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A PXI-based, Multi-channel Ultra-fast Data Acquisition System for Transient Pulsed Signal

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We design a high speed, high resolution data acquisition system(DAS) with 1Gsps sampling rate and 12-bit resolution, mainly applying to nuclear and particle physics experiments. The system consists of two PXIe-1084 chassis, each containing a controller card and 16 data acquisition cards at most. For every single card, the signal conditioning module incorporates one high precision Op Amps converting single-ended signals to differential signals(LVDS) with low additional noise level, and the data acquisition module combines a 12-bit folding interpolating ADC with a Xilinx Kintex-7 FPGA, implementing controls of A/D conversion and high speed data transmission through SFP interface using aurora protocol. All these cards of each chassis can be synchronized easily using timing and triggering with PXI resources. Besides, a simple software of our system is designed to display the captured waveform signal and communicate with the host PC for remote controlling. After careful calibration, primary measurements show that the digitizer achieves an analog bandwidth of higher than 250MHz and an ENOB of more than 9 bit at 1Gsps sampling rate. Due to such high speed and resolution, the system gain more ability to rapidly and precisely extract maximum information from radiation signals. Besides, with great scalability, the system can be used for modern big physics experiments. In addition, high speed data transmission is also an important key feature of our DAS.

Minioral

Yes

Description

1Gsps board

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