

# DT9844

## 32-Channel Analog Input USB DAQ Module

### Overview

The DT9844 is a high-accuracy (20-bit resolution), high-speed (1 MS/s sample rate) USB data acquisition module offering unparalleled performance. The specially-designed circuitry on this module reduces crosstalk between channels, and when combined with the free QuickDAQ software, provides a high-performance measurement solution for even the most sophisticated applications. This module provides 32 single-ended (SE) or 16 differential (DIFF) analog input channels. Digital input and counter/timer data can be synchronously acquired with the analog input data.

### Key Features

- Highest accuracy/sample rate available anywhere: 20-bit @ 1 MS/s,  $\pm 10$  V range, 20  $\mu$ V, 1 ppm resolution
- Lowest noise/crosstalk: -80 dB at 1 kHz, 500 kHz settling

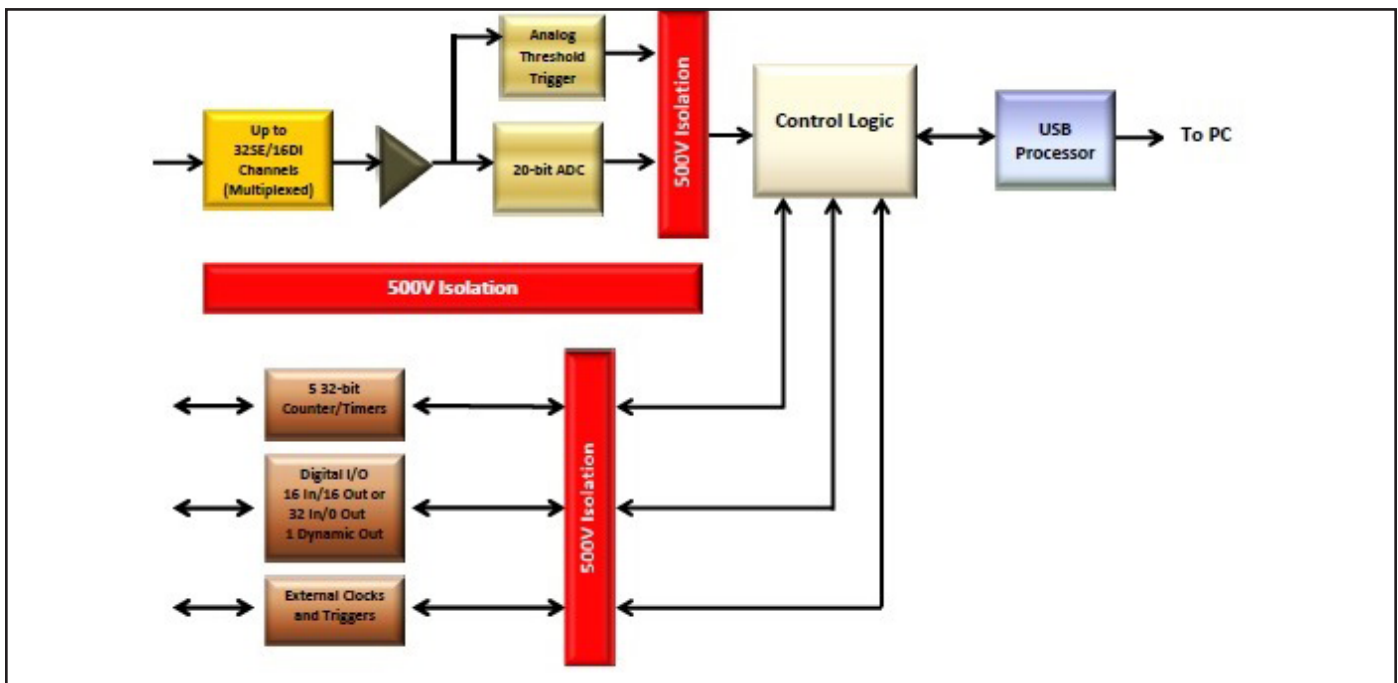


*The DT9844 is available in two configurations: STP connection box or OEM embedded version. Combine with the free QuickDAQ software for an isolated, easy-to-use measurement solution at the highest throughput and accuracy.*

