

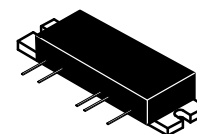
The RF Line UHF Power Amplifiers

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

- MHW803-1 820-850 MHz
- MHW803-2 806-870 MHz
- MHW803-3 870-905 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 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.

MHW803-1
MHW803-2
MHW803-3

2 W, 806 to 905 MHz
UHF POWER
AMPLIFIERS



CASE 301E-04, STYLE 1

MAXIMUM RATINGS (Flange Temperature = 25°C)

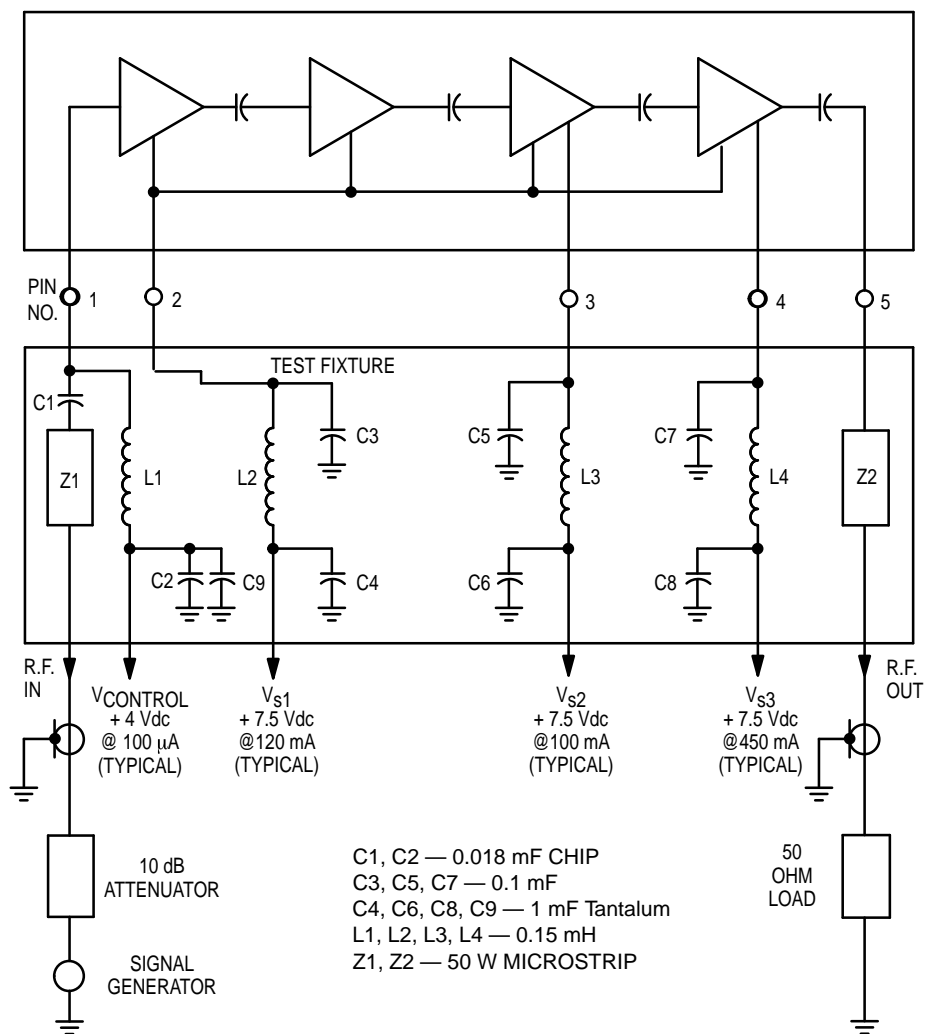
Rating	Symbol	Value	Unit
DC Supply Voltage (Pins 2,3,4)	$V_{s1,2,3}$	10	Vdc
DC Control Voltage (Pin 1)	V_{Cont}	4	Vdc
RF Input Power	P_{in}	3	mW
RF Output Power ($V_{s1} = V_{s2} = V_{s3} = 10 \text{ V}$)	P_{out}	3	W
Operating Case Temperature Range	T_C	-30 to +100	°C
Storage Temperature Range	T_{stg}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

