Verification of KC901V VNA using Verification Attenuator Model 85033 (S/N 0470) from Kirkby Microwave Ltd for S21 measurement (Revision 3)

For S11 and S22 measurement, please refer to Revision 2 Report. This report (Revision 3) is to amend the report on S12 and S21 measurement previously made in Revision 2. The excessive ripple of S12 and S21 measurement was partly due to poor quality 50 ohm coaxial cable used during the testing.

In Revision 2, the cable used was an unknown brand RG174 coaxial cable and has the following characteristic when tested with KC901V VNA (after calibration with Kirkby's Calibration Kit), which clearly shows not a good 50 ohm cable.

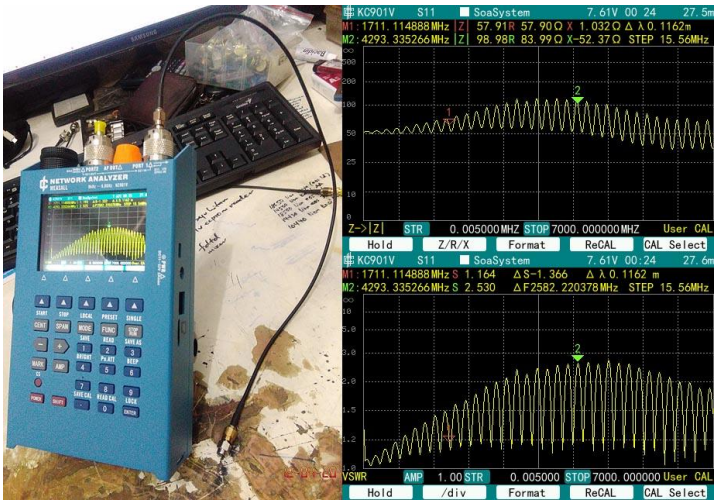

Figure 1.

The S21 measurement is repeated in Revision 3 with better quality RG402 semi rigid cable with the following characteristic.

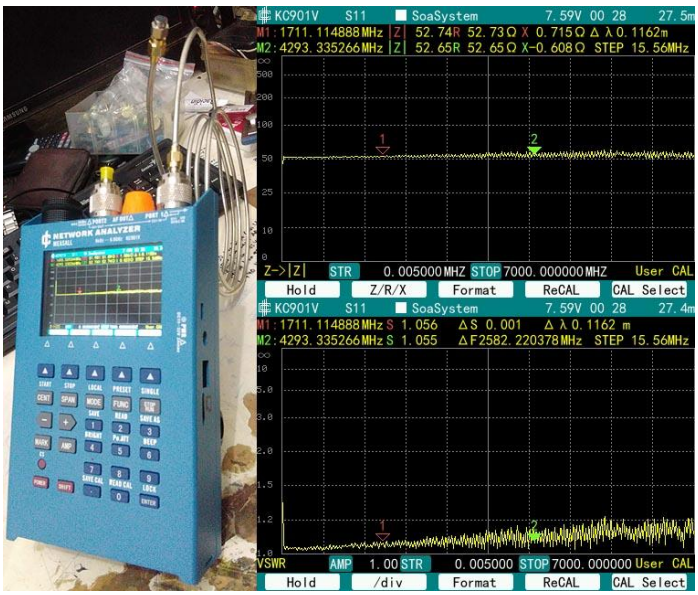

Figure 2.

S12 measurement will not be repeated but is assumed to give similar improvement as S21 measurement conducted here.

S21 Measurement

The provided attenuator's S21 profile (attenuator-0470-S21.pdf) from Kirkby Microwave Ltd is as follows:

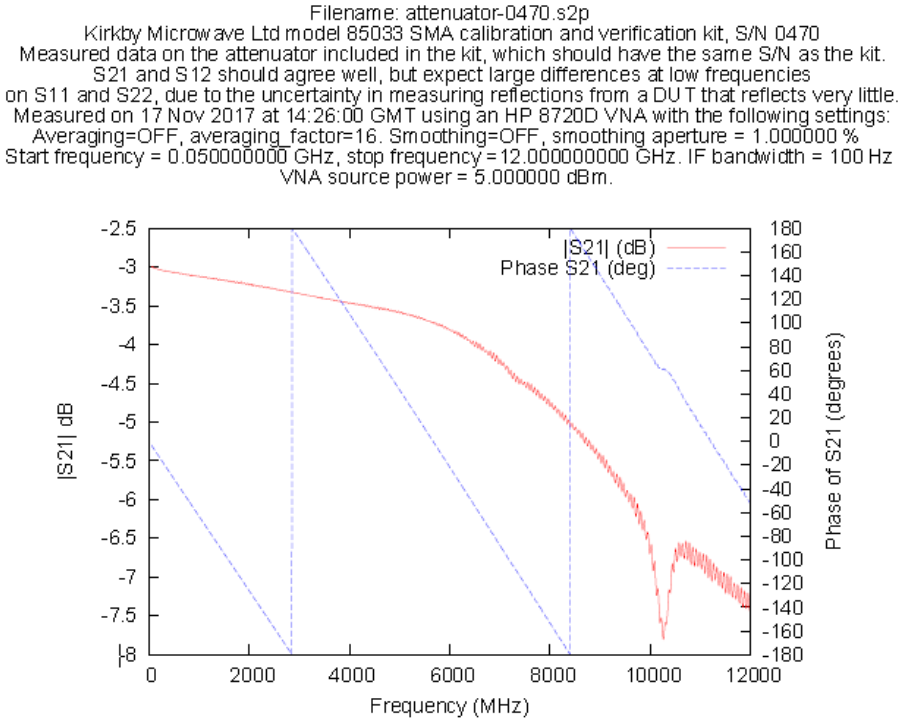

Figure 3.

The following is the S21 plot, magnitude and phase as previously measured by the KC901V VNA in Revision 2 using poor quality RG174 cable (included here for better comparison with Revision 3)

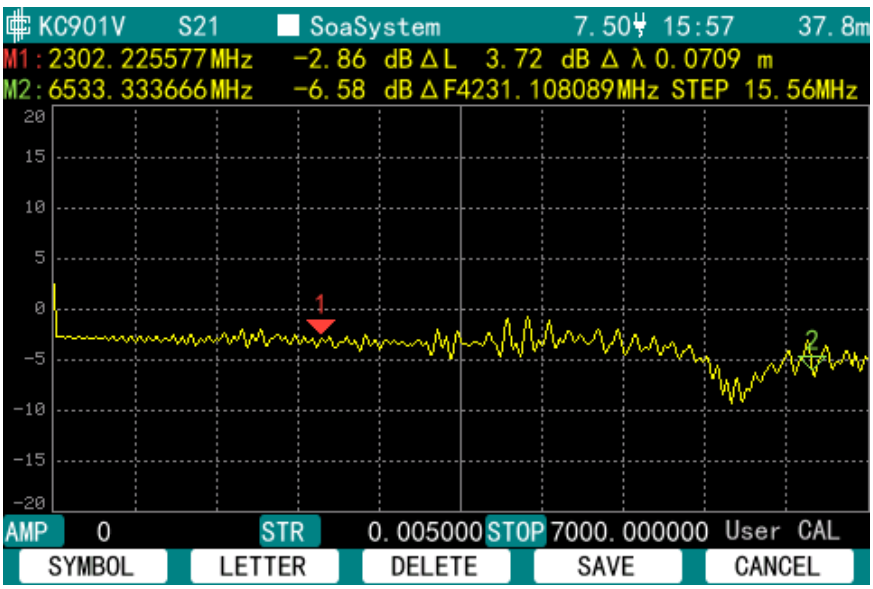

Figure 4.

