Bump bonding test

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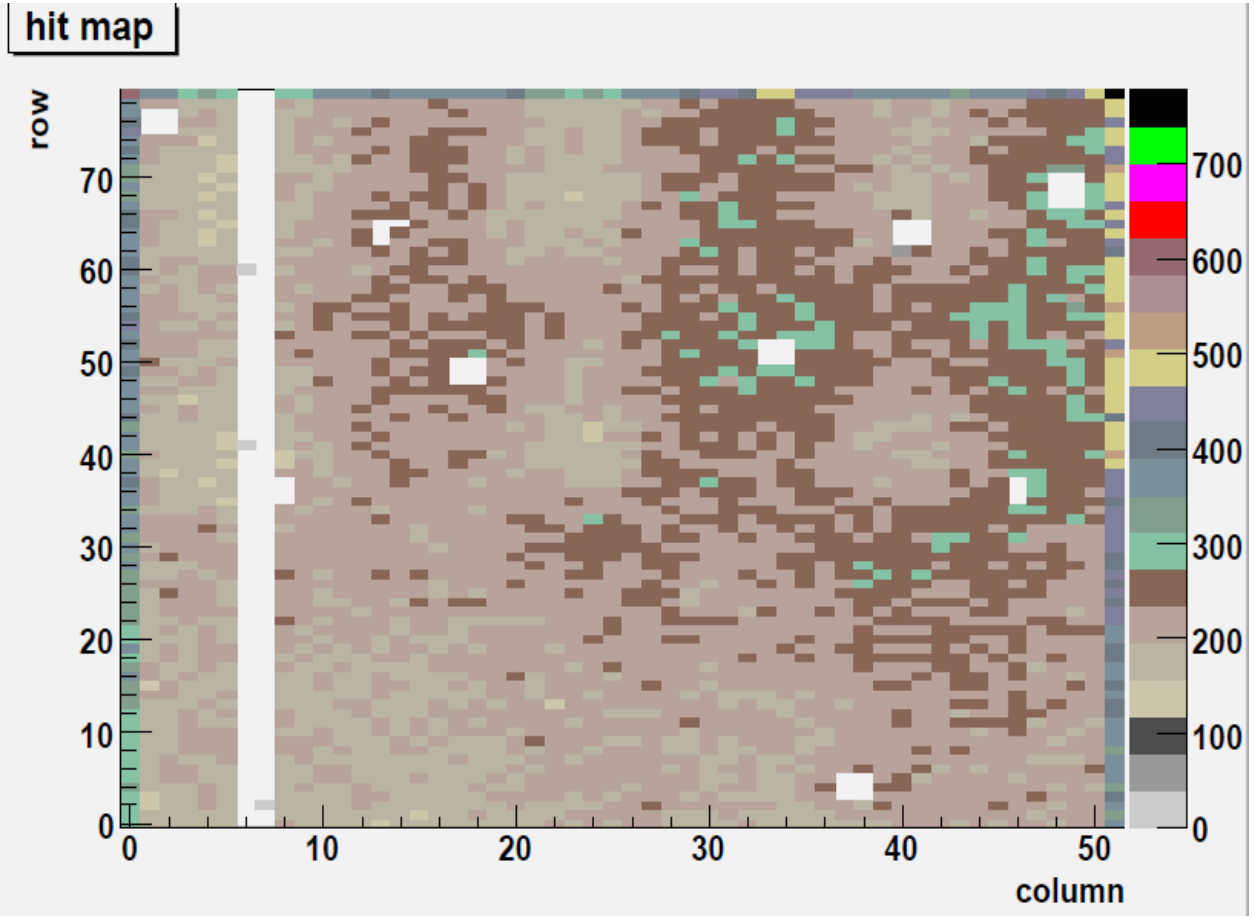
CMS Tracker Upgrade 18.05.2011

