



ATLAS SCT  
The ATLAS Semiconductor Tracker

# UK-B Production Status

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On behalf of the UK-B Cluster  
Birmingham, Cambridge, Queen Mary U of L, RAL



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## Hybrid Assembly Status in Birmingham

As of Friday 28 February: (since Dec02)

- **146** Production hybrids received from KEK (82)
- 89 have ASICs attached (42)
- 51 Waiting for assembly
- 4 Early “green” hybrids (not used)
- 2 PA problems seen before ASIC attach  
(to be returned to KEK)

Production delayed by problems of connector rework and “White PA” questions

Maximum rate so far is 8 hybrids / week, additional jigs coming this week, then we have capacity for 12 hybrids / week



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Of the 89 starts (since Dec02):

- 71 through QA, 62 of these delivered to RAL (38)
- 6 in production
- 7 awaiting rework (ASIC replacement) (4)
  - ...4 new bad chips:
    - 1 large gain spread (**UK100**)
    - 1 large gain spread cold (**UK019**)
    - 1 bad strobe delay setting (**UK056**)
    - 1 bad s-curves (**UK050**)
- 1 has a damaged PA not noticed in initial inspection (**UK107**)
- 2 destroyed(?) shipping to Japan (UK059,UK060)
- 1 destroyed in Birmingham (glue accident) (UK061)

We now remove the PA blue film before initial visual inspection, after bad experiences not seeing defects through it (film often quite dirty, but most dirt lifts off with film)



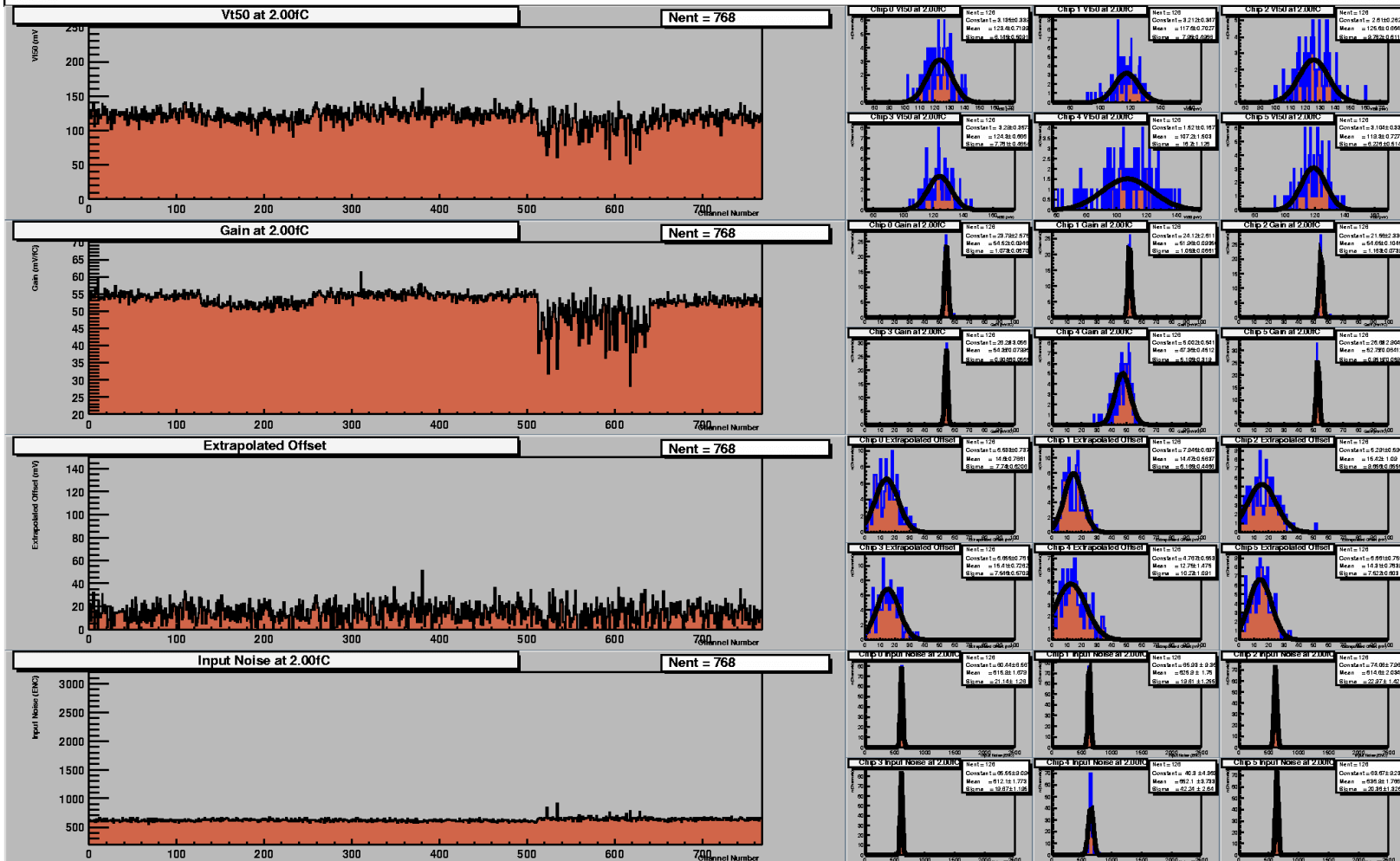
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## Hybrid UK100 S04 – Large Gain Spread (room temp)

ATLAS SCT Module Test: Response vs. Channel - Fri Jan 31 15:50:33 2003 - Birmingham

Page 1 Run 1196 Start Scan 12 Stream 0 Module 1 (20220330200100) - Type Barrel\_Hybrid





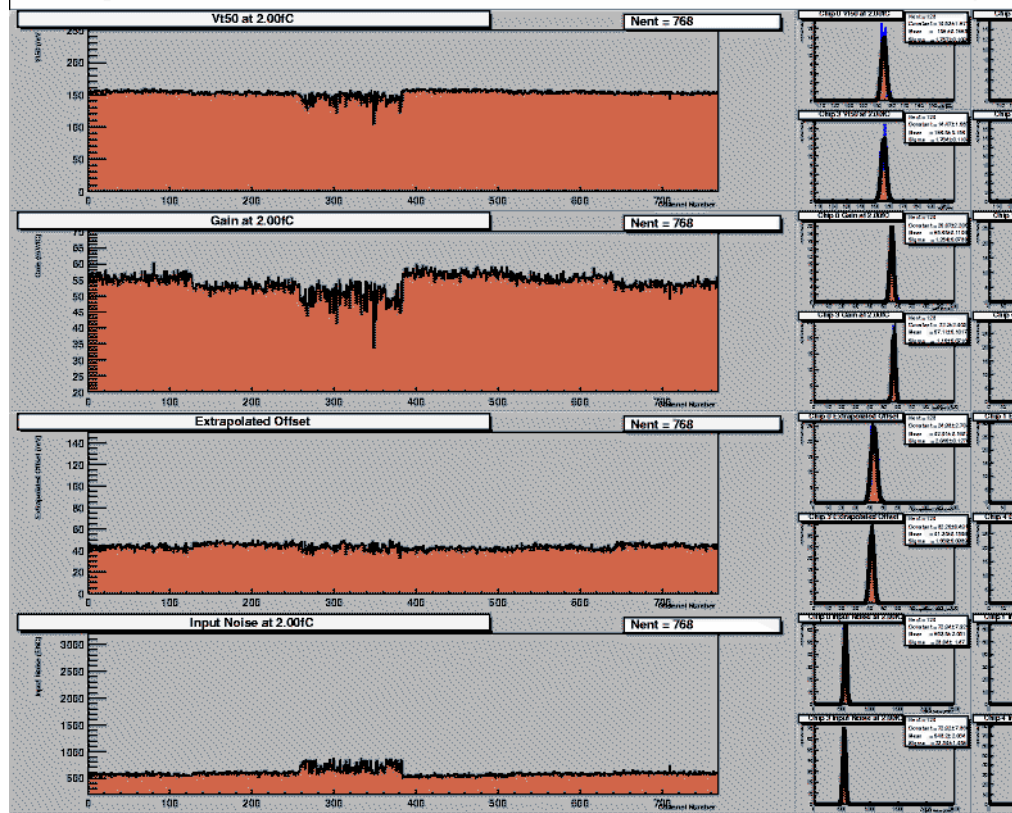
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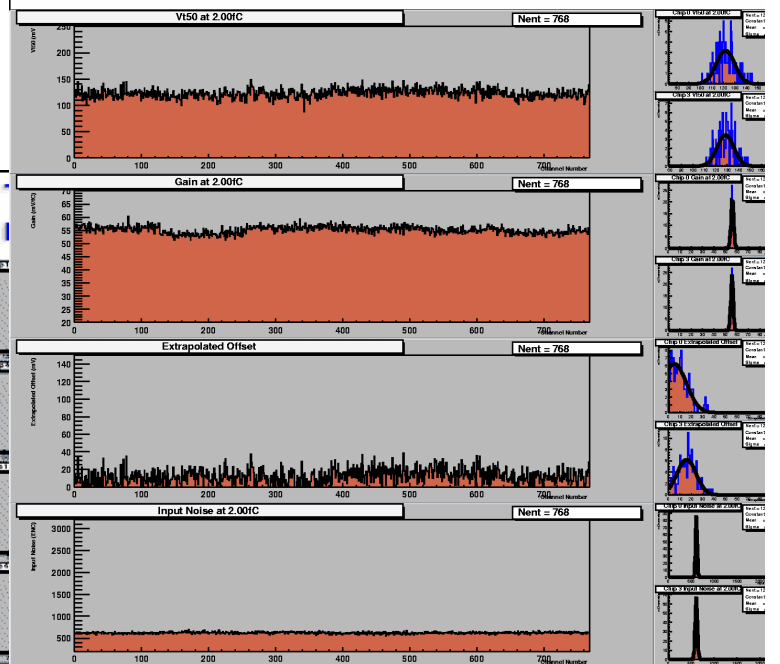
## Hybrid UK019 S10 – Large Gain Spread (cold only)

