

# DAQ/DAQe-2213/2214

16-CH 16-Bit 250 kS/s Low-Cost Multi-Function DAQ Cards



DAQ-2213/2214



DAQe-2213 / 2214

## Introduction

ADLINK's DAQ/DAQe-2213/2214 cards can sample up to 16 AI channels with different gain settings and scan sequences, making them ideal for dealing with analog signals with various input ranges and sampling speeds. These devices also offer differential mode for 8 AI channels in order to achieve maximum noise elimination.

In addition to providing analog input functions, the DAQ/DAQe-2214 features 2-CH 12-bit analog outputs which are capable of waveform generation. The DAQ-2213/2214 and DAQe-2213/2214 also feature analog and digital triggering, 24-CH programmable digital I/O lines and 2-CH 16-bit general-purpose timer/counter.

Like all the other members in the DAQ-2000 and DAQe-2000 family, multiple DAQ/DAQe-2213/2214 can be synchronized through the SSI (System Synchronization Interface) 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 cards.

## Features

- Supports a 32-bit 3.3 V or 5 V PCI bus (DAQ-2213, DAQ-2214)
- x1 lane PCI Express® Interface (DAQe-2213, DAQe-2214)
- Onboard 1 k-sample A/D FIFO
- Bipolar or unipolar analog input ranges
- Programmable gains: x1, x2, x4, x8
- 512-configuration channel gain queue
- Scatter-gather DMA
- 2-CH 12-bit multiplying analog outputs with waveform generation (DAQ/DAQe-2214)
- Onboard 1 k-sample D/A FIFO (DAQ-2214, DAQe-2214)
- 24-CH TTL digital input/output
- 2-CH 16-bit general-purpose timer/counter
- Analog and digital triggering
- Fully auto calibration
- Multiple cards synchronization through SSI (System Synchronization Interface) 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 LabVIEW™
- DAQ-MTLB for MATLAB®
- D2K-DASK for Windows
- D2K-DASK/X for Linux

## SSI Bus Cables (DAQ/DAQe-2214) (for multiple cards synchronization)

### ACL-SSI-2

SSI Bus cable for 2 devices

### ACL-SSI-3

SSI Bus cable for 3 devices

### ACL-SSI-4

SSI Bus cable for 4 devices



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

## Pin Assignment Connector CN1

|            |    |    |             |
|------------|----|----|-------------|
| AI0 (AIH0) | 1  | 35 | (AIL0) AI8  |
| AI1 (AIH1) | 2  | 36 | (AIL1) AI9  |
| AI2 (AIH2) | 3  | 37 | (AIL2) AI10 |
| AI3 (AIH3) | 4  | 38 | (AIL3) AI11 |
| AI4 (AIH4) | 5  | 39 | (AIL4) AI12 |
| AI5 (AIH5) | 6  | 40 | (AIL5) AI13 |
| AI6 (AIH6) | 7  | 41 | (AIL6) AI14 |
| AI7 (AIH7) | 8  | 42 | (AIL7) AI15 |
| NC         | 9  | 43 | NC          |
| NC         | 10 | 44 | NC          |
| NC         | 11 | 45 | NC          |
| NC         | 12 | 46 | NC          |
| NC         | 13 | 47 | NC          |
| NC         | 14 | 48 | NC          |
| NC         | 15 | 49 | NC          |
| NC         | 16 | 50 | NC          |
| AISENSE    | 17 | 51 | AI GND      |
| NC         | 18 | 52 | NC          |
| NC         | 19 | 53 | NC          |
| NC         | 20 | 54 | NC          |
| NC         | 21 | 55 | NC          |
| NC         | 22 | 56 | NC          |
| NC         | 23 | 57 | NC          |
| NC         | 24 | 58 | NC          |
| NC         | 25 | 59 | NC          |
| NC         | 26 | 60 | NC          |
| NC         | 27 | 61 | NC          |
| NC         | 28 | 62 | NC          |
| NC         | 29 | 63 | NC          |
| NC         | 30 | 64 | NC          |
| NC         | 31 | 65 | NC          |
| NC         | 32 | 66 | NC          |
| NC         | 33 | 67 | NC          |
| EXTATRIG   | 34 | 68 | AI GND      |

