

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

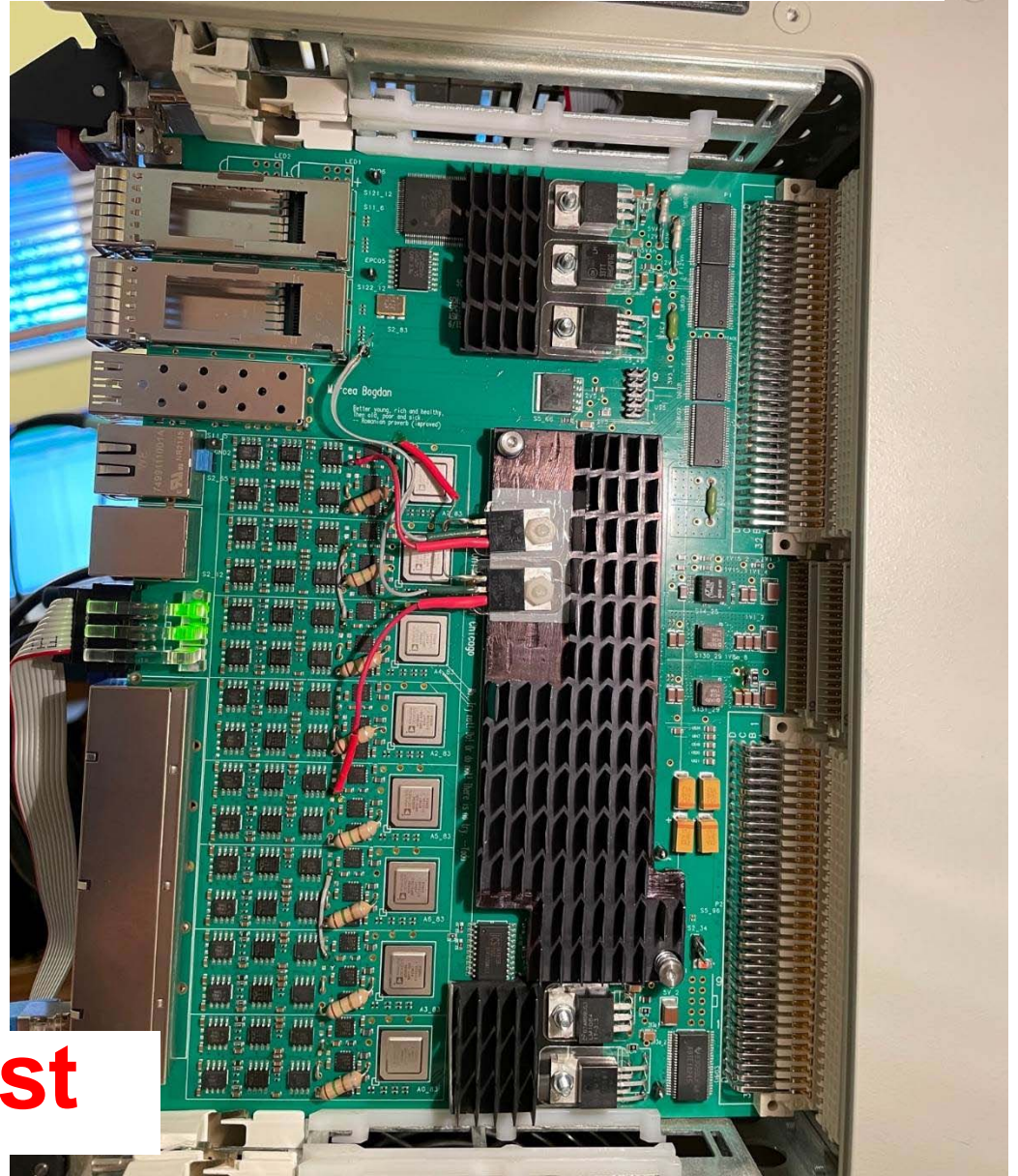
The University of Chicago

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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

