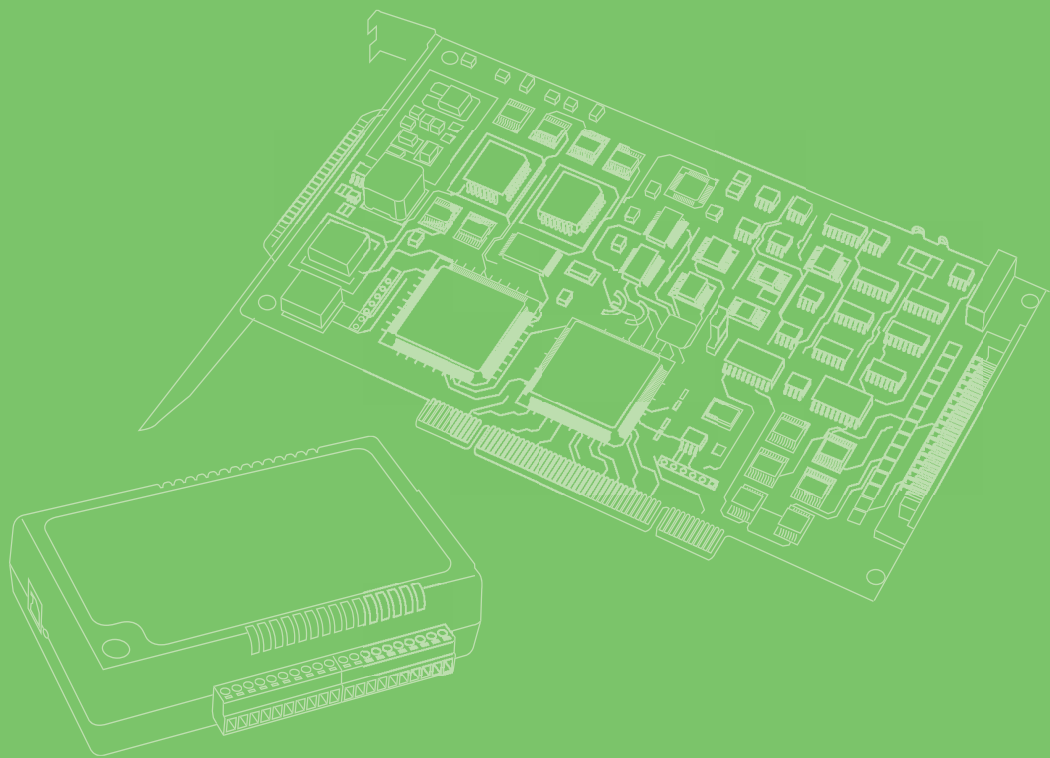


User Manual



AIIS-1750

32-Channel Isolated Digital I/O
Card with Digital Filter

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

Advantech warrants the original purchaser that all of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers are billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product is defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any on screen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any relevant information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from damaged due to ESD (electrostatic discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A comprehensive description of the problem
 - The exact wording of any error messages

Warnings, Cautions, and Notes

Warning! Warnings indicate conditions that if not observed can cause personal injury!



Caution! Cautions are included to help users avoid damaging the hardware or losing data. For example,



“Batteries are at risk of exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer’s instructions.”

Document Feedback

To assist us in making improvements to this manual, we welcome all comments and constructive criticism. Please send all feedback in writing to support@advantech.com

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect this equipment from all AC outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect this equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the power source voltage is correct before connecting the equipment to the power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations occurs, have the equipment checked by qualified service personnel:
 15. The power cord or plug is damaged.
 16. Liquid has penetrated into the equipment.
 17. The equipment has been exposed to moisture.
 18. The equipment is malfunctioning, or does not operate according to the user manual.

19. The equipment has been dropped and damaged.
20. The equipment shows obvious signs of breakage.
21. Do not leave the equipment in an environment where the storage temperature fluctuates below -20 °C (-4 °F) or above 60 °C (140 °F) as this may cause damage. The equipment should be stored in a controlled environment.
22. Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
23. In accordance with the IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).