Cold

ATLAS SCT Module Test: Response vs. Channel - Thu Jan 23 18:25:32 2003  
Page 3 Run 348 Start Scan 12 Stream 1 Module 0 (20220330200019) - Type I



ATLAS SCT Module Test: Response vs. Channel - Tue Jan 21 18:06:02  
Page 3 Run 1174 Start Scan 12 Stream 1 Module 0 (20220330200019)



Room T

4th March 2003



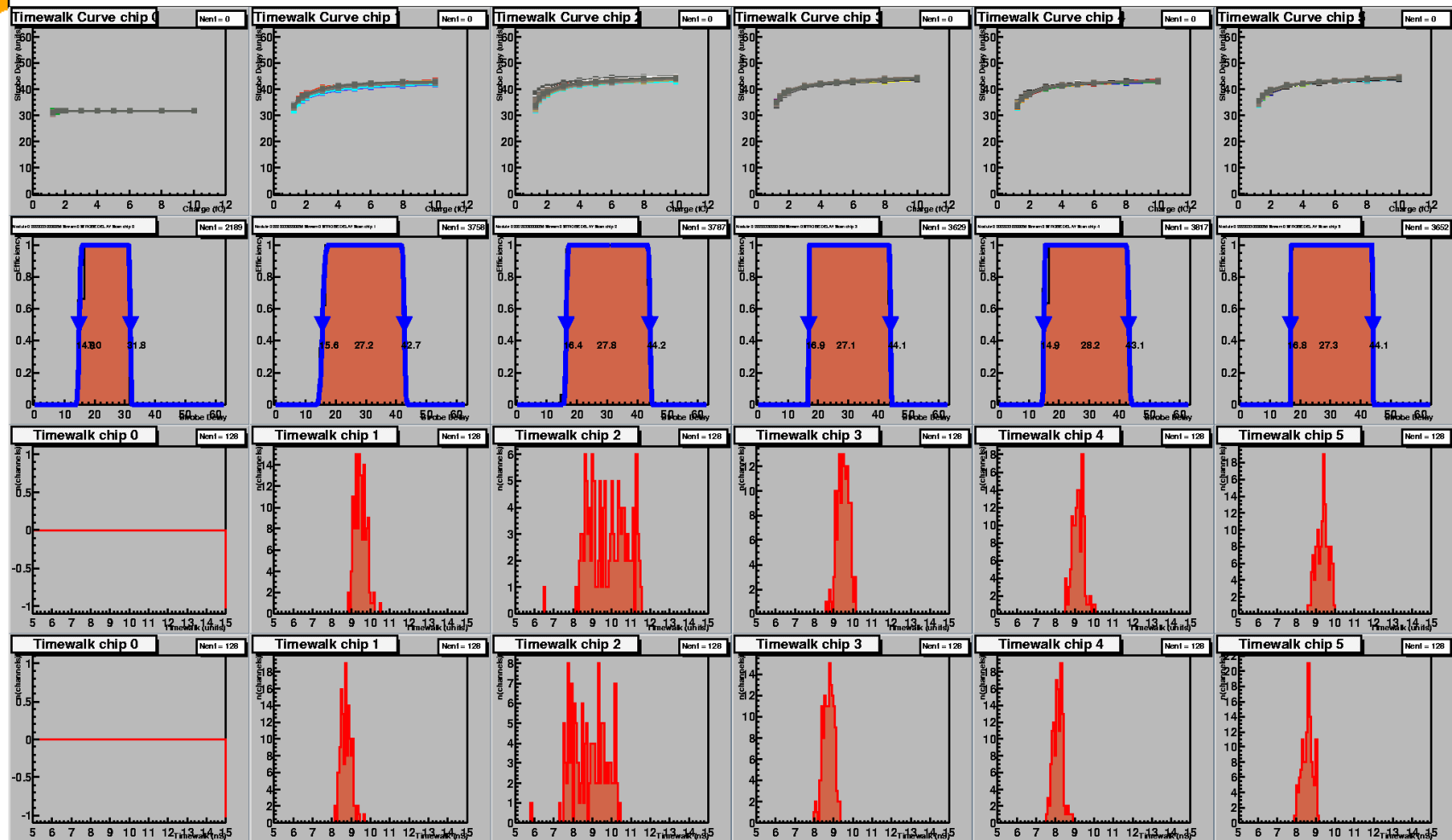
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## Hybrid UK056 M00 – Strobe Delay Setting Problem

ATLAS SCT Module Test: Timewalk Curve - Thu Dec 12 19:07:48 2002 - Birmingham

Page 1 Run 318 Start Scan 55 Stream 0 Module 0 (20220330200056) - Type Barrel\_Hybrid

