ECE 398-MA
Introduction to Modern Communication with Python and SDR
SDR Lab 1

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1 Assignment 1

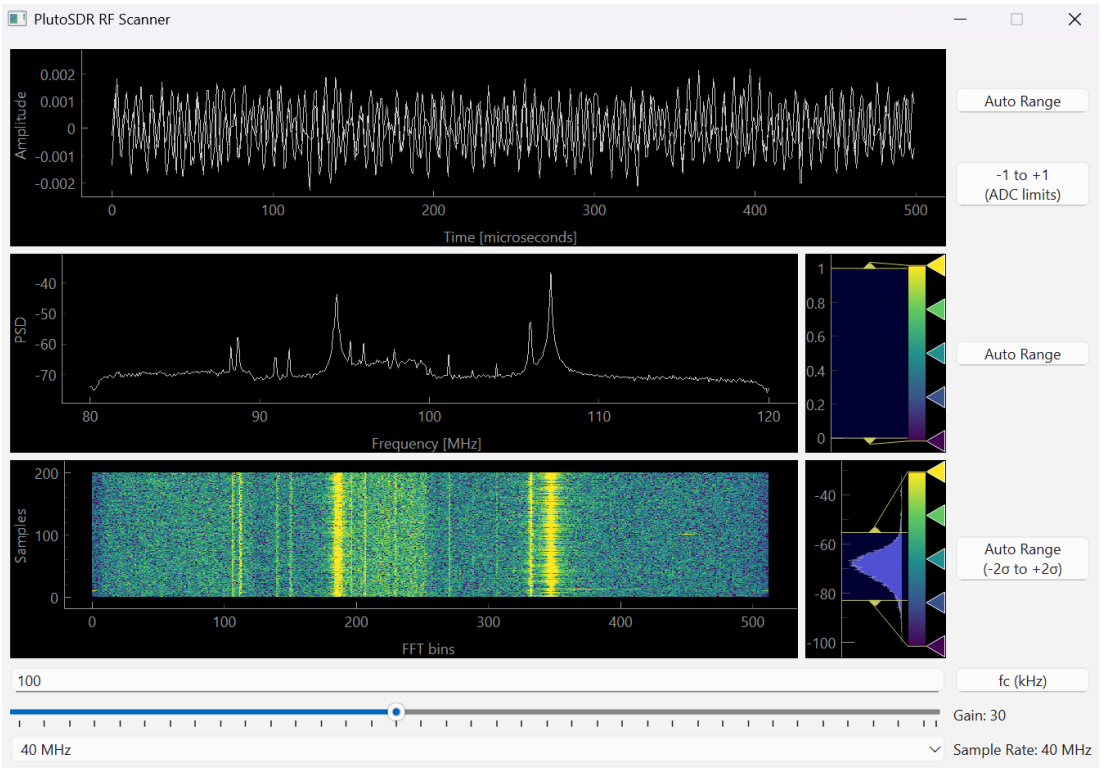

Figure 1: RF Scanner GUI @ 100 MHz (FM BAND)

