

DT9834 Series

High-Performance Multifunction USB Data Acquisition Modules

DT9834 Series

High Performance, Multifunction USB DAQ

Key Features:

- **Simultaneous subsystem operation** on up to 32 analog input channels, 4 analog output channels, 32 digital I/O lines, and 5 counter/timers
- **500 kHz throughput** on both the A/D and D/A with 16-bit resolution
- **Four deglitched analog outputs** for smooth waveform generation
- **32 digital input/output lines** that can be clocked synchronously with one bank of eight digital input lines that also support interrupt-on-change
- **Five 32-bit counter/timer channels** that can be clocked synchronously at the analog input rate
- **Flexible clocking and triggering**
 - **Independent clock sources** (internal and external TTL-level) for pacing analog inputs and analog outputs.
 - **Independent trigger sources** (internal, external TTL-level, and external analog threshold) for starting analog input and analog output operations
 - **Flexible acquisition modes** (single value, continuous, and triggered scan) for input operations, and flexible output modes (single value, continuous, and waveform generation) for output operations
- **500 volt galvanic isolation** prevents ground loops, maximizes analog signal integrity, and protects your computer.



Figure 1. DT9834 Series modules are available in three configurations: BNC or STP connection box and OEM embedded version. (STP connection box available for the 32-analog input channel version only).

- **High-speed USB 2.0** for transferring data at rates up to 480 Mbps
- **Many software choices** available for application development from ready-to-measure programs like quickDAQ to full graphical programming with Measure Foundry

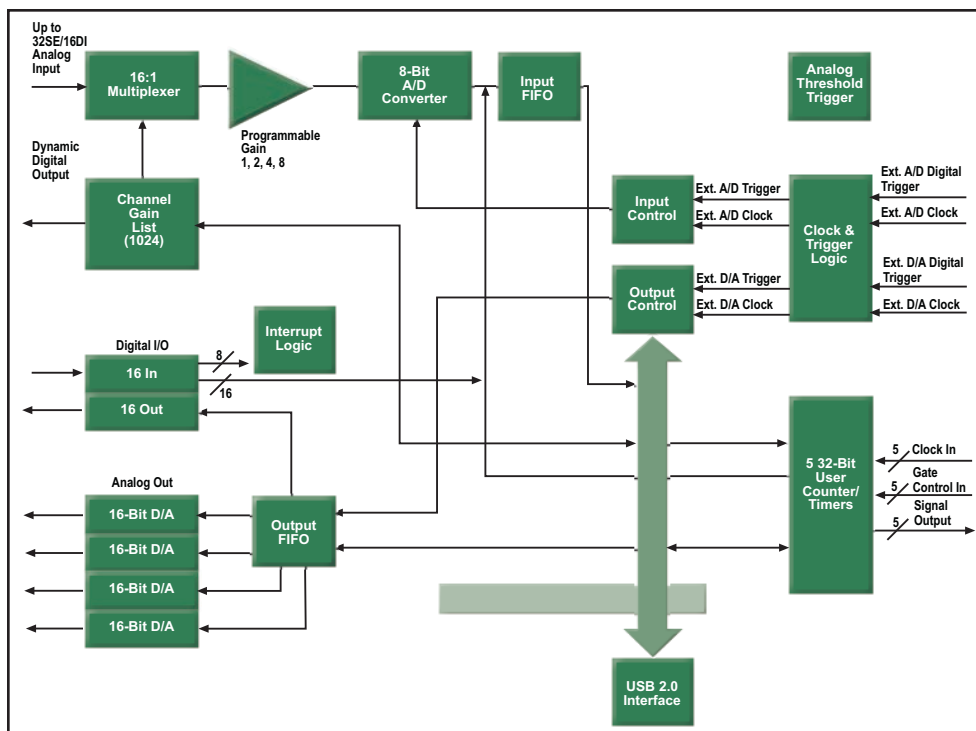


Figure 2. The DT9834 Series provides USB 2.0 multifunction modules for simultaneous A/D, D/A, DIO, and C/T subsystem operation. This detailed block diagram shows the relationship of each subsystem and the control signals used in the series. For flexible, cost-effective solutions, you can choose the number of analog I/O channels as well as the packaging configuration that suits your application.

