FEATURES
- 16-bit, 500kHz A/D converter
- High-speed USB 2.0 device, USB 1.1 compatible
- 16 single-ended or 8 differential inputs, unipolar or bipolar
- Auto calibration
- Unique channel-by-channel programmable gain (choose from 8 ranges)
- Overvoltage protection
- Software selectable external, software, and timed trigger modes
- 16 digital I/O lines
- 16-bit programmable counter
- Alternate embedded USB connector
- PC/104 module size and mounting compatibility
- Small (4” x 4” x 1.25”) rugged industrial enclosure

FACTORY OPTIONS
- External power for high current capabilities
- DIN rail mounting provision
- OEM (board only) version with mounting holes for added flexibility in embedded applications
- Factory input range / gain of 1-100
- Self standing mode with 1Msample memory

FUNCTIONAL DESCRIPTION
The USB-AI16-16 is an ideal solution for adding portable, easy-to-install high-speed analog and digital I/O capabilities to any computer with a USB port. The unit is a USB 2.0 high-speed device, offering the highest speed available with the USB bus. The USB-AI16-16 is a 16-bit resolution A/D board capable of speeds up to 500kHz for its 16 single-ended or eight differential analog input channels. Each analog input channel can be independently configured to accept 8 different input ranges. Additionally, each channel contains its own analog ground pin which is helpful in reducing noise. A unique, real-time internal calibration system allows the card to continually adjust for offset/gain errors giving a more accurate reading. It is fully compatible with both USB 1.1 and USB 2.0 ports. The unit is plug-and-play allowing quick connect or disconnect whenever you need additional I/O on your USB port.

This small, compact, multifunction I/O board provides the user with everything needed to start acquiring, measuring, analyzing, and monitoring a variety of applications. The USB-AI16-16 data acquisition board can be used in many current real-world applications such as embedded equipment monitoring, precision PC-based and portable environmental measurements, and mobile data acquisition. Additional features include 16 digital I/O lines and a programmable 16-bit counter. The counter can be configured in a variety of modes and has the ability to use external signals for its inputs.

The USB-AI16-16 is designed to be used in rugged industrial environments but is small enough to fit nicely onto any desk or testing station. The board is PC/104 sized (3.550 by 3.775 inches) and ships inside a steel powder-coated enclosure with an anti-skid bottom.

OEM USB/104 FORM FACTOR
The OEM (board only) version is perfect for a variety of embedded applications. What makes the OEM option unique is that its PCB size and mounting holes match the PC/104 form factor (without the bus connections). This allows our rugged digital board to be added to any PCI-104 or PC/104 stack by connecting it to a simple USB port usually included on-board with embedded CPU form factors such as EBX, EPIC, and PC/104. This is especially important since many newer CPU chipsets do not support ISA and have plenty of USB ports. The USB-AI16-16 OEM board can also be installed using standoffs inside other enclosures or systems.

ACCESSORIES
The USB-AI16-16 is available with optional cable assemblies and screw terminal boards for easy-to-use, out of the box connectivity.

SOFTWARE
The USB-AI16-16 is plug-and-play which allows quick connect or disconnect whenever you need additional I/O on your USB port. The module utilizes a high-speed custom function driver optimized for a maximum data throughput of 1MBps that is 50-100 times faster than the USB human interface device (HID) driver used by many competing products. This approach maximizes the full functionality of the hardware along with capitalizing the advantage of high-speed USB 2.0. The USB-AI16-16 is supported for use in most USB supported operating systems and includes a free Linux (including Mac OS X) and Windows 98se/Me/2000/XP/2003 compatible software package. This package contains sample programs and source code in Visual Basic, Delphi, C++ Builder, and Visual C++ for Windows. Also incorporated is a graphical setup program in Windows. Third party support includes a Windows standard DLL interface usable from the most popular application programs, and includes example LabVIEW VIs. Embedded OS support include Windows XPe.
**A/D**
- Type: Successive approximation
- Sampling rate: 500kHz
- Resolution: 16-bit
- Integral Nonlinearity: ±4 LSBs typ
- Calibration: Real-time in line for offset/gain values

**ANALOG INPUTS**
- Inputs: 16 single-ended or 8 differential
- Bipolar ranges: ±1.25V, ±2.5V, ±5V, ±10V
- Unipolar ranges: 0-1.25V, 0-2.5V, 0-5V, 0-10V
- Overvoltage protection: -40 to +55V
- Trigger Source: Software selectable: programmable timer, external trigger, program command

**DIGITAL I/O**
- Inputs: 16, programmable as inputs or outputs in groups of 8
- Input voltage: Logic low: 0V(min) to 0.8V(max)
  Logic high: 2V(min) to 5V(max)
- Input current: ±1μA(max)
- Output voltage: Logic low: 0V(min) to 0.55V(max)
  Logic high: 2.5V(min) to 5V(max)
- Output current: Logic low: 64mA(max) sink
  Logic high: 32mA(max) source

**Counter/Timer**
- Type: 82C54-10 programmable interval counter
- Maximum Input Frequency: 10MHz
- Counter size: 3 x 16-bit
- Clock: Software selectable: internally generated or external (user supplied)
- Minimum Clock Pulse Width: 30ns (high), 40ns (low)
- Input/Output voltage/current: Same as digital I/O

**POWER**
- Power required: ±5V at 420mA typ*
- *USB 2.0 spec defines a device in terms of a unit load. A unit load is defined to be 100mA. Devices drawing an absolute maximum of one unit load is considered to be low-powered and devices drawing an absolute maximum of five unit loads is considered to be high-powered. Because this spec is not strictly adhered to, it is best to verify the USB port's power capabilities before operation. This card, according to the USB 2.0 spec, is a high powered device. An optional external power supply can be ordered if the USB port cannot support high powered devices.

**ENVIRONMENTAL**
- Temperature: Operating: 0° to +70°C, optional: -40° to +85°C; Storage: -40° to +105°C
- Humidity: 5% to 90% RH, without condensation
- Board Dimensions: PC/104 format, 3.550" by 3.775"

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