DISCLAIMER: These instructions is provided according to the IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precautions - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before manual handling. Do not touch any components on the system board, CPU, or adapter cards while the PC is powered on.
- Disconnect power before making any configuration changes to avoid electrostatic discharge. The sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

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Chapter 1

Overview

1.1 Introduction

The AIIS-1750 is a 32-channel isolated digital input/output card that supports the PCI Express bus.

The AIIS-1750's isolated digital input channels are ideal for collecting digital inputs in noisy environments or under floating potentials.

The following sections of this chapter will provide further information about the AIIS-1750 card's features, installation process, software, and accessories.

1.2 Features

AIIS-1750

- 32-channel isolated DI/O (16-ch digital input w/digital filter, 16-ch digital output)
- High output driving capacity with 500 mA per channel (maximum)
- High-voltage isolation on isolated I/O channels (2,500 V_{DC})
- Interrupt handling capability for all ID/I channels
- D-type connector for isolated input and output channels
- High ESD protection (2,000 V_{DC})
- High over-voltage protection (70 V_{DC})
- Supports dry contact or 5 ~ 50 V_{DC} isolated input
- Board ID to identify a specific card when multiple devices are installed

Advantech's AIIS-1750 card offers the following main features:

Robust Protection

The AIIS-1750 digital input channels feature robust isolation protection for industrial, laboratory, and machinery automation applications. The card can withstand voltages up to 2,500 V_{DC}, protecting the host system from incidental damage. If connected to an external input source with surge protection, the AIIS-1750 card can offer up to a maximum of 2,000 V_{DC} ESD protection. Even with an input voltage of up to 70 V_{DC}, the AIIS-1750 card can still operate correctly, albeit only for a short period of time.

Wide Input Range

The AIIS-1750 card features a wide input voltage range of 5 ~ 50 V_{DC}, and is suitable for most industrial applications that require a 12 V_{DC} or 24 V_{DC} input voltage.

Plug-and-Play Functionality

The AIIS-1750 card has plug-and-play functionality, which fully complies with the PCI Express Specification, Rev V1.0. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations, such as base I/O address and interrupt, are automatically configured by the plug-and-play function.

Board ID

The AIIS-1750 card features a built-in DIP switch that helps define each card's ID when multiple AIIS-1750 cards have been installed on the same PC chassis. The board ID setting function is very useful when users build a system with multiple AIIS-1750 cards. With correct board ID settings, users can easily identify and access each card during hardware configuration and software programming.

Reset Protection

When the system has undergone a hot reset (i.e., without turning off the system power), the AIIS-1750 card can either retain outputs values of each channel, or return to its default configuration as *open*, depending on its on-board jumper setting. This function protects the system from incorrect operations during unexpected system resets.

Note! For detailed specifications of the AIIS-1750 card, refer to Appendix A, Specifications.



1.3 Applications

- Industrial ON/OFF control
- Switch status sensing
- BCD interfacing
- Digital I/O control
- Industrial and lab automation
- Laboratory and education

1.4 Installation Guide

Before installing your AIIS-1750 card, please ensure that you have the following necessary components:

- AIIS-1750 card
- AIIS-1750 user manual
- Advantech driver DAQNav (included on the CD-ROM)
- Wiring cable PCL-10137 (optional)
- Wiring board PCLD-880, ADAM-3937 (optional)
- Personal computer or workstation with a PCI Express bus slot

The following additional optional components are also available for enhanced operation:

- Application software: Advantech Navigator (utility) offered by DAQNav software.

After collecting all necessary components and any accessories for enhanced operation, you can begin the card installation procedures.

1.5 Software Overview

Advantech offers device drivers, SDKs, third-party driver support, and application software for fully exploiting the functions of your AIIS-1750 card. All these software packages are available on the accompanying CD-ROM and the Advantech website. Browse the Advantech website at <http://www.advantech.com/> to obtain the latest updates.

