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ITS3 DPTS Tests at ORNL

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ORNL is managed by UT-Battelle LLC for the US Department of Energy

U.S. DEPARTMENT OF ENERGY

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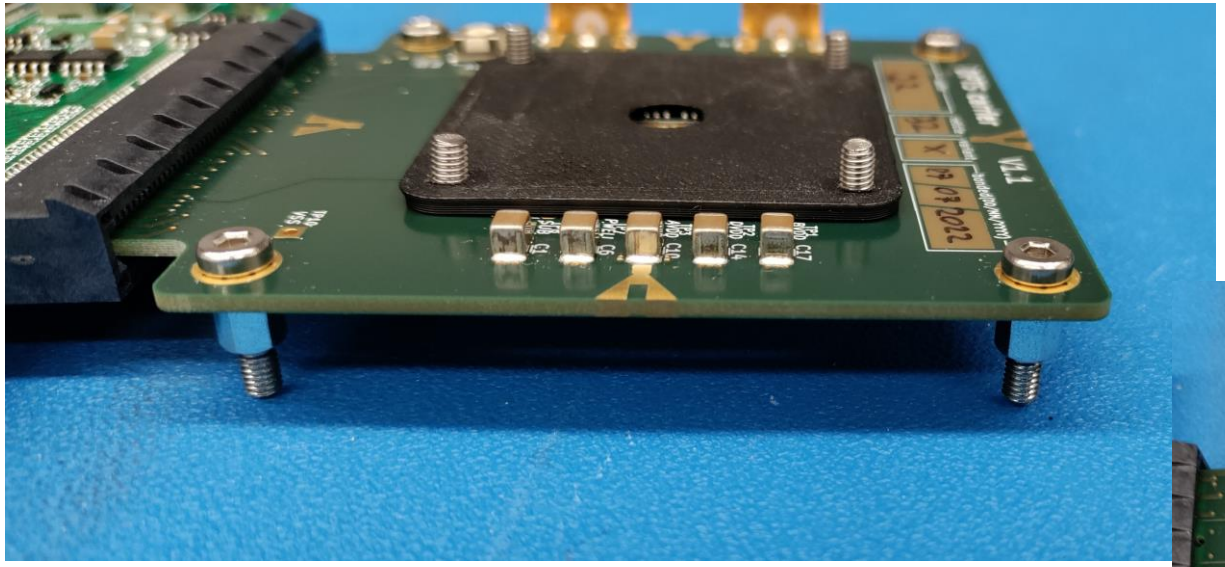
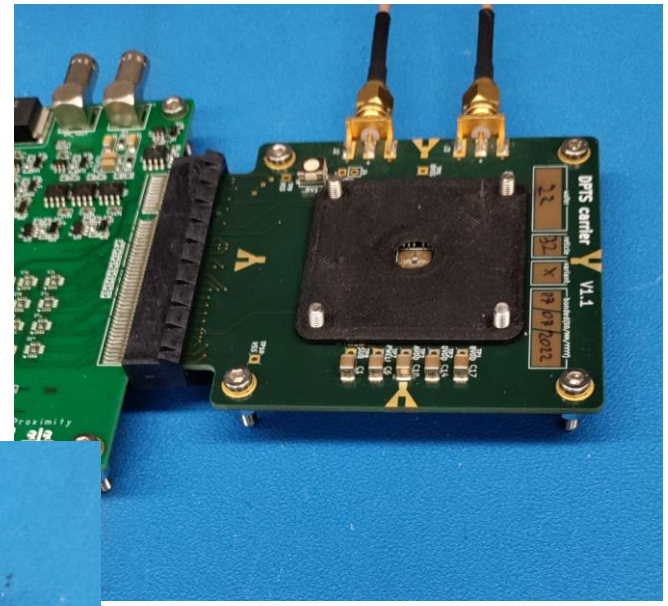
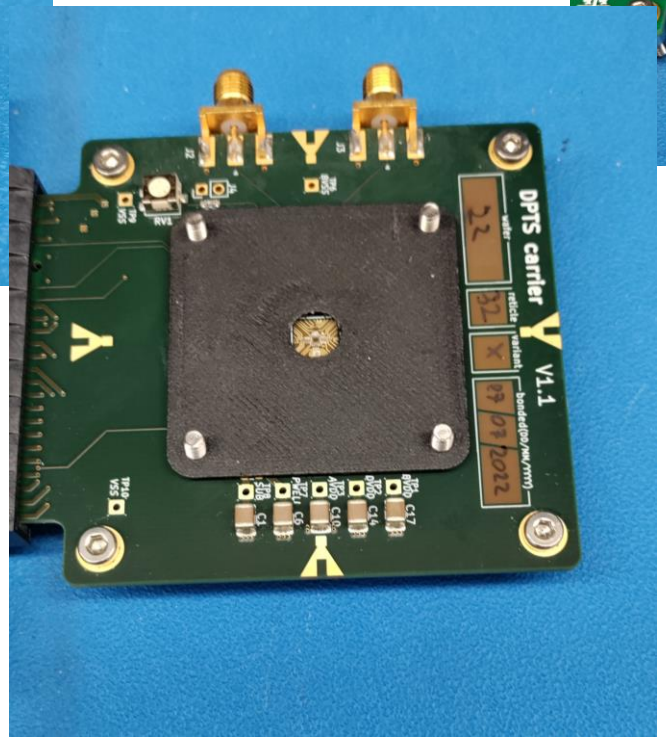
3-D printed a fixture for Fe-55 Data Taking







