PCI9103

User's Manual

Beijing ART Technology Development Co., Ltd.

Contents

Chapter 1 Overview

In the fields of Real-time Signal Processing, Digital Image Processing and others, high-speed and high-precision data acquisition modules are demanded. ART PCI9103 data acquisition module, which brings in advantages of similar products that produced in china and other countries, is convenient for use and has low cost and stably high performance.

ART PCI9103 is an Arbitrary-waveform generator board based on PCI bus. It can be directly inserted into IBM-PC/AT or a computer which is compatible with PCI9103. It can be used as signal generating source in a variety of fields such as the laboratory, product quality testing center and so on.

Technical Characteristic

- 32-bit PCI Bus, support PCI2.2 protocol and achieve plug and play
- The design of FPGA Interface CMOS chip has the utmost confidentiality, especially suit OEM cooperation with our partners.

Unpacking Checklist

Check the shipping carton for any damage. If the shipping carton and contents are damaged, notify the local dealer or sales for a replacement. Retain the shipping carton and packing material for inspection by the dealer.
Check for the following items in the package. If there are any missing items, contact your local dealer or sales.

- PCI9103 Data Acquisition Board
- ART Disk
  a) user's manual (pdf)
  b) drive
  c) catalog
- Warranty Card

FEATURES

Analog Output

- Channel No.: 4-channel
- Output Range: ±10V, ±5V(default), ±2.5, 0~10V, 0~5V
- 12-bit resolution
- Sampling Rate: 1S/s~1.7MS/s (software-configurable)
- Analog Signals Bandwidth: 0~50KHz
- Analog Output Impedance: 50 Ω or 75 Ω(software-configurable)
- Trigger Source: software trigger, hardware trigger (ATR and DTR)
- Trigger Mode: single time, continuum, single step and emergency trigger
- Trigger Direction: negative, positive, positive and negative trigger
- Trigger Level: 0~10V (software setting)
- Clock Source: External Clock, Internal Clock(software-configurable)
- Memory Depth: each channel 256K word (point) RAM memory
- Working Sign: DA conversion flag, trigger flag, the current segment number, the current segment address, the current number of cycles, the current total number of cycles
- Data Transfer Mode: programmed mode

- Operating Temperature Range: 0℃~50℃
- Storage Temperature Range: -20℃~70℃

Digital Input/Output

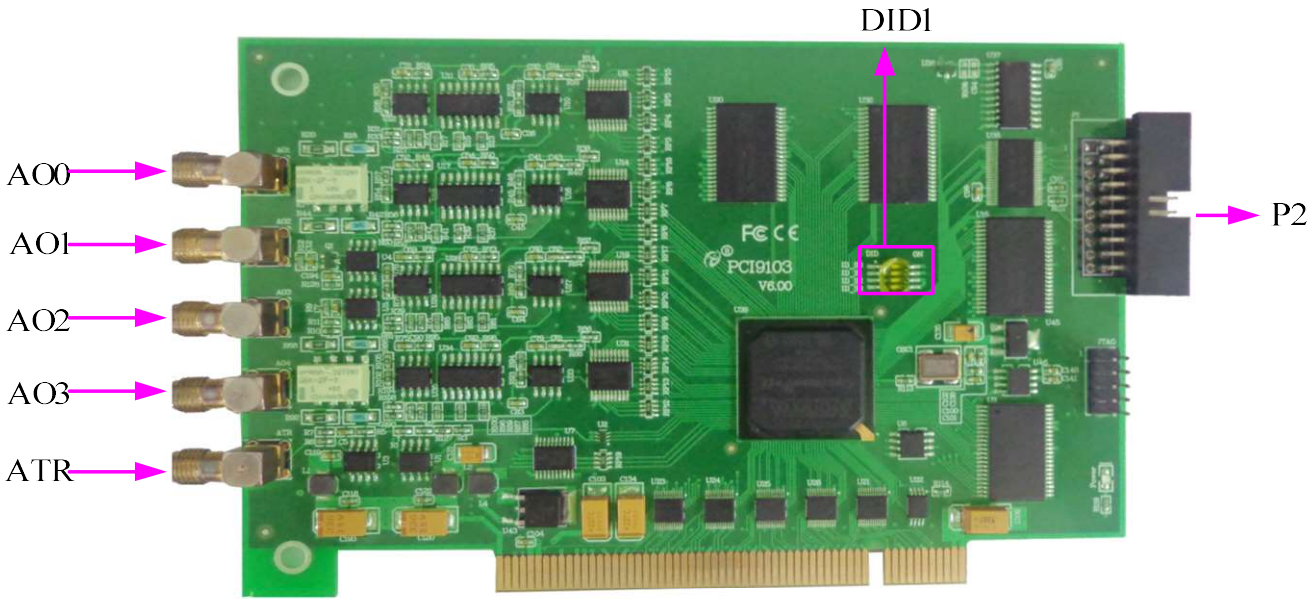
- Input Channel No.: 4-channel
- Output Channel No.: 4-channel
- Electric Standard: TTL compatible
- Input Voltage Range: high voltage≧2V, low voltage≦0.8V
- Output Voltage Range: high voltage≧3.7V, low voltage≦0.55V

