



PCIe-862x Series Board User Manual

High-speed Multifunction Boards

Version 1.0, May 2015

SUPPORT

This manual relates to the following boards: PCIe-8620 and PCIe-8622.

WARRANTY

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

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service@icpdas.com or service.icpdas@gmail.com

We will respond to you within 2 working days.



TABLE OF CONTENTS

PACKING LIST 4

1. INTRODUCTION 5

1.1 OVERVIEW 5

1.2 FEATURES..... 6

1.3 SPECIFICATIONS 7

1.4 APPLICATIONS 9

2 HARDWARE CONFIGURATION10

2.1 BOARD LAYOUT 10

2.2 CARD ID SWITCH (SW1) 12

2.3 SYSTEM BLOCK DIAGRAM 13

2.4 ANALOG INPUT 14

 2.4.1 *Analog Input Block* 14

 2.4.2 *Analog Input Range*..... 15

 2.4.3 *Connecting Analog Input Signals* 16

 2.4.4 *Signal Shielding* 16

 2.4.5 *Analog Input Data Acquisition Methods* 17

2.5 ANALOG OUTPUT 18

 2.5.1 *Analog Output Block* 18

 2.5.2 *Connection Analog Output Signals*..... 19

2.6 DIGITAL INPUT/OUTPUT..... 20

2.7 COUNTERS..... 21

2.8 PIN ASSIGNMENTS 22

 2.8.1 *CON1 Connector of the PCIe-8620/8622* 22

 2.8.2 *I/O Connector Signal Descriptions*..... 23

 2.8.3 *Power Source*..... 23

3 HARDWARE INSTALLATION24

4 SOFTWARE INSTALLATION28

4.1 OBTAINING/INSTALLING THE DRIVER INSTALLER PACKAGE 28

4.2 PLUG AND PLAY DRIVER INSTALLATION 30

4.3 VERIFYING THE INSTALLATION 32

 4.3.1 *Accessing Windows Device Manager*..... 32

 4.3.2 *Check the Installation*..... 35

5 TESTING THE PCIE-8620/8622 SERIES BOARD36

5.1 PCIE-8620 SELF-TEST..... 36

5.2 PCIE-8622 SELF-TEST..... 41

6 I/O REGISTER ADDRESSES46

6.1 HARDWARE ID 46

6.2 I/O ADDRESS MAPPING..... 47

6.3 BAR 0 (MMIO) 48

6.3.1 *Interrupt and Initialize Control/Status Registers* 48

6.3.2 *Digital I/O Registers* 50

6.3.3 *Analog Input Registers* 51

6.3.4 *Analog Output Registers* 53

6.3.5 *Counter Registers* 54

6.4 BAR 1 (MMIO) 55

6.4.1 *Xilinx Spartan-6 Control/Status Registers*..... 55

7 CALIBRATION56

7.1 INTRODUCTION..... 56

7.2 STEP-BY-STEP CALIBRATION PROCESS..... 58

7.2.1 *PCie-8622 Calibration Step*..... 58

7.2.2 *PCie-8620 Calibration Step*..... 80

8 WINDOWS API FUNCTION90

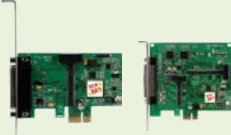




APPENDIX: DAUGHTER BOARDS91

DN-68A..... 91

DN-25 92

Packing List

The shipping package should contain the following items:

	One High-speed multifunction board:	
	PCIe-8620	PCIe-8622
	One printed Quick Start Guide	
	One Software Utility CD	
	One CA-PC25M D-Sub Connector	-
	One Low-profile Bracket	-



Note:

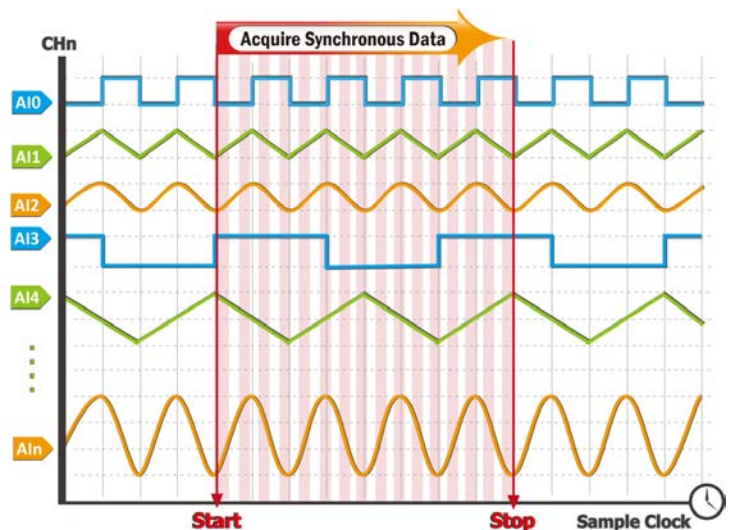
If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you need to ship or store the product in the future.

1. Introduction

The PCIe-862x User Manual contains information about using the ICP DAS PCIe-862x Series data acquisition (DAQ) boards with UniDAQ. PCIe-862x Series boards feature up to 16 Analog Input (AI) channels, up to two Analog Output (AO) channels, up to 24 lines of digital input/output (DIO), and two counters. This chapter provides basic information you need to get started using your PCIe-862x Series boards.

1.1 Overview

The PCIe-8620/8622 is a powerful multifunction board based on the PCI Express. With a FIFO of 2048 samples, the maximum sampling rate of PCIe-862x Series is up to 200 kS/s with 8/16 16-bit A/D converters simultaneously sampling on each channel. The PCIe-862x Series has two 16-bit voltage output (D/A) channels, 4/12 digital input channels, 4/12 digital output channels, and two PWM output channels.



PCIe-8620/8622 supports more kinds of trigger modes for A/D conversion: software trigger, internal pacer trigger and external pacer trigger. The software trigger can acquire a sample whenever needed, while the internal pacer saves CPU loading by triggering the sampling at pre-programmed frequency. An external pacer can be used for triggering by external frequency source.

The PCIe-8620/8622 also includes an onboard Card ID switch that can be used to set a unique ID for each board so that they can be instantly recognized if two or more boards are installed in the same computer.

1.2 Features

The following is an overview of the general features provided by the PCIe-862x Series boards. Refer to [Section 1.3](#) for more details.

■ Interface

- PCI Express x1, Full-profile or Low-profile (for PCIe-8620)
- PCI Express x1, Full-profile (for PCIe-8622)
- Card ID switch
- Software Calibration

■ Analog Input

- 16-bit AD converter, with up to 200 kHz sampling rate for each channel
- 8/16-channel Synchronous Sample & Hold A/D
- 8/16 single-ended Analog Inputs
- Multiple A/D trigger methods
- Analog Input range: +/-10 V, +/- 5 V
- Built-in 2048-sample A/D FIFO
- 2500 V_{DC} Isolation(Bus-type)

■ Analog Output

- 2-channel 16-bit voltage output (for PCIe-8622)
- Voltage output range: +/-10 V, +/-5 V, 0 ~ +10 V, 0 ~ +5 V

■ Digital Input/Output

- 4-channel Digital Inputs (for PCIe-8620)
- 4-channel Digital Outputs (for PCIe-8620)
- 12-channel Digital Inputs (for PCIe-8622)
- 12-channel Digital Outputs (for PCIe-8622)
- Digital Output Readback function
- 2500 V_{DC} Isolation

1.3 Specifications

The following is an overview of the specifications for the various models in the PCIe-862x Series.

Model	PCIe-8620	PCIe-8622
Analog Input		
Channels	8 single-ended (Simultaneously)	16 single-ended (Simultaneously)
Isolation Voltage	2500 V _{DC} (Bus-type)	
A/D Converter	16-bit, 5 μ s conversion time	
Sampling Rate	200 kS/s	
FIFO Size	2048 samples	
Over voltage Protection	Continuous +/-35 Vp-p	
Input Impedance	10,000 M Ω /4pF	
Trigger Modes	Software, Pacer, External	
Data Transfer	Polling, Interrupt, DMA	
Accuracy	0.05 % of FSR \pm 1 LSB @ 25 $^{\circ}$ C, \pm 10 V	
Input Range	Gain: 1, 2 Bipolar Range: \pm 10 V, \pm 5 V	
Analog Output		
Channels	-	2
Resolution	-	16-bit
Accuracy	-	\pm 6 LSB
Output Range	-	\pm 5 V, \pm 10 V
Output Driving	-	+/- 5 mA
Slew Rate	-	2.8 V/ μ s
Output Impedance	-	0.1 Ω (Max.)
Operating Mode	-	Static update
Digital Input		
Channels	4	12
Isolation Voltage	2500 V _{DC}	
Compatibility	5 V/TTL	
Input Voltage	Logic 0: 0.8 V (Max.)/Logic 1: 2.0 V (Min.)	
Response Speed	1.0 MHz (Typical)	
Trigger Mode	Software	
Data Transfer	Polling	

Model	PCIe-8620	PCIe-8622
Digital Output		
Channels	4	12
Isolation Voltage	2500 V _{DC}	
Compatibility	5 V/CMOS	
Output Voltage	Logic 0: 0.4 V (max.)/Logic 1: 2.4 V (min.)	
Output Capability	Sink: 6 mA @ 0.33 V/Source: 6 mA @ 4.77 V	
DO Readback	Yes	
Operation Mode	Static update	
Response Speed	1.0 MHz (Typical)	
Timer/Counter		
Channel	-	2
General		
Bus Type	PCI Express x1	
Data Bus	32-bit	
Card ID	Yes (4-bit)	
I/O Connector	Female DB25 x 1	SCSI II 68-pin x 1
Dimensions (L x W x D) Unit: mm	Full-profile: 107 x 120 x 22 Low-profile: 107 x 80 x 22	107 x 95 x 22
Power Consumption	500 mA @ +3.3 V 200 mA @ +12 V	600 mA @ +3.3 V 250 mA @ +12 V
Operating Temperature	0 ~ 60 °C	
Storage Temperature	-20 ~ 70 °C	
Humidity	5 ~ 85% RH, Non-condensing	

1.4 Applications

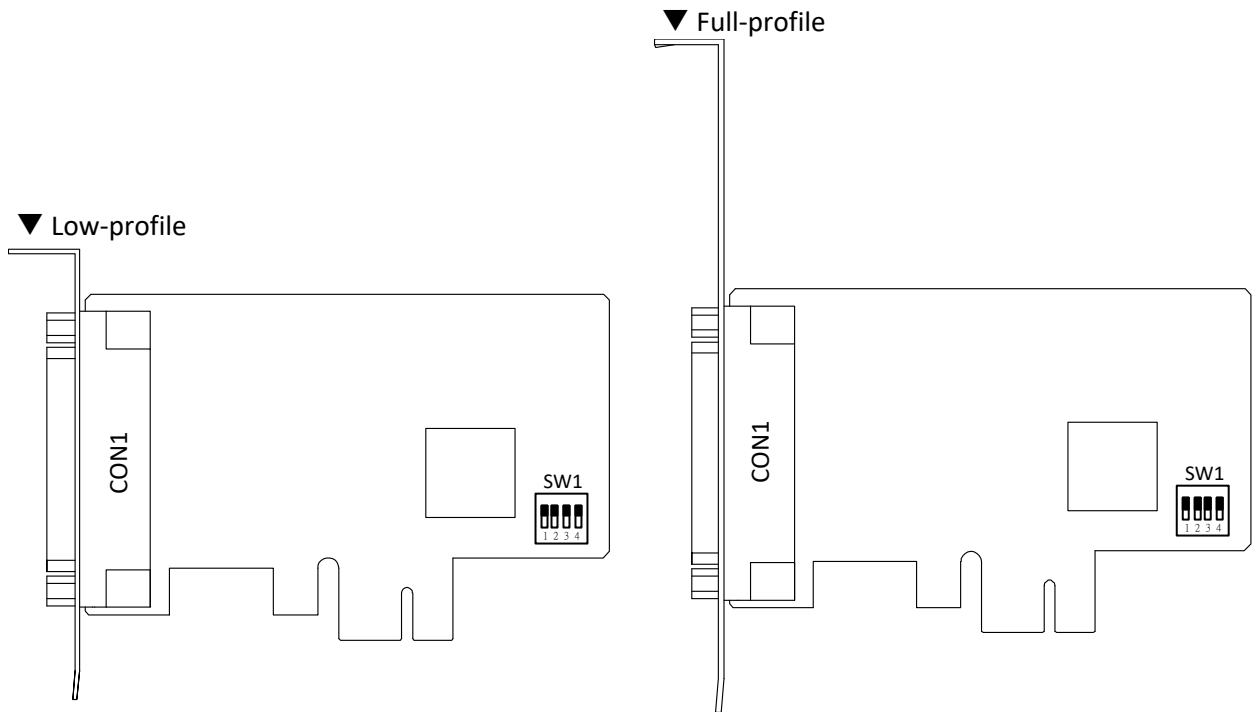
- Signal Analysis
- FFT and Frequency Analysis
- Transient Analysis
- Temperature Monitor
- Vibration Analysis
- Energy Management
- Other Industrial and Laboratory Measurement and Control

2 Hardware Configuration

2.1 Board Layout

The following is an overview of the board layout for each of the PCIe-862x Series cards.

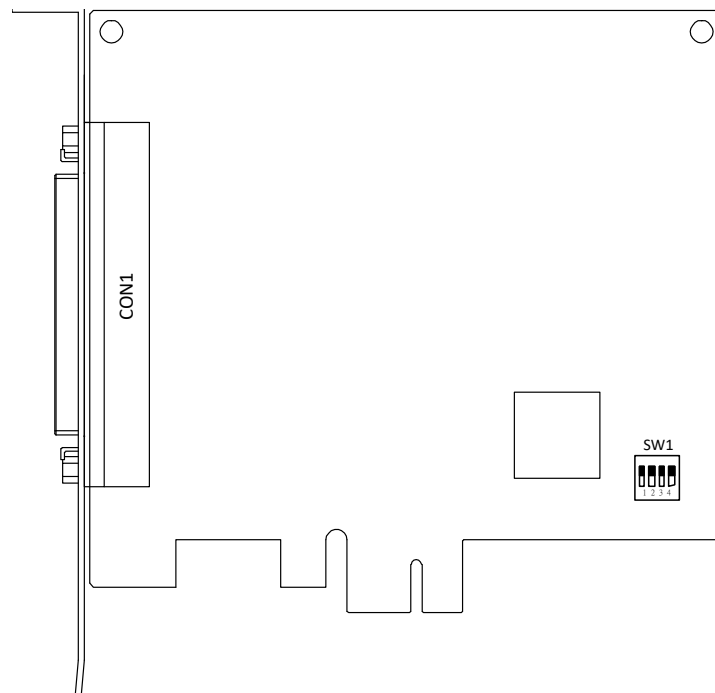
➤ **PCIe-8620**



CON1 The Connector for 8-channel Analog Input and 4-channel isolated DIO. Refer to [Section 2.8 Pin Assignments](#)

SW1 DIP Switch used to configure the Board ID. Refer to [Section 2.2 Card ID Switch \(SW1\)](#)

➤ **PCIe-8622**

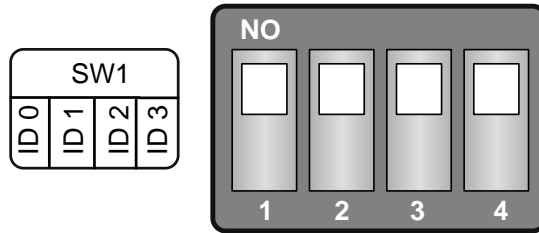


CON1 The Connector for 16-channel Analog Input, 2-channel Analog Output and 12-channel isolated DIO. Refer to [Section 2.8 Pin Assignments](#)

SW1 DIP Switch used to configure the Board ID. Refer to [Section 2.2 Card ID Switch \(SW1\)](#)

2.2 Card ID Switch (SW1)

The PCIe-8620/8622 includes an onboard Card ID switch (SW1) that enables the board to be recognized via software if two or more PCIe-8620/8622 boards are installed in the same computer. The default Card ID is 0x0. For more details regarding the SW1 Card ID settings, refer to the table below.



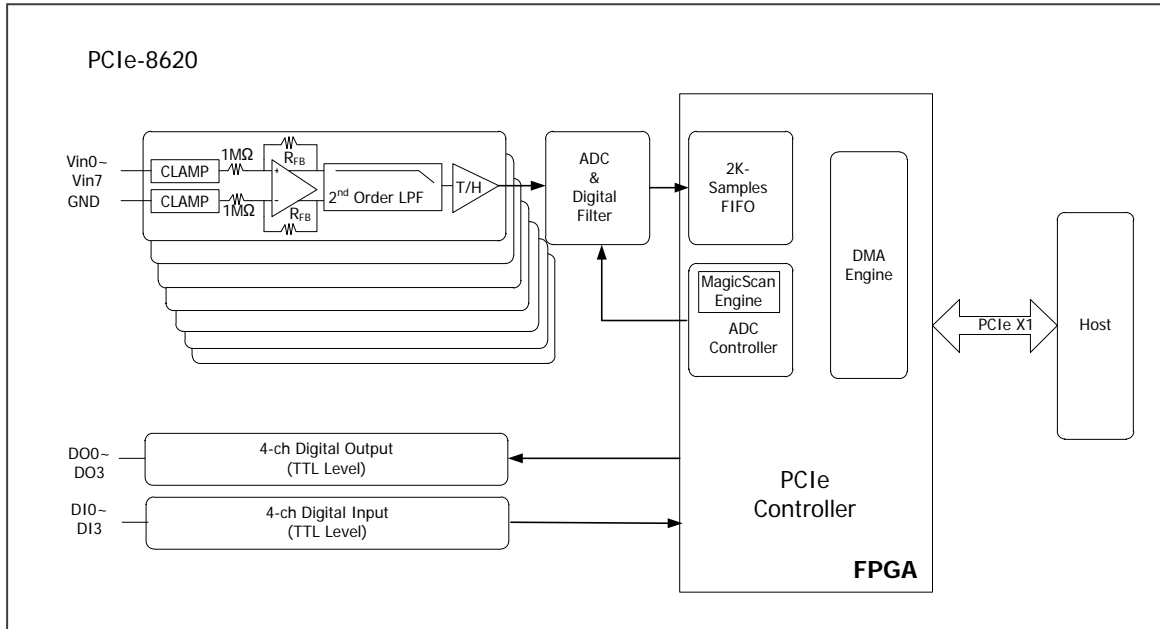
(Default Settings)

Card ID (Hex)	1 ID0	2 ID1	3 ID2	4 ID3
(*) 0x0	ON	ON	ON	ON
0x1	OFF	ON	ON	ON
0x2	ON	OFF	ON	ON
0x3	OFF	OFF	ON	ON
0x4	ON	ON	OFF	ON
0x5	OFF	ON	OFF	ON
0x6	ON	OFF	OFF	ON
0x7	OFF	OFF	OFF	ON
0x8	ON	ON	ON	OFF
0x9	OFF	ON	ON	OFF
0xA	ON	OFF	ON	OFF
0xB	OFF	OFF	ON	OFF
0xC	ON	ON	OFF	OFF
0xD	OFF	ON	OFF	OFF
0xE	ON	OFF	OFF	OFF
0xF	OFF	OFF	OFF	OFF

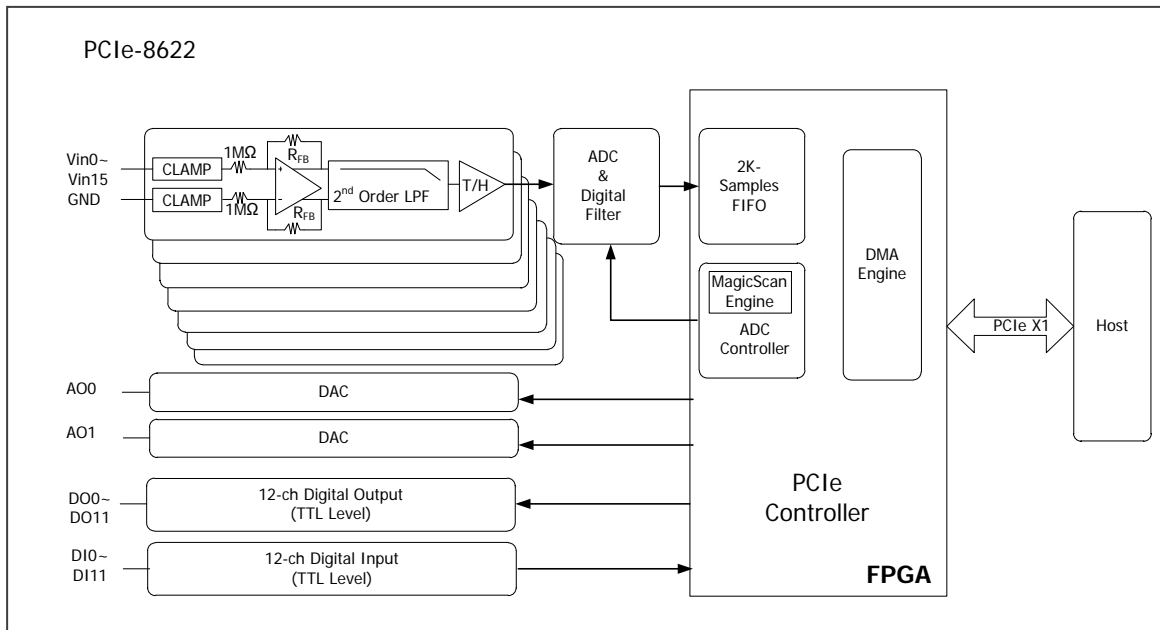
(*) Default Settings; OFF → 1; ON → 0

2.3 System Block Diagram

➤ The following is the block diagram for the PCI-8620:



