DEEPELEC NanoVNA-F Handheld Vector Network Analyzer Instruction Manual

DEEPELEC NanoVNA-F Handheld Vector Network Analyzer

Contents

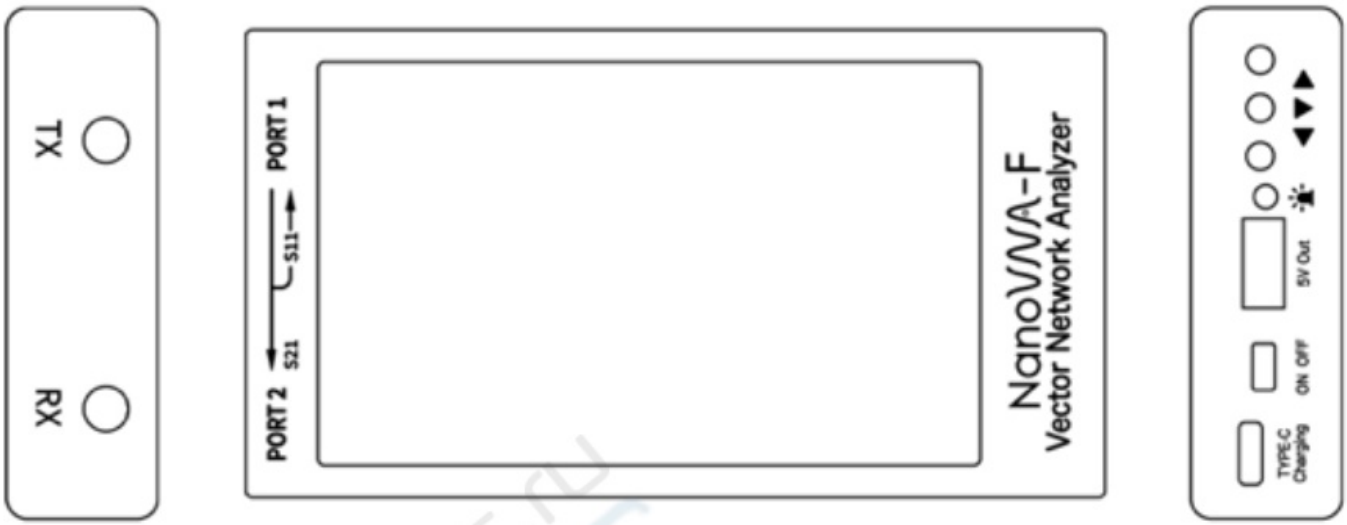
Product introduction

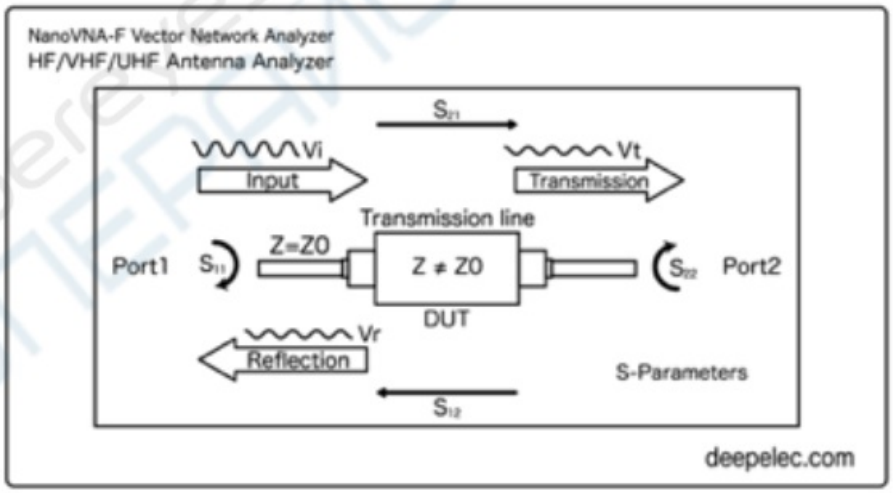
NanoVNA-F “Handheld Vector Network Analyzer” is a product based on the Open Source Project of NanoVNA (https://ttrf.tk/kit/nanovna). We designed the NanoVNA-F hardware, which is based on the STM32F103 Cortex-M3 processor and has a larger and brighter 4.3-inch high resolution IPS display, a large-capacity battery, a metal body, a full set of accessories, and more.

