

Broadcast Concepts Inc.

RF power components for commercial, military, scientific & amateur applications.

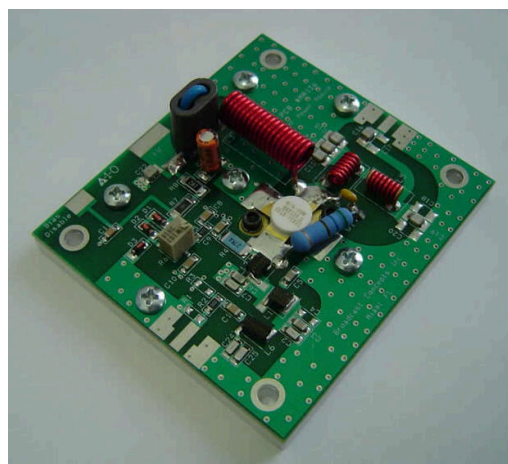
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Model FM15 Pallet Amplifier Module

This amplifier module is ideal for driver and final output stages in analog and digital FM broadcast equipment.

- **86 – 110MHz**
- **28 Volts**
- **Input/output 50 ohms**
- **Pout: 15W typical**
- **11dB Gain (15W)**
- **Class AB**
- **Premium grade driver module**



Dimension (L x W x H inch) [3" x 3.325" x 1.2"]

Absolute Maximum Ratings (T case = 25C)

Symbol	Parameter	Value	Unit
Vs	Drain voltage supply	28	V DC
Is	Supply Current	1.0	A dc
VSWR	Load Mismatch (All phase angles, Id=1.0A, TC=+50C)	10 to 1	
Tstg	Storage temperature range	-40 to +85C	Celsius
Tc	CNC Base plate operating temperature	-40 to +55C	Celsius

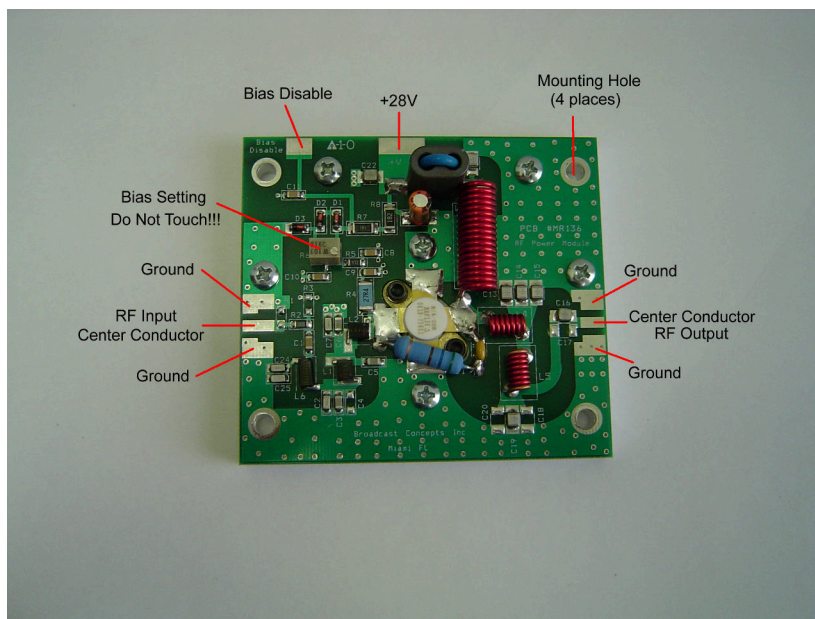
Electrical Specifications (T case = 25C, 50 ohm loaded, VS=28V Id=1.0A, bias=100ma)

Characteristics	min	typ	max	unit
Operating Frequency range	86		110	MHz
Fundamental output power	12	14	15	W
Power Input	n/a	1.0	1.2	W
Power Gain (150w output)	10.5	11.0	11.5	dB
Collector Efficiency	50	60	n/a	%
Insertion Phase variation (unit to unit)		+/-5		degrees
Power gain (unit to unit)		+/-0.5		dB
F2 Second Harmonic		-30dB		dB
F3 Third Harmonic		-45dB		dB

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Electrical Connections

- This module requires 1 power supply connection. A wire, #16 AWG or larger must be soldered to the surface mount pad shown in the photo above marked “+28V”. Ground should be connected any where on your heat sink and not to the module.
- The RF input is on the left side of the photo and the RF output is on the right. A flexible 50-ohm coax should be used to make the input and output RF connections. Use small diameter coax 0.141 inch outer diameter or smaller to make the connections to the pallet; then transition to larger coax as required. When choosing a small diameter coax use something that has a Teflon dielectric. This is very important, low quality coax that is not made with Teflon will melt when soldered to.