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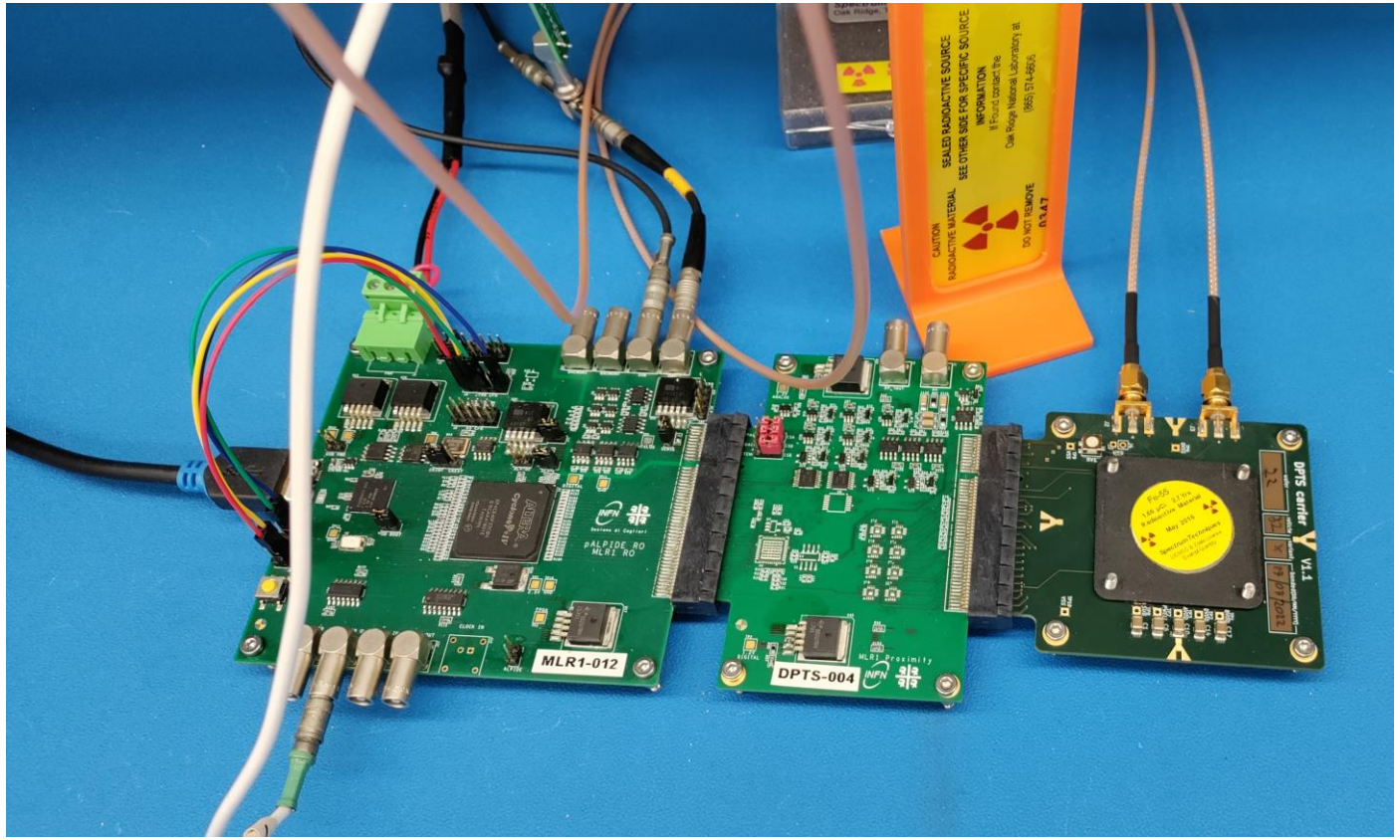
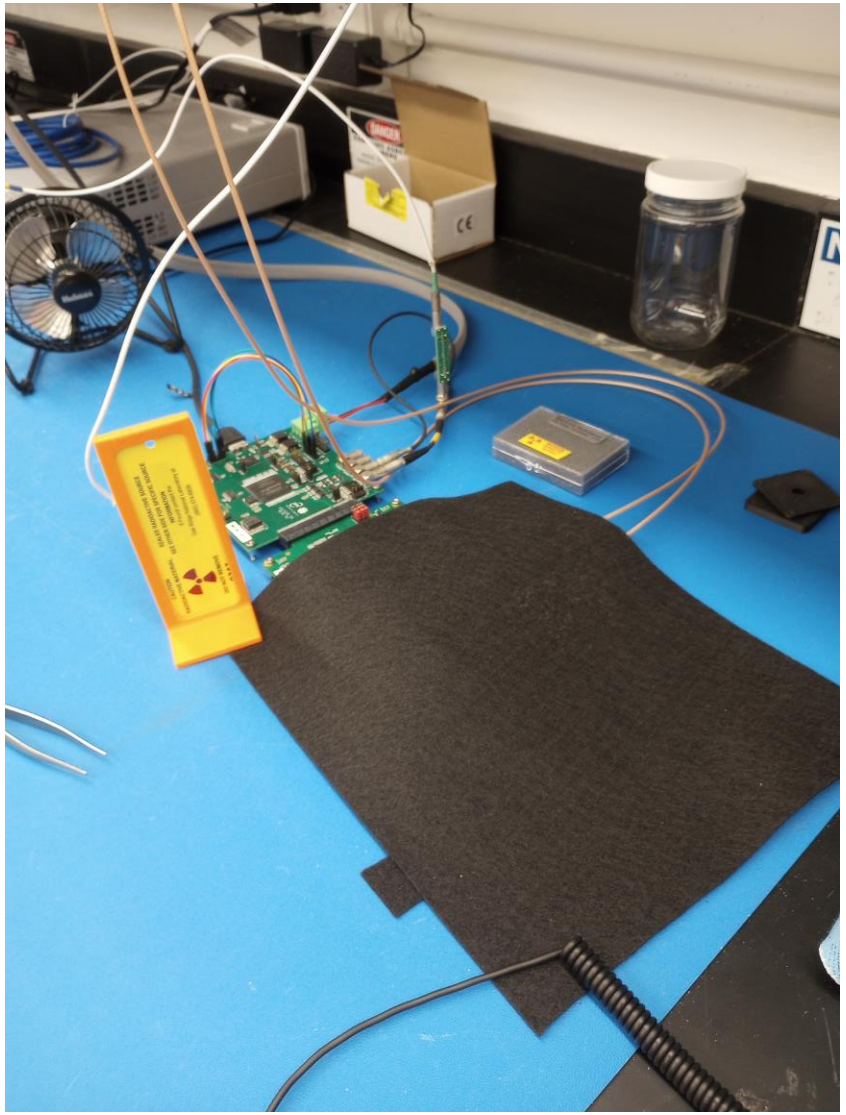
Fe-55 Data Taking Setup