At the same time, we have transplanted the open source software of edy555 to FreeRTOS system. The current open source address of this project is: https://github.com/flyoob/NanoVNA-F. Every enthusiast canview and learn to compile the firmware.

Caution

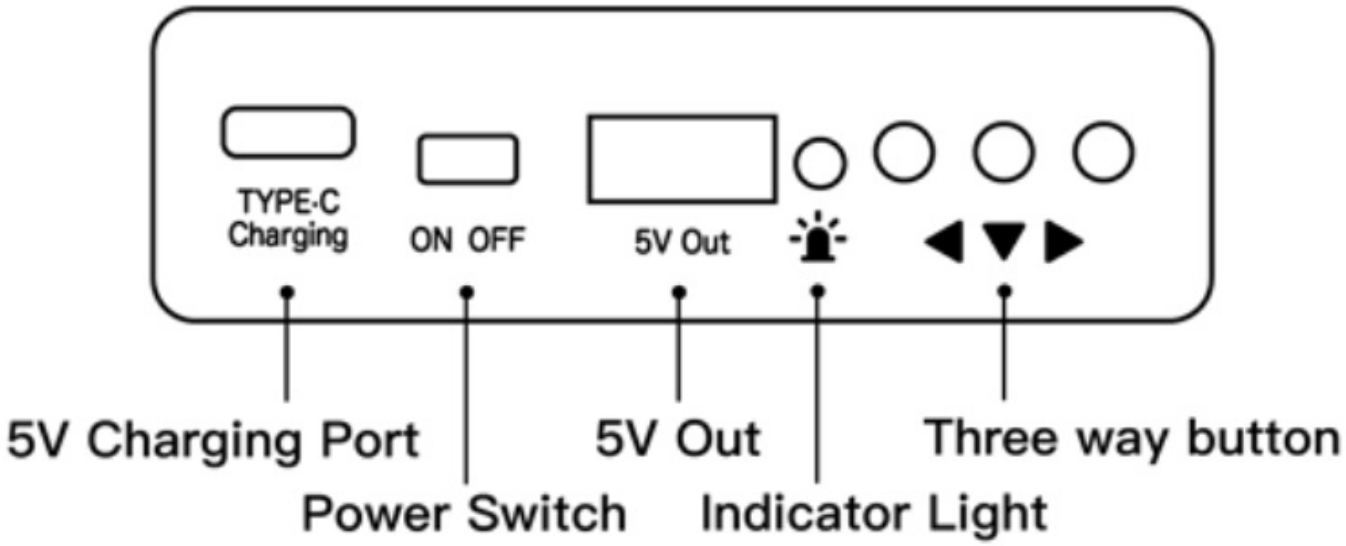
- This image apply to machines with Push-button Hardware.
- This image does not apply to machines with Trackwheel Hardware. Visit www.deepelec.com to know other version of appearance.