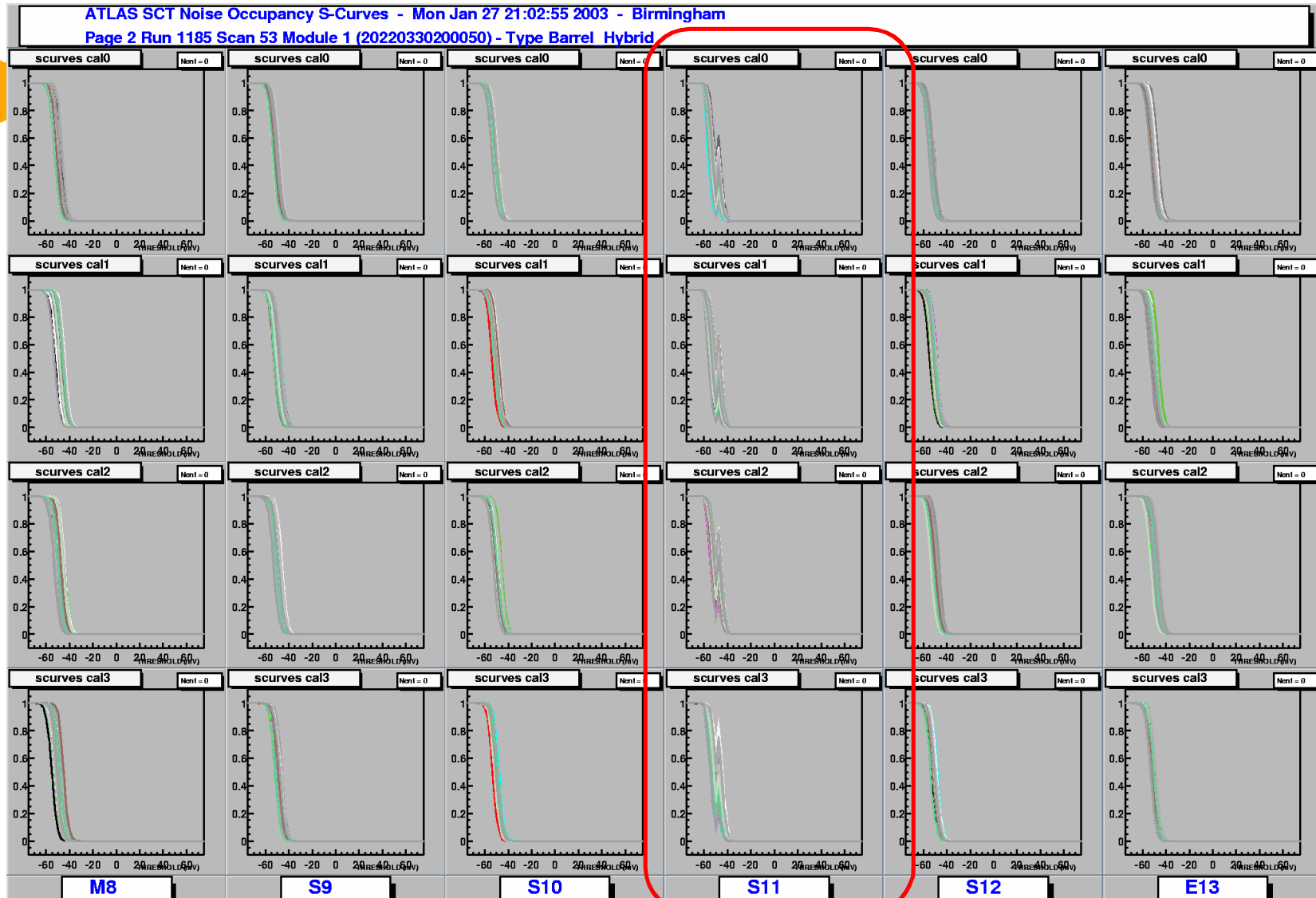


Strobe delay settings >31 don't work – only seen as TimeWalk fail cold 4th March 2003



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Hybrid UK050 S11 – Bad s-curves



Did not show up as a defect from sctdaq!

4th March 2003

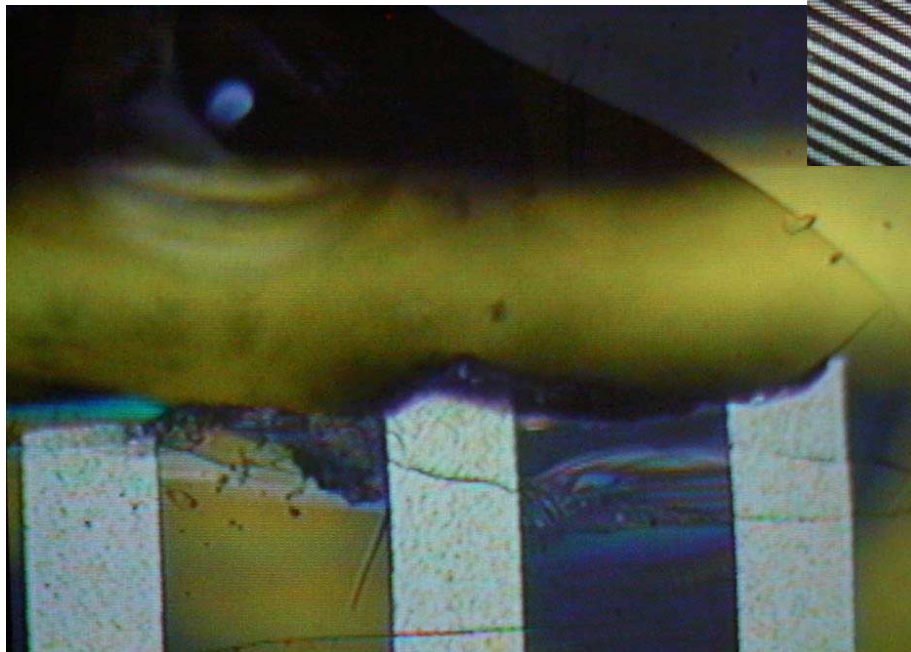
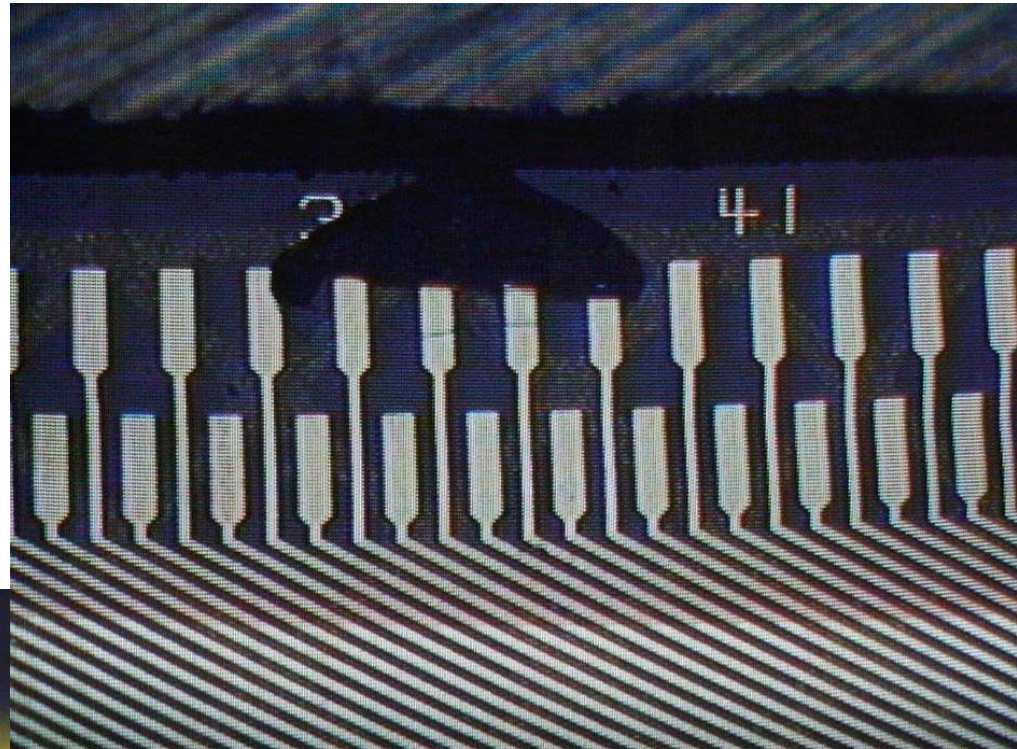


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Hybrid UK107 – Hole in PA

Not noticed when inspecting  
hybrid initially (through blue film)

