

A DISCRETE SAR ADC/DAC

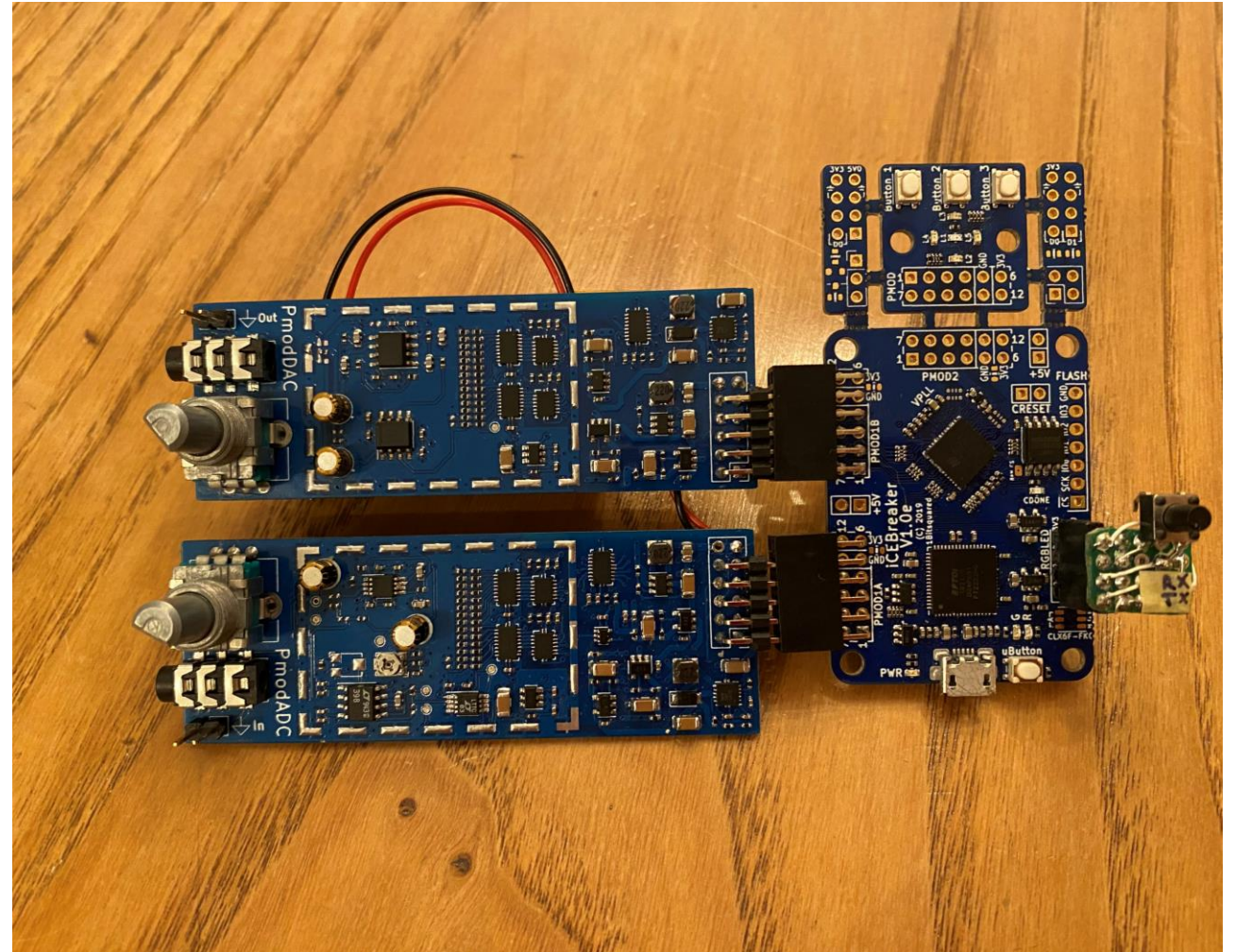
Philipp Schilk HS2020

P&S “iCEBreaker FPGA For IoT Sensing Systems”

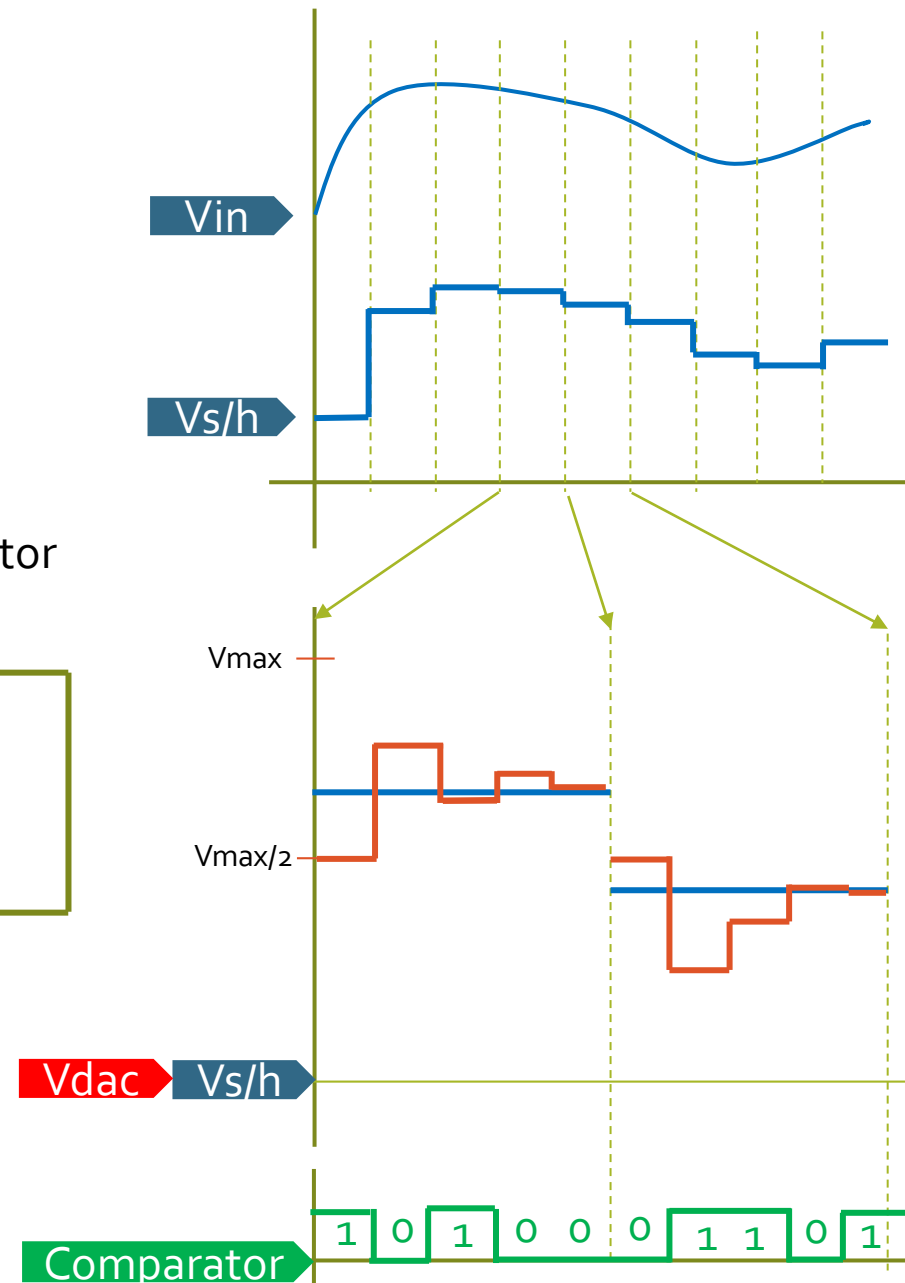
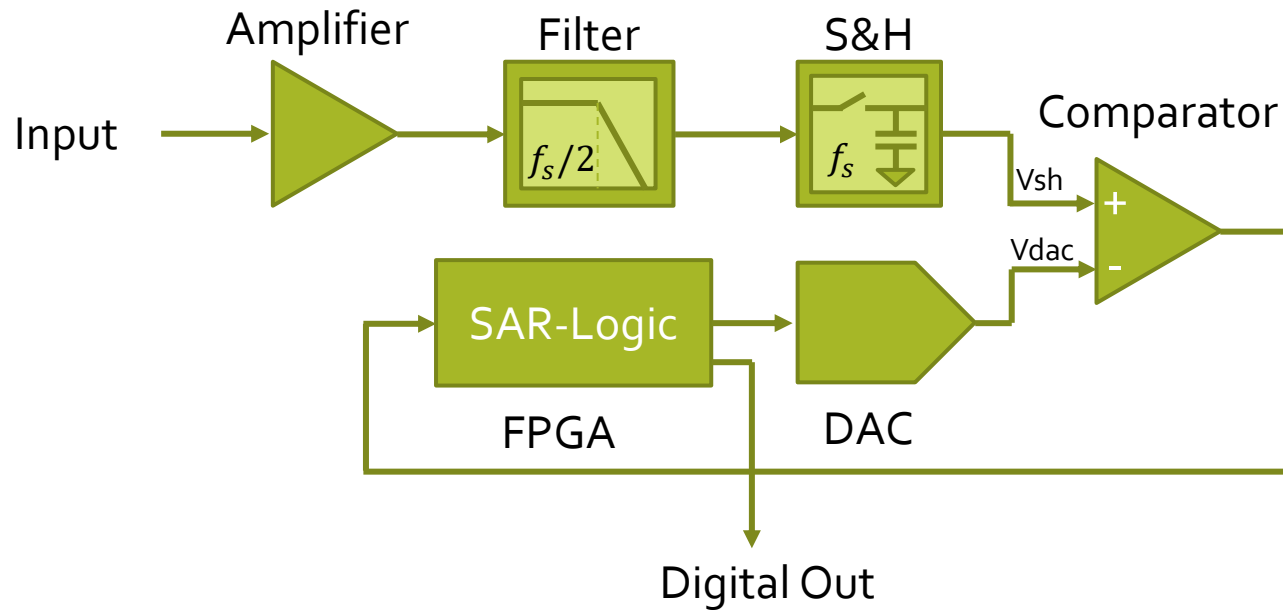
Center for Project Based Learning / ETH Zuerich

