Creation of a Custom PCB for RD53B Eye Diagram Testing

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Motivation

- YARR still works with lower quality differential signals but ATLAS will not

- Need to individually ensure the signals are up to par

- Best way to do this is an eye diagram

- Need to make PCB to interface between a commercial FPGA (used to create eye diagrams) and the RD53B single chip card
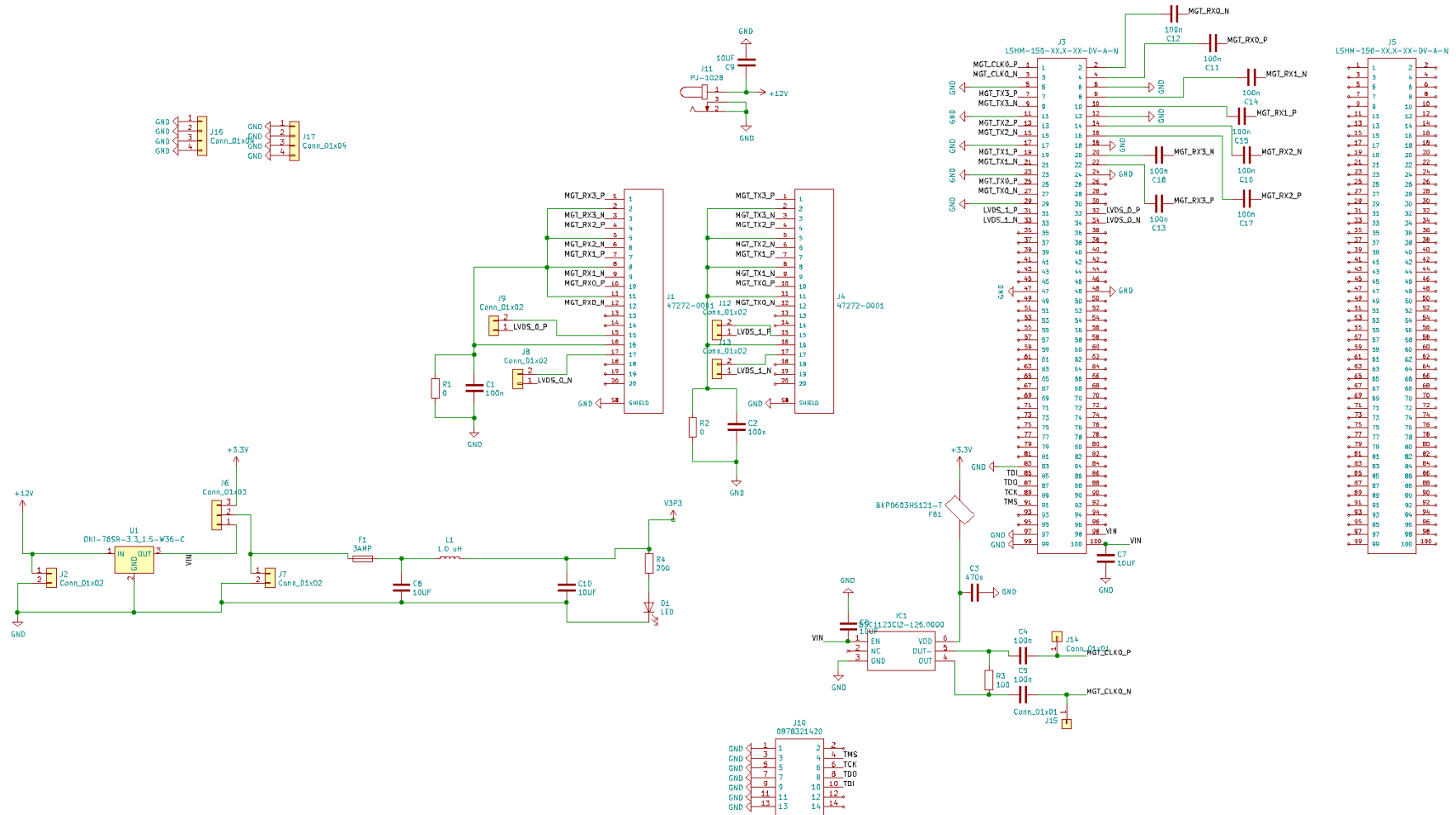
Eye Diagram

