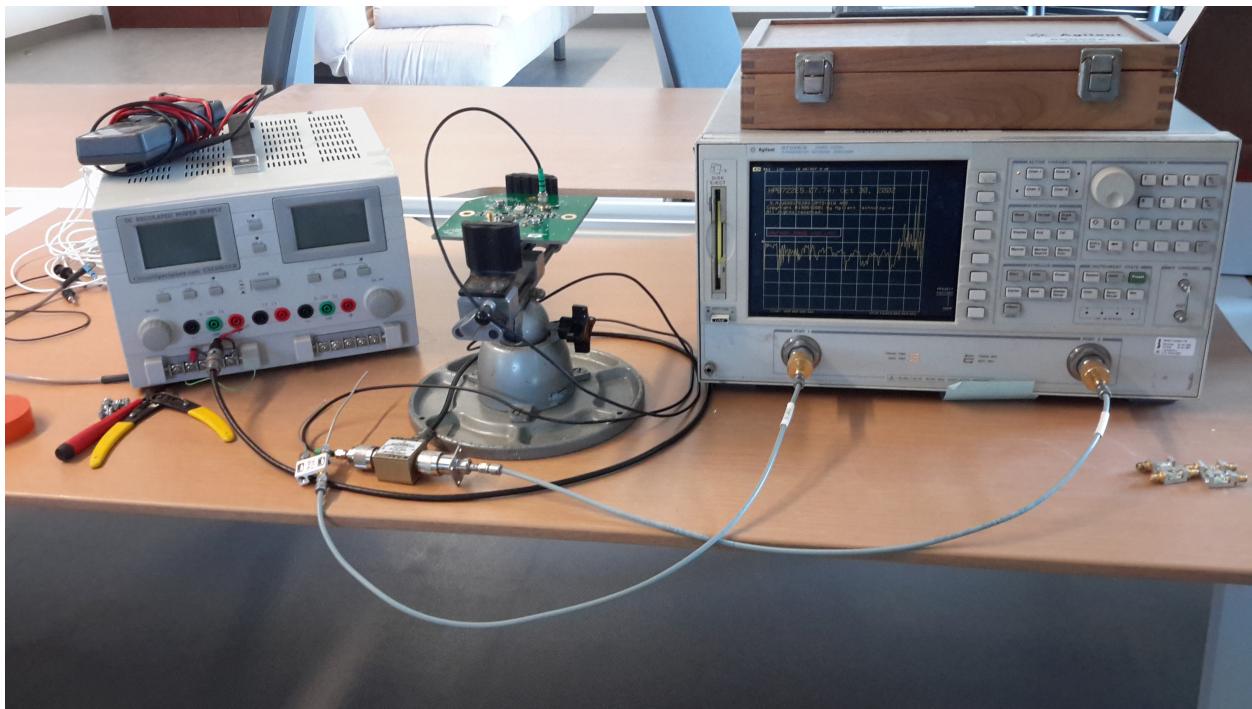


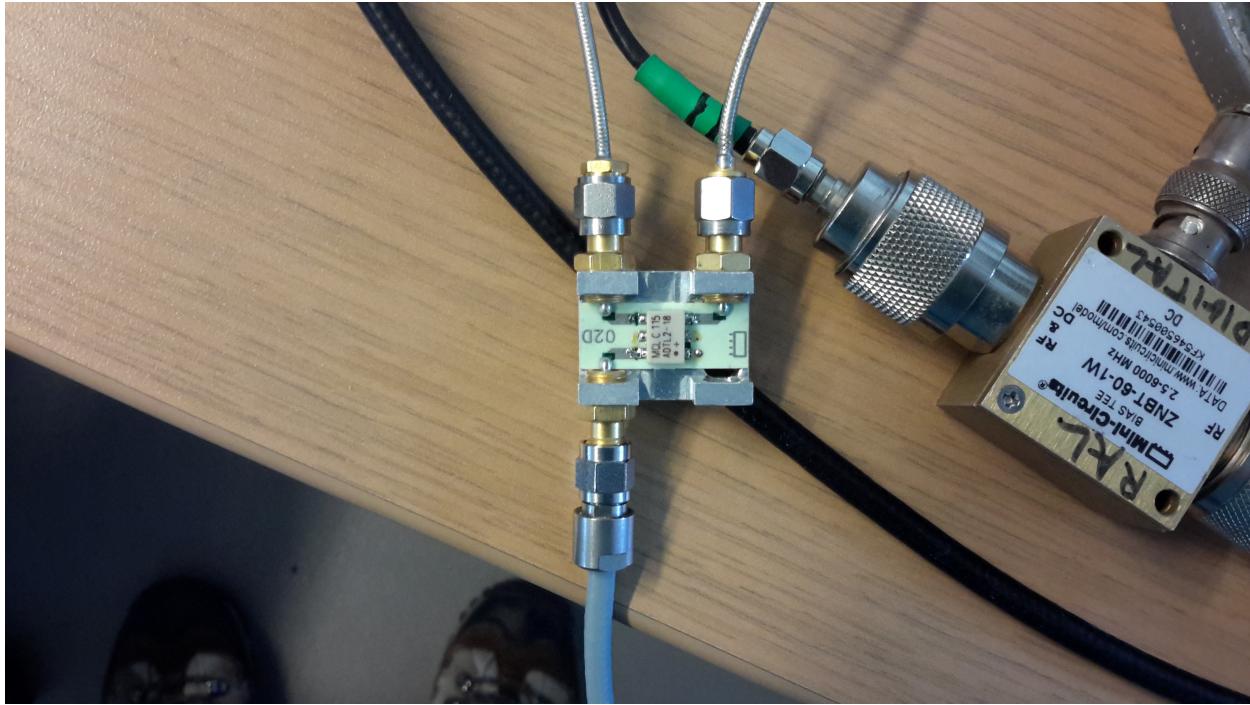
LWA FEE Circuit setup used to measure gain



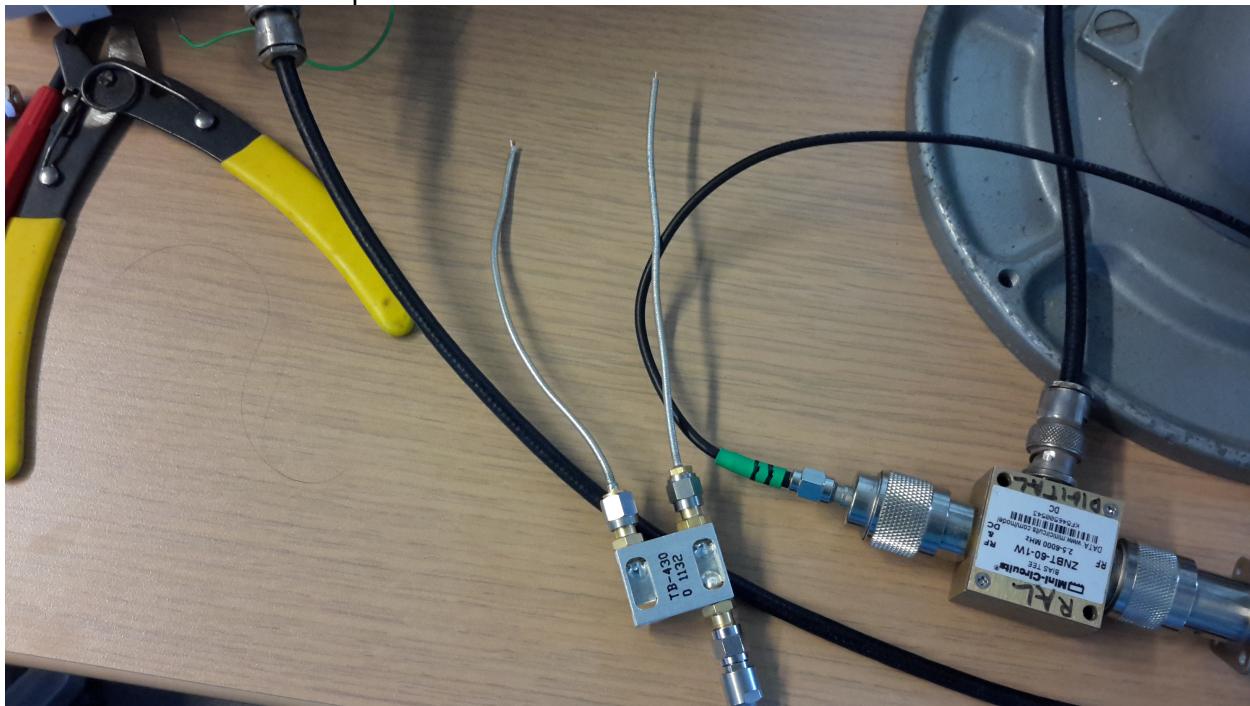
Setup for measuring gain on LWA FEE: (from right) DC Regulated Power Supply (CircuitSpecialists.com CSI3003XIII), LWA FEE in vice, Agilent 8722ES S-Parameter Network Analyzer 50 MHz - 40 GHz range



