North Texas NTMS Microwave Society

AA5C 3rd Gen 10 GHz Transverter

Greg McIntire, AA5C

March 8, 2025

AA5C 3rd Gen 10 GHz Transverter

North Texas NTMS Microwave Society

- Objectives
  - Build a “modern” 10 GHz transverter for portable operation to replace one I built in the late 80s
    - Single 13.8 VDC Supply
    - Simple interface
      - Power
      - PTT in and out to facilitate using digital modes
      - 144 MHz IF
      - RF
  - Include front panel meter for relative TX output power indication
  - Have some fun building

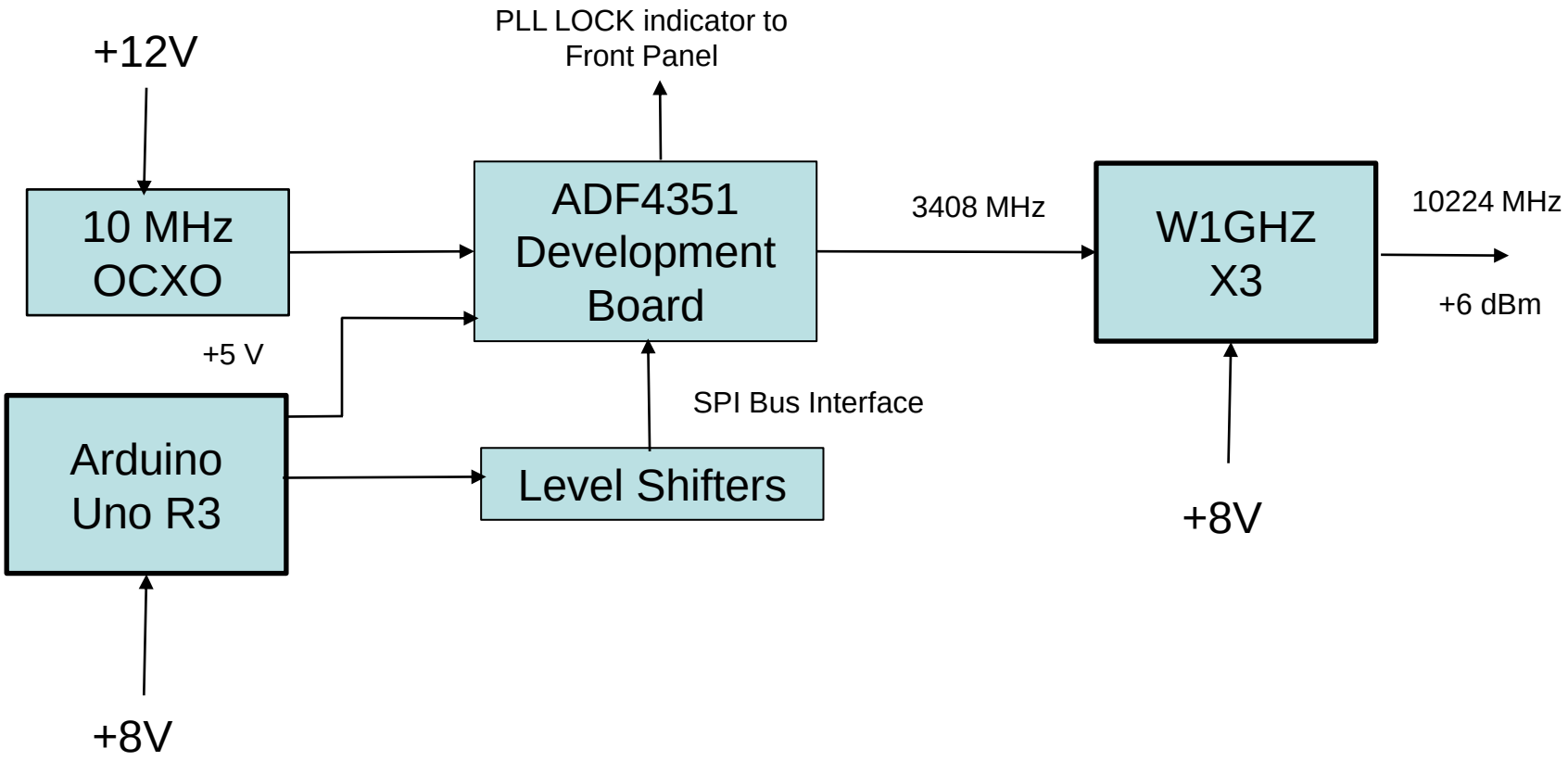
