

DEM Part Number 23120PA SN _____

Specifications

Frequency range:	1240 to 1300 MHz, armature radio frequencies only		
Power Out (linear):	120 Watts (full scale on relative power meter)		
Power Out (saturated):	>150 Watts Maximum		
Input for rated linear power out:	500 mW	3 Watts	10 Watts Other _____
Power requirements:	13.8 VDC @ 38 amps minimum for full power		
Connectors:	Type "N" female		
Size:	10" L x 7.0" W x 4" H		
Input VSWR:	<15 dB across band		
Output VSWR:	<12 dB across band		
Active devices:	4 - RA18H1213G		
Options:	Transceive	YES	NO
	Preamplifier power	YES	NO
	PTT-H	PTT-L	External On Coax
	Cooling Fans	YES	NO

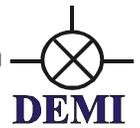
Description:

The 23120PA is a broadband linear power amplifier covering the entire 23 CM amateur band. It has a linear power output of 120 Watts or a saturated output of over 150 Watts. The output power can be monitored on the built in relative power meter. Type "N" connectors are used on both input and output. The 23120PA requires well-regulated 13.8 VDC at 38 A for full power output. Keying is done by PTT-L (closure to ground) or a PTT-H (positive voltage that will sink or source approximately 2 mA. This design is not recommended for AM ATV use but may be used in any FM, SSB, or CW application. This amplifier design utilizes the combining of four Mitsubishi MOSFET hybrid power modules. All regulated voltages and biasing that are required for proper operation are self-contained. All RF switching (if option is ordered) and input attenuation is also self-contained. No adjustments are required. The 23120PA contains protection circuits for excessive VSWR, excessive output power, excessive input drive, and over temperature that enable the PTT circuit are indicated on the relative power meter. These features will be covered in detail with their instruction for use.

Instructions for Use

This 23120PA amplifier has all installed options checked on the top of this page. If you find that it is not configured correctly or your requirements have changed, please consult DEMI. If the options are correct, connect the PA's input to your exciter or transceiver. Connect the PA's output to your 23 cm antennae system. Use high quality coaxial cables on both RF connections. At 1300 MHz, VSWR and insertion loss become factors even in the shortest lengths of coax. Test all coaxial components at low levels before installing into the final system.

The use of isolators on the input or output connections are not necessary but will provide a safety margin in remote installations. This amplifier's wide band performance may dictate a band pass filter on the input to reduce the amount of amplified out of band



spurious emissions in certain installations. Second harmonics are attenuated in the design to and acceptable level.

With the supplied power cord, connect Red to positive, Black to ground or negative on a DC power supply with enough head room to supply the specifications listed above in any operating environment. If your supply has any protection circuits such as over-voltage and voltage sensing circuits take the time to install them and test them. With a high current drain that this amplifier will have during full power operation, voltage sag will inhibit the amplifier's output power performance, and then possibly allow the voltage to soar beyond the amplifiers specified limits when un-keyed. This voltage "soar" could damage the active components. Also, avoid lengthening the power cord to prevent excessive voltage drop unless you have voltage sensing in the power supply.

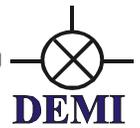
Install the amplifier with the heat sink on top or with the fins vertical so the amplifier will convection-cool. If the cooling fan option is installed, mount the amp with fins up. A cooling fan is recommended and is specified for continuous duty applications.

Last step is to connect the PTT circuit to your transceiver, COR circuit, or system's sequenced switching scheme. This amplifier does not have a RF sensed switching circuit. It is always "Hard-Keyed" To place this amplifier into the transmit mode, the PTT circuit needs to be enabled. Depending on the configuration listed on the first page, (specified when ordered) make the correct connections to you system. If you transmit without keying the PTT circuit, the drive power will either be sent directly to the antennae system or absorbed in the input attenuator. When the 23120PA's PTT is actuated, it will draw as much as 18 amps of idle current without RF drive. Therefore, it is recommended to key the amplifier in transmit mode only.

