USB-AI12-16A - High Speed Multifunction 12-Bit Analog Input

FEATURES

- High-speed USB 2.0 device, sampling rate to 500kHz
- All functions fully software configurable
- 12-bit resolution A/D converter
- 16 single-ended or 8 differential inputs
- Eight input ranges, unipolar or bipolar
- Real-time hardware auto-calibration and oversampling for accurate data
- Unique channel-by-channel programmable gains
- Data buffer for A/D
- Synchronous, asynchronous, timed trigger modes
- 16 high-current digital I/O lines
- 16-bit programmable counter/timer
- Alternate embedded USB connector
- USB/104 form-factor for embedded OEM's
- Small (4" x 4" x 1.25") rugged industrial enclosure
- All required power drawn from USB port

FACTORY OPTIONS

- External power for high current capabilities
- DIN rail mounting provision
- OEM (board only) version with PC/104 mounting holes and PCB footprint for added flexibility in embedded applications
- Current ranges (4-20mA, 10-50mA) S.E. or Diff
- Extended Temperature Operation -40 to +85°C

FUNCTIONAL DESCRIPTION

The USB-AI12-16A 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-AI12-16A is a 12-bit resolution A/D board capable of speeds up to 500kHz for its 16 single-ended or 8 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 the convenience of 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-AI12-16A 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 to trigger and control the scanning of its inputs.

The USB-AI12-16A 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-AI12-16A OEM board can also be installed using standoffs inside other enclosures or systems.

ACCESSORIES

The USB-AI12-16A is available with optional cable assemblies and screw terminal boards for easy-to-use, out of the box connectivity.

SOFTWARE

The USB-AI12-16A 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 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-USB-AI12-16A is supported for use in most USB supported operating systems and includes a free Linux 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. Embedded OS support include Windows XPe.