- Bump bonding test results for ROCs 10&11 from tb-21 and e-lab

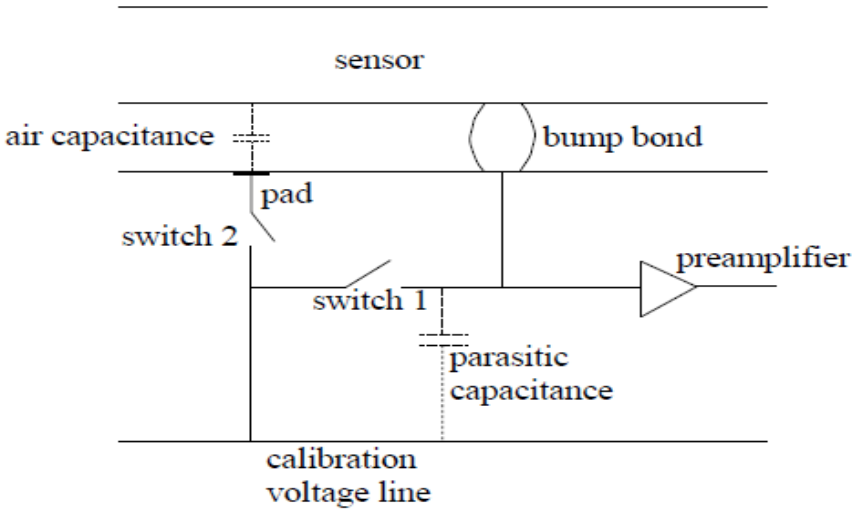
Bump Bonding Test Necessity



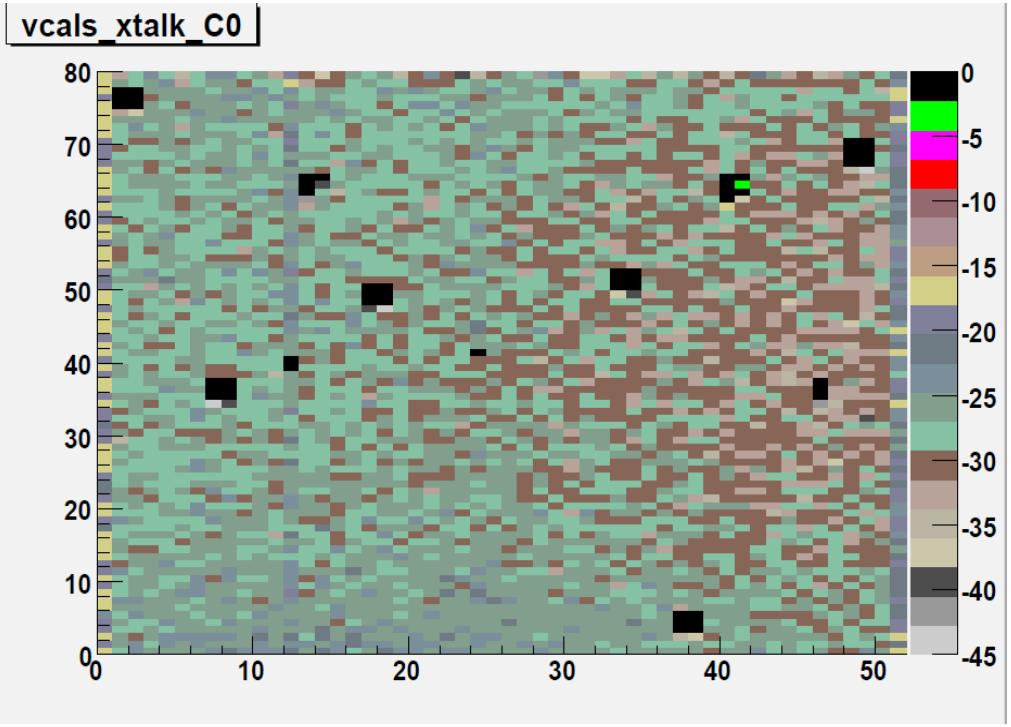
- 5.6 GeV e+ test beam
- Chip 11 (sensor)
- Dead dcolumn
- Many dead regions
- Use 'psi46expert' to test bump bonding