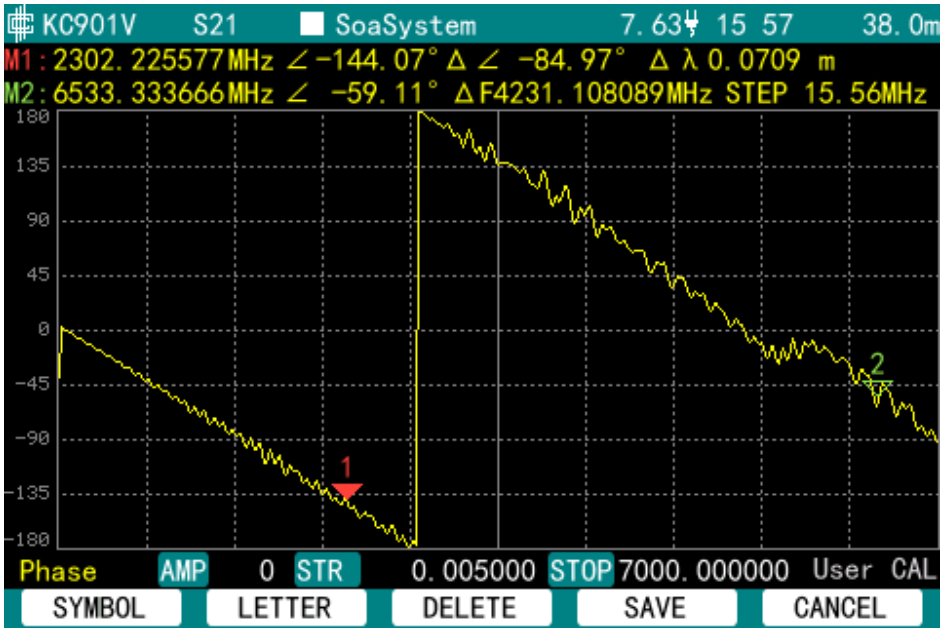

Figure 5.

The following is the S21 plot, magnitude and phase as measured by the KC901V VNA in Revision 3 using better characteristic RG402 semi rigid cable, we can see substantial improvement in the measurement with noticeable lesser ripple (previously termed as noise).

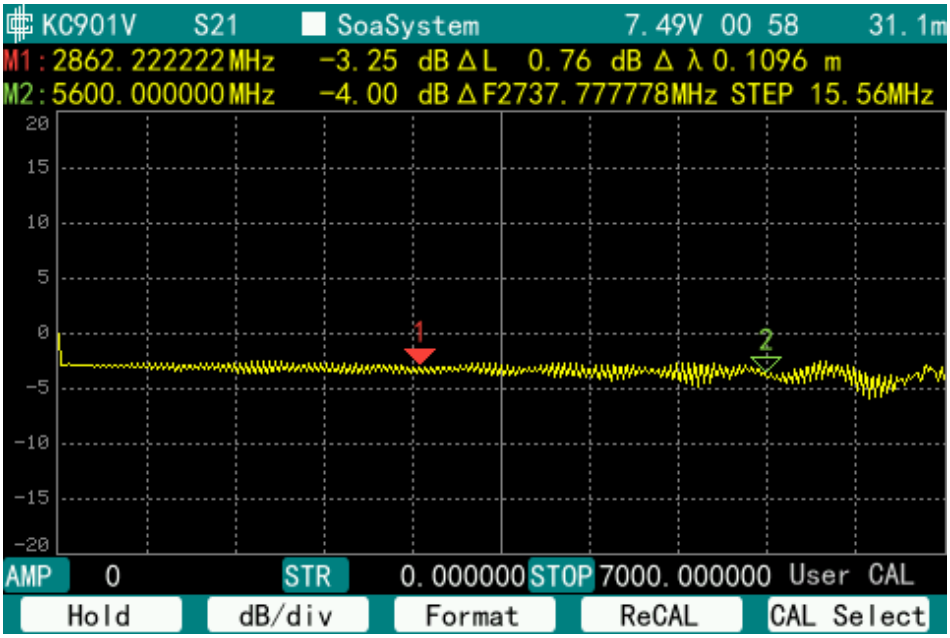

Figure 6a.

