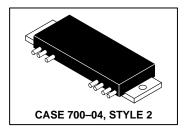
The RF Line **UHF Power Amplifiers**

Capable of wide power range control as encountered in UHF cellular telephone applications.

- MHW720A1 400-440 MHz
- MHW720A2 440-470 MHz
- Specified 12.5 Volt, UHF Characteristics Output Power = 20 Watts Minimum Gain = 21 dB Harmonics = -40 dB (Max)
- 50 Ω 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.

MHW720A1 MHW720A2

20 W, 400 to 470 MHz RF POWER AMPLIFIERS



MAXIMUM RATINGS (Flange Temperature = 25°C)

Rating		Symbol	Value	Unit
DC Supply Voltages		V _{s1} , V _{s2}	15.5	Vdc
RF Input Power		Pin	250	mW
RF Output Power (@ V _{S1} = V _{S2} = 12.5 V)		P _{out}	25	W
Operating Case Temperature Range		TC	-30 to +100	°C
Storage Temperature Range	MHW720A1, MHW720A2	T _{stg}	-40 to +100	°C

ELECTRICAL CHARACTERISTICS (V_{S1} and V_{S2} set at 12.5 Vdc, T_C = 25°C, 50 Ω system unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
Frequency Range	MHW720A1 MHW720A2	_	400 440	440 470	MHz
Input Power (Pout = 20 W)		Pin	_	150	mW
Power Gain (Pout = 20 W)		Gp	21	_	dB
Efficiency (P _{out} = 20 W)	MHW720A1, MHW720A2	η	35	_	%
Harmonics (P _{out} = 20 W, Reference)		_	_	-40	dB
Input Impedance ($P_{Out} = 20 \text{ W}, 50 \Omega \text{ Reference}$	ce)	Z _{in}	_	2:1	VSWR
Gain Degradation (1) ($P_{Out} = 20 \text{ W}$, Reference Gain @ $T_C = + 25^{\circ}C$)	$T_{C} = -30^{\circ}C$ $T_{C} = +80^{\circ}C$	_	_	-0.7 -0.7	dB
Load Mismatch (VSWR = 30:1, $V_{S1} = V_{S2} = 15.5$ Vdc, $P_{out} = 30$ W)		_	No degradation in P _{out}		
Stability (P _{in} = 0 to 250 mW, V _{S1} = V _{S2} = 10 t 1. Load VSWR = 4:1, 50Ω Reference 2. Source VSWR = 2:1, 50Ω Reference	o 15.5 Vdc) MHW720A1, MHW720A2	_	All spurious outputs more than 60 dB below desired signal		
Quiescent Current (I _{S1} No RF Drive Applied)	MHW720A1, MHW720A2	l _{s1 (q)}	_	200	mA

NOTE:

1. See Figure 5, Input Power versus Case Temperature



APPLICATIONS INFORMATION

Nominal Operation

All electrical specifications are based on the nominal conditions of Vs₁ (Pin 5) and V_{s2} (Pin 3) equal to 12.5 Vdc and with output power equaling 20 watts. With these conditions, maximum current density on any device is 1.5 x 10^5 A/cm² and maximum die temperature with 100° base plate temperature is 165° . 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 has been made with the factory representative.

Gain Control

This module is designed for wide range P_{Out} level control. The recommended method of power output control, as shown in Figure 3, is to fix V_{S1} and V_{S2} at 12.5 Vdc and vary the input RF drive level at Pin 7.

In all applications, the module output power should be limited to 20 watts.

Decoupling

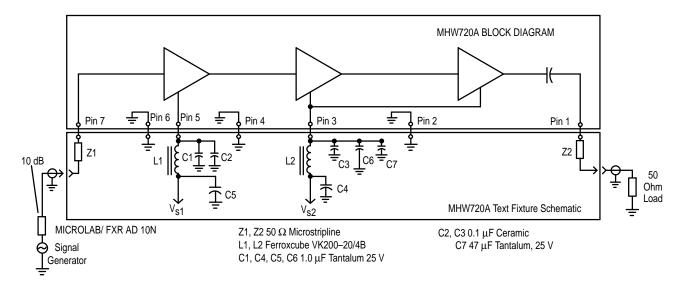
Due to the high gain of the three stages and the module size limitation, the external decoupling network requires careful consideration. Both Pins 3 and 5 are internally bypassed with a 0.018 μ F chip capacitor effective for frequencies from 5 through 470 MHz. For bypassing frequencies below 5 MHz, networks equivalent to that shown in the test fixture schematic are recommended. Inadequate decoupling will result in spurious outputs at certain operating frequencies and certain phase angles of input and output VSWR less than 4:1.