AA5C 3rd Gen 10 GHz Transverter

North Texas NTMS Microwave Society

- Approach
  - Use a 2M IF
  - Program an ADF4351 for 3,408 MHz with a 10 MHz Reference and build a W1GHz X3 multiplier to get the 10,224 MHz LO
  - Use a 10 MHz OCXO reference
    - Good stability
    - Facilitates easy transition to GPSDO
  - Build a W1GHz 10 GHz XVTR board for the basic low level RX and TX sections
  - Add a LNA and PA to get good RX and TX performance

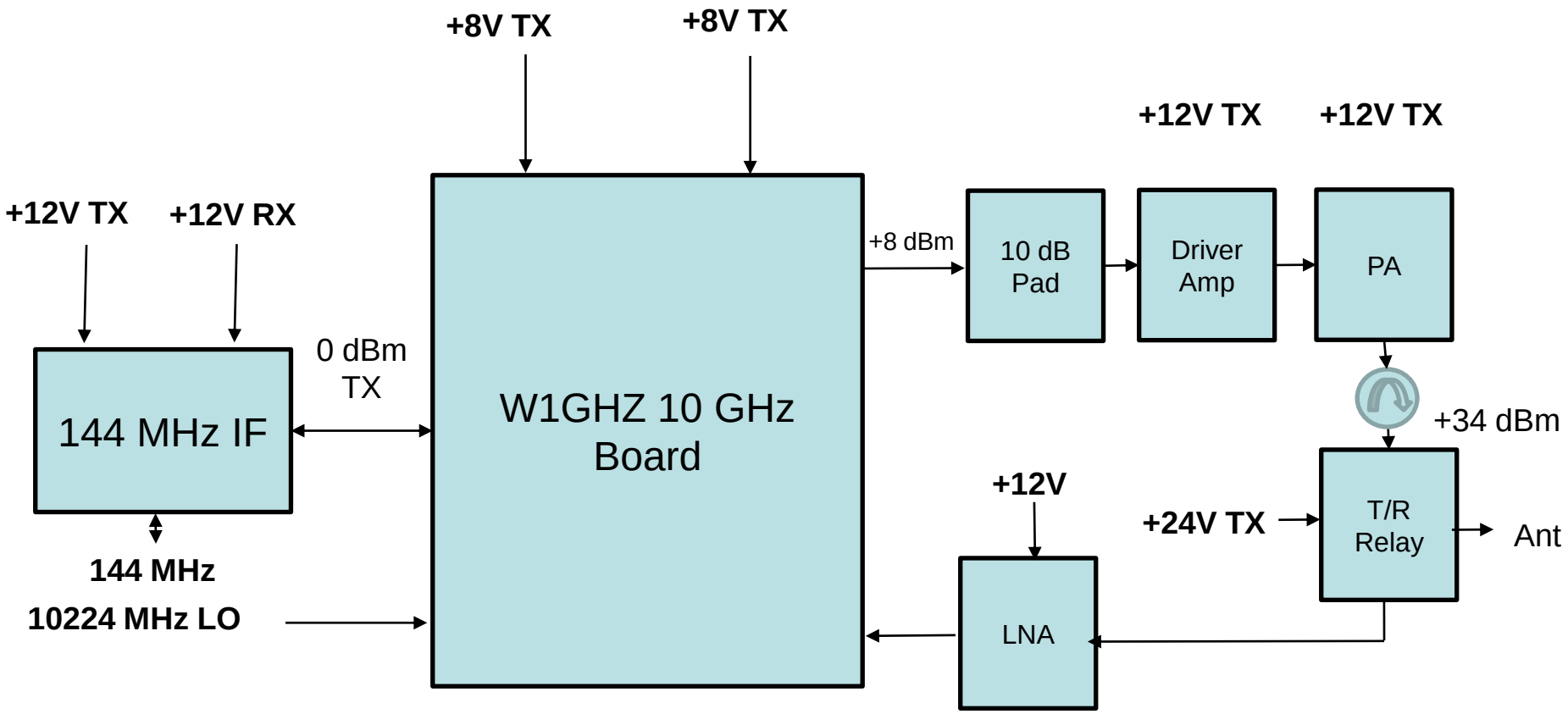
AA5C 3rd Gen 10 GHz Transverter Local Oscillator Block Diagram

