ÖAW AUSTRIAN ACADEMY OF SCIENCES

HEPHY INSTITUTE OF HIGH ENERGY PHYSICS

RD50 HV-CMOS Meeting

Lab Measurements

Irradiated samples

(preliminary)

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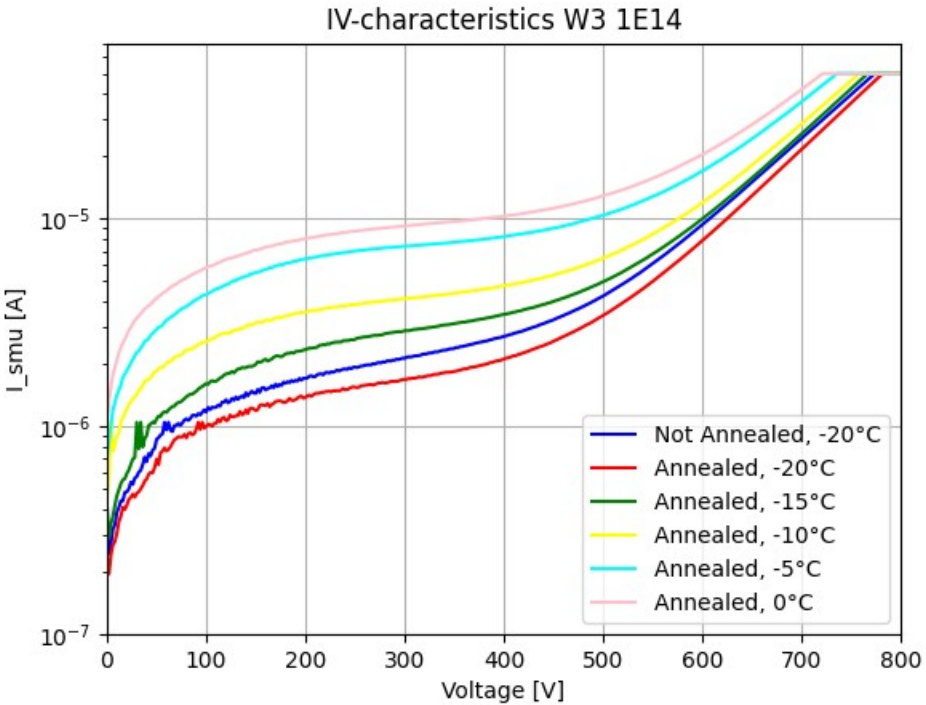
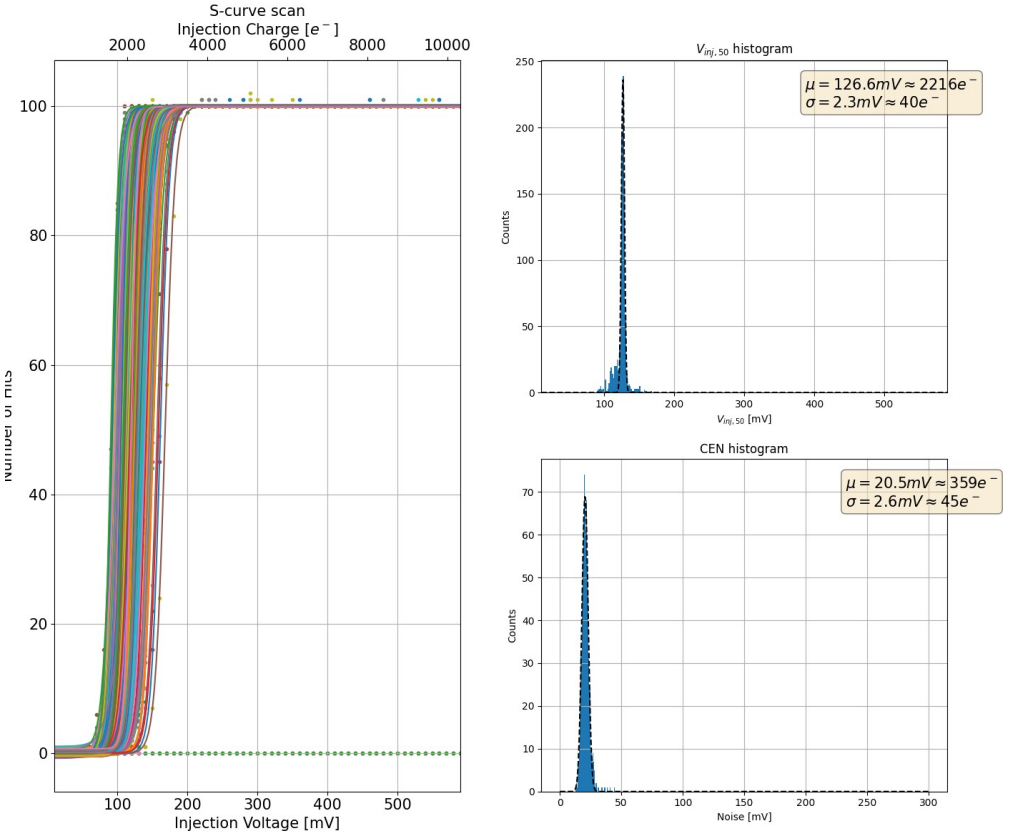
Setup

