



Operational Description:

The Dedicated RF (DRF) amplifier is a legal limit RF power amplifier with continuous frequency coverage from 1.8 MHz to 54 MHz. In Operate mode, the unit is configured for a maximum of 100W RF input power and up to 1500W RF output power. In Bypass mode, the amplifier is capable of 500W maximum input. The RF input and selectable A/B RF outputs are designed for 50Ω impedance and use high quality N-type RF connectors.

Per FCC licensing regulations, the 26–28 MHz frequency range is locked out in firmware as factory default. A user that is licensed to transmit in this range can easily unlock their DRF amplifier by uploading a special license file key to their amplifier, which is matched to that amplifier's serial number. In addition to frequency-unlock privileges, the DRF web server can provide performance and security updates to the control firmware and software via the internet.

Input/Output ports on the back of the unit include three (3) N-type RF connectors, a single RCA connector for transceiver keying, a DB25 port for transceiver control, an RJ-45 Ethernet jack, and an IEC 320-C20 AC plug for amplifier power. The DRF amplifier is comprised of six (6) main printed circuit boards, two (2) power supplies, a single board computer and a 7" capacitive touch screen local display. Two small temperature sensor printed circuit boards measure the temperature of the copper heat spreader under the power amplifier board near the power MOSFETs.

The DRF amplifier is powered with a standard 110VAC-240VAC, 50-60Hz wall socket. Internally, one power supply provides DC power to the RF amplifier at 60VDC up to 50A. The other internal supply provides DC power to the processor board and display. The efficiency of the power amplifier is around 40-60% on average (depending on the input frequency and input drive level). A ground lug is located on the back of the unit to provide an earth ground to the chassis.

The DB25 port and RCA jack connect many popular transceiver units to the RF amplifier. The DB25 band data cable port allows band filter relays to automatically be selected. A Frequency Auto Detect feature also allows automatic band filter relay selection via the internal frequency counter without the need for a band data cable.

Board Descriptions:

Processor Board - Measures and controls all amplifier functions in real time. A USB connection to the single board computer facilitates all user interaction and remote operation.

Rx/Tx Board - This is the first board in the RF path. The input signal immediately enters a dual directional coupler that samples the input power and frequency. In Bypass (receive) mode, the signal is connected directly to the selected antenna. In Operate (transmit) mode, the input signal is routed to the input conditioning board and the amplifier's output is connected to the selected antenna.

Input Conditioning Board - The signal is attenuated with a 1dB attenuator to meet FCC gain limits. A resistive RF splitter then separates the signal into three single ended signals. This resistive splitter also attenuates an additional 4.8dB. The power in each of these three signals is limited to roughly 5W with a pin diode limiter circuit. The pin limiter circuit also takes a shutdown signal that can be used to prevent RF power from reaching the power amplifier when relays are switching.

Power Amp Board - A total of three (3) MOSFET pair amplifiers (six FETs total) each take a single ended input signal. The output from each amp is a differential signal around 20 dB higher than the input. The max output power is 500W per transistor pair. Fault protection circuitry allows for the amplifiers to be shut down in a potentially damaging condition.

Combiner Board - Three differential signals come in from the power amplifier board. Three baluns convert the differential signals to single ended signals. An RF power combiner combines the signals into one 1500W signal.

Filter Board - Eight low pass filters reduce harmonics. Each filter is selectable with an input and output relay. The filter board also measures the output forward and reflected power using a dual-directional coupler.