A Labview–based DAQ system for SiPM study and characterization.

Bari, 28/11/2013
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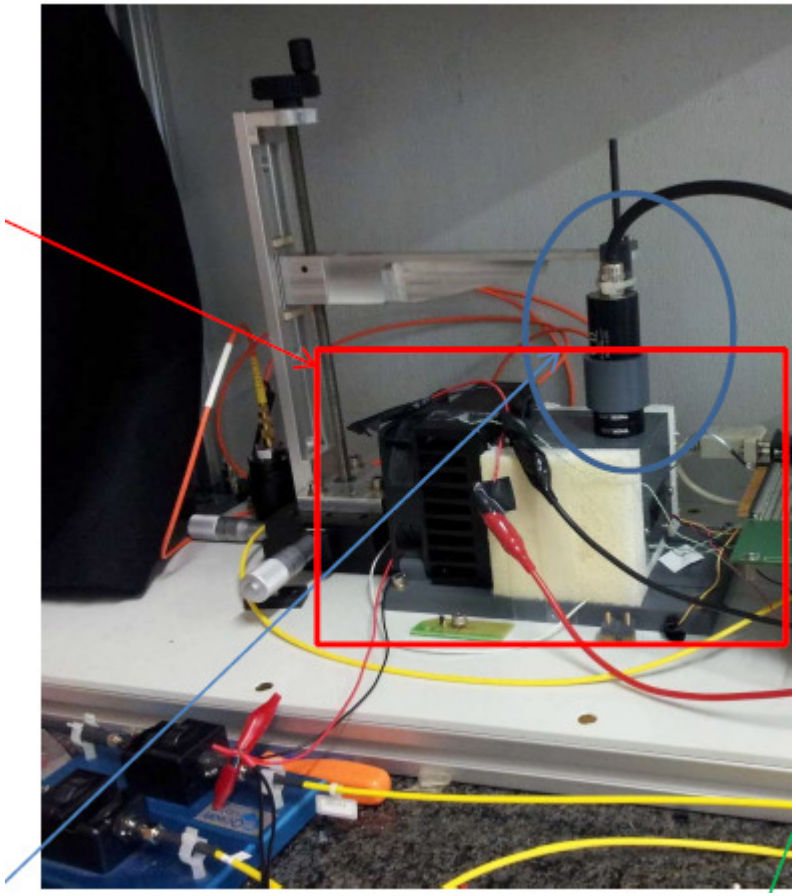
Setup:

- Dark box for SiPM allocation;
- Peltier cooling for temperature control.
- LeCroy ArbStudio waveform generator;
- Tektronix TDS5104b Oscilloscope;
- Keithley 2400 source meter;
- Picosecond pulsed driver w/ pulsed LED;

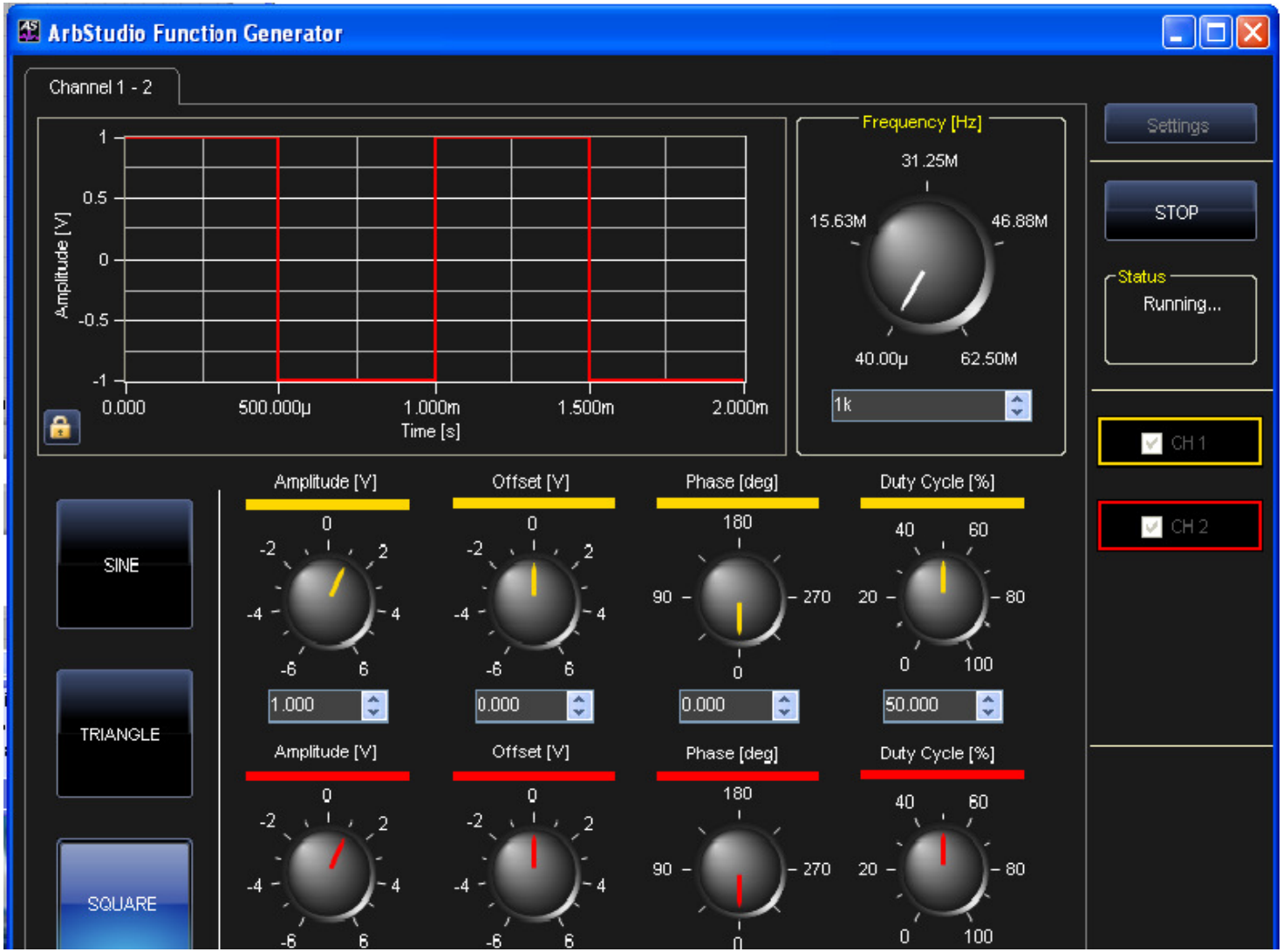


The light source: pulsed LED driven by a picosecond driver

- Central wavelength 380nm and bandpass filter;
- Pulse width down to 500ps;
- Adjustable average power up to 80μW;
- Bandpass filter;
- Thorlabs c50md diffuser kit;

