TPAC1.1 Progress
JC: Dec 8th

Laser

- No further investigation of odd scans on V1.1
- De-ionizing filter needs replacing
  - On order...
- Bulb needs replacing
  - Manual says >30M shots intensity starts to vary
  - We've done 88M shots!
  - On order...

Chip Alignment

- Hand-placed two 12u+DPW parts on a PCB so the test pixels were aligned with centre of PCB hole
- Significant offset from "standard" position
- Confirms most test pixels will be near the edge of the PCB hole
- Will scan one of these hand-placed parts when laser is available
- Propose to <u>not</u> place all chips in the new (offset) location as they would then not be well aligned when placed in a stack configuration

Yield

- Probed & bonded some more devices

		Probed ok	of # tested		Bonded ok	of # bonded	
5u no DPW	wafers 1,2	12	25	48%	1	1	100%
5u with DPW	wafers 5,6,7	12	25	48%	4	7	57%
12u no DPW	wafers 9,10,11	6	25	24%	1	1	100%
12u with DPW	wafers 13,14,15	16	60	27%	16	17	94%

PCB Summary

| PCB	Sensor	Status	Preferred
37	5u +DPW	At RAL; Ok	
40	5u +DPW	At RAL; Ok	
32	12u +DPW	At RAL Two dead columns; Used for analog test pixels (laser, 55Fe)	
35	5u +DPW	At RAL Severe data corruption – to be investigated	
36	5u +DPW	At IC; Ok	
31	12u +DPW	At RAL; Ok	←
32	12u +DPW	At RAL; Ok	←
38	12u – DPW	At RAL; Ok	
34	5u –DPW	At RAL; Ok	
26	12u +DPW	At IC; Ok	←
27	12u +DPW	At RAL; Ok	←
24	12u +DPW	To be tested	←
25	12u +DPW	To be tested	←
28	12u +DPW (aligned)	To be tested	
30	12u +DPW (aligned)	To be tested	

Configuration Registers

- Were reporting many errors and not holding the correct data
- Problem due to different power domains and high loading of "slow" clock drivers
- Fixed by driving one of the power domains at 1.6v (previously 1.8v)
- Implemented using the power module developed for TPAC1.0 with updated resistor values and driving VDD1V8sram through J7
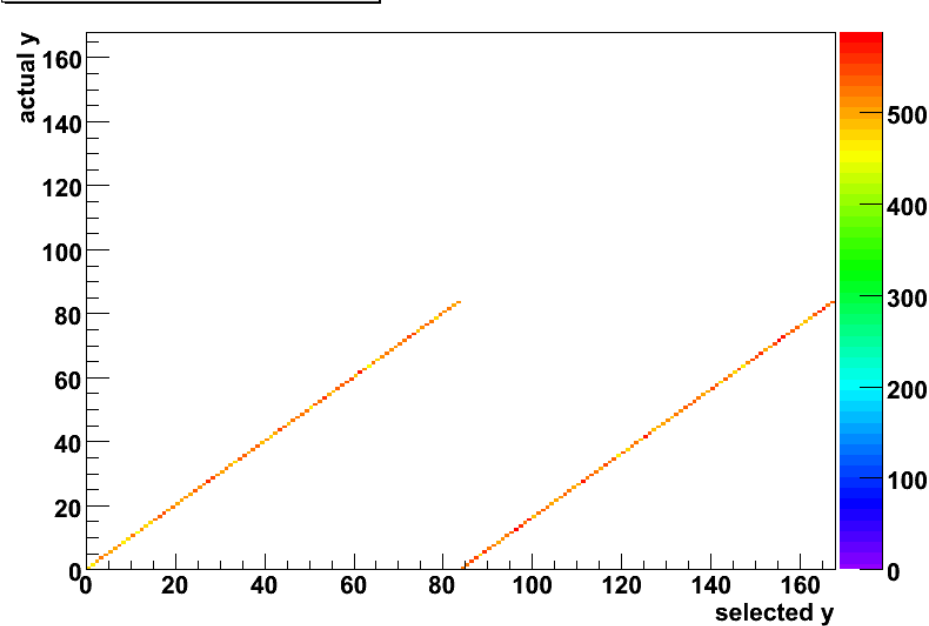
1.8v

