

DISLORD NanoVNA FIRMWARE UPDATE NOTES

Mar 30 2020 to Dec 17 2021

Disclaimer: This is a compilation of various posts from DiSlord and other NanoVNA Forum members. The NanoVNA-Users Forum is open to anyone but the NanoVNA-Beta-Test forum access is by invite.

Please Refer ALL questions to the respective forums !

Some spelling & grammar corrections and added explanations were added where appropriate.

The end-user of any info contained in this document takes all responsibility for how it is used. Period.

FORMAL RELEASE of v1.1.00 on Dec 17, 2021

Repository: [DiSlord/NanoVNA-D](#) · Tag: [v1.1.00](#) · Commit: [79b0104](#) · Released by: [DiSlord](#)

Changes:

- Use dynamic calibration data calculations
- Change calibration logic (now more easy control calibration data)
- Fix saved bmp header, now bmp file open in all software
- Update touch calibration procedure, need touch this point (mark as *), not use screen corner, this allow more correct calibrate
- New 6x10 font
- New medium size Marker plate for small screen
- Added 5x7 and 6x10 font support, use adapted font size for menus for small screens (H devices and 320x240 V2)
- 5x7 fonts used in calibration / grid values / frequency / menus
- Added new v3.6 hardware support (maybe a replacement SI5351 on MS5351), see Expert settings
- Now correct reset USB connection on software reset (H4)
- Init i2c bus devices on low speed, change on max speed after (I hope this allow fix problem vs hang on first power on)
- 2x increase wait time for SD card (also hope this fix errors on old slow cards)
- Added dump firmware to SD card. See expert options (save as xxx.bin file)
- Add backup feature, this allow save some settings (freq range / points count / jog step / leveler mode / bandwidth or avg / last used slot)
Backup restore settings only for stored on flash slot (not work for RAM calibration data)
By default loaded 0 slot (if no backup enabled / on error / no battery)
- Added measurement module (MEASURE):
- XTAL and LC measure (S21). It allows you to automatically measure the parameters of quartz or LC filters (connect in series between ports, or how shunt ports are connected and DUT to ground). The measuring range is the center of the resonance and the resonance itself should be clearly visible on the screen.

- Measuring cables, the initial frequency - minimum, final - must be such that the cable length is more than 1/4 of the wavelength, automatically measures the length, characteristic impedance, loss at the point of the active marker. The measuring range is chosen so that the Smith is rotated clockwise 180 degrees, the most important point for this measurement is at marker 1. The shorter the cable, the higher the maximum frequency.
- Add Resonance search measure. Search frequency vs $X = 0$. (or more closest point)
- Added module for normalization of impedance (DISPLAY-> PORT Z 50 -> XX), allows you to see what the DUT would be if the device had the same impedance as it. Works for two ports, which means filters can be measured as well. This will allow you to measure 75 ohm systems, or even higher-impedance filters (there are limitations, the higher the impedance, the lower the dynamic range). Calibrate as usual to 50 ohms, no matching adapters are needed.

UI menu text fixes:

- Added multi color string, use color index 25 (LCD_LINK_COLOR) for set color (default color dark blue: R = 0, G = 0, B = 192)
- Show selected Smith value in marker menu
- Copy Set E-Delay button to calibration (some users use custom edelay for calibration)
- Use one button for marker search min / max, move buttons from MARKER->SEARCH to MARKER menu
- Move MARKER->MEASURE menu to main screen menu
- Added DATE/TIME input (devices support RTC)
See CONFIG->EXPERT SETTINGS
Date input keyboard (need in YYMMDD format)
Time input keyboard (need in HHMMSS format)
- Added Enter button image (replace x1) for SCALE/REF/DATE/TIME input
- Lot of cleanup / optimisation

—
This release has 5 assets:

NanoVNA.H.v1.1.00.dfu
 NanoVNA.H.v1.1.00.small.font.dfu
 NanoVNA.H4.v1.1.00.dfu
 Source code (zip)
 Source code (tar.gz)

<https://github.com/DiSlord/NanoVNA-D/releases/tag/v1.1.00>

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 Fri., Dec. 17 at 8:49 a.m.

Update all device firmware to v1.1.00 (preliminary release)

Changes from v1.0.69:

- New 6x10 font

- New medium size Marker plate for small screen
- Added 5x7 and 6x10 font support, use adapted font size for menus for small screens (H devices and 320x240 V2)
- Added multi color string, use color index 25 (LCD_LINK_COLOR) for set color (default color dark blue: R = 0, G = 0, B = 192)
- 5x7 fonts used in calibration / grid values / frequency / menus
- Add Resonance search measure
- Lot of cleanup / optimisation

UI menu text fixes:

- Show selected Smith value in marker menu
- Copy Set E-Delay button to calibration (some users use custom edelay for calibration)
- Use one button for marker search min / max, move buttons from MARKER->SEARCH to MARKER menu
- Move MARKER->MEASURE menu to main screen menu

Only H / H4 / LiteVNA

- Add backup feature, this allow save some settings (freq range / points count / jog step / leveler mode / bandwidth or avg / last used slot)
- Backup restore settings only for stored on flash slot (not work for RAM calibration data)
- By default loaded 0 slot (if no backup enabled / on error / no battery)

Only LiteVNA

Added USART support, now possible connect and control device over it. You can use any BT / WiFi / USB to TTL dongle. Or control from external CPU.

All V2

- Now support 401 measure and calibration points (NOT INTERPOLATED)

LiteVNA

- Support up to 1001 points (NOT INTERPOLATED)

Only H / H4

- Init i2c bus devices on low speed, change on max speed after (I hope this allow fix problem vs hang on first power on)
- 2x increase wait time for SD card (also hope this fix errors on old slow cards)

!!!! V2Plus4 firmware work only on old V2Plus4 devices, new V2Plus4 devices have different LCD module not supported by this FW. As last V2Plus4 sources (software and hardware info) closed I not support it. !!!

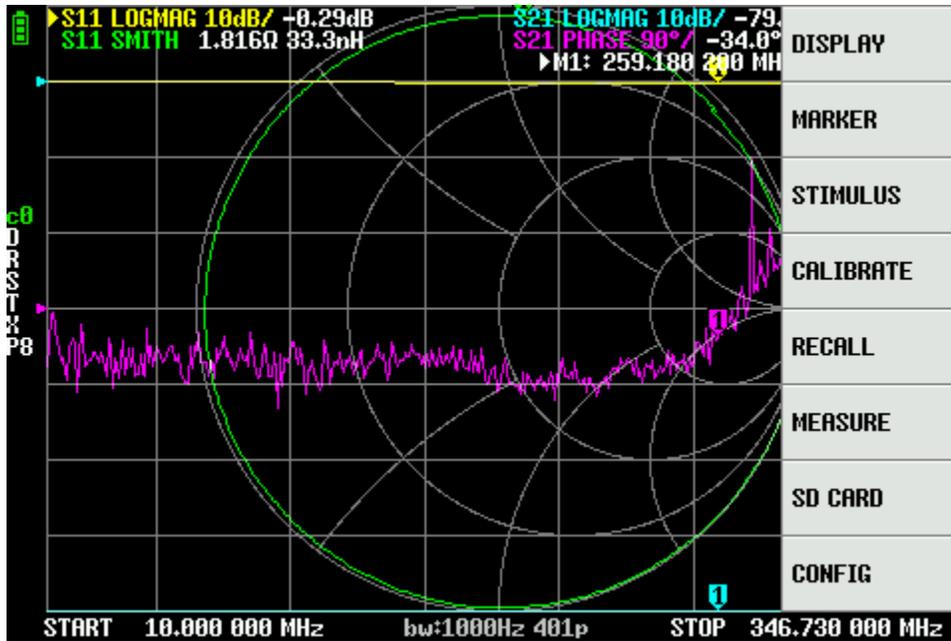
PS thanks Huguen, sponsored the support of these products
PSS finally I update all code, cleanup and made release

https://groups.io/g/nanovna-beta-test/attachment/3190/0/NanoVNA%20v1.1.00%20fw%20pack%20H_H4_LiteVNA_V2_V2Plus_V2Plus4.zip

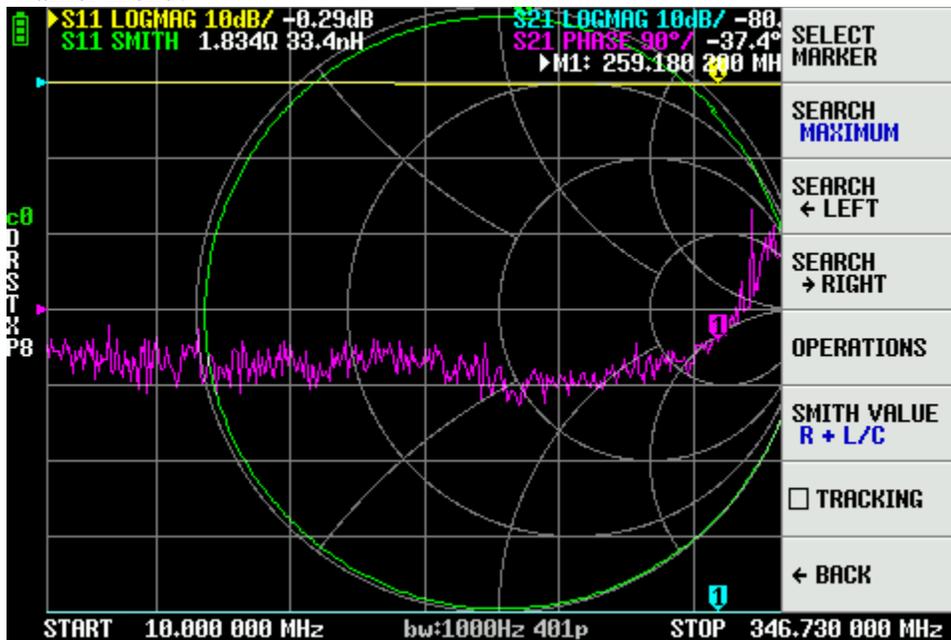
=====
Mon., Dec. 13 at 1:12 p.m.

Possible better move MARKER->MEASURE menu to main screen menu?
And on free space move all items from MARKER->SEARCH to MARKER?
This allow less steps in menu for control

Main menu:



Marker menu:



Mon., Dec. 13 at 1:06 p.m.

Ok, I build this variant for both H/H4

I hope this final variant, and all work as need (soon i also port this on V2)

<https://groups.io/g/nanovna-beta-test/attachment/3178/0/NanoVNA%20H%20v1.1%20beta%202.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/3178/1/NanoVNA%20H4%20v1.1%20beta%202.dfu>

Mon., Dec. 13 at 12:21 p.m.

I think for 1 image need show not found - no any minimum value on screen (need change freq range)
 For second image i can search minimum X, and provide this point frequency

You can check it on your H device?

<https://groups.io/g/nanovna-beta-test/attachment/3176/0/NanoVNA%20H%20v1.1%20beta%202.dfu>

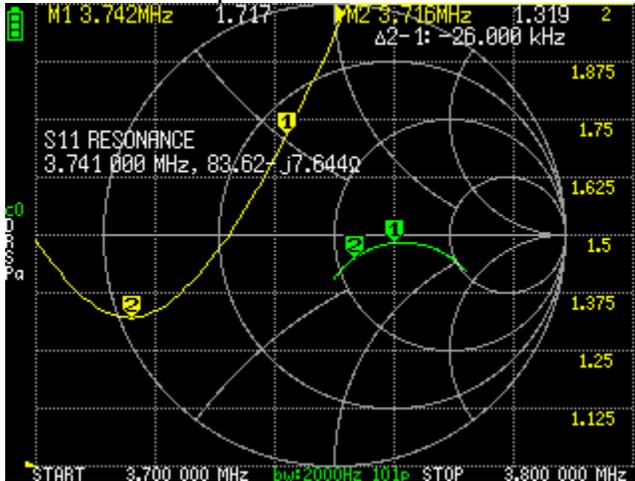
Igor Jobim

Mon., Dec. 13 at 12:45 p.m.

DiSlord, It works.

Marker 1 = S11 RESONANCE.

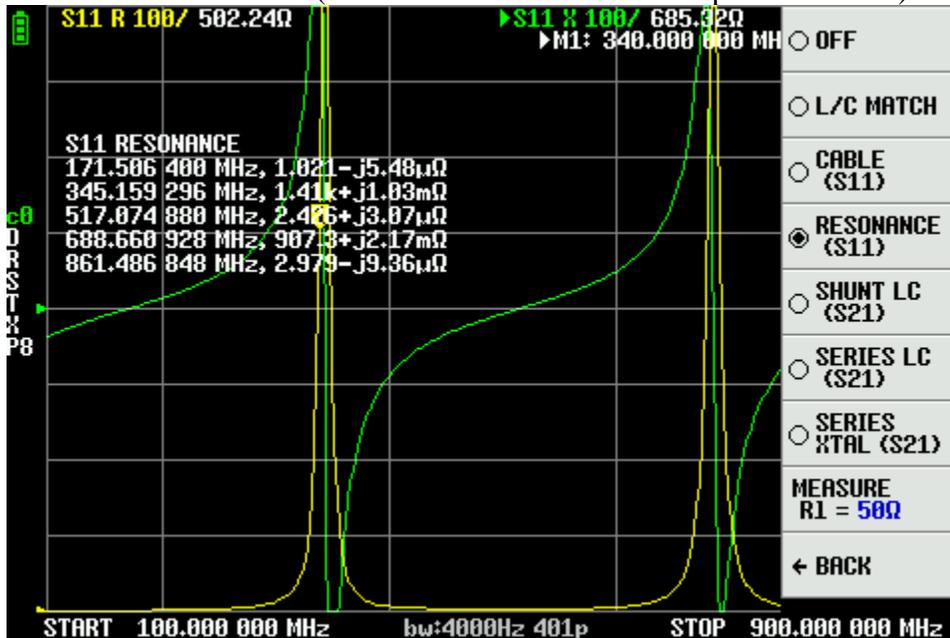
Then the best point of X is found.



Dec 12 [#3173](#)

Made as say, show resonances F, R+jX

X in all cases close to 0 (not zero due to noise and interpolation errors) need show it?



<https://groups.io/g/nanovna-beta-test/attachment/3173/1/NanoVNA%20H%20v1.1%20beta%202.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/3173/2/NanoVNA%20H4%20v1.1%20beta%202.dfu>

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DiSlord Dec 12 [#3170](#)

Here rebuild, show all resonances if X = 0

Disable LTO compiler option

Not place markers on Resonance measure (user can move it)

<https://groups.io/g/nanovna-beta-test/attachment/3170/0/NanoVNA%20H%20v1.1%20beta%202.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/3170/1/NanoVNA%20H4%20v1.1%20beta%202.dfu>

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DiSlord Dec 12 [#3166](#) [Edited](#) Dec 12

> Redrawing of screen after screenshot is not working!

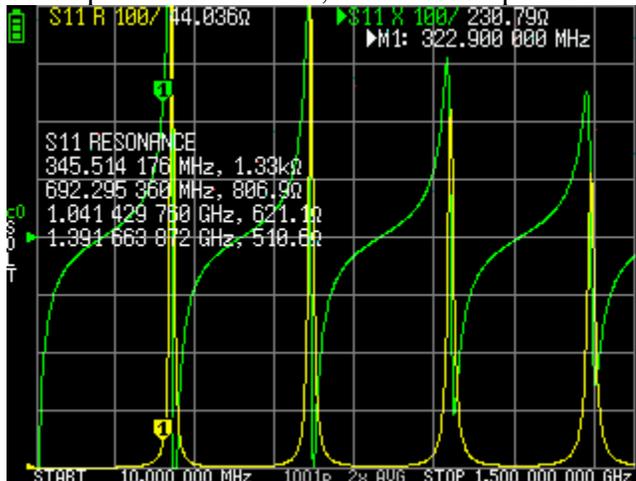
I know about this issue, in rare cases after SD card write, H4 hang, and not correct measure. This can be hardware problem (voltage drop in SD card write) but ...

PS also I found, new compiler option LTO - not stable on H4, so i disable it on next releases

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DiSlord Dec 12 [#3164](#)

This option on LiteVNA, it have 1001 points and allow get more better results in big ranges



PS I disable automatic marker placement, user can move it as need. Just display resonance frequency and R (need display R value?)

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DiSlord Dec 12 [#3163](#)

I cannot put markers on resonance position, so user can move it as need manually

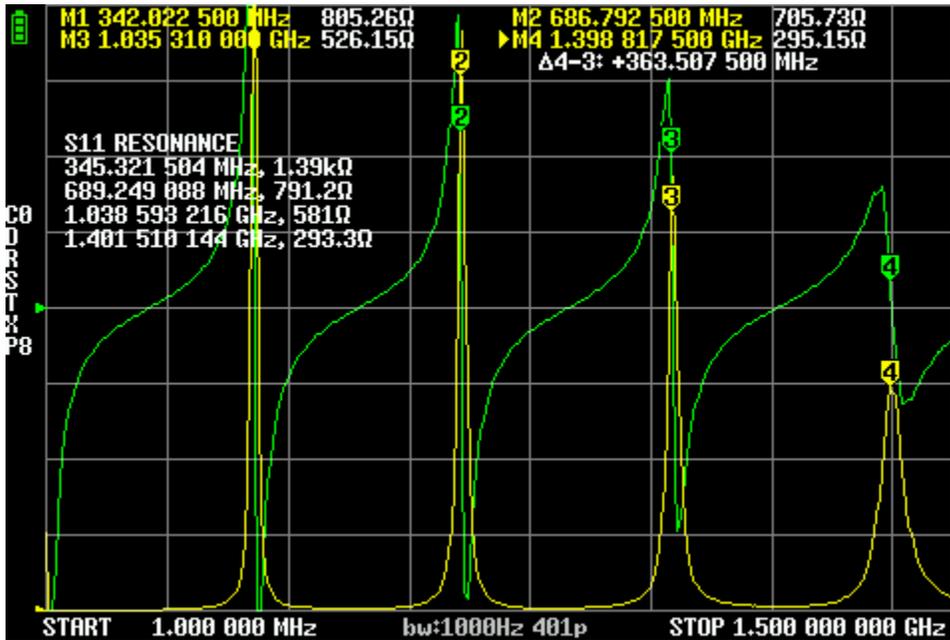
Or user can select free marker (number 5 for example) and move it.

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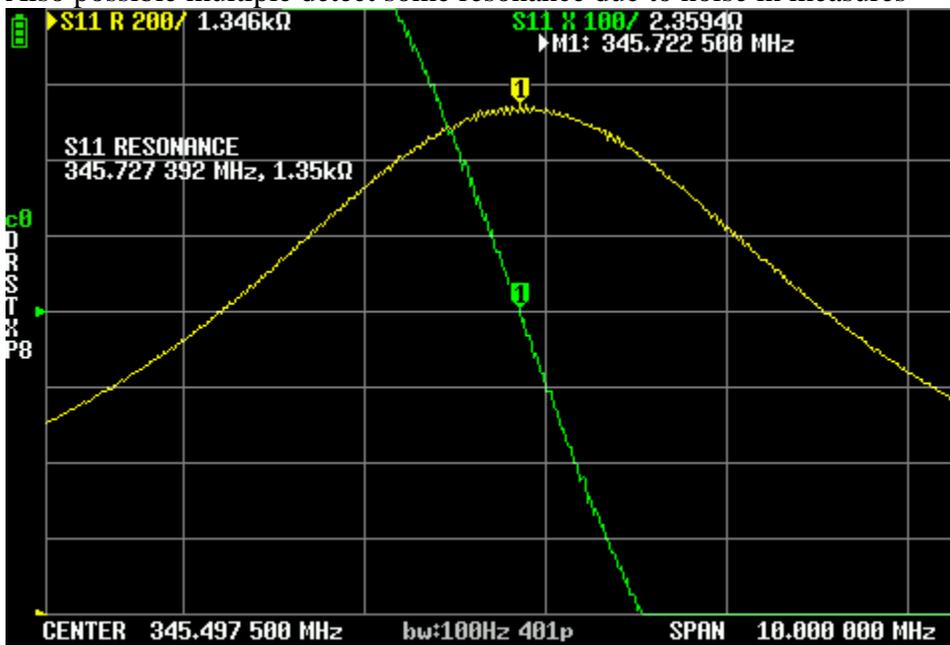
Dec 12 [#3162](#)

H4 have 401 points, this allow little better search on big range:

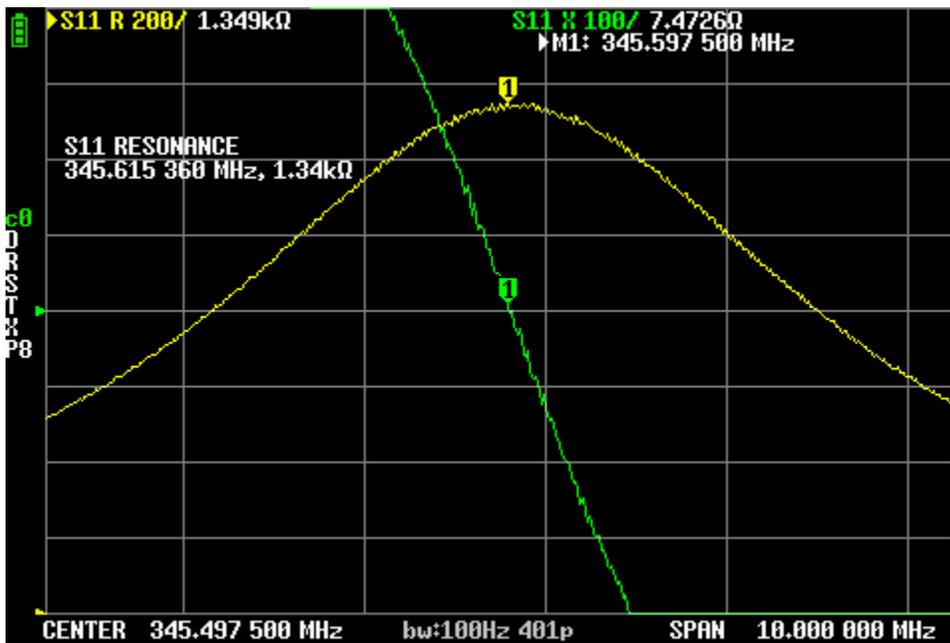
Marker values not some as measured - marker can placed only on point, measure option allow get results between points (made bilinear interpolation) so show more close result



First resonance more close, as can see error not so big (on 401 points i have ~ 4 MHz step, but error ~ 300 k)
 Also possible multiple detect some resonance due to noise in measures



More close 1 resonance, as can see error not so big

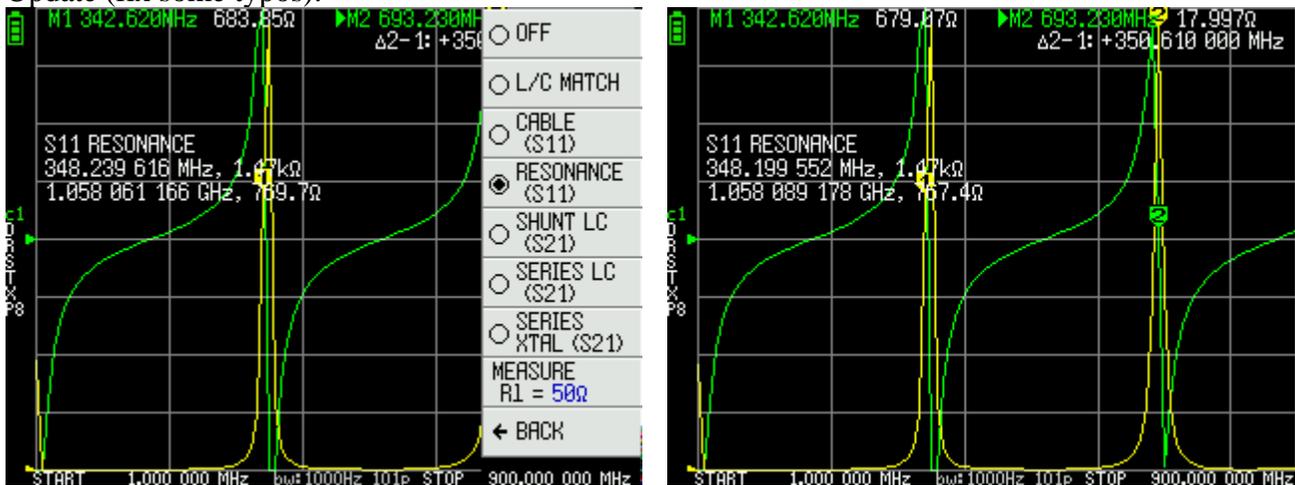


Also fix not correct freq at 2 index in measured results

<https://groups.io/g/nanovna-beta-test/attachment/3162/3/NanoVNA%20H4%20v1.1%20beta%201%20resonance.dfu>
<https://groups.io/g/nanovna-beta-test/attachment/3162/4/NanoVNA%20H%20v1.1%20beta%201%20resonance.dfu>

Dec 12 [#3158](#)

Update (fix some typos):



<https://groups.io/g/nanovna-beta-test/attachment/3158/2/NanoVNA%20H%20v1.1%20beta%201%20resonance.dfu>

DiSlord Dec 12 [#3156](#) [Edited](#) Dec 12

Would there be a way to implement a search for resonance? Find the point is X zero or very close regardless of the value of R?

This better implement in measure section, measure option have good search / measure / marker set functional

Need search points (up to 6 for example) there S11 X == 0 and R > ?? (value ?? or no matter?)

Output:

Freq = XX Hz, R = XX Ohm

Also paste markers at this point

I correct understand this functional?

Sat., Dec. 11 at 9:43 a.m.

Update to v1.1 beta 1:

- Init i2c bus devices on low speed, change on max speed after (i hope this allow fix problem vs hang on first power on)

- 2x increase wait time for SD card (also hope this fix errors on old slow cards)

- Add backup feature, this allow save some settings (freq range / points count / jog step / leveler mode / bandwidth / last used slot)

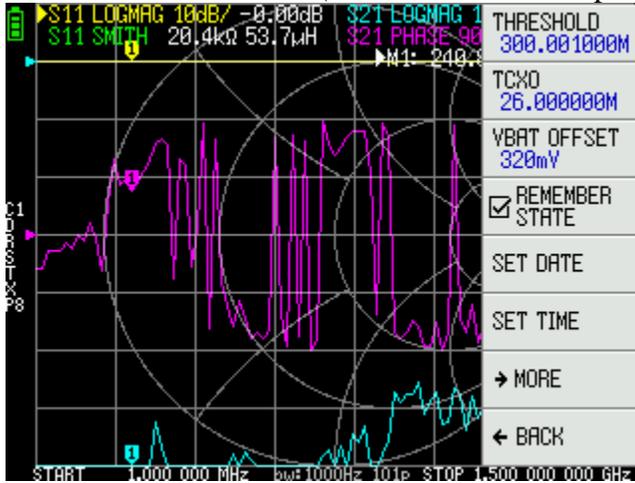
Backup restore settings only for stored on flash slot (not work for RAM calibration data)

By default loaded 0 slot (if no backup enabled / on error / no battery)

- Small UI changes

Divide Expert settings on 2 screens

Added Remember State (enable/disable backup feature) checkbox (need save config after for apply)



Copy Set E-Delay button to calibration

(some users use custom edelay for calibration)



Use one button for marker search min/max



<https://groups.io/g/nanovna-beta-test/attachment/3152/4/NanoVNA%20H%20v1.1%20beta%201.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/3152/5/NanoVNA%20H4%20v1.1%20beta%201.dfu>

Thu., Dec. 9 at 10:59 a.m.

DiSlord's NanoVNA H/H4 firmware supports console commands for SD card access, so someone can write software for work.

```
sd_list {pattern}
sd_read {filename}
sd_delete {filename}
```

Command usage:

Get all files list

```
sd_list or sd_list *.*
```

Read s1p list

```
sd_list *.s1p
```

Read bmp list

```
sd_list *.bmp
```

Read s1p and s2p list

```
sd_list *.s?p
```

Read *.bin list

```
sd_list *.bin
```

Example of sd_list output:

```
Log {filename} {size}
```

```
18.238 rx: ch>
```

```
18.241 tx: sd_list *.bmp
```

```
18.243 rx: sd_list *.bmp
```

```
18.246 rx: sd_list:
```

```
18.250 rx: VNA_000004.bmp 153670
```

```
18.253 rx: VNA_00000C.bmp 153670
```

```
18.256 rx: VNA_210721_210606.bmp 307270
```

```
18.258 rx: VNA_000077.bmp 153670
```

```
18.261 rx: VNA_000114_212649.bmp 307322
```

```
18.300 rx: VNA_000119_233142.bmp 307322
```

```
18.303 rx: VNA_000119_233204.bmp 307322
```

```
18.306 rx: VNA_000119_233223.bmp 307322
```

```
18.309 rx: VNA_000122_082125.bmp 307322
```

```
18.312 rx: VNA_000129_085002.bmp 307322
```

```
18.315 rx: VNA_000129_085132.bmp 307322
```

```
18.318 rx: VNA_000129_085345.bmp 307322
```

```
18.321 rx: VNA_000129_085607.bmp 307322
```

```
18.323 rx: VNA_000129_091616.bmp 307322
```

```
18.326 rx: VNA_000129_091818.bmp 307322
```

```
18.361 rx: VNA_000301_213820.bmp 307322
```

```
18.364 rx: VNA_201129_081345.bmp 307322
```

```
18.368 rx: VNA_201129_081351.bmp 307322
```

```
18.371 rx: VNA_201129_081357.bmp 307322
```

```
18.374 rx: ch>
```

For read file need

```
sd_read {filename}
```

After nano return binary file data or an error:

Output:

```
"err: no file\r\n"
```

Delete file:

```
sd_delete {filename}
```

After nano delete it from SD card:

Output:

```
shell_printf("delete: %s %s\r\n", filename, res == FR_OK ? "OK" : "err");
```

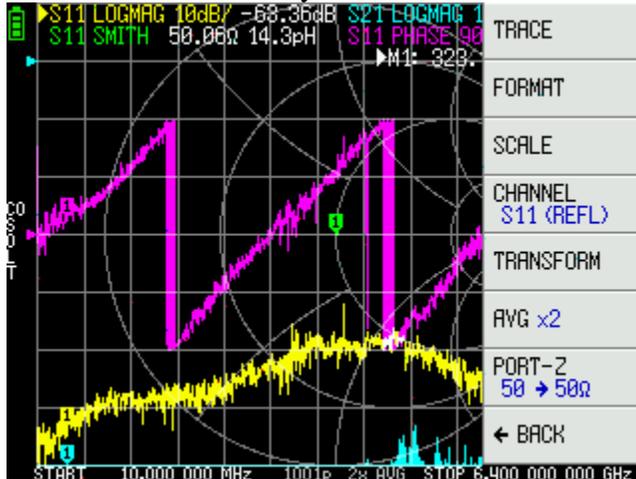
V2 / V2Plus / V2Plus4 / LiteVNA firmwae v1.1 beta

Tue., Nov. 30 at 3:34 a.m.

Port all features from H/H4:

- 6x10 font
- Multi color text in UI
- UI menu text fixes
- All features

Just screenshot from my LiteVNA



https://groups.io/g/nanovna-beta-test/attachment/3121/1/V2_LiteVNA%20v1.1%20beta%20fw%20pack.zip

<https://groups.io/g/nanovna-beta-test/attachment/3129/0/V2Plus4%20v1.1%20beta.bin>

For users prefer old small font on H devices build v1.1 and use only old 5x7 fonts:

<https://groups.io/g/nanovna-beta-test/attachment/3138/0/NanoVNA%20H%20v1.1%20beta%20small%20font.dfu>

Mon., Nov. 29

Another software for VNA Mouse / NanoVNA V2 / V2Plus / S-A-A V2 / V2Plus4 / LiteVNA

<http://www.ur5ffr.com/viewtopic.php?f=12&t=348> (Russian)

Video

<https://www.youtube.com/watch?v=4y7B7rqwT00>

You can try use it, not work vs NanoVNA H/H4 (it use V2 protocol)

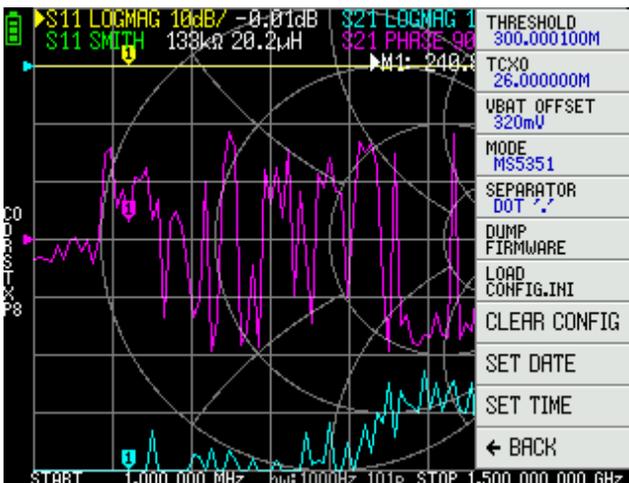
https://groups.io/g/nanovna-beta-test/attachment/3117/0/UR5FFR_VNA_2.0_29.10.2021.zip

=====

NanoVNA H/H4 v1.1 beta firmware

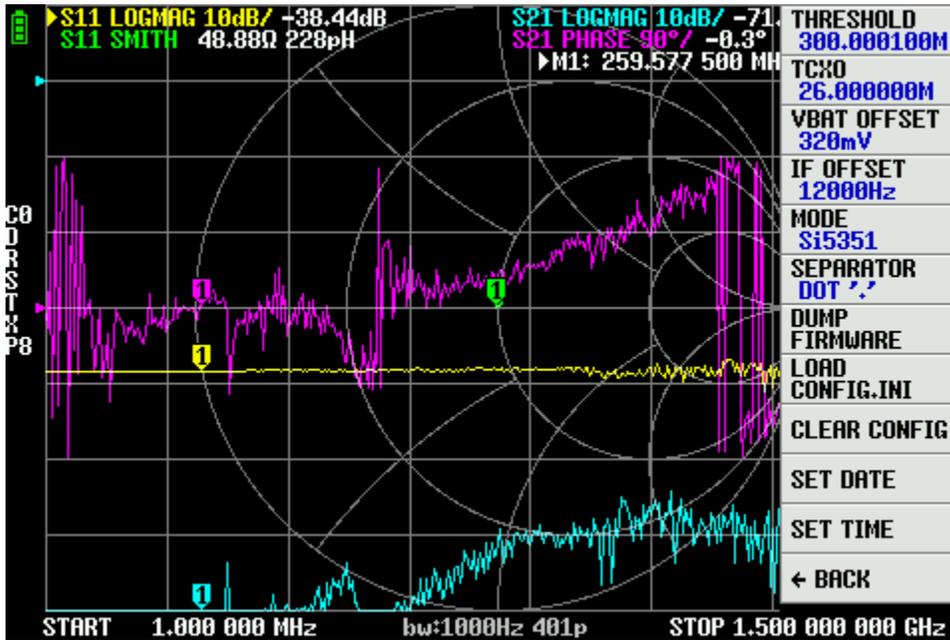
Mon., Nov. 29 at 4:51 p.m.

