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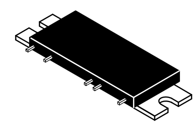
The RF Line
UHF Power Amplifiers

MHW851-1
MHW851-2
MHW851-3
MHW851-4

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

- High Efficiency
- MHW851–1: f = 820 – 850 MHz
- MHW851–2: f = 870 – 905 MHz
- MHW851–3: f = 890 – 915 MHz
- MHW851–4: f = 915 – 925 MHz
- Specified 6.0 Volt Characteristics
  RF Input Power = 1.0 mW (0 dBm)
  RF Output Power
  = 1.6 Watts (MHW851–1,–2,–4)
  = 2.0 Watts (MHW851–3)
  Minimum Gain
  ($V_{Control}$ = 3.5 V) = 32 dB (MHW851–1,–2,–4)
  ($V_{Control}$ = 3.5 V) = 33 dB (MHW851–3)
  Harmonics = – 45 dBc Max @ 2.0 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.

1.6 W, 820 – 925 MHz
RF POWER
AMPLIFIERS



CASE 301N–02, STYLE 1

MAXIMUM RATINGS (Flange Temperature = 25°C)

Rating	Symbol	Value	Unit
DC Supply Voltage (Pins 2, 3, 4)	$V_{S1,2,3}$	7.5	Vdc
DC Control Voltage (Pin 1)	V_{Cont}	4.0	Vdc
RF Input Power	P_{in}	3.0	mW
RF Output Power (V_{S1} = V_{S2} = V_{S3} = 7.5 V)	P_{out}	3.0	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} = 6.0 Vdc, (Pins 2, 3, 4), T_C = 25°C, 50 Ω System)

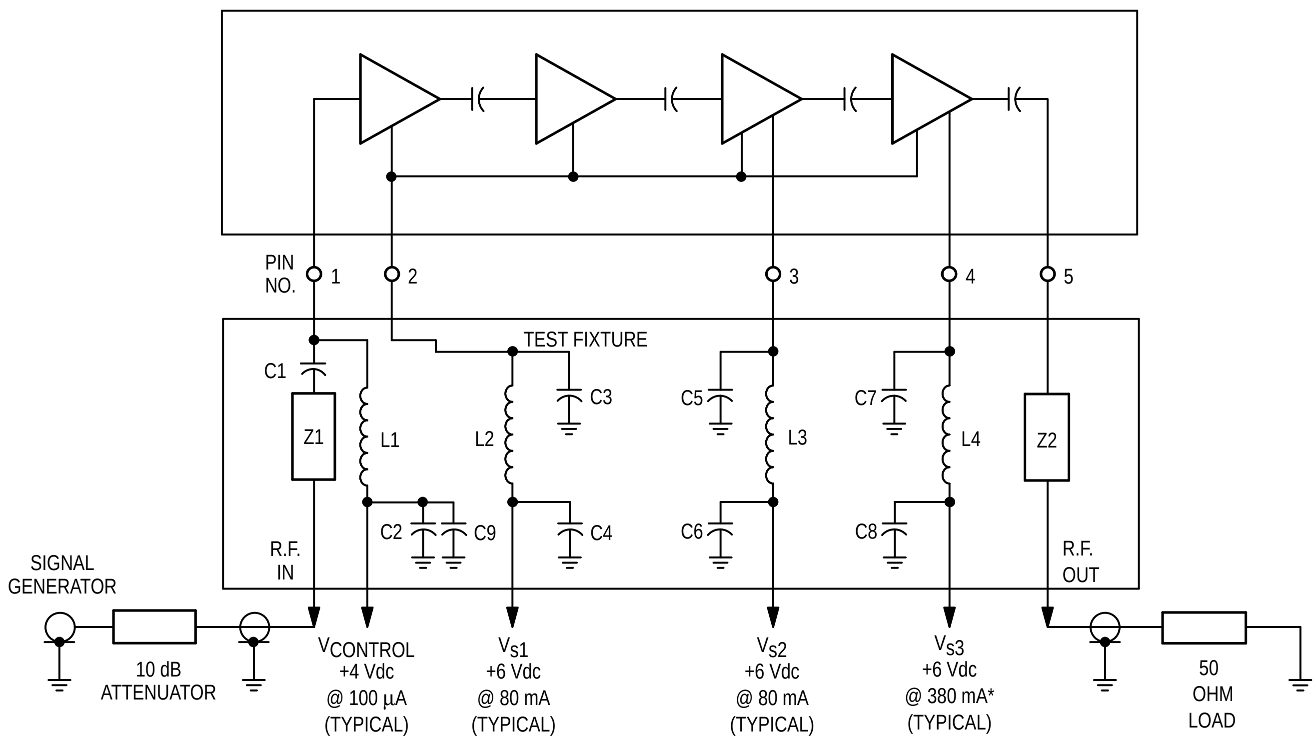
Characteristic	Symbol	Min	Max	Unit
Frequency Range MHW851–1 MHW851–2 MHW851–3 MHW851–4	BW	820 870 890 915	850 905 915 925	MHz
Control Voltage (P_{out} = 1.6 W, P_{in} = 1.0 mW) (1)(3)	V_{Cont}	0	3.5	Vdc
Quiescent Current (V_{S1}, Pin 2 = 6.0 Vdc) (2)	$I_{S1(q)}$	—	65	mA
Power Gain (P_{out} = 1.6 W, V_{Cont} = 3.5 Vdc) (3) MHW851–1,–2,–4 (P_{out} = 2.0 W, V_{Cont} = 3.5 Vdc) MHW851–3	G_p	32 33	—	dB
Efficiency (P_{out} = 1.6 W, P_{in} = 1.0 mW) (1) (3)	η	45	—	%