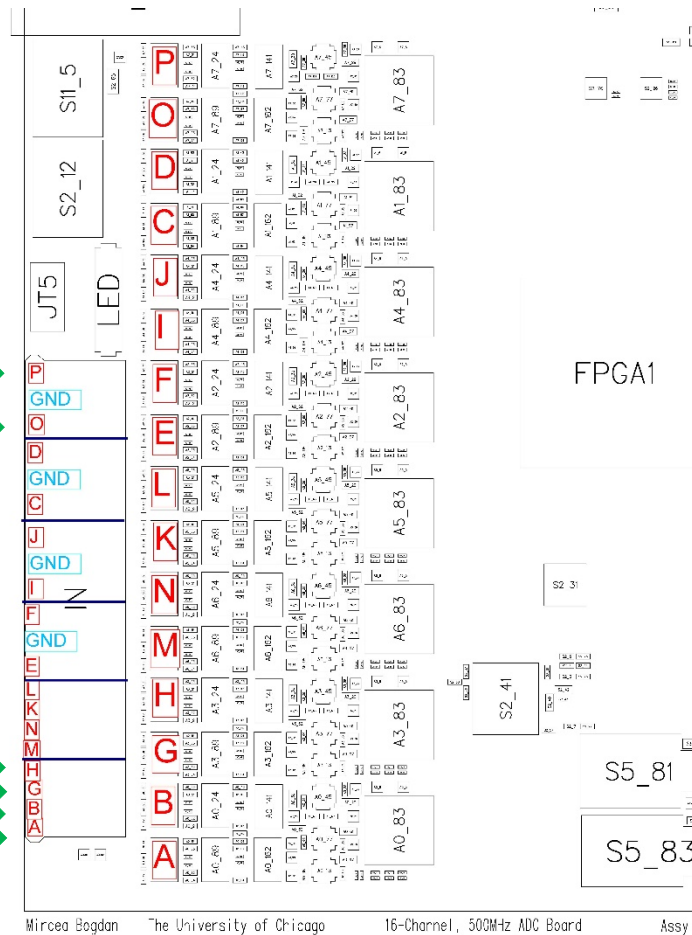
Prototype has 6 RJ45 ports:

- 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

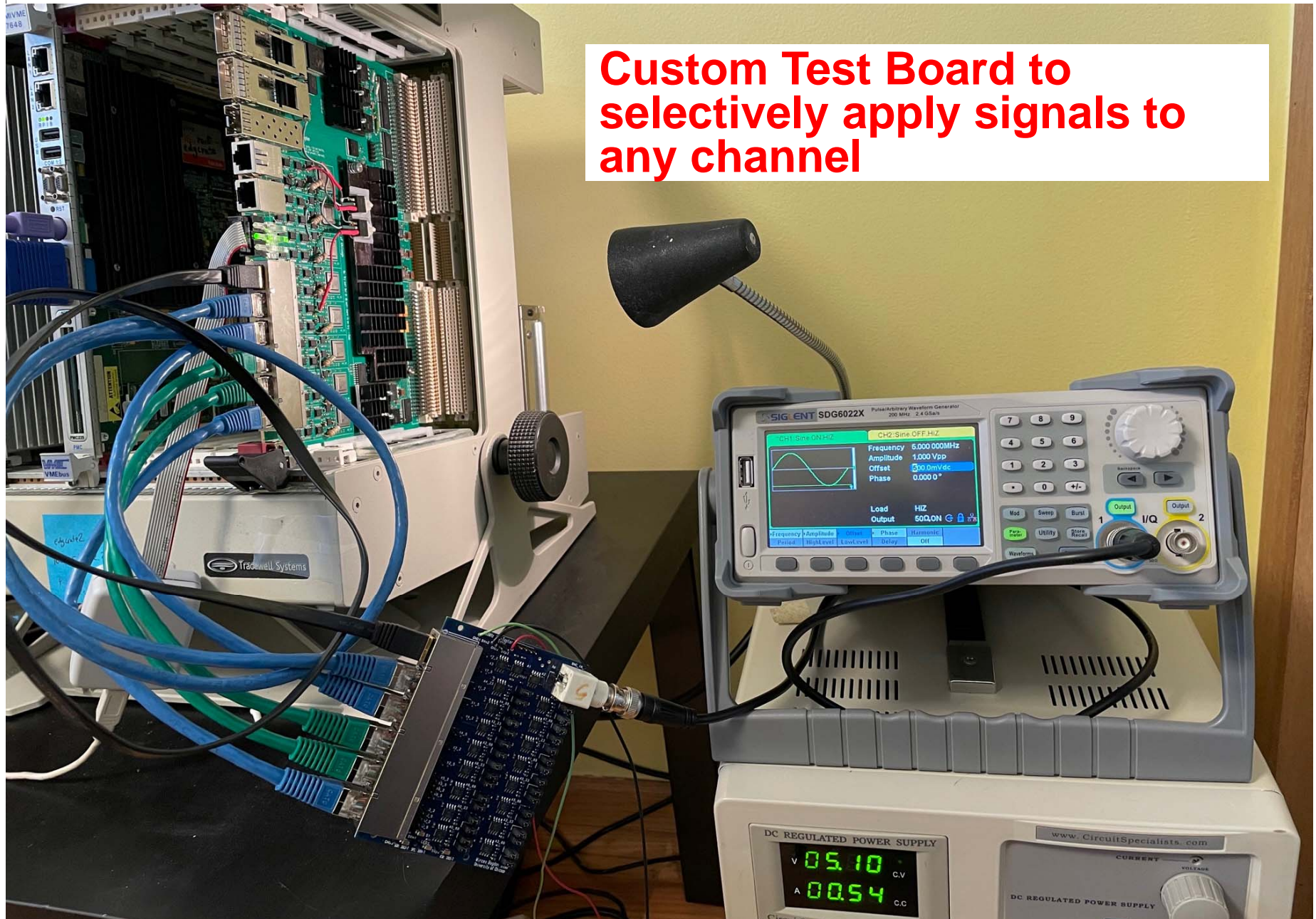


Potential Problem: Crosstalk between the 4 analog input channels inside the RJ45 connector

