

# The RF Line

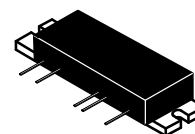
## UHF Power Amplifiers

Capable of wide power range control as encountered in portable cellular radio applications (30 dB typical).

- MHW803-2 806-870 MHz
- Specified 7.5 Volt Characteristics
  - RF Input Power = 1 mW (0 dBm)
  - RF Output Power = 2 Watts
  - Minimum Gain ( $V_{\text{Control}} = 4 \text{ V}$ ) = 33 dB
  - Harmonics = -45 dBc Max @  $2 f_o$
- 50  $\Omega$  Input/Output Impedance
- Guaranteed Stability and Ruggedness
- Epoxy Glass PCB Construction Gives Consistent Performance and Reliability
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

**MHW803-2**

**2 W, 806 to 905 MHz  
UHF POWER  
AMPLIFIERS**



**CASE 301E-04, STYLE 1**

### MAXIMUM RATINGS (Flange Temperature = 25°C)

Rating	Symbol	Value	Unit
DC Supply Voltage (Pins 2,3,4)	$V_{s1,2,3}$	10	Vdc
DC Control Voltage (Pin 1)	$V_{\text{Cont}}$	4	Vdc
RF Input Power	$P_{\text{in}}$	3	mW
RF Output Power ( $V_{s1} = V_{s2} = V_{s3} = 10 \text{ V}$ )	$P_{\text{out}}$	3	W
Operating Case Temperature Range	$T_C$	-30 to +100	°C
Storage Temperature Range	$T_{\text{stg}}$	-30 to +100	°C

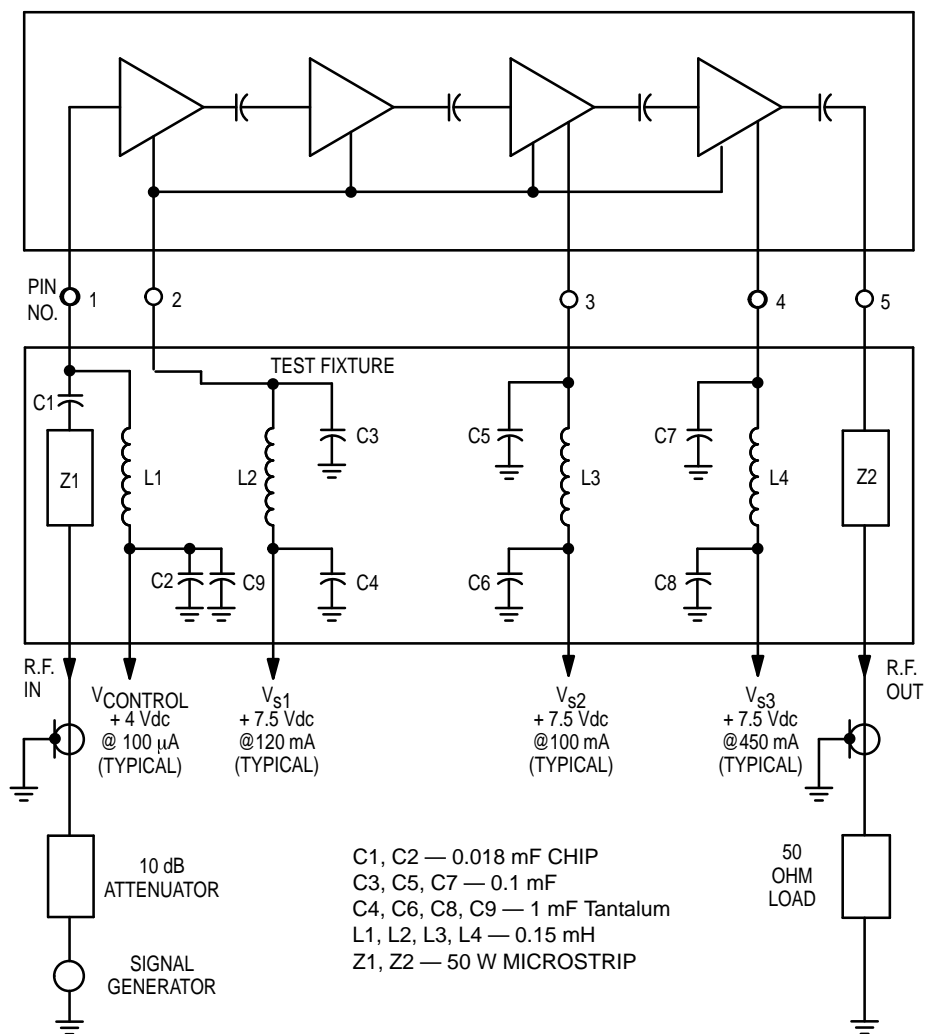
### ELECTRICAL CHARACTERISTICS $V_{s1} = V_{s2} = V_{s3} = 7.5 \text{ Vdc}$ , (Pins 2,3,4), $T_C = 25^\circ\text{C}$ , 50 $\Omega$ System

