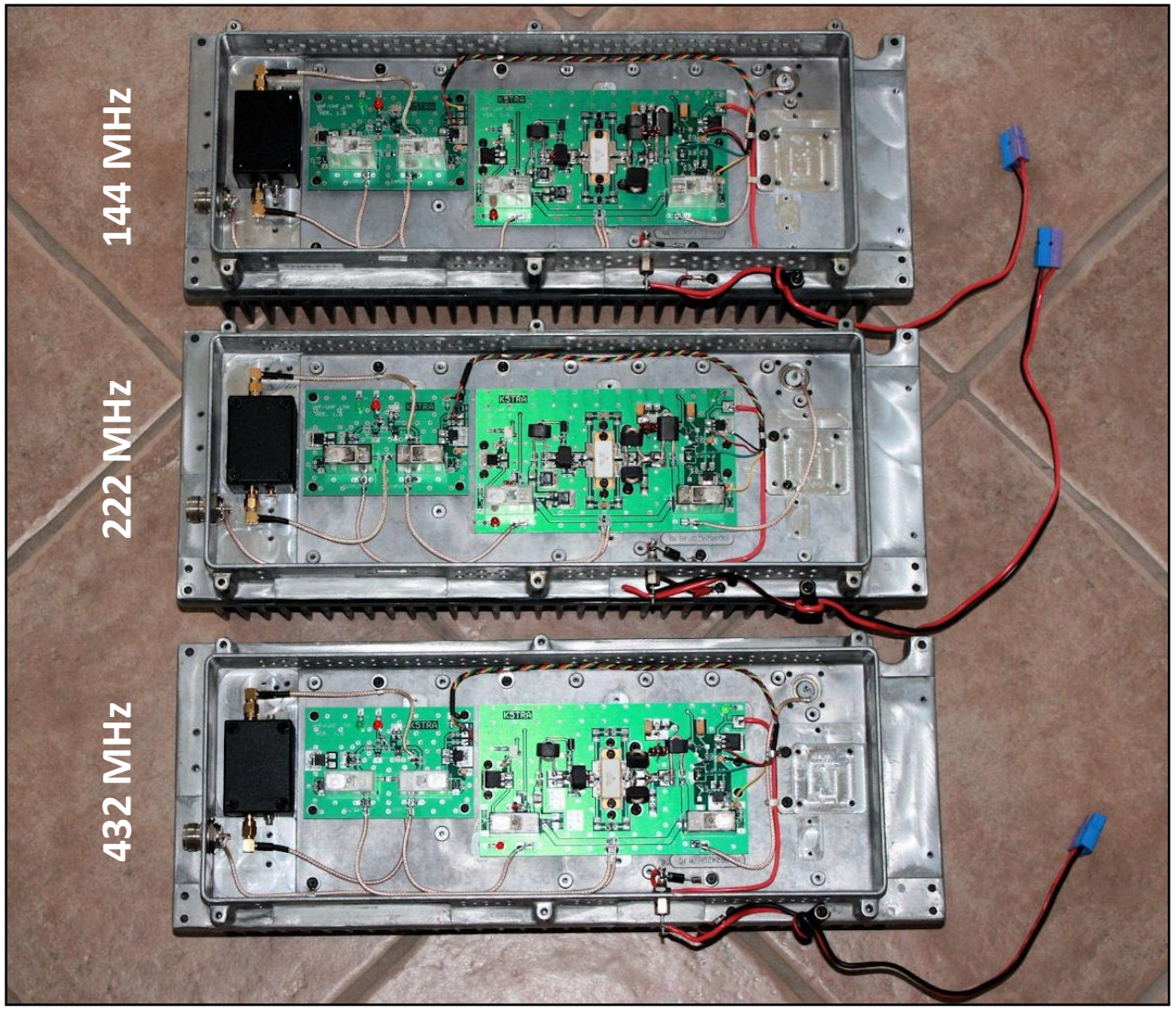
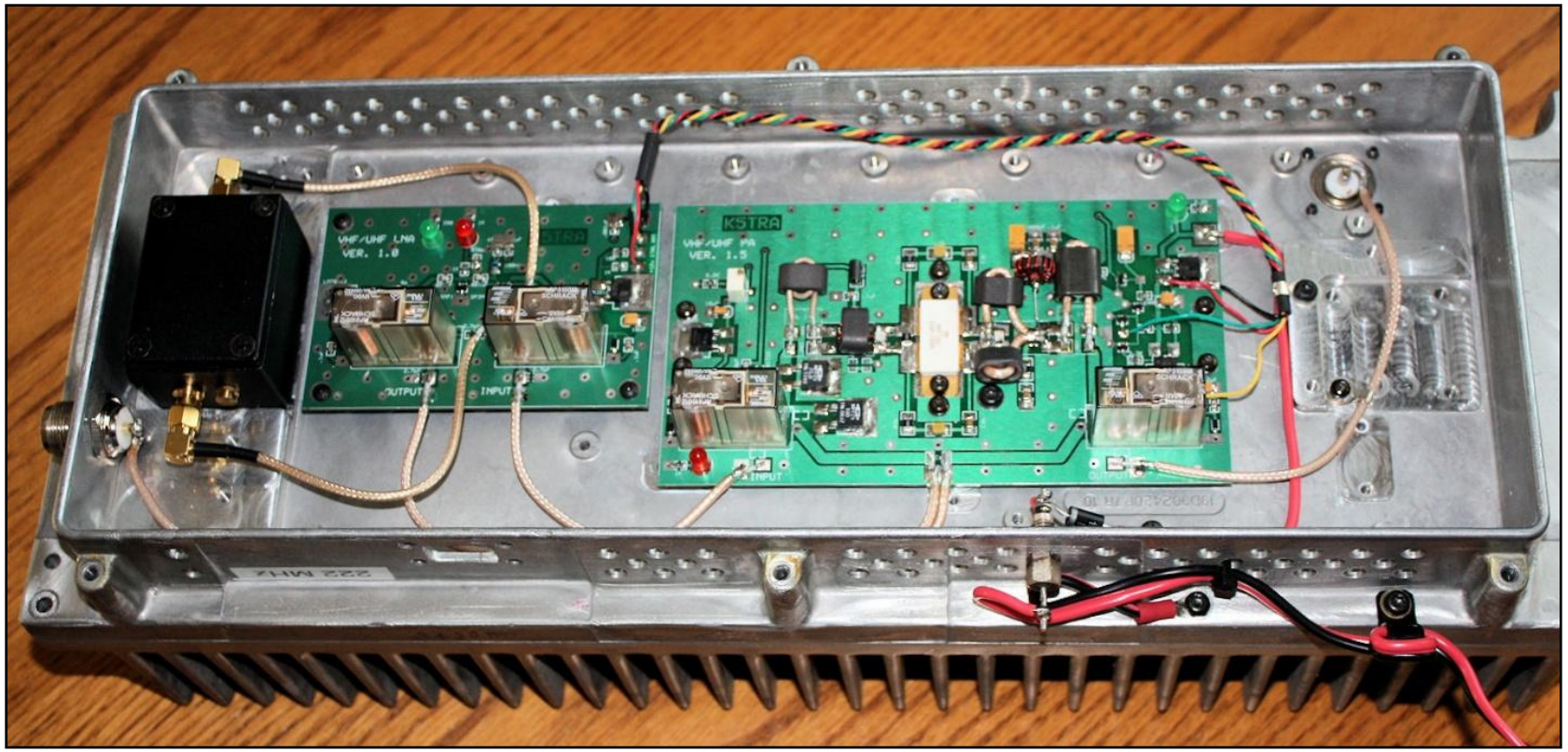
Remote PA & LNA

