EE230: Experiment 8
Phase Sensitive Detection

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1 Overview of the experiment

1.1 Aim of the experiment

In this experiment we deal with Switch driving circuits.We vary the phase shift between two waves by varying the resistance at the input terminal.We also test this circuit by passing it through a low pass filter. We made the frequency response for that low pass filter.
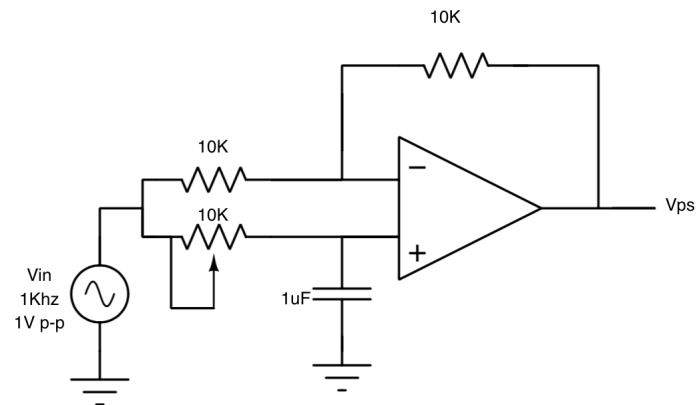We do PSD as it is very important for any signal conditioning

