

Codebase for Automated Software-Defined Radio Calibration



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SPECTRUM

BACKGROUND

Accurate calibration is required for all spectrum sensing applications and becomes increasingly difficult as the scale of the system increases. Automated calibration enables a consistent and scalable calibration process.

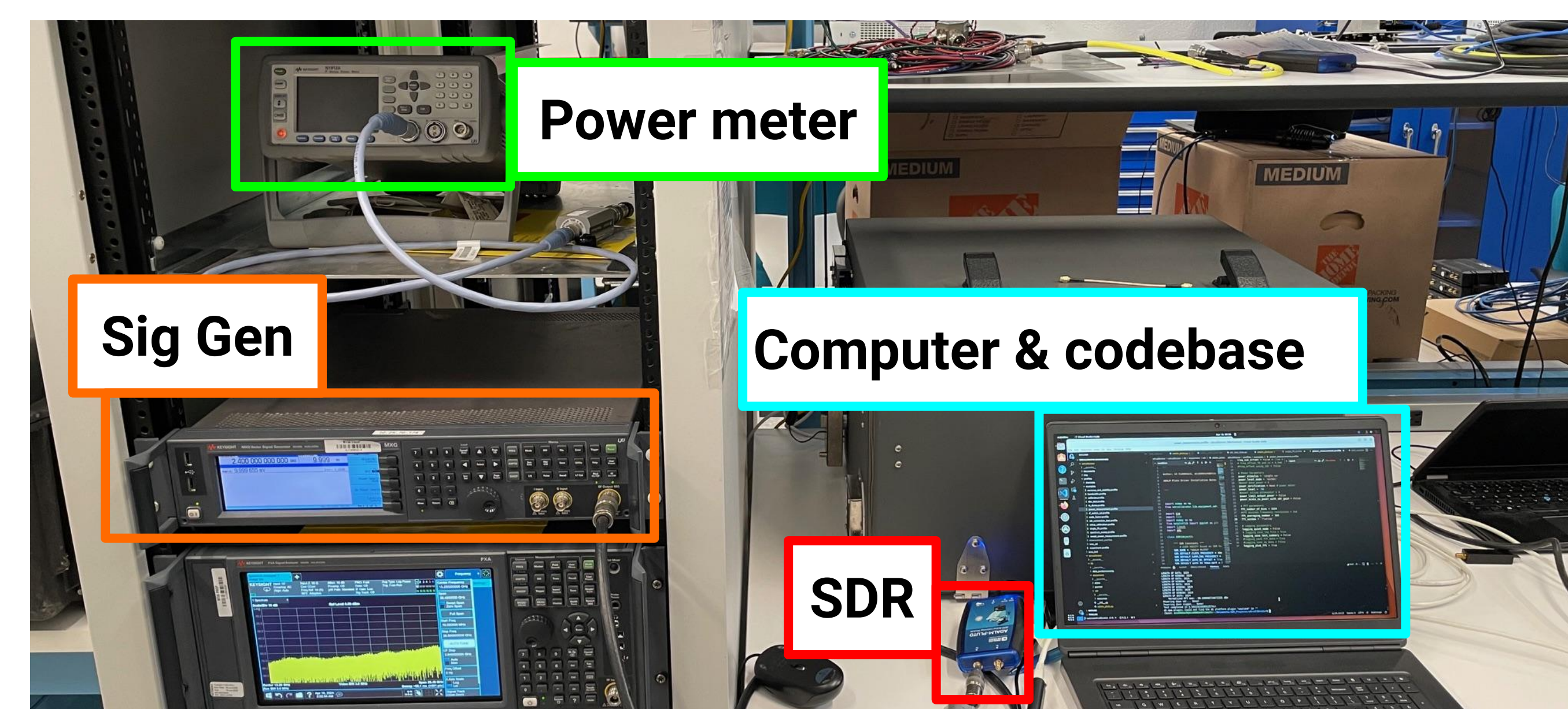
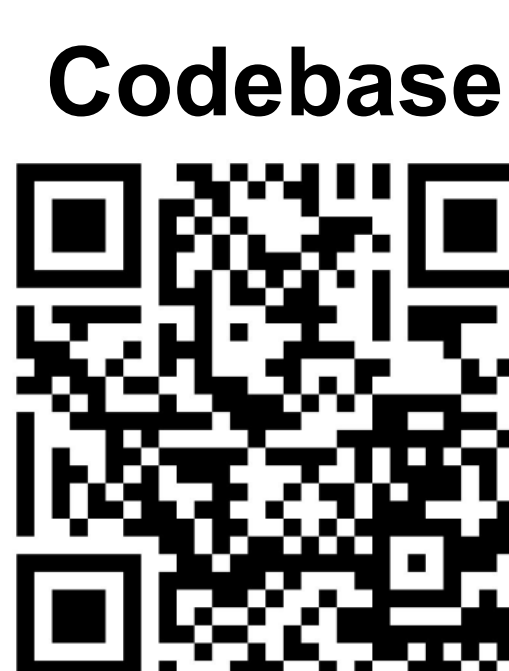
OBJECTIVE

Demonstrate use of an open-source calibration codebase, originally developed at NTIA [1], which could be automated to measure key parameters for SDRs.



