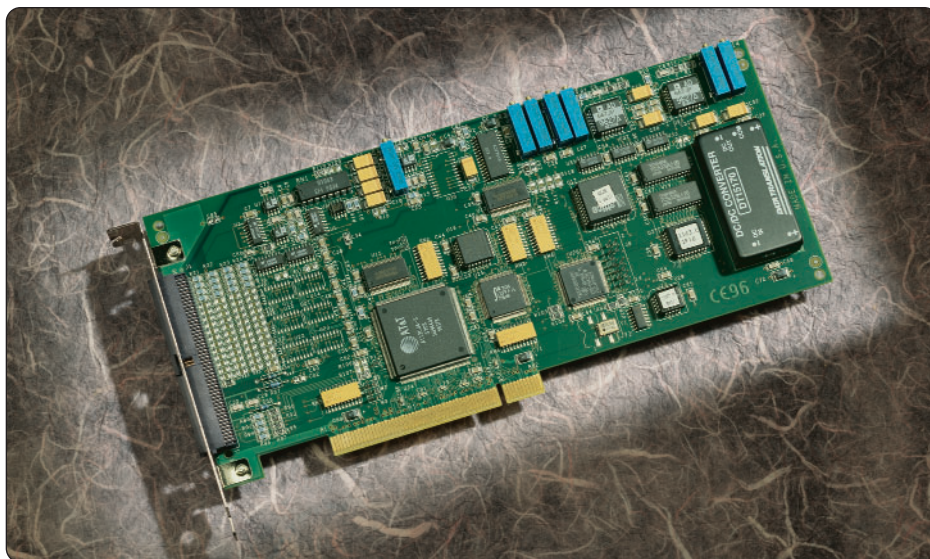


DT3000 Series

Key Features

High-Performance, High Channel-Count Data Acquisition Boards for the PCI Bus

- Seven different board configurations provide a range of flexible, cost-effective options.
- Support gap-free A/D, D/A, and digital I/O at full rated throughput.
- Up to 64 analog inputs support high channel-count applications.
- ENOB specification guarantees outstanding total system accuracy.
- 256-location channel-gain list allows flexible channel selection in any sequence desired.
- High-gain versions for low-level input applications, such as thermocouple and strain gauge.
- Supported by Measure Foundry™, test and measurement application builder software that lets you easily create complex measurement applications.



The DT3000 Series brings high performance data acquisition to the PCI Bus.

Overview

The DT3000 Series brings you high performance data acquisition on a high performance bus at low cost. The boards are optimized for use on the PCI Bus, and support continuous performance (gap-free) simultaneous A/D and D/A operation at full rated throughput.

A/D Choices: Up to 64 Channels, 330 kS/s Throughput, 12- or 16-Bit Resolution

High channel count design gives you up to 64 single-ended (or 32 differential) analog input channels on a single PCI compatible board. Models with 32 or 16 inputs, 12- or 16-bit A/D resolution, or with analog outputs, are also available.

High Performance Features

The DT3000 Series offers high performance features that give extra flexibility to your data acquisition application. A 256-location onboard channel gain list allows the acquisition of channels in nonsequential order or with different gains, giving you added flexibility in setting up your acquisition sequences. The triggered scan feature emulates simultaneous sample and hold functionality by scanning through all channels in the channel gain list at a high speed and then using a second clock to time the scans.

Features Summary

Model	Analog Inputs				Analog Outputs		Digital	
	Channels	Resolution (bits)	Input Ranges	Throughput (kS/s)	Channels	Throughput (kS/s)	I/O Lines	Counter/Timer
DT3001	16SE/8DI	12	±1.25, 2.5, 5, 10V	330	2 DACs	200/DAC	8	1
DT3001-PGL	16SE/8DI	12	±0.02, .1, 1, 10V	330	2 DACs	200/DAC	8	1
DT3002	32SE/16DI	12	±1.25, 2.5, 5, 10V	330	—	—	8	1
DT3003	64SE/32DI	12	±1.25, 2.5, 5, 10V	330	2 DACs	200/DAC	8	1
DT3003-PGL	64SE/32DI	12	±0.02, .1, 1, 10V	330	2 DACs	200/DAC	8	1
DT3004	16SE/8DI	16	±1.25, 2.5, 5, 10V	100	2 DACs	200/DAC	8	1
DT3005	16SE/8DI	16	±1.25, 2.5, 5, 10V	200	2 DACs	200/DAC	8	1

Easy Installation

Installation is simple: Just plug the board into a PCI slot and you're done. DT3000 supports true plug and play under Microsoft® Windows. "Hands-Off" design permits all board parameters—channel selection, gain, operating mode, base address, hardware interrupt—to be performed in software without the need for jumpers or switches.

