# Lab Assignment - 3

# MODULATION USING SIMULINK

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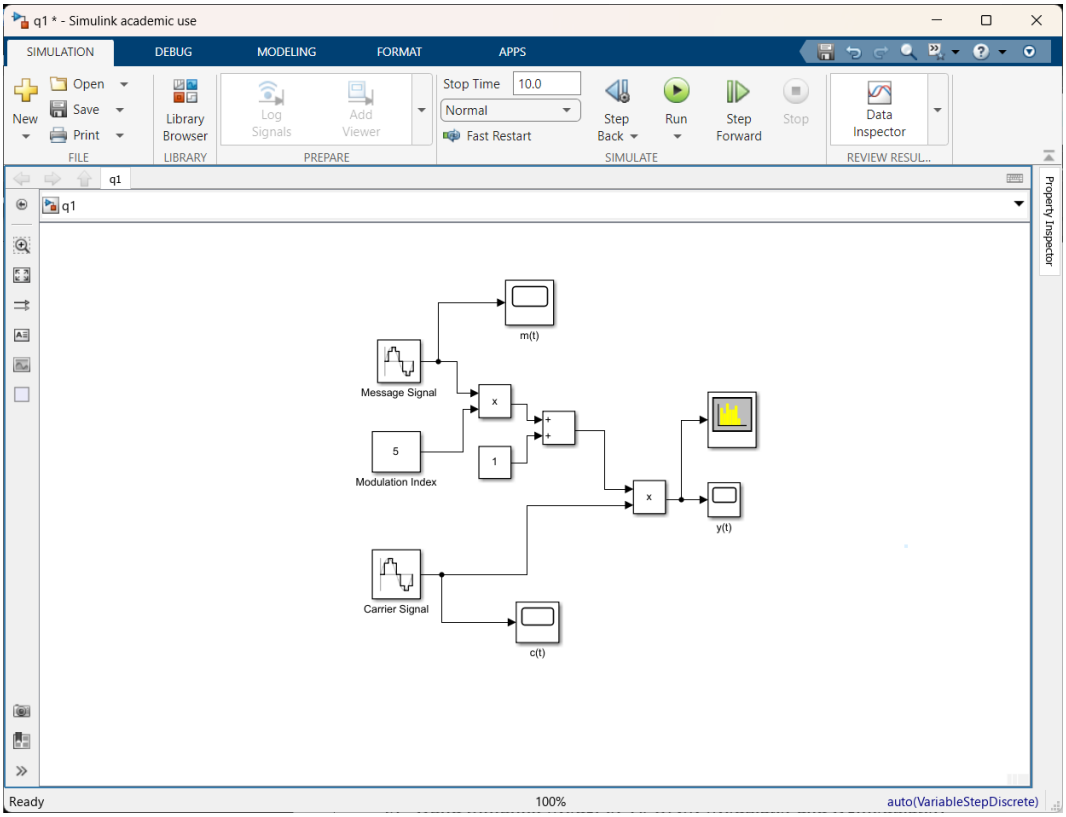
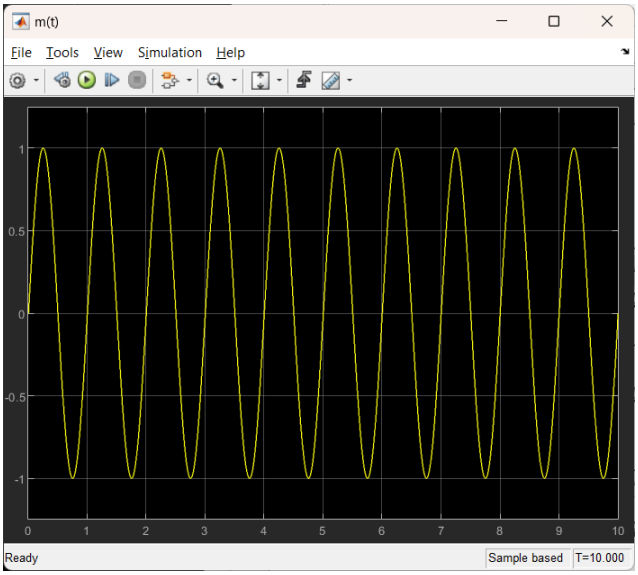
1. Build the Simulink model of AM modulator with parameters Carrier Signal frequency = 2*pi*25, Message Signal frequency = 2*pi and sampling time=1/5000. Amplitudes of both signals are 1

