

Model P1200XR-B3TV TV Pallet Amplifier Module

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

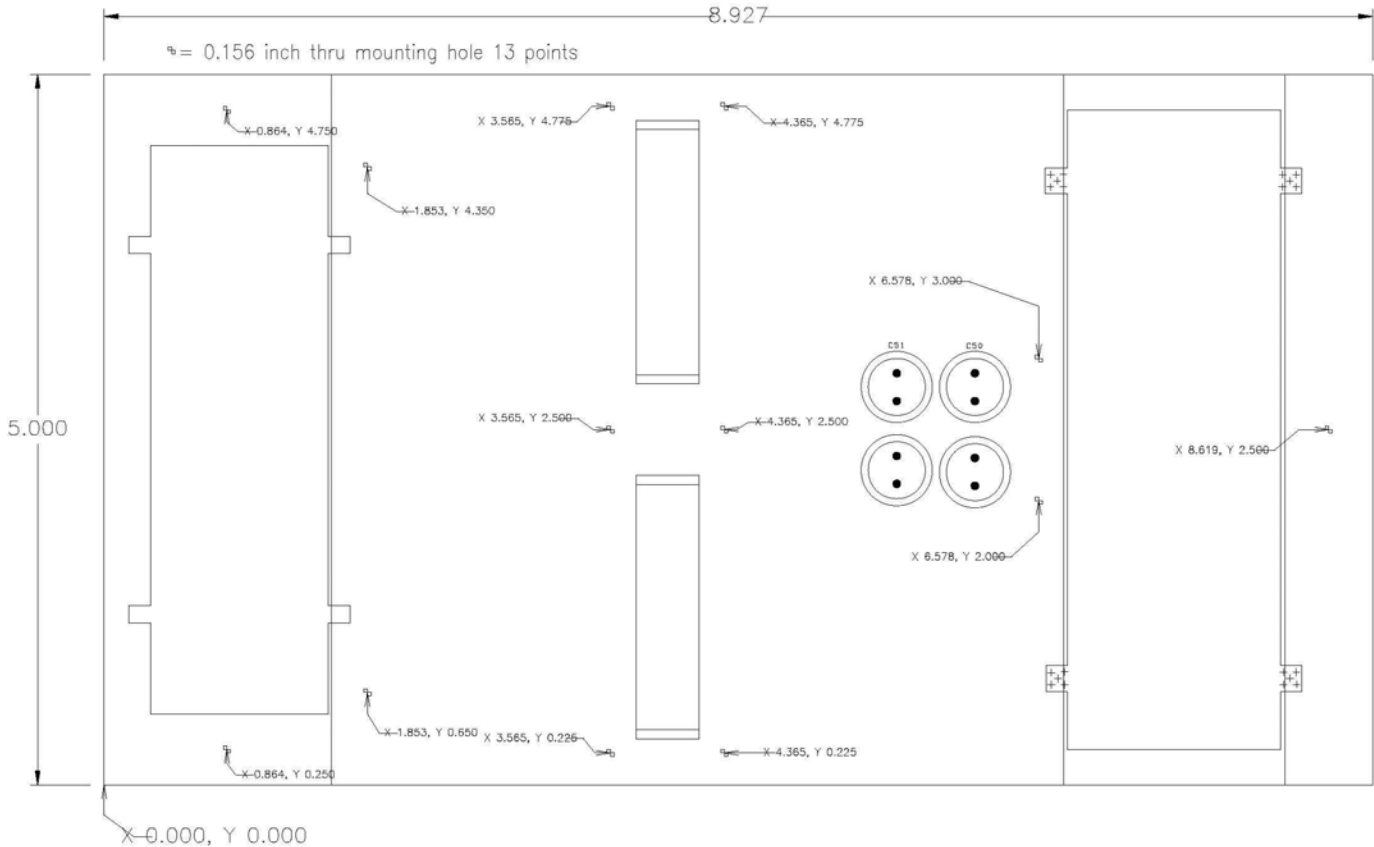
- **170 – 230MHz (CH 7 – 13)**
- **50 Volts**
- **Input/output 50 ohms**
- **Pout: 1200W Peak Sync.**
- **600 Watts digital power.**
- **21dB Gain**
- **Hybrid Combined output**
- **NXP BLF188XR Devices**



Dimension (L x W x H inch) [8.93" x 5.00" x 1.25"]