For 144, 222, and 432 MHz

VHF-UHF Remote PA & LNAs



222 MHz Remote PA & LNA



Overview

- Remote PAs and LNAs for operation at the antenna
- T/R switching is drive sensed
- Schottky detector circuit is tweaked for sensitivity
  - As low as +18 dBm will key the control circuit
- TX key hold time constant is 1.2 seconds
- Housing-heatsink from GE MASTR-III 120W PA
- Motorola MRF-186 LDMOS final provides:
  - 125 W output on each band: 144, 222, and 432 MHz
  - Gain (approx. +19 dB) padded at input for available drive
- Triquint TQP3M9008 LNA provides:
  - 0.8 dB NF on each band: 144, 222, and 432 MHz
  - Gain (approx.+22 dB) padded at output to + 12 dB

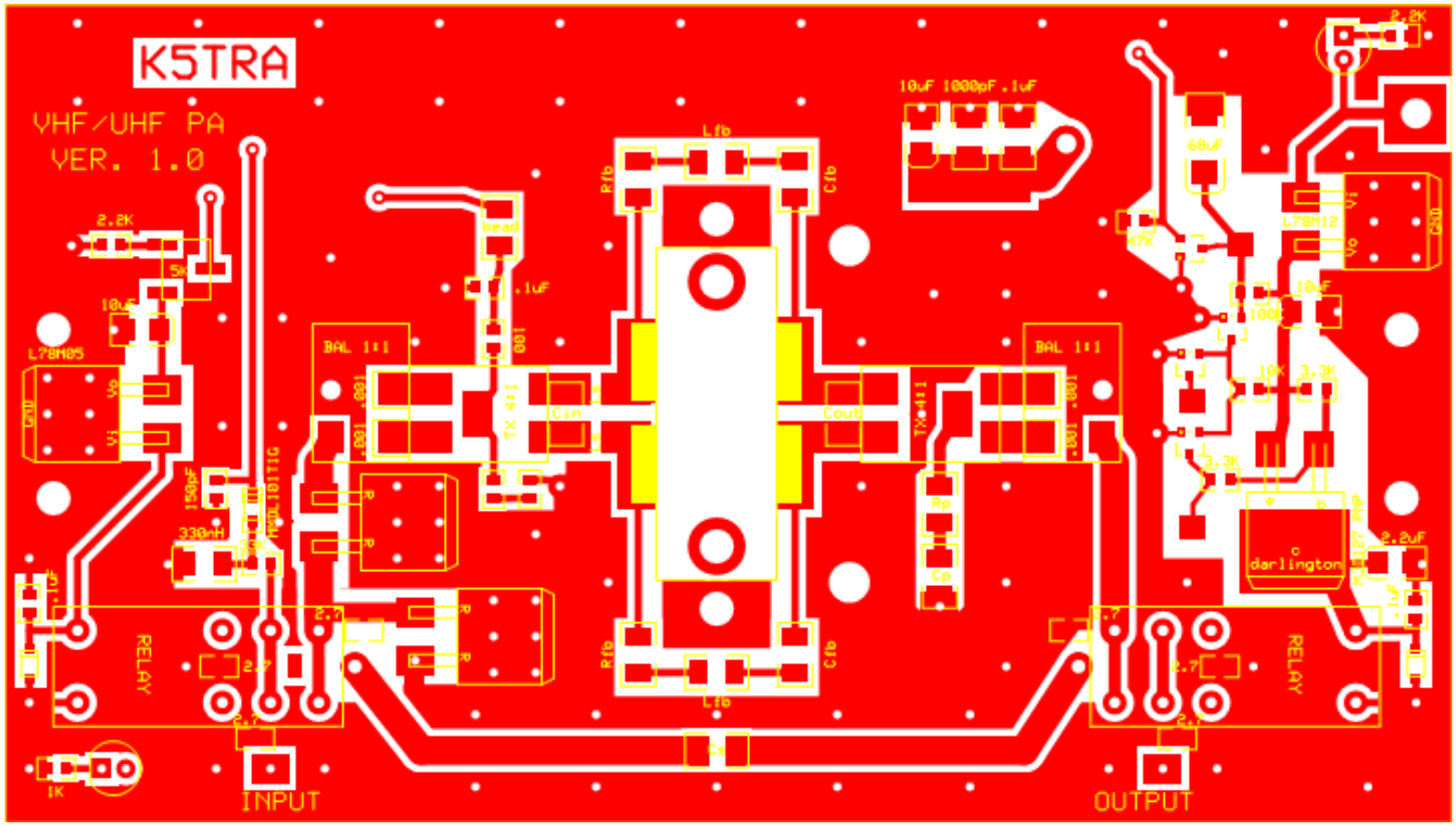
Important Details

- LNA preselector filter is required
  - FM and TV broadcast signals will overwhelm the LNA without filtering
  - Two helical resonator BPF used
- LNA protection diodes required
  - Leading edge protection while relay control activates
  - Leakage capacitance in relay can allow excessive RF into LNA when transmitting
- PA input pad prevents overdrive
  - MRF186 easily provides +19 dB of gain
  - Two resistor, compact L-pad topology
  - For added ruggedness to overdrive and mismatch, the final can be changed to MRF151G for VHF or MRF372 for UHF