REQUIRED EQUIPMENT

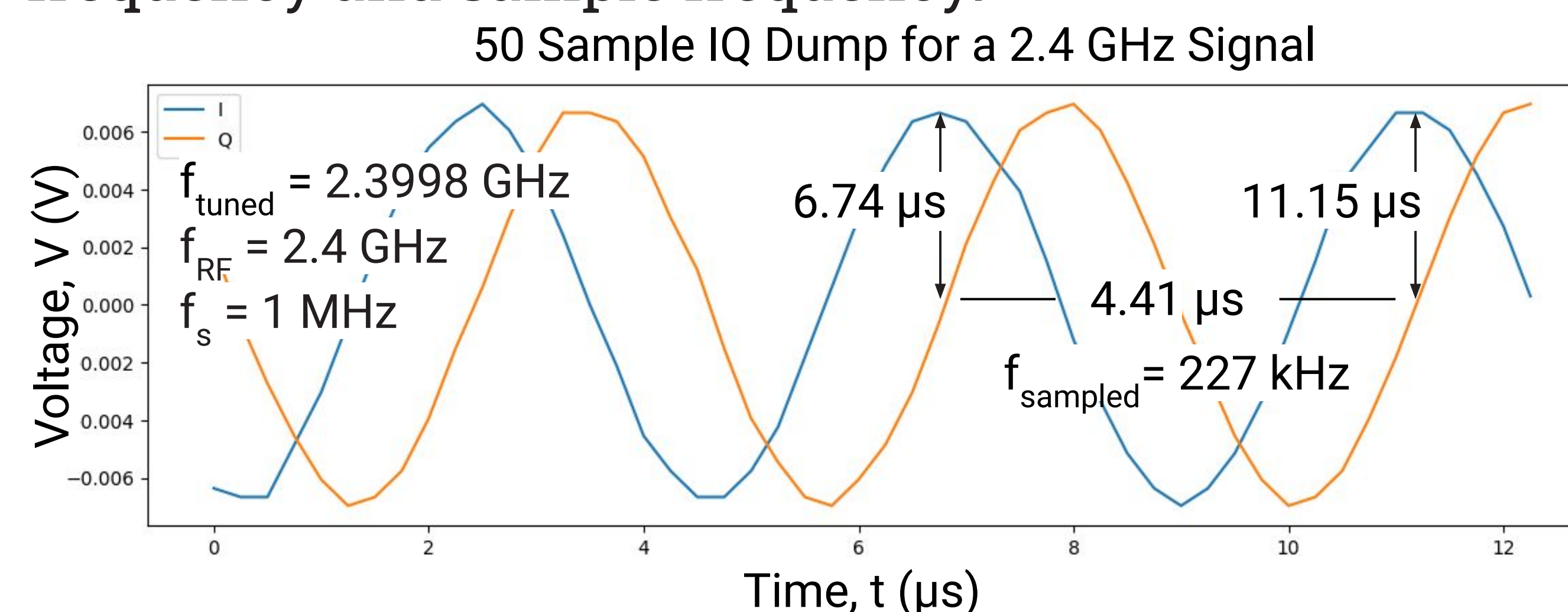
The equipment required to make use of the codebase to characterize an SDR consists of a power meter, signal generator, and computer to run the code. The full codebase is hosted on GitHub →



This work was done using a Keysight N5182b [2] signal generator, Keysight N1219a [3] power meter, and ADALM-Pluto [4] SDR.

