LimeSuite and LimeSDR

Danny Webster

Table of Contents

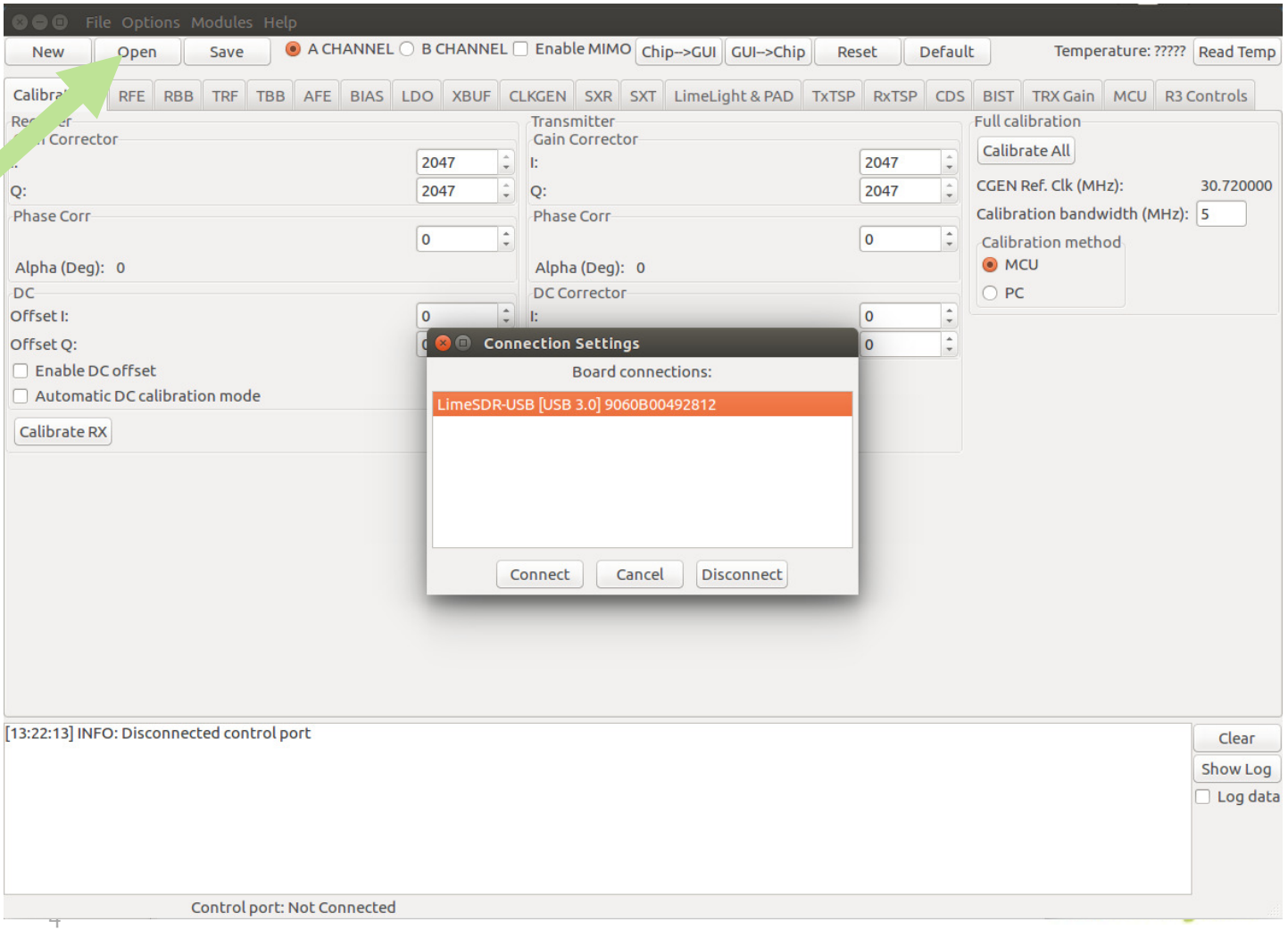
1. Introduction
2. Operating LimeSuite software
3. Examples FSK/ASK/PSK
4. Calibration
5. Changing gain, frequency and sample rate
6. Other settings

Differences between Linux and Windows

- **Linux (Built from Source)**
  - Copy lms7suite_wfm to
  - ~/LimeSuite/builddir/bin
- **Linux (Repository)**
  - Copy lms7suite_wfm to
  - ~/
- **Windows**
  - Copy lms7suite_wfm to
  - \Documents or \Desktop

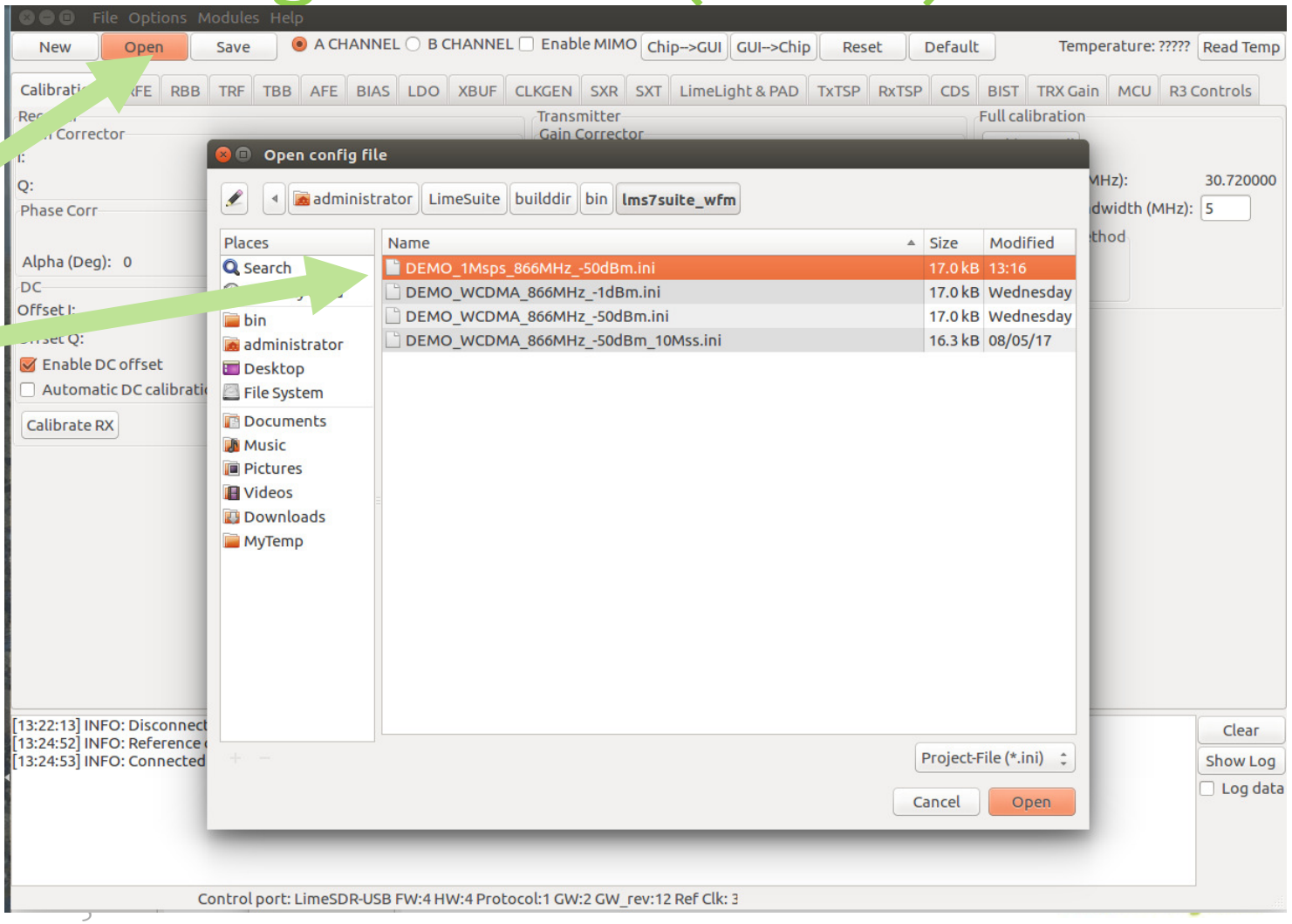
Connecting to LimeSDR

- **Connect LimeSDR to USB3**
- **Start LimeSuite software**
- **To select LimeSDR**
- **Top Menubar**
  - Options → Connect
- **RESET**



