



Progress on RD53A wafer probing

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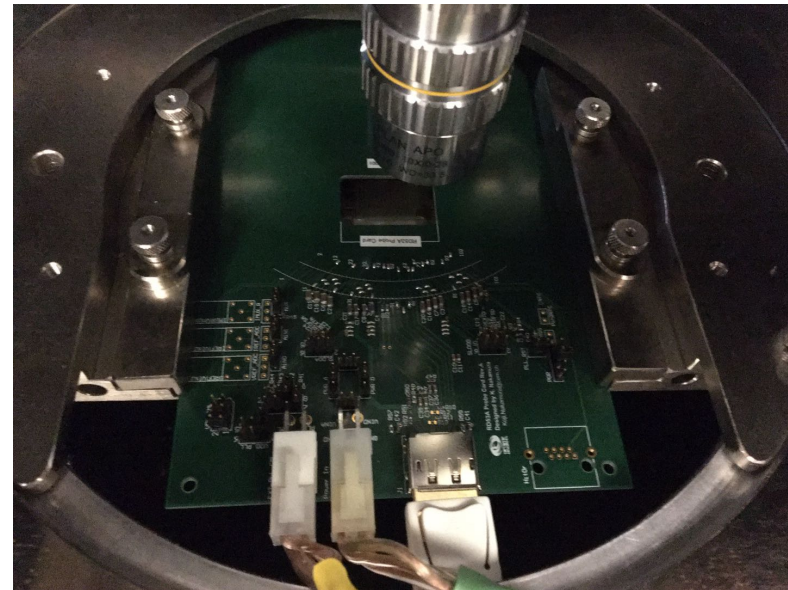
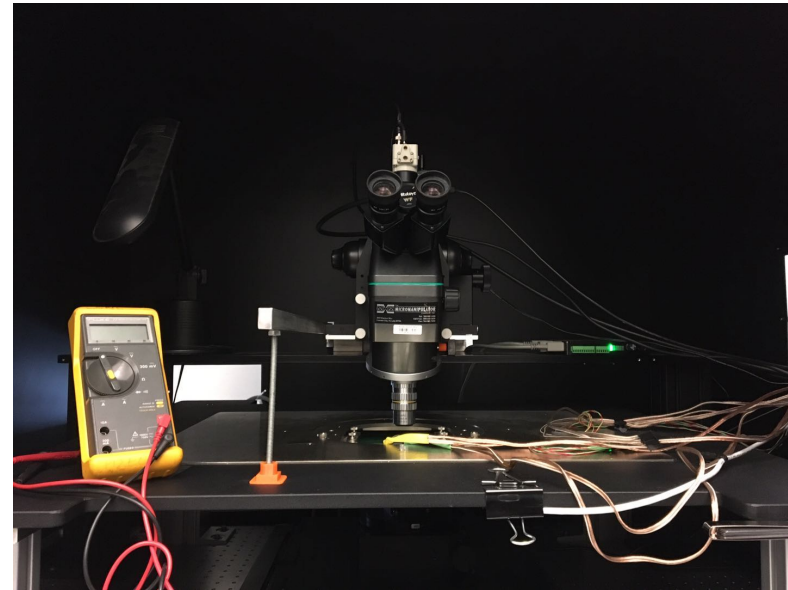
Many thanks to Aleksandra for the help!

