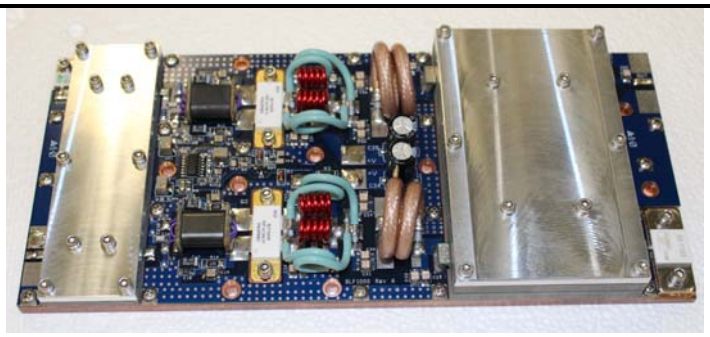
Broadcast Concepts Inc
11700 NW 102nd Road Suite 4Medley FL 33178
Tel: 305.887.8400 FAX 305.887.8444

Model P1200FM-184XR FM Pallet Amplifier

This amplifier module is ideal for final output stages in FM Broadcast Applications.

- **87.5 – 108.1MHz (FM BAND)**
- **50 Volts**
- **Input/output 50 ohms**
- **Pout: 1200W minimum**
- **Up to 82% efficiency**
- **23dB Gain**
- **NXP BLF184XR Mosfets**



Dimension (L x W x H inch) [8.94” x 4.00” x 1.25”]

Electrical Specifications				
Characteristics	min	typ	max	unit
Operating Frequency range	87.5		108.1	MHz
peak saturated power (@ 50V)	1200	-	-	W
P1dB @ 50V		1100		W
Power Input		5.5	7.5	W
Input VSWR		1.2	-	VSWR
Power Gain	22	23	24	dB
Amplifier efficiency at 1200W	78	-	-	%
Absolute maximum current rating	-	-	36	A dc
Insertion Phase variation (unit to unit)	-	+/-3.5	-	degrees
Power gain (unit to unit)	-	+/-1.0	-	dB
F2 Second Harmonic		-45	-40	dB
F3 Third Harmonic		-20	-17	dB
Bias Current per transistor: Factory set @50V.		100		MA dc
Drain voltage supply		48	52	V
Base plate operating temperature	0	n/a	75	Celsius
Load Mismatch (All phase angles, Id=32A, 10 seconds)			65:1	VSWR
Shipping Weight		4.0		LBS

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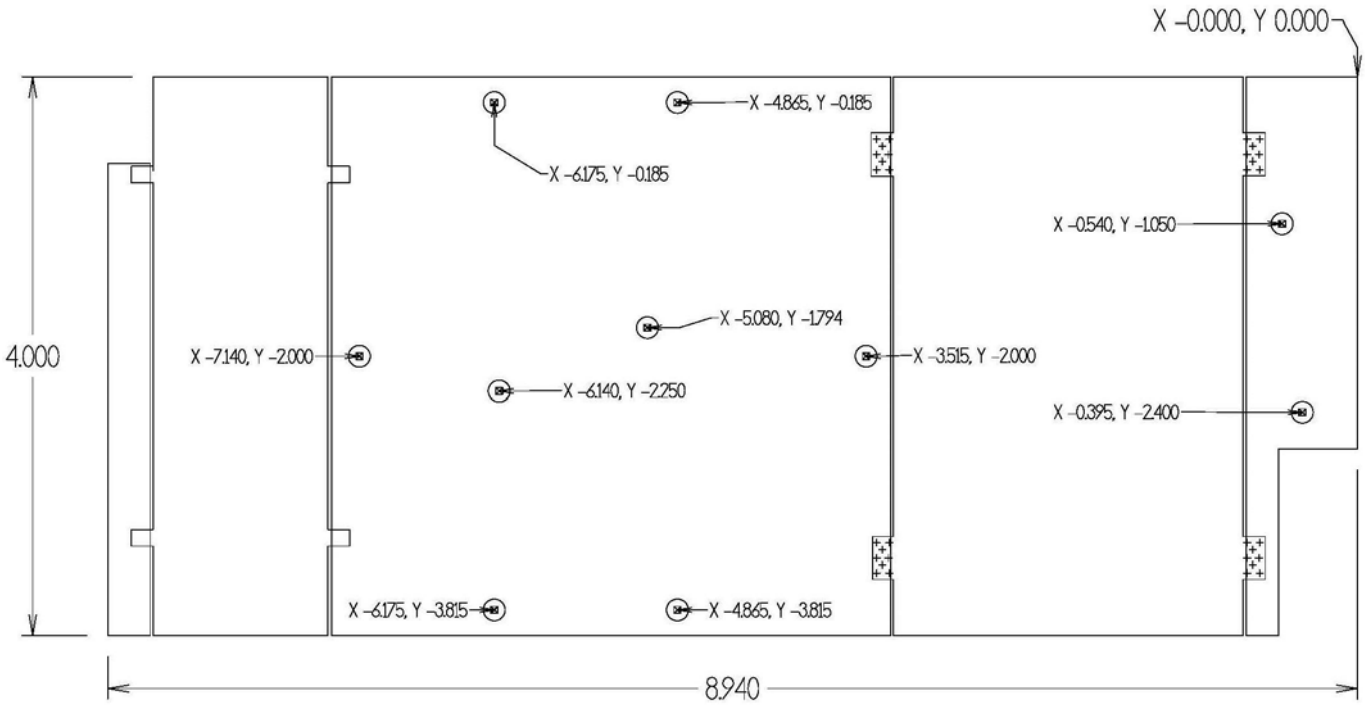
Amplifier Mechanical Drawing: Figure 1
All dimensions are in mills. 1 mil=.001 inches.