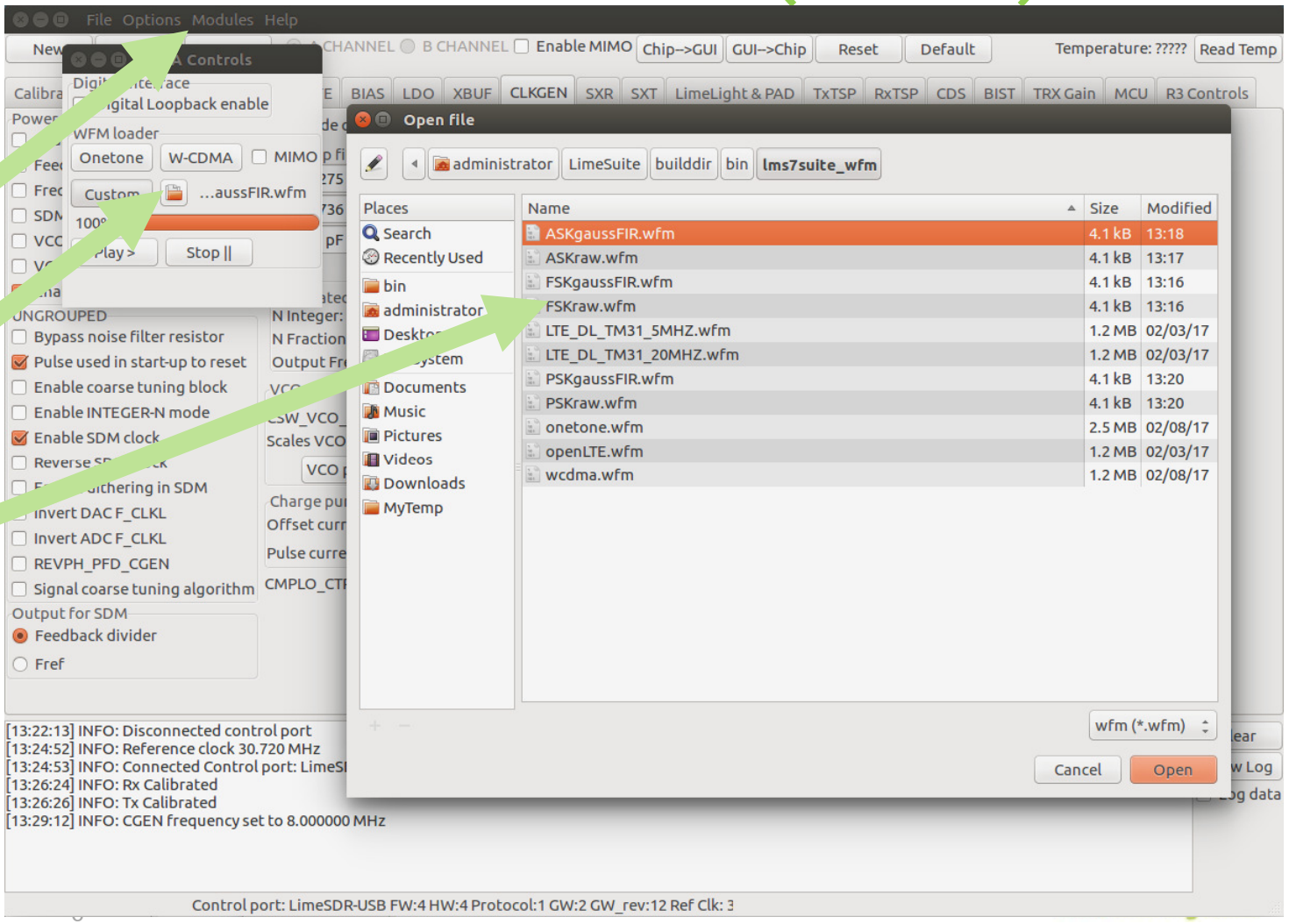
Loading a settings file (.ini)

- **To select LimeSDR settings**
- **Open Button**
- **Select**
  - DEMO_1Msps_866Mhz _-50dBm .ini



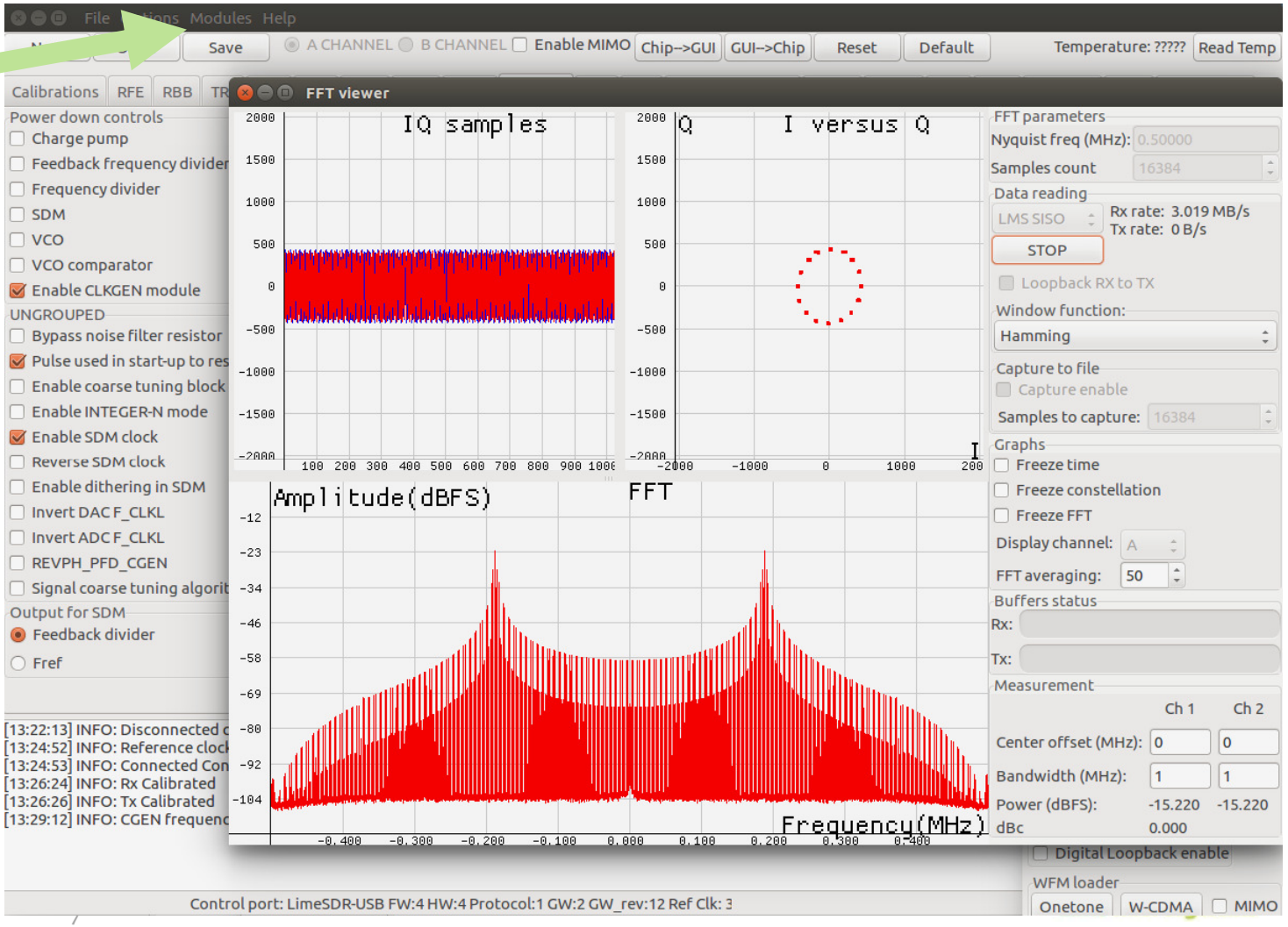
Selecting a Waveform file (.wfm)

- **To select waveform to play back on LimeSDR**
- **Modules (Top Menubar)**
  - FPGA Control
  - Custom Open File
    - (Middle)
  - Custom Button (Left)
  - FSKraw.wfm