Overview

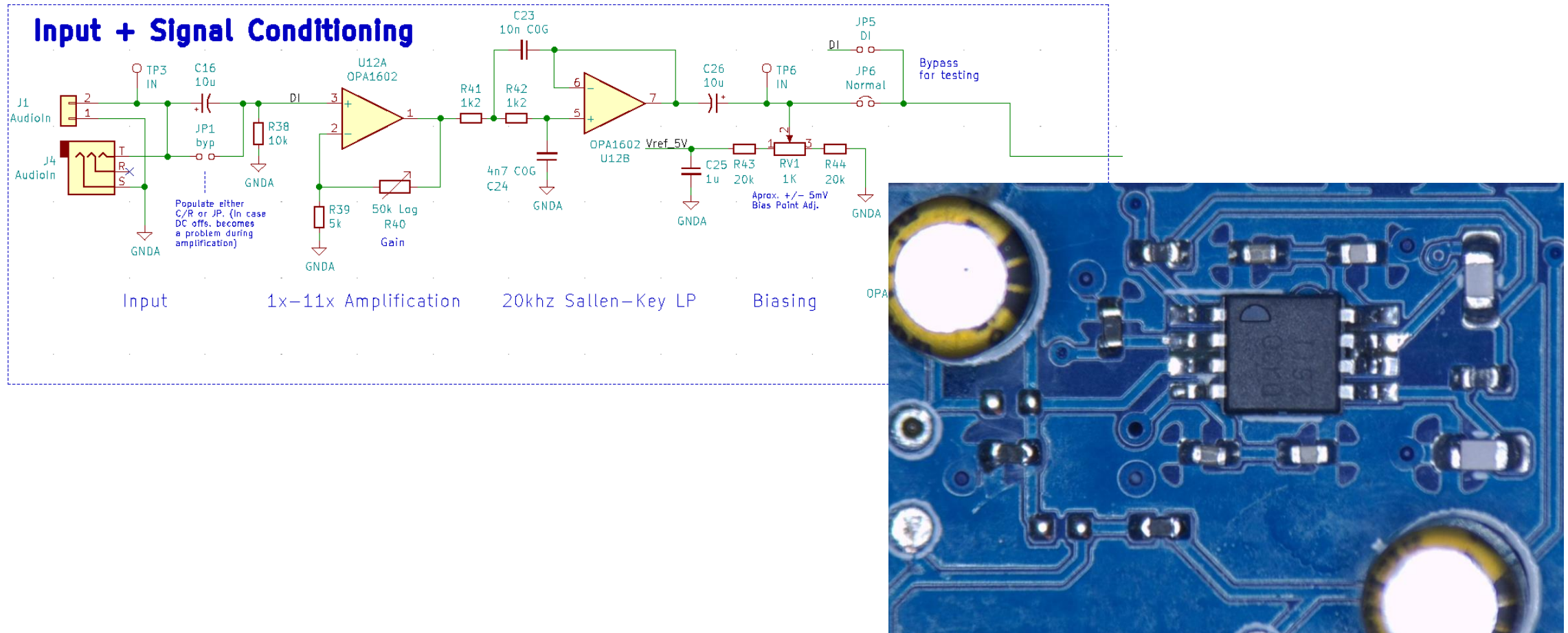
- ADC and DAC
- 14bit Resolution
- 41kHz Sample Rate
- Custom Circuit and Hardware
- Realtime Bidirectional USB Communication
- Python Scripts for Recording and Playback
- MATLAB Scripts for Recording, Playback, and Characterization



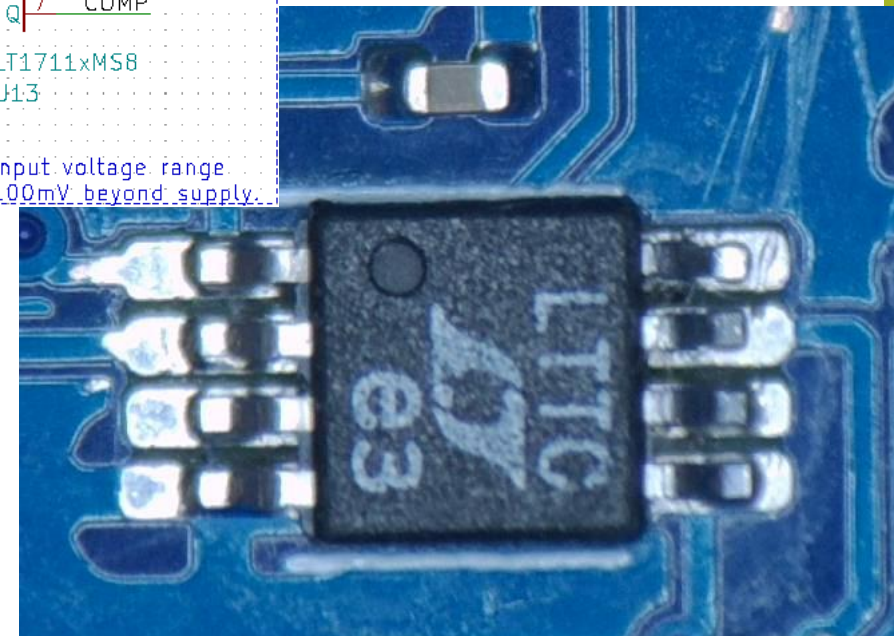
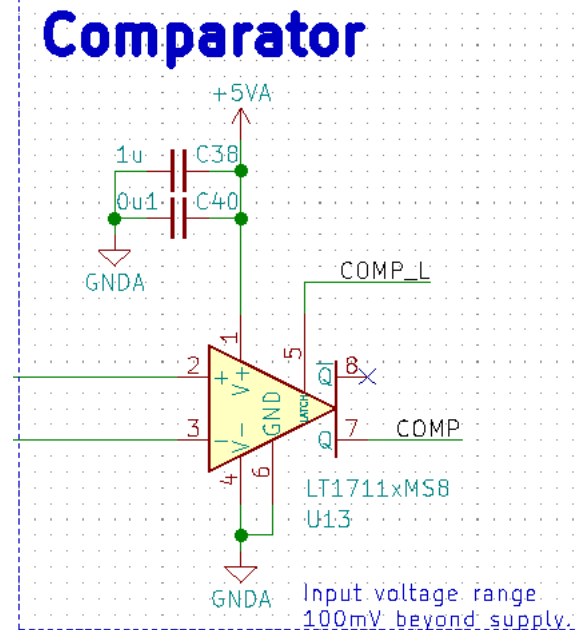
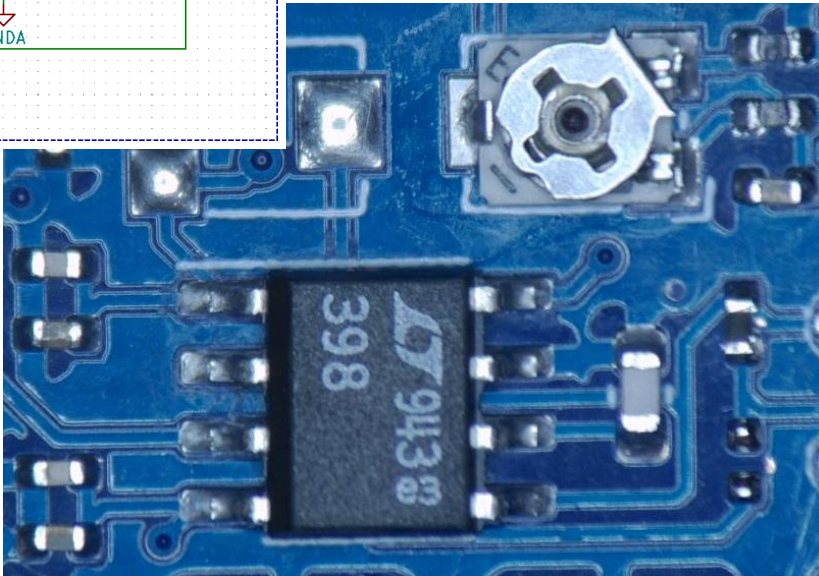
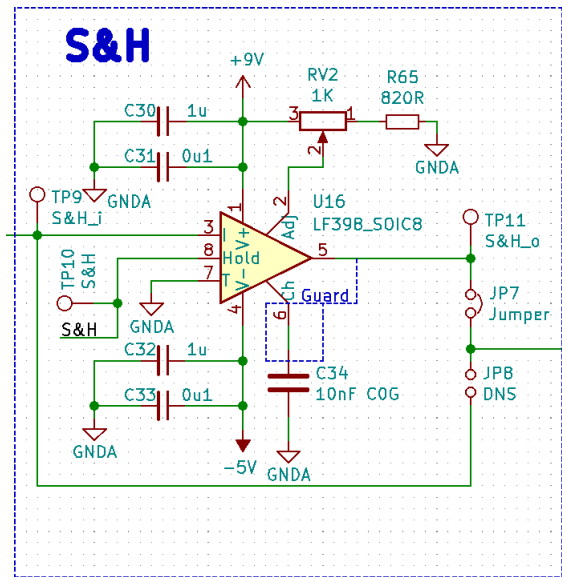
Operating Principle



