

# Taking measurements from single-side HPF to measure $V_{\text{phase}}$ and $V_{\text{neutral}}$

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# Task planned in last meeting (07-10-2014)

- Check if termination impedance of equipment is 50 ohm than if it has to be included in computing High pass filter cut-off.
- Make two such circuits on a good quality PCB board.
- Test this circuit with DMM and DSO to measure input & output voltages and cal. attenuation offered.
- Test Mixed Domain Oscilloscope 4104-06 (to be used for time domain measurements)[configuration, probe calibration, data dump].
  - Try to dump data from two channels simultaneously (at same start time).
- Get Vphase and Vneutral data with a single appliance from MDO.
- Compute Vcm and Vdm using Vphase and Vneutral data in MATLAB and compute FFT for this.
- Match Vdm results with previous results from EMI paper.

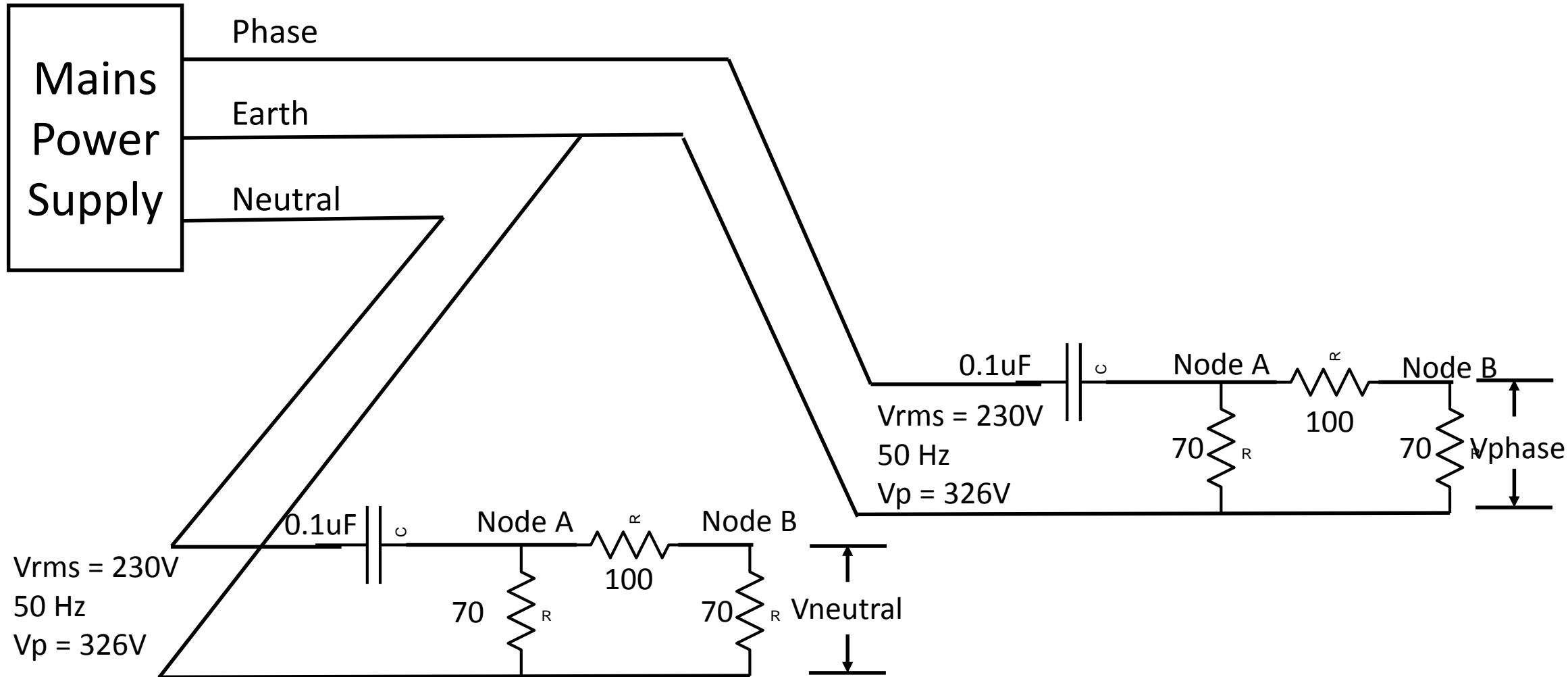
Check if 50 ohm termination of equipment has to be considered while calculating cutoff of filter.

