a simple and cheap vector network analyzer, including support software https://www.kickstarter.com/projects/...

254 commits | 1 branch | 4 releases | 6 contributors | GP

Branch: master | New pull request | Find File | Clone

This branch is 21 commits behind xaxaxa-dev:master. | Pull request

xaxaxa vna_qt: change frequency limits to 35 to 4400 MHz | Latest commit a929

appimage	fix default.desktop
enclosure	tweak enclosure dimensions
include	sw: move calibration functions to library
lib_mock	libxavna: added mock library
libxavna	Fix segfault when compiled with cmake.
pcb	update readme
pictures	add new screenshots (of qt gui)
tester	update tester
vhdl	vhdl: increase spi clock speed to 2MHz for faster frequency setting
vhdl_twoport	vhdl_twoport: use direct adc data in phase/magnitude detector
vna_diagtool	proper support for full two port vna
vna_gtk	restructure; support windows & mac; use automake instead of custom Ma...
vna_qt	vna_qt: change frequency limits to 35 to 4400 MHz
.gitignore	update gitignores
.gitmodules	add svf player to .gitmodules
CMakeLists.txt	Fix segfault when compiled with cmake.
LICENSE	Create LICENSE
Makefile.am	restructure; support windows & mac; use automake instead of custom Ma...
README.md	Merge branch 'master' of https://github.com/xaxaxa-dev/vna
configure.ac	add platform workarounds
deploy_linux.sh	deploy_linux.sh: clean up files before generating appimage
deploy_macos.sh	deploy_macos: fix path error; build dmg
deploy_windows.sh	deploy_windows.sh: remove unneeded files from output zip
env.cfg	deploy_*: don't hardcode paths

generate_source_tarball	vna_qt: wip
lo_amp.cct	add simulation files
lo_amp_2.cct	add simulation files
lo_amp_3.cct	add simulation files
run	take executable as argument in run script

README.md

vna

A simple and cheap vector network analyzer, including support software.

As seen on kickstarter: https://www.kickstarter.com/projects/1759352588/xavna-a-full-featured-low-cost-two-port

Directory layout

- libxavna: C & C++ library for accessing the hardware, see README.md in subdirectory for more info
- vna_qt: QT GUI
- pcb: schematics, pcb layouts, and simulation files
- vhdl: circuitry implemented on the fpga

Specifications

- Frequency range: guaranteed **137MHz - 2500MHz**, typical **135MHz - 3500MHz**
- Output signal level (configurable in software): **-20dBm to 10dBm, with 1dB increments**

Interfacing

- The main board connects to a PC through usb and communicates via a virtual serial port device; the PC softwar the frequency and other parameters by sending two-byte register write commands, and the device sends avera vector values representing magnitude and phase of measured waves.

Table of Contents

Downloads

For pre-compiled executables go to: https://github.com/xaxaxa-dev/vna/releases

Building the software

Building on linux

Build libxavna (required for QT GUI):

```
sudo apt-get install automake libtool make g++ libeigen3-dev libfftw3-dev
cd /PATH/TO/vna
autoreconf --install
./configure
make
cd libxavna/xavna_mock_ui/
/PATH/TO/qmake
make
```

Build & run QT GUI:

```
sudo apt-get install libqt5charts5-dev
cd /PATH/TO/vna
cd vna_qt
/PATH/TO/qmake
make
export QT=/PATH/TO/QT # e.g. ~/qt/5.10.1/gcc_64
../run ./vna_qt
```

Building on mac os

```
brew install automake libtool make eigen fftw
cd /PATH/TO/vna
./deploy_macos.sh
# result is in ./vna_qt/vna_qt.app
```

Cross-compile for windows (from linux)

Download and build MXE:

```
cd ~/
git clone https://github.com/mxe/mxe.git
cd mxe
export QT_MXE_ARCH=386
make qt5 qtcharts cc eigen fftw pthreads
```

