The Nano-VNA: Introduction and Demo of Calibration & Measurement procedures

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Content

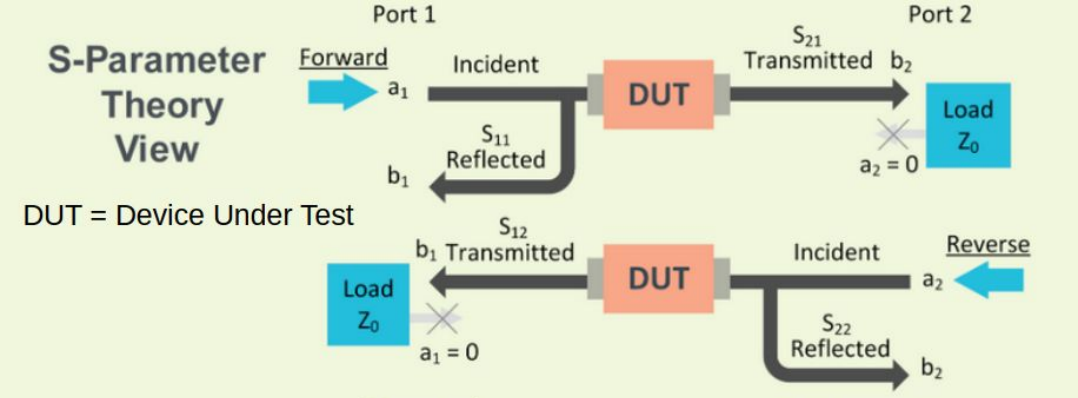
1. Basic specifications
2. Nano-VNA's interface
3. Calibration procedure and demo
4. Measurement procedure and demo

Basic specifications

- Nano-VNA v2: Basically a VNA, but smaller, cheaper but with fewer features
- Frequency range: 50kHz ~ 3 GHz

Nano-VNA's Interface

Calibration procedure and demo



	Forward:	Reverse:
Reflection:	$S_{11} = \frac{\text{Reflected}}{\text{Incident}} = \frac{b_1}{a_1}\Big\vert_{a_2=0}$	$S_{22} = \frac{\text{Reflected}}{\text{Incident}} = \frac{b_2}{a_2}\Big\vert_{a_1=0}$
Transmission:	$S_{21} = \frac{\text{Transmitted}}{\text{Incident}} = \frac{b_2}{a_1}\Big\vert_{a_2=0}$	$S_{12} = \frac{\text{Transmitted}}{\text{Incident}} = \frac{b_1}{a_2}\Big\vert_{a_1=0}$