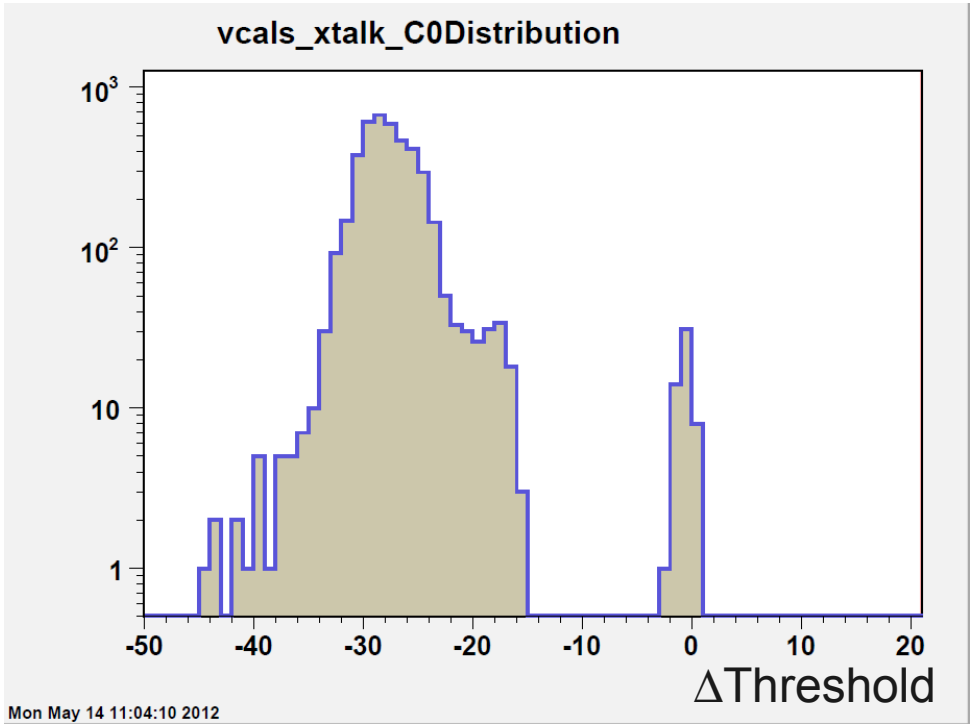
Bump Bonding Test Procedure

- Vcal to switch 2 induces a signal in sensor. If bump bond (bb) is present it is seen by preamplifier: missing bb can be identified
- Problem: cross-talk via a parasitic coupling between the calibration voltage line and preamplifier can fake a signal even without bb
- Determine Vcal_Thr2 for the signal injection through the sensor
- Measure Vcal_Thr1 for the parasitic cross-talk (with both switches open)
- |Vcal_Thr1 – Vcal_Thr2| < 5 DAC units → defect bump bonding



