eXpert™ FIR Filtering

Advanced On-board FPGA Technology

Finite Impulse Response (FIR) filtering technology allows users to filter digitized data in real-time with a completely flexible and user-customizable FIR filter.

Filtering of analog voltage signals is a powerful method for removing unwanted signal features (like noise) and emphasizing signal features of interest.

Filtering of analog voltage signals is a powerful method for removing unwanted signal features (like noise) from a single waveform acquisition and emphasizing signal features of interest. Traditional analog filters are usually limited to rather simple filtering methods, such as low-pass filtering, high-pass filtering and band-pass filtering. Numerical filtering of digitized waveform data, such as that now available on-board GaGe's new-generation digitizers, allows much more complex filtering methods to be implemented with no CPU loading.

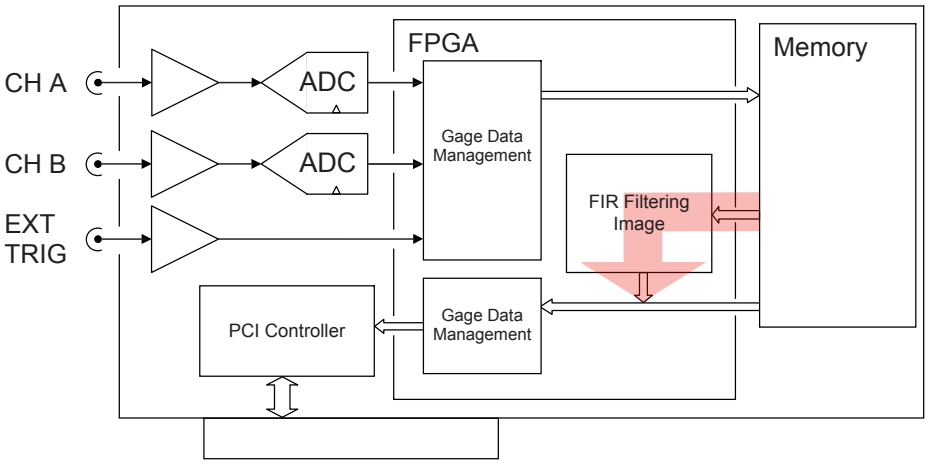
APPLICATIONS

Communications
Ultrasonic Testing
Lidar Testing
Optical Fiber Testing
Radar Testing
Stimulus/Response Test Systems
Network Analysis

FEATURES

- Allows processing by an FIR filter with up to 20 taps; can be extended in software to up to 39 symmetric taps
- FIR filter coefficients can be tailored to emphasize signal pulses of a specific shape
- FIR filtering is performed by GaGe hardware, allowing the host-PC to handle other tasks in parallel
- Data is filtered during transfer to the PC so that the repetitive signal capture rate of the digitizer is not reduced
- FIR filter algorithm covers a wide range of common numerical filters such as moving average filters and Gaussian filters
- Compatible with CompuScope Software Development Kits (SDKs) for C/C#, LabVIEW and MATLAB

FIR Filtering Simplified Block Diagram



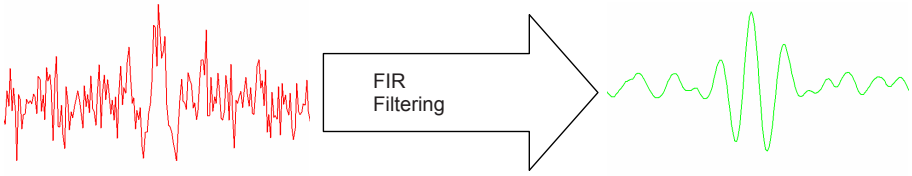
The output from a numerical FIR filter depends only on a finite number of input points. The generalized FIR filter algorithm covers a wide range of common numerical filters such as moving average filters and Gaussian filters. The FIR filter coefficients can be tailored to emphasize signal pulses of a specific shape.

The general form of the FIR filter is:

$$Y_i = \sum_{j=0}^{N} A_j X_{i-j}$$

where:

$\{X_i\}$ is the *input data set*,
$\{Y_i\}$ is the *output data set*,
$\{A_j\}$ is the set of *FIR filter coefficients* $(0 \le j < N)$ and N is the *number of taps* and is equal to the number of coefficients.



ORDERING INFORMATION

Note: the eXpert FIR Filtering Firmware Option is only available on the following products: CS12400, CS14200, CS14105, and the Octopus™ family of CompuScope digitizers (CS82XX & CS83XX).

eXpert FIR Filtering Firmware Option	250-181-002
eXpert Firmware Option bundle (Signal Averaging, FIR Filtering and Peak Detection)	888-100-026

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