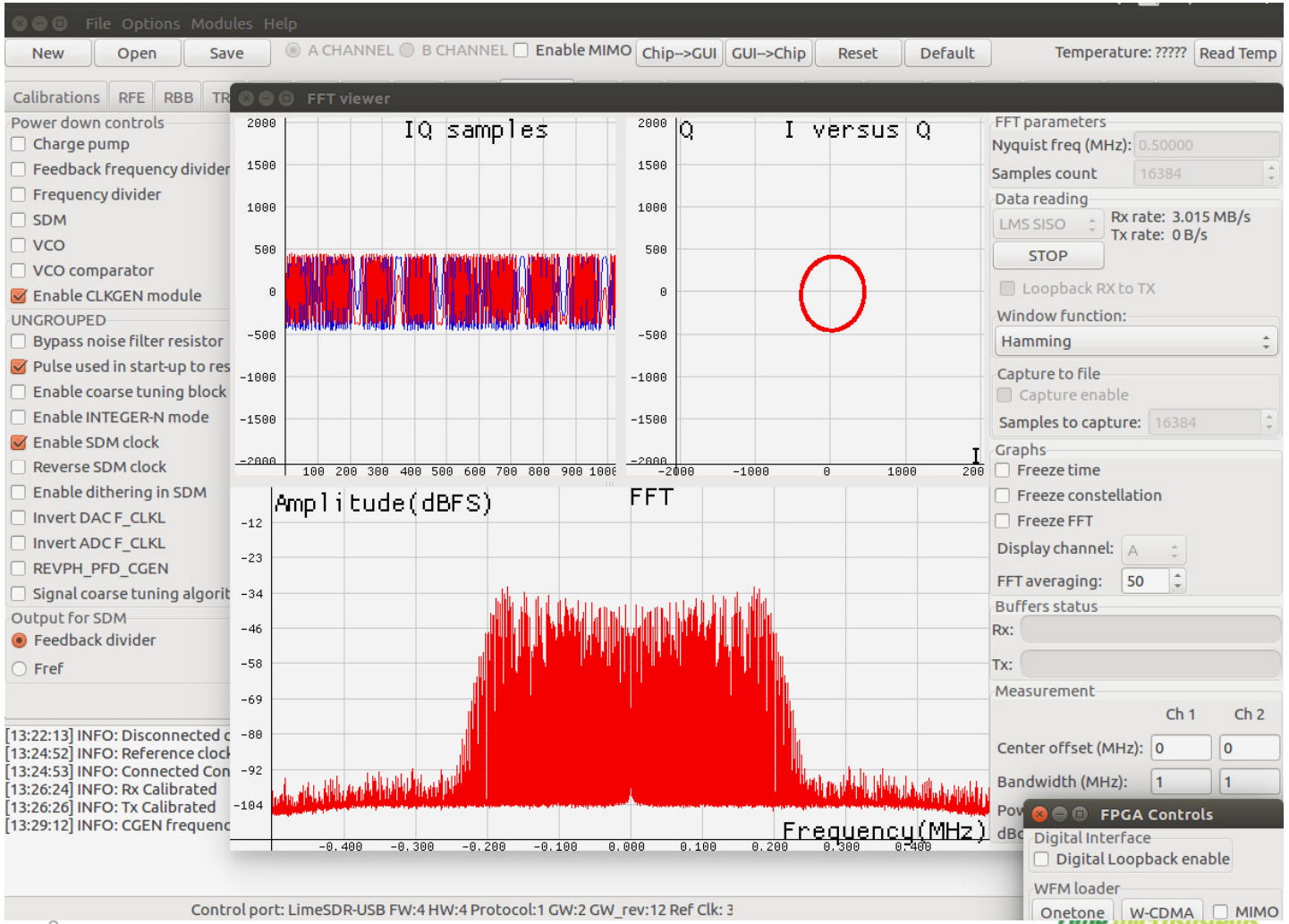
FSK Demo

- **Modules**
  - FFT Viewer
  - Hamming or Hanning windows
- **FSKraw.wfm**



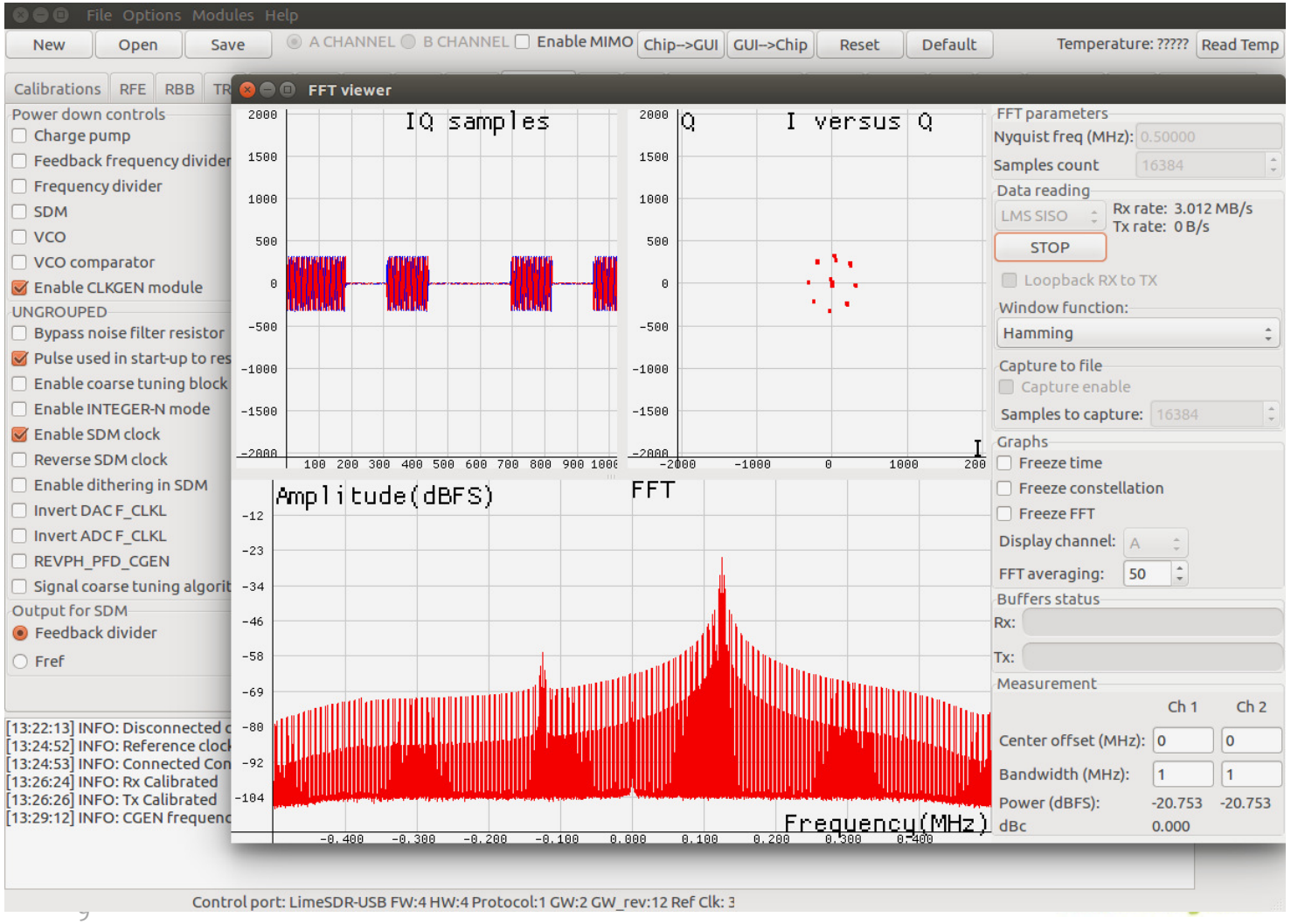
Filtered FSK Demo

- **FSKgaussFIR.wfm**
- **Less interference to adjacent channels.**
- **FFT Viewer helps you to find optimum radio settings for your signal.**
  - Phase Noise
  - Adjacent Channel Interference
  - Avoid Rx overload.