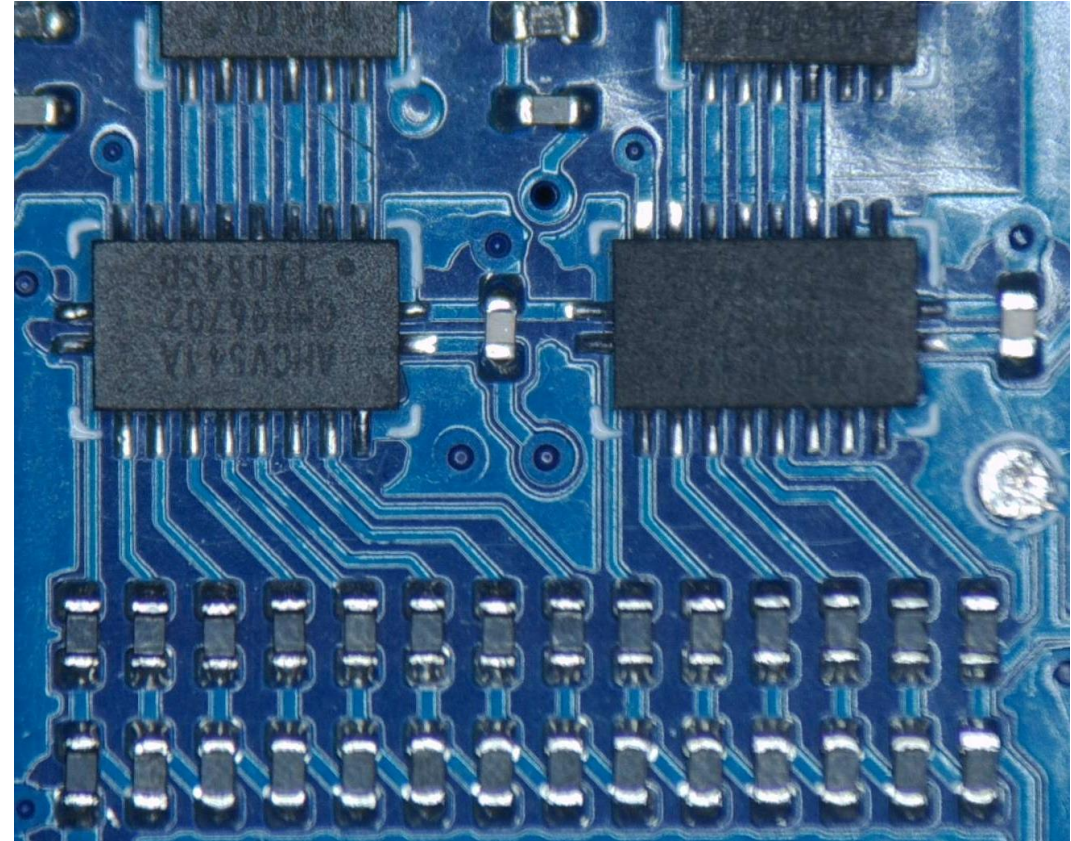
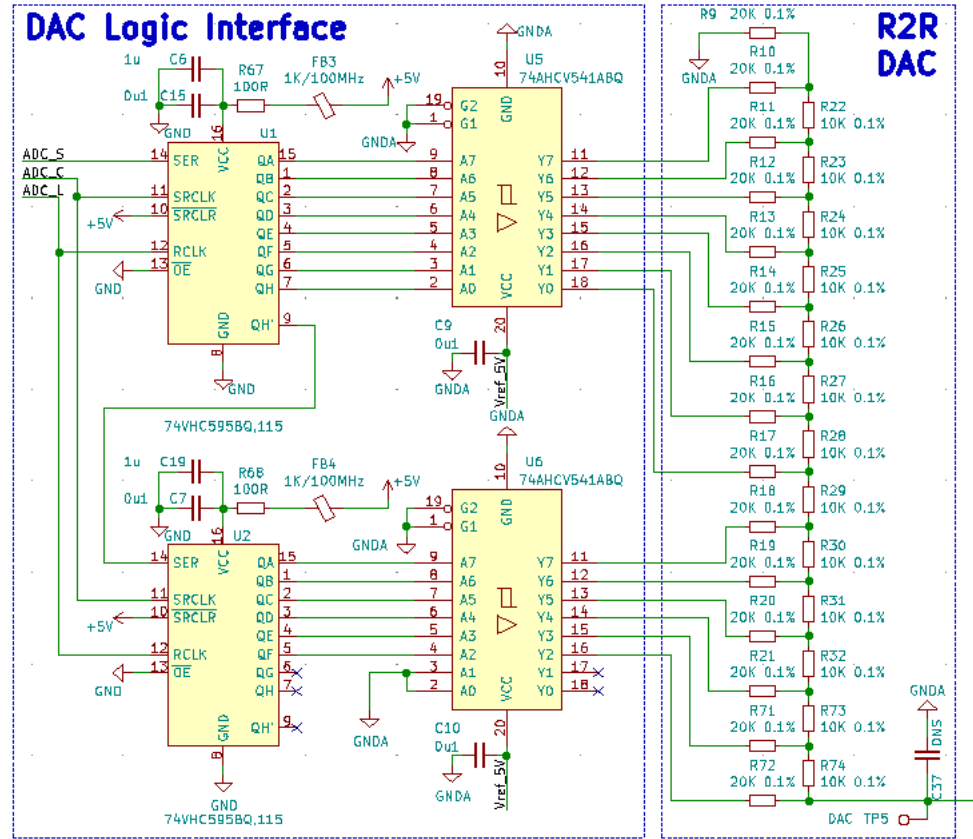
Hardware Implementation