clk

1.8v

SR

Periphery

Pixel
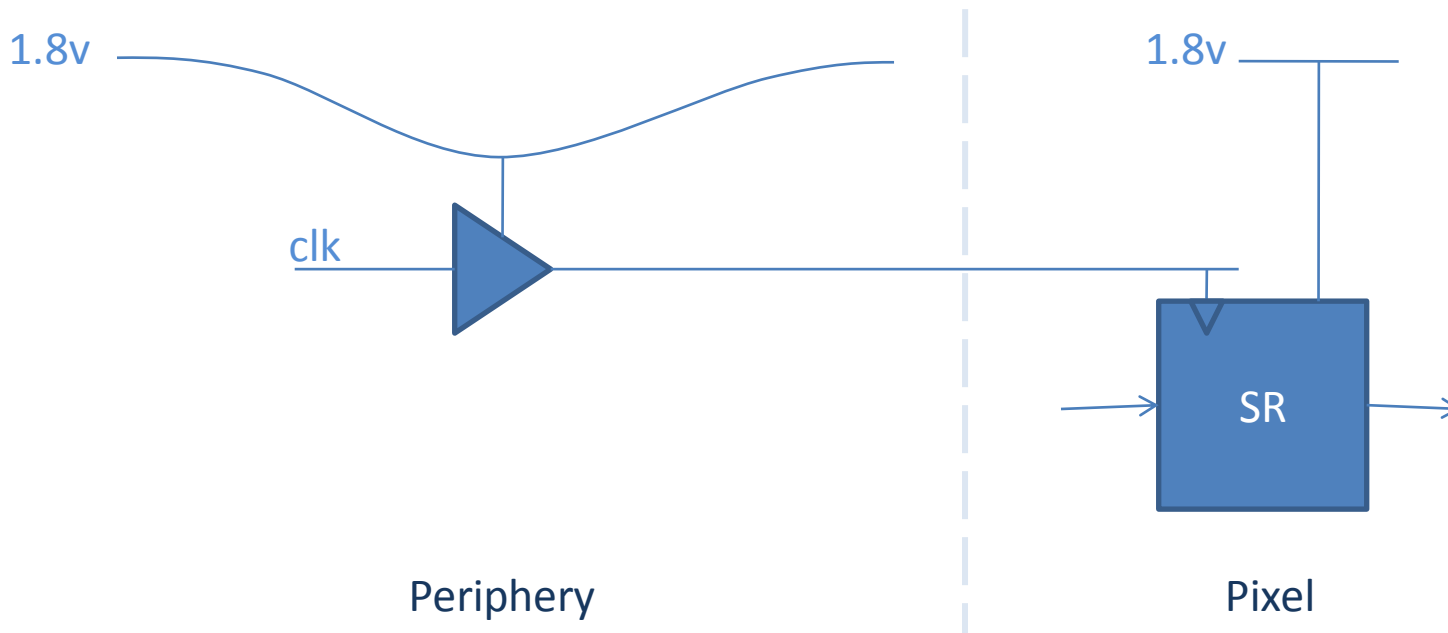
Data Integrity

- Row & Column masked scans look ok
  - Row address bug repeats row codes 0→83
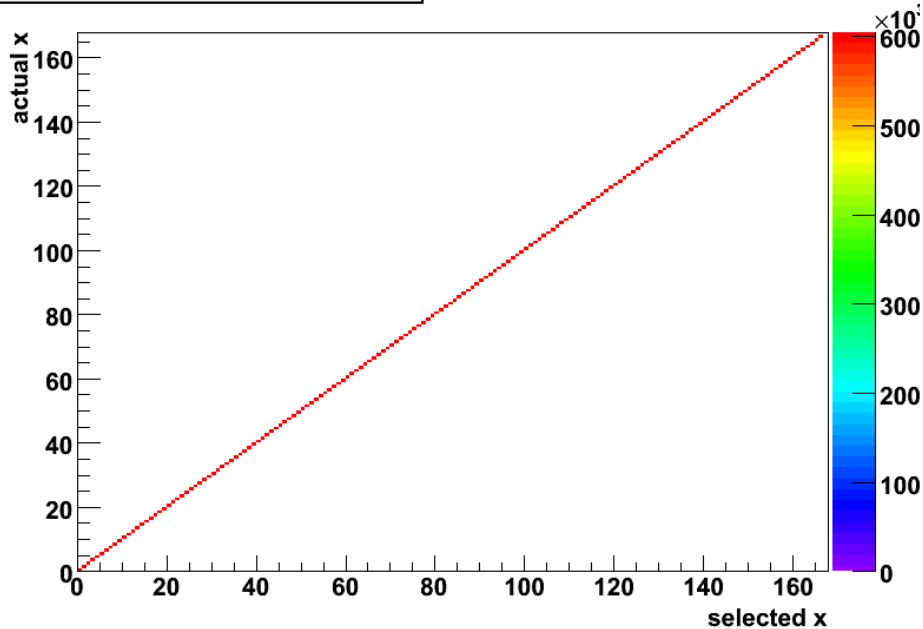
