

ART2753

User's Manual



Beijing ART Technology Development Co., Ltd.

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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. ART2753 data acquisition module, which brings in advantages of similar products that produced in China and other countries, is convenient for use, high cost and stable performance.

ART2753 is a data acquisition module based on PC104 bus. It can be directly connected with PC104 interface of computer to constitute the laboratory, product quality testing center and systems for different areas of data acquisition, waveform analysis and processing. It may also constitute the monitoring system for industrial production process.

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.

- ART2753 Data Acquisition Board
- User's Manual
- Warranty Card

FEATURES

AD analog input

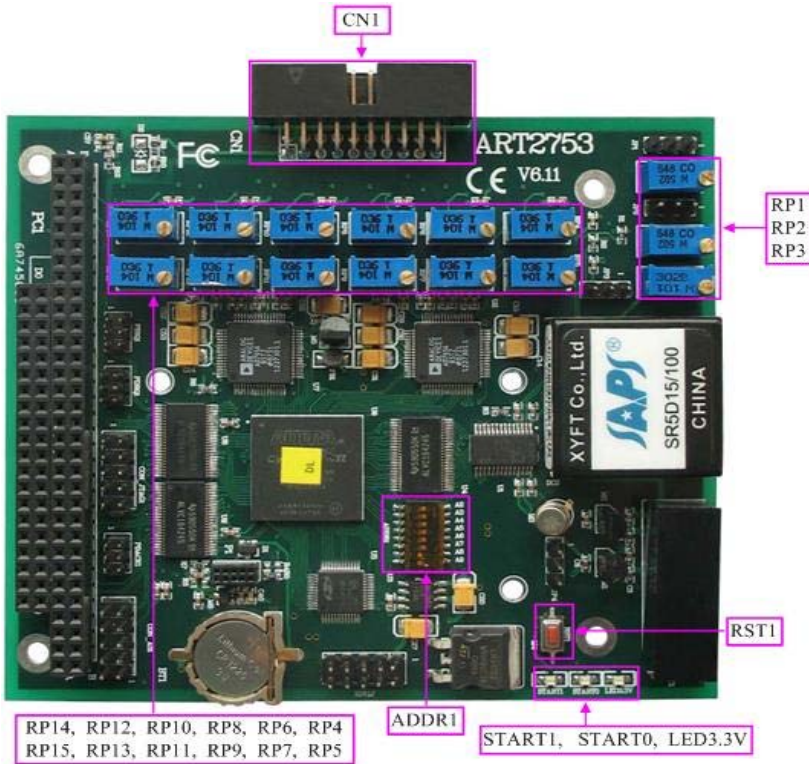
- Input Range: $\pm 10V$, $\pm 5V$
- 16-bit resolution
- Sampling Rate: 10Hz~10KHz
- Analog Input Mode: 12SE
- Data Read Mode: half-full inquiry mode
- Memory Depth: 8K word FIFO memory
- Memory Signs: half-full and overflow
- Trigger Mode: software trigger, hardware trigger, GPS trigger (external trigger)
- Trigger Source: EXCLK
- AD Conversion Time: $\leq 3\mu S$
- System Measurement Accuracy: 0.01%
- Operating Temperature Range: $0^{\circ}C \sim 55^{\circ}C$
- Storage Temperature Range: $-20^{\circ}C \sim 70^{\circ}C$

Other features

Base Address: 300H

Chapter 2 Components Layout Diagram and a Brief Description

2.1 The Main Components Layout Diagram



2.2 The Function Description for the Main Component

2.2.1 Signal Input and Output Connectors

CN1: signal input and output connector

P1: GPS interface

2.2.2 Potentiometer

RP1: analog signal IN1 input zero-point adjustment potentiometer

RP4: analog signal IN2 input zero-point adjustment potentiometer

RP7: analog signal IN3 input zero-point adjustment potentiometer

RP6: analog signal IN4 input zero-point adjustment potentiometer

RP9: analog signal IN5 input zero-point adjustment potentiometer

RP8: analog signal IN6 input zero-point adjustment potentiometer

RP11: analog signal IN7 input zero-point adjustment potentiometer

RP10: analog signal IN8 input zero-point adjustment potentiometer

RP13: analog signal IN13 input zero-point adjustment potentiometer

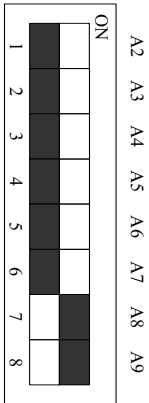
RP12: analog signal IN10 input zero-point adjustment potentiometer
RP15: analog signal IN15 input zero-point adjustment potentiometer
RP14: analog signal IN12 input zero-point adjustment potentiometer

