Cascade Noise Figure

Fn = F1 + (F2-1)/G1 + (F3-1)/G1*G2 …

Fn = Total Noise Factor
F() = Stage Noise Factor
G() = Stage Power Gain

Noise Factor = 10^(noise figure(dB)/10)
Gain = 10^(stage power gain(dB)/10)
Noise figure(dB) = 10*log(Noise Factor)
[Friis equation]

Cascade Noise Figure Calculators

- Everythingrf.com/rf-calculators/cascaded-noise-figure-gain-calculator
- Qorvo.com/design-hub/design-tools/interactive/cascade-calculator
- Leleivre.com/rf_cascade_nf.html
- Microwaves101.com/calculators/859-cascade-calculator

Current Preamp Example

- 2 stage 365 MHz Plishner preamp
- Stage 1 0.4dB nf; 22 dB gain
- Band Pass filter -2dB loss
- Stage 2 1.0dB nf; 20dB gain
- Line loss -4dB [200 feet of coax]
- Receiver 5dB nf
- Result Overall nf = .41dB [~29K]

Six Metre Example

- ARR preamp 0.5dB nf; 24dB gain [P50VDG]
- Attenuator none; -10dB; -15dB; -20dB; -24dB
- SDR 3.5dB nf
- Results: none nf = .52dB
- -10dB nf = .69dB
- -15dB nf = 1.1dB
- -20dB nf = 2.1dB
- -24dB nf = 3.7dB

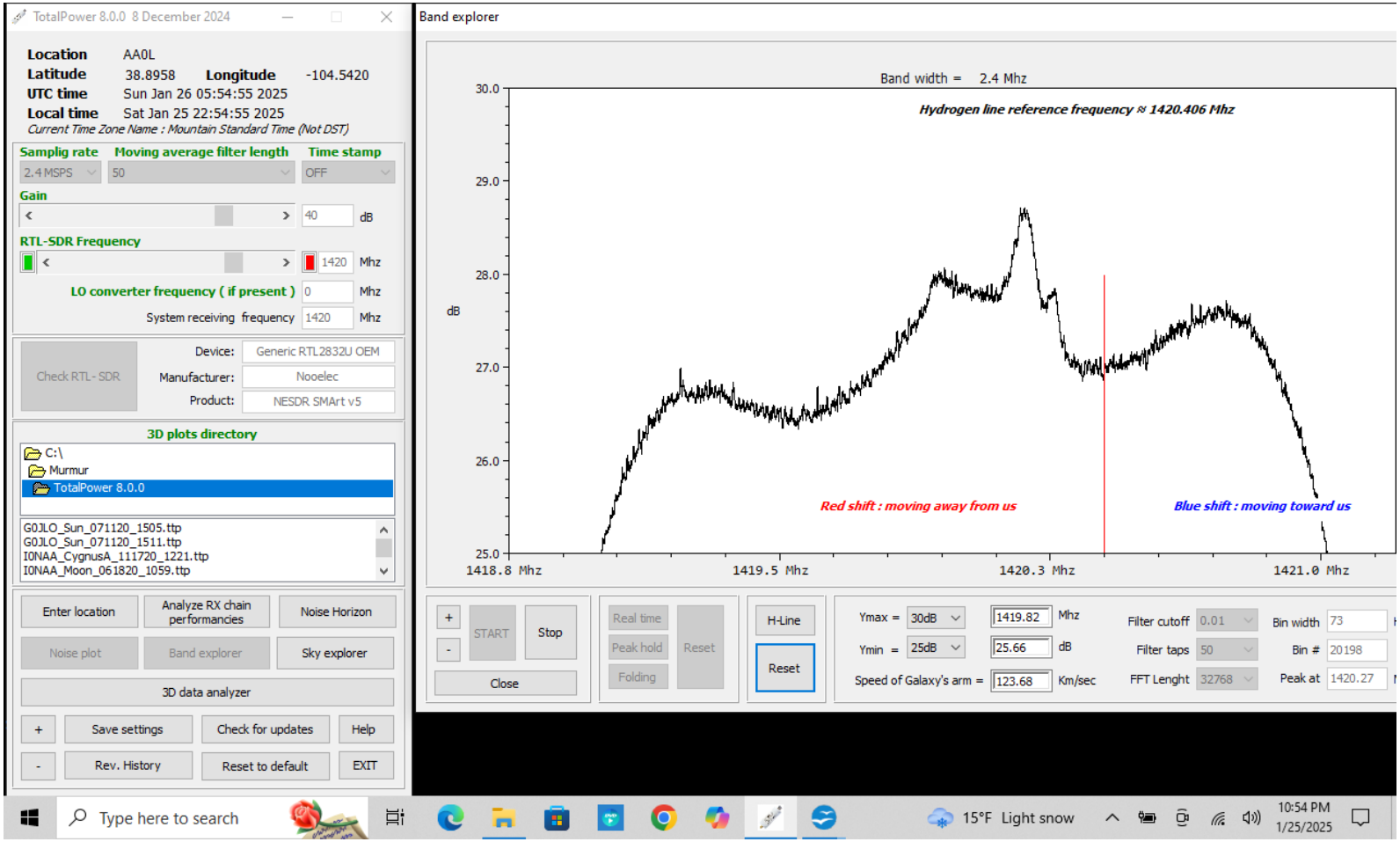
Stuff to Remember

- The first stage has no filtering on the input so any/all signals present might cause overdriving resulting in intermodulation issues.
- The second stage can be overdriven if it is not filtered first by the interstage filter.
- Any transmitter at the site can overload the preamp even with interstage filtering.

continued

- In this case a potential transmitter is any source putting out a milliwatt (or less) power.
- Any signal that causes a stage to overdrive causes ALL signals to mix producing many spurs.

H1 Line Looking Out Thru Galaxy



Sun Noise - 3.8M AA0L Dish