## PCI Smart DAQ Solutions

### DAQ-2000 Series

#### Simultaneous Sampling DAQ Cards

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<td>Bus-mastering DMA</td>
<td>Scatter-gather</td>
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<tr>
<td>Voltage Output</td>
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<td>±10V, ±5V, ±2.5V, ±1.25V</td>
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#### Analog Output Cards

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### Multi-Function DAQ Cards

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<th>DAQ-2204A</th>
<th>DAQ-2205A</th>
<th>DAQ-2206A</th>
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### Supports
- Supported: – Not available
- Supported: – Not available
- Supported: – Not available

## Notes
- (1) Analog outputs with hardware-based arbitrary waveform generation.

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**Legend:**
- **Digital Input:** Digital Input
- **Digital Output:** Digital Output
- **Voltage Output:** Voltage Output
- **Voltage Range:** Voltage Range
- **Channel-gain Queue:** Channel-gain Queue
- **Analog Output Ranges:** Analog Output Ranges
- **Simultaneous Sampling:** Simultaneous Sampling
- **Max. Sampling Rates (S/s):** Max. Sampling Rates (S/s)
- **Digital Resolution (bits):** Digital Resolution (bits)
- **Analog Resolution (bits):** Analog Resolution (bits)
- **Simultaneous Update:** Simultaneous Update
- **Voltage Outputs:** Voltage Outputs
- **FIFO Size (samples):** FIFO Size (samples)
- **Update Rate (S/s):** Update Rate (S/s)
- **Channel-gain Queue:** Channel-gain Queue
- **Bipolar Input Ranges (V):** Bipolar Input Ranges (V)
- **Unipolar Input Ranges (V):** Unipolar Input Ranges (V)
- **ANalog Output Ranges:** Analog Output Ranges
- **Voltage Outputs:** Voltage Outputs
- **FIFO Size (samples):** FIFO Size (samples)
- **Update Rate (S/s):** Update Rate (S/s)
- **Channel-gain Queue:** Channel-gain Queue
- **Bipolar Input Ranges (V):** Bipolar Input Ranges (V)
- **Unipolar Input Ranges (V):** Unipolar Input Ranges (V)
- **ANalog Output Ranges:** Analog Output Ranges

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**PCI-9820**

**2-CH Up to 130MS/s 14-Bit Digitizer with SDRAM**

### Features
- Supports a 32-bit 3.3 V or 5 V PCI bus
- 14-bit A/D resolution
- Up to 60 MS/s sampling rate per channel with internal timebase
- Up to 65 MS/s sampling rate per channel with external timebase
- Up to 130 MS/s sampling rate in “ping pong” mode
- 2-CH single-ended bipolar inputs
- 30 MHz -3dB bandwidth
- Up to 512MB on-board SODIMM SDRAM
- Programmable ranges of ±1 V and ±5 V
- User-selectable input impedance of 50 Ω or high input impedance
- Scatter-gather DMA
- Analog and digital triggering
- Fully auto calibration
- Multiple cards synchronization
- Compact, half-size PCB

### Operating Systems
- Linux

### Recommended Software
- VB/V+/+BCB/Delphi
- DAQBench
- DAQ-LVIEW PnP for LabVIEW
- DAQ-MATLAB for MATLAB
- DAQBOY for Windows
- WD-DASK for Windows
- WD-DASK/K for Linux

### Introduction
ADLINK PCI-9820 is a 65 MS/s, high-resolution PCI digitizer with deep SODIMM SDRAM memory. The device features flexible input configurations, including programmable input ranges and user-selectable input impedance. With the deep on-board acquisition memory, the PCI-9820 is not limited by the PCI 133 MB/s bandwidth, and can record the waveform for a long period of time. The PCI-9820 is ideal for high-speed waveform capturing, such as radar and ultrasound applications, as well as software radio applications, or those signal digitizing applications which need deep memory for data storage.

### Analog Input
The PCI-9820 device features two analog input channels. The small signal bandwidth of each channel exceeds 30 MHz. The input ranges are programmable as either ±5 V or ±1 V. The 14-bit A/D resolution makes the PCI-9820 ideal both for time-domain and frequency-domain applications.

### Acquisition System
ADLINK PCI-9820 device uses a pair of 65 MS/s, 14-bit pipeline ADCs to digitize the input signals, and the device provides an internal 60 MHz timebase for data acquisition. The maximum real-time sampling rate is 60 MS/s with internal timebase, and is up to 65 MS/s with external timebase. By using the “ping pong” mode, the sampling rate is up to 120 MS/s with internal timebase or 130 MS/s with external timebase.

### Acquisition Memory
The PCI-9820 device supports different size of SODIMM SDRAM ranging from 128 MB to 512 MB. The digitized data are stored in the on-board SDRAM before being transferred to the host memory. The PCI-9820 device uses the scatter-gather bus mastering DMA to move data to the host memory. If the data throughput from the PCI-9820 is less than the available PCI bandwidth, the PCI-9820 also features on-board 3k-sample FIFO to achieve real-time transfer bypassing the SDRAM, directly to the host memory.

### Triggering
The PCI-9820 device features flexible triggering functionalities, such as analog and digital triggering. The analog trigger features programmable trigger thresholds on rising or falling edges on both input channels. The 5 V/TTL digital trigger comes from SSI interface or the external SMB connector for synchronizing multiple devices.

Post-trigger, pre-trigger, delay-trigger and middle-trigger modes are available to acquire data around the trigger event. The PCI-9820 also features repeated trigger acquisition, so you can acquire data in multiple segments coming with successive trigger events at extremely short rearming interval.

### Multiple-Instrument Synchronization
On the PCI-9820, a synchronization bus (system synchronization interface, SSI) routes timing and trigger signals between one or more PCI-9820 devices. The SSI could reach synchronization between different acquisition hardware by a common trigger signal or a single sample clock for the acquisition of multiple devices.

### Calibration
The auto-calibration function of the PCI-9820 is performed with trim DACs to calibrate the offset and gain errors of the analog input channels. Once the calibration process is done, the calibration constant will be stored in EEPROM such that these values can be loaded and used as needed by the board. Because all the calibration is conducted automatically by software commands, you don’t have to adjust trimpots to calibrate the boards.
Specifications

Analog Input
- Number of channels: 2 simultaneous-sampled single-ended
- Resolution: 14 bits
- Maximum sampling rate: 65 MS/s for 2 inputs
- 130 MS/s for Ping-Pong mode
- On-board sample memory: 128 MB, standard
- up to 512 MB, optional
- Bandwidth (-3 dB): 30 MHz minimum
- Input signal ranges: (software programmable)
  ±5 V, ±1 V
- Input Coupling: DC
- Overvoltage protection
  Range | Overvoltage protection
  ±5 V  | ±5 V
  ±1 V  | ±1 V
- Input impedance (soldering selectable):
  50Ω, 1.5 MΩ
- Crosstalk: -80 dB, DC to 1 MHz
- Total harmonic distortion (THD): -75 dB
- Signal-to-Noise ratio (SNR)
  Range | SNR
  ±5 V  | 66 dB
  ±1 V  | 62 dB
- Spurious-free dynamic range (SFDR): 75 dB
- Data transfer: bus mastering DMA with scatter-gather

Auto Calibration
- On-board reference: +5 V
- Temperature drift: 2 ppm/°C
- Stability: 6 ppm/1000 Hrs

External Timebase Input
- Connector: SMB
- Impedance: 50Ω
- Input impedance: 1 Vpp to 2 Vpp
- Overvoltage protection: 2.5 Vpp
- Frequency range: 500 kHz - 65 MHz

Triggering
- Analog triggering
  - Modes: pre-trigger, post-trigger, middle-trigger, delay-trigger
  - Source: CH0 and CH1
  - Slope: rising/falling
  - Coupling: DC
  - Trigger sensitivity: 256 steps in full-scale voltage range
- Digital triggering
  - Modes: pre-trigger, post-trigger, middle-trigger, delay-trigger
  - Source: external digital trigger from SMB
  - Slope: rising/falling
  - Compatibility: 5 V TTL
  - Minimum pulse width: 10 ns
  - Repeated trigger rearming interval: 2 cycles of timebase
- Pre-trigger depth: 128 MB or 512 MB, depending on memory option
- Post-trigger depth: 128 MB or 512 MB, depending on memory option

General Specifications
- I/O connector
  - BNC x 2 for analog inputs
  - SMB x 2 for external digital trigger and external timebase
- Operating temperature: 0 to 50°C
- Storage temperature: -20 to 80°C
- Relative humidity: 5 to 95%, noncondensing
- Power requirements

<table>
<thead>
<tr>
<th>Power Rail</th>
<th>Current</th>
</tr>
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<tbody>
<tr>
<td>5 V</td>
<td>895 mA</td>
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<tr>
<td>12 V</td>
<td>295 mA</td>
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<td>3.3 V</td>
<td>380 mA</td>
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- Dimensions (not including connectors)
  175 mm x 107 mm

Accessories
- SMB-SMB-1M 1-meter SMB to SMB cable
- SMB-BNC-1M 1-meter SMB to BNC cable
- 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

Ordering Information
- PCI-9820D/128-0 2-CH 65 MS/s 14-Bit Digitizer with 128 MB Memory
- PCI-9820D/512-0 2-CH 65 MS/s 14-Bit Digitizer with 512 MB Memory
PCI-9812/9812A/9810
4-CH 10/12-Bit 20 MS/s Simultaneous-Sampling Analog Input Cards

Features
- Supports a 32-bit 3.3 V or 5 V PCI bus
- 12-bit A/D resolution (PCI-9812 and PCI-9812A)
- 10-bit A/D resolution (PCI-9810)
- Up to 20 MS/s simultaneous-sampling rate
- ±17 MHz -3 dB bandwidth
- 4-CH single-ended inputs
- Bipolar analog input ranges
- User-selectable input impedance of 50Ω, 1.25 kΩ, and 15MΩ
- On-board 32 k-sample A/D FIFO (PCI-9810 and PCI-9812)
- On-board 128 k-sample A/D FIFO (PCI-9812A)
- Analog and digital triggering
- External clock input for customized conversion rate
- Bus-mastering DMA for analog inputs
- 3-CH TTL digital inputs
- Compact, half-size PCB

Introduction
ADLINK PCI-9812, PCI-9810 and 9812A are 4-CH, 10 or 12-bit, 20 MS/s simultaneous-sampling analog input cards. The high-speed analog input channels are single-ended, with hardware programmable input ranges of ±1V, ±5V and input impedances of 50Ω, 1.25 kΩ and 15MΩ. The on-board 32k-sample A/D FIFO can buffer the sampled data. When the data throughput is less than 100 Mbytes/s, the FIFO performs as the temporary A/D sample buffer, and as a rule of thumb, no data loss will happen. When four channels operate at 20 MS/s simultaneously, each sample generates two bytes, resulting in 160 Mbytes/s (4 channels * 20M * 2 bytes) throughput, which exceeds the peak 132 Mbyte/s bandwidth of PCI bus. To avoid data loss, the 32k-sample FIFO is the limitation of sample count. For applications needing a larger number of samples at full sampling rate, the PCI-9812A features 128K-sample A/D FIFO for storage.

In addition to the on-board 40MHz time base, users are able to supply the external time base in either sine wave or digital forms. The PCI-9810 and PCI-9812 also feature external digital trigger and programmable analog trigger, thus the conversion start point of multiple cards can be synchronized to external events. The trigger modes include software-trigger, pre-trigger, post-trigger, middle-trigger and delay trigger, further expands the capabilities of these high-speed devices.

ADLINK PCI-9812, PCI-9810 and 9812A deliver cost-effective and reliable data acquisition capabilities and are ideal for vibration testing, image digitizing, ultrasonic measurement, biomedical research, ATE and other high-end Industrial/Scientific/Military applications.
PCI High Speed Digitizer

Specifications

Analog Input
- Number of channels: 4 single-ended
- Resolution
  - 12-bit (PCI-9812 and PCI-9812A)
  - 10-bit (PCI-9810)
- Maximum sampling rate: 20 MS/s
- Input signal ranges, impedance and overvoltage protection
<table>
<thead>
<tr>
<th>Input Range</th>
<th>Input Impedance</th>
<th>Overvoltage protection</th>
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</thead>
<tbody>
<tr>
<td>±1 V</td>
<td>50 Ω</td>
<td>±2 V</td>
</tr>
<tr>
<td>±5 V</td>
<td>50 Ω</td>
<td>±10 V</td>
</tr>
</tbody>
</table>
- Accuracy: ±1.5 % typical
- DNL: ±0.4 LSB typical, ±1.0 LSB maximum
- INL: ±1.9 LSB typical
- Input coupling: AC
- Trigger sources: software, analog and digital trigger (5 V/TTL compatible)
- Trigger modes: software-trigger, pre-trigger, post-trigger, middle-trigger & delay trigger
- FIFO buffer size
  - 32k samples (PCI-9810 & PCI-9812)
  - 128k samples (PCI-9812A)
- Data transfers: bus mastering DMA
- Analog triggering
  - Modes: pre-trigger, post-trigger, middle-trigger, delay-trigger
  - Source: CH0, CH1, CH2 and CH3
  - Slope: rising/falling
  - Coupling: DC
  - Trigger sensitivity: 256 steps in full-scale voltage range
- Digital triggering
  - Modes: pre-trigger, post-trigger, middle-trigger, delay-trigger
  - Source: external digital trigger
  - Slope: rising edge
  - Compatibility: 5 V/TTTL
  - Minimum pulse width: 25 ns

External Sine Wave Clock
- Input coupling: AC
- Input impedance: 500
- Input frequency: 300 kHz to 40 MHz
- Input range: 1.0 to 2.0 Vpp
- Overvoltage protection: 2.5 Vpp

External Digital Clock
- Input coupling: DC
- Input impedance: 500
- Compatibility: 5 V/TTTL
- Input frequency: 20 kHz to 40 MHz
- Overvoltage protection: diode clamping, -0.3 V to +5.3 V

Digital Input
- Number of channels: 3
- Compatibility:
  - 5 V/TTTL with 10 KΩ pull down resistors
- Overvoltage protection:
  - Diode clamping, -0.3 V to +5.3 V
- Data transfers:
  - bus mastering DMA with A/D samples

General Specifications
- I/O connector: 50-pin male
- Operating temperature: 0 to 40°C
- Storage temperature: -20 to 70°C
- Relative humidity: 5 to 95%, noncondensing
- Power requirements:
<table>
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<th>+5 V</th>
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<tbody>
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<td>PCI-9812</td>
<td>1.4 A typical</td>
</tr>
<tr>
<td>PCI-9812A</td>
<td>1.4 A typical</td>
</tr>
</tbody>
</table>
- Dimensions (not including connectors): 173 mm x 108 mm

Ordering Information
- PCI-9810
  - 4-CH 10-Bit 20 MSa/s Simultaneous-Sampling Analog Input Card with 32k-Sample A/D FIFO
- PCI-9812
  - 4-CH 12-Bit 20 MSa/s Simultaneous-Sampling Analog Input Card with 32k-Sample A/D FIFO
- PCI-9812A
  - 4-CH 12-Bit 20 MSa/s Simultaneous-Sampling Analog Input Card with 128k-Sample A/D FIFO

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The DAQ-2000 series are able to perform the analog input function and analog output functions at full speed simultaneously. The special intelligent timing control logic and data buffer management allows high-speed data I/O throughput at the same time. Unlike counterparts from other vendors, the specifications are not sacrificed, which come from limited design.

**Full speed simultaneous operation**

The DAQ-2000 series are able to perform the analog input function and analog output functions at full speed simultaneously. The special intelligent timing control logic and data buffer management allows high-speed data I/O throughput at the same time. Unlike counterparts from other vendors, the specifications are not sacrificed, which come from limited design.

**High Immunity to noise**

The modular design of the DAQ-2000 separates the digital circuitry and analog device into two-board piggy-back configurations. The isolation of digital and analog circuitry provides the best digital noise immunity. In addition, a special custom power regulation unit is implemented to provide a stable and clean power for the system. This DC/DC circuitry greatly reduces the noise induced from the power supply.

**Custom design instrumentation amplifier**

Most commercial amplifiers are limited to frequency response lower than 1MHz. This makes scanning multiple channels at fast rates and high gain with accurate data impossible. The custom design instrumentation amplifier provides settling time faster than that of commercial amplifiers such that the signal can settle before going into the A/D converters.

**Versatile random channel sampling and gain settings**

The DAQ-2200 series can scan up to 64 channels of data and sample the channels in any order at the maximum conversion rate. Each channel can be configured with different gain, unipolar or bipolar, single-ended or differential and the information is stored in the channel gain queue. This makes it possible to measure fast and slow, large and small signals in one system.

**Analog and digital triggering**

The data acquisition can be started before or after the trigger event and the trigger signal can be analog threshold or digital signal. There are four trigger modes available: Pre-Trigger, Post-Trigger, Middle-Trigger, and Delay-Trigger. In addition, Post-trigger and Delay trigger modes allow successive triggers in order to capture repeated burst of data.