Other Features

- Board Clock Oscillation: 40MHz
- Board Dimensions: 130mm (L) * 91mm (W)

Chapter 2 Components Layout Diagram and a Brief Description

2.1 The Main Component Layout Diagram



2.2 The Function Description for the Main Component

2.2.1 Signal Input and Output Connectors

AO0~AO3: analog signal output port.
ATR: external analog trigger signal input port.
P2: external digital trigger signal, clock input/output and on/off port.

2.2.2 Physical ID of DIP Switch

DID1: Set physical ID number. When the PC is installed more than one PCI9103 , you can use the DIP switch to set a physical ID number for each board, which makes it very convenient for users to distinguish and visit each board in the progress of the hardware configuration and software programming. The following four-place numbers are expressed by the binary system: When DIP switch points to "ON", that means "1", and when it points to the other side, that means "0." As they are shown in the following diagrams: place "ID3" is the high bit."ID0" is the low bit, and the black part in the diagram represents the location of the switch. (Test softwares of the company often use the logic ID management equipments and at this moment the physical ID DIP switch is invalid. If you want to use more than one kind of the equipments in one and the same system at the same time, please use the physical ID as much as possible. As for the differences between logic ID and physical ID, please refer to the function explanations of "CreateDevice" and "CreateDeviceEx" of ***The Prototype Explanation of Device Object Management Function*** in ***PCI9103S*** software specification

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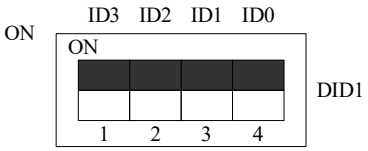
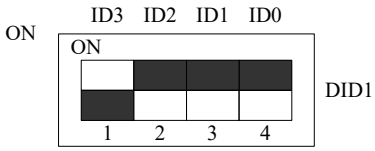


The above chart shows"1111", so it means that the physical ID is 15.



The above chart shows"0111", so it means that the physical ID is 7.

The above chart shows"0101", so it means that the physical ID is 5.

ID3	ID2	ID1	ID0	Physical ID（Hex）	Physical ID（Dec）
OFF（0）	OFF（0）	OFF（0）	OFF（0）	0	0
OFF（0）	OFF（0）	OFF（0）	ON（1）	1	1
OFF（0）	OFF（0）	ON（1）	OFF（0）	2	2
OFF（0）	OFF（0）	ON（1）	ON（1）	3	3
OFF（0）	ON（1）	OFF（0）	OFF（0）	4	4
OFF（0）	ON（1）	OFF（0）	ON（1）	5	5
OFF（0）	ON（1）	ON（1）	OFF（0）	6	6
OFF（0）	ON（1）	ON（1）	ON（1）	7	7
ON（1）	OFF（0）	OFF（0）	OFF（0）	8	8
ON（1）	OFF（0）	OFF（0）	ON（1）	9	9
ON（1）	OFF（0）	ON（1）	OFF（0）	A	10
ON（1）	OFF（0）	ON（1）	ON（1）	B	11
ON（1）	ON（1）	OFF（0）	OFF（0）	C	12
ON（1）	ON（1）	OFF（0）	ON（1）	D	13
ON（1）	ON（1）	ON（1）	OFF（0）	E	14
ON（1）	ON（1）	ON（1）	ON（1）	F	15

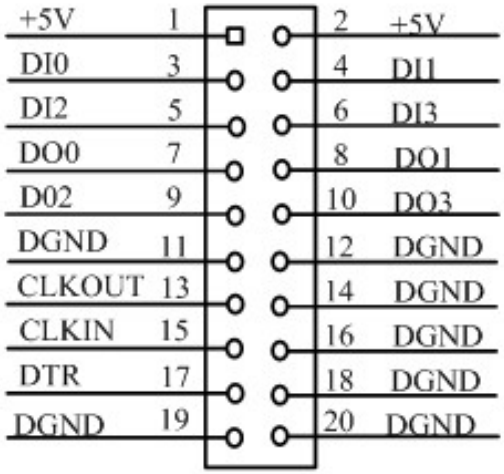
Chapter 3 Signal Connectors

3.1 The Definition of Signal Output Connectors

There are five signal ports in the side of the PCI9103, AO0, AO1, AO2, AO3, ATR signal ports, AO0, AO1, AO2, AO3 are analog signal output ports, and ART is external analog trigger signal input port.