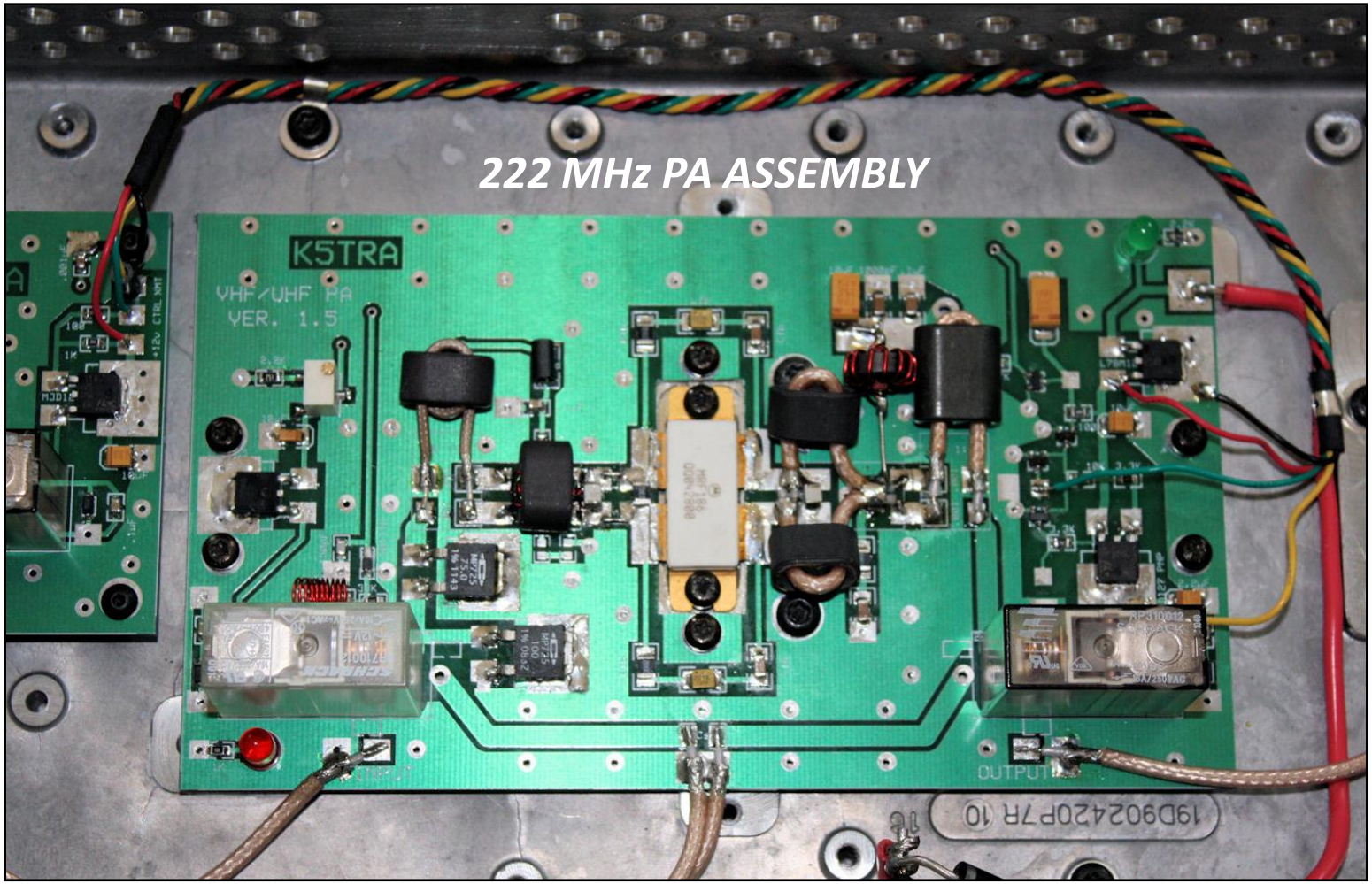
Control

- Off mode:
  - RF pass through
- RX mode:
  - LNA is powered ON
  - PA BIAS is removed
  - Relays select LNA signal path
- TX mode:
  - LNA is powered OFF
  - LNA PIN protect is turned ON
  - PA BIAS turned ON
  - Relays select PA signal path

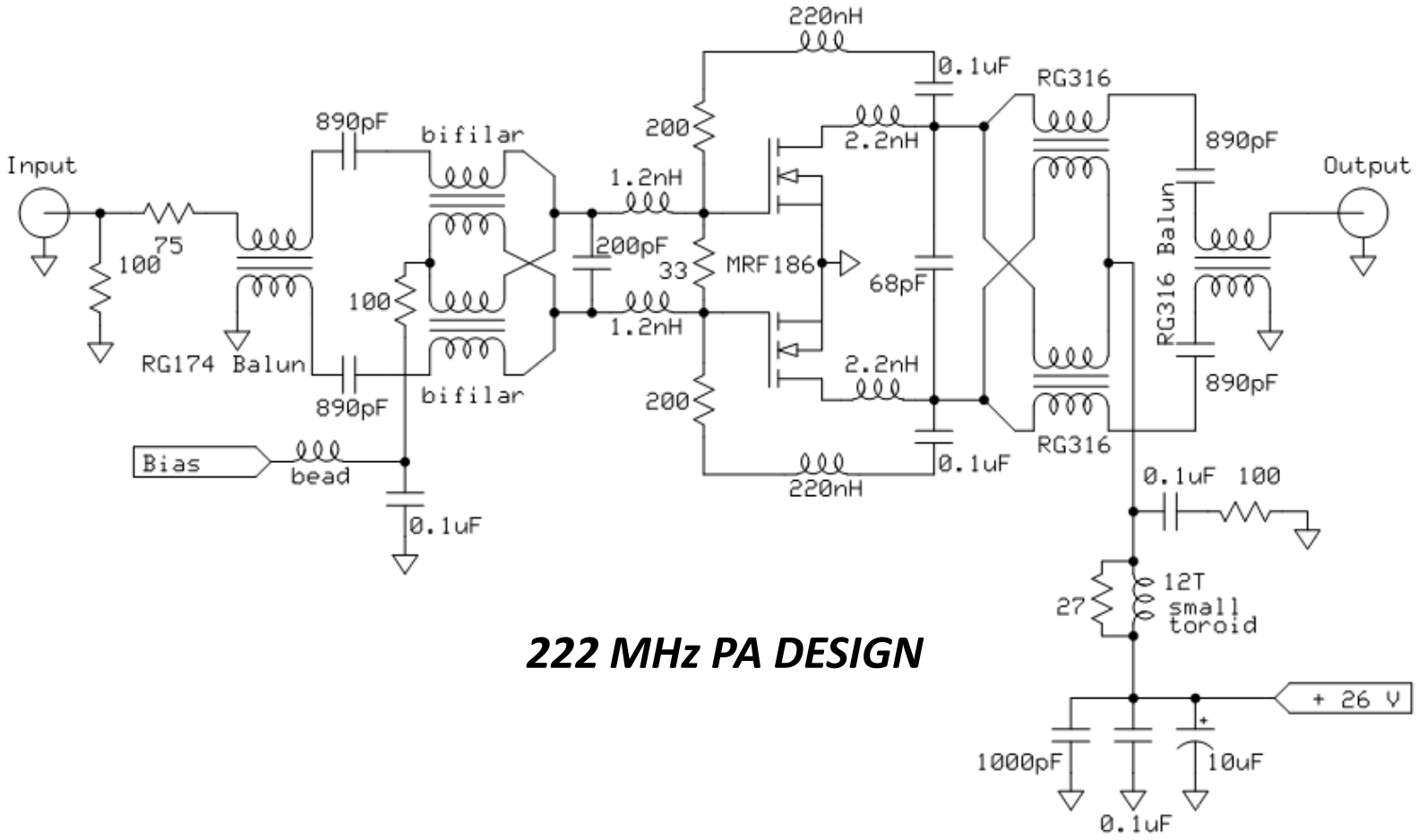
PA Board Layout



Remote PA



PA Schematic



222 MHz PA DESIGN

PA Input L-Pad Design

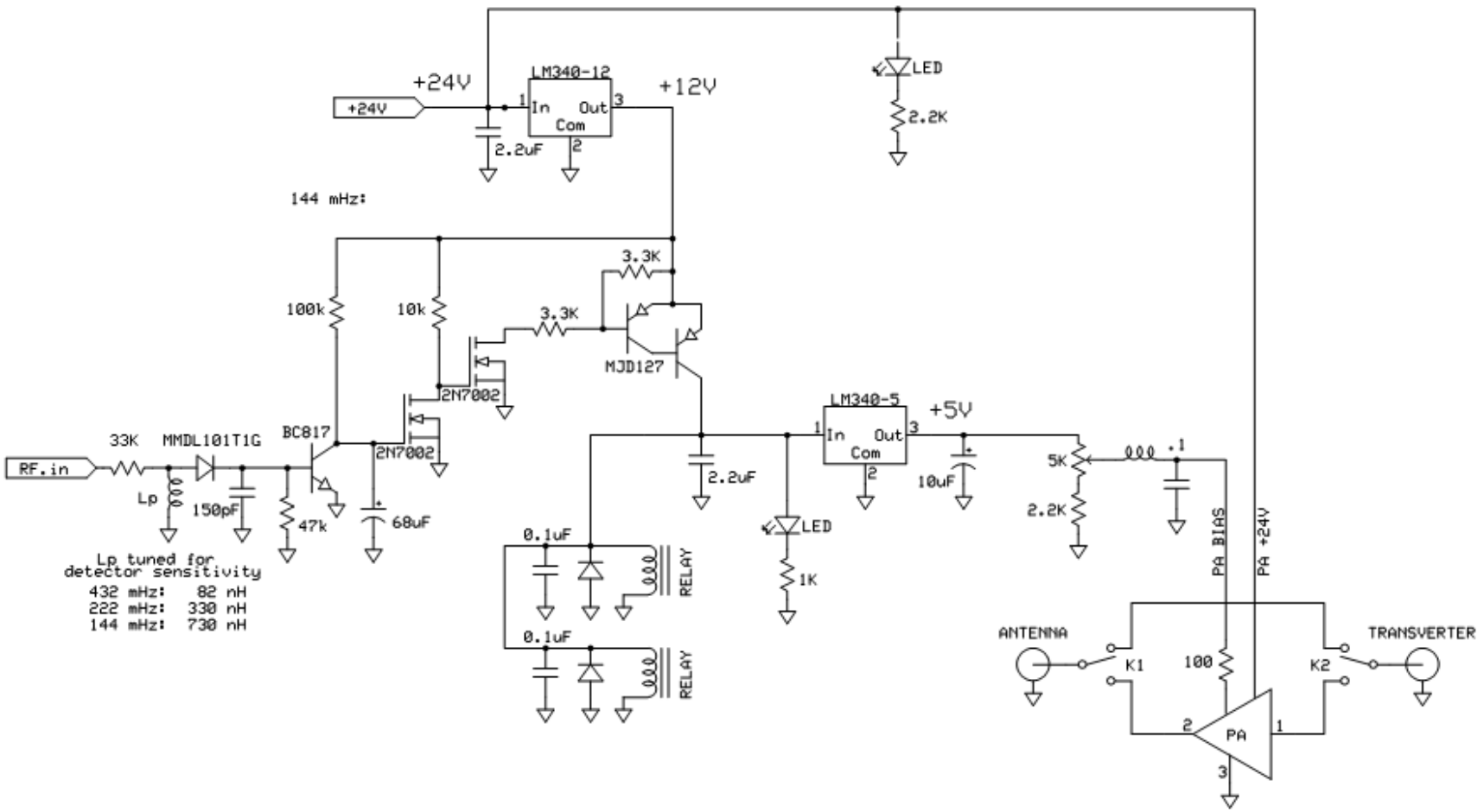
S21 (dB)

