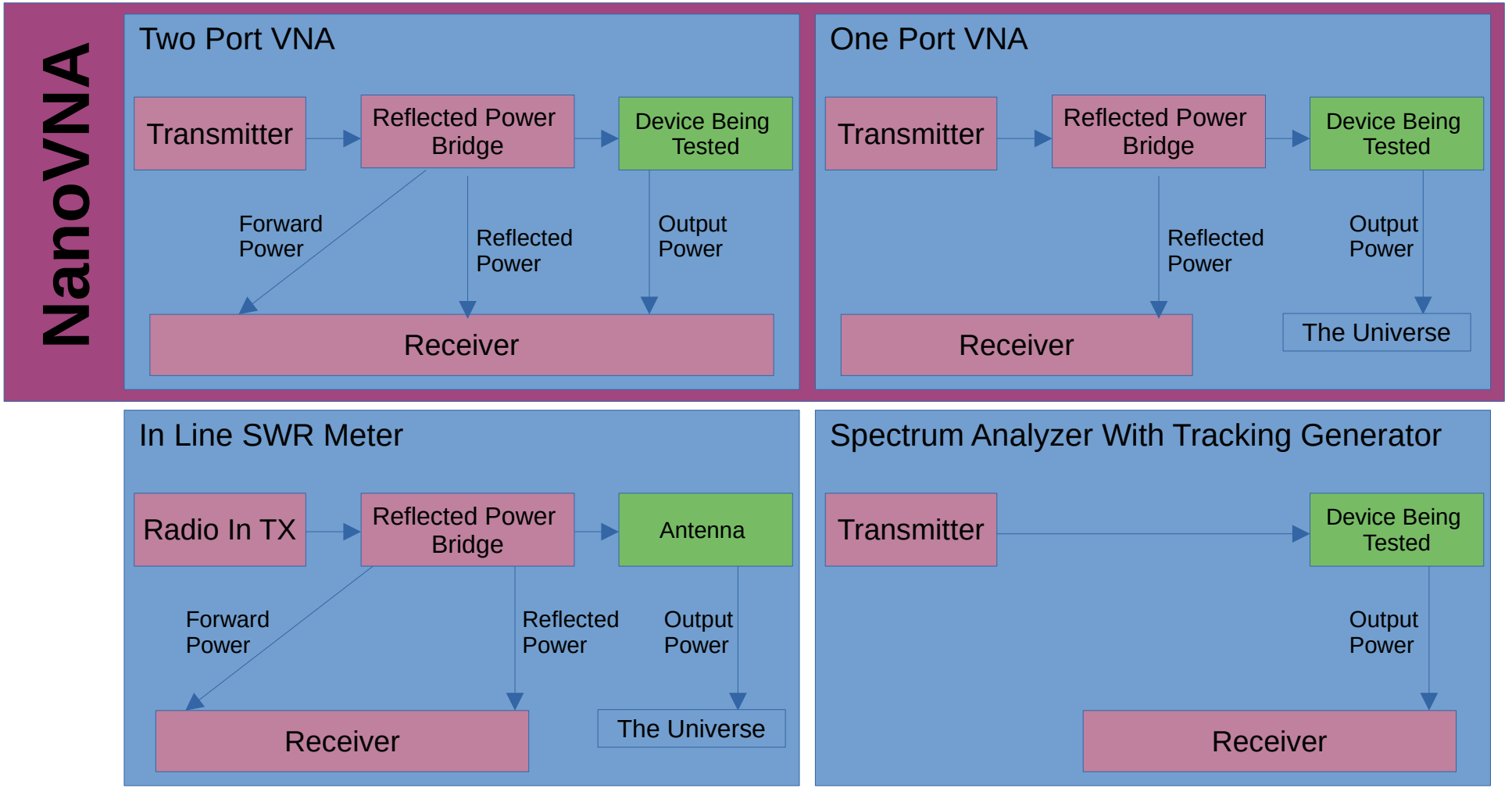
NanoVNA And TinySA at the end...

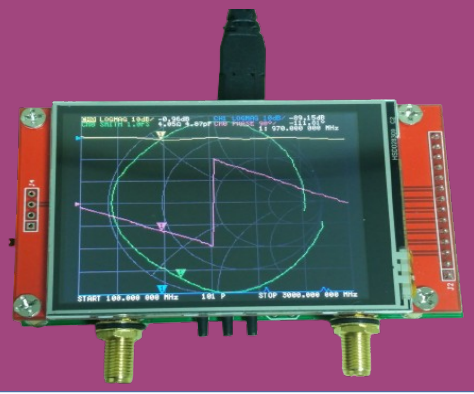
What is a VNA anyway?



NanoVNA Variants

Original

- 50 kHz – 900MHz
- 70dB (up to 1.5GHz), 60dB (up to 3GHz)
- SA512A
- Noise -50dB (up to 1.5GHz), -40dB (up to 3GHz)
- 100 points/s Sweep rate
- 2.8", 320 x 240 Display
- Micro USB

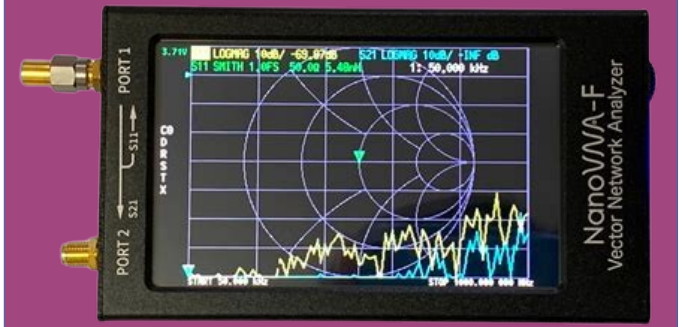


H/H4

- 10KHz to 1500MHz Range
- Dynamic Range 70dB (50KHz-300MHz), 60dB (300-900MHz), 40dB (900-1500MHz)
- 0dbm TX
- 2.8” 320x240 (H) / 4” 320x480
- USBC