Comparator Simulation (DC)

Vcm	~TU
0.25	625
0.5	1250
0.75	1875
1	2500
1.25	3125
1.5	3750
1.75	4375

Sweeps: Threshold common-mode
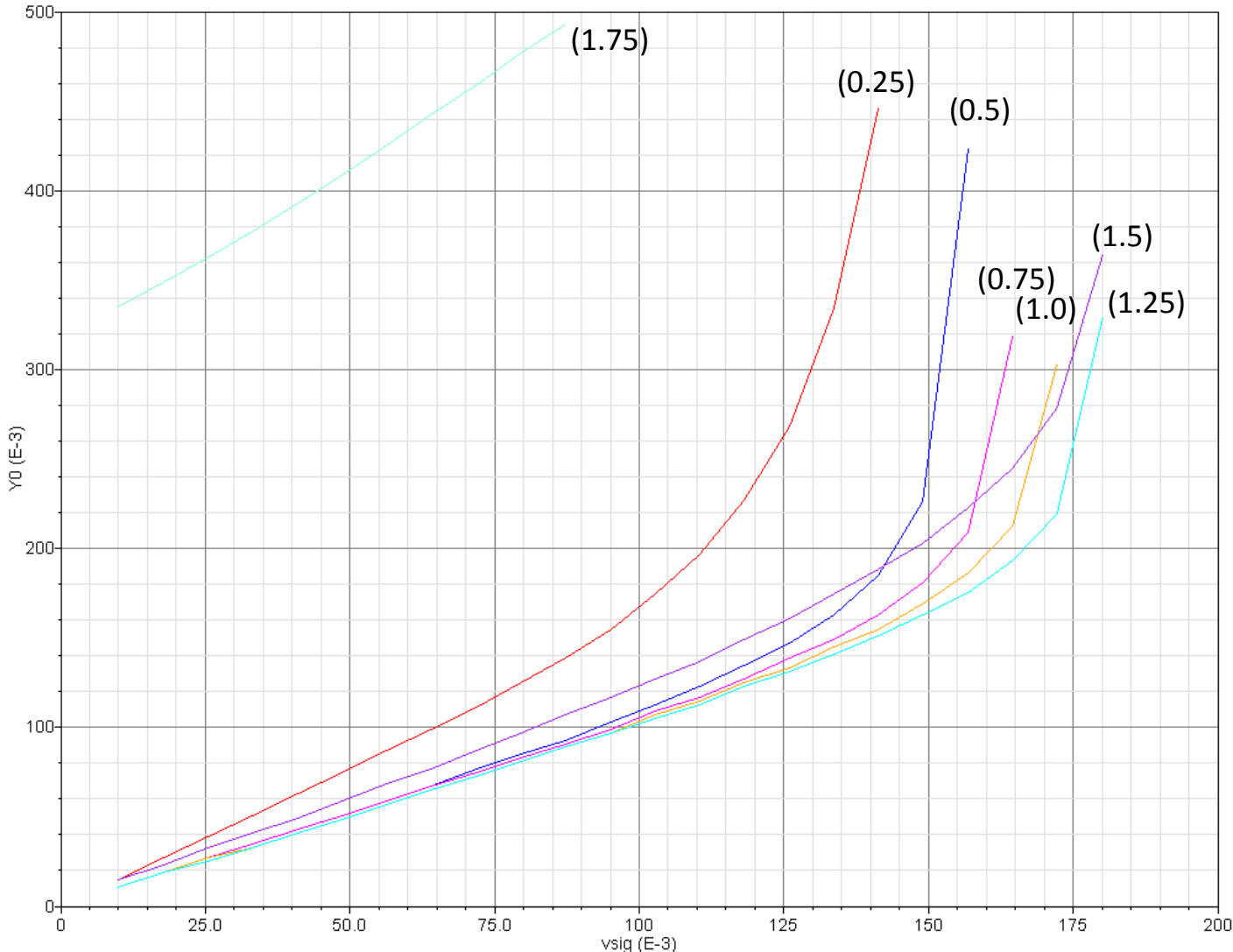
Vin = 1v + Vsig