1.2 Methods

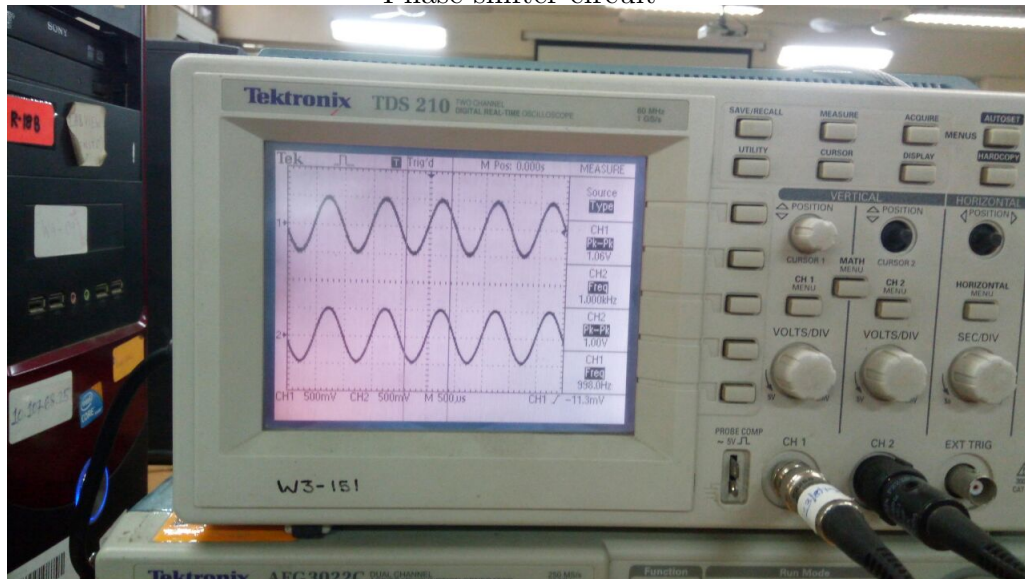We do PSD as it is very important for any signal conditioning
We used a phase shifter, low-pass filter, switched-based psd and a switch driving circuit to implement our design.
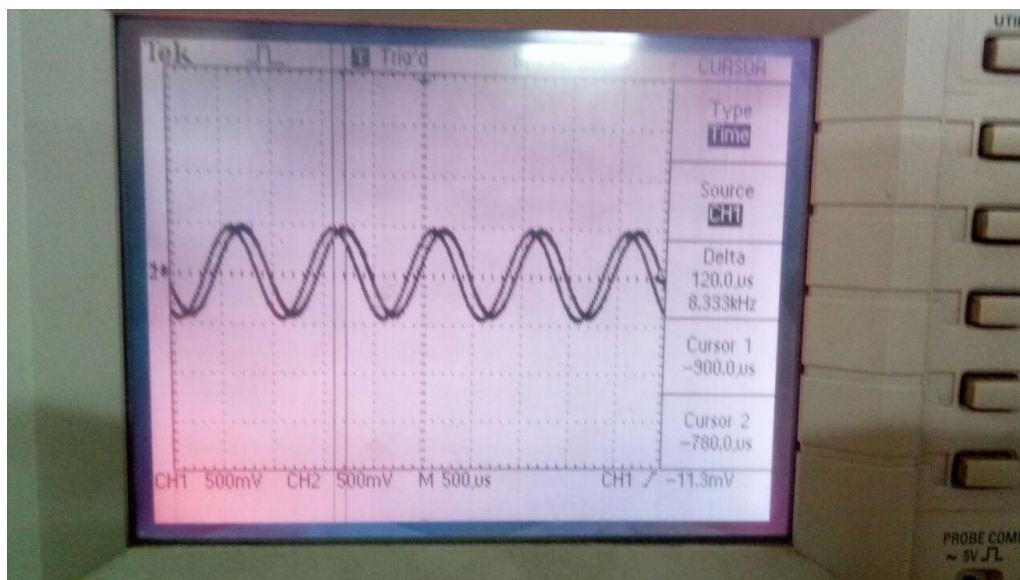
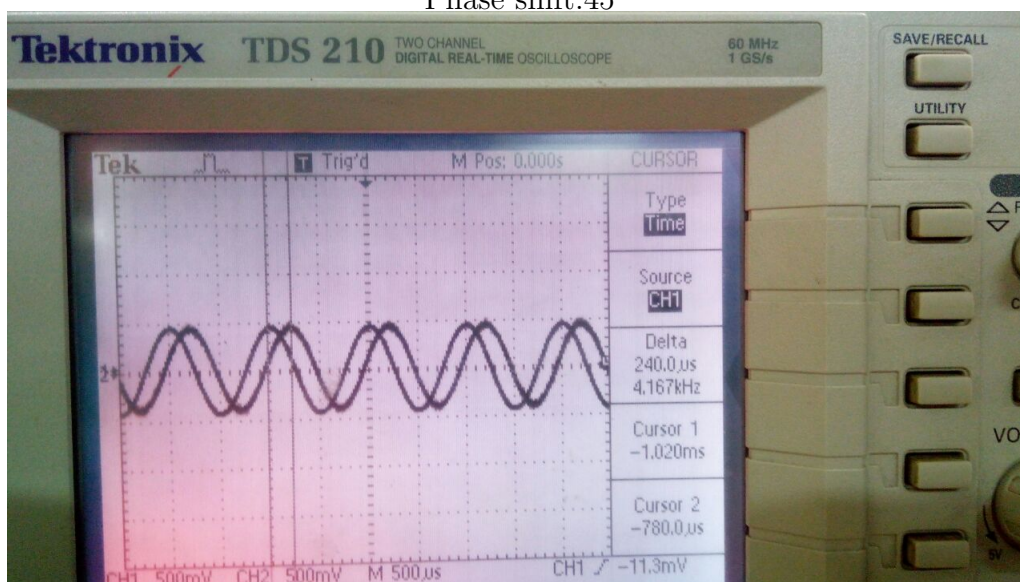# 2 Experimental results

