FEATURES
- High-speed USB 2.0 A/D board at up to 500kHz
- All functions fully software configurable
- 12-bit resolution A/D converter
- Add channel capacity of 32 differential inputs per AIMUX32 board (up to four boards plus A/D board)
- Eight input ranges, unipolar or bipolar
- Real-time hardware autocalibration and oversampling for accurate data
- Unique channel-by-channel programmable gains
- Wide range of signal conditioning types per channel
- Data buffer for A/D
- Synchronous, asynchronous, timed trigger modes
- 16-bit programmable counter/timer
- Alternate embedded USB connector
- Two DB37F right-angle I/O connectors per board
- USB/104 form-factor for embedded OEM’s
- OEM (board only) version ships as standard for added flexibility in embedded applications
- All required power drawn from USB port

FACTORY OPTIONS
- External power for high current capabilities
- DIN rail mounting provision
- Current ranges (4-20mA, 10-50mA) S.E. or Diff
- Extended Temperature Operation -40 to +85°C

FUNCTIONAL DESCRIPTION
The USB-AI12-128A 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 currently available with the USB bus. The USB-AI12-128A is a 12-bit resolution A/D board set capable of speeds up to 500kHz (divided equally by the total number of conditioned channels in the board set) for the 32 single-ended or 32 differential analog inputs. Each channel can be independently software configured to accept 8 different input ranges. Additionally, each channel includes its own analog ground pin on the I/O connector which is helpful in reducing noise. A unique, real-time internal calibration system allows the card to continually compensate for offset/gain errors giving a more accurate reading. The unit is plug-and-play allowing a quick connection whenever you need additional I/O on a USB port.

This small, compact, multifunction I/O board provides the user with everything needed to start acquiring, measuring, analyzing and monitoring in a variety of applications. The USB-AI12-128A data acquisition board set can be used in many 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 to trigger and control the scanning of its inputs.

The USB-AI12-128A is designed to be used in rugged industrial environments but is small enough to fit nicely onto any desk or testing station. The board sets are PC/104 sized (3.550 by 3.775 inches) and are intended to be ordered specifically configured / tailored to the user’s application based on signal conditioning types. A minimum stack configuration is one A/D board with one signal conditioning board connected together via a short ribbon cable, which yields 32 differential analog input channels. A maximum stack configuration is one A/D board with four signal conditioning boards connected together via a five-connector ribbon cable.

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 analog input board to be added to any PCI-104 or PC/104 stack by connecting it to a 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-AI12-128A OEM board can also be installed using standoffs inside other enclosures or systems.

ACCESSORIES
The USB-AI12-128A is available with optional cable assemblies and screw terminal boards for easy-to-use, out of the box connectivity.

SOFTWARE
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-AI12-128A board set 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 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.
**SPECIFICATIONS**

**Analog Inputs**
ADC Type: Successive approximation
Sampling rate:
- USB-AI12-128A: 500K samples/sec (maximum aggregate)
- USB-AI12-128E: 250K samples/sec (maximum aggregate)
Resolution: 12-bit
Number of channels: 32 single-ended or 32 differential per each of up to 4 AIMUX-32 boards
Bipolar ranges: ±1V, ±2V, ±5V, ±10V (software selectable)
Unipolar ranges: 0-1V, 0-2V, 0-5V, 0-10V (software selectable)
4-20mA or 10-50mA Factory installed (optional)
Board Calibration:
- VREF LOW: AGND
- VREF HIGH: 9.90V ± 0.0299V
System Calibration: Program provided to calibrate entire system
Calibration Hardware:
- USB-AI12-128A: Calibrated real-time output for offset/gain errors
- USB-AI12-128E: None
Input Impedance: 1M
A/D Start Sources: Software Start, Timer Start, and External Start Trigger (rising or falling edge; software selectable)
A/D Start Enable: Externally supplied (pulled-up; active-high)
A/D Start Types: Single Channel or Scan (software selectable)
Channel Oversamp: 0-255 consecutive samples/channel
Over volt protection:
- -40 to +56V
- No crosstalk present below 400KHz
- -60dB @ 500KHz

**Digital I/O**
Lines: 16 inputs or outputs in groups of 8 (pulled-up)
Input voltage:
- Logic low: 0V(min) to 0.8V(max)
- Logic high: 2V(min) to 5V(max)
Input current:
- ±20mA (max)
Output voltage:
- Logic low: 0V(min) to 0.55V(max)
- Logic high: 2V(min) to 5V(max)
Output current:
- Logic low: 64mA(max) sink
- Logic high: 32mA(max) source

**Environmental**
Operating Temp: 0° to +70°C, optional -40° to +85°C
Storage Temp: -40° to +105°C
Humidity: 5% to 90% RH, without condensation
Board Dimensions: PC/104 format, 3.550” by 3.775” and mounting holes
Power required: +5V at 330mA typical

**Counter/Timer**
Available Counters: Counter 0
Type: 82C54 programmable interval counter
Input Frequency:
- 10KHz (max)
Counter size: 16-bit
Clock: Internal 10KHz or Externally supplied
Clock Period: 100ns (min)
Clock Width High / Low: 30ns (min) / 40ns (min)
Gate: Externally supplied (pulled-up; active-high)
Output: External (pulled-up)
Voltage/Current: Same as Digital I/O

**The following items are included with your shipment**
- Board set with interconnecting ribbon cable assembly
- 6’ USB cable
- Software Master CD (PDF user manual installed with product package)
- Printed USB I/O Quick-Start Guide

**Ordering Guide**
USB-AI12-128A Advanced w/128 inputs, 12-Bit, 500kHz, w/autocalibration
USB-AI12-128 Standard w/128 inputs, 12-Bit, 250kHz, w/software calibration
USB-AI12-96A Economy w/96 inputs, 12-Bit, 500kHz, w/software calibration
USB-AI12-96 Standard w/96 inputs, 12-Bit, 250kHz, w/software calibration
USB-AI12-96E Economy w/96 inputs, 12-Bit, 100kHz, w/software calibration
USB-AI12-64A Advanced w/64 inputs, 12-Bit, 500kHz, w/autocalibration
USB-AI12-64 Standard w/64 inputs, 12-Bit, 250kHz, w/software calibration
USB-AI12-64E Economy w/64 inputs, 12-Bit, 100kHz, w/software calibration
USB-AI12-32A Advanced w/32 inputs, 12-Bit, 500kHz, w/autocalibration
USB-AI12-32 Standard w/32 inputs, 12-Bit, 250kHz, w/software calibration
USB-AI12-32E Economy w/32 inputs, 12-Bit, 100kHz, w/software calibration

**Model Options**
- -P External AC/DC adapter (power jack/regulator installed)
- -DIN DIN rail mounting provision
- -T Extended Temperature Operation (-40° to +85°C)
- -Sx “x” = special number designator
- 4-20mA or 10-50mA inputs
- DIO lines can be configured with pull down resistors

**Accessories**
STB-50 Screw terminal board
CAB50F-6 6’ flat ribbon cable, female 50 pin connector
MP104-DIN DIN rail mounting provision
CUSB-EMB-6 6’ USB Cable with Type A to mini type USB connector for embedded applications