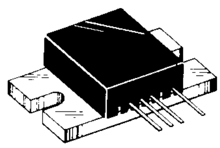
MOTOROLA
SEMICONDUCTORS
P.O. BOX 20912 • PHOENIX, ARIZONA 85036

MHW808-1
MHW808-2
MHW808-3

The RF Line

7.5 W — 806-950 MHz

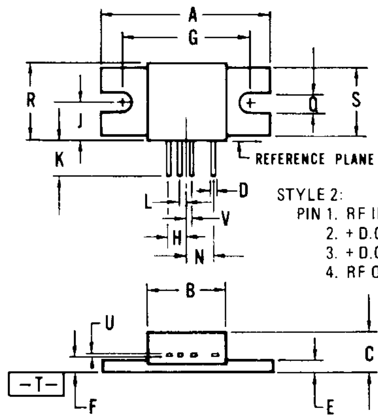
RF POWER
AMPLIFIER MODULE



UHF POWER AMPLIFIER MODULE

. . . designed for 12.5 volt UHF power amplifier applications in industrial and commercial FM equipment operating from 806 to 950 MHz.

- MHW808-1 806-870 MHz
  MHW808-2 806-890 MHz
  MHW808-3 870-950 MHz
- Specified 12.5 Volt, UHF Characteristics
  Output Power = 7.5 Watts
  Minimum Gain = 14.8 dB (MHW808-1, 2)
  = 13.3 dB (MHW808-3)
  Harmonics = –45 dB Max
- 50 Ω Input/Output Impedances
- Guaranteed Stability and Ruggedness
- Features Two Common-Emitter Gain Stages
- Thin-Film Hybrid Construction Gives Consistent Performance and Reliability
- Gold-Metallized and Silicon Nitride-Passivated Transistor Chips
- Controllable, Stable Performance Over More Than 30 dB Range in Output Power



STYLE 2:
PIN 1. RF INPUT
2. + D.C.
3. + D.C.
4. RF OUTPUT

NOTES:
1. DIMENSIONS A AND S ARE DATUMS.
2. [-T-] IS DATUM AND SEATING PLANE.
3. POSITIONAL TOLERANCE FOR SLOTS:
⌖ 0.25 (0.010) Ⓜ | T | S Ⓜ | A Ⓜ
LEADS: (MEASURED AT REF PLANE)
⌖ 0.25 (0.010) Ⓜ | T | A Ⓜ | S Ⓜ
DIMENSION B LOCATION:
⌖ 0.25 (0.010) Ⓜ | A Ⓜ | S Ⓜ

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	37.85	38.35	1.490	1.510
B	17.78	18.29	0.700	0.720
C	8.38	9.02	0.330	0.380
D	0.35	0.05	0.014	0.026
E	2.54	2.92	0.100	0.140
F	3.18	3.94	0.125	0.180
G	29.72 BSC		1.170 BSC	
H	3.81 BSC		0.150 BSC	
J	9.24 BSC		0.364 BSC	
K	2.54	–	0.100	–
L	1.27 BSC		0.050 BSC	
N	6.35 BSC		0.250 BSC	
Q	3.81	4.06	0.150	0.160
R	17.40	19.55	0.685	0.770
S	15.11	15.62	0.595	0.615
U	0.20	0.30	0.008	0.012
V	1.27 BSC		0.050 BSC	