- External/internal trigger mode;
- Adjustable repetition rates from 2.5 to 40MHz;
- Synchronization output;
- Pulse energy control for attached laser or LED heads;

External trigger mode w/ LeCroy Arbstudio waveform generator

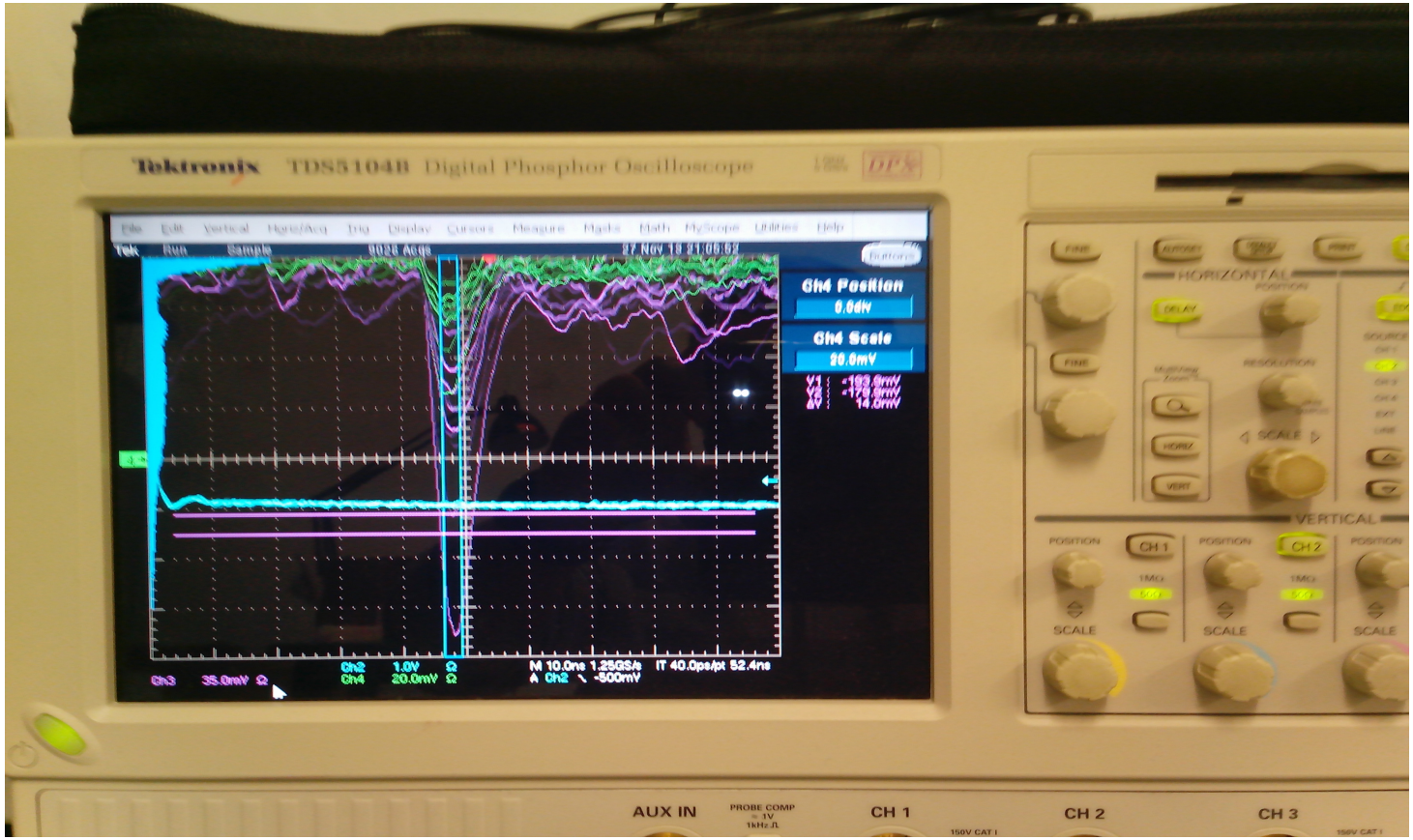


Tektronix TDS5104B Oscilloscope

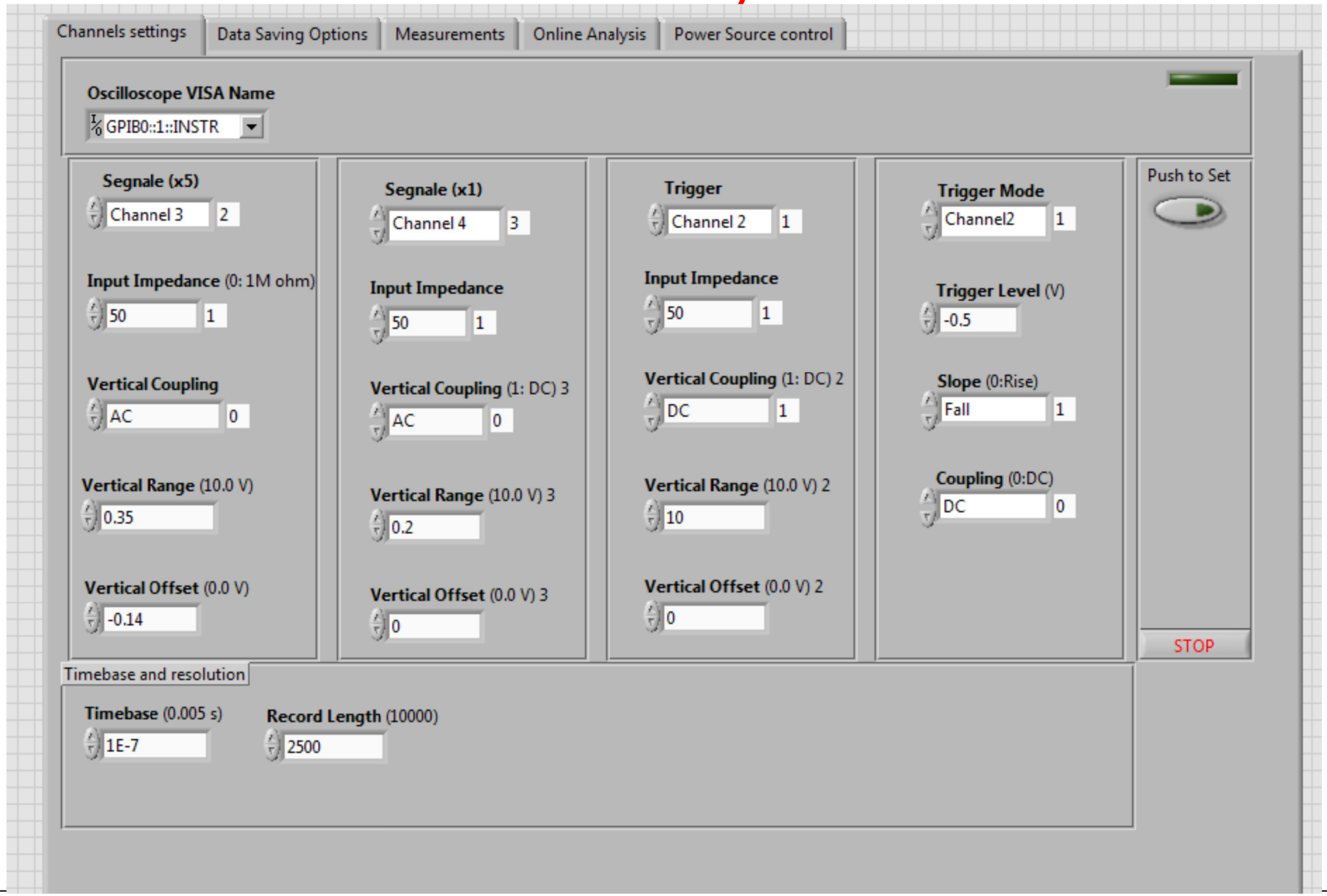
- 4 Input channels;
- 8 bit ADC vertical resolution;
