

# NanoVNA



# Introduction



# What is a VNA?

- Vector Network Analyzer
  - NOT for computer networks
- RF test equipment
- Measures impedance
- Traditionally reserved for RF labs
- Traditionally very expensive (not so much anymore)
- Calibrated device



# What is a nanoVNA?

- Small form factor, inexpensive VNA
- Open source
- High performance
- Released in 2019
- Created by edy555
- Very rich feature set

# Models

- Different form factor & frequency range
- NanoVNA LiteVNA
  - 500kHz-6GHz & 2.8" Touchscreen
- NanoVNA LiteVNA 64
  - 500kHz-6GHz & 4" Touchscreen
- NanoVNA H
  - 500kHz-1.5GHz & 2.8" Touchscreen
- NanoVNA H4
  - 10kHz-1.5GHz & 4" Touchscreen

# NanoVNA Anatomy

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# What can you do with it?

- SWR
- TDR
- Cable test
- Test devices

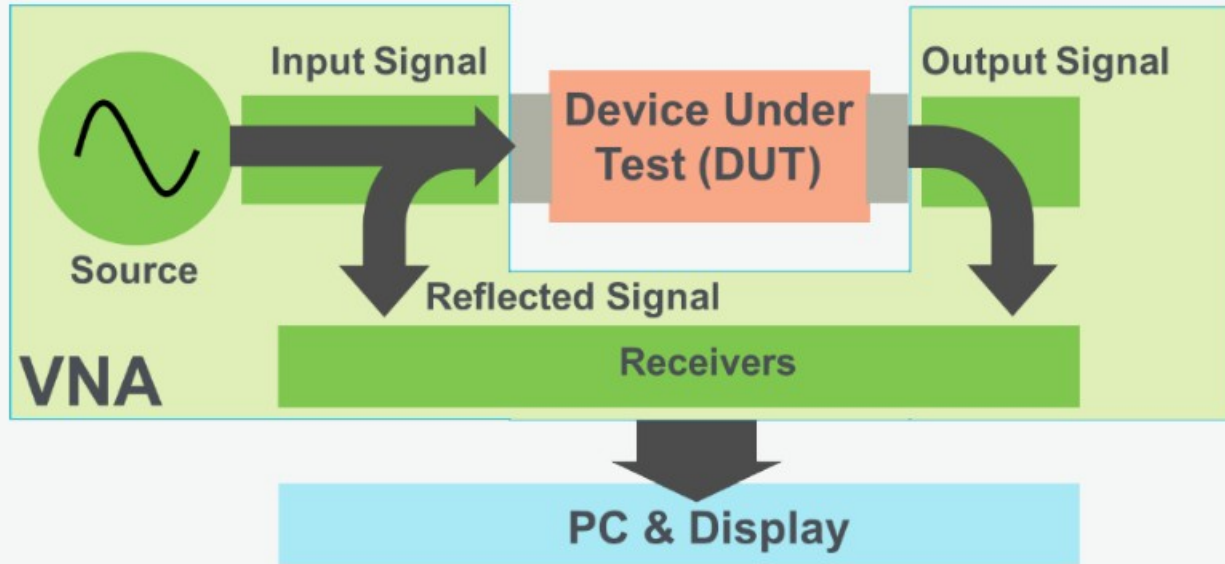
# How it works





# S11 & S21

- S11 – Reflection
- S21 - Thru



# Calibration

- Reference plane, remove interconnects
- Frequency range
- Points
- Loads
  - Open
  - Short
  - Load

# Calibration (cont.)

- Open – Reflect nothing
- Short – Reflect everything
- Load (50 ohm)
- Isolation – Eliminate leakage between ports
- Thru – Eliminates differences in frequency response between two ports
- File vs. Slot

# But what about UHF?

- MFJ-252U UHF Calibration Loads
- Max-Gain Systems 7820-HT-A1 SMA Male to BNC Female
- Max-Gain Systems 7060-A1 BNC Male to SO-239

# Traces

- Logmag
- Smith
- SWR
- S11 or S21

# Firmware

- Many firmware to choose from
- DiSlord
- Firmware upgrade process

# Software

- NanoVNASaver (Windows, Linux)
- NanoVNA Web Client/Android App



# Demos



# Mystery Coax

- Got a coax from a hamfest
- Does it work?
- Test loss
- Test length (.82)

# Antenna SWR

- Tuning an antenna
- Check SWR

# Traces

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# How to calibrate

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Price



# Cost Breakdown

- NanoVNA H4 - \$90 (check official distributor R&L)
- MFJ 252U - \$40
- 2x BNC male to SO-239 - \$10
- 2x BNC female to SMA male \$16
- Total - \$156

# MFJ 259

- \$300
- 280kHz – 230MHz
- SWR, return loss
- Magnitude and phase
- Check velocity factor
- Small LCD screen
- SO-239 connector



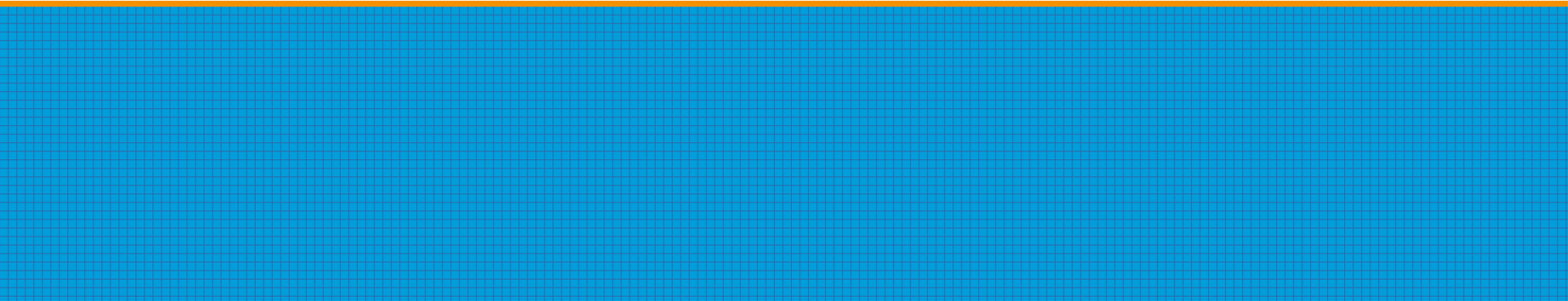
# RigExpert Stick 230

- \$320
- 100kHz – 230MHz
- SWR, return loss
- Magnitude & phase angle
- SO-239 connector
- Small e-paper display
- USB connection
- Bluetooth

# Why NOT to buy a NanoVNA

- More complex
- Not as plug-and-play
- Learning curve
- Build Quality

Thank you to Rick -  
KW4MQ



# More info

- Firmware Upgrade Process:  
[http://nanovna.com/?page\\_id=103](http://nanovna.com/?page_id=103)
- DiSlord firmware (recommended)  
<https://github.com/DiSlord/NanoVNA-D>
- ONLY buy from official distributor R&L Electronics. Clones of inferior quality exist due to the nanoVNA being open source

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