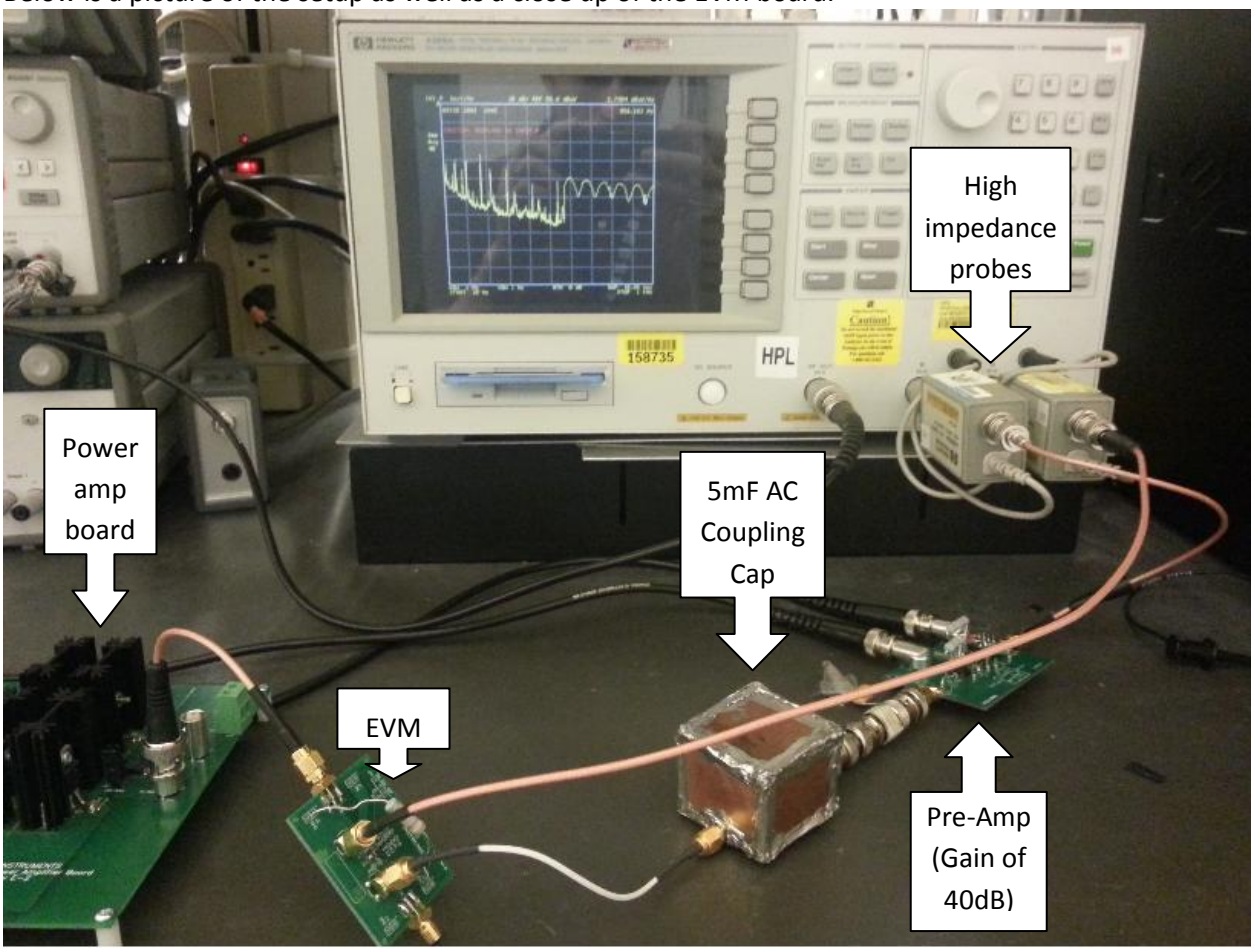
Power Supply Rejection Measurement

Equipment used:

- Agilent 4395A Network/Spectrum Analyzer
- (2) Agilent E3631A Power Supplies
- (2) Agilent 41802A High Impedance Probes

The power supplies are connected to the power amplifier as both the rails and the DC level to be used for the DUT. The Analyzer's RF Out port is connected to the power amplifier to provide the sine wave which will be varied across frequency. The power amplifier acts as a summing op-amp adding the sine wave and DC level together. The output of the power amplifier is then connected to the input of the DUT. Two high impedance probes are used to measure the ripple on the input and output of the DUT.

