

# PXI/DAQ/DAQe-2500 Series

## 4/8-CH 12-Bit 1 MS/s Analog Output Multi-Function DAQ Cards



### Introduction

ADLINK's PXI/DAQ/DAQe-2500 series are high-speed and high-performance analog output multi-function DAQ cards able to update up to 8-CH, 12-bit analog outputs simultaneously while sustaining a 1 MS/s rate. The reference sources and the output polarities are programmable on a per channel basis. Combined with a multiplying DAC architecture, the ADLINK PXI/DAQ/DAQe-2500 series of DAQ cards can generate complex modulated analog signals.

The hardware-based arbitrary waveform generation reduces CPU loading even when all analog outputs are updating at full speed, and the lengths of waveforms are only limited by the system memory.

The PXI/DAQ/DAQe-2500 series integrates up to 8-CH, 400 kS/s, 14-bit single-ended analog inputs with programmable polarity, 24-CH programmable digital I/O lines, and a 2-CH 16-bit general-purpose timer/counter.

The PXI/DAQ/DAQe-2500 series is able to perform analog input and output functions at full speed simultaneously and multiple cards can be synchronized through the SSI (System Synchronization Interface) bus or PXI trigger bus. The auto-calibration functions adjust the gain and offset to within specified accuracies such that you do not have to adjust trimpots to calibrate the boards.

### Features

- Supports a 32-bit 3.3 V or 5 V PCI bus (DAQ-2500 series)
- PXI specification Rev 2.2 compliant (PXI-2500 series)
- x1 lane PCI Express® Interface (DAQe-2500 series)
- Hardware-based arbitrary waveform generation
- Onboard 8 k-sample D/A FIFO (PXI/DAQ/DAQe-2501)
- Onboard 16 k-sample D/A FIFO (PXI/DAQ/DAQe-2502)
- Programmable bipolar or unipolar analog output ranges on per channel basis
- Programmable internal or external reference sources on per channel basis
- 8-CH 400 kS/s 14-bit single-ended analog inputs (PXI/DAQ/DAQe-2501)
- 4-CH 400 kS/s 14-bit single-ended analog inputs (PXI/DAQ/DAQe-2502)
- Onboard 2 k-sample A/D FIFO
- Bipolar or unipolar analog input ranges
- Scatter-gather DMA for both analog inputs and outputs
- 24-CH TTL digital input/output
- 2-CH 16-bit general-purpose timer/counter
- Analog & digital triggering
- Fully auto-calibration
- Multiple cards synchronization through SSI (System Synchronization Interface) bus or PXI trigger bus

#### Operating Systems

- Windows 7/Vista/XP/2000/2003 Server
- Linux

#### Recommended Software

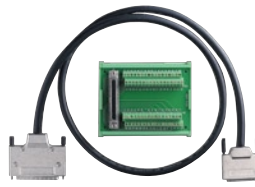
- AD-Logger
- VB.NET/VC.NET/VB/VC+++/BCB/Delphi
- DAQBench

#### Driver Support

- DAQPilot for Windows
- DAQPilot for LabVIEW™
- DAQ-MTLB for MATLAB®
- D2K-DASK for Windows
- D2K-DASK/X for Linux



SSI bus cable for multiple card synchronization for DAQ/DAQe-2000 series



Terminal board DIN-68S-01 & 68-Pin SCSI-VHDCI cable ACL-10568-I

### Terminal Boards & Cables

#### DIN-68S-01

Terminal Board with One 68-pin SCSI-II Connector and DIN-Rail Mounting (Cables are not included.)

#### ACL-10568-I

68-pin SCSI-VHDCI cable (mating with AMP-787082-7), 1 M

\* For more information on mating cables, please refer to P2-59/60.