This drawing may be downloaded in DXF format on the main product page.

Heatsink Mounting/Hardware

Tips for Mechanical Mounting:

1 All mounting holes are 0.156 inch thru and they are designed for a #6 Screw. Stainless Steel mounting hardware is recommended, grade 18-8 or better. A lock washer of same material should also be used.
2 Ensure mounting surface is flat to better than 0.0025”
3 Use a thin layer of thermal compound on the backside of the PA - no more than 0.001” - 0.002” thickness!
4 Torque all screws to 10-12 in-lbs

Use of cooling air on top of pallet to keep output transformers cool is required. Output transformers are rated for continuous operation at 200C; however, temperatures under 75C are easily maintained at 600W with airflow over the output cables. Keep all external circuitry away from input and output transformers to avoid interference - give at least 0.5 inch clearance above tallest cables to avoid creating feedback loops.

Warning: Failure to use a proper heat sink and/or improper installation will cause the transistors to burn out. This type of failure is not covered by warranty. This product can be ordered with a custom heat sink. Please contact factory for more information.

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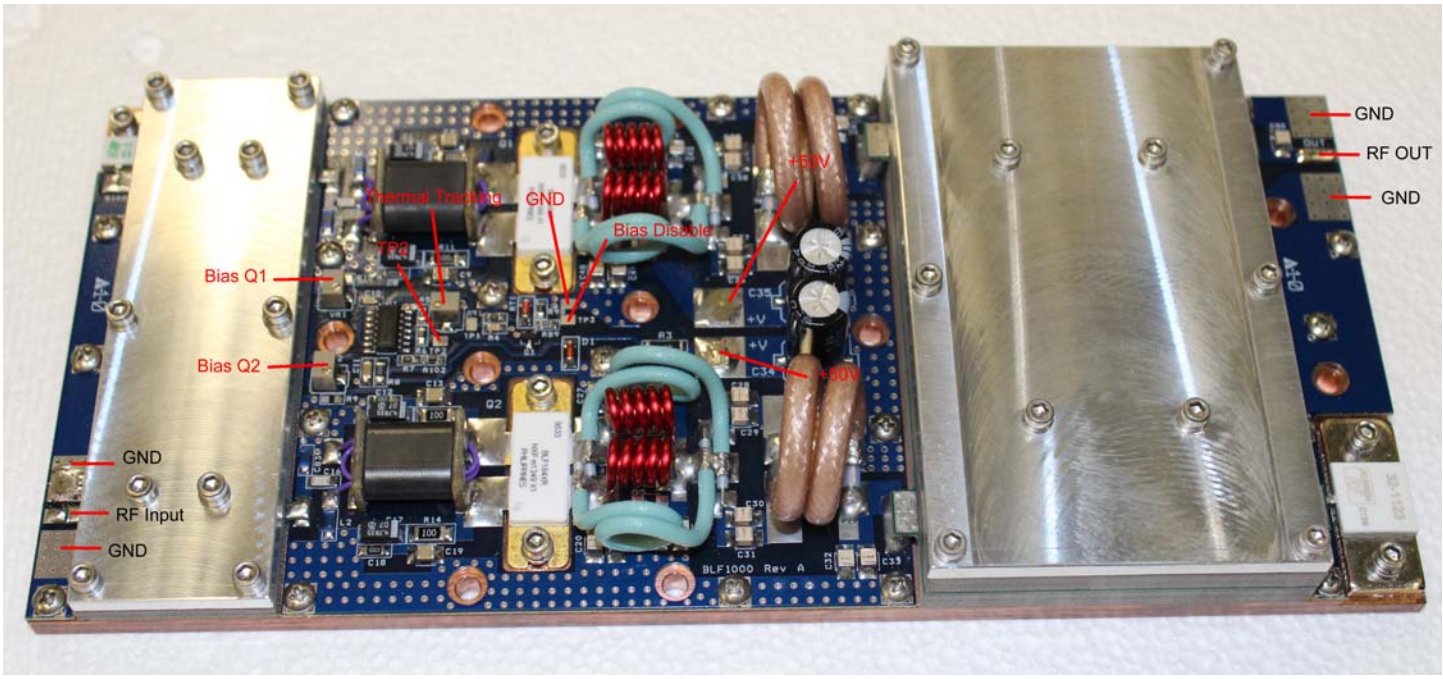
Electrical Connections: Figure 2



Electrical Notes:

There are 2 “+V” pads for the main power supply (marked +50V in the drawing above). 2 Meanwell RSP1000, SE1000 or 1 RSP2000 are the suggested power supplies for this amplifier. If 1 power supply is used the 2 +V pads can be connected together. Do not attempt to connect ground to the pallet or modify the PCB for ground attachment. Ground can be attached to the heat sink that the pallet is mounted on.

The pots marked “bias Q1” and “bias Q2” are the bias controls. The factory setting is 100ma and adjustment is not required unless the transistors are being replaced during a repair procedure.