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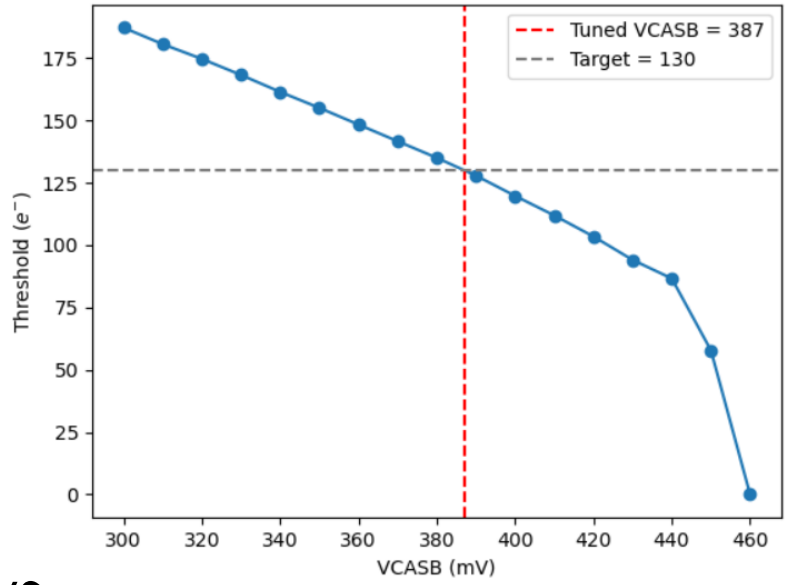
Fe-55 Data Taking

- Obtained a Fe-55 from ORNL source custodian
- Initially took 650,000 waveforms in about 2 days
- Successfully went through all of the calibration steps as instructed by M. Buckland
- Tuned VCASB to 130 e-
- Took an additional 400,000 event in another 2 days
- Spectrum looks reasonable, still need to continue analysis to fit the peaks so the results can be compared to other chips