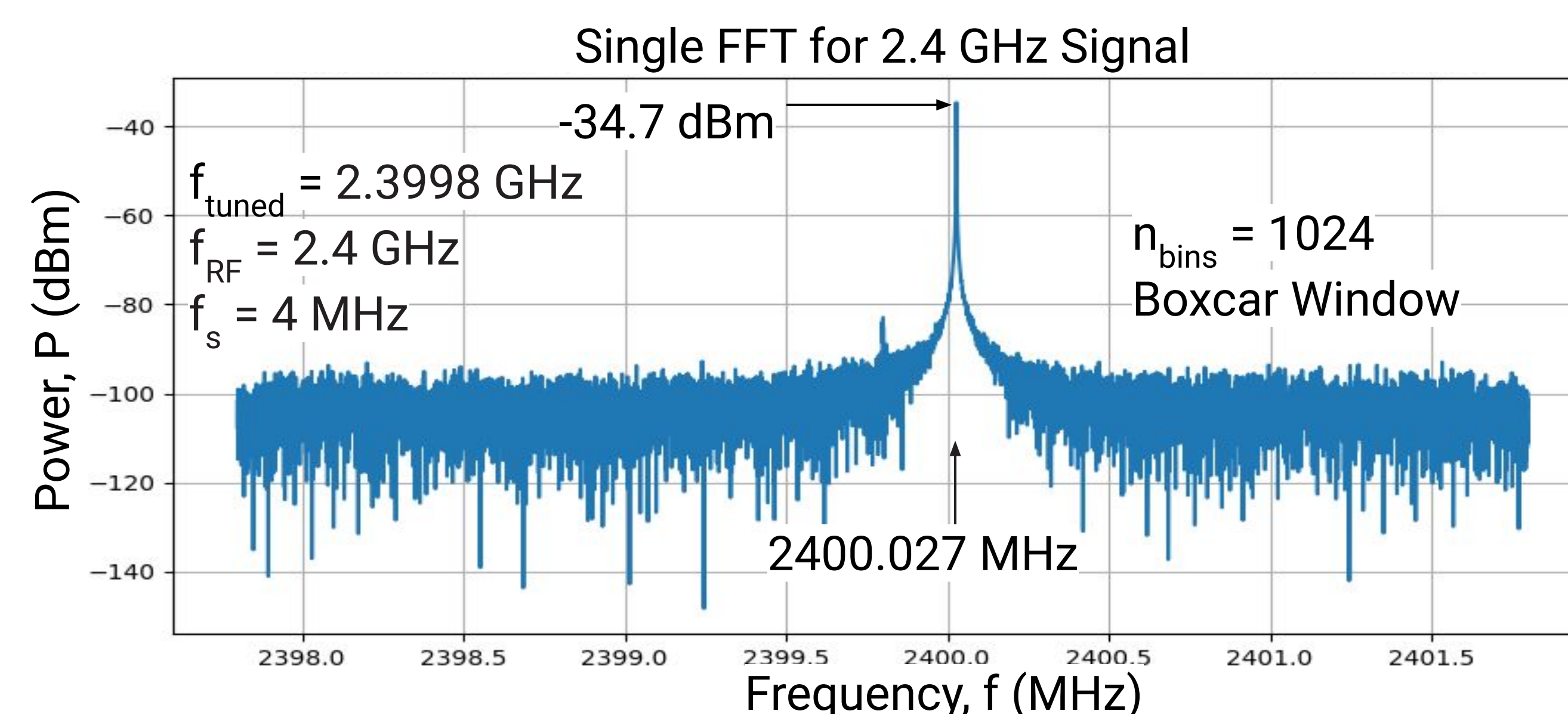
IQ DUMP ROUTINE

IQ dump is the core functionality of SDR calibrator on which every other routine is based. The routine samples IQ data from the SDR at a specified tuned frequency and sample frequency.

