Patch Panels

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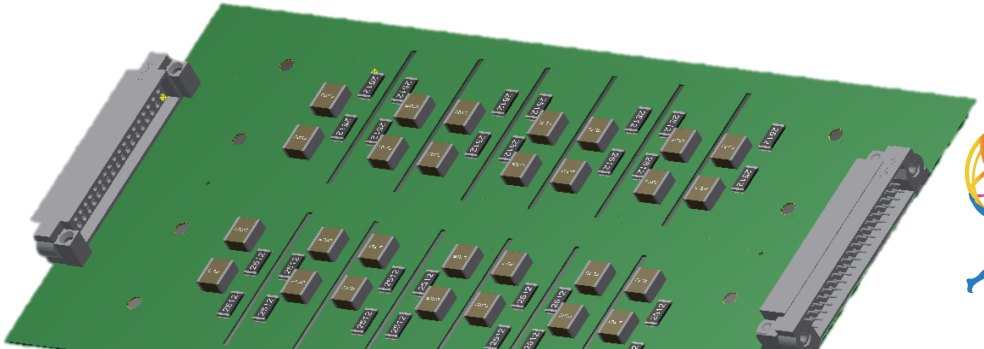
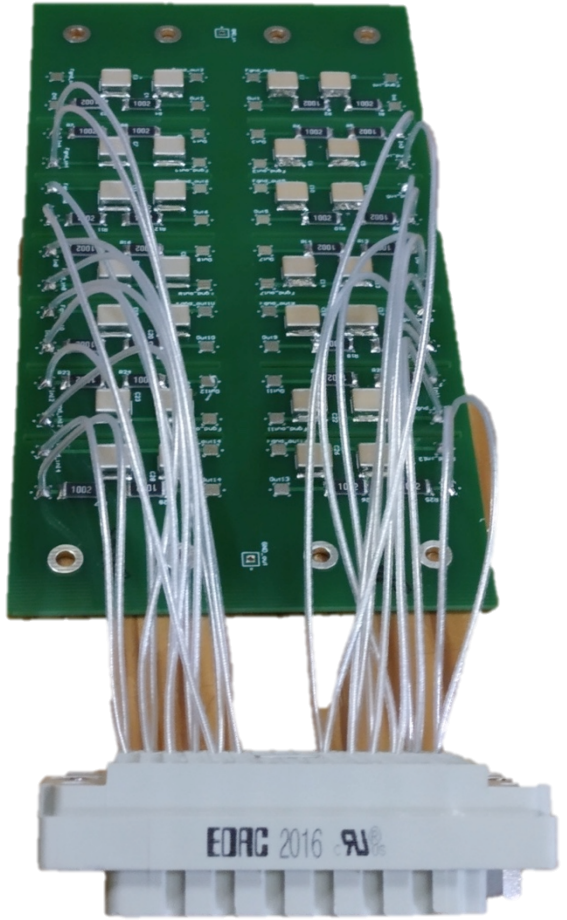


Status

Not much change since July
- Holiday period and other activities

Tests done so far show necessary performance
- Would like to better understand high-frequency response (see below)

Now working on:
- Budget – assess assembly time and final cost
- Optimizing design to improve cost and robustness
- Collating information for SPR