Answer is yes if it is a 50 ohm termination the resultant will turn out to be 25 ohm. But following RF circuit principles this is meant to provide a matched termination so that no reflections occur at the end of transmission line.

After a brief discussion with Tektronix people, this is a bit of subjective question as it depends on probes and termination selection of equipment. Most of the probes/equipment are meant for one of the two terminations (1Mohm or 50 ohm) and probes have internal feedback based compensation system to match with these terminations.

NB: We have only 1Mohm based compensated probes. Normal BNC cables can be used for 50 ohm termination but they have to be matched using function generators. Tektronix people will come in day or two to demonstrate this as my trials were not successful.

# Testing of single sided HPF without any load



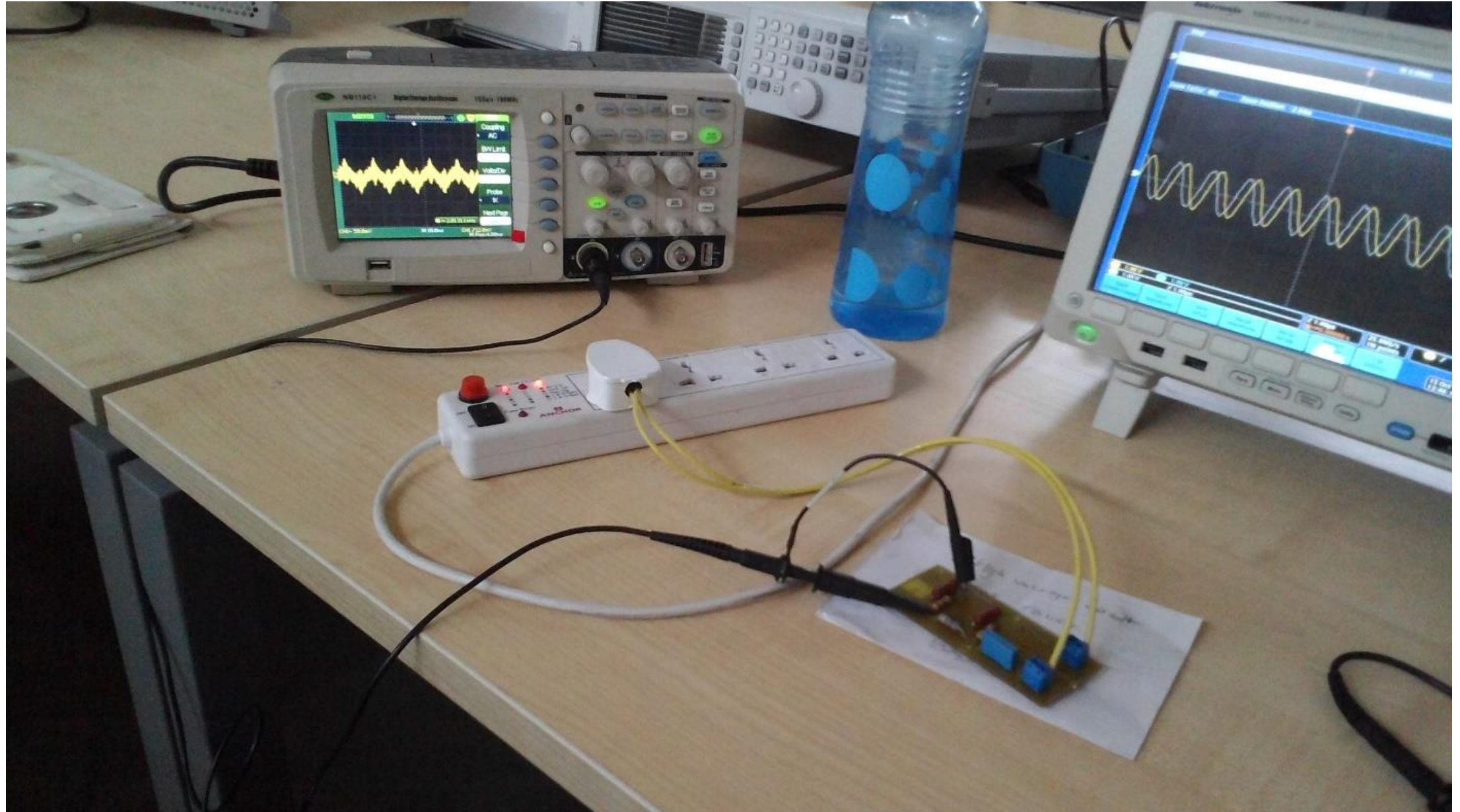
# Calculations/Testing HPF (Mains power supply)