- $\pm 500$  V Tri-Sectional Galvanic Isolation: prevents digital interference with precise analog signals... preserves signal integrity
- Full simultaneous operation of all functions: 32 A/D channels, 32 DIO, 5 counter/timers
- Choice of packaging: USB DAQ module or OEM embedded board
- Includes free QuickDAQ software to get up and running quickly

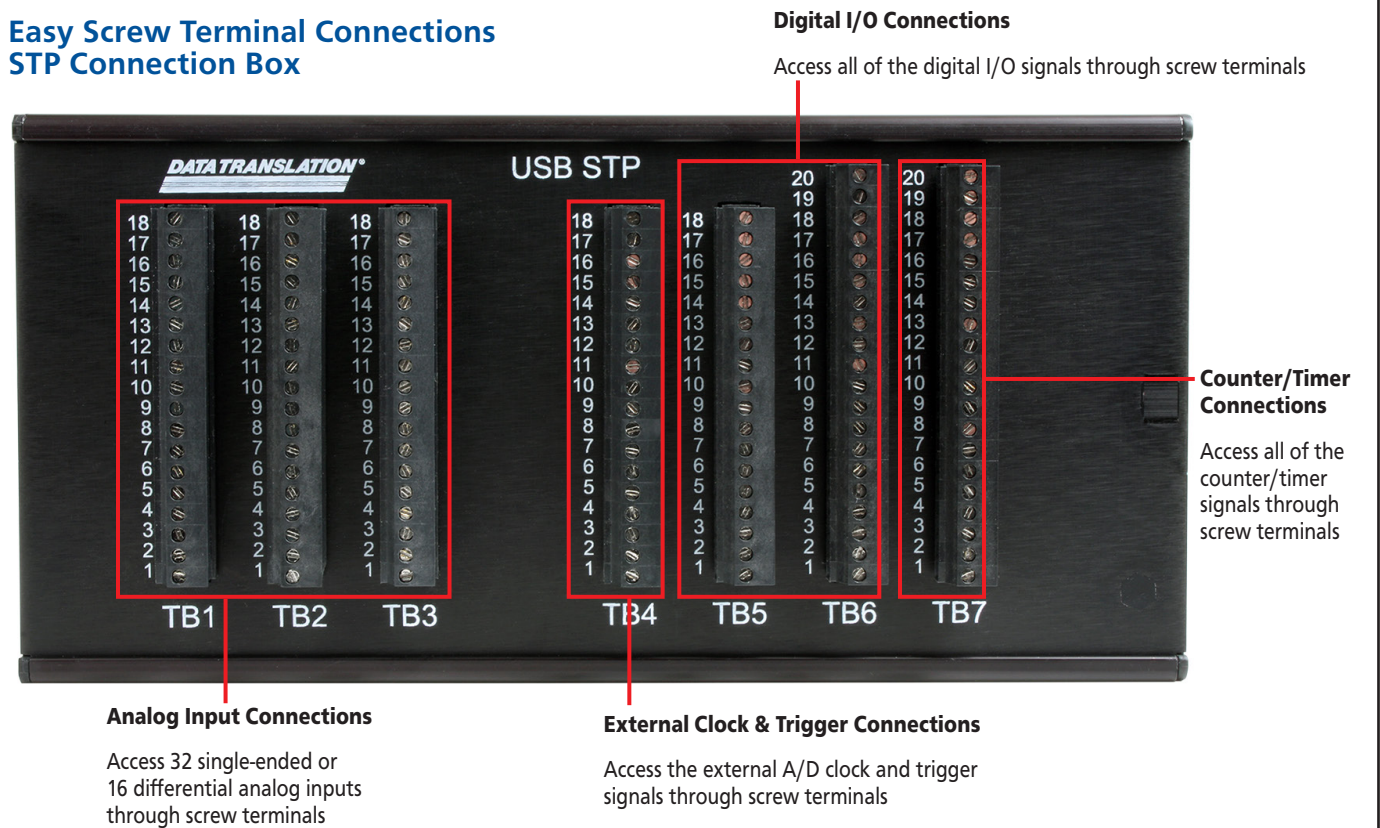
Features Summary

Module	Analog In	Resolution	Input Ranges	Throughput	Digital In	Digital Out	Counters	Packaging
DT9844-32-STP	32 SE/16 DIFF	20-bit	$\pm 10$ V	1 MS/s	16	16	5	STP
DT9844-32-OEM	32 SE/16 DIFF	20-bit	$\pm 10$ V	1 MS/s	16	16	5	OEM