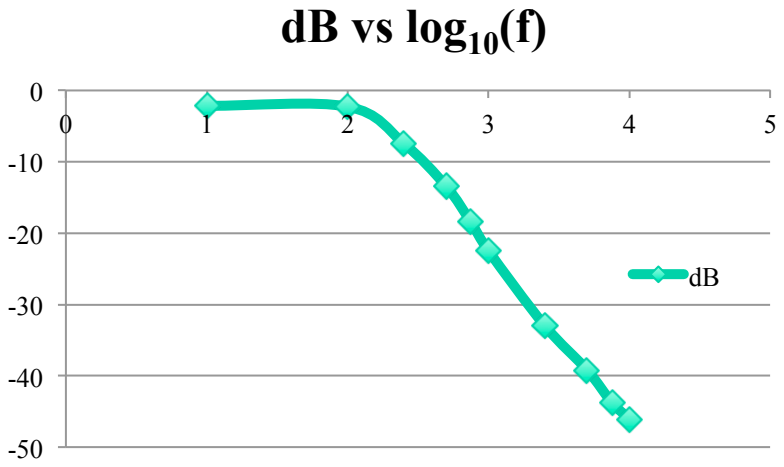


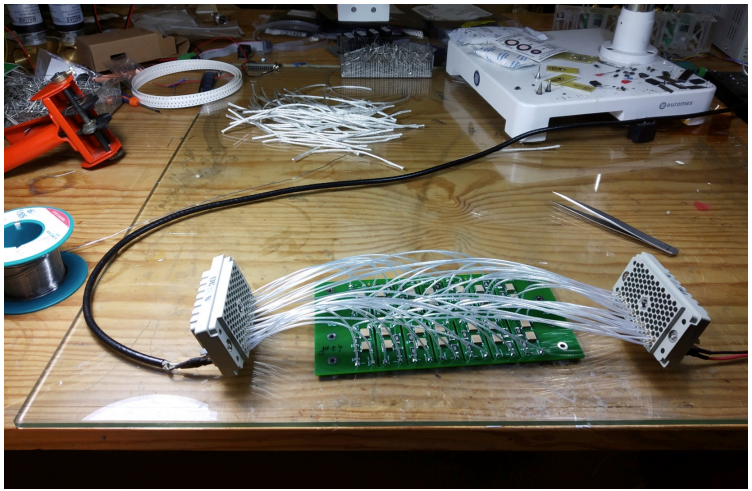
Prototype tests

RC–RC filter: 10 kΩ x 33 nF or 47 nF
- Note R and C not final – must be defined together with sensors and tested together

Assuming 3 mA maximum current means:
- 60 V voltage drop
- 180 mW max. dissipation per channel
- I.e. 5 W / 24-channel box

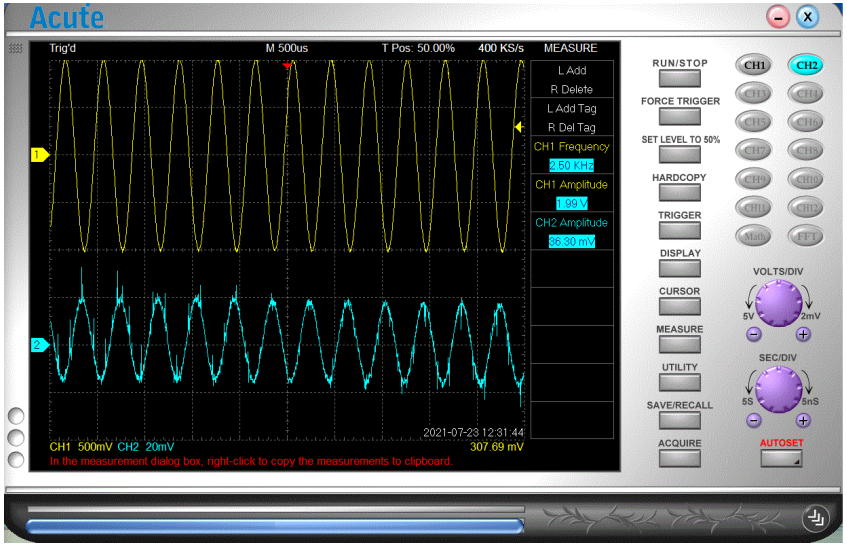
Ideal response:
- f_c = 338 Hz (33 nF) or 482 Hz (47 nF)
- -40 dB / decade
- Not quite what we see, but not far
- Later tried same test inside metal box

