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Lab2-1

- Mismatched data type going from Random Source to PSK Mod blocks
    - Changed Random source output to byte from int
    - The PSK Mod block did not accept an int type as input but rather it expects a byte stream, so one way to fix this was to change the output of the Random Source block to byte

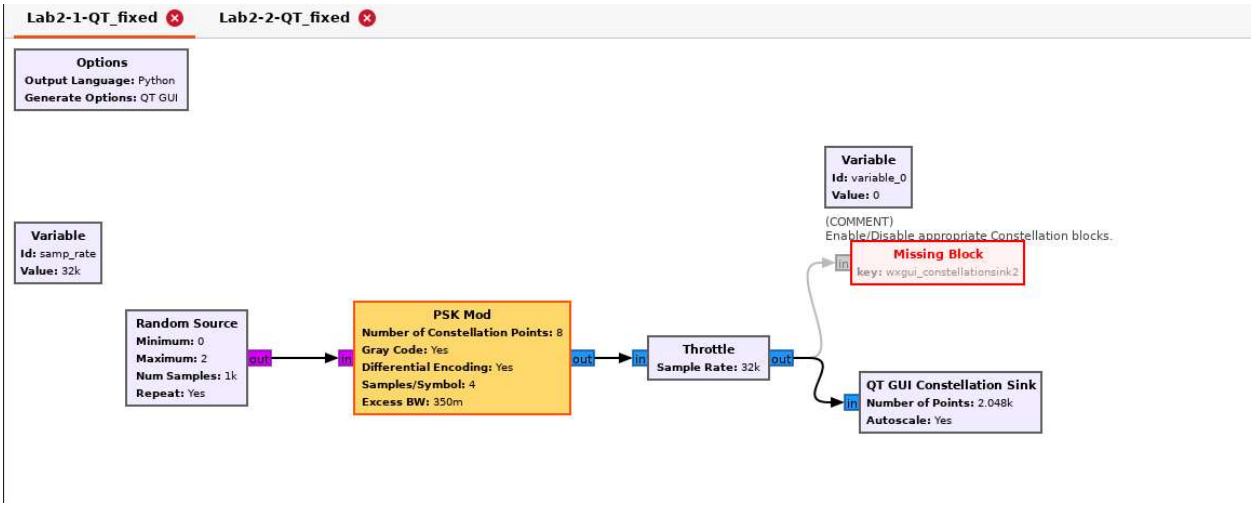

Figure 1: Lab2-1 Corrected GRC Flow Graph

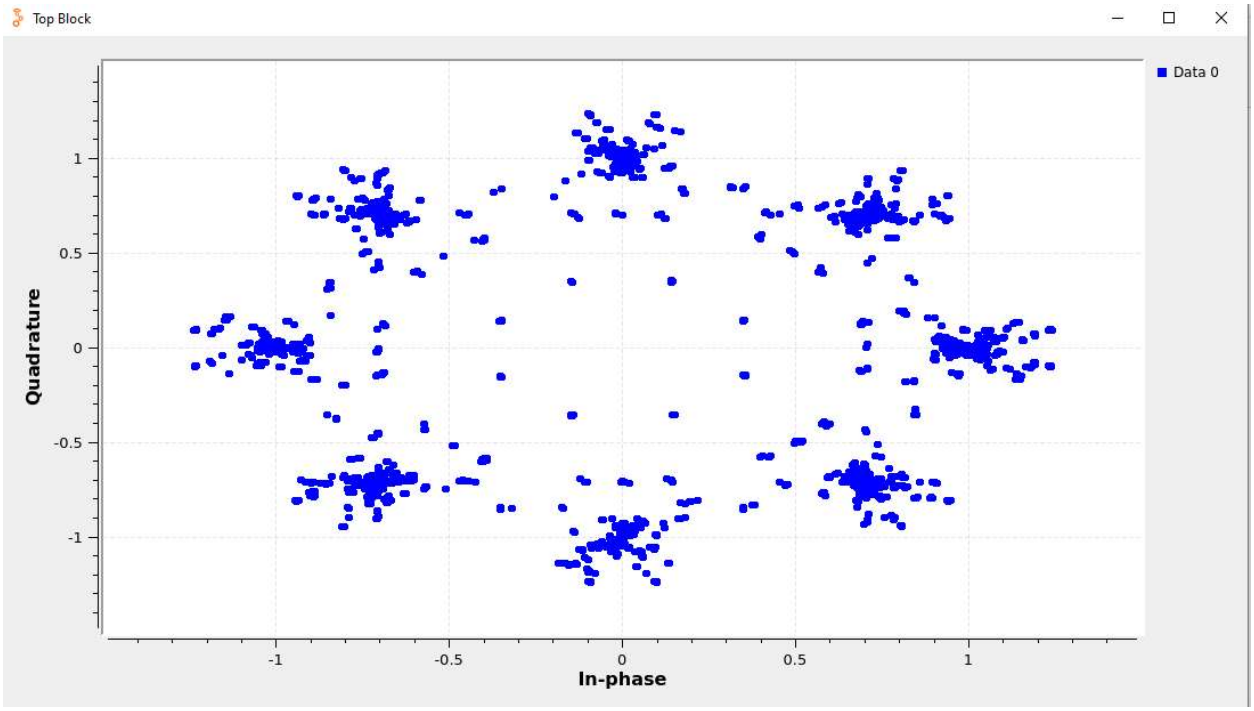

Figure 2: Lab 2-1 GRC Output

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Lab2-2

- Missing wire between 2nd Signal Source and Add block
    - Connected the appropriate wire
- Type mismatch between Add block and Throttle block
    - Changed Throttle input to “float” and GUI Frequency Sink to “float” as well
- The signals were changed to “float” because it was simpler, but another valid option would be to change all of them to “complex”. The main difference in the flow graph operation would be that a Quadrature Demod block would be needed between the throttle and the Audio Sink to convert the “complex” signal to “float”.
- The Throttle block also caused a warning because it isn’t needed, as the Audio Sink acts as a rate limiting block for the stream
    - However, it did not stop the graph from running and the lab instructions state that no blocks are to be deleted, so it was left in.
- Audio output ‘0’ was not found
    - This may have been a hardware issue on the system used, as the WSL installation could not seem to find the computer microphone to output audio. Outputting to any named microphone output was not successful. The only way found to allow the program to run was to output the Audio Sink data to “null” which essentially discards the audio data