Electrical Specifications				
Characteristics	min	typ	max	unit
Operating Frequency range	170		230	MHz
Analog TV peak power	1200			W
Analog TV average power			550	W
8VSB Digital TV -47dB shoulder uncorrected	550	600	600	W
DVB Digital TV (Estimated uncorrected)	500			W
Power Input		2	3	W
Input VSWR		1.15	1.2	VSWR
Power Gain	20	21	22	dB
Collector Eff – 600W Average 8VSB	40	42		%
Collector Current 600W Average 8VSB		28	29	A dc
Absolute maximum current rating			32	A dc
Insertion Phase variation (unit to unit)		+/-3.5		degrees
Power gain (unit to unit)		+/-1.0		dB
F2 Second Harmonic		-30dB		dB
F3 Third Harmonic		-25dB		dB
Bias Current per transistor: Factory set @50V.		2.4		A dc
Drain voltage supply	48	50	52	V
Base plate operating temperature	0	n/a	70	Celsius
Load Mismatch (All phase angles, Id=32A, 10 seconds)			65:1	VSWR
Shipping Weight		5.0		LBS

Amplifier Mechanical Drawing: Figure 1



This drawing may be downloaded in DXF format: <http://broadcastconcepts.com/177300/CAPT3B.DXF>

Heatsink Mounting/Hardware

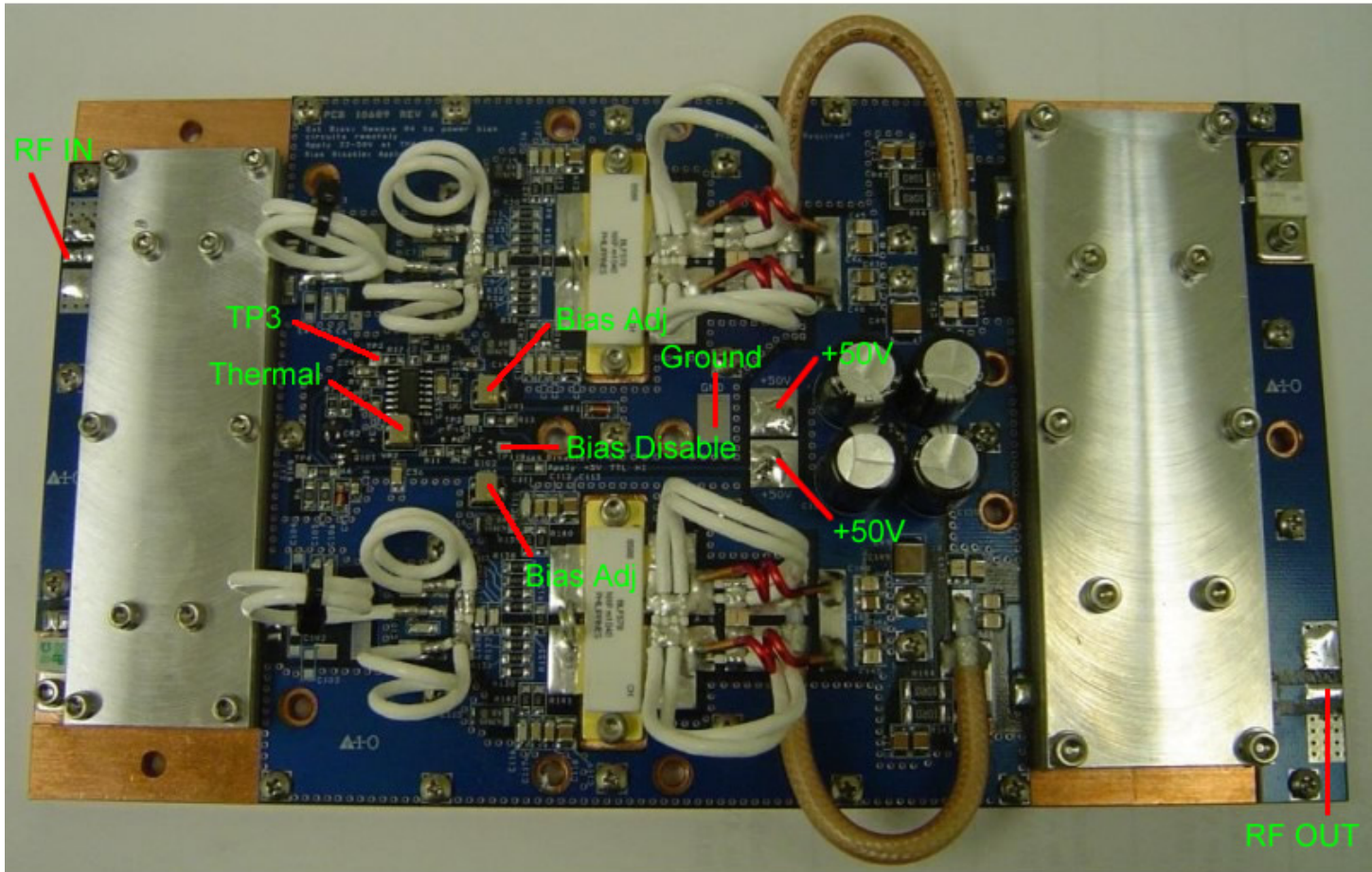
Tips for Mechanical Mounting:

- 1 All holes (Designated "A thru E") 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 recommended. Output transformers are rated for continuous operation at 150C. 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.

Electrical Connections: Figure 2



There are 2 50V pads; 1 for each transistor. 2 independent power supplies can be used or 1 supply can be attached to both pads. The Meanwell RSP1500, RSP2400 and RSP3000 are the suggested power supplies for this pallet.

Ground can be attached to the heatsink. An optional ground pad is provided on the amplifier board as shown above.

The 2 bias pots marked “Bias Adj” independently control the bias current for each BLF188XR. The factory setting is 2.4A for each transistor.

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Electrical Connections:

When bias adjustment is required both transistors must be set to the same idle current. Always use a small lab supply that is current limited when making bias adjustments. This will prevent accidental over bias and loss of a transistor.

The adjustment pot marked “Thermal” sets up the thermal compensation slope. Adjustment of this pot is not required; however, if it is accidentally tampered with simply re-adjust it until “7.2 volts” is present at TP3 as this is the factory setting. “Bias disable” removes bias voltage from the transistors. A voltage above 2.0V is required to activate the “disable bias” condition.

If transistor replacement is necessary always verify that the bias circuits are functioning before installing new parts. Transistor pockets must be cleaned with alcohol, all debris removed and new thermal compound applied prior to installing new transistors. Bias voltage should be adjusted to 0.5V before new parts are installed. We assume no responsibility for self repairs. Please consider sending pallet back to factory for service.

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 without a current limited lab supply.
- If the transistor bias is adjusted then take extra care to set **BOTH TRANSISTORS** to the same bias current.
- Do not allow the amplifier to overheat. Do not let the base plate temp exceed 70C. This amplifier is capable of dissipating over 800W in the maximum working condition. **This product requires prior experience working with high power RF amplifiers. This is not for beginners.**
- This amplifier has been designed for analog and digital TV modulation only. Under no circumstances should CW signals be applied. CW signals may cause the transistor to over-dissipate and burn out. We have amplifiers that are designed for CW non-linear service based on the BLF188XR. Please contact factory for more information.
- Expensive test equipment like RF wattmeters, 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 too 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 (R_{th}) of the device to calculate the junction temperature. The R_{th} from the junction to the device flange for the BLF188XR is $0.11\text{ }^{\circ}\text{C}/\text{W}$. If the device is soldered down to the pallet baseplate, this same value can be used to determine T_j . If the device is greased down to the pallet baseplate, the $R_{th(j-h)}$ value becomes $0.26\text{K}/\text{W}$, as the thermal resistivity for the grease layer from the flange to the baseplate is approximately $0.15\text{ }^{\circ}\text{C}/\text{W}$.

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 300W with the RF output power at 50V while consuming 14 amps on a pallet baseplate (e.g. $70\text{ }^{\circ}\text{C}$). T_j can be determined based on this condition for the given baseplate temperature:

- Dissipated power (P_d) = $(50\text{V} \times 14\text{A}) - (300\text{W}) = 400\text{W}$
- Temperature rise (T_r) = $P_d \cdot R_{th} = 400\text{W} (0.26\text{ }^{\circ}\text{C}/\text{W}) = 104\text{ }^{\circ}\text{C}$
- Junction temperature (T_j) = $T_h + T_r = 70^{\circ}\text{C} + 104\text{ }^{\circ}\text{C} = 174\text{ }^{\circ}\text{C}$

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 $0.11^{\circ}\text{C}/\text{W}$.

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