2.2.3 Board Base Address Selection

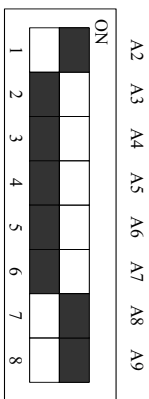
ADDR1: board base address DIP switches. Board base address can be set to binary code which from 200H to 3E0H be divided by 16, board base address defaults 300H, will occupy the base address of the date of 20 consecutive I/O addresses.

Switch No. 1 (A2) is to choose the type of embedded motherboards, when used in PC, dial this switch to "ON"; when used in ARM board, dial this switch to the other side. No. 2, 3 bits are reserved bits. No. 4, 5,6,7,8 correspond to address bits A5, A6, A7, A8, A9, are the base address of selector switch. Board base address selection is as follows: when the black box DIP switches dial to "ON" that means the high valid value is 1, the switch to the other side means low virtual value is 0.

ARM board default DIP switch settings are as follows: (base address 300)



PC default DIP switch settings are as follows: (base address 300)



If there are two ART2753, the base address of two cards at least interval 20 I/O addresses, for example, one of which is set to 300H, the other one can be set to 320H.

2.2.4 Reset Button

RST1: Red hardware reset button, the low-level makes the circuit board hardware reset

2.2.5 Status Light

LED3.3V: 3.3V power supply status light.

START0: FIFO writing status light. When the light is on, it shows that FIFO is writing.

START1: FIFO full status light. When the light is on, it shows that the FIFO is full.

Chapter 3 Signal Connectors

3.1 The Definition of Signal Connector

20-core plug on the CN1 pin definition

EIDI_COM	1	□	2	EXCLK
IN12	3	○	4	IN11
AGND	5	○	6	AGND
IN10	7	○	8	IN9
IN8	9	○	10	IN7
IN6	11	○	12	IN5
AGND	13	○	14	AGND
IN4	15	○	16	IN3
IN2	17	○	18	IN1
AO1	19	○	20	AO0

Pin definition about CN1:

Pin name	Type	Pin function definition
IN1-IN12	Input	Analog input, reference ground is AGND.
AGND	GND	Analog ground. This AGND pin should be connected to the system's AGND plane.
EXCLK	Input	External clock input, but also do external trigger signal input (5V TTL signal)
EIDI_COM	Output	The ground of external clock, but also do the ground of external trigger signal input signal
AO0~AO1	Output	Analog output pins, this function does not provide temporarily

Chapter 4 Connection Ways for Each Signal

4.1 AD Input Signal Connection Mode

4.1.1 AD Single-ended Input Connection Mode

Single-ended mode can achieve a signal input by one channel, and several signals use the common reference ground. This mode is widely applied in occasions of the small interference and relatively many channels.

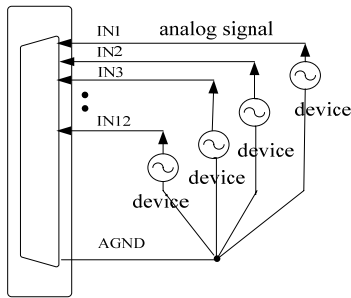


Figure 4.1.1 single-ended input connection

4.2 Other Connection Mode

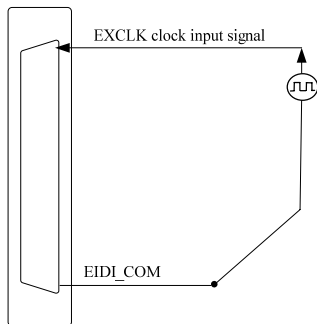


Figure 4.2.1 clock input signal connection

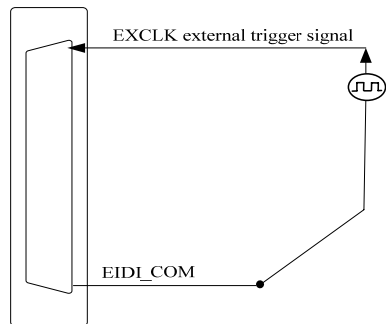


Figure 4.2.2 external trigger signal connection

Chapter 5 The Instruction of the AD Trigger Function

5.1 AD Internal Trigger Mode

In internal trigger mode, the user need not take any external signal, just set the software, you can realize sample.

