

# PCIe-9100 Series

## Multiplexer/Simultaneous Multi-Function Data Acquisition Card



### Features

- PCI Express bus
- High-density design to integrate AI/AO/DI/DO functions in one card
- High accuracy with up to 16-bit resolution A/D and D/A
- Supports a wide, programmable voltage input range of  $\pm 10V$ ,  $\pm 5V$ ,  $\pm 2.5V$ ,  $\pm 1.25V$ ,  $\pm 0.625V$ ,  $\pm 0.3125V$
- Up to 2-channel encoder for simple motion control, supporting CW/CCW, x1/x2/x4 AB phase encoder
- Direct memory access channels offload CPU utilization
- Fully automated calibration
- Board ID switch
- Easy to use utility/SDK simplifies design effort
- PM (Pattern Match) function realtime reflective actions by comparing pattern of digital input or encoder

### Introduction

The PCIe-9100 series are multi-function data acquisition cards with a PCI Express interface for industrial applications. Their high sample rate, high resolution, and high-density I/O design allow customers easily integrate multiple functions in one card for various applications, such as data logging, process control, and condition monitoring.

### Software Support

- **Operating Systems**  
Windows 7/10/11 x86/x64 or later, Linux
- **Driver and SDK**  
LabVIEW, C/C++, Visual Basic, Visual Studio.NET
- **Software Utility**  
ACE, Soft-Front Panel

## Ordering Information

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### Multiplexer DAQ

- **PCIe-9101**  
16-ch 16-bit 250KS/s Multifunction DAQ
- **PCIe-9121**  
16-ch 14-bit 800KS/s Multifunction DAQ
- **PCIe-9141**  
16-ch 16-bit 1MS/s Multifunction DAQ
- **PCIe-9103**  
32-ch 16-bit 500KS/s Multifunction DAQ
- **PCIe-9161**  
16-ch 16-bit 4MS/s multifunction DAQ
- **PCIe-9163**  
32-ch 16-bit 4MS/s multifunction DAQ
- **PCIe-9164**  
64-ch 16-bit 4MS/s multifunction DAQ

### Terminal Boards & Cables

- **DIN-37D-01**  
Terminal board with one 37-pin D-sub connector and DIN-rail mounting (cables not included)
- **DIN-68S-01**  
68-pin SCSI-II Termination board with DIN-Rail Mounting (Cables are not included.)
- **ACL-10137-1MM**  
37-pin D-sub male/male cable, 1M
- **ACL-10120-1**  
20-pin flat cable, 1 M
- **ACL-10568-1**  
SCSI 68P(M) to VHDCI 68P cable, 1M

### Simultaneous DAQ

- **PCIe-9146**  
4-ch 16-bit 1MS/s simultaneous multifunction DAQ
- **PCIe-9147**  
8-ch 16-bit 1MS/s simultaneous multifunction DAQ

### Terminal Boards & Cables

- **DIN-68S-01**  
68-pin SCSI-II terminal board with DIN-rail mounting (cables not included)
- **ACL-10568-1**  
SCSI 68P(M) to VHDCI 68P cable, 1M