- Timebase range: 200 ps/div to 1000 s/div;
- Real time sample rates: 1.25 GS/s – 2.5 GS/s – 5GS/s;

Acquisition mode:

- Multiple waveforms at 1.25 GS/s;
- Record lenght of 2500 samples for each waveform;
- Timebase: 100ns ;



Labview software for waveforms acquisition and online analysis.



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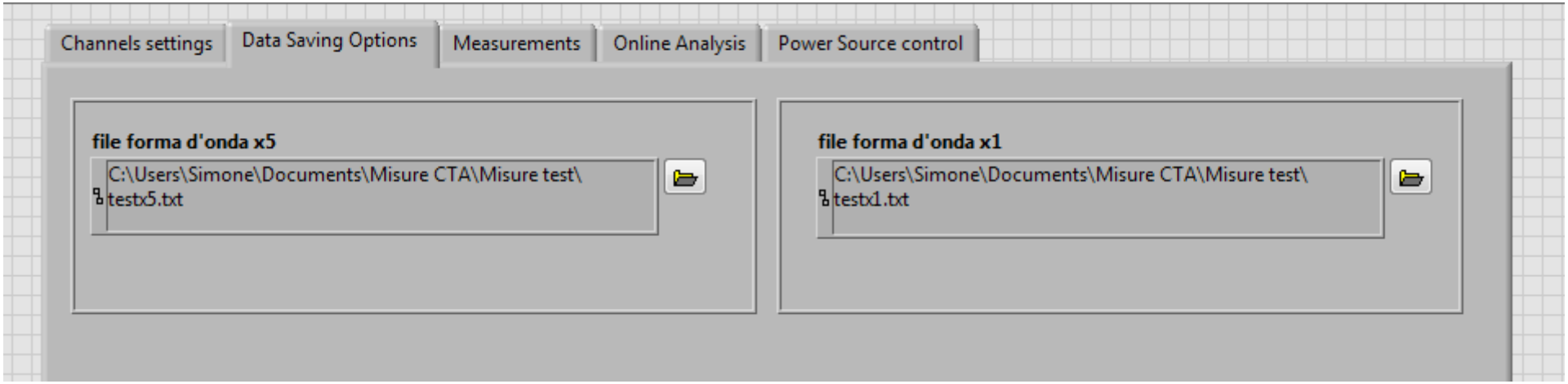

