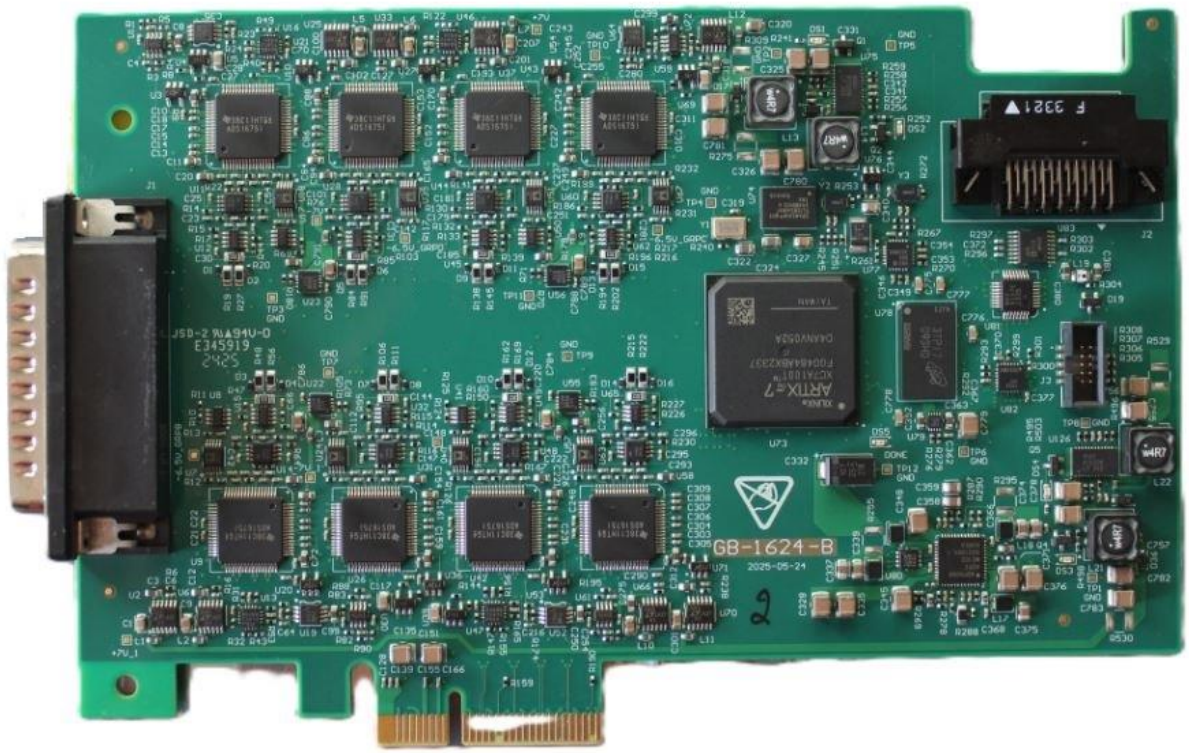
BlackburnTechno

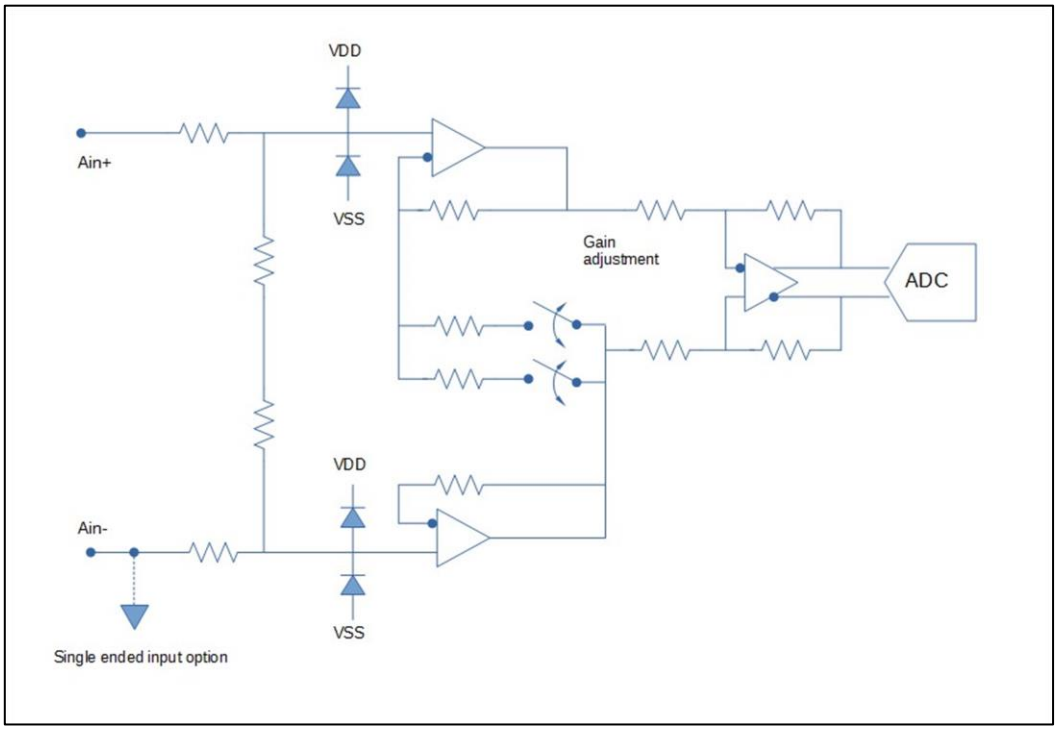
High Speed Acoustic data acquisition card PCI24ADC16