The adjustment pot VR2 marked “Thermal tracking” sets up the thermal compensation slope. Adjustment of this pot is not required; however, if it is accidently tampered with simply re-adjust it until “7.2 volts” is present at TP2 as this is the factory setting. “Bias disable” removes bias voltage from the transistor. A voltage above 2.0V is required to activate the “bias disable” condition. Bias disable may not completely turn off the amplifier; however, 90% power reduction can be obtained which is sufficient to protect the amplifier in a fault condition.

If transistor replacement is necessary always verify that the bias circuits are functioning before installing new parts. Transistor pocket must be cleaned with alcohol, all debris removed and new thermal compound applied prior to installing new transistor. Bias voltage should be adjusted to 0.5V before new part is installed. We assume no responsibility for self repairs. Please consider sending pallet back to factory for service.
When bias adjustment is required always use a small lab supply that is current limited. This will prevent accidental over bias and loss of a transistor.

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Warning: **Solid state amplifiers can be easily destroyed! Operating the amplifier outside of its specifications will cause the mosfets to fail. These failures are not covered by warranty.**

- Do not over drive the amplifier.
- Do not run the amplifier into an open circuit. Do not run the amplifier when the SWR is unknown. System integrator must foresee adding VSWR protection if there is a risk that the amplifier will be subjected to high VSWR conditions. Do not adjust the bias settings or attempt transistor replacement without a current limited lab supply and RF amplifier repair experience.
- Do not allow the amplifier to overheat. Do not let the base plate temp exceed 75C. **This product requires prior experience working with high power RF amplifiers. This is not for beginners.**
- This amplifier has been designed for analog FM broadcast. Performance in digital FM has not been evaluated.
- Expensive test equipment like RF watt meters, dummy loads, Ammeters and thermal meters are required to verify proper installation. Operating this amplifier without this equipment is like driving blind. You won't be able to see what's really going on and the end result could be transistors that burn out.