1.6 Accessories

Advantech offers a complete set of accessories to support the AIIS-1750 card. These accessories are as follows:

Wiring Cable

The PCL-10137 shielded cable is specially designed for AIIS-1750 cards to provide high resistance to noise. To achieve superior signal quality, the signal wires are twisted into twisted-pair cables, reducing cross-talk and noise from other signal sources. Furthermore, the digital lines are separately sheathed and shielded to prevent EMI/EMC problems.

Wiring Boards

The ADAM-3937 is a 37-pin D-type wiring terminal module for DIN-rail mounting. This terminal module can be connected to the Advantech PC-Lab cards and allow easy yet reliable access to individual pin connections for the AIIS-1750 card.

The PCLD-880 is a universal screw-terminal board suitable for use with any PC-Lab card that has 37-pin D-type connectors.

Chapter 2

Hardware Installation

2.1 Installation

This chapter provides a package item checklist, unpacking instructions, and step-by-step procedures for both driver and card installation.

2.2 Unpacking

After receiving your AIIIS-1750 package, please inspect the contents. The package should contain the following items:

- 1 x AIIIS-1750 card
- 1 x AIIIS-1750 startup manual

The AIIIS-1750 card features electronic components that are vulnerable to electrostatic discharge (ESD). ESD can easily damage the integrated circuits and certain components if preventive measures are not carefully heeded.

Before removing the card from the antistatic plastic bag, take the following precautions to prevent ESD damage:

- Touch the metal part of your computer chassis with your hand to discharge any static electricity accumulated on your body. Alternatively, use a grounding strap.
- Touch the antistatic bag to a metal part of your computer chassis before opening the bag.
- Hold the card by the metal bracket only when removing the card from the bag.

After taking the card out, first inspect the card for any signs of external damage (loose or damaged components, etc.). If the card is visibly damaged, please notify the Advantech service department or your local sales representative immediately.

Do not install a damaged card into your system.

Also pay extra caution to the following aspects to ensure correct installation:

- Avoid physical contact with materials that could hold static electricity such as plastic, vinyl, and styrofoam.
- When handling the card, grasp the card only by its edges. Do not touch the exposed metal pins of the connector or the electronic components.

Note! *Retain the antistatic bag for future use. You may need the original bag to store the card if you have to remove the card from PC or transport the card elsewhere.*



2.3 Driver Installation

We recommend that you install the driver before installing the AIIIS-1750 card into your system because this will guarantee a smooth installation process.

The Advantech device driver for the AIIIS-1750 card is included on the accompanying CD-ROM that is shipped with your DA&C card package.

2.4 Hardware Installation

Note! *Ensure that you have installed the driver before installing the card.*



After the device driver is installed, you can now install the AIIIS-1750 card into the MIOe connector on your computer. Follow the steps below to install the card on your system.

1. Turn off the computer and unplug the power cord and cables. The computer should be powered off before any components on the computer are installed or removed.
2. Remove the cover of the computer.
3. Remove the slot cover on the back panel of the computer.
4. Touch the metal part on the surface of the computer to neutralize any static electricity that may be on your body.
5. Insert the AIIIS-1750 card into the MIOe connector. Hold the card only by its edges and carefully align it with the slot. Insert the card firmly in place. Avoid using excessive force when inserting the card, otherwise the card may be damaged.
6. Tighten the screws on the corners of the PCI Express card.
7. Connect appropriate accessories to the PCI Express card.
8. Replace the cover of the computer chassis. Re-connect the cables removed in Step 1.
9. Plug in the power cord and turn on the computer.

Note! *After the card is correctly installed in the system, you can configure the device using the Advantech Navigator program installed on your system during driver setup. Complete device installation procedures should include device setup, configuration, and testing. The following sections will guide you through the setup, configuration, and testing of your device.*



After the AIIS-1750 card is installed, you can verify whether it is correctly installed on the system through the Device Manager:

1. Access the Device Manager via the Control Panel/System/Device Manager.
2. The AIIS-1750 device name should be listed on the Device Manager tab.

Note!