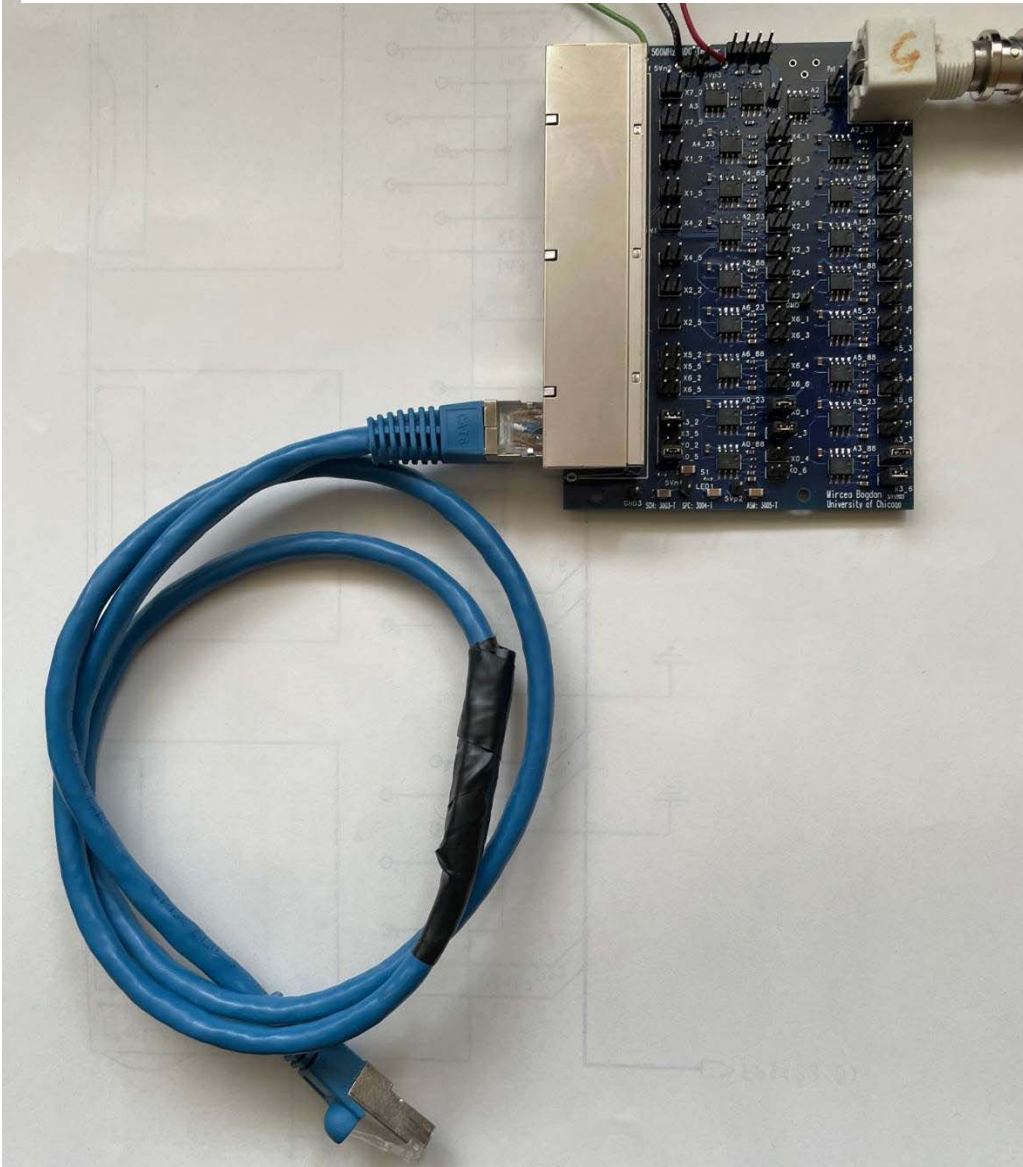


# 16-Channel, 14-Bit, 500MHz ADC Board

**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.**



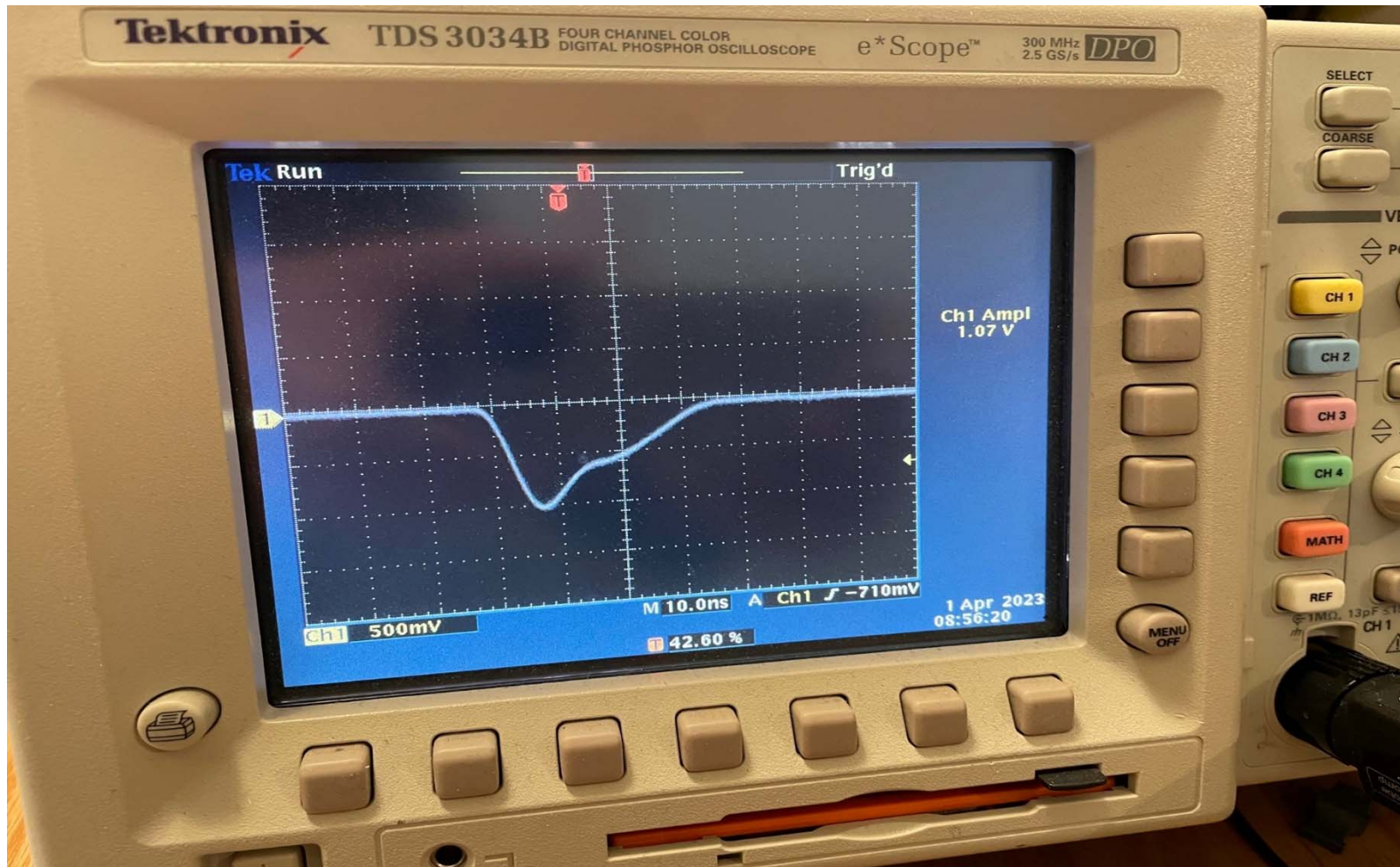
**Only crosstalk from inside the ADC module is recorded.**