CASE 297A-05

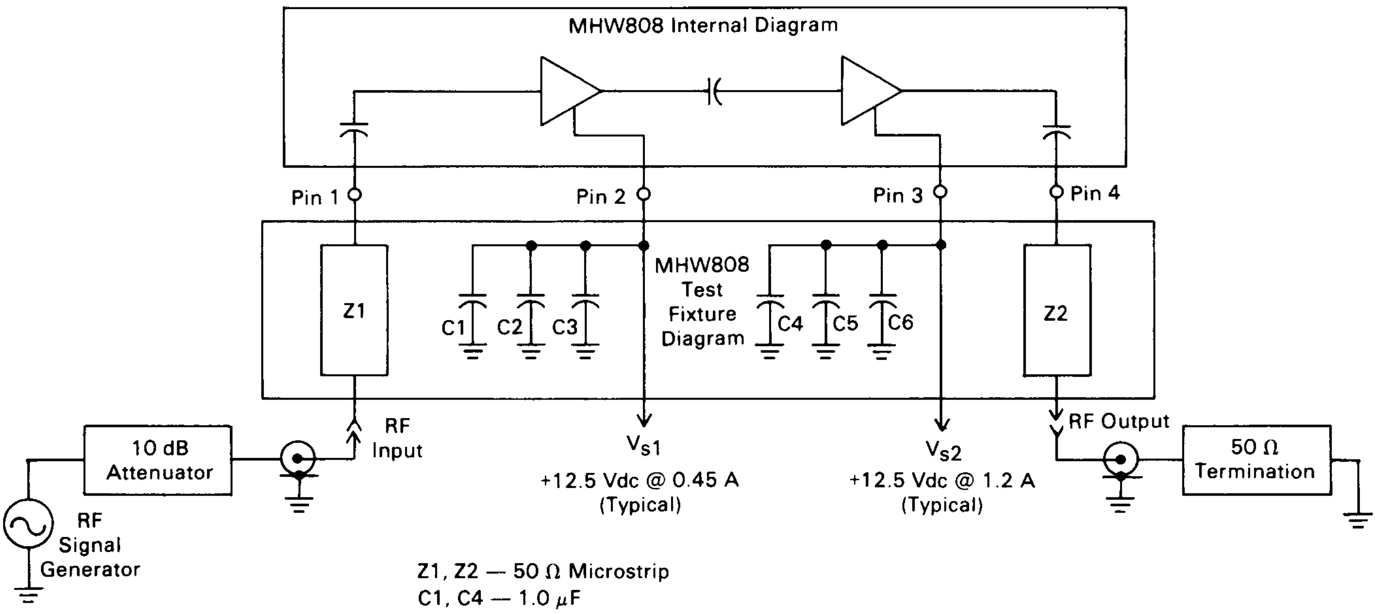
MAXIMUM RATINGS (Flange Temperature = 25°C)

Rating	Symbol	Value	Unit
DC Supply Voltages	V_{S1}, V_{S2}	16	Vdc
RF Input Power ($P_{out} \leqslant 9.0$ W)	P_{in}	400	mW
RF Output Power ($V_{S1} = V_{S2} = 12.5$ V)	P_{out}	9.0	W
Storage Temperature Range	T_{stg}	-30 to +100	°C
Operating Case Temperature Range	T_C	-30 to +100	°C

ELECTRICAL CHARACTERISTICS (Flange Temperature = 25°C, 50 Ω system, and V_{s1} = V_{s2} = 12.5 V unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Frequency Range	MHW808-1 MHW808-2 MHW808-3	BW	806 806 870	— — —	870 890 950	MHz
Input Power (P_{out} = 7.5 W)	MHW808-1, 2 MHW808-3	P_{in}	— —	200 300	250 350	mW
Power Gain (P_{out} = 7.5 W)	MHW808-1, 2 MHW808-3	G_p	14.8 13.3	15.7 14.0	— —	dB
Efficiency (P_{out} = 7.5 W)		η	30	38	—	%
Harmonic Output (P_{out} = 7.5 W Reference)		—	—	—	-45	dB
Input VSWR (P_{out} = 7.5 W, 50 Ω Reference)		—	—	—	2:1	—
Power Degradation (-30 to +80°C) (Reference P_{out} = 7.5 W @ T_C = 25°C)		—	—	—	1.2	dB
Load Mismatch Stress (V_{s1} = V_{s2} = 16 Vdc, P_{out} = 9.0 W, VSWR = 30:1, all phase angles)		—	No degradation in Power Output			
Stability (P_{in} = 0 to 250 mW, [MHW808-1, 2] or 350 mW [MHW808-3] consistent with max. P_{out} = 9.0 W, V_{S1} = V_{S2} = V_{S3} = 10 to 16 Vdc, Load VSWR = 4:1)		All spurious outputs ≥70 dB below the desired output signal level				
Quiescent Current (I_{s1} with no RF drive applied)		$I_{s1(q)}$	—	—	125	mA

FIGURE 1 — UHF POWER MODULE TEST SYSTEM DIAGRAM



Z1, Z2 — 50 Ω Microstrip
C1, C4 — 1.0 μF
C2, C5 — 0.1 μF
C3, C6 — 0.018 μF

TYPICAL PERFORMANCE CURVES (MHW808-1, 2)