**Automatic calibration**

The auto-calibration function of the DAQ-2000 is performed with trim DACs to calibrate the offset and gain errors of the analog input and analog output channels. Once the calibration process is done, the calibration constant will be stored in EEPROM such that these values can be loaded and used as needed by the board. Because all the calibration is conducted automatically by software command, you don’t have to adjust trimpots to calibrate the boards.
Multiple card synchronization

The DAQ-2000 series provide high-speed signal bus for trigger and clock transmission. This interface allows you to integrate multiple cards into a system with card-to-card synchronization.

Bus-mastering DMA with scatter-gather

The scatter-gather bus mastering DMA can transfer data to and from fragmented physical memory intelligently without CPU intervention. The DMA controller has a built-in linking table that tells DMA controller the memory address and the number of data to transfer, and it can automatically load the next linking address to transfer data to or from the next memory segment. With this mechanism, scatter-gather bus mastering allows the DMA controller to transfer data to and from the memory up to the size limited by the system memory. Therefore it allows user to acquire high speed, huge amount of data into the cost effective system memory.

Small footprint

The piggy-back configuration of the DAQ-2000 not only minimizes the noise induced from digital circuitry but also reduces the size of the board. This allows you to integrate the DAQ-2000 into half size computer chassis to meet the applications when the space is a concern.

Easy upgrade to PXI/CompactPCI form factor

By taking the advantage of carrier and daughter card design, the DAQ-2000 can be upgraded to PXI/CompactPCI form factor easily (PXI-2000 series). The software is fully compatible such that the modification of program is not needed at all.

Wiring termination

DIN-68SI1M

www.adlinktech.com
**Features**
- Supports a 32-bit 3.3 V or 5 V PCI bus
- 4-CH differential analog inputs
- Up to 2 MS/s simultaneous-sampling rate (DAQ-2010)
- 14-bit A/D resolution (DAQ-2010)
- Up to 9 k-sample A/D FIFO (DAQ-2010)
- Bipolar or unipolar analog input ranges
- Programmable gains of x1, x2, x4, x8
- Scatter-gather DMA for both analog inputs and outputs
- 2-CH 12-bit multiplying analog outputs with waveform generation
- 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
- Driver Support
  - DAQ-LVIEW PnP for LabVIEW
  - DAQ-MTLB for MATLAB
  - DAQBOY for Windows
  - D2K-DASK for Windows
  - D2K-DASK/K for Linux

**Introduction**
ADLINK DAQ-2000 series products are simultaneous-sampling multifunction DAQ cards to meet a wide range of application requirements. The devices can simultaneously sample 4 AI channels with differential input configuration in order to achieve maximum noise elimination. They also provide 2-CH 12-bit analog outputs with waveform generation capability, which can be performed together with analog input functions. If more analog input or output channels are required, multiple cards can be synchronized through the SSI (system synchronization interface) bus. This makes the DAQ-2000 series ideal for the stimulus/response test.

The DAQ-2000 series also feature analog and digital triggering, 24-CH programmable digital I/O lines, and 2-CH 16-bit general-purpose timer/counters. 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.

**Termination Boards**
- DIN-68S/1M
  - Termination Board with a 68-pin SCSI-II Connector and DIN-Rail Mounting (including One 1-meter ACL-10568 Cable)

**SSI Bus Cables (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

**Ordering Information**
- DAQ-2010
  - 4-CH 14/16-Bit 2 MS/s Simultaneous-Sampling Multi-Function DAQ Card
- DAQ-2016
  - 4-CH 16-Bit 800 kS/s Simultaneous-Sampling Multi-Function DAQ Card
- DAQ-2005
  - 4-CH 16-Bit 500 kS/s Simultaneous-Sampling Multi-Function DAQ Card
- DAQ-2006
  - 4-CH 16-Bit 250 kS/s Simultaneous-Sampling Multi-Function DAQ Card

**Recommended Software**
- VB/VC++/BCB/Delphi
- Linux

**Recommended Operation Systems**
- Linux

**Recommended Driver Support**
- DAQ-LVIEW PnP for LabVIEW
- DAQ-MTLB for MATLAB
- DAQBOY for Windows
- D2K-DASK for Windows
- D2K-DASK/K for Linux
# Quick Selection Guide

## Analog Input

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DAQ-2010</th>
<th>DAQ-2016</th>
<th>DAQ-2005</th>
<th>DAQ-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of channels</td>
<td>4-CH DI</td>
<td>4-CH DI</td>
<td>4-CH DI</td>
<td>4-CH DI</td>
</tr>
<tr>
<td>Resolution</td>
<td>14 bits</td>
<td>16 bits</td>
<td>16 bits</td>
<td>16 bits</td>
</tr>
<tr>
<td>Input range</td>
<td>±1.25 V to ±10 V</td>
<td>±1.25 V to ±10 V</td>
<td>±1.25 V to ±10 V</td>
<td>±1.25 V to ±10 V</td>
</tr>
<tr>
<td>Sampling rate</td>
<td>2 MS/s</td>
<td>1 MS/s</td>
<td>1 MS/s</td>
<td>1 MS/s</td>
</tr>
<tr>
<td>Maximum sampling rate</td>
<td>2 MS/s</td>
<td>1 MS/s</td>
<td>1 MS/s</td>
<td>1 MS/s</td>
</tr>
<tr>
<td>Programmable gain</td>
<td>1, 2, 4, 8</td>
<td>1, 2, 4, 8</td>
<td>1, 2, 4, 8</td>
<td>1, 2, 4, 8</td>
</tr>
<tr>
<td>Bipolar input ranges</td>
<td>±10 V, ±5 V, ±2.5 V, ±1.25 V</td>
<td>±10 V, ±5 V, ±2.5 V, ±1.25 V</td>
<td>±10 V, ±5 V, ±2.5 V, ±1.25 V</td>
<td>±10 V, ±5 V, ±2.5 V, ±1.25 V</td>
</tr>
<tr>
<td>Unipolar input ranges</td>
<td>±10 V, 0-5 V, 0-2.5 V, 0-1.25 V</td>
<td>±10 V, 0-5 V, 0-2.5 V, 0-1.25 V</td>
<td>±10 V, 0-5 V, 0-2.5 V, 0-1.25 V</td>
<td>±10 V, 0-5 V, 0-2.5 V, 0-1.25 V</td>
</tr>
<tr>
<td>Offset error</td>
<td>±0.01% of FSR</td>
<td>±0.01% of FSR</td>
<td>±0.01% of FSR</td>
<td>±0.01% of FSR</td>
</tr>
<tr>
<td>Gain error</td>
<td>±0.03% of FSR</td>
<td>±0.01% of FSR</td>
<td>±0.01% of FSR</td>
<td>±0.01% of FSR</td>
</tr>
<tr>
<td>Input Coupling</td>
<td>DC</td>
<td>DC</td>
<td>DC</td>
<td>DC</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>1 GΩ</td>
<td>1 GΩ</td>
<td>1 GΩ</td>
<td>1 GΩ</td>
</tr>
<tr>
<td>CMRR (gain = 1)</td>
<td>85 dB</td>
<td>85 dB</td>
<td>85 dB</td>
<td>85 dB</td>
</tr>
<tr>
<td>-3dB small signal bandwidth (gain = 1)</td>
<td>1 MHz</td>
<td>1 MHz</td>
<td>1 MHz</td>
<td>1 MHz</td>
</tr>
</tbody>
</table>

## Analog Output

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DAQ-2010</th>
<th>DAQ-2016</th>
<th>DAQ-2005</th>
<th>DAQ-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of channels</td>
<td>2 voltage outputs</td>
<td>2 voltage outputs</td>
<td>2 voltage outputs</td>
<td>2 voltage outputs</td>
</tr>
<tr>
<td>Resolution</td>
<td>12 bits</td>
<td>12 bits</td>
<td>12 bits</td>
<td>12 bits</td>
</tr>
<tr>
<td>Output ranges</td>
<td>0-10 V, ±10 V, 0-AOEXTREF, ±AOEXTREF</td>
<td>0-10 V, ±10 V, 0-AOEXTREF, ±AOEXTREF</td>
<td>0-10 V, ±10 V, 0-AOEXTREF, ±AOEXTREF</td>
<td>0-10 V, ±10 V, 0-AOEXTREF, ±AOEXTREF</td>
</tr>
<tr>
<td>Maximum update rate</td>
<td>1 µs</td>
<td>1 µs</td>
<td>1 µs</td>
<td>1 µs</td>
</tr>
<tr>
<td>Slew rate</td>
<td>20 V/µs</td>
<td>20 V/µs</td>
<td>20 V/µs</td>
<td>20 V/µs</td>
</tr>
<tr>
<td>Settling time</td>
<td>3 µs to ±0.5 LSB accuracy</td>
<td>3 µs to ±0.5 LSB accuracy</td>
<td>3 µs to ±0.5 LSB accuracy</td>
<td>3 µs to ±0.5 LSB accuracy</td>
</tr>
<tr>
<td>Offset error</td>
<td>±1 mV</td>
<td>±1 mV</td>
<td>±1 mV</td>
<td>±1 mV</td>
</tr>
<tr>
<td>Gain error</td>
<td>±0.02% of max. output</td>
<td>±0.02% of max. output</td>
<td>±0.02% of max. output</td>
<td>±0.02% of max. output</td>
</tr>
<tr>
<td>Driving capacity</td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
<td>5 mA</td>
</tr>
<tr>
<td>Stability</td>
<td>Any passive load, up to 1500 pf</td>
<td>Any passive load, up to 1500 pf</td>
<td>Any passive load, up to 1500 pf</td>
<td>Any passive load, up to 1500 pf</td>
</tr>
<tr>
<td>Trigger modes</td>
<td>Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger</td>
<td>Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger</td>
<td>Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger</td>
<td>Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger</td>
</tr>
<tr>
<td>FIFO buffer size</td>
<td>8K samples</td>
<td>8K samples</td>
<td>8K samples</td>
<td>8K samples</td>
</tr>
<tr>
<td>Data transfers</td>
<td>Polling, scatter-gather DMA</td>
<td>Polling, scatter-gather DMA</td>
<td>Polling, scatter-gather DMA</td>
<td>Polling, scatter-gather DMA</td>
</tr>
</tbody>
</table>

## Digital I/O

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DAQ-2010</th>
<th>DAQ-2016</th>
<th>DAQ-2005</th>
<th>DAQ-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of channels</td>
<td>8255 24-bit programmable input/output</td>
<td>8255 24-bit programmable input/output</td>
<td>8255 24-bit programmable input/output</td>
<td>8255 24-bit programmable input/output</td>
</tr>
<tr>
<td>Compatibility</td>
<td>5V/TTL</td>
<td>5V/TTL</td>
<td>5V/TTL</td>
<td>5V/TTL</td>
</tr>
<tr>
<td>Base clock available</td>
<td>40 MHz, external clock up to 10 MHz</td>
<td>40 MHz, external clock up to 10 MHz</td>
<td>40 MHz, external clock up to 10 MHz</td>
<td>40 MHz, external clock up to 10 MHz</td>
</tr>
</tbody>
</table>

## Auto Calibration

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DAQ-2010</th>
<th>DAQ-2016</th>
<th>DAQ-2005</th>
<th>DAQ-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-board reference</td>
<td>±5 V</td>
<td>±5 V</td>
<td>±5 V</td>
<td>±5 V</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>±2 ppm/˚C</td>
<td>±2 ppm/˚C</td>
<td>±2 ppm/˚C</td>
<td>±2 ppm/˚C</td>
</tr>
<tr>
<td>Stability</td>
<td>6 ppm/1000 Hrs</td>
<td>6 ppm/1000 Hrs</td>
<td>6 ppm/1000 Hrs</td>
<td>6 ppm/1000 Hrs</td>
</tr>
</tbody>
</table>

## General

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DAQ-2010</th>
<th>DAQ-2016</th>
<th>DAQ-2005</th>
<th>DAQ-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension</td>
<td>175 mm x 107 mm (not including connectors)</td>
<td>175 mm x 107 mm (not including connectors)</td>
<td>175 mm x 107 mm (not including connectors)</td>
<td>175 mm x 107 mm (not including connectors)</td>
</tr>
<tr>
<td>Connector</td>
<td>68-pin VHDCI-type female</td>
<td>68-pin VHDCI-type female</td>
<td>68-pin VHDCI-type female</td>
<td>68-pin VHDCI-type female</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 to 55 C</td>
<td>0 to 55 C</td>
<td>0 to 55 C</td>
<td>0 to 55 C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 to 70 C</td>
<td>-20 to 70 C</td>
<td>-20 to 70 C</td>
<td>-20 to 70 C</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95%, noncondensing</td>
<td>5 to 95%, noncondensing</td>
<td>5 to 95%, noncondensing</td>
<td>5 to 95%, noncondensing</td>
</tr>
<tr>
<td>Power requirement</td>
<td>±5 V 1.82 A typical</td>
<td>±5 V 1.82 A typical</td>
<td>±5 V 1.82 A typical</td>
<td>±5 V 1.82 A typical</td>
</tr>
</tbody>
</table>

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DAQ-2208
96-CH 12-Bit 3 MS/s Ultra High Density Analog Input Card

Features
- Supports a 32-bit 3.3 V or 5 V PCI bus
- 96-CH single-ended or 48-CH differential analog inputs
- Up to 3 MS/s sampling rate
- 12-bit A/D resolution
- On-board 1 k-sample A/D FIFO
- Bipolar or unipolar analog input ranges
- Programmable gains of x1, x2, x4, x5, x8, x10, x20, x40, x50, x200
- 1024-configuration channel-gain queue
- Scatter-gather DMA for analog inputs
- 24-CH TTL digital input/output
- Analog and digital triggering
- Fully auto-calibration
- Multiple cards synchronization through SSI (System Synchronization Interface) bus
- Compact, half-size PCB

Introduction
ADLINK DAQ-2208 is an ultra-high-density and high-performance analog input card. The device can sample up to 96 AI channels with different gain settings and scan sequences. It makes them ideal for dealing with ultra-high-density analog signals with various input ranges and sampling speeds. These devices also offer differential mode for 48 AI channels in order to achieve maximum noise elimination.

The DAQ-2208 also features analog and digital triggering and 24-CH programmable digital I/O lines. Like all the other members in DAQ-2000 family, the DAQ-2208 is able to perform the analog input at full speed while multiple cards can be synchronized through the SSI (system synchronization interface) bus. The auto-calibration functions adjust the gain and offset to within specified accuracies so that you do not have to adjust trimpots to calibrate the cards.

Termination Boards
- DIN-68S/1M
  Termination Board with a 68-pin SCSI-II Connector and DIN-Rail Mounting (including One 1-meter ACL-10568 Cable)

SSI Bus Cables (for multiple cards synchronization)
- ACL-SSI2
  SSI Bus cable for 2 devices
- ACL-SSI3
  SSI Bus cable for 3 devices
- ACL-SSI4
  SSI Bus cable for 4 devices

Ordering Information
- DAQ-2208
  96-CH 12-bit 3 MS/s Ultra High Density Analog Input Card

Pin Assignment
Connector CN1 Pin Assignment

A10 (AIH10) 1-35 (AI0) 48
A11 (AIH11) 2-36 (AI1) 49
A12 (AIH12) 3-37 (AI2) 50
A13 (AIH13) 4-38 (AI3) 51
A14 (AIH14) 5-39 (AI4) 52
A15 (AIH15) 6-40 (AI5) 53
A16 (AIH16) 7-41 (AI6) 54
A17 (AIH17) 8-42 (AI7) 55
AISENSE 9-43 AIIGN
A18 (AIH18) 10-44 (AI8) 56
A19 (AIH19) 11-45 (AI9) 57
A10 (AH10) 12-46 (AI10) 58
A11 (AH11) 13-47 (AI11) 59
A12 (AH12) 14-48 (AI12) 60
A13 (AH13) 15-49 (AI13) 61
A14 (AH14) 16-50 (AI14) 62
A15 (AH15) 17-51 (AI15) 63
A16 (AH16) 18-52 (AI16) 64
A17 (AH17) 19-53 (AI17) 65
A18 (AH18) 20-54 (AI18) 66
A19 (AH19) 21-55 (AI19) 67
A20 (AH20) 22-56 (AI20) 68
A21 (AH21) 23-57 (AI21) 69
A22 (AH22) 24-58 (AI22) 70
A23 (AH23) 25-59 (AI23) 71
AIGND 26-60 AIIGN
A24 (AH24) 27-61 (AI24) 72
A25 (AH25) 28-62 (AI25) 73
A26 (AH26) 29-63 (AI26) 74
A27 (AH27) 30-64 (AI27) 75
A28 (AH28) 31-65 (AI28) 76
A29 (AH29) 32-66 (AI29) 77
A30 (AH30) 33-67 (AI30) 78
A31 (AH31) 34-68 (AI31) 79

