

MRF648

The RF Line

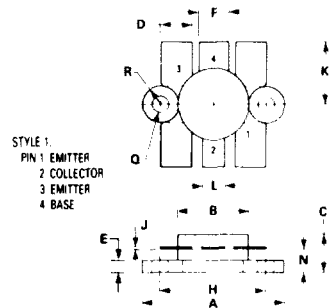
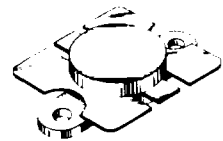
NPN SILICON RF POWER TRANSISTOR

... designed for 12.5 Volt UHF large signal amplifier applications in industrial and commercial FM equipment operating to 512 MHz.

- Specified 12.5 Volt, 470 MHz Characteristics
 Output Power 60 Watts
 Minimum Gain 4.4 dB
 Efficiency 55%
- Characterized with Series Equivalent Large Signal Impedance Parameters
- Built In Matching Network for Broadband Operation
- Tested for Load Mismatch Stress at all Phase Angles with 20:1 VSWR @ 16 Volt High Line and 20% Overdrive

60 W - 470 MHz

CONTROLLED Q
RF POWER
TRANSISTOR
NPN SILICON



NOTE
 FLANGE IS ISOLATED IN ALL STYLES

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	24.38	25.14	0.960	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	5.33	5.58	0.210	0.220
E	2.16	3.04	0.085	0.120
F	5.08	5.33	0.200	0.210
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.006
K	10.29	11.17	0.405	0.440
L	3.81	4.06	0.150	0.160
N	3.81	4.31	0.150	0.170
Q	2.92	3.30	0.115	0.130
R	3.05	3.30	0.120	0.130
U	11.94	12.57	0.470	0.495

CASE 316-01

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	16	Vdc
Collector-Base Voltage	V _{CBO}	36	Vdc
Emitter-Base Voltage	V _{EBO}	4.0	Vdc
Collector Current — Continuous	I _C	11.0	Adc
Total Device Dissipation @ T _C = 25°C Derate above 25°C	P _D	175	Watts
Storage Temperature Range	T _{stg}	- 65 to +150	°C

THERMAL CHARACTERISTICS

Thermal Resistance, Junction to Case	R _{θJC}	1.0	°C/W
--------------------------------------	------------------	-----	------

MRF648

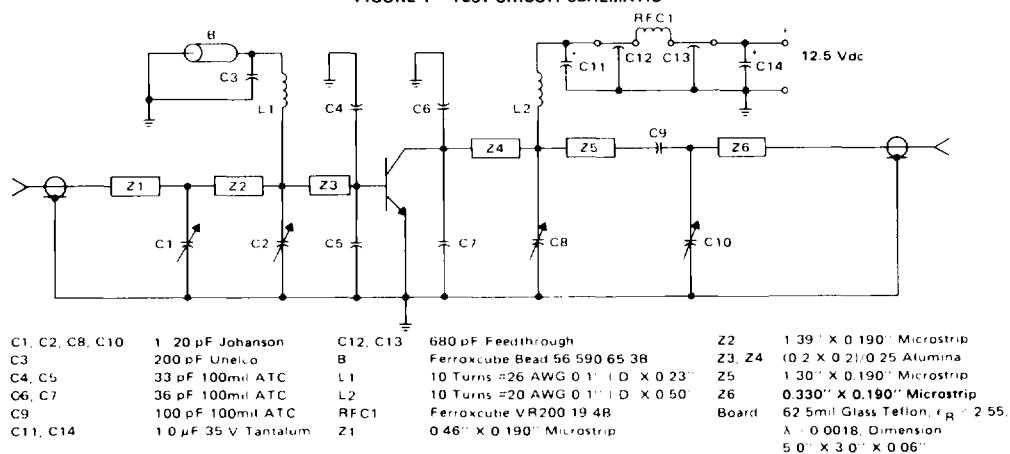
ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 50 \text{ mA dc}, I_B = 0$)	$V_{(BR)CEO}$	16	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 50 \text{ mA dc}, V_{BE} = 0$)	$V_{(BR)CES}$	36	—	—	Vdc
Emitter Base Breakdown Voltage ($I_E = 5.0 \text{ mA dc}, I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 15 \text{ Vdc}, V_{BE} = 0, T_C = 25^\circ\text{C}$)	I_{CES}	—	—	15	mA dc
ON CHARACTERISTICS					
DC Current Gain ($I_C = 6.0 \text{ A dc}, V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	20	70	150	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 12.5 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$)	C_{ob}	—	130	150	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5 \text{ Vdc}, P_{out} = 60 \text{ W}, f = 470 \text{ MHz}$)	G_{pe}	4.4	5.0	—	dB
Input Power ($V_{CC} = 12.5 \text{ Vdc}, P_{out} = 60 \text{ W}, f = 470 \text{ MHz}$)	P_{in}	—	19	22	Watts
Collector Efficiency ($V_{CC} = 12.5 \text{ Vdc}, P_{out} = 60 \text{ W}, f = 470 \text{ MHz}$)	η	55	65	—	%
Output Mismatch Stress ($V_{CC} = 16 \text{ Vdc}, P_{in} = 26 \text{ W}, f = 470 \text{ MHz}, \text{VSWR} = 20:1$, All Phase Angles)	ψ^*	No Degradation in Output Power			