We now remove PA blue film before  
initial visual inspection







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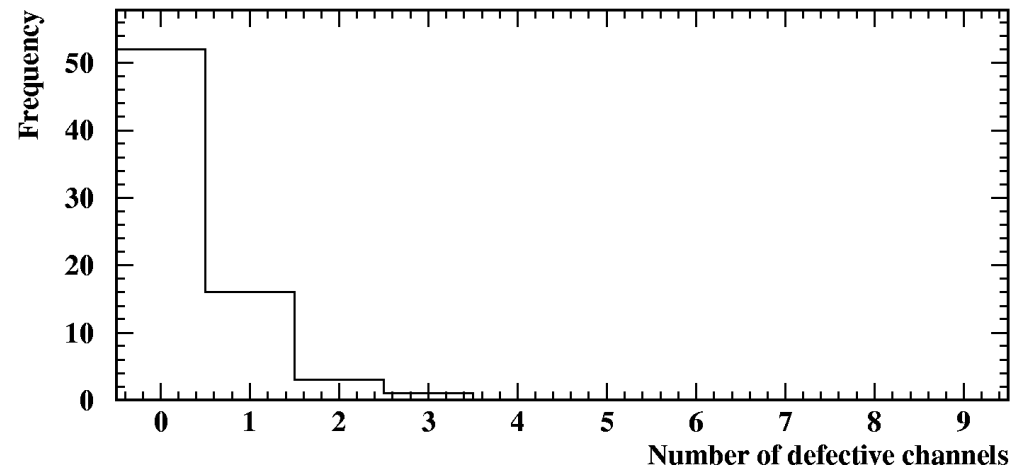
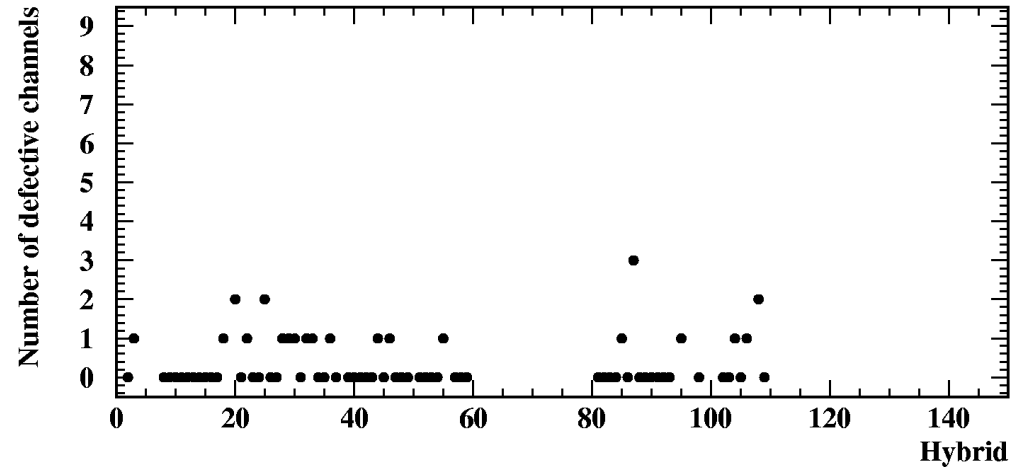
## Defective ASICs and Channels on Hybrids

2003/03/02 14.43

**So far in Birmingham:  
Bad ASICs: 6 / 1068 (0.6%)**

Mean number of  
defective **channels** / hybrid  
=  $25 / 72 = 0.3$   
(not all are completely dead)

Production Hybrids (Bham)





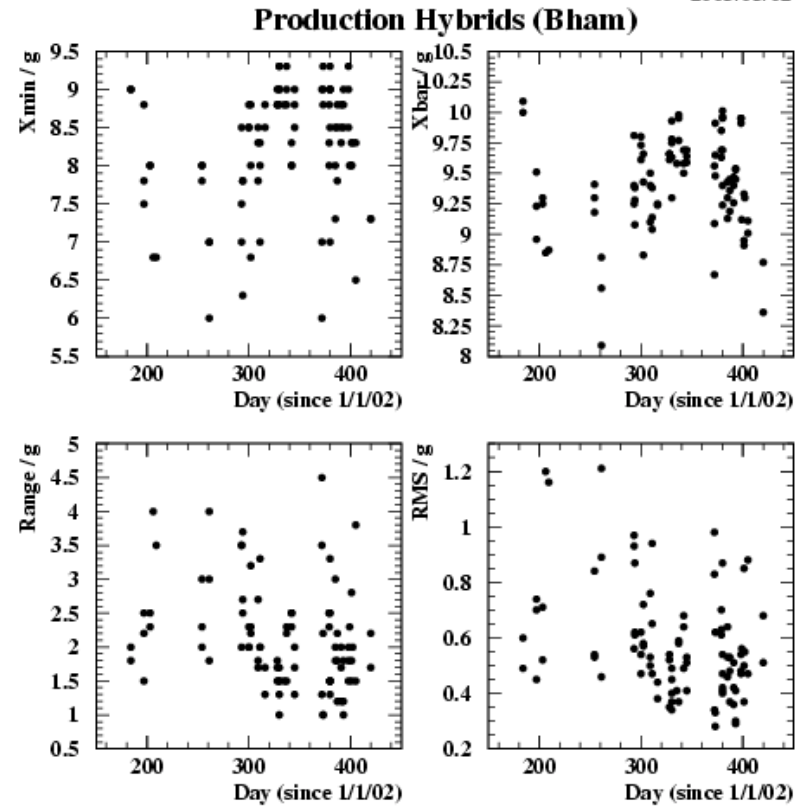
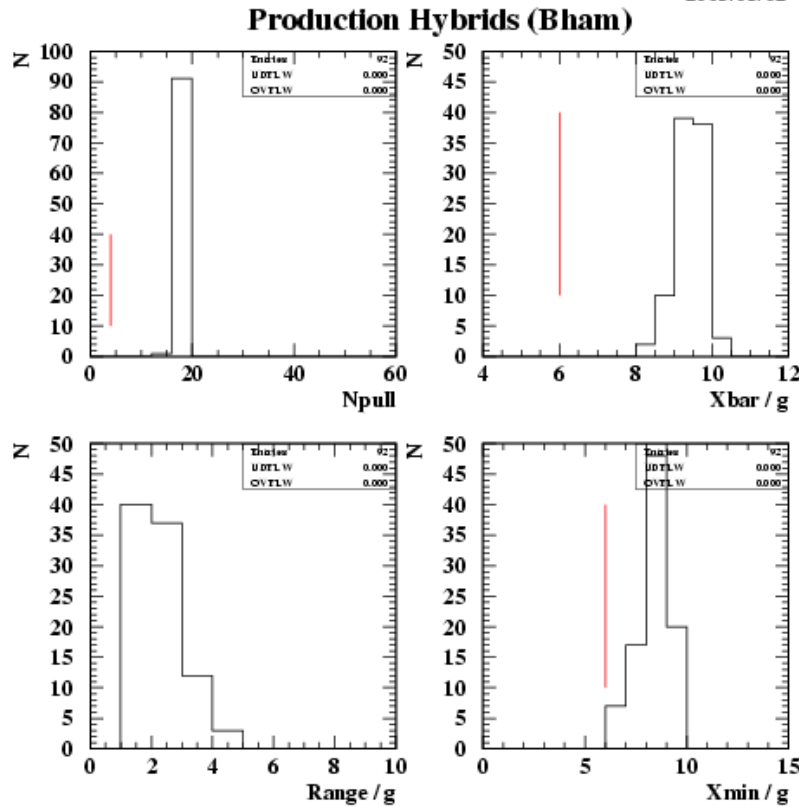
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## Hybrid Bonding Quality

2003/03/02 13.32

2003/03/02 13.32



Pull strengths are fine, also on PA



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## Module Production Status at end of February 2003

Modules Started					<b>57</b>
In Progress					<b>4</b>
Shipped					<b>26</b>
Ready to be shipped					<b>14</b>
On Hold					<b>6</b>
Failed					<b>6</b>
Test Beam and Irrad					<b>1</b>

**29** Completed Modules at end Jan

**41** Completed Modules at end Feb (**6.9%** of 550)



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## 6 Failed Modules – no chance of recovery

- ¥ PR1 —M 002
  - Misplaced hybrid, damaged bonds
- ¥ PR12 — BB804
  - Fractured Baseboard, Result of accident
- ¥ PR39 — BB917
  - Wild-In-plane Metrology. Operator Error
- ¥ PR42 — BB 890
  - midyf at 14micron, msy at 77micron (tolerance=30)
- ¥ PR50 — BB941
  - Control of Hybrid lost in hybrid mount.
- ¥ PR55 — BB937
  - Glue in gap between and up on to sensors.
  - Miscalculation of spacers on new jig.