Types of calibration

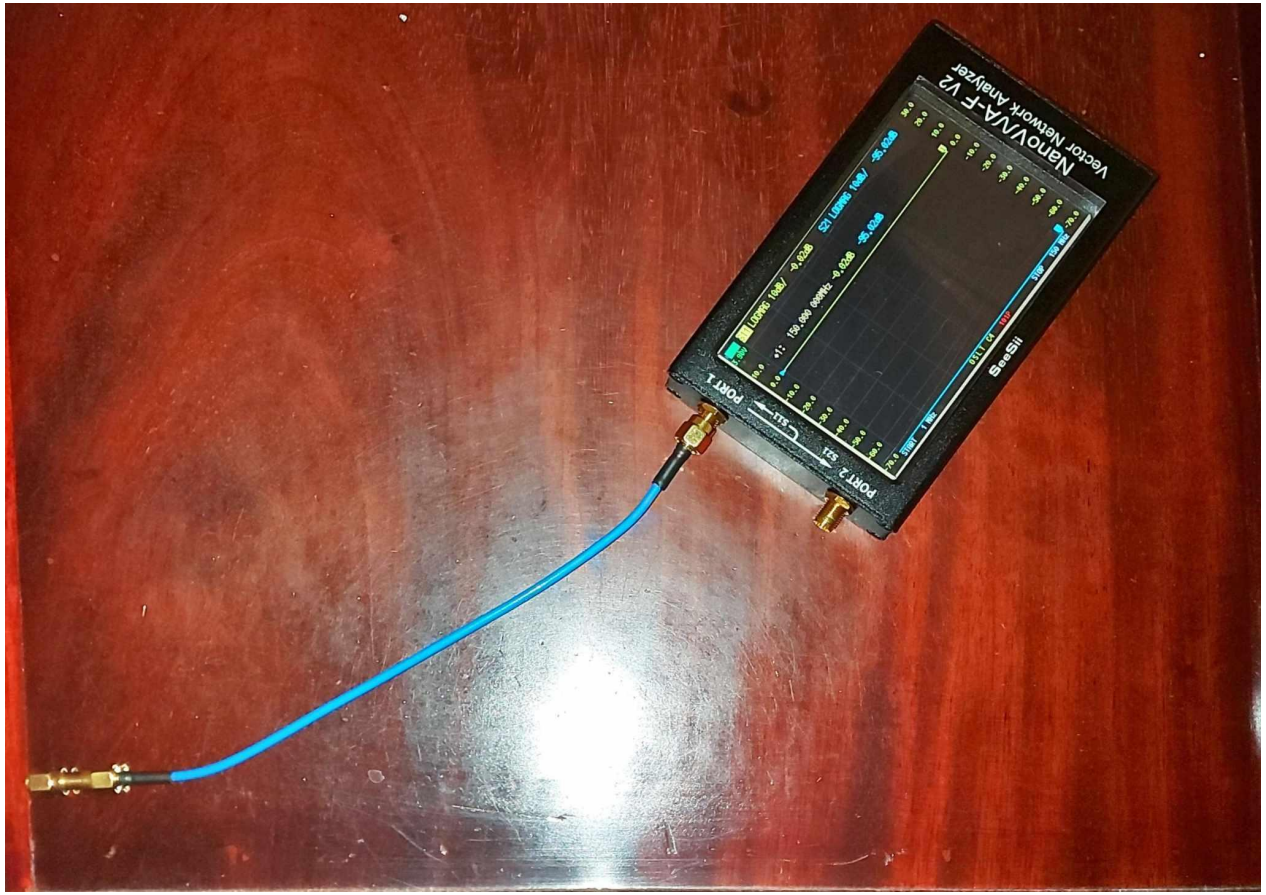
- Open
- Short
- Load
- Thru

1 port

2 ports

Calibration: Open

- **Connect the Open connector to the Nano-VNA**



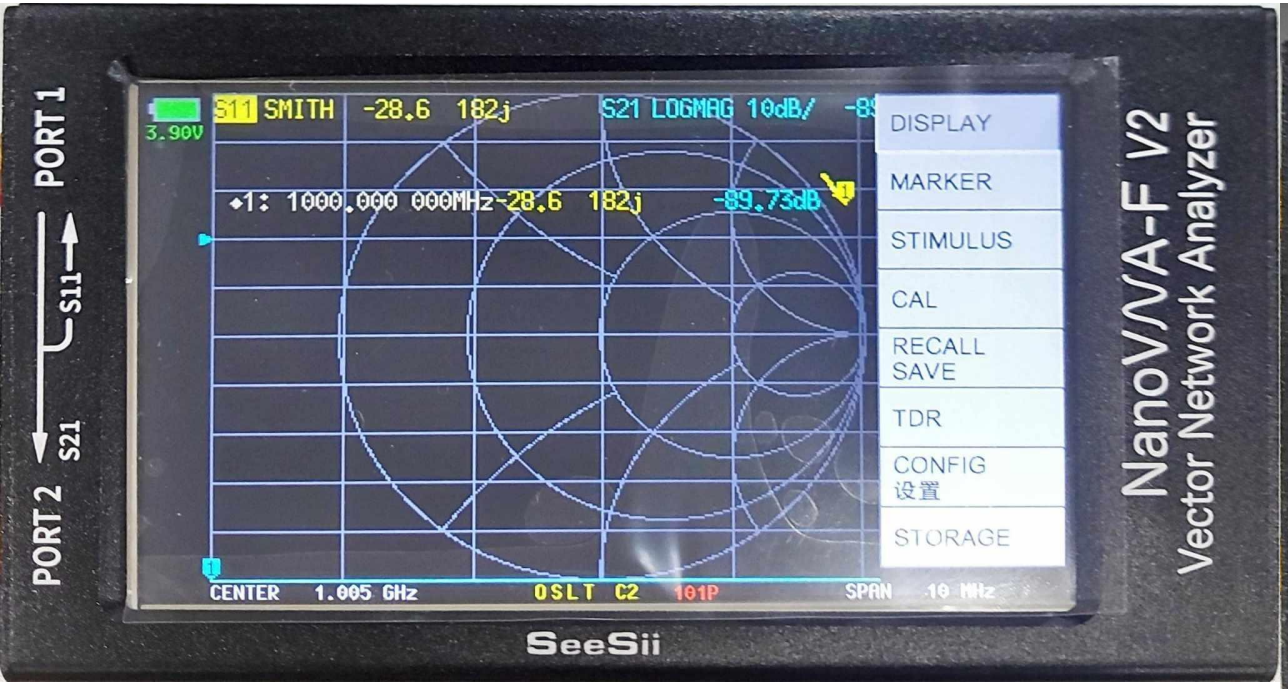
Calibration: Open

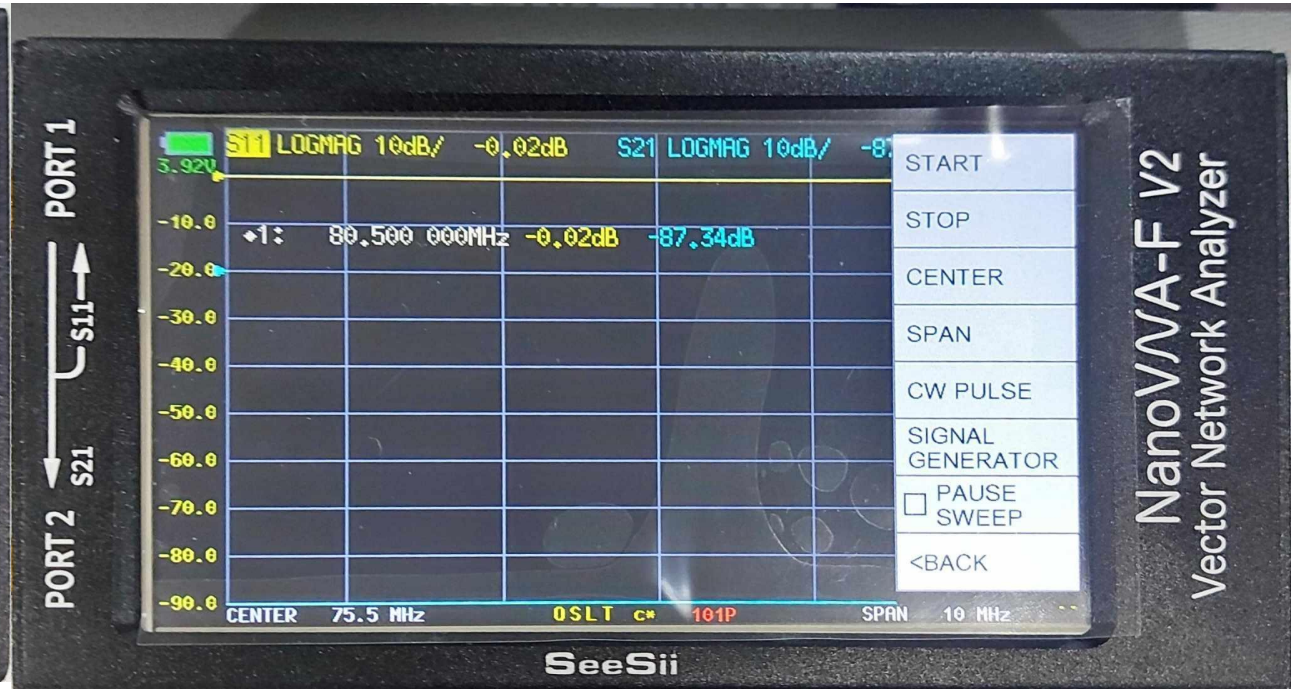
- **Set the Center Frequency and Span/ Start, Stop Frequency and Span**

- Depends on the frequency range of what is going to be measured later to set the appropriate values

