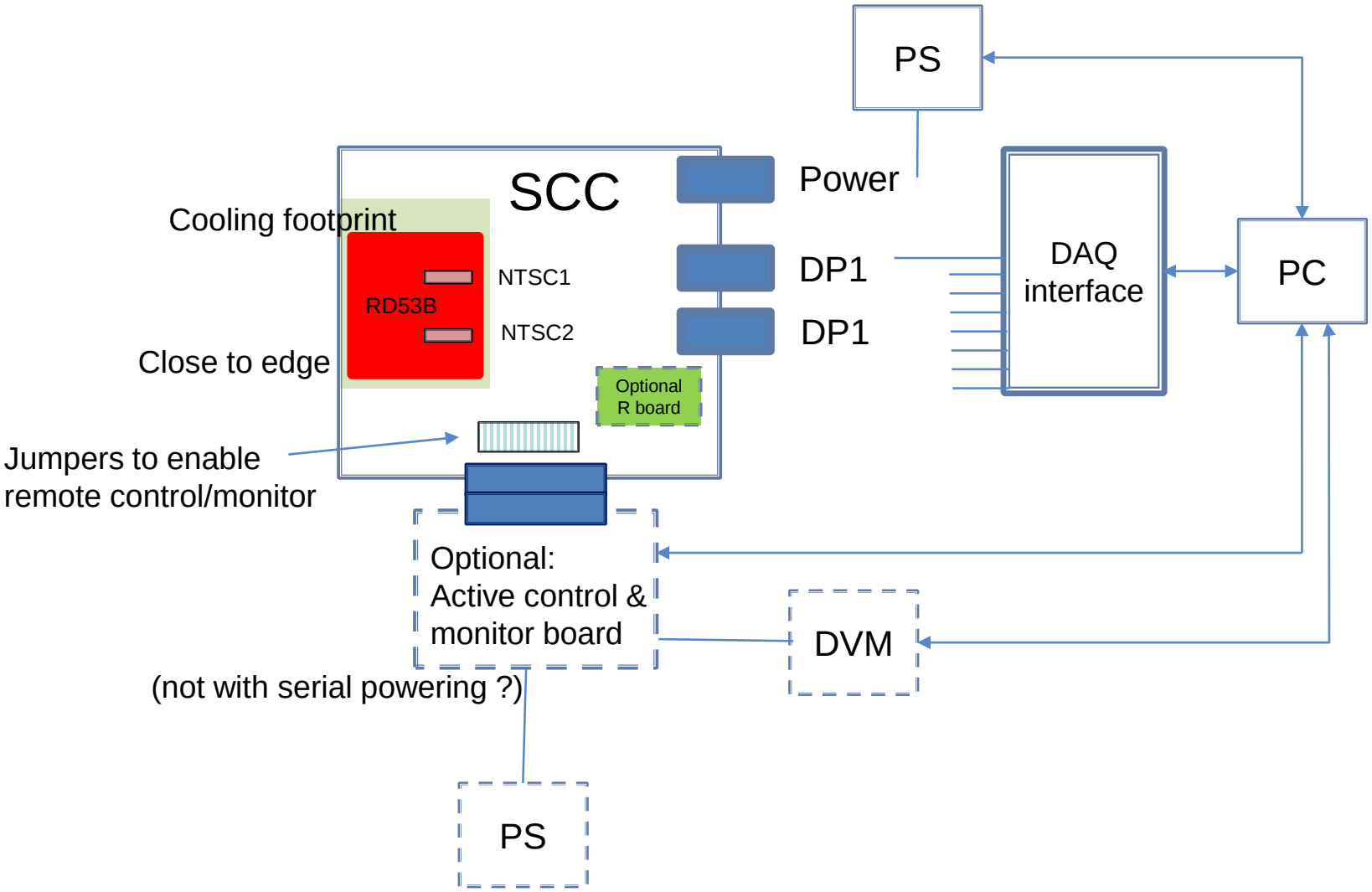
RD53B single chip card requests

- RD53A SCC was very good and extremely useful.
- Some changes/improvements can be suggested for multiple reasons
  - Specialist and non specialist use
    - Simple default card configuration
    - Means for specialists to try out “exotic” and emergency options
  - Chip functional testing
  - Radiation tests
  - Serial powering testing
  - Chip tests with sensor (by chip community)
  - Sensor testing (by sensor community)
  - Debugging of wafer probing routines (without probe card)
  - Many new features in RD53B