If your card is correctly installed, you should see the device name of your card listed on the Device Manager tab. If you do see the device name listed but it is marked with an exclamation mark “!”, this means the card has not been correctly installed. In such cases, remove the card device from the Device Manager by selecting the device name and clicking the remove button. Then go through the driver installation process again.

After the card is correctly installed on your system, you can configure the device using the Advantech Navigator after installing DAQNav on your computer.

Chapter 3

Signal Connections

3.1 Overview

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices. This chapter provides useful information about how to connect input and output signals to the AIIIS-1750 card via the I/O connector.

3.2 Jumper Settings

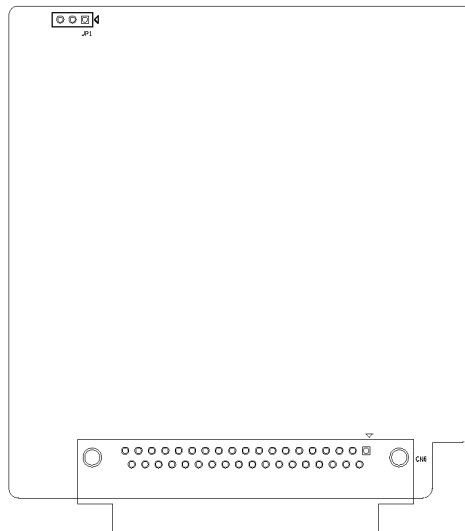


Figure 3.1 Card Connector and Jumper

Table 3.1: Summary of Jumper Settings

Names of Jumpers	Function Description
JP2 (1, 2 short)	Output channels will retain last status after system resets
JP2 (2,3 short)	Output channels will set their values to <i>Low</i> after system resets (default)

3.3 Signal Connections

Description of Pin Use

- IDIn (n = 0 ~ 15):
Isolated digital input
- IDOn (n = 0 ~ 15):
Isolated digital output
- COM0 & 1:
Free wheeling common diode for IDO
Every 8 output channels share 1 COM pin
- EGND:
External ground for IDO & IDI

IDI 0	1		
IDI 2	2	20	IDI 1
IDI 4	3	21	IDI 3
IDI 6	4	22	IDI 5
IDI 8	5	23	IDI 7
IDI 10	6	24	IDI 9
IDI 12	7	25	IDI 11
IDI 14	8	26	IDI 13
EGND	9	27	IDI 15
COM0	10	28	EGND
COM1	11	29	EGND
IDO 0	12	30	IDO 1
IDO 2	13	31	IDO 3
IDO 4	14	32	IDO 5
IDO 6	15	33	IDO 7
IDO 8	16	34	IDO 9
IDO 10	17	35	IDO 11
IDO 12	18	36	IDO 13
IDO 14	19	37	IDO 15
COM1			

3.4 Isolated Digital Input

All of the 16 isolated digital input channels accept dry contacts or 5 ~ 50 V_{DC} voltage inputs. All 16 input channels also share 3 ground pins. Figure 3.2 shows how to connect an external input source to one of the AHS-1750 card's isolated input channels.

Warning! *Be careful when wiring digital input cables.*



Never apply a negative voltage to an isolated input pin, as this may damage the PCI-1750.

Note for wet contacts: Malfunctions may occur in cases where the internal resistance of a voltage source under wet contacts is significant (>5 KΩ). We recommend connecting a parallel 5KΩ, 0.5Ω resistor to avoid a voltage rise inside the voltage source.

