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TaichuPix-3 test

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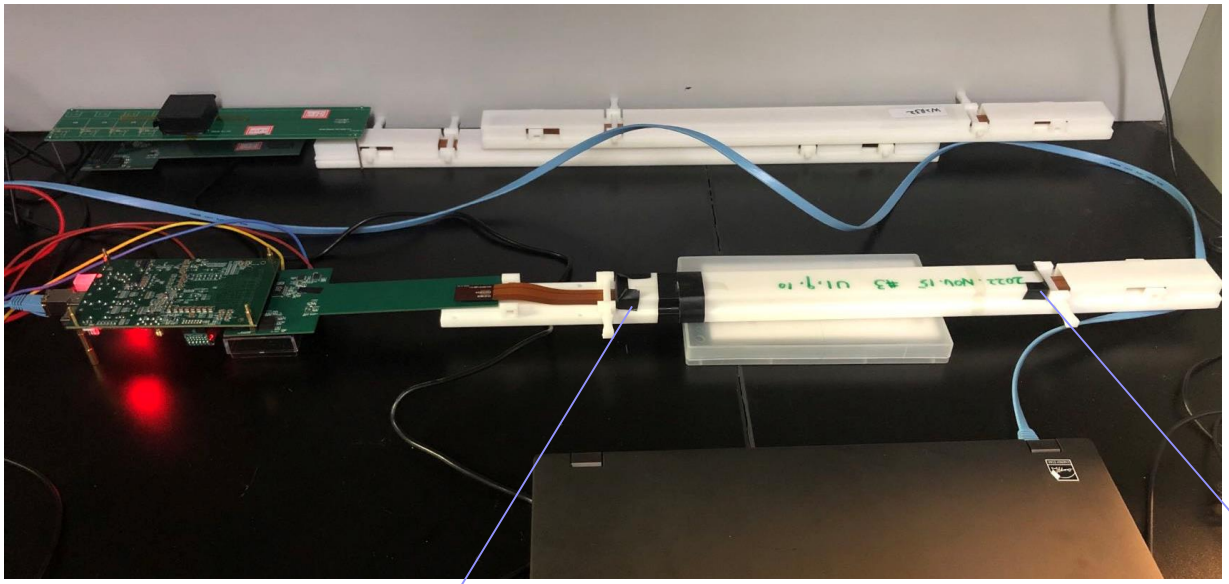
Flex test overview

- **FlexV1p3 → 2-layer flex**
  - FlexV1p3-H: chip U1&U9, U10
  - FlexV1p3-F: chip U7
- **FlexV1p4 → 4-layer flex**
  - FlexV1p4-A: chip U10

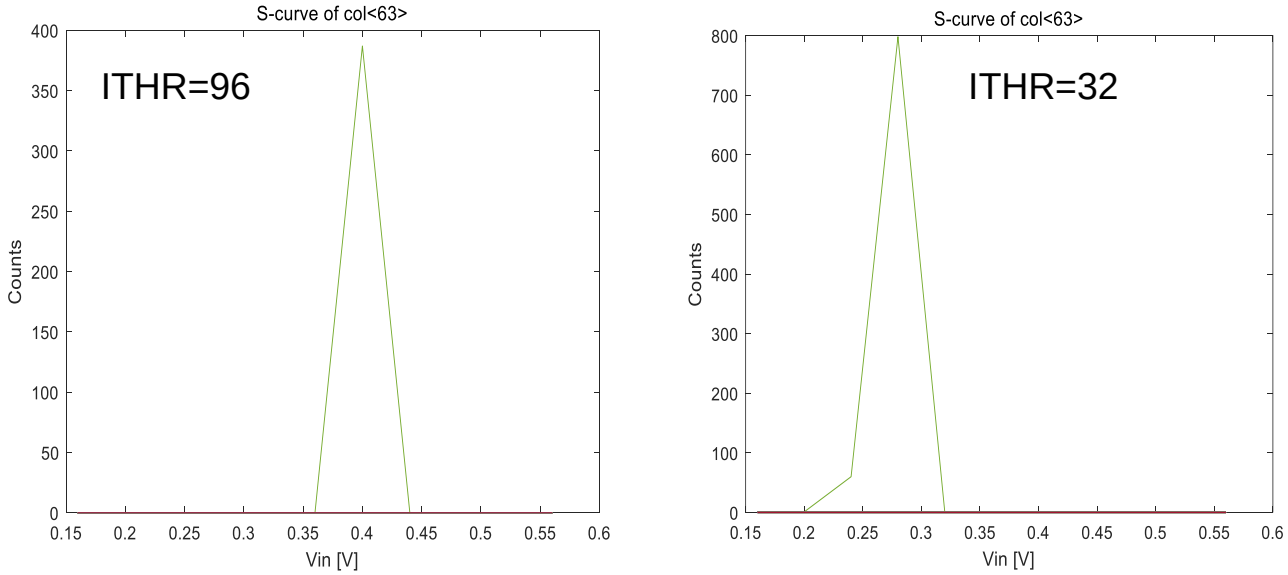
All tests performed at
20 MHz readout clk