ASK Demo

- **ASKraw.wfm**

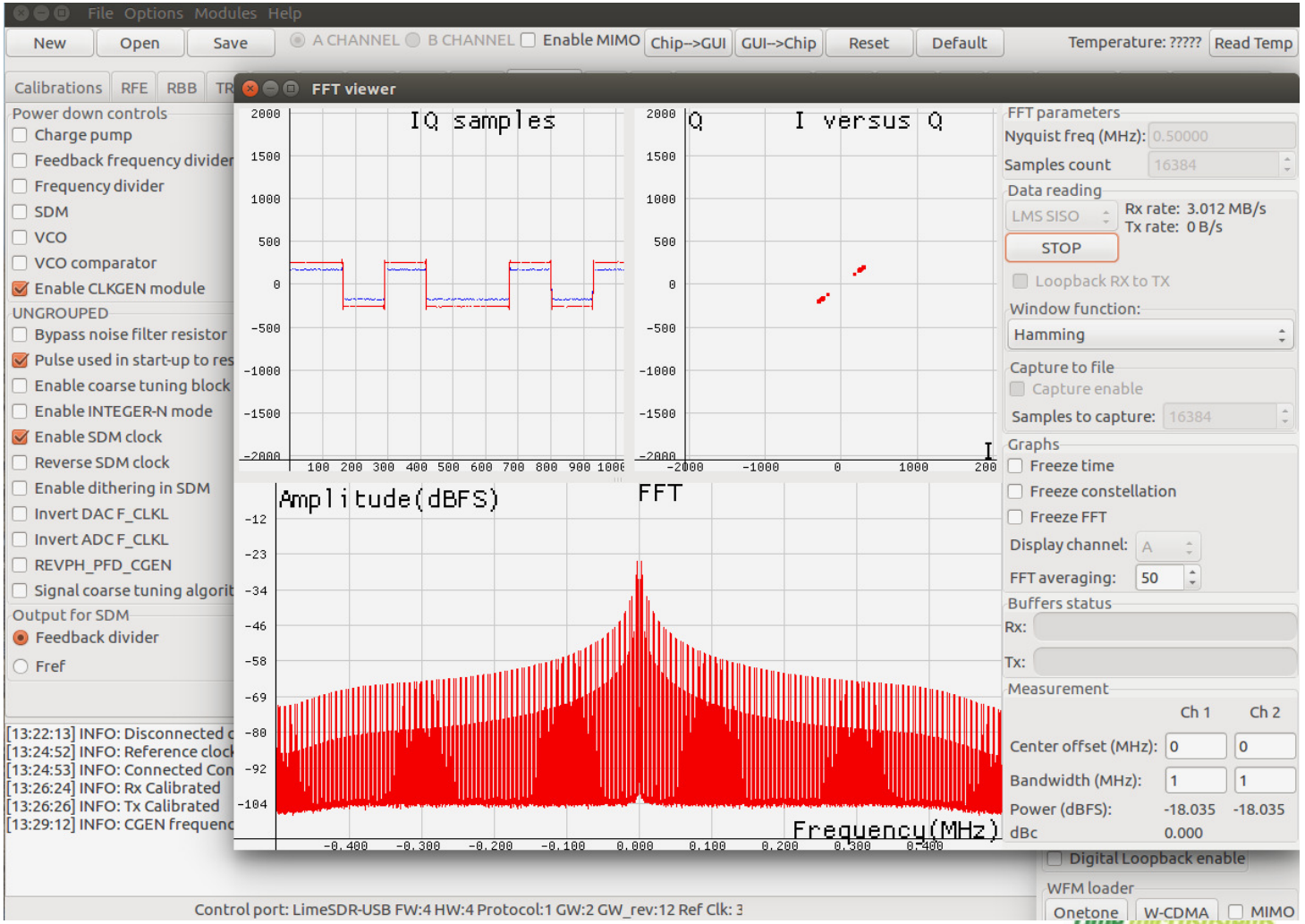


Filtered ASK Demo

- **ASKgaussFIR.wfm**
- **Less interference to adjacent channels.**

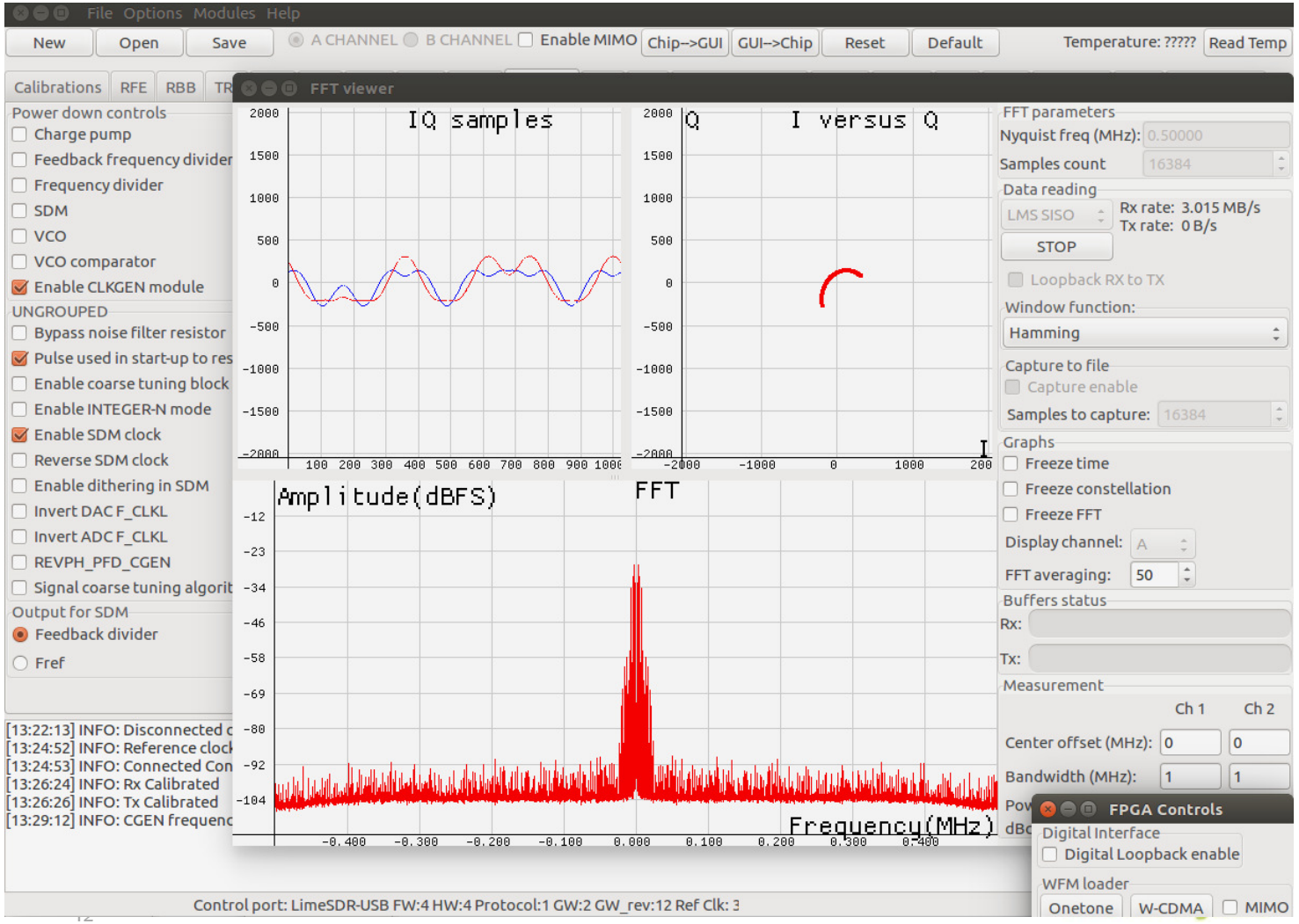
PSK Demo

- **PSKraw.wfm**



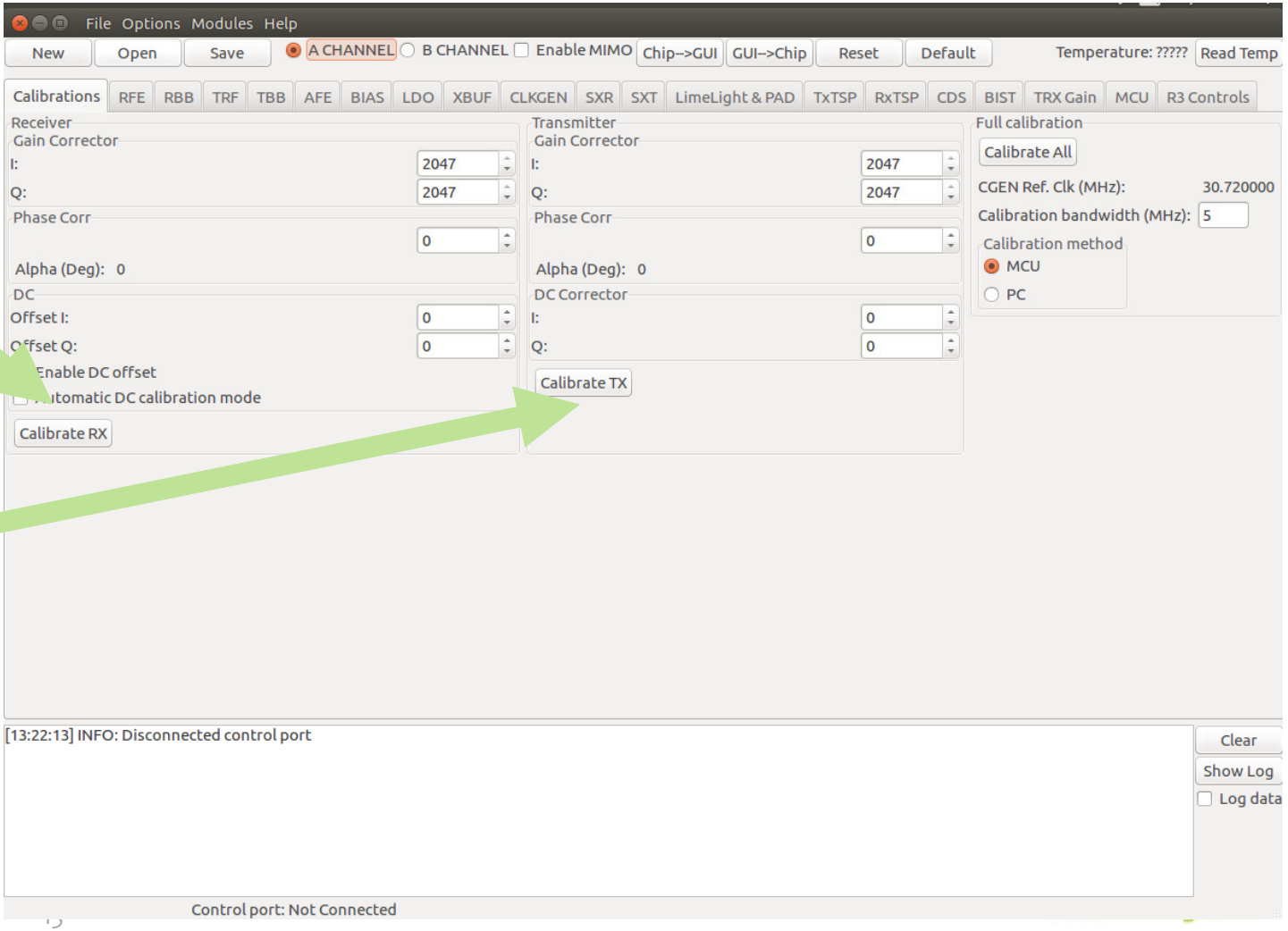
Filtered PSK Demo

- **PSKgaussFIR.wfm**
- **Less interference to adjacent channels.**