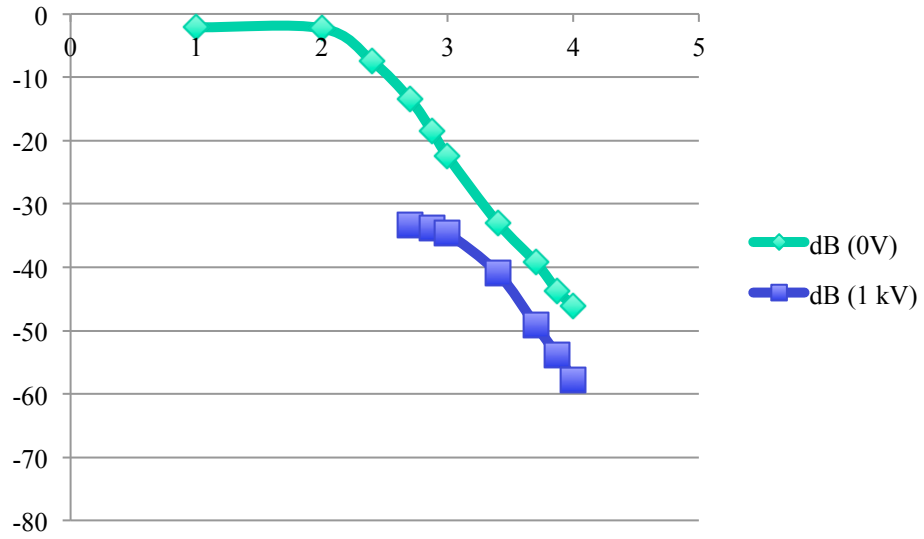




More tests

- Measurements both with direct coupling (no High Voltage) and under HV bias from 0 V to 1000 V - injected signal through decoupling capacitor



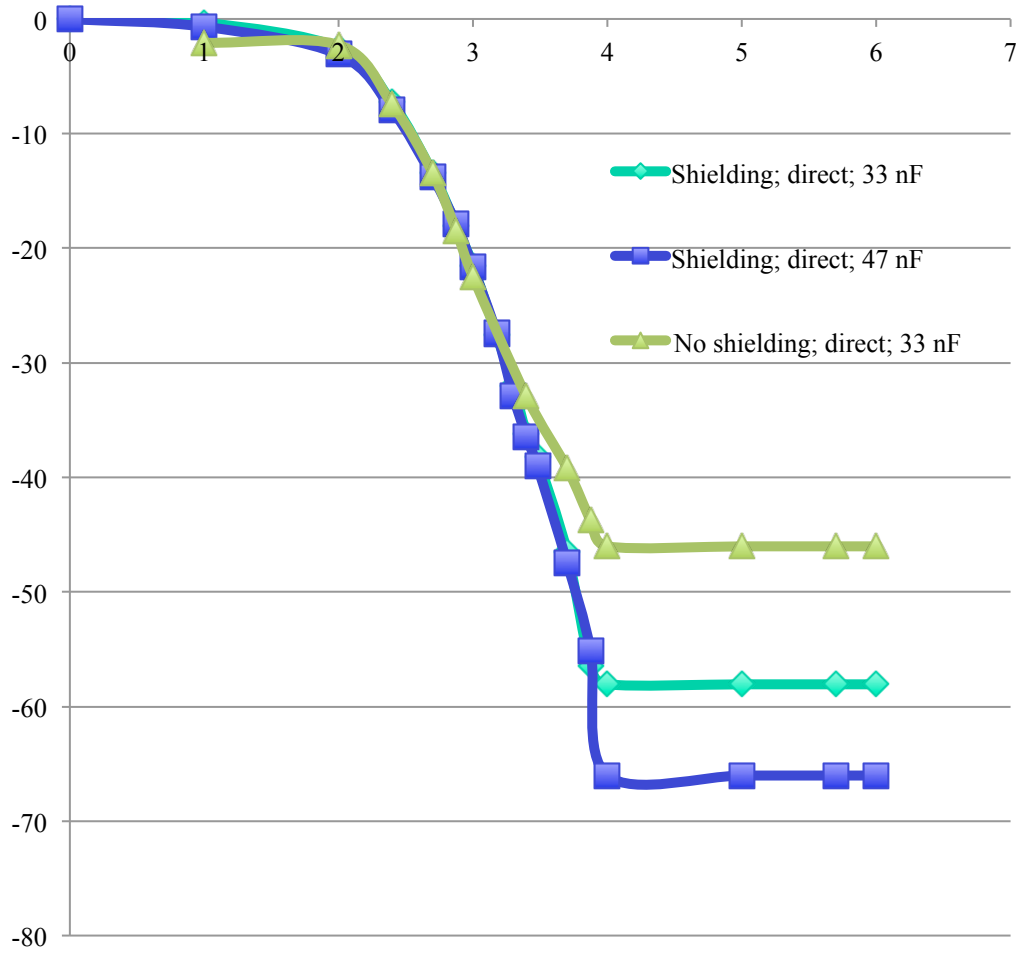


Current questions

Response improves with shielding (Faraday cage)
- Closer to -40 dB / decade

Response flat above 10 kHz
- Can investigate further
- Or is this good enough?

