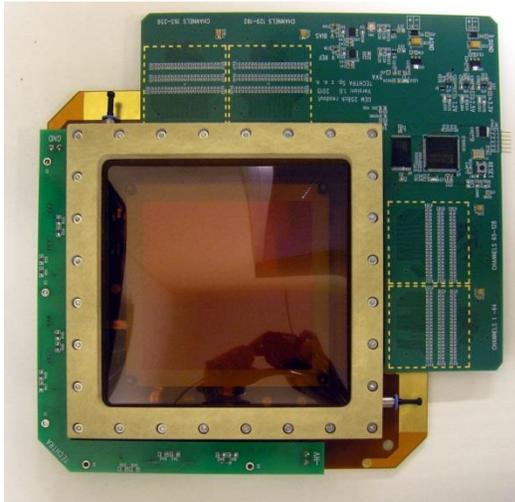


GEM-based ionizing radiation detector and readout electronics



Features

- Detector active area: 100 x 100 mm²
- Readout Board: X-Y strips
- Resolution 128 x 128 or 256 x 256 strips
- Based on Texas Instruments DDC 264
- Number of channels: 256 or 512
- ADC resolution: 16 or 20 bits
- Noise level: below 1 fC peak-to-peak
- Continuous conversion with no dead time
- sampling rate (per-channel): 6kSPS
- Communication protocol: Ethernet

Perfect for cosmic radiation detection and GEM R&D, the detector is reliable and easy to use.

TTA Techtra is pleased to offer GEM-based detector kits which include:

1. A 10 x 10 cm² standard detector kit compatible with the CERN kits
2. Front-end readout electronics
3. Power supplies and gas armature

The detector kit from TTA Techtra allows for easy entry into the GEM research and development.

Detector Gas-box and Hardware

TTA Techtra offers assembled and validated GEM detectors compatible with the CERN-made detector kits and pad planes. The detector contains a pad plane (Figure 1), 3 GEM foils, and a drift electrode. The GEM foils have special snap-on connectors which permit GEM foil removal and installation without soldering (Figure 2). A resistive voltage-divider plugs onto the readout board to polarize the GEM foils and the drift plane (Figure 3).

To operate, the detector needs a 5kV high voltage power supply and a source of working gas, typically a mixture of Argon and CO₂. Compatible power supplies and the gas armature is available separately upon request.

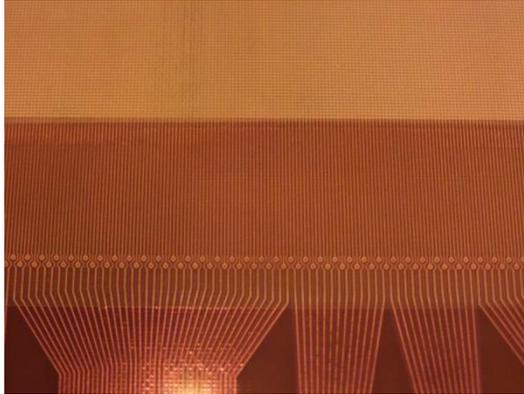


Figure 1 Close-up of the pad-plane with perpendicular XY strips.

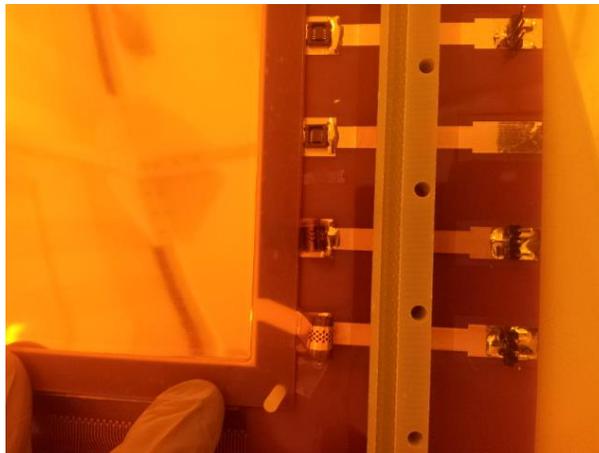


Figure 2 GEM foils are connected using snap-on connectors for easy foil exchange.