Easy Signal Connections BNC Connection Box

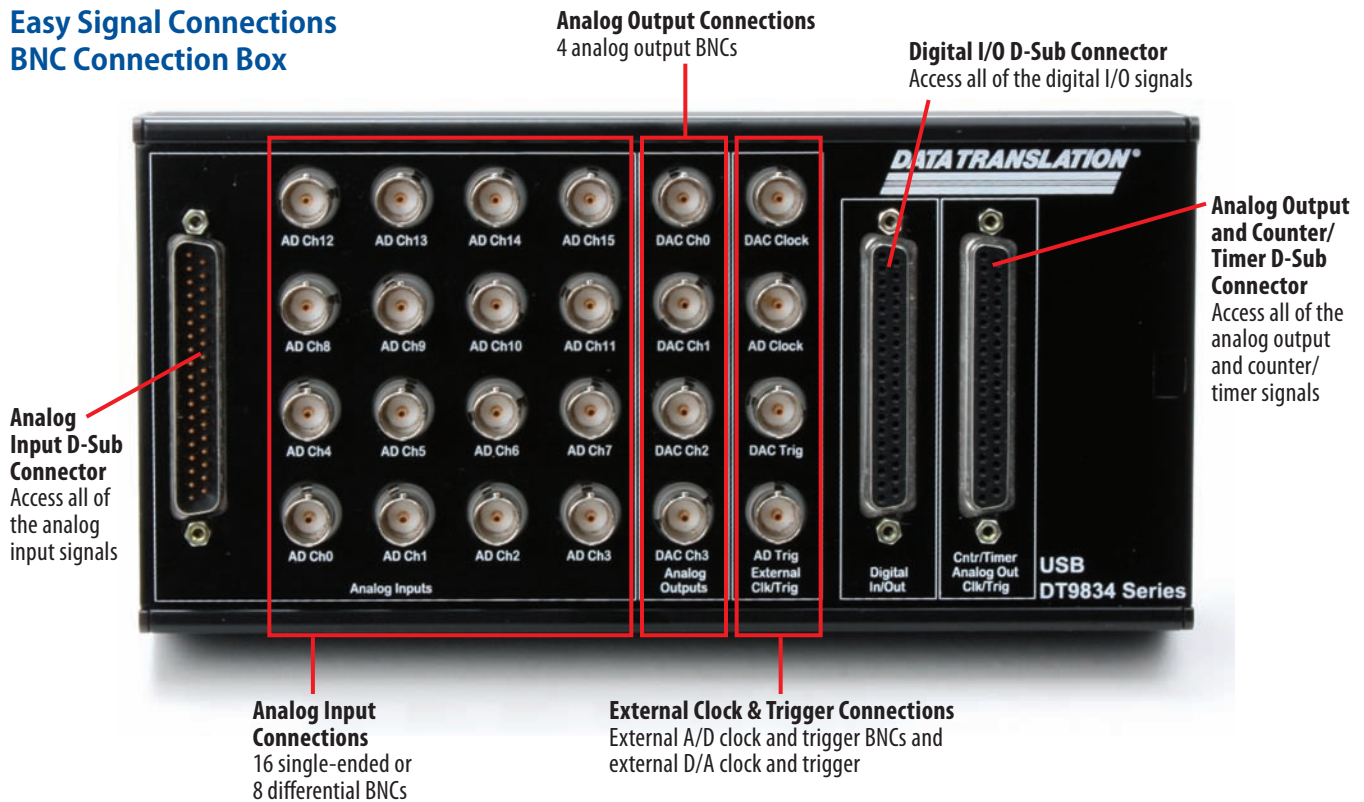


Figure 3. The BNC connection box is available for easy signal connections.