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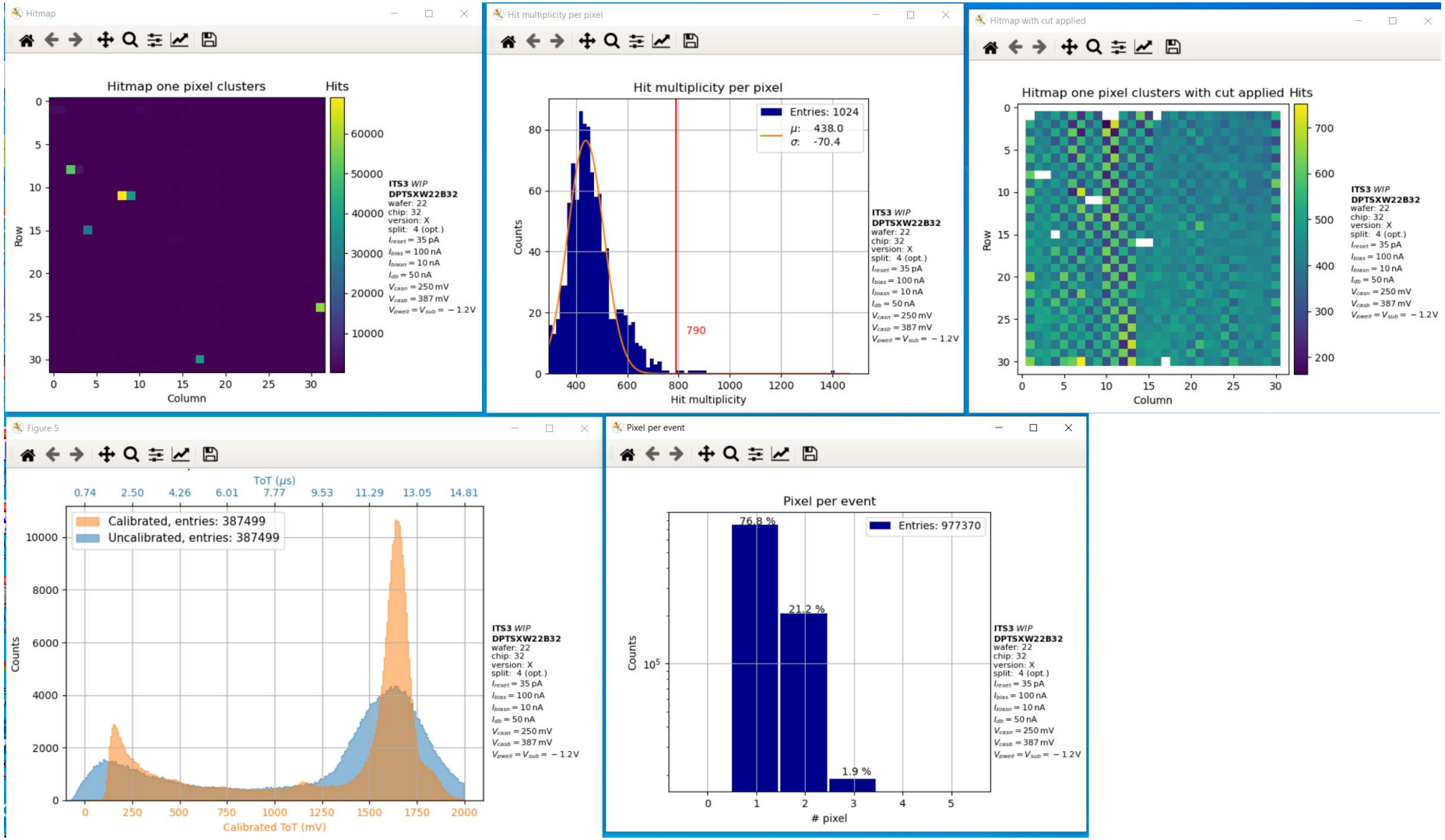
Fe-55 results (~1M waveforms)



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CML Digital Output Buffering Characterization

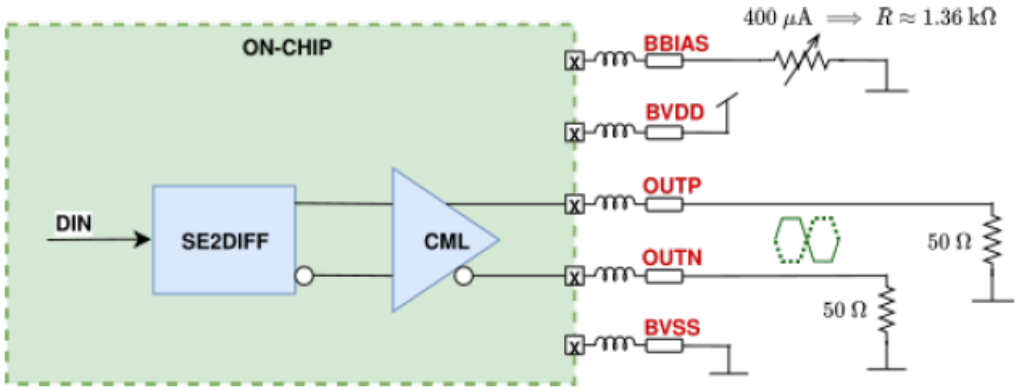
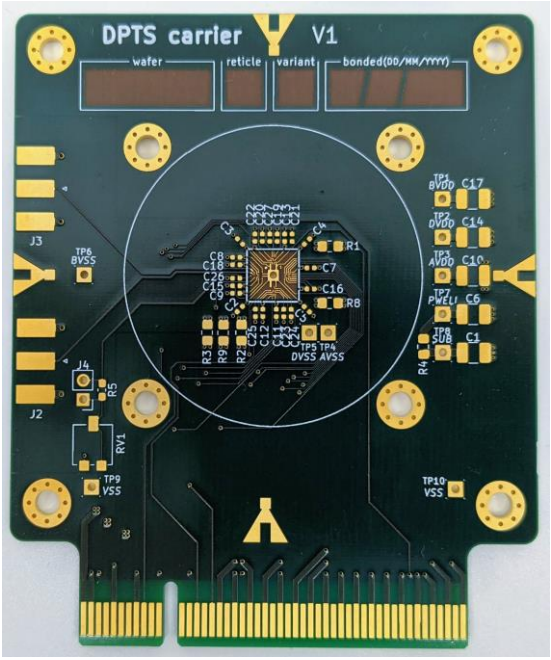