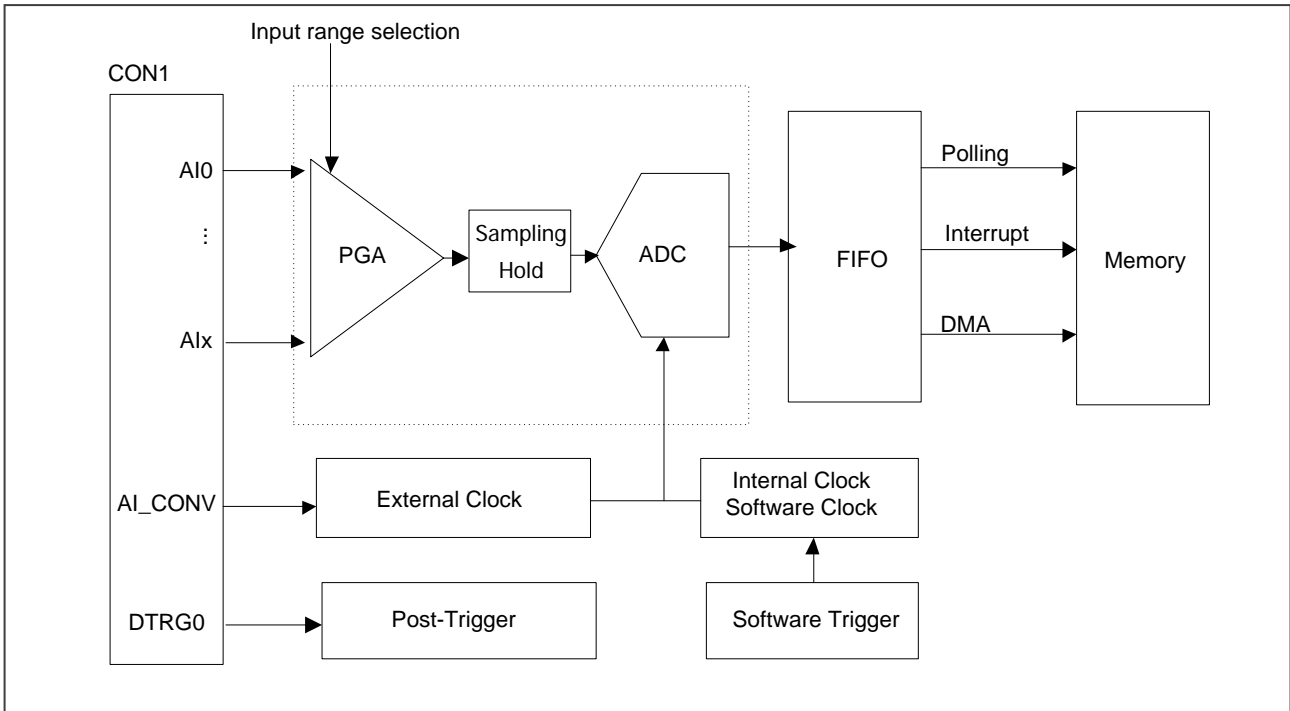
➤ The following is the block diagram for the PCI-8622:



2.4 Analog Input

2.4.1 Analog Input Block

The following is the block diagram for the A/D system:



On PCIe-8620/8622, each channel uses its own instrumentation amplifier and A/D converter to achieve simultaneous data acquisition. The main blocks featured in the PCIe-8620/8622 Analog Input block are as follows:

- **CON1:**
User can connect Analog Input signals to the PCIe-8620/8622 through the CON1.
- **ADC:**
The analog-to-digital converter (ADC) digitizes the AI signal by converting the analog voltage into a digital number.
- **FIFO:**
PCIe-862x Series can perform A/D conversion of a fixed or infinite number of samples. A large first-in-first out (FIFO) buffer holds data during AI acquisitions to ensure that no data is lost. PCIe-862x can handle A/D conversion operations with DMA or programmed I/O.

2.4.2 Analog Input Range

Input Range refers to the set of input voltages that an Analog Input channel can digitize with the specified accuracy. The PGA amplifies or attenuates the AI signal depending on the input range. User can individually program the input range of all channels on PCIe-862x Series board.

Input range affects the resolution of the PCIe-862x Series for an AI channel. Resolution refers to the voltage of one ADC code. 16-bit ADC converts Analog Inputs into one of 65,536 (=2¹⁶) codes – that is, one of 65,536 possible digital values. These values are spread fairly evenly across the input range.

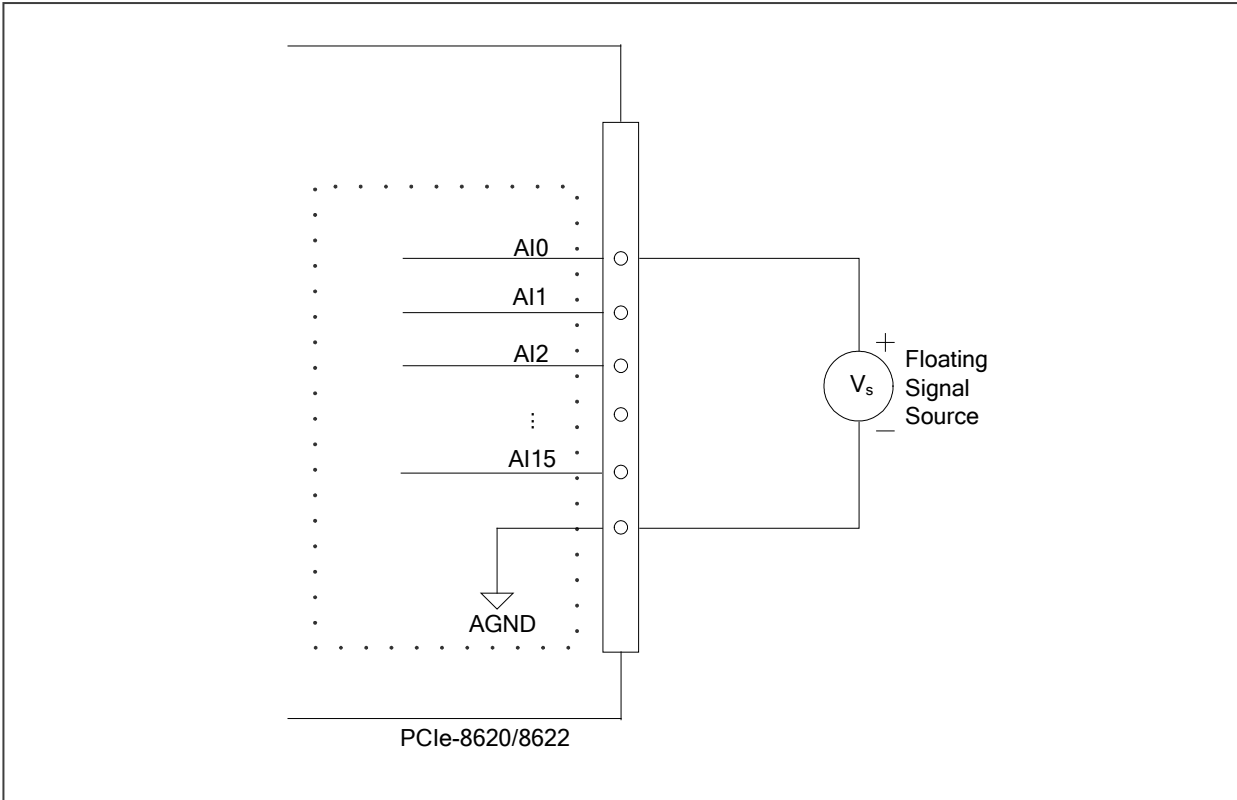
For an input range of -10 V to 10 V,
the voltage of each code of a 16-bit ADC is $10\text{ V} - (-10\text{ V}) / 65536 = 305\text{ }\mu\text{V}$

For an input range of -5 V to 5 V,
the voltage of each code of a 16-bit ADC is $5\text{ V} - (-5\text{ V}) / 65536 = 152\text{ }\mu\text{V}$

Module Name	Input Range	Nominal Resolution
PCIe-8620	-10 V to 10 V	305 μV
PCIe-8622	-5 V to 5 V	152 μV

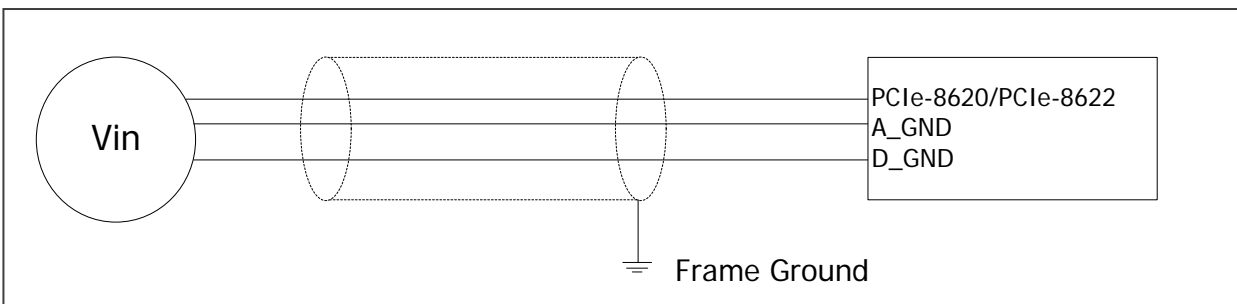
2.4.3 Connecting Analog Input Signals

The PCIe-862x Series board can be used to measure single-ended type Analog Input signals for floating signal source.



2.4.4 Signal Shielding

Use a single-point connection to the frame ground, rather than the AGND or DGND pins.



2.4.5 Analog Input Data Acquisition Methods

The following is an overview of the five trigger modes:

Trigger Mode		Description
Software Trigger		No trigger signal is used and all A/D operations are initiated by software.
Post Trigger		DTRG0 trigger signal is used to initiate the A/D operations.

After the clock signal is generated, A/D data will be recorded and saved to the buffer or the FIFO. Two clock sources are provided, a software command and a pacer clock.

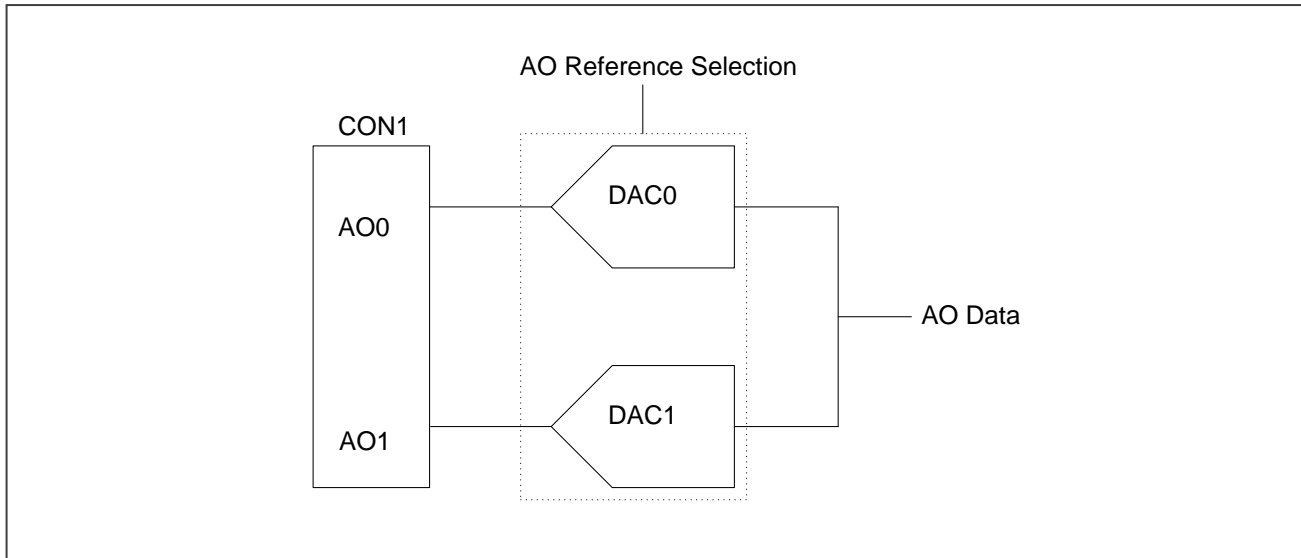
The saved data can be transferred to the memory on the PC using either software polling, Interrupt transfer or DMA transfer.

Different combinations of trigger mode, clock signal and data transfer can be used to create four different types of A/D applications, which are summarized below:

Trigger Mode	Clock Mode	Transfer Mode	FIFO (K Samples)	Trigger Source
Software Trigger	Software Command	Polling	N/A	N/A
Software Trigger Post Trigger	Internal Clock External Clock	Interrupt	2 (sharing)	DTRG0 AI_CONV
Software Trigger Post Trigger	Internal Clock External Clock	DMA	2 (sharing)	DTRG0 AI_CONV

2.5 Analog Output

2.5.1 Analog Output Block



PCIe-8622 has Analog Output functionality. PCIe-8622 that supports Analog Output has two AO channels that are controlled by software command. The main blocks featured in the PCIe-8622 Analog Output block are as follows:

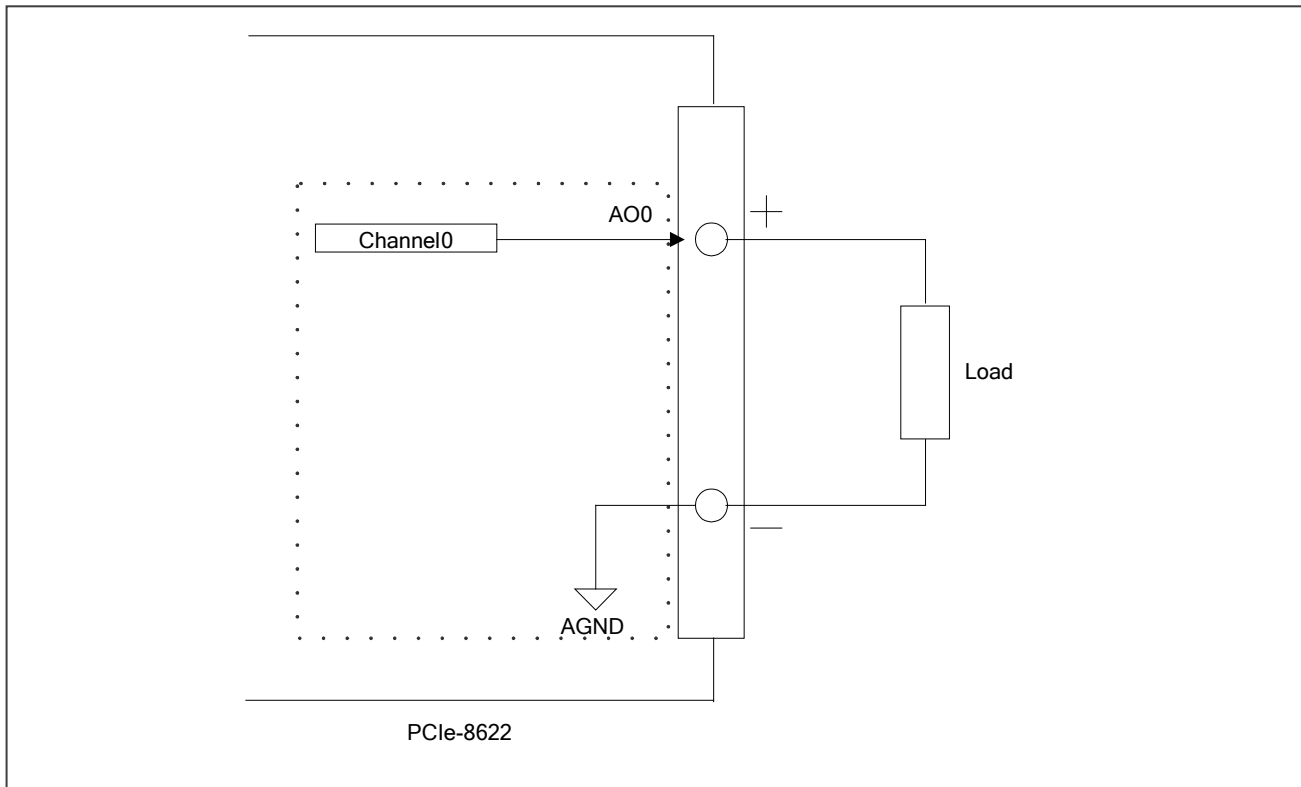
- **CON1:**
User can connect Analog Input signals to the PCIe-8622 through the CON1.
- **DACs:**
Digital-to-digital converters (DACs) convert digital codes to analog voltages.
- **AO Reference Selection:**
The AO reference selection signal allows you to change the range of the Analog Output.



Note: The DAC function (Analog Output) has 1 mS/0.6 V output glitch on power-up.

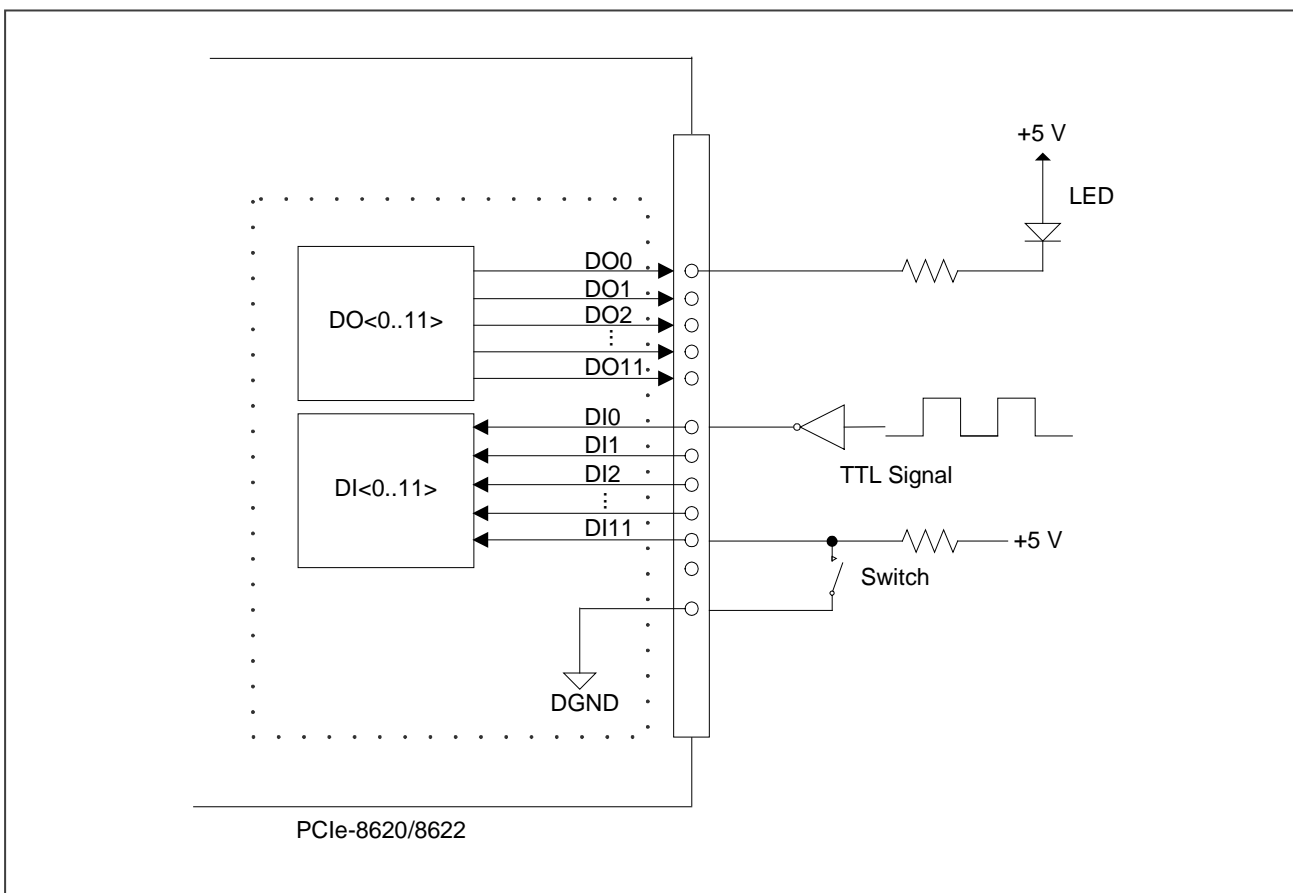
2.5.2 Connection Analog Output Signals

The PCIe-8622 board provides two DA output channels, AO0 and AO1, and the onboard -5 V (-10 V) reference signal on the PCIe-8622 may be used to generate a DA output range of 0 V to +5 V (+10 V).



2.6 Digital Input/Output

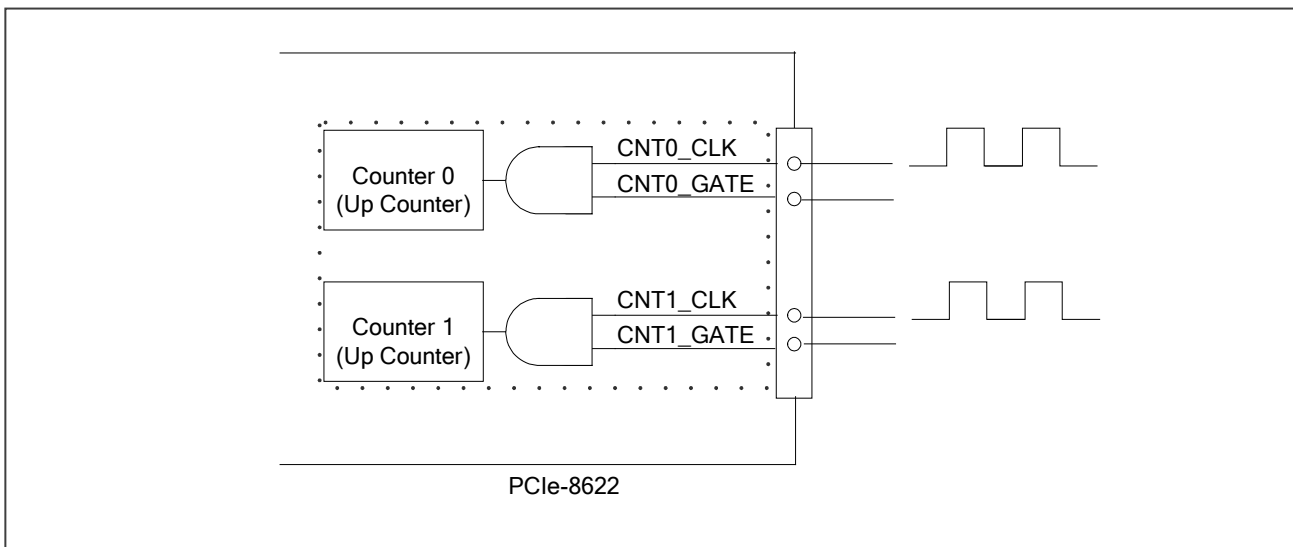
The DIO signals, $DO<0..11>$ and $DI<0..11>$ are referenced to DGND. The figure shows $DI<0..11>$ configured for Digital Input and $DO<0..11>$ configured for Digital Output. Digital Input applications include receiving TTL signals and sensing external device states such as the state of a switch. Digital Output applications include sending TTL signals and driving external devices such as the LED shown in the figure.