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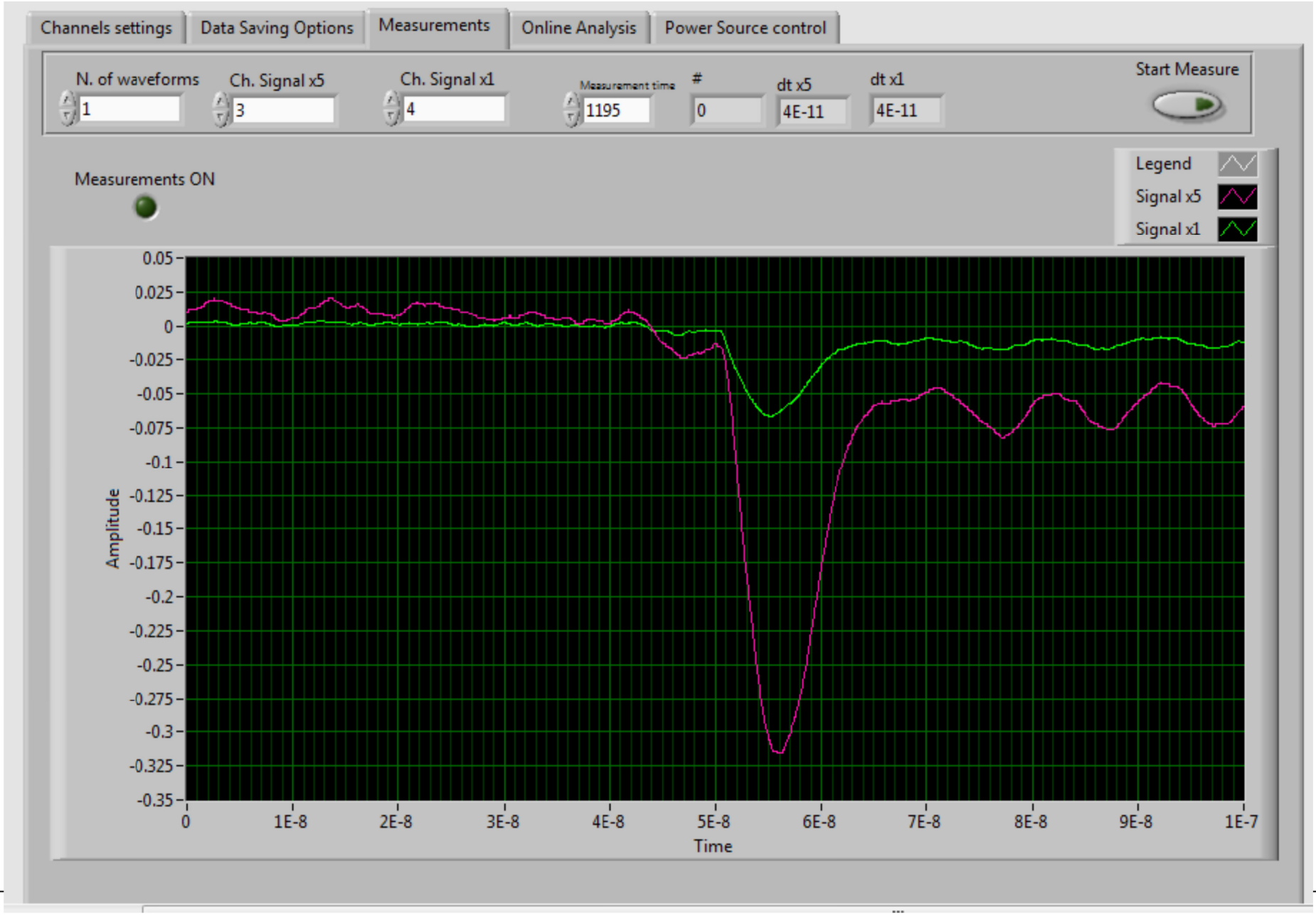