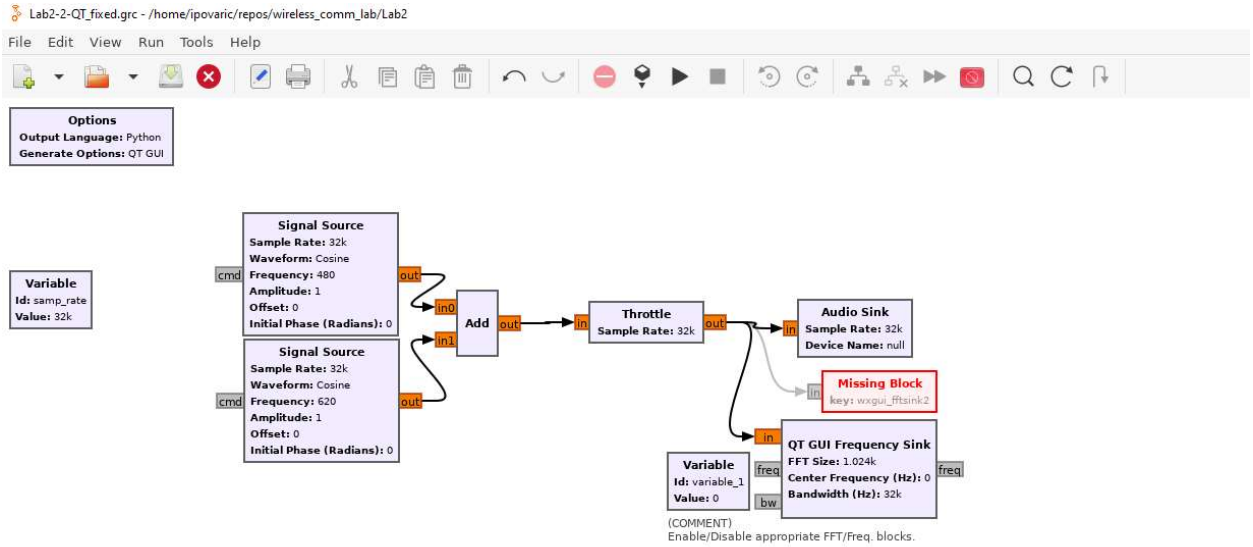

Figure 3: Lab 2-2 GRC Corrected Flow Graph

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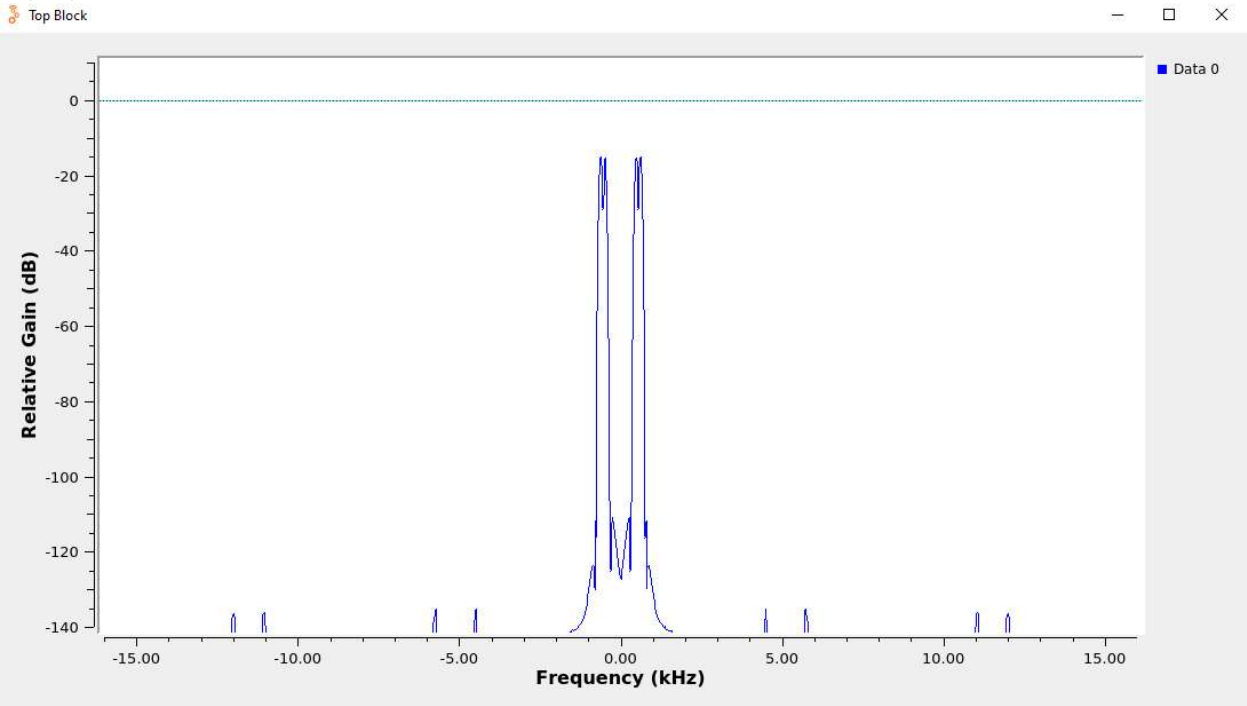

Figure 4: Lab 2-2 GRC Output

Lab2-3

- Pointer file in File Source “Waldo.txt” doesn’t exist
    - Pointed to the only other text file provided in the Lab: “Message.txt”
- Complex type provided by file source can’t be directly read by FFT Sink
    - Modified type at File Source and Throttle to Float
    - Added Frequency Mod block with a gain of 1 to convert to complex frequency
    - Pointing the float output of the Throttle block to Audio Sink also fixed the issue of not being able to read a complex value into Audio Sink
- Same issue with the Audio Sink not finding an output was encountered here and again resolved by outputting to null (discard)