Figure 3: Digital Output Buffering



BVDD, BVSS – output CML buffer domain
BBIAS – Digital output buffer bias

Recommended CML BVDD: < 1.32V

Outp,Outn termination resistance: 50 Ohm

BBIAS current typical: 400 μA
BBIAS current max : 450 μA

Adjusted typically to 400 μA via RV1 on carrier card to have a voltage drop across R5 of 1kΩ of 400 mV (probed @ J4)

Expected Rise/Fall time (from datasheet):
60 ps @ C_{load} = 1 pF
90 ps @ C_{load} = 2.5 pF

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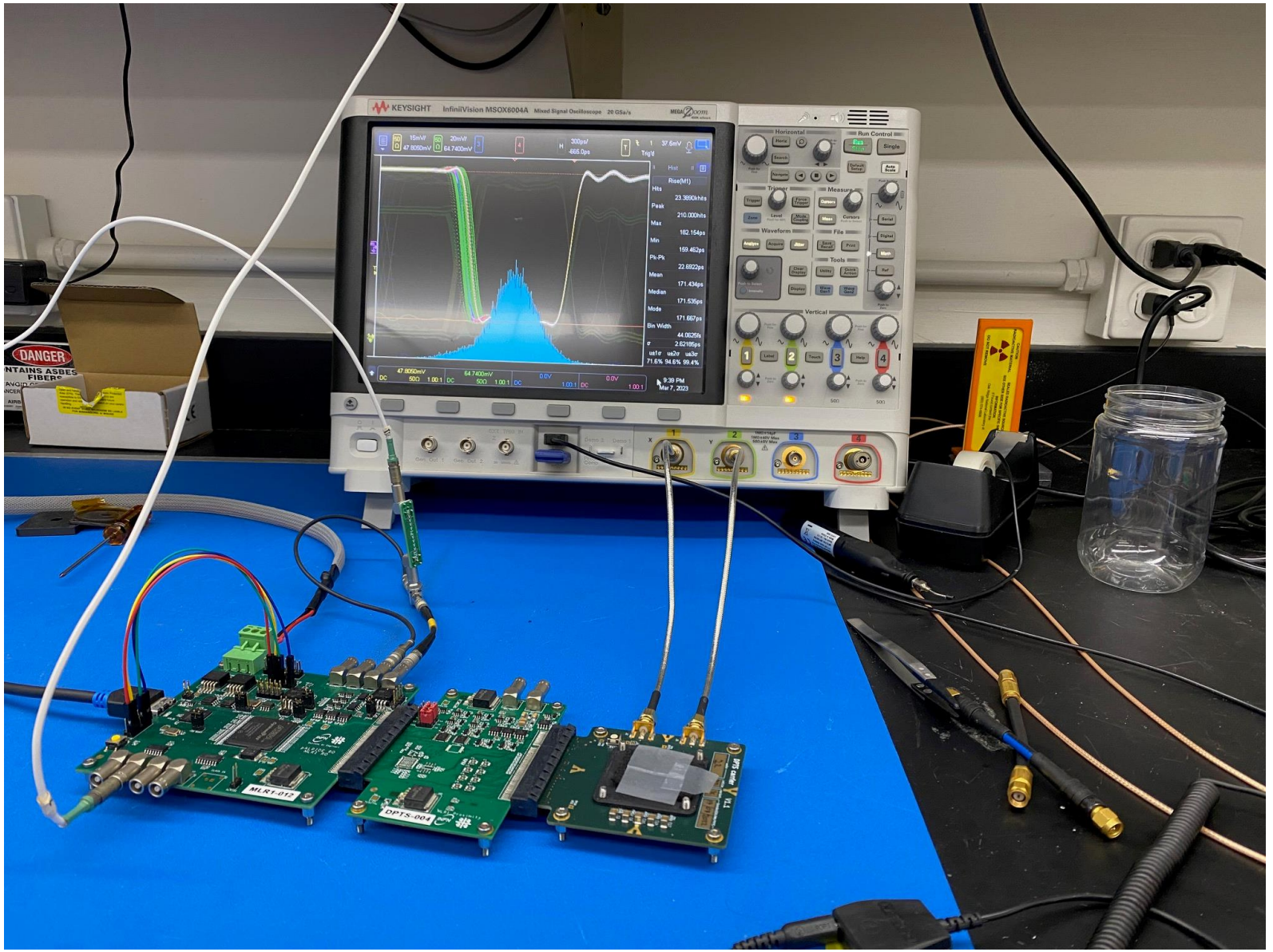
Test Setup