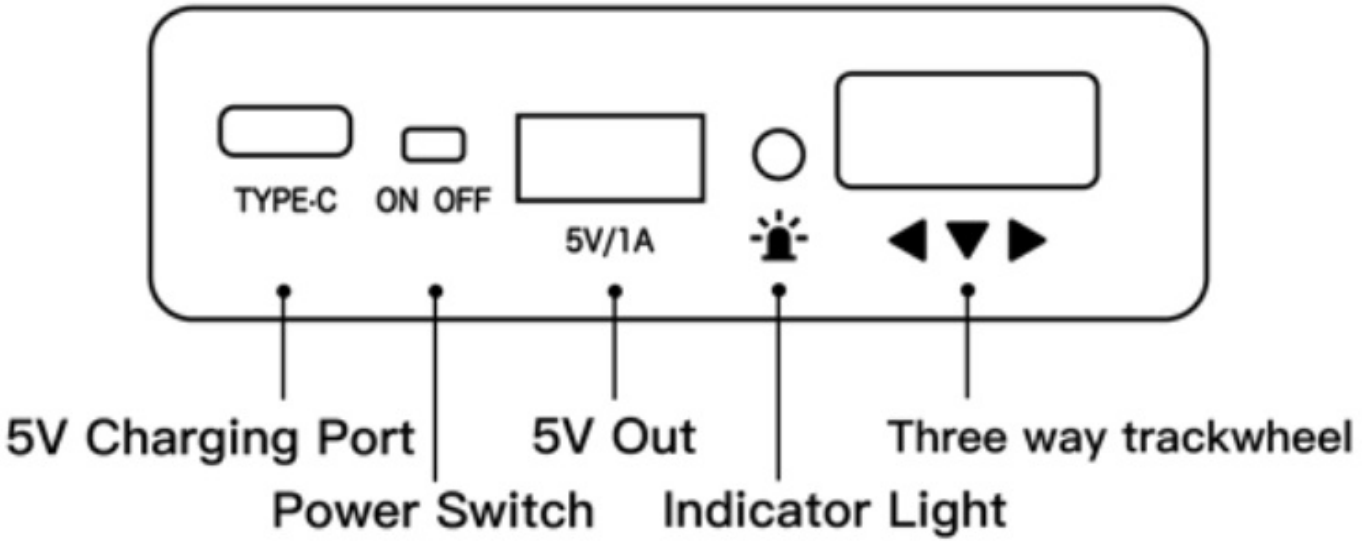


Operation panel

Button version:



Trumbwheel version:



Icon/icon name	Description
Type-c	Use for charging
Power Switch	Power On or Off
5V Out	5V/1A Output
	Red Blink : Charging Red : Full charged Blue : Discharge Blue Blink : Low battery
	Three way button(In Hardware V2.2 it’s wheel)

Accessory

- NanoVNA-F host 4.3 inch (with screen protective film) x 1
- USB Type-C data cable x1
- 20cm SMA male to male RG316 RF cable x2
- SMA male calibration kit – OPEN x1
- SMA male calibration kit – SHORT x1
- SMA male calibration kit – LOAD x1

- SMA-JJ male to male connector x1
- SMA-KK female to female connector x1
- SMA-JKW male to female right angle connector x1
- Incomplete Manual × 1
- Quick Start Guide × 1

Basic operations

Start a measurement

1. Set the frequency range (**STIMULUS→START/STOP or CENTER / SPAN)**
2. Calibration (According to actual needs, refer to the next chapter)
3. Select display format and channel **(DISPLAY→FORMAT/CHANNEL)**
4. Save the parameters for the next measurement. **(CAL→SAVE→0/1/2/3/4)**

You can change the display format and channel selection at any time. In the normal test mode, tap the right area of the screen or press the multifunctional switch to call up the menu. Tap the screen or turn the multifunctional switch to select a menu item.

Select the display trace and display format/channel

The menu **DISPLAY → TRACE** item can choose to open (activate) or close the corresponding display curve. When the background color of the curve name is consistent with the curve color, it indicates that the curve is active. The items **FORMAT, SCALE,** and **CHANNEL** are only valid for this curve. **DISPLAY→SCALE** can adjust the scale, **DISPLAY→CHANNEL** can select the measured port.