Load Mismatch

During final test, each module is load mismatch tested in a fixture having the identical decoupling network described in Figure 1. Electrical conditions are $\,V_{S1}$ and $\,V_{S2}$ equal 15.5 V, load VSWR infinite, and output power equal to 30 watts.

Mounting Considerations

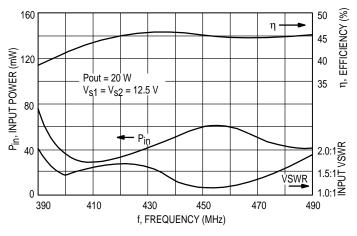
To insure optimum heat transfer from the flange to heatsink, use standard 6–32 mounting screws and an adequate quantity of silicon thermal compound (e.g., Dow Corning 340). With both mounting screws finger tight, alternately torque down the screws to 4–6 inch pounds. The heatsink mounting surface directly beneath the module flange should be flat to within 0.005 inch to prevent fracturing of ceramic substrate material. For more information on module mounting, see EB–107.



NOTE: No Internal D.C. blocking on input pin.

Figure 1. UHF Power Amplifier Test Setup

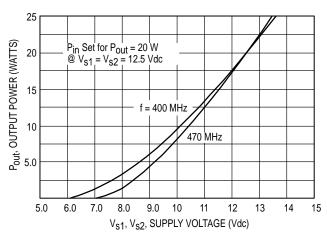
TYPICAL CHARACTERISTICS MHW720A1, MHW720A2



25 20 f = 400 MHz 440 MHz 15 470 MHz Vs1 = Vs2 = 12.5 V 0 20 40 60 80 100 f, FREQUENCY (MHz)

Figure 2. Input Power, Efficiency, and VSWR versus Frequency

Figure 3. Output Power versus Input Power



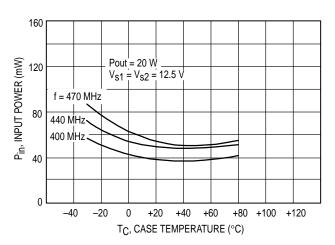


Figure 4. Output Power versus Voltage

Figure 5. Input Power versus

Case Temperature

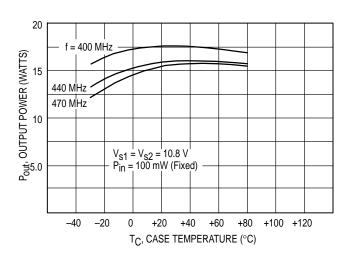
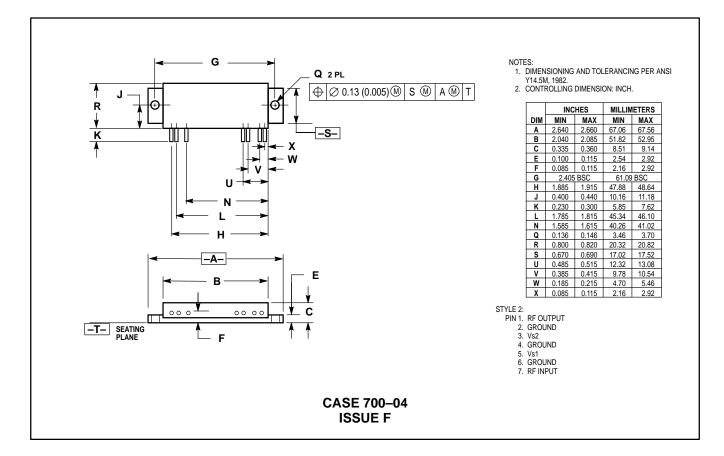


Figure 6. Output Power versus Case Temperature @ 10.8 V Supply

PACKAGE DIMENSIONS



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How to reach us:

USA/EUROPE: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244–6609 INTERNET: http://Design-NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki, 6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298



