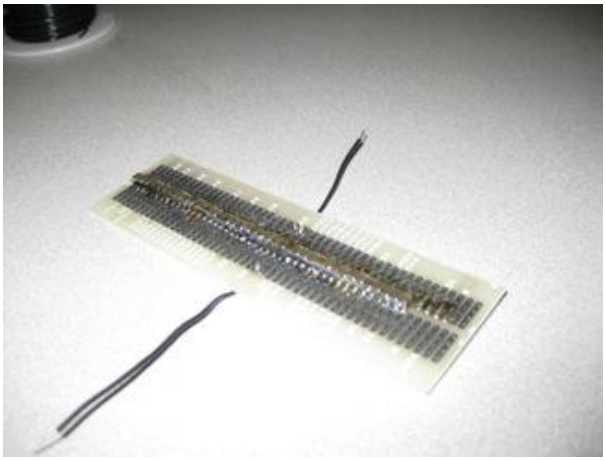
Noise Measurment Procedure

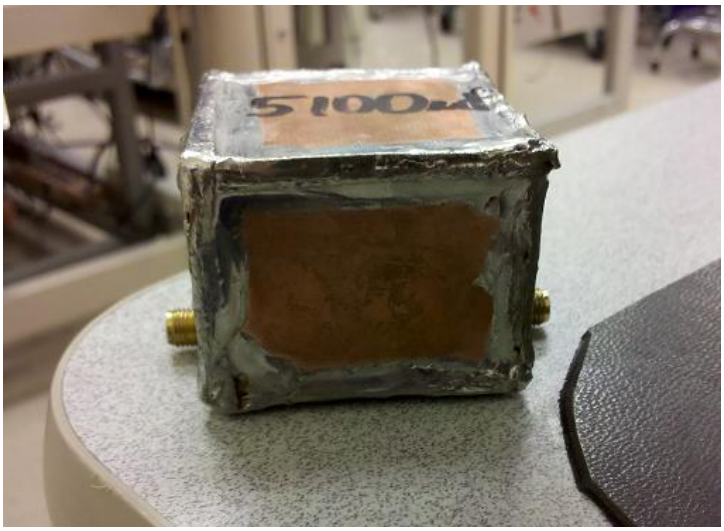
January 8, 2013 – Kyle Van Renterghem

1. Set up the DUT on an EVM board so it is ready to be tested.
2. Connect required load to Vout using a resistive load (Using an active load/power supply could incorrectly increase the measured noise).
   a. If using a high load you may want to ground the resistor back at the input. This will help minimize the noise on the ground plane.

3. Place the EVM in a metal (or metal coated) box and ground it at the input supply (This will help shield it from environmental noise).
   a. Insulate the inside bottom of the metal box to prevent short circuits from occurring.
4. Connect required Vin, Venable etc… using shielded coax cables.
5. Connect the AC coupling capacitor to the output of the EVM and connect the other side of the AC coupling capacitor to the analyzer used for measurement. Use coax cables whenever possible. Below are two examples of AC coupling capacitors we have used.

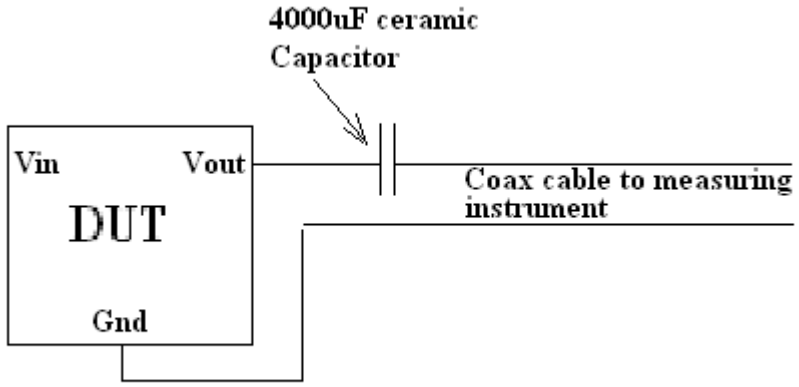


Unshielded 4000uF Cap



Shielded 5100uF Cap

AC Coupling Capacitor Setup

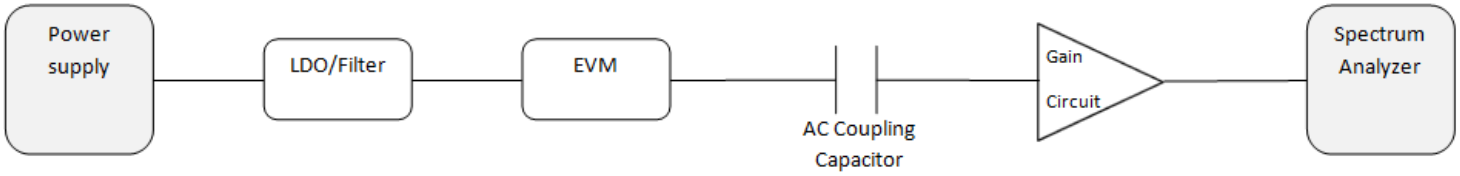


Things to Keep in Mind

1. The input voltage source should be low noise so as to not add additional noise to the measurement of the LDO. Most power supplies will have noise spikes due to the line cycle (50Hz or 60Hz) and switching noise (generally between100KHZ-1MHz).
    a. Good input supplies:
        i. Battery
        ii. Low noise, high PSRR LDO
        iii. Passive filter with cutoff frequency appropriate for line cycle and switching nosie
2. Make sure that the noise floor of the measurement equipment is lower than the noise floor of the LDO.
    a. If the noise floor is larger than or close to the noise of the LDO use a low noise op-amp to gain up the noise
        i. Keep the resistors small to limit their noise contribution
        ii. Check to see that the gain you've chosen gives you a flat gain across the frequency range you care about. (if it's not flat either lower the gain or make sure you account for the gain's roll off in the calculation)
        iii. Once you have the noise data (in uV/√Hz) divide by the gain (in Volt/Volt) of the gain circuit.

3. The AC coupling capacitor should be large (2mF-10mF, we use 5mF for our testing) to ensure that the low frequency noise is adequately captured.
4. Try to keep all connection and wires as short as possible to reduce the environtmental noise picked up.
5. See the diagram below for a block diagram of the setup and picture of our actual setup

Noise Test Block Diagram



Picture of Actual Setup