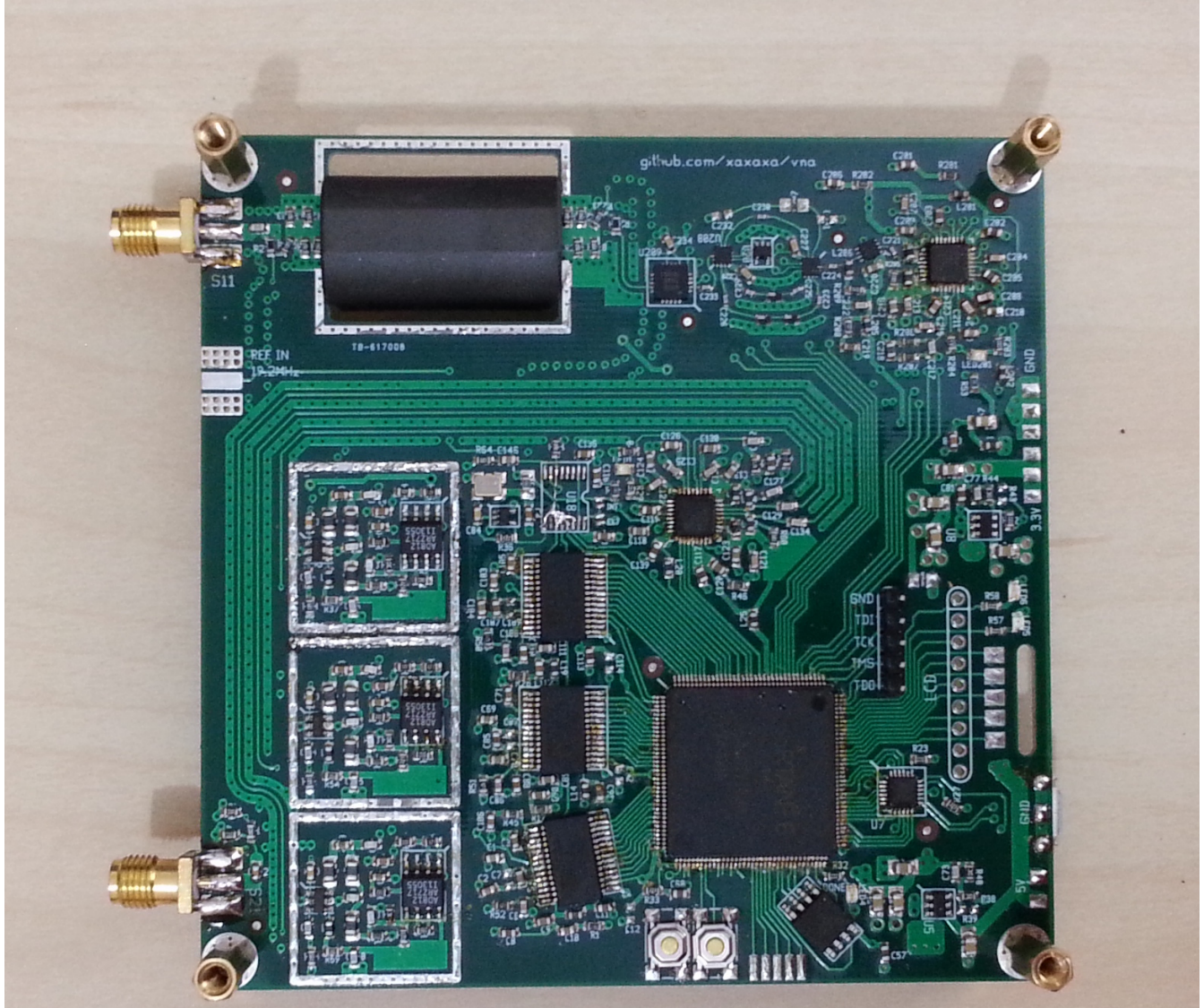
Edit mxe/settings.mk and add i686-w64-mingw32.shared to MXE_TARGETS.