## Pin Assignment Connector CN2

|                        |    |    |              |
|------------------------|----|----|--------------|
| NC / DA0OUT*           | 1  | 35 | AO GND* / NC |
| NC / DA1OUT*           | 2  | 36 | AO GND* / NC |
| NC / AOEXTREF*         | 3  | 37 | AO GND* / NC |
| NC                     | 4  | 38 | NC           |
| DGND                   | 5  | 39 | DGND         |
| RESERVED / EXTWFTTRIG* | 6  | 40 | DGND         |
| EXTDTRIG               | 7  | 41 | DGND         |
| SSHOUT                 | 8  | 42 | DGND         |
| RESERVED               | 9  | 43 | DGND         |
| RESERVED               | 10 | 44 | DGND         |
| RESERVED / AF1*        | 11 | 45 | DGND         |
| AF10                   | 12 | 46 | DGND         |
| GPTC0_SRC              | 13 | 47 | DGND         |
| GPTC0_GATE             | 14 | 48 | DGND         |
| GPTC0_UPDOWN           | 15 | 49 | DGND         |
| GPTC0_OUT              | 16 | 50 | DGND         |
| GPTC1_SRC              | 17 | 51 | DGND         |
| GPTC1_GATE             | 18 | 52 | DGND         |
| GPTC1_UPDOWN           | 19 | 53 | DGND         |
| GPTC1_OUT              | 20 | 54 | DGND         |
| EXTTIMEBASE            | 21 | 55 | DGND         |
| PB7                    | 22 | 56 | PB6          |
| PB5                    | 23 | 57 | PB4          |
| PB3                    | 24 | 58 | PB2          |
| PB1                    | 25 | 59 | PB0          |
| PC7                    | 26 | 60 | PC6          |
| PC5                    | 27 | 61 | PC4          |
| DGND                   | 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          |

\* Note: Analog output related pins on the DAQ/DAQe-2214

## 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 P2-61/62.

## Ordering Information / Quick Selection Guide

| Model Name    | Analog Input    |            |               |                            | Analog Output   |            |               | DIO             | Timer/Counter   |
|---------------|-----------------|------------|---------------|----------------------------|-----------------|------------|---------------|-----------------|-----------------|
|               | No. of channels | Resolution | Sampling rate | Input range                | No. of channels | Resolution | Sampling rate | No. of channels | No. of channels |
| DAQ/DAQe-2213 | 8 DI/16 SE      | 16 bits    | 250 kS/s      | $\pm 1.25$ V to $\pm 10$ V | -               | -          | -             | 24-CH 8255 PIO  | 2-CH, 16-bit    |
| DAQ/DAQe-2214 | 8 DI/16 SE      | 16 bits    | 250 kS/s      | $\pm 1.25$ V to $\pm 10$ V | 2               | 12 bits    | 1 MS/s        | 24-CH 8255 PIO  | 2-CH, 16-bit    |

