

EE 311 Assignment 1

January 8, 2018
Due: January 18, 2018

Download Asn01.zip from the website, unzip it, and load the project onto your ARM Nucleo board.

Use the Tektronics AFG 3021B signal generator to produce the input for your board with the following settings:

1. Top Menu → Output menu → Load Impedance → High Z
2. Top Menu → Frequency/Period → Frequency → Enter 1 KHz
3. Top Menu → Amplitude Level → Amplitude → Enter 1.3 V_{p-p}
4. Top Menu → Amplitude Level → Offset → Enter 0.7 volts
5. On the Function buttons select Sine
6. Use the output marked 50Ω (not the TTL output)

The program inputs an analog signal on PA5 and outputs the same signal on PA4. **Note that the input voltage from the generator must be between 0 volts and 3 volts.** Input voltages outside this range may damage your board. Use an oscilloscope to verify the correct input signal *before you connect it to your board.*

Connect the generator to pin PA5. Use an oscilloscope to look at PA5 (input on Ch 1) and PA4 (output on Ch 2). You should see a sinusoid at 1 KHz on both channels. If this is not the case you have something wrong that needs to be fixed before you can proceed.

For this assignment you will measure the sampling frequency using three different methods:

Method 1: The program toggles bit PA7 each time it outputs a sample. The high time or the low time of the signal on PA7 will be the sampling period.

Method 2: Use the scope to expand the time scale so that you can look at the discrete stepped output on channel 2. You may have to push Run/Stop on the scope because it is difficult to synch the scope to this signal otherwise. The step size in time is the sampling period.

Method 3: Increase the input frequency until you get aliasing on the output. Find the next highest input frequency which aliases as 1 KHz. This input frequency will be 1 KHz lower than the sample frequency. A second input frequency which is 1 KHz above the sample frequency will also produce a 1 KHz aliased output.

Turn in the following:

1. Cover page with your name, the course number (EE 311), the date turned in, and the assignment number.
2. A screen capture of the oscilloscope showing the results of each of the three methods used to find the sample frequency. For each method list the sample frequency which you measured.

Be sure to include figure numbers and titles.

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