FIGURE 2 — INPUT POWER, EFFICIENCY AND VSWR versus FREQUENCY

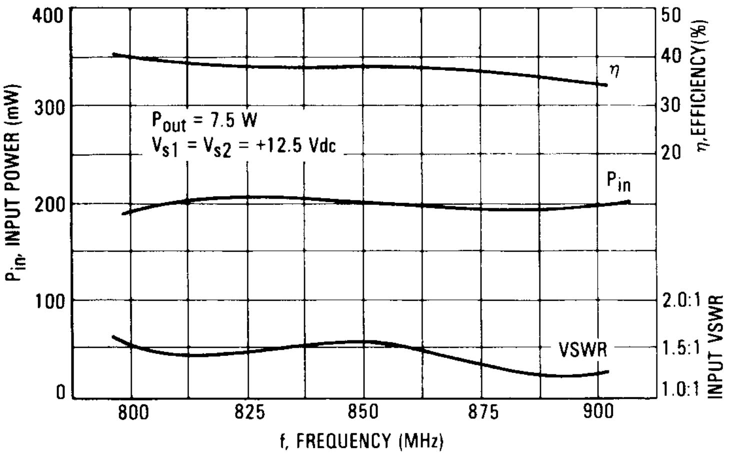


FIGURE 3 — OUTPUT POWER versus INPUT POWER

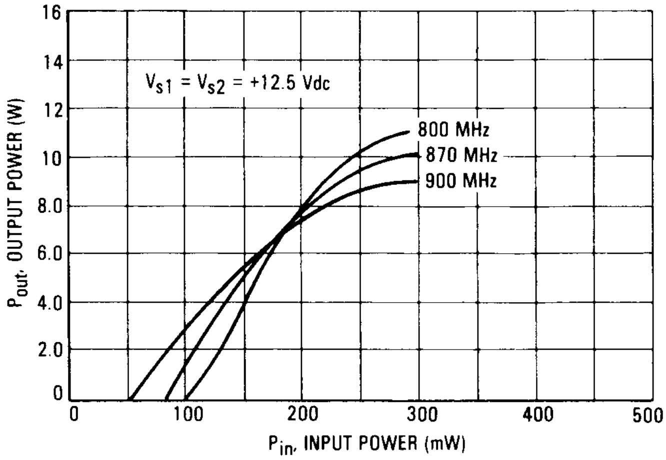


FIGURE 4 — OUTPUT POWER versus SUPPLY VOLTAGE

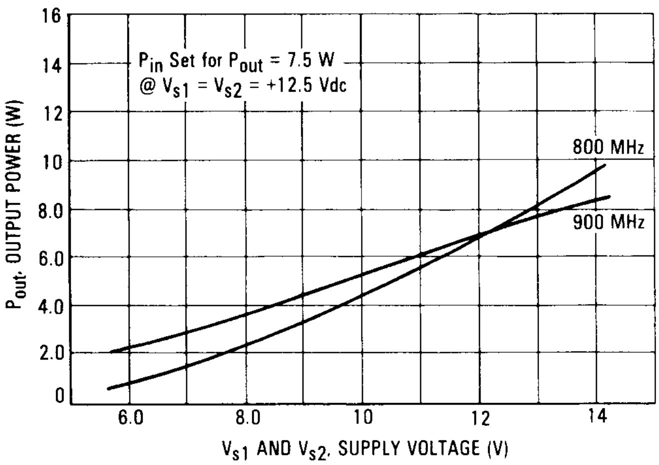


FIGURE 5 — EFFICIENCY versus SUPPLY VOLTAGE

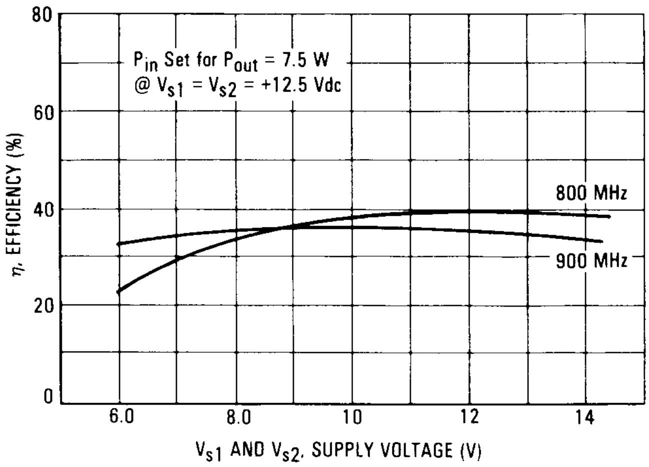


FIGURE 6 — OUTPUT POWER versus SUPPLY VOLTAGE TO FIRST STAGE (V_{s1})

