AL12250

12 bit 250 MHz A/D Card

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Document

AL12250 Manual
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General Information

General Description

The AL12250 is a single channel, dual input A/D board for the PCI bus. It is optimized for high-speed transient capture at sampling rates up to 250Msample/sec at very high repetition rates. A large dual-ported onboard buffer memory allows simultaneous transient recording and readout of captured data. A post-processing section can be used to extract peak information on multiple gates while the captured data is transferred over the PCI bus into the PC's main memory.

The analog inputs can be AC- or DC-coupled under software control. High input impedance (50 kOhms) or 50 Ohms termination are also software-selectable for high signal fidelity over the entire analog bandwidth of typically 100 MHz. Input voltage range can be set from 50 mV to 5 V peak to peak.

An A/D converter with 12 bits resolution samples the input signal at 250 Msample/sec. The sampled data is stored in an onboard memory buffer of 128 Msamples. The size of this buffer memory determines the maximum length of an acquisition. The board will be ready to accept a trigger about 2 microseconds after the end of the previous acquisition, which allows for repetition rates well beyond 100 kHz for short acquisitions.

The sampling clock is generated on the board or can be accepted from an external source in the form of a frequency reference of 5.0 or 10.0 MHz or as a direct sampling clock. Decimating the sampled data while reading it from the buffer memory creates lower sampling rates. Reading data from the buffer memory occurs simultaneously with acquisition and does not affect repetition rate.

The sampled data is transferred over the PCI bus using DMA, thus requiring no CPU intervention to achieve high transfer rates. During this data transfer, a set of peak detectors can be used to monitor the sample stream and extract peak position and threshold crossing data over selected regions (gates) of the sampled data.

A large selection of flexible triggering modes allows the user to tailor the behavior of the board to many applications. In addition to the standard software-generated trigger, the board can be triggered by a threshold crossing of the analog input signal or a signal fed to the BNC Trigger connector, a digital TTL signal on the internal trigger connector or a position-derived trigger from an encoder or motor of a scanning system.

The BNC Trigger connector can also drive a trigger signal as an output; for instance, to fire an ultrasonic pulser/receiver. This driver supports special modes that can be used to trigger multiple boards simultaneously from any of the connected boards, simply by tying the BNC Trigger connectors together.

A simple oscilloscope program is included with the board. It allows evaluation of the various configurations and triggering modes of this board. Drivers and a DLL implementing OKOS Solutions's API provide easy access to the functionality of the board from a user application.

Specifications

Analog Section

- Single analog channel, two inputs switched by software-controlled multiplexer
- AC/DC coupling, software selectable
- 50 Ohm / 50 kOhm input impedance - software selectable
- Input ranges: 50 mV_{p-p} - 5 V_{p-p}
- Bandwidth: DC to 100 MHz -3dB
- Fine offset control
- Time profile for gain control, 20 ns resolution, 10 bit gain control DAC

A/D Converter

- 250 Msamples/sec sampling rate, 12 bits resolution, single channel

Sampling Rates

- Sampling rates: 250 MHz, 125, 83.3, 62.5, 50, 41.6 to 0.976 MHz

Connectors

- 2-BNC connector for analog signal input
- BNC connector for clock/reference input/output
- BNC connector for trigger input/output
- 16 bit digital I/O and encoder inputs
- Internal trigger I/O connector (3 pin header)

Trigger Sources

- Software trigger
- Encoder trigger
- Internal trigger connector, TTL
- External trigger input, programmable threshold (BNC)
- Signal threshold trigger, programmable threshold

Acquisition Control

- Pre-trigger and Post-trigger delay acquisition
- Auto re-arming

Memory

- 128 MSamples on-board acquisition memory
- Fast offload while acquiring
- Optimized for maximum repetition rate in both pre- and post-trigger modes

DSP Functions

- Peak Detectors
- Multiple acquisitions per trigger

Bus Interface

- PCI interface, 32 bits, 33 MHz
- PCI burst transfer rates up to 133 MBytes/sec
- DMA transfers with scatter/gather support
- Interrupt on completion of DMA transfers

General

- Full height, half length PCI board (176mm)

Installation

Initial Inspection

A complete A/D package consists of the following:

1. A/D Product: AL12250
2. AL.NET Drivers with Al2250 Scope Software
3. User Guide
4. Software Development Kit (SDK)

Before installing the AL12250 inspect the board and make sure the board is not damaged. If any of the pins or connectors is bent, or if the board appears to be cracked, please contact OKOS Solutions as the board may have been damaged in transit. The board and software have been carefully inspected and tested prior to shipment. Please retain all packing slips and shipment information in case a claim needs to be submitted to the carrier.

Unpacking

The AL12250 is shipped in an anti-static bag. The board has sensitive electronic components that can be damaged due to static electricity discharge. Prior to touching the board, ground yourself by touching the back panel of the computer that is plugged into an electrical outlet. When handling the board, please always touch the board at the PCI bracket, never directly touch the board surface.