Build

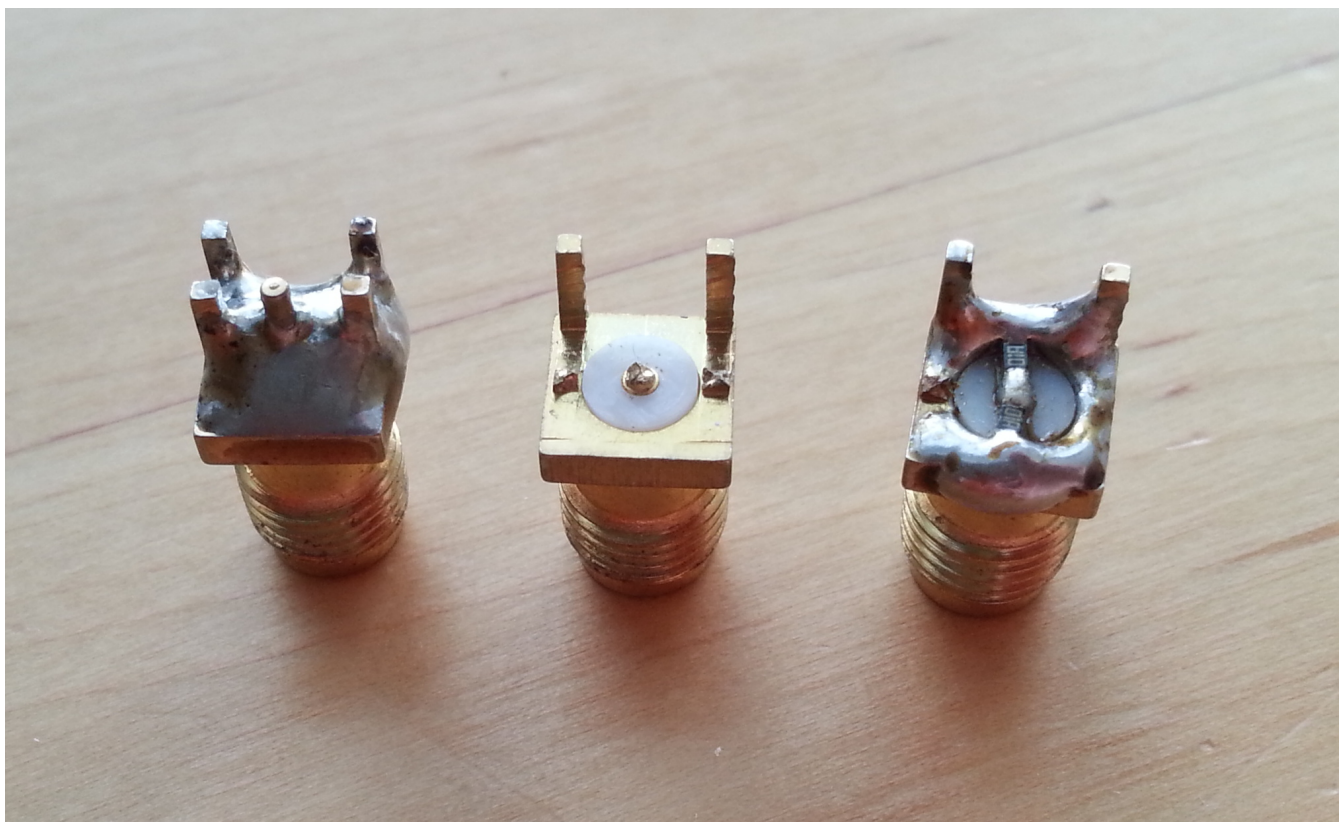
```
cd /PATH/TO/vna
export PATH="/PATH/TO/MXE/usr/bin:$PATH"
./deploy_windows.sh
```

Pictures

Main board (release 2)