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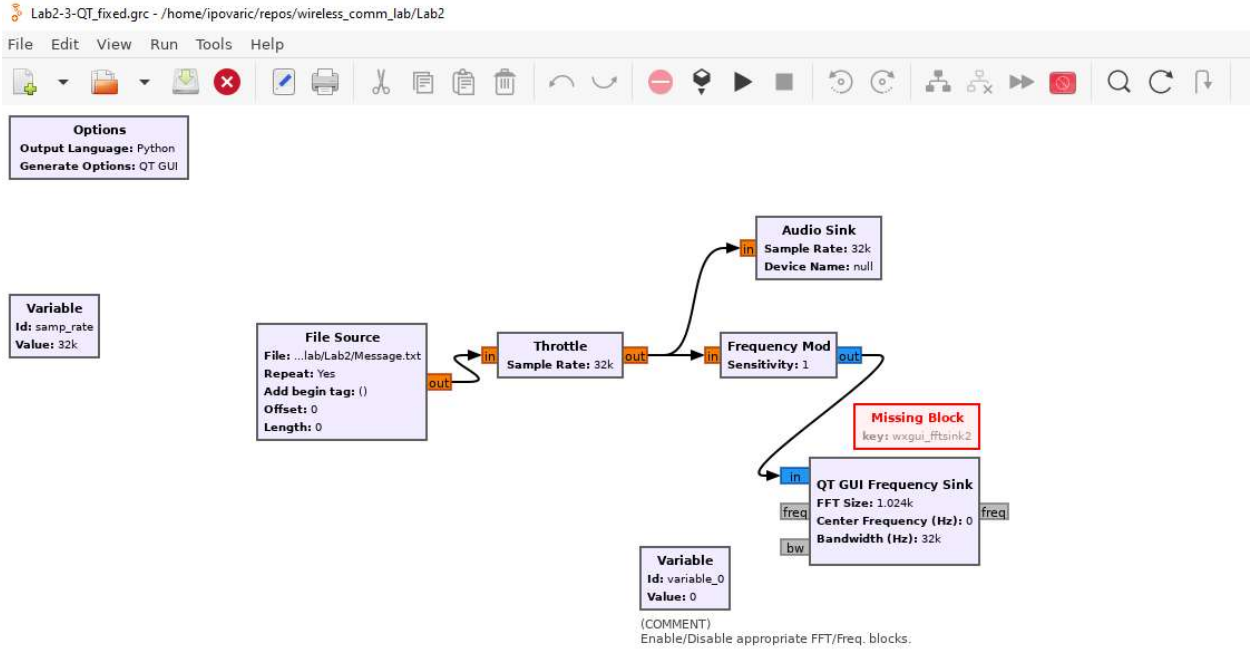