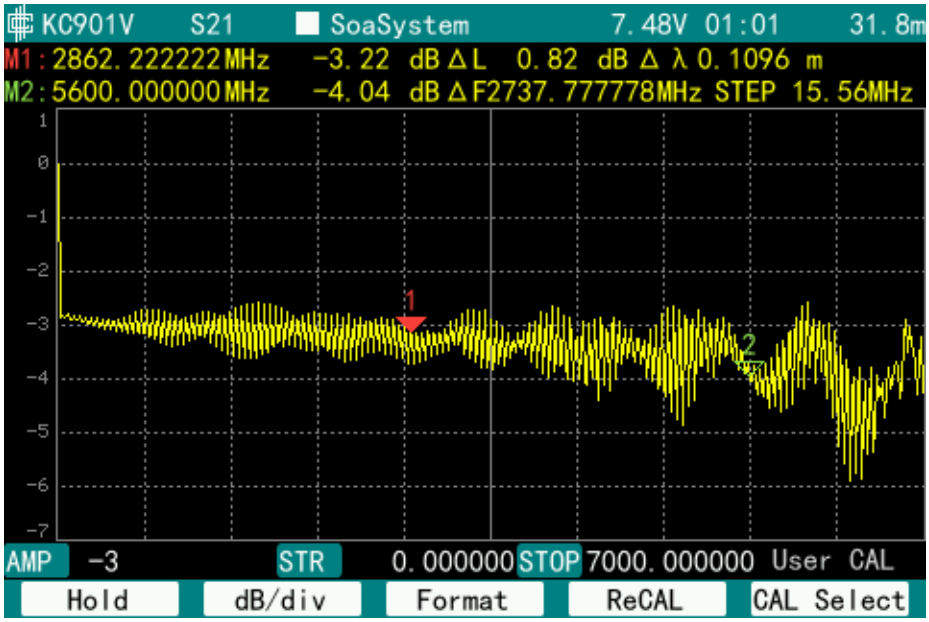

Figure 6b. (smaller dB/div)

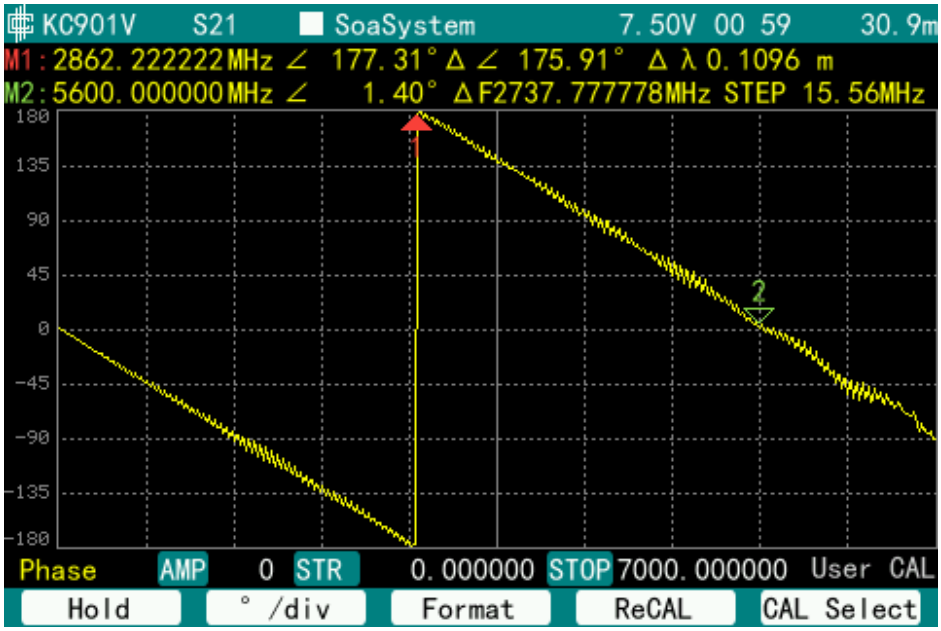

Figure 7.

Conclusion

As stated in Revision 2, KC901V's measurements is acceptable on S11 and S22 measurements. With better quality cable, S12 and S21 can also be made acceptable, given the price point of KC901V that is targeted at hobbyist level. This latest test indicates that KC901V cannot fully eliminate the error terms in the measurement (systematic error), ie cabling used for testing, but using better quality cable, ie lesser systematic error, will result in improvement in the measurement result.

Prepared by,
SoaSystem Engineering
on 180413