

Radiation monitor

The main part of the on-line radiation monitor is the Radiation Monitor Sensor Board (RMSB). On this board radiation sensors and a temperature sensor (NTC) will be mounted. On the photo below one can see a prototype of the Inner Detector RMSB. The outer dimension of the housing box for the ID is $40 \times 40 \times 8 \text{ mm}^3$.

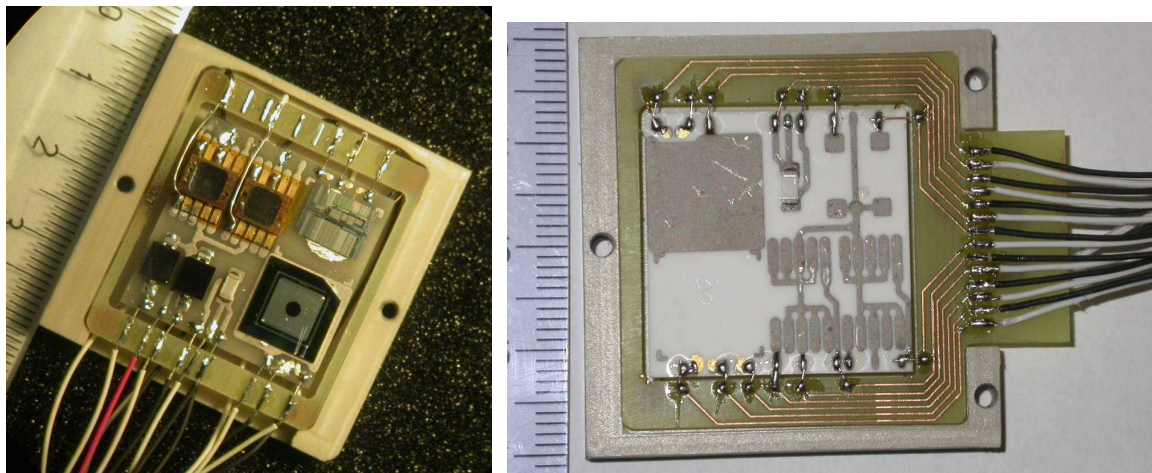


Fig 1 Left: populated hybrid connected to a PCB frame in the bottom part of PEEK housing. Right: Al203 hybrid in new PCB frame and PEEK box.

For locations outside of the ID we plan to use similar hybrids populated with only 3 components: a pin diode for NIEL measurements, a radfet for TID measurements and a temperature sensor. A RMSB will therefore be connected with 4 wires: one for each sensor plus return wire.

To get the estimate of the dose, constant current (1 mA) in forward direction is enforced through the pin diode and voltage across the diode is measured. In the case of radfet, gate voltage at constant drain current ($\sim 100 \mu\text{A}$) is measured. Current source will be ELMB-DAC and voltages (and temperature) will be measured by ADCs on ELMB.

ELMB-DAC board (shown in the Fig 2. below) has 16 channels, therefore 8 RMSBs (in case of 2 sensors per RMSB) can be connected to one DAC board. Each RMSB needs 3 ELMB ADC channels (2 for sensors and 1 for temperature).

ELMB-DAC is connected to ELMB with the 20 pin J8 connector on the ELMB motherboard. The power for the DAC boards will be taken from the power supplies of ELMB boards (and will not be powered *by the* ELMB) in order to get higher voltages at the DAC output.

Another PCB (patch panel), of about the same dimensions as the DAC board, will be made. To this PCB RMSBs, DAC and ELMB will be connected. This PCB could also host the circuits for temperature measurements and differential attenuators needed to increase the input voltage ranges of ADC. But these circuits can also be plugged into back side of the ELMB motherboard. On Fig 3. a scheme of the connections is shown. DAC and patch panel board should be placed close to the ELMB board whereas cables between RMSBs and patch panel can be long (13 m tested, but also longer should be OK).

