Vincent Saechao
912140715

App Note for Component Selection

During this quarter 2, we had to design a FMCW radar system from ground up. My part consisted of component selection. To begin the component selection, you first need a diagram of the complete system so that you know what parts you need and what the power flow is. We decided to use the block diagram similar to quarter 1 lab because we knew that system worked, and we didn't know much about how components should flow in a radar system.

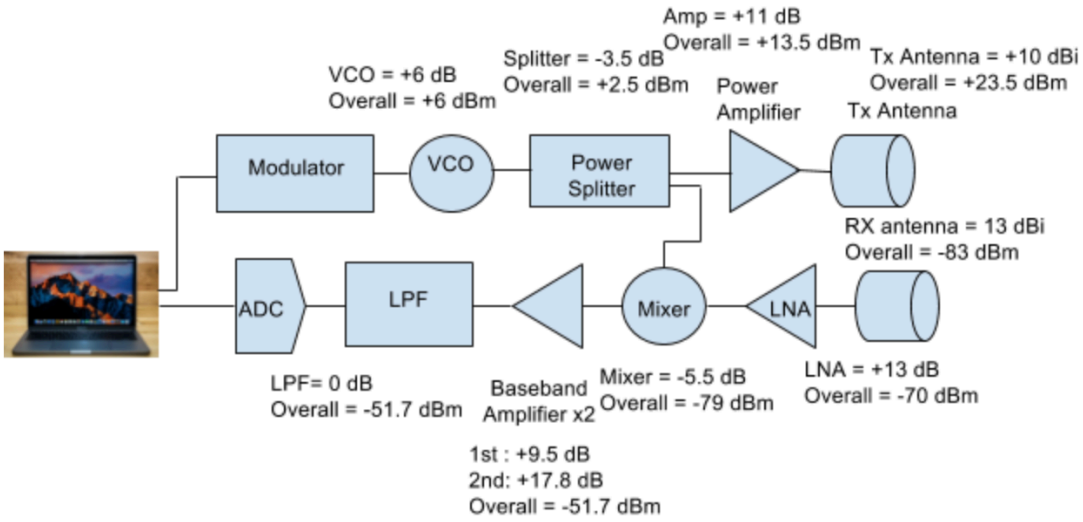

Fig. (1) Block diagram

The second step we needed to do was find the actual components online now. Our main websites we used were Digikey and Minicircuits. When trying to find the components online, it is very useful to use the filters they provide. For instance, if you want a component to work around a certain frequency, such as 2.4 GHz, you can choose that specification and the online website will show you all the components that match what you want. Our main goal was to find components that matched the 2.4 GHz range, so that's how our first round of components was chosen.

