DT9818

Isolated, Embedded USB Data Acquisition Board

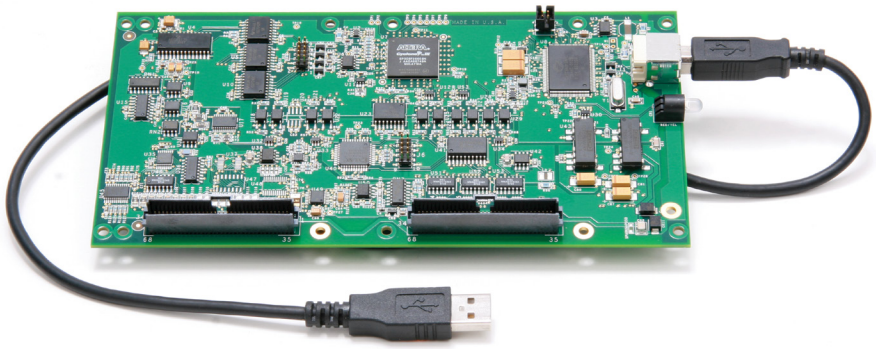


Figure 1. The DT9818 is a high performance, isolated data acquisition board that can be readily embedded in industrial or laboratory applications. It allows synchronous or asynchronous operation for all the analog, digital, and counter/timer functions, while running off USB power.

The DT9818 is perfect for **embedding in a custom application where isolation is required**. The DT9818 is a high-performance USB data acquisition (DAQ) board that combines the functionality of multiple boards by providing **simultaneous subsystem operation** for analog input and output, digital I/O, and counter/timer.

Key Features:

- **150 kHz throughput:** A/D and D/A
- **16SE/8DI** analog input channels
- **Two deglitched analog outputs:** smooth waveform generation
- **16 DIO**, two32-bit C/T
- **±500V galvanic isolation...**protects signal integrity
- **Runs on USB power...**no external power required
- **Flexible** clocking and triggering
- **Compatible** with LabVIEW and MATLAB
- **Includes free** QuickDAQ software...get up and running quickly

Flexible Acquisition Modes... Using The Input Channel-Gain List

The DT9818 can acquire data from one or more analog input channels using an input channel-gain list. A 1024-location channel-gain list allows great flexibility in configuring channels, sample rates, and gains.

The DT9818 provides two ways to cycle through the channel-gain list:

- Continuous scan mode
- Triggered scan mode

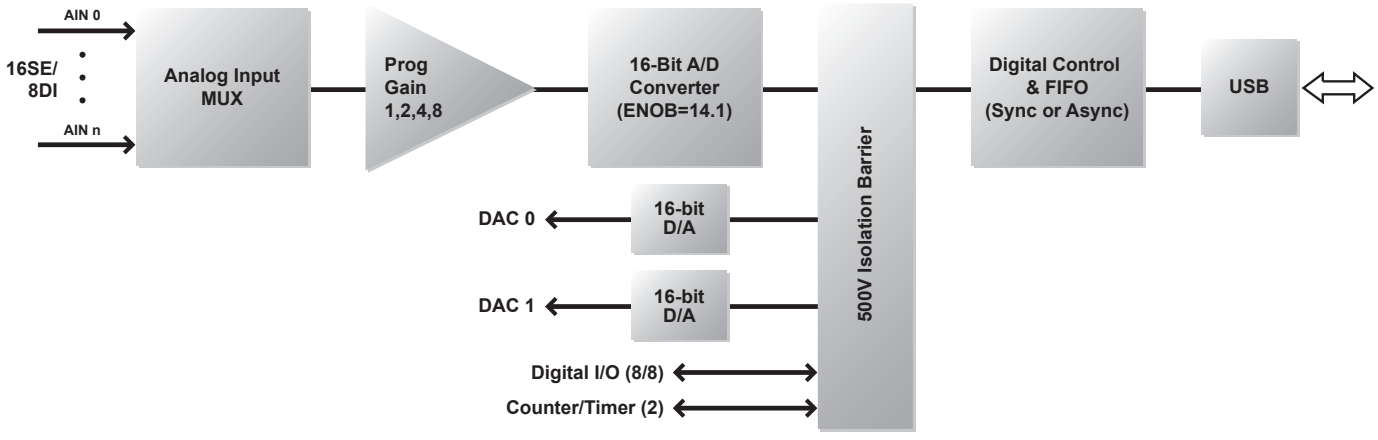


Figure 2. The ±500V galvanic isolation allows all analog input, analog output, digital I/O, and counter/timer functions to operate in high noise environments. Signal accuracy is maintained despite the presence of large noise spikes on small signal paths. This is especially critical for embedded applications.

Flexible Output Modes... Using The Output Channel-Gain List

The DT9818 provides a great deal of flexibility in the output of analog and digital signals. For example, output a single value from a single analog output channel or multiple values from multiple analog output channels. An output-channel list gives the flexibility of updating only the analog output channels desired or updating the digital output lines with specified analog output channels at the D/A clock rate. Analog output channels can be updated at up to 150 kSamples/s.

The DT9818 features the following output modes:

- Continuous output mode
- Waveform mode

High-Speed Digital I/O Lines

The DT9818 features one digital input port, consisting of 8 digital input lines and one digital output port, consisting of 8 digital output lines. The resolution is fixed at 8-bits.

The following digital I/O operation modes are available:

- Single-value operations
- Continuous digital I/O
  - Digital input
  - Digital output

High-Speed, High-Resolution Analog Outputs

The DT9818 provides two streaming analog output channels. Each analog output channel has its own digital-to-analog converter and provides an output signal range of ±10 V. A maximum update rate of 150 kSamples/second with 16-bit resolution is standard. Ultra-smooth waveforms can be produced with less than 1.0 nV-sec glitch energy from the D/As. For gap-free simultaneous stimulus and response, the analog output channels can be updated as the analog input data is acquired. In addition, you can update the digital output lines with the analog output channels at the analog output rate.

Multifunction Counter/Timers

The DT9818 features two 32-bit user counter/timers. If desired, read the value of the counter/timer channels with the analog input channels and digital input lines at the A/D clock rate. The following counter/timer functions are supported: event counting, up/down counting, frequency measurement, edge-to-edge measurement, continuous edge-to-edge measurement (for determining the frequency and period width of a signal), rate generation, one-shot, and repetitive one-shot operations.

ENOB... The Accuracy Figure of Merit...