Port 1 connected to SMA cable

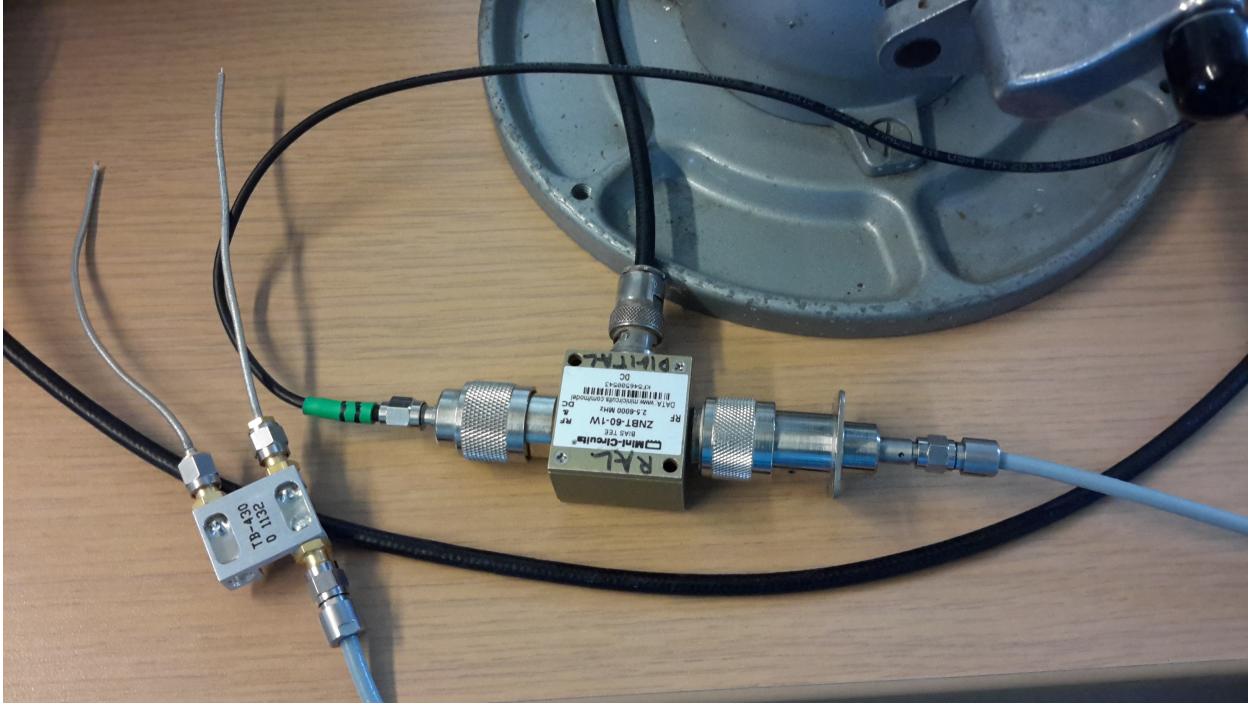


Port 1's SMA cable connected to MCL C 115 ADTL2-18+ RF Transformer Surface Mount. This is connected to two Hand Formable Coaxial (Semi-Rigid) cables (RG-402) with tips stripped of Teflon and shielding so that exposed wire tips (see next image) can be used to inject the signal from the network analyzer. The signal is injected through the tips at the input sides of the C4 and C7 capacitors.

