Department of Electrical & Computer Engineering
ENEE4113 - Communications Laboratory

Experiment #10
Ampiltude Shift Keying (ASK)

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Section: 4

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Contents

List of Figures

1 Simulation and Data Analysis

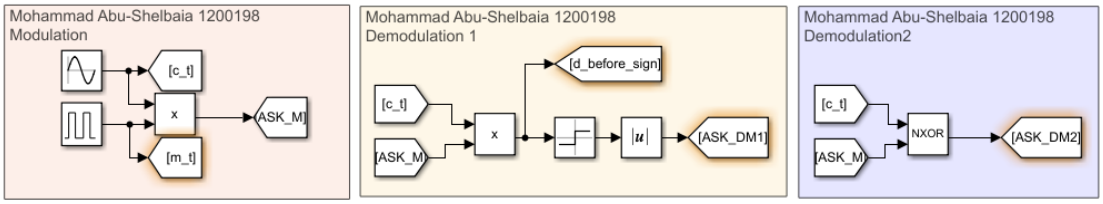

Figure 1: Modulation/Demodulation Simulink Block Diagram

The above system is simulated using MATLAB Simulink for different messages modulated over a carrier signal with a frequency of 20KHz.

$$c(t) = \cos(2\pi(20k)t) \tag{1}$$

1.1 Input Signals

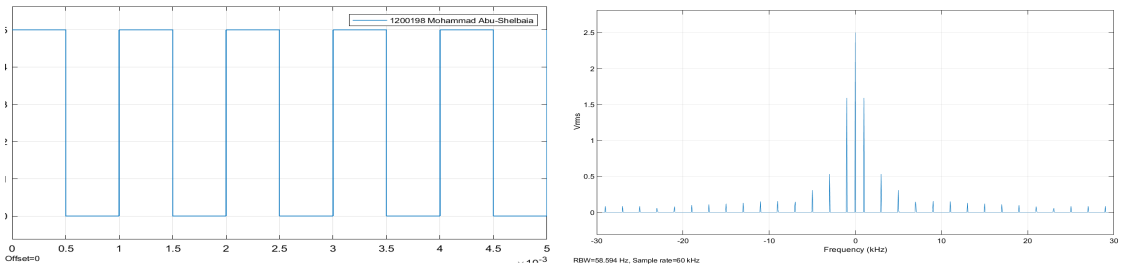

Figure 2: Message Signal

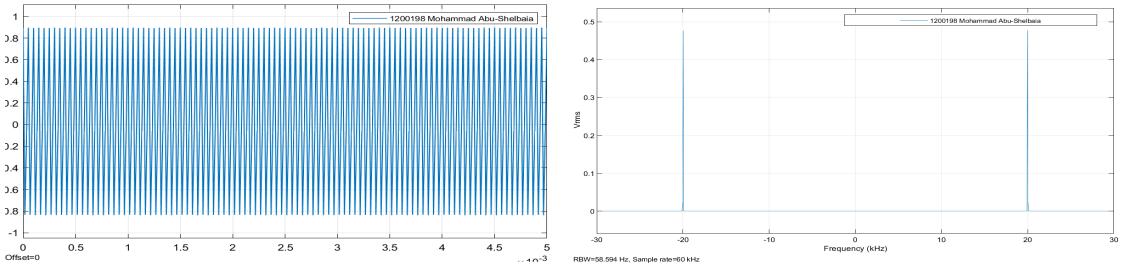

Figure 3: Carrier Signal

1.2 Charchterstics of the ASK Modulated Signal

To observer the characteristics of the ASK modulated signal, we are going to modulate a signal with low-voltage (0V) and high-voltage (2.5V) over the same carrier.

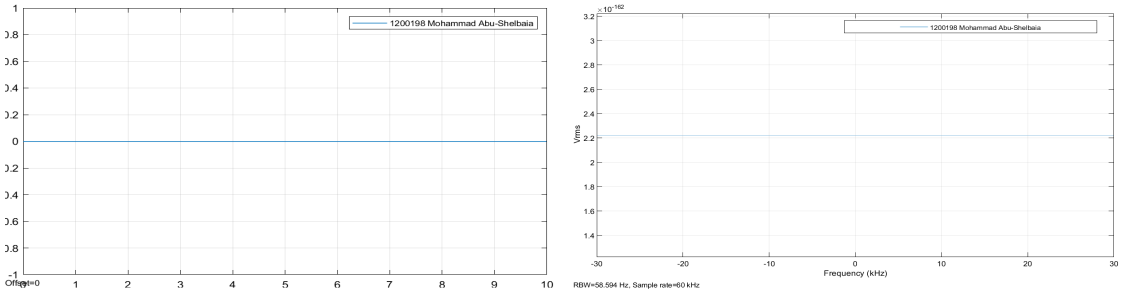

Figure 4: Low voltage Modulating Signal (0V)