2.1 Phase shifter circuit
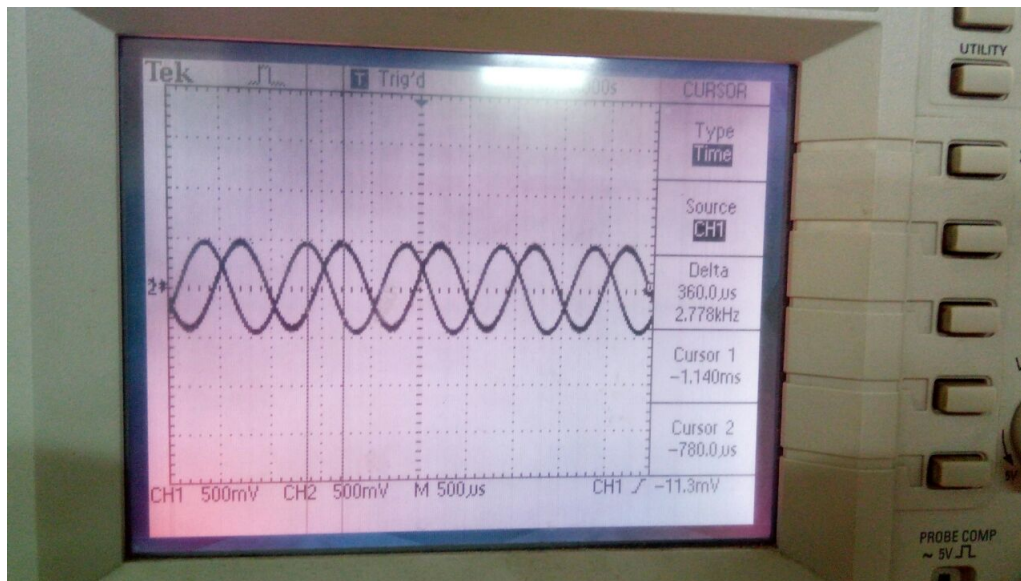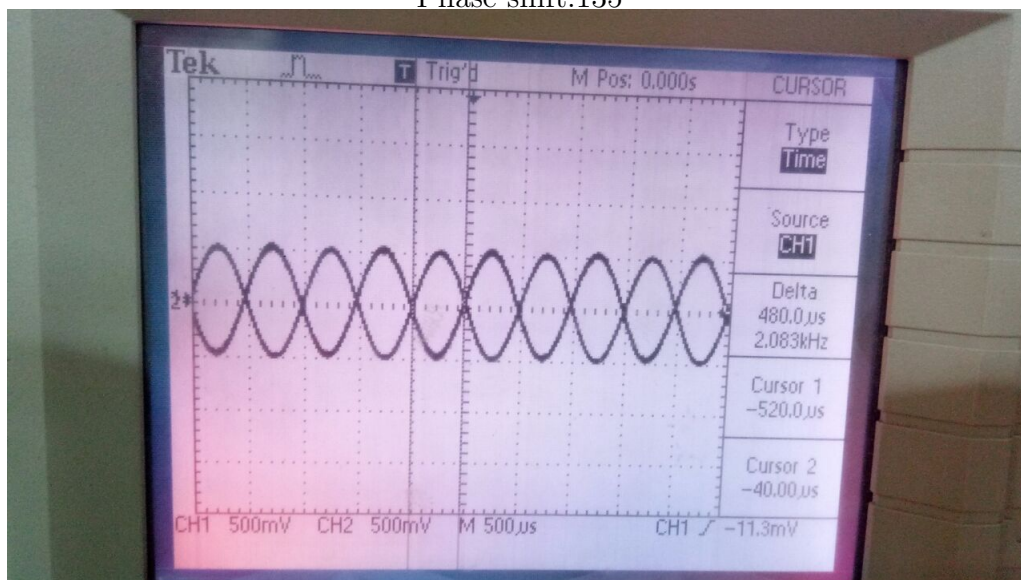

Phase shifter circuit

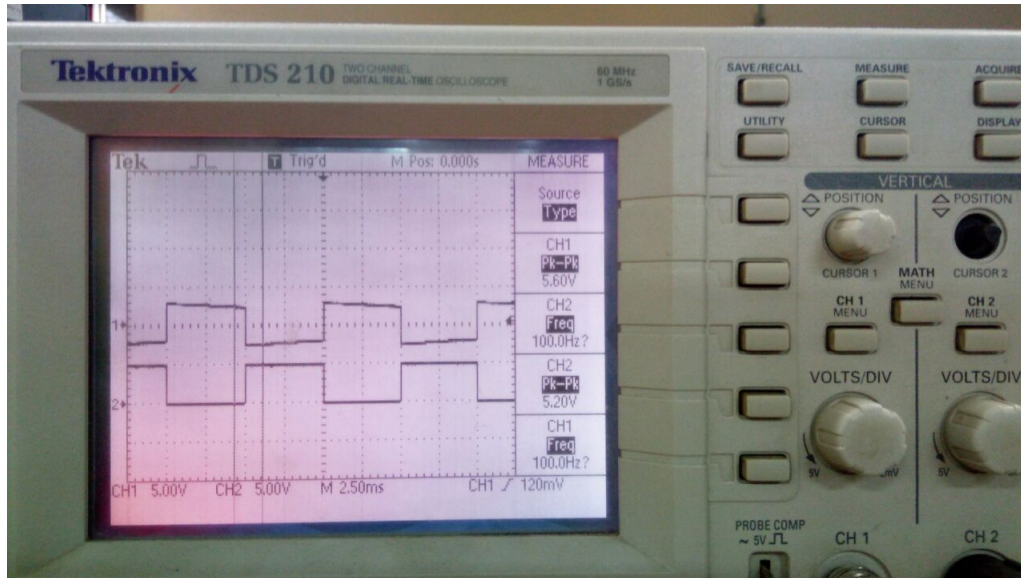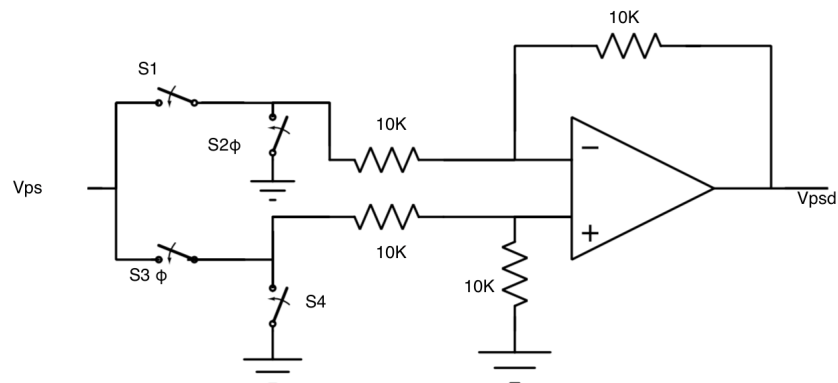Phase shift:0

