

Model P2200FM-ART6 FM Pallet Amplifier Module

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

- **86 – 110MHz**
- **32-55 Volts**
- **VSWR tolerant.**
- **Pout: 2200W Minimum**
- **21dB Gain (2200W)**
- **Thermal Tracking Bias**
- **Temperature monitor with automatic bias disable.**
- **Low harmonic output**
- **Ampleon ART1K6FH**
- **79% efficiency typical.**

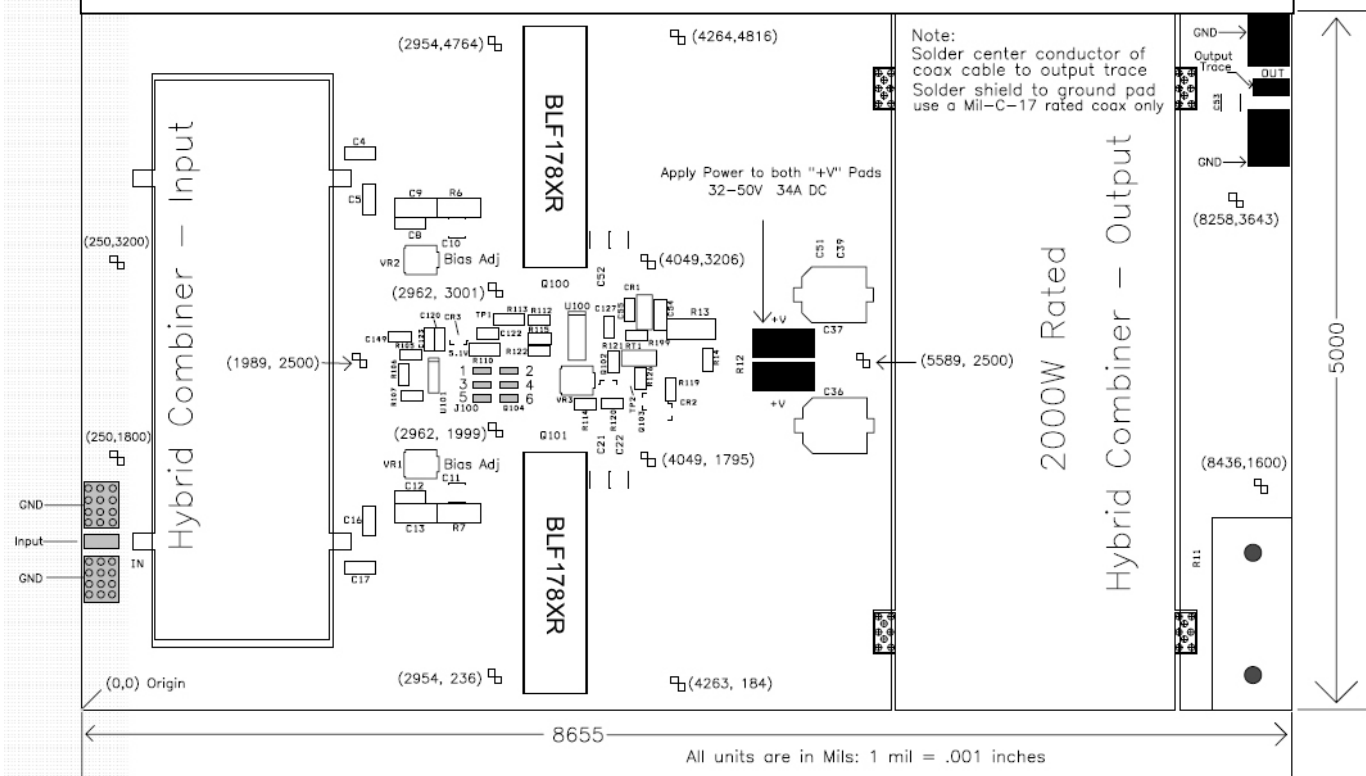


Dimension (L x W x H inch) [8.7" x 5.00" x 1.5"]

Absolute Maximum Ratings (T case = 25C)				
Symbol	Parameter		Value	Unit
Vs	Drain voltage supply		57	V DC
Is	Supply Current		55	A dc
VSWR	Load Mismatch (All phase angles, Id=52A, TC=+55C) 10 seconds max time.		60 to 1	
Tstg	Storage temperature range		-40 to +85C	Celsius
Tc	Base plate operating temperature		-40 to +65C	Celsius
RF IN	RF Input		16	Watts
RF OUT	Peak Saturated Power (3dB compression)		2300	Watts
Electrical Specifications (T base = 25C, 50 ohm loaded, VS=55V bias=100ma)				
Characteristics	min	typ	max	unit
Operating Frequency range	87.5		108	MHz
Fundamental output power	2200	-	2300	W
Power Input		12	16	W
Input return loss		-25	-20	dB
Power Gain (1200w output)	20	21	22	dB
Collector Efficiency	77	79	82	%
Collector Current (1800w output)	-	-	TBD	A dc
Insertion Phase variation (unit to unit)		+/-3.5		degrees
Power gain (unit to unit)		+/-1.0		dB
F2 Second Harmonic @ 1000W		-35dB		dB
F3 Third Harmonic @ 1000W		-25dB		dB
Transistor Bias Current: Factory set to 100ma ea mosfet @55V. Adjustment is not required		100		ma dc