- New 6x10 font
- Added 5x7 and 6x10 font support, use adapted font size for menus for small screens (H devices)
- Added multi color string, use color index 25 (LCD_LINK_COLOR) for set color
(default color dark blue: R = 0, G = 0, B = 192)
- 5x7 fonts used in calibration / grid values / menus



- Small UI menu text fixes
- Show selected Smith value in marker menu
- Small fixes

H4 screen example



<https://groups.io/g/nanovna-beta-test/attachment/3118/2/NanoVNA%20H%20v1.1%20beta.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/3118/3/NanoVNA%20H4%20v1.1%20beta.dfu>

Restoring V2 firmware after CPU replace

Nov 19, 2021

One user from forum asked how restore a V2 after brick:

For this need ST-link programmer

Like this for example:



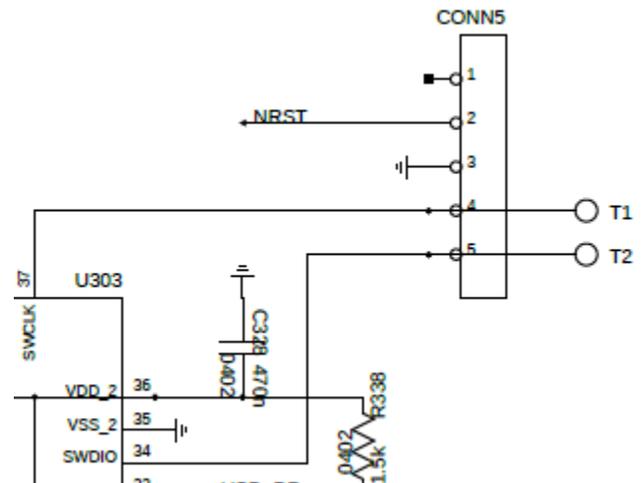
Need connect it to V2:

SWCLK (SWD clock)

GND (Ground)

SWDIO (SWD data input/output)

Here V2 board scheme:



Need download and install STM32 ST-Link utility from STM site:
(<https://www.st.com/en/development-tools/stsw-link004.html>)

Connect ST-Link to USB, and power on device

Run STM32 ST-Link utility

Run Target->Connect

After connection utility show device flash (I use screenshot from tinySA, but for V2 CPU all look same)

The screenshot displays the STM32 ST-LINK Utility application window. At the top, there is a menu bar (File, Edit, View, Target, ST-LINK, External Loader, Help) and a toolbar with various icons. Below the toolbar is a 'Memory display' section with fields for 'Address' (0x08000000), 'Size' (0x40000), and 'Data Width' (32 bits). To the right, a 'Device' information panel shows: Device: STM32F302xB-xC/F303xB-xC/F358xx, Device ID: 0x422, Revision ID: Rev Y, and Flash size: 256KBytes. A 'LiveUpdate' checkbox is present at the bottom right of this panel.

The main area is a table titled 'Target memory, Address range: [0x08000000 0x08040000]'. The table has columns for Address, 0, 4, 8, C, and ASCII. The data shows a memory dump with hexadecimal values and their corresponding ASCII representations.

Address	0	4	8	C	ASCII
0x08000000	20000200	080001A1	08001261	080125C1	... Ÿ... a... Б %..
0x08000010	08001261	08001261	08001261	08001261	a... a... a... a...
0x08000020	08001261	08001261	08001261	08001A01	a... a... a...
0x08000030	08001261	08001261	08001261	08001261	a... a... a... a...
0x08000040	08001261	08003E11	08003EA1	08003ED1	a... >... Ÿ > .. C > ..
0x08000050	08001261	08001261	08003C31	08003C61	a... a... 1 <... a < ..
0x08000060	08003C91	08003CC1	08003CF1	08003241	' < .. Б < .. c < .. A 2 ..
0x08000070	08003271	080032A1	080032D1	08003301	q 2 .. Ÿ 2 ... C 2 ... 3 ..
0x08000080	08003331	08003361	0801A9B1	08001261	1 3 .. a 3 .. ± © .. a ...
0x08000090	08001261	08001261	08001261	08003D21	a... a... a... ! = ..
0x080000A0	08001261	08001261	08001261	08001261	a... a... a... a...
0x080000B0	08003561	08004361	08004381	08001261	a 5 .. a C .. f C .. a ...
0x080000C0	08001261	08001261	08001261	08001261	a... a... a... a...
0x080000D0	08001261	08004511	08001261	08001261	a... E... a... a...
0x080000E0	08003D91	08003E41	08003E71	08001261	' = .. A > .. q > .. a ...
0x080000F0	08001261	08001261	08001261	08001261	a... a... a... a...

At the bottom of the window, a log window shows the following messages:

```
11:58:26 : ST-LINK SN : 56FF73066580515208240767
11:58:26 : ST-LINK Firmware version : V2J29S7
11:58:26 : Connected via SWD.
11:58:26 : SWD Frequency = 125 KHz.
11:58:26 : Connection mode : Normal.
11:58:26 : Device ID:0x422
11:58:26 : Device flash Size : 256KBytes
11:58:26 : Device family :STM32F302xB-xC/F303xB-xC/F358xx
```

The status bar at the bottom indicates: Connection mode : Normal, Device ID:0x422, and Core State : Live Update Disabled.

Next better made full dump device CPU flash (on V2 256k)

Need enter size 0x40000, address 0x08000000, after File->Save file as... chose name and after Save

You can always restore device from this dump, just upload it to address 0x08000000

Now need flash V2 bootloader:

File->Open file, after select V2bootloader.bin

But you can flash it by ST-Link, V2 firmware need flash at address 0x08004000
 File->Open file, after select V2 firmware
 Next need Target->Program & Verify
 V2 firmware address 0x08004000
 Push start

!!! V2Plus/V2Plus4 use signed bootloader, and if replace CPU this bootloader not start!

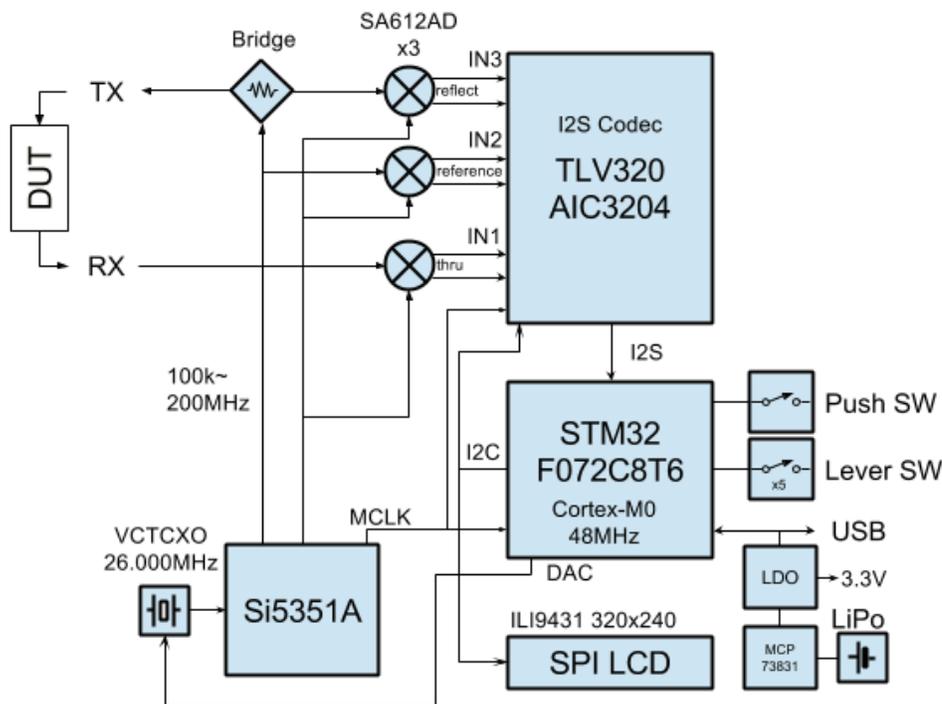
I just dumped this bootloader from flash, and hope that the microcontroller never breaks down, as it will be impossible to restore it

!!! V2Plus4 bootloader size 32k (it contains all measure code for device), and firmware need flash at address 0x08008000

<https://groups.io/g/nanovna-beta-test/attachment/3109/5/V2bootloader.bin>

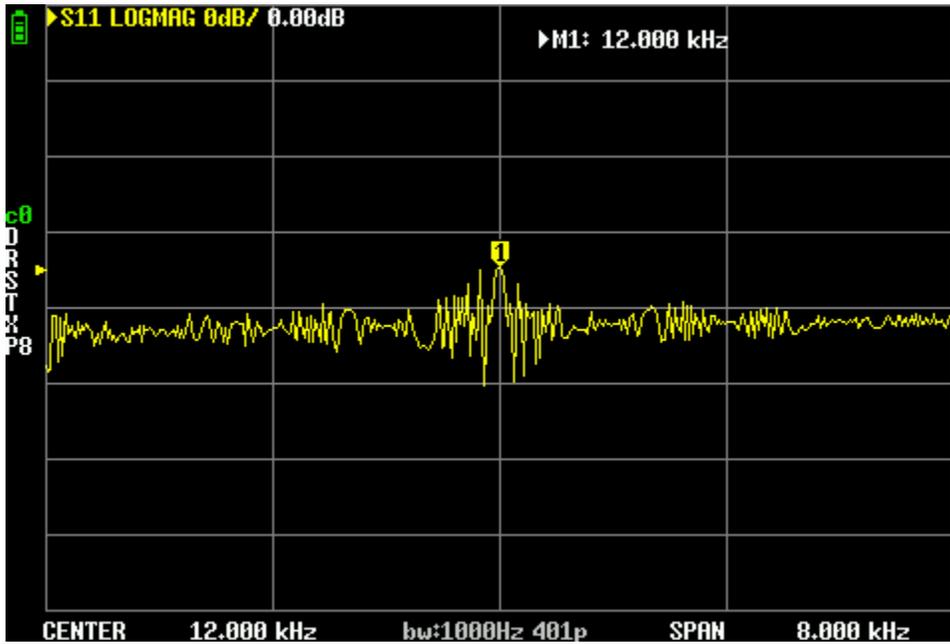
Fri., Oct. 29 at 1:52 p.m.

Explanation of **IF** (Intermediate frequency) Command Starting with FW v1.0.65 (Located in Expert Menu)
 Intermediate frequency (IF) this frequency used for signal analyse:

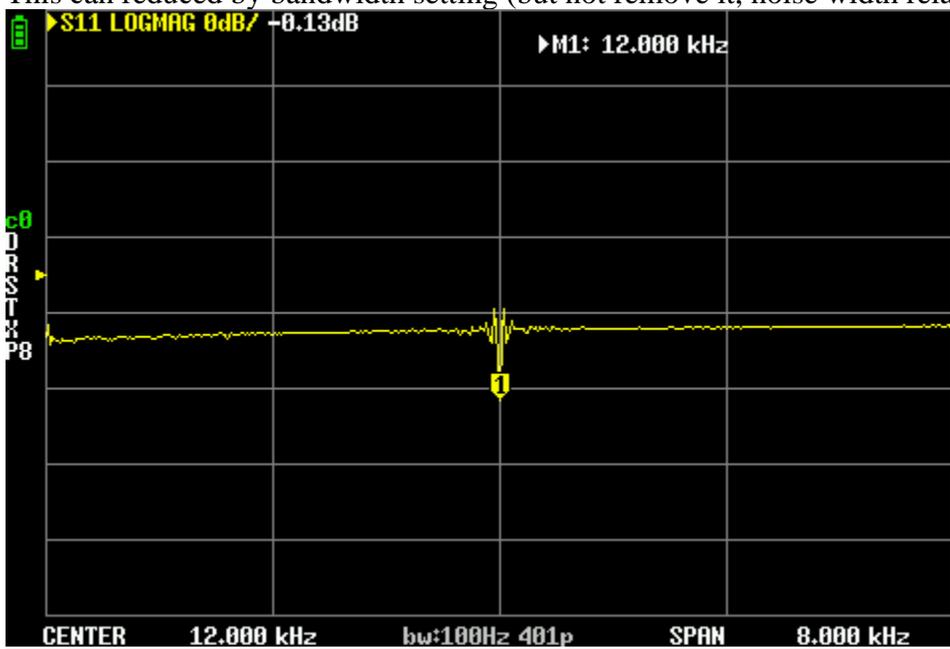


By default in my firmware used 12k

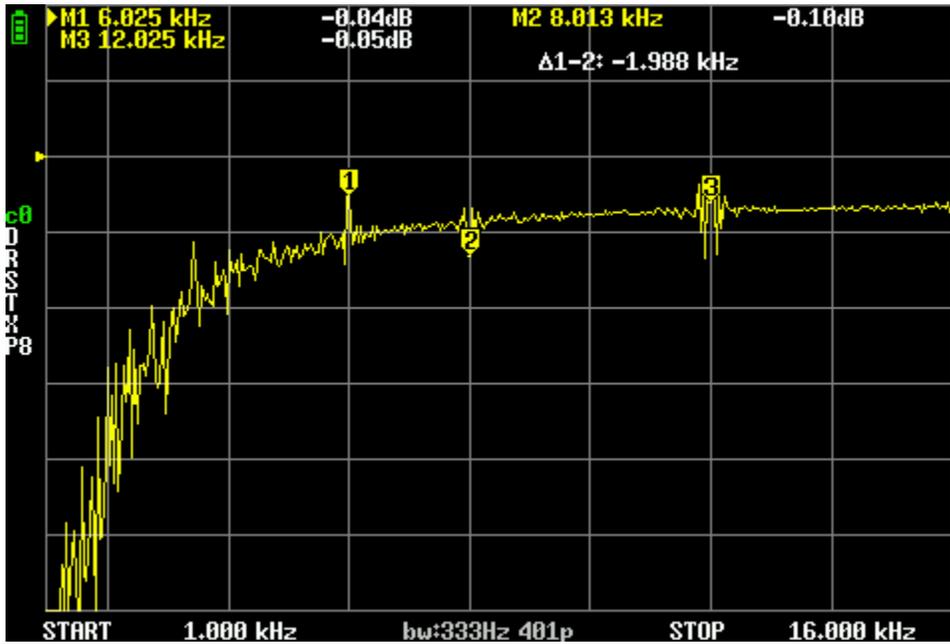
On measure near this frequency exist small noise (also this possible near this frequency harmonics)



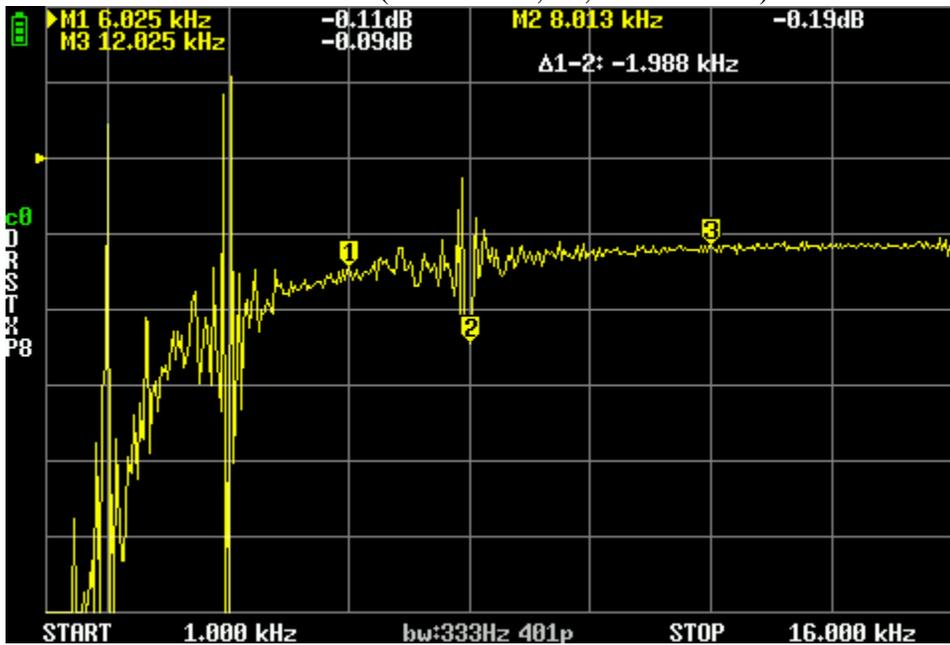
This can be reduced by bandwidth setting (but not remove it, noise width related to bandwidth):



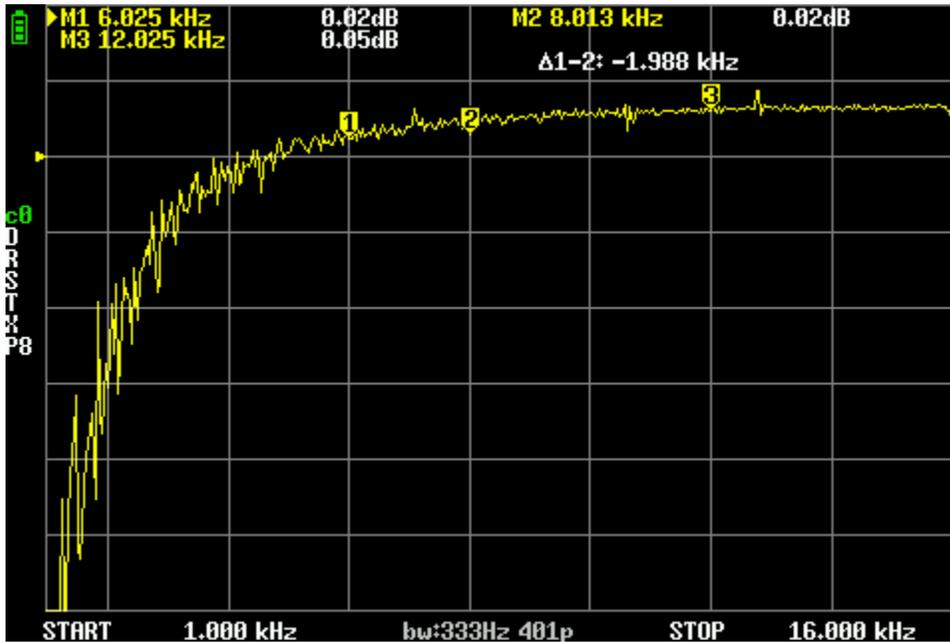
This is also visible on harmonics (3k, 6k, 8k):



Here image if change IF to 4k:
 Possible see no noise on 12k (but near 2k, 4k, 8k increased)



And here IF = 32k:
 All noise removed



Possible also see on IF change - change amplitude - this related to IF filter in NanoVNA

This option used for low frequency measure see this post (here related to this problems, but I could not explain the problem to this person):

<https://www.eevblog.com/forum/rf-microwave/nanovna-custom-software/msg3585624/#msg3585624>

PS edy555 use 6k IF in own firmware, but i test and 12k show more better results on my device (H4 use dynamic table, so possible change IF on fly)

=====

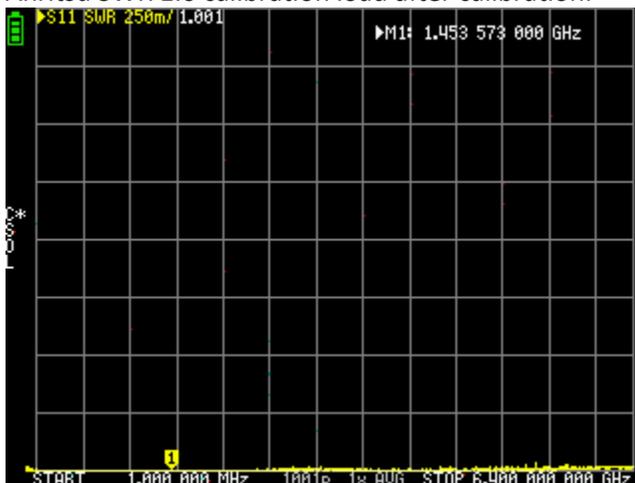
Oct 18 New V2 version Hardware

I have Anritsu N-Type calibration kit (to 18GHz)

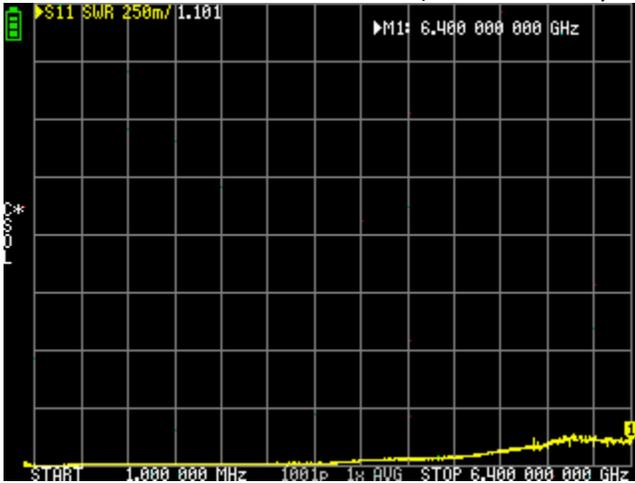
Made calibration (use cheap SMA to N) 1MHz to 6.4GHz on SAA2s (use last FW vs 1001 measure point support)

I have various N-Type load (some have the ability to fine-tune using a micro-screw, and I tried to align their characteristics with the reference set on Anritsu S810D)

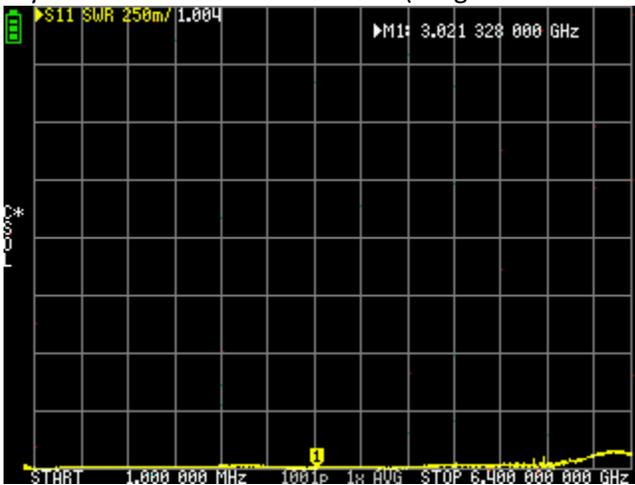
Anritsu SWR 1.0 calibration load after calibration:



Next 0 to 2.3GHz calibration load (SWR < 1.015 by datasheet)

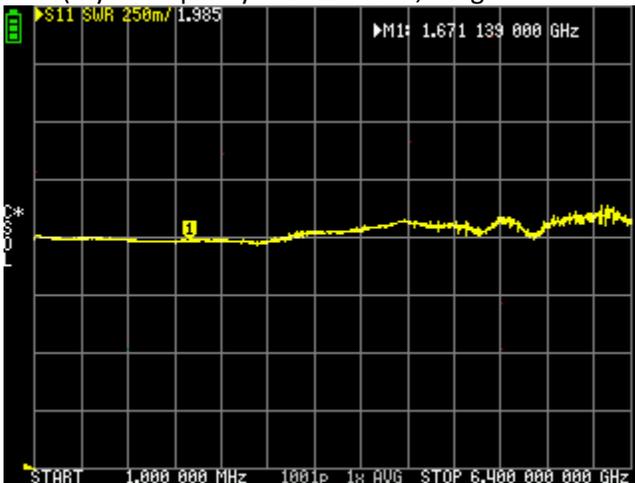


My next SWR 1.0 calibration load (I align it on Anritsu S810D up to 6GHz)

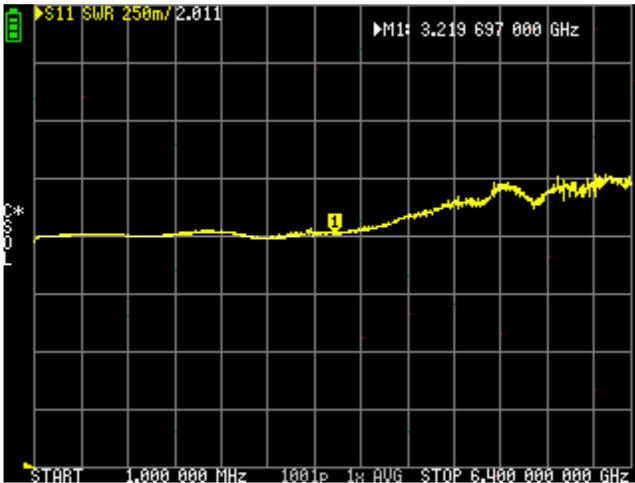


And measure three SWR 2.0 load (up to 3GHz)

First (my best quality SWR 2.0 load, i align it on Anritsu S810D up to 6GHz)



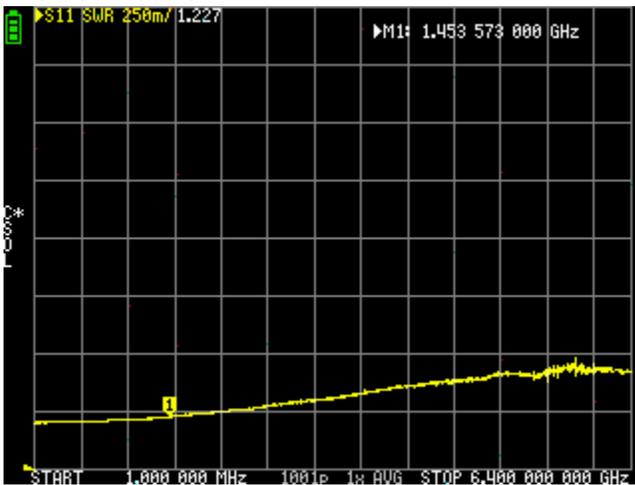
Another 3GHz load SWR 2.0



And 1GHz load SWR 2.0 (not possible calibrate)



And 1GHz load SWR 1.2



SAA2s show good performance for SWR measure up to 6.4GHz

Mon., Oct. 18 at 3:42 p.m.

Update to v1.0.71 pre release (next use v1.1 release version):

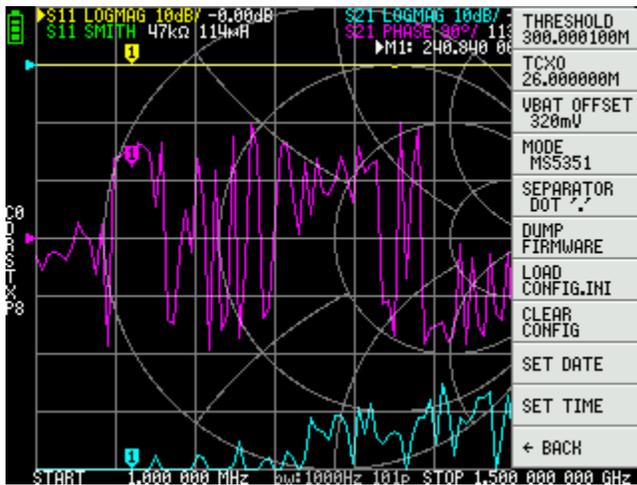
- Added DATE/TIME input

- Added MS5351 support on H v3.6 board

- Replaced onscreen keypad “X1” button with Enter button
See CONFIG->EXPERT SETTINGS



for SCALE/REF/DATE/TIME input



Date input keyboard (need input in YYMMDD format!!):

7	8	9	ENT
4	5	6	ENT
1	2	3	ENT
0	.	←	ENT

SET DATE
YYMMDD **21 10 18**

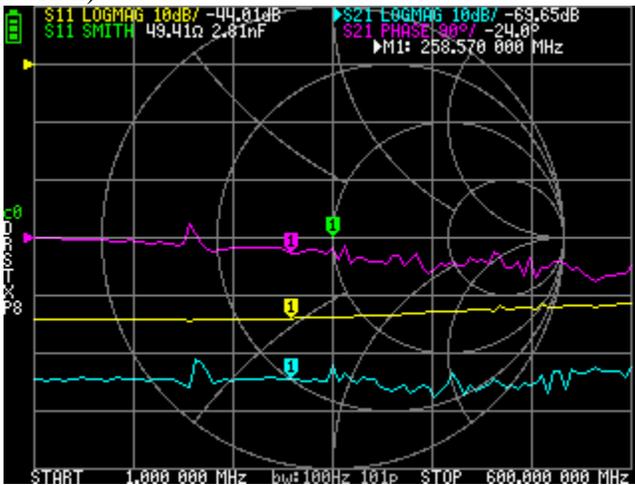
Time input keyboard (need input in HHMMSS format!!)

7	8	9	ENT
4	5	6	ENT
1	2	3	ENT
0	.	←	ENT

SET TIME
HHMMSS **22 36 18**

PS Use NanoVNA H v3.6 + replaced SI5351 to MS5351 generator:

Show perfect results on 600MHz range, here is 70dB attenuator measure (only interpolation glitch on harmonic switch)



<https://groups.io/g/nanovna-beta-test/attachment/3091/4/NanoVNA%20H%20v1.0.71%20prerelease.dfu>
<https://groups.io/g/nanovna-beta-test/attachment/3091/5/NanoVNA%20H4%20v1.0.71%20prerelease.dfu>

=====
Oct 16 #3090

As i see dynamic lost on output mixer AD8342

<https://www.analog.com/media/en/technical-documentation/data-sheets/AD8342.pdf>

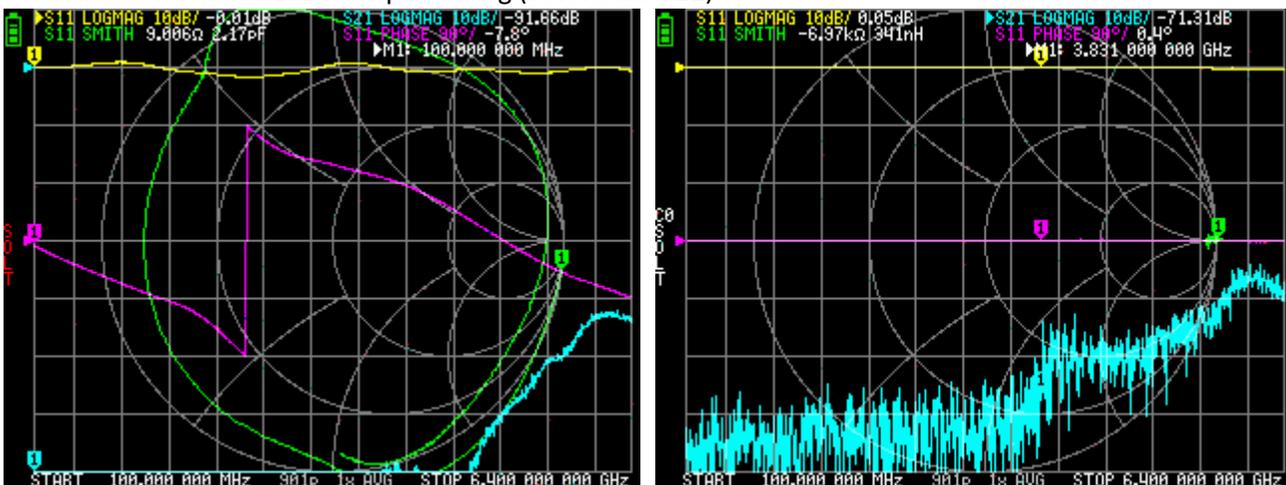
Low Frequency to 3.8 GHz

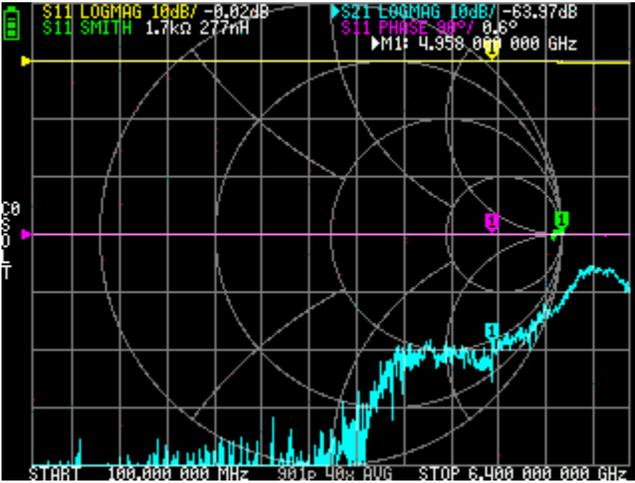
After 3.8GHz all V2 start lost dynamic

SAA2s have better port isolation and better signal generator (also tuned by software), so can work to ~5GHz\

PS: just test maximum points, at this moment CPU allow store/process 901 measure/calibration points (second image after calibration, visible lost after ~3.8GHz, next dynamic lost after ~5GHz)

For increase need add 1024 FFT processing (before use 512)





Small screen not allow see this points count, but look interesting

Oct 16 [#3087](#)

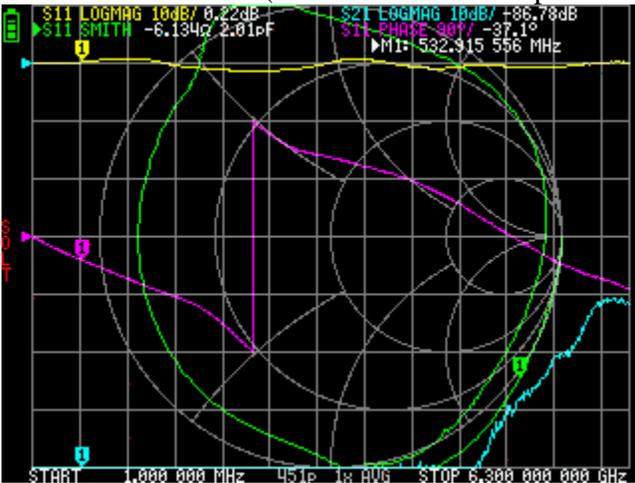
On Fri, Oct 15, 2021 at 11:28 AM, Jos Stevens wrote:
 Interesting, firmware change needed ?