Vincent Saechao
912140715

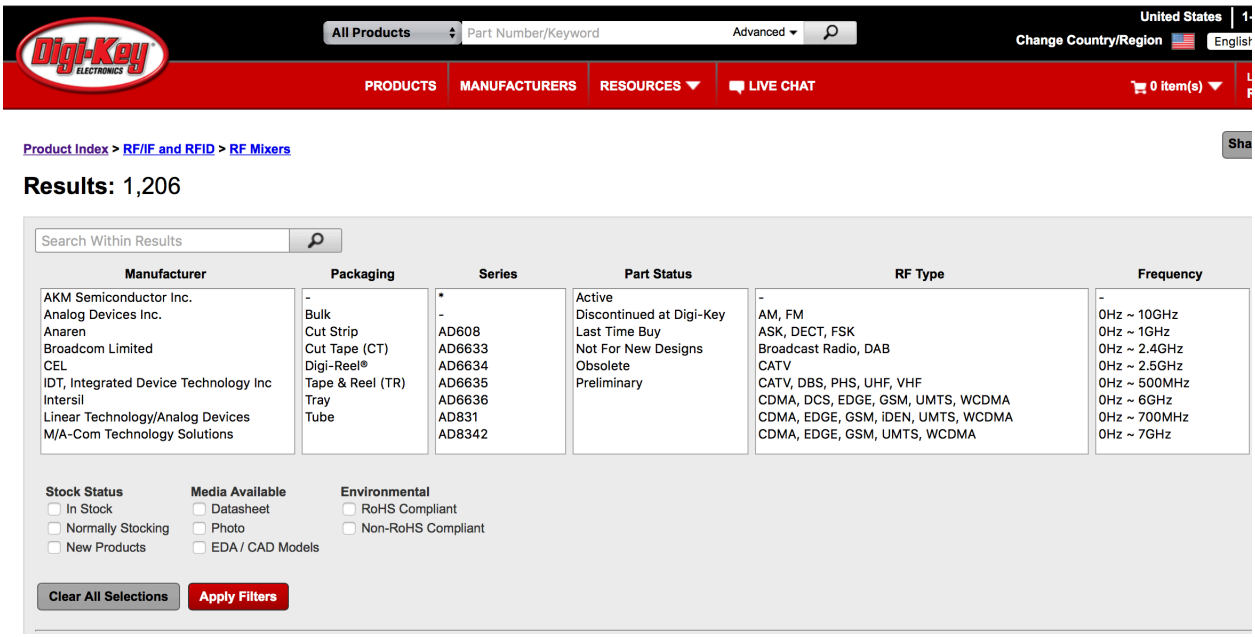

Fig. (2) Digikey component section applying filters

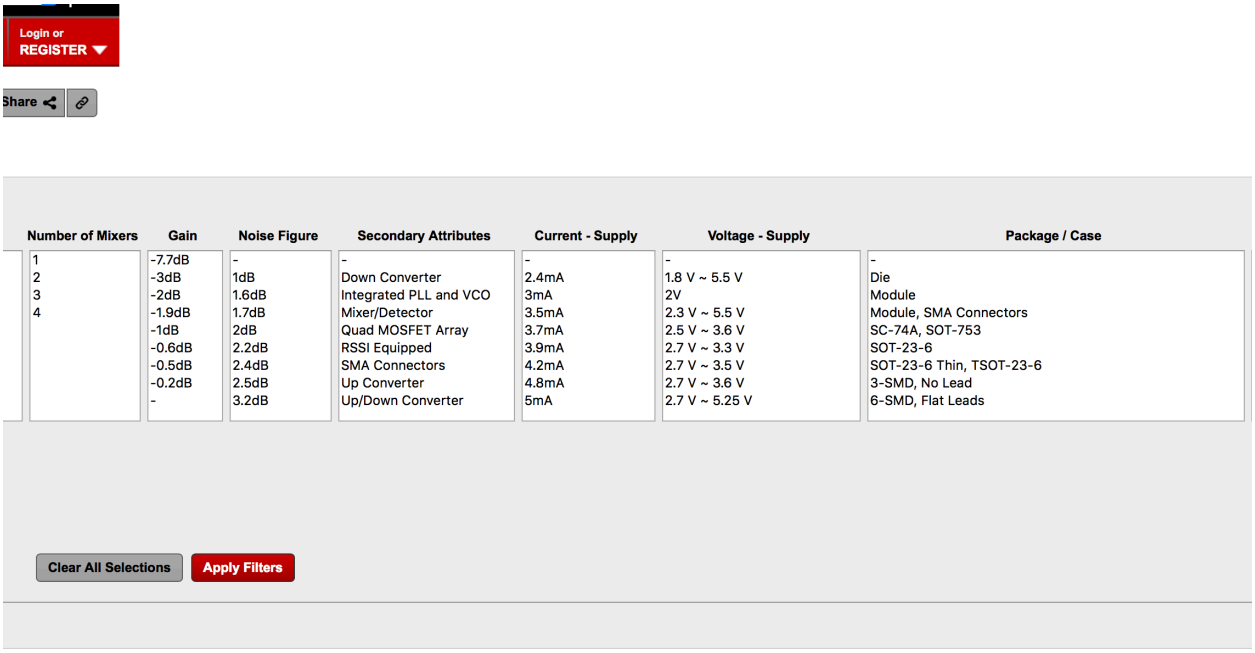

Fig. (3) Digikey component section applying filters

Once we found the components, the next step was to plug the components into ADI Sim. This would tell us if each component we chose is compatibles with each other. Each component needs enough power to run the next component. To get the numbers to fill into ADI sim, you have to read the datasheet provided for each component. Then, once all the components are in, you run the program. If it shows a red, that means the component you chose will not work for the system. Reasons for this could be because the voltage gain is too