Phase shift:45

Phase shift:90

3

Phase shift:135

Phase shift:180
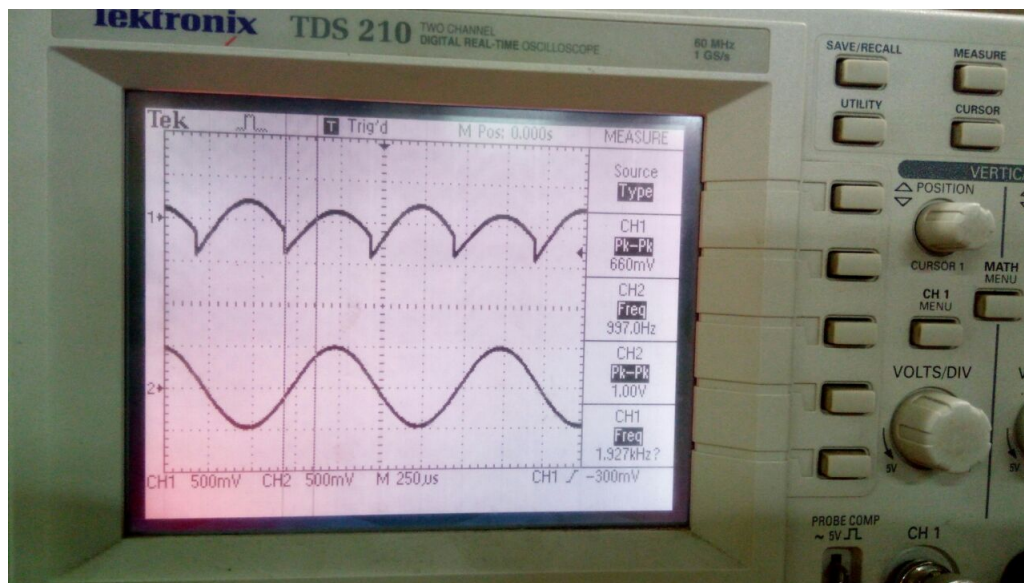
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2.2 Switch driving circuit