BNC Box Assembly

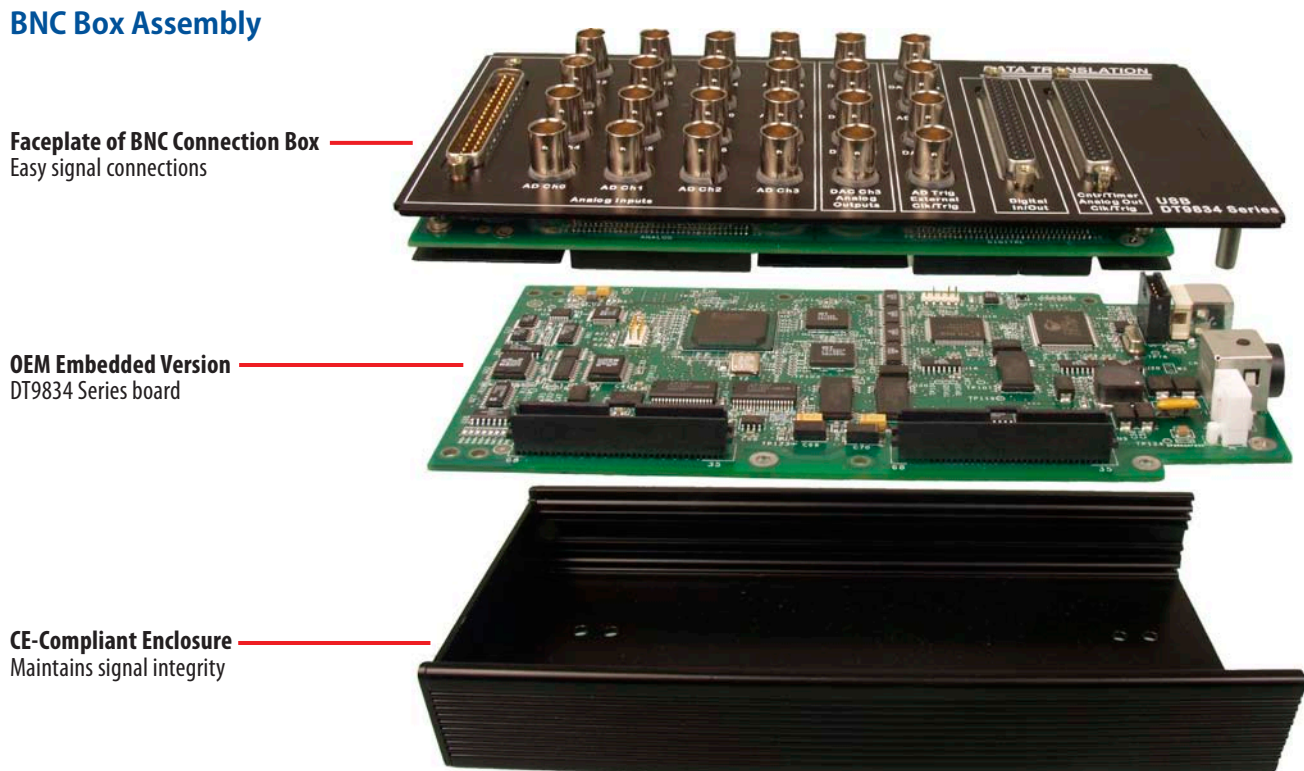


Figure 4. The BNC connection box packages the OEM embedded version of the DT9834 Series in a CE-compliant enclosure.

Easy Screw Terminal Connections STP Connection Box

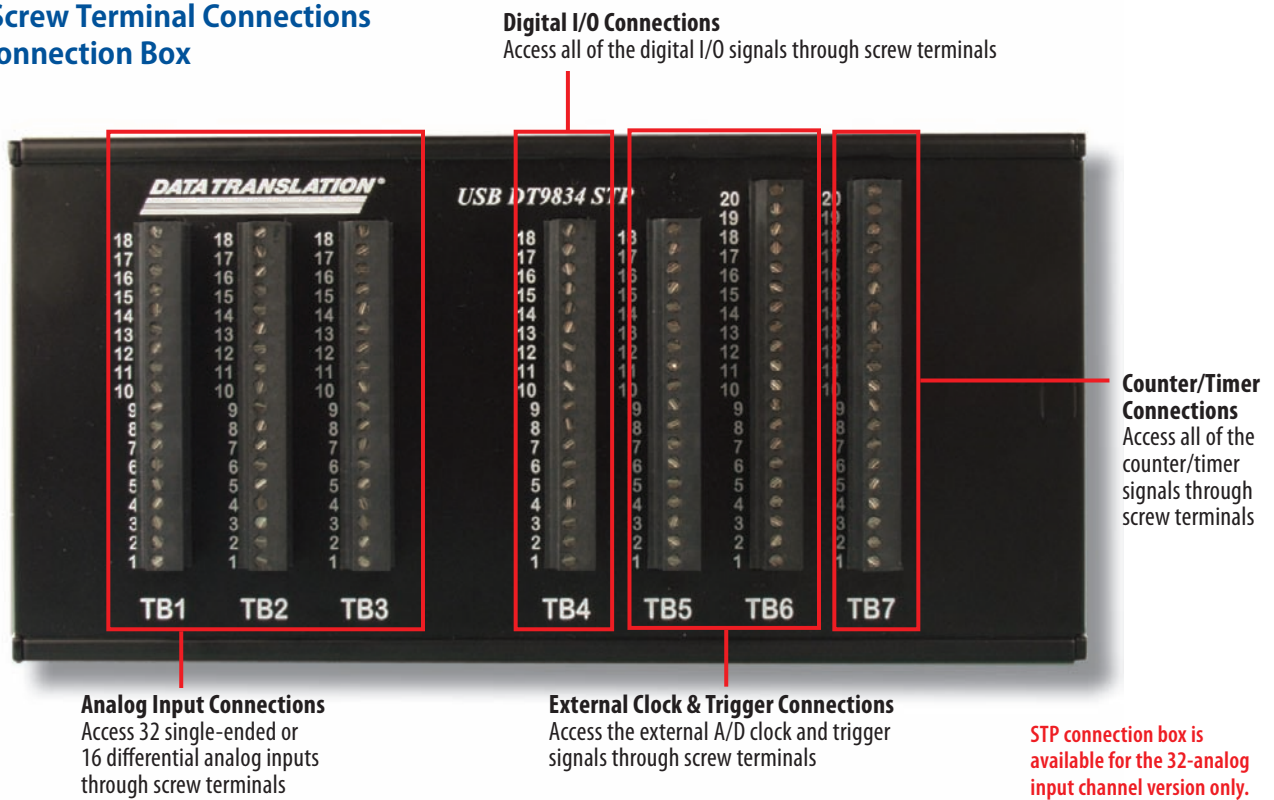


Figure 5. The STP connection box is available for easy signal connections on the 32-channel version of the module.

