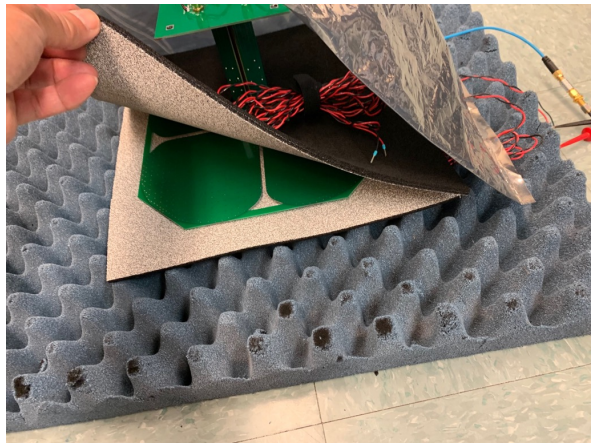
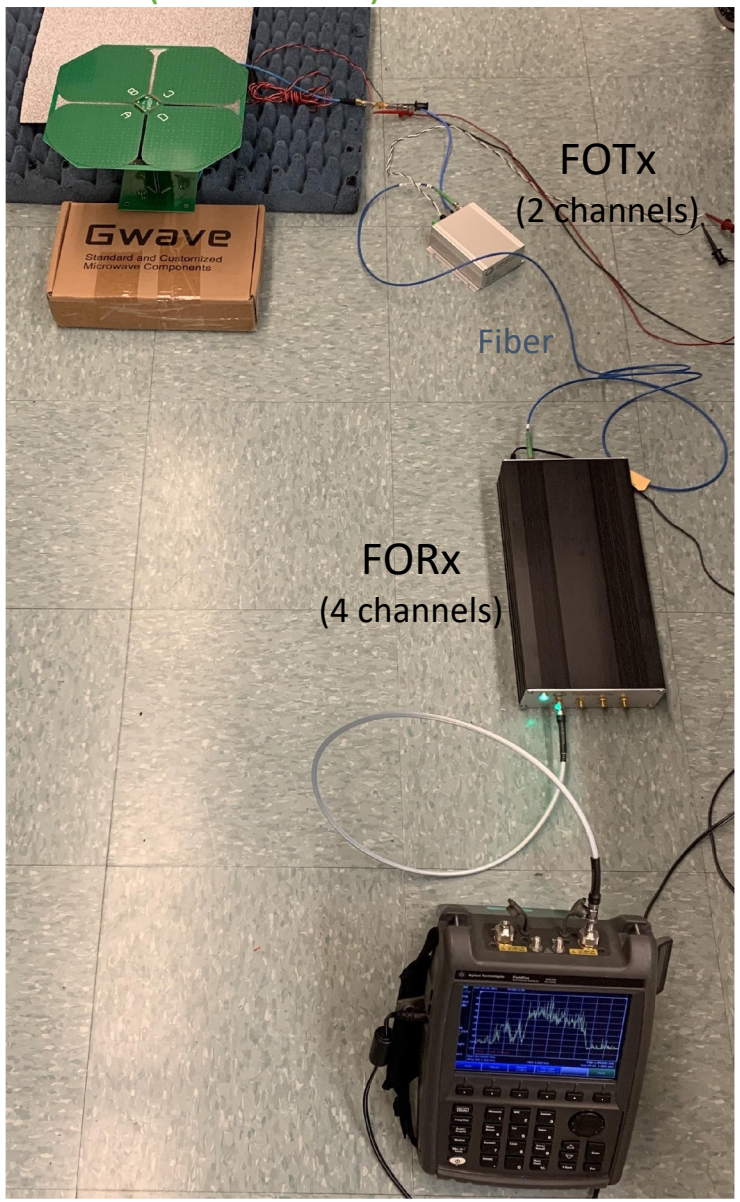
Test Setup in Hilo Microwave Lab, Clover Leaf + LNA

