DT3034

High-Speed, Highly Accurate DAQ Board for the PCI Bus

- **500kHz throughput** on up to 32 single-ended or 16 differential analog input channels with 16 bit resolution.

- **500kHz throughput** on two analog output channels with 16 bit resolution.

- **ENOB rating of 14.2 bits** with a Signal-to-Noise Ratio of 100dB for the cleanest, most accurate signals available..

- **Drive solid state relays** over 16 digital I/O lines.

- **Simultaneous subsystem operation** at full speed without losing data.

- **Flexible clocking and triggering** for any application need.

- **Fully supported by DT-Open Layers for .NET Class Library** for developing test and measurement application with Visual Basic .NET and C#.
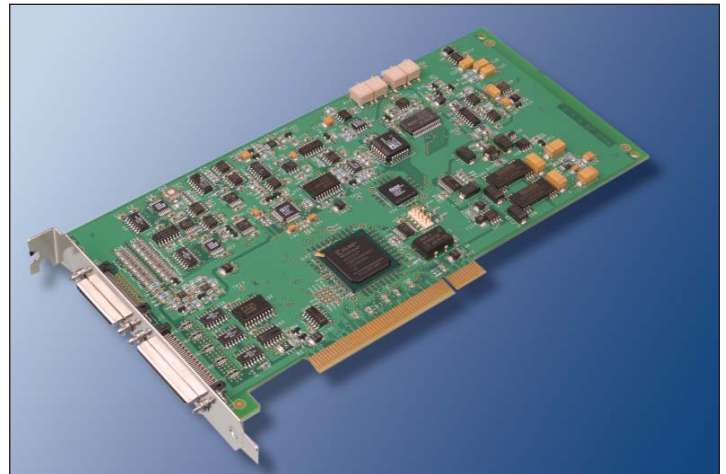
- **Fully RoHS-compliant** lead-free design.

Figure 1. The DT3034 is a high-speed, high resolution data acquisition board for the PCI Bus.

	A/D Channels@ Throughput	Analog I/O Resolution	D/A Channels@ Throughput	DIO/CT	Output FIFO	Applications
						Semiconductor testing, device characterization, automotive testing, scientific analysis.
DT3034	16/32 ch @ 500 kHz	16-bit	2 ch @ 500kHz	16/4	4K	

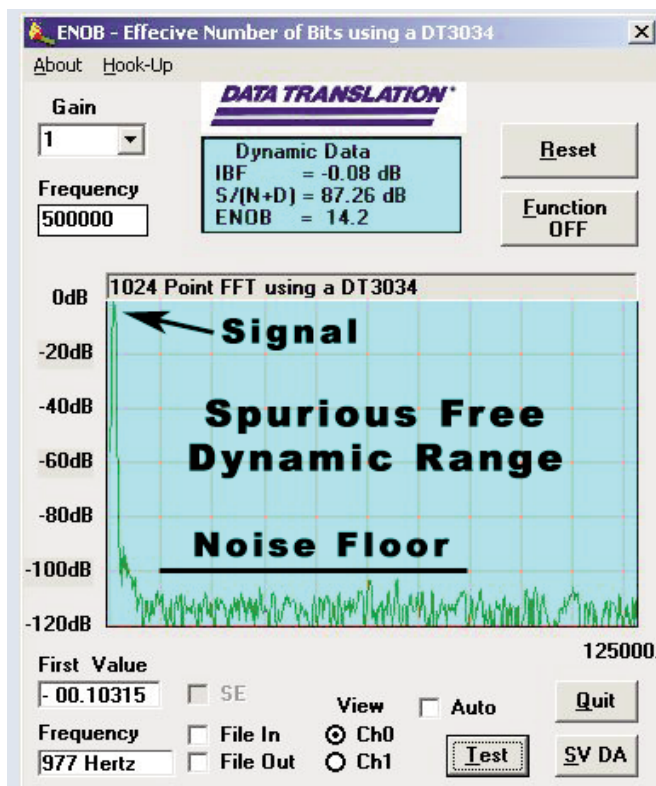**High-Speed Multifunction DAQ Board for PCI**

Figure 2. This graph shows the outstanding quality of the DT3034 when switching channels at full scale, for all error sources ... with ENOB (Effective Number Of Bits) rating of 14.2 bits and an SFDR (Spurious Free Dynamic Range) of 100dB. Since this is the worst case, most users in normal conditions would get even better ENOB ratings.

Note: Signal-to-Noise ratio plus Distortion (as a sum of all peaks) is 87dB.

Overview

The DT3034 is a PCI-compatible, plug-in data acquisition board for high-speed, high accuracy, and high channel-count applications. The DT3034 offer high speed, 16-bit measurements at up to 500kHz, 2 simultaneous analog outputs with throughput rates of 500kHz, 16 digital I/O lines and 4 counter/timers.