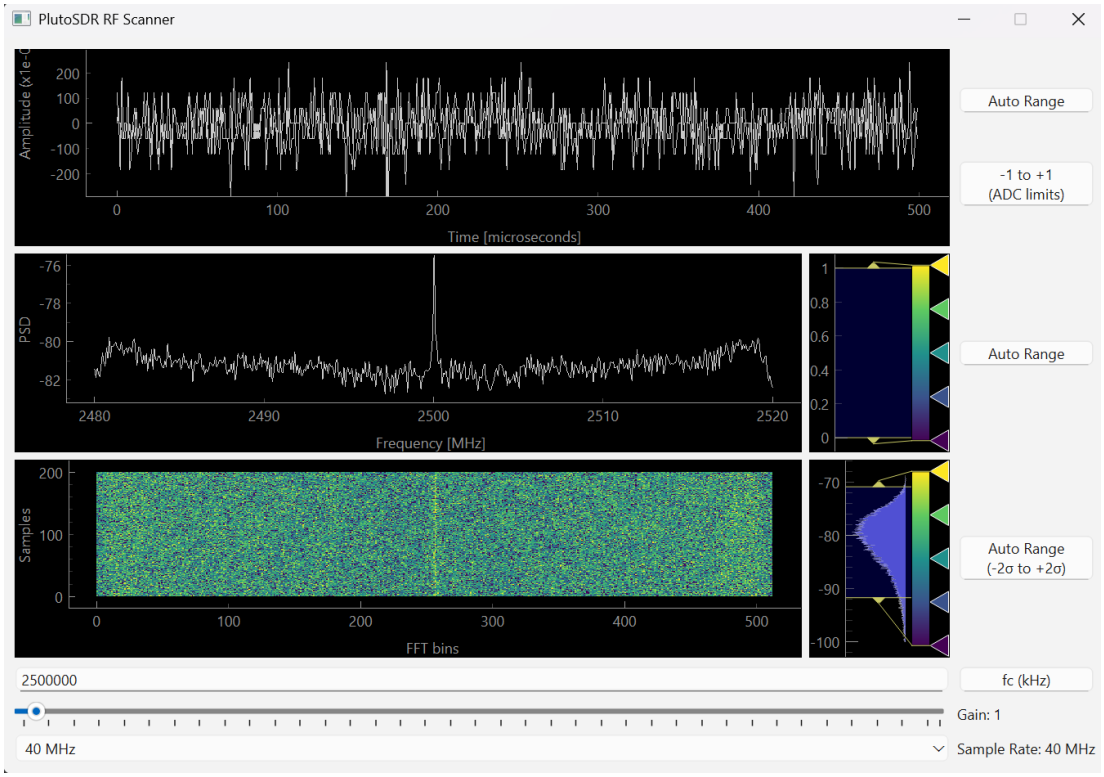

Figure 2: RF Scanner GUI @ 2.5 GHz (WiFi BAND)

2 Assignment 2

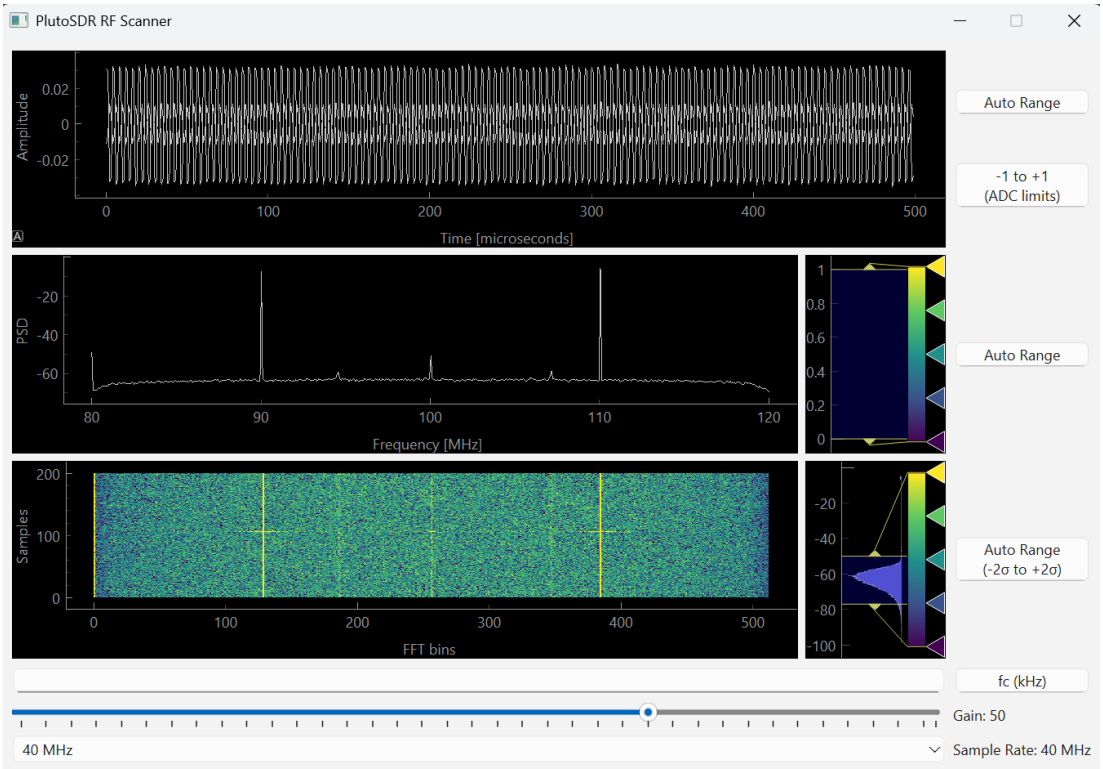

Figure 3: Two Tone Signal @ 100 MHz

Two Tone Signal code provided below:

```
############ YOUR CODE STARTS HERE ############

t = np.arange(0, Ns/sample_rate, 1/sample_rate)  # Time vector
# Generate two-tone signal at baseband (hint: cosine already has two tones
tx_samples = np.cos(2*np.pi*f_tone*t)   # Fc Carrier Freq @ 100 MHz,
# so freq components will appear at
# 90 MHz and 110 MHz

############ YOUR CODE STOPS HERE ############
```