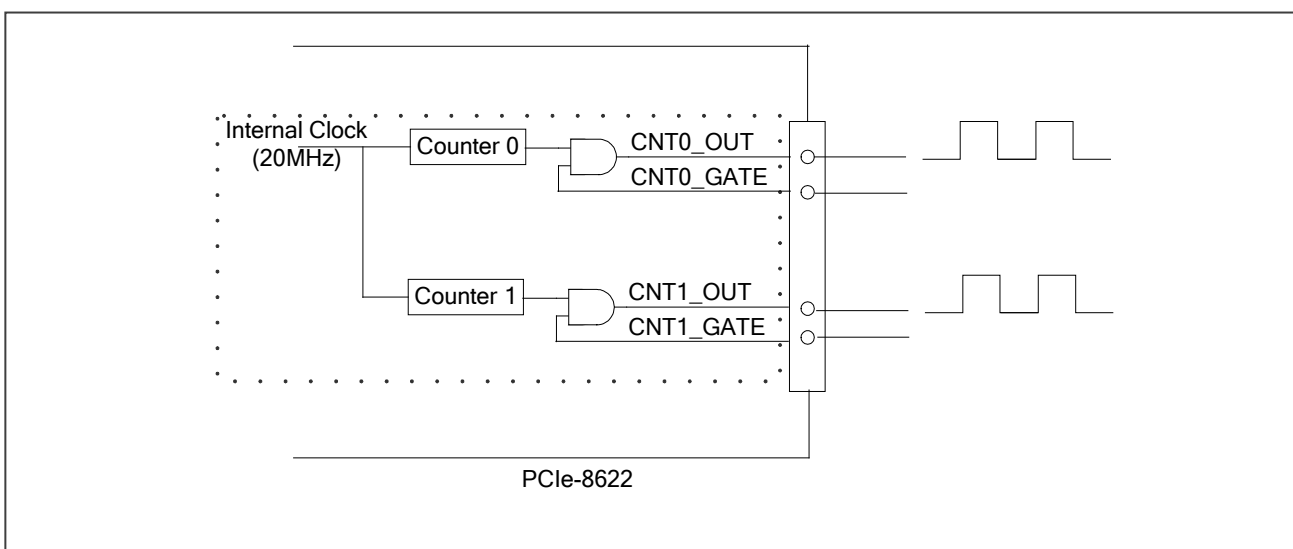
2.7 Counters

The Counter0 and 1 can be used as either an **up counter** or a **Pulse-width Modulation Generator**.

➤ Up Counter



➤ Pulse-width Modulation (PWM) Generator

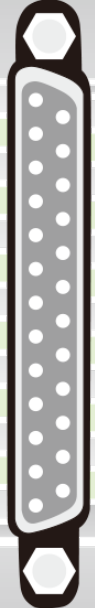


2.8 Pin Assignments

2.8.1 CON1 Connector of the PCIe-8620/8622

▼ PCIe-8620


Pin Assignment	Terminal No.	Pin Assignment
AI0	01	14 A_GND
AI1	02	15 A_GND
AI2	03	16 A_GND
AI3	04	17 A_GND
AI4	05	18 A_GND
AI5	06	19 A_GND
AI6	07	20 A_GND
AI7	08	21 D_GND
DGND	09	22 DI0
DI1	10	23 DI2
DI3	11	24 DO0
DO1	12	25 DO2
DO3	13	



PCIe-8620 (CON1)

▼ PCIe-8622

Pin Assignment	Terminal No.	Pin Assignment
Output +5 V	01	35 Output +15 V
CNT1_GATE	02	36 CNT0_GATE
CNT1_OUT	03	37 CNT0_OUT
CNT1_CLK	04	38 CNT0_CLK
D_GND	05	39 D_GND
DO11	06	40 DO10
DO9	07	41 DO8
DO7	08	42 DO6
DO5	09	43 DO4
DO3	10	44 DO2
DO1	11	45 DO0
DI11	12	46 DI10
DI9	13	47 DI8
D_GND	14	48 D_GND
DI7	15	49 DI6
DI5	16	50 DI4
DI3	17	51 DI2
DI1	18	52 DI0
N.C.	19	53 N.C.
AI_CONV	20	54 N.C.
DTRG1	21	55 DTRG0
A_GND	22	56 A_GND
A_GND	23	57 A_GND
AO1	24	58 AO0
A_GND	25	59 A_GND
A_GND	26	60 A_GND
AI15	27	61 AI14
AI13	28	62 AI12
AI11	29	63 AI10
AI9	30	64 AI8
AI7	31	65 AI6
AI5	32	66 AI4
AI3	33	67 AI2
AI1	34	68 AI0



PCIe-8622 (CON1)

2.8.2 I/O Connector Signal Descriptions

Signal Name	Reference	Direction	Description
AI<0..15>	AGND	Input	Analog Input channels 0 to 15. For single-ended measurements, each signal is an Analog Input voltage channel.
A_GND	-	-	Analog Input/Output Ground. These terminals are reference point for single-ended AI measurements and AO<0..1>.
AO<0..1>	AGND	Output	Analog Output channels 0 to 1. These terminals supply the voltage output of AO channels 0 to 3.
DO<0..11>	DGND	Output	Digital Output channels.
DI<0..11>	DGND	Input	Digital Input channels.
D_GND	-	-	Digital Ground
CNT0_CLK	D_GND	Input	Clock Input for Counter0, which can be either an external or an internal source, as set using software.
CNT0_OUT	D_GND	Output	Counter0 Output.
CNT0_GATE	D_GND	Input	Counter0 Gate Control.
AI_CONV	D_GND	Input	AD External Clock Trigger.
DTRG0	D_GND	Input	AD external trigger.(Only support post trigger)
+12 V	D_GND	Output	+12 V_{DC} Power Source. These terminals provide a fused +12 V power source. Refer to Power Source section for more information.
+5 V	D_GND	Output	+5 V_{DC} Power Source. These terminals provide a fused +5 V power source. Refer to Power Source section for more information.

2.8.3 Power Source

The +5 V terminals on the I/O connector supply +5 V referenced to DGND. Use these terminals to power external circuitry.



Caution:

Never connect the +5/+12 V power terminals to analog or digital ground or to any other voltage source on PCIe-8622 or any other device. Doing so can damage the device and the computer. ICP DAS is not liable for damage resulting from such a connection.

3 Hardware Installation



Note:

It is recommended that the driver is installed before installing the hardware as the computer may need to be restarted once the driver is installed in certain operating systems, such as Windows 2000 or Windows XP, etc. Installing the driver first helps reduce the time required for installation and restarting the computer.

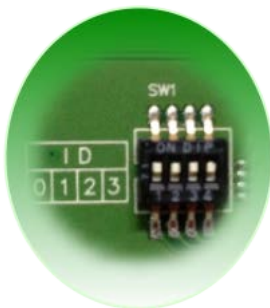
To install the PCIe-8620/8622 Series cards, follow the procedure described below:

Step 1: Install the driver for the PCIe-8620/8622 board on your computer.



For detailed information about installing the driver, refer to [Chapter 4 Software Installation](#).

Step 2: Configure the Card ID using the DIP Switch (SW1).

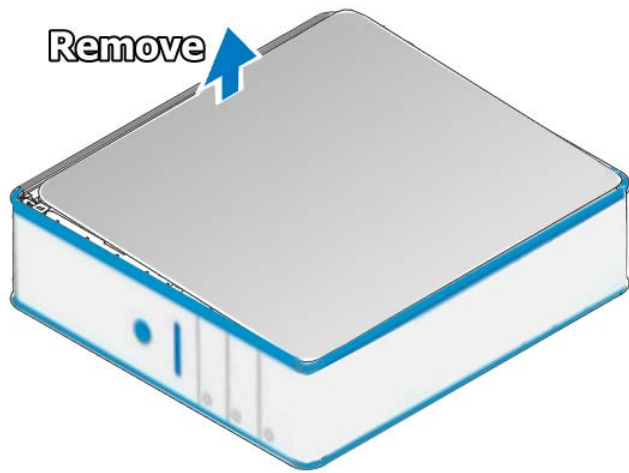


For detailed information about the Card ID, refer to [Section 2.2 Card ID Switch \(SW1\)](#).

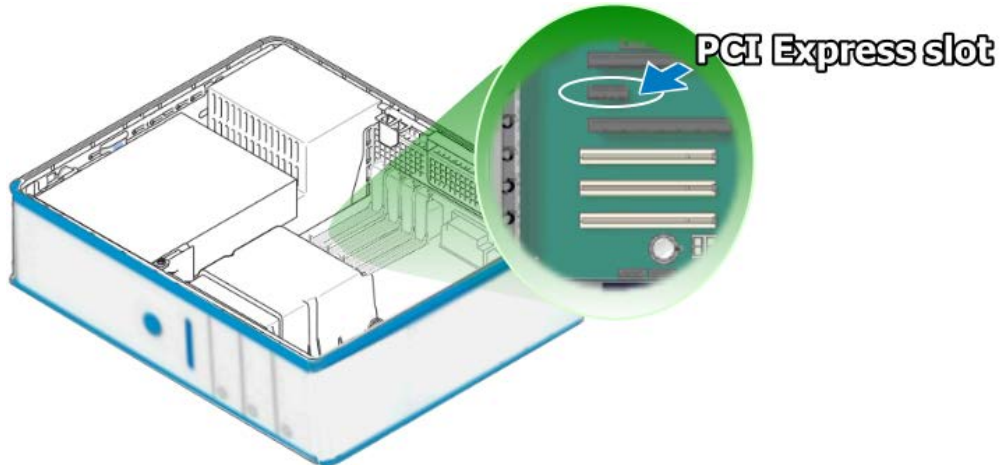


Step 3: Shut down and switch off the power to the computer, and then disconnect the power supply.

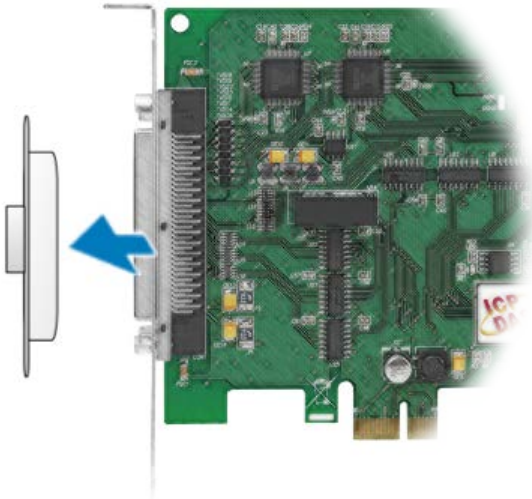
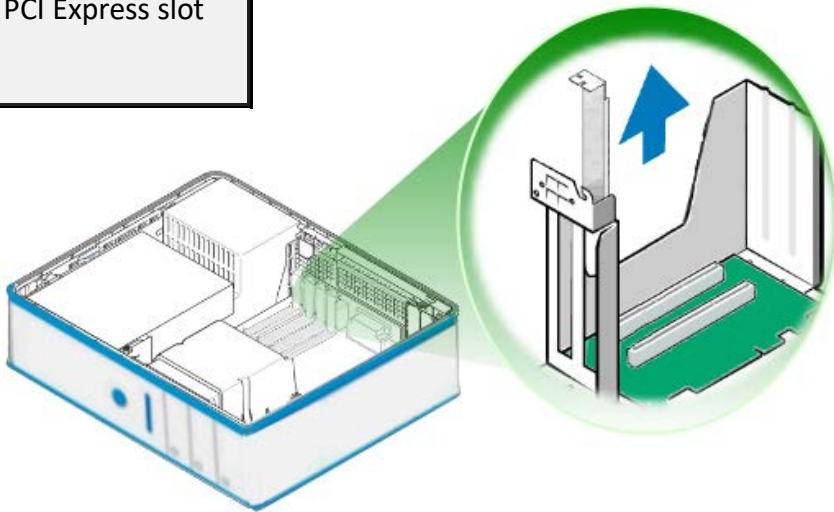
Step 4: Remove the cover from the computer.



Step 5: Select a vacant PCI Express slot.

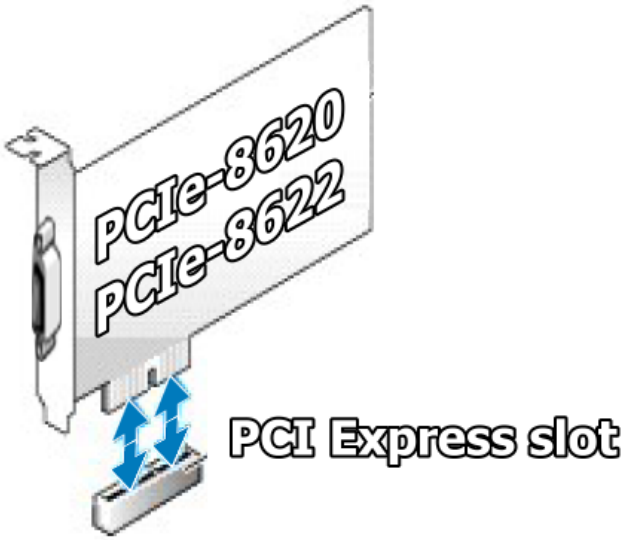


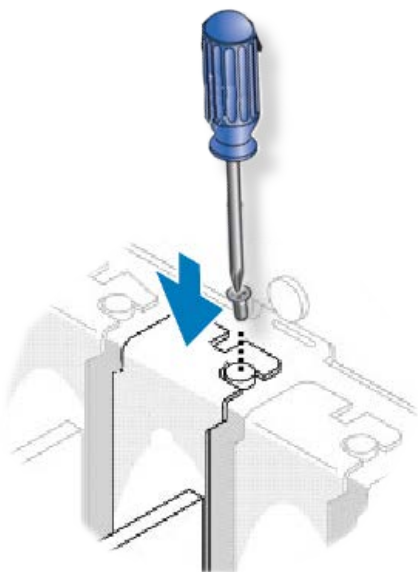
Step 6: Unscrew and remove the PCI Express slot cover from the computer case.



Step 7: Remove the connector cover from the PCIe-8620/8622 board.

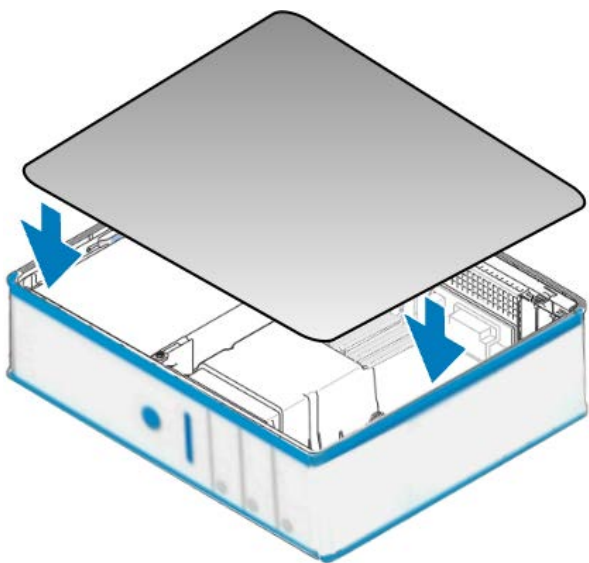
Step 8: Carefully insert the PCIe-8620/8622 board into the PCI Express slot by gently pushing down on both sides of the card until it slides into the PCI connector.





Step 9: Confirm that the card is correctly inserted in the motherboard, and then secure the PCIe-8620/8622 board in place using the retaining screw that was removed in Step 6.

Step 10: Replace the covers on the computer.



Step 11: Re-attach any cables, insert the power cord and then switch on the power to the computer.



Once the computer reboots, follow any message prompts that may be displayed to complete the Plug and Play installation procedure. Refer to [Chapter 4 Software Installation](#) for more information.

4 Software Installation

This chapter provides a detailed description of the process for installing the driver for the PCIe-862x Series board as well as how to verify whether the PCIe-862x Series board was properly installed. PCIe-862x Series cards can be used on DOS, Linux and Windows 2000 and 32/64-bit versions of Windows XP/2003/2008/7/8 based systems, and the drivers are fully Plug and Play compliant for easy installation.

4.1 Obtaining/Installing the Driver Installer Package

The driver installation package for PCIe-862x Series board can be found on the companion CD-ROM, or can be obtained from the ICP DAS FTP web site. Install the appropriate driver for your operating system. The location and website addresses for the installation package are indicated below.

➤ **UniDAQ Driver/SDK**

Operating System	Windows 2000, 32/64-bit Windows XP, 32/64-bit Windows 2003, 32/64-bit Windows 7, 32/64-bit Windows 2008, and 32/64-bit Windows 8
Driver Name	UniDAQ Driver/SDK (unidaq_win_setup_xxxx.exe)
CD-ROM	CD:\\ NAPDOS\\PCI\\UniDAQ\\DLL\\Driver\\
Web site	http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/unidaq/dll/driver/
Installing Procedure	<p>To install the UniDAQ driver, follow the procedure described below.</p> <p>Step 1: Double-click the UniDAQ_Win_Setupxxx.exe icon to begin the installation process.</p> <p>Step 2: When the “Welcome to the ICP DAS UniDAQ Driver Setup Wizard” screen is displayed, click the “Next>” button to start the installation.</p>

**Installation
Procedure**

Step 3: On the “Information” screen, verify that the DAQ card is included in the list of supported devices, then click the “**Next>**” button.

Step 4: On the “Select Destination Location” screen, click the “**Next>**” button to install the software in the default folder, **C:\ICPDAS\UniDAQ**.

Step 5: On the “Select Components” screen, verify that the DAQ Card is in the list of device, and then click the “**Next>**” button to continue.

Step 6: On the “Select Additional Tasks” screen, click the “**Next>**” button to continue.

Step 7: On the “Download Information” screen, click the “**Next>**” button to continue.

Step 8: Once the installation has completed, click “**No, I will restart my computer later**”, and then click the “**Finish**” button.

For more detailed information about how to install the UniDAQ driver, refer to “Section 2.2 Install UniDAQ Driver DLL” of the UniDAQ Software Manual, which can be found in the `\NAPDOS\PCI\UniDAQ\Manual\` folder on the companion CD, or can be downloaded from:

<http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/unidag/manual/>


4.2 Plug and Play Driver Installation



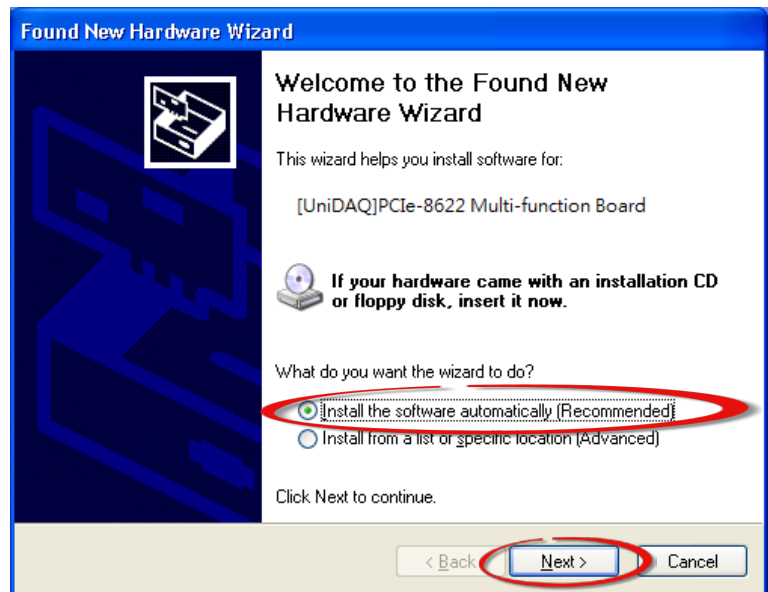
Step 1: Correctly shut down and power off your computer and disconnect the power supply, and then install the PCIe-8620/8622 Series board into the computer.

For detailed information about the hardware installation of the PCIe-8620/8622Series board, refer to [Chapter 3 Hardware Installation](#).