- Bonded to chipboards:
  - W3 1E14
  - W3 1E15
  - ~~W3 1E16~~
  - W3 3E16
- Annealed at 60°C for 80min
- IV-curves
  - Biased by Keithley 2410
  - Stepsize = 2V
  - Compliance set to 50µA
  - Chip on PCB measured (no needles, full matrix, no test structures)
- S-curves
  - Peary's *scurve* method

W3 1E14

T = -20°C

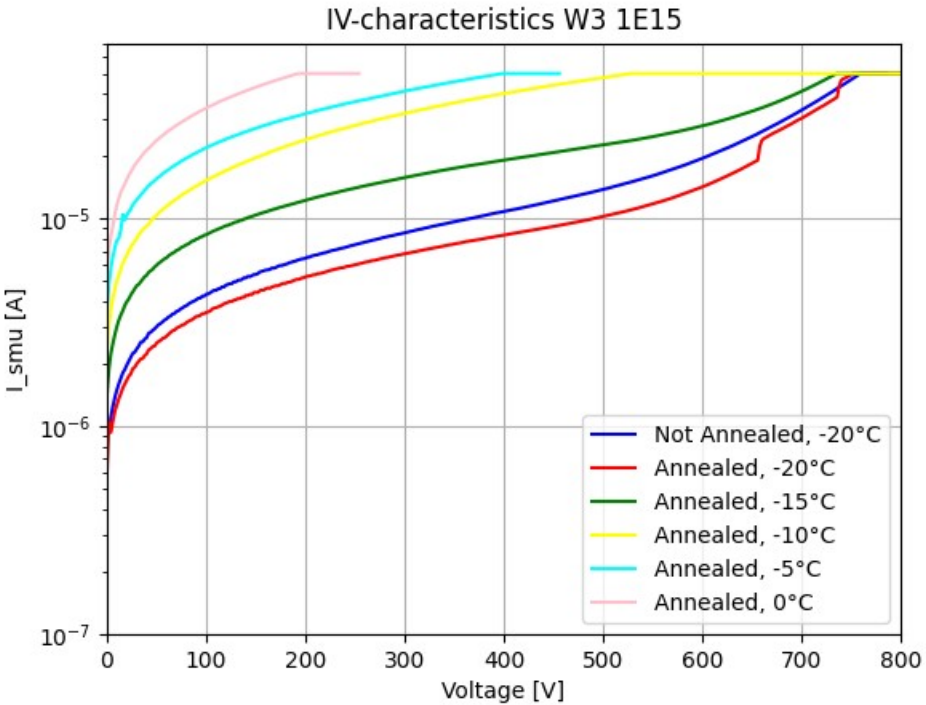