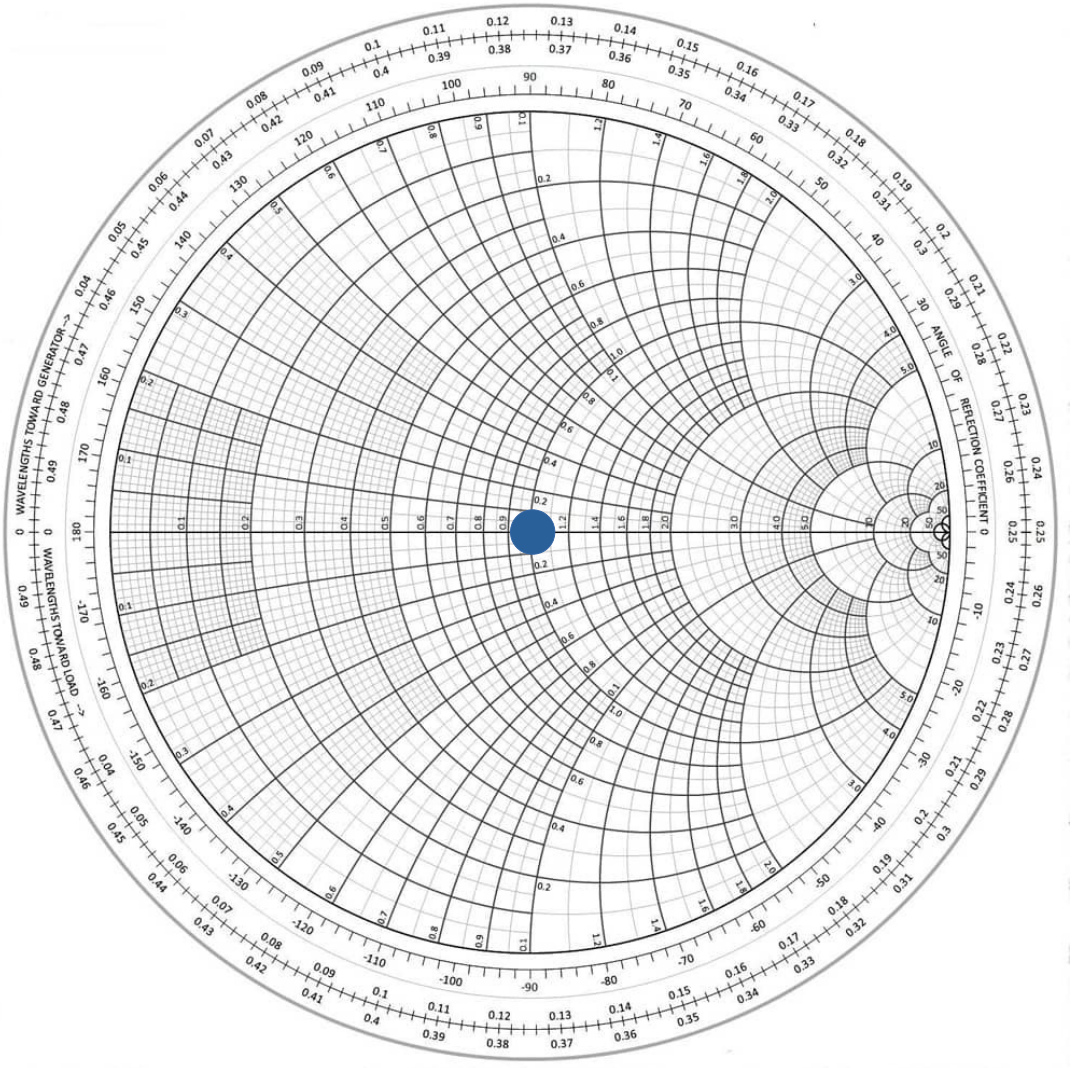
F

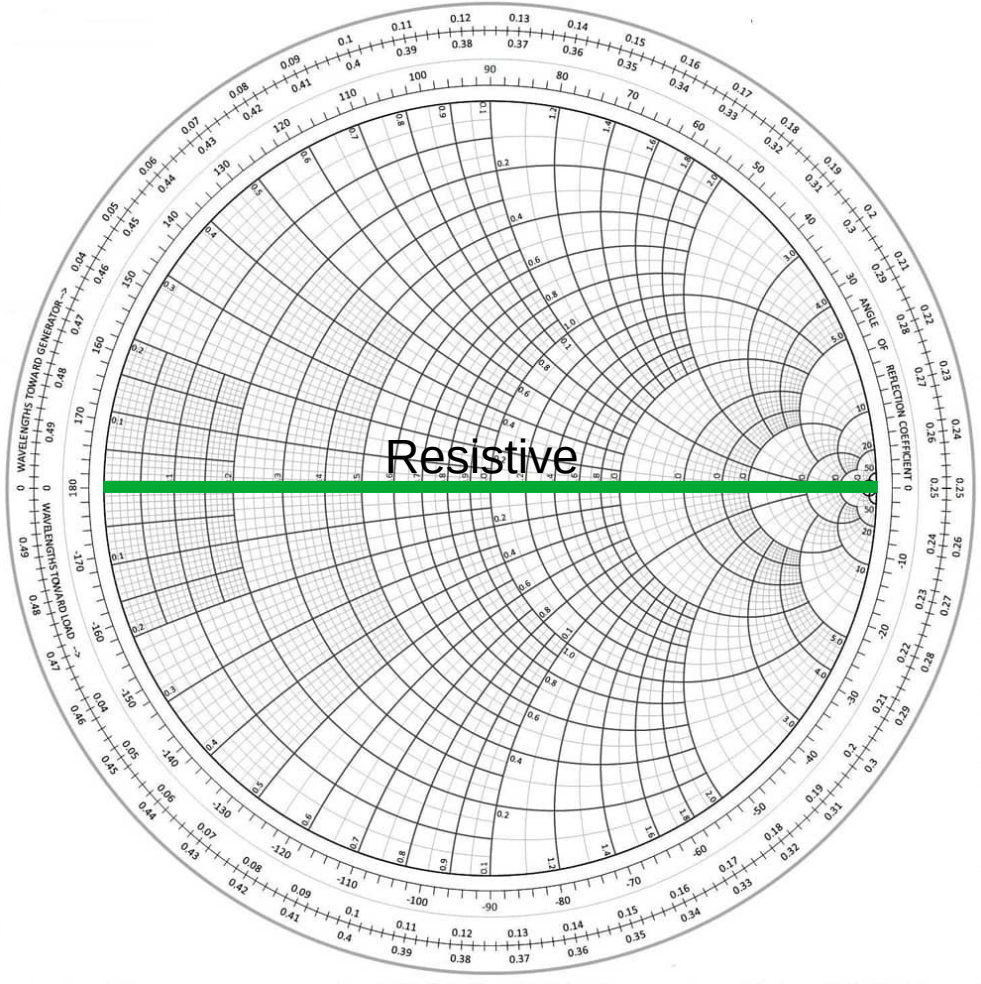
- 50kHz to 1500Mhz Range
- Dynamic Range (S11) 60dB (50kHz-300MHz) 50 dB (300MHz-300MHz) 40dB (600MHz-1000MHz)
- Dynamic Range (S21) 70dB (50kHz-300MHz) 70 dB (300MHz-300MHz) 60dB (600MHz-1000MHz)
- 4.3” Display