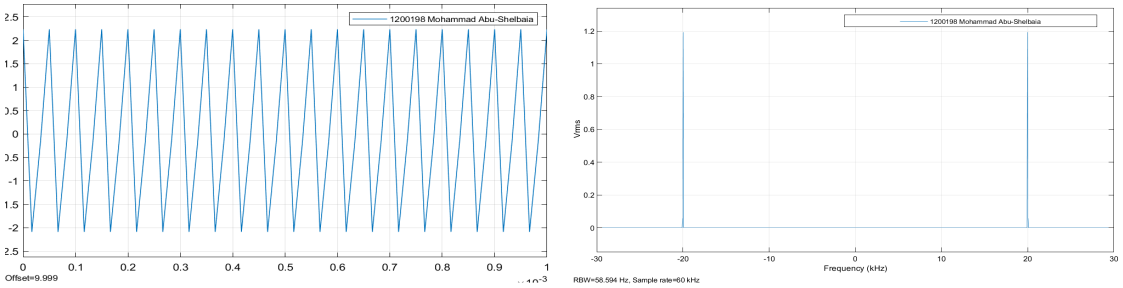

Figure 5: High voltage Modulating Signal (2.5V)

We observed that whenever we send a high voltage signal, the carrier singal is transmitted as it is, and whenever we send a low voltage signal nothing is transmitted (zero signal).

1.3 Modulation and Demodulation

1.3.1 Refrence Modulating Signal

This is our refrence modulating signal, which is a pulse-train with a frequency of 1KHz, duty cycle of 50%, and an amplitude of 5V.

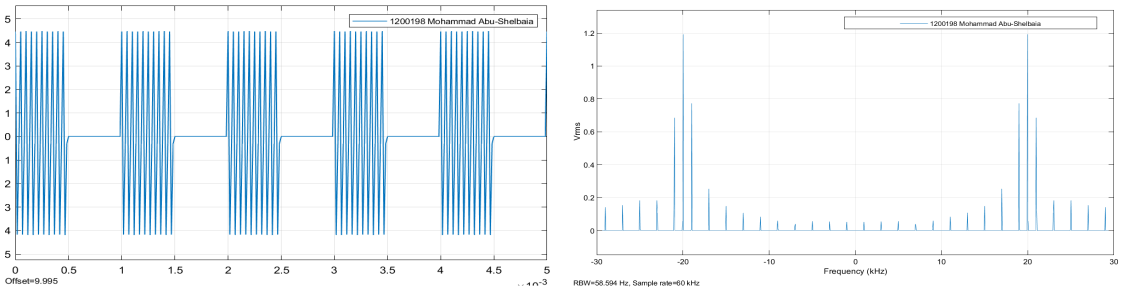

Figure 6: Modulated Singal

We can see that the modulated signal is a cosine wave when the message signal is high, and zero when the message signal is low.