NOTES:
1. Adjust V_{cont} for specified P_{out}.
2. V_{Cont} = 0 Vdc.
3. P_{out} = 2.0 watts for MHW851–3 only.

ELECTRICAL CHARACTERISTICS — continued ($V_{S1} = V_{S2} = V_{S3}$ = 6.0 Vdc, (Pins 2, 3, 4), T_C = 25°C, 50 Ω System)

Characteristic	Symbol	Min	Max	Unit
Harmonics (P_{out} = 1.6 W) (1)(3) 2.0 f_o (P_{out} = 1.0 mW) 3.0 f_o	—	—	–45 –55	dBc
Input VSWR (P_{out} = 1.6 W, V_{Cont} = 3.5 V) (3)(4)	$VSWR_{in}$	—	2.0:1	—
Noise Power 30 kHz Bandwidth, 45 MHz, above f_o (P_{out} = 1.6 W) (1)(3) T_C = +25°C (P_{in} = 1.0 mW) T_C = +100°C	—	 — —	 –85 –82	dBm
Load Mismatch ($V_{S1} = V_{S2} = V_{S3}$ = 7.5 Vdc) VSWR = 10:1, P_{out} = 3.0 W, P_{in} = 3.0 mW) (1)	ψ	No Degradation in Power Output		
Stability (P_{in} = 0.5–2.0 mW, $V_{S1} = V_{S2} = V_{S3}$ = 4.8–7.5 Vdc P_{out} between 0 mW and 1.6 W (1)(3) 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_{Cont} = 0 Vdc.
3. P_{out} = 2.0 watts for MHW851–3 only.
4. Adjust P_{in} for specified P_{out}.