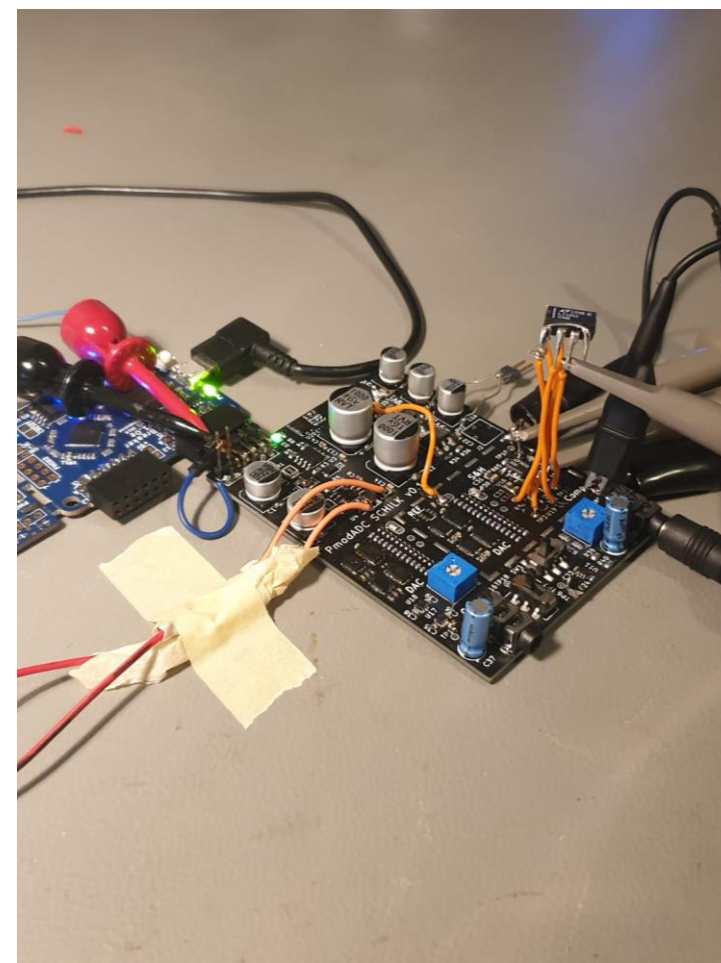
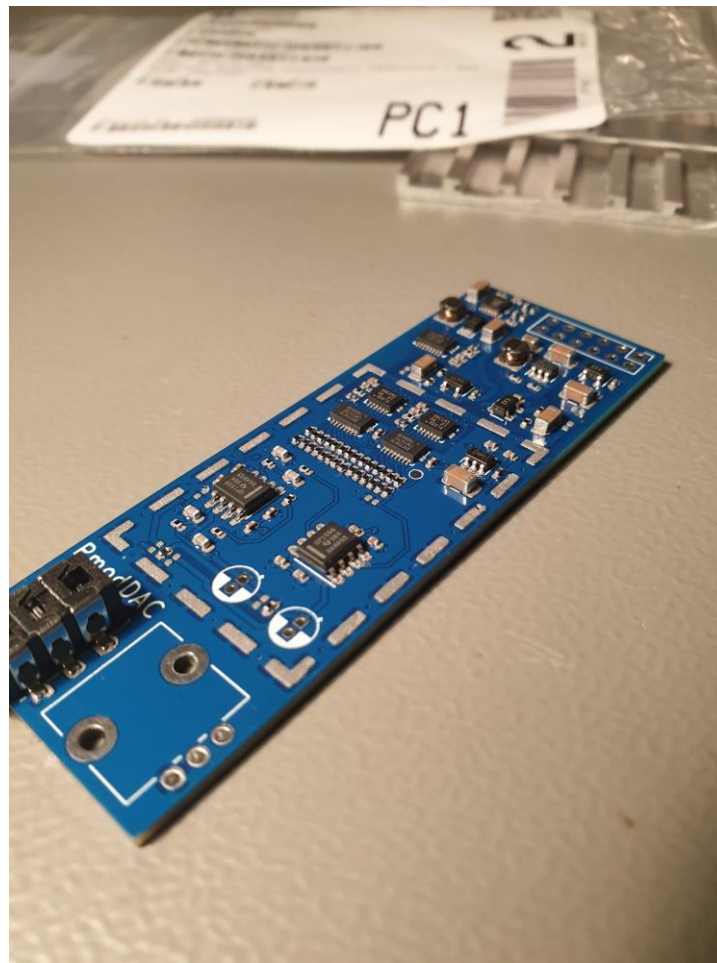
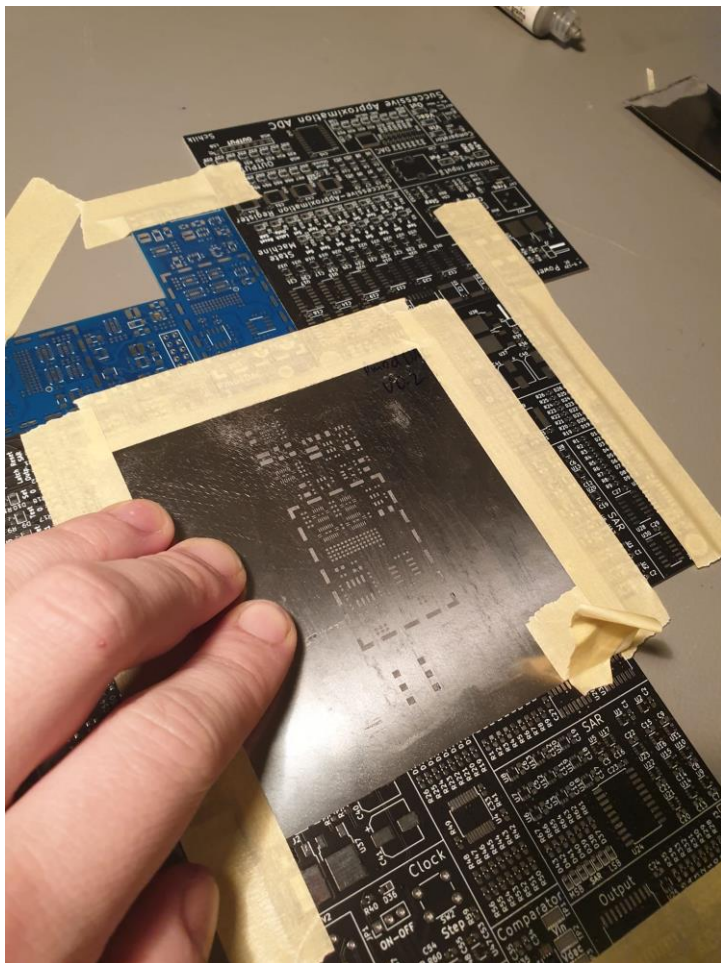
Hardware Implementation