U10	**U9**	U8	**U7**	U6	U5	**U4**	U3	U2	**U1**

4-layer flex test results

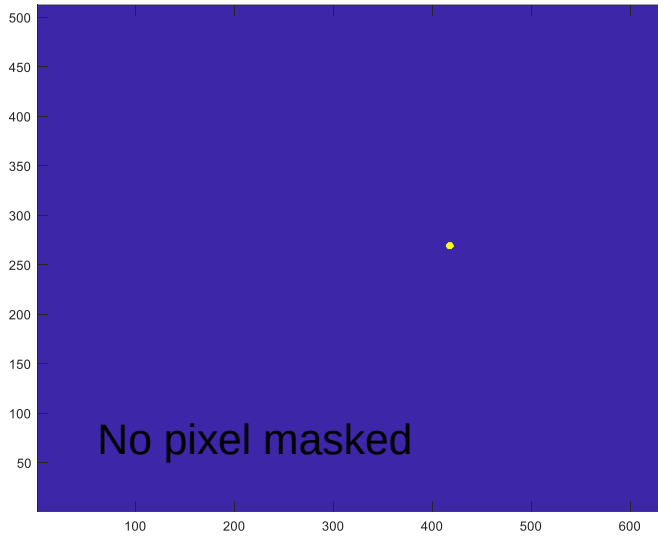
- **FlexV1p4-A: chip U10**
  - OCT mode: ~30% output normal, but ~70% output empty
  - Power current normal and stable at different ITHR (32-96)
  - Apulse read: works normal with Vin=1.13V @ITHR=32/96
    - S-curve result is abnormal, while the power current stable (no oscillation)