Calibration: Open

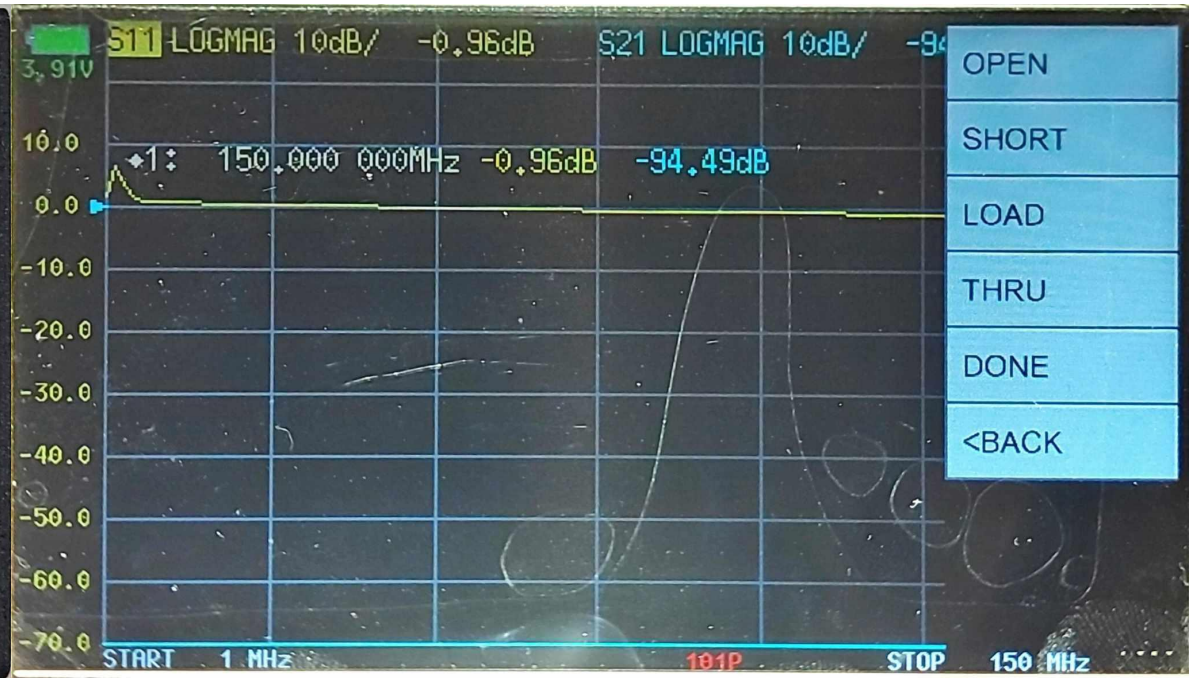
- **Set the Center Frequency and Span**





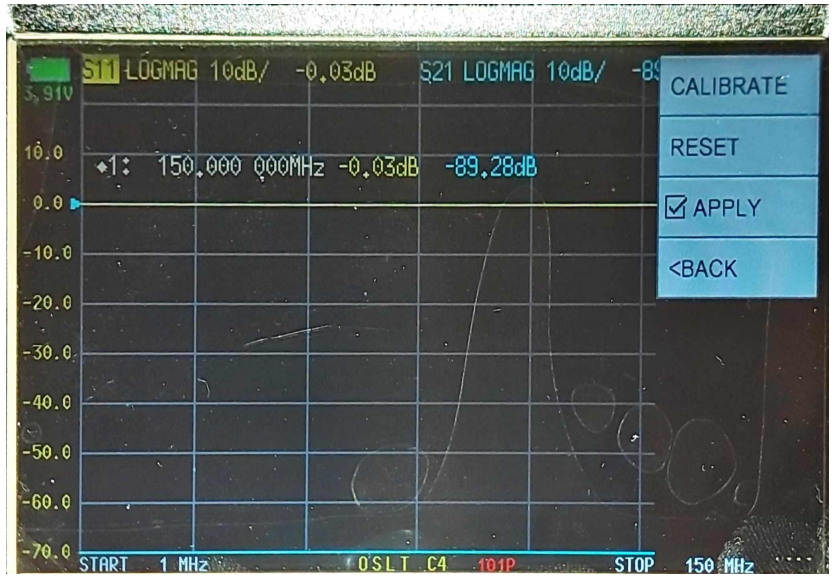
Calibration: Open

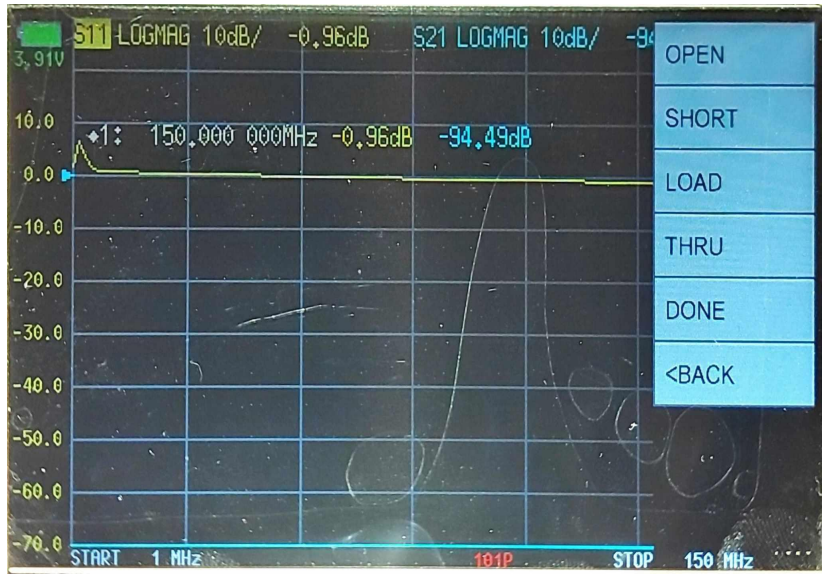
- **Set the Center Frequency and Span**



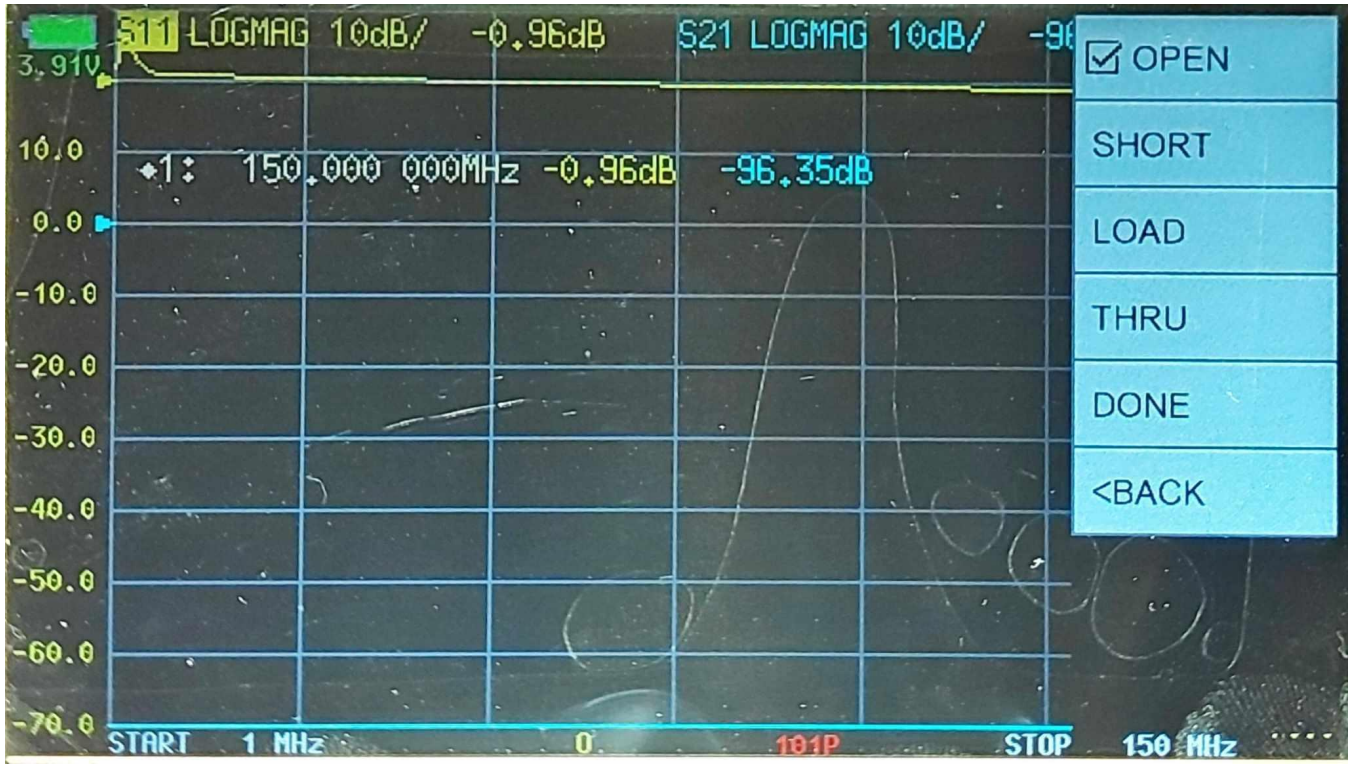
Calibration: Open

- **Perform Open Calibration**