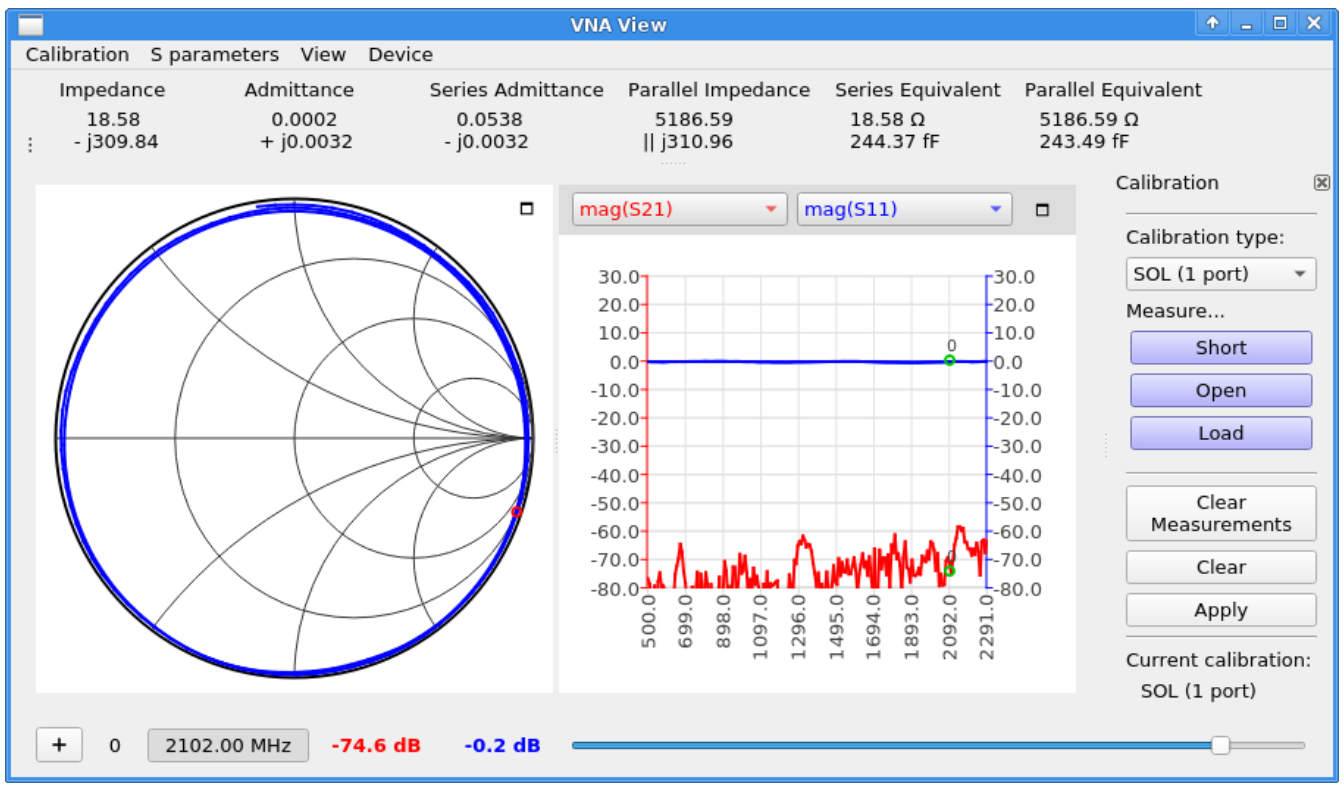


Calibration standards (Short, Open, Load)