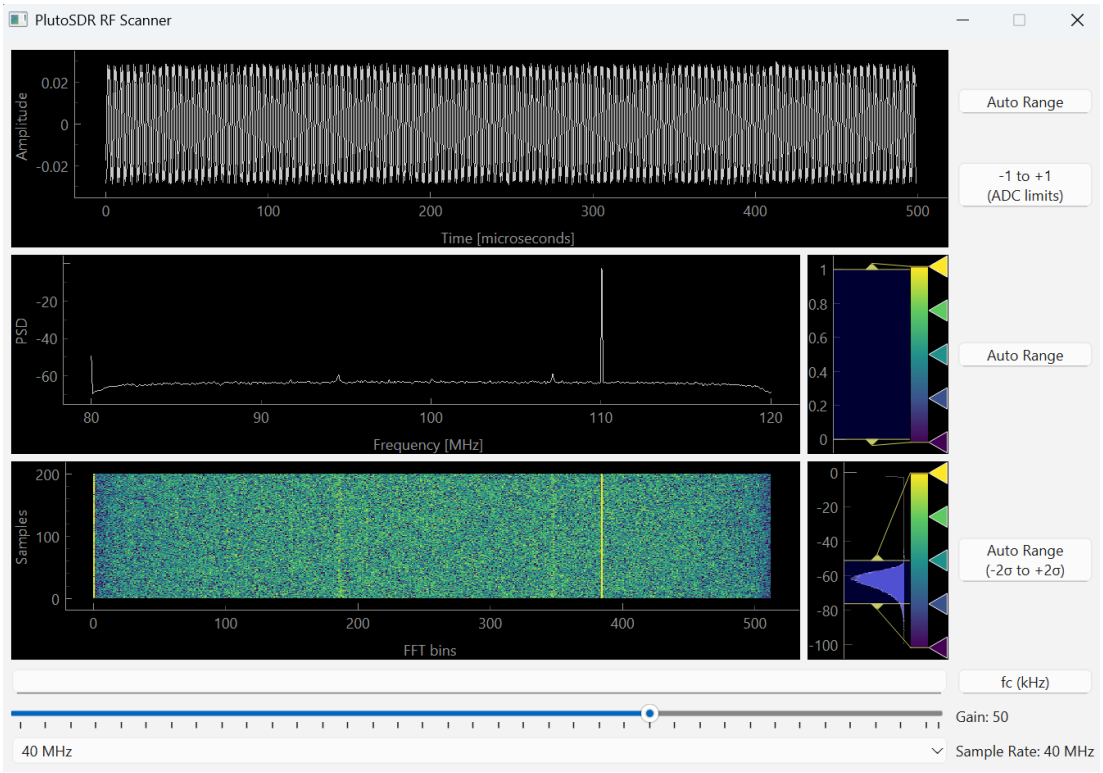

Figure 4: Single Tone Signal @ 100 MHz

Single Tone Signal code provided below:

```
############ YOUR CODE STARTS HERE ############

t = np.arange(0, Ns/sample_rate, 1/sample_rate)  # Time vector
# Generate one-tone signal at baseband (110 MHz)
tx_samples = np.exp(1j*2*np.pi*f_tone*t)     # Fc Carrier Freq @ 100 MHz,
# so freq components will appear at
# 110 MHz

############ YOUR CODE STOPS HERE ############
```