C1, C2 — 0.018 mF CHIP
C3, C5, C7 — 0.1 mF
C4, C6, C8, C9 — 1 mF TANTALUM
L1, L2, L3, L4 — 0.15 mH
Z1, Z2 — 50 W MICROSTRIP

*480 mA for MHW851–3

Figure 1. Power Module Test System Block Diagram

TYPICAL CHARACTERISTICS

MHW851–1 and MHW851–2

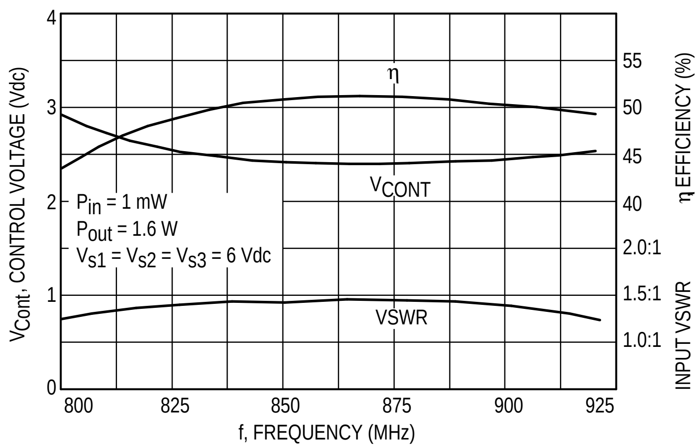


Figure 2. Control Voltage, Efficiency and Input VSWR versus Frequency

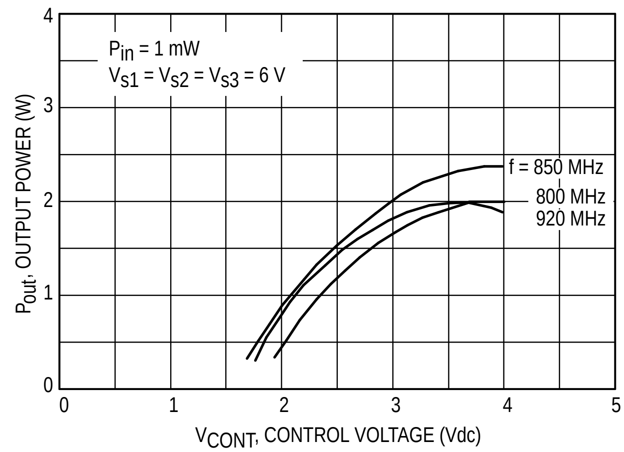


Figure 3. Output Power versus Control Voltage