Amplifier Drawing for ART1K6FH/BLF188XR/BLF178XR/BLF178P

Photo is outdated. Hybrid combiner has been upgraded with thermally conductive circuit board material and heatsink to handle 3KW

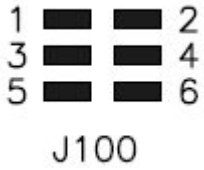


Electrical Connections:

- Apply mains DC supply to both power pads marked +V with a minimum 12 AWG Teflon insulated wire. The amplifier uses an LM723 voltage regulator to control the bias voltage. The amplifier can operate from 32 to 55V. The bias circuitry will automatically disable the bias below 25 volts. (Amplifier can operate over 32 – 55V)
- All units are set to 100ma bias per transistor at 55 volts and 25C. The bias circuitry including the temperature sensor consumes 20ma. When the pallet is powered up on 55 volts it will draw approximately 220ma with no RF input. The bias point of 100ma per mosfet offers the best compromise between efficiency and gain.
- Make all coaxial connections with a Teflon Mil-C-17 rated coax. Do not attempt to connect oversized cables (LMR400, Belden 9913) to the RF output. They will damage the circuit board. Use harbor industries RG402/RG400 or equivalent.
- Attach the ground wire to the heat sink. It is not necessary to attach the ground wire directly to the pallet. Do not attach anything to the hybrid covers because this can interfere with the amplifier frequency response.
- Use ferrite beads and feed thru capacitors on the power supply lines. An improperly bypassed DC line can cause power supply RFI and may damage the amplifier.

Notes:

Warning: Careless adjustment of the transistor bias pots can cause the transistors to burn out.
 Warning: Do not adjust bias pot VR3. It sets the thermal tracking bias rate, and it is for factory use only.



J100-1 TTL HI when pallet base exceeds 70C
J100-2 Alarm Input: Jumper to J100-1 to enable automatic shut down feature. The amplifier will shut down at 70C.
J100-3 Ground
J100-4 Bias supply. Remove 0 ohm 0805 resistor R199 to power bias circuit from this pin.
J100-5 Temp: Output voltage from LM56 temperature sensor.
J100-6 Bias Disable. Apply TTL HI to disable bias.

This connector is a standard 0.1 inch pitch.

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 and output combiner 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 0.5" 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 and enclosure (Export only). Please contact factory for more information.

Theory of Operation:

The Ampleon ART1K6FH is a modern high power LDMOS transistor available RF applications. The transistors can operate on 50V-55V DC power supplies. The transistor can operate below these voltages when high output power is not needed.

Amplifier efficiency is function of supply voltage and input power. 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 of efficiency.

This pallet uses an LM723 voltage regulator to maintain constant bias voltage. The pallet can be operated from 32 to 50V and bias adjustment is not required; however, advanced users may find it necessary to adjust the bias voltage for a specific operating condition. Care must be taken to set the bias current to the same value for both transistors. Operation below 55V results in a significant reduction in output power.

Low Pass Filter

In commercial broadcast applications it is necessary to use a low pass filter to prevent the transmission of harmonic signals.

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

- Do not over drive the amplifier. Exceeding maximum ratings can destroy 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. This transistor is extremely rugged; however, it can still fail from thermal overload.
- 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.
- Do not place the pallet in a sealed box with no ventilation.
- The ART1K6FH can operate into open and short circuits without damage; however, operation into a mismatched load for a short time can cause the transistor to fail from thermal stress. 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 (worst phase angle) are the ones that are most likely to cause a thermal failure.
- The transistors cannot tolerate reversed polarity. We are not aware of any transistor that can withstand reversed polarity.
- Suggested power supply is 1 RSP3000 or 2 RSP1500 MeanWell. These can be adjusted for 55 volts.
- Constant operation into a high VSWR may damage output baluns or hybrid combiner and balance resistor. This type of damage is not covered by warranty.
- The RF pallet should be completely shielded from switching power supplies. RFI from the pallet or low pass filters has the potential to cause power supplies to lose regulation and damage the pallet. Installing the pallet and DC supply into the same enclosure without shielding between them is a recipe for failure.

Warranty Disclaimer:

We will replace or repair any amplifier that fails due to a defect in workmanship during the lifetime of the amplifier. We do not warranty this product against damage caused by improper installation. All amplifiers are template tested with professional engineering practices prior to shipment.

Typical Performance Data:

55V 2200W Performance				
Frequency	Voltage	Current	Gain dB	Efficiency
88MHz	55	50.0	20.8	80.0%
98MHz	55	51.5	21.2	77.7%
108MHz	55	51.0	21.0	78.4%
50V 1800W Performance				
Frequency	Voltage	Current	Gain dB	Efficiency
88MHz	50	44.5	21.1	80.9%
98MHz	50	45.3	21.5	79.5%
108MHz	50	45.4	21.1	79.3%