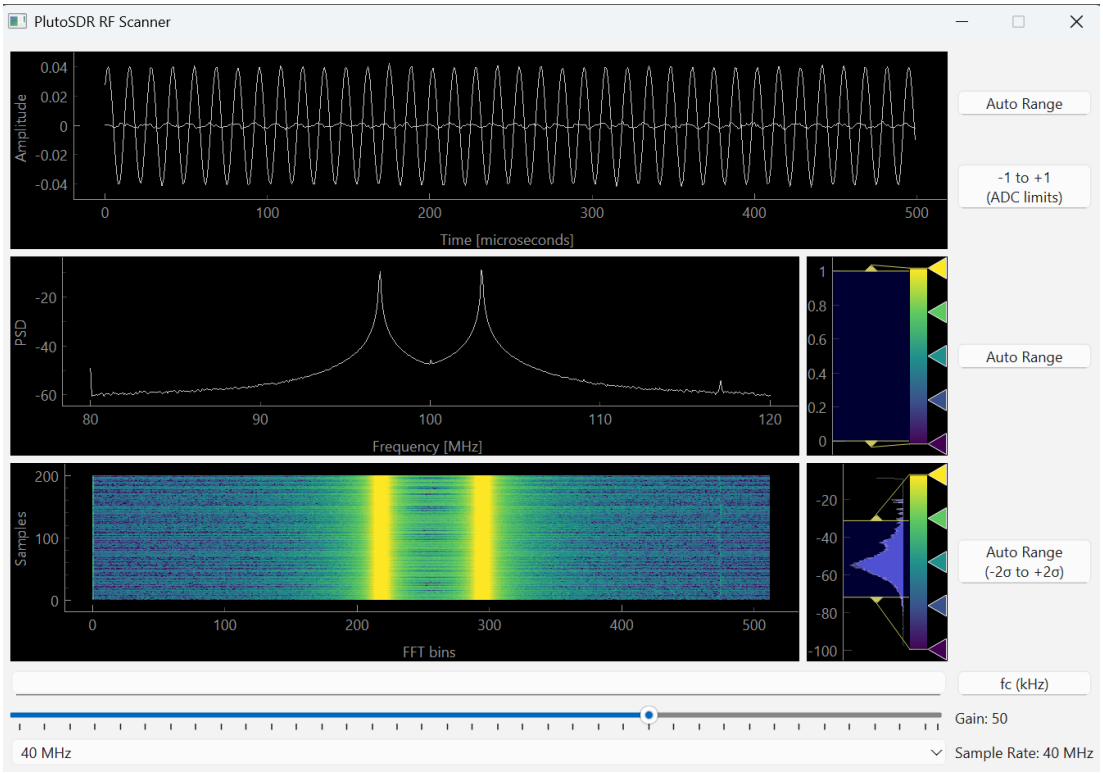

Figure 5: Two Tone Signal w 3 MHz f-tone @ 100 MHz

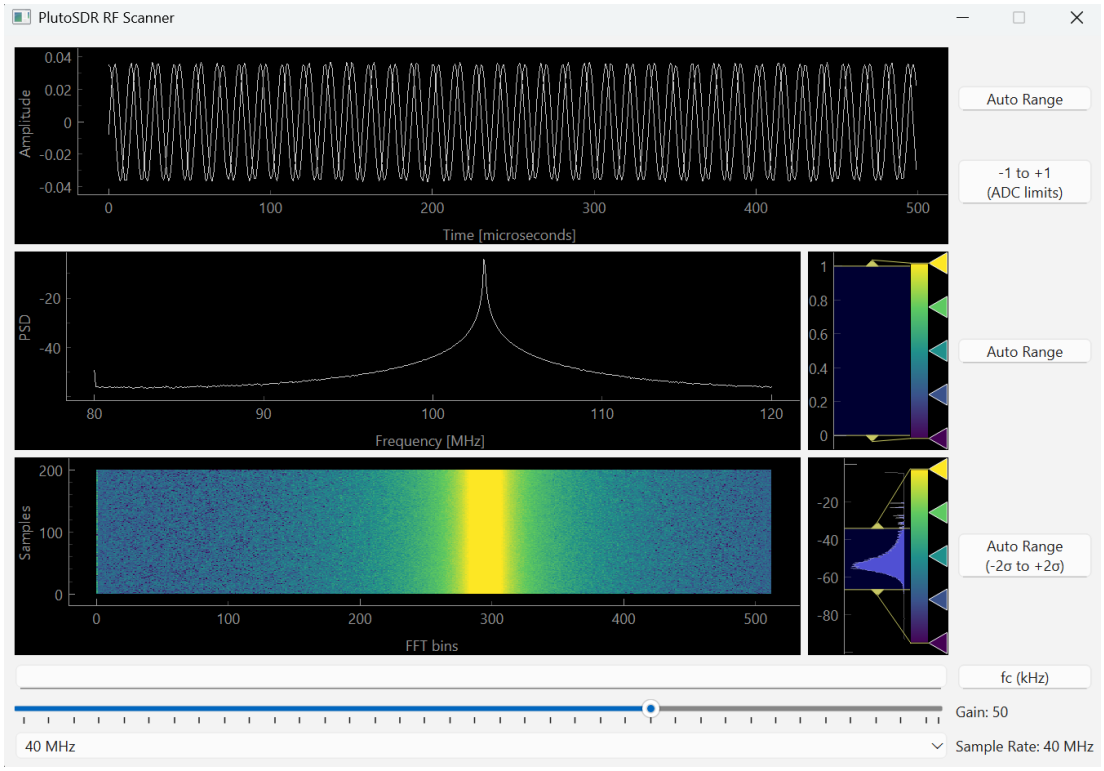

Figure 6: Single Tone Signal w 3 MHz f-tone @ 100 MHz

The spectrum changes when ‘f-tone’ is changed to 3 MHz because the bandwidth of the signal exceeds the 3 MHz ‘distance’ between the peaks of (+)f-tone and (-)f-tone frequency components. We know this because the spectrum analyzer shows that the region between the peaks at around 100 MHz is at -40 dB while the region above and below the peaks decreases to -60 dB.