North Texas NTMS Microwave Society



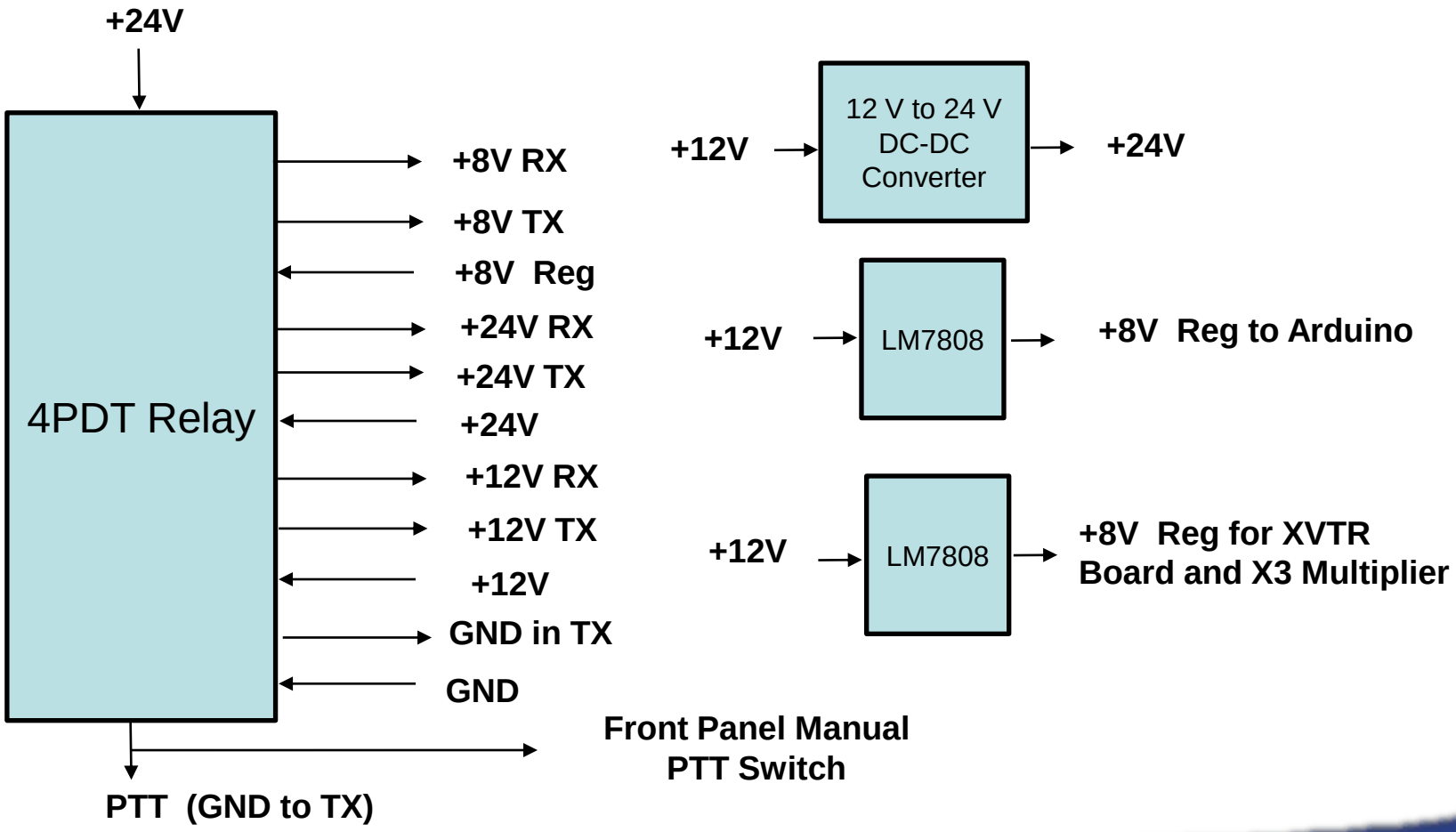
AA5C 3rd Gen 10 GHz Transverter RF Block Diagram

