OSHW-Multimeter

High Level System Requirements

Version 0.1 - Draft

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The following (informal) requirements were copied from the eevblog thread and are currently evaluated if feasible for the project. Once they are OK, they will be slightly reformulated into a more common requirements notation (eg. “shall” ☺)

1. Modular Design: AFEs with a central medium micro, let's say a STM32F4 (done some nice stuff with this one; plenty of computing power, nice peripherals, etc.)

2. For most of the proposed functions, we need to accurately measure VDC (Ohm, Amps, VDC, VAC, not so sure about the LC-Stuff). I think it may be possible to achieve 6 x/x digits (somewhere around 2999999 counts, around 22 noise-free bits).
   2.1. Guess it would be a good idea to go with a custom integrating adc. I'd suggest a multi-slope design (first up multi-slope rundown, not sure if we need continuous runup). This would give us decent speed with a nice accuracy.
   2.2. The controller and auto-ranging would be implemented in an FPGA (Xess offers some cheap Spartan-6 LX25 modules), presumeably at a speed >50Mhz for the integrator time base.
   2.3. Add decent protection circuits on the input, to comply with some CAT rating
   2.4. Decade (bought) resistor network for 5 switchable ranges: 200mV, 2V, 20V, 200V, 2000V
   2.5. Make sure that the buffer in front of the ADC is reasonably high quality (noise isn't that much of a problem for an integrating adc, if it's designed properly)

3. With the DVM capability, we could then build additional building blocks for current measurement, resistance (with precision current source), etc.

4. Figure out how to do VACrms. If the adc is fast enough - do it in software. Otherwise, use a COTS component (sorry, aerospace term here) or build the circuit (nope, don't want to do that)

5. Of course bench-type one. No handheld.

6. The mesurements are streamed to a PC for display purposes, and mode selection is done there. Just to keep the interface out of the equation for the initial phase. Once the AFE is done and working, we can attach what ever interface people want to the modular µC-Board.