Setting the frequency range

The frequency range of a channel can be expressed by three groups of parameters: Start Frequency, Center Frequency and Stop Frequency. If any of the parameters change, the others will be adjusted automatically in order to ensure the coupling relationship among them. fcenter = (fstart + fstop)/2 [fspan = fstop – fstart Where /fspan is the SPAN. **Usage 1:**

Set the center frequency point of the current screen through the **STIMULUS→CENTER** of the menu, and display the values of the center frequency and sweep span, respectively, to the left and right of the bottom of the grid. In the lower-right corner of the pop-up Settings value screen, click to eject the soft keyboard and enter the frequency value via the soft keyboard. Please pay attention to the following points: The start and stop frequencies will vary with changes to the center frequency when the span is constant. In Zero Span, the start frequency, stop frequency and center frequency are always set to the same value. Now, you can use PORT1 as a signal source for a fixed output amplitude, but it is important to note that this machine uses the clock signal generator Si5351 as the signal source, the output signal is square wave, contains a larger odd harmonic. **Usage 2:**
Set the frequency range through the **STIMULUS→SPAN** of the menu, display the center frequency and sweep span values on the left and right sides of the grid, and click on the lower right corner of the pop-up settings value screen to eject the soft keyboard and enter the frequency values through the soft keyboard.
Please pay attention to the following points: The start and stop frequency vary with the span when the center frequency is constant. When the span is set to the maximum, the analyzer enters full span mode. In Zero Span, the start frequency, stopfrequency and center frequency are always set to the same value **Usage 3:**

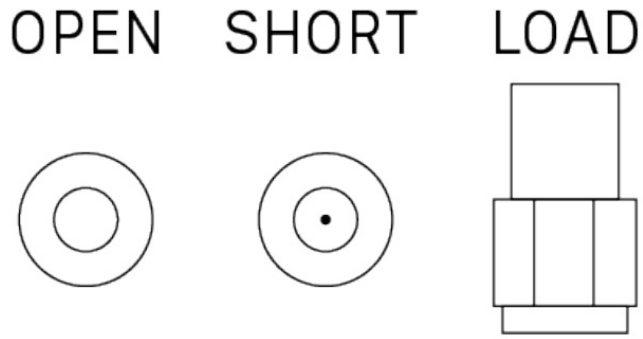
Set the start frequency through the **STIMULUS→START** of the menu and display the start frequency and stop frequency values on the left and right sides of the grid, respectively. Click on thebottom right corner of the pop-up settings screen to eject the soft keyboard and enter the frequency value through the soft keyboard.
Please pay attention to the following points: The span and center frequency vary with the start frequency when

the span does not reach the minimum (The parameters vary with the span, please refer to “Span”); In Zero Span, the start frequency, stop frequency and center frequency are always the same value. Set the stop frequency through the **STIMULUS→STOP** of the menu, and display the start frequency and stop frequency values on the left and right sides of the grid, respectively, in the lower right corner of the pop-up Settings screen, click to eject the soft keyboard and enter the frequency value through the soft keyboard. Please pay attention to the following points: The span and center frequency vary with the stop frequency. The change of the span will affect other system parameters. For more details, please refer to “Span”.
In Zero Span, the start frequency, stop frequency and center frequency are always the same value. For more test examples, please visit www.deepelec.com

Calibration

Calibration and Normalization

The VNA Master is a field portable unit operating in the rigors of the test environment. In order to ensure measurement accuracy, RF calibration (SOLT) must be performed prior to making a measurement in the field. Calibrating with the specified mechanical calibration requires three calibration parts: open, short, and match(load) and one RG316 RF cable. Calibration data is saved as user calibration data. It can be saved to status 0/1/2/3/4, which will be automatically loaded at the next boot and can be also be loaded via the RECALL menu.