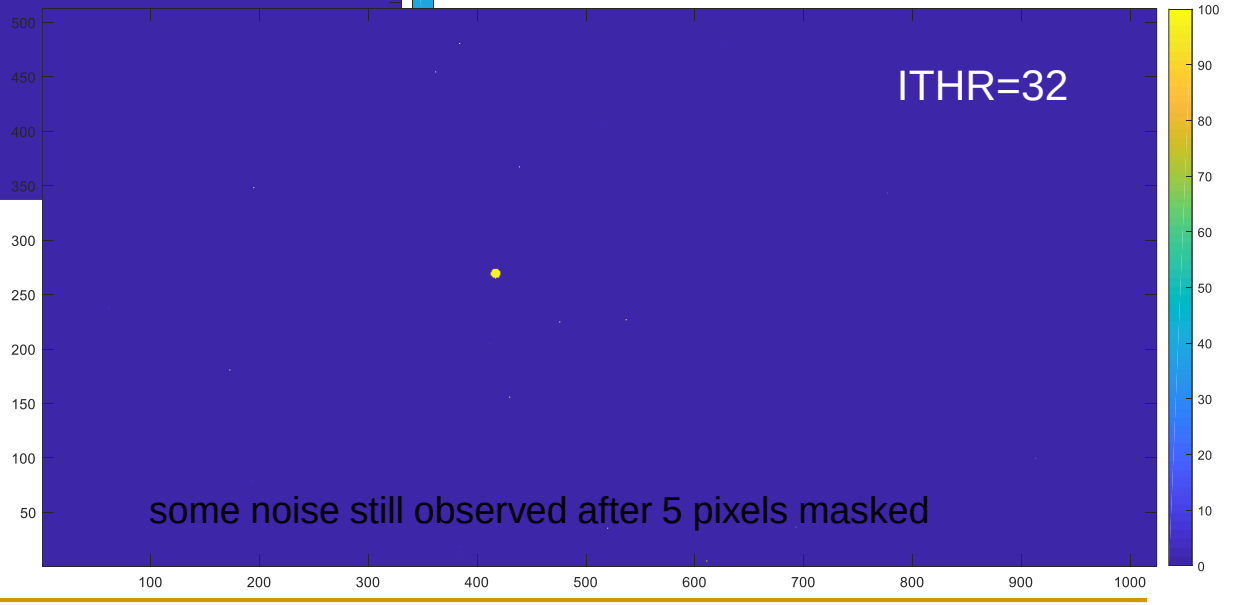


Single pixel s-curve scan

4-layer flex test results

- **FlexV1p4-A: chip U10**
  - A clear laser spot observed at ITHR=96/64 without pixel masking, repeatable result
  - 5 noisy pixels need to be masked at ITHR=48/32, clear laser spot observed