STP Box Assembly

Pluggable Screw Terminals
Easy wiring

Faceplate of STP Connection Box
Easy signal connections

OEM Embedded Version
DT9834 Series board

CE-Compliant Enclosure
Maintains signal integrity

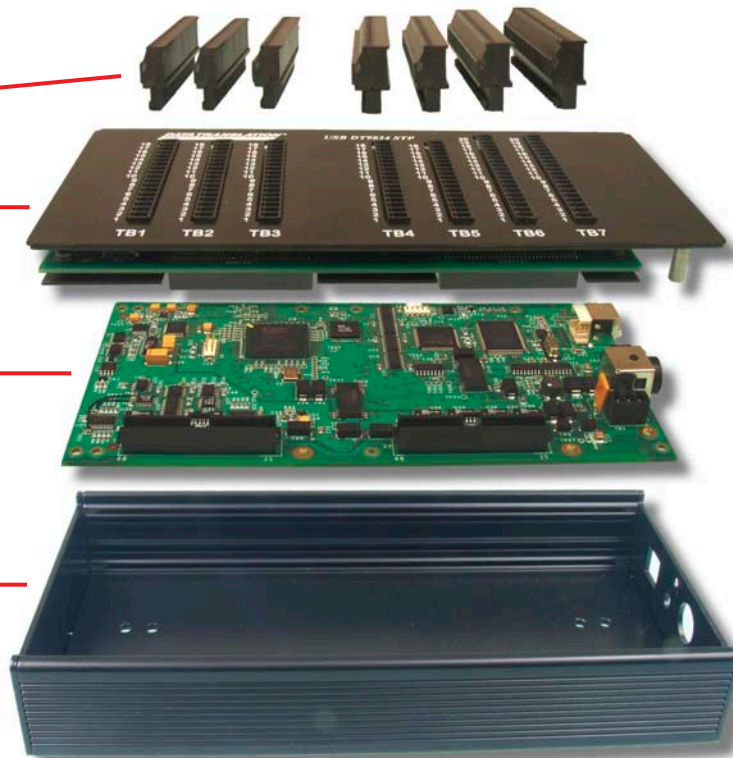


Figure 6. The STP connection box packages the OEM embedded version of the DT9834 Series in a CE-compliant enclosure with screw terminal connections.

Uncompromised, High-Integrity Performance OEM Embedded Version

Clean Signal Connection...

Up to 32 high-speed analog input channels

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 ideal for automotive testing applications

Pure Signal Generation...