- Input Voltage  $V_{rms} = 228V$  (50 Hz Mains) [measured with multimeter]
- Input Voltage  $V_{peak} = 322.4V$
- Output Voltage  $V_{rms} = 123.76mV$  (50 Hz)[measured with DSO]
- Output Voltage  $V_{peak} = 175mV$  (50 Hz)

## Calculations:

- Attenuation (offered at 50 Hz) = -65.30 dBV
- Power observed(across 50 ohm load) = -32.12 dB  
= -2.12 dBm

# Setup with DSO



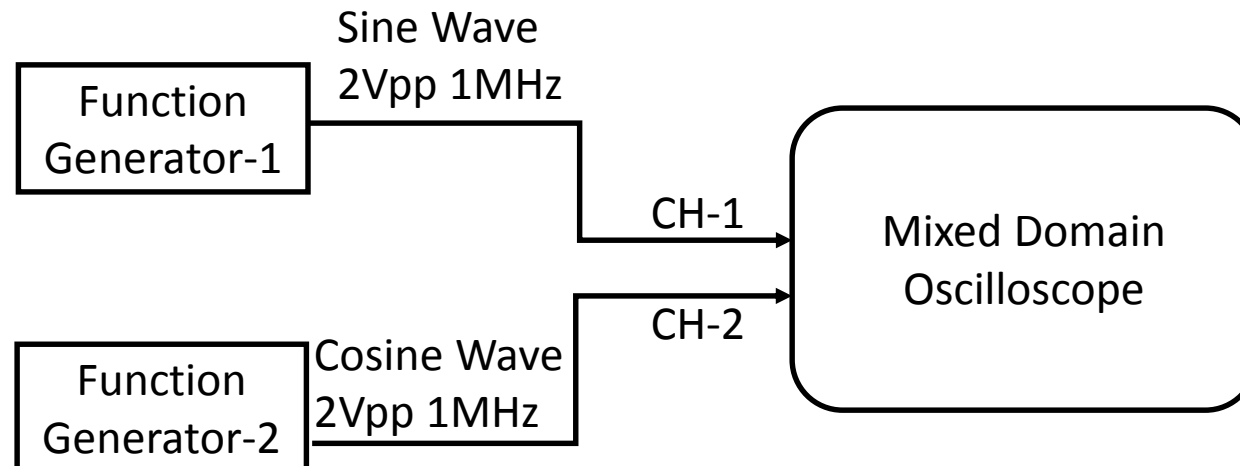
# Configuration of Mixed Domain Oscilloscope

## Configuration

- Sampling frequency  $F_s = 25\text{Msa/s}$  [Best 5 Gsa/s]
- No. of points in time domain = 1M [Max. 20M]

Task-1 Calibrate 1Mohm probes and take one trace from function generator. [Done]