Connector CN2 Pin Assignment

A32 (AH32) 1-35 (AI32) 80
A33 (AH33) 2-36 (AI33) 81
A34 (AH34) 3-37 (AI34) 82
A35 (AH35) 4-38 (AI35) 83
A36 (AH36) 5-39 (AI36) 84
A37 (AH37) 6-40 (AI37) 85
A38 (AH38) 7-41 (AI38) 86
A39 (AH39) 8-42 (AI39) 87
A40 (AH40) 9-43 AIGN
A41 (AH41) 10-44 (AI40) 88
A42 (AH42) 11-45 (AI41) 89
A43 (AH43) 12-46 (AI42) 90
A44 (AH44) 13-47 (AI43) 91
A45 (AH45) 14-48 (AI44) 92
A46 (AH46) 15-49 (AI45) 93
A47 (AH47) 16-50 (AI46) 94
AIGN 17-51 AIGN
AIGN 18-52 AIGN
NC 19-53 NC
EXTTRIG 20-54 AF0
EXTTIMEBASE 21-55 DGN
PB7 22-56 PB6
PB8 23-57 PB7
PB9 24-58 PB2
PB1 25-59 PB0
PC7 26-60 PC6
PC8 27-61 PC4
DGN 28-62 DGN
PC3 29-63 PC2
PC1 30-64 PC0
PA7 31-65 PA6
PA5 32-66 PA4
PA3 33-67 PA2
PA1 34-68 PA0

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## Specifications

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DAQ-2208</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analog Input</strong></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>12 bits, no missing codes</td>
</tr>
<tr>
<td>Number of channels</td>
<td>96 single-ended or 48 differential (software selectable per channel)</td>
</tr>
<tr>
<td>Channel gain queue size</td>
<td>1024</td>
</tr>
<tr>
<td>Maximum sampling rate</td>
<td>3 MS/s</td>
</tr>
<tr>
<td>Programmable gain</td>
<td>1, 2, 4, 8, 10, 20, 40, 50, 200</td>
</tr>
<tr>
<td>Bipolar input ranges</td>
<td>±10 V, ±5 V, ±2.5 V, ±1.25 V, ±2 V, ±2.5 V, ±5 V, ±10 V, ±0.25 V, ±1 V, ±0.5 V</td>
</tr>
<tr>
<td>Unipolar input ranges</td>
<td>0-10 V, 0-5 V, 0-2.5 V, 0-1 V, 0-0.5 V, 0-0.25 V, 0-0.125 V</td>
</tr>
<tr>
<td>Offset error</td>
<td>±1 mV</td>
</tr>
<tr>
<td>Gain error</td>
<td>±0.03 % of FSR</td>
</tr>
<tr>
<td>Input Coupling</td>
<td>DC</td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>Power on: Continuous ±30 V, Power off: Continuous ±15 V</td>
</tr>
<tr>
<td>Input impedance</td>
<td>1 GΩ/100 pF</td>
</tr>
<tr>
<td>CMRR (gain = 1)</td>
<td>90 dB</td>
</tr>
<tr>
<td>Setting time</td>
<td>1 µs to 0.1 % error *</td>
</tr>
<tr>
<td>Trigger sources</td>
<td>Software, external digital/analog trigger, SSI bus</td>
</tr>
<tr>
<td>Trigger modes</td>
<td>Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger</td>
</tr>
<tr>
<td>FIFO buffer size</td>
<td>1 k samples</td>
</tr>
<tr>
<td>Data Transfers</td>
<td>Polling, scatter-gather DMA</td>
</tr>
<tr>
<td><strong>Digital I/O</strong></td>
<td></td>
</tr>
<tr>
<td>Number of channels</td>
<td>24-CH 8255 programmable input/output</td>
</tr>
<tr>
<td>Compatibility</td>
<td>5 V/TTL</td>
</tr>
<tr>
<td>Data transfers</td>
<td>Programmed I/O</td>
</tr>
<tr>
<td><strong>Auto Calibration</strong></td>
<td></td>
</tr>
<tr>
<td>On-board reference</td>
<td>+5 V</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>≤2 ppm/°C</td>
</tr>
<tr>
<td>Stability</td>
<td>≤6 ppm/1000 Hrs</td>
</tr>
<tr>
<td><strong>General Specifications</strong></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>175 mm x 107 mm (not including connectors)</td>
</tr>
<tr>
<td>Connector</td>
<td>68-pin VHDCI female x 2</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 to 55 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 to 70 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 to 95 %, noncondensing</td>
</tr>
<tr>
<td>Power requirements</td>
<td>+5 V 950mA typical</td>
</tr>
</tbody>
</table>

*Gain = 1, 2, 4, 8
DAQ-2200 Series
64-CH 12/16-Bit Up to 3 MS/s Multi-Function DAQ Cards

Features
- Supports a 32-bit 3.3 V or 5 V PCI bus
- 64-CH single-ended or 32-CH differential analog inputs
- Up to 3 MS/s sampling rate (DAQ-2204)
- 12-bit A/D resolution (DAQ-2205)
- 16-bit A/D resolution (DAQ-2205 & DAQ-2206)
- On-board 1-K-sample A/D FIFO
- Bipolar or unipolar analog input ranges
- Programmable gains:
  - x1, x2, x4, x5, x8, x10, x20, x40, x50, x200 (DAQ-2204)
  - x1, x2, x4, x8 (DAQ-2205 & DAQ-2206)
- 512 configuration channel-gain queue
- Scatter-gather DMA for both analog inputs and outputs
- 2-CH 12-bit multiplying analog outputs with waveform generation
- On-board 1-K-sample DA/FIFO
- 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
- Linux

Recommended Software
- VB/V+C/VC++/Delphi
- DAQBench

Introduction
ADLINK DAQ-2204, DAQ-2205, and DAQ-2206 are high-density and high-performance multifunction DAQ cards. The devices can sample up to 64 AI channels with different gain settings and scan sequences. It makes them ideal for dealing with high-density analog signals with various input ranges and sampling speeds. These devices also offer differential mode for 32 AI channels in order to achieve maximum noise elimination.

The DAQ-2200 series also feature analog and digital triggering, 2-CH 12-bit analog outputs with waveform generation capability, 24-CH programmable digital I/O lines, and 2-CH 16-bit general-purpose timer/counters. Like all the other members in DAQ-2000 family, the DAQ-2200 series are able to perform the analog input and output functions at full speed simultaneously and multiple cards 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 trimpoints to calibrate the cards.

Termination Boards
- DIN-68S/1M
  - Termination Board with a 68-pin SCSI-II Connector and DIN-Rail Mounting (Including One 1-meter ACL-10568 Cable)
- SSI Bus Cables (for multiple cards synchronization)
  - ACL-SLi-2
    - SBus cable for 2 devices
  - ACL-SLi-3
    - SBus cable for 3 devices
  - ACL-SLi-4
    - SBus cable for 4 devices

Ordering Information
- DAQ-2204
  - 64-CH 12/16-Bit 3 MS/s Multi-Function DAQ Card
- DAQ-2205
  - 64-CH 12/16-Bit 500 kS/s Multi-Function DAQ Card
- DAQ-2206
  - 64-CH 12/16-Bit 250 kS/s Multi-Function DAQ Card

Pin Assignment
Connector CN1 Pin Assignment
- A00 (AIH00)  A16 (AIH16)  A32 (AIH32)
- A11 (AIH11)  A27 (AIH27)  A33 (AIH33)
- A2 (AIH02)  A14 (AIH14)  A34 (AIH34)
- A3 (AIH03)  A15 (AIH15)  A35 (AIH35)
- A4 (AIH04)  A16 (AIH16)  A36 (AIH36)
- A5 (AIH05)  A17 (AIH17)  A37 (AIH37)
- A6 (AIH06)  A18 (AIH18)  A38 (AIH38)
- A7 (AIH07)  A19 (AIH19)  A39 (AIH39)
- A8 (AIH08)  A20 (AIH20)  A40 (AIH40)
- A9 (AIH09)  A21 (AIH21)  A41 (AIH41)
- A10 (AIH10) A22 (AIH22)  A42 (AIH42)
- A11 (AIH11) A23 (AIH23)  A43 (AIH43)
- A12 (AIH12) A24 (AIH24)  A44 (AIH44)
- A13 (AIH13) A25 (AIH25)  A45 (AIH45)
- A14 (AIH14) A26 (AIH26)  A46 (AIH46)
- A15 (AIH15) A27 (AIH27)  A47 (AIH47)
- AISENSE 17  AISENSE 17  AISENSE 17
- AI0ND 18  AI0ND 18  AI0ND 18
- AI16 19  AI16 19  AI16 19
- AI17 20  AI17 20  AI17 20
- AI18 21  AI18 21  AI18 21
- AI19 22  AI19 22  AI19 22
- AI20 23  AI20 23  AI20 23
- AI21 24  AI21 24  AI21 24
- AI22 25  AI22 25  AI22 25
- AI23 26  AI23 26  AI23 26
- AI24 27  AI24 27  AI24 27
- AI25 28  AI25 28  AI25 28
- AI26 29  AI26 29  AI26 29
- AI27 30  AI27 30  AI27 30
- AI28 31  AI28 31  AI28 31
- AI29 32  AI29 32  AI29 32
- AI30 33  AI30 33  AI30 33
- AI31 34  AI31 34  AI31 34
- EXATRIG 35  EXATRIG 35  EXATRIG 35
- AI0ND 36  AI0ND 36  AI0ND 36

Connector CN2 Pin Assignment
- DAQOUT 1  DAQOUT 1  DAQOUT 1
- DATOUT 2  DATOUT 2  DATOUT 2
- A0E/EXTRIG 3  A0E/EXTRIG 3  A0E/EXTRIG 3
- N/C 4  N/C 4  N/C 4
- DGN 5  DGN 5  DGN 5
- GPTC0_UPDOWN 6  GPTC0_UPDOWN 6  GPTC0_UPDOWN 6
- GPTC1_SRC 7  GPTC1_SRC 7  GPTC1_SRC 7
- GPTC1_OAT 8  GPTC1_OAT 8  GPTC1_OAT 8
- DGND 9  DGND 9  DGND 9
- PC0 10  PC0 10  PC0 10
- PC1 11  PC1 11  PC1 11
- PC2 12  PC2 12  PC2 12
- PC3 13  PC3 13  PC3 13
- PC4 14  PC4 14  PC4 14
- DGN 15  DGN 15  DGN 15
- A0E/EXTRIG 3  A0E/EXTRIG 3  A0E/EXTRIG 3
- N/C 4  N/C 4  N/C 4
- DGN 5  DGN 5  DGN 5
- A0E/EXTRIG 3  A0E/EXTRIG 3  A0E/EXTRIG 3
- N/C 4  N/C 4  N/C 4
- DGN 5  DGN 5  DGN 5

*Pin 42-45 are DGN-0. 3 for DAQ-2204; DGN-2 for DAQ-2205 and DAQ-2206

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## Quick Selection Guide

<table>
<thead>
<tr>
<th>Model Number</th>
<th>No. of channels</th>
<th>Resolution</th>
<th>Sampling rate</th>
<th>Input range</th>
<th>No. of channels</th>
<th>Resolution</th>
<th>Update rate</th>
<th>No. of channels</th>
<th>No. of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAQ-2204</td>
<td>12 bits</td>
<td>12 bits</td>
<td>5 MS/s</td>
<td>±0.05 V to ±10 V</td>
<td>2</td>
<td>12 bits</td>
<td>1 MS/s</td>
<td>2-CH, 16-bit</td>
<td></td>
</tr>
<tr>
<td>DAQ-2205</td>
<td>16 bits</td>
<td>500 kS/s</td>
<td>250 kS/s</td>
<td>±1.25 V to ±10 V</td>
<td>2</td>
<td>12 bits</td>
<td>1 MS/s</td>
<td>2-CH, 16-bit</td>
<td></td>
</tr>
<tr>
<td>DAQ-2206</td>
<td>16 bits</td>
<td>16 bits</td>
<td>250 kS/s</td>
<td>±1.25 V to ±10 V</td>
<td>2</td>
<td>12 bits</td>
<td>1 MS/s</td>
<td>2-CH, 16-bit</td>
<td></td>
</tr>
</tbody>
</table>

## Specifications

### Analog Input

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DAQ-2204</th>
<th>DAQ-2205</th>
<th>DAQ-2206</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>12 bits, no missing codes</td>
<td>16 bits, no missing codes</td>
<td>16 bits, no missing codes</td>
</tr>
<tr>
<td>Number of channels</td>
<td>64 single-ended or 32 differential (software selectable per channel)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel gain queue size</td>
<td>512</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum sampling rate</td>
<td>3 MS/s</td>
<td>500 kS/s</td>
<td>250 kS/s</td>
</tr>
<tr>
<td>Programmable gain</td>
<td>1, 2, 4, 5, 8, 10, 20, 40, 50, 200</td>
<td>1, 2, 4, 8</td>
<td></td>
</tr>
<tr>
<td>Bipolar input ranges</td>
<td>±10 V, Min. ±0.25 V</td>
<td>±10 V, Min. ±0.25 V</td>
<td>±10 V, Min. ±0.25 V</td>
</tr>
<tr>
<td>Unipolar input ranges</td>
<td>±0-10 V, Min. ±0.1 V</td>
<td>±0-10 V, 0.5 V, ±0-2.5 V, ±0-1.25 V</td>
<td>±0-10 V, 0.5 V, ±0-2.5 V, ±0-1.25 V</td>
</tr>
<tr>
<td>Offset error</td>
<td>±1 mV</td>
<td>±1 mV</td>
<td>±1 mV</td>
</tr>
<tr>
<td>Gain error</td>
<td>±0.03% of FSR</td>
<td>±0.01% of FSR</td>
<td>±0.01% of FSR</td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>Power on: Continuous ±30 V, Power off: Continuous ±15 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input impedance</td>
<td>1 GΩ/100 pF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMRR (gain = 1)</td>
<td>90 dB</td>
<td>83 dB</td>
<td>83 dB</td>
</tr>
<tr>
<td>Setting time</td>
<td>1 µs to 0.1% error*</td>
<td>2 µs to 0.1% error</td>
<td>4 µs to 0.01% error</td>
</tr>
<tr>
<td>-3dB small signal bandwidth (gain = 1)</td>
<td>2 MHz</td>
<td>1.6 MHz</td>
<td>760 kHz</td>
</tr>
<tr>
<td>Trigger sources</td>
<td>Software, external digital/analog trigger, SSI bus</td>
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<td></td>
</tr>
<tr>
<td>Trigger modes</td>
<td>Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIFO buffer size</td>
<td>1 k samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data transfers</td>
<td>Polling, scatter-gather DMA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Analog Output

<table>
<thead>
<tr>
<th>Number of channels</th>
<th>2 voltage outputs</th>
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<tbody>
<tr>
<td>Resolution</td>
<td>12 bits</td>
</tr>
<tr>
<td>Output ranges</td>
<td>±10 V, ±10 V, ±AOEXTREF, ±AOEXTREF</td>
</tr>
<tr>
<td>Maximum update rate</td>
<td>1 µs</td>
</tr>
<tr>
<td>Slew rate</td>
<td>20 V/µs</td>
</tr>
<tr>
<td>Setting time</td>
<td>3 µs to ±0.5 LSB accuracy</td>
</tr>
<tr>
<td>Offset error</td>
<td>±1 mV</td>
</tr>
<tr>
<td>Gain error</td>
<td>±0.02% of max. output</td>
</tr>
<tr>
<td>Driving capacity</td>
<td>±15 mA</td>
</tr>
<tr>
<td>Stability</td>
<td>Any passive load, up to 1500 pF</td>
</tr>
<tr>
<td>Trigger sources</td>
<td>Software, external digital/analog trigger, SSI bus</td>
</tr>
<tr>
<td>Trigger modes</td>
<td>Post-trigger, delay-trigger, and repeated trigger</td>
</tr>
<tr>
<td>FIFO buffer size</td>
<td>1 k samples</td>
</tr>
<tr>
<td>Data transfers</td>
<td>Programmed I/O, scatter-gather DMA</td>
</tr>
<tr>
<td>Compatibility</td>
<td>5 V/TTL</td>
</tr>
</tbody>
</table>

### Digital I/O

<table>
<thead>
<tr>
<th>Number of channels</th>
<th>24-CH 8255 programmable input/output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data transfers</td>
<td>Programmed I/O</td>
</tr>
</tbody>
</table>

### General-Purpose Timer/Counter

<table>
<thead>
<tr>
<th>Number of channels</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>16 bit</td>
</tr>
<tr>
<td>Compatibility</td>
<td>5 V/TTL</td>
</tr>
<tr>
<td>Base clock available</td>
<td>40 MHz, external clock up to 10 MHz</td>
</tr>
</tbody>
</table>

### General Specifications

| Dimensions | 175 mm x 107 mm (not including connectors) |
| Connectors | 68-pin VHDCI female x 2 |
| Operating temperature | 0 to 55 °C |
| Storage temperature | -20 to 70 °C |
| Humidity | 5 to 95 %, noncondensing |
| Power requirements | +5V 1.3 A typical, +5 V 1.2 A typical, +5 V 1.2 A typical |

*Gain = 1, 2, 4, 8
DAQ-2500 Series
4/8-CH 12-Bit 1 MS/s Analog Output Multi-Function DAQ Cards

Features
- Supports a 32-bit 3.3 V or 5 V PCI bus
- 12-bit multiplying D/A resolution
- Up to 1 MS/s simultaneous-update rate
- 4-CH multiplying analog outputs (DAQ-2501)
- 8-CH multiplying analog outputs (DAQ-2502)
- Hardware-based arbitrary waveform generation
- On-board 8 k-sample D/A FIFO (DAQ-2501)
- On-board 16 k-sample D/A FIFO (DAQ-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 (DAQ-2501)
- 8-CH 400 kS/s 14-bit single-ended analog inputs (DAQ-2502)
- On-board 2k-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/counters
- Analog & digital triggering
- Fully auto-calibration
- Multiple cards synchronization through SSI (System Synchronization Interface) bus

Introduction
ADLINK DAQ-2501 and DAQ-2502 are high-speed and high-performance analog output multifunction DAQ cards. The devices are able to update up to 8-CH, 12-bit analog outputs simultaneously at sustaining 1 MS/s. The reference sources and the output polarities are programmable on per channel basis, combining with the multiplying DAC architecture, ADLINK DAQ-2500 series DAQ cards can generate complex modulated analog signals. The hardware-based arbitrary waveform generation frees the CPU intervention even when all analog outputs are updating at full speed, and the lengths of waveforms are only limited by the system memory.