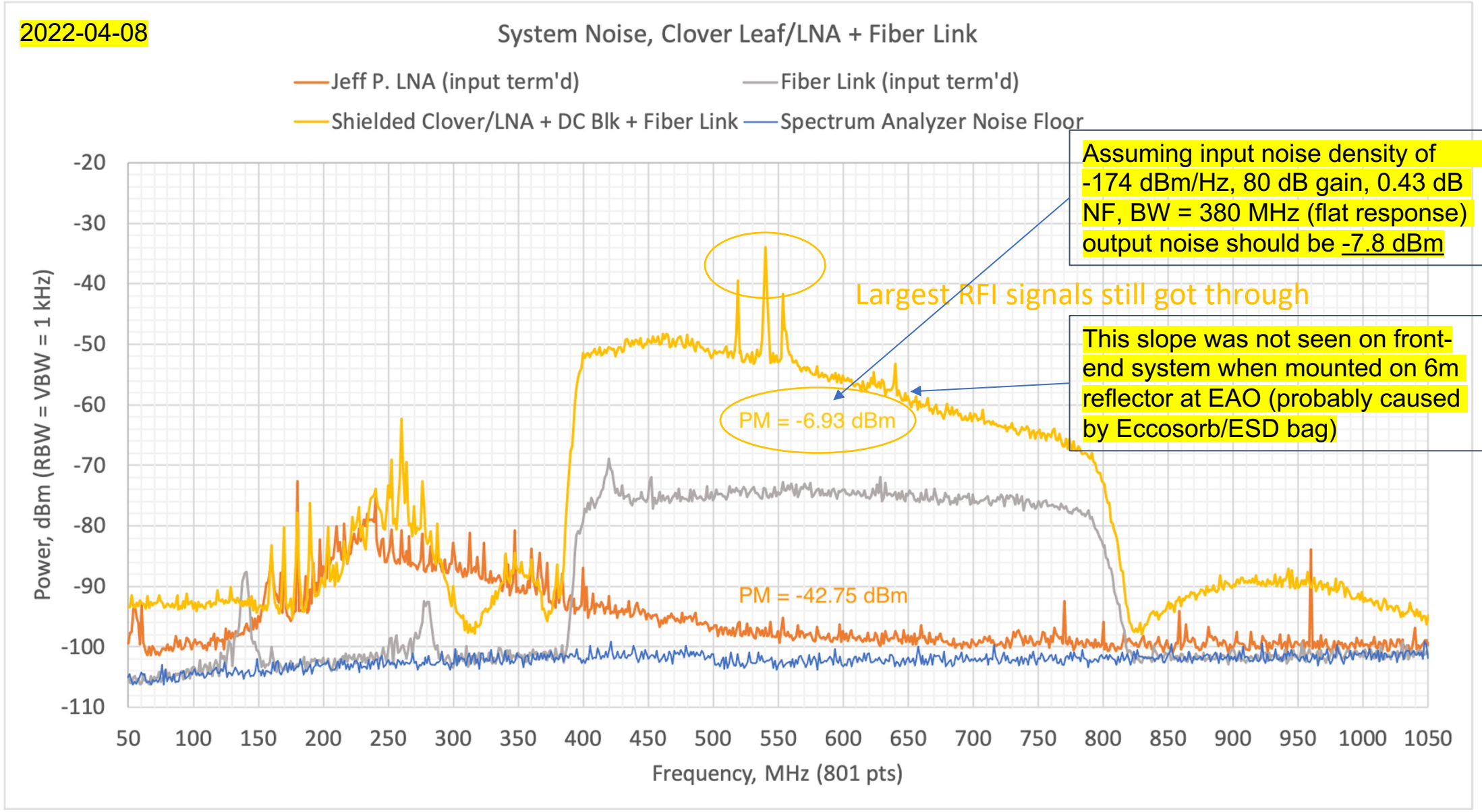
2022-04-08



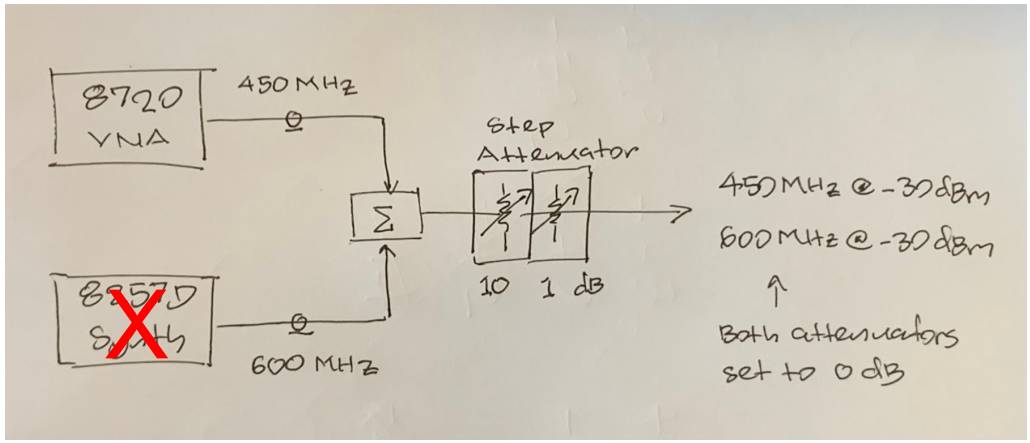
Integrated Clover Leaf Antenna + LNA (2 channels)



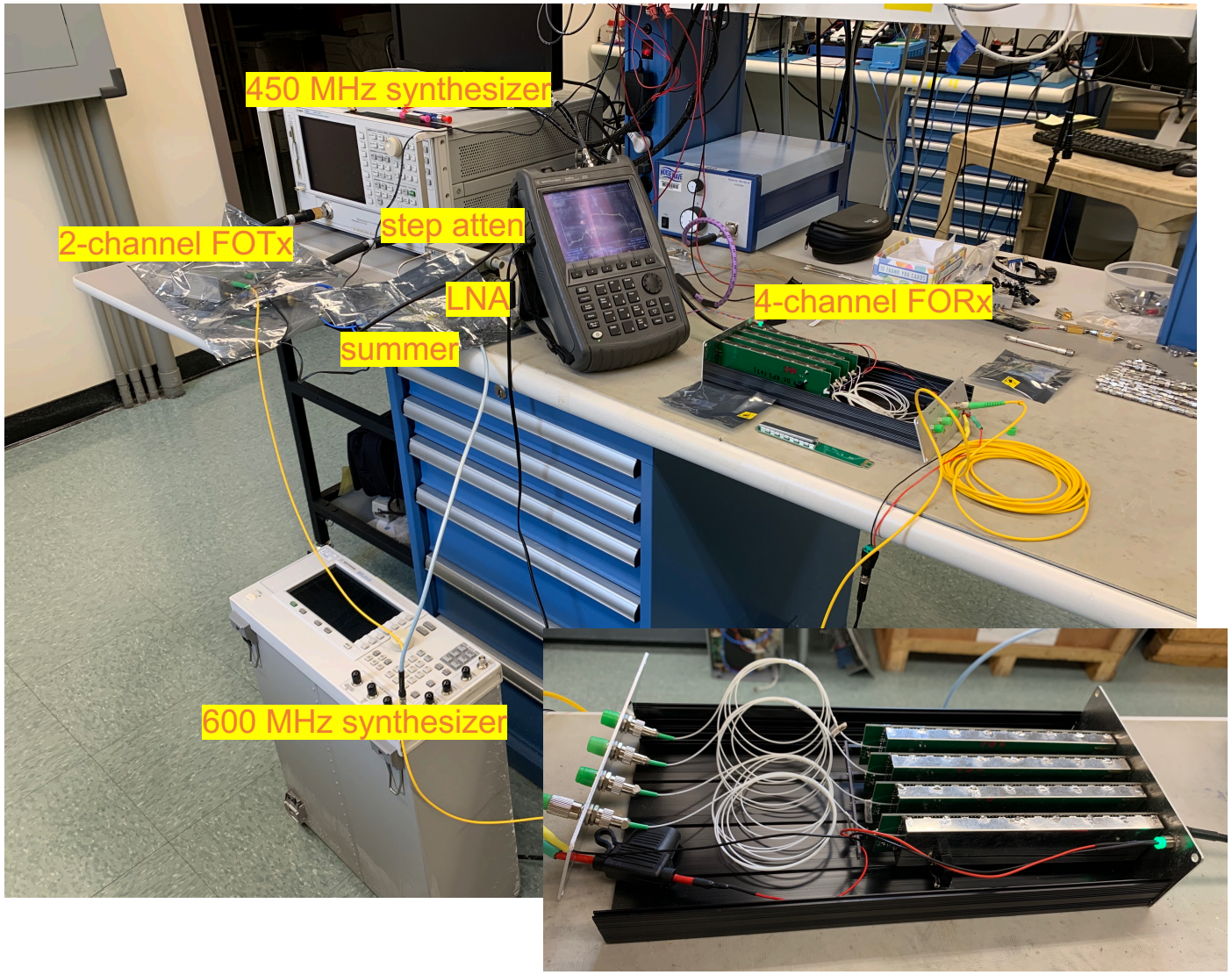
Characterization of Noise Outputs, Clover Leaf Shielded