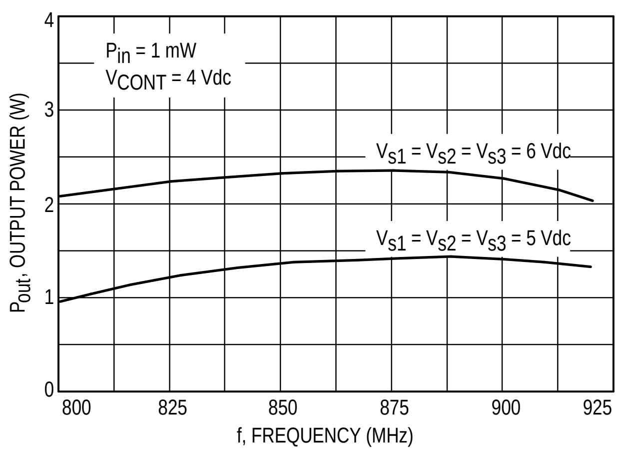


Figure 4. Output Power versus Frequency

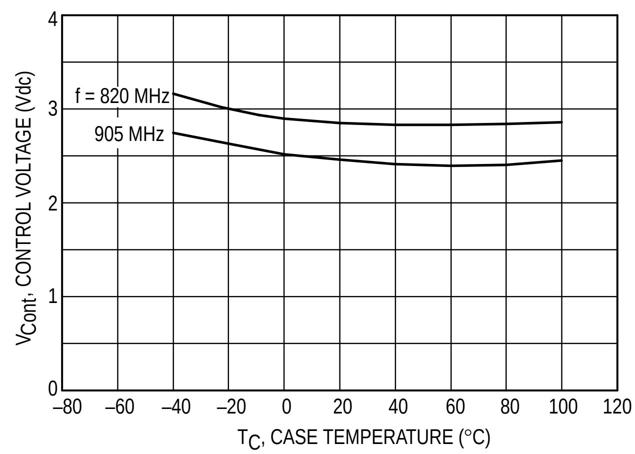


Figure 5. Control Voltage versus Case Temperature

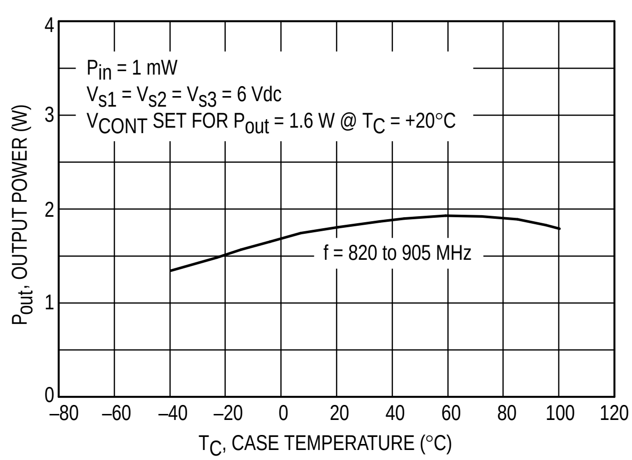


Figure 6. Output Power versus Case Temperature

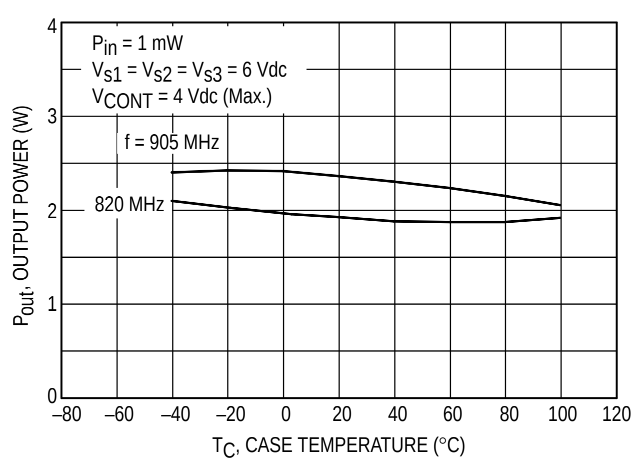


Figure 7. Output Power versus Case Temperature at Maximum Control Voltage

TYPICAL CHARACTERISTICS (continued)