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

Like all the other members in DAQ-2000 family, the DAQ-2500 series are able to perform the analog input and output functions at full speed simultaneously and multiple cards 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 trim pots to calibrate the boards.

Termination Boards
- DIN-68S/1M
  - Termination Board with a 68-pin SCSI-II Connector and DIN-Rail Mounting (Including One 1-meter ACL-10568 Cable)

Ordering Information
- DAQ-2501
  - 4-CH 12-Bit 1 MS/s Analog Output Multi-Function DAQ Card
- DAQ-2502
  - 8-CH 12-Bit 1 MS/s Analog Output Multi-Function DAQ Card

Pin Assignment
Connector CN1 Pin Assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO_0</td>
<td>A/D ground</td>
</tr>
<tr>
<td>AO_1</td>
<td>A/D ground</td>
</tr>
<tr>
<td>AO_2</td>
<td>A/D ground</td>
</tr>
<tr>
<td>AO_3</td>
<td>A/D ground</td>
</tr>
<tr>
<td>AOEXTREF_AAI_0</td>
<td>External reference input A1</td>
</tr>
<tr>
<td>AOEXTREF_BAI_0</td>
<td>External reference input B1</td>
</tr>
<tr>
<td>AO_4</td>
<td>A/D ground</td>
</tr>
<tr>
<td>AO_5</td>
<td>A/D ground</td>
</tr>
<tr>
<td>AO_6</td>
<td>A/D ground</td>
</tr>
<tr>
<td>AO_7</td>
<td>A/D ground</td>
</tr>
<tr>
<td>EXTTRIG_A</td>
<td>External trigger input A</td>
</tr>
<tr>
<td>EXTTRIG_B</td>
<td>External trigger input B</td>
</tr>
<tr>
<td>GPTC1_SRC</td>
<td>Gate input A</td>
</tr>
<tr>
<td>GPTC0_SRC</td>
<td>Gate input B</td>
</tr>
<tr>
<td>GPTC0_GATE</td>
<td>Gate output A</td>
</tr>
<tr>
<td>GPTC1_GATE</td>
<td>Gate output B</td>
</tr>
<tr>
<td>GPTC0_OUT</td>
<td>Outgoing output A</td>
</tr>
<tr>
<td>GPTC1_OUT</td>
<td>Outgoing output B</td>
</tr>
<tr>
<td>GPTC0_UPDOWN</td>
<td>Up/Down output A</td>
</tr>
<tr>
<td>GPTC1_UPDOWN</td>
<td>Up/Down output B</td>
</tr>
<tr>
<td>AGND</td>
<td>Analog ground</td>
</tr>
<tr>
<td>VCC</td>
<td>Power supply</td>
</tr>
<tr>
<td>PC2</td>
<td>Pin 2</td>
</tr>
<tr>
<td>PB1</td>
<td>Pin 1</td>
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<tr>
<td>PB2</td>
<td>Pin 2</td>
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<tr>
<td>PB3</td>
<td>Pin 3</td>
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<tr>
<td>PB4</td>
<td>Pin 4</td>
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<td>PB5</td>
<td>Pin 5</td>
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<td>PB6</td>
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<td>PC1</td>
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<td>PA5</td>
<td>Pin 5</td>
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<tr>
<td>PA6</td>
<td>Pin 6</td>
</tr>
<tr>
<td>PA7</td>
<td>Pin 7</td>
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</table>

* Pin 0~12 are A0~A7 for DAQ-2501; AO0~AO7 for DAQ-2502
* The external references inputs and the external analog trigger share the analog input pins 5, 7, and 8
## Quick Selection Guide

<table>
<thead>
<tr>
<th>Model number</th>
<th>DAQ-2501</th>
<th>DAQ-2502</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Output</td>
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</tr>
<tr>
<td>No. of channels</td>
<td>4</td>
<td>8</td>
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<tr>
<td>Resolution</td>
<td>12 bits</td>
<td>12 bits</td>
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<tr>
<td>Output range</td>
<td>±10 V, 0-10 V</td>
<td>±10 V, 0-10 V</td>
</tr>
<tr>
<td>Maximum update rate</td>
<td>1 MS/s</td>
<td>1 MS/s</td>
</tr>
<tr>
<td>Slew rate</td>
<td>20 V/μs</td>
<td>20 V/μs</td>
</tr>
<tr>
<td>Settling time</td>
<td>3 μs to ±0.5 LSB accuracy</td>
<td>3 μs to ±0.5 LSB accuracy</td>
</tr>
<tr>
<td>Offset error</td>
<td>±2 mV</td>
<td>±2 mV</td>
</tr>
<tr>
<td>Gain error</td>
<td>±0.02% of max. output</td>
<td>±0.02% of max. output</td>
</tr>
<tr>
<td>Driving capacity</td>
<td>±5 mA</td>
<td>±5 mA</td>
</tr>
<tr>
<td>Stability</td>
<td>Any passive load, up to 1500 pF</td>
<td>Any passive load, up to 1500 pF</td>
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<tr>
<td>Trigger sources</td>
<td>Software, external digital/analog trigger, SSI bus</td>
<td>Software, external digital/analog trigger, SSI bus</td>
</tr>
<tr>
<td>Trigger modes</td>
<td>Post-trigger, delay-trigger, and repeated trigger</td>
<td>Post-trigger, delay-trigger, and repeated trigger</td>
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<td>FIFO buffer size</td>
<td>8 k samples</td>
<td>16 k samples</td>
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<tr>
<td>Data transfers</td>
<td>Programmed I/O, scatter-gather DMA</td>
<td>Programmed I/O, scatter-gather DMA</td>
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<tr>
<td>Analog Input</td>
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<td></td>
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<tr>
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<td>14 bits</td>
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<tr>
<td>Number of channels</td>
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<td>4 single-ended</td>
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<td>Maximum sampling rate</td>
<td>400 kS/s</td>
<td>400 kS/s</td>
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<tr>
<td>Gain</td>
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<td>Bipolar input ranges</td>
<td>±10 V</td>
<td>±10 V</td>
</tr>
<tr>
<td>Unipolar input ranges</td>
<td>0-10 V</td>
<td>0-10 V</td>
</tr>
<tr>
<td>Offset error</td>
<td>±1 mV</td>
<td>±1 mV</td>
</tr>
<tr>
<td>Gain error</td>
<td>±0.03% of FSR</td>
<td>±0.03% of FSR</td>
</tr>
<tr>
<td>Input coupling</td>
<td>DC</td>
<td>DC</td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>Power on: Continuous ±30 V, Power off: Continuous ±15 V</td>
<td>Power on: Continuous ±30 V, Power off: Continuous ±15 V</td>
</tr>
<tr>
<td>Input impedance</td>
<td>1 GΩ/6 pF</td>
<td>1 GΩ/6 pF</td>
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<tr>
<td>Trigger sources</td>
<td>Software, external digital/analog trigger, SSI bus</td>
<td>Software, external digital/analog trigger, SSI bus</td>
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<tr>
<td>Trigger modes</td>
<td>Post-trigger, delay-trigger, and repeated trigger</td>
<td>Post-trigger, delay-trigger, and repeated trigger</td>
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<tr>
<td>FIFO buffer size</td>
<td>2 k samples</td>
<td>2 k samples</td>
</tr>
<tr>
<td>Data transfers</td>
<td>Polling, scatter-gather DMA</td>
<td>Polling, scatter-gather DMA</td>
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<tr>
<td>Digital I/O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of channels</td>
<td>24-CH 8255 programmable input/output</td>
<td>24-CH 8255 programmable input/output</td>
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<tr>
<td>Compatibility</td>
<td>5 V/VTTL</td>
<td>5 V/VTTL</td>
</tr>
<tr>
<td>Data transfers</td>
<td>Programmed I/O</td>
<td>Programmed I/O</td>
</tr>
<tr>
<td>Timer/Counter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of channels</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Resolution</td>
<td>16 bits</td>
<td>16 bits</td>
</tr>
<tr>
<td>Compatibility</td>
<td>5 V/VTTL</td>
<td>5 V/VTTL</td>
</tr>
<tr>
<td>Base clock available</td>
<td>40 MHz, external clock up to 10 MHz</td>
<td>40 MHz, external clock up to 10 MHz</td>
</tr>
</tbody>
</table>

## Specifications

### Analog Output

- **Model Number**: DAQ-2501
  - Number of channels: 4
  - Resolution: 12 bits
  - Output range: ±10 V, 0-10 V
  - 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

- **Model Number**: DAQ-2502
  - Number of channels: 8
  - Resolution: 12 bits
  - Output range: ±10 V, 0-10 V
  - 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

### Analog Input

- **Model Number**: DAQ-2501
  - Number of channels: 8
  - Resolution: 14 bits
  - 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

- **Model Number**: DAQ-2502
  - Number of channels: 4
  - Resolution: 14 bits
  - 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

### Digital I/O

- **Model Number**: DAQ-2501
  - Number of channels: 24
  - Compatibility: 5 V/VTTL
  - Data transfers: Programmed I/O

- **Model Number**: DAQ-2502
  - Number of channels: 16
  - Compatibility: 5 V/VTTL
  - Data transfers: Programmed I/O

### Timer/Counter

- **Model Number**: DAQ-2501
  - Number of channels: 2
  - Resolution: 16 bits
  - Compatibility: 5 V/VTTL
  - Base clock available: 40 MHz, external clock up to 10 MHz

- **Model Number**: DAQ-2502
  - Number of channels: 2
  - Resolution: 16 bits
  - Compatibility: 5 V/VTTL
  - Base clock available: 40 MHz, external clock up to 10 MHz

### Auto Calibration

- **Model Number**: DAQ-2501
  - On-board reference: ±5 V
  - Temperature drift: ±2 ppm/°C
  - Stability: ±6 ppm/1000 Hrs

- **Model Number**: DAQ-2502
  - On-board reference: ±5 V
  - Temperature drift: ±2 ppm/°C
  - Stability: ±6 ppm/1000 Hrs

### General Specifications

- **Dimensions**: 175 mm x 107 mm (not including connectors)
- **Connector**: 68-pin VHDCI female
- **Operating temperature**: 0 to 55°C
- **Storage temperature**: -20 to 70°C
- **Humidity**: 5 to 95%, noncondensing
- **Power requirements**: ±5 V, 1.6 A typical

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**Features**
- Supports a 32-bit 3.3 V or 5 V PCI bus
- 16-CH single-ended or 8-CH differential analog inputs
- 250 kS/s sampling rate
- 16-bit A/D resolution
- On-board 1 k-sample A/D FIFO
- Bipolar or unipolar analog input ranges
- Programmable gains: x1, x2, x4, x8
- S12-configuration channel-gain queue
- Scatter-gather DMA
- 2-CH 12-bit multiplying analog outputs with waveform generation (DAQ-2214)
- On-board 1 k-sample D/A FIFO (DAQ-2214)
- 2X-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

**Introduction**
ADLINK DAQ-2213 and DAQ-2214 are low-cost multifunction DAQ cards. The devices can sample up to 16 AI channels with different gain settings and scan sequences. It makes them ideal for dealing with analog signals with various input ranges and sampling speeds. These devices also offer different modes for 8 AI channels in order to achieve maximum noise elimination.

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

Like all the other members in DAQ-2000 family, multiple DAQ-2213 and DAQ-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 trim pots to calibrate the cards.

**Termination Boards**
- DIN-68S/1M
  - Termination Board with a 68-pin SCSI-II Connector and DIN-Rail Mounting (Including One 1-meter ACL-10568 Cable)
- SSI Bus Cables
  - (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

**Driver Support**
- DAQ-LVIEW PnP for LabVIEW
- DAQ-MTLB for MATLAB
- DAQBOY for Windows
- D2K-DASK for Windows
- D2K-DASK for Linux

**Recommended Software**
- VB/VC++/BCB/Delphi
- DAQBench

**Ordering Information**
- DAQ-2213
  - 16-CH 16-Bit 250 kS/s Low-Cost Multi-Function DAQ Card w/o Analog Outputs
- DAQ-2214
  - 16-CH 16-Bit 250 kS/s Low-Cost Multi-Function DAQ Card with 2-CH Analog Outputs
## Quick Selection Guide

<table>
<thead>
<tr>
<th>Model number</th>
<th>Analog Input</th>
<th>Analog Output</th>
<th>DIO</th>
<th>Timer/Counter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of channels</td>
<td>Resolution</td>
<td>Sampling rate</td>
<td>Input range</td>
</tr>
<tr>
<td>DAQ-2213</td>
<td>16 bits</td>
<td>16 bits</td>
<td>250 kS/s</td>
<td>±1.25 V to ±10 V</td>
</tr>
<tr>
<td>DAQ-2214</td>
<td>16 bits</td>
<td>16 bits</td>
<td>250 kS/s</td>
<td>±1.25 V to ±10 V</td>
</tr>
</tbody>
</table>

## Specifications

### Analog Input

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DAQ-2213</th>
<th>DAQ-2214</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>16 bits, no missing codes</td>
<td>16 bits, no missing codes</td>
</tr>
<tr>
<td>Number of channels</td>
<td>16 single-ended or 9 differential (software selectable per channel)</td>
<td>16 single-ended or 9 differential (software selectable per channel)</td>
</tr>
<tr>
<td>Channel gain queue size</td>
<td>512</td>
<td>512</td>
</tr>
<tr>
<td>Maximum sampling rate</td>
<td>250 kS/s</td>
<td>250 kS/s</td>
</tr>
<tr>
<td>Programmable gain</td>
<td>1, 2, 4, 8</td>
<td>1, 2, 4, 8</td>
</tr>
<tr>
<td>Bipolar input ranges</td>
<td>±10 V, ±5 V, ±2.5 V, ±1.25 V</td>
<td>±10 V, ±5 V, ±2.5 V, ±1.25 V</td>
</tr>
<tr>
<td>Unipolar input ranges</td>
<td>0-10 V, 0-5 V, 0-2.5 V, 0-1.25 V</td>
<td>0-10 V, 0-5 V, 0-2.5 V, 0-1.25 V</td>
</tr>
<tr>
<td>Offset error</td>
<td>±1 mV</td>
<td>±1 mV</td>
</tr>
<tr>
<td>Gain error</td>
<td>±0.01% of FSR</td>
<td>±0.01% of FSR</td>
</tr>
<tr>
<td>Input coupling</td>
<td>DC</td>
<td>DC</td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>Power on: Continuous ±30 V, Power off: Continuous ±15 V</td>
<td>Power on: Continuous ±30 V, Power off: Continuous ±15 V</td>
</tr>
<tr>
<td>Input impedance</td>
<td>1.0 GΩ/100 pF</td>
<td>1.0 GΩ/100 pF</td>
</tr>
<tr>
<td>CMRR (gain = 1)</td>
<td>83 dB</td>
<td>83 dB</td>
</tr>
<tr>
<td>Setting time</td>
<td>4 µs to 0.01% error</td>
<td>2 µs to 0.01% error</td>
</tr>
<tr>
<td>-3dB small signal bandwidth (gain = 1)</td>
<td>760 kHz</td>
<td>760 kHz</td>
</tr>
<tr>
<td>Trigger sources</td>
<td>Software, external digital/analog trigger, SSI bus</td>
<td>Software, external digital/analog trigger, SSI bus</td>
</tr>
<tr>
<td>Trigger modes</td>
<td>Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger</td>
<td>Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger</td>
</tr>
<tr>
<td>FIFO buffer size</td>
<td>1 k samples</td>
<td>1 k samples</td>
</tr>
<tr>
<td>Data transfers</td>
<td>Polling, scatter-gather DMA</td>
<td>Polling, scatter-gather DMA</td>
</tr>
</tbody>
</table>

### 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 |
| Setting time | --- | 3 µs to ±0.5 LSB accuracy |
| Offset error | --- | ±1 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 | --- | 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

| On-board reference | +5 V |
| Temperature drift | ±2 ppm/°C |
| Stability | ±6 ppm/1000 Hrs |

### General Specifications

| Dimensions | 175 mm x 107 mm (not including connectors) |
| Connector | 68-pin VHDCI female x 2 |
| Operating temperature | 0 to 55 °C |
| Storage temperature | -20 to 70 °C |
| Relative Humidity | 5 to 95 %, non-condensing |
| Power requirements | +5 V 1.2 A typical |

*Gain = 1, 2, 4, 8*
ADLINK PCI-9118/L series are high performance data acquisition cards. The PCI-9118/L series are the simplified version of the phase-out PCI-9118. The PCI-9118/L series provides fully compatible functionality as the PCI-9118 series except the analog output function. The PCI-9118/DGL and PCI-9118/HGL feature 12-bit resolution, with sampling rates up to 333kS/s, while the PCI-9118/HRL, on the other hand, features 16-bit resolution, with sampling rate up to 333kS/s. The 256-location channel-gain queues on PCI-9118/L series cards allow high-speed data acquisition with different gains on each channel and non-sequential order of automatic analog input scanning capability. The on-board 1k-sample A/D FIFO ensures reliable high-speed data acquisition under Windows operating system. The data can be transferred through bus-mastering DMA with gap-free, continuous high throughput, even for a large amount of data.