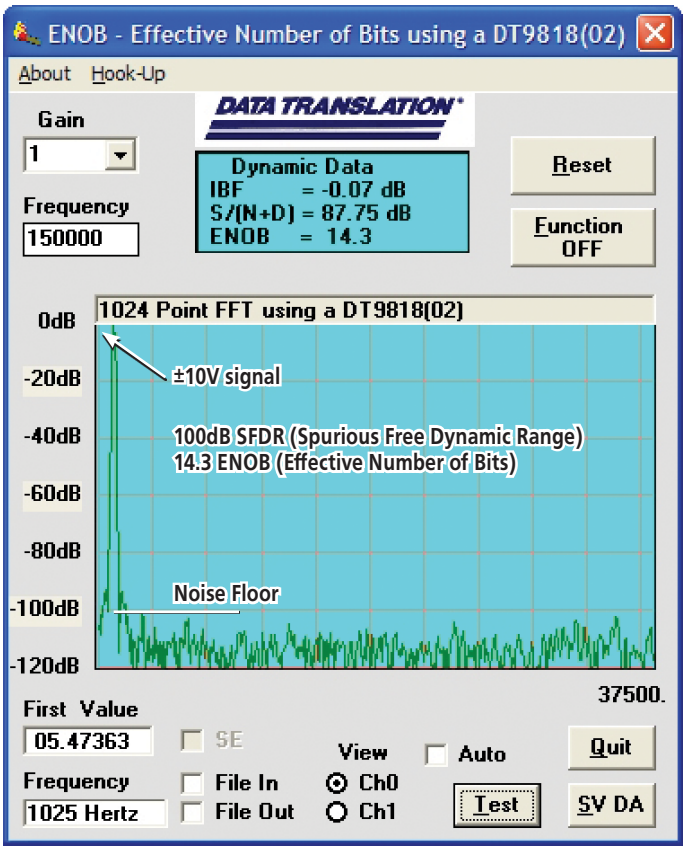


Figure 3. The ENOB program has a 1kHz sine wave on channel 0 with a signal level 0.06db below full scale and channel 1 is tied to ground or zero volts. (Full scale is ±10V). The program is scanning both channels at a 150kHz rate. The actual sampling rate of channel 0 would then be 75kHz for a Nyquist Frequency of 37.5kHz as shown in the graph for channel 0. An FFT is computed on channel zero and displayed. The signal to noise plus distortion is 87.75dB for an Effective Number of Bits of 14.3. The primary component on the left side of the chart is the DC component of the signal.

Flexible Clocks and Triggers

For maximum flexibility, the DT9818 provides independent clocks and triggers for the A/D and D/A subsystems. This