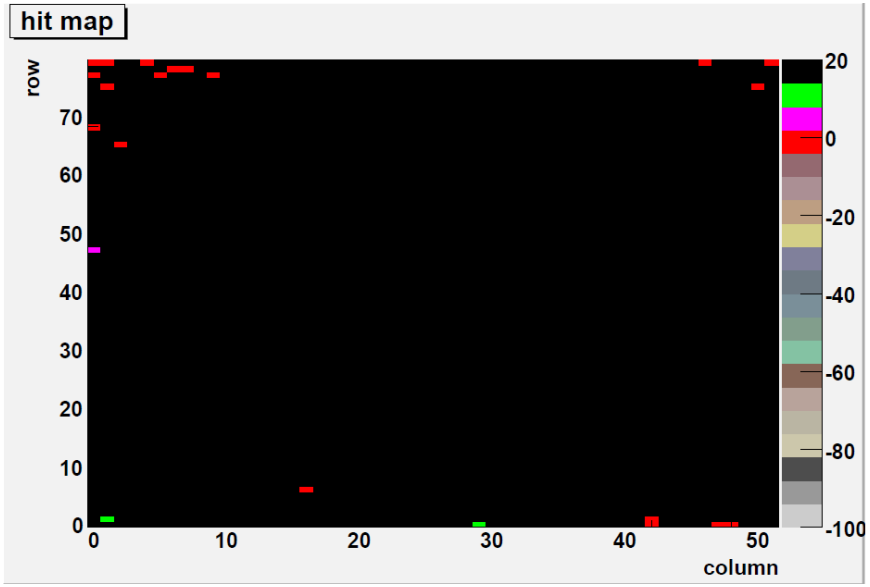
Bump Bonding Test Results, chip11



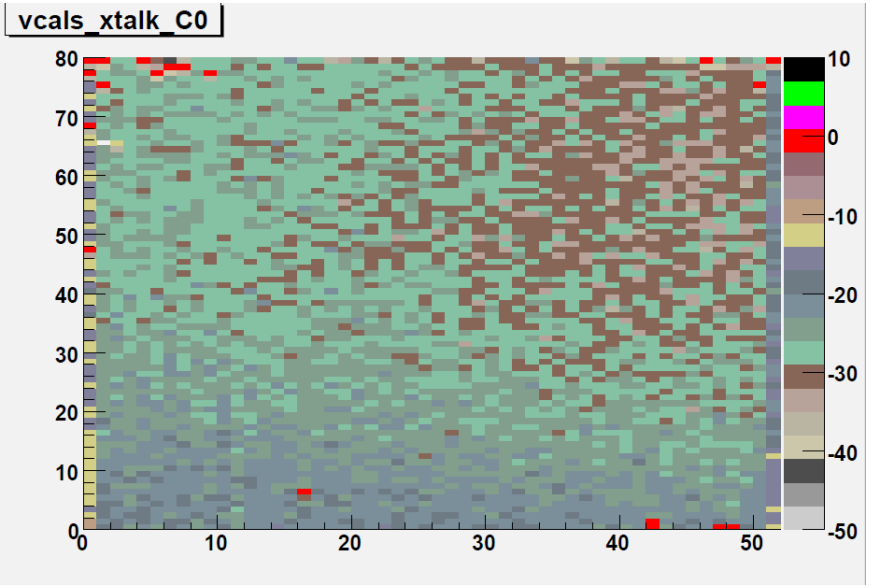


- Threshold difference: expected defects from beam test are correctly identified by 'psi46expert'
- Peak at ΔThreshold ~ -25 → good bump bonds. Peak at ΔThreshold ~ 0 → bad bump bonds

Bump Bonding Test Results, chip10

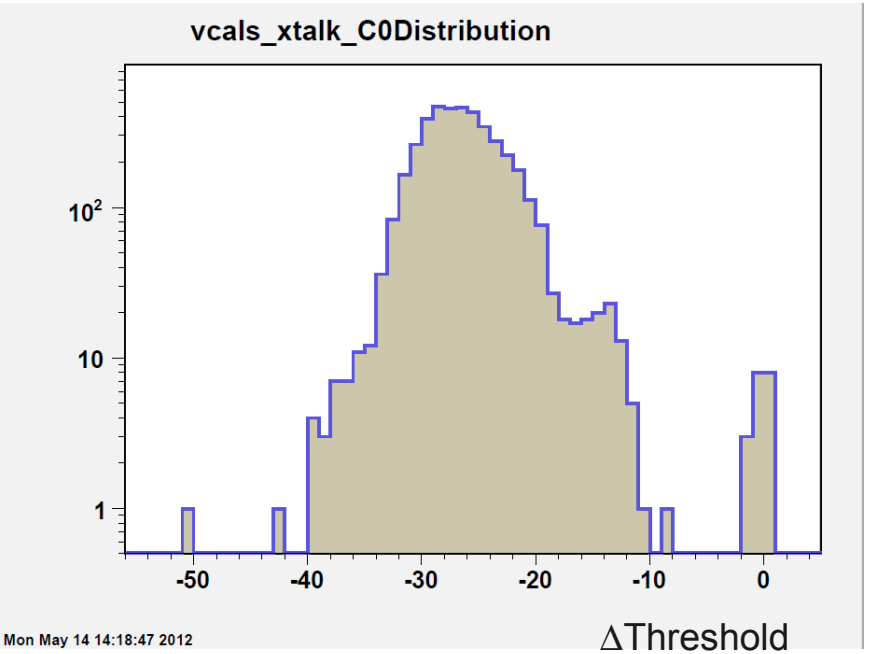


From test beam, run 2076



From e-lab

- Red bins: bad bump bonds in DUT as well?