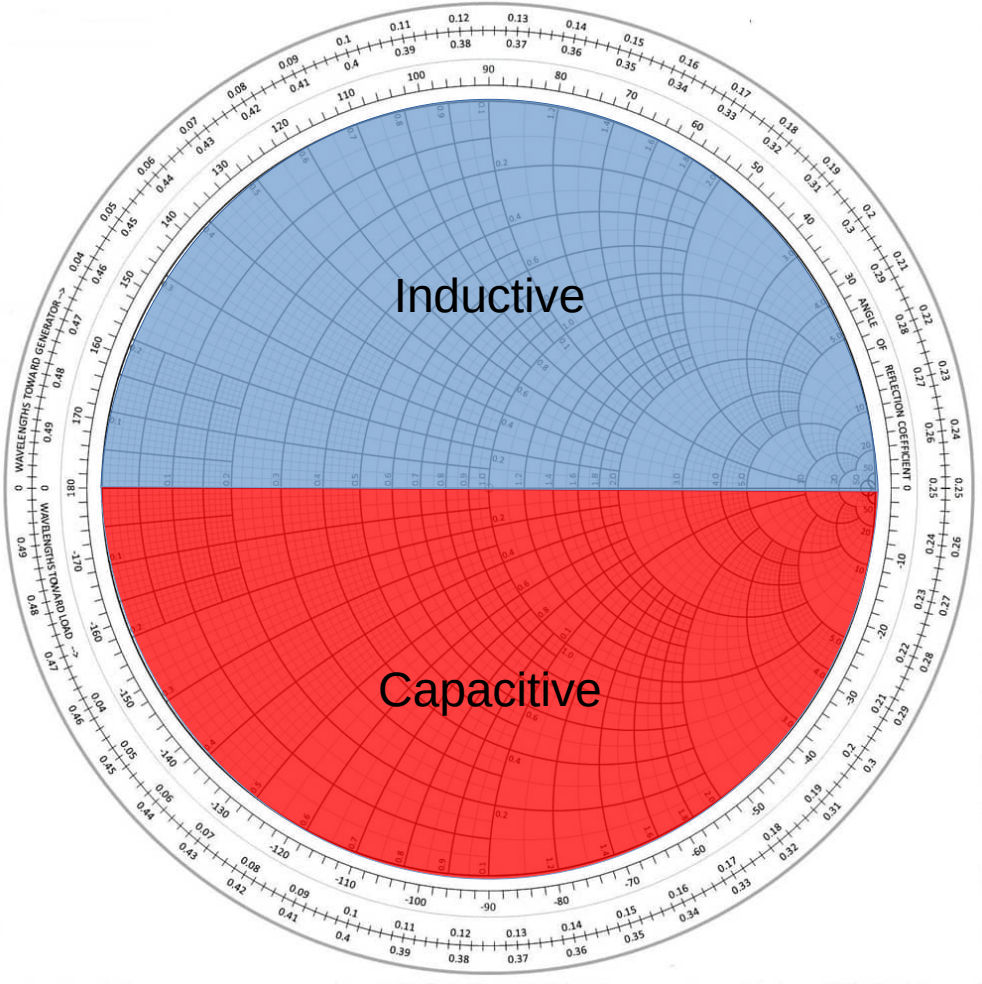


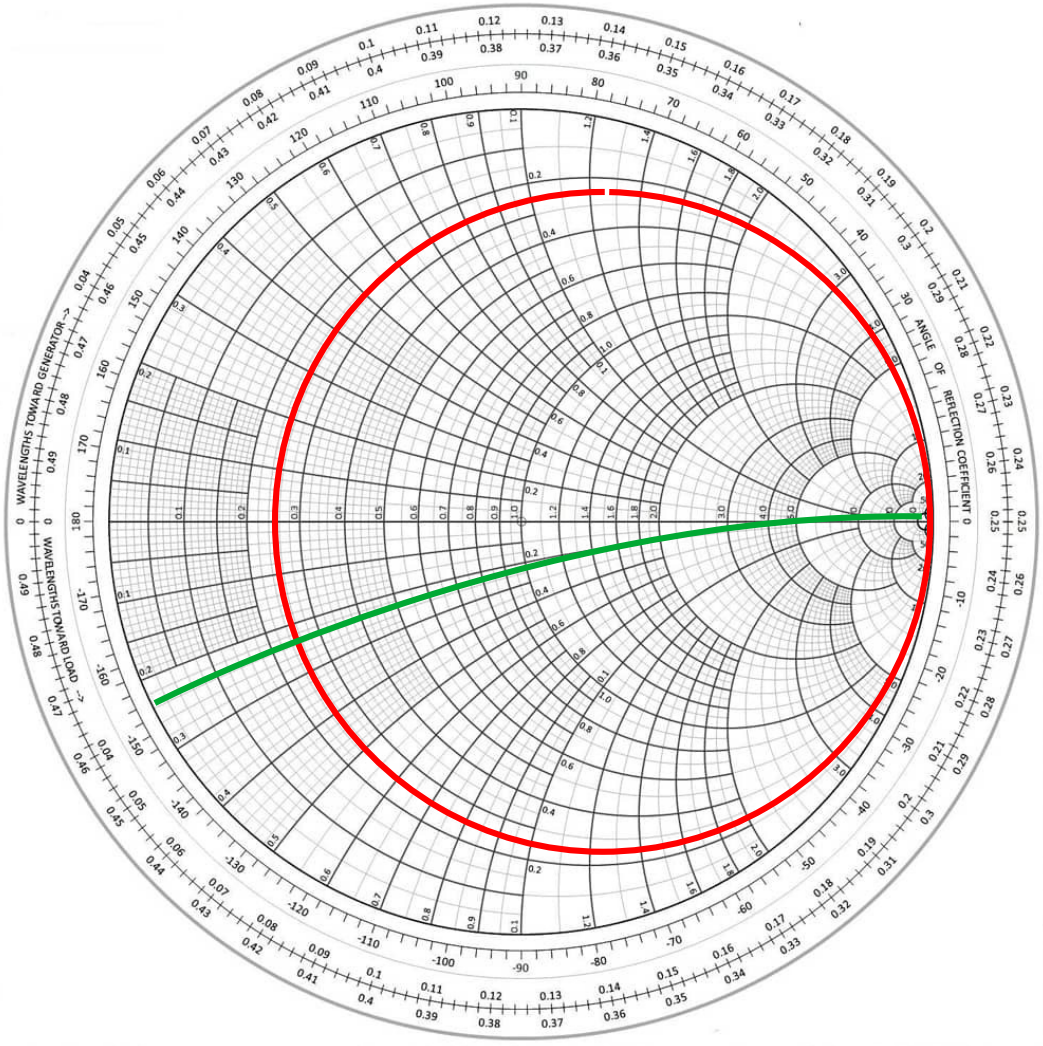
Smith Charts

