

# PCI-9221/9222/9223

16/32-CH 16-Bit 250/500 kS/s Multi-Function DAQ Cards with Encoder Input



PCI-9222/9223

PCI-9221

## Features

- Supports a 32-Bit 3.3 V or 5 V PCI bus
- Programmable gains for analog input: 1, 2, 4, 5, 8, 10, 20, 40 (PCI-9222/9223) 1, 5, 10, 25 (PCI-9221)
- 2-CH 16-Bit simultaneous analog outputs, up to 1 MS/s analog output update rate (PCI-9222/9223)
  - TTL DI and TTL DO
  - 2 MHz High-Speed DIO (PCI-9222/9223 only)
  - General-purpose timer/counter
  - PWM outputs
  - Encoder inputs
- Dedicated 2-CH 4 MHz encoder inputs, supporting AB phase, and CW/CCW (PCI-9222/9223)
- Dedicated DMA channels for A/D, D/A, and high-speed DIO (PCI-9222/9223)
- External digital trigger for A/D, D/A, and high-speed DIO (PCI-9222/9223)
- Multiple card synchronization through SSI (System Synchronization Interface) bus (PCI-9222/9223)
- Auto-calibration
- Supported Operating System
  - Windows 7/8 x64/x86, Linux
- Driver and SDK
  - LabVIEW, MATLAB, C/C++, Visual Basic, Visual Studio.NET
- Software Utility
  - AD-Logger