Vth = Vcm ± (Vth/2)
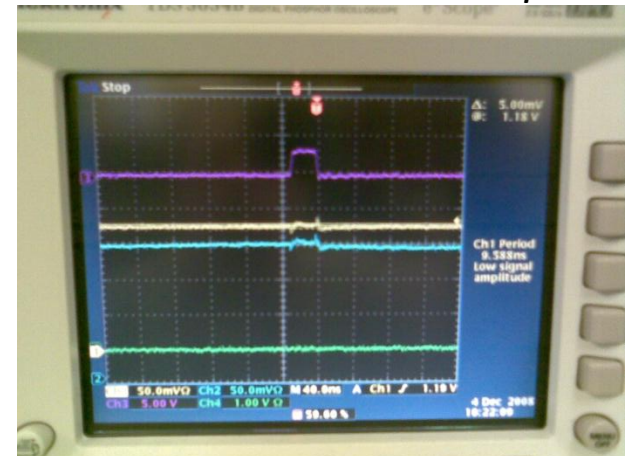
Comparator Operation

- Test pixels give access to comparator inputs and outputs...
- Worrying effects (not yet fully understood)
  - Set a very low threshold
  - Comparator fires (on noise)
  - Injection into shaper circuit
  - Effect is more pronounced in new pixel
  - Can oscillate at certain low thresholds
  - Probably explains the non-gaussian profiles
- Needs further investigation
  - Layout scrutiny
  - Response to signal
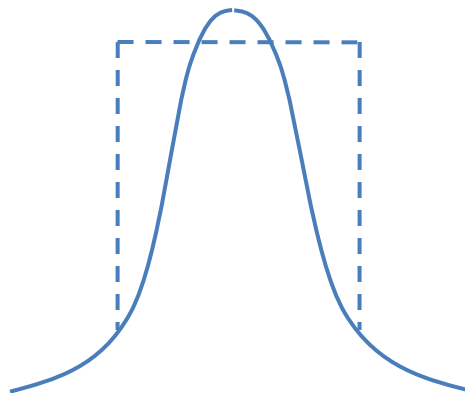
New pixel

Old pixel

Next steps

- Need to see how TPAC1.1 performs in bulk with high-rate source
  - Marcel's 55Fe results need to be confirmed

- Would like to observe operation of comparator with repeatable signal source (laser)