North Texas NTMS Microwave Society



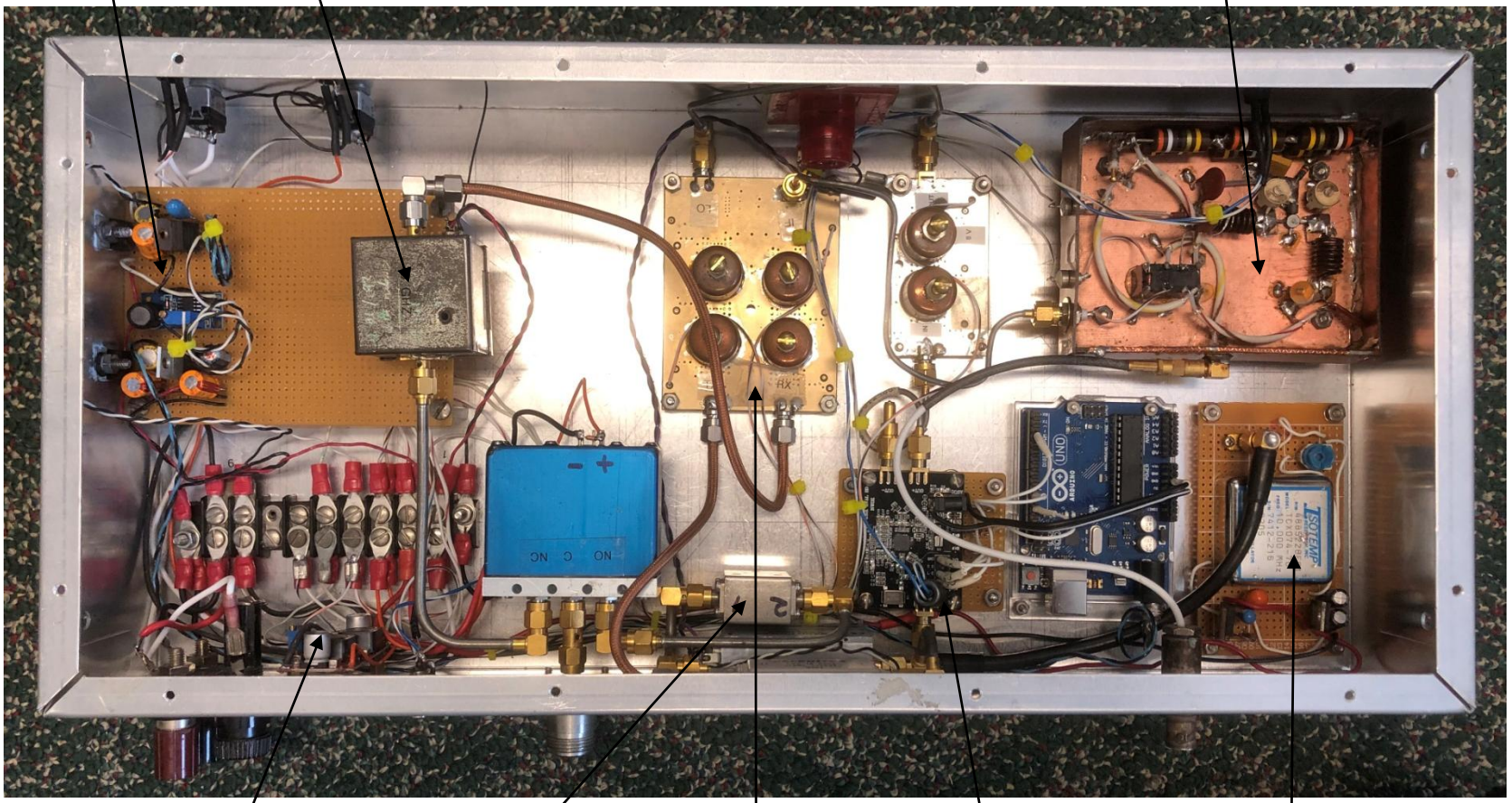
AA5C 3rd Gen 10 GHz Transverter Control Block Diagram