Below is a picture of the setup as well as a close up of the EVM board.



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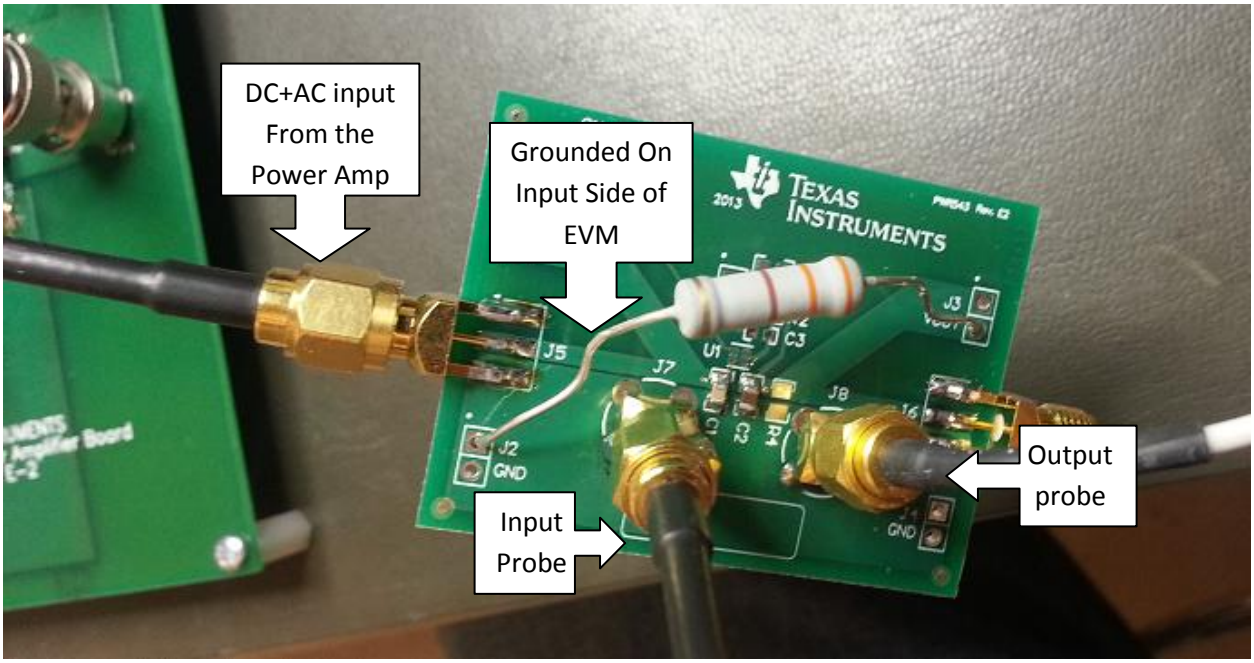

DUT Setup

1. Set up the EVM so that the board has the DUT, load* and correct capacitors on it.
2. The Power Amp Board (shown in Figure 1) requires +15V and -15V to operate, an input voltage which is equal to the DC level needed to operate the DUT, and an AC signal (sine wave is preferred) which will be generated by the Agilent 4395A Spectrum Analyzer's "RF Out" terminal.
3. Screw on two Agilent 41802A (High Impedance Probes), one to the terminal labeled "R" and the other to the terminal labeled "A".

4. Connect the output of the Power Amp Board to the input of the EVM, this should be done using the shortest wires possible.

