**Source Module - Damian Loya**

The goal of this portion of the Radar is to create and send a clean 5.8 GHz signal to the other modules. This is done by using a voltage controlled oscillator whose output frequency will be set by an Teensy ADC output. The output frequency will be 1.93 GHz which is then multiplied into the desired 5.8 GHz, after being amplified. After the multiplier there is a filter to attenuate any of the 1.93 GHz that leaks through the multiplier. The 5.8 GHz signal is then amplified again before being split in the Wilkinson divider. This module is found on the fourth page of the schematic, based on the initial block diagram given in the project description. I will now explain each of the components in more detail.

Starting off is the voltage controlled oscillator (VCO), the exact model is MAX 2752. This component can take in a voltage from 0V to 3.3V (VCC) which corresponds to its frequency range of 1875 MHz to 2275 MHz. The supporting circuitry is set up according to the application guide found in the datasheet.

The Amplifiers Selected are the GALI -2+ because they were the best performing at 5.8GHz according to the data sheet. The simulated gain of each one had around 12 dB of gain, a more detailed chart which the different power levels is included as well. To power the amplifiers there is a DC line with a AC grounding capacitor at a distance of from the output. There are also DC blocking capacitors on both the inputs and outputs.

The frequency multiplier being used is the RMK -3-93+. This is one of the reasons, so much gain is needed from the amplifiers. It needs at least 7dBm of input and has a conversion loss of around 16.5 DB at 5.8GHz. On issues is that it lets through a decent amount of the original frequency. This is an issue because we do not want to unintentionally transmit this frequency. So the output signal is then filtered with a single pole filter to further attenuate the 1.9 GHz signal.

Once Amplified again the signal is sent through a Wilkinson power divider. This ideal should take a signal and split it into two -3dB signals. When simulated in ADS each signal was closer to -3.1dB. Drawing the Shape within KiCad was one factor that lead to a blockier shape rather than a horse shoe or omega shape.

Also included on the Schematic is a resistive divider which could be used to monitor the 1.93 GHz signal form the VCO. Th pads could be left unpopulated and zero-ohm resistors can be used to bypass it. Another thing that was placed on the VCO board was the Voltage regulator which takes in 9V from the battery and regulates it to 5V. The Teensy is powered of this, and also is used to regulate the 5V. into 3.3V.