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## 6 “On Hold” modules

¥ PR3 (M 09), PR9, PR10

—Bad midyf (greater than 5 and less than 10)

¥ PR 16 (M 21)

—Chip dead after HV breakdown

—Put aside for later repair

¥ PR 24 (M 23)

—Cracked pitch adaptor (23 channels missing)

¥ PR 28 (M 26)

—HV Problems

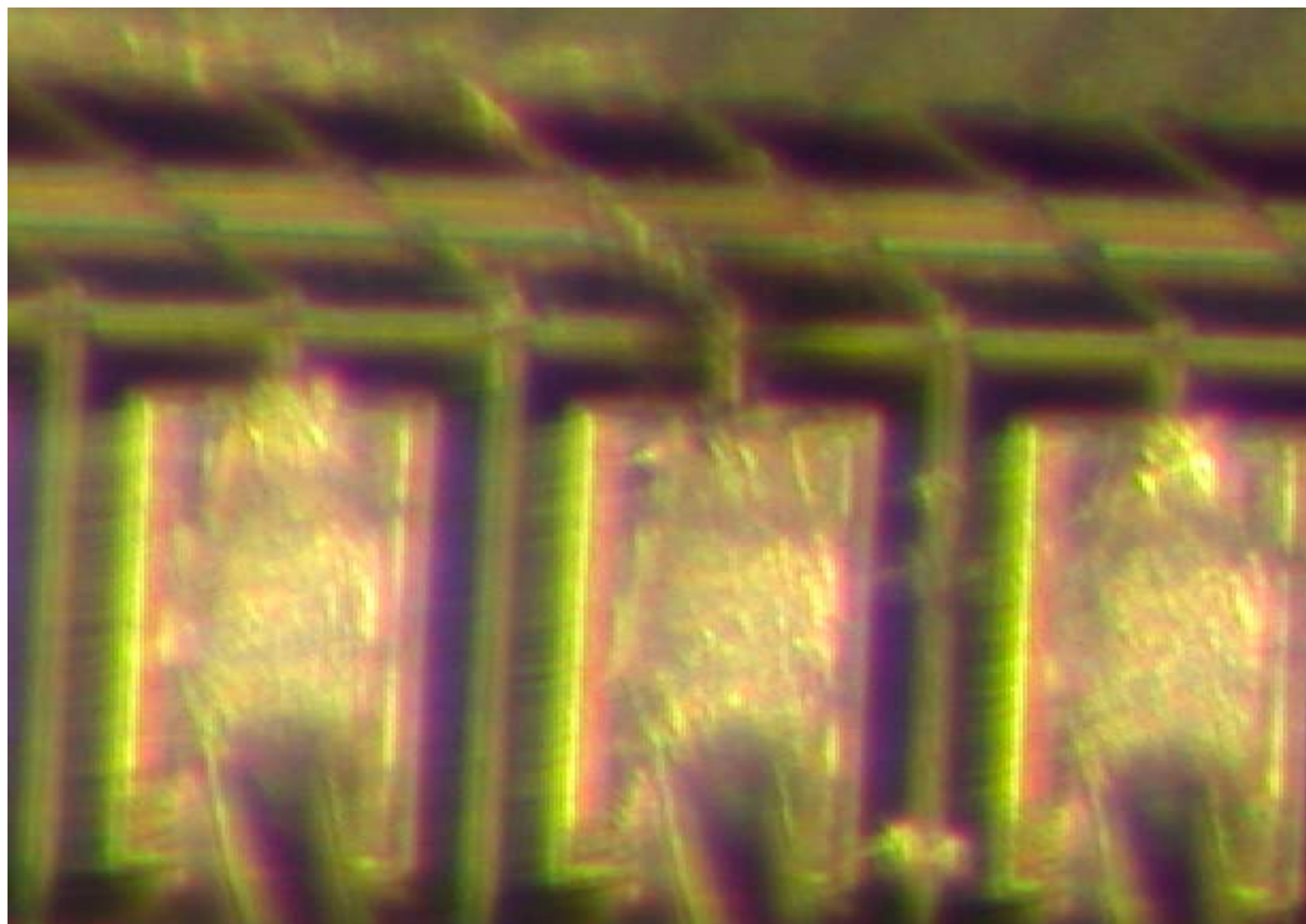
—For investigation and possible repair



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## Module 21 Breakdown at ASIC



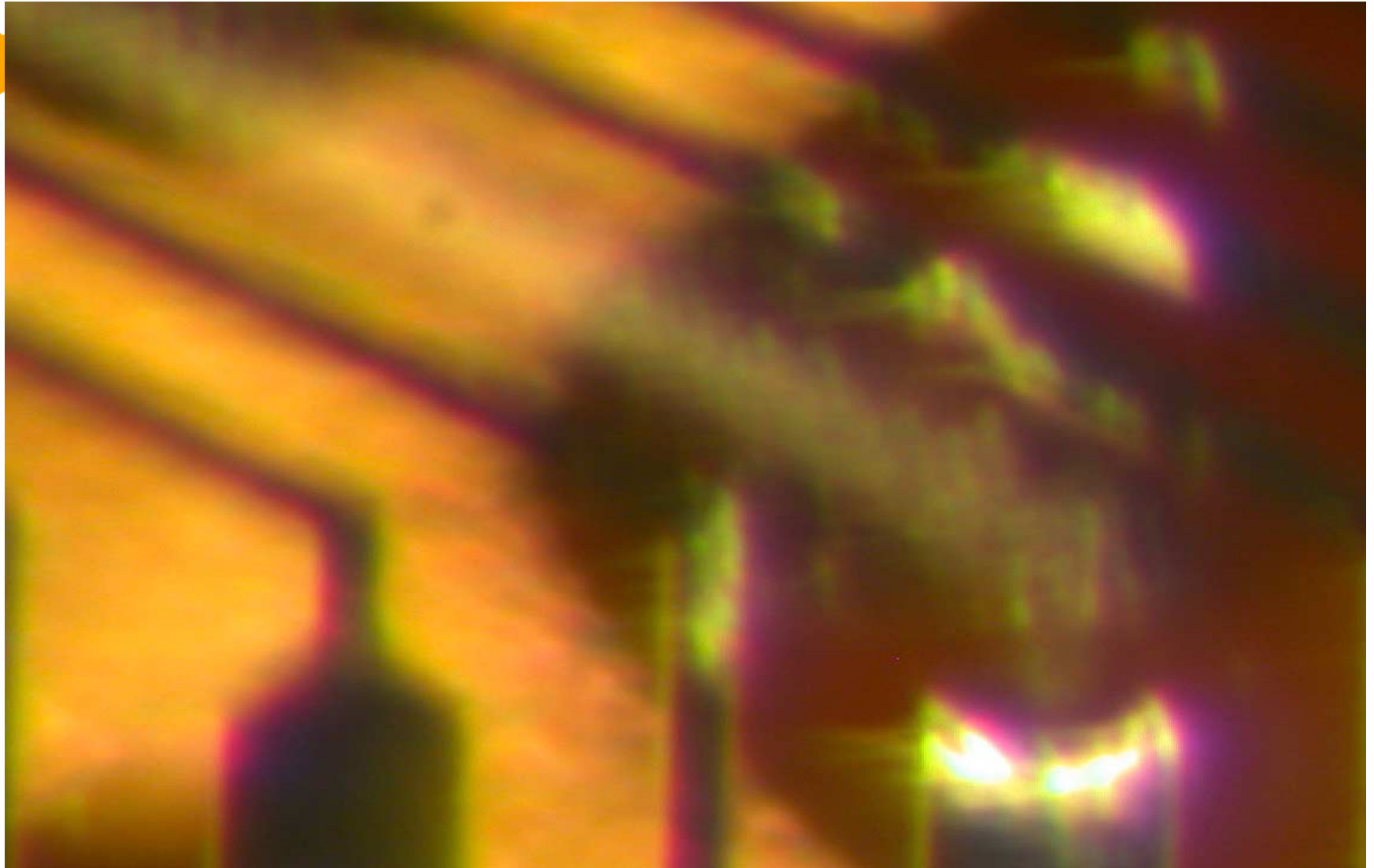
4th March 2003



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## Module 21: Fanin "Fuse"