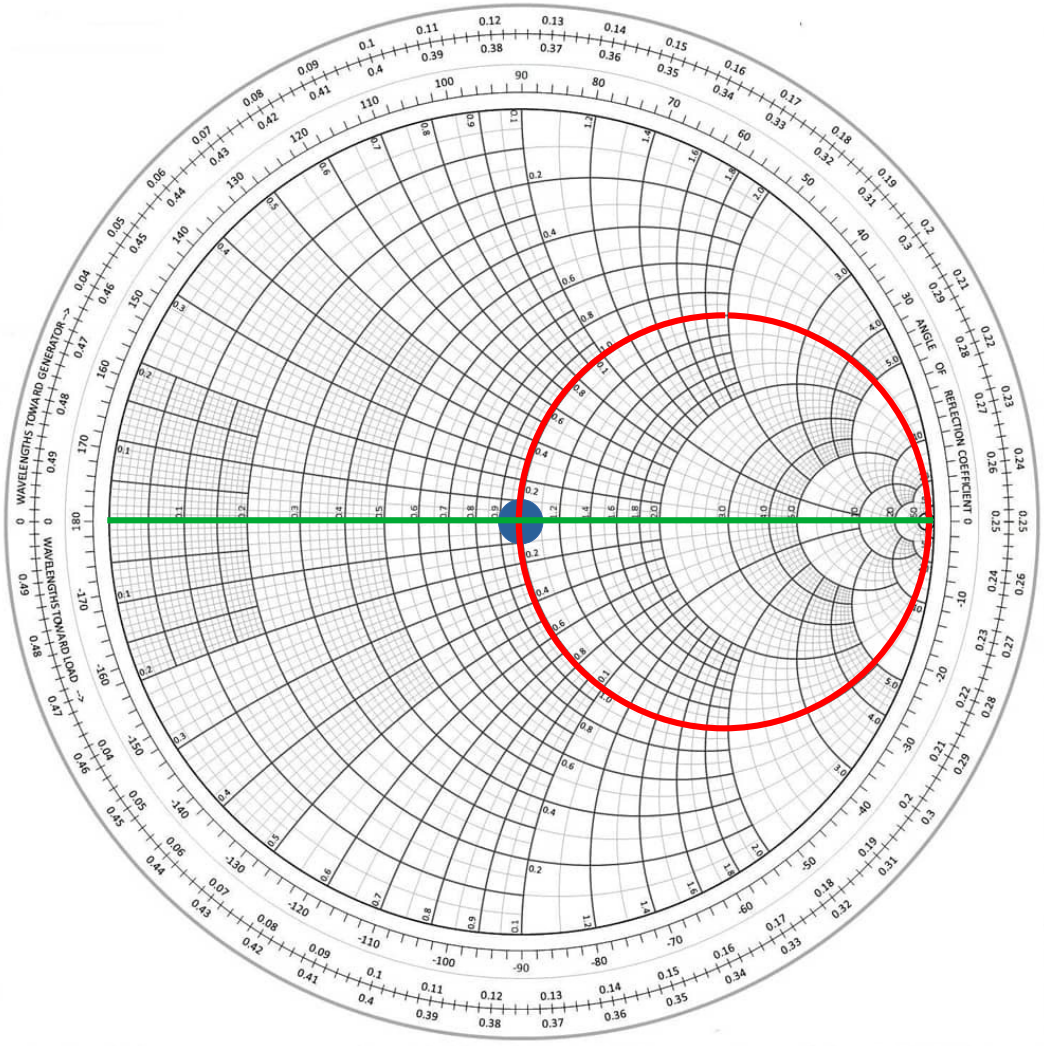
- Show Complex impedance
- Composed of reactance and resistance