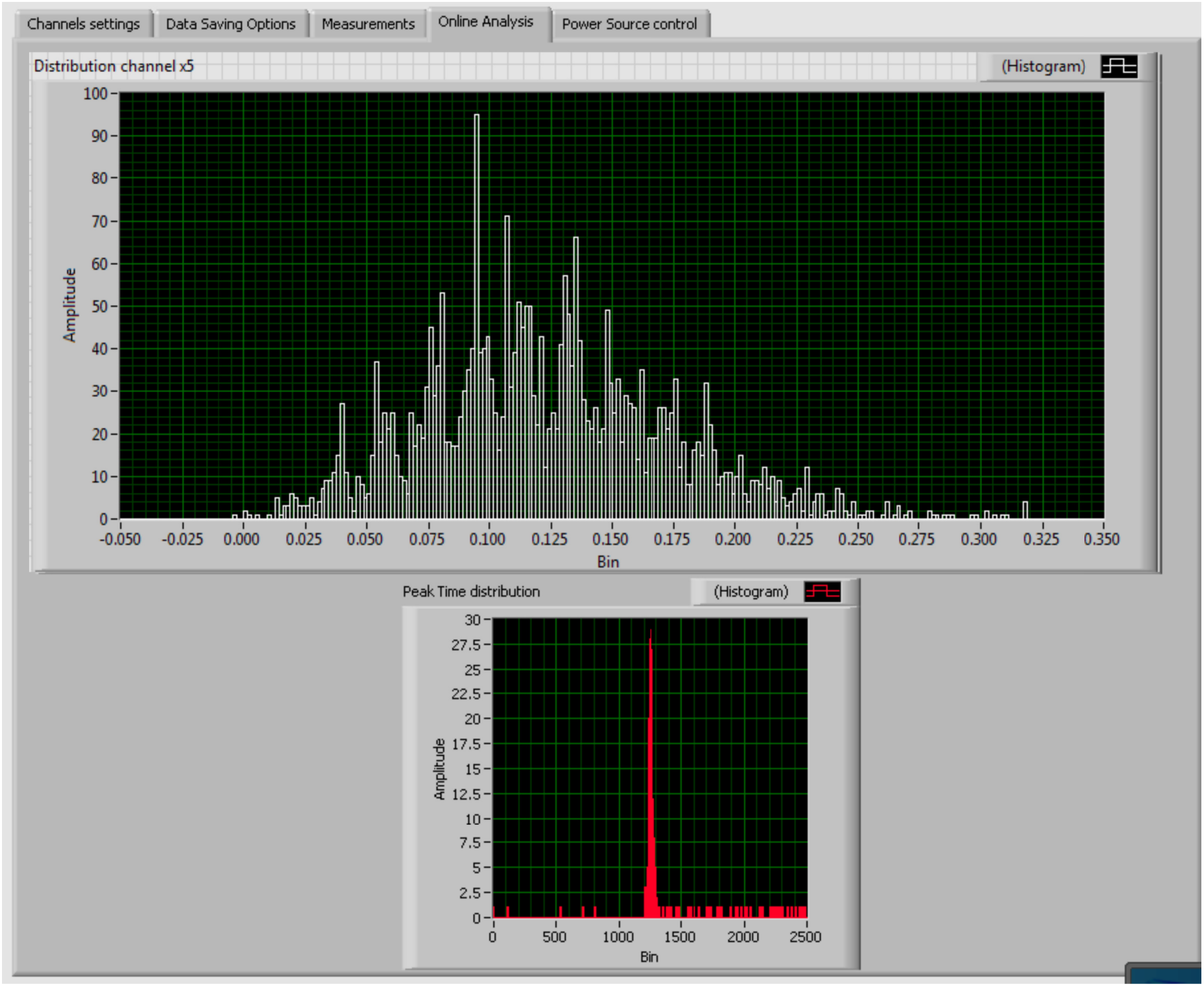
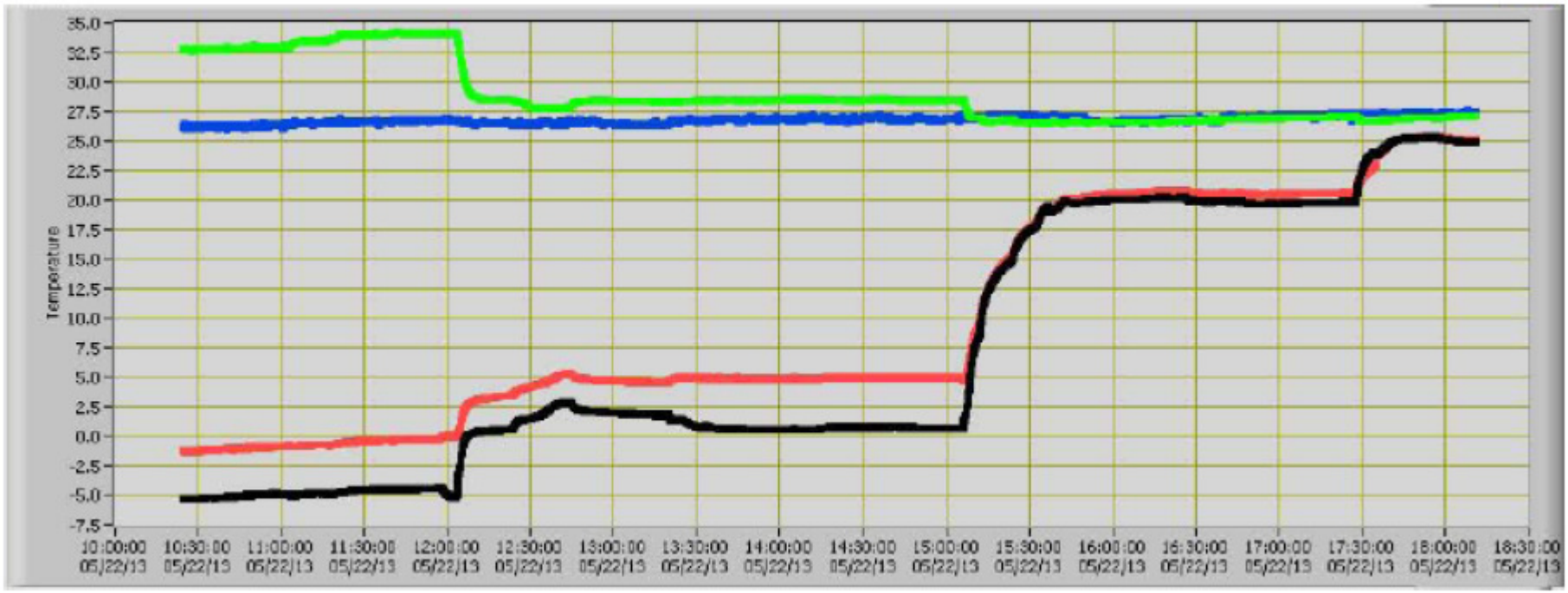
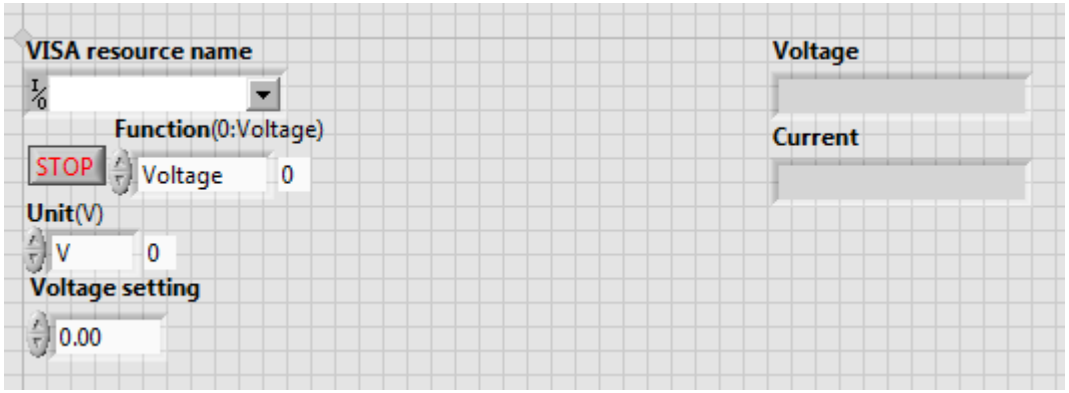


