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DT3016

High-Speed, Multifunction PCI Data Acquisition Board

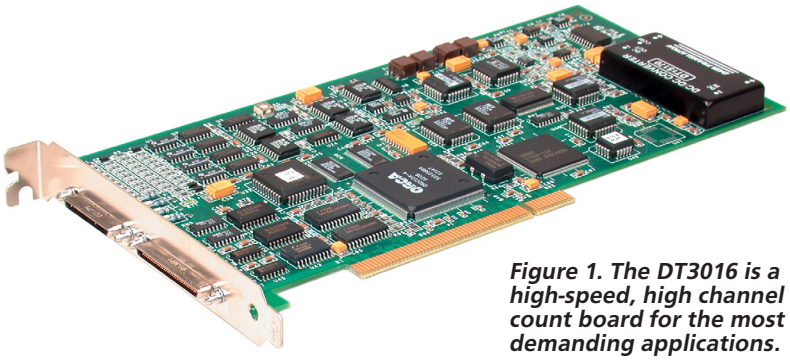


Figure 1. The DT3016 is a high-speed, high channel count board for the most demanding applications.

The DT3016 provides a full range of PCI-compatible, plug-in data acquisition boards for high-speed, high accuracy, and high channel-count applications. The DT3016 offers high accuracy, 16-bit measurements at throughput rates up to 250kHz. Additionally, this board offers 2 high-speed analog output channels, 16 digital I/O lines, and 4 counter/timers. The DT3016 is RoHS compliant.

Simultaneous Subsystem Operation

The DT3016 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.

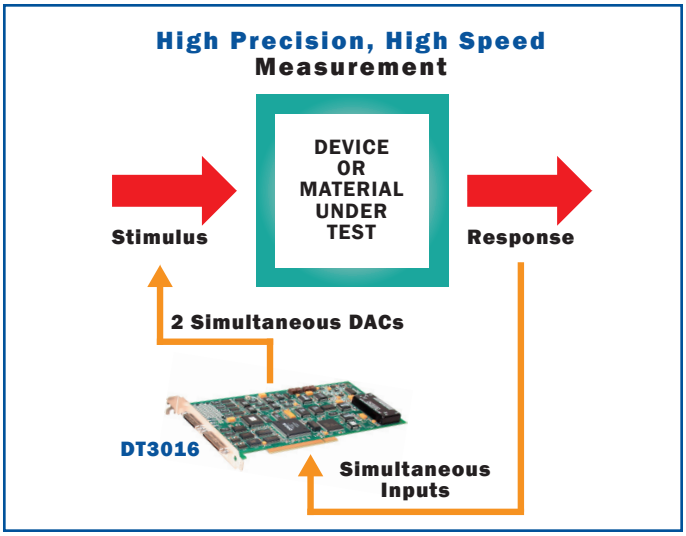


Figure 2. Subsystems can be run simultaneously for gap-free stimulus and response.