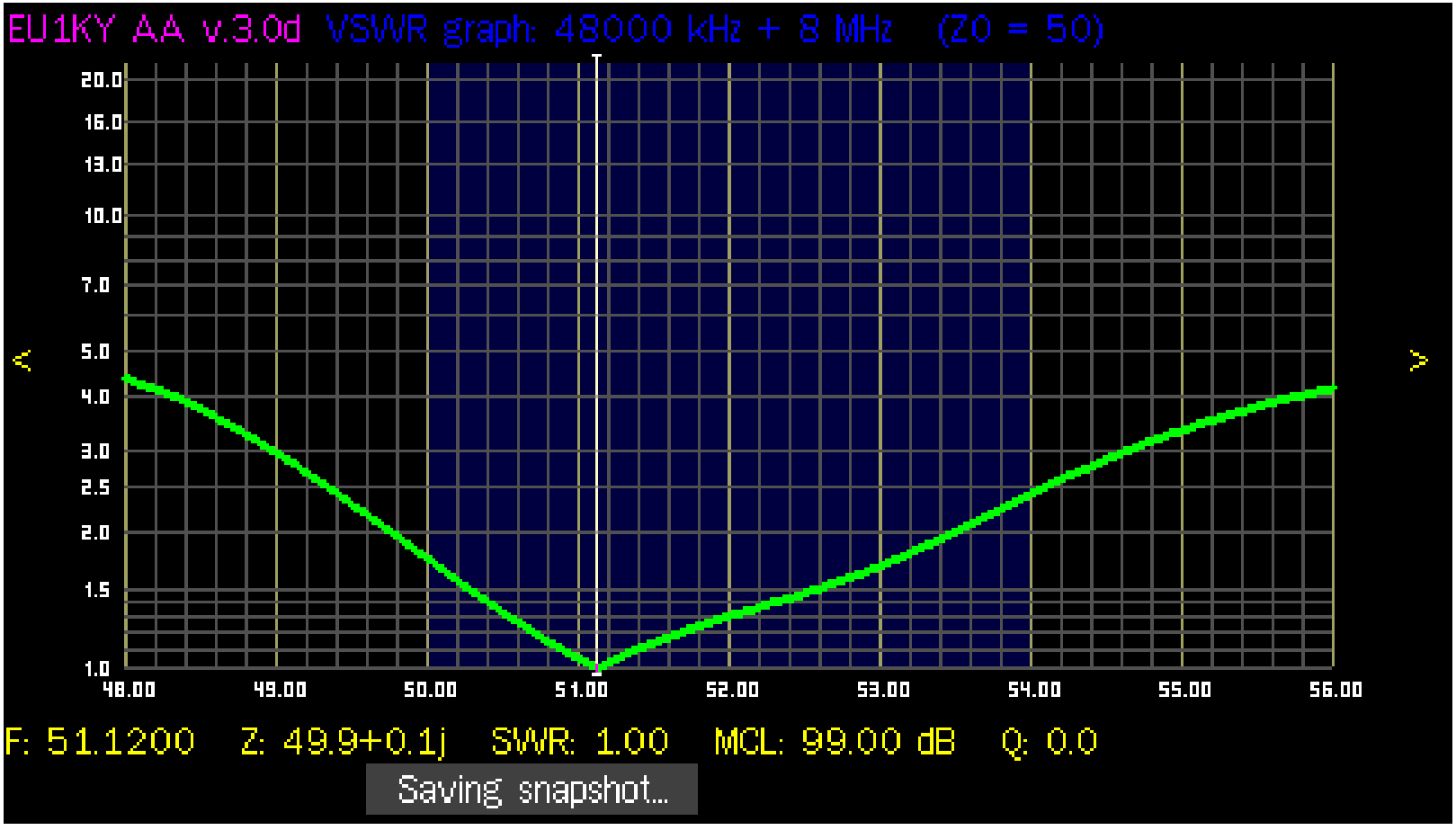

Resistive


Inductive
Capacitive

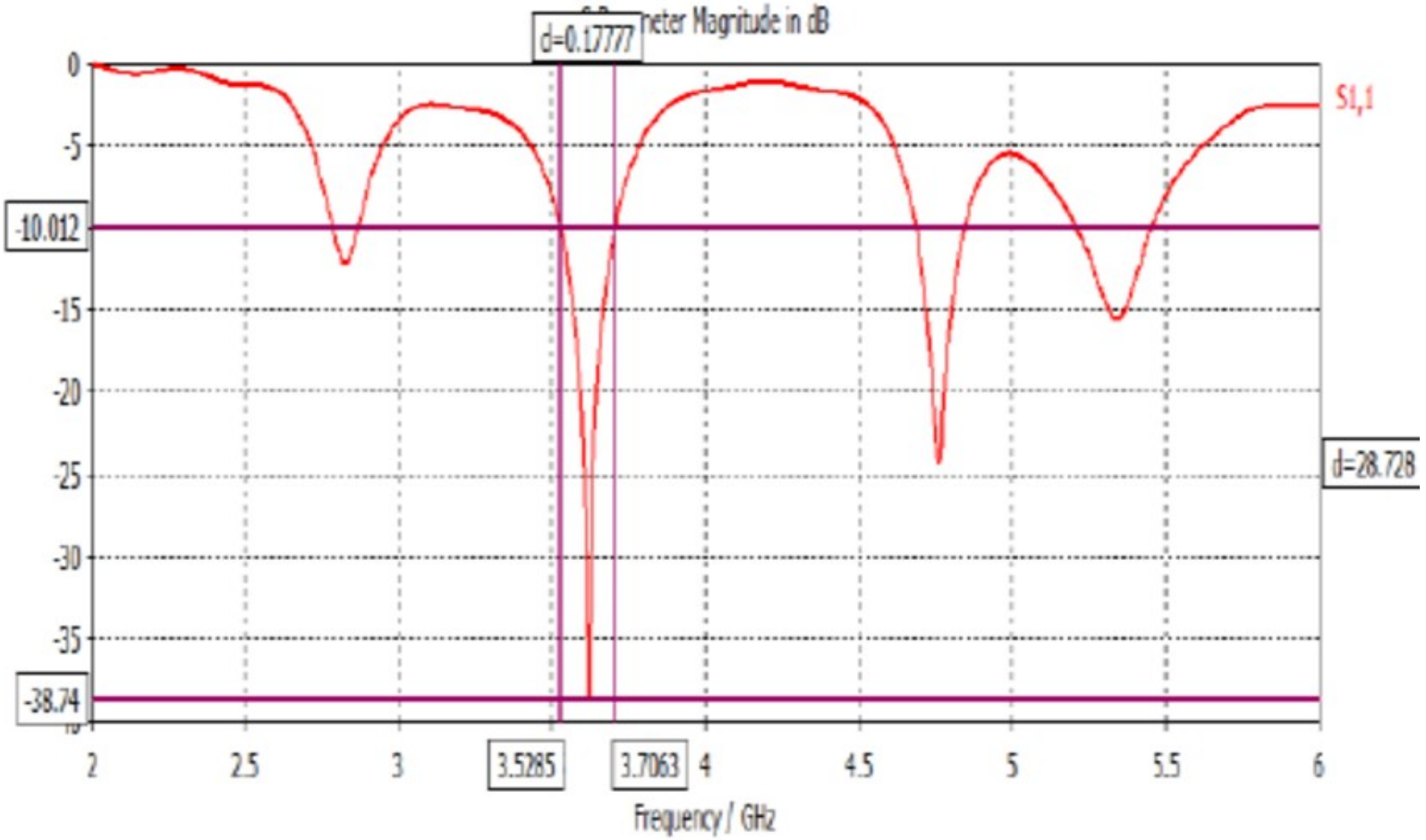

WAVELENGTHS TOWARD GENERATOR -->
WAVELENGTHS TOWARD LOAD -->
ANGLE OF REFLECTION COEFFICIENT


WAVELENGTHS TOWARD GENERATOR -->
WAVELENGTHS TOWARD LOAD -->
ANGLE OF REFLECTION COEFFICIENT

SWR Charts


EU1KY AA v.3.0d VSWR graph: 48000 kHz + 8 MHz (Z0 = 50)
20.0
16.0
13.0
10.0
7.0
5.0
4.0
3.0
2.5
2.0
1.5
1.0
48.00
49.00
50.00
51.00
52.00
53.00
54.00
55.00
56.00
F: 51.1200 Z: 49.9+0.1j SWR: 1.00 MCL: 99.00 dB Q: 0.0