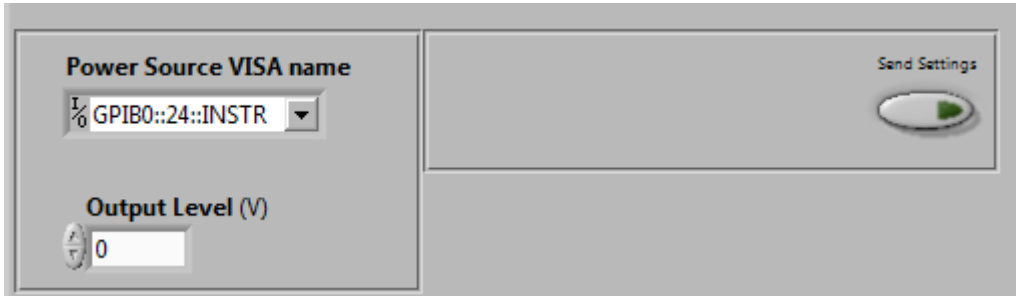
Labview online analysis.



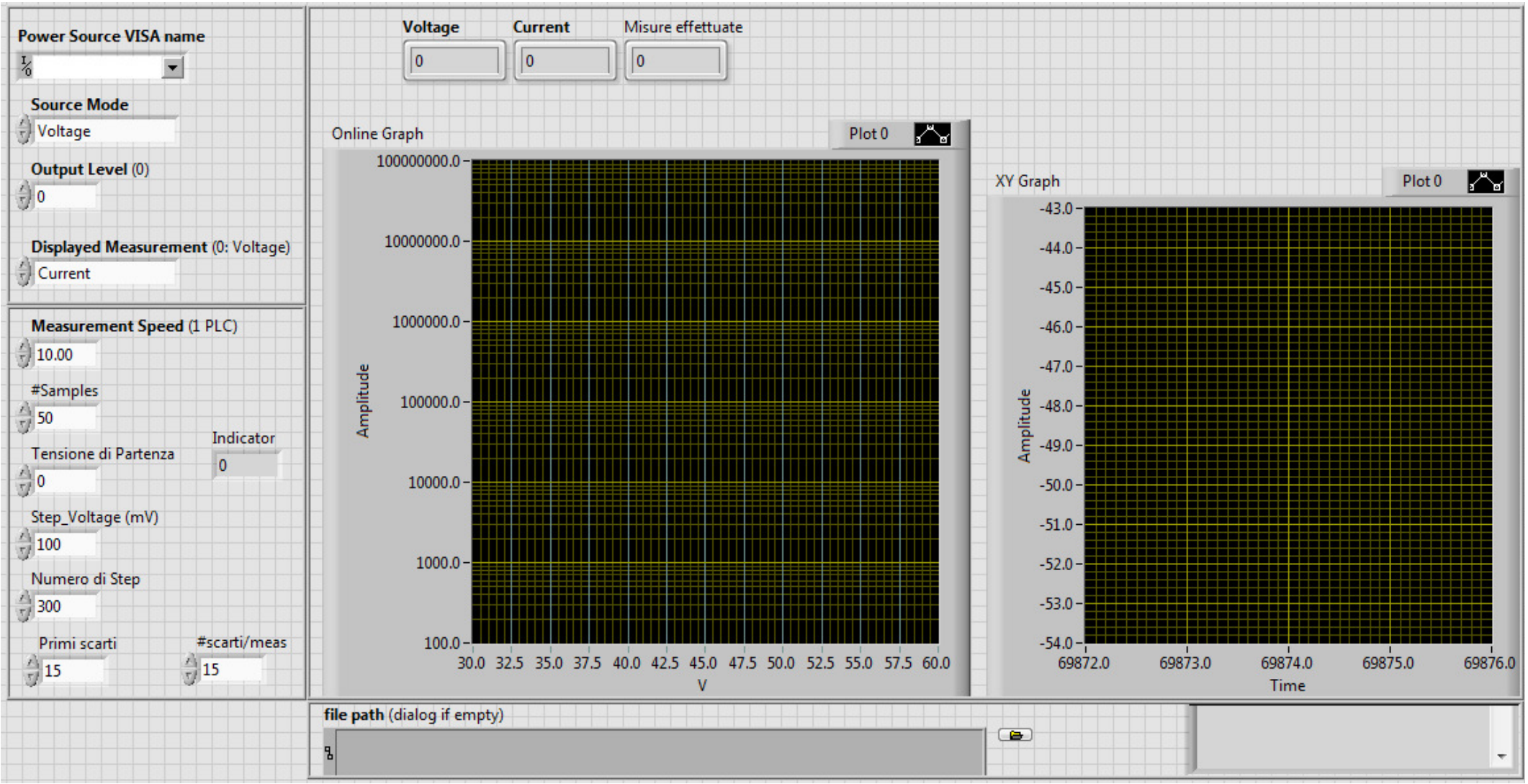
Power supply and temperature control.