Figure 5: Lab 2-3 GRC Corrected Flow Graph

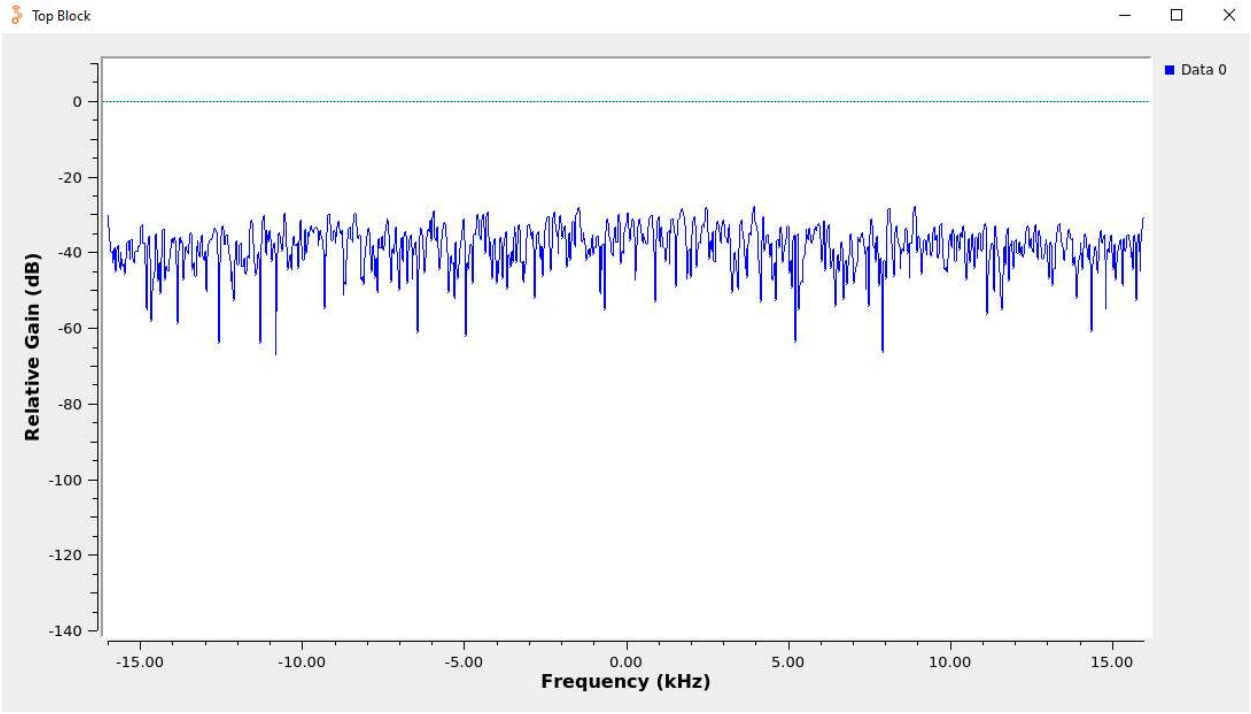

Figure 6: Lab 2-3 GRC Output

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Lab2-4

- The OFDM Transmitter block throws a 'ValueError("Length of sync sequences(s) must be FFT length")'
    - The main source of this error identified was that the sync_word1 and sync_word2 parameters in the OFDM Transmitter block needed to be set in accordance with the length of the FFT
    - The calculation for the sync_words was based partially on the number of active carrier frequencies assigned
    - One way of resolving this was to assign some carrier and pilot frequencies – the ones from the "ofdm_loopback.grc" example were used
- 'RuntimeError: flow graph has loops!'