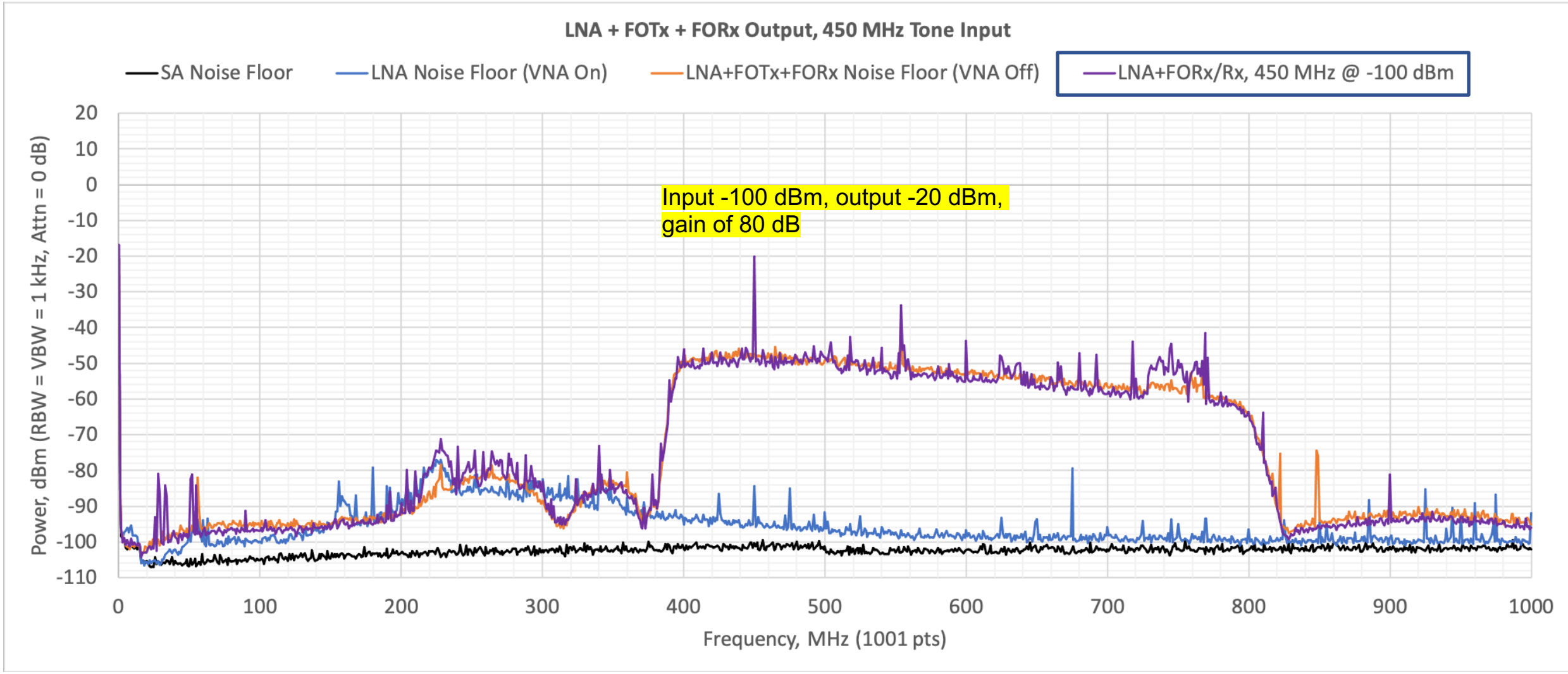
LNA + FOTx + FORx Test Setup in Microwave Lab



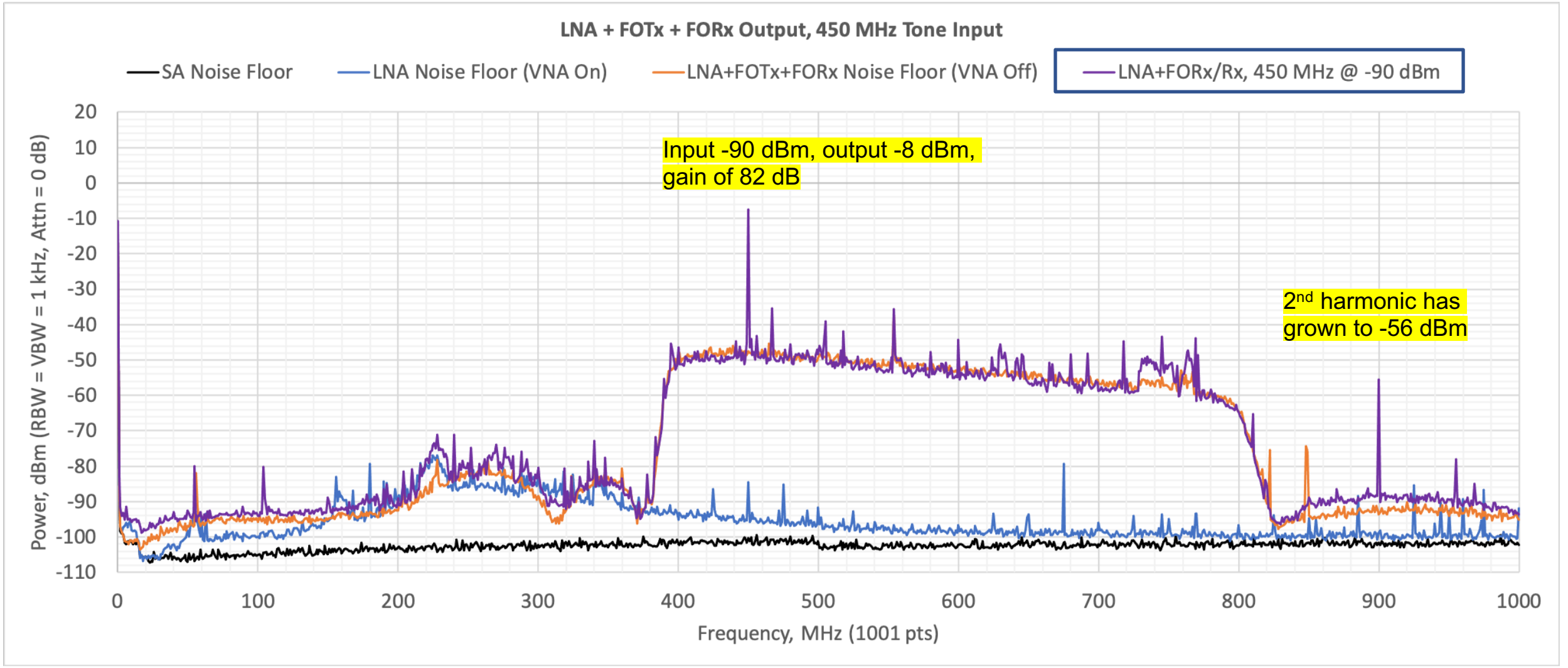
- Injected 450 MHz directly into LNA
- System gain of 80 dB is very high and susceptible to local RFI pickup
  - Shielded subassemblies in ESD bags
  - Used ferrite chokes on DC lines
  - Turn off all unused test equipment