North Texas NTMS Microwave Society



AA5C 3rd Gen 10 GHz Transverter

North Texas NTMS Microwave Society



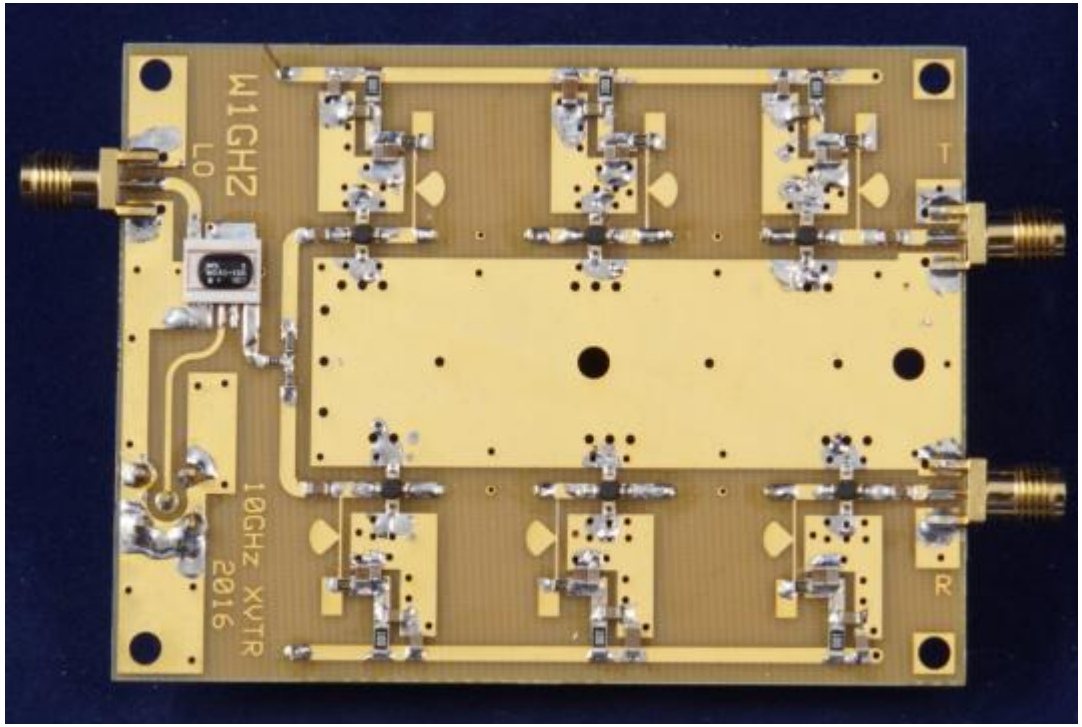
North Texas NTMS Microwave Society

AA5C 144 MHz Transverter Interface

- Functions
  - Attenuates 144 MHz IF transmit signal from IF rig
  - TX drive level adjustment
    - Input from <2W to 10W
  - RX buffer amplifier
    - Protects W1GHZ board in case of inadvertent 2M TX
  - T/R switching
- AA5C “standard” transverter interface to Yaesu FT-290R