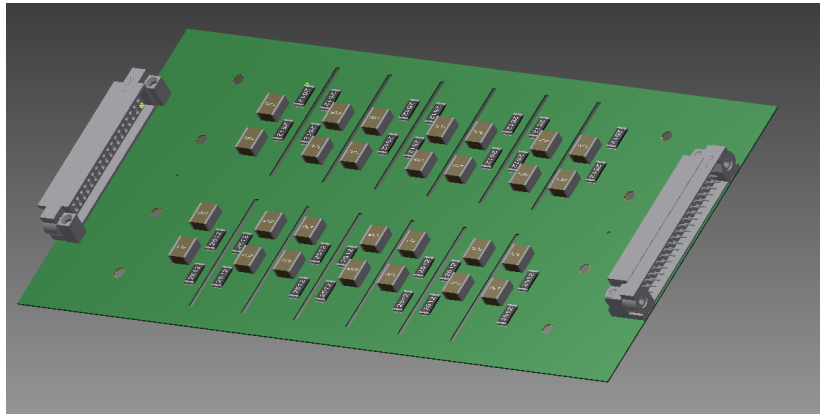
Still to check:
- Leak current under HV bias – waiting for precision HV module to be free, to ease measurement
- Final tests must be done with HGTD HV source prototype

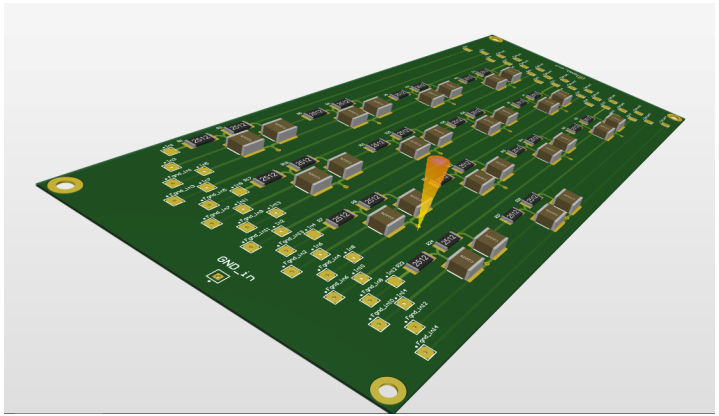


Optimising design

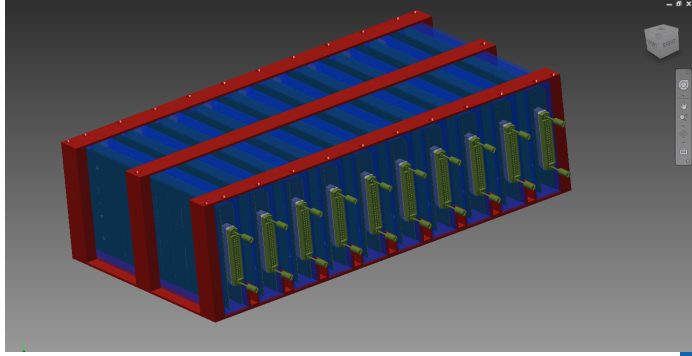
Also trying an alternative design to:

- Ease assembly: reduces production time and manufacture errors
- Improve robustness: assess robustness of routing cables / soldering
- Lower cost:
  - Especially by reducing length of cable for HV routing
  - Trying routing in 4-layer PCB





Conclusions... so far



Initial prototype was very useful to gain confidence in design and performance

- Some work still to be done, but seems in track
- Now aim to improve plans with a view on production

Must define:

- Final R and C values – together with sensor development
- Final connectors – together with infrastructure
- Would be very usefil to test together with prototype HV source

Prepare for SPR in October

Thanks!