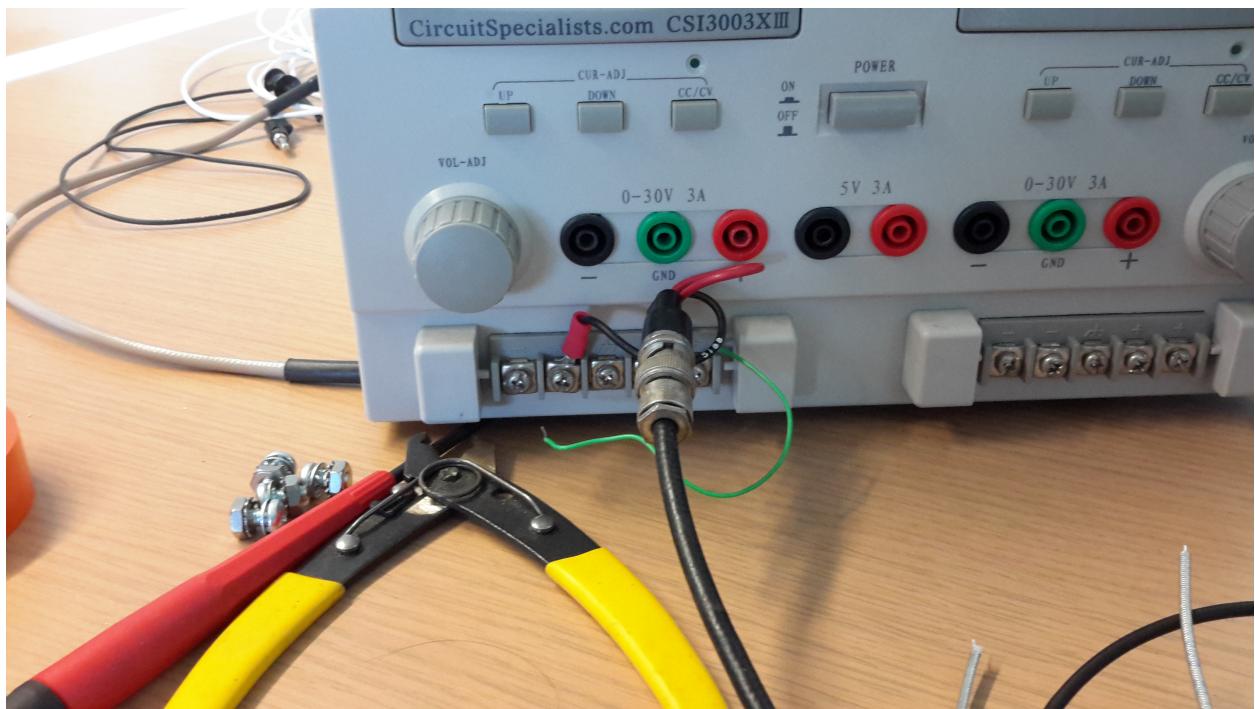




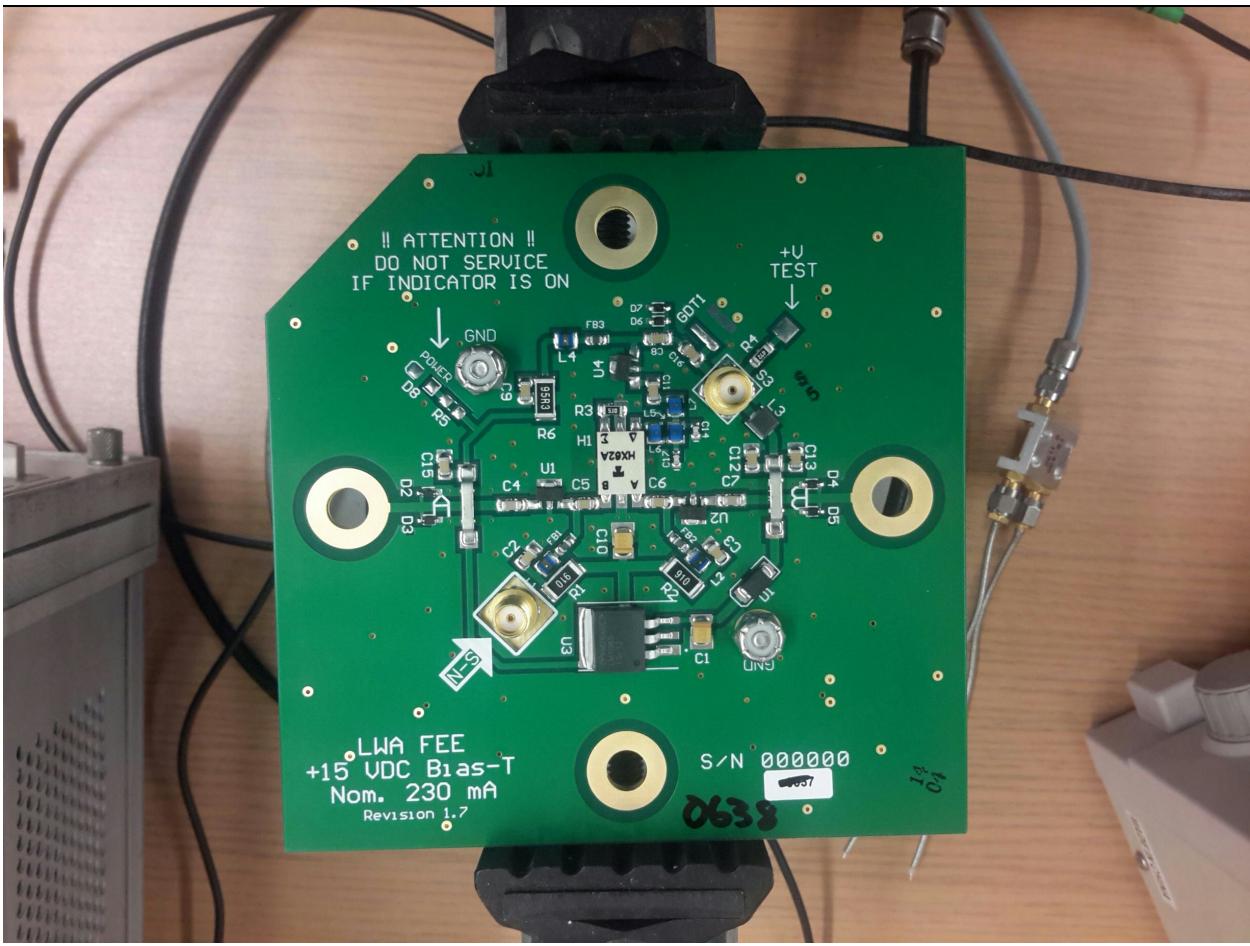
Port 2 is connected through an SMA cable to an SMA to N-type connector.