The figure below shows the OPEN, SHORT, and LOAD calibration components that are standard with the NanoVNA-F. Brief summary of NanoVNA-F calibration steps:

1. Open **CAL** menu and press **RESET**
2. Open **CALIBRATE** menu
3. Connect SMA Open to PORT1 wait more than 3 seconds (wait for the screen to stabilize) and press **OPEN**
4. Connect SMA Short to PORT1 wait more than 3 seconds (wait for the screen to stabilize) and press **SHORT**
5. Connect SMA Load to PORT1 wait more than 3 seconds (wait for the screen to stabilize) and press **LOAD**
6. Connect SMA Load to PORT1, connect second Load to PORT2, wait more than 3 seconds (wait for the screen to stabilize) and press **ISOLN**

   Note: if you don’t have second Load, just leave PORT2 open.
7. Connect RF cable from PORT1 to PORT2 wait more than 3 seconds (wait for the screen to stabilize) and press THRU
8. Press **DONE,** save to 0/1/2/3/4 one of them.

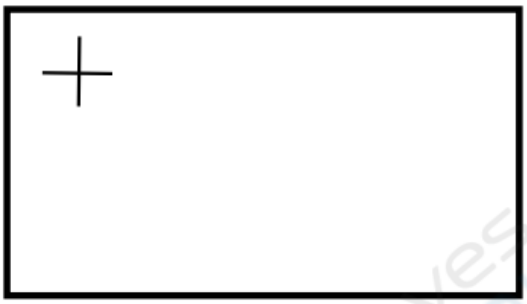
   Note: If there is already saved calibration data, first press RESET to clear the calibration data and then calibrate!If you make a mistake, start again with RESET!

   See more:**www.deepelec.com/support**

calibrate the touch screen

1. Enter menu **CONFIG→TOUCH CAL**

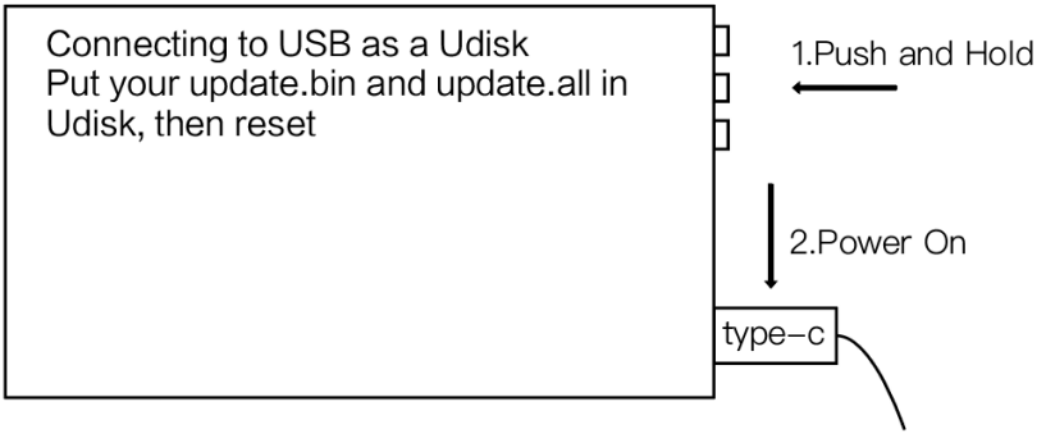
2. Use a toothpick or other sharp object to click the center of the cross that appears in order.



3. **CONFIG→SAVE**

Upgrade the firmware

Download: https://github.com/flyoob/NanoVNA-F/releases Points to: https://github.com/flyoob/NanoVNA-F_Boot
0) Download and unzip the update. You should have a file **update.bin** and **update.all.**



1. Connect your NanoVNA-F to a PC's USB port using Type-C USB socket on the device. Press the middle of the three way buttons and keep it down, while powering up the device. The LCD displays the following prompt, indicating that the boot-loader is active.
2. Then at PC side, the device will act as a disk drive, which should appear in File Explorer. Copy you new **"update.bin" and "update.bin"** into the root directory of that disk.
3. Power the device off and on, and the boot-loader will run automatically, and update your NanoVNA-F. Re-power for normal operation.