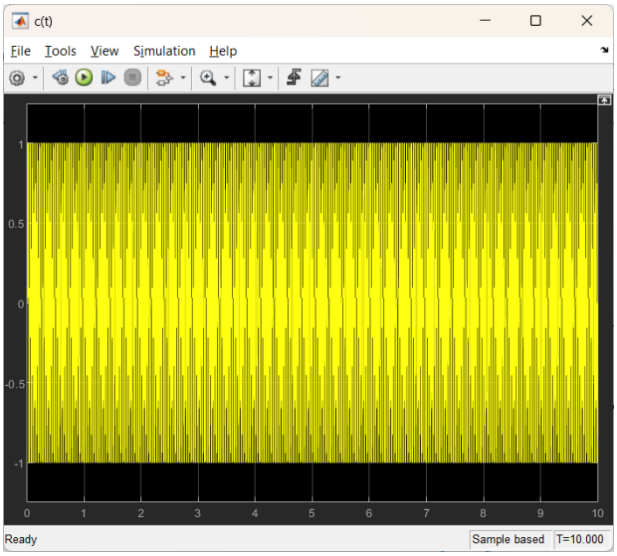
**BLOCK DIAGRAM :**



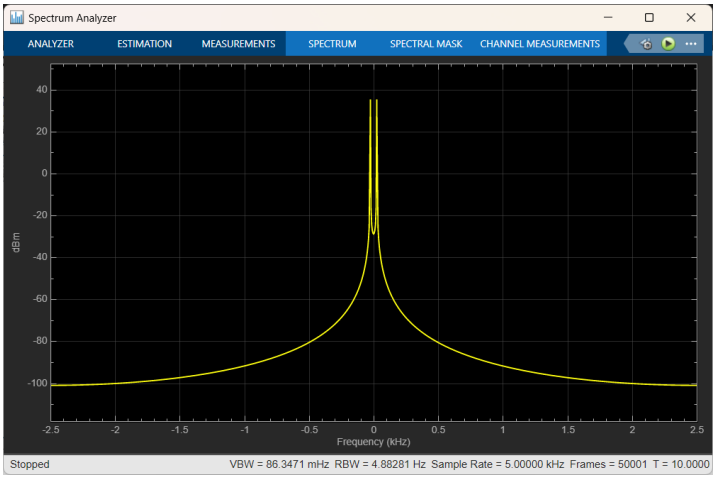

**Message signal :**



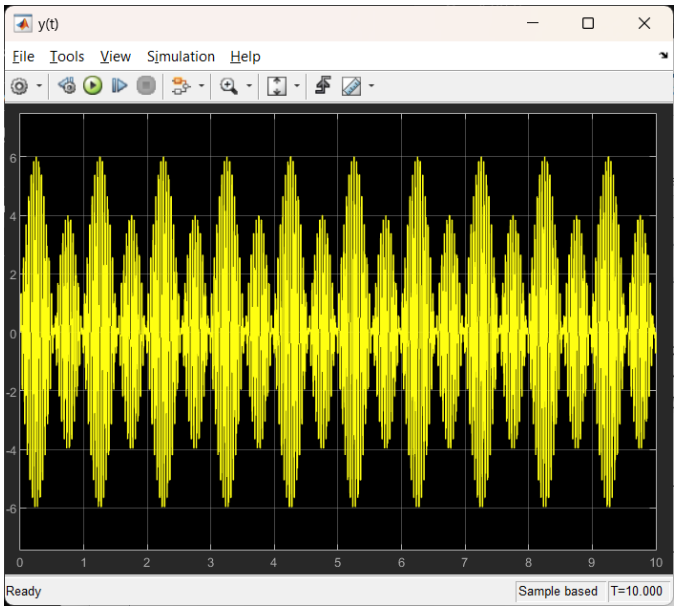
**Carrier signal :**




**Frequency spectrum:**

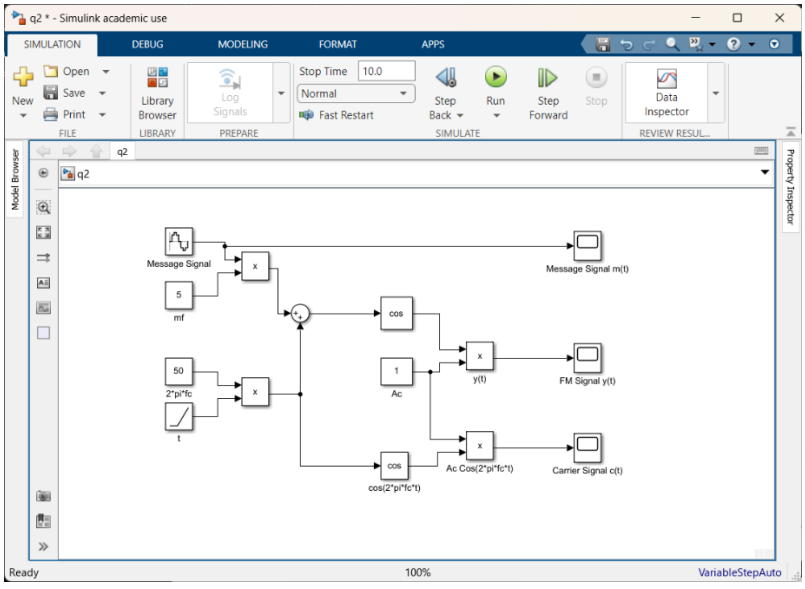