Yes, and all my version V2 firmware after v1.0.69 use SAA2s code

On this board new CPU, more external devices

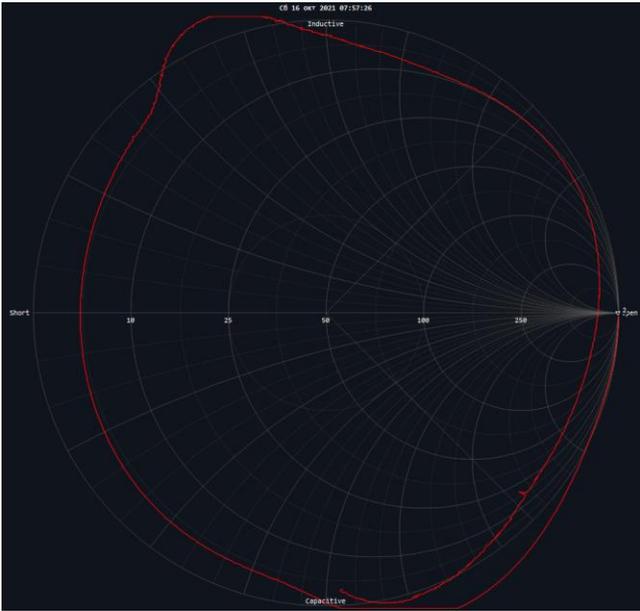
PS The name will be LiteVNA

Uncalibrated screen (on 1x AVG and 560 points/sec measure speed)



Device provide very low phase noise in all range, SMITH chart very clean

Also attach NanoVNA-App uncalibrated smith (much better resolution)

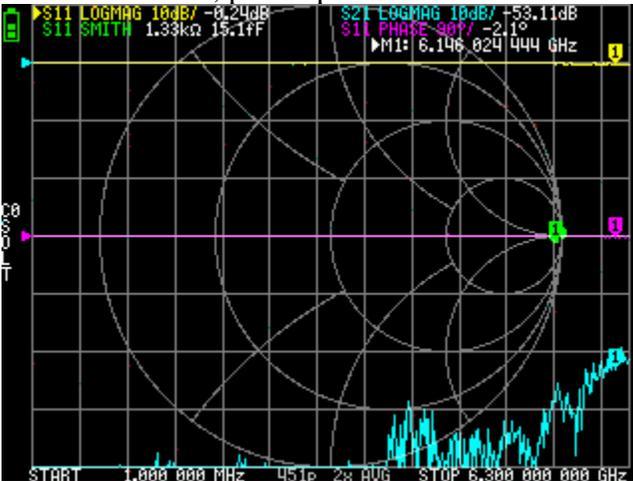


Oct 14 [#3081](#)

Another news, more SAA2s improvements:

- Added Brightness control
- Added USART pins for external modules
- Change ADF4350 to MAX2871 (increased max frequency to 6GHz, my device work up to 6.4MHz)

After calibration, ports open



50 Ohm on all ports and AVG = 60

NanoVNA H/H4 v1.0.70

Thu., Oct. 7 at 3:30 p.m.

Update touch calibration procedure, now:

Need touch this point (mark as *), not use screen corner, this allow more correct calibrate

✱

TOUCH UPPER LEFT *

After need touch bottom point

TOUCH LOWER RIGHT *

✱

- Restore dump console command (allow get raw ADC data)

"dump 0" get reflect raw data

"dump 1" get reference raw data

49.328	rx:	-2568	-646	1361	3295	5062	6590	7840	8738	9264	9437	9248	8677
49.332	rx:	7756	6608	5273	3785	2132	341	-1464	-3231	-4901	-6395	-7646	-8592
49.339	rx:	-9205	-9469	-9406	-9004	-8239	-7197	-5840	-4224	-2453	-548	1411	3319
49.343	rx:	5102	6623	7839	8745	9282	9444	9222	8638	7790	6686	5341	3833
49.347	rx:	2178	395	-1439	-3246	-4909	-6371	-7638	-8594	-9211	-9486	-9398	-8952
49.351	rx:	-8197	-7184	-5867	-4325	-2561	-662	1344	3290	5021	6546	7781	8709
49.357	rx:	9261	9431	9245	8709	7821	6654	5333	3850	2204	417	-1393	-3211
49.361	rx:	-4909	-6410	-7668	-8605	-9218	-9480	-9381	-8960	-8218	-7221	-5946	-4386
49.380	rx:	-2599	-664	1333	3276	5057	6573	7819	8722	9263	9447	9236	8683
49.384	rx:	7827	6686	5269	3727	2085	358	-1435	-3199	-4869	-6353	-7601	-8568
49.391	rx:	-9176	-9451	-9387	-8968	-8206	-7188	-5885	-4317	-2531	-602	1348	3296
49.395	rx:	5082	6600	7836	8751	9286	9424	9218	8656	7794	6680	5358	3836
49.399	rx:	2171	386	-1454	-3211	-4887	-6392	-7655	-8619	-9246	-9502	-9398	-8959
49.407	rx:	-8222	-7172	-5863	-4280	-2446	-461	1504	3404	5129	6618	7825	8720
49.411	rx:	9265	9416	9219	8654	7768	6651	5280	3754	2115	330	-1515	-3331
49.415	rx:	-4978	-6467	-7706	-8643	-9240	-9497	-9417	-8971	-8195	-7146	-5841	-4303

- Fix saved bmp header, now bmp file open in all software
- Now correct reset USB connection on software reset
- Cleanup

<https://groups.io/g/nanovna-beta-test/attachment/3060/2/NanoVNA%20H%20v1.0.70.bin>
<https://groups.io/g/nanovna-beta-test/attachment/3060/3/NanoVNA%20H4%20v1.0.70.bin>

=====
 NanoVNA-V2 v1.0.70

Sat., Oct. 2 at 4:34 p.m.

Fixed v1.0.70 for V2 (fix bug on calibrate on less then maximum possible points)

<https://groups.io/g/nanovna-beta-test/attachment/3056/0/V2%20320x240%20v1.0.70.bin>
<https://groups.io/g/nanovna-beta-test/attachment/3056/1/V2%20480x320%20v1.0.70.bin>

PS only V2 firmware contain SD card option, not all users have this mod

=====
 V2 v1.0.70

Sat., Oct. 2 at 4:20 p.m.

Build only for **V2Plus**

2.8 inch - <https://groups.io/g/nanovna-beta-test/attachment/3055/0/V2Plus%20480x320%20v1.0.70.bin>
 4 inch - <https://groups.io/g/nanovna-beta-test/attachment/3055/1/V2Plus%20320x240%20v1.0.70.bin>

=====
 Sat., Oct. 2 at 3:42 p.m.

Build v1.0.70 only for **V2Plus4**

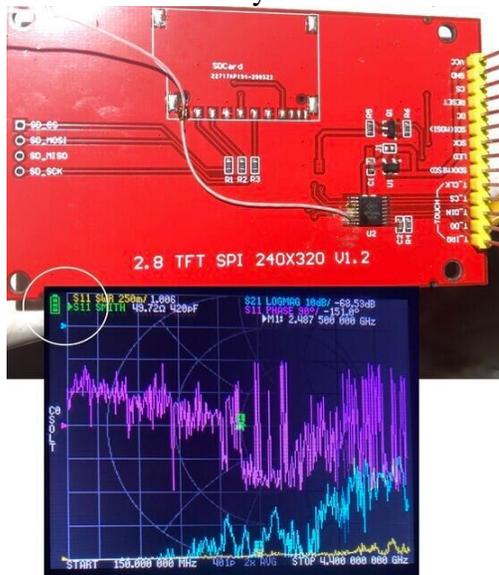
Limits as before:

- no XTAL measure

But added store trace feature as on H/H4 (DISPLAY->TRACE->STORE TRACE)

<https://groups.io/g/nanovna-beta-test/attachment/3054/0/V2Plus4%20v1.0.70.bin>

=====
 nanoVNA-V2 mod to allow battery status measure:



Sun., Sep. 26 at 1:05 p.m.

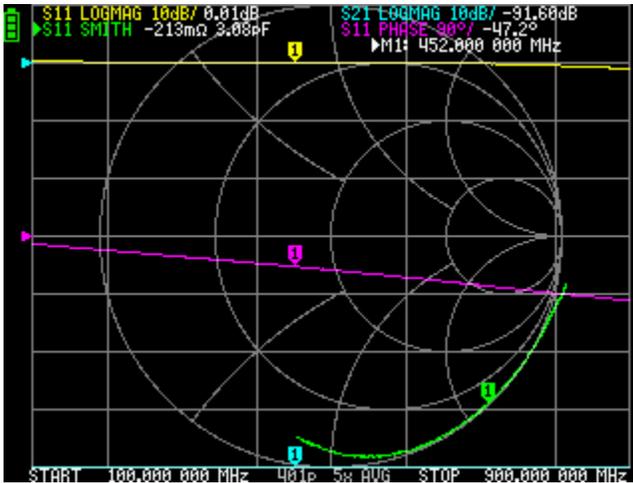
Update NanoVNA-**V2** code:

- Added measure Vbat by xpt2046 (need made hw mod):

cut vbat pin 7 on xpt2046 from ground on LCD module, and connect to battery+ for measure

<https://ldm-systems.ru/f/doc/catalog/HY-TFT-2,8/XPT2046.pdf>

If pin 7 measure battery voltage then battery indicator show on screen (and measured voltage on version screen), for add correction use CONFIG->EXPERT SETTING->VBAT OFFSET as on H/H4



- Now possible change color theme on **SAA V2**:

In NanoVNA-App

Need send: 2054**07**2250BBGGRR00

20 - write byte

54 - address (color index)

07 - value (7 index is LCD_TRACE_2_COLOR)

22 - write dword

50 - address (color value)

BB - color in RGB

GG - color in RGB

RR - color in RGB

00 -

Read color from color[8] need send: 2054081250

rx *00 fc 00 00

BB GG RR 00

20 - write byte

54 - address (color index)

08 - value (8 index is LCD_TRACE_3_COLOR)

12 - read dword

50 - address (color value)

Color indexes as on H/H4

#define LCD_BG_COLOR 0

#define LCD_FG_COLOR 1

#define LCD_GRID_COLOR 2

#define LCD_MENU_COLOR 3

#define LCD_MENU_TEXT_COLOR 4

```

#define LCD_MENU_ACTIVE_COLOR      5
#define LCD_TRACE_1_COLOR          6
#define LCD_TRACE_2_COLOR          7
#define LCD_TRACE_3_COLOR          8
#define LCD_TRACE_4_COLOR          9
#define LCD_TRACE_5_COLOR         10
#define LCD_TRACE_6_COLOR         11
#define LCD_NORMAL_BAT_COLOR       12
#define LCD_LOW_BAT_COLOR          13
#define LCD_SPEC_INPUT_COLOR       14
#define LCD_RISE_EDGE_COLOR        15
#define LCD_FALLEN_EDGE_COLOR      16
#define LCD_SWEEP_LINE_COLOR       17
#define LCD_BW_TEXT_COLOR          18
#define LCD_INPUT_TEXT_COLOR       19
#define LCD_INPUT_BG_COLOR         20
#define LCD_LC_MATCH_COLOR         21
#define LCD_GRID_VALUE_COLOR       22
#define LCD_INTERP_CAL_COLOR       23
#define LCD_DISABLE_CAL_COLOR      24

```

- Compile vs SD card support (how made mod see <https://groups.io/g/nanovna-users/message/23642>)
- Rewrite all hw related code (also not use Owo MCULIB code)
- Rewrite software i2c bus support allow 2x increase si5351 speed, now measure quality on < 140MHz use 2x more average by default
- fixed bmp header, now stored bmp files can open in any software
- lot of cleanup and optimisations allow free some RAM, so now V2 support 401 measure and calibration points

PS all code written for SAA2s, and ported to V2, thanks Hugen for donation and motivation support old V2 hardware
<https://groups.io/g/nanovna-beta-test/attachment/3046/1/V2%20320x240%20v1.0.70.bin>
<https://groups.io/g/nanovna-beta-test/attachment/3046/2/V2%20480x320%20v1.0.70.bin>

=====

Aug 31, 2021

Not released publicly - Compiled new v1.0.69b

[Remove options](#) - Makefile

[Remove unused menu types](#) - ui.c

[More pin defines](#) - [NANOVNA STM32 F303/board.h](#) (Allow USB reset on start/reconnect)

[Remove obsolete code](#) - dsp.c

[More compact code for stored traces](#) - plot.c

[Not USE ChibiOS DAC driver](#) - halconf.h , main.c & ili9341.c

Can now re-enable DUMP & TRACE console commands with no compiler errors

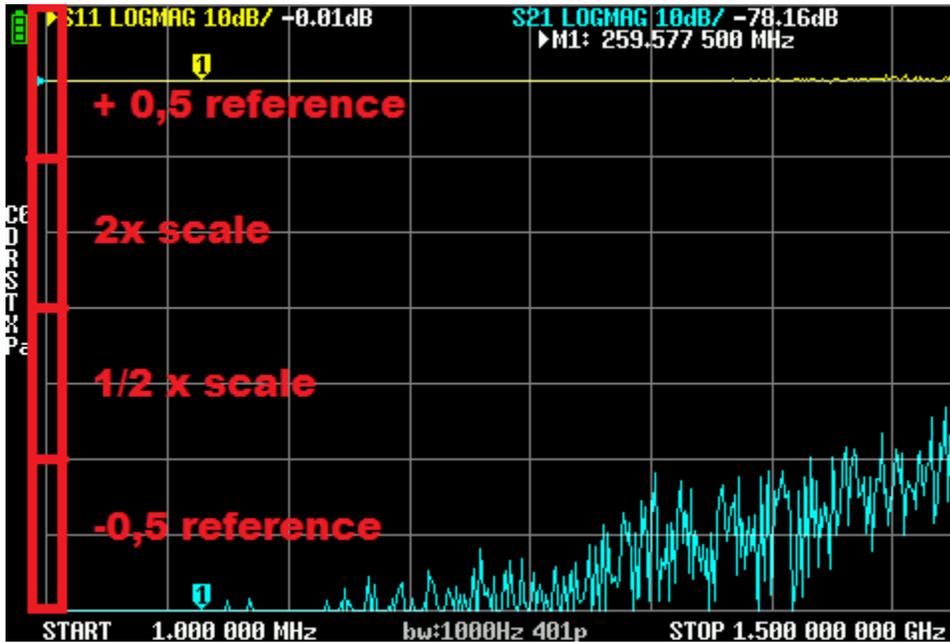
=====

Sat., Jul. 31 at 9:38 a.m.

- >I have a question: the numerical displays for changing (for instance) the 'reference position'
- >do not have the 'minus' sign.... (and it's in the last version even on the V2)

If I correctly remember, this is not available in all FW

But now possible quick change reference and scale position for current selected trace see attached image

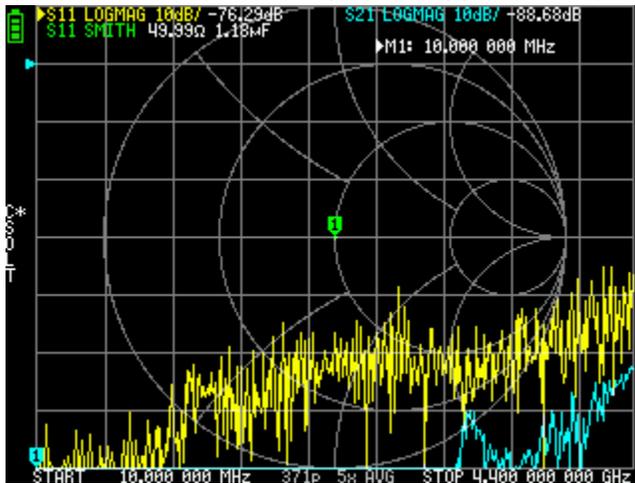


Sat., Jul. 31 at 5:48 a.m.

Another update v1.0.69 - for V2 fixed some UI bugs, and port more code (this allow reduce V2 FW size on ~4k-5k)

For SAA2S added battery indicator, now it look as on H/H4

Here is calibrated from 10M to 4400M SAA2S vs 50 om load on CH0 port



Sat., Jul. 31 at 5:37 a.m.

Reload v1.0.69 firmware pack

<https://groups.io/g/nanovna-users/files/Dislord%27s%20Nanovna%20-H%20Firmware/NanoVNA%20v1.0.69%20fw%20pack.zip>

For V2, added some UI fixes, and fix velocity factor apply.

Now Display flipped by default, for Si5351 used 0 power setting as default

Reduced V2 firmware size (port printf code from H/H4, port all plot and UI code)

hwalker <herbwalker2476@gmail.com>

To:nanovna-beta-test@groups.io

Thu., Jul. 29 at 10:56 a.m.

On Thu, Jul 29, 2021 at 06:56 AM, DiSlord wrote:

Loss - current cable loss at active marker frequency. In this measure

$\text{loss} = s_{11} \log_{\text{mag}} / 2$

This not fully correct, but simple for calculate

Signal go from Nano and back and drop amplitude due to cable loss. So need just divide logmag by 2.

But in 1 port measure you can see s11 logmag not linear, need made average on it.

Rudy,

DiSlord's cable loss measurement (at the S11 marker frequency) is calculated the same way as in NanoVNA-App. It is not as accurate as measuring the cable loss using S21 with the cable connected to CH0 and CH1, but if you don't have easy access to the other end of the open cable it is quick and dirty substitute.

At higher stop frequencies you will see reflections in the S11 trace and will need to visually average where the marker needs to be placed. OneOFEleven's NanoVNA-App has smoothing and averaging features that help with this when using her program.

A 1meter length of cable is short enough that both ends should be accessible, so a S21 measurement should be your preferred measurement for best accuracy.

- Herb

=====

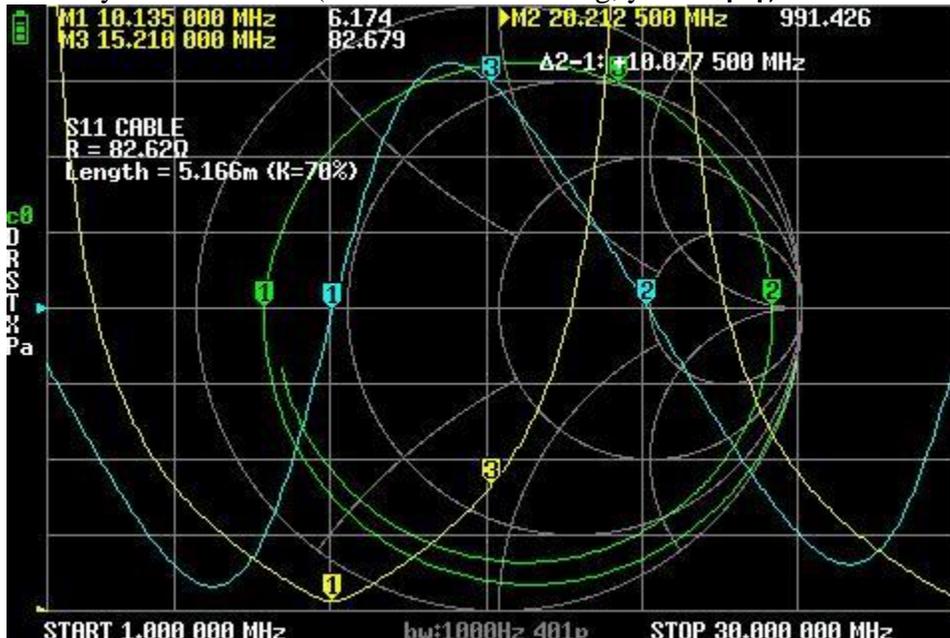
DiSlord <dislordlive@gmail.com>

To:nanovna-beta-test@groups.io

Thu., Jul. 29 at 7:31 a.m.

(See original Normalization entry on July 19, 2021 – below)

Here my cable measure (trace data: blue - Imag, yellow |Z|)



For measure need point at marker 1 (then blue trace first time cross zero) at this freq, wave go from Nano, reflect back and return on phase rotated by 180 degrees.
 So if know velocity factor, it is possible to calculate the cable length (signal goes from Nano and back and only 1/2 period in this length)

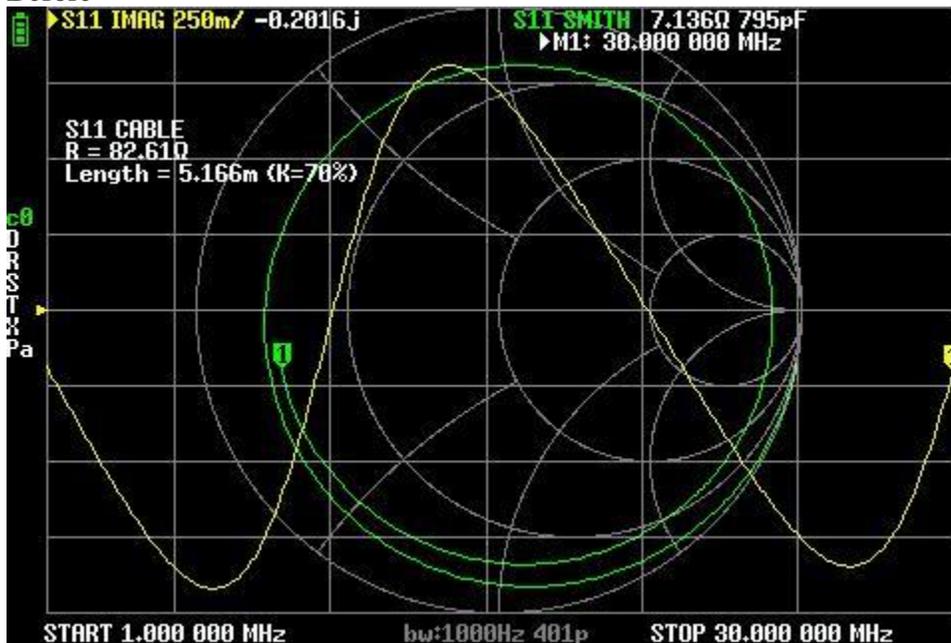
To calculate cable Z0 (or R) need to divide this frequency by 2, and see reactance on smith at this point.

About Normalization (Port Z: 50->XX), Nano have 50 Ohm bridge and calibrate/measure on 50 Ohm.

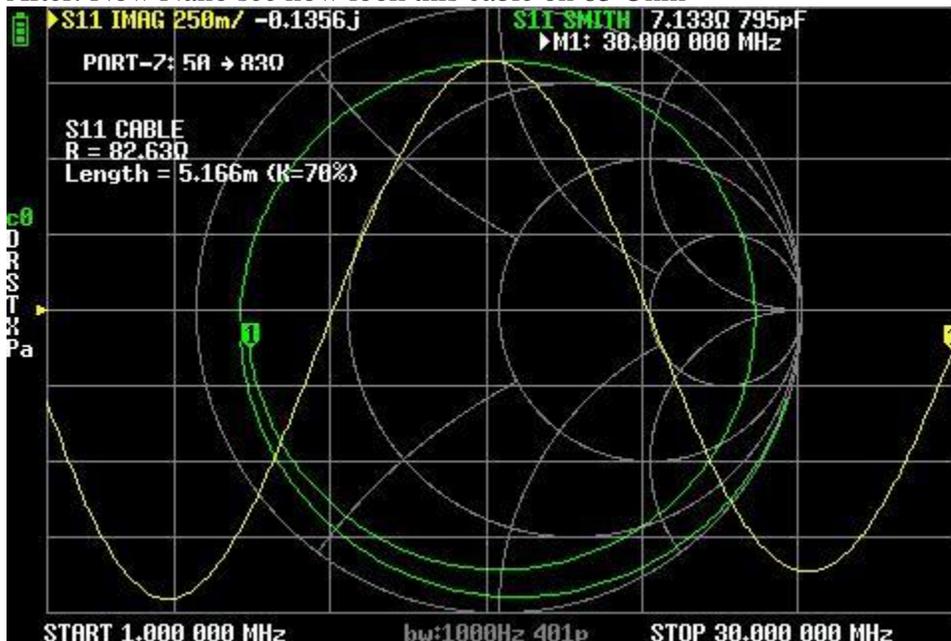
So then you see 75 Ohm impedance cable rotate on by smith center.

For example, I have 82 Ohm cable, and using the Nano's Marker menu: Marker->Measure-> RL=XXX made Port Z: 50->82 transform

Before



After: Now Nano see how look this cable on 83 Ohm



This allows measuring different values from 50 Ohm DUT (include filters) on Nano, but exist some limits (on low/high impedance there is reduced dynamic range)

NanoVNA S11 cable measurement

hwalker <herbwalker2476@gmail.com>

To:nanovna-beta-test@groups.io Thu., Jul. 29 at 6:50 a.m.

- On Wed, Jul 28, 2021 at 10:31 PM, DiSlord wrote:

Calibrate NanoVna

Connect cable to CH0, enable cable measure marker-measure-cable s11

For long cable need reduce max freq (better result get then on smit chart line rotate little more than 180 degree).

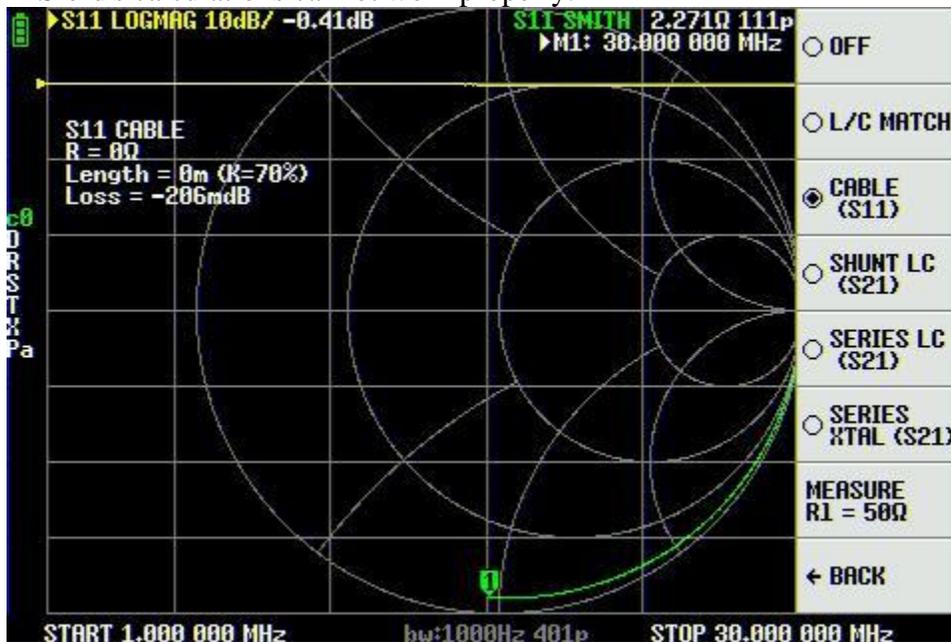
For zo measure in some cases need reduce min freq

Rudi,

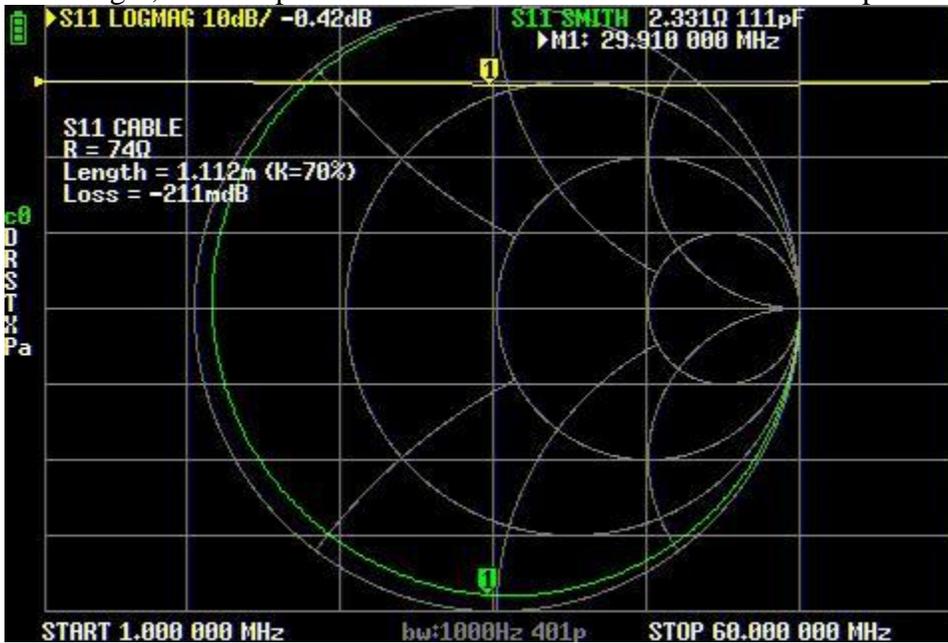
See the following examples where I am measuring a ~1meter length of RG 59B/U, 75ohm cable. Follow DiSlord's instructions to perform a SOLT calibration and then from the MARKER menu, select **CABLE (S11)**. Attach the open ended 1 meter cable to CH0 of the NanoVNA/NANOVNA-H4.

In order for DiSlord's calculations to work properly the Smith chart trace has to rotate past the center of the circle (from open clockwise to past the center line on the left side of the chart).

In the first figure below my stop frequency is 30MHz and the Smith trace does not rotate past center so DiSlord's calculations cannot work properly.



In the second figure I changed my stop frequency to 60MHz and the Smith trace rotates past center. Now the cable length, cable impedance and cable loss are all calculated as expected.



Hope that helps.

NOTES:

Velocity factor for your cable can be changed under the TRANSFORM menu.

Loss = current cable loss at **active marker frequency**.

loss = s11 logmag / 2 This not fully correct, but simple to calculate

Signal go from Nano and back and drop amplitude due to cable loss. So need just divide logmag by 2.

But in 1 port measure you can see s11 logmag not linear, need made average on it.

=====
Sun., Jul. 25

I fix small bugs vs display data on V2, and rebuild for all

Upload this firmware on NanoVNA group

The rar & zip archives contain firmware for all models:

NanoVNA-H - for default NanoVNA (all version 1 - 2.8" display models)

NanoVNA-H4 - for Hugen 4 inch screen NanoVNA

V2 320x240 - all V2 hardware vs 2.8/3.5 inch screen

V2 480x320 - all V2 hardware vs 4 inch screen (SAA-2N for example)

V2Plus - some as V2 for 2.8/3.5/4 inch screen, !! only for V2Plus hardware or modded V2 to V2Plus vs correct bootloader

V2Plus4 - for this model

<https://groups.io/g/nanovna-users/attachment/23608/0/NanoVNA%20v1.0.69.zip>

<https://groups.io/g/nanovna-beta-test/attachment/2975/0/NanoVNA%20v1.0.69.rar>

=====

Sat., Jul. 24 at 4:12 p.m.

v1.0.69

Made some firmware unification, build for all platforms (H / H4 / V2 / V2Plus / V2Plus4)

New features since 1.0.64:

- For V2 port most H/H4 features
- Added measure module (User need select correct frequency range) MARKER->MEASURE:
 - * allow auto cable measure (length, loss, wave impedance) range - S11 smith should rotate from min to 180 degree counterclockwise)
 - * allow auto XTAL / LC measure, range - should visible Fp and Fc peaks (Rl option in measure menu allow set R visible by Xtal, = 50 ohm for NanoVNA, but can be different if used special test fixture)
- Added Z renorm option (DISPLAY->PORT Z: 50 -> XX), allow measure (see how look) system vs different from 50 Ohm impedance (include filters), example allow see how look 75 Ohm antennas measured by NanoVNA (experimental option)
- For V2 added SD cart support (not activated), allow in future add SD card slot (feature tested on new V2 test board)
- Added FW dump expert option (allow dump current firmware and settings to SD card)
- Some code fixes

PS V2Plus4 not allow measure XTAL, so this option disabled, for V2/V2Plus on select measure XTAL / LC used special adaptation, for better measure need use avg >= 5.