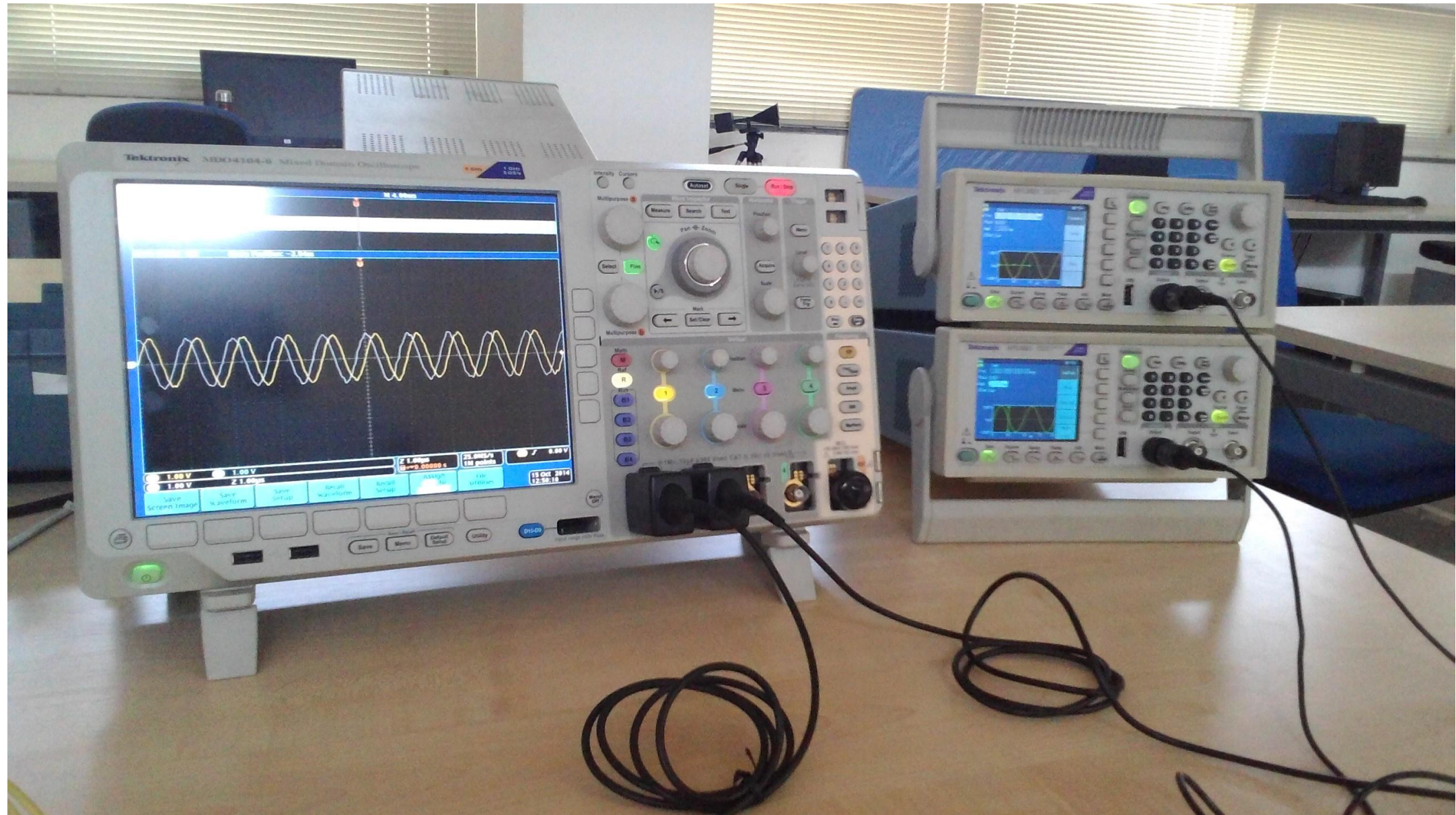
Task-2 Capture traces simultaneously from two channels using 1Mohm probes (used two function generator). [Done, results on next page]



Capture Time = 0.04 sec  
No. of points in time domain = 1M  
Sampling Freq.  $F_s = 25\text{Msa/s}$