allows the analog output subsystem to be triggered and clocked synchronously with, or independent of, the analog input subsystem. Each subsystem supports an internal clock and external clock input, as well as the following trigger types: software command and external digital input trigger.

±500 V Galvanic Isolation Protects Your Data

Computers are susceptible to ground-spikes through any external port. These spikes can cause system crashes and may even cause permanent damage to the computer. The DT9818 features ±500 Volts of galvanic isolation to protect the computer from ground-spikes and to ensure a reliable stream of data.

Uncompromised, High-Integrity Performance

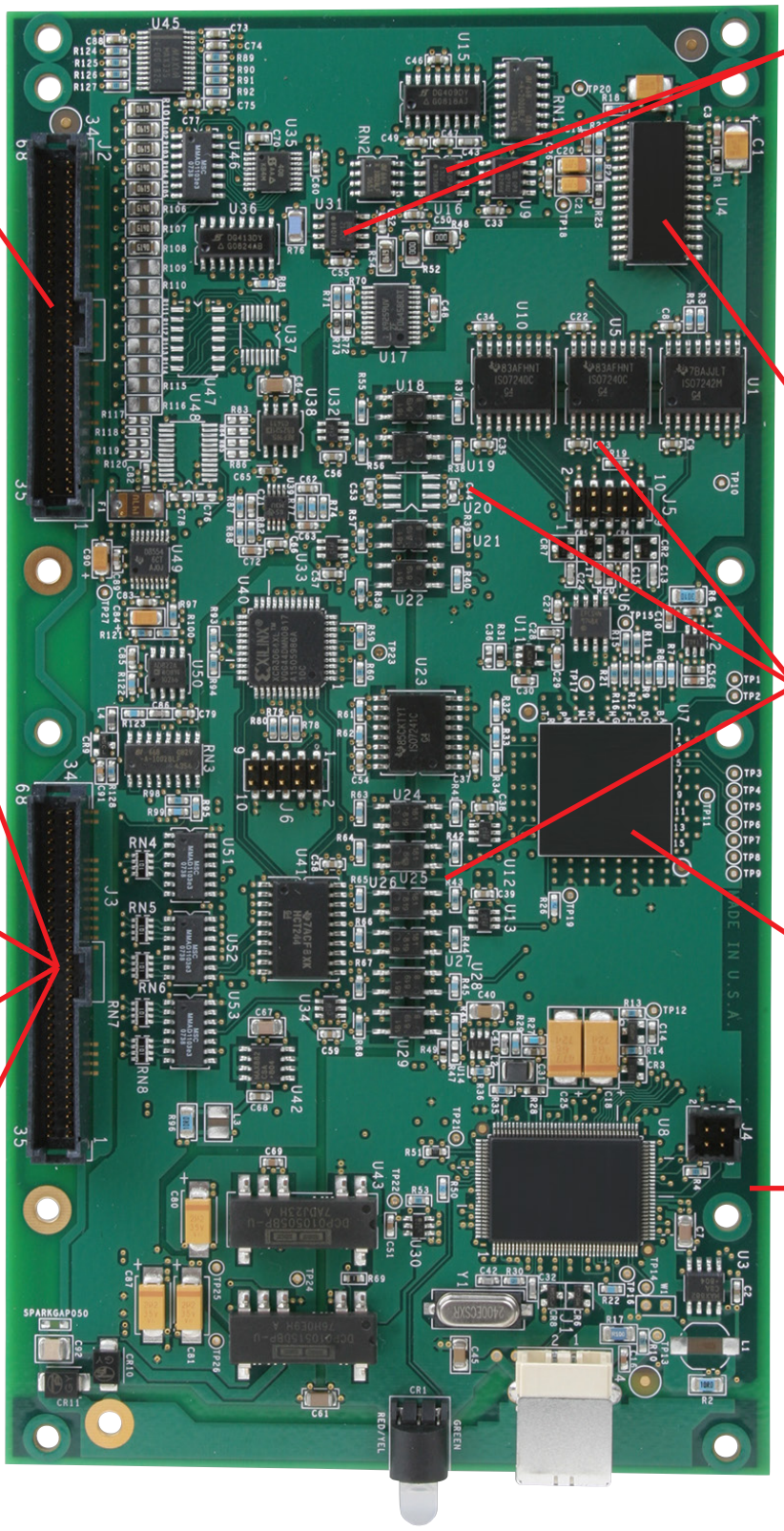
Clean Signal Connection...
16SE/8DI analog input channels