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Some Remarks

- Use “standard” settings for various voltages:
  - VBB = -1.2 V, VCASB = VCASN = 300 mV, IRESET = 10 pA, IDB=100 nA, IBIAS = 100 nA, IBIASN = 10 nA
- Initially tried with longer cables, significant impedance load
- Short cables reduced rise/fall times (30pF / foot, i.e. 10pF)
- Fabricated a PCB to provide controlled impedance loading of the output and proper test pads for scope
  - Unfortunately, the scope bandwidth limits the rise/fall time

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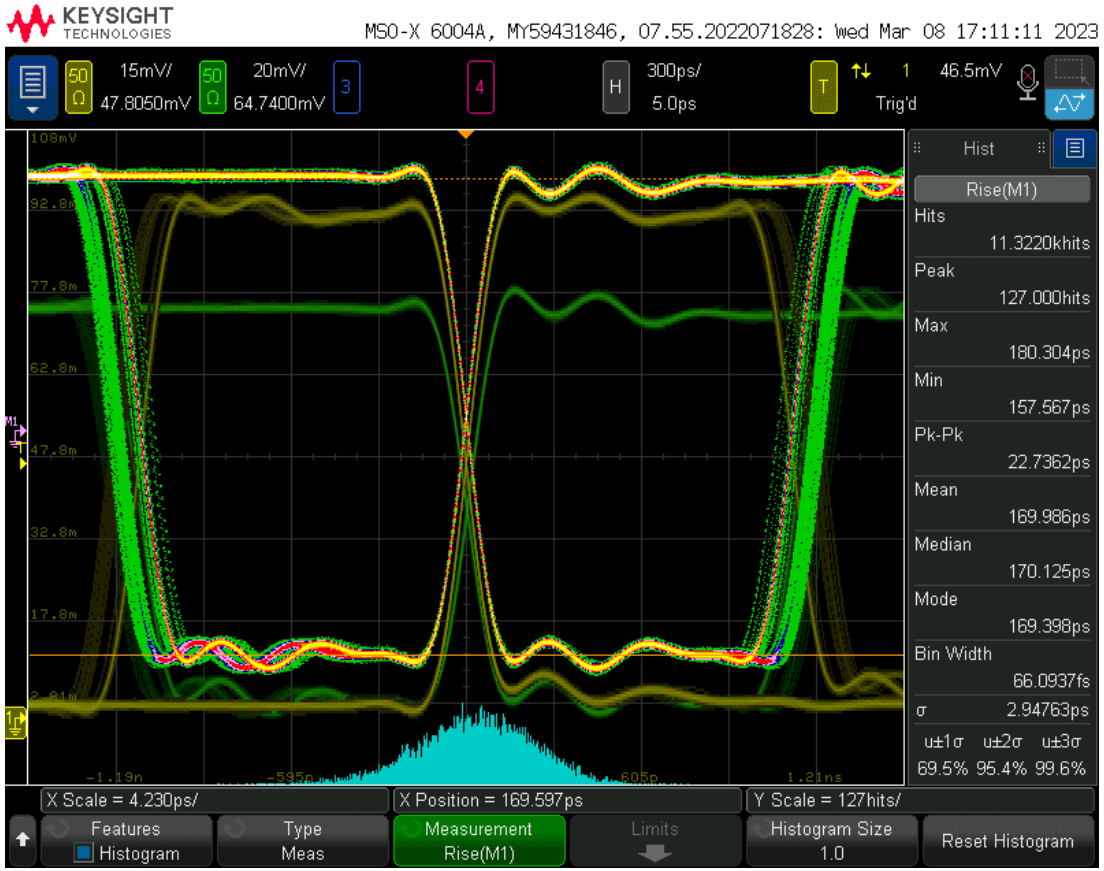
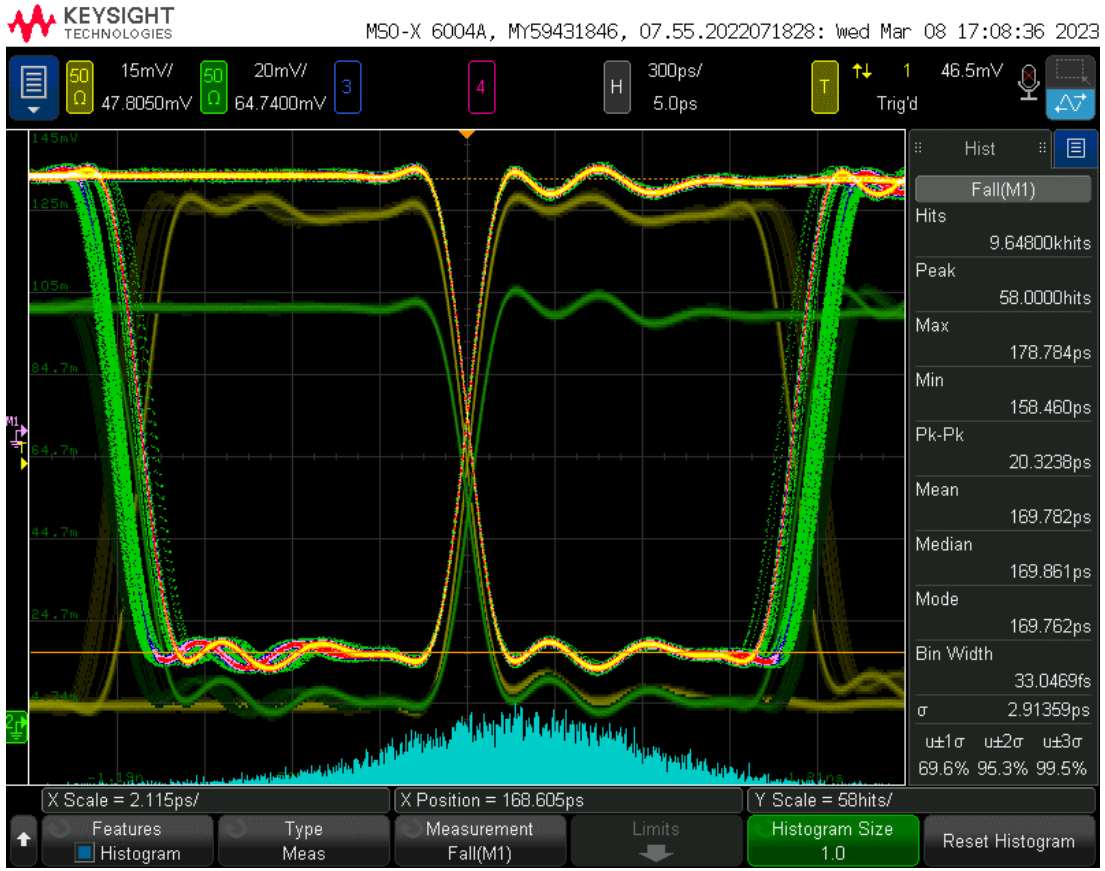
Scope Measurement