We can see that both the waves are 180 phase shifted. They are not perfectly square shaped due to irregularities in the not gate.
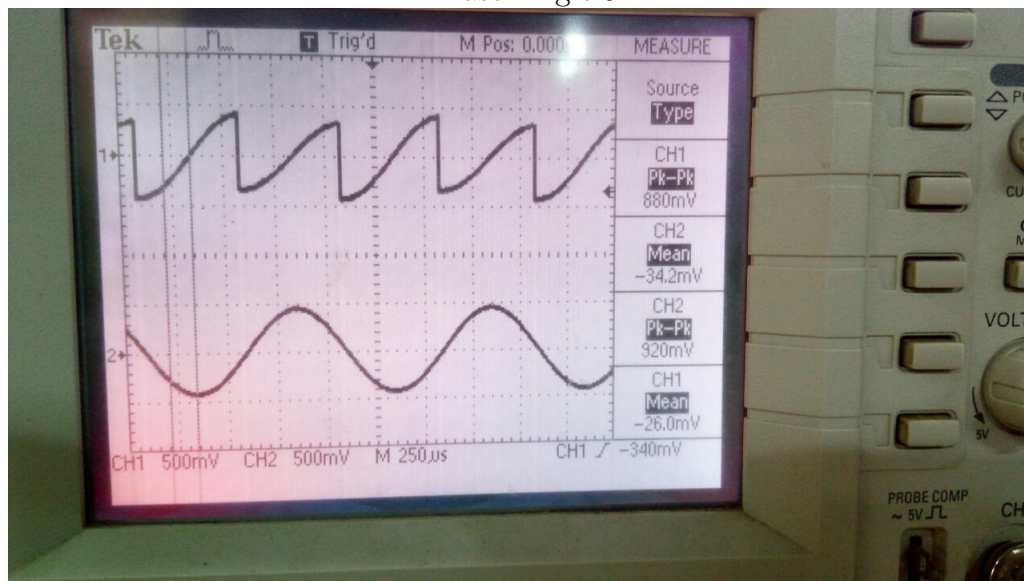
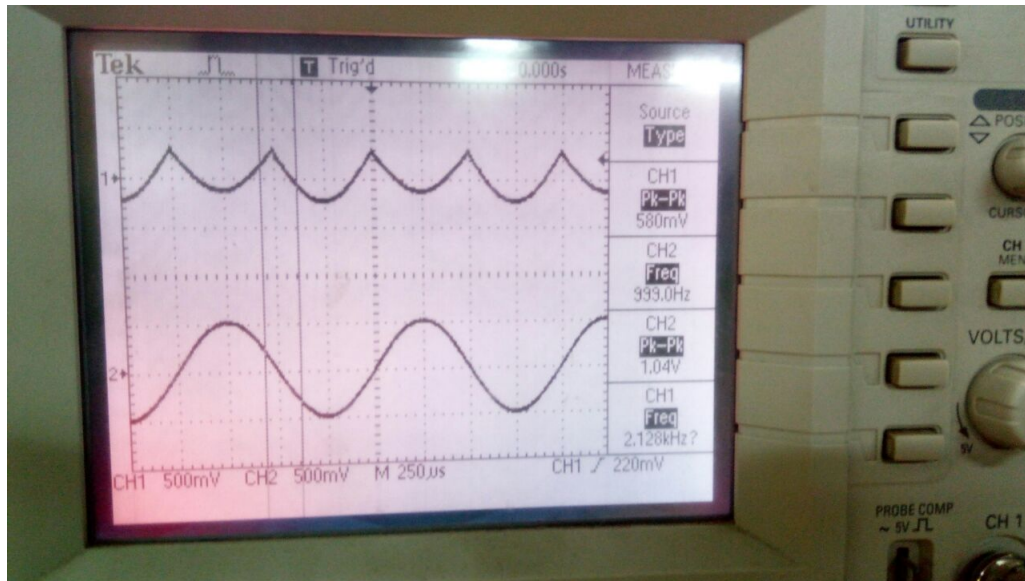## 2.3 Switch based phase sensitive detection circuit-1

