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**The IOtech 3001 PCI card**

I have advanced in the development of the IOtech 3001 PCI card as a substitute of the ISS-FCS-PCI card and possibly for substituting also the ISS 3axis card. In the following is the documentation of what I did.

First I will go through the hardware to indicate the function of the pins on the SCSI 68 pin connector of the card.

I am using the following pins

- **68** CHO analog input
- **37** Analog common ground
- **67** CH1 Analog input
- **65** CH2 Analog input
- **30** CH3 Analog input
- **5** Counter 0, digital input for photon counting CH1 (32 bits),
- **39** Counter 1, digital input for photon counting CH2 (32 bits)
- **35** Digital common
- **2** External clock, must be 1MHz maximum
- **22** X-axis Scanner output, Analog. Use the analog common at pin 37
- **21** Y-axis Scanner output, Analog. Use the analog common at pin 37
- **55** Z-axis Scanner output, Analog. Use the analog common at pin 37
- **18** Line digital signal, high during data valid only. Could be used for the AOM
- **52** Frame signal, starts high when the frame stars; goes down at the last line.

In practice, we could have a box with the following 10 connectors

- 2 for the analog inputs
- 2 for the photon counting inputs
- 3 for the x, y and z for the scanner
2 for the frame and line output

1 for clock input

Since all signals are generated inside the card, they are perfectly synchronized.

4 analog inputs are supported for acquisition, but generally we use only 2. These are 16 bit converters. I programmed with a full range of 10V, which means that the maximum resolution is 0.15 mV. If we will need in the future better analog resolution then we can change the gains. I am not sure we will never use the analog inputs, but they are very handy for testing. Analog inputs could also be mixed with photon counting on the same board.

For the counters, if we want to use 32 bit counters, there are only 2 counters, but if we want to use 16 bit counters we could have 4 channels of photon counting.

The DAC for the scanner put out voltages form -10V to +10V. We should not use a resistor since the voltage should never exceed the maximum allowed for the scanner.

The frame signal is specifically programmed to work with the FLIMbox.

All digital signals are TTL compatible.

I tested the counter input up to 30 MHz. It works fine

**Software mode**

There are two “input cards” for the IOtech that you can select in SimFCS. One is the analog input mode and the other is for the photon counting mode. Select the mode you are using.

There is an IOtech scanner card. All the normal operations are supported, including imaging, FCS and scanning FCS. In imaging I tested the frame, line and arbitrary line modes.

I did some reprogramming and maximization for using the card for high speed. I tested the tracking mode.

Using the USB edition of the card, I cannot get the data transfer from the card to achieve feedback for speeds faster than 32us dwell time. Although this is not a problem per se, it limits the maxim speed with can obtain with this card. This limit is reached no matter how many points there are in the orbit. Simply the card cannot read the data at the required speed during an orbit. Of course, data are not lost, but the feedback cannot be done every orbit.

Instead, the PCI card seems to respond fast enough up to 512 us per orbit, which is the fastest we can go even with the 3axis card.

I am now waiting for the opportunity to test the card on a real system, since all my tests are using simulations and the oscilloscope.