Saving snapshot...

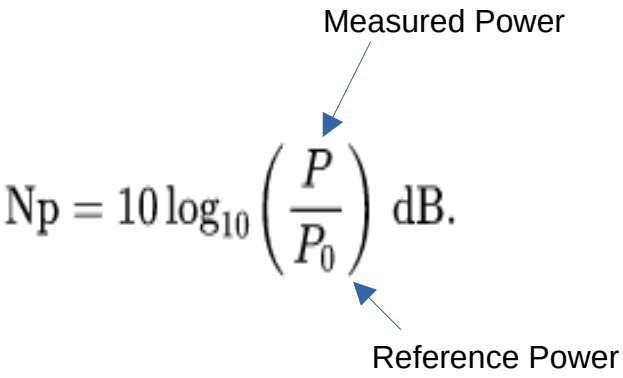
Return Loss (S11) / Through Loss (S21) Charts



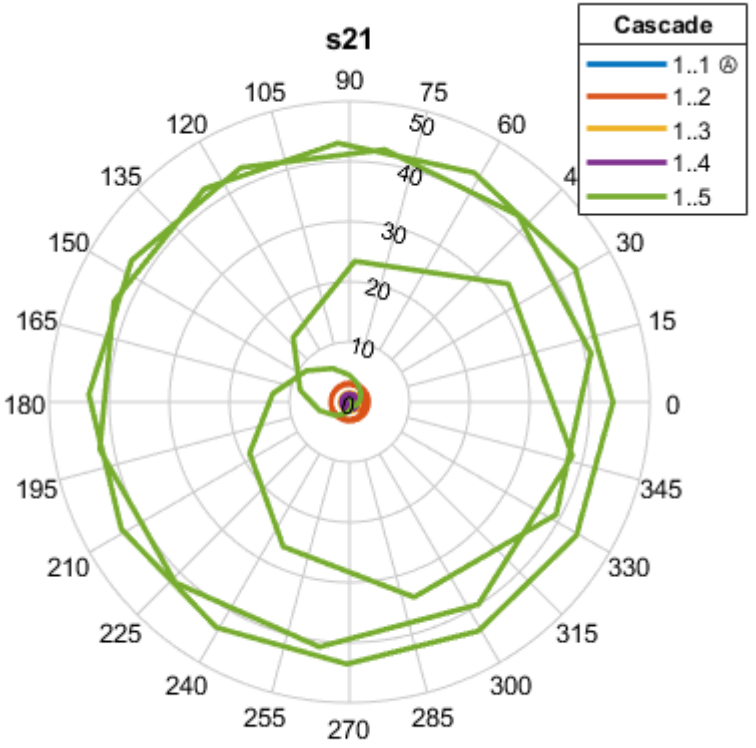
Decibels (dB)

To convert from POWER unit to Decibels:
- Get ratio between measured and reference power
- Take base 10 log of that
- Multiply by ten (for dB) (Ignore for bels)

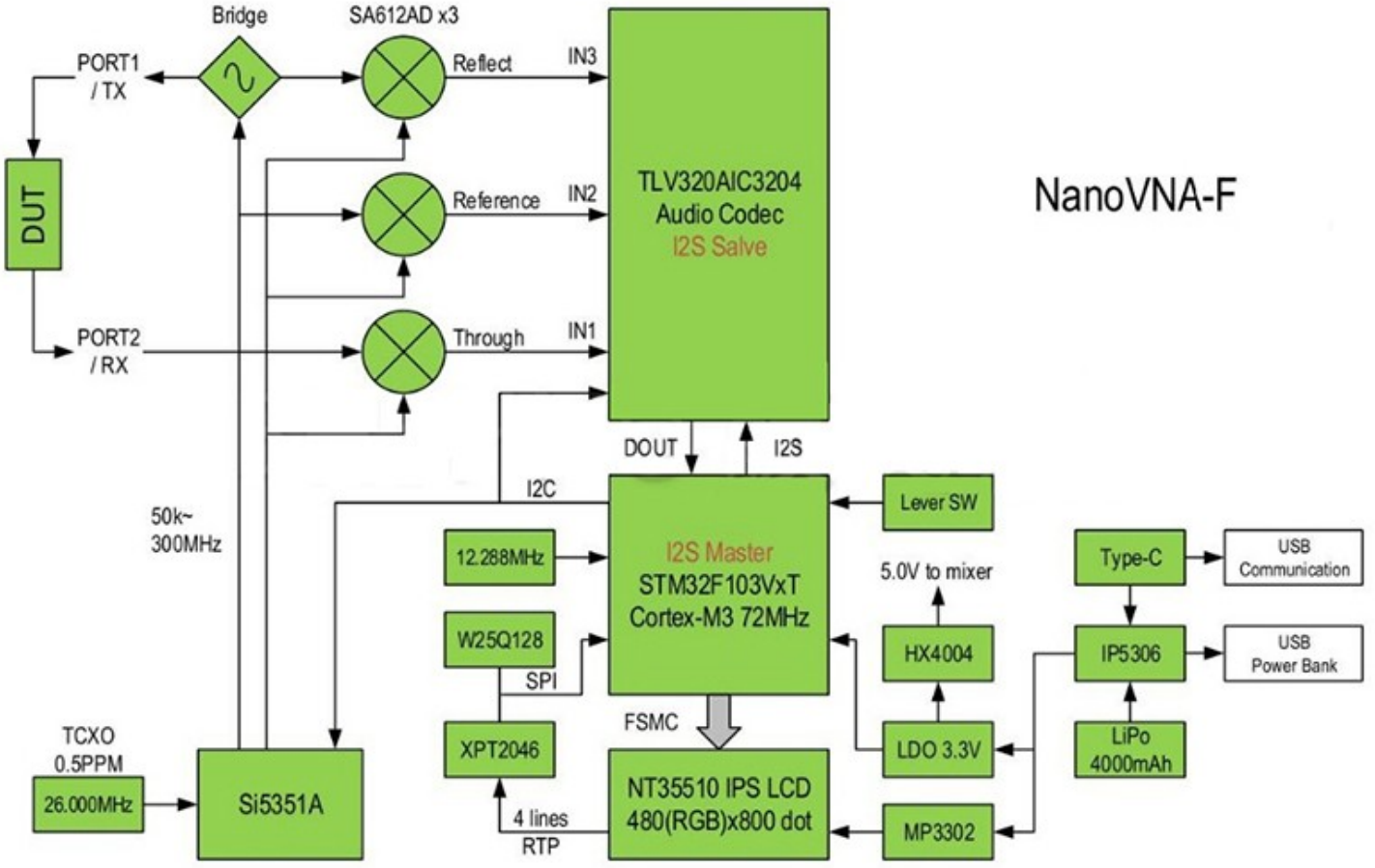
To convert Decibels to POWER unit:
- Divide by ten
- Take inverse base 10 log
- Multiply or divide so the ratio's denominator is 1