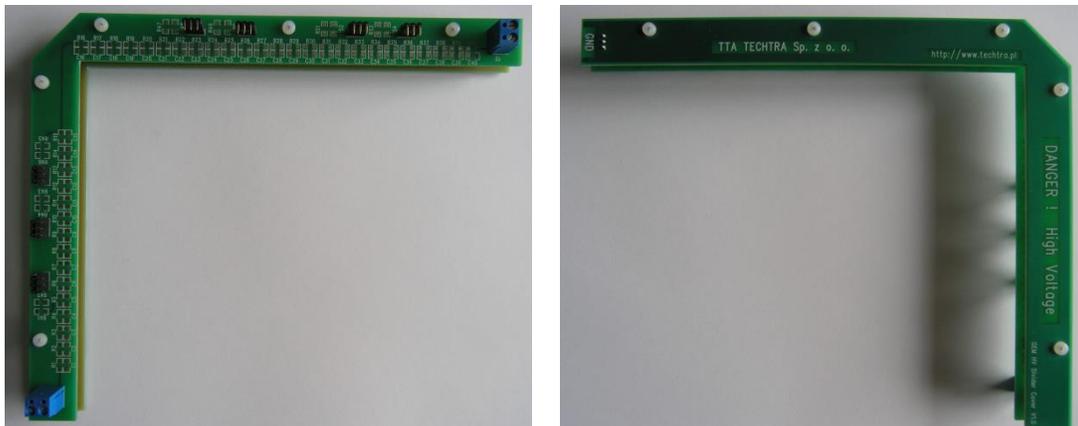


Figure 3 The L-shaped voltage divider plugs onto the pad plane and polarizes all GEM foils and the drift electrode.

Readout electronics

The L-shaped readout board is pictured in Figure 4. It plugs directly into the Panasonic connectors on the pad plane. It can concurrently read 256 or 512 channels. Each channel is digitized using a switched integrator that guarantees a loss-less collection of the input current (Figure 5). The readout electronics are based on the DDC264 chips. Each channel can be sampled every $160\mu\text{s}$ with a 20 bit accuracy, which is perfect to read cosmic radiation. Moreover, the readout board has a controlling FPGA device and an Ethernet controller. We provide dedicated software for the PC that controls device's operation.

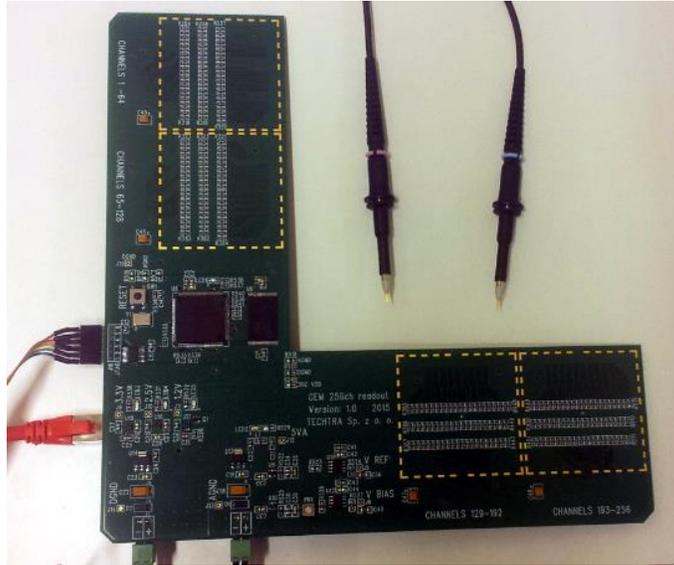


Figure 4 Readout electronics. The board plugs directly onto the pad plane. I connects to the PC via Ethernet

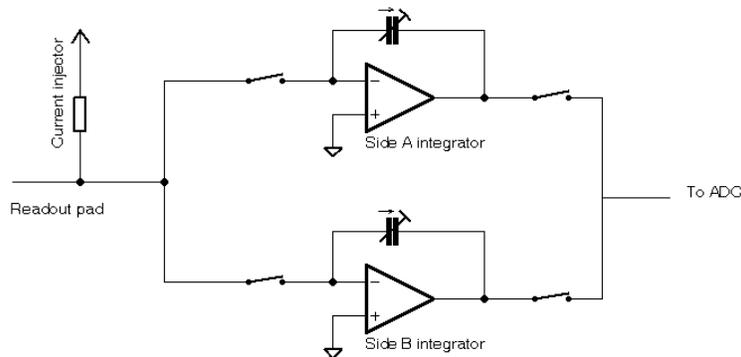


Figure 5 Single channel readout architecture