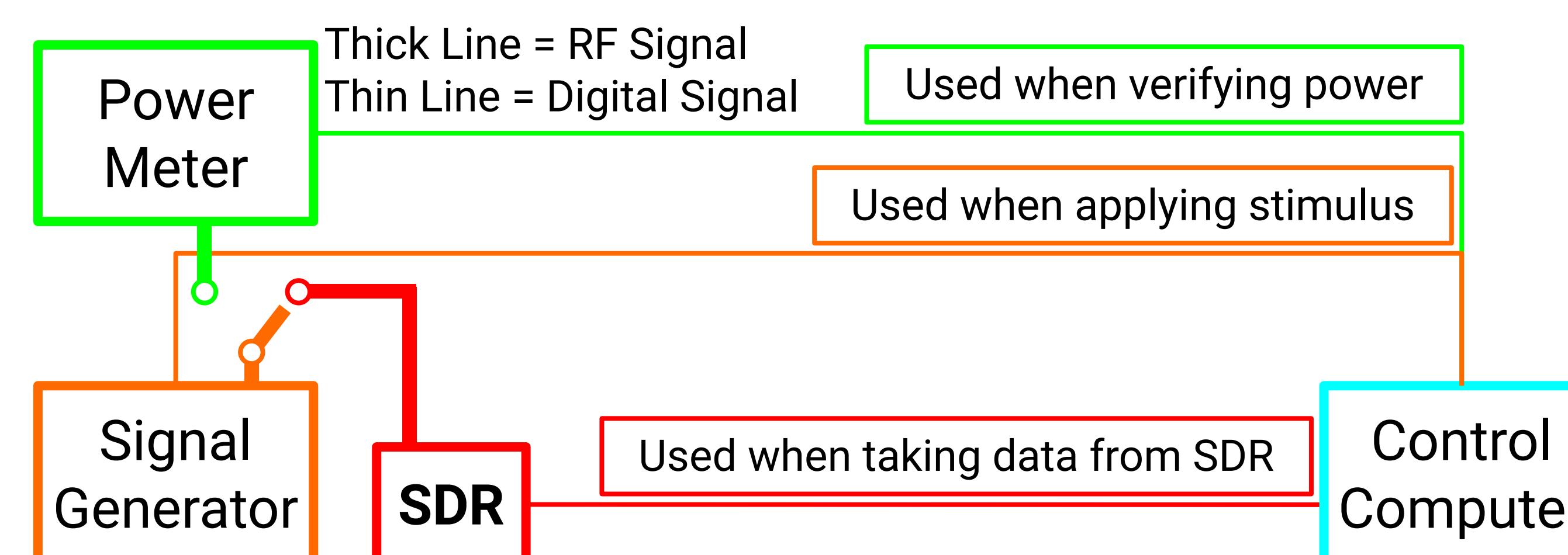


SINGLE FFT ROUTINE

Single FFT forms the basis for routines such as the power measurement test and spectrum sweep. It calculates an estimated power spectral density using Bartlett's method with a boxcar or flattop window.