S1 and S4 are complementary with S2 and S3

Phase Angle:0

Phase Angle:90

Phase Angle:180
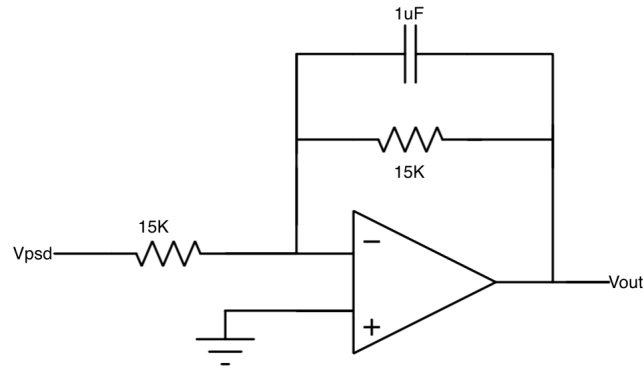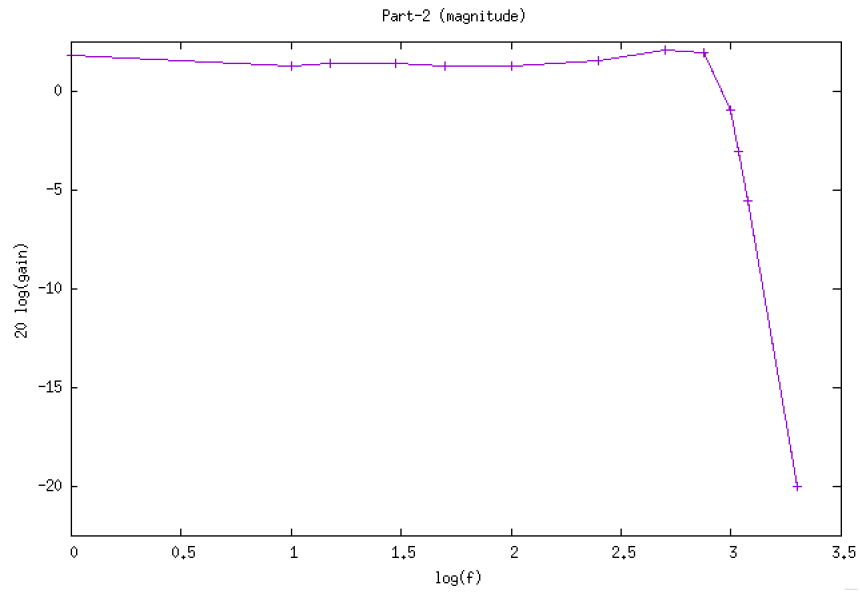
What challenges did you face in performing this part of the experiment?