Add call sign display

1. Connect your NanoVNA-F to a PC's USB port using Type-C USB socket on the device. Press the selector switch and keep it down, while powering up the device. The LCD displays the following prompt, indicating that the boot-loader is active.
2. Then at PC side, the device will act as a disk drive, which should appear in File Explorer. Copy your callsign.txt into the root directory of that disk, then re-power the device.

Use PC software and install drivers

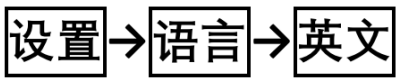
http://deepelec.com/files/en.stsw-stm32102.zip
Install the appropriate 32 or 64bit driver. Turn ON the nano, attach to any USB port, and wait for the computer to

give the “Installing driver”message. Wait until it completes.
We haven’t released official PC software at this time, we recommend using nanovna-saver(by Rune B. Broberg), a powerful NanoVNA PC software.
https://github.com/mihtjel/nanovna-saver

Change Language

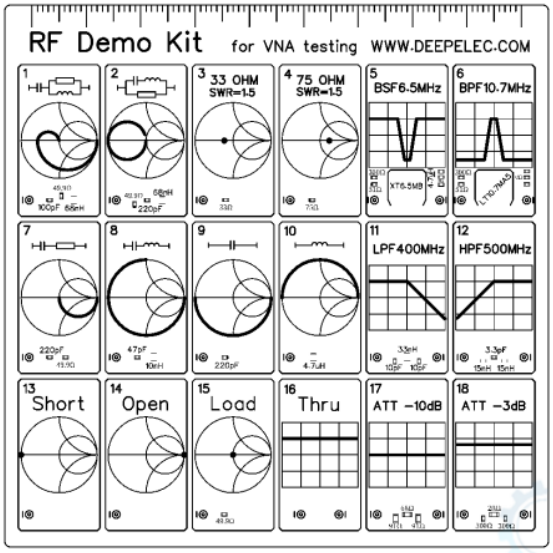
If you received NanoVNA-F with or switched to Chinese language.

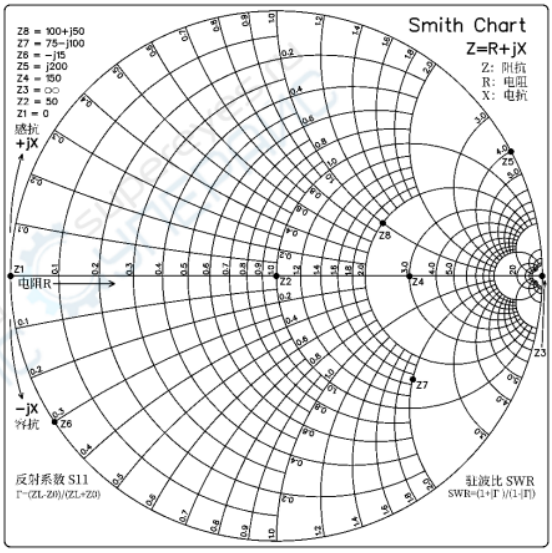
1. You can follow these steps as figure to change the language to English



Other Product :

RF Demo Kit



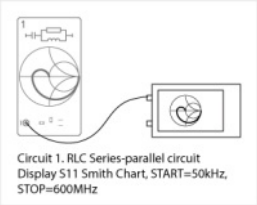


RF Demo Kit deepelec.com/rf-demo-kit
The RF Demo Kit is a NanoVNA RF test board independently designed by BH5HNU, with a size of 10 * 10CM. It is used to learn the use of a vector network analyzer.
The Smith chart is printed on the back, which can be used to learn to read the Smith chart and learn the basic principles of impedance matching.
The test board has 18 kinds of circuit. More visit : deepelec.com/rf-demo-kit

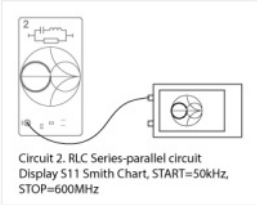
RF Demo Kit Quick start guide

Two st eps must be performed before testing:
Step 1. Connect the two 20CM SMA to IPEX adapt er cables to the NenoVNA-F machine.
Step 2. Recalibrate the machine using the 13 Short, 14 Open 15 Load, and 16 Thru circuit s on the t est board, and save the parameters t o SAVE o.