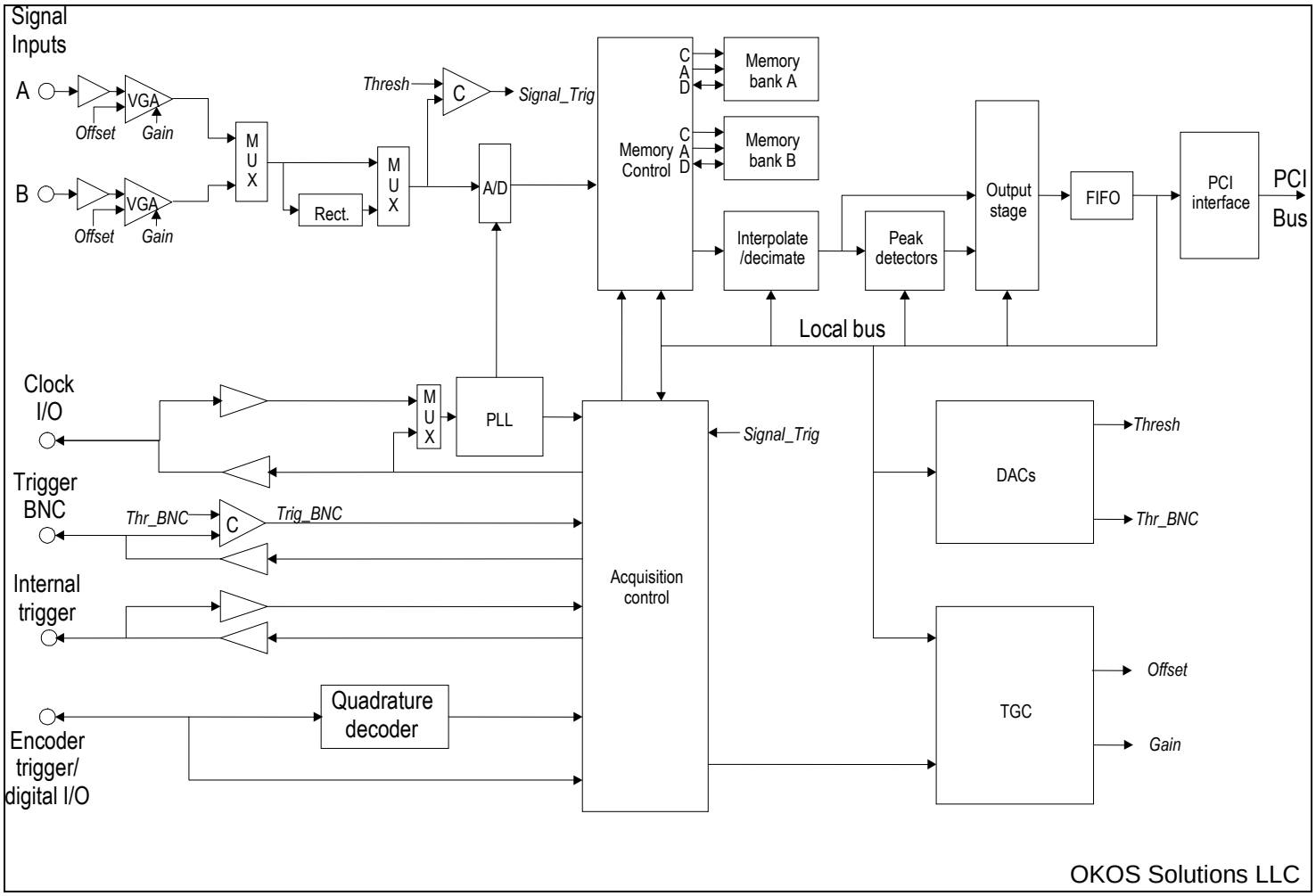
After installing the AL.NET drivers, peel the yellow 'Static Warning' sticker off the antistatic bag and remove the board from its bag by holding the metal bracket at the end of the board. Install the board carefully into a free PCI slot in the computer and properly secure the board (usually by screwing down the bracket or securing it with a clip). Do not install the board in the computer before the AL.NET drivers have been installed.

> ***IMPORTANT NOTE:*** Make sure the board is firmly inserted and that the bracket is screwed down before operation. Otherwise, the board may not be seated well and will be damaged or not function properly when the system is turned on.

Software Updates

Please contact OKOS Solutions at info@okos.com for information on software updates.