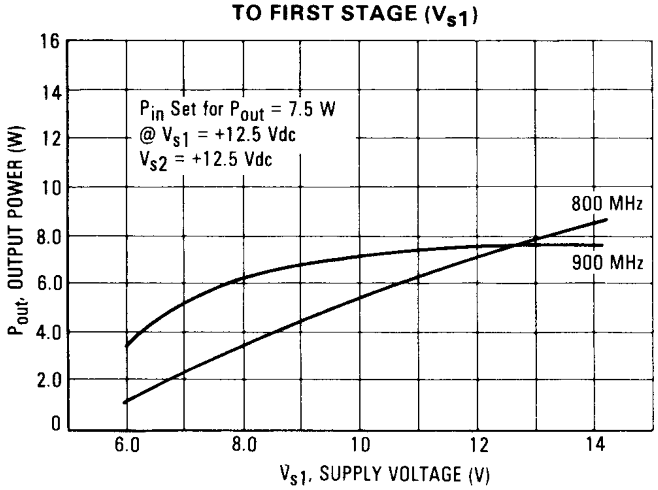
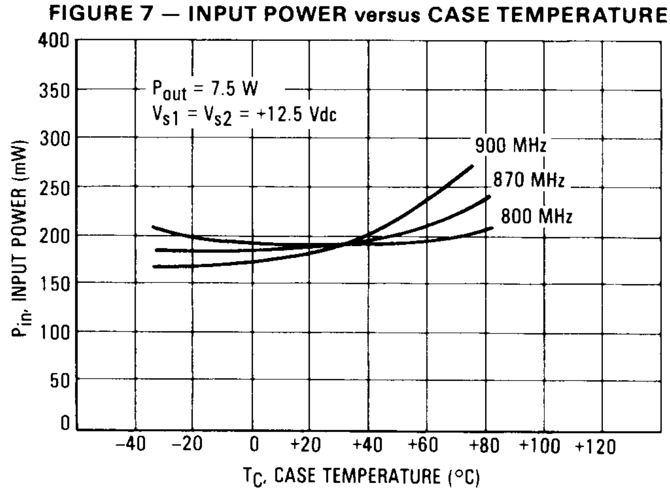


FIGURE 7 — INPUT POWER versus CASE TEMPERATURE



TYPICAL PERFORMANCE CURVES (MHW808-3)