REPÚBLICA PORTUGUESA

FCT Fundação para a Ciência e a Tecnologia

LIP

Backup

Connectors

Found potentially interesting connectors from Farnell:

http://www.farnell.com/datasheets/2916873.pdf

REF:516-120-000-101 REF: 516-056-000-301 REF: 516-120-000-402 REF: 516-056-000-402 REF: 516-230-512 REF:516 230-556

Unit price (120 pins, small quant.): 53 € plug; 45 € pins; 26 € connector

To be used for this prototype and replaced later

EDAC

516 SERIES

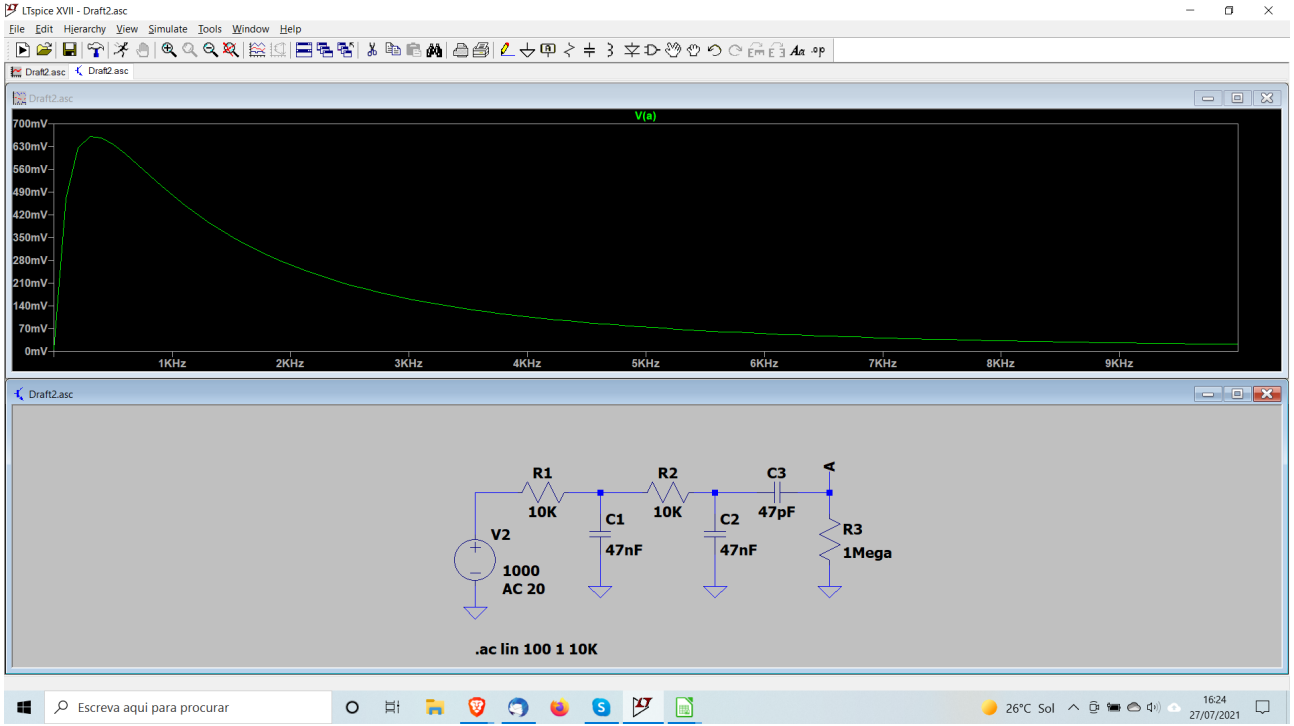
RACK AND PANEL CONNECTOR (PLUG AND RECEPTACLE)

Specifications:

Insulator Material	Diallyl Phthalate, Thermoplastic Polyester or Polycarbonate UL 94V- 0
Color	Green or Grey
Contact Material	Copper Alloy
Contact Plating	Gold Plating over Nickel over entire contact
Current Rating	8.5 Amperes
Contact Resistance	10 milliohms maximum
Withstanding Voltage	2000 VAC rms at sea level
Insulation Resistance	5000 Megaohms minimum
Operating Temp	-40°C to +125°C (Diallyl Phthalate Only)
Operating Temp	-40°C to +105°C
Insertion & Withdrawal Force	2 to 16 Oz (0.56 to 4.45N) per contact position

Measurements

Difficult to measure low-frequency behaviour with our current setup due to output capacitor in waveform generator



Status of development

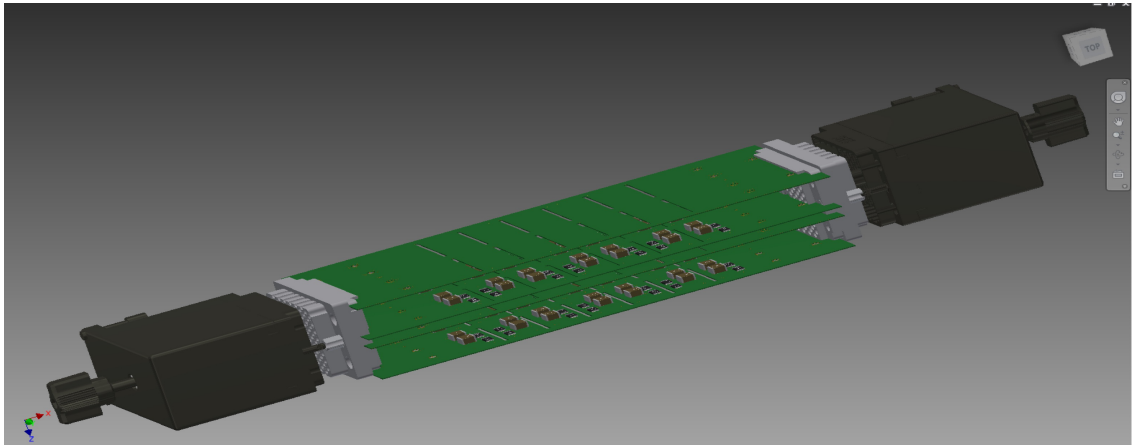
Preparing to build initial “Prototype 0”

Will produce 2 equipped boards for basic tests of insulation, mechanics, grounding, noise before end July

I.e. 2 × 14 RC-RC filters mounted 1/RC = 450 Hz

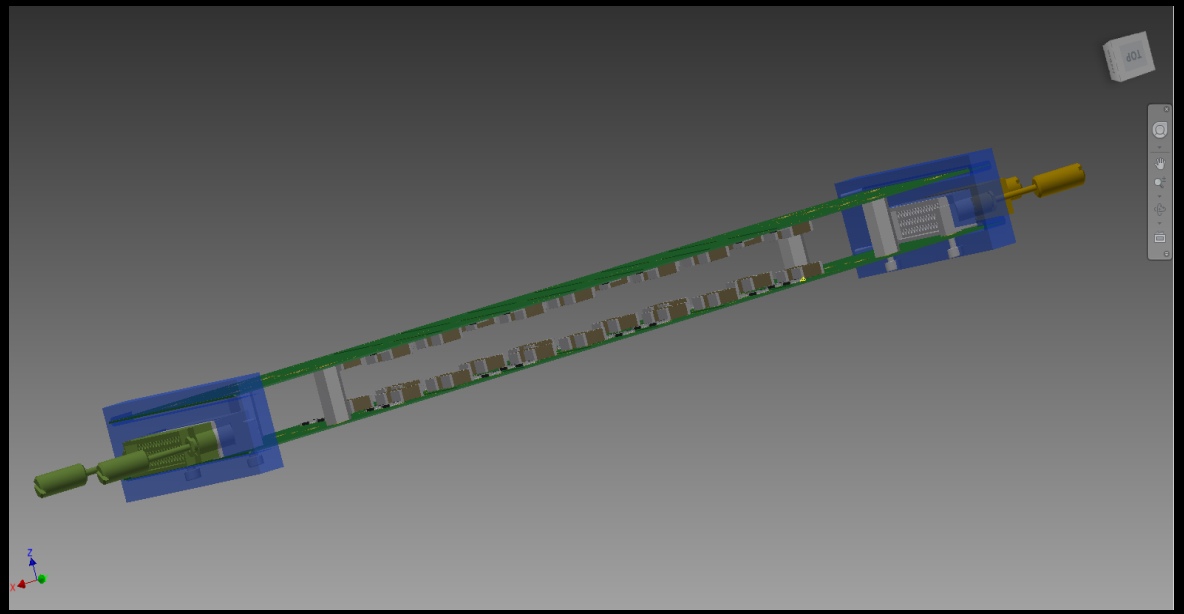
Initial guess (to be corrected): R = 100 kΩ; C = 22 nF