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

**Test Pulse: 1Vpp, ~3.5ns Rise**

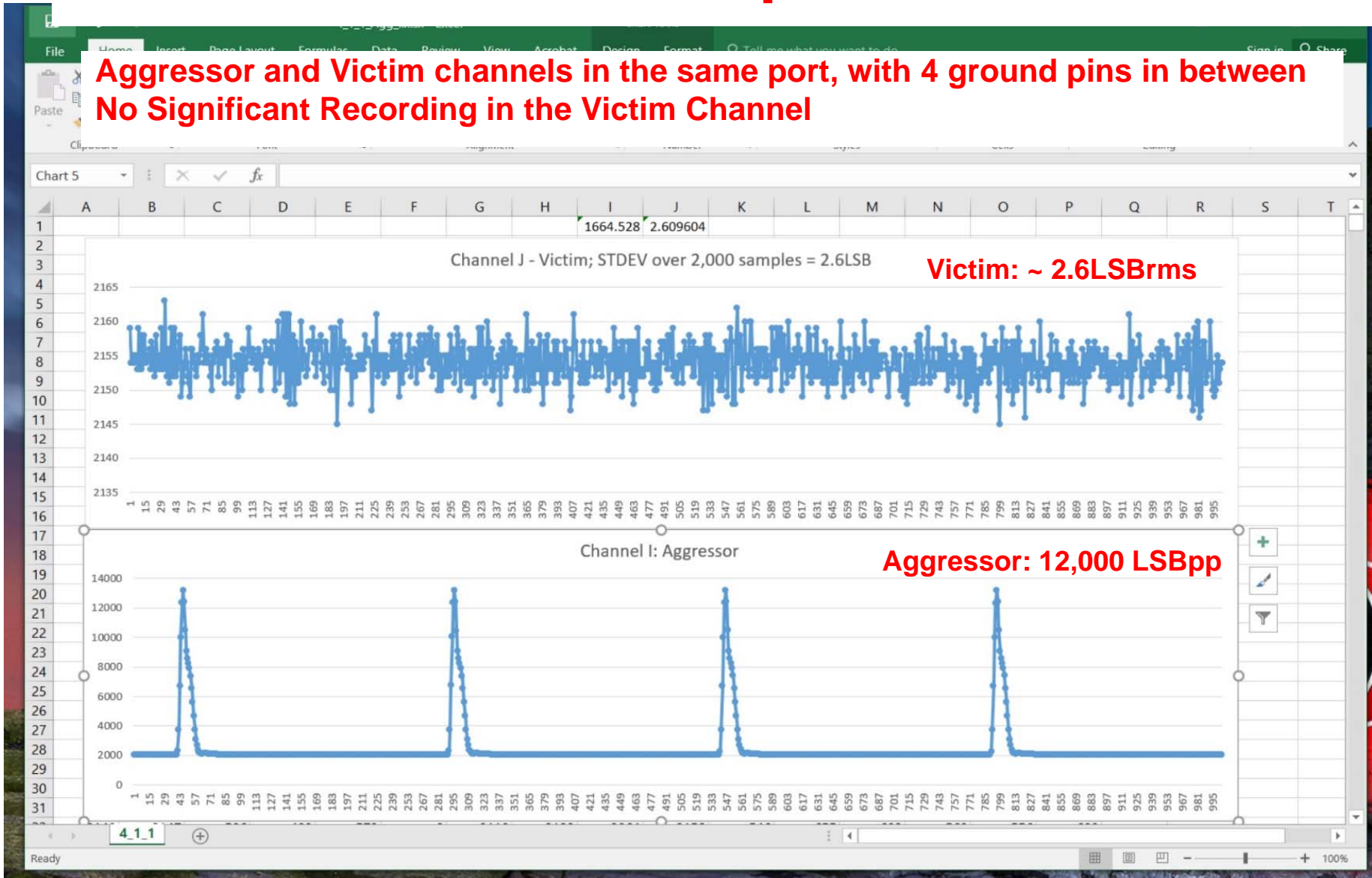
**$BW[\text{MHz}] = 350/R_t[\text{ns}] \sim 100\text{MHz}$**