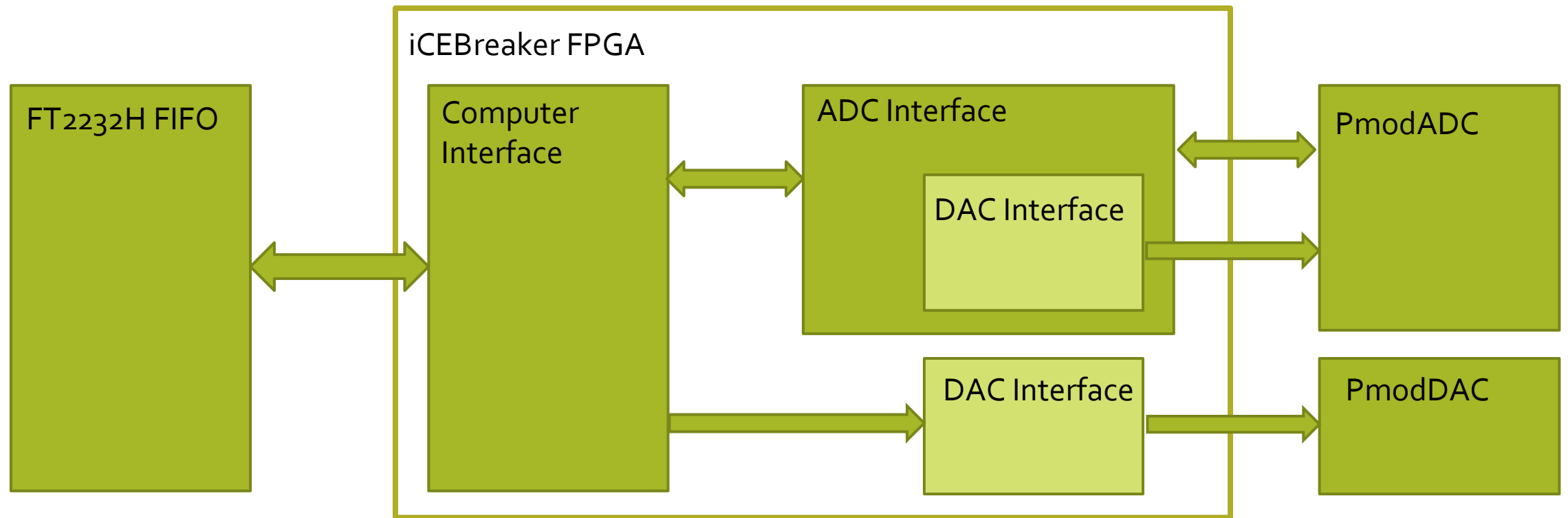
Hardware Implementation



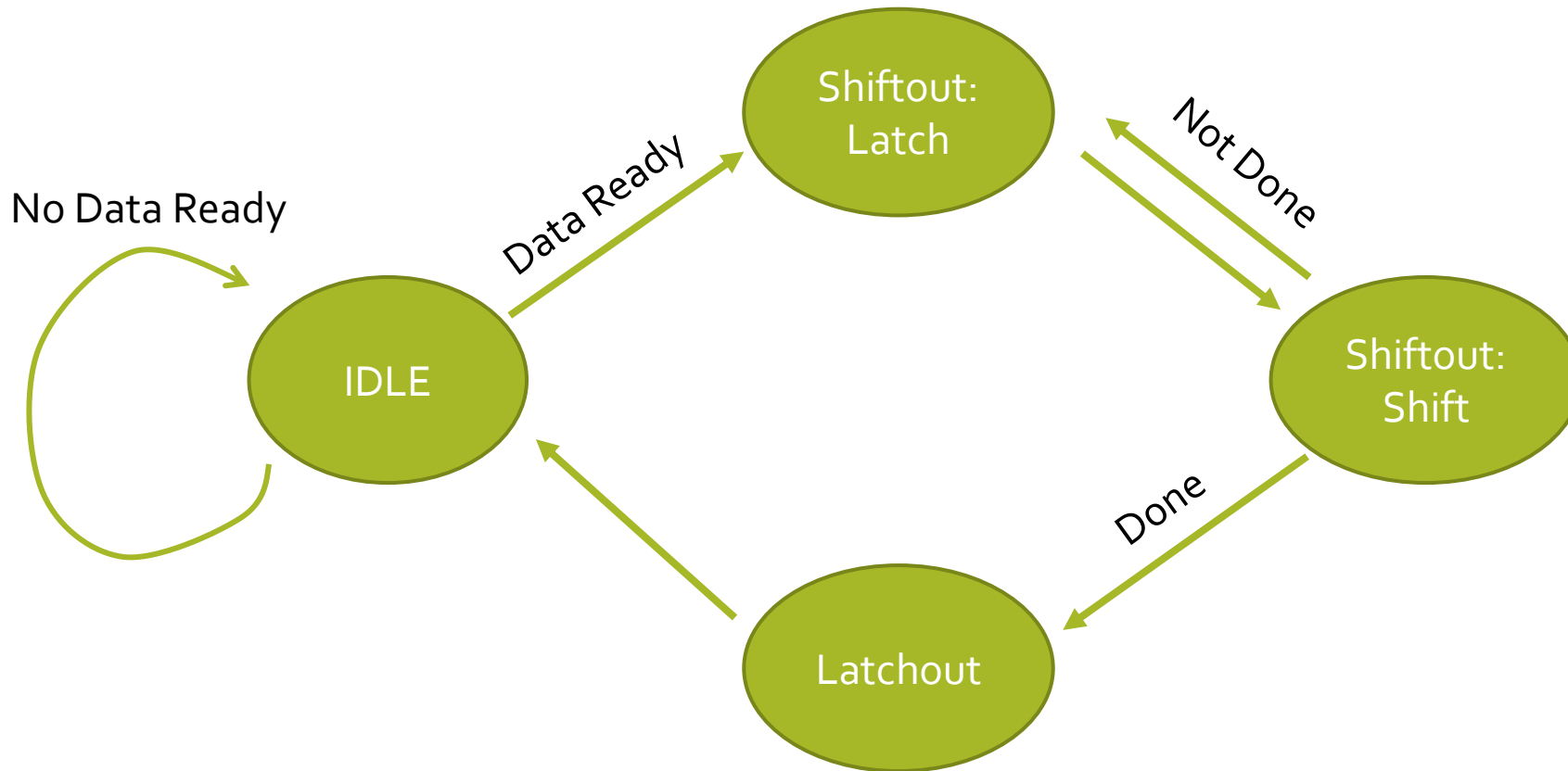
Construction



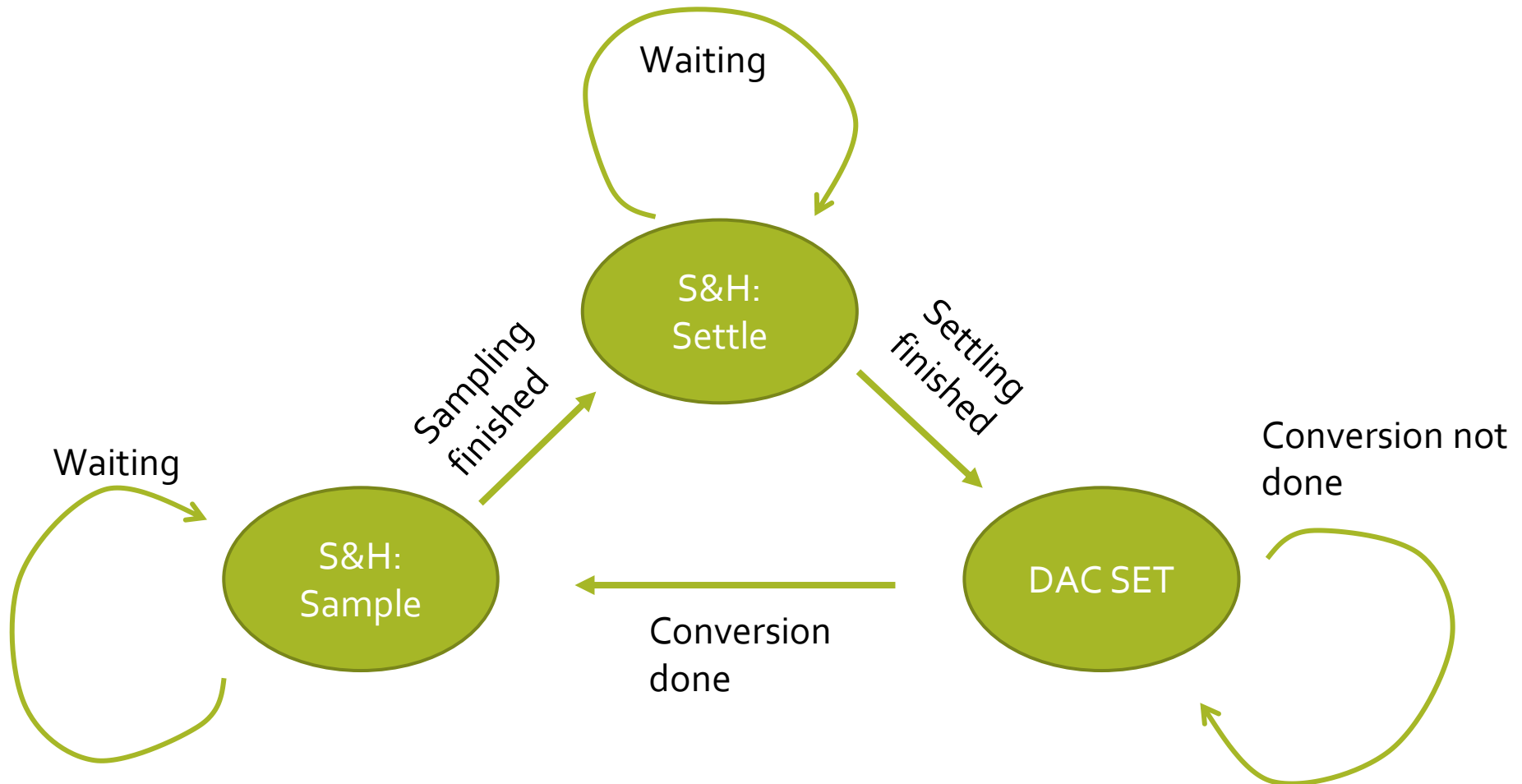
Verilog Implementation



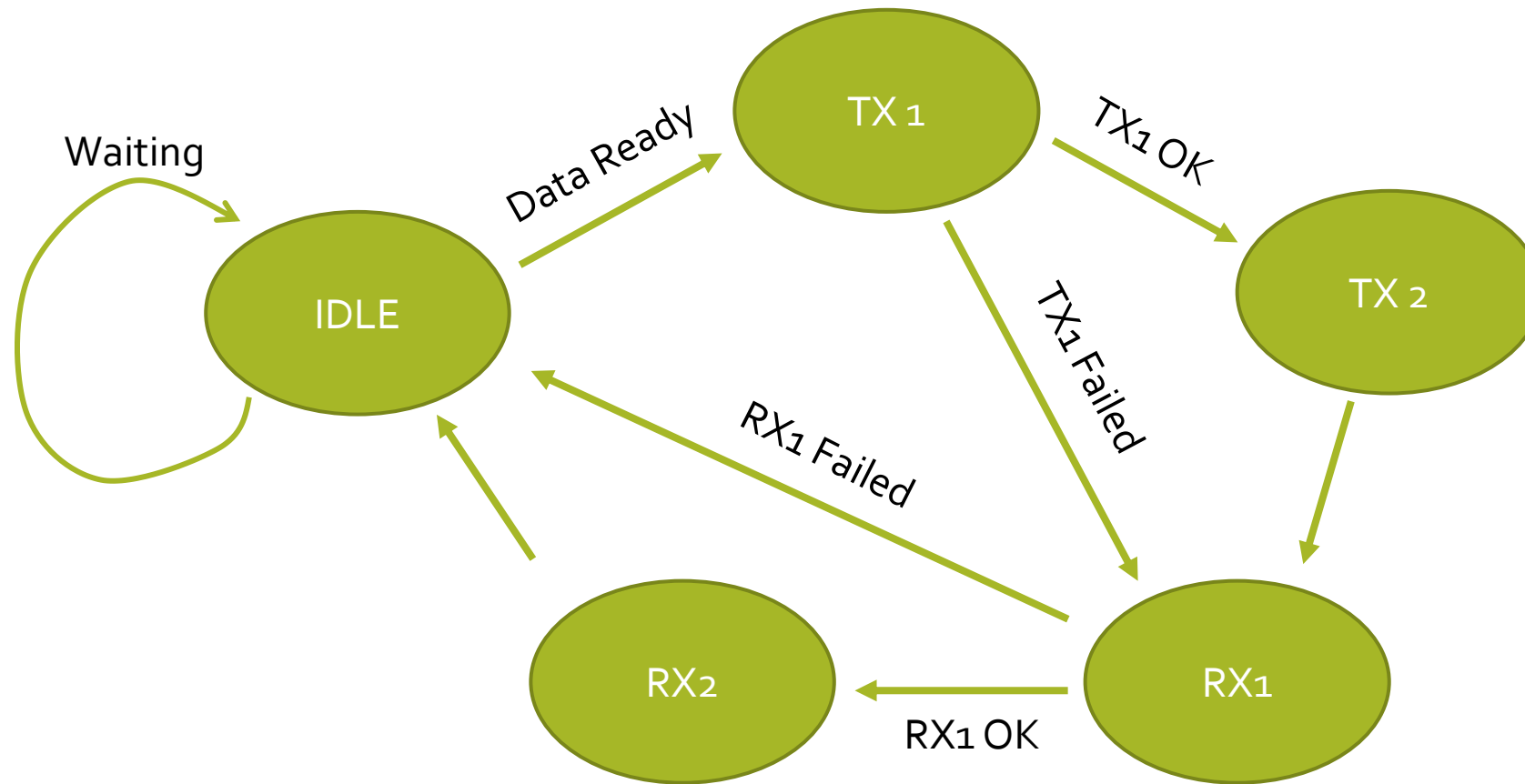
Verilog Implementation: DAC Interface



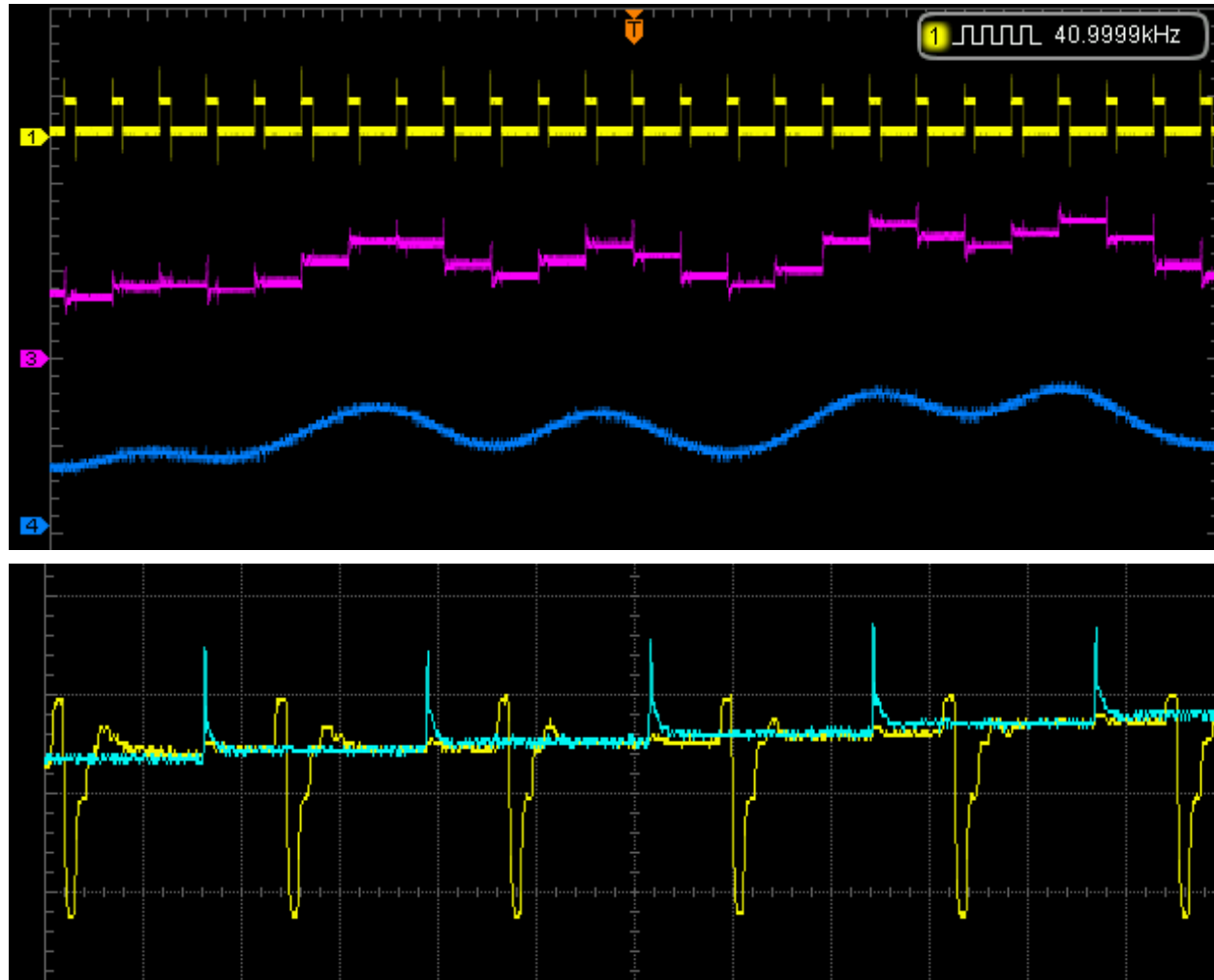