Characteristic	Symbol	Min	Max	Unit
Frequency Range MHW803-1 MHW803-2 MHW803-3	—	820 806 870	850 870 905	MHz
Control Voltage ($P_{\text{out}} = 2 \text{ W}$, $P_{\text{in}} = 1 \text{ mW}$) (1)	V_{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)	η	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 Ω Ref. (1)	—	—	2.0:1	—
Noise power 30 kHz Bandwidth, 45 MHz above f_o ($P_{\text{out}} = 2 \text{ W}$) (1) $T_C = +25^\circ\text{C}$ ($P_{\text{in}} = 1 \text{ mW}$) $T_C = +100^\circ\text{C}$	— —	— —	-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_{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_{Cont} for specified P_{out} .
2. $V_{\text{Cont}} = 0 \text{ Vdc}$.



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

TYPICAL CHARACTERISTICS (MHW803-1,-2)

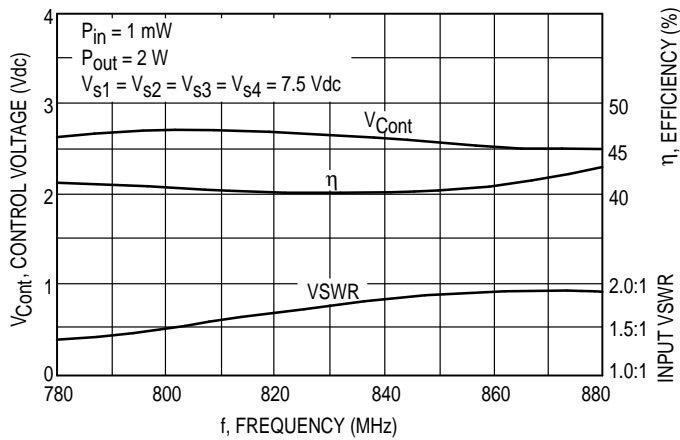


Figure 2. Control Voltage, Efficiency and VSWR versus Frequency

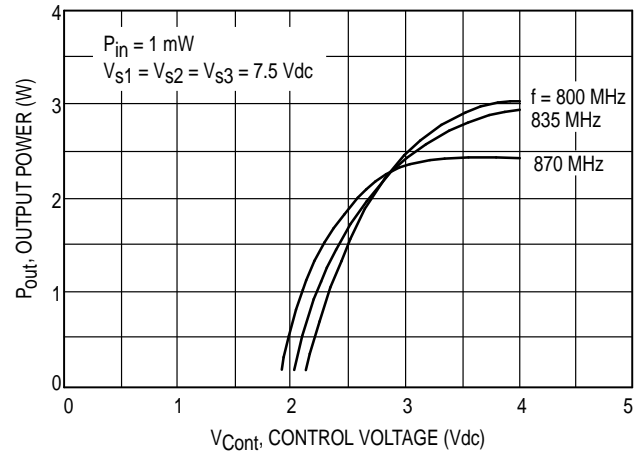


Figure 3. Output Power versus Control Voltage

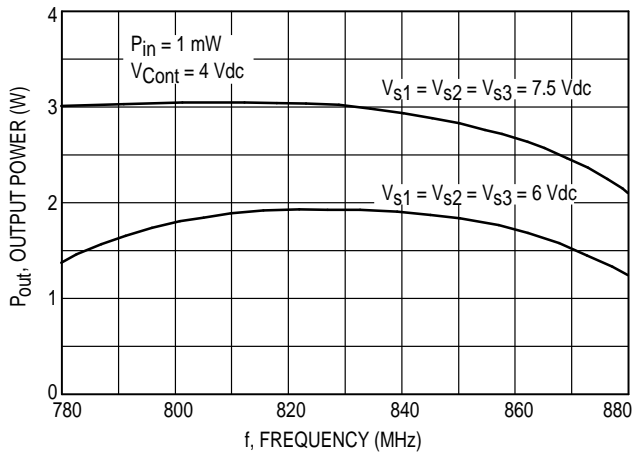


Figure 4. Output Power versus Frequency

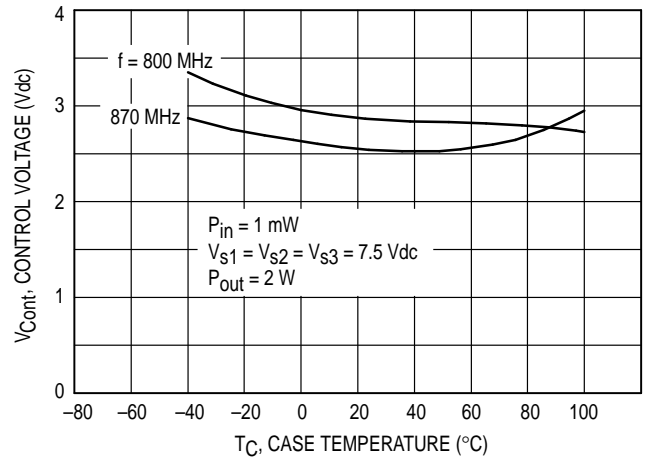


Figure 5. Control Voltage versus Case Temperature

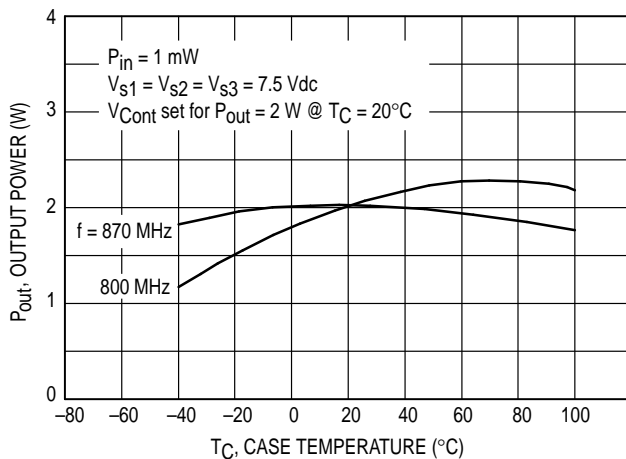


Figure 6. Output Power versus Case Temperature

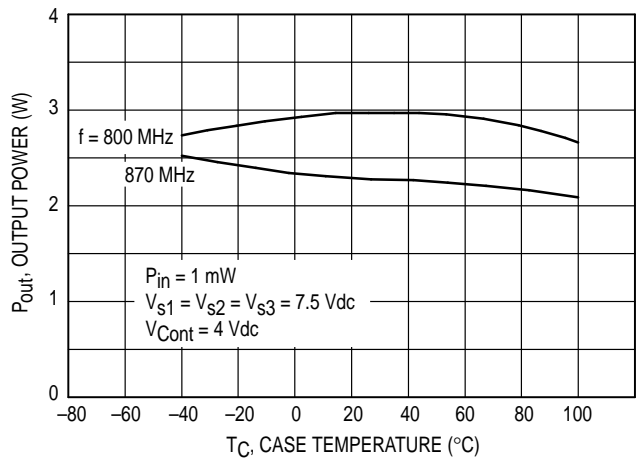


Figure 7. Output Power versus Case Temperature at Maximum Control Voltage

TYPICAL CHARACTERISTICS (MHW803-3)