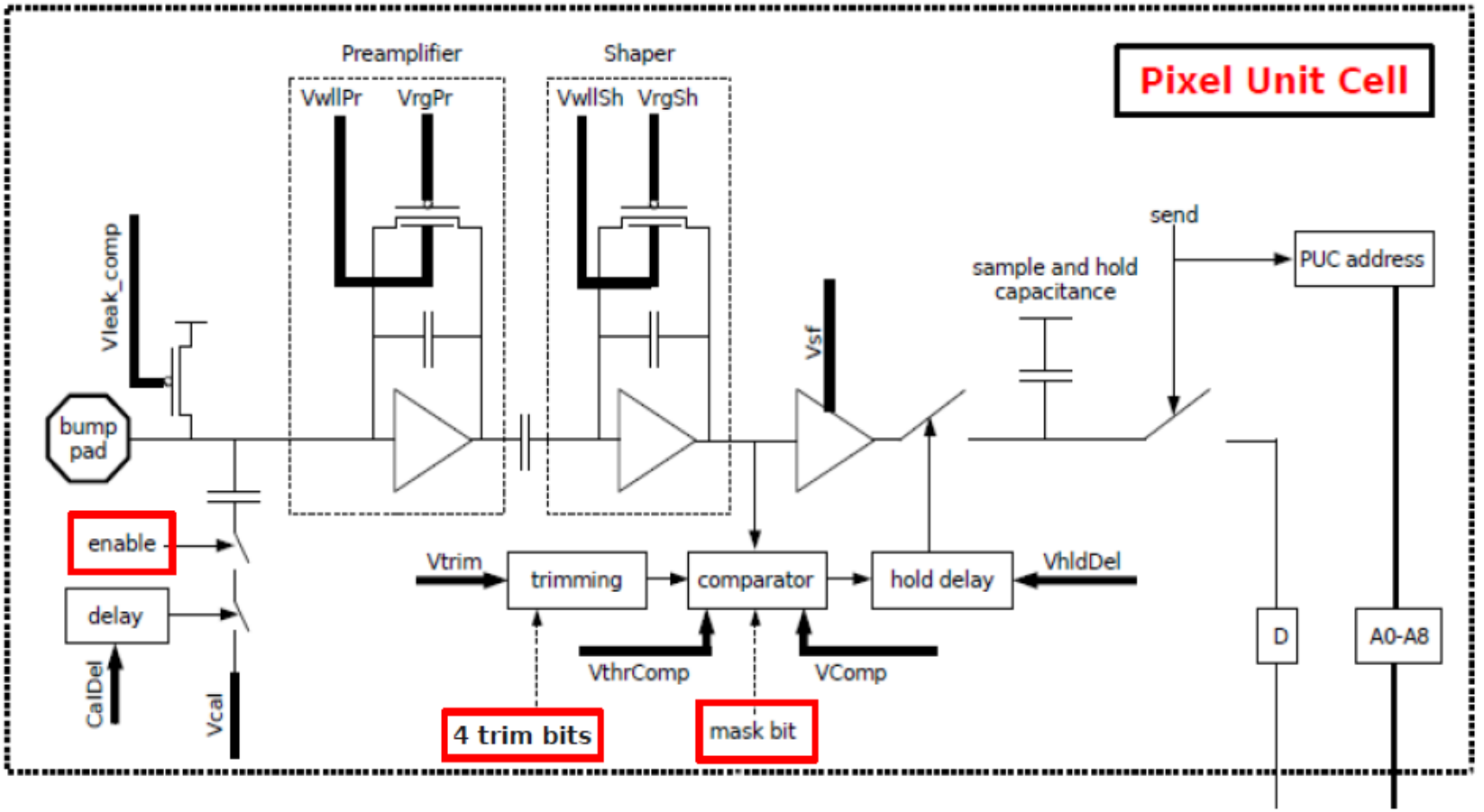


From e-lab

Summary

- Bump bonding test for chip11 correctly identified a few dead regions
- Columns 5-6: not dead (PixelAlive test), bump bonded. Some readout problems?
- A few bad bump bonds in DUT?