## Specifications

| Model                              |                | PCle-9101/9121/9141   | PCle-9103  | PCle-9161/63/64  | PCle-9146/47   |
|------------------------------------|----------------|---|--|--|--|
| <b>Analog Input</b>                |                |   |  |  |  |
| Simultaneous/Scanning              |                | Scanning  |  |  | Simultaneous   |
| Number of Channels                 |                | 16-ch single-ended (SE) or 8-ch differential input (DI)   | 32-ch single-ended (SE) or 16-ch differential input (DI) | PCle-9161: 16-ch<br>PCle-9163: 32-ch<br>PCle-9164: 64-ch single-ended (SE) or<br>PCle-9161: 8-ch<br>PCle-9163: 16-ch<br>PCle-9164: 32-ch differential input (DI) | PCle-9146: 4-ch<br>PCle-9147: 8-ch differential input (DI) |
| Resolution                         |                | PCle-9101/9141: 16-bit<br>PCle-9121: 14-bit   | 16-bit   | 16-bit   | 16-bit   |
| Sampling Rate                      | Single-channel | PCle-9101: 250 KS/s<br>PCle-9121: 800 KS/s<br>PCle-9121: 1 MS/s   | 500 KS/s   | 4M S/s   | 1M S/s   |
|                                    | Scanning       | PCle-9101: 100kS/s<br>PCle-9121: 400 KS/s<br>PCle-9141: 500 KS/s  |  | 1M S/s<br>*1   |  |
| FIFO Buffer Size                   |                | Onboard 4K samples  |  | Onboard 8K samples   | Onboard 4K samples   |
| Input Range                        |                | $\pm 10\text{ V}, \pm 5\text{ V}, \pm 2.5\text{ V}, \pm 1.25\text{ V}, \pm 0.625\text{ V}, \pm 0.3125\text{ V}$ |  |  |  |
| Input Impedance                    |                | 10M $\Omega$  |  |  | 1G $\Omega$  |
| Input Coupling                     |                | DC  |  |  |  |
| Overvoltage Protection             |                | Continuous $\pm 20\text{ V}$  | Continuous $\pm 15\text{ V}$                             |  | Continuous $\pm 30\text{ V}$                               |
| Trigger Source                     |                | Software, digital, analog   |  |  |  |
| Data Transfer                      |                | Polling, DMA  |  |  |  |
| SNR                                |                | 90 dB   | 90 dB  | 84 dB  | 80 dB  |
| ENOB                               |                | 14.5-bit  | 14.5-bit   | 14-bit   | 13-bit   |
| <b>Analog Output</b>               |                |   |  |  |  |
| Number of Channels                 |                | 2   | N/A  | PCle-9161: 2-ch<br>PCle-9163: 4-ch<br>PCle-9164: 4-ch  | 2  |
| Resolution                         |                | 16-bit  |  | 16-bit   | 16-bit   |
| Output Range                       |                | $\pm 10\text{ V}$   |  | $\pm 10\text{ V}$  | $\pm 10\text{ V}$  |
| FIFO Buffer Size                   |                | Onboard 1K samples<br>(2-channel share)   |  | Onboard 4K samples<br>(2/4-channel share)  | Onboard 1K samples<br>(2-channel share)                    |
| Output Driving Capacity            |                | $\pm 20\text{ mA max.}$   |  | $\pm 20\text{ mA max.}$  | $\pm 20\text{ mA max.}$                                    |
| Slew Rate                          |                | 10 V/ $\mu\text{s}$   |  | 10 V/ $\mu\text{s}$  | 10 V/ $\mu\text{s}$  |
| Settling Time (0.1% of Full scale) |                | 2 $\mu\text{s}$   |  | 2 $\mu\text{s}$  | 2 $\mu\text{s}$  |
| Output Coupling                    |                | DC  |  | DC   | DC   |
| Output Impedance                   |                | < 0.1 ohm   |  | < 0.1 ohm  | < 0.1 ohm  |
| Trigger Source                     |                | Software, digital   |  | Software, digital  | Software, digital  |
| Data Transfers                     |                | Polling, DMA  | Polling, DMA   | Polling, DMA   |  |
| <b>Digital Input</b>               |                |   |  |  |  |
| Number of Channels                 |                | 16  | 16   | 16   | 16   |
| Compatibility                      |                | TTL   | Isolation  | TTL  | TTL  |
| Input Impedance                    |                | pull-low 100Kohm  | 2.4Kohm/0.5W   | pull-low 100Kohm   | pull-low 100Kohm   |
| Input Frequency Range              |                | 0.01Hz to 1M Hz   | -  | 0.01Hz to 1M Hz  | 0.01Hz to 1M Hz  |
| FIFO Buffer Size                   |                | Onboard 512 samples   | -  | Onboard 1024 samples   | Onboard 512 samples  |
| Isolation                          |                | No  | Yes  | No   | No   |
| Trigger Source                     |                | Software, digital   | N/A  | Software, digital  | Software, digital  |
| Data Transfer                      |                | Polling, DMA  | Polling  | Polling, DMA   | Polling, DMA   |