MHW851–3 and MHW851–4

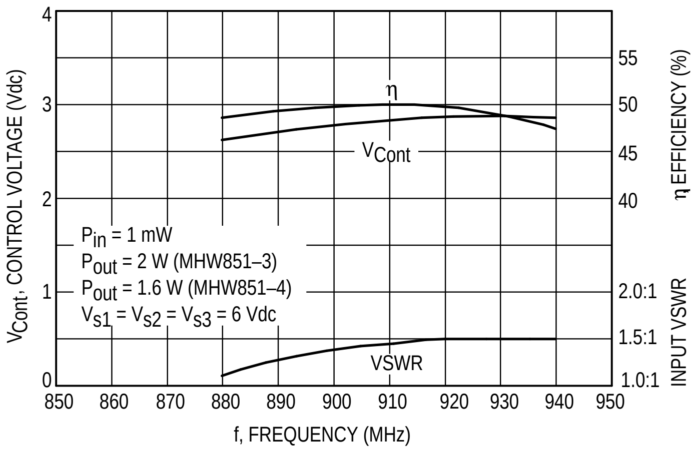


Figure 8. Control Voltage, Efficiency and VSWR versus Frequency

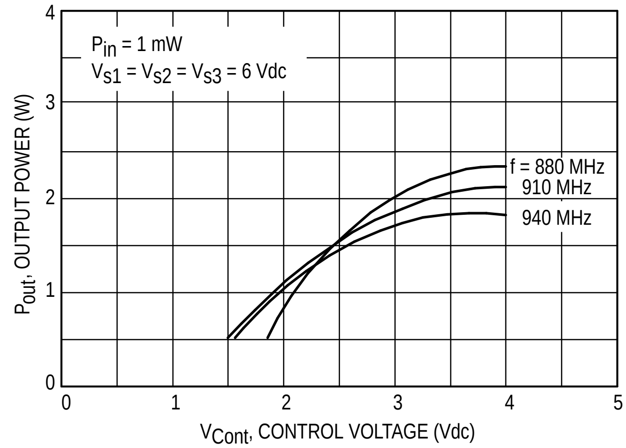


Figure 9. Output Power versus Control Voltage

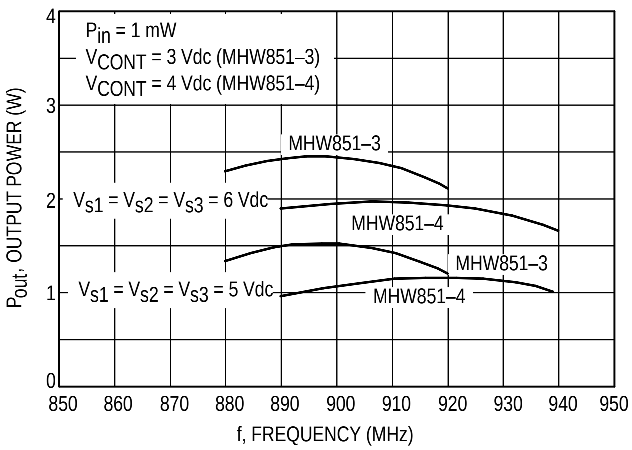


Figure 10. Output Power versus Frequency

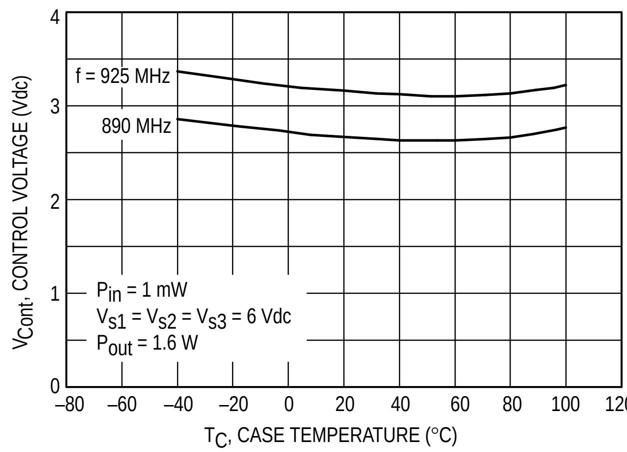


Figure 11. Control Voltage versus Case Temperature

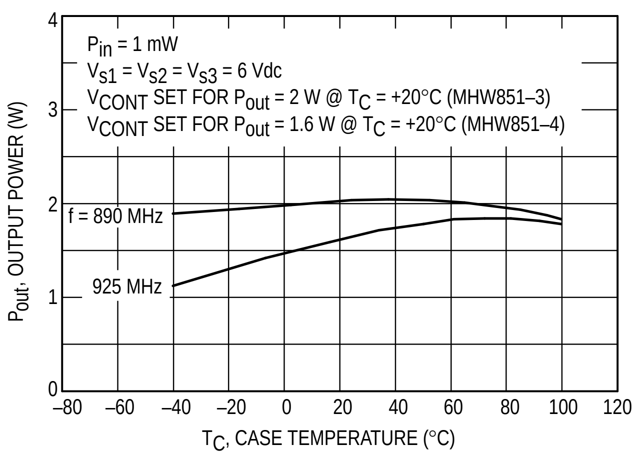


Figure 12. Output Power versus Case Temperature

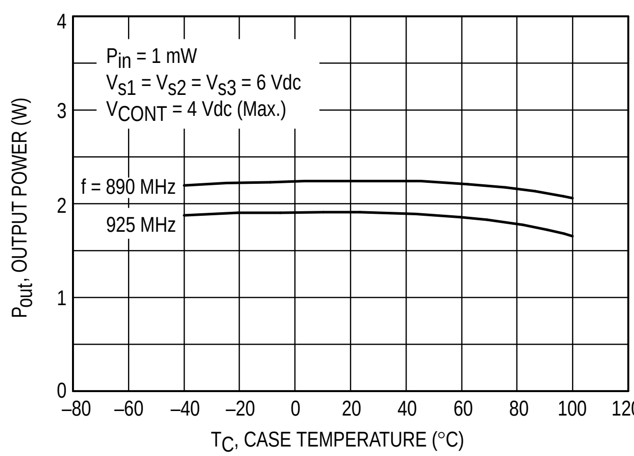


Figure 13. Output Power versus Case Temperature at Maximum Control Voltage

APPLICATIONS INFORMATION

NOMINAL OPERATION

All electrical specifications are based on the nominal conditions of $V_{S1} = V_{S2} = V_{S3} = 6.0$ Vdc (Pins 2, 3, 4). With these conditions, maximum current density on any device is 1.5×10^5 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 specified value. The preferred method of power output control is to fix $V_{S1} = V_{S2} = V_{S3} = 6.0$ Vdc (Pins 2, 3, 4), P_{in} (Pin 1) at 1 mW, and vary V_{Cont} (Pin 1) voltage.

DECOUPLING

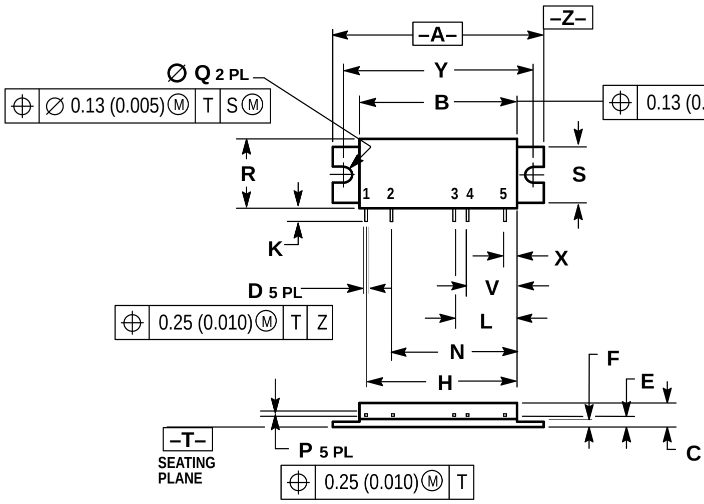