Rise Time



Fall Time

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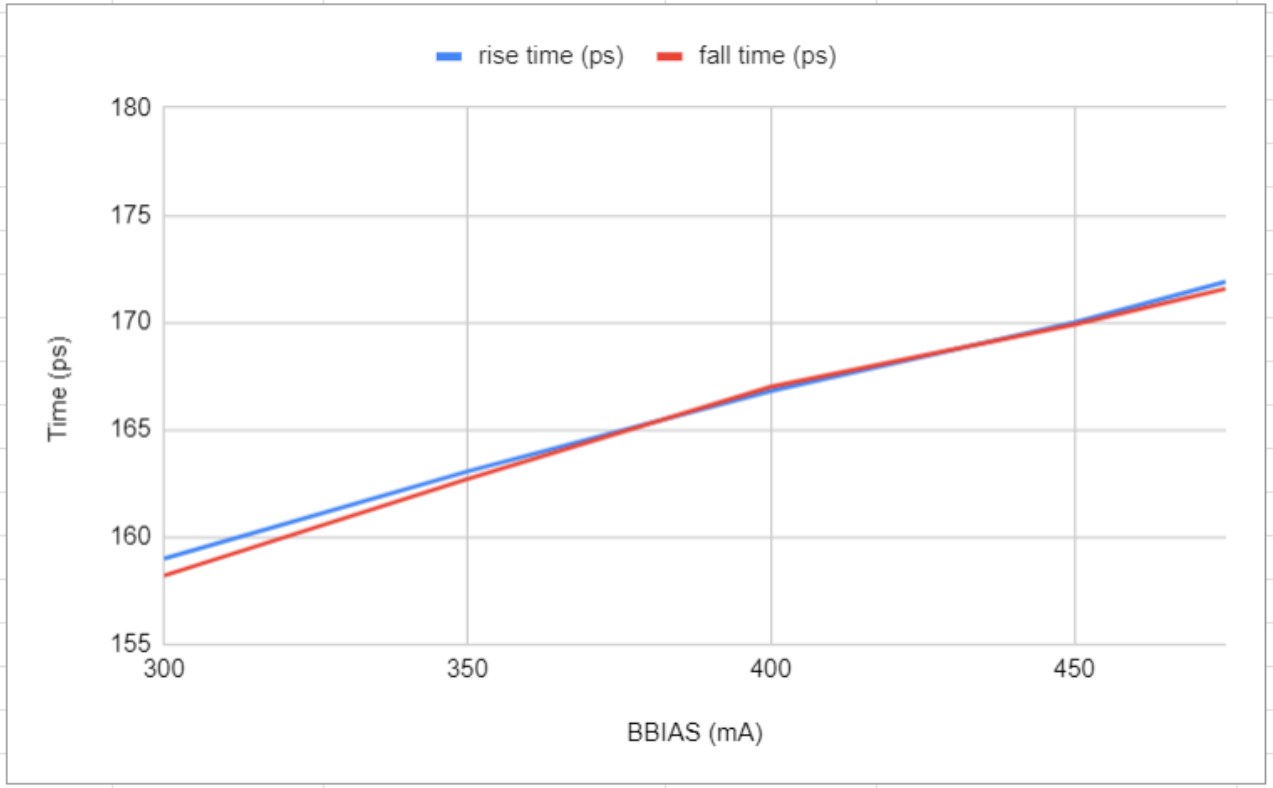
Rise and Fall Time Measurements