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Calculating Die Temperature:

How do you know if the amplifier is running to hot? There are symptoms to watch for. If there is a significant drop in power of more than 5% over a short period of time the amplifier is likely overheating.

There is a scientific method that must be used to verify that the amplifier is installed and running within thermal limits. We do not recommend the "dropping power with time test" described above.

Use the thermal resistance (Rth) of the device to calculate the junction temperature. The Rth from the junction to the device flange for the BLF184XR is 0.18 °C /W. If the device is soldered down to the pallet baseplate, this same value can be used to determine Tj. If the device is greased down to the pallet baseplate, the Rth(j-h) value becomes 0.33K/W, as the thermal resistivity for the grease layer from the flange to the baseplate is approximately 0.15 °C /W.

Note: *We always use thermal grease under transistors because soldering them directly would render the pallets unserviceable.*

Example: Assuming that each device is running at 600W with the RF output power at 48V while consuming 16.0 amps on a pallet baseplate (e.g. 70 °C). Tj can be determined based on this condition for the given baseplate temperature:
• Dissipated power (Pd) = (48V x 16.0) – (600W) = 168W
• Temperature rise (Tr) = Pd *Rth = 168W *(0.33 °C/W) = 55.4 °C
• Junction temperature (Tj) = Th + Tr = 70°C + 55.4 °C = 125.4 °C

The best way to make this calculation is to measure the temperature of the transistor flange directly. In this case temperature rise is calculated using 0.18°C/W.

The maximum junction temperature for most LDMOS devices is 200C. We suggest staying under 175C. In the example above a base plate temperature of 70C was used. When the pallet is mounted to an efficient heatsink like one of our bonded fin models base plate temperatures in the 50C range are easily maintained at full output power.

Note: The NXP BLF184XR has nearly identical surface area as a BLF278. The Rth junction to flange on a BLF278 is 0.35°C /W. The BLF184XR is 0.18 °C /W. The lower the Rth the better the thermal performance of the transistor.

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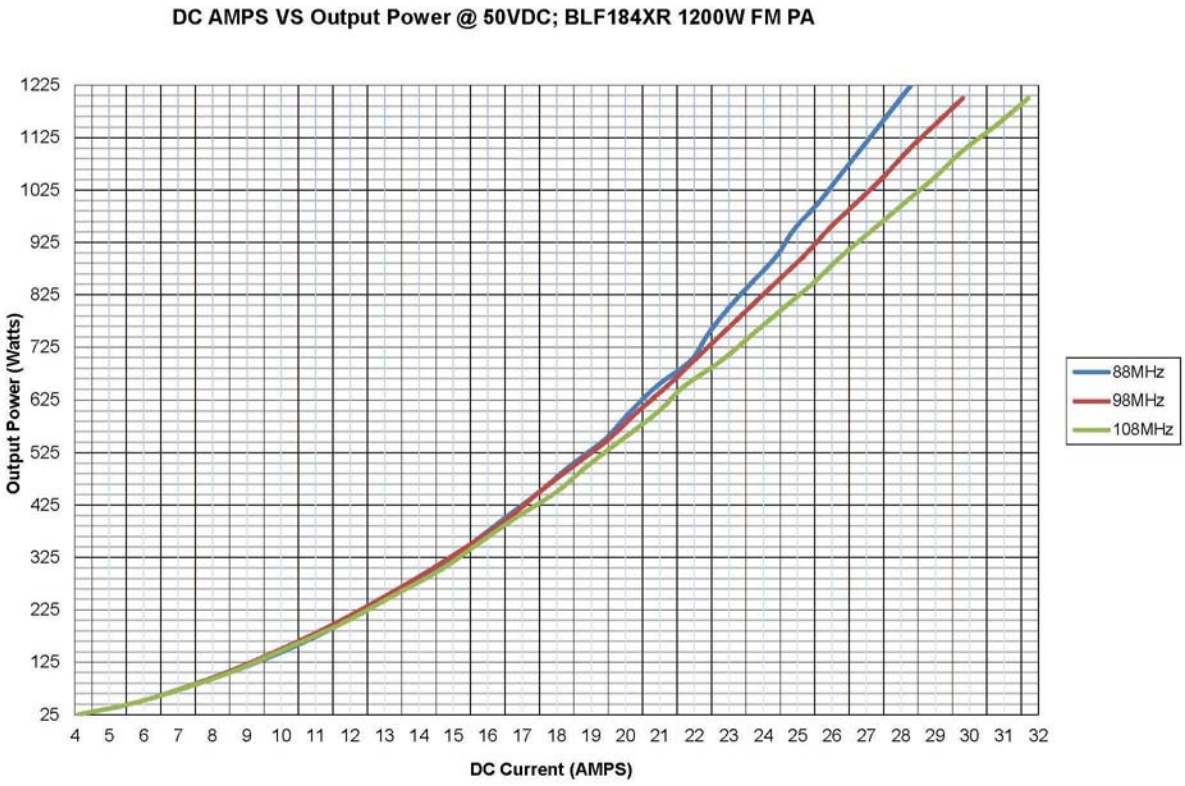