- Overlaying successive digital signals
- The more open the eye the better signal quality
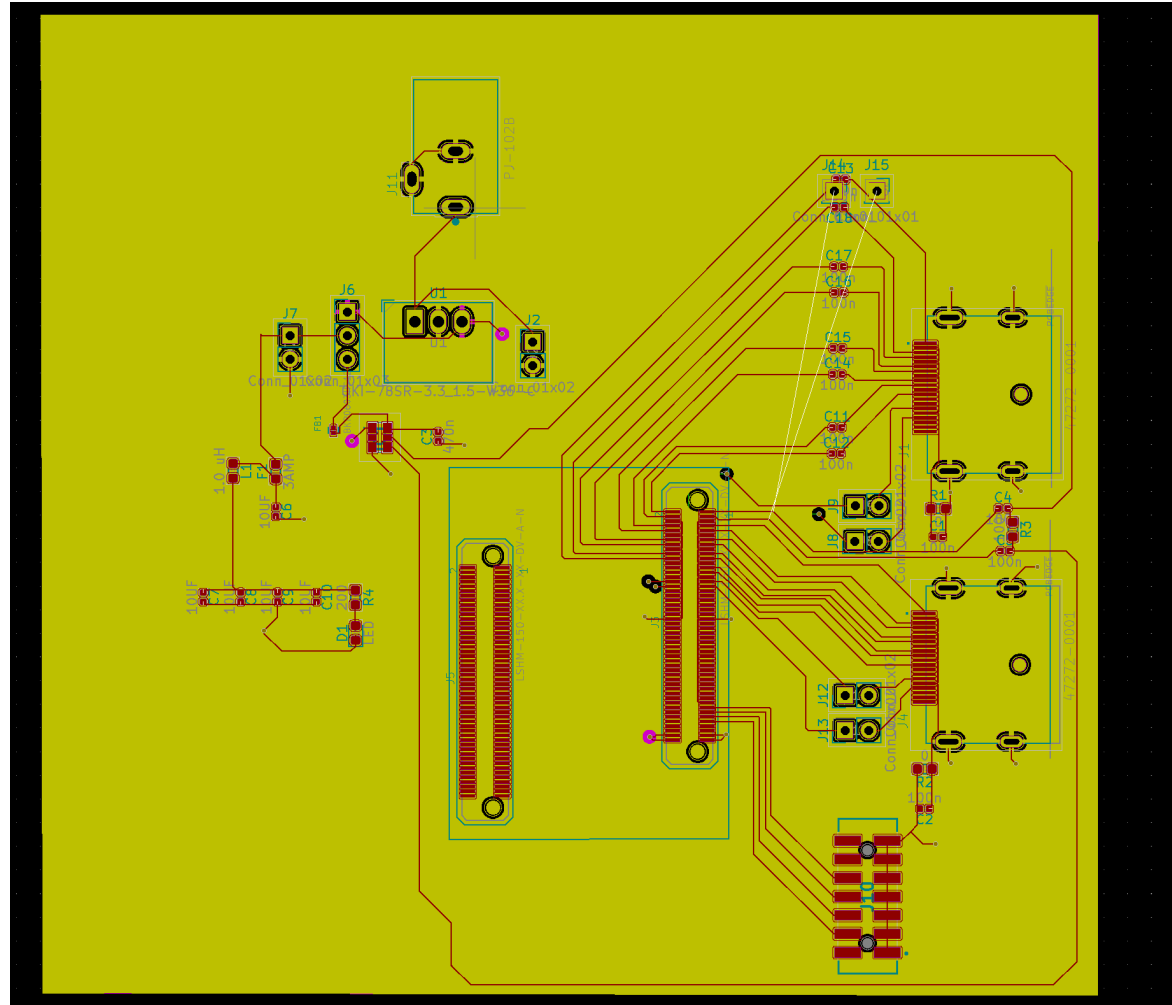- Can quantify quality by placing objects in eye
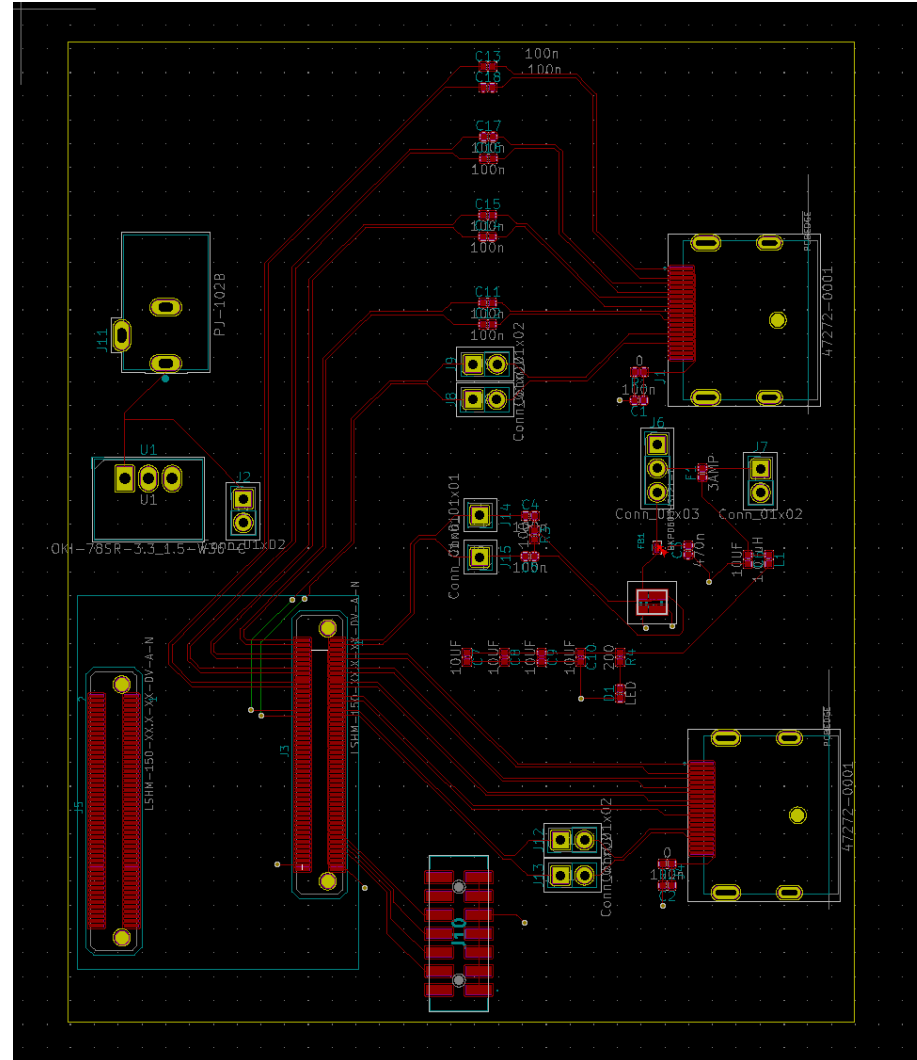