AA5C 3rd Gen 10 GHz Transverter

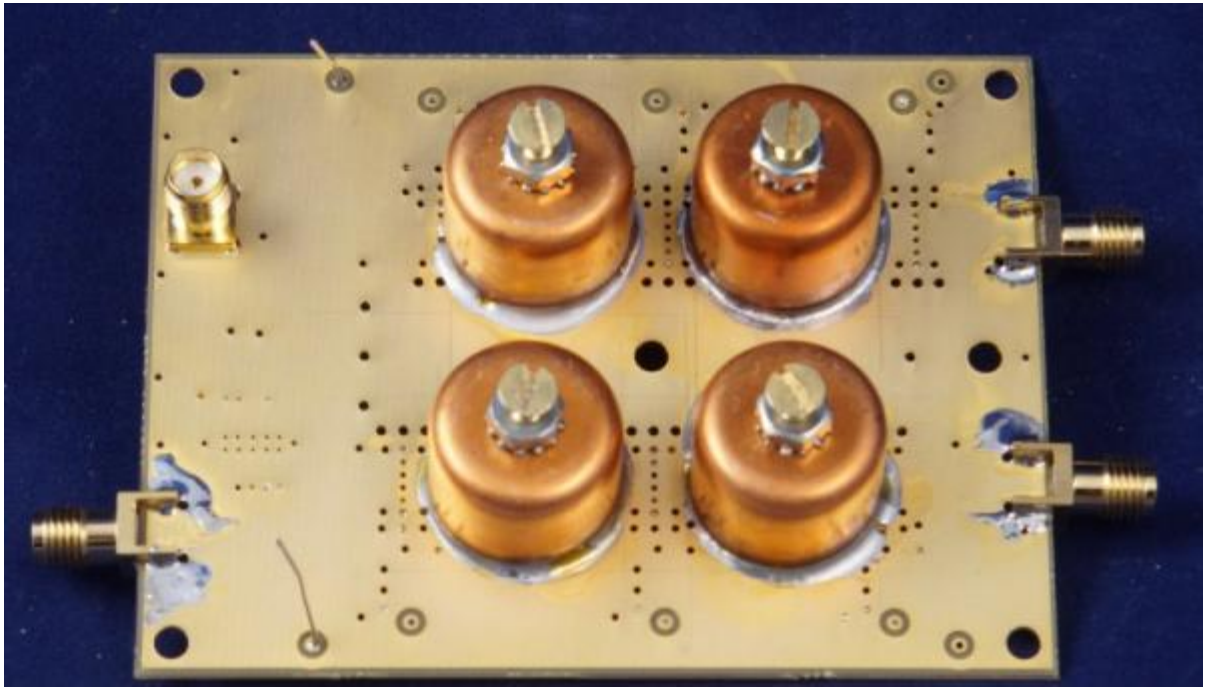
North Texas NTMS Microwave Society



W1GHZ 10 GHz Transverter Board – Circuit Side

AA5C 3rd Gen 10 GHz Transverter

North Texas NTMS Microwave Society



W1GHZ 10 GHz Transverter Board – Top Side

AA5C 3rd Gen 10 GHz Transverter

North Texas NTMS Microwave Society

- Po= +6 dBm when driven directly by ADF4351
- Terminate unused output on ADF4351 board!

W1GHZ X3 Multiplier Board

AA5C 3rd Gen 10 GHz Transverter Front Panel

North Texas NTMS Microwave Society

Kuhne 2W PA module used includes a TX power monitor/detector:
Select the series resistor for your meter.

AA5C 3rd Gen 10 GHz Transverter Back Panel

North Texas NTMS Microwave Society

AA5C 3rd Gen 10 GHz Transverter Performance

North Texas NTMS Microwave Society

Parameter	W1GHZ Board w/2M IF	System	Comments
Gain (dB)	29.2	42.6	
Noise Figure (dB)	9.3	2.1	
Pout (dBm)	+8	+34	

AA5C 3rd Gen 10 GHz Transverter - Summary

- About $100 for the W1GHZ boards and parts
  - Parts are listed in a project at Mouser
- All parts fit in an 8”x17”x3” chassis
- Utilized the chassis for heat sinking regulators and amplifiers
- Adapted to parts on hand
  - Out of 12VDC SMA coaxial relays but plenty of 24VDC coaxial relays in the junk box so I added the 12V-24V converter
  - Also out of 12V multi pole relays so used a 24V relay
  - LNA from old EME system
  - TX amps on hand
- No noise issues noticed with the 12-24V converter