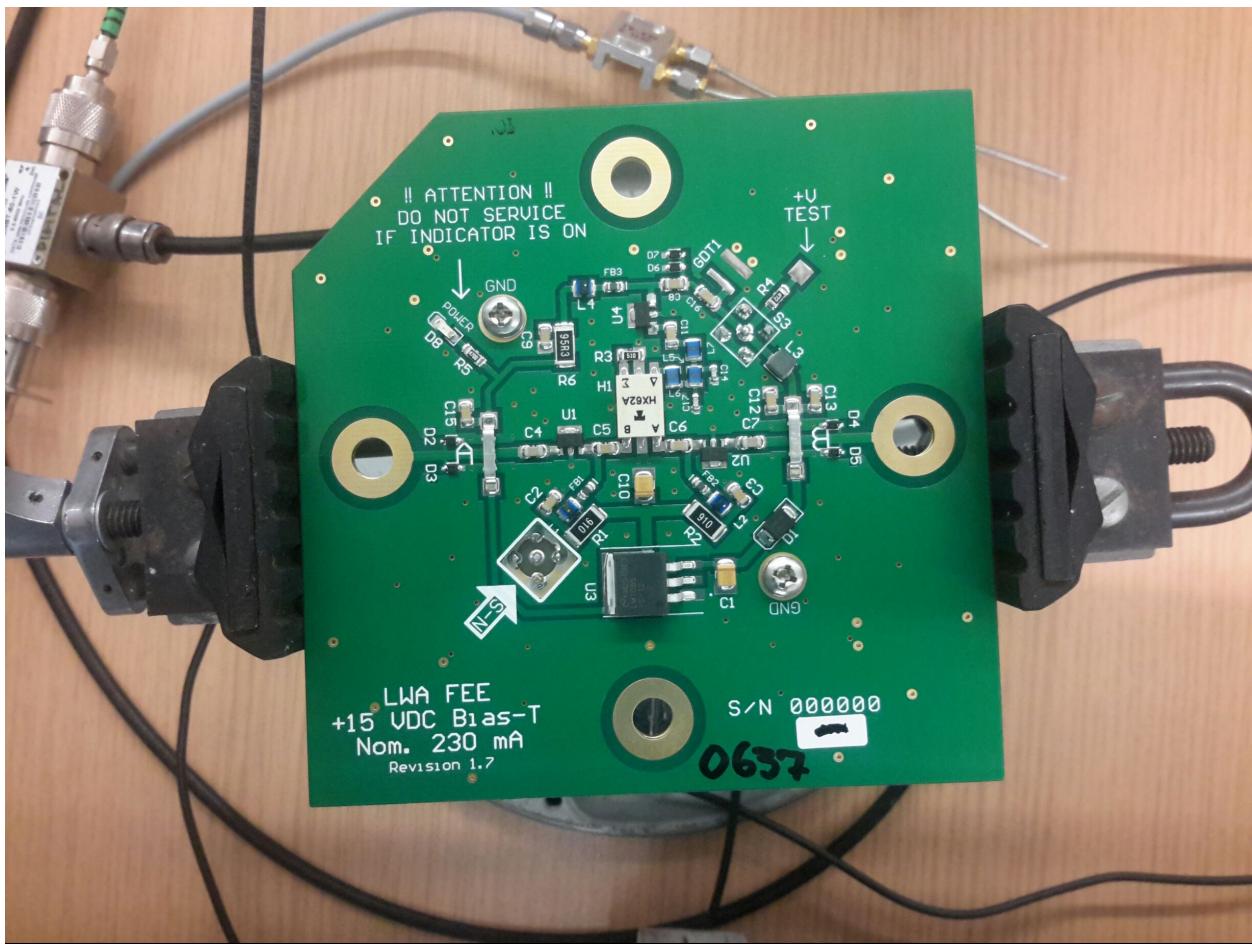
The SMA to N-type connector is connected to A BIAS-TEE (Mini-Circuits ZNBT-60-1W 2.5-6000 MHz) The signal out of the LWA FEE comes through here and into Port 2. The RF and DC connection of the BIAS-TEE is connected to an N-type to SMA connector which connects through an SMA cable (LMR 100A -PVC Coaxial Cable Times Microwave Systems 68999) directly to the power input on LWA FEE.



The DC Regulated Power Supply is set to 15 volts and the current through LWA FEE IS 230 mA. Fork terminal to BNC (Pomona 5188) connected to a BNC to BNC cable. This is connected to the DC connection on the BIAS-TEE (see previous image).