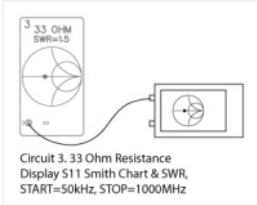
Designed By: BH5HNU & June
Date: 15 July 2020
Release: 2.0



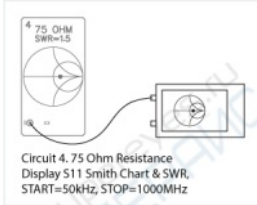
Circuit 1. RLC Series-parallel circuit
Display S11 Smith Chart, START=50kHz, STOP=600MHz



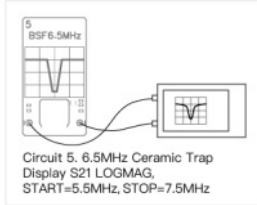
Circuit 2. RLC Series-parallel circuit
Display S11 Smith Chart, START=50kHz, STOP=600MHz



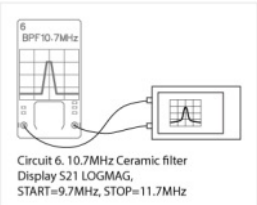
Circuit 3. 33 Ohm Resistance
Display S11 Smith Chart & SWR, START=50kHz, STOP=1000MHz



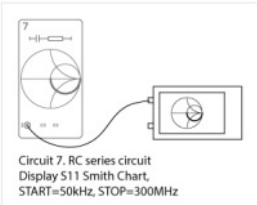
Circuit 4. 75 Ohm Resistance
Display S11 Smith Chart & SWR, START=50kHz, STOP=1000MHz



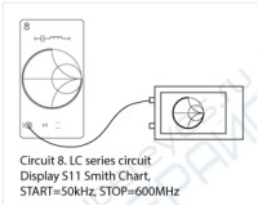
Circuit 5. 6.5MHz Ceramic Trap
Display S21 LOGMAG, START=5.5MHz, STOP=7.5MHz



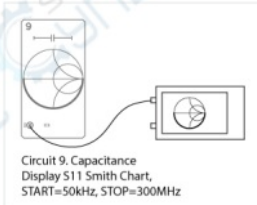
Circuit 6. 10.7MHz Ceramic filter
Display S21 LOGMAG, START=9.7MHz, STOP=11.7MHz



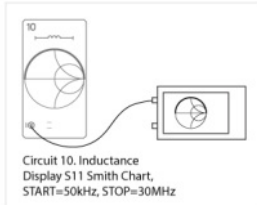
Circuit 7. RC series circuit
Display S11 Smith Chart, START=50kHz, STOP=300MHz



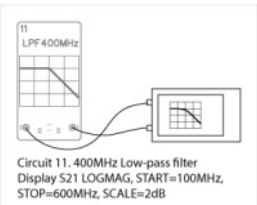
Circuit 8. LC series circuit
Display S11 Smith Chart, START=50kHz, STOP=600MHz



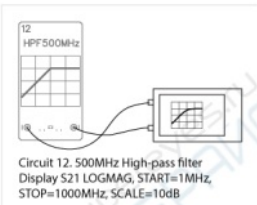
Circuit 9. Capacitance
Display S11 Smith Chart, START=50kHz, STOP=300MHz



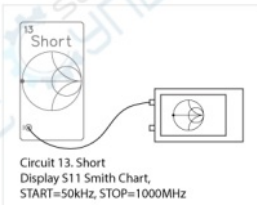
Circuit 10. Inductance
Display S11 Smith Chart, START=50kHz, STOP=30MHz