	Rp = 10	Rp = 20	Rp = 25	Rp = 30	Rp = 50	Rp = 75	Rp = 100	Rp = 150
Rs= 0	-10.88	-7.04	-6.02	-5.26	-3.52	-2.50	-1.94	-1.34
Rs= 10	-12.26	-8.30	-7.23	-6.44	-4.61	-3.52	-2.92	-2.28
Rs= 20	-13.44	-9.40	-8.30	-7.48	-5.58	-4.44	-3.81	-3.13
Rs= 25	-13.98	-9.90	-8.79	-7.96	-6.02	-4.86	-4.22	-3.52
Rs= 30	-14.49	-10.37	-9.25	-8.41	-6.44	-5.26	-4.61	-3.90
Rs= 50	-16.26	-12.04	-10.88	-10.01	-7.96	-6.72	-6.02	-5.26
Rs= 75	-18.06	-13.76	-12.57	-11.67	-9.54	-8.24	-7.51	-6.72
Rs= 100	-19.55	-15.19	-13.98	-13.06	-10.88	-9.54	-8.79	-7.96
Rs= 150	-21.94	-17.50	-16.26	-15.32	-13.06	-11.67	-10.88	-10.01

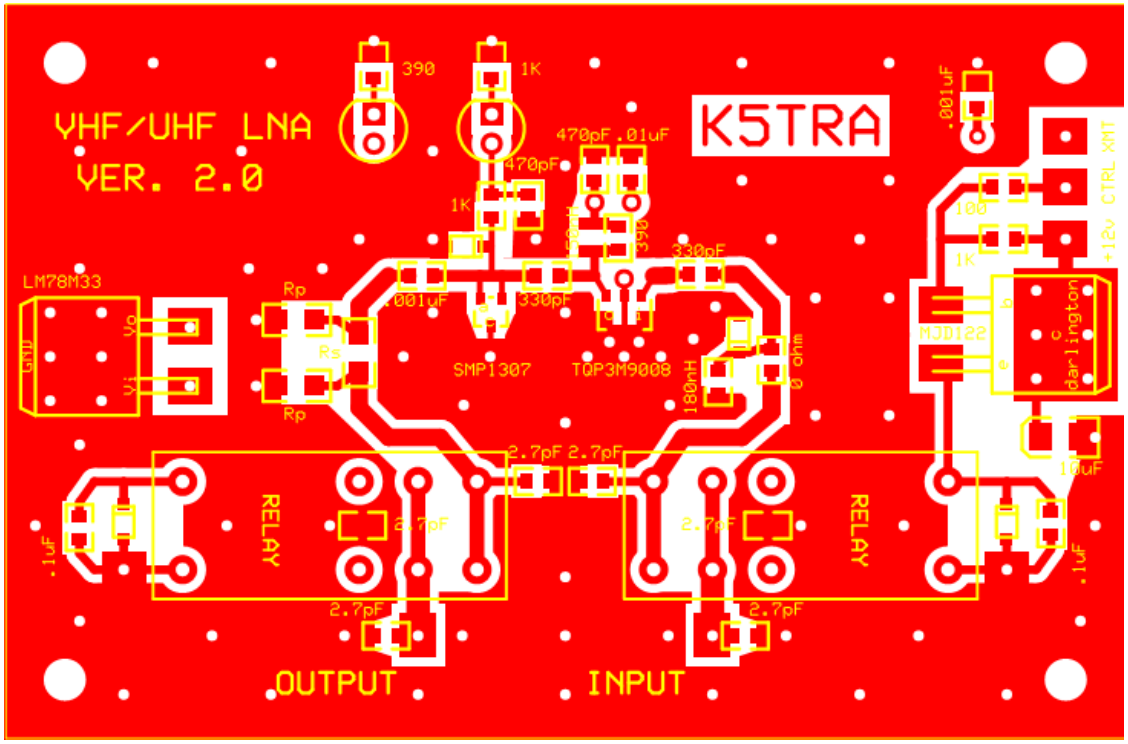
S11 (dB)

	Rp = 10	Rp = 20	Rp = 25	Rp = 30	Rp = 50	Rp = 75	Rp = 100	Rp = 150
Rs= 0	-2.92	-5.11	-6.02	-6.85	-9.54	-12.04	-13.98	-16.90
Rs= 10	-3.01	-5.38	-6.41	-7.36	-10.63	-13.98	-16.90	-22.28
Rs= 20	-3.07	-5.59	-6.72	-7.78	-11.60	-15.92	-20.29	-32.67
Rs= 25	-3.10	-5.68	-6.85	-7.96	-12.04	-16.90	-22.28	-323.53
Rs= 30	-3.12	-5.76	-6.97	-8.13	-12.47	-17.91	-24.61	-33.44
Rs= 50	-3.19	-6.02	-7.36	-8.67	-13.98	-22.28	-800.00	-20.83
Rs= 75	-3.25	-6.25	-7.71	-9.17	-15.56	-29.83	-25.58	-16.26
Rs= 100	-3.30	-6.41	-7.96	-9.54	-16.90	-328.31	-20.83	-13.98
Rs= 150	-3.35	-6.62	-8.30	-10.05	-19.09	-27.24	-16.90	-11.60