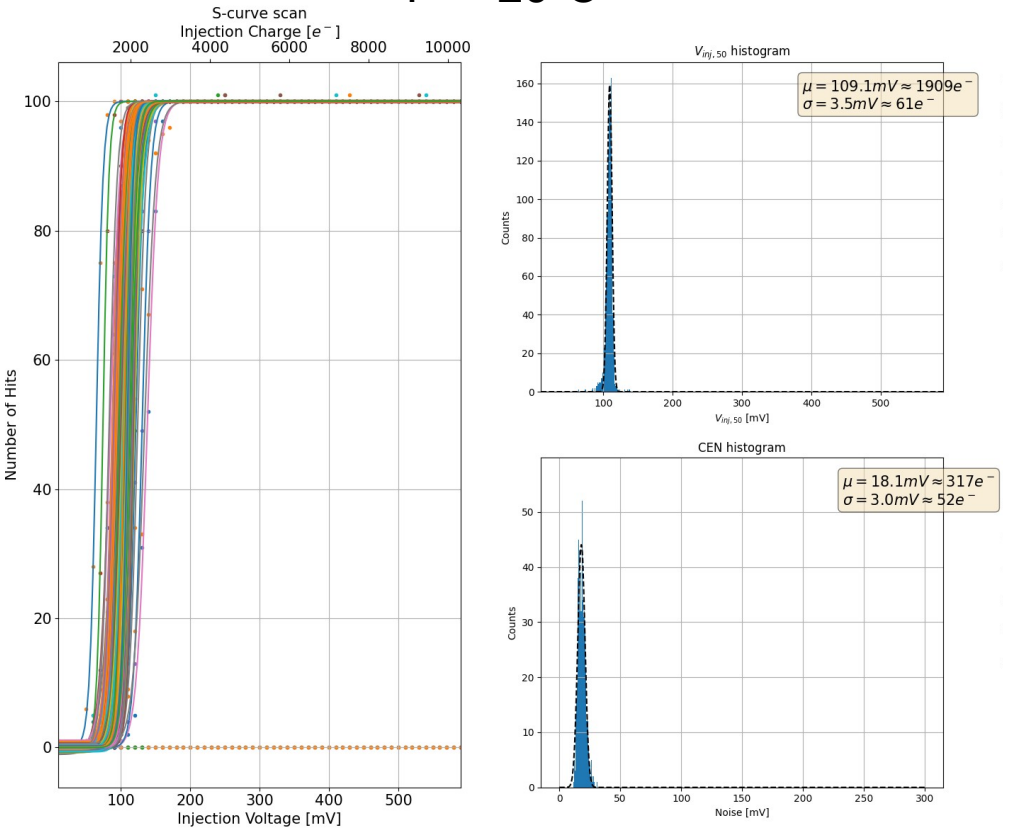


V_{Thr} = 1.0V

W3 1E15

T = -20°C





V_{Thr} = 0.93V

W3 1E16

- Not responding to I2C
- No clock output
- DEAD :(

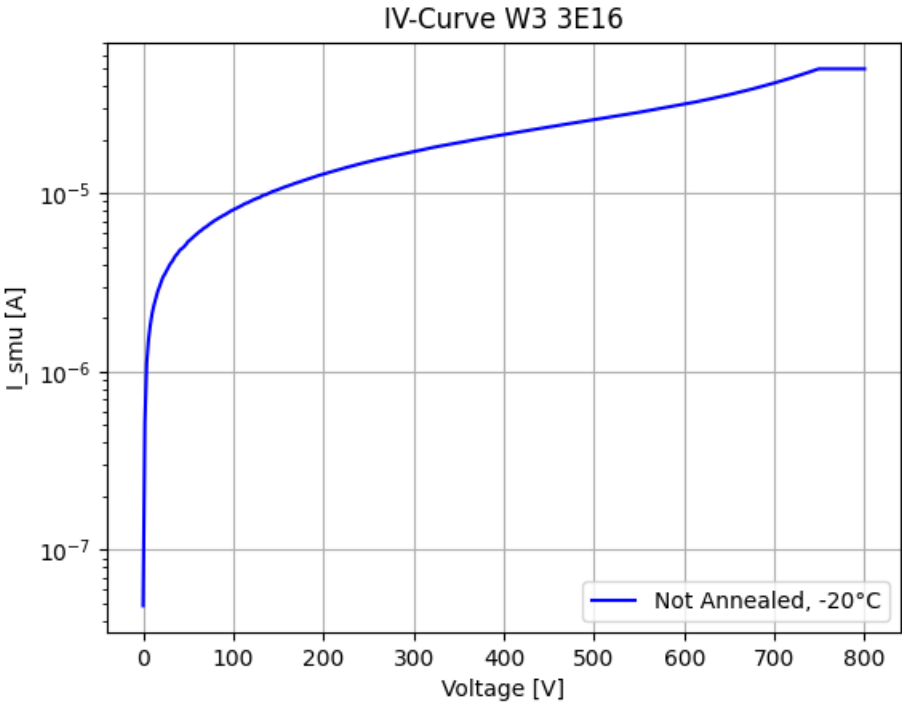
- Ripped of again and replaced with W3 3E16
  - No second W3 1E16 available at HEPHY
  - Not only fluence could be the problem