Spectral Response to 450 MHz Tone Injection

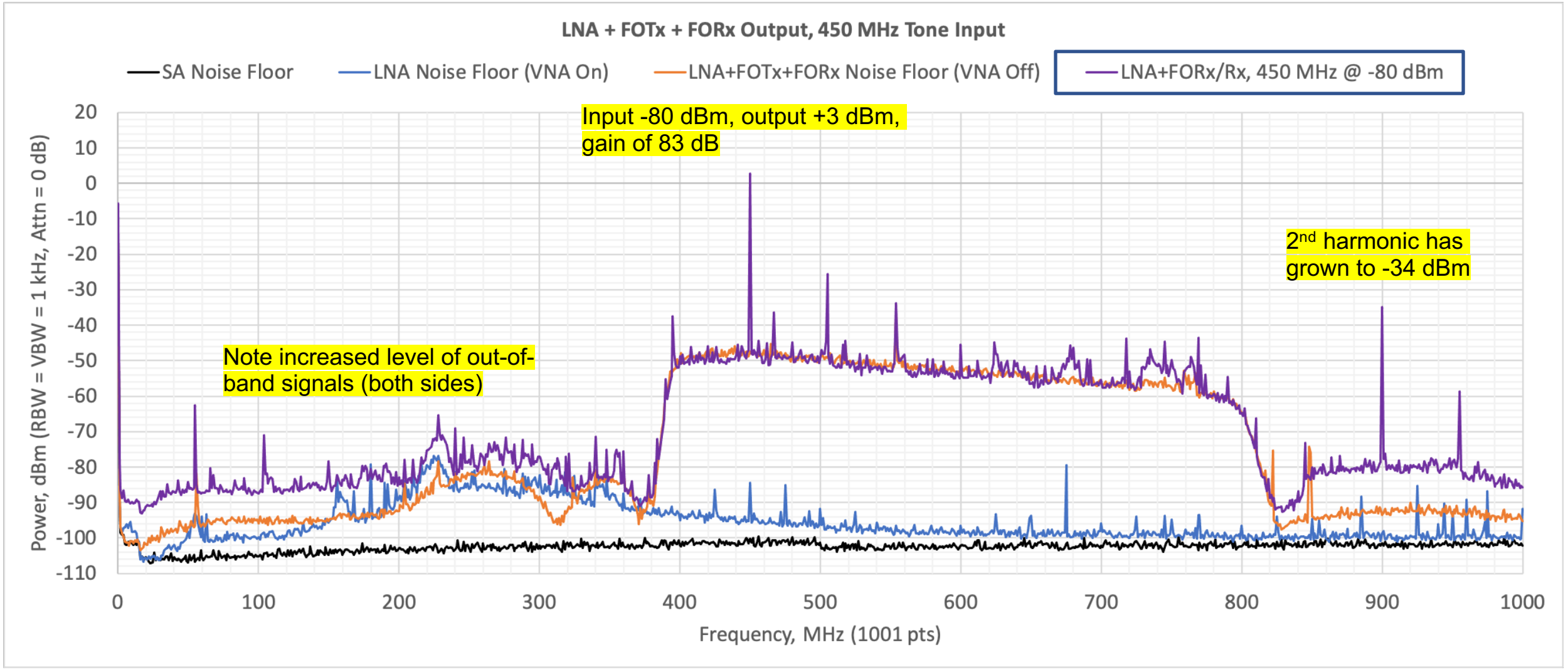


Spectral Response to 450 MHz Tone Injection



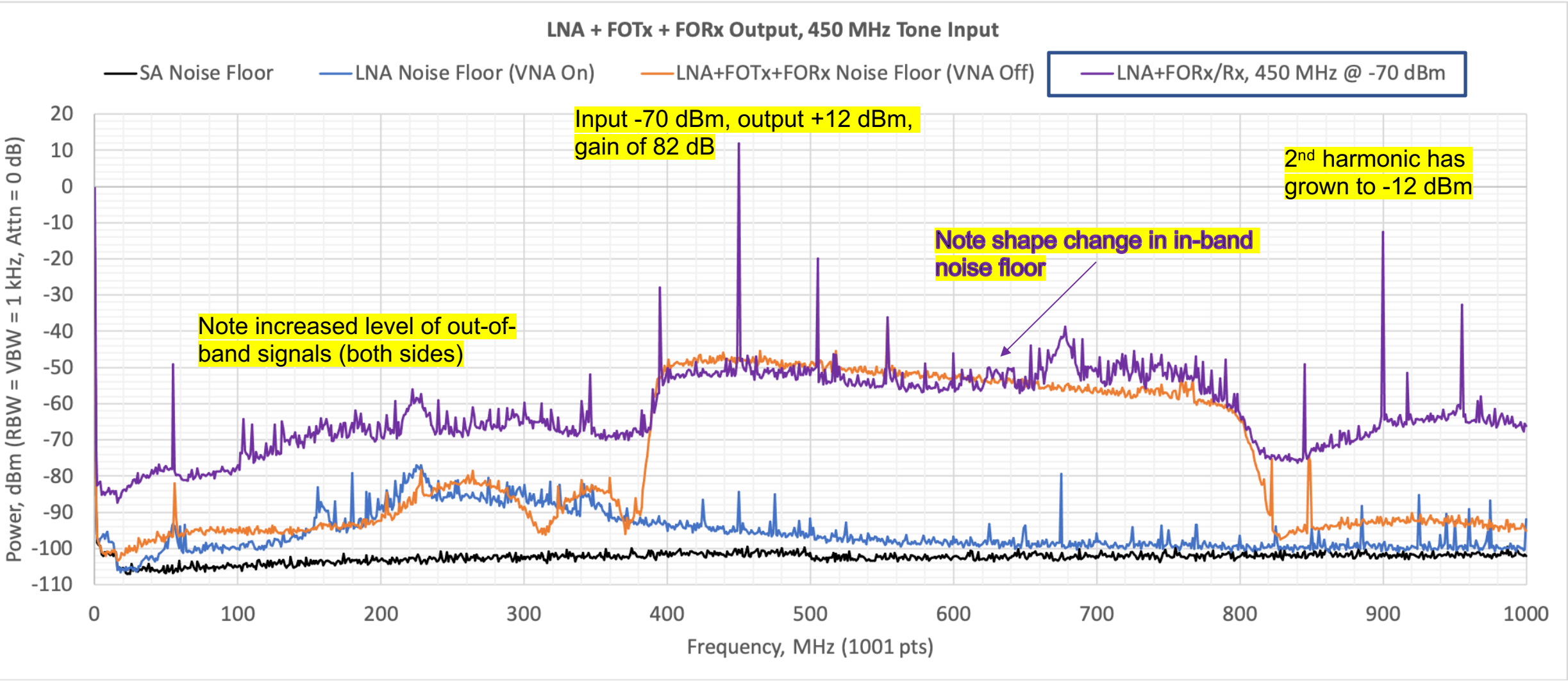
Spectral Response to 450 MHz Tone Injection