PA Control Schematic

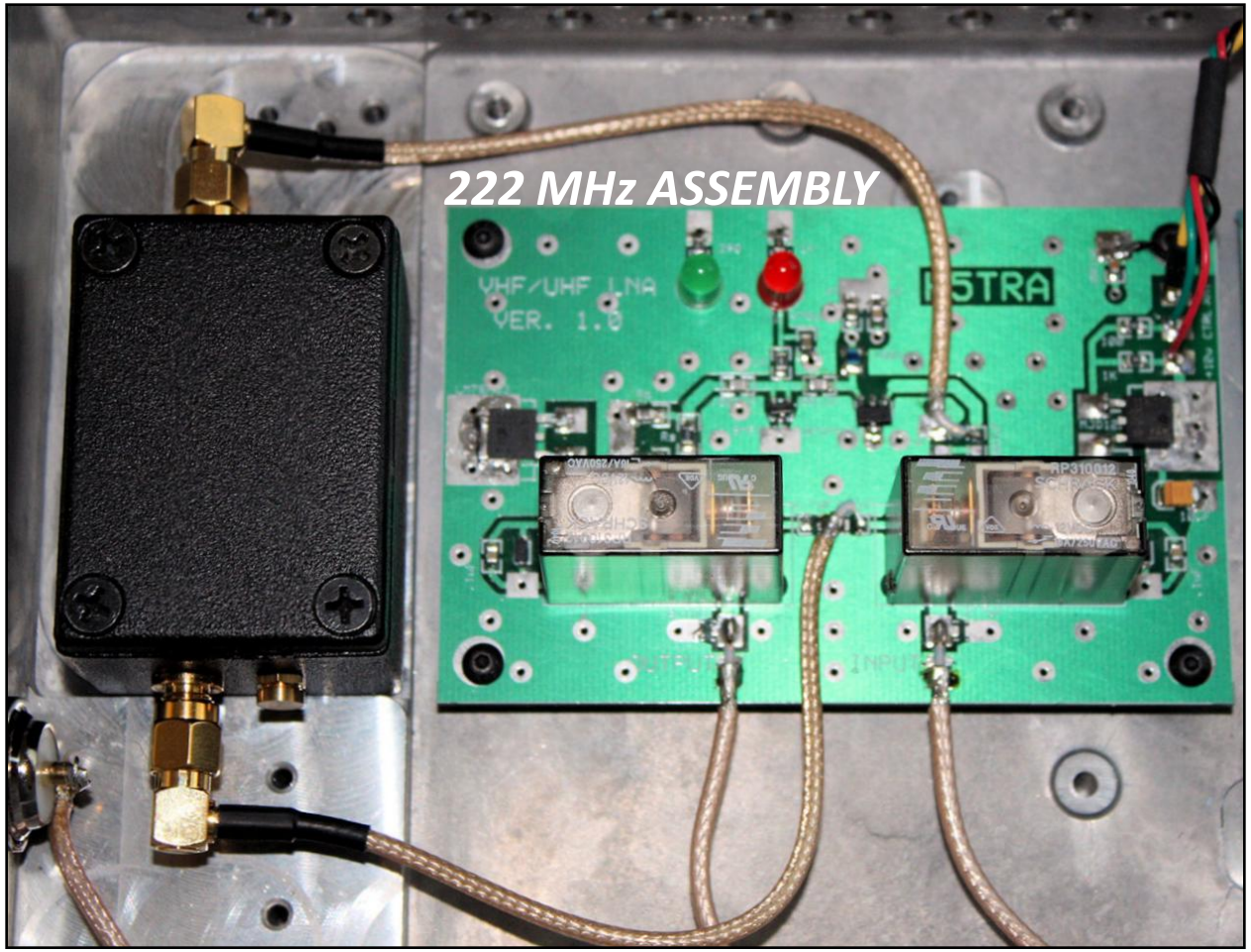


LNA Board Layout

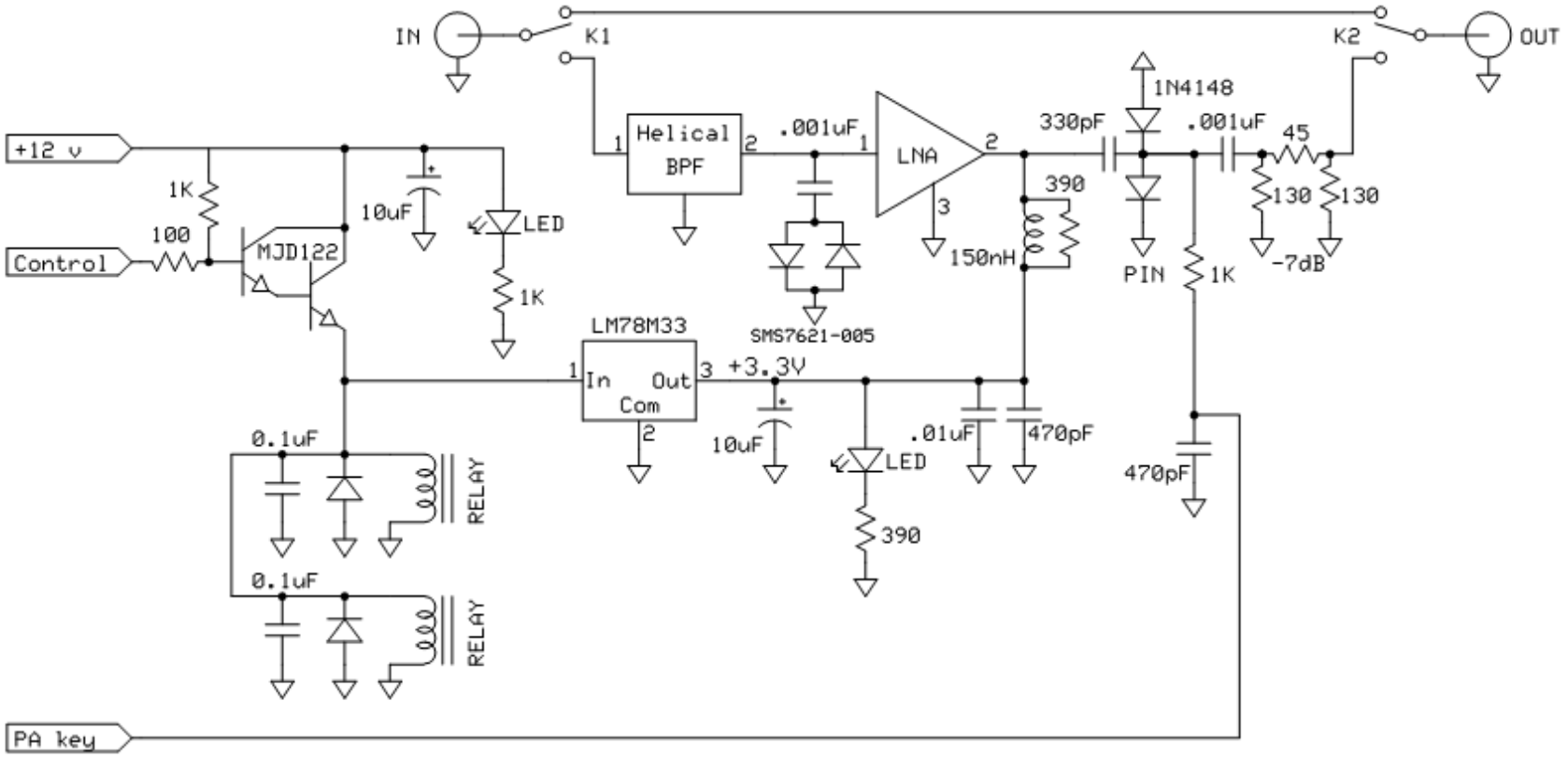


LNA BOARD IS OPTIONAL

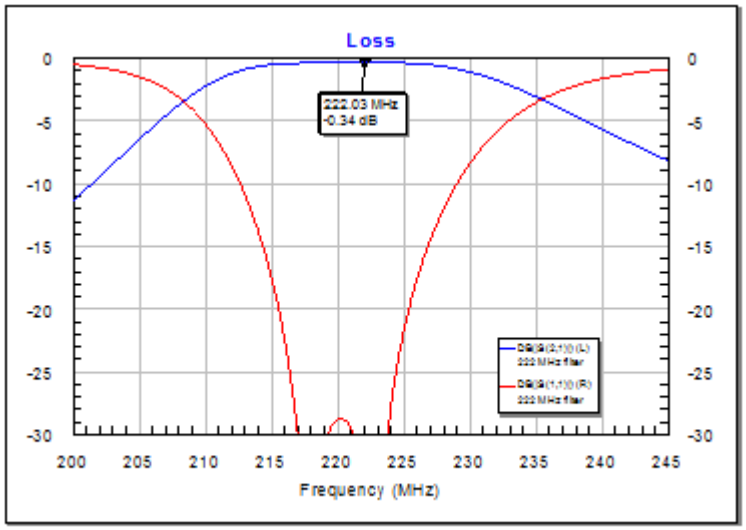
Remote LNA

