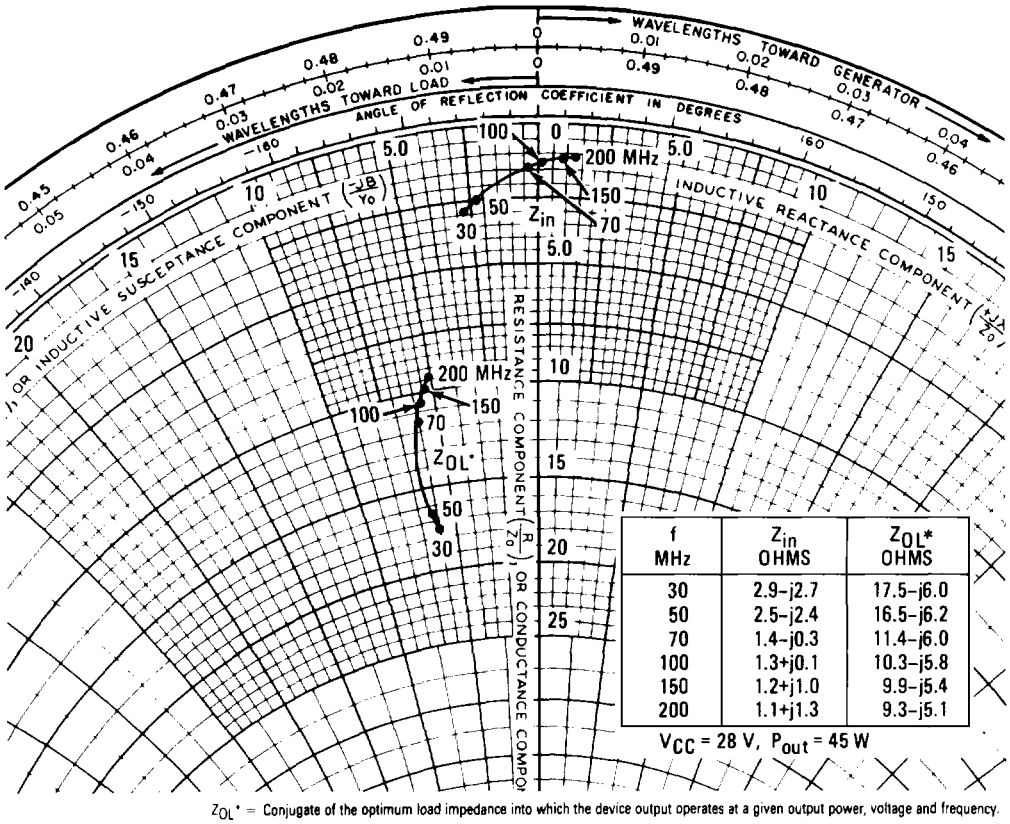
FIGURE 6 – SERIES EQUIVALENT INPUT-OUTPUT IMPEDANCE



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 7 – TEST FIXTURE