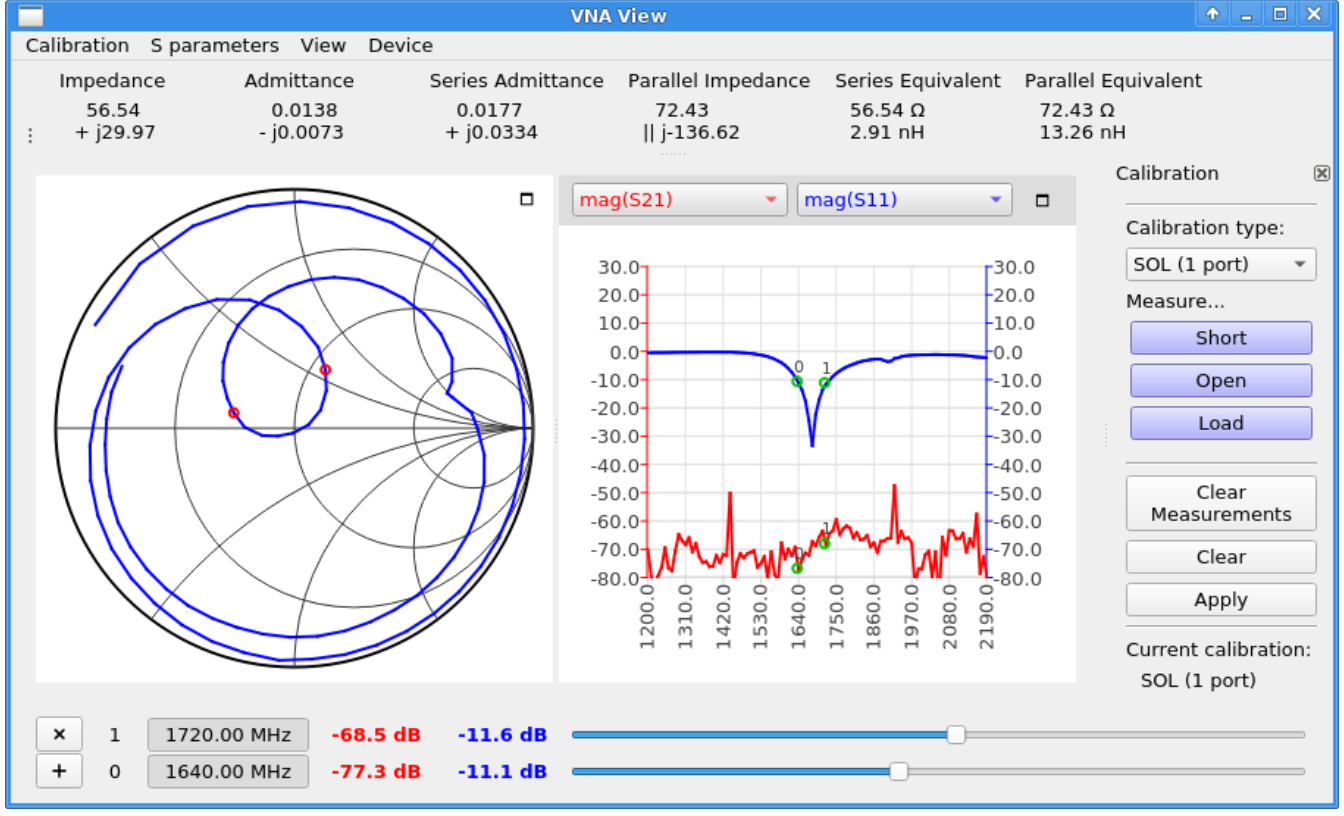


Screenshots

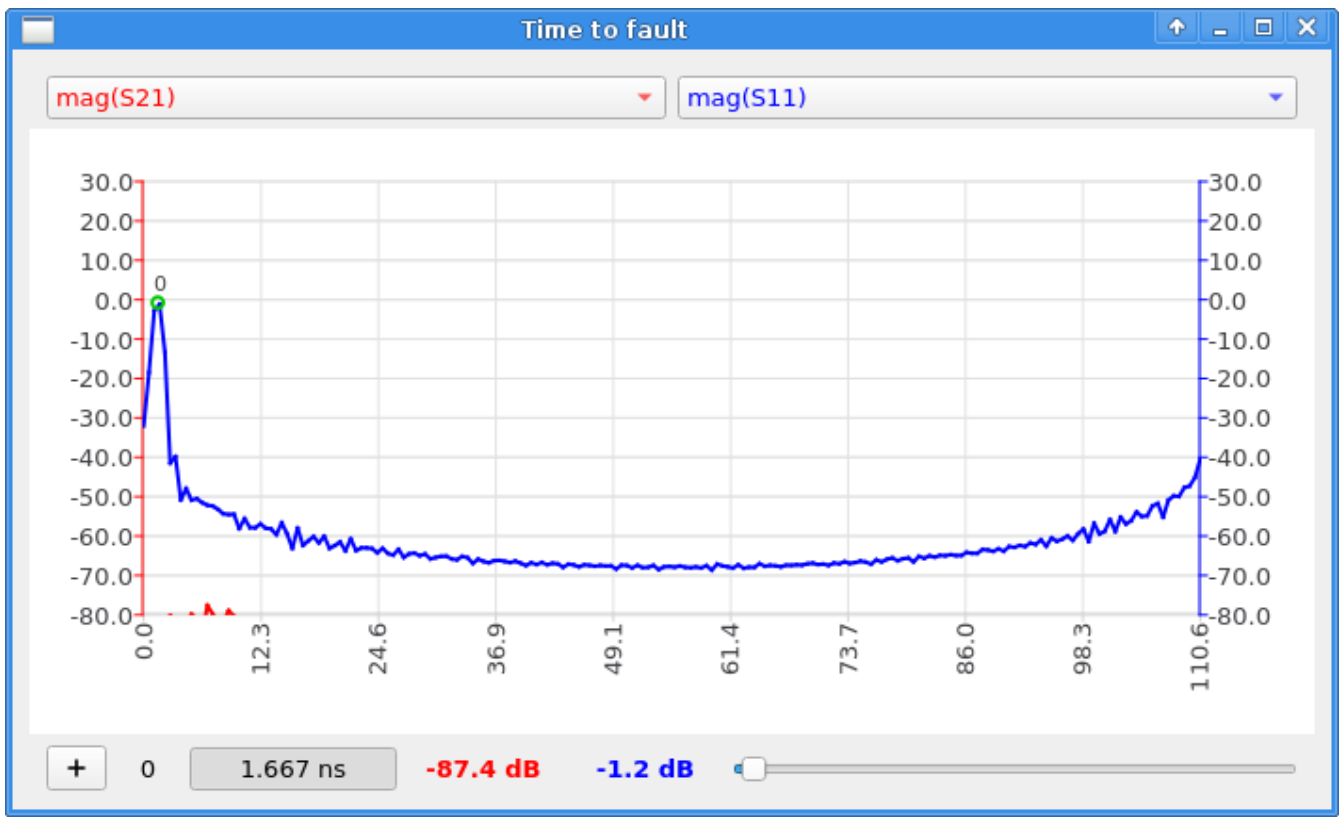