Notes

- * ψ^* = Mismatch stress factor — the electrical criterion established to verify the device resistance to load mismatch failure. The mismatch stress test is accomplished in the standard test fixture (Figure 1) terminated in a 20:1 minimum load mismatch at all phase angles.

FIGURE 1 — TEST CIRCUIT SCHEMATIC



MRF648

FIGURE 2 – POWER OUTPUT versus POWER INPUT

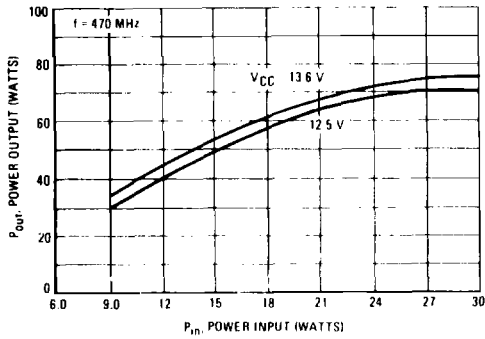


FIGURE 3 – POWER OUTPUT versus FREQUENCY

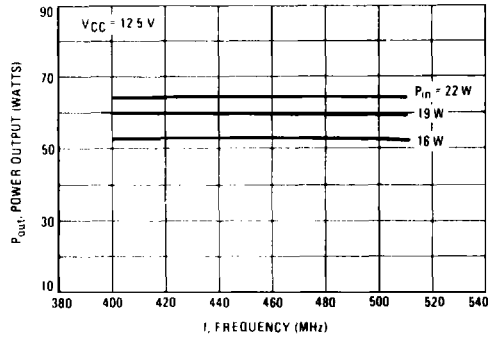