Simultaneous Subsystem Operation

The DT3034 can run multiple subsystems simultaneously at full speed without losing data. A custom-designed PCI bus interface chip allows for high-speed, bus mastering data transfers to the PC. By setting aside a block of memory in the PC, the board performs bus-master data transfers without CPU intervention. You can trigger the analog inputs to run synchronously with the analog outputs using the analog threshold trigger or the digital trigger input that is dedicated to the DACs.

Additionally, the analog input subsystem can be run concurrently with the analog output subsystem for gap-free simultaneous stimulus and response.
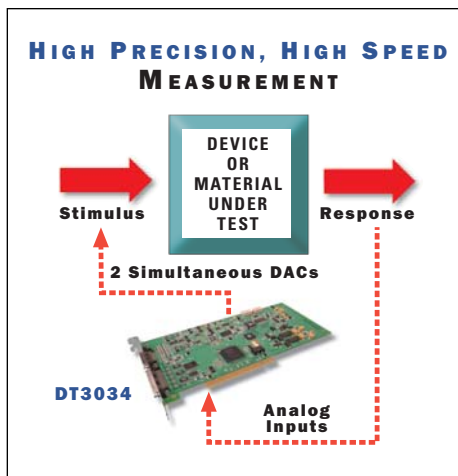
Figure 3. Subsystems can be run simultaneously for gap-free stimulus and response.

Analog Inputs

The 16-bit resolution DT3034 board features 32 single-ended or 16 differential inputs at a maximum sampling rate of 500kHz. The board has software-selectable unipolar or bipolar operation and gain settings of 1, 2, 4 or 8 that accommodate input ranges of 0-10V, 0-5V, 0-2.5V, 0-1.25V, +/-10V, +/-5V, +/- 2.5V, +/-1.25V. An amp low connection allows single-ended inputs to be referenced to a common point other then ground, thus providing 32 pseudo-differential inputs. Hands-off operation lets you calibrate the analog input subsystem through software.
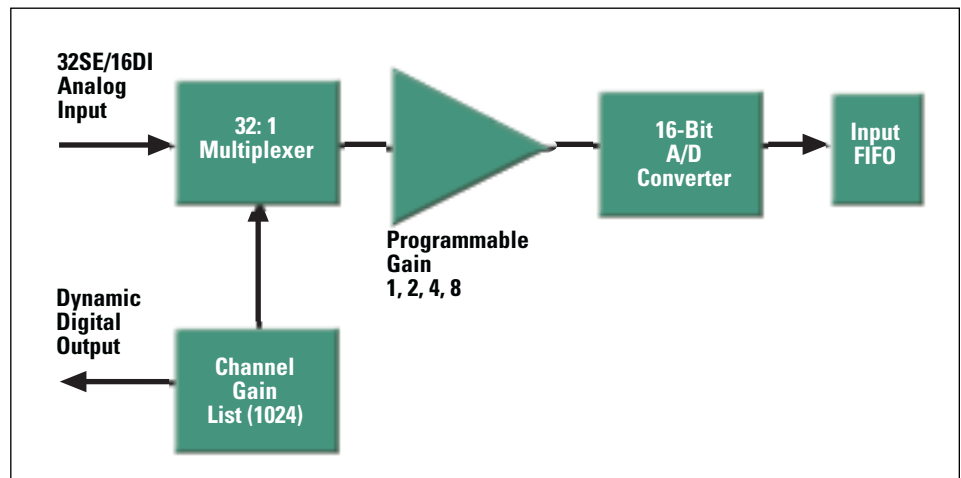
Figure 4. A 32:1 multiplexer provides high channel count A/D conversion at 16-bit resolution.

Channel Gain List

The 1024-location channel-gain list gives the flexibility to sample non-sequential channels and channels with different gains. A single value can be acquired from any channel or a number of samples can be acquired from multiple channels. A multi-channel acquisition is performed by loading the channel gain list and cycling through it continuously or until a specific number of samples are acquired.

Triggered Scan Mode

The triggered scan mode capability of the DT3034 allows scanning through a list of channels at high speed with a programmed interval between scans, emulating a simultaneous sample and hold function. An internal or external clock can be used to pace the acquisition. In addition, the channel-gain list can be cycled through up to 256 times per trigger in the re-trigger mode, acquiring a waveform of data per channel for each trigger, up to 256k samples per trigger.

High-Speed Analog Outputs

The DT3034 features two high-speed, 16-bit analog outputs with a range of +/-10V. An internal or external source triggers the analog outputs. The analog outputs can be updated simultaneously at a rate of up to 500kHz each.

Repetitive waveforms can be loaded into the on-board FIFO and this data can be continuously cycled through. The 4K of board memory can be used for deglitched waveforms from 2 to 4096 samples. The DT3034 also features 20kHz smoothing filters that are software-selectable for each DAC.