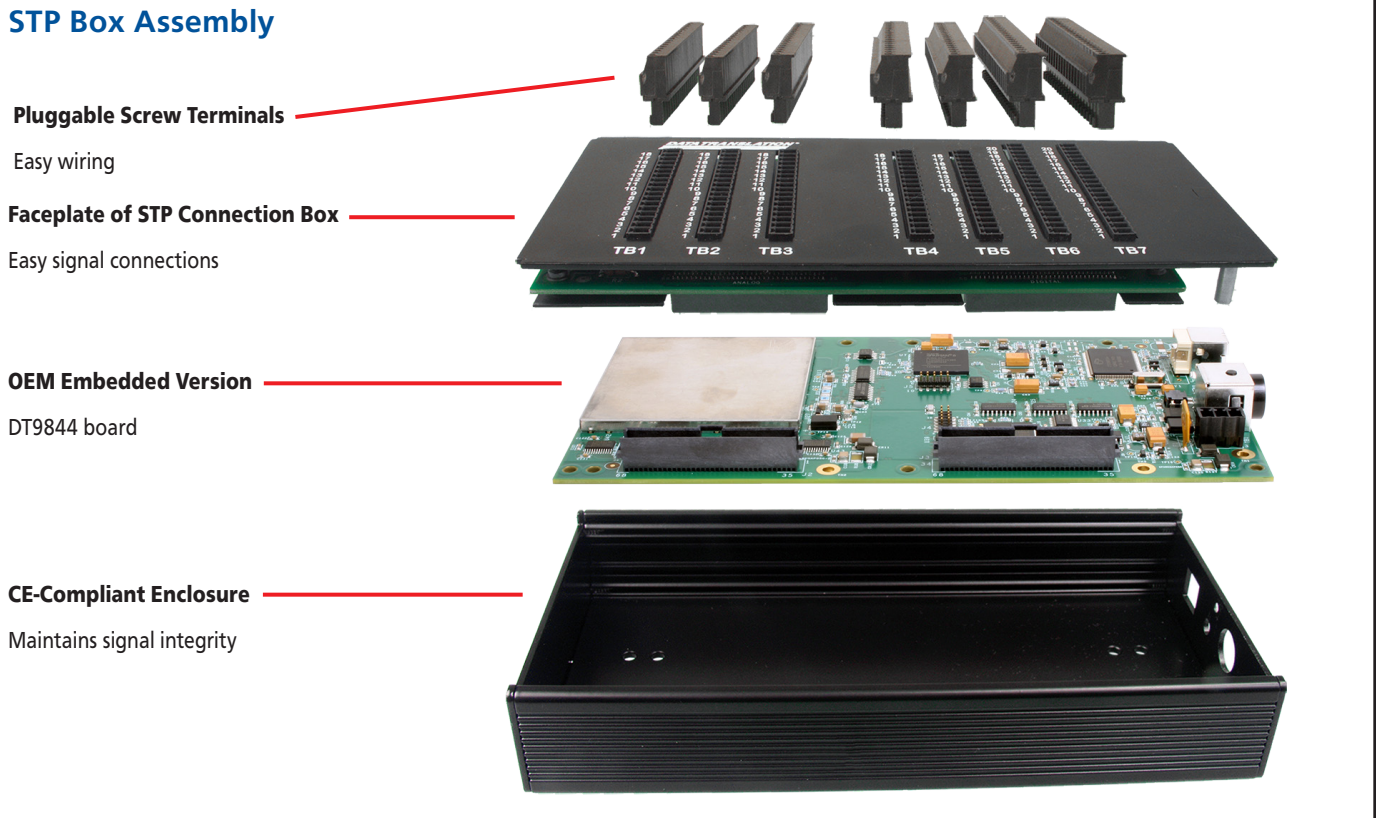
*The block diagram of the DT9844 shows the  $\pm 500$  V isolation between three subsystems and the host computer. All circuitry is designed to preserve the lowest noise for analog data acquisition.*

## Easy Screw Terminal Connections STP Connection Box



The STP connection box is available for easy signal connections on the 32-channel version of the module

## STP Box Assembly



The STP connection box packages the OEM embedded version of the DT9844 in a CE-compliant enclosure with screw terminal connections.

