Commissioning Module HDI Tests at UCSB

SVT Video Meeting
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For details, see
`http://charm.physics.ucsb.edu/BaBar/CommTest/HdiComm.html`

Chip Problems

Several chips had serious problems. Quality control needs to be much higher for production.

Forward detector: D02F-4 (H1-29)

- **Chip 4:** 38 bad channels (30 %).
- **Chip 9*:** Coherent bursts of noise, unstable gain.
- **Chip 10:** No response to Q inj. Digital problems.
- **Chip 11:** Digital problems.
- **Chip 13:** Unknown problem. Digital problems.

Backward detector: D02B-8 (H1-13)

- **Chip 0:** Digital problems.
- **Chip 1:** All channels fire when masked off (intermittent).
- **Chip 3:** After bonding, no response to Q inj.
- **Chip 9*:** Coherent bursts of noise, unstable gain.

$*$ May be a problem with HDI not chip.

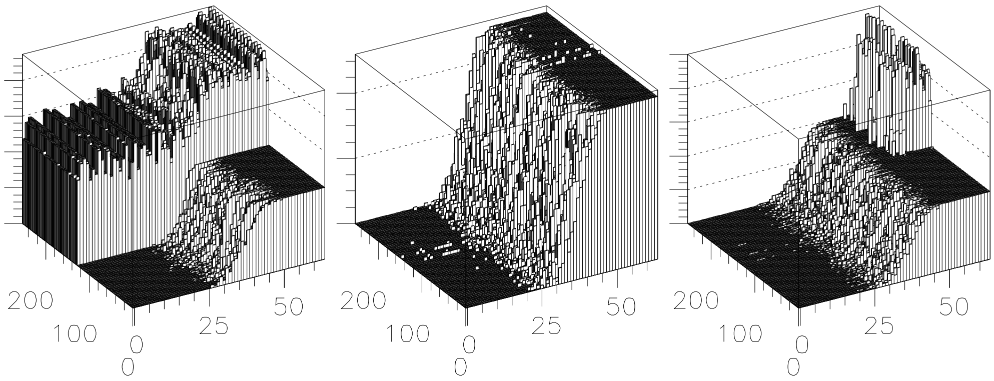
Chip Problems

No response to Q injection:

- Channels fire but only at very low threshold.
- Channels do not respond to LED.
- Never seen before on rad-soft or V1 rad-hard chips.

Masked off channels firing:

- Problem is intermittent. The data below show chips 0 and 1 of H1-13/D02B-8 for 3 different runs.

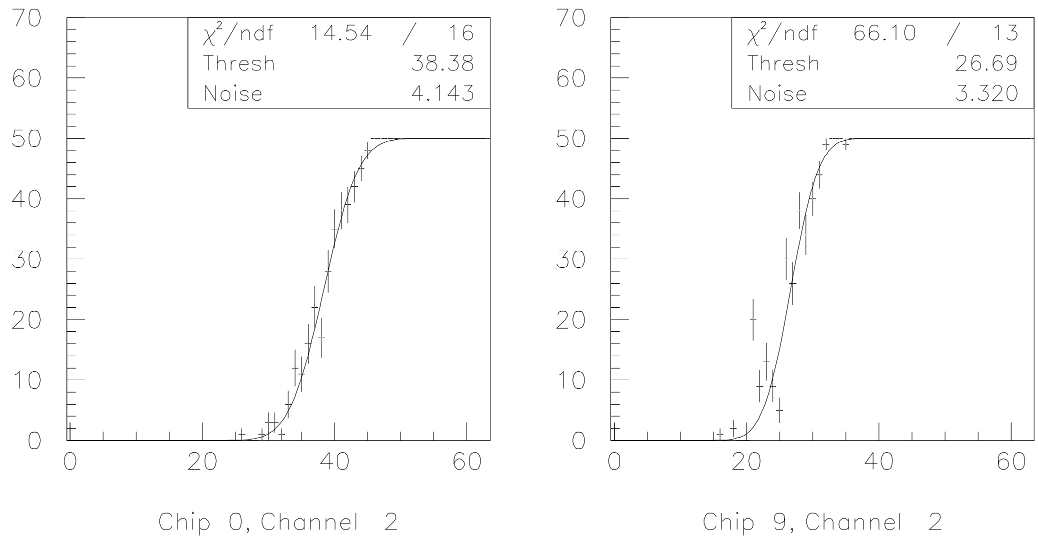


- Will be difficult to weed out chips like this before attaching them to HDIs. Burn in should help.