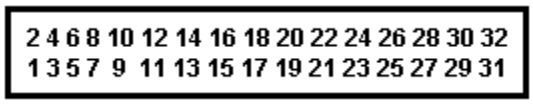
AL12250 Block Diagram



AL12250 Block Diagram

Connector Assignments

ENCTRIG connector (header 2x17) - J5



Pin #	Direction	Function
1	-	GND
2	I	Digital I/O port, bit 0; Encoder 0 Step/CW/Quadrature A-
3	-	GND
4	I	Digital I/O port, bit 1; Encoder 0 Direction/CCW/Quadrature B-
5	-	GND
6	I	Digital I/O port, bit 2; Encoder 0 Quadrature A+
7	-	GND
8	I	Digital I/O port, bit 3; Encoder 0 Quadrature B+
9	-	GND
10	I	Digital I/O port, bit 4; Encoder 1 Step/CW/Quadrature A-
11	-	GND
12	I	Digital I/O port, bit 5; Encoder 1 Direction/CCW/Quadrature B-
13	-	GND
14	I	Digital I/O port, bit 6; Encoder 1 Quadrature A+
15	-	GND
16	I	Digital I/O port, bit 7; Encoder 1 Quadrature B+
17	-	GND
18	I/O	Digital I/O port, bit 8; Encoder 2 Step/CW
19	-	GND
20	I/O	Digital I/O port, bit 9; Encoder 2 Direction/CCW
21	-	GND
22	I/O	Digital I/O port, bit 10; Encoder 2 Quadrature A
23	-	GND
24	I/O	Digital I/O port, bit 11; Encoder 2 Quadrature B
25	-	GND
26	I/O	Digital I/O port, bit 12; Encoder 3 Step/CW
27	-	GND
28	I/O	Digital I/O port, bit 13; Encoder 3 Direction/CCW
29	-	GND
30	I/O	Digital I/O port, bit 14; Encoder 3 Quadrature A
31	-	GND
32	I/O	Digital I/O port, bit 15; Encoder 3 Quadrature B
33	-	+5V, switched and overload protected
34	-	+5V, switched and overload protected

Internal Trigger Connector – J6

Pin #	Direction	Function
1	-	GND
2	I/O	Internal Trigger I/O
3	-	GND

The internal trigger connector is a single-row, three pin header at the upper edge of the board (J6). Pins 1 and 3 are Ground, and pin 2 can be used as a trigger input with programmable polarity or as a trigger output under program control. In either case the signal is TTL compatible. An active trigger edge on this input will be accepted with a timing uncertainty of +- 10 ns.

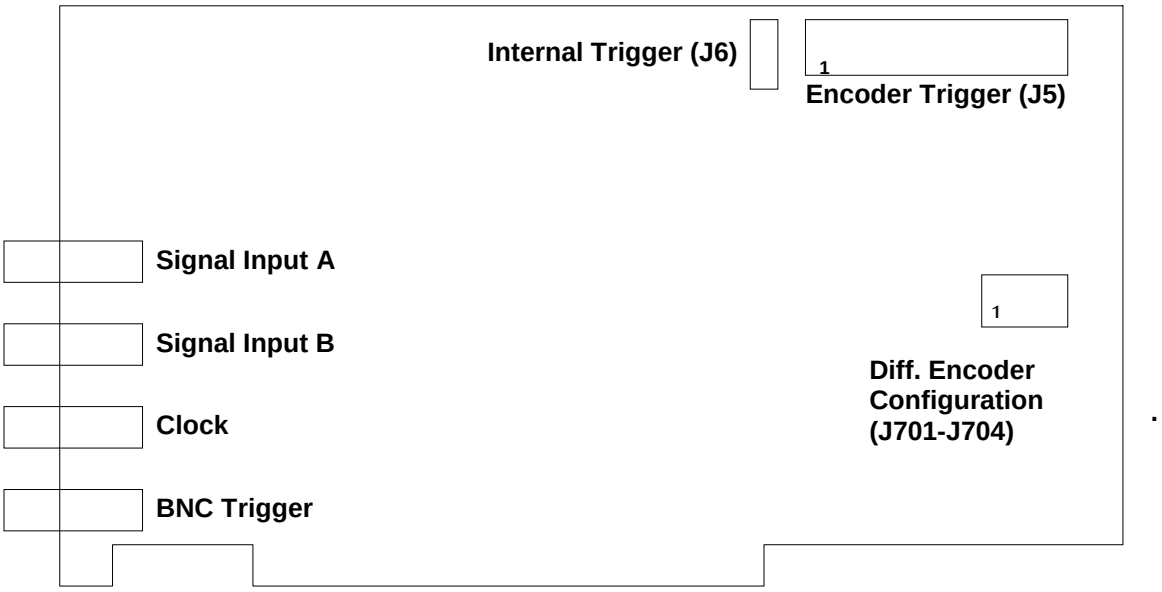
Differential Encoder Configuration - J701-J704

Jumper#	Function
701	Encoder 1 Single/Diff Select (off = single, on = diff)
702	Encoder 1 Diff Not Invert (off = inverted, only works in diff mode)
703	Encoder 2 Single/Diff Select
704	Encoder 2 Diff Not Invert (off = inverted)

Jumper block on the front of the board enables and configures differential encoder input. All switches are off by default. When J701 or J703 are present, the corresponding encoder Step/Direction or CW/CCW inputs are used for Quadrature A-/B- instead.

Location of Connectors

The AL12250 is a plug and play device. The PCI Bios assigns the system resources automatically at system startup. All functions are software configurable. No jumpers or switches are used on this card. The input analog signal to be digitized is fed through ***Analog Input A*** BNC connector. The ***Trigger*** BNC connector is used for receiving an external trigger or generating a trigger to be used by an external device.



AL12250 Connector locations

Contact Information

Contact Information

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