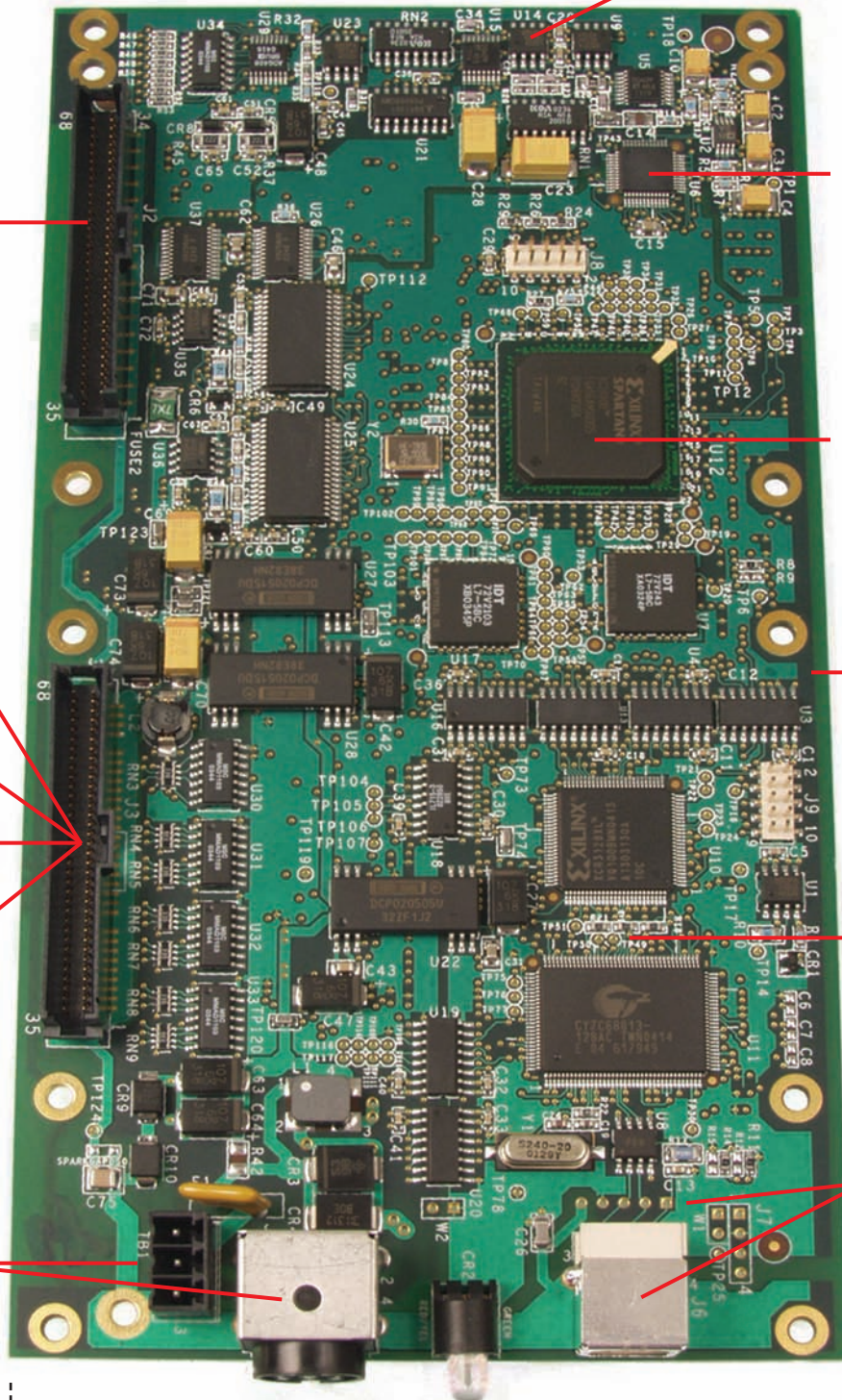
Four waveform, deglitched DACs

External Control...

Flexible clocks and triggers

Flexible Power Connections...

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



High Throughput...

Two-stage instrumentation amplifiers in series maintain high-speed throughput

Precision Measurements...

True 16-bit resolution at 500 kHz throughput for measuring dynamic signals

No Limits...

Full simultaneous operation of all subsystems

Designed for Low Noise...

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

Fully Protected...

500 V galvanic isolation protects your computer and maintains 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

Figure 7. Screw terminal panels are available for the OEM embedded version.

Overview

The DT9834 Series combines the functionality of multiple boards in a single USB 2.0 module to provide simultaneous analog input, analog output, digital I/O, and counter/timer operations. Available in a number of configurations, the DT9834 Series provides maximum flexibility - select the number of analog I/O channels as well as the packaging configuration for your application. All modules feature 16 digital input lines, 16 digital output lines, and 5 counter/timer channels.

High-Speed, High-Resolution Analog Inputs

DT9834 Series modules are available in three analog input channel configurations: 32 single-ended/16 differential, 16 single-ended/8 differential, or no analog inputs. All analog input signals are multiplexed to a single analog-to-digital converter. All modules feature sampling rates up to 500 kSamples/s with 16-bit resolution.

Four programmable gains (1, 2, 4, and 8) are provided to support input signal ranges of ± 10 V, ± 5 V, ± 2.5 V, and ± 1.25 V. By configuring each analog input channel for the input range that you want, you can connect many output transducers directly to the module.

Flexible Acquisition Modes

Using the DT9834 Series, 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.

DT9834 Series modules provide two ways to cycle through the channel-gain list:

- Continuous scan mode – Choose this mode if you want to accurately control the period between conversions of individual channels in the channel-gain list.
- Triggered scan mode – Choose this mode if you want to accurately control both the period between conversions of individual channels in the channel-gain list and the period between each scan. This mode emulates a sample-and-hold function and is useful when synchronizing or controlling external equipment, or when acquiring a buffer of data on each trigger. Using this mode, you can acquire up to 262,144 samples per trigger (256 times per trigger x 1024-location channel-gain list).

High-Speed, High-Resolution Analog Outputs

DT9834 Series modules are available in two analog output channel configurations: 4 deglitched analog output channels, or no analog output channels. Each analog output channel has its own digital-to-analog converter and provides an output signal range of ± 10 V. You can achieve a maximum update rate of 500 kSamples/second with 16-bit resolution.

You can update the analog output channels as you are acquiring analog input data for gap-free simultaneous stimulus and response. In addition, you can update the digital output lines with the analog output channels at the analog output rate.

Flexible Output Modes

Using the DT9834 Series, you can output a single value from a single analog output channel or multiple values from multiple analog output channels. An output-channel list gives you the flexibility of updating only the analog output channels you want or updating the digital output lines with specified analog output channels at the D/A clock rate. You can update analog output channels at up to 500 kSamples/s.

The DT9834 features the following output modes:

- Continuous output mode – Choose this mode if you want to accurately control the period between conversions of individual output channels in the output-channel list.
- Waveform mode - Use this mode if you want to output waveforms repetitively from an output FIFO on the module, minimizing communication overhead with the host computer. If you specify only one channel in the output-channel list, you can load a waveform containing up to 128 kSamples into the output FIFO. If you specify all the analog output channels and the digital output lines in the output-channel list, you can load a waveform containing up to 24 kSamples into the output FIFO. Using waveform mode, you can update multiple channels at up to 500 kSamples/s.

High-Speed Digital I/O Lines

DT9834 Series modules feature 16 digital input lines and 16 digital output lines. 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 500 kSamples/second.

For digital output operations, you can update all the digital output lines with the analog output channels at the D/A rate. A dynamic digital output line is also provided for synchronizing external devices. You can program this line to change state as an analog input channel is read.