Chip 9 Problem?

Chip 9 (p-side, address 2) on both commissioning module HDIs and the 2nd H1 prototype with V1 rad-hard chips has the following unusual features:

- Bursts of coherent noise.



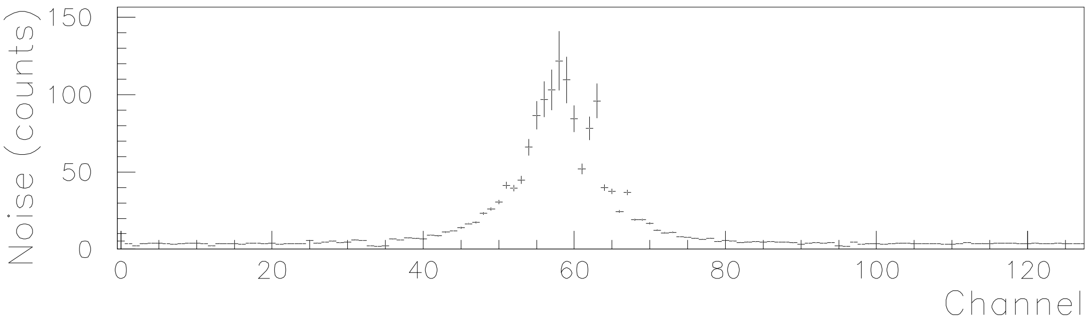
- Unstable gain. For example, the Chip 9 gain for H1-29 went from 170 to 0 to 130 mV/fC.

Features are present in ringframe and post commissioning module assembly data, so probably not a problem with test stand.

If it's a problem with the H1 hybrid, 15% of the z-side layer 1 and 2 channels will be compromised at some level!

Miscellaneous Problems

- **Chip 7, H1-29/D02F-4:** Developed a region of very high noise after assembling the commissioning module. The problem is not understood.



- **Chip 3, H1-13/D02B-8:** Stopped responding to Q injection after bonding to the silicon. Current draw on AVDD2 dropped by about $1/7^{\mathrm{th}}$. May be infant mortality or due to a handling accident.

Noise

Noise values are in general agreement with previous individual chip measurements.

HDI/DFA	n-side				
	Unbonded		Bonded		
	100 ns	400 ns	100 ns	200 ns	400 ns
H1-13/D02B-8 (counts)	1.22	0.98	4.08	4.48	3.20
H1-29/D02F-4 (counts)	1.25	1.00	4.17	—	3.23
H1-13/D02B-8 (ele)	400	320	1410	1240	1105
H1-29/D02F-4 (ele)	410	345	1440	—	1115

HDI/DFA	p-side				
	Unbonded		Bonded		
	100 ns	400 ns	100 ns	200 ns	400 ns
H1-13/D02B-8 (counts)	1.47	0.94	3.35	3.12	2.51
H1-29/D02F-4 (counts)	1.50	1.02	3.22	—	2.40
H1-13/D02B-8 (ele)	480	325	1155	865	865
H1-29/D02F-4 (ele)	490	350	1110	—	830

Gain

Gain values are in general agreement with previous individual chip measurements.

HDI/DFA	n-side				
	Unbonded		Bonded		
	100 ns	400 ns	100 ns	200 ns	400 ns
H1-13/D02B-8 (C/c)	-9.24	-9.46	-8.61	-10.65	-9.16
H1-29/D02F-4 (c/c)	-9.12	-9.30	-8.09	—	-8.63
H1-13/D02B-8 (mV/fC)	204	209	190	235	202
H1-29/D02F-4 (mV/fC)	201	205	178	—	190

HDI/DFA	p-side				
	Unbonded		Bonded		
	100 ns	400 ns	100 ns	200 ns	400 ns
H1-13/D02B-8 (c/c)	-9.34	-9.31	-8.82	-10.82	-8.57
H1-29/D02F-4 (c/c)	-8.78	-8.59	-8.78	—	-8.90
H1-13/D02B-8 (mV/fC)	206	205	195	239	189
H1-29/D02F-4 (mV/fC)	194	190	194	—	196