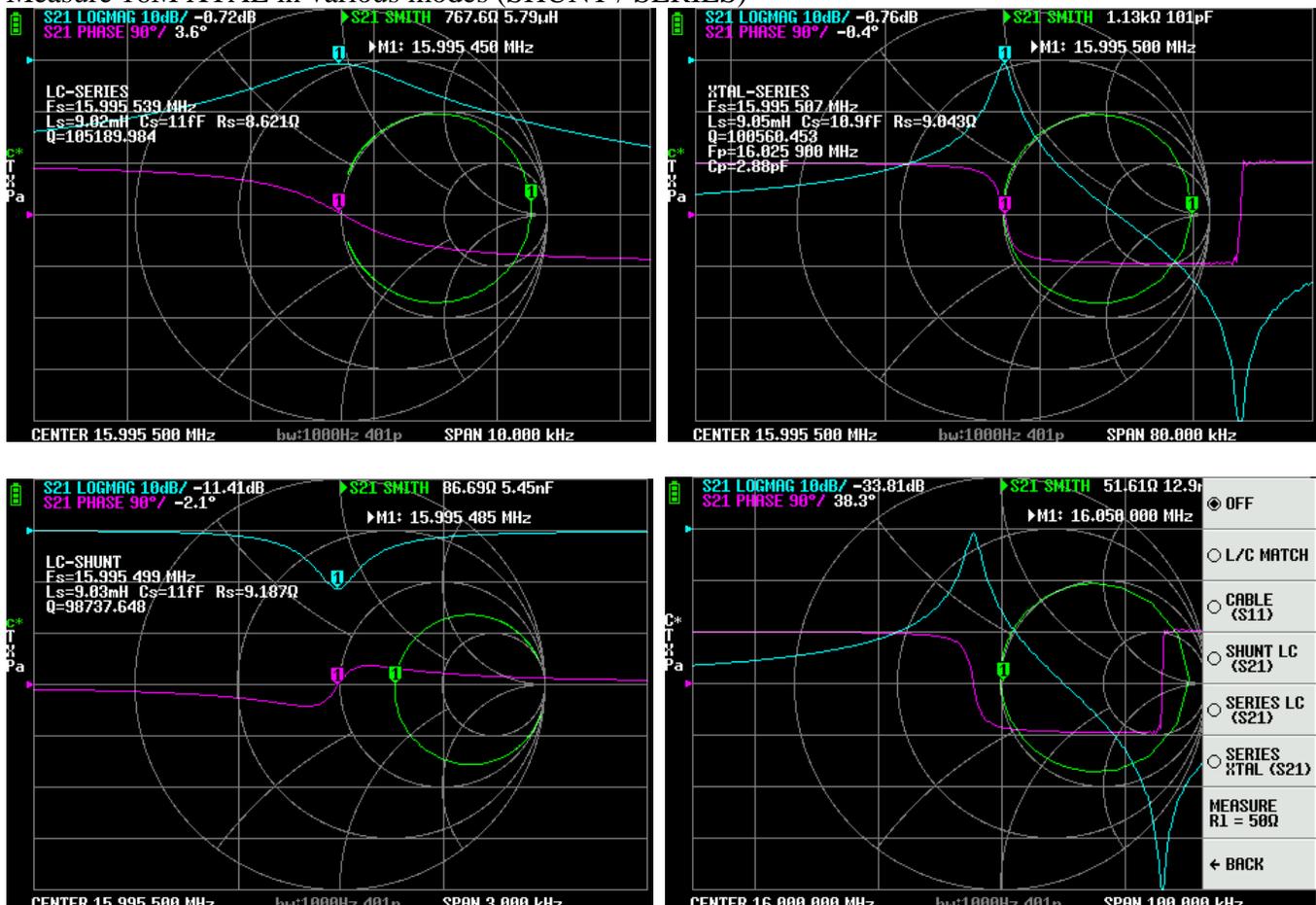
Some screenshots:

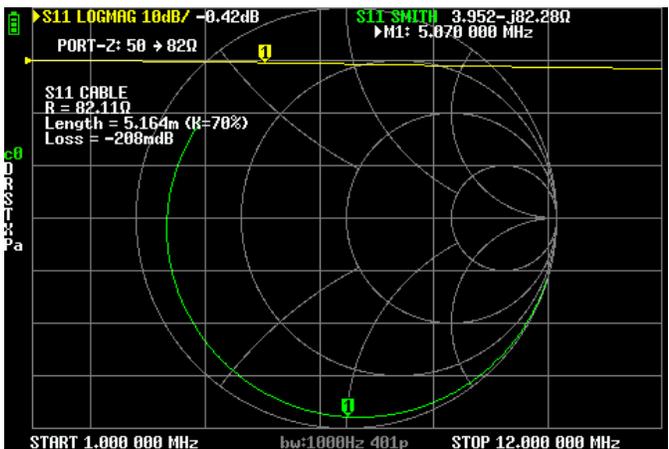
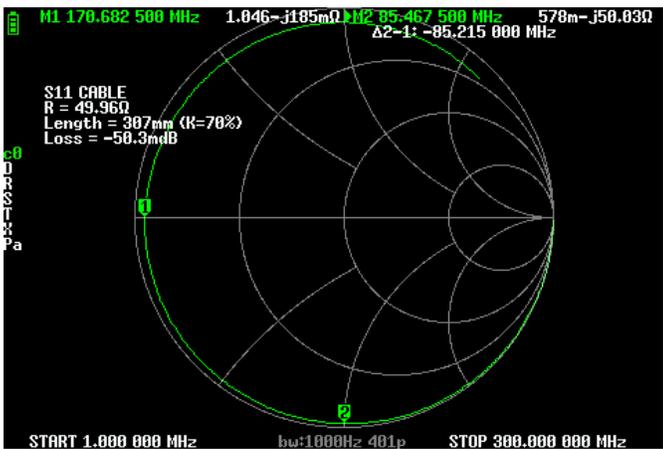
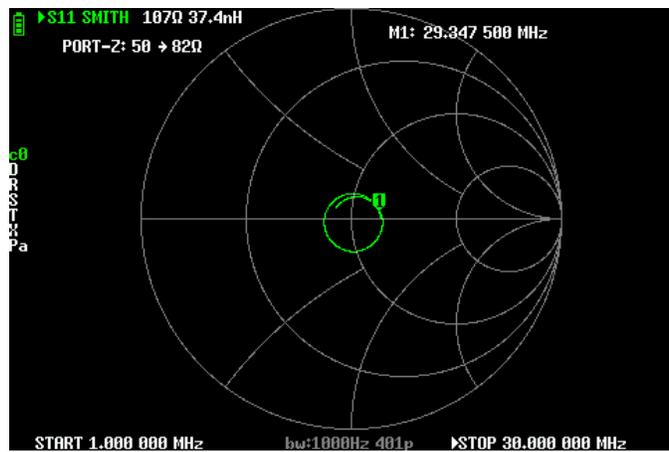
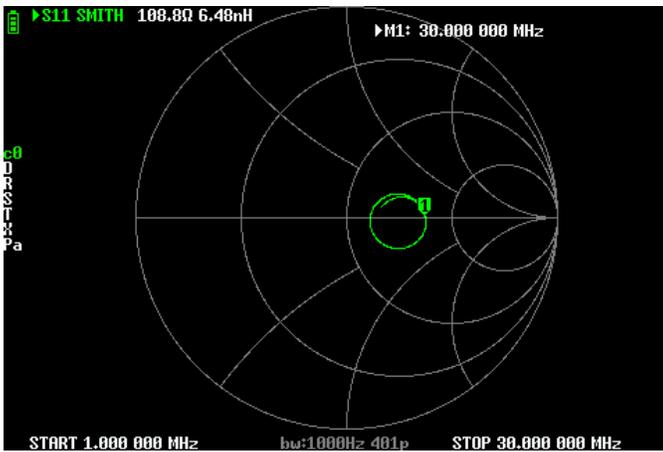
On it I measure 75 Ohm cable ~5.2m (measured as 83 Ohm)

Apply adaptation Port Z: 50 - 83 Ohm (visible as circle move to smith center)

Measure 50 Ohm cable (310 mm)

Measure 16M XTAL in various modes (SHUNT / SERIES)





Fri., Jul. 23 at 4:44 p.m.

Update V2 code, more try for made it some as possible as for V1 (need more work in plot module)
 Port all last features to V2 (Port Z renorm, measure cable/xtal/lc, sd card features)

Now V2/V2Plus can measure XTAL vs some limits (need use minimum x5 avg), special XTAL mode enable for V2 if selected XTAL or LC measure mode
 V2Plus4 can't measure XTAL so this option disabled on it.
 All V2 firmware build for No FPU platform

H/H4 added dump firmware to SD card expert option

PS V2 also support SD card (I use Hugen test board), I can build firmware vs it support for test, but need made hardware mod (soldier SD card slot)

- <https://groups.io/g/nanovna-beta-test/attachment/2973/0/NanoVNA%20H%20v1.0.69.dfu>
- <https://groups.io/g/nanovna-beta-test/attachment/2973/1/NanoVNA%20H4%20v1.0.69.dfu>
- <https://groups.io/g/nanovna-beta-test/attachment/2973/2/V2%20320x240%20v1.0.69.bin>
- <https://groups.io/g/nanovna-beta-test/attachment/2973/3/V2%20480x320%20v1.0.69.bin>
- <https://groups.io/g/nanovna-beta-test/attachment/2973/4/V2Plus%20480x320%20v1.0.69.bin>
- <https://groups.io/g/nanovna-beta-test/attachment/2973/5/V2Plus4%20v1.0.69.bin>

Wed., Jul. 21 at 2:28 p.m.

V1.0.68

It was suggested to dump old firmware before flashing new.
Added expert setting feature for this.

Implement CONFIG->EXPERT SETTINGS->DUMP FIRMWARE option

In this case NanoVNA dump all flash to SD card as bin file.
Possible upload it as firmware and restore all settings.

The bin file needs to saved at 0x08000000 offset (I dump from it, not save any offset headers).

<https://groups.io/g/nanovna-beta-test/attachment/2958/0/NanoVNA%20H4%20v1.0.68%20fw%20dump.dfu>

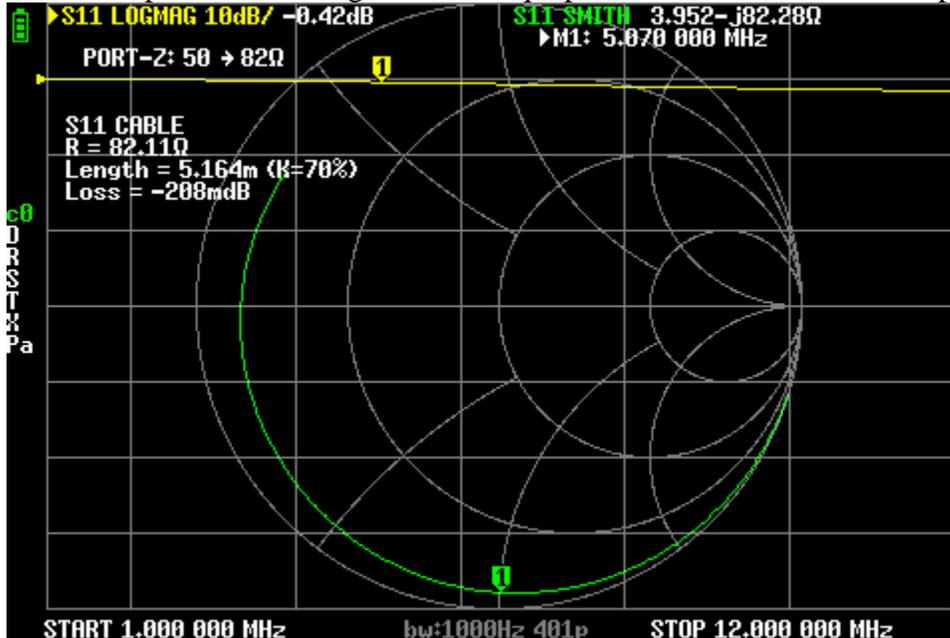
Tue., Jul. 20 at 1:38 p.m.

Fix Port Z text clipping

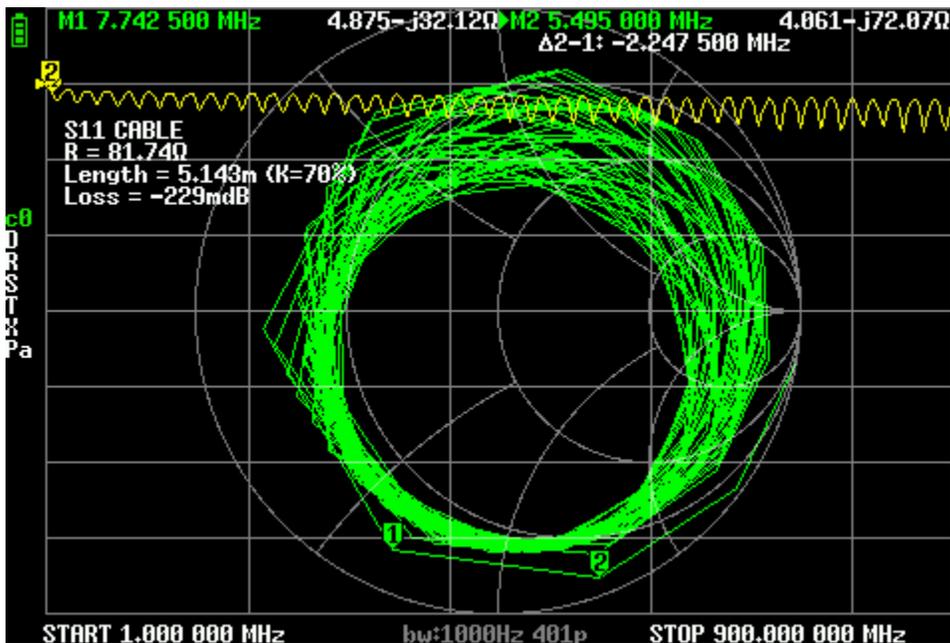
Add bilinear interpolation for get measured data (before only for search), this allow get more clean result:

- on close point error exist always
- on linear interpolation if real value $R = 82$, if select big range (1500M) $R = 78$, if select 900M range $R = 80$;
- on bilinear interpolation $R = 81$ for 1500M range, and 81.6 on 900M

Here example of work, range ~small freq/2 point near, used bilinear interpolation and calculated 82.11Ohm



And here is big range, exist only 2 points near for calculation (marker 1 and marker 2) but bilinear interpolation calculate $R = 81.74$ Ohm very close result



Added cable loss measure at active marker point, simple use S11 loss / 2

PS velocity factor (K=70%) can change in DISPLAY->TRANSFORM->VELOCITY CACTOR

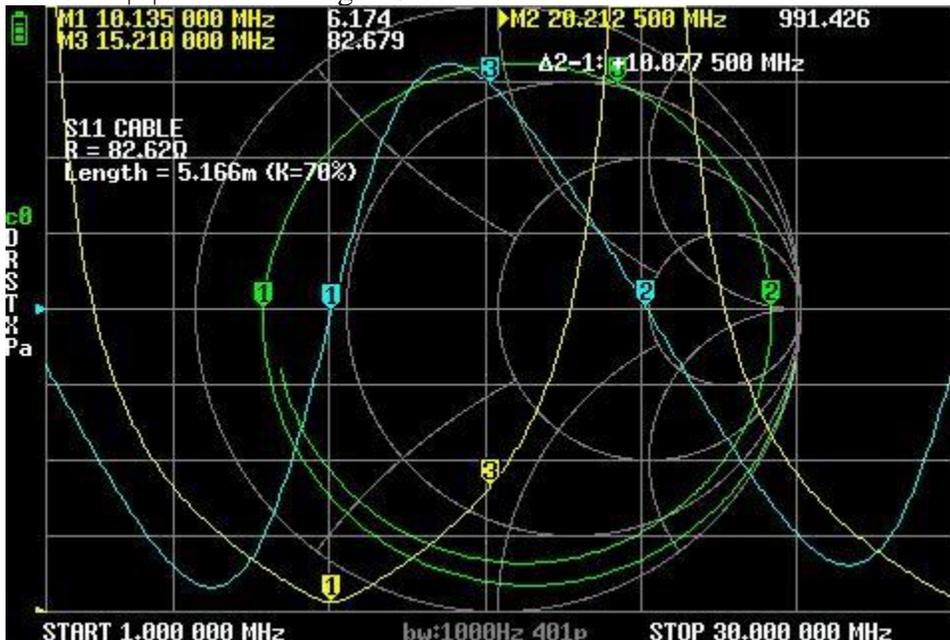
<https://groups.io/g/nanovna-beta-test/attachment/2953/2/NanoVNA%20H4%20v1.0.67%20normalization%20cable.dfu>

Mon., Jul. 19 at 1:47 p.m.

Research some methods for measure cable connected to CH0 (S11) port

Here measure bad 75 Ohm cable image:

Yellow - |Z| Blue - Imag Green - smith



Measure cable impedance:

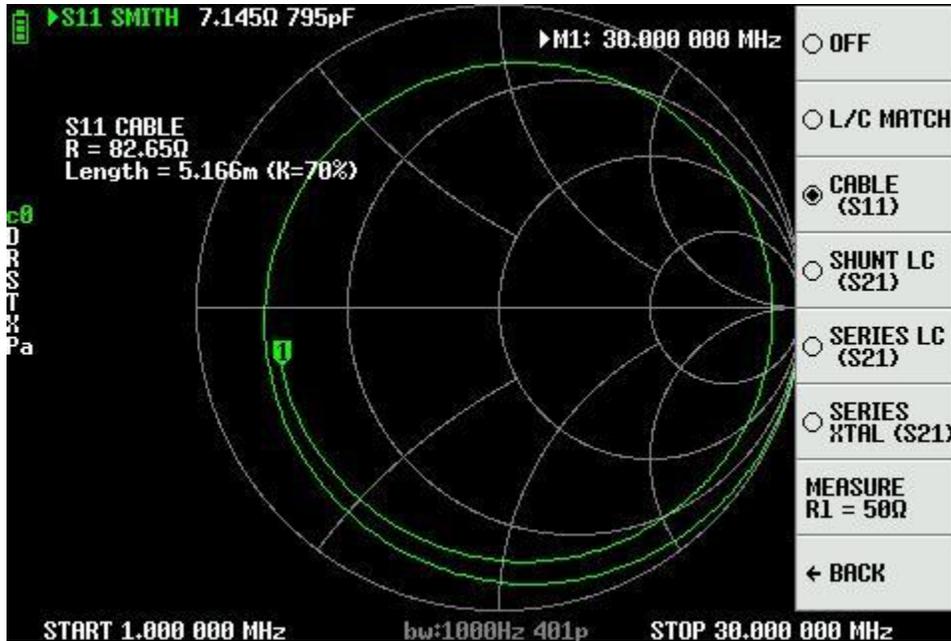
If set start = min freq stop any freq vs wavelength < cable length (on smith chart need see how it cross marker 1 position)

Need search first place vs imag = zero

This point allow get R, need get this point frequency divide it by 2 and measure $|Z|$ at this frequency

Also this point can give cable length

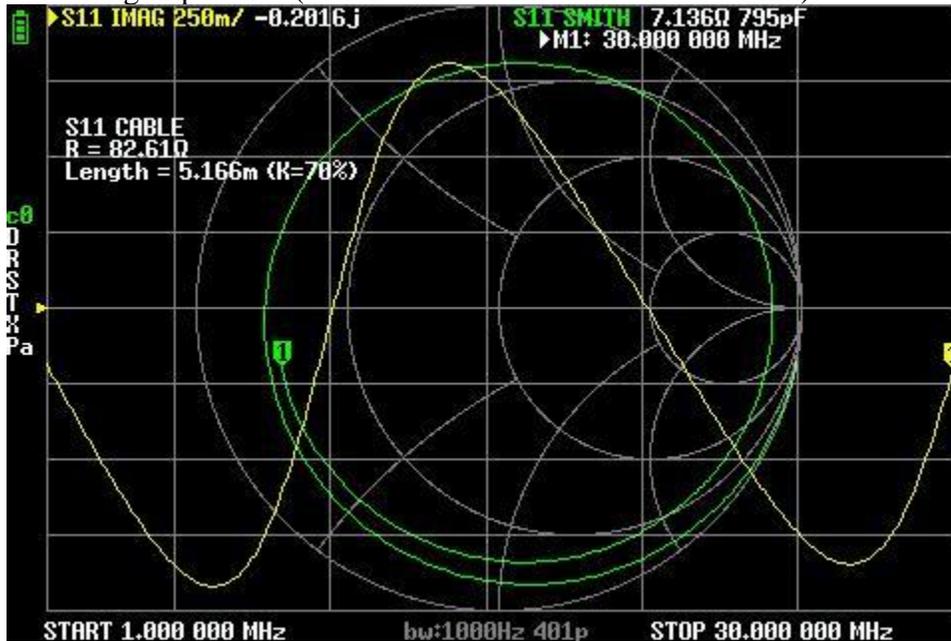
I add measure R and LEN to H4



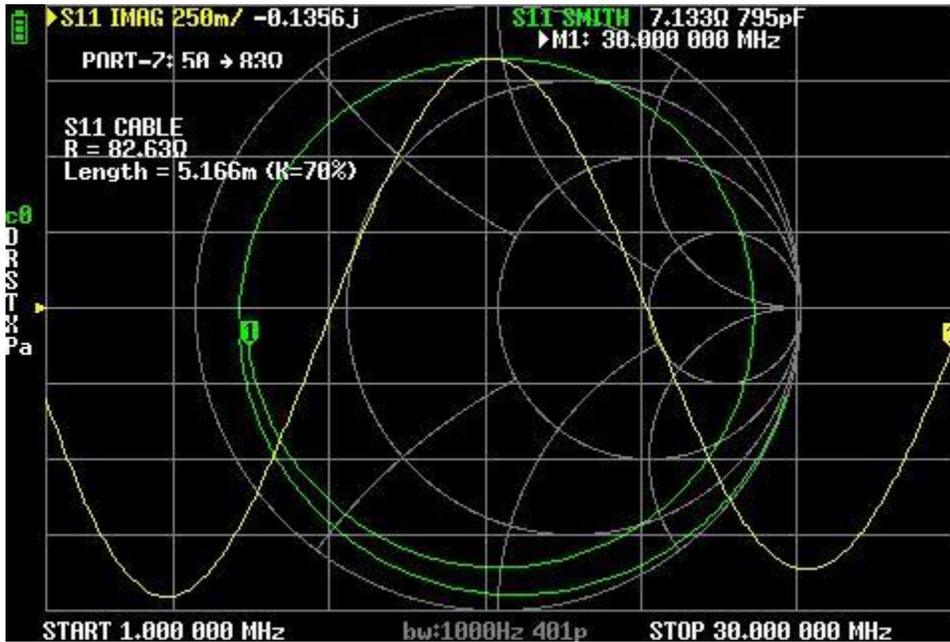
Now try understand how work Normalization (impedance correction):

If measured DUT impedance = cal LOAD it Smith point around center smith, so real and imag part should look as sin or cos function

For wrong impedance (current cable as measured R = 83 Ohm)



But after set Port Z: 50->83 Ohm, possible see correct round over Smith center, and real and imag part look as sin/cos function



https://groups.io/g/nanovna-beta-test/attachment/2948/0/NanoVNA%20H4%20v1.0.67%20normalization_cable.dfu

Sat., Jul. 17 at 3:25 p.m.

v1.0.67a

Build for both H/H4

Added:

- Save screenshot button (quick save on bandwidth text also enabled)
- Fixed scan command for old soft (if soft need disabled calibration)
- Added flag for scan disable edelay setting

<https://groups.io/g/nanovna-beta-test/attachment/2946/0/NanoVNA%20H%20v1.0.67%20normalization.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/2946/1/NanoVNA%20H4%20v1.0.67%20normalization.dfu>

Add port Z normalization feature (beta)

Wed., Jul. 14 at 12:58 p.m.

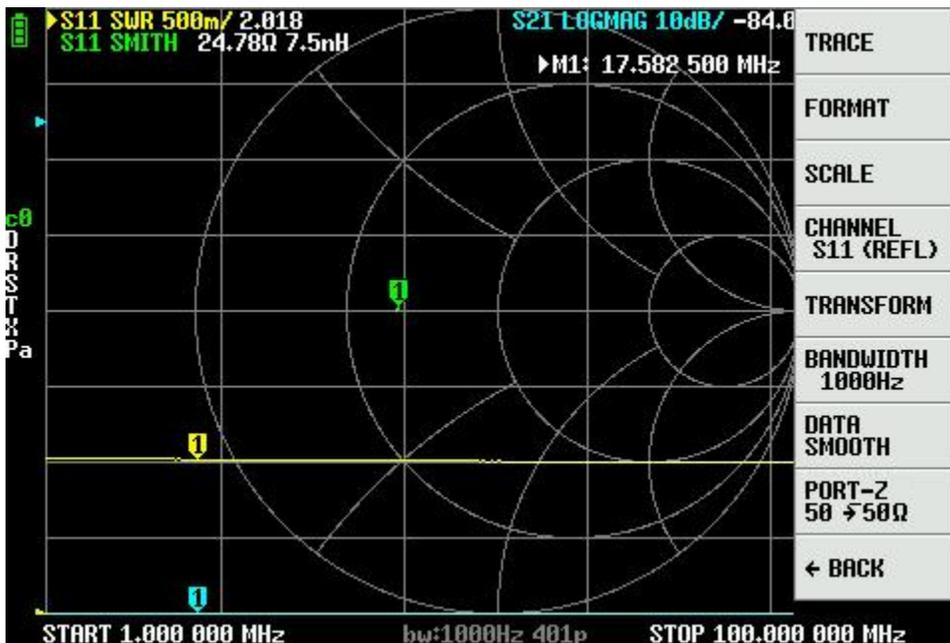
V1.0.67

A lot of ask about how measure 75 Ohm DUT by NanoVNA

[ojisankoubou](#) implemented this feature, I use its math functions and adapted to nanoVNA

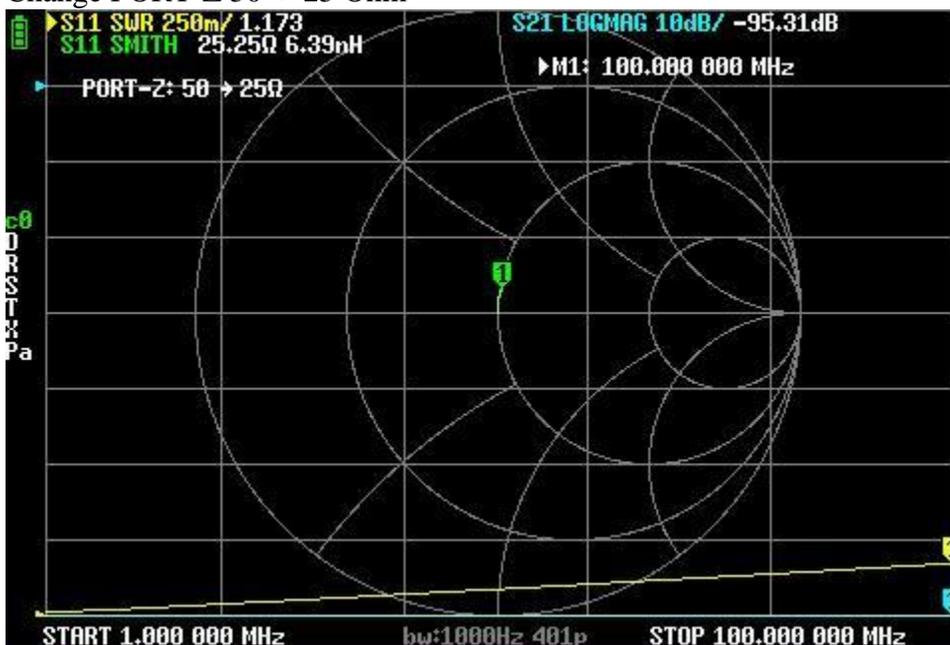
I made calibration by use default 50 Ohm LOAD

And measure 25 Ohm (SWR 2.0) calibration load



Possible see new menu PORT-Z 50 -> 50 Ohm
 Calibration load correct measure as SWR = 2.0 and on smith chart dot at left of center

Now need see how it look if I measure load as 25 Ohm
 Change PORT-Z 50 -> 25 Ohm



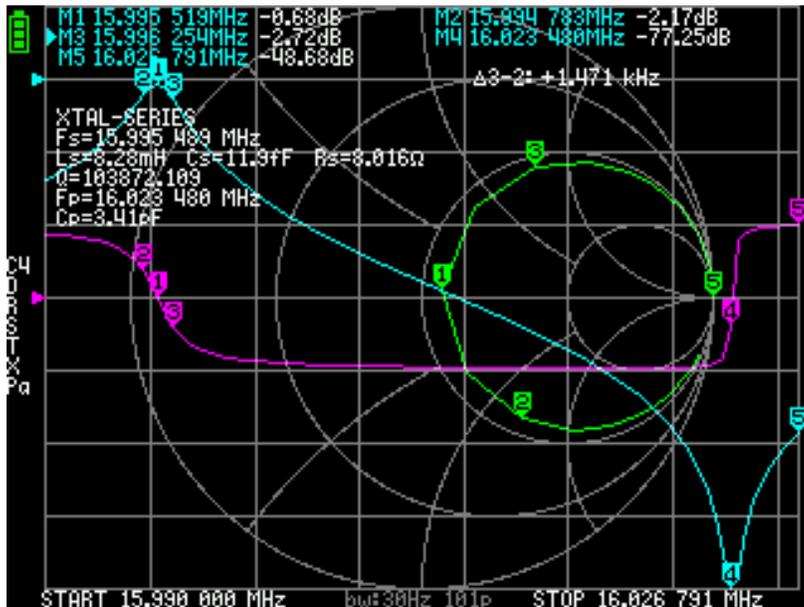
Possible see correct dot at center smith chart and SWR = 1 (I use SMA to N converter and not calibrate vs it, so not pure 1.0).

PS: this beta feature, need made it more user friendly, and made some math optimizations
<https://groups.io/g/nanovna-beta-test/attachment/2933/1/NanoVNA%20H4%20v1.0.67%20normalization.dfu>

=====
 Mon., Jul. 12 at 2:51 p.m.
 Fw v1.0.66

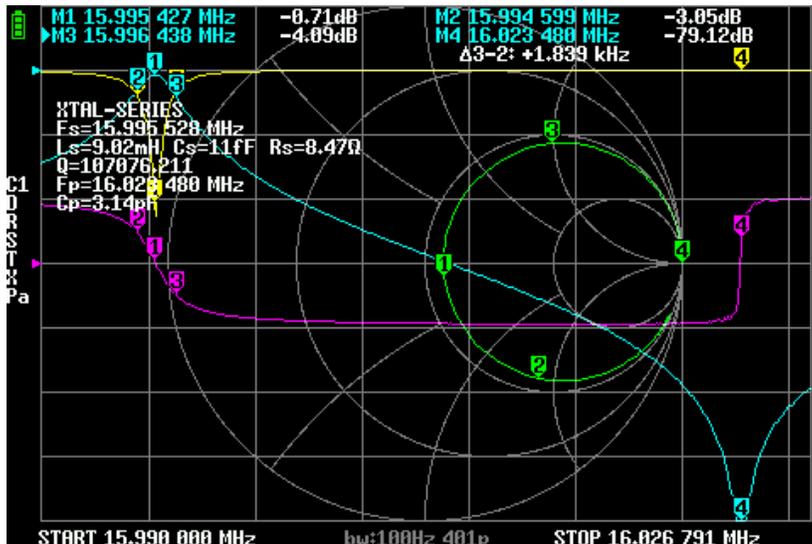
- Use dynamic calibration data calculations
- Change calibration logic (now more easy control calibration data)
- Add menu for IF offset select (if used dynamic IF table)
- Reduce output power on < 100MHz
- Add measure module (allow made some calculations on measured data)
- Move LC Math function to MARKER->MEASURE menu
- Add some LC and XTAL measure options

Measure 16M XTAL on H



As H use only 101 points, on measure need more carefully select range for get better result

Some measure on H4



<https://groups.io/g/nanovna-beta-test/attachment/2923/2/NanoVNA%20H%20v1.0.66.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/2923/3/NanoVNA%20H4%20v1.0.66.dfu>

Sun., Jul. 11 at 9:55 a.m.