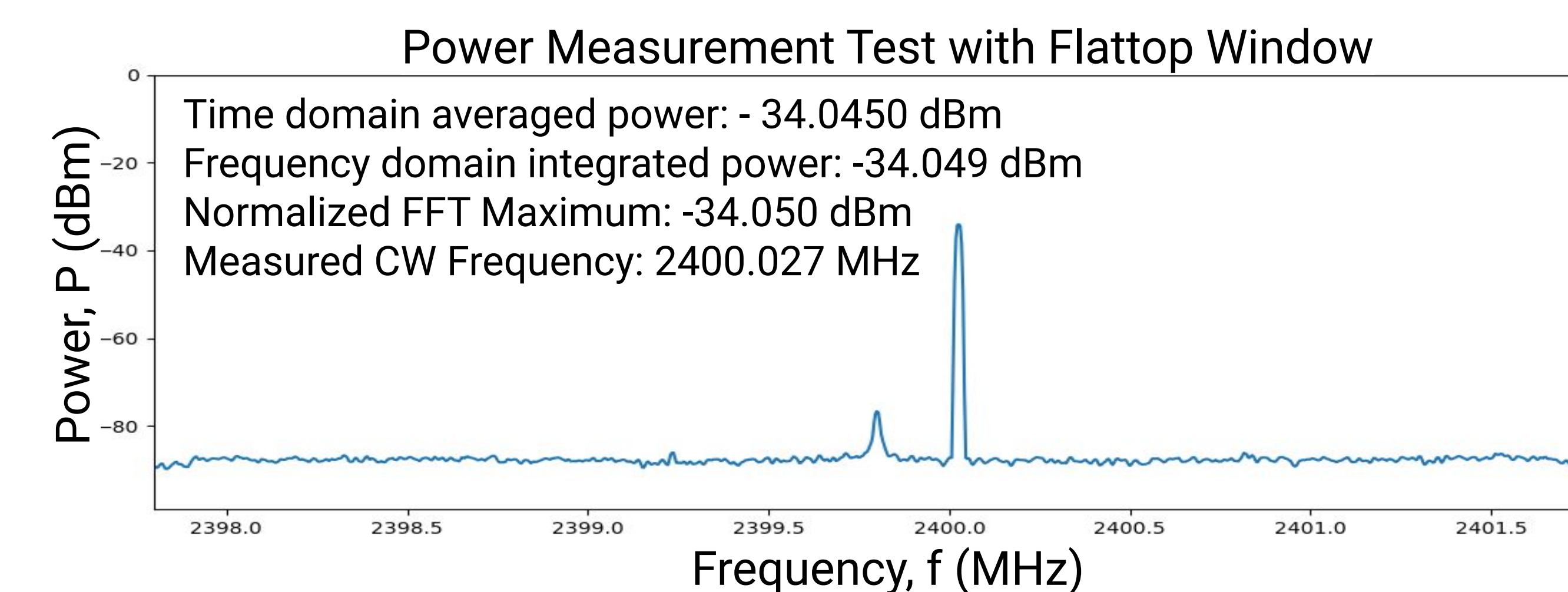


SYSTEM BLOCK DIAGRAM



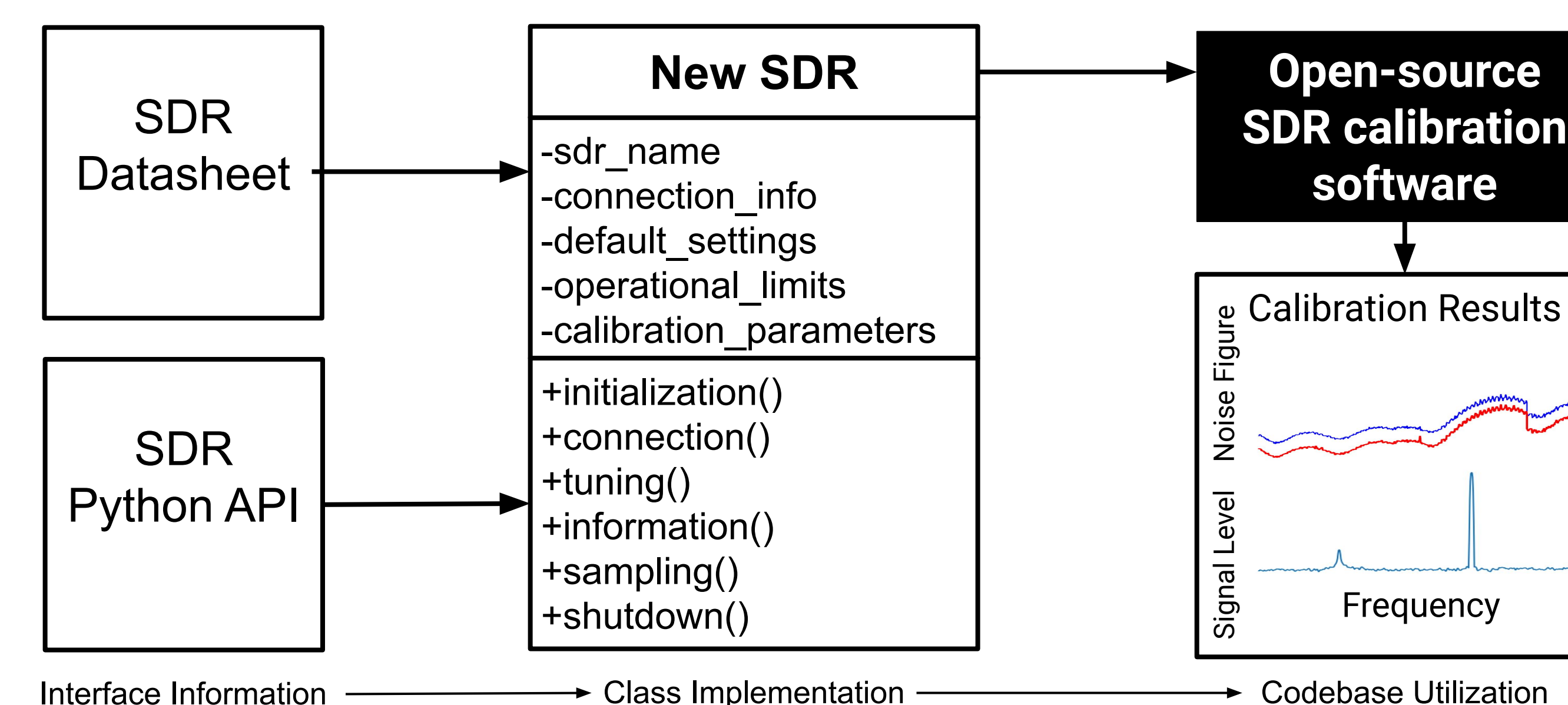
POWER MEASUREMENT ROUTINE

The power measurement routine runs multiple FFTs to calculate average signal power and frequency.



The power measurement routine forms the basis for multiple other tests, such as calibrate, which calculates noise figure, compression, and equivalent noise bandwidth by taking multiple power measurements across the full range of SDR parameters.

ADDING ADDITIONAL SDRs



ACKNOWLEDGEMENTS

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The initial codebase for this project was developed at the Institute for Telecommunication Sciences by Dr. Todd Schumann and Douglas Anderson. The authors thank Todd and other ITS collaborators for their assistance on this project.