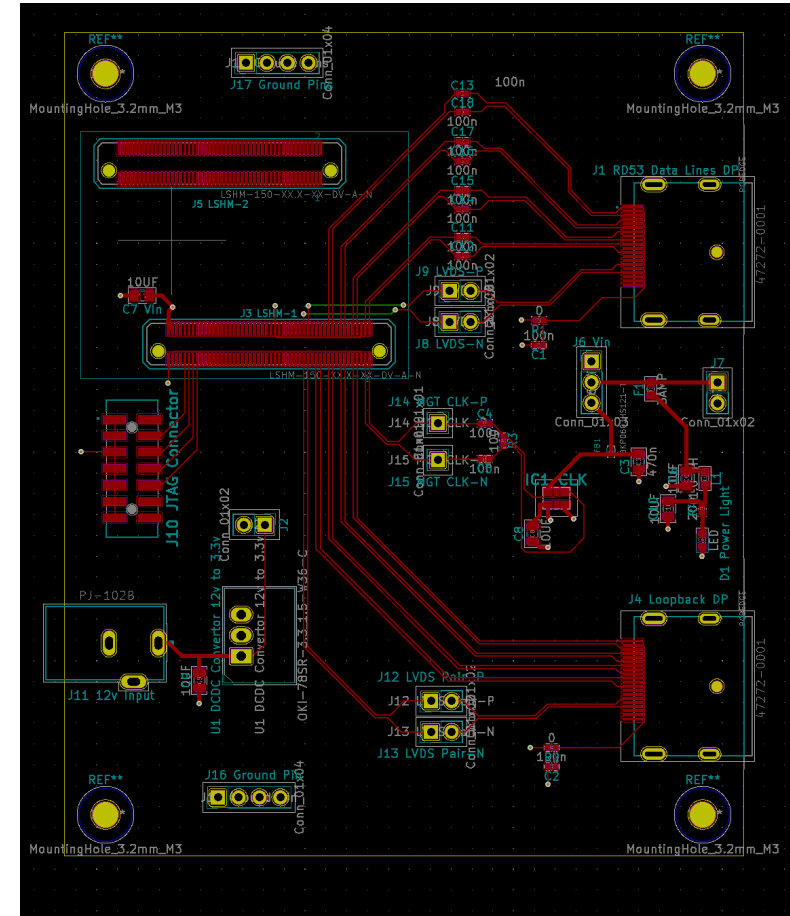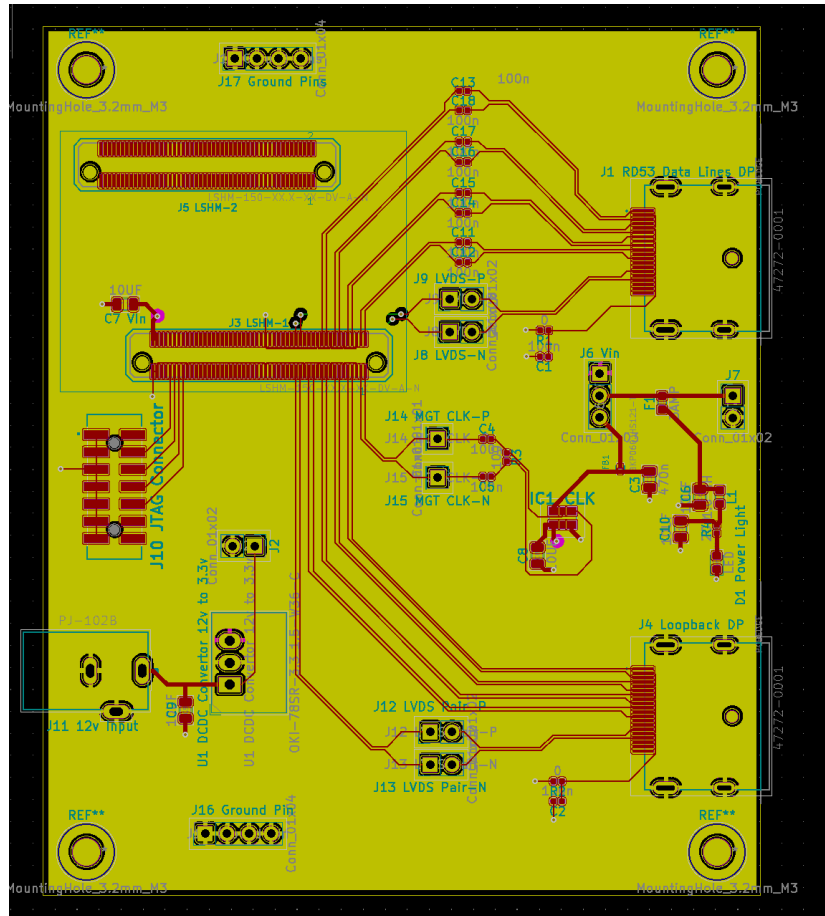Eye makeup
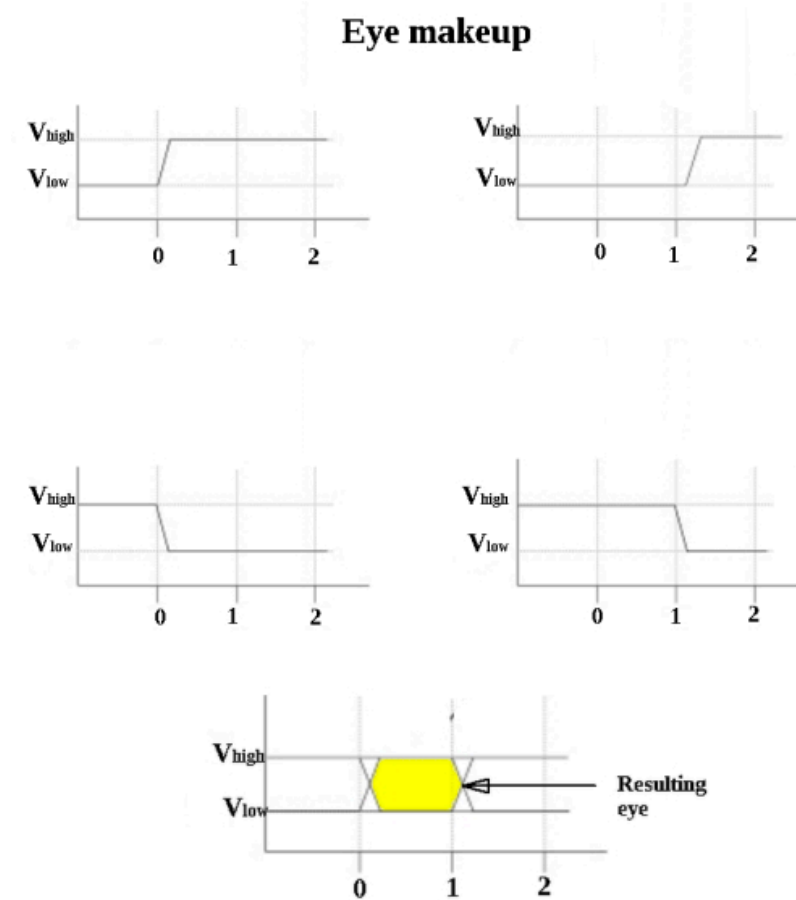
Testing Set Up
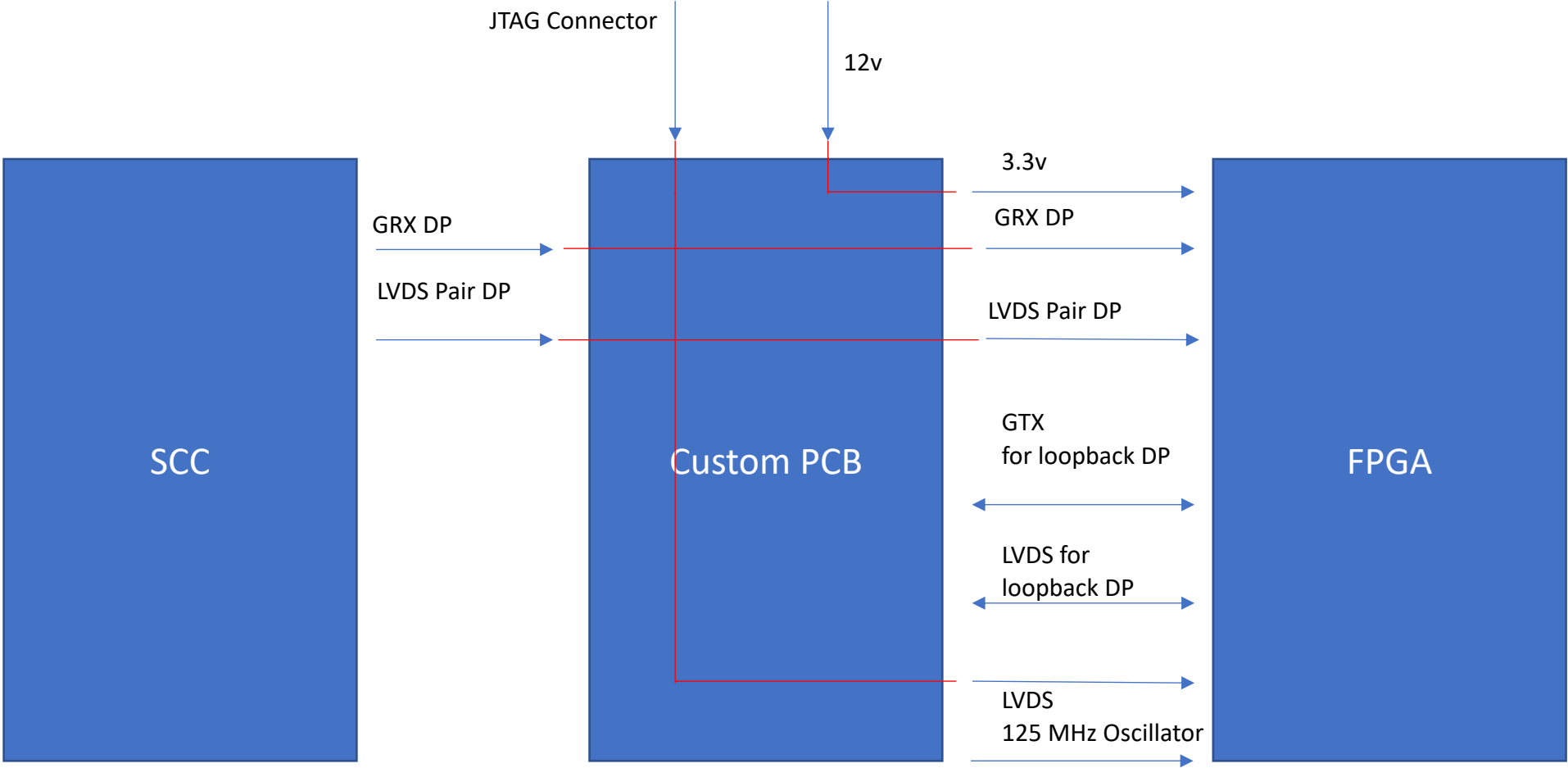
KiCad Schematic

PCB Design Iteration Version 3

PCB Design Iteration Version 7

PCB Design Iteration Version 12 (Current)

General Lessons Learned

- "Tracing is both an optimization problem and an art"-Maurice
- Differential traces must be kept close to one another
- There is always a more efficient layout
- Pay very close attention to hermaphrodite connectors
- PCB design is highly iterative
- Helps to just erase all traces and redraw
- I miss the lab

Next Steps

- Final iterations of PCB
  - Adding test LEDs
  - Final crosschecks
- Fabrication of board
- Set up at Berkeley Lab
- Learn Vivado and how to program FPGA's
  - Done some tutorials already but nothing hands on
- Creation of eye diagram and quantification firmware