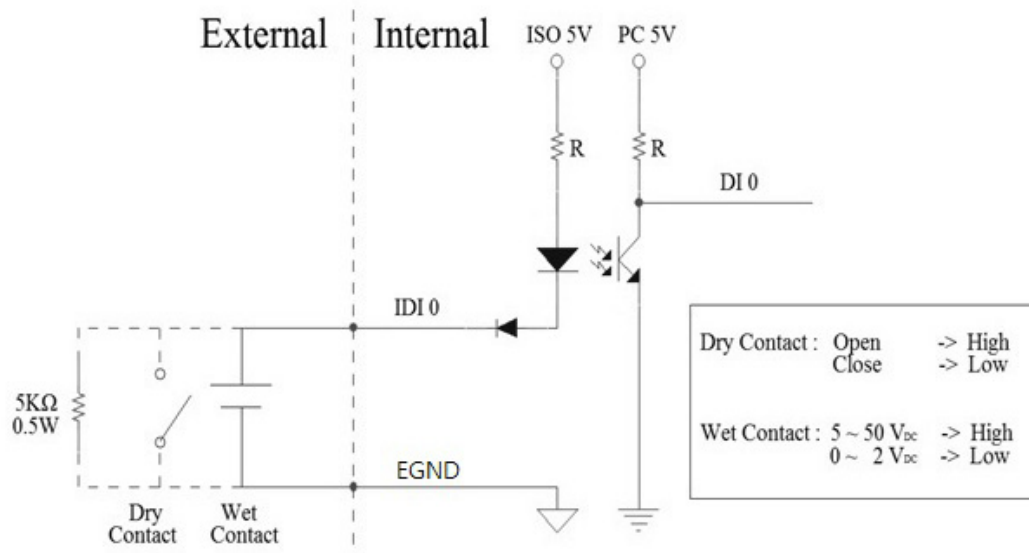


Figure 3.2 Isolated D/I Connection

3.5 Isolated Digital Output

Each of the isolated output channels are equipped with a MOSFET, polySwitch (for current protection), and integral suppression diode for use with inductive loads.

Note! *If the external voltage source (5 ~ 40 V) is connected to each isolated output channel (ID/O 0 ~ 15) and its isolated digital output turns on (500 mA max./ch), the card's current will flow from the external voltage source. The current through EGND should not exceed 3.2 A.*



Figure 3.3 shows how to connect an external output load to the AIIS-1750 card's isolated outputs.

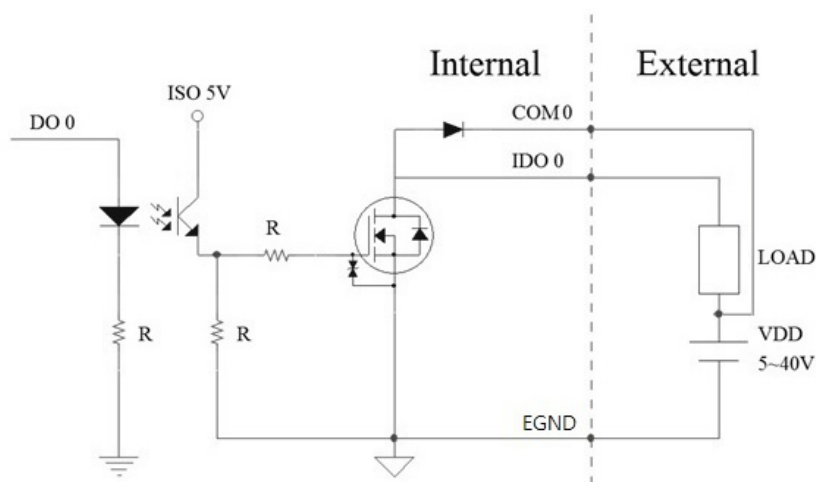


Figure 3.3 Isolated D/O Connection

Appendix **A**

Specifications

A.1 Specifications

A.1.1 Isolated Digital Input

Input Channels	16
Input Voltage	Logic 0: 2 V max. (0 V _{DC} min.) Logic 1: 5 V min. (50 V _{DC} max.)
Interrupt Capable Channels	16
Digital Filter Channels	16
Isolation Protection	2,500 V _{DC}
Overvoltage Protection	70 V _{DC}
ESD Protection	2,000 V _{DC}
Opto-Isolator Response	100 μs

A.1.2 Isolated Digital Output

Output Channels	16
Output Type	Sink (NPN)
Isolation Protection	2,500 V _{DC}
Output Voltage	5 ~ 40 V _{DC} *
Sink Current	500 mA max./channel
Opto-Isolator Response	100 μs

Note! * When an inductance load is connected, the maximum output voltage will be 24 V_{DC}.