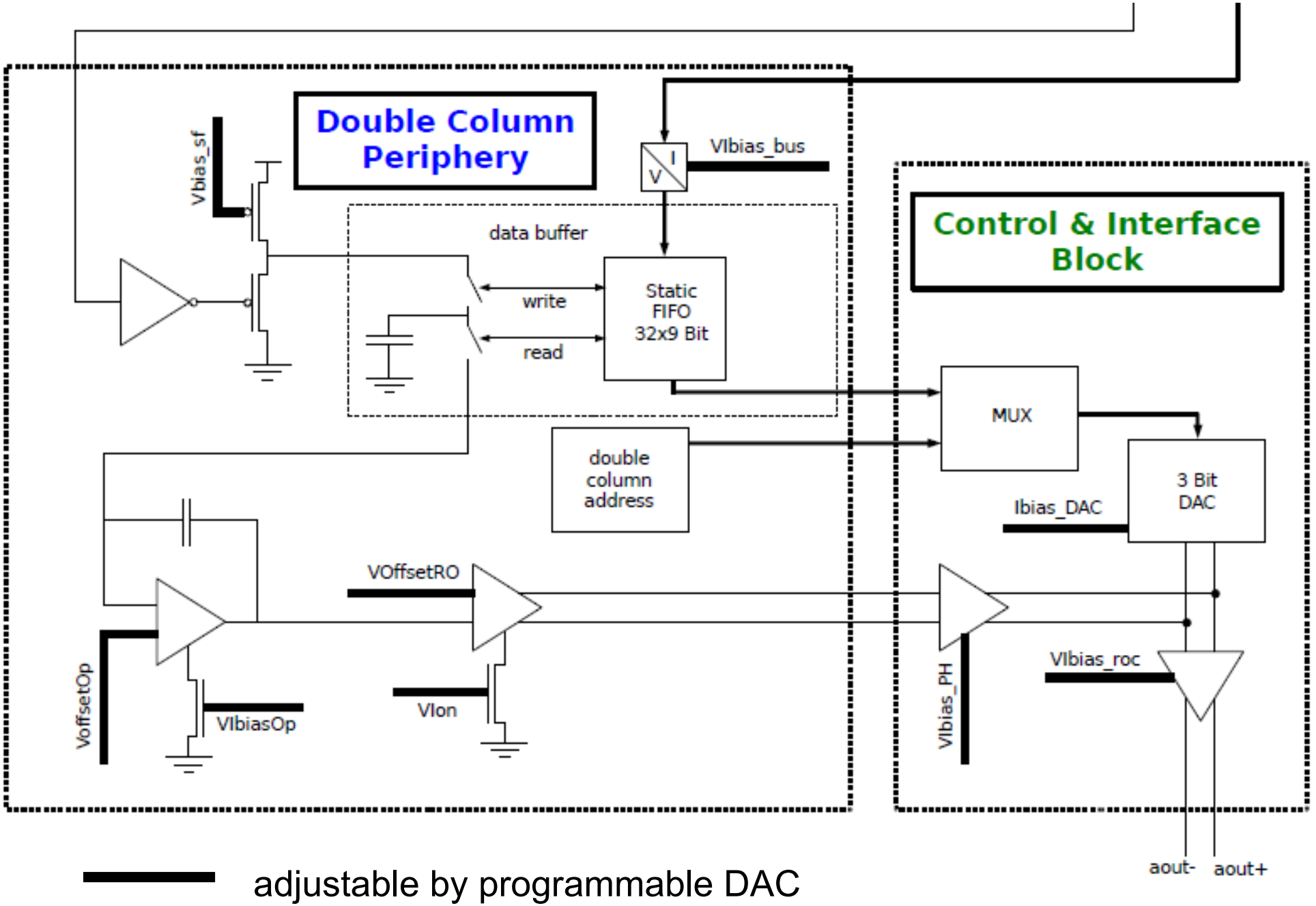
Psi46 Pixel Readout Chip



adjustable by programmable DAC, per ROC

programmable register, per pixel

psi46 pixel readout chip



adjustable by programmable DAC

psi46 DACs, Pretest

1	Vdig	6
2	Vana	150
3	Vsf	160
4	Vcomp	10
5	Vleak_comp	0
6	VrgPr	0
7	VwllPr	35
8	VrgSh	0
9	VwllSh	35
10	VhldDel	130
11	Vtrim	7
12	VthrComp	124
253	CtrlReg	0
254	WBC	20

13	VIBias_Bus	30
14	Vbias_sf	10
15	VoffsetOp	55
16	VIbiasOp	115
17	VOffsetR0	120
18	VIon	115
19	VIbias_PH	130
20	Ibias_DAC	122
21	VIbias_roc	220
22	VIColOr	100
23	Vnpix	0
24	VSumCol	0
25	Vcal	200
26	CalDel	125
27	RangeTemp	0