ADLINK PCI-9118/L series analog input cards deliver cost-effective and reliable data acquisition capabilities, with gap-free, continuous high throughput, even for a large amount of data.

### Analog Input
- Supports analog input of 16 single-ended or 8 differential inputs
- Programmable gains: x1, x2, x4, x8 (PCI-9118/DGL and PCI-9118/HRL)
- x1, x10, x100 (PCI-9118/HGL)
- 256-location channel-gain queue
- Bus mastering DMA for analog inputs
- 4-CH TTL digital inputs and 4-CH TTL digital outputs
- Compact, half-size PCB

### Specifications
- **Analog Input**
  - Number of channels: 16 single-ended or 6 differential
  - Channel gain queue size: 256
  - Resolution: 12 bits (PCI-9118/DGL and PCI-9118/HGL)
  - 16 bits (PCI-9118/HRL)
  - Conversion time: 3 µs (PCI-9118/DGL and PCI-9118/HGL)
  - 10 µs (PCI-9118/HRL)
  - Maximum sampling rate: 333 kS/s (PCI-9118/DGL and PCI-9118/HGL)
  - 100 kS/s (PCI-9118/HRL)
  - Input signal ranges: Software programmable

### Device Gain Input Range

<table>
<thead>
<tr>
<th>Device</th>
<th>Gain</th>
<th>Bipolar</th>
<th>Unipolar</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI-9118/HGL</td>
<td></td>
<td>±5 V</td>
<td>±5 V</td>
</tr>
<tr>
<td>PCI-9118/HRL</td>
<td>2</td>
<td>±2.5 V</td>
<td>±2.5 V</td>
</tr>
<tr>
<td>PCI-9118/DGL</td>
<td>4</td>
<td>±15 V</td>
<td>±15 V</td>
</tr>
</tbody>
</table>

### Device Gain Accuracy

<table>
<thead>
<tr>
<th>Device</th>
<th>Gain</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI-9118/DGL</td>
<td>1</td>
<td>0.008 % of FSR ± 1 LSB</td>
</tr>
<tr>
<td>PCI-9118/HRL</td>
<td>2</td>
<td>0.02 % of FSR ± 1 LSB</td>
</tr>
<tr>
<td>PCI-9118/HGL</td>
<td>4</td>
<td>0.04 % of FSR ± 1 LSB</td>
</tr>
<tr>
<td>PCI-9118/HRL</td>
<td>8</td>
<td>0.08 % of FSR ± 1 LSB</td>
</tr>
<tr>
<td>PCI-9118/HGL</td>
<td>10</td>
<td>0.1 % of FSR ± 1 LSB</td>
</tr>
<tr>
<td>PCI-9118/HRL</td>
<td>100</td>
<td>0.2 % of FSR ± 1 LSB</td>
</tr>
</tbody>
</table>

### Pin Assignment

<table>
<thead>
<tr>
<th>Pin Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device</td>
</tr>
<tr>
<td>+5Vout</td>
</tr>
<tr>
<td>DGND</td>
</tr>
<tr>
<td>N/C</td>
</tr>
<tr>
<td>N/C</td>
</tr>
<tr>
<td>Vcc</td>
</tr>
<tr>
<td>ADGAIN2</td>
</tr>
<tr>
<td>TGIN</td>
</tr>
<tr>
<td>DI0</td>
</tr>
<tr>
<td>DI1</td>
</tr>
<tr>
<td>DI2</td>
</tr>
<tr>
<td>DO0</td>
</tr>
<tr>
<td>DO1</td>
</tr>
<tr>
<td>DO2</td>
</tr>
<tr>
<td>DO3</td>
</tr>
<tr>
<td>DOSTB</td>
</tr>
<tr>
<td>TGOUT</td>
</tr>
<tr>
<td>ADCHN3</td>
</tr>
<tr>
<td>ADCHN4</td>
</tr>
<tr>
<td>ADCHN5</td>
</tr>
<tr>
<td>ADCHN6</td>
</tr>
<tr>
<td>Vcc</td>
</tr>
<tr>
<td>Vcc</td>
</tr>
<tr>
<td>DGND</td>
</tr>
</tbody>
</table>

### Ordering Information

- **PCI-9118/DGL**
  - 16-CH 12/16 Bit Up to 333 kS/s Analog Input Cards
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card

- **PCI-9118/HRL**
  - 16-CH 12-16 Bit 333 kS/s High-Gain Analog Input Card
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card

- **PCI-9118/HGL**
  - 16-CH 16-bit 100 kS/s High-Resolution Analog Input Card
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card
  - Analog Input Card
## PCI-9114 Series

### 32-CH 16-Bit Up to 250 kS/s Multi-Function DAQ Cards

#### Features
- Supports a 32-bit 5 V PCI bus
- 16-bit A/D resolution
- Up to 100 kS/s sampling rate (PCI-9114DG and PCI-9114HG)
- Up to 250 kS/s sampling rate (PCI-9114A-DG and PCI-9114A-HG)
- 32-CH single-ended or 16-CH differential analog inputs
- Bipolar or unipolar analog input ranges
- On-board 1-k sample A/D FIFO
- Programmable gains:
  - x1, x2, x4, x8 (PCI-9114DG and PCI-9114A-DG)
  - x1, x10, x100 (PCI-9114HG and PCI-9114A-HG)
- Automatic analog inputs scanning
- 16-CH isolated digital inputs and 16-CH isolated digital outputs
- 2500 Vrms optical isolation for digital inputs and outputs
- 1-CH 16-bit general purpose timer/counter
- +12 V and -12 V power available on the 37-pin D-sub connector
- On-board resettable fuses for power output protection
- Compact, half-size PCB
- **Recommended Software**
  - V8/V9+/VC++/Delphi
  - DAQBench
  - DAQCreator

#### Introduction

ADLINK PCI-9114 series are 32-CH, 16-bit, high-resolution multi-function DAQ Cards. The PCI-9114 device features flexible configurations on analog input. The devices are divided into 2 kinds: normal gain version and high gain version. Both versions provide 4 programmable input ranges for bipolar and unipolar inputs. The A/D on the PCI-9114DG/HG device features a sampling rate of 100 kS/s with resolution at 16 bits, while PCI-9114A-DG/HG device features a sampling rate of up to 250 kS/s with resolution at 16 bits. The device supports automatic analog input scanning, and offers a differential mode for 8-CH analog inputs and maximum noise elimination, as well as single-ended modes for 16-CH analog input.

The PCI-9114 also features 1-CH 16-bit general purpose timer/counter, 16-CH TTL isolated digital inputs and 16-CH TTL isolated digital outputs. ADLINK PCI-9114 delivers cost-effective and reliable data acquisition capabilities and is ideal for a broad variety of applications.

#### Specifications
**Analog Input**
- Number of channels: 32 single-ended or 16 differential
- Resolution: 16 bits
- Conversion time:
  - 12 µs (PCI-9114DG and PCI-9114A-DG)
  - 20 µs (PCI-9114HG and PCI-9114A-HG)
- Input signal range (software programmable)

<table>
<thead>
<tr>
<th>Device</th>
<th>Gain</th>
<th>Input Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI-9114DG</td>
<td>2</td>
<td>±3 V</td>
</tr>
<tr>
<td>PCI-9114A-DG</td>
<td>4</td>
<td>±3 V</td>
</tr>
<tr>
<td>PCI-9114HG</td>
<td>8</td>
<td>±2.5 V</td>
</tr>
<tr>
<td>PCI-9114A-HG</td>
<td>16</td>
<td>±1.25 V</td>
</tr>
</tbody>
</table>

**Isolated Digital Output**
- Number of channels: 16
- Output type: open emitter Darlington transistors
- Sink current: +350 mA for one channel @ 100% duty
- +260 mA for all channels @ 100% duty
- Power dissipation: Max. 1.47 W per chip (8 DO channels)
- Supply voltage: 5-35 V
- Isolation voltage: 2000 Vrms
- Data transfers: programmed I/O
- Output power
  - ±12 V and ±12 V
- Resettable fuse protection: 506 mA
- **General-Purpose Timer/Counter**
  - Number of channels: 1
  - Resolution: 16 bits
  - Compatibility: 5/VT/TTL
  - Base clock available: 2 MHz, external clock to 2MHz
  - General Specifications
    - I/O connector
    - 37-pin D-sub female
  - +25-pin ribbon male x 2
  - Operating temperature: 0 to 55°C
  - Storage temperature: -20 to 80°C
  - Relative humidity: 5 to 95%, noncondensing
  - Power requirements

**Input Coupling:**
- DC
- Overvoltage protection: continuous ±35 V
- Trigger input: ±35 V
- Trigger modes: software, pulse, and external trigger (5/VT/TTL compatible)
- FIFO buffer size: 1000 samples
- Data transfers: polling, interrupt

**Isolated Digital Input**
- Number of channels: 16
- Maximum input range: 24 V, non-polarity
- Digital logic levels:
  - 0: 24 V, non-polarity
  - Input high voltage: 5 - 24 V
  - Input low voltage: 0 - 1.5 V
- Input resistance: 2.4 kΩ (0.5 W)
- Isolation voltage: 2500 Vrms
- Data transfers: programmed I/O

**Power Requirements**
- ±12 V and ±12 V power available on the 37-pin D-sub connector
- On-board resettable fuses for power output protection
- Compact, half-size PCB

**Recommended Software**
- V8/V9+/VC++/Delphi
- DAQBench
- DAQCreator

**Drivers Support**
- DAQ-VIEW II
- DAQ-MTLB for MATLAB
- DAQBOY for Windows
- PCIS-DASK for Windows
- PCIS-DASK/X for Linux

**I/O Connector**
- Compatibility: 5 V/TTL
- Number of channels: 1
- Resettable fuse protection: 500 mA
- Isolation voltage: 2500 VRMS

**Isolation voltage:**
- Continuous

**Device Gain**
- 1
- 2
- 4
- 8
- 16

**Input resistance (driver output):**
- 24 kΩ @ ±5 V

**Pin Assignment**

### Ordering Information

- **PCI-9114DG**
  - 32-CH 16-bit up to 100 kS/s Normal Gain Multi-Function DAQ Card

- **PCI-9114HG**
  - 32-CH 16-bit up to 100 kS/s High Gain Multi-Function DAQ Card

- **PCI-9114A-DG**
  - 32-CH 16-bit 250 kS/s Normal Gain Multi-Function DAQ Card

- **PCI-9114A-HG**
  - 32-CH 16-bit 250 kS/s High Gain Multi-Function DAQ Card

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ADLINK PCI-9113A is a 32-CH, 12-bit, 100 kS/s isolated analog input card. The PCI-9113A provides analog inputs with 3 programmable input ranges for both bipolar and unipolar inputs. The 32-CH single-ended analog inputs can be converted to 16-CH differential analog inputs, which improve the noise rejection in harsh industrial environments.

The analog inputs are isolated from the PC’s system ground. This feature not only protects the PC from being damaged from surges on the signal lines, but also eliminates ground loops and common-mode problems commonly seen in industrial measurement applications.

The PCI-9113A provides custom circuit area for input signal conditioning. Either signal attenuation or filtering can be applied on per channel basis. With all the features, ADLINK PCI-9113A delivers cost-effective and reliable data acquisition capabilities for ATE, sensor monitoring, data logging, power transmission, and a broad variety of industrial measurement applications.

### Features
- Supports a 32-bit 5 V PCI bus
- 12-bit A/D resolution
- Up to 100 kS/s sampling rate
- 32-CH single-ended or 16-CH differential inputs
- On-board 1 k-sample A/D FIFO
- Bipolar or unipolar analog input ranges
- Programmable gains of x1, x10, x100
- Automatic analog inputs scanning
- On-board low-pass filtering capability for analog inputs
- 2500 Vrms optical isolation
- Compact, half-size PCB

### Introduction
ADLINK PCI-9113A is a 32-CH, 12-bit, 100 kS/s isolated analog input card. The PCI-9113A provides analog inputs with 3 programmable input ranges for both bipolar and unipolar inputs. The 32-CH single-ended analog inputs can be converted to 16-CH differential analog inputs, which improve the noise rejection in harsh industrial environments.

The analog inputs are isolated from the PC’s system ground. This feature not only protects the PC from being damaged from surges on the signal lines, but also eliminates ground loops and common-mode problems commonly seen in industrial measurement applications.

The PCI-9113A provides custom circuit area for input signal conditioning. Either signal attenuation or filtering can be applied on per channel basis. With all the features, ADLINK PCI-9113A delivers cost-effective and reliable data acquisition capabilities for ATE, sensor monitoring, data logging, power transmission, and a broad variety of industrial measurement applications.

### Specifications
#### Analog Input
- Number of channels: 32 single-ended or 16 differential
- Resolution: 12 bits
- Conversion time: 8 μs
- Maximum sampling rate: 100 kS/s
- Input signal ranges
<table>
<thead>
<tr>
<th>Gain</th>
<th>Bipolar</th>
<th>Unipolar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>±16 V</td>
<td>±16 V</td>
</tr>
<tr>
<td>10</td>
<td>±1 V</td>
<td>±0.5 V</td>
</tr>
<tr>
<td>100</td>
<td>±0.1 V</td>
<td>±0.05 V</td>
</tr>
</tbody>
</table>
  | Accuracy: 0.01 % of FSR ± 1 LSB
- Input coupling: DC
- Overvoltage protection: continuous ±35 V
- Input impedance: 1 GΩ
- Trigger modes: software, pacer
- FIFO buffer size: 1 k samples
- Data transfers: polling, interrupt
- Isolation Voltage: 2500 Vrms

#### General Specifications
- I/O connector: 37-pin D-sub female
- Operating temperature: 0 to 55 °C
- Storage temperature: -20 to 80 °C
- Relative humidity: 5 to 95%, noncondensing
- Power requirements
- dimensions (not including connectors)
<table>
<thead>
<tr>
<th>Width (mm)</th>
<th>Depth (mm)</th>
<th>Height (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>173</td>
<td>107</td>
<td>40</td>
</tr>
</tbody>
</table>

### Installation
- DIN-37D Termination Board with a 37-pin D-sub Connector and DIN-Rail Mounting (Including One 1-meter ACL-10137 Cable)
- ACLD-9137 General-Purpose Termination Board with a 37-pin D-sub Male Connector

### Ordering Information
- PCI-9113A
  32-CH 12-Bit 100 kS/s Isolated Analog Input Card
**Features**
- Supports a 32-bit 5 V PCI bus (PCI-9112)
- Supports a 3.3 V or 5 V PCI bus (LPCI-9112)
- 12-bit A/D resolution
- Up to 110 kS/s sampling rate
- 16/CH single-ended or 8-CH differential inputs
- Bipolar or unipolar analog input ranges
- Programmable gains of x0.5, x1, x2, x4, x8
- Automatic analog inputs scanning
- Bus-mastering DMA for analog inputs
- 2-CH 12-bit multiplying analog outputs
- 16-CH TTL digital inputs and 16-CH TTL digital outputs
- 1-CH 16-bit general purpose timer/counter
- Compact, half size PCB (PC-9112)
- Compact, low-profile PCI size PCB (LPCI-9112)
- Operating Systems
  - Linux
  - DOS
  - Windows CE (call for availability)
- Recommended Software
  - V8/VCC++/8CB/Delphi
  - DAQBench
  - DAQCreator
- Driver Support
  - DAQ-SVIEW PrnP for LabVIEW
  - DAQ-MTLB for MATLAB
  - DAQBOY for Windows
  - PCIe-DASK for Windows
  - PCIe-DASK/X for Linux

**Introduction**
ADLINK PCI-9112/LPCI-9112 is a 16-CH, 12-bit, 110kS/s multi-function DAQ Card. The PCI-9112/LPCI-9112 is ideal for users who require both high-performance and cost-effective solutions. PCI-9112/LPCI-9112 is designed to offer a wide range of features, including high-resolution analog inputs, fast sampling rates, and flexible configuration options.

