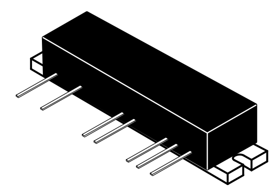
The RF Line
UHF Power Amplifiers

MHW804-1

Designed specifically for portable radio applications. The MHW804 is capable of wide power range control, operates from a 7.5 volt supply and requires only 1.0 mW of RF input power.

- Specified 7.5 Volt Characteristics:
  RF Input Power — 1.0 mW (0 dBm)
  RF Output Power — 4.0 W
  Minimum Gain — 36 dB
  Harmonics — –45 dBc Max @ 2.0 f_o
- 50 Ohm Input/Output Impedances
- Guaranteed Stability and Ruggedness
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

4.0 WATTS
800 to 870 MHz
RF POWER
AMPLIFIERS



CASE 301F–03, STYLE 1

MAXIMUM RATINGS (Flange Temperature = 25°C)

Rating	Symbol	Value	Unit
DC Supply Voltage	V_S	10	Vdc
DC Control Voltage	V_{cont}	4.0	Vdc
RF Input Power	P_{in}	5.0	mW
RF Output Power	P_{out}	6.0	W
Operating Case Temperature Range	T_C	– 30 to +100	°C
Storage Temperature Range	T_{stg}	– 30 to +100	°C

ELECTRICAL CHARACTERISTICS (T_C = + 25°C, 50 ohm system, unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
Frequency Range	BW	800	870	MHz
Power Gain ($V_{S1} = V_{S2} = V_{S3} = V_{S4} = V_{S5}$ = 7.5 V; V_{cont} = 3.75 V)	G_p	36	—	dB
Control Voltage (P_{in} = 0 dBm, P_{out} = 4.0 W, $V_{S1} = V_{S2} = V_{S3} = V_{S4} = V_{S5}$ = 7.5 V, Adjust V_{cont} for specified P_{out})	V_{cont}	—	3.75	Vdc
Efficiency (Same condition as for V_{cont})	η	32	—	%
Current Drain (Same conditions as for V_{cont}) IS1 + IS4 (Pins 2, 5) IS2 + IS3 + IS5 (Pins 3, 4, 6) $I_{control}$ (Pin 1)	I_D	— — —	210 1430 0.2	mA
Input VSWR (Same conditions as for V_{cont})	$VSWR_{in}$	—	2.0:1	—
Harmonic Content (Same conditions as for V_{cont}) 2.0 f_o 3.0 f_o	—	— —	– 45 – 50	dBc
Leakage Current — $I_{S2} + I_{S3} + I_{S5}$ ($V_{S2} = V_{S3} = V_{S5}$ = 7.5 V; $V_{S1} = V_{S4}$ = 0 V V_{cont} = 0 V; P_{in} = 0 mW)	I_L	—	0.3	mA
Standby Current — $I_{S1} + I_{S4}$ ($V_{S1} = V_{S2} = V_{S3} = V_{S4} = V_{S5}$ = 7.5 V V_{cont} = 4.0 V; P_{in} = 0 mW)	I_S	—	220	mA
Load Mismatch Stress ($V_{S1} = V_{S2} = V_{S3} = V_{S4} = V_{S5}$ = 9.0 V; P_{in} = 2.0 mW; P_{out} = 6.0 W; Load VSWR = 20:1, All Phase Angles. Adjust V_{cont} for Specified P_{out})	ψ	No Degradation in Output Power		
Stability ($V_{S1} = V_{S2} = V_{S3} = V_{S4} = V_{S5}$ = 6.0 to 9.0 V; P_{IN} = – 1.0 dBm to + 3.0 dBm; P_{out} = 1.0 W to 4.0 W; Load VSWR = 6:1, All Phase Angles; Adjust V_{cont} for Specified P_{out})	—	All Spurious Outputs More Than 60 dB Below Desired Signal		

