CT303 LAB REPORT

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Lab-6

OCTOBER 29, 2023

DAIICT

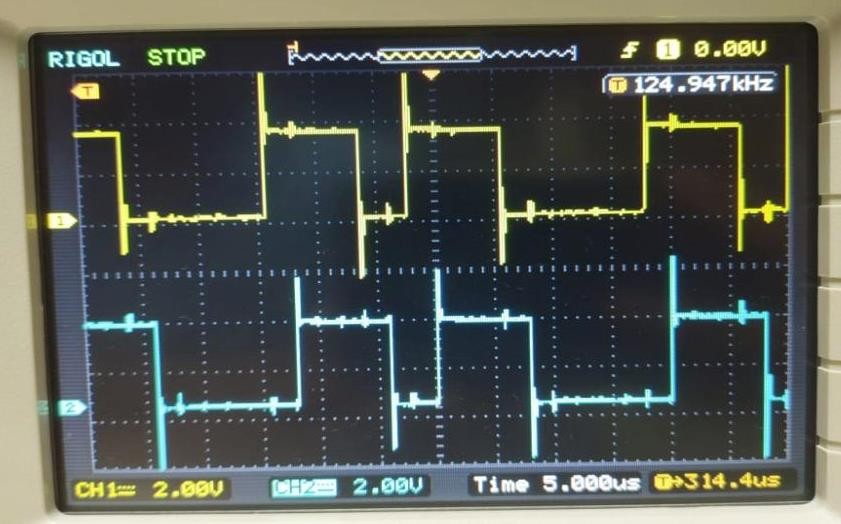
**Experiment -1**

**Problem 1:**

**CH 1: DATA CLK (266 KHz) & CH 2: SERIAL DATA (00011011)**



**CH 1:DATA IN& CH 2:NRZ-L**



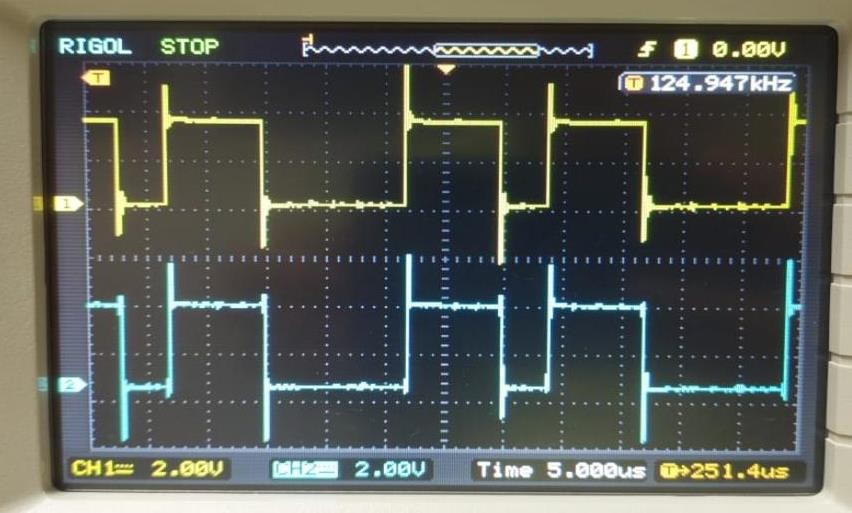
**CH 1: DATA IN& CH 2: NRZ-M**



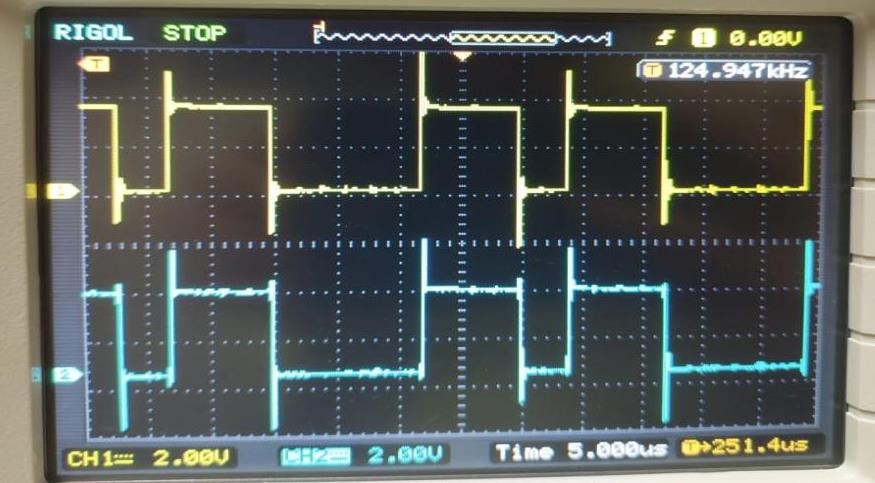
**CH 1: DATA IN& CH 2: NRZ-S**

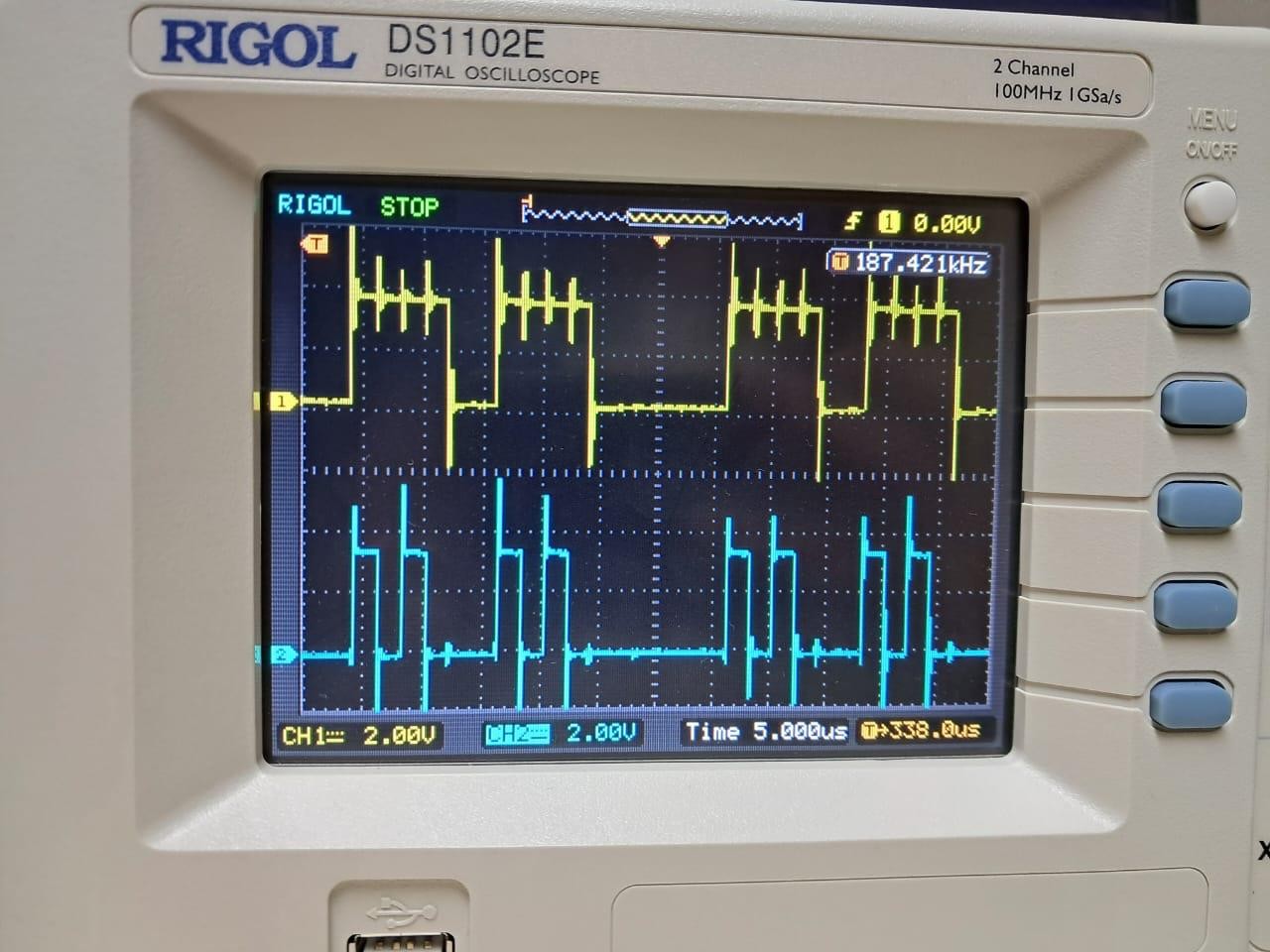