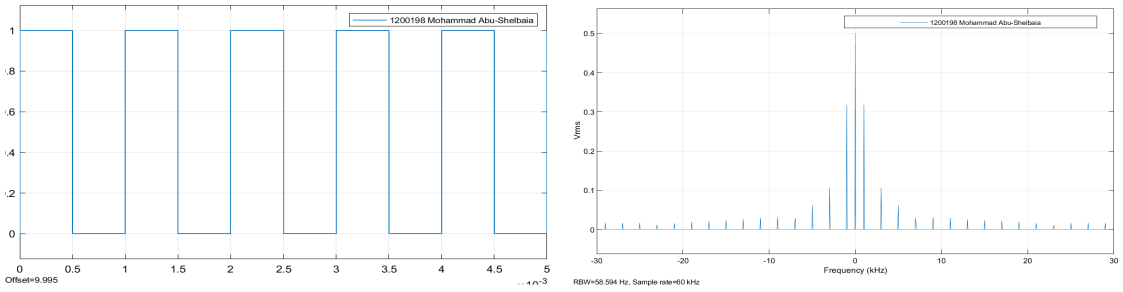

Figure 7: Demodulaed Singal Method 1

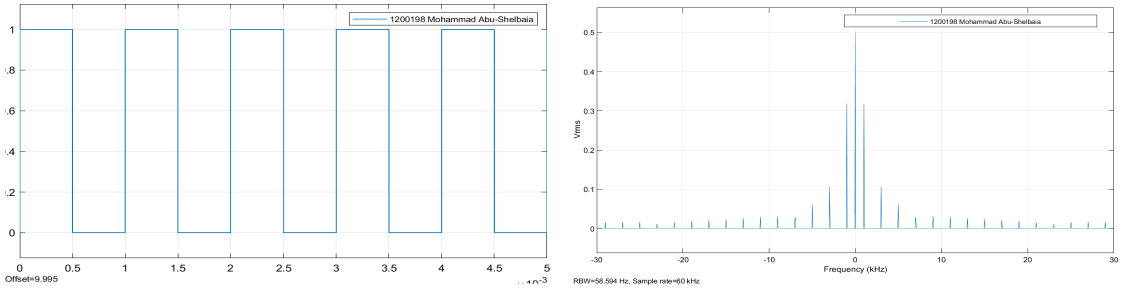

Figure 8: Demodulated Singal Method 2

We can see that we have successfully demodulated the signal using both methods, the high portion of the message singal is recoverd as 1, and the low portion is recovered as 0.

1.3.2 1.5V Modulating Signal

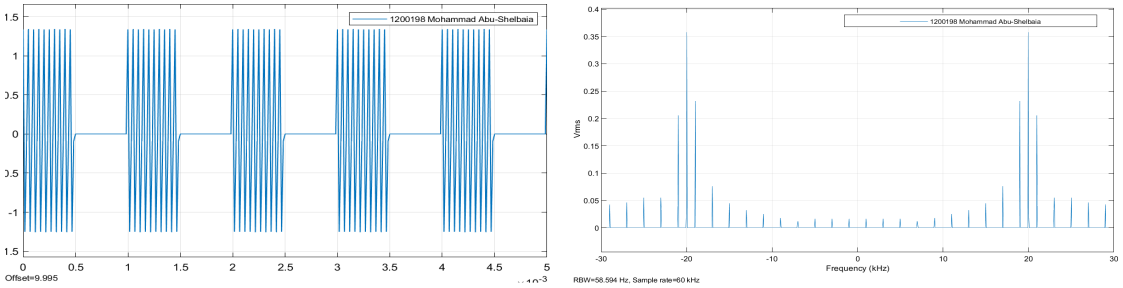

Figure 9: Modulated Singal (1.5V)

We can see that the modulated signal amplitude is lower, but the same characteristics are still there.

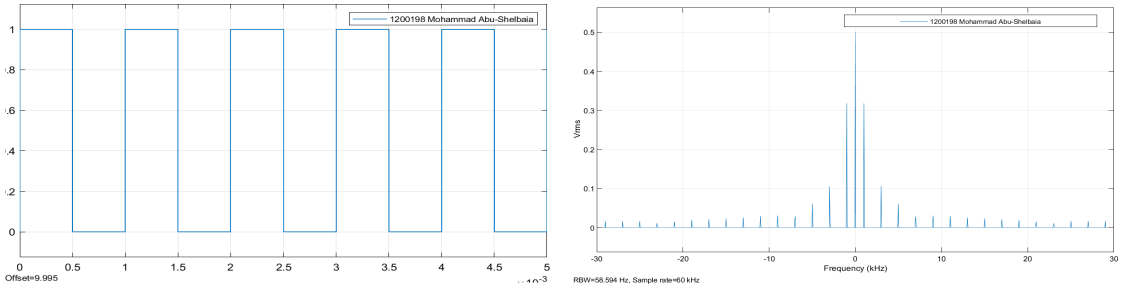

Figure 10: Demodulated Singal Method 1 (1.5V)

