

# 1 Project Description

## 1.1 Program 1 - NCO

Starting from the **aic3204** project create your own project to generate a continuous sinusoid at a controllable frequency,  $f_{tone}$ , using a Numerically Controlled Oscillator (NCO). Write the resulting sinusoid to the Stereo Out connector J4. Use a sample rate of 48k (same as the aic3204 project). For the NCO use  $M = 32$ -bits and  $N = 9$ -bits. To modularize your program so we can reuse the NCO, structure your code appropriately and place the NCO within it's own source files (e.g. myNCO.c and myNCO.h). Undergraduates may work in groups of 2, graduate students must work alone.

- With your report include 2 O-scope captures from J4 (or equivalent) at different (constant) output frequencies
- Comment on the frequency accuracy of your NCO and it's dependencies
- Comment on the observable frequency range of your NCO and how it matches with expectations.
- Generate a chirp signal over the frequency range you observe in the previous step over a time period of 5 seconds.
- The amplitude of the NCO signal can be attenuated by right shifting the values from the LUT. Add a function call that can adjust this attenuation value if needed.
- Use Code Composer to count the number of cycles between adjacent samples written to the DAC (i.e. via the I2S port). What value would you expect and does your measurement match your expectation? (Hint: setting a break point and counting cycles from one sample to the next won't work because of the nature of the I2S port. You will have to count cycles for a larger number of samples and then estimate cycles per one sample)

## 2 Report

Your report and all source code is due at the beginning of class the day the project is due or if demonstrations are scheduled at the time of your project demo. If you work in groups hand in one report per group. Reports must be written in Latex. Comments in your code must be accurate and meaningful.