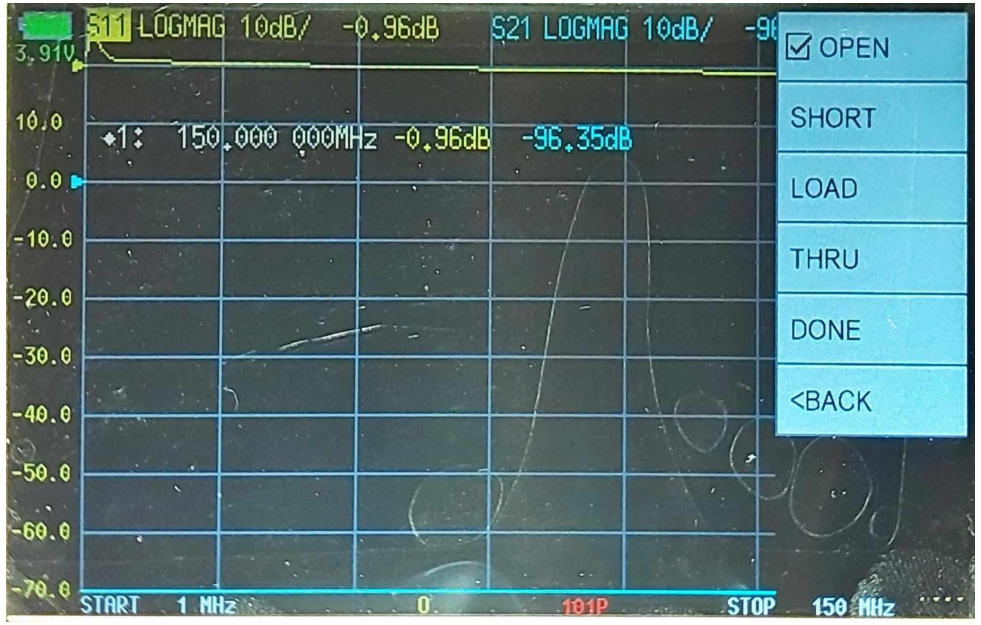




Calibration: Open



Calibration: Short

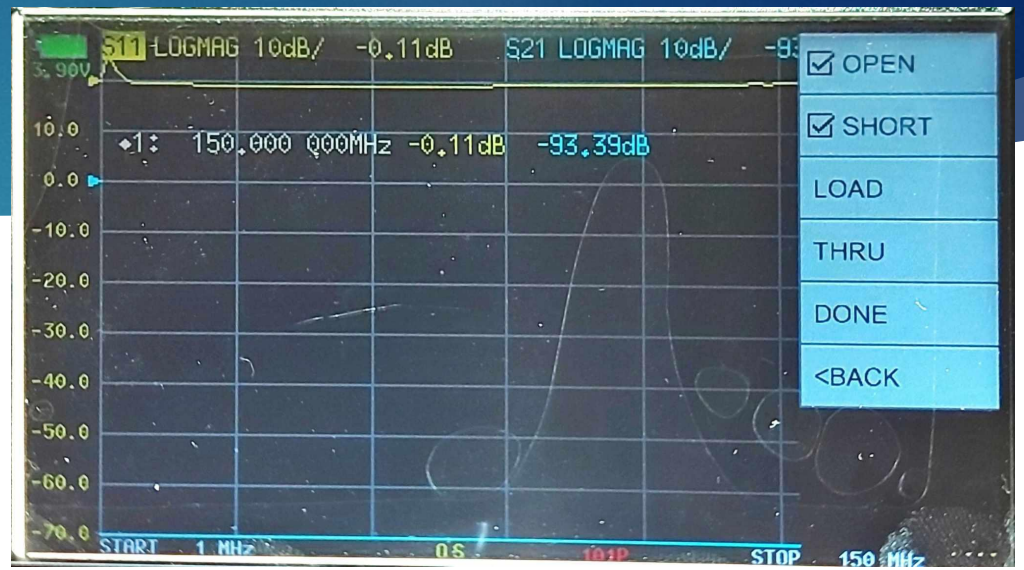


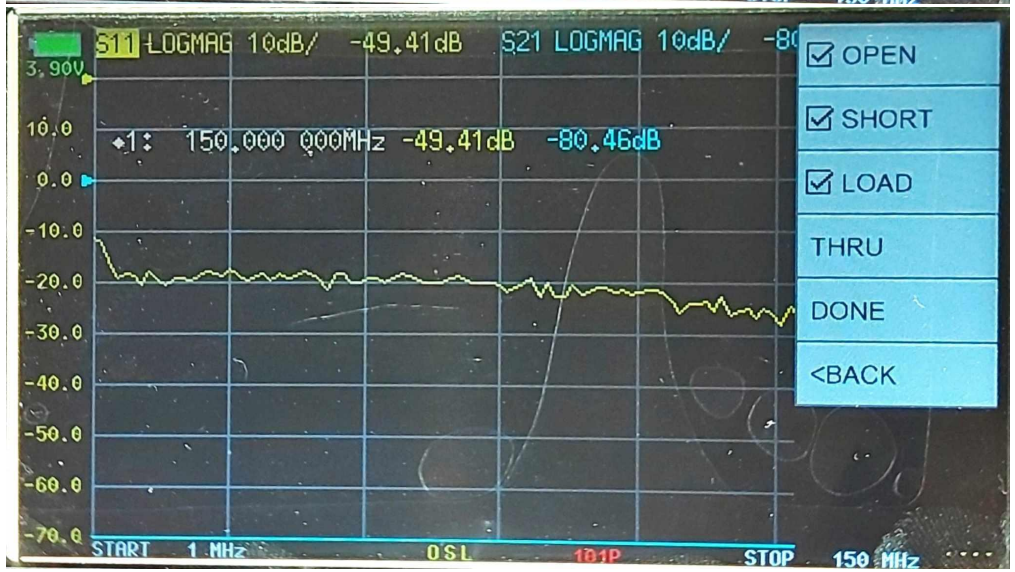
Calibration: Load

- Load is a **50 ohm** connector

Why?

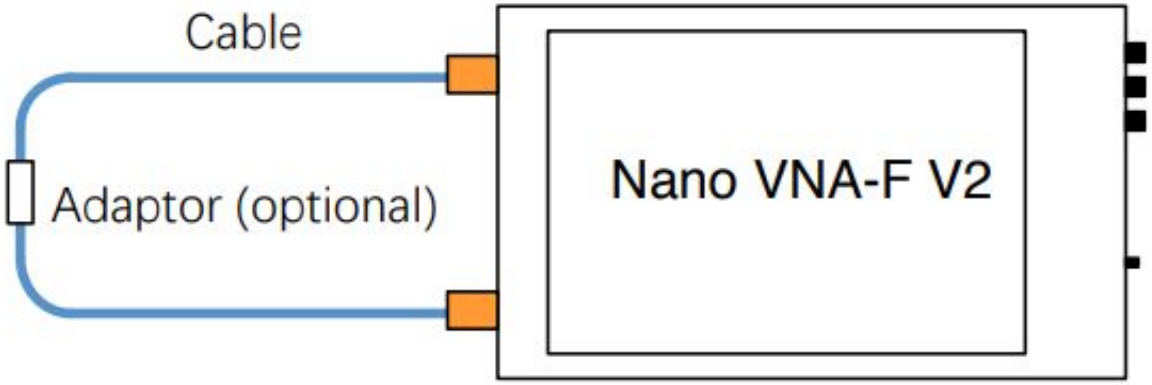
Cables with 50 Ohm impedance are commonly used in RF applications