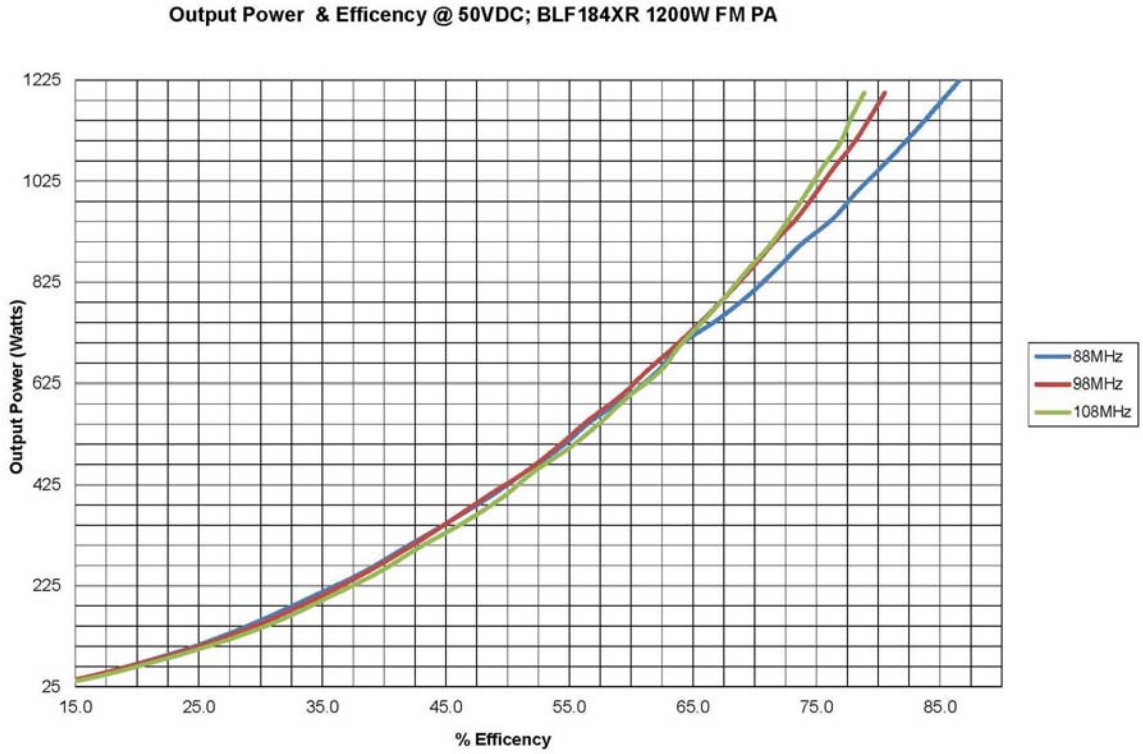

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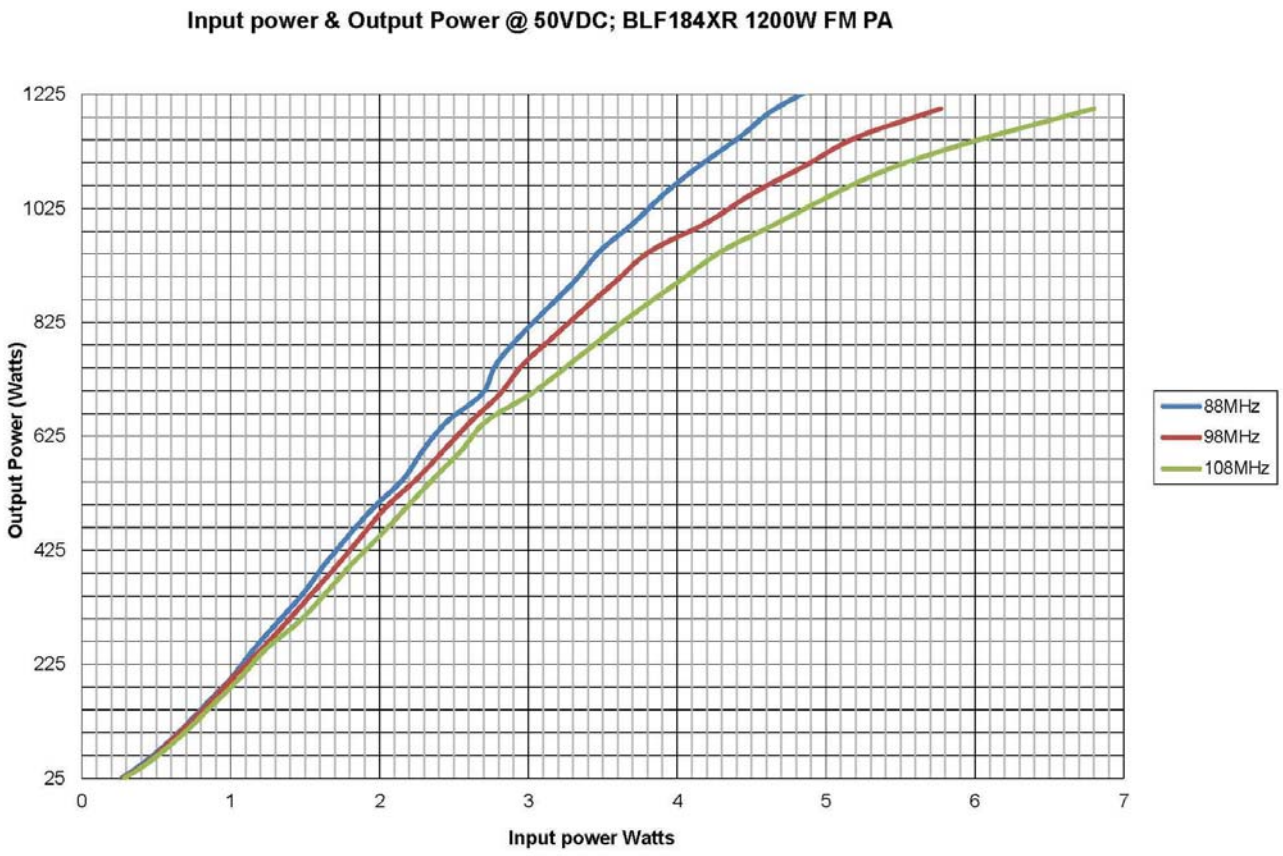

Low Pass Filter
A low pass filter is required to reduce harmonics. Harmonics from FM transmitters are regulated by most government regulatory authorities. Any of our low pass filters rated for at least 1200 watts can be used with this pallet. Since this pallet is hybrid combined there are no filter reaction issues. (The length of coax between the pallet and low pass filter is not critical.)

The BLF184XR can operate into open and short circuits without damage; however, operation into a mismatched load for even a few minutes can cause the transistor to fail from thermal stress. The BLF184XR is not clown proof. Thermal overload and RF overdrive will still destroy the transistor. It should be noted that load mismatches that cause the transistor to draw high current are the ones that are most likely to cause a thermal failure**.**