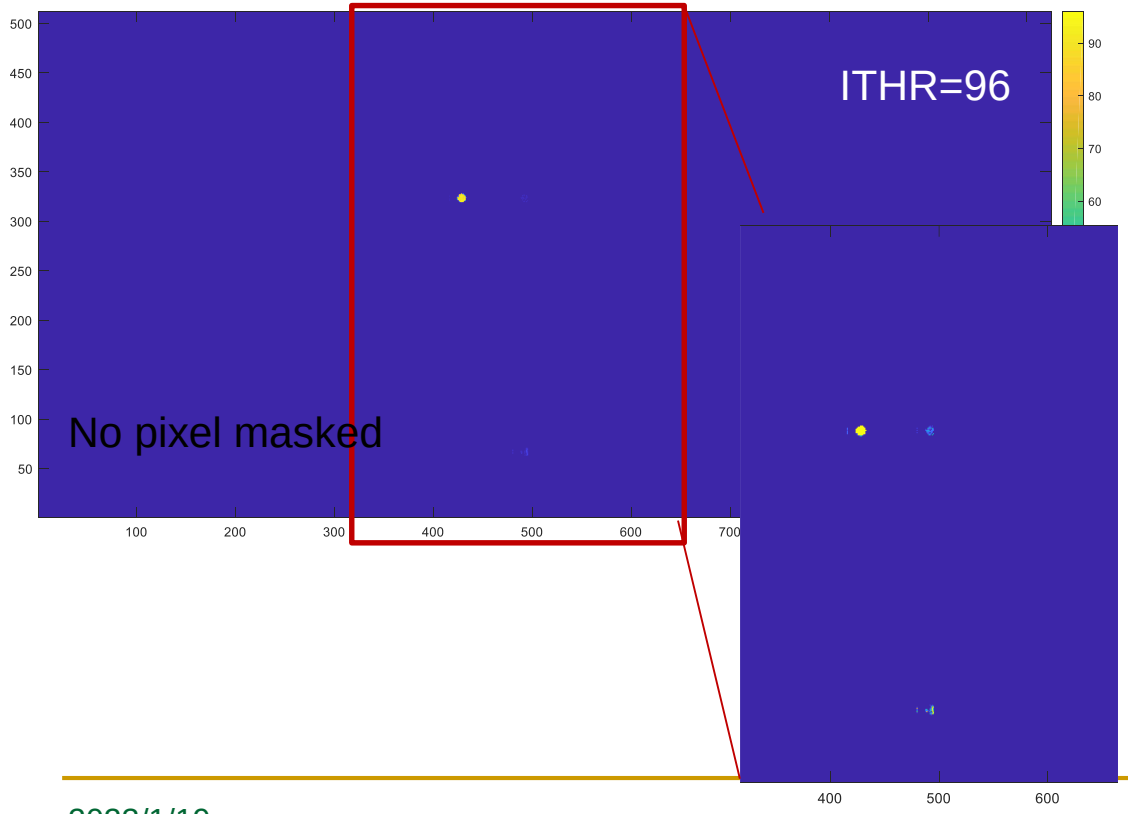


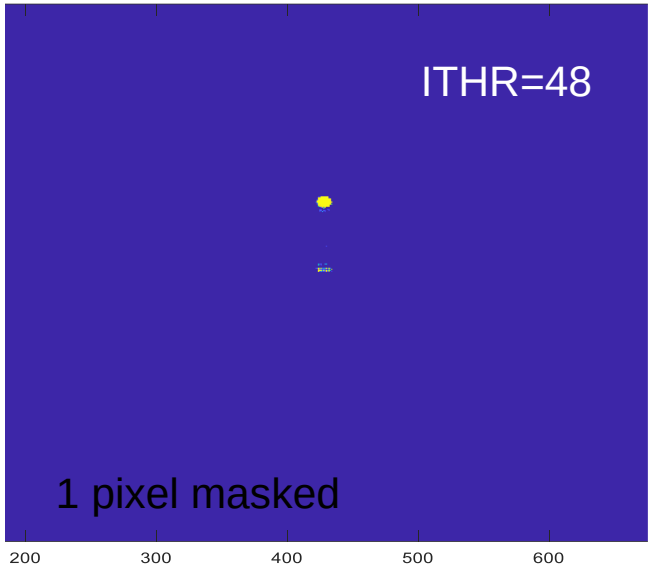


Exposure 1s with a 100 Hz laser source

2-layer flex test results

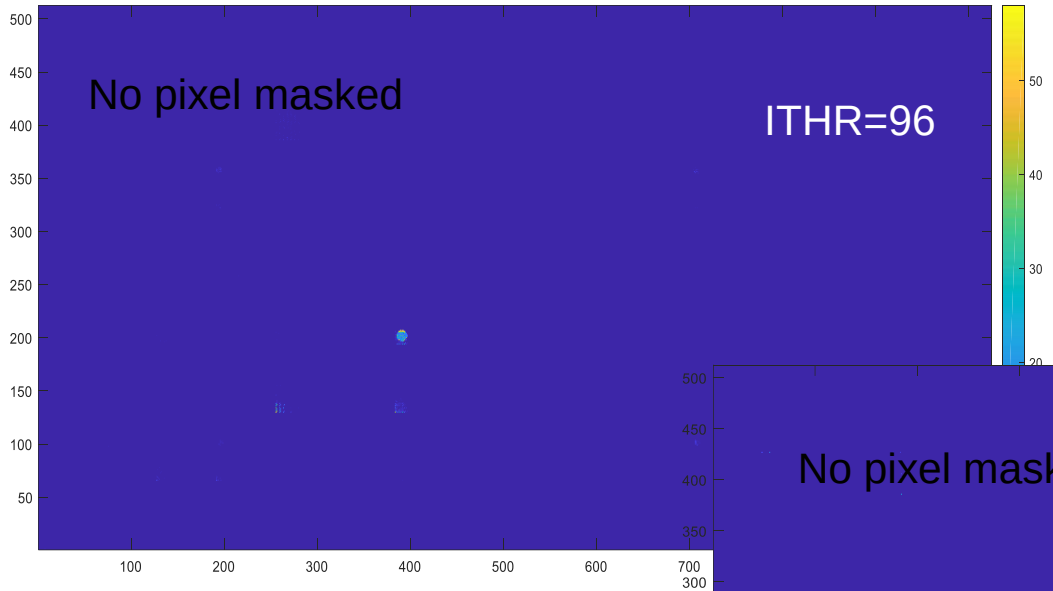
- **FlexV1p3-H: chip U10**
  - Power current normal @ITHR=96, unstable @ITHR48, overload @32
  - Apulse read: power current overload as long as input ‘apulse_in’ @160/128/96/48
  - Laser test: laser spot and ‘ghost’ spot observed at different ITHR