Verilog Implementation: ADC Interface



Verilog Implementation: Computer Interface



Operation



Demonstration

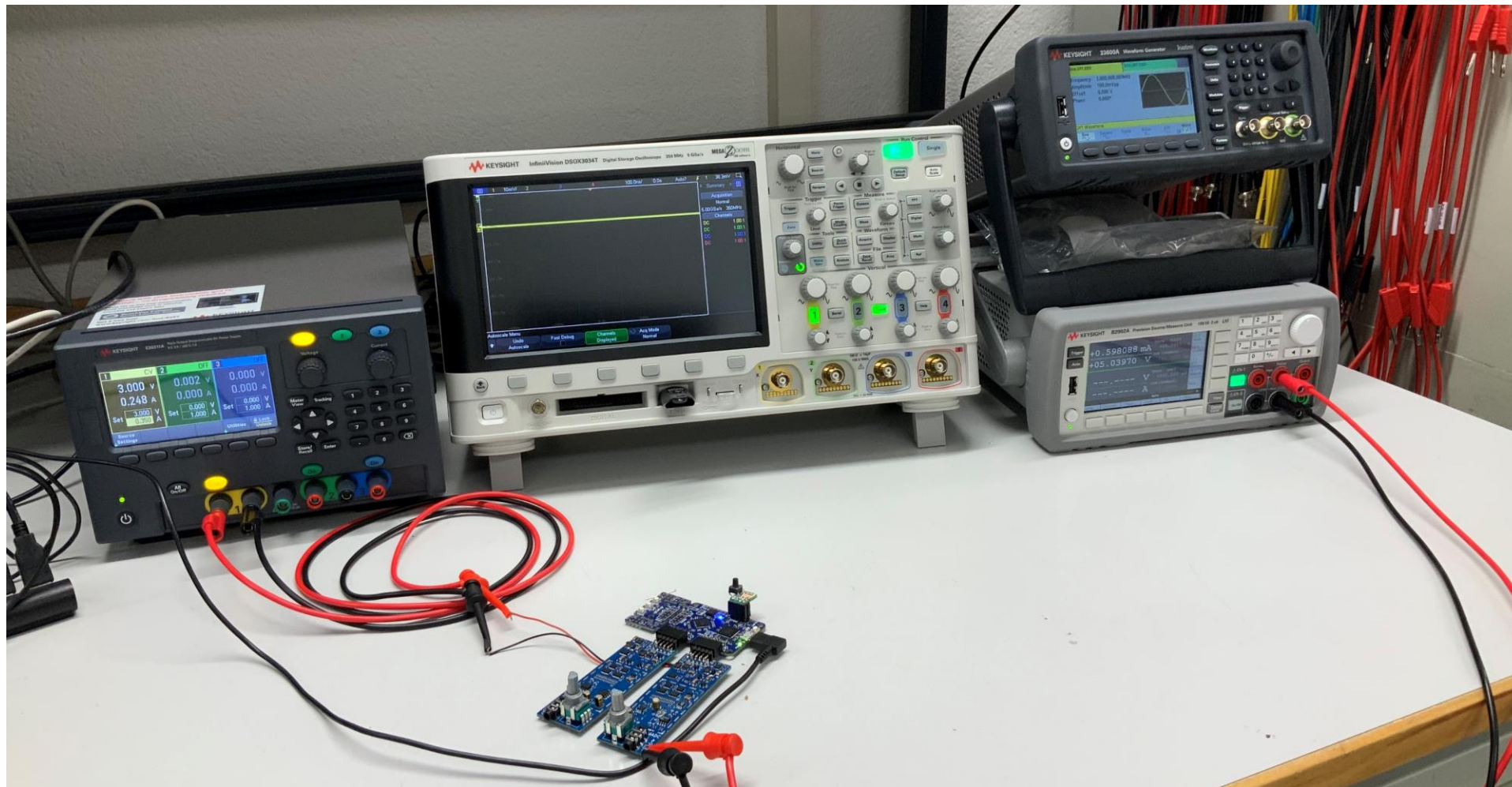


Demonstration

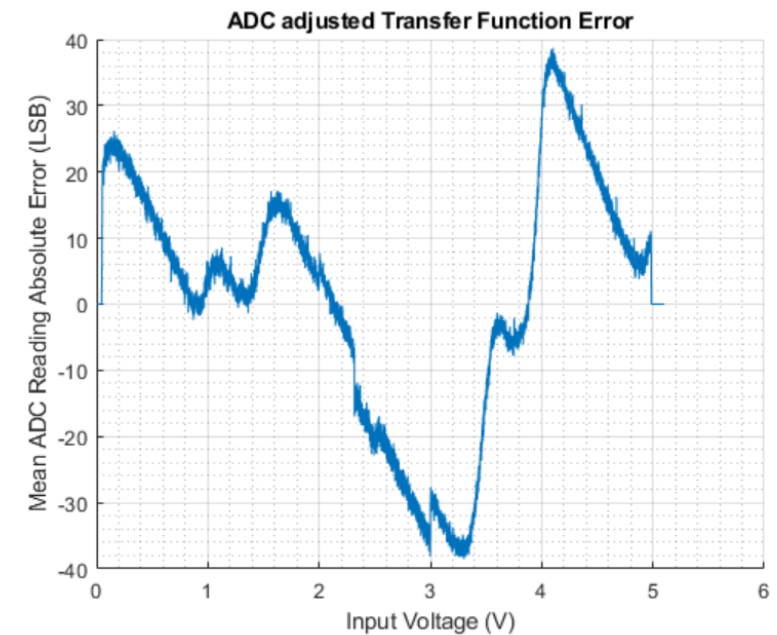
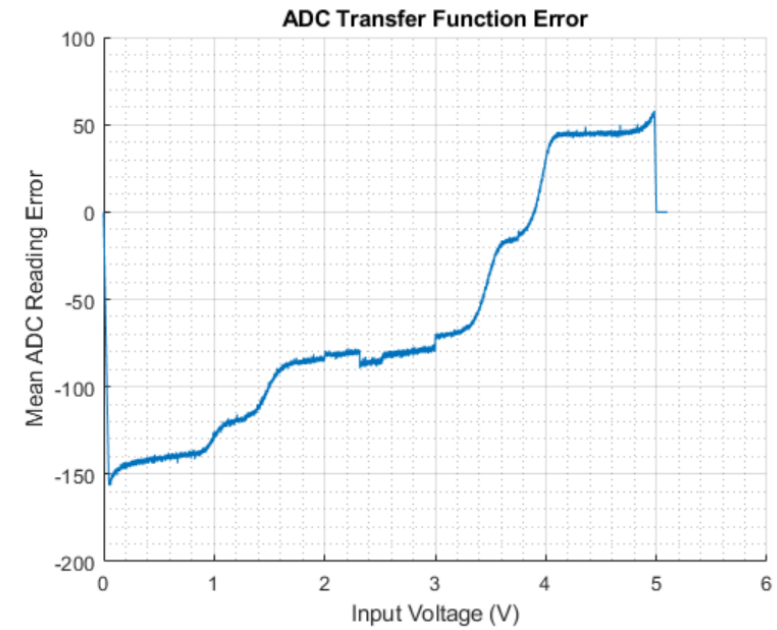
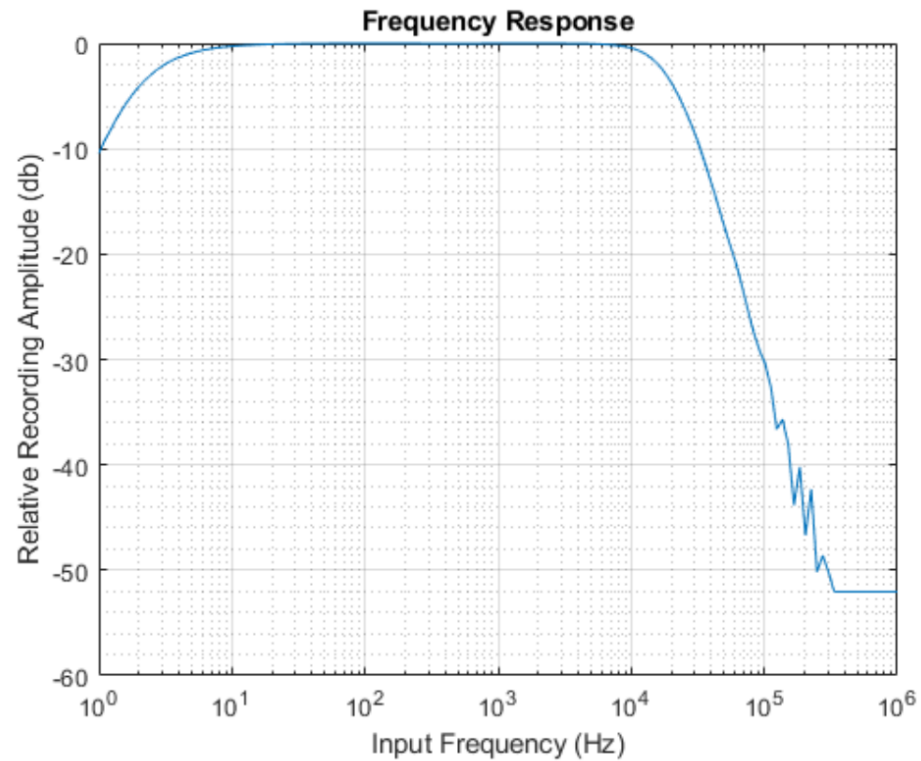
Song	Original	PmodADC Demo	PmodDAC Demo
New Hero in Town	<u>here</u>	<u>here</u>	<u>here</u>
Protofunk	<u>here</u>	<u>here</u>	<u>here</u>
Whiskey on the Mississippi	<u>here</u>	<u>here</u>	<u>here</u>
The Parting	<u>here</u>	<u>here</u>	<u>here</u>

- <https://github.com/TheSchilk/PmodADC>
- <https://soundcloud.com/user-489490213/sets/pmodadc-demonstration/s-fJryQAe7XSp>

