

OSL-SMA-Cal-Kit from surplus components

Matthias DD1US June 7th2020

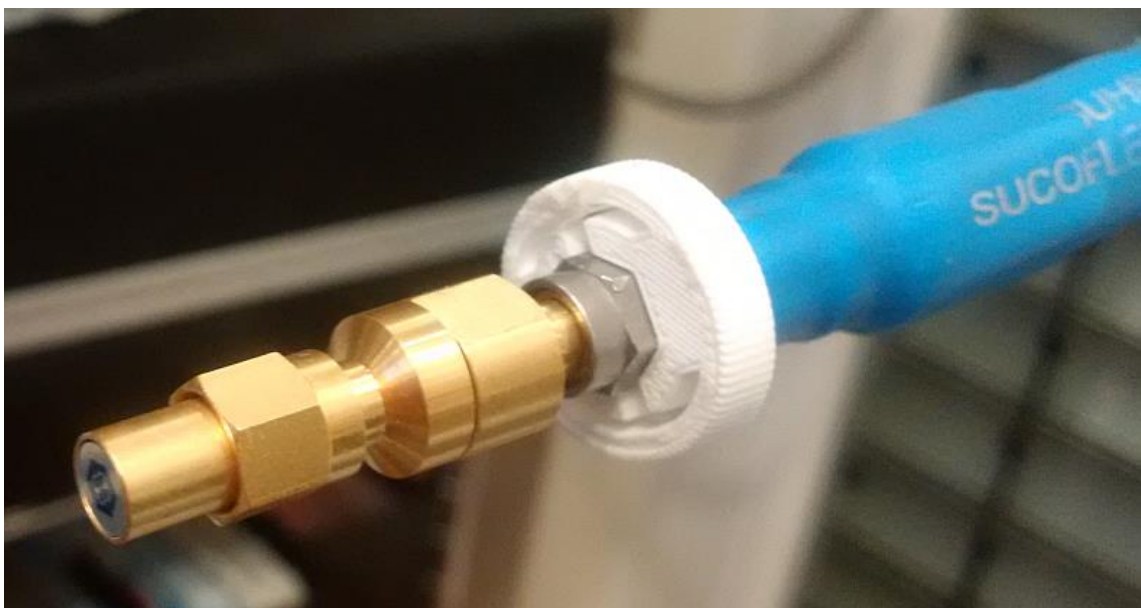
Recently I bought a Nano-VNA V2 vector network analyser and the need for a suitable calkit arose. I decided to check my available devices in my junk box.

I found a 50 Ohm load from Huber&Suhner, a short from an unknown source and for the open I cut off a SMA-plug soldered onto a semi-rigid cable right after the plug. Here is a picture of my devices:

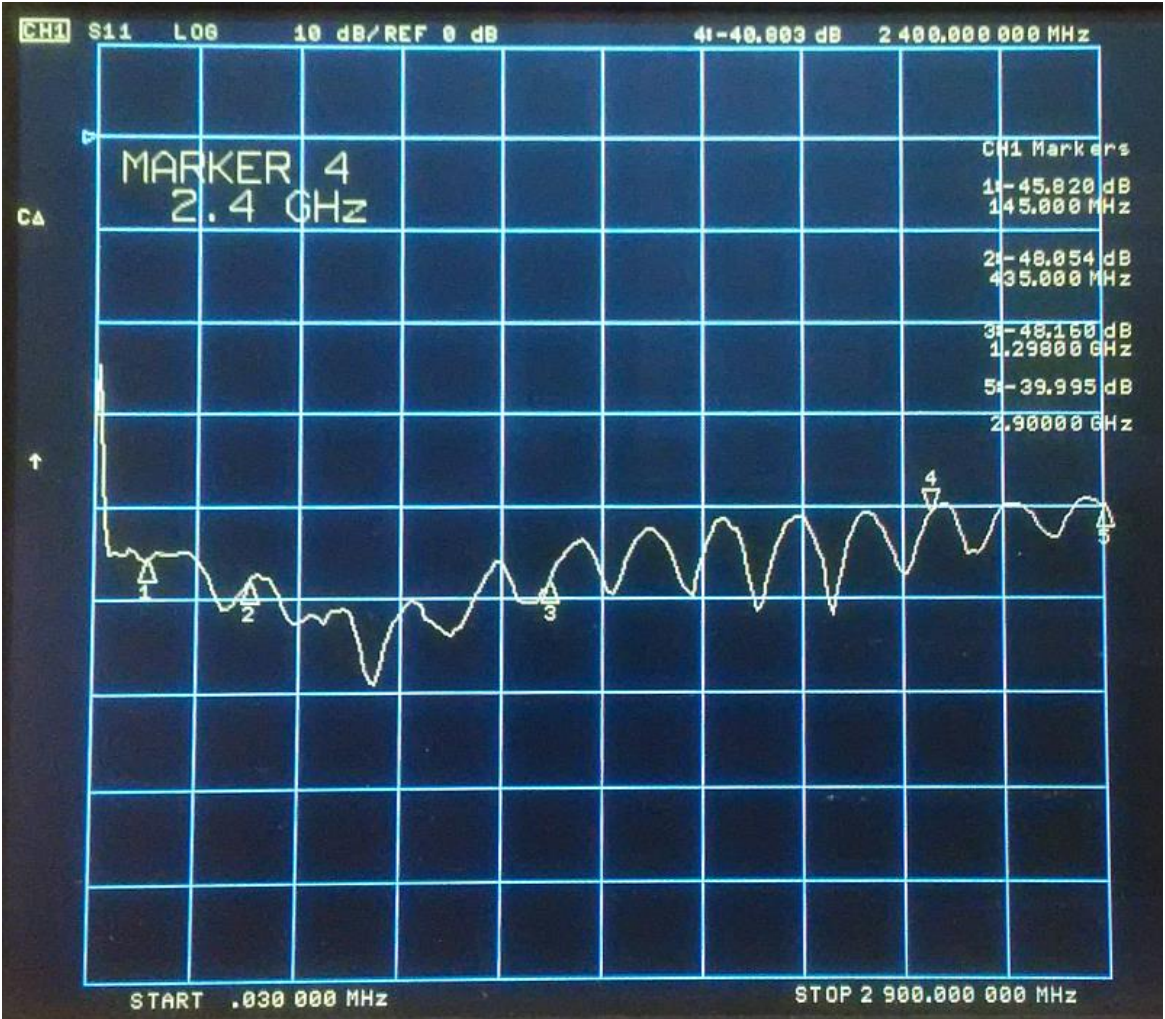


I characterized all 3 units a professional VNA from HP. I calibrated my setup using a high-performance cable with a SMA-f to SMA-f adapter.

Here is a picture of the 50 Ohm load connected to the measurement setup:



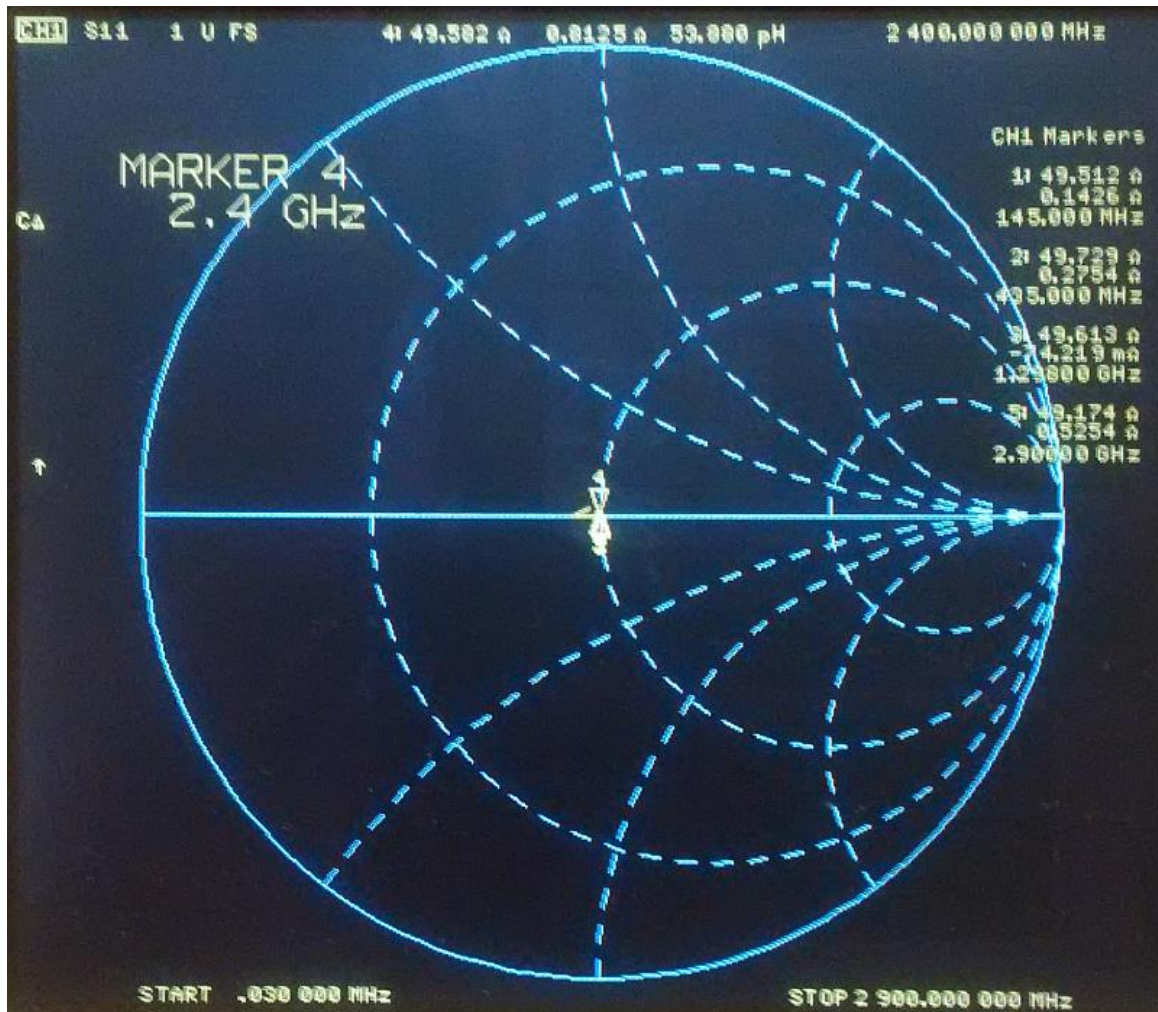
Here is S11 of the 50 Ohm load measured in the frequency range 30kHz to 2.9 GHz:



The return loss is 46dB at 145 MHz, 48dB at 435 MHz, 48dB at 1298 MHz, 41dB at 2400 MHz and 40dB at 2900 Mhz.

Based on the measurement results it should serve well as a calibration 50 Ohm load in my setup.

In the next picture you can see S11 of the 50 Ohm load in the Smith chart:

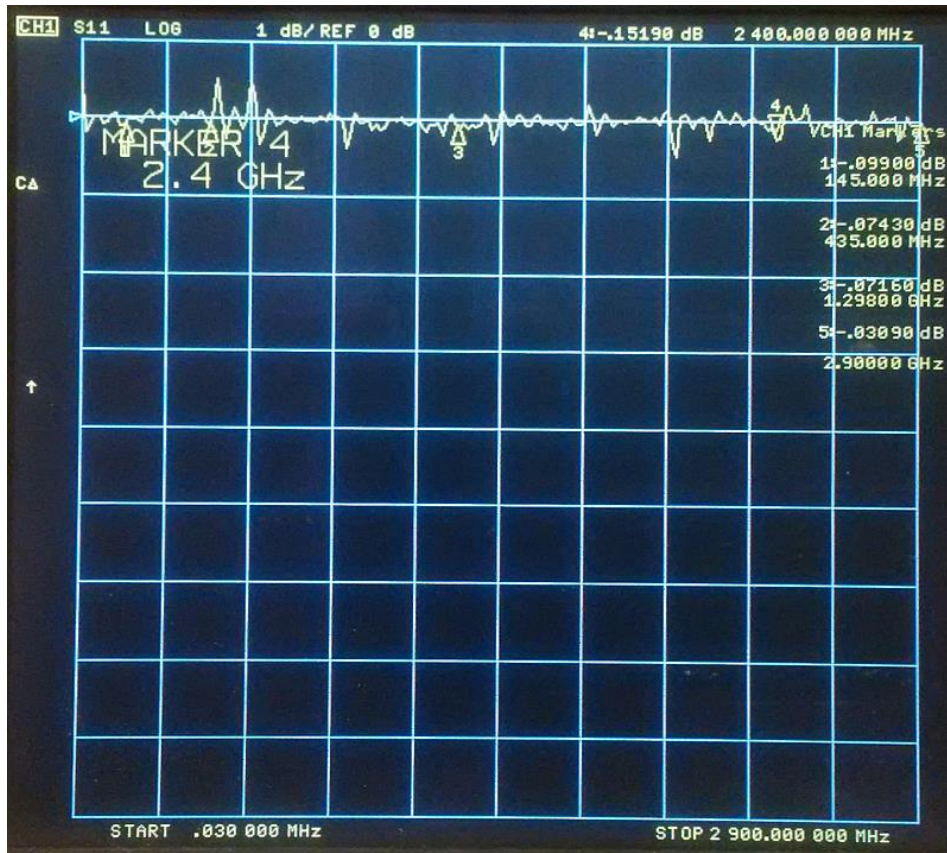


Corresponding to the S11 log mag measurement also the S11 Smith Chart shows an almost perfect match up to 2.9 GHz.

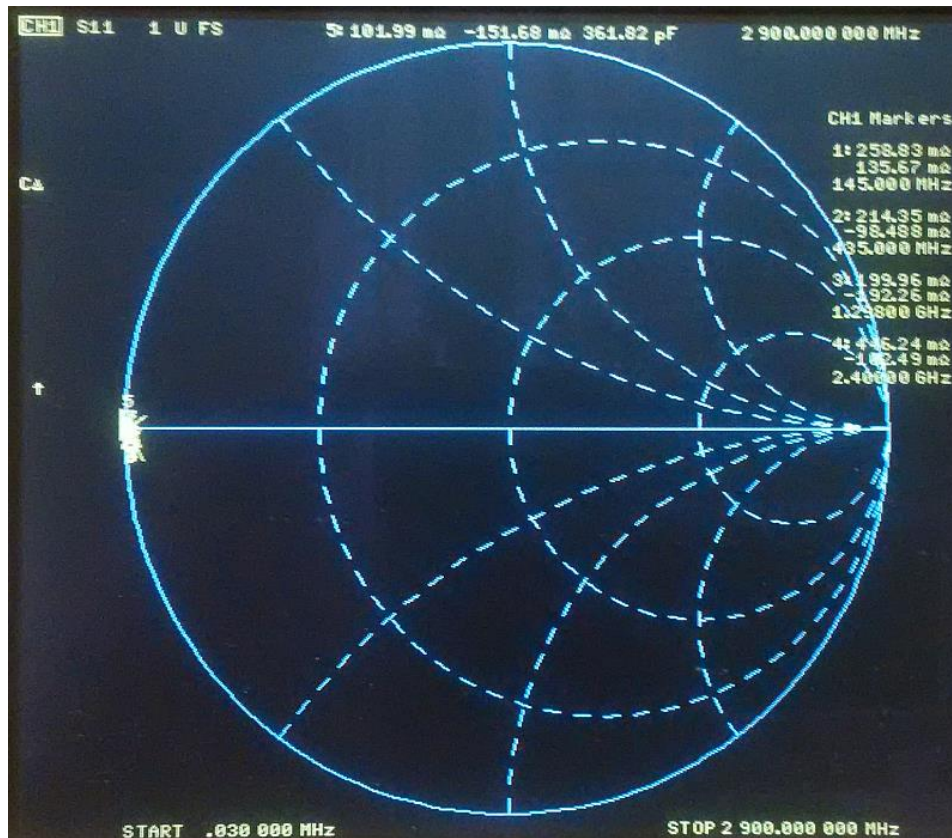
Next I measured S11 of the short-device. Here is a picture of the short-device connected to the measurement setup:



In the next picture you see S11 of the short-device load measured in the frequency range 30kHz to 2.9 GHz. Please note that the vertical scale is 1dB/div.

