16-Channel, 14-Bit, 500 MHz ADC Module Status Report

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16-Channel, 14-Bit, 500MHz ADC Board

Test the RJ45 connector with respect to crosstalk between the analog input signals.

Module Under Test
16-Channel, 14-Bit, 500MHz ADC Board

Prototype has 6 RJ45 ports:
- 4 ports with 2 analog signals each
- 2 ports with 4 analog signals each

KOTO Style RJ45 Connection for the Analog Input Signals – 2 signals per connector

Tested RJ45 Connection for the Analog Input Signals – 2 signals per connector

Potential Problem: Crosstalk between the 4 analog input channels inside the RJ45 connector
16-Channel, 14-Bit, 500MHz ADC Board

Custom Test Board to selectively apply signals to any channel
16-Channel, 14-Bit, 500MHz ADC Board

The victim transmission line was cut from the CAT5 cable to eliminate possible noise from the test board.

Victim line terminated -100 Ohm.

Only crosstalk from inside the ADC module is recorded.
16-Channel, 14-Bit, 500MHz ADC Board

Test Pulse: 1Vpp, ~3.5ns Rise

\[ BW[MHz] = \frac{350}{Rt[ns]} \approx 100MHz \]
Crosstalk test for KOTO Style Connection
2 channels per RJ45

Aggressor and Victim channels in the same port, with 4 ground pins in between
No Significant Recording in the Victim Channel

Aggressor: 12,000 LSBpp
Victim: ~ 2.6LSBrms
Tested Connection - 4 channels per RJ45

2 Aggressor Channels and 1 Victim channel in the same port

Recording in the Victim Channel: ~ 37 LSBpp

Aggressor: 12,000 LSBpp

Aggressor: 12,000 LSBpp
Tested Connection - 4 channels per RJ45

3 Aggressor Channels and 1 Victim channel in the same port
Recording in the Victim Channel: ~ 40 LSBpp
Crosstalk Results - Aggressors at 100MHz BW

KOTO Style – 2 signals per RJ45 port – Negligible X-talk

Tested Configuration – 4 signals per RJ45:
- 3 aggressors of 12,000 LSBpp each
- Victim Line measured pulse: 40 LSBpp
Conclusion:

To reduce crosstalk to negligible levels, we have to stay with the old KOTO Style connection, i.e. two analog lines per RJ45 port and CAT5.

Rev.B module will have 8 RJ45 ports for the analog signals.

To do for Rev.B:
- Fix minor schematic issue;
- Change some resistor values in BOM;
- Move JTAG port inside board;
- Move QSFP/SFP/RJ45 up 1-2mm;
- Replace 6-Port RJ45 with 8-Port.