Due to the high gain of the three stages and the module size limitation, external decoupling networks require careful consideration. Pins 2, 3 and 4 are internally bypassed with a 0.018 µF chip capacitor which is effective for frequencies from 5 MHz through 940 MHz. For bypassing frequencies below 5 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.

Remember that the modules are NOT hermetic. Do not immerse a module in a flux cleaning solution or other liquids under any circumstances.

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 7.5 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: MILLIMETER.
3. DIMENSION F TO CENTER OF LEADS.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	42.80	43.05	1.685	1.695
B	32.01	32.38	1.260	1.275
C	4.45	4.75	0.175	0.187
D	0.46	0.55	0.018	0.022
E	1.02	1.14	0.040	0.045
F	1.96	2.41	0.077	0.095
H	30.61 BSC		1.205 BSC	
K	2.54	—	0.100	—
L	12.83 BSC		0.505 BSC	
N	25.53 BSC		1.005 BSC	
P	0.21	0.30	0.008	0.012
Q	3.05	3.30	0.120	0.130
R	13.85	14.22	0.545	0.560
S	11.43	11.68	0.450	0.460
V	10.29 BSC		0.405 BSC	
X	2.67 BSC		0.105 BSC	
Y	38.99 BSC		1.535 BSC	

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

CASE 301N–02
ISSUE A

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