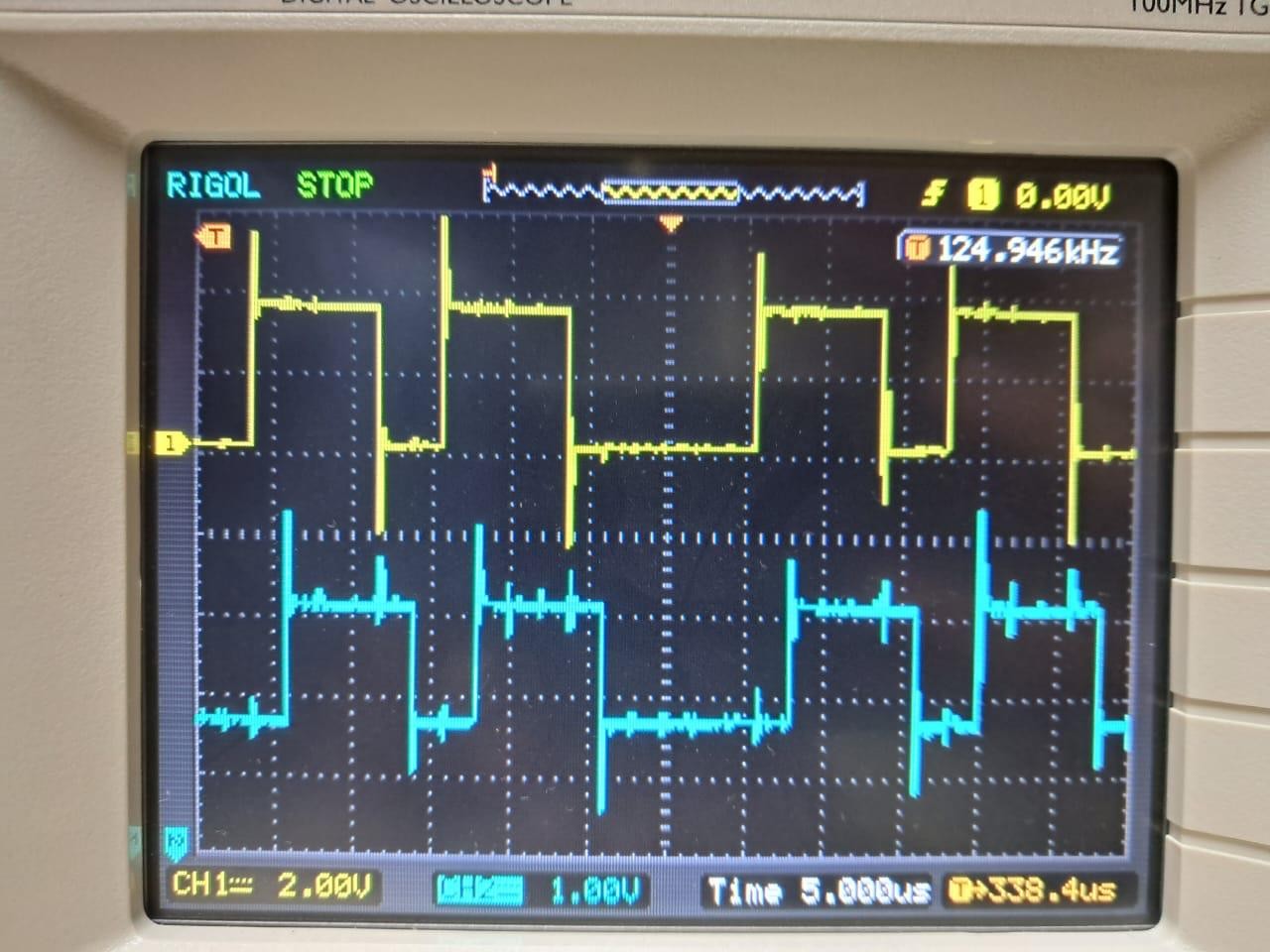
**CH 1:DATA IN& CH 2: OUT1**

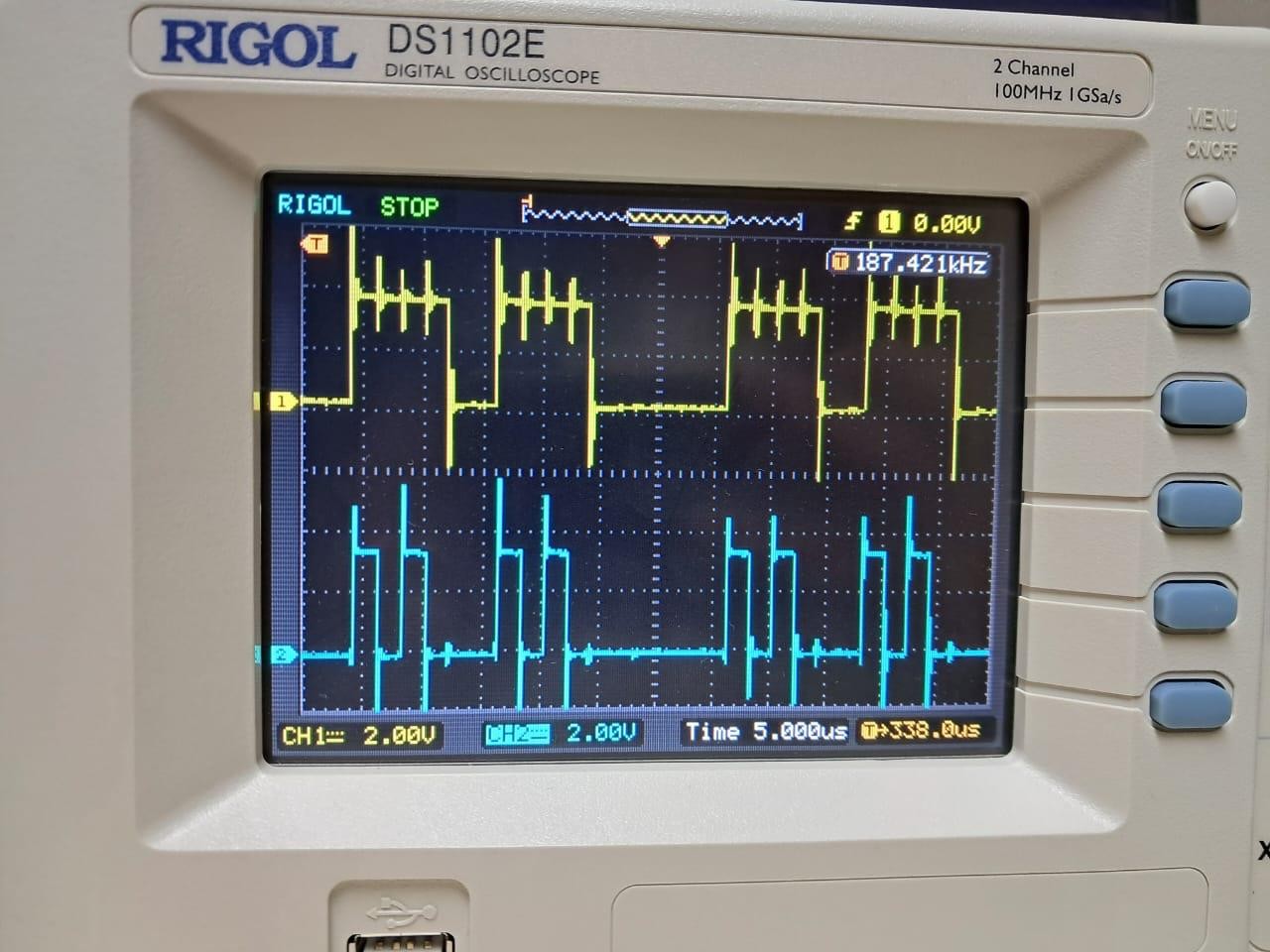


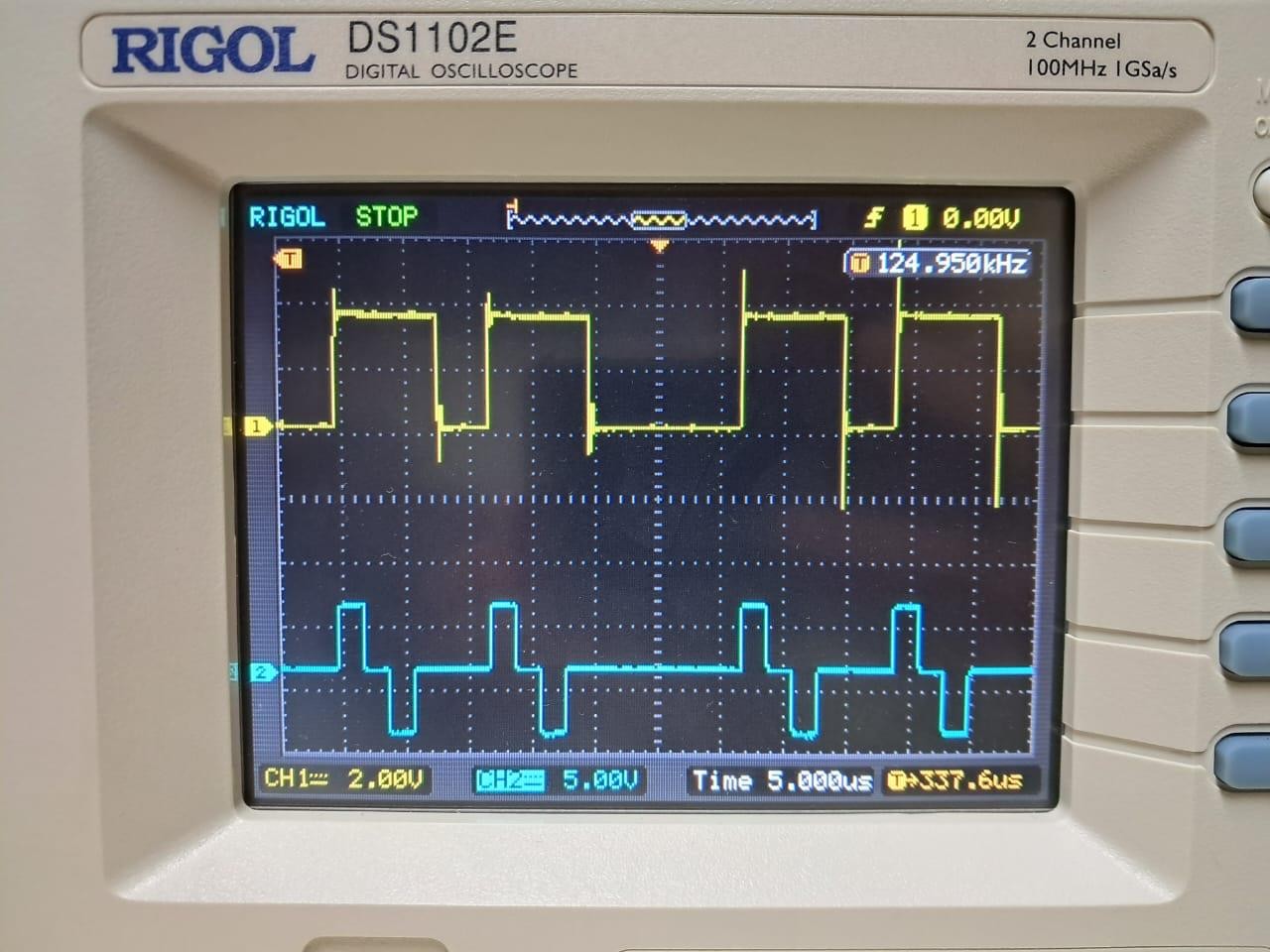
**CH 1: DATA IN& CH 2: OUT2**

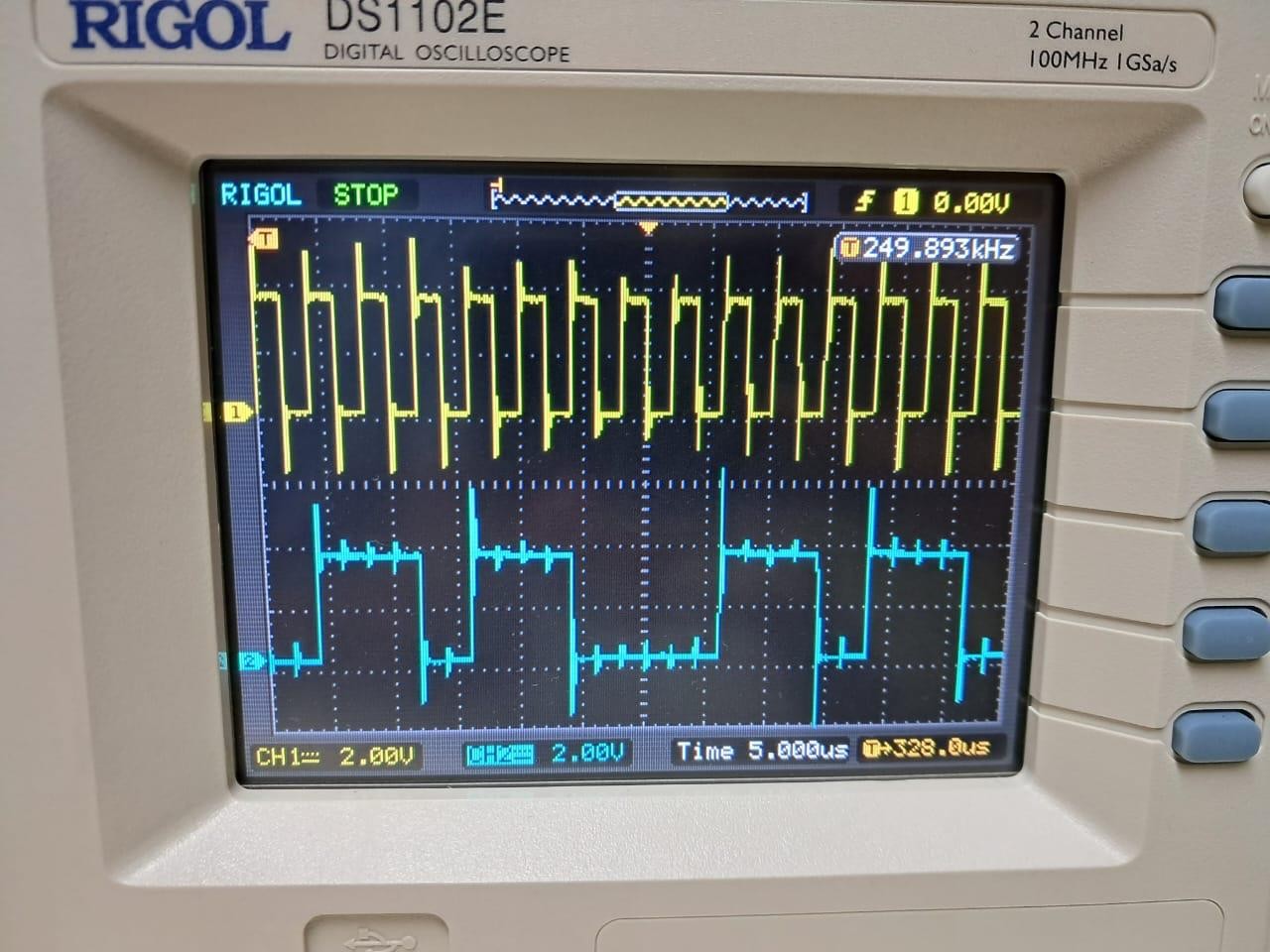


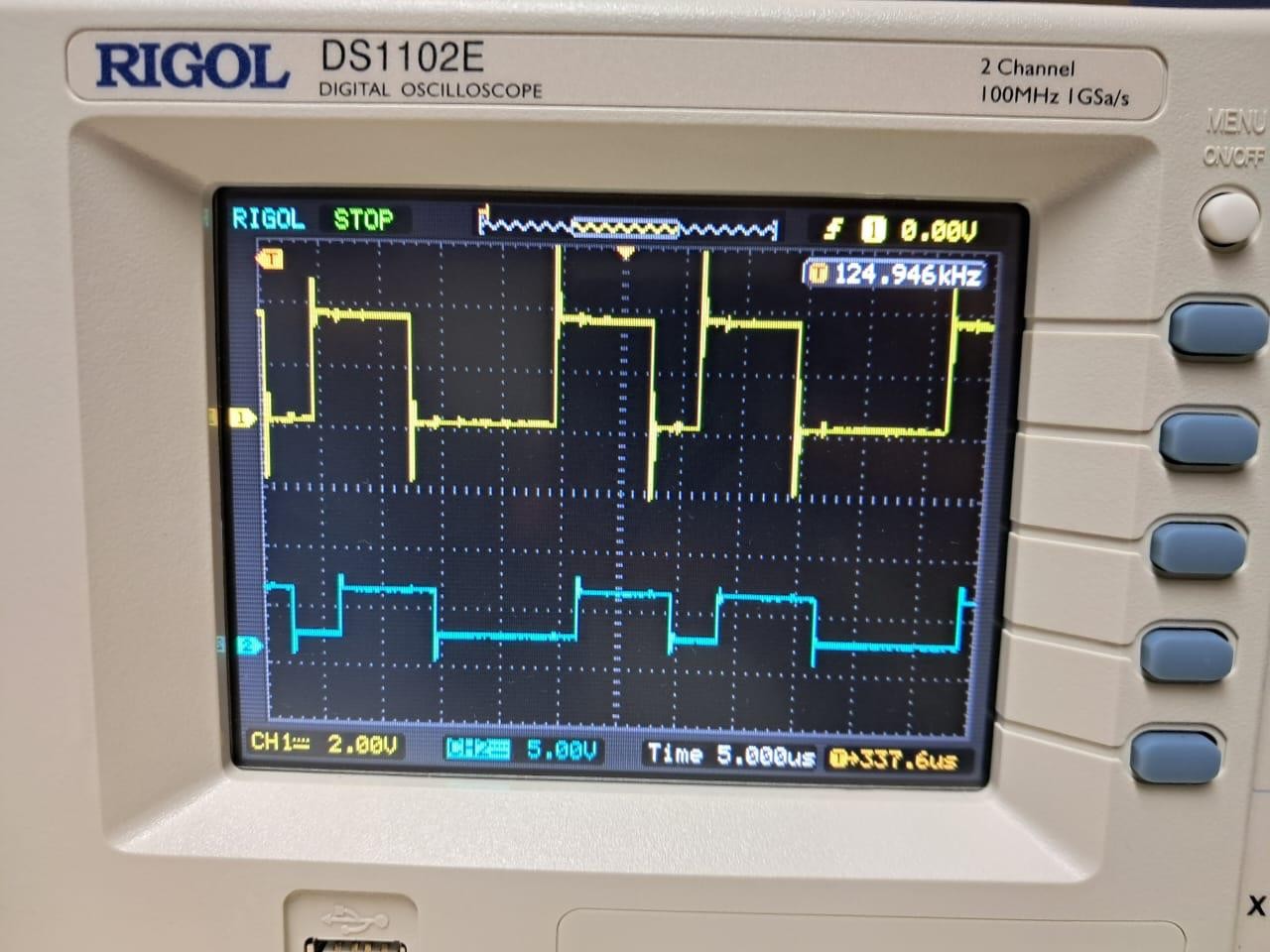


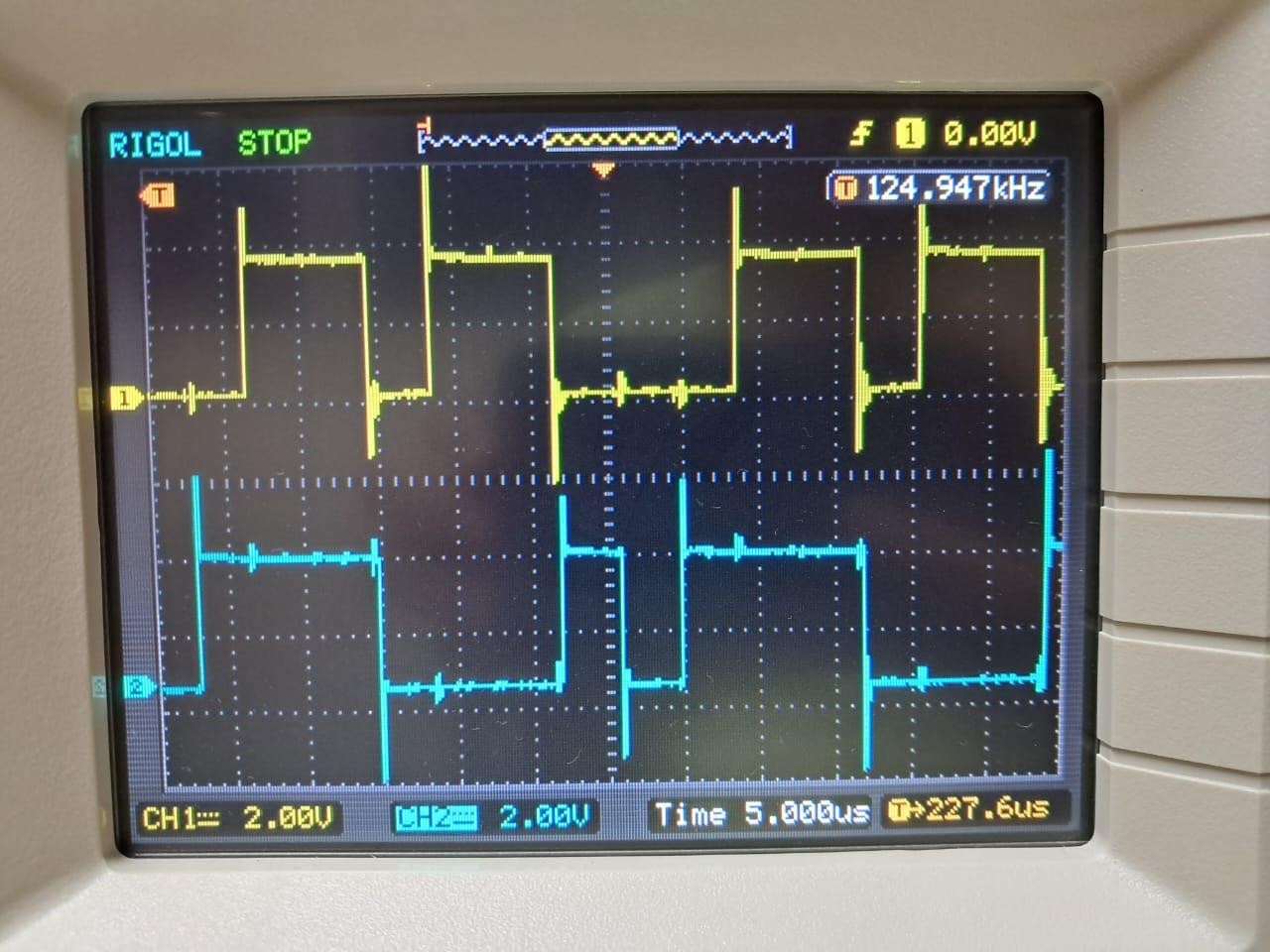


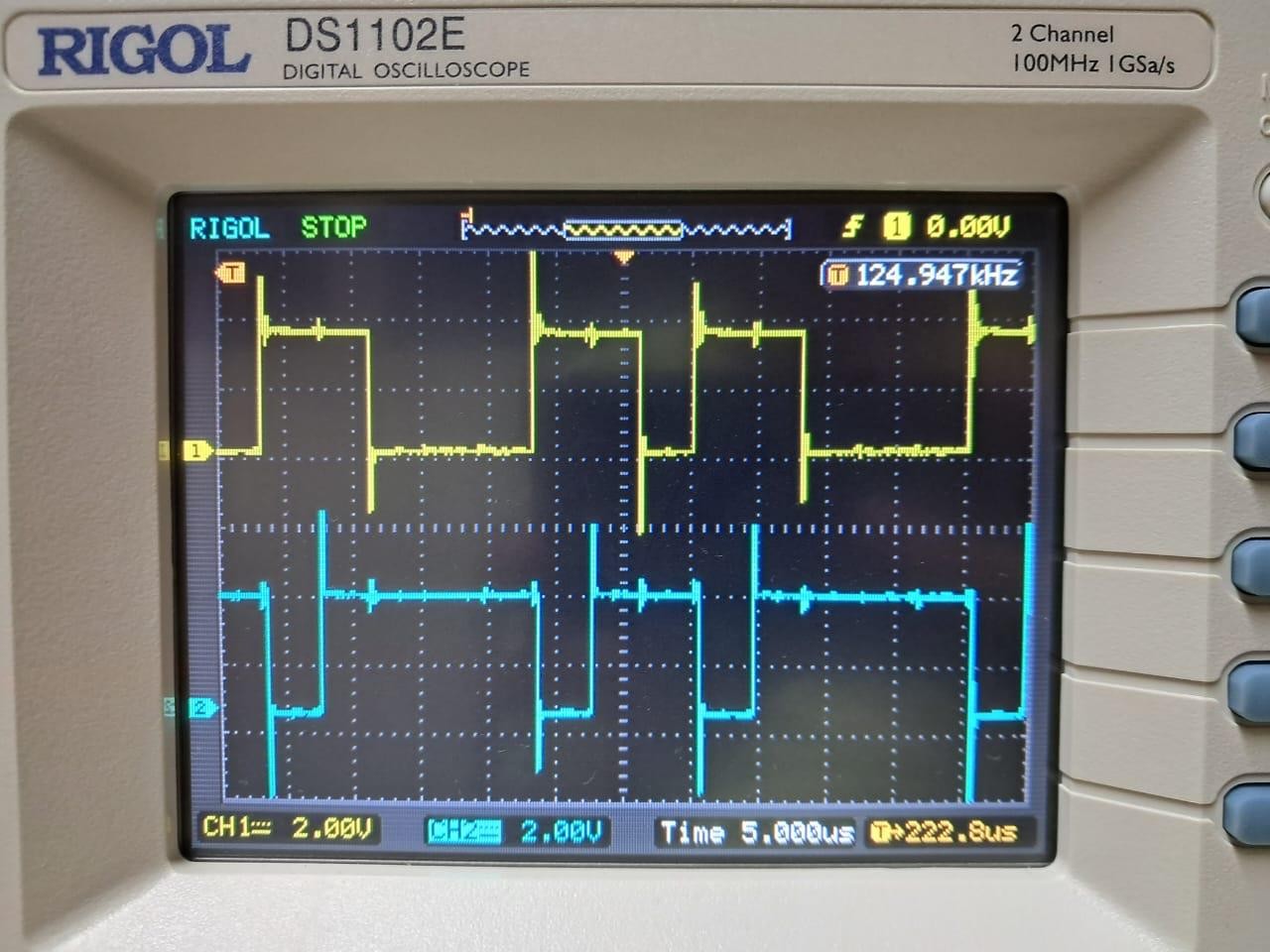


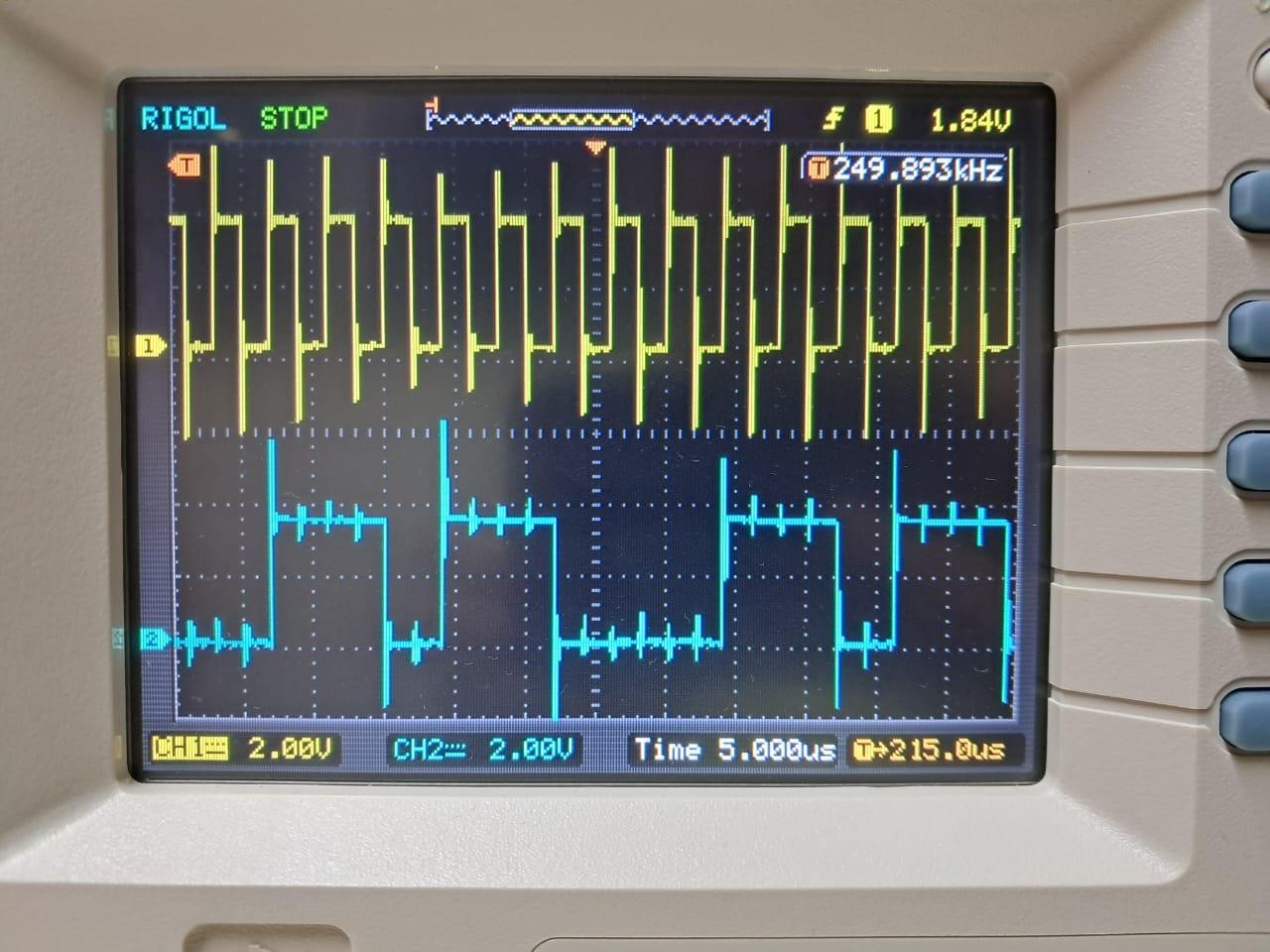


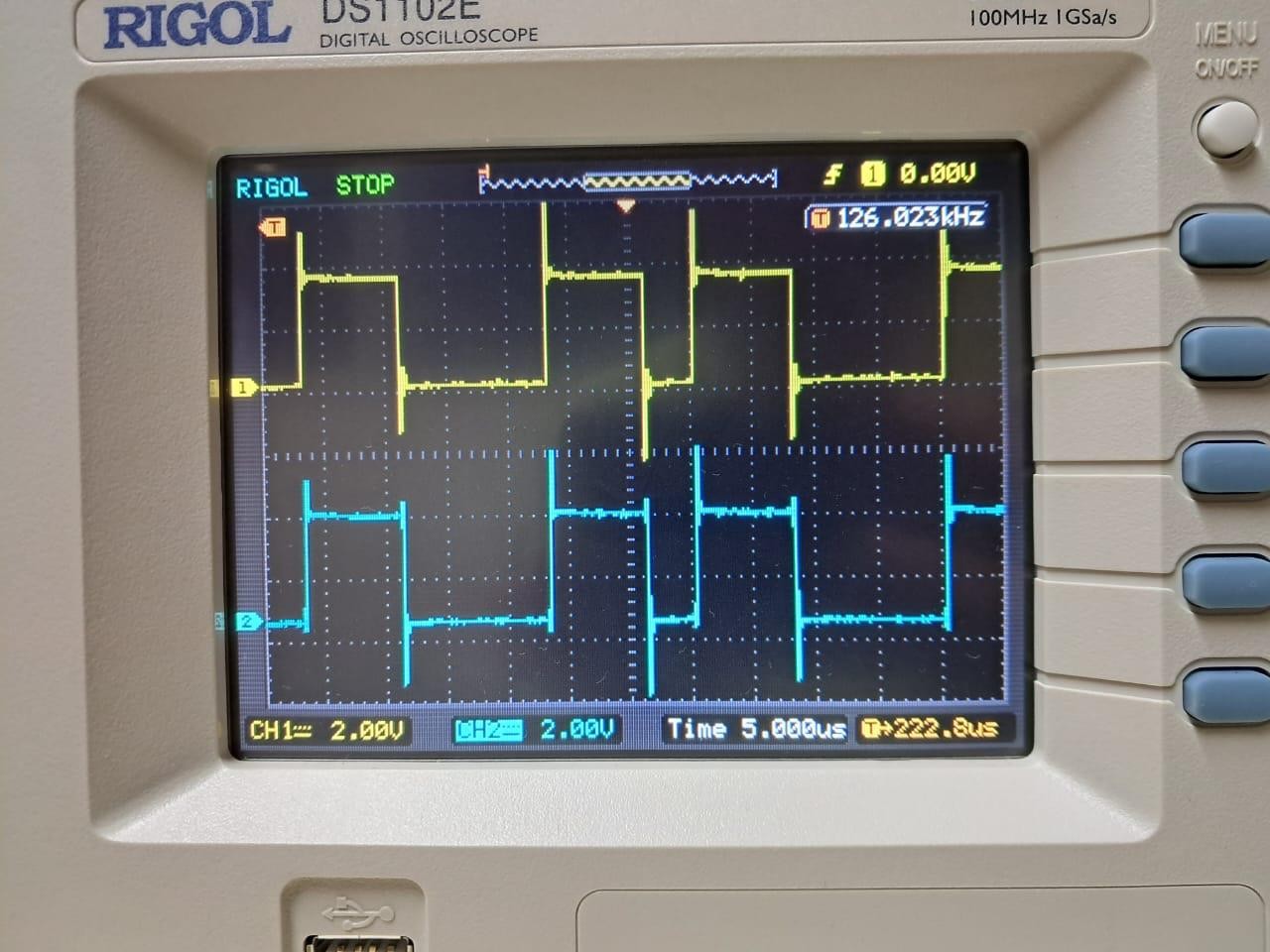


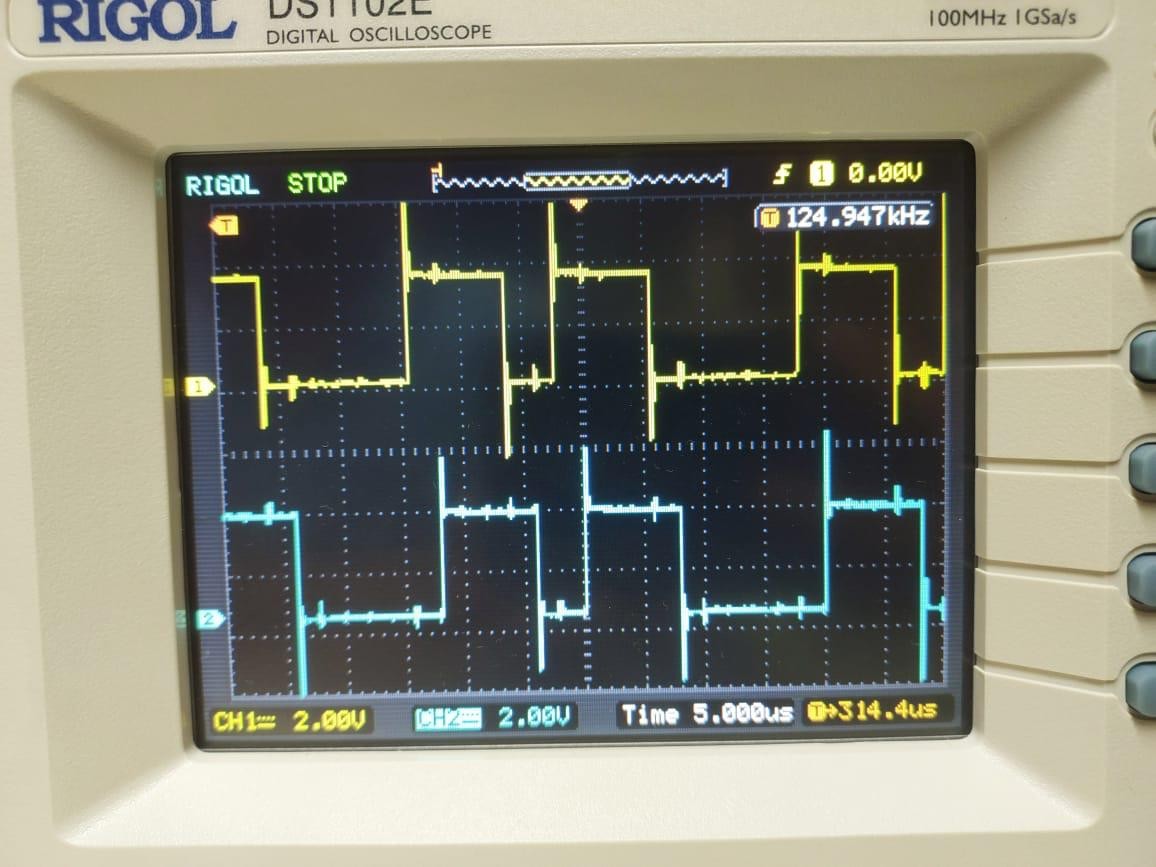