### SSI Bus Cables (for multiple cards synchronization)

#### ACL-SSI-2/3/4

SSI Bus cable for two, three, and four devices

### Pin Assignment

#### Connector CNI Pin Assignment

|                 |    |    |              |
|-----------------|----|----|--------------|
| AO_0            | 1  | 35 | AGND         |
| AO_1            | 2  | 36 | AGND         |
| AO_2            | 3  | 37 | AGND         |
| AO_3            | 4  | 38 | AGND         |
| AOEXTREF_A/AI_0 | 5  | 39 | AGND         |
| AI_1            | 6  | 40 | AGND         |
| EXTTRIG/AI_2    | 7  | 41 | AGND         |
| AOEXTREF_B/AI_3 | 8  | 42 | AGND         |
| AO_4/AI_4       | 9  | 43 | AGND         |
| AO_5/AI_5       | 10 | 44 | AGND         |
| AO_6/AI_6       | 11 | 45 | AGND         |
| AO_7/AI_7       | 12 | 46 | AGND         |
| AO_TRIG_OUT_A   | 13 | 47 | EXTWFRG_A    |
| AO_TRIG_OUT_B   | 14 | 48 | EXTWFRG_B    |
| GPTC1_SRC       | 15 | 49 | VCC          |
| GPTC0_SRC       | 16 | 50 | DGND         |
| GPTC0_GATE      | 17 | 51 | GPTC1_GATE   |
| GPTC0_OUT       | 18 | 52 | GPTC1_OUT    |
| GPTC0_UPDOWN    | 19 | 53 | GPTC1_UPDOWN |
| RESERVED        | 20 | 54 | DGND         |
| AF11            | 21 | 55 | AF10         |
| PB7             | 22 | 56 | PB6          |
| PB5             | 23 | 57 | PB4          |
| PB3             | 24 | 58 | PB2          |
| PB1             | 25 | 59 | PB0          |
| PC7             | 26 | 60 | PC6          |
| PC5             | 27 | 61 | PC4          |
| DNGD            | 28 | 62 | DGND         |
| PC3             | 29 | 63 | PC2          |
| PC1             | 30 | 64 | PC0          |
| PA7             | 31 | 65 | PA6          |
| PA5             | 32 | 66 | PA4          |
| PA3             | 33 | 67 | PA2          |
| PA1             | 34 | 68 | PA0          |

\* Pin 9-12 are AI<4..7> for 2501; AO<4..7> for 2502

\* The external references inputs and the external analog trigger share the analog input pins 5, 7, and 8

## Ordering Information / Quick Selection Guide

| Model Name        | Analog Output   |            |             |                  | Analog Input    |            |               |                    | DIO             | Timer/Counter   |
|-------------------|-----------------|------------|-------------|------------------|-----------------|------------|---------------|--------------------|-----------------|-----------------|
|                   | No. of channels | Resolution | Update rate | Output range     | No. of channels | Resolution | Sampling rate | Input range        | No. of channels | No. of channels |
| PXI/DAQ/DAQe-2501 | 4               | 12 bits    | 1 MS/s      | ±10 V, 0 to 10 V | 8               | 14 bits    | 400 kS/s      | ±10 V or 0 to 10 V | 24-CH 8255 PIO  | 2-CH, 16-bit    |
| PXI/DAQ/DAQe-2502 | 8               | 12 bits    | 1 MS/s      | ±10 V, 0 to 10 V | 4               | 14 bits    | 400 kS/s      | ±10 V or 0 to 10 V | 24-CH 8255 PIO  | 2-CH, 16-bit    |