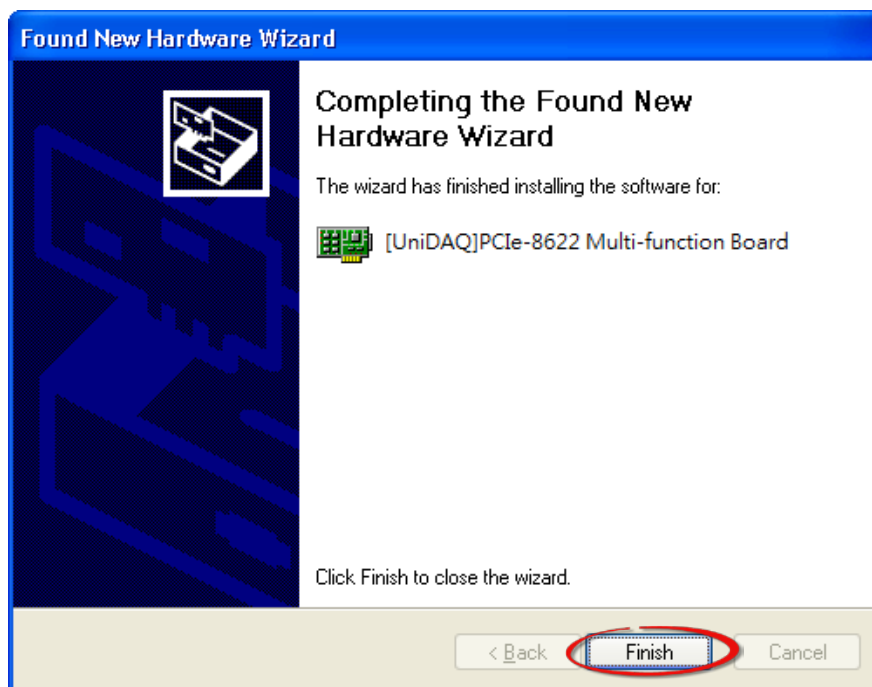
Step 2: Power on the computer and complete the Plug and Play installation.

 *Note: More recent operating systems, such as Windows Vista/7/8 will automatically detect the new hardware and install the necessary drivers etc., so Steps 3 to 5 can be skipped.*

Step 3: Select “Install the software automatically [Recommended]” and click the “Next>” button.



Step 4: Click the “**Finish**” button.



Step 5: Windows pops up “**Found New Hardware**” dialog box again.



4.3 Verifying the Installation

To verify that the driver was correctly installed, use the Windows **Device Manager** to view and update the device drivers installed on the computer, and to ensure that the hardware is operating correctly. The following is a description of how access the Device Manager in each of the major versions of Windows. Refer to the appropriate description for the specific operating system to verify the installation.

4.3.1 Accessing Windows Device Manager

➤ Windows 2000/XP

Step 1: Click the “**Start**” button and then point to “**Settings**” and click “**Control Panel**”.

Double-click the “**System**” icon to open the “**System Properties**” dialog box.

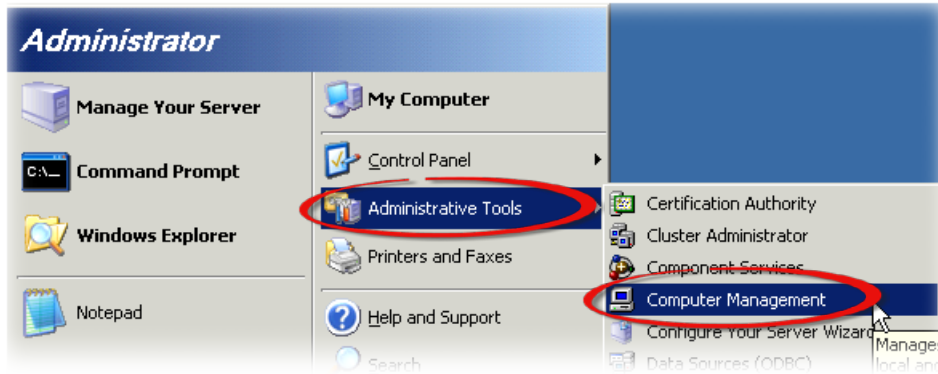
Step 2: Click the “**Hardware**” tab and then click the “**Device Manager**” button.



➤ **Windows Server 2003**

Step 1: Click the “**Start**” button and point to “**Administrative Tools**”, and then click the “**Computer Management**” option.

Step 2: Expand the “**System Tools**” item in the console tree, and then click “**Device Manager**”.



➤ **Windows 7**

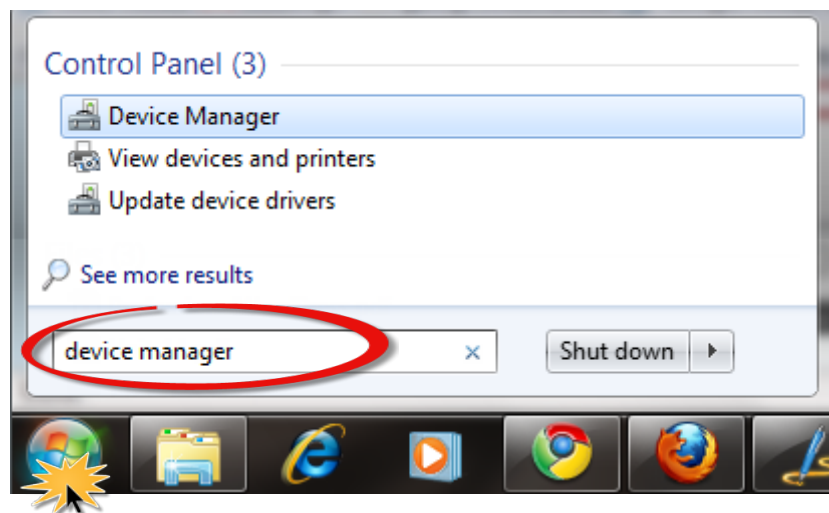
Step 1: Click the “**Start**” button, and then click “**Control Panel**”.


Step 2: Click “**System and Maintenance**”, and then click “**Device Manager**”.

Alternatively,

Step 1: Click the “**Start**” button.

Step 2: In the **Search field**, type **Device Manager** and then press Enter.



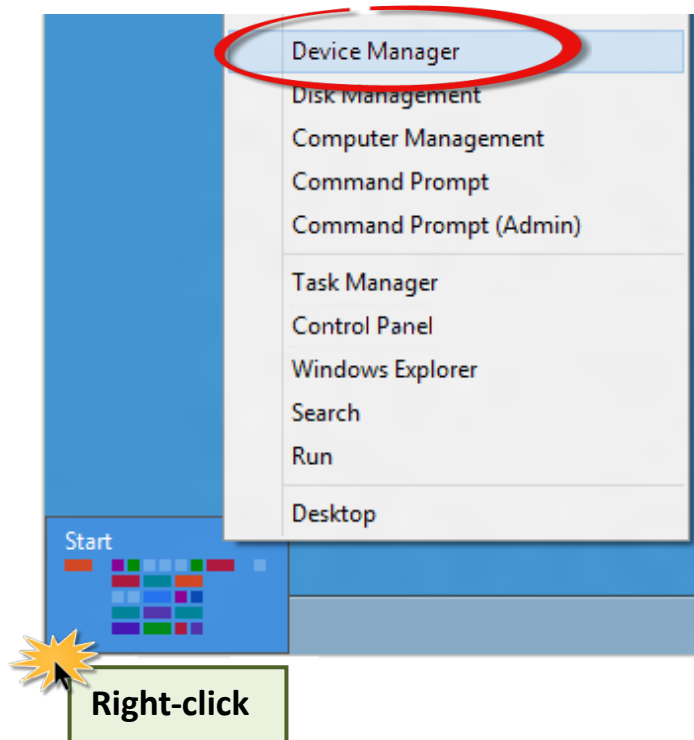
 *Note that Administrator privileges are required for this operation. If you are prompted for an administrator password or confirmation, enter the password or provide confirmation by clicking the “Yes” button in the User Account Control message.*

➤ **Windows 8**

Step 1: To display the **Start screen icon** from the desktop view, hover the mouse cursor over the **bottom-left corner** of screen.

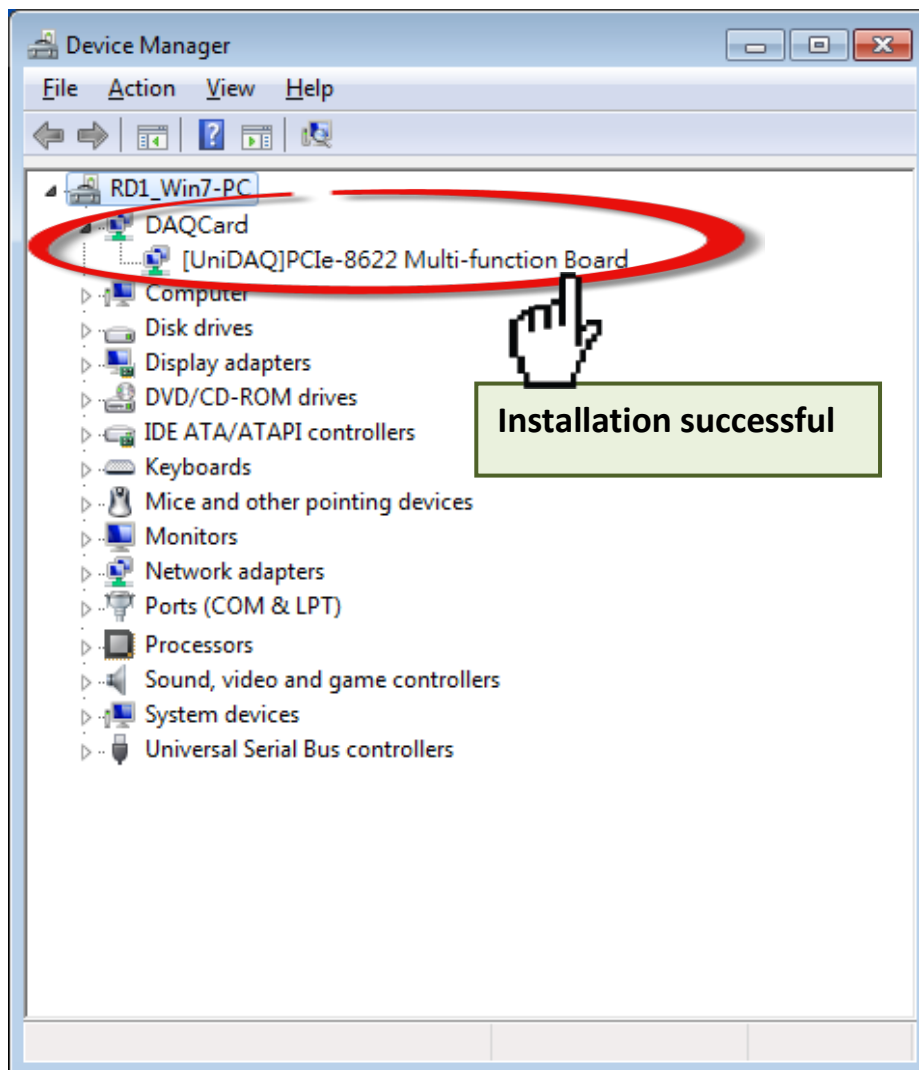
Step 2: **Right-click** the Start screen icon and then click **“Device Manager”**.

Alternatively, press **[Windows Key] + [X]** to open the Start Menu, and then select Device Manager from the options list.



4.3.2 Check the Installation

Check that the PCIe-8620/8622 Series board is correctly listed in the Device Manager, as illustrated below.



5 Testing the PCIe-8620/8622 Series Board

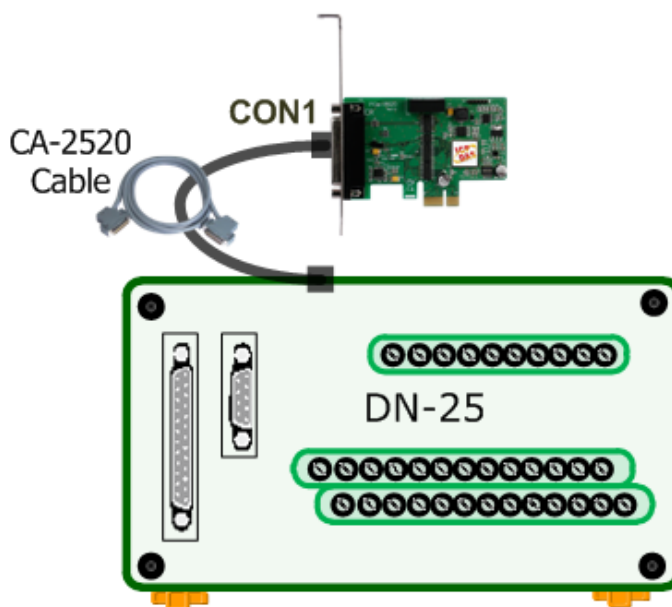
This chapter provides detailed information about the “Self-Test” process, which is used to confirm that the PCIe-8620/8622 Series board is operating correctly. Before beginning the “Self-Test” process, ensure that both the hardware and driver installation procedures are fully completed. For detailed information about the hardware and driver installation, refer to [Chapter 3 Hardware Installation](#) and [Chapter 4 Software Installation](#).

5.1 PCIe-8620 Self-Test

Before beginning the “Self-Test” procedure, ensure that the following items are available:

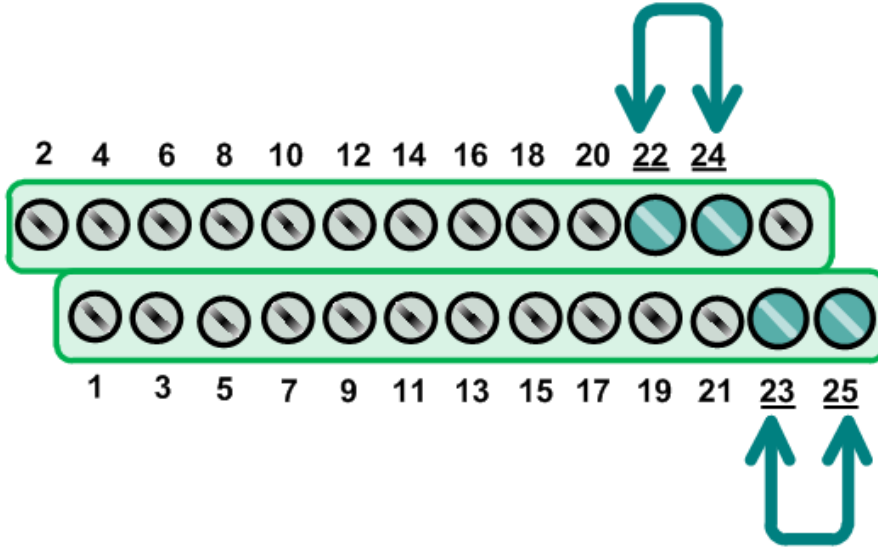
- A DN-25 wiring terminal board
(Optional, Website: http://www.icpdas.com/products/DAQ/screw_terminal/dn_25.htm)
- A CA-2520 Cable
(Optional, Website: http://www.icpdas.com/products/Accessories/cable/cable_selection.htm)
- A stable signal source. (For example, a dry cell battery)

Step 1: Connect the **DN-25 terminal board** to the **CON1** connector on the **PCIe-8620** board using the **CA-2520** cable.



➤ **Wiring for the Digital Input/Output Test:**

Step 2: Connect the **DIO pin (Pin22)** on the terminal board to **DO0 pin (Pin24)** and connect the **D12 pin (Pin23)** on the terminal board to **DO2 pin (Pin25)**.

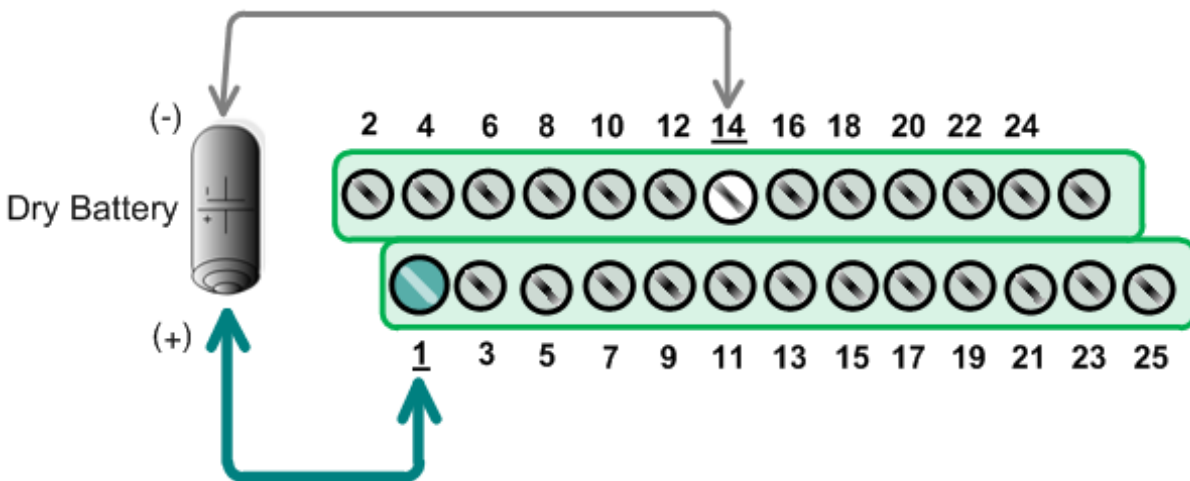


➤ **Wiring for the Analog Input Test:**

Step 3: Connect the signal source to AI channel 0, and connect the signals as follows.

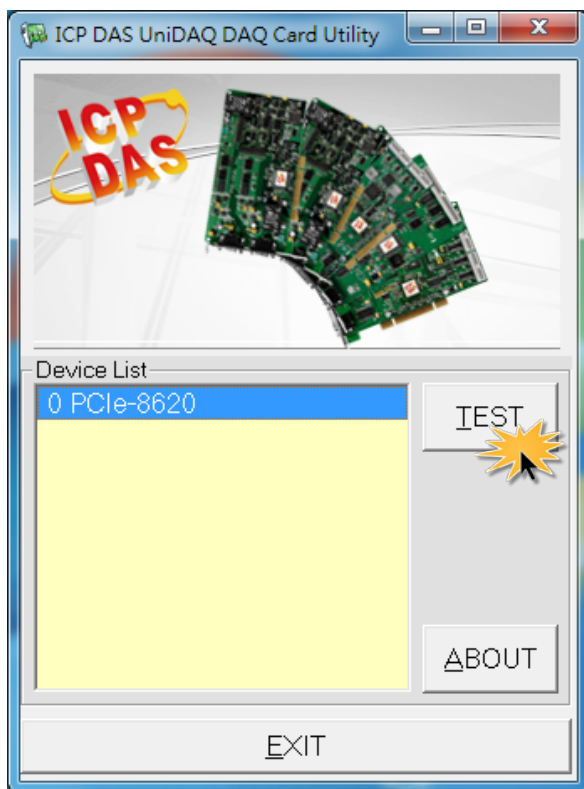
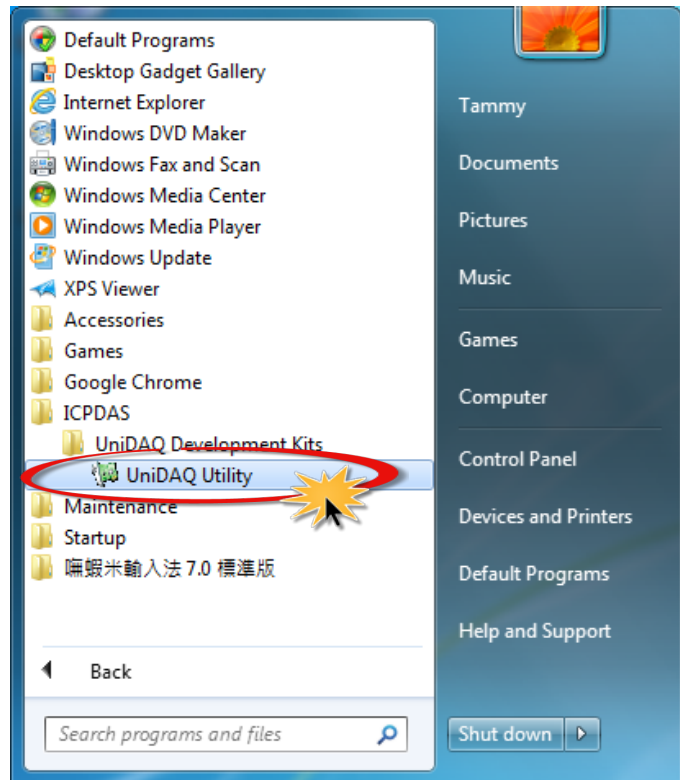
Connect the **AI0 pin (Pin01)** on the terminal board to **positive signal terminal (+)**

Connect the **A_GND pin (Pin14)** on the terminal board to **negative signal terminal (-)**



➤ **Execute the Test Program:**

Step 4: In Windows 7, click the “Start” button, point to “All Programs”, and then click the “ICPDAS” folder. Point to “UniDAQ Development Kits” and then click the “UniDAQ Utility” to execute the UniDAQ Utility Program.

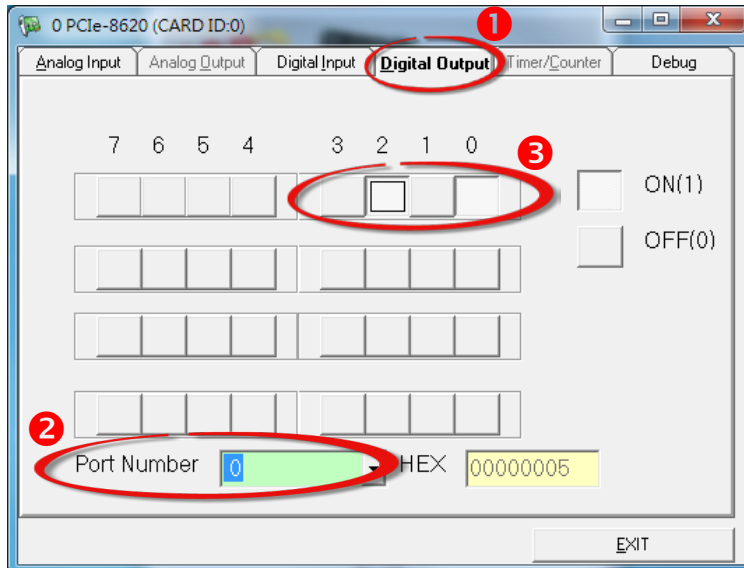


Step 5: Confirm that the PCIe-8620 board has been successfully installed in the Host system. Note that the device numbers start from 0.