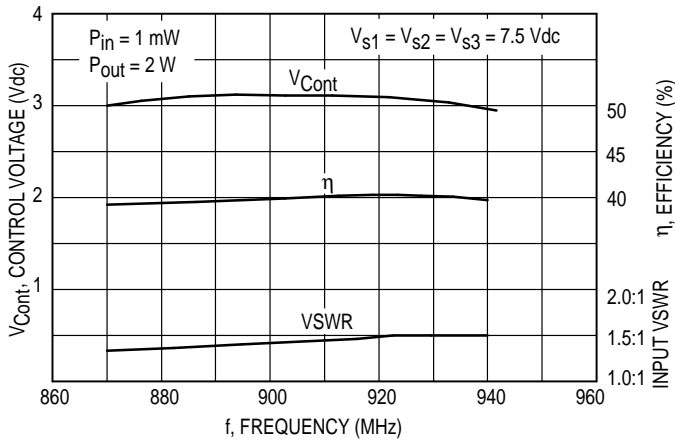


Figure 8. Control Voltage, Efficiency and VSWR versus Frequency

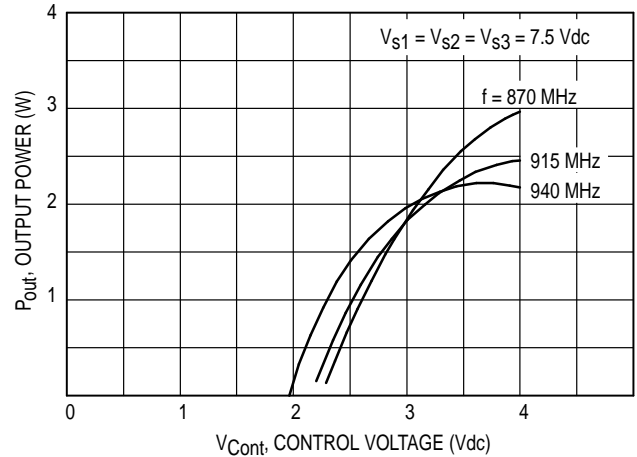


Figure 9. Output Power versus Control Voltage

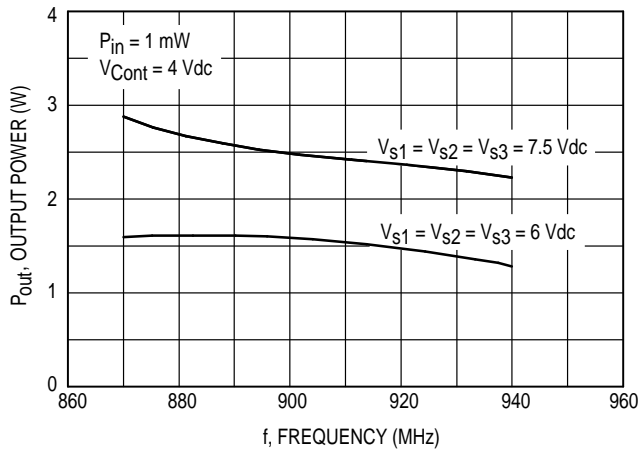


Figure 10. Output Power versus Frequency

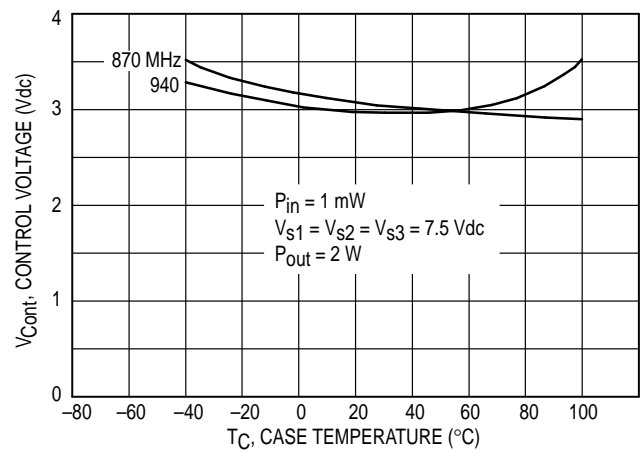


Figure 11. Control Voltage versus Case Temperature

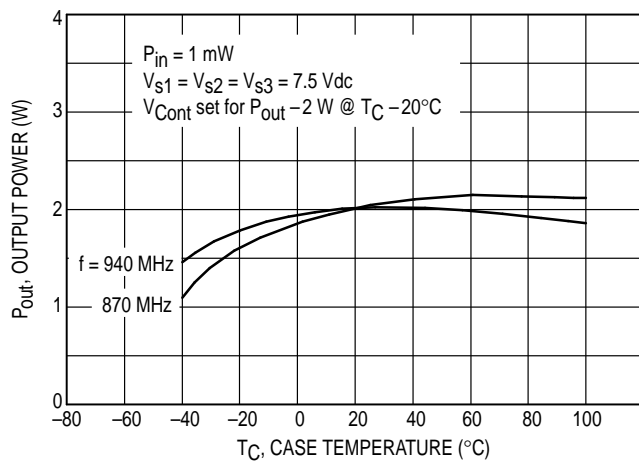


Figure 12. Output Power versus Case Temperature

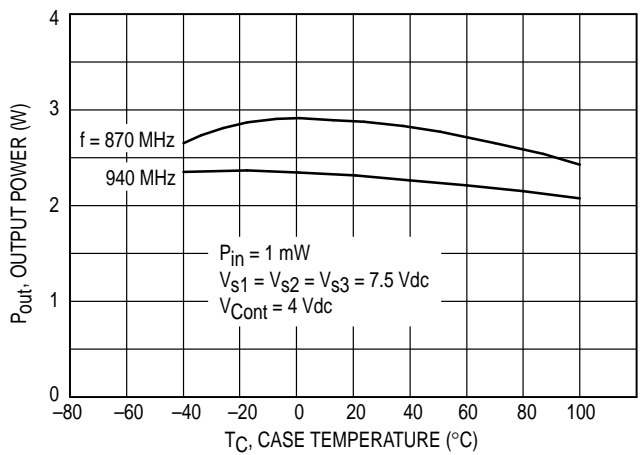


Figure 13. Output Power versus Case Temperature at Maximum Control Voltage

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_{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°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 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_{in} (Pin 1) at 1 mW, and vary V_{Cont} (Pin 1) voltage.