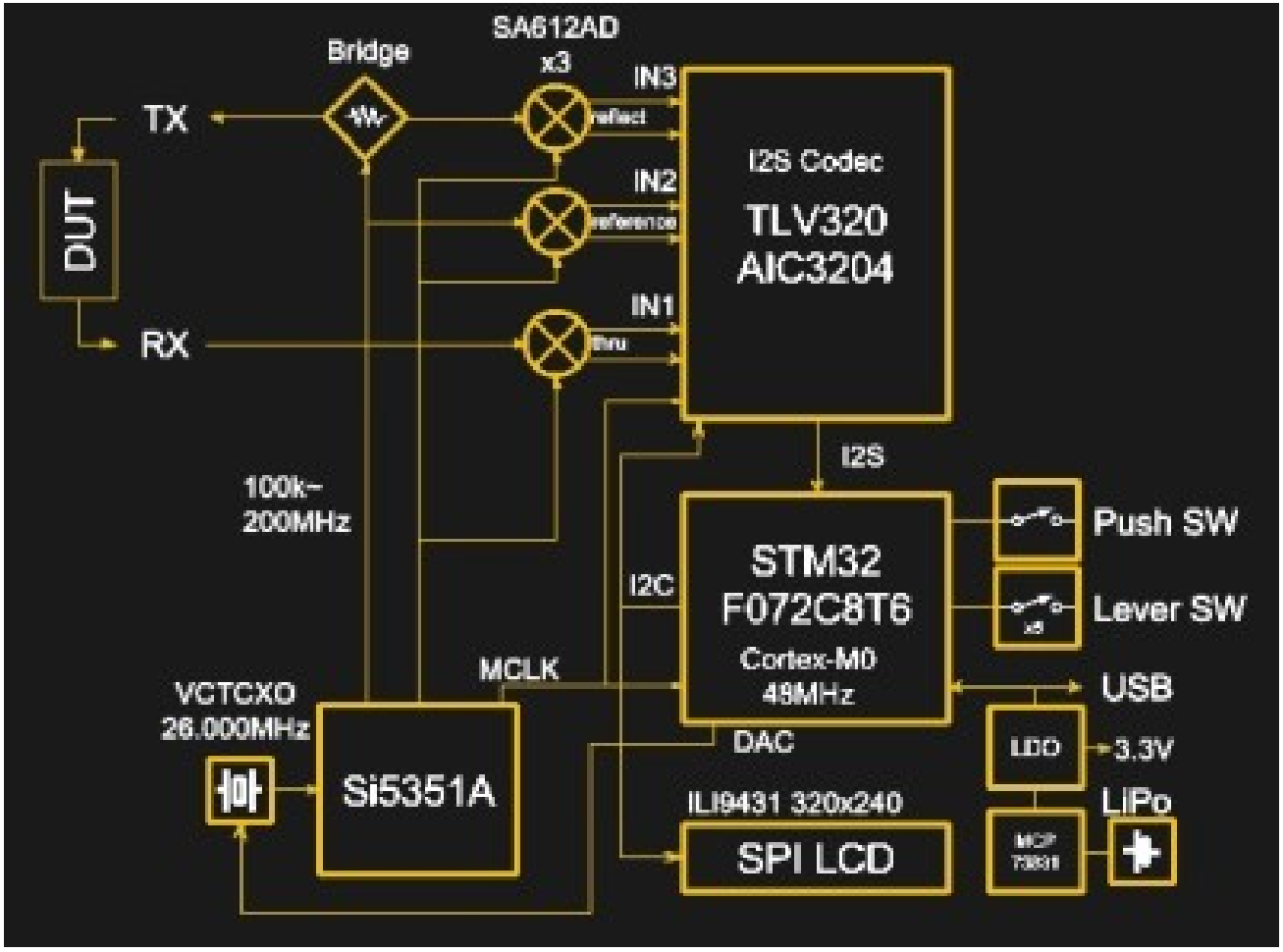
Phase Charts



NanoVNA F Diagram

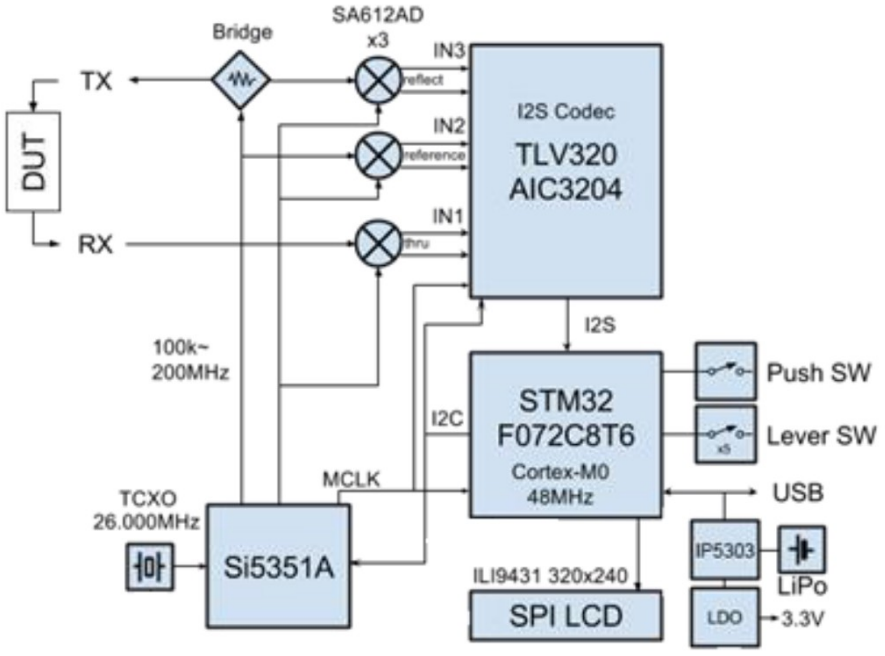


NanoVNA Original Diagram



NanoVNA H Original Diagram

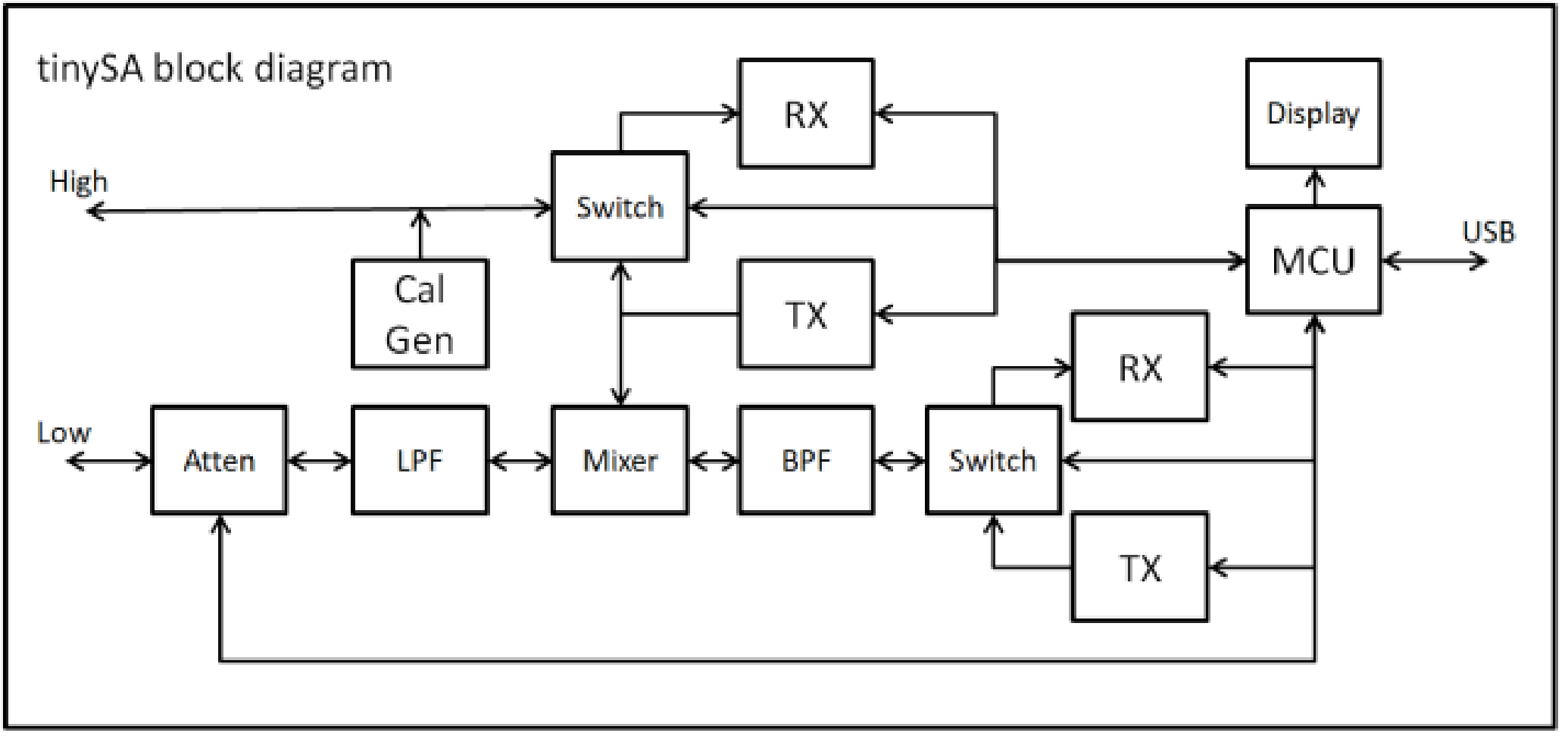
Block diagram：



https://github.com/hugen79/NanoVNA-H/blob/master/doc/NanoVNA%20User%20Guide_20190711.pdf

TinySA

Spectrum Analyzer with two inputs, high quality MF/HF/VHF input for 0.1MHZ-350MHz, lesser quality UHF input for 240MHz-960MHz or
Signal Generator with two output, sinus output for 0.1MHz - 350MHz and square wave output for 240MHz-960MHz when not used as Spectrum Analyzer.
Switchable resolution bandpass filters for both ranges between 2.6kHz and 640kHz
Color display showing 290 scan points covering up to the full low or high frequency range.
Input Step attenuator from 0dB to 31dB for the MF/HF/VHF input.
A built-in calibration signal generator that is used for automatic self test and low input calibration.
Connected to a PC via USB it becomes a PC controlled Spectrum Analyzer or Signal Generator
Rechargeable battery allowing a minimum of at least 2 hours portable use
Max input level +10dBm. Do not destroy your tinySA
Due to the low cost and very small form factor there are certain relevant limitations.


tinySA block diagram
RX
Display
High
Switch
USB
MCU
Cal
Gen
TX
RX
Low
Atten
LPF
Mixer
BPF
Switch
TX