    - Traditional loops are not allowed in GR, so the feedback of the Multiply Const block back into the add block is not allowed in this fashion
    - To fix this, the original signal (rather than the delayed signal) was instead multiplied by 2 – this will have different functionality than the original graph but it is similar and not using feedback loops
- 'Error: missing length tag'
    - The ODFM Transmitter block expects a tagged stream of bytes to indicate the length of the packet
    - In this case, the default vector length was 1, so the a "Stream to Tagged Stream" block was added using the existing "length" tag and a packet length of 1 assigned

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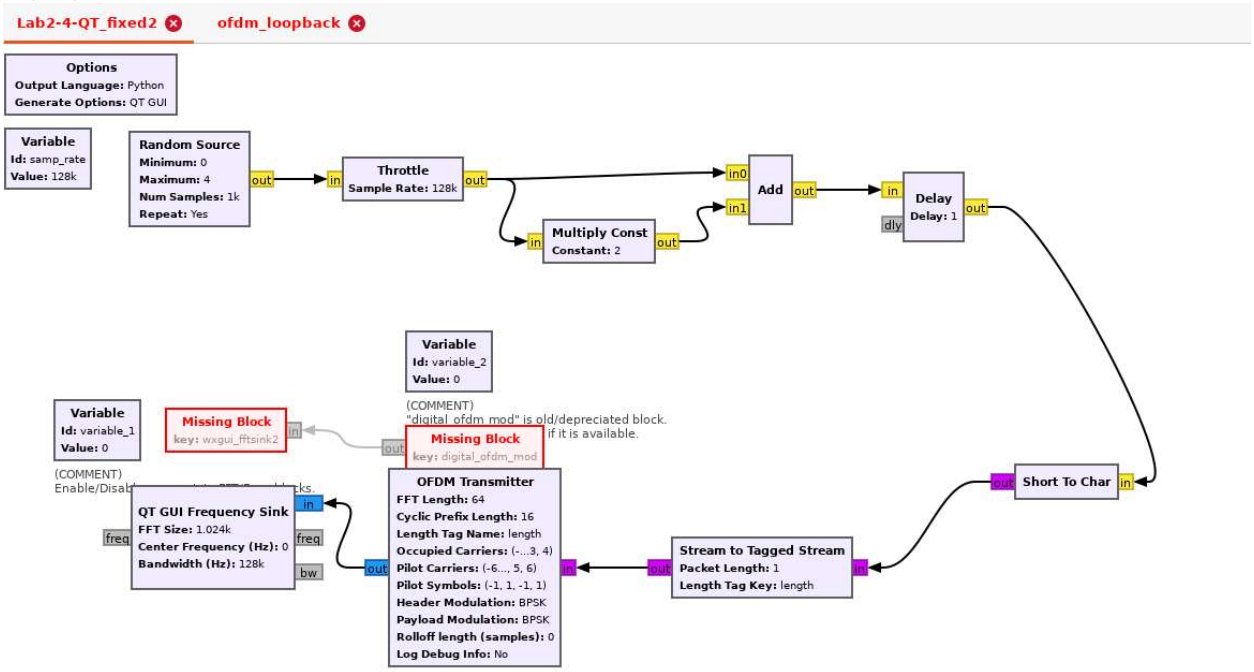