## Specifications

| Digital Output                |   |  |  |  |
|-------------------------------|---|--|--|--|
| Number of Channels            | 16  | 16   | 16   | 16   |
| Compatibility                 | TTL   | Isolation  | TTL  | TTL  |
| Output Impedance              | pull-low 100Kohm  | No, default Open   | pull-low 100Kohm   | pull-low 100Kohm   |
| Output Frequency Range        | 0.01Hz to 1M Hz   | -  | 0.01Hz to 1M Hz  | 0.01Hz to 1M Hz  |
| FIFO Buffer Size              | Onboard 512 samples   | -  | Onboard 1024 samples   | Onboard 512 samples  |
| Isolation                     | No  | Yes  | No   | No   |
| Trigger Source                | Software, digital   | N/A  | Software, digital  | Software, digital  |
| Data Transfer                 | Polling, DMA  | Polling  | Polling, DMA   | Polling, DMA   |
| General Purpose Timer Counter |   |  |  |  |
| Number of Channels            | 2   | 1  | 4  | 2  |
| Resolution                    | 32-bit  |  |  |  |
| Compatibility                 | TTL   |  |  |  |
| Clock Source                  | Internal clock fix 33M Hz.<br>External clock 0.01Hz to 8M Max.<br>Selected by software  | Internal clock fix 33M Hz.<br>External clock 0.01Hz to 2M Max.<br>Selected by software | Internal clock fix 33M Hz.<br>External clock 0.01Hz to 8M Max.<br>Selected by software | Internal clock fix 33M Hz.<br>External clock 0.01Hz to 8M Max.<br>Selected by software |
| Output Frequency              | By internal clock: 16.5MHz<br>By external clock: 32MHz<br>Max   | By internal clock: 16.5MHz<br>By external clock: 32MHz<br>Max                          | By internal clock: 16.5MHz<br>By external clock: 32MHz<br>Max                          | By internal clock: 16.5MHz<br>By external clock: 32MHz<br>Max                          |
| Encoder                       |   |  |  |  |
| Number of Channels            | N/A   |  | 2  |  |
| Encoder Type                  | N/A   |  | CW/CCW encoder, x 1 AB phase encoder, x 2 AB phase encoder, x 4 AB phase encoder       |  |
| General Specification         |   |  |  |  |
| Bus Type                      | PCI Express 1.0   |  |  |  |
| Bus Width                     | x1 lane   |  |  |  |
| Dimension (L x W x H)         | 169.55 mm (L) x 16.15 mm (W) x 98.4 mm (H)  |  | 181.05mm (L) x 21.1mm (W) x 126.29mm (H)   | 181.05mm (L) x 19.4mm (W) x 126.72mm (H)   |
| Connector                     | 37-pin D-type connector   |  | 68-pin SCSI-type female  | 68-pin SCSI-type female  |
| Operating Temperature         | 0°C to 60°C   |  |  |  |
| Storage Temperature           | -40 to 85 °C  |  |  |  |
| Power Consumption             | PCIe-9101: Typical: 71.6 mA@3.3V<br>261.5 mA@12V<br>Max: 257.8 mA@3.3V<br>556.24 mA@12V<br>PCIe-9121/9141: Typical: 60.3 mA@3.3V<br>358.2 mA@12V<br>Max: 246.5 mA@3.3V<br>652.94 mA@12V | Typical: 113 mA@3.3V/292.1 mA@12V<br>Max: 140 mA@3.3V/656.2 mA@12V                     | Typical: 34 mA@3.3V<br>490 mA@12V<br>Max: 55 mA@3.3V<br>885 mA@12V                     | Typical: 30 mA@3.3V<br>650 mA@12V<br>Max: 45 mA@3.3V<br>770 mA@12V                     |

\*1: The PCIe-9161/9163 is a 16/32-ch multiplexer DAQ with a 1MSps sampling rate. It can also function as a 2-ch simultaneous DAQ with a 4MSps sampling rate.  
The PCIe-9164 is a 64-ch multiplexer DAQ with a 1MSps sampling rate. It can also function as a 4-ch simultaneous DAQ with a 4MSps sampling rate.