**Specifications**
**Analog Input**
- Number of channels: 16 single-ended or 8 differential
- Resolution: 12 bits
- Conversion time: 8 µs
- Maximum sampling rate: 110 kS/s
- Relative humidity: 5 to 95 %, noncondensing
- Power requirement: +12 V (460 mA typical)

**Analog Output**
- Number of channels: 2 voltage outputs
- Resolution: 12 bits
- Output ranges (software programmable)
  - Unipolar: 0 to 10 V, 0 to 5 V, 0 to EXTREF
  - Bipolar: 0 to 10 V, 0 to 5 V, 0 to EXTREF

**General Specifications**
- I/O connector: 37-pin D-sub female
- Operating temperature: 0 to 60 °C
- Storage temperature: -20 to 80 °C
- Relative humidity: 5 to 95 %, noncondensing
- Power requirements: +12 V (460 mA typical)

**Pin Assignment**
- **CN1: Digital Input**
  - D7: GND
  - D6: GND
  - D5: GND
  - D4: GND
  - D3: GND
  - D2: GND
  - D1: GND

- **CN2: Digital Output**
  - D8: GND
  - D7: GND
  - D6: GND
  - D5: GND
  - D4: GND

**Ordering Information**
- **PCI-9112**
  - 16-CH 12-Bit 110 kS/s Multi-Function DAQ Card

- **LPCI-9112**
  - 16-CH, 12-Bit 110kS/s Multi-Function Low-Profile DAQ Card

Visit [www.adlinktech.com](http://www.adlinktech.com) for more information.
PCI-9111 Series
16-CH 12/16-Bit 100 kS/s Low Cost Multi-Function DAQ Cards

Features
- Supports a 32-bit 5 V PCI bus
- 12-bit A/D resolution (PCI-9111DG)
- 16-bit A/D resolution (PCI-9111HR)
- 16-CH single-ended analog inputs
- Up to 100 kS/s sampling rate
- On-board 1-k sample A/D FIFO
- Programmable gains of x1, x2, x4, x8, x16
- Bipolar analog input ranges
- On-board low-pass filtering capability for analog inputs
- Automatic analog inputs scanning
- One 12-bit multiplying analog outputs
- 16-CH TTL digital inputs and 16-CH TTL digital outputs
- 4-CH TTL extended digital inputs and 4-CH TTL extended digital outputs
- Compact, half-size PCB
- Operating Systems
  - Linux
  - DOS
- Recommended Software
  - LABVIEW
  - VISA/VC++/VB/Visual C#
  - DAQCreator
- Driver Support
  - DAQ-LVIEW PnP for LabVIEW
  - DAQ-MTLB for MATLAB
  - DAQBOY for Windows
  - PCIS-DASK for Windows
  - PCIS-DASKX for Linux

Introduction
ADLINK PCI-9111 series are 16-CH, 100 kS/s low cost multi-function DAQ card. The PCI-9111 series feature flexible configurations on analog inputs. A RC filter is implemented on each A/D input channel for user to attenuate or filter input signal. The PCI-9111 series provide analog inputs with 5 programmable input ranges for bipolar inputs. The PCI-9111 series also support automatic analog input scanning. PCI-9111DG provides 12-bit A/D resolution while PCI-9111HR provides 16-bit A/D resolution.

The PCI-9111 series also feature 1-CH 12-bit analog output, 16-CH TTL digital inputs and 16-CH TTL digital outputs. ADLINK PCI-9111 series deliver cost-effective and reliable data acquisition capabilities, and is ideal for a broad variety of applications.

Specifications
Analog Input
- Number of channels: 16 single-ended
- Resolution
  - 12 bits (PCI-9111DG)
  - 16 bits (PCI-9111HR)
- Conversion time: 8 μs
- Maximum sampling rate: 100 kS/s
- Input signal ranges (software programmable)

<table>
<thead>
<tr>
<th>Gain</th>
<th>Input Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>±10 V</td>
<td>±0.05 %</td>
</tr>
<tr>
<td>2</td>
<td>±5 V</td>
<td>±0.05 %</td>
</tr>
<tr>
<td>4</td>
<td>±2.5 V</td>
<td>±0.05 %</td>
</tr>
<tr>
<td>8</td>
<td>±1.25 V</td>
<td>±0.05 %</td>
</tr>
<tr>
<td>16</td>
<td>±0.625 V</td>
<td>±0.05 %</td>
</tr>
</tbody>
</table>

- Input coupling: DC
- Over-voltage protection: continuous ±35 V
- Input impedance: 10 MΩ
- Trigger modes: software, pacer, and external trigger
- FIFO buffer size: 1 k samples

Analog Output
- Number of channels: 1 voltage outputs
- Resolution: 12 bits
- Output ranges (jumper selectable)

<table>
<thead>
<tr>
<th>Output Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>±25-pin ribbon male x 2</td>
<td></td>
</tr>
</tbody>
</table>
- Operating temperature: 0 to 60 °C
- Storage temperature: -20 to 80 °C
- Relative humidity: 5 to 95%, noncondensing
- Power requirements

<table>
<thead>
<tr>
<th>Device</th>
<th>+5 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI-9111DG</td>
<td>570 mA Typical</td>
</tr>
<tr>
<td>PCI-9111HR</td>
<td>570 mA Typical</td>
</tr>
</tbody>
</table>

- Dimensions (not including connectors)
  175 mm x 107 mm

Termination Boards
- DIN-37D
  Termination Board with a 37-pin D-sub Connector and DIN-Rail Mounting (Including One 1-meter ACL-10137 Cable)
- DIN-20P
  Termination Board with a 20-pin Ribbon Connector and DIN-Rail Mounting (Including One 1-meter ACL-10120 Cable)
- ACLD-9137
  General-Purpose Termination Board with a 37-pin D-sub Male Connector
- ACLD-9188
  General-Purpose Termination Board with Two 20-pin Ribbon Connectors and One 37-pin D-sub Connector (Including Two 1-meter ACL-10120 Cables)
- ACLD-9182A
  Termination Board with 16-CH Isolated Digital Inputs (Including One 1-meter ACL-10102 Cable)
- ACLD-9185
  Termination Board with 16-CH Relay Outputs (Including One 1-meter ACL-10120 Cable)
- ACLD-9125
  Termination Board with a 37-pin D-sub Connector and One Cold Junction Temperature Sensor (Including One 1-meter ACL-10137 Cable)

Ordering Information
- PCI-9111DG
  16-CH 12-Bit 100 kS/s Low Cost Multi-Function DAQ Card
- PCI-9111HR
  16-CH 16-Bit 100 kS/s Low Cost Multi-Function DAQ Card
### PCI-6308V/6308A

**8-CH 12-Bit Isolated Analog Output Cards**

#### Features
- Supports a 32-bit 5 V PCI bus
- 12-bit D/A resolution (PCI-6308V & PCI-6308A)
- Isolated 8-CH 12-bit voltage output (PCI-6308V)
- Isolated 8-CH 12-bit current output (PCI-6308A)
- Bipolar or unipolar output ranges
- External reference input for user-defined ranges
- 4-CH isolated digital outputs and 4-CH isolated digital inputs
- 2500 Vrms optical isolation
- Compact, half-size PCB

#### Operating Systems
- Linux
- DOS
- Windows CE (call for availability)

#### Recommended Software
- VB/VC++/ICSDK/Delphi
- DAQBench

#### Driver Support
- DAQ-VIEW PnP for LabVIEW
- DAQ-MTLB for MATLAB
- DAQBOY for Windows
- PCI-DASIX for Windows
- PCI-DASKIX for Linux

#### Pin Assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI3</td>
<td>1-20 D03</td>
</tr>
<tr>
<td>DI2</td>
<td>1-21 D02</td>
</tr>
<tr>
<td>DI1</td>
<td>1-22 D01</td>
</tr>
<tr>
<td>DI0</td>
<td>1-23 D00</td>
</tr>
<tr>
<td>DIGND</td>
<td>5-24 Header</td>
</tr>
<tr>
<td>ExtRef</td>
<td>6-25 ExtRef</td>
</tr>
<tr>
<td>+5V</td>
<td>7-26 AGND</td>
</tr>
<tr>
<td>-15V</td>
<td>8-27 A7</td>
</tr>
<tr>
<td>AGND</td>
<td>9-28 V7</td>
</tr>
<tr>
<td>V6</td>
<td>10-29 A5</td>
</tr>
<tr>
<td>AGND</td>
<td>11-30 A5</td>
</tr>
<tr>
<td>V4</td>
<td>12-31 A4</td>
</tr>
<tr>
<td>AGND</td>
<td>13-32 A4</td>
</tr>
<tr>
<td>V2</td>
<td>14-33 A3</td>
</tr>
<tr>
<td>V1</td>
<td>15-34 V3</td>
</tr>
<tr>
<td>A0</td>
<td>16-35 AGND</td>
</tr>
<tr>
<td>V0</td>
<td>17-36 A1</td>
</tr>
<tr>
<td>A1</td>
<td>18-37 V1</td>
</tr>
<tr>
<td>A2</td>
<td>19-38</td>
</tr>
</tbody>
</table>

#### Ordering Information
- **PCI-6308V**
  - 8-CH 12-Bit Isolated Voltage Output Card
- **PCI-6308A**
  - 8-CH 12-Bit Isolated Voltage & Current Output Card

### Specifications

#### Isolated Analog Output
- Number of channels: 8 voltage outputs (PCI-6308V & PCI-6308A)
- Resolution: 12 bits
- Output ranges (jumper selectable)
  - **Bipolar**: ±10 V
  - **Unipolar**: 0 to 10 V, 0 to EXTREF
- Setting time: 16 µs (20 V step)
- Maximum update interval: 90 µs for four channels simultaneously
- Gain error: ±0.2 % max.
- DNL: ±1 LSB
- Output driving capacity: ±5 mA
- Isolation voltage: 2500 Vrms
- Output initial status: 0 V (after RESET or POWER-ON)
- Data transfers: programmed I/O

#### Current Output (PCI-6308A)
- Number of channels: 8
- Resolution: 12 bits
- Output ranges (software programmable): 0-20 mA, 4-20 mA, and 0-5 mA
- Setting time: 17 µs (0-20 mA)
- Slope rate: 1.3 mA/s
- DNL: ±1 LSB maximum
- Output resistance: 10 Q typical
- Current load resistance: 0 - 5000
- Output initial status: 4 mA (after RESET or POWER-ON)
- Data transfer: programmed I/O

#### Isolated Digital Input
- Number of channels: 4
- Maximum input range: 24 V, non-polarity
- Digital logic levels
  - Input high voltage: 5 - 24 V
  - Input low voltage: 0 - 1.5 V

#### Introduction
The PCI-6308V is a high-performance 12-bit analog output board with PCI interface. It provides 8 identical voltage output channels, with each channel capable of bipolar voltage outputs, unipolar voltage output and unipolar 0 to user defined voltage output. The PCI-6308V provides good monotonicity, low distortion, and low differential linearity error over long periods of time. The output ranges of the PCI-6308V are bipolar ±10 to ±10 V, unipolar 0 to 10 V and as well as user-defined ranges with external reference input, which are jumper selectable. The PCI-6308A device is the combination of the PCI-6308V with an 8-CH current output extended board, EXP-8A. The EXP-8A board includes 8 precision voltage-to-current converters.

ADLINK PCI-6308 series devices provide flexible and isolated analog output functionalities and are suitable for ATE, signal generation, industrial process control, servo control and other industrial control applications.

#### Driver Support
- DAQ-VIEW PnP for LabVIEW
- DAQ-MTLB for MATLAB
- DAQBOY for Windows
- PCI-DASIX for Windows
- PCI-DASKIX for Linux

#### Operating Systems
- Linux
- DOS
- Windows CE (call for availability)

#### Recommended Software
- VB/VC++/ICSDK/Delphi
- DAQBench

#### Pin Assignment

<table>
<thead>
<tr>
<th>Device</th>
<th>±5V</th>
<th>±12V</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI-6308V</td>
<td>220 mA typical</td>
<td>175 mA typical</td>
</tr>
<tr>
<td>PCI-6308A</td>
<td>220 mA typical</td>
<td>250 mA typical</td>
</tr>
</tbody>
</table>

#### Dimensions (not including connectors)
- 175 mm x 107 mm
ADLINK PCI-6208 series are 8 or 16-CH, 16-bit, analog output cards. The PCI-6208V offers 8 voltage outputs with ±10 V range, featuring 15-bit monotonicity and 10 V/µs slew rate. The on-board analog switches minimize the power-on glitches. Combining one PCI-6208V and one EXP-8V, the PCI-6216V expands the voltage output channels to a total of 16 for higher analog output density requirements. In addition to the voltage output functions, the PCI-6208A features 8 current outputs with ranges of 0-20 mA, 4-20 mA, and 5-25 mA. The daughter board EXP-8A provides high-quality voltage to current transducers. The PCI-6208A device is capable of delivering 14-bit monotonicity with 1.3 mA/µs slew rate.

ADLINK PCI-6208 series devices provide high-resolution, high-density analog output functionalities and are suitable for ATE, signal generation, industrial process control, servo control and other industrial control applications.

### Features
- Supports a 32-bit 5 V PCI bus
- 16-bit D/A resolution (PCI-6208V and PCI-6216V)
- Effective 15-bit resolution current transducers (PCI-6208A)
- 8-CH voltage outputs (PCI-6208V and PCI-6208A)
- 16-CH voltage outputs (PCI-6216V)
- 8-CH current outputs (PCI-6208A)
- Bipolar analog output range
- 4-CH TTL digital inputs and 4-CH TTL digital outputs
- Compact, half-size PCB

### Operating Systems
- Linux
- DOS

### Recommended Software
- VB/VC++, BCB, Delphi
- DAQBench

### Introduction
ADLINK PCI-6208 series are 8 or 16-CH, 16-bit, analog output cards. The PCI-6208V offers 8 voltage outputs with ±10 V range, featuring 15-bit monotonicity and 10 V/µs slew rate. The on-board analog switches minimize the power-on glitches. Combining one PCI-6208V and one EXP-8V, the PCI-6216V expands the voltage output channels to a total of 16 for higher analog output density requirements. In addition to the voltage output functions, the PCI-6208A features 8 current outputs with ranges of 0-20 mA, 4-20 mA, and 5-25 mA. The daughter board EXP-8A provides high-quality voltage to current transducers. The PCI-6208A device is capable of delivering 14-bit monotonicity with 1.3 mA/µs slew rate.

ADLINK PCI-6208 series devices provide high-resolution, high-density analog output functionalities and are suitable for ATE, signal generation, industrial process control, servo control and other industrial control applications.

### Specifications
#### Voltage Output
- Number of channels: 8 voltage outputs (PCI-6208V & PCI-6208A)
- 16 voltage outputs (PCI-6216V)
- Resolution: 16 bits
- Monotonicity: 15 bits typical
- Output ranges: ±10 V
- Slew rate: 10 V/µs typical
- Settling time: 4 µs typical (20 V step)
- Gain Error: ±0.2% maximum
- DNL: ±0.65 LSB typical
- Output driving capacity: ±15 mA maximum
- Output initial status: 0 V
- Data transfer: programmed I/O

#### Current Output
- Number of channels: 8 current outputs (PCI-6208A)
- Resolution: 15 bits typical
- Monotonicity: 14 bits typical
- Output ranges: (Software programmable)
  - 0-20 mA, 4-20 mA, 5-25 mA
- Slew rate: 1.3 mA/µs typical
- Settling time: 17 µs typical (20 mA step)
- Span Error: ±0.3% typical
- Output initial status: 4 mA
  - (after RESET or POWER-ON)
- Data transfer: programmed I/O

### Digital I/O
- Number of channels: 4 inputs and 4 outputs
- Compatibility: 5 V/TTL
- Data transfers: programmed I/O

### General Specifications
- I/O connector: 37-pin D-sub female
- Operating temperature: 0 to 50˚C
- Storage temperature: -20 to 80˚C
- Relative humidity: 5 to 95%, noncondensing
- Power requirements
- Dimensions (not including connectors): 175 mm x 107 mm
**PCI Analog Output**

![Image of PCI-6216V and PCI-6208A]

**Termination Boards**
- **DIN-37D**
  - Termination Board with a 37-pin D-sub Connector and DIN-Rail Mounting (including One 1-meter ACL-10137 Cable)
- **ACLD-9137**
  - General-Purpose Termination Board with a 37-pin D-sub Male Connector

**Ordering Information**
- **PCI-6208V**
  - 8-CH 16-Bit Voltage Output Card
- **PCI-6216V**
  - 16-CH 16-Bit Voltage Output Card
- **PCI-6208A**
  - 8-CH 16-Bit Voltage and Current Output Card