**AM modulated signal :**

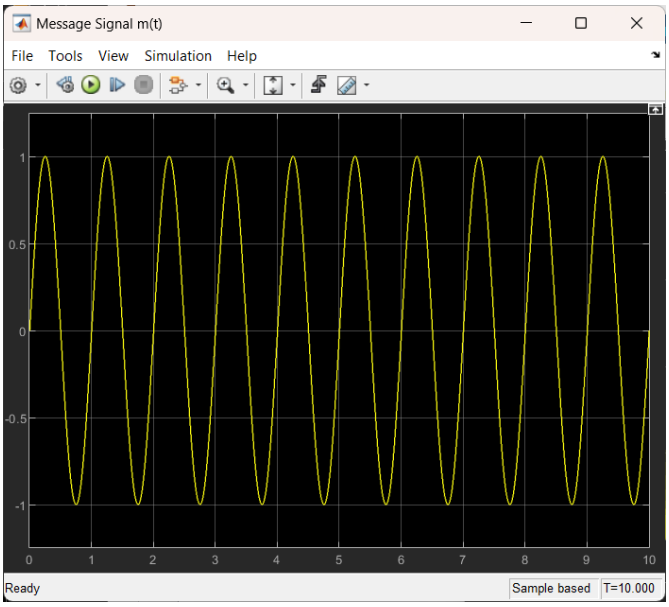



2. Build the Simulink model of FM modulator.

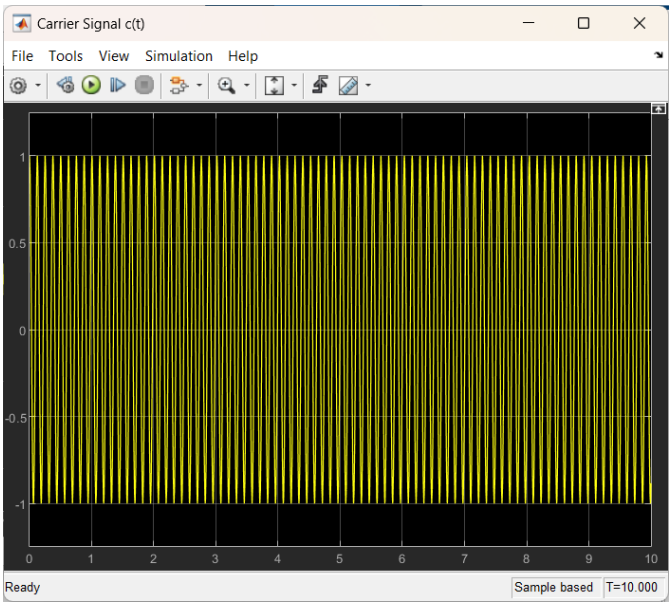
**BLOCK DIAGRAM :**



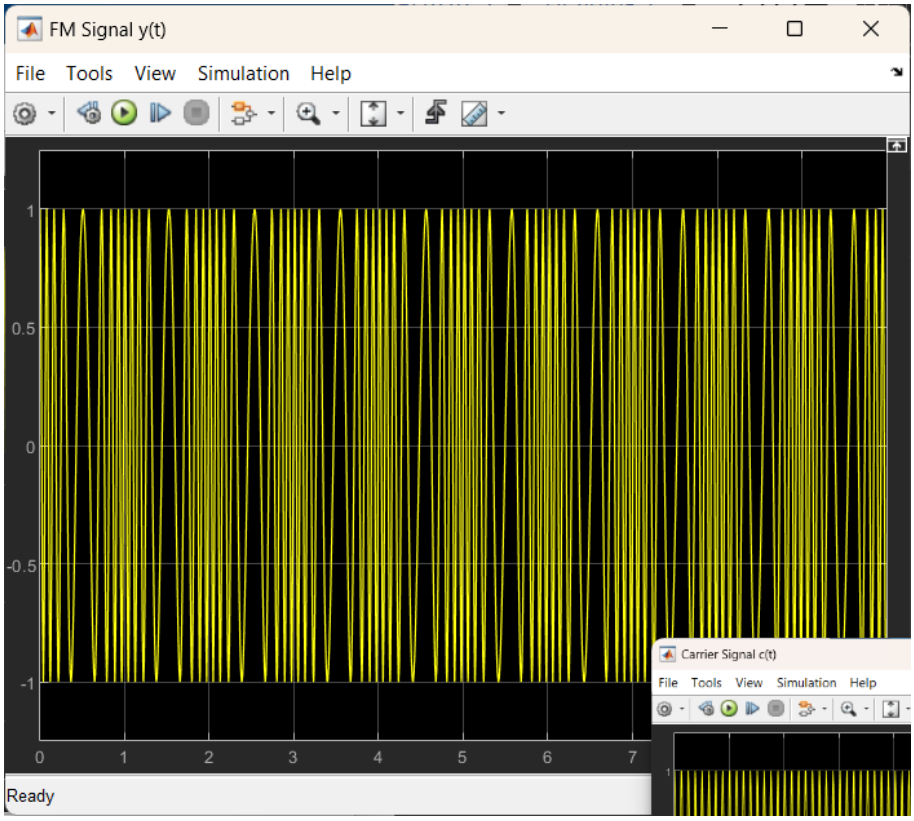
**Message signal :**




**Carrier Signal :**

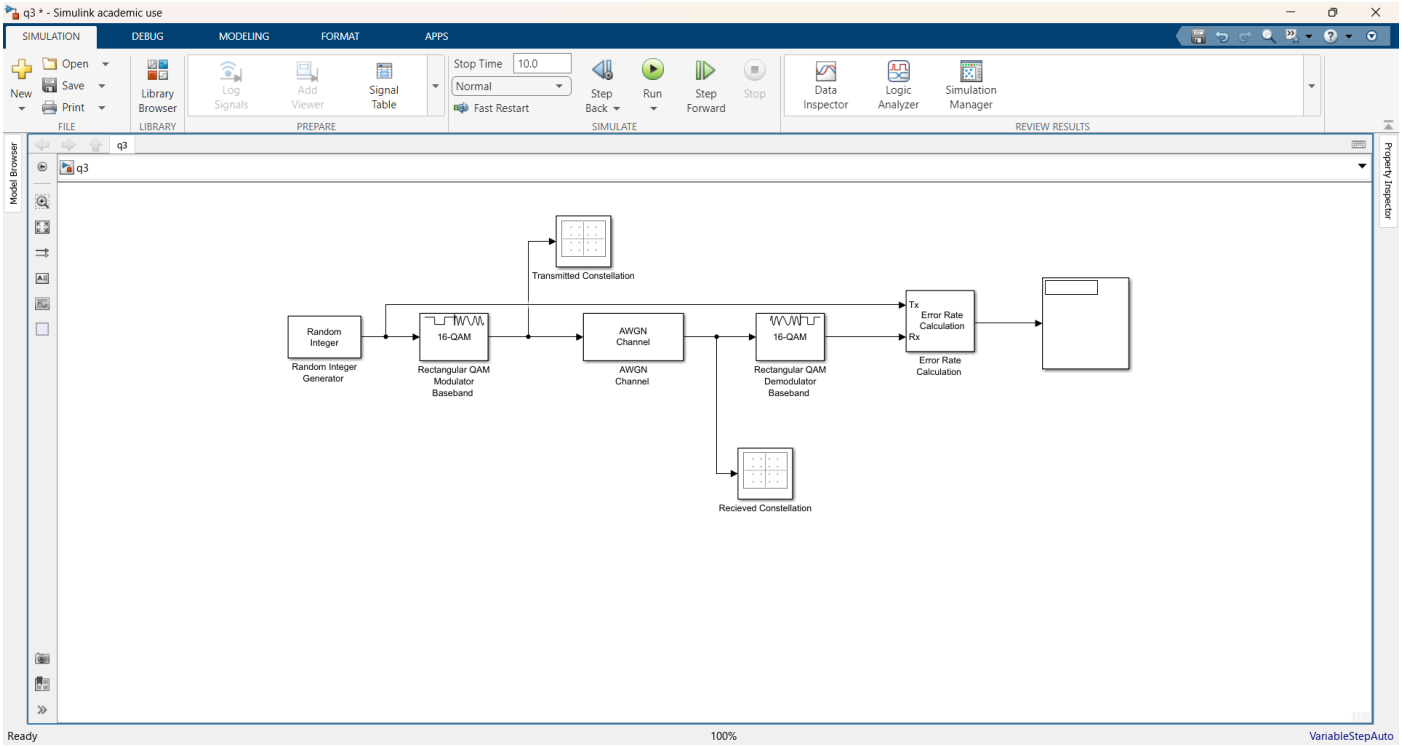