Highest Acceptable Input Level -80 dBm



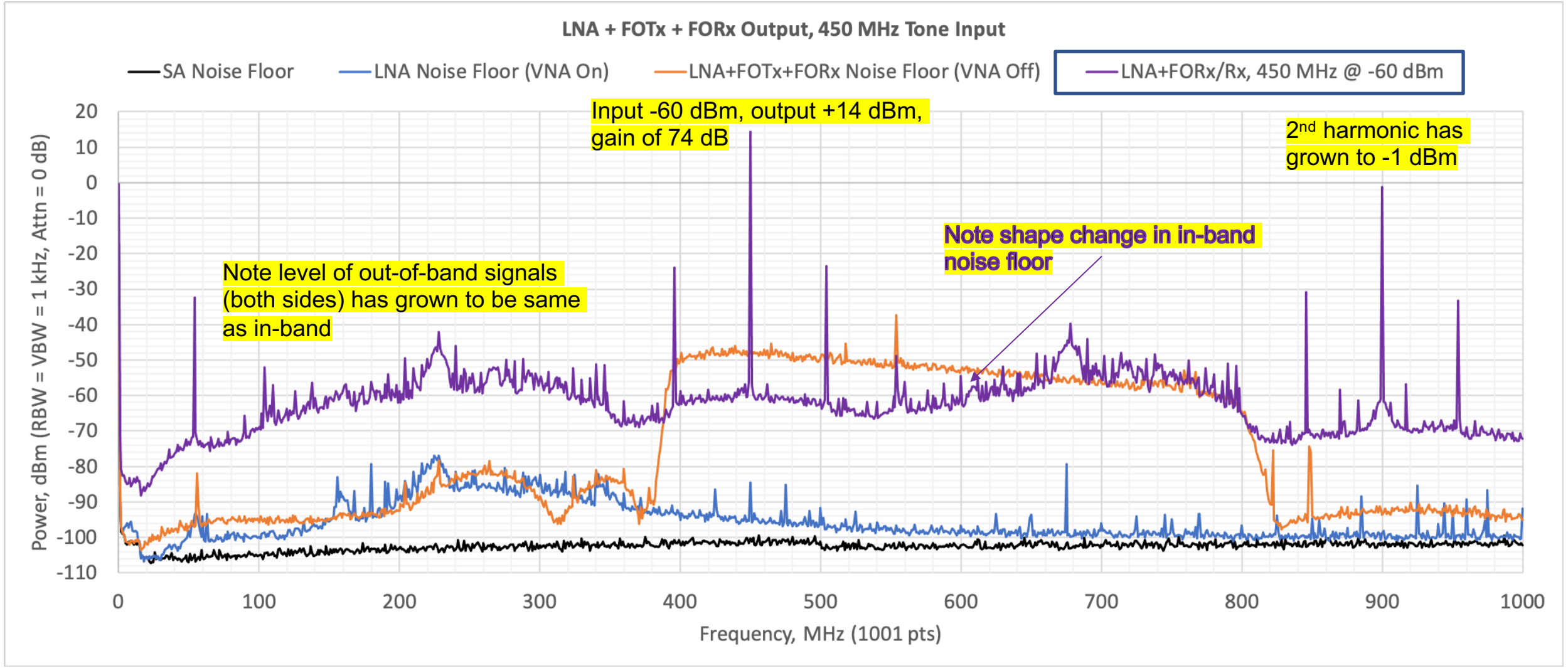
Spectral Response to 450 MHz Tone Injection

Input Level too High



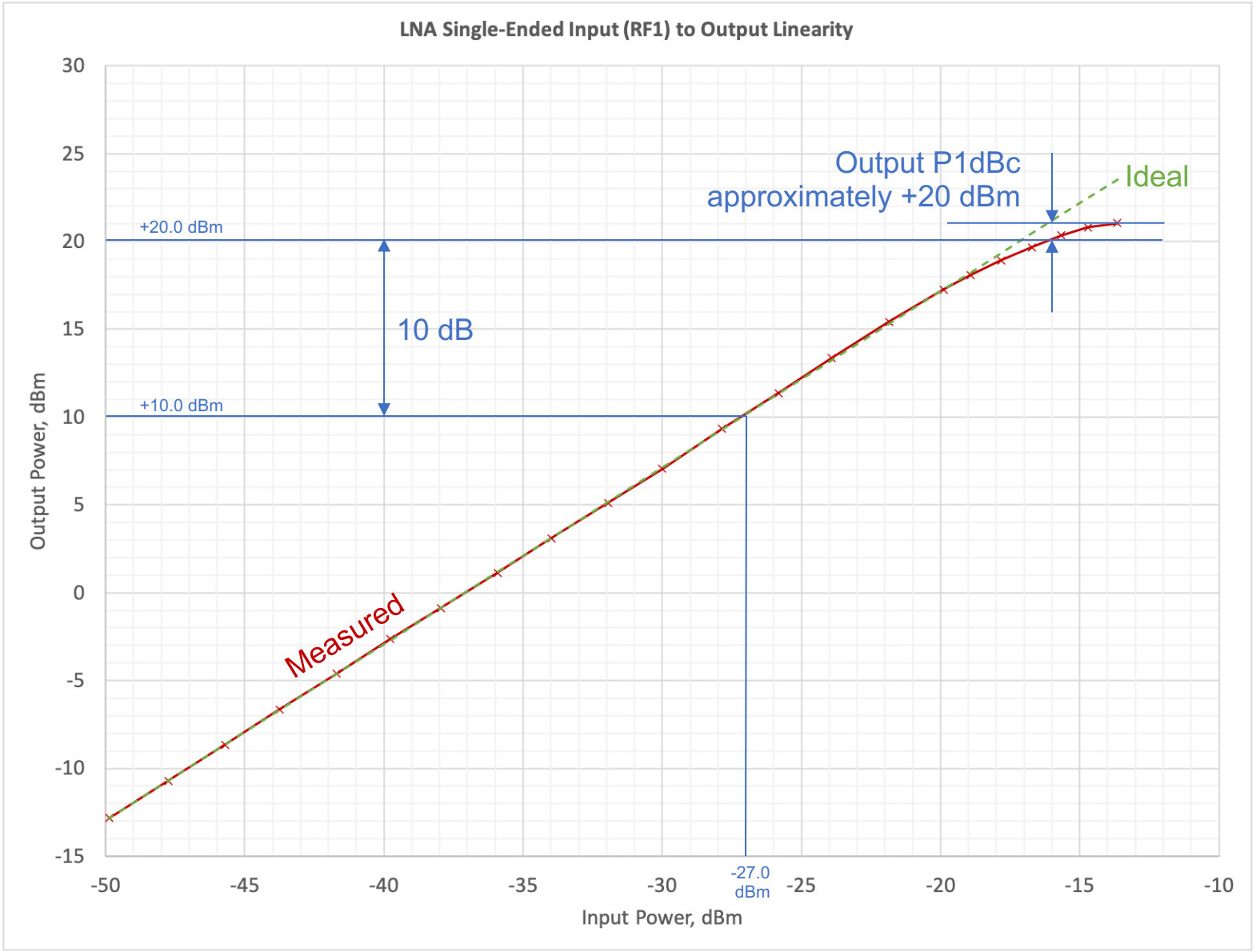
Spectral Response to 450 MHz Tone Injection