# Crosstalk test for KOTO Style Connection

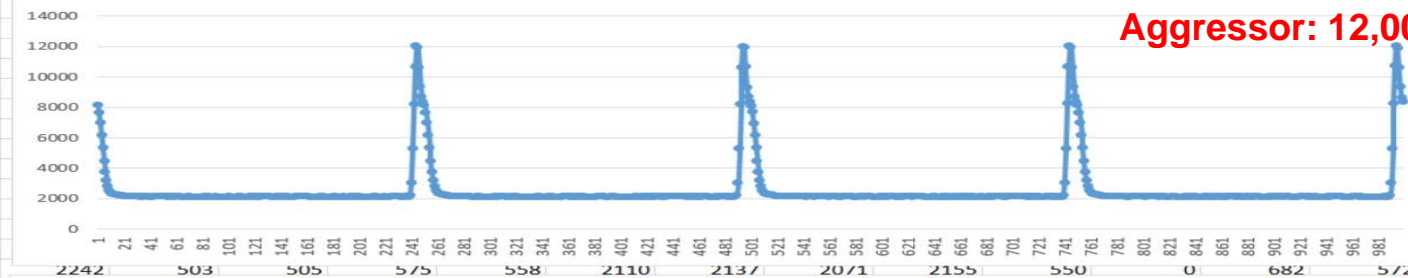
## 2 channels per RJ45

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

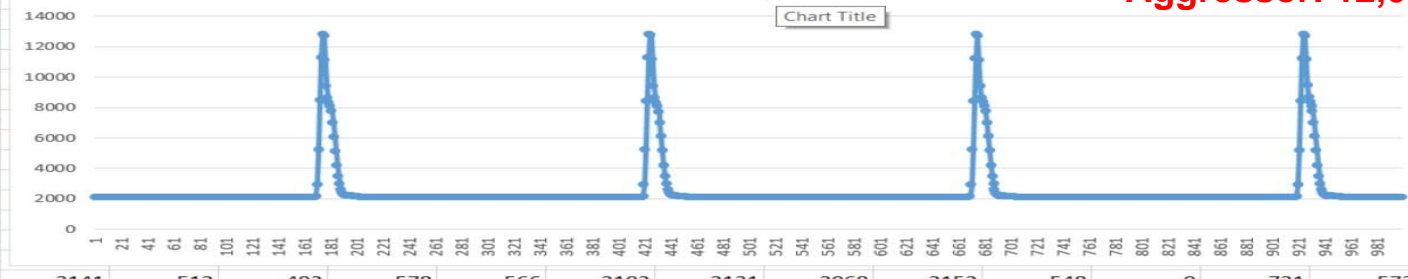


# Tested Connection - 4 channels per RJ45

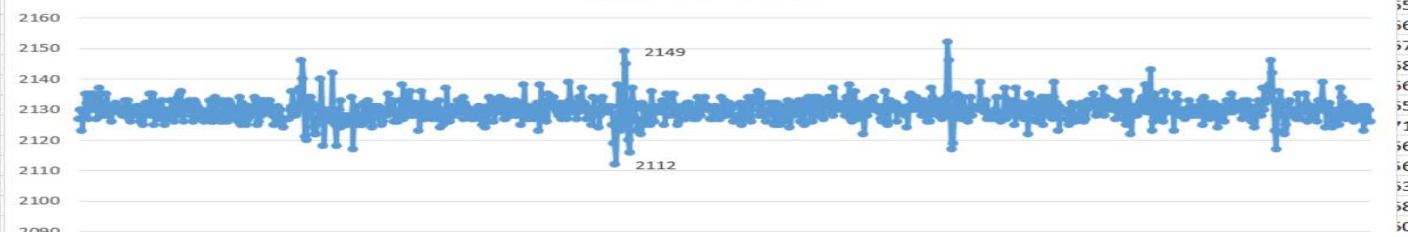
Channel B - Aggressor



Channel G - Aggressor