# Uncompromised, High-Integrity Performance

## OEM Embedded Version

### Multiple Isolation Blocks

All sections are isolated to  $\pm 500$  V so that digital signals don't interfere with analog signals, preserves signal accuracy.

### A/D Section

### USB Power Block

### Digital I/O, Counter/Timer, Clocks

### Ultra Digital I/O

Full digital I/O flexibility for time stamping, pattern recognition, and synchronizing with external events

### Full-Featured Counter/Timers...

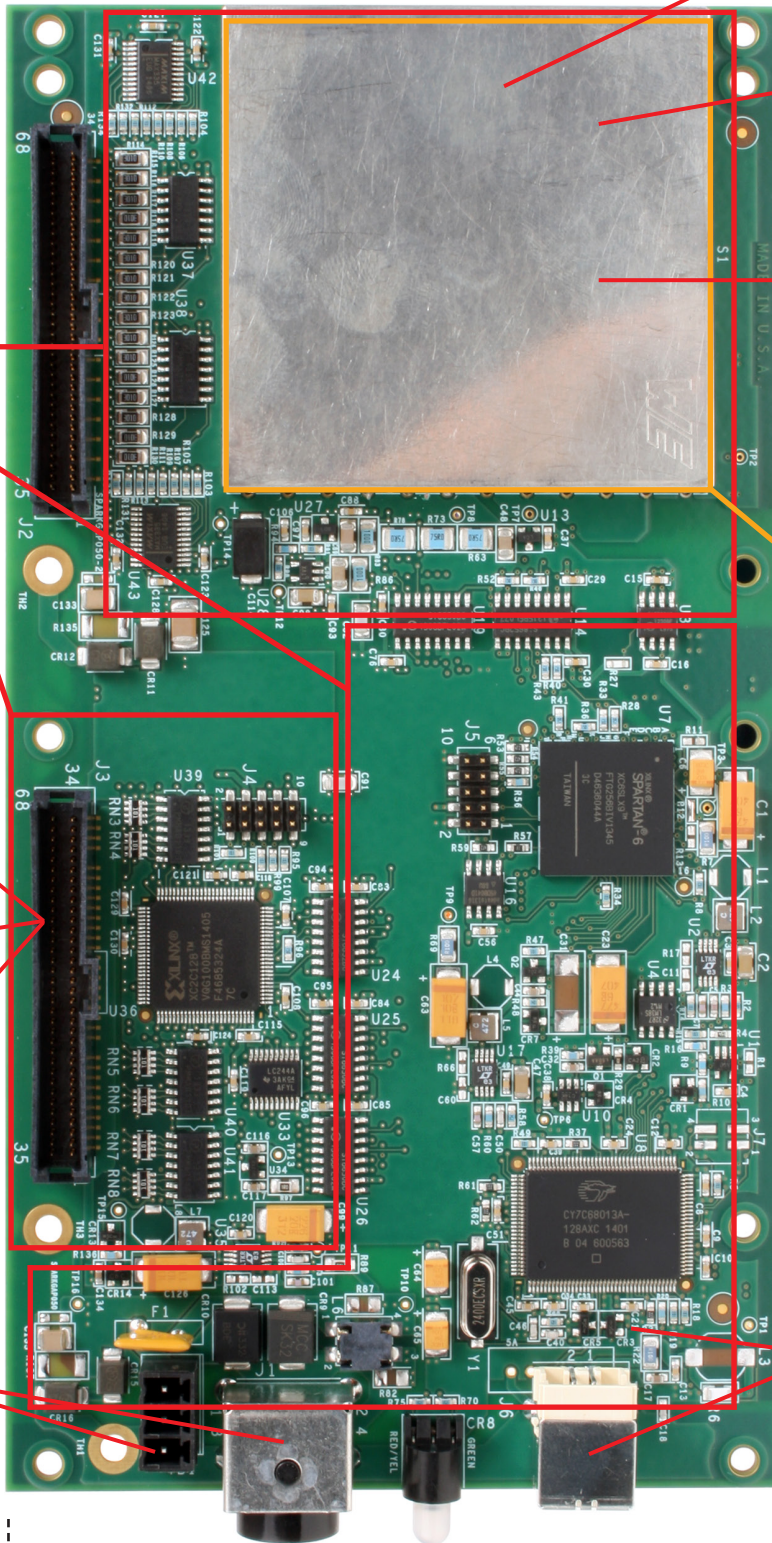
Five 32-bit counter/timers

### External Control

Flexible clocks and triggers

### Flexible Power Connections

+5 V connector; a secondary +5 V connector is provided for embedded applications



### Metal Shield Prevents Noise Coupling from External Circuitry

From ESD, EMI, and RFI