3.2 Trigger Signal, Clock Input/Output and Digital Input/Output Connector

20 core plug P2 pin definition



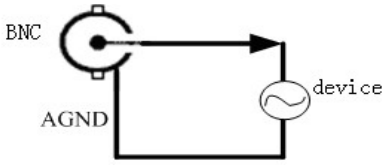
Pin definition

Pin name	Type	Pin function definition
DI0~DI3	Input	Digital signal input pin, the reference ground is DGND
DO0~DO3	Output	Digital signal output pin, the reference ground is DGND
DGND	GND	Digital ground
CLKOUT	Output	Internal clock output pin
CLKIN	Input	External clock input pin
+5V	Power	+5V power output
DTR	Input	External digital trigger signal input pin, the reference ground is DGND.

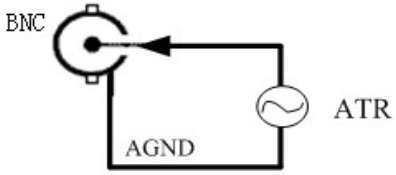
Chapter 4 Connection Ways for Each Signal

4.1 BNC Interface Connection

The method to connect DA analog output signals AO0~AO3



The method to connect external analog trigger signal (ATR)



If use ART BNC down-lead to connect with output or input signals, please keep in mind that the red port is output/ input signals, the black port is ground.

4.2 Signal Connection

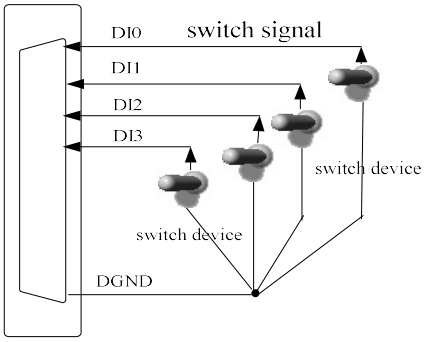


Figure 4.2.1 digital signal input connection

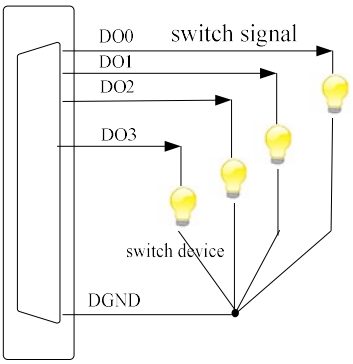


Figure 4.2.2 digital signal output connection

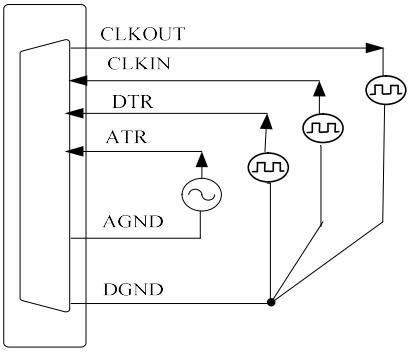


Figure 4.2.3 Clock Input/Output and Trigger Signal Connect

Chapter 5 The Instruction of Trigger and Clock Functions

5.1 The Instruction of the DA Trigger Function

Refer to the trigger part of the PCI 9103 Software Instruction

5.2 Methods of using DA Internal and External Clock Function

5.2.1 Internal Clock Function of DA

Internal Clock Function refers to the use of on-board clock oscillator and the clock signals which are produced by the user-specified frequency to trigger the DA conversion regularly. Its maximum value up to the frequency of the DA chip, and its minimum value is one thirty-second of the on-board clock. So it can playback the waveform stored in SRAM slowly. To use the clock function, the hardware parameters ADPara.ClockSource = PCI9103 _CLOCKSRC_IN should be installed in the software. The frequency of the clock in the software depends on the hardware parameters ADPara.Frequency. For example, if Frequency = 100000, that means the rate of output points is 100 KHz.

5.2.2 External Clock Function of DA

External Clock Function refers to the use of the outside clock signals to trigger the DA conversion regularly. The clock signals are provide by the CLKIN pin of the CN1 connector. To use the external clock function, the hardware parameters ADPara.ClockSource = PCI9103_CLOCKSRC_OUT should be installed in the software. In the external clock mode, the clocks of DA refreshing and waveform data reading are the same as the external clock.