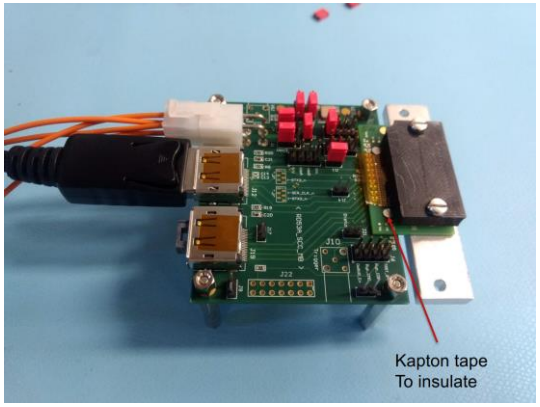
- Compatible to both ATLAS and CMS RD53B chips (Same pad frame, different chip size)
- Compatible with current test/DAQ systems (BDAQ53, Yarr, CMS tracker DAQ, ATLAS DAQ ?.)
- Keep:
  - Display port connections, Power connection
  - Cooling foot print with no components below chip and thermal vias. (where to put NTSC ?)
  - Powering options with simple jumpers
  - Short inductance between chip and decoupling caps
    - Possible to replace/decrease decoupling caps for tests of required caps (without destroying wire-bonds)
  - NTSC temp sensor (with factory calibration +/- 1^{o}C)
    - Pt100 alternative as intrinsically calibrated
  - Test points for manual measuring with multi-meter, oscilloscope, etc.
    - Use of Samtec high speed probe connectors for control and serial links ?
  - Default external resistors, etc. for basic/easy use.
  - Simple passive card (no radiation issues)
- Minor changes/additions:
  - DIP switch for ID
  - Easy exchange of external resistors values: Iref, Voff, Reff1, Reff2, etc (small plug on card)
  - Test point to measure voltage on external Reff to verify current mirror ratio (issue in RD53A)
  - 2nd NTSC for chip NTSC input
  - Chip at edge of board (no top pad frame) as useful for double chip irradiation (low dose rate)
  - Support for DFT TBD (so can be debugged without probe card)
- Emergency options (e.g. PLL bypass, etc)
- Minimize activatable material (see CMS irradiation card)
- Additional expert flexibility with optional control/monitor plug-in card: Defined signals on connector
  - Remote control between power modes (as for wafer probe card)
  - Remote monitoring of important references, voltages, currents (as for wafer probe card)
  - Use jumpers to define if signals controlled/monitored by external control/monitor card

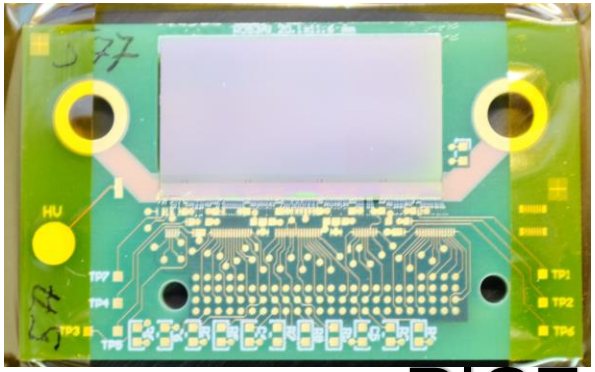
RD53B dream SCC ?

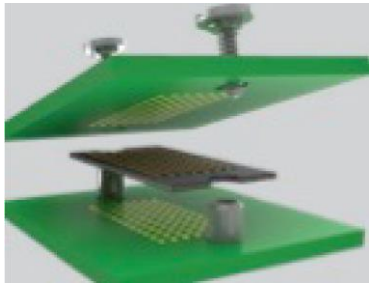


Sensor assembly irradiation card

- Minimalistic irradiation card for sensor irradiation campaigns
  - Not powered during irradiation
  - Minimal mass/activation
  - Small
  - Plugs into adaptor card having same interfaces as SCC.
    - Test chip/sensor before and after irradiation.
    - Active use in test beams (before and after irradiation)
    - Use of Samtec interposer connector
      (small, high pin count, high frequency, no physical connector on irradiation card)
  - Extensively used in CMS for sensor assembly irradiations and tests
  - Designed by Rice university
  - Adapter card made as modified version of SCC.
- Common/shared development ?
  - Shared design files







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