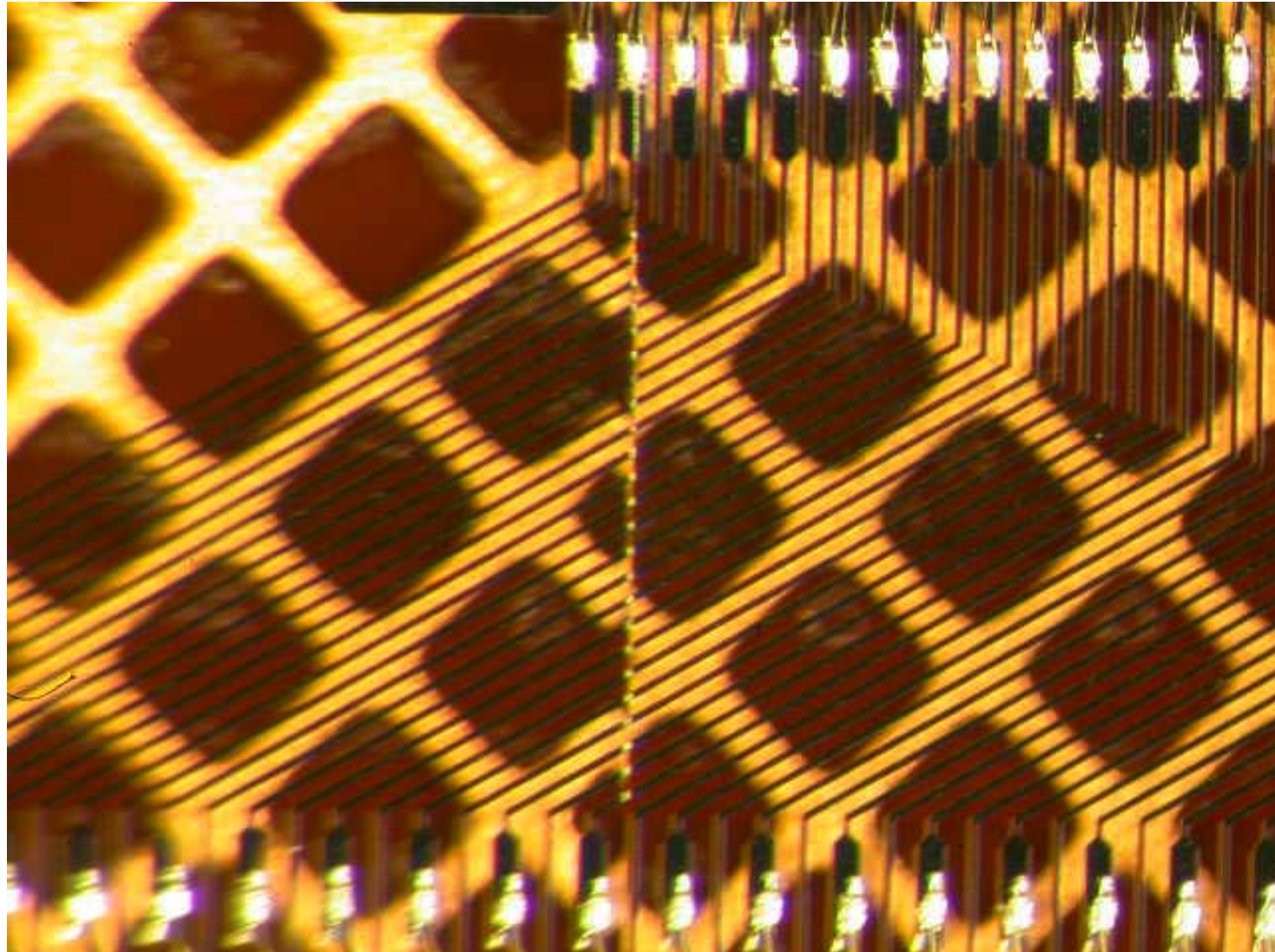




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## Module 23 Cracked Pitch Adaptor