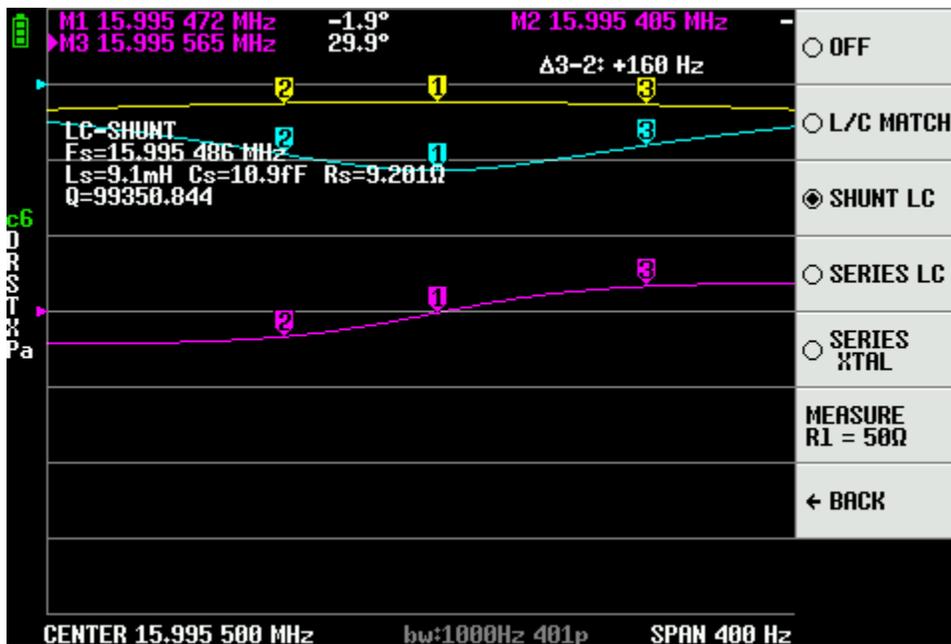
In most cases measure module done:

- Implement any measure as module
- Cleanup code
- Add universal search data functions (example need search min/max value, search frequency vs -3dB or 45degree), on search used interpolation on parabola

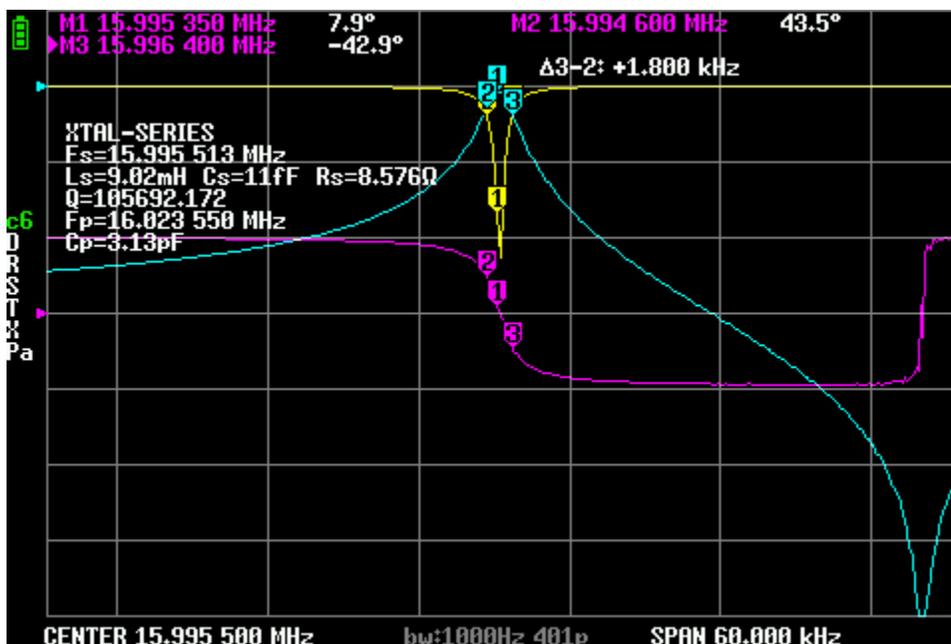
Now more easy add any measure function to NanoVNA

Added SHUNT LC measure (see <https://ojisankoubou.web.fc2.com/nanovna/nanovnav2.html> LC-SHUNT), this measure module need only 300 bytes of flash

Example measure 16MHz XTAL in SHUNT mode



Some XTAL in Series mode:



Measured result very close

PS on measure low frequency XTAL better use less Bandwidth setting (allow get better xtal response) and use less span (need to see only Fs and Fp), on smith chart measure should look as circle.

<https://groups.io/g/nanovna-beta-test/attachment/2912/2/NanoVNA-H4%20measure%20beta.dfu>

MARKER OPERATION in XTAL MODE:

Fri., Jul. 9 at 12:03 a.m

I find that the S11 logmag and S11 phase markers snap to another freq** when "Series Xtal" or "Series LC" are enabled and I move the markers to the resonant dip.

** the markers snap to another freq they were at when the marker measure/"Series LC or Series Xtal" functions are enabled.

пт, 9 июл. 2021 г. в 06:57, DiSlord Live <dislordlive@gmail.com>:

You can use Marker->Operations for set frequency as on marker

Example Selected M1, use Operation->Center - set center frequency on marker 1

Yes, markers 1-4 auto set on used for measure points

M1 - on S21 max peak value frequency

M2 - on closest -45 degree phase point

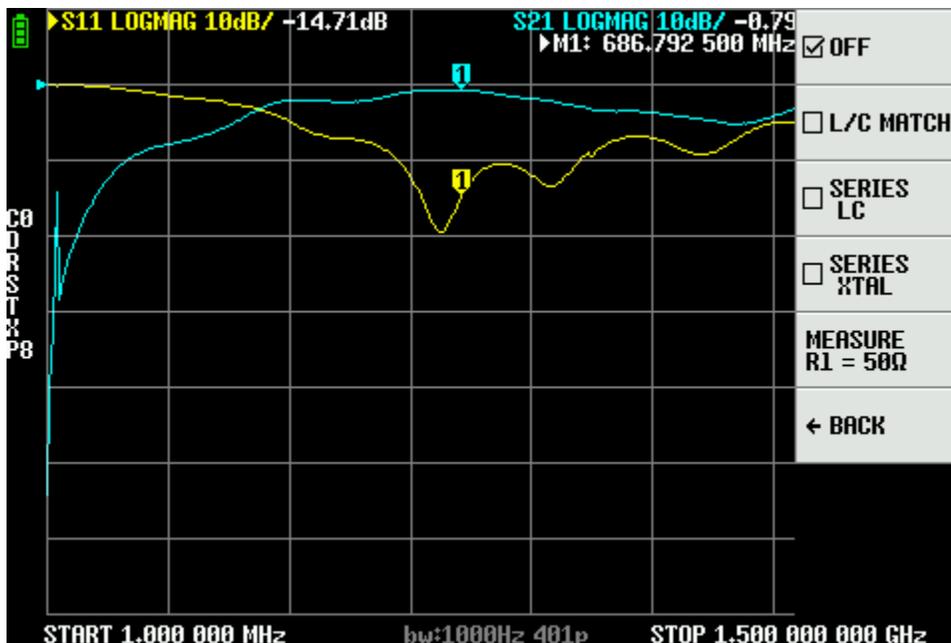
M3 - on closest +45 degree phase point

M4 - on S21 min peak value

Wed., Jul. 7 at 4:35 p.m.

Prepare beta version of measure option:

See MARKER->MEASURE menu



Move L/C math function to it

Add Series LC measure
Add Series Xtal measure

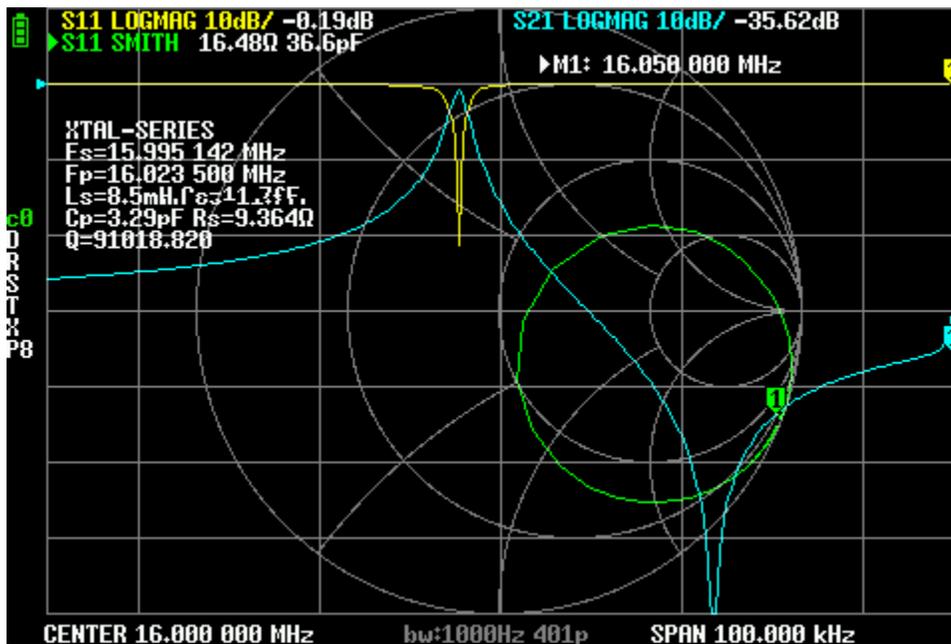
For LC and Xtal measure add RI input (default 50 Ohm), can be different if use custom adapter
For more info see https://www.mikrocontroller.net/attachment/473317/Crystal_Motional_Parameters.pdf
on Series LC and XTAL measure used Phase Shift Measurement mode

Fully rewrite +-40 degree detection and use correct parabola interpolation function (now in most cases error not depend from span and point count)

<https://groups.io/g/nanovna-beta-test/attachment/2905/1/NanoVNA-H4%20xtal%20measure%20beta.dfu>

Tue., Jul. 6 at 2:34 p.m.

I port xtal measure function from <https://ojisankoubou.web.fc2.com/> to H4 as very nice test feature:



Can anyone help check how correct result it give?

Calculation always on, need select xtal frequency and set span ~100k (Fs/Fp resonance should visible on screen)

<https://groups.io/g/nanovna-beta-test/attachment/2900/0/NanoVNA-H4%20xtal%20measure%20alfa.dfu>

https://groups.io/g/nanovna-beta-test/attachment/2901/1/nanovna-h4_2021-07-06_21-53-58.s2p

Sat., Jul. 3 at 11:16 a.m.

Fw 1.0.65

Eric found how additional reduce code size (save ~4k flash), i also apply to NanoVNA code

Additional add some fixes from issues (thanks Ho-Ro)

Build last test firmware vs all this fixes for H and H4

<https://groups.io/g/nanovna-beta-test/attachment/2899/0/NanoVNA%20H%20v1.0.65%20calibration.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/2899/1/NanoVNA%20H4%20v1.0.65%20calibration.dfu>

Wed., Jun. 16 at 2:30 p.m.

Changes in calibration logic (for less errors in calibration procedure):
Now calibration data collected for start/stop/points range.

Possible re-calibrate some part of data, but need select some range as on old calibration data, if new measured start/stop/points calibration range not some - old calibration auto reset.

For select this range use 'RESET CAL RANGE' button (it show current calibration range if calibration data collected):



Button mark as green if range not some (set 1M to 1G, but calibration data for 1 to 1.5G), if press on this button measure range set to calibration range:



After reset to calibration range, possible update only CH0 calibration data if measure only:

>SHORT+OPEN

or

>LOAD

Update only CH1 data if measure only:

>ISOLN + THRU

Calibration range+points stored vs calibration data in slot.

<https://groups.io/g/nanovna-beta-test/attachment/2857/3/NanoVNA%20H4%20v1.0.65%20cal.dfu>

Tue., Jun. 15 at 2:28 p.m.

Add real time interpolation for calibration data:

- Now possible after calibration not save data (Added button DONE IN RAM)

You can change frequency range, this not affect to calibration data (table not rebuild for new range)

If calibration data in RAM - then slot named as '*'

- Added IF offset select in EXPERT SETTINGS (value stored in config)

Console command as before

>'offset freq'

This allow select better IF offset (for example in low frequency measure < 50k, select 4k IF possible get better results)

Bigger IF possible better on high frequency range, need more test for this

- Rename STORE SLOT to STORE TRACE

<https://groups.io/g/nanovna-beta-test/attachment/2850/0/NanoVNA%20H4%20cal%20interpolation.dfu>

DiSlord

Jun 13, 2021 [#2848](#)

Inserted 2 additional color indexes, 10 & 11 for H4 model

Color Index Table:

Index	H	H4Color	Description	RGB565 Coding	NOTES
0	0	0	background	RGB565(0, 0, 0)	(0x000000=black)
1	1	1	foreground (text, lines)	RGB565(255,255,255)	(0xffffffff=white)
2	2	2	grid	RGB565(128,128,128)	
3	3	3	menu buttons	RGB565(230,230,230)	
4	4	4	menu text	RGB565(0, 0, 0)	
5	5	5	active (selected) menu	RGB565(210,210,210)	
6	6	6	trace 1	RGB565(255,255, 0)	
7	7	7	trace 2	RGB565(0,255,255)	
8	8	8	trace 3	RGB565(0,255, 0)	
9	9	9	trace 4	RGB565(255, 0,255)	
		10	trace 5	RGB565(255, 0,255)	NanoVNA-H4 only
		11	trace 6	RGB565(255, 0,255)	NanoVNA-H4 only
10	12	12	normal batt	RGB565(31,227, 0)	
11	13	13	low batt	RGB565(255, 0, 0)	
12	14	14	selected digit on input screen	RGB565(128,255,128)	(not used)
13	15	15	button rising edge	RGB565(255,255,255)	
14	16	16	button falling edge	RGB565(128,128,128)	
15	17	17	sweep line	RGB565(0, 0,255)	(at top screen, if bandwidth > 100)
16	18	18	bandwidth text	RGB565(0, 0,255)	
17	19	19	input text	RGB565(0, 0,255)	
18	20	20	input text background	RGB565(0, 0,255)	
19	21	21	LC match text color	RGB565(0, 0,255)	
20	22	22	grid scale values	RGB565(0, 0,255)	
21	23	23	unknown (at this time)		

Console command to change color:

'color idx 0x#####'

Where:

idx is color index: [0 to 23]

0x123ABC - is color in RGB888 HEX format: [0xf8fc00] (see May 23 config.ini entry, below)

Running the color command by itself displays all current color settings in a list.

NOTE!! Not everything will redraw on screen immediately after a color change command.

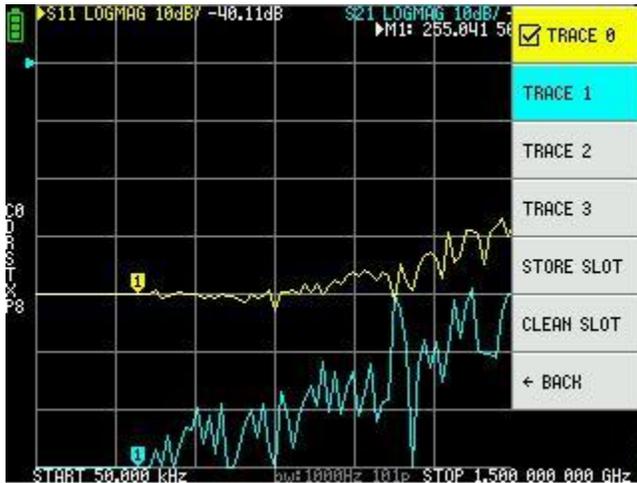
You need to **save config** to make changes permanent then power cycle device.

(You can use any online calculator <https://allcalc.ru/node/402> see HEX #54ff84 so need use as value 0x54ff84)

=====
Sat., Jun. 12 at 5:39 p.m.

Free memory from frequency list allow add store trace option:

Added menus 'STORE SLOT' and 'CLEAN SLOT'



Store slot save current trace graph to slot (visible as red)

Stored trace - just line, it not allow change ref/scale, not change on frequency range switch and so on.



How useful this option vs this limitations?

<https://groups.io/g/nanovna-beta-test/attachment/2845/2/NanoVNA%20H%20store.bin>

<https://groups.io/g/nanovna-beta-test/attachment/2845/3/NanoVNA%20H4%20store.bin>

Sat., Jun. 12 at 1:20 p.m.

Start work under real time interpolation calculate, this allow:

- remove point limit for external soft
- load calibration data from SD card

At this moment remove frequency list table use (allow save lot of ram), now frequency for measure point calculated in real time

Also added some UI fixes:

- On bandwidth select button - show current bandwidth setting
- On Sweep points select button - show current sweep points setting
- On Power select button - show current power settings

Restore SD card work (fix typo on last test firmware)

<https://groups.io/g/nanovna-beta-test/attachment/2844/0/NanoVNA%20H%20v1.0.65.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/2844/1/NanoVNA%20H4%20v1.0.65.dfu>

Mon., Jun. 7 at 3:19 p.m.

Added support to display floating text value on button.

Added E-DELAY button value

Now Time Domain WINDOW button doesn't call submenu. Button press rotates through min/max/normal (and shows setting on button)

https://groups.io/g/nanovna-beta-test/attachment/2841/0/NanoVNA%20H4%20start%20timings%20_%20text.dfu

Sun., Jun. 6 at 5:35 p.m.

More fixes:

- faster startup on power on
- show grid field after init (less visible startup delay, not wait first scan)
- fixed delays for bad SD card
- show brightness settings in menu and in select (for H4)
- implement menu items chain (saves some flash size)
- add black border to marker icons (for H4)

PS black border not added, need more work

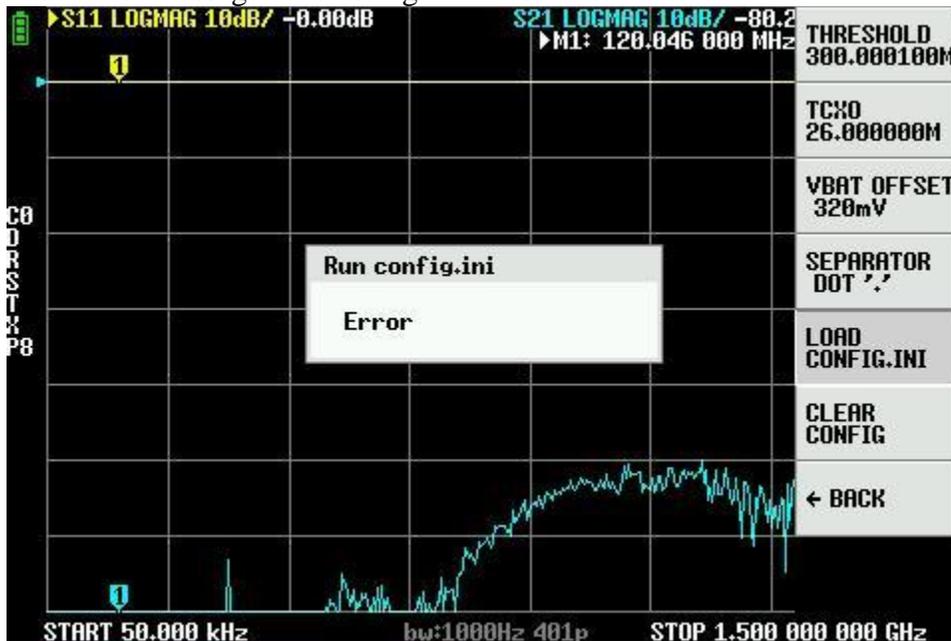
<https://groups.io/g/nanovna-beta-test/attachment/2839/0/NanoVNA%20H%20start%20timings.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/2839/1/NanoVNA%20H4%20start%20timings.dfu>

Tue., Jun. 1 at 2:30 p.m.

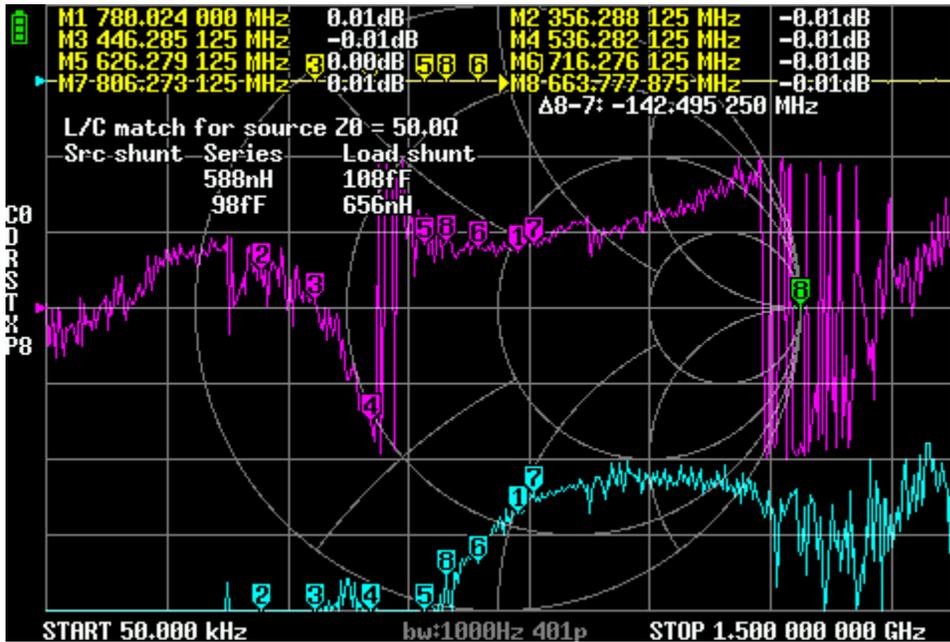
V1.0.64b

I add Error message if no config.ini file or error



Additional - I checked what the black border of the text and labels looks like on the screen (there is a problem when the trace and markers at the top they merge with the text)

This mode made slowdown, need research better algorithm, but looks good:



Tue., Jun. 1 at 1:03 p.m.

V1.0.64a

Add small updates:

- reset calibration slot selection on recall empty slot (or error)

- add additional check for clear config button

<https://groups.io/g/nanovna-beta-test/attachment/2830/0/NanoVNA-H%20v1.0.64%20test.dfu>

<https://groups.io/g/nanovna-beta-test/attachment/2830/1/NanoVNA-H4%20v1.0.64%20test.dfu>

Mon., May 31 at 4:36 p.m.

V1.0.64

Update: lever switch Enter should work better

<https://github.com/DiSlord/NanoVNA-D/releases/tag/v1.0.64>

Sun., May 30 at 4:03 p.m.

Update to v1.0.63

Smoother UI menu/keyboard update (less flicker)

Added EXPERT config menu:

- Harmonic threshold input from on-screen menu

- TCXO frequency input from on-screen menu (allow precision frequency calibration)

- Vbat offset input from on-screen menu

- Expert option SEPARATOR (can be dot or comma, used for digit output to console, some O/S's don't work correctly vs default dot (1.56 example) if system locale use comma (need send 1,56))

- Ability to load a config.ini file from SD card (possible write custom script for run/restore)

- Added clearconfig on-screen menu button (use with caution – works instantly)

Faster sweep (up to 770 points/sec)

Faster and smoother LCD update

Added SD card access console commands (sd_read, sd_list, sd_delete)

Allow fast change scale/ref fy click on left screen side

Rename CH0 to S11, and CH1 to S21 (engineering standard)

Added up to 8 markers support

Added more serial speed options (up to 3Mb, at this speed can work WiFi modules)

Added custom recall buttons (possible see start/stop freq or empty slot)

Added smooth option Display->Data smooth (Smooth mode need use carefully!!!)

- Smooth now has 2 modes
 - Arith avg - made arithmetic average
 - Geom avg - made geometry average
- Max of 6 smoothing levels (from on-screen menu, 8 available from console)

Added show grid value option (DISPLAY->SCALE->SHOW GRID VALUES)

Added dotted grid option (DISPLAY->SCALE->DOT GRID)

A lot of small bug fixes, code size optimization

Interpretation of each change (gyula.ha3hz@gmail.com):

Expert settings:

Harmonic threshold is the threshold frequency after which the NanoVNA switches to harmonics (performance deteriorates), the generator in the SI5351 nanometer works up to 200 MHz according to the datasheet. But in general, most of the copies can go up to 300MHz without too many problems. Therefore, the default is 300MHz. But some of the microcircuits cannot work (or they do not work well around 300MHz), this can be seen if you set the range to 280-305MHz, turn off the calibration if there are noise / bursts. It is necessary to look at what frequency they start, and limit the upper threshold. Previously, for this it was necessary to connect to a computer, enter a command in the console. This can now be entered into the menu.

TCXO frequency - The reference TCXO oscillator for SI5351 has a frequency of 26MHz and is generally quite stable. But if you have a good frequency counter (at least 1Hz accuracy at 26MHz is desirable) you can calibrate the nana output. To do this, set the CW mode to 26MHz, go to the expert menu, enter TCXO = 26MHz there, let the nana and the frequency meter warm up (15-20 minutes), measure the output frequency of the nana on the CH0 channel. Enter the measured frequency as TCXO, after that the nana output should be exactly 26MHz. And in general, up to 200 MHz, the frequency error will be minimal. This can be useful for accurate quartz measurements, or when the quality of the TCXO nana is poor.

Vbat offset is a correction for measuring the battery voltage (set it to 0, then switch to the version screen, see what the battery voltage will be, measure the real battery voltage, and make this correction (battery voltage in millivolts minus what is shown on the screen in millivolts))

SEPARATOR is for external software so that nanoVNA outputs floating point numbers to the console, separated by commas or decimal point (there are some problems in external software that does not work well with the locale)

Load config.ini - this command will run the script from the config.ini file from the SD card (the file should contain lists of console commands), this is useful for restoring settings after a reset.

Clear config - resets all settings to factory defaults. (Change to Factory Reset)

Do not forget to save the config after making changes

Also added the ability to change the scale / ref of the current chart:

Click image for larger version. Name: nanovna-h4_screen_2021-05-21_18-41-30.png
By clicking on the red zones, you can move the chart up / down or zoom in / out

Also added the ability to enter the step with which the frequency will change (option JOG STEP in the STIMULUS menu)

Click image for larger version. Name: nanovna-h4_screen_2021-05-22_18-43-45.png
Now, having selected the CW or START / STOP or CENTER / SPAN mode and clicking on the desired frequency (> will appear in front of it) with the lever, you can change this frequency with the step specified in JOG STEP. (Another option - a second click on this frequency will bring up the screen for entering that frequency).

<https://groups.io/g/nanovna-beta-test/attachment/2826/0/NanoVNA-H%20v1.0.63.dfu>
<https://groups.io/g/nanovna-beta-test/attachment/2826/1/NanoVNA-H4%20v1.0.63.dfu>

=====
Thu., May 27 at 11:47 p.m.

I see problem with lever Enter detect, quick fix it (i think, need check)

https://groups.io/g/nanovna-beta-test/attachment/2821/0/NanoVNA-H4%20ref_scale_step_settings_load.dfu

Also fixed some small issues
=====

Wed., May 26 at 2:33 p.m.

Rewrite shell command processing (for safe run config.ini script)

- This also improve device response for shell commands
 - Faster response improve sweep speed from CPU (now it more close to internal sweep speed)
- Example H4 vs NanoVNA-App sweep speed vs bw=4k in 1-100MHz range now 770 point/sec (670 before), and for > 100MHz now 640 points/sec (570 before)
- Fixed apply XTAL correction frequency from menu (now it apply on current CW frequency)
 - Added digit separation on input (see screenshots, now better see input):

7	8	9	G
4	5	6	M
1	2	3	k
0	.	←	×1

START 12.369 85

7	8	9	G
4	5	6	M
1	2	3	k
0	.	←	×1

START 12 345 678

7	8	9	G
4	5	6	M
1	2	3	k
0	.	←	×

START 123 456

NanoVNA-H4 firmware:

https://groups.io/g/nanovna-beta-test/attachment/2813/3/NanoVNA-H4%20ref_scale_step_settings_load.dfu

=====
 Mon., May 24 at 1:30 p.m.

Save config as console script need lot of space of flash.

Store config in binary - not problem (as device do), but on any change in config structure not possible load (on some fw update vs change it structure), and it reset to default.

But possible write script for setup device settings from console, and run store. For this need console. But now possible run it from SD card file named 'config.ini'

=====
 Mon., May 24 at 4:59 a.m.

>This latest H / H4 release has "load config" disabled, right?
 Found tupo, added by me, lost button reaction on load, fix it

Also added SD card commands:

- > sd_list pattern
- > sd_read filename
- > sd_delete filename

Need external software support for manage files on NanoVNA SD card

sd_list pattern

Return list of files on SD card root dir (example need *.ini file), pattern can contain ? for any char and * for any size chars

- >07.515 tx: sd_list *.ini
- >07.524 rx: sd_list:
- >07.576 rx: config.ini 1509

sd_read filename

Read and send data to console

Return uint32_t size (binary), and after binary file data

Example:

- sd_read config.ini
- 03.818 tx: sd_read config.ini
- 03.880 rx: sd_read config.ini
- 03.885 rx: [e5][05][00][00]vbat_offset 500

03.889 rx: bandwidth 2000 Hz
03.893 rx: color 1 0xF8FCF8
03.898 rx: color 2 0x2E2E2E

.....
Size = 0x000005E5 = 1509
after config.ini data

Delete file from SD card
>sd_delete filename

=====
Sun., May 23 at 2:35 p.m.
Build for both H/H4
Fix some small issues
=====

Sun., May 23 at 10:55 a.m.
After executing the command clearconfig I send the commands to customize the settings of the nanoVNA (attached file).
Is it possible to store this file on the SD card and through an option in the nanoVNA menu "call" this file?
Thanks!

For test i implement it. I do not guarantee that this option will be added to the release (it will be in the code, but most likely it will not be involved)
The reason is a very unsafe function that should be used carefully.

Restrictions:

- File should have name '**config.ini**' and put into SD card root directory
- Should contain only commands and parameters (one line - one command)
- You cannot use any commands associated with memory card
- You cannot use commands sending large amounts of data to console
- The last command must necessarily transfer the carriage.

I fix your config and use for test (see attachment config.ini) (2 columns):

transform on	power 255
transform impulse	sweep 50000 900000000 401
transform normal	trace 0 off
vbat_offset 500	trace 1 off
bandwidth 2000 Hz	trace 2 off
color 1 0xF8FCF8	trace 3 smith 0
color 2 0x2E2E2E	save 4
color 3 0xF0F0F0	transform on
color 4 0x000000	transform impulse
color 5 0x00FC00	transform normal
color 6 0x3064F8	trace 0 real 0
color 7 0xF8FC00	trace 0 scale 0.15
color 8 0xF86030	trace 0 refpos 4
color 9 0x00FC00	trace 1 off
color 10 0xFFFFFFFF	trace 2 off
color 16 0x00E600	trace 3 off
color 19 0xF8FCF8	save 3

```

transform off
sweep 3000000 150000000 401
trace 0 logmag 0
trace 0 scale 10
trace 0 refpos 7
trace 1 swr 0
trace 1 scale 0.25
trace 1 refpos 0
trace 2 logmag 1
.....>>>con't column 2
trace 2 scale 15
trace 2 refpos 7
trace 3 off
save 2
trace 0 phase 0
trace 0 scale 90
trace 0 refpos 4
trace 1 smith 0
trace 1 scale 1.5

```

```

trace 2 x 0
trace 2 scale 400
trace 2 refpos 4
trace 3 off
save 1
trace 0 swr 0
trace 0 scale 0.125
trace 0 refpos 0
trace 1 r 0
trace 1 scale 25
trace 1 refpos 1
trace 2 smith 0
trace 2 scale 1
trace 3 x 0
trace 3 scale 25
trace 3 refpos 4
save 0
saveconfig

```

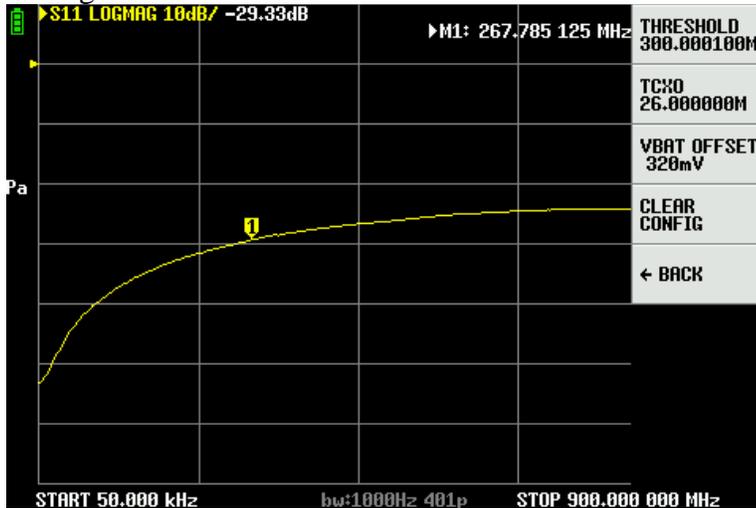
Sun., May 23 at 5:46 a.m.

Added more UI options (added Expert settings menu)

- Added harmonic threshold input
- Added TCXO frequency input
- Added Vbat offset input
- Added clear config !!! possibly need remove this option or protect it from use in future!!!

Now not need computer connection for tune (more easy for some users)

Config menu:



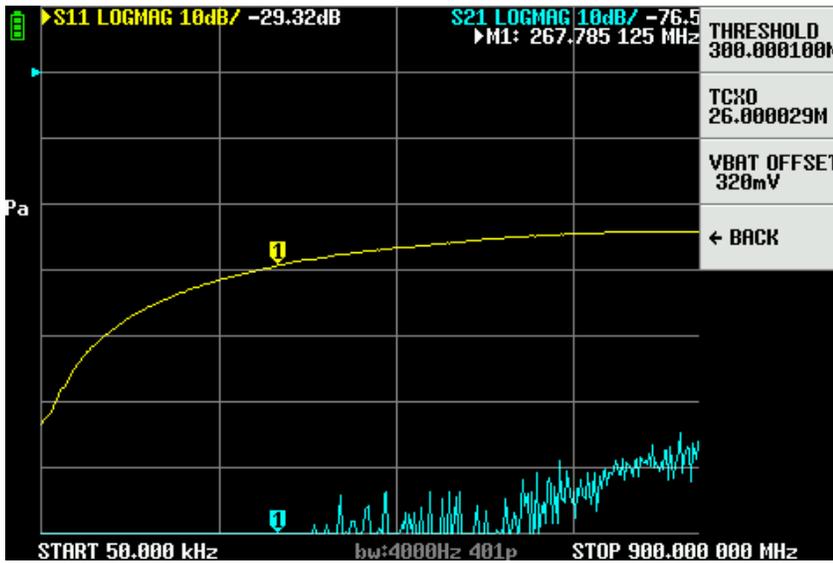
Sun., May 23 at 5:31 a.m.

