

Module Mechanics: Update on Dimensions and Half-Module Assembly

Karl-Heinz Ackermann, Christian Kiesling, *Martin Ritter*

7th International Workshop on DEPFET Detectors and Applications
Maz 9, 2011



Max-Planck-Institut für Physik
(Werner-Heisenberg-Institut)



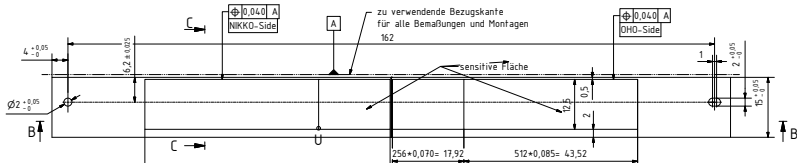
New Dimensions
Module Assembly
Electrical isolation
Conclusions

New Dimensions

- ▶ modified holes: moved 2 mm more to module center, increased radius to 2 mm and shortend elongated hole
- ▶ tolerances for laser cutting had to be increased to $50\text{ }\mu\text{m}$
- ▶ changed length of sensitive area to be multiple of $5\text{ }\mu\text{m}$

outer layer: $768 \times 80\text{ }\mu\text{m}$ or $256 \times 70\text{ }\mu\text{m}$, $512 \times 85\text{ }\mu\text{m} = 44.80\text{ mm}$

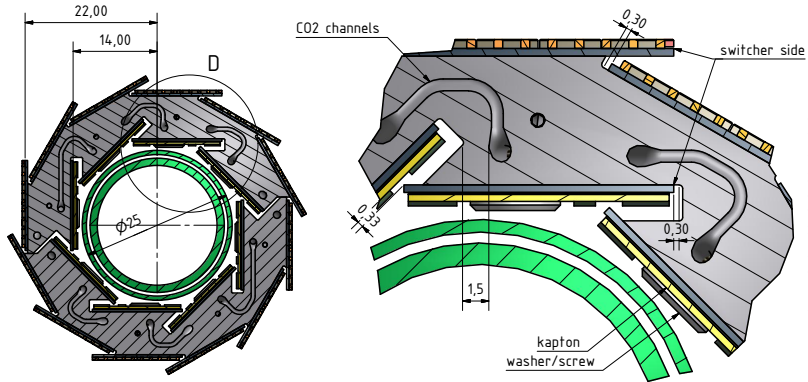
inner layer: $256 \times 55\text{ }\mu\text{m}$, $512 \times 60\text{ }\mu\text{m} = 61.44\text{ mm}$



Complete drawings can be found on indico and we will update the twiki as soon as possible

Module Width

Requests were made to increase the module width by $500\text{ }\mu\text{m}$ on the switcher side and $100\text{ }\mu\text{m}$ on the narrow balcony.

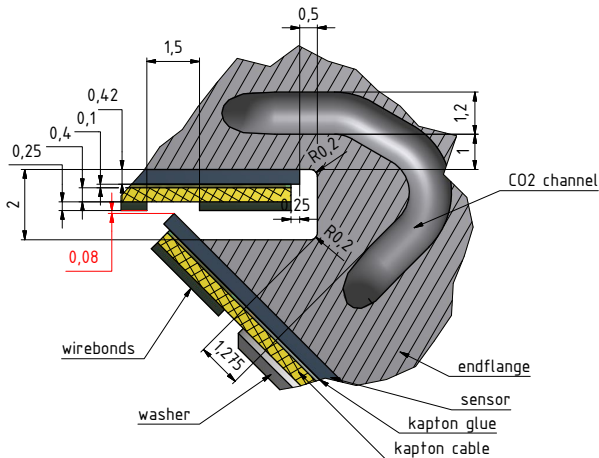


we agreed to $300\text{ }\mu\text{m}$ on switcher side and $100\text{ }\mu\text{m}$ on the other and will check if $500\text{ }\mu\text{m}$ on the switcher side is possible



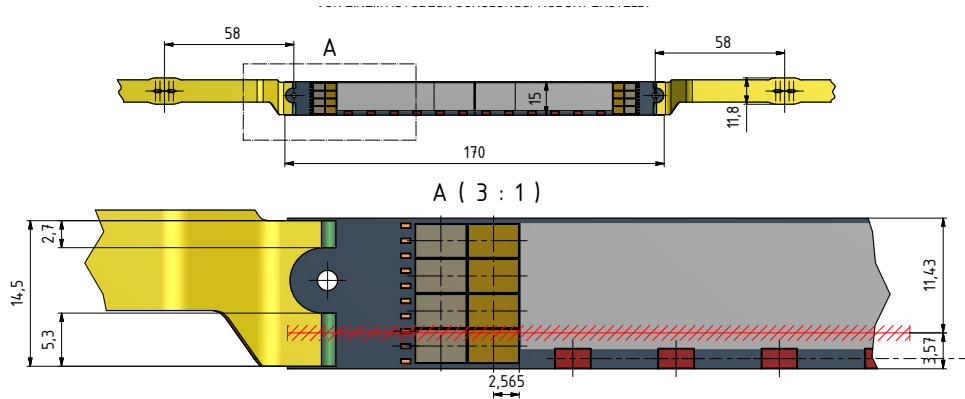
almost no tolerance left between modules