Input Level too High



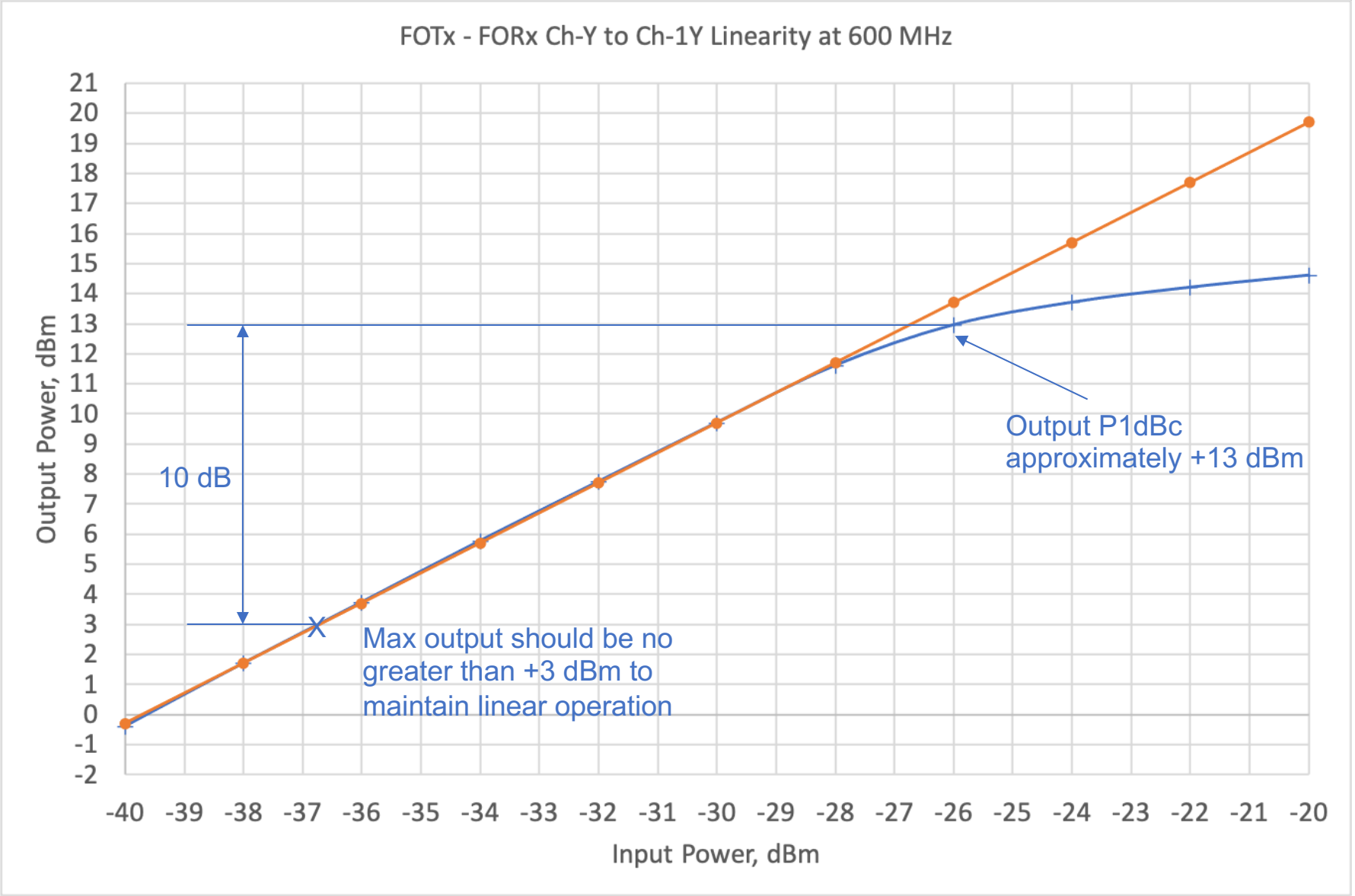
LNA Linearity Measurement (SE input)

- General rule to maintain linearity for noise-like signals is to operate 10 dB below the 1 dB compression point (P1dBc)
- This corresponds to max input level of -16 dBm from LNA (SE)
- +20 dBm output from LNA