Added more UI options (added Expert settings menu)

- Added harmonic threshold input
- Added TCXO frequency input
- Added Vbat offset input

Now not need computer connection for tune (more easy for some users)

Config menu:



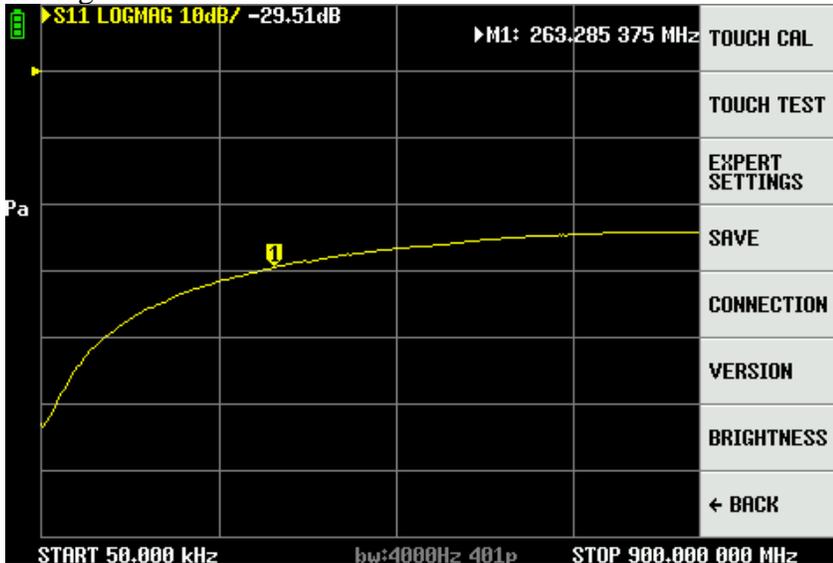
Sun., May 23 at 5:07 a.m.

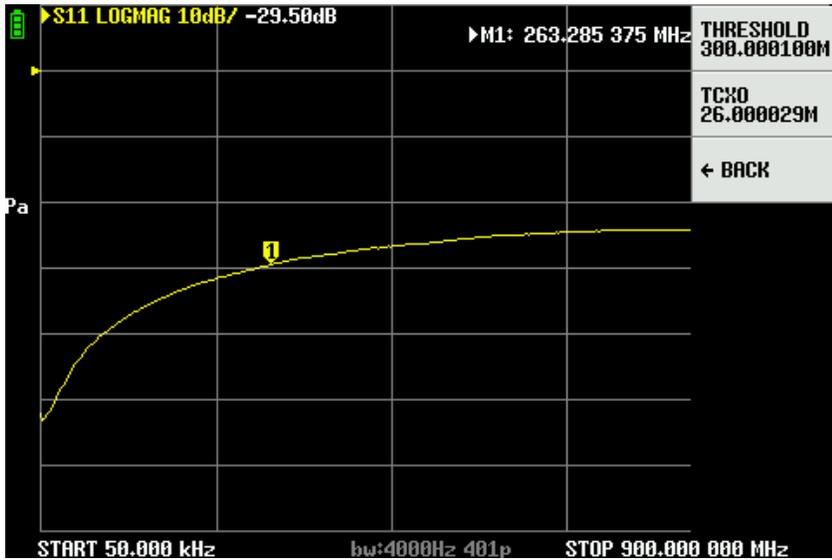
Added more UI options (added Expert settings menu)

- Added harmonic threshold input
- Added TCXO frequency input

Now not need computer connection for tune (more easy for some users)

Config menu:

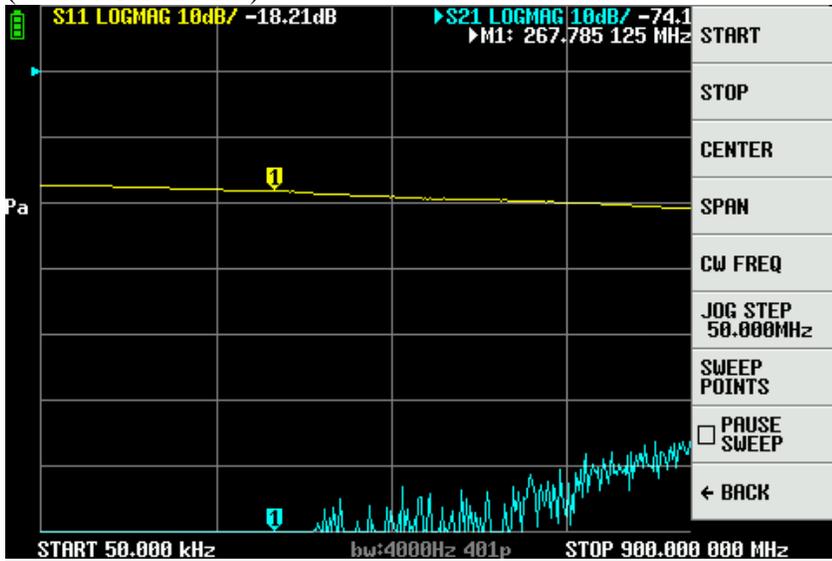


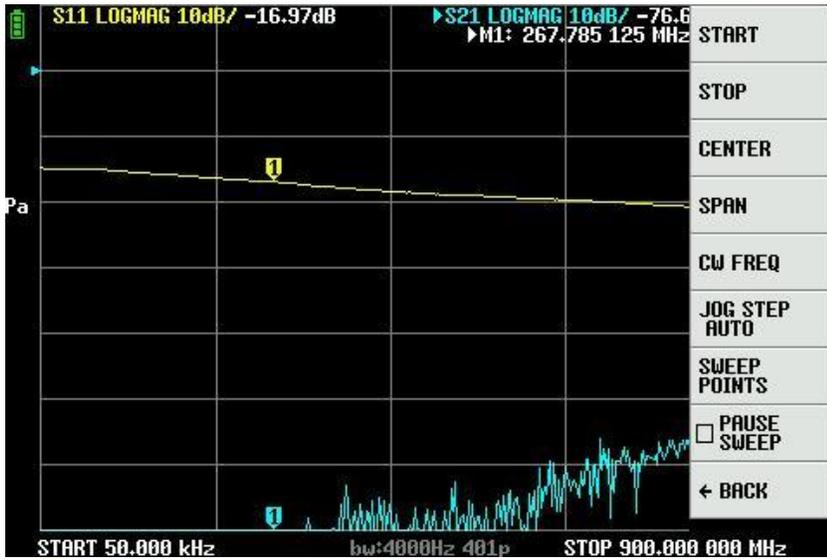


Sat., May 22 at 11:49 a.m.

Added JOG STEP feature:

It allow set constant step for change START/STOP/CENTER/SPAN frequency by lever JOG (set to 0 for AUTO)





On second screen JOG STEP = 50MHz, this mean on select frequency change mode by lever, it change +50MHz on jog right or -50MHz on jog left

This more useful in CENTER/SPAN mode and move CENTER frequency left/right.

=====

I experienced some problem after doing my calibrations :

1) This is what I did (calibrating and saving) :

:

- Save 1 1MHz - 10MHz
- Save 2 10MHz - 30MHz
- Save3 30MHz -100MHz
- Save4 100MHz - 500MHz
- Save 5 500Mhz - 1GHZ
- Save 6 1GHz - 2 GHz

2) All went fine, but after doing the last one (1GHz --2GHz) , could not use the "joy" switch to move the marker on the display, in stead it changes the stop frequency that is displayed.,
Incidentally, I have seen it changing the saved calibration ranges in the list !

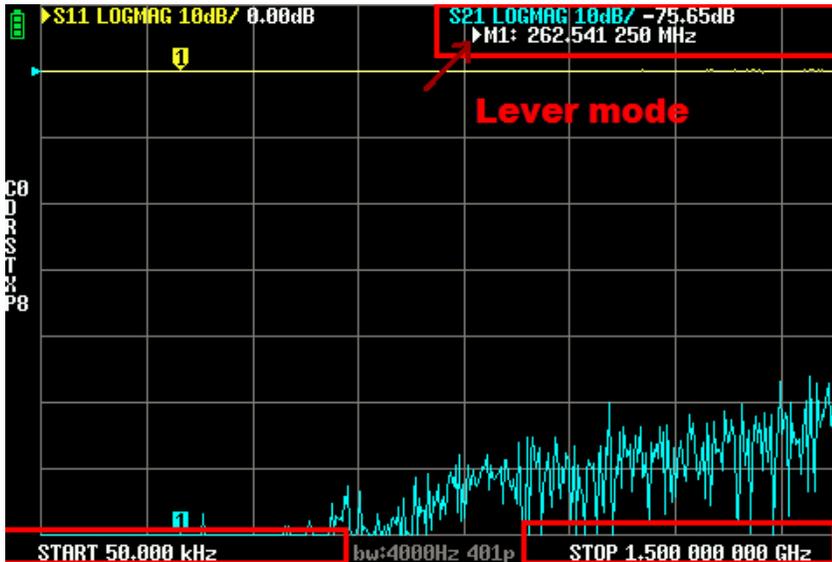
Sat., May 22 at 10:55 a.m.

This not bug

Lever can use in different modes:

- Marker move
- Start/stop/center/span frequency change
- Edelay change

See screenshot:



>STOP _____ frequency (and change stop frequency on jog left/right) click on it red area to select, next tap on it area - stop frequency input

All some for start/center/edelay mode

For back to move leveler my marker need tap on it.

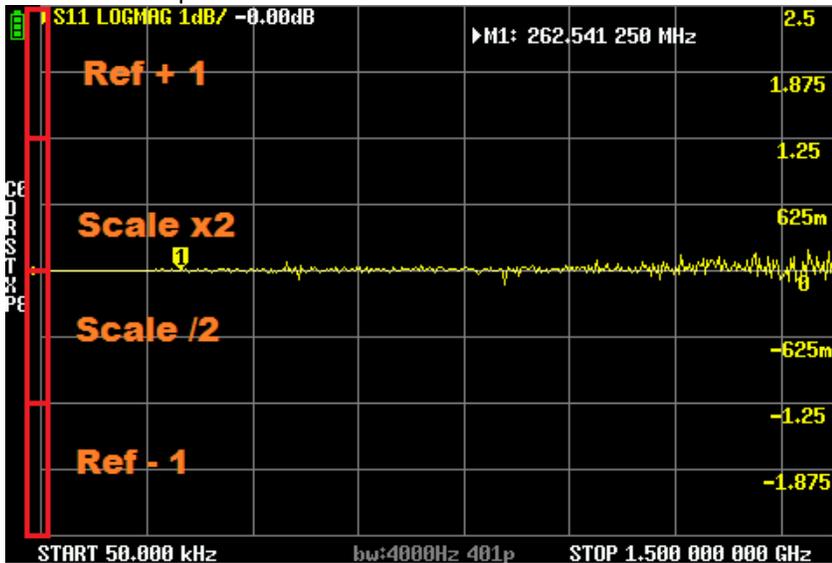
PS soon I also add VAR frequency type - this mean use this step for change START/STOP/CENTER/SPAN/CW by lever (not only auto as at this moment)

=====

Fri., May 21 at 11:55 a.m.

V1.0.62a

- Fixed update grid values
- Added also scale change (see red area)
- PS need add quick buttons at calibration area



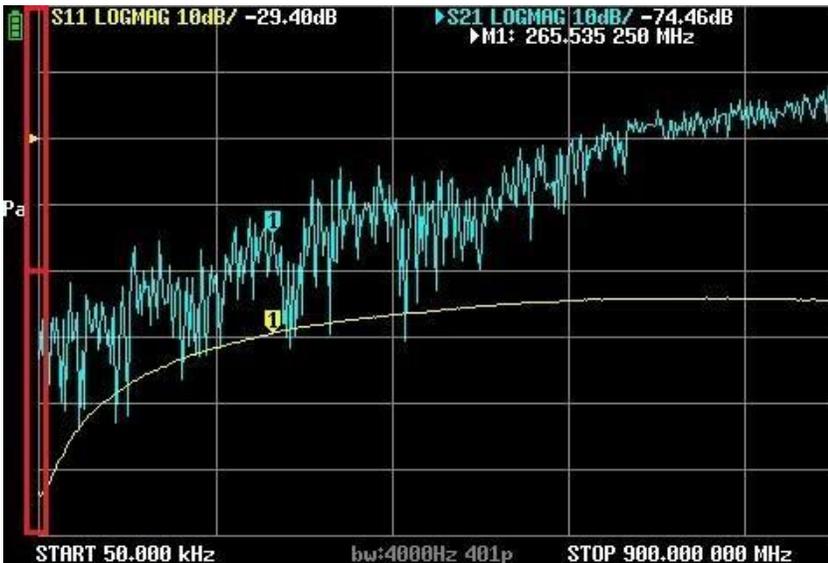
=====

Thu., May 20 at 4:48 p.m.

Refactoring UI code v1.0.62

- Now full screen keyboard not stop sweep and other work (possible work vs CPU and so)
- Fixed small UI bugs

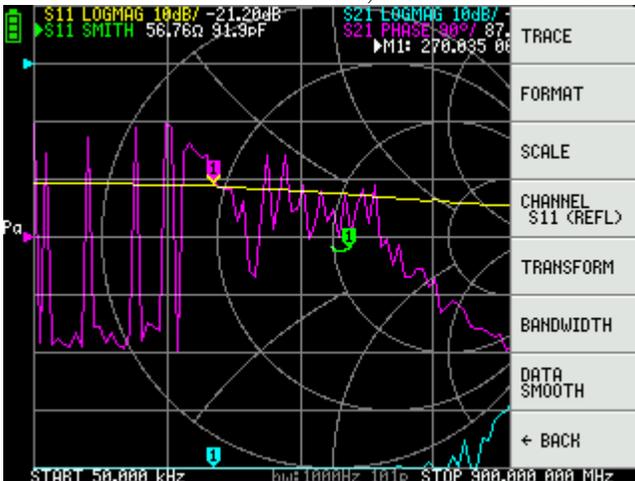
- Now possible up/down reference position on tap at reference field (red square) (need know how it useful): Tap on top of this field (also possible hold tap) move **current selected** trace up
- Tap on bottom of this field (also possible hold tap) move **current selected** trace down



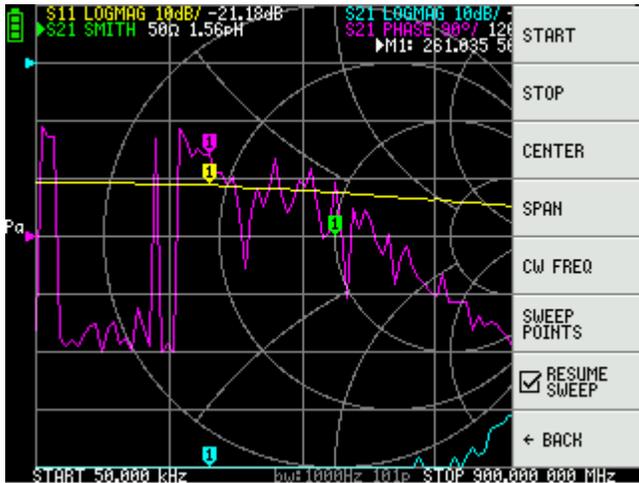
Mon., May 17 at 2:40 p.m.
Version v1.0.61

Changes:

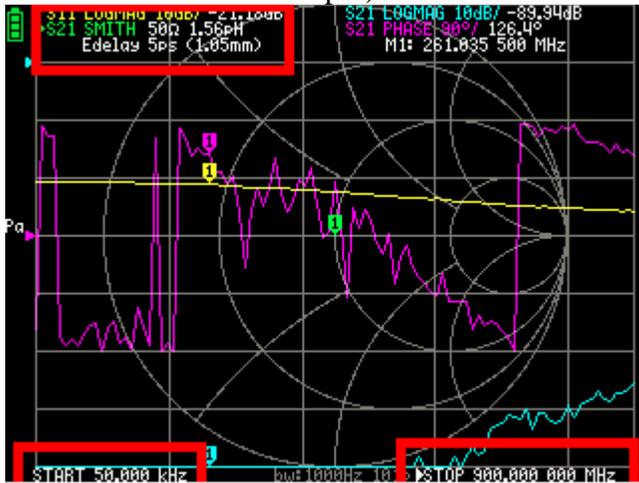
- Fixes some SD card issue (corrupt SPI data transfer, but need card inserted before power on)
- Refactoring LCD code, added lcd_printf function, now more easy print text formatted data (allow save some space, and more easy work vs text)
- Rename CH0 to S11, and CH1 to S21
- Remove Channel submenu, now channel switch on button click, also change Channel button text



- Pause button now change PAUSE/RESUME SWEEP text
- SWEEP POINTS menu move to STIMULUS (now possible little more buttons in menus)



- Refactoring keyboard code, remove double variable usage (allow save some space)
- Added quick frequency/edelay input, now first click select, second click call value input (double click in this area for select and input):

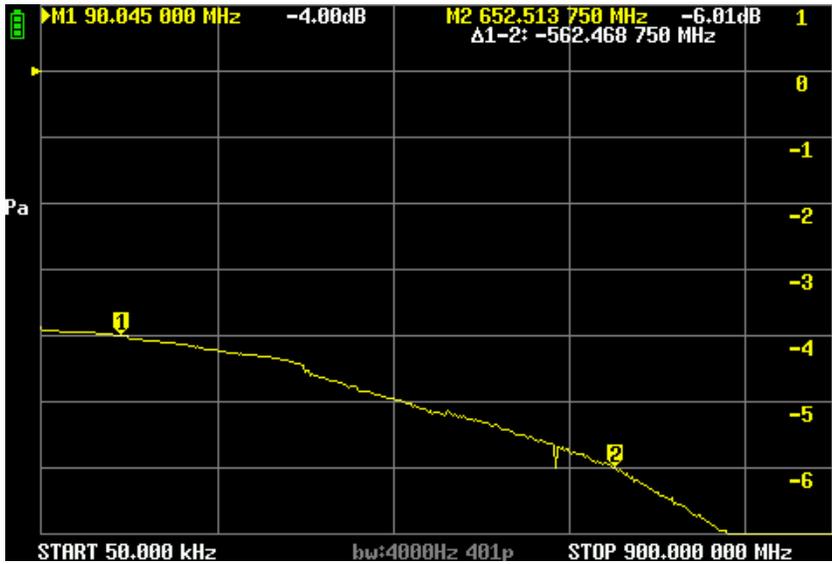


=====
 May 16 #2770
 v1.0.59 Edited May 16

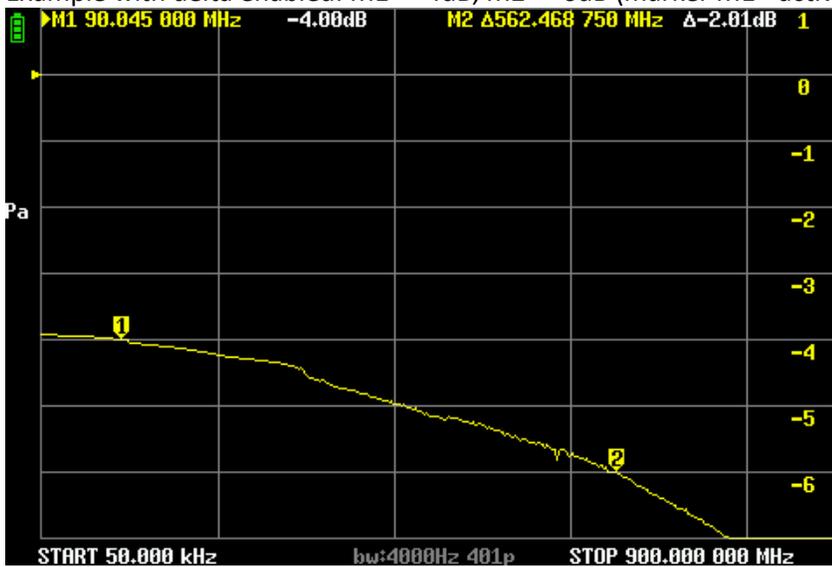
For work delta marker need minimum 2 enabled markers (so function not turn on) one reference, second delta from reference

Marker show as 'A' in menu or '>' on screen - active/reference marker (no delta value for it)
 Others markers - delta from it (show difference from reference).

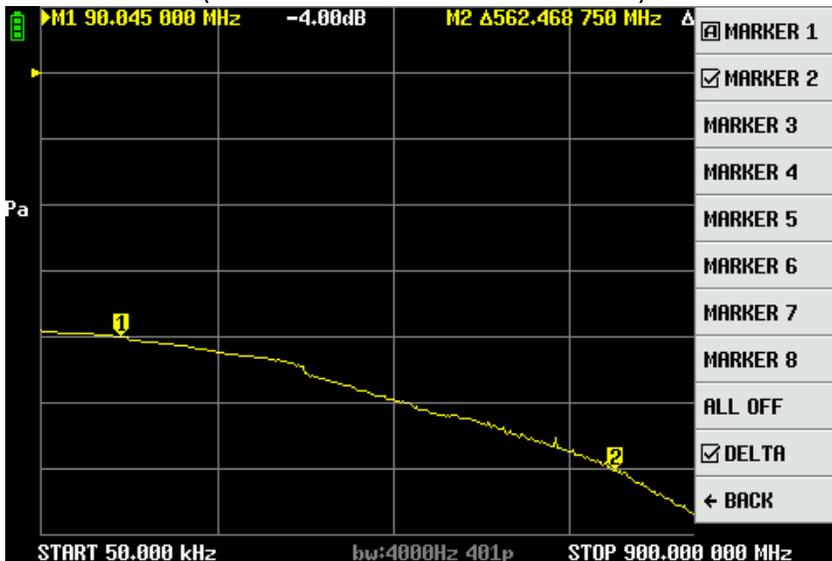
If enabled 2 markers and delta disabled, show real markers value (and in frequency string, delta frequency)



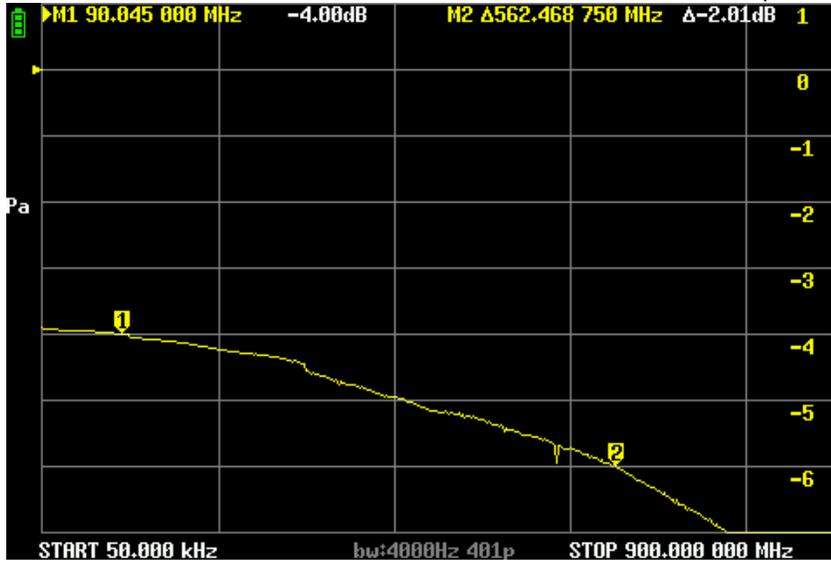
Example with delta enabled: M1 = -4dB, M2 = -6dB (marker M1 - active/reference marker):



On enable delta (active marker on menu shown as 'A'):



Visible Marker 2 show as delta value from reference = delta freq 562M, delta value -2dB (-6dB - (-4dB)) = -2dB



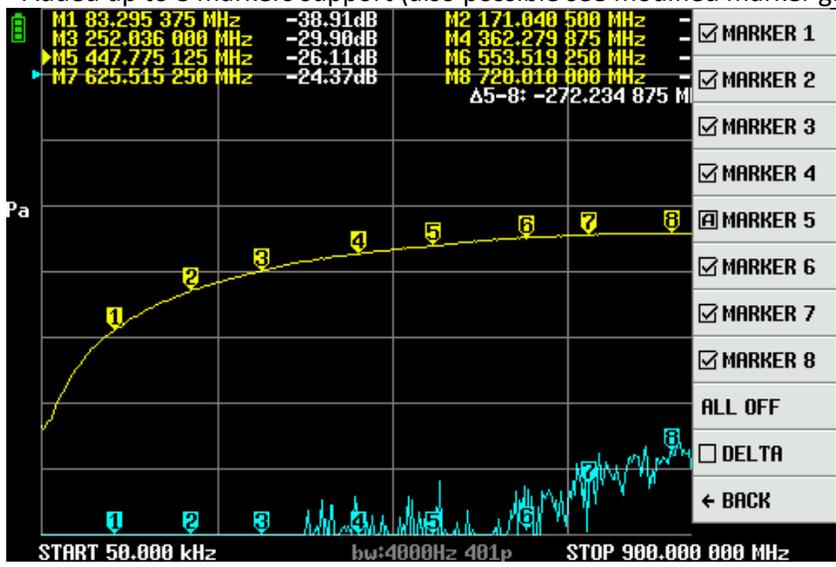
=====
 May 15 #2767

v1.0.59

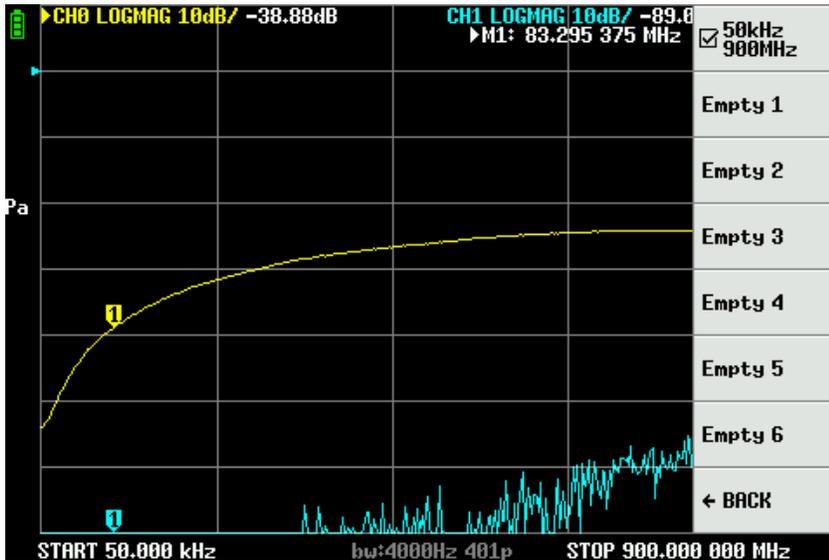
- Added variable menu button size support (now button size adapt from menu count)
- Added custom button label support
- Use 10us timer resolution (this allow much better measure time, and more little faster made sweep)
- Adapt sweep delay times to 1us resolution
- Move center/span or start/stop mode flag to properties (this allow save mode vs calibration)
- Replace some trace type menus

UI changes allow add this features

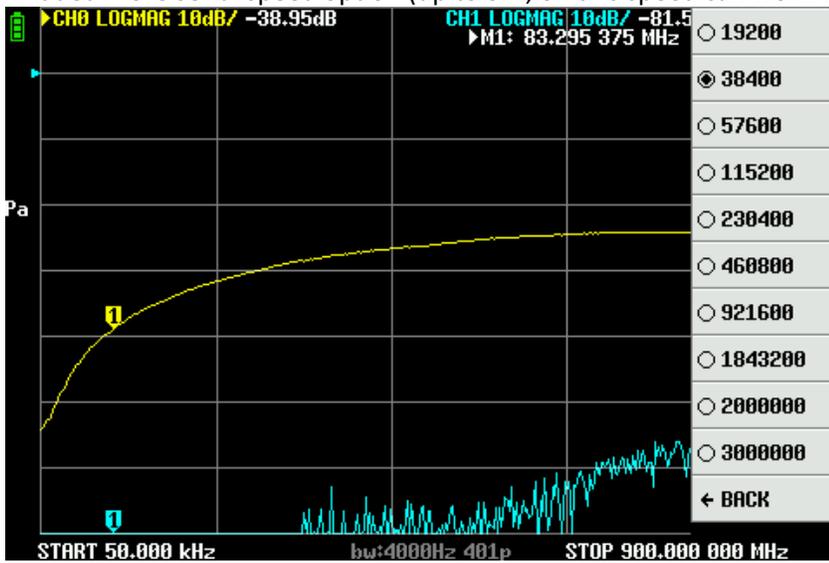
- Added up to 8 markers support (also possible see modified marker glyph and adapted size menu)



- Added custom recall buttons (possible see start/stop freq or empty slot)



- Added more serial speed option (up to 3M, on this speed can work WiFi modules)



=====
 Fri., May 14 2021
 NanoVNA-D-1.0.58a-Add variable menu button height support & Increase timer resolution for ChibiOS
 NanoVNA-D-H4-1.0.58a-Increase timer resolution for ChibiOS
 =====

Tue., May 11 at 11:44 a.m.
 Rename xtail command to tcxo (fix my typo)
 PS Need add more easy way for add correction from menu
 =====

Tue., May 11 at 8:11 a.m.
 NanoVNA have internal TXCO for si5351 generator (not related to RTC ~~xtail~~, tcxo or CPU ~~xtail~~ tcxo).
 See https://github.com/hugen79/NanoVNA-H/blob/F303/doc/Schematic_NanoVNA-H4_2.pdf
 Y1, this TXCO should output 26MHz

Need enter real TCXO frequency, this allow add correction to SI5351 generation.

How measure real TCXO frequency?

Need reset compensation ('~~xtail~~ tcxo 0' command), set NanoVNA work in CW mode on TCXO frequency 26MHz (better do it from device, stimulus->cw-> 26M)
Now measure output on CH0.
Enter real frequency in Hz (example for 26000068 Hz)
>~~xtail~~ tcxo 26000068
Check device output, now if all ok frequency should be 26000000Hz
Save config for store setting

=====
Tue., May 11 at 7:27 a.m.
Forgot warm up frequency meter, but anyway NanoVNA need warm~15min for stable frequency output.
Re do measure (after 2 hour warm frequency meter):
At power up H4 have 26.000 064 3 MHz
After 15 min 26.000 066 1 MHz

After output ~stable just deviate +-0.2Hz

So output frequency stable, but for better correction need wait before add calibration.

=====
Mon., May 10 at 11:51 p.m.
Build v1.0.58 for both unit H/H4:

Made frequency output measure for ~~XTAIL~~ TCXO calibration (use 0.1Hz resolution frequency meter GFC-8131H)

On power up my H4 have 25.999 930 MHz
after warm 15min:
Output 26.000 040 MHz

So for get better result need wait device warm 15min.
H also little faster (use 900k i2c, and little faster timings)

=====
Mon., May 10 at 11:14 a.m.
Update to v1.0.58
- now possible set real ~~XTAIL~~ TCXO frequency for NanoVNA
Console command, value input in Hz
>~~xtail~~ tcxo 26000000
Input range 23MHz - 29MHz
Also on version screen show ~~XTAIL~~ TCXO frequency

How made ~~XTAIL~~ TCXO calibration:
set default value
>~~xtail~~ tcxo 0
set cw mode to 26M
>freq 26000000
measure CH0 output frequency (example if measure 26000060 Hz), and setup ~~XTAIL~~ TCXO in Hz
>~~xtail~~ tcxo 26000060
Store config
>saveconfig

Value stored in config (version screen):

NanoVNA-H 4

```
2019-2021 Copyright @DiSlord (based on @edy555 source)
Licensed under GPL. See: https://github.com/DiSlord/NanoVNA-D
Version: 1.0.58 [p:401, IF:12k, ADC:384k, Lcd:480x320]
Build Time: May 10 2021 - 17:35:16
Kernel: 4.0.0
Compiler: GCC 9.2.1 20191025 (release) [ARM/arm-9-branch revision 277599]
Architecture: ARMv7E-M Core Variant: Cortex-M4F
Port Info: Advanced kernel mode
Platform: STM32F303xC Analog & DSP
XTAIL = 26.000 060 MHz

Time: 2021/05/10 17:35:43 (LSE)
Batt: 4.218V
```

This allow more good measure quartz

=====
Sun., May 9 at 6:06 p.m.

Changes v1.0.57:

- Set si5351 exchange speed on i2c bus to 900k
- use smith marker show as 50 + j30 Ohm (before value show as 50 + 30 jOhm)
- update fatFS to last revision R0.14b
- less code size

This (and also some prev optimisations) allow update timings for H4 (only H4, CPU for H can't work more fast)
Now full span speed in NanoVNA-App 1 - 1500MHz in 4k BW, made 570 points/sec (before 440 points/sec)
In 1-100MHz range speed much faster ~670 points/sec (before also ~440 points/sec)

PS onboard sweep speed much faster (not need send data to CPU)

PSS need also check how faster work on 768k ADC

=====
Mon., Apr. 26 at 4:10 p.m.

Firmware version 1.0.56:

- redefine some math function in nanoVNA data calculations

Take a week for search best by speed/size/minimum error functions for STM CPU

Default math functions need a additional check for valid data, get most best result as can, but for NanoVNA not need precision calculations, in most cases for example 0.001 error not visible.

This allow save a lot of size (~2.5k), get more faster code (2-6x faster)

For H4 you not see big difference (hardware FPU fast, and difference in 4ms or 1ms not visible), for H this feature give more (yes also not good visible 20ms or 9ms) but...

PS some of this work allow get more faster processing in tinySA (and save a lot of space in it also)

=====
Smooth in any case change data. This function remove High frequency data change (noise), more smooth factor - more steps on data, and more changes.