To be replaced with final values later



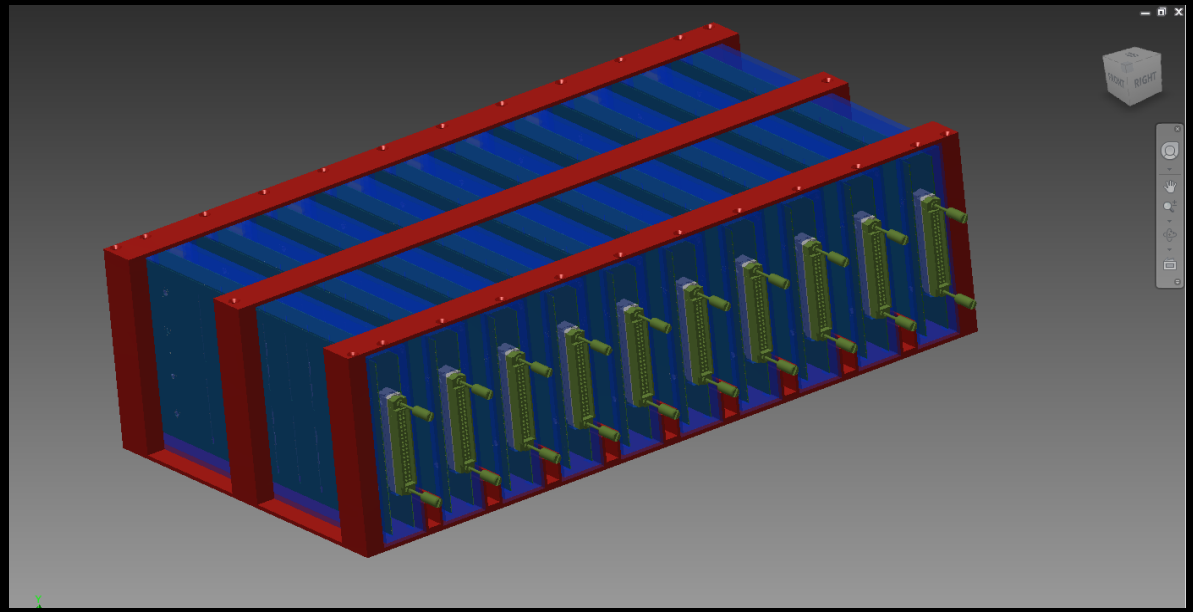
Filter module

Initial idea: two PCBs per module with filters



Modular box

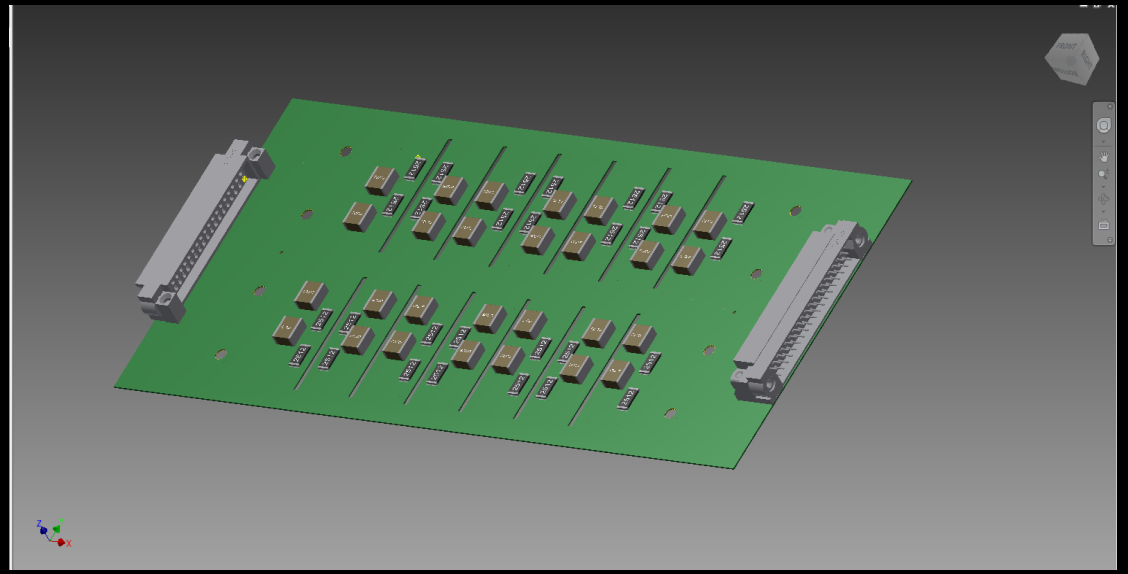
Dimensions: 360 x 195 x 104 mm^3 Weight: 7.5 kg (final around 10 kg)



56 wires in (28 pairs)
For insulation: male pins on USA15 side; female plugs on sensor side

PCB with filters

14 RC-RC filters per PCB – 28 per module / Wire routing from connector to filter