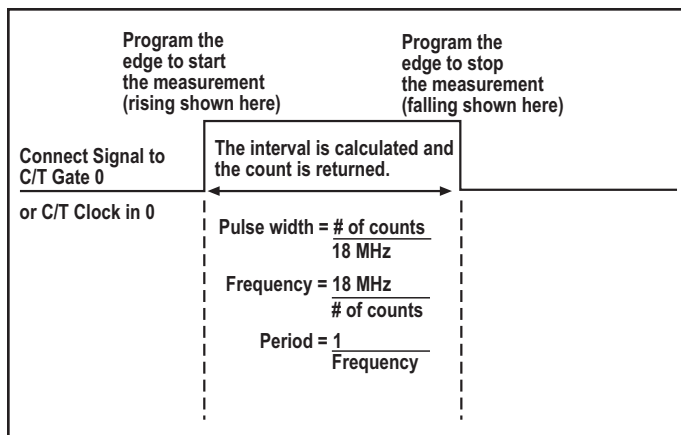


Figure 8. Programmable edges allow you to use counter/timers to measure the pulse width, frequency, and period of signal.

Flexible Clocks and Triggers

For maximum flexibility, all DT9834 Series modules provide independent clocks and triggers for the A/D and D/A subsystems. This allows you to trigger and clock the analog output subsystem 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, analog threshold, and external digital input trigger.

Multifunction Counter/Timers

All DT9834 Series 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. To read the frequency period of a signal as part of the analog input data stream, use continuous edge-to-edge measurement mode.

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

Flexible Packaging Configurations

DT9834 Series modules are available in three packaging configurations: a BNC or STP connection box or an OEM embedded version. The BNC connection box is available for 16 single-ended channels, 8 differential channels, or 0 analog input channels. The BNC configurations are enclosed in metal boxes with standard BNC and D-sub connectors, 4 BNCs for connecting analog outputs, and 4 BNCs for connecting external clocks and triggers. The STP connection box is available for 32 single-ended channels or 16 differential analog input channels. The STP configuration is enclosed in a metal box with screw terminals for connecting all signals.

The BNC and STP configurations ship 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 DT9834 Series in PC-board form. This configuration ships with a USB 2.0 cable and Data Acquisition OMNI CD.

Power

The BNC and STP connection boxes include a +5 V power supply and power cable for quick setup. OEMs can purchase these options separately as EP361 (see Figure 10). A secondary power connector is also provided for OEMs to allow custom power wiring (see Figure 11).

USB 2.0 Compatibility

The DT9834 Series is fully compatible with USB 2.0 and USB 1.1. USB 2.0 extends the speed of connection to up to 480 Mbps. For optimal performance, it is recommended that you use the DT9834 Series with a USB 2.0 port. The DT9834 Series can be used with a USB 1.1 port, but at USB 1.1 performance.

500 V Galvanic Isolation Protects Your Data

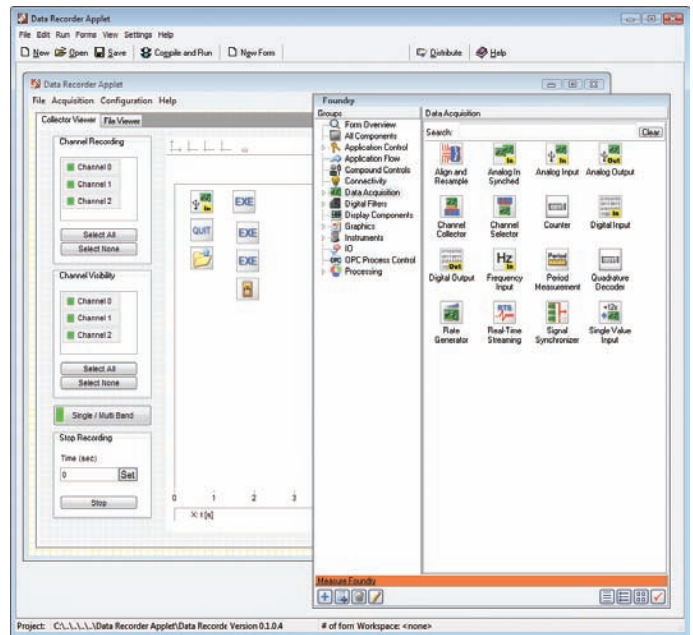
Computers are susceptible to ground-spikes through any external port. These spikes can cause system crashes and may even cause permanent damage to your computer. DT9834 Series modules feature 500 Volts of galvanic isolation to protect your computer from ground-spikes and to ensure a reliable stream of data.

Software Options

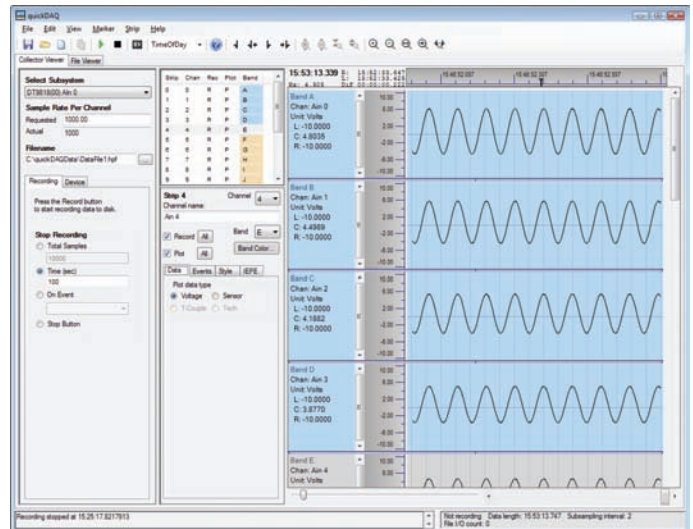
Many software choices are available for application development, from ready-to-measure applications to programming environments.