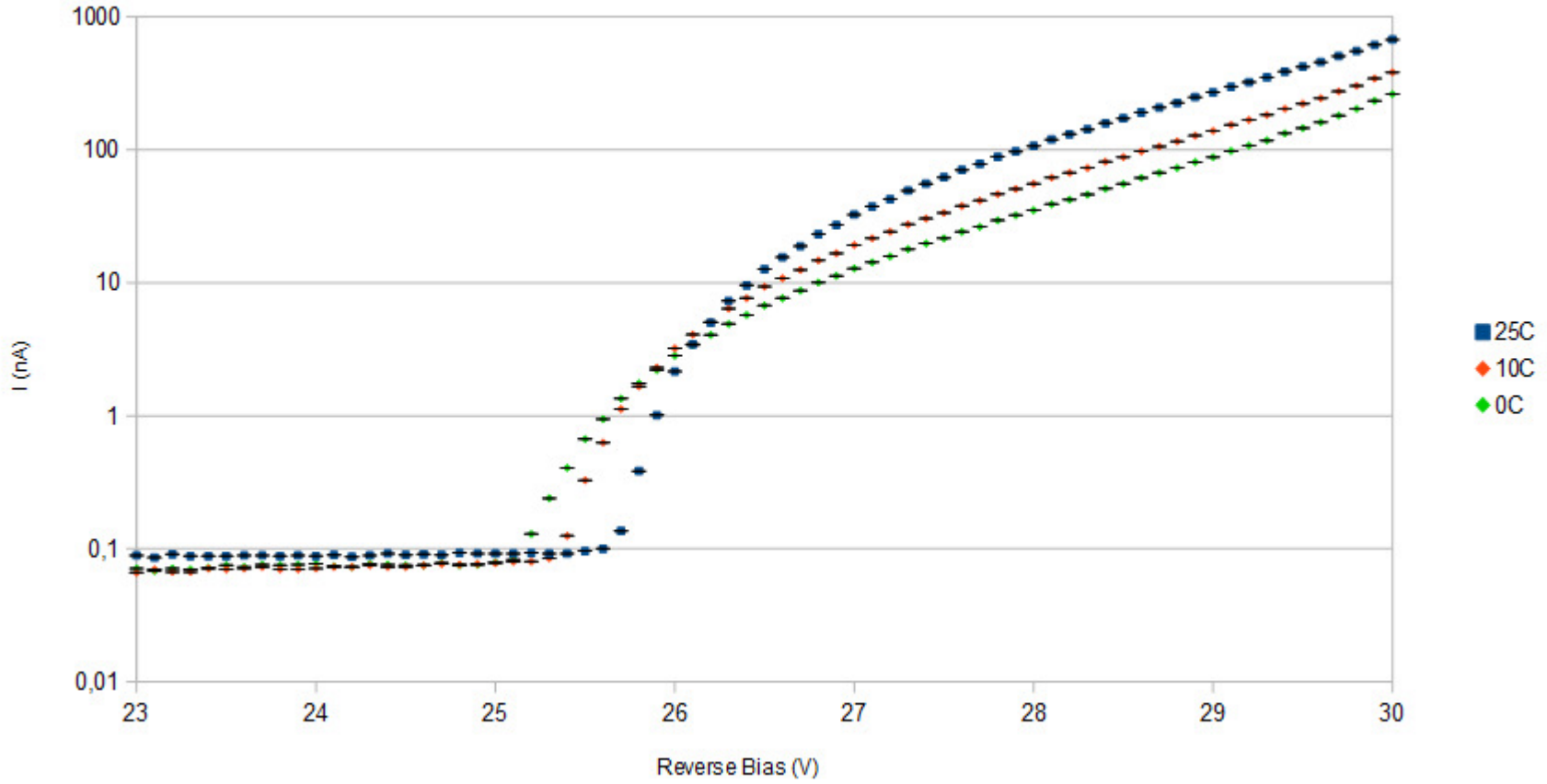




Labview software for SiPM IV characterization

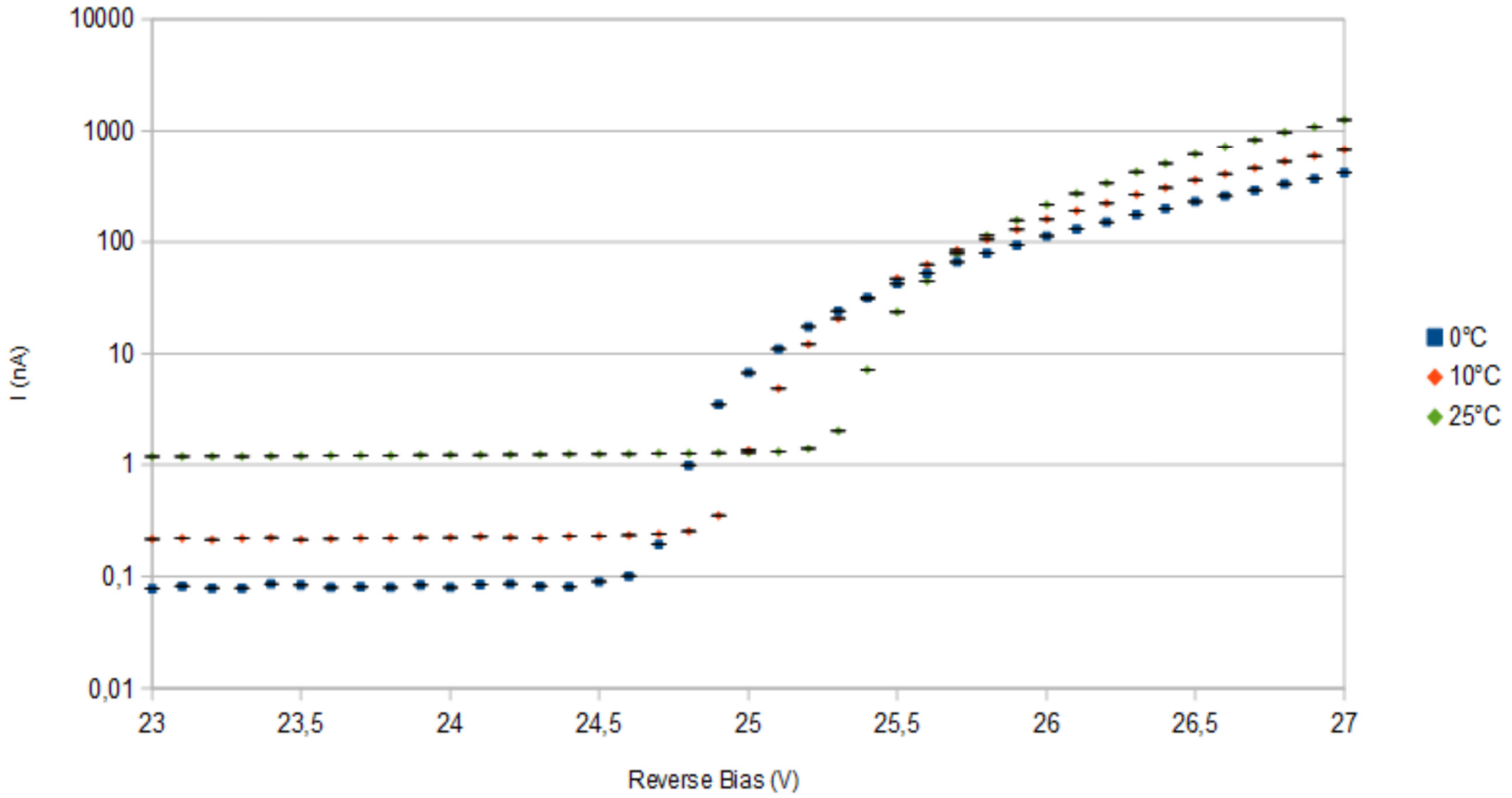


I–V plots for SiPM FBK 1x1mm^2



The breakdown voltage increases at a rate of about 22 mV/°C
The breakdown is 25,67 V @ 25 °C.