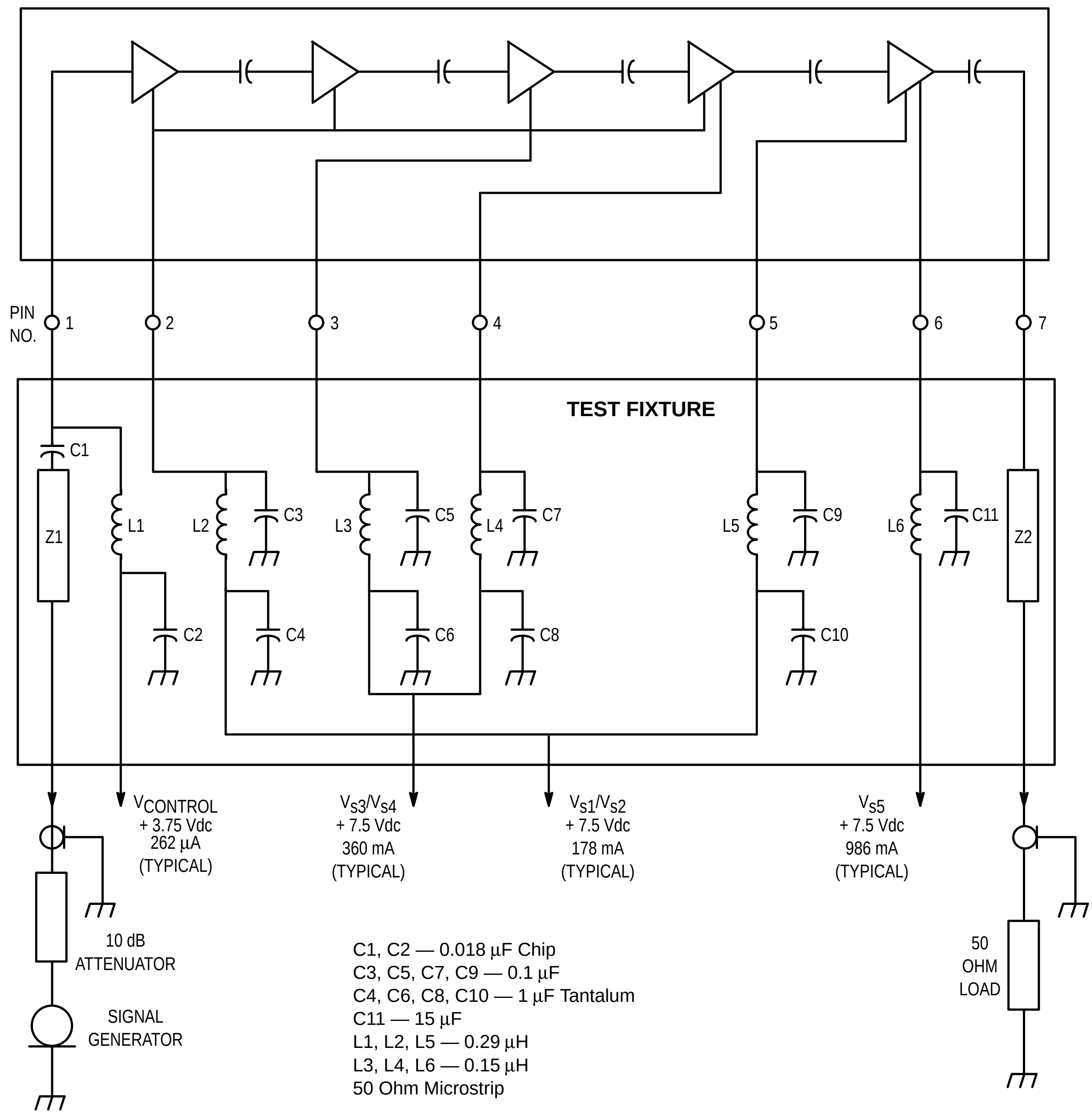


Figure 1. Power Module Test System Block Diagram

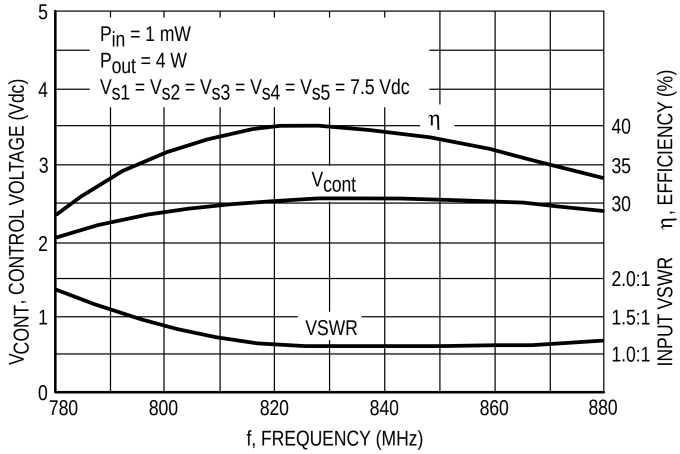


Figure 2. Control Voltage, Efficiency and VSWR versus Frequency

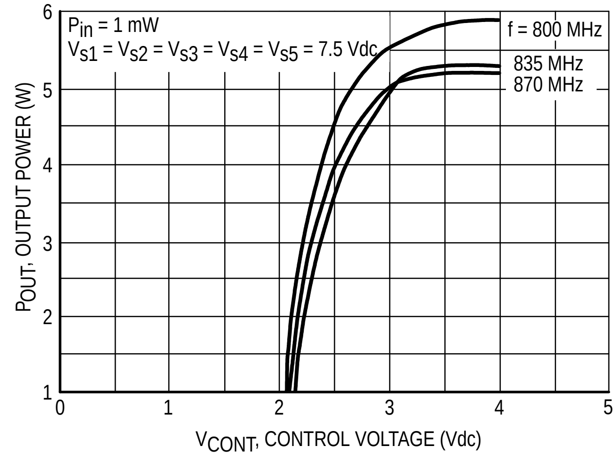


Figure 3. Output Power versus Control Voltage

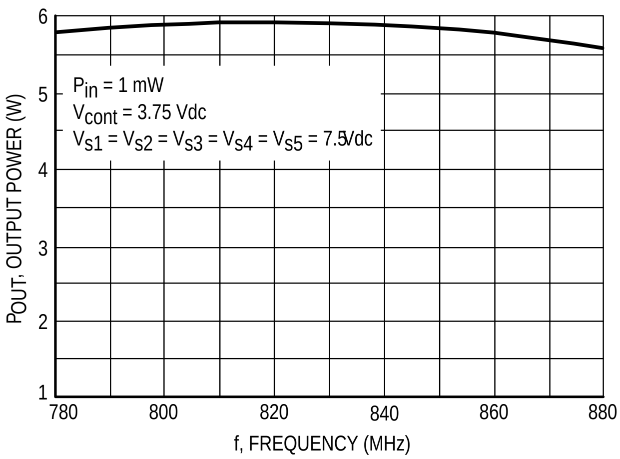


Figure 4. Output Power versus Frequency

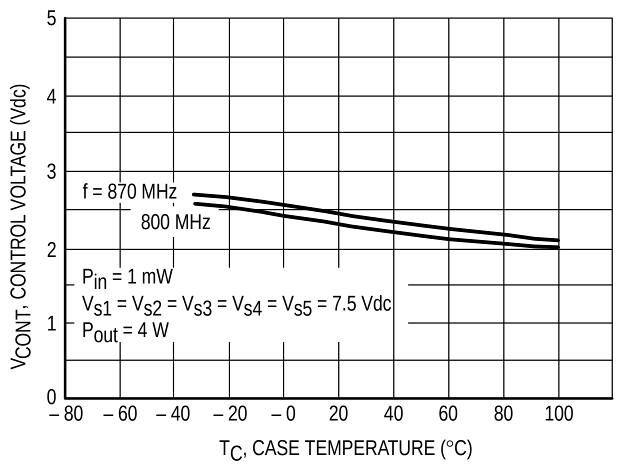


Figure 5. Control Voltage Case Temperature

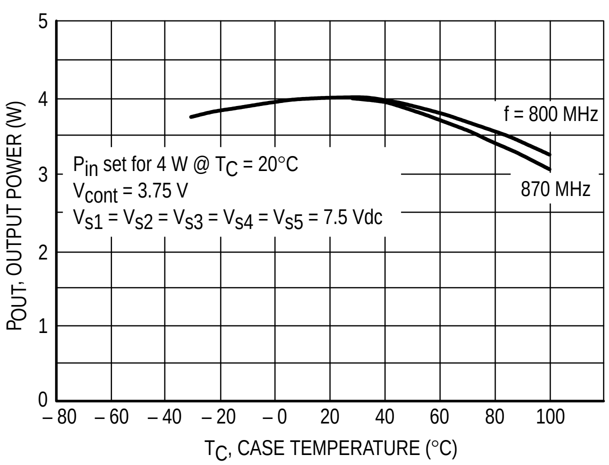


Figure 6. Output Power versus Case Temperature

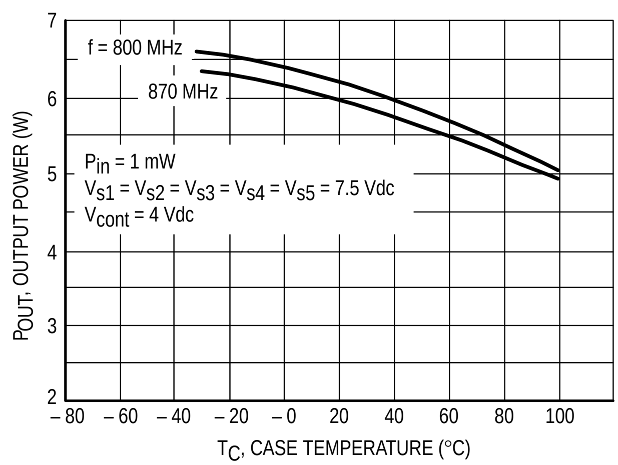


Figure 7. Output Power versus Case Temperature at Maximum Control Voltage

APPLICATIONS INFORMATION

NOMINAL OPERATION

All electrical specifications are based on the nominal conditions of $V_{S1} = V_{S2} = V_{S3} = V_{S4} = V_{S5}$ = 7.5 Vdc (Pins 2, 3, 4, 5, 6) and P_{out} equal to 4.0 watts. With these conditions, maximum current density on any device is 1.5 x 10^5 A/cm^2 and maximum die temperature with 100°C case operating temperature is 165°C. While the modules are