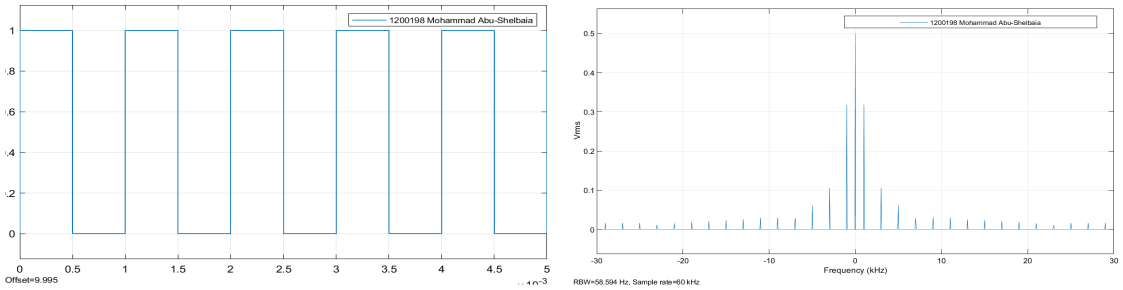

Figure 11: Demodulated Singal Method 2 (1.5V)

We can see the same results as before, the high portion of the message singal is recoverd

as one, and the low portion is recovered as zero.

1.3.3 500Hz Modulating Signal

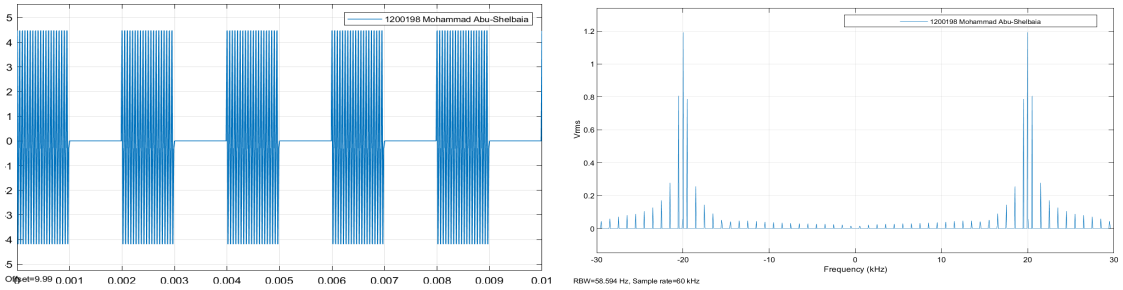

Figure 12: Modulated Singal (500Hz)

We can see that the modulated signal is just more dense, but the same characteristics are still there.

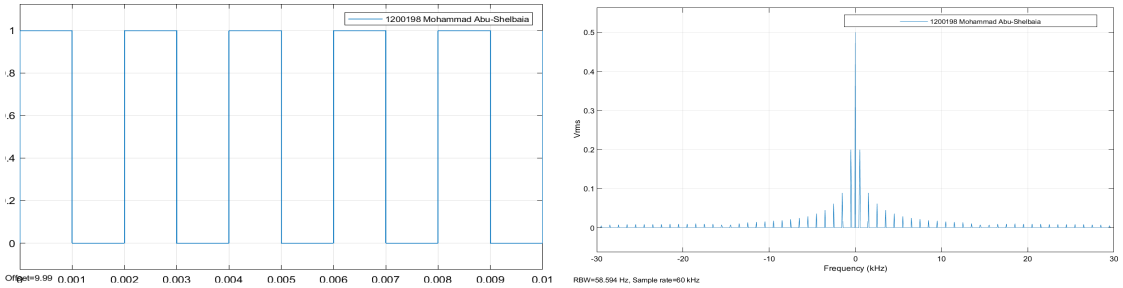

Figure 13: Demodulated Singal Method 1 (500Hz)

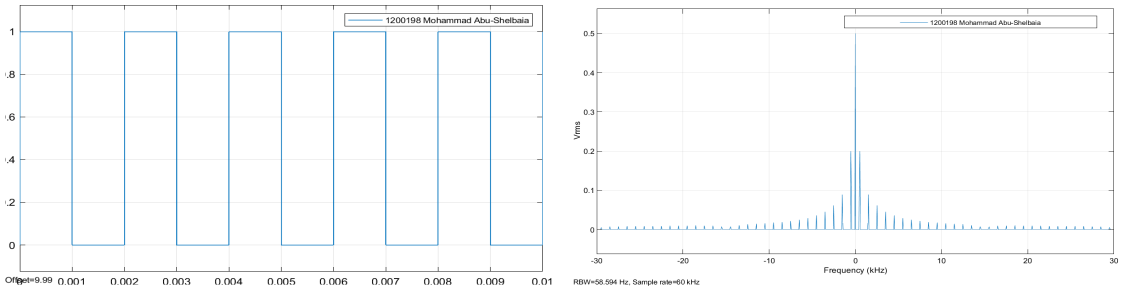

Figure 14: Demodulated Singal Method 2 (500Hz)

We were able to recover the message signal dispite the low frequency.

