



## eXpert Fast Fourier Transform (FFT) Firmware

Fourier Transform analysis is a powerful signal processing technique used in a wide variety of applications. Typically, Fourier transformation of time domain waveforms requires the execution of the computationally intensive Fast Fourier Transform (FFT) algorithm on a host PC.

Utilizing the eXpert FFT Firmware on a GaGe CompuScope Digitizer allows users to conduct computationally intensive FFT algorithms completely on the digitizer's onboard FPGA with absolutely no host system CPU loading, allowing the host PC to handle other tasks in parallel.

Perform 512, 1024, or 2048 point FFTs on time domain waveforms. Real and Imaginary FFT amplitude components are separately available. Standard and customized time domain windowing are also included. Conducting FFTs onboard the digitizer's FPGA also provides the benefit of downloading multiple FFT spectra in a single transfer to the host PC system.

Within the eXpert FFT Firmware, time domain waveform acquisition is performed as usual in either Single or Multiple Record acquisition modes to the CompuScope Digitizer's onboard acquisition memory. The acquired data residing in onboard memory is then put through an FFT algorithm that allows FFT analysis of 512, 1024 or 2048 time domain waveform points within the CompuScope Digitizer's onboard FPGA. The FFT spectra results only can then be transferred to the host PC. A bypass mode is also provided that allows the regular acquired time domain data to be transferred.

The eXpert FFT firmware separately provides both the Real and the Imaginary spectral components, from which both amplitude and phase spectra may easily be derived; often respectively called the In-phase and Quadrature spectral components (I&Q). A scaling Exponent Factor is also provided to ensure that the dynamic range of the FFT values is optimally exploited.

The user may select to apply a time domain Windowing function to the time domain waveform data before the FFT calculation. The user may select one of several standard Windowing functions, such as Hamming and Blackman-Harris Windowing functions or may also configure an arbitrary Windowing function.

The real power of the eXpert FFT firmware is its ability to download multiple FFT spectra in a single transfer. The user may select to use one of two multi-spectral modes: One that downloads multiple spectra from contiguous portions within the same waveform, and one that downloads a single spectrum from the same position within many acquired waveforms. For example, a user might choose to download 100 spectra of 2048 points each from a 300,000 points waveform acquisition. Alternately, a user might choose to download 100 spectra of 2048 points each from 100 separate waveforms acquired in CompuScope Multiple Record Mode.

The eXpert FFT Firmware is compatible with and requires one of the available GaGe Software SDKs for C/C#, MATLAB, or LabVIEW that provide a ready-made compiled sample program illustrating how to configure and use the FFT feature with documentation for its use in custom developed applications.

## ORDERING INFORMATION

eXpert FFT Firmware	Order Part Number
<p>eXpert FFT</p> <p><b>NOTE:</b> The eXpert FFT Firmware requires one of the available GaGe Software SDKs for C/C#, MATLAB, or LabVIEW and is compatible for use with the following GaGe Digitizer Model Series sold separately:</p> <ul style="list-style-type: none"><li>• EON Express</li><li>• Octave Express</li><li>• Octopus Express</li><li>• RazorMax Express</li></ul> <p>Please refer to the separate GaGe product datasheets for these digitizer models for their full specification details and ordering information.</p>	250-181-004

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