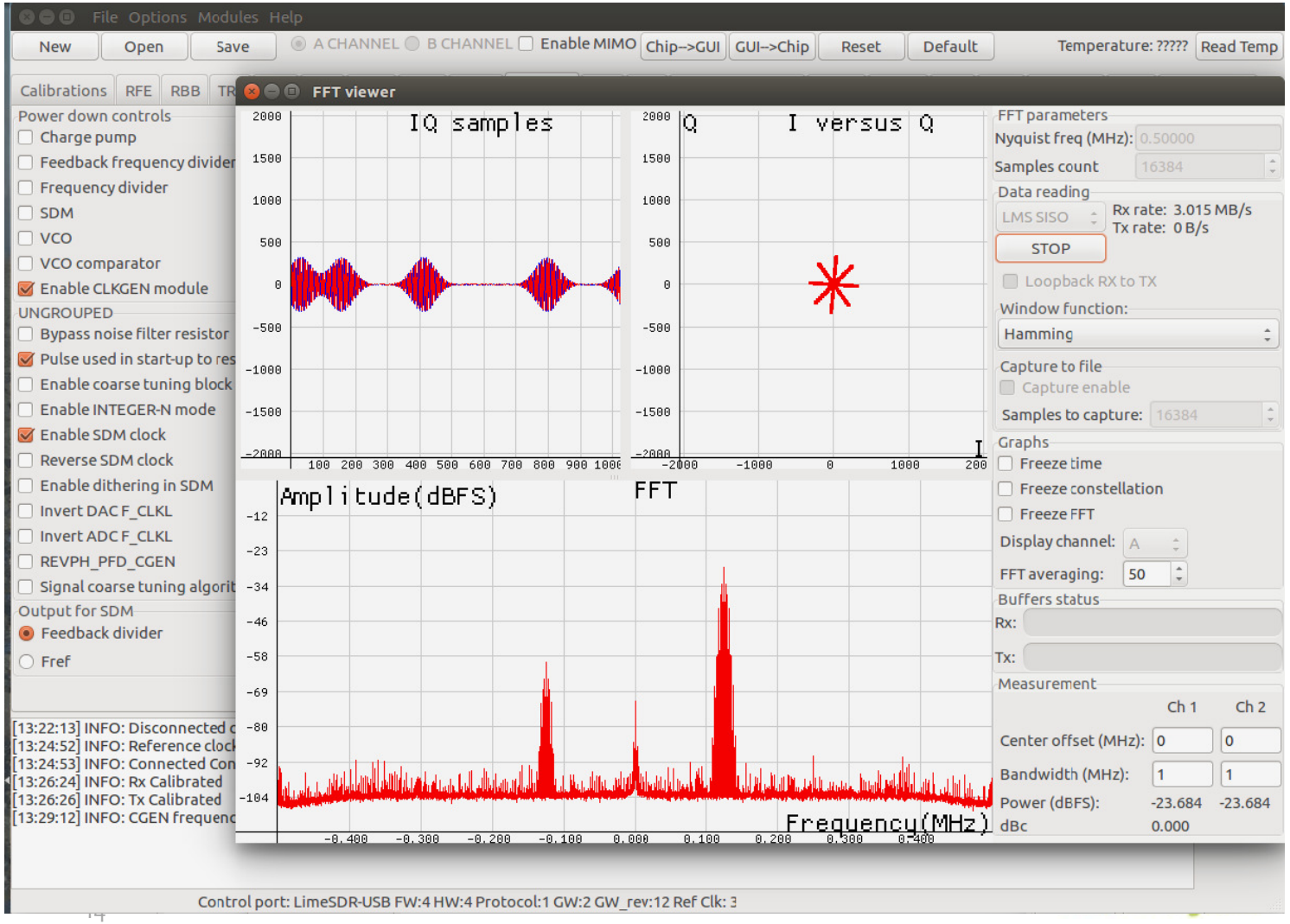


Automatic Calibration

- **Callibrate RX**
- **Callibrate TX**

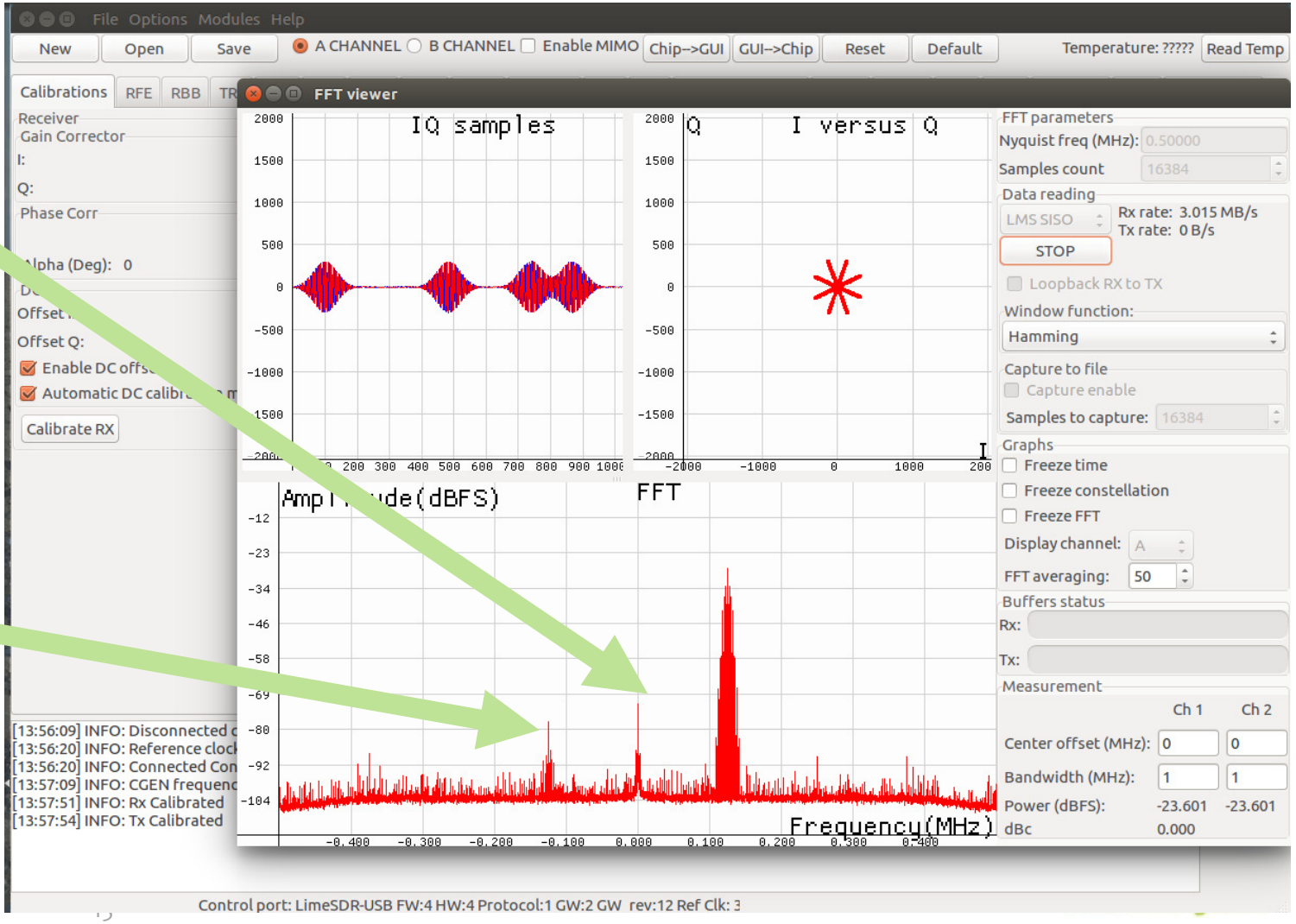


Before Calibration



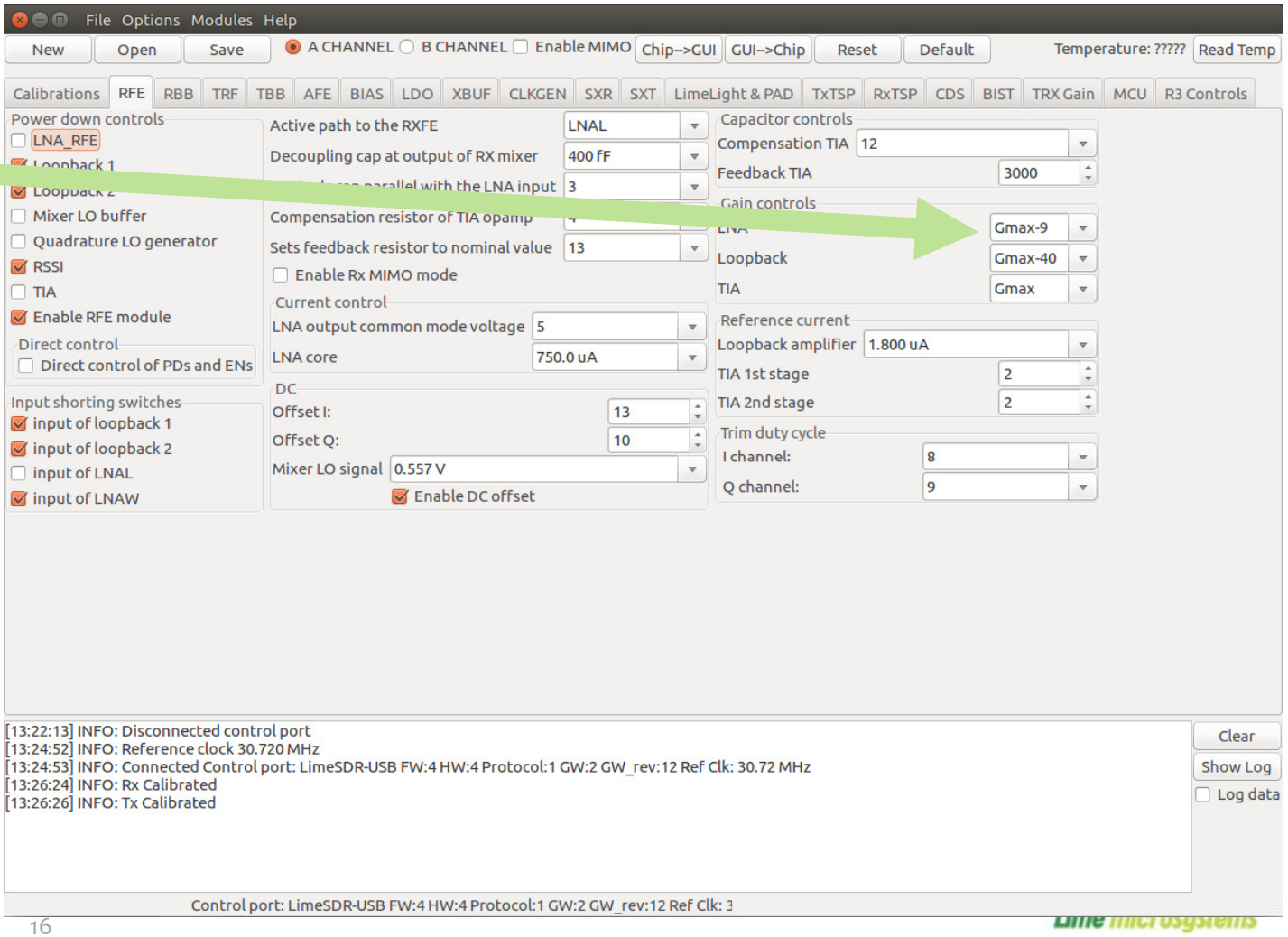
After Calibration

- **DC Leakage redued in RX**
- **Unwanted sideband rejection improved**



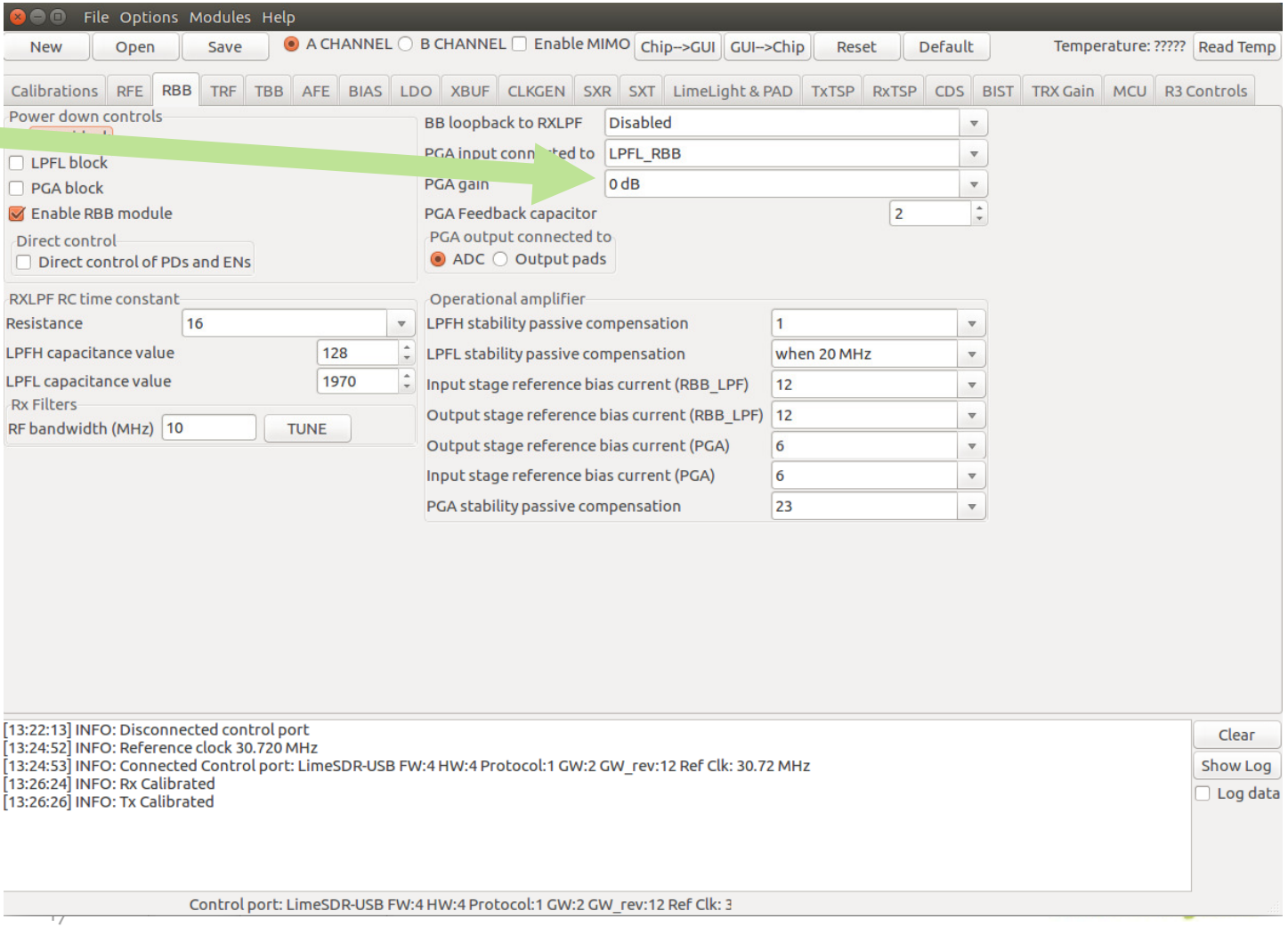
Changing RF gain (Rx RF)