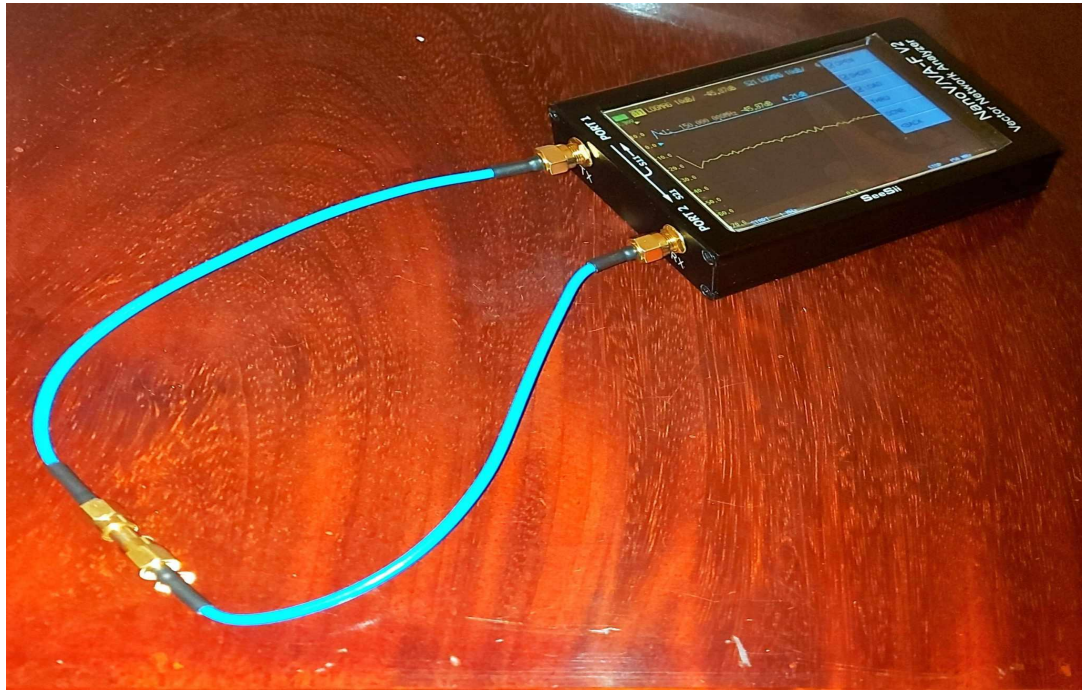




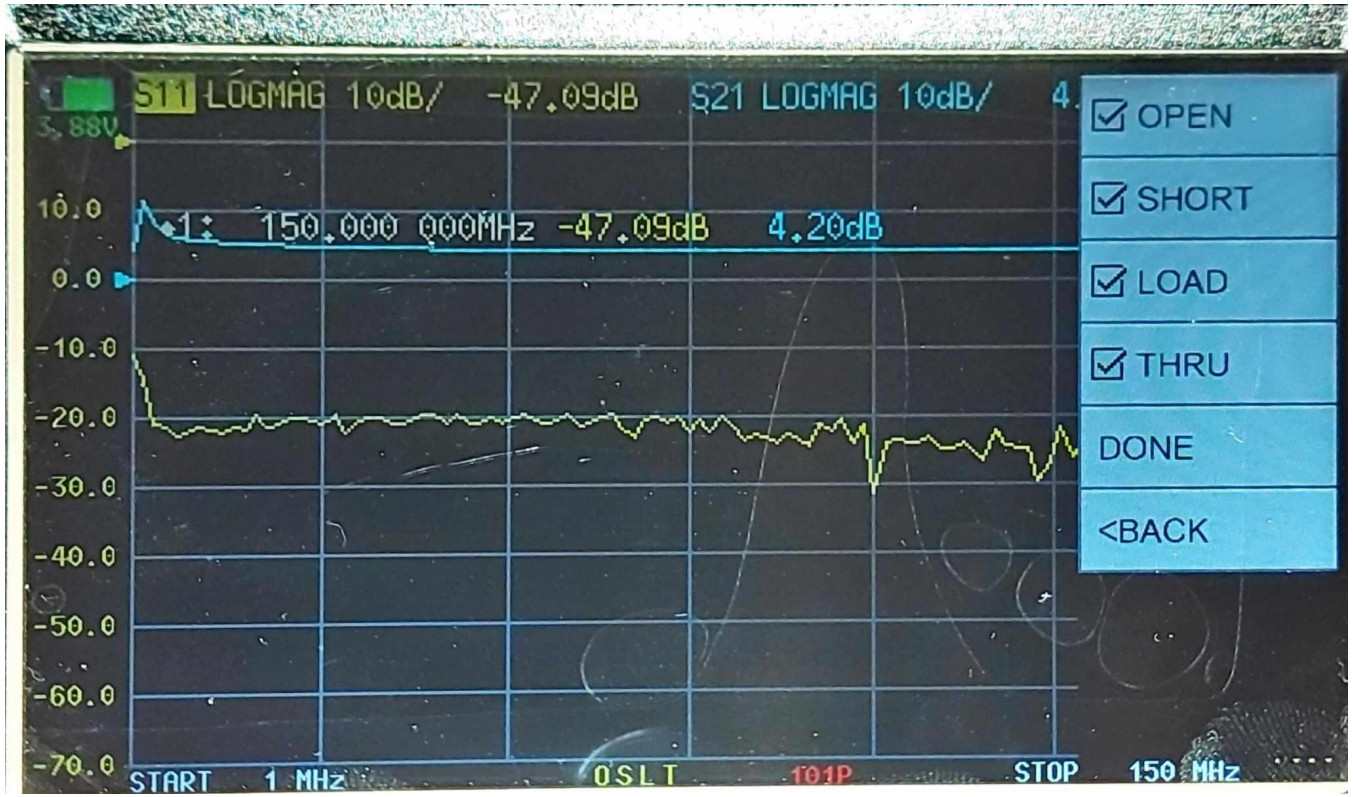
Calibration: Thru

- Requires both ports of the Nano-VNA



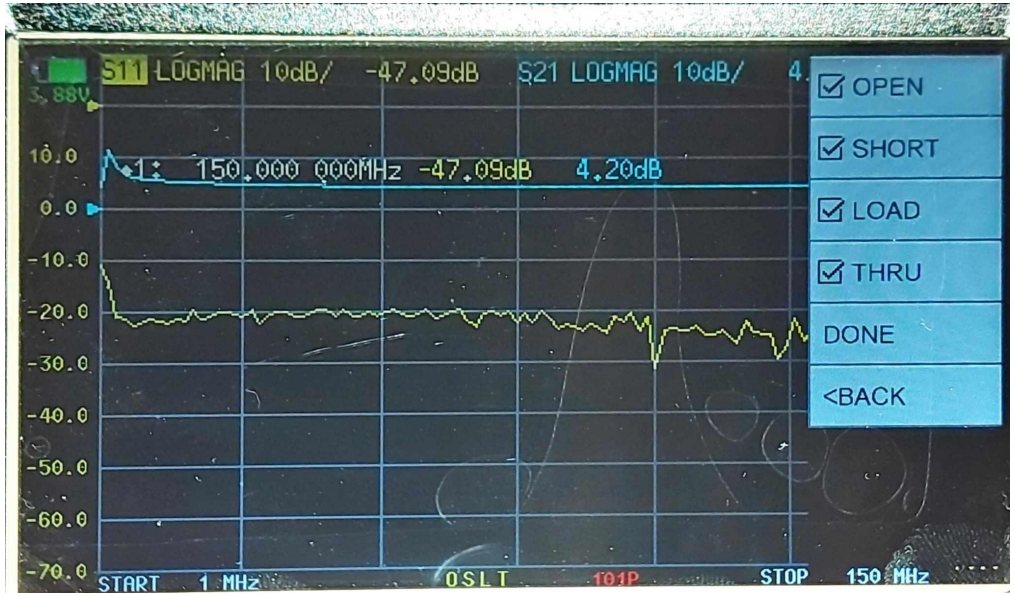


Calibration: Thru



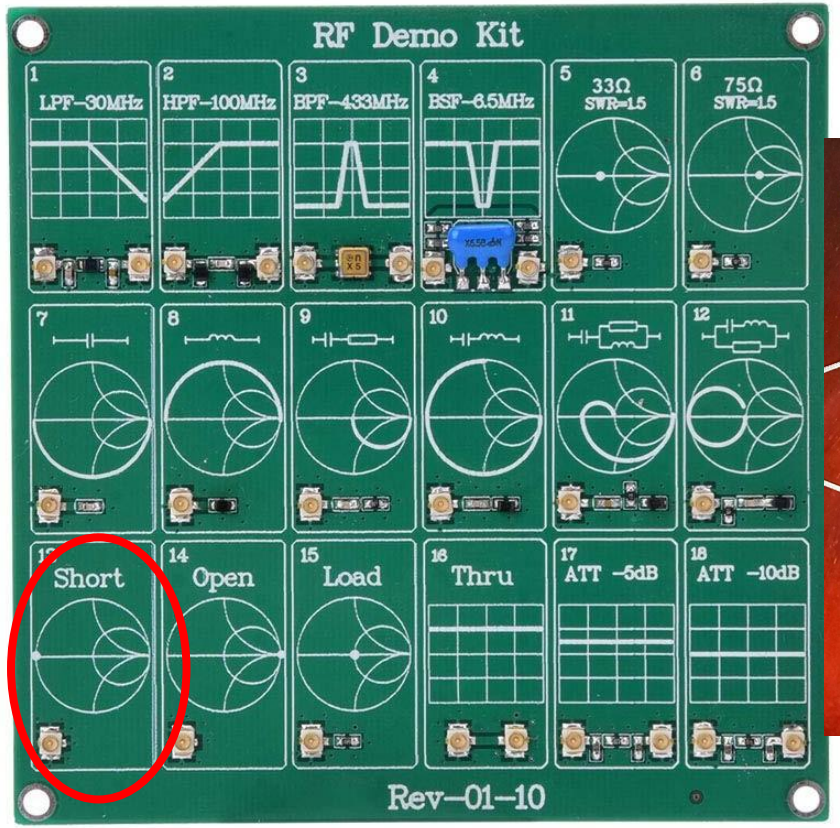
Calibration: Final steps

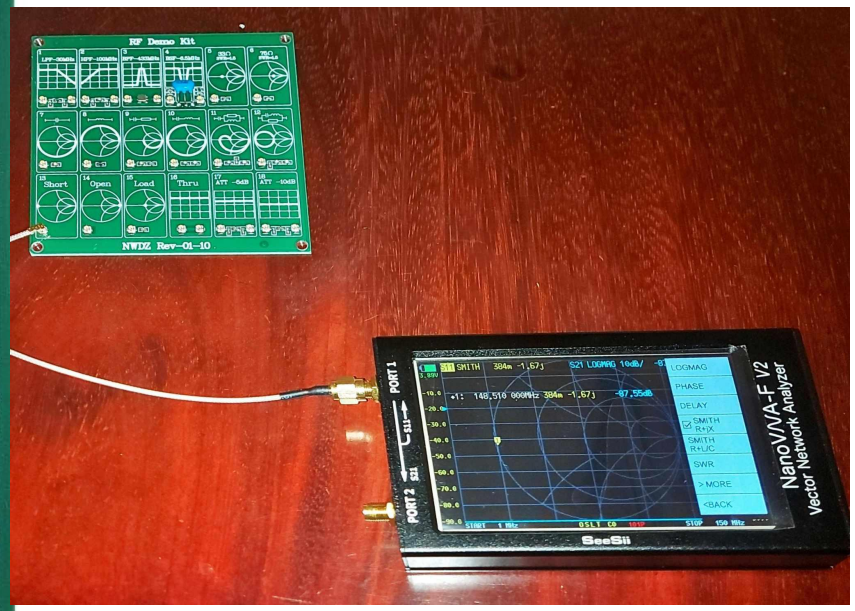
- Press ‘Done’