Instrumentation Weekly Meeting

Mar 6, 2020

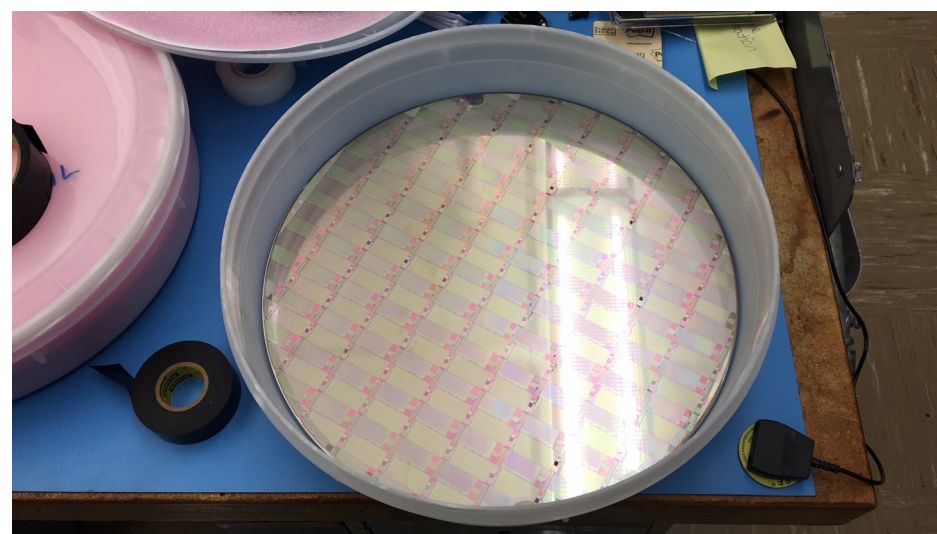
Introduction

- Probe station now working with **Koji's needle card**
 - Our needle card was not working due to shorted capacitor (fixed) and possibly other reasons
 - Did not investigate further for the sake of time (need to return Koji's card in time)
- This talk will summarize the procedure and the probing results obtained so far)



Align needle card

- **Use direction of X-Y station movement as baseline.** Use dummy wafer to provide auxiliary features (e.g. pads) for alignment
 - Align dummy wafer features to X-Y
 - Align needle card to dummy wafer features
 - Adjust tilting of needle card in Z direction
 - Touch down **lightly** on dummy wafer and check the uniformity of the marks
 - Adjust by inserting metal strips with fixed thickness
- * Above procedure needs to be repeated every time the needle card is moved. The outcome will be different each time
- After loading real wafer, it only needs to be aligned with the needle card



Real wafer probing procedure

- Use LDO powering
 - Auxiliary powering seems not helping improve stability from a quick test. Did not investigate in detail
- Automatic touch down based on current measurement working in most cases (except for 1 chip so far)
 - Touch down distance ~ 700 μm
 - Overdrive 100 μm
- Perform digital and analog scans with YARR on each chip
 - If not working, take mitigative actions (next slide)
 - If still not working, measure the voltages of VDDA, VDDD, POR and status and try to find the reason
- Move needle card up and move to the next chip

Mitigative actions

- Scrubbing: move needle up and down (no horizontal movements)
- Unplug then plug mini DP connector
- Power cycle
- Change SLDO analog trim (usually from 31)
- Touch down again
- * *Currently the probing is mainly done manually and the procedure is not very well defined & complete*
- * *Improvements (in particular towards automation) can be implemented in the future, although it could be non-trivial due to instability of the setup*

Probing results

| | | | | | | | | | |
|-----|------|------|------|------|------|------|------|------|------|
| | | | | 5-1 | 6-1 | | | | |
| | | | 4-2 | 5-2 | 6-2 | 7-2 | 8-2 | | |
| | 2-3 | 3-3 | 4-3 | 5-3 | 6-3 | 7-3 | 8-3 | 9-3 | |
| | 2-4 | 3-4 | 4-4 | 5-4 | 6-4 | 7-4 | 8-4 | 9-4 | |
| | 2-5 | 3-5 | 4-5 | 5-5 | 6-5 | 7-5 | 8-5 | 9-5 | 10-5 |
| 1-6 | 2-6 | 3-6 | 4-6 | 5-6 | 6-6 | 7-6 | 8-6 | 9-6 | 10-6 |
| 1-7 | 2-7 | 3-7 | 4-7 | 5-7 | 6-7 | 7-7 | 8-7 | 9-7 | 10-7 |
| 1-8 | 2-8 | 3-8 | 4-8 | 5-8 | 6-8 | 7-8 | 8-8 | 9-8 | 10-8 |
| | 2-9 | 3-9 | 4-9 | 5-9 | 6-9 | 7-9 | 8-9 | 9-9 | 10-9 |
| | 2-10 | 3-10 | 4-10 | 5-10 | 6-10 | 7-10 | 8-10 | 9-10 | |
| | | 3-11 | 4-11 | 5-11 | 6-11 | 7-11 | 8-11 | | |
| | | | 4-12 | 5-12 | 6-12 | 7-12 | | | |

| | |
|------------------------------|--|
| Unprobed | |
| Cleared for Testing | |
| Failed | |
| No Scan but Voltages Correct | |
| Problematic scan | |

- Full probing results summarized [here](#)
 - Analog and digital scans saved for each working (green) chip
- Many chips have good powering but the scan keeps failing (blue). Can check them one more time at the end if there is time

Next steps

- This morning during probing, noticed there is a piece of junk attached to the needle
 - Need to clean up the needles tips and also the wafer before continuing
- Aim for finishing probing next week