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

- **DT9834 device driver** – The device driver allows the use of a DT9834 module with any of the supported software packages or utilities.
- **Measure Foundry®** – An evaluation version of this software is included on the Data Acquisition Omni CD. Measure Foundry® is a drag-and-drop test and measurement application builder designed to give top performance with ease-of-use development.
- **Measurement Applets** – Included in the Measure Foundry evaluation version. These small applications, developed with Measure Foundry, can be modified or combined to provide a specific solution. Order the full development version of Measure Foundry to develop applications using real hardware.
- **quickDAQ application** – An evaluation version of this .NET application is included on the Data Acquisition Omni CD. quickDAQ acquires analog data from all devices supported by DT-Open Layers for .NET software at high speed, plots it during acquisition, analyzes it, and/or saves it to disk for later analysis. Note: quickDAQ supports analog input functions only. DT9817 and DT9835 modules are DIO only and are not supported.
- **Quick DataAcq application** – The Quick DataAcq application provides a quick way to get up and running using your USB module. 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 for your USB module using Visual Studio® 2003/2005/2008; 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 for your USB module using Windows®; the DataAcq SDK complies with the DT-Open Layers standard.
- **DTx-EZ** – DTx-EZ provides ActiveX® controls, which allows access to the capabilities of your USB module using Microsoft Visual Basic or Visual C++®; DTx-EZ 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** – An evaluation version of this software is included on the Data Acquisition Omni CD. Use LV-Link to use the LabVIEW™ graphical programming language to access the capabilities of your USB module.



The data recorder applet is developed with Measure Foundry and allows you to acquire data, plot it, and save it to disk.



quickDAQ acquires analog data from all devices supported by DT-Open Layers for .NET software at high speed, plots it during acquisition, analyzes it, and/or saves it to disk for later analysis.

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.

Accessories for OEM Configurations

For applications where you want to embed a DT9834 Series module inside other equipment, use the OEM packaging configuration (no enclosure) with the following optional accessories:

- EP361 – A +5 V power supply. It is included with the BNC and STP connection box.
- EP353 – This accessory panel plugs into connector J2 of a DT9834 Series module and provides one 37-pin, D-sub connector for attaching analog input signals and one 26-pin connector for attaching a 5B signal conditioning backplane. (See Figure 16.)
- EP355 – This screw terminal panel plugs into connector J2 or J3 of a DT9834 Series module and provides 14-position screw terminal blocks for attaching analog I/O and digital I/O signals. (See Figure 17.)
- EP356 – This accessory panel plugs into connector J3 of a DT9834 Series module and provides two 37-pin, D-sub connectors. You can use one of these connectors to attach analog output, counter/timer, trigger, and clock signals, and the other connector to attach digital I/O signals. (See Figure 16.)
- EP333 – This cable connects the STP37 screw terminal panel to a 37-pin female connector on the EP356 or BNC box.
- EP360 – This cable connects the STP37 screw terminal panel to a 37-pin male (Analog Input) connector on the EP353 or BNC box.
- STP37 – This screw terminal panel allows you to connect analog input, digital I/O, analog output, counter/timer, and clock/trigger signals from the EP353 or EP356 screw terminal panel, or BNC box.

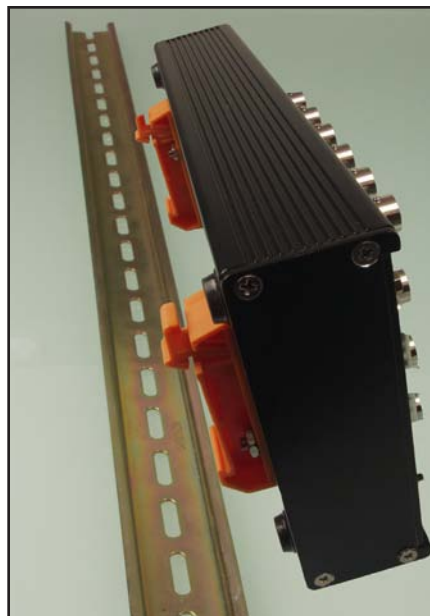


Figure 8. With the optional DIN rail mounting kit (BNC-DIN-RAIL-KIT), you can mount the DT9834 BNC model to a standard DIN rail.

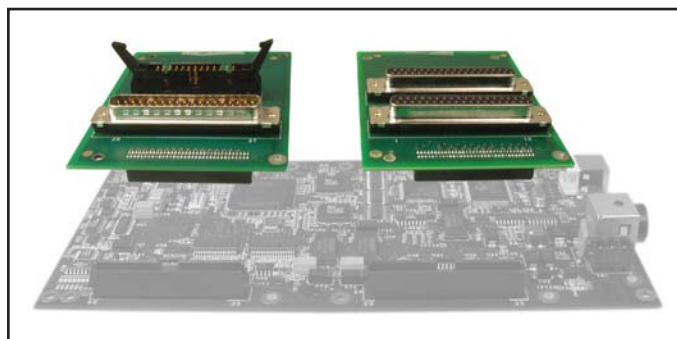


Figure 16. This example shows an EP353 accessory panel, which plugs into connector J2, and an EP356 accessory panel, which plugs into J3.