**Pin Assignment**

**PCI-6208V and PCI-6216V**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D00</td>
<td>1</td>
</tr>
<tr>
<td>D01</td>
<td>2</td>
</tr>
<tr>
<td>D02</td>
<td>3</td>
</tr>
<tr>
<td>D03</td>
<td>4</td>
</tr>
<tr>
<td>+5Vout</td>
<td>5</td>
</tr>
<tr>
<td>+15Vout</td>
<td>6</td>
</tr>
<tr>
<td>AGND</td>
<td>7</td>
</tr>
<tr>
<td>NC/V15</td>
<td>8</td>
</tr>
<tr>
<td>NC/V14</td>
<td>9</td>
</tr>
<tr>
<td>V7</td>
<td>10</td>
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<tr>
<td>AGND</td>
<td>11</td>
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<tr>
<td>NC/V13</td>
<td>12</td>
</tr>
<tr>
<td>V6</td>
<td>13</td>
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<td>AGND</td>
<td>14</td>
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<td>NC/V12</td>
<td>15</td>
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<td>V5</td>
<td>16</td>
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<td>V4</td>
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<td>NC/V10</td>
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<td>V3</td>
<td>22</td>
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<td>AGND</td>
<td>23</td>
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<td>NC/V9</td>
<td>24</td>
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<td>V2</td>
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<td>AGND</td>
<td>26</td>
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<tr>
<td>NC/V8</td>
<td>27</td>
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<tr>
<td>V1</td>
<td>28</td>
</tr>
<tr>
<td>V0</td>
<td>29</td>
</tr>
</tbody>
</table>

**PCI-6208A**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D00</td>
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<tr>
<td>D01</td>
<td>2</td>
</tr>
<tr>
<td>D02</td>
<td>3</td>
</tr>
<tr>
<td>D03</td>
<td>4</td>
</tr>
<tr>
<td>GND</td>
<td>5</td>
</tr>
<tr>
<td>+5Vout</td>
<td>6</td>
</tr>
<tr>
<td>+15Vout</td>
<td>7</td>
</tr>
<tr>
<td>AGND</td>
<td>8</td>
</tr>
<tr>
<td>A7</td>
<td>9</td>
</tr>
<tr>
<td>V7</td>
<td>10</td>
</tr>
<tr>
<td>AGND</td>
<td>11</td>
</tr>
<tr>
<td>A5</td>
<td>12</td>
</tr>
<tr>
<td>V5</td>
<td>13</td>
</tr>
<tr>
<td>AGND</td>
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<td>A3</td>
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</tr>
<tr>
<td>AGND</td>
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</tr>
<tr>
<td>A1</td>
<td>18</td>
</tr>
<tr>
<td>V1</td>
<td>19</td>
</tr>
</tbody>
</table>
**USBDAQ-9100MS**

**USB 8-CH 12-Bit 500 kS/s Simultaneous-Sampling Multi-Function DAQ Module**

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**Introduction**

ADLINK USBDAQ-9100MS is an 8-CH, 12-bit, 500 kS/s Simultaneous-sampling Multi-function DAQ Module with USB 1.1 compliant interface. Eight analog input channels are differential, with software programmable gain of x0.5, x1, x2, x4, x8, and can accept bipolar or unipolar signals. In addition to traditional automatic analog input scanning, four of the eight channels can be sampled simultaneously up to 500 kS/s, or 100 kS/s for continuous acquisition.

The analog outputs of the USBDAQ-9100MS feature up to 500 kS/s update rate at 12-bit resolution. With hardware-base waveform generation and the on-board 511 samples D/A FIFO, it is capable of generating continuous waveforms without taking up USB bandwidth.

The USBDAQ-9100MS also features 8-CH isolated digital inputs and 8-CH isolated digital outputs, as well as 2-CH 16-bit general purpose timer/counters. These enhancements make the USBDAQ-9100MS ideal for standalone data acquisition applications.

The mechanical design makes the USBDAQ-9100MS easy to be mounted in a PC 5.25” disk drive bay for desktop applications, or can be converted to a powerful portable data acquisition module with the optional 5400 mAh battery pack.

ADLINK USBDAQ-9100MS delivers cost-effective and reliable data acquisition capabilities for sensor monitoring, data logging, signal generation and control applications, no matter in the lab or in the field.

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**Features**

- Supports a USB 1.1 Interface
- 12-bit A/D resolution
- Up to 500 kS/s sampling rate
- 8-CH differential inputs
- 8-CH simultaneous-sampling capability
- On-board 4 k-sample A/D FIFO
- Programmable gains of x0.5, x1, x2, x4, x8
- 2-CH 12-bit multiplying analog outputs with waveform generation
- On-board 511-sample D/A FIFO per channel
- Bipolar analog output ranges
- Fully-auto-calibration
- 8-CH isolated digital inputs and outputs
- 2500 Vrms optical isolation for digital inputs and outputs
- 2-CH 16-bit general purpose timer/counters
- 5.25” Disk Drive Bay mountable

**Introduction Specifications**

**Operating Systems**


**Recommended Software**

- VB/VG/BCB/Delphi
- DAQBench
- Driver Support
- USB-LVIEW for Windows
- USB-DASK for Windows

**General Specifications**

- **Dimensions (not including connectors)**:
  - 203 mm x 146 mm x 42 mm (L x W x H)

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**USB 8-CH 12-Bit 500 kS/s Simultaneous-Sampling Multi-Function DAQ Module**

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**Isolated Digital Output**

- Number of channels: 8
- Output type: open collector Darlington transistor
- Sink current
  - Max. 500 mA for only one Darlington pair
  - 500 mA for all Darlington pair @ 20% duty
- Power dissipation:
  - Max. 2.25 W per chip (8 DO channels)
- Supply voltage: 5-35 V
- Isolation voltage: 2500 Vrms
- Data transfer: programmed I/O

**General-Purpose Timer/Counter**

- Number of channels: 1
- Resolution: 16 bits
- Compatibility: 5 V/TTL
- Base clock available:
  - 2 MHz, external clock to 2MHz

**Recommended Software**

- VB/VG/BCB/Delphi
- DAQBench
- Driver Support
- USB-LVIEW for Windows
- USB-DASK for Windows

**General Specifications**

- **I/O connectors**:
  - RCA jacks x 10 for analog inputs & outputs
  - 68-pin SCSI-II female for digital I/O
  - USB type B connector x 2 (front and rear)
  - Power jack for the external AC/DC adapter or the battery pack
  - 4-pin PC power connector
- Operating temperature: 0 to 50°C
- Storage temperature: -20 to 80°C
- Relative humidity: 5 to 95%, noncondensing
- Power requirements:
  - 12 V
  - 500 mA typical
USB Multi-Function DAQ

Termination Boards
- DIN-68S/1S Termination Board with a 68-pin SCSI-II Connector and DIN-Rail Mounting (Including One 1-meter ACL-10569 Cable)

Bundled Accessories
- USB cable (Type A to Type B) x 1
- RCA to crocodile clip cable x 10
- Stand arm x 1
- DIN-68S/1S for digital I/O x 1
- 110 VAC to 12 VDC power adaptor x 1

Pin Assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWR</td>
<td>1-35 GND</td>
</tr>
<tr>
<td>ID00</td>
<td>2-36 GND</td>
</tr>
<tr>
<td>ID01</td>
<td>3-37 GND</td>
</tr>
<tr>
<td>ID02</td>
<td>4-38 GND</td>
</tr>
<tr>
<td>ID03</td>
<td>5-39 GND</td>
</tr>
<tr>
<td>ID04</td>
<td>6-40 GND</td>
</tr>
<tr>
<td>ID05</td>
<td>7-41 GND</td>
</tr>
<tr>
<td>ID06</td>
<td>8-42 GND</td>
</tr>
<tr>
<td>ID07</td>
<td>9-43 GND</td>
</tr>
<tr>
<td>N/C</td>
<td>10-44 N/C</td>
</tr>
<tr>
<td>N/C</td>
<td>11-45 N/C</td>
</tr>
<tr>
<td>N/C</td>
<td>12-46 N/C</td>
</tr>
<tr>
<td>N/C</td>
<td>13-47 N/C</td>
</tr>
<tr>
<td>N/C</td>
<td>14-48 N/C</td>
</tr>
<tr>
<td>N/C</td>
<td>15-49 N/C</td>
</tr>
<tr>
<td>N/C</td>
<td>16-50 N/C</td>
</tr>
<tr>
<td>N/C</td>
<td>17-51 N/C</td>
</tr>
<tr>
<td>ID08</td>
<td>18-52 N/C</td>
</tr>
<tr>
<td>ID09</td>
<td>19-53 N/C</td>
</tr>
<tr>
<td>ID10</td>
<td>20-54 N/C</td>
</tr>
<tr>
<td>ID11</td>
<td>21-55 N/C</td>
</tr>
<tr>
<td>ID12</td>
<td>22-56 N/C</td>
</tr>
<tr>
<td>ID13</td>
<td>23-57 N/C</td>
</tr>
<tr>
<td>ID14</td>
<td>24-58 N/C</td>
</tr>
<tr>
<td>ID15</td>
<td>25-59 N/C</td>
</tr>
<tr>
<td>CLK0</td>
<td>26-60 GND</td>
</tr>
<tr>
<td>GATE0</td>
<td>27-61 GND</td>
</tr>
<tr>
<td>OUT0</td>
<td>28-62 GND</td>
</tr>
<tr>
<td>CLK1</td>
<td>29-63 GND</td>
</tr>
<tr>
<td>GATE1</td>
<td>30-64 GND</td>
</tr>
<tr>
<td>OUT1</td>
<td>31-65 GND</td>
</tr>
<tr>
<td>TG0</td>
<td>32-66 GND</td>
</tr>
<tr>
<td>TGOUT</td>
<td>33-67 GND</td>
</tr>
<tr>
<td>N/C</td>
<td>34-68 N/C</td>
</tr>
</tbody>
</table>

Ordering Information
- USBDAQ-9100MS USB 8-CH 12-bit 500 kS/s Simultaneous-Sampling Multi-Function DAQ Module
Introduction
The SM2064 and SM2060 are much faster than any bench-top DMM, and maintain high accuracy at high measurement rates. The measurement speed is up to 20,000 readings/second for SM2064. The SM206x series provides a comprehensive set of DMM capabilities, including 2-wire, 4-wire, and 6-wire guarded resistance measurements; inductance and capacitance; leakage and low current; and much more. The SM2064 and SM2060 Digital Multimeters are easy to setup and use, have sophisticated analog and digital circuitry to provide repeatable measurements, and are protected to handle any unexpected situation your measurement environment may encounter. With high performance and variable applications, the SM2064 and SM2060 are suitable for automated production testing, laboratory automation, and portable/field testing.

Specifications
Specifications subject to change without notice.
For the most current and complete specifications, please refer to the user manual.

DC Voltage

<table>
<thead>
<tr>
<th>Range</th>
<th>Full scale</th>
<th>Resolution</th>
<th>Input Resistance</th>
<th>24 hours</th>
<th>90 Days</th>
<th>One Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>330V</td>
<td>330.000000V</td>
<td>10µV</td>
<td>10Ω</td>
<td>0.033 + 20mV</td>
<td>0.30 + 30mV</td>
<td>1.6 + 100mV</td>
</tr>
<tr>
<td>240V</td>
<td>240.000000V</td>
<td>10µV</td>
<td>10Ω</td>
<td>0.025 + 15mV</td>
<td>0.21 + 100mV</td>
<td></td>
</tr>
<tr>
<td>120V</td>
<td>120.000000V</td>
<td>10µV</td>
<td>10Ω</td>
<td>0.016 + 10mV</td>
<td>0.13 + 100mV</td>
<td></td>
</tr>
<tr>
<td>60V</td>
<td>60.000000V</td>
<td>10µV</td>
<td>10Ω</td>
<td>0.009 + 5mV</td>
<td>0.073 + 100mV</td>
<td></td>
</tr>
<tr>
<td>30V</td>
<td>30.000000V</td>
<td>10µV</td>
<td>10Ω</td>
<td>0.005 + 2mV</td>
<td>0.065 + 100mV</td>
<td></td>
</tr>
</tbody>
</table>

[1] With Aperture set to ≥ 0.5 sec, and within one hour from Self Calibration (S-Cal).

AC Functions

| Test voltages are 2.4V max with the exception of the 24Ω and 240Ω ranges 240mV. |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 2.4V  | 2.400000V    | 10µA      | 0.005 + 130µV    | 0.015 + 0.8mV    | 0.025 + 1Ω   | 0.037 + 5Ω   | 0.055 + 1KΩ  | 0.08 + 20kΩ  | 0.15 + 30kΩ  | 0.25 + 50kΩ  | 0.35 + 100kΩ |
| 240Ω  | 240.00000Ω  | 10µΩ      | 0.013 + 40Ω     | 0.026 + 0.5Ω   | 0.033 + 2.5mΩ| 0.050 + 10Ω  | 0.073 + 100Ω| 0.105 + 1kΩ | 0.150 + 10kΩ| 0.225 + 20kΩ|
| 240kΩ | 240.000kΩ   | 100µΩ     | 0.026 + 8Ω      | 0.052 + 1Ω    | 0.064 + 2mΩ | 0.092 + 20Ω | 0.130 + 200Ω| 0.180 + 2kΩ | 0.270 + 20kΩ| 0.420 + 50kΩ|

(1) Available only with the SM2064.

Destructive Characterization

<table>
<thead>
<tr>
<th>Maximum Diode Voltage Compliance</th>
<th>Available DC current</th>
<th>Typical Current Value</th>
<th>Typical Voltage Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4V</td>
<td>100mA, 1mA, 10mA, 100µA and 1mA (SM2064) 10mA±2% 0.5mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5V</td>
<td>100mA, 1mA, 10mA, 100µA and 1mA (SM2064) 10mA±2% 0.5mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10V</td>
<td>100mA, 1mA, 10mA, 100µA and 1mA (SM2064) 10mA±2% 0.5mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2-Wire Resistance

<table>
<thead>
<tr>
<th>Range</th>
<th>Full scale</th>
<th>Resolution</th>
<th>24 hours</th>
<th>90 Days</th>
<th>One Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>24Ω</td>
<td>24.00000Ω</td>
<td>1µA</td>
<td>0.005 + 130Ω</td>
<td>0.015 + 0.8Ω</td>
<td>0.025 + 1Ω</td>
</tr>
<tr>
<td>240Ω</td>
<td>240.000Ω</td>
<td>10µΩ</td>
<td>0.013 + 40Ω</td>
<td>0.026 + 0.5Ω</td>
<td>0.033 + 2.5mΩ</td>
</tr>
</tbody>
</table>

(1) Available only with the SM2064.

Recommended Software
- VB/VC++/BCC/Dephi
- DAQBench
- Operating Systems
- DAQBench
- Fully programmable with Visual Basic, C++, LabView etc.
- Precise trigger capabilities
- Capacitance & inductance measurements (SM2064)
- Frequency and time measurements
- DAQBench
- Voltage & current sourcing (SM2064)
- DC & AC voltage & current, 2-wire, 4-wire, 6-wire (SM2064) ohms
- Plug-and-Play software with graphical user interface
- Fully programmable with Visual Basic, C++, LabView etc.
- DC & AC voltage & current, 2-wire, 4-wire, 6-wire (SM2064) ohms
- Voltage & current sourcing (SM2064)
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- DAQBench
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- DC & AC voltage & current, 2-wire, 4-wire, 6-wire (SM2064) ohms
- Plug-and-Play software with graphical user interface
- Fully programmable with Visual Basic, C++, LabView etc.

www.adlinktech.com
AC Current (true RMS)  
One Year Accuracy ± (% of reading + Amps), 23˚C±10˚C

<table>
<thead>
<tr>
<th>Range</th>
<th>Full scale</th>
<th>Resolution</th>
<th>Max Burden Voltage (RMS)</th>
<th>10kHz - 2kHz(Account)</th>
<th>20kHz - 4kHz(Account)</th>
<th>50kHz - 1kHz(Account)</th>
<th>1kHz - 1MHz(Account)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4mA</td>
<td>2.00000mA</td>
<td>1µA</td>
<td>2.0 ± 4µA</td>
<td>4 ± 4µA</td>
<td>32.2 ± 4µA</td>
<td>328.3 ± 4µA</td>
<td></td>
</tr>
<tr>
<td>24mA</td>
<td>24.0000mA</td>
<td>10µA</td>
<td>24.0 ± 30µA</td>
<td>5 ± 30µA</td>
<td>365.2 ± 30µA</td>
<td>354.6 ± 30µA</td>
<td></td>
</tr>
<tr>
<td>240mA</td>
<td>240.0000mA</td>
<td>100µA</td>
<td>240.0 ± 400µA</td>
<td>5 ± 400µA</td>
<td>315.6 ± 400µA</td>
<td>303.4 ± 400µA</td>
<td></td>
</tr>
<tr>
<td>2.4A</td>
<td>2.400000mA</td>
<td>1µA</td>
<td>2.4 ± 10µA</td>
<td>2 ± 10µA</td>
<td>150.6 ± 10µA</td>
<td>145.4 ± 10µA</td>
<td></td>
</tr>
</tbody>
</table>

[1] All AC Current ranges have typical measurement capability to 20 kHz.

Accuracy is specified for values greater than 5% of the selected range.