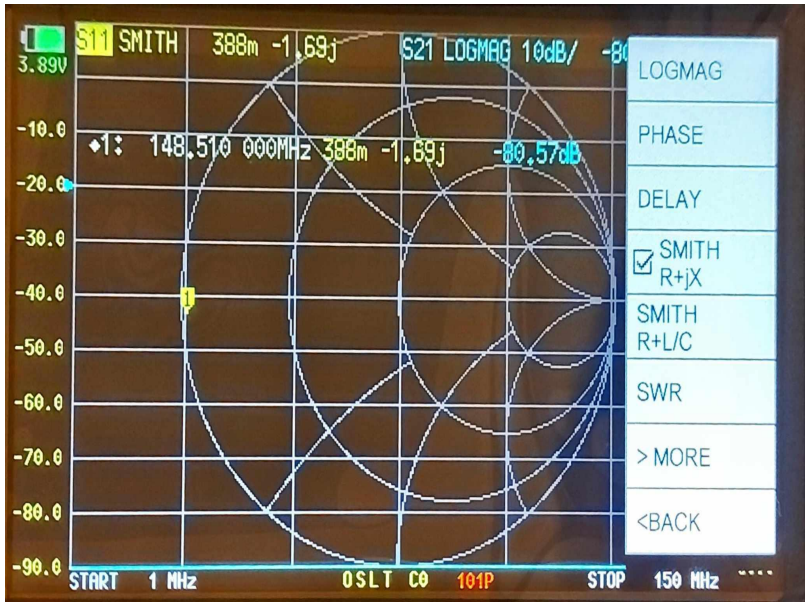


- Press ‘Save’ and choose a Save slot

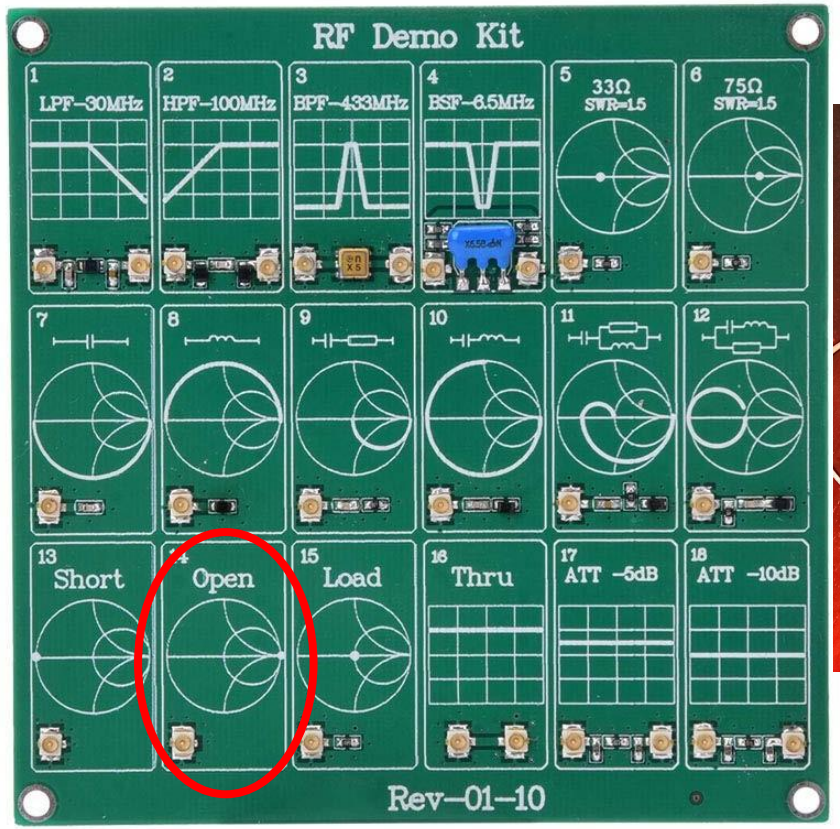
Optional step: Testing

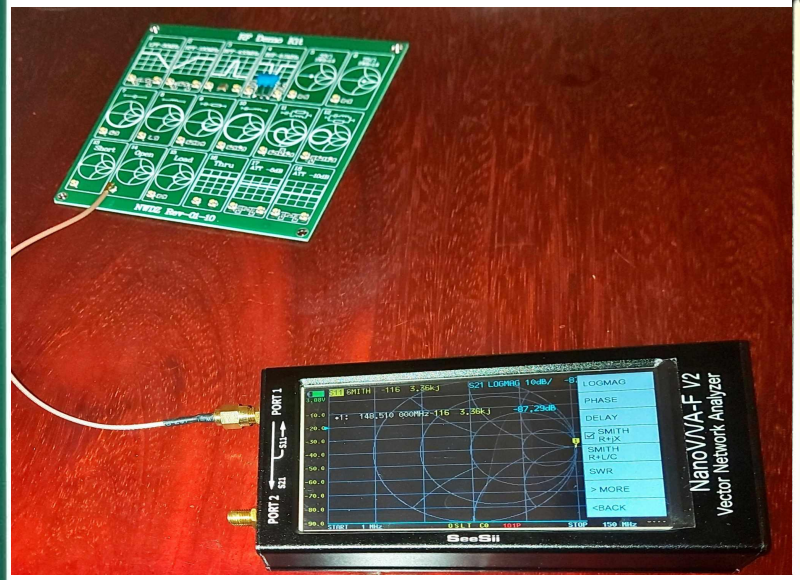


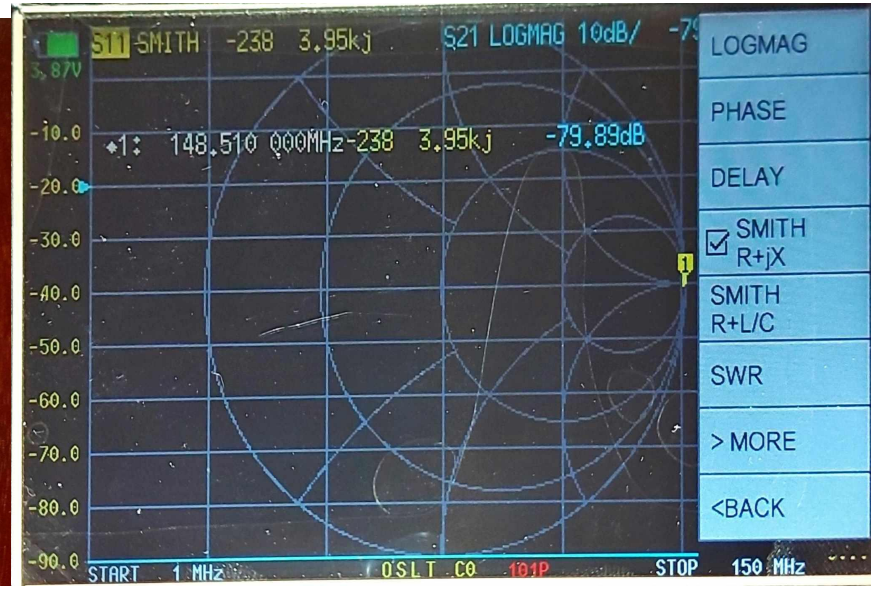




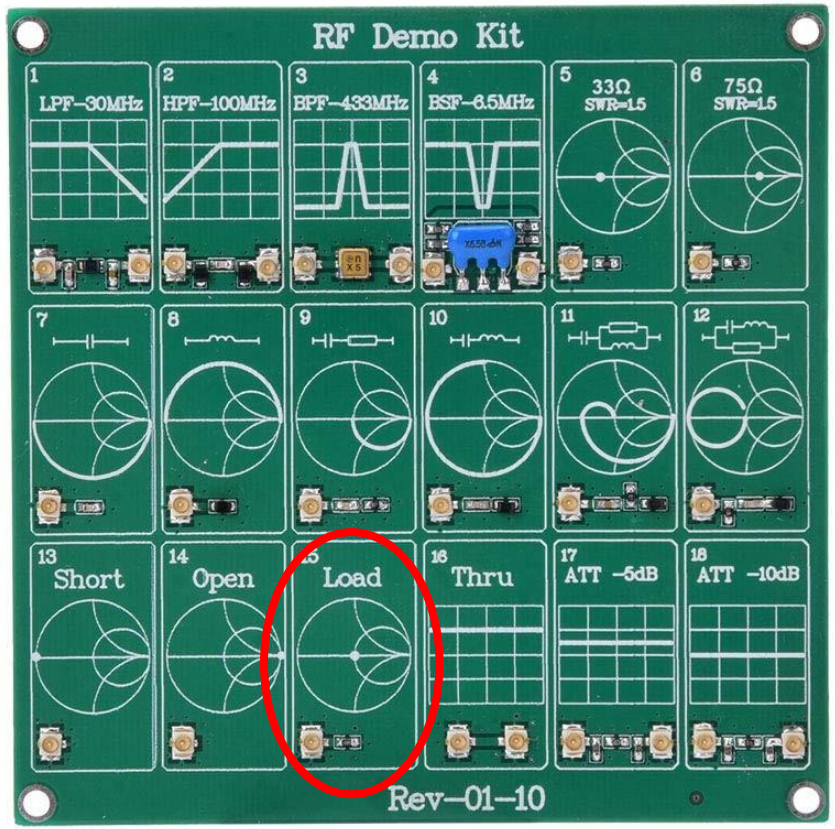
Optional step: Testing

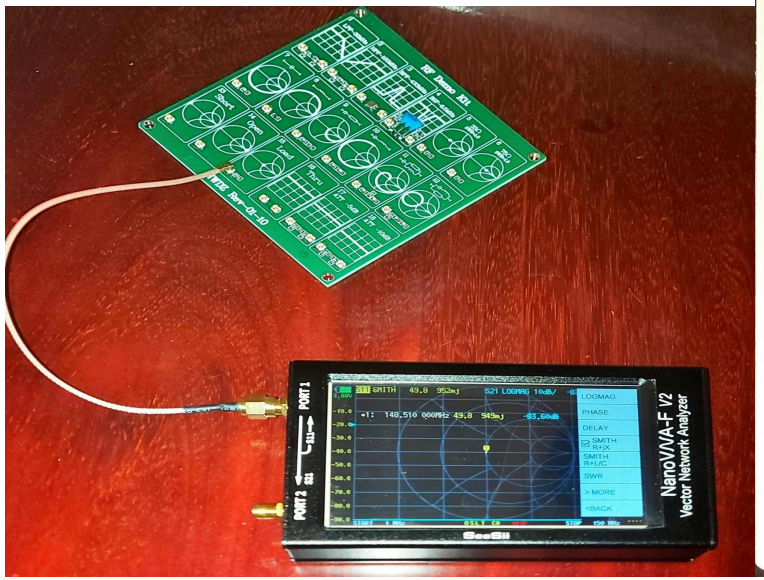