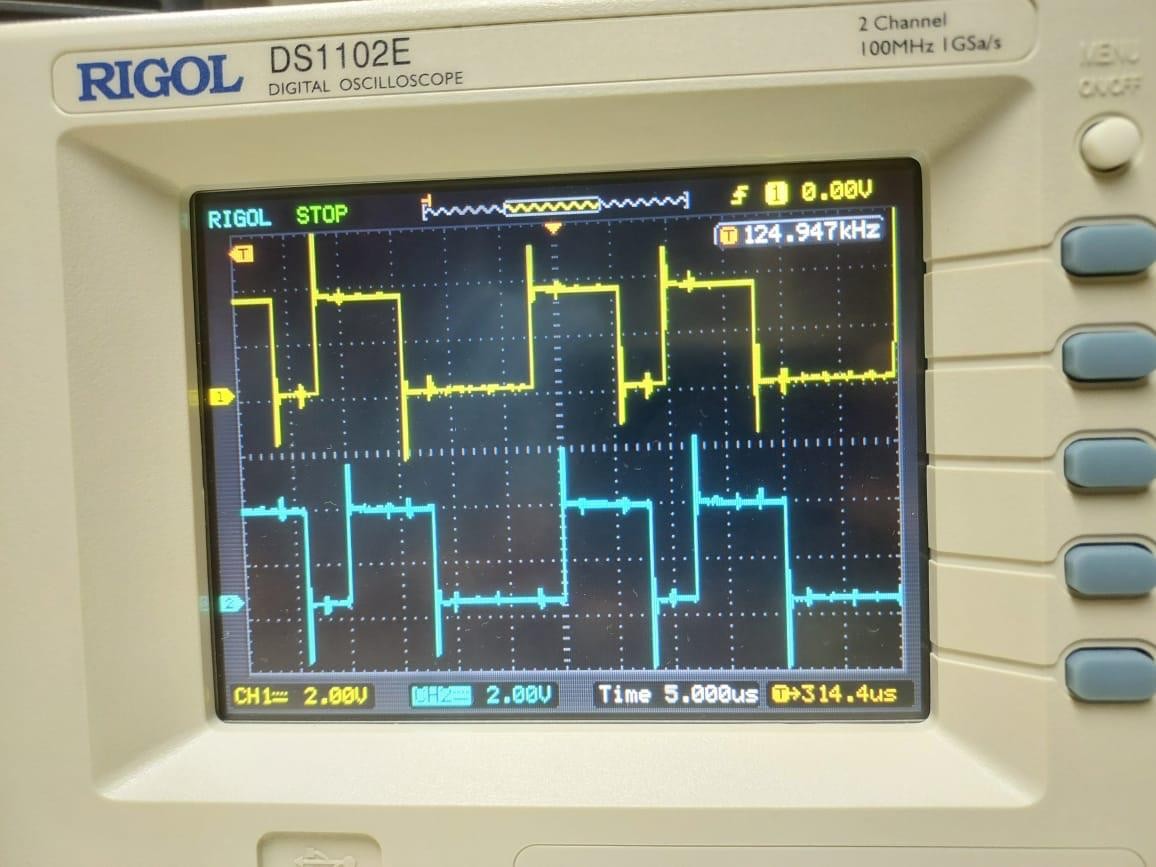


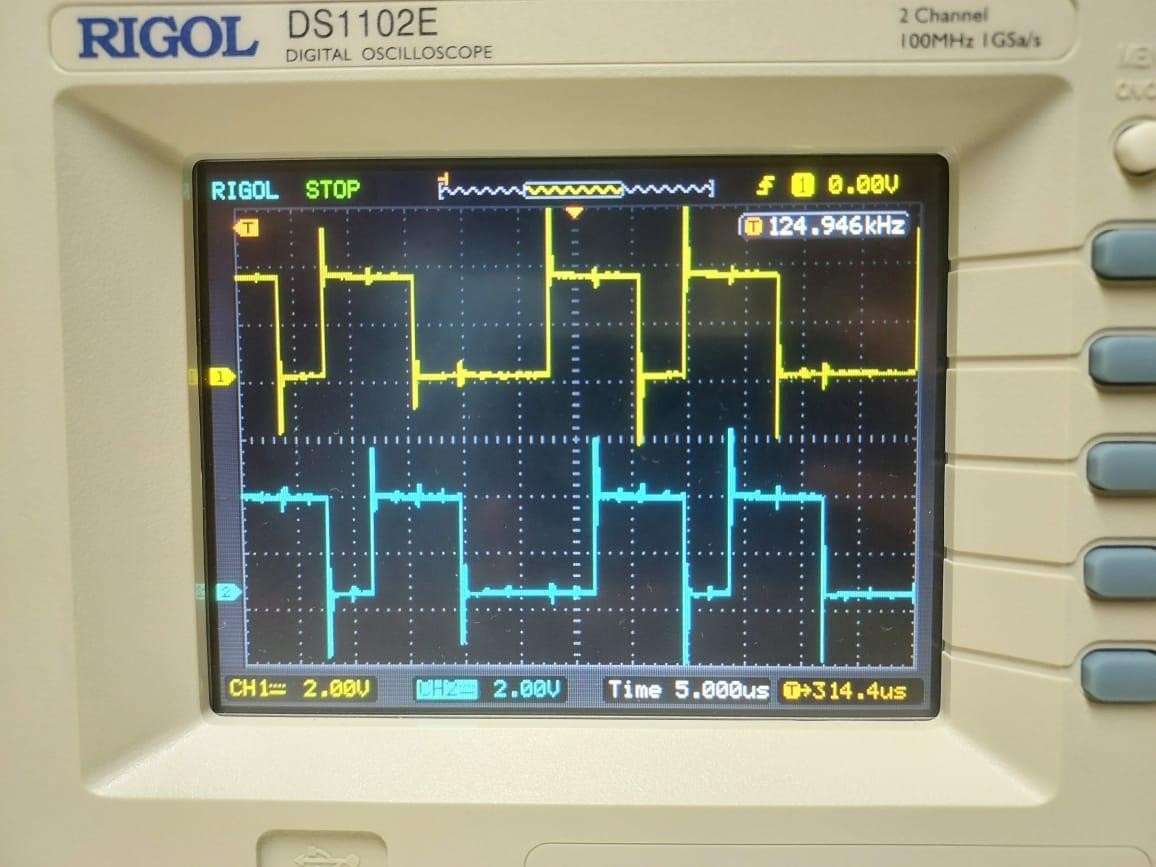


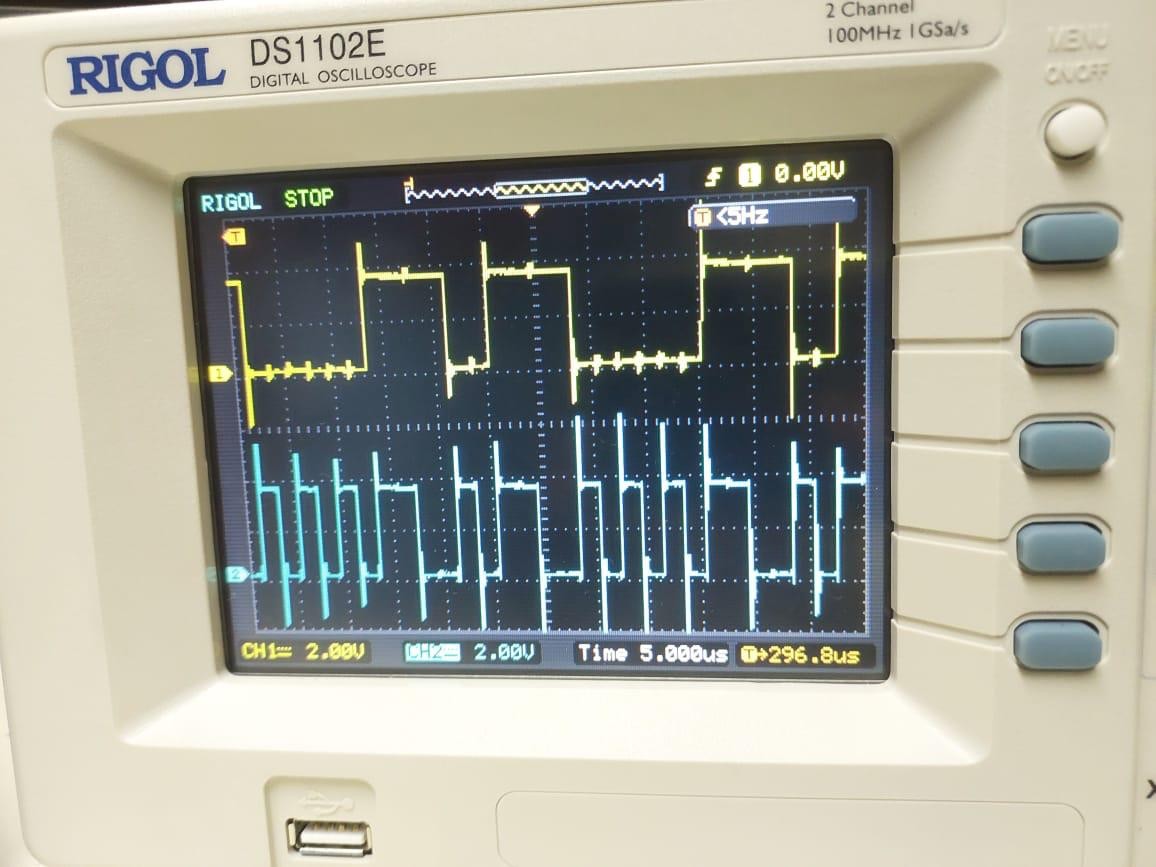


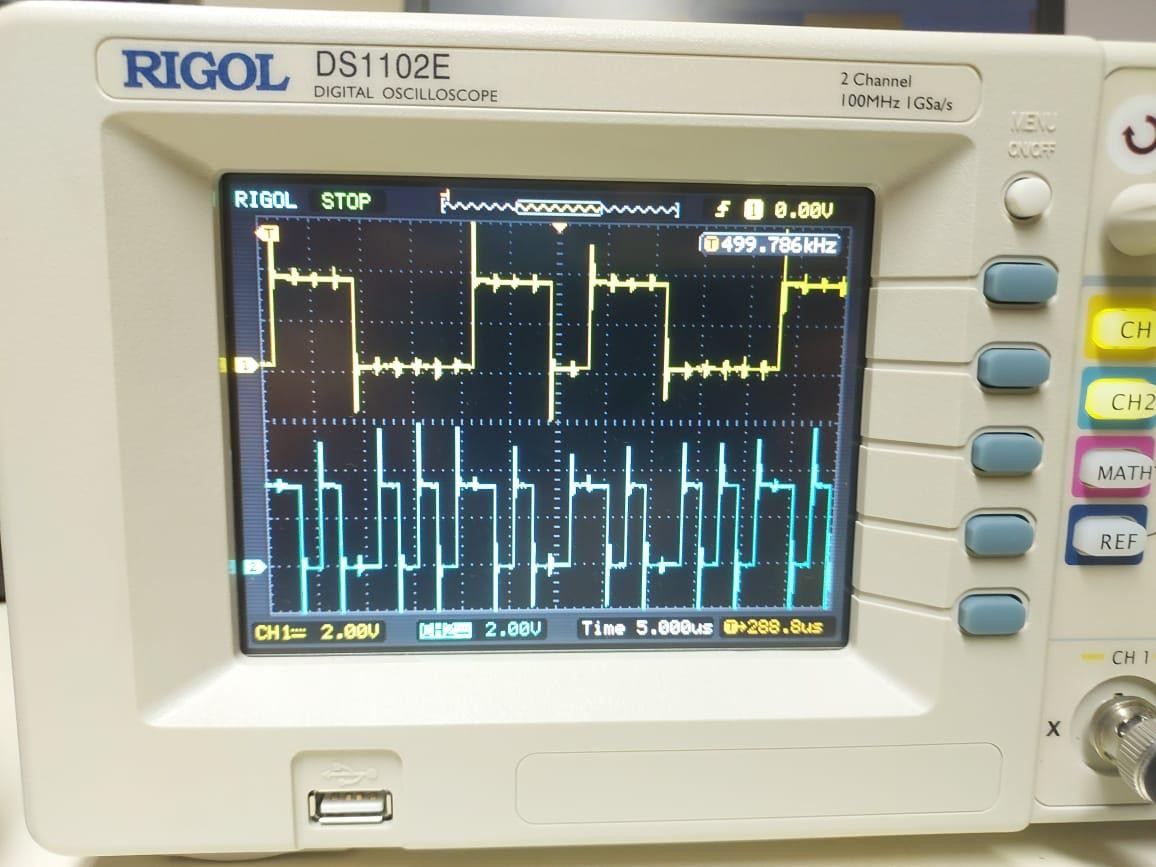


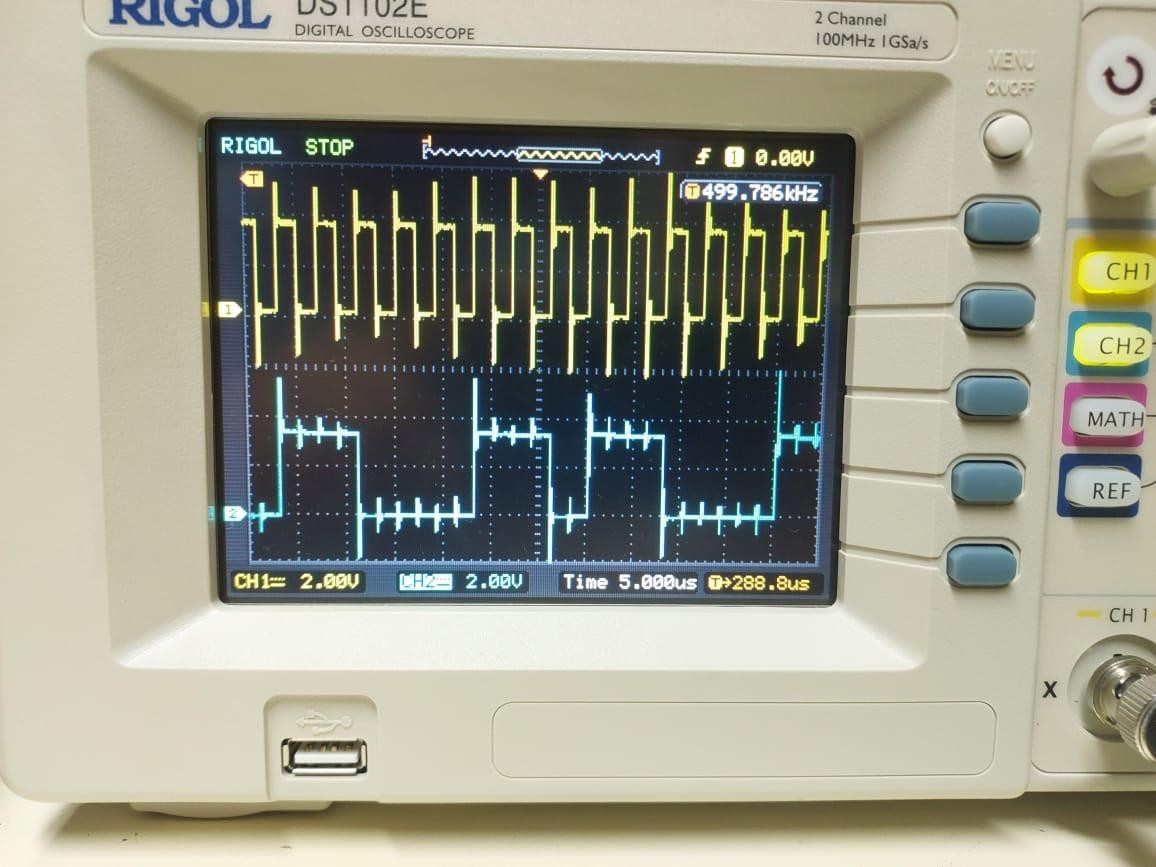


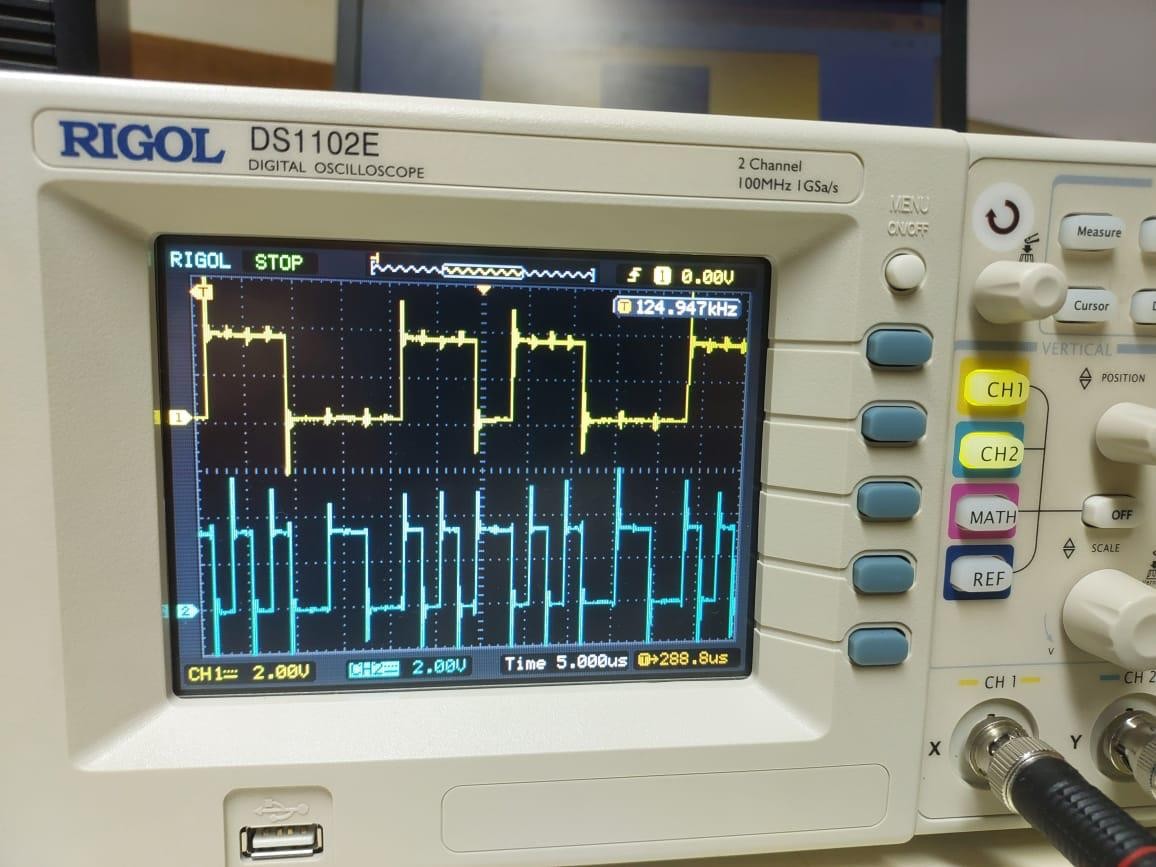


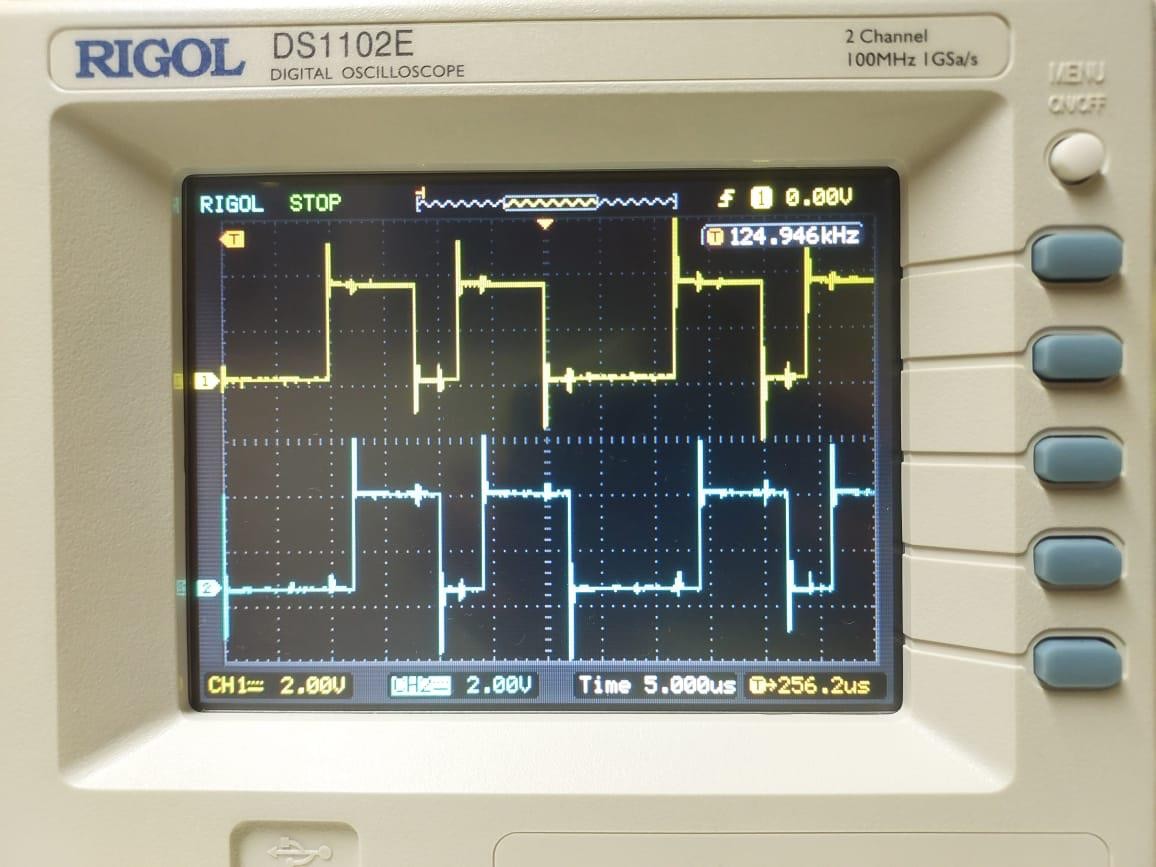


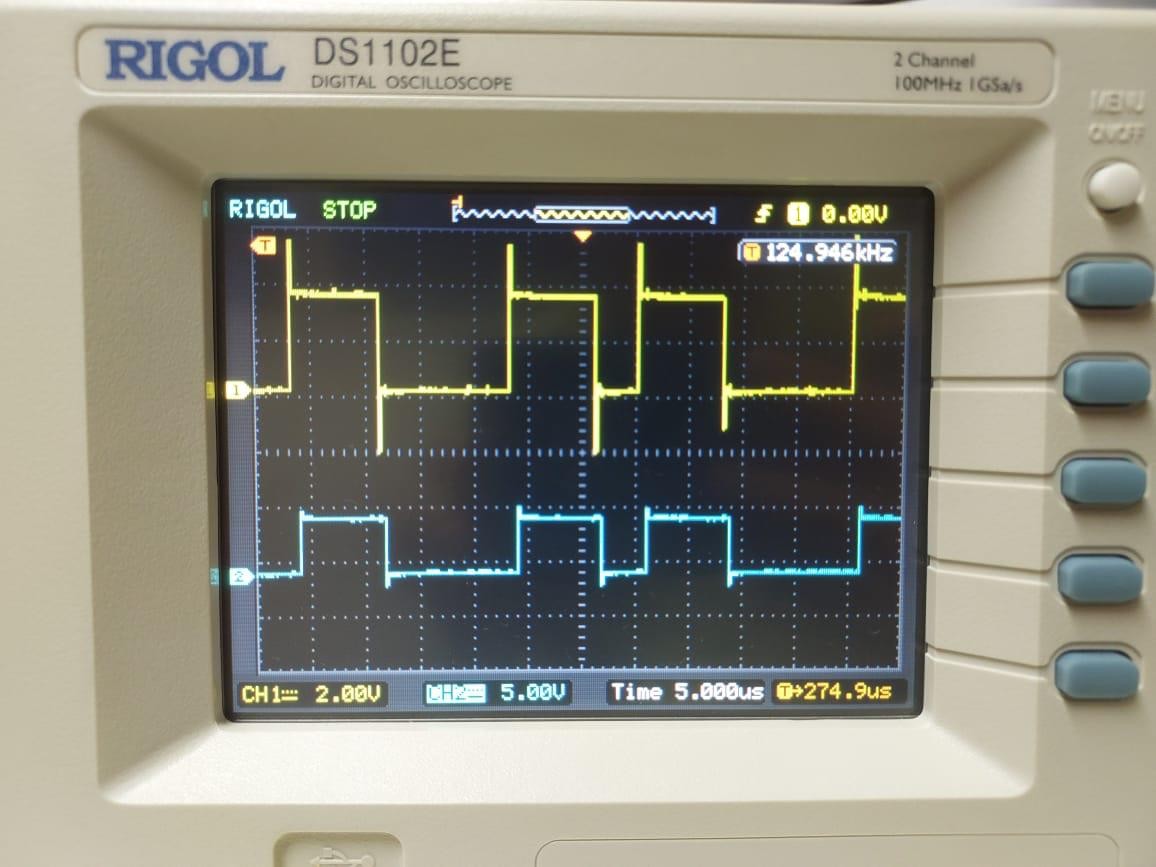


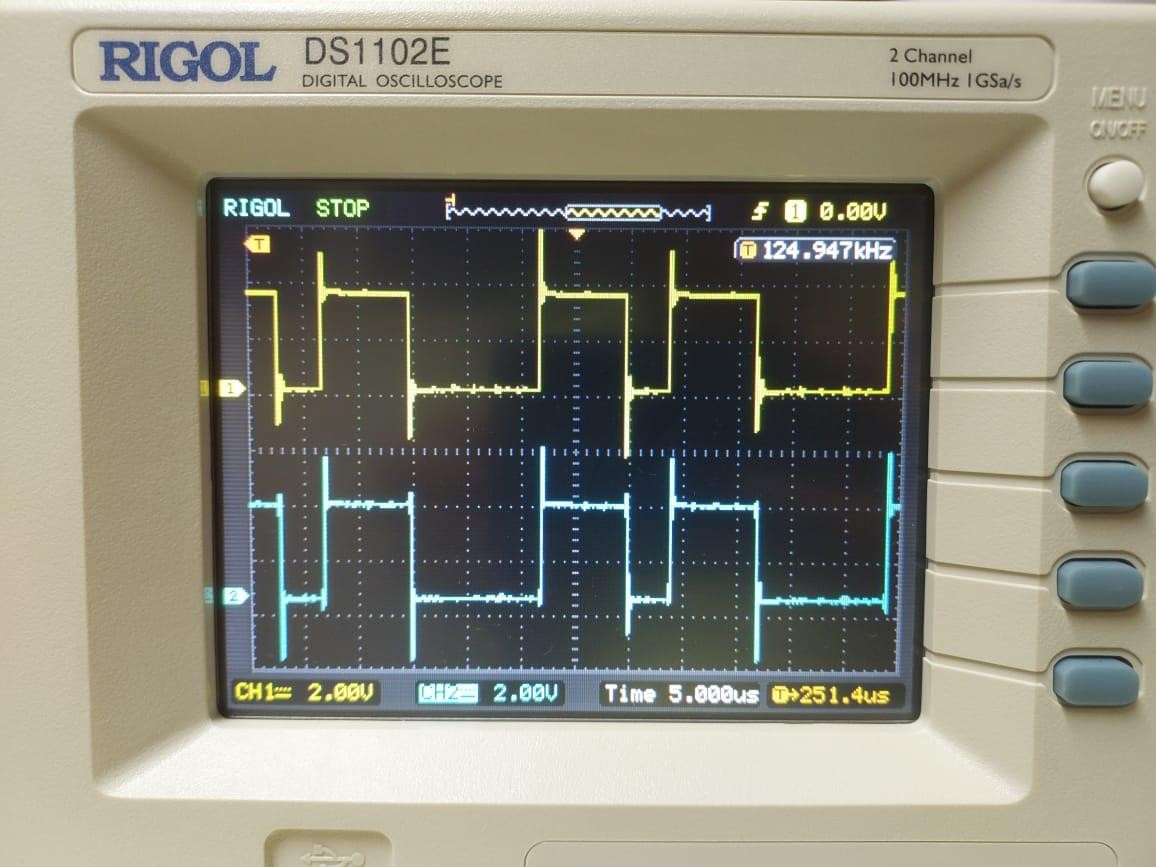


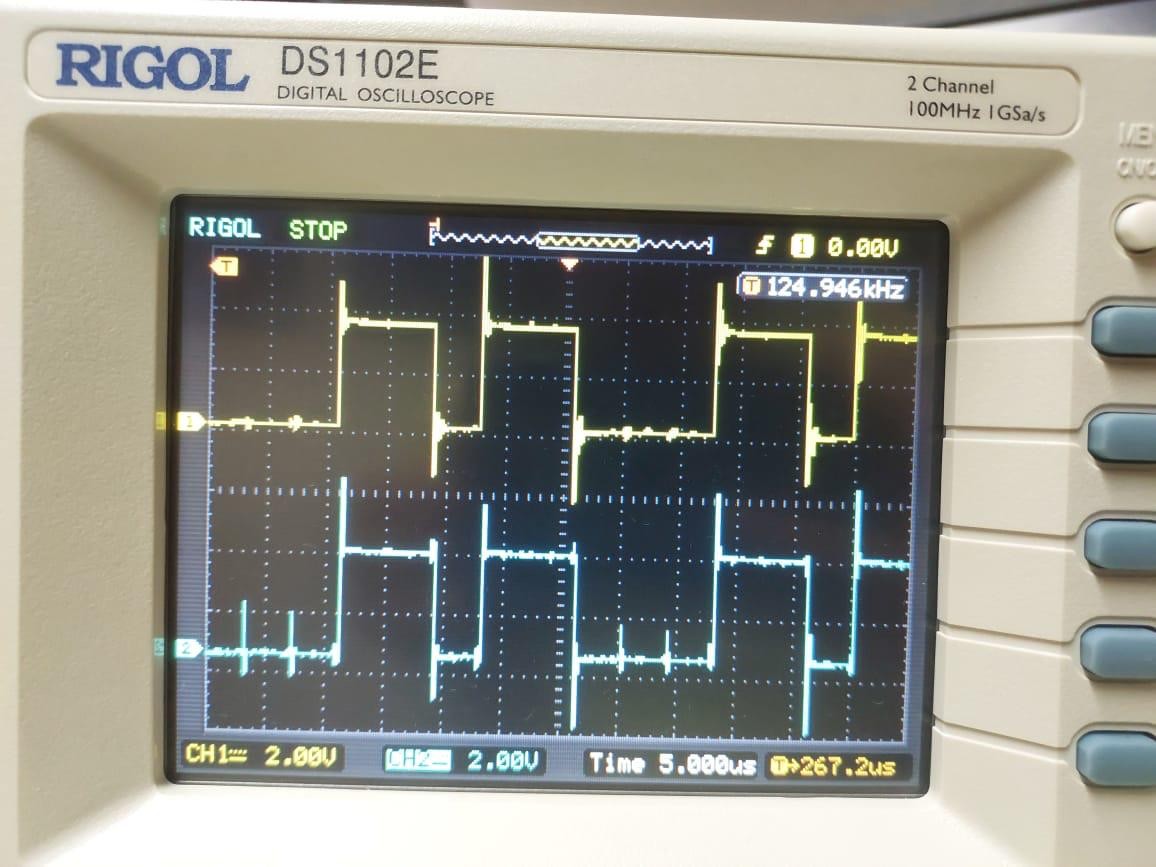


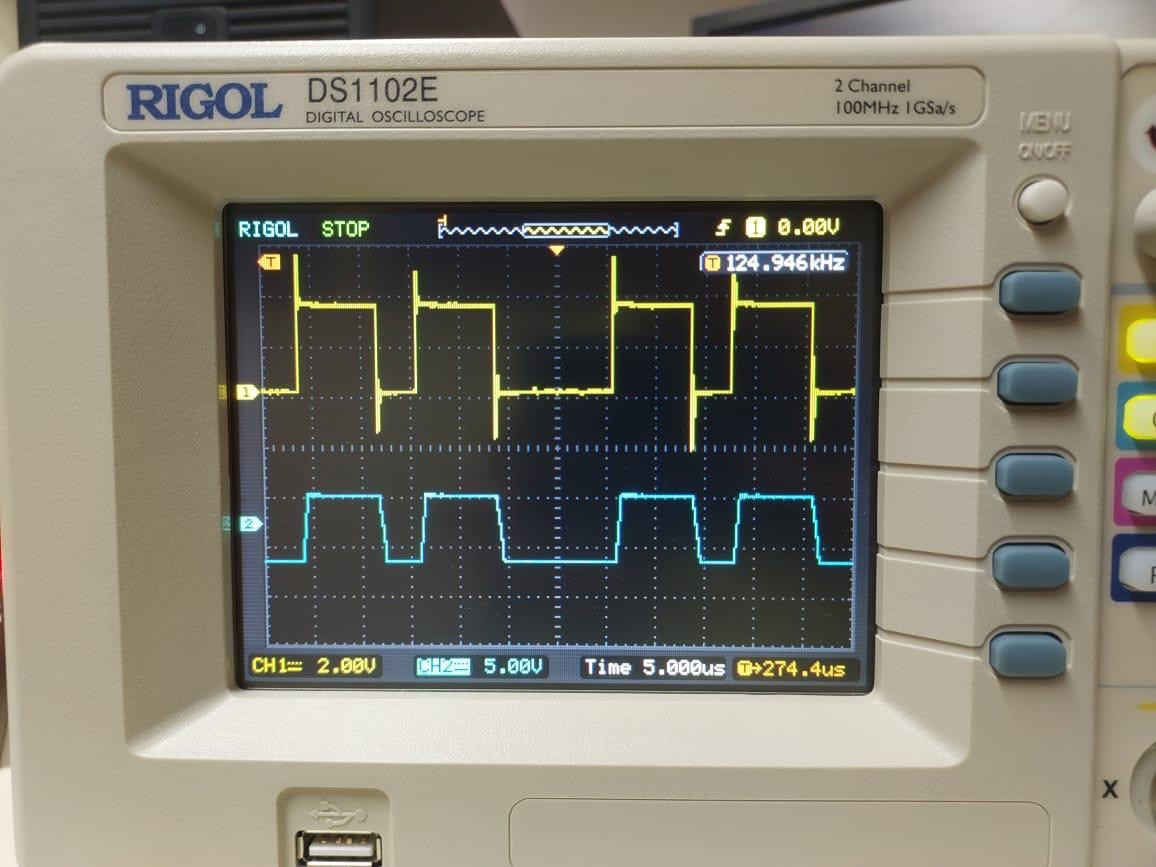


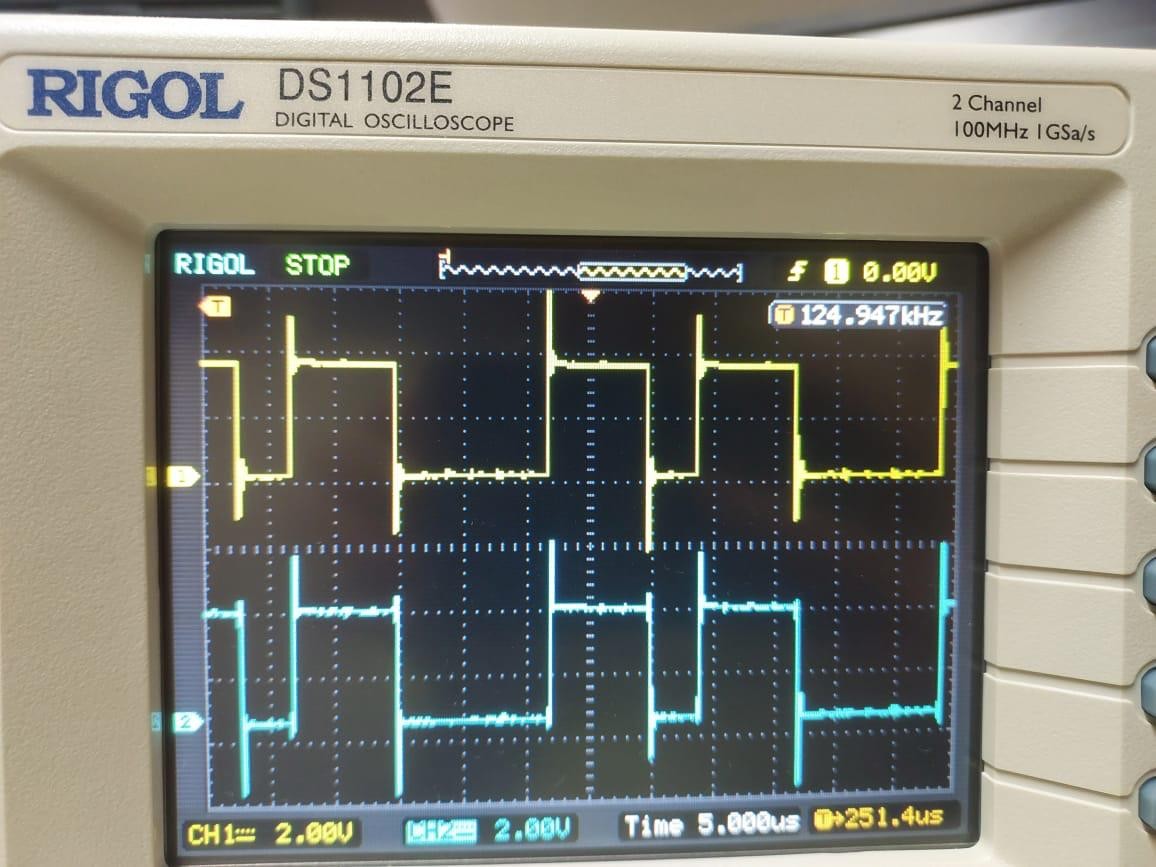












