

Model P900178XRFM FM Pallet Amplifier Module

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

- **87.5 – 108MHz**
- **45 - 50 Volts**
- **VSWR immune**
- **Input/output 50 ohms**
- **Pout: 800W minimum**
- **25dB Gain (900W)**
- **Thermal Tracking Bias**
- **High power density**

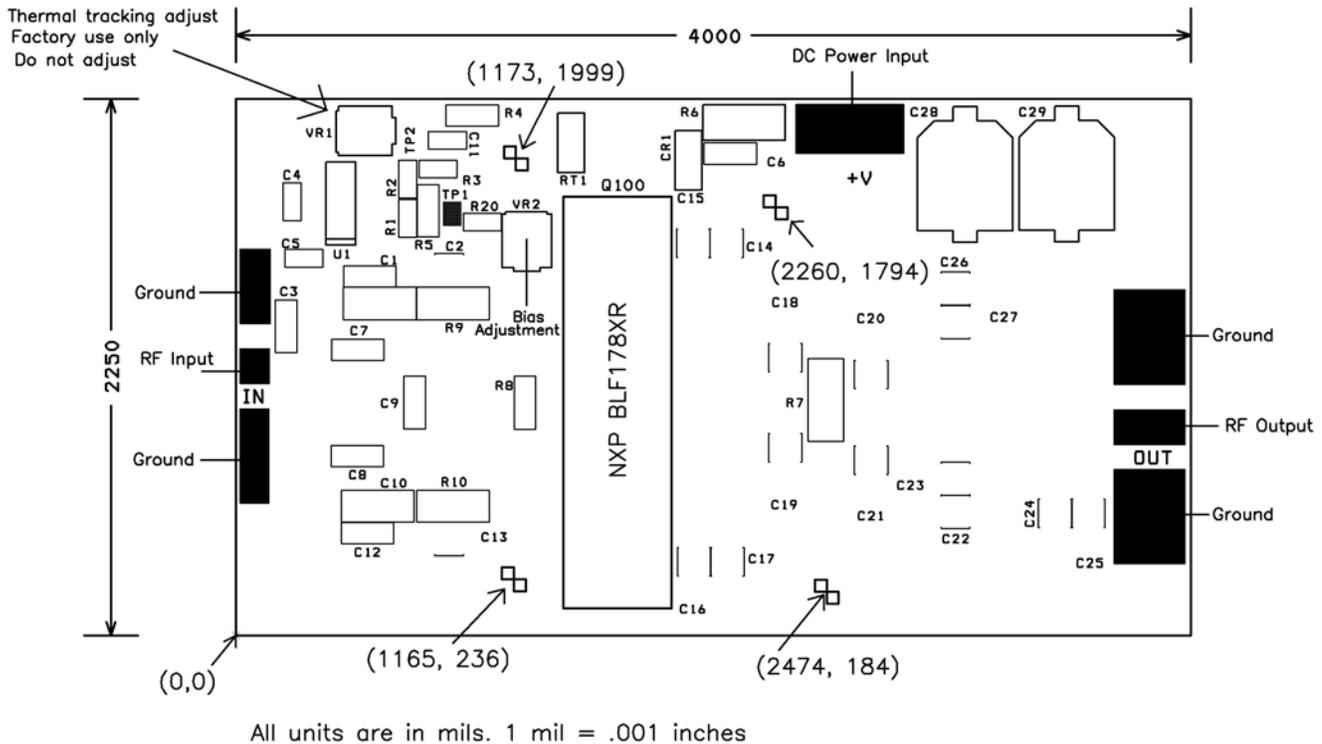


Dimension (L x W x H inch) [4.0" x 1.25" x 1.5"]

Absolute Maximum Ratings (T case = 25C)			
Symbol	Parameter	Value	Unit
Vs	Drain voltage supply	52	V DC
Is	Supply Current	27	A dc
VSWR	Load Mismatch (All phase angles, Id=26A, TC=+55C)	120 to 1	
Tstg	Storage temperature range	-40 to +85C	Celsius
Tc	Base plate operating temperature	-40 to +65C	Celsius
RF IN	RF Input	2.75	Watts
RF OUT	RF Output	900	Watts