Flexible Triggering and Clocking Capabilities

The DT3034 provides flexibility in triggering, both in the trigger modes available and with events causing the trigger. Data can be
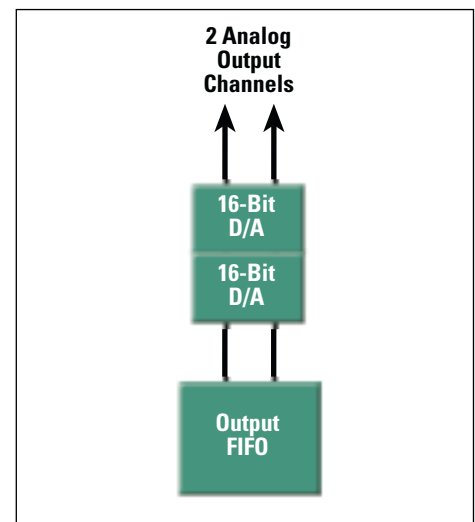
Figure 5. Two, deglitched, 16-bit D/A converters for pure waveform generation.

acquired using post-trigger, pre-trigger and about-trigger modes. Post-trigger allows the user to acquire data after a hardware or software trigger. The pre-trigger mode enables acquisition up until a hardware trigger occurs. Data can be acquired both before and after a hardware trigger, using the about-trigger mode. Either an analog or digital signal can be used as the trigger source. The analog trigger can originate from a dedicated input pin or any of the analog input channels can be designated as the analog trigger input. The level of the analog input trigger can be from -10V to +10V.

The analog inputs and analog outputs can be paced using an internal or an external clock. Set the internal clock to acquire data from one sample per second up to 500ksamples/second. If slower rates are needed, use an external source, or cascade two or more of the user counter/timers and connect the output to the external clock input.
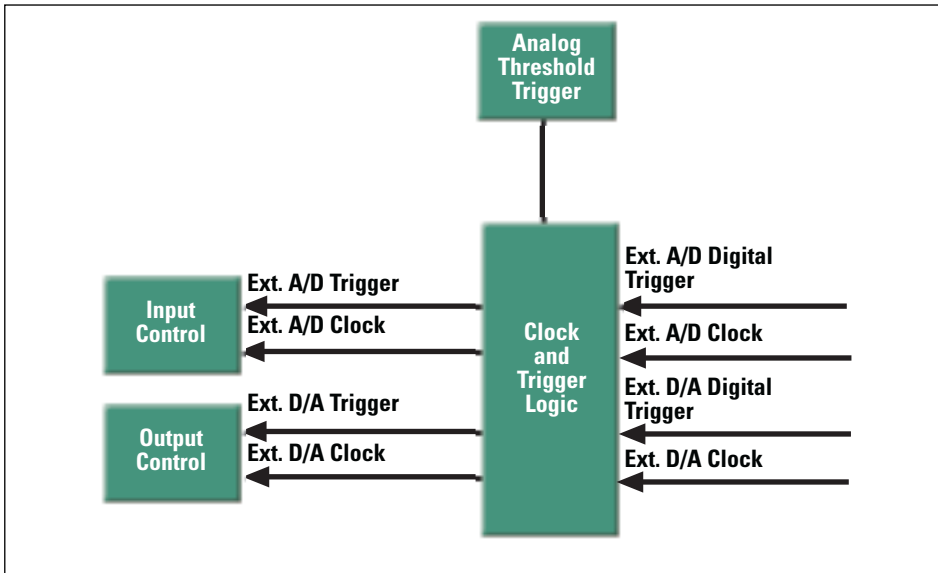
Figure 6. The DT3034 Series offers flexible clocks and triggers to satis-fy any application.

Figure 8. Dedicated counter/timers on every board.

The A/D sample clock and the A/D trigger signals are available on the user connector. Multiple boards or multiple instruments can be synchronized using these outputs.

Digital I/O

This board also features 16 digital I/O lines. They can be programmed in two banks of eight for input or output. Read the status of the digital inputs at high speeds by including the digital inputs as a channel in the analog channel gain list. This dynamic digital input feature allows you to "time stamp" the digital inputs in relation to the analog inputs. In this mode, all digital input lines are read as one word. The digital outputs have sufficient current capability to drive external solid state relay modules (sink 24mA and source 15mA).

The series also includes two dedicated dynamic digital outputs. You can program these outputs to change state as a specified analog input is read, thereby triggering or synchronizing external circuitry or other data acquisition boards.
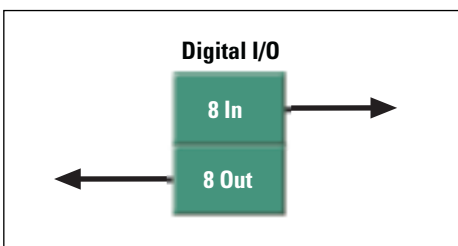

Figure 7. 16 DIO lines can be programmed in banks of 8 for input or outp[ut.