Ultra Digital I/O...
Full digital I/O flexibility for pattern generation and synchronizing with external events

Full-Featured Counter/ Timers... Two 32-bit counter/timers ideal for automotive testing applications

Pure Signal Generation...
Two waveform deglitched DACs

External Control...
Flexible clocks and triggers



High Throughput...
Fast settling instrumentation amplifier maintains high-speed while switching channels

Precision Measurements...
True 16-bit resolution at 150kHz throughput for measuring dynamic signals

Fully Protected...
500V galvanic isolation protects your computer and maintains signal integrity

No Limits...
Full simultaneous operation of all subsystems

Designed for Low Noise...
Multi-layer PCB provides optimal grounding and shielding to maintain signal integrity

Figure 4. The DT9818 can be embedded into custom applications.

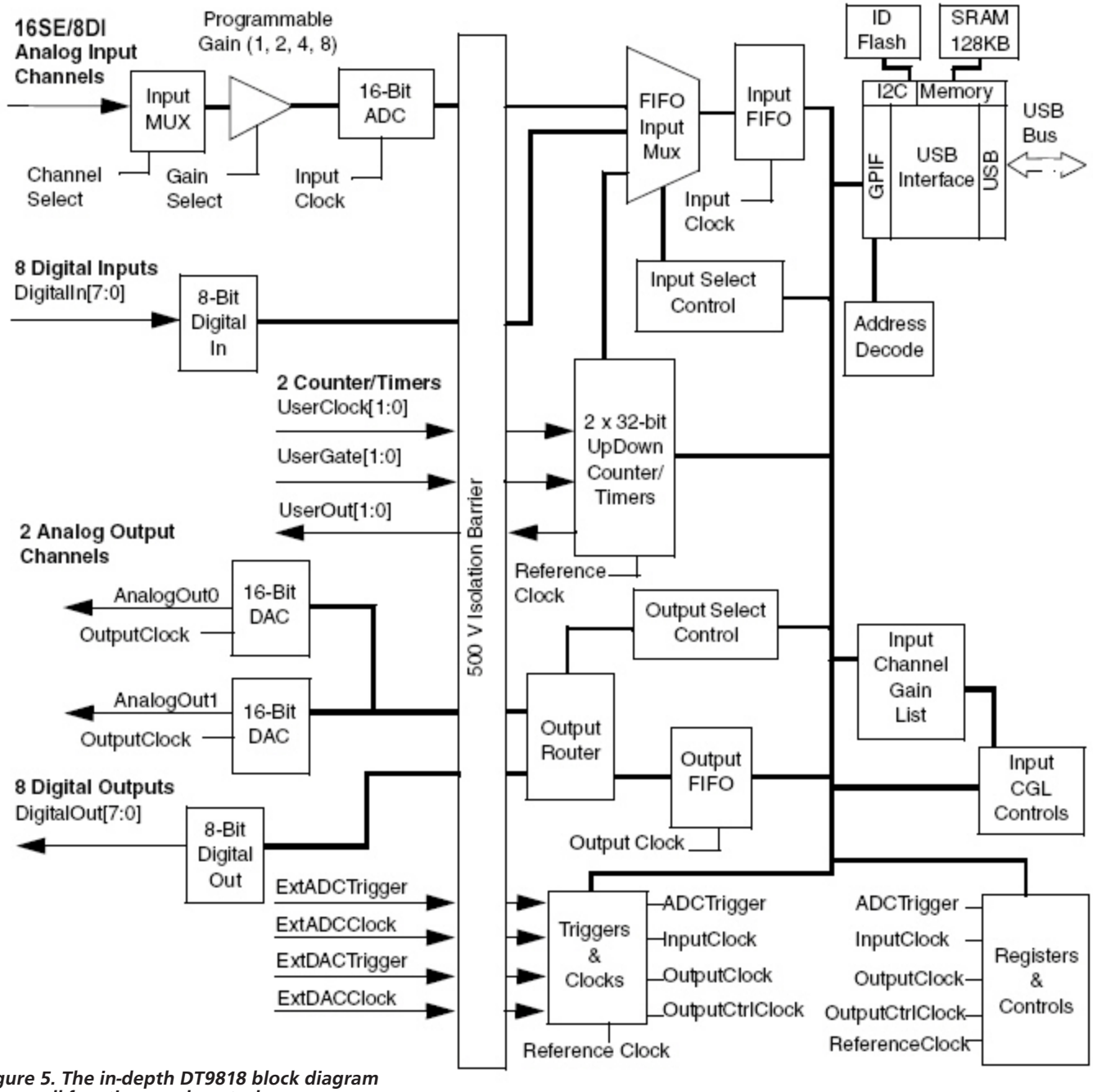


Figure 5. The in-depth DT9818 block diagram shows all functions and controls.

QuickDAQ

QuickDAQ allows you to acquire and display from all Data Translation USB and Ethernet data acquisition devices that support analog input streaming. Combine QuickDAQ with Data Translation hardware to acquire data, record data to disk, display the results in both a plot and digital display, and read a recorded data file. Be productive right out of the box with this powerful data logging software. Data can be exported to other applications like Microsoft Excel® and The Mathworks MATLAB® for more advanced analysis. Two additional options can be purchased to add FFT analysis capabilities to the base package.

Key Features:

- **QuickDAQ Base Package (Free)**
  - Ready-to-measure application software
  - Configure, acquire, log, display, and analyze your data
  - Customize many aspects of the acquisition, display, and recording functions to suit your needs
- **FFT Analysis Option (License Required)**
  - Includes all the features of the QuickDAQ Base Package
  - Perform single-channel FFT operations including:
    - Auto Spectrum
    - Spectrum
    - Power Spectral Density
  - Configure and view dynamic performance statistics
  - Supports Hanning, Hamming, Bartlett, Blackman, Blackman Harris, and Flat Top response windows
- **Advanced FFT Analysis Option (License Required)**
  - Includes all the features of the QuickDAQ Base Package and FFT Analysis Package
  - Perform 2-channel FFT operations including:
    - FRF
    - Cross-Spectrum
    - Cross Power Spectral Density
    - Coherence
    - Coherent Output Power
  - Supports real, imaginary, and Nyquist display functions
  - Additional FFT analysis functions supported: Exponential, Force, Cosiner Taper
  - Save data to .uff file format