Time Functions  
Frequency and Period

ACI Mode  
Input Signal range

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Period Range</th>
<th>Resolution</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>240kHz - 5kHz</td>
<td>2μs - 5kHz</td>
<td>2MHz</td>
<td>± 0.02% of reading</td>
</tr>
</tbody>
</table>

Pulse Width  

<table>
<thead>
<tr>
<th>Polarity or negative pulse width</th>
<th>Frequency Range</th>
<th>Resolution</th>
<th>Width Range</th>
<th>Typical Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive or negative</td>
<td>10kHz - 100kHz</td>
<td>1µs</td>
<td>2µs to 1µs</td>
<td>± 0.01% of reading</td>
</tr>
</tbody>
</table>

Threshold DAC  

<table>
<thead>
<tr>
<th>Selected VAC Range</th>
<th>Threshold range (DC level)</th>
<th>Threshold DAC resolution</th>
<th>Highest allowed input Vpp-p</th>
<th>Typical one year settling uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>240V</td>
<td>-100V to +100V</td>
<td>500V</td>
<td>24MHz</td>
<td>± 0.2% of reading ± 4mV</td>
</tr>
<tr>
<td>2.4V</td>
<td>-100V to +100V</td>
<td>100V</td>
<td>240MHz</td>
<td>± 0.0% of reading ± 0mV</td>
</tr>
<tr>
<td>24V</td>
<td>-100V to +100V</td>
<td>100V</td>
<td>2400MHz</td>
<td>± 0.2% of reading ± 4V</td>
</tr>
</tbody>
</table>

Totalizer  
Active edge polarity

<table>
<thead>
<tr>
<th>Positive or negative transition</th>
<th>Maximum Count</th>
<th>Allowed rate</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive or negative</td>
<td>1 to 30,000 events per second</td>
<td>32 Threshold DAC</td>
<td></td>
</tr>
</tbody>
</table>

Capacitance and Inductance Specifications (SM2064 only)

Capacitance  
Accuracy ±(% of reading + farads) [1]

<table>
<thead>
<tr>
<th>Range</th>
<th>Full scale Reading</th>
<th>Resolution</th>
<th>One Year 25˚C (C)</th>
<th>Measurement Time</th>
<th>Measurement Rate (om/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.200µF</td>
<td>1.1999µF</td>
<td>0.1µF</td>
<td>1.5 ± 2.25µF</td>
<td>52.3ms</td>
<td>19</td>
</tr>
<tr>
<td>12µF</td>
<td>11.999µF</td>
<td>1µF</td>
<td>1.2 ± 2.6µF</td>
<td>118ms</td>
<td>8.5</td>
</tr>
<tr>
<td>120µF</td>
<td>119.99µF</td>
<td>10µF</td>
<td>1.0 ± 2.7µF</td>
<td>127ms</td>
<td>7.9</td>
</tr>
<tr>
<td>1.2µF</td>
<td>1.1999µF</td>
<td>100µF</td>
<td>1.0 ± 2.7µF</td>
<td>717ms</td>
<td>0.7</td>
</tr>
<tr>
<td>12µF</td>
<td>11.999µF</td>
<td>1000µF</td>
<td>1.0 ± 2.7µF</td>
<td>410ms</td>
<td>0.1</td>
</tr>
<tr>
<td>120µF</td>
<td>119.99µF</td>
<td>10000µF</td>
<td>1.0 ± 2.7µF</td>
<td>151.5ms</td>
<td>0.6</td>
</tr>
<tr>
<td>1200µF</td>
<td>1200.000µF</td>
<td>1µF</td>
<td>1.0 ± 2.7µF</td>
<td>170ms</td>
<td>0.9</td>
</tr>
</tbody>
</table>

[1] Accuracy is specified for values higher than 5% of the selected range with the exception of the 1.200µF range.

Other measurement functions of SM2064: 6-wire guarded resistance, extended resistance, AC peak-to-peak voltage, AC crest factor, AC median value, leakage current, RCD temperature, thermocouple temperature.

Source Functions (SM2064 only)

- DC Voltage Source  
  - Output range: -10.000V to +10.000V  
  - DAC resolution: 18 bits (closed loop), 12 bits (open loop)

- AC Voltage Source  
  - Output range: 900mV to 8V  
  - DAC resolution: 12 bits

- DC Current Source  
  - Output range: 1.25µA to 12.5mA

Trigger Functions  

- External Hardware Trigger (at DIN-7 connector)  
  - Trigger input level range: +3V to +15V  
  - Minimum trigger input current: 1mA

- Analog Threshold Trigger  
  - Trigger point: selectable positive or negative transition of set threshold  
  - Captures up to 120 post-trigger readings for apertures > 625µSec.

- Delayed Hardware Trigger  
  - Up to 65mSec with 1µSec resolution  
  - Up to 1µs with 2µs resolution

General Specifications

- Overload Protection (voltage inputs): 330Voc, 250Vac
- Isolation: 330Voc, 250Vac from earth ground
- Maximum Input (Volts x Hertz)  
  - 8x10^10 volts x Hz normal mode input  
  - 1x10^10 volts x Hz common mode input
- Calibration: Calibrations are performed by Signametrics in a computer at 23˚C internal temperature rise. All calibration constants are stored in a text file.

Ordering Information  

- SM2064  
  7½-digits PCI Digital Multimeter with LCR Meter

- SM2060  
  7½-digits PCI Digital Multimeter
SM2040 Series
6-1/2 Digit PCI Digital Multimeter

Features
- Flexible, full-featured auto-ranging DMM
- 6-1/2 digit resolution
- Up to 1,000 readings/second
- DC & AC Volts & Current, 2-Wire, 4-Wire Ohms
- True AC RMS measurements, 10Hz to 100kHz
- Measure 1µV to 330V
- Frequency Counter 1Hz to 300kHz
- Capacitance, Inductance, Leakage, 6-Wire Guarded Resistance, Temperature measurements (SM2042/2044)
- 330V Isolation Barrier
- Self-Calibrating
- Plug-and-Play, Windows 95/98/Me/NT/2000/XP
- Language support - Visual Basic, MSVisual C++, Delphi
- Package support - LabView, LabWindows/CVI, TestPoint, ATEasy, Matlab, VBA & more.

Introduction
The SM2040 series is a PCI 6-1/2 digit Digital Multimeter which provides a combination of resolution, accuracy, and speed that surpasses rivals. A 6-1/2 digit display, 0.0045% basic DCV accuracy and 1,000 readings per second assure accurate, fast, and repeatable measurements. The SM2040 series is designed as a universal, multifunctional DMM. Measurements commonly associated with "high-end" system DMMs are standard features with the SM2040 family, such as 2-wire, 4-wire and 6-wire guarded resistance measurements, inductance and capacitance, leakage and temperature, RMS and peak-to-peak, frequency and timing, sourcing of voltage and current, and much more. The SM2040 is best suited for applications demanding precision sources with simultaneous measurements such as in Parametric testing, while the SM2040 fits the bill as a universal, multifunctional DMM. Measurements commonly associated with "high-end" system DMMs are standard features with the SM2040 family, such as 2-wire, 4-wire and 6-wire guarded resistance measurements, inductance and capacitance, leakage and temperature, RMS and peak-to-peak, frequency and timing, sourcing of voltage and current, and much more. The SM2040 is best suited for applications demanding precision sources with simultaneous measurements such as in Parametric testing, while the SM2040 fits the bill as a universal, multifunctional DMM.

Specifications
Specifications subject to change without notice.

DC Functions

<table>
<thead>
<tr>
<th>Range</th>
<th>Full scale 6-1/2 Digits</th>
<th>Resolution Input 24 hours 23˚C±5˚C</th>
<th>90 Days 23˚C±5˚C</th>
<th>One Year 23˚C±5˚C</th>
</tr>
</thead>
<tbody>
<tr>
<td>330V</td>
<td>330.00000V</td>
<td>10µV</td>
<td>0.003 + 1µV</td>
<td>0.005 + 1µV</td>
</tr>
<tr>
<td>3.3V</td>
<td>3.300000V</td>
<td>100nA</td>
<td>0.005 + 1µV</td>
<td>0.006 + 1µV</td>
</tr>
<tr>
<td>330kΩ</td>
<td>330.0000kΩ</td>
<td>1Ω</td>
<td>0.006 + 1µV</td>
<td>0.009 + 1µV</td>
</tr>
<tr>
<td>33Ω</td>
<td>33.0000Ω</td>
<td>10µΩ</td>
<td>0.007 + 5Ω</td>
<td>0.009 + 1.5Ω</td>
</tr>
<tr>
<td>3.3Ω</td>
<td>3.3000Ω</td>
<td>1µΩ</td>
<td>0.008 + 1.5Ω</td>
<td>0.009 + 1.5Ω</td>
</tr>
</tbody>
</table>

[1] With reading rate set to 2 rps or slower, and within one hour of DCV zero, using Relative control.

AC Functions

<table>
<thead>
<tr>
<th>Range</th>
<th>Full scale 6-1/2 Digits</th>
<th>Resolution Input 24 hours 23˚C±5˚C</th>
<th>90 Days 23˚C±5˚C</th>
<th>One Year 23˚C±5˚C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3kΩ</td>
<td>3.300000kΩ</td>
<td>1µΩ</td>
<td>0.018 + 2mA</td>
<td>0.030 + 3mA</td>
</tr>
<tr>
<td>33kΩ</td>
<td>33.0000kΩ</td>
<td>10µΩ</td>
<td>0.035 + 2.5mA</td>
<td>0.065 + 3mA</td>
</tr>
<tr>
<td>330kΩ</td>
<td>330.0000kΩ</td>
<td>1Ω</td>
<td>0.04 + 4Ω</td>
<td>0.07 + 5Ω</td>
</tr>
<tr>
<td>330MΩ</td>
<td>330.00MΩ</td>
<td>10Ω</td>
<td>0.08 + 7Ω</td>
<td>0.11 + 8Ω</td>
</tr>
</tbody>
</table>

[1] With reading rate set to 10 readings per second (rps) or slower, and within one hour of DCV zero, using Relative control.
### Time Functions (SM2042, 44)

#### Frequency and Period

**ACV Mode**

<table>
<thead>
<tr>
<th>Input RMS Voltage range</th>
<th>Input Impedance</th>
<th>Frequency Range</th>
<th>Period Range</th>
<th>Resolution</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>33mV - 200V</td>
<td>1MΩ with ≤ 30pF</td>
<td>1Hz - 300kHz</td>
<td>1s - 3.3µs</td>
<td>5 digits</td>
<td>±0.002% of reading</td>
</tr>
</tbody>
</table>

**ACI Mode**

<table>
<thead>
<tr>
<th>Input RMS Voltage range</th>
<th>Input Impedance</th>
<th>Frequency Range</th>
<th>Period Range</th>
<th>Resolution</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.33mA - 2.5A</td>
<td>100 (3mA &amp; 30mA)</td>
<td>0.1Ω (30mA &amp; 2.5A)</td>
<td>1s - 50kHz</td>
<td>5 digits</td>
<td>±0.01% of reading</td>
</tr>
</tbody>
</table>

#### Pulse Width

<table>
<thead>
<tr>
<th>Polarity</th>
<th>Frequency Range</th>
<th>Resolution</th>
<th>Width Range</th>
<th>Typical Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive or negative</td>
<td>100kHz - 1MHz</td>
<td>2µs</td>
<td>2µs to 1s</td>
<td>0.01% of reading</td>
</tr>
</tbody>
</table>

#### Threshold DAC

<table>
<thead>
<tr>
<th>Selected VAC</th>
<th>Threshold range (DC level)</th>
<th>Threshold DAC resolution</th>
<th>Highest allowed input Vpp</th>
<th>Typical one year settling uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>330V</td>
<td>-10V to +10V</td>
<td>0.5mV</td>
<td>1,000V</td>
<td>0.2% + 4mV</td>
</tr>
<tr>
<td>3.3V</td>
<td>-0.5V to +0.5V</td>
<td>0.5mV</td>
<td>19.00V</td>
<td>0.2% + 40mV</td>
</tr>
<tr>
<td>33V</td>
<td>-100V to +100V</td>
<td>10µV</td>
<td>190.0V</td>
<td>0.2% + 0.4V</td>
</tr>
<tr>
<td>250V</td>
<td>-500V to +500V</td>
<td>100µV</td>
<td>900.0V</td>
<td>0.2% + 4V</td>
</tr>
</tbody>
</table>

#### Totalizer

<table>
<thead>
<tr>
<th>Active edge polarity</th>
<th>Maximum Count</th>
<th>Allowed rate</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>10^9</td>
<td>1 to 30,000 events per second</td>
<td>Use Threshold DAC</td>
</tr>
</tbody>
</table>

### Capacitance and Inductance Specifications (SM2042, 44)

#### Capacitance

Accuracy ± (% of reading + farads) [1]

<table>
<thead>
<tr>
<th>Range</th>
<th>Full scale Reading</th>
<th>Resolution</th>
<th>One Year 23°C C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10pF</td>
<td>11.5900µF</td>
<td>1µF</td>
<td>2.1 ± 5µF</td>
</tr>
<tr>
<td>100pF</td>
<td>119.00µF</td>
<td>10µF</td>
<td>1.0</td>
</tr>
<tr>
<td>1µF</td>
<td>1,1990µF</td>
<td>100µF</td>
<td>1.0</td>
</tr>
<tr>
<td>10µF</td>
<td>119.00µF</td>
<td>1µF</td>
<td>1.0</td>
</tr>
<tr>
<td>100µF</td>
<td>11,990µF</td>
<td>100µF</td>
<td>1.2</td>
</tr>
<tr>
<td>1nF</td>
<td>1,1990mF</td>
<td>1000µF</td>
<td>2</td>
</tr>
<tr>
<td>10nF</td>
<td>115,900mF</td>
<td>1µF</td>
<td>2</td>
</tr>
</tbody>
</table>

[1] Within one hour of zero, using Relative control. Accuracy is specified for values higher than 5% of the selected range. Other measurement functions of the SM2044: 6-wire guarded resistance, AC peak-to-peak voltage, AC crest factor, AC median value, leakage current, RTD temperature, in circuit AC-based capacitance.

#### Source Functions (SM2044 only)

- **DC Voltage Source**
  - Output range: -10.000V to +10.000V
  - DAC resolution: 18 bits (closed loop), 12 bits (open loop)

- **AC Voltage Source**
  - Output range: 50mV to 7.1Vrms
  - DAC resolution: 16 bits (closed loop), 12 bits (open loop)
  - Frequency range/resolution: 2 Hz to 75 kHz

- **DC Current Source**
  - Output range: 1.25µA to 12.5mA

#### Trigger Functions

- **External Hardware Trigger** (at DIN-7 connector)
  - Trigger input voltage level range: High: +3V to +15V, Low: -15V to +0.8V
  - Trigger high current drive: Min. 1 mA, Max 15mA (TTL or CMOS logic level)
- **Analog Threshold Trigger**
  - Captures up to 64 post-trigger readings
  - Reading rate: 10 rps or higher

#### General Specifications

- **Reading Rate (user selectable):**
  - 0.5 to 1,000 readings per second (rps)
  - Up to 10 rps, 6 ½ digits
  - Up to 30 rps, 5 ½ digits
- **Overload Protection (voltage inputs):**
  - 330VDC, 250VAC from Earth Ground
  - Maximum Input (Volt x Hertz):
    - 8x10^6 Volt x Hz common mode input
    - 1x10^6 Volt x Hz normal mode input
- **Output range:**
  - 1.25µA to 12.5mA
  - DAC resolution: 16 bits (closed loop), 12 bits (open loop)
  - Output range: ±10.000V to ±10.000V
  - Isolation: 330Vdc, 250VAC from Earth Ground

- **Maximum Input (Volt x Hertz):**
  - Operating Temperature: -10 to 70°C
  - Storage Temperature: -65 to 85°C
  - Power requirements: ±5 volts, 300mA maximum
- **Dimensions (not including connectors):**
  - 208mm x 112mm
  - Weight:
    - 0.1Ω (330mA & 2.5A) 0.33mA - 2.5A
    - 0.33mA - 2.5A
  - Full scale Reading
  - Resolution
  - 1µF 0.1% + 40mV
  - 10µF 1µF 0.1% + 40mV
  - 100µF 1µF 0.1% + 40mV
  - 1nF 1µF 0.1% + 40mV
  - 10nF 1µF 0.1% + 40mV
  - 100nF 1µF 0.1% + 40mV
  - 1µF 1µF 0.1% + 40mV
  - 10µF 1µF 0.1% + 40mV
  - 100µF 1µF 0.1% + 40mV
  - 1nF 1µF 0.1% + 40mV
  - 10nF 1µF 0.1% + 40mV
  - 100nF 1µF 0.1% + 40mV
  - 1µF 1µF 0.1% + 40mV
  - 10µF 1µF 0.1% + 40mV
  - 100µF 1µF 0.1% + 40mV
  - 1nF 1µF 0.1% + 40mV
  - 10nF 1µF 0.1% + 40mV
  - 100nF 1µF 0.1% + 40mV
  - 1µF 1µF 0.1% + 40mV
  - 10µF 1µF 0.1% + 40mV
  - 100µF 1µF 0.1% + 40mV
  - 1nF 1µF 0.1% + 40mV
  - 10nF 1µF 0.1% + 40mV
  - 100nF 1µF 0.1% + 40mV
  - 1µF 1µF 0.1% + 40mV