Electrical Specifications (T case = 25C, 50 ohm loaded, VS=50V bias=100ma)				
Characteristics	min	typ	max	unit
Operating Frequency range	87.5		108	MHz
Fundamental output power	800		900	W
Power Input		2.0	2.75	W
Input return loss		-15	-10	dB
Power Gain (900w output)	24	25		dB
Collector Efficiency on 50V supply	72	76		%
Collector Current (900w output)		25		A dc
Insertion Phase variation (unit to unit)		+/-5		degrees
Power gain (unit to unit)		+/-1.0		dB
F2 Second Harmonic		-35dB		dB
F3 Third Harmonic		-20dB		dB
Transistor Bias Current: Factory set to 100ma @48V. Adjustment is not required		100		ma dc

Amplifier Drawing



Heatsink Mounting/Hardware

Tips for Mechanical Mounting:

- 1 All holes are clear for #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 0.003" / "
- 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 150C. Keep any external circuitry away from input and output transformers to avoid any interference - give at least 1.5" clearance to avoid creating feedback paths.

Warning: Failure to use a proper heat sink 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.

Theory of Operation:

The NXP BLF178XR is a modern high power LDMOS transistor available for broadcast applications. The transistor is rated for 1400W operation on 50V supply.

Amplifier efficiency is function of supply voltage and input power. In order to obtain maximum efficiency please reduce supply voltage in function of desired output power. High voltage supply and low input power result in a significant reduction in the efficiency. Please note that this amplifier is designed to have the best efficiency around 800W on 45V to 48V supply. This pallet uses an LM723 voltage regulator to maintain constant bias voltage. The pallet can be operated from 43 to 50V and bias adjustment is not required.

This amplifier uses a 4:1 output coaxial transformer. In theory a 9:1 should work better; however, FM band efficiency and harmonic performance were found to be unacceptable in our experiments. This is an area of continued research.

We have also found that the BLF178P produces more power in our FM circuit than the BLF178XR. Peak saturated power on the BLF178P FM pallet is around 1050W and on the BLF178XR it is around 950W. The BLF178P and BLF178XR have the same efficiency. The BLF178XR maximum power rating is 900W because of the lower peak saturated power performance. With a low pass filter it is recommended that system integrators specify equipment to operate at no more than 800watts to allow for design margin.

Upgrades & Repairs

When transistor replacement is necessary, a BLF578 or BLF178P FM pallet can be repaired with a BLF178XR; however, there are component and coax cable changes required. Contact us for more information.

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 900 watts can be used with this pallet. It is critical to install a 13.5 inch piece of RG400 between the pallet output and the filter input to prevent a filter reaction. When a filter reaction occurs the pallet sees a high mismatch which can cause the transistor to overheat and slowly burnout.

The BLF178XR 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 BLF178XR 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.

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

- Do not over drive the amplifier. Exceeding 900 watts can destroy the transistor. Do not exceed 2.75W maximum RF input rating. If the pallet does not develop expected output power at maximum input level it is likely do to mismatch problem.
- 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. This transistor is extremely rugged and it might not fail during a high VSWR event; however, this high ruggedness also increases the risk of fire. Precautions must be taken to make sure that antennas and feed lines can not create a fire.
- Do not allow the amplifier to overheat. Do not let the base plate temp exceed 65C.
- Do not adjust the bias settings without a DC ammeter attached.
- Bias disable: This pallet can be "disabled" by applying +5V to the designated pad TP3. This will result in an 85% reduction in power. Since these transistors have high gain disabling bias does not result in complete shutdown. If complete shutdown is required; disable 50V main supply and/or driver stages.
- Some engineers prefer to apply negative voltage to the gates to disable bias. Do not attempt. This may have worked with the older VDMOS parts; however with the new LDMOS devices, negative gate voltage may damage the transistor.