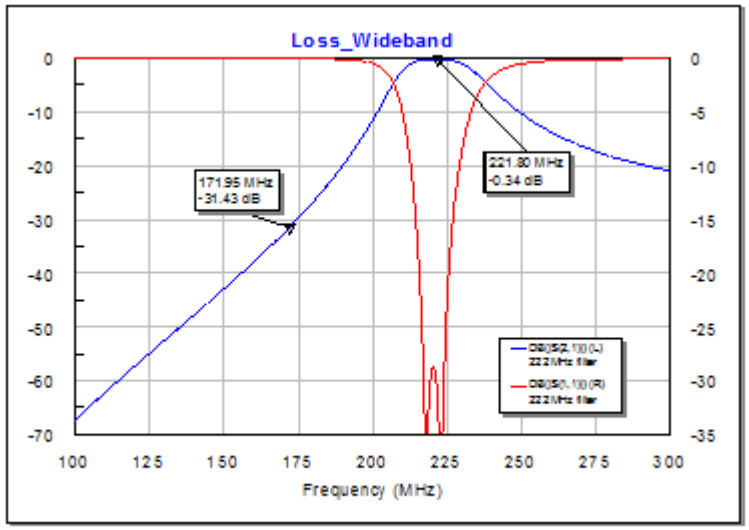


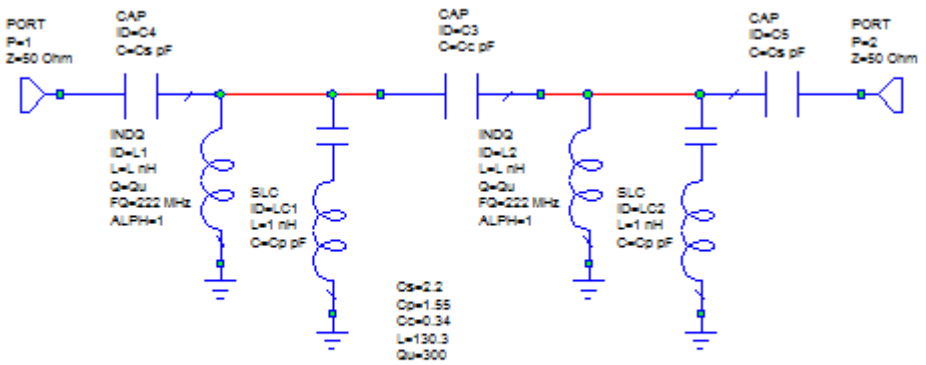
LNA Control Schematic

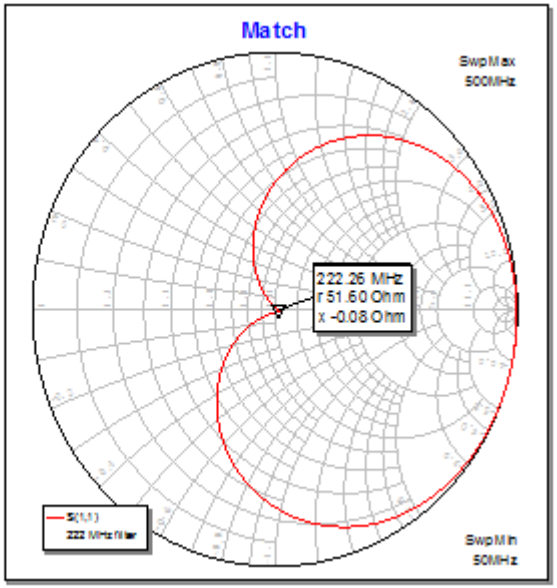


Preselector Design



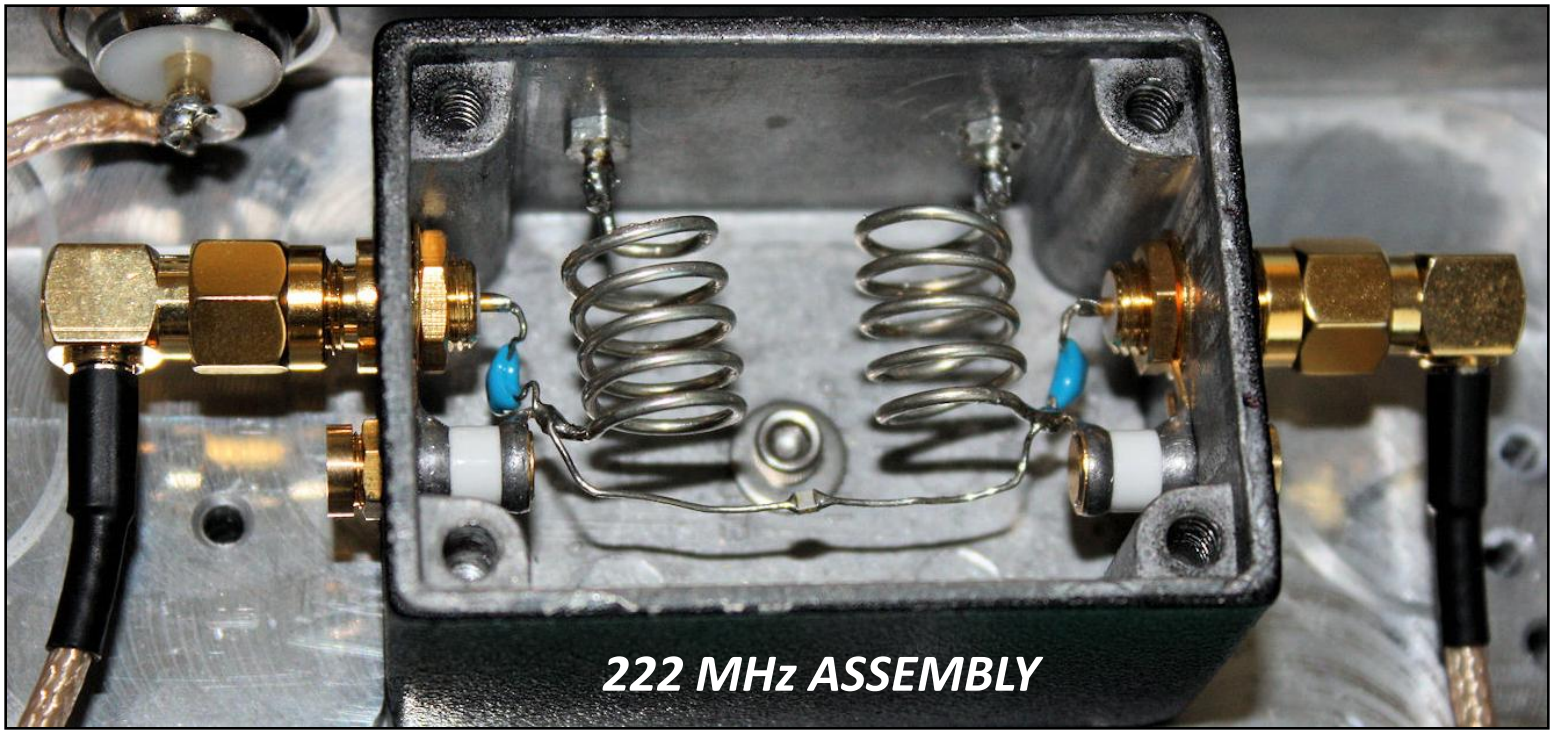