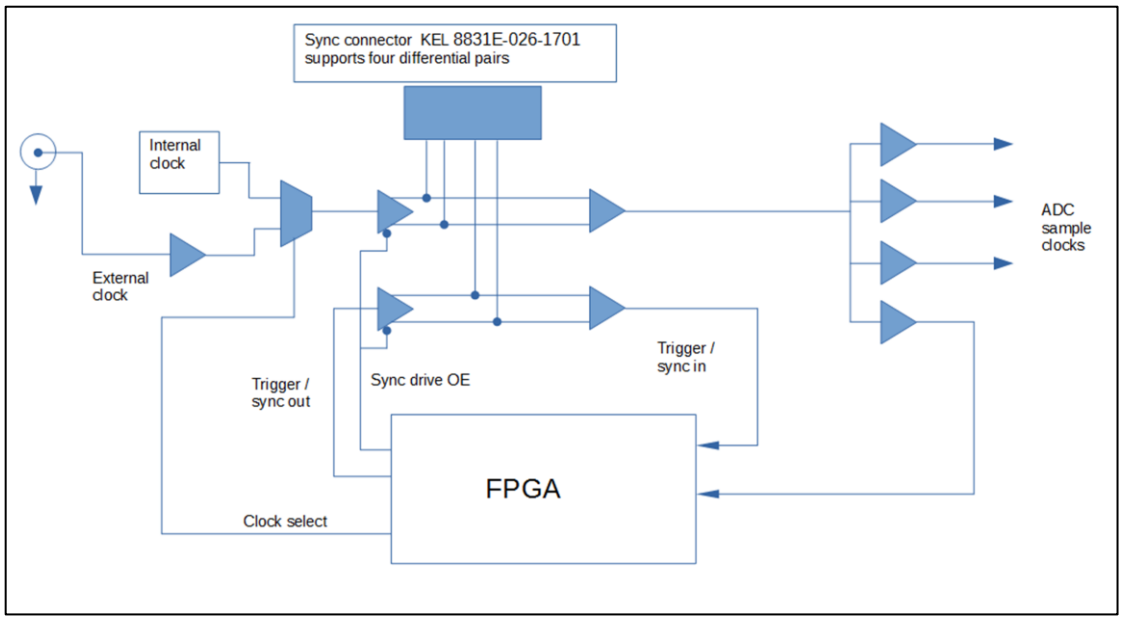
- 16 analog input channels
- 4 lane Gen 2 PCI Express interface with DMA engine, 256MB waveform memory

Analog input circuit

The analog inputs are arranged as shown above. Use of differential inputs is recommended whenever possible, but this circuit may be ordered in a configuration to allow the card to accept single ended signals. Note that there may be a slight reduction some aspects of performance when operating with single ended inputs. The sensitivity of the input can be adjusted at run time, selecting from one of four ranges.