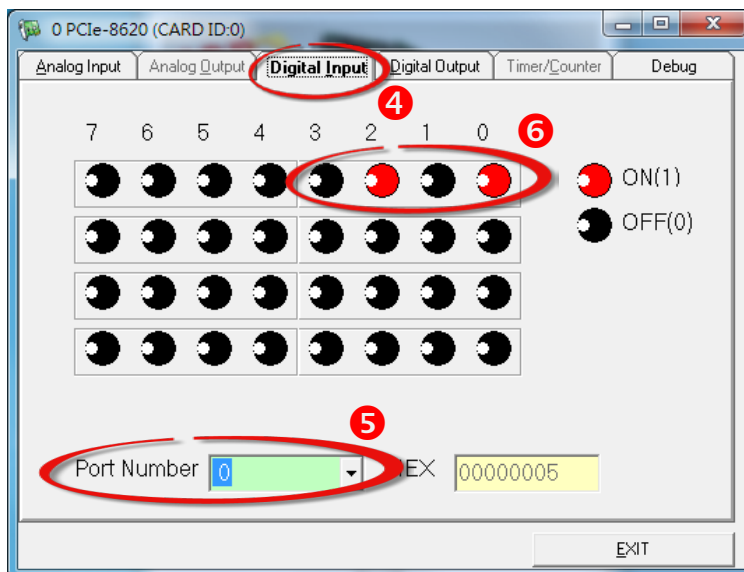
Step 6: Click the “TEST” button to start the test.

Step 7: Check the results of the **Digital Input/Output** functions test.

1. Click the **“Digital Output”** tab.
2. Select **“Port0”** from the **“Port Number”** drop-down menu.
3. Check the checkboxes for **channels 0 and 2**.

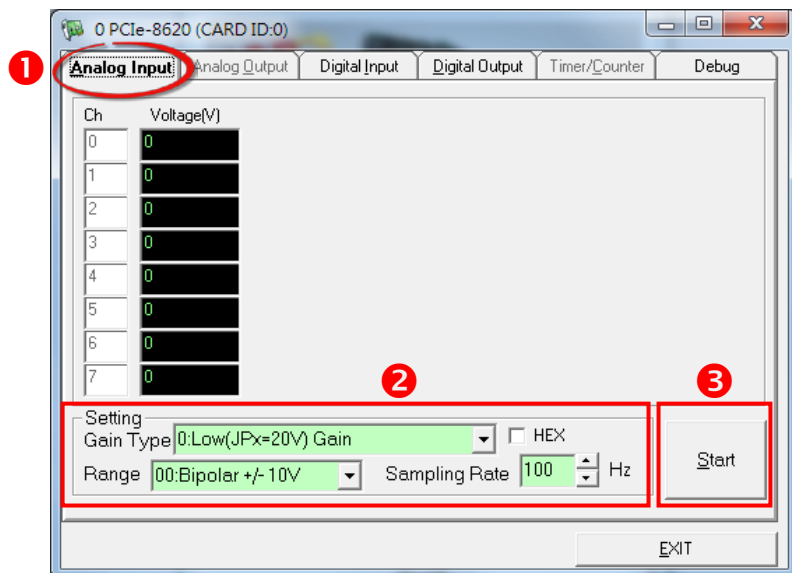


4. Click the **“Digital Input”** tab.
5. Select **“Port0”** from the **“Port Number”** drop-down menu.
6. The DI indicators will turn **red** when the corresponding DO channels 0 and 2 are **ON**.

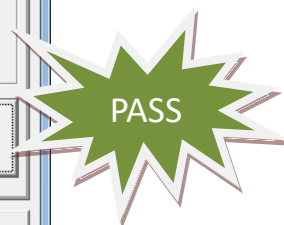
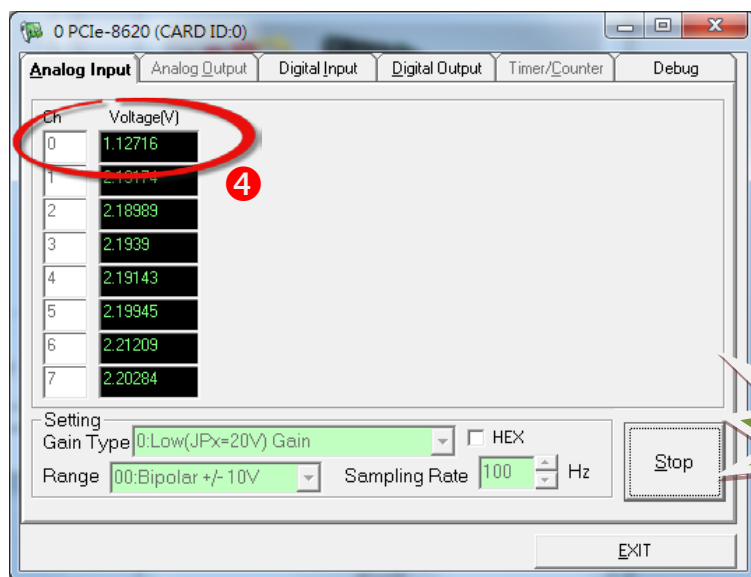


Step 8: Check the results of the **Analog Input** functions test.

1. Click the **“Analog Input”** tab.
2. Confirm the configuration settings.
3. Click the **“Start”** button to start the test.



4. Check the Analog Input value for Channel 0. The values for other channels value will be a floating number.



5.2 PCIe-8622 Self-Test

Before beginning the “Self-Test” procedure, ensure that the following items are available:

- ☑ A DN-68A wiring terminal board

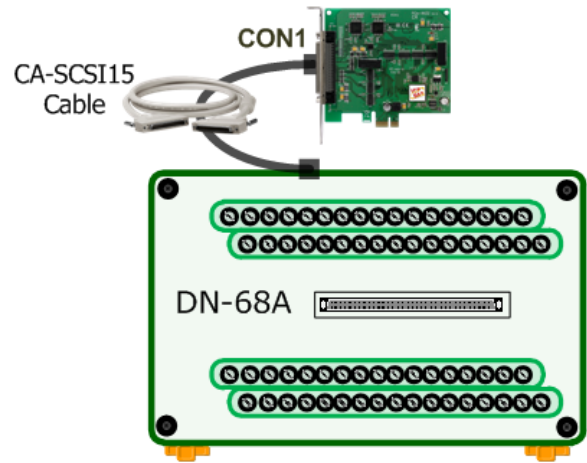
(Optional, Website:

http://www.icpdas.com/root/product/solutions/pc_based_io_board/daughter_boards/dn-68a.html)

- ☑ A CA-SCSI15-H Cable

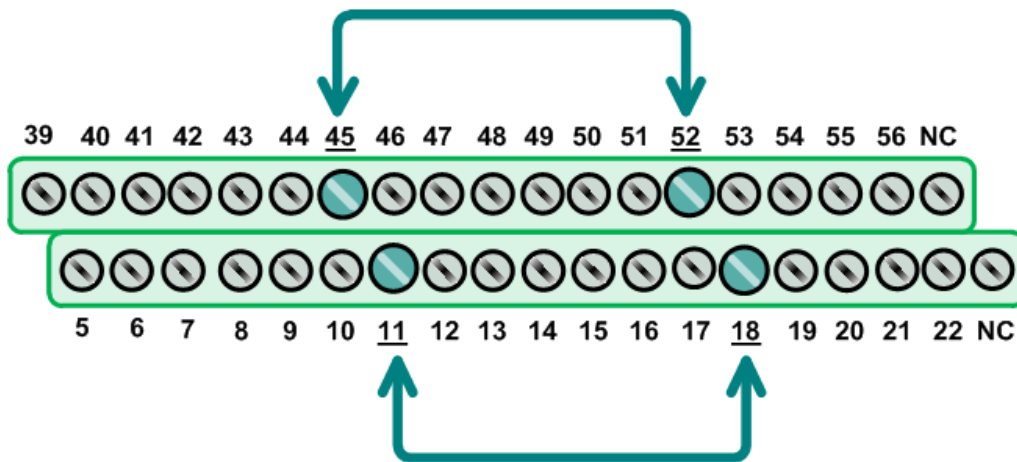
(Optional, Website: http://www.icpdas.com/products/Accessories/cable/cable_selection.htm)

Step 1: Connect the **DN-68A terminal board** to the **CON1** connector on the **PCIe-8622** board using the **CA-SCSI15-H** cable.



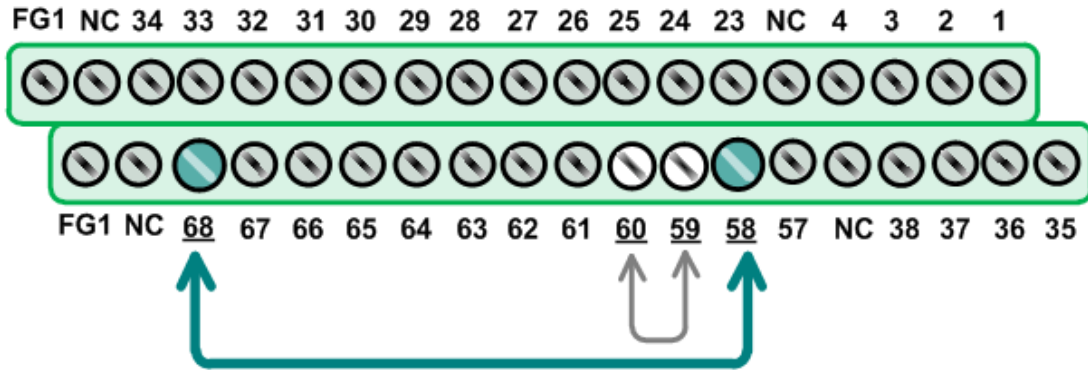
➤ **Wiring for the Digital Input/Output Test:**

Step 2: Connect the **DIO pin (Pin52)** on the terminal board to **DO0 pin (Pin45)** and connect the **DI1 pin (Pin18)** on the terminal board to **DO1 pin (Pin11)**.



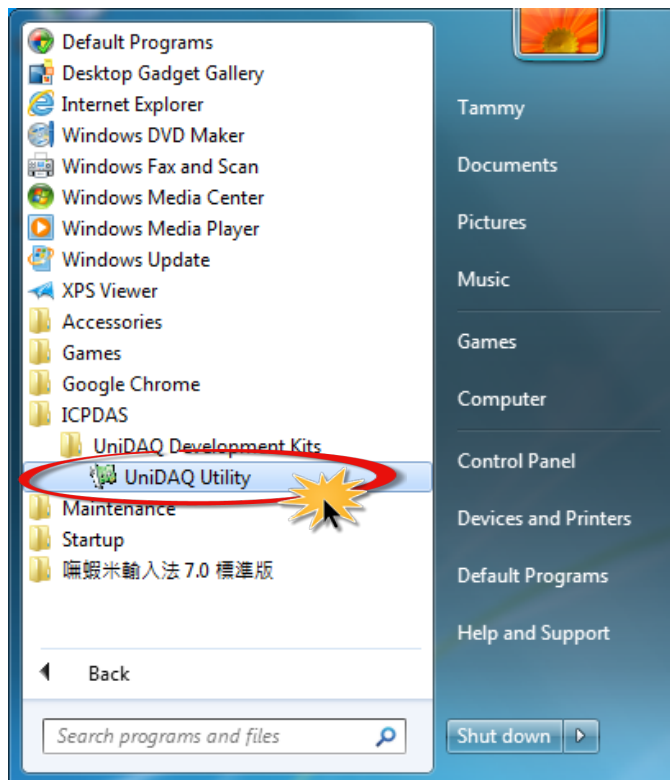
➤ **Wiring for the Analog Input/Output Test:**

Step 3: Connect the **A00 pin (Pin58)** on the terminal board to **AIO pin (Pin60)** and connect the **A_GND pin (Pin59)** on the terminal board to **A_GND pin (Pin60)**.



➤ **Execute the Test Program:**

Step 4: In Windows 7, click the “Start” button, point to “All Programs”, and then click the “ICPDAS” folder. Point to “UniDAQ Development Kits” and then click the “UniDAQ Utility” to execute the UniDAQ Utility Program.



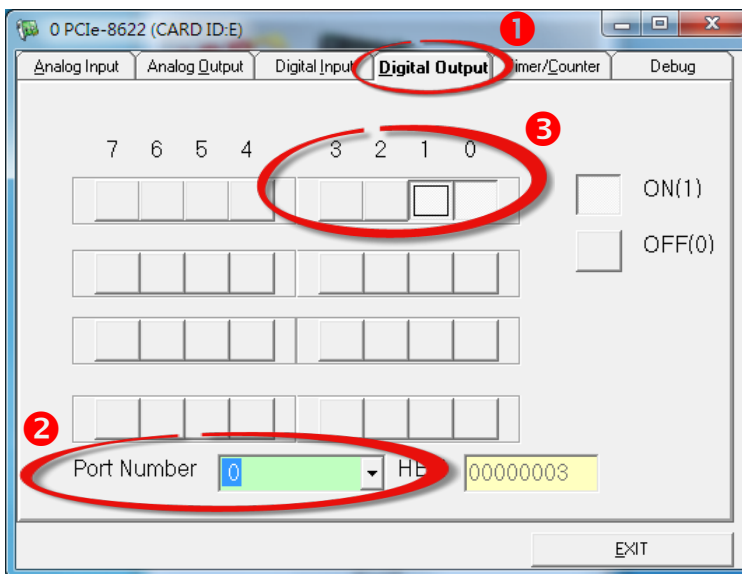
Step 5: Confirm that the PCIe-8622 board has been successfully installed in the Host system. Note that the device numbers start from 0.

Step 6: Click the **“TEST”** button to start the test.

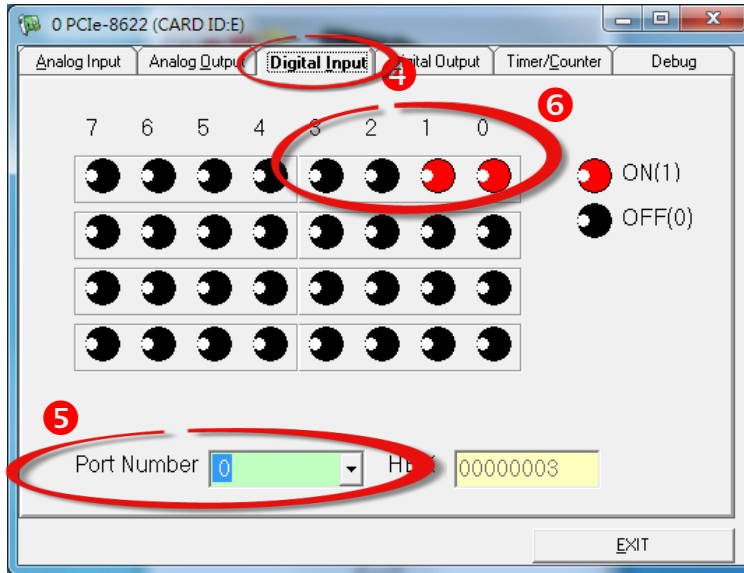


Step 7: Check the results of the **Digital Input/Output** functions test.

1. Click the **“Digital Output”** tab.
2. Select **“Port0”** from the **“Port Number”** drop-down menu.
3. Check the checkboxes for **Channels 0 and 1**.

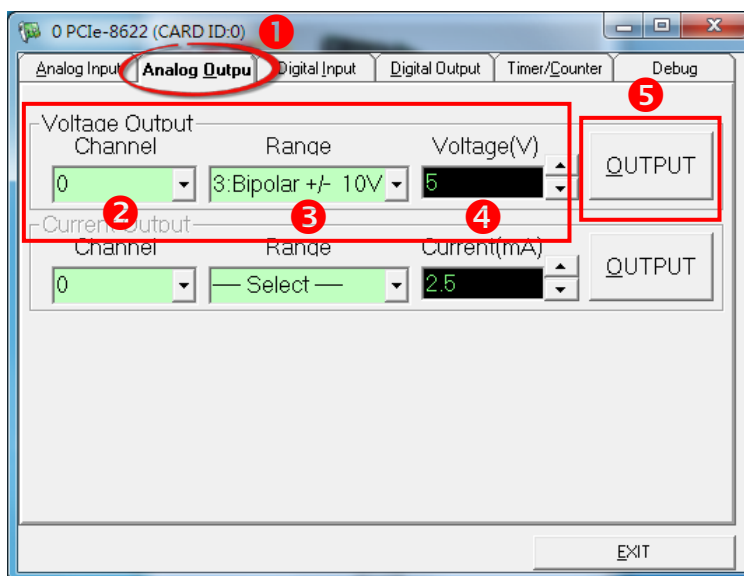


7. Click the **“Digital Input”** tab.
8. Select **“Port0”** from the **“Port Number”** drop-down menu.
9. The **DI indicators will turn red** when the corresponding **DO Channels 0 and 1** are **ON**.

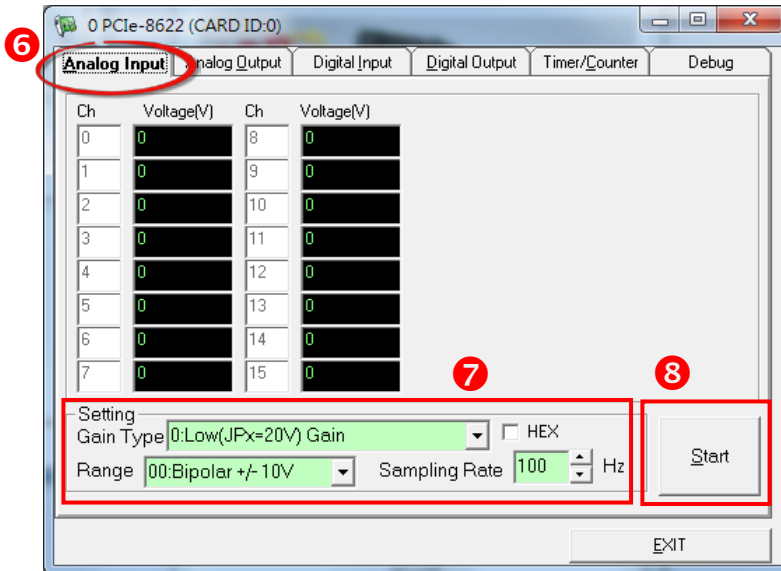


Step 8: Check the results of the **Analog Input/Output** functions test.

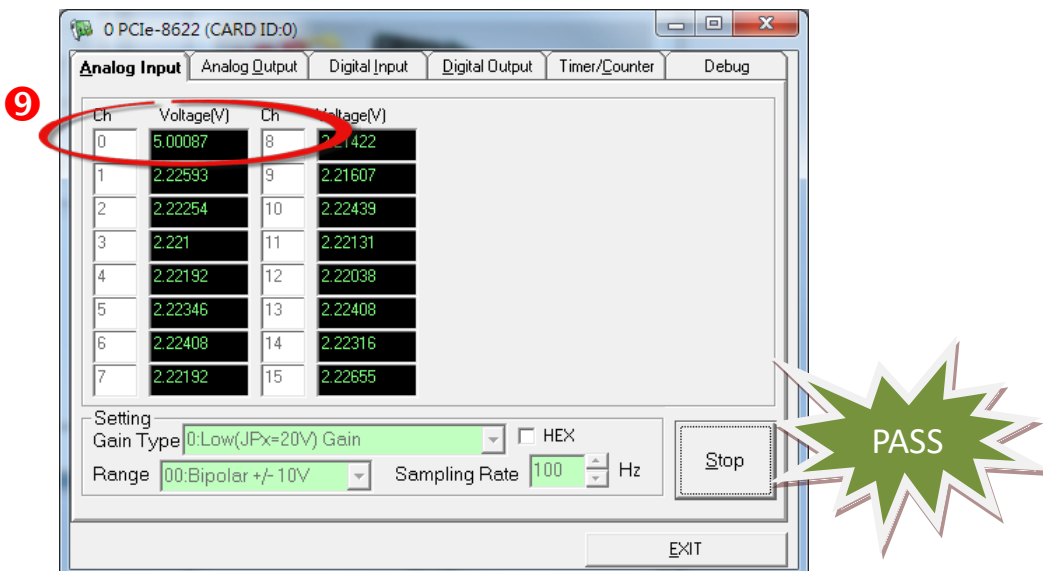
1. Click the **“Analog Output”** tab.
2. Select the **“0”** from the **“Channel”** drop-down menu.
3. Select the **“3: Bipolar +/- 10V”** from the **“Range”** drop-down menu.
4. Enter the **voltage value depending on your requirements (e.g. 5)** in the **“Voltage(V)”** field.
5. Click the **“OUTPUT”** button to start test.



6. Click the **“Analog Input”** tab.
7. Confirm the configuration settings.
8. Click the **“Start”** button to start the test.



9. Check the **Analog Input** value for **Channel 0**. The values for other channels value will be a floating number.



6 I/O Register Addresses

6.1 Hardware ID

During the power-on stage, the Plug and Play BIOS will assign an appropriate I/O address to each PCIe-8620/8622 Series board installed in the system. Each card includes four fixed ID numbers that are used to identify the card, and are indicated below:

Model	PCIe-8620	PCIe-8622
Vendor ID (HEX)	0x10EE	0x10EE
Device ID (HEX)	0x0007	0x0007
Sub-Vendor ID (HEX)	0x3577	0x3577
Sub-Device ID (HEX)	0x8620	0x8622

6.2 I/O Address Mapping

An overview of the registers for the PCIe-8620/8622 Series board is given below. The address of each register can be determined by simply adding the offset value to the base address of the corresponding Bar number. More detailed descriptions of each register can be found in the following.