Exist a lot of functions, i use simple:

get 3 points, made average, and set this data at middle:

arithmetic avg : $data[0] = (data[-1] + 2*data[0] + data[1])/4$

Geometry avg : $data[0] = \text{cube_root}(data[-1]*data[0]*data[1])$

This good work on scalar data (used in SA, and so on, you can see how it work on tinySA, i used some algorithms)

For vectors both mode not correct (see <https://groups.io/g/nanovna-beta-test/message/2736>), geometry work little better, but add some additional errors, arithmetic reduce amplitude

You can connect cable, change to Smith, see spinned circle, and do x1 to x6 avg in both modes and see result Geometry avg work good in logmag traces, but can show additional errors in delay for example (arithmetic work good in this case) and so on.

For correct calculation need geometry avg in complex plane, and this calculation very difficult

More simple get calculated trace, and smooth on it (like NanoVNA-App do for scalar traces), but Nano not have RAM for store trace data and made calculation on it

At result, this function need use carefully, some users can set x6 as default and get not correct results, i repeat Smooth always change data.

=====

Tue., Apr. 20 at 4:00 p.m.

Update to v1.0.55

- Smooth now have 2 modes (slow and fast) see Display->Data smooth->Smooth fast/slow

- max value in device x6 (x8 available from console)

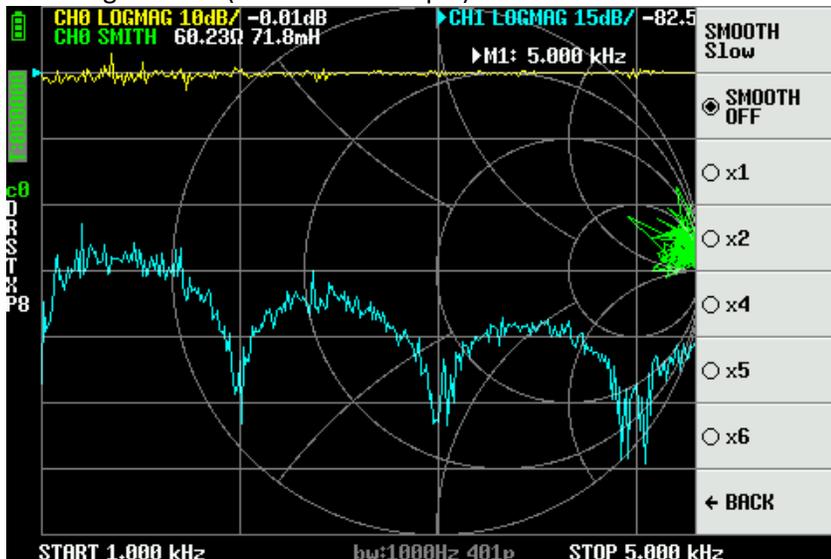
Fast - made arithmetic average

Slow - made geometry average

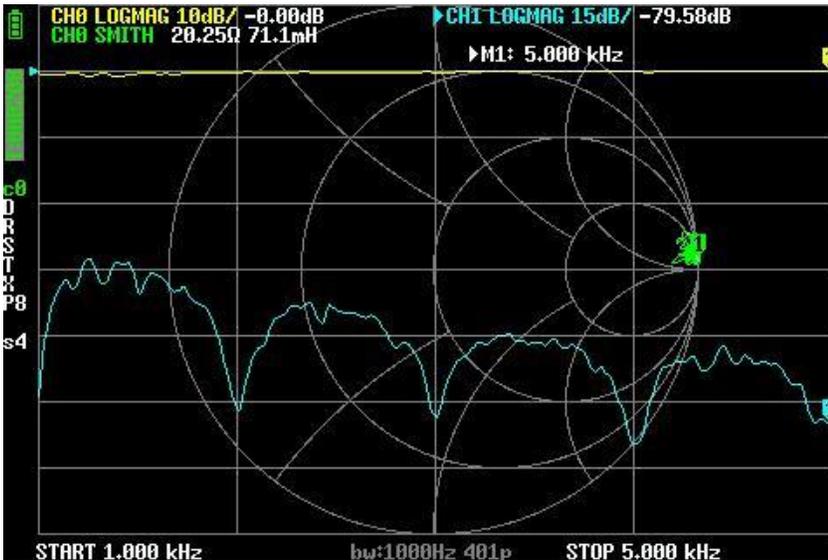
I found fast implementation of cube root (it more than 10x faster my first test, now geometry average more usable, x6 need only 80ms, before need ~800ms), so I think leave slow mode as default, in most cases it give best results

Also, as smooth mode need use carefully, I remove save it from config, and it always disabled on startup

Here original data (and menu example):



Here x4 slow mode smooth (need only 20ms on 401 points)



Need check both modes, need fast mode?

Sat., Apr. 17 at 7:35 p.m.

Update: 1.0.54

Now as I say smooth factor can be 0 - 8 (0 for disable)

Smooth factor show in calibration as 'sn' if enabled



Also 'smooth' command now input only in 0-8 range

Possible I use 2^n as smooth factor ($n = 0$ to 8 , 0 - disabled)

And show S_n in calibration status if $n > 0$

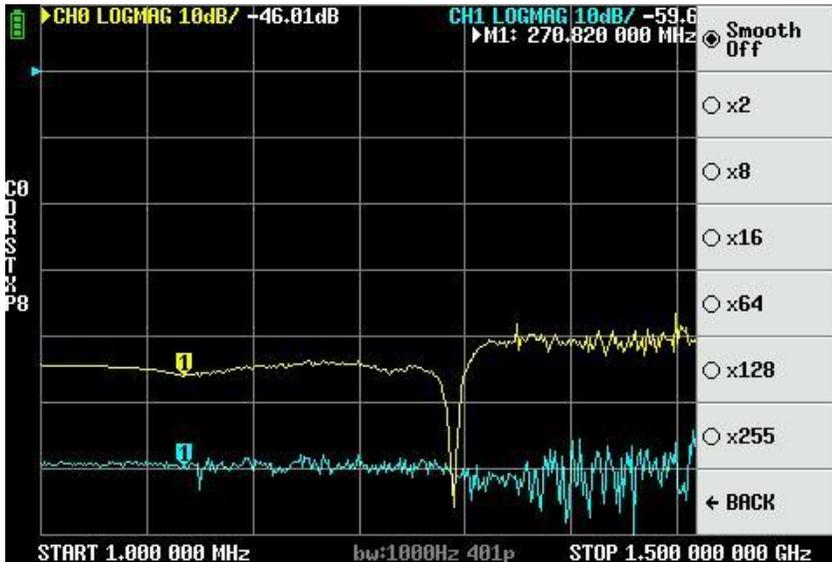
So used smooth 1, 2, 4, 8, 16, 32, 64, 128, 256 (255) options

Sat., Apr. 17 at 5:27 p.m.

Here test F/W for smooth option (for H4 at this moment, it have lot of points and fast FPU, so can made calculation)

See Display->DATA SMOOTH menu

Here menu option (smooth off)



Here selected x64 factor



Additional implement command

>smooth {0-255}

If it useful, and work good, i port it to H and V2

=====
Sat., Mar. 27 at 4:09 a.m.

Version 1.0.53

Made this optional (DISPLAY->SCALE->SHOW GRID VALUES)

Use better grid values formatting (5.3F) it allow see any values

Removed zeroes at value string

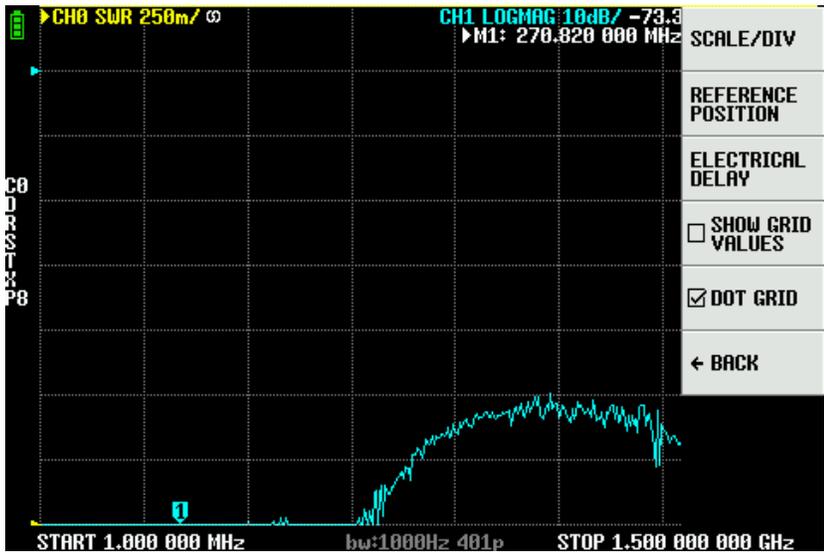
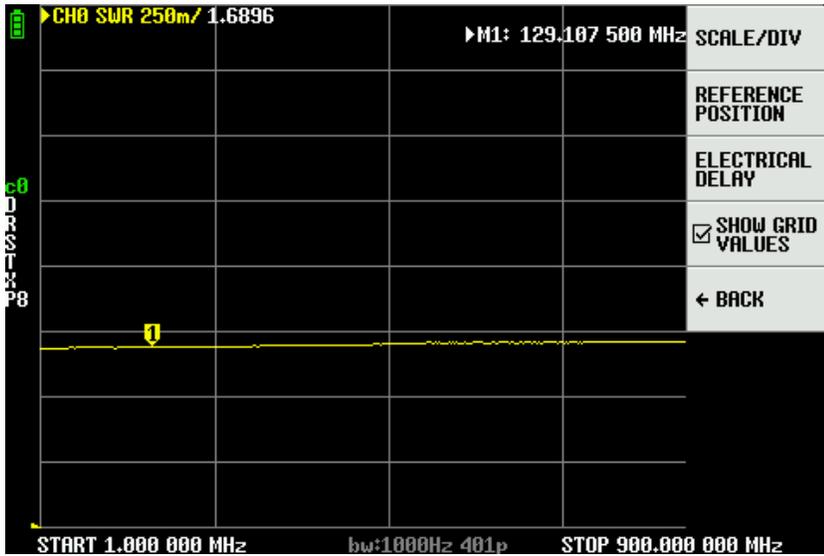
I think finish (made some cleanup and push code to git), now v1.0.53:

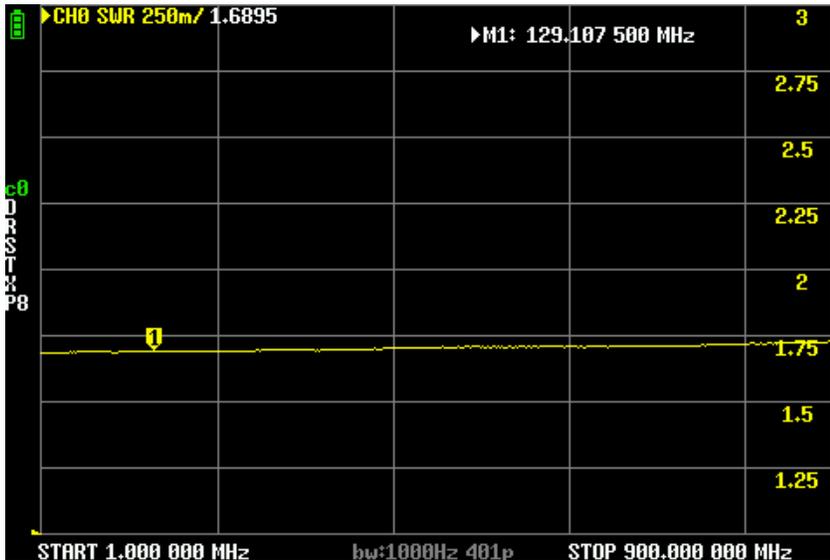
- Added show grid value option (DISPLAY->SCALE->SHOW GRID VALUES)

- Added dotted grid option (DISPLAY->SCALE->DOT GRID)

Setting stored in config

Console command for change it not present, i possible add it in future





=====

Sun., Mar. 21 at 2:12 p.m.

Update to v1.0.50

Work under more faster Smith chart render (now on ~30% faster)

Rewrite string render on plot area (now possible skip string formatting if not on cell) it allow little faster work (and more universal)

For H4 now possible up to 7 save slots

PS i impressive how fast it update, most code speed i also port on tinySA and V2

PSS i also upload this file to NanoVNA group for all users, if all good I try made release to git

=====

Thu., Mar. 18 at 5:25 p.m.

Update to NanoVNA v1.0.49:

- code size optimizations
- More code unification for H/H4 (now possible use 4 inch display for H or 2.8 display for H4 if need for example)
- Add |Z| trace type
- Use less gain and disable align in 300-600MHz range (should increase dynamic)

- Math calculation optimization (logmag processing ~2x faster)
- More faster prepare and draw traces (in some cases up to 3x faster, for example on long lines draw)
- Rewrite Transform Domain math to more fast processing on H (up to 2x faster) on no FPU usage
- More fast LCD data read (for screenshots) for small screen
- Fix calibration state show (not lost last X state)
- Now on calibration measure show O (Open collected data) S (Short collected data) t (Thru collected data). After press done data recalculated to D,R,S,T,X (as before)
- Fix marker state on reload
- Now possible enable up to 6 markers
- Add radio button for min/max marker search (mode also stored in config)
- Now possible change Scale/Ref/Trace type on sweep pause and screen redraw for new settings
- Add 'A' icon for active marker in menu

=====

Sun, Mar 14 2021

NanoVNA H4 v1.0.48

Use less gain in 300-600M range and disable freq align & fix Smithchart

Much faster Time Domain transform for FPU less devices (~2x faster)

Misc S/W bug fixes

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Mon Feb 8 2021

NanoVNA H4 v1.0.46 (no change in version)

Update SD Card & DSP routines:

Merge branch 'master' of <https://github.com/DiSlord/NanoVNA-D> into H4

Update FatFs file-system module to R0.14a

Made all transform_domain in tmp buffer

Change input Common mode from 0.75 to 0.9V for tlv320aic

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Thu., Jan. 14 at 12:46 p.m. NanoVNA H4 v1.0.46 SDcard debug

Here is SD card debug version of firmware, connect it to CPU

(use any console app like Putty, also you can use NanoVNA-App console)

Made any save to SC card and send me log from console.

I have this after save screenshot:

56.026 rx: CMD0 Ok

56.032 rx: CMD8 Ok

56.037 rx: CMD8 0xAA010000

56.043 rx: CMD55 + ACMD41 97

56.048 rx: CMD58 OCR = 0xC0FF8000

56.053 rx: CardType 12

56.649 rx: disk_ioctl(0) = 0,

56.654 rx: Read speed = 445217 Byte/s (count 6, time 69)

56.660 rx: Write speed = 885226 Byte/s (count 606, time 3505)

56.665 rx: Total time = 6416

56.671 rx: CRC16 time 0

As can see my card have very good write speed ~900k seconds, no any errors

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Tue., Dec. 15 at 12:06 p.m.

Small update: NanoVNA H4 v1.0.45

- More compact flash code
- Update power setting on pause sweep also

This fix issue then in NanoVNA-App set CW mode and change power setting

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Wed., Nov. 4 at 2:10 p.m.

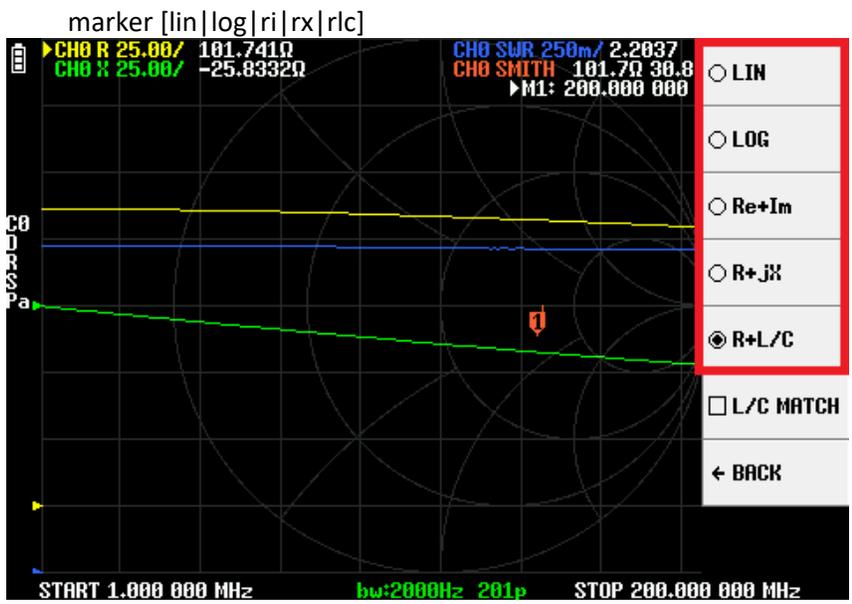
Small update to v1.0.42

- Code cleanup
- Small speedup in build trace data
- Allow edit smith format option from console command: 'marker [lin|log|ri|rx|rlc]'
- Add more delay for init AIC codec (possible better clock frequency stabilization improve startup)

=====

Oct 26 #1554

Add command to H4 version v1.0.41 for test



Now possible change smith format option

=====

Oct 25 #1535

Update to v1.0.41 (made code review)

Changes:

- * Add warning if power settings in calibration not same as current (red power string)
- * Disable marker track after marker start drag
- * Fix LC Match text update on screen
- * Fix marker frequency update in memory (return correct marker info from console command)
- * Fix measure in 450-460MHz
- * Disable AIC channel cache
- * Code size fixes

- * Increase 1 point measure wait time (hope this solve calibrate issue)
- * Fix graphic update on trace/channel change (work also in pause sweep)
- * Calibrate on 100Hz bw (30Hz bw before)

=====

Sun., Oct. 18 at 4:51 p.m.

Change list from last v1.0.39:

- * big code optimisation (allow save ~1k)
- * add palette color for LC match text (LCD_LC_MATCH_COLOR 19)
- * cache channel in sweep (possibly fix issue on calibration in one trace mode)
- * fix LSE startup time (disable not tick time check, need more research in it)
- * increase USART IRQ priority (prevent data lost on high speed exchange)
- * disable calibration apply show after any calibration collect data run
- * for sin/cos calculation use extended FFT table (allow save additional 4.5k flash), this also fix hang if enter big edelay value

Marker fix:

- search closest marker for drag
- correct select previous on add/remove marker (fix problem then marker removed and mode can change to one marker show)
- fix some 'marker' console command errors

PS interesting thing, then i start code fix from edy555 v0.6, firmware have size ~96k and no more free space. Now if compile vs disabled SD card/LC Math/Serial console function flash size 75k. And this include new UI, and all code fixes.

Current size for H (include all features) only ~87k

=====

Tue., Oct. 13 at 11:54 a.m.

I add this (for all model):

PA0 output high level = fundamental wave; output low level = high pass (harmonic).

Now if freq > threshold value - PA0 set to low, else set to high

=====

Sun., Oct. 11 at 3:23 a.m.

Here my test firmware (number not change):

- Reduce firmware size (made plot function optimisation, little faster and save ~650 bytes), need check correct measure in different formats
 - Cache measure channel (possibly can fix issue see https://groups.io/g/nanovna-users/topic/strange_problem_with_dislord/77228052, i not want use 2 channel mode for calibration, also this not fix only one chanel mode)
- I think problem come from on first point freq set audion codec freq not stable and mode not set, but i set channel and cache it, and after freq stable I not set channel

- Change IRQ priority for serial, on USB to TTL i get stable work up to 3M, no data lost

- More stable LSE startup at first run (but i disable auto LSI start on bad LSE, need more check timings)

=====

Thu., Oct. 1 at 4:00 p.m.

Try this, in it for calibrate need 2x time, but i do some as on measure

=====

Tue., Sep. 29 at 4:37 p.m.

Main idea:

sin/cos calculation used only in edelay correction, for it work compiler use big size tables vs double values (~6-7k flash only for tables), FFT for TDR also use some table

If use 512 elements table + interpolations, and use it also for FFT, this allow save ~4-5k flash and speedup calculation. Max error on sin/cos calculation ~3.87e-7 (less then measure noise).

As can see this firmware less size (can compare vs old v1.0.39)

I not fully test it on CPU (try do it tomorrow), but can check sin/cos error and in this part (edelay apply) all should be good (in FFT also should be good, but need check)

PS use some part of code from OneOfEleven

=====

Sun., Sep. 27 at 5:28 p.m.

Firmware v1.0.39 Compensate for FFT window / zero-padding losses in TDR mode

=====

Sat., Sep. 26 at 10:50 a.m.

On Sat, Sep 26, 2020 at 07:12 AM, Alain wrote:

On V1.0.38, my H4 does not work in LSE mode. Yet I checked and the xtal oscillates?

Every startup NanoVNA check mode, if LSI try start LSE, after check clock, if run ok, if no, use LSI.

Check this, only LSE mode, disable autodetect, it cannot start - this mean no LSE run

=====

Sat., Sep. 19 at 1:18 p.m.

Release Version v1.0.38 for H and H4

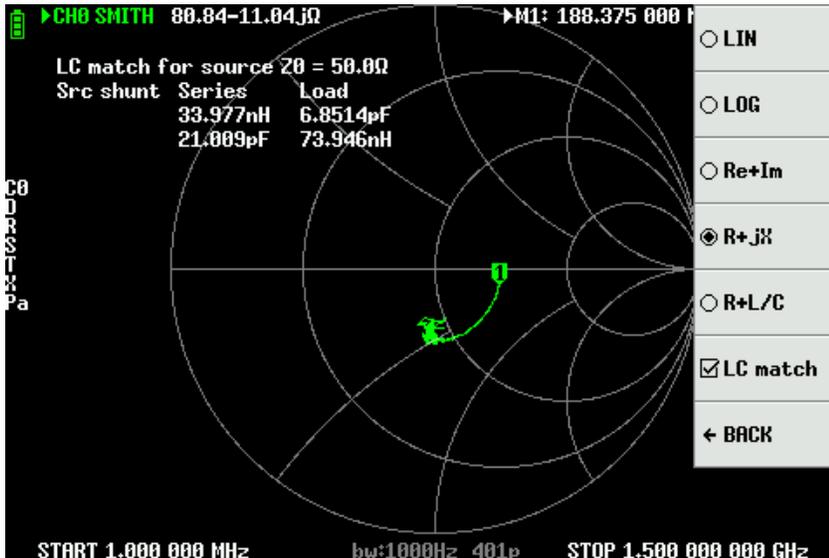
* LC match code added as additional option

* small code style fixes and size optimisations

For H need ~1.8k flash for this function

For H4 need ~1.5k flash

Enable disable function in MARKER->SMITH VALUE option LC match



=====
 Thu., Sep. 17 at 5:10 p.m.
 Update v1.0.36:
 * add 'usart_cfg speed' command, allow set any serial speed example:
 Send 'usart_cfg' return 'Serial: 38400 baud'
 Send 'usart_cfg 57600' return 'Serial: 57600 baud' and apply this speed

- * For H4 add 2 additional save slots
- * Change "< BRIGHTNESS>" text on apply brightness to

"BRIGHTNESS"
 "< USE LEVELER BUTTON >"

I hope it allow more better understand how change it.

=====
 Tue., Sep. 15 at 5:04 p.m.
 Update v1.0.35:
 * add 'usart "command" [timeout]' command

'usart' command allow on connect by USB translate command to USART port
 command - text sent to Serial port, if this text contain ' ' (space) then need use " at command begin and " at end
 (example: "cmd 1 2 3")
 timeout - optional, time for wait answer from device in ms (default 200ms)

This allow configure (or control device connected to serial port of NanoVNA)

For example:
 On serial port connected Bluetooth module HC-05, and i need setup it
 I need press KEY on it for enter configuration mode, on NanoVNA select Serial Port speed BUT not change to Serial mode (leave USB connection!)

Now if i connect to NanoVNA by USB i send command to HC-05 from NanoVNA console:

usart "AT+VERSION?"

See console log:

```
03.102 tx: usart "AT+VERSION?"
03.116 rx: usart "AT+VERSION?"
03.310 rx: +VERSION:2.0-20100601
03.314 rx: OK
03.607 rx: ch>
```

```
03.116 rx: usart "AT+VERSION?" -> This NanoVNA echo command answer
03.310 rx: +VERSION:2.0-20100601 -> This HC-05 answer translated to console
03.314 rx: OK -> This HC-05 answer translated to console
03.607 rx: ch> -> This NanoVNA ready console input
```

=====

Tue., Sep. 15 at 12:13 p.m.

Update v1.0.35:

- * Fix hang on select USB connection if no cable connected
- * Disable 'sample' command (used for debug)

=====

Tue., Sep. 15 at 9:12 a.m.

Compile USB Hangup fix for H4 (for H add later)

=====

Mon., Sep. 14 at 5:06 p.m.

Update v1.0.34:

- Separate DAC and Brightness control (this allow disable not used DAC on H version and save ~600 bytes of flash)
- Disable 'dac' command
- Brightness config value now not same as DAC value, and after flash it load as 0 (you get dark screen on H4, need select CONFIG->BRIGHTNESS and use leveler to adjust it)
- Disable some serial speed setting - this allow use one menu page for it
- Increase USB connection buffers count - this increase exchange speed ~10% over USB

=====

Mon., Sep. 14 at 6:53 a.m.

On Mon, Sep 14, 2020 at 01:48 AM, DiSlord wrote:

Exist some 'bug' if you send data over USB, but in NanoVNA not selected USB connection, and data packet big and made input buffer overflow, after need restart device for restore USB connection.

Need search ChibiOS I/O stream 'error ?', and fix it.

Update to v1.0.33

Add Serial connection to firmware as default (i think now code stable)

Fixed bug vs USB stream overflow and no response after (Now possible on fly select any source, speed)

Added more Serial speed options (for more fast WiFi or USB to TTL): 19200, 38400, 57600, 74800, 115200, 230400, 460800, 921600, 1843200, 3686400

Rename menu item SPEED to SERIAL SPEED

=====

Tue., Sep. 15 at 12:13 p.m.

Update v1.0.35:

- * Fix hang on select USB connection if no cable connected
- * Disable 'sample' command (used for debug)

=====

Tue., Sep. 15 at 9:12 a.m.

Compile USB Hangup fix for H4 (for H add later)

=====

Mon., Sep. 14 at 5:06 p.m.

NanoVNA H4 v1.0.34

Update v1.0.34:

Separate DAC and Brightness control (this allow disable not used DAC on H version and save ~600 bytes of flash)

Disable 'dac' command

Brightness config value now not same as DAC value, and after flash it load as 0 (you get dark screen on H4, need select CONFIG->BRIGHTNESS and use leveler adjust it)

Disable some serial speed setting - this allow use one menu page for it

Increase USB connection buffers count - this increase exchange speed ~10% over USB

On Mon, Sep 14, 2020 at 04:32 AM, OneOfEleven wrote:

So far so good DiSlord .. on my -H .. will test the -H4 after dinner.

What size are the USB and serial input buffers I wonder ?

USB packet size = 64 bytes (configured on init USB connection)

So i set USB serial buffer as 64 byte (128 before) and for Serial buffer also 64 bytes (32 as default before)

=====

Sat., Sep. 12 at 5:20 p.m.

Serial shell extension

Compile both variants for H and H4

Sorry but for H i can't test it. My old NanoVNA not have pins for connect

Firmware v1.0.31 (beta only for H4).

Fixes:

- correct apply power settings in all cases (found mistake, power settings not apply if no band change in sweep)

Features:

- Add support connection by Serial interface

Now possible select USB or Serial command interface (setting store in config)

!Warning! not send command over USB if select Serial connection (or need restart device for restore USB connection)

Also connection speed over Serial not so fast as over USB (so exchange speed also not fast, and for made screenshot need more time)

Connection to H4 (On PCB exist pins):

UART Rx - Need connect to module Tx pin

UART Tx - Need connect to module Rx pin

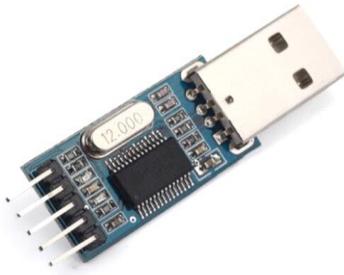
GND - connect to GND pin

5V - connect to Bluetooth module 5V pin (not need for USB to TTL module)

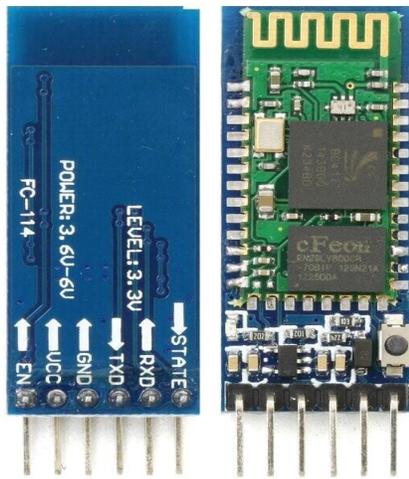
I test HC-05 Bluetooth module on speed 115200 all work.

!!! Need configure HC-05 for speed (see HC-05 manual) before install (default speed 38400). In CPU program possible select any speed (it speed over Bluetooth to HC-05 module), but on nanoVNA need select HC-05 serial speed setting.

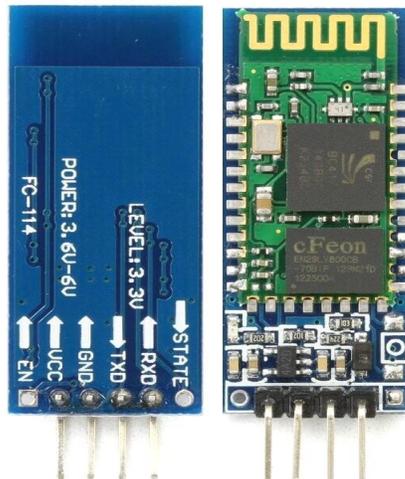
Test USB to TTL module
up to 921600:



HC-05 FC-114



HC-06 FC-114



=====

Wed., Sep. 9 at 5:52 a.m.

Small update v1.0.30:

Added 3 colors:

LCD_BW_TEXT_COLOR	16 - BW text at bottom
LCD_INPUT_TEXT_COLOR	17 - input text color (on keyboard screen)
LCD_INPUT_BG_COLOR	18 - input background color

Default:

```
[LCD_BW_TEXT_COLOR    ] = RGB565(128,128,128), \  
[LCD_INPUT_TEXT_COLOR] = RGB565( 0, 0, 0), \  
[LCD_INPUT_BG_COLOR  ] = RGB565(255,255,255), \  

```

Palette now contain 24 colors (16 before, for future extend)

Fix small bug on draw keyboard

!! Again config reset after update (added more colors to it)

=====

Tue., Sep. 8 at 4:42 p.m

NanoVNA v1.0.29 - Custom colors theme

Now possible set any color used by NanoVNA for draw

Changed color command

'color idx RGB888'

There - idx is color index:

LCD_BG_COLOR	0
LCD_FG_COLOR	1
LCD_GRID_COLOR	2
LCD_MENU_COLOR	3
LCD_MENU_TEXT_COLOR	4
LCD_MENU_ACTIVE_COLOR	5
LCD_TRACE_1_COLOR	6
LCD_TRACE_2_COLOR	7
LCD_TRACE_3_COLOR	8
LCD_TRACE_4_COLOR	9
LCD_NORMAL_BAT_COLOR	10
LCD_LOW_BAT_COLOR	11
LCD_SPEC_INPUT_COLOR	12
LCD_RISE_EDGE_COLOR	13
LCD_FALLEN_EDGE_COLOR	14
LCD_SWEEP_LINE_COLOR	15

RGB888 - is color in RGB888 format (you can use any online calculator <https://allcalc.ru/node/402> see HEX #54ff84 so need use as value 0x54ff84)

Warning!! not all redraw on screen after color change (menu for example, need close/open it)

Colors stored in config (so it reset after flash this firmware) need save config for apply

Default colors:

```
[LCD_BG_COLOR      ] = RGB565( 0, 0, 0), \  
[LCD_FG_COLOR      ] = RGB565(255,255,255), \  
[LCD_GRID_COLOR    ] = RGB565(128,128,128), \  
[LCD_MENU_COLOR    ] = RGB565(230,230,230), \  
[LCD_MENU_TEXT_COLOR ] = RGB565( 0, 0, 0), \  
[LCD_MENU_ACTIVE_COLOR] = RGB565(210,210,210), \  
[LCD_TRACE_1_COLOR  ] = RGB565(255,255, 0), \  
[LCD_TRACE_2_COLOR  ] = RGB565( 0,255,255), \  
[LCD_TRACE_3_COLOR  ] = RGB565( 0,255, 0), \  
[LCD_TRACE_4_COLOR  ] = RGB565(255, 0,255), \  
[LCD_NORMAL_BAT_COLOR] = RGB565( 31,227, 0), \  
[LCD_LOW_BAT_COLOR  ] = RGB565(255, 0, 0), \  
[LCD_SPEC_INPUT_COLOR] = RGB565(128,255,128), \  
[LCD_RISE_EDGE_COLOR ] = RGB565(255,255,255), \  
[LCD_FALLEN_EDGE_COLOR] = RGB565(128,128,128), \  
[LCD_SWEEP_LINE_COLOR] = RGB565( 0, 0,255), \  
=====
```

Fri., Sep. 4 at 7:07 a.m.
Check this, i revert SPI init settings. (clock and phase)
All others, should not accept to work SD and LCD.

PS On H4 all work as need, vs this settings (and as on ili LCD datasheet correct)

=====
Wed., Sep. 2 at 5:59 a.m.