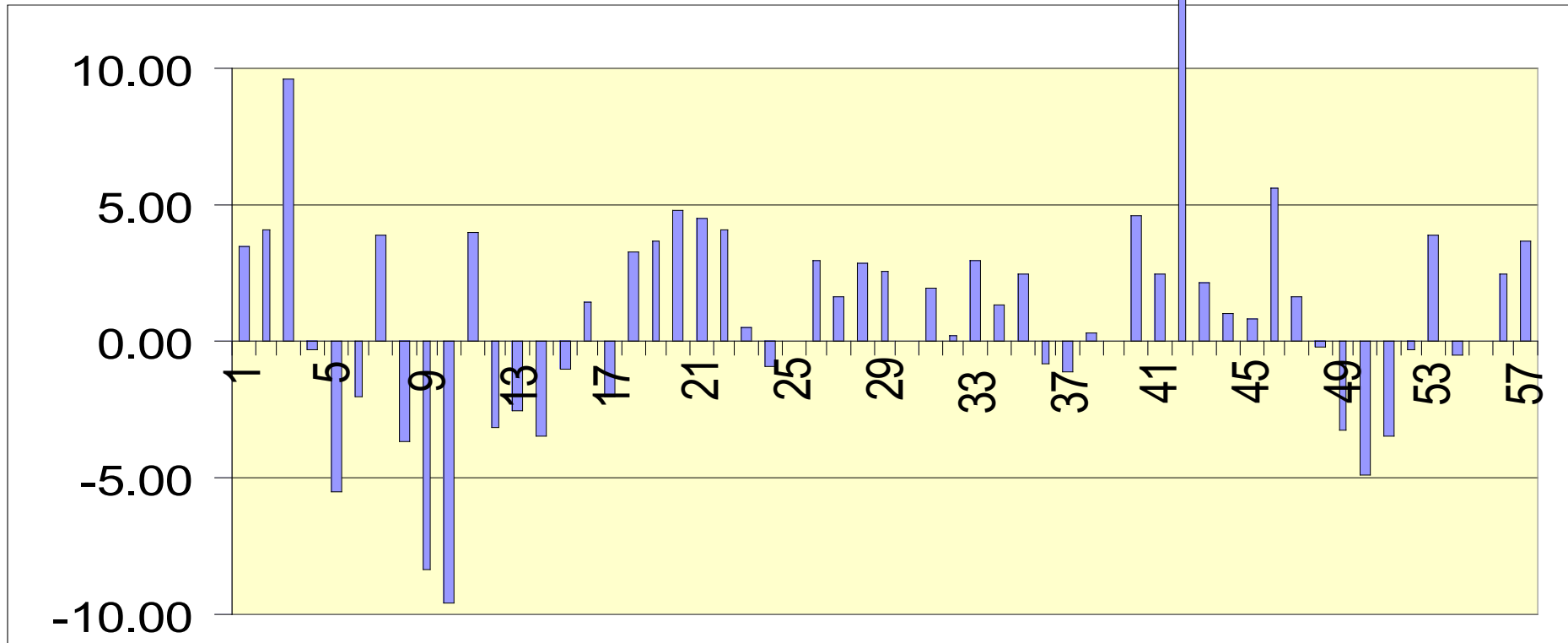




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## UK-B midyf History



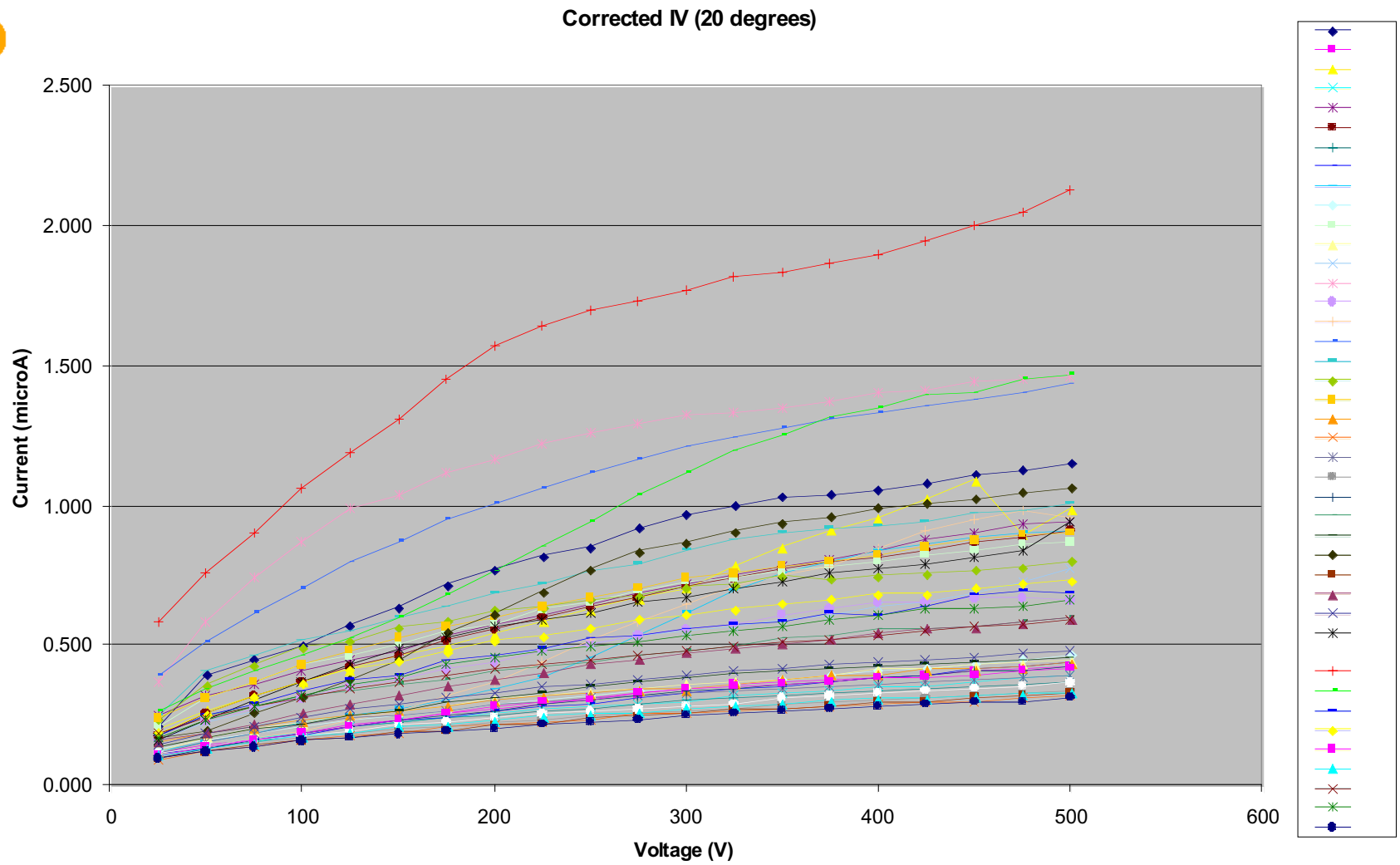
Excluding point 42 and early data (<16):  
RMS of 2.4 $\mu\text{m}$  with mean 1.3 $\mu\text{m}$