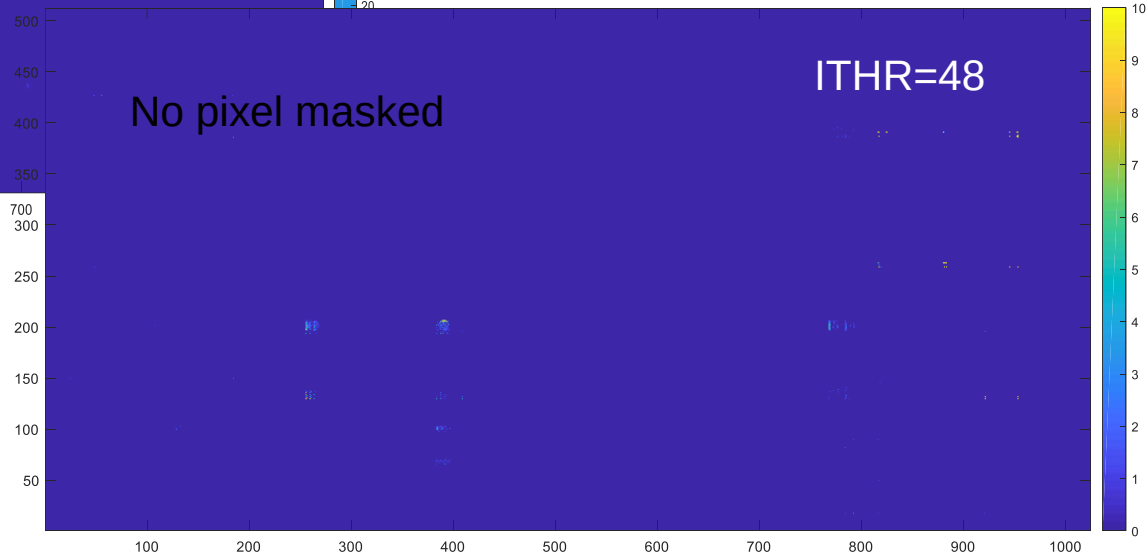




2-layer flex test results

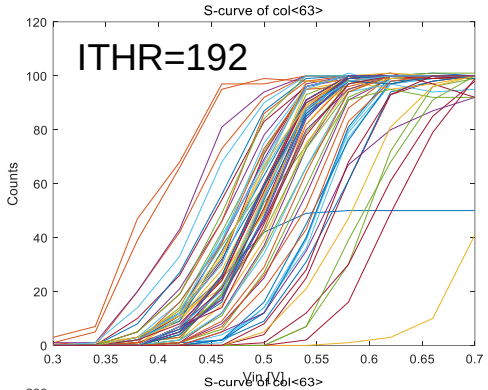
- **FlexV1p3-H: chip U9**
  - Laser test: laser spot and ‘ghost’ spot observed at different ITHR