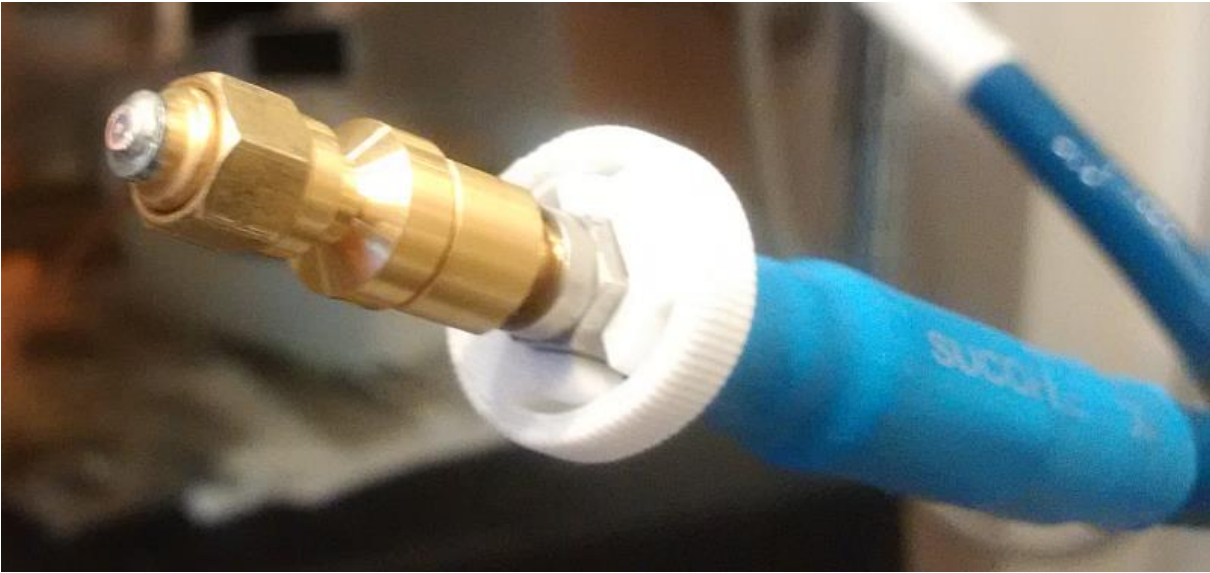


In the next picture you can see S11 in the Smith chart:



S11 in the Smith chart shows an almost perfect “short” up to 2.9 GHz.

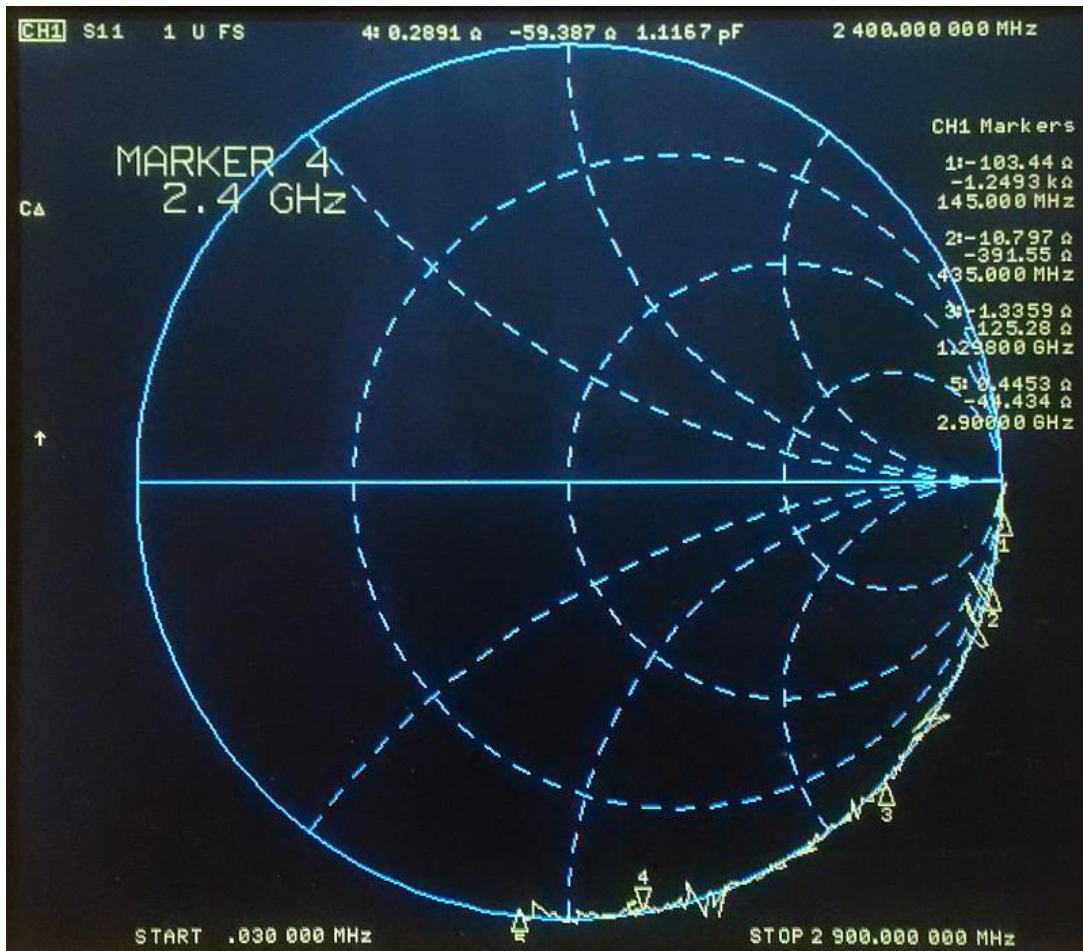
Finally, I measured the input impedance of the open-device. I had cut off a SMA-plug soldered onto a semi-rigid cable right after the plug. Here is a picture of the open-device connected to the measurement setup:



Here is S11 of the open-device measured in the frequency range 30kHz to 2.9 GHz:



In the next picture you can see S11 in the Smith chart:

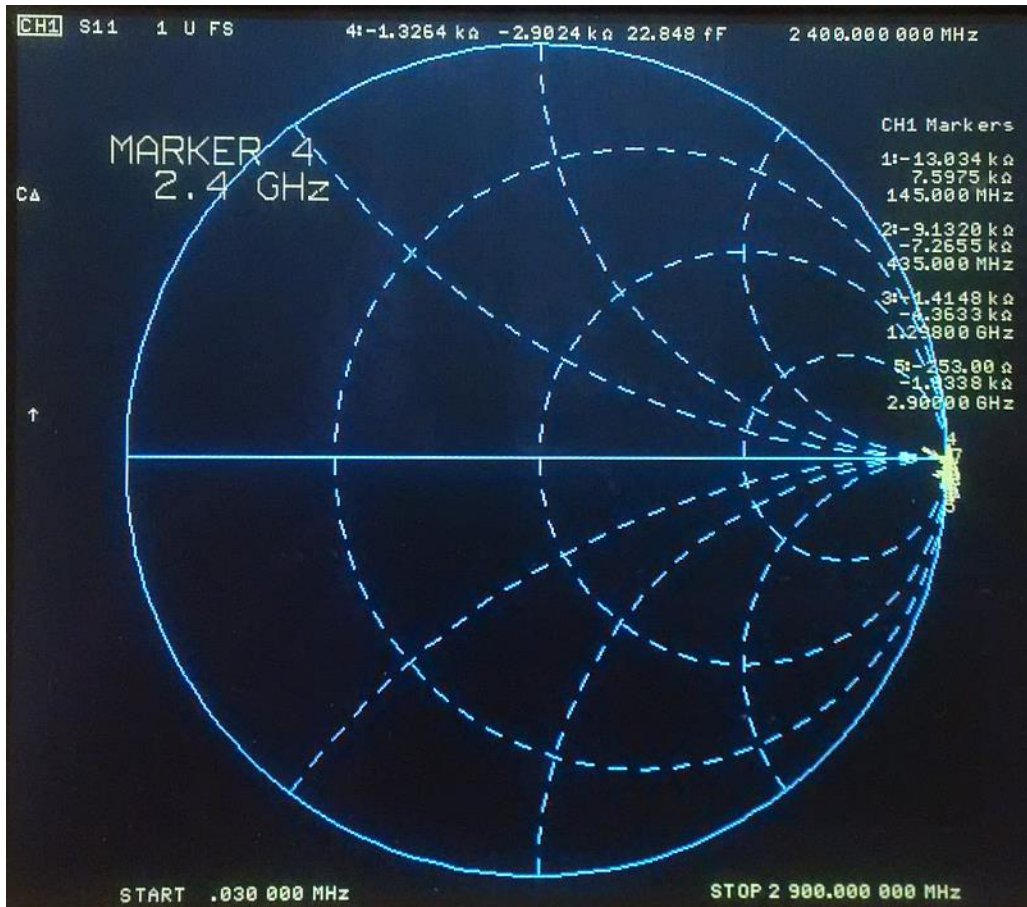
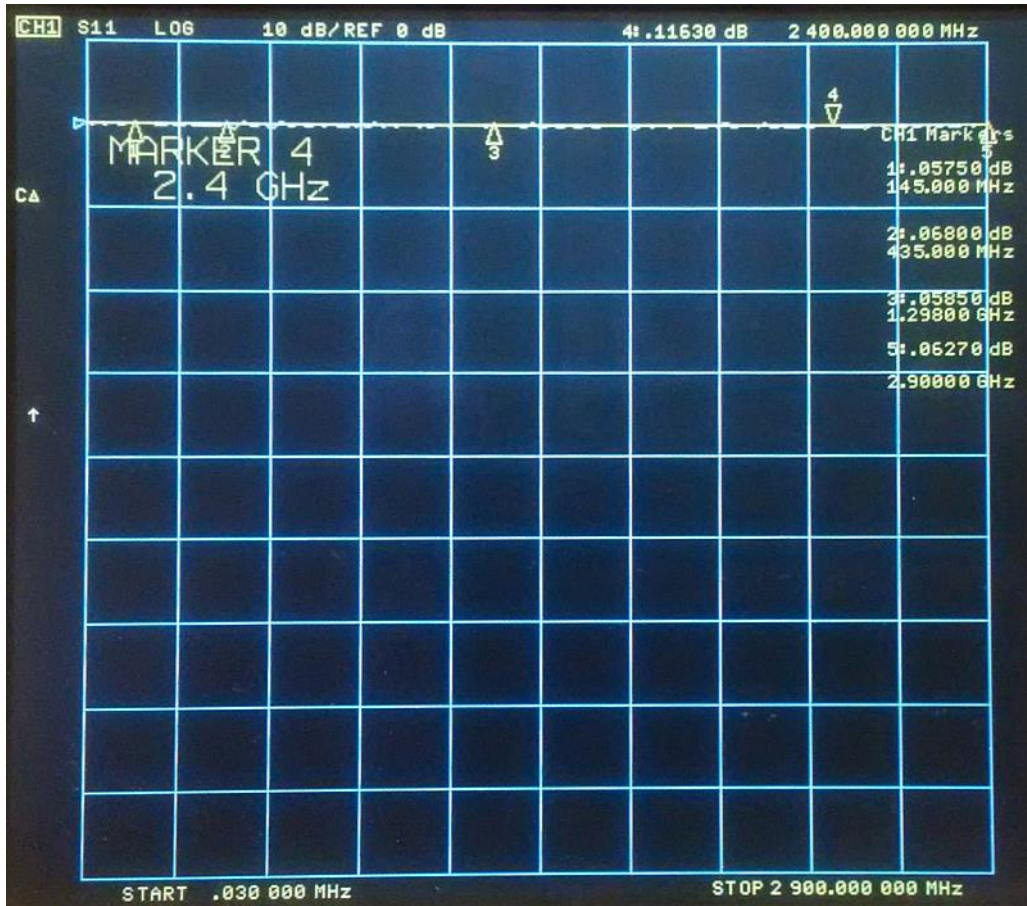


This “open” device does not really work well.

Therefore, I decided to check the open SMA jack with nothing connected to it. Actually, it is an APC 3.5 jack. Here is a picture.



In the next 2 screenshots you see the measurement results:



This “open” looks very good. It is almost a spot on the very right of the horizontal axis of the Smith Chart up to 2.9 GHz. Thus, I will use this second option for the open standard in the future. However, I plan to shield the open for proper calibration. Therefore, I have prepared a SMA jacket by soldering a metal plate to the back opening. Here are some pictures:



I will verify in the next days that there is no negative effect by screwing the prepared SMA jacket on the SMA jack.

In the future I plan to prepare also a SMA Calkit with SMA-plugs instead of SMA-jacks.

I appreciate feedback from other on those measurements and how to interpret them.

Also, if you have questions or any comments please send them to the Email address given below.

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