### Wide Bandwidth Amplifiers For Fast Settling and Low Noise

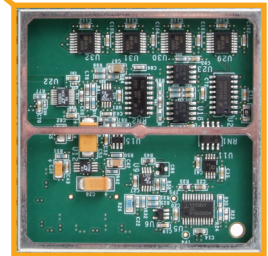
500 kS/s/ch sample rate settles to 0.01% ( $2 \mu\text{sec}$ )

### Precision Measurements

True 20-bit resolution at 1 MS/s sample rate for measuring dynamic signals with no cross-talk

### Critical Analog Circuitry

Located underneath the metal shield



### No Limits

Full simultaneous operation of all subsystems

### Designed for Low Noise

8-layer PCB provides optimal grounding and shielding to maintain signal integrity

### High-Speed USB 2.0

USB 2.0 connector; a secondary USB 2.0 connector is provided for embedded applications

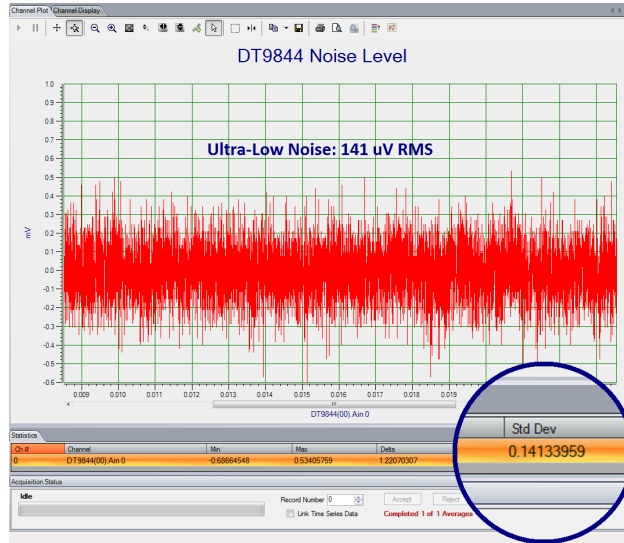
Euro Card Compliance...

100 mm size

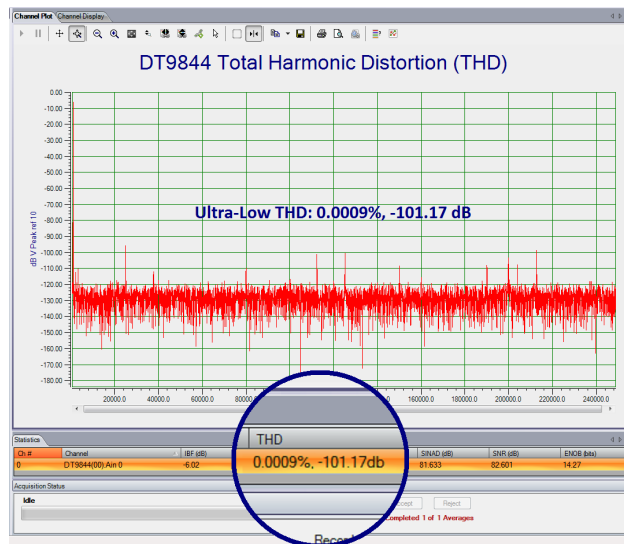
Screw terminal panels are available for the OEM embedded version.