User Counter/Timers

Four dedicated counter/times are available for counting events, creating a one-shot or frequency output, or measuring a frequency output. Cascade two counters internally through software or cascade more then two counters externally on the screw terminal accessory. Set the duty cycle, frequency, and output polarity of the output pulse from the user counter/timers.

User Connections

To maintain the accuracy of your measurements and preserve signal integrity, the analog and digital connections are separate. All analog input and output connections are brought out to a dedicated 50-pin connector on the backplate of the boards. The digital input and output connections are brought out to a dedicated 68-pin connector. The DT740 screw terminal panel is available to simplify connections. The EP307 and EP308 cables complete the system.

Software

All DT3034 Series boards ship with the Omni CD that includes the following software:

■ **DT-Open Layers for .NET with DT-Display:**
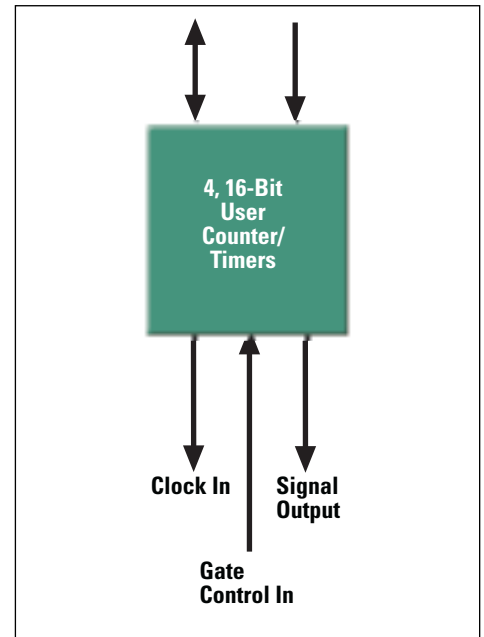The DT-Open Layers for .NET Class Library is a collection of classes, methods, properties, and events that provides a programming interface for DT-Open Layers-compatible hardware devices. It can be used from any language that conforms to the Common Language Specification (CLS), including Visual Basic.NET, Visual C#, Visual C++.NET with managed extensions, and Visual J#.NET.

— **DT-Display for .NET** is a control for plotting data to a Windows form. It provides a powerful and user-friendly interface for rendering data.

■ **DT-Open Layers for Win32:**
DT-Open Layers for Win32 consists of the DataAcq SDK and DTx-EZ.

— The **DataAcq SDK** consists of the necessary header files, libraries, example programs, and documentation to develop your own DT-Open Layers data acquisition and control applications. It is intended for use with non .NET languages, such as ANSI C, Visual C++ 6.0, and Visual Basic 6.0.

— **DTx-EZ** provides visual programming tools for Microsoft Visual Basic and Visual C++ that enable quick and easy development of test and measurement applications.

Note: If you have an existing application that was written using the DataAcq SDK, we recommend that you migrate your application to use the DT-Open Layers for .NET Class Library. This will guarantee compatibility with future Data Translation hardware and software.

- **Drivers:**
  The 32-bit WDM device drivers make your application cross-platform compatible. These drivers support Data Translation USB and PCI boards using Windows 2000/XP.

You can choose to install demo versions of the following software from the CD:

- **Measure Foundry** is an open, powerful application builder for test and measurement systems. No programming is required!

- **LV-Link** contains all necessary VIs, examples, and documentation to use Data Translation hardware in LabVIEW 8.0 and greater.

- **quickDAQ** is a high-performance, ready-to-run application that lets you acquire, plot, analyze, and save data to disk at up to 2 MHz per channel without writing any code. quickDAQ supports applications from temperature measurement to high-speed testing and analysis.

The following software is available as a free download from our website:

- **DAQ Adaptor for MATLAB**™ to access the visualization and analysis capabilties of MATLAB from The MathWorks™.

Cross-Series Compatibility Saves Programming Time, Protects Your Investment

Virtually all Data Translation data acquisition boards, including the DT3034 Series, 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 programming is needed.

User Manuals

Each DT3034 Series board includes a user's manual. Manuals are provided in electronic (PDF) format on the Omni CD that is shipped with the module. You can also purchase hard copies, if desired.

Technical Support

As you develop your application, technical support is available when you need it. Extensive information is available 24 hours a day on our web site at www.datatranslation.com, including drivers, examples, a searchable Knowledgebase, and much more. You can also request complimentary support via email or fax at any time.

- **Click here for specifications.**
- **Click here for block diagram.**