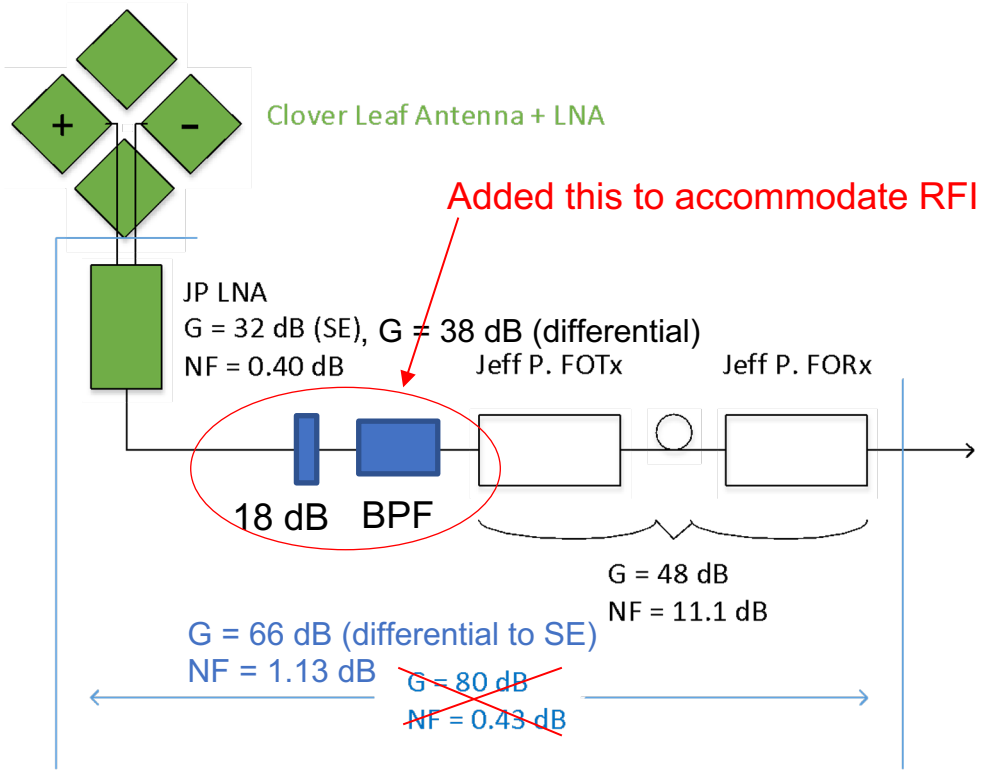


Fiber System Linearity Measurement

- General rule to maintain linearity for noise-like signals is to operate 10 dB below the 1 dB compression point (P1dBc)
- This corresponds to max output level of +3 dBm from FORx
- And is also consistent (maybe coincidentally) with single tone input tests on page 7



2022-08-17 Initial Hardware Configuration for 6m Dish at EAO



Xpol = ~ +4.4 dBm

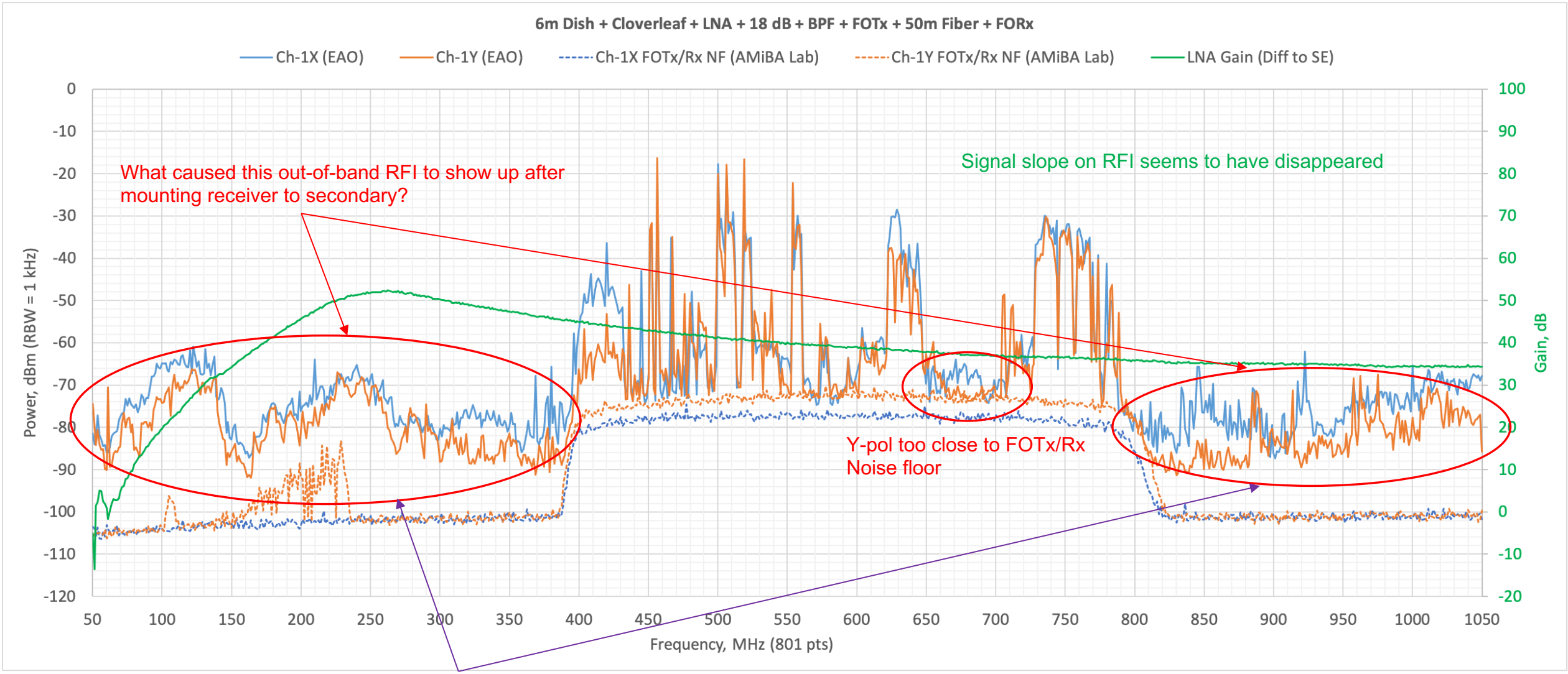
Ypol = ~ +2.8 dBm

These power values are close to +3 dBm max drive to maintain linearity of Fiber Link

2022-08-17 Clover Leaf Antenna System Mounted to Secondary (EAO)

- Mounting of receiver was fairly straight forward
  - Setup quad legs on grass and mounted receiver while on ground
  - Moved quad legs + receiver assembly up to dish
  - With antenna tilted down, bolted side legs using 12 foot ladder
  - Bolted front leg
  - With antenna at zenith bolted last leg using 12 foot ladder