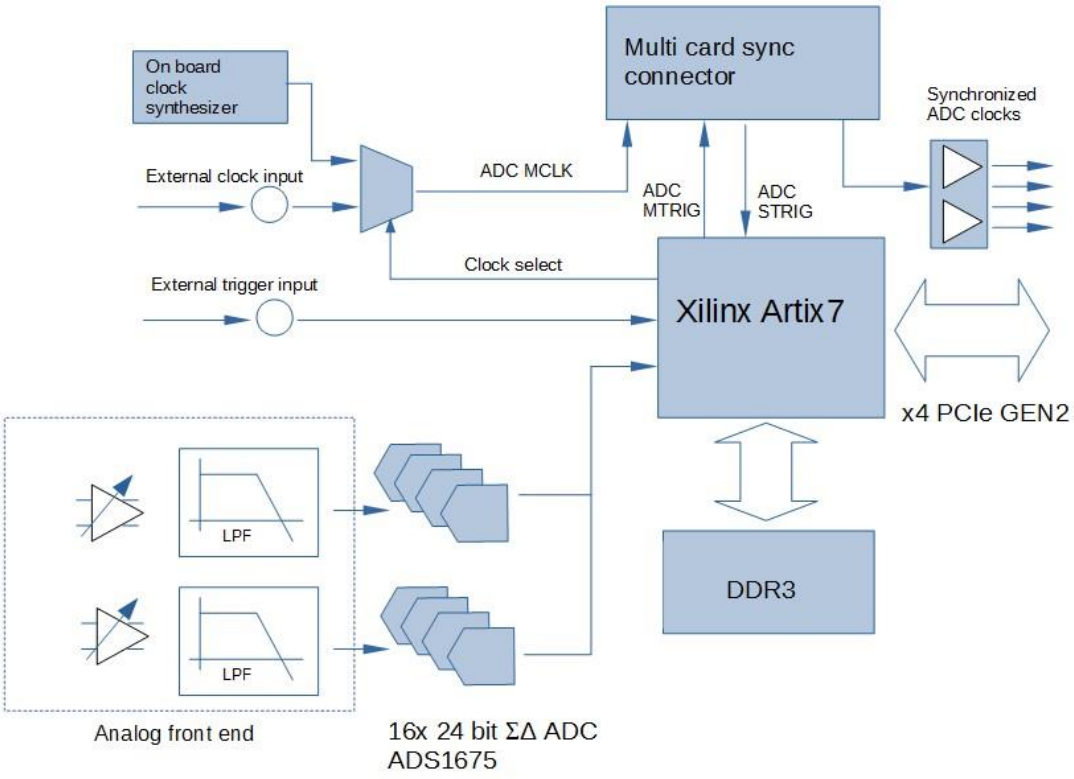
Multi-card synchronization



The PCI24ADC16 is a high-resolution wide band acoustic data acquisition card in short PCIe form factor which enables a variety of acoustic and ultrasound signal processing functions, including active or passive sonar, vibration analysis, geophysics, and other test and measurement applications. The card provides 16 analog input channels, which it converts to digital data with 24-bit resolution, at sample rates up to 4MSPS. The design includes the ability to precisely synchronize multiple cards, allowing systems to be expanded to support hundreds of channels. Anti-aliasing inherent in the Sigma-Delta converters simplifies analog signal conditioning elsewhere in the signal path. The analog front end includes only adjustable gain and two pole anti-alias filtering. All other processing is performed using the on-board FPGA resources.

The PCI24ADC16 includes a high precision frequency synthesizer which allows the user to generate a sample clock of virtually any frequency, with high precision. It can also accept an external clock for frequency coherent synchronization to peripheral equipment. When using the PCI24ADC16, data acquisition may be performed in either capture or continuous mode. In capture mode a specific number of samples are acquired following a trigger event, while in continuous mode the amount data acquired is virtually unlimited. In this mode acquisition is initiated and terminated by software commands.

PCI24ADC16 : Architecture



Target Specifications:

Architecture and Functionality

- 16 channel sigma-delta ADC card in short PCIe form factor.
- 256MB DDR3 DRAM memory.
- Xilinx Artix 7 FPGA: XC7A100T.
- Flash memory for FPGA configuration, calibration data, etc.
- Phase coherent operation across multiple cards.
- Supports continuous and capture modes of operation. Capture mode includes pre-trigger storage capability.
- x4 PCI Express (Gen 2). Includes demand mode DMA engine with 64 bit addressing capability.
- Total power dissipation approximately 22W. (estimated)

Analog Inputs

- 16 analog input channels, may be driven differentially, or configured for single ended operation.
- 4 Khom input impedance. Two pole low pass anti-alias filter. Fc 1.7MHz.
- Programmable voltage range, up to 20Vp-p differential, can be driven single ended up to 10Vp-p.
- Other values can be supported as build options (minimum order quantities may be required).
- 24-bit Sigma Delta ADCs, Texas Instruments ADS. Sample rate programmable up to 4MSPS.
- Low latency and wideband digital filtering modes.
- >105dB SNR @ 125kSPS, >95dB SNR @ 4MSPS (Target specifications)
- >93dB SINAD (THD >99dB)
- >110dB SFDR @ 4MSPS (excluding harmonics)
- 44 pin high density D-SUB connector (male) Positronic 163A17789X or similar.

Clock generation and synchronization

- On board clock synthesizer programmable with approximately 1Hz resolution.
- The clock synthesizer may be synchronized to an external reference clock (typically 10MHz).
- An external clock can be accepted at the ADC Master clock frequency.
- KEL Corporation 8831E-026-1701 connector for multi-card synchronization

Integration Support

- Software Development Kit for 64-bit Linux.
- Application examples written in ‘C’.

Environmental

- Specifications guaranteed for operation from 0 to 50 °C.
- Storage temperature -40 to +85 °C.
- Approximately 500LFM airflow required for cooling.