## Specifications

| Model Name                             | PCI-9221                                                                                            | PCI-9222                                                                      | PCI-9223                                                   |
|----------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------|
| Analog Input                           |                                                                                                     |                                                                               |                                                            |
| Resolution                             | 16 Bit                                                                                              |                                                                               |                                                            |
| Number of channels                     | 16 SE/ 8 DIFF                                                                                       | 16 SE/ 8 DIFF                                                                 | 32 SE/ 16 DIFF                                             |
| Maximum sampling rate (single channel) | 250 kS/s                                                                                            | 250 kS/s                                                                      | 500 kS/s                                                   |
| Programmable gain                      | 1, 5, 10, 25                                                                                        | 1, 2, 4, 5, 8, 10, 20, 40                                                     | 1, 2, 4, 5, 8, 10, 20, 40                                  |
| Input range                            | ±5 V, ±1 V, ±500 mV, ±200 mV                                                                        | ±10 V, ±5 V, ±2.5 V, ±2 V, ±1.25 V, ±1 V, ±500 mV, ±250 mV                    | ±10 V, ±5 V, ±2.5 V, ±2 V, ±1.25 V, ±1 V, ±500 mV, ±250 mV |
| Offset error                           | ±0.7 mV typical, after calibration                                                                  |                                                                               |                                                            |
| Gain error                             | ±0.015% of FSR, after calibration                                                                   |                                                                               |                                                            |
| FIFO buffer size                       | 1 k samples                                                                                         |                                                                               |                                                            |
| Trigger sources                        | Software, external digital                                                                          | Software, external digital, SSI                                               |                                                            |
| Trigger mode                           | Post trigger                                                                                        | Post trigger, retrigger, gate trigger                                         |                                                            |
| Input coupling                         | DC                                                                                                  |                                                                               |                                                            |
| Overvoltage protection                 | ±10 V                                                                                               | Continuous ±30 V                                                              |                                                            |
| Input impedance                        | High impedance > 1 GΩ                                                                               |                                                                               |                                                            |
| Data Transfer                          | Polling, scatter-gather DMA                                                                         |                                                                               |                                                            |
| Analog Output                          |                                                                                                     |                                                                               |                                                            |
| Number of channels                     | 2 voltage outputs                                                                                   |                                                                               |                                                            |
| Resolution                             | 16-Bit                                                                                              |                                                                               |                                                            |
| Maximum update rate                    | 1.25 kS/s (static)                                                                                  | 1 MHz (simultaneous update)                                                   |                                                            |
| FIFO                                   | -                                                                                                   | 512                                                                           |                                                            |
| Output range                           | ±5 V                                                                                                | ±10 V                                                                         |                                                            |
| Output driving capacity                | ±5 mA                                                                                               |                                                                               |                                                            |
| Slew rate                              | 0.014 V/μs                                                                                          | 20 V/μs                                                                       |                                                            |
| Setting time (0.1% of full scale)      | 1396 μs                                                                                             | 2.6 μs                                                                        |                                                            |
| Offset error                           | ±1 mV                                                                                               |                                                                               |                                                            |
| Gain error                             | ±0.02% FSR                                                                                          | ±0.01% FSR                                                                    |                                                            |
| Rising time                            | 390 μs                                                                                              | 0.67 μs                                                                       |                                                            |
| Falling time                           | 395 μs                                                                                              | 0.705 μs                                                                      |                                                            |
| Function I/O                           |                                                                                                     |                                                                               |                                                            |
| Mode                                   | Digital I/O <sup>(1)</sup> , General Timer/Counter <sup>(1)</sup> , Pulse Generation <sup>(1)</sup> | Digital I/O, General Timer/Counter,Pulse Generation                           |                                                            |
| Digital I/O                            | 8 DI/4 DO (5 V TTL level)                                                                           | 16 DO (3.3 V TTL Level) / 16 DI (3.3 V or 5 V TTL Level)                      |                                                            |
| General Timer/Counter                  | Two 32-Bit, Base clock: 40 MHz, external to 10 MHz                                                  | Four 32-Bit, Base clock: 80 MHz, external to 10 MHz                           |                                                            |
| Pulse generation                       | Two PWM outputs (Modulation frequency: 0.005 Hz to 5 MHz; Duty cycle: 1%-99%)                       | Four PWM outputs (Modulation frequency: 0.01 Hz to 5 MHz; Duty cycle: 1%-99%) |                                                            |
| Encoder Input                          |                                                                                                     |                                                                               |                                                            |
| Number of channels                     | 2 <sup>(2)</sup>                                                                                    |                                                                               |                                                            |
| Encoder type                           | CW/CCW encoder, x 1 AB phase encoder, x 2 AB phase encoder, x 4 AB phase encoder                    |                                                                               |                                                            |
| General Specifications                 |                                                                                                     |                                                                               |                                                            |
| PCI Bus                                | 5 V and 3.3 V universal PCI bus                                                                     |                                                                               |                                                            |
| Auto-calibration                       | Yes                                                                                                 |                                                                               |                                                            |
| I/O Connector                          | One 37-pin D-Sub connector                                                                          | Two 68-pin SCSI-VHDCI female                                                  |                                                            |
| Operation temperature                  | 0°C to 45°C (32°F to 113°F)                                                                         | 0°C to 55°C (32°F to 131°F)                                                   |                                                            |
| Storage temperature                    | -20°C to 80°C (-4°F to 176°F)                                                                       | -20°C to 70°C (-4°F to 158°F)                                                 |                                                            |
| Humidity                               | 5 to 95% non-condensing                                                                             |                                                                               |                                                            |
| Power requirements                     | +5 V 1A typical, +12 V 100mA typical, -12 V 100mA typical                                           | +5 V 1.2 A typical, +12 V 760 mA typical, -12 V 50 mA typical                 |                                                            |
| Dimensions                             | 120 mm x 87 mm (4.68" x 3.39")                                                                      | 175 mm x 107 mm (6.82" x 4.17")(not including connectors)                     |                                                            |

Note:

(1) The function I/O and encoder inputs share the same I/O pins of the PCI-9221. Only one of these modes can be selected.

(2) Dedicated

## Terminal Boards & Cables

- DIN-68S-01 (for PCI-9222/9223)
- DIN-37D-01 (for PCI-9221)
- ACL-10568-1 (for PCI-9222/9223)
- ACL-10137-IMM (for PCI-9221)
- ACL-SSI-2/3/4 (for PCI-9222/9223)

\* For more information on mating terminal board and cables, please refer to P3-48/49.

## Ordering Information

### ■ PCI-9221

2-CH 16-Bit 250 kS/s Multi-Function DAQ Card with Encoder Input

### ■ PCI-9222

16-CH 16-Bit 250 kS/s Multi-Function DAQ Card with Encoder Input

### ■ PCI-9223

32-CH 16-Bit 500 kS/s Multi-Function DAQ Card with Encoder Input

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