- **Change LNA gain to improve signal to noise.**
- **Too much gain can sometimes overload receiver or make it vulnerable to interference.**



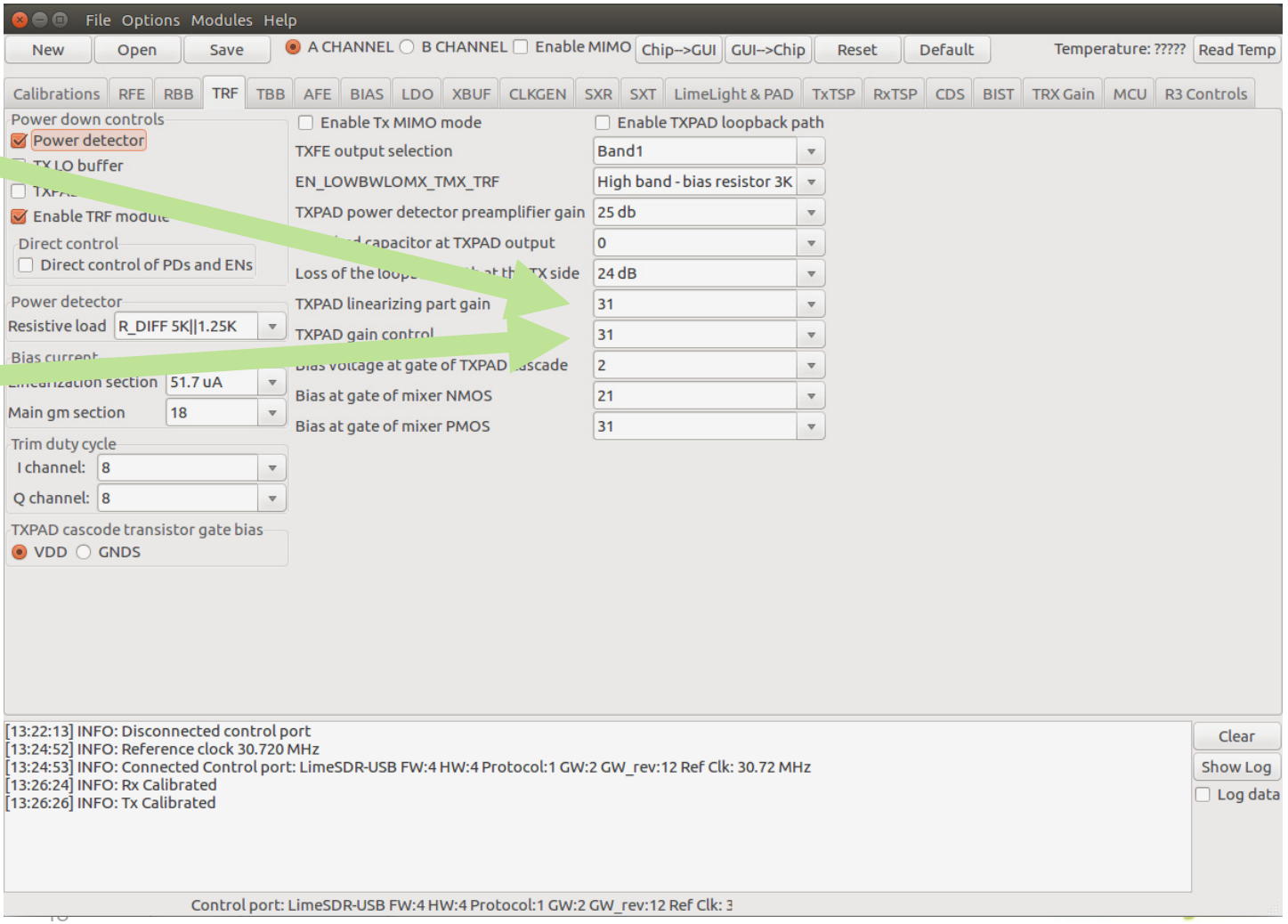
Changing analogue gain (Rx IF)

- **Change PGA gain to optimise level at ADC.**
- **Too much gain can overload receiver.**
- **Too little gain can give poor signal to noise ratio.**