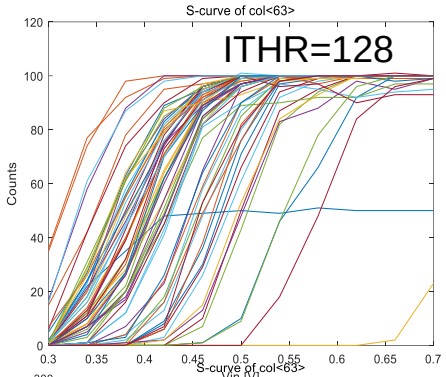


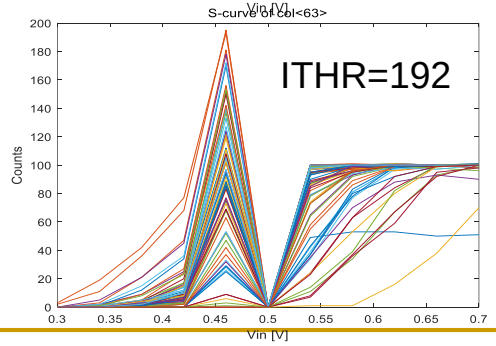


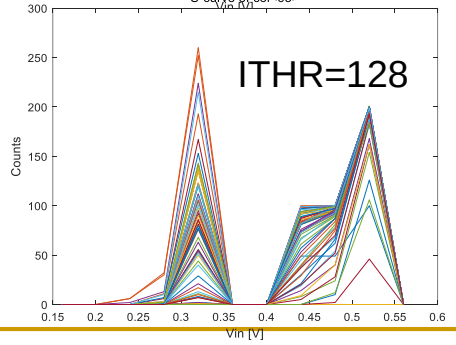
2-layer flex test results

- **FlexV1p3-H: chip U1**
  - OCT mode: ~40% output normal, but ~60% output empty
  - Power current normal and stable at high ITHR (254/224/192)
    - S-curve result unstable, while the power current stable (no oscillation)
  - Stable at most of times with ITHR=160/128
  - Apulse_in leads to power current overload @ITHR 112/96
  - Power current overload @ITHR=56/48/32



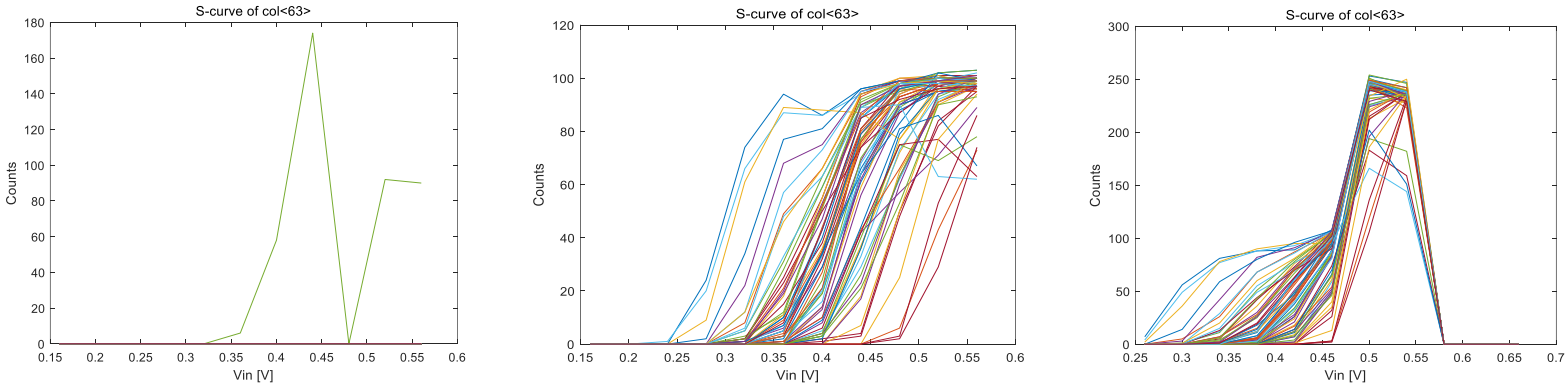






2-layer flex test results

- **FlexV1p3-F: chip U7**
  - OCT mode: ~10% output normal, and ~90% output error code
  - Analog power twice as normal level
  - Power current stable @ITHR=128
    - Different s-curve results with the same setting



Scurve scan @ITHR=128

  - Power current overload when input ‘apulse_in’ @ITHR=96
  - Power current overload when setting ITHR=64/48/32