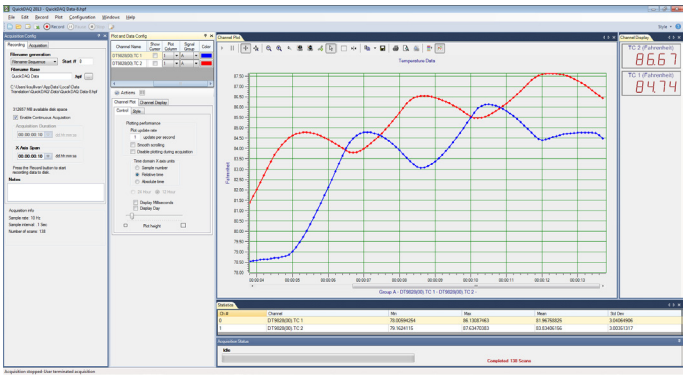


Figure 6: QuickDAQ ships free-of-charge and allows you to get up and running quickly.

Other Software Options

There are many software choices available for application development, from ready-to-measure applications to programming environments.

The following software is available for use with the DT9818 module and is provided on the Data Acquisition Omni CD:

- **DT9818 Device Driver** –The device driver allows you to use a DT9818 module with any of the supported software packages or utilities.
- **DT9818 Calibration Utility** – This utility allows you to calibrate features of a DT9818 module.
- **Quick DataAcq** application – The Quick DataAcq application provides a quick way to get up and running. Using this application, verify key features of the module, display data on the screen, and save data to disk.
- **DT-Open Layers® for .NET Class Library** – Use this class library if you want to use Visual C#® or Visual Basic® for .NET to develop application software using Visual Studio® 2003-2012; the class library complies with the DT-Open Layers standard.
- **DataAcq SDK** – Use the Data Acq SDK to use Visual Studio 6.0 and Microsoft® C or C++ to develop application software using Windows® XP/Vista/7/8; the DataAcq SDK complies with the DT-Open Layers standard.
- **DAQ Adaptor for MATLAB** – Data Translation's DAQ Adaptor provides an interface between the MATLAB® Data Acquisition (DAQ) toolbox from The MathWorks™ and Data Translation's DT-Open Layers architecture.
- **LV-Link** – Data Translation's LV-Link is a library of VIs that enable LabVIEW™ programmers to access the data acquisition features of DT-Open Layers compliant USB and PCI devices.

Accessories

For applications where the DT9818 is embedded in other equipment, the following optional accessories are available:

- **EP355** – This screw terminal panel plugs into connector J2 or J3 of a DT9818 and provides 14-position screw terminal blocks for attaching analog I/O and digital I/O signals.

Figure 7. The EP355 screw terminal panel plugs into the J2 or J3 connector of a DT9818 module.

Cross-Series Compatibility

Virtually all Data Translation data acquisition modules are compatible with the DT-Open Layers for .NET Class Library. This means that if your application was developed with one of Data Translation's software products, you can easily upgrade to a new Data Translation board. Little or no reprogramming is needed.

Ordering Summary

HARDWARE

- DT9818-OEM

ACCESSORIES

- **EP355** – Screw terminal panel

FREE SOFTWARE

- **QuickDAQ**
- **DAQ Adaptor for MATLAB** – Access the analyzation and visualization tools of MATLAB®.
- **LV-Link** – Access the power of Data Translation boards through LabVIEW™.

OPTIONAL SOFTWARE

- **QuickDAQ FFT Analysis Option** (License Required)
- **QuickDAQ Advanced FFT Analysis Option** (License Required)