Wirebonds



- ▶ only $80\text{ }\mu\text{m}$ between module and wirebonds
- ▶ increasing the narrow balcony by $100\text{ }\mu\text{m}$, where will be $13\text{ }\mu\text{m}$

Top view of narrow area



Red line and shading shows area where the other module comes close

- ▶ in this area, wirebonds on the top layer are difficult
- ▶ depending on space left on the EoS, end of kapton could be adjusted.

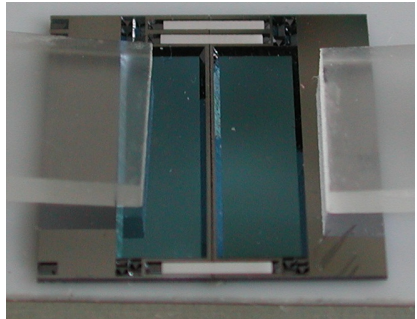
Module assembly

When glueing the modules, we aim at a precision of $20\text{ }\mu\text{m}$

- ▶ At the moment, modules are glued manually
- ▶ Achieved precision was between a few micrometers and $\sim 0.1\text{ mm}$
- ▶ We are certain that we can reach $20\text{ }\mu\text{m}$ with this method
- ▶ But will need a precise edge on the backside.

Modules touching

due to roughness of the cut, it may be possible that the two halves touch directly



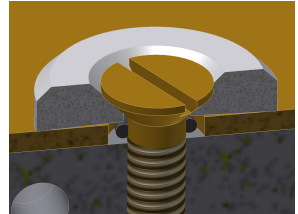
Once module layout is completely fixed we will continue to think about improving the module assembly

Electrical isolation

Sensors have to be isolated

- ▶ endflange will be covered in Parylen
- ▶ washer is made from plastic
- ▶ O-ring solution: a rubber ring will be added to the screw to prevent the screw from touching the sensor
- ▶ Parylen coating of screws also an option

➡ we will test Parylen coating and O-ring solution



Module vs. Module

Due to the very low distances between the modules we cannot guarantee that the modules will not touch

➡ force will be small, but electrically OK?



Conclusions

Module Dimensions


- ▶ Module dimensions still subject to change
- ▶ we will do our best to increase module width, but there is not much space left
- ▶ currently, the wirebonds are the biggest problem

Module Assembly

- ▶ we are confident about reaching a precision of $20\text{ }\mu\text{m}$ for module assembly
- ▶ modules may touch each other due to rough edges

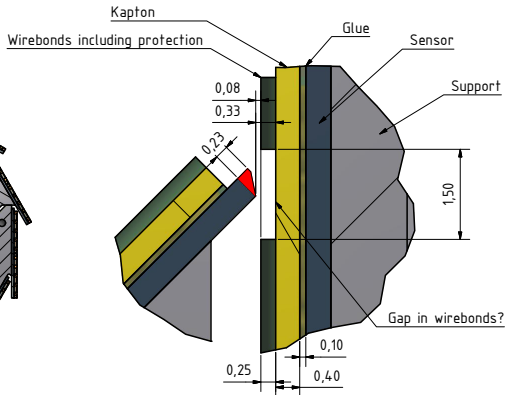
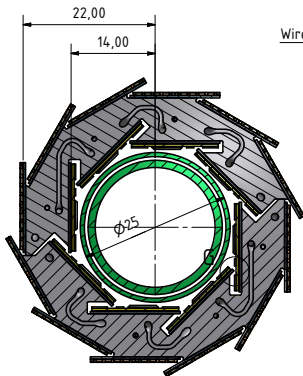
Electrical Isolation

- ▶ steps were taken to ensure electrical isolation between modules and mechanical support
- ▶ we will carry out tests to check Parylen coating
- ▶ due to tight space constraints we cannot exclude modules touching each other



Thank you
for your attention

Alternative module cutting



- ▶ now modules are cut in thick area
- ▶ if we add another thin area on the narrow balcony side and cut in the thin region, the edge of the sensor would have an angle
- ▶ theoretical up to $230\ \mu\text{m}$ wider modules without changing the clearance

Overlap