FIGURE 8 — INPUT POWER, EFFICIENCY AND VSWR versus FREQUENCY

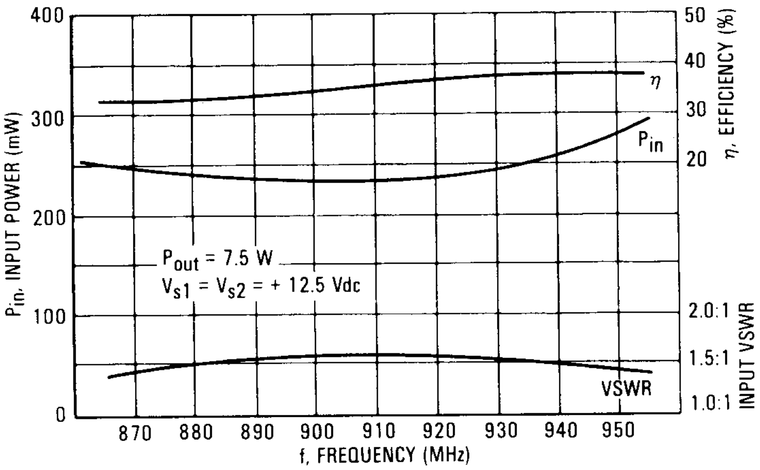


FIGURE 9 — OUTPUT POWER versus INPUT POWER

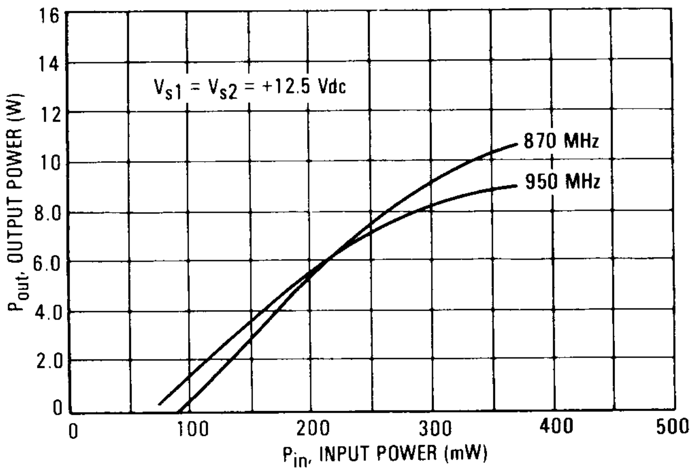


FIGURE 10 — OUTPUT POWER versus SUPPLY VOLTAGE

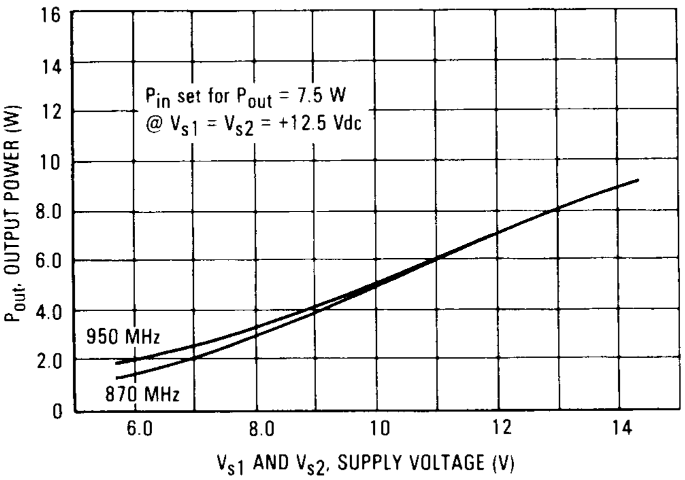
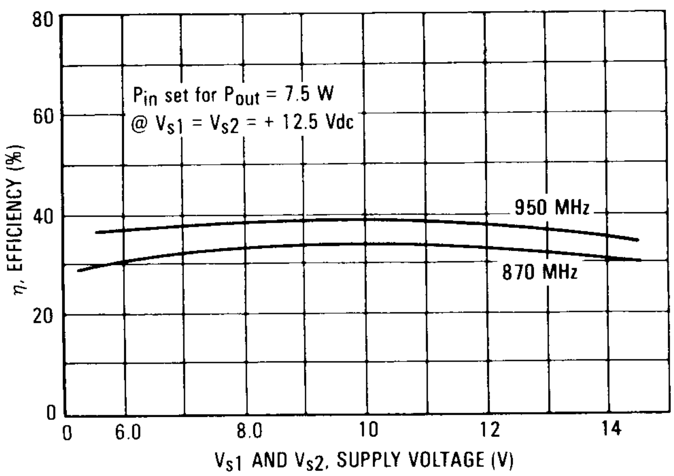


FIGURE 11 — EFFICIENCY versus SUPPLY VOLTAGE



APPLICATIONS INFORMATION

Nominal Operation

All electrical specifications are based on the following nominal conditions: (P_{out} = 7.5 W, $V_{S1} = V_{S2}$ = 12.5 Vdc). This module is designed to have excess gain margin with ruggedness, but operation outside the limits of the published specifications is not recommended unless prior communications regarding the intended use has been made with a factory representative.

Gain Control

In general, the module output power should be limited to 9.0 watts. The preferred method of power output control is to fix both V_{S1} and V_{S2} at 12.5 volts and to vary the input RF drive level at Pin 1.

A second method of output power control is to adjust the supply voltages (V_{S1} independently or V_{S1} and V_{S2} simultaneously). Typical ranges of power control using these methods are illustrated in Figures 4, 6 and 10.