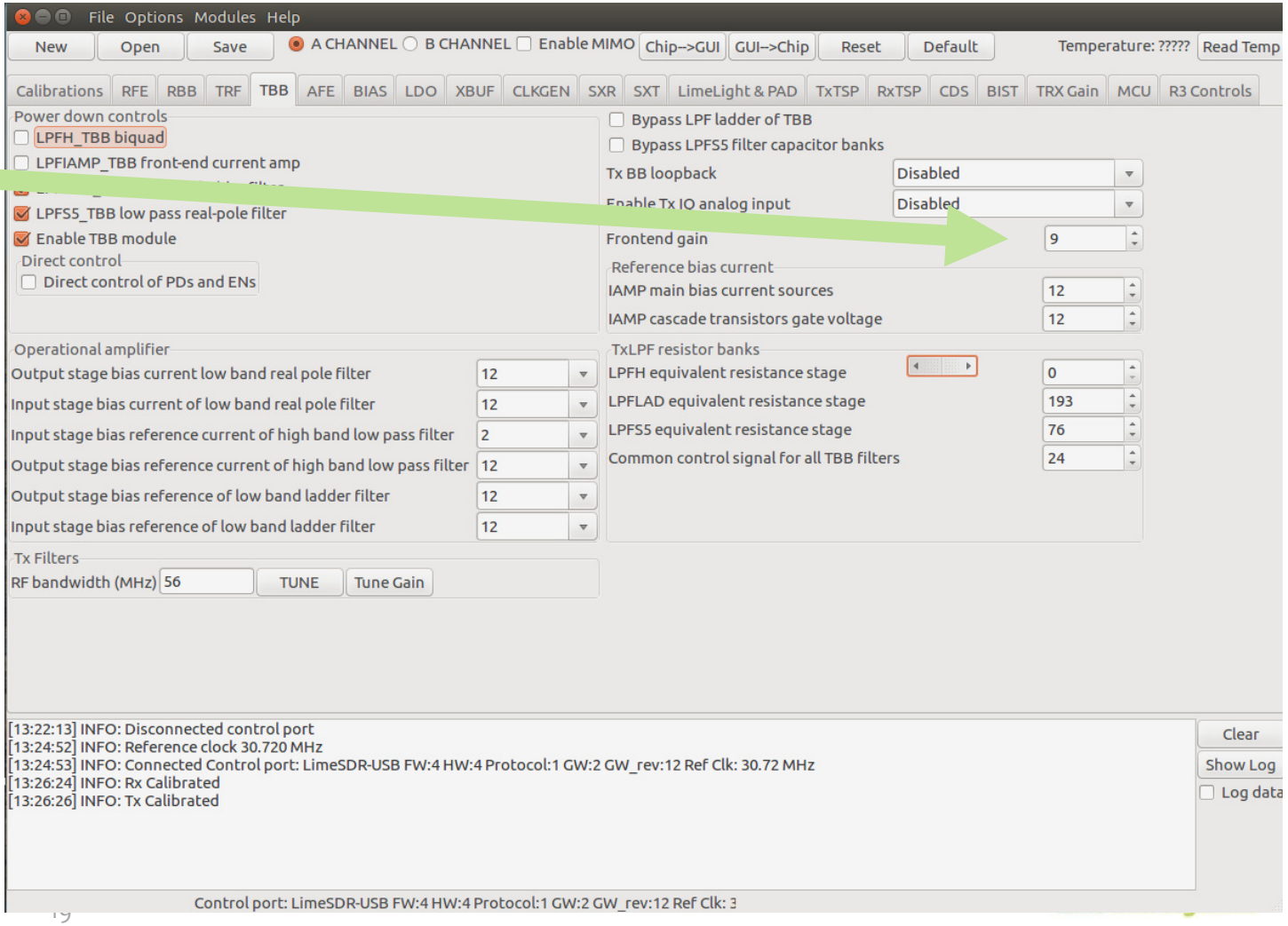
Changing RF gain (Tx RF)

- **Change TX gain to change output signal level.**
- **Change both TXPAD gain controls to same value.**



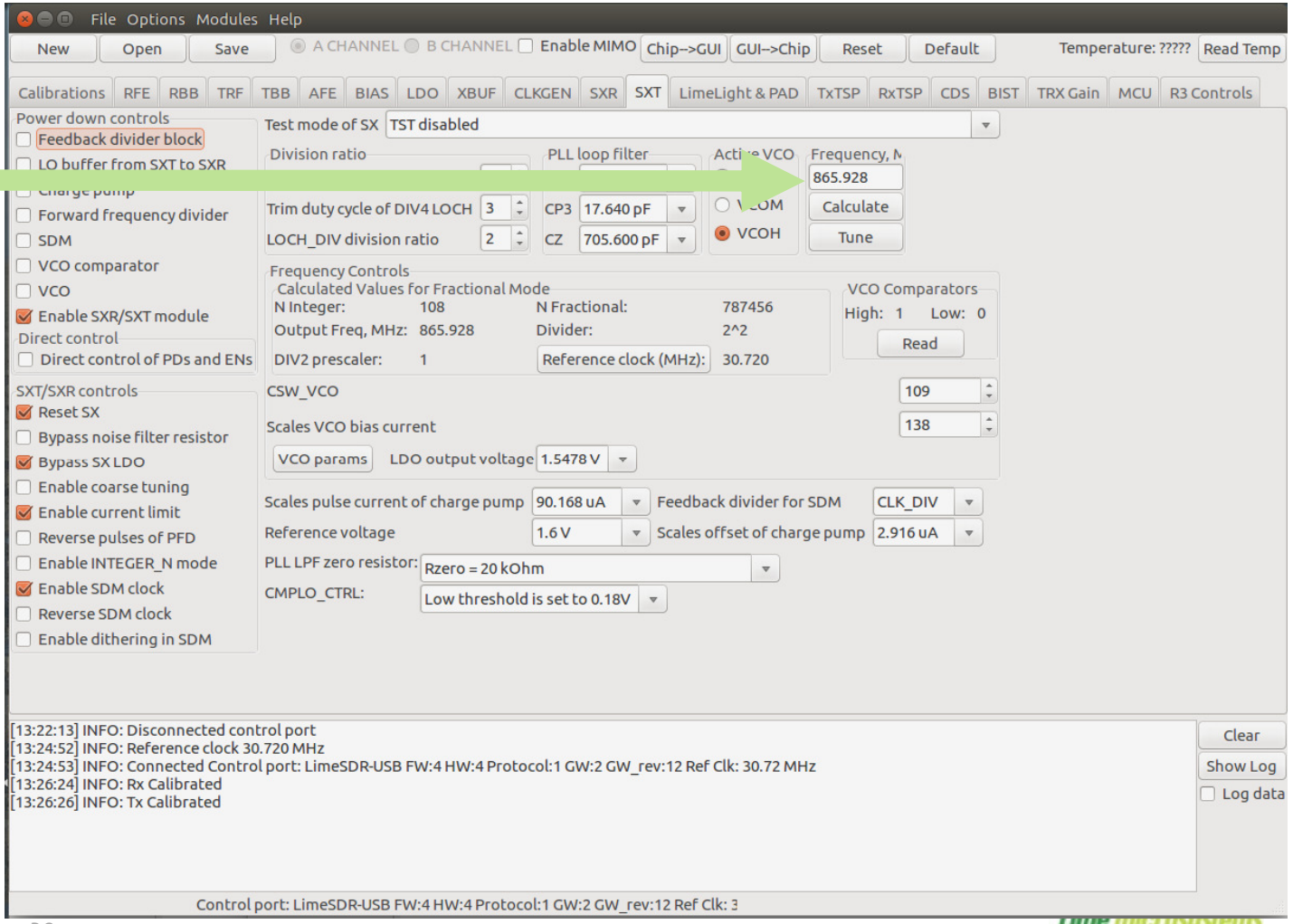
Changing analogue gain (Tx IF)

- **Change TX IF gain to change to minimise adjacent channel interference.**
- **(Needed after filter bandwidth changed)**
- **(Recalibration needed after filter and gain change)**



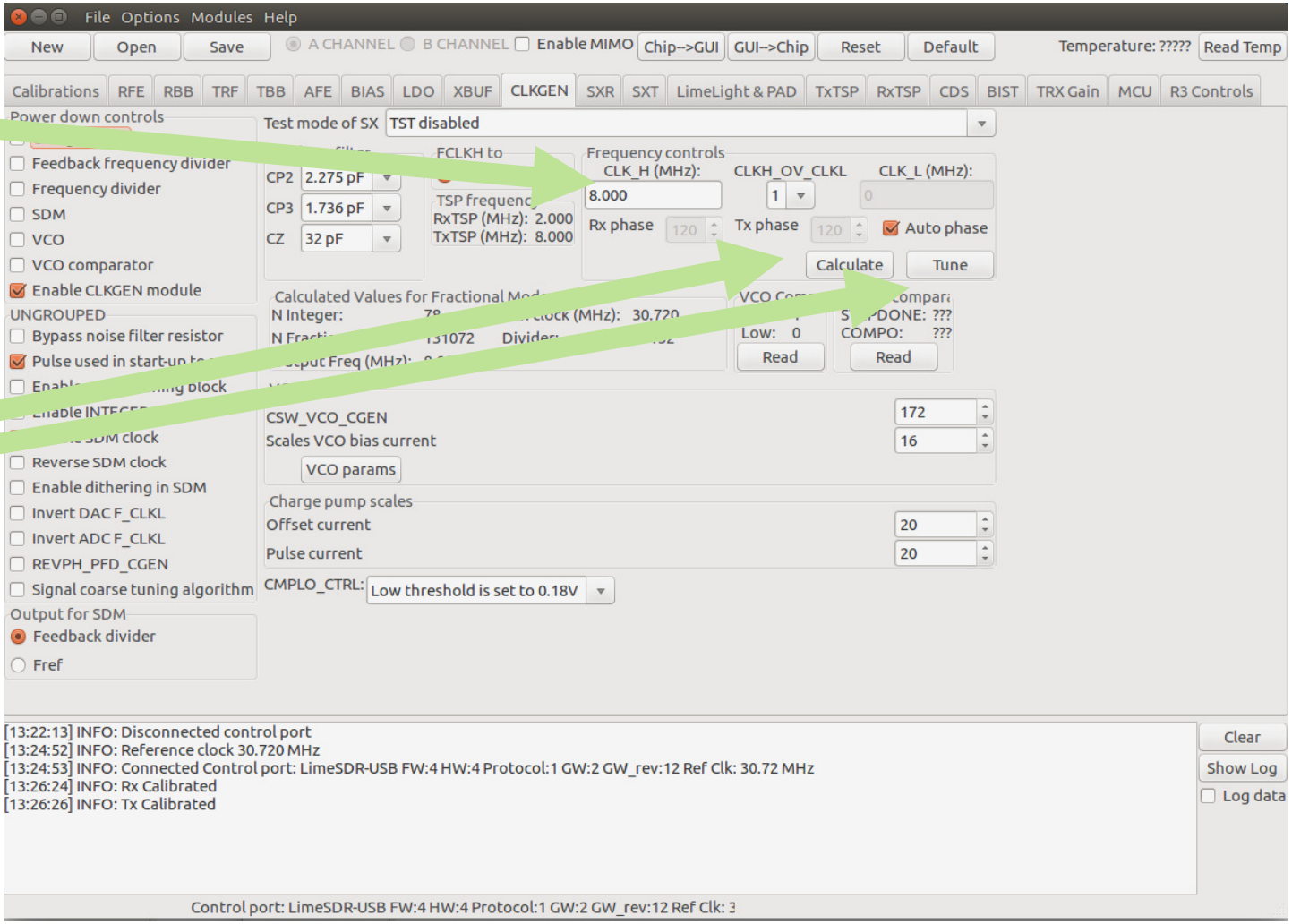
Changing RF frequency (SXT and SXR)