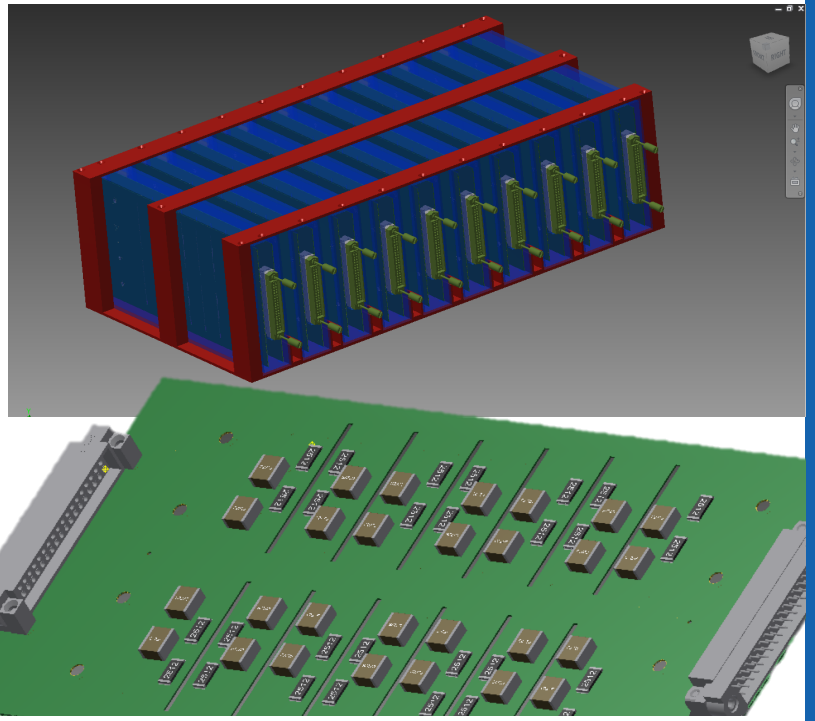
Patching options:
56 wires in (28 pairs) – 56 wires out (28 pairs)
48 wires in (24 pairs) – 56 wires out (28 pairs)

HGTD Involvement

Producing HV patch panels with CERN group:

- 16 patch panel boxes located around the calorimeter perimeter
- Routing of High Voltage to HGTD detector and filtering AC noise out
- Presented in Electronics meetings
- Team: 1 academic, 2 engineers





Looking for new projects to get involved with in HGTD