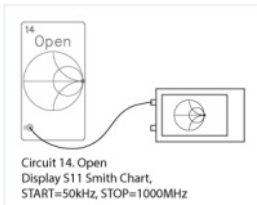
Circuit 11. 400MHz Low-pass filter
Display S21 LOGMAG, START=100MHz, STOP=600MHz, SCALE=2dB



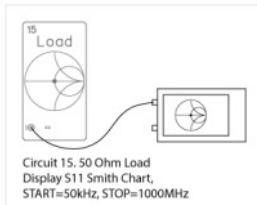
Circuit 12. 500MHz High-pass filter
Display S21 LOGMAG, START=1MHz, STOP=1000MHz, SCALE=10dB



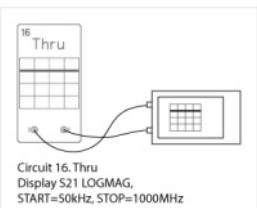
Circuit 13. Short
Display S11 Smith Chart, START=50kHz, STOP=1000MHz



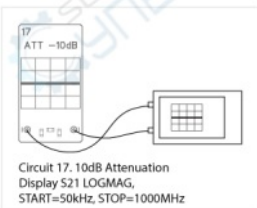
Circuit 14. Open
Display S11 Smith Chart, START=50kHz, STOP=1000MHz



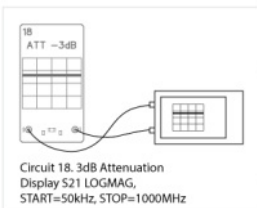
Circuit 15. 50 Ohm Load
Display S11 Smith Chart, START=50kHz, STOP=1000MHz



Circuit 16. Thru
Display S21 LOGMAG, START=50kHz, STOP=1000MHz



Circuit 17. 10dB Attenuation
Display S21 LOGMAG, START=50kHz, STOP=1000MHz



Circuit 18. 3dB Attenuation
Display S21 LOGMAG, START=50kHz, STOP=1000MHz

RF Demo Kit MACE 1N a;1NA
For VNA Testing
More Detail : deepelec.com/rf-demo-kit
deepelec.aliexpress.com
groups.io/g/nanovna-f
Facebook Group : NanoVNA- F
Hangzhou Minghong Electronic Technology Co., Ltd.

www.deepelec.com

HANGZHOU MINGHONG ELECTRONIC TECHNOLOGY CO., LTD.
Version : 2.1
Website : www.deepelec.com
Support : support@deepelec.com
Facebook Group : NanoVNA-F (Need to answer Membership Questions)
Groups.io : https://groups.io/g/nanovna-f
QQ : 522796745

Note : If there are technical improvements to the product, it will be compiled into the new version of the electronic manual without notice. Please visit the official website for inquires. If the appearance and color of the product are changed, the actual product shall govern.

Documents / Resources

	DEEPELEC NanoVNA-F Handheld Vector Network Analyzer [pdf] Instruction Manual NanoVNA-F, Handheld Vector Network Analyzer, NanoVNA-F Handheld Vector Network Analyzer, Vector Network Analyzer, Network Analyzer, Analyzer

References

- Hangzhou Minghong Electronic Technology Co., Ltd.
- RF Demo Kit Introduction – Hangzhou Minghong Electronic Technology Co., Ltd.
- Groups.io: Email Groups, Supercharged
- Hangzhou Minghong Electronic Technology Co., Ltd.
- Support – Hangzhou Minghong Electronic Technology Co., Ltd.
- GitHub - flyoob/NanoVNA-F: NanoVNA-F, NanoVNA-Fairy, FreeRTOS version of TTRFTECH's NanoVNA.
- GitHub - flyoob/NanoVNA-F_Boot: NanoVNA-F BootLoader,STM32F1+SPI FLASH+USB Device Mass Storage for IAP
- Releases · flyoob/NanoVNA-F · GitHub
- GitHub - NanoVNA-Saver/nanovna-saver: A tool for reading, displaying and saving data from the NanoVNA
- nanovna-f@groups.io | Home
- NanoVNA (out of stock)