NanoVNA H4 v1.0.25 LSI

No big changes, only small version info update

Now some device settings output to info:

>[p:101, IF:12k, ADC:192k, Lcd:320x240]

p - max point count

IF - if frequency (it can be variable if enabled offset command, but have limits - step should be = max bandwidth)

ADC - adc speed

Lcd - LCD display resolution

This string can contain '\r\n' inside for allow show on device screen (if need output more things)

External program can use this info

Example for NanoVNA-H:

Board: NanoVNA

2019-2020 Copyright @DiSlord (based on @edy555 source)

Licensed under GPL. See: <https://github.com/DiSlord/NanoVNA-D>

Version: 1.0.25 [p:101, IF:12k, ADC:192k, Lcd:320x240]

Build Time: Sep 2 2020 - 12:38:59

Kernel: 4.0.0

Compiler: GCC 9.2.1 20191025 (release) [ARM/arm-9-branch revision 277599]

Architecture: ARMv6-M Core Variant: Cortex-M0

Port Info: Preemption through NMI

Platform: STM32F072xB Entry Level Medium Density devices

=====
Tue., Sep. 1 at 1:01 p.m.

v 1.0.25

From 1.0.24 only add command

>'bandwidth count'

or

>'bandwidth freq Hz'

=====
Aug 31 #399

NanoVNA H4 1.0.24 LSI performance test.dfu

Here variant only for stable and performance test

900k i2c bus

More fast timings

384k ADC and 8k BW

=====
Aug 31 #394

NanoVNA H4 1.0.24 LSI (2).dfu

v1.0.24

- revert show vbat voltage (and measure), i hope now problem solved

- add extend variant sweep and sweep_bin command (allow NanoVNA-App get binary data, more fast)

- some optimisation (not rebuild interpolation/frequency table if start/stop/point count some, this also allow get

more speed on one segment scan for external app)

- move Power menu to Calibration (Calibration->Power) and on reset also set Power to auto.
- also now threshold should work again
- new time input time format

=====

Mon., Aug. 31 at 3:10 p.m.

NanoVNA H4 1.0.24 LSI

Here my test variant:

- revert show vbat voltage (and measure)
- add extend variant sweep and sweep_bin command (allow NanoVNA-App get binary data, more fast)
- some optimisation (not rebuild interpolation/frequency table if start/stop/point count some, this also allow get more speed on one segment scan for external app)
- move Power menu to Calibration (Calibration->Power) and on reset also set Power to auto.

=====

Aug 30 #328

NanoVNA H4 1.0.23 disabled vbat _ 384k LSI slow SPI.dfu

This very very strange, you get CPU hard fault in sweep. It not possible, but...

And no problem on Hugen firmware?

I slowdown LCD (and revert all my test overdrive), it should help, in all other cases something wrong on SPI bus to LCD

=====

Aug 30 #324

NanoVNA H4 1.0.23 disabled vbat _ 384k LSI.dfu

Can you test this?

I add SPI ready check before send command to LCD.

Also this firmware have maximum measure speed, it allow measure 2 channel 401 point on 700ms (850 before), i test it for stable work

=====

Aug 30 #309

1.0.23 Add scan_bin and ex scan for H4 (some as for H)

NanoVNA H4 1.0.23 add scan_bin and ex scan command.dfu

Now work vs NanoVNA-App more faster (less data to send, not need additional conversion)

Also for H4 set 192k ADC (see in version screen)

Set 64 segments vs 401 points and it run stable

=====

Aug 30 #290

NanoVNA firmware v1.0.22 think now it stable

Fixes:

Measure vbat only one time in 5 second

Show Battery voltage in version screen for both H and H4 (also always average measure)

Show power settings in calibration panel (power can select in STIMULUS->POWER menu)

new Stimulus->Power menu he said he was adding its setting to the left status display.

Pa = auto

P2 = 2 mA

P4 = 4 mA

P6 = 6 mA

P8 = 8MA

Power command return current power

DMA screen draw for both (allow increase screen update)

More better start and stop touch interrupt (handle touch press)
Fix some default constants (touch calibration and vbat_offset)

Add both variants (LSI and LSE) SD card included in all (not test it on H version but should work)

!!!Need reset config after update

=====

Mon., Aug. 17 at 2:18 p.m.

Changes:

FFT made on selected points count (more fast if select less points)

Separate signal power frequency and freauency+offset. Now main frequency use max power(8mA), offset use less value (4mA for H4, and 6mA for H)

Now in info (version screen) show compiler options (max point count, IF, and ADC speed)

For H4 used LTO compiler options (allow reduce size up to 6k, result size ~81k old 88k), on H4 this mode stable, but for H no :(

This firmware allow change offset ('offset' command) and band settings ('b' command)

More info about band settings:

Here is used band table (THRESHOLD = 300MHz)

```
0 { 0 , 0, { 0}, 0, 0, 0, 0, 0, 0, 1}, //
1 {SI5351_FIXED_PLL , 10000U, { 8}, 1, 1, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 0, 0, 1}, //
2 {SI5351_FIXED_PLL , 100000000U, {32}, 1, 1, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 0, 0, 1}, //
3 {SI5351_FIXED_MULT, 130000000U, { 8}, 1, 1, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 0, 0, 1}, //
4 {SI5351_FIXED_MULT, 180000000U, { 6}, 1, 1, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 0, 0, 1}, //
5 {SI5351_FIXED_MULT, THRESHOLD, { 4}, 1, 1, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 0, 0, 1}, //
6 {SI5351_FIXED_MULT, 450000000U, { 6}, 3, 5, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 50, 50, 3*5*6}, //
7 {SI5351_FIXED_MULT, 600000000U, { 4}, 3, 5, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 50, 50, 3*5*4}, //
8 {SI5351_FIXED_MULT, 3*THRESHOLD, { 4}, 3, 5, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 50, 50, 3*5*4}, //
9 {SI5351_FIXED_MULT, 1200000000U, { 4}, 5, 7, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 75, 75, 5*7*4}, //
//10 {SI5351_FIXED_MULT, 5*THRESHOLD, { 4}, 5, 7, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_6MA, 75, 75, 5*7*4},
//11 {SI5351_FIXED_MULT, 1800000000U, { 4}, 7, 9, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_8MA, 85, 85, 7*9*4},
//12 {SI5351_FIXED_MULT, 7*THRESHOLD, { 4}, 7, 9, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_8MA, 85, 85, 7*9*4},
//13 {SI5351_FIXED_MULT, 2400000000U, { 4}, 9,11, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_8MA, 95, 95, 9*11*4},
//14 {SI5351_FIXED_MULT, 9*THRESHOLD, { 4}, 9,11, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_8MA, 95, 95, 9*11*4},
//15 {SI5351_FIXED_MULT, 11*THRESHOLD, { 4},11,12, SI5351_CLK_DRIVE_STRENGTH_8MA, SI5351_CLK_DRIVE_STRENGTH_8MA, 95, 95, 11*12*4}
```

From left to right:

uint32_t mode; - freq set mode, not need change

uint32_t freq; - freq range (range from prev mode freq to this freq)

uint8_t pow; - si5351 power freq (can be from 0 to 3)

uint8_t opow; - si5351 power freq+offset (can be from 0 to 3)

uint8_t div; - PLL divider (not need change)

uint8_t mul; - main freq harmonic

uint8_t omul; - offset freq harmonic

uint8_t l_gain; - ADC ref gain
uint8_t r_gain; - ADC measure gain
uint16_t freq_align; - frequency align

You can try change power or gain (in most cases should be some) for different band
For example need fix 600-900M band
See band number vs freq 900M (index 8 have freq = 900M, index 7 have freq 600M) so need 8
send in console

```
'b [mode|freq|div|mul|omul|pow|opow|l|r|adj] value'
```

For example:
'b 8 pow 3' for change output power to 3
'b 8 lr 60' fro set gain 60

Settings not stored, after reset set to default! If you can find better, i can add it

=====

On Thu, Aug 13, 2020 at 09:03 AM,

DiSlord wrote: Replace this file in NanoVNA Saver Hardware dir for add new BW settings for this firmware:

```
DISLORD_BW = OrderedDict((
```

```
(30, 131),
```

```
(100, 39),
```

```
(333, 11),
```

```
(1000, 3),
```

```
(2000, 1),
```

```
(4000, 0),
```

```
))
```

DiSlord, I tested v1.0.19 on three NanoVNA-H4 devices and no issues were detected. NanoVNA-Saver is working well after updating the two modules that you supplied. Both for 401pts and 4K bandwidth. OneOfEleven's Window's application also works, but of course it doesn't know about the firmware change you made for 401pts so it defaults to 201pts. Hopefully, he'll release an updated version in the wild.

=====

Wed., Aug. 12 at 1:17 p.m.

I test my old NanoVNA-H v3.2 and found it can run on 192k, but it DSP process slow, and in some cases nanoVNA can halt

I revert to 96k (but leave all other settings)

You can test it both..

=====

Wed., Aug. 12 at 12:04 a.m.

[Edited Message Follows]

On Tue, Aug 11, 2020 at 07:52 PM, hwalker wrote:

I was using a 100Hz bandwidth which affected the serial transfer. Once I reset the serial interface screen capture worked.

You can pause sweep on device and take screenshot on any BW

NanoVNA can answer on capture command after made sweep, for 401 points need ~x1.5-2 more time. (you also

get this issue on 201 points and 30bw)

Also NanoVNA saver need grab all data and send it to garbage form NanoVNA for cleanup last possible not grabbed request.

In this situation NanoVNA Saver ask screenshot, not wait need time, and closeup. NanoVNA finish sweep and send screenshot, fill internal buffer and wait CPU grab this data (and not response on additional request), if cleanup this buffer NanoVNA continue work. You can check it: run capture command on BW 30, get NanoVNA saver hang. Run putty connect to NanoVNA - and it get all captured data (cleanup buffer). Close putty. Run NanoVNA Saver. All continue work.

Possible solution - increase wait answer time in NanoVNA Saver/break sweep on external req (i think add this for some commands).

Can you check correct work Transform option? now used 512 FFT (old 256 not allow correct process more then 256 points)

PS if send non calibrated data NanoVNA allow process any points count (limit only time). I can add additional command for this. This allow increase speed vs CPU exchange.

=====

Tue., Aug. 11 at 2:36 p.m.

Add 512 FFT, now 401 points TRANSFORM work

=====

Tue., Aug. 11 at 1:23 p.m.

For external program test:

Add 401 points for NanoVNA saver, replace NanoVNA_H4.py in hardware

=====

Tue., Aug. 11 at 1:05 p.m.

Add 401 points, just test how good H4 allow process it and draw

Some limits:

FFT not work on > 256 points (need change it to 512 mode)

Only 3 save slots (can expand to 5 flash size allow it at this moment, but need reduce usage by remove isol mode, move it to config and build on self test for all modes)

Add increased marker move speed from time (for more better step on 401 points)

Question, need leave this mode?

Need try reduce resource usage for device (less size for slot)?

How good UI response

=====

June 21

Add modified FatFS library vR0.14 for future SD card support

=====

June 20

Add compact RTC library (only 500 bytes for all, default RTC lib req~ 2kB)

For enable use external (LSE) clock generator need un-comment in Makefile

#UDEFS+= -DVNA_USE_LSE

By default use internal (LSI) clock generator, but it stop then VNA power off

For enable use external (LSE) clock generator, need install 32.768kHz clock quartz on PC14 and PC15 pins, it allow

clock run while power off

For enable use RTC in code uncomment in nanovna.h

```
#define __USE_RTC__
```

This enable command 'time'

usage: time [y|m|d|h|min|sec] 0-99

Example set 2020 year run 'time y 20'

Add show current time in version screen

Better use font size constants for all screen size

Add hard fault handler for STM32 CPU (disabled by default)

=====
Sun., Jun. 7 at 12:53 p.m.

H-version only - Now all work correctly

NanoVNA-H 0.9.3.3 beta SD Card

Screenshots, and s1p or s2p correctly stored on SD card

A lot of thanks Gyula Molnar for help test and fix bugs from this firmware

PS this version also contain all my last fixes as on H4

SD Card slot on old PCB can see in this post, if solder it and install this firmware now possible store screenshots and S1P or S2P files on it.

Some limits. Only FAT12/FAT16/FAT32 support (exFAT not supported). RTC clock not run while power off (hardware limits, need install external quartz and add software support). Only short filenames.

Most limits comes from small flash size in H version CPU.

=====
Jun 1 #13959

RTC (Real Time Clock) module on stm32 processor can run from:

LSI generator (old NanoVNA settings). LSI run while processor power on, then power off by switch and only vbat power on, LSI generator suspend and RTC not tick, time value stay while power on vbat pin exist. Its a hardware limits of stm32

Then power on, Time continue tick from stopped value.

If use LSE generator, then need install 32.768 kHz quartz on PC14 and PC15 pin, and enable use it for RTC by software. LSE generator continue work then power off by switch, while power on vbat exist (also LSE frequency more stable). So time value always correct.

RTC clock use by filesystem for set correct file create time, and set name (for better navigation on card, need only sort by name or creation time)

So if installed quartz, better use LSE variant (but possible and LSI), if not installed - use LSI variant (LSE possible not launch, ChibiOS on init wait LSE ready).

=====
May 30 #13941

It this time, i not want add autodetect external clock quartz (i want use it by default, but in ChibiOS if enable it, possible not start)

Made 2 version

LSI version - for not installed 32.768 kHz quartz (Time not tick while power off) RTC used for detect last file save and names

LSE version if you install 32.768 kHz quartz on PC14 and PC15 pin (Time tick while power off)

Also again fix screenshot bmp header (now chrome correct show uploaded screenshots)

=====

May 30 #13938

Fix (NanoVNA H4 v0.9.3.1 beta - SD Card) :

Slow down read on SPI bus (fix screenshots artefacts)

=====

May 30 #13937

Next update for SD Card support (NanoVNA H4 v0.9.3 beta - SD Card):

Fixes:

Wrong bmp file header for screenshots, (windows show not correct colors)

By default Windows use 16bpp color in ARGB1555 format for show, NanoVNA use RGB565. Need write extend header to file, i fix it and now header correct

>and colors fine. See screenshots old.bmp and Last.bmp

Increase SD card read/write speed (cleanup and optimize SPI bus for SD Card):

read speed on good card increased from 200kB/s to 1.1MB/s

write speed on good card increased from 100-200kB/s to 330-430kB/s

Add show current time and vbat on Version screen

Now for RTC used external 32.768 kHz quartz

You should install external 32.768 kHz quartz (possible use P3 connector for install, see RTC_clock_osc.jpg)
PC14

PC15

!!!! Disable use internal osc, if not install external quartz, RTC not work, and all files have some name

!!!! Auto detect installed external quartz not implemented yet

Implement save s1p and s2p trace data to SD Card

Now possible save trace data and open it on NanoVNA Saver after (use Files...->Load as sweep in program)

See examples on screenshots and data files

Code cleanup and e.t.c.

=====

May 25 #13847

On Mon, May 25, 2020 at 12:56 PM, Larry Rothman wrote:

Since the F303 was a drop-in upgrade from the F072, all the pinouts remained the same.

I have attached portions of the H and H4 schematics - the SD card interface from the uP is the same for both boards.

...Larry

Then possible try build H version vs SD Card support, possibly in future i do it

At this moment i get one problem RTC clock on STM32. Then use internal oscillator not run then power off, and not possible fix it, so timer settings not valid after power on

For fix this need use external oscillator for RTC on MCU pin

Pin 3 - PC14 - OSC32_IN

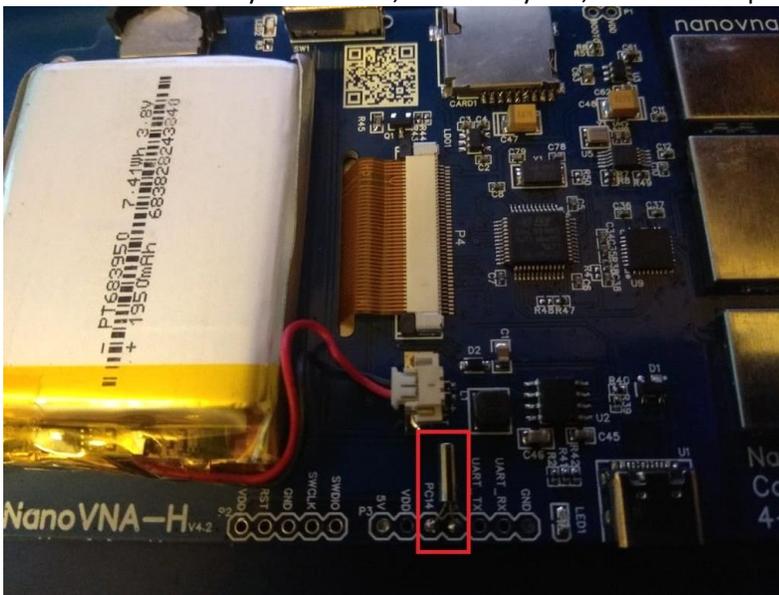
Pin 4 - PC15 - OSC32_OUT

Easy way to install it use P3 connector and olc clock 32768 oscillator

For additional need enable use LSE by software.

But need detect installed external osc, and if it not present enable internal mode (but in this mode clock not show correct time).

At this moment i only enable LSE, it correctly run, not reset on power off (only if remove battery)



=====
May 25 #13832

Add support ExFAT filesystem and check work on my SD card

Samsung EVO Plus 128Gb HD XL

All worked, support ExFat need additional 4kB flash and can't be supported on NanoVNA-H (if add card slot in it)
But on H4 stii more flash space (only ~89kB + 64kB for calibration save used from 256kB)

On Samsung EVO Plus 128Gb HD XL read speed ~300kB/sec write ~190kB/s

=====
May 24 #13815

Try this variant of firmware vs you card
Now for card init used low speed SPI bus (~280kHz)

If not work, need try check Card slot pins, and card should be inserted as on photo
Used pins:

- 2 - SD_CS
- 3 - SPI_MOSI
- 4 - VDD
- 5 - SPI_SCLK
- 6 - GND
- 7 - SPI_MISO

And send logs

All read/write after init go on max speed (36MHz), possibly it to big, datasheet say max speed = 25MHz



=====
Mon., May 11 at 7:14 a.m.

Try understand why in range 250-300MHz and 1300-1500MHz exist not correct CH1 measure
Also continue work under get better result on CH1

Now at -110dB on 1-100MHz less noise (see screenshot), also less noise on all measure.

You can see arc at measurement - this linear interpolation error on low level data (real and imaginary part linear interpolated, and get error)

Also then you made ISOLN calibration need add 50 Ohm terminals on both CH

As you can see noise level depend from load on CH1 and CH2. And not possible made correct software compensation for measure signals near this noise level.

So if you measure attenuator connect it to CH1 (and 50 Ohm terminator on CH0) and made ISOLN calibration for get correct noise level, this not solve measure error, but allow get better result.

Also now possible made calibration and not reset old calibration data, just disable correction (not made reset) and made another calibration.

Open - Short calibration depend from self, need recalibrate it together.

Load calibration possible made alone

Isoln, Thru also depend from self, need recalibrate it together.

=====

Tue., May 5 at 12:57 p.m.

Made many test for get less noise

Change:

IF to 12kHz

Disable AIC3204 internal PLL clock, use direct MCLK as CODEC_CLKIN from si5351

More faster calibrate (measure only calibrated CH) allow reduce default bandwidth on calibrate to 30Hz

Gain selected to get the lowest noise level for AIC3204 in some harmonic range

At result measure CH1 allow get approximate measuring range:

~ -80dB on less 10kHz

~ -85dB to -100dB on 10-100kHz

~ -110dB on 100kHz - 75Mhz

~ -100dB on 75 - 100Mhz

~ -95dB on 100 - 300MHz

~ -75dB on 300 - 900MHz

~ -70dB on 900 - 1500MHz

Measure on next ranges give errors but usable

~ -45dB on 1500 - 1800MHz

~ -40dB on 1800 - 2100MHz

~ -40dB on 2100 - 2700MHz

Now if set outmask in scan command, measure only selected by outmask data (and output it)

Speedup internal flash read, this allow speedup code execution on 20% (for example render Smith chart reduce from 2300 to 1800 systick)

Sorry, but need made recalibrate old settings.

=====

Thu., Apr. 30 at 1:24 p.m.

Upload compiled GitHub version and name it as 0.8.4.5

Found bug (AIC datasheet very poor) on CH1 (search why H version work better on 0.8.4.3 on CH1 measure) update GitHub code

For better CH1 measure good set 10Hz bandwidth and made full calibration.

My H4 allow measure on ~ -35dB in 2.4-2.7GHz range

About Brightness, i remember about this option, but Ken, AA6LK:

>One of the new feature of the H4 is the LCD brightness adjustment. However, the current numeric pad entry method is not intuitive, so I have been thinking of changing it to sliding bar display and use jog switch left and right to change brightness between 25% (DAC=800) and 100% (DAC=3300). So I think I'd better add my change based on yours.

I upload code and think soon this feature will be added

=====

Wed., Apr. 29 at 12:26 p.m.

Upload H4 source code based on H version to git

<https://github.com/DiSlord/NanoVNA/tree/H4>

I think it final variant for last changes and fixes (last compiled variant i soon upload):

At result (difference from eddy 0.7.1-20200321):

- Add H4 support
- Add bandwidth option
- Add variable sweep points (up to 201 for H4)
- Add large font for H4
- Reduce size of save calibration properties (allow add additional 2 save slot for free in H4)
- Add DSP instruction support in H4 for DSP faster and better process
- Better menu response (not reset sweep on menu process)
- Better button debounce
- On calibration use minimum 100Hz bandwidth (can be greater if user select bigger value in Bandwidth option)
- Fix calibration point interpolation
- Add 96kHz ADC support (allow more fast sweep)
- Add additional bands for more stable si5351 generation
- Add band for 800Hz-10kHz generation
- Allow more fast trace measure if select only CH0 or CH1 trace data (only for stand alone use)
- Faster FFT process by use tables (use reduced table size)
- Faster i2c bus speed, optimize control for si5351 and aic3204 on this bus
- A lot of code unification for support different platform and little bug fixes
- Also i try reduce ChibiOS usage for allow get less code size

=====
Mon., Apr. 27 at 2:53 p.m.

- Long read TLV320AIC3204 datasheet (unfortunately it is poorly written)
- Revert external freq set 96kHz mode for AIC ADC (this mode have more noise), use internal multiplier as before (i found PLL set error in AIC init, and hope fix it)
- Not use fractional multiplier for AIC PLL clock (look like less noise)

Add delay for SI5351 PLL reset (more stable on band change)

Some code optimization and definition fore easy control build

PS in CH1 mode noise level drop ~3-5dB
PSS i hope now not need change threshold

=====
Sat., Apr. 25 at 4:31 p.m.

Good, ok i change 96kHz mode for AIC ADC (now increased external freq), possible it help (on my H4 it also give good result)

Also i change IF to 8kHz (in my test got less noise)
Additional not use float type variable on DSP (float type can lost data) it allow more correct measure low level signal (it only for H4, processor have hardware DSP instruction support)

Need reset old calibration settings

PS made test CH1 port use up to 80dB attenuator, get this measure result (on high freq better use high bandwidth for better result)

- 85dB on 1-300MHz
- 70dB on 300-900MHz
- 50dB On 900-1500MHz
- 40dB on 1500-2400MHz
- 30dB on 2400-2700MHz

=====

Sat., Apr. 11 at 4:59 a.m.

Prev fixes not full, found non stable PLL work on big range switch (600-1200 before)

Fix problems vs unstable PLL on si5351

Add additional band (separate 100-150 to 100-130 and 130-170MHz), now PLL change from 680 to 1200MHz (and fixed on 832Mhz)

Bands:

- 1: 800-10kHz
- 2: 10kHz - 100MHz
- 3: 100MHz-130MHz
- 4: 130MHz-170MHz
- 5: 170MHz-300MHz

Bands in harmonic mode:

- 3: 300MHz-390MHz
- 4: 390MHz-510MHz
- 5: 510MHz- to max

<https://drive.google.com/file/d/1RX8MeE4KX2i7OzJoTkGfIrn7s-YFk0d8/view?usp=sharing>

Try better check this freq ranges

PS read this 'Jog wheel switch causes problems'

https://groups.io/g/nanovna-users/topic/jog_wheel_switch_causes/71352857?p=,,20,0,0,0::recentpostdate%2Fsticky,,20,2,0,71352857

Want to know how work jog switch on my firmware? My first fixes - is better jog button debounce improvement.

=====

Thu., Apr. 9 at 1:57 p.m.

Corrected my error in the DSP for the H4 model (due to which an overflow could occur with increased power that was introduced in 0.8.4 transmissions in the < 300 MHz band) thanks Huguen for reply and help test

<https://drive.google.com/file/d/1l6dm98HA3p8wcQynleZFs5h0kfGHZC1V/view?usp=sharing>

=====

Tue., Apr. 7 at 2:13 p.m.

Finish 0.8.4

Need compare vs 0.7 versions from eddy555 or last huguen measure quality on ranges

Need update calibration after.

Changes:

- No auto power set for si5351 (power constant set to 3, you can change by command), compare noise level on < 300MHz (as i see should be better)
- Change band 2 generation settings (not drop generation in some range settings), check Range 100-150 MHz and 300-450 MHz
- Optimize AIC3204 i2c data send (more faster)
- Allow si5351 low freq generation 800Hz - 10kHz (please not do all range calibration, made 10k-XXX or 800Hz - 100kHz)

<https://drive.google.com/file/d/1t9G3MYFfgji8u8ROY60RTch3BdJKOekq/view?usp=sharing>

=====

DiSlord

Apr 4 #12276

0.8.3

After remove depends calibration CH1 from CH0, it allow separate measure CH data (i made this patch before, but can't solve this problem).

If you not select in traces CH1, NanoVNA not do CH1 measure in sweep, also for CH0, if you not select CH0, CH0 measure skipped.

It allow more speedup sweep (its fantastic how fast NanoVNA work, if select only CH0 measure need 2300 systick on 101 points and 1300 on 51 points, for compare: total speedup before all optimisation for full sweep - 8600 systick)

For Calibration and sweep commands from CPU, measure always CH0 + CH1

In can be useful for SWR only measure on CH0, or Logmag for CH1 only (in spectrum analyse mode for example or on filter calibration).

https://drive.google.com/file/d/10n2385JUc-Q07i-C_htdk-eo_Oz1st5X/view?usp=sharing

=====

Made hard work under support variable sweep points count.

Firmware v0.8.2 now support:

96kHz IF

Min 3.2kHz

Variable sweep points (For H4 version add support 201 measure and calibration points)

Command sweep now support sweep point count set:

"usage: sweep {start(Hz)} {stop(Hz)} [points]"

Fix sweep command response for freq > 2.147 Ghz (now correct output unsigned freq values)

Command scan now support any point count from 1 to (101 for H) and (201 for H4)

Syntax is (outmask support after 0.7.1):

'scan {start(Hz)} {stop(Hz)} [points] [outmask]'

[outmask] - optional, allow output measured data, its a mask (allow dec, hex, bin, oct)

0b001 - output frequency

0b010 - output CH0 data

0b100 - output CH1 data

Example:

'scan 1000000 5000000 101 0b111' - output data in format: freq ch0[0] ch0[1] ch1[0] ch1[1]

'scan 1000000 5000000 101 0b101' - output data in format: freq ch1[0] ch1[1]

'scan 1000000 5000000 101 0b110' - output data in format: ch1[0] ch1[1]

'scan 1000000 5000000 101 0x7' - output data as 0b111

Sweep points count can be change in "Config->Sweep points" menu

I not enable auto set max sweep points set on calibration (do it manually before calibration start, but you can leave less calibration points if need)

Remember NanoVNA-Saver not support 201 points and on scan apply 101 and not restore old value (after measure restore it manually if need)

Version for NanoVNA-H (allow 51 and 101 sweep points, its flash and RAM limits)

Version for NanoVNA-H4 (allow 51, 101 and 201 sweep points)

<https://drive.google.com/file/d/1WLREjM9qO2RrwclVUSZtxyRNBW6otKYN/view?usp=sharing>

And finally, i test it on H, but not on H4 (i hope recive H4 version, hugen send it to me)

=====
Yes it artefacts problem (i can reproduce this problem then set 350Mhz threshold)

As i write before some si5351 chips can't normal work on 300Mhz (by datasheet it have max limits 200Mhz)

Here is discussion about it: <https://groups.io/g/nanovna-users/message/3285>

For check si5351 you can set start freq 200Mhz stop freq 600MHz

Reset calibration

Leave CH0 port open and select trace CH0 Linear

You can see at frequency 300Mhz and 450Mhz anomaly spike (or not if all good)

Here is table for si5351:

```
> * For FREQ_HARMONICS = 300MHz - band range is:
> * +-----+
---+
> * |      Band 1      | Band 2      | Band 3      | Band 2      |      Band 3      |
> * +-----+
---+
> * |      Direct mode  x1 : x1      |      x3 : x5      | x5-x7      | x7-x9      | x9-x11      |
> * +-----+
---+
> * | 50kHz - 100MHz | 100 - 150MHz | 150 - 300MHz | 300-450MHz | 450-900MHz | 900-1500MHz | 1500-2100MHz | 2100-
2700MHz |
> * +-----+
---+
> * |      f = 50kHz-300MHz      | f=100-150      | f=150-300      | f=150-300      | f=214-300      | f=233-300
|
> * |      of = 50kHz-300MHz      | |of= 60- 90      | |of= 90-180      | |of=128-215      | |of=166-234      | |of=190-246
|
> * +-----+
---+
```

As you can see for freq near 300Mhz, 450Mhz, 900Mhz, 1500MHz and so used max possible 300Mhz freq for chip

Now try reduce maximum connect putty or other console program to NanoVNA

Reduce harmonic_freq_threshold settings for si5351

Enter command 'threshold 290000000' there 290000000 freq in Hz

Anomaly should removed

Try higher threshold settings while all work good, after found max (not use values greater then 300Mhz) store settings by use Config->Save

=====
April 2-2020

Then you ask about minimum frequency, i test my last firmware and made some improvements to si5351 generator for better work on freq < 50kHz

Now minimum possible frequency 3.2kHz (look very good if use bandwidth <= 300 Hz)

Also little improve DSP processing for both (for H4 use CortexM4 DSP instruction for faster process data)

Add both version to H and H4 firmware (include last 96kHz AIC3204 dac and 10kHz IF)

<https://drive.google.com/file/d/1RsgwZlGdF9Theb3UhSI7U4Svi72lQQEV/view?usp=sharing>

=====
April 2-2020

Here new update:

Change AIC3204 dac from 48kHz to 96kHz (it allow more fast measure)

Use 10kHz IF freq (5kHz before)

Add 2kHz bandwidth option
Move bandwidth setting to config (now allow save setting config->save)

As result:

2kHz bandwidth sweep speed increased on 2x (yes little noise exist)
1kHz bandwidth sweep speed increased on 1.5x (noise level not change)

Better see sweep speed non use Smith or Polar grid.

Add both version to H (tested, but can't measure real bandwidth and noise level, only on my work) and H4
https://drive.google.com/file/d/13JH_gXCm0Tf5flaUM-XZKnu7zb4O5oRm/view?usp=sharing

=====

Apr 1, 2020

Small update for NanoVNA-H4

<https://drive.google.com/file/d/1jeMHJhU9Ry6Vje8GYYcss6LJzld0QnF/view?usp=sharing>

Font fixes (try made more readable, fix some font glyph)

Little slowdown i2c bus (as i calculated in last version i set 800kHz speed, it too fast, set it to 600kHz)

Little display text error fixes

I hope updated font look better

=====

Mar. 31, 2020 at 3:23 p.m.

Re: [nanovna-users] edy555 release 0.7.1-20200321 #firmware

Yahoo/Inbox

DiSlord <dislordlive@gmail.com>

To:nanovna-users@groups.io

bandwidth N

N - is number from 0 to 255 (not recommend use values bigger then 99, possibly counter overflow)

N+1 number of samples count passed in dsp

One sample process give 1kHz bandwidth

Two samples give 500Hz

100 samples give 10Hz

$BW = 1000 / (N+1) \text{ Hz}$

For additional understanding of how it works:

You can use generator, set freq for example 20MHz, set AM modulation 60% and freq 1kHz

Output for example 100mV

Connect to NanoVNA CH1

Set on NanoVNA center freq 20MHz, and span 5kHz, and CH1 Logmag

Now you can see AM signal spectrum on you NanoVNA

You can change bandwidth setting and see changes (its like VBW option on any spectrum analyser), less BW freq allow recive less noise and better measure signal data, but need made more measures

=====

Additionally, for the information of other group members, sending the bandwidth command without any qualifier returns the current bandwidth, i.e.:

sending:

bandwidth

returns

bandwidth 0 (1000Hz)

From the DISPLAY-BANDWIDTH menu only 5 bandwidths are selectable:

1 kHz, 300 Hz, 100 Hz, 30 Hz, 10 Hz

- Herb

=====

Mar 30, 2020 at 6:15 PM

Subject: Re: [nanovna-users] edy555 release 0.7.1-20200321 #firmware

Sorry, then i port code for H4 i fogot copy dsp.c file

As result Bandwidth option not work :((It measure many time, but use only last data)

Now all correct, also i speedup SPI bus, display update should be very fast

https://drive.google.com/file/d/1SgWTL1B2NbydMbNIIDZKIZw_Ylq_BbiU/view?usp=sharing

=====

On Mon, Mar 30, 2020 at 11:49 AM, DiSlord wrote:

>

> I try 12kHz offset (in my last commits i add dynamic update dsp sin/cos table

> on offset change, work only on 1kHz step) i don't see differences, but possible

> i mistake

>

> Also i try speedup audio codec from 48kHz to 60kHz, it allow speedup sweep and

> not lost bandwidth

>

Its option Bandwidth, you can use generator and send AM modulated signal to CH1 port and see signal spectrum. Use Bandwidth and see better and better bandwidth filter of signal

See <https://github.com/ttrftech/NanoVNA/pull/7>

=====