A.1.3 General

I/O Connector Type	37-pin D-Sub female	
Dimensions	96 x 102 mm (3.8 x 4.0 in)	
Power Consumption	Typical	+3.3 V @ 280 mA +12 V @ 330 mA
	Max.	+3.3 V @ 420 mA +12 V @ 400 mA
Temperature	Operating	0 ~ 50 °C (32 ~ 122 °F) (refer to IEC 68-2-1,2)
	Storage	-20 ~ 70 °C (-4 ~ 158 °F)
Relative Humidity	5 ~ 95% RH non-condensing (refer to IEC 68-2-3)	
Certification	CE certified	

A.1.4 Digital Filter Time

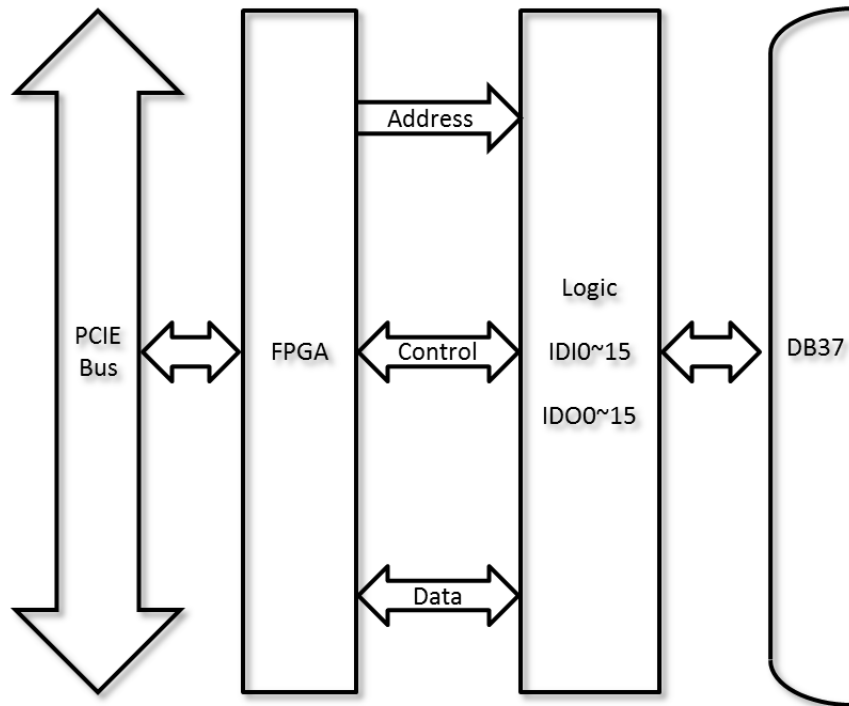
Digital Filter Time [sec.] = $2^n / (8 \times 10^6)$, n = setting data (0 ~ 20)

Setting Data (n)	Digital Filter Time	Setting Data (n)	Digital Filter Time	Setting Data (n)	Digital Filter Time
0 (00h)	The filter function is not used.	7 (07h)	16 μ sec	14 (0Eh)	2.048 msec
1 (01h)	0.25 μ sec	8 (08h)	32 μ sec	15 (0Fh)	4.096 msec
2 (02h)	0.5 μ sec	9 (09h)	64 μ sec	16 (10h)	8.192 msec
3 (03h)	1 μ sec	10 (0Ah)	128 μ sec	17 (11h)	16.384 msec
4 (04h)	2 μ sec	11 (0Bh)	256 μ sec	18 (12h)	32.768 msec
5 (05h)	4 μ sec	12 (0Ch)	512 μ sec	19 (13h)	65.536 msec
6 (06h)	8 μ sec	13 (0Dh)	1.024 msec	20 (14h)	131.072 msec

Appendix **B**

Block Diagram

B.1 AIIS-1750



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Please verify specifications before quoting. This guide is intended for reference purposes only.

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