Chapter 6 Notes, Calibration and Warranty Policy

6.1 Notes

In our products' packing, user can find a user manual, a PCI9103 module and a quality guarantee card. Users must keep quality guarantee card carefully, if the products have some problems and need repairing, please send products together with quality guarantee card to ART, we will provide good after-sale service and solve the problem as quickly as we can.

When using PCI9103, in order to prevent the IC (chip) from electrostatic harm, please do not touch IC (chip) in the front panel of PCI9103 module.

6.2 Analog Signal Output Calibration

The product has been calibrated when it is released from the factory. Only when customers use it for a long time, or when customers need to calibrate according to their needs, can they calibrate them, and customers can calibrate them according to the following methods.

The calibration function of PCI9103 requires the calibration of zero and fullness with the help of a high-precision multimeter (best for 4 bits and a higher precision). An example of the calibration process of the AO0 channel in the range of the 5V range shows that the other range and channel are calibrated.

Multimeter select 20V DC voltage gear, the multimeter the red pen is connected to the AO0 connector on the board, the avonmeter black pen from AO0 AGND.

1. zero point calibration

In the advanced program of the card, under the device calibration menu, click the start calibration button, output channel to select AO0, output range to choose + 5V, then click "zero calibration" button to see if the reading of multimeter is 0.

If reading is 0, the zero is accurate, does not require calibration; if reading is not 0, you can fill in the a value between 0~255 in the "calibration value" in the text box, you can also use the calibration value below the text box to drag calibration value changes, the measured output the value of the variable is 0.00V.(to ensure that the zero point is more accurate, the "DC voltage 200mV" can also be selected by the multimeter.)

2. Fullness calibration

After the zero point calibration is completed, click the "full degree calibration" button to see if the reading number of the multimeter is 4.998V of the full range of the range. If the reading is 4.998V, the full degree is accurate without calibration. If the reading number is not 4.998V, then the calibration value can be gradually increased or reduced with the calibration value below the text box, so that the output measurement value will be changed to 4.998V.

3. Calibration test

After the zero and full calibration is completed, click the "stop calibration" button to start the calibration test.

Select the range of + 5V, set the output voltage or code value (range [0 to 4095]), also use drag bar to change output value, then use multimeter to measure output value. The measured value should be the same as set value.

6.3 Warranty Policy

Thank you for choosing ART. To understand your rights and enjoy all the after-sales services we offer, please read the

following carefully.

1. Before using ART products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: www.art-control.com.

2. All ART products come with a limited two-year warranty:

- The warranty period starts on the day the product is shipped from ART factory
- For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ART is not responsible for any loss of data.
- Please ensure the use of properly licensed software with our systems. ART does not condone the use of pirated software and will not service systems using such software. ART will not be held legally responsible for products shipped with unlicensed software installed by the user.

3. Our repair service is not covered by ART guarantee in the following situations:

- Damage caused by not following instructions in the User's Manual.
- Damage caused by carelessness on the user's part during product transportation.
- Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals).
- Damage from improper repair by unauthorized ART technicians.
- Products with altered and/or damaged serial numbers are not entitled to our service.

4. Customers are responsible for shipping costs to transport damaged products to our company or sales office.

5. To ensure the speed and quality of product repair, please download an RMA application form from our company website.

Products Rapid Installation and Self-check

Rapid Installation

Product-driven procedure is the operating system adaptive installation mode. After inserting the disc, you can select the appropriate board type on the pop-up interface, click the button【driver installation】; or select CD-ROM drive in Resource Explorer, locate the product catalog and enter into the APP folder, and implement Setup.exe file. After the installation, pop-up CD-ROM, shut off your computer, insert the PCI card. If it is a USB product, it can be directly inserted into the device. When the system prompts that it finds a new hardware, you do not specify a drive path, the operating system can automatically look up it from the system directory, and then you can complete the installation.

Self-check

At this moment, there should be installation information of the installed device in the Device Manager (when the device does not work, you can check this item.). Open "Start -> Programs -> ART Demonstration Monitoring and Control System -> Corresponding Board -> Advanced Testing Presentation System", the program is a standard testing procedure. Based on the specification of Pin definition, connect the signal acquisition data and test whether AD is normal or not. Connect the input pins to the corresponding output pins and use the testing procedure to test whether the switch is normal or not.

Delete Wrong Installation

When you select the wrong drive, or viruses lead to driver error, you can carry out the following operations: In Resource Explorer, open CD-ROM drive, run Others-> SUPPORT-> PCI.bat procedures, and delete the hardware information that relevant to our boards, and then carry out the process of section I all over again, we can complete the new installation.