5.2 AD External Trigger Mode

In external trigger mode, when calling the StartDeviceProAD function, AD will not immediately access to the conversion process but wait for the external trigger source signals accord with the condition, then start converting the data. It also can be interpreted as the hardware trigger. Trigger source is the digital trigger source signal.

5.3 GPS Trigger Mode

GPS trigger mode, GPS module shall be installed to the card and connected with GPS antenna. At the same time, select GPS Trigger Mode, then you can realize sample. In this way, it will be synchronization acquisition according to the second cycle of GPS satellite signals reading.

Chapter 6 Methods of using External Clock Function

6.1 External Clock Function

External Clock Function refers to the use of the outside clock signals to trigger the AD conversion regularly. The clock signals are provide by the EXCLK pin of the CN1 connector. External clock can be supplied by other devices, such as clock frequency generator, in continuous acquisition mode, AD conversion clock frequency and external clock frequency are the same.

Chapter 7 The Register Address Allocation Table

ART2753 register address allocation table

offset address	read operation	write operation
0x00	read FIFO data	16MHz reference clock, set range: 0x000000C8-0x00186A00 corresponds to 80kHz-10Hz
0x02	AD conversion frequency setting register, low 16 bit	
0x04	trigger mode control	D [1 .. 0] = 00: internal clock trigger mode, default this model, single-board synchronous acquisition; D [1 .. 0] = 01: external clock trigger mode, the boards received the same trigger signal to achieve synchronous acquisition cubicles; D [1 .. 0]: GPS trigger mode to achieve off-site synchronous acquisition.
0x06	Read FIFO Status D12-D0 effective words of FIFO D13=0 reserve D14=1 FIFO half-full flag D15=1 FIFO empty flag FIFO maximum space: 0-0x1FEE	D0=1 enable interrupts;D0=0 prohibition interrupt
0x08	AD enable control D0=0 prohibited sampling (default) D0=1 allow sampling	external trigger mode, AD enable bit needs external clock to trigger; AD_EN_buffer only saves user settings value. internal and GPS trigger mode, AD enable bit immediate effect when it is set.
0x0A	AD conversion frequency setting register, low 16 bit	send GPS time command D7-D0=0 single-refresh time D7-D0=1..255 refresh time
0x0C	GPS_FLAG_BYTE,GPS_SEC_BYTE	null
0x0E	GPS_HOUR_BYTE,GPS_MIN_BYTE	null
0x10	GPS_Satelite1,GPS_Satelite0	the number of visible satellites and satellite tracking
0x12	GPS_YEAR_HBYTE,GPS_YEAR_LBYTE	null
0x14	null	null
0x16	null	null
0x18	null	null
0x1A	null	null
0x1c	interrupt flag	null
0x1e	hardware version: Bit15-8:PCB; Bit7-0:HDL	null

Chapter8 Notes, Calibration and Warranty Policy

8.1 Notes

In our products' packing, user can find a user manual, a ART2753 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 ART2753, in order to prevent the IC (chip) from electrostatic harm, please do not touch IC (chip) in the front panel of ART2753 module.

8.2 AD Analog Signal Input Calibration

Every device has to be calibrated before sending from the factory. It is necessary to calibrate the module again if users want to after using for a period of time or changing the input range. ART2753 default input range: $\pm 10V$, in the manual, we introduce how to calibrate ART2753 in $\pm 10V$, calibrations of other input ranges are similar.

Prepare a digital voltage instrument which the resolution is more than 5.5 bit, install the ART2753 module, and then power on, warm-up for fifteen minutes.

Zero adjustment: select one channel of analog inputs, take the channel IN1 for example, connect 0V to IN1, and then run ART Data Acquisition Measurement Suite in the WINDOWS. Choose channel 1, $\pm 10V$ input range and start sampling, adjust potentiometer RP5 in order to make voltage value is 0.000V or about 0.000V. Zero adjustment of other channels is alike.

8.3 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's 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's 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's 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.