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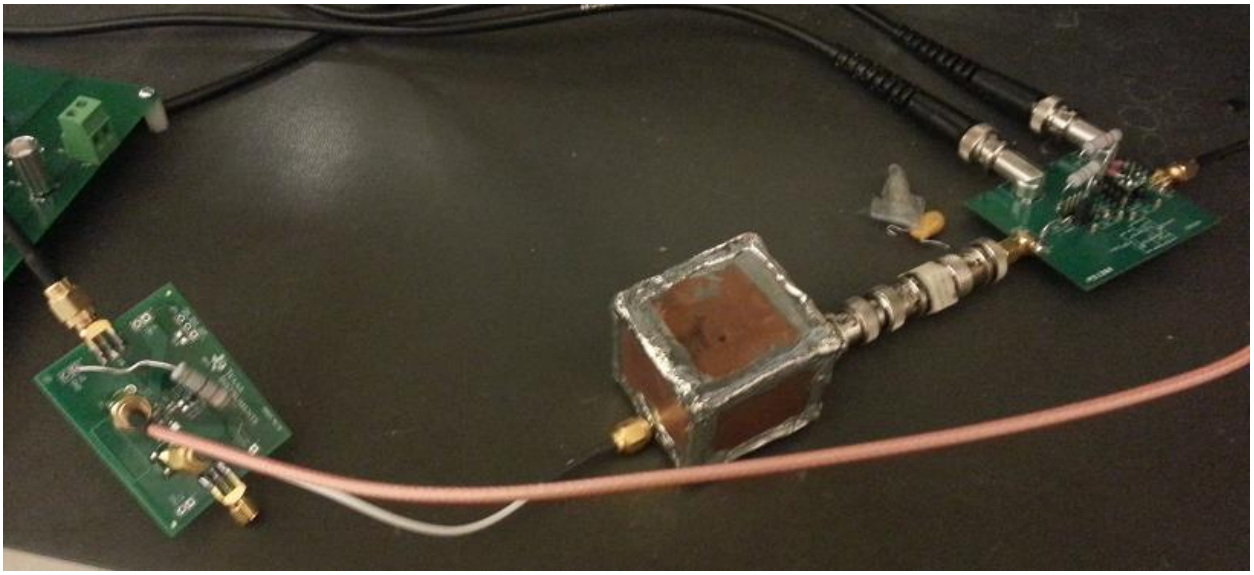
5. Connect the SMA cable from terminal “A” to the input and the SMA cable from terminal “R” to the output.
    a. If using a pre-amp connect the output to the AC coupling cap and connect the other terminal of the AC coupling cap to the input of the pre-amp.



Things to keep in mind

- The input ripple should be about 100 mVpp (this is done to try and keep the signal on the output large enough to measure)
    - Using a pre-amp before the analyzer can help measure signals smaller than the analyzer alone has the resolution to measure.
        - If a Pre-Amp is used make sure that its power rails are filtered. Not doing so will cause the switching noise of the supply and power line frequency noise to degrade the measurement.
- Keep wires going to and from the DUT as short as possible
- Ground the load at the input side of the EVM, this reduces the amount of noise introduced onto the ground plane. This is especially important for high current applications
- SMA/BNC connectors should be used if available
- The size of the oscillation may change with frequency, particularly low (<100Hz) and high (>1MHz) frequencies, so it may have to be adjusted depending on the frequencies being swept and the amplifier used.
- If an input capacitor is required for device operation you will want to measure the input signal across the input capacitor. This is likely the closest you will be able to get to the input of the DUT and due to the capacitor’s attenuation the input signal may not be the same as what is seen at the input of the EVM.
    - A tantalum capacitor can be used for Cin which will reduce the attenuation of the input signal.
    - This will also cause you to have to break the measurement into smaller frequency bands to keep the amplitude of the input signal relatively consistent throughout the measurement.
    - If a Kelvin SMA connector is not available an SMA connector can be soldered directly across the input cap, however be careful as this usually results in a weak mechanical connection and can easily be ripped off.