Below are images highlighting the superior dynamic performance characteristics of the DT9844 using QuickDAQ.

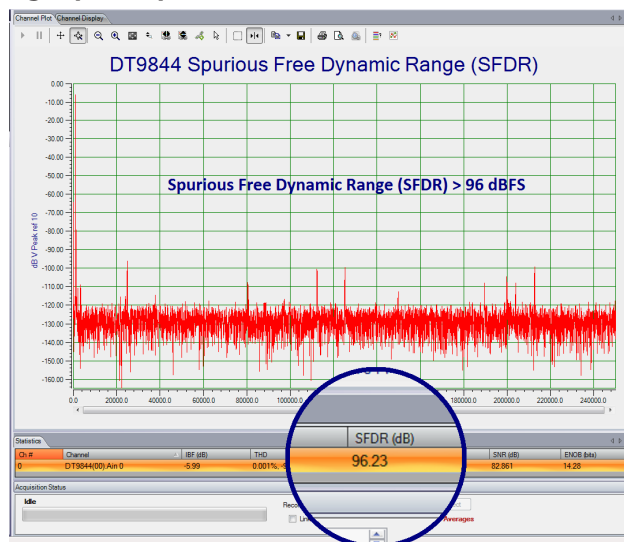
## Noise Level



## Total Harmonic Distortion (THD)



## Spurious Free Dynamic Range (SFDR)



## High-Speed, High-Resolution Analog Inputs

DT9844 modules can be configured as 32 single-ended or 16 differential inputs. All analog input signals are multiplexed to a single analog-to-digital converter. The module features sample rates up to 1 MS/s on a single channel with 20-bit resolution and an input range of  $\pm 10$  V.

**Note:** If using more than one channel requiring the same accuracy, the maximum frequency goes to 640 kS/s.

## Flexible Acquisition Modes

Using the DT9844, you can acquire a single sample from a single analog input channel or multiple samples from multiple analog input channels. A 1024-location channel-gain list gives you the flexibility to sample non-sequential analog input channels, analog input channels with different gains, and digital inputs and counter/timer channels with the analog input channels you want at the A/D sample rate.

## High-Speed Digital I/O Lines

The DT9844 features a digital input port and a digital output port. The digital input port can consist of 16 or 32 digital input lines depending on the resolution, which is programmable. If the digital input subsystem is programmed for a resolution of 16, 16 digital output lines are available through the digital output port. (Note that if the digital input subsystem is programmed for a resolution of 32, no digital output lines are available.) The first eight digital input lines can also be used for interrupt on change. You can read all the digital input lines simultaneously with the analog input channels at the A/D clock rate. The digital input lines can also be clocked separately as the only channel in the channel-gain list at up to 1 MS/s.

## Multifunction Counter/Timers

All DT9844 modules feature five 32-bit user counter/timers. If you wish, you can 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, edge-to-edge measurement, continuous edge-to-edge measurement (for determining the frequency and period width of a signal), continuous pulse output, one-shot, repetitive one-shot, and up/down counting operations.

Programmable gates, clocks, and output signals are also supported.

## Flexible Clocks and Triggers

Each subsystem supports an internal clock and external clock input, as well as the following trigger types: software command, analog threshold, and external digital input trigger.

## Flexible Packaging Configurations

The DT9844 module is available in two packaging configurations: an STP connection box or an OEM embedded version.

The STP configuration is enclosed in a metal box with screw terminals for connecting all signals. It ships with a +5 V galvanically isolated power supply and power cable (EP361), USB 2.0 cable, and Data Acquisition Omni CD.

The OEM configuration, ideal for embedding in test systems, provides all the functionality of the DT9844 in PC-board form. This configuration ships with a USB 2.0 cable and Data Acquisition Omni CD.

## Power

The STP connection box includes a +5 V power supply and power cable for quick setup. OEMs can purchase these options separately as EP361. A secondary power connector is also provided for OEMs to allow custom power wiring.