BBIAS (mA)	rise time (ps)	rise time sigma (ps)	fall time (ps)	fall time sigma (ps)	load (pF)
300	159	3.2	158.2	2.9	?
350	163.055	2.9	162.7	2.9	?
400	166.8	3	167	2.9	?
450	170	2.96	169.9	2.9	?
475	171.9	2.9	171.57	2.9	?



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High Statistics “Eye”

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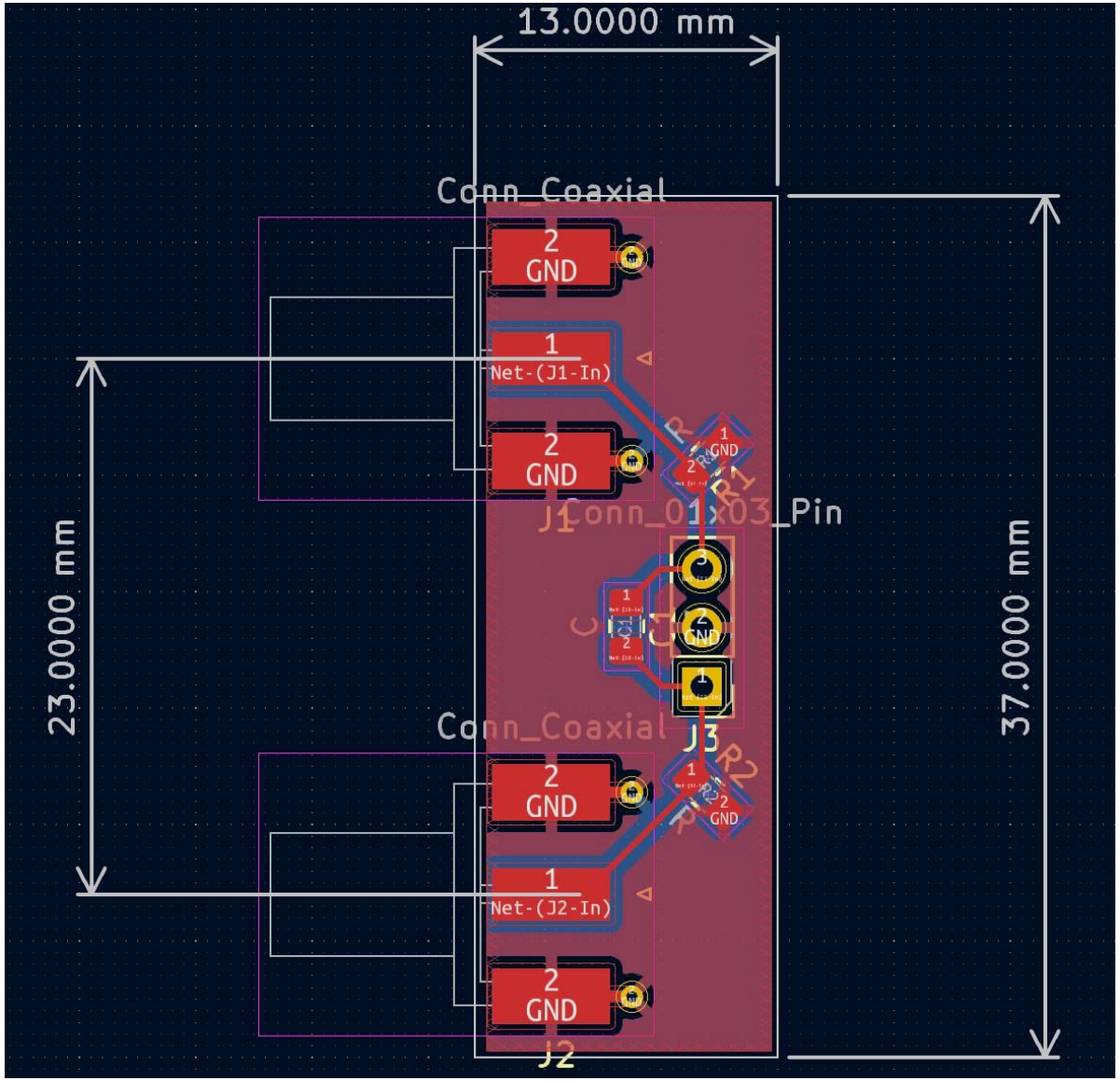
PCB for output probing



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