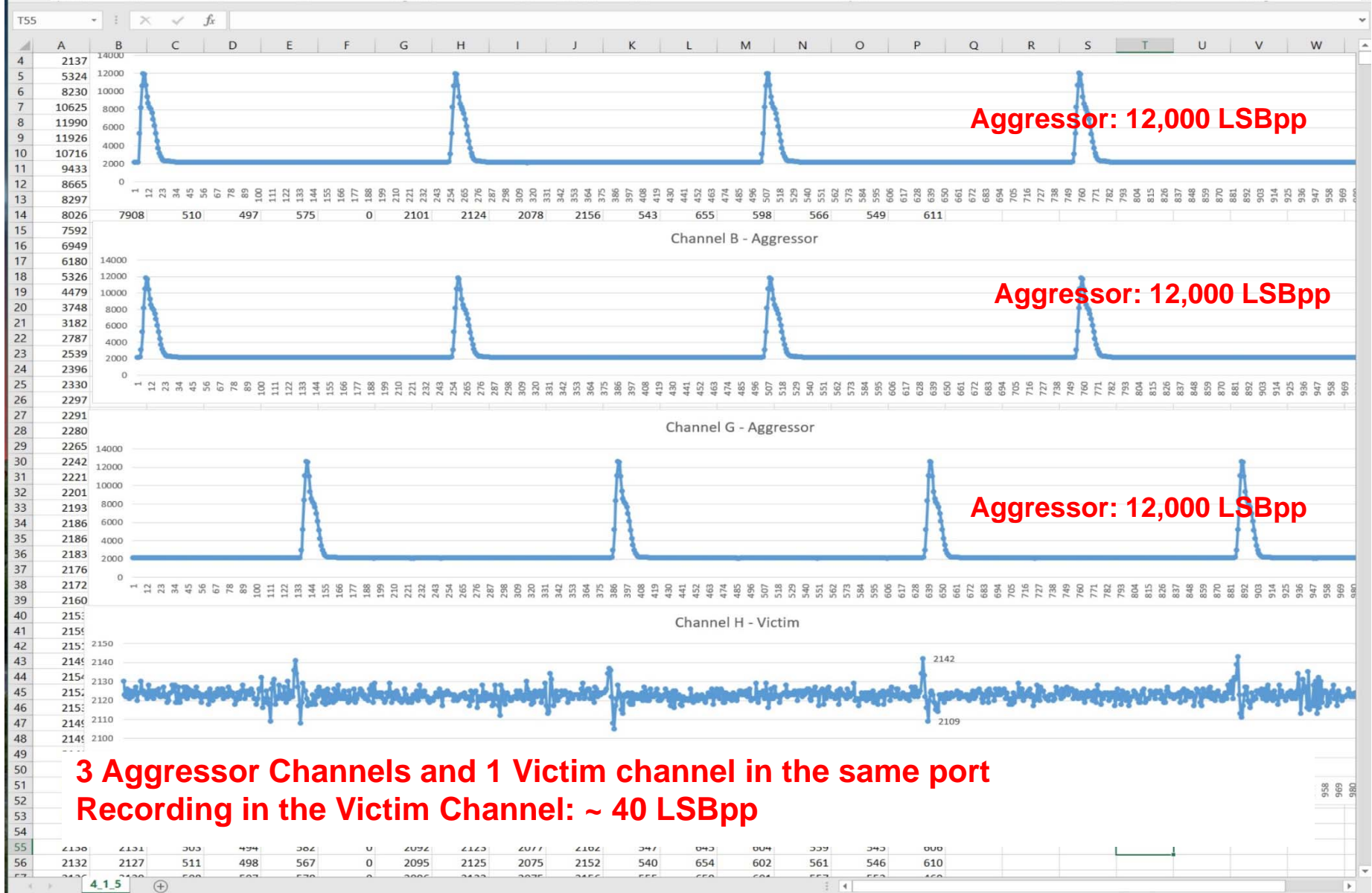
Channel H - Victim



2 Aggressor Channels and 1 Victim channel in the same port  
Recording in the Victim Channel: ~ 37 LSBpp



# Tested Connection - 4 channels per RJ45



## **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**

# Module - Rev. B

## 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.