Heatsink Mounting/Hardware

Planarity: better than 0.03mm

Roughness: typical value 0.8u

Heat sink size: What size heat sink should be used? This is a difficult question to answer because heatsinks come in many different sizes and shapes. The heatsink must be large enough to prevent the base plate of the pallet from exceeding +55C. Pay close attention to the deck thickness of the heatsink and the number of fins per inch. The deck thickness should be ¼ inch or larger. Fins should be 1 inch long or better. The fin density should be 4 fins per inch or more. Forced air-cooling may be required. The heatsink should be twice the length and width of the pallet. Avoid CPU heatsinks or any heatsink developed for computer equipment. Most of these are unsuitable.

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Thermal compound

Silicon free compound is highly recommended because silicon based compounds may dry out in time.

Paste thickness: optimum between 0.06mm and 0.15mm, on the whole back surface of the pallet. Basically the thermal compound that is applied should not be thicker than a coat of paint. Using too much thermal compound is worse than using none.

Suggested Coaxial Connection Procedure:

Use 50ohm RG178 Mil-17-C Teflon, Belden part number 83284. Prepare with an exacto knife. Begin by rolling the coax on a flat surface with an exacto knife. Score and remove the outer insulation without damaging the braid (don't use too much pressure on the knife, this requires some practice). Next tin the braid with solder and score it by rolling the coax on a flat surface. Now use a pair of needle nose pliers to twist the braid back and forth. It will break on the score line. Finally strip the insulation from the center conductor by rolling the coax on a flat surface with an exacto knife.

The procedure described above will yield professional results. Many choose to twist the braid into a wire to solder to ground. This creates inductance and it's sloppy.

Mounting considerations:

- 6-32 or 8-32 screws. There are 4 mounting locations; 1 at each corner.
- Recommended Torque is 12 Kg . cm (10.5 in . lbs).
- Additional Mechanical information can be downloaded from the main webpage for this product. DXF and PDF formats are provided

Final Warnings: Solid state amplifiers can be easily destroyed!!!. Pay attention to these precautions.

- Do not over drive the amplifier. Exceeding 15 watts can destroy the transistor. Follow the charts on the next page.
- Do not run the amplifier into an open circuit. Do not run the amplifier when the SWR is unknown. Basically don't run the amplifier without a wattmeter.
- Don't use an unregulated power supply. Don't reverse the power supply connections.
- Don't touch the amplifier circuit while it is running.
- Do not allow the amplifier to overheat. Do not let the base plate temp exceed 55C.
- Don't attach anything to the bias disable pad if you don't plan to use this control line.

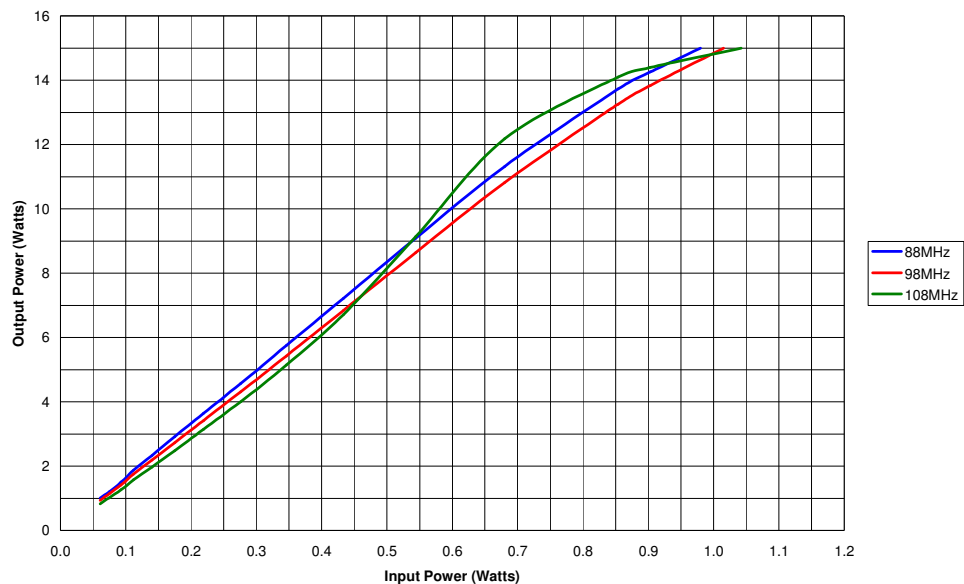
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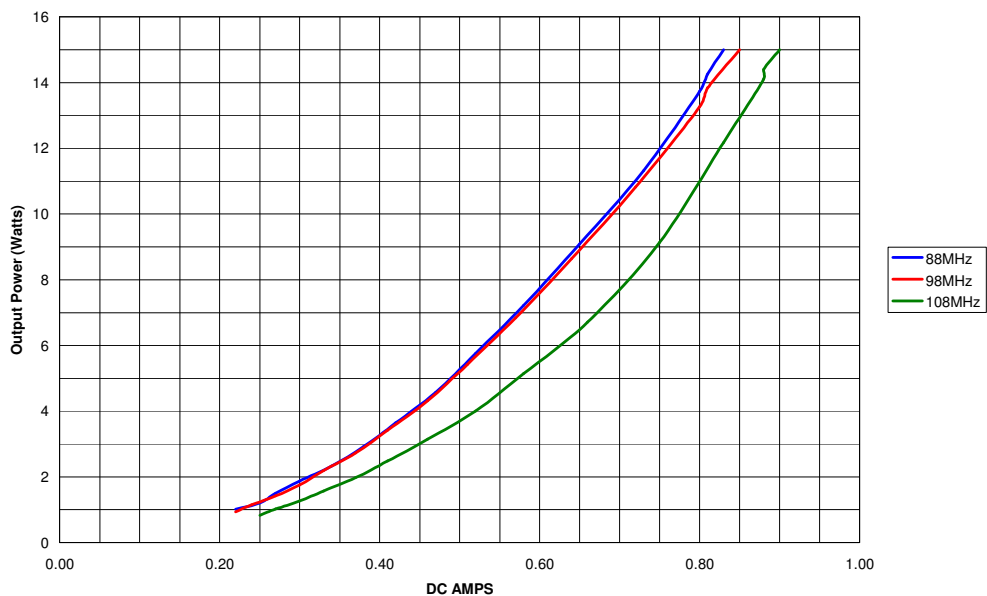
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Input Power Vs Output Power @ 28VDC; Class AB 100ma bias current MRF136