Measure the average value of the output of the phase shifter Vpsd in each of the three cases.

Phase Shift	Mean Value mv
0	275
90	70
180	-305

2.4 Low pass filter-1

Transfer Funtion:$\frac{R}{R(wCR+1)}$
Cutoff Frequency:$\frac{1}{2\pi CR} = 9.55hz$

Frequency(hz)	Amplitude(in V)
1	1
3	1
5	1
7	1
8	1
9	0.92
10	0.72
13	0.634
15	0.568
20	0.48
40	0.268
60	0.188
80	0.15
100	0.12
130	0.098
160	0.086
200	0.078
250	0.064
300	0.06
400	0.044
500	0.04

The slope comes out to be 15.5db/dec . The circuit had only one pole so the slope will be less .But theoretical it should be around 20db/dec.

cutoff frequency:10 hz

We can see that there is only a minute difference between theoretical value(9.55hz) and experimental value=10hz. This occurs due to the fact that we can vary the frequency in steps of one only
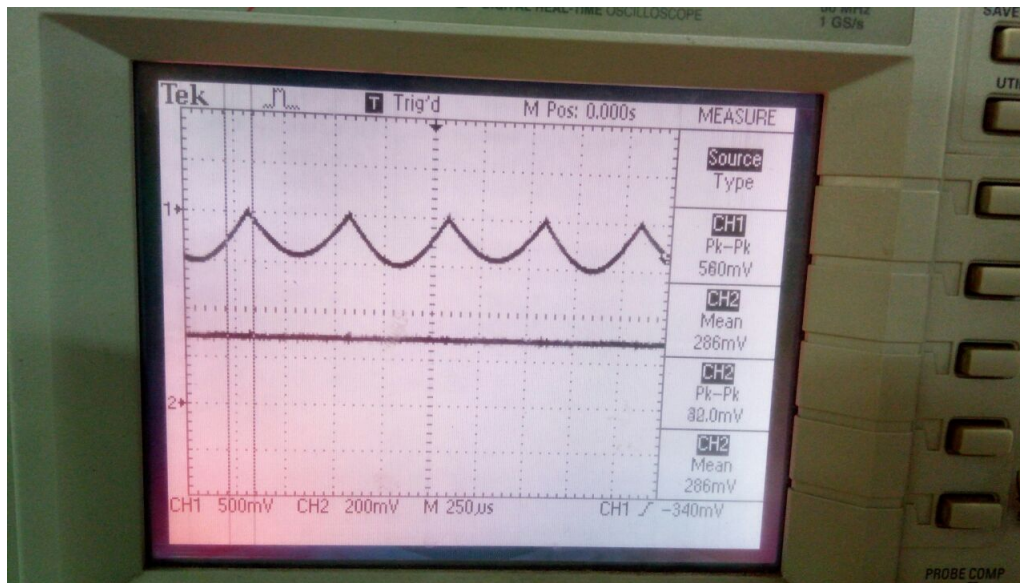
2.5   The complete PSD
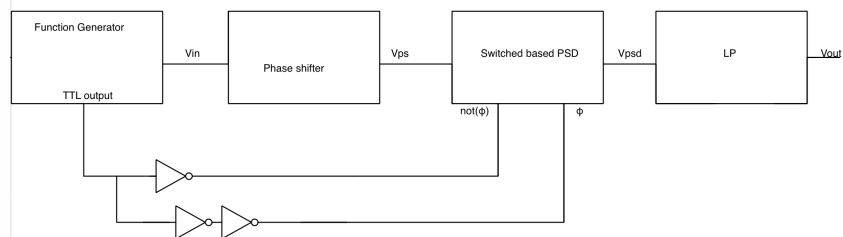
Phase Angle:0

Phase Angle:90

Phase Angle:180

Phase Shift	without low pass filter(mV)	with low pass filter(mV)
0	275	-259
90	70	-42
180	-305	286

table: Average values of the output signal