FIGURE 12 — TEST FIXTURE ASSEMBLY

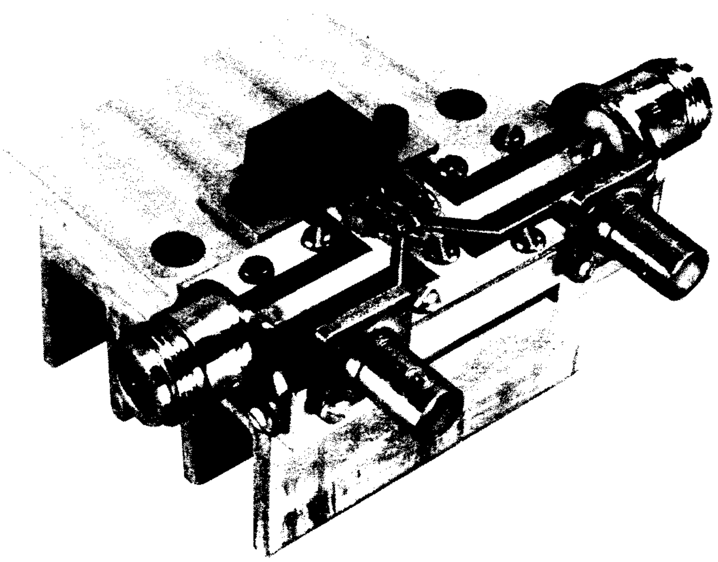
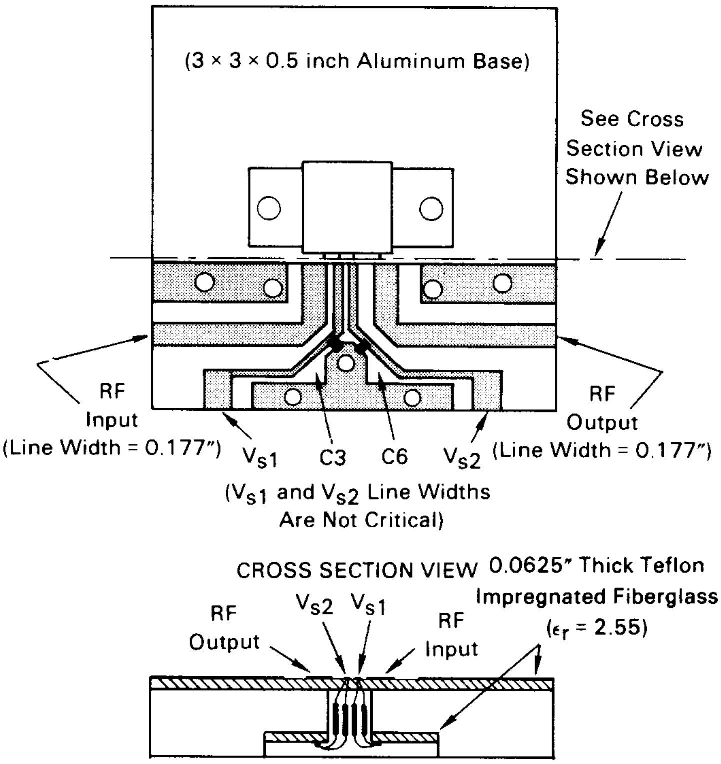


FIGURE 13 — TEST FIXTURE CONSTRUCTION

TOP VIEW



Bring capacitor leads through fiberglass board and solder to V_{S1} and V_{S2} lines as close to module as possible.
To insure optimum heat transfer from flange to heatsink, use standard 6-32 mounting screws and an adequate quantity of silicon thermal compound (e.g., Dow Corning 340). With both mounting screws finger tight, alternately torque down the screws to 4–6 inch pounds.

Decoupling

Due to the high gain of each of the two stages and the module size limitation, external decoupling networks require careful consideration. Both Pins 2 and 3 are internally bypassed with a 0.018 μF chip capacitor which is effective for frequencies from 5 MHz through 950 MHz. For bypassing frequencies below 5 MHz, networks equivalent to that shown in the test fixture schematic are recommended. Inadequate decoupling will result in spurious outputs at specific operating frequencies and phase angles of input and output VSWR.

Load Pull

During final test, each module is "load pull" tested in a fixture having the identical decoupling network described in Figure 1. Electrical conditions are V_{S1} and V_{S2} equal to 16 volts output, VSWR 30:1 and output power equal to 9.0 watts.