designed to have excess gain margin with ruggedness, operation of these units outside the limits of published specifications is not recommended unless prior communications regarding intended use have been made with the factory representative.

GAIN CONTROL

The module output should be limited to 4.0 watts. The preferred method of power output control is to fix $V_{S1} = V_{S2} = V_{S3} = V_{S4} = V_{S5}$ = 7.5 Vdc (Pins 2, 3, 4, 5, 6), P_{in} (Pin 1) at 1.0 mW, and vary V_{cont} (Pin 1) voltage.

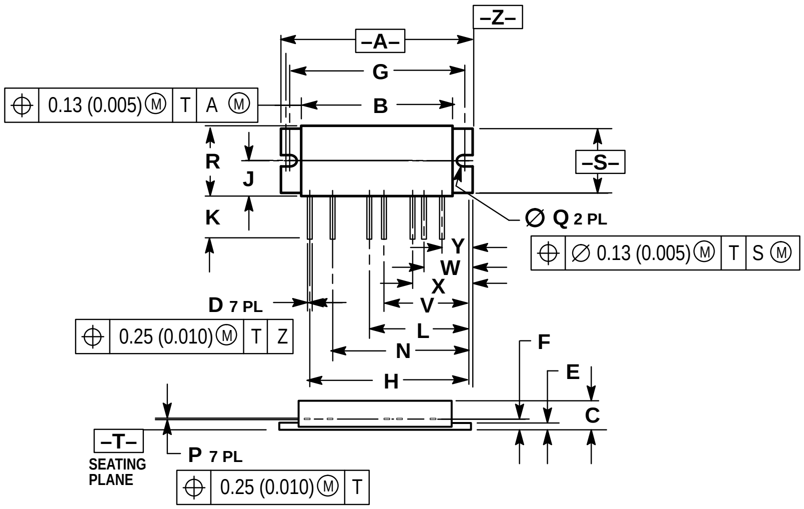
DECOUPLING

Due to the high gain of the four stages and the module size limitation, external decoupling networks require careful consideration. Pins 2, 3, 4, and 6 are internally bypassed with a 0.018 μF chip capacitor which is effective for frequencies from 5.0 MHz through 925 MHz. For bypassing frequencies below 5.0 MHz, networks equivalent to that shown in Figure 1 are recommended. Inadequate decoupling will result in spurious outputs at certain operating frequencies and certain phase angles of input and output VSWR.