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## Leakage Current



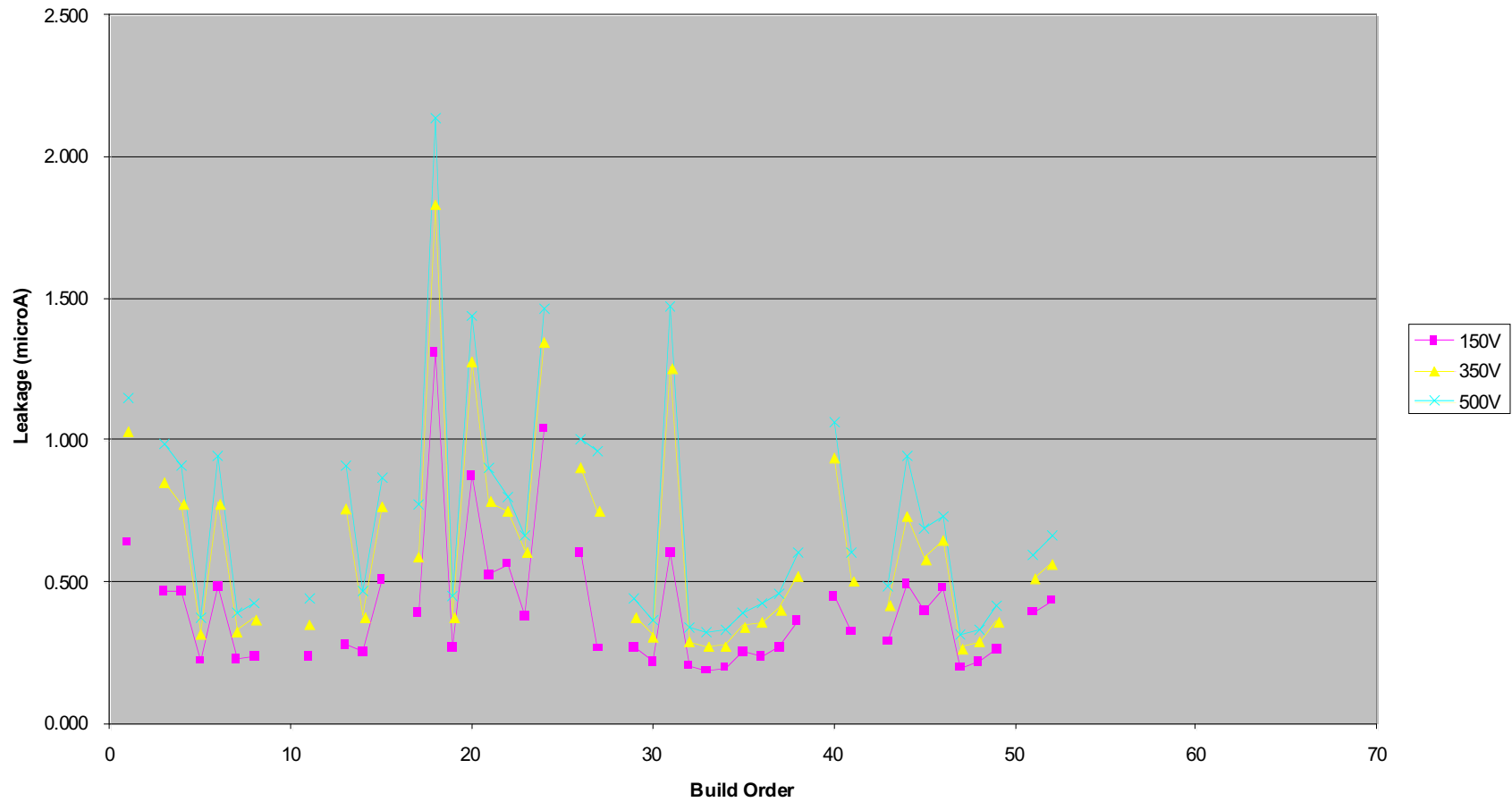


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## Leakage Current

Corrected IV in Build Order of 4 Wafer Assemblies



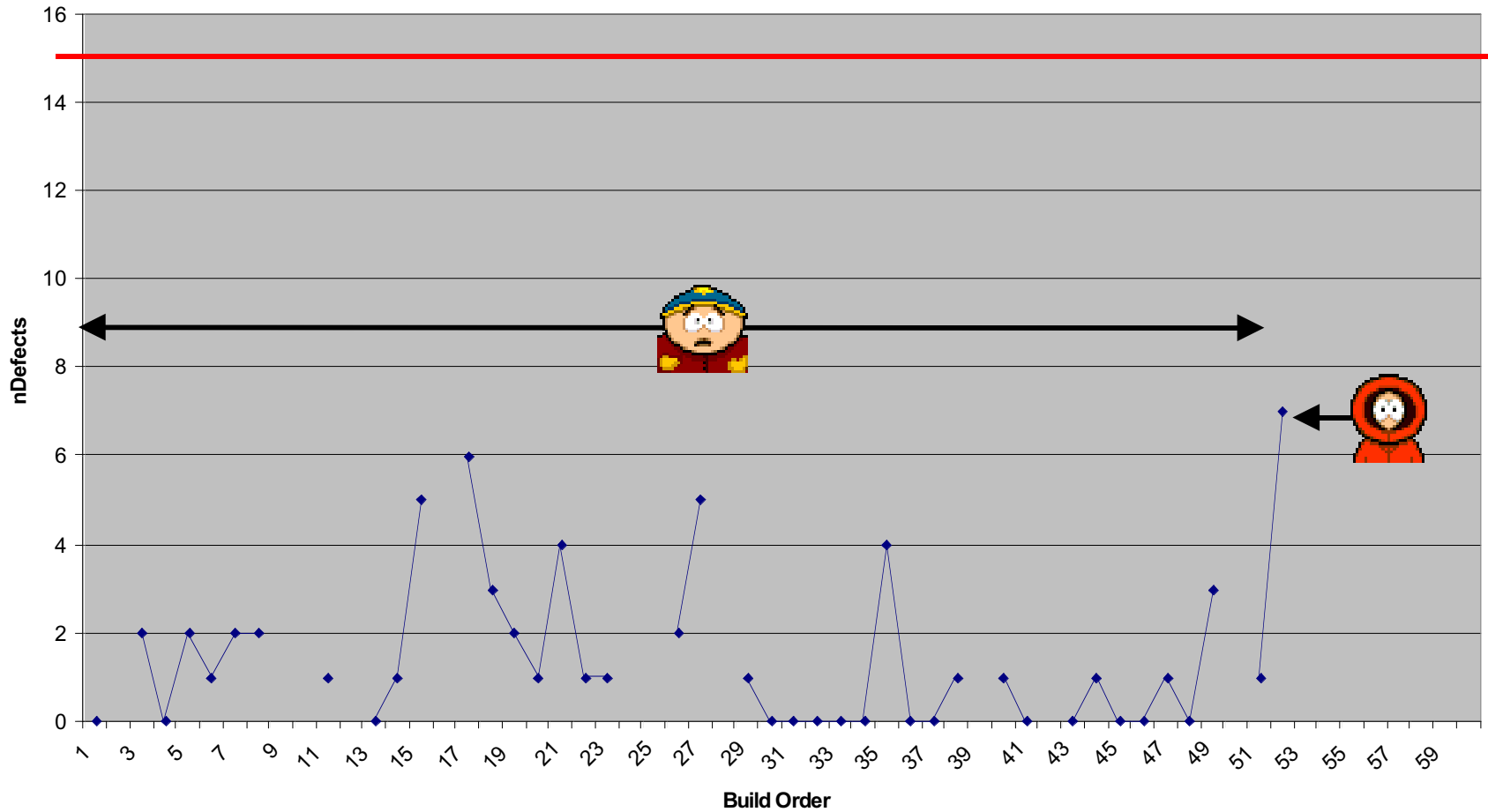


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## Defective Channels

Number of Defective Channels in Build Order of 4 Wafer Assemblies



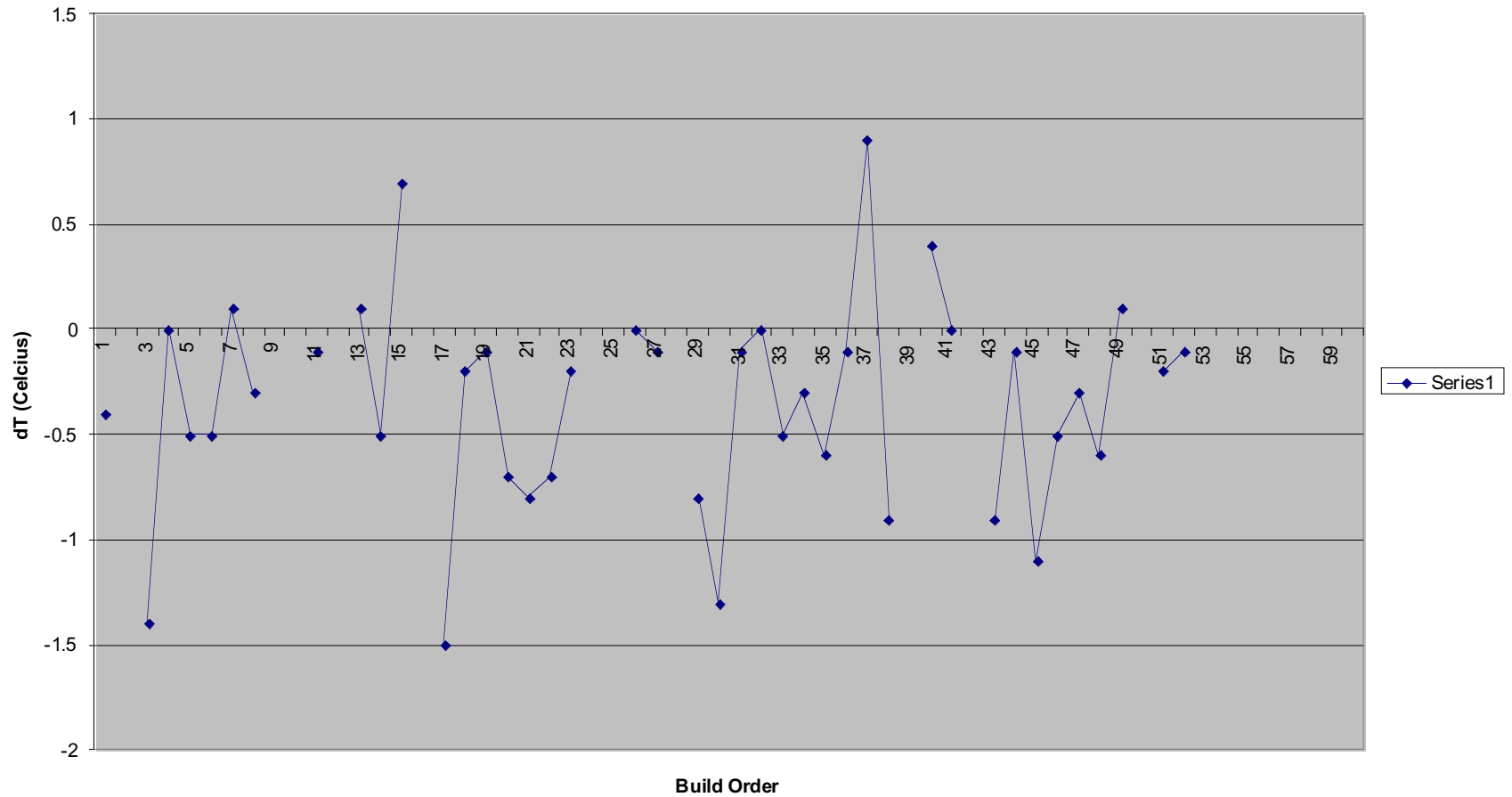


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## Temperature Difference (Top-Bottom)

dT in Build Order of 4 Wafer Assemblies





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### Plan for March

- It was difficult to commission the new jig sets in parallel with module production.
- Production stopped until all six jig sets are ready for use
- Production will resume this week.
- We require 4 jigs in daily use to meet our projected production rate.