

Measurement results on Capacitively Coupled Particle Detector with 25 μm x 50 μm pixel size and 50 μm Pad pitch

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A sensor chip for a capacitively coupled particle detector (CCPD53) has been designed and produced in a 180 nm high voltage CMOS (HVCMOS) technology on a high resistivity wafer with deep p-well option. Capacitively coupled detectors are simple and low cost alternative to classical hybrid detectors and it can be used for several particle physics experiments.

The CCPD53 sensor chip contains a pixel matrix of 64 x 40 pixels, each has 25 μm x 50 μm in size. The digital output signals of the pixels are multiplexed to pads of 50 μm x 50 μm size. Using special address encoding a group of 16 pixels is connected to 8 transmitting electrodes. The pad geometry has been chosen so that it fits to the geometry of the pixel readout ASIC developed by RD53 collaboration at CERN. Via small number of large bumps the sensor chip CCPD53 and the readout chip can be mechanically connected together. The bumps can be also used for powering and configuring of the sensor chip. The digital pixel output signals have large amplitudes (1.8 V) and they are transmitted over the chip-chip gap via capacitive coupling.

The standalone CCPD53 chip tests with the injection circuit and Fe55 source, as well as the measurements on the CCPD53 chip that is attached to a readout chip have been performed. Several new measurements are planned, such as irradiations with beta sources and x-rays and investigations of capacitive coupling in the case of large chip to chip distance. In this contribution the sensor and the readout chip will be described and measurement results will be presented.

Key words: Capacitively Coupled Particle Detector, CCPD, HVCMOS Detector, Hybrid Pixel Detector

Submission declaration

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