Software

All 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!

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

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

The following software is available as a free download from our web site.

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

Cross-Series Compatibility Saves Programming Time, Protects Your Investment

Virtually all Data Translation data acquisition boards, including the DT3000 Series, are compatible with the DT-Open Layers for .NET software standard. 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, now or in the future. Little or no reprogramming is needed. For example, if you are currently using a Data Translation DT2801 data acquisition board, upgrading to a DT3000 Series board is simple—just load the new drivers and you're done.

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, example code, bug fixes, pinouts, a searchable KnowledgeBase, and much more.

Support is also available from your point of purchase. You can also request complimentary support via e-mail or fax at any time. Additional support options are available; contact your Data Translation representative for details.

DT730 and DT730-T Screw Terminal Panels and Cable

The DT730 and DT730-T screw terminal panels and cable simplify the connection of input and output devices to data acquisition boards. They accommodate all user connections on convenient screw clamp connectors. The DT730-T includes a temperature sensor for use with thermocouples and the DT3001-PGL or DT3003-PGL. The DT730 and DT730-T are designed for tabletop or panel mounting, and include nylon standoffs. The panels measure approximately 4.5 in. wide x 6.56 in. long (11.43 x 16.55 cm). They are shipped complete with a 3.3 ft. (1 m) cable assembly to plug directly into the PCI-EZ board.

DT3000

BUS: PCI

Type: High Channel Count

Analog Inputs

		DT3001/ DT3001-PGL	DT3002	DT3003/ DT3003-PGL	DT3004	DT3005	Unit
General							
Resolution	Min	12	12	12	16	16	Bits
Throughput							
One Channel	Min	330*	330*	330*	100*	200*	kS/s
Channel Scan		300	300	300	100	200	kS/s
Channel Scan to Rated Accuracy		250	100	100	50	100	kS/s
Inputs							
Number of Channels							
Single-Ended		16	32	64	16	16	
Differential		8	16	32	8	8	
Input Ranges (Bipolar)		±1.25,2.5,5,10/ ±0.02,0.1,1,10	±1.25,2.5,5,10	±1.25,2.5,5,10/ ±0.02,0.1,1,10	±1.25,2.5,5,10	±1.25,2.5,5,10	V
Input Gain		1,2,4,8/ 1,10,100,500	1,2,4,8	1,2,4,8/ 1,10,100,500	1,2,4,8	1,2,4,8	
Input Impedance							
On Channel	Typ	100/400**	100/400**	100/400**	100/100†	100/100†	MΩ/pF
Off Channel	Typ	100/10**	100/10**	100/10**	100/10†	100/10†	MΩ/pF
Input Bias Current	Max	±20	±20	±20	±20	±20	nA
Maximum Input Voltage	Max	±35	±35	±35	±35	±35	V
ESD Protection (Mil 38510 class 2)	Max	1500	1500	1500	1500	1500	V
Common Mode Rejection Ratio (@60Hz, 1kΩ balanced)	Min	74	74	74	74	74	dB
Common Mode Input Range	Max	±10.5	±10.5	±10.5	±11	±11	V
DC Accuracy							
System Error (Gain=1)	Max	0.03	0.03	0.03	0.01	0.01	% FSR
Integral Nonlinearity	Max	±0.03	±0.03	±0.03	±0.01	±0.01	%FSR
Differential Nonlinearity	Max	±0.75	±0.75	±0.75	±1.5†††	±1.5†††	LSB
No missing codes to 12 bits							
System Noise	Typ	0.3	0.3	0.3	0.5	0.5	LSB rms
Amplifier Input Noise (multiplied by gain)	Typ	20	20	20	20	20	μV rms (voltage)
Typ	20	20	20	20			pA rms (current)
Channel-to-Channel Offset	Typ	±80	±80	±80	±40	±40	μV
AC Accuracy							
Signal/Noise Ratio (@1kS/s Input, Gain=1)	Typ	70	70	70	82	82	dB
Effective Number of Bits††	Typ	11.5	11.5	11.5	13.5	13.5	bits
Total Harmonic Distortion (@1kS/s Input, 100kS/s Sampling Rate)	Typ	-74	-74	-74	-84	-84	dB
Channel Crosstalk (@ 1kS/s)	Typ	-80	-80	-80	-80	-80	dB
Dynamic Performance							
Channel Acquisition Time	Typ	3	3	3	10	5	μs
A/D Conversion Time	Typ	3	3	3	10	5	μs
Temperature Characteristics							
Zero Drift	Typ	±20 (±10 x Gain)	±20 (±10 x Gain)	±20 (±10 x Gain)	±20 (±10 x Gain)	(±10 x Gain)	μV/°C
Gain Drift	Typ	±30	±30	±30	±20	±20	ppm of FSR/°C