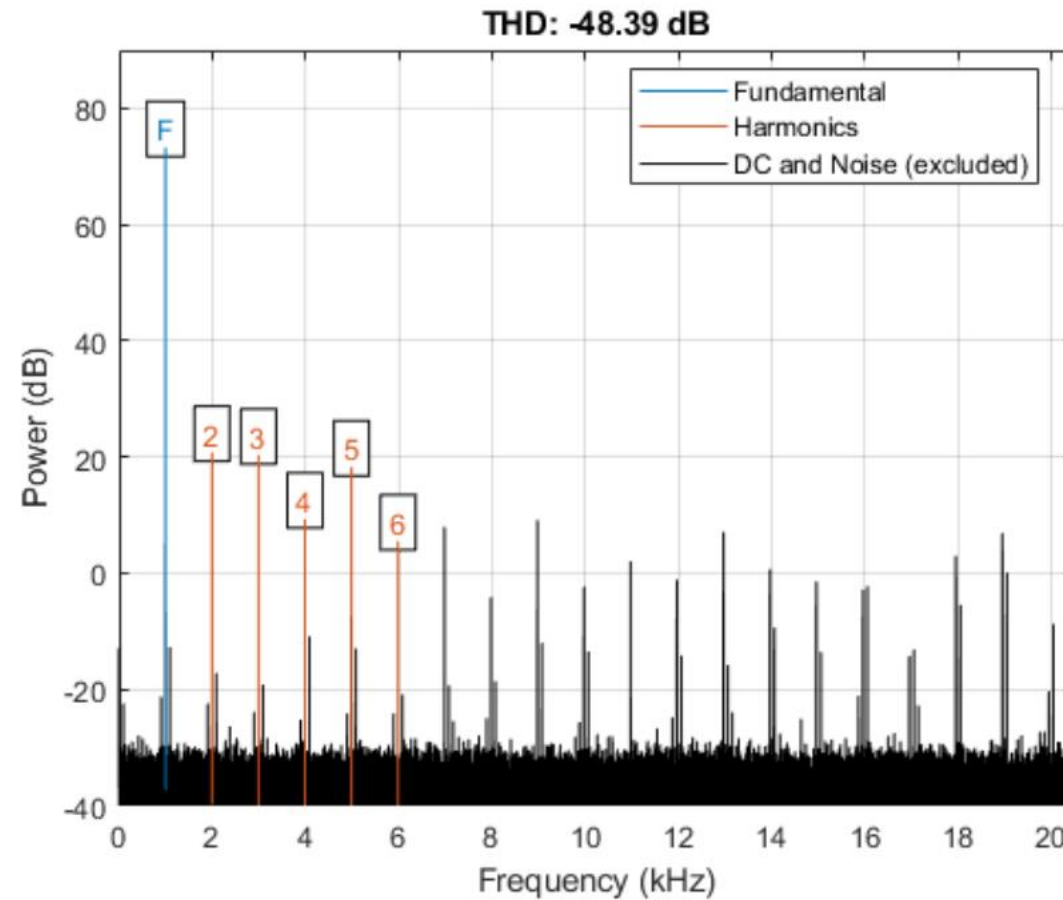
Characterization



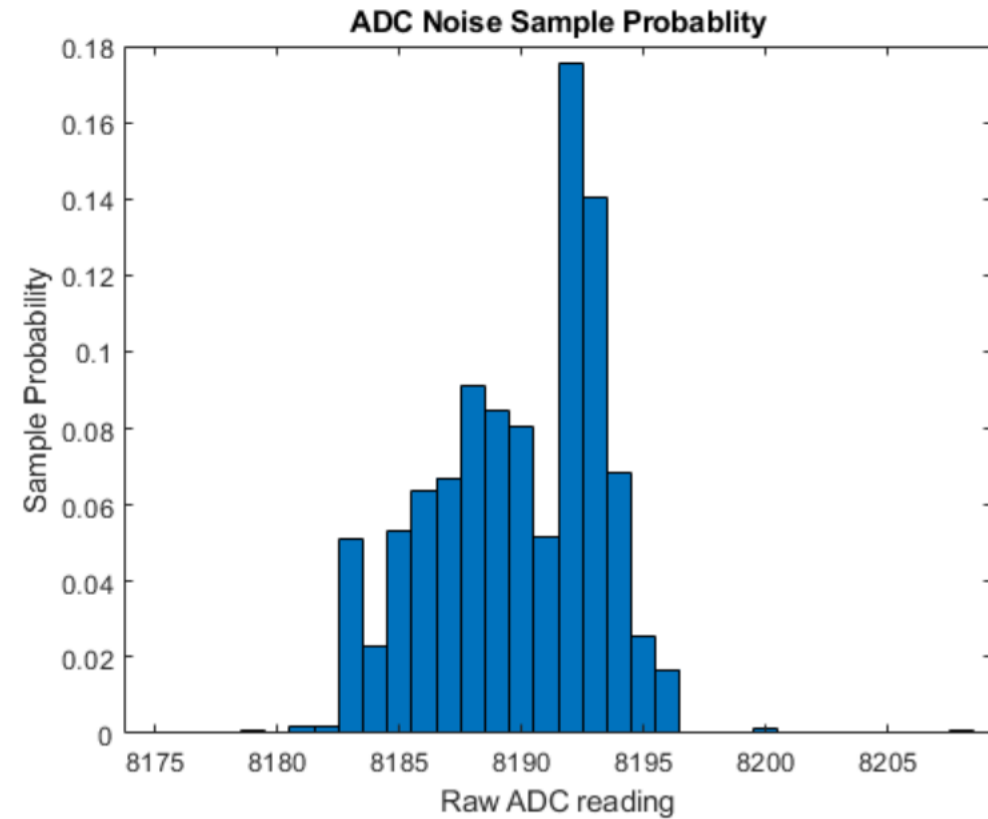
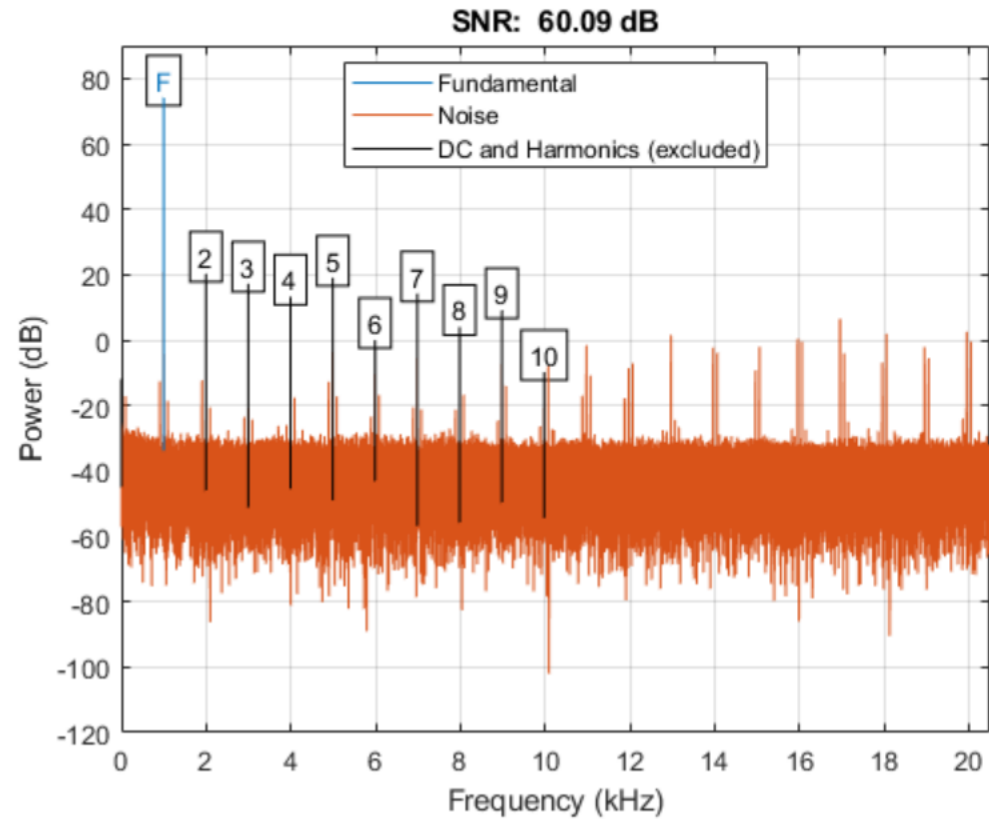
Characterization Results



Characterization Results



Characterization Results



- Comparison Recordings:

- <https://soundcloud.com/user-489490213/sets/pmodadc-demonstration/s-fJryQAe7XSp>

- All Design Files, Code, Scripts, Characterization Reports, Documentation, ... :

- <https://github.com/TheSchilk/PmodADC>

- In Particular:

- KiCAD Projects
 - Schematics/Gerbers (<https://github.com/TheSchilk/PmodADC/tree/master/ProductionFiles>)
 - Verilog
 - Characterization Results (<https://github.com/TheSchilk/PmodADC/tree/master/Characterization>)
 - Interface Scripts

Thank you!

- Questions?