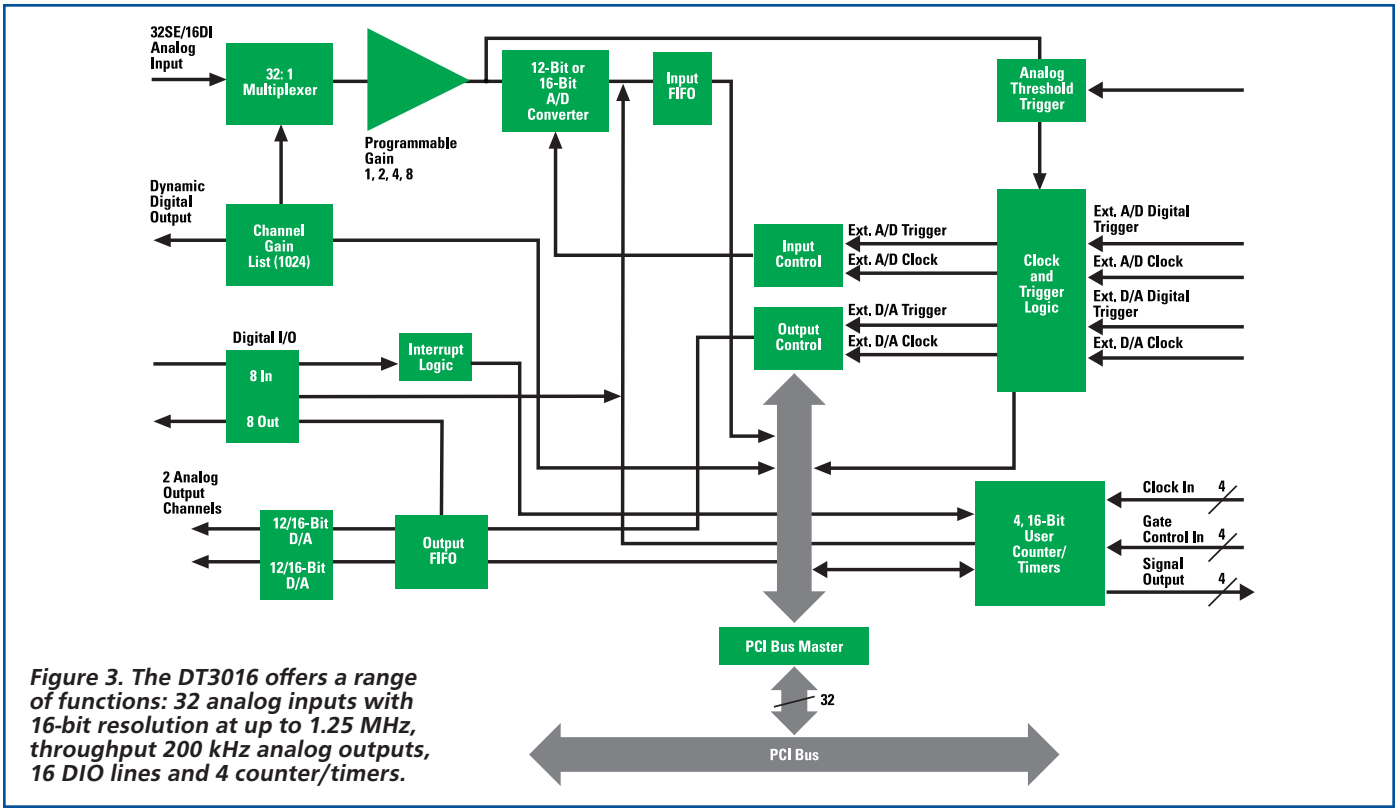


Figure 3. The DT3016 offers a range of functions: 32 analog inputs with 16-bit resolution at up to 1.25 MHz, throughput 200 kHz analog outputs, 16 DIO lines and 4 counter/timers.

Analog Inputs

The 12-bit resolution DT3016 features 32 single-ended or 16 differential inputs at a maximum sampling rate of up to 250kHz. 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.

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 DT3016 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 DT3016 features two high-speed, 16 bit outputs, both 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 200kHz each for the DT3016.

Repetitive waveforms can be loaded into the on-board FIFO and this data can be continuously cycled through. The 4K of board memory on the DT3016 can be used for deglitched waveforms from 2 to 4096 samples. The DT3016 also features 20kHz smoothing filters that are software-selectable for each DAC.

Flexible Triggering and Clocking Capabilities

The DT3016 provides flexibility in triggering, both in the trigger modes available and with events causing the trigger. Data can be 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 250ksamples/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.

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

All boards in this series 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.

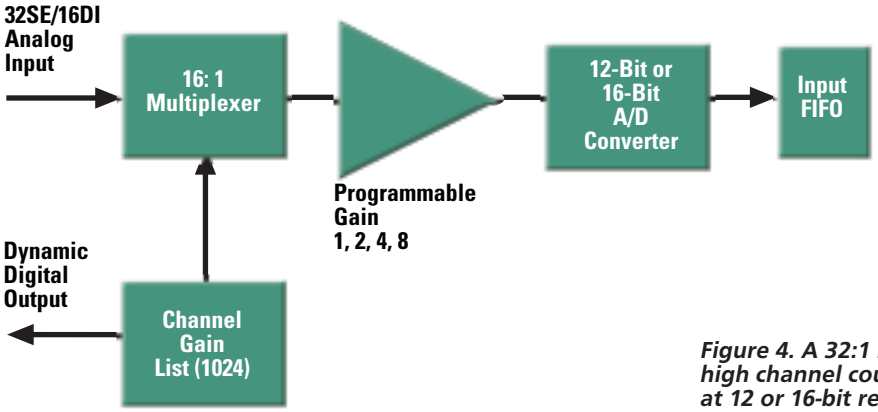
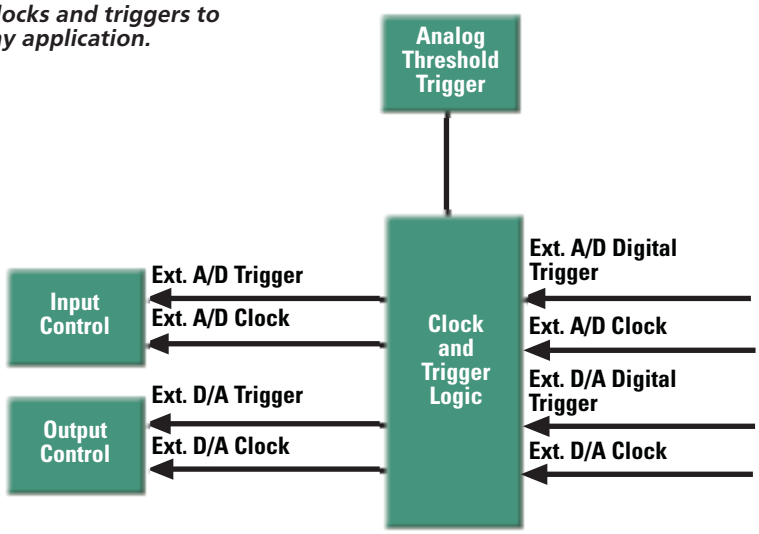