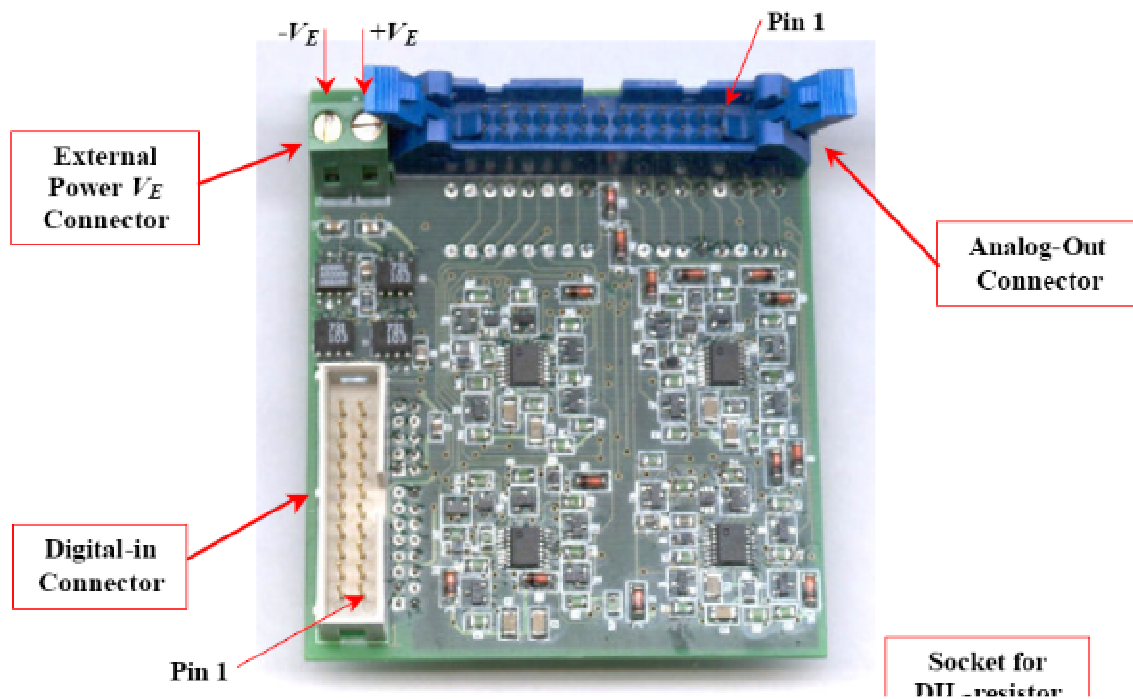


Fig 2. Photo of the ELMB-DAC board. Dimensions of the board are $65 \times 72 \text{ mm}^2$.

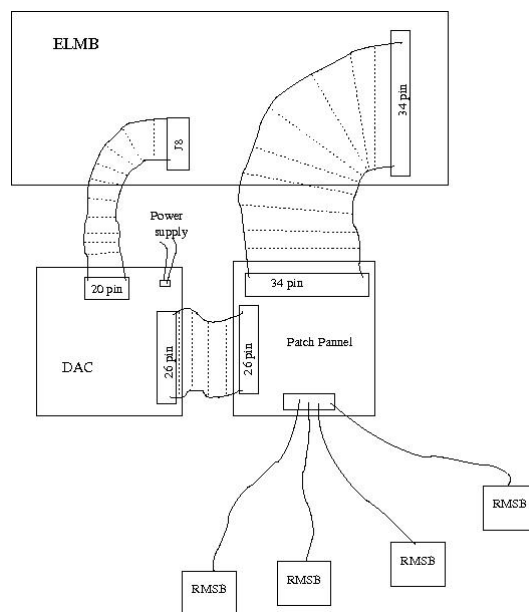


Fig 3. Scheme of connections of 4 RMSBs to ELMB and ELMB-DAC. Cables between RMSB and patch panel can be long ($\sim 15 \text{ m}$).