DC Amps Vs Output Power @ 28VDC; Class AB 100ma bias current MRF136



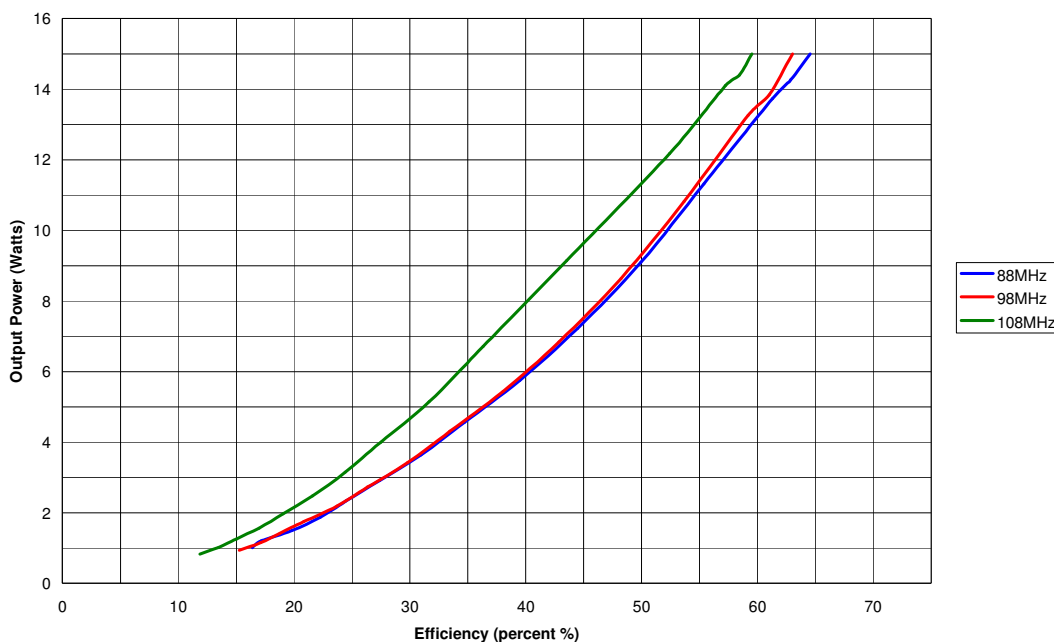
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Efficiency Vs Output Power @ 28VDC; Class AB 100ma bias current MRF136



Note concerning RF overdrive.

The MRF136 PA module is designed for a 1 watt input. The absolute maximum input drive level is 1.2 watts. Operating above 1.2 watts input drive may damage the mosfet or shorten its service life.

Note concerning bias disable control:

The bias disable control line is used to turn off the bias of the amplifier in a high SWR condition. It is included for customer systems that employ automatic SWR protection. Any circuit that connects to this pad must not introduce a higher voltage than is present on the pad. Introducing a higher voltage here could create an over bias condition and destroy the amplifier. Circuits that connect to this point should bring the voltage as close to ground as possible. When the bias disable pad is grounded the amp will not operate.

Note concerning harmonic output:

If this product is being used as a final output stage then a low pass filter should be used to avoid problems with regulatory agencies.