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Low-power large-dynamic range readout ASIC for VLAST silicon strip detector

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The main scientific goals of the Very Large Area Gamma-ray Space Telescope (VLAST) include indirect detection of dark matter research based on gamma rays, detection of the MeV line spectrum of late kilonovae to confirm the origin of super-iron elements directly, etc. The VLAST plans to use silicon strip detector (SSD) to build a Silicon Tracker and low Energy gamma-ray Detector(STED) to collect the electron-hole pairs converted from the high-energy gamma photons. STED comprises eight super-layers, including eight CsI detection layers and sixteen large silicon strip detection layers, with 344064 channels. Each detector channel has a large equivalent capacitance of ~100pF. The SiReadout is a 16-channel, ultra low-power, low-noise, large dynamic range readout ASIC for the silicon strip detector of VLAST. Each channel mainly consists of the charge sensitive preamplifier, the polarity selection circuit, the shaper circuit, the peak detect and hold circuit, and the discriminator. The input charge dynamic range of the chip spans from -200 fC to 200 fC, the power consumption is less than 270uW/channel, the equivalent noise charge(ENC) for positive charge input is 508e- at zero F plus 1.3e- per pF, the linearity error below 2%. The performance of SiReadout proves it fulfills the requirements of VLAST.

Minioral

Yes

IEEE Member

No

Are you a student?

Yes

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