You are ready for operation. Switch the amplifier on and key the amplifier's PTT circuit. Observe the current drain. Apply a small amount of RF drive and slowly increase it to the specified drive level or to your desired output level that is less than 120 watts. Observe the relative power meter. It will measure 120 watts full scale into a well-matched system. If you observe the two center LED's of the power meter light, and the PTT circuit becomes "non-responsive", one of the protection circuits has become enabled. The amplifier will then need to be re-set by cycling the ON/OFF switch after finding the cause of the problem.

Protection Circuit Descriptions:

1. Output VSWR: If the output VSWR in your antennae system exceeds 8 dB return loss, the VSWR trip will enable. Check all antennae connections, re-set the amplifier by cycling the power switch and retry. If you wish to test the circuit, simply remove the antennae connection from the amplifier and transmit. It will immediately kick out and will need to be reset.
2. Excessive Output power, Excessive Input Drive: If the output power exceeds 150 watts, the PTT circuit will enable and bypass the amplifier. This is to prevent excessive current drain and stress to the amplifier. This could only happen if the DC voltage rises above the specified 13.8VDC operation level (causing the output power to rise) or if the Input drive level exceeds the specified amount indicated on the front page. In any case, check the voltage or reduce the drive level. Reset the amplifier and operate. If you have changed your drive source, have the internal attenuator modified to meet your new specifications. In addition, if the attenuator circuit fails from excessive drive, the circuit will protect the amplifier. This failure may also produce a bad input match in the



amplifier and trigger any warning mechanisms in your transmitter or transceiver, not allowing the full drive level. This can be verified with a return loss bridge between the amplifier and drive source. Minimum input VSWR should be < -15 dB.

3. Excessive Operating Temperature: If the amplifier's internal air temperature exceeds the operating specifications, it will trip the bypass circuit and light the LED's. This circuit has a preliminary warning indicator. As the amplifier warms through use, the two center LED's on the relative power meter will start to glow when the amplifier is not transmitting. They will become brighter and brighter as the amplifier becomes warmer. This is considered normal operation. The amplifier trips if the external cooling fans fail or are not installed while the amplifier is used in a continuous duty fashion. The amplifier will not be able to reset unless the temperature decreases to the normal range. After reset, the operating time may not be as long due to the heat built up in the amplifier unless it is totally cooled to the ambient temperature.

Caution:

Do not exceed the specified drive level indicated at the top of the page. Even though it has an overdrive protection circuit, it may damage the input attenuator. Do not exceed 15 volts on the DC line even at lower drive levels. When in operation, utilize any protection circuits that your power supply may offer such as over voltage and voltage sensing circuits. Marginal performance power supplies will heat and de-rate causing failure of the power supply or drop the DC power available to the amplifier under full output operation. Verify all operating parameters of the power supply intended for use.

Do not operate the amplifier in a continuous duty fashion without cooling fans on the heat sink. The over temperature circuit will protect the amplifier but the activation of the circuit means the active components have been over heated and stressed. Multiple activations will shorten the life of the amplifier. Do not keep the amplifier in transmit without applying RF even if the protections circuits do not activate. This will also stress and shorten the life of the amplifier.

Be sure of all RF connections and the direction of any directional gain antennas connected to this amplifier. RF fields are large at the 120-watt power level on 23 cm and could become hazardous if used incorrectly. Use the highest quality coax possible or feasible in your system. This concept will also allow the maximum performance of your complete system.

Down East Microwave Inc. will not perform any warranty repairs if we find tampering with the protection circuits, signs of excessive voltage, lightning damage or if the Input attenuators are damaged from excessive drive. Due to the power level of this amplifier, we also do not guarantee any preamplifier/LNA, coaxial switches, cables, power supplies, filters, isolators, antennas, or other equipment associated with the operation of your 23 cm system. Please verify all aspects of operation including sequencing, insertion loss, isolation, VSWR, switching, and safety before operation.