Characteristic	Symbol	Min	Max	Unit
Frequency Range	—	806	870	MHz
Control Voltage ( $P_{\text{out}} = 2 \text{ W}$ , $P_{\text{in}} = 1 \text{ mW}$ ) (1)	$V_{\text{Cont}}$	0	4	Vdc
Quiescent Current ( $V_{s1}$ , Pin 2 = 7.5 Vdc) (2)	$I_{s1(q)}$	—	65	mA
Power Gain ( $P_{\text{out}} = 2 \text{ W}$ , $V_{\text{Cont}} = 4 \text{ Vdc}$ )	$G_p$	33	—	dB
Efficiency ( $P_{\text{out}} = 2 \text{ W}$ , $P_{\text{in}} = 1 \text{ mW}$ ) (1)	$\eta$	37	—	%
Harmonics ( $P_{\text{out}} = 2 \text{ W}$ ) (1) $2 f_o$ ( $P_{\text{in}} = 1 \text{ mW}$ ) $3 f_o$	—	—	-45 -55	dBc
Input VSWR ( $P_{\text{out}} = 2 \text{ W}$ , $P_{\text{in}} = 1 \text{ mW}$ ), 50 $\Omega$ Ref. (1)	—	—	2.0:1	—
Noise power 30 kHz Bandwidth, 45 MHz above $f_o$ ( $P_{\text{out}} = 2 \text{ W}$ ) $T_C = +25^\circ\text{C}$ ( $P_{\text{in}} = 1 \text{ mW}$ ) $T_C = +100^\circ\text{C}$	— —	— —	-85 -82	dBm dBm
Load Mismatch ( $V_{s1} = V_{s2} = V_{s3} = 10 \text{ Vdc}$ ) VSWR = 10:1, $P_{\text{out}} = 3 \text{ W}$ , $P_{\text{in}} = 3 \text{ mW}$ (1)		No Degradation in Power Output		
Stability ( $P_{\text{in}} = 0.5-2 \text{ mW}$ , $V_{s1} = V_{s2} = V_{s3} = 6-9 \text{ Vdc}$ ) $P_{\text{out}}$ between 0 mW and 2 W (1) Load VSWR = 6:1, Source VSWR = 3:1		All spurious outputs more than 60 dB below desired signal		

#### NOTES:

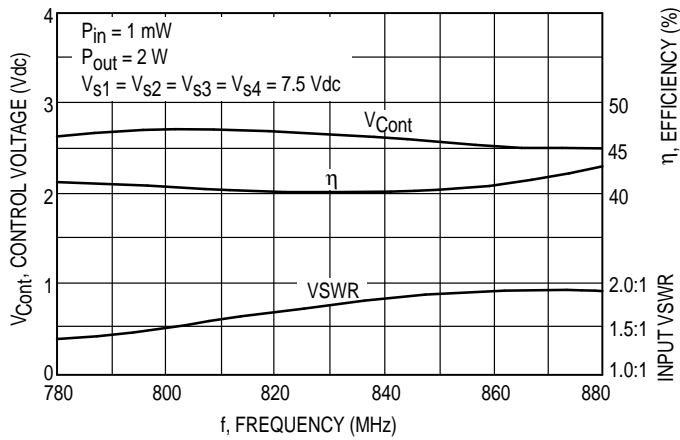
1. Adjust  $V_{\text{cont}}$  for specified  $P_{\text{out}}$ .
2.  $V_{\text{Cont}} = 0 \text{ Vdc}$ .



