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Developing a Program for Calibrating and Streaming from a Software-Defined Radio

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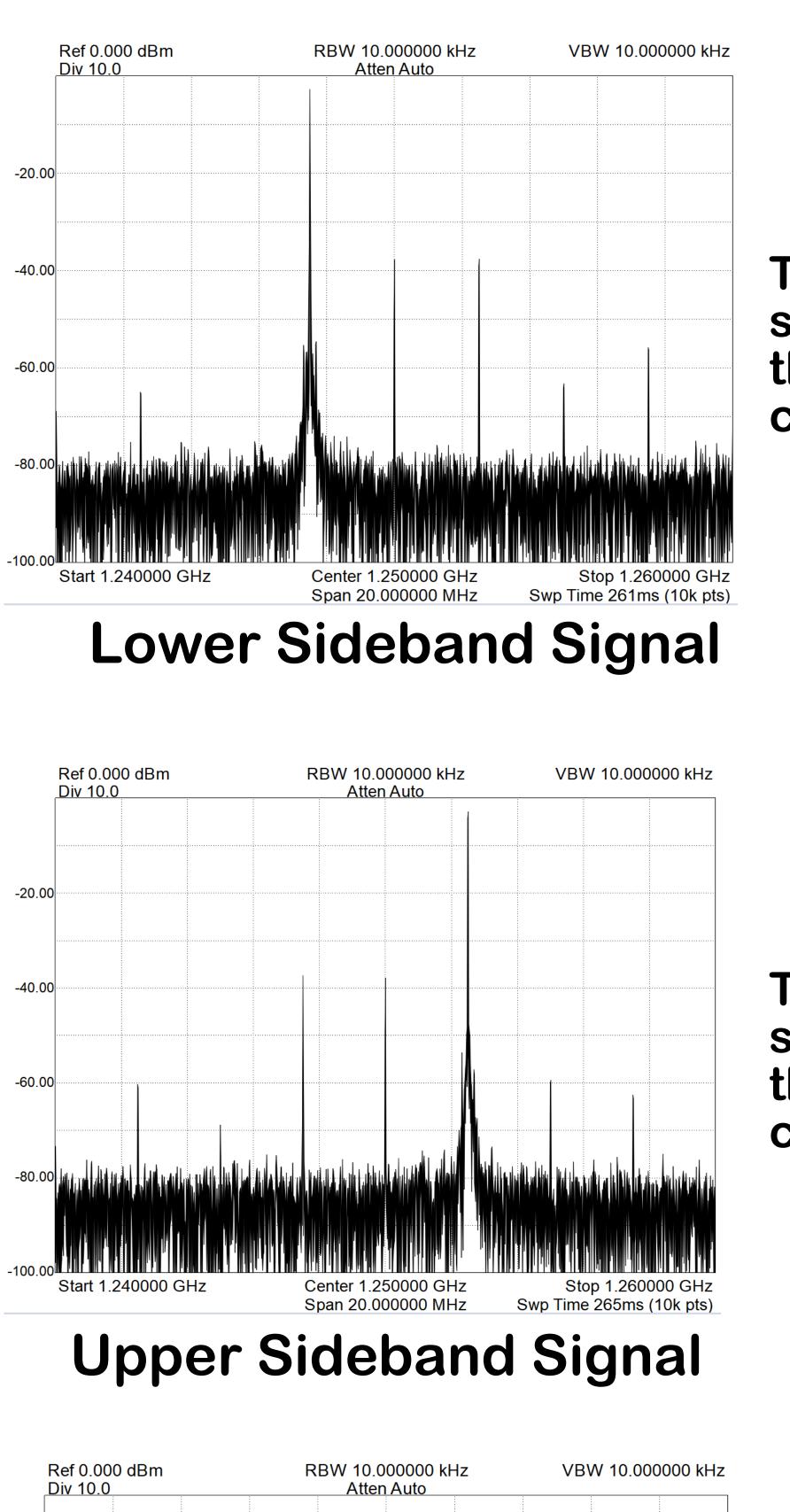
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Results with a Carrier Frequency of 1250 MHz



Span 20.000000 MHz

Double Sideband Signal

-20.00

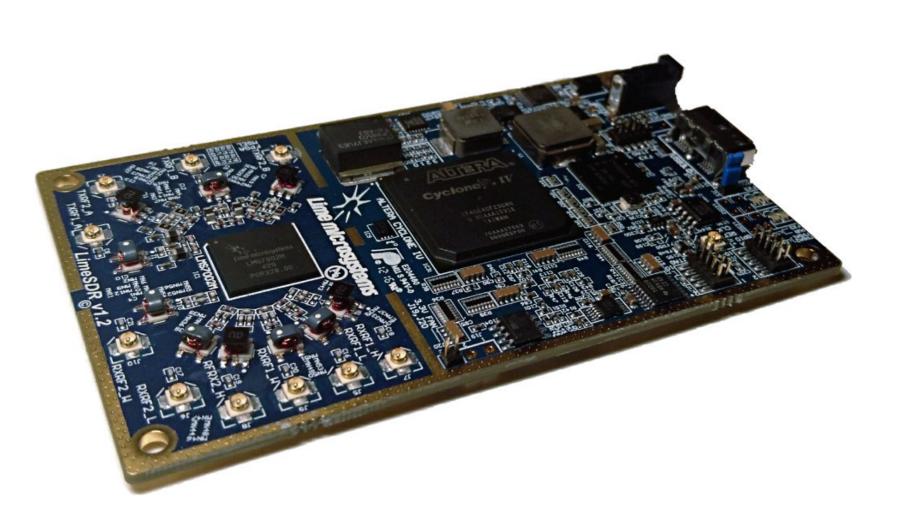
-40.00

-60.0

Transmitted signal is on both sides of the 1250 MHz carrier signal.

Developing a Program for Calibrating and Streaming from a Software-Defined Radio

The board connects via USB 3.0 and has RF transceivers, a field-programmable gate array (FPGA), and microcontroller chipsets.



LimeSDR Hardware

Transmitted signal is below the 1250 MHz carrier signal.

Transmitted signal is above the 1250 MHz carrier signal.

Background and Significance

Radio transmission is a valuable tool for communicating in areas where common signals can't reach, and software-defined radios (SDRs) are the next step in radio communication. SDRs are remote access radio systems that utilize software rather than hardware to transmit

and receive radio signals.

SDRs provide a new level of customizability in radio transmission, allowing faster and easier alterations to be made to transmitting and receiving channels.

Methods

- Obtained a LimeSDR, a software-defined radio developed by Lime Microsystems.
- Developed a Python code using SoapySDR, a vendor-neutral library with a Python API.
- Created lower sideband, upper sideband, and double sideband signals in MATLAB using I/Q data.
- Played the signals and observed them on a spectrum analyzer.
- Calibrated the signals from the LimeSDR with the Python code.

Amanda Kolbeck (Montana Tech) with mentor Kevin Negus (Montana Tech)

- developed code.
- computer software.
- hardware.



LimeSDR with Aluminum Case

This work was supported by Montana Tech's Summer **Undergraduate Research Fellowship (SURF).**



Conclusions

• Signals transmitted from the LimeSDR can be successfully calibrated and tuned with a user-

 Calibration changes can be made quickly and efficiently when the LimeSDR is interfaced with

• The developed code can be further expanded upon to calibrate received signals.

• A collaborative online environment provides countless possibilities and applications for this

> This project used the LimeSDR with an aluminum case. This model was \$599.

Acknowledgements