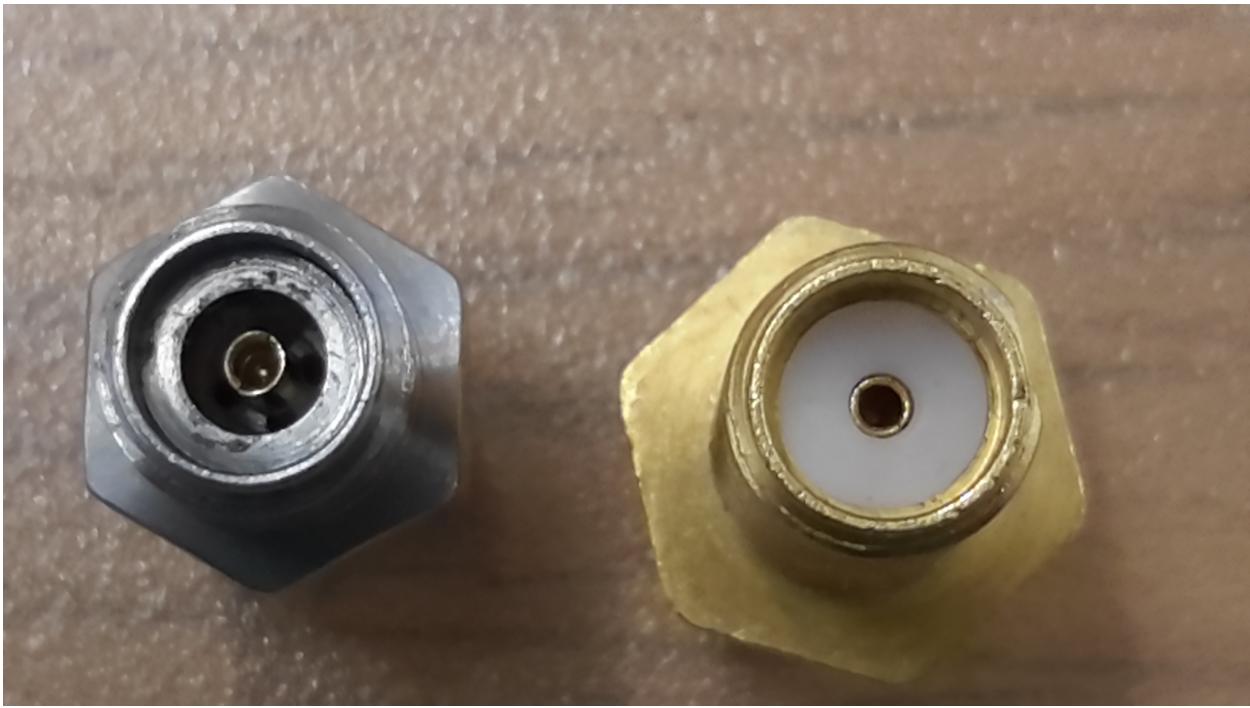


LWA FEE. Inject signal for E/W power input on "top" side (pictured; the SMA connection side) at input sides of C4 and C7.



"Bottom" side of LWA FEE. Inject signal for N/S power input on "bottom" side of board at input sides of C4 and C7.





Reference values used for network analyzer:

Start: 50 MHz

Stop: 1 GHz

Sweep setup --> number of points: 1601

Measured S11/S21

Signal Power: -40 dBm

Calibration Procedure:

Start: 50 MHz

Stop: 1 GHz

Sweep setup: 1601 (number of discrete points sampled)

Power --> manual --> Power ranges --> select appropriate range (we used the -25 to -40 dBm range) --> set to desired power level (we used -40 dBm)

Cal --> calibration menu --> S11/S21

Reflection --> Open

Attach Open (from calibration kit) to Port 1 (signal out) cable via the silver adapter (see picture above)--> arrange cable roughly in the "in use" position --> press Open button --> remove Open

Reflection --> Short

Attach Short (from calibration kit) to Port 1 cable via silver adapter (above) --> arrange cable into "in use" position --> press Short button --> remove Short

Reflection --> Loads

Attach 50 Ohm load (calibration kit) to Port 1 cable via silver adapter (above) --> press Loads --> arrange cable into "in use" position --> press Broadband, wait --> press Lowband, wait --> press Done Loads --> remove 50 Ohm load

Standards Done

Remove silver adapter (above picture) and replace with gold adapter (above picture)

Attach Port 1 cable to Port 2 cable (Port 2 to BIAS-TEE to SMA that will connect to the LWA
FEE--attach at end of this SMA cable)

Transmission --> Do Both Thrus

Detach cables

Isolation --> Omit Isolation

End Calibration

Meas --> choose what you'd like to measure (we're measuring "Refl: FWD S11" and "Trans: FWD S21")

Saving files:

Save/Recall --> Select Disk --> Internal Disk --> Return --> Save File Formats --> Text --> Save File --> wait until it gives you filename

Saving multiple files: go from Save file step; the others are now set until you power it off