Lab 3
Signal Aliasing

Dr. Aly El-Osery

September 9, 2017

The purpose of this lab is to get more familiar with the DSK board, understand the operation of the Codec. By the end of the lab you will be able to input and output signals through the Codec chip as well as see the effects of aliasing.

1 Prelab

Given the following continuous time signal

$$x_1(t) = A\cos(2\pi F_0 t) \tag{1}$$

Assuming a sampling rate of F_{s1}

1. Sketch the Fourier transform $x_1(t)$.
2. What is the condition on F_{s1} such that there is no aliasing.
3. Compute the discrete signal $x_1(n)$.
4. If you were to output the signal $x_2(t)$ which is every other sample of $x_1(n)$ through the codec, what would be the equivalent sampling rate, F_{s2}.
5. Assume $F_{s1} = 48$kHz and an ideal reconstruction filter with bandwidth of 24kHz
   (a) what is the frequency content of $x_2(t)$ if $F_0 = 11$kHz after the reconstruction filter?
   (b) what is the frequency content of $x_2(t)$ if $F_0 = 12$kHz after the reconstruction filter?

2 Lab

1. Start a new project.
2. Write a code that will allow you to read/write from and to the codec.

3. Using a sampling rate of 48kHz and the function generator at 11kHz, generate the signal $x_2(t)$ as described in the prelab and sketch the output signal. Does it match your prelab? Explain how.

4. Using a sampling rate of 48kHz and the function generator at 12kHz, generate the signal $x_2(t)$ as described in the prelab and sketch the output signal. Does it confirm your prelab result.