LOAD MISMATCH

During final test, each module is load mismatch tested in a fixture having the identical decoupling networks described in Figure 1. Electrical conditions are $V_{S1} = V_{S2} = V_{S3} = V_{S4} = V_{S5}$ equal to 9.0 V, VSWR equal to 20:1, and output power equal to 6.0 watts.

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION F TO CENTER OF LEADS.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	2.380	2.395	60.46	6.083
B	1.970	1.990	50.04	50.54
C	0.250	0.265	6.35	6.73
D	0.018	0.022	0.46	0.55
E	0.085	0.100	2.16	2.54
F	0.132 BSC		3.35 BSC	
G	2.260 BSC		57.40 BSC	
H	2.042 BSC		51.87 BSC	
J	0.267	0.278	6.78	7.06
K	0.230	0.300	5.85	7.62
L	1.242 BSC		31.55 BSC	
N	1.742 BSC		44.25 BSC	
P	0.008	0.012	0.21	0.30
Q	0.120	0.130	3.05	3.30
R	0.535	0.555	13.59	14.09
S	0.445	0.465	11.31	11.81
V	1.142 BSC		29.01 BSC	
W	0.542 BSC		13.77 BSC	
X	0.642 BSC		16.31 BSC	
Y	0.342 BSC		8.69 BSC	

STYLE 1:
PIN 1. RF INPUT/V CONT
2. VS1
3. VS2
4. VS3
5. VS4
6. VS5
7. RF OUTPUT
CASE: GROUND

CASE 301F–03
ISSUE C

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