## Specifications

| Model Name                                            | DAQ/DAQe-2213                                                                                                             |                                                                                   | DAQ/DAQe-2214 |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------|
| Analog Input                                          |                                                                                                                           |                                                                                   |               |
| Resolution                                            | 16 bits, no missing codes                                                                                                 |                                                                                   |               |
| Number of channels                                    | 16 single-ended or 8 differential (software selectable per channel)                                                       |                                                                                   |               |
| Channel gain queue size                               | 512                                                                                                                       |                                                                                   |               |
| Maximum update rate                                   | 250 kS/s                                                                                                                  |                                                                                   |               |
| Programmable gain                                     | 1, 2, 4, 8                                                                                                                |                                                                                   |               |
| Bipolar input ranges                                  | ±10 V, ±5 V, ±2.5 V, ±1.25 V                                                                                              |                                                                                   |               |
| Unipolar input ranges                                 | 0-10 V, 0-5 V, 0-2.5 V, 0-1.25 V                                                                                          |                                                                                   |               |
| Offset error                                          | ±1 mV                                                                                                                     |                                                                                   |               |
| Gain error                                            | ±0.06% of FSR                                                                                                             |                                                                                   |               |
| Input coupling                                        | DC                                                                                                                        |                                                                                   |               |
| Overvoltage protection                                | Power on: Continuous ±30 V, Power off: Continuous ±15 V                                                                   |                                                                                   |               |
| Input impedance                                       | 1 GΩ /100 pF                                                                                                              |                                                                                   |               |
| CMRR (gain = 1)                                       | 83 dB                                                                                                                     |                                                                                   |               |
| Settling time                                         | 4 μs to 0.01% error                                                                                                       |                                                                                   |               |
| -3 dB small signal bandwidth (@Bipolar +/-10V Gain=1) | 600 kHz (@Bipolar +/-10V Gain=1)                                                                                          |                                                                                   |               |
| Trigger sources                                       | Software, external digital/analog trigger, SSI bus                                                                        |                                                                                   |               |
| Trigger modes                                         | Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger                                            |                                                                                   |               |
| FIFO buffer size                                      | 1 k samples                                                                                                               |                                                                                   |               |
| Data transfers                                        | Polling, scatter-gather DMA                                                                                               |                                                                                   |               |
| Analog Output                                         |                                                                                                                           |                                                                                   |               |
| Number of channels                                    | -                                                                                                                         | 2 voltage outputs                                                                 |               |
| Resolution                                            | -                                                                                                                         | 12 bits                                                                           |               |
| Output ranges                                         | -                                                                                                                         | 0-10 V, ±10 V, 0-AOEXTREF, ±AOEXTREF                                              |               |
| Maximum update rate                                   | -                                                                                                                         | 1 μs                                                                              |               |
| Slew rate                                             | -                                                                                                                         | 20 V / μs                                                                         |               |
| Settling time                                         | -                                                                                                                         | 3 μs to ±0.5 LSB accuracy                                                         |               |
| Offset error                                          | -                                                                                                                         | ±2 mV                                                                             |               |
| Gain error                                            | -                                                                                                                         | ±0.04% 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                                      | -                                                                                                                         | 1 k samples                                                                       |               |
| Data transfers                                        | -                                                                                                                         | Programmed I/O, scatter-gather DMA                                                |               |
| Digital I/O                                           |                                                                                                                           |                                                                                   |               |
| Number of channels                                    | 24-CH 8255 programmable input/output                                                                                      |                                                                                   |               |
| Compatibility                                         | 5 V/TTL                                                                                                                   |                                                                                   |               |
| Data transfers                                        | Programmed I/O                                                                                                            |                                                                                   |               |
| General-Purpose 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                                            | 175 mm x 107 mm (not including connectors) (DAQ-2213/2214)<br>168 mm x 107 mm (not including connectors) (DAQe-2213/2214) |                                                                                   |               |
| Connector                                             | 68-pin VHDCI female x 2                                                                                                   |                                                                                   |               |
| Operating temperature                                 | 0 to 55°C                                                                                                                 |                                                                                   |               |
| Storage temperature                                   | -20 to 70°C                                                                                                               |                                                                                   |               |
| Humidity                                              | 5 to 95%, non-condensing                                                                                                  |                                                                                   |               |
| Power requirements                                    | +5 V 1.2 A typical (DAQ-2213)<br>+3.3 V 0.84 A, +12 V 0.604 A typical (DAQe-2214)                                         | +5 V 1.2 A typical (DAQ-2214)<br>+3.3 V 0.77 A, +12 V 0.572 A typical (DAQe-2213) |               |

\*Gain = 1, 2, 4, 8

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