**FM modulated signal :**

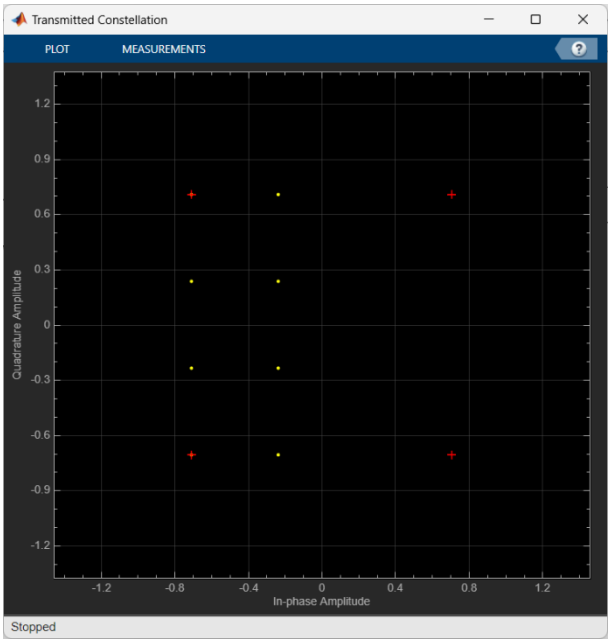


3. Build Simulink Model of 16 QAM Modulator and Demodulator.

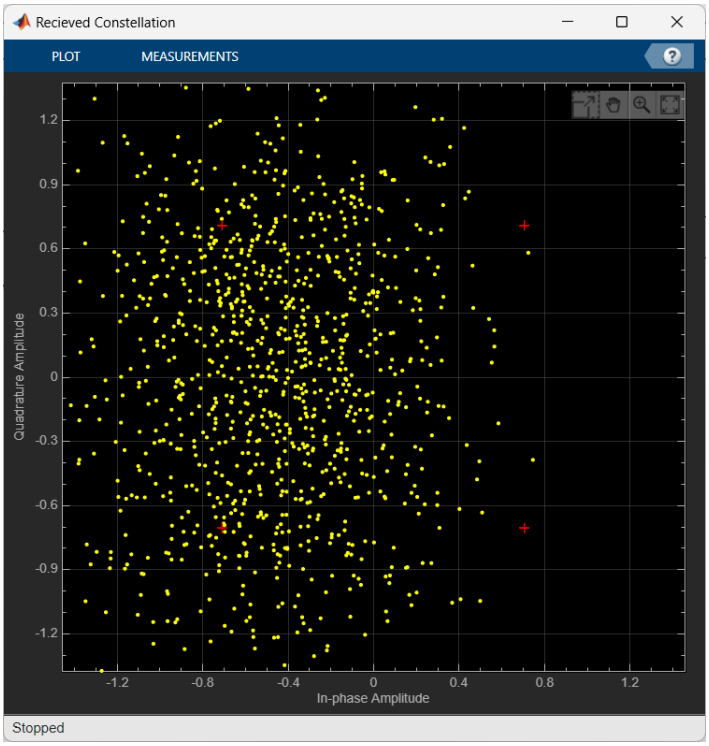
**BLOCK DIAGRAM :**




**Transmitted Constellation:**

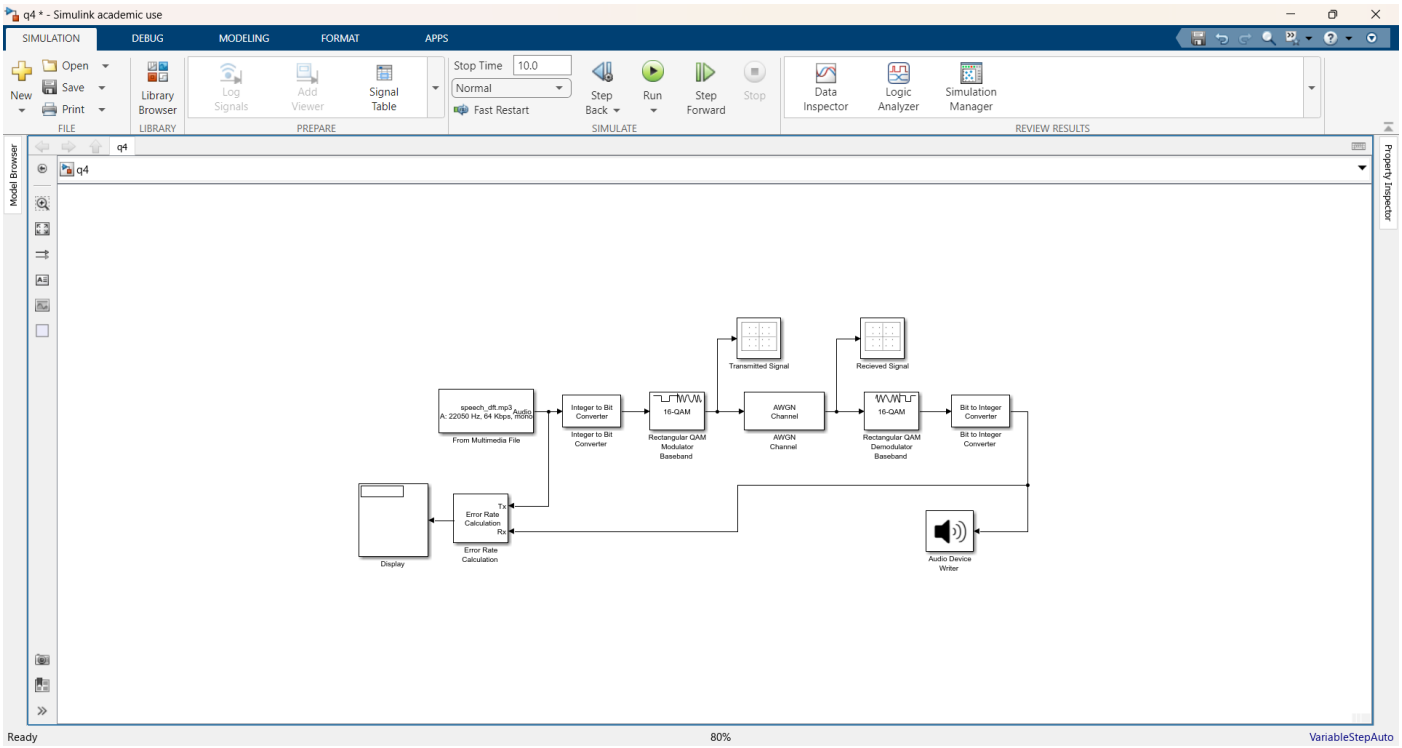



**Received Constellation:**



4. Try to simulate a music file transmission using 16 QAM modulation with AWGN channel

**BLOCK DIAGRAM :**




## Comments on Audio Quality:

- **SNR = 10 dB (low)**: The audio quality is poor with significant noise and distortion. The music is recognizable but heavily affected by noise.
- **SNR = 50 dB(medium)**: The audio quality is good with slight noise. The music is clear and enjoyable, with minimal artifacts.
- **SNR = 100 dB(high)**: The audio quality is excellent. The music is very clear, with negligible noise, providing an experience close to the original audio.