Bar No.	Offset	Register Function Description	
		Read	Write
0 (MMIO)	00H	Read AI FIFO Data	N/A
	04H	AI FIFO Status	Clear FIFO
	08H	Internal Clock Control/Status	Internal Clock Control/Status
	0CH	AI Mode Control/Status	AI Mode Control/Status
	10H	Read AI Data	AI Trigger
	14H	Read AI Data	Start AI Trigger
	18H	Interrupt Control/Status	Interrupt Control/Status
	1CH	N/A	Clear Interrupt
	20H	AO Control/Status	AO Control/Status
	24H	Read DI Port and DO Port status	Write DO Port
	28H	Counter 0 Control/Status	Counter 0 Control/Status
	2CH	Counter 0 Period Control/Status	Counter 0 Period Control/Status
	30H	Counter 1 Control/Status	Counter 1 Control/Status
	34H	Counter 1 Period Control/Status	Counter 1 Period Control/Status
3CH	Read Card ID and firmware Version	N/A	
1 (MMIO)	00H 40H	Xilinx Spartan-6 DMA Control/Status	Xilinx Spartan-6 DMA Control/Status

Note: The length of the register is 32-bits.

6.3 Bar 0 (MMIO)

6.3.1 Interrupt and Initialize Control/Status Registers

Register 0-1 Base+0x18 **Interrupt Control/Status**

Bit	Description	Read	Write
0	Enable Interrupt. Write a 1 enables interrupt when DMA done or FIFO level trigger.	Yes	Yes
1	Interrupt Status. Reading a 1 indicates an interrupt is complete.	Yes	No
2	Set Interrupt Mode. Write a 1 enables DMA down interrupt. Write a 0 enable FIFO level trigger.	Yes	No
3	1	Yes	No
4:7	FIFO Trigger Level. Write a 0 indicates 32, write a 1 indicates 64, write a 2 indicates 128, write a 3 indicates 256, write a 4 indicates 512, write a 5 indicates 1024, write a 6 is 1536 and write 7 to 15 is 32.	Yes	Yes
8	Enable AI Post Trigger Mode. Writing a 1 indicates a post-trigger mode for Analog Input when DTRG0 interrupt enables.	Yes	Yes
9	Enable AI Pre Trigger Mode. Writing a 1 indicates a pre-trigger mode for Analog Input when DTRG1 interrupt enables.	Yes	Yes
10	1	Yes	No
11	1	Yes	No
12	Enable DTRG0 External Trigger Interrupt. Writing a 1 enable external signal interrupt from DTRG0.	Yes	Yes
13	DTRG0 Interrupt Status. Reading a 1 indicates an external trigger interrupt is complete for DTRG0.	Yes	No
14	Enable DTRG1 External Trigger Interrupt. Writing a 1 enable external signal interrupt from DTRG1.	Yes	Yes
15	DTRG1 Interrupt Status. Reading a 1 indicates an external trigger interrupt is complete for DTRG1.	Yes	No
16:31	Reserved.	Yes	No

Register 6.3.1-2 Base+0x1C **Interrupt Clear**

Bit	Description	Read	Write
0	Interrupt Clear. Write a 0 to clear PCI interrupt.	Yes	Yes
1:31	Reserved.	Yes	No

6.3.2 Digital I/O Registers

Register 6.3.2-1 wBase+0x24 **Write DO Port and Read DI Port**

Bit	Description	Read	Write
0:11	DO Port Write. Write the digital output data to specified digital output port. Read the digital output status to specified digital output port.	Yes	Yes
12:15	Reserved.	Yes	No
16:27	DI Port Read. Read the digital input data to specified digital input port.	Yes	Yes
28:31	Reserved.	Yes	No

6.3.3 Analog Input Registers

Register 6.3.3-1 Base+0x00 **Read AI FIFO Data**

Bit	Description	Read
0:15	FIFO Read. Read the Analog Input data to specified FIFO.	Yes
16:31	Reserved.	Yes

Register 6.3.3-2 Base+0x04 **AI FIFO Control Status**

Bit	Description	Read	Write
0:10	FIFO Count and Clear. Read the FIFO data count to specified FIFO. Write a 0 to clear data to specified FIFO.	Yes	Yes
11	FIFO Full. Reading a 1 indicates a FIFO status is full.	Yes	No
12	FIFO Empty. Reading a 1 indicates a FIFO status is empty.	Yes	No
13:31	Reserved.	Yes	No

Register 6.3.3-3 Base+0x08 **Analog Input Internal Clock Control/Status**

Bit	Description	Read	Write
0:31	Set Div Clock. Indicates the $(\text{WORD})((\text{Base Clock}/\text{Sampling Rate})-1)$ to set internal pacer clock during an Analog Input operation.	Yes	Yes

Register 6.3.3-4 Base+0x0C **AI Scan Mode Control/Status**

Bit	Description	Read	Write
0:3	Total Scan Channel Number. Indicates the number of channels to MagicScan. Writing a N indicates an 0 to N channels. Ex. Writing a 15 indicates 0 to 15 channel. Writing an 9 indicates 0 to 9 channel.	Yes	Yes
4:6	Reserved.	Yes	No
7	Analog Input Range. Writing 1 indicates a bipolar 10 V, Writing 0 indicates a bipolar 5 V.	Yes	Yes
8	Pacer Trigger Start Status.	Yes	No
9	ADC Status. Reading a 1 indicates a ADC Status is ready. Reading a 0 indicates a ADC Status is busy.		
10:11	Reserved.	Yes	No
12	Pacer Trigger Source. Writing 1 indicates an external clock, Writing 0 indicates an external clock.	Yes	Yes
13:31	Reserved.	Yes	No

Register 6.3.3-5 Base+0x10 **AI Software Trigger Control**

Bit	Description	Read	Write
0	Software Trigger Start. Writing a 0 causes the Analog Input channel to measure Analog Input data.	Yes	Yes
1:31	Reserved.	Yes	No

Register 6.3.3-6 Base+0x10 **Read AI Data**

Bit	Description	Read	Write
0:15	Software Trigger Data Read. Read Analog Input data form analog input channel 0 to 7.	Yes	Yes
16:31	Reserved.	Yes	No

Register 6.3.3-7 Base+0x14 **AI Data Acquisition Start**

Bit	Description	Read	Write
0:1	Acquisition Start. Writing a 1 to causes channel to start acquisition data.	Yes	Yes
2:31	Reserved.	Yes	No

Register 6.3.3-8 Base+0x14 **Read AI Data**

Bit	Description	Read	Write
0:15	Software Trigger Data Read. Read Analog Input data form Analog Input channel 8 to 15.	Yes	Yes
16:31	Reserved.	Yes	No

6.3.4 Analog Output Registers

Register 6.3.4-1 Base+0x20 **AO Control/Status**

Bit	Description	Read	Write
0:23	AO Command. Writing a AO command.	Yes	Yes
24	AO Command Read. Reading a 1 indicates a Command Status is ready. Reading a 0 indicates a Command Status is busy.	Yes	No
25:31	Reserved.	Yes	No

For more detailed information, refer to the documentation for the AD5752, which can be found at: http://www.analog.com/media/en/technical-documentation/data-sheets/AD5722_5732_5752.pdf

6.3.5 Counter Registers

Register 6.3.5-1 Base+0x28 **Counter 0 Control/Status**

Bit	Description	Read	Write
0	0	Yes	No
1	0	Yes	No
2	Set Mode. Writing 1 indicates a pulse (PWM) output mode, Writing 0 indicates a up counter mode.	Yes	Yes
3	Set Source. Writing 1 indicates an external clock when up counter mode, Writing 0 indicates an internal clock.	Yes	No
8:31	Set Pulse Width. Writing value to set pulse width, the pulse equal 0.05 us x Value.	Yes	Yes

Register 6.3.5-2 Base+0x30 **Counter 1 Control/Status**

Bit	Description	Read	Write
0	0	Yes	No
1	0	Yes	No
2	Set Mode. Writing 1 indicates a pulse (PWM) output mode, Writing 0 indicates a up counter mode.	Yes	Yes
3	Set Source. Writing 1 indicates an external clock when up counter mode, Writing 0 indicates an internal clock.	Yes	No
8:31	Set Pulse Width. Writing value to set pulse width, the pulse equal 0.05 us x Value.	Yes	Yes

Register 6.3.5-3 Base+0x2C **Counter 0 Period Control/Status**

Bit	Description	Read	Write
0:31	Set Pulse Period. Writing value to set period width, the pulse equal 0.05 us x Value.	Yes	Yes

Register 6.3.5-4 Base+0x34 **Counter 1 Period Control/Status**

Bit	Description	Read	Write
8:31	Set Pulse Period. Writing value to set period width, the pulse equal 0.05 us x Value.	Yes	Yes

6.4 Bar 1 (MMIO)

6.4.1 Xilinx Spartan-6 Control/Status Registers

For more detailed information, refer to the documentation for the Spartan-6, which can be found at:

http://www.xilinx.com/support/documentation/application_notes/xapp1052.pdf

7 Calibration

7.1 Introduction

When shipped from the factory, the PCIe-8620/8622 Series board is already fully calibrated, including the calibration coefficients that are stored in the onboard Flash. For a more precise application of voltages in the field, the procedure described below provides a method that allows the board installed in a specific system to be calibrated so that the correct voltages can be achieved for the field connection. This calibration allows the effects of voltage drops caused by IR loss in the cable and/or the connector to be eliminated.

At first the user has to prepare the equipment for calibration: the precise multi-meter. Note that the calibrated values for Analog Output/Input channels are stored within 3 words in the address of the Flash, as show in. The calibration procedure will be demonstrated below:

The Analog Input channel calibration values stored in the Flash are as follows:

Flash Address		A/D Calibration Channel Number							
		0	1	2	3	4	5	6	7
Bipolar 10 V	10 V Ref	0	4	8	12	16	20	24	28
	0 V	1	5	9	13	17	21	25	29
Bipolar 5 V	5 V Ref	2	6	10	14	18	22	26	30
	0 V	3	7	11	15	19	23	27	31

Flash Address		A/D Calibration Channel Number							
		8	9	10	11	12	13	14	15
Bipolar 10 V	10 V Ref	32	36	40	44	48	52	56	60
	0 V	33	37	41	45	49	53	57	61
Bipolar 5 V	5 V Ref	34	38	42	46	50	54	58	62
	0 V	35	39	43	47	51	55	59	63

The Analog Output channel calibration values stored in the Flash are as follows:

Flash Address		DA Calibration	
		CH 0	CH 1
Bipolar	+5 V	64	72
	+ 0 V	65	73
Unipolar	+10 V	66	74
	+ 0 V	67	75
Bipolar	+5 V	68	76
	- 5 V	69	77
Unipolar	+10 V	70	78
	- 10 V	71	79

7.2 Step-by-Step Calibration Process

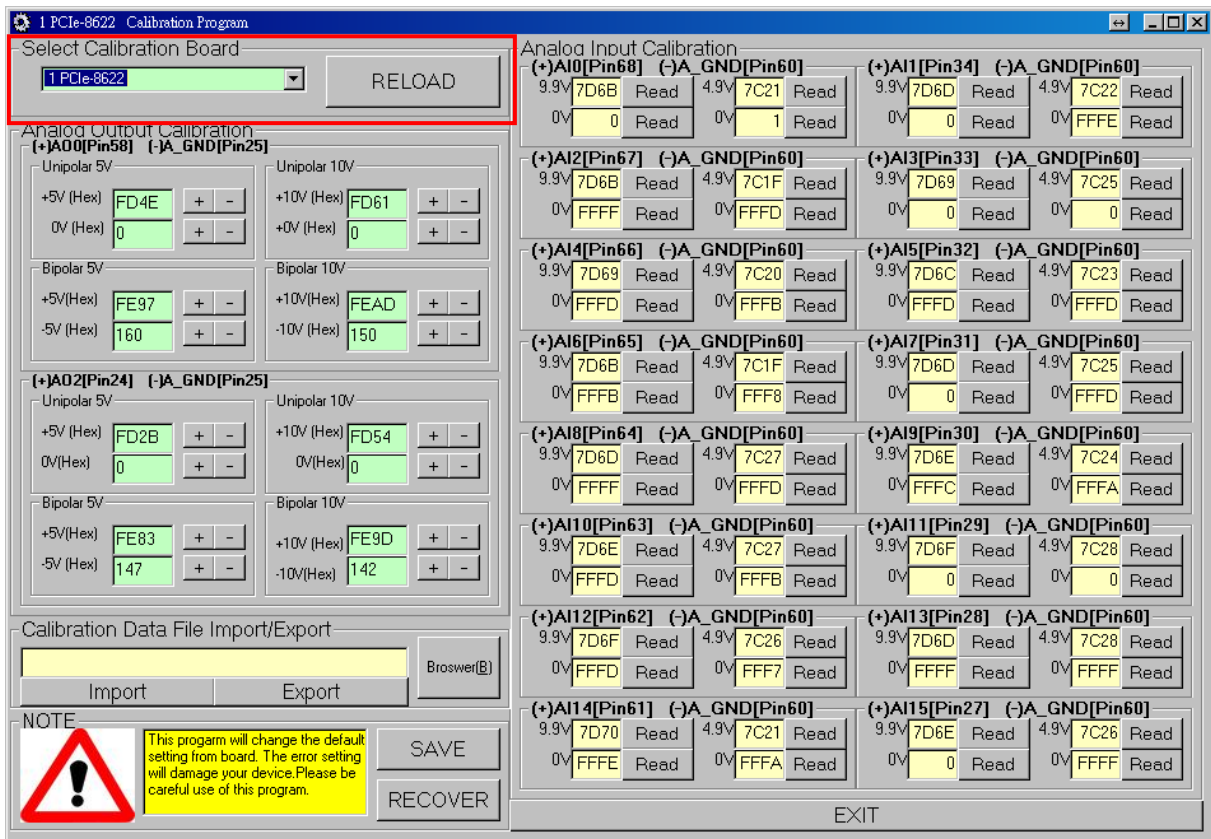
The following is a step-by-step description of the calibration process using the Windows Calibration Program for the PCIe-8620/8622, which can be downloaded from:

<http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/pci-8600/dll/calibration/>

7.2.1 PCIe-8622 Calibration Step

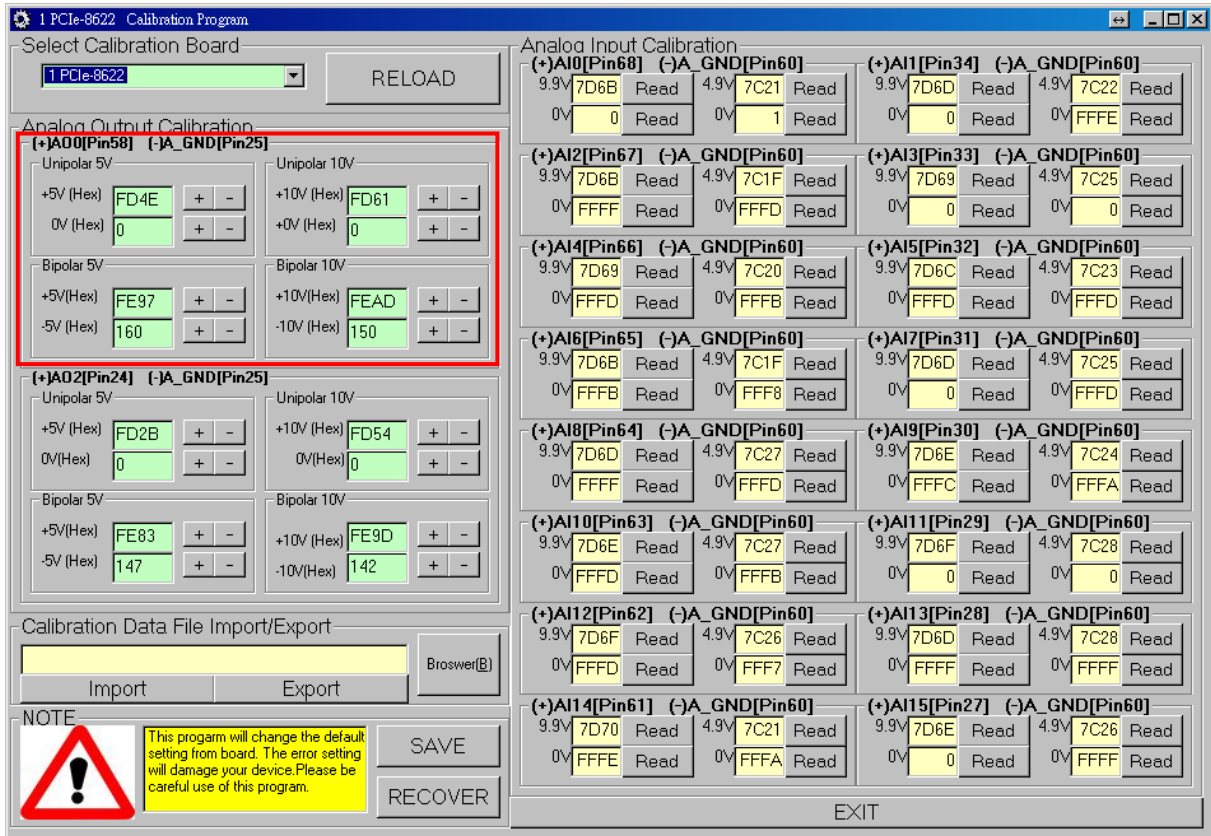
Step 1: Select calibration board

- (1) Select “1 PCIe-8622” from the “Select Calibration Board” drop-down menu.
- (2) Click the “RELOAD” button.



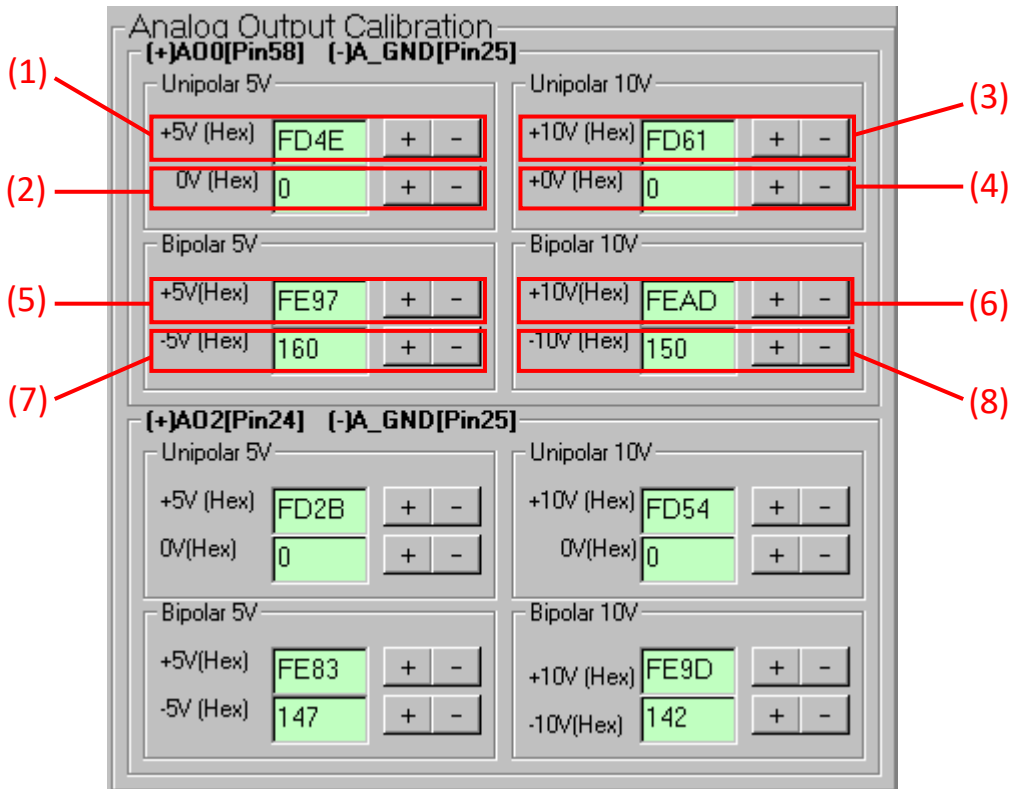
Step 2: Calibrate the Analog Output Channel 0

- (1) Connect the meter to measure the voltage from channel 0
- (2) Connect meter(+) to PCIe-8622.AO0 (Pin58)
- (3) Connect meter(-) to PCIe-8622.A_GND (Pin25)



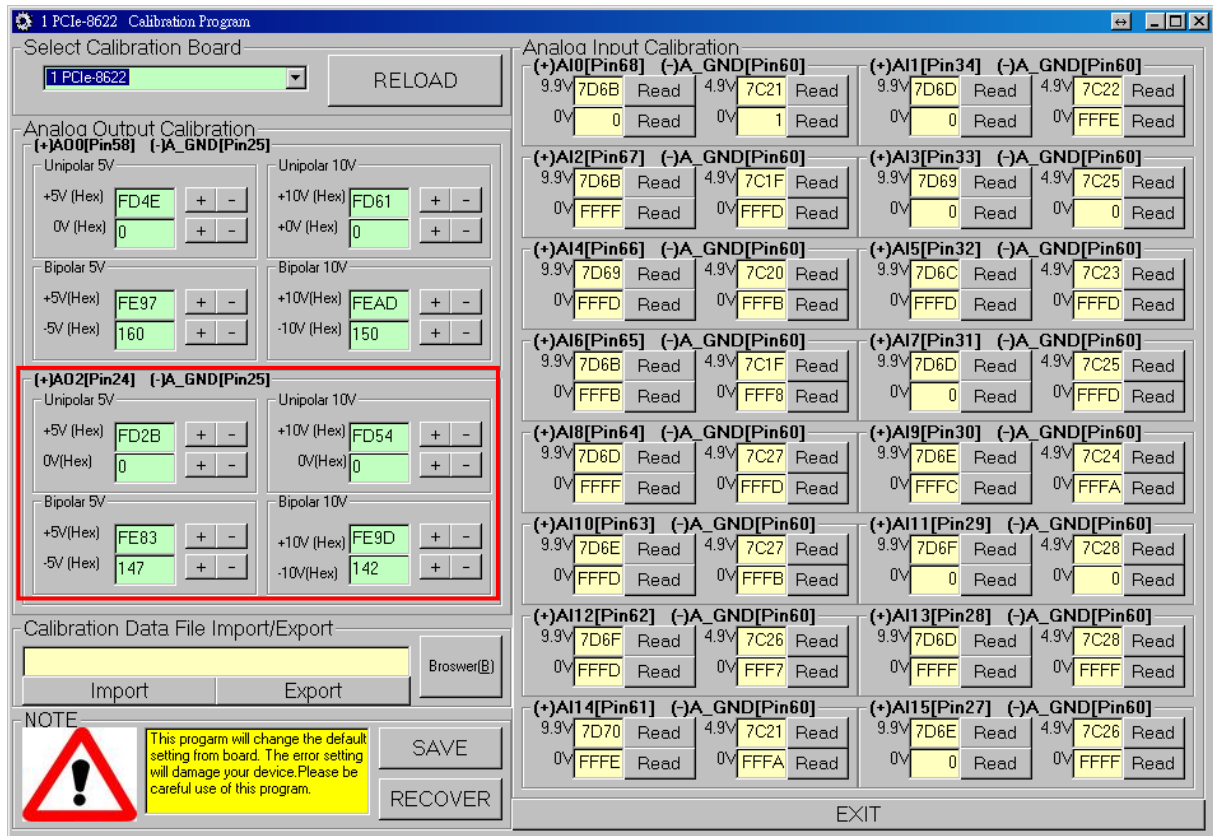
Step 3: Calibrate the Unipolar 5 V, Unipolar 10 V, Bipolar 5 V and Bipolar 10 V for Analog Output Channel 0

- (1) Use button “+” or “-” and adjust output voltage to voltage 5 V.
- (2) Use button “+” or “-” and adjust output voltage to voltage 0 V.
- (3) Use button “+” or “-” and adjust output voltage to voltage 10 V.
- (4) Use button “+” or “-” and adjust output voltage to voltage 0 V.
- (5) Use button “+” or “-” and adjust output voltage to voltage 5 V.
- (6) Use button “+” or “-” and adjust output voltage to voltage -5 V.
- (7) Use button “+” or “-” and adjust output voltage to voltage 10 V.
- (8) Use button “+” or “-” and adjust output voltage to voltage -10 V.