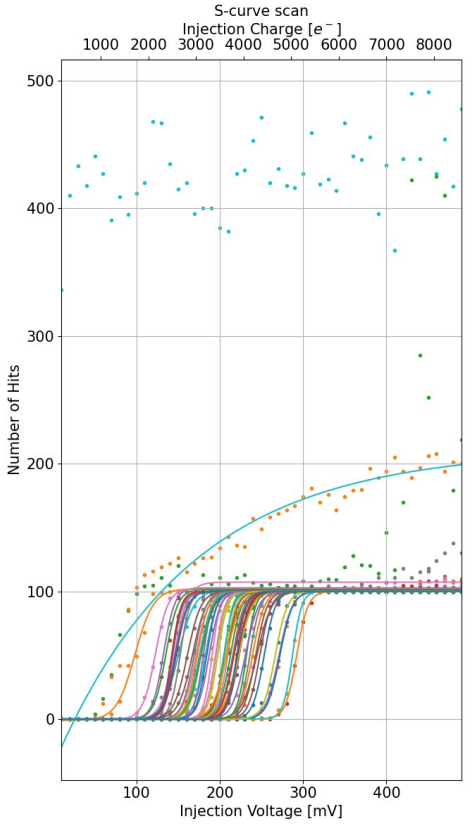
W3 3E16

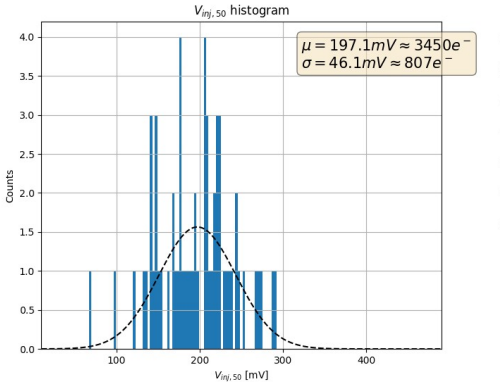
- Responding to I2C
- ALIVE :)
- Measurements in progress

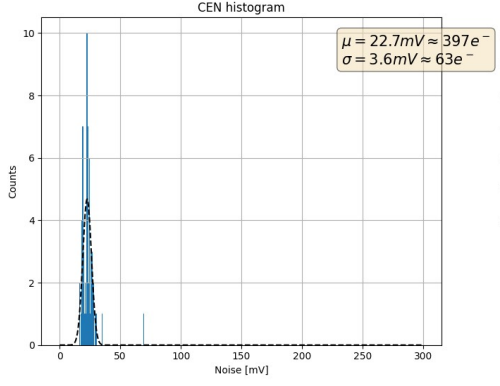
W3 3E16 Teaser

T = -20°C; not annealed









V_{Thr} = 0.92V

Conclusion

- HEPHY will bring 3 irradiated samples on PCBs to DESY
  - 1E14
  - 1E15
  - 3E16
- All samples can be properly biased
  - Leakage current increased at higher fluences, still manageable (at least when cooled) though
- All sensors show only slightly increased noise and can be operated at sufficiently (comparing to values used at last beam test) low threshold
- I am optimistic to achieve nice results at DESY