Open circuited coax stub



Antenna

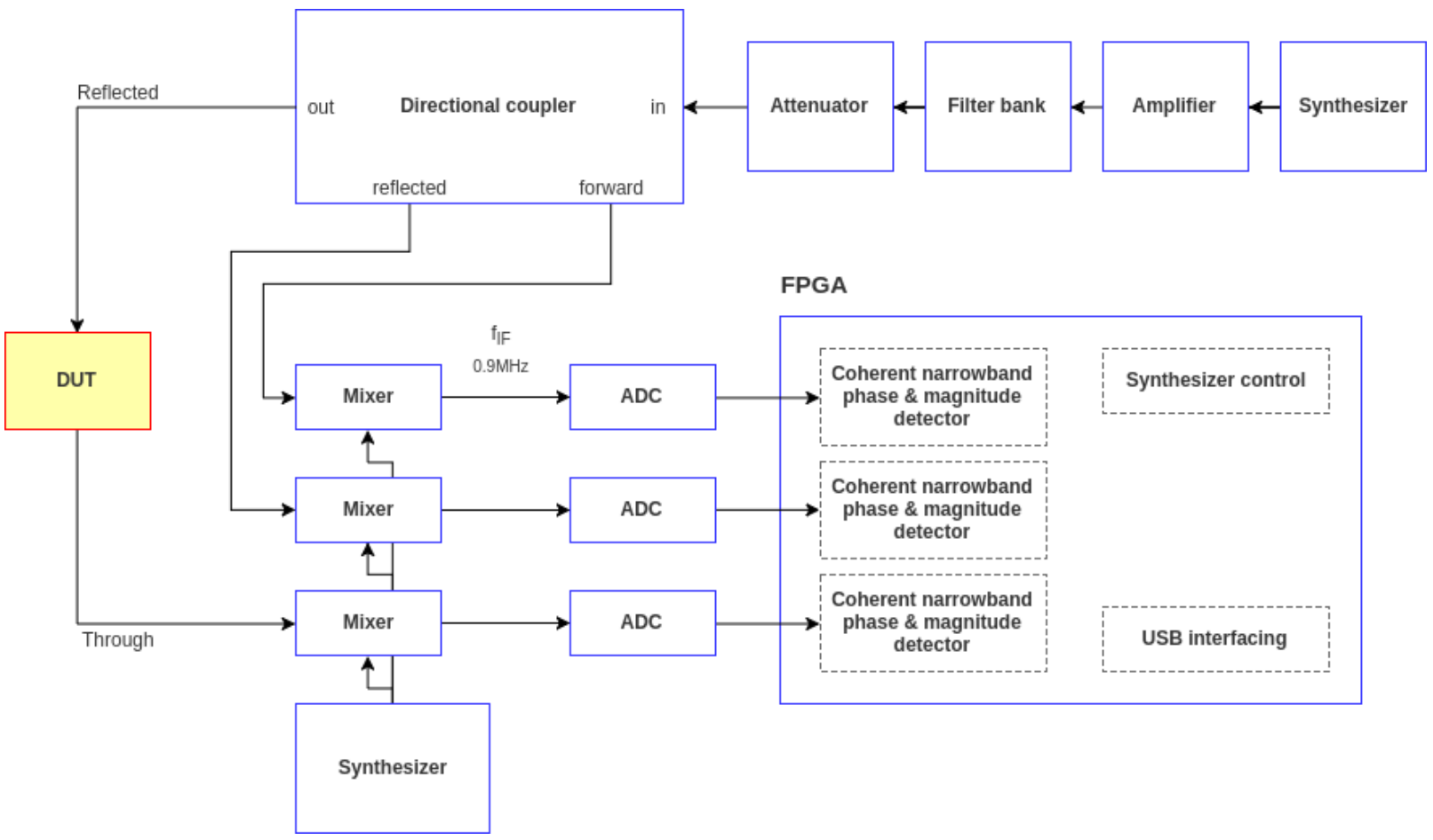


Time to fault (measuring coax cable)