Figure 7: Lab 2-4 GRC Flow Graph

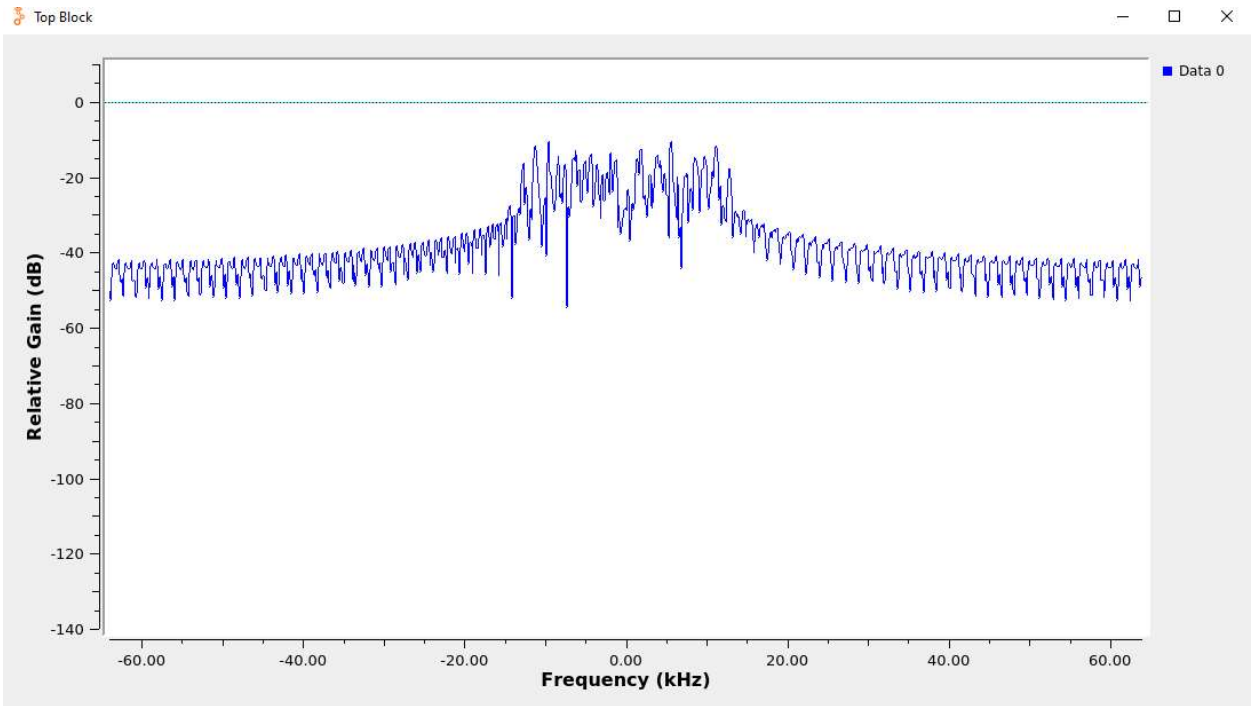

Figure 8: Lab 2-4 GRC Output

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Lab2-5

- The only runtime issue identified in this program was a type mismatch between the throttle block and the Phase Shift Keying (PSK) modulator block, which expects a byte stream
    - This was resolved by inserting a Short to Char block to convert the short data type to Char data type