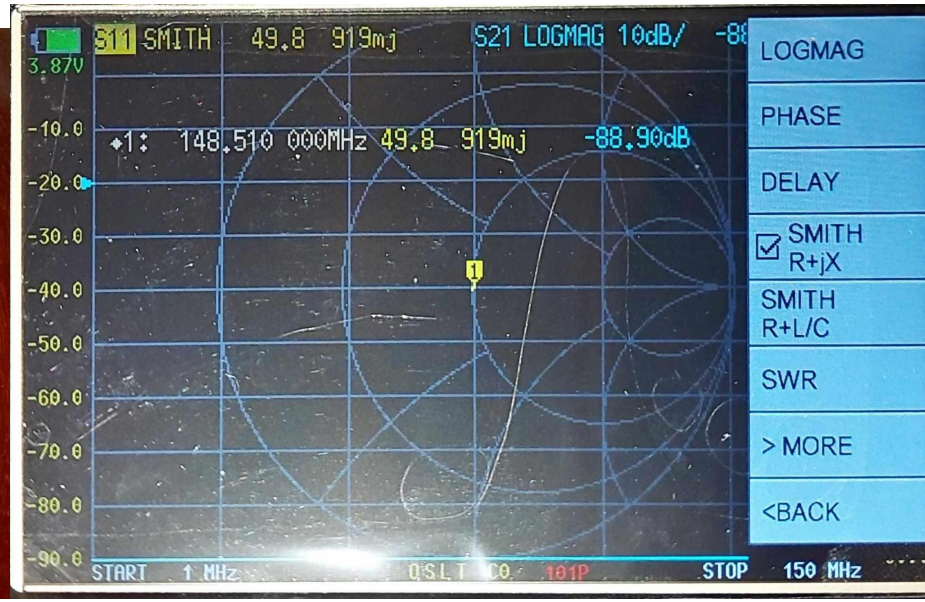




Optional step: Testing





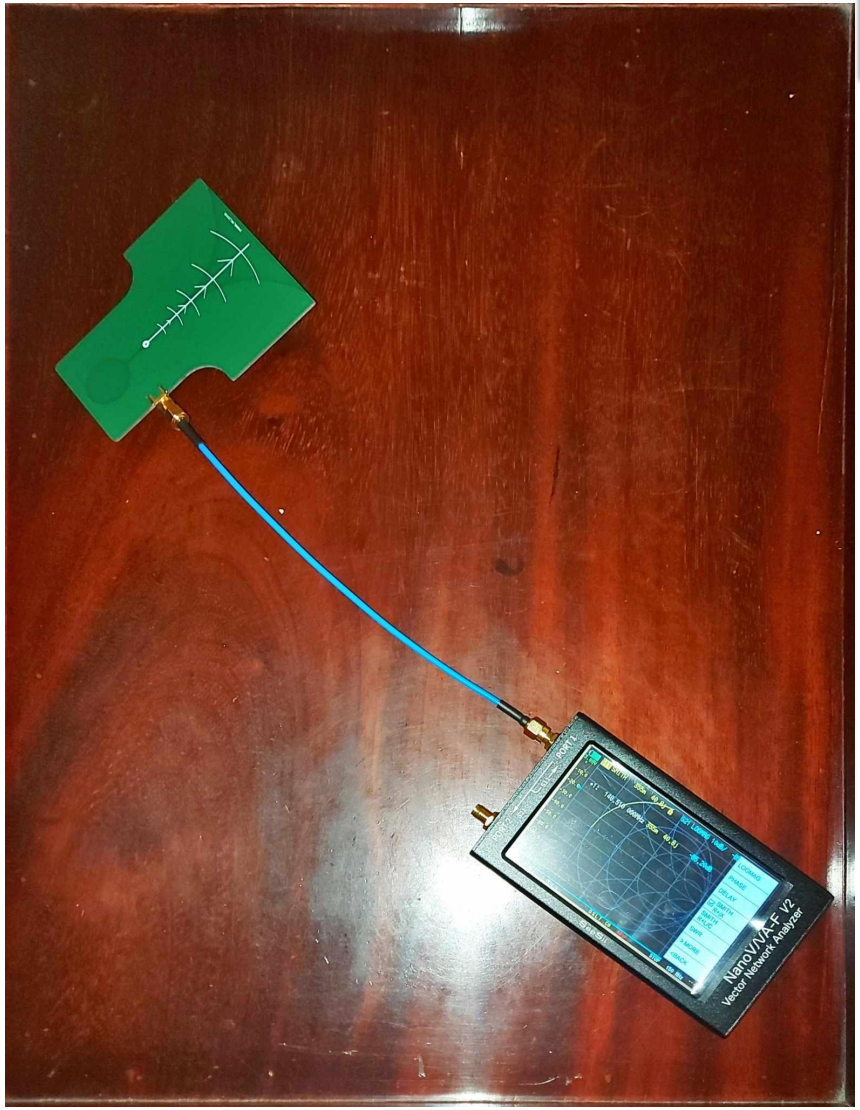


Measurement procedure

- Range: ~1500 MHz (1.5 GHz)

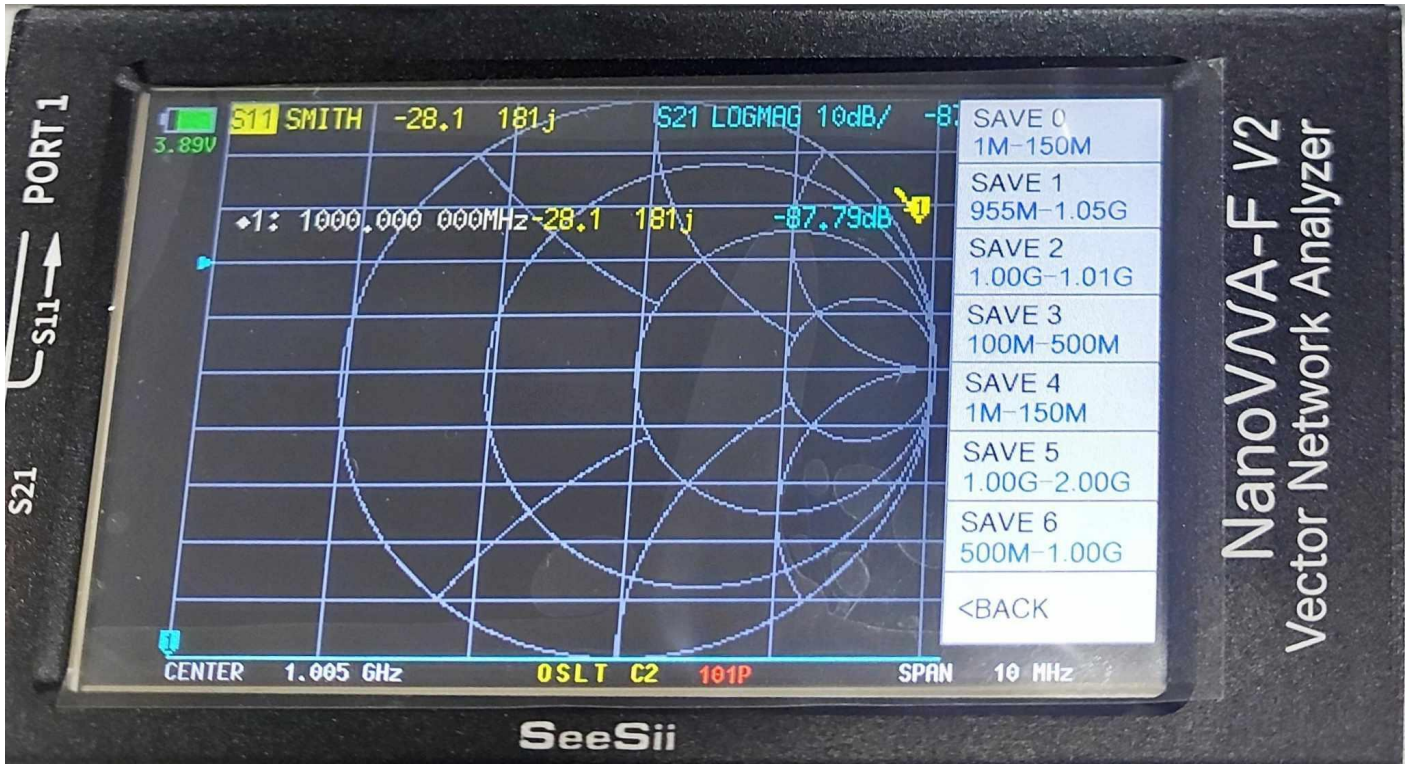
Measurement procedure

- Connect the antenna to the Nano-VNA



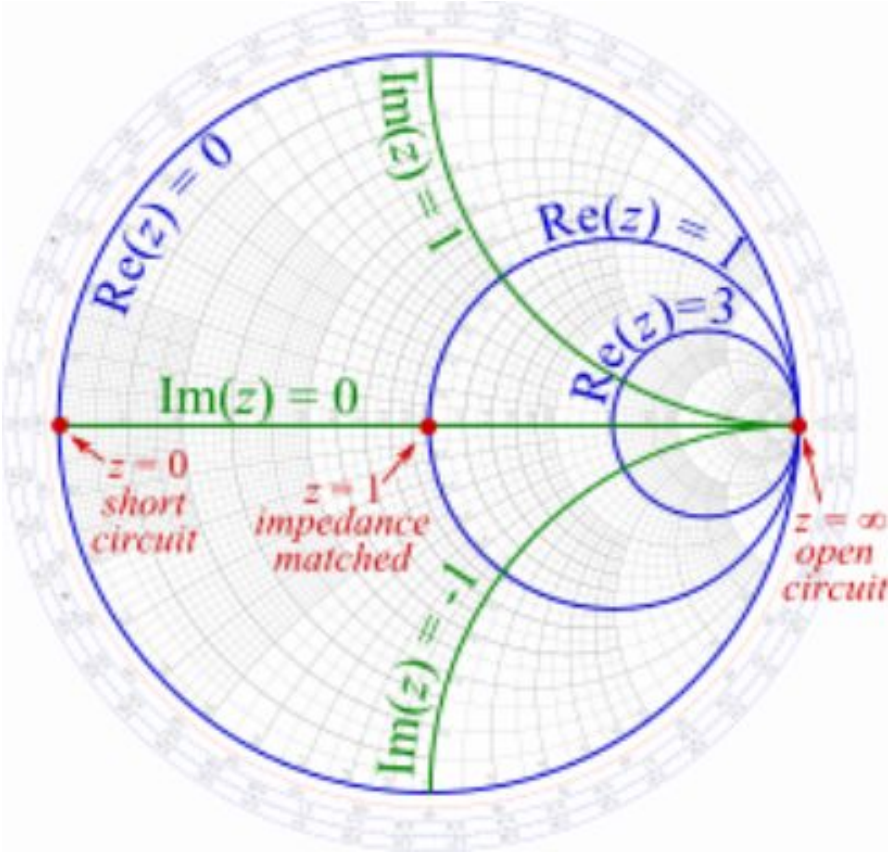
Measurement procedure

- Calibrate again for the correct frequency range of the antenna



Measurement result

How to interpret the measurement result?



Summary

- Nano-VNA: Miniature version of the VNAs
- Small frequency range: 50kHz ~ 3GHz
- Calibration: Open, Short, Load, Thru
- Always calibrate before performing measurement
- Can use Smith Chart to interpret the results

Q&A

Thank u ☺