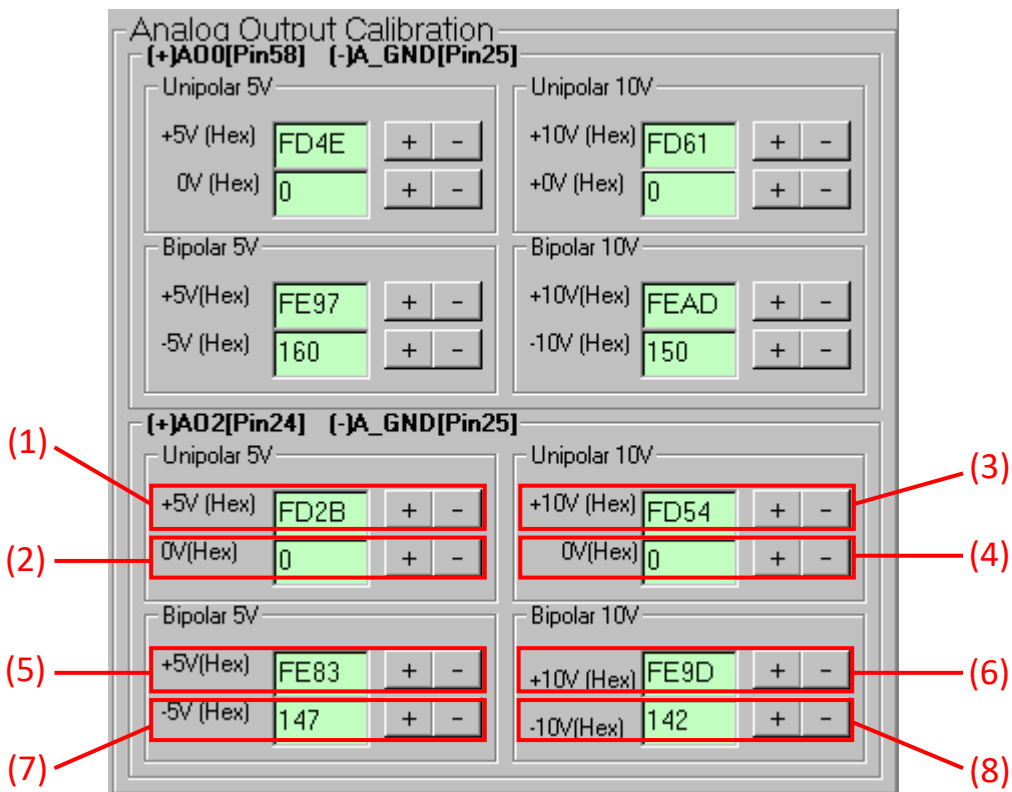
Step 4: Calibrate the Analog Output Channel 1

- (1) Connect the meter to measure the voltage from channel 1
- (2) Connect meter(+) to PCIe-8622.AO0 (Pin24)
- (3) Connect meter(-) to PCIe-8622.A_GND (Pin25)



Step 5: Calibrate the Unipolar 5 V, Unipolar 10 V, Bipolar 5 V and Bipolar 10 V for Analog Output Channel 1

- (1) Use button “+” or “-” and adjust output voltage to voltage 5 V.
- (2) Use button “+” or “-” and adjust output voltage to voltage 0 V.
- (3) Use button “+” or “-” and adjust output voltage to voltage 10 V.
- (4) Use button “+” or “-” and adjust output voltage to voltage 0 V.
- (5) Use button “+” or “-” and adjust output voltage to voltage 5 V.
- (6) Use button “+” or “-” and adjust output voltage to voltage -5 V.
- (7) Use button “+” or “-” and adjust output voltage to voltage 10 V.
- (8) Use button “+” or “-” and adjust output voltage to voltage -10 V.



Step 6: Calibrate the Analog Input Channel 0

- (1) Connect 9.9 V voltage source to PCIe-8622.AI0 (Pin68)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI0 (Pin68)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI0 (Pin68)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI0 (Pin68)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read		(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read	
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read		(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read	
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read		(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read	
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read		(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read	
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read		(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read	
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read		(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read	
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read		(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read	
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read		(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read	

Step 7: Calibrate the Analog Input Channel 1

- (1) Connect 9.9 V voltage source to PCIe-8622.AI1 (Pin34)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI1 (Pin34)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI1 (Pin34)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI1 (Pin34)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read		(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read	
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read		(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read	
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read		(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read	
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read		(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read	
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read		(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read	
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read		(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read	
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read		(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read	
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read		(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read	

Step 8: Calibrate the Analog Input Channel 2

- (1) Connect 9.9 V voltage source to PCIe-8622.AI2 (Pin67)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI2 (Pin67)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI2 (Pin67)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI2 (Pin67)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read	(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read	(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read	(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read	(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read	(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read	(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read	(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read	(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read

Step 9: Calibrate the Analog Input Channel 3

- (1) Connect 9.9 V voltage source to PCIe-8622.AI3 (Pin33)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI3 (Pin33)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI3 (Pin33)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI3 (Pin33)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read	(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read	(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read	(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read	(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read	(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read	(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read	(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read	(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read

Step 10: Calibrate the Analog Input Channel 4

- (1) Connect 9.9 V voltage source to PCIe-8622.AI4 (Pin66)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI4 (Pin66)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI4 (Pin66)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI4 (Pin66)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read	(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read	(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read	(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read	(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read	(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read	(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read	(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read	(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read

Step 11: Calibrate the Analog Input Channel 5

- (1) Connect 9.9 V voltage source to PCIe-8622.AI5 (Pin32)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI5 (Pin32)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI5 (Pin32)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI5 (Pin32)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read	(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read	(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read	(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read	(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read	(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read	(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read	(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read	(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read

Step 12: Calibrate the Analog Input Channel 6

- (1) Connect 9.9 V voltage source to PCIe-8622.AI6 (Pin65)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI6 (Pin65)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI6 (Pin65)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI6 (Pin65)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read	(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read	(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read	(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read	(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read	(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read	(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read	(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read	(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read

Step 13: Calibrate the Analog Input Channel 7

- (1) Connect 9.9 V voltage source to PCIe-8622.AI7 (Pin31)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI7 (Pin31)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI7 (Pin31)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI7 (Pin31)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read	(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read	(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read	(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read	(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read	(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read	(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read	(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read	(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read

Step 14: Calibrate the Analog Input Channel 8

- (1) Connect 9.9 V voltage source to PCIe-8622.AI8 (Pin64)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI8 (Pin64)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI8 (Pin64)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI8 (Pin64)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read	(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read	(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read	(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read	(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read	(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read	(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read	(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read	(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read

Step 15: Calibrate the Analog Input Channel 9

- (1) Connect 9.9 V voltage source to PCIe-8622.AI9 (Pin30)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI9 (Pin30)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI9 (Pin30)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI9 (Pin30)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read	(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read	(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read	(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read	(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read	(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read	(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read	(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read	(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read

Step 16: Calibrate the Analog Input Channel 10

- (1) Connect 9.9 V voltage source to PCIe-8622.AI10 (Pin63)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI10 (Pin63)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI10 (Pin63)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI10 (Pin63)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read		(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read	
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read		(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read	
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read		(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read	
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read		(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read	
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read		(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read	
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read		(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read	
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read		(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read	
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read		(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read	

Step 17: Calibrate the Analog Input Channel 11

- (1) Connect 9.9 V voltage source to PCIe-8622.AI11 (Pin29)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI11 (Pin29)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI11 (Pin29)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI11 (Pin29)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read		(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read	
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read		(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read	
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read		(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read	
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read		(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read	
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read		(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read	
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read		(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read	
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read		(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read	
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read		(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read	

Step 18: Calibrate the Analog Input Channel 12

- (1) Connect 9.9 V voltage source to PCIe-8622.AI12 (Pin62)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI12 (Pin62)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI12 (Pin62)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI12 (Pin62)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60]		(+)AI1[Pin34] (-)A_GND[Pin60]	
9.9V 7D6B Read	4.9V 7C21 Read	9.9V 7D6D Read	4.9V 7C22 Read
0V 0 Read	0V 1 Read	0V 0 Read	0V FFFE Read
(+)AI2[Pin67] (-)A_GND[Pin60]		(+)AI3[Pin33] (-)A_GND[Pin60]	
9.9V 7D6B Read	4.9V 7C1F Read	9.9V 7D69 Read	4.9V 7C25 Read
0V FFFF Read	0V FFFD Read	0V 0 Read	0V 0 Read
(+)AI4[Pin66] (-)A_GND[Pin60]		(+)AI5[Pin32] (-)A_GND[Pin60]	
9.9V 7D69 Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFD Read	0V FFFB Read	0V FFFD Read	0V FFFD Read
(+)AI6[Pin65] (-)A_GND[Pin60]		(+)AI7[Pin31] (-)A_GND[Pin60]	
9.9V 7D6B Read	4.9V 7C1F Read	9.9V 7D6D Read	4.9V 7C25 Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V FFFD Read
(+)AI8[Pin64] (-)A_GND[Pin60]		(+)AI9[Pin30] (-)A_GND[Pin60]	
9.9V 7D6D Read	4.9V 7C27 Read	9.9V 7D6E Read	4.9V 7C24 Read
0V FFFF Read	0V FFFD Read	0V FFFC Read	0V FFFA Read
(+)AI10[Pin63] (-)A_GND[Pin60]		(+)AI11[Pin29] (-)A_GND[Pin60]	
9.9V 7D6E Read	4.9V 7C27 Read	9.9V 7D6F Read	4.9V 7C28 Read
0V FFFD Read	0V FFFB Read	0V 0 Read	0V 0 Read
(+)AI12[Pin62] (-)A_GND[Pin60]		(+)AI13[Pin28] (-)A_GND[Pin60]	
9.9V 7D6F Read	4.9V 7C26 Read	9.9V 7D6D Read	4.9V 7C28 Read
0V FFFD Read	0V FFF7 Read	0V FFFF Read	0V FFFF Read
(+)AI14[Pin61] (-)A_GND[Pin60]		(+)AI15[Pin27] (-)A_GND[Pin60]	
9.9V 7D70 Read	4.9V 7C21 Read	9.9V 7D6E Read	4.9V 7C26 Read
0V FFFE Read	0V FFFA Read	0V 0 Read	0V FFFF Read

Step 19: Calibrate the Analog Input Channel 13

- (1) Connect 9.9 V voltage source to PCIe-8622.AI13 (Pin28)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI13 (Pin28)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI13 (Pin28)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI1 (Pin28)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read		(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read	
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read		(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read	
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read		(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read	
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read		(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read	
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read		(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read	
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read		(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read	
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read		(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read	
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read		(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read	

Step 20: Calibrate the Analog Input Channel 14

- (1) Connect 9.9 V voltage source to PCIe-8622.AI14 (Pin61)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI14 (Pin61)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI14 (Pin61)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI14 (Pin61)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read		(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read	
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read		(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read	
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read		(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read	
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read		(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read	
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read		(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read	
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read		(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read	
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read		(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read	
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read		(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read	

Step 21: Calibrate the Analog Input Channel 15

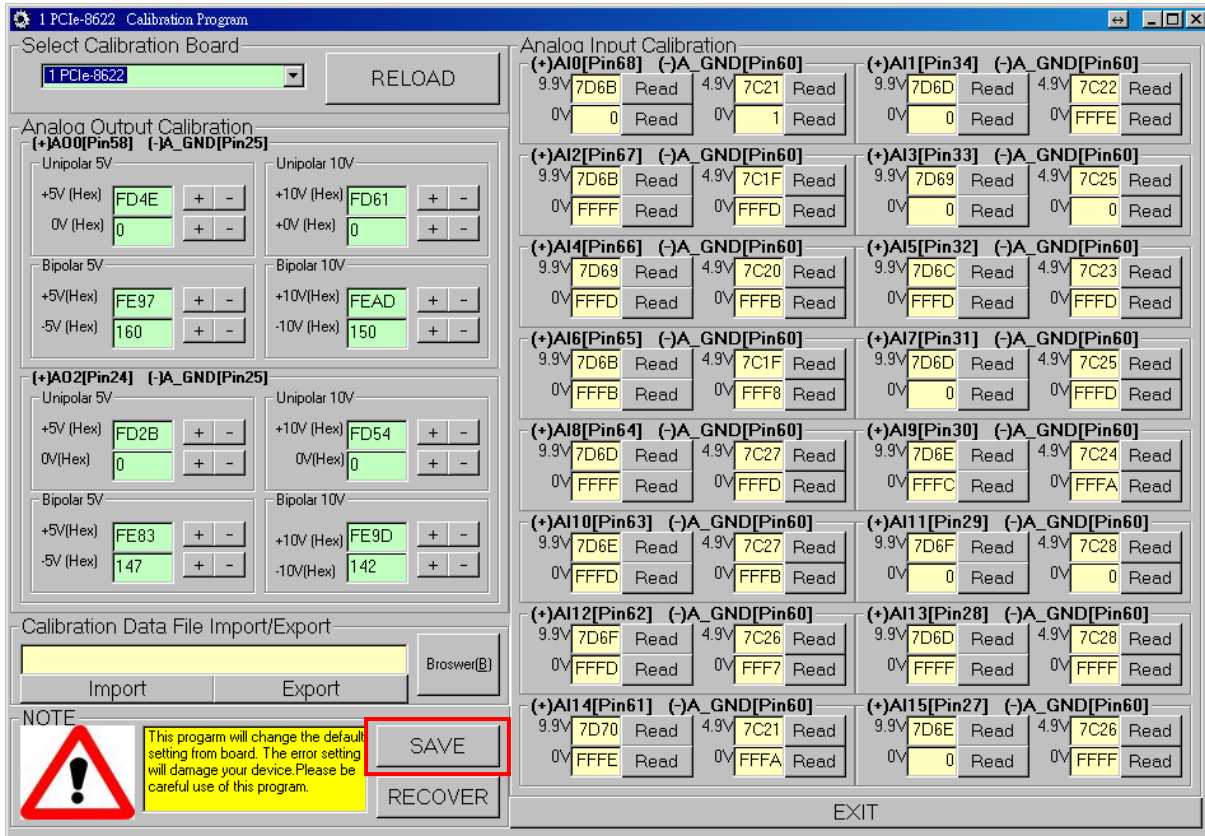
- (1) Connect 9.9 V voltage source to PCIe-8622.AI15 (Pin27)
- (2) Connect GND source to PCIe-8622.A_GND (Pin60)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8622.AI15 (Pin27)
- (5) Connect GND source to PCIe-8622.A_GND (Pin60)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8622.AI15 (Pin27)
- (8) Connect GND source to PCIe-8622.A_GND (Pin60)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8622.AI15 (Pin27)
- (11) Connect GND source to PCIe-8622.A_GND (Pin60)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin68] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C21 Read 0V 0 Read 0V 1 Read		(+)AI1[Pin34] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C22 Read 0V 0 Read 0V FFFE Read	
(+)AI2[Pin67] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFF Read 0V FFFD Read		(+)AI3[Pin33] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C25 Read 0V 0 Read 0V 0 Read	
(+)AI4[Pin66] (-)A_GND[Pin60] 9.9V 7D69 Read 4.9V 7C20 Read 0V FFFD Read 0V FFFB Read		(+)AI5[Pin32] (-)A_GND[Pin60] 9.9V 7D6C Read 4.9V 7C23 Read 0V FFFD Read 0V FFFD Read	
(+)AI6[Pin65] (-)A_GND[Pin60] 9.9V 7D6B Read 4.9V 7C1F Read 0V FFFB Read 0V FFF8 Read		(+)AI7[Pin31] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C25 Read 0V 0 Read 0V FFFD Read	
(+)AI8[Pin64] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C27 Read 0V FFFF Read 0V FFFD Read		(+)AI9[Pin30] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C24 Read 0V FFFC Read 0V FFFA Read	
(+)AI10[Pin63] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C27 Read 0V FFFD Read 0V FFFB Read		(+)AI11[Pin29] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C28 Read 0V 0 Read 0V 0 Read	
(+)AI12[Pin62] (-)A_GND[Pin60] 9.9V 7D6F Read 4.9V 7C26 Read 0V FFFD Read 0V FFF7 Read		(+)AI13[Pin28] (-)A_GND[Pin60] 9.9V 7D6D Read 4.9V 7C28 Read 0V FFFF Read 0V FFFF Read	
(+)AI14[Pin61] (-)A_GND[Pin60] 9.9V 7D70 Read 4.9V 7C21 Read 0V FFFE Read 0V FFFA Read		(+)AI15[Pin27] (-)A_GND[Pin60] 9.9V 7D6E Read 4.9V 7C26 Read 0V 0 Read 0V FFFF Read	

Step 22: Save Calibrate Data

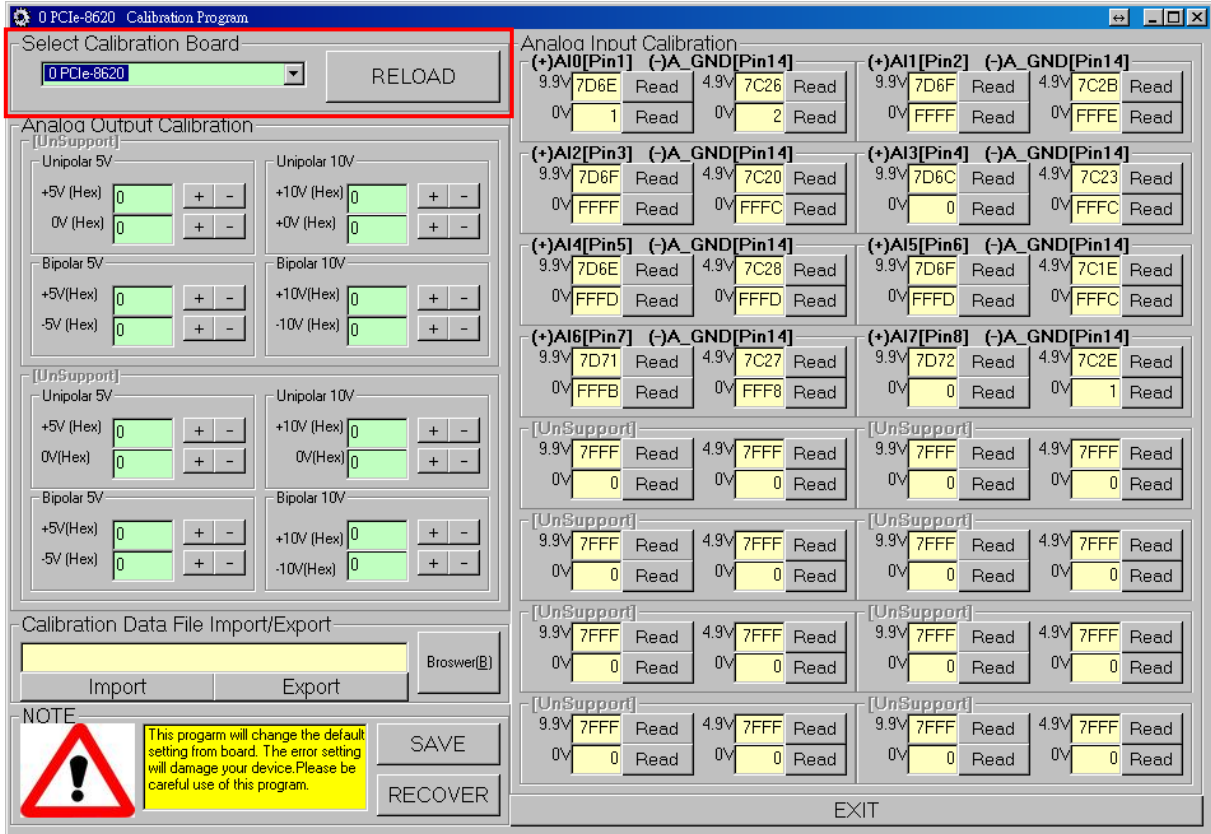
(1) Click “SAVE” button



7.2.2 PCIe-8620 Calibration Step

Step 1: Select calibration board

- (1) Select “1 PCIe-8620” from the “Select Calibration Board” drop-down menu.
- (2) Click the “RELOAD” button.