low, or the power gain is to low. It would be easy to tell because the specific box will be red. So, when it doesn't work, you have to go back to Digikey and find another component that fits what you want. It will be a lot of guessing and checking but once there is no red like the figures below, you will be set. ADI also tells you the output power of the whole system.

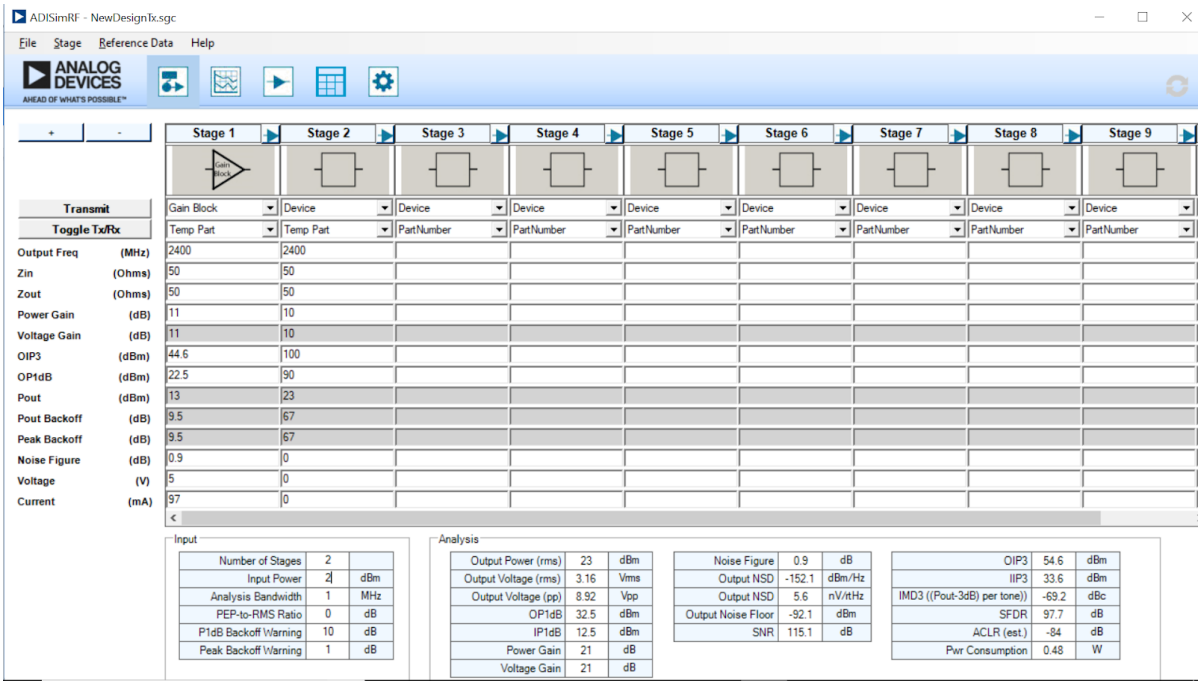

Fig. (4) ADI Sim for transmitter

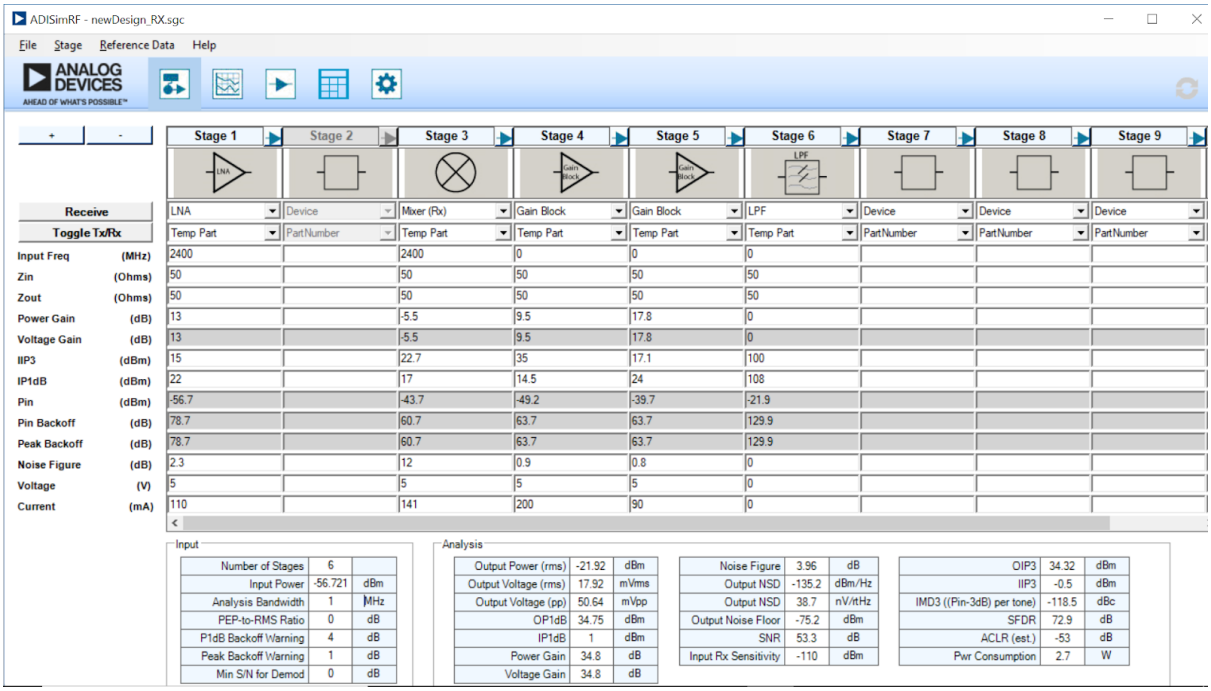

Fig. (5) ADI Sim for Receiver

Component	Model Number	URL
LNA (1)	HMC 639ST89E	https://www.digikey.com/product-detail/en/analog-devices-inc/HMC639ST89E/1127-3004-ND/5359984
VCO	ROS-2490+	https://www.minicircuits.com/WebStore/dashboard.html?model=ROS-2490%2B
Mixer	Sim-63LH+	https://www.minicircuits.com/WebStore/dashboard.html?model=SIM-63LH%2B
LPF	MAX291ESA+	https://www.digikey.com/product-detail/en/maxim-integrated/MAX291ESA/MAX291ESA-ND/1513302
Amplifier (Rx) #1	PGA-103	https://www.minicircuits.com/WebStore/dashboard.html?model=PGA-103%2B
Amplifier (Tx)	PGA-103	https://www.minicircuits.com/WebStore/dashboard.html?model=PGA-103%2B
Amplifer (Rx) #2	MMG20241H	https://www.mouser.com/productdetail/nxp-freescale/mmg20241ht1?qs=sGAEpiMZZMvlz5n0fllKWCPT5hyshv%2FsuQS0BdS5sXs%3D
Antenna	Yagi	http://www.wa5vjb.com/pcb-pdfs/Yagi2400.pdf or http://www.wa5vjb.com/products2.html
Splitter	BP2U+	https://www.minicircuits.com/WebStore/dashboard.html?model=BP2U%2B

Table (6) Component List

This is a list of our components we purchased. It will be very convenient to put all the parts in one list and links to where they can be purchased. You yourself will not have to order the components. But you will have to make a list like this and include the quantity you want. Then send it to the TA's and they will order for you. I recommend ordering three to four of each component if you can afford it in your budget because sometimes your first PCB design might not work, and you would want to restart another one. Also, the components are very small, so they are very easy to lose so ordering a few extra may be very beneficial. I also recommend starting your component list early and placing the order in early because they do take a while to come in. This concludes the component selection app note.