FIGURE 4 – POWER OUTPUT versus SUPPLY VOLTAGE

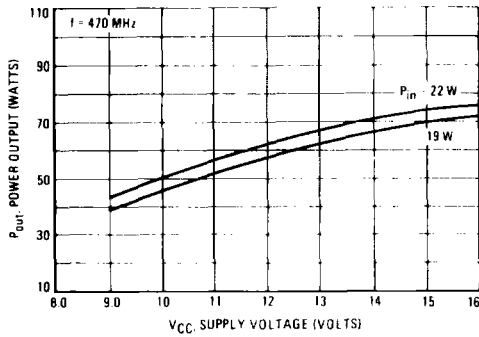


FIGURE 5 – POWER SATURATION PROFILE

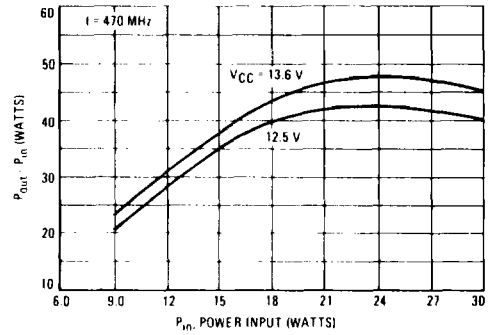
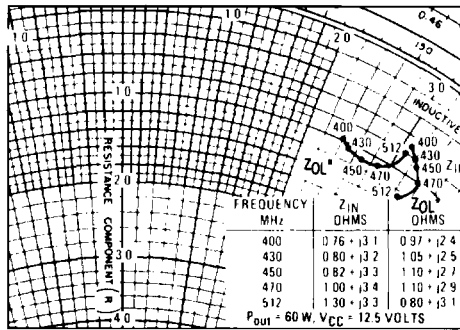
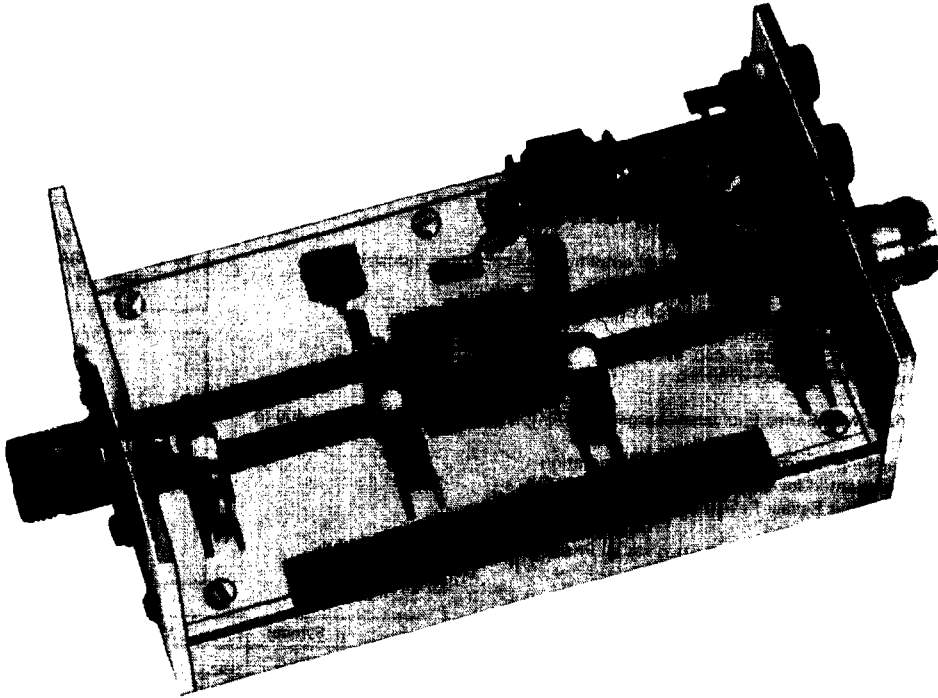


FIGURE 6 – SERIES EQUIVALENT INPUT-OUTPUT IMPEDANCE



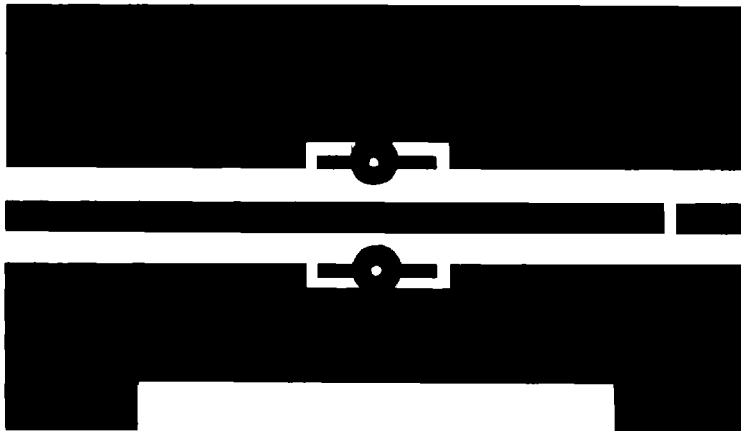
Z_{OL}^* = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

MRF648



2

TEST CIRCUIT TEST FIXTURE



NOTE: The Printed Circuit Board shown is 75% of the original.