

VMM prototype status/plans – 4/27/23

- 10-bit firmware for prototype needs some more work. Totally different data transfer protocol and data format. Simulating main sections now. Expect to finish within several days.
- Had to inquire with De Geronimo about some points where documentation is not clear.
- When implemented on prototype need to do phase shift scan on data capture clock.
- Minor changes still needed in software programs to acquire and analyze data.
- New 6-bit firmware generated. Realized that beam crossing clock (40 MHz) and 10-bit data transfer clock (160 MHz) are *not necessary* when operating with only 6-bit mode. Currently they are free running clocks (4 total) applied to the two VMMs.
- New firmware disables these clocks. Could be a noise source.
- Also a 'fast reset' on each channel is *not necessary* when the 10-bit mode is already disabled. Could be a noise source.
- Xinzhao should test noise levels on the prototype with the new firmware and the fast reset disabled (configuration file.)

10-bit data on Evaluation Board

- Last week Xinzhan compared a normal 10-bit run with a run in which we also turned on the 6-bit mode. (No fast reset.)
- There are NO direct outputs connected on this evaluation board, so the outputs on the VMM chip see no load.
- The noise in both these runs were the same. It appeared that the 6-bit processing does not increase observed noise in the module (which is a good thing).
- BUT I don't believe that this evaluation card has the 6-bit data clock (160 MHz) applied to it.
- The 6-bit ADC may be working but the serialization of the data does not occur.
- No real conclusion can be made from this noise comparison.

Prototype 10-bit test plan

- 1 - Run 10-bit mode with 6-bit mode (clock and outputs) *disabled*. This is the best 1-1 comparison.
- 2 - Run 10-bit mode with 6-bit mode *enabled*. (But no fast reset after 6-bit conversion.) We can then see the effect on noise of the 6-bit processing, serialization, and 128 switching digital direct outputs.
- 3 - If prototype noise in (1) is larger than for the evaluation board, we can power the VMMs with a benchtop low noise supply. The VMM power mezzanine card can be replaced with a mezzanine card that maps the external supply (or supplies) cable to the prototype base board.
- 4 – Can make more robust ground connection with GEM – ground tabs exist on prototype board.
- 5 – Can experiment with series resistor values for VMM inputs. (Need guidance from (DeGeronimo on this.)
- Note: Prototype inputs are DC coupled. Evaluation card inputs are AC coupled. Can easily change evaluation card to DC coupling and make measurements again.