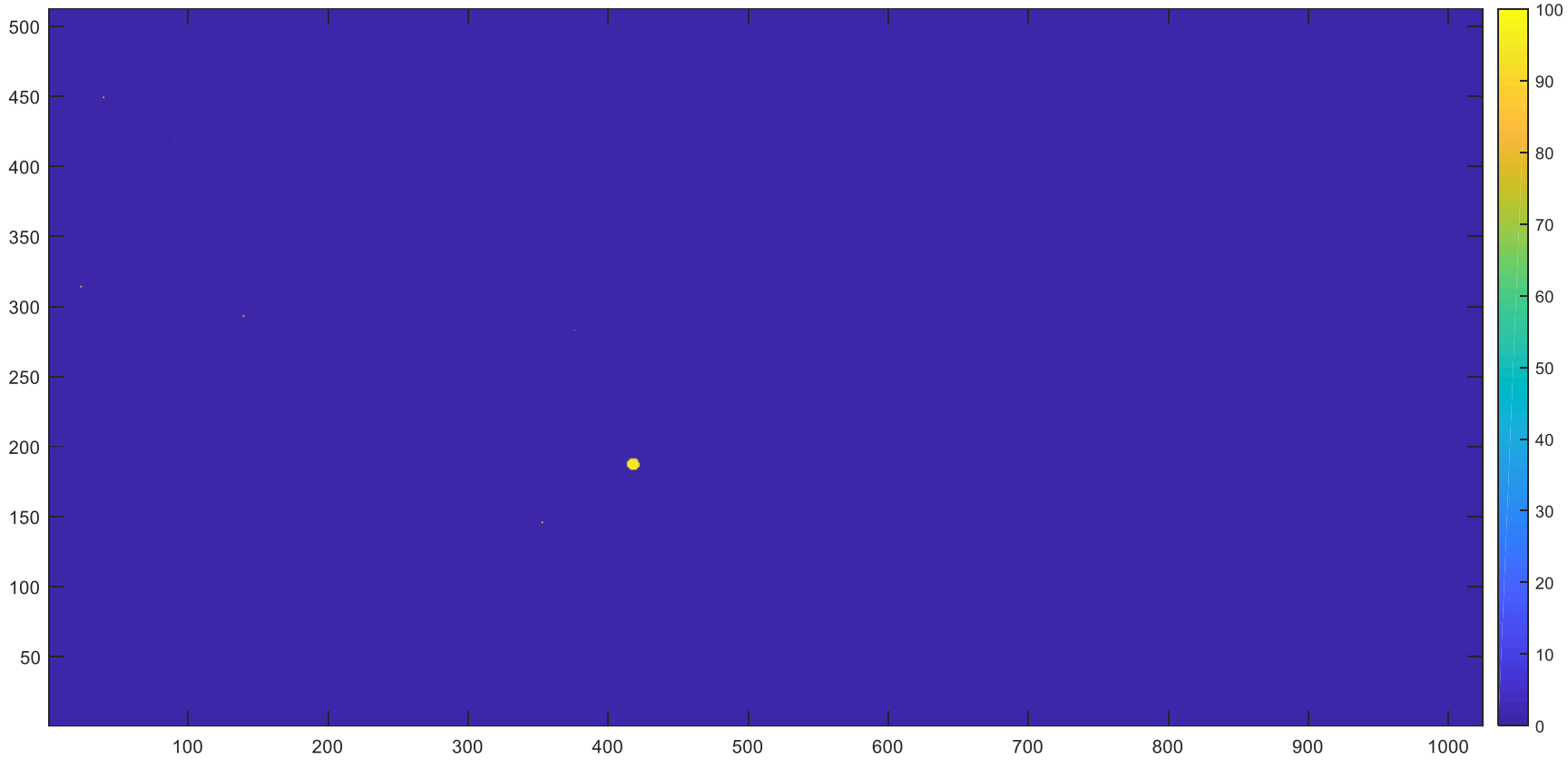
summary

- **Chips with the best power condition on both 2-layer and 4-layer flex have response to the laser source**
  - ‘ghost’ spot observed on the 2-layer flex, probably due to worse Ground
- **2-layer flex has higher noise**
  - Minimum ITHR is 32 for 4-layer flex, but that is larger than 48 for 2-layer
- **2-layer flex has larger crosstalk**
  - Input ‘apulse_in’ signal leads to power current overload (probably oscillation) when ITHR< 128
- **Next step:**
  - Test different chip with worse power supply on the same flex
    - Chip U5/6 needed to be bonded on FlexV1p3-H and FlexV1p4-A

Laser test of Flex v1.5-6D

- Sample at different ITHR

6-layer rigid ladder readout board



Exposure 1s with a 100 Hz laser source @ITHR=32

- **100 times of stable output observed**