# Question 6.8:

% Parameters

N = 10000; % Number of bits

data = 2\*randi([0,1], 1, N) - 1; % Generating random data: +1 or -1

% Channel 1 from 6.7 (assuming a simple FIR filter for this example) h = [0.5, 0.5]; % This is an assumption.

% Variance values

sigma\_values = [0, 0.1, 0.2, 0.5, 1.0];

% Loop through sigma values for sigma = sigma\_values

% Passing data through channel with AWGN noise received\_data = filter(h, 1, data);

noisy\_received\_data = received\_data + sigma \* randn(1, N);

% Decision Making: Assuming zero threshold. This might need to change based on your actual channel.

decoded\_data = sign(noisy\_received\_data);

% Calculating error

error = sum(data ~= decoded\_data); error\_rate = error/N;

fprintf('Error rate for sigma = %f is: %f\n', sigma, error\_rate);

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| end |  | | | | | | |
| Error | rate | for | sigma | = | 0.000000 | is: | 0.496700 |
| Error | rate | for | sigma | = | 0.100000 | is: | 0.249400 |
| Error | rate | for | sigma | = | 0.200000 | is: | 0.249700 |
| Error | rate | for | sigma | = | 0.500000 | is: | 0.255900 |
| Error | rate | for | sigma | = | 1.000000 | is: | 0.321700 |

# Question 6.9:

% For 6.9, it seems we have a different channel h\_new = [1, 0.25]; % As described in the problem

% Using the same data and sigma values from 6.8:

for sigma = sigma\_values

% Passing data through new channel with AWGN noise received\_data\_new = filter(h\_new, 1, data); noisy\_received\_data\_new = received\_data\_new + sigma \* randn(1, N);

% Decision Making: Assuming zero threshold. This might need to change based on your actual channel.

decoded\_data\_new = sign(noisy\_received\_data\_new);

% Calculating error for new channel error\_new = sum(data ~= decoded\_data\_new); error\_rate\_new = error\_new/N;

fprintf('Error rate for sigma = %f with new channel is: %f\n', sigma, error\_rate\_new);

end

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Error | rate | for | sigma | = | 0.000000 | with | new | channel | is: | 0.000000 |
| Error | rate | for | sigma | = | 0.100000 | with | new | channel | is: | 0.000000 |
| Error | rate | for | sigma | = | 0.200000 | with | new | channel | is: | 0.000100 |
| Error | rate | for | sigma | = | 0.500000 | with | new | channel | is: | 0.033100 |
| Error | rate | for | sigma | = | 1.000000 | with | new | channel | is: | 0.159600 |