- **Change Tx and Rx frequency using SXT and SXR.**
- **Redo calibrations if above 1GHz.**
- **Advanced settings can be used to optimise phase noise.**



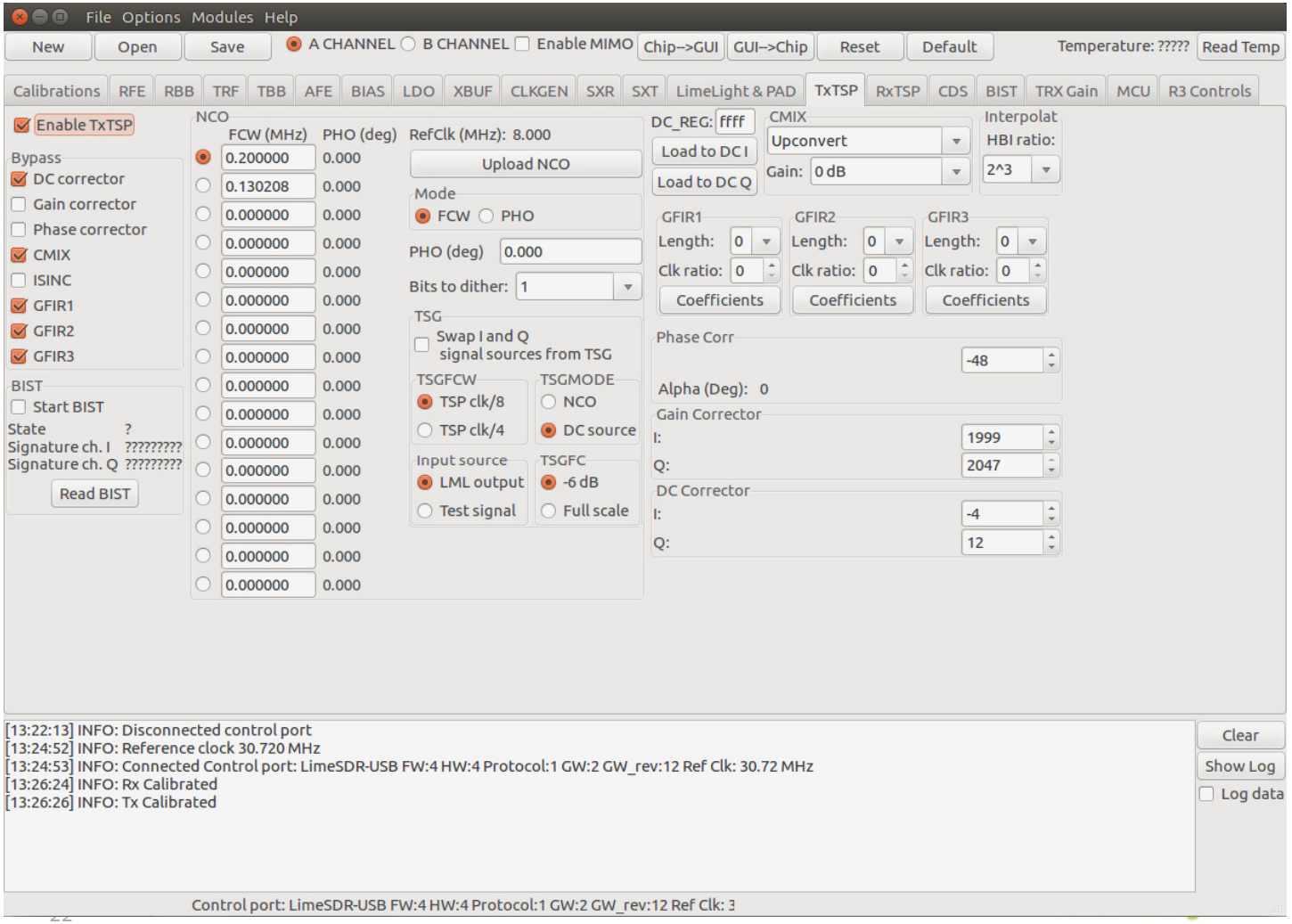
Changing sample rate (CLKGEN)

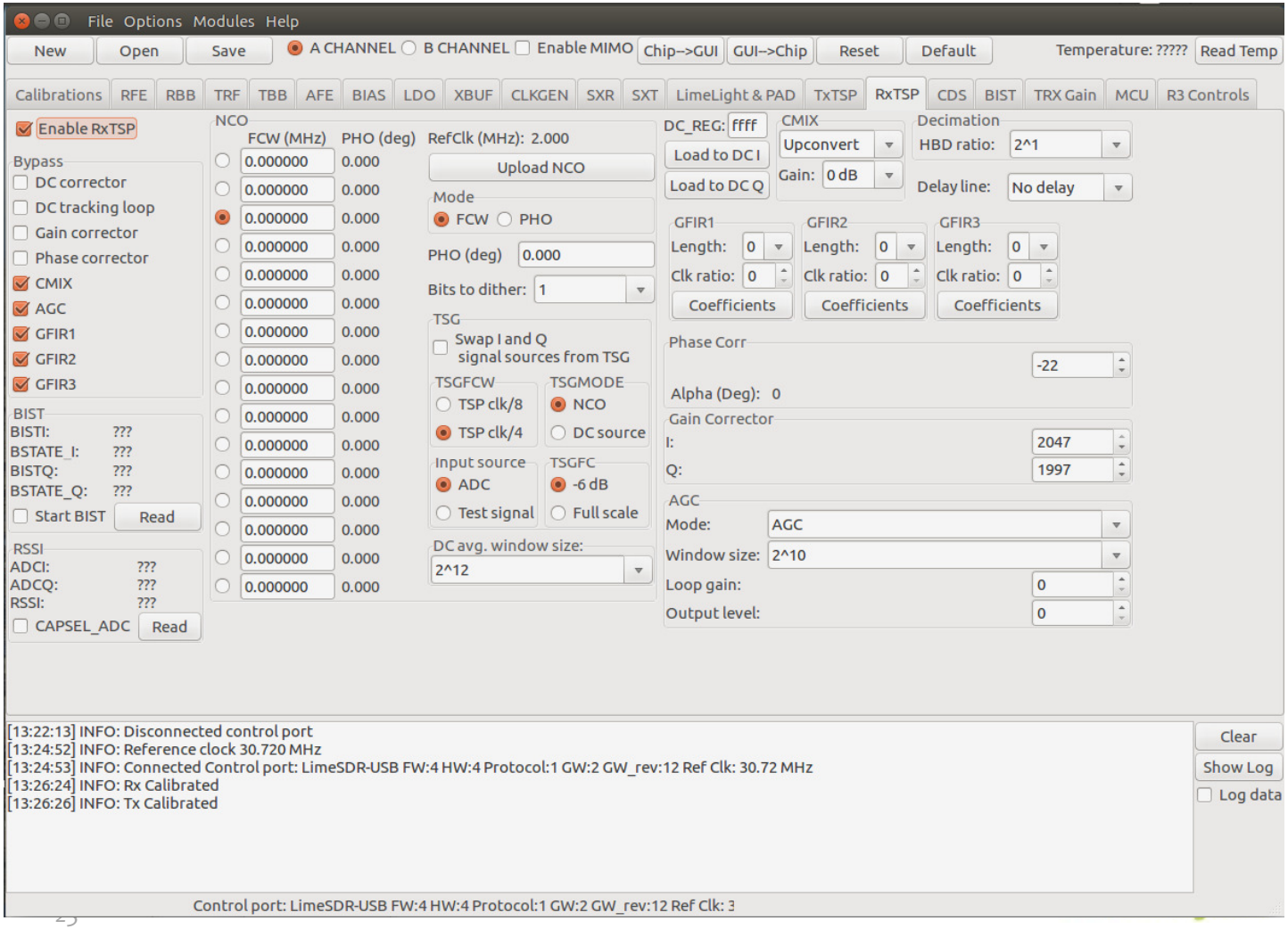
- **Change CLKGEN Frequency**
- **ADC rate=CLKGEN/4**
- **DAC rate=CLKGEN/1,2,4**
- **Calculate**
- **Tune**



Changing signal processing (TSP)

- **Change signal processing option**
  - DC Corrector
  - Gain/Phase Corrector
  - Inverse Sinc
  - NCO Frequency/Phase
    - (Enable CMIX)
  - Interpolation Ratio
  - FIR Filters



Changing signal processing (RSP)

- **Change signal processing option**
  - Gain/Phase Corrector
  - Auto DC Corrector
  - NCO Frequency/Phase
    - (Enable CMIX)
  - AGC
  - Decimation Ratio
  - FIR Filters