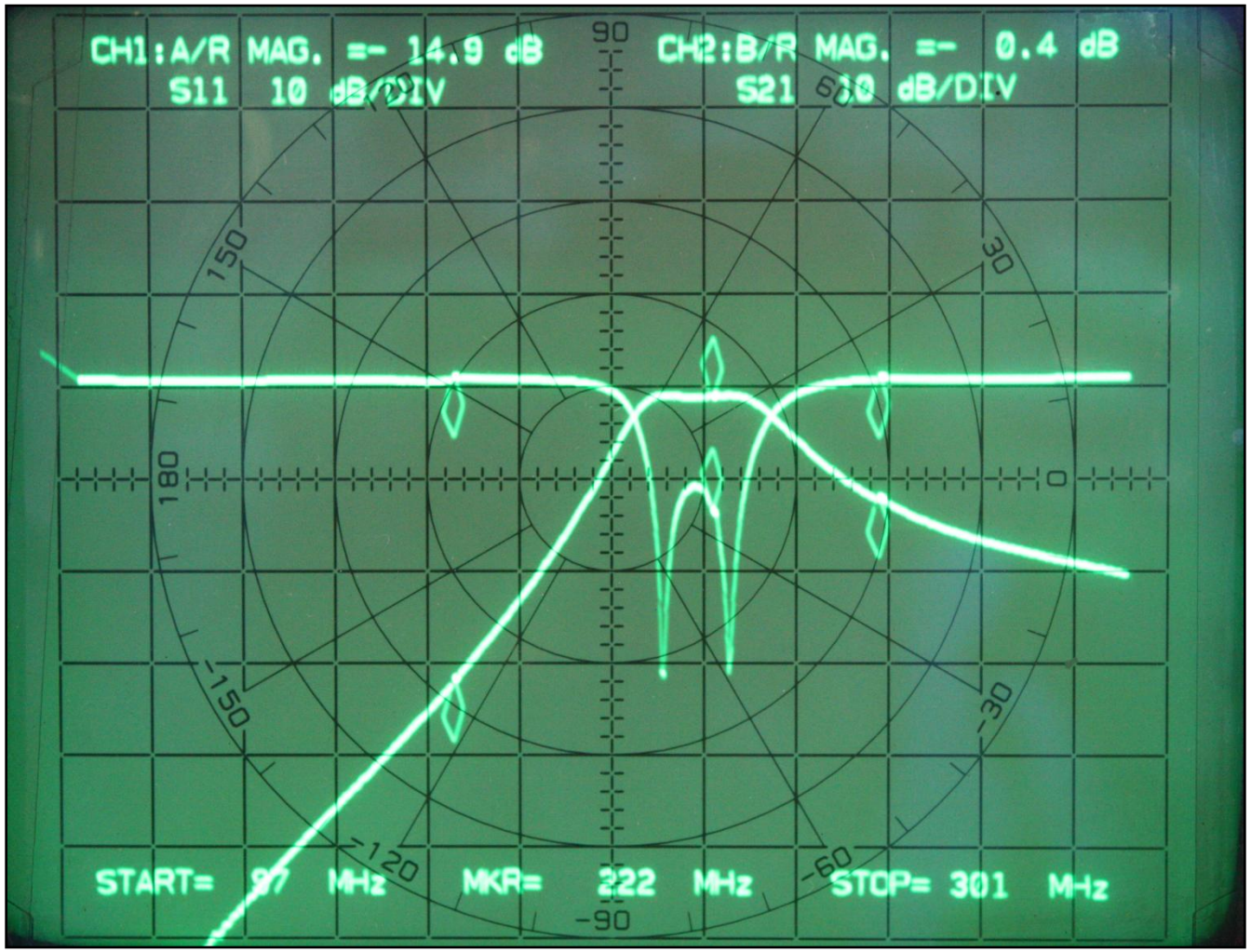


222 MHz BPF

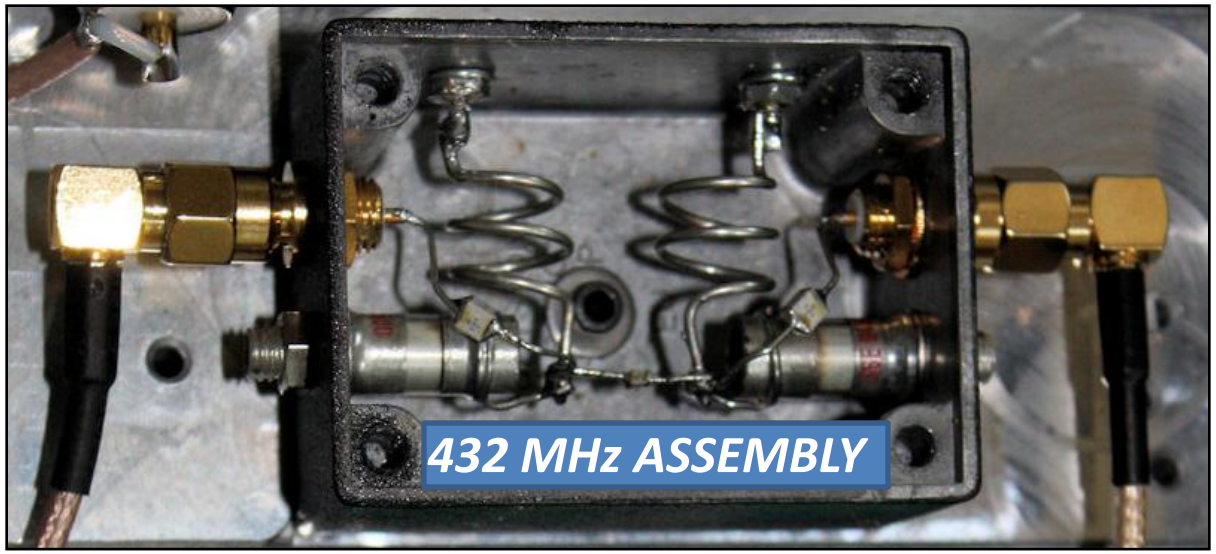
Helical BPF

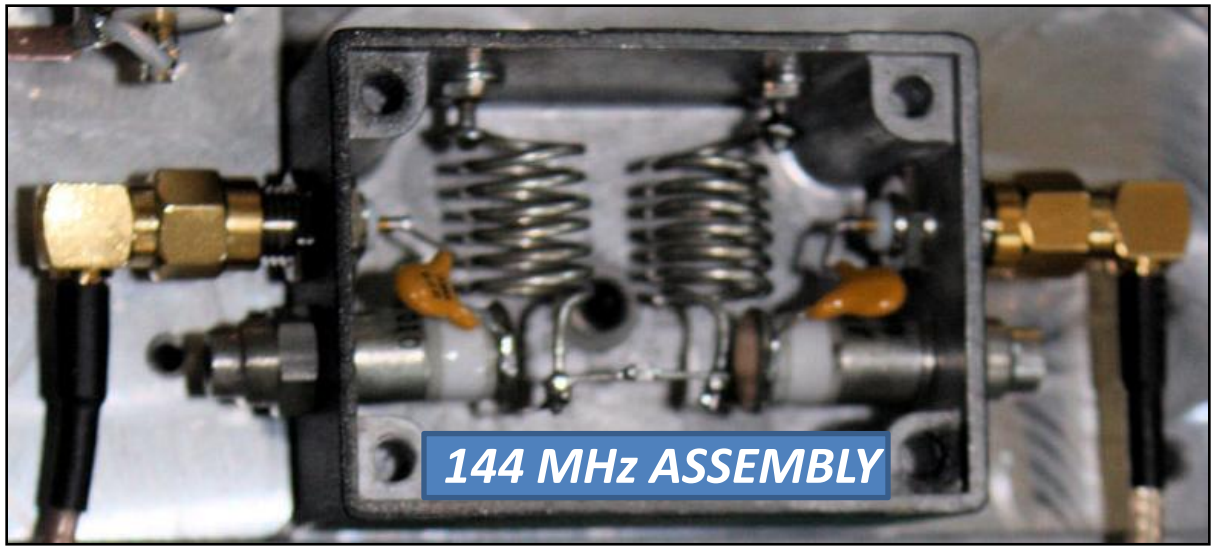


LNA Preselector Response

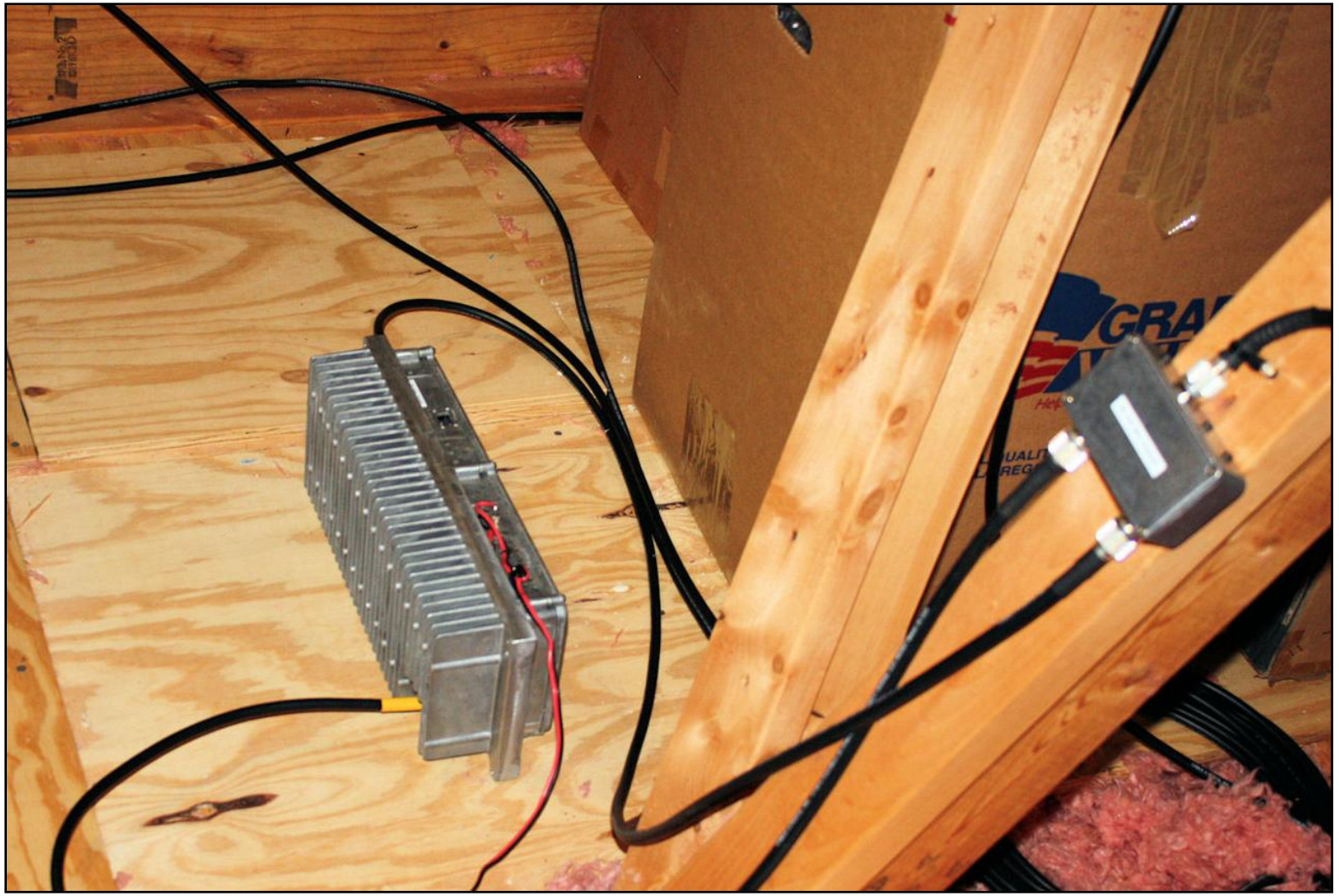


