Construction of Electronic Systems

Exercise 11: USB DAQ project: designing the rest of the PCB

In this exercise you will design the rest of the PCB so that when you are finished with the exercise all nets will be connected. You will also add the ground polygon pours that will ensure low impedance return paths for ground currents.

Exercise tasks:

1. **First, if necessary, *improve the design that you have already made*.** Be especially careful about the details regarding the following important circuit parts:
   - bypass capacitors (placement, GND vias, low-impedance current loop)
   - fast USB connection (obstacle-free ground return path, small differential loop area, low-impedance ESD bypass path)
   - high frequency oscillator (unsegmented ground pour around the oscillator, low-impedance return path, small loop area)
   - bottom ground plane under the microprocessor (try to minimize the segmentation of the GND plane under the microprocessor)

2. **Design the *remaining parts of the analog section*:** the analog power supply and the analog reference. Be careful with the so-called *sense connections* for the voltage reference IC.

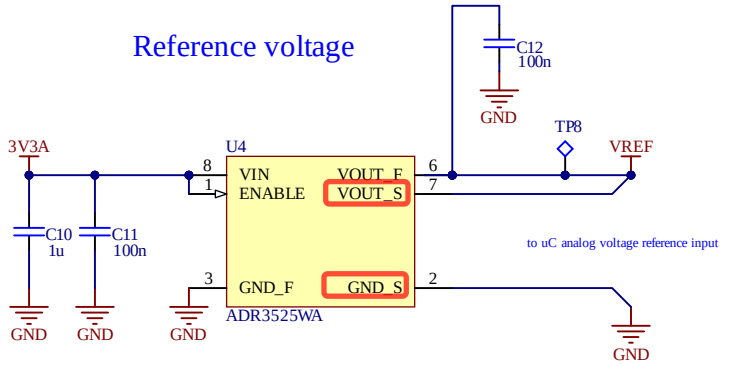

Figure 1 - the voltage reference IC is using so-called sense connections to ensure more precise reference voltage at the point where it is needed. Therefore, you should be careful when routing these connections.

3. **Design the "*interfaces*" part.**

4. **Design the *remaining parts* of the circuit.**

5. **Add top and bottom *ground polygon pours* to ensure low-impedance ground return paths.**

   In the additional materials eFE folder you will find some hints on how to use the ground planes in a more efficient way.

Explanation of the exercise

At this stage you are in the *final phase of the PCB design*. This means that by now the most critical circuit parts should have already been designed to a good degree. At this final phase we are now "fine-tuning" these critical circuit part designs and also taking care of the rest not-so-critical parts such as slower digital parts.

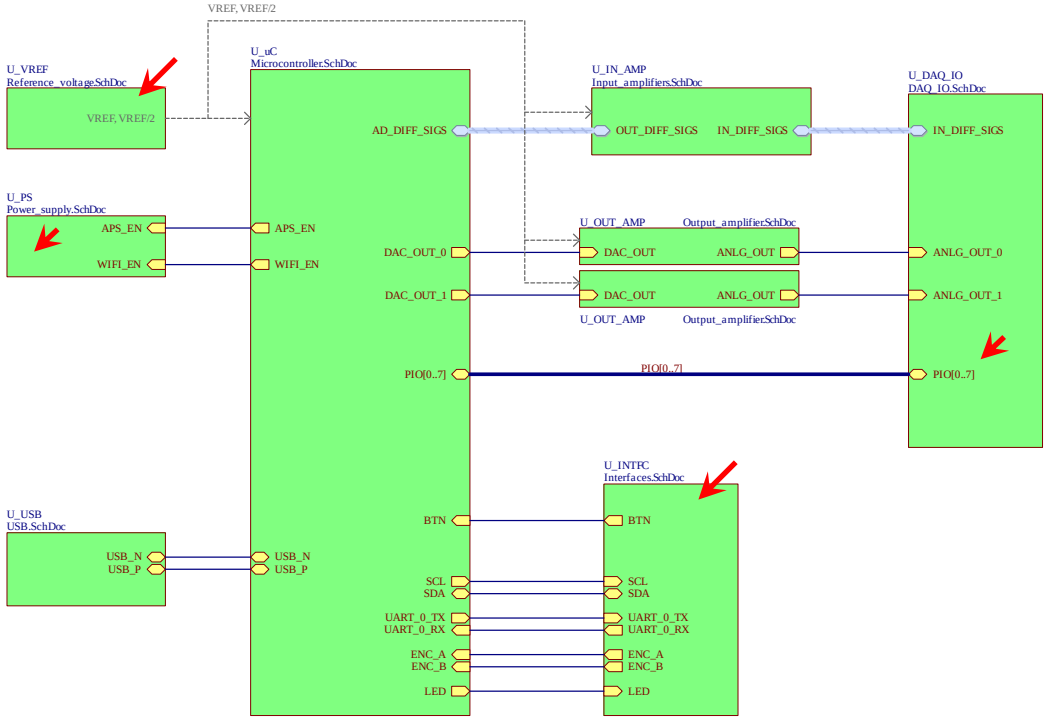

Figure 2 – in this exercise you will design the remaining parts of the circuit: analog power supply and reference voltage, interfaces and whatever might still be unconnected.