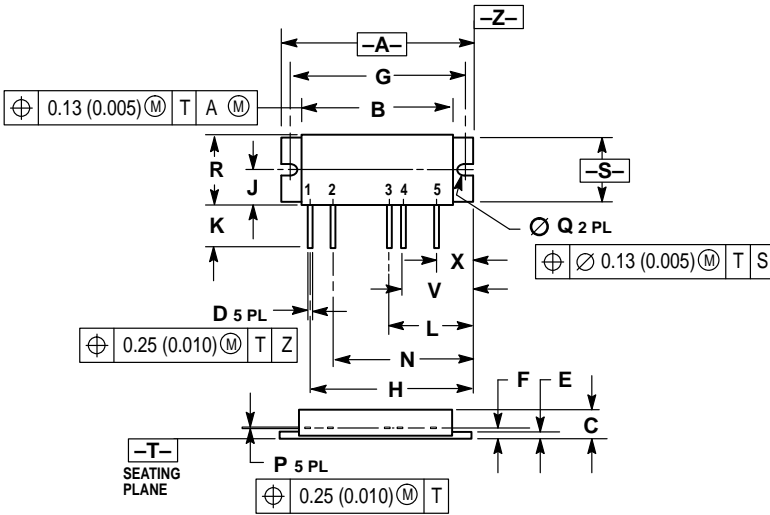
DECOUPLING

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.

	INCHES		MILLIMETERS	
DIM	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	1.295 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	0.395 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**

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Literature Distribution Centers:

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.

EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.

JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan.

ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.



MHW803/D