More Helical BPFs

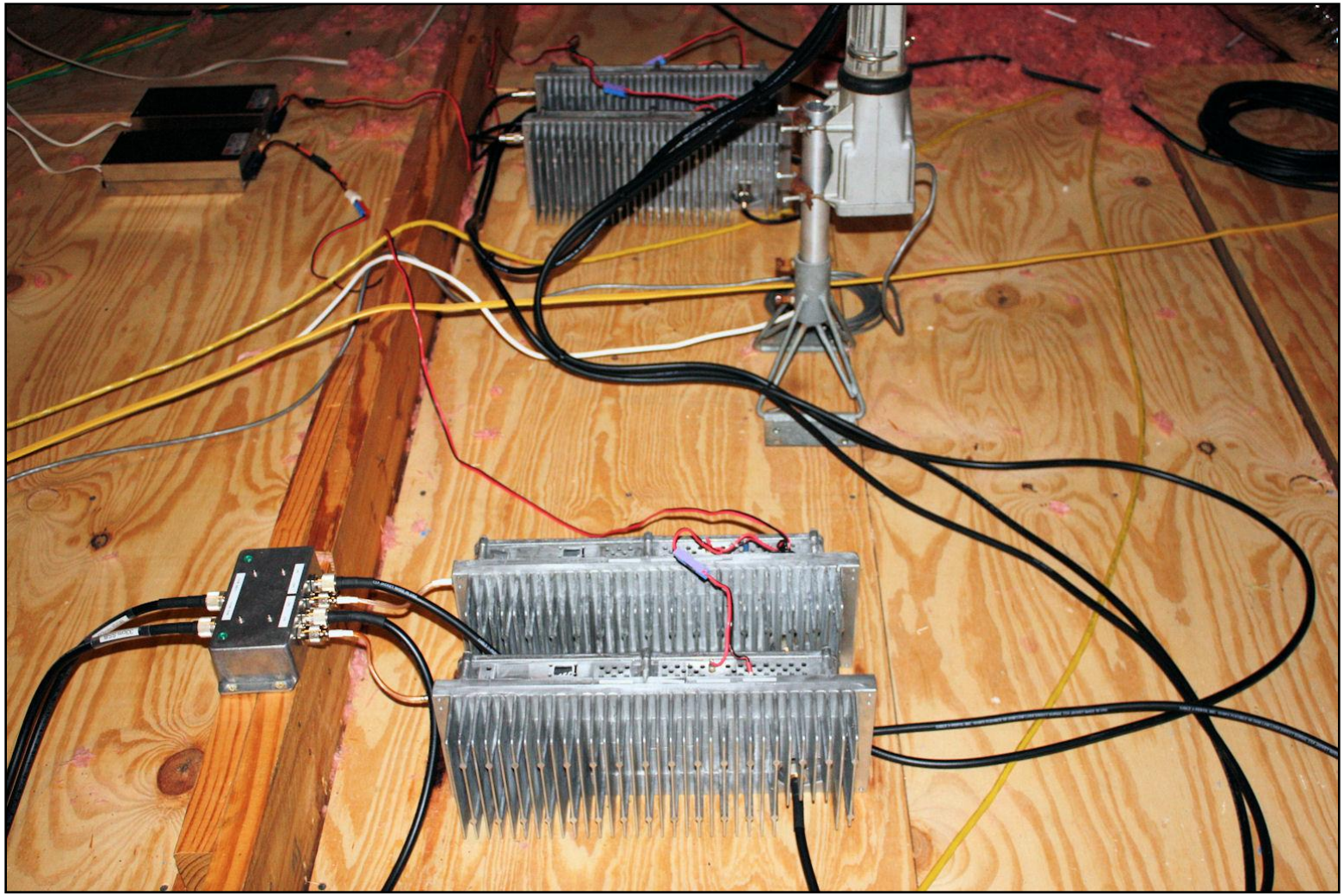




222 MHz Remote Amplifier in Attic



902, 1296, 144, & 432 Remote Amplifiers



WEB-IP Power Strip

144 MHz Remote PA & LNA