1.3.4 0.10 Duty-Cycle Modulating Signal

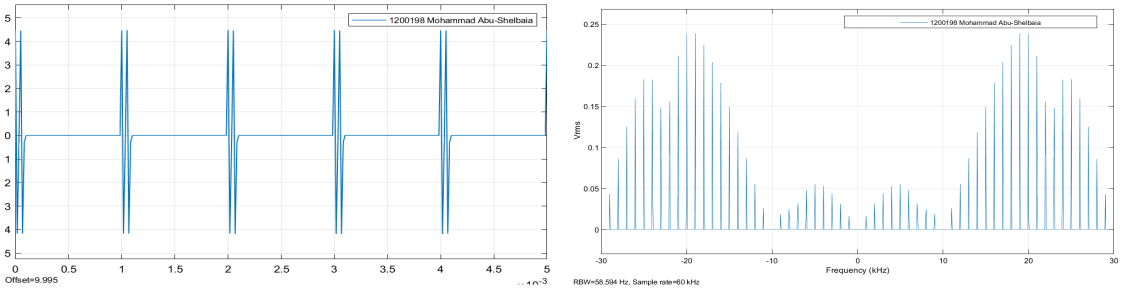

Figure 15: Modulated Singal (10% Duty Cycle)

We notice the the cosine repeated for only 2 times on the high portion of the message signal, and we further noticed that spectrum of the modulated signal is more dense with more frequencies.

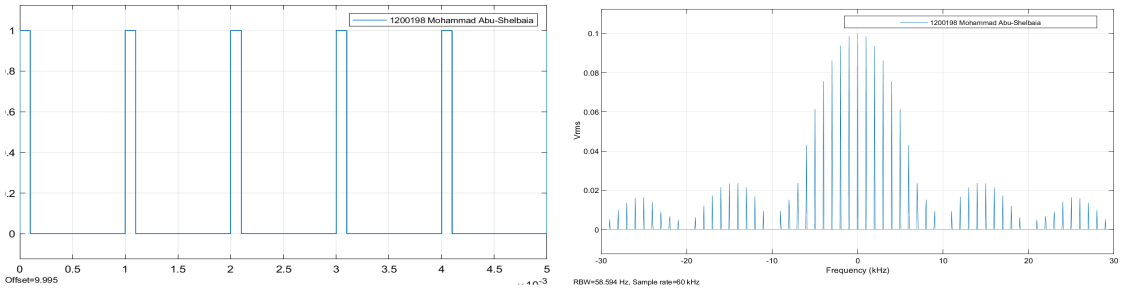

Figure 16: Demodulated Singal Method 1 (10% Duty Cycle)

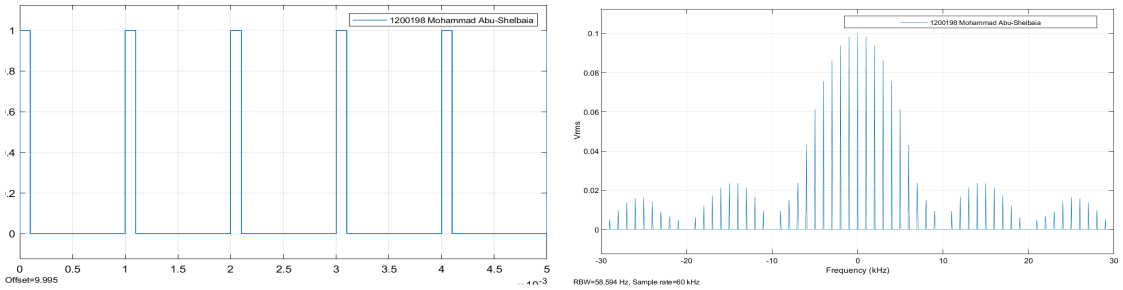

Figure 17: Demodulated Singal Method 2 (10% Duty Cycle)

We can see as all the previous parts we were able to recover the message correctly, the high portion of the message singal is recoverd as one, and the low portion is recovered as zero.