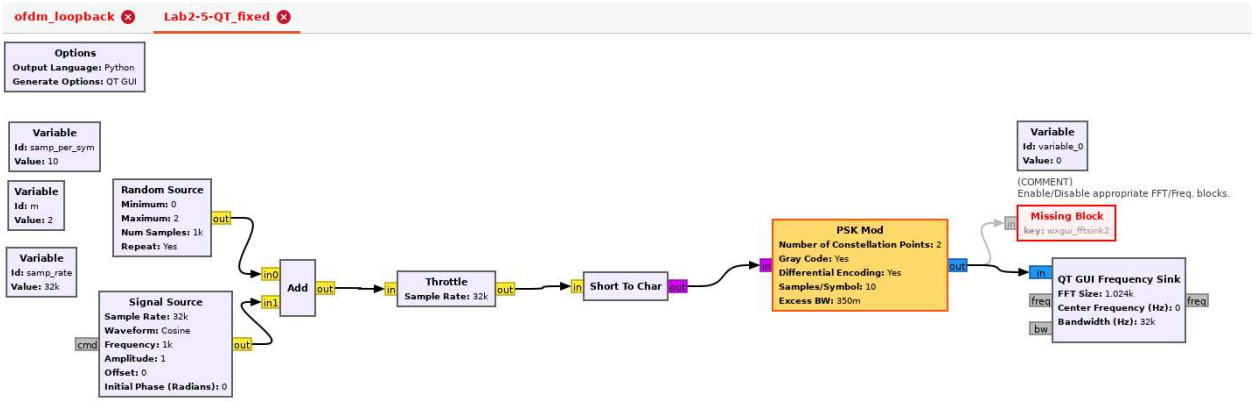

Figure 9 Lab 2-5 GRC Flow Graph

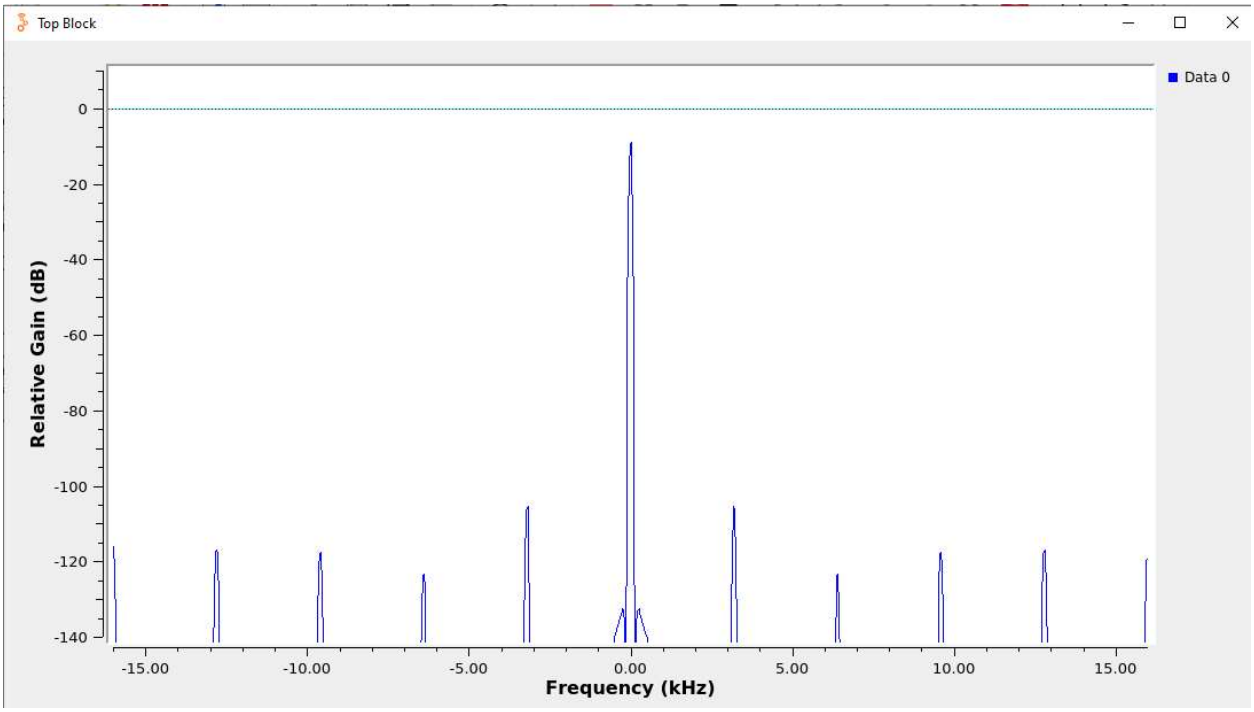

Figure 10: Lab 2-5 GRC Output