BLOCK DIAGRAM
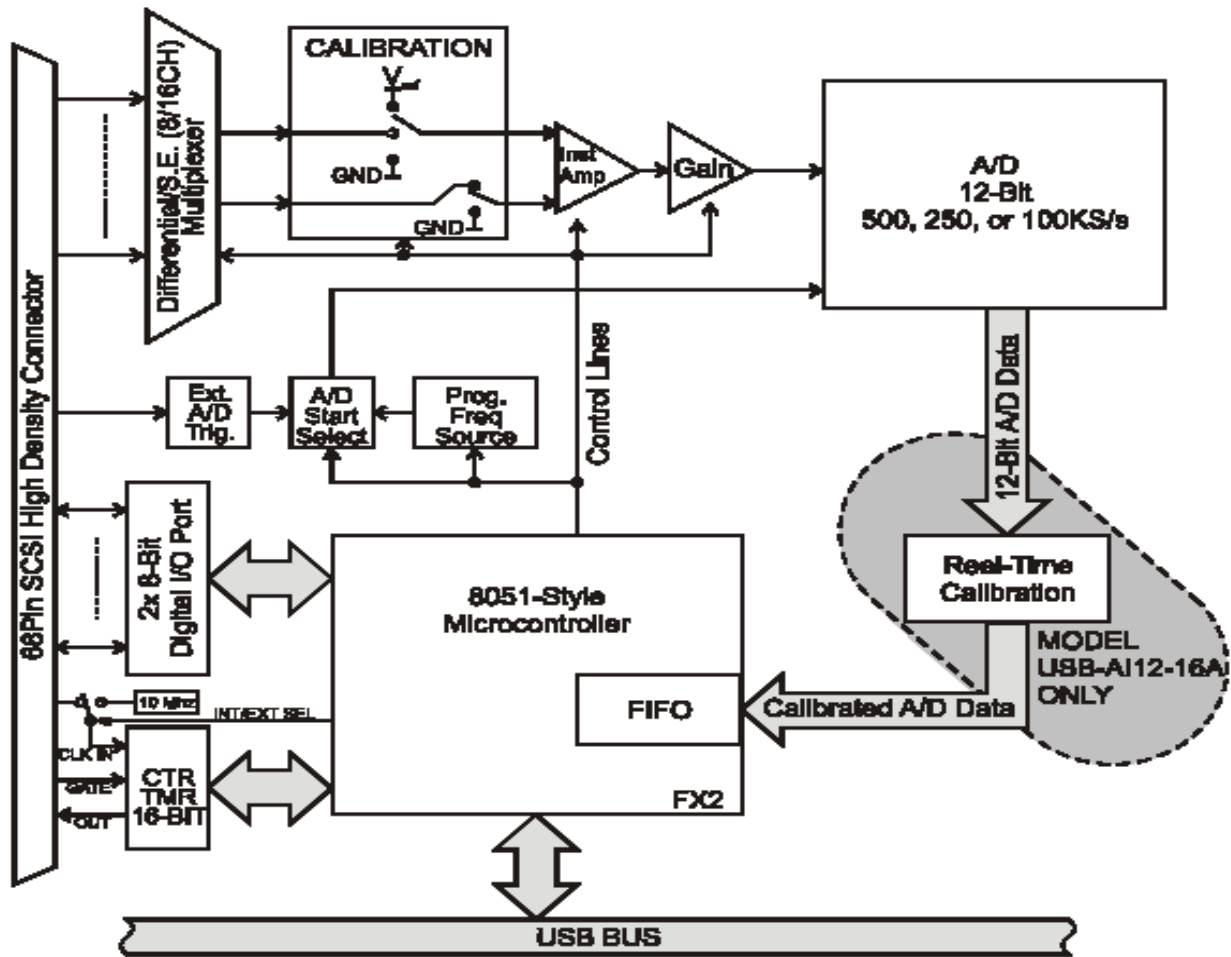
Specifications

Analog Inputs

ADC Type
Successive approximation

Sampling rate
USB-AI12-16A 500Ksamples/sec (maximum aggregate)
USB-AI12-16 250Ksamples/sec (maximum aggregate)
USB-AI12-16E 100Ksamples/sec (maximum aggregate)

Resolution
12-bit

Number of channels
16 single-ended or 8 differential (software selectable)

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-AI12-16A Calibrated real-time output for offset/gain errors
USB-AI12-16 NONE
USB-AI16-16E 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 +55V

Crosstalk
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
±20:A (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

Counter/Timer

Available Counters
Counter 0

Type:
82C54 programmable interval counter

Input Frequency
10MHz (max)

Counter size
16-bit

Clock Internal
10MHz or Externally supplied
(software selectable; pulled-up)

Clock Period
100ns (min)

Clock Pulse Width High
30ns (min)

Clock Pulse Width Low
40ns (min)

Gate
Externally supplied (pulled-up; active-high)

Output
External (pulled-up)

Input/Output

Voltage/Current
Same as Digital I/O

Environmental

Operating Temperature
0º to +70ºC, optional -40º to +85ºC

Storage Temperature
-40º to +105ºC

Humidity
5% to 90% RH, non-condensing

Board Dimensions
PC/104 format, 3.550" by 3.775" and mounting holes

Power required
+5V at 330mA typical

The following items are included with your shipment

• Board installed in labeled enclosure
• 6' USB cable
• Software Master CD (PDF user manual installed with product package)
• Printed USB I/O Quick-Start Guide

Ordering Guide

USB-AI12-16A
Advanced version, 12-Bit, 500kHz, with auto calibration

USB-AI12-16
Standard version, 12-Bit, 250kHz, with software calibration

USB-AI12-16E
Economy version, 12-Bit, 100kHz, with software calibration

Model Options

-P
External AC/DC adapter (power jack/regulator installed)

-OEM
Board only (no enclosure)

-DIN
DIN rail mounting provision

-T
Extended Temperature Operation (-40º to +85ºC)

-S0x
"x" = special number designator
- 4-20mA or 10-50mA inputs
- 16 current inputs when factory configured as single-ended
- 8 current inputs when factory configured as differential
- DIO lines can be configured with pull down resistors

Accessories

STB-68
Screw terminal board

C68PS18L
68-Pin SCSI 18" shielded cable

MP104-DIN
DIN rail mounting provision

CUSB-OTG-6
6' USB Cable with Type A to mini type OTG connector for embedded applications