2022-08-17 6m + Clover Leaf Receiver Response at EAO



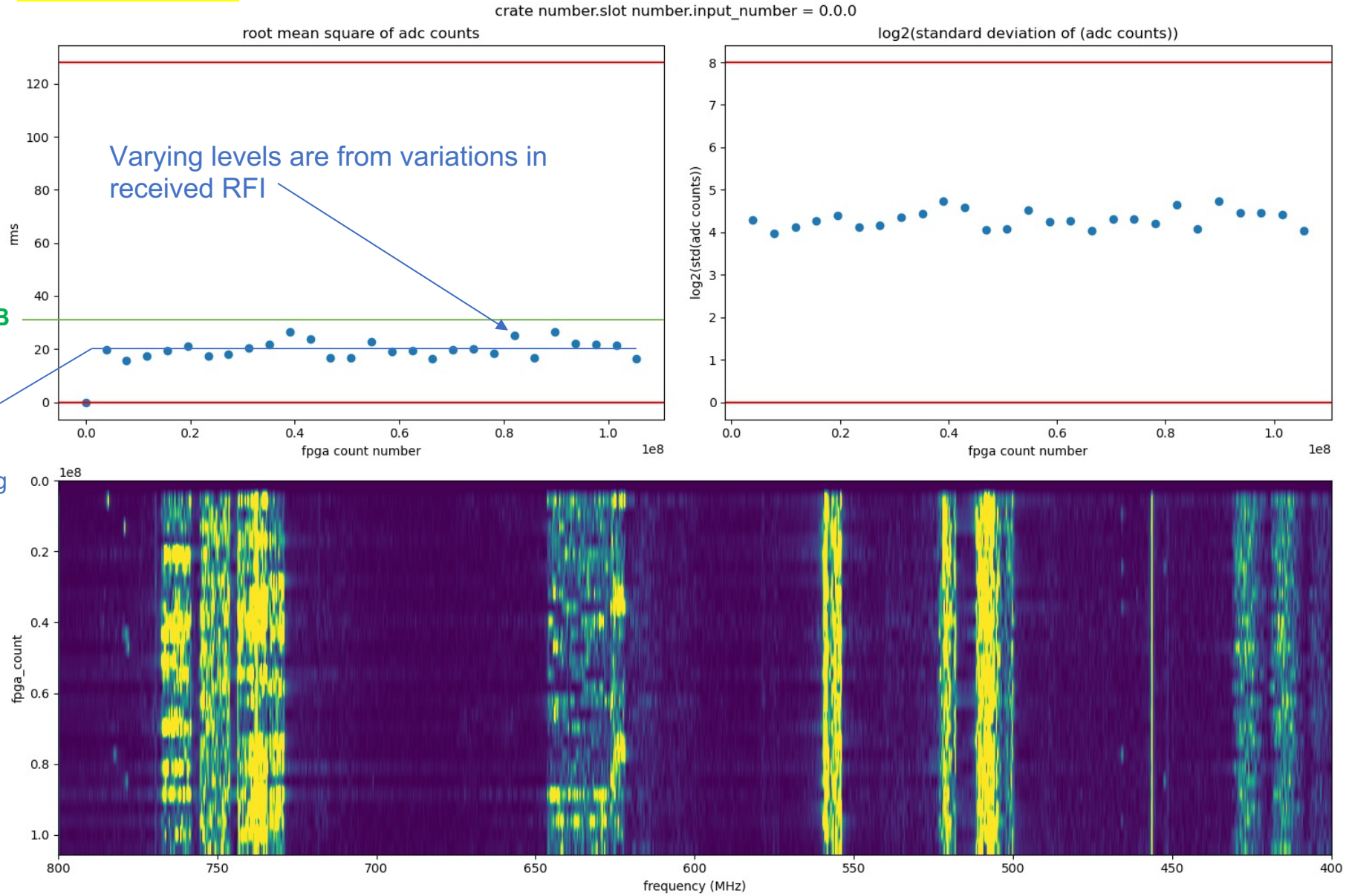
These out-of-band responses appear similar to that shown on page 8 indicating severe saturation

2030-08-18 6m + Cloverleaf Receiver Response at EAO

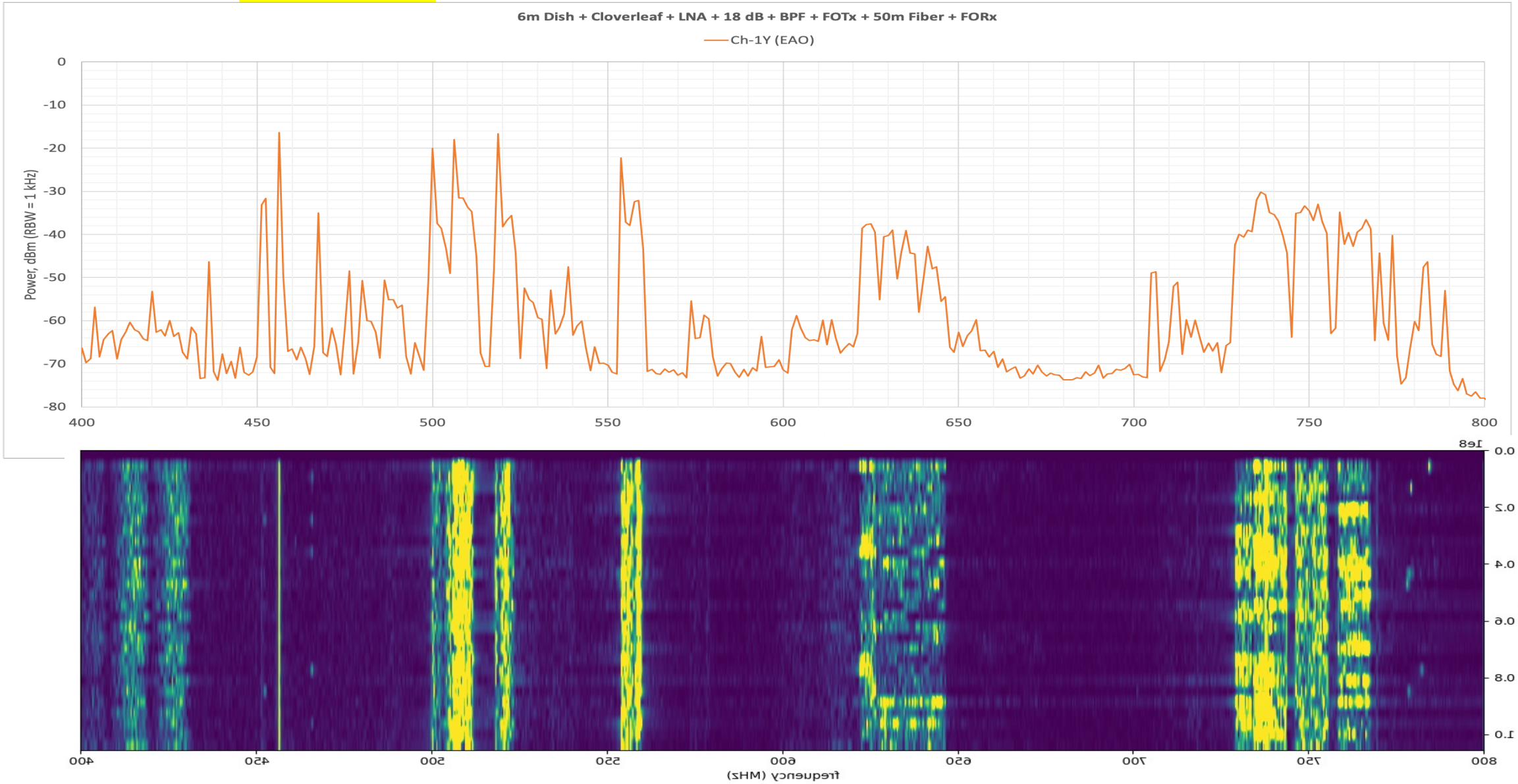
Ideal drive is approx.
12 dB below Vclip
20Log(32/128) = -12 dB

20Log(20/128) = -16.1 dB

We are ~4 dB too low, existing pad at ADC input ~20 dB



2030-08-18 6m + Clover Leaf Receiver Response at EAO



2022-09-06 6m + Clover Leaf Receiver Response at EAO