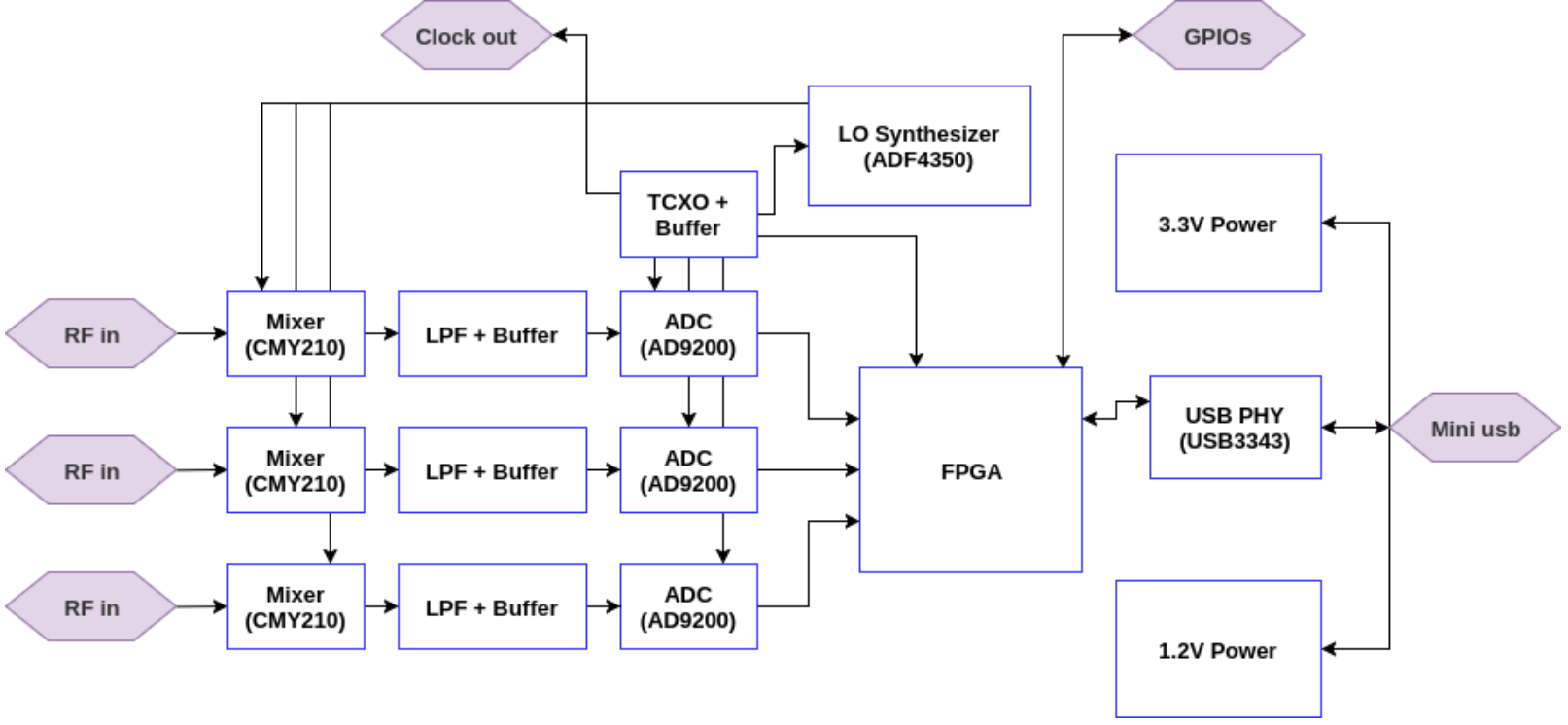


Block diagram

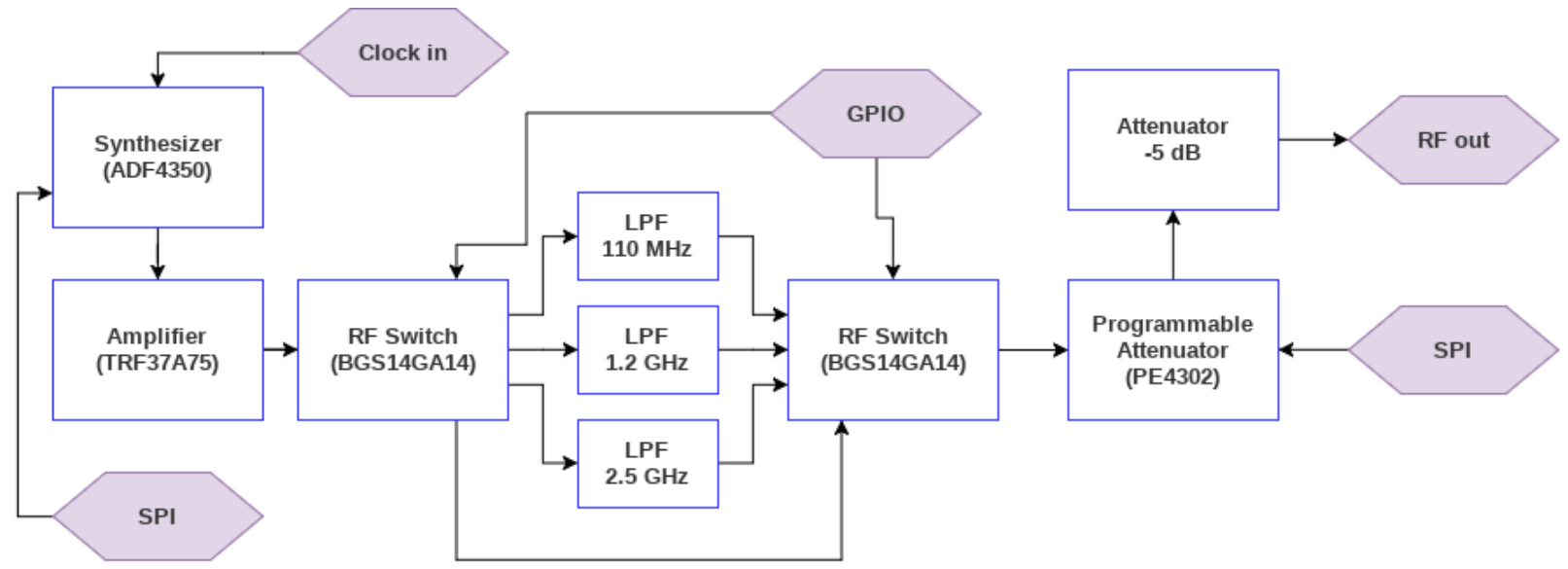
Overall architecture



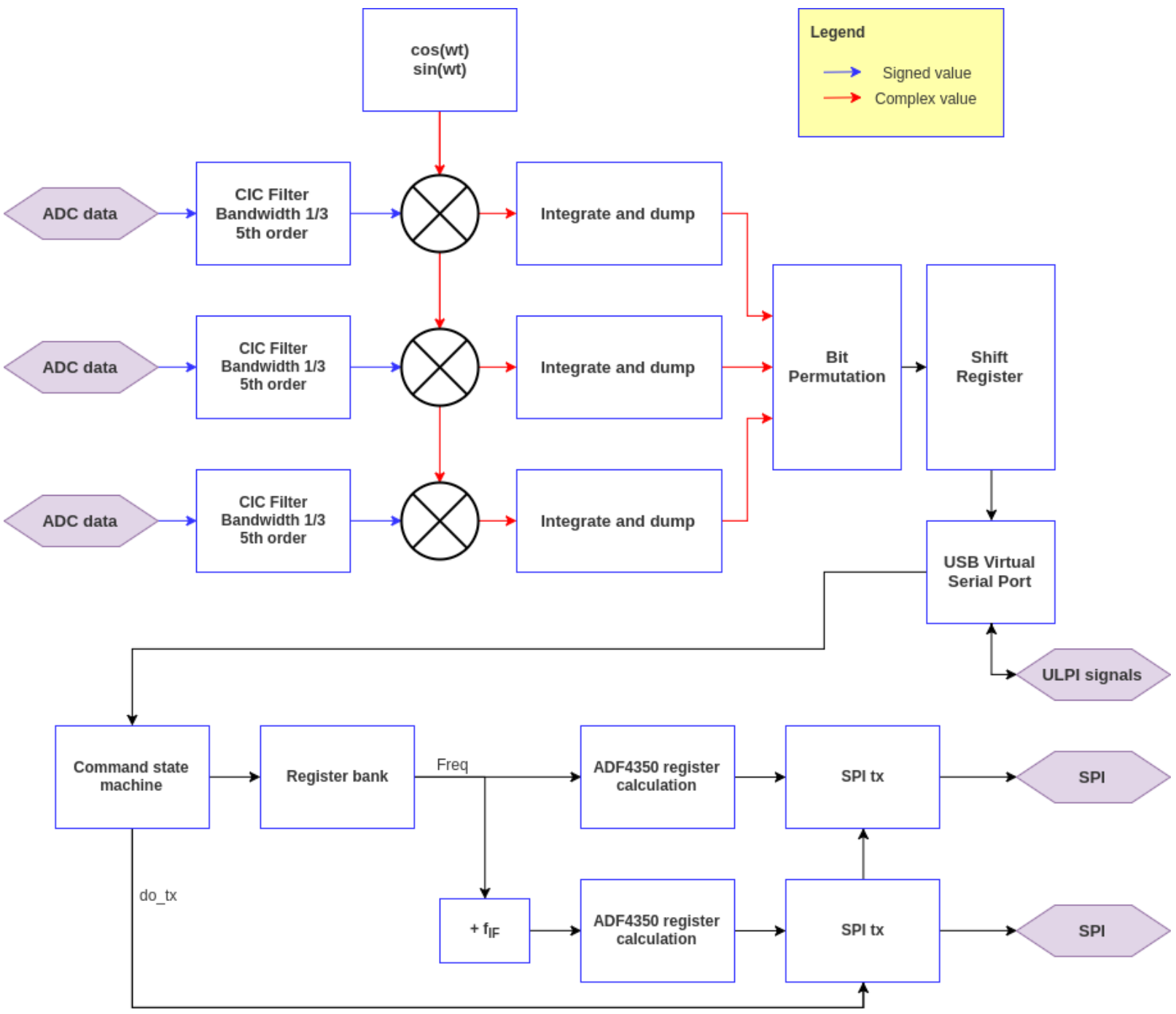
Receivers & interfacing



Signal generator



FPGA logic



Parts selection

T/R version

- fpga: XC6SLX9-2TQG144C
- adc: AD9200

- mixer: AD8342
- synthesizers: ADF4350
- rf switches: BGS14GA14
- programmable attenuator: PE4312

Full two port version

- fpga: XC6SLX9-2TQG144C
- adc: ADC10080
- adc driver: ADA4932-1
- mixer: AD8342
- synthesizers: ADF4351
- rf switches: RFSW6024, BGS12PL6
- programmable attenuator: PE4312