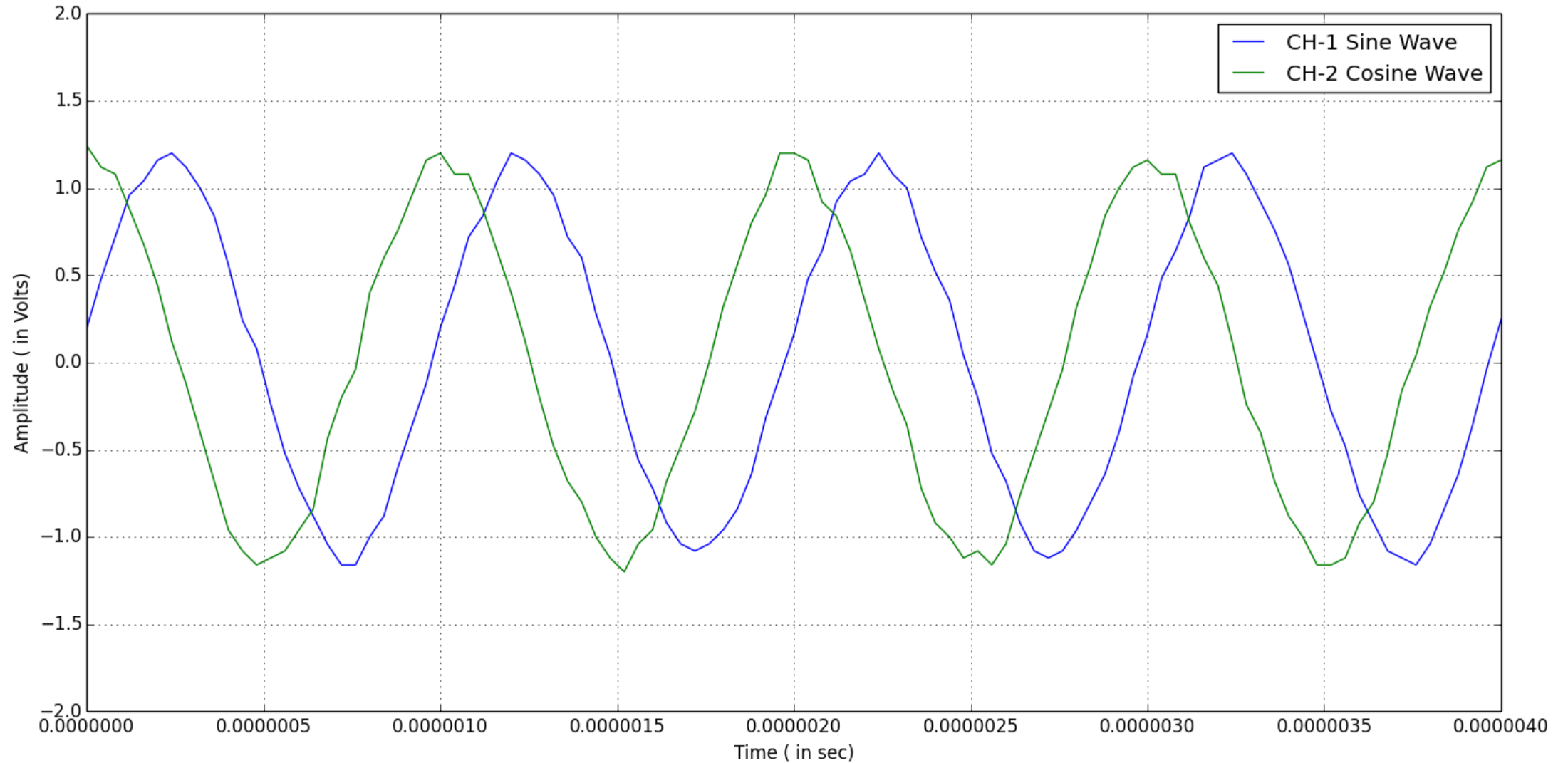


# Snapshot of setup





# Capturing two simultaneous channels on Oscilloscope



## Tasks pending for next week

- Get  $V_{\text{phase}}$  and  $V_{\text{neutral}}$  data with a single appliance from MDO.
- Compute  $V_{\text{cm}}$  and  $V_{\text{dm}}$  using  $V_{\text{phase}}$  and  $V_{\text{neutral}}$  data in MATLAB and compute FFT for this.
- Match  $V_{\text{dm}}$  results with previous results from EMI paper.