* Exceeding these throughputs may result in inaccurate dynamic measurements.

** In addition to the value given, inputs also have a 1kΩ series resistance to minimize the effects of capacitive loading.

† The input capacitive loading is isolated with a 330Ω resistor.

†† This is calculated as follows: ENOB = (s/n ratio - 1.73)/6.02.

††† No missing codes to 15 bits.

Guaranteed Accuracy

ENOB Specification Measures Total Accuracy

Total system performance of the DT3000 Series is specified with the most accurate measurement available: ENOB (Effective Number of Bits). Derived from a board's signal-to-noise ratio, ENOB specifies the overall accuracy of the A/D transfer function. This single comprehensive figure of merit enables you to easily evaluate a board's AC accuracy and performance.

ENOB is 11.5 bits for the DT3001, DT3002, and DT3003, and 13.5 bits for the DT3004 and DT3005.

Analog Outputs

(DT3001, DT3003, DT3004, and DT3005 only)

			Unit
General			
Resolution		12	Bits
Throughput	Max	200/DAC	kS/s
Outputs			
Number of DACs		2	
Output Range		±10	V
Current Output	Max	±5	mA
Output Impedance	Max	0.1	Ω
Capacitive Drive Capability	Typ	0.004	μF, no oscillations
Protection	Short Circuit to Analog Common		
Power On Voltage	Max	±10	mV
Accuracy			
Integral Nonlinearity	Max	±0.03	%FSR
Differential Nonlinearity	Typ	±0.75	LSB
Monotonicity Guaranteed			
Gain Error	Adjustable to 0		
Zero Error	Adjustable to 0		
Dynamic Performance			
Settling Time (to 0.01% FSR)			
20V Step	Max	5	μs
100mV Step	Max	2.5	μs
Slew Rate	Typ	10	V/μs

User Connections

Pin	Description	Pin	Description
100	Analog In 00	99	Analog In 08/00 Return
98	Analog In 01	97	Analog In 09/01 Return
96	Analog In 02	95	Analog In 10/02 Return
94	Analog In 03	93	Analog In 11/03 Return
92	Analog In 04	91	Analog In 12/04 Return
90	Analog In 05	89	Analog In 13/05 Return
88	Analog In 06	87	Analog In 14/06 Return
86	Analog In 07	85	Analog In 15/07 Return
84	Analog In 16	83	Analog In 24/16 Return
82	Analog In 17	81	Analog In 25/17 Return
80	Analog In 18	79	Analog In 26/18 Return
78	Analog In 19	77	Analog In 27/19 Return
76	Analog In 20	75	Analog In 28/20 Return
74	Analog In 21	73	Analog In 29/21 Return
72	Analog In 22	71	Analog In 30/22 Return
70	Analog In 23	69	Analog In 31/23 Return
68	Analog In 32	67	Analog In 40/32 Return
66	Analog In 33	65	Analog In 41/33 Return
64	Analog In 34	63	Analog In 42/34 Return
62	Analog In 35	61	Analog In 43/35 Return
60	Analog In 36	59	Analog In 44/36 Return
58	Analog In 37	57	Analog In 45/37 Return
56	Analog In 38	55	Analog In 46/38 Return
54	Analog In 39	53	Analog In 47/39 Return
52	Analog In 48	51	Analog In 56/48 Return
50	Analog In 49	49	Analog In 57/49 Return
48	Analog In 50	47	Analog In 58/50 Return
46	Analog In 51	45	Analog In 59/51 Return
44	Analog In 52	43	Analog In 60/52 Return
42	Analog In 53	41	Analog In 61/53 Return
40	Analog In 54	39	Analog In 62/54 Return
38	Analog In 55	37	Analog In 63/55 Return
36	Analog Ground	35	Amp Low
34	Analog Output 0 +	33	Analog Output 0 Return
32	Analog Output 1 +	31	Analog Output 1 Return
30	Power Ground	29	Analog Ground
28	+15 Volts Out (5mA max)	27	-15 Volts Out (5mA max)
26	Digital Ground	25	Digital Ground
24	Digital I/O 0	23	Digital I/O 4
22	Digital I/O 1	21	Digital I/O 5
20	Digital I/O 2	19	Digital I/O 6
18	Digital I/O 3	17	Digital I/O 7
16	Digital Ground	15	Digital Ground
14	+5 Volts Out (250mA max)	13	+5 Volts Out (250mA max)
12	Reserved	11	Reserved
10	Digital Ground	9	Digital Ground
8	External A/D Sample Clock In	7	User Counter Input
6	External A/D Trigger In	5	External Gate
4	Reserved	3	User Counter Output
2	Digital Ground	1	Digital Ground

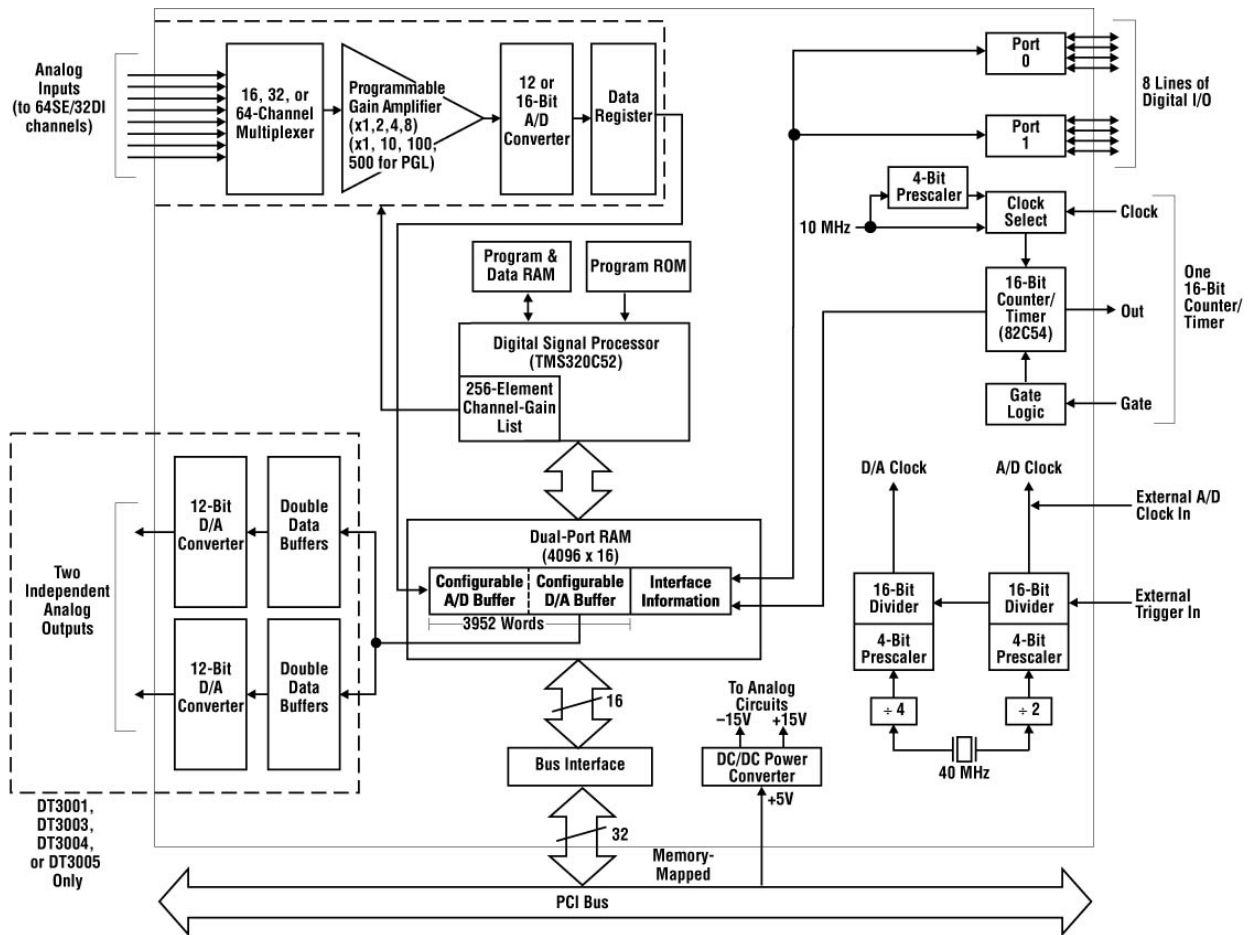
NOTE:

Pin assignments for DT3003 shown. DT3001, DT3004, and DT3005 are as shown, except pins 37–84 are Reserved. DT3002 is as shown, except pins 37–68 are Reserved.

DT3000 Series

BUS: PCI

Type: High Channel Count



DT3000 Series Block Diagram

M-0419

Specifications

All specifications are at 25°C and rated voltage, unless otherwise specified.



STATIC DIGITAL I/O

Number of Lines
Eight, organized as two 4-line ports; ports can be set individually for input or output

Outputs
TTL levels; fanout: 16 TTL loads

Inputs
Edge sensitive; positive true; TTL levels; present one ABT load; no termination, unused inputs float

PACER CLOCKS

Function
Independent A/D and D/A pacer clocks initiate A/D or D/A conversions; clocks are started by software trigger or a single external trigger

Usable Range
A/D Pacer Clock—19 Hz to 328 kS/s
D/A Pacer Clock—9.5 Hz to 200kS/s

Description

Each pacer clock consists of a 16-bit counter with a 4-bit prescaler, and an onboard frequency source (20 MHz for A/D clock, 10 MHz for D/A clock)

External Trigger

Function—synchronizes A/D, D/A, or simultaneous A/D and D/A conversions with outside event
Electrical—edge-sensitive (software-selectable active on

rising or falling edge); TTL levels; presents one ABT load; terminated with 22 k Ω pullup to +5 V

External A/D Clock In Function—initiates A/D conversions in place of onboard A/D pacer clock

Electrical—edge-sensitive, active on rising edge; TTL levels; presents one LSTTL load; terminated with 22 k Ω pullup to +5 V

COUNTER/TIMER

One 16-bit counter/timer; supports frequency measurement, rate generation, one-shot, and event counting operations; 82C54-based; user-accessible clock, gate, and output
Clock—choice of: user-supplied (10 MHz max), onboard 10 MHz, or onboard 10 MHz with 4-bit prescaler

ONBOARD DIGITAL SIGNAL PROCESSOR

TMS320C52 handles board timing, data transfers, error checking, and performs diagnostic check on powerup. Also implements DT-Open Layers command interpreter. Not user-programmable.
Program & Data RAM—64 K x 16 RAM

Specifications (continued)

stores program instructions and data; not user-accessible

DATA MEMORY

Dual-Port RAM

4096 x 16 dual-port RAM is mapped into PCI memory space, and serves as interface between DSP and PCI Bus. An interface section contains command parameters, response parameters, and mailboxes.

Configurable A/D and D/A Circular Buffers—A 3952 x 16 space is used for A/D and D/A circular buffers. These buffers store data so multiple values can be transferred across the PCI Bus in a single operation; support Continuous Performance (gap-free) data transfers at full A/D and D/A throughput; either buffer is configurable to 3952 samples.

OPERATING MODES

A/D

Channel/Gain Selection—256-element random channel-gain list
Operation—single scan (a trigger is issued; on successive clock pulses, conversions are performed as specified in the channel-gain list; when the last element in the list has been reached, conversions stop); continuous scan (same as single scan, but does not stop after last element in channel/gain list is reached; wraps back to first element, and continues until stop command issued or error occurs); triggered scan (same as single scan, but performs successive scans of channel/gain list each time a new trigger is issued)

Data Transfer—memory move; A/D data is buffered by a configurable A/D circular buffer on bus transfers

D/A

Channel Selection—either DAC singly or both DACs simultaneously

Data Transfer—memory move; D/A data is buffered by a configurable D/A circular buffer on bus transfers

Simultaneous A/D, D/A

A/D and D/A subsystems can operate simultaneously, transferring values to or from circular buffers

GENERAL

Interface

PCI Bus compliant; memory-mapped; 32-bit PCI target device; supports PCI burst transfers to and from memory space and configuration space

Interrupt—one level-sensitive interrupt to PCI Bus Master; source: A/D done (# of samples specified have been collected in A/D buffer), A/D scan done, counter/timer terminal count, D/A event complete, error detected

User Connections

All user-accessible signals are brought out to a 100-pin connector

Mating Connector—Amp 1-111196-6

Compatible Screw Terminal Panel

DT730 screw terminal panel and cable assembly accommodates all user connections or DT730-T with temperature sensor for thermocouple applications

Power Requirements

+5 V @ 1.5 A max; low-noise ± 15 V to power analog circuits generated by onboard DC/DC converter

Physical/

Environmental

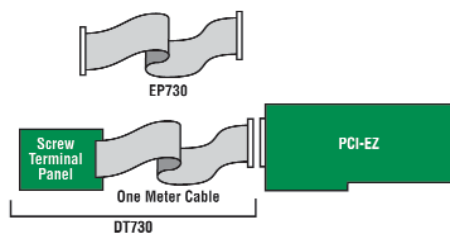
Dimensions—PCI Bus board; 10.7 x 23.2 x 1.3 cm (4.2 in. x 9.15 in. x 0.5 in.)

Weight—5.6 oz (159 g)

Temperature—operating: 0 to 70° C; storage: -25 to 85° C

Relative Humidity—to 95%, non-condensing.

EMI Compliance—all models are FCC Class A verified; will not compromise FCC compliance of host computer



For convenient connection of analog and digital inputs and outputs, the DT730 and DT730-T screw terminal panels with cable are available. The DT730 accommodates all user connections on screw clamp connectors, and includes a cable assembly.

Note: The DT730 and DT730-T screw terminal panels are designed to fit inside a standard EAI plastic enclosure (part # 0-0-94-14-110). Contact EAI for availability.

Ordering Summary

All Data Translation hardware products are covered by a 1-year warranty. For pricing information, see a current price list, visit our web site, or contact your local reseller.

DT3000 Series

Each DT3000 Series board is shipped with the Data Acquisition Omni CD, which includes DT-Open Layers-compliant drivers for Microsoft Windows/2000/XP, ready-to-run software, and a comprehensive user's manual in PDF format. Manuals are available in hard-copy form for an additional charge.

- DT3001—12-bit, 330 kS/s A/D with 16SE/8DI inputs; 2 DACs
- DT3001-PGL—12-bit, 330 kS/s A/D with 16SE/8DI inputs; gains of 1, 10, 100, 500; 2 DACs
- DT3002—12-bit, 330 kS/s A/D with 32SE/16DI inputs; no DACs
- DT3003—12-bit, 330 kS/s A/D with 64SE/32DI inputs; 2 DACs
- DT3003-PGL—12-bit, 330 kS/s A/D with 64SE/32DI inputs; gains of 1, 10, 100, 500; 2 DACs
- DT3004—16-bit, 100 kS/s A/D with 16SE/8DI inputs; 2 DACs
- DT3005—16-bit, 200 kS/s A/D with 16SE/8DI inputs; gains of 1,2,4,8; 2 DACs

Accessories

- DT730—screw terminal panel and 1m cable
- DT730-T—screw terminal panel with temperature sensor and 1m cable
- 5B Series modular signal conditioners
- 7B Series modular signal conditioners
- AAF-3 Anti-aliasing Filters

Software

The following software can be purchased separately:

- Measure Foundry is an open, powerful application builder for test and measurement systems. SP1300-CD
- 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. SP8501-CD
- LV Link to access the power of our boards through LabVIEW. SP0811

Data Translation now offers free downloads on the Web for:

- DAQ Adaptor for MATLAB to access the analysis and visualization tools in MATLAB.

© Copyright 2006 Data Translation, Inc. All rights reserved. All trademarks are the property of their respective holders. Prices and specifications subject to change without notice. 03/2007