## $\pm 500$ 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 your computer. DT9844 modules feature a 500 V galvanic isolation barrier that isolates each subsystem from each other and from the host computer to protect your computer from ground-spikes and to ensure a reliable stream of data.

## Cross-Series Compatibility

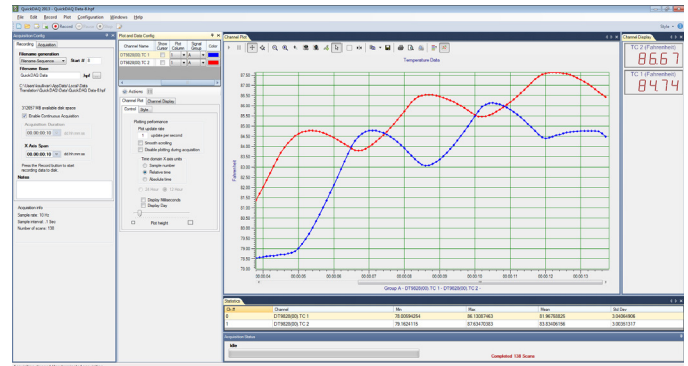
Virtually all Data Translation data acquisition modules are compatible with the DT-Open Layers® software standard. This means any application developed with one of Data Translation's software products can easily be upgraded to a new Data Translation module with little to no reprogramming needed.

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



*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.

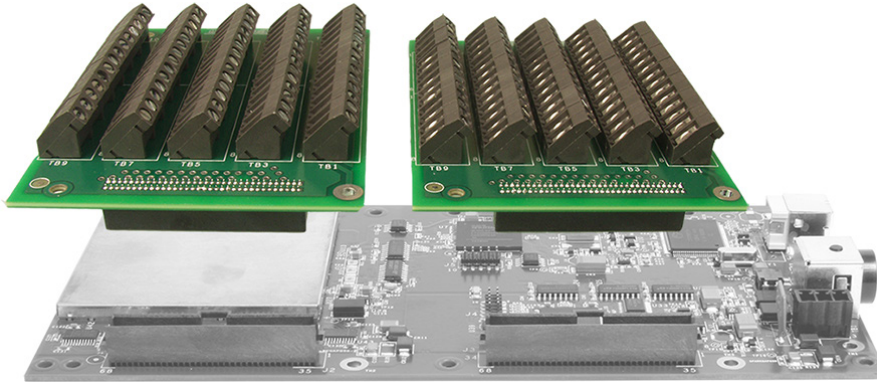
The following software is available for use with the DT9844 module and is provided on the Data Acquisition Omni CD:

- **Device Driver** –The device driver allows you to use a DT9844 module with any of the supported software packages or utilities.
- **Calibration Utility** – This utility allows you to calibrate features of the DAQ 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 DataAcq SDK to use Visual Studio 6.0 and Microsoft® C or C++ to develop application software using Windows 10/8/7/Vista/XP 32/64-bit; 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 OEM Configurations

For applications where you want to embed a DT9844 module inside other equipment, use the OEM packaging configuration (no enclosure) with the following optional accessories:

- **EP355** — This screw terminal panel plugs into connector J2 or J3 on the OEM version of a DT9844 module and provides 14-position screw terminal blocks for attaching analog inputs and digital I/O signals.
- **EP361** — A +5 V power supply. It is included with the STP connection box.



*The EP355 screw terminal panel plugs into the J2 or J3 connector on the OEM version of the DT9844 module.*

## Ordering Summary

### DAQ MODULES

- DT9844-32-STP
- DT9844-32-OEM

### ACCESSORIES

- **EP355** — Screw terminal panel for attaching analog input and digital I/O signals (for OEM configurations only).
- **EP361** — A +5 V power supply (included with STP configurations).
- **BNC DIN Rail Kit** — Kit for mounting USB modules in BNC or STP enclosure to a DIN rail. Includes mounting clips, screws, and instructions. DIN Rail not included.

### FREE SOFTWARE

- **QuickDAQ**
- **DAQ Adaptor for MATLAB** — Access the analysis 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)