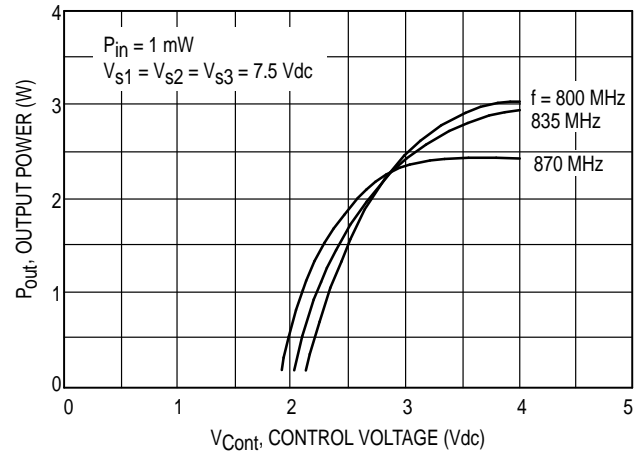


**Figure 1. Power Module Test System  
Block Diagram**

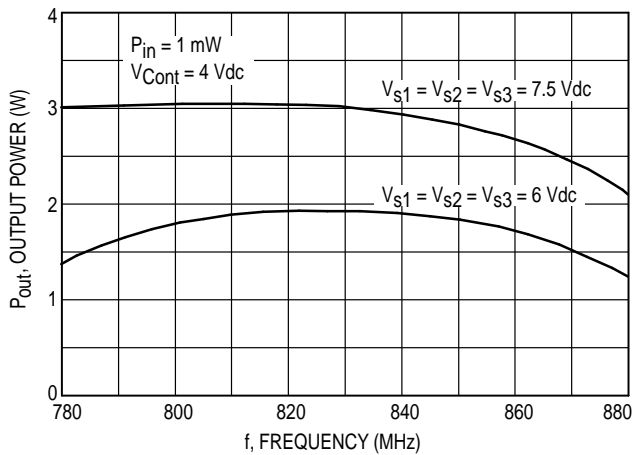
## TYPICAL CHARACTERISTICS



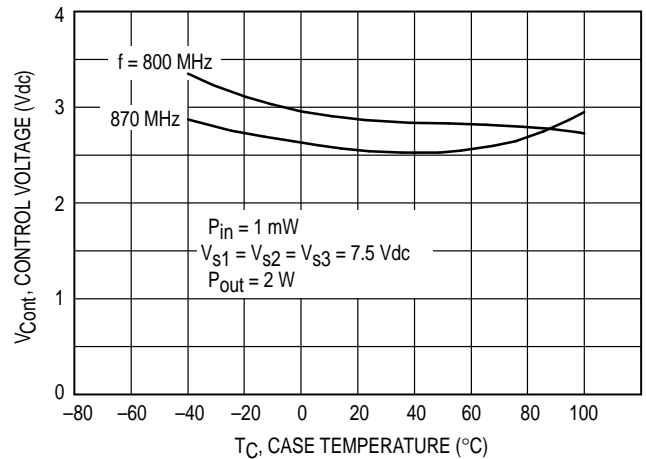
**Figure 2. Control Voltage, Efficiency and VSWR versus Frequency**



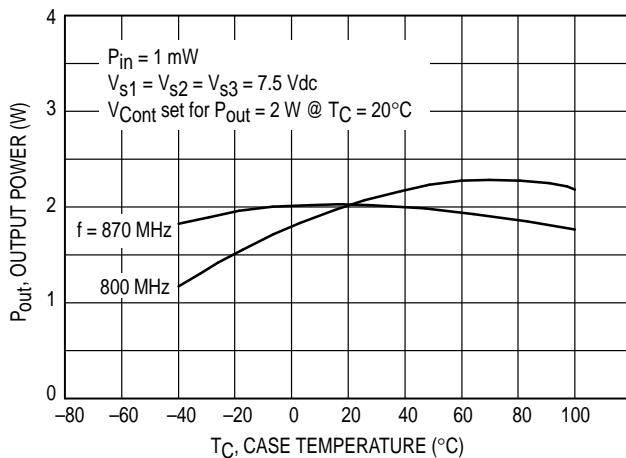
**Figure 3. Output Power versus Control Voltage**



