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Spacepix-3: SoI MAPS Detector for Space Radiation Monitoring

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Radiation in space is a potential risk to human health and electronic systems. Spacepix-3, the successor of Spacepix-2 [1], is a high voltage monolithic active pixel sensor (HV-MAPS) ASIC capable of measuring flux and distinguishing between types of radiation, protons, electrons, and ions. SpacePix3, improved version of the former SpacePix2, features a 64×64 pixel matrix with a pixel pitch of 60 μm and a total sensitive area of 3.84×3.84 mm^2. Analog signals from pixels are digitized by 32 10-bit column ADCs with a successive approximation register (SAR). The total power consumption is 43 mA from a 1.8 V power supply. Sensor diodes are biased at -150 V. Special Spacepix-3 functions are backside channel signal processing, SPI/LVDS readout modes, hit trigger output, debugging features, thermometer, radiation-hardened, multichip operation, and analog pixel output. Chip is implemented in 180 nm SoI technology.

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