Step 2: Calibrate the Analog Input Channel 0

- (1) Connect 9.9 V voltage source to PCIe-8620.AI0 (Pin1)
- (2) Connect GND source to PCIe-8620.A_GND (Pin14)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8620.AI0 (Pin1)
- (5) Connect GND source to PCIe-8620.A_GND (Pin14)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8620.AI0 (Pin1)
- (8) Connect GND source to PCIe-8620.A_GND (Pin14)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8620.AI0 (Pin1)
- (11) Connect GND source to PCIe-8620.A_GND (Pin14)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin1] (-)A_GND[Pin14]		(+)AI1[Pin2] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C26 Read	9.9V 7D6F Read	4.9V 7C2B Read
0V 1 Read	0V 2 Read	0V FFFF Read	0V FFFE Read
(+)AI2[Pin3] (-)A_GND[Pin14]		(+)AI3[Pin4] (-)A_GND[Pin14]	
9.9V 7D6F Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFF Read	0V FFFC Read	0V 0 Read	0V FFFC Read
(+)AI4[Pin5] (-)A_GND[Pin14]		(+)AI5[Pin6] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C28 Read	9.9V 7D6F Read	4.9V 7C1E Read
0V FFFD Read	0V FFFD Read	0V FFFD Read	0V FFFC Read
(+)AI6[Pin7] (-)A_GND[Pin14]		(+)AI7[Pin8] (-)A_GND[Pin14]	
9.9V 7D71 Read	4.9V 7C27 Read	9.9V 7D72 Read	4.9V 7C2E Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V 1 Read

Step 3: Calibrate the Analog Input Channel 1

- (1) Connect 9.9 V voltage source to PCIe-8620.AI1 (Pin2)
- (2) Connect GND source to PCIe-8620.A_GND (Pin14)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8620.AI1 (Pin2)
- (5) Connect GND source to PCIe-8620.A_GND (Pin14)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8620.AI1 (Pin2)
- (8) Connect GND source to PCIe-8620.A_GND (Pin14)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8620.AI1 (Pin2)
- (11) Connect GND source to PCIe-8620.A_GND (Pin14)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin1] (-)A_GND[Pin14]		(+)AI1[Pin2] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C26 Read	9.9V 7D6F Read	4.9V 7C2B Read
0V 1 Read	0V 2 Read	0V FFFF Read	0V FFFE Read
(+)AI2[Pin3] (-)A_GND[Pin14]		(+)AI3[Pin4] (-)A_GND[Pin14]	
9.9V 7D6F Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFF Read	0V FFFC Read	0V 0 Read	0V FFFC Read
(+)AI4[Pin5] (-)A_GND[Pin14]		(+)AI5[Pin6] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C28 Read	9.9V 7D6F Read	4.9V 7C1E Read
0V FFFD Read	0V FFFD Read	0V FFFD Read	0V FFFC Read
(+)AI6[Pin7] (-)A_GND[Pin14]		(+)AI7[Pin8] (-)A_GND[Pin14]	
9.9V 7D71 Read	4.9V 7C27 Read	9.9V 7D72 Read	4.9V 7C2E Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V 1 Read

Step 4: Calibrate the Analog Input Channel 2

- (1) Connect 9.9 V voltage source to PCIe-8620.AI2 (Pin3)
- (2) Connect GND source to PCIe-8620.A_GND (Pin14)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8620.AI2 (Pin3)
- (5) Connect GND source to PCIe-8620.A_GND (Pin14)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8620.AI2 (Pin3)
- (8) Connect GND source to PCIe-8620.A_GND (Pin14)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8620.AI2 (Pin3)
- (11) Connect GND source to PCIe-8620.A_GND (Pin14)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin1] (-)A_GND[Pin14]		(+)AI1[Pin2] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C26 Read	9.9V 7D6F Read	4.9V 7C2B Read
0V 1 Read	0V 2 Read	0V FFFF Read	0V FFFE Read
(+)AI2[Pin3] (-)A_GND[Pin14]		(+)AI3[Pin4] (-)A_GND[Pin14]	
9.9V 7D6F Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFF Read	0V FFFC Read	0V 0 Read	0V FFFC Read
(+)AI4[Pin5] (-)A_GND[Pin14]		(+)AI5[Pin6] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C28 Read	9.9V 7D6F Read	4.9V 7C1E Read
0V FFFD Read	0V FFFD Read	0V FFFD Read	0V FFFC Read
(+)AI6[Pin7] (-)A_GND[Pin14]		(+)AI7[Pin8] (-)A_GND[Pin14]	
9.9V 7D71 Read	4.9V 7C27 Read	9.9V 7D72 Read	4.9V 7C2E Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V 1 Read

Step 5: Calibrate the Analog Input Channel 3

- (1) Connect 9.9 V voltage source to PCIe-8620.AI3 (Pin4)
- (2) Connect GND source to PCIe-8620.A_GND (Pin14)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8620.AI3 (Pin4)
- (5) Connect GND source to PCIe-8620.A_GND (Pin14)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8620.AI3 (Pin4)
- (8) Connect GND source to PCIe-8620.A_GND (Pin14)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8620.AI3 (Pin4)
- (11) Connect GND source to PCIe-8620.A_GND (Pin14)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin1] (-)A_GND[Pin14]		(+)AI1[Pin2] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C26 Read	9.9V 7D6F Read	4.9V 7C2B Read
0V 1 Read	0V 2 Read	0V FFFF Read	0V FFFE Read
(+)AI2[Pin3] (-)A_GND[Pin14]		(+)AI3[Pin4] (-)A_GND[Pin14]	
9.9V 7D6F Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFF Read	0V FFFC Read	0V 0 Read	0V FFFC Read
(+)AI4[Pin5] (-)A_GND[Pin14]		(+)AI5[Pin6] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C28 Read	9.9V 7D6F Read	4.9V 7C1E Read
0V FFFD Read	0V FFFD Read	0V FFFD Read	0V FFFC Read
(+)AI6[Pin7] (-)A_GND[Pin14]		(+)AI7[Pin8] (-)A_GND[Pin14]	
9.9V 7D71 Read	4.9V 7C27 Read	9.9V 7D72 Read	4.9V 7C2E Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V 1 Read

Step 6: Calibrate the Analog Input Channel 4

- (1) Connect 9.9 V voltage source to PCIe-8620.AI4 (Pin5)
- (2) Connect GND source to PCIe-8620.A_GND (Pin14)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8620.AI4 (Pin5)
- (5) Connect GND source to PCIe-8620.A_GND (Pin14)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8620.AI4 (Pin5)
- (8) Connect GND source to PCIe-8620.A_GND (Pin14)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8620.AI4 (Pin5)
- (11) Connect GND source to PCIe-8620.A_GND (Pin14)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin1] (-)A_GND[Pin14]		(+)AI1[Pin2] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C26 Read	9.9V 7D6F Read	4.9V 7C2B Read
0V 1 Read	0V 2 Read	0V FFFF Read	0V FFFE Read
(+)AI2[Pin3] (-)A_GND[Pin14]		(+)AI3[Pin4] (-)A_GND[Pin14]	
9.9V 7D6F Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFF Read	0V FFFC Read	0V 0 Read	0V FFFC Read
(+)AI4[Pin5] (-)A_GND[Pin14]		(+)AI5[Pin6] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C28 Read	9.9V 7D6F Read	4.9V 7C1E Read
0V FFFD Read	0V FFFD Read	0V FFFD Read	0V FFFC Read
(+)AI6[Pin7] (-)A_GND[Pin14]		(+)AI7[Pin8] (-)A_GND[Pin14]	
9.9V 7D71 Read	4.9V 7C27 Read	9.9V 7D72 Read	4.9V 7C2E Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V 1 Read

Step 7: Calibrate the Analog Input Channel 5

- (1) Connect 9.9 V voltage source to PCIe-8620.AI5 (Pin6)
- (2) Connect GND source to PCIe-8620.A_GND (Pin14)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8620.AI5 (Pin6)
- (5) Connect GND source to PCIe-8620.A_GND (Pin14)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8620.AI5 (Pin6)
- (8) Connect GND source to PCIe-8620.A_GND (Pin14)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8620.AI5 (Pin6)
- (11) Connect GND source to PCIe-8620.A_GND (Pin14)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin1] (-)A_GND[Pin14]		(+)AI1[Pin2] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C26 Read	9.9V 7D6F Read	4.9V 7C2B Read
0V 1 Read	0V 2 Read	0V FFFF Read	0V FFFE Read
(+)AI2[Pin3] (-)A_GND[Pin14]		(+)AI3[Pin4] (-)A_GND[Pin14]	
9.9V 7D6F Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFF Read	0V FFFC Read	0V 0 Read	0V FFFC Read
(+)AI4[Pin5] (-)A_GND[Pin14]		(+)AI5[Pin6] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C28 Read	9.9V 7D6F Read	4.9V 7C1E Read
0V FFFD Read	0V FFFD Read	0V FFFD Read	0V FFFC Read
(+)AI6[Pin7] (-)A_GND[Pin14]		(+)AI7[Pin8] (-)A_GND[Pin14]	
9.9V 7D71 Read	4.9V 7C27 Read	9.9V 7D72 Read	4.9V 7C2E Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V 1 Read

Step 8: Calibrate the Analog Input Channel 6

- (1) Connect 9.9 V voltage source to PCIe-8620.AI6 (Pin7)
- (2) Connect GND source to PCIe-8620.A_GND (Pin14)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8620.AI6 (Pin7)
- (5) Connect GND source to PCIe-8620.A_GND (Pin14)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8620.AI6 (Pin7)
- (8) Connect GND source to PCIe-8620.A_GND (Pin14)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8620.AI6 (Pin7)
- (11) Connect GND source to PCIe-8620.A_GND (Pin14)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin1] (-)A_GND[Pin14]		(+)AI1[Pin2] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C26 Read	9.9V 7D6F Read	4.9V 7C2B Read
0V 1 Read	0V 2 Read	0V FFFF Read	0V FFFE Read
(+)AI2[Pin3] (-)A_GND[Pin14]		(+)AI3[Pin4] (-)A_GND[Pin14]	
9.9V 7D6F Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFF Read	0V FFFC Read	0V 0 Read	0V FFFC Read
(+)AI4[Pin5] (-)A_GND[Pin14]		(+)AI5[Pin6] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C28 Read	9.9V 7D6F Read	4.9V 7C1E Read
0V FFFD Read	0V FFFD Read	0V FFFD Read	0V FFFC Read
(+)AI6[Pin7] (-)A_GND[Pin14]		(+)AI7[Pin8] (-)A_GND[Pin14]	
9.9V 7D71 Read	4.9V 7C27 Read	9.9V 7D72 Read	4.9V 7C2E Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V 1 Read

Step 9: Calibrate the Analog Input Channel 7

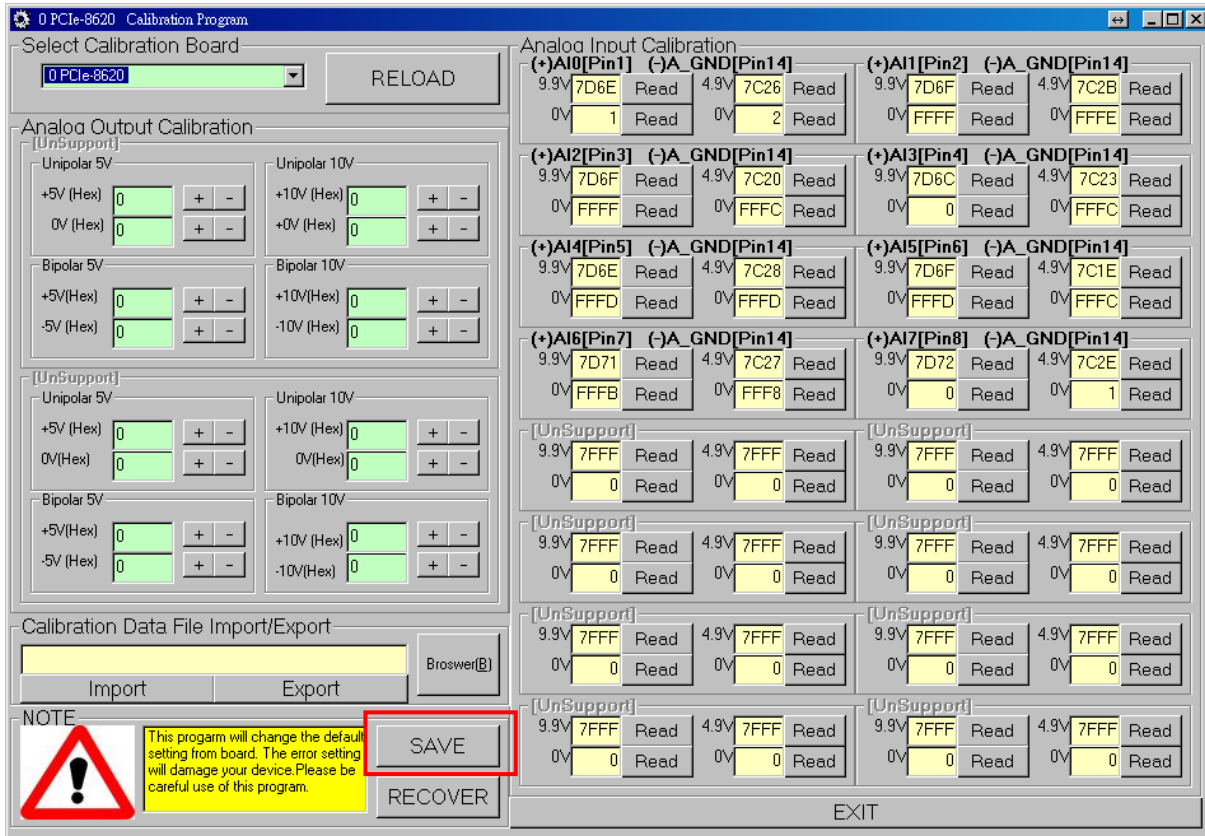
- (1) Connect 9.9 V voltage source to PCIe-8620.AI7 (Pin8)
- (2) Connect GND source to PCIe-8622.A_GND (Pin14)
- (3) Click **“Read”** button to get hexadecimal value
- (4) Connect 0 V voltage source to PCIe-8620.AI7 (Pin8)
- (5) Connect GND source to PCIe-8622.A_GND (Pin14)
- (6) Click **“Read”** button to get hexadecimal value
- (7) Connect 4.9 V voltage source to PCIe-8620.AI7 (Pin8)
- (8) Connect GND source to PCIe-8622.A_GND (Pin14)
- (9) Click **“Read”** button to get hexadecimal value
- (10) Connect 0 V voltage source to PCIe-8620.AI7 (Pin8)
- (11) Connect GND source to PCIe-8622.A_GND (Pin14)
- (12) Click **“Read”** button to get hexadecimal value

Analog Input Calibration

(+)AI0[Pin1] (-)A_GND[Pin14]		(+)AI1[Pin2] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C26 Read	9.9V 7D6F Read	4.9V 7C2B Read
0V 1 Read	0V 2 Read	0V FFFF Read	0V FFFE Read
(+)AI2[Pin3] (-)A_GND[Pin14]		(+)AI3[Pin4] (-)A_GND[Pin14]	
9.9V 7D6F Read	4.9V 7C20 Read	9.9V 7D6C Read	4.9V 7C23 Read
0V FFFF Read	0V FFFC Read	0V 0 Read	0V FFFC Read
(+)AI4[Pin5] (-)A_GND[Pin14]		(+)AI5[Pin6] (-)A_GND[Pin14]	
9.9V 7D6E Read	4.9V 7C28 Read	9.9V 7D6F Read	4.9V 7C1E Read
0V FFFD Read	0V FFFD Read	0V FFFD Read	0V FFFC Read
(+)AI6[Pin7] (-)A_GND[Pin14]		(+)AI7[Pin8] (-)A_GND[Pin14]	
9.9V 7D71 Read	4.9V 7C27 Read	9.9V 7D72 Read	4.9V 7C2E Read
0V FFFB Read	0V FFF8 Read	0V 0 Read	0V 1 Read

Step 10: Save Calibrate Data

(1) Click “SAVE” button



8 Windows API Function

For more details regarding the Windows API Functions for the PCIe-8620/8622 Series board, refer to UniDAQ SDK User manual, which can be downloaded from:



CD:\NAPDOS\PCI\UniDAQ\Manual

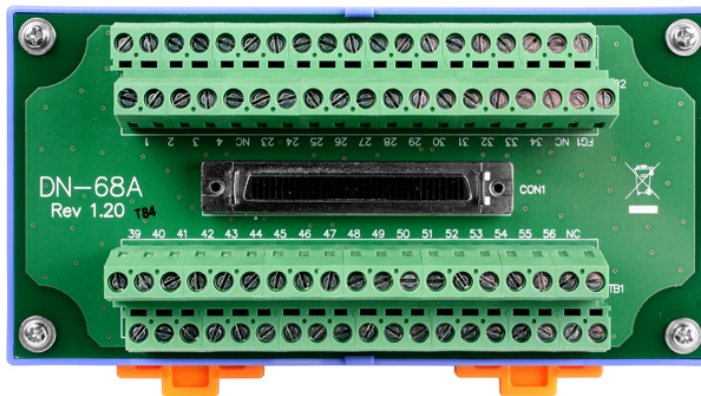
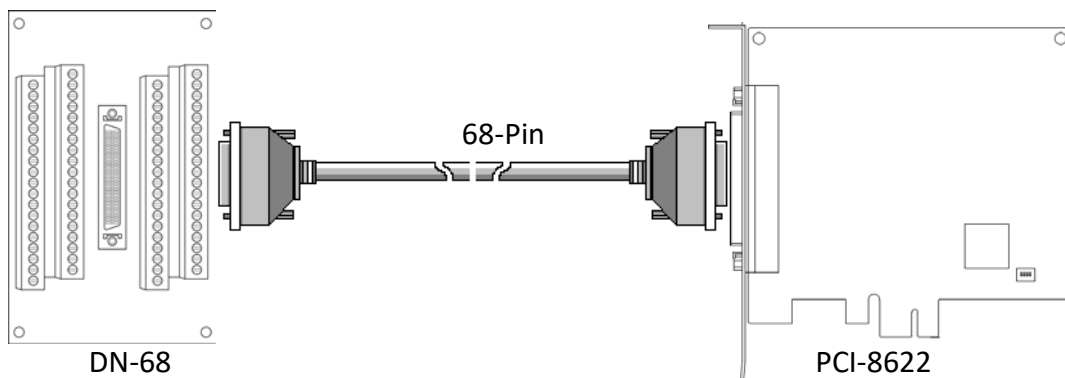


<http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/unidaq/manual/>

Appendix: Daughter Boards

DN-68A

The DN-68A is a general-purpose DIN-Rail mountable daughter board containing female 68 pin D-sub I/O Connectors and is designed to allow easy field wiring connections.

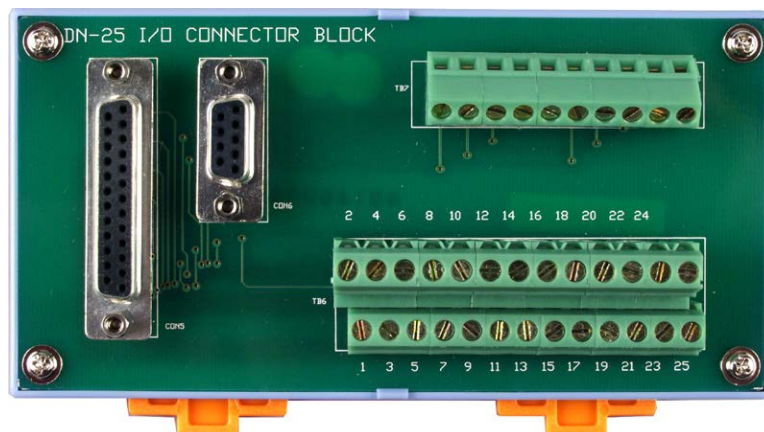
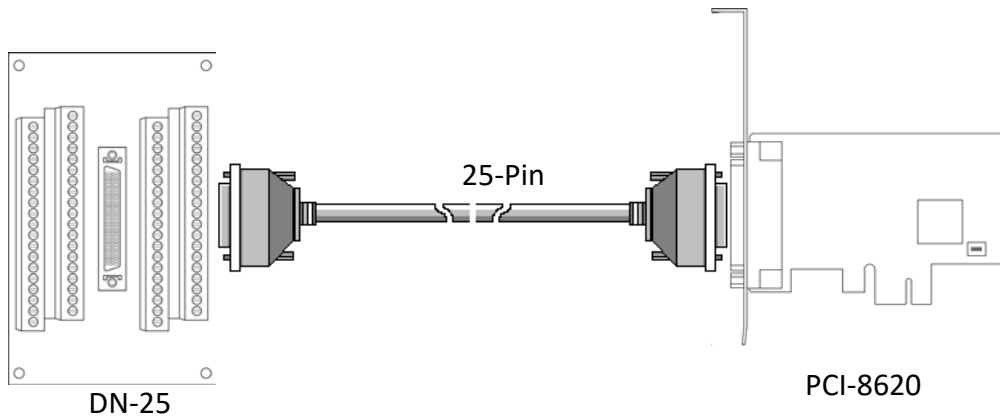


Pins 01 to 68 on the DN-68A daughter board are connected to the CON1 connector on the PCIe-8620/8622 using a 68-pin male-male cable.

The FG on the DN-68A is connected to the shielding wire of the 68-pin cable.

DN-25

The DN-25 is a general-purpose DIN-Rail mountable daughter board containing female 25 pin D-sub I/O Connectors and is designed to allow easy field wiring connections.



Pins 01 to 25 on the DN-25 daughter board are connected to the CON1 connector on the PCI-8620 using a 25-pin male-male cable.

The FG on the DN-25 is connected to the shielding wire of the 25-pin cable.