Figure 4. A 32:1 multiplexer provides high channel count A/D conversion at 12 or 16-bit resolution.



Figure 5. Two, deglitched, 16-bit D/A converters for pure waveform generation.

Figure 6. The DT3016 offers flexible clocks and triggers to satisfy any application.



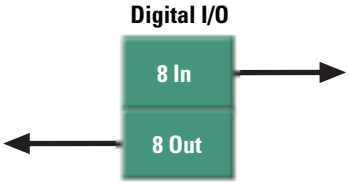


Figure 7. 16 DIO lines can be programmed in banks of 8 for input or output.

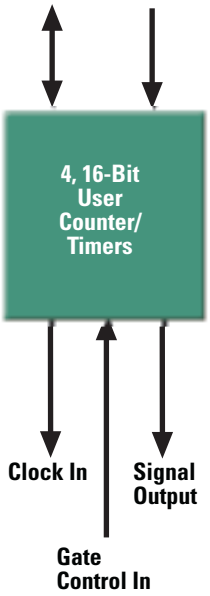


Figure 8. Dedicated counter/ timers on every board.

User Counter/Timers

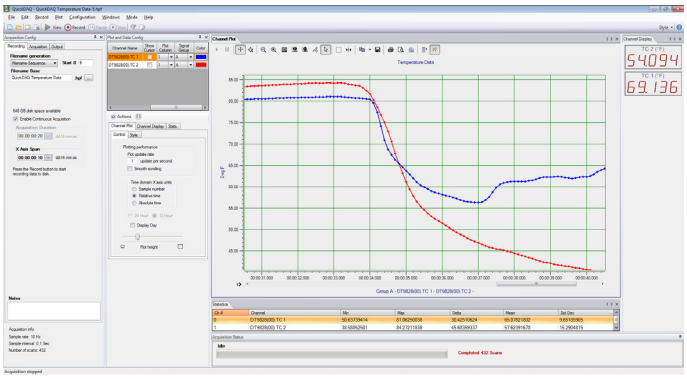
Four dedicated counter/times are available for counting events, creating a one-shot or frequency output, or measuring a frequency output. Cascade two counters internally through software or cascade more then two counters externally on the screw terminal accessory. Set the duty cycle, frequency, and output polarity of the output pulse from the user counter/timers. These four user counter/timers are in addition to the two 24-bit counter/timers dedicated to clocking and triggering in the A/D subsystem.

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.

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.



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

QuickDAQ

QuickDAQ allows you to acquire and display from all Data Translation 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
  - 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
  - Supports real, imaginary, and Nyquist display functions
  - Additional FFT analysis functions supported: Exponential, Force, Cosiner Taper
  - Save data to .uff file format

Other Software Options

The following software is available for free and provided on the Data Acquisition Omni CD:

- **Device Driver** –The device driver allows you to use the PCI DAQ board with any of the supported software packages or utilities.
- **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.

Ordering Summary

HARDWARE

- **DT3016** — High-speed PCI data acquisition board.

ACCESSORIES

- **DT740** — Screw terminal panel
- **EP307** — 1m, 50-pin shielded cable
- **EP307-3** — 3m, 50-pin shielded cable
- **EP308** — 1m, 68-pin shielded cable
- **EP308-3** — 3m, 68-pin shielded cable

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)

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