

Kocaeli University, Electronics and Telecommunications Engineering Department
Digital Communications Laboratory

Experiment 1: Sampling and Reconstruction - Lab Report (26.02.2024)

Name-Surname-Number:
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SIMULINK PART - The questions below are for verification only and filled by the lab instructor.

Are sampling results in Q1 and Q2 correct? (10 pts)

Is the required sampling frequency calculation understood by students? (5 pts)

Is the aliasing concept understood by students? (10 pts)

Do the students understand the difference between ideal and practical sampling (sampling with pulse signal)? (5 pts)

Is the relationship between pulse duty cycle and BW understood by the students? (5 pts)

STM32 PART - Section 1: Sampling an Analog Voltage

Step 1: Build a voltage divider using a potentiometer (place it on a breadboard) and connect the variable voltage pin of the potentiometer to **ADC input pin (A5 on Nucleo-64 or PC0 on Discovery)**.

Step 2: Run your STM32 C code in **debug mode**, inspect the value of `adcValue_12bit`, `adcValue_10bit`, `adcValue_8bit`, `adcValue_6bit` variables in Watch1 and fill in the table below. (20 pts)

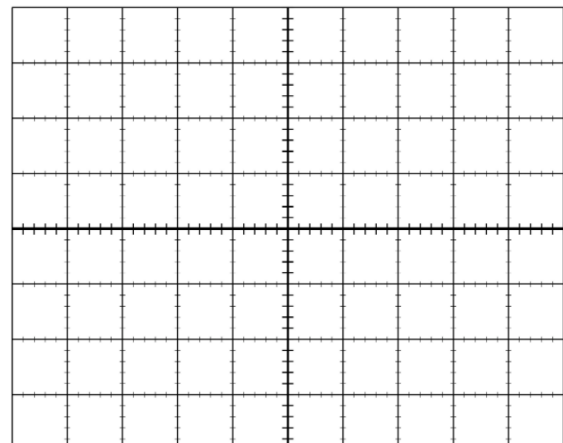
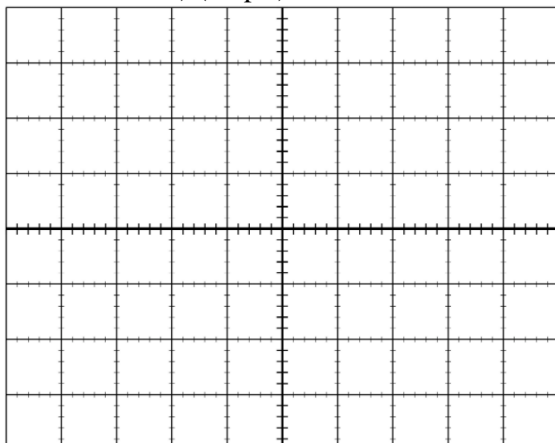
Analog Voltage	n = 12 bit	n = 10 bit	n = 8 bit	n = 6 bit
3.3V				
0V				

Section 2: Sampling an Analog Sinewave Signal (Time Domain)

Step 3: Using the FGEN module in NI Elvis II kit, generate a 2Vpp **1.5V offset** 1kHz sinusoidal wave and connect it to ADC input pin.

Step 4: Adjust the sample rate as given by your lab instructor and connect the NI Elvis II Scope CH0 to ADC input pin and Scope CH1 to **DAC output pin (A2 on Nucleo-64 or PA4 on Discovery)**.

Step 5: Draw Scope CH0 on the left and CH1 on the right graph area (Scope divisions are explained on the whiteboard) (30 pts).



Section 3: Sampling an Analog Sinewave Signal (Frequency Domain)

Step 6: Stop the Scope then Open NI Elvis II DSA. Adjust the DS parameters as listed in the table below:

Source Channel	SCOPE CH1
Frequency Span	40000
Units	dB

Step 7: Observe the frequency components which have magnitude above -40dB, Fill the first three ones in the table below. (15 pts)

Frequency (kHz)	Magnitude (dB)