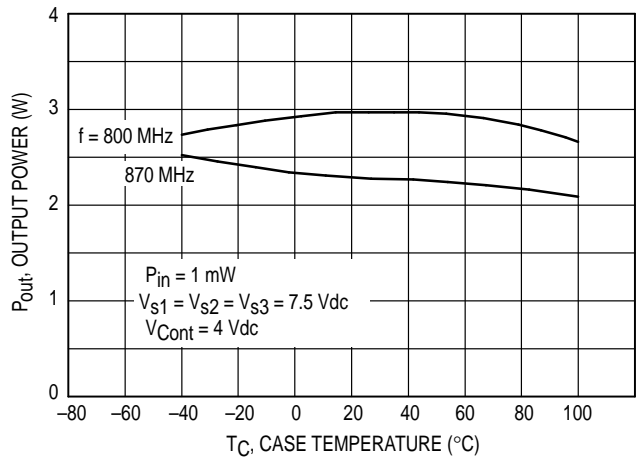
**Figure 4. Output Power versus Frequency**



**Figure 5. Control Voltage versus 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  $V_{S1} = V_{S2} = V_{S3} = 7.5 \text{ Vdc}$  (Pins 2, 3, 4) and  $P_{\text{Out}}$  equal to 2 watts. With these conditions, maximum current density on any device is  $1.5 \times 10^5 \text{ A/cm}^2$  and maximum die temperature with  $100^\circ\text{C}$  case operating temperature is  $165^\circ\text{C}$ . 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 2 watts. The preferred method of power output control is to fix  $V_{S1} = V_{S2} = V_{S3} = 7.5 \text{ Vdc}$  (Pins 2, 3, 4),  $P_{\text{In}}$  (Pin 1) at 1 mW, and vary  $V_{\text{Cont}}$  (Pin 1) voltage.

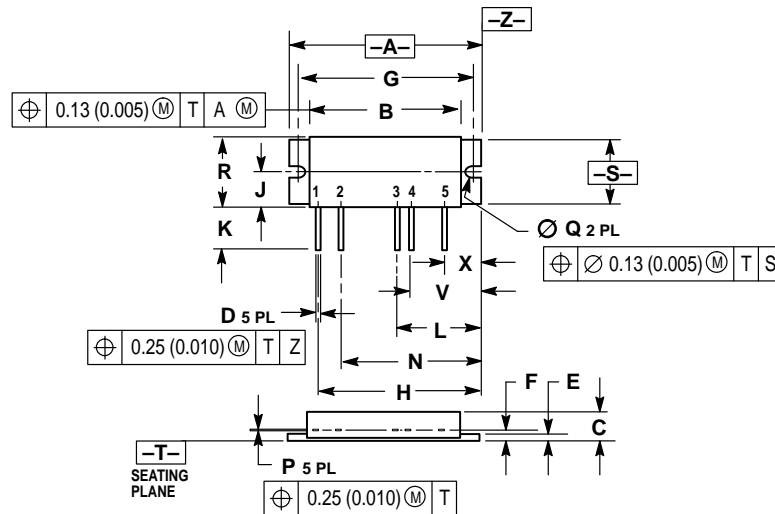
### DECOUPLING

Due to the high gain of the three stages and the module size limitation, external decoupling networks require careful consideration. Pins 2, 3 and 4 are internally bypassed with a  $0.018 \mu\text{F}$  chip capacitor which is effective for frequencies from 5 MHz through 905 MHz. For bypassing frequencies below 5 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  $V_{S1} = V_{S2} = V_{S3}$  equal to 10 Vdc, VSWR equal to 10:1, and output power equal to 3 watts.

## PACKAGE DIMENSIONS




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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.760	1.780	44.71	45.21
B	1.370	1.390	34.80	35.30
C	0.245	0.265	6.23	6.73
D	0.018	0.022	0.46	0.55
E	0.080	0.100	2.04	2.54
F	0.130 BSC		3.30 BSC	
G	1.650 BSC		41.91 BSC	
H	1.485 BSC		37.72 BSC	
J	0.267	0.278	6.79	7.06
K	0.230	0.300	5.85	7.62
L	0.785 BSC		19.94 BSC	
N	1.285 BSC		32.64 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	0.685 BSC		17.40 BSC	
X	0.385 BSC		9.78 BSC	

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

**CASE 301E-04  
 ISSUE F**

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