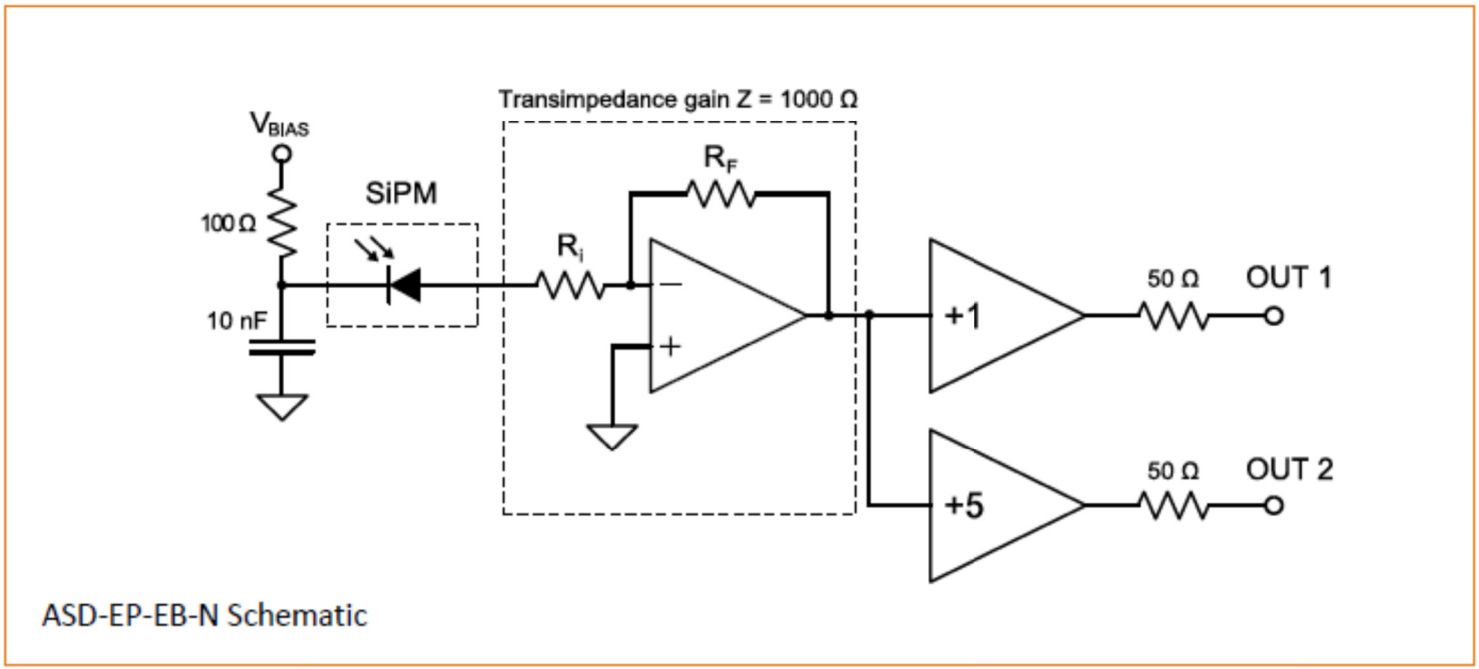
I–V plots for SiPM FBK 3x3mm^2



The breakdown voltage increases at a rate of about 25 mV/°C
The breakdown is 25,27 V @ 25 °C.

AdvanSiD evaluation board signal amplifier

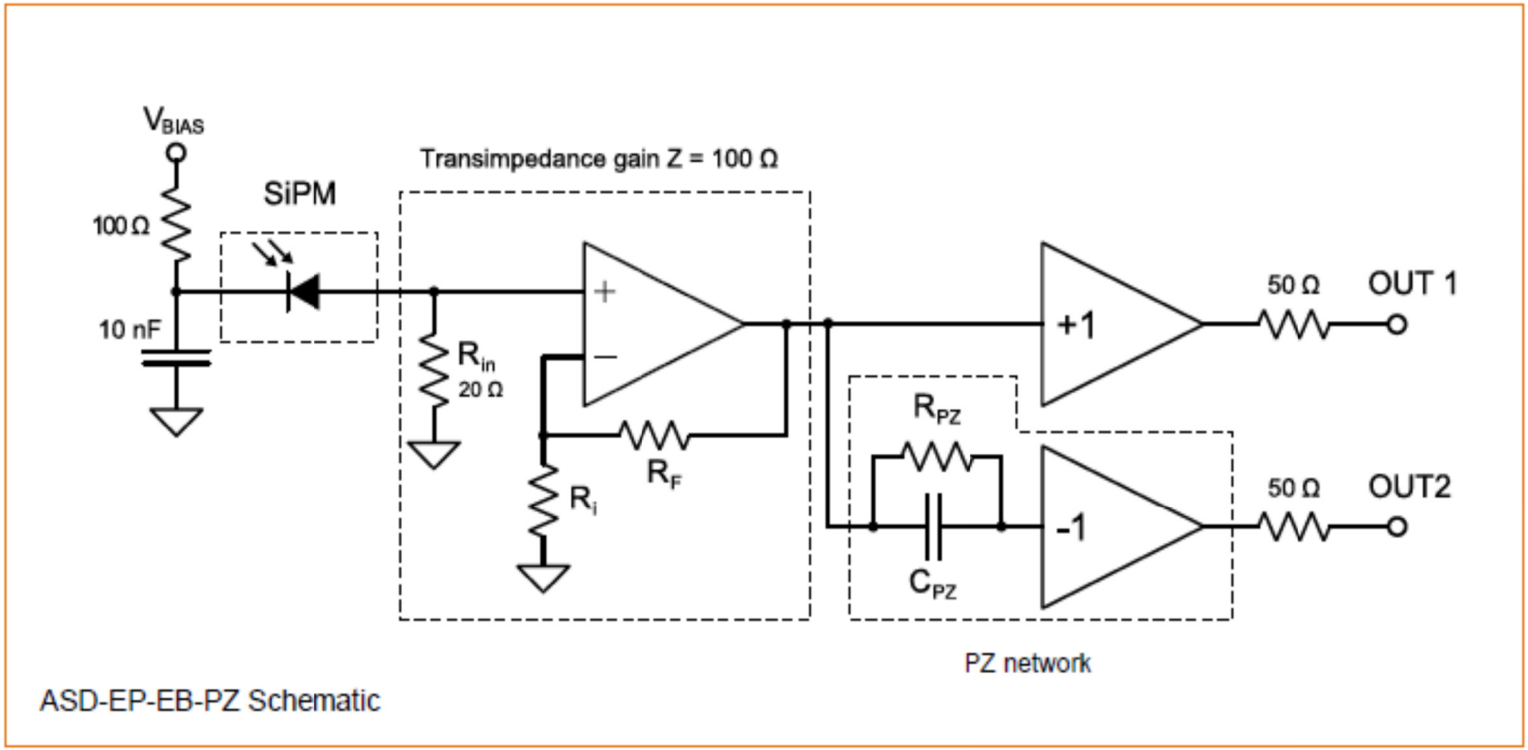
- Transimpedance SiPM signal amplifier;
- High gain output with a total 2500Ω gain;
- Low gain output with a total 500Ω gain ;



ASD-EP-EB-N Schematic

AdvanSiD evaluation board signal amplifier w\ Pole–Zero compensation

- Transimpedance SiPM signal amplifier;
- Low gain output;
- Differential output (Pole–Zero Compensation) good for timing measurements;



ASD-EP-EB-PZ Schematic

Conclusions

- The measurement setup provides an high sensitivity in characterization and testing of SiPMs and front-end electronics;
- The Labview-based DAQ system allows a good control of the measurement setup and a very useful preliminary online analysis;
- This semi-automated DAQ systems also allows to do faster testing sessions;
- The testing setup @ INFN Bari is in continuous upgrading.