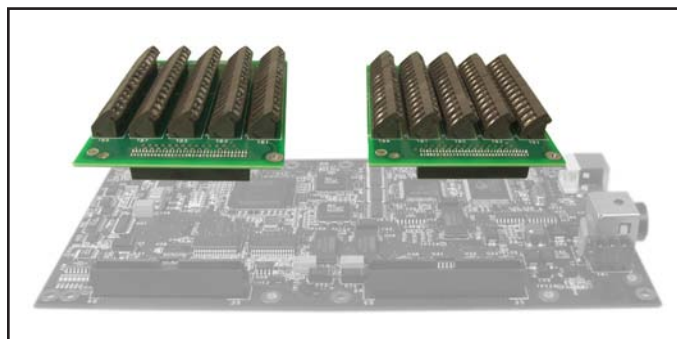


Figure 17. The EP355 screw terminal panel plugs into the J2 or J3 connector of a DT9834 Series module.

Ordering Summary

All Data Translation hardware products are covered by a 1-year warranty. For pricing information, please visit our website or contact your local reseller.

Ordering Guide

DT9834

—XX

—X

—XX

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Analog Inputs

00 = No Analog Inputs
08 = 8 differential
16 = 16 single-ended or
16 single-ended/
8 differential for the
OEM configuration
32 = 32 single-ended/
16 differential
channels

Throughput/Resolution

16 = 16-bit A/D and D/A
@ 500 kHz

Analog Outputs

0 = No Analog Outputs
4 = 4 channels

Package Configuration

OEM = Board-level embedded version for maximum flexibility. No power supply.
BNC = Metal box enclosure with either 16 BNCs for single-ended analog inputs, 8 BNCs for differential analog inputs, or 0 BNCs for not no inputs. 4 BNCs are provided for connecting analog output signals. The BNC box configuration provides 4 BNCs for connecting external clocks and triggers. Power supply and cable included.
STP = Metal box enclosure with connections for up to 32 analog inputs, 32 digital I/O lines, and 5 counter/timers via screw terminals.

Accessories

- **BNC DIN Rail Kit** – Kit for mounting USB modules in BNC enclosure to a DIN rail. Includes mounting clips, screws, and instructions. DIN Rail not included.
- **EP353** – Accessory panel for attaching analog input signals and 5B signal conditioning backplanes (for OEM configurations only).
- **EP355** – Screw terminal panel for attaching analog I/O and digital I/O signals (for OEM configurations only).
- **EP356** – Accessory panel for attaching analog output, counter/timer, trigger, clock signals, and digital I/O signals (for OEM configurations only).
- **EP361** – A +5 V power supply (included with BNC and STP configurations).

Software

The following software is available for purchase separately:

- **Measure Foundry** (SP1300-CD)– Visual, drag-and-drop software development environment for Windows® XP, Vista, and Windows 7.
- **quickDAQ** (SP8501-CD) – High-performance, ready-to-run application that lets you acquire, plot, analyze, and save data to disk at up to 2 MHz per channel.
- **LV-Link** – Access the power of Data Translation boards through LabVIEW™.

Free Software Downloads

The following software is available for free download from our website:

- **DAQ Adaptor for MATLAB** – Access the analysis and visualization tools of MATLAB®.

Module	Analog In	Analog Out	Resolution	Input Ranges*	Throughput	Digital In	Digital Out	Counters	Packaging
DT9834-00-4-16-BNC	—	4	16-bit	—	500 kS/s	16	16	5	BNC
DT9834-00-4-16-OEM	—	4	16-bit	—	500 kS/s	16	16	5	OEM
DT9834-08-0-16-BNC	8DI	—	16-bit	PGH	500 kS/s	16	16	5	BNC
DT9834-08-4-16-BNC	8DI	4	16-bit	PGH	500 kS/s	16	16	5	BNC
DT9834-16-0-16-BNC	16SE	—	16-bit	PGH	500 kS/s	16	16	5	BNC
DT9834-16-0-16-OEM	16SE/8DI	—	16-bit	PGH	500 kS/s	16	16	5	OEM
DT9834-16-4-16-BNC	16SE	4	16-bit	PGH	500 kS/s	16	16	5	BNC
DT9834-16-4-16-OEM	16SE/8DI	4	16-bit	PGH	500 kS/s	16	16	5	OEM
DT9834-32-0-16-STP	32SE/16DI	—	16-bit	PGH	500 kS/s	16	16	5	STP
DT9834-32-0-16-OEM	32SE/16DI	—	16-bit	PGH	500 kS/s	16	16	5	OEM

*PGH input range: $\pm 10, 5, 2.5, 1.25$ volts.