## Specifications

| Model Name             | PXI/DAQ/DAQe-2501                                                                                                                                                                             |  | PXI/DAQ/DAQe-2502                                                                     |  |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------|--|
| Analog Output          |                                                                                                                                                                                               |  |                                                                                       |  |
| Number of channels     | 4 voltage outputs                                                                                                                                                                             |  | 8 voltage outputs                                                                     |  |
| Resolution             | 12 bits                                                                                                                                                                                       |  |                                                                                       |  |
| Output ranges          | 0-10 V, ±10 V, 0-AOEXTREF, ±AOEXTREF                                                                                                                                                          |  |                                                                                       |  |
| Maximum update rate    | 1 MS/s                                                                                                                                                                                        |  |                                                                                       |  |
| Slew rate              | 20 V/μs                                                                                                                                                                                       |  |                                                                                       |  |
| Settling time          | 3 μs to ±0.5 LSB accuracy                                                                                                                                                                     |  |                                                                                       |  |
| Offset error           | ±2 mV                                                                                                                                                                                         |  |                                                                                       |  |
| Gain error             | ±0.02% of max. output                                                                                                                                                                         |  |                                                                                       |  |
| Driving capacity       | ±5 mA                                                                                                                                                                                         |  |                                                                                       |  |
| Stability              | Any passive load, up to 1500 pF                                                                                                                                                               |  |                                                                                       |  |
| Trigger sources        | Software, external digital/analog trigger, SSI bus                                                                                                                                            |  |                                                                                       |  |
| Trigger modes          | Post-trigger, delay-trigger, and repeated trigger                                                                                                                                             |  |                                                                                       |  |
| FIFO buffer size       | 8 k samples                                                                                                                                                                                   |  | 16 k samples                                                                          |  |
| Data transfers         | Programmed I/O, scatter-gather DMA                                                                                                                                                            |  |                                                                                       |  |
| Analog Input           |                                                                                                                                                                                               |  |                                                                                       |  |
| Resolution             | 14 bits, no missing codes                                                                                                                                                                     |  |                                                                                       |  |
| Number of channels     | 8 single-ended                                                                                                                                                                                |  | 4 single-ended                                                                        |  |
| Maximum sampling rate  | 400 kS/s                                                                                                                                                                                      |  |                                                                                       |  |
| Gain                   | 1                                                                                                                                                                                             |  |                                                                                       |  |
| Bipolar input ranges   | ±10 V                                                                                                                                                                                         |  |                                                                                       |  |
| Unipolar input ranges  | 0-10 V                                                                                                                                                                                        |  |                                                                                       |  |
| Offset error           | ±1 mV                                                                                                                                                                                         |  |                                                                                       |  |
| Gain error             | ±0.03% of FSR                                                                                                                                                                                 |  |                                                                                       |  |
| Input coupling         | DC                                                                                                                                                                                            |  |                                                                                       |  |
| Overvoltage protection | Power on: Continuous ±30 V, Power off: Continuous ±15 V                                                                                                                                       |  |                                                                                       |  |
| Input impedance        | 1 GΩ/6 pF                                                                                                                                                                                     |  |                                                                                       |  |
| Trigger sources        | Software, external digital/analog trigger, SSI bus                                                                                                                                            |  |                                                                                       |  |
| Trigger modes          | Post-trigger, delay-trigger, and repeated trigger                                                                                                                                             |  |                                                                                       |  |
| FIFO buffer size       | 2 k samples                                                                                                                                                                                   |  |                                                                                       |  |
| Data transfers         | Polling, scatter-gather DMA                                                                                                                                                                   |  |                                                                                       |  |
| Digital I/O            |                                                                                                                                                                                               |  |                                                                                       |  |
| Number of channels     | 24-CH 8255 programmable input/output                                                                                                                                                          |  |                                                                                       |  |
| Compatibility          | 5 V/TTL                                                                                                                                                                                       |  |                                                                                       |  |
| Data transfers         | Programmed I/O                                                                                                                                                                                |  |                                                                                       |  |
| Timer/Counter          |                                                                                                                                                                                               |  |                                                                                       |  |
| Number of channels     | 2                                                                                                                                                                                             |  |                                                                                       |  |
| Resolution             | 16 bits                                                                                                                                                                                       |  |                                                                                       |  |
| Compatibility          | 5 V/TTL                                                                                                                                                                                       |  |                                                                                       |  |
| Base clock available   | 40 MHz, external clock up to 10 MHz                                                                                                                                                           |  |                                                                                       |  |
| Auto Calibration       |                                                                                                                                                                                               |  |                                                                                       |  |
| Onboard reference      | +5 V                                                                                                                                                                                          |  |                                                                                       |  |
| Temperature drift      | ±2 ppm/°C                                                                                                                                                                                     |  |                                                                                       |  |
| Stability              | ±6 ppm/1000 Hrs                                                                                                                                                                               |  |                                                                                       |  |
| General Specifications |                                                                                                                                                                                               |  |                                                                                       |  |
| Dimensions             | 160 mm x 100 mm (not including connectors) (PXI-2500 series)<br>175 mm x 107 mm (not including connectors) (DAQ-2500 series)<br>168 mm x 107 mm (not including connectors) (DAQe-2500 series) |  |                                                                                       |  |
| Connector              | 68-pin VHDCI female                                                                                                                                                                           |  |                                                                                       |  |
| Operating temperature  | 0 to 55°C                                                                                                                                                                                     |  |                                                                                       |  |
| Storage temperature    | -20 to 70°C                                                                                                                                                                                   |  |                                                                                       |  |
| Humidity               | 5 to 95%, non-condensing                                                                                                                                                                      |  |                                                                                       |  |
| Power requirements     | +5 V 1.6 A typical (PXI/DAQ-2501)<br>+3.3 V 0.78 A, +12 V 0.66 A typical (DAQe-2